

AME8815

1.5A CMOS LDO

■ General Description

The AME8815 family of linear regulators feature low quiescent current (45 μ A typ.) with low dropout voltage, making them ideal for battery applications. It is available in TO-252 and SOT-223 packages.

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" operating conditions.

The AME8815 is stable with an output capacitance of 4.7 μ F or greater.

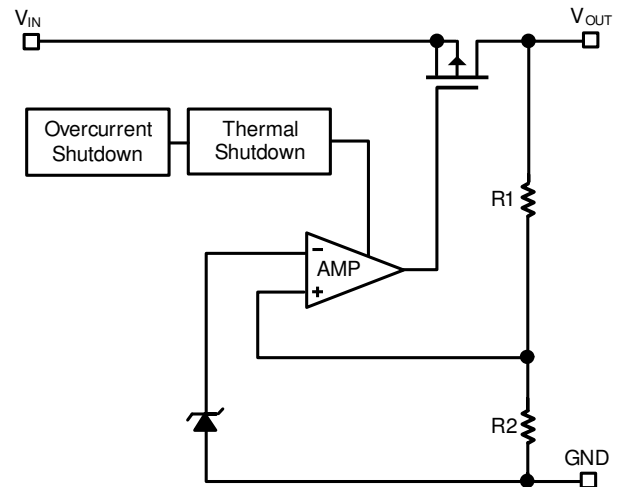
■ Features

- Very Low Dropout Voltage
- Guaranteed 1.5A Output
- Accurate to within 1.5%
- 45 μ A Quiescent Current Typically
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Low Temperature Coefficient
- All AME's Lead Free Products Meet RoHS Standards

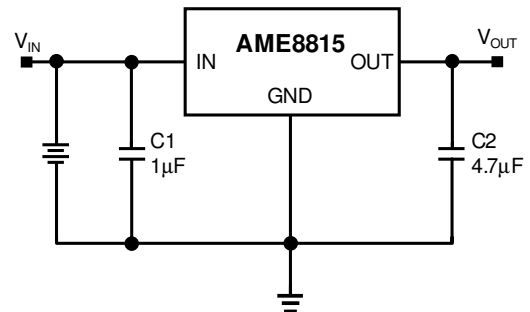
■ Applications

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

■ Functional Block Diagram



■ Typical Application



■ Pin Configuration



AME8815AEGTxxx

1. IN
2. GND(TAB)
3. OUT

*** Die Attach:
Conductive Epoxy**



AME8815BEGTxxx

1. GND
2. OUT (TAB)
3. IN

*** Die Attach:
Non-Conductive Epoxy**



AME8815AECSxxx

1. IN
2. GND(TAB)
3. OUT

*** Die Attach:
Conductive Epoxy**



AME8815BECSxxx

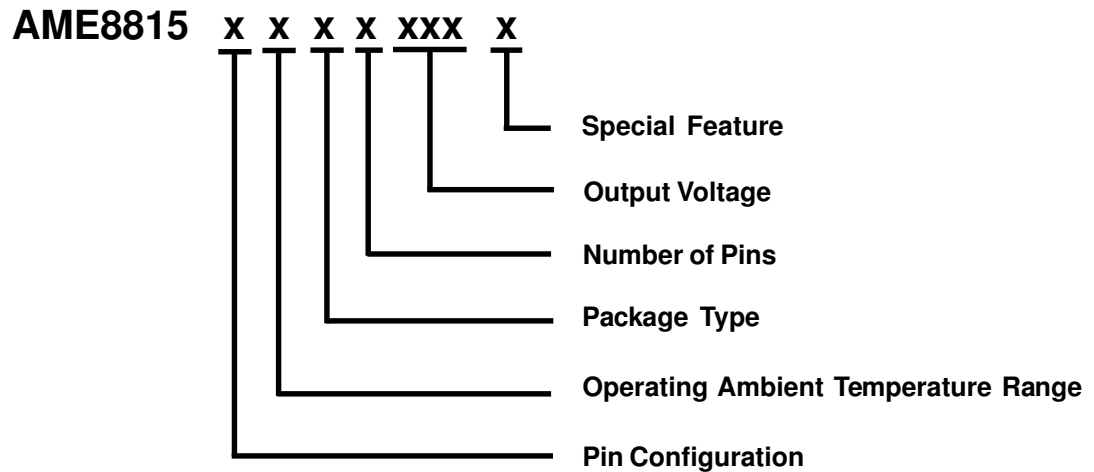
1. GND
2. OUT(TAB)
3. IN

*** Die Attach:
Non-Conductive Epoxy**

■ Pin Description

Pin Name	Pin Description
IN	Input voltage pin. It should be decoupled with 1 μ F or greater capacitor.
GND	Ground connection pin.
OUT	LDO voltage regulator output pin. It should be decoupled with a 4.7 μ F or greater value low ESR ceramic capacitor.

