

# LR8558

## Low noise, fast response 500mA LDO regulator

### Features:

- Low Power Consumption: 75uA (Typ.)
- Low output noise (47uVRMS)
- Standby Mode: 0.1uA
- Low dropout Voltage: 0.46V@500mA (Typ.)
- High Ripple Rejection: 66dB@100Hz (Typ.)
- Low Temperature Coefficient:  $\pm 100\text{ppm}/^\circ\text{C}$
- Excellent Line regulation: 0.05%/V
- Build-in chip enable and discharge circuit
- Output Voltage Range: 1.2V~4.5V (customized on command every 0.1V step)
- Highly Accurate:  $\pm 2\%$  ( $\pm 1\%$  customized)
- Output Current Limit

### Applications:

- Power source for cellular phones and various kind of PCs
- Battery Powered equipment
- Power Management of MP3, PDA, DSC, Mouse, PS2 Games
- Reference Voltage Source
- Regulation after Switching Power

### General Description:

LR8558 series is a group of positive voltage output, low power consumption, low dropout voltage regulator.

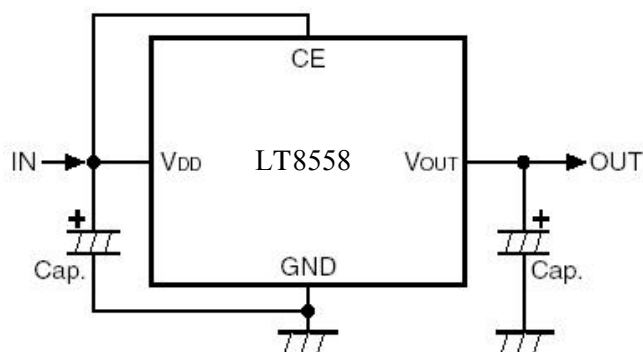
LR8558 can provide output value in the range of 1.2V~4.5V every 0.1V step. It also can be customized on command.

LR8558 includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module with discharge capability.

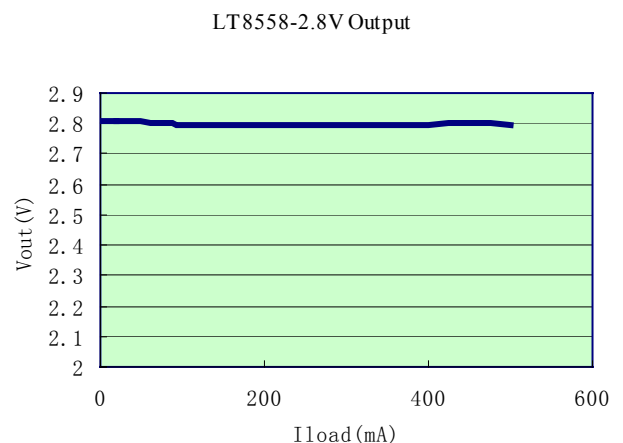
LR8558 has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within  $\pm 2\%$ .

LR8558 is available in SOT-23-5, SC-82 packages which is lead free. It also can available in these packages with lead.

