

OUTLINE

R8154x is a CMOS-based LDO that specifically designed for automotive applications featuring 500 mA output current and 36 V input voltage. In addition to a conventional regulator circuit, R8154x 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 R8154x is very suitable for power source of car accessories.

R8154x supports the internal fixed output voltage type of R8154xxxxB/D/E/F and the adjustable output voltage setting type, which is controlled by external resistances, of R8154J001C. As for the soft-start time, R8154x is fixed internally in R8154xxxxB/D/E/F and is set to 120 μs (Typ). And the soft-start time in R8154Jxx1E/F is adjustable by external capacitors. R8154x supports the auto-discharge function at standby in R8154xxxxD/F.

R8154x 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. 0.35 V ($I_{\text{OUT}} = 500 \text{ mA}$, $V_{\text{OUT}} = 5.0 \text{ V}$)
- Output Voltage Accuracy $\pm 0.8\%$ ($V_{\text{OUT}} \leq 5.0 \text{ V}$)
- Temperature-Drift Coefficient of Output Voltage..... Typ. $\pm 60 \text{ ppm}/^{\circ}\text{C}$ ($-40^{\circ}\text{C} \leq T_a \leq 125^{\circ}\text{C}$)
- 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.
R8154J001C: Adjustable from 2.5 V to 12.0 V
with External Resistors
Feedback Voltage: 2.5 V
- Built-in Short Current Limit Circuit Typ. 75 mA
- Built-in Fold-Back Protection Circuit..... Min. 500 mA
- Built-in Thermal Shutdown Circuit Typ. 160°C
- Built-in Soft-start Circuit Typ. 120 μs
R8154Jxx1E/F: Adjustable Time
with External Capacitors
- Ceramic Capacitors can be used 0.1 μF or more
R8154J001C: 1.0 μF or more

R8154x

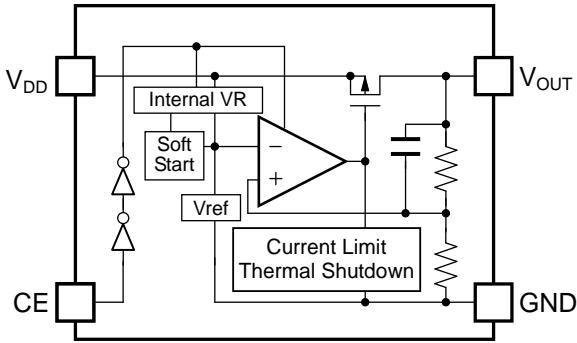
NO. EC-330-180510

APPLICATIONS

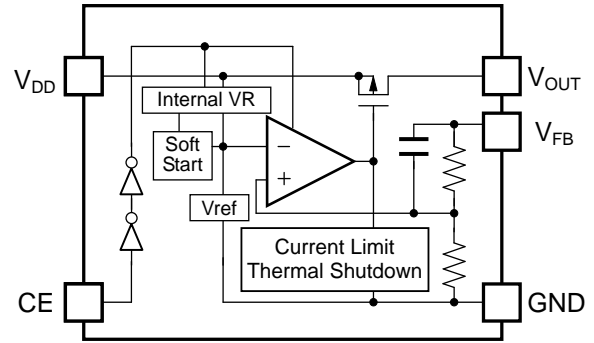
- Power supply for electronic control units such as EV inverter and battery charge control unit.

BLOCK DIAGRAMS

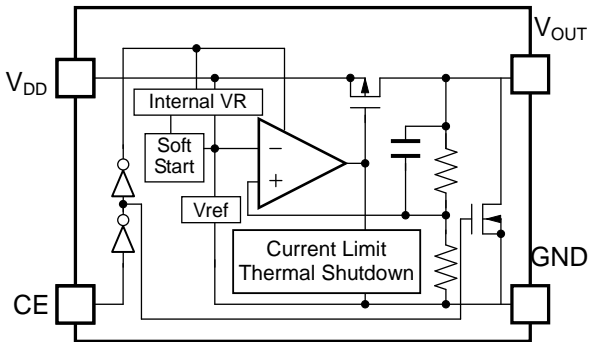
R8154xxxxB



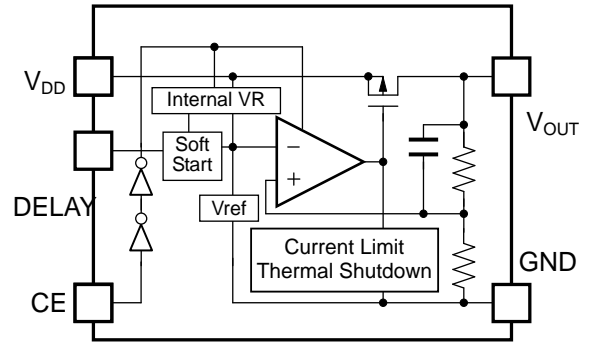
R8154J001C



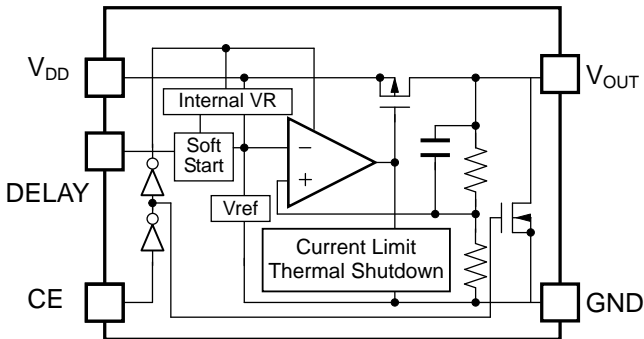
R8154xxxxD



R8154Jxx1E



R8154Jxx1F



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
R8154Sxx2*-E2-FE	HSOP-6J	1,000 pcs	Yes	Yes
R8154Jxx1*-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: R8154J001C-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

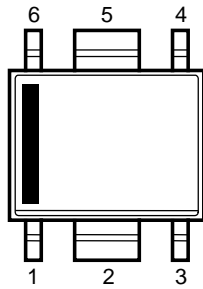
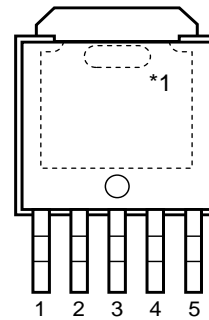
F: Auto-discharge function / Adjustable soft-start time setting

Note: R8154Sxx2*-E2-FE is only for R8154Sxx2B/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	R8154Jxx1B/D
	V _{FB}	Feedback Pin	R8154J001C
	DELAY	Adjustable Soft-start Time Pin	R8154Jxx1E/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 MAXIMUM 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 ≤ 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	
T _j	Junction Temperature		-40 to 150	°C
T _{stg}	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
T _a	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.

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ELECTRICAL CHARACTERISTICS $V_{IN} = V_{SET} + 1.0\text{ V}$, $I_{OUT} = 1\text{ mA}$, $C_{IN} = C_{OUT} = 0.1\text{ }\mu\text{F}$, unless otherwise noted.**R8154xxxxB/D**($-40 \leq T_a \leq 125^\circ\text{C}$)

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit	
V_{OUT}	Output Voltage	$T_a = 25^\circ\text{C}$	$V_{SET} \leq 5.0\text{ V}$	$\times 0.992$		$\times 1.008$	V
			$V_{SET} > 5.0\text{ V}$	$\times 0.99$		$\times 1.01$	V
		$-40^\circ\text{C} \leq T_a \leq 125^\circ\text{C}$	$V_{SET} \leq 5.0\text{ V}$	$\times 0.982$		$\times 1.018$	V
			$V_{SET} > 5.0\text{ V}$	$\times 0.98$		$\times 1.02$	V
$\Delta V_{OUT} / \Delta I_{OUT}$	Load Regulation	$V_{IN} = V_{SET} + 2.0\text{ V}$ $1\text{ mA} \leq I_{OUT} \leq 250\text{ mA}$	-15	3	25	mV	
		$V_{IN} = V_{SET} + 2.0\text{ V}$ $1\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	-25	5	40	mV	
V_{DIF}	Dropout Voltage	$I_{OUT} = 500\text{ mA}$	Refer to the <i>Product-specific Electrical Characteristics</i> .				
I_{SS}	Supply Current	$I_{OUT} = 0\text{ mA}$		18	36	μA	
$I_{standby}$	Standby Current	$V_{CE} = 0\text{ V}$		0.1	2.0	μA	
$\Delta V_{OUT} / \Delta V_{IN}$	Line Regulation	$V_{SET} + 0.5\text{ V} \leq V_{IN} \leq 36\text{ V}$, if $V_{IN} \leq 3.5\text{ V}$		0.01	0.02	%/V	
I_{LIM}	Output Current Limit	$V_{IN} = V_{SET} + 2.0\text{ V}$	500	750	1000	mA	
I_{SC}	Short Current Limit	$V_{OUT} = 0\text{ V}$	50	75	100	mA	
I_{PD}	CE Pull-down Current	$V_{CE} = 5\text{ V}$		0.2	0.6	μA	
		$V_{CE} = 36\text{ V}$		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		$^\circ\text{C}$	
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature	125	135		$^\circ\text{C}$	
R_{LOW}	Low Output Nch Tr. ON Resistance (R8154xxxxD)	$V_{IN} = 14.0\text{ V}$, $V_{CE} = 0\text{ V}$	1.0	3.2	5.0	k Ω	

$V_{IN} = V_{SET} + 1.0 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $C_{IN} = 0.1 \text{ }\mu\text{F}$, $C_{OUT} = 1.0 \text{ }\mu\text{F}$, unless otherwise noted.

R8154J001C

($-40 \leq T_a \leq 125^\circ\text{C}$)

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
V_{FB}	Feedback Voltage	$T_a = 25^\circ\text{C}$	2.480		2.520	V
		$-40^\circ\text{C} \leq T_a \leq 125^\circ\text{C}$	2.455		2.545	V
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$	Load Regulation	$V_{IN} = V_{SET} + 2.0 \text{ V}$ $1 \text{ mA} \leq I_{OUT} \leq 250 \text{ mA}$	-10	3	10	mV
		$V_{IN} = V_{SET} + 2.0 \text{ V}$ $1 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$	-20	5	20	mV
V_{DIF}	Dropout Voltage	$V_{SET} = V_{FB}$, $I_{OUT} = 500 \text{ mA}$			1.0	V
I_{SS}	Supply Current	$I_{OUT} = 0 \text{ mA}$		18	36	μA
Istandby	Standby Current	$V_{CE} = 0 \text{ V}$		0.1	2.0	μA
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	Line Regulation	$V_{SET} = V_{FB}$, $3.5 \text{ V} \leq V_{IN} \leq 36 \text{ V}$		0.01	0.02	%/V
I_{LIM}	Output Current Limit	$V_{IN} = V_{SET} + 2.0 \text{ V}$	500	750	1000	mA
I_{SC}	Short Current Limit	$V_{OUT} = V_{FB} = 0 \text{ V}$	50	75	100	mA
I_{PD}	CE Pull-down Current	$V_{CE} = 5 \text{ V}$		0.2	0.6	μA
		$V_{CE} = 36 \text{ V}$		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		$^\circ\text{C}$
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature	125	135		$^\circ\text{C}$

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 $V_{IN} = V_{SET} + 1.0 \text{ V}$, $I_{OUT} = 1 \text{ mA}$, $C_{IN} = C_{OUT} = 0.1 \mu\text{F}$, unless otherwise noted.**R8154Jxx1E/F**($-40 \leq T_a \leq 125^\circ\text{C}$)

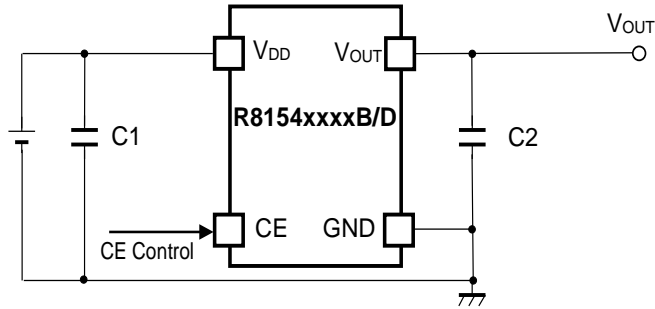
Symbol	Item	Conditions	Min.	Typ.	Max.	Unit	
V_{OUT}	Output Voltage	$T_a = 25^\circ\text{C}$	$V_{SET} \leq 5.0 \text{ V}$	$\times 0.992$		$\times 1.008$	V
			$V_{SET} > 5.0 \text{ V}$	$\times 0.99$		$\times 1.01$	V
		$-40^\circ\text{C} \leq T_a \leq 125^\circ\text{C}$	$V_{SET} \leq 5.0 \text{ V}$	$\times 0.982$		$\times 1.018$	V
			$V_{SET} > 5.0 \text{ V}$	$\times 0.98$		$\times 1.02$	V
$\Delta V_{OUT} / \Delta I_{OUT}$	Load Regulation	$V_{IN} = V_{SET} + 2.0 \text{ V}$ $1 \text{ mA} \leq I_{OUT} \leq 250 \text{ mA}$	-15	3	25	mV	
		$V_{IN} = V_{SET} + 2.0 \text{ V}$ $1 \text{ mA} \leq I_{OUT} \leq 500 \text{ mA}$	-25	5	40	mV	
V_{DIF}	Dropout Voltage	$I_{OUT} = 500 \text{ mA}$	Refer to the <i>Product-specific Electrical Characteristics</i> .				
I_{SS}	Supply Current	$I_{OUT} = 0 \text{ mA}$		18	36	μA	
$I_{standby}$	Standby Current	$V_{CE} = 0 \text{ V}$		0.1	2.0	μA	
$\Delta V_{OUT} / \Delta V_{IN}$	Line Regulation	$V_{SET} + 0.5 \text{ V} \leq V_{IN} \leq 36 \text{ V}$, if $V_{IN} \leq 3.5 \text{ V}$		0.01	0.02	%/V	
V_{IN}	Input Voltage		3.5		36	V	
I_{LIM}	Output Current Limit	$V_{IN} = V_{SET} + 2.0 \text{ V}$	500	750	1000	mA	
I_{SC}	Short Current Limit	$V_{OUT} = 0 \text{ V}$	50	75	100	mA	
I_{PD}	CE Pull-down Current	$V_{CE} = 5 \text{ V}$		0.2	0.6	μA	
		$V_{CE} = 36 \text{ V}$		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		$^\circ\text{C}$	
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature	125	135		$^\circ\text{C}$	
R_{LOW}	Low Output Nch Tr. ON Resistance (R8154Jxx1F)	$V_{IN} = 14.0 \text{ V}$, $V_{CE} = 0 \text{ V}$	1.0	3.2	5.0	k Ω	

