AEC-Q100 Grade 1 Compliant

1 A 36V Input Low Supply Current LDO for Automotive Applications

NO. EC-331-180510

OUTLINE

R8155x is a CMOS-based LDO that specifically designed for automotive applications featuring 1 A output current and 36 V input voltage. In addition to a conventional regulator circuit, R8155x consists of a constant slope circuit as a soft-start function, a fold-back protection circuit, a short current limit circuit, and a thermal shutdown circuit. Besides the low supply current by CMOS, the operating temperature is −40°C to 125°C and the maximum input voltage is 36 V, the R8155x is very suitable for power source of car accessories.

R8155x supports the internal fixed output voltage type of R8155xxxxB/D/E/F and the adjustable output voltage setting type, which is controlled by external resistances, of R8155J001C. As for the soft-start time, R8155x is fixed internally in R8155xxxxB/D/E/F and is set to 120 µs (Typ). And the soft-start time in R8155Jxx1E/F is adjustable by external capacitors. R8155x supports the auto-discharge function at standby in R8155xxxxD/F.

R8155x is available in two packages for ultra high wattage: HSOP-6J and TO-252-5-P2.

FEATURES

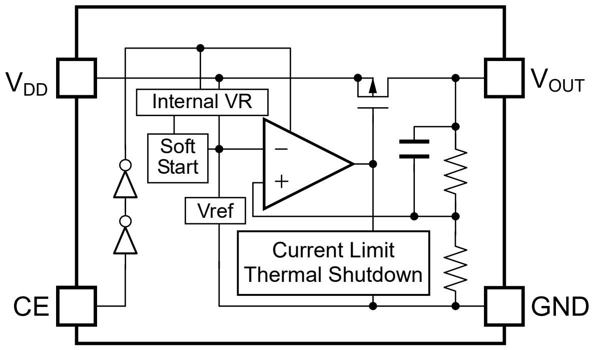
- Input Voltage Range (Maximum Rating) ············· 3.5 V to 36.0 V (50.0V)
- Operating Temperature range ························· –40°C to 125°C
- Supply Current··· Typ. 18 µA
- Standby Current······································· Typ. 0.1 µA
- Dropout Voltage ······································· Typ. 0.7 V (I_{OUT} = 1 A, V_{OUT} = 5.0 V)
- Output Voltage Accuracy······························ ±0.8% (V_{OUT} ≤ 5.0 V)
- Temperature-Drift Coefficient of Output Voltage····· Typ. ±60 ppm/°C (−40°C ≤ Ta ≤ 125°C)
- Line Regulation·· Typ. 0.01%/V
- Packages ·· HSOP-6J, TO-252-5-P2
- Output Voltage Range ································· 2.5 V/2.8 V/3.0 V/3.3 V/3.4 V/5.0 V/6.0 V/8.0 V /8.5 V/9.0 V
  *Contact our sales representatives for other voltages.
  R8155J001C: Adjustable from 2.5 V to 12.0 V
  with External Resistors
  Feedback Voltage: 2.5 V
- Built-in Short Current Limit Circuit ····················· Typ. 150 mA
- Built-in Fold-Back Protection Circuit···················· Min. 1.1 A
- Built-in Thermal Shutdown Circuit ····················· Typ. 160°C
- Built-in Soft-start Circuit ································ Typ.120 µs
  R8155Jxx1E/F: Adjustable Time
  with External Capacitors
- Ceramic Capacitors can be used ······················ 0.1 µF or more
  R8155J001C: 1.0 µF or more

APPLICATIONS

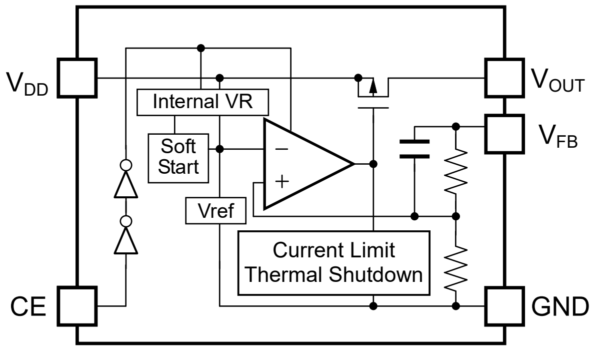
- Power supply for electronic control units such as EV inverter and battery charge control unit.

BLOCK DIAGRAMS

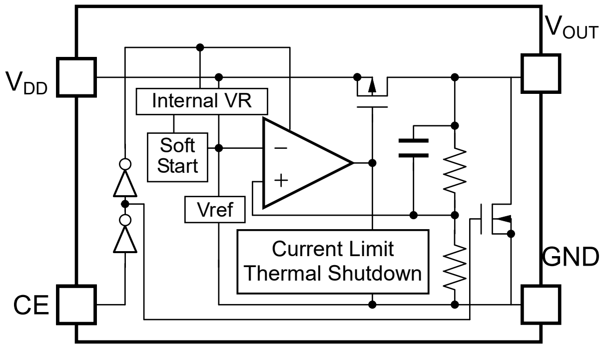
R8155xxxxB



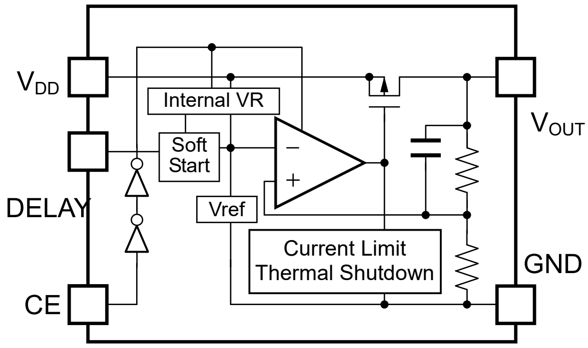
R8155J001C



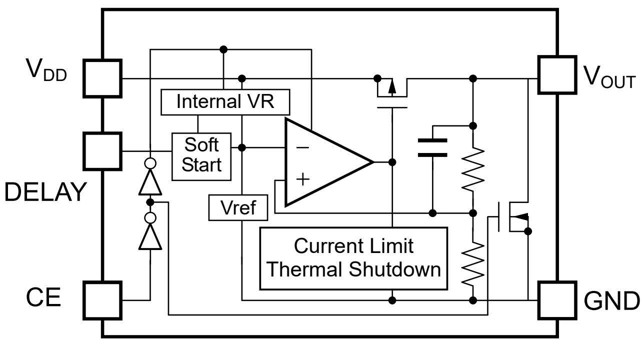
R8155xxxxD



R8155Jxx1E



R8155Jxx1F



SELECTION GUIDE

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

Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
R8155Sxx2∗-E2-FE	HSOP-6J	1,000 pcs	Yes	Yes
R8155Jxx1∗-T1-FE	TO-252-5-P2	3,000 pcs	Yes	Yes

xx: Specify the set output voltage (V_{SET})
2.5 V (25) / 2.8 V (28) / 3.0 V (30) / 3.3 V (33) / 3.4 V (34) / 5.0 V (50) / 6.0 V (60) / 8.0 V (80) / 8.5 V (85) / 9.0 V (90)
Note: Contact our sales representatives for other voltages.

Adjustable output voltage setting type is fixed to (00)
Note: R8155J001C-T1-#E only support

∗ : Specify the version with desired functions
B: No auto-discharge function
C: No auto-discharge function / Adjustable output voltage setting
D: Auto-discharge function
E: No auto-discharge function / Adjustable soft-start time setting
F: Auto-discharge function / Adjustable soft-start time setting

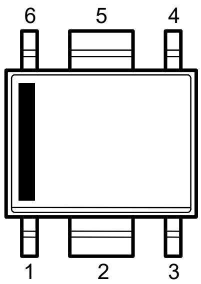
Note: R8155Sxx2∗-E2-FE is only for R8155Sxx2B/D

R8 Automotive Class Code

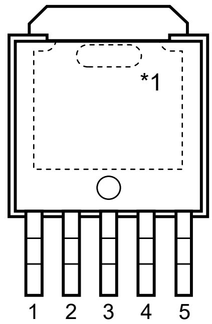
Operating Temperature Range	Guaranteed Specs Temperature Range	Screening
−40°C to 125°C	−40°C to 125°C	High and low temperature

Auto-Discharge function quickly lowers the output voltage to 0 V by releasing the electrical charge in the external capacitor when the chip enable signal is switched from the active mode to the standby mode.

PIN DESCRIPTION



HSOP-6J



TO-252-5-P2

HSOP-6J

Pin No.	Symbol	Description
1	V_{DD}	Input Pin
2	GND	Ground Pin
3	GND	Ground Pin
4	CE	Chip Enable Pin, Active-high
5	GND	Ground Pin
6	V_{OUT}	Output Pin

TO-252-5-P2

Pin No.	Symbol	Description	
1	V_{DD}	Input Pin	
2	NC	No Connection	R8155Jxx1B/D
	V_{FB}	Feedback Pin	R8155J001C
	DELAY	Adjustable Soft-start Time Pin	R8155Jxx1E/F
3	GND	Ground Pin	
4	CE	Chip Enable Pin, Active-high	
5	V_{OUT}	Output Pin	

*1 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 MAXMUM RATINGS

Symbol	Item		Rating	Unit
V_{IN}	Input Voltage		−0.3 to 50	V
V_{IN}	Peak Input Voltage[*2]		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 $V_{IN} + 0.3 \leq 50$	V
P_D	Power Dissipation (HSOP-6J)[*3]	Standard Land Pattern	2100	mW
		Ultra High Wattage Land Pattern	3400	
	Power Dissipation (TO-252-5-P2)[*3]	Standard Land Pattern	2350	
		Ultra High Wattage Land Pattern	4800	
Tj	Junction Temperature		−40 to 150	°C
Tstg	Storage Temperature Range		−55 to 150	°C

[*2] Duration time = 200 ms
[*3] 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 life time and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

RECOMMENDED OPERATING RATINGS

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	3.5 to 36	V
Ta	Operating Temperature Range	−40 to 125	°C

RECOMMENDED OPERATING RATINGS

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

ELECTRICAL CHARACTERISTICS

V_{IN} = V_{SET} + 1.0 V, I_{OUT} = 1 mA, C_{IN} = C_{OUT} = 0.1 μF, unless otherwise noted.

R8155xxxxB/D (−40 ≤ Ta ≤ 125°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	Ta = 25°C	V_{SET} ≤ 5.0 V	×0.992		×1.008	V
			V_{SET} > 5.0 V	×0.99		×1.01	V
		−40°C ≤ Ta ≤ 125°C	V_{SET} ≤ 5.0 V	×0.982		×1.018	V
			V_{SET} > 5.0 V	×0.98		×1.02	V
ΔV_{OUT} /ΔI_{OUT}	Load Regulation	V_{IN} = V_{SET} +2.0 V 1 mA ≤ I_{OUT} ≤ 250 mA		−15	3	25	mV
		V_{IN} = V_{SET} +2.0 V 1 mA ≤ I_{OUT} ≤ 1 A		−60	5	60	mV
V_{DIF}	Dropout Voltage	I_{OUT} = 1 A		Refer to the *Product-specific Electrical Characteristics*			
I_{SS}	Supply Current	I_{OUT} = 0 mA			18	36	μA
Istandby	Standby Current	V_{CE} = 0 V			0.1	2.0	μA
ΔV_{OUT} /ΔV_{IN}	Line Regulation	V_{SET} +0.5 V ≤ V_{IN} ≤ 36 V, if V_{IN} ≤ 3.5 V			0.01	0.02	%/V
I_{LIM}	Output Current Limit	V_{IN} = V_{SET} +2.0 V		1.1	1.8	2.5	A
I_{SC}	Short Current Limit	V_{OUT} = 0 V		110	180	250	mA
I_{PD}	CE Pull-down Current	V_{CE} = 5 V			0.2	0.6	μA
		V_{CE} = 36 V			0.5	1.3	μA
V_{CEH}	CE Input Voltage "H"			2.2		36	V
V_{CEL}	CE Input Voltage "L"			0		1.0	V
T_{TSD}	Thermal Shutdown Temperature	Junction Temperature		150	160		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature		125	135		°C
R_{LOW}	Low Output Nch Tr. ON Resistance (R8155xxxxD)	V_{IN} = 14.0 V, V_{CE} = 0 V		1.0	3.2	5.0	kΩ

V_{IN} = V_{SET} +1.0 V, I_{OUT} = 1 mA, C1 = C2 = 0.1 μF, unless otherwise noted.

R8155J001C (−40 ≤ Ta ≤ 125°C)

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
V_{FB}	Feedback Voltage	Ta = 25°C	2.480		2.520	V
		−40°C ≤ Ta ≤ 125°C	2.455		2.545	V
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	V_{IN} = V_{SET} + 2.0 V 1 mA ≤ I_{OUT} ≤ 250 mA	−60	3	60	mV
		V_{IN} = V_{SET} + 2.0 V 1 mA ≤ I_{OUT} ≤ 1 A	−25	5	35	mV
V_{DIF}	Dropout Voltage	V_{SET} = V_{FB}, I_{OUT} = 1 A		1.0	1.8	V
I_{SS}	Supply Current	I_{OUT} = 0 mA		18	36	μA
Istandby	Standby Current	V_{CE} = 0 V		0.1	2.0	μA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	V_{SET} = V_{FB}, 3.5 V ≤ V_{IN} ≤ 36 V		0.01	0.02	%/V
I_{LIM}	Output Current Limit	V_{IN} = V_{SET} + 2.0 V	1.1	1.8	2.5	A
I_{SC}	Short Current Limit	V_{OUT} = V_{FB} = 0 V	110	180	250	mA
I_{PD}	CE Pull-down Current	V_{CE} = 5 V		0.2	0.6	μA
		V_{CE} = 36 V		0.5	1.3	μA
V_{CEH}	CE Input Voltage "H"		2.2		36	V
V_{CEL}	CE Input Voltage "L"		0		1.0	V
T_{TSD}	Thermal Shutdown Temperature	Junction Temperature	150	160		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature	125	135		°C

V_{IN} = V_{SET} +1.0 V, I_{OUT} = 1 mA, C_{IN} = C_{OUT} = 0.1 μF, unless otherwise noted.

