300mA 36V Input Regulator

NO.EA-300-221111

OUTLINE

The R1511x Series are CMOS-based high-voltage resistant and fast response voltage regulators that provide the minimum 300mA of output current. Internally, R1511x consists of an Output Short-circuit Protection Circuit, an Over-current Protection Circuit, and a Thermal Shutdown Circuit in addition to the basic regulator circuits. The operating temperature range is between –40ºC to +105ºC, and the maximum input voltage is 36V. All these features allow the R1511x Series to become an ideal power source of electric home appliances.

R1511x is available in B version (R1511xxxxB) with the fixed output voltage type, and C version (R1511x001C) with adjustable output voltage type with external resistors. The output voltage accuracy is ±1.0%.

R1511x is available in two types of packages: HSOP-6J for high-density mounting and TO-252-5-P2 for high wattage.

FEATURES

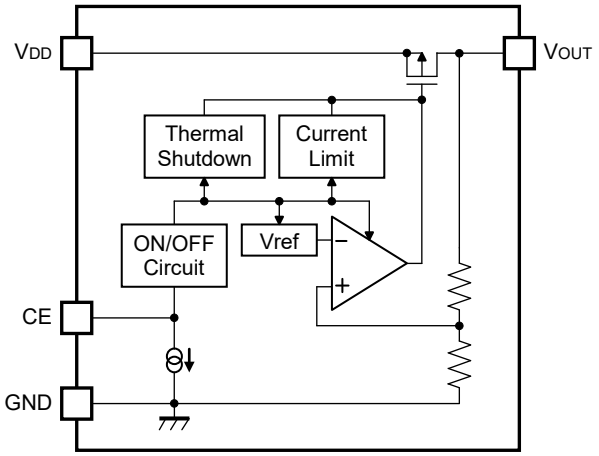
- Input Voltage Range ····· 3.5V to 36V
- Supply Current ····· Typ. 100μA
- Supply Current (Standby Mode) ····· Typ. 0.1μA (R1511xxxxB)
- Output Voltage Range ····· R1511xxxxB: 3.0V to 9.0V (0.1V step)
  (For other voltages, please refer to MARK INFORMATIONS.)
  R1511xxxxC: 3.0V to 12.0V
- Output Voltage Accuracy····· R1511xxxxB: ±1.0% (T_a=25°C)
- Feed Back Voltage ····· R1511xxxxC: 3.0V ±1.0% (T_a=25°C)
- Output Voltage Temperature-Drift Coefficient····· Typ. ±60ppm/°C
- Line Regulation····· Typ. 0.01%/V (V_{DD}=V_{OUT}+0.5V to 36V)
- Dropout Voltage ····· Typ. 0.64V (I_{OUT}=300mA, V_{OUT}=5.0V)
- Package Option ····· HSOP-6J, TO-252-5-P2
- Built-in Output Short-circuit Protection Circuit ····· Typ. 50mA
- Built-in Over-current Protection Circuit ····· Typ. 450mA
- Built-in Thermal Shutdown Circuit ····· Thermal Shutdown Temperature: Typ. 160°C
- Operating Temperature Range ·····-40 to +105°C
- Ripple Rejection·····Typ. 65dB (1kHz)
- Ceramic capacitors are recommended to be used with this IC
  ·····C_{IN}=1.0μF or more, C_{OUT}=6.8μF or more

APPLICATIONS

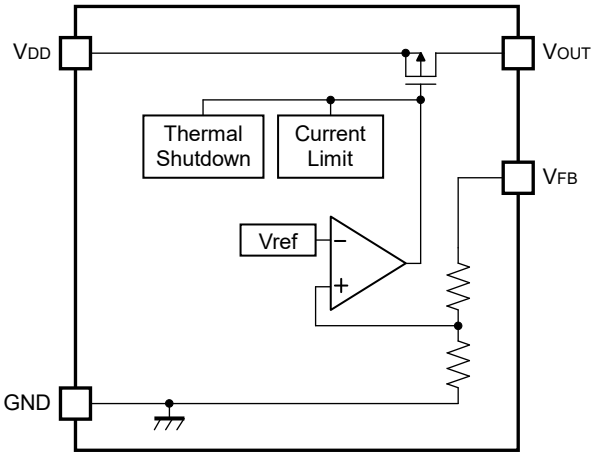
- For home electrical appliances: refrigerators, rice cookers, electrical pots, etc.
- For digital equipments: laptop PCs, digital TVs, telephone equipments, home LAN systems, etc.
- For OA equipments: copy machines, printers, fax machines, scanners, projectors, etc.

BLOCK DIAGRAMS

R1511xxxxB



R1511x001C



SELECTION GUIDE

The output voltage, version and the package type for the ICs can be selected at the user's request.

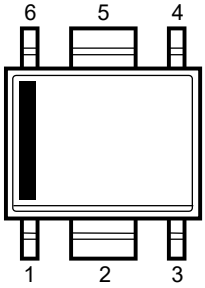
Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
R1511Sxxx∗-E2-FE	HSOP-6J	1,000pcs	Yes	Yes
R1511Jxxx∗-T1-FE	TO-252-5-P2	3,000pcs	Yes	Yes

xxx : Specify the output setting voltage (V_{SET})
R1511xxxxB: Specify the output voltage within the range of 3.0V (030) to 9.0V (090) in 0.1V steps.
(For other voltages, please refer to MARK INFORMATIONS.)
R1511x001C: only (001)

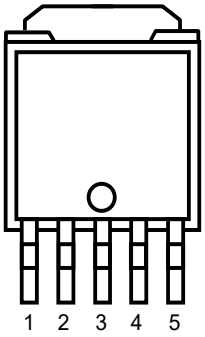
∗ : Specify the version
(B) Fixed output and Built-in Chip Enable ("H" active)
(C) Adjustable output

PIN CONFIGHURATIONS

● **HSOP-6J**



● **TO-252-5-P2**



PIN DESCRIPTIONS

R1511S:HSOP-6J

Pin No.	Symbol	Description	
1	V_{DD}	Input Pin	
2	GND*	Ground Pin	
3	GND*	Ground Pin	
4	CE	R1511SxxxB	Chip Enable Pin (“H” Active)
	V_{FB}	R1511S001C	Feed Back Pin
5	GND*	Ground Pin	
6	V_{OUT}	Output Pin	

*) No. 2, No. 3 and No. 5 pins must be wired to the GND plane when they are mounted on board.

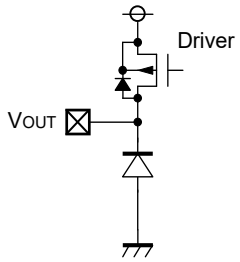
R1511J:TO-252-5-P2

Pin No.	Symbol	Description	
1	V_{DD}	Input Pin	
2	GND*	Ground Pin	
3	GND*	Ground Pin	
4	CE	R1511JxxxB	Chip Enable Pin (“H” Active)
	V_{FB}	R1511J001C	Feed Back Pin
5	V_{OUT}	Output Pin	

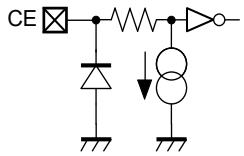
*) No. 2 and No. 3 pins must be wired to the GND plane when they are mounted on board.

PIN EQIVALENT CIRCUIT DIAGRAMS

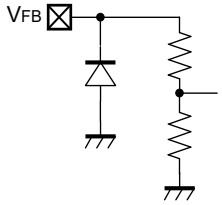
<V_{OUT} Pin>



<CE Pin (R1511xxxxB)>



<V_{FB} Pin (R1511x001C)>



ABSOLUTE MAXIMUM RATINGS

Symbol	Item	Rating		Unit
V_{IN}	Input Voltage	-0.3 to 50		V
V_{IN}	Peak Input Voltage*1	60		V
V_{CE}	Input Voltage (CE Pin)	-0.3 to 50		V
V_{FB}	Input Voltage (V_{FB} Pin)	-0.3 to 50		V
V_{OUT}	Output Voltage	-0.3 to V_{IN}+0.3 ≤ 50		V
P_D	Power Dissipation (JEDEC STD. 51-7) *2	HSOP-6J	2700	mW
		TO-252-5-P2	3800	
Tj	Operating Junction Temperature Range	-40 to +125		°C
Tstg	Storage Temperature Range	-55 to +125		°C

∗1) Duration time: 200ms

∗2) For Power Dissipation, please refer to next page to be described.

ABSOLUTE MAXIMUM RATINGS

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the lifetime and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings are not assured.

RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Rating	Unit
Ta	Operating Temperature Range	-40 to +105	°C

RECOMMENDED OPERATING CONDITIONS (ELECTRICAL CHARACTERISTICS)

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

Power Dissipation (HSOP-6J)

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

Measurement Conditions

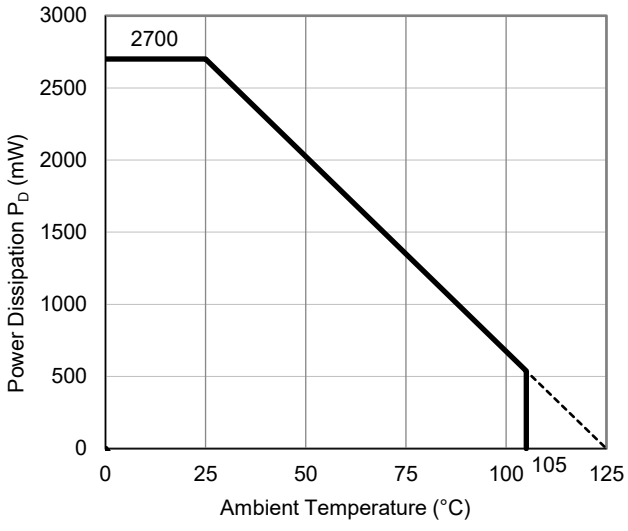
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square
Through-holes	ϕ 0.3 mm × 28 pcs

Measurement Result (Ta = 25°C, Tjmax = 125°C)

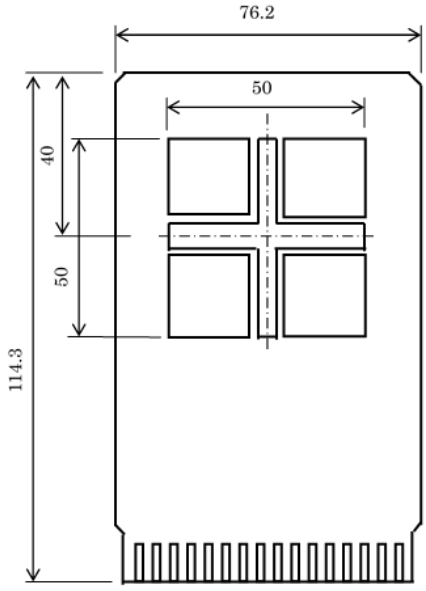
Item	Measurement Result
Power Dissipation	2700 mW
Thermal Resistance (θja)	θja = 37°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 7°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