### LR8558 Typical Application Circuit

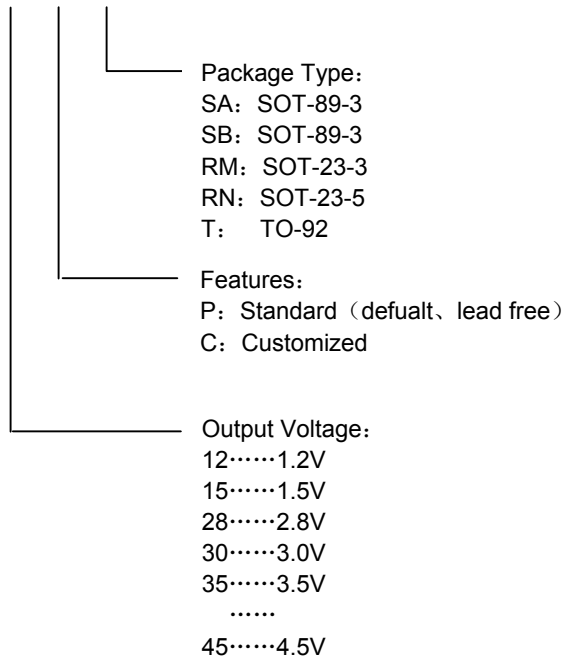


### LR8558 Typical Performance Characteristics:

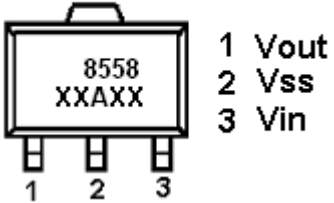
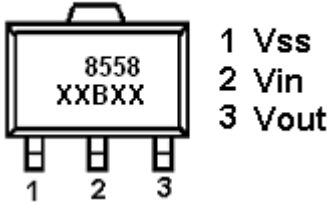
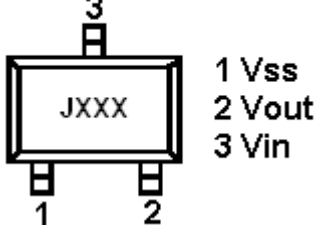
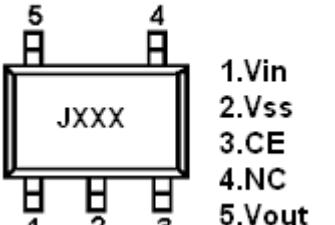
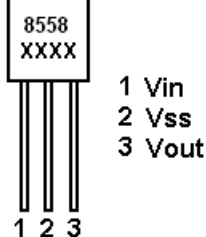


**Selection Guide:**

**LR8558-XX X X**



**Pin Assignment:**

LR8558-XXPSA	<p>SOT-89-3</p>  <p>1 Vout 2 Vss 3 Vin</p>	LR8558-XXPSB	<p>SOT-89-3</p>  <p>1 Vss 2 Vin 3 Vout</p>
LR8558-XXPRM	<p>SOT-23-3</p>  <p>1 Vss 2 Vout 3 Vin</p>	LR8558-XXPRN	<p>SOT-23-5</p>  <p>1.Vin 2.Vss 3.CE 4.NC 5.Vout</p>
LR8558-XXPT	<p>TO-92</p>  <p>1 Vin 2 Vss 3 Vout</p>		

**Pin Description:**

Pin Number					Symbol	Function
SOT-89-3 (A)	SOT-89-3 (B)	SOT-23-5	SOT-23-3	TO-92		
1	3	5	2	3	Vout	Output pin
3	2	1	3	1	Vin	Input Pin
2	1	2	1	2	Vss	Ground Pin
		3			CE	Chip Enable Pin
		4			NC	No Connection

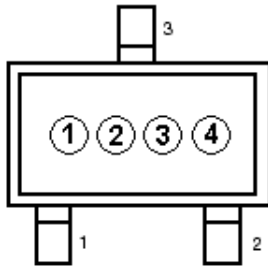
**Product Classification:**

Output Voltage	Package Type	Product Name	Package Type	Product Name	Package Type	Product Name
1.2V	SOT-89-3A	LR8558-12PSA	SOT-89-3B	LR8558-12PSB	SOT-23-5	LR8558-12PRN
1.5V	SOT-89-3A	LR8558-15PSA	SOT-89-3B	LR8558-15PSB	SOT-23-5	LR8558-15PRN
1.8V	SOT-89-3A	LR8558-18PSA	SOT-89-3B	LR8558-18PSB	SOT-23-5	LR8558-18PRN
2.1V	SOT-89-3A	LR8558-21PSA	SOT-89-3B	LR8558-21PSB	SOT-23-5	LR8558-21PRN
2.5V	SOT-89-3A	LR8558-25PSA	SOT-89-3B	LR8558-25PSB	SOT-23-5	LR8558-25PRN
2.8V	SOT-89-3A	LR8558-28PSA	SOT-89-3B	LR8558-28PSB	SOT-23-5	LR8558-28PRN
3.0V	SOT-89-3A	LR8558-30PSA	SOT-89-3B	LR8558-30PSB	SOT-23-5	LR8558-30PRN
3.2V	SOT-89-3A	LR8558-32PSA	SOT-89-3B	LR8558-32PSB	SOT-23-5	LR8558-32PRN
3.3V	SOT-89-3A	LR8558-33PSA	SOT-89-3B	LR8558-33PSB	SOT-23-5	LR8558-33PRN
3.5V	SOT-89-3A	LR8558-35PSA	SOT-89-3B	LR8558-35PSB	SOT-23-5	LR8558-35PRN
⋮	⋮	⋮	⋮	⋮	⋮	⋮
4.5V	SOT-89-3A	LR8558-45PSA	SOT-89-3B	LR8558-45PSB	SOT-23-5	LR8558-45PRN

