

AME8822

High PSRR, 250mA CMOS LDO

■ General Description

The AME8822 family of positive, linear regulators feature low quiescent current (30 μ A typ.) low dropout voltage and excellent PSRR, thus making them ideal for telecommunications and other battery applications.

These rugged devices have both thermal shutdown and current limit to prevent device failure under the "Worst" operating conditions.

The AME8822 is stable with an output capacitance of 1 μ F or larger.

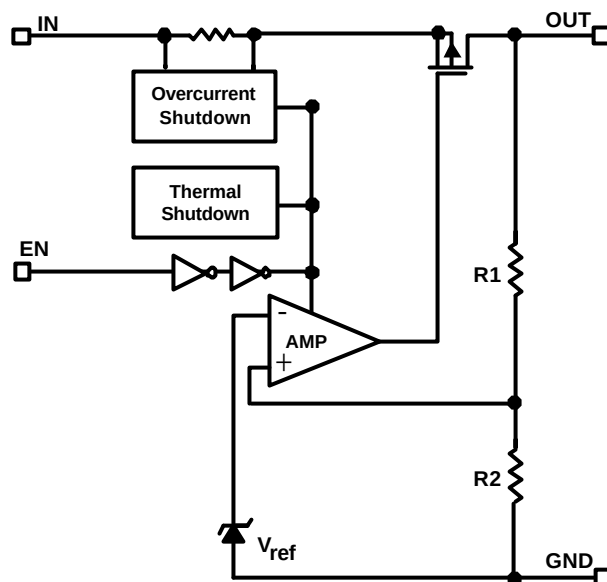
■ Features

- Very Low Dropout Voltage
- Fast Turn on Time 100 μ S(Typ.)
- Guaranteed 250mA Output
- 30 μ A Quiescent Current
- Over-Temperature Shutdown
- Excellent PSRR (Typ. 65dB)
- Power-Saving Shutdown Mode in SOT-25, SOT-23 & SC-70-5 Packages
- Low Temperature Coefficient
- All AME's Lead Free Products Meet RoHS Standards.

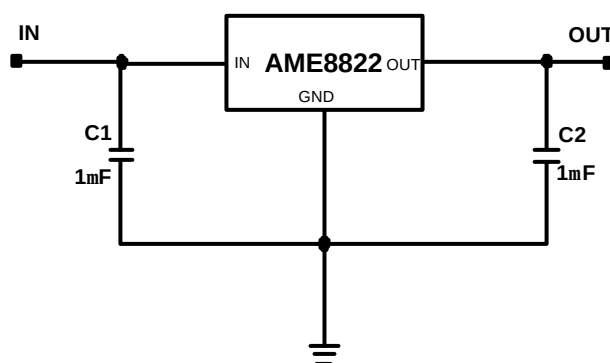
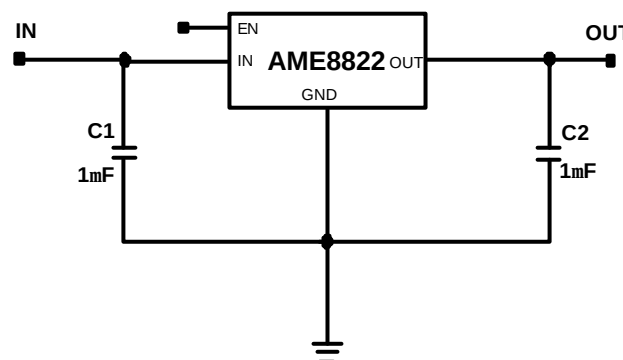
■ Applications

- Instrumentation
- Portable Electronics
- Wireless Devices
- PC Peripherals

■ Functional Block Diagram



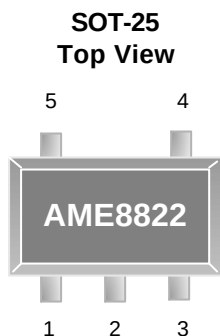
■ Typical Application



AME8822

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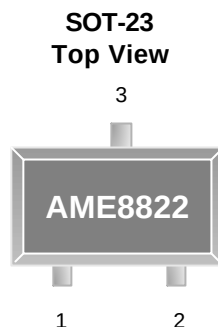
■ Pin Configuration