R8155Jxx1E/F (−40 ≤ Ta ≤ 125°C)

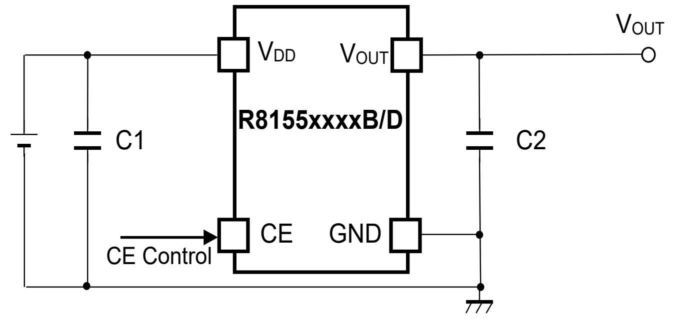
Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	Ta = 25°C	V_{SET} ≤ 5.0 V	×0.992		×1.008	V
			V_{SET} > 5.0 V	×0.99		×1.01	V
		−40°C ≤ Ta ≤ 125°C	V_{SET} ≤ 5.0 V	×0.982		×1.018	V
			V_{SET} > 5.0 V	×0.98		×1.02	V
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	V_{IN} = V_{SET} + 2.0 V 1 mA ≤ I_{OUT} ≤ 250 mA		−15	3	25	mV
		V_{IN} = V_{SET} + 2.0 V 1 mA ≤ I_{OUT} ≤ 1 A		−60	5	60	mV
V_{DIF}	Dropout Voltage	I_{OUT} = 1 A		Refer to the *Product-specific Electrical Characteristics*			
I_{SS}	Supply Current	I_{OUT} = 0 mA			18	36	μA
Istandby	Standby Current	V_{CE} = 0 V			0.1	2.0	μA
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	V_{SET} + 0.5 V ≤ V_{IN} ≤ 36 V, if V_{IN} ≤ 3.5 V			0.01	0.02	%/V
V_{IN}	Input Voltage			3.5		36	V
I_{LIM}	Output Current Limit	V_{IN} = V_{SET} + 2.0 V		1.1	1.8	2.5	A
I_{SC}	Short Current Limit	V_{OUT} = 0 V		110	180	250	mA
I_{PD}	CE Pull-down Current	V_{CE} = 5 V			0.2	0.6	μA
		V_{CE} = 36 V			0.5	1.3	μA
I_{DELAY}	DELAY Current	DELAY = GND		1.5	2.5	3.5	μA
V_{CEH}	CE Input Voltage "H"			2.2		36	V
V_{CEL}	CE Input Voltage "L"			0		1.0	V
T_{TSD}	Thermal Shutdown Temperature	Junction Temperature		150	160		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature		125	135		°C
R_{LOW}	Low Output Nch Tr. ON Resistance (R8155Jxx1F)	V_{IN} = 14.0 V, V_{CE} = 0 V		1.0	3.2	5.0	kΩ

R8155xxxxB/D,R8155Jxx1E/F Product-specific Electrical Characteristics

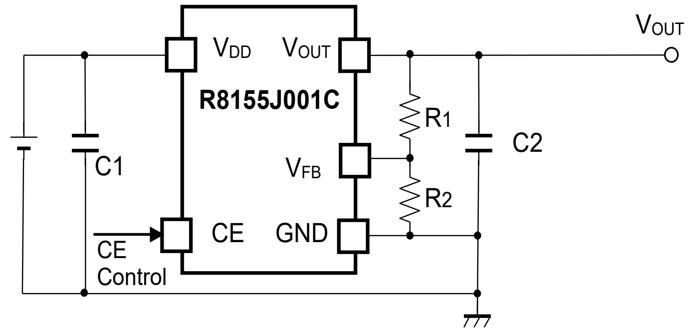
(−40 ≤ Ta ≤ 125°C)

Product Name	VOUT (V) (Ta = 25°C)			VOUT (V) (−40°C ≤ Ta ≤ 125°C)			VDIF (V) (IOUT = 1 A)	
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	TYP.	MAX.
R8155x25xx	2.480	2.500	2.520	2.455	2.500	2.545	1.00	1.80
R8155x28xx	2.778	2.800	2.822	2.750	2.800	2.850		
R8155x30xx	2.976	3.000	3.024	2.946	3.000	3.054		
R8155x33xx	3.274	3.300	3.326	3.241	3.300	3.359	0.90	1.60
R8155x34xx	3.373	3.400	3.427	3.339	3.400	3.461		
R8155x50xx	4.960	5.000	5.040	4.910	5.000	5.090	0.70	1.30
R8155x60xx	5.940	6.000	6.060	5.880	6.000	6.120		
R8155x80xx	7.920	8.000	8.080	7.840	8.000	8.160		
R8155x85xx	8.415	8.500	8.585	8.330	8.500	8.670	0.65	1.10
R8155x90xx	8.910	9.000	9.090	8.820	9.000	9.180		

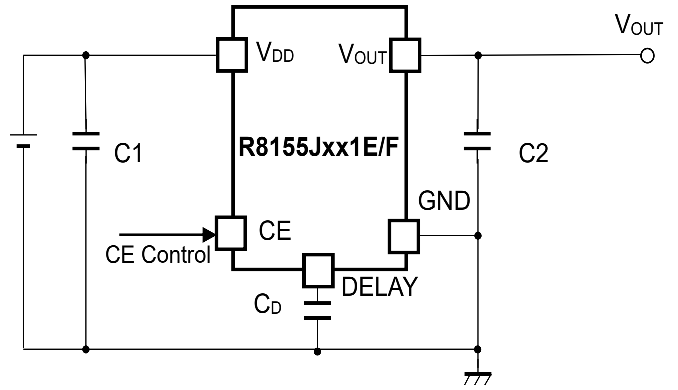
TYPICAL APPLICATION



R8155xxxxB/D Typical Application



R8155J001C Typical Application

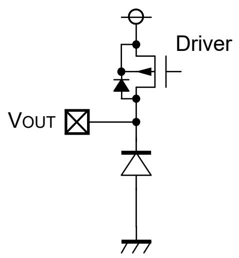


R8155Jxx1E/F Typical Application

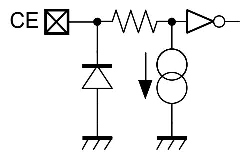
External Part Examples：

R8155xxxxB//D/E/F	
C1	0.1μF (Ceramic)
C2	0.1μF (Ceramic)
R8155J001C	
C1	0.1μF (Ceramic)
C2	1.0μF (Ceramic)

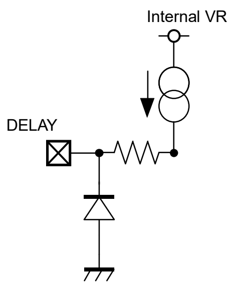
PIN EQUIVALENT CIRCUIT DIAGRAMS



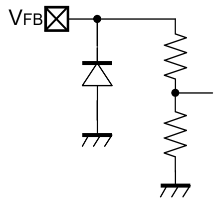
V_{OUT} Pin



CE Pin



DELAY Pin (R8155Jxx1E/F)



V_{FB} Pin (R8155J001C)

TECHNICAL NOTES

Phase Compensation

In LDO regulators, phase compensation is provided to secure stable operation even when the load current is varied. For this purpose, use 0.1 µF or more (R8155xxxxB/D/E/F), 1.0 µF or more (R8155J001C) of the capacitor C2.

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

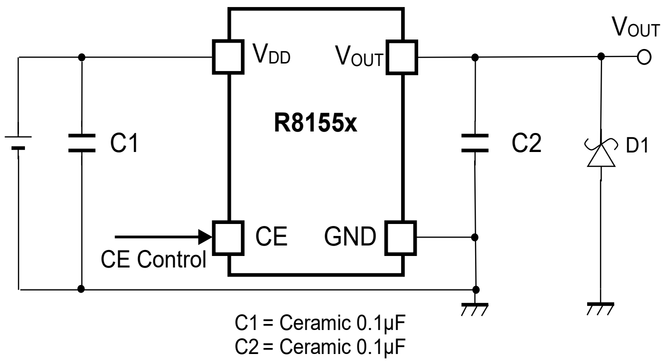
For the externally adjustable output voltage type (R8155J001C), use 10 kΩ or lower resistance R2.

PCB Layout

Ensure the V_{DD} and GND lines are sufficiently robust. If their impedance is too high, noise pickup or unstable operation may result. Connect 0.1 µF or more of the capacitor C1 between the V_{DD} and GND, and as close as possible to the pins.

In addition, connect the capacitor C2 between V_{OUT} and GND, and as close as possible to the pins.

■ TYPICAL APPLICATION FOR IC CHIP BREAKDOWN PROVENTION



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 (C_{OUT}) 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..

APPLICATION INFORMATION

Thermal Shutdown Function

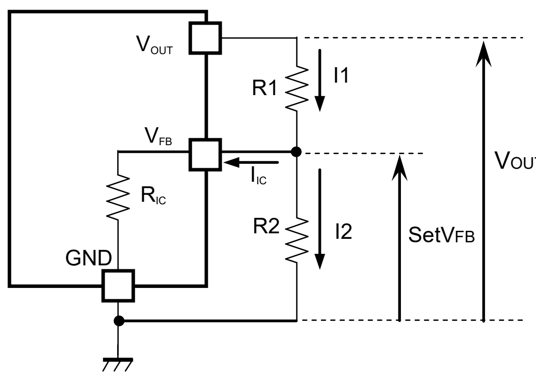
Thermal shutdown function is included in this device. If the junction temperature is more than or equal to 160°C (Typ.), the operation of the regulator would stop. After that, when the junction temperature is less than or equal to 135°C (Typ.), the operation of the regulator would restart. Unless the cause of rising temperature is removed, the regulator repeats on and off, and output waveform would be like consecutive pulses.

Adjustable Output Voltage Setting (R8155J001C)

The output voltage of R8155J001C can be adjusted by using the external divider resistors (R1, R2). By using the following equation, the output voltage (V_{OUT}) can be determined. The voltage which is fixed inside the IC is described as V_{FB}.

$$V_{OUT} = V_{FB} \times ((R1 + R2) / R2)$$

Recommended Range: $2.5\ V \leq V_{OUT} \leq 12.0\ V$
$V_{FB} = 2.5\ V$



Output Voltage Adjustment Using External Divider Resistors (R1, R2)

R_{IC} of the R8155J001C is approximately Typ. 1.35 MΩ (Ta=25°C, guaranteed by Design Engineering). For better accuracy, setting R1 << R_{IC} reduces errors. The resistance value for R2 should be set to 10 kΩ or lower. It is easily affected by noises when setting the value of R1 and R2 larger, which makes the impedance of V_{FB} pin larger.

R_{IC} could be affected by the temperature, therefore evaluate the circuit taking the actual conditions of use into account when deciding the resistance values for R1 and R2.

Soft-start Function

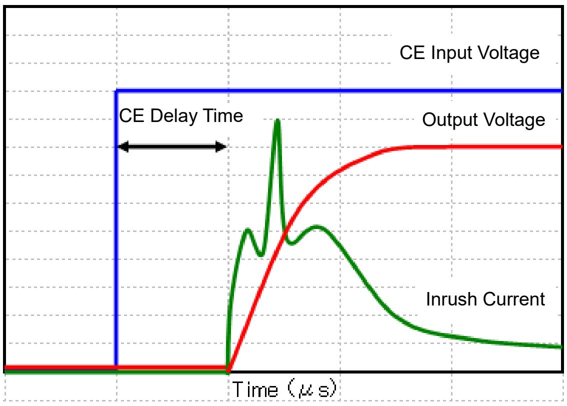
R8155x is equipped with a constant slope circuit, which achieves a soft-start function. This circuit allows the output voltage to start up gradually when the CE is turned on. The constant slope circuit minimizes the inrush current at the start-up and also prevents the overshoot of the output voltage. For R8155xxxxB/C/D, the capacitor to create the start-up slope is built in this device that does not require any external components. The start-up time and the start-up slope angle are fixed inside the device. In R8155Jxx1E/F, the soft-start time is adjustable by inserting the external capacitor to DELAY pin. By using the following equation, the relation between the soft-start time t_D [s] and DELAY pin capacitor C_D [F] is determined.

$$t_D = ((C_D + 90 \times 10^{-12}) / I_{DELAY}) \times 0.73$$

When the capacitor C_D is not used in R8155Jxx1E/F, use the DELAY pin as OPEN. At that time, C_D = 0 in the above equation, therefore the start-up time is about 26 μs. However, be sure to consider approximately 50 μs of CE delay time.

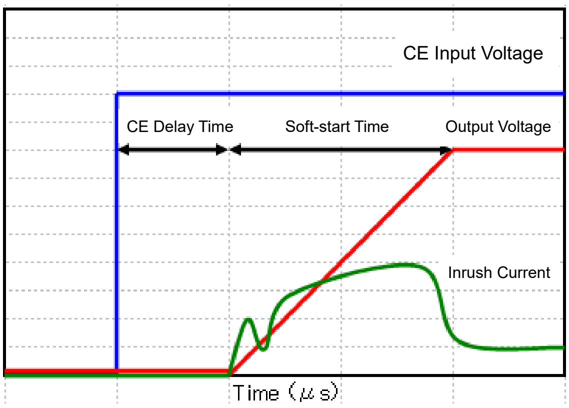
Conventional Inrush Current Limit Circuit

(Diagrammatic sketch)



Constant Slope Circuit

(Diagrammatic sketch)



PACKAGE INFORMATION

POWER DISSIPATION (HSOP-6J)

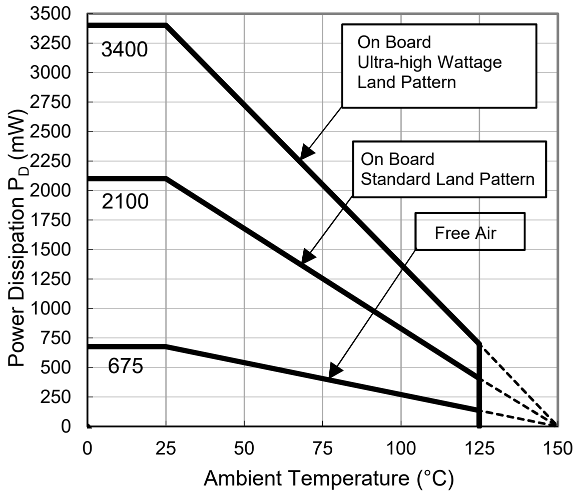
The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following conditions are used in this measurement.

Measurement Conditions

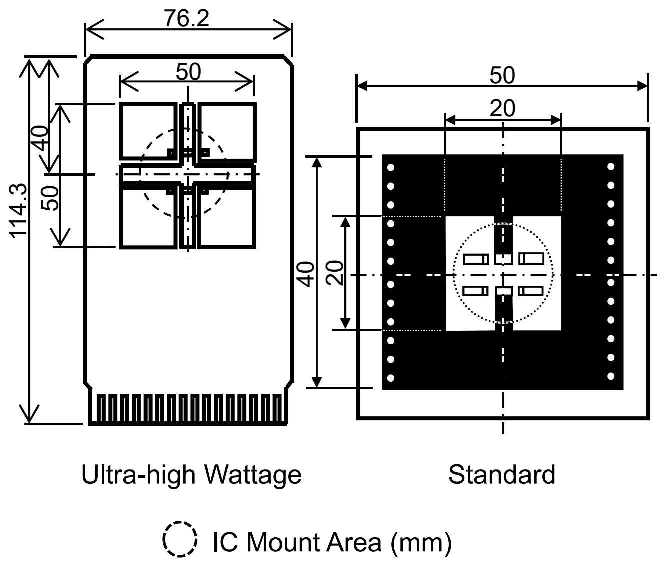
	Ultra-high Wattage Land Pattern	Standard Land Pattern
Environment	Mounting on Board (Wind Velocity = 0 m/s)	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-layer Board)	Glass Cloth Epoxy Plastic (Double-sided Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm	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

