Fast Ultra High-PSRR, Low-Noise 300mA CMOS LDO in SOT-23 Package

General Description

The EMP8733 features ultra-high power supply rejection ratio, low output voltage noise, low dropout voltage, low quiescent current and fast transient response. It guarantees delivery of 300mA output current and supports preset output voltages ranging from 0.8V to 4.5V with 0.05V increment.

Based on its low quiescent current consumption, the EMP8733 is ideal for battery-powered applications. The high power supply rejection ratio of the EMP8733 holds well for low input voltages typically encountered in battery-operated systems. The regulator is stable with small ceramic capacitive loads (1µF typical). The EMP8733 is Available in miniature 3-pin SOT-23-3 package.

EMP products are Halogen free and RoHS compliant.

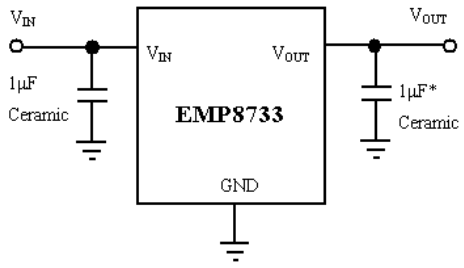
Features

- 300mA guaranteed output current
- 62dB typical PSRR at 1kHz
- 110µV RMS output voltage noise (10Hz to 100kHz)
- 290mV typical dropout at 300mA
- 57µA typical quiescent current
- Fast line and load transient response
- 2.2V to 5.5V input range
- Stable with small ceramic output capacitors
- Over temperature and over current protection
- ±2% output voltage tolerance

Applications

- Wireless handsets
- PCMCIA cards
- DSP core power
- Hand-held instruments
- Battery-powered systems
- Portable information appliances

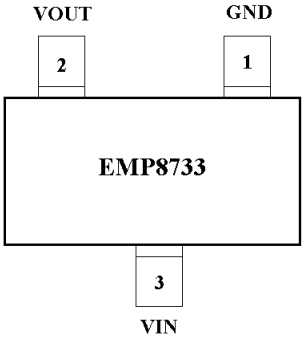
Typical Application



*Use 2.2µF for V_{OUT} < 1.2V

CONNECTION DIAGRAM

SOT-23-3(TOP View)



ORDER INFORMATION

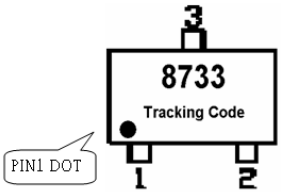
EMP8733-XXVB03GRR

XX	Output voltag
VB03	SOT-23-3 Package
GRR	RoHS & Halogen free
	Rating: -40 to 85°C
	Package in Tape & Reel

