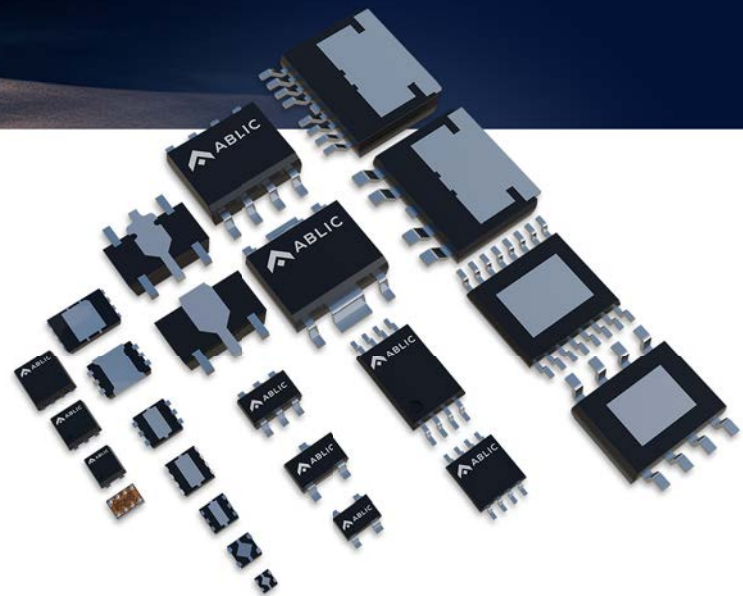


Product Catalog

Automotive Power Management ICs

2025



ABLIC Inc.

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Linear Regulators (LDO Regulators) (125°C)

Click the product name for more product information.

[Automotive Linear Regulators \(LDO Regulators\) on ablic.com](#)

I_{OUT} (mA)	Product / V_{IN} (V)					V_{OUT} (V)	I_{SS} (μ A)
	10V	20V	30V	40V	50V		
1000	S-19214					1.8 to 30	5.0
	S-19244					1.0 to 9.0	120
600	S-19701					3.3 to 20	80
500	S-19213					1.8 to 30	5.0
	S-19218					2.5 to 30	30
	S-19318					3.3, 5.0	3.0
	S-19506/7					3.3 to 5.0	3.0
	S-19509					3.3 to 5.0	3.2
	S-19516/7					3.3 to 5.0	3.0
400	S-19519					3.3 to 5.0	3.2
	S-19243					0.9 to 9.0	120
300	S-19312					3.0 to 5.3	60
	S-19502/3					3.0 to 5.3	60
	S-19700					3.3 to 20	80
250	S-19222					1.8 to 30	22
	S-19255					0.9 to 3.6	55
200	S-19212					2.5 to 16	6.5
	S-19317					3.3, 5.0	3.0
	S-19504/5					3.3 to 5.0	3.0
	S-19514/5					3.3 to 5.0	3.0
	S-19518					3.3 to 5.0	3.2
100	S-19721					—	40
	S-1142					2.0 to 12	4.0
	S-19200					2.0 to 15	4.0
50	S-19311					3.0 to 5.3	60
	S-19500/1					3.0 to 5.3	60
40	S-19720					—	30
	S-19310					2.9 to 5.3	2.2
	S-19315					1.0 to 5.3	2.0
	S-19316					1.0 to 5.3	2.0

Linear Regulators (LDO Regulators) (105°C)

Click the product name for more product information.

[Automotive Linear Regulators \(LDO Regulators\) on ablic.com](#)

I_{OUT} (mA)	Product / V_{IN} (V)					V_{OUT} (V)	I_{SS} (μ A)
	10V	20V	30V	40V	50V		
2000	S-19246					1.0 to 6.0	120
1000	S-19244					1.0 to 9.0	120
	S-19254					1.0 to 5.5	120
500	S-19243					0.9 to 9.0	120
	S-19253					1.0 to 5.5	120
250	S-19212					2.5 to 16	6.5
200	S-1142A/B					2.0 to 15	4.0
	S-1142C/D					2.0 to 15	4.0
	S-19200					2.0 to 15	4.0
150	S-19251					1.0 to 3.5	20
	S-19252					1.0 to 3.6	36

Voltage Trackers (125°C)

Click the product name for more product information.

[Automotive Voltage Trackers on ablic.com](https://www.ablic.com/automotive-voltage-trackers)

ΔV_{OUT} : Offset voltage

I_{SS1} : Current consumption during operation I_{SS2} : Current consumption during power-off

I_{OUT} (mA)	Product	V_{IN} (V)	ΔV_{OUT} (mV)	I_{SS1} (μ A)	I_{SS2} (μ A)
250	S-19721	10V - 40V	± 4.5	40	3.7
50	S-19720	10V - 40V	± 5	30	4.0

Voltage Detectors (Battery Monitoring & Reset ICs) (150°C)

Click the product name for more product information.

[Automotive Voltage Detectors on ablic.com](#)

[Single detection]

Type	Product	V_{DD} (V)	V_{UVDET} (V)	V_{OVDET} (V)	I_{SS} (μ A)
SENSE detection	S-19113	4.0 to 10	—	—	0.6
	S-19115	—	16 to 18	—	0.6
	S-19117/9	4.0 to 10	—	—	0.75

[Window detection]

Type	Product	V_{DD} (V)	V_{UVDET} (V)	V_{OVDET} (V)	I_{SS} (μ A)
SENSE detection	S-191E	4.0 to 10	16 to 18	—	0.9
	S-191L/N	4.0 to 10	16 to 18	—	0.9

Voltage Detectors (Battery Monitoring & Reset ICs) (125°C)

Click the product name for more product information.

[Automotive Voltage Detectors on ablic.com](https://www.ablic.com/en/automotive-voltage-detectors)

[Single detection]

Type	10V		20V		30V		40V		V _{UVDET} (V)	V _{OVDET} (V)	I _{SS} (μA)
	Product	/ V _{DD} (V)	Product	/ V _{DD} (V)	Product	/ V _{DD} (V)	Product	/ V _{DD} (V)			
SENSE detection	S-19110E to H		S-19110N to R		S-19113		S-19114		5.0 to 10	—	0.55
	S-19115		S-19117/9		S-19113		S-19114		3.0 to 4.95	—	0.55
	S-19122		S-19110A to D		S-19110J to M		S-19113		4.0 to 10	—	0.6
	S-19110A to D		S-19110J to M		S-19113		S-19114		4.0 to 12	—	2.0
	S-19110A to D		S-19110J to M		S-19113		S-19114		—	12.2 to 18	0.6
	S-19110A to D		S-19110J to M		S-19113		S-19114		4.0 to 10	—	0.75
	S-19110A to D		S-19110J to M		S-19113		S-19114		0.6 to 4.9	—	1.2
VDD detection	S-19100		S-19101		S-19400/1		S-19405		5.0 to 10	—	0.6
	S-19100		S-19101		S-19400/1		S-19405		3.6 to 4.95	—	0.6
	S-19100		S-19101		S-19400/1		S-19405		1.2 to 4.6	—	0.27
	S-19100		S-19101		S-19400/1		S-19405		1.2 to 4.6	—	0.27
	S-19100		S-19101		S-19400/1		S-19405		2.0 to 5.0	—	3.8
S-19100		S-19101		S-19400/1		S-19405		2.0 to 5.0	—	3.8	

[Window detection]

Type	10V		20V		30V		40V		V _{UVDET} (V)	V _{OVDET} (V)	I _{SS} (μA)
	Product	/ V _{DD} (V)	Product	/ V _{DD} (V)	Product	/ V _{DD} (V)	Product	/ V _{DD} (V)			
SENSE detection	S-191E		S-191L/N		S-191E		S-191L/N		4.0 to 10	16 to 18	0.9
	S-191A		S-191B		S-191E		S-191L/N		4.0 to 10	16 to 18	0.9
	S-191A		S-191B		S-191E		S-191L/N		0.6 to 4.9	0.7 to 5.5	1.5
	S-191A		S-191B		S-191E		S-191L/N		0.6 to 4.9	0.7 to 5.5	1.5

Voltage Detectors (Battery Monitoring & Reset ICs) (105°C)

Click the product name for more product information.

[Automotive Voltage Detectors on ablic.com](https://www.ablic.com/en/automotive/voltage-detectors)

[Single detection]

Type	Product / V _{DD} (V)	V _{UVDET} (V)	V _{OVDET} (V)	I _{SS} (μA)
SENSE detection	S-19110E to H	5.0 to 10	—	0.55
	S-19110N to R	3.0 to 4.95	—	0.55
	S-19113	4.0 to 10	—	0.6
	S-19115	—	16 to 18	0.6
	S-19117/9	4.0 to 10	—	0.75
	S-19102/8	1.0 to 5.0	—	0.5
	S-19103/9	1.0 to 5.0	—	0.5
	S-19104/6	1.0 to 5.0	—	0.5
	S-19105/7	1.0 to 5.0	—	0.5
	VDD detection	S-19110A to D	5.0 to 10	—
S-19110J to M		3.6 to 4.95	—	0.6
S-19100		1.2 to 4.6	—	0.27
S-19101		1.2 to 4.6	—	0.27

[Window detection]

Type	Product / V _{DD} (V)	V _{UVDET} (V)	V _{OVDET} (V)	I _{SS} (μA)
SENSE detection	S-191E	4.0 to 10	16 to 18	0.9
	S-191L/N	4.0 to 10	16 to 18	0.9

Watchdog Timers (125°C)

Click the product name for more product information.

[Automotive Watchdog Timer on ablic.com](https://www.ablic.com/en/automotive/watchdog-timer)

I_{OUT} (mA)	10V		20V		30V		40V	
	Product		/ V_{IN} (V)		V_{OUT} (V)		I_{SS} (μ A)	
500	S-19506/7		3.3 to 5.0		3.0			
	S-19509		3.3 to 5.0		3.2			
	S-19516/7		3.3 to 5.0		3.0			
	S-19519		3.3 to 5.0		3.2			
400	S-19502/3		3.0 to 5.3		60			
250	S-19504/5		3.3 to 5.0		3.0			
	S-19514/5		3.3 to 5.0		3.0			
	S-19518		3.3 to 5.0		3.2			
200	S-19500/1		3.0 to 5.3		60			
—	S-19400/1		—		3.8			
	S-19405		—		3.8			

Switching Regulators (DC-DC Converters) (125°C)

Click the product name for more product information.

[Automotive Switching Regulators \(DC-DC Converters\) on ablic.com](#)

[Step-down]

I_{OUT} (mA)	10V		20V		30V		40V		V_{OUT} (V)	Freq. (kHz)
	Product		V_{IN} (V)		Product		V_{IN} (V)			
1000	S-19914/5 A/B		20V		S-19904/5 A/B		30V		2.5 to 12	2200
	S-19944/5 A/B		20V		S-19904/5 A/B		30V		2.5 to 12	2200
	S-19934/5 A/B		20V		S-19904/5 A/B		30V		1.0 to 12	2200
	S-19954/5		20V		S-19904/5 A/B		30V		1.0 to 12	2200
600	S-19912/3 A/B		20V		S-19902/3 A/B		30V		2.5 to 12	2200
	S-19912/3 A/B		20V		S-19902/3 A/B		30V		2.5 to 12	2200
	S-19912/3 A/B		20V		S-19902/3 C/D		30V		2.5 to 12	400
	S-19942/3 A/B		20V		S-19902/3 A/B		30V		1.0 to 12	2200
	S-19932/3 A/B		20V		S-19902/3 A/B		30V		1.0 to 12	2200
	S-19932/3 C/D		20V		S-19902/3 C/D		30V		2.5 to 12	400
	S-19952/3		20V		S-19902/3 A/B		30V		0.8 to 3.3	2250

[Step-up]

I_{OUT} (mA)	10V		20V		30V		40V		V_{OUT} (V)	Freq. (kHz)
	Product		V_{IN} (V)		Product		V_{IN} (V)			
-	S-19980		20V		S-19980		30V		-	400, 2200
	S-19989		20V		S-19989		30V		6.8, 8.5	400, 2200
	S-19990		20V		S-19990		30V		-	400, 2200
	S-19999		20V		S-19999		30V		6.8, 8.5	400, 2200

Connection Diagnosis ICs (125°C)

Click the product name for more product information.

[Automotive Connection Diagnosis ICs on ablic.com](https://www.ablic.com/en/automotive-connection-diagnosis-ics)

[LDO]

I_{OUT} (mA)	10V	20V	30V	40V	V_{OUT} (V)	I_{SS} (μ A)
	Product		V_{IN} (V)			
600	S-19701				3.3 to 20	80
400	S-19700				3.3 to 20	80

[High side switch]

I_{OUT} (mA)	10V	20V	30V	40V	V_{OUT} (V)	I_{SS} (μ A)
	Product		V_{IN} (V)			
600	S-19683B				—	55
300	S-19682B				—	55
100	S-19680 *1				—	12

[Voltage tracker]

I_{OUT} (mA)	10V	20V	30V	40V	V_{OUT} (V)	I_{SS} (μ A)
	Product		V_{IN} (V)			
250	S-19721				—	40

*1: Only S-19680 operates up to 105°C.

Lithium-ion Battery Protection ICs / EDLC Protection ICs (105°C)

Click the product name for more product information.

[Automotive Lithium-ion Battery Protection ICs / EDLC Voltage Monitoring ICs on ablic.com](#)

Function	Number of cells			
	1-cell	6-cell	7-cell or more
Cell-balancing				
Overcharge detection	S-19190		S-19192	S-19193 ^{*1}
Overdischarge detection				

*1: Only S-19193 operates up to 125°C.

S-1142A/BxxH Series

HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION LOW DROPOUT 105°C OPERATION CMOS VOLTAGE REGULATOR

The S-1142A/BxxH Series, developed by using high-withstand voltage CMOS technology, is a positive voltage regulator with a high-withstand voltage, low current consumption, and high-accuracy output voltage.

The S-1142A/BxxH Series operates at a high maximum operating voltage of 50 V and a low current consumption of 4.0 μA typ. In addition to a built-in low on-resistance transistor which provides a very small dropout voltage and a large output current, this voltage regulator also has a built-in ON / OFF circuit.

An overcurrent protection circuit prevents the load current from exceeding the capacitance of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by heat.

A high heat radiation HSOP-6 package enables high-density mounting.

Caution Before using the product in automobile control unit or medical equipment, contact to ABLIC Inc. is indispensable.

■ Features

- Output voltage: 2.0 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 50 V
- Output voltage accuracy: $\pm 1.0\%$ ($T_j = +25^\circ\text{C}$)
 $\pm 3.0\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: During operation: 4.0 μA typ., 9.0 μA max. ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
During power-off: 0.1 μA typ., 2.5 μA max. ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output current: Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 2.0 \text{ V}$)*1
- Input and output capacitors: A ceramic capacitor of 0.1 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

*1. Attention should be paid to the power dissipation of the package when the output current is large.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance

■ Package

- HSOP-6

S-1142C/DxxA Series

HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION LOW DROPOUT CMOS VOLTAGE REGULATOR

The S-1142C/DxxA Series, developed by using high-withstand voltage CMOS technology, is a positive voltage regulator with a high-withstand voltage, low current consumption, and high-accuracy output voltage.

The S-1142C/DxxA Series operates at a high maximum operating voltage of 50 V and a low current consumption of 4.0 μA typ. In addition to a built-in low on-resistance transistor which provides a very small dropout voltage and a large output current, this voltage regulator also has a built-in ON / OFF circuit.

An overcurrent protection circuit prevents the load current from exceeding the capacitance of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by heat.

A high heat radiation HSOP-6 package enables high-density mounting.

Caution Before using the product in automobile control unit or medical equipment, contact to ABLIC Inc. is indispensable.

■ Features

- Output voltage: 2.0 V to 12.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 50 V
- Output voltage accuracy: $\pm 1.0\%$ ($T_j = +25^\circ\text{C}$)
 $\pm 4.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: During operation: 4.0 μA typ., 15.0 μA max. ($T_j = -40^\circ\text{C}$ to $+135^\circ\text{C}$)
During power-off: 0.1 μA typ., 3.5 μA max. ($T_j = -40^\circ\text{C}$ to $+135^\circ\text{C}$)
- Output current: Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 2.0 \text{ V}$)*¹
- Input and output capacitors: A ceramic capacitor of 0.1 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

*1. Attention should be paid to the power dissipation of the package when the output current is large.

■ Applications

- Constant-voltage power supply for application of vehicle interior electric equipment
- Constant-voltage power supply for home electric appliance

■ Package

- HSOP-6

S-1142C/DxxH Series

HIGH-WITHSTAND VOLTAGE LOW CURRENT CONSUMPTION LOW DROPOUT 105°C OPERATION CMOS VOLTAGE REGULATOR

The S-1142C/DxxH Series, developed by using high-withstand voltage CMOS technology, is a positive voltage regulator with a high-withstand voltage, low current consumption, and high-accuracy output voltage.

The S-1142C/DxxH Series operates at a high maximum operating voltage of 50 V and a low current consumption of 4.0 μ A typ. In addition to a built-in low on-resistance transistor which provides a very small dropout voltage and a large output current, this voltage regulator also has a built-in ON / OFF circuit.

An overcurrent protection circuit prevents the load current from exceeding the capacitance of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by heat.

A high heat radiation HSOP-6 package enables high-density mounting.

Caution Before using the product in automobile control unit or medical equipment, contact to ABLIC Inc. is indispensable.

■ Features

- Output voltage: 2.0 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 50 V
- Output voltage accuracy: $\pm 1.0\%$ ($T_j = +25^\circ\text{C}$)
 $\pm 3.0\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: During operation: 4.0 μ A typ., 9.0 μ A max. ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
During power-off: 0.1 μ A typ., 2.5 μ A max. ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output current: Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 2.0 \text{ V}$)*1
- Input and output capacitors: A ceramic capacitor of 0.1 μ F or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

*1. Attention should be paid to the power dissipation of the package when the output current is large.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance

■ Package

- HSOP-6

S-19200A/BxxA Series

AUTOMOTIVE, 125°C OPERATION, 50 V INPUT, 200 mA VOLTAGE REGULATOR

The S-19200A/BxxA Series, developed by using high-withstand voltage CMOS technology, is a positive voltage regulator with a high-withstand voltage, low current consumption, and high-accuracy output voltage.

The S-19200A/BxxA Series operates at a high maximum operation voltage of 50 V and a low current consumption of 4.0 μ A typ. In addition to a built-in low on-resistance transistor which provides a very small dropout voltage and a large output current, this voltage regulator also has a built-in ON / OFF circuit.

An overcurrent protection circuit prevents the load current from exceeding the current capacity of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by heat.

High heat radiation TO-252-5S(A) package enables high-density mounting.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 2.0 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 50 V
- Output voltage accuracy: $\pm 1.0\%$ ($T_j = +25^\circ\text{C}$)
 $\pm 4.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: During operation: 4.0 μ A typ., 15.0 μ A max. ($T_j = -40^\circ\text{C}$ to $+135^\circ\text{C}$)
During power-off: 0.1 μ A typ., 3.5 μ A max. ($T_j = -40^\circ\text{C}$ to $+135^\circ\text{C}$)
- Output current: Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 2.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 0.1 μ F or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 65 V load dump
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance

■ Package

- TO-252-5S(A)

S-19200A/BxxH Series

AUTOMOTIVE, 105°C OPERATION, 50 V INPUT, 200 mA VOLTAGE REGULATOR

The S-19200A/BxxH Series, developed by using high-withstand voltage CMOS technology, is a positive voltage regulator with a high-withstand voltage, low current consumption, and high-accuracy output voltage.

The S-19200A/BxxH Series operates at a high maximum operation voltage of 50 V and a low current consumption of 4.0 μ A typ. In addition to a built-in low on-resistance transistor which provides a very small dropout voltage and a large output current, this voltage regulator also has a built-in ON / OFF circuit.

An overcurrent protection circuit prevents the load current from exceeding the current capacity of the output transistor, and a built-in thermal shutdown circuit prevents damage caused by heat.

High heat radiation TO-252-5S(A) and HSOP-6 packages enable high-density mounting.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 2.0 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 50 V
- Output voltage accuracy: $\pm 1.0\%$ ($T_j = +25^\circ\text{C}$)
 $\pm 3.0\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: During operation: 4.0 μ A typ., 9.0 μ A max. ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
During power-off: 0.1 μ A typ., 2.5 μ A max. ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output current: Possible to output 200 mA ($V_{IN} \geq V_{OUT(S)} + 2.0 \text{ V}$)*1
- Input and output capacitors: A ceramic capacitor of 0.1 μ F or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Prevents damage caused by heat.
- Built-in ON / OFF circuit: Ensures long battery life.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 65 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance

■ Packages

- TO-252-5S(A)
- HSOP-6

S-19212B/DxxA Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 250 mA VOLTAGE REGULATOR

The S-19212B/DxxA Series, developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage, and has a built-in ON / OFF circuit.

The S-19212B/DxxA Series operates at the maximum operation voltage of 36 V and a low current consumption of 6.5 μ A typ., and has a built-in low on-resistance output transistor which provides a very small dropout voltage and a large output current.

Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

For more information regarding our thermal simulation service, contact our sales representatives.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 2.5 V to 16.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 36 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: During operation: 6.5 μ A typ., 8.5 μ A max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
During power-off: 0.1 μ A typ., 3.5 μ A max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output current: Possible to output 250 mA (at $V_{IN} \geq V_{OUT(S)} + 2.0\text{ V}$)*1
- Input capacitor: A ceramic capacitor can be used. (1.0 μ F or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μ F to 100 μ F)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 165°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function is available.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A
- HSOP-6
- SOT-89-5
- HTMSOP-8
- SOT-23-5

S-19212B/DxxH Series

AUTOMOTIVE, 105°C OPERATION, 36 V INPUT, 250 mA VOLTAGE REGULATOR

The S-19212B/DxxH Series, developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage, and has a built-in ON / OFF circuit.

The S-19212B/DxxH Series operates at the maximum operation voltage of 36 V and a low current consumption of 6.5 μ A typ., and has a built-in low on-resistance output transistor which provides a very small dropout voltage and a large output current.

Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

For more information regarding our thermal simulation service, contact our sales representatives.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 2.5 V to 16.0 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 36 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: During operation: 6.5 μ A typ., 8.5 μ A max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
During power-off: 0.1 μ A typ., 3.5 μ A max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output current: Possible to output 250 mA (at $V_{IN} \geq V_{OUT(S)} + 2.0\text{ V}$)*¹
- Input capacitor: A ceramic capacitor can be used. (1.0 μ F or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μ F to 100 μ F)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 165°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function is available.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*²

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A
- HSOP-6
- SOT-89-5
- HTMSOP-8
- SOT-23-5

S-19213 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA VOLTAGE REGULATOR

The S-19213 Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage.

The S-19213 Series operates at the maximum operation voltage of 36 V and a low current consumption of 5.0 μ A typ. and has a built-in low on-resistance output transistor, which provides a very small dropout voltage and a large output current. In addition to the type in which output voltage is set inside the IC, the type for which output voltage can be set via an external resistor is added to a lineup. Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

For more information regarding our thermal simulation service, contact our sales representatives.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (internally set): 1.8 V, 3.0 V, 3.3 V, 5.0 V, 8.0 V, 12.0 V
- Output voltage (externally set): 1.8 V to 30.0 V, settable via external resistor
- Input voltage: 2.8 V to 36.0 V
- Output voltage accuracy: $\pm 1.5\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: During operation: 5.0 μ A typ., 9.8 μ A max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
During power-off: 0.1 μ A typ., 2.0 μ A max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output current: Possible to output 500 mA (at $V_{IN} \geq V_{OUT(S)} + 1.0 \text{ V}$)^{*1}
- Input and output capacitors: A ceramic capacitor can be used. (1.0 μ F or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
(with a detection function of the difference between input and output voltage)
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function is available.
Pull-down function is available.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A

S-19214 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 1000 mA VOLTAGE REGULATOR

The S-19214 Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage.

The S-19214 Series operates at the maximum operation voltage of 36 V and a low current consumption of 5.0 μ A typ. and has a built-in low on-resistance output transistor, which provides a very small dropout voltage and a large output current. In addition to the type in which output voltage is set inside the IC, the type for which output voltage can be set via an external resistor is added to a lineup. Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

For more information regarding our thermal simulation service, contact our sales representatives.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (internally set): 1.8 V, 3.0 V, 3.3 V, 5.0 V, 8.0 V, 12.0 V
- Output voltage (externally set): 1.8 V to 30.0 V, settable via external resistor
- Input voltage: 2.8 V to 36.0 V
- Output voltage accuracy: $\pm 1.5\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: During operation: 5.0 μ A typ., 9.8 μ A max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
During power-off: 0.1 μ A typ., 2.0 μ A max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output current: Possible to output 1000 mA (at $V_{IN} \geq V_{OUT(S)} + 2.0\text{ V}$)*1
- Input and output capacitors: A ceramic capacitor can be used. (1.0 μ F or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
(with a detection function of the difference between input and output voltage)
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function is available.
Pull-down function is available.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A

S-19218 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, FAST TRANSIENT RESPONSE, VOLTAGE REGULATOR

The S-19218 Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage.