R8154xxxxB/D,R8154Jxx1E/F Product-specific Electrical Characteristics

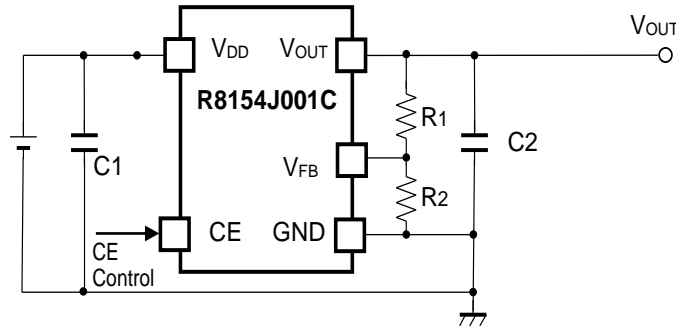
(-40 ≤ Ta ≤ 125°C)

Product Name	VOUT (V) (Ta = 25°C)			VOUT (V) (-40°C ≤ Ta ≤ 125°C)			VDIF (V) (IOUT = 500 mA)	
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	TYP.	MAX.
R8154x25xx	2.480	2.500	2.520	2.455	2.500	2.545	/	1.00
R8154x28xx	2.778	2.800	2.822	2.750	2.800	2.850		
R8154x30xx	2.976	3.000	3.024	2.946	3.000	3.054		
R8154x33xx	3.274	3.300	3.326	3.241	3.300	3.359	0.45	0.77
R8154x34xx	3.373	3.400	3.427	3.339	3.400	3.461		
R8154x50xx	4.960	5.000	5.040	4.910	5.000	5.090	0.35	0.62
R8154x60xx	5.940	6.000	6.060	5.880	6.000	6.120		
R8154x80xx	7.920	8.000	8.080	7.840	8.000	8.160		
R8154x85xx	8.415	8.500	8.585	8.330	8.500	8.670	0.30	0.50
R8154x90xx	8.910	9.000	9.090	8.820	9.000	9.180		

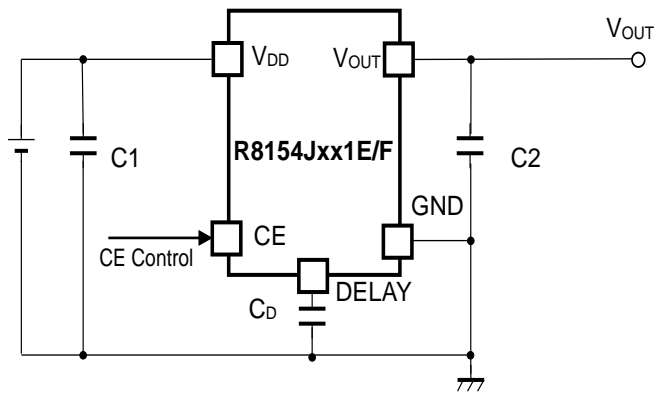
TYPICAL APPLICATION



R8154Jxx1B/D Typical Application



R8154J001C Typical Application

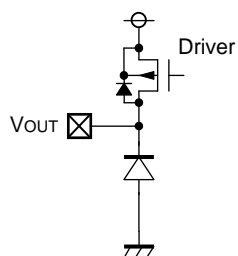


R8154Jxx1E/F Typical Application

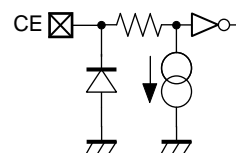
External Part Examples :

R8154xxxxB//D/E/F	
C1	0.1μF (Ceramic)
C2	0.1μF (Ceramic)
R8154J001C	
C1	0.1μF (Ceramic)
C2	1.0μF (Ceramic)

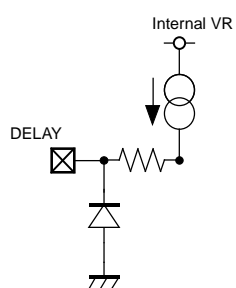
PIN EQUIVALENT CIRCUIT DIAGRAMS



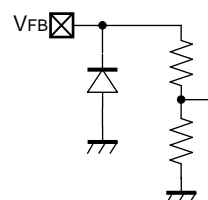
Vout Pin



CE Pin



DELAY Pin (R8154Jxx1E/F)



VFB Pin (R8154J001C)

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 (R8154xxxxB/D/E/F), 1.0 μF or more (R8154J001C) 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.

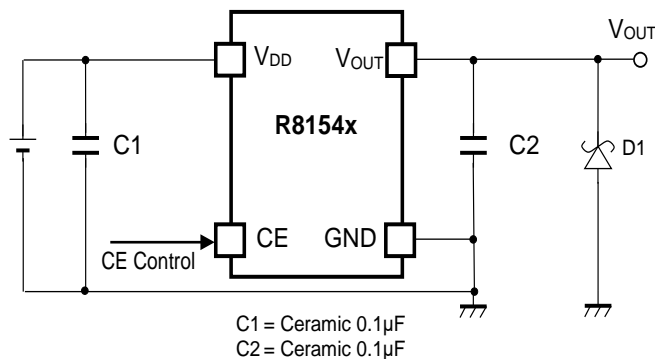
For the externally adjustable output voltage type (R8154J001C), use 10 k Ω or lower resistance R2.

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.

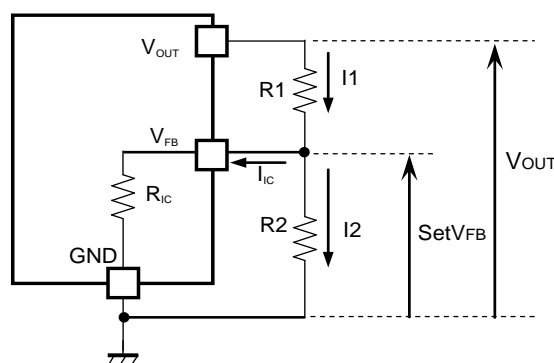
Adjustable Output Voltage Setting (R8154J001C)

The output voltage of R8154J001C 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: $2.5 \text{ V} \leq V_{OUT} \leq 12.0 \text{ V}$

$V_{FB} = 2.5 \text{ V}$



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

R_{IC} of the R8154J001C is approximately Typ. 1.35 M Ω ($T_a=25^\circ\text{C}$, guaranteed by Design Engineering). For better accuracy, setting $R1 \ll R_{IC}$ reduces errors. The resistance value for R2 should be set to 10 k Ω 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.

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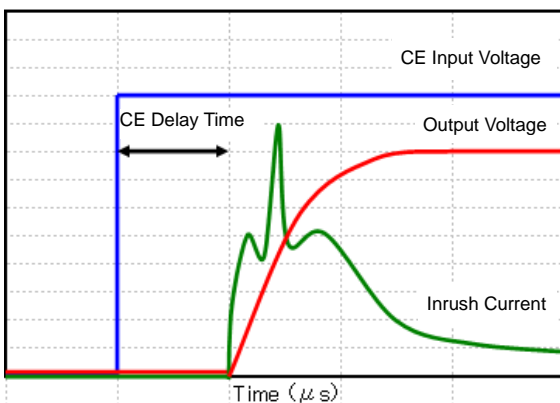
Soft-start Function

R8154x 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 R8154xxxxB/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 R8154Jxx1E/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.

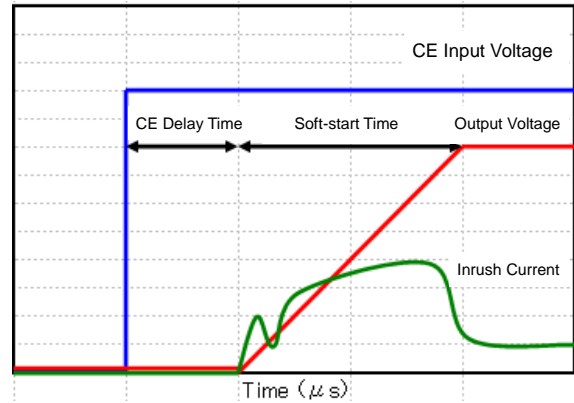
$$t_D = ((C_D + 90 \times 10^{-12}) / I_{\text{DELAY}}) \times 0.73$$

When the capacitor C_D is not used in R8154Jxx1E/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 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.

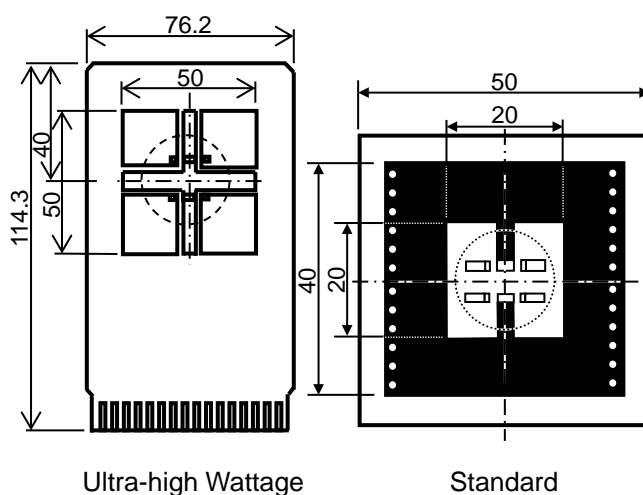
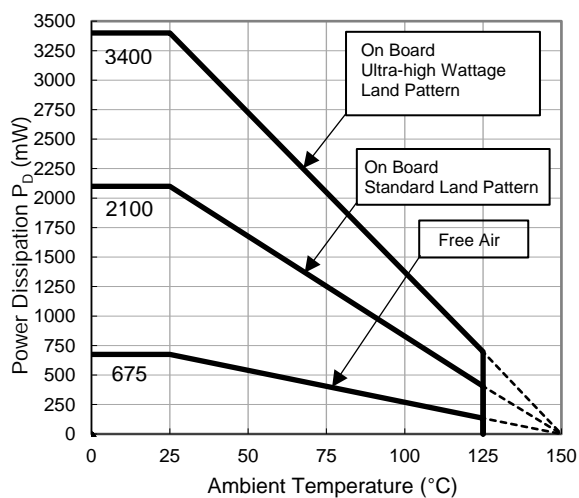
Measurement Conditions

	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

($T_a = 25^\circ\text{C}$, $T_{j\text{max}} = 150^\circ\text{C}$)

	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

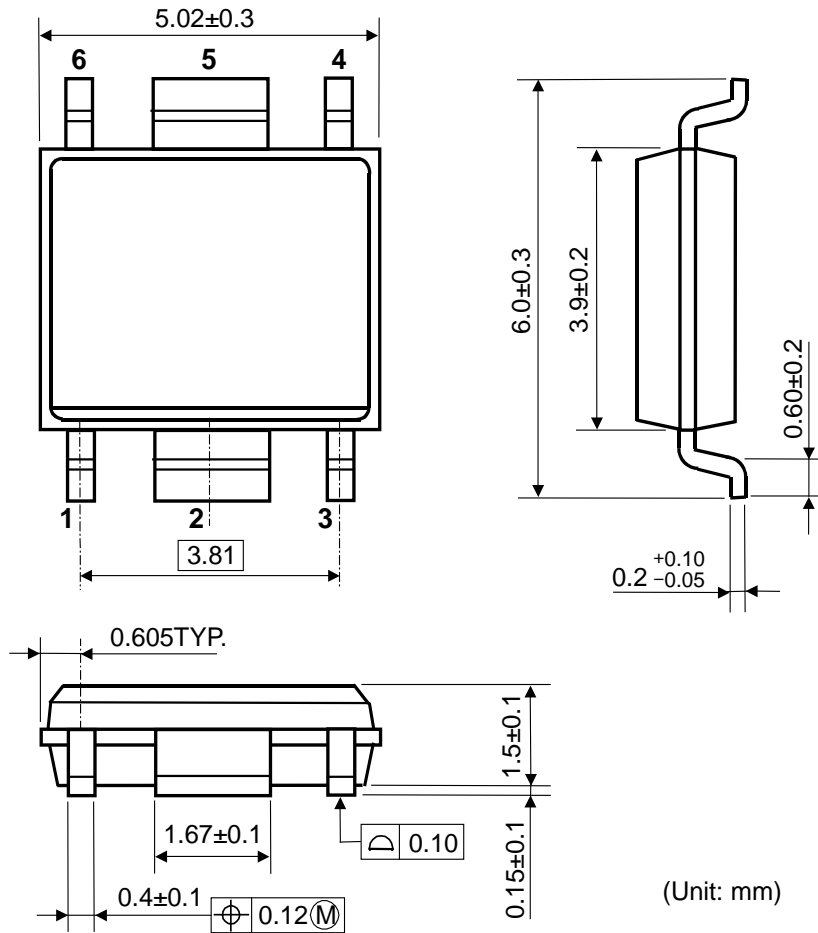


○ IC Mount Area (mm)

Power Dissipation vs. Ambient Temperature

Measurement Board Pattern

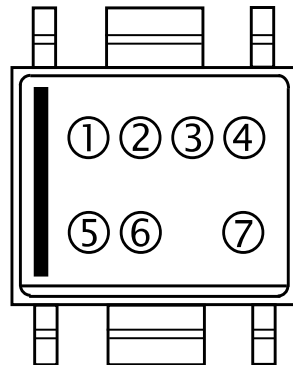
PACKAGE DIMENSIONS (HSOP-6J)



HSOP-6J Package Dimensions

MARK SPECIFICATION (HSOP-6J)

- ①②③④: Product Code ... Refer to R8154S MARK SPECIFICATION TABLE
- ⑤⑥: Lot Number ... Alphanumeric Serial Number
- ⑦: Lot Sub Number ... Alphanumeric Serial Number



HSOP-6J Mark Specification

R8154S MARK SPECIFICATION TABLE (HSOP-6J)**R8154Sxx2B**

Product Name	①②③④	V_{SET}
R8154S252B	X 2 5 B	2.5 V
R8154S282B	X 2 8 B	2.8 V
R8154S302B	X 3 0 B	3.0 V
R8154S332B	X 3 3 B	3.3 V
R8154S342B	X 3 4 B	3.4 V
R8154S502B	X 5 0 B	5.0 V
R8154S602B	X 6 0 B	6.0 V
R8154S802B	X 8 0 B	8.0 V
R8154S852B	X 8 5 B	8.5 V
R8154S902B	X 9 0 B	9.0 V

R8154Sxx2D

Product Name	①②③④	V_{SET}
R8154S252D	X 2 5 D	2.5 V
R8154S282D	X 2 8 D	2.8 V
R8154S302D	X 3 0 D	3.0 V
R8154S332D	X 3 3 D	3.3 V
R8154S342D	X 3 4 D	3.4 V
R8154S502D	X 5 0 D	5.0 V
R8154S602D	X 6 0 D	6.0 V
R8154S802D	X 8 0 D	8.0 V
R8154S852D	X 8 5 D	8.5 V
R8154S902D	X 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:

