300mA 36V Input Regulator for Automotive Applications

NO.EC-307-180510

OUTLINE

The R8153x Series are CMOS-based high-voltage resistant and fast response voltage regulators that provide the minimum 300mA of output current. Internally, R8153x 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 125ºC, and the maximum input voltage is 36V. All these features allow the R8153x Series to become an ideal power source of Automotive Applications.

R8153x is available in B version (R8153xxxxB) with the fixed output voltage type, and C version (R8153x001C) with adjustable output voltage type with external resistors. The output voltage accuracy is ±2.0%.

R8153x is available in two types of packages: HSOP-6J and TO-252-5-P2 for ultra high wattage.

FEATURES

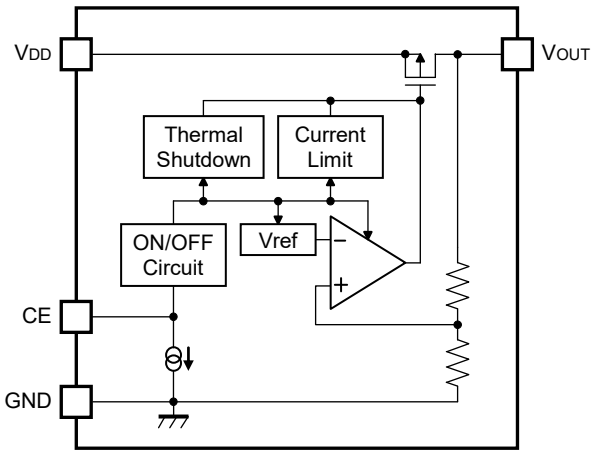
- Input Voltage Range (Maximum Rating) ····· 3.5V to 36V (50V)
- Supply Current ····· Typ. 100μA
- Supply Current (Standby Mode) ····· Typ. 0.1μA (R8153xxxxB)
- Output Voltage Range ····· R8153xxxxB: 3.0V to 9.0V (0.1V step)
  R8153xxxxC: 3.0V to 12.0V
- Output Voltage Accuracy ····· R8153xxxxB: ±2.0%
- Feed Back Voltage ····· R8153xxxxC: 3.0V ±2.0%
- 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)
- Packages ····· 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 125°C
- Ceramic capacitors are recommended to be used with this IC
  ····· C_{IN}=1.0μF or more, C_{OUT}=6.8μF or more

APPLICATIONS

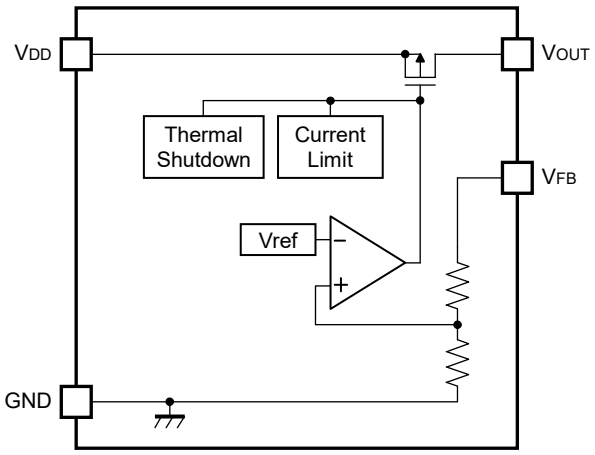
- Power supply for electronic control units such as EV inverter and battery charge control unit.

BLOCK DIAGRAMS

R8153xxxxB



R8153x001C



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
R8153Sxxx∗-E2-FE	HSOP-6J	1,000 pcs	Yes	Yes
R8153Jxxx∗-T1-FE	TO-252-5-P2	3,000 pcs	Yes	Yes

xxx : Specify the set output voltage (V_{SET})
R8153xxxxB: Specify the output voltage within the range of 3.0V (030) to 9.0V (090) in 0.1V step.

R8153x001C: only (001)

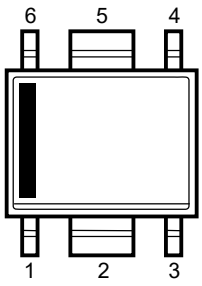
∗ : Specify the version
(B) Fixed output and Built-in Chip Enable ("H" active)
(C) Adjustable output

R8 Automotive Class Code

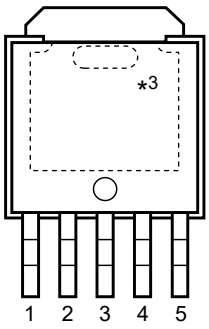
Operating Temperature Range	Guaranteed Specs Temperature Range	Screening
−40°C to 125°C	−40°C to 125°C	High and Low Temperature

PIN DESCRIPTIONS

● **HSOP-6J**



● **TO-252-5-P2**



HSOP-6J

Pin No.	Symbol	Description	
1	V_{DD}	Input Pin	
2	GND*1	Ground Pin	
3	GND*1	Ground Pin	
4	CE	R8153SxxxB	Chip Enable Pin (“H” Active)
	V_{FB}	R8153S001C	Feed Back Pin
5	GND*1	Ground Pin	
6	V_{OUT}	Output Pin	

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

TO-252-5-P2

Pin No.	Symbol	Description	
1	V_{DD}	Input Pin	
2	GND*2	Ground Pin	
3	GND*2	Ground Pin	
4	CE	R8153JxxxB	Chip Enable Pin (“H” Active)
	V_{FB}	R8153J001C	Feed Back Pin
5	V_{OUT}	Output Pin	

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

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
I_{OUT}	Output Current			450	mA
P_D	Power Dissipation[*2]	HSOP-6J	Standard Test Land Pattern	2100	mW
			Ultra High Wattage Land Pattern	3400	
		TO-252-5-P2	Standard Test Land Pattern	2350	
			Ultra High Wattage Land Pattern	4800	
Tj	Junction Temperature			−40 to 150	°C
Tstg	Storage Temperature			−55 to 150	°C

[*1] Duration time: 200ms

[*2] Refer to *PACKAGE INFORMATION* for detailed information.

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
V_{IN}	Input Voltage	3.5 to 36	V
Ta	Operating Temperature	−40 to 125	°C

RECOMMENDED OPERATING CONDITIONS

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.

ELECTRICAL CHARACTERISTICS

C_{IN}=1.0µF, C_{OUT}=6.8µF, unless otherwise noted.

R8153xxxxB (−40°C ≤ Ta ≤ 125°C)

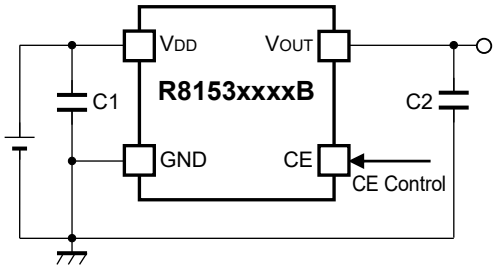
Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
I_{SS}	Supply Current	V_{IN}=V_{SET}+1.0V, I_{OUT}=0mA			100	180	µA
Istandby	Standby Current	V_{IN}=36V, V_{CE}=0V			0.1	2.0	µA
V_{OUT}	Output Voltage	V_{IN}=V_{SET}+2.0V I_{OUT}=1mA	Ta=25°C	×0.99		×1.01	V
			−40°C≤Ta≤125°C	×0.98		×1.02	
ΔV_{OUT} /ΔI_{OUT}	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		−0.02	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	
I_{LIM}	Output Current Limit	V_{IN}=V_{SET}+2.5V		300	450	610	mA
I_{SC}	Short Current Limit	V_{IN}=5V, V_{OUT}=0V		35	50	65	mA
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		150	160		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature		125	135		°C

C_{IN}=1.0µF, C_{OUT}=6.8µF, V_{OUT}=V_{FB}, unless otherwise noted.

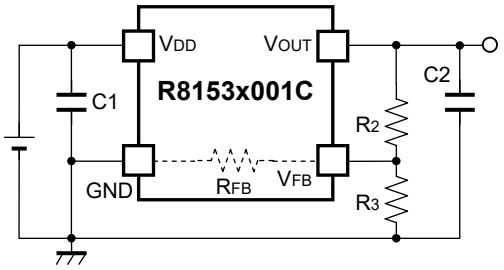
R8153x001C (−40°C ≤ Ta ≤ 125°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
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≤125°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		−0.02	0.01	0.02	%/V
V_{DIF}	Dropout Voltage	I_{OUT}=300mA			0.98	1.5	V
I_{LIM}	Output Current Limit	V_{IN}= V_{SET}+2.5V		300	450	610	mA
I_{SC}	Short Current Limit	V_{IN}=5V, V_{OUT}=0V		35	50	65	mA
R_{FB}	V_{FB} Pin Resistanse			1.0	3.0		MΩ
T_{TSD}	Thermal Shutdown Temparature	Junction Temperature		150	160		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature		125	135		°C

TYPICAL APPLICATIONS



R8153xxxxB



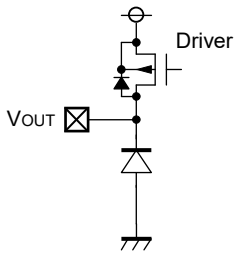
R8153x001C

External Components:

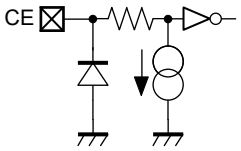
Symbol	Description
C1	1.0μF, Ceramic
C2	6.8μF, Ceramic

PIN EQUIVALENT CIRCUIT DIAGRAMS

<VOUT Pin>



<CE Pin (R8153xxxxB)>



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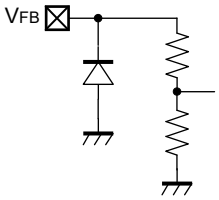


TECHNICAL NOTES

Phase Compensation

In the R8153x 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

R8153x contains a thermal shutdown circuit, which stops regulator operation if the junction temperature of R8153x 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.

