



Preliminary

## AME8817

## 1.5A CMOS LDO

### General Description

The AME8817 family of positive, linear regulators feature low quiescent current (35 $\mu$ A typ.) with low dropout voltage, making them ideal for battery applications.

Output voltages are set at the factory and trimmed to 1.5% accuracy.

These rugged devices have both thermal shutdown, and current fold-back to prevent device failure under the "worst" of operating conditions.

In applications requiring a low noise, regulated supply, place a 1000pF capacitor between Bypass and Ground.

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

The AME8817 is stable with an output capacitance of 4.7 $\mu$ F or greater.

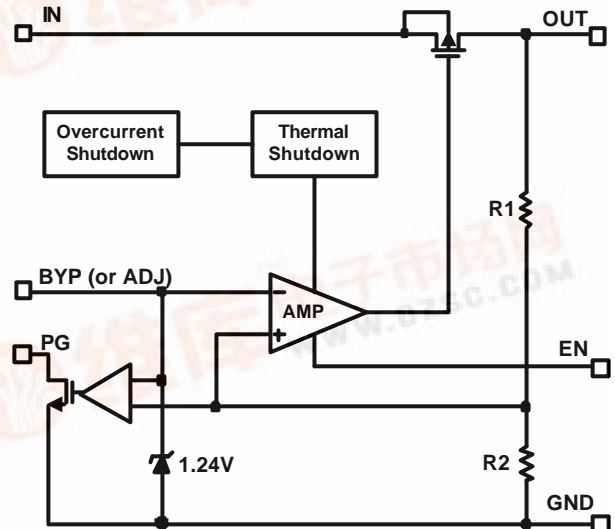
### Features

- Very Low Dropout Voltage
- Guaranteed 1.5A Output
- Accurate to within 1.5%
- 35 $\mu$ A Quiescent Current Typically
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Noise Reduction Bypass Capacitor
- Power Good Output
- Power-Saving Shutdown Mode
- Space-Saving DDPAK-7 Package
- Low Temperature Coefficient

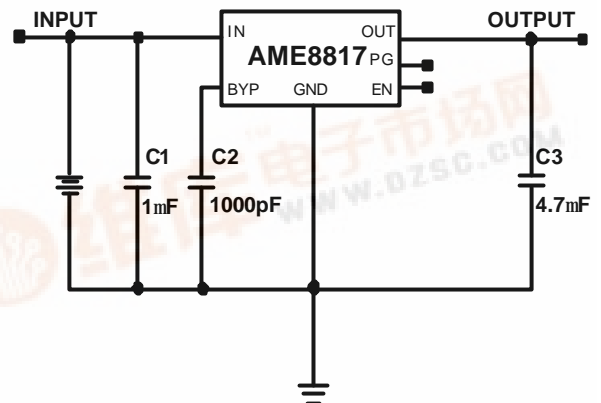
### Applications

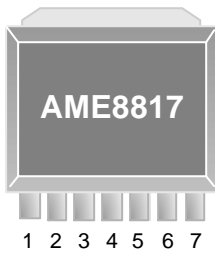
- Instrumentation
- Portable Electronics
- Wireless Devices
- PC Peripherals
- Battery Powered Widgets

