GENERAL DESCRIPTION

The CM2854 family is positive, linear regulators featured low quiescent current (30μA typ.) with low dropout voltage, making them ideal for battery applications. The space-saving SOT-23-6 package is attractive for “Pocket” and “Hard Held” applications.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the “Worst” of operating conditions.

An additional feature is a “Power Good” detector, which pulls low when the output is out of regulation.

The CM2854 is stable with an output capacitance of 2.2μF or greater.

FEATURES

- Very Low Dropout Voltage
- Low Current Consumption: Typ. 30μA, Max. 35μA
- High Accuracy Output Voltage: +/- 1.5%
- Guaranteed 150mA Output
- Input Range of 2.6V to 7.0V
- Thermal Shutdown
- Current Limiting
- Power Good Output Function
- Compact Package: SOT-23-6
- Adjustable Output Voltages
- Short Circuit Current Fold-Back
- Low Temperature Coefficient

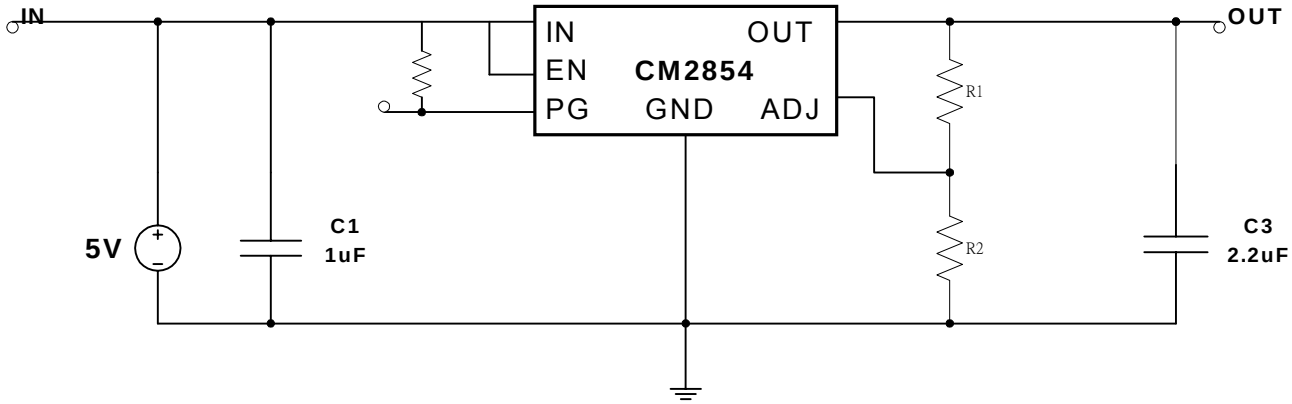
APPLICATIONS

- Battery-powered devices
- Personal communication devices
- Home electric/electronic appliances
- PC peripherals

24 Hours Technical Support--WebSIM

Champion provides customers an online circuit simulation tool called WebSIM. You could simply logon our website at www.champion-micro.com for details.