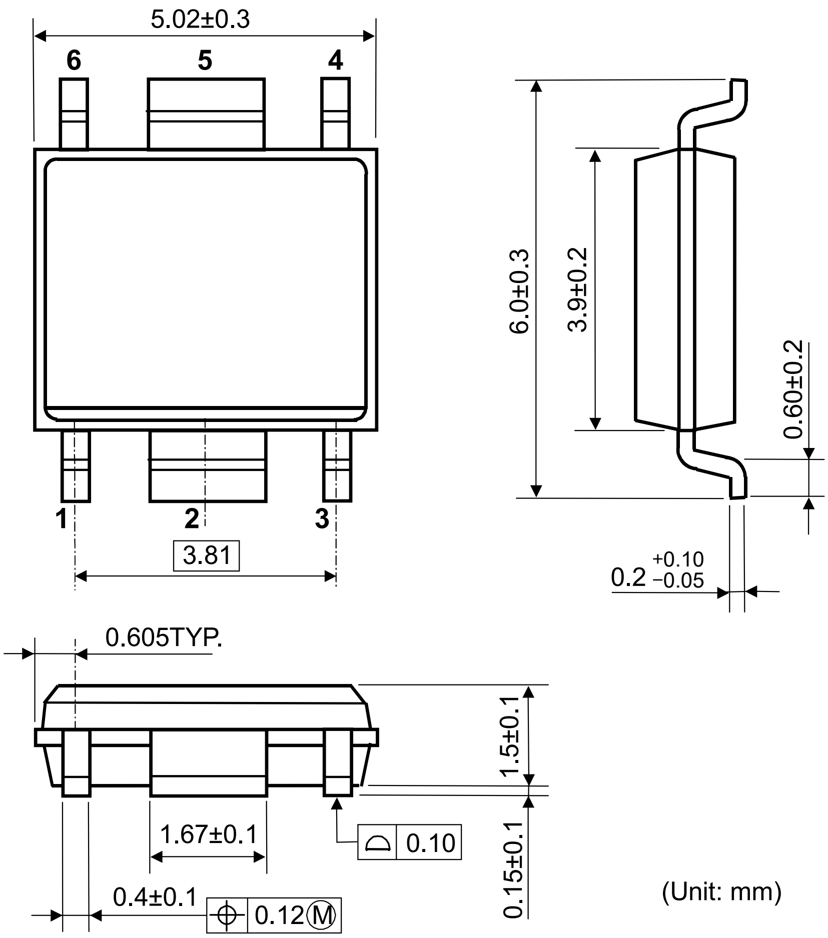


Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

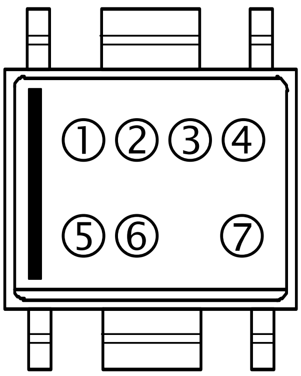
PACKAGE DIMENSIONS (HSOP-6J)



HSOP-6J　Package Dimensions

MARK SPECIFICATION (HSOP-6J)

①②③④: Product Code … **Refer to *R8155S MARK SPECIFICATION TABLE***
⑤⑥: Lot Number … Alphanumeric Serial Number
⑦: Lot Sub Number ... Alphanumeric Serial Number



HSOP-6J　Mark Specification

R8155S MARK SPECIFICATION TABLE (HSOP-6J)

R8155Sxx2B

Product Name	①②③④	V_{SET}
R8155S252B	**Y 2 5 B**	2.5 V
R8155S282B	**Y 2 8 B**	2.8 V
R8155S302B	**Y 3 0 B**	3.0 V
R8155S332B	**Y 3 3 B**	3.3 V
R8155S342B	**Y 3 4 B**	3.4 V
R8155S502B	**Y 5 0 B**	5.0 V
R8155S602B	**Y 6 0 B**	6.0 V
R8155S802B	**Y 8 0 B**	8.0 V
R8155S852B	**Y 8 5 B**	8.5 V
R8155S902B	**Y 9 0 B**	9.0 V

R8155Sxx2D

Product Name	①②③④	V_{SET}
R8155S252D	**Y 2 5 D**	2.5 V
R8155S282D	**Y 2 8 D**	2.8 V
R8155S302D	**Y 3 0 D**	3.0 V
R8155S332D	**Y 3 3 D**	3.3 V
R8155S342D	**Y 3 4 D**	3.4 V
R8155S502D	**Y 5 0 D**	5.0 V
R8155S602D	**Y 6 0 D**	6.0 V
R8155S802D	**Y 8 0 D**	8.0 V
R8155S852D	**Y 8 5 D**	8.5 V
R8155S902D	**Y 9 0 D**	9.0 V

POWER DISSIPATION (TO-252-5-P2)

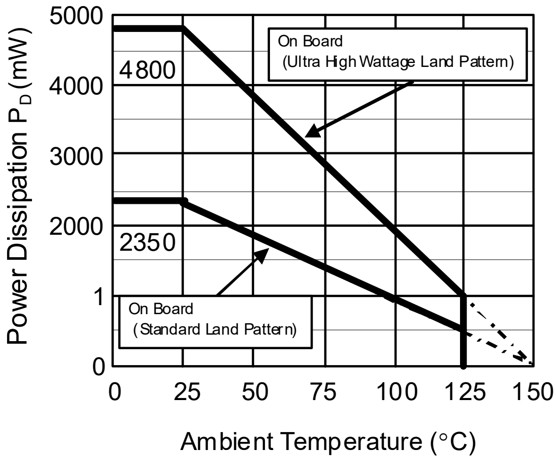
Power Dissipation (P_D) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

Measurement Conditions

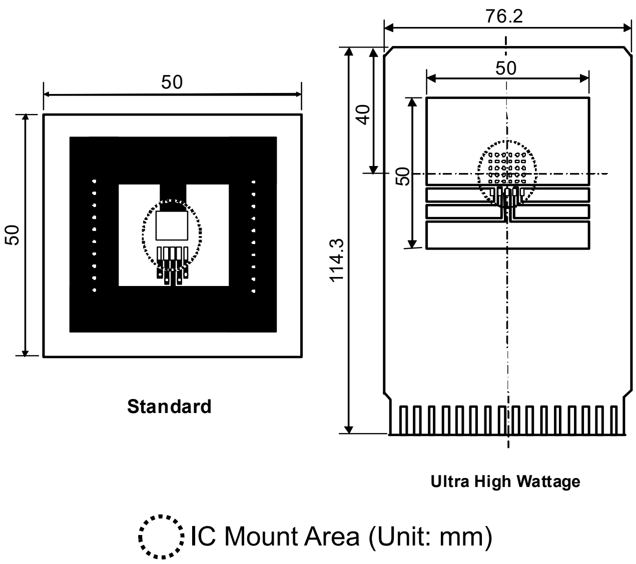
	Ultra High Wattage Land Pattern	Standard Land Pattern
Environment	Mounting on board (Wind velocity 0 m/s)	
Board Material	Glass cloth epoxy plastic (Four-layers)	Glass cloth epoxy plastic (Double layers)
Board Dimensions	76.2 mm x 114.3 mm x 0.8 mm	50 mm x 50 mm x 1.6 mm
Copper Ratio	Top, Back side: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

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

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



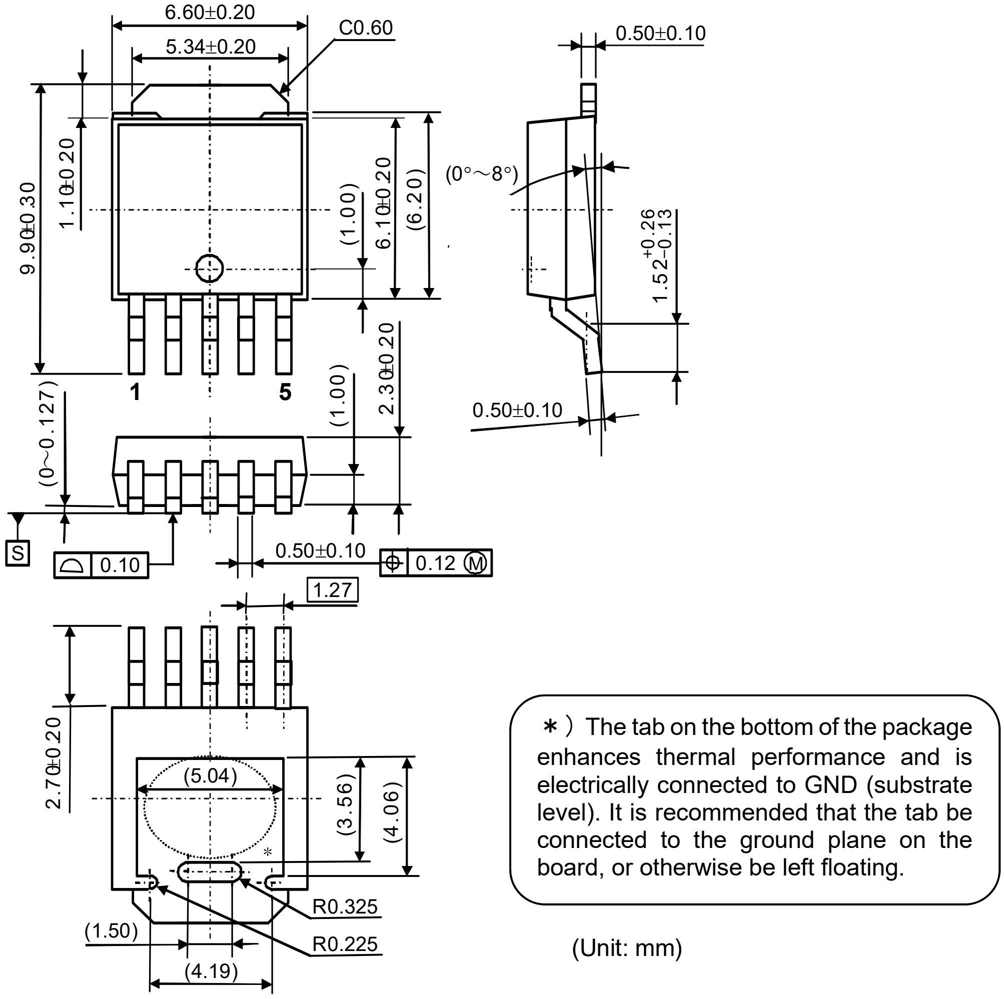
Power Dissipation



Power Dissipation vs. Ambience Temperature

Measurement Board Pattern

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)

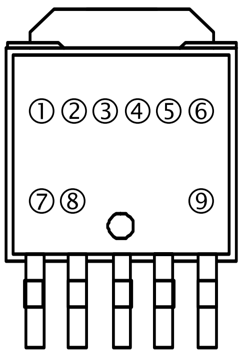
TO-252-5-P2　Package Dimensions

MARK SPECIFICATION (TO-252-5-P2)

①②③④⑤⑥: Product Code … **Refer to *R8155J MARK SPECIFICATION TABLE***

⑦⑧: Lot Number … Alphanumeric Serial Number

⑨: Lot Sub Number ... Alphanumeric Serial Number



TO-252-5-P2 Mark Specification

NO. EC-331-180510

R8155J MARK SPECIFICATION TABLE (TO-252-5-P2)

R8155Jxx1B

Product Name	①②③④⑤⑥	V_{SET}
R8155J251B	**N 1 J 2 5 1**	2.5 V
R8155J281B	**N 1 J 2 8 1**	2.8 V
R8155J301B	**N 1 J 3 0 1**	3.0 V
R8155J331B	**N 1 J 3 3 1**	3.3 V
R8155J341B	**N 1 J 3 4 1**	3.4 V
R8155J501B	**N 1 J 5 0 1**	5.0 V
R8155J601B	**N 1 J 6 0 1**	6.0 V
R8155J801B	**N 1 J 8 0 1**	8.0 V
R8155J851B	**N 1 J 8 5 1**	8.5 V
R8155J901B	**N 1 J 9 0 1**	9.0 V

R8155J001C (Adjustable Output Voltage Setting Type)

Product Name	①②③④⑤⑥	V_{SET}
R8155J001C	**N 2 J 0 0 1**	—

R8155Jxx1D

Product Name	①②③④⑤⑥	V_{SET}
R8155J251D	**N 3 J 2 5 1**	2.5 V
R8155J281D	**N 3 J 2 8 1**	2.8 V
R8155J301D	**N 3 J 3 0 1**	3.0 V
R8155J331D	**N 3 J 3 3 1**	3.3 V
R8155J341D	**N 3 J 3 4 1**	3.4 V
R8155J501D	**N 3 J 5 0 1**	5.0 V
R8155J601D	**N 3 J 6 0 1**	6.0 V
R8155J801D	**N 3 J 8 0 1**	8.0 V
R8155J851D	**N 3 J 8 5 1**	8.5 V
R8155J901D	**N 3 J 9 0 1**	9.0 V

R8155Jxx1E

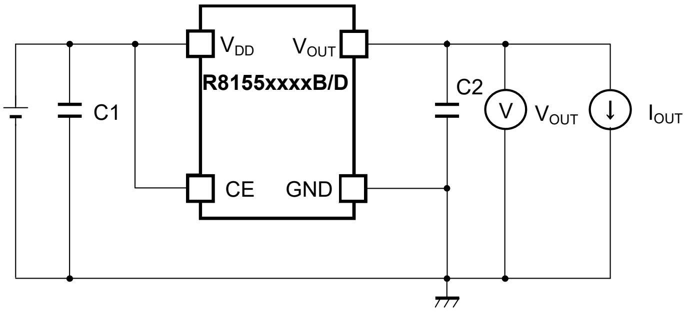
Product Name	①②③④⑤⑥	V_{SET}
R8155J251E	**N 4 J 2 5 1**	2.5 V
R8155J281E	**N 4 J 2 8 1**	2.8 V
R8155J301E	**N 4 J 3 0 1**	3.0 V
R8155J331E	**N 4 J 3 3 1**	3.3 V
R8155J341E	**N 4 J 3 4 1**	3.4 V
R8155J501E	**N 4 J 5 0 1**	5.0 V
R8155J601E	**N 4 J 6 0 1**	6.0 V
R8155J801E	**N 4 J 8 0 1**	8.0 V
R8155J851E	**N 4 J 8 5 1**	8.5 V
R8155J901E	**N 4 J 9 0 1**	9.0 V

R8155Jxx1F

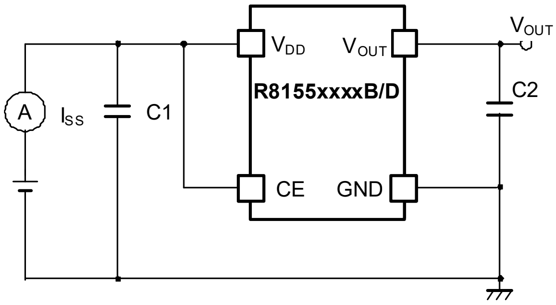
Product Name	①②③④⑤⑥	V_{SET}
R8155J251F	**N 5 J 2 5 1**	2.5 V
R8155J281F	**N 5 J 2 8 1**	2.8 V
R8155J301F	**N 5 J 3 0 1**	3.0 V
R8155J331F	**N 5 J 3 3 1**	3.3 V
R8155J341F	**N 5 J 3 4 1**	3.4 V
R8155J501F	**N 5 J 5 0 1**	5.0 V
R8155J601F	**N 5 J 6 0 1**	6.0 V
R8155J801F	**N 5 J 8 0 1**	8.0 V
R8155J851F	**N 5 J 8 5 1**	8.5 V
R8155J901F	**N 5 J 9 0 1**	9.0 V

TEST CIRCUITS

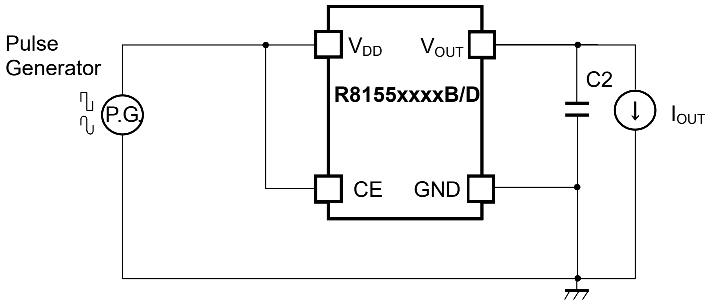
Soft-start: Internally Fixed Type (R8155xxxxB/D)