Power Dissipation (TO-252-5-P2)

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

Measurement Conditions

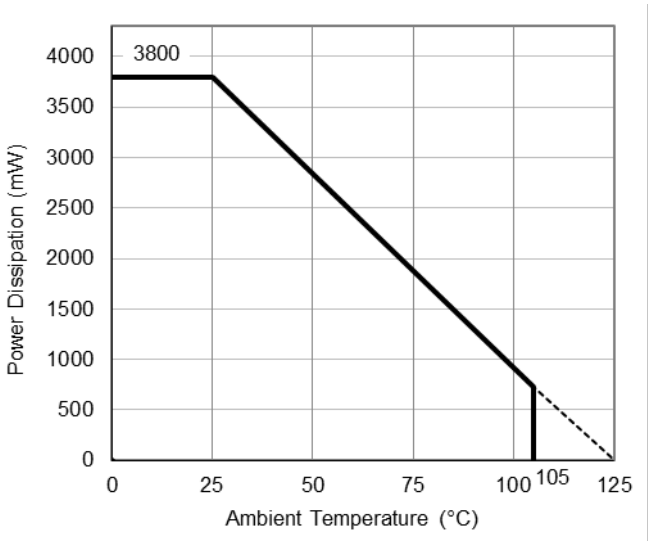
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square
Through-holes	ϕ 0.3 mm × 21 pcs

Measurement Result (Ta = 25°C, Tjmax = 125°C)

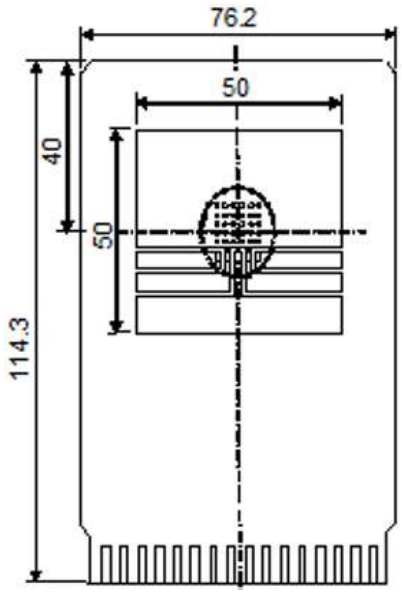
Item	Measurement Result
Power Dissipation	3800 mW
Thermal Resistance (θja)	θja = 26°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 7°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

ELECTRICAL CHARACTERISTICS

C_{IN}=1.0µF, C_{OUT}=6.8µF, unless otherwise noted.
The specification surrounded by ☐ are guaranteed by design engeneering at -40°C ≤ Ta ≤ +105°C.

R1511xxxxB (Ta=25°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
V_{IN}	Input Voltage			3.5		36	V
I_{SS}	Supply Current	V_{IN}=V_{SET}+1.0V, I_{OUT}=0mA			100	180	µA
Istandby	Standby Current	V_{IN}=36V, V_{CE}=0V			0.1	2.0	µA
V_{OUT}	Output Voltage	V_{IN}=V_{SET}+2.0V I_{OUT}=1mA	Ta=25°C	×0.99		×1.01	V
			−40°C≤Ta≤+105°C	×0.98		×1.02	
ΔV_{OUT} /ΔI_{OUT}	Load Regulation	V_{IN}=V_{SET}+2.0V 1mA≤I_{OUT}≤300mA	V_{SET}≤5.0V	-20		100	mV
			5.0V<V_{SET}	-20		120	
ΔV_{OUT} /ΔV_{IN}	Line Regulation	V_{SET}+0.5V≤V_{IN}≤36V, I_{OUT}=1mA			0.01	0.02	%/V
V_{DIF}	Dropout Voltage	I_{OUT}=300mA	3.0V≤V_{SET}≤3.1V		0.98	1.5	V
			3.1V<V_{SET}≤3.4V		0.94	1.4	
			3.4V<V_{SET}≤3.8V		0.88	1.3	
			3.8V<V_{SET}≤4.3V		0.79	1.2	
			4.3V<V_{SET}≤4.9V		0.71	1.1	
			4.9V<V_{SET}≤5.7V		0.64	1.0	
			5.7V<V_{SET}≤6.8V		0.59	0.9	
			6.8V<V_{SET}≤8.3V		0.54	0.8	
			8.3V<V_{SET}≤9.0V		0.47	0.7	
ΔV_{OUT} /ΔTa	Output Voltage Temperature Coefficient	V_{IN}=V_{SET}+2.0V, I_{OUT}=1mA −40°C≤Ta≤+105°C			±60		ppm /°C
I_{LIM}	Output Current Limit	V_{IN}=V_{SET}+2.5V			450		mA
I_{SC}	Short Current Limit	V_{OUT}=0V			50		mA
RR	Ripple Rejection	f=1kHz, Ripple=0.5Vpp I_{OUT}=10mA, V_{IN}=V_{SET}+2.0V			65		dB
V_{CEH}	CE Input Voltage “H”			2.2		36	V
V_{CEL}	CE Input Voltage “L”			0		1.0	V
I_{PD}	CE Pull-down Current	V_{CE}=5.0V			0.2	0.6	µA
		V_{CE}=36V			0.5	1.3	
T_{TSD}	Thermal Shutdown Temparature	Junction Temperature			160		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature			135		°C

All test items listed under Electrical Characteristics are done under the pulse load condition (Tj≈Ta=25ºC) except for Ripple Rejection and Output Voltage Temperature Coefficient.

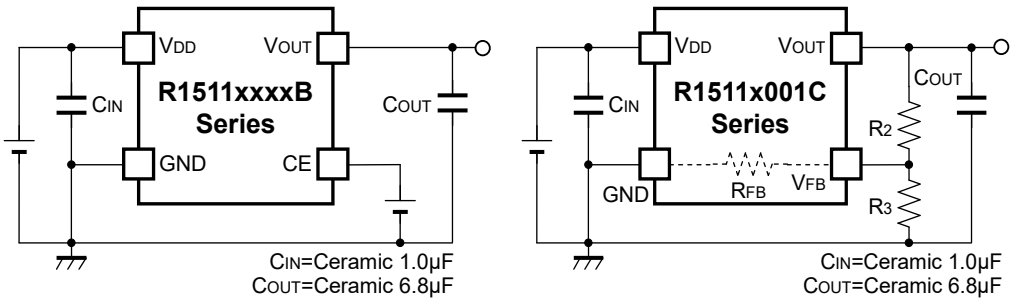
C_{IN}=1.0µF, C_{OUT}=6.8µF, V_{OUT}=V_{FB}, unless otherwise noted.
The specification surrounded by ☐ are guaranteed by design engeneering at -40°C ≤ Ta ≤ +105°C.

R1511x001C (Ta=25°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
V_{IN}	Input Voltage			3.5		36	V
I_{SS}	Supply Current	V_{IN}=4.0V, I_{OUT}=0mA			100	180	µA
V_{OUT}	Output Voltage	V_{IN}=5.0V I_{OUT}=1mA	Ta=25°C	2.97		3.03	V
			−40°C≤Ta≤+105°C	2.94		3.06	
ΔV_{OUT} /ΔI_{OUT}	Load Regulation	V_{IN}=5.0V 1mA≤I_{OUT}≤300mA		-20		40	mV
ΔV_{OUT} /ΔV_{IN}	Line Regulation	V_{SET}+0.5V≤V_{IN}≤36V I_{OUT}=1mA			0.01	0.02	%/V
V_{DIF}	Dropout Voltage	I_{OUT}=300mA			0.98	1.5	V
ΔV_{OUT} /ΔTa	Output Voltage Temperature Coefficient	V_{IN}=V_{SET}+2.0V, I_{OUT}=1mA −40°C≤Ta≤+105°C			±60		ppm /°C
I_{LIM}	Output Current Limit	V_{IN}= V_{SET}+2.5V			450		mA
I_{SC}	Short Current Limit	V_{OUT}=0V			50		mA
RR	Ripple Rejection	f=1kHz, Ripple=0.5Vpp I_{OUT}=10mA, V_{IN}=V_{SET}+2.0V			65		dB
R_{FB}	V_{FB} Pin Resistanse			1.0	3.0		MΩ
T_{TSD}	Thermal Shutdown Temparature	Junction Temperature			160		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature			135		°C

All test items listed under Electrical Characteristics are done under the pulse load condition (Tj≈Ta=25ºC) except for Ripple Rejection and Output Voltage Temperature Coefficient.

TYPICAL APPLICATIONS



NOTES CONCERNING EXTERNAL PARTS

Phase Compensation

In the R1511x Series, phase compensation is provided to secure stable operation even when the load current is varied. For this purpose, please make sure to use a C_{OUT} capacitor.

In case of using a tantalum type capacitor and the ESR (Equivalent Series Resistance) value of the capacitor is large, the output might be unstable. Evaluate the circuit including consideration of frequency characteristics.

Depending on the capacitor size, manufacturer, and part number, the bias characteristics and temperature characteristics are different. Evaluate the circuit taking actual characteristics into account.

PCB Layout and GND Wiring

Ensure the V_{DD} and GND lines are sufficiently robust. If their impedance is too high, noise pickup or unstable operation may result. Connect a C_{IN} capacitor with 1.0μF or more value between the V_{DD} and GND pins, and as close as possible to the pins. Likewise, connect a C_{OUT} capacitor with suitable values between the V_{OUT} and GND pins, and as close as possible to the pins (Please refer to the Typical Application above).

In the case of using HSOP-6J package, please make sure to wire No. 2, No. 3, and No. 5 pins to the GND plane. Also, in the case of using TO-252-5-P2 package, please make sure to wire No. 2 and No. 3 pins to the GND plane.

Thermal Shutdown

R1511x contains a thermal shutdown circuit, which stops regulator operation if the junction temperature of R1511x becomes higher than 160ºC (Typ.). Additionally, if the junction temperature after the regulator being stopped decreases to a level below 135ºC (Typ.), it restarts regulator operation. As a result the operation of the thermal shutdown circuit causes the regulator repeatedly to turn off and on until the causes of overheating are removed. As a consequence a pulse shaped output voltage occurs.

Output Voltage Setting Method (R1511x001C)

R1511x001C can be adjusted the output voltage up to 12.0V by using the external divider resistors. The output voltage can be calculated by the following equation.