The S-19218 Series operates at the maximum operation voltage of 36 V and has a built-in low on-resistance output transistor, which provides a very small dropout voltage and a large output current. In addition, favorable transient response characteristics ensure stable output voltage even if the power supply voltage should be impacted by transient fluctuations. The regulator can be combined with a 0.1 μ F low-capacity input capacitor. The lineup has also been extended to include a model where the output voltage can be set using an external resistor in addition to the model where it is set inside the IC. Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

For more information regarding our thermal simulation service, contact our sales representatives.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (internally set): 2.5 V, 3.0 V, 3.3 V, 5.0 V, 8.0 V, 12.0 V
- Output voltage (externally set): 2.5 V to 30.0 V, settable via external resistor
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 1.5\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: During operation: 30.0 μA typ., 50.0 μA max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
During power-off: 0.1 μA typ., 2.0 μA max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output current: Possible to output 500 mA (at $V_{IN} \geq V_{OUT(S)} + 1.0 \text{ V}$)*¹
- Input capacitor: A ceramic capacitor can be used. (0.1 μF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μF or more)
- Fast transient response:
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
(with a detection function of the difference between input and output voltage)
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function is available.
Pull-down function is available.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*²

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A

S-19222xxxA Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 300 mA, FAST TRANSIENT RESPONSE, VOLTAGE REGULATOR

This IC developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with a high-withstand voltage, low current consumption and high-accuracy output voltage.

This IC operates at the maximum operation voltage of 36 V and has a built-in low on-resistance output transistor, which provides a very small dropout voltage and a large output current. In addition, favorable transient response characteristics ensure stable output voltage even if the power supply voltage should be impacted by transient fluctuations. The regulator can be combined with a 0.1 μF low-capacity input capacitor. The lineup has also been extended to include a model where the output voltage can be set using an external resistor in addition to the model where it is set inside the IC. Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

For more information regarding our thermal simulation service, contact our sales representatives.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (internally set): 1.8 V, 2.5 V, 3.0 V, 3.3 V, 5.0 V, 5.5 V, 6.0 V
- Output voltage (externally set): 1.8 V to 30.0 V, settable via external resistor
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 1.5\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: During operation: 22.0 μA typ., 40.0 μA max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
During power-off: 0.1 μA typ., 0.5 μA max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output current: Possible to output 300 mA (at $V_{\text{IN}} \geq V_{\text{OUT(S)}} + 2.0 \text{ V}$)*¹
- Ripple rejection: 75 dB typ. (at $f = 1.0 \text{ kHz}$)
- Input capacitor: A ceramic capacitor can be used. (0.1 μF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μF or more)
- Fast transient response:
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function is available.
Pull-down function is available.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*²

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A
- SOT-89-5
- HTMSOP-8
- SOT-23-5

S-19310 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 40 mA VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19310 Series, developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with the reset function, which has high-withstand voltage and low current consumption.

Regarding a release signal output in the reset function, the S-19310 Series enables delay time adjustment by an external capacitor. Output form of the reset function is selectable from Nch open-drain output or CMOS output.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 2.9 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Dropout voltage: 240 mV typ. ($V_{\text{OUT(S)}} = 5.0\text{ V}$, $I_{\text{OUT}} = 30\text{ mA}$)
- Output current: Possible to output 40 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 2.0\text{ V}$)*¹
- Input and output capacitors: A ceramic capacitor can be used. (1.0 μF or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor
- Built-in thermal shutdown circuit: Detection temperature 160°C typ.

Detector block

- Detection voltage: 2.6 V to $V_{\text{OUT(S)}} - 0.3\text{ V}$, selectable in 0.1 V step
- Operation voltage: A type: 1.8 V to 36.0 V
B type: 2.5 V to 36.0 V
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Hysteresis width selectable from "Available" / "Unavailable": "Available": $5.0\% \leq V_{\text{HYS}} \leq 30.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
"Unavailable": $V_{\text{HYS}} = 0\%$
- Release delay time accuracy: $\pm 20\%$ ($C_D = 3.3\text{ nF}$, $T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output form: Nch open-drain output
CMOS output

Overall

- Current consumption: 2.2 μA typ. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*²

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply and reset circuit for automotive electric component
- Power supply and reset circuit for low-current battery-powered device

■ Packages

- SOT-89-5
- HTMSOP-8
- SOT-23-5

S-19311 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 200 mA VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19311 Series, developed by using high-withstand voltage CMOS technology, is a positive voltage regulator with the reset function, which has high-withstand voltage and high-accuracy output voltage. This IC has a built-in low on-resistance output transistor which provides a small dropout voltage and a large output current. Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. High heat radiation TO-252-5S(A) and HSOP-8A packages enable high-density mounting.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.0 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 4.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 120 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 200 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 2.2 μF or more can be used.
- Ripple rejection: 70 dB typ. ($f = 100$ Hz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: ± 100 mV ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 18 ms typ. ($C_{\text{DLY}} = 47$ nF)

Overall

- Current consumption: During operation: 60 μA typ., 95 μA max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply and reset circuit for automotive electric component
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A

S-19312 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 400 mA VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19312 Series, developed by using high-withstand voltage CMOS technology, is a positive voltage regulator with the reset function, which has high-withstand voltage and high-accuracy output voltage. This IC has a built-in low on-resistance output transistor which provides a small dropout voltage and a large output current. Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. High heat radiation TO-252-5S(A) and HSOP-8A packages enable high-density mounting.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.0 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 4.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 120 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 400 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 2.2 μF or more can be used.
- Ripple rejection: 70 dB typ. ($f = 100$ Hz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: ± 100 mV ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 18 ms typ. ($C_{\text{DLY}} = 47$ nF)

Overall

- Current consumption: During operation: 60 μA typ., 95 μA max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply and reset circuit for automotive electric component
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A

S-19315 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 40 mA VOLTAGE REGULATOR WITH SENSE-INPUT RESET FUNCTION

The S-19315 Series, developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with the reset function, which has high-withstand voltage and low current consumption.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared for the reset function, so the output is stable even if the SENSE pin falls to 0 V. The output form is Nch open-drain output.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 1.0 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: ± 0.03 V ($1.0 \text{ V} \leq V_{\text{OUT(S)}} < 1.5 \text{ V}$, $T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
 $\pm 2.0\%$ ($1.5 \text{ V} \leq V_{\text{OUT(S)}} \leq 5.3 \text{ V}$, $T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Dropout voltage: 240 mV typ. ($V_{\text{OUT(S)}} = 5.0 \text{ V}$, $I_{\text{OUT}} = 30 \text{ mA}$)
- Output current: Possible to output 40 mA ($1.0 \text{ V} \leq V_{\text{OUT(S)}} < 2.0 \text{ V}$, $V_{\text{IN}} = 4.0 \text{ V}$)*¹
Possible to output 40 mA ($2.0 \text{ V} \leq V_{\text{OUT(S)}} \leq 5.3 \text{ V}$, $V_{\text{IN}} = V_{\text{OUT(S)}} + 2.0 \text{ V}$)*¹
A ceramic capacitor can be used. (1.0 μF or more)
- Input and output capacitors: Limits overcurrent of output transistor
- Built-in overcurrent protection circuit: Detection temperature 160°C typ.
- Built-in thermal shutdown circuit: Discharges output capacitor electrical charge during detector detection
- Built-in discharge shunt circuit:

Detector block

- Detection voltage: 3.0 V to 11.3 V, selectable in 0.1 V step
- Operation voltage: 3.0 V to 36.0 V
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Hysteresis width selectable from "Available" / "Unavailable": "Available": $5.0\% \leq V_{\text{HYS}} \leq 30.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
"Unavailable": $V_{\text{HYS}} = 0\%$
- Output form: Nch open-drain output

Overall

- Current consumption: During operation: 2.0 μA typ. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
During detector detection: 0.5 μA typ. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*²

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply and reset circuit for automotive electric component
- Power supply and reset circuit for low-current battery-powered device

■ Packages

- SOT-89-5
- HTMSOP-8
- SOT-23-5

S-19316 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 40 mA VOLTAGE REGULATOR WITH INPUT MONITORING RESET FUNCTION

The S-19316 Series, developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with the reset function, which has high-withstand voltage and low current consumption.

Regarding a release signal output in the reset function, the S-19316 Series enables delay time adjustment by an external capacitor. Output form of the reset function is selectable from Nch open-drain output or CMOS output.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: A type: 1.0 V to 5.3 V, selectable in 0.1 V step
B type: 1.8 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: ± 0.03 V ($1.0 \text{ V} \leq V_{\text{OUT(S)}} < 1.5 \text{ V}$, $T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
 $\pm 2.0\%$ ($1.5 \text{ V} \leq V_{\text{OUT(S)}} \leq 5.3 \text{ V}$, $T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Dropout voltage: 240 mV typ. ($V_{\text{OUT(S)}} = 5.0 \text{ V}$, $I_{\text{OUT}} = 30 \text{ mA}$)
- Output current: Possible to output 40 mA ($1.0 \text{ V} \leq V_{\text{OUT(S)}} < 2.0 \text{ V}$, $V_{\text{IN}} \geq 4.0 \text{ V}$)*¹
Possible to output 40 mA ($2.0 \text{ V} \leq V_{\text{OUT(S)}} \leq 5.3 \text{ V}$, $V_{\text{IN}} = V_{\text{OUT(S)}} + 2.0 \text{ V}$)*¹
- Input and output capacitors: A ceramic capacitor can be used. (1.0 μF or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor
- Built-in thermal shutdown circuit: Detection temperature 160°C typ.

Detector block

- Detection voltage: 3.0 V to 11.3 V, selectable in 0.1 V step
- Operation voltage: A type: 1.8 V to 36.0 V
B type: 2.5 V to 36.0 V
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Hysteresis width selectable from "Available" / "Unavailable": "Available": $5.0\% \leq V_{\text{HYS}} \leq 30.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
"Unavailable": $V_{\text{HYS}} = 0\%$
- Release delay time accuracy: $\pm 20\%$ ($C_D = 3.3 \text{ nF}$, $T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output form: Nch open-drain output
CMOS output

Overall

- Current consumption: 2.2 μA typ. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*²

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply and battery monitoring circuit for automotive electric component
- Power supply and battery monitoring circuit for low-current battery-powered device

■ Packages

- SOT-89-5
- HTMSOP-8
- SOT-23-5

S-19317 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 250 mA, VOLTAGE REGULATOR WITH RESET FUNCTION

This IC is a high-withstand voltage and low dropout positive voltage regulator with a reset function and has a built-in ON / OFF circuit, developed using high-withstand voltage CMOS process technology.

This IC operates at the maximum operation voltage of 36 V and a low current consumption of 3.0 μA typ. A built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. Regarding a release signal output in the reset function, this IC enables delay time adjustment by an external capacitor.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100 \text{ mA}$)
- Output current: Possible to output 250 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0 \text{ V}$)*¹
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable*²: 20 ms typ. ($C_{\text{DLY}} = 10 \text{ nF}$)

Overall

- Current consumption: 3.0 μA typ. (During regulator operation)
0.1 μA typ. (During regulator stop)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*³

*¹. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*². The release delay time can be adjusted by connecting C_{DLY} to the DLY pin.

*³. Contact our sales representatives for details.

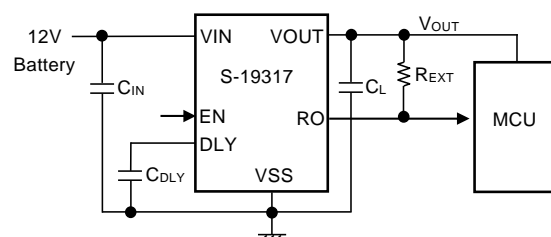
■ Applications

- Constant-voltage power supply and reset circuit for automotive electric component

■ Packages

- TO-252-9S
- HSOP-8A

■ Typical Application Circuit



S-19318 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, VOLTAGE REGULATOR, WITH RESET FUNCTION

This IC is a high-withstand voltage and low dropout positive voltage regulator with a reset function and has a built-in ON / OFF circuit, developed using high-withstand voltage CMOS process technology.

This IC operates at the maximum operation voltage of 36 V and a low current consumption of 3.0 μA typ. A built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. Regarding a release signal output in the reset function, this IC enables delay time adjustment by an external capacitor.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 500 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Overall

- Current consumption: 3.0 μA typ. (During regulator operation)
0.1 μA typ. (During regulator stop)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

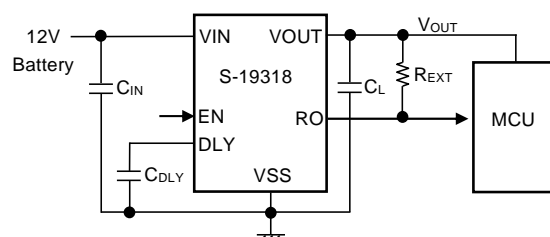
■ Applications

- Constant-voltage power supply and reset circuit for automotive electric component

■ Packages

- TO-252-9S
- HSOP-8A

■ Typical Application Circuit



S-19500/19501 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 200 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19500/19501 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.0 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 4.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 120 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 200 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 2.2 μF or more can be used.
- Ripple rejection: 70 dB typ. ($f = 100$ Hz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: ± 100 mV ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 18 ms typ. ($C_{\text{DLY}} = 47$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 43 ms typ. ($C_{\text{DLY}} = 47$ nF)
- Product type is selectable: S-19500 Series (Product with WEN pin (Output: WO / RO pin))
S-19501 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 60 μA typ. ($I_{\text{OUT}} = 0$ mA, During the watchdog timer deactivation)
75 μA typ. ($I_{\text{OUT}} \leq 5$ mA, During the watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Package

- HSOP-8A

S-19502/19503 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 400 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19502/19503 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.0 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 4.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 120 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 400 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 2.2 μF or more can be used.
- Ripple rejection: 70 dB typ. ($f = 100$ Hz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: ± 100 mV ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 18 ms typ. ($C_{\text{DLY}} = 47$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 43 ms typ. ($C_{\text{DLY}} = 47$ nF)
- Product type is selectable: S-19502 Series (Product with WEN pin (Output: WO / RO pin))
S-19503 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 60 μA typ. ($I_{\text{OUT}} = 0$ mA, During the watchdog timer deactivation)
75 μA typ. ($I_{\text{OUT}} \leq 5$ mA, During the watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19504/19505 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 250 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19504/19505 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{OUT} = 100$ mA)
- Output current: Possible to output 250 mA ($V_{IN} = V_{OUT(S)} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{DLY} = 10$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{DLY} = 10$ nF)
- Product type is selectable: S-19504 Series (Product with WEN pin (Output: WO / RO pin))
S-19505 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 3.0 μA typ. (During watchdog timer deactivation)
5.0 μA typ. (During watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19506/19507 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19506/19507 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 500 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Product type is selectable: S-19506 Series (Product with WEN pin (Output: WO / RO pin))
S-19507 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 3.0 μA typ. (During watchdog timer deactivation)
5.0 μA typ. (During watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19509 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19509 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 500 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Product type is selectable: S-19509A Series
(TO-252-9S package product, HSOP-8A package product)
S-19509B Series (HTSSOP-16 package product)
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 3.2 μA typ. (During regulator operation, during watchdog timer deactivation)
0.1 μA typ. (During regulator stop)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A
- HTSSOP-16

S-19514/19515 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 250 mA, BUILT-IN WINDOW WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19514/19515 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the window watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 250 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Product type is selectable: S-19514 Series (Product with WEN pin (Output: WO / RO pin))
S-19515 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Window mode

Overall

- Current consumption: 3.0 μA typ. (During watchdog timer deactivation)
5.0 μA typ. (During watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19516/19517 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, BUILT-IN WINDOW WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19516/19517 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the window watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 500 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)*1
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable*2: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable*2: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Product type is selectable: S-19516 Series (Product with WEN pin (Output: WO / RO pin))
S-19517 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Window mode

Overall

- Current consumption: 3.0 μA typ. (During watchdog timer deactivation)
5.0 μA typ. (During watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*3

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19518 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 250 mA, BUILT-IN WINDOW WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19518 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the window watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 250 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current: 1.5 mA typ.
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Window mode

Overall

- Current consumption: 3.2 μA typ. (During regulator operation, during watchdog timer deactivation)
0.1 μA typ. (During regulator stop)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19519 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, BUILT-IN WINDOW WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19519 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the window watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 500 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF) (S-19519A/B Series)
0.56 ms typ. ($C_{\text{DLY}} = 3.3$ nF) (S-19519C Series)

Watchdog timer block

- Watchdog activation current: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF) (S-19519A/B Series)
15.2 ms typ. ($C_{\text{DLY}} = 3.3$ nF) (S-19519C Series)
- Product type is selectable: S-19519A/C Series
(TO-252-9S package product, HSOP-8A package product)
S-19519B Series (HTSSOP-16 package product)
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Window mode

Overall

- Current consumption: 3.2 μA typ. (During regulator operation, during watchdog timer deactivation)
0.1 μA typ. (During regulator stop)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A
- HTSSOP-16

S-19700 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 400 mA VOLTAGE REGULATOR WITH CURRENT MONITOR AND ADJUSTABLE CURRENT LIMIT

The S-19700 Series, developed by using CMOS technology, is a positive voltage regulator with a current monitoring function for 125°C automotive operation.

It provides an output current of 400 mA min., and a ceramic capacitor of 4.7 μ F or more can be used as the output capacitor. Due to the built-in reverse current protection function, the reverse current flowing from the VOUT pin to the VIN pin can be controlled as the small value 15 μ A typ.

The current monitor monitors the current flowing to the voltage regulator and outputs the voltage according to the external resistance, and limits the current value from exceeding the set value.

The S-19700 Series has two types of products of which one is the externally set product whose output voltage is determined by the external divided-resistor, and the other is the internally set product which includes an INT pin and whose output voltage is fixed.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (externally set): 3.3 V to 20.0 V, settable via an external resistor
- Output voltage (internally set): 3.3 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 4.5 V to 36.0 V
- Output voltage accuracy: $\pm 2.3\%$ ($1.0 \text{ mA} \leq I_{\text{OUT}} \leq 30 \text{ mA}$, $T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 240 mV typ. (3.3 V output product, $I_{\text{OUT}} = 300 \text{ mA}$)
- Current consumption: During operation: 80 μ A typ., 170 μ A max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 1.0 μ A typ., 5.0 μ A max. ($T_j = -40^\circ\text{C}$ to $+90^\circ\text{C}$)
- Output current: Possible to output 400 mA ($V_{\text{IN}} \geq V_{\text{OUT(S)}} + 2.0 \text{ V}$)*1
- Output capacitor: A ceramic capacitor of 4.7 μ F or more can be used.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in overvoltage detection circuit: Detects an output short-circuit of the higher voltage.
- Built-in ON / OFF circuit: Ensures long battery life.
- Constant current source pull-down is selectable.
- Current monitoring function: Possible to monitor load current by monitoring the CSO pin voltage.
- Current limit function: Possible to adjust a current limit value via an external resistor.
- Reverse current protection function: $I_{\text{REV}} = 45 \mu\text{A}$ max.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Remote LNA phantom power
- Car audio system
- Car navigation system

■ Package

- HSOP-8A

S-19701 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 600 mA VOLTAGE REGULATOR WITH CURRENT MONITOR AND ADJUSTABLE CURRENT LIMIT

The S-19701 Series, developed by using CMOS technology, is a positive voltage regulator with a current monitoring function for 125°C automotive operation.

It provides an output current of 600 mA min., and a ceramic capacitor of 4.7 μ F or more can be used as the output capacitor. Due to the built-in reverse current protection function, the reverse current flowing from the VOUT pin to the VIN pin can be controlled as the small value 15 μ A typ.

The current monitor monitors the current flowing to the voltage regulator and outputs the voltage according to the external resistance, and limits the current value from exceeding the set value.

The S-19701 Series has two types of products of which one is the externally set product whose output voltage is determined by the external divided-resistor, and the other is the internally set product which includes an INT pin and whose output voltage is fixed.

By connecting the VADJ pin to GND, the externally set product can be utilized as a high side switch with a current monitor.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (externally set): 3.3 V to 20.0 V, settable via an external resistor
- Output voltage (internally set): 3.3 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 4.5 V to 36.0 V
- Output voltage accuracy: $\pm 2.3\%$ ($1.0 \text{ mA} \leq I_{\text{OUT}} \leq 30 \text{ mA}$, $T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 240 mV typ. (3.3 V output product, $I_{\text{OUT}} = 300 \text{ mA}$)
- Current consumption: During operation: 80 μ A typ., 170 μ A max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 1.0 μ A typ., 5.0 μ A max. ($T_j = -40^\circ\text{C}$ to $+90^\circ\text{C}$)
- Output current: Possible to output 600 mA ($V_{\text{IN}} \geq V_{\text{OUT(S)}} + 2.0 \text{ V}$)*1
- Output capacitor: A ceramic capacitor of 4.7 μ F or more can be used.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in overvoltage detection circuit: Detects an output short-circuit of the higher voltage.
- Built-in ON / OFF circuit: Ensures long battery life.
- Constant current source pull-down is selectable.
- Current monitoring function: Possible to monitor load current by monitoring the CSO pin voltage.
- Current limit function: Possible to adjust a current limit value via an external resistor.
- Reverse current protection function: $I_{\text{REV}} = 45 \mu\text{A}$ max.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Power supply for automotive camera
- Remote LNA phantom power
- High-side power switch for small current application

■ Package

- HSOP-8A

S-19720 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 50 mA VOLTAGE TRACKER WITH REVERSE CURRENT PROTECTION

This IC, developed by using high-withstand voltage CMOS process technology, is a voltage tracker with a reverse current protection function, which has high-withstand voltage and low current consumption.

Since the maximum operating voltage is as high as 36 V and the current consumption is as low as 30 μA typ., it contributes to the reduction of standby current.

This IC operates stably due to the internal phase compensation circuit so that users are able to use low ESR ceramic capacitor as the output capacitor.

This IC includes an overcurrent protection circuit that prevents the load current from exceeding the current capacity of the output transistor and a thermal shutdown circuit that prevents damage because of overheating.

Due to the built-in reverse current protection function, the reverse current flowing from the VOUT pin to the VIN pin can be controlled as the small value $-5 \mu\text{A}$ min. Therefore, IC protection diode is not needed.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 36.0 V
- Offset voltage: ± 5 mV ($0.1 \text{ mA} \leq I_{\text{OUT}} \leq 50 \text{ mA}$)
- Dropout voltage: 160 mV typ. ($V_{\text{ADJ/EN}} = 4.0 \text{ V}$, $I_{\text{OUT}} = 10 \text{ mA}$)
- Current consumption:
 - During operation: 30 μA typ.
 - During power-off: 4.0 μA typ.
- Output current: Possible to output 50 mA ($V_{\text{IN}} = V_{\text{ADJ/EN}} + 2.0 \text{ V}$)*1
- Input capacitor: A ceramic capacitor can be used. (1.0 μF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μF to 1000 μF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 175°C typ.
- Reverse current protection function: $I_{\text{REV}} = -5 \mu\text{A}$ min. ($V_{\text{IN}} = 0 \text{ V}$, $V_{\text{ADJ/EN}} = 5.0 \text{ V}$, $V_{\text{OUT}} = 16.0 \text{ V}$)
- Operation temperature range: $T_{\text{a}} = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Power supply for automotive off-board sensors
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- SOT-23-5
- HSNT-6(2025)

S-19721 Series

**AUTOMOTIVE, 125°C OPERATION,
36 V INPUT, 250 mA VOLTAGE TRACKER
WITH REVERSE CURRENT PROTECTION AND ANOMALY NOTIFICATION**

This IC, developed by using high-withstand voltage CMOS process technology, is a voltage tracker with a reverse current protection and an anomaly notification function, which has high-withstand voltage and low current consumption. Since the maximum operating voltage is as high as 36 V and the current consumption is as low as 40 μA typ., it contributes to the reduction of standby current. This IC operates stably due to the internal phase compensation circuit so that users are able to use low ESR ceramic capacitor as the output capacitor.

This IC includes an overcurrent protection circuit that prevents the load current from exceeding the current capacity of the output transistor and a thermal shutdown circuit that prevents damage because of overheating. Due to the built-in reverse current protection function that protects the IC from the overvoltage application to the output pins, the reverse current flowing from the VOUT pin to the VIN pin can be controlled as the small value $-5 \mu\text{A}$ min. Therefore, IC protection diode is not needed.