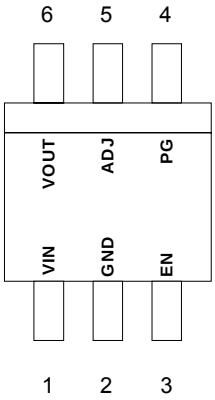
TYPICAL APPLICATIONS



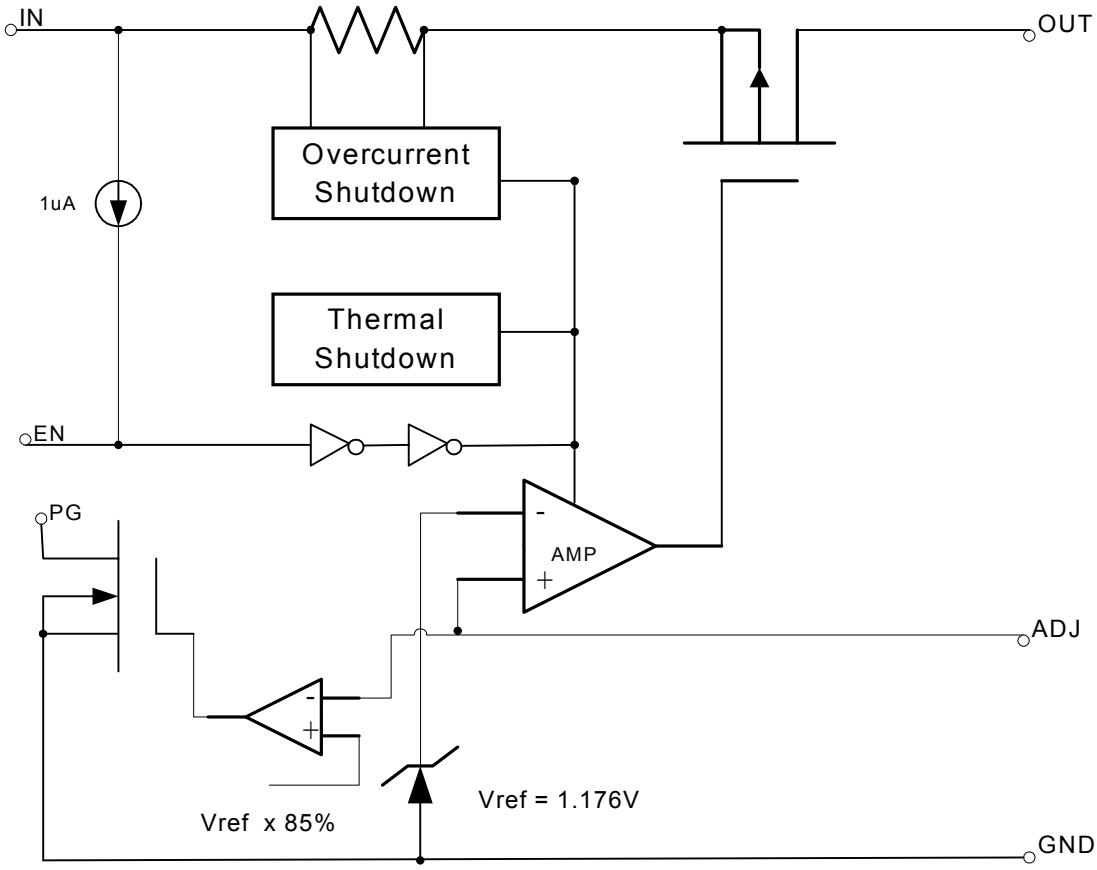
Note: 1. Suggest to add a small Cap 100pF between OUT and connection of R1and R2 to get less VOUT ripple
Vout = Vref * (1 + R1/R2); Vref = 1.176V
2. Enable pin can not be floating.

PIN CONFIGURATION

SOT-23-6
Top View



BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Output Voltage	Temperature Range	Package
CM2854IM26	Adjustable	-40℃ ~ +85℃	SOT-23-6

ABSOLUTE MAXIMUM RATINGS

Input Voltage ..... +7V
Output Current ..... P_D / (V_{IN} - Vo)
Output Voltage ..... GND-0.3V to V_{IN}+0.3V
ESD Classification ..... B

OPERATING RATINGS

Ambient Temperature Range (T_A) ..... -40℃ to +85℃
Junction Temperature Range ..... -40℃ to +125℃

THERMAL INFORMATION

Parameter		Maximum	Unit
Thermal Resistance (Θ_{JA})	SOT-23-6	260	℃/W
Internal Power Dissipation (P_D)	SOT-23-6	**Note 1**	
Maximum Junction Temperature		150	℃
Maximum Lead Temperature (10 Sec)		300	℃

Caution: Stress above the listed absolute rating may cause permanent damage to the device.
Note 1: $P_{D(MAX)} = (T_{J(MAX)} - T_A)/\theta_{JA}$, where θ_{JA} depends on the printed circuit layout.