AME8822AEEV

1. IN
2. GND
3. EN
4. NC
5. OUT

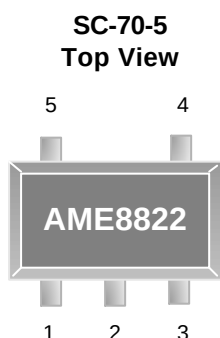
*** Die Attach:**
Conductive Epoxy



AME8822AEET

1. GND
2. OUT
3. IN

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



AME8822AEIV

1. IN
2. GND
3. EN
4. NC
5. OUT

*** Die Attach:**
Conductive Epoxy

■ Pin Description

AME8822AEET SOT-23

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



■ Pin Description

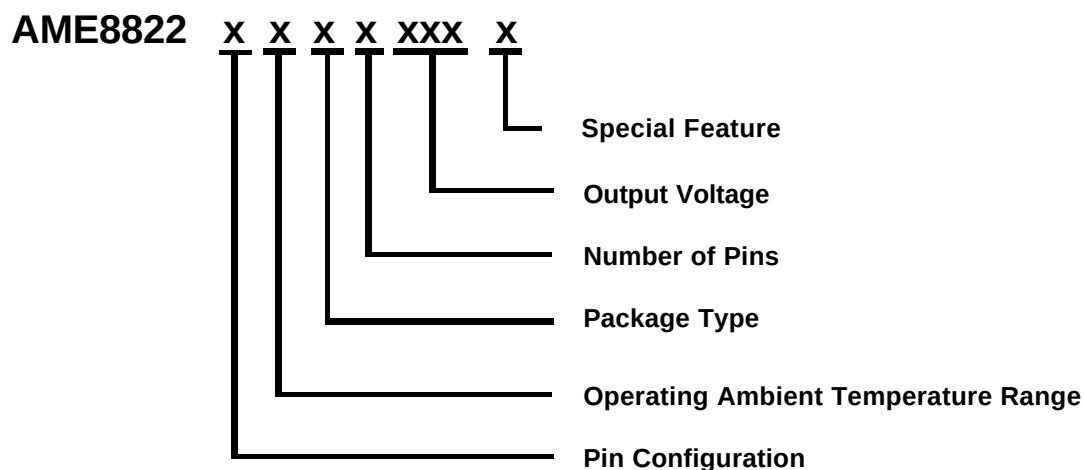
AME8822AEEV SOT-25 / AME8822AEIV SC-70-5

Pin Number	Pin Name	Pin Description
1	IN	Input voltage pin. It should be decoupled with 1mF or greater capacitor.
2	GND	Ground connection pin.
3	EN	Enable pin. When pulled low, the PMOS pass transistor turns off, current consuming less than 1mA.
4	NC	No Connection.
5	OUT	LDO voltage regulator output pin. It should be decoupled with a 1mF or greater value low ESR ceramic capacitor.

AME8822

High PSRR, 250mA CMOS LDO

■ Ordering Information



Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Output Voltage	Special Feature
A: 1. IN (SOT-25) 2. GND 3. EN 4. NC 5. OUT A: 1. GND (SOT-23) 2. OUT 3. IN A: 1. IN (SC-70-5) 2. GND 3. EN 4. NC 5. OUT	E: -40°C to 85°C	E: SOT-2X I: SC-70	T: 3 V: 5	120: V=1.2V 130: V=1.3V 150: V=1.5V 180: V=1.8V 250: V=2.5V 260: V=2.6V 270: V=2.7V 280: V=2.8V 290: V=2.9V 285: V=2.85V 300: V=3.0V 310: V=3.1V 330: V=3.3V	Z: Lead free