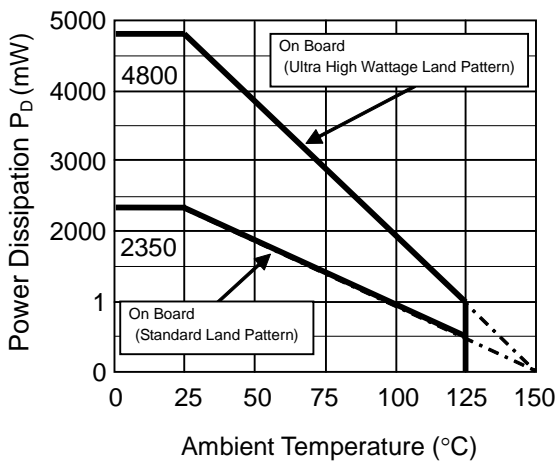
Measurement Conditions

	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

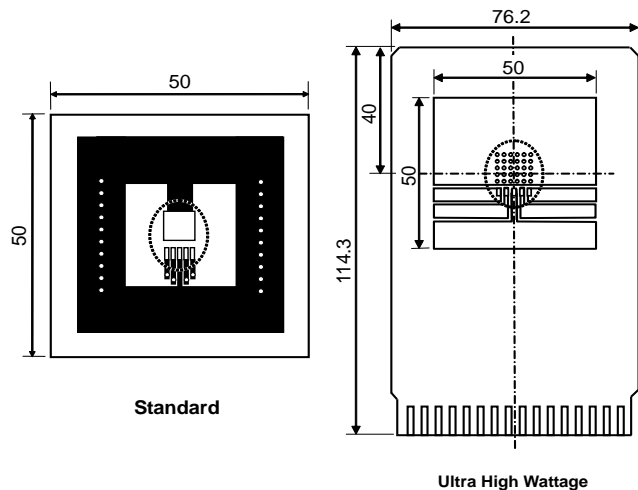
($T_a = 25^\circ\text{C}$, $T_{j\text{max}} = 150^\circ\text{C}$)

	Ultra High Wattage Land Pattern	Standard Land Pattern
Power Dissipation	4800 mW	2350 mW
Thermal Resistance	$\theta_{ja} = (150-25^\circ\text{C})/4.8 \text{ W} = 26^\circ\text{C/W}$	$\theta_{ja} = (150-25^\circ\text{C})/2.35 \text{ W} = 53^\circ\text{C/W}$
	$\theta_{jc} = 7^\circ\text{C/W}$	$\theta_{jc} = 17^\circ\text{C/W}$



Power Dissipation

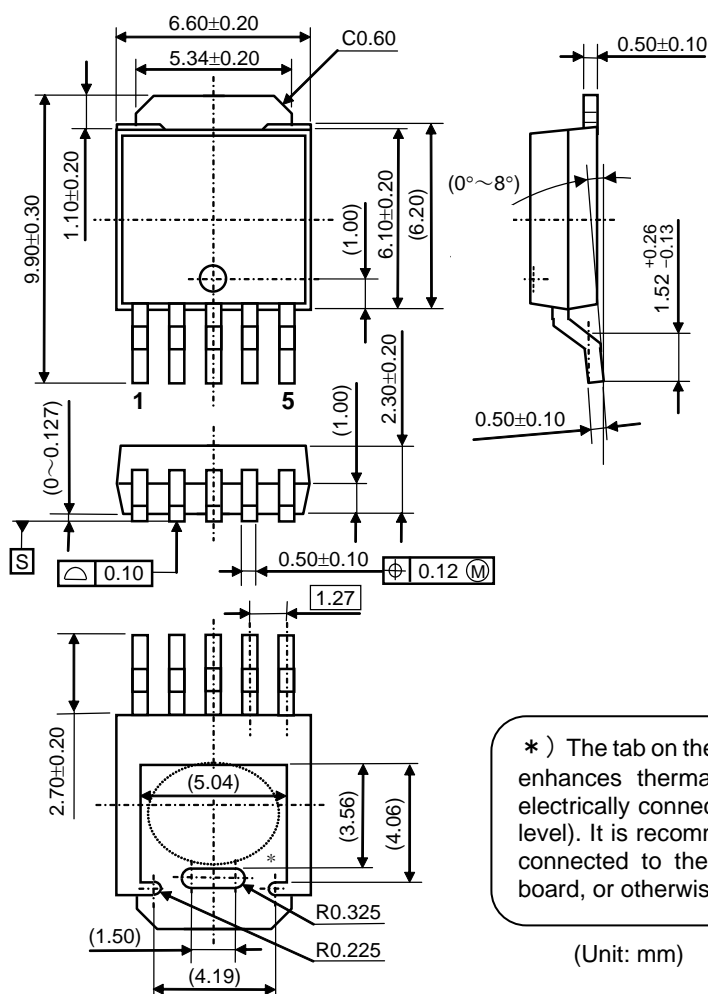
Power Dissipation vs. Ambience Temperature



IC Mount Area (Unit: mm)

Measurement Board Pattern

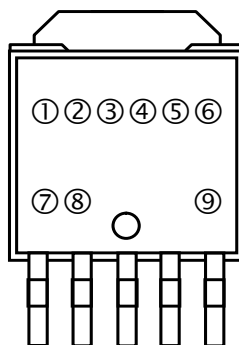
PACKAGE DIMENSIONS (TO-252-5-P2)



TO-252-5-P2 Package Dimensions

MARK SPECIFICATION (TO-252-5-P2)

- ①②③④⑤⑥: Product Code ... **Refer to R8154J MARK SPECIFICATION TABLE**
- ⑦⑧: Lot Number ... Alphanumeric Serial Number
- ⑨: Lot Sub Number ... Alphanumeric Serial Number



TO-252-5-P2 Mark Specification

R8154x

NO. EC-330-180510

R8154J MARK SPECIFICATION TABLE (TO-252-5-P2)**R8154Jxx1B**

Product Name	①②③④⑤⑥	V _{SET}
R8154J251B	M 1 J 2 5 1	2.5 V
R8154J281B	M 1 J 2 8 1	2.8 V
R8154J301B	M 1 J 3 0 1	3.0 V
R8154J331B	M 1 J 3 3 1	3.3 V
R8154J341B	M 1 J 3 4 1	3.4 V
R8154J501B	M 1 J 5 0 1	5.0 V
R8154J601B	M 1 J 6 0 1	6.0 V
R8154J801B	M 1 J 8 0 1	8.0 V
R8154J851B	M 1 J 8 5 1	8.5 V
R8154J901B	M 1 J 9 0 1	9.0 V

R8154J001C (Adjustable Output Voltage Setting Type)

Product Name	①②③④⑤⑥	V _{SET}
R8154J001C	M 3 J 0 0 1	—

R8154Jxx1D

Product Name	①②③④⑤⑥	V _{SET}
R8154J251D	M 2 J 2 5 1	2.5 V
R8154J281D	M 2 J 2 8 1	2.8 V
R8154J301D	M 2 J 3 0 1	3.0 V
R8154J331D	M 2 J 3 3 1	3.3 V
R8154J341D	M 2 J 3 4 1	3.4 V
R8154J501D	M 2 J 5 0 1	5.0 V
R8154J601D	M 2 J 6 0 1	6.0 V
R8154J801D	M 2 J 8 0 1	8.0 V
R8154J851D	M 2 J 8 5 1	8.5 V
R8154J901D	M 2 J 9 0 1	9.0 V

R8154Jxx1E

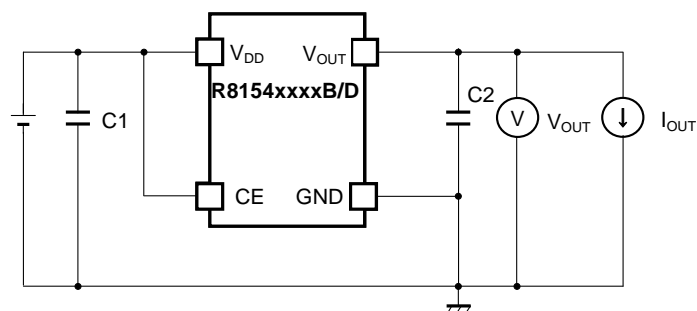
Product Name	①②③④⑤⑥	V _{SET}
R8154J251E	M 4 J 2 5 1	2.5 V
R8154J281E	M 4 J 2 8 1	2.8 V
R8154J301E	M 4 J 3 0 1	3.0 V
R8154J331E	M 4 J 3 3 1	3.3 V
R8154J341E	M 4 J 3 4 1	3.4 V
R8154J501E	M 4 J 5 0 1	5.0 V
R8154J601E	M 4 J 6 0 1	6.0 V
R8154J801E	M 4 J 8 0 1	8.0 V
R8154J851E	M 4 J 8 5 1	8.5 V
R8154J901E	M 4 J 9 0 1	9.0 V

R8154Jxx1F

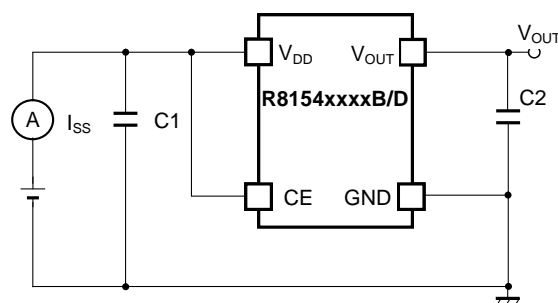
Product Name	①②③④⑤⑥	V _{SET}
R8154J251F	M 5 J 2 5 1	2.5 V
R8154J281F	M 5 J 2 8 1	2.8 V
R8154J301F	M 5 J 3 0 1	3.0 V
R8154J331F	M 5 J 3 3 1	3.3 V
R8154J341F	M 5 J 3 4 1	3.4 V
R8154J501F	M 5 J 5 0 1	5.0 V
R8154J601F	M 5 J 6 0 1	6.0 V
R8154J801F	M 5 J 8 0 1	8.0 V
R8154J851F	M 5 J 8 5 1	8.5 V
R8154J901F	M 5 J 9 0 1	9.0 V

TEST CIRCUITS

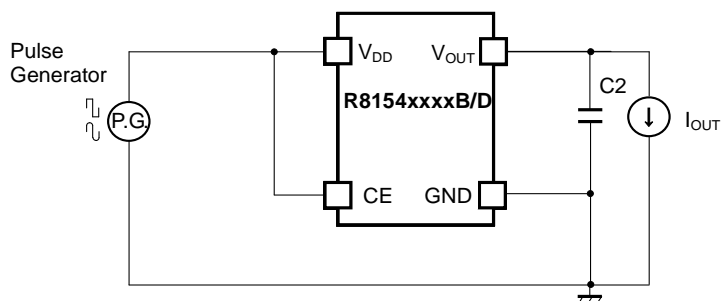
Soft-start: Internally Fixed Type (R8154xxxxB/D)



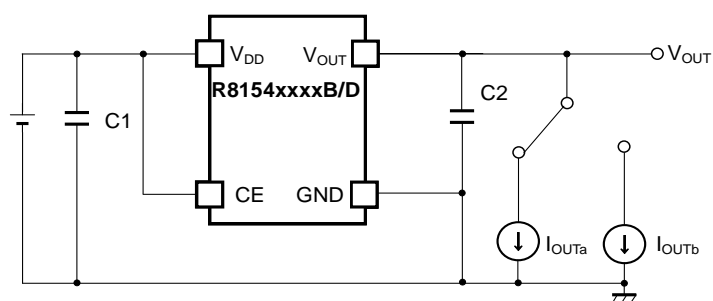
R8154xxxxB/D Basic Test Circuit



R8154xxxxB/D Supply Current Test Circuit

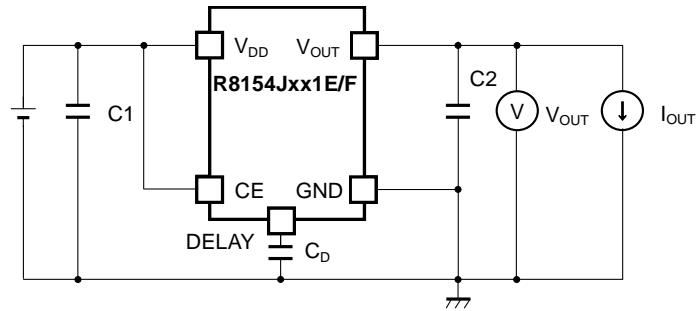


R8154xxxxB/D Ripple Rejection Test Circuit

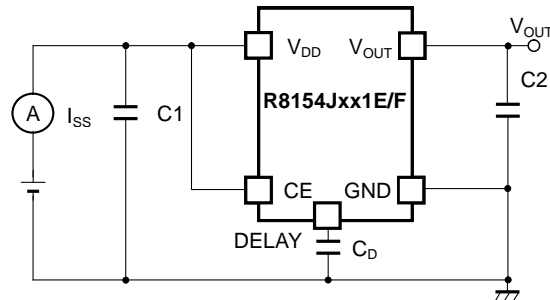


R8154xxxxB/D Load Transient Response Test Circuit

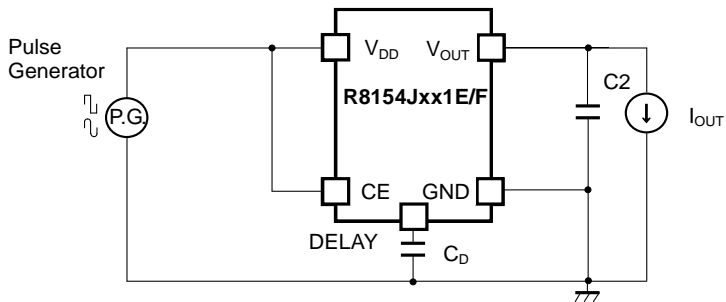
Adjustable Soft-start Setting Type (R8154Jxx1E/F)



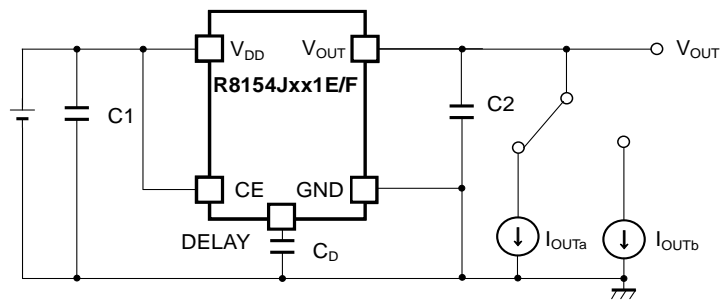
R8154Jxx1E/F Basic Test Circuit



R8154Jxx1E/F Supply Current Test Circuit



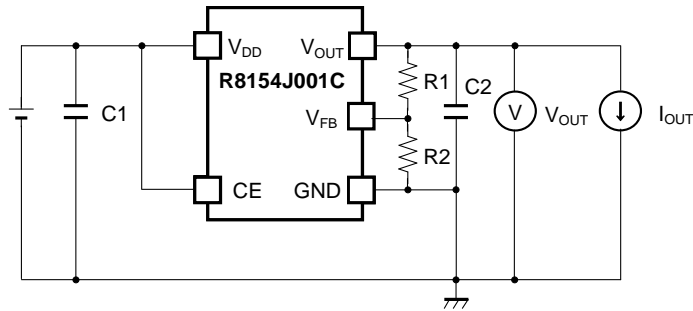
R8154Jxx1E/F Ripple Rejection Test Circuit