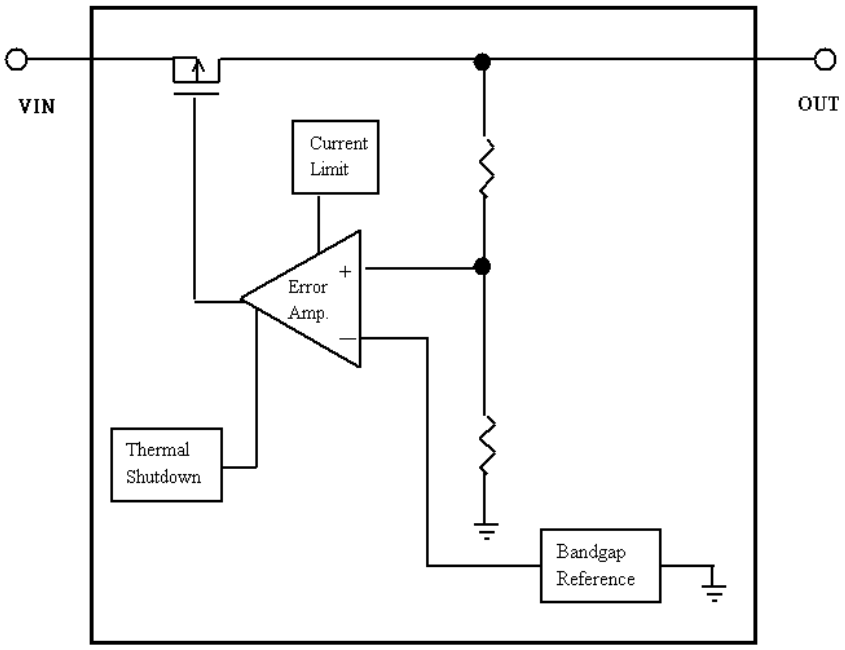
Pin Functions

Name	No.	Function
GND	1	**Ground Pin**.
VOUT	2	**Output Voltage Feedback**.
VIN	3	**Supply Voltage Input**. Require a minimum input capacitor of close to 1μF to ensure stability and sufficient decoupling from the ground pin.

Order, Mark & Packing Information

Vout	Marking	Product ID	Packing
1.2		EMP8733-12VB03GRR	3K units Tape & Reel
1.3		EMP8733-13VB03GRR	3K units Tape & Reel
1.5		EMP8733-15VB03GRR	3K units Tape & Reel
1.8		EMP8733-18VB03GRR	3K units Tape & Reel
2.5		EMP8733-25VB03GRR	3K units Tape & Reel
2.8		EMP8733-28VB03GRR	3K units Tape & Reel
3.0		EMP8733-30VB03GRR	3K units Tape & Reel
3.3		EMP8733-33VB03GRR	3K units Tape & Reel

Functional Block Diagram



Absolute Maximum Ratings (Notes 1, 2)

VIN, VOUT	-0.3V to 6.5V
Storage Temperature Range	-65°C to160°C
Junction Temperature (T_J)	150°C
Lead Temperature (10 sec.)	240°C
ESD Rating	
Human Body Model	2kV
MM	200V
Thermal Resistance (θ_{JA})	
3-pin SOT-23-3	250°C/W

Operating Ratings (Note 1, 2)

Temperature Range	-40°C to 85°C
Supply Voltage	2.2V to 5.5V

Electrical Characteristics

Unless otherwise specified, all limits guaranteed for $V_{IN} = V_{OUT} + 1V$ (Note 3), $C_{IN} = C_{OUT} = 2.2\mu F$, $T_A = 25°C$. **Boldface** limits apply for the operating temperature extremes: -40°C and 85°C.

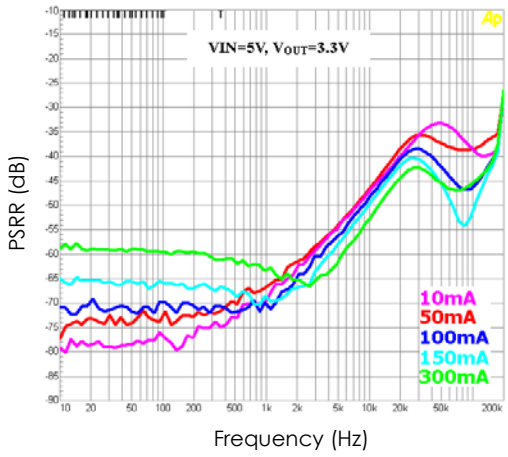
Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IN}	Input Voltage		**2.2**		**5.5**	V
V_{OUT}	Output Voltage		**0.8**		**4.5**	V
ΔV_{OTL}	Output Voltage Tolerance (Note 3)	$V_{OUT} \geqq 1.8V$,I_{OUT} = 10mA	-2		+2	% of $V_{OUT (NOM)}$
			-3		**+3**	
		$V_{OUT} < 1.8V$,I_{OUT} = 10mA	-35		35	mV
			-50		**50**	
I_{OUT}	Maximum Output Current	Average DC Current Rating	**300**			mA
I_{LIMIT}	Output Current Limit		**300**	450		mA
I_Q	Supply Current	I_{OUT} = 0mA		57		µA
		I_{OUT} = 300mA		130		
V_{DO}	Dropout Voltage (Note4)	I_{OUT} = 100mA		90		mV
		I_{OUT} = 300mA		290		
ΔV_{OUT}	Line Regulation	I_{OUT} = 1mA, $(V_{OUT} + 1V) \leq V_{IN} \leq$ 5.5V (Note 3)	-0.1	0.01	0.1	%/V
	Load Regulation	$1mA \leq I_{OUT} \leq 300mA$		0.0008		%/mA
e_n	Output Voltage Noise	V_{OUT}=2.5V, I_{OUT} = 10mA, 10Hz ≤ f ≤ 100kHz		110		μV_{RMS}
T_{SD}	Thermal Shutdown Temperature			165		℃
	Thermal Shutdown Hysteresis			35		