ELECTRICAL CHARACTERISTICS

T_A = +25℃; V_{IN} = $V_{IN(MIN)}$ unless otherwise noted

Parameter	Symbol	Test Conditions		CM2854 Min.	CM2854 Typ.	CM2854 Max.	Unit
Input Voltage	V_{IN}			**Note 2**		7	V
Output Voltage Accuracy	V_{OUT}	I_O = 1mA		-1.5		1.5	%
Dropout Voltage	$V_{DROPOUT}$	I_O = 150mA, V_{OUT}=$V_{O(NOM)}$-1.5%,	1.2V< $V_{O(NOM)}$<=2.0V			1300	mV
			2.0V< $V_{O(NOM)}$<=2.5V			800	
			2.5V< $V_{O(NOM)}$			300	
Output Current	I_O	V_{OUT} > 1.2V		300			mA
Current Limit	I_{LIM}	V_{OUT} > 1.2V			800		mA
Short Circuit Current	I_{SC}	V_{OUT} < 0.8V **(Note 3)**			150		mA
Quiescent Current	I_Q	I_O = 0mA			30	35	μA
Ground Pin Current	I_{GND}	I_O = 1mA to 150mA			30	35	μA
Bandgap Reference	V_{REF}	V_O = V_{REF}, load = 10mA		1.168	1.176	1.184	V
Line Regulation	REG_{LINE}	I_{OUT}=1mA, V_{IN}=V_{OUT}+1 to V_{OUT}+2	V_{OUT} < 2.0V	-0.1	0.02	0.1	%
			2.0V<V_{OUT} < 3.0V	-.015	0.03	0.15	%
			3.0V<V_{OUT}	-0.3	0.06	0.3	%
Load Regulation	REG_{LOAD}	I_O=1mA to 150mA			0.2	1	%
Over Temperature Shutdown	OTS				150		℃
Over Temperature Hysteresis	OTH				30		℃
V_{OUT} Temperature Coefficient	TC				25		ppm/℃
Power Supply Rejection	PSRR	I_O = 100mA C_O=2.2μF ceramic	f=1kHz		60		dB
			f=10kHz		50		
			f=100kHz		40		
Output Voltage Noise	eN	f=10Hz to 100kHz I_O = 10mA	C_O=2.2μF		30		μVrms
EN Input Bias Current	I_{EH}	V_{EN}=V_{IN}, V_{IN}=2.7V to 7V				0.1	μA
	I_{EL}	V_{EN}=0V, V_{IN}=2.7V to 7V			1.0	3.0	μA
EN Input Threshold	V_{EH}	V_{IN}=2.7V to 7V			V_{IN}/2+0.8V	V_{IN}	V
	V_{EL}	V_{IN}=2.7V to 7V		0	V_{IN}/2-0.8V		V
Shutdown Supply Current	I_{SD}	V_{IN}=5.0V, V_{OUT}=0V, V_{EN} < V_{EL}			2.0		μA
Shutdown Output Voltage	$V_{O, SD}$	I_O=150mA		0		0.1	V
PG Leakage Current	I_{LC}	V_{PG} = 7V				1	μA
PG Voltage Rating	V_{PG}	V_{OUT} in regulation				7	V
PG Low Threshold		% of V_O (PG ON)		89.5			%
PG High Threshold		% of V_O (PG OFF)				96.5	%
PG Voltage Low	V_{OL}	I_{SINK} = 2mA				0.1	V
Delay Time to PG **(Note 3)**	t_{DELAY}	V_{IN} = 5V			7.8		ms
		V_{IN} = 3V			3.8		ms

Note 2. $V_{IN(MIN)}$ = V_{OUT} + $V_{DROPOUT}$
Note 3. Guaranteed by Design, not 100% test. VIN start time needs to be less than 2ms.
Note 4. Short Circuit Current and Current limit value will increase as input voltage is larger than $V_{IN(MIN)}$

DETAILED DESCRIPTION

The CM2854 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, output short circuit protection, thermal shutdown, and power good function.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, short output protection, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150℃, or the current exceeds 150mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120℃.

The CM2854 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The CM2854 also incorporates current fold-back to reduce power dissipation when the output is short-circuited. This feature becomes active when the output drops below 0.95V, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.95V.

EXTERNAL CAPACITOR

The CM2854 is stable with an output capacitor to ground of 2.2μF or greater. It can keep stable even with higher or poor ESR capacitors. A second capacitor is recommended between the input and ground to stabilize VIN. The input capacitor should be larger than 0.1μF to have a beneficial effect. All capacitors should be placed in close proximity to the pins. A “quiet” ground termination is desirable.

ENABLE

When actively, pulled low, the PMOS pass transistor shut off, and all internal circuits are powered down. In this state, the quiescent current is less than 1μA. This pin behaves much like an electronic switch.