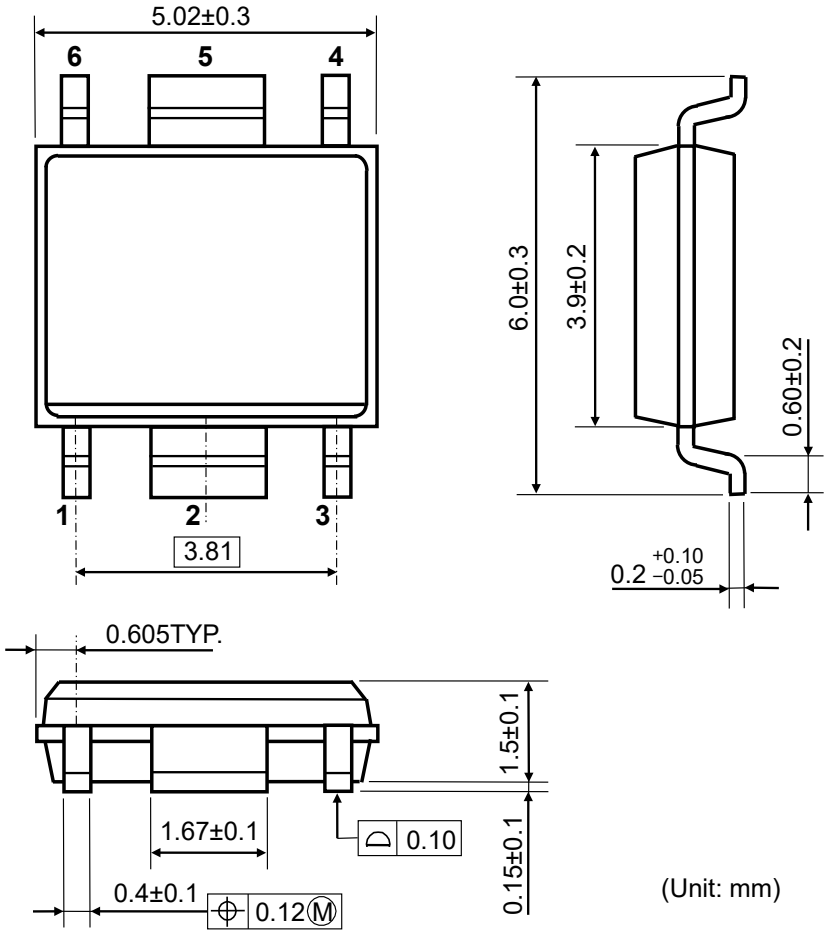
$$V_{OUT}=V_{FB}\times(R2+R3)/R3$$

However, output voltage will be as large as "$R2\times I_{FB}$" by the current flowing through the resistor in the IC. Because $I_{FB} = V_{FB}/R_{FB}$, "$R2\times I_{FB}$" cause of error is as follows.

$$R2\times I_{FB}=R2\times V_{FB}/R_{FB}=V_{FB}\times R2/R_{FB}$$

For better accuracy, choosing $R2<<R_{FB}$ reduces this error. R_{FB} of R1511x is approximately min 1.0MΩ (guaranteed by design).

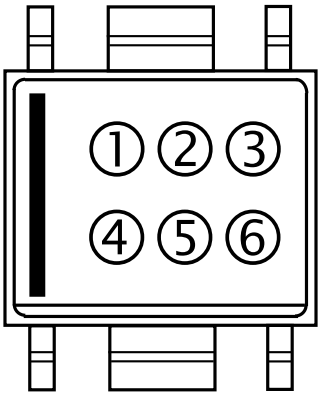
Package Dimensions (HSOP-6J)



(Unit: mm)

Mark Specification (HSOP-6J)

①②③④: Product Code … **Refer to *R1511S Series Mark Specification Table***
⑤⑥ : Lot Number … Alphanumeric Serial Number



NOTICE
There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact our sales or distributor before attempting to use AOI.

R1511S Series Mark Specification Table

PKG: HSOP-6J

R1511SxxxB Mark Specification Table

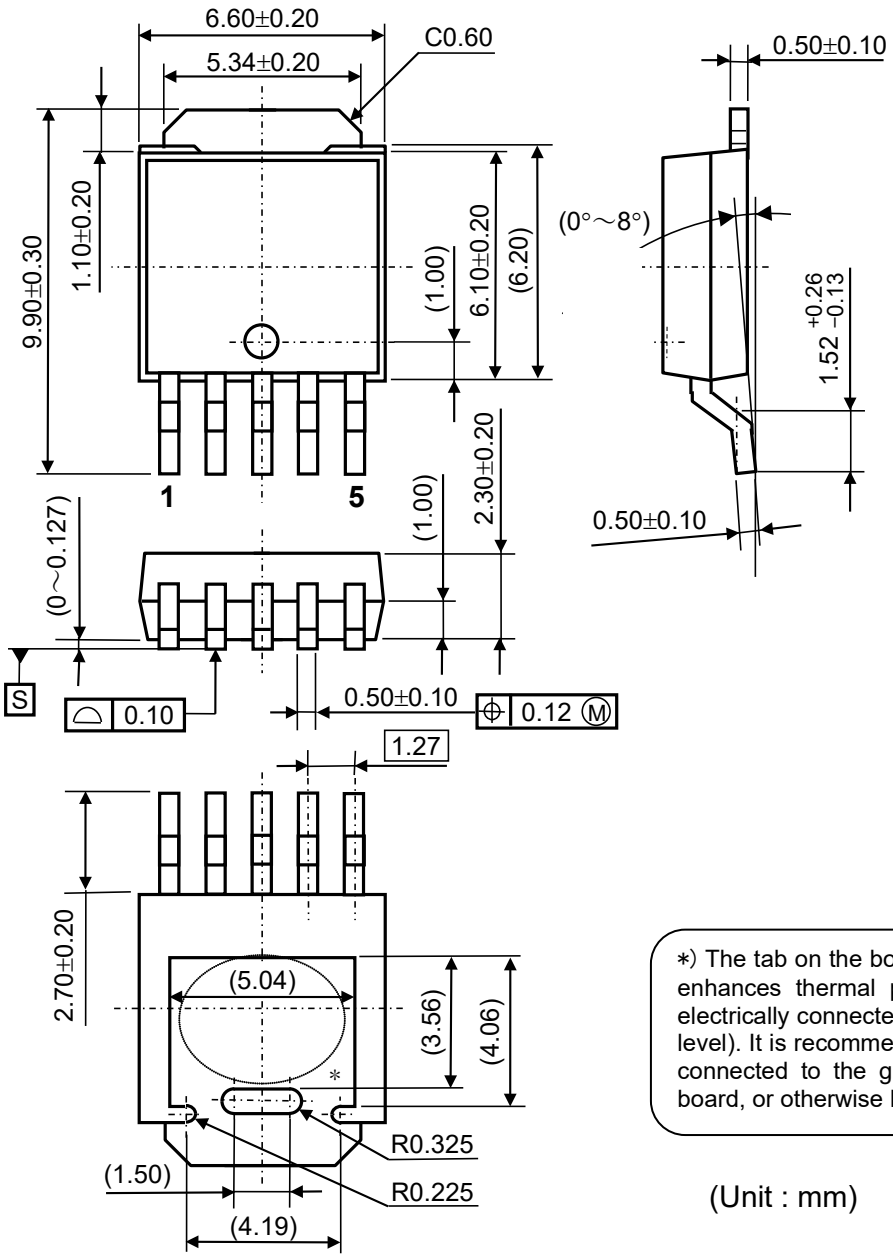
Product Name	①②③④	V_{SET}
R1511S030B	**S 3 0 B**	3.0 V
R1511S031B	**S 3 1 B**	3.1 V
R1511S032B	**S 3 2 B**	3.2 V
R1511S033B	**S 3 3 B**	3.3 V
R1511S034B	**S 3 4 B**	3.4 V
R1511S035B	**S 3 5 B**	3.5 V
R1511S036B	**S 3 6 B**	3.6 V
R1511S037B	**S 3 7 B**	3.7 V
R1511S038B	**S 3 8 B**	3.8 V
R1511S039B	**S 3 9 B**	3.9 V
R1511S040B	**S 4 0 B**	4.0 V
R1511S041B	**S 4 1 B**	4.1 V
R1511S042B	**S 4 2 B**	4.2 V
R1511S043B	**S 4 3 B**	4.3 V
R1511S044B	**S 4 4 B**	4.4 V
R1511S045B	**S 4 5 B**	4.5 V
R1511S046B	**S 4 6 B**	4.6 V
R1511S047B	**S 4 7 B**	4.7 V
R1511S048B	**S 4 8 B**	4.8 V
R1511S049B	**S 4 9 B**	4.9 V
R1511S050B	**S 5 0 B**	5.0 V
R1511S051B	**S 5 1 B**	5.1 V
R1511S052B	**S 5 2 B**	5.2 V
R1511S053B	**S 5 3 B**	5.3 V
R1511S054B	**S 5 4 B**	5.4 V
R1511S055B	**S 5 5 B**	5.5 V
R1511S056B	**S 5 6 B**	5.6 V
R1511S057B	**S 5 7 B**	5.7 V
R1511S058B	**S 5 8 B**	5.8 V
R1511S059B	**S 5 9 B**	5.9 V
R1511S060B	**S 6 0 B**	6.0 V
R1511S061B	**S 6 1 B**	6.1 V
R1511S062B	**S 6 2 B**	6.2 V
R1511S063B	**S 6 3 B**	6.3 V
R1511S064B	**S 6 4 B**	6.4 V
R1511S065B	**S 6 5 B**	6.5 V
R1511S066B	**S 6 6 B**	6.6 V
R1511S067B	**S 6 7 B**	6.7 V
R1511S068B	**S 6 8 B**	6.8 V
R1511S069B	**S 6 9 B**	6.9 V
R1511S070B	**S 6 0 B**	7.0 V
R1511S071B	**S 7 1 B**	7.1 V
R1511S072B	**S 7 2 B**	7.2 V
R1511S073B	**S 7 3 B**	7.3 V
R1511S074B	**S 7 4 B**	7.4 V
R1511S075B	**S 7 5 B**	7.5 V
R1511S076B	**S 7 6 B**	7.6 V
R1511S077B	**S 7 7 B**	7.7 V
R1511S078B	**S 7 8 B**	7.8 V
R1511S079B	**S 7 9 B**	7.9 V
R1511S080B	**S 8 0 B**	8.0 V

Product Name	①②③④	V_{SET}
R1511S081B	**S 8 1 B**	8.1 V
R1511S082B	**S 8 2 B**	8.2 V
R1511S083B	**S 8 3 B**	8.3 V
R1511S084B	**S 8 4 B**	8.4 V
R1511S085B	**S 8 5 B**	8.5 V
R1511S086B	**S 8 6 B**	8.6 V
R1511S087B	**S 8 7 B**	8.7 V
R1511S088B	**S 8 8 B**	8.8 V
R1511S089B	**S 8 9 B**	8.9 V
R1511S090B	**S 9 0 B**	9.1 V

R1511S001C Mark Specification Table

Product Name	①②③④	V_{SET}
R1511S001C	**S 0 0 C**	3.0 V

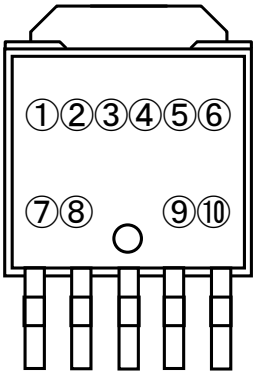
Package Dimensions (TO-252-5-P2)



∗) The tab on the bottom of the package enhances thermal performance and is electrically connected to GND (substrate level). It is recommended that the tab be connected to the ground plane on the board, or otherwise be left floating.