Note 1: Absolute Maximum ratings indicate limits beyond which damage may occur. Electrical specifications do not apply when operating the device outside of its rated operating conditions.
Note 2: All voltages are with respect to the potential at the ground pin.
Note 3: Condition does not apply to input voltages below 2.2V since this is the minimum input operating voltage.
Note 4: Dropout voltage is measured by reducing V_{IN} until V_{OUT} drops 100mV from its nominal value at $V_{IN} - V_{OUT} = 1V$. Dropout voltage does not apply to the regulator versions with V_{OUT} less than 2.2V.

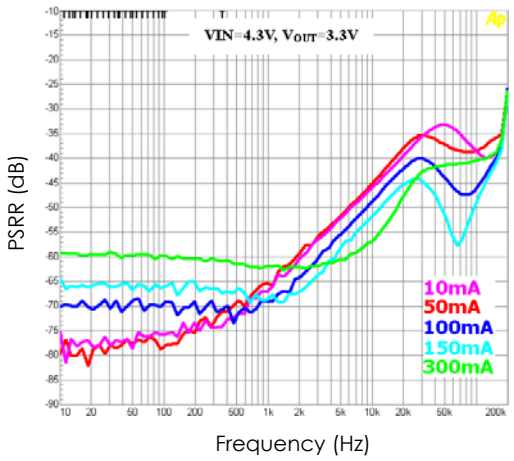
Typical Performance Characteristics

Unless otherwise specified, VIN = $V_{OUT\ (NOM)}$ + 1V, C_{IN} = C_{OUT} = 1.0μF, T_A = 25°C.

