AME8845 3A CMOS LDO

■ General Description

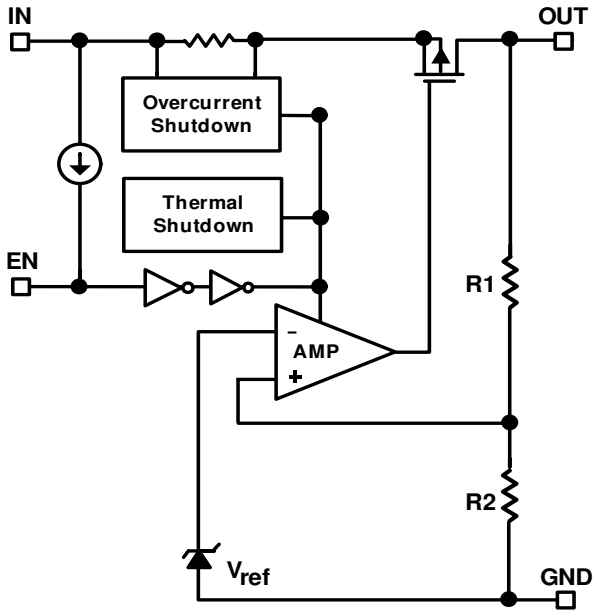
The AME8845 family of linear regulators feature low quiescent current (300µA typ.) with low dropout voltage, making them ideal for battery applications. It is available in TO-252 and SOT-223 packages. The space-efficient TO-252, SOT-223 packages are attractive for "Pocket" and "Hand Held" applications.

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" operating conditions.

The AME8845 is stable with an output capacitance of 2.2µF or greater.

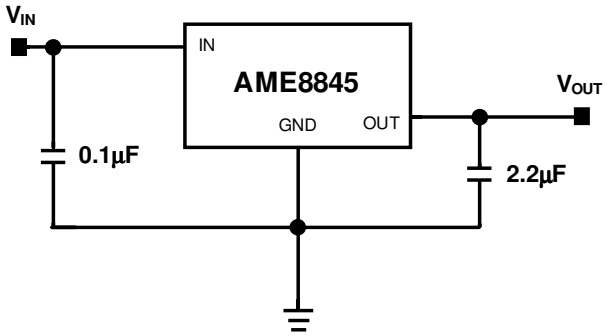
■ Functional Block Diagram



■ Features

- Very Load Dropout Voltage
- Guaranteed 3A Output
- Accurate to within 1.5%
- 300µA Quiescent Current Typically
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Low Temperature Coefficient
- All AME′s Lead Free Products Meet RoHS Stangdards