(Unit : mm)

Mark Specification (TO-252-5-P2)



①②③④⑤⑥⑦⑧: Product Code … **Refer to *R1511J Series Mark Specification Table***

⑨⑩: Lot Number … Alphanumeric Serial Number

NOTICE
There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact our sales or distributor before attempting to use AOI.

R1511J Series Mark Specification Table

PKG: TO-252-5-P2

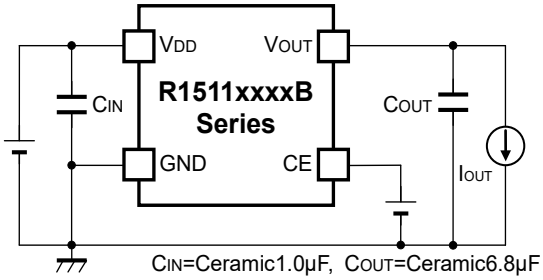
R1511JxxxB Mark Specification Table

Product Name	①②③④⑤⑥⑦⑧	V_{SET}
R1511J030B	**H 1 J 0 3 0 B _**	3.0 V
R1511J031B	**H 1 J 0 3 1 B _**	3.1 V
R1511J032B	**H 1 J 0 3 2 B _**	3.2 V
R1511J033B	**H 1 J 0 3 3 B _**	3.3 V
R1511J034B	**H 1 J 0 3 4 B _**	3.4 V
R1511J035B	**H 1 J 0 3 5 B _**	3.5 V
R1511J036B	**H 1 J 0 3 6 B _**	3.6 V
R1511J037B	**H 1 J 0 3 7 B _**	3.7 V
R1511J038B	**H 1 J 0 3 8 B _**	3.8 V
R1511J039B	**H 1 J 0 3 9 B _**	3.9 V
R1511J040B	**H 1 J 0 4 0 B _**	4.0 V
R1511J041B	**H 1 J 0 4 1 B _**	4.1 V
R1511J042B	**H 1 J 0 4 2 B _**	4.2 V
R1511J043B	**H 1 J 0 4 3 B _**	4.3 V
R1511J044B	**H 1 J 0 4 4 B _**	4.4 V
R1511J045B	**H 1 J 0 4 5 B _**	4.5 V
R1511J046B	**H 1 J 0 4 6 B _**	4.6 V
R1511J047B	**H 1 J 0 4 7 B _**	4.7 V
R1511J048B	**H 1 J 0 4 8 B _**	4.8 V
R1511J049B	**H 1 J 0 4 9 B _**	4.9 V
R1511J050B	**H 1 J 0 5 0 B _**	5.0 V
R1511J051B	**H 1 J 0 5 1 B _**	5.1 V
R1511J052B	**H 1 J 0 5 2 B _**	5.2 V
R1511J053B	**H 1 J 0 5 3 B _**	5.3 V
R1511J054B	**H 1 J 0 5 4 B _**	5.4 V
R1511J055B	**H 1 J 0 5 5 B _**	5.5 V
R1511J056B	**H 1 J 0 5 6 B _**	5.6 V
R1511J057B	**H 1 J 0 5 7 B _**	5.7 V
R1511J058B	**H 1 J 0 5 8 B _**	5.8 V
R1511J059B	**H 1 J 0 5 9 B _**	5.9 V
R1511J060B	**H 1 J 0 6 0 B _**	6.0 V
R1511J061B	**H 1 J 0 6 1 B _**	6.1 V
R1511J062B	**H 1 J 0 6 2 B _**	6.2 V
R1511J063B	**H 1 J 0 6 3 B _**	6.3 V
R1511J064B	**H 1 J 0 6 4 B _**	6.4 V
R1511J065B	**H 1 J 0 6 5 B _**	6.5 V
R1511J066B	**H 1 J 0 6 6 B _**	6.6 V
R1511J067B	**H 1 J 0 6 7 B _**	6.7 V
R1511J068B	**H 1 J 0 6 8 B _**	6.8 V
R1511J069B	**H 1 J 0 6 9 B _**	6.9 V
R1511J070B	**H 1 J 0 7 0 B _**	7.0 V
R1511J071B	**H 1 J 0 7 1 B _**	7.1 V
R1511J072B	**H 1 J 0 7 2 B _**	7.2 V
R1511J073B	**H 1 J 0 7 3 B _**	7.3 V
R1511J074B	**H 1 J 0 7 4 B _**	7.4 V
R1511J075B	**H 1 J 0 7 5 B _**	7.5 V
R1511J076B	**H 1 J 0 7 6 B _**	7.6 V
R1511J077B	**H 1 J 0 7 7 B _**	7.7 V
R1511J078B	**H 1 J 0 7 8 B _**	7.8 V
R1511J079B	**H 1 J 0 7 9 B _**	7.9 V
R1511J080B	**H 1 J 0 8 0 B _**	8.0 V
R1511J081B	**H 1 J 0 8 1 B _**	8.1 V
R1511J082B	**H 1 J 0 8 2 B _**	8.2 V
R1511J083B	**H 1 J 0 8 3 B _**	8.3 V
R1511J084B	**H 1 J 0 8 4 B _**	8.4 V
R1511J085B	**H 1 J 0 8 5 B _**	8.5 V
R1511J086B	**H 1 J 0 8 6 B _**	8.6 V
R1511J087B	**H 1 J 0 8 7 B _**	8.7 V
R1511J088B	**H 1 J 0 8 8 B _**	8.8 V
R1511J089B	**H 1 J 0 8 9 B _**	8.9 V
R1511J090B	**H 1 J 0 9 0 B _**	9.0 V

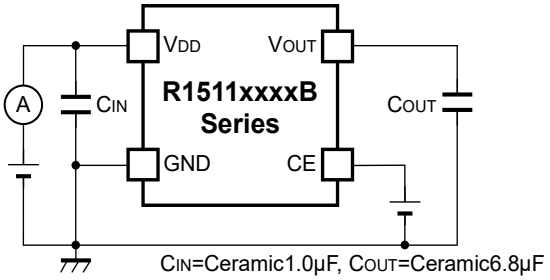
R1511J001C Mark Specification Table

Product Name	①②③④⑤⑥⑦⑧	V_{SET}
R1511J001C	**H 1 J 0 0 1 C _**	3.0 V

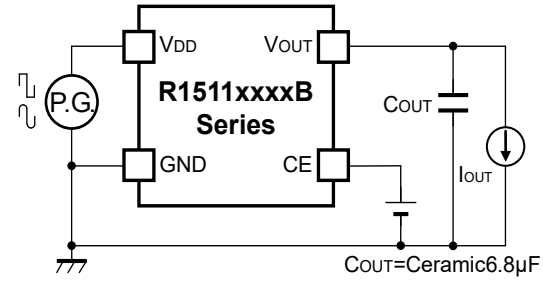
TEST CIRCUITS.



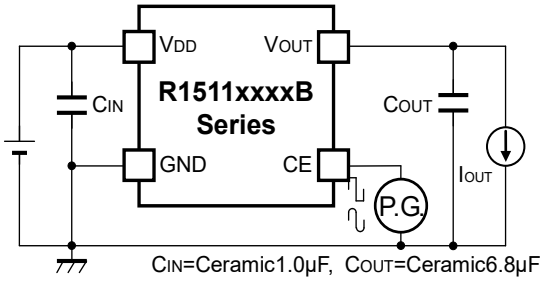
R1511xxxxB Basic Test Circuit



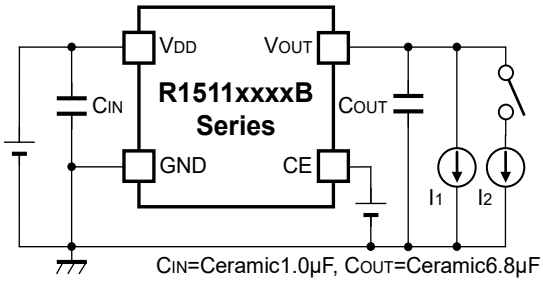
R1511xxxxB Test Circuit for Supply Current



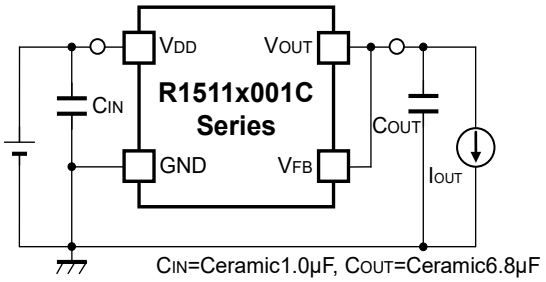
R1511xxxxB Test Circuit for Ripple Rejection and Regulator Input Transient Response



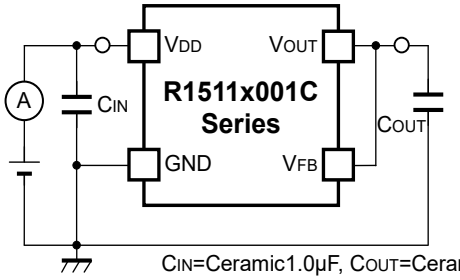
R1511xxxxB Test Circuit for CE Start-up



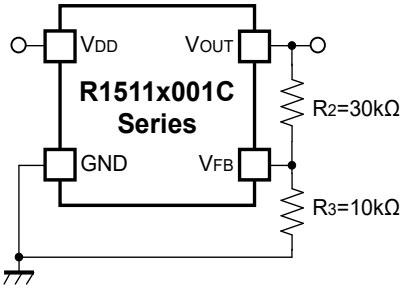
R1511xxxxB Test Circuit for Load Transient Response