■ Ordering Information



Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Output Voltage	Special Feature
A: 1. IN (TO-252-2) 2. GND (SOT-223) 3. OUT B: 1. GND (TO-252-2) 2. OUT (SOT-223) 3. IN	E: -40 ^o C to +85 ^o C	C: TO-252 G: SOT-223	T: 3 S: 2	150: V=1.5V 180: V=1.8V 190: V=1.9V 250: V=2.5V 310: V=3.1V 330: V=3.3V 390: V=3.9V 475: V=4.75V 500: V=5.0V	Z: Lead Free

■ Ordering Information (Contd.)

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8815AECS150	AME8815 AECS150 yyww	1.50	TO-252-2	- 40°C to +85°C
AME8815AECS150Z	AME8815 AECS150 yyww	1.50	TO-252-2	- 40°C to +85°C
AME8815AECS180	AME8815 AECS180 yyww	1.80	TO-252-2	- 40°C to +85°C
AME8815AECS180Z	AME8815 AECS180 yyww	1.80	TO-252-2	- 40°C to +85°C
AME8815AECS190	AME8815 AECS190 yyww	1.90	TO-252-2	- 40°C to +85°C
AME8815AECS190Z	AME8815 AECS190 yyww	1.90	TO-252-2	- 40°C to +85°C
AME8815AECS250	AME8815 AECS250 yyww	2.50	TO-252-2	- 40°C to +85°C
AME8815AECS250Z	AME8815 AECS250 yyww	2.50	TO-252-2	- 40°C to +85°C
AME8815AECS330	AME8815 AECS330 yyww	3.30	TO-252-2	- 40°C to +85°C
AME8815AECS330Z	AME8815 AECS330 yyww	3.30	TO-252-2	- 40°C to +85°C
AME8815AECS475	AME8815 AECS475 yyww	4.75	TO-252-2	- 40°C to +85°C
AME8815AECS475Z	AME8815 AECS475 yyww	4.75	TO-252-2	- 40°C to +85°C
AME8815AECS500	AME8815 AECS500 yyww	5.00	TO-252-2	- 40°C to +85°C

■ Ordering Information (Contd.)

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8815AECS500Z	AME8815 AECS500 yyww	5.00	TO-252-2	- 40°C to +85°C
AME8815BECS150	AME8815 BECS150 yyww	1.50	TO-252-2	- 40°C to +85°C
AME8815BECS150Z	AME8815 BECS150 yyww	1.50	TO-252-2	- 40°C to +85°C
AME8815BECS180	AME8815 BECS180 yyww	1.80	TO-252-2	- 40°C to +85°C
AME8815BECS180Z	AME8815 BECS180 yyww	1.80	TO-252-2	- 40°C to +85°C
AME8815BECS190	AME8815 BECS190 yyww	1.90	TO-252-2	- 40°C to +85°C
AME8815BECS190Z	AME8815 BECS190 yyww	1.90	TO-252-2	- 40°C to +85°C
AME8815BECS250	AME8815 BECS250 yyww	2.50	TO-252-2	- 40°C to +85°C
AME8815BECS250Z	AME8815 BECS250 yyww	2.50	TO-252-2	- 40°C to +85°C
AME8815BECS330	AME8815 BECS330 yyww	3.30	TO-252-2	- 40°C to +85°C
AME8815BECS330Z	AME8815 BECS330 yyww	3.30	TO-252-2	- 40°C to +85°C
AME8815BECS475	AME8815 BECS475 yyww	4.75	TO-252-2	- 40°C to +85°C
AME8815BECS475Z	AME8815 BECS475 yyww	4.75	TO-252-2	- 40°C to +85°C

■ Ordering Information (Contd.)