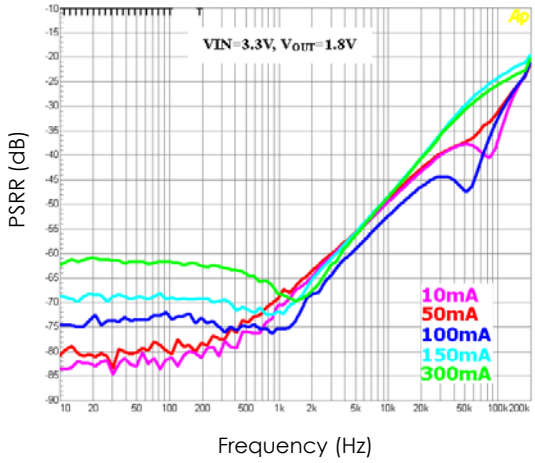
PSRR vs. Frequency



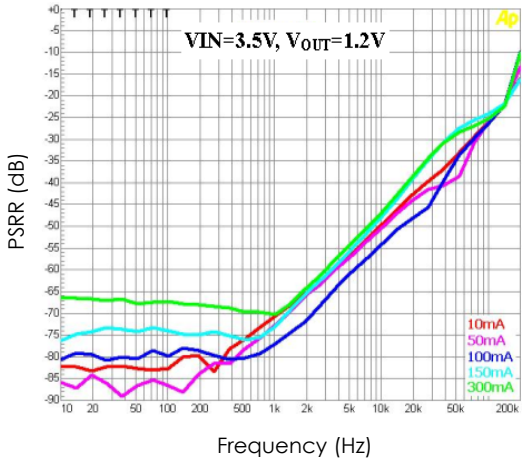
PSRR vs. Frequency



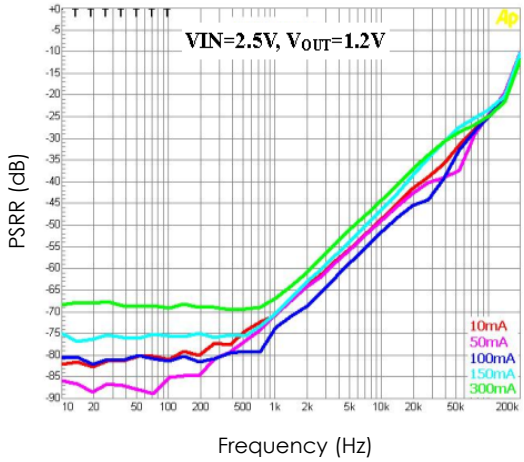
PSRR vs. Frequency



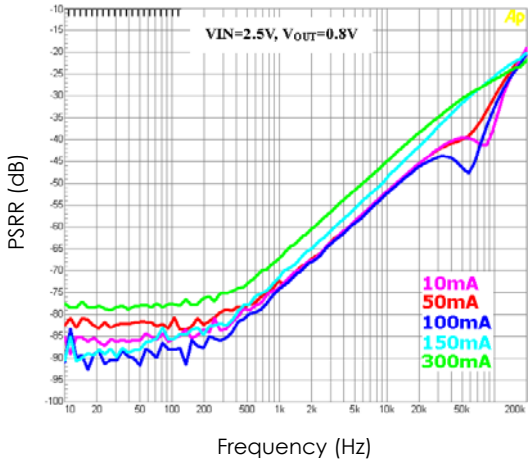
PSRR vs. Frequency



PSRR vs. Frequency



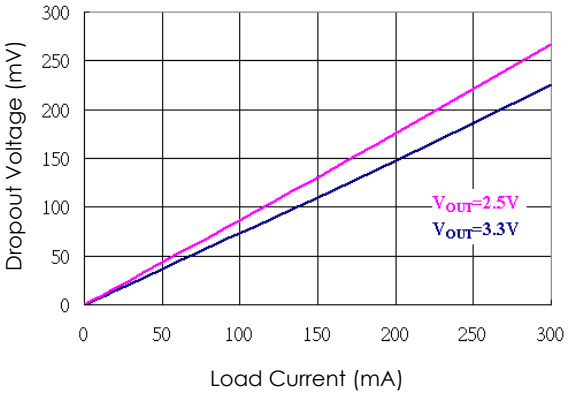
PSRR vs. Frequency



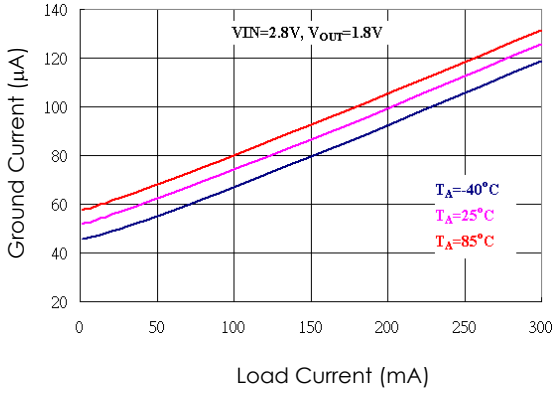
Typical Performance Characteristics

Unless otherwise specified, VIN = $V_{OUT\ (NOM)}$ + 1V, C_{IN} = C_{OUT} = 2.2μF, T_A = 25°C. (Continued)