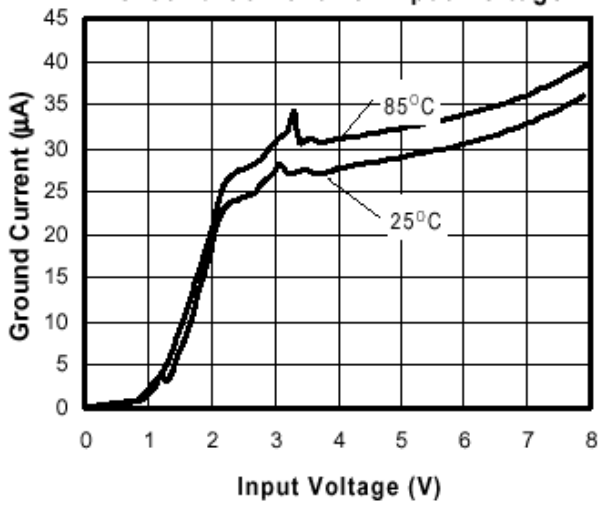
POWER GOOD

The CM2854 includes the Power Good feature. Normally, Pin 4 is floating, however, when the output is lower than 85% of the specified voltage, it pulls low. This can occur under the following conditions:

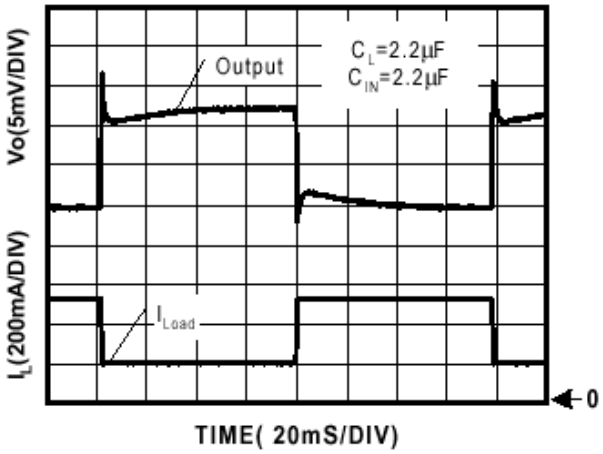
1) Input Voltage too low
2) During Over-Temperature
3) During Over-Current

TYPICAL ELECTRICAL CHARACTERISTICS

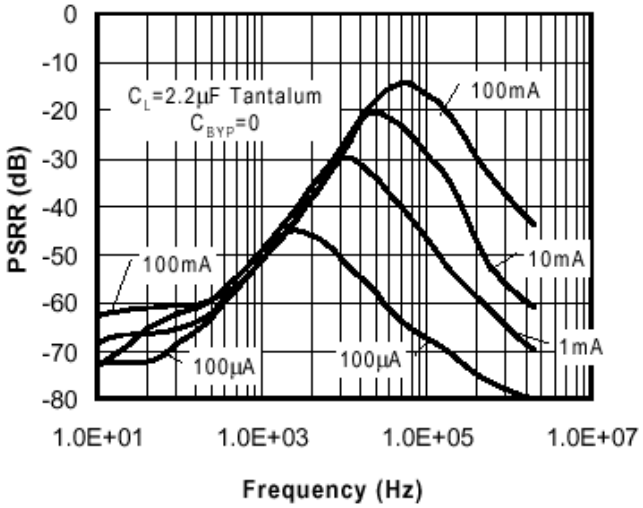
Ground Current vs. Input Voltage



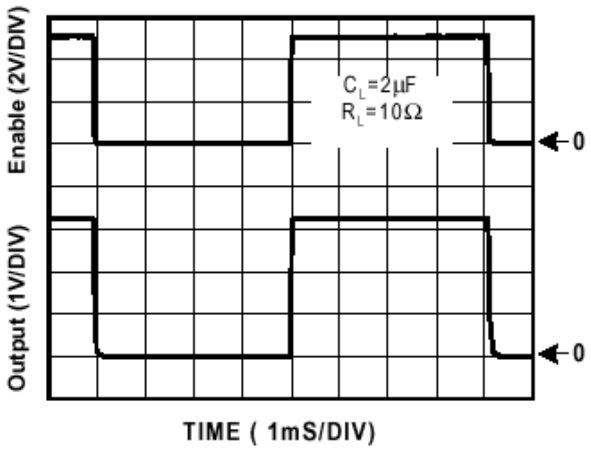
Load Step (1mA-300mA)