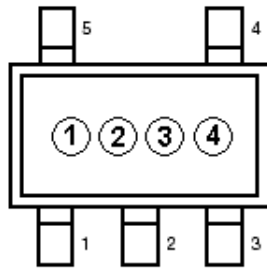
Output Voltage	Package Type	Product Name	Package Type	Product Name
1.2V	SOT-23-3	LR8558-12PRM	TO-92	LR8558-12PT
1.5V	SOT-23-3	LR8558-15PRM	TO-92	LR8558-15PT
1.8V	SOT-23-3	LR8558-18PRM	TO-92	LR8558-18PT
2.1V	SOT-23-3	LR8558-21PRM	TO-92	LR8558-21PT
2.5V	SOT-23-3	LR8558-25PRM	TO-92	LR8558-25PT
2.8V	SOT-23-3	LR8558-28PRM	TO-92	LR8558-28PT
3.0V	SOT-23-3	LR8558-30PRM	TO-92	LR8558-30PT
3.2V	SOT-23-3	LR8558-32PRM	TO-92	LR8558-32PT
3.3V	SOT-23-3	LR8558-33PRM	TO-92	LR8558-33PT
3.5V	SOT-23-3	LR8558-35PRM	TO-92	LR8558-35PT
⋮	⋮	⋮	⋮	⋮
4.5V	SOT-23-3	LR8558-45PRM	TO-92	LR8558-45PT

**Product Marking information:**

**SOT-23-3**



**SOT23-5**



- ① : Output current & EN availability
- ② : Output voltage
- ③ : Year of manufacturing
- ④ : Week of manufacturing

① LR8558 with output current 500mA, SOT-23-3 & SOT-23-5 package, its position ① is J

②

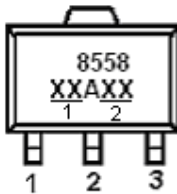
Code	Vout	Code	Vout	Code	Vout
2	1.2V	7	2.7V	2	4.2V
3	1.3V	8	2.8V	3	4.3V
4	1.4V	9	2.9V	4	4.4V
5	1.5V	0	3.0V	5	4.5V
6	1.6V	1	3.1V		
7	1.7V	2	3.2V		
8	1.8V	3	3.3V		
9	1.9V	4	3.4V		
0	2.0V	5	3.5V		
1	2.1V	6	3.6V		
2	2.12V	7	3.7V		
3	2.3V	8	3.8V		
4	2.4V	9	3.9V		
5	2.5V	0	4.0V		
6	2.6V	1	4.1V		

③ The year of manufacturing. "5" stands for year 2005, "6" stands for year 2006, and "0" for year 2010.

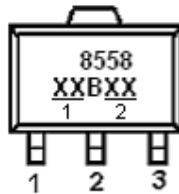
④

Code	Week of Mfg	Code	Week of Mfg	Code	Week of Mfg	Code	Week of Mfg	Code	Week of Mfg
A	1	L	12	W	23	H	34	S	45
B	2	M	13	X	24	I	35	T	46
C	3	N	14	Y	25	J	36	U	47
D	4	O	15	Z	26	K	37	V	48
E	5	P	16	A	27	L	38	W	49
F	6	Q	17	B	28	M	39	X	50
G	7	R	18	C	29	N	40	Y	51
H	8	S	19	D	30	O	41	Z	52
I	9	T	20	E	31	P	42		
J	10	U	21	F	32	Q	43		
K	11	V	22	G	33	R	44		