■ Ordering Information

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8822AEEV120Z	BIWwww	1.2V	SOT-25	- 40°C to 85°C
AME8822AEEV150Z	BHKwww	1.5V	SOT-25	- 40°C to 85°C
AME8822AEEV180Z	BHLwww	1.8V	SOT-25	- 40°C to 85°C
AME8822AEEV250Z	BHMwww	2.5V	SOT-25	- 40°C to 85°C
AME8822AEEV270Z	BHQwww	2.7V	SOT-25	- 40°C to 85°C
AME8822AEEV280Z	BHNwww	2.8V	SOT-25	- 40°C to 85°C
AME8822AEEV285Z	BHUwww	2.85V	SOT-25	- 40°C to 85°C
AME8822AEEV300Z	BHOwww	3.0V	SOT-25	- 40°C to 85°C
AME8822AEEV310Z	BHRwww	3.1V	SOT-25	- 40°C to 85°C
AME8822AEEV330Z	BHPwww	3.3V	SOT-25	- 40°C to 85°C
AME8822AEET120Z	BJJwww	1.2V	SOT-23	- 40°C to 85°C
AME8822AEET150Z	BFZwww	1.5V	SOT-23	- 40°C to 85°C
AME8822AEET180Z	BFOwww	1.8V	SOT-23	- 40°C to 85°C
AME8822AEET250Z	BGAwww	2.5V	SOT-23	- 40°C to 85°C
AME8822AEET280Z	BGBwww	2.8V	SOT-23	- 40°C to 85°C
AME8822AEET300Z	BGCwww	3.0V	SOT-23	- 40°C to 85°C
AME8822AEET330Z	BGDwww	3.3V	SOT-23	- 40°C to 85°C
AME8822AEIV150Z	BJMw	1.5V	SC-70-5	- 40°C to 85°C
AME8822AEIV180Z	BJNw	1.8V	SC-70-5	- 40°C to 85°C
AME8822AEIV280Z	BJKw	2.8V	SC-70-5	- 40°C to 85°C
AME8822AEIV285Z	BJLw	2.85V	SC-70-5	- 40°C to 85°C



AME8822

High PSRR, 250mA CMOS LDO

■ Ordering Information

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8822AEEV130Z	BLDww	1.3V	SOT-25	- 40°C to 85°C
AME8822AEEV260Z	BTUww	2.6V	SOT-25	- 40°C to 85°C
AME8822AEEV290Z	BTVww	2.9V	SOT-25	- 40°C to 85°C

Note: ww represents the date code and pls refer to Date Code Rule page on Package Dimension.

* A line on top of the first letter represents lead free plating such as BIWww.

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

■ 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*: 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 Ambient)	SOT-23	Non-Conductive Epoxy	θ_{JA}	280	$^{\circ}\text{C} / \text{W}$
	SOT-25	Conductive Epoxy		260	
	SC-70-5			331	
Thermal Resistance (Junction to Case)	SOT-23*	Non-Conductive Epoxy	θ_{JC}	140	
	SOT-25*	Conductive Epoxy		81	
Internal Power Dissiption	SOT-23	Non-Conductive Epoxy	P_D	400	
	SOT-25	Conductive Epoxy		400	
	SC-70-5			300	
Maximum Junction Temperature				150	$^{\circ}\text{C}$
Solder Iron (10 Sec)**				350	$^{\circ}\text{C}$

* Measure θ_{JC} on backside center of molding compound if IC has no tab.

** MIL-STD-202G 210F
Rev.D.05



AME8822

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■ Electrical Specifications (Contd.)

$V_{OUT(nom)} > 2.0V$, $V_{IN}=V_{OUT(nom)}+0.5V$; $V_{OUT} \leq 2V$, $V_{IN}=2.5V$, $V_{EN}=V_{IN}$, $T_J = -40$ to $125^\circ C$, $C_{IN}=C_{OUT}=1\mu F$, unless otherwise noted.