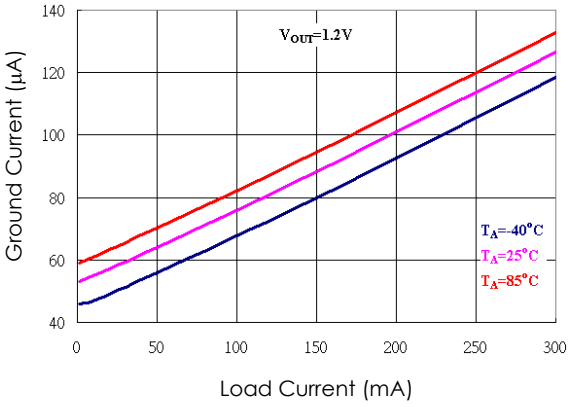
Dropout Voltage vs. Load Current



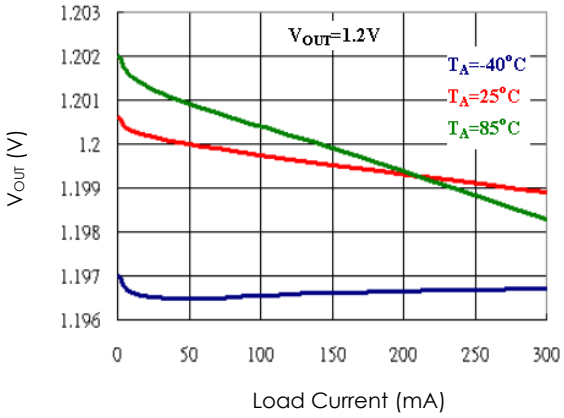
Ground Current vs. Load Current



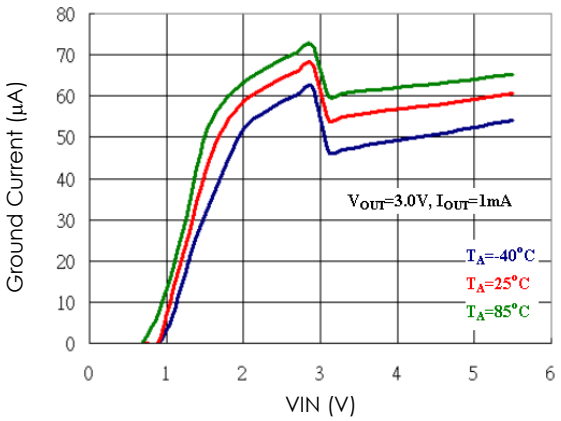
Ground Current vs. Load Current



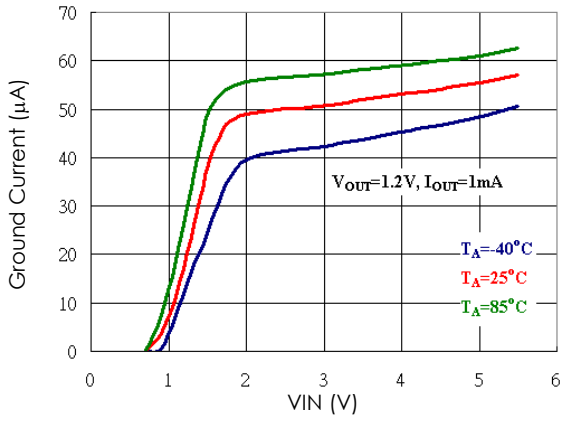
Load Regulation



Ground Current vs. VIN



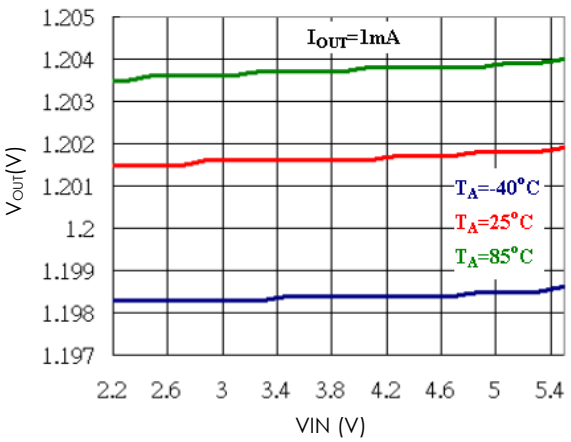
Ground Current vs. VIN



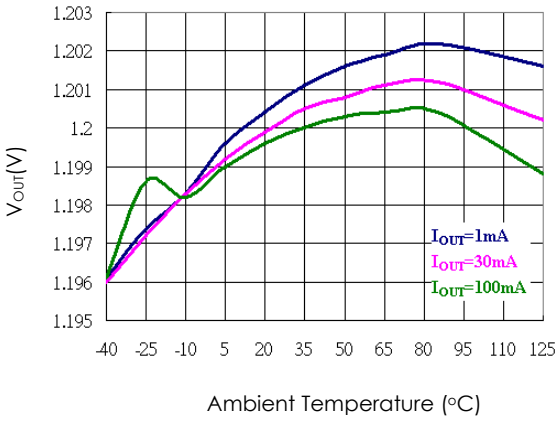
Typical Performance Characteristics

Unless otherwise specified, VIN = $V_{OUT\ (NOM)}$ + 1V, C_{IN} = C_{OUT} = 2.2µF, T_A = 25°C. (Continued)