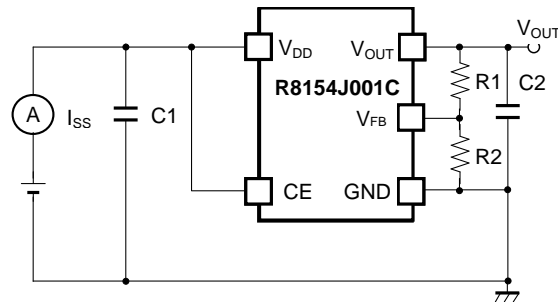
R8154Jxx1E/F Load Transient Response Test Circuit

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

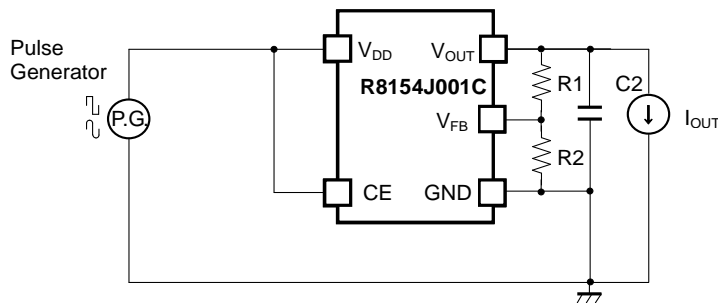
Adjustable Output Voltage Setting Type (R8154J001C)



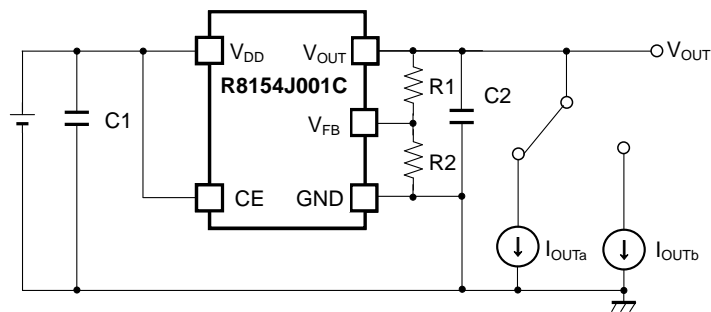
R8154J001C Basic Test Circuit



R8154J001C Supply Current Test Circuit



R8154J001C Ripple Rejection Test Circuit



R8154J001C Load Transient Response Test Circuit

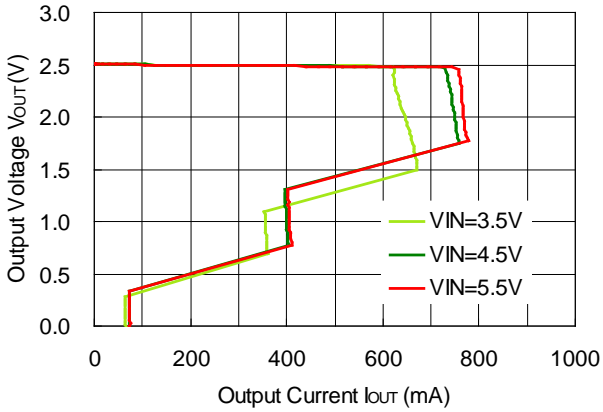
Note: Refer to *Adjustable Output Voltage Setting* for R1 and R2.

TYPICAL CHARACTERISTICS

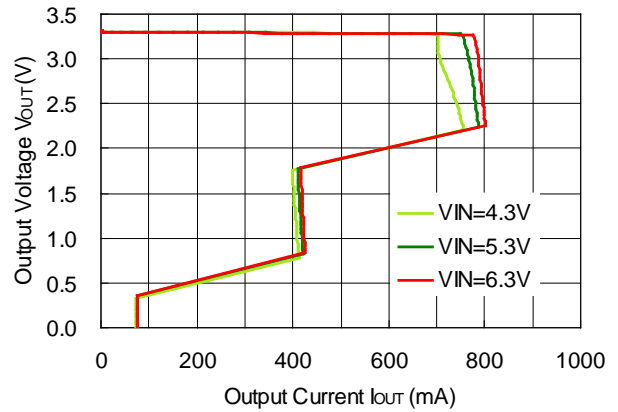
Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

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

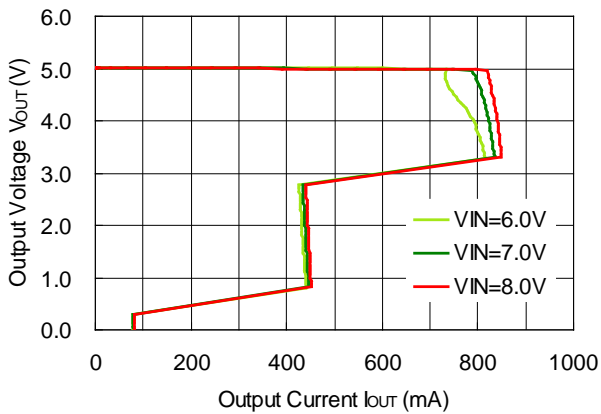
R8154x25xx, R8154J001C



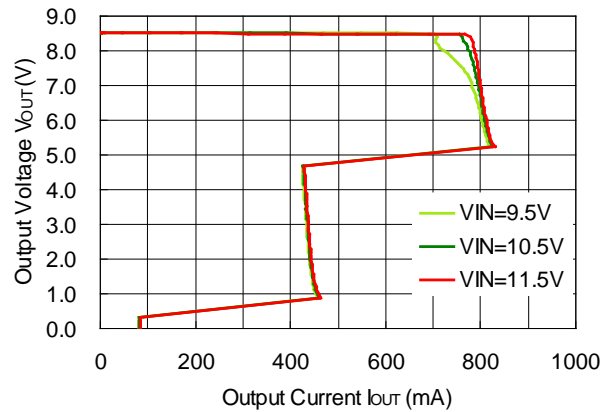
R8154x33xx



R8154x50xx

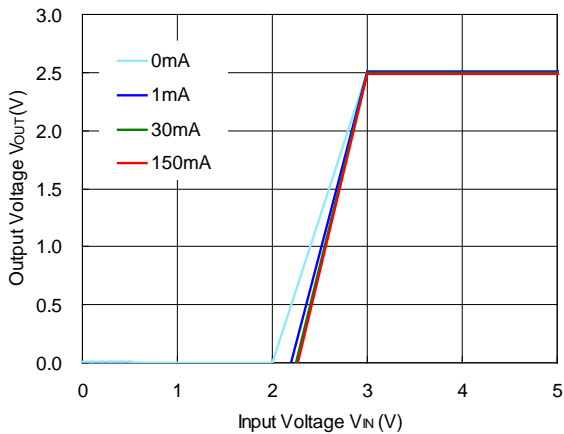


R8154x85xx

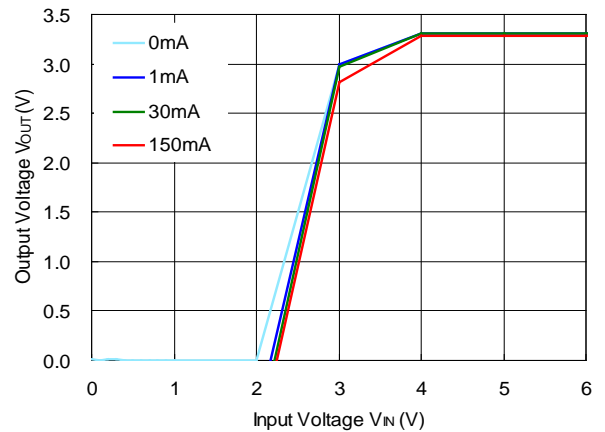


2) Output Voltage vs. Input Voltage (Ta = 25°C)

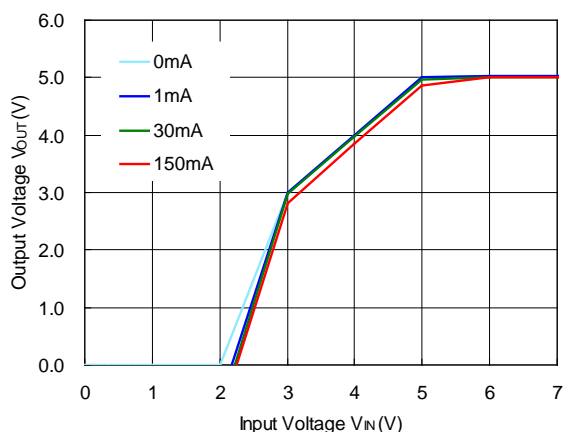
R8154x25xx



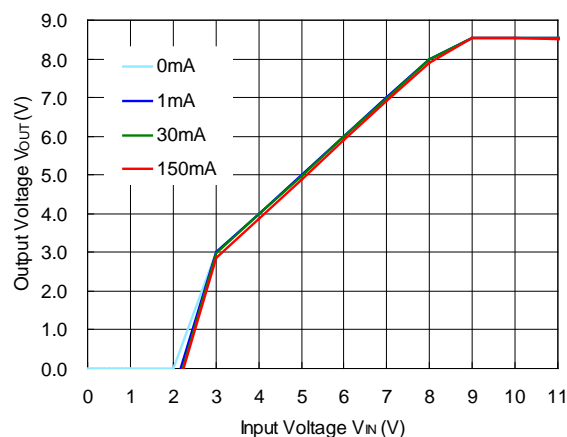
R8154x33xx



R8154x50xx

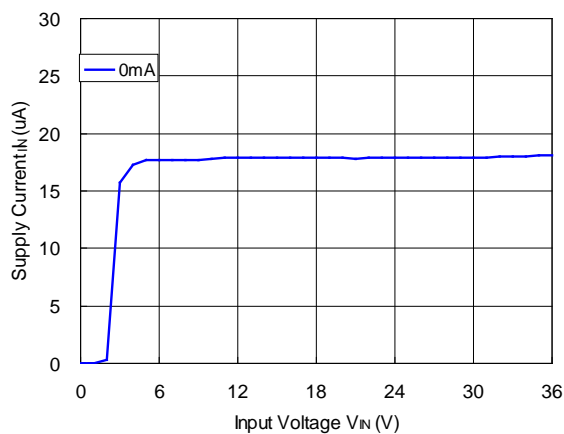


R8154x85xx

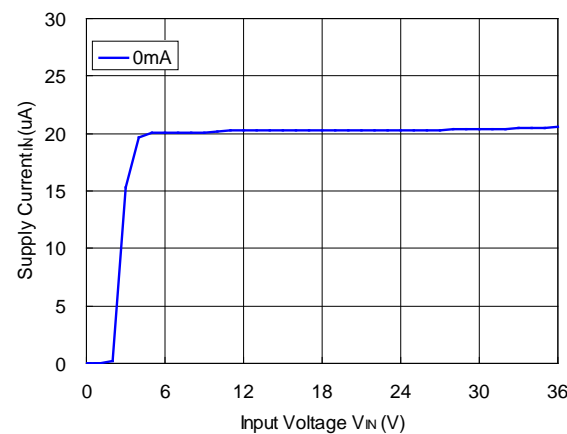


3) Supply Current vs. Input Voltage

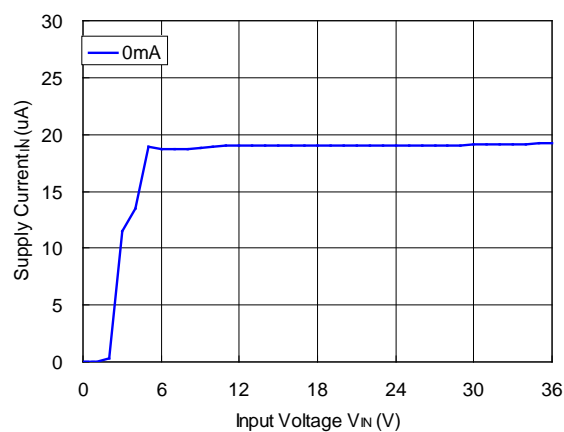
R8154x25xx, R8154J001C



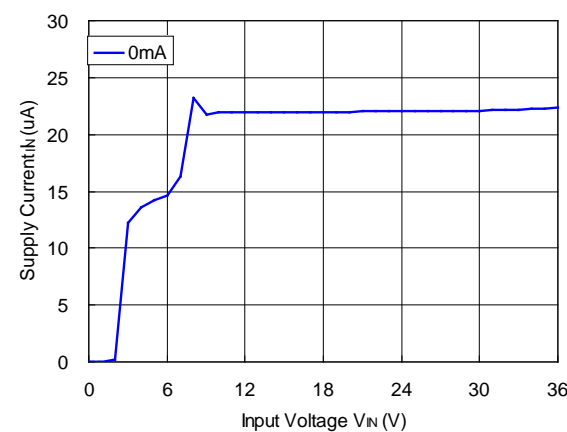
R8154x33xx



R8154x50xx



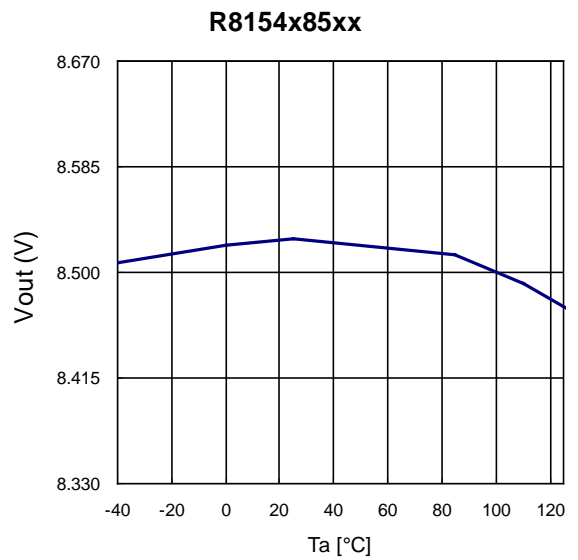
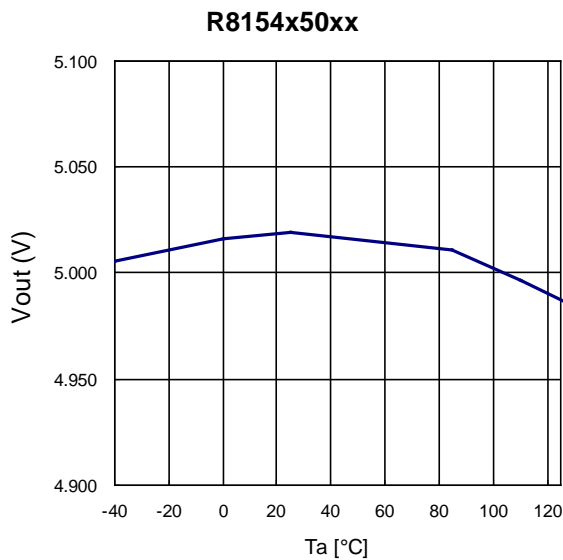
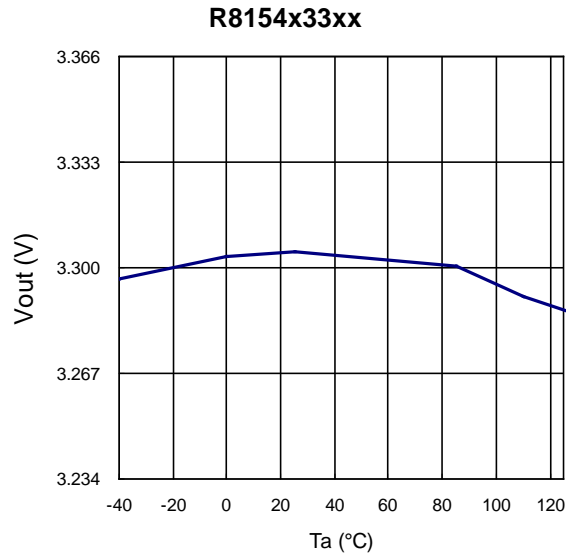
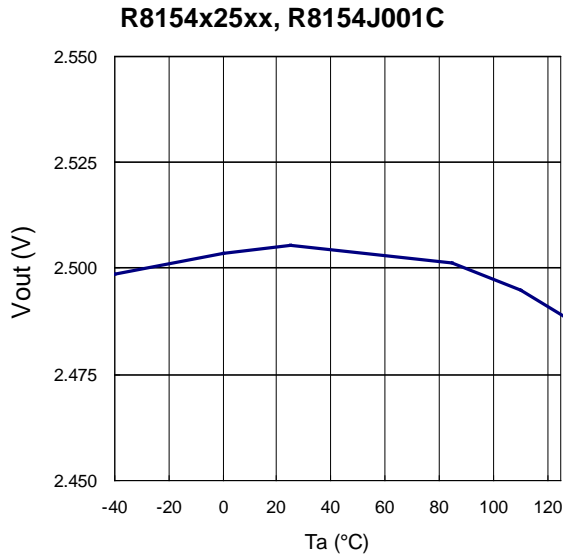
R8154x85xx