In addition, an anomaly notification function is equipped to notify the activation of protection functions against the anomalies, contributing to safety design.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 36.0 V
- Output voltage: Adjustable down to 2.0 V min.
- Offset voltage: $\pm 4.5 \text{ mV}$ ($0.1 \text{ mA} \leq I_{\text{OUT}} \leq 250 \text{ mA}$)
- Dropout voltage: 330 mV typ. ($V_{\text{ADJ}} = 4.0 \text{ V}$, $I_{\text{OUT}} = 125 \text{ mA}$)
- Current consumption:
 - During operation: 40 μA typ.
 - During power-off: 3.7 μA typ.
- Output current: Possible to output 250 mA ($V_{\text{IN}} = V_{\text{ADJ}} + 2.0 \text{ V}$)*1
- Input capacitor: A ceramic capacitor can be used. (4.7 μF or more)
- Output capacitor: A ceramic capacitor can be used. (4.7 μF to 1000 μF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 175°C typ.
- Built-in overvoltage detection circuit: A/B type: Detects an output short-circuit of the higher voltage.
- Reverse current protection function: $I_{\text{REV}} = -5 \mu\text{A}$ min. ($V_{\text{IN}} = 0 \text{ V}$, $V_{\text{ADJ}} = 5.0 \text{ V}$, $V_{\text{OUT}} = 16.0 \text{ V}$)
- Anomaly notification function: INT pin notifies operation anomaly of the IC.
 - A type: Overvoltage, ground fault, overheat
 - B type: Overvoltage, overheat
 - C type: Ground fault, overheat
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

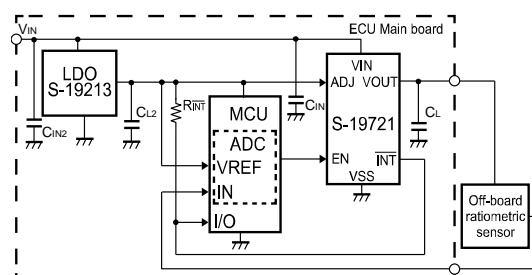
■ Applications

- Power supply for automotive off-board sensors
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-9S
- HSOP-8A
- HSNT-8(2030)

■ Application Circuit



S-19243xxxA Series

AUTOMOTIVE, 125°C OPERATION, 10 V INPUT, 500 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

The S-19243xxxA Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with high-accuracy output voltage and high output current.

A built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. In addition to the type in which output voltage is set inside the IC, the type for which output voltage can be set via an external resistor is added to a lineup. Also, the S-19243xxxA Series includes the soft-start function to adjust the output voltage rising time at power-on or at the time when the ON / OFF pin is set to ON.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (internally set): 0.9 V to 6.0 V, selectable in 0.05 V step
- Output voltage (externally set): 1.0 V to 9.0 V, settable via external resistor (HSOP-8A, HSOP-6 and HSNT-8(2030) only)
- Input voltage: 2.5 V to 10.0 V
- Output voltage accuracy: $\pm 2.3\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Dropout voltage: 0.09 V typ. (2.6 V output product, at $I_{\text{OUT}} = 200$ mA)
- Current consumption: During operation: 120 μA typ., 150 μA max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 0.1 μA typ., 10.5 μA max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output current: Possible to output 500 mA (at $V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Ripple rejection: 60 dB typ. (at $f = 1.0$ kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in soft-start circuit: Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
Adjustable type: E / F / G / H type, $t_{\text{SS}} = 6.0$ ms typ. ($C_{\text{SS}} = 10$ nF)
Soft-start time can be changed by the capacitor (C_{SS}).
Fixed type: A / B / C / D type: Fixed to $t_{\text{SS}} = 1.0$ ms typ.
- Built-in ON / OFF circuit: Ensures long battery life
Discharge shunt function "available" / "unavailable" is selectable.
Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A
- HSOP-6
- SOT-89-5
- HSNT-8(2030)

S-19243xxxH Series

AUTOMOTIVE, 105°C OPERATION, 10 V INPUT, 500 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

The S-19243xxxH Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with high-accuracy output voltage and high output current.

A built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. In addition to the type in which output voltage is set inside the IC, the type for which output voltage can be set via an external resistor is added to a lineup. Also, the S-19243xxxH Series includes the soft-start function to adjust the output voltage rising time at power-on or at the time when the ON / OFF pin is set to ON.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (internally set): 0.9 V to 6.0 V, selectable in 0.05 V step
 - Output voltage (externally set): 1.0 V to 9.0 V, settable via external resistor (HSOP-8A, HSOP-6 and HSNT-8(2030) only)
 - Input voltage: 2.5 V to 10.0 V
 - Output voltage accuracy: $\pm 2.3\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 - Dropout voltage: 0.09 V typ. (2.6 V output product, at $I_{OUT} = 200\text{ mA}$)
 - Current consumption: During operation: 120 μA typ., 150 μA max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 0.1 μA typ., 4.5 μA max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 - Output current: Possible to output 500 mA (at $V_{IN} \geq V_{OUT(S)} + 1.0\text{ V}$)^{*1}
 - Ripple rejection: 60 dB typ. (at $f = 1.0\text{ kHz}$)
 - Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
 - Built-in thermal shutdown circuit: Detection temperature 170°C typ.
 - Built-in soft-start circuit: Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
Adjustable type: E / F / G / H type, $t_{SS} = 6.0\text{ ms}$ typ. ($C_{SS} = 10\text{ nF}$)
Soft-start time can be changed by the capacitor (C_{SS}).
Fixed type: A / B / C / D type: Fixed to $t_{SS} = 1.0\text{ ms}$ typ.
 - Built-in ON / OFF circuit: Ensures long battery life
Discharge shunt function "available" / "unavailable" is selectable.
Pull-down function "available" / "unavailable" is selectable.
 - Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
 - Lead-free (Sn 100%), halogen-free
 - AEC-Q100 qualified^{*2}
- *1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.
*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A
- HSOP-6
- SOT-89-5
- HSNT-8(2030)

S-19244xxxA Series

AUTOMOTIVE, 125°C OPERATION, 10 V INPUT, 1000 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

The S-19244xxxA Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with high-accuracy output voltage and high output current.

A built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. In addition to the type in which output voltage is set inside the IC, the type for which output voltage can be set via an external resistor is added to a lineup. Also, the S-19244xxxA Series includes the soft-start function to adjust the output voltage rising time at power-on or at the time when the ON / OFF pin is set to ON.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (internally set): 1.0 V to 6.0 V, selectable in 0.05 V step
- Output voltage (externally set): 1.0 V to 9.0 V, settable via external resistor (HSOP-8A, HSOP-6 and HSNT-8(2030) only)
- Input voltage: 2.5 V to 10.0 V
- Output voltage accuracy: $\pm 2.3\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Dropout voltage: 0.38 V typ. (2.6 V output product, at $I_{OUT} = 1000$ mA)
- Current consumption: During operation: 120 μA typ., 150 μA max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 0.1 μA typ., 10.5 μA max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
Possible to output 1000 mA (at $V_{IN} \geq V_{OUT(S)} + 1.0$ V)^{*1}
- Output current: 60 dB typ. (at $f = 1.0$ kHz)
- Ripple rejection: Limits overcurrent of output transistor.
- Built-in overcurrent protection circuit: Detection temperature 170°C typ.
- Built-in thermal shutdown circuit: Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
Adjustable type: E / F / G / H type, $t_{SS} = 6.0$ ms typ. ($C_{SS} = 10$ nF)
Soft-start time can be changed by the capacitor (C_{SS}).
- Built-in soft-start circuit: Fixed type: A / B / C / D type: Fixed to $t_{SS} = 1.0$ ms typ.
- Built-in ON / OFF circuit: Ensures long battery life
Discharge shunt function "available" / "unavailable" is selectable.
Pull-down function "available" / "unavailable" is selectable.
 $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A
- HSOP-6
- HSNT-8(2030)

S-19244xxxH Series

AUTOMOTIVE, 105°C OPERATION, 10 V INPUT, 1000 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

The S-19244xxxH Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with high-accuracy output voltage and high output current.

A built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. In addition to the type in which output voltage is set inside the IC, the type for which output voltage can be set via an external resistor is added to a lineup. Also, the S-19244xxxH Series includes the soft-start function to adjust the output voltage rising time at power-on or at the time when the ON / OFF pin is set to ON.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (internally set): 1.0 V to 6.0 V, selectable in 0.05 V step
- Output voltage (externally set): 1.0 V to 9.0 V, settable via external resistor (HSOP-8A, HSOP-6 and HSNT-8(2030) only)
- Input voltage: 2.5 V to 10.0 V
- Output voltage accuracy: $\pm 2.3\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Dropout voltage: 0.38 V typ. (2.6 V output product, at $I_{\text{OUT}} = 1000$ mA)
- Current consumption: During operation: 120 μA typ., 150 μA max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 0.1 μA typ., 4.5 μA max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output current: Possible to output 1000 mA (at $V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Ripple rejection: 60 dB typ. (at $f = 1.0$ kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in soft-start circuit: Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
Adjustable type: E / F / G / H type, $t_{\text{SS}} = 6.0$ ms typ. ($C_{\text{SS}} = 10$ nF)
Soft-start time can be changed by the capacitor (C_{SS}).
Fixed type: A / B / C / D type: Fixed to $t_{\text{SS}} = 1.0$ ms typ.
- Built-in ON / OFF circuit: Ensures long battery life
Discharge shunt function "available" / "unavailable" is selectable.
Pull-down function "available" / "unavailable" is selectable.
 $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Packages

- TO-252-5S(A)
- HSOP-8A
- HSOP-6
- HSNT-8(2030)

S-19246xxxH Series

AUTOMOTIVE, 105°C OPERATION, 10 V INPUT, 2000 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

The S-19246xxxH Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with high-accuracy output voltage and high output current.

A built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. Also, the S-19246xxxH Series includes the soft-start function to adjust the output voltage rising time at power-on or at the time when the ON / OFF pin is set to ON.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 1.0 V to 6.0 V, selectable in 0.05 V step
- Input voltage: 2.5 V to 10.0 V
- Output voltage accuracy: $\pm 2.3\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Dropout voltage: 0.62 V typ. (3.0 V output product, at $I_{OUT} = 2000$ mA)
- Current consumption:
 - During operation: 120 μA typ., 150 μA max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
 - During power-off: 0.1 μA typ., 4.5 μA max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output current: Possible to output 2000 mA (at $V_{IN} \geq V_{OUT(S)} + 1.0$ V)^{*1}
- Ripple rejection: 60 dB typ. (at $f = 1.0$ kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in soft-start circuit:
 - Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
 - $t_{SS} = 6.0$ ms typ. ($C_{SS} = 10$ nF)
 - Soft-start time can be changed by the capacitor (C_{SS}).
- Built-in ON / OFF circuit:
 - Ensures long battery life
 - Discharge shunt function "available" / "unavailable" is selectable.
 - Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for telecommunication module
- Constant-voltage power supply for home electric appliance
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Package

- TO-252-5S(A)

S-19253xxxH Series

AUTOMOTIVE, 105°C OPERATION, 6.5 V INPUT, 500 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

The S-19253xxxH Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with high-accuracy output voltage and high output current.

A built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. Also, the S-19253xxxH Series includes the soft-start function to adjust the output voltage rising time at power-on or at the time when the ON / OFF pin is set to ON.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 1.0 V to 5.5 V, selectable in 0.05 V step
- Input voltage: 2.5 V to 6.5 V
- Output voltage accuracy: $\pm 3.0\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Dropout voltage: 0.09 V typ. (2.6 V output product, at $I_{\text{OUT}} = 200$ mA)
- Current consumption: During operation: 120 μA typ., 150 μA max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
During power-off: 0.1 μA typ., 4.5 μA max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output current: Possible to output 500 mA (at $V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Ripple rejection: 60 dB typ. (at $f = 1.0$ kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in soft-start circuit: Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
Adjustable type: $t_{\text{SS}} = 6.0$ ms typ. ($C_{\text{SS}} = 10$ nF)
Soft-start time can be changed by the capacitor (C_{SS}).
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function is available.
Pull-down function is available.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (accessory, car navigation system, car audio system, etc.)

■ Package

- SOT-89-5

S-19254xxxH Series

AUTOMOTIVE, 105°C OPERATION, 6.5 V INPUT, 1000 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

The S-19254xxxH Series developed by using high-withstand voltage CMOS process technology, is a positive voltage regulator with high-accuracy output voltage and high output current.

A built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. Also, the S-19254xxxH Series includes the soft-start function to adjust the output voltage rising time at power-on or at the time when the ON / OFF pin is set to ON.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 1.0 V to 5.5 V, selectable in 0.05 V step
- Input voltage: 2.5 V to 6.5 V
- Output voltage accuracy: $\pm 3.0\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Dropout voltage: 0.38 V typ. (2.6 V output product, at $I_{\text{OUT}} = 1000$ mA)
- Current consumption: During operation: 120 μA typ., 150 μA max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
During power-off: 0.1 μA typ., 4.5 μA max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output current: Possible to output 1000 mA (at $V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Ripple rejection: 60 dB typ. (at $f = 1.0$ kHz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in soft-start circuit: Adjusts output voltage rising time at power-on or at the time when ON / OFF pin is set to ON.
Adjustable type: $t_{\text{SS}} = 6.0$ ms typ. ($C_{\text{SS}} = 10$ nF)
Soft-start time can be changed by the capacitor (C_{SS}).
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function is available.
Pull-down function is available.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for home electric appliance
- For automotive use (accessory, car navigation system, car audio system, etc.)

■ Package

- HSOP-8A

S-19251 Series

AUTOMOTIVE, 105°C OPERATION, 5.5 V INPUT, 150 mA VOLTAGE REGULATOR

The S-19251 Series, developed by using CMOS process technology, is a positive voltage regulator with a low current consumption, high ripple-rejection and high-accuracy output voltage. This IC has high ripple-rejection of 75 dB typ., and operates with low current consumption of 20 μ A typ.

Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. In addition to the conventional package SOT-23-5, the super-small packages HSNT-4(1010)B and HSNT-4(0808)B are added to the lineup, which realizes higher-density mounting.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 1.0 V to 3.5 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: $\pm 2.5\%$ ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption:
 - During operation: 20 μ A typ., 50 μ A max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 - During power-off: 0.1 μ A typ., 4.5 μ A max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Dropout voltage: 0.16 V typ. (2.8 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 150 mA ($V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Ripple rejection: 75 dB typ. (1.2 V output product, $f = 1.0$ kHz)
70 dB typ. (2.8 V output product, $f = 1.0$ kHz)
- Input capacitor: A ceramic capacitor can be used. (1.0 μ F or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μ F or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 150°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
Discharge shunt function "available" / "unavailable" is selectable.
Pull-down function "available" / "unavailable" is selectable.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- For automotive use (meter, car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)
: SOT-23-5 package product
- For automotive use (accessory, car navigation system, car audio system, etc.)
: HSNT-4(1010)B package product, HSNT-4(0808)B package product

■ Packages

- SOT-23-5
- HSNT-4(1010)B
- HSNT-4(0808)B

S-19252 Series

AUTOMOTIVE, 105°C OPERATION, 5.5 V INPUT, 150 mA VOLTAGE REGULATOR WITH SOFT-START FUNCTION

The S-19252 Series, developed by using CMOS process technology, is a positive voltage regulator with high-accuracy output voltage which incorporates the soft-start function. This IC has high ripple-rejection of 80 dB typ. and operates with low current consumption of 36 μ A typ.

The S-19252 Series incorporates the soft-start function to adjust the rising time of output voltage immediately after power-on or after the ON / OFF pin is set to ON. It also has a built-in overcurrent protection circuit to limit overcurrent of output transistor.

In addition to the conventional small packages SOT-23-5 and SC-82AB, the super-small package HSNT-4(1010)B is added to the lineup, which realizes higher-density mounting.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 1.0 V to 3.6 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: ± 15 mV ($1.0 \text{ V} \leq V_{\text{OUT(S)}} < 1.5 \text{ V}$, $T_a = +25^\circ\text{C}$)
 $\pm 1.0\%$ ($1.5 \text{ V} \leq V_{\text{OUT(S)}} \leq 3.6 \text{ V}$, $T_a = +25^\circ\text{C}$)
 $\pm 3.0\%$ ($1.0 \text{ V} \leq V_{\text{OUT(S)}} \leq 3.6 \text{ V}$, $T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: During operation: 36 μ A typ., 57 μ A max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 During power-off: 0.1 μ A typ., 4.2 μ A max. ($T_j = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Dropout voltage: 70 mV typ. (2.8 V output product, at $I_{\text{OUT}} = 100 \text{ mA}$)
- Output current: Possible to output 150 mA (at $V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0 \text{ V}$)*¹
- Ripple rejection: 70 dB typ. ($V_{\text{OUT(S)}} \leq 2.5 \text{ V}$, at $f = 10 \text{ kHz}$)
 80 dB typ. (at $f = 1.0 \text{ kHz}$)
- Input capacitor: A ceramic capacitor can be used. (1.0 μ F or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μ F or more)
- Built-in soft-start circuit: The rising time of output voltage immediately after power-on or after the ON / OFF pin is set to ON is adjustable.
 The soft-start time of SOT-23-5 can be switched to $t_{\text{SS0}} = 0.1 \text{ ms}$ typ. / $t_{\text{SS1}} = 1.0 \text{ ms}$ typ. with the SST pin.
 The soft-start time of SC-82AB is fixed to $t_{\text{SS0}} = 0.1 \text{ ms}$ typ.
 The soft-start time of HSNT-4(1010)B is fixed to either $t_{\text{SS0}} = 0.1 \text{ ms}$ typ. or $t_{\text{SS1}} = 1.0 \text{ ms}$ typ.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in ON / OFF circuit: Ensures long battery life.
 Discharge shunt function "available" / "unavailable" is selectable.
 Pull-down function "available" / "unavailable" is selectable.
 $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified²

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- For automotive use (meter, car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)
 : SOT-23-5 package product, SC-82AB package product
- For automotive use (accessory, car navigation system, car audio system, etc.)
 : HSNT-4(1010)B package product

■ Packages

- SOT-23-5
- SC-82AB
- HSNT-4(1010)B

S-19255 Series

AUTOMOTIVE, 125°C OPERATION, 5.5 V INPUT, 300 mA VOLTAGE REGULATOR

The S-19255 Series, developed by using CMOS process technology, is a positive voltage regulator with high-accuracy output voltage. This IC has high ripple-rejection of 80 dB typ.

Also, a built-in overcurrent protection circuit to limit overcurrent of the output transistor and a built-in thermal shutdown circuit to limit heat are included. In addition to the conventional small package SOT-23-5, the super-small package HSNT-4(1010)B is added to the lineup, which realizes higher-density mounting.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage: 0.9 V to 3.6 V, selectable in 0.05 V step
- Input voltage: 1.5 V to 5.5 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: During operation: 55 μA typ., 89 μA max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
During power-off: 0.1 μA typ., 6.4 μA max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Dropout voltage: 120 mV typ.
(HSNT-4(1010)B package products, 2.5 V output product, at $I_{\text{OUT}} = 200$ mA)
- Output current: Possible to output 300 mA (at $V_{\text{IN}} \geq V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Ripple rejection: 50 dB typ. ($V_{\text{OUT(S)}} = 3.3$ V, at $f = 100$ kHz)
80 dB typ. ($V_{\text{OUT(S)}} = 3.3$ V, at $f = 1.0$ kHz)
- Input capacitor: A ceramic capacitor can be used. (0.1 μF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μF or more)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 175°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.
Pull-down function "available" / "unavailable" is selectable.
Discharge shunt function "available" / "unavailable" is selectable.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified^{*2}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- For automotive use (front sensing camera, DMS, FCW)
: SOT-23-5 package product
- For automotive use (accessory, car navigation system, car audio system, etc.)
- Surround view camera for automotive
: HSNT-4(1010)B package product
- Constant-voltage power supply for electrical application for vehicle interior

■ Packages

- SOT-23-5
- HSNT-4(1010)B

S-19720 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 50 mA VOLTAGE TRACKER WITH REVERSE CURRENT PROTECTION

This IC, developed by using high-withstand voltage CMOS process technology, is a voltage tracker with a reverse current protection function, which has high-withstand voltage and low current consumption.

Since the maximum operating voltage is as high as 36 V and the current consumption is as low as 30 μA typ., it contributes to the reduction of standby current.

This IC operates stably due to the internal phase compensation circuit so that users are able to use low ESR ceramic capacitor as the output capacitor.

This IC includes an overcurrent protection circuit that prevents the load current from exceeding the current capacity of the output transistor and a thermal shutdown circuit that prevents damage because of overheating.

Due to the built-in reverse current protection function, the reverse current flowing from the VOUT pin to the VIN pin can be controlled as the small value $-5 \mu\text{A}$ min. Therefore, IC protection diode is not needed.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 36.0 V
- Offset voltage: $\pm 5 \text{ mV}$ ($0.1 \text{ mA} \leq I_{\text{OUT}} \leq 50 \text{ mA}$)
- Dropout voltage: 160 mV typ. ($V_{\text{ADJ/EN}} = 4.0 \text{ V}$, $I_{\text{OUT}} = 10 \text{ mA}$)
- Current consumption:
 - During operation: 30 μA typ.
 - During power-off: 4.0 μA typ.
- Output current: Possible to output 50 mA ($V_{\text{IN}} = V_{\text{ADJ/EN}} + 2.0 \text{ V}$)*1
- Input capacitor: A ceramic capacitor can be used. (1.0 μF or more)
- Output capacitor: A ceramic capacitor can be used. (1.0 μF to 1000 μF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 175°C typ.
- Reverse current protection function: $I_{\text{REV}} = -5 \mu\text{A}$ min. ($V_{\text{IN}} = 0 \text{ V}$, $V_{\text{ADJ/EN}} = 5.0 \text{ V}$, $V_{\text{OUT}} = 16.0 \text{ V}$)
- Operation temperature range: $T_{\text{a}} = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Power supply for automotive off-board sensors
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- SOT-23-5
- HSNT-6(2025)

S-19721 Series

**AUTOMOTIVE, 125°C OPERATION,
36 V INPUT, 250 mA VOLTAGE TRACKER
WITH REVERSE CURRENT PROTECTION AND ANOMALY NOTIFICATION**

This IC, developed by using high-withstand voltage CMOS process technology, is a voltage tracker with a reverse current protection and an anomaly notification function, which has high-withstand voltage and low current consumption. Since the maximum operating voltage is as high as 36 V and the current consumption is as low as 40 μA typ., it contributes to the reduction of standby current. This IC operates stably due to the internal phase compensation circuit so that users are able to use low ESR ceramic capacitor as the output capacitor.

This IC includes an overcurrent protection circuit that prevents the load current from exceeding the current capacity of the output transistor and a thermal shutdown circuit that prevents damage because of overheating. Due to the built-in reverse current protection function that protects the IC from the overvoltage application to the output pins, the reverse current flowing from the VOUT pin to the VIN pin can be controlled as the small value $-5 \mu\text{A}$ min. Therefore, IC protection diode is not needed.

In addition, an anomaly notification function is equipped to notify the activation of protection functions against the anomalies, contributing to safety design.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 36.0 V
- Output voltage: Adjustable down to 2.0 V min.
- Offset voltage: $\pm 4.5 \text{ mV}$ ($0.1 \text{ mA} \leq I_{\text{OUT}} \leq 250 \text{ mA}$)
- Dropout voltage: 330 mV typ. ($V_{\text{ADJ}} = 4.0 \text{ V}$, $I_{\text{OUT}} = 125 \text{ mA}$)
- Current consumption:
 - During operation: 40 μA typ.
 - During power-off: 3.7 μA typ.
- Output current: Possible to output 250 mA ($V_{\text{IN}} = V_{\text{ADJ}} + 2.0 \text{ V}$)*1
- Input capacitor: A ceramic capacitor can be used. (4.7 μF or more)
- Output capacitor: A ceramic capacitor can be used. (4.7 μF to 1000 μF)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 175°C typ.
- Built-in overvoltage detection circuit: A/B type: Detects an output short-circuit of the higher voltage.
- Reverse current protection function: $I_{\text{REV}} = -5 \mu\text{A}$ min. ($V_{\text{IN}} = 0 \text{ V}$, $V_{\text{ADJ}} = 5.0 \text{ V}$, $V_{\text{OUT}} = 16.0 \text{ V}$)
- Anomaly notification function: INT pin notifies operation anomaly of the IC.
 - A type: Overvoltage, ground fault, overheat
 - B type: Overvoltage, overheat
 - C type: Ground fault, overheat
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

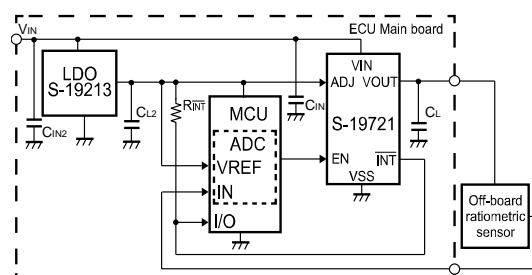
■ Applications

- Power supply for automotive off-board sensors
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TO-252-9S
- HSOP-8A
- HSNT-8(2030)

■ Application Circuit



S-19100xxxA Series

AUTOMOTIVE, 125°C OPERATION, 10 V VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19100xxxA Series, developed by using CMOS technology, is a voltage detector IC for automotive 125°C operation. The detection voltage is fixed internally with an accuracy of $\pm 3.0\%$ ($-V_{DET} = 2.4\text{ V}$). It operates with current consumption of 270 nA typ.

The release signal can be delayed by setting a capacitor externally, and the delay time accuracy at $T_a = +25^\circ\text{C}$ is $\pm 15\%$. The operation temperature range is $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$. Two output forms Nch open-drain and CMOS output are available.