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
Input Voltage	V_{IN}			Note1		5.5	V
Output Voltage Accuracy	$V_{OUT(nom)}$	$I_{OUT}=1mA$	$T_A=25^\circ C$	-1.5		1.5	%
		$I_{OUT}=1mA$	$T_J=-40$ to $125^\circ C$	-3		3	
Dropout Voltage (See Note 1)	$V_{DROPOUT}$	$I_{OUT}=250mA$ $V_{OUT}=V_{OUT(nom)}-2\%V_{OUT(nom)}$	$V_{OUT}>2.0V$		300	500	mV
		$I_{OUT}=250mA$	$V_{OUT}\leq 2.0V$, $V_{DROPOUT}=2.5V-V_{OUT}$				
Current Limit	I_{LIM}	$V_{OUT}=0.8 \times V_{OUT(nom)}$	$T_A=25^\circ C$		350	500	mA
Short Circuit Limit	I_{SC}	$V_{OUT}=0V$	$T_A=25^\circ C$		200		
Quiescent Current	I_Q	$V_{IN}=5V$, $1mA < I_{OUT} < 250mA$	$T_A=25^\circ C$		30	45	μA
Line Regulation (See Note 2)	REG_{LINE}	$I_{OUT}=1mA$, $V_{OUT}>2.0V$ $V_{IN}=V_{OUT}+0.5V$ to $V_{IN}=5.5V$	$T_A=25^\circ C$	-0.25	0.1	0.25	%/V
			$T_J=-40$ to $125^\circ C$	-0.4		0.4	
		$I_{OUT}=1mA$, $V_{OUT}\leq 2.0V$ $V_{IN}=2.5V$ to $V_{IN}=5.5V$	$T_A=25^\circ C$	-0.4	0.2	0.4	
			$T_J=-40$ to $125^\circ C$	-0.6		0.6	
Load Regulation (See Note 3)	REG_{LOAD}	$I_{OUT} = 1$ to $250mA$	$V_{OUT}>2.0V$ $V_{IN}=V_{OUT}+0.5V$	-0.02	0.0025	0.02	%/mA
			$V_{OUT}\leq 2.0V$ $V_{IN}=2.5V$	-0.04	0.004	0.04	
Over Temperature Shutdown	OTS	$I_{OUT}=0mA$			160		$^\circ C$
Over Temperature Hysteresis	OTH	$I_{OUT}=0mA$			40		$^\circ C$
V_{OUT} Temperature Coefficient	TC				30		ppm/ $^\circ C$
Power Supply Ripple Rejection	PSRR	$V_{OUT}=3.3V$, $I_{OUT}=100mA$, $C_{OUT}=10\mu F$, $V_{IN}=V_{OUT}+1V$, $f=1kHz$			65		dB

Note1: If $V_{OUT(nom)} > 2.0V$, $V_{IN(min)}=V_{OUT(nom)}+V_{DROPOUT}$. If $V_{OUT(nom)} \leq 2.0V$, $V_{IN(min)} = 2.5V$.

$$\text{Note2: Line Regulation} = \frac{\frac{\Delta V_{out}}{\Delta V_{in}} \times 100\%}{V_{out}}$$

$$\text{Note3: Load Regulation} = \frac{\frac{\Delta V_{out}}{V_{out}} \times 100\%}{\Delta I(mA)}$$



■ Electrical Specifications

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Output Voltage Noise	e_N	$f=10\text{Hz to }100\text{kHz}, I_{OUT}=10\text{mA}$		40		μVrms
Enable Input Threshold*	V_{ENH}	$V_{OUT} \geq V_{OUT(min)}$	1.4		V_{IN}	V
	V_{ENL}	$V_{OUT} \leq 0.2\text{V}$	0		0.3	V
Enable Input Bias Current*	I_{EN}	$V_{IN}=5\text{V}, EN=0\text{V or }5\text{V}$		0.01	1	μA
Shutdown Supply Current*	I_{SD}	$V_{IN}=5\text{V}, V_{EN}=0\text{V}$		0.5	1	μA
Shutdown Output Voltage*	$V_{O,SD}$	$I_{OUT}=1\text{mA}$			0.2	V

* These parameters are applicable to part numbers with enable function.

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■ Detailed Description

The AME8822 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 250mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 130°C.

The AME8822 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress.

■ External Capacitors

The AME8822 is stable with an output capacitor to ground of 1 μ F or larger. 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.

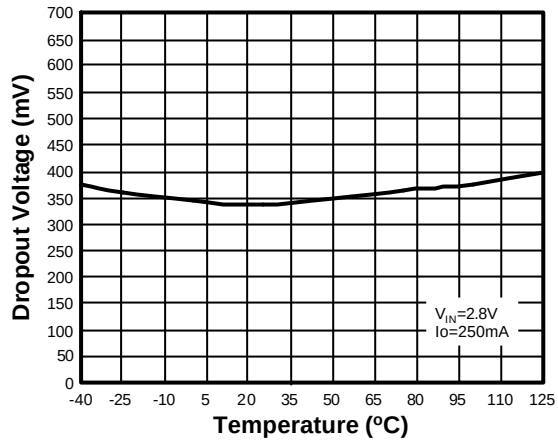
A second capacitor is recommended between the input and ground to stabilize V_{IN} . The input capacitor should be at least 1 μ F to have a beneficial effect.