R1511x001C Basic Test Circuit



R1511x001C Test Circuit for Supply Current

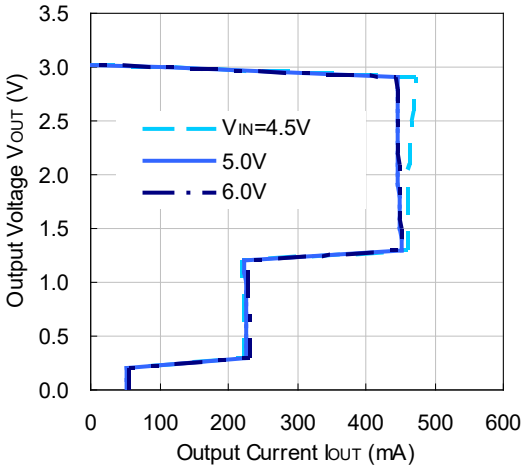


R1511x001C Case of output voltage adjustment by external resistors

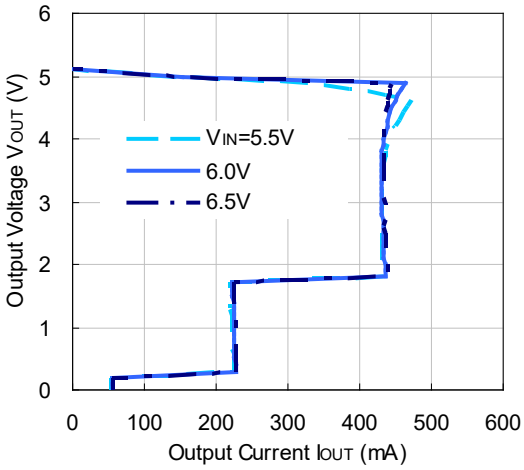
TYPICAL CHARACTERISTICS

(1) Output Voltage Vs. Output Current (Ta=25ºC)

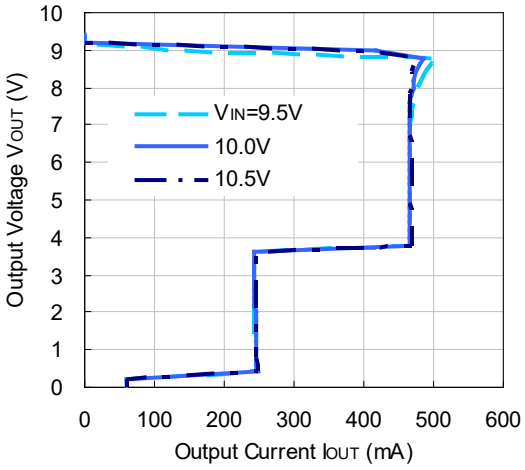
R1511x030B



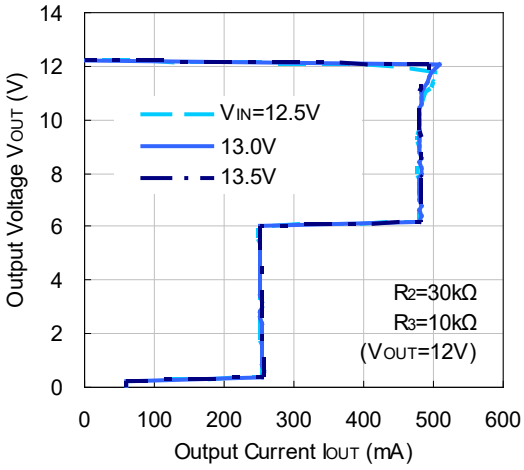
R1511x050B



R1511x090B

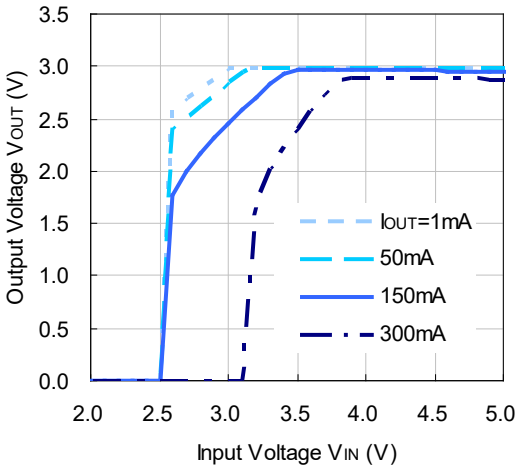


R1511x001C

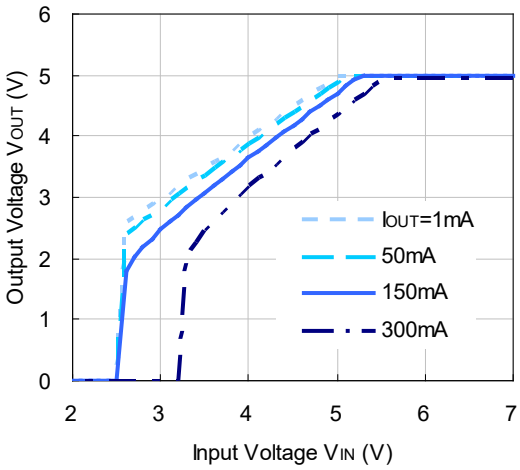


2) Output Voltage Vs. Input Voltage (Ta=25ºC)