**SOT-89-3(A)**



**SOT-89-3(B)**

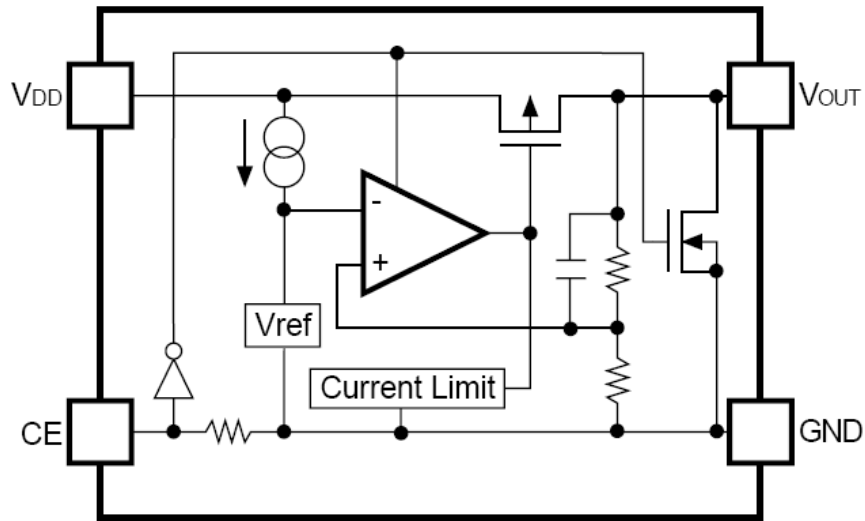


**TO-92**



- 1: Output voltage
- 2.: Lot NO.

**Block Diagram:**



**Absolute Maximum Ratings:**

Max input voltage	-----	10V
Junction Temperature (T <sub>J</sub> )	-----	125°C
Output Current	-----	500mA
Power Dissipation		
SOT-23-5	-----	250mW
SOT-23-3	-----	200mW
SOT-89-3	-----	500mW
TO-92	-----	350mW
Storage Temperature (T <sub>S</sub> )	-----	-45°C~150°C

**Recommended Work Conditions:**

Item	Min	Recommended	Max	unit
Input Voltage Range			8	V
Ambient Temperature	-40		85	°C

**Electrical Characteristics:**

( Test Conditions: C<sub>in</sub>=1uF,C<sub>out</sub>=3.4uF,TA=25°C, unless otherwise specified. )

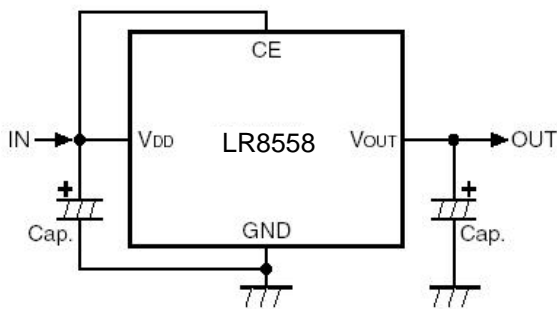
**LR8558, for arbitrary output voltage**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V <sub>in</sub>	Input Voltage				8	V
V <sub>out</sub>	Output Voltage	V <sub>in</sub> =Set V <sub>out</sub> +1V 1mA≤I <sub>out</sub> ≤30mA	V <sub>out</sub> x0.98	V <sub>out</sub> 1	V <sub>out</sub> X1.02	V
I <sub>out</sub> (Max.)	Maximun Output Current	V <sub>in</sub> -V <sub>out</sub> =1V	500			mA