### Functional Block Diagram

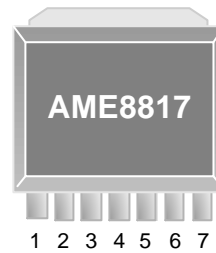


### Typical Application

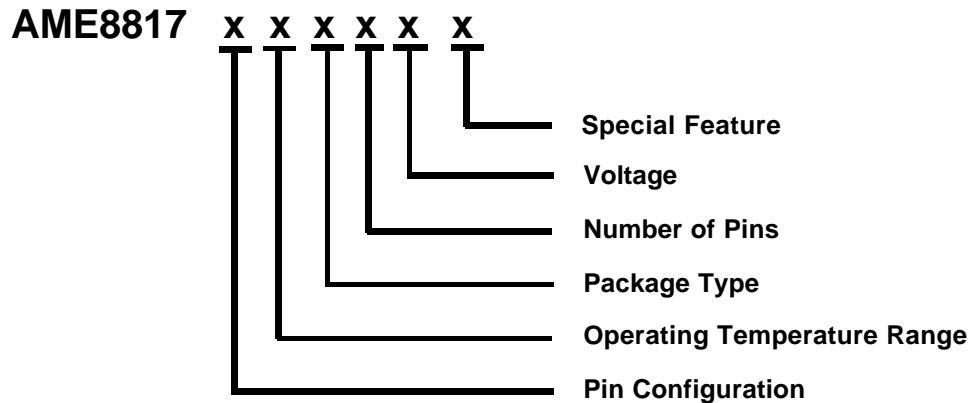


**■ Pin Configuration**
**TO-263(DDPAK-7)  
Top View**

**AME 8817AEDZxxx**

1. EN
2. PG
3.  $V_{IN}$
4. GND
5.  $V_{OUT}$
6.  $V_{OUT}$
7. BYP

**TO-263(DDPAK-7)  
Top View**

**AME 8817BEDZxxx**

1. EN
2. PG
3.  $V_{IN}$
4. GND
5.  $V_{OUT}$
6.  $V_{OUT}$
7. ADJ

**■ Ordering Information**


Pin Configuration	Operating Temperature Range	Package Type	Number of Pins	Voltage	Special Feature
A: 1. EN 2. PG 3. $V_{IN}$ 4. GND 5. $V_{OUT}$ 6. $V_{OUT}$ 7. BYP  B: 1. EN 2. PG 3. $V_{IN}$ 4. GND 5. $V_{OUT}$ 6. $V_{OUT}$ 7. ADJ	E: -40°C to 85°C	D: TO-263	Z: 7	150: V=1.5V 180: V=1.8V 250: V=2.5V 330: V=3.3V 475: V=4.75V 500: V=5.0V ADJ: Adjustable	Z: Lead free



■ Ordering Information (contd.)

Part Number	Marking*	Output Voltage	Package	Operating Temp. Range
AME8817AEDZ150	AME8817 AEDZ150 yyww	1.50	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ150Z	AME8817 AEDZ150 yyww	1.50	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ180	AME8817 AEDZ180 yyww	1.80	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ180Z	AME8817 AEDZ180 yyww	1.80	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ250	AME8817 AEDZ250 yyww	2.50	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ250Z	AME8817 AEDZ250 yyww	2.50	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ330	AME8817 AEDZ330 yyww	3.30	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ330Z	AME8817 AEDZ330 yyww	3.30	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ475	AME8817 AEDZ475 yyww	4.75	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ475Z	AME8817 AEDZ475 yyww	4.75	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ500	AME8817 AEDZ500 yyww	5.00	DDPAK-7	- 40°C to + 85°C
AME8817AEDZ500Z	AME8817 AEDZ500 yyww	5.00	DDPAK-7	- 40°C to + 85°C

Note: yyww represents the date code

\* A line on top of the first character represents lead free platingsuch as AME8817

Please consult AME sales office or authorized Rep./Distributor for the availability of output voltage and package type.



AME, Inc.

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AME8817

1.5A CMOS LDO

■ Ordering Information (contd.)

Part Number	Marking*	Output Voltage	Package	Operating Temp. Range
AME8817BEDZADJ	AME8817 BEDZADJ yyww	ADJ	DDPAK-7	- 40°C to + 85°C
AME8817BEDZADJZ	AME8817 BEDZADJ yyww	ADJ	DDPAK-7	- 40°C to + 85°C



### ■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Input Voltage	8	V
Output Current	$P_D / (V_{IN} - V_O)$	mA
Output Voltage	GND - 0.3 to $V_{IN} + 0.3$	V
ESD Classification	B	

Caution: Stress above the listed absolute maximum rating may cause permanent damage to the device

### ■ Recommended Operating Conditions

Parameter	Rating	Unit
Ambient Temperature Range	- 40 to + 85	°C
Junction Temperature	- 40 to + 125	°C