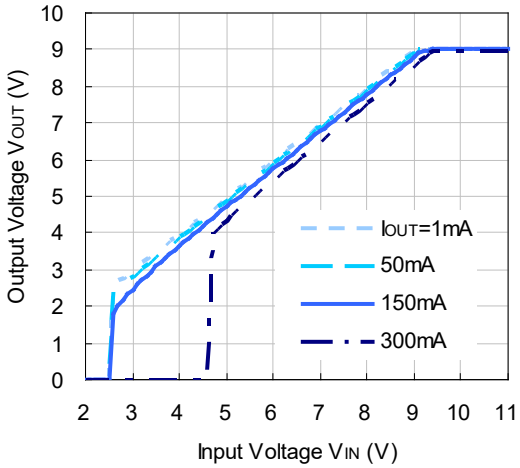
R1511x030B



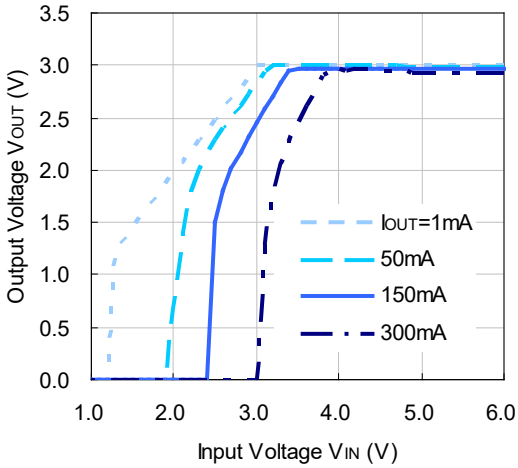
R1511x050B



R1511x090B

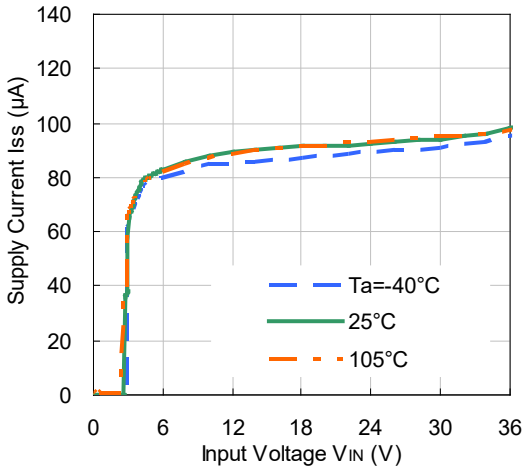


R1511x001C

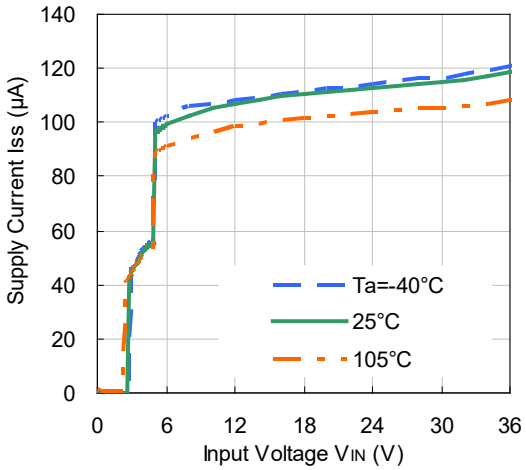


3) Supply Current Vs. Input Voltage

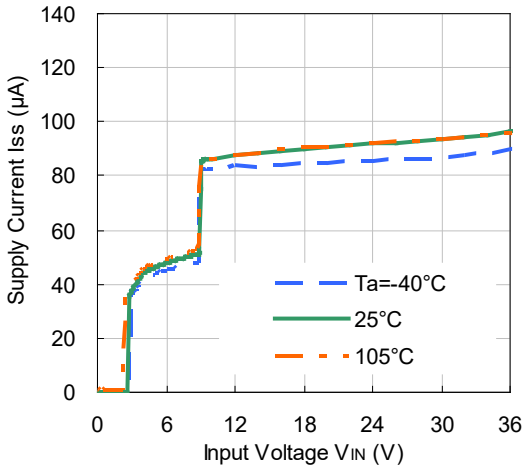
R1511x030B



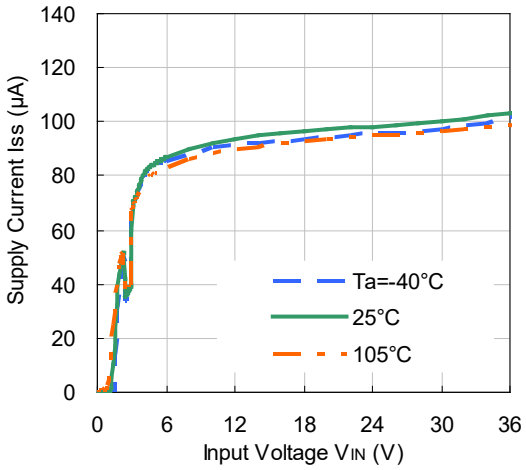
R1511x050B



R1511x090B

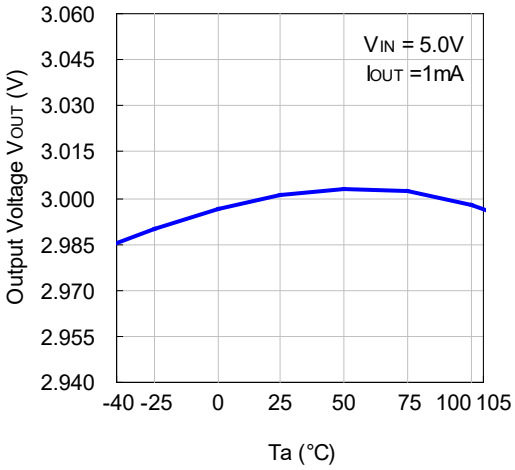


R1511x001C

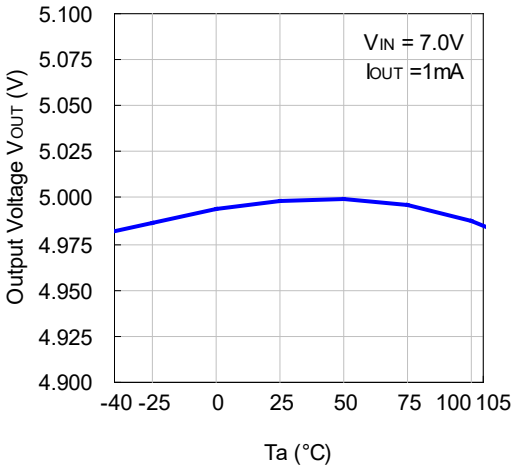


4) Output Voltage Vs. Ambient Temperature

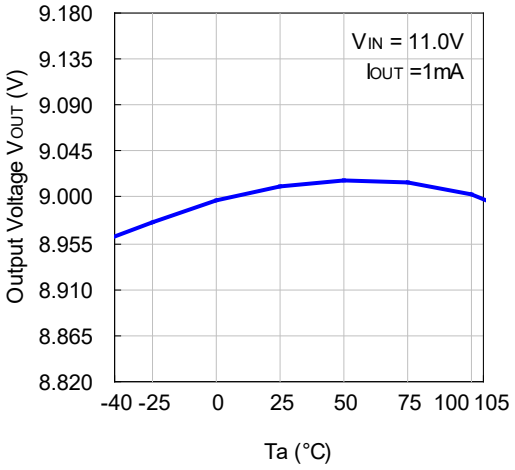
R1511x030B



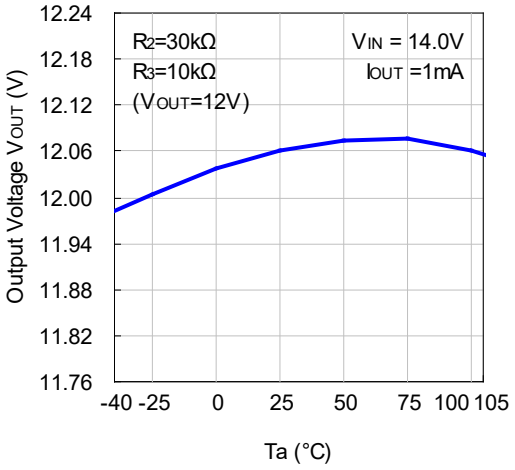
R1511x050B



R1511x090B

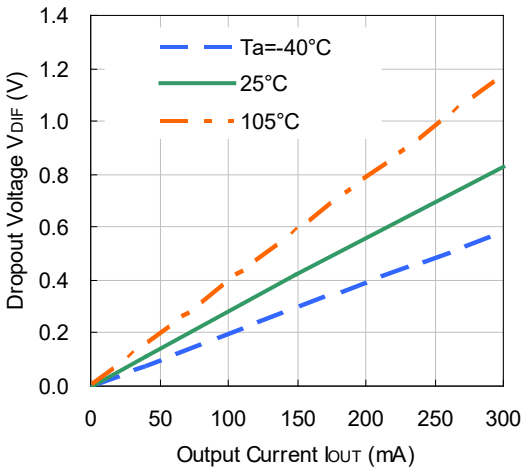


R1511x001C

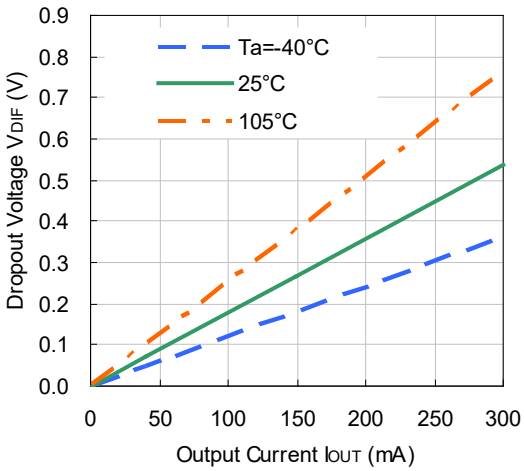


5) Dropout Voltage Vs. Output Current

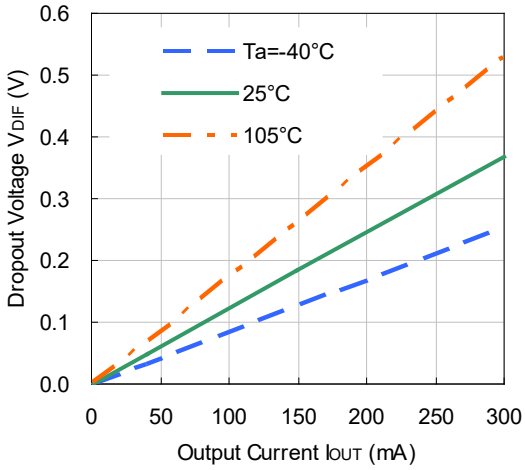
R1511x030B/R1511x001C



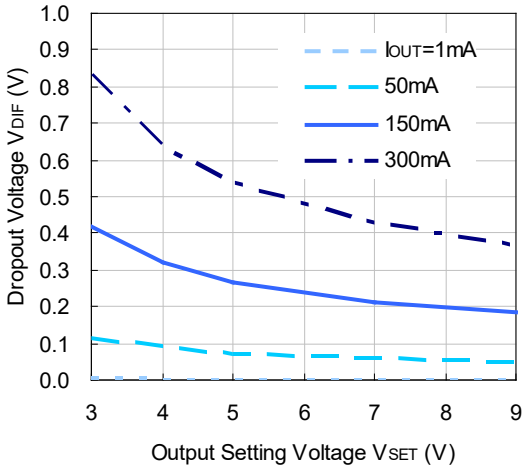
R1511x050B



R1511x090B

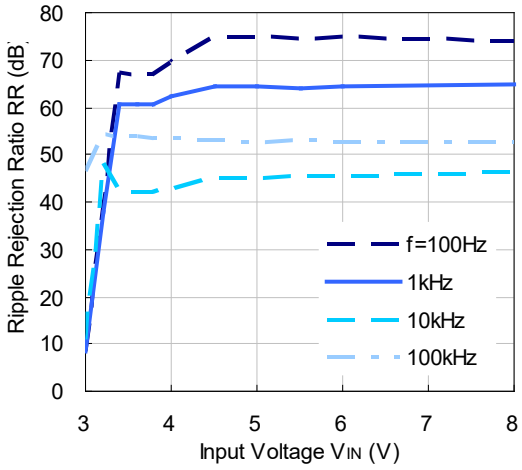


6) Dropout Voltage Vs. Setting Voltage (Ta=25ºC)

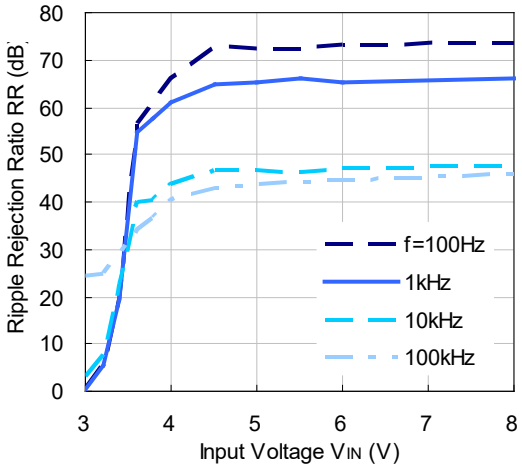


7) Ripple Rejection Vs. Input Bias Voltage (Ta=25°C, Ripple=0.5Vpp)

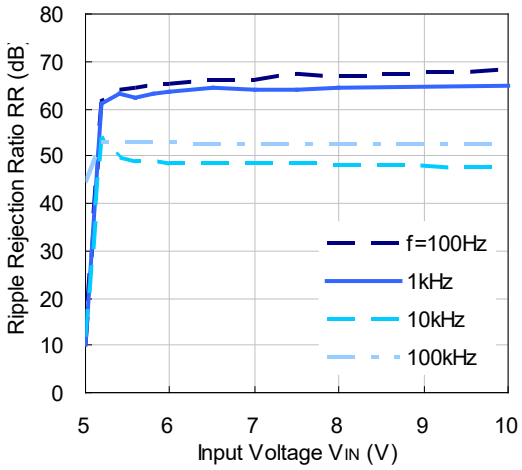
R1511x030B/R1511x001C (IOUT=1mA)



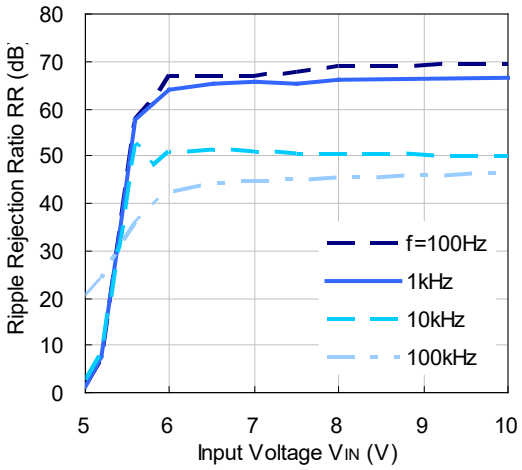
R1511x030B/R1511x001C (IOUT=100mA)



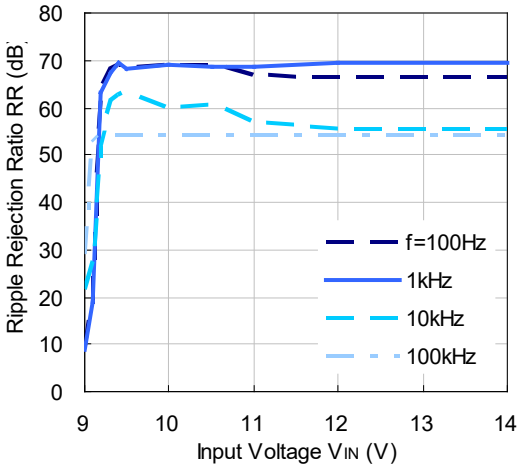
R1511x050B (IOUT=1mA)



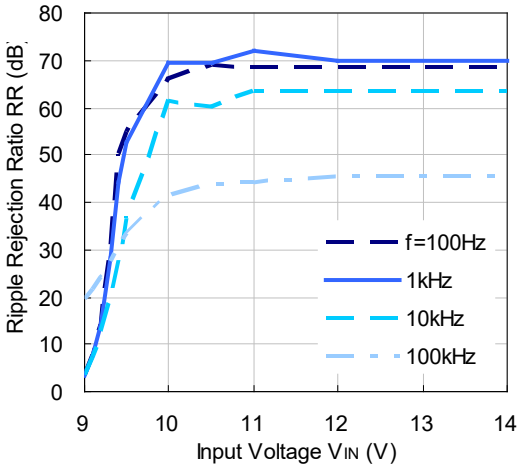
R1511x050B (IOUT=100mA)