Adjustable Output Voltage Type (R8153x001C)

R8153x001C 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.

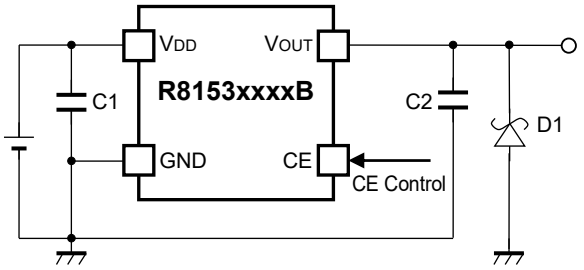
$$V_{OUT}=V_{FB}\times(R_2+R_3)/R_3$$

However, output voltage will be as large as "$R_2\times I_{FB}$" by the current flowing through the resistor in the IC. Because $I_{FB} = V_{FB}/R_{FB}$, "$R_2\times I_{FB}$" cause of error is as follows.

$$R_2\times I_{FB}=R_2\times V_{FB}/R_{FB}=V_{FB}\times R_2/R_{FB}$$

For better accuracy, choosing $R2<<R_{FB}$ reduces this error. R_{FB} of R8153x is approximately min 1.0MΩ.

TYPICAL APPLICATION FOR IC CHIP BREAKDOWN PREVENTION



C1 = Ceramic 1.0μF
C2 = Ceramic 6.8μF

When a sudden surge of electrical current travels along the V_{OUT} pin and GND due to a short-circuit, electrical resonance of a circuit involving an output capacitor (C2) and a short circuit inductor generates a negative voltage and may damage the device or the load devices. Connecting a schottky diode (D1) between the V_{OUT} pin and GND has the effect of preventing damage to them.

PACKAGE INFORMATION

POWER DISSIPATION (HSOP-6J)

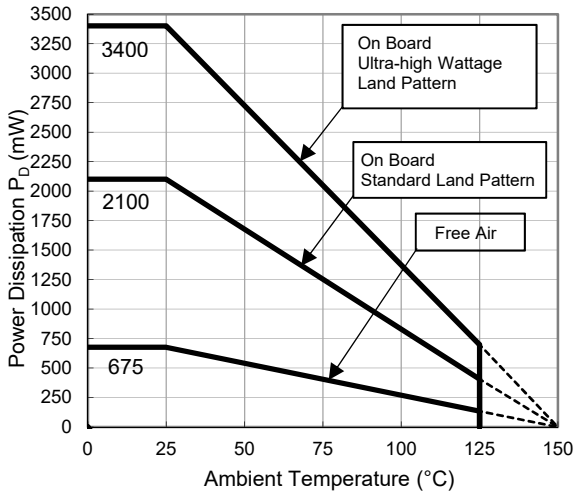
The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following conditions are used in this measurement.

Measurement Conditions

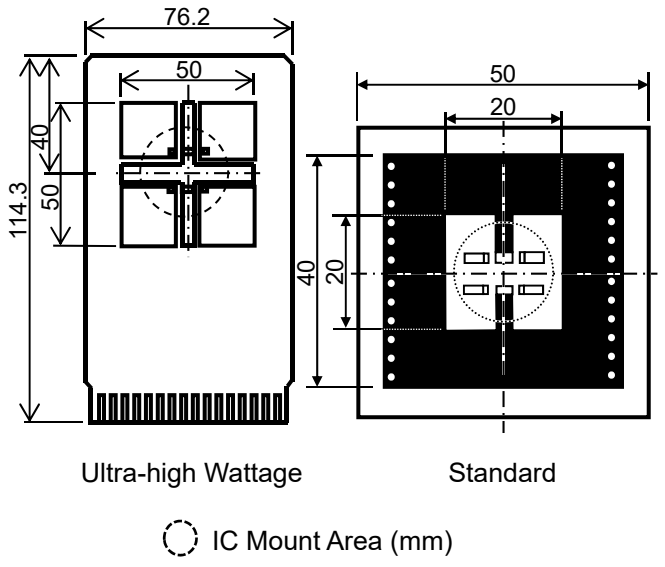
	Ultra-high Wattage Land Pattern	Standard Land Pattern
Environment	Mounting on Board (Wind Velocity = 0 m/s)	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-layer Board)	Glass Cloth Epoxy Plastic (Double-sided Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm	50 mm × 50 mm × 1.6 mm
Copper Ratio	96%	50%
Through-holes	ϕ 0.3 mm × 28 pcs	ϕ 0.5 mm × 24 pcs

Measurement Result (Ta = 25°C, Tjmax = 150°C)

	Ultra-high Wattage Land Pattern	Standard Land Pattern	Free Air
Power Dissipation	3400 mW	2100 mW	675 mW
Thermal Resistance	37°C/W	59°C/W	185°C/W

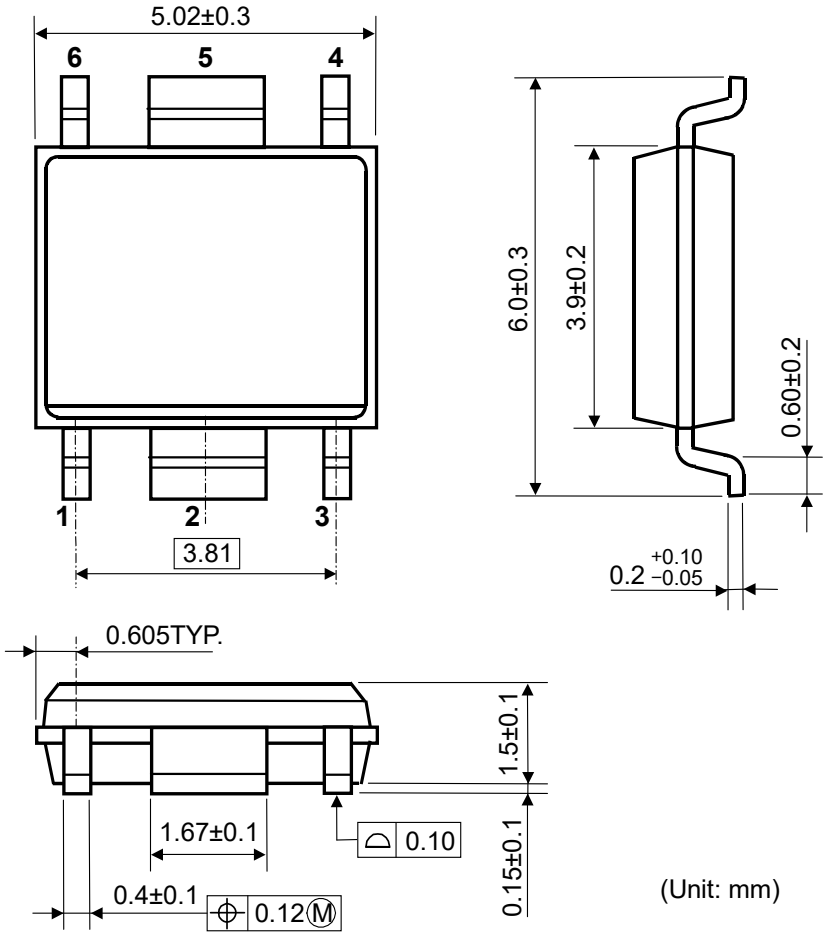


Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

PACKAGE DIMENSIONS (HSOP-6J)



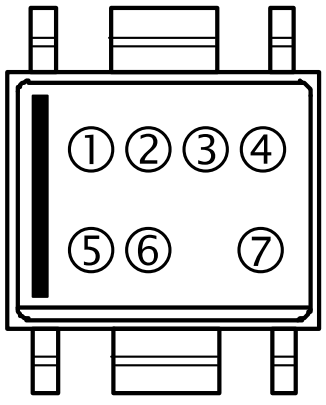
HSOP-6J Package Dimensions

MARK SPECIFICATION (HSOP-6J)

①②③④: Product Code… **Refer to *R8153S MARK SPECIFICATION TABLE***

⑤⑥: Lot Number … Alphanumeric Serial Number

⑦: Lot Sub Number …Alphanumeric Serial Number



HSOP-6J Mark Specification

R8153S MARK SPECIFICATION TABLE (HSOP-6J)

R8153SxxxB

Product Name	① ② ③ ④	V_{SET}
R8153S030B	T 0 3 0	3.0 V
R8153S031B	T 0 3 1	3.1 V
R8153S032B	T 0 3 2	3.2 V
R8153S033B	T 0 3 3	3.3 V
R8153S034B	T 0 3 4	3.4 V
R8153S035B	T 0 3 5	3.5 V
R8153S036B	T 0 3 6	3.6 V
R8153S037B	T 0 3 7	3.7 V
R8153S038B	T 0 3 8	3.8 V
R8153S039B	T 0 3 9	3.9 V
R8153S040B	T 0 4 0	4.0 V
R8153S041B	T 0 4 1	4.1 V
R8153S042B	T 0 4 2	4.2 V
R8153S043B	T 0 4 3	4.3 V
R8153S044B	T 0 4 4	4.4 V
R8153S045B	T 0 4 5	4.5 V
R8153S046B	T 0 4 6	4.6 V
R8153S047B	T 0 4 7	4.7 V
R8153S048B	T 0 4 8	4.8 V
R8153S049B	T 0 4 9	4.9 V
R8153S050B	T 0 5 0	5.0 V
R8153S051B	T 0 5 1	5.1 V
R8153S052B	T 0 5 2	5.2 V
R8153S053B	T 0 5 3	5.3 V
R8153S054B	T 0 5 4	5.4 V
R8153S055B	T 0 5 5	5.5 V
R8153S056B	T 0 5 6	5.6 V
R8153S057B	T 0 5 7	5.7 V
R8153S058B	T 0 5 8	5.8 V
R8153S059B	T 0 5 9	5.9 V
R8153S060B	T 0 6 0	6.0 V
R8153S061B	T 0 6 1	6.1 V
R8153S062B	T 0 6 2	6.2 V
R8153S063B	T 0 6 3	6.3 V
R8153S064B	T 0 6 4	6.4 V
R8153S065B	T 0 6 5	6.5 V
R8153S066B	T 0 6 6	6.6 V
R8153S067B	T 0 6 7	6.7 V
R8153S068B	T 0 6 8	6.8 V
R8153S069B	T 0 6 9	6.9 V