Vdrop <sup>1</sup>	Dropout Voltage, Vout≥2.8V	Iout=100mA	88	120	mV	
		Iout=300mA	270	350	mV	
		Iout=500mA	460	600	mV	
$\frac{\Delta V_{out}}{\Delta V_{in} \cdot V_{out}}$	Line Regulation	Iout=40mA 2.8V≤Vin≤8V	0.05	0.2	%/V	
$\Delta V_{out} / \Delta I_{out}$	Load Regulation	Vin=Set Vout+1V 1mA≤Iout≤500mA	20	40	mV	
I <sub>ss</sub>	Supply Current	Vin=Set Vout+1V	75	90	uA	
I <sub>standby</sub>	Supply Current (Srandby)	Vin=Set Vout+1V Vce=GND	0.1	1.0	uA	
$\frac{\Delta V_{out}}{\Delta T \cdot V_{out}}$	Output Voltage Temperature Coefficiency	Iout=30mA	±100		ppm/°C	
PSRR	Ripple Rejection	F=100Hz, Ripple=0.5Vp-p Vin=Set Vout+1V	65		dB	
I <sub>lim</sub>	Short Current Limit	Vout=0V	200		mA	
R <sub>pd</sub>	CE Pull down Resistance		2.0	5.0	10.0	MΩ
V <sub>ceh</sub>	CE Input Voltage “H”		1.5		Vin	V
V <sub>cel</sub>	CE Input Voltage “L”		0		0.25	V
en	Output Noise	BW=10Hz~100kHz	47		uVrms	

1.  $V_{drop}=V_{in1}-(V_{out2} \cdot 0.98)$   $V_{out2}$  is the output voltage when  $V_{in}=V_{out1}+1.0V$  and  $I_{out}=300mA$  or  $I_{out}=500mA$ .  
 $V_{in1}$  is the input voltage at which the output voltage becomes 98% of  $V_{out1}$  after gradually decreasing the input voltage.

### Typical Application Circuit:



### Application hints:

NOTE1: Input capacitor (C<sub>in</sub>=1uF) is recommended in all application circuit.

NOTE2: Output capacitor (C<sub>out</sub>=3.3uF/4.7uF) is recommended in all application to assure the stability of circuit.

### Explanation:

LR8558 series is a group of positive voltage output, low noise, low power consumption, low dropout voltage regulator.

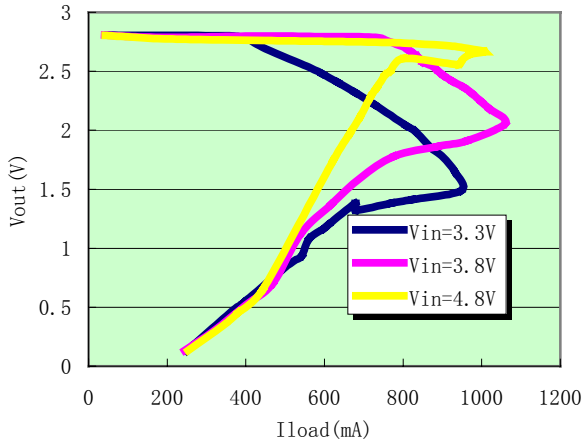
LR8558 can provide output value in the range of 1.2V~4.5V every 0.1V step. It also can be customized on command.

LR8558 includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module.

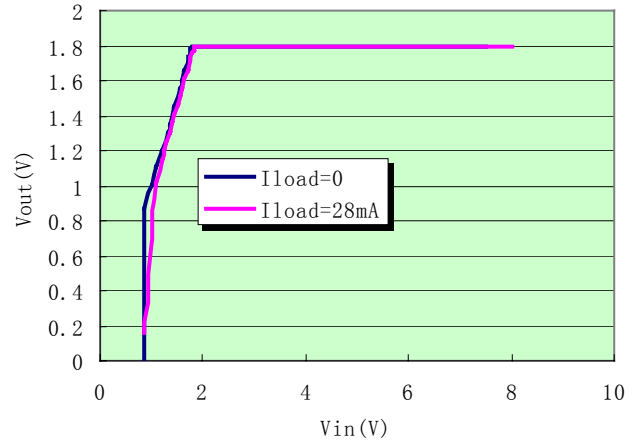
LR8558 has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within ±2%.