■ Typical Application

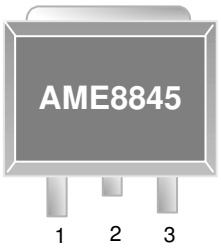


■ Applications

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

■ Pin Configuration

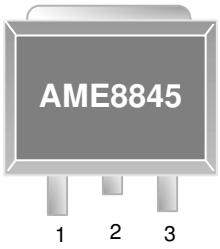
TO-252-2
Top View



AME 8845AECSxxx
1. IN
2. GND (TAB)
3. OUT

*** Die Attach:**
Conductive Epoxy

TO-252-2
Top View



AME 8845BECSxxx
1. GND
2. OUT (TAB)
3. IN

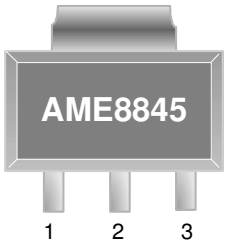
*** Die Attach:**
Non-Conductive Epoxy

SOT-223
Top View

AME8845AEGTxxx
1. IN
2. GND (TAB)
3. OUT

*** Die Attach:**
Conductive Epoxy

SOT-223
Top View

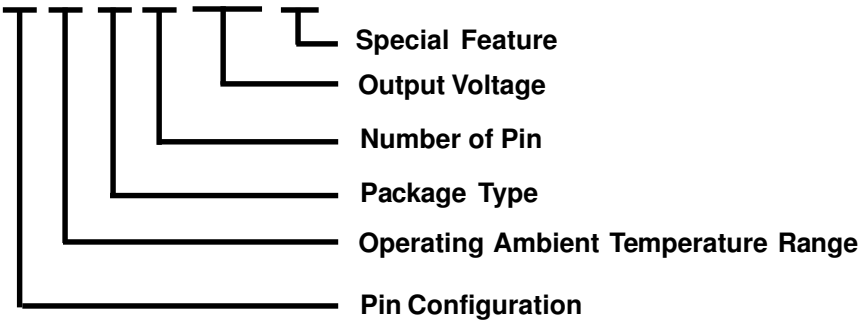


AME8845BEGTxxx
1. GND
2. OUT (TAB)
3. IN

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

■ Ordering Information

AME8845 x x x x xxx x



Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Output Voltage	Special Feature
A: 1. IN (TO-252-2) 2. GND 3. OUT B: 1. GND (TO-252-2) 2. OUT 3. IN A: 1. IN (SOT-223) 2. GND 3. OUT B: 1. GND (SOT-223) 2. OUT 3. IN	E: -40^{O}C to +85^{O}C	C: TO-252 G: SOT-223	S: 2 T: 3	150: V=1.5V 180: V=1.8V 250: V=2.5V 330: V=3.3V	Z: Lead Free

■ Ordering Information (contd.)

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8845AECS150Z	AME8845 AECS150 yyww	1.50	TO-252-2	- 40°C to +85°C
AME8845AECS180Z	AME8845 AECS180 yyww	1.80	TO-252-2	- 40°C to +85°C
AME8845AECS250Z	AME8845 AECS250 yyww	2.50	TO-252-2	- 40°C to +85°C
AME8845AECS330Z	AME8845 AECS330 yyww	3.30	TO-252-2	- 40°C to +85°C
AME8845BECS150Z	AME8845 BECS150 yyww	1.50	TO-252-2	- 40°C to +85°C
AME8845BECS180Z	AME8845 BECS180 yyww	1.80	TO-252-2	- 40°C to +85°C
AME8845BECS250Z	AME8845 BECS250 yyww	2.50	TO-252-2	- 40°C to +85°C
AME8845BECS330Z	AME8845 BECS330 yyww	3.30	TO-252-2	- 40°C to +85°C
AME8845AEGT150Z	BGIyww	1.50	SOT-223	- 40°C to +85°C
AME8845AEGT180	BAZyww	1.80	SOT-223	- 40°C to +85°C
AME8845AEGT180Z	BAZyww	1.80	SOT-223	- 40°C to +85°C
AME8845AEGT250	AZSyww	2.50	SOT-223	- 40°C to +85°C
AME8845AEGT250Z	AZSyww	2.50	SOT-223	- 40°C to +85°C
AME8845AEGT330Z	BDFyww	3.30	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 AME8845

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

■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Input Voltage	-0.3 to +7	V
EN Voltage	-0.3 to +7	V
Output Voltage	-0.3 to V_{IN} + 0.3	V
Output Current	P_D / (V_{IN} - V_{OUT})	mA
ESD Classification	B*	

Caution: Stress above the listed absolute maximum rating may cause permanent damage to the device
* HBM B:2000~3999V

■ Recommended Operating Conditions

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

■ Thermal Information

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

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

** MIL-STD-202G 210F

■ Electrical Specifications

V_{IN} = $V_{O(Nom)}$ +1V, C_{IN}=0.1μF, C_{OUT}=2.2μF, T_A = 25°C unless otherwise noted

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
Input Voltage	V_{IN}			Note 1		6	V
Output Voltage Accuracy	V_O	I_O=1mA		-1.5		1.5	%
Dropout Voltage	$V_{DROPOUT}$	I_O=3A V_O=$V_{O(NOM)}$ -2.0%	1.5V<=$V_{O(NOM)}$<=1.8V			1200	mV
			1.8V<$V_{O(NOM)}$<2.5V			700	
			2.5V<=$V_{O(NOM)}$		300	450	
Output Current	I_O	V_O>1.2V			3000		mA
Current Limit	I_{LIM}	V_O>1.2V			3		A
Short Circuit Current	I_{SC}	V_{IN}= $V_{O(NOM)}$+1V, V_O<0.4V			1.7		A
Quiescent Current	I_Q	I_O=0mA			300	400	μA
Ground Pin Current	I_{GND}	I_O=1mA to 3A			300		μA
Line Regulation	REG_{LINE}	I_O=1mA, V_{IN}=V_O+1 to V_O+2		-0.2	0.1	0.2	%
Load Regulation	REG_{LOAD}	I_O=1mA to 3A		-1		1	%
Over Temperature Shutdown	OTS				140		°C
Over Temperature Hysterisis	OTH				30		°C
V_O Temperature Coefficient	TC				30		ppm/°C
Power Supply Rejection	PSRR	I_O=100mA C_O=10μF	f=100Hz		70		dB
			f=1kHz		50		
Output Voltage Noise	eN	f=10Hz to 100kHz I_O=10mA	Co=2.2μF		30		μVrms
EN Input Threshold	V_{EH}	V_{IN}=$V_{IN,MIN}$ to $V_{IN,\ MAX}$		V_{IN}*0.8		V_{IN}	V
	V_{EL}			0		0.4	
EN Input Leakage	I_{EH}	V_{EN}=V_{IN}=5V				2	μA
	I_{EL}	V_{EN}=0V, V_{IN}=5V				2	
Shutdown Current	I_{SD}	V_{EN}=0V, V_{IN}=5V				10	μA