### ■ Thermal Information

Parameter	Maximum	Unit
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (10 Sec)	300	°C

## ■ Electrical Specifications

 $V_{IN}=V_{O(NOM)}+2V$ ,  $V_{EN}=V_{IN}$ ,  $T_A = 25^{\circ}C$  unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units	
Input Voltage	$V_{IN}$		Note 1		7	V	
Output Voltage Accuracy	$V_O$	$I_O=1mA$	-1.5		1.5	%	
Dropout Voltage	$V_{DROPOUT}$	$I_O=1500mA$ $V_O=V_{O(NOM)}-2.0\%$	$1.5V \leq V_{O(NOM)} \leq 2.0V$	See chart	1000	mV	
			$2.0V < V_{O(NOM)} \leq 2.8V$		800		
			$2.8V < V_{O(NOM)} < 3.8V$		600		
Output Current	$I_O$	$V_O > 1.2V$	1500			mA	
Current Limit	$I_{LIM}$	$V_O > 1.2V$	1500	2000		mA	
Short Circuit Current	$I_{SC}$	$V_O < 0.4V$		750	1500	mA	
Quiescent Current	$I_Q$	$I_O=0mA$		35	50	$\mu A$	
Ground Pin Current	$I_{GND}$	$I_O=1mA$ to 1.5A		35		$\mu A$	
Line Regulation	$REG_{LINE}$	$I_O=1mA$ $V_{IN}=V_O+1$ to $V_O+2$	$V_O < 2.0V$	-0.15		0.15	%
			$4.0V > V_O \geq 2.0V$	-0.1	0.02	0.1	%
			$V_O \geq 4.0V$	-0.4	0.2	0.4	%
Load Regulation	$REG_{LOAD}$	$I_O=1mA$ to 1500mA		0.2	1	%	
Over Temperature Shutdown	OTS			150		$^{\circ}C$	
Over Temperature Hysteresis	OTH			30		$^{\circ}C$	
$V_O$ Temperature Coefficient	TC			30		ppm/ $^{\circ}C$	
Power Supply Rejection	PSRR	$I_O=100mA$ $C_O=4.7\mu F$	$f=1kHz$		50	dB	
			$f=10kHz$		20		
			$f=100kHz$		15		
Power Supply Rejection	PSRR	$I_O=100mA$ $C_O=4.7\mu F$ $C_{BYP}=0.01\mu F$	$f=1kHz$		75	dB	
			$f=10kHz$		55		
			$f=100kHz$		30		
Output Voltage Noise	eN	$f=10Hz$ to 100kHz $I_O=10mA, C_{BYP}=0\mu F$	$C_O=4.7\mu F$		30	mVrms	
			$C_O=100\mu F$		20		
Output Voltage Noise	eN	$f=10Hz$ to 100kHz $I_O=10mA, C_{BYP}=0.01\mu F$	$C_O=4.7\mu F$		30	mVrms	
			$C_O=100\mu F$		20		
ADJ Input Bias Current	$I_{ADJ}$			1		mA	
ADJ Reference Voltage	$V_{REF}$		1.223	1.242	1.26	V	
EN Input Threshold	$V_{EH}$	$V_{IN}=2.7V$ to 7V	2.0		$V_{IN}$	V	
	$V_{EL}$	$V_{IN}=2.7V$ to 7V	0		0.4	V	
EN Input Bias Current	$I_{EH}$	$V_{EN}=V_{IN}$ , $V_{IN}=2.7V$ to 7V			0.1	$\mu A$	
	$I_{EL}$	$V_{EN}=V_{OV}$ , $V_{IN}=2.7V$ to 7V			0.5	$\mu A$	
Shutdown Supply Current	$I_{SD}$	$V_{IN}=5V$ , $V_O=0V$ , $V_{EN}<V_{EL}$		0.5	1	$\mu A$	
Output Under Voltage	$V_{UV}$				85	% $V_{O(NOM)}$	
Output Over Voltage	$V_{OV}$		115			% $V_{O(NOM)}$	
PG Leakage Current	$I_{LC}$	$V_{PG}=7V$			1	$\mu A$	
PG Voltage Rating	$V_{PG}$	$V_O$ in regulation			7	V	
PG Voltage Low	$V_{OL}$	$I_{SINK}=500\mu A$			0.4	V	