**Typical Performance Characteristics:**

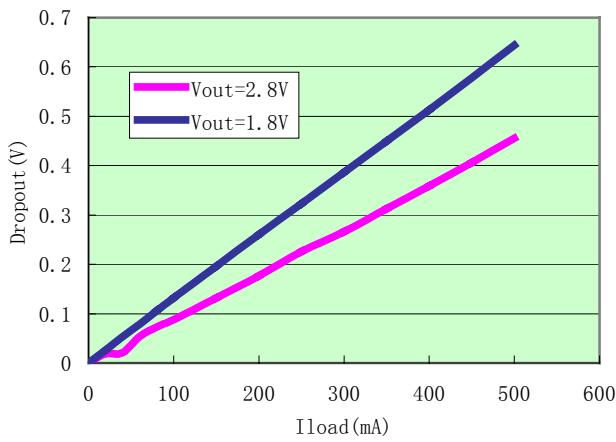
1) Output Voltage vs. Output Current (with output short protection)



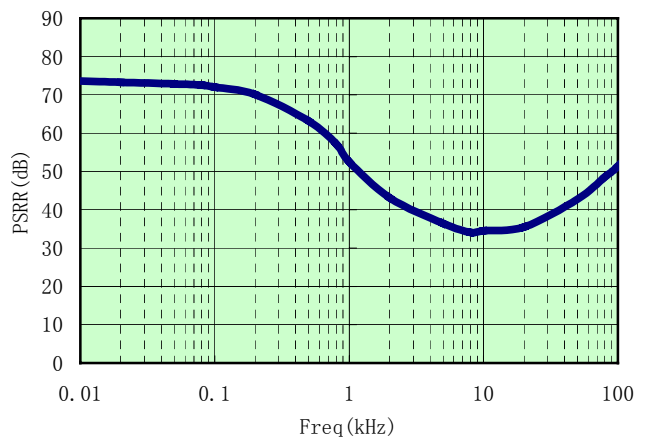
2) Output Voltage vs. Input Voltage



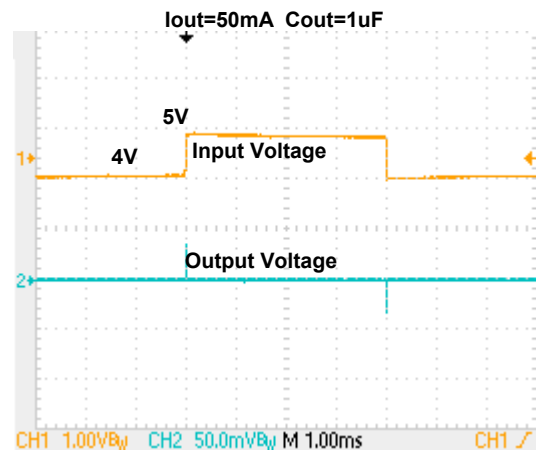
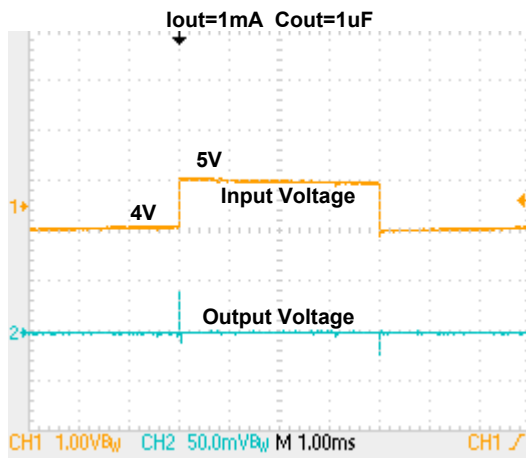
3) Dropout Voltage vs. Output Current