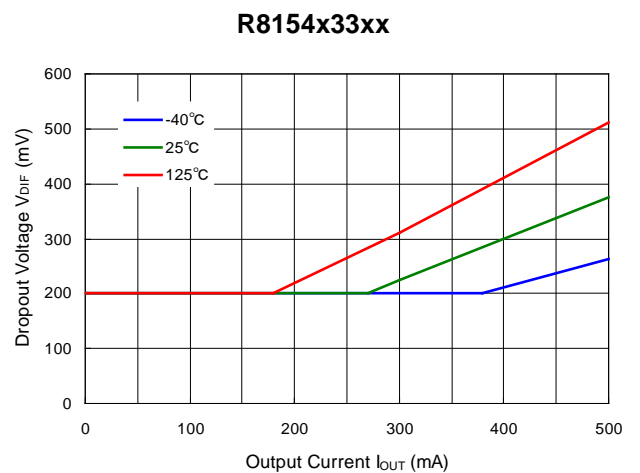
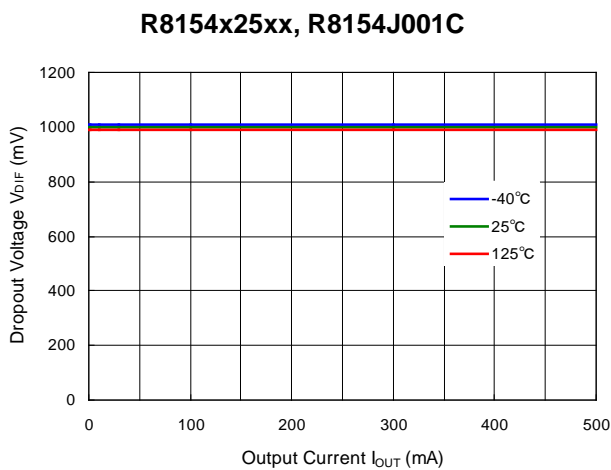
R8154x

NO. EC-330-180510

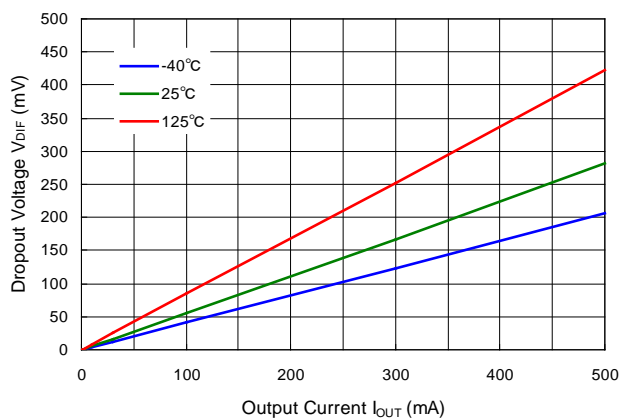
4) Output Voltage vs. Operating Temperature



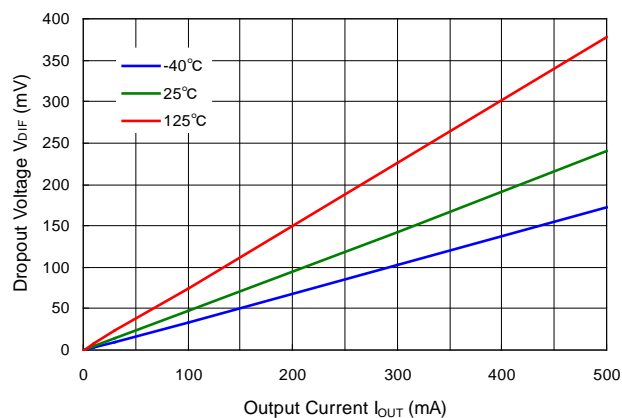
5) Dropout Voltage vs. Output Current



R8154x50xx

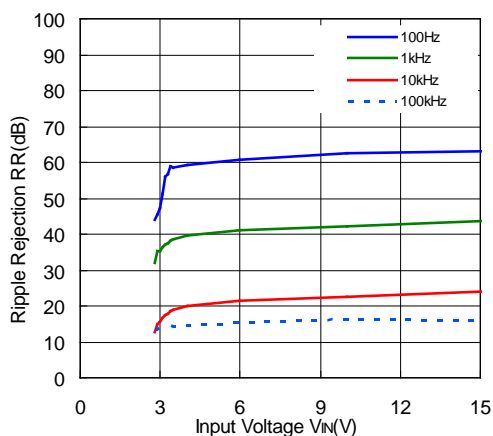


R8154x85xx

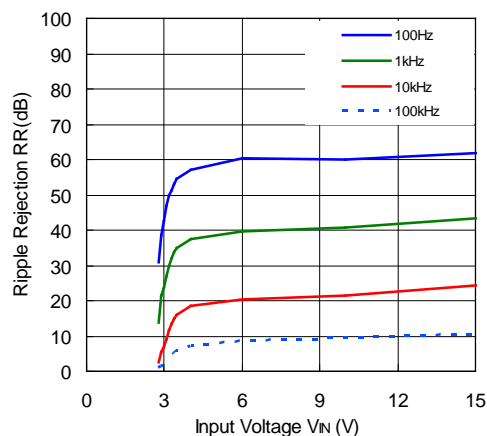


6) Ripple Rejection vs. Input Voltage ($T_a = 25^\circ\text{C}$, Ripple = 0.5 Vpp)

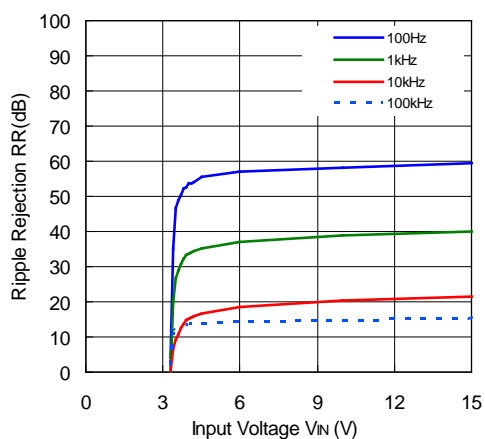
R8154x25xx, R8154J001C ($I_{OUT} = 1\text{ mA}$)



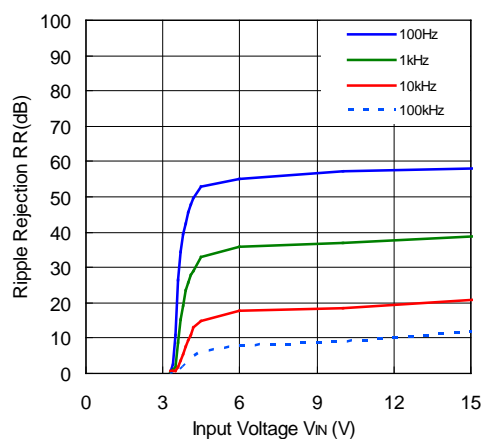
R8154x25xx, R8154J001C ($I_{OUT} = 150\text{ mA}$)



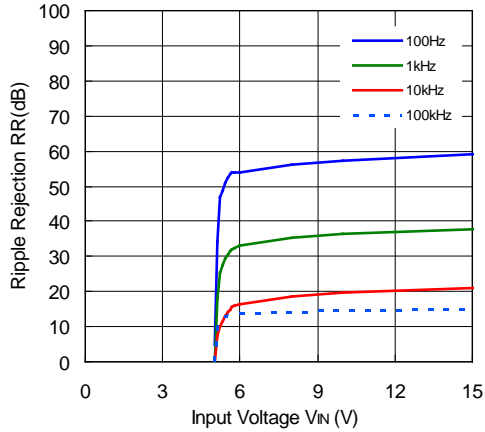
R8154x33xx ($I_{OUT} = 1\text{ mA}$)



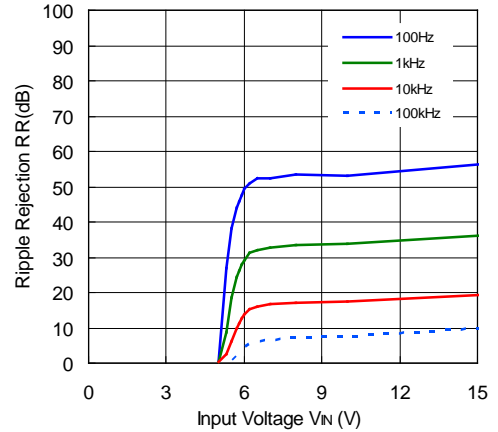
R8154x33xx ($I_{OUT} = 150\text{ mA}$)



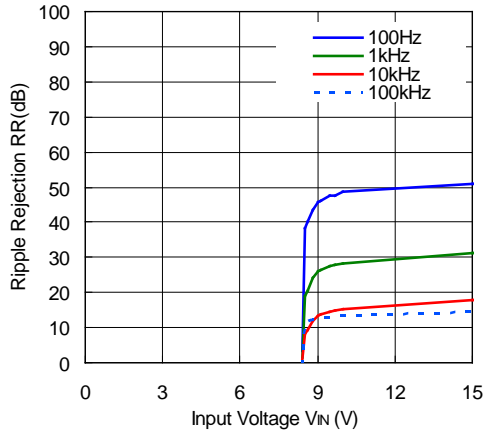
R8154x50xx (I_{OUT} = 1 mA)



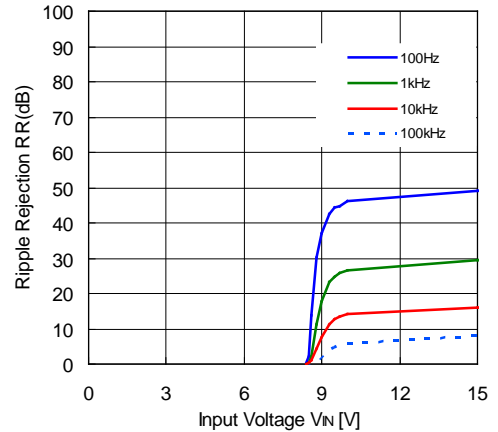
R8154x50xx (I_{OUT} = 150 mA)



R8154x85xx (I_{OUT} = 1 mA)

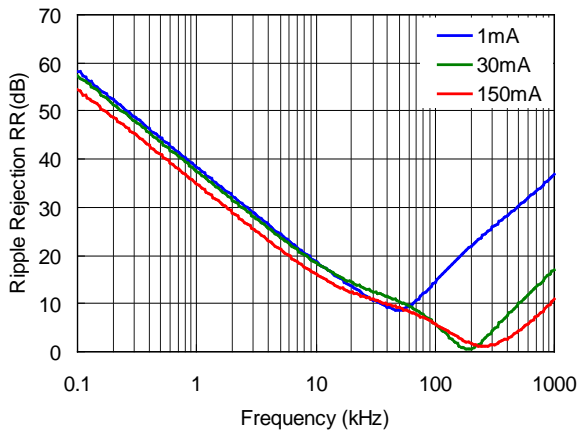


R8154x85xx (I_{OUT} = 150 mA)

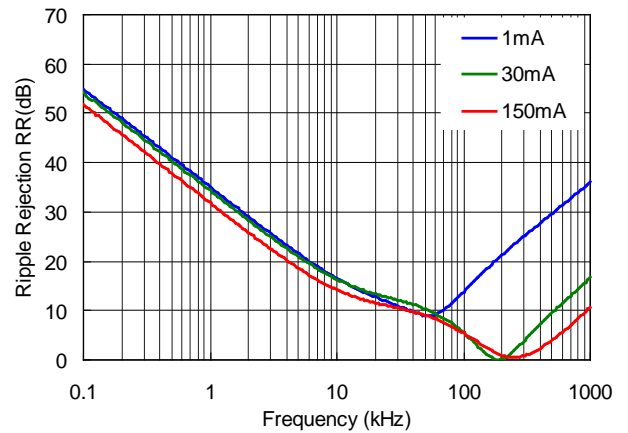


7) Ripple Rejection vs. Frequency (Ta = 25°C, Ripple = 0.5 Vpp)