R1511x090B (I_{OUT}=1mA)

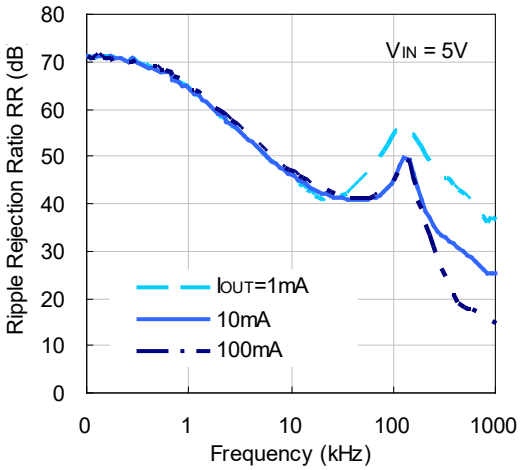


R1511x090B (I_{OUT}=100mA)

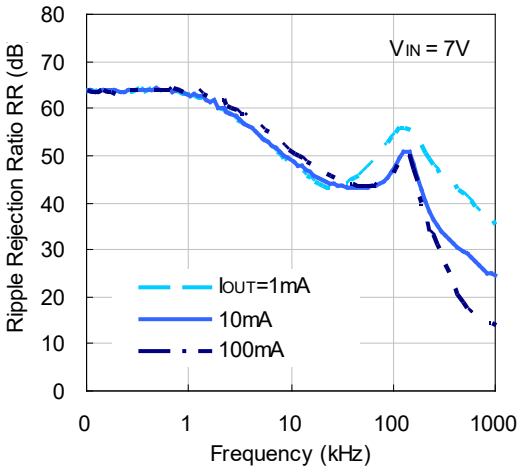


8) Ripple Rejection Vs. Frequency (Ta=25°C, Ripple=0.5V_{pp})

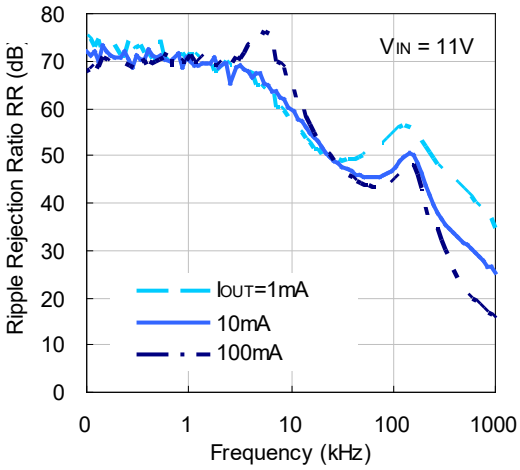
R1511x030B/R1511x001C



R1511x050B

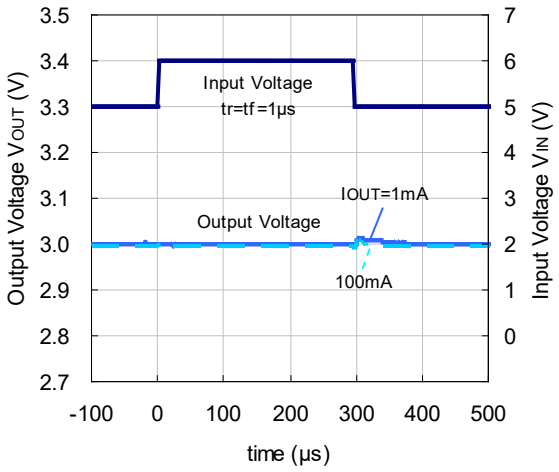


R1511x090B

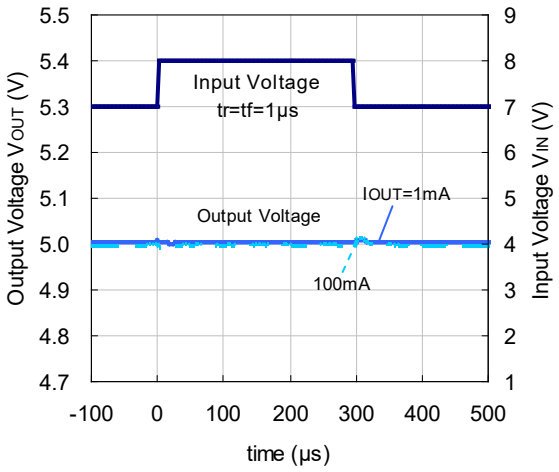


10) Input Transient Response (Ta=25°C)

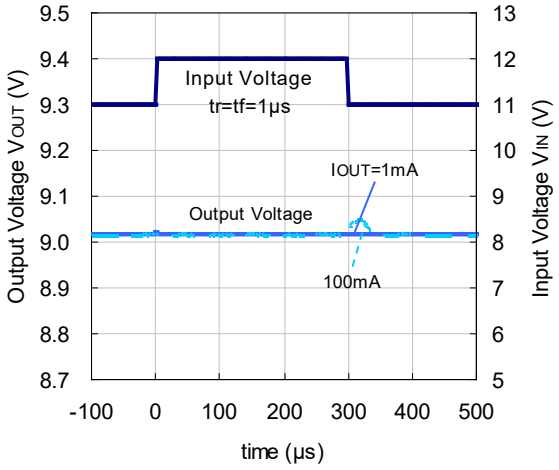
R1511x030B



R1511x050B

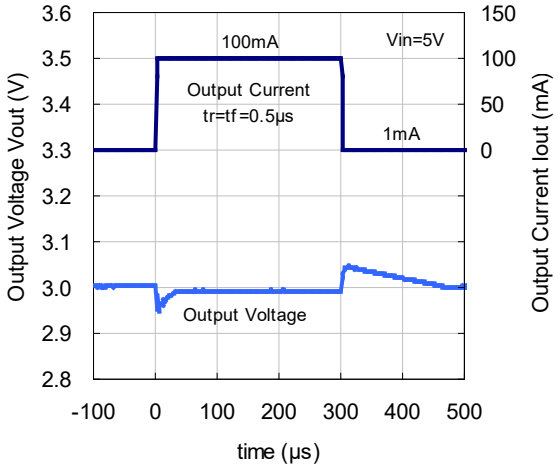


R1511x090B

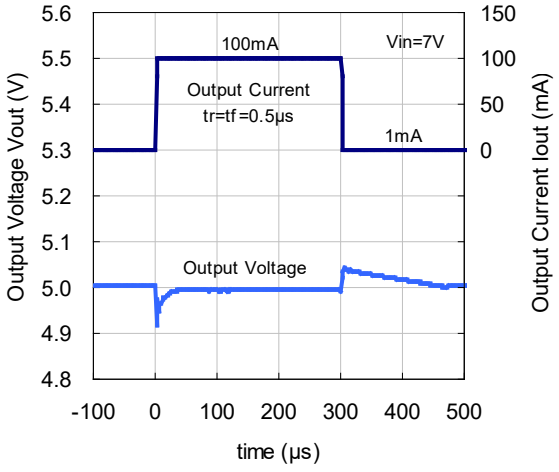


10) Load Transient Response (Ta=25°C)

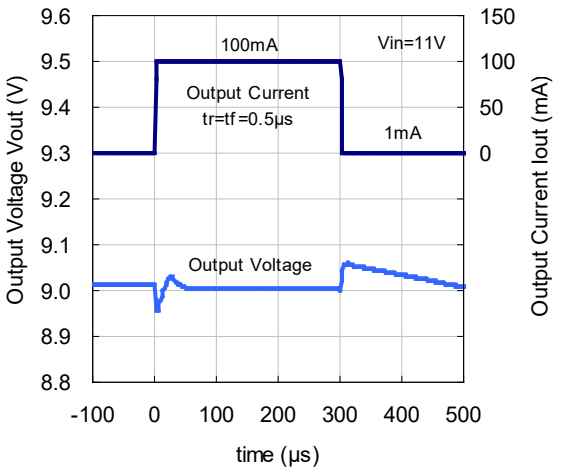
R1511x030B



R1511x050B

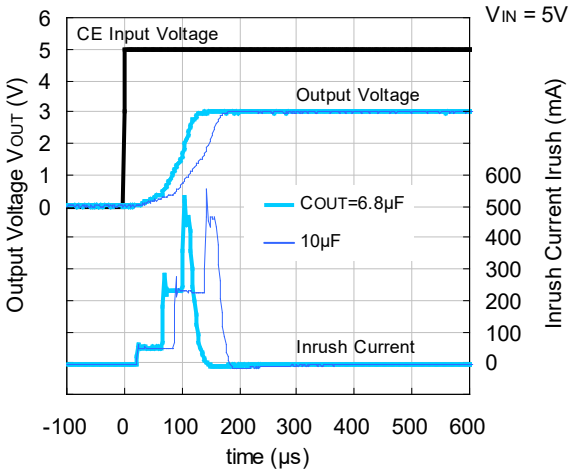


R1511x090B



11) CE Response (Ta=25°C)

R1511x030B (Turn On)



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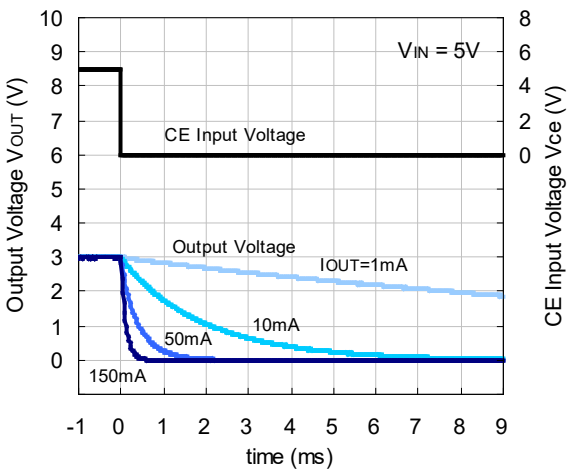