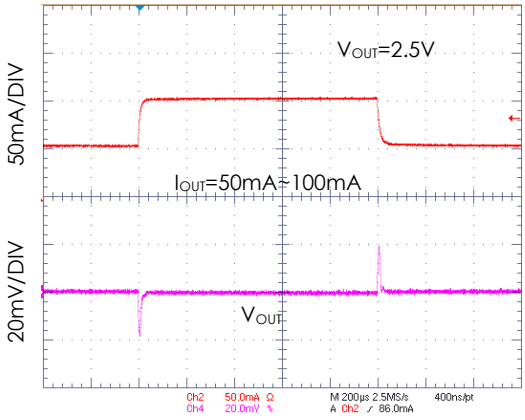
Line Regulation



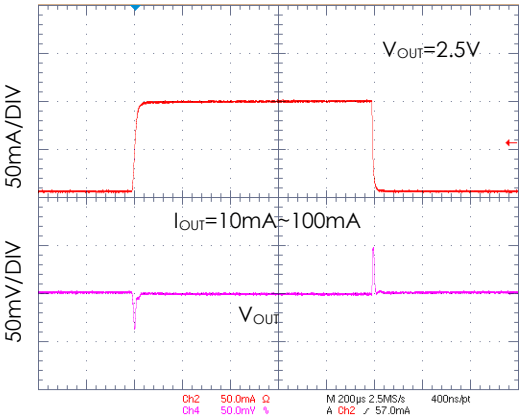
Temperature Stability



Load Transient



Load Transient



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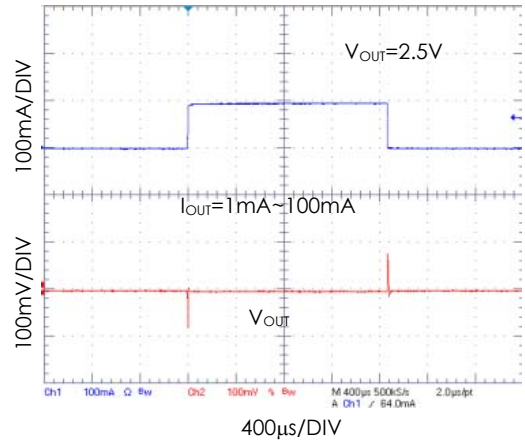
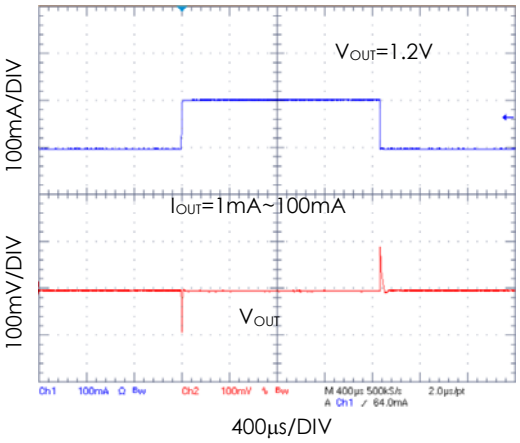