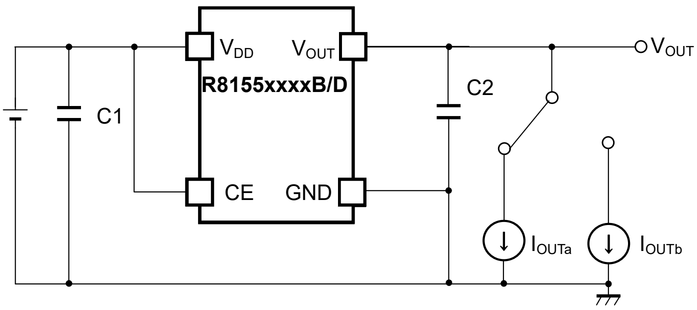
R8155xxxxB/D Basic Test Circuit



R8155xxxxB/D Supply Current Test Circuit

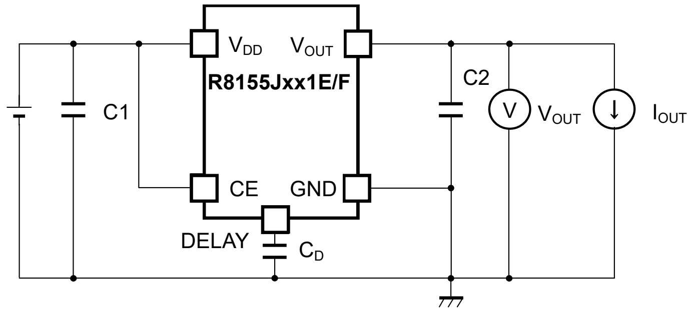


R8155xxxxB/D Ripple Rejection Test Circuit

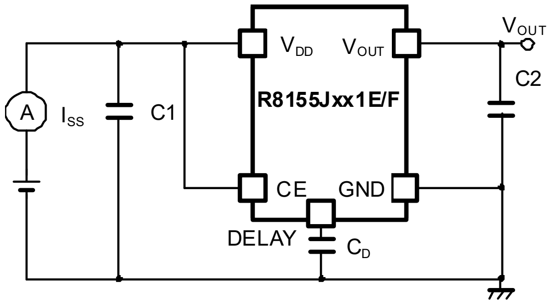


R8155xxxxB/D Load Transient Response Test Circuit

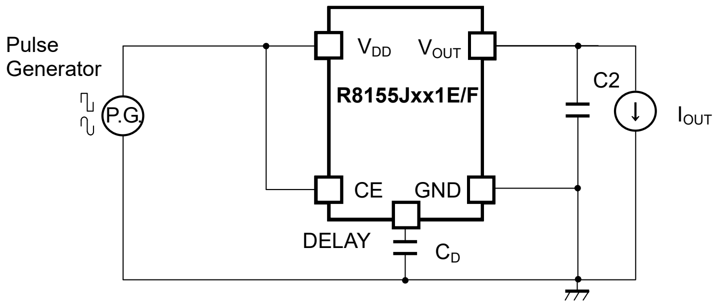
Adjustable Soft-start Setting Type (R8155Jxx1E/F)



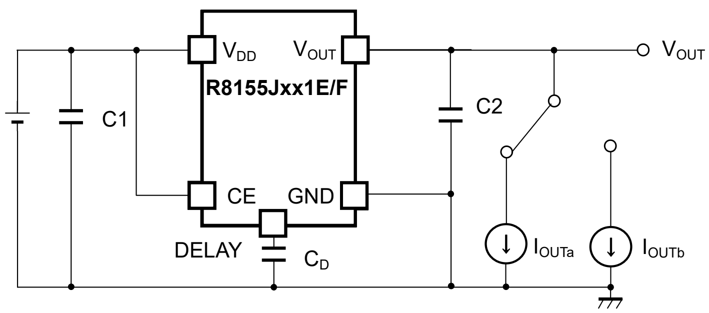
R8155Jxx1E/F Basic Test Circuit



R8155Jxx1E/F Supply Current Test Circuit



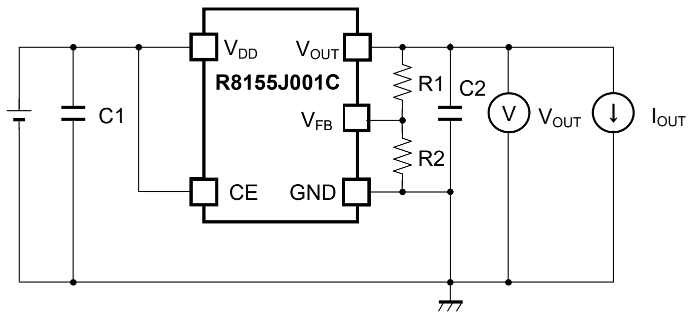
R8155Jxx1E/F Ripple Rejection Test Circuit



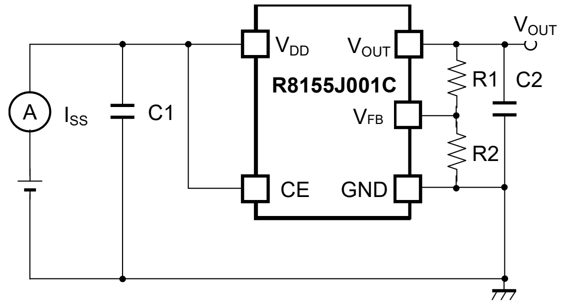
R8155Jxx1E/F Load Transient Response Test Circuit

Note: Refer to *Soft-start Function* for detailed information on C_D.

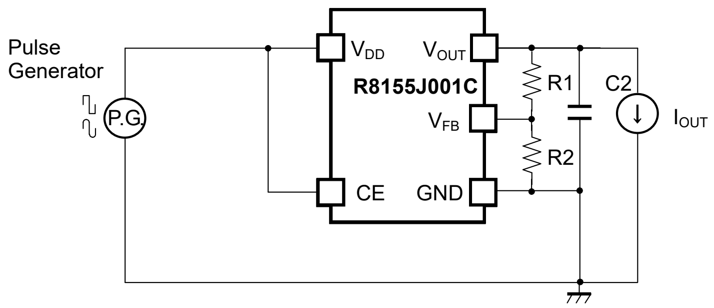
Adjustable Output Voltage Setting Type (R8155J001C)



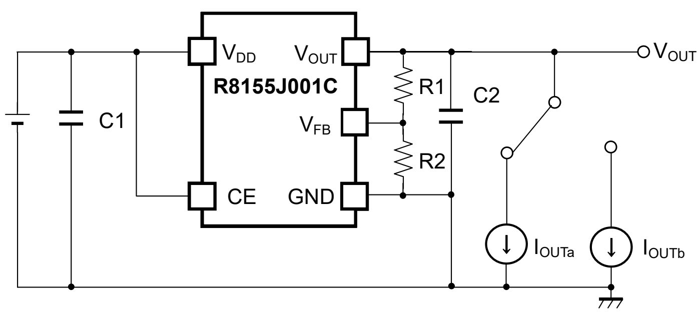
R8155J001C Basic Test Circuit



R8155J001C Supply Current Test Circuit



R8155J001C Ripple Rejection Test Circuit



R8155J001C Load Transient Response Test Circuit

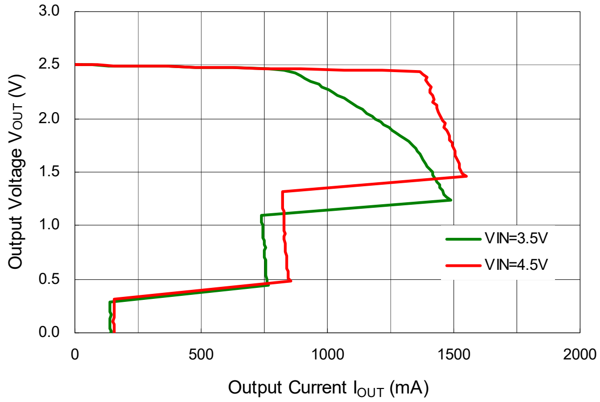
Note: Refer to *Adjustable Output Voltage Setting* for R1 and R2.

TYPICAL CHARACTERISTICS

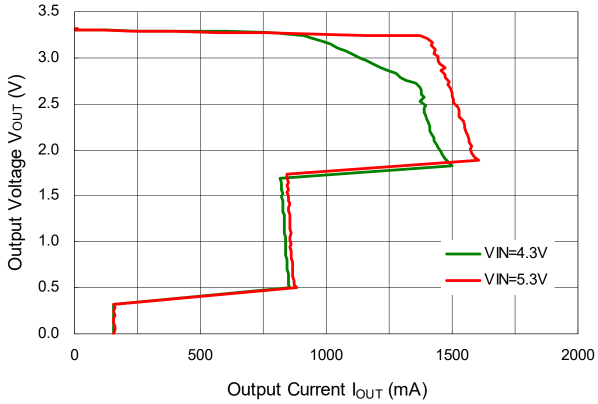
Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

1) Output Voltage vs. Output Current (Ta = 25°C)

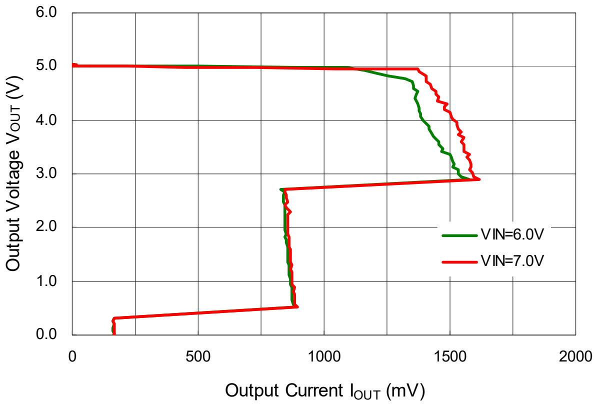
R8155x25xx, R8155J001C



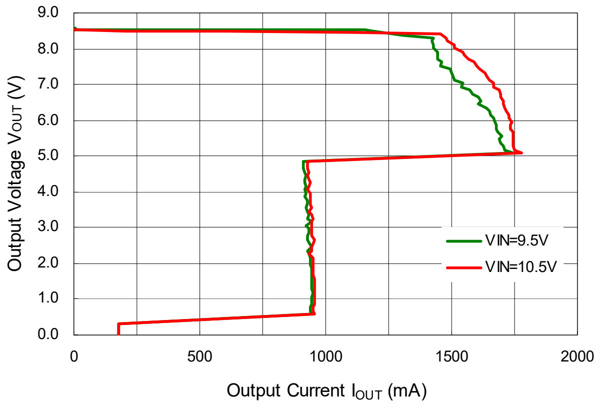
R8155x33xx



R8155x50xx

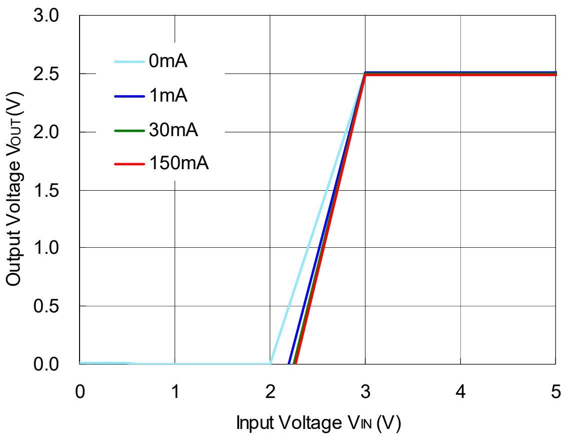


R8155x85xx

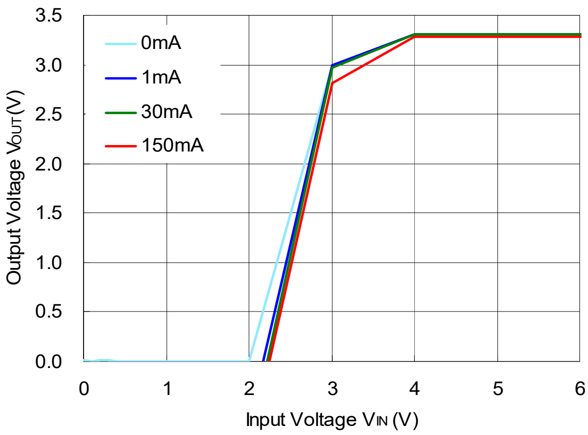


2) Output Voltage vs. Input Voltage (Ta = 25°C)