Product Name	① ② ③ ④	V_{SET}
R8153S070B	T 0 7 0	7.0 V
R8153S071B	T 0 7 1	7.1 V
R8153S072B	T 0 7 2	7.2 V
R8153S073B	T 0 7 3	7.3 V
R8153S074B	T 0 7 4	7.4 V
R8153S075B	T 0 7 5	7.5 V
R8153S076B	T 0 7 6	7.6 V
R8153S077B	T 0 7 7	7.7 V
R8153S078B	T 0 7 8	7.8 V
R8153S079B	T 0 7 9	7.9 V
R8153S080B	T 0 8 0	8.0 V
R8153S081B	T 0 8 1	8.1 V
R8153S082B	T 0 8 2	8.2 V
R8153S083B	T 0 8 3	8.3 V
R8153S084B	T 0 8 4	8.4 V
R8153S085B	T 0 8 5	8.5 V
R8153S086B	T 0 8 6	8.6 V
R8153S087B	T 0 8 7	8.7 V
R8153S088B	T 0 8 8	8.8 V
R8153S089B	T 0 8 9	8.9 V
R8153S090B	T 0 9 0	9.0 V

R8153S001C (Adjustable Output Voltage Type)

Product Name	① ② ③ ④	V_{SET}
R8153S001C	U 0 0 1	—

POWER DISSIPATION (TO-252-5-P2)

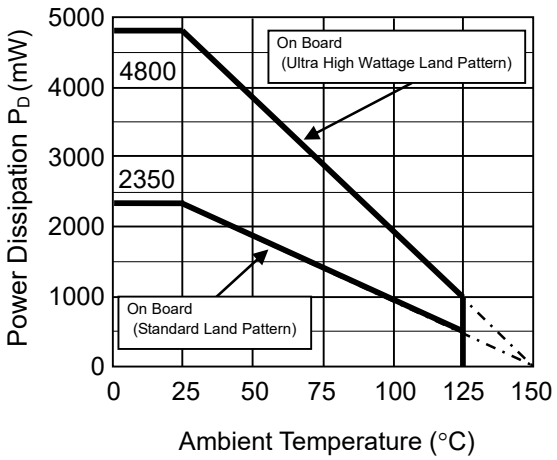
Power Dissipation (P_D) depends on conditions of mounting on board.
This specification is based on the measurement at the condition below:

* Measurement conditions

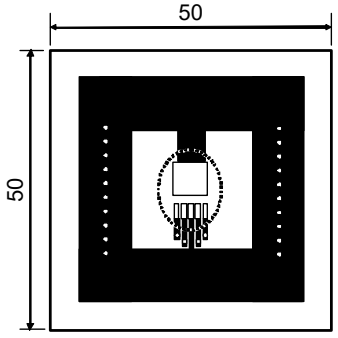
	Standard Land Pattern	Ultra High Wattage Land Pattern
Environment	Mounting on board (Wind velocity 0m/s)	
Board Material	Glass cloth epoxy plastic (Double layers)	Glass cloth epoxy plastic (Four-layers)
Board Dimensions	50mm x 50mm x 1.6mm	76.2mm x 114.3mm x 0.8mm
Copper Ratio	Top side: Approx. 50%, Back side: Approx. 50%	Top, Back side: Approx. 96%, 2nd, 3rd: 100%
Through - hole	ϕ 0.5mm x 24pcs	ϕ 0.4mm x 30pcs

* Measurement Results (Ta=25°C, Tjmax=150°C)

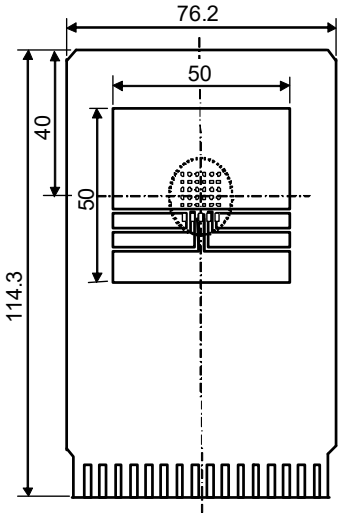
	Standard Land Pattern	Ultra High Wattage Land Pattern
Power Dissipation	2350mW	4800mW
Thermal Resistance	θja=(150-25°C)/2.35W= 53°C/W	θja= (150-25°C)/4.8W = 26°C/W
	θjc= 17°C/W	θjc= 7°C/W



Power Dissipation



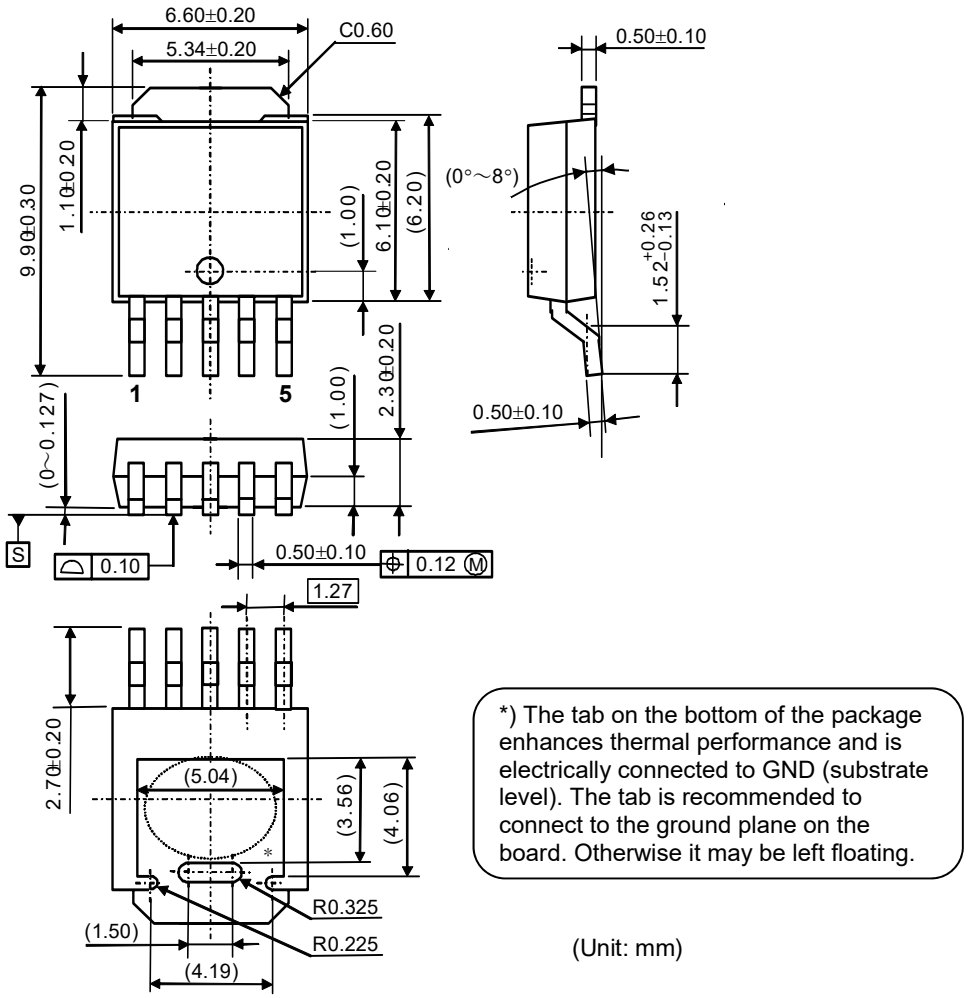
Standard



Ultra High Wattage

Measurement Board Pattern
IC Mount Area (Unit: mm)

PACKAGE DIMENSIONS (TO-252-5-P2)



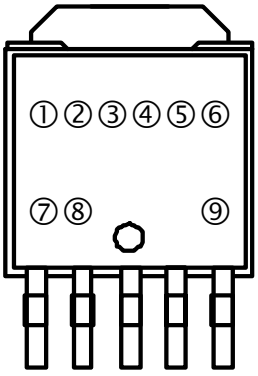
TO-252-5-P2 Package Dimensions

MARK SPECIFICATION (TO-252-5-P2)

①②③④⑤⑥: Product Code… ***Refer to R8153J MARK SPECIFICATION TABLE***

⑦⑧: Lot Number … Alphanumeric Serial Number

⑨: Lot Sub Number …Alphanumeric Serial Number



TO-252-5-P2 Mark Specification

R8153J MARK SPECIFICATION TABLE (TO-252-5-P2)