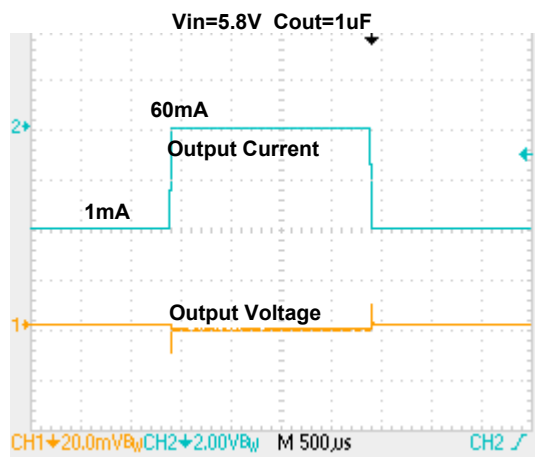
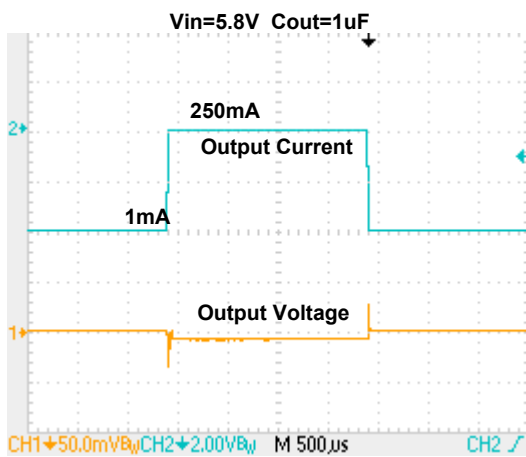
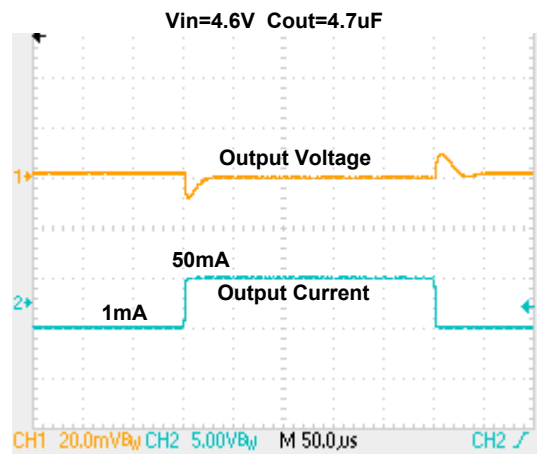
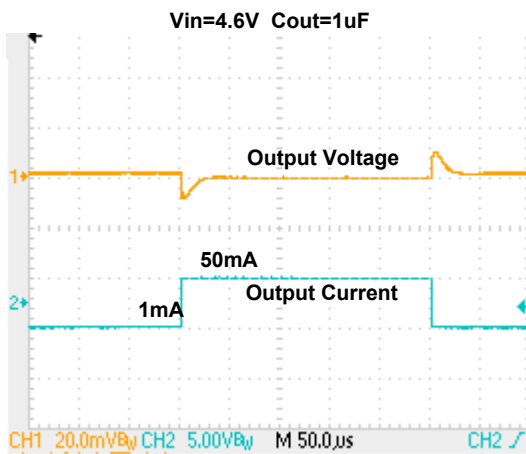
4) Ripple rejection vs. Frequency