Compared with conventional CMOS voltage detectors, the S-19100xxxA Series has super-low current consumption and small packages.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 1.2 V to 4.6 V (0.1 V step)
- Detection voltage accuracy: $\pm 3.0\%$ ($2.4\text{ V} \leq -V_{DET} \leq 4.6\text{ V}$, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
 $\pm(2.5\% + 12\text{ mV})$ ($1.2\text{ V} \leq -V_{DET} < 2.4\text{ V}$, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: 270 nA typ. ($1.2\text{ V} \leq -V_{DET} < 2.3\text{ V}$)
- Operation voltage range: 0.6 V to 10.0 V (CMOS output product)
- Hysteresis width*1: $5\% \pm 2\%$ ($T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Delay time accuracy: $\pm 15\%$ ($C_D = 4.7\text{ nF}$, $T_a = +25^\circ\text{C}$)
- Output form: Nch open-drain output (active "L")
CMOS output (active "L")
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*2

*1. The product without hysteresis width is also available.

*2. Contact our sales representatives for details.

■ Applications

- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- SOT-23-5
- SC-82AB

S-19100xxxH Series

AUTOMOTIVE, 105°C OPERATION, 10 V VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19100xxxH Series, developed by using CMOS technology, is a voltage detector IC for automotive 105°C operation. The detection voltage is fixed internally with an accuracy of $\pm 2.5\%$ ($-V_{DET} = 2.4\text{ V}$). It operates with current consumption of 270 nA typ.

The release signal can be delayed by setting a capacitor externally, and the delay time accuracy at $T_a = +25^\circ\text{C}$ is $\pm 15\%$. The operation temperature range is $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$. Two output forms Nch open-drain and CMOS output are available.

Compared with conventional CMOS voltage detectors, the S-19100xxxH Series has super-low current consumption and small packages.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 1.2 V to 4.6 V (0.1 V step)
- Detection voltage accuracy: $\pm 2.5\%$ ($2.4\text{ V} \leq -V_{DET} \leq 4.6\text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 $\pm(2.0\% + 12\text{ mV})$ ($1.2\text{ V} \leq -V_{DET} < 2.4\text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: 270 nA typ. ($1.2\text{ V} \leq -V_{DET} < 2.3\text{ V}$)
- Operation voltage range: 0.6 V to 10.0 V (CMOS output product)
- Hysteresis width*1: $5\% \pm 2\%$ ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Delay time accuracy: $\pm 15\%$ ($C_D = 4.7\text{ nF}$, $T_a = +25^\circ\text{C}$)
- Output form: Nch open-drain output (active "L")
CMOS output (active "L")
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*2

*1. The product without hysteresis width is also available.

*2. Contact our sales representatives for details.

■ Applications

- For automotive use (meter, car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)
: SOT-23-5 package product, SC-82AB package product
- For automotive use (accessory, car navigation system, car audio system, etc.)
: SNT-4A package product

■ Packages

- SOT-23-5
- SC-82AB
- SNT-4A

S-19101xxxA Series

AUTOMOTIVE, 125°C OPERATION, 10 V VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19101xxxA Series, developed by using CMOS technology, is a voltage detector IC for automotive 125°C operation. The detection voltage is fixed internally with an accuracy of $\pm 3.0\%$ ($-V_{DET} = 2.4\text{ V}$). The release voltage is set to the same value as the detection voltage, since there is no hysteresis width. It operates with current consumption of 270 nA typ. The release signal can be delayed by setting a capacitor externally, and the delay time accuracy at $T_a = +25^\circ\text{C}$ is $\pm 15\%$. The operation temperature range is $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$. Two output forms Nch open-drain and CMOS output are available.

Compared with conventional CMOS voltage detectors, the S-19101xxxA Series has super-low current consumption and small packages.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 1.2 V to 4.6 V (0.1 V step)
- Detection voltage accuracy: $\pm 3.0\%$ ($2.4\text{ V} \leq -V_{DET} \leq 4.6\text{ V}$, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
 $\pm(2.5\% + 12\text{ mV})$ ($1.2\text{ V} \leq -V_{DET} < 2.4\text{ V}$, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: 270 nA typ. ($1.2\text{ V} \leq -V_{DET} < 2.3\text{ V}$)
- Operation voltage range: 0.6 V to 10.0 V (CMOS output product)
- Delay time accuracy: $\pm 15\%$ ($C_D = 4.7\text{ nF}$, $T_a = +25^\circ\text{C}$)
- Output form: Nch open-drain output (active "L")
CMOS output (active "L")
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- SOT-23-5
- SC-82AB

S-19101xxxH Series

AUTOMOTIVE, 105°C OPERATION, 10 V VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19101xxxH Series, developed by using CMOS technology, is a voltage detector IC for automotive 105°C operation. The detection voltage is fixed internally with an accuracy of $\pm 2.5\%$ ($-V_{DET} = 2.4\text{ V}$). The release voltage is set to the same value as the detection voltage, since there is no hysteresis width. It operates with current consumption of 270 nA typ. The release signal can be delayed by setting a capacitor externally, and the delay time accuracy at $T_a = +25^\circ\text{C}$ is $\pm 15\%$. The operation temperature range is $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$. Two output forms Nch open-drain and CMOS output are available.

Compared with conventional CMOS voltage detectors, the S-19101xxxH Series has super-low current consumption and small packages.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 1.2 V to 4.6 V (0.1 V step)
- Detection voltage accuracy: $\pm 2.5\%$ ($2.4\text{ V} \leq -V_{DET} \leq 4.6\text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 $\pm(2.0\% + 12\text{ mV})$ ($1.2\text{ V} \leq -V_{DET} < 2.4\text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: 270 nA typ. ($1.2\text{ V} \leq -V_{DET} < 2.3\text{ V}$)
- Operation voltage range: 0.6 V to 10.0 V (CMOS output product)
- Delay time accuracy: $\pm 15\%$ ($C_D = 4.7\text{ nF}$, $T_a = +25^\circ\text{C}$)
- Output form: Nch open-drain output (active "L")
CMOS output (active "L")
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Packages

- SOT-23-5
- SC-82AB

S-19102/19108 Series

AUTOMOTIVE, 105°C OPERATION, 10 V, SENSE-INPUT VOLTAGE DETECTOR

The S-19102/19108 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage is fixed internally with an accuracy of $\pm 3.5\%$ ($-V_{\text{DET(S)}} \geq 2.2 \text{ V}$). It operates with current consumption of 500 nA typ. Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin falls to 0 V.

Two output forms Nch open-drain output and CMOS output are available.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: $\pm 3.5\%$ ($2.2 \text{ V} \leq -V_{\text{DET(S)}} \leq 5.0 \text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 $\pm(2.5\% + 22 \text{ mV})$ ($1.0 \text{ V} \leq -V_{\text{DET(S)}} < 2.2 \text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: 500 nA typ.
- Operation voltage range: 0.95 V to 10.0 V
- Hysteresis width: $5\% \pm 2\%$ ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output form: Nch open-drain output (Active "L")
CMOS output (Active "L")
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- For automotive use (accessory, car navigation system, car audio system, etc.)

■ Package

- SOT-23-5

S-19103/19109 Series

AUTOMOTIVE, 105°C OPERATION, 10 V, SENSE-INPUT VOLTAGE DETECTOR

The S-19103/19109 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage is fixed internally with an accuracy of $\pm 3.5\%$ ($-V_{\text{DET(S)}} \geq 2.2 \text{ V}$). The release voltage is set to the same value as the detection voltage, since there is no hysteresis width. It operates with current consumption of 500 nA typ.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin falls to 0 V.

Two output forms Nch open-drain output and CMOS output are available.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: $\pm 3.5\%$ ($2.2 \text{ V} \leq -V_{\text{DET(S)}} \leq 5.0 \text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 $\pm(2.5\% + 22 \text{ mV})$ ($1.0 \text{ V} \leq -V_{\text{DET(S)}} < 2.2 \text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: 500 nA typ.
- Operation voltage range: 0.95 V to 10.0 V
- Output form: Nch open-drain output (Active "L")
CMOS output (Active "L")
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- For automotive use (accessory, car navigation system, car audio system, etc.)

■ Package

- SOT-23-5

S-19104/19106 Series

AUTOMOTIVE, 105°C OPERATION, 10 V, SENSE-INPUT VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19104/19106 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage is fixed internally with an accuracy of $\pm 3.5\%$ ($-V_{\text{DET(S)}} \geq 2.2 \text{ V}$). It operates with current consumption of 500 nA typ.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin falls to 0 V.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 34\%$ ($C_D = 4.7 \text{ nF}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$).

Two output forms Nch open-drain output and CMOS output are available.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: $\pm 3.5\%$ ($2.2 \text{ V} \leq -V_{\text{DET(S)}} \leq 5.0 \text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 $\pm(2.5\% + 22 \text{ mV})$ ($1.0 \text{ V} \leq -V_{\text{DET(S)}} < 2.2 \text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: 500 nA typ.
- Operation voltage range: 0.95 V to 10.0 V
- Hysteresis width: $5\% \pm 2\%$ ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Release delay time accuracy: $\pm 34\%$ ($C_D = 4.7 \text{ nF}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output form: Nch open-drain output (Active "L")
CMOS output (Active "L")
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- For automotive use (accessory, car navigation system, car audio system, etc.)

■ Package

- SOT-23-5

S-19105/19107 Series

AUTOMOTIVE, 105°C OPERATION, 10 V, SENSE-INPUT VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19105/19107 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage is fixed internally with an accuracy of $\pm 3.5\%$ ($-V_{\text{DET(S)}} \geq 2.2 \text{ V}$). The release voltage is set to the same value as the detection voltage, since there is no hysteresis width. It operates with current consumption of 500 nA typ.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin falls to 0 V.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 34\%$ ($C_D = 4.7 \text{ nF}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$).

Two output forms Nch open-drain output and CMOS output are available.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 1.0 V to 5.0 V (0.1 V step)
- Detection voltage accuracy: $\pm 3.5\%$ ($2.2 \text{ V} \leq -V_{\text{DET(S)}} \leq 5.0 \text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 $\pm(2.5\% + 22 \text{ mV})$ ($1.0 \text{ V} \leq -V_{\text{DET(S)}} < 2.2 \text{ V}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: 500 nA typ.
- Operation voltage range: 0.95 V to 10.0 V
- Release delay time accuracy: $\pm 34\%$ ($C_D = 4.7 \text{ nF}$, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output form: Nch open-drain output (Active "L")
CMOS output (Active "L")
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- For automotive use (accessory, car navigation system, car audio system, etc.)

■ Package

- SOT-23-5

S-19110AxxA to S-19110HxxA Series

AUTOMOTIVE, 125°C OPERATION, 36 V, SENSE-INPUT VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19110 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 2.0\%$. It operates with current consumption of 600 nA typ.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared in the SENSE detection product, so the output is stable even if the SENSE pin falls to 0 V.

The detection signal and release signal can be delayed by setting a capacitor externally, and the detection delay time accuracy is $\pm 20\%$ ($C_N = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$), the release delay time accuracy is $\pm 20\%$ ($C_P = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$).

The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 5.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 2.0\%$ ($T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Detection delay time accuracy: $\pm 20\%$ ($C_N = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Release voltage: 5.25 V to 13.0 V (0.05 V step)
- Release voltage accuracy: $\pm 2.0\%$ ($T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$, $5.0\% \leq V_{HYS} \leq 20.0\%$)
 $\pm 2.5\%$ ($T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$, $20.0\% < V_{HYS} \leq 30.0\%$)
- Release delay time accuracy: $\pm 20\%$ ($C_P = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: 600 nA typ.
- Operation voltage range: 1.8 V to 36.0 V
- Hysteresis width*1: "Available" / "unavailable" is selectable.
5.0% to 30.0% ($T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output form: Nch open-drain output
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. When "available" is selected, the hysteresis width can be set in the range of 5.0% to 30.0%.

*2. Contact our sales representatives for details.

■ Applications

- Power supply monitor for microcomputer and reset for CPU
- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Package

- SOT-23-6

S-19110AxxH to S-19110HxxH Series

AUTOMOTIVE, 105°C OPERATION, 36 V, SENSE-INPUT VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19110 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$. It operates with current consumption of 600 nA typ.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared in the SENSE detection product, so the output is stable even if the SENSE pin falls to 0 V.

The detection signal and release signal can be delayed by setting a capacitor externally, and the detection delay time accuracy is $\pm 20\%$ ($C_N = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$), the release delay time accuracy is $\pm 20\%$ ($C_P = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$).

The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 5.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 1.5\%$ ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Detection delay time accuracy: $\pm 20\%$ ($C_N = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Release voltage: 5.25 V to 13.0 V (0.05 V step)
- Release voltage accuracy: $\pm 1.5\%$ ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$, $5.0\% \leq V_{HYS} \leq 20.0\%$)
 $\pm 2.0\%$ ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$, $20.0\% < V_{HYS} \leq 30.0\%$)
- Release delay time accuracy: $\pm 20\%$ ($C_P = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: 600 nA typ.
- Operation voltage range: 1.8 V to 36.0 V
- Hysteresis width*1: "Available" / "unavailable" is selectable.
5.0% to 30.0% ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output form: Nch open-drain output
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. When "available" is selected, the hysteresis width can be set in the range of 5.0% to 30.0%.

*2. Contact our sales representatives for details.

■ Applications

- Power supply monitor for microcomputer and reset for CPU
- Automotive battery voltage detection
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Package

- SOT-23-6

S-19110JxxA to S-19110RxxA Series

AUTOMOTIVE, 125°C OPERATION, 36 V, SENSE-INPUT VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19110 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 2.5\%$. It operates with current consumption of 600 nA typ.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared in the SENSE detection product, so the output is stable even if the SENSE pin falls to 0 V.

The detection signal and release signal can be delayed by setting a capacitor externally, and the detection delay time accuracy is $\pm 20\%$ ($C_N = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$), the release delay time accuracy is $\pm 20\%$ ($C_P = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$).

The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: J / K / L / M type (VDD detection product): 3.6 V to 4.95 V (0.05 V step)
N / P / Q / R type (SENSE detection product): 3.0 V to 4.95 V (0.05 V step)
- Detection voltage accuracy: $\pm 3.0\%$ ($-V_{\text{DET(S)}} = 3.0$ V to 4.15 V, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
 $\pm 2.5\%$ ($-V_{\text{DET(S)}} = 4.2$ V to 4.95 V, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Detection delay time accuracy: $\pm 20\%$ ($C_N = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Release voltage: J / K / L / M type (VDD detection product): 3.8 V to 6.4 V (0.05 V step)
N / P / Q / R type (SENSE detection product): 3.15 V to 6.4 V (0.05 V step)
- Release voltage accuracy: $\pm 3.0\%$ ($-V_{\text{DET(S)}} = 3.0$ V to 4.15 V, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$, $5.0\% \leq V_{\text{HYS}} \leq 20.0\%$)
 $\pm 3.5\%$ ($-V_{\text{DET(S)}} = 3.0$ V to 4.15 V, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$, $20.0\% < V_{\text{HYS}} \leq 30.0\%$)
 $\pm 2.5\%$ ($-V_{\text{DET(S)}} = 4.2$ V to 4.95 V, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$, $5.0\% \leq V_{\text{HYS}} \leq 20.0\%$)
 $\pm 3.0\%$ ($-V_{\text{DET(S)}} = 4.2$ V to 4.95 V, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$, $20.0\% < V_{\text{HYS}} \leq 30.0\%$)
- Release delay time accuracy: $\pm 20\%$ ($C_P = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Current consumption: 600 nA typ.
- Operation voltage range: 1.8 V to 36.0 V
- Hysteresis width*1: "Available" / "unavailable" is selectable.
5.0% to 30.0% ($T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Output form: Nch open-drain output
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. When "available" is selected, the hysteresis width can be set in the range of 5.0% to 30.0%.

*2. Contact our sales representatives for details.

■ Applications

- Power supply monitor for microcomputer and reset for CPU
- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Package

- SOT-23-6

S-19110JxxH to S-19110RxxH Series

AUTOMOTIVE, 105°C OPERATION, 36 V, SENSE-INPUT VOLTAGE DETECTOR WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

The S-19110 Series is a high-accuracy voltage detector developed using CMOS technology. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 2.5\%$. It operates with current consumption of 600 nA typ.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared in the SENSE detection product, so the output is stable even if the SENSE pin falls to 0 V.

The detection signal and release signal can be delayed by setting a capacitor externally, and the detection delay time accuracy is $\pm 20\%$ ($C_N = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$), the release delay time accuracy is $\pm 20\%$ ($C_P = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$).

The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: J / K / L / M type (VDD detection product): 3.6 V to 4.95 V (0.05 V step)
N / P / Q / R type (SENSE detection product): 3.0 V to 4.95 V (0.05 V step)
- Detection voltage accuracy: $\pm 3.0\%$ ($-V_{DET(S)} = 3.0$ V to 4.15 V, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
 $\pm 2.5\%$ ($-V_{DET(S)} = 4.2$ V to 4.95 V, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Detection delay time accuracy: $\pm 20\%$ ($C_N = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Release voltage: J / K / L / M type (VDD detection product): 3.8 V to 6.4 V (0.05 V step)
N / P / Q / R type (SENSE detection product): 3.15 V to 6.4 V (0.05 V step)
- Release voltage accuracy: $\pm 3.0\%$ ($-V_{DET(S)} = 3.0$ V to 4.15 V, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$, $5.0\% \leq V_{HYS} \leq 20.0\%$)
 $\pm 3.5\%$ ($-V_{DET(S)} = 3.0$ V to 4.15 V, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$, $20.0\% < V_{HYS} \leq 30.0\%$)
 $\pm 2.5\%$ ($-V_{DET(S)} = 4.2$ V to 4.95 V, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$, $5.0\% \leq V_{HYS} \leq 20.0\%$)
 $\pm 3.0\%$ ($-V_{DET(S)} = 4.2$ V to 4.95 V, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$, $20.0\% < V_{HYS} \leq 30.0\%$)
- Release delay time accuracy: $\pm 20\%$ ($C_P = 3.3$ nF, $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Current consumption: 600 nA typ.
- Operation voltage range: 1.8 V to 36.0 V
- Hysteresis width*1: "Available" / "unavailable" is selectable.
5.0% to 30.0% ($T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$)
- Output form: Nch open-drain output
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. When "available" is selected, the hysteresis width can be set in the range of 5.0% to 30.0%.

*2. Contact our sales representatives for details.

■ Applications

- Power supply monitor for microcomputer and reset for CPU
- Automotive battery voltage detection
- For automotive use (related-devices for EV / HEV / PHEV, car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Package

- SOT-23-6

S-19113xxxA Series

AUTOMOTIVE, 125°C OPERATION, 36 V, VOLTAGE DETECTOR WITH SENSE PIN REVERSE CONNECTION PROTECTION, DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

This IC, developed using CMOS technology, is a high-accuracy voltage detector. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 4.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 1.5\%$
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 5.0%, 10.0%
"Unavailable": 0%
- Release delay time accuracy: $\pm 15\%$ ($C_D = 3.3 \text{ nF}$)
- Current consumption: 0.6 μA typ.
- Output form: Nch open-drain output
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation voltage range: 3.0 V to 36.0 V
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)
- SOT-23-5

S-19113xxxH Series

AUTOMOTIVE, 105°C OPERATION, 36 V, VOLTAGE DETECTOR WITH SENSE PIN REVERSE CONNECTION PROTECTION, DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

This IC, developed using CMOS technology, is a high-accuracy voltage detector. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 4.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 1.5\%$
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 5.0%, 10.0%
"Unavailable": 0%
- Release delay time accuracy: $\pm 15\%$ ($C_D = 3.3 \text{ nF}$)
- Current consumption: 0.6 μA typ.
- Output form: Nch open-drain output
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation voltage range: 3.0 V to 36.0 V
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- Automotive battery voltage detection
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)
- SOT-23-5

S-19113xxxS Series

AUTOMOTIVE, 150°C OPERATION, 36 V, VOLTAGE DETECTOR WITH SENSE PIN REVERSE CONNECTION PROTECTION, DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

This IC, developed using CMOS technology, is a high-accuracy voltage detector. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 2.0\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 20\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 4.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 2.0\%$
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 5.0%, 10.0%
"Unavailable": 0%
- Release delay time accuracy: $\pm 20\%$ ($C_D = 3.3 \text{ nF}$)
- Current consumption: 0.6 μA typ.
- Output form: Nch open-drain output
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation voltage range: 3.0 V to 36.0 V
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+150^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)
- SOT-23-5

S-19114xxxA Series

**AUTOMOTIVE, 125°C OPERATION, 36 V, VOLTAGE DETECTOR
WITH FAST DETECTION RESPONSE, SENSE PIN REVERSE CONNECTION PROTECTION,
DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)**

This IC, developed using CMOS technology, is a high-accuracy voltage detector. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Since the detection response time is as fast as 10 μs max., voltage abnormalities can be detected and notified quickly.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 20\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 4.0 V to 12.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 1.5\%$
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 2.0%, 5.0%, 10.0%
"Unavailable": 0%
- Detection response time: 10 μs max. (S-19114 Series L / M / N / R type)
25 μs max. (S-19114 Series P / Q / S / T type)
- Release delay time: 10 ms typ. ($C_D = 3.3 \text{ nF}$)
- Release delay time accuracy: $\pm 20\%$ ($C_D = 3.3 \text{ nF}$)
- Current consumption: 2.0 μA typ.
- Operation voltage range: 3.0 V to 36.0 V
- Output form: Nch open-drain output
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

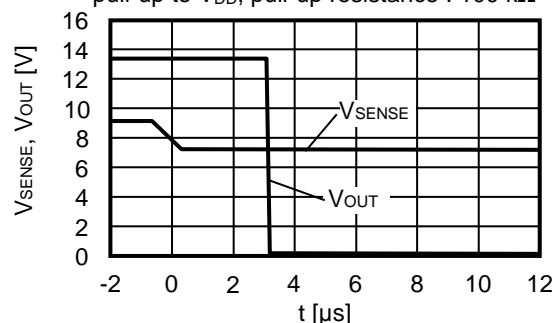
- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- SOT-23-5
- HSNT-6(2025)

■ Detection response time

$V_{\text{DET(S)}} = 8.0 \text{ V}$, $V_{\text{HYS}} = 5.0 \%$, $V_{\text{DD}} = 13.5 \text{ V}$,
 $V_{\text{SENSE}} = V_{\text{DET(S)}} + 1.0 \text{ V} \rightarrow V_{\text{DET(S)}} - 1.0 \text{ V}$,
pull-up to V_{DD} , pull-up resistance : 100 k Ω



S-19115xxxA Series

AUTOMOTIVE, 125°C OPERATION, 36 V, VOLTAGE DETECTOR FOR OVERVOLTAGE DETECTION WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

This IC, developed using CMOS technology, is a high-accuracy voltage detector. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$ ($16.0\text{ V} \leq V_{\text{DET(S)}})$

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3\text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 12.2 V to 18.0 V (0.1 V step)
- Detection voltage accuracy: $\pm 1.5\%$ ($16.0\text{ V} \leq V_{\text{DET(S)}} \leq 18.0\text{ V}$, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
 $\pm 1.6\%$ ($12.2\text{ V} \leq V_{\text{DET(S)}} < 16.0\text{ V}$, $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 5.0%, 10.0%
"Unavailable": 0%
- Release delay time accuracy: $\pm 15\%$ ($C_D = 3.3\text{ nF}$)
- Current consumption: 0.6 μA typ.
- Output form: Nch open-drain output
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation voltage range: 3.0 V to 36.0 V
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)
- SOT-23-5

S-19115xxxH Series

AUTOMOTIVE, 105°C OPERATION, 36 V, VOLTAGE DETECTOR FOR OVERVOLTAGE DETECTION WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

This IC, developed using CMOS technology, is a high-accuracy voltage detector. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 16.0 V to 18.0 V (0.1 V step)
- Detection voltage accuracy: $\pm 1.5\%$
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 5.0%, 10.0%
"Unavailable": 0%
- Release delay time accuracy: $\pm 15\%$ ($C_D = 3.3 \text{ nF}$)
- Current consumption: 0.6 μA typ.
- Output form: Nch open-drain output
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation voltage range: 3.0 V to 36.0 V
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- Automotive battery voltage detection
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)
- SOT-23-5

S-19115xxxS Series

AUTOMOTIVE, 150°C OPERATION, 36 V, VOLTAGE DETECTOR FOR OVERVOLTAGE DETECTION WITH DELAY FUNCTION (EXTERNAL DELAY TIME SETTING)

This IC, developed using CMOS technology, is a high-accuracy voltage detector. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 2.0\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 20\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 16.0 V to 18.0 V (0.1 V step)
- Detection voltage accuracy: $\pm 2.0\%$
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 5.0%, 10.0%
"Unavailable": 0%
- Release delay time accuracy: $\pm 20\%$ ($C_D = 3.3 \text{ nF}$)
- Current consumption: 0.6 μA typ.
- Output form: Nch open-drain output
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation voltage range: 3.0 V to 36.0 V
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+150^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)
- SOT-23-5

S-19117/19119xxxA Series

**AUTOMOTIVE, 125°C OPERATION, 36 V,
SUPPLY VOLTAGE DIVIDED OUTPUT, VOLTAGE DETECTOR
WITH SENSE PIN REVERSE CONNECTION PROTECTION**

This IC, developed using CMOS technology, is a high-accuracy voltage detector with the supply voltage divided output. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3$ nF). The output form is Nch open-drain output.