R8153JxxxB

Product Name	①②③④⑤⑥	V_{SET}
R8153J030B	J 1 J 0 3 0	3.0 V
R8153J031B	J 1 J 0 3 1	3.1 V
R8153J032B	J 1 J 0 3 2	3.2 V
R8153J033B	J 1 J 0 3 3	3.3 V
R8153J034B	J 1 J 0 3 4	3.4 V
R8153J035B	J 1 J 0 3 5	3.5 V
R8153J036B	J 1 J 0 3 6	3.6 V
R8153J037B	J 1 J 0 3 7	3.7 V
R8153J038B	J 1 J 0 3 8	3.8 V
R8153J039B	J 1 J 0 3 9	3.9 V
R8153J040B	J 1 J 0 4 0	4.0 V
R8153J041B	J 1 J 0 4 1	4.1 V
R8153J042B	J 1 J 0 4 2	4.2 V
R8153J043B	J 1 J 0 4 3	4.3 V
R8153J044B	J 1 J 0 4 4	4.4 V
R8153J045B	J 1 J 0 4 5	4.5 V
R8153J046B	J 1 J 0 4 6	4.6 V
R8153J047B	J 1 J 0 4 7	4.7 V
R8153J048B	J 1 J 0 4 8	4.8 V
R8153J049B	J 1 J 0 4 9	4.9 V
R8153J050B	J 1 J 0 5 0	5.0 V
R8153J051B	J 1 J 0 5 1	5.1 V
R8153J052B	J 1 J 0 5 2	5.2 V
R8153J053B	J 1 J 0 5 3	5.3 V
R8153J054B	J 1 J 0 5 4	5.4 V
R8153J055B	J 1 J 0 5 5	5.5 V
R8153J056B	J 1 J 0 5 6	5.6 V
R8153J057B	J 1 J 0 5 7	5.7 V
R8153J058B	J 1 J 0 5 8	5.8 V
R8153J059B	J 1 J 0 5 9	5.9 V
R8153J060B	J 1 J 0 6 0	6.0 V
R8153J061B	J 1 J 0 6 1	6.1 V
R8153J062B	J 1 J 0 6 2	6.2 V
R8153J063B	J 1 J 0 6 3	6.3 V
R8153J064B	J 1 J 0 6 4	6.4 V
R8153J065B	J 1 J 0 6 5	6.5 V
R8153J066B	J 1 J 0 6 6	6.6 V
R8153J067B	J 1 J 0 6 7	6.7 V
R8153J068B	J 1 J 0 6 8	6.8 V
R8153J069B	J 1 J 0 6 9	6.9 V

Product Name	①②③④⑤⑥	V_{SET}
R8153J070B	J 1 J 0 7 0	7.0 V
R8153J071B	J 1 J 0 7 1	7.1 V
R8153J072B	J 1 J 0 7 2	7.2 V
R8153J073B	J 1 J 0 7 3	7.3 V
R8153J074B	J 1 J 0 7 4	7.4 V
R8153J075B	J 1 J 0 7 5	7.5 V
R8153J076B	J 1 J 0 7 6	7.6 V
R8153J077B	J 1 J 0 7 7	7.7 V
R8153J078B	J 1 J 0 7 8	7.8 V
R8153J079B	J 1 J 0 7 9	7.9 V
R8153J080B	J 1 J 0 8 0	8.0 V
R8153J081B	J 1 J 0 8 1	8.1 V
R8153J082B	J 1 J 0 8 2	8.2 V
R8153J083B	J 1 J 0 8 3	8.3 V
R8153J084B	J 1 J 0 8 4	8.4 V
R8153J085B	J 1 J 0 8 5	8.5 V
R8153J086B	J 1 J 0 8 6	8.6 V
R8153J087B	J 1 J 0 8 7	8.7 V
R8153J088B	J 1 J 0 8 8	8.8 V
R8153J089B	J 1 J 0 8 9	8.9 V
R8153J090B	J 1 J 0 9 0	9.0 V

R8153J001C (Adjustable Output Voltage Type)

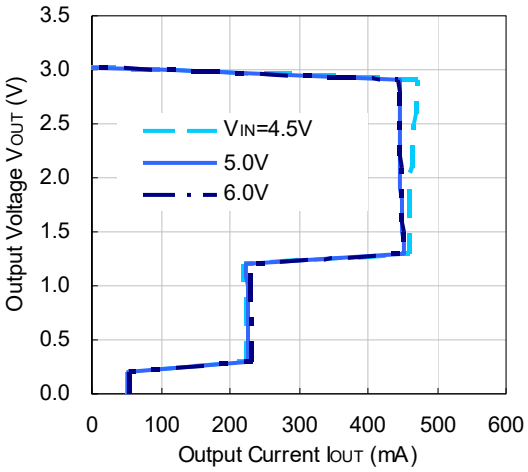
Product Name	①②③④⑤⑥	V_{SET}
R8153J001C	J 2 J 0 0 0 1	—

TYPICAL CHARACTERISTICS

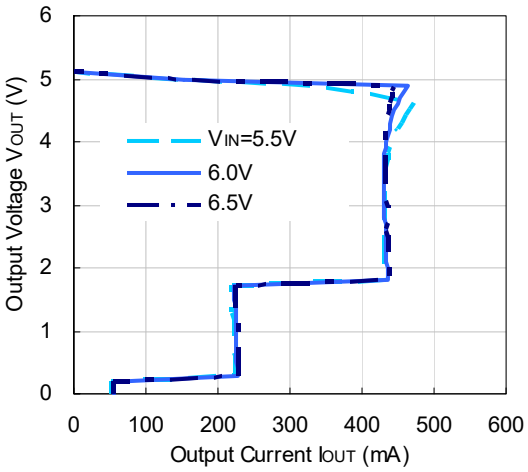
Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

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

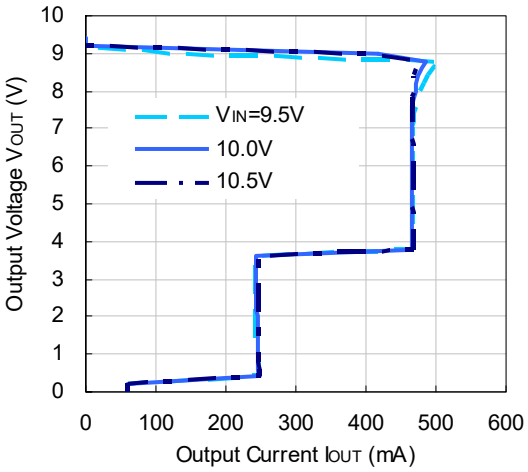
R8153x030B



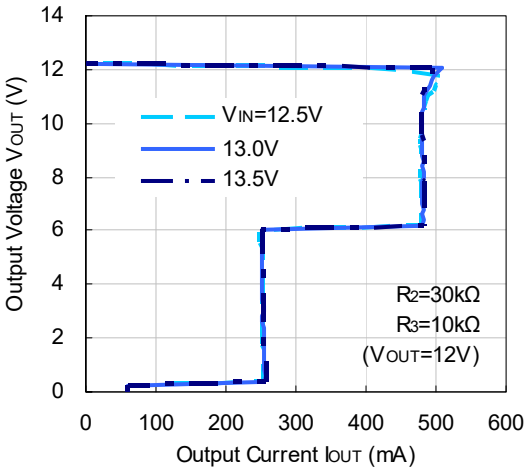
R8153x050B



R8153x090B

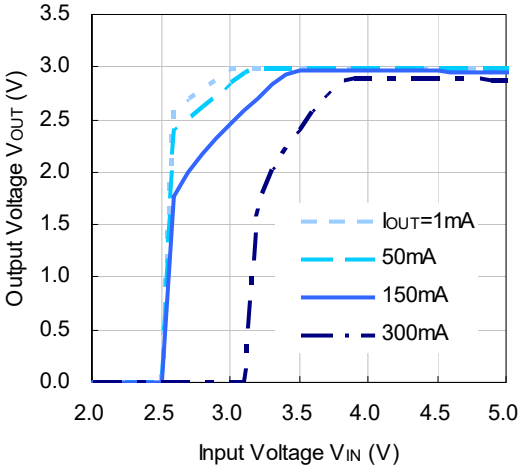


R8153x001C



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

R8153x030B



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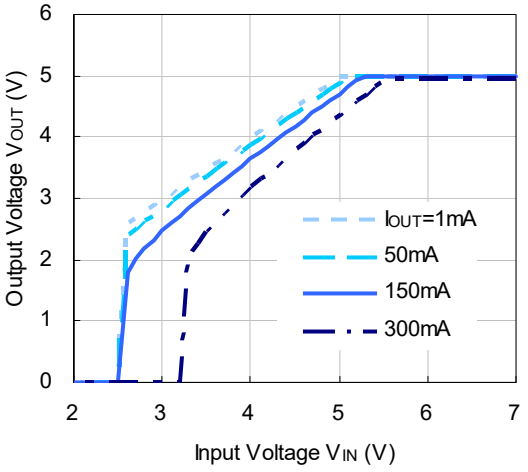