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

■ Detailed Description

The AME8845 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 140°C, or the current exceeds 4.5A. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 110°C.

The AME8845 behaves like a current source when the load reaches 4.5A. 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

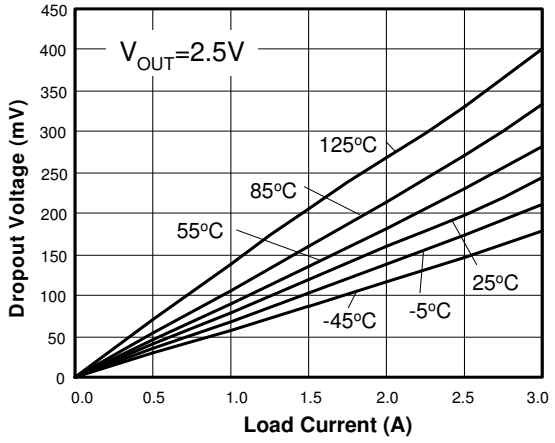
The AME8845 is stable with an output capacitor to ground of 2.2µF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic 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 Vin. The input capacitor should be at least 0.1µF to have a beneficial effect.

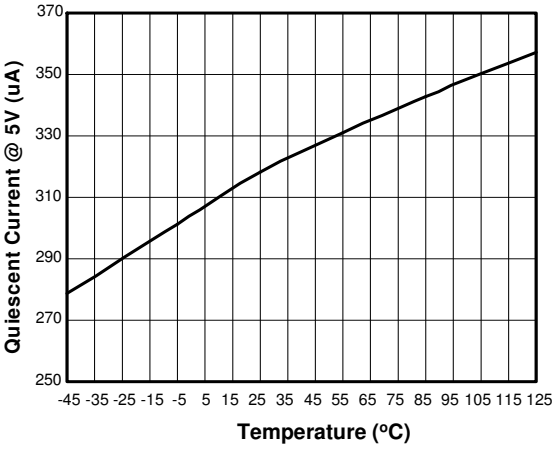
All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