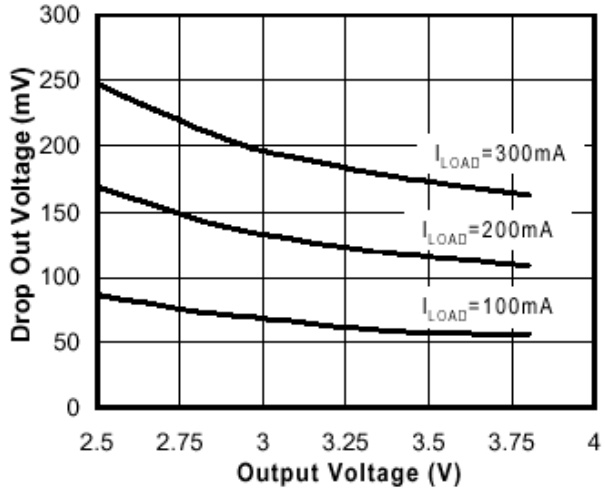
Power Supply Rejection Ratio



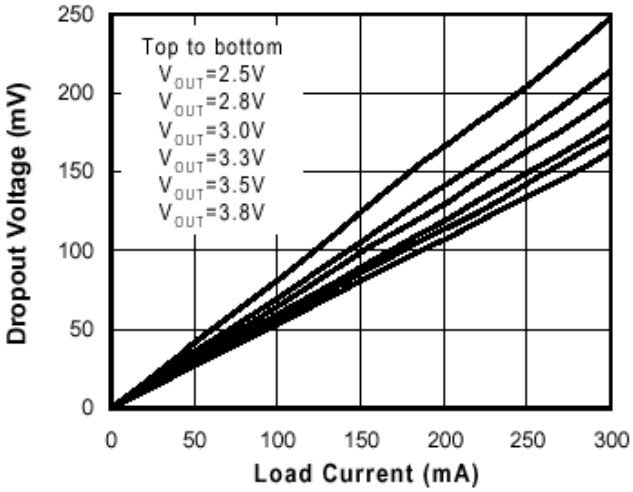
Chip Enable Transient Response



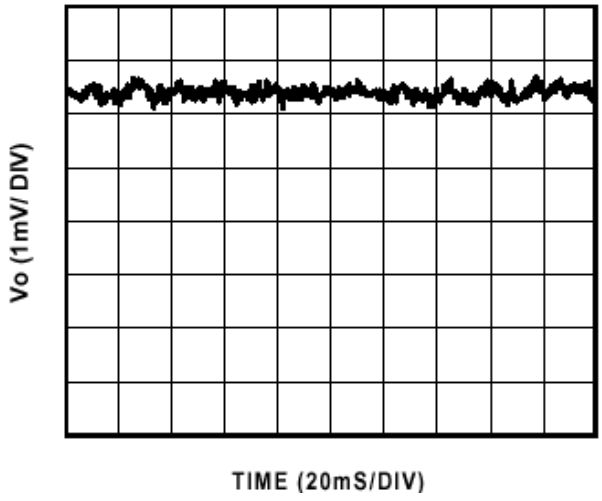
Drop Out Voltage vs Output Voltage



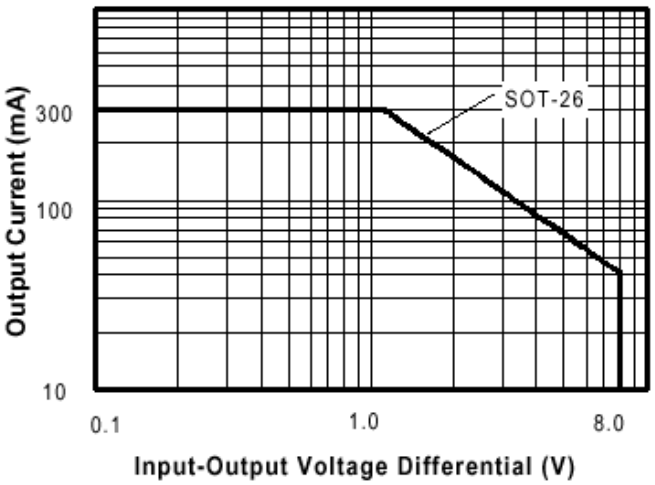
Drop Out Voltage vs Load Current



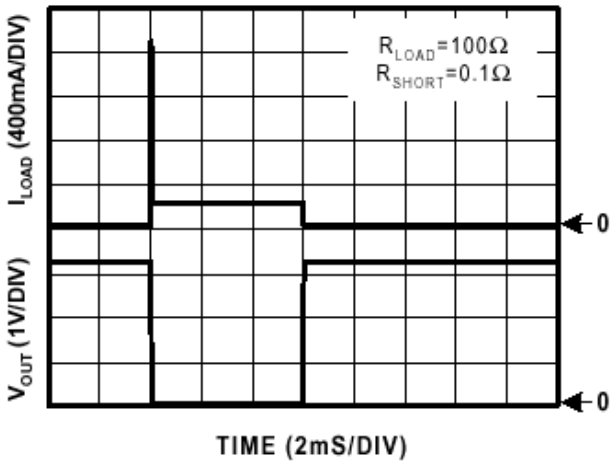
Noise Measurement



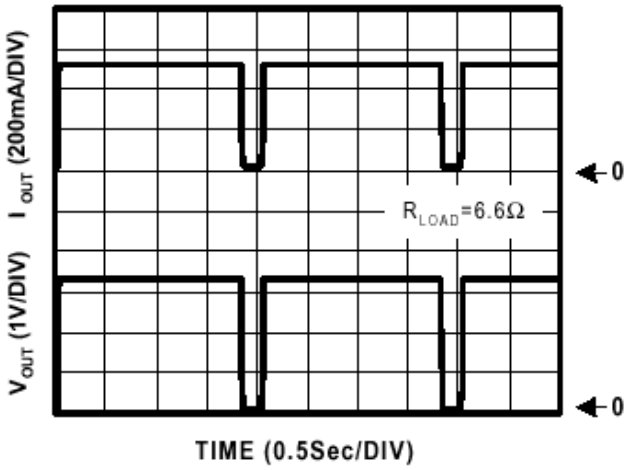
Safe Operating Area



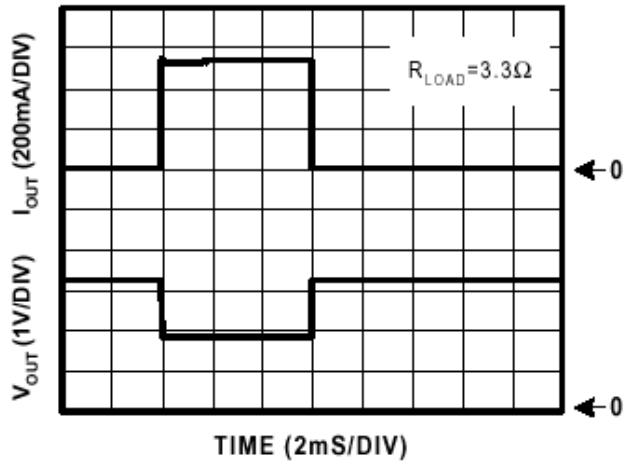
Short Circuit Response



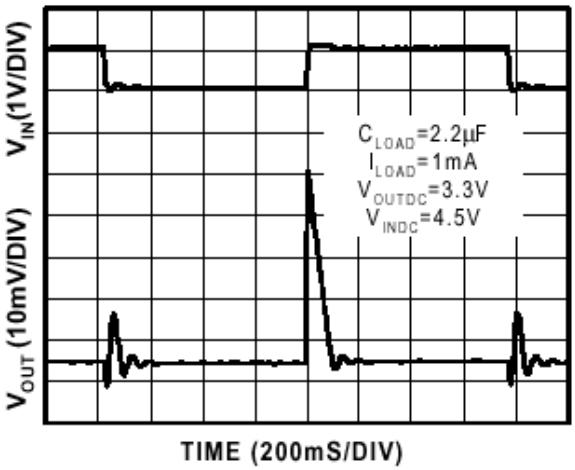