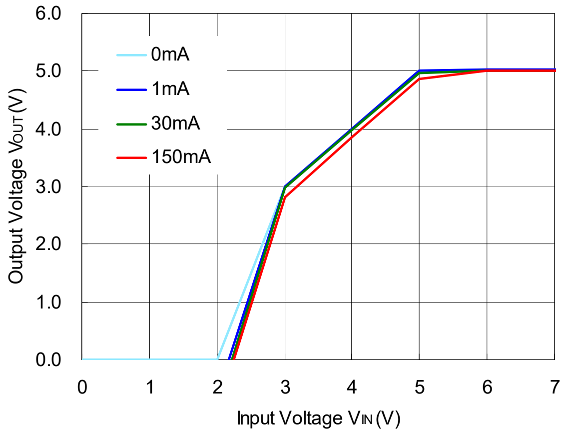
R8155x25xx



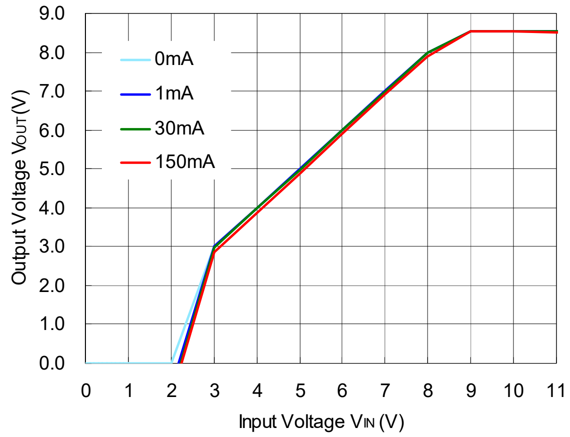
R8155x33xx



R8155x50xx

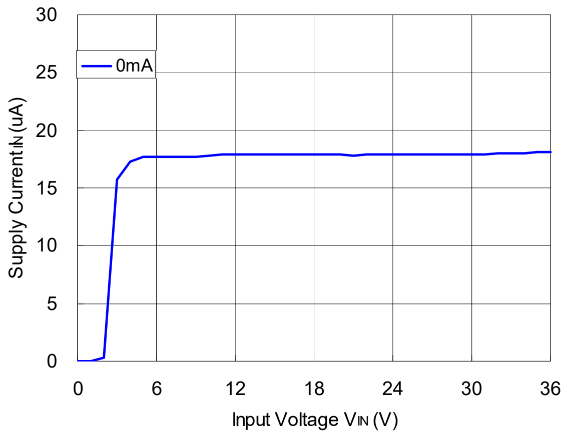


R8155x85xx

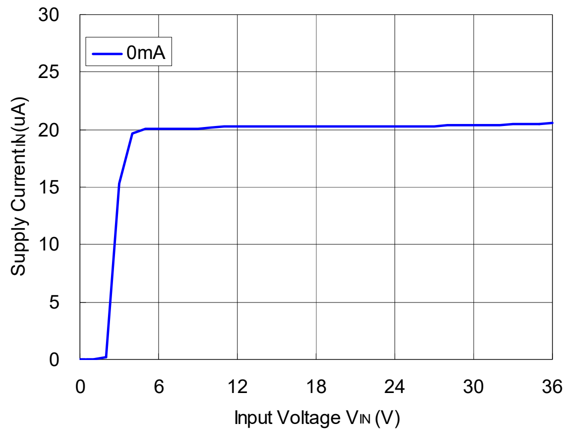


3) Supply Current vs. Input Voltage

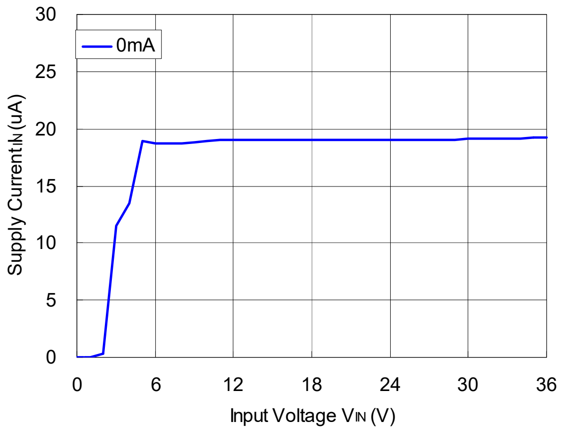
R8155x25xx, R8155J001C



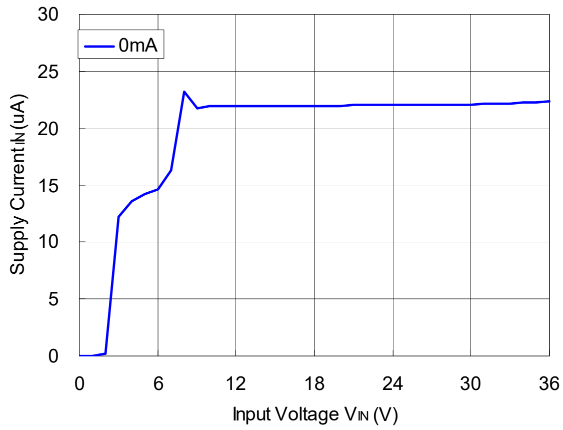
R8155x33xx



R8155x50xx

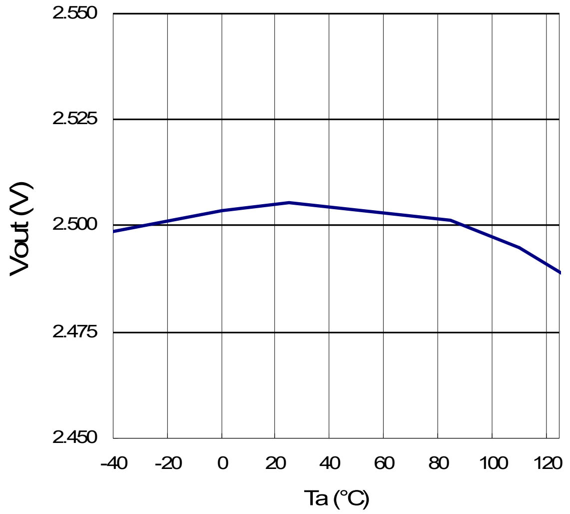


R8155x85xx

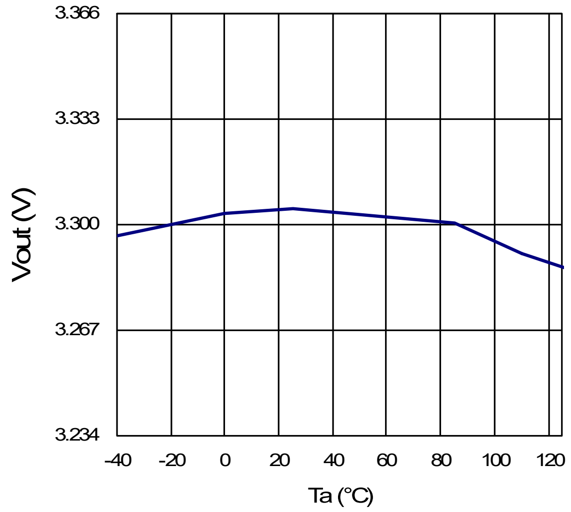


4) Output Voltage vs. Operating Temperature

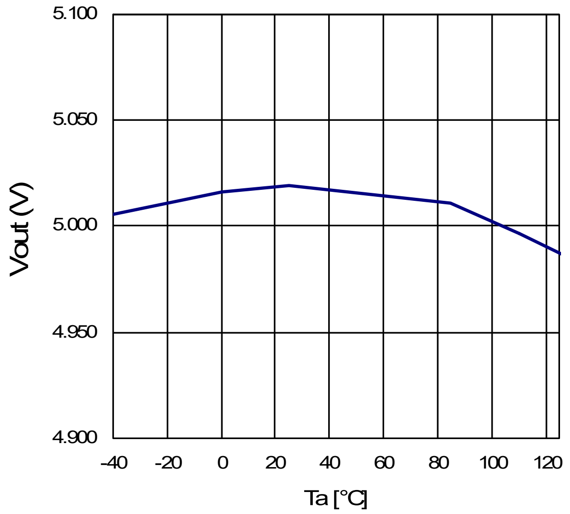
R8155x25xx, R8155J001C



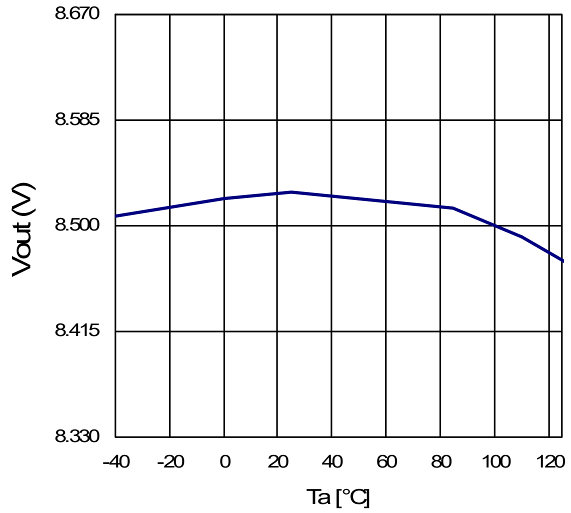
R8155x33xx



R8155x50xx

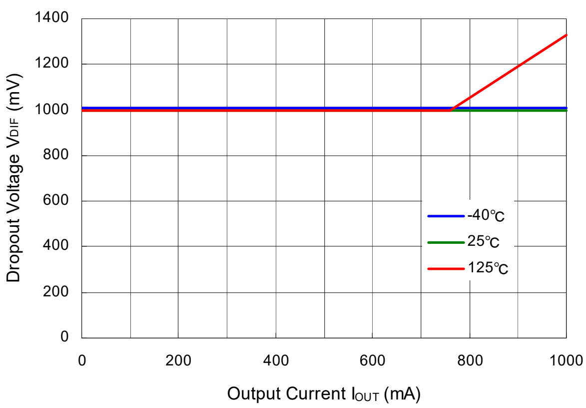


R8155x85xx

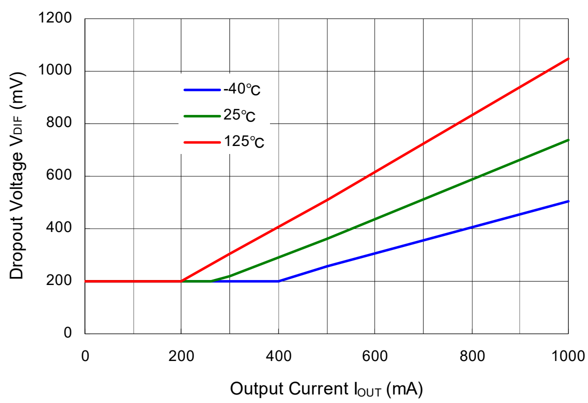


5) Dropout Voltage vs. Output Current

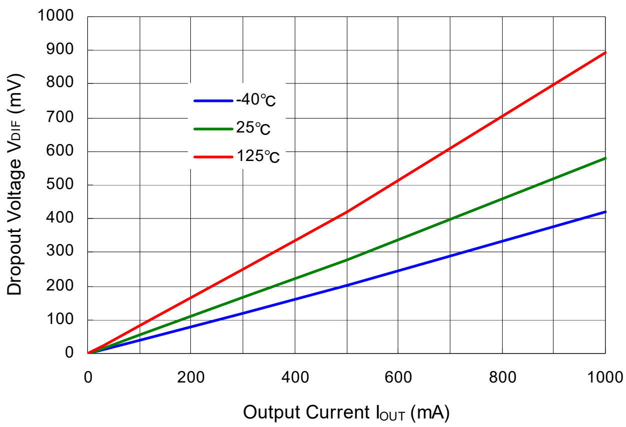
R8155x25xx, R8155J001C



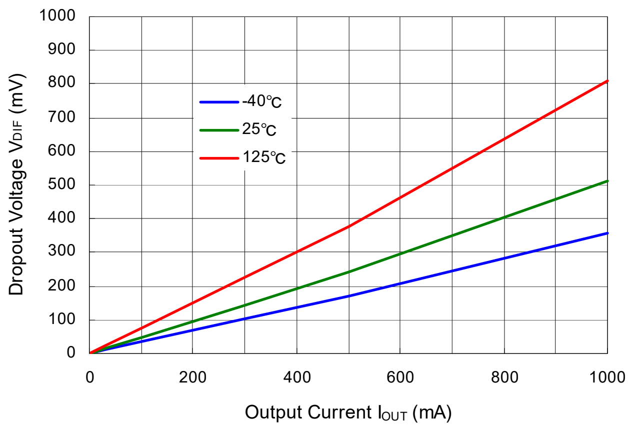
R8155x33xx



R8155x50xx

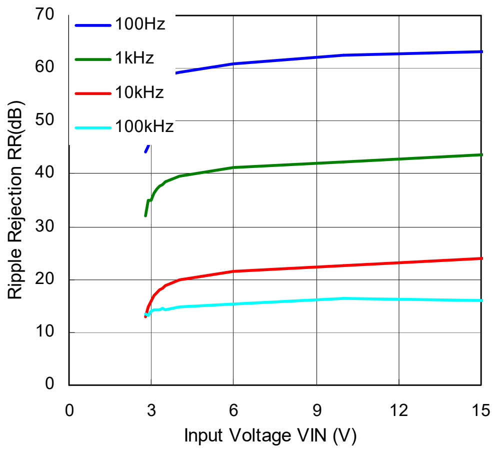


R8155x85xx

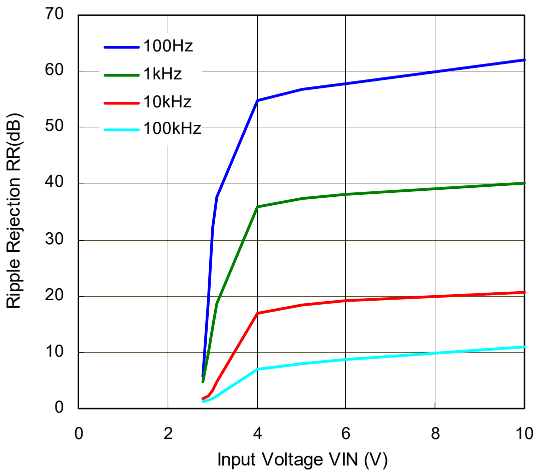


6) Ripple Rejection vs. Input Voltage (Ta = 25°C, Ripple = 0.5 Vpp)

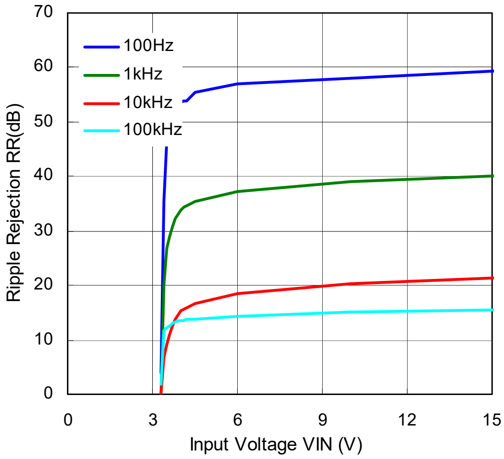
R8155x25xx, R8155J001C (I_{OUT} = 1 mA)



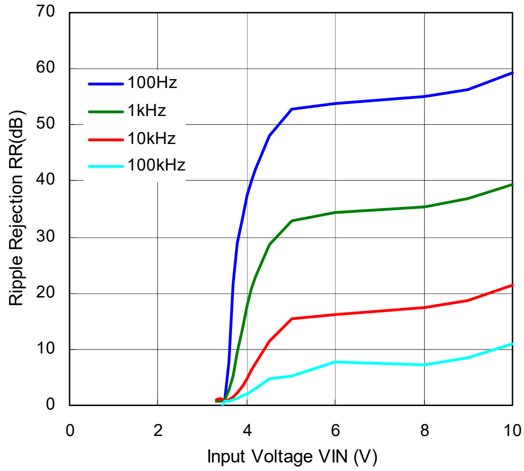
R8155x25xx, R8155J001C (I_{OUT} = 300 mA)



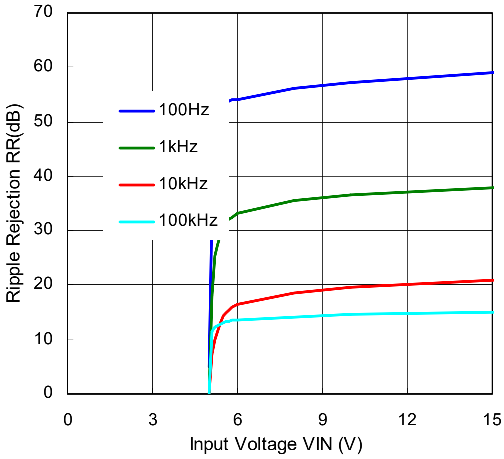
R8155x33xx (I_{OUT} = 1 mA)



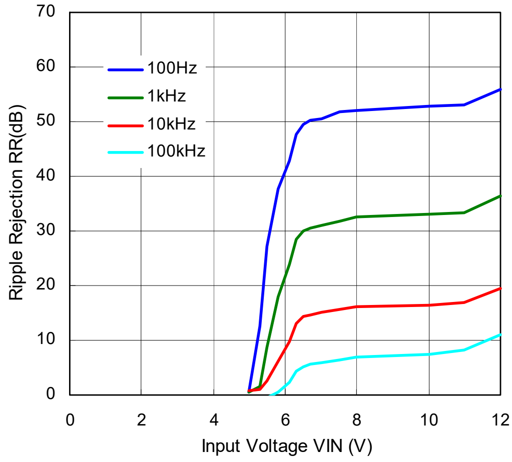
R8155x33xx (I_{OUT} = 300 mA)



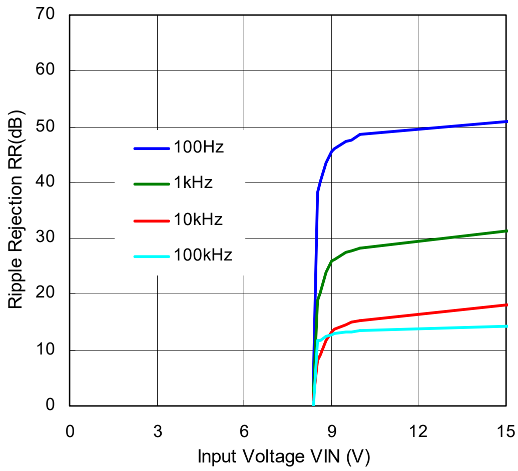
R8155x50xx (I_{OUT} = 1 mA)



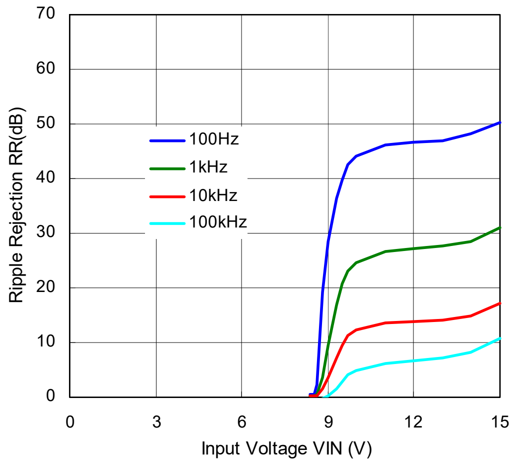
R8155x50xx (I_{OUT} = 300 mA)