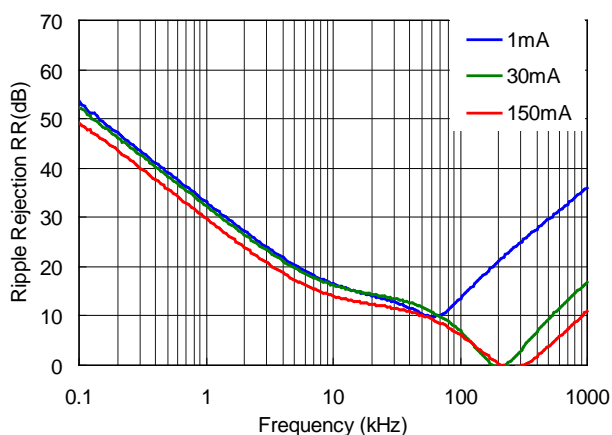
R8154x25xx, R8154J001C



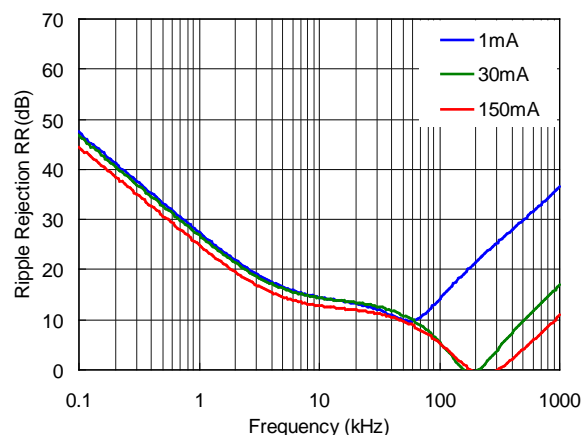
R8154x33xx



R8154x50xx

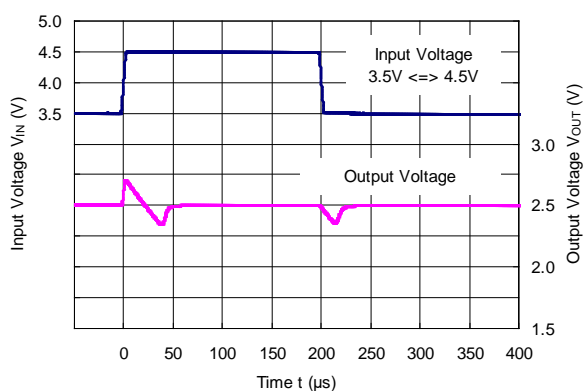


R8154x85xx

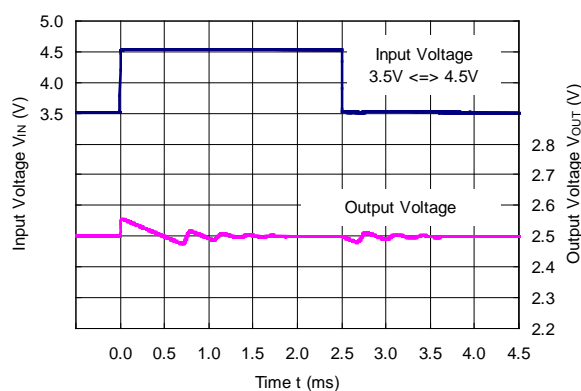


8) Input Transient Response ($T_a = 25^\circ\text{C}$, $I_{OUT} = 1\text{ mA}$, $t_r = t_f = 5\ \mu\text{s}$)

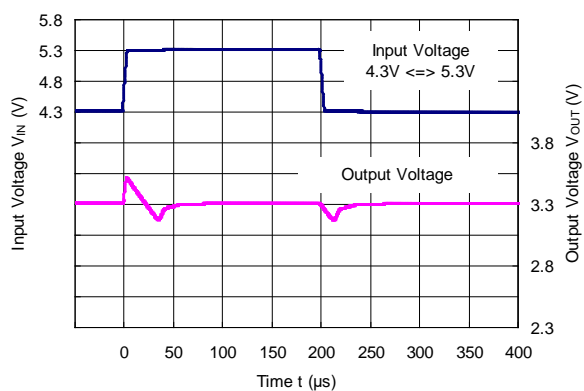
R8154x25xx, R8154J001C ($C_2 = 0.1\ \mu\text{F}$)



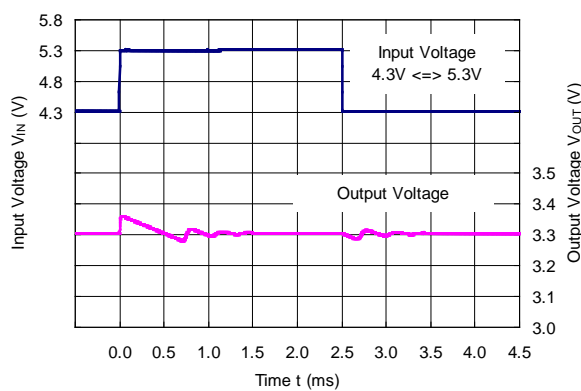
R8154x25xx, R8154J001C ($C_2 = 10\ \mu\text{F}$)



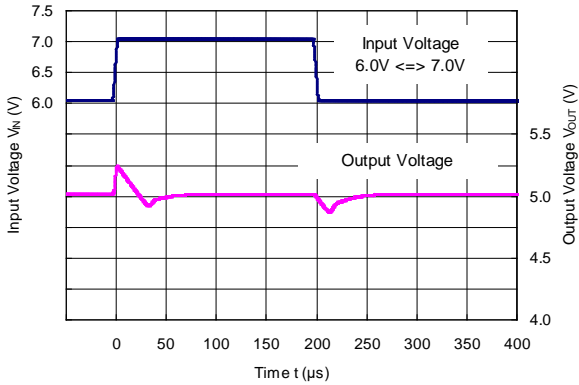
R8154x33xx ($C_2 = 0.1\ \mu\text{F}$)



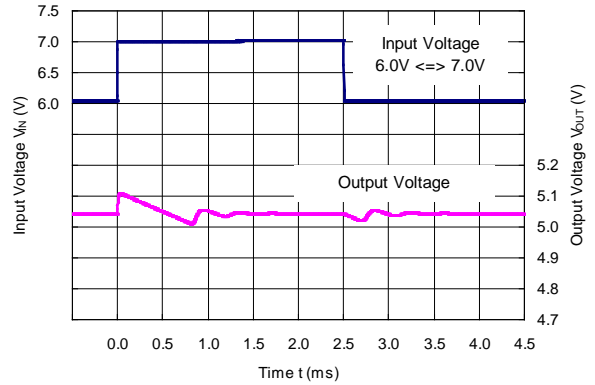
R8154x33xx ($C_2 = 10\ \mu\text{F}$)



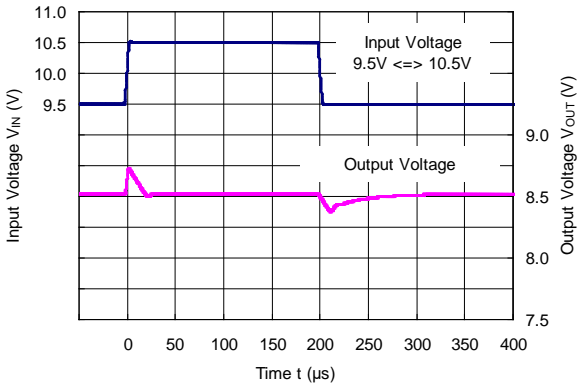
R8154x50xx (C2 = 0.1 μ F)



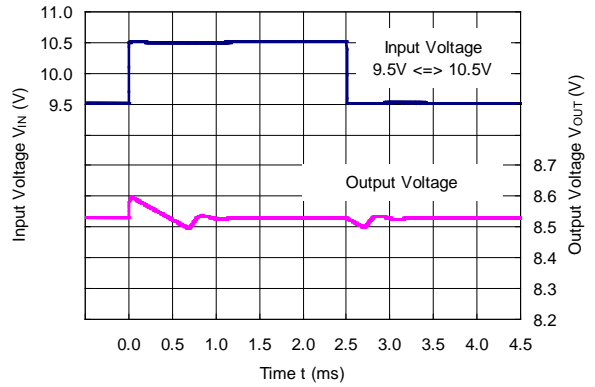
R8154x50xx (C2 = 10 μ F)



R8154x85xx (C2 = 0.1 μ F)

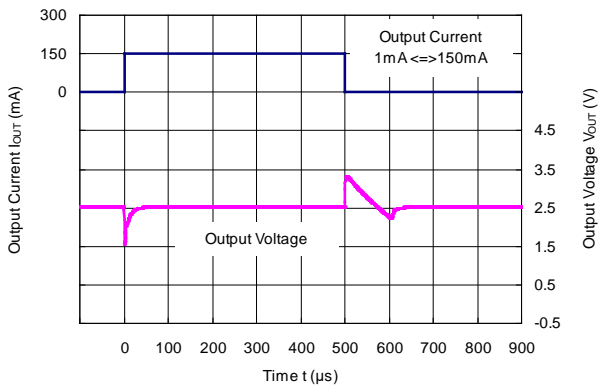


R8154x85xx (C2 = 10 μ F)

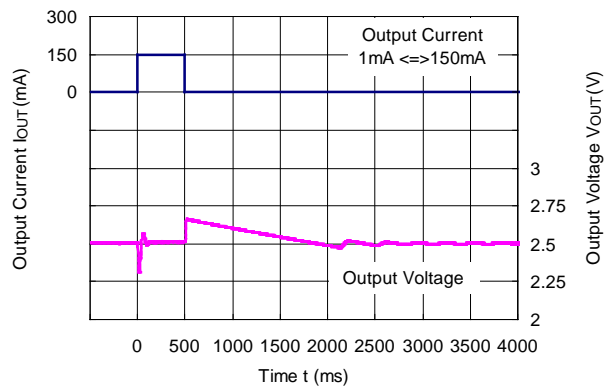


9) Load Transient Response ($T_a = 25^\circ\text{C}$, $V_{IN} = V_{OUT} + 1.0\text{ V}$, $t_r = t_f = 0.5\ \mu\text{s}$)

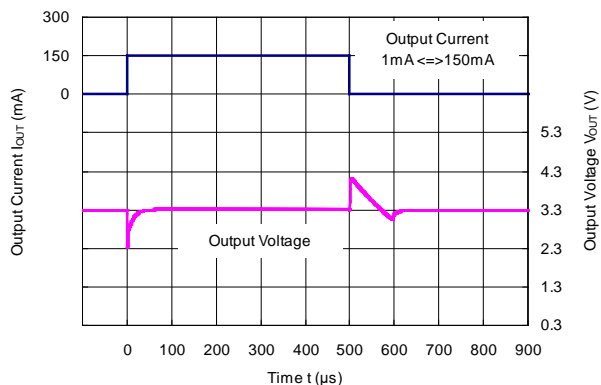
R8154x25xx, R8154J001C (C2 = 0.1 μ F)



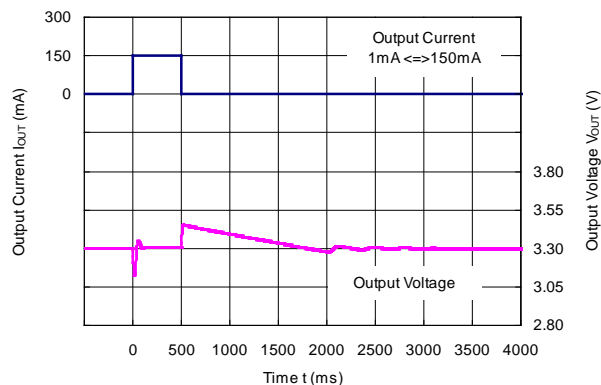
R8154x25xx, R8154J001C (C2 = 10 μ F)



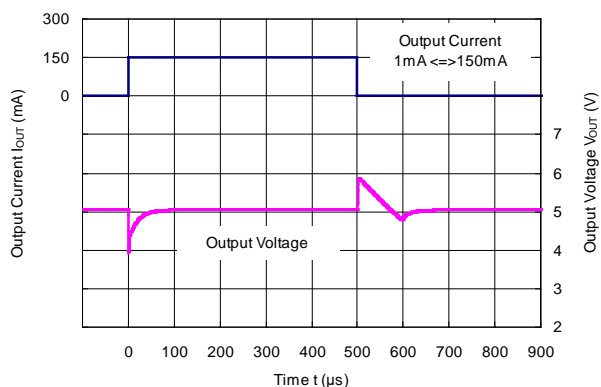
R8154x33xx (C2 = 0.1 μ F)



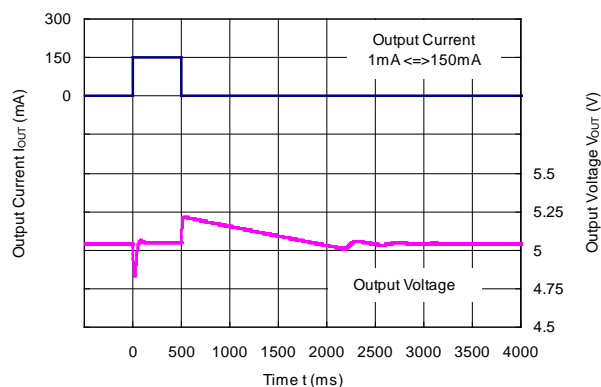
R8154x33xx (C2 = 10 μ F)



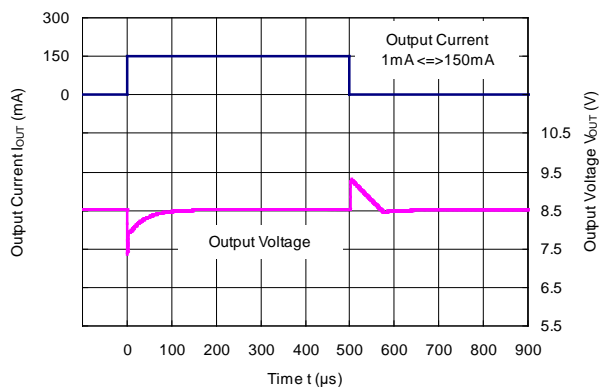
R8154x50xx (C2 = 0.1 μ F)



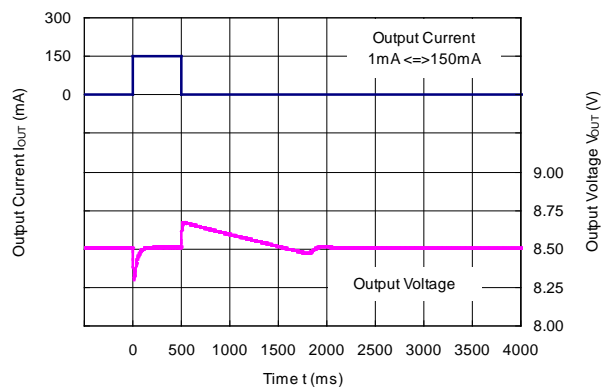
R8154x50xx (C2 = 10 μ F)



R8154x85xx (C2 = 0.1 μ F)



R8154x85xx (C2 = 10 μ F)

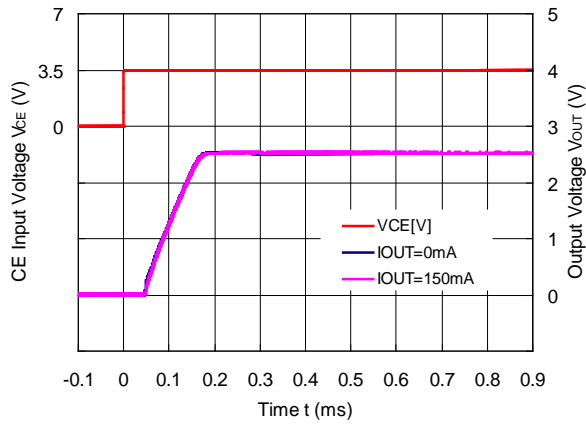


R8154x

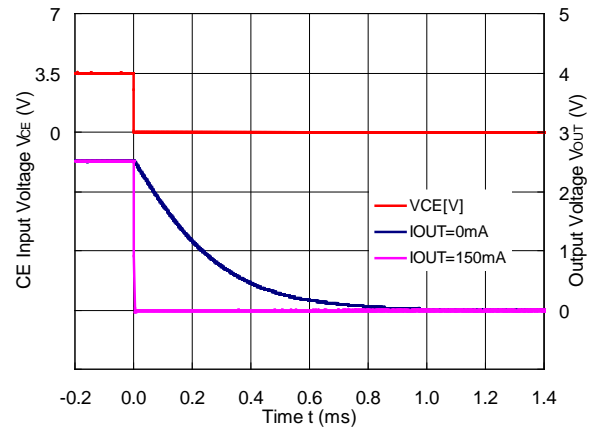
NO. EC-330-180510

10) CE Transient Response ($T_a = 25^\circ\text{C}$, $I_{OUT} = 1\text{ mA}$)