■ Characterization Curve

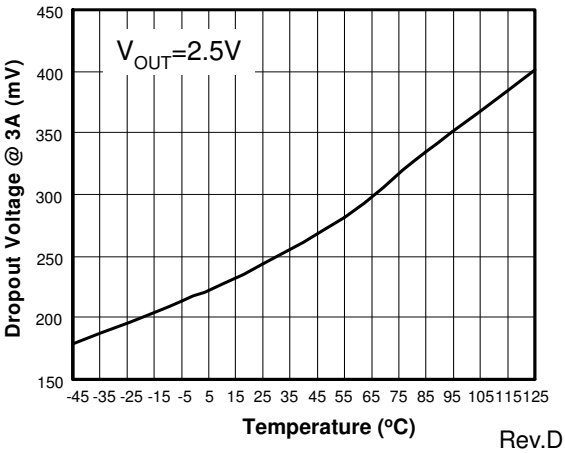
Dropout Voltage vs. Load Current



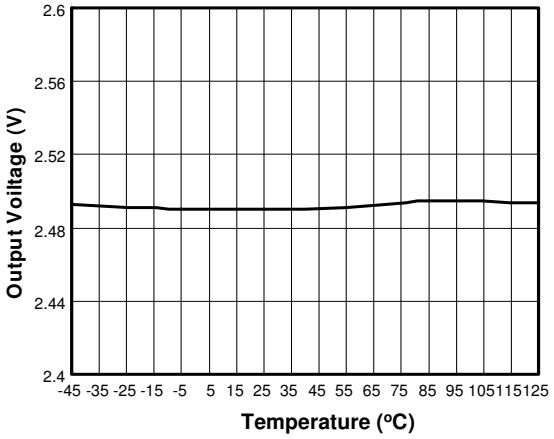
Quiescent Current vs.Temperature



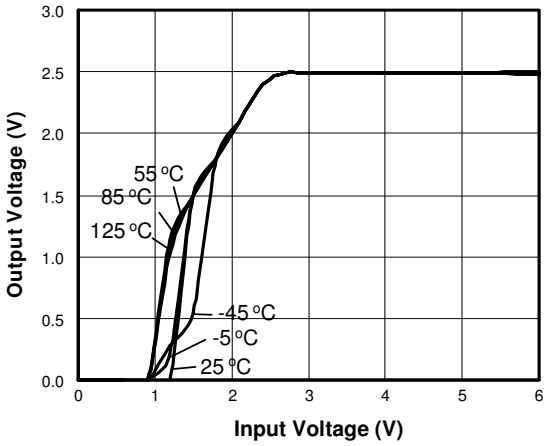
Dropout Voltage vs. Temperature



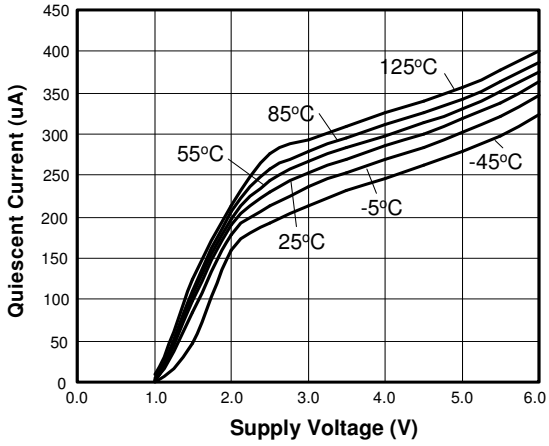
Temperature Stability



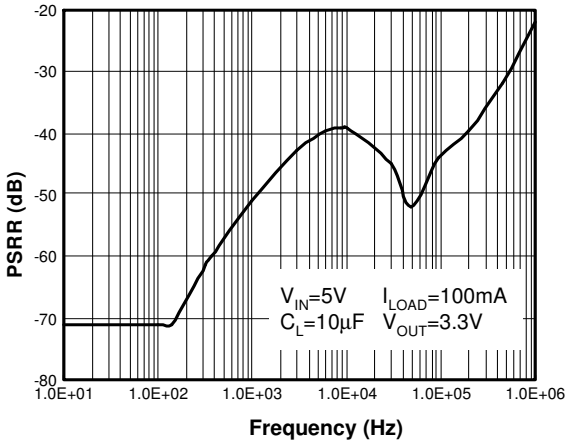
Output Voltage(2.5V) vs. Input Voltage



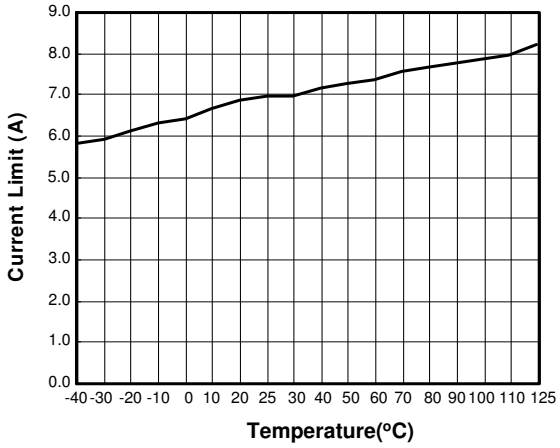
Quiescent Current vs. Supply Voltage



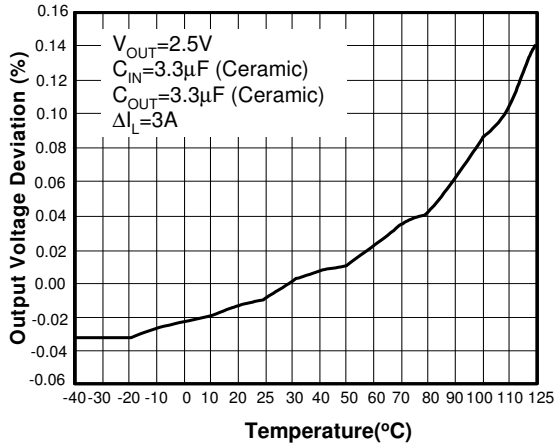
PSRR vs. Frequency



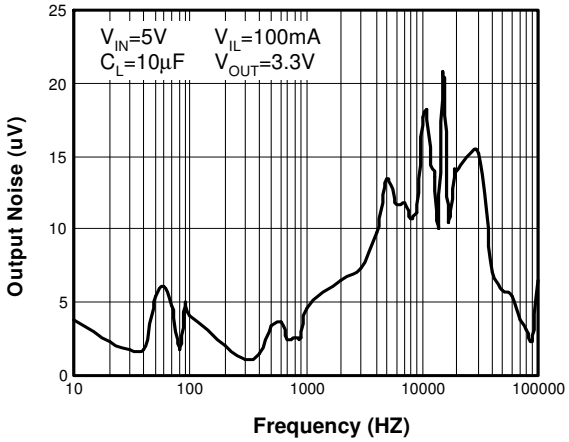
Current Limit vs. Temperature