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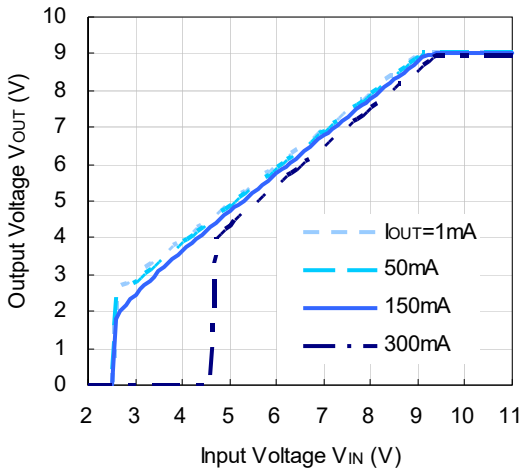
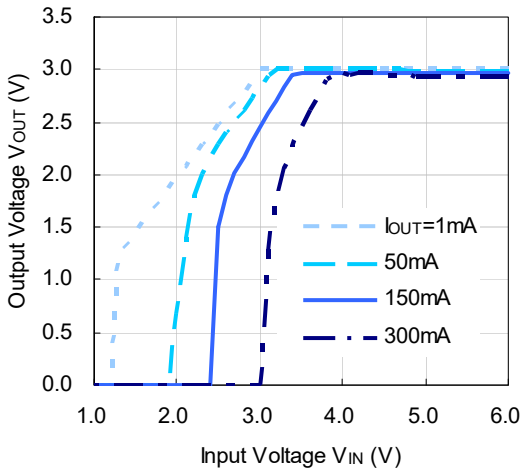
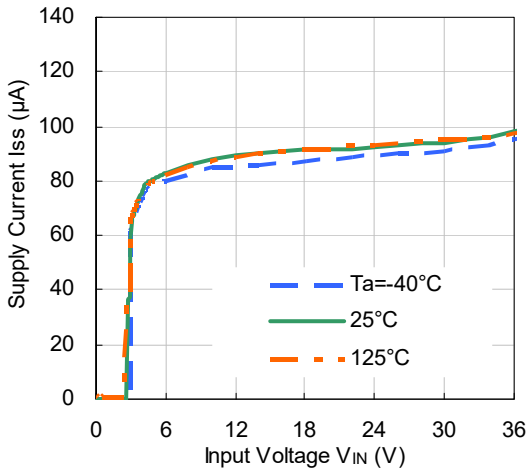


R8153x001C



3) Supply Current vs. Input Voltage

R8153x030B



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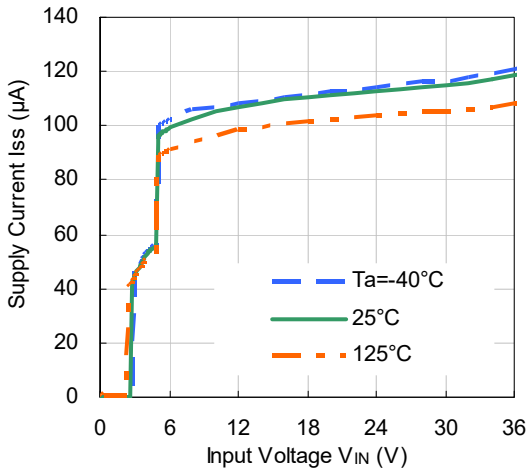

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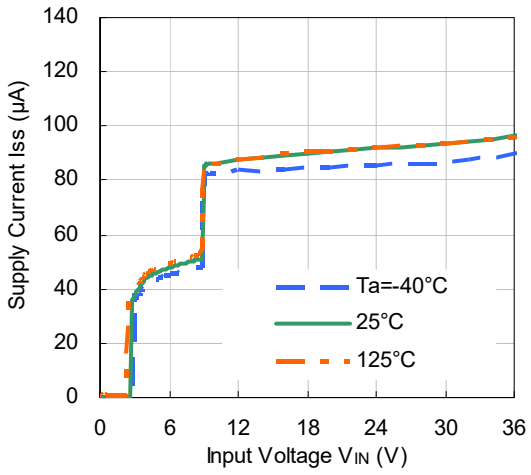
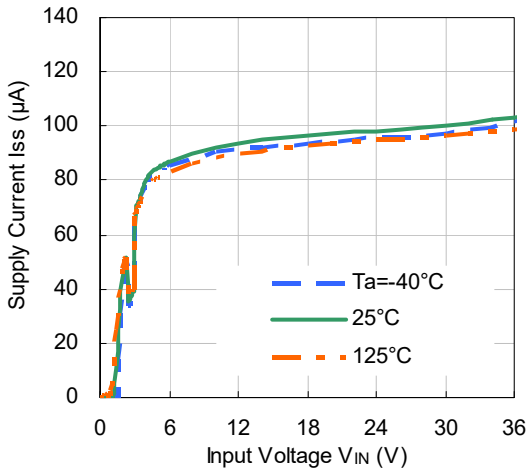
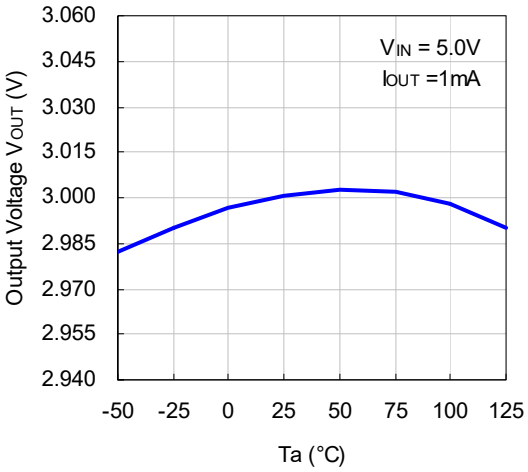


R8153x001C



4) Output Voltage vs. Ambient Temperature

R8153x030B



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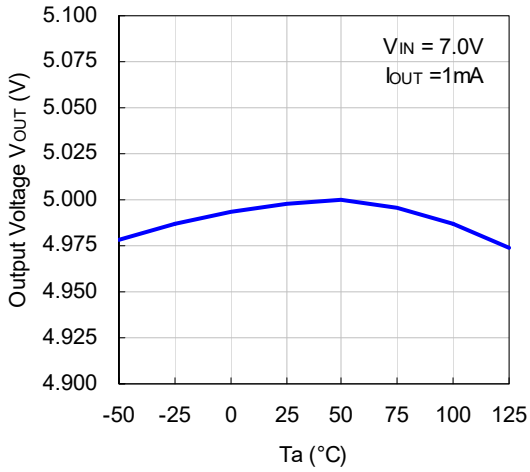

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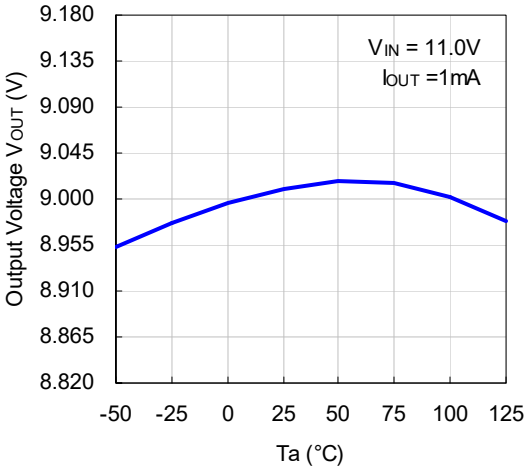

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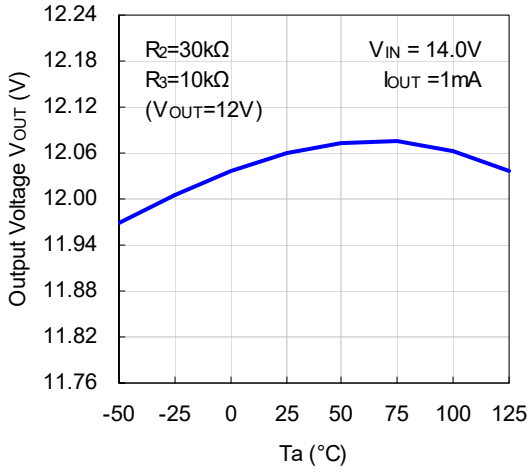
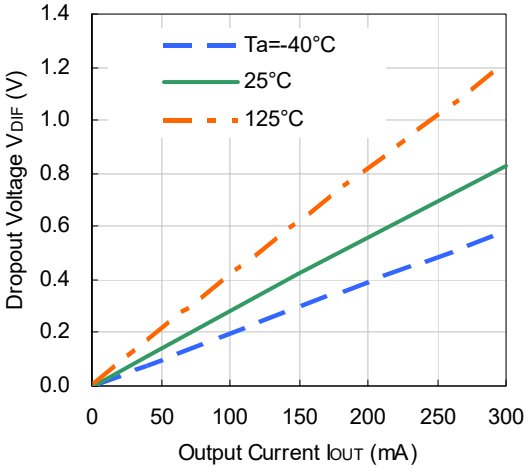
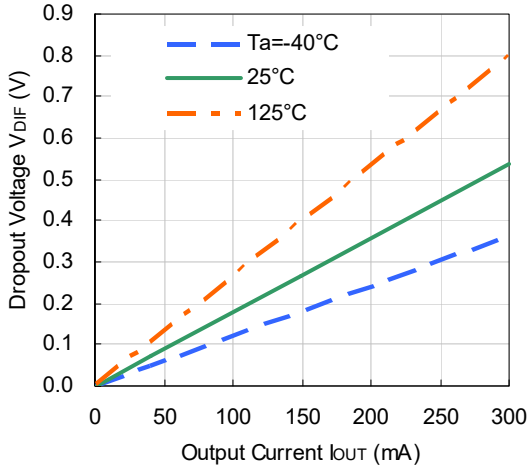