R8155x85xx (I_{OUT} = 1 mA)

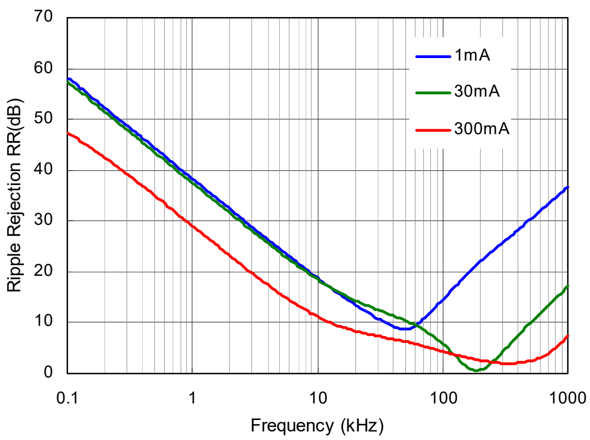


R8155x85xx (I_{OUT} = 300 mA)

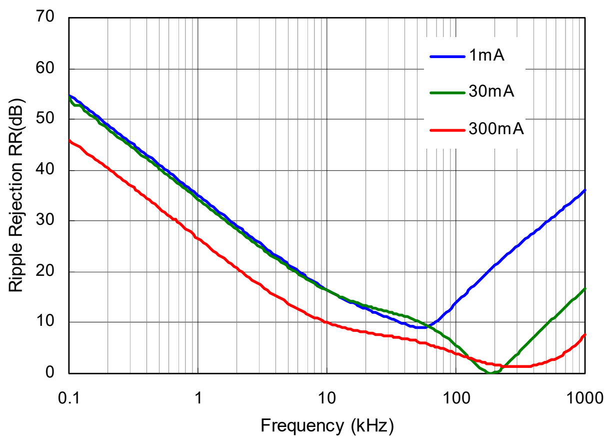


7) Ripple Rejection vs. Frequency (Ta = 25°C, Ripple = 0.5 Vpp)

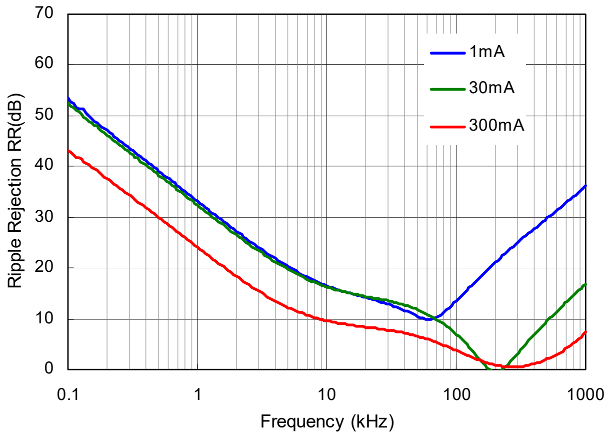
R8155x25xx, R8155J001C



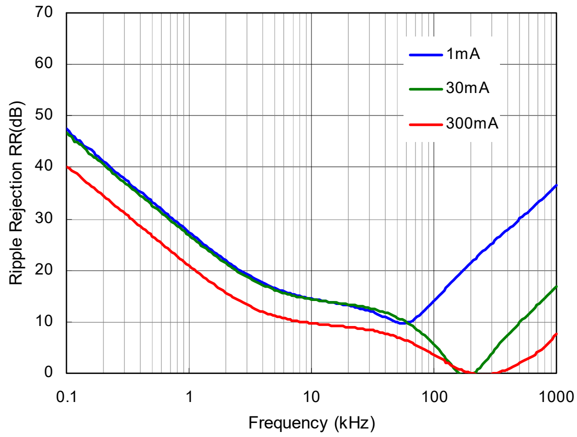
R8155x33xx



R8155x50xx

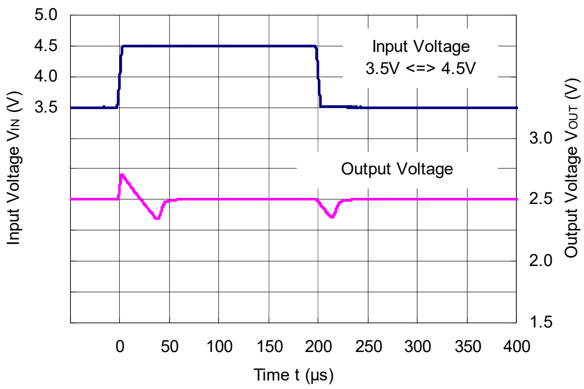


R8155x85xx

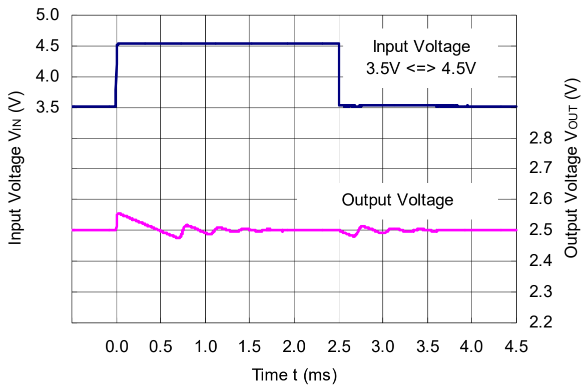


8) Input Transient Response (Ta = 25°C, I_{OUT} = 1 mA, tr = tf = 5 μs)

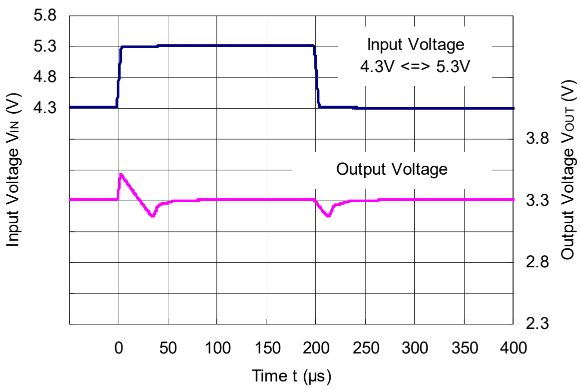
R8155x25xx, R8155J001C (C2 = 0.1 μF)



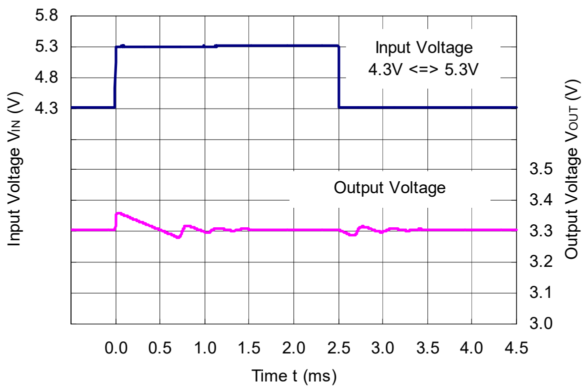
R8155x25xx, R8155J001C (C2 = 10 μF)



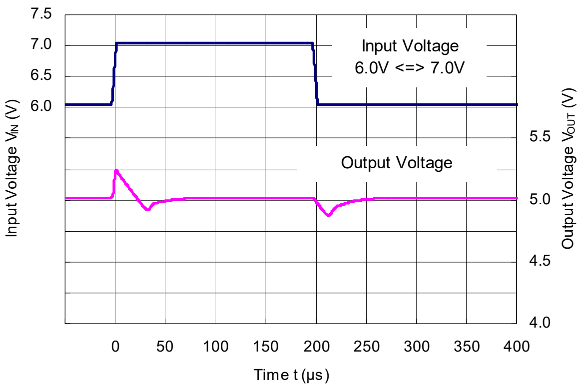
R8155x33xx (C2 = 0.1 μF)



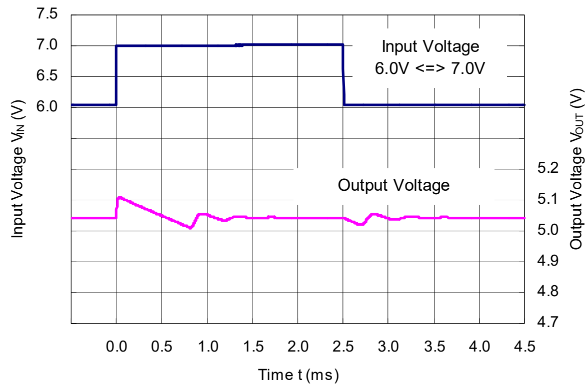
R8155x33xx (C2 = 10 μF)



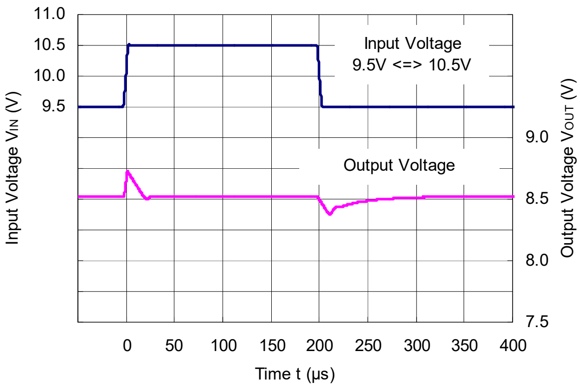
R8155x50xx (C2 = 0.1 µF)



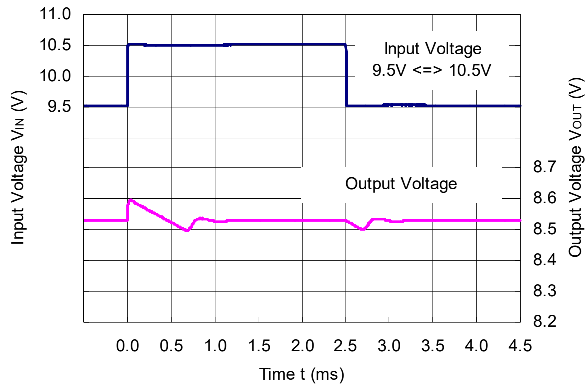
R8155x50xx (C2 = 10 µF)



R8155x85xx (C2 = 0.1 µF)

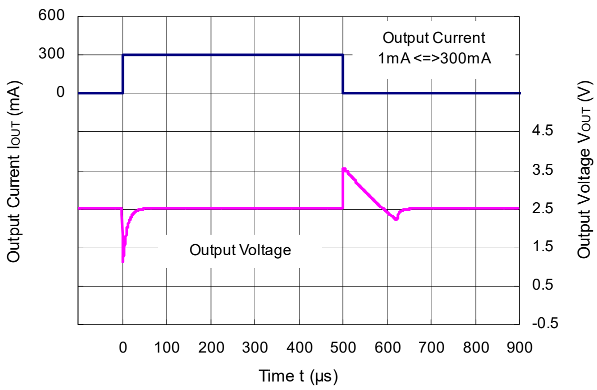


R8155x85xx (C2 = 10 µF)

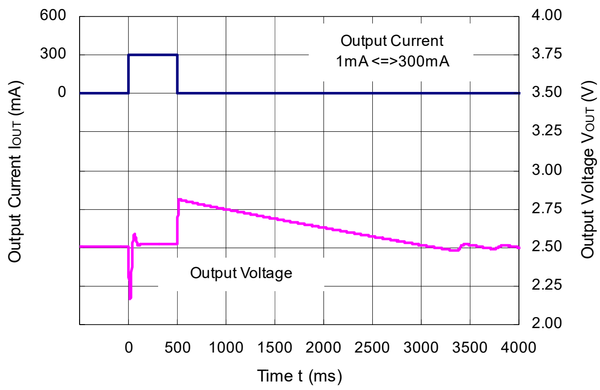


9) Load Transient Response (Ta = 25°C, V_{IN} = V_{OUT} + 1.0 V, tr = tf = 0.5 µs)

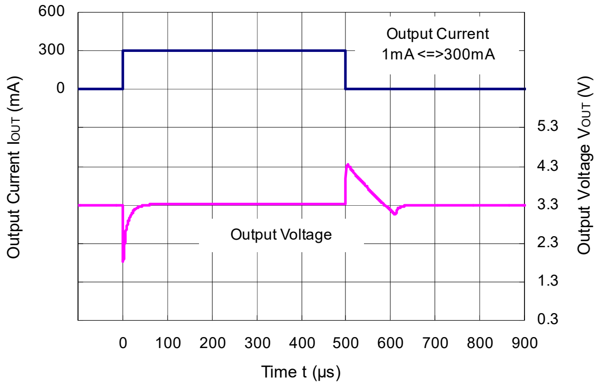
R8155x25xx, R8155J001C (C2 = 0.1 µF)



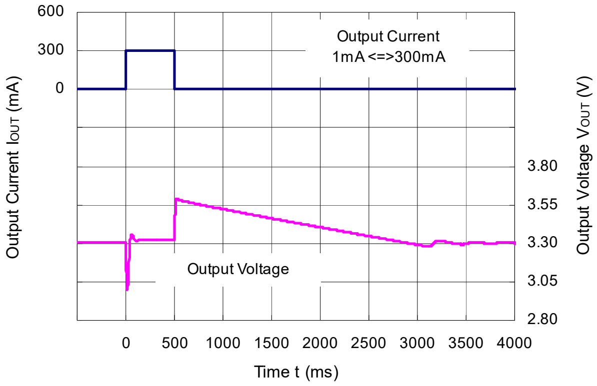
R8155x25xx, R8155J001C (C2 = 10 µF)



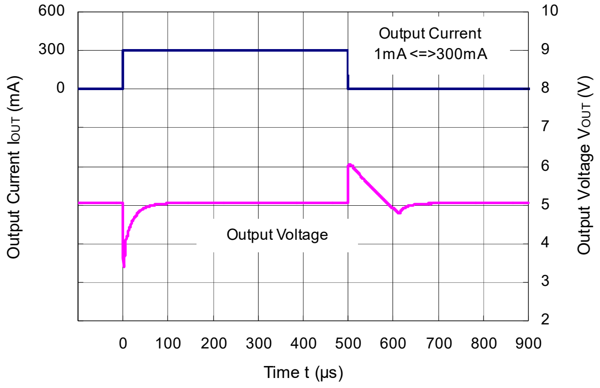
R8155x33xx (C2 = 0.1 µF)



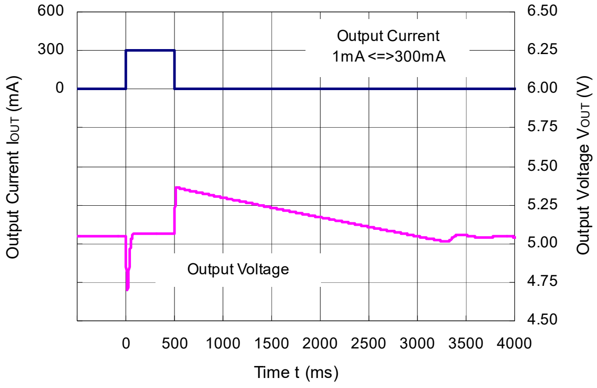
R8155x33xx (C2 = 10 µF)