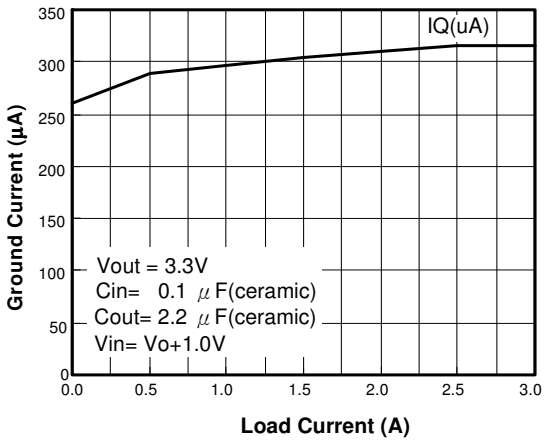
Load Regulation Deviation



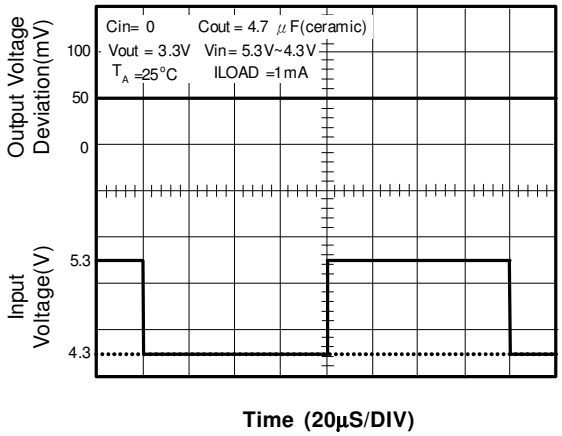
Output Noise vs. Frequency



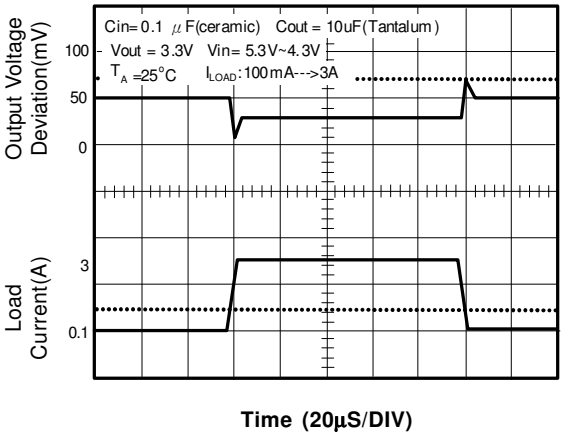
Ground Current vs. Load Current



Line Transient Response

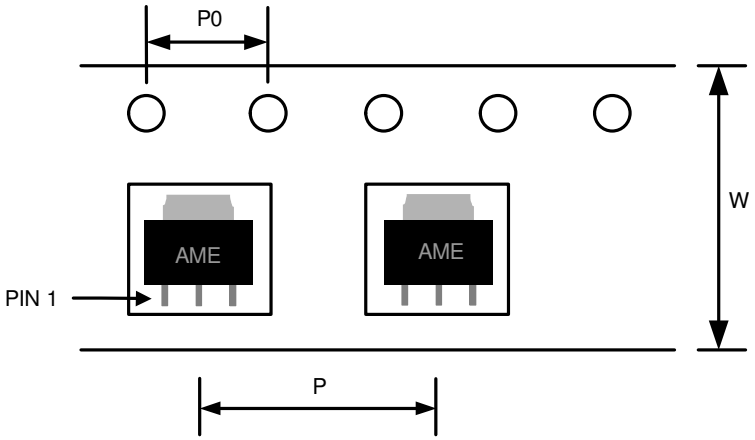


Load Transient Response



■ Tape and Reel Dimension

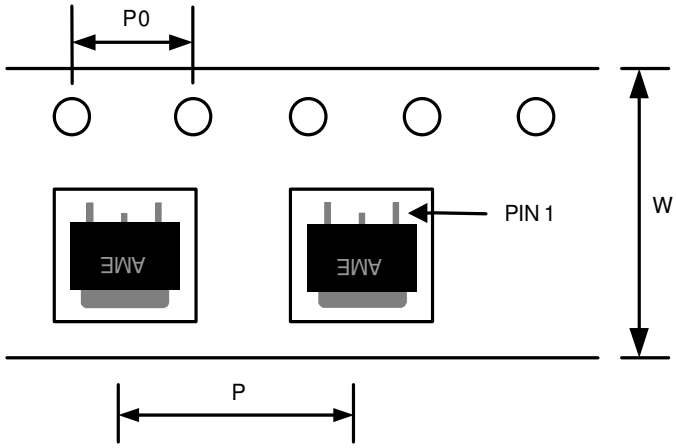
SOT-223



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

TO-252-2

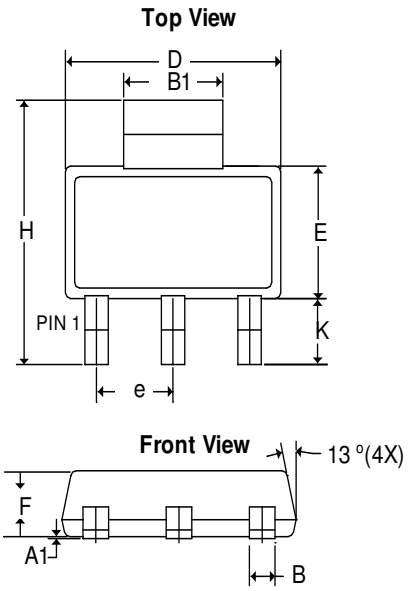


Carrier Tape, Number of Components Per Reel and Reel Size

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