5) Dropout Voltage vs. Output Current

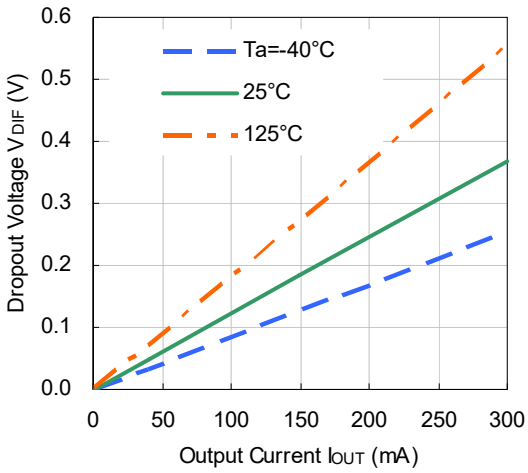
R8153x030B/R8153x001C



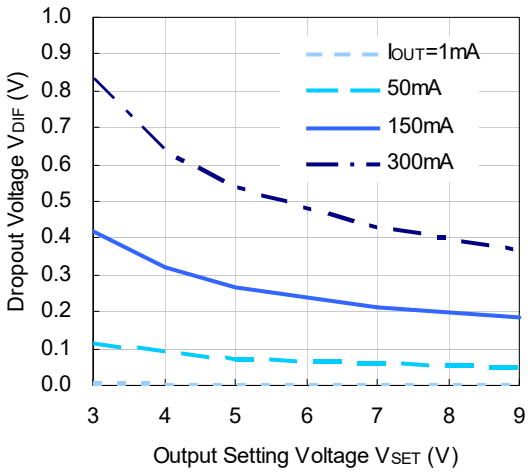
R8153x050B



R8153x090B

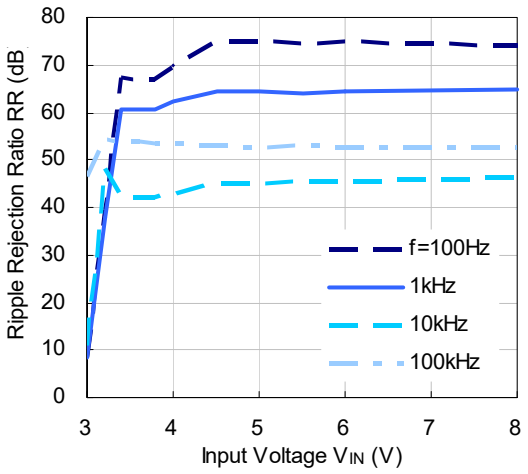


6) Dropout Voltage vs. Setting Voltage (Ta=25ºC)

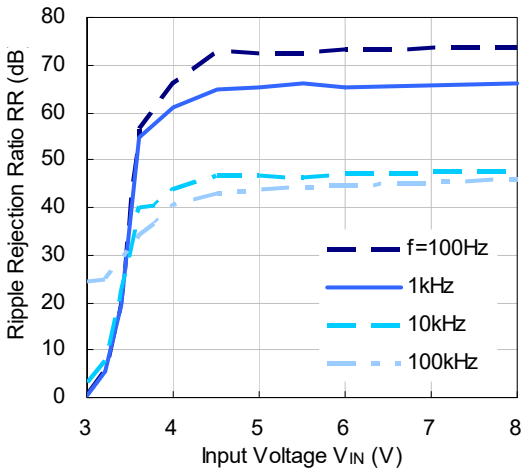


7) Ripple Rejection vs. Input Bias Voltage (Ta=25°C, Ripple=0.5Vpp)

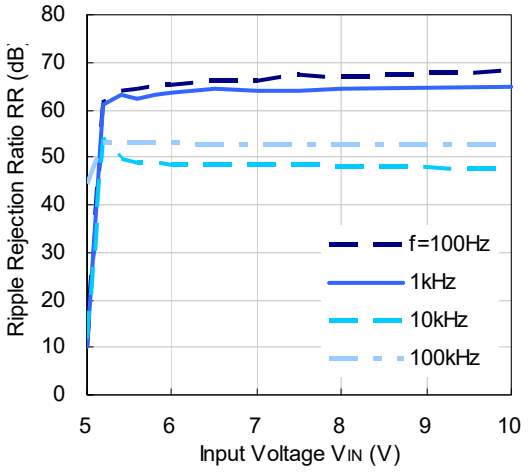
R8153x030B/R8153x001C (IOUT=1mA)



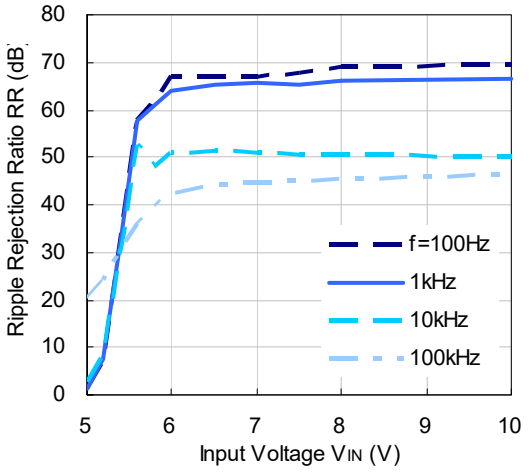
R8153x030B/R8153x001C (IOUT=100mA)



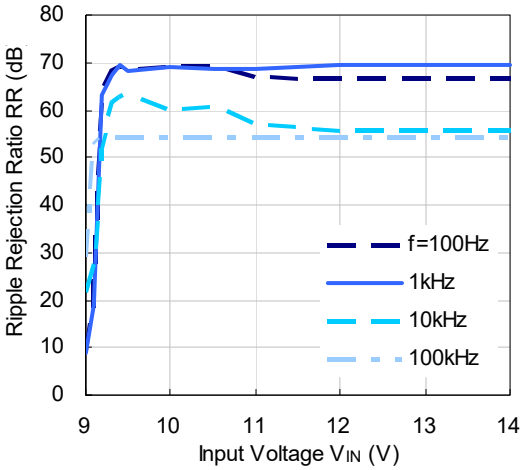
R8153x050B (IOUT=1mA)



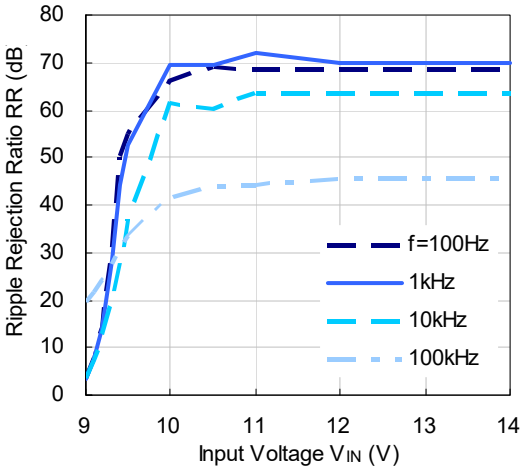
R8153x050B (IOUT=100mA)



R8153x090B (I_{OUT}=1mA)

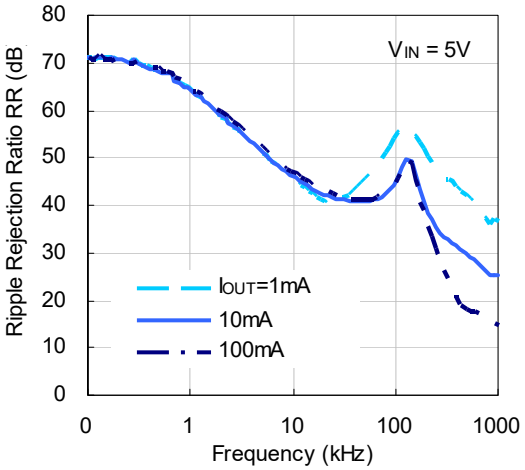


R8153x090B (I_{OUT}=100mA)

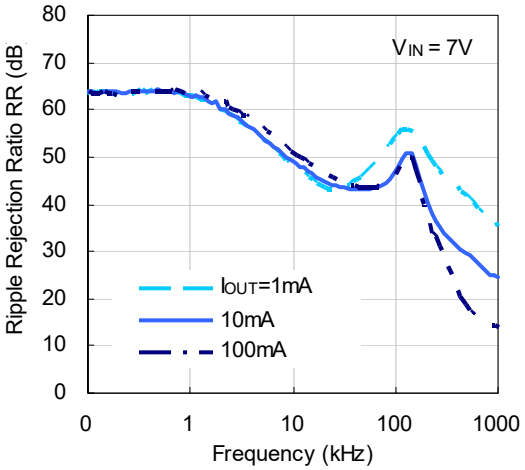


8) Ripple Rejection vs. Frequency (Ta=25°C, Ripple=0.5Vpp)