The supply voltage divided output is prepared in this IC. The supply voltage divided output is a function that divides the V_{SENSE} into $V_{SENSE}/6$, $V_{SENSE}/8$, $V_{SENSE}/12$ or $V_{SENSE}/14$ and outputs the voltage. For example, this function makes it possible that the IC connects to a low voltage microcontroller A/D converter directly and the microcontroller monitors a battery voltage.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Detector block

- Detection voltage: 4.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 1.5\%$
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 5.0%, 10.0%
"Unavailable": 0%
- Release delay time accuracy: $\pm 15\%$ ($C_D = 3.3$ nF)
- Output form: Nch open-drain output

Supply voltage divider block

- Output voltage: $V_{PMOUT} = V_{SENSE}/6$ (S-19117 Series L / M / N type)
 $V_{PMOUT} = V_{SENSE}/8$ (S-19117 Series P / Q / R type)
 $V_{PMOUT} = V_{SENSE}/12$ (S-19119 Series L / M / N type)
 $V_{PMOUT} = V_{SENSE}/14$ (S-19119 Series P / Q / R type)
- Output capacitor (C_{PM}): A ceramic capacitor can be used (0.1 μ F to 0.22 μ F).
- Built-in enable circuit: Ensures long battery life.

Overall

- Current consumption: During supply voltage divided output operates 1.15 μ A typ.
During supply voltage divided output stops 0.75 μ A typ.
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation voltage range: 3.0 V to 36.0 V
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)

S-19117/19119xxxH Series

**AUTOMOTIVE, 105°C OPERATION, 36 V,
SUPPLY VOLTAGE DIVIDED OUTPUT, VOLTAGE DETECTOR
WITH SENSE PIN REVERSE CONNECTION PROTECTION**

This IC, developed using CMOS technology, is a high-accuracy voltage detector with the supply voltage divided output. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3$ nF). The output form is Nch open-drain output.

The supply voltage divided output is prepared in this IC. The supply voltage divided output is a function that divides the V_{SENSE} into $V_{SENSE}/6$, $V_{SENSE}/8$, $V_{SENSE}/12$ or $V_{SENSE}/14$ and outputs the voltage. For example, this function makes it possible that the IC connects to a low voltage microcontroller A/D converter directly and the microcontroller monitors a battery voltage.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Detector block

- Detection voltage: 4.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 1.5\%$
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 5.0%, 10.0%
"Unavailable": 0%
- Release delay time accuracy: $\pm 15\%$ ($C_D = 3.3$ nF)
- Output form: Nch open-drain output

Supply voltage divider block

- Output voltage: $V_{PMOUT} = V_{SENSE}/6$ (S-19117 Series L / M / N type)
 $V_{PMOUT} = V_{SENSE}/8$ (S-19117 Series P / Q / R type)
 $V_{PMOUT} = V_{SENSE}/12$ (S-19119 Series L / M / N type)
 $V_{PMOUT} = V_{SENSE}/14$ (S-19119 Series P / Q / R type)
- Output capacitor (C_{PM}): A ceramic capacitor can be used (0.1 μ F to 0.22 μ F).
- Built-in enable circuit: Ensures long battery life.

Overall

- Current consumption: During supply voltage divided output operates 1.15 μ A typ.
During supply voltage divided output stops 0.75 μ A typ.
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation voltage range: 3.0 V to 36.0 V
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- Automotive battery voltage detection
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)

S-19117/19119xxxS Series

**AUTOMOTIVE, 150°C OPERATION, 36 V,
SUPPLY VOLTAGE DIVIDED OUTPUT, VOLTAGE DETECTOR
WITH SENSE PIN REVERSE CONNECTION PROTECTION**

This IC, developed using CMOS technology, is a high-accuracy voltage detector with the supply voltage divided output. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 2.0\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 20\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

The supply voltage divided output is prepared in this IC. The supply voltage divided output is a function that divides the V_{SENSE} into $V_{SENSE}/6$, $V_{SENSE}/8$, $V_{SENSE}/12$ or $V_{SENSE}/14$ and outputs the voltage. For example, this function makes it possible that the IC connects to a low voltage microcontroller A/D converter directly and the microcontroller monitors a battery voltage.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Detector block

- Detection voltage: 4.0 V to 10.0 V (0.05 V step)
- Detection voltage accuracy: $\pm 2.0\%$
- Hysteresis width selectable from "Available" / "Unavailable": "Available": 5.0%, 10.0%
"Unavailable": 0%
- Release delay time accuracy: $\pm 20\%$ ($C_D = 3.3 \text{ nF}$)
- Output form: Nch open-drain output

Supply voltage divider block

- Output voltage: $V_{PMOUT} = V_{SENSE}/6$ (S-19117 Series L / M / N type)
 $V_{PMOUT} = V_{SENSE}/8$ (S-19117 Series P / Q / R type)
 $V_{PMOUT} = V_{SENSE}/12$ (S-19119 Series L / M / N type)
 $V_{PMOUT} = V_{SENSE}/14$ (S-19119 Series P / Q / R type)
- Output capacitor (C_{PM}): A ceramic capacitor can be used (0.1 μF to 0.22 μF).
- Built-in enable circuit: Ensures long battery life.

Overall

- Current consumption: During supply voltage divided output operates 1.15 μA typ.
During supply voltage divided output stops 0.75 μA typ.
- Built-in reverse connection protection circuit: Reduces current in the SENSE pin during a reverse connection.
- Operation voltage range: 3.0 V to 36.0 V
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+150^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Applications

- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)

S-19122xxxA Series

AUTOMOTIVE, 125°C OPERATION, 6 V, VOLTAGE DETECTOR WITH FAST DETECTION RESPONSE AND MANUAL RESET FUNCTION

This IC, developed using CMOS technology, is a high-accuracy voltage detector. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3$ nF).

This IC also has a manual reset function. The manual reset function changes the comparator input voltage of the internal circuit, and the detector is forcibly put into the detection status. This enables a diagnosis of anomalies in the detector, such as erroneous release.

The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- | | | | |
|---|---|----------------|-------------------|
| • Detection voltage: | 0.6 V to 4.9 V (0.05 V step) | | |
| • Detection voltage accuracy: | $\pm 1.5\%$ | | |
| • Hysteresis width selectable from "Available" / "Unavailable": | | "Available": | 3.0%, 5.0%, 10.0% |
| | | "Unavailable": | 0% |
| • Detection response time: | 10.0 μ s typ. | | |
| • Manual reset function: | MR pin input logic: | Active "L" | |
| • Release delay time accuracy: | $\pm 15\%$ ($C_D = 3.3$ nF) | | |
| • Current consumption: | 1.2 μ A typ. | | |
| • Output form: | Nch open-drain output | | |
| • Operation voltage range: | 2.5 V to 6.0 V | | |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$ | | |
| • Lead-free (Sn 100%), halogen-free | | | |
| • AEC-Q100 qualified*1 | | | |

*1. Contact our sales representatives for details.

■ Applications

- Voltage detection of power supply for automotive electric component
- Voltage monitoring of automotive ECUs, ADAS and other systems that require failure detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- SOT-23-6
- HSNT-8(1616)B

S-191AxxxxA Series

**AUTOMOTIVE, 125°C OPERATION, 6 V,
WINDOW VOLTAGE DETECTOR
WITH FAST DETECTION RESPONSE AND MANUAL RESET FUNCTION**

This IC, developed using CMOS technology, is a high-accuracy window voltage detector that detects undervoltage and overvoltage. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3$ nF). This IC also has a manual reset function. The manual reset function changes the comparator input voltage of the internal circuit, and the detector is forcibly put into the detection status. This enables a diagnosis of anomalies in the detector, such as erroneous release.

The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- | | | |
|---|---|---|
| • Detection voltage: | Undervoltage detection voltage | 0.6 V to 4.9 V (0.05 V step) |
| | Overvoltage detection voltage | 0.7 V to 5.5 V (0.05 V step) |
| • Detection voltage accuracy: | Undervoltage detection voltage | $\pm 1.5\%$ |
| | Overvoltage detection voltage | $\pm 1.5\%$ |
| • Hysteresis width selectable from "Available" / "Unavailable": | | "Available": 3.0%, 5.0%, 10.0%
"Unavailable": 0% |
| • Detection response time: | 10.0 μ s typ. | |
| • Manual reset function: | MR pin input logic: | Active "L" |
| • Release delay time accuracy: | $\pm 15\%$ ($C_D = 3.3$ nF) | |
| • Output form: | Nch open-drain output | |
| • Current consumption: | 1.5 μ A typ. | |
| • Operation voltage range: | 2.5 V to 6.0 V | |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$ | |
| • Lead-free (Sn 100%), halogen-free | | |
| • AEC-Q100 qualified**1 | | |

*1. Contact our sales representatives for details.

■ Applications

- Overvoltage detection of power supply for automotive electric component
- Voltage monitoring of automotive ECUs, ADAS and other systems that require failure detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- SOT-23-6
- HSNT-8(1616)B

S-191BxxxxA Series

**AUTOMOTIVE, 125°C OPERATION, 6 V,
WINDOW VOLTAGE DETECTOR
WITH FAST DETECTION RESPONSE**

This IC, developed using CMOS technology, is a high-accuracy window voltage detector that detects undervoltage and overvoltage. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3$ nF).

The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- | | | |
|---|---|---|
| • Detection voltage: | Undervoltage detection voltage | 0.6 V to 4.9 V (0.05 V step) |
| | Overvoltage detection voltage | 0.7 V to 5.5 V (0.05 V step) |
| • Detection voltage accuracy: | Undervoltage detection voltage | $\pm 1.5\%$ |
| | Overvoltage detection voltage | $\pm 1.5\%$ |
| • Hysteresis width selectable from "Available" / "Unavailable": | | "Available": 3.0%, 5.0%, 10.0%
"Unavailable": 0% |
| • Detection response time: | 10.0 μ s typ. | |
| • Release delay time accuracy: | $\pm 15\%$ ($C_D = 3.3$ nF) | |
| • Output form: | Nch open-drain output | |
| • Current consumption: | 1.5 μ A typ. | |
| • Operation voltage range: | 2.5 V to 6.0 V | |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$ | |
| • Lead-free (Sn 100%), halogen-free | | |
| • AEC-Q100 qualified*1 | | |

*1. Contact our sales representatives for details.

■ Applications

- Overvoltage detection of power supply for automotive electric component
- Voltage monitoring of automotive ECUs, ADAS, etc.
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- SOT-23-6
- HSNT-8(1616)B

S-191ExxxxA Series

AUTOMOTIVE, 125°C OPERATION, 36 V, WINDOW VOLTAGE DETECTOR WITH SENSE PIN REVERSE CONNECTION PROTECTION

This IC, developed using CMOS technology, is a high-accuracy window voltage detector that detects undervoltage and overvoltage. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- | | | |
|---|---|---|
| • Detection voltage: | Undervoltage detection voltage | 4.0 V to 10.0 V (0.05 V step) |
| | Overvoltage detection voltage | 16.0 V to 18.0 V (0.1 V step) |
| • Detection voltage accuracy: | Undervoltage detection voltage | $\pm 1.5\%$ |
| | Overvoltage detection voltage | $\pm 1.5\%$ |
| • Hysteresis width selectable from "Available" / "Unavailable": | | "Available": 5.0%, 10.0%
"Unavailable": 0% |
| • Release delay time accuracy: | $\pm 15\%$ ($C_D = 3.3 \text{ nF}$) | |
| • Current consumption: | 0.9 μA typ. | |
| • Output form: | Nch open-drain output | |
| • Built-in reverse connection protection circuit: | Reduces current in the SENSE pin during a reverse connection. | |
| • Operation voltage range: | 3.0 V to 36.0 V | |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$ | |
| • Lead-free (Sn 100%), halogen-free | | |
| • Withstand 45 V load dump | | |
| • AEC-Q100 qualified*1 | | |

*1. Contact our sales representatives for details.

■ Applications

- Overvoltage detection of power supply for automotive electric component
- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)

S-191ExxxxH Series

AUTOMOTIVE, 105°C OPERATION, 36 V, WINDOW VOLTAGE DETECTOR WITH SENSE PIN REVERSE CONNECTION PROTECTION

This IC, developed using CMOS technology, is a high-accuracy window voltage detector that detects undervoltage and overvoltage. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- | | | |
|---|---|---|
| • Detection voltage: | Undervoltage detection voltage | 4.0 V to 10.0 V (0.05 V step) |
| | Overvoltage detection voltage | 16.0 V to 18.0 V (0.1 V step) |
| • Detection voltage accuracy: | Undervoltage detection voltage | $\pm 1.5\%$ |
| | Overvoltage detection voltage | $\pm 1.5\%$ |
| • Hysteresis width selectable from "Available" / "Unavailable": | | "Available": 5.0%, 10.0%
"Unavailable": 0% |
| • Release delay time accuracy: | $\pm 15\%$ ($C_D = 3.3 \text{ nF}$) | |
| • Current consumption: | 0.9 μA typ. | |
| • Output form: | Nch open-drain output | |
| • Built-in reverse connection protection circuit: | Reduces current in the SENSE pin during a reverse connection. | |
| • Operation voltage range: | 3.0 V to 36.0 V | |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$ | |
| • Lead-free (Sn 100%), halogen-free | | |
| • Withstand 45 V load dump | | |
| • AEC-Q100 qualified*1 | | |

*1. Contact our sales representatives for details.

■ Applications

- Overvoltage detection of power supply for automotive electric component
- Automotive battery voltage detection
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)

S-191ExxxxS Series

AUTOMOTIVE, 150°C OPERATION, 36 V, WINDOW VOLTAGE DETECTOR WITH SENSE PIN REVERSE CONNECTION PROTECTION

This IC, developed using CMOS technology, is a high-accuracy window voltage detector that detects undervoltage and overvoltage. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 2.0\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 20\%$ ($C_D = 3.3 \text{ nF}$). The output form is Nch open-drain output.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- | | | |
|---|---|---|
| • Detection voltage: | Undervoltage detection voltage | 4.0 V to 10.0 V (0.05 V step) |
| | Overvoltage detection voltage | 16.0 V to 18.0 V (0.1 V step) |
| • Detection voltage accuracy: | Undervoltage detection voltage | $\pm 2.0\%$ |
| | Overvoltage detection voltage | $\pm 2.0\%$ |
| • Hysteresis width selectable from "Available" / "Unavailable": | | "Available": 5.0%, 10.0%
"Unavailable": 0% |
| • Release delay time accuracy: | $\pm 20\%$ ($C_D = 3.3 \text{ nF}$) | |
| • Current consumption: | 0.9 μA typ. | |
| • Output form: | Nch open-drain output | |
| • Built-in reverse connection protection circuit: | Reduces current in the SENSE pin during a reverse connection. | |
| • Operation voltage range: | 3.0 V to 36.0 V | |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+150^\circ\text{C}$ | |
| • Lead-free (Sn 100%), halogen-free | | |
| • Withstand 45 V load dump | | |
| • AEC-Q100 qualified*1 | | |

*1. Contact our sales representatives for details.

■ Applications

- Overvoltage detection of power supply for automotive electric component
- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)

S-191L/191NxxxxA Series

AUTOMOTIVE, 125°C OPERATION, 36 V, SUPPLY VOLTAGE DIVIDED OUTPUT, WINDOW VOLTAGE DETECTOR WITH SENSE PIN REVERSE CONNECTION PROTECTION

This IC, developed using CMOS technology, is a high-accuracy window voltage detector with the supply voltage divided output that detects undervoltage and overvoltage. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection. The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3$ nF). The output form is Nch open-drain output.

The supply voltage divided output is prepared in this IC. The supply voltage divided output is a function that divides the V_{SENSE} into $V_{SENSE}/6$, $V_{SENSE}/8$, $V_{SENSE}/12$ or $V_{SENSE}/14$ and outputs the voltage. For example, this function makes it possible that the IC connects to a low voltage microcontroller A/D converter directly and the microcontroller monitors a battery voltage.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Detector block

- | | | |
|---|--------------------------------|---|
| • Detection voltage: | Undervoltage detection voltage | 4.0 V to 10.0 V (0.05 V step) |
| | Overvoltage detection voltage | 16.0 V to 18.0 V (0.1 V step) |
| • Detection voltage accuracy: | Undervoltage detection voltage | $\pm 1.5\%$ |
| | Overvoltage detection voltage | $\pm 1.5\%$ |
| • Hysteresis width selectable from "Available" / "Unavailable": | | "Available": 5.0%, 10.0%
"Unavailable": 0% |
| • Release delay time accuracy: | | $\pm 15\%$ ($C_D = 3.3$ nF) |
| • Output form: | | Nch open-drain output |

Supply voltage divider block

- | | |
|----------------------------------|--|
| • Output voltage: | $V_{PMOUT} = V_{SENSE}/6$ (S-191L Series L / M / N type) |
| | $V_{PMOUT} = V_{SENSE}/8$ (S-191L Series P / Q / R type) |
| | $V_{PMOUT} = V_{SENSE}/12$ (S-191N Series L / M / N type) |
| | $V_{PMOUT} = V_{SENSE}/14$ (S-191N Series P / Q / R type) |
| • Output capacitor (C_{PM}): | A ceramic capacitor can be used (0.1 μ F to 0.22 μ F). |
| • Built-in enable circuit: | Ensures long battery life. |

Overall

- | | | |
|---|---|------------------|
| • Current consumption: | During supply voltage divided output operates | 1.3 μ A typ. |
| | During supply voltage divided output stops | 0.9 μ A typ. |
| • Built-in reverse connection protection circuit: | Reduces current in the SENSE pin during a reverse connection. | |
| • Operation voltage range: | 3.0 V to 36.0 V | |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$ | |
| • Lead-free (Sn 100%), halogen-free | | |
| • Withstand 45 V load dump | | |
| • AEC-Q100 qualified*1 | | |

*1. Contact our sales representatives for details.

■ Applications

- Overvoltage detection of power supply for automotive electric component
- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)

S-191L/191NxxxxH Series

AUTOMOTIVE, 105°C OPERATION, 36 V, SUPPLY VOLTAGE DIVIDED OUTPUT, WINDOW VOLTAGE DETECTOR WITH SENSE PIN REVERSE CONNECTION PROTECTION

This IC, developed using CMOS technology, is a high-accuracy window voltage detector with the supply voltage divided output that detects undervoltage and overvoltage. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 1.5\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 15\%$ ($C_D = 3.3$ nF). The output form is Nch open-drain output.

The supply voltage divided output is prepared in this IC. The supply voltage divided output is a function that divides the V_{SENSE} into $V_{SENSE}/6$, $V_{SENSE}/8$, $V_{SENSE}/12$ or $V_{SENSE}/14$ and outputs the voltage. For example, this function makes it possible that the IC connects to a low voltage microcontroller A/D converter directly and the microcontroller monitors a battery voltage.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Detector block

- | | | |
|---|--------------------------------|-------------------------------|
| • Detection voltage: | Undervoltage detection voltage | 4.0 V to 10.0 V (0.05 V step) |
| | Overvoltage detection voltage | 16.0 V to 18.0 V (0.1 V step) |
| • Detection voltage accuracy: | Undervoltage detection voltage | $\pm 1.5\%$ |
| | Overvoltage detection voltage | $\pm 1.5\%$ |
| • Hysteresis width selectable from "Available" / "Unavailable": | "Available": | 5.0%, 10.0% |
| | "Unavailable": | 0% |
| • Release delay time accuracy: | $\pm 15\%$ ($C_D = 3.3$ nF) | |
| • Output form: | Nch open-drain output | |

Supply voltage divider block

- | | |
|----------------------------------|--|
| • Output voltage: | $V_{PMOUT} = V_{SENSE}/6$ (S-191L Series L / M / N type) |
| | $V_{PMOUT} = V_{SENSE}/8$ (S-191L Series P / Q / R type) |
| | $V_{PMOUT} = V_{SENSE}/12$ (S-191N Series L / M / N type) |
| | $V_{PMOUT} = V_{SENSE}/14$ (S-191N Series P / Q / R type) |
| • Output capacitor (C_{PM}): | A ceramic capacitor can be used (0.1 μ F to 0.22 μ F). |
| • Built-in enable circuit: | Ensures long battery life. |

Overall

- | | | |
|---|---|------------------|
| • Current consumption: | During supply voltage divided output operates | 1.3 μ A typ. |
| | During supply voltage divided output stops | 0.9 μ A typ. |
| • Built-in reverse connection protection circuit: | Reduces current in the SENSE pin during a reverse connection. | |
| • Operation voltage range: | 3.0 V to 36.0 V | |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+105^\circ\text{C}$ | |
| • Lead-free (Sn 100%), halogen-free | | |
| • Withstand 45 V load dump | | |
| • AEC-Q100 qualified*1 | | |

*1. Contact our sales representatives for details.

■ Applications

- Overvoltage detection of power supply for automotive electric component
- Automotive battery voltage detection
- For automotive use (car body, headlight, ITS, accessory, car navigation system, car audio system, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)

S-191L/191NxxxxS Series

**AUTOMOTIVE, 150°C OPERATION, 36 V,
SUPPLY VOLTAGE DIVIDED OUTPUT, WINDOW VOLTAGE DETECTOR
WITH SENSE PIN REVERSE CONNECTION PROTECTION**

output that detects undervoltage and overvoltage. The detection voltage and release voltage are fixed internally with an accuracy of $\pm 2.0\%$.

Apart from the power supply pin, the detection voltage input pin (SENSE pin) is also prepared, so the output is stable even if the SENSE pin voltage (V_{SENSE}) falls to 0 V. The SENSE pin also has a built-in reverse connection protection circuit that reduces current in the SENSE pin during a reverse connection.

The release signal can be delayed by setting a capacitor externally, and the release delay time accuracy is $\pm 20\%$ ($C_D = 3.3$ nF). The output form is Nch open-drain output.

The supply voltage divided output is prepared in this IC. The supply voltage divided output is a function that divides the V_{SENSE} into $V_{SENSE}/6$, $V_{SENSE}/8$, $V_{SENSE}/12$ or $V_{SENSE}/14$ and outputs the voltage. For example, this function makes it possible that the IC connects to a low voltage microcontroller A/D converter directly and the microcontroller monitors a battery voltage.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Detector block

- | | | |
|---|--------------------------------|---|
| • Detection voltage: | Undervoltage detection voltage | 4.0 V to 10.0 V (0.05 V step) |
| | Overvoltage detection voltage | 16.0 V to 18.0 V (0.1 V step) |
| • Detection voltage accuracy: | Undervoltage detection voltage | $\pm 2.0\%$ |
| | Overvoltage detection voltage | $\pm 2.0\%$ |
| • Hysteresis width selectable from "Available" / "Unavailable": | | "Available": 5.0%, 10.0%
"Unavailable": 0% |
| • Release delay time accuracy: | | $\pm 20\%$ ($C_D = 3.3$ nF) |
| • Output form: | | Nch open-drain output |

Supply voltage divider block

- | | |
|----------------------------------|--|
| • Output voltage: | $V_{PMOUT} = V_{SENSE}/6$ (S-191L Series L / M / N type)
$V_{PMOUT} = V_{SENSE}/8$ (S-191L Series P / Q / R type)
$V_{PMOUT} = V_{SENSE}/12$ (S-191N Series L / M / N type)
$V_{PMOUT} = V_{SENSE}/14$ (S-191N Series P / Q / R type) |
| • Output capacitor (C_{PM}): | A ceramic capacitor can be used (0.1 μ F to 0.22 μ F). |
| • Built-in enable circuit: | Ensures long battery life. |

Overall

- | | |
|---|---|
| • Current consumption: | During supply voltage divided output operates 1.3 μ A typ.
During supply voltage divided output stops 0.9 μ A typ. |
| • Built-in reverse connection protection circuit: | Reduces current in the SENSE pin during a reverse connection. |
| • Operation voltage range: | 3.0 V to 36.0 V |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+150^\circ\text{C}$ |
| • Lead-free (Sn 100%), halogen-free | |
| • Withstand 45 V load dump | |
| • AEC-Q100 qualified*1 | |

*1. Contact our sales representatives for details.

■ Applications

- Overvoltage detection of power supply for automotive electric component
- Automotive battery voltage detection
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- HTMSOP-8
- HSNT-8(2030)

S-19400/19401 Series

AUTOMOTIVE, 125°C OPERATION, 3.8 μ A CURRENT CONSUMPTION WATCHDOG TIMER WITH RESET FUNCTION

The S-19400/19401 Series is a watchdog timer developed using CMOS technology, which can operate with low current consumption of 3.8 μ A typ. The reset function and the low voltage detection function are available.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 2.0 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$
- Input voltage: $V_{DD} = 0.9$ V to 6.0 V
- Hysteresis width: 5% typ.
- Current consumption during watchdog timer operation: 3.8 μ A typ.
- Reset time-out period: 14.5 ms typ. ($C_{POR} = 2200$ pF)
- Watchdog time-out period: 24.6 ms typ. ($C_{WDT} = 470$ pF)
- Watchdog operation is switchable: Enable, Disable
- Watchdog operation voltage range: $V_{DD} = 2.5$ V to 6.0 V
- Watchdog mode switching function*1: Time-out mode, window mode
- Watchdog input edge is selectable: Rising edge, falling edge, both rising and falling edges
- Product type is selectable: S-19400 Series
(Product with \overline{W} / T pin (Output: \overline{WDO} pin))
S-19401 Series
(Product without \overline{W} / T pin (Output: \overline{RST} pin, \overline{WDO} pin))
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*2

*1. The S-19401 Series is fixed to the window mode.