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8815BECS500	AME8815 BECS500 yyww	5.00	TO-252-2	- 40°C to +85°C
AME8815BECS500Z	AME8815 BECS500 yyww	5.00	TO-252-2	- 40°C to +85°C
AME8815AEGT150	ASPyww	1.50	SOT-223	- 40°C to +85°C
AME8815AEGT150Z	ASPyww	1.50	SOT-223	- 40°C to +85°C
AME8815AEGT180	AQUyww	1.80	SOT-223	- 40°C to +85°C
AME8815AEGT180Z	AQUyww	1.80	SOT-223	- 40°C to +85°C
AME8815AEGT190	BAYyww	1.90	SOT-223	- 40°C to +85°C
AME8815AEGT190Z	BAYyww	1.90	SOT-223	- 40°C to +85°C
AME8815AEGT250	APRyww	2.50	SOT-223	- 40°C to +85°C
AME8815AEGT250Z	APRyww	2.50	SOT-223	- 40°C to +85°C
AME8815AEGT330	AKCyww	3.30	SOT-223	- 40°C to +85°C
AME8815AEGT330Z	AKCyww	3.30	SOT-223	- 40°C to +85°C
AME8815AEGT475	AQRyww	4.75	SOT-223	- 40°C to +85°C
AME8815AEGT475Z	AQRyww	4.75	SOT-223	- 40°C to +85°C
AME8815AEGT500	AQSyww	5.00	SOT-223	- 40°C to +85°C
AME8815AEGT500Z	AQSyww	5.00	SOT-223	- 40°C to +85°C
AME8815BEGT150	AJYyww	1.50	SOT-223	- 40°C to +85°C
AME8815BEGT150Z	AJYyww	1.50	SOT-223	- 40°C to +85°C
AME8815BEGT180	AJZyww	1.80	SOT-223	- 40°C to +85°C
AME8815BEGT180Z	AJZyww	1.80	SOT-223	- 40°C to +85°C
AME8815BEGT250	AKByww	2.50	SOT-223	- 40°C to +85°C
AME8815BEGT250Z	AKByww	2.50	SOT-223	- 40°C to +85°C
AME8815BEGT330	AKDyww	3.30	SOT-223	- 40°C to +85°C
AME8815BEGT330Z	AKDyww	3.30	SOT-223	- 40°C to +85°C
AME8815BEGT390	AQQyww	3.90	SOT-223	- 40°C to +85°C
AME8815BEGT390Z	AQQyww	3.90	SOT-223	- 40°C to +85°C



AME8815

1.5A CMOS LDO

■ Ordering Information (Contd.)

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8815BEGT475	AMNyww	4.75	SOT-223	- 40°C to +85°C
AME8815BEGT475Z	AMNyww	4.75	SOT-223	- 40°C to +85°C
AME8815BEGT500	AQTyww	5.00	SOT-223	- 40°C to +85°C
AME8815BEGT500Z	AQTyww	5.00	SOT-223	- 40°C to +85°C
AME8815BEGT190Z	CAGyww	1.90	SOT-223	- 40°C to +85°C

Note: yyww & yww represents the date code

* A line on top of the first letter represents lead free plating such as $\bar{A}$ ME8815

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

■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Input Voltage	-0.3 to +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.

* HBM B:2000V~3999V

■ Recommended Operating Conditions

Parameter	Symbol	Rating	Unit
Ambient Temperature Range	T_A	- 40 to +85	°C
Junction Temperature Range	T_J	- 40 to +125	°C
Storage Temperature Range	T_{STG}	- 65 to +150	°C

■ Thermal Information

Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance (Junction to Case)	*SOT-223	Conductive Epoxy	θ_{JC}	25	°C / W
		Non-Conductive Epoxy		31	
	*TO-252-2	Conductive Epoxy		5	
		Non-Conductive Epoxy		30	
Thermal Resistance (Junction to Ambient)	SOT-223	Conductive Epoxy	θ_{JA}	120	
		Non-Conductive Epoxy		135	
	TO-252-2	Conductive Epoxy		90	
		Non-Conductive Epoxy		140	
Internal Power Dissipation	SOT-223	Conductive Epoxy	P_D	900	mW
		Non-Conductive Epoxy		800	
	TO-252-2	Conductive Epoxy		1200	
		Non-Conductive Epoxy		1000	
Maximum Junction Temperature				150	°C
Solder Iron (10 Sec)**				350	

* Measure θ_{JC} on backside center of tab.

** MIL-STD-202G210F

■ Electrical Specifications

$V_{IN} = V_{O(Nom)} + 2V$, $T_A = 25^{\circ}C$ 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	$V_{DROPOUT}$	$I_O = 1.5A$ $V_O = V_{O(NOM)} - 2.0\%$	$1.4V < V_{O(NOM)} \leq 2.0V$		See chart	1300	mV
			$2.0V < V_{O(NOM)} \leq 2.8V$			800	
			$2.8V < V_{O(NOM)}$			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}	$V_{IN} = V_{O(NOM)} + 1V$, $V_O < 0.4V$			750		mA
Quiescent Current	I_Q	$I_O = 0mA$			45	70	μA
Ground Pin Current	I_{GND}	$I_O = 1mA$ to $1500mA$			45		μA
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	%
			$4.0V \leq V_O$	-0.4		0.4	%
Load Regulation	REG_{LOAD}	$I_O = 1mA$ to $1500mA$		-1	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	$I_O = 100mA$ $C_O = 4.7\mu F$	$f = 100Hz$		70		dB
			$f = 1kHz$		50		
			$f = 10kHz$		20		
Output Voltage Noise	eN	$f = 10Hz$ to $100kHz$ $I_O = 10mA$	$C_O = 4.7\mu F$		30		μV_{rms}

Note1: $V_{IN(min)} = V_{OUT} + V_{DROPOUT}$

■ Detailed Description

The AME8815 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 120°C.