Overtemperature Shutdown

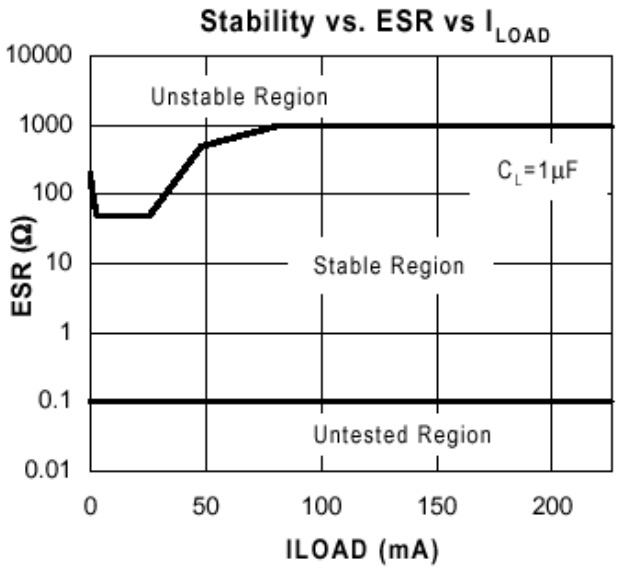


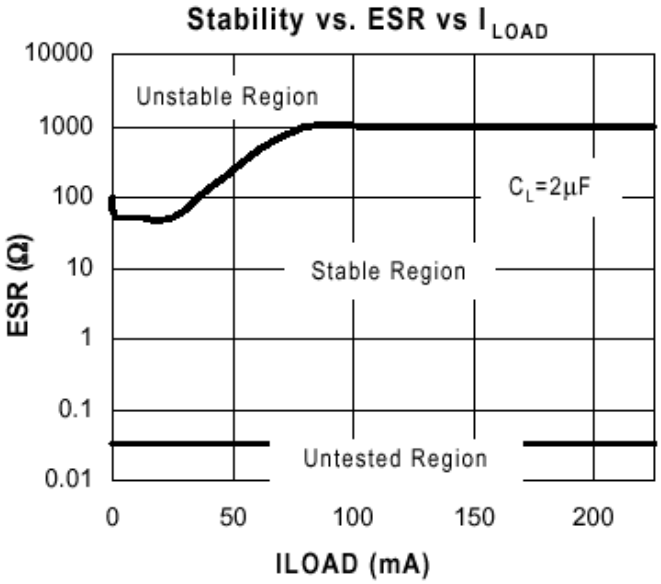
Current Limit Response

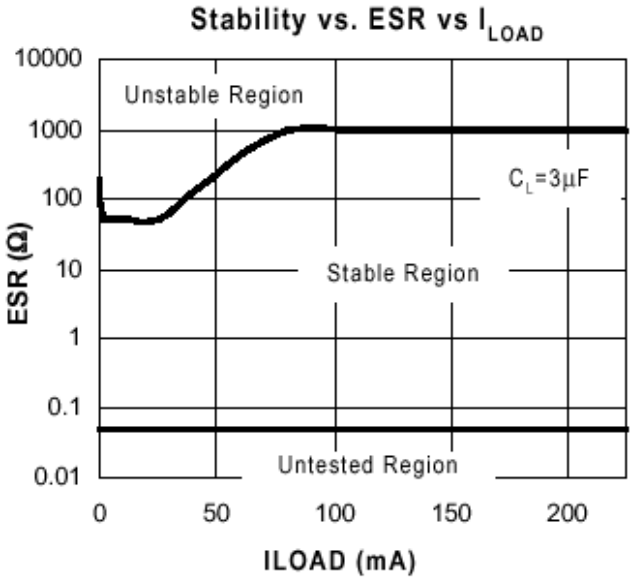


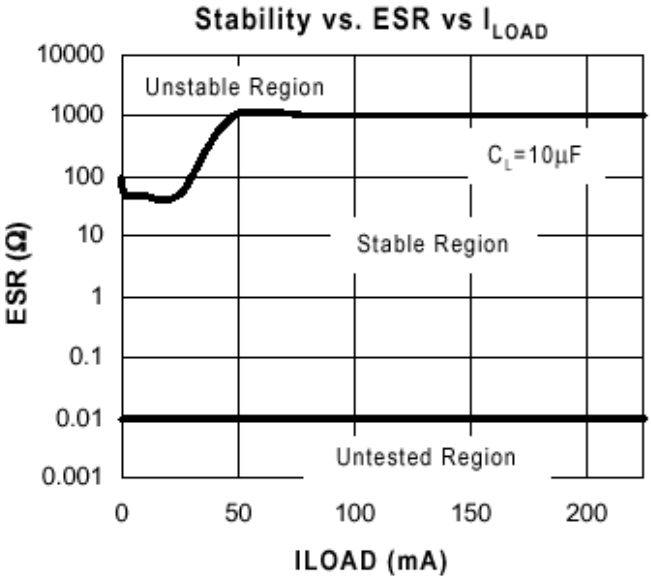
Line Transient Response




Stability vs. ESR vs I_{LOAD}
Unstable Region
C_L=1µF
Stable Region
Untested Region
ESR (Ω)
10000
1000
100
10
1
0.1
0.01
0
50
100
150
200
ILOAD (mA)

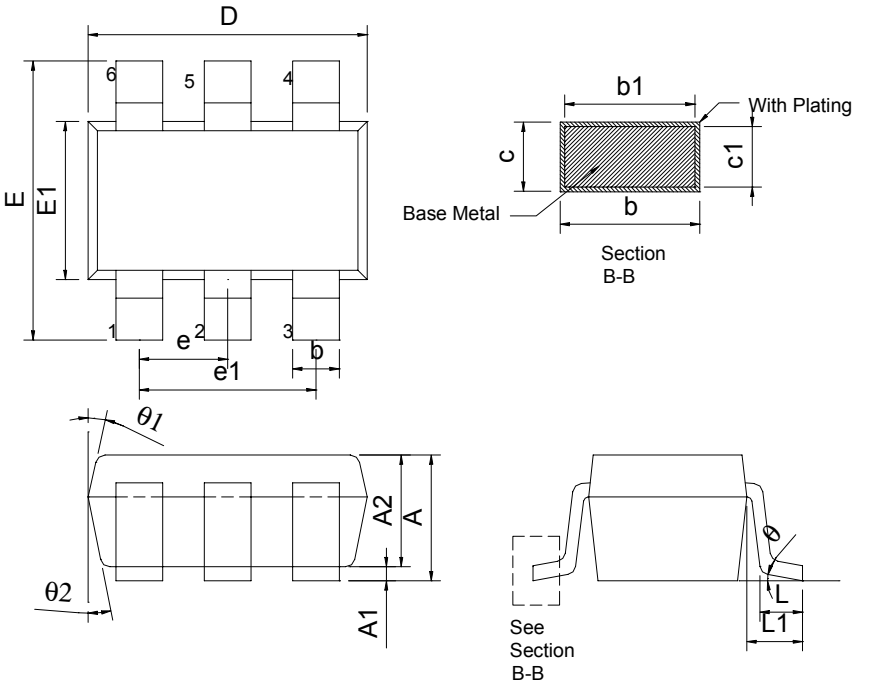

Stability vs. ESR vs I_{LOAD}
Unstable Region
C_L=2µF
Stable Region