 Note 1:  $V_{IN(min)}=V_{OUT}+V_{DROPOUT}$



## ■ Detailed Description

The AME8817 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, and thermal shutdown.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, 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°C, or the current exceeds 2.2A. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 110°C.

The AME8817 behaves like a current source when the load reaches 2.2A. However, if the load impedance drops below 0.3 ohms, the current drops back to 600mA to prevent excessive power dissipation. Normal operation is restored when the load resistance exceeds 0.75 ohms.

## ■ External Capacitors

The AME8817 is stable with an output capacitor to ground of 4.7µF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1µF ceramic capacitor with a 10µF Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

A second capacitor is recommended between the input and ground to stabilize  $V_{in}$ . The input capacitor should be at least 0.1µF to have a beneficial effect.

A third capacitor can be connected between the BY-PASS pin and GND. This capacitor can be a low cost Polyester Film variety between the value of 0.001 ~ 0.01µF. A larger capacitor improves the AC ripple rejection, but also makes the output come up slowly. This "Soft" turn-on is desirable in some applications to limit turn-on surges.

All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

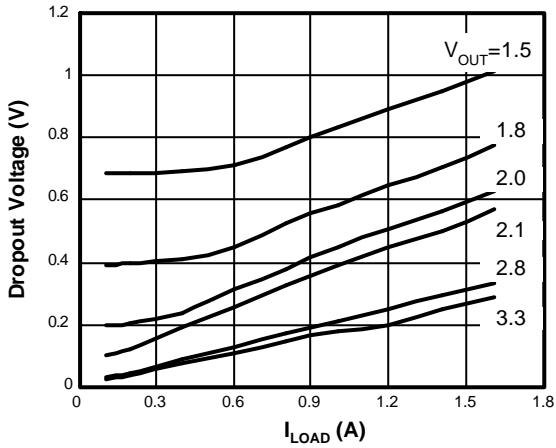
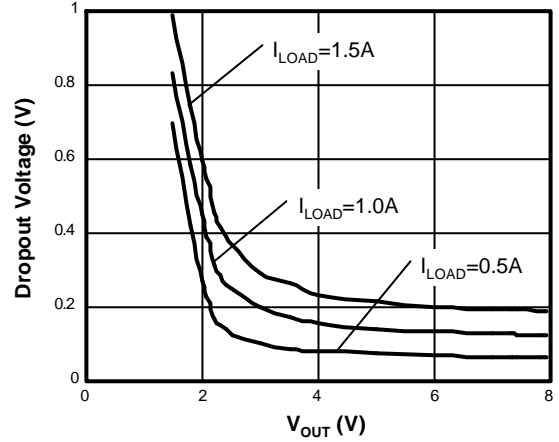
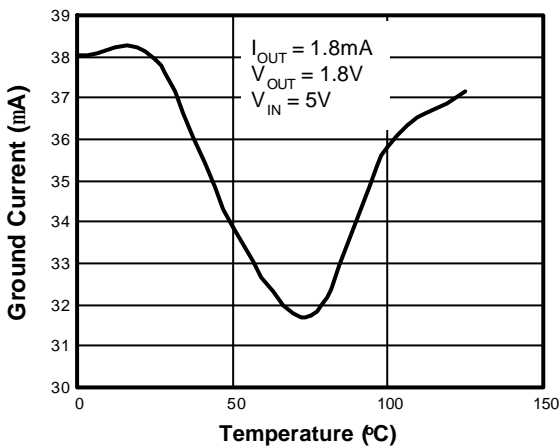
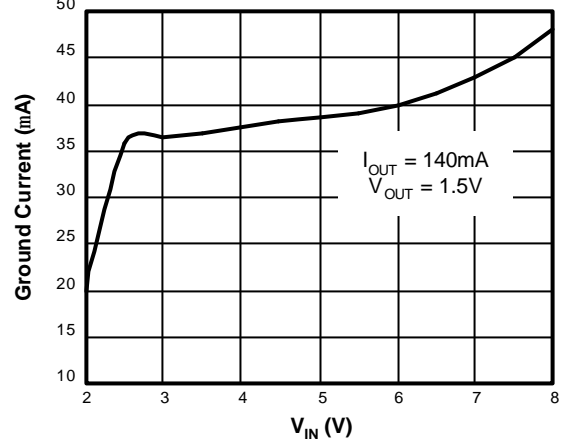
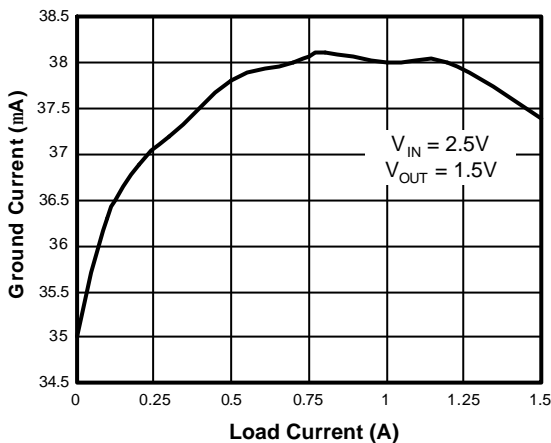
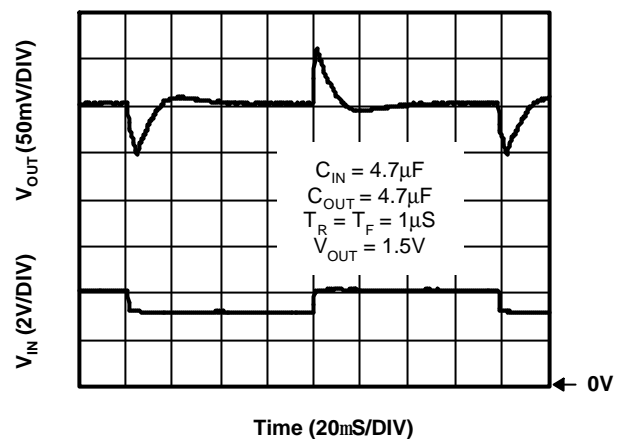
## ■ Enable