The AME8815 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.

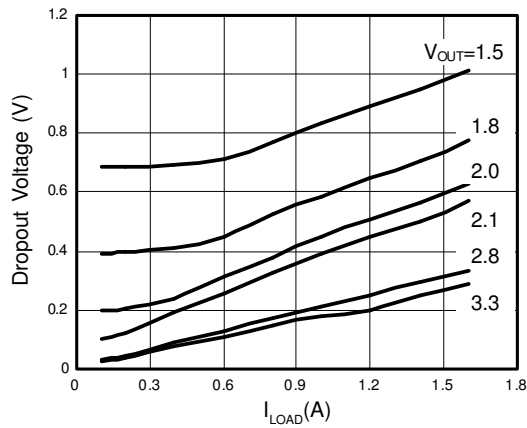
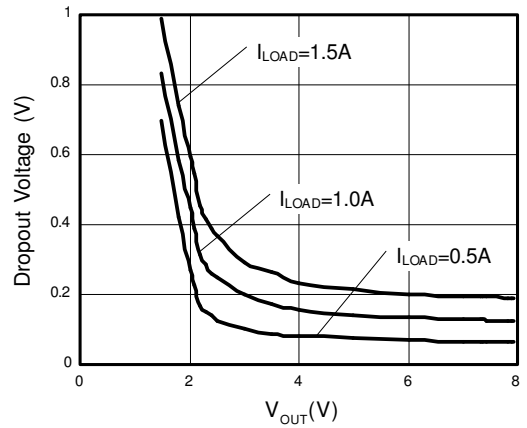
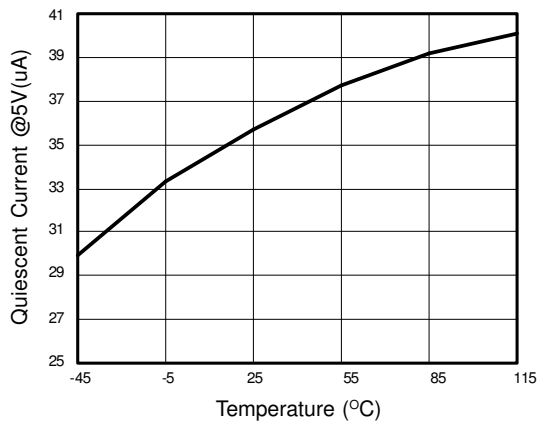
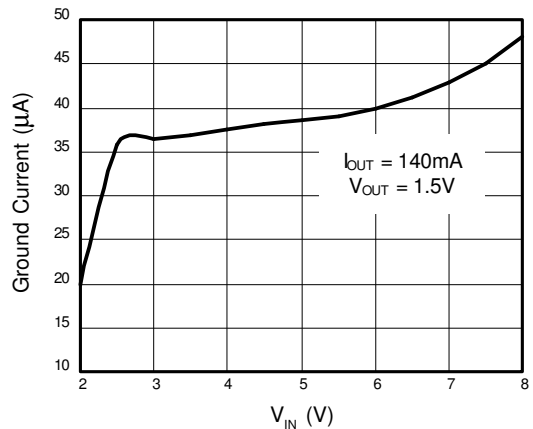
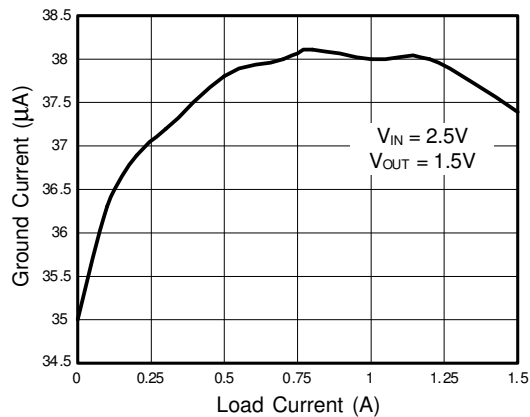
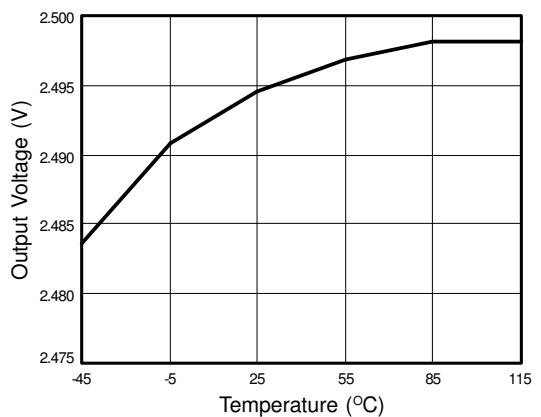
■ External Capacitors