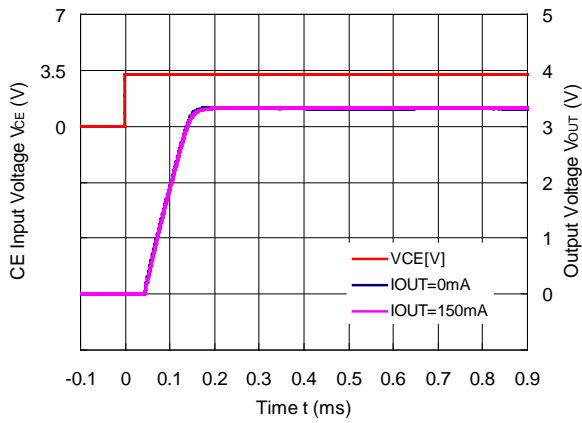
R8154x25xB/D, R8154J001C ($C_2 = 0.1\ \mu\text{F}$)



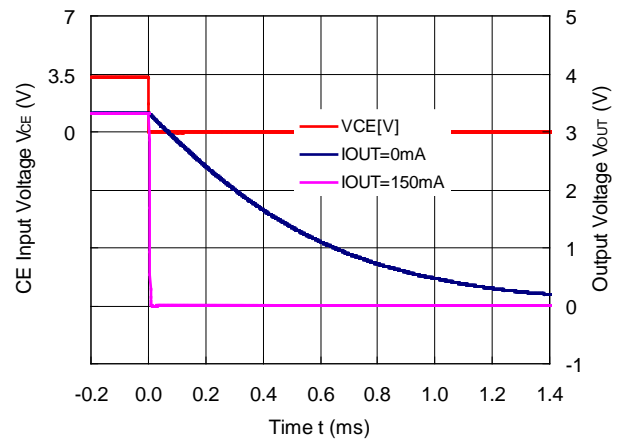
R8154x25xD ($C_2 = 0.1\ \mu\text{F}$)



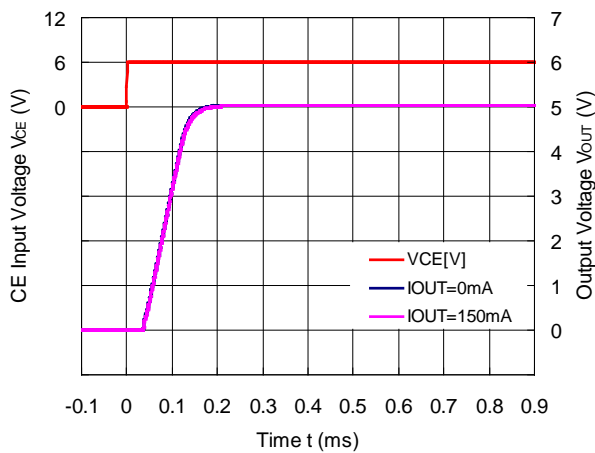
R8154x33xB/D ($C_2 = 0.1\ \mu\text{F}$)



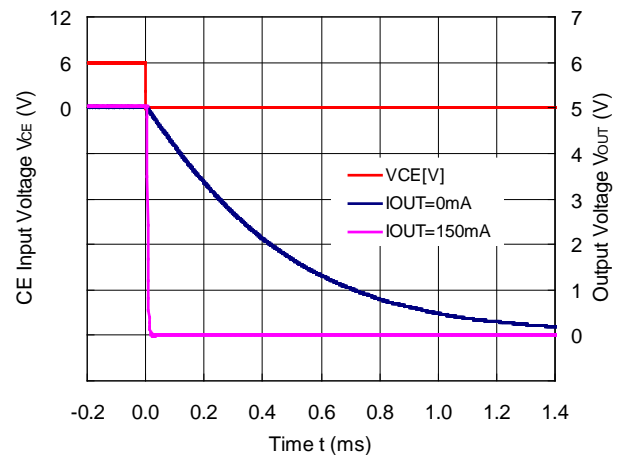
R8154x33xD ($C_2 = 0.1\ \mu\text{F}$)



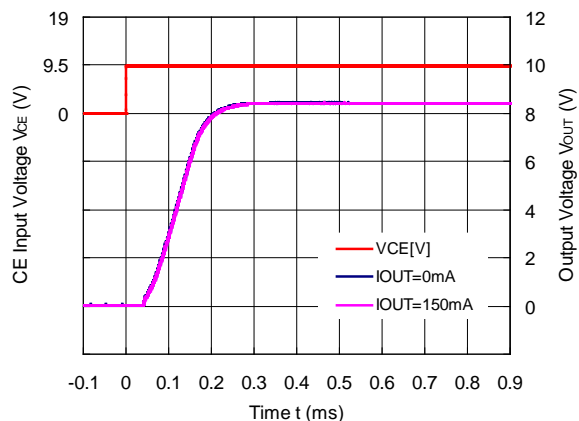
R8154x50xB/D ($C_2 = 0.1\ \mu\text{F}$)



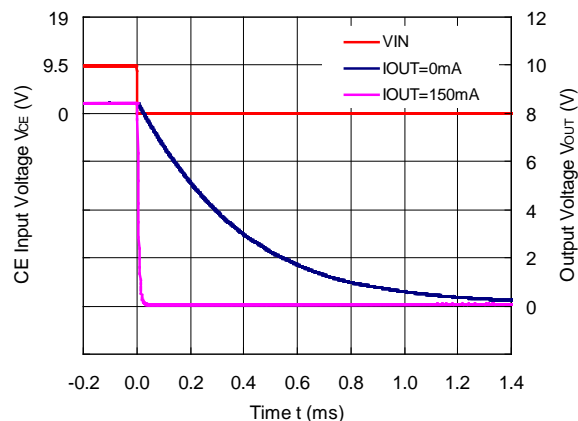
R8154x50xD ($C_2 = 0.1\ \mu\text{F}$)



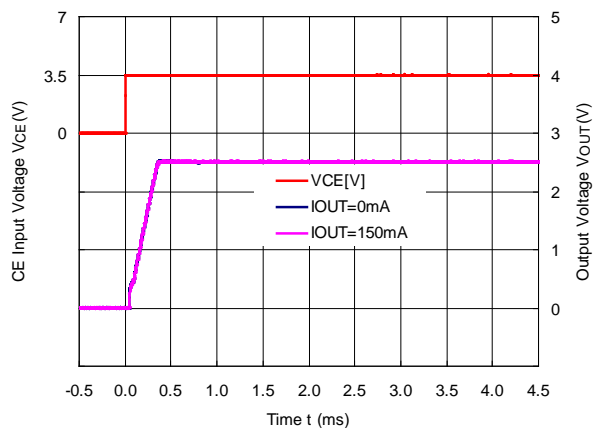
R8154x85xB/D (C2 = 0.1 μ F)



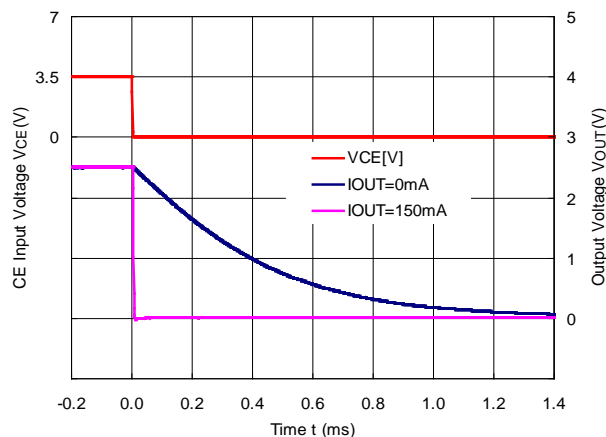
R8154x85xD (C2 = 0.1 μ F)



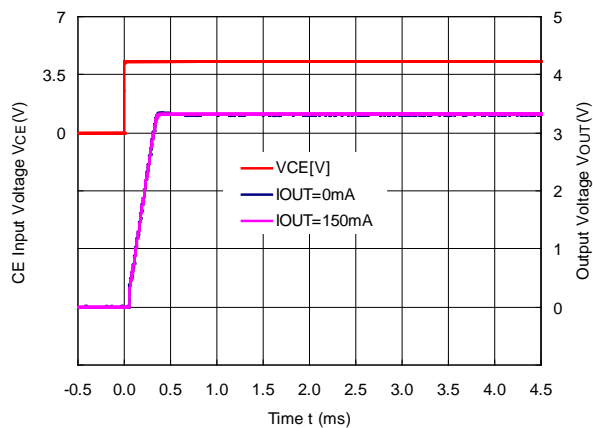
R8154J251E/F (C2 = 0.1 μ F, C_D = 1 nF)



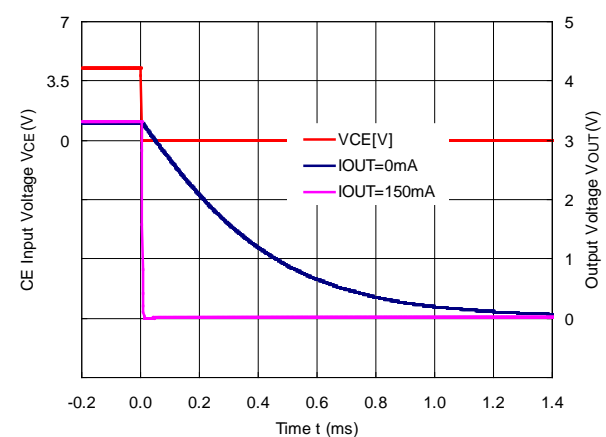
R8154J251F (C2 = 0.1 μ F, C_D = 1 nF)



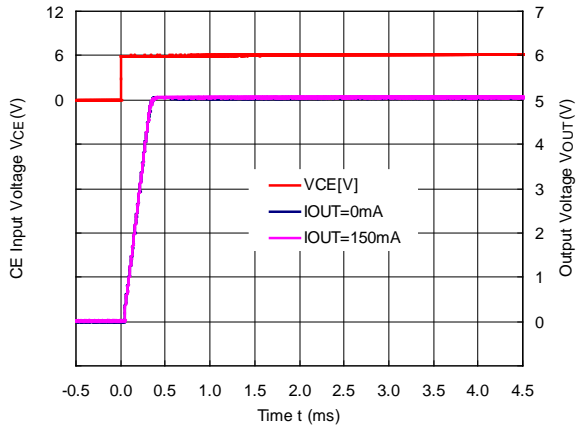
R8154J331E/F (C2 = 0.1 μ F, C_D = 1 nF)



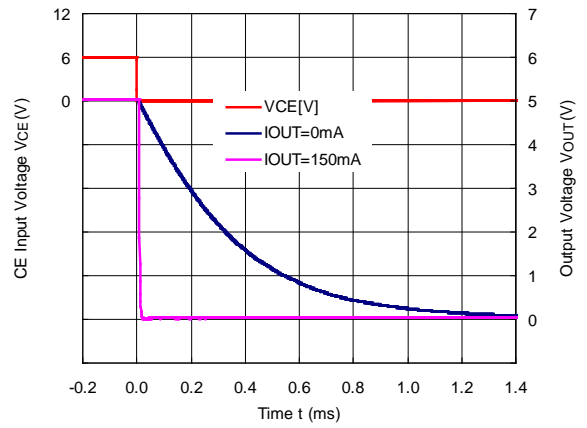
R8154J331F (C2 = 0.1 μ F, C_D = 1 nF)



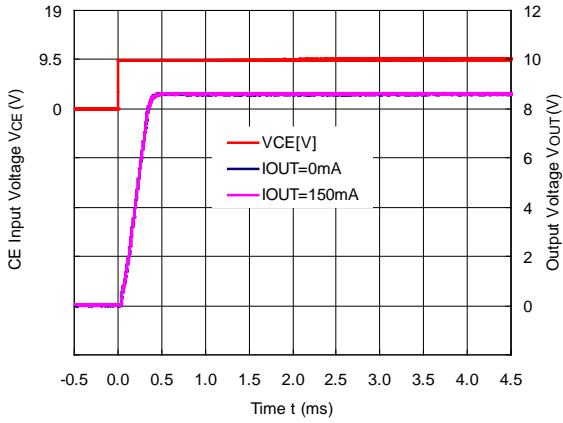
R8154J501E/F (C2 = 0.1 μF, CD = 1 nF)



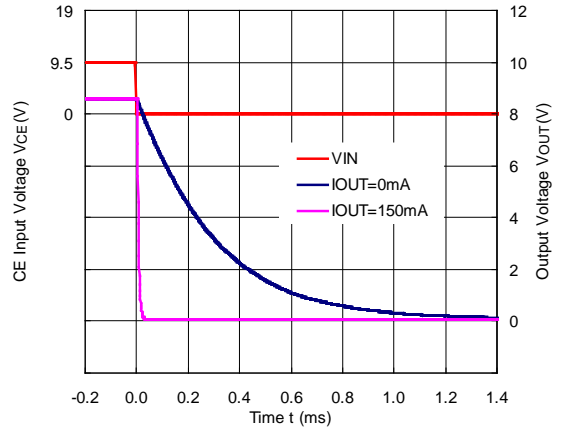
R8154J501F (C2 = 0.1 μF, CD = 1 nF)



R8154J851E/F (C2 = 0.1 μF, CD = 1 nF)

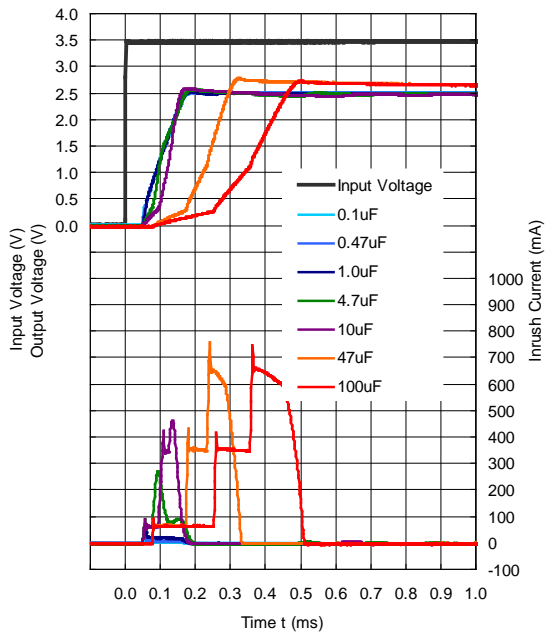


R8154J851F (C2 = 0.1 μF, CD = 1 nF)