Untested Region
ESR (Ω)
10000
1000
100
10
1
0.1
0.01
0
50
100
150
200
ILOAD (mA)


Stability vs. ESR vs I_{LOAD}
Unstable Region
C_L=3µF
Stable Region
Untested Region
ESR (Ω)
10000
1000
100
10
1
0.1
0.01
0
50
100
150
200
ILOAD (mA)


Stability vs. ESR vs I_{LOAD}
Unstable Region
C_L=10µF
Stable Region
Untested Region
ESR (Ω)
10000
1000
100
10
1
0.1
0.01
0.001
0
50
100
150
200
ILOAD (mA)

PACKAGE DIMENSION

SOT-23-6 (M26)



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.05	---	1.35	0.041	---	0.053
A1	0.05	---	0.15	0.002	---	0.006
A2	1.00	1.10	1.20	0.039	0.043	0.047
b	0.25	---	0.55	0.010	---	0.020
b1	0.25	0.40	0.50	0.010	0.016	0.018
c	0.08	---	0.20	0.003	---	0.008
c1	0.08	0.11	0.15	0.003	0.004	0.006
D	2.70	2.90	3.00	0.106	0.114	0.118
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
L	0.35	0.45	0.55	0.014	0.018	0.022
L1	0.60 REF			0.024 REF		
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
θ	0°	5°	10°	0°	5°	10°
θ1	3°	5°	7°	3°	5°	7°
θ2	6°	8°	10°	6°	8°	10°

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