■ Enable

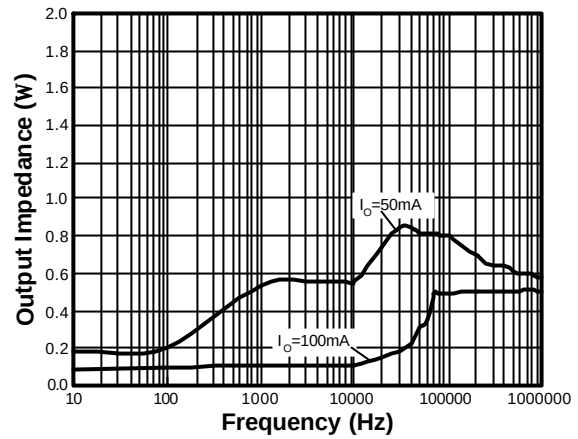
The Enable Pin is normally pull-high. When activated pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the standby current is less than 1 μ A. This pin can't be floating.



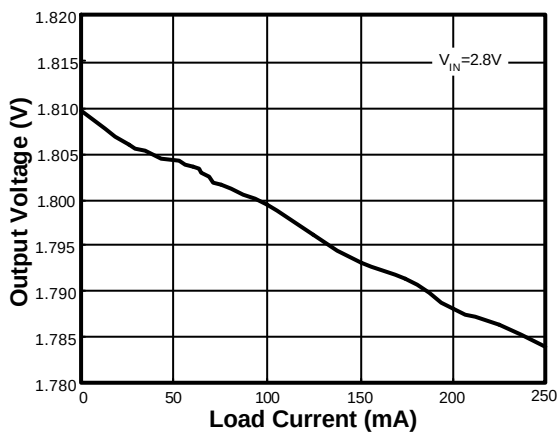
Dropout Voltage vs Temperature



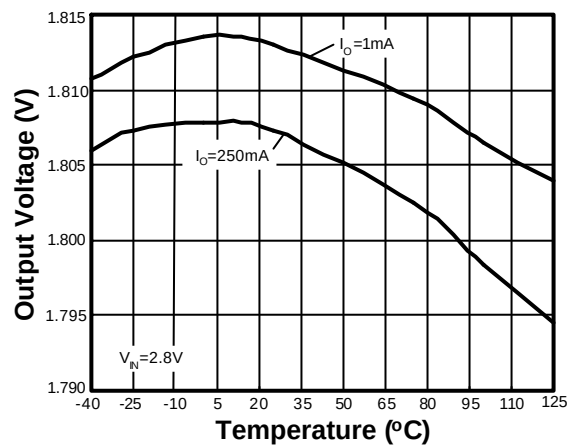
Output Impedance vs Frequency



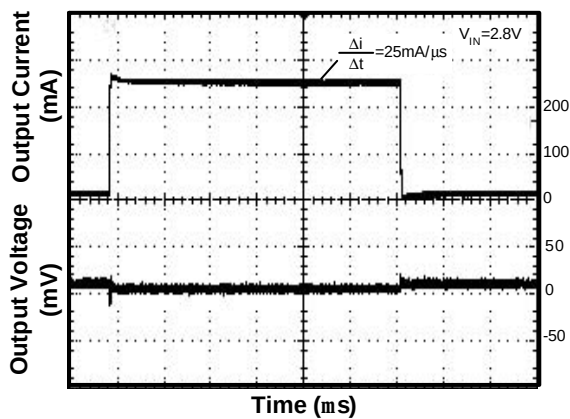
Output Voltage vs Load Current



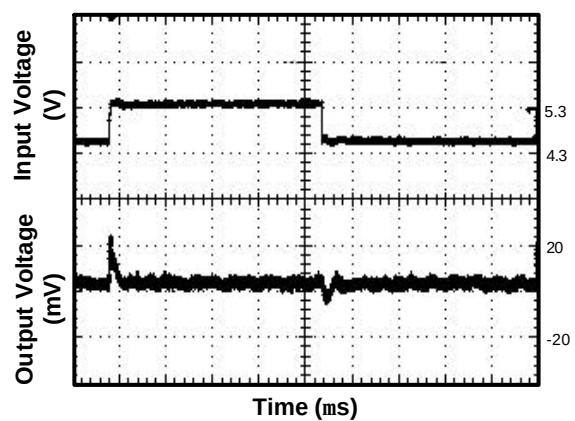
Output Voltage vs Temperature



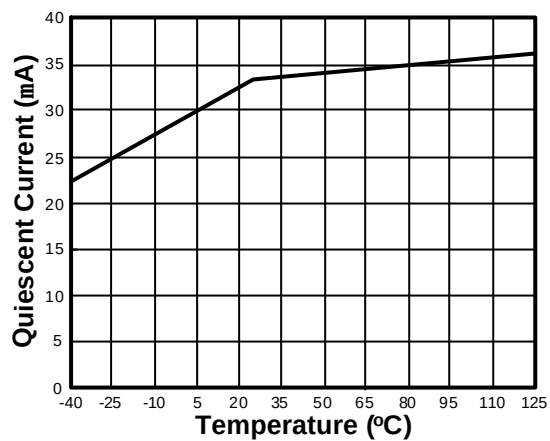
Load Transient Response



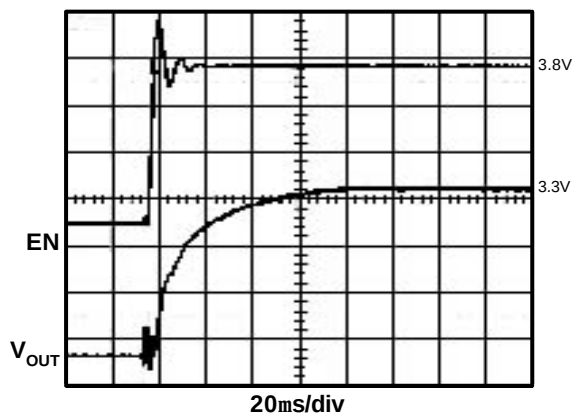
Line Transient Response



Quiescent Current vs Temperature



Rising Time



■ Date Code Rule

For SOT-23/SOT-25 Package Only

Marking			Date Code		Year
A	A	A	W	W	xxx0