When pulled low, the PMOS pass transistor shuts 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 AME8817 includes the Power Good feature. Normally, the PG pin is "Floating", however, when the output is not within ±15% of the specified voltage, it pulls low. This can occur under the following conditions:

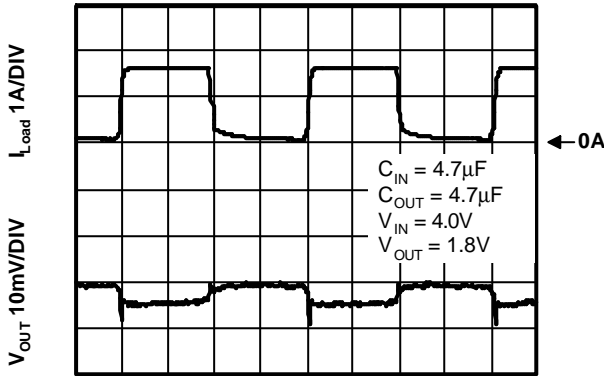
- 1) Input Voltage too low.
- 2) During Over-Temperature.
- 3) During Over-Current.
- 4) If output is pulled up.

**Dropout Voltage vs.  $I_{LOAD}$** 

**Dropout Voltage vs.  $V_{OUT}$** 

**Ground Current vs. Temperature**

**Ground Current vs.  $V_{IN}$** 

**Ground Current vs. Load Current**

**Line Transient Response**




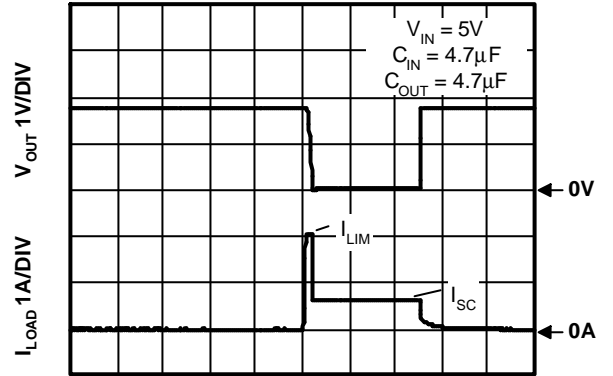


Load Step 40mA to 1.5A



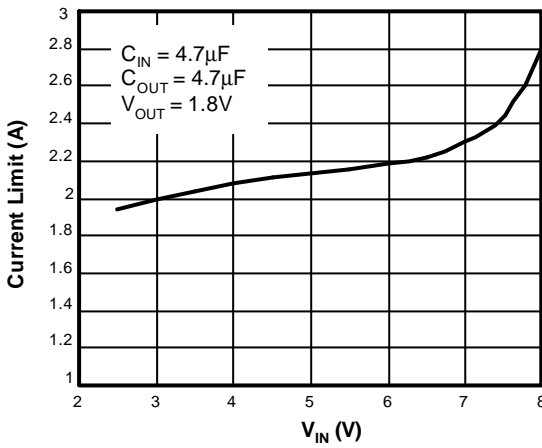
Time 500mS/DIV

Current Limit Response

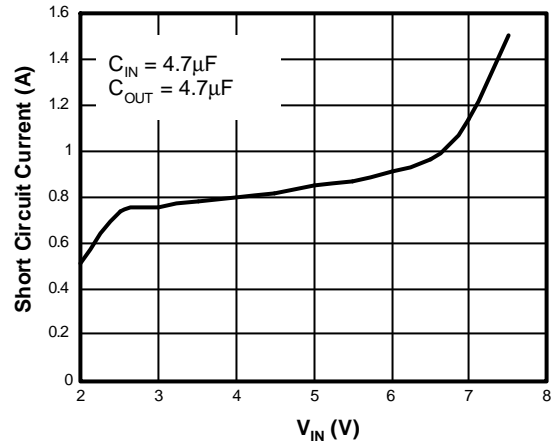


Time 1mS/DIV