The AME8815 is stable with an output capacitor to ground of 4.7 μ F 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 0.1 μ F ceramic capacitor with a 10 μ F Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

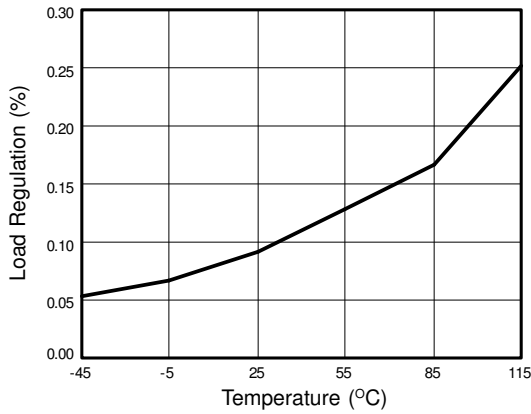
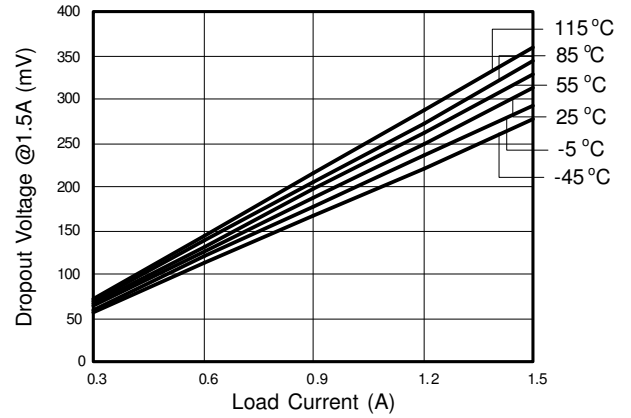
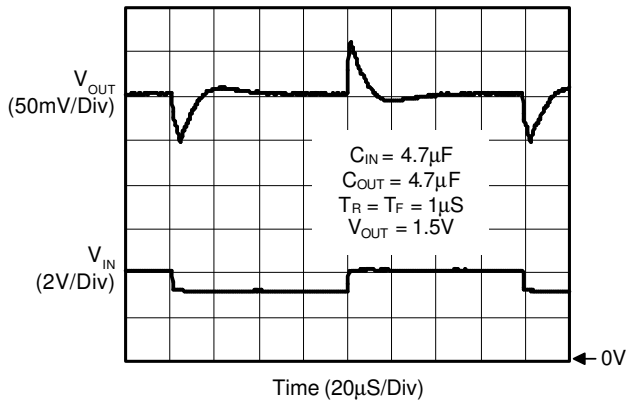
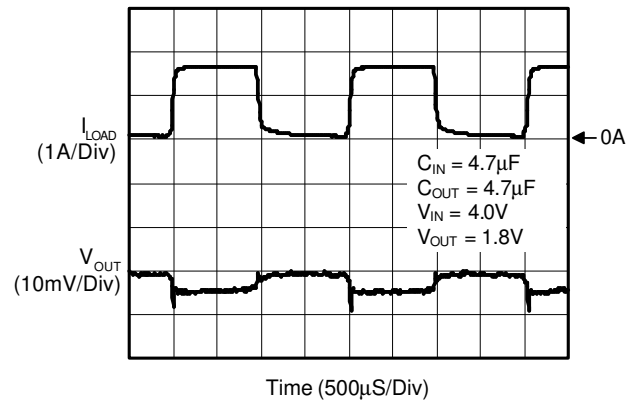
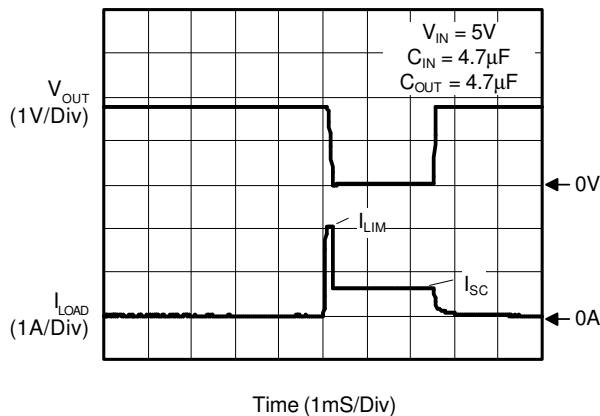
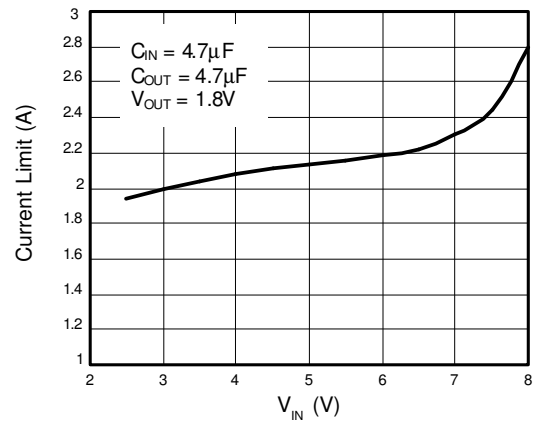
A second capacitor is recommended between the input and ground to stabilize V_{in} . The input capacitor should be at least 0.1 μ F to have a beneficial effect.