5) Line transient response

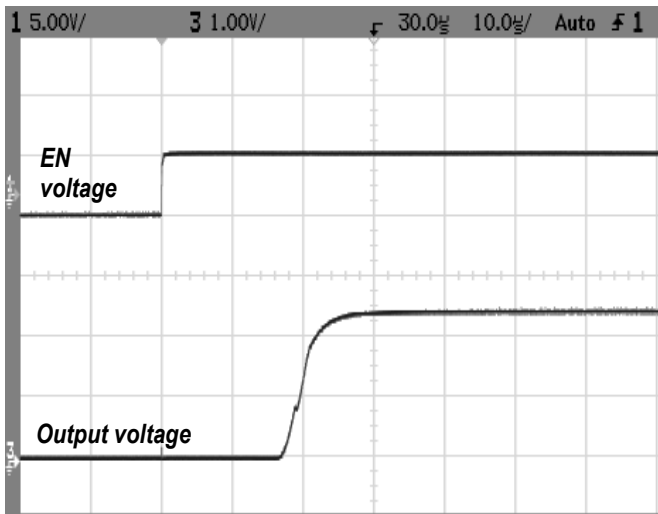


6) Load transient response

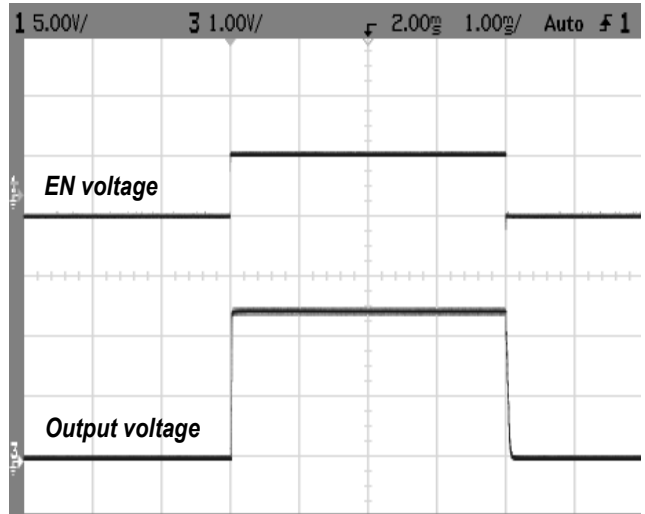




7) Startup response



8) Shutdown response

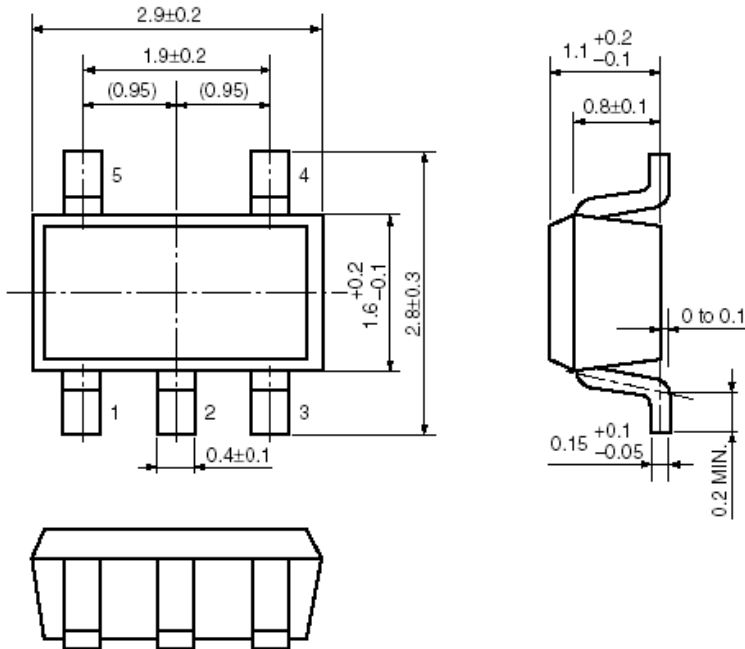


**Package Information:**

SOT-23-5:

Package specification:

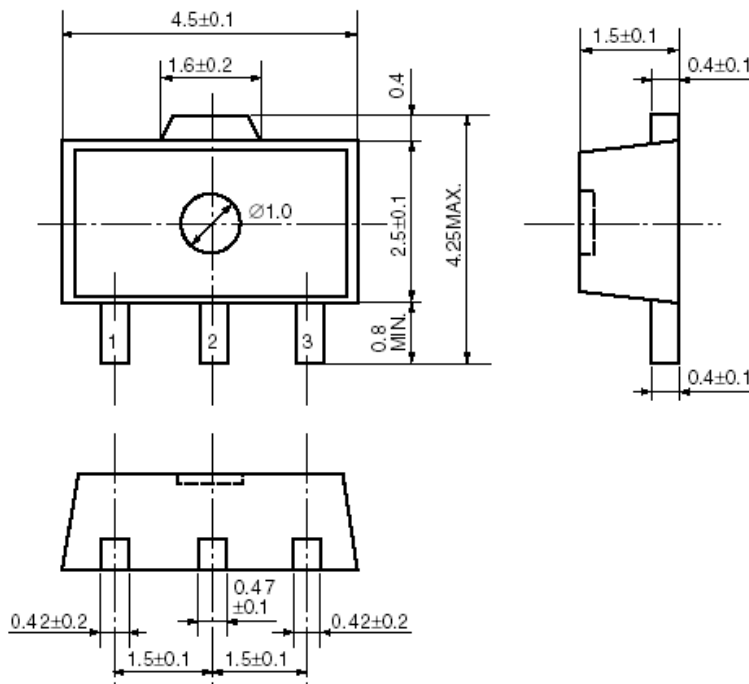
Unit: mm



SOT-89-3:

Package Dimension:

Unit: mm



SOT-23-3:

Package dimension:

Unit: mm