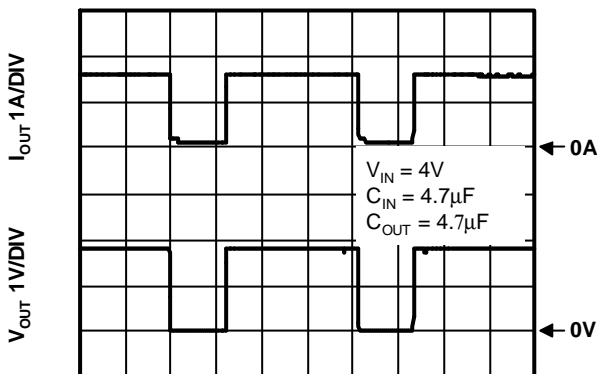
Current Limit vs.  $V_{IN}$



Short Circuit Current vs.  $V_{IN}$

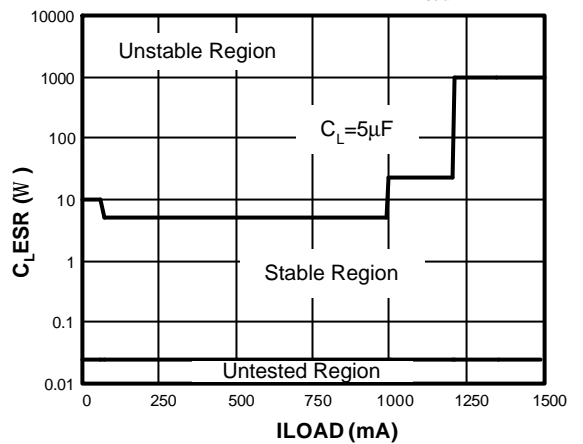


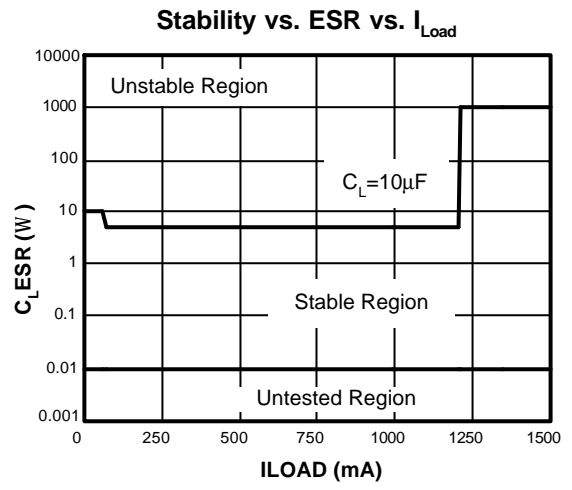
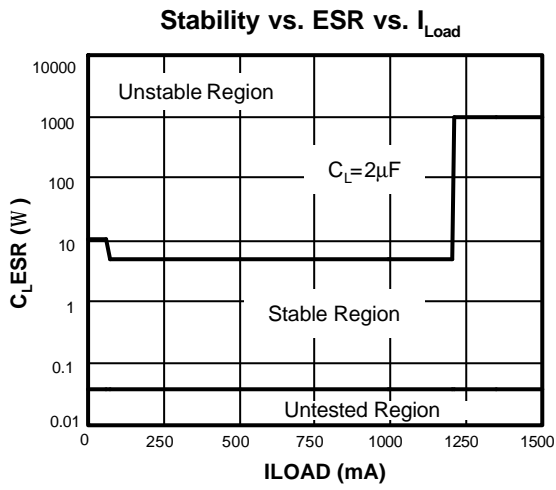
Overtemperature Shutdown



Time 100mS/DIV

Stability vs. ESR vs.  $I_{Load}$

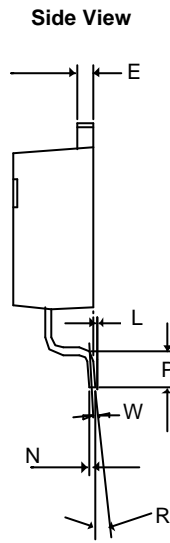
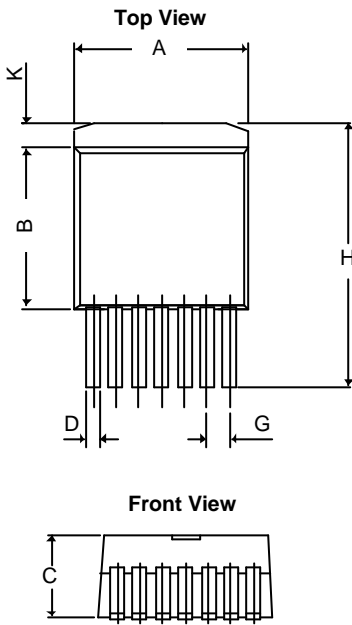






■ Package Dimension

TO-263-7



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.05	10.31	0.396	0.406
B	8.28	8.53	0.326	0.336
C	4.31	4.57	0.170	0.180
D	0.66	0.91	0.026	0.036
E	1.14	1.40	0.045	0.055
G	1.27 REF		0.050 REF	
H	14.73	15.75	0.580	0.620
K	1.40	1.68	0.055	0.066
L	0.00	0.25	0.000	0.010
M	2.49	2.74	0.098	0.108
N	0.43	0.58	0.017	0.023
P	2.29	2.79	0.090	0.110
R	0°	8°	0°	8°
S	2.41	2.67	0.095	0.105
W	0.25 REF		0.01 REF	



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