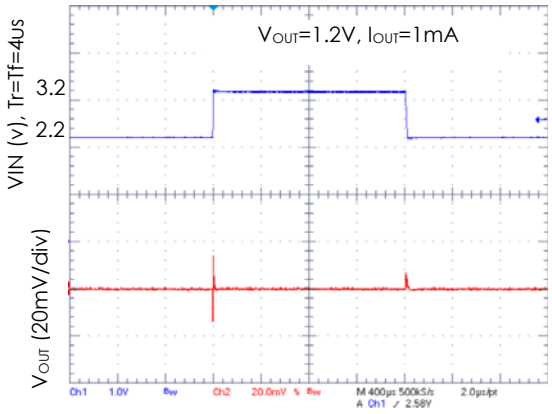
Load Transient



Typical Performance Characteristics

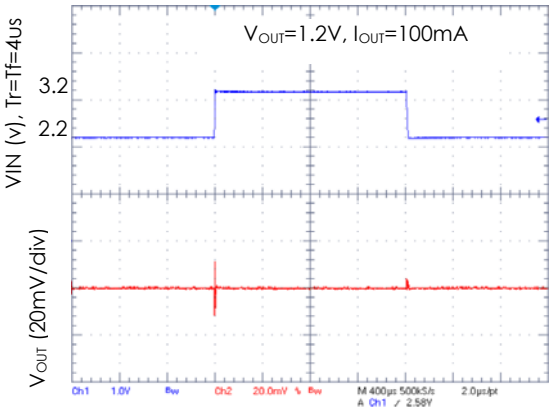
Unless otherwise specified, VIN = $V_{OUT\ (NOM)}$ + 1V, C_{IN} = C_{OUT} = 2.2µF, T_A = 25°C. (Continued)