A	A	A	W	<u>W</u>	xxx1
A	A	A	<u>W</u>	W	xxx2
A	A	A	<u>W</u>	<u>W</u>	xxx3
A	A	<u>A</u>	W	W	xxx4
A	A	<u>A</u>	W	<u>W</u>	xxx5
A	A	<u>A</u>	<u>W</u>	W	xxx6
A	A	<u>A</u>	<u>W</u>	<u>W</u>	xxx7
A	<u>A</u>	A	W	W	xxx8
A	<u>A</u>	A	W	<u>W</u>	xxx9

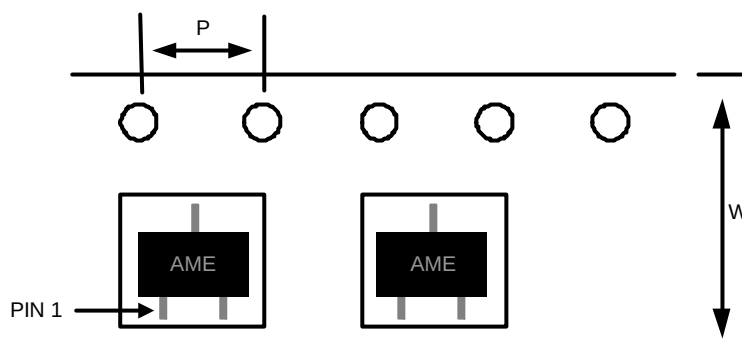
For SC-70 Package Only

Marking			Date Code	Year
A	A	A	W	xxx0
A	A	A	<u>W</u>	xxx1
A	A	<u>A</u>	W	xxx2
A	A	<u>A</u>	<u>W</u>	xxx3
A	<u>A</u>	A	W	xxx4
A	<u>A</u>	A	<u>W</u>	xxx5
A	<u>A</u>	<u>A</u>	W	xxx6
A	<u>A</u>	<u>A</u>	<u>W</u>	xxx7
<u>A</u>	A	A	W	xxx8
<u>A</u>	A	A	<u>W</u>	xxx9

w: Work Week Code		
A: 01&02	K: 21&22	U: 41&42
B: 03&04	L: 23&24	V: 43&44
C: 05&06	M: 25&26	W: 45&46
D: 07&08	N: 27&28	X: 47&48
E: 09&10	O: 29&30	Y: 49&50
F: 11&12	P: 31&32	Z: 51&52
G: 13&14	Q: 33&34	
H: 15&16	R: 35&36	
I: 17&18	S: 37&38	
J: 19&20	T: 39&40	