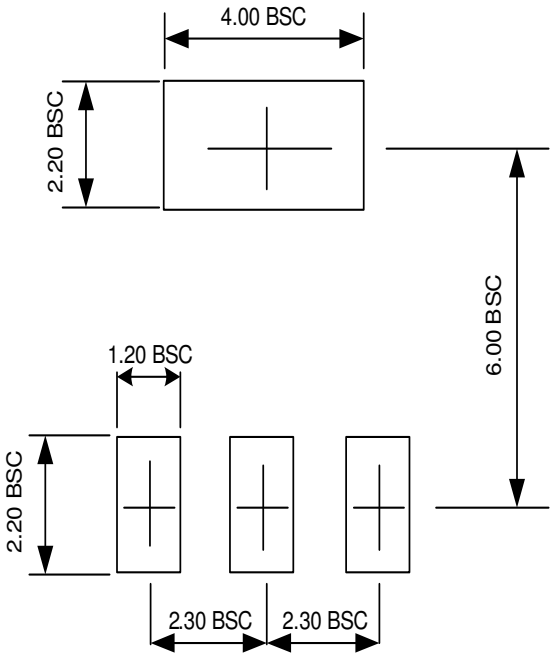
■ Package Dimension

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

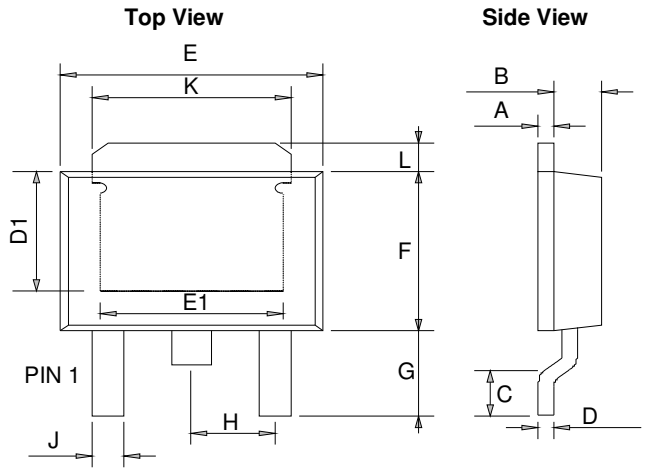


Note:

1. Lead pattern unit description:
   BSC: Basic. Represents theoretical exact dimension or dimension target.
2. Dimensions in Millimeters.
3. General tolerance ±0.05mm unless otherwise specified.

■ Package Dimension (contd.)

TO-252-2(DPAK)-EIAJ



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

***: 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.

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