Line Transient



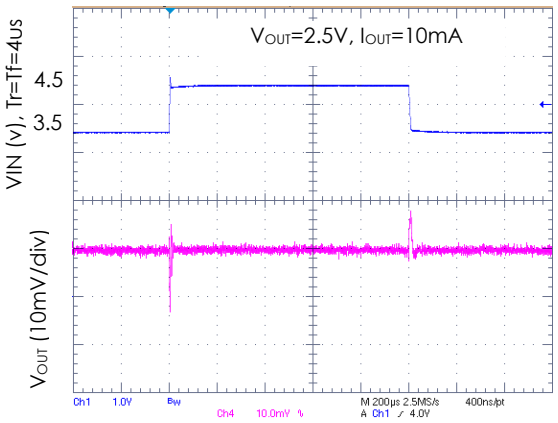
400µs/DIV

Line Transient



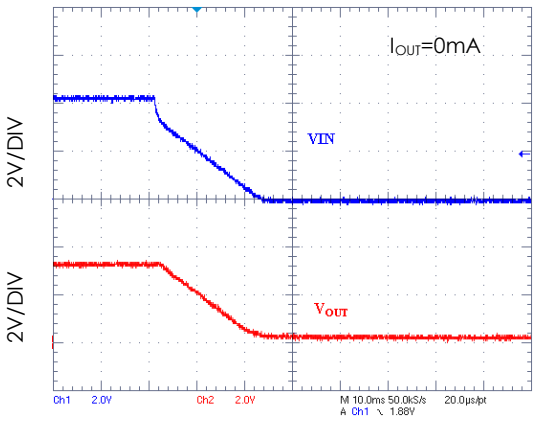
400µs/DIV

Line Transient



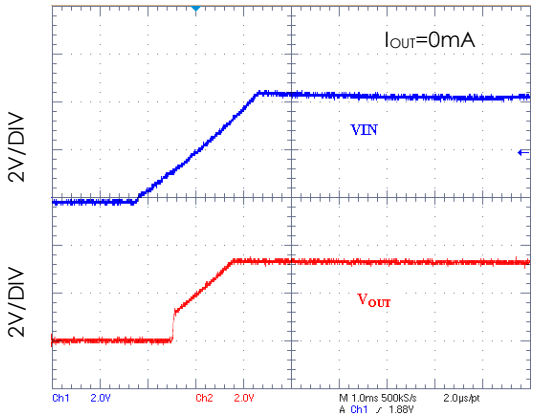
200µs/DIV

Power off Transient



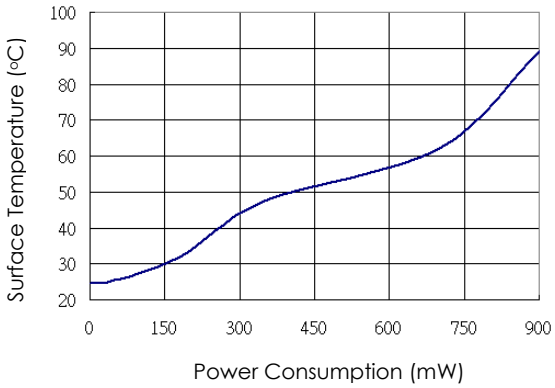
10ms/DIV

Power on Transient

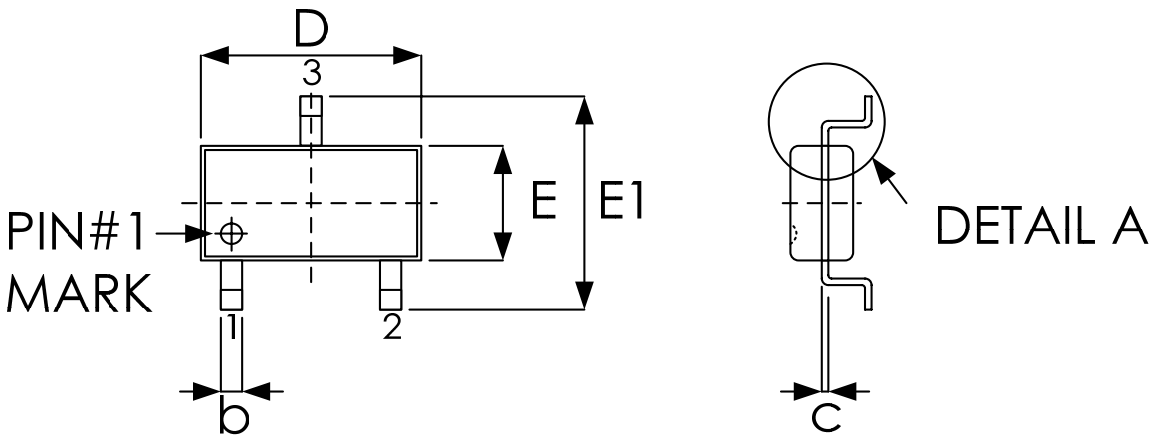


1ms/DIV

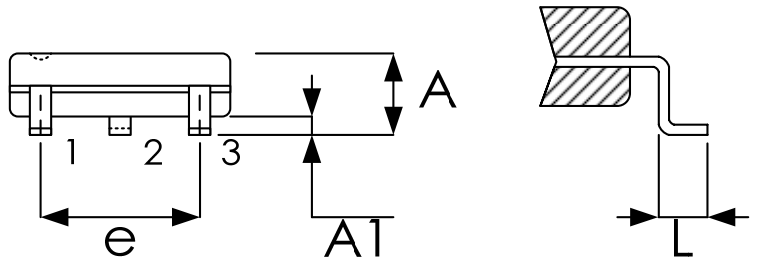
Power Derating



Package Outline Drawing
SOT-23-3



TOP VIEW



SIDE VIEW **DETAIL A**

Symbol	Dimension in mm	
	Min.	Max.
A	0.90	1.45
A1	0.00	0.15
b	0.30	0.50
c	0.08	0.25
D	2.70	3.10
E	1.40	1.80
E1	2.60	3.00
e	1.90 BSC	
L	0.30	0.60

Revision History

Revision	Date	Description
2.0	2009.04.03	1.Title 2.Ending 3.Order information 4.Add Revision History Form 5.Important Notice
2.1	2009.12.17	General description→ Halogen free (page 1) GRR definition correction (page 2)
2.2	2010.09.10	Change package dimensions (page 9)
2.3	2011.08.16	1.Modify Input Voltage (page 4) 2.Modify Output Voltage (page 4) 3.Modify Output Voltage Tolerance (page 4) 4.Modify Maximum Output Current (page 4) 5.Modify Output Current Limit (page 4)
2.4	2012.04.02	1. Add Vout=1.3V voltage option (page 2) 2. Revise output voltage tolerance spec for Vout<1.8V option (page 4) 3. Revise package outline drawing (page 9)
2.5	2013.10.24	Modify package outline drawing

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