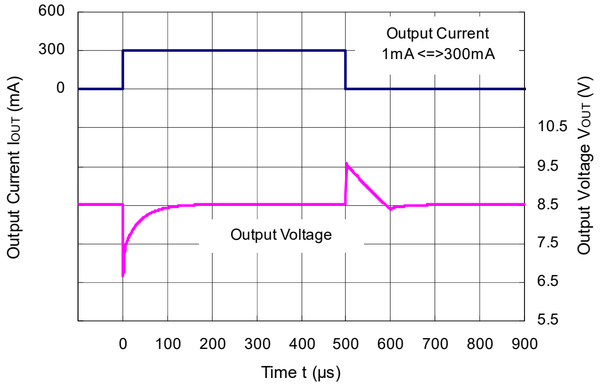
R8155x50xx (C2 = 0.1 µF)



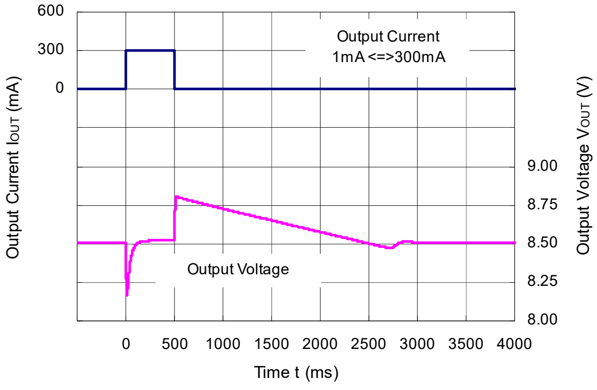
R8155x50xx (C2 = 10 µF)



R8155x85xx (C2 = 0.1 µF)

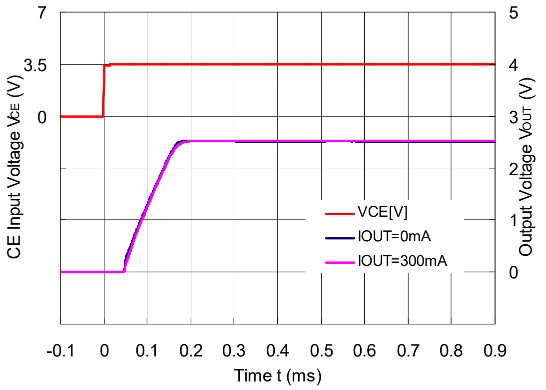


R8155x85xx (C2 = 10 µF)

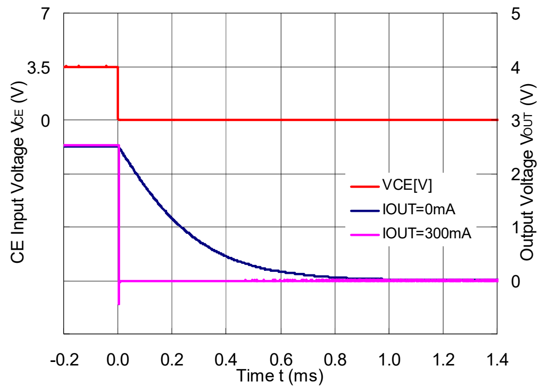


10) CE Transient Response (Ta = 25°C, I_{OUT} = 1 mA)

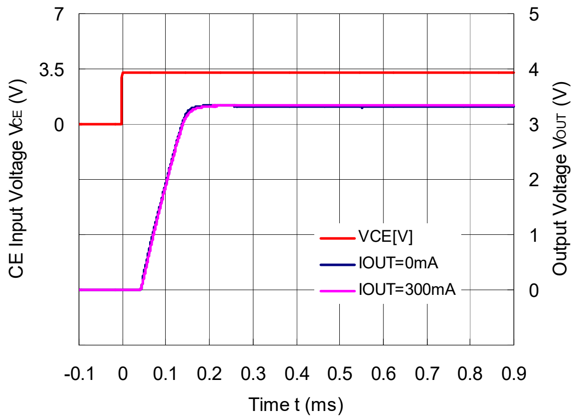
R8155x25xB/D, R8155J001C (C2 = 0.1 μF)



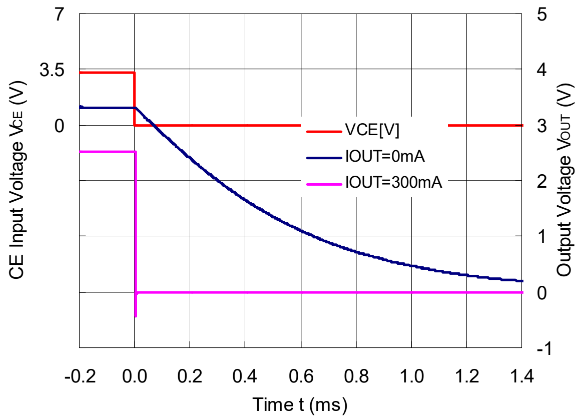
R8155x25xD (C2 = 0.1 μF)



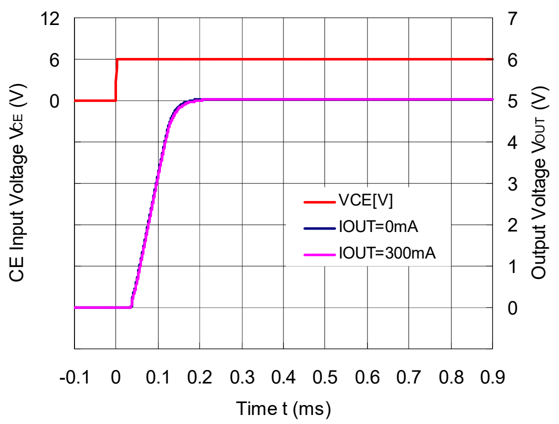
R8155x33xB/D (C2 = 0.1 μF)



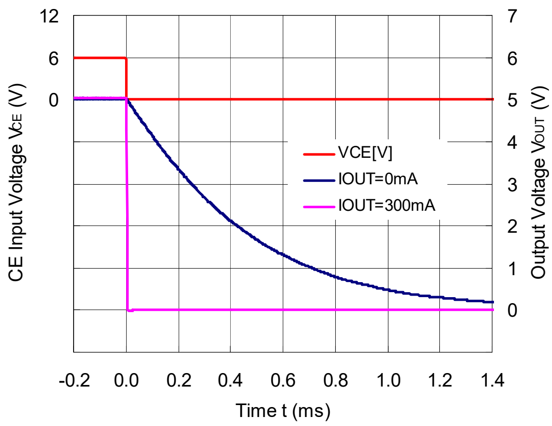
R8155x33xD (C2 = 0.1 μF)



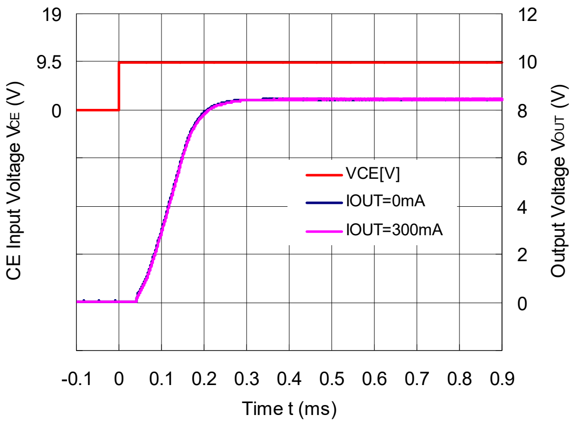
R8155x50xB/D (C2 = 0.1 μF)



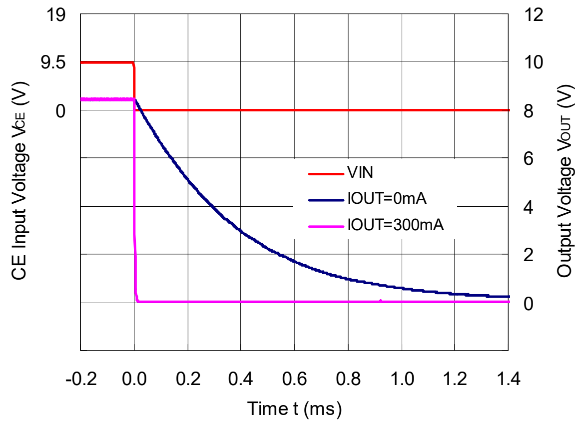
R8155x50xD (C2 = 0.1 μF)



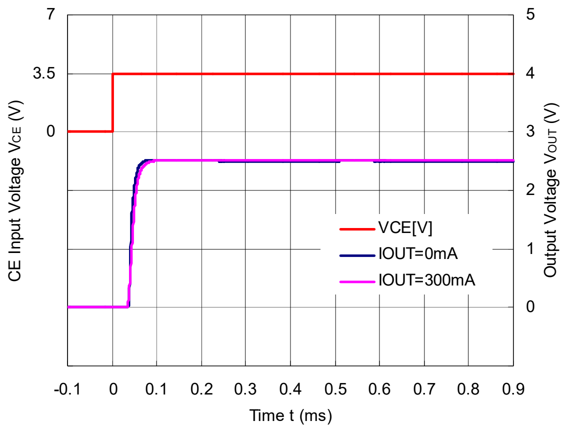
R8155x85xB/D (C2 = 0.1 μF)



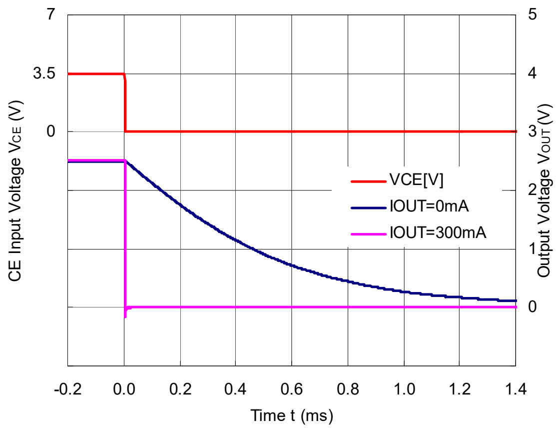
R8155x85xD (C2 = 0.1 μF)



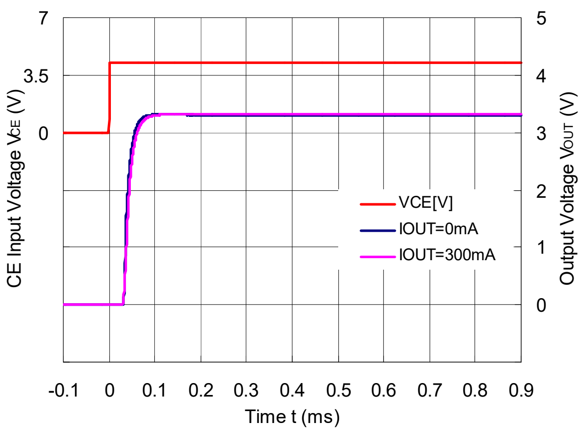
R8155J251E/F (C2 = 0.1 μF, C_D = 1 nF)



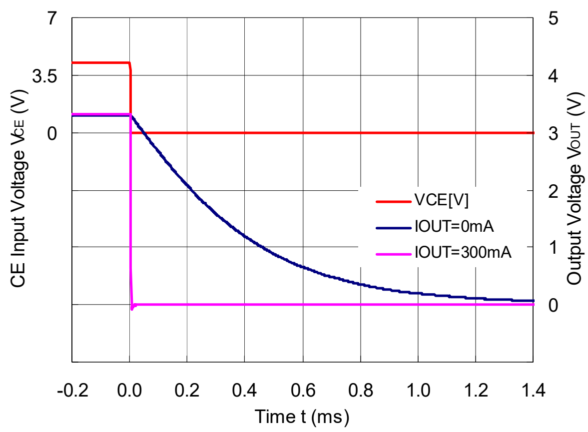
R8155J251F (C2 = 0.1 μF, C_D = 1 nF)



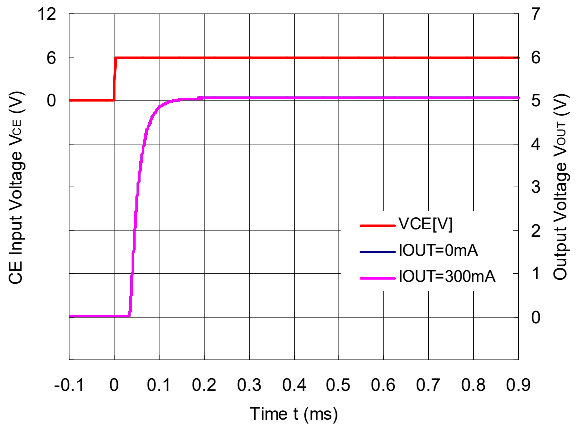
R8155J331E/F (C2 = 0.1 μF, C_D = 1 nF)



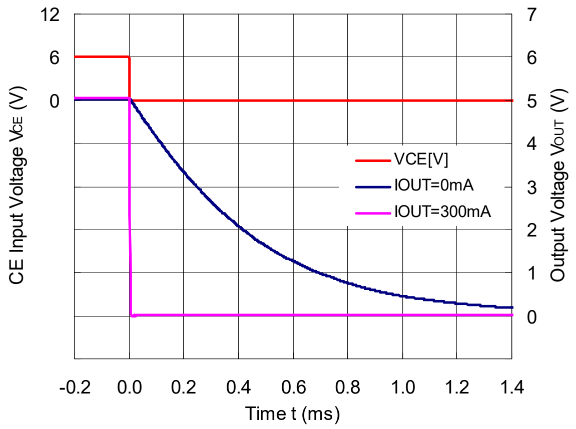
R8155J331F (C2 = 0.1 μF, C_D = 1 nF)



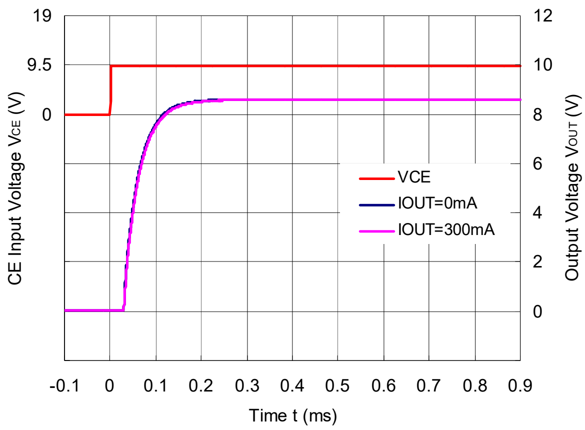
R8155J501E/F (C2 = 0.1 μF, C_D = 1 nF)



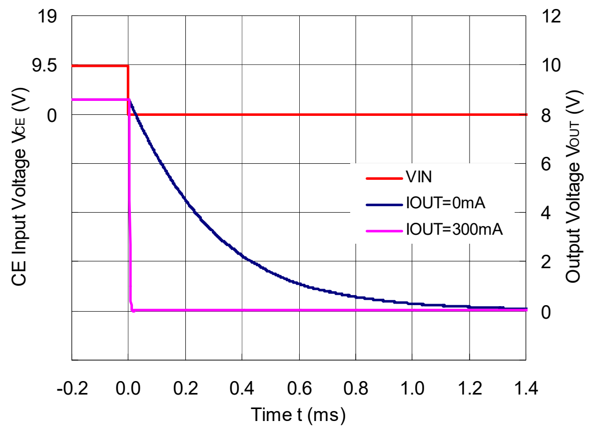
R8155J501F (C2 = 0.1 μF, C_D = 1 nF)



R8155J851E/F (C2 = 0.1 μF, C_D = 1 nF)