■ Tape and Reel Dimension

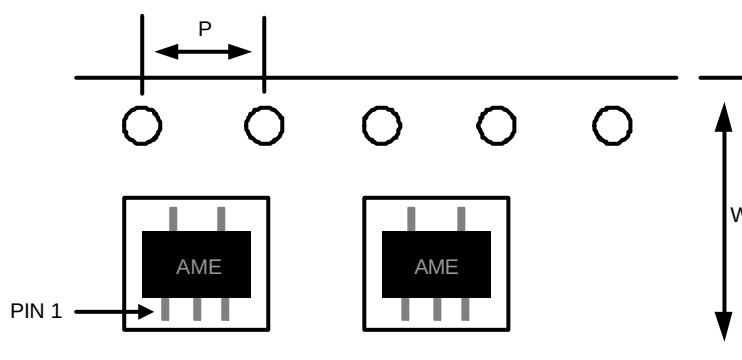
SOT-23



Carrier Tape, Number of Components Per Reel and Reel Size

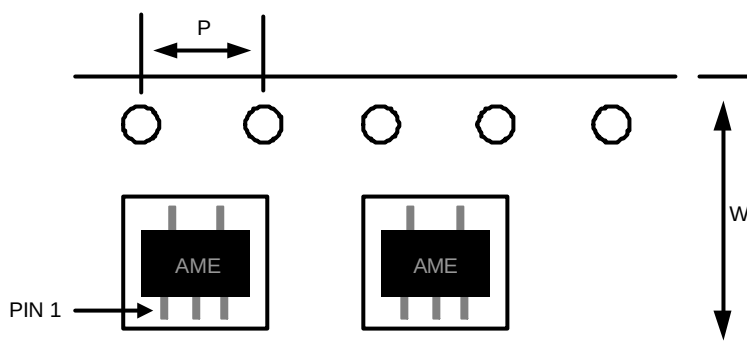
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOT-23	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm

SOT-25



Carrier Tape, Number of Components Per Reel and Reel Size

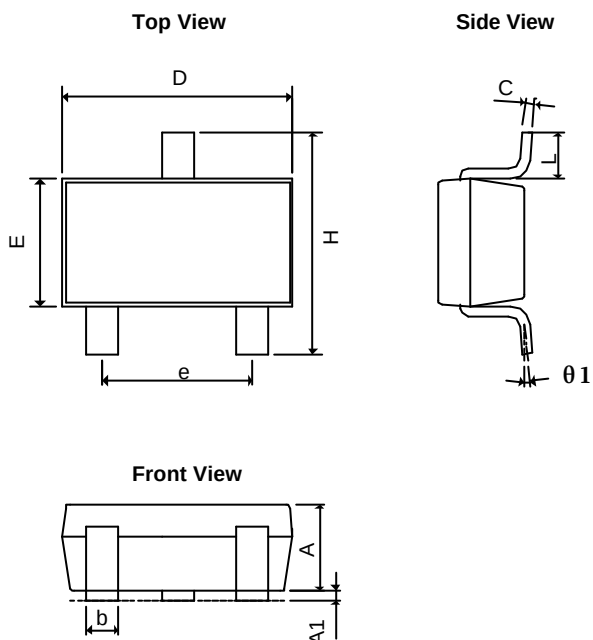
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOT-25	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm

■ Tape and Reel Dimension
SC-70-5

Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SC-70-5	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm

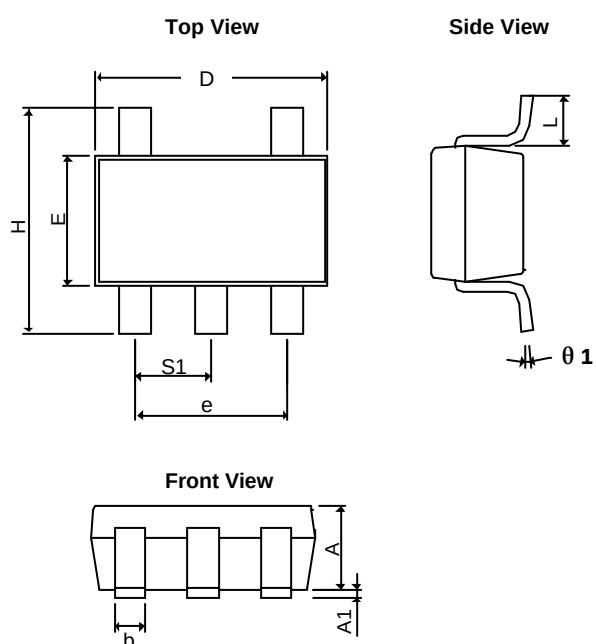
■ Package Dimension

SOT-23



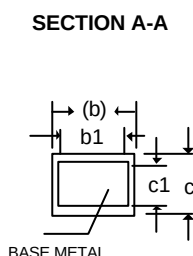
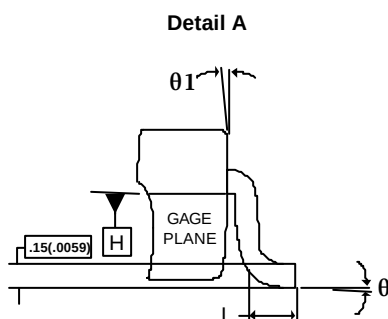
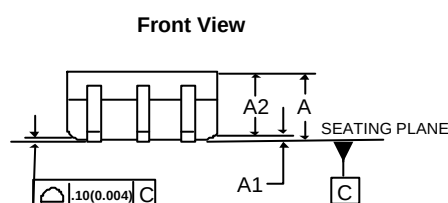
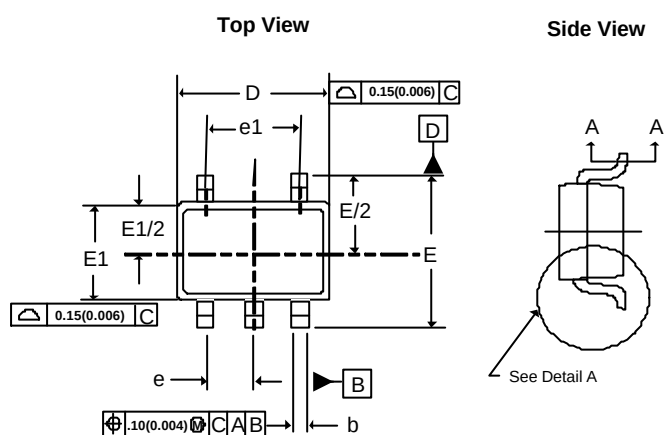
SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.00	1.40	0.0394	0.0551
A ₁	0.00	0.15	0.0000	0.0059
b	0.35	0.50	0.0138	0.0197
C	0.09	0.25	0.0035	0.0098
D	2.70	3.10	0.1063	0.1220
E	1.40	1.80	0.0551	0.0709
e	1.90 BSC		0.0748 BSC	
H	2.40	3.00	0.09449	0.11811
L	0.35BSC		0.0138BSC	
q1	0°	10°	0°	10°

SOT-25



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.20REF		0.0472REF	
A ₁	0.00	0.15	0.0000	0.0059
b	0.30	0.55	0.0118	0.0217
D	2.70	3.10	0.1063	0.1220
E	1.40	1.80	0.0551	0.0709
e	1.90 BSC		0.07480 BSC	
H	2.60	3.00	0.10236	0.11811
L	0.37BSC		0.0146BSC	
q1	0°	10°	0°	10°
S ₁	0.95BSC		0.0374BSC	

■ Package Dimension

SC-70-5


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.10	0.031	0.043
A1	0.00	0.10	0.000	0.004
A2	0.80	1.00	0.031	0.040
b	0.15	0.30	0.006	0.012
b1	0.15	0.25	0.006	0.010
c	0.08	0.25	0.003	0.010
c1	0.08	0.20	0.003	0.008
D	1.90	2.15	0.074	0.084
E	2.00	2.20	0.078	0.086
E1	1.15	1.35	0.045	0.055
e	0.65BSC		0.0255BSC	
e1	1.30BSC		0.0512BSC	
L	0.26	0.46	0.010	0.018
q1	0°	8°	0°	8°
q2	4°	10°	4°	10°



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