*2. Contact our sales representatives for details.

■ Applications

- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TMSOP-8
- HSNT-8(2030)

S-19405 Series

AUTOMOTIVE, 125°C OPERATION, 3.8 μ A CURRENT CONSUMPTION WATCHDOG TIMER WITH RESET FUNCTION

The S-19405 Series is a watchdog timer developed using CMOS technology, which can operate with low current consumption of 3.8 μ A typ. The reset function and the low voltage detection function are available.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- | | |
|--|---|
| • Detection voltage: | 2.0 V to 5.0 V, selectable in 0.1 V step |
| • Detection voltage accuracy: | $\pm 2.0\%$ |
| • Input voltage: | $V_{DD} = 0.9$ V to 6.0 V |
| • Hysteresis width: | 5% typ. |
| • Current consumption during watchdog timer operation: | 3.8 μ A typ. |
| • Reset time-out period: | 14.5 ms typ. ($C_{POR} = 2200$ pF) |
| • Watchdog time-out period: | 24.6 ms typ. ($C_{WDT} = 470$ pF) |
| • Watchdog operation is switchable: | Enable, Disable |
| • Watchdog operation voltage range: | $V_{DD} = 2.5$ V to 6.0 V |
| • Watchdog input edge is selectable: | Rising edge, falling edge |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| • Lead-free (Sn 100%), halogen-free | |
| • AEC-Q100 qualified*1 | |

*1. Contact our sales representatives for details.

■ Applications

- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TMSOP-8
- HSNT-8(2030)

S-19400/19401 Series

AUTOMOTIVE, 125°C OPERATION, 3.8 μ A CURRENT CONSUMPTION WATCHDOG TIMER WITH RESET FUNCTION

The S-19400/19401 Series is a watchdog timer developed using CMOS technology, which can operate with low current consumption of 3.8 μ A typ. The reset function and the low voltage detection function are available.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Detection voltage: 2.0 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$
- Input voltage: $V_{DD} = 0.9$ V to 6.0 V
- Hysteresis width: 5% typ.
- Current consumption during watchdog timer operation: 3.8 μ A typ.
- Reset time-out period: 14.5 ms typ. ($C_{POR} = 2200$ pF)
- Watchdog time-out period: 24.6 ms typ. ($C_{WDT} = 470$ pF)
- Watchdog operation is switchable: Enable, Disable
- Watchdog operation voltage range: $V_{DD} = 2.5$ V to 6.0 V
- Watchdog mode switching function*1: Time-out mode, window mode
- Watchdog input edge is selectable: Rising edge, falling edge, both rising and falling edges
- Product type is selectable:
 - S-19400 Series
 - (Product with \overline{W} / T pin (Output: \overline{WDO} pin))
 - S-19401 Series
 - (Product without \overline{W} / T pin (Output: \overline{RST} pin, \overline{WDO} pin))
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*2

*1. The S-19401 Series is fixed to the window mode.

*2. Contact our sales representatives for details.

■ Applications

- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TMSOP-8
- HSNT-8(2030)

S-19405 Series

AUTOMOTIVE, 125°C OPERATION, 3.8 μ A CURRENT CONSUMPTION WATCHDOG TIMER WITH RESET FUNCTION

The S-19405 Series is a watchdog timer developed using CMOS technology, which can operate with low current consumption of 3.8 μ A typ. The reset function and the low voltage detection function are available.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- | | |
|--|---|
| • Detection voltage: | 2.0 V to 5.0 V, selectable in 0.1 V step |
| • Detection voltage accuracy: | $\pm 2.0\%$ |
| • Input voltage: | $V_{DD} = 0.9$ V to 6.0 V |
| • Hysteresis width: | 5% typ. |
| • Current consumption during watchdog timer operation: | 3.8 μ A typ. |
| • Reset time-out period: | 14.5 ms typ. ($C_{POR} = 2200$ pF) |
| • Watchdog time-out period: | 24.6 ms typ. ($C_{WDT} = 470$ pF) |
| • Watchdog operation is switchable: | Enable, Disable |
| • Watchdog operation voltage range: | $V_{DD} = 2.5$ V to 6.0 V |
| • Watchdog input edge is selectable: | Rising edge, falling edge |
| • Operation temperature range: | $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| • Lead-free (Sn 100%), halogen-free | |
| • AEC-Q100 qualified*1 | |

*1. Contact our sales representatives for details.

■ Applications

- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

■ Packages

- TMSOP-8
- HSNT-8(2030)

S-19500/19501 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 200 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19500/19501 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.0 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 4.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 120 mV typ. (5.0 V output product, $I_{OUT} = 100$ mA)
- Output current: Possible to output 200 mA ($V_{IN} = V_{OUT(S)} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 2.2 μF or more can be used.
- Ripple rejection: 70 dB typ. ($f = 100$ Hz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: ± 100 mV ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 18 ms typ. ($C_{DLY} = 47$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 43 ms typ. ($C_{DLY} = 47$ nF)
- Product type is selectable: S-19500 Series (Product with WEN pin (Output: WO / RO pin))
S-19501 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 60 μA typ. ($I_{OUT} = 0$ mA, During the watchdog timer deactivation)
75 μA typ. ($I_{OUT} \leq 5$ mA, During the watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Package

- HSOP-8A

S-19502/19503 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 400 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19502/19503 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.0 V to 5.3 V, selectable in 0.1 V step
- Input voltage: 4.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 120 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 400 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 2.2 μF or more can be used.
- Ripple rejection: 70 dB typ. ($f = 100$ Hz)
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 5.0 V, selectable in 0.1 V step
- Detection voltage accuracy: ± 100 mV ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 18 ms typ. ($C_{\text{DLY}} = 47$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 43 ms typ. ($C_{\text{DLY}} = 47$ nF)
- Product type is selectable: S-19502 Series (Product with WEN pin (Output: WO / RO pin))
S-19503 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 60 μA typ. ($I_{\text{OUT}} = 0$ mA, During the watchdog timer deactivation)
75 μA typ. ($I_{\text{OUT}} \leq 5$ mA, During the watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19504/19505 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 250 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19504/19505 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{OUT} = 100$ mA)
- Output current: Possible to output 250 mA ($V_{IN} = V_{OUT(S)} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{DLY} = 10$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{DLY} = 10$ nF)
- Product type is selectable: S-19504 Series (Product with WEN pin (Output: WO / RO pin))
S-19505 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 3.0 μA typ. (During watchdog timer deactivation)
5.0 μA typ. (During watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19506/19507 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19506/19507 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 500 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Product type is selectable: S-19506 Series (Product with WEN pin (Output: WO / RO pin))
S-19507 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 3.0 μA typ. (During watchdog timer deactivation)
5.0 μA typ. (During watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19509 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, BUILT-IN WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19509 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 500 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Product type is selectable: S-19509A Series
(TO-252-9S package product, HSOP-8A package product)
S-19509B Series (HTSSOP-16 package product)
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Time-out mode

Overall

- Current consumption: 3.2 μA typ. (During regulator operation, during watchdog timer deactivation)
0.1 μA typ. (During regulator stop)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A
- HTSSOP-16

S-19514/19515 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 250 mA, BUILT-IN WINDOW WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19514/19515 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the window watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 250 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Product type is selectable: S-19514 Series (Product with WEN pin (Output: WO / RO pin))
S-19515 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Window mode

Overall

- Current consumption: 3.0 μA typ. (During watchdog timer deactivation)
5.0 μA typ. (During watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19516/19517 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, BUILT-IN WINDOW WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19516/19517 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the window watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 500 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current is adjustable: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Product type is selectable: S-19516 Series (Product with WEN pin (Output: WO / RO pin))
S-19517 Series (Product without WEN pin (Output: WO pin and RO pin))
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Window mode

Overall

- Current consumption: 3.0 μA typ. (During watchdog timer deactivation)
5.0 μA typ. (During watchdog timer activation)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19518 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 250 mA, BUILT-IN WINDOW WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19518 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the window watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 250 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF)

Watchdog timer block

- Watchdog activation current: 1.5 mA typ.
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF)
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Window mode

Overall

- Current consumption: 3.2 μA typ. (During regulator operation, during watchdog timer deactivation)
0.1 μA typ. (During regulator stop)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A

S-19519 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 500 mA, BUILT-IN WINDOW WATCHDOG TIMER VOLTAGE REGULATOR WITH RESET FUNCTION

The S-19519 Series, developed by using high-withstand voltage CMOS technology, is a low dropout positive voltage regulator with the window watchdog timer and the reset function, which has high-withstand voltage. The monitoring time of watchdog timer can be adjusted by an external capacitor. Moreover, a voltage detection circuit which monitors the output voltage is also prepared.

ABLIC Inc. offers a "thermal simulation service" which supports the thermal design in conditions when our power management ICs are in use by customers. Our thermal simulation service will contribute to reducing the risk in the thermal design at customers' development stage.

ABLIC Inc. also offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

Contact our sales representatives for details.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

Regulator block

- Output voltage: 3.3 V, 5.0 V
- Input voltage: 3.0 V to 36.0 V
- Output voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 100 mV typ. (5.0 V output product, $I_{\text{OUT}} = 100$ mA)
- Output current: Possible to output 500 mA ($V_{\text{IN}} = V_{\text{OUT(S)}} + 1.0$ V)^{*1}
- Input and output capacitors: A ceramic capacitor of 1.0 μF or more can be used.
- Built-in overcurrent protection circuit: Limits overcurrent of output transistor.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in ON / OFF circuit: Ensures long battery life.

Detector block

- Detection voltage: 2.6 V to 4.7 V, selectable in 0.1 V step
- Detection voltage accuracy: $\pm 2.0\%$ ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Hysteresis width: 0.12 V min.
- Release delay time is adjustable^{*2}: 20 ms typ. ($C_{\text{DLY}} = 10$ nF) (S-19519A/B Series)
0.56 ms typ. ($C_{\text{DLY}} = 3.3$ nF) (S-19519C Series)

Watchdog timer block

- Watchdog activation current: 1.5 mA typ. (WADJ pin is open)
- Watchdog trigger time is adjustable^{*2}: 46 ms typ. ($C_{\text{DLY}} = 10$ nF) (S-19519A/B Series)
15.2 ms typ. ($C_{\text{DLY}} = 3.3$ nF) (S-19519C Series)
- Product type is selectable: S-19519A/C Series
(TO-252-9S package product, HSOP-8A package product)
S-19519B Series (HTSSOP-16 package product)
- Autonomous watchdog operation function: Watchdog timer operates due to detection of load current.
- Watchdog mode: Window mode

Overall

- Current consumption: 3.2 μA typ. (During regulator operation, during watchdog timer deactivation)
0.1 μA typ. (During regulator stop)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified^{*3}

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. The release delay time and the watchdog trigger time can be adjusted by connecting C_{DLY} to the DLY pin.

*3. Contact our sales representatives for details.

■ Applications

- Constant-voltage power supply for automotive electric component, monitoring of microcontroller

■ Packages

- TO-252-9S
- HSOP-8A
- HTSSOP-16

S-19902A/19902B/19903A/19903B Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 600 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19902/19903 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 36 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. As suitable packages for high-density mounting, such as small-sized HSNT-6(2025), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19902 Series) or PWM / PFM switching control (S-19903 Series) can be selected as an option.

Since the S-19903 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19902/19903 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 36.0 V
- Output voltage (externally set): 2.5 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

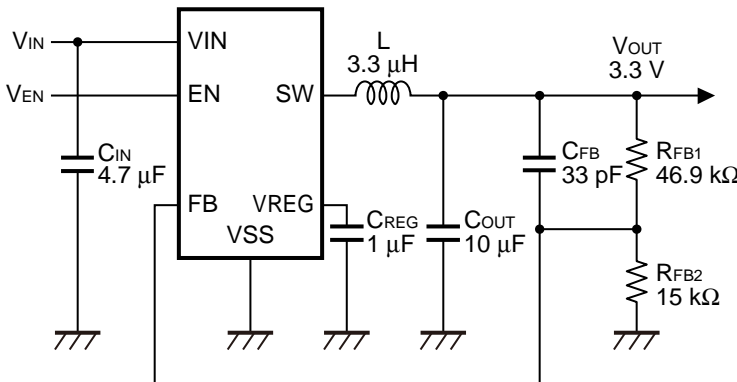
■ Applications

- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

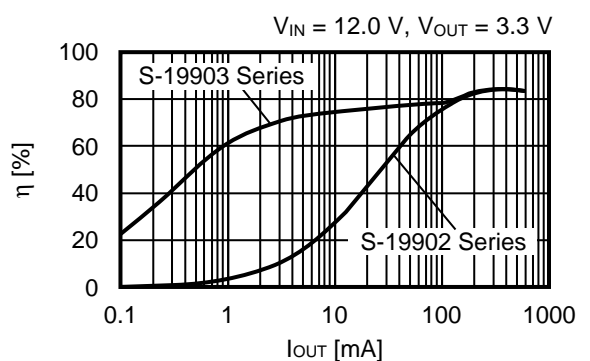
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)
- HSNT-6(2025)
(2.46 mm \times 1.96 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19902C/19902D/19903C/19903D Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 600 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19902/19903 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 36 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. As suitable packages for high-density mounting, such as small-sized HSNT-6(2025), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19902 Series) or PWM / PFM switching control (S-19903 Series) can be selected as an option.

Since the S-19903 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19902/19903 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

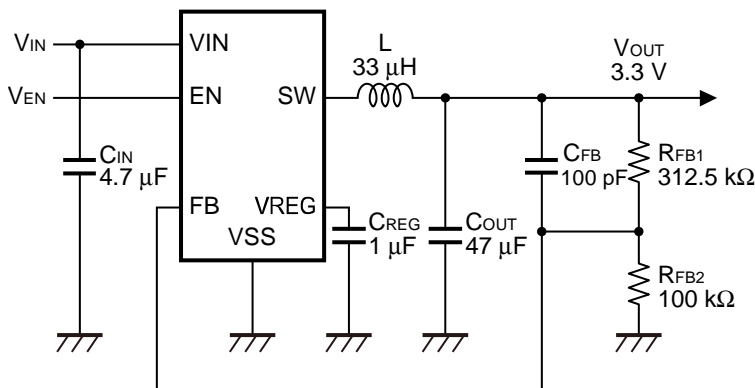
Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 36.0 V
- Output voltage (externally set): 2.5 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 95%
- Oscillation frequency: 400 kHz typ.
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Typical Application Circuit



ABLIC Inc.

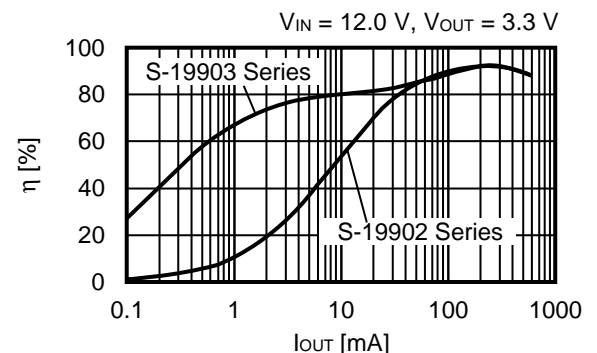
■ Applications

- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

■ Packages

- HTMSOP-8
(4.0 mm × 2.9 mm × t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm × 2.0 mm × t0.5 mm max.)
- HSNT-6(2025)
(2.46 mm × 1.96 mm × t0.5 mm max.)

■ Efficiency



S-19904A/19904B/19905A/19905B Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 1 A, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19904/19905 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 36 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. As suitable packages for high-density mounting, such as small-sized HSNT-8(2030), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19904 Series) or PWM / PFM switching control (S-19905 Series) can be selected as an option.

Since the S-19905 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19904/19905 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 36.0 V
- Output voltage (externally set): 2.5 V to 12.0 V
- Output current: 1 A
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Overcurrent protection function: 1.85 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

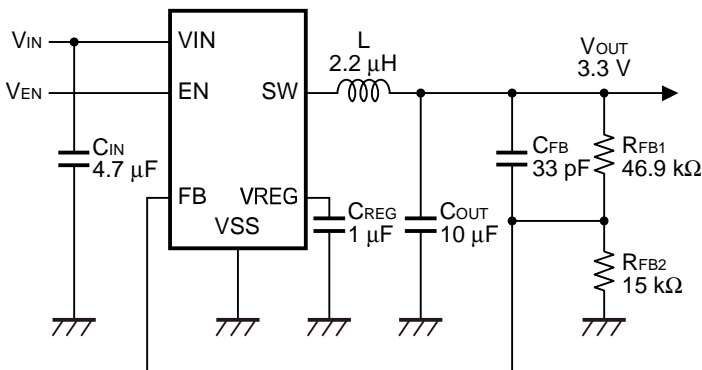
■ Applications

- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

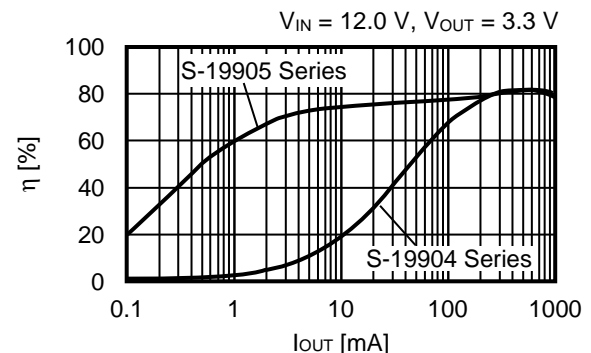
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19912A/19912B/19913A/19913B Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 600 mA, LOW EMI, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19912/19913 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 36 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. It has a built-in spread spectrum clock generation circuit capable of reducing conductive noise and emission noise during PWM operation. As suitable packages for high-density mounting, such as small-sized HSNT-8(2030), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19912 Series) or PWM / PFM switching control (S-19913 Series) can be selected as an option.

Since the S-19913 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19912/19913 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 36.0 V
- Output voltage (externally set): 2.5 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Spread spectrum clock generation function: $F_{SS} = +6\%$ typ. (Diffusion rate)
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 in qualified*1

*1. Contact our sales representatives for details.

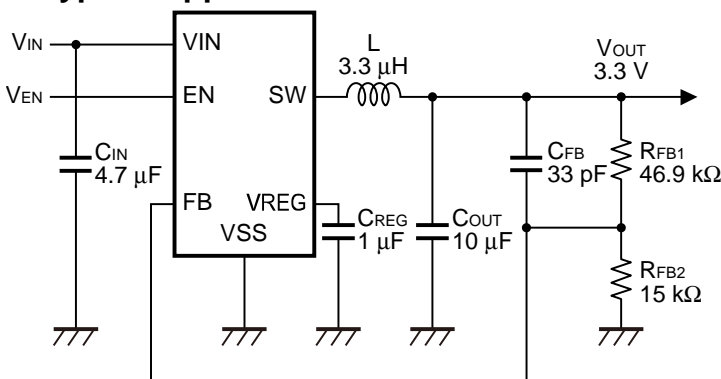
■ Applications

- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

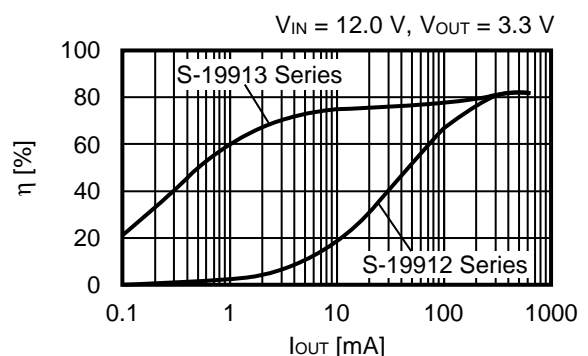
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19914A/19914B/19915A/19915B Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 1 A, LOW EMI, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19914/19915 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 36 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. It has a built-in spread spectrum clock generation circuit capable of reducing conductive noise and emission noise during PWM operation. As suitable packages for high-density mounting, such as small-sized HSNT-8(2030), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19914 Series) or PWM / PFM switching control (S-19915 Series) can be selected as an option.

Since the S-19915 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19914/19915 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 36.0 V
- Output voltage (externally set): 2.5 V to 12.0 V
- Output current: 1 A
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Spread spectrum clock generation function: $F_{SS} = +6\%$ typ. (Diffusion rate)
- Overcurrent protection function: 1.85 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

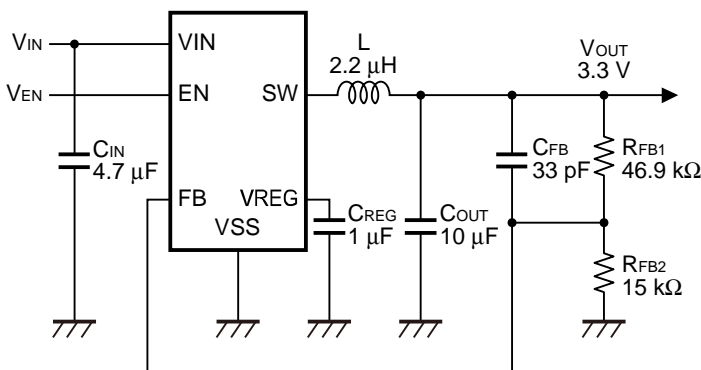
■ Applications

- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

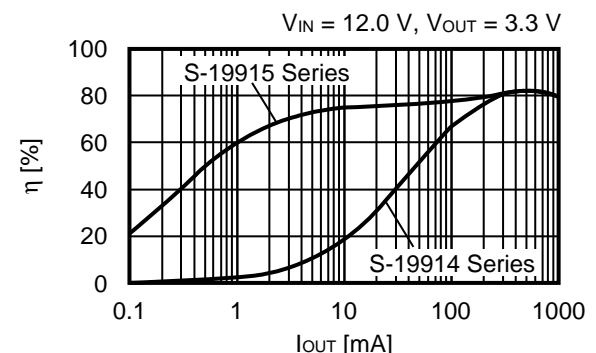
■ Packages

- HTMSOP-8 (4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030) (3.0 mm \times 2.0 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19932A/19932B/19933A/19933B Series

AUTOMOTIVE, 125°C OPERATION, 18 V INPUT, 600 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19932/19933 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 18 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. As suitable packages for high-density mounting, such as small-sized HSNT-6(2025), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19932 Series) or PWM / PFM switching control (S-19933 Series) can be selected as an option.

Since the S-19933 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19932/19933 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 18.0 V
- Output voltage (externally set): 1.0 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

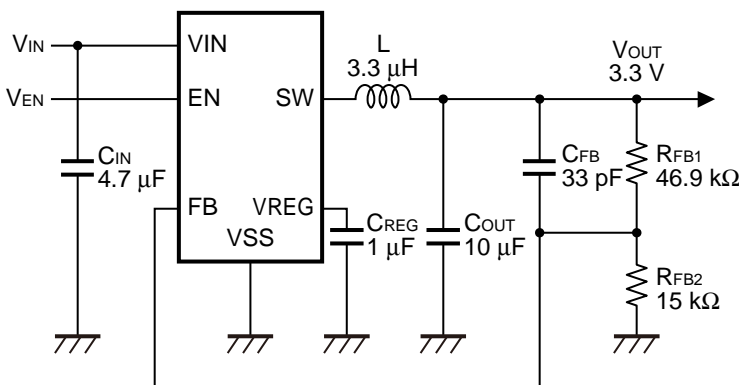
■ Applications

- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

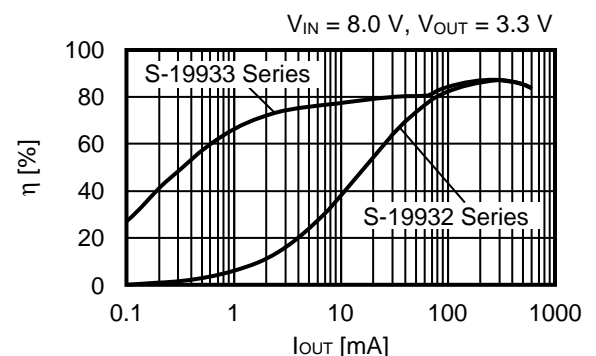
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)
- HSNT-6(2025)
(2.46 mm \times 1.96 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19932C/19932D/19933C/19933D Series

AUTOMOTIVE, 125°C OPERATION, 18 V INPUT, 600 mA SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19932/19933 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 18 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. As suitable packages for high-density mounting, such as small-sized HSNT-6(2025), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19932 Series) or PWM / PFM switching control (S-19933 Series) can be selected as an option.