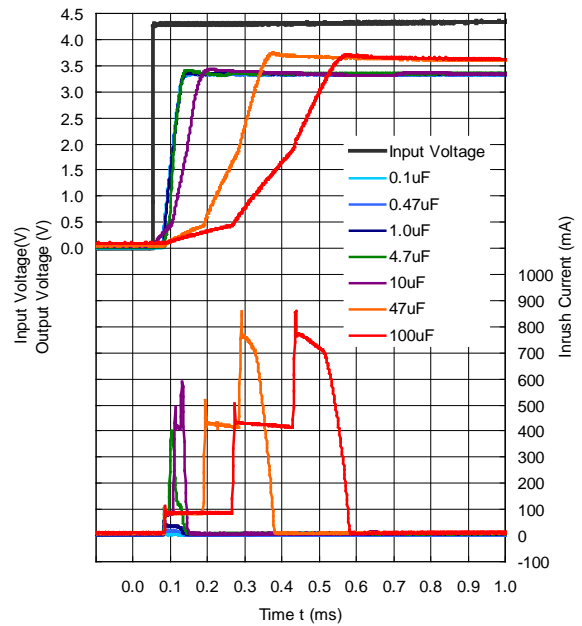


11) Inrush Current Prevention Circuit (Ta = 25°C, I_{OUT} = 1 mA)

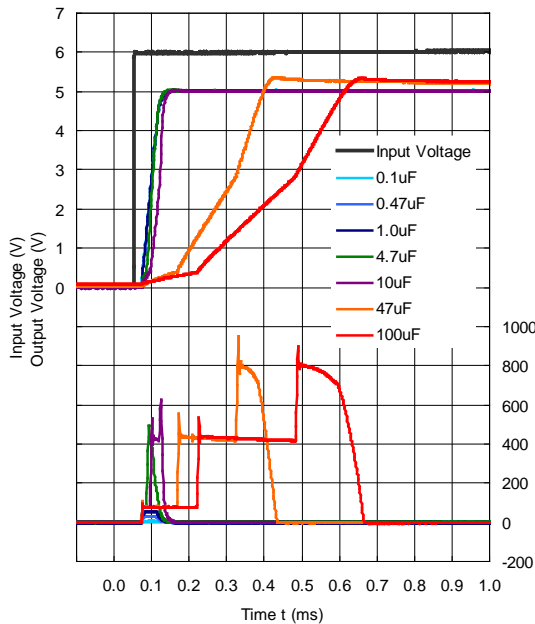
R8154x25xB/D, R8154J001C



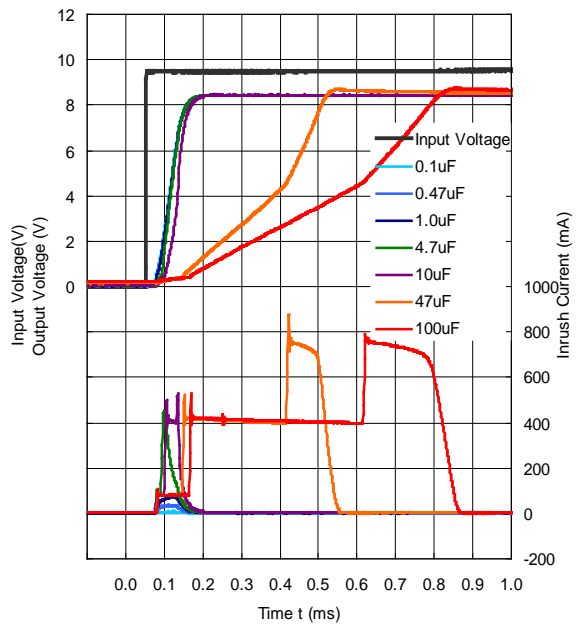
R8154x33xB/D



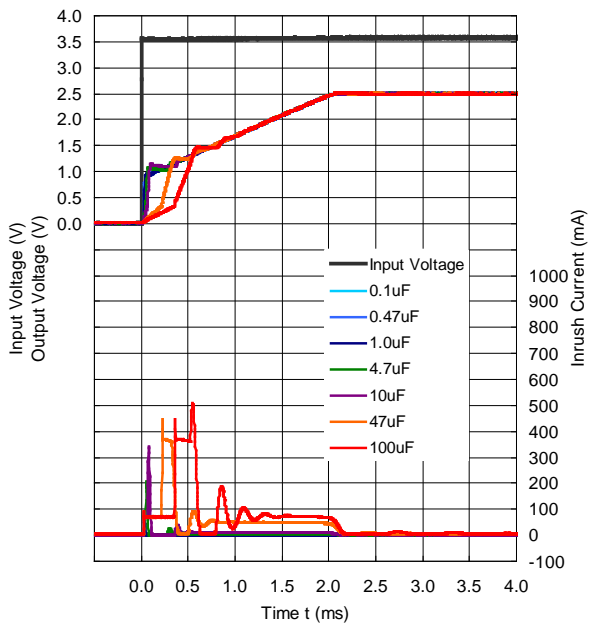
R8154x50xB/D



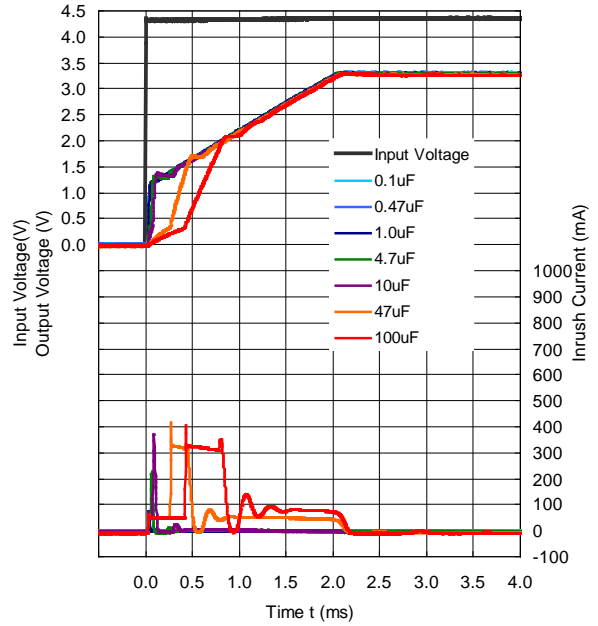
R8154x85xB/D



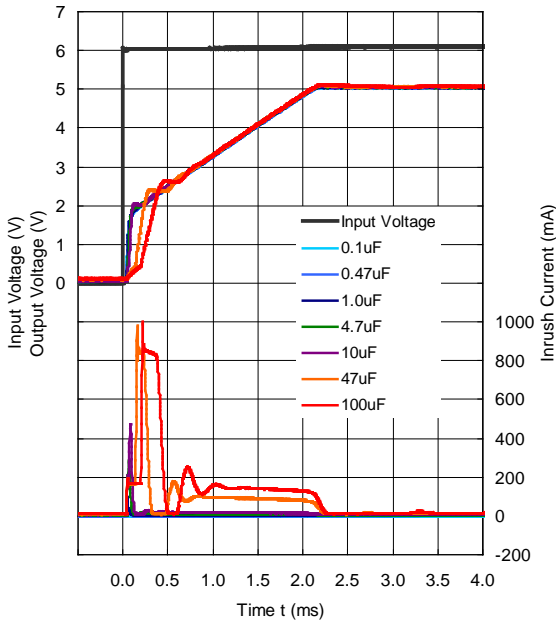
R8154J251E/F ($C_D = 10 \text{ nF}$)



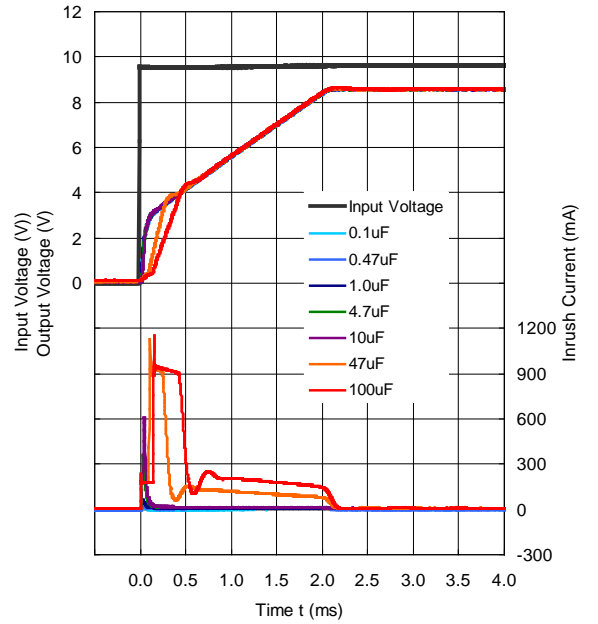
R8154J331E/F ($C_D = 10 \text{ nF}$)



R8154J501E/F ($C_D = 10 \text{ nF}$)

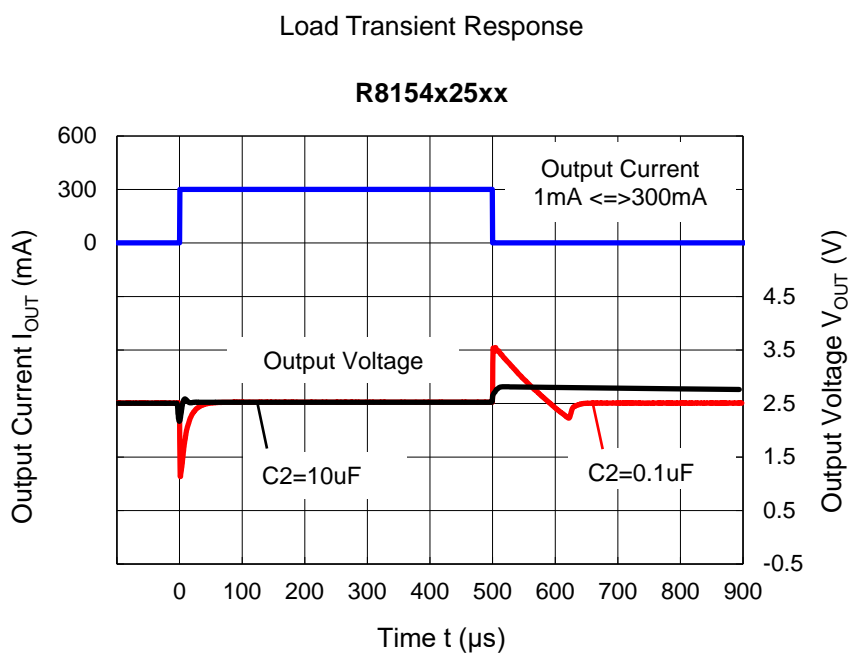


R8154J851E/F ($C_D = 10 \text{ nF}$)



Load Transient vs. Output Capacity (C2)

R8154 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.

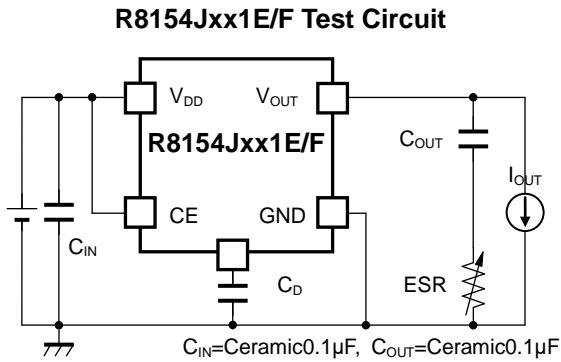
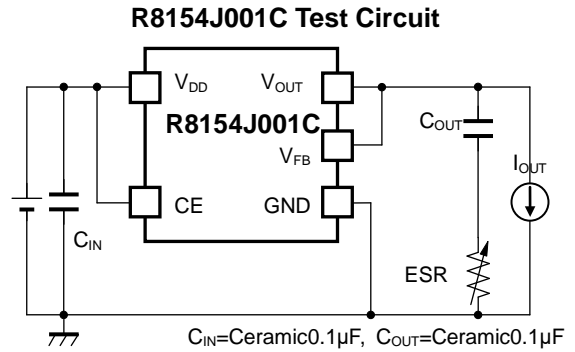
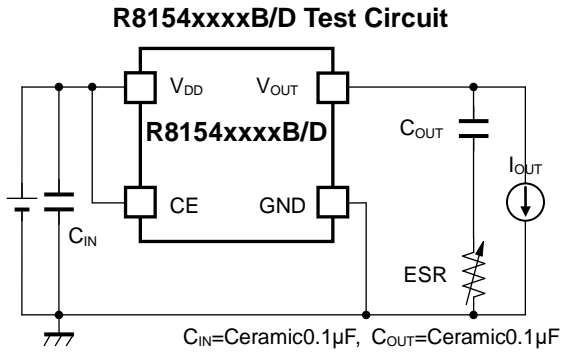


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ESR vs. Output Current

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.

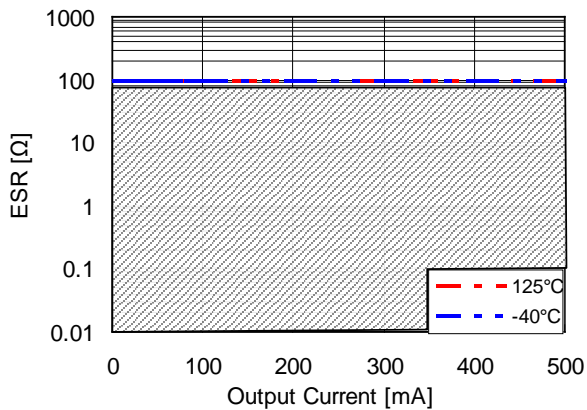


Measurement conditions

- Frequency Band: 10 Hz to 2 MHz
- Measurement Temperature: -40°C to 125°C
- Hatched area: Noise level is $40\ \mu\text{V}$ (average) or below
- Ceramic Capacitors: $C_1 = 0.1\ \mu\text{F}$, $C_2 = 0.1\ \mu\text{F}$

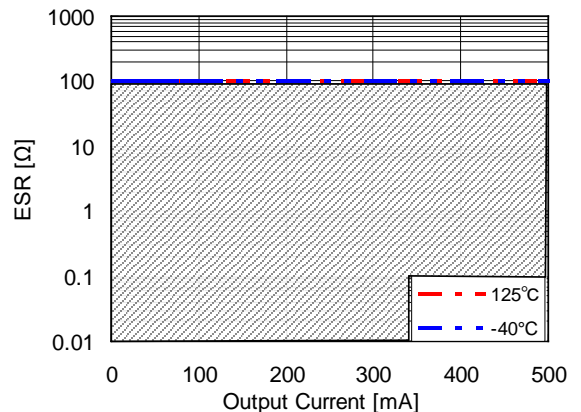
R8154x25xx Output Current I_{OUT} vs. ESR

$V_{in} = 2.5\text{V to } 36\text{V}$



R8154x85xx Output Current I_{OUT} vs. ESR

$V_{in} = 8.5\text{V to } 36\text{V}$





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