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.

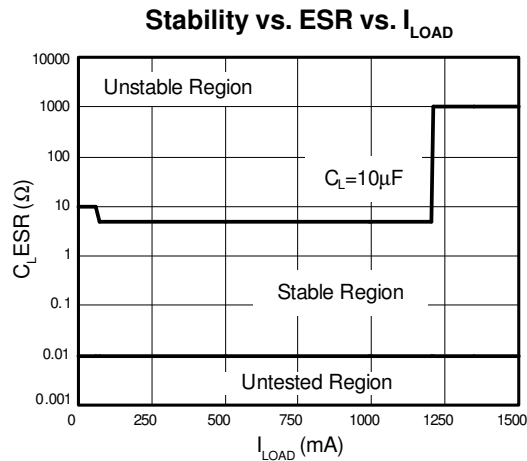
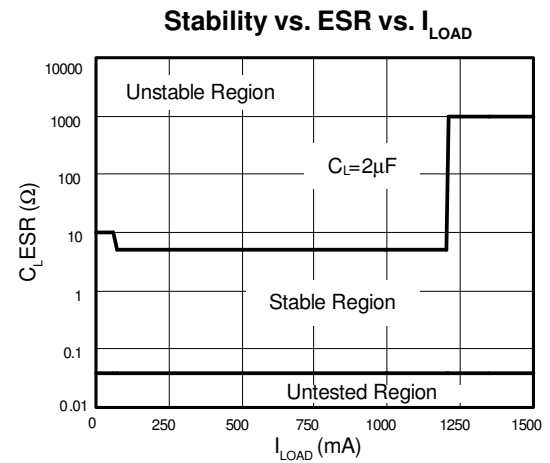
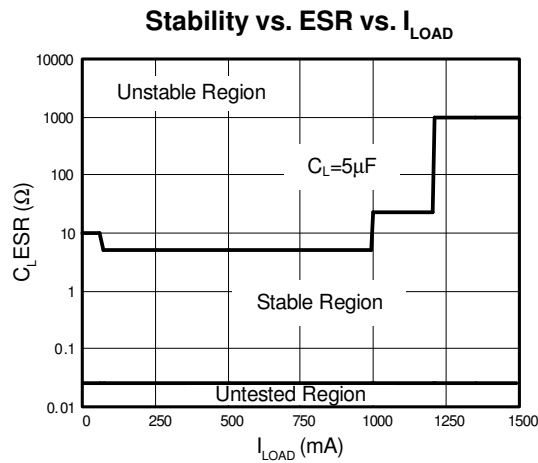
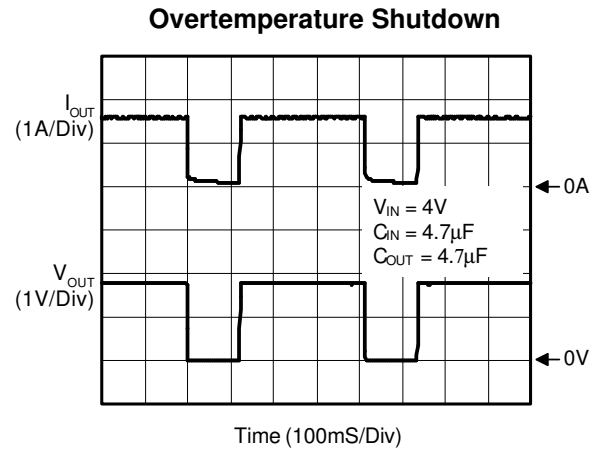
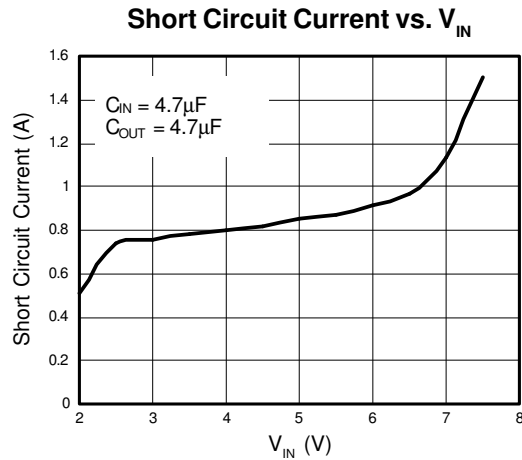
■ Characterization Curve

Dropout Voltage vs. I_{LOAD}

Dropout Voltage vs. V_{OUT}

Quiescent Current vs. Temperature

Ground Current vs. V_{IN}

Ground Current vs. Load Current

 V_{OUT} vs. Temperature (2.5V)


■ Characterization Curve (Contd.)