Since the S-19933 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19932/19933 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 18.0 V
- Output voltage (externally set): 2.5 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 95%
- Oscillation frequency: 400 kHz typ.
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

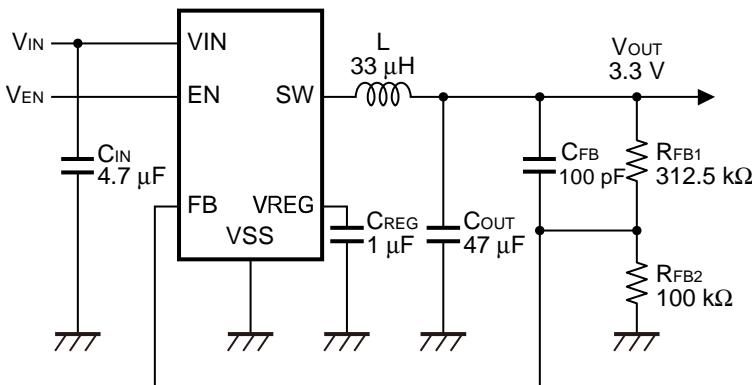
■ Applications

- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

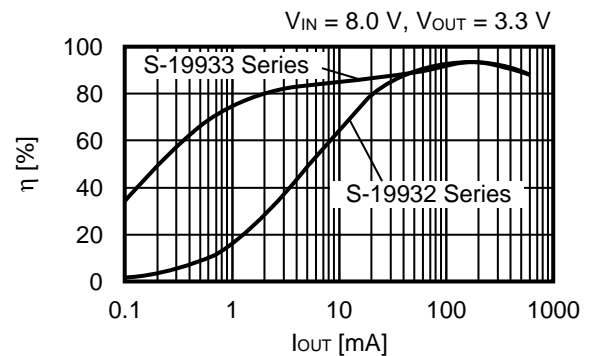
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)
- HSNT-6(2025)
(2.46 mm \times 1.96 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19934A/19934B/19935A/19935B Series

AUTOMOTIVE, 125°C OPERATION, 18 V INPUT, 1 A, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19934/19935 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 18 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. As suitable packages for high-density mounting, such as small-sized HSNT-8(2030), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19934 Series) or PWM / PFM switching control (S-19935 Series) can be selected as an option.

Since the S-19935 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19934/19935 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 18.0 V
- Output voltage (externally set): 1.0 V to 12.0 V
- Output current: 1 A
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Overcurrent protection function: 1.85 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free

- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

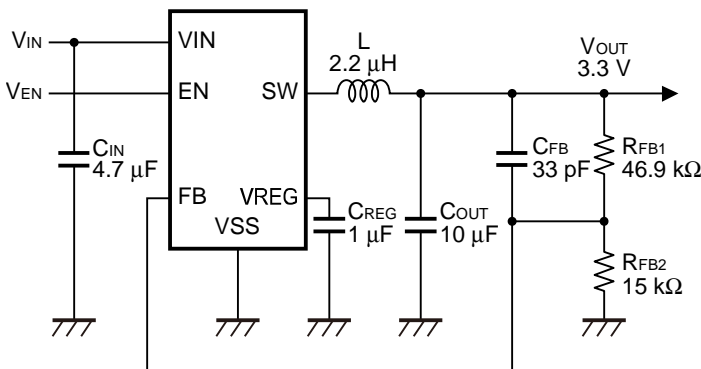
■ Applications

- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

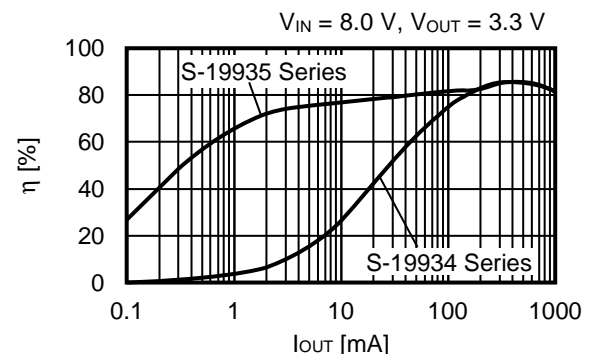
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19942A/19942B/19943A/19943B Series

AUTOMOTIVE, 125°C OPERATION, 18 V INPUT, 600 mA, LOW EMI, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19942/19943 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 18 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. It has a built-in spread spectrum clock generation circuit capable of reducing conductive noise and emission noise during PWM operation. As suitable packages for high-density mounting, such as small-sized HSNT-8(2030), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19942 Series) or PWM / PFM switching control (S-19943 Series) can be selected as an option.

Since the S-19943 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19942/19943 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 18.0 V
- Output voltage (externally set): 1.0 V to 12.0 V
- Output current: 600 mA
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Spread spectrum clock generation function: $F_{SS} = +6\%$ typ. (Diffusion rate)
- Overcurrent protection function: 1.2 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

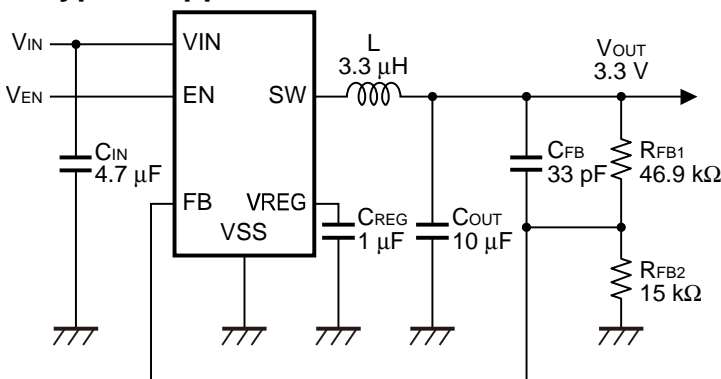
■ Applications

- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

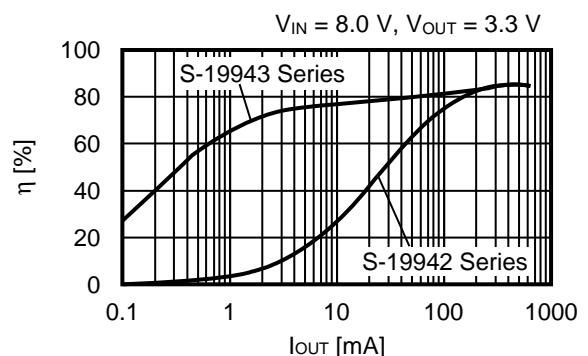
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19944A/19944B/19945A/19945B Series

AUTOMOTIVE, 125°C OPERATION, 18 V INPUT, 1 A, LOW EMI, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

The S-19944/19945 Series is a step-down switching regulator developed using high withstand voltage CMOS process technologies.

This IC has high maximum operation voltage of 18 V and maintains high-accuracy FB pin voltage at $\pm 1.5\%$. It has a built-in spread spectrum clock generation circuit capable of reducing conductive noise and emission noise during PWM operation. As suitable packages for high-density mounting, such as small-sized HSNT-8(2030), are adopted, this IC contributes to miniaturization of electronic equipment.

PWM control (S-19944 Series) or PWM / PFM switching control (S-19945 Series) can be selected as an option.

Since the S-19945 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load, it achieves high-efficiency operation in accordance with the device's status. Furthermore, our distinctive PWM / PFM switching control technology suppresses the ripple voltage to be generated in V_{OUT} while PFM control is in operation.

Since the S-19944/19945 Series has the built-in synchronous circuit, it achieves high efficiency easier compared with conventional step-down switching regulators. In addition, it has the built-in overcurrent protection circuit which protects the IC and coils from excessive load current as well as a thermal shutdown circuit which prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 4.0 V to 18.0 V
- Output voltage (externally set): 1.0 V to 12.0 V
- Output current: 1 A
- FB pin voltage accuracy: $\pm 1.5\%$
- Efficiency: 91%
- Oscillation frequency: 2.2 MHz typ.
- Spread spectrum clock generation function: $F_{SS} = +6\%$ typ. (Diffusion rate)
- Overcurrent protection function: 1.85 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation:
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 3.35 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

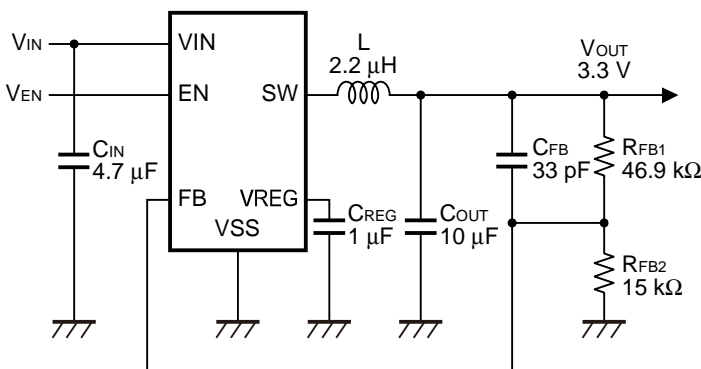
■ Applications

- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior
- Constant-voltage power supply for industrial equipment
- Constant-voltage power supply for home electric appliance

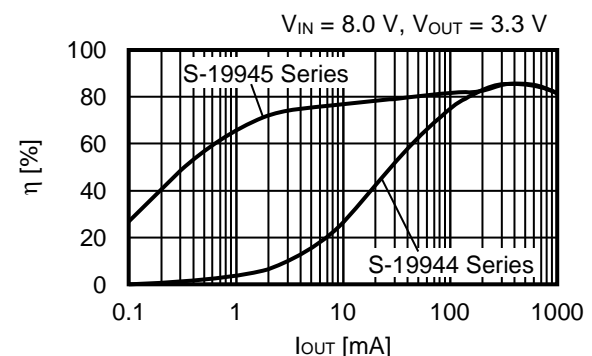
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19952/19953 Series

AUTOMOTIVE, 125°C OPERATION, 5.5 V INPUT, 600 mA, POWER GOOD, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

This IC is a secondary step-down switching regulator developed using CMOS process technologies with a built-in Power Good function.

PWM control (S-19952 Series) or PWM / PFM switching control (S-19953 Series) can be selected as an option.

S-19952 Series, which features PWM control, can be used without interfering with AM radio bands.

Since the S-19953 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load. It achieves high-efficiency operation in accordance with the device's status.

This IC is implemented as a small package and can comprise an application circuit with an inductor and two capacitors at the minimum configuration. Since the switching frequency is as high as 2.25 MHz, and the peripheral parts can be made compact, the IC is suitable for space-saving uses.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

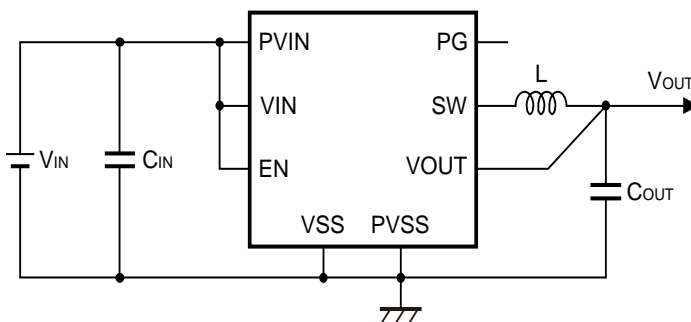
Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 2.7 V to 5.5 V
- Output voltage: 0.8 V to 3.3 V
- Output current: 600 mA
- VOUT pin detection voltage accuracy: $\pm 1.5\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Efficiency: 95%
- Oscillation frequency: 2.25 MHz typ.
- Overcurrent protection function: 1.1 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation
- Output discharge function: "Available " / "Unavailable " is selectable.
- Power Good function: Nch open-drain output
- Soft-start function: 0.35 ms typ.
- Under voltage lockout function (UVLO): 2.43 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*¹

*1. Contact our sales representatives for details.

■ Typical Application Circuit



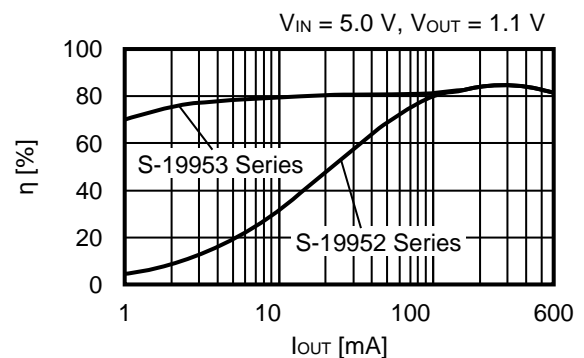
■ Applications

- Secondary power supply for automotive equipment
- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior

■ Packages

- HTMSOP-8 (2.9 mm × 4.0 mm × t0.8 mm max.)
- HSNT-8(1616)B (1.6 mm × 1.6 mm × t0.41 mm max.)

■ Efficiency



S-19954/19955 Series

AUTOMOTIVE, 125°C OPERATION, 5.5 V INPUT, 1 A, POWER GOOD, SYNCHRONOUS STEP-DOWN SWITCHING REGULATOR

This IC is a secondary step-down switching regulator developed using CMOS process technologies with a built-in Power Good function.

PWM control (S-19954 Series) or PWM / PFM switching control (S-19955 Series) can be selected as an option.

S-19954 Series, which features PWM control, can be used without interfering with AM radio bands.

Since the S-19955 Series, which features PWM / PFM switching control, operates with PWM control under heavy load and automatically switches to PFM control under light load. It achieves high-efficiency operation in accordance with the device's status.

This IC is implemented as a small package and can comprise an application circuit with an inductor and two capacitors at the minimum configuration. Since the switching frequency is as high as 2.25 MHz, and the peripheral parts can be made compact, the IC is suitable for space-saving uses.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

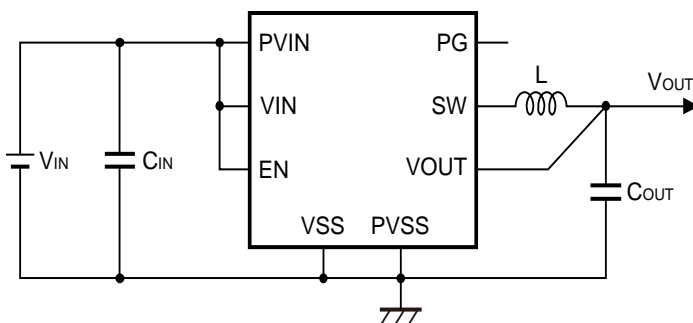
Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 2.7 V to 5.5 V
- Output voltage: 0.8 V to 3.3 V
- Output current: 1 A
- VOUT pin detection voltage accuracy: $\pm 1.5\%$ ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Efficiency: 95%
- Oscillation frequency: 2.25 MHz typ.
- Overcurrent protection function: 1.75 A typ. (pulse-by-pulse method)
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- 100% duty cycle operation
- Output discharge function: "Available " / "Unavailable " is selectable.
- Power Good function: Nch open-drain output
- Soft-start function: 0.35 ms typ.
- Under voltage lockout function (UVLO): 2.43 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified*1

*1. Contact our sales representatives for details.

■ Typical Application Circuit



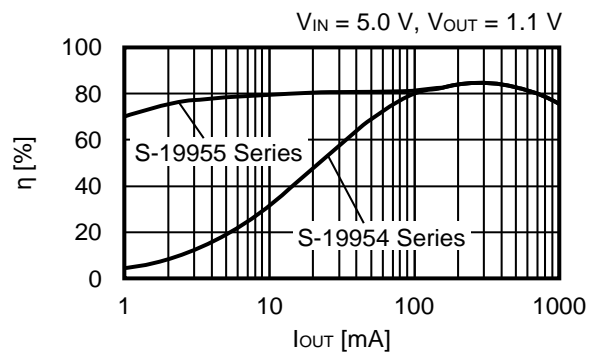
■ Applications

- Secondary power supply for automotive equipment
- Camera module
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)
- Constant-voltage power supply for electrical application for vehicle interior

■ Packages

- HTMSOP-8 (2.9 mm × 4.0 mm × t0.8 mm max.)
- HSNT-8(1616)B (1.6 mm × 1.6 mm × t0.41 mm max.)

■ Efficiency



S-19980 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, STEP-UP / FLYBACK SWITCHING REGULATOR CONTROLLER

This IC is a step-up / flyback switching regulator controller developed using high withstand voltage CMOS process technologies.

Its wide input operating range of 3.0 V to 36 V makes it suitable for powering automotive start-stop systems and emergency battery backup systems. When this IC is used to configure a converter and the output voltage (V_{OUT}) of the converter is applied to the VIN pin in a bootstrap configuration, the input voltage can be extended below the operating input voltage range after startup.

This IC contributes to system space saving as it adopted suitable packages for high-density mounting like small-sized HSNT-8(2030), can operate at very high switching frequencies, and the peripheral parts can be made compact.

An overcurrent protection circuit protects the IC and the coil from excessive load current, and a thermal shutdown circuit prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 3.0 V to 36.0 V
- Low voltage operation after startup (bootstrap configuration)
- Control system: Current mode
- FB pin voltage accuracy: $\pm 1.5\%$
- Oscillation frequency: 2.2 MHz typ., 400 kHz typ.
- Overcurrent protection function: Pulse-by-pulse method
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 2.75 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 in process*1

*1. Contact our sales representatives for details.

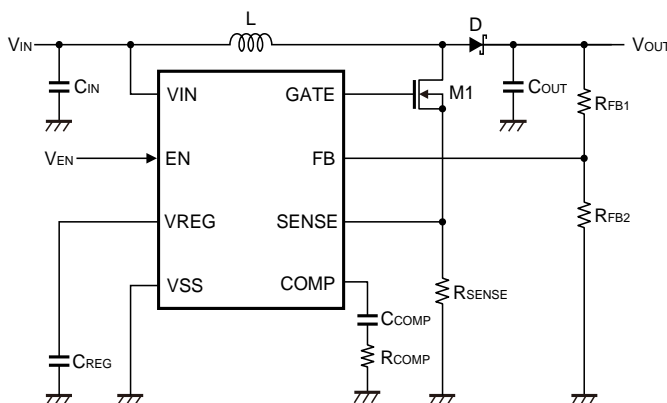
■ Applications

- Automotive and industrial step-up flyback converters
- Automotive start-stop systems
- Emergency battery backup systems
- Automotive LED lamps
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

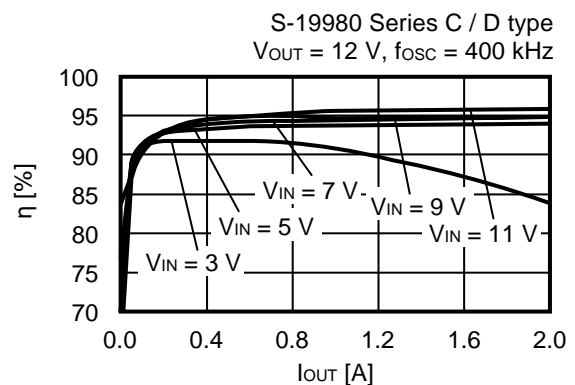
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19989 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, START-STOP STEP-UP SWITCHING REGULATOR CONTROLLER

This IC is a step-up switching regulator controller developed using high withstand voltage CMOS process technologies. It is suitable for automotive start-stop systems and emergency battery backup systems due to its wide input operating range of 3.0 V to 36 V and the capacity to extend the input voltage below the operating input voltage range after startup. This IC enters a low current consumption sleep mode when the output voltages are equal to or higher than the sleep voltage, and it starts switching operation when the output voltage drops below the wake-up voltage.

This IC contributes to system space saving as it adopted suitable packages for high-density mounting like small-sized HSNT-8(2030), can operate at very high switching frequencies, and the peripheral parts can be made compact.

An overcurrent protection circuit protects the IC and the coil from excessive load current, and a thermal shutdown circuit prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 3.0 V to 36.0 V
- Low voltage operation after startup
- Wake-up voltage triggers auto startup
- Control system: Current mode
- Output regulation voltage: 6.80 V, 8.50 V
- Output regulation voltage accuracy: $\pm 2.0\%$
- Oscillation frequency: 2.2 MHz typ., 400 kHz typ.
- Overcurrent protection function: Pulse-by-pulse method
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control
- Under voltage lockout function (UVLO): 2.75 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 in process*1

*1. Contact our sales representatives for details.

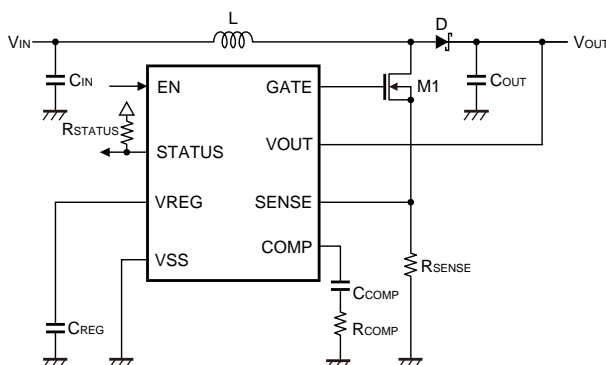
■ Applications

- Automotive and industrial step-up
- Automotive start-stop systems
- Emergency battery backup systems
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

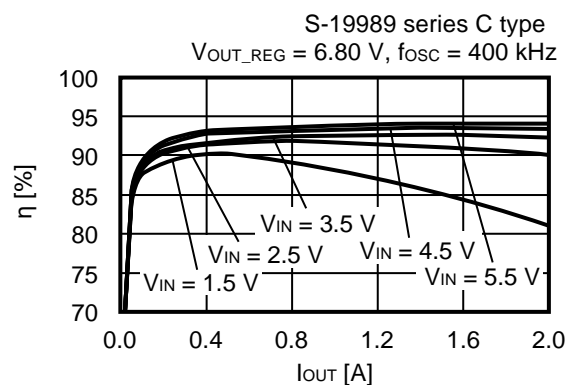
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19990 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, LOW EMI, STEP-UP / FLYBACK SWITCHING REGULATOR CONTROLLER

This IC is a step-up / flyback switching regulator controller developed using high withstand voltage CMOS process technologies.

Its wide input operating range of 3.0 V to 36 V makes it suitable for powering automotive start-stop systems and emergency battery backup systems. When this IC is used to configure a converter and the output voltage (V_{OUT}) of the converter is applied to the VIN pin in a bootstrap configuration, the input voltage can be extended below the operating input voltage range after startup.

This IC contributes to system space saving as it adopted suitable packages for high-density mounting like small-sized HSNT-8(2030), can operate at very high switching frequencies, and the peripheral parts can be made compact. A built-in spread spectrum clock generation circuit enhances the EMI performance of the system.

An overcurrent protection circuit protects the IC and the coil from excessive load current, and a thermal shutdown circuit prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 3.0 V to 36.0 V
- Low voltage operation after startup (bootstrap configuration)
- Control system: Current mode
- FB pin voltage accuracy: $\pm 1.5\%$
- Oscillation frequency: 2.2 MHz typ., 400 kHz typ.
- Spread spectrum clock generation function: $F_{SS} = +6\%$ typ. (Diffusion rate)
- Overcurrent protection function: Pulse-by-pulse method
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control, Latch control
- Soft-start function: 5.8 ms typ.
- Under voltage lockout function (UVLO): 2.75 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 in process*1

*1. Contact our sales representatives for details.

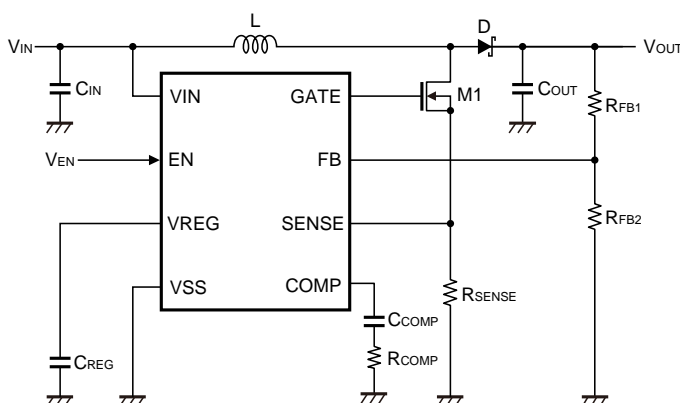
■ Applications

- Automotive and industrial step-up flyback converters
- Automotive start-stop systems
- Emergency battery backup systems
- Automotive LED lamps
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

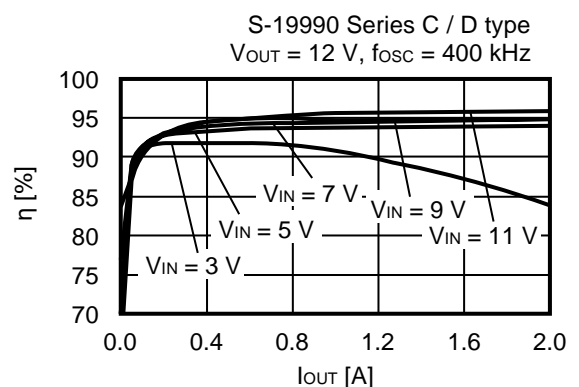
■ Packages

- HTMSOP-8
(4.0 mm \times 2.9 mm \times t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm \times 2.0 mm \times t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19999 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, LOW EMI, START-STOP STEP-UP SWITCHING REGULATOR CONTROLLER

This IC is a step-up switching regulator controller developed using high withstand voltage CMOS process technologies. It is suitable for automotive start-stop systems and emergency battery backup systems due to its wide input operating range of 3.0 V to 36 V and the capacity to extend the input voltage below the operating input voltage range after startup. This IC enters a low current consumption sleep mode when the output voltages are equal to or higher than the sleep voltage, and it starts switching operation when the output voltage drops below the wake-up voltage.

This IC contributes to system space saving as it adopted suitable packages for high-density mounting like small-sized HSNT-8(2030), can operate at very high switching frequencies, and the peripheral parts can be made compact. A built-in spread spectrum clock generation circuit enhances the EMI performance of the system.