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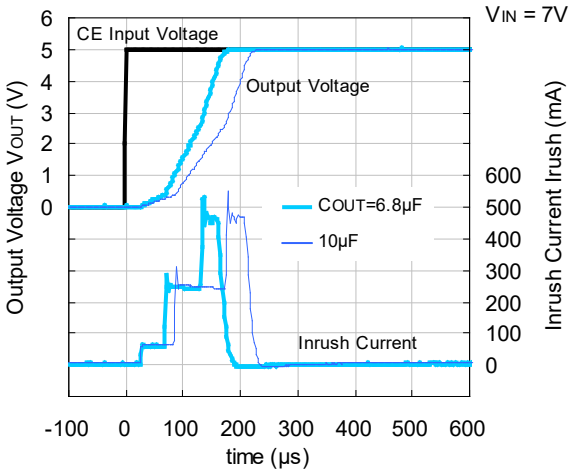
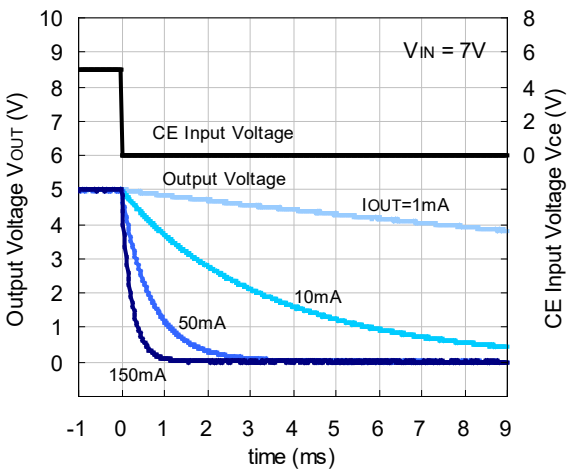


R1511x050B (Turn Off)



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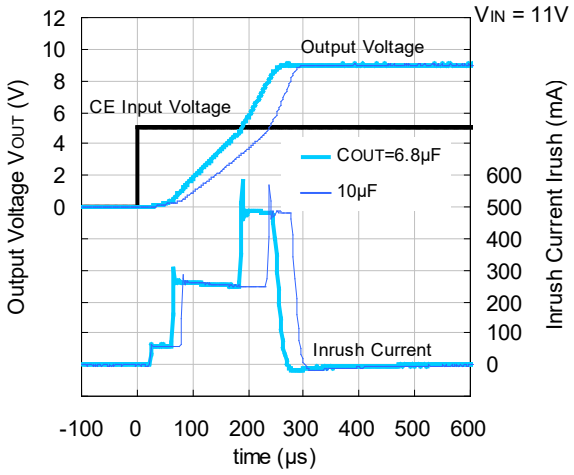
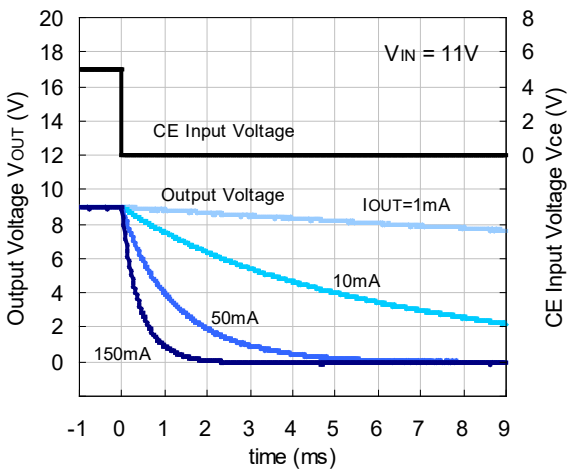
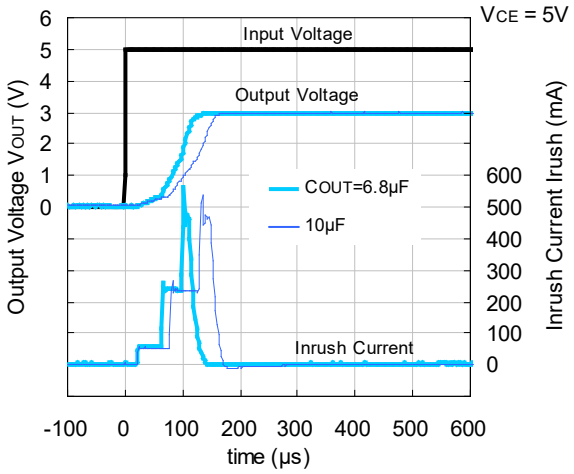


R1511x090B (Turn Off)

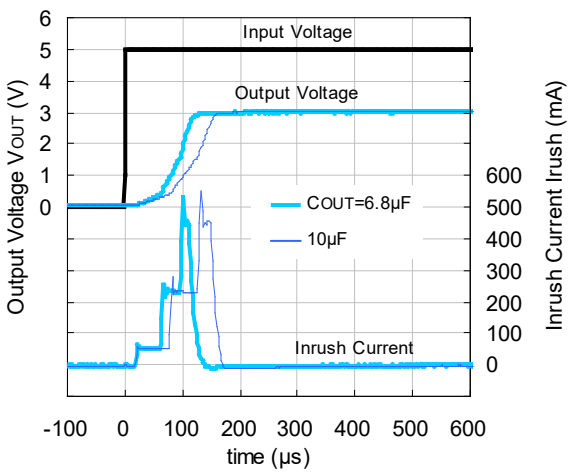


12) Start Up Waveform (Ta=25°C)

R1511x030B

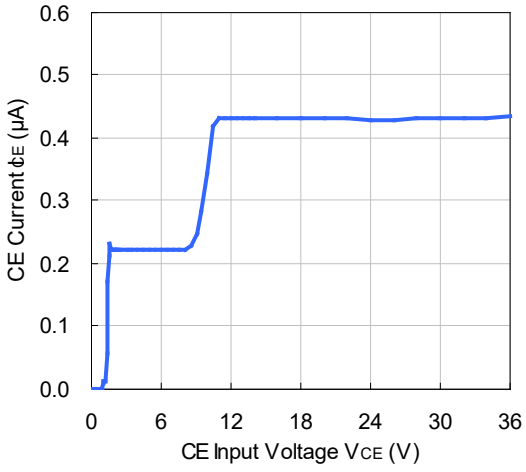


R1511x001C



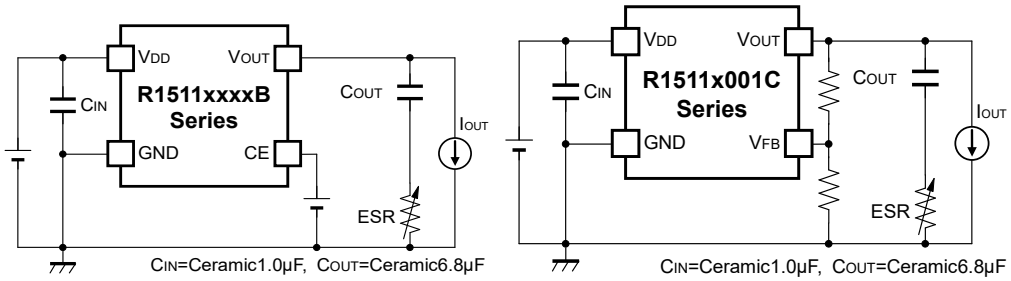
13) CE Pin Current Vs. CE Input Voltage

R1511xxxxB



EFFECTIVE SERIES RESISTANCE (ESR) VS. OUTPUT CURRENT

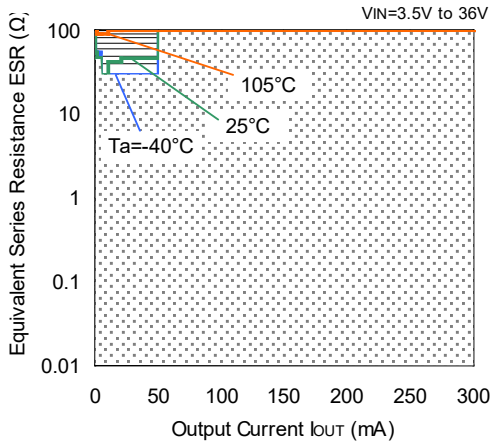
Ceramic type output capacitor is recommended for this series; however, the other output capacitors with low ESR also can be used. As for reference, the below graphs show the relationship between output current (I_{OUT}) and effective series resistance (ESR). The noise level of the output current (I_{OUT}) was measured by the test circuit and is lower than the specified value.



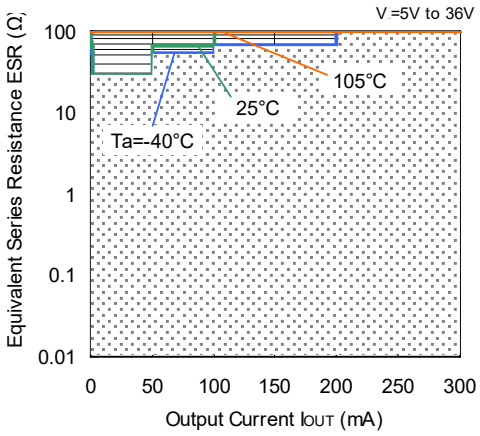
Measurement Conditions

- Noise Frequency Range: 10Hz to 1MHz
- Ambient Temperature: -40ºC to 105ºC
- Shaded Area: Noise level is lower than the specified value (40μV)
- Capacitor: C_{IN}=Ceramic 1.0μF, C_{OUT}=Ceramic 6.8μF (C4532X7S1H685K)

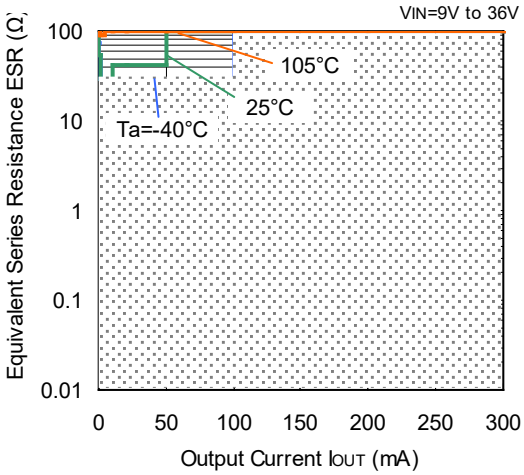
R1511x030B



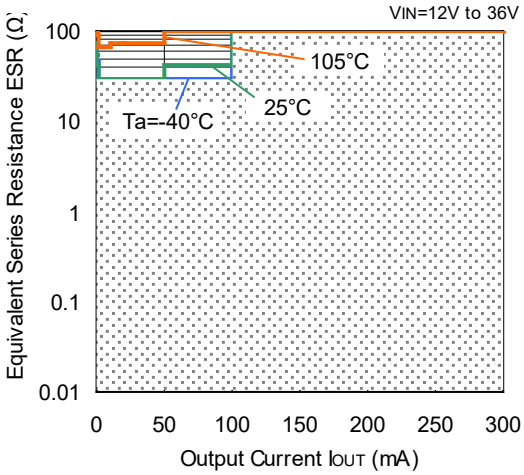
R1511x050B



R1511x090B



R1511x001C (V_{OUT}=12V)



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    When it has been proved defective due to manufacturing factors as a result of defect analysis by us, we will either deliver a substitute for the defective product or refund the purchase price of the defective product.
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    With respect to any defect of this product found after the quality warranty period, the defect will be analyzed by us. On the basis of the defect analysis results, the scope and amounts of damage shall be determined by mutual agreement of both parties. Then we will deal with upper limit in Section 8-2. This provision is not intended to limit any legal rights of your company.
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