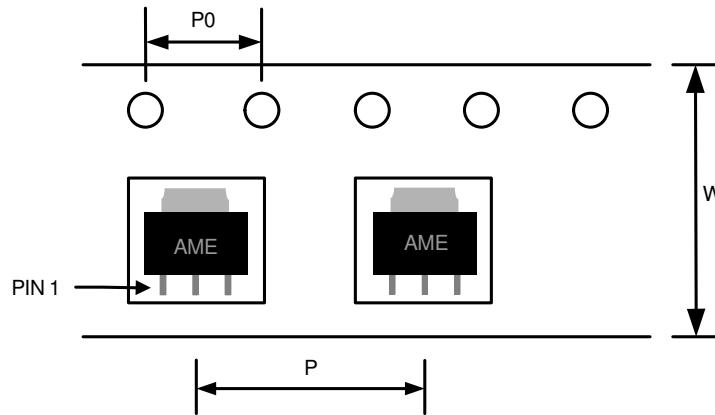
Load Regulation vs. Temperature

Dropout Voltage vs. Load Current (2.5V)

Line Transient Response

Load Step 40mA to 1.5A

Current Limit Response

Current Limit vs. V_{IN}


■ Characterization Curve (Contd.)



■ Tape and Reel Dimension

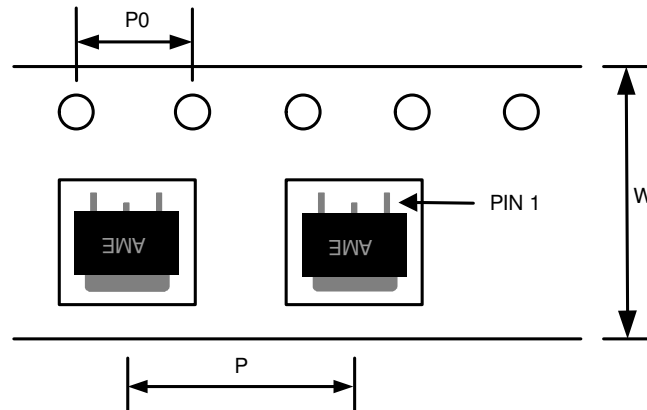
TO-223



Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Pitch (P0)	Part Per Full Reel	Reel Size
SOT-223	12.0±0.1 mm	8.0±0.1 mm	4.0±0.1 mm	2500pcs	330±1 mm

SOT-252-2

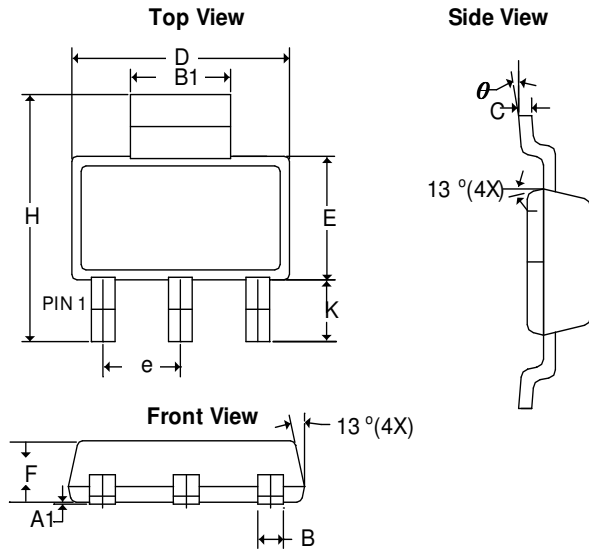


Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Pitch (P0)	Part Per Full Reel	Reel Size
TO-252-2	16.0±0.1 mm	8.0±0.1 mm	4.0±0.1 mm	2500pcs	330±1 mm