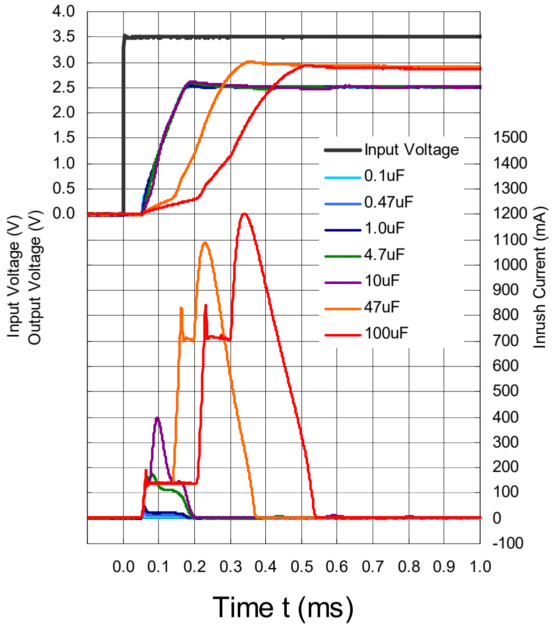


R8155J851F (C2 = 0.1 μF, CD = 1 nF)

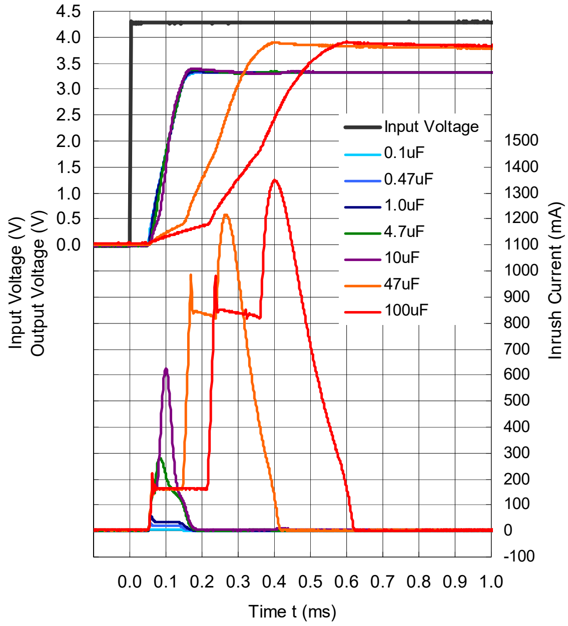


11) Inrush Current Prevention Circuit (Ta = 25°C, I_{OUT} = 1 mA)

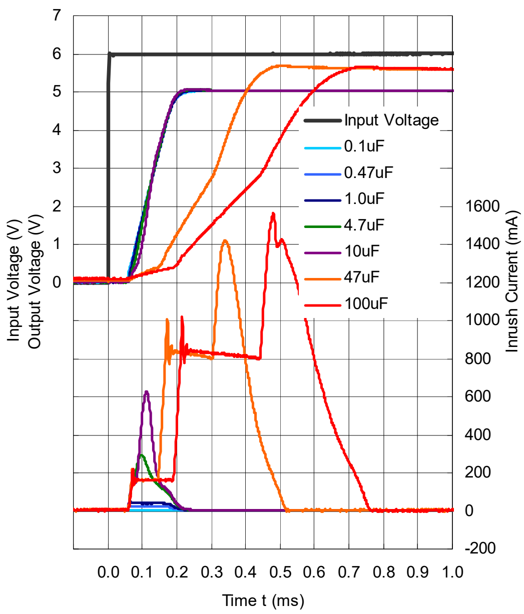
R8155x25xB/D, R8155J001C



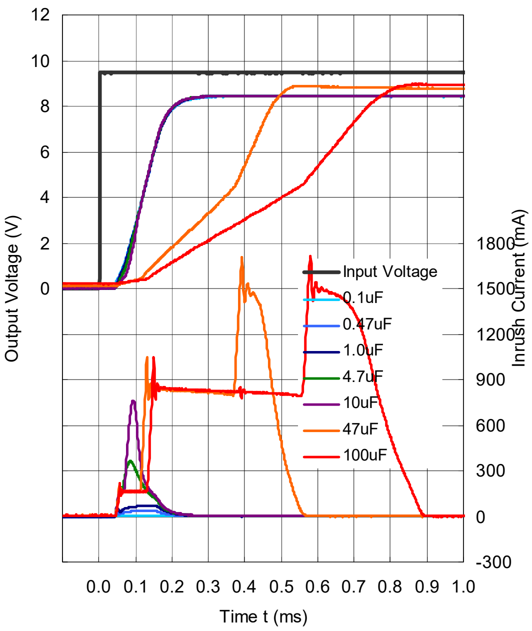
R8155x33xB/D



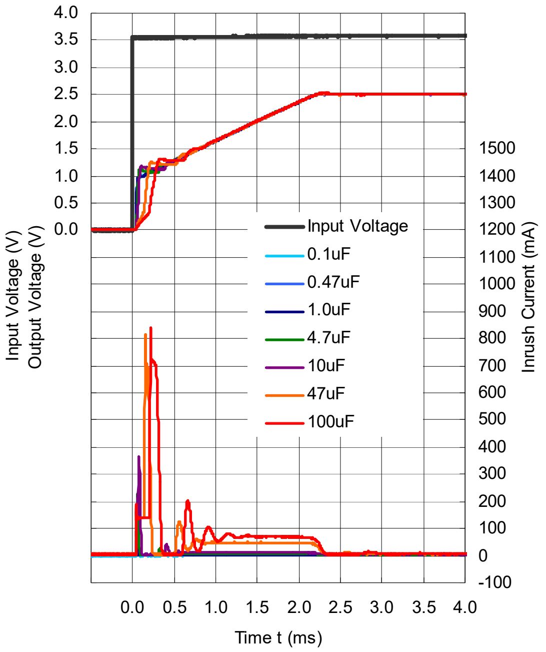
R8155x50xB/D



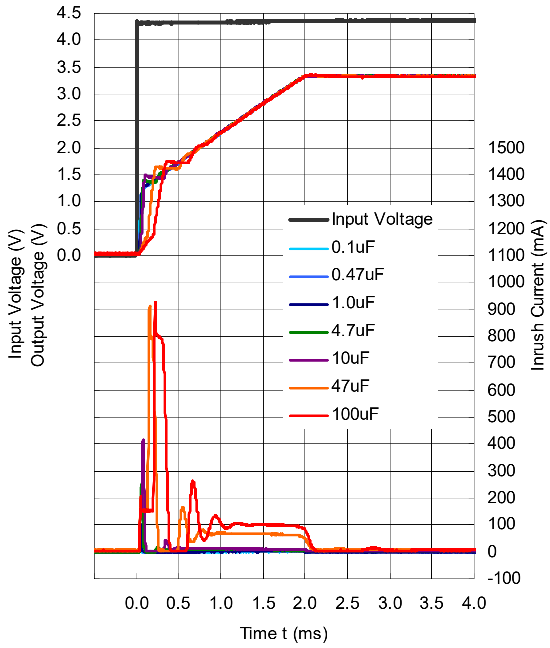
R8155x85xB/D



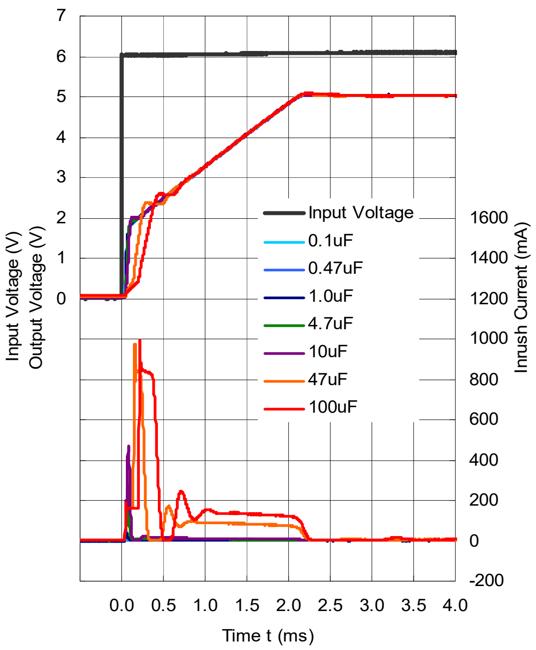
R8155J251E/F (CD = 10 nF)



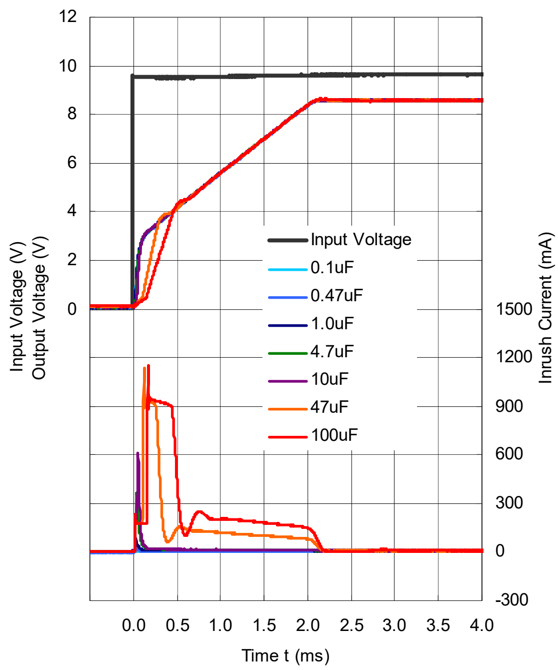
R8155J331E/F (CD = 10 nF)



R8155J501E/F (CD = 10 nF)



R8155J851E/F (CD = 10 nF)

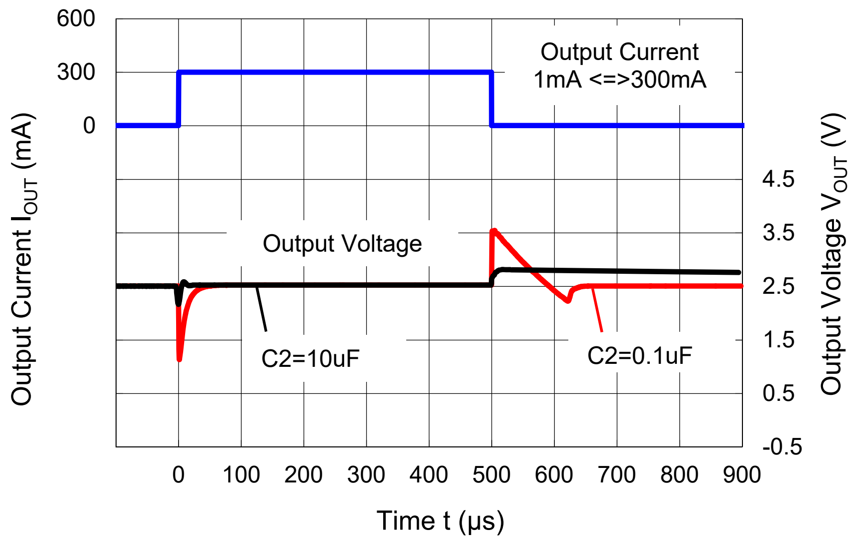


Load Transient vs. Output Capacity (C2)

R8155 performs a stable operation by using 0.1 μF of ceramic capacitor as the output capacitor. However, the variation of output voltage may not meet the demand of the system when input voltage and load current vary. In such cases, the variation of output voltage can be minimized significantly by using 10 μF or higher ceramic capacitor. When using a high-capacity electrolytic capacitor for the output line, place the electrolytic capacitor a few centimeters apart from the IC after arranging the ceramic capacitor close to the IC.

Load Transient Response

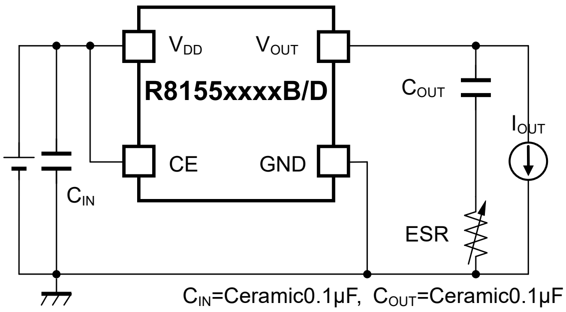
R8155x25xx



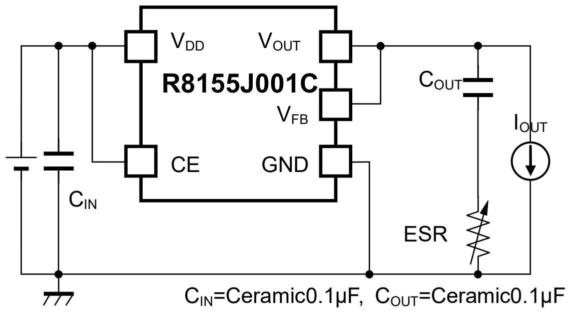
ESR vs. Output Current

It is recommended that a ceramic type capacitor be used for this device. However, other types of capacitors having lower ESR can also be used. The relation between the output current (I_{OUT}) and the ESR of output capacitor is shown below.

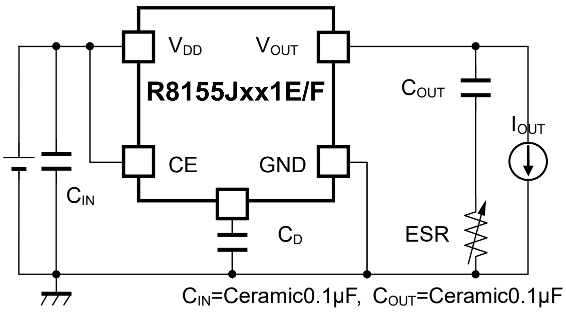
R8155xxxxB/D Test Circuit



R8155J001C Test Circuit



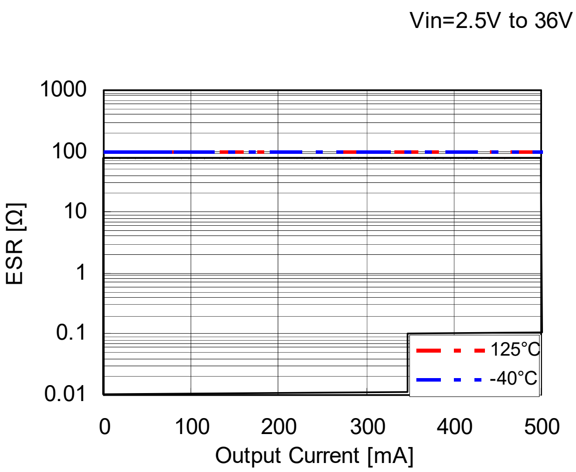
R8155Jxx1E/F Test Circuit



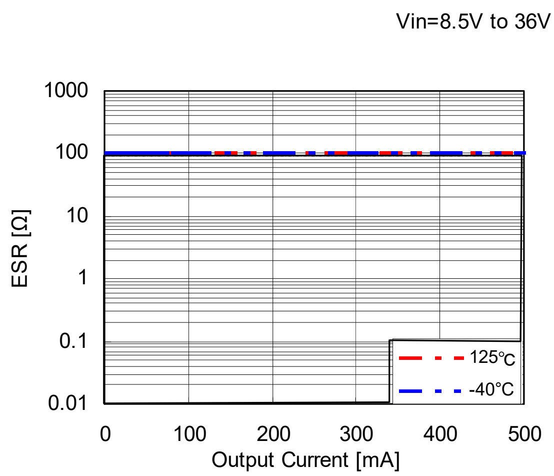
Measurement conditions

Frequency Band: 10 Hz to 2 MHz
Measurement Temperature: −40°C to 125°C
Hatched area: Noise level is 40 µV (average) or below
Ceramic Capacitors: C1 = 0.1 µF, C2 = 0.1 µF

R8155x25xx Output Current I_{OUT} vs. ESR



R8155x85xx Output Current I_{OUT} vs. ESR



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