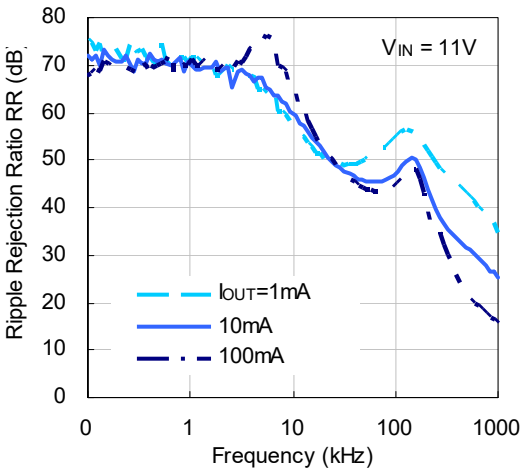
R8153x030B/R8153x001C



R8153x050B

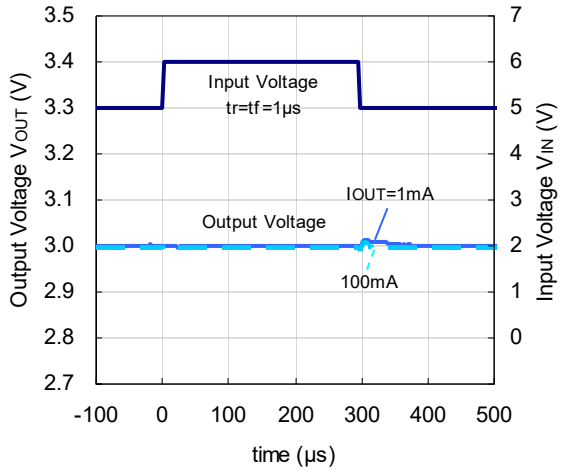


R8153x090B

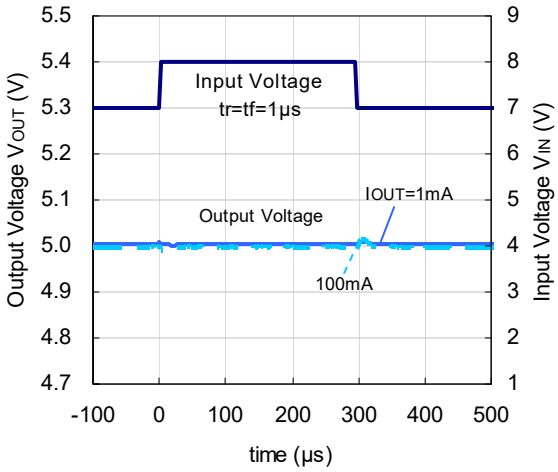


9) Input Transient Response (Ta=25°C)

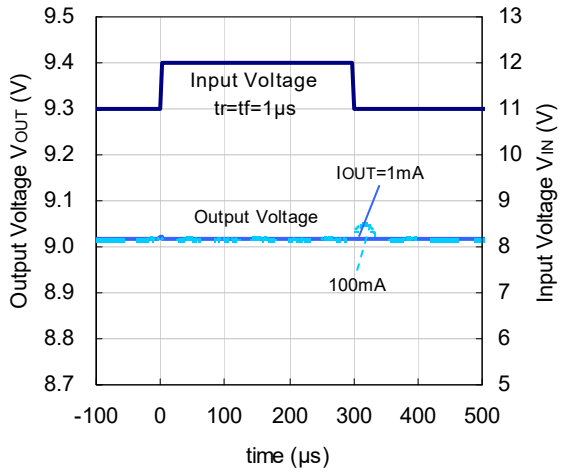
R8153x030B



R8153x050B

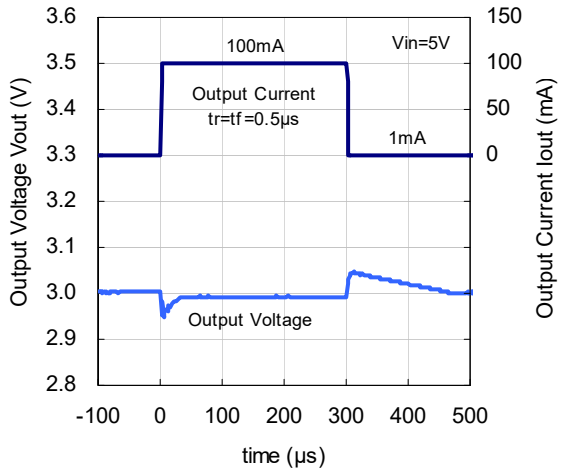


R8153x090B

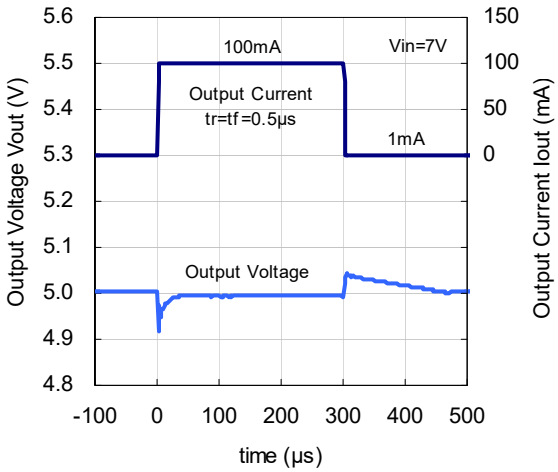


10) Load Transient Response (Ta=25°C)

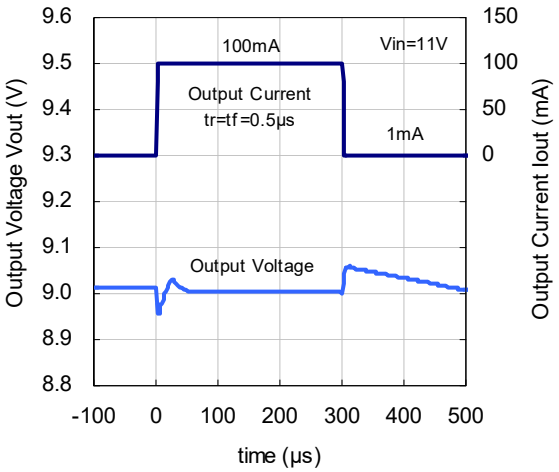
R8153x030B



R8153x050B

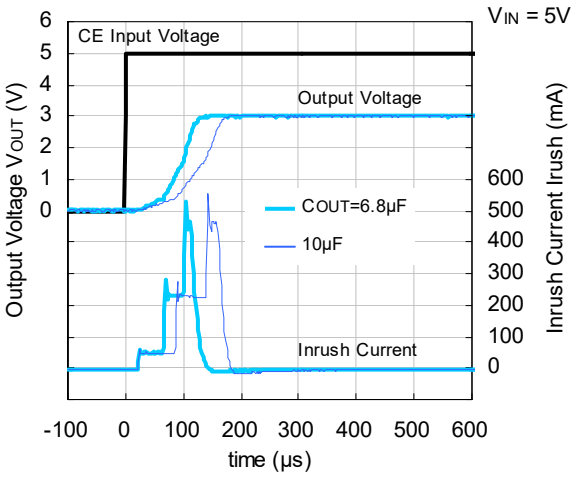


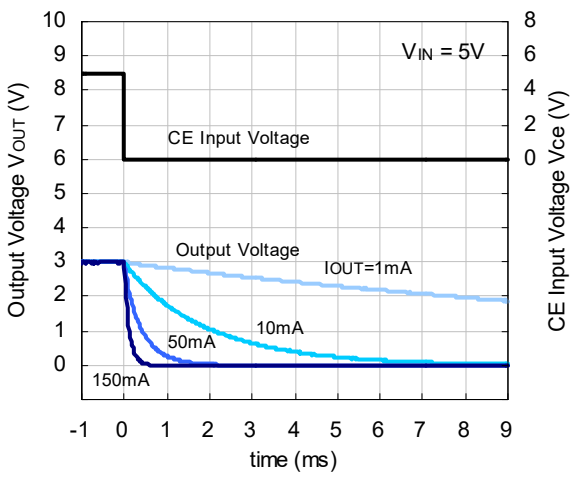
R8153x090B



11) CE Response (Ta=25°C)

R8153x030B





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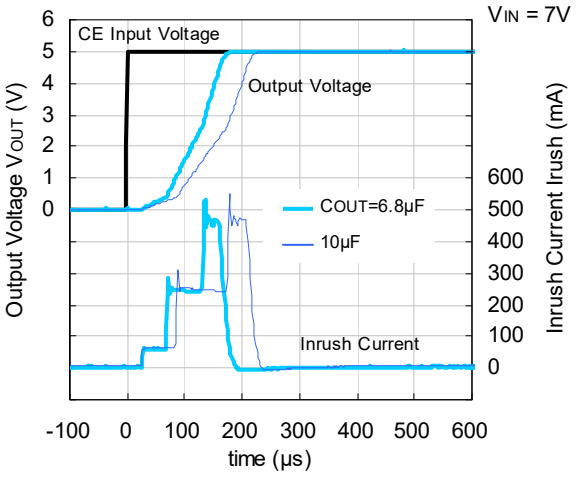
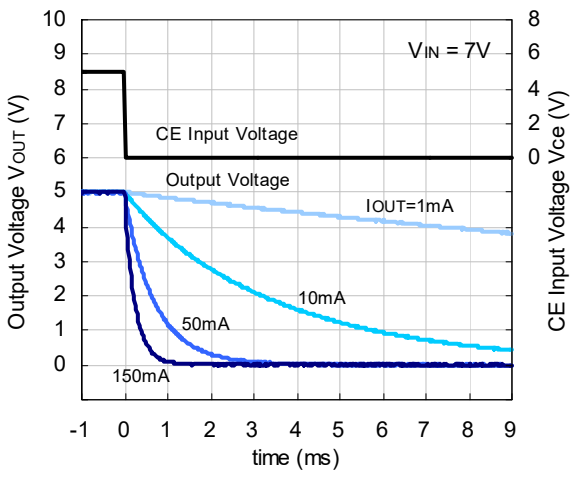
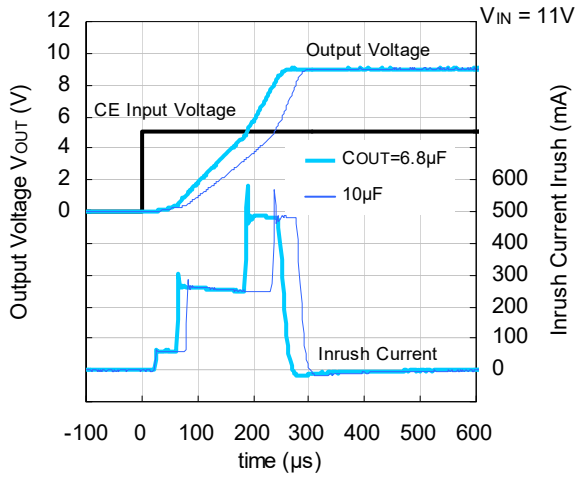
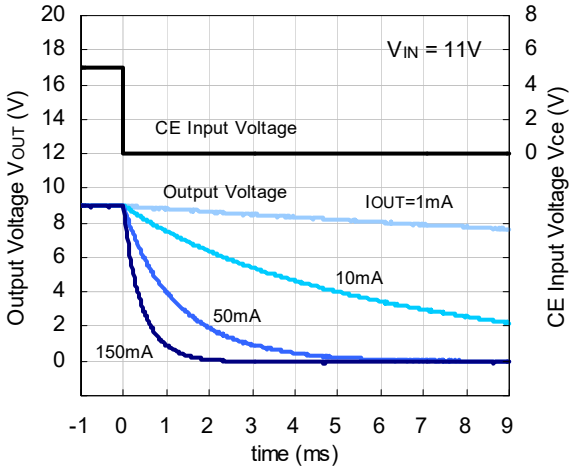