An overcurrent protection circuit protects the IC and the coil from excessive load current, and a thermal shutdown circuit prevents damage from heat generation.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Input voltage: 3.0 V to 36.0 V
- Low voltage operation after startup
- Wake-up voltage triggers auto startup
- Control system: Current mode
- Output regulation voltage: 6.80 V, 8.50 V
- Output regulation voltage accuracy: $\pm 2.0\%$
- Oscillation frequency: 2.2 MHz typ., 400 kHz typ.
- Spread spectrum clock generation function: $F_{SS} = +6\%$ typ. (Diffusion rate)
- Overcurrent protection function: Pulse-by-pulse method
- Thermal shutdown function: 170°C typ. (detection temperature)
- Short-circuit protection function: Hiccup control
- Under voltage lockout function (UVLO): 2.75 V typ. (detection voltage)
- Input and output capacitors: Ceramic capacitor compatible
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 in process*1

*1. Contact our sales representatives for details.

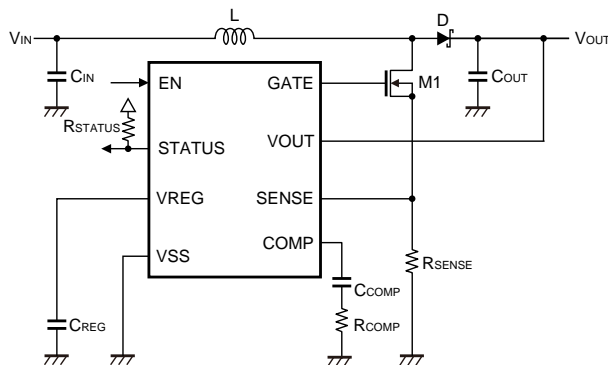
■ Applications

- Automotive and industrial step-up
- Automotive start-stop systems
- Emergency battery backup systems
- For automotive use (engine, transmission, suspension, ABS, related-devices for EV / HEV / PHEV, etc.)

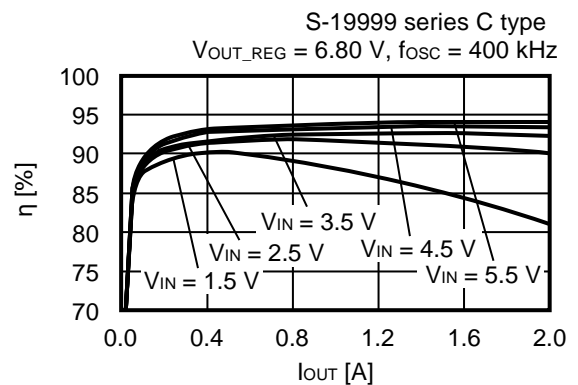
■ Packages

- HTMSOP-8
(4.0 mm × 2.9 mm × t0.8 mm max.)
- HSNT-8(2030)
(3.0 mm × 2.0 mm × t0.5 mm max.)

■ Typical Application Circuit



■ Efficiency



S-19680 Series

AUTOMOTIVE, 105°C OPERATION, HIGH SIDE SWITCH WITH CURRENT MONITOR

The S-19680 Series, developed by using CMOS technology, is a high side switch with the current monitor function. When the Pch output transistor is turned on, voltage is supplied to the load connected to the OUT pin. Monitoring the current which flows from the VIN pin to the OUT pin by using two external resistors, the S-19680 Series limits the current so that it does not exceed the set value. Depending on the monitored current value, the S-19680 Series detects the short-circuit status or the open status of the load connected to the OUT pin, and outputs an alarm signal. In addition, the S-19680 Series has the ON / OFF circuit to control the Pch output transistor's status, ON and OFF, and the thermal shutdown circuit to limit overheating. The hysteresis type or latch type can be selected for the thermal shutdown circuit.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- | | |
|---|--|
| • Power supply voltage: | $V_{DD} = 2.7 \text{ V to } 10.0 \text{ V}$ |
| • Current consumption during operation: | $I_{SS1} = 12 \mu\text{A typ.}, I_{SS1} = 24 \mu\text{A max. (} T_j = -40^\circ\text{C to } +105^\circ\text{C)}$ |
| • ON resistance: | $R_{ON} = 1.1 \Omega \text{ typ.}, R_{ON} = 3.7 \Omega \text{ max. (} T_j = -40^\circ\text{C to } +105^\circ\text{C)}$ |
| • Limit current: | 40 mA to 100 mA, selectable in 10 mA step |
| • Load short-circuit detection current: | $I_{LIM} \times 0.3 \text{ to } I_{LIM} \times 1.0 (I_{SHORT} \geq 30 \text{ mA})$, selectable in 0.1 step |
| • Load open detection current: | 2.5 mA to 30 mA, selectable in 2.5 mA step |
| • Built-in thermal shutdown circuit: | Detection temperature 165°C typ.
Selectable in hysteresis type or latch type |
| • Built-in ON / OFF circuit: | Ensures long battery life. |
| • Operation temperature range: | $T_a = -40^\circ\text{C to } +105^\circ\text{C}$ |
| • Lead-free (Sn 100%), halogen-free | |
| • AEC-Q100 qualified *1 | |

*1. Contact our sales representatives for details.

■ Applications

- Remote LNA phantom power such as GPS antenna
- ADAS locator
- e-call
- Car navigation system
- Car audio system

■ Package

- TMSOP-8

S-19682B Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 300 mA, HIGH SIDE SWITCH WITH CURRENT MONITOR

This IC, developed by using CMOS technology, is a high side switch with the current monitor function.

When the Pch output transistor is turned on, voltage is supplied to the load connected to the VOUT pin. The current monitor measures the current flowing to the high side switch, outputs the voltage according to the load current, and limits the current value from exceeding the set value.

In addition, this IC has the ON / OFF circuit to control the Pch output transistor's status, ON and OFF, and the thermal shutdown circuit to limit overheating.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to ABLIC Inc. is indispensable.

■ Features

- Input voltage: 4.5 V to 36.0 V
- Current consumption: During operation: 55 μ A typ., 95 μ A max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 0.6 μ A typ., 2.0 μ A max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- ON resistance: $R_{ON} = 0.6 \Omega$ typ., 1.0 Ω max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Limit current: 100 mA to 300 mA, selectable in 10 mA step
- Limit current accuracy: $\pm 10\%$ ($I_{LIM(S)} = 200$ mA to 300 mA)
- Current monitor function: Possible to monitor load current by monitoring the CSO pin voltage.
- Built-in thermal shutdown circuit: Latch type*1, detection temperature 170°C typ.
- Built-in overvoltage detection circuit: Detects an output short-circuit of the higher voltage.
- Built-in ON / OFF circuit: Ensures long battery life.
- Under voltage lockout function (UVLO): 2.6 V typ. (Detection voltage)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified *2

*1. Please contact our sales representatives for products with hysteresis type.

*2. Contact our sales office for details.

■ Applications

- Remote LNA phantom power such as GPS antenna
- ADAS locator
- e-call
- Car navigation system
- Car audio system

■ Package

- HSNT-8(2030)

S-19683B Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 600 mA, HIGH SIDE SWITCH WITH CURRENT MONITOR

This IC, developed by using CMOS technology, is a high side switch with the current monitor function.

When the Pch output transistor is turned on, voltage is supplied to the load connected to the VOUT pin. The current monitor measures the current flowing to the high side switch, outputs the voltage according to the load current, and limits the current value from exceeding the set value.

In addition, this IC has the ON / OFF circuit to control the Pch output transistor's status, ON and OFF, and the thermal shutdown circuit to limit overheating.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product in the purpose, contact to ABLIC Inc. is indispensable.

■ Features

- Input voltage: 4.5 V to 36.0 V
- Current consumption: During operation: 55 μ A typ., 95 μ A max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 0.6 μ A typ., 2.0 μ A max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- ON resistance: $R_{ON} = 0.6 \Omega$ typ., 1.0 Ω max. ($T_j = -40^\circ\text{C}$ to $+125^\circ\text{C}$)
- Limit current: 300 mA to 600 mA, selectable in 10 mA step
- Limit current accuracy: $\pm 10\%$
- Current monitor function: Possible to monitor load current by monitoring the CSO pin voltage.
- Built-in thermal shutdown circuit: Latch type*1, detection temperature 170°C typ.
- Built-in overvoltage detection circuit: Detects an output short-circuit of the higher voltage.
- Built-in ON / OFF circuit: Ensures long battery life.
- Under voltage lockout function (UVLO): 2.6 V typ. (Detection voltage)
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified *2

*1. Please contact our sales representatives for products with hysteresis type.

*2. Contact our sales office for details.

■ Applications

- Automotive surround camera ECU
- Connection diagnosis for camera module

■ Package

- HSNT-8(2030)

S-19700 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 400 mA VOLTAGE REGULATOR WITH CURRENT MONITOR AND ADJUSTABLE CURRENT LIMIT

The S-19700 Series, developed by using CMOS technology, is a positive voltage regulator with a current monitoring function for 125°C automotive operation.

It provides an output current of 400 mA min., and a ceramic capacitor of 4.7 μ F or more can be used as the output capacitor. Due to the built-in reverse current protection function, the reverse current flowing from the VOUT pin to the VIN pin can be controlled as the small value 15 μ A typ.

The current monitor monitors the current flowing to the voltage regulator and outputs the voltage according to the external resistance, and limits the current value from exceeding the set value.

The S-19700 Series has two types of products of which one is the externally set product whose output voltage is determined by the external divided-resistor, and the other is the internally set product which includes an INT pin and whose output voltage is fixed.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (externally set): 3.3 V to 20.0 V, settable via an external resistor
- Output voltage (internally set): 3.3 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 4.5 V to 36.0 V
- Output voltage accuracy: $\pm 2.3\%$ ($1.0 \text{ mA} \leq I_{\text{OUT}} \leq 30 \text{ mA}$, $T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 240 mV typ. (3.3 V output product, $I_{\text{OUT}} = 300 \text{ mA}$)
- Current consumption: During operation: 80 μ A typ., 170 μ A max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 1.0 μ A typ., 5.0 μ A max. ($T_j = -40^\circ\text{C}$ to $+90^\circ\text{C}$)
- Output current: Possible to output 400 mA ($V_{\text{IN}} \geq V_{\text{OUT(S)}} + 2.0 \text{ V}$)*¹
- Output capacitor: A ceramic capacitor of 4.7 μ F or more can be used.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in overvoltage detection circuit: Detects an output short-circuit of the higher voltage.
- Built-in ON / OFF circuit: Ensures long battery life.
- Constant current source pull-down is selectable.
- Current monitoring function: Possible to monitor load current by monitoring the CSO pin voltage.
- Current limit function: Possible to adjust a current limit value via an external resistor.
- Reverse current protection function: $I_{\text{REV}} = 45 \mu\text{A}$ max.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*²

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Remote LNA phantom power
- Car audio system
- Car navigation system

■ Package

- HSOP-8A

S-19701 Series

AUTOMOTIVE, 125°C OPERATION, 36 V INPUT, 600 mA VOLTAGE REGULATOR WITH CURRENT MONITOR AND ADJUSTABLE CURRENT LIMIT

The S-19701 Series, developed by using CMOS technology, is a positive voltage regulator with a current monitoring function for 125°C automotive operation.

It provides an output current of 600 mA min., and a ceramic capacitor of 4.7 μ F or more can be used as the output capacitor. Due to the built-in reverse current protection function, the reverse current flowing from the VOUT pin to the VIN pin can be controlled as the small value 15 μ A typ.

The current monitor monitors the current flowing to the voltage regulator and outputs the voltage according to the external resistance, and limits the current value from exceeding the set value.

The S-19701 Series has two types of products of which one is the externally set product whose output voltage is determined by the external divided-resistor, and the other is the internally set product which includes an INT pin and whose output voltage is fixed.

By connecting the VADJ pin to GND, the externally set product can be utilized as a high side switch with a current monitor.

ABLIC Inc. offers FIT rate calculated based on actual customer usage conditions in order to support customer functional safety design.

For more information regarding our FIT rate calculation, contact our sales representatives.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- Output voltage (externally set): 3.3 V to 20.0 V, settable via an external resistor
- Output voltage (internally set): 3.3 V to 15.0 V, selectable in 0.1 V step
- Input voltage: 4.5 V to 36.0 V
- Output voltage accuracy: $\pm 2.3\%$ ($1.0 \text{ mA} \leq I_{\text{OUT}} \leq 30 \text{ mA}$, $T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
- Dropout voltage: 240 mV typ. (3.3 V output product, $I_{\text{OUT}} = 300 \text{ mA}$)
- Current consumption: During operation: 80 μ A typ., 170 μ A max. ($T_j = -40^\circ\text{C}$ to $+150^\circ\text{C}$)
During power-off: 1.0 μ A typ., 5.0 μ A max. ($T_j = -40^\circ\text{C}$ to $+90^\circ\text{C}$)
- Output current: Possible to output 600 mA ($V_{\text{IN}} \geq V_{\text{OUT(S)}} + 2.0 \text{ V}$)*1
- Output capacitor: A ceramic capacitor of 4.7 μ F or more can be used.
- Built-in thermal shutdown circuit: Detection temperature 170°C typ.
- Built-in overvoltage detection circuit: Detects an output short-circuit of the higher voltage.
- Built-in ON / OFF circuit: Ensures long battery life.
- Constant current source pull-down is selectable.
- Current monitoring function: Possible to monitor load current by monitoring the CSO pin voltage.
- Current limit function: Possible to adjust a current limit value via an external resistor.
- Reverse current protection function: $I_{\text{REV}} = 45 \mu\text{A}$ max.
- Operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Lead-free (Sn 100%), halogen-free
- Withstand 45 V load dump
- AEC-Q100 qualified*2

*1. Please make sure that the loss of the IC will not exceed the power dissipation when the output current is large.

*2. Contact our sales representatives for details.

■ Applications

- Power supply for automotive camera
- Remote LNA phantom power
- High-side power switch for small current application

■ Package

- HSOP-8A

S-19192 Series

AUTOMOTIVE, 105°C OPERATION, BATTERY MONITORING IC FOR 3-SERIAL TO 6-SERIAL CELL PACK

The S-19192 Series is a monitoring IC for automotive rechargeable batteries, which includes high-accuracy voltage detection circuits and delay circuits. Switching control for 3-serial to 6-serial cell is possible by inputting voltage to the SEL1 pin and the SEL2 pin.

In addition, the S-19192 Series can perform a self-test to confirm overcharge and overdischarge detection operations.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- High-accuracy voltage detection circuit for each cell

Overcharge detection voltage n (n = 1 to 6):	2.500 V to 4.500 V (25 mV step)	Accuracy ±20 mV (Ta = +25°C)
		Accuracy ±30 mV (Ta = -5°C to +55°C)
Overcharge release voltage n (n = 1 to 6):	2.300 V to 4.500 V ^{*1}	Accuracy ±50 mV
Overdischarge detection voltage n (n = 1 to 6):	1.500 V to 3.000 V (100 mV step) ^{*2, *3}	Accuracy ±80 mV
Overdischarge release voltage n (n = 1 to 6):	1.500 V to 3.300 V ^{*4}	Accuracy ±100 mV
- Self-test results to confirm overcharge and overdischarge detection operations can be output from OUT2 pin.

Delay time shortening during self-test:	Available, unavailable
Self-test result output latch:	Available, unavailable
- Each delay time is settable by an internal circuit only (External capacitors are not necessary).

Detection delay time:	32 ms, 64 ms, 128 ms, 256 ms
Release delay time:	2.0 ms, 4.0 ms, 8.0 ms, 16.0 ms
- Switching control for 3-serial to 6-serial cell is possible by inputting voltage to the SEL1 pin and the SEL2 pin.
- Two detection signal types:

Common:	OUT1 pin: Overcharge and overdischarge detection signal
Separate:	OUT1 pin: Overcharge detection signal
	OUT2 pin: Overdischarge detection signal
- Output form: CMOS output, Nch open-drain output
- Output logic: Active "H", active "L"
- High-withstand voltage: Absolute maximum rating 28.0 V
- Wide operation voltage range: 6.0 V to 28.0 V
- Wide operation temperature range: Ta = -40°C to +105°C
- Low current consumption

During operation:	18 μA max. (Ta = +25°C)
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- Lead-free (Sn 100%), halogen-free
- AEC-Q100 qualified^{*5}
- This IC has been developed for the battery management system in accordance with ISO 26262. ABLIC Inc. can provide a safety manual for this IC.^{*5, *6}

*1. Overcharge release voltage = Overcharge detection voltage – Overcharge hysteresis voltage
(Overcharge hysteresis voltage n (n = 1 to 6) is selectable from 0 V to 400 mV in 50 mV step.)

*2. Set the voltage difference between the overcharge detection voltage and overdischarge detection voltage to 2.5 V or lower.

Set the voltage ratio so that the following formula is satisfied:

$$\text{Overcharge detection voltage} \times 0.7 > \text{Overdischarge detection voltage}$$

*3. When the S-19192 Series is used for monitoring a 3-serial-cell battery, set the overdischarge detection voltage n (n = 1 to 6) to 2.0 V or higher.

*4. Overdischarge release voltage = Overdischarge detection voltage + Overdischarge hysteresis voltage
(Overdischarge hysteresis voltage n (n = 1 to 6) is selectable from 0 V to 0.7 V in 100 mV step.)

*5. Contact our sales representatives for details.

*6. A Non-Disclosure Agreement is necessary when providing the documents.

■ Application

- Automotive rechargeable battery pack (EV, HEV, PHEV)

■ Package

- HTSSOP-16

S-19193 Series

AUTOMOTIVE, 125°C OPERATION, BATTERY MONITORING IC FOR 3-SERIAL TO 6-SERIAL CELL PACK

This IC is a monitoring IC for automotive rechargeable batteries, which includes high-accuracy voltage detection circuits and delay circuits. Switching control for 3-serial to 6-serial cell is possible by inputting voltage to the SEL1 pin and the SEL2 pin. By cascade connection, it is possible to protect 7-serial or more cells lithium-ion rechargeable battery pack. In addition, this IC can perform a self-test to confirm overcharge and overdischarge detection operations.

Caution This product can be used in vehicle equipment and in-vehicle equipment. Before using the product for these purposes, it is imperative to contact our sales representatives.

■ Features

- High-accuracy voltage detection circuit for each cell

Overcharge detection voltage n:	2.500 V to 4.500 V (25 mV step)	Accuracy ± 20 mV ($T_a = +25^\circ\text{C}$)
		Accuracy ± 30 mV ($T_a = -5^\circ\text{C}$ to $+55^\circ\text{C}$)
Overcharge release voltage n:	2.300 V to 4.500 V* ¹	Accuracy ± 50 mV
Overdischarge detection voltage n:	1.000 V to 3.000 V (100 mV step)* ²	Accuracy ± 80 mV
Overdischarge release voltage n:	1.000 V to 3.300 V* ³	Accuracy ± 100 mV
- Self-test results to confirm overcharge and overdischarge detection operations can be output from the OUT1 pin and the OUT2 pin.
- Cascade connection function: Battery voltage monitoring of multiple modules is possible by connecting the upper module output to the CASI1 pin and the CASI2 pin.
- Each delay time is settable by an internal circuit only (External capacitors are not necessary).^{*4}

Detection delay time:	0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms, 32 ms, 64 ms, 128 ms, 256 ms
Release delay time:	0.25 ms, 0.5 ms, 1 ms, 2 ms, 4 ms, 8 ms, 16 ms
- Switching control for 3-serial to 6-serial cell is possible by inputting voltage to the SEL1 pin and the SEL2 pin.
- Two detection signal types:

Common:	OUT1 pin: Overcharge and overdischarge detection signal
	OUT2 pin: Overcharge detection signal
Separate:	OUT1 pin: Overcharge detection signal
	OUT2 pin: Overdischarge detection signal
- OUT1 pin, OUT2 pin output form: CMOS output
- OUT1 pin, OUT2 pin output logic: Active "H"
- High-withstand voltage: Absolute maximum rating 28.0 V
- Wide operation voltage range: 4.8 V to 28.0 V
- Wide operation temperature range: $T_a = -40^\circ\text{C}$ to $+125^\circ\text{C}$
- Low current consumption

During operation:	20 μA max. ($T_a = +25^\circ\text{C}$)
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- Lead-free (Sn 100%), halogen-free
- AEC-Q100 in process^{*5}
- This IC has been developed for the battery management system in accordance with ISO 26262. ABLIC Inc. can provide a safety manual for this IC.^{*5, *6}

- *1. Overcharge release voltage = Overcharge detection voltage – Overcharge hysteresis voltage (Overcharge hysteresis voltage n is selectable from 0 V to 400 mV in 50 mV step.)
- *2. When this IC is used for monitoring a 3-serial-cell battery, set the overdischarge detection voltage n to 1.6 V or higher.
- *3. Overdischarge release voltage = Overdischarge detection voltage + Overdischarge hysteresis voltage (Overdischarge hysteresis voltage n is selectable from 0 V to 0.7 V in 100 mV step.)
- *4. Set the delay time to detection delay time > release delay time.
- *5. Contact our sales representatives for details.
- *6. A Non-Disclosure Agreement is necessary when providing the documents.

Remark n = 1 to 6

■ Application

- Automotive rechargeable battery pack (EV, HEV, PHEV, etc.)

■ Package

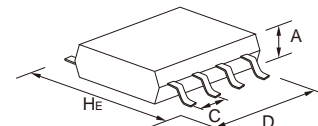
- HTSSOP-16

Package List

Package Type	Pin Count	Package Name	Package Size (mm)			Pitch (mm)	
			H _E	D	A (max.)	C	
Lead insertion type	3	TO-92	14.5	5.2	4.2	2.5/1.27	
Flat-lead type	3	SOT-89-3	4.0	4.5	1.6	1.5	
	5	SOT-89-5	4.5	4.5	1.6	1.5	
Gull-wing type	4	SC-82AB	2.1	2.0	1.1	1.3	
	5	SC-88A	2.1	2.0	1.1	0.65	
	3	SOT-23-3	2.8	2.9	1.3	1.9	
	3	SOT-23-3S	2.8	2.9	1.2	1.9	
	3	TSOT-23-3S	2.85	2.9	0.8	1.9	
	5	SOT-23-5	2.8	2.9	1.3	0.95	
	6	SOT-23-6	2.8	2.9	1.35	0.95	
	6	SOT-23-6W	2.8	2.9	1.3	0.95	
	8	8-Pin SOP (JEDEC)	6.0	5.02	1.75	1.27	
	8	8-Pin TSSOP	6.4	3.0	1.1	0.65	
	16	16-Pin TSSOP	6.4	5.1	1.1	0.65	
	20	20-Pin TSSOP	6.4	6.5	1.2	0.65	
	24	24-Pin SSOP	7.6	7.9	1.4	0.65	
	8	TMSOP-8	4.0	2.9	0.8	0.65	
	8	HTMSOP-8	4.0	2.9	0.8	0.65	
	16	HTSSOP-16	6.4	5.12	1.1	0.65	
	6	HSOP-6	6.0	5.02	1.75	1.91	
	8	HSOP-8A	6.0	5.02	1.68	1.27	
	8	HSOP-8Q	6.0	5.02	1.68	1.27	
	5	TO-252-5S(A)	6.5	6.5	1.4	1.27	
	9	TO-252-9S	6.5	6.5	1.4	0.65	
	Non-lead type	6	6-Pin HSON(A)	3.0	2.9	0.9	0.95
		4	SNT-4A	1.6	1.2	0.5	0.65
		6	SNT-6A	1.8	1.57	0.5	0.5
		6	SNT-6A(H)	1.8	1.57	0.5	0.5
		8	SNT-8A	2.46	1.97	0.5	0.5
4		HSNT-4(0808)	0.8	0.8	0.4	0.4	
4		HSNT-4(0808)B	0.8	0.8	0.41	0.4	
4		HSNT-4(1010)	1.0	1.0	0.4	0.65	
4		HSNT-4(1010)B	1.0	1.0	0.41	0.65	
6		HSNT-6A	2.46	1.96	0.5	0.5	
6		HSNT-6(1212)	1.2	1.2	0.4	0.4	
6		HSNT-6D (HSNT-6(1618))	1.8	1.6	0.4	0.5	
6		HSNT-6(2025)	2.46	1.96	0.5	0.5	
8		HSNT-8(1616)	1.6	1.6	0.4	0.4	
8		HSNT-8(1616)B	1.6	1.6	0.41	0.4	
8		HSNT-8(2030)	3.0	2.0	0.5	0.5	
6		DFN-6(1414)A	1.4	1.4	0.6	0.5	
6		DFN-6(1518)A	1.8	1.5	0.33	0.5	
8		DFN-8(1616)A	1.6	1.6	0.6	0.4	
8		DFN-8(2020)A	2.0	2.0	0.6	0.5	
8		DFN-8(2030)	3.0	2.0	0.5	0.5	
8		DFN-8(2030)A	3.0	2.0	0.6	0.5	
8		DFN-8(2030)B	3.0	2.0	0.8	0.5	

Remarks 1. For more details, please refer to our website. [Package List on ablic.com](http://ablic.com)

2. Please contact our sales representatives regarding WLP package products.



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