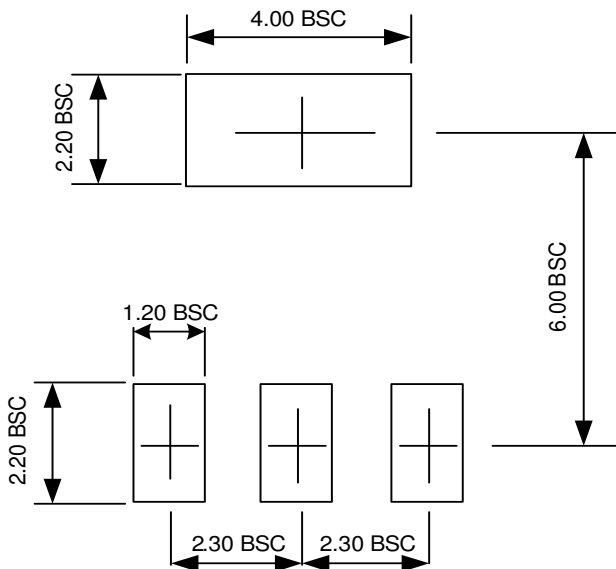
■ Package Dimension

SOT-223



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A ₁	0.01	0.10	0.0004	0.0039
B	0.60	0.84	0.0236	0.0330
B ₁	2.90	3.15	0.1140	0.1240
C	0.23	0.38	0.0091	0.0150
D	6.20	6.71	0.2441	0.2640
E	3.30	3.71	0.1299	0.1460
e	2.30 BSC		0.0906 BSC	
F	1.40	1.80	0.0551	0.0709
H	6.70	7.30	0.2638	0.2874
K	1.665	1.669	0.0656	0.0657
θ	0°	10°	0°	10°

■ Lead Pattern Drawing



Note:

1. Lead pattern unit description:

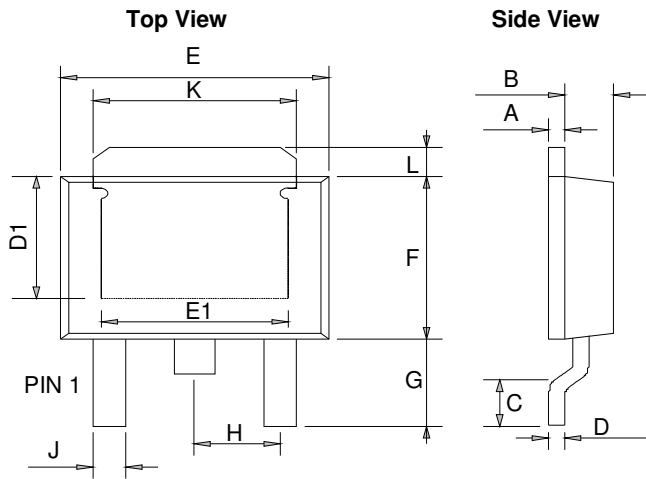
BSC: Basic. Represents theoretical exact dimension or dimension target.

2. Dimensions in Millimeters.

3. General tolerance $\pm 0.05\text{mm}$ unless otherwise specified.

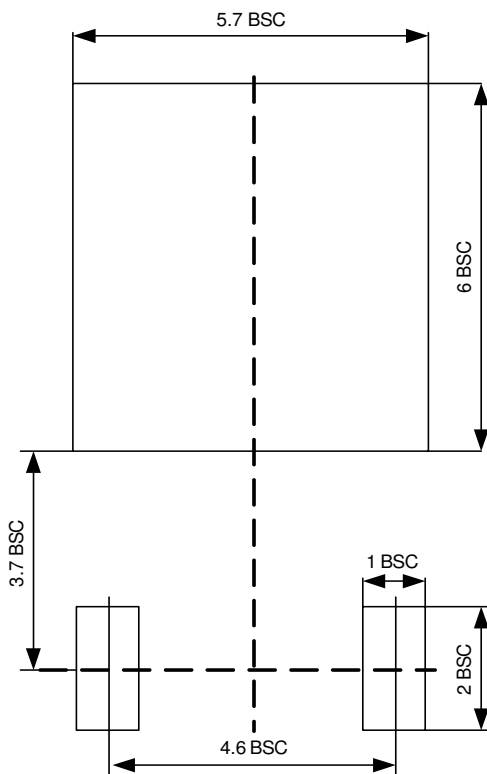
■ Package Dimension (Contd.)

TO-252-2



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.43	0.58	0.0169	0.0230
B	1.60	1.95	0.0630	0.0768
C	0.51	1.78	0.0200	0.0701
D	0.43	0.60	0.0169	0.0236
E	6.35	6.80	0.2500	0.2677
F	5.36	7.20	0.2110	0.2835
G	2.20	3.00	0.0866	0.1181
H	-	* 2.30	-	*0.0906
J	-	0.97	-	0.0380
K	5.20	5.50	0.2047	0.2165
L	1.40 REF		0.0551 REF	
D1	3.80 REF		0.1496 REF	
E1	3.81	5.10	0.1500	0.2008

■ Lead Pattern Drawing



*: Typical Value

Notes:

1. Controlling dimension: Millimeters.
2. Maximum lead thickness includes lead finish thickness. Minimum lead thickness is the minimum thickness of base material.

Note:

1. Lead pattern unit description:
BSC: Basic. Represents theoretical exact dimension or dimension target.
2. Dimensions in Millimeters.
3. General tolerance $\pm 0.05\text{mm}$ unless otherwise specified.



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