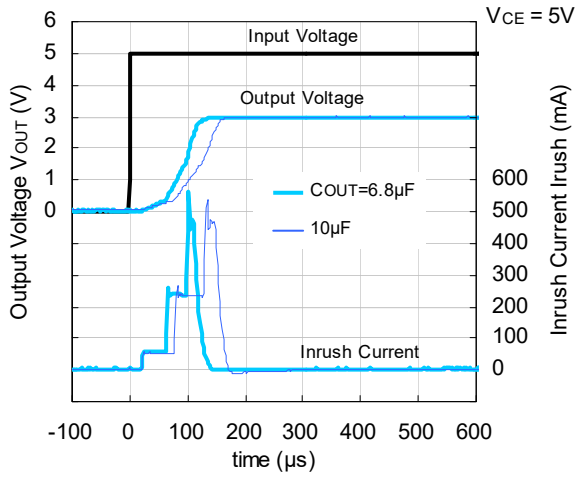
R8153x090B



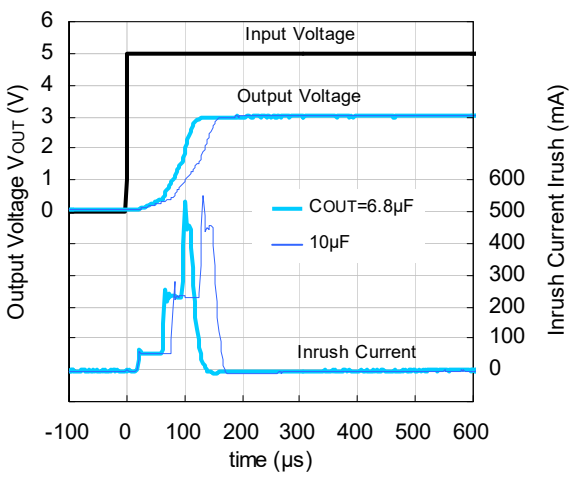


12) Start Up Waveform (Ta=25°C)

R8153x030B

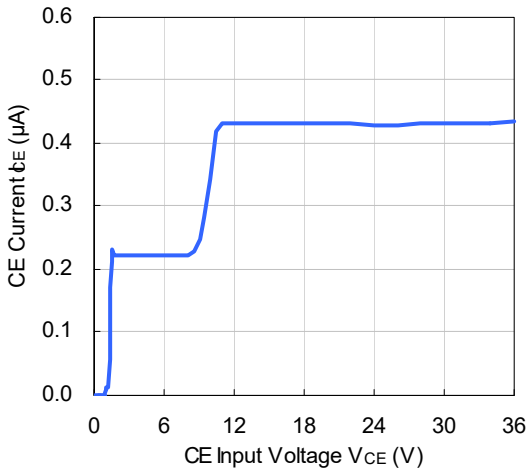


R8153x001C



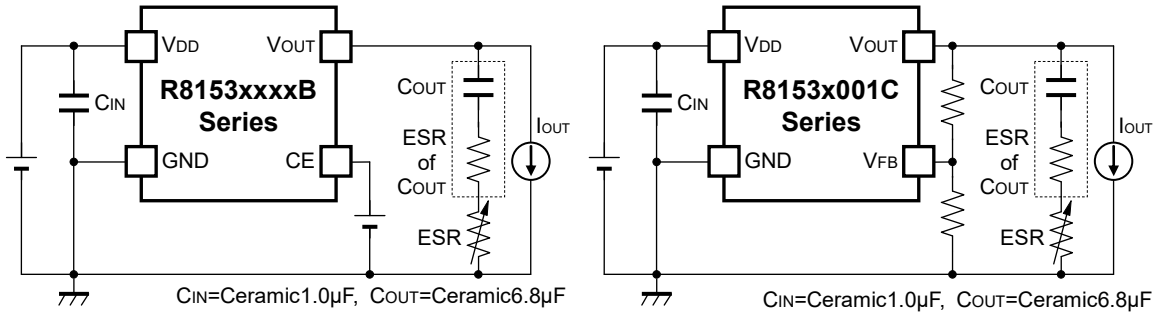
13) CE Pin Current vs. CE Input Voltage (Ta=25°C)

R8153xxxxB



EQUIVALENT SERIES RESISTANCE (ESR) VS. OUTPUT CURRENT

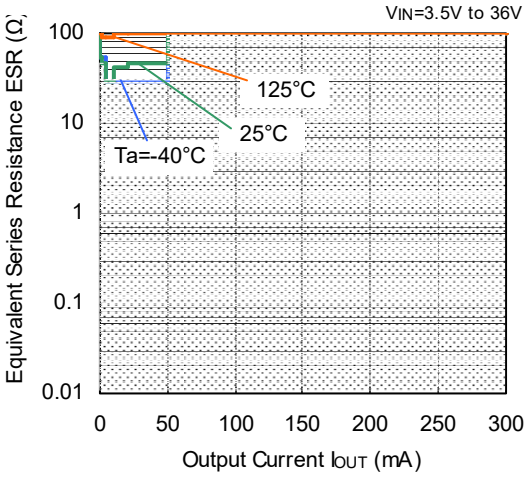
Ceramic type output capacitor is recommended for this series; however, the other output capacitors with low ESR also can be used. As for reference, the below graphs show the relationship between output current (I_{OUT}) and equivalent series resistance (ESR). The noise level of the output current (I_{OUT})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



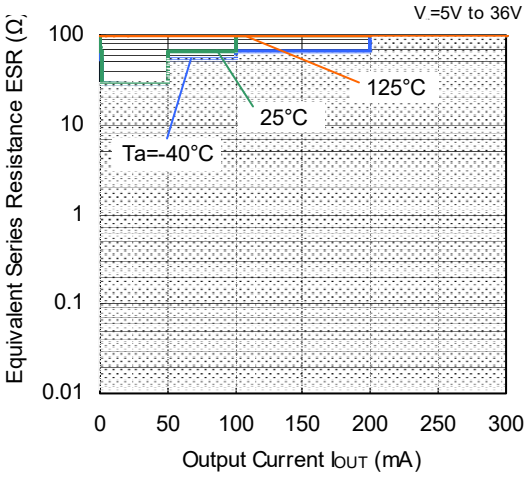
Measurement Conditions

- Noise Frequency Range: 10Hz to 2MHz
- Ambient Temperature: −40ºC to 125ºC
- Shaded Area: Noise level is lower than the specified value (40μV)
- Capacitor: C_{IN}=Ceramic 1.0μF, C_{OUT}=Ceramic 6.8μF (C5432X7R1H685K)

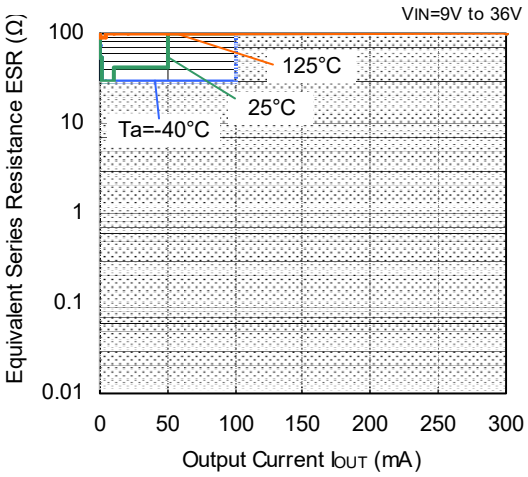
R8153x030B



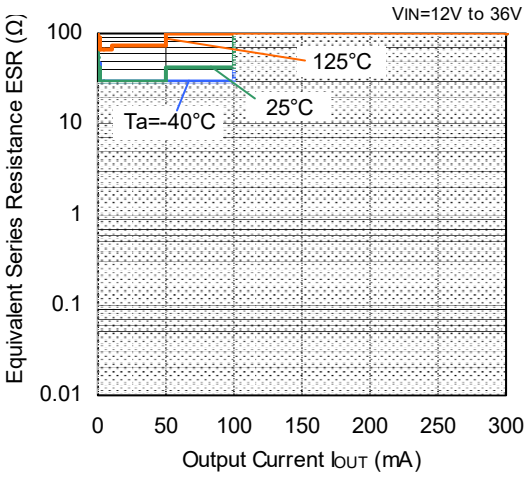
R8153x050B



R8153x090B



R8153x001C (V_{OUT}=12V)



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