

## ■ General Description

The AME8819 is a CMOS linear regulator. It operated from 2.8V to 5.5V input voltage and delivers up to 600mA output current. The AME8819 provide low quiescent current (70 $\mu$ A typ) low dropout voltage ( $V_{out}=3.3V$ , 540mV @ 600mA typ), and excellent PSRR, thus marking them ideal for Data-Communications and battery applications.

The AME8819 provide over temperature and over current protected functions. It is stable with an output capacitance of 2.2 $\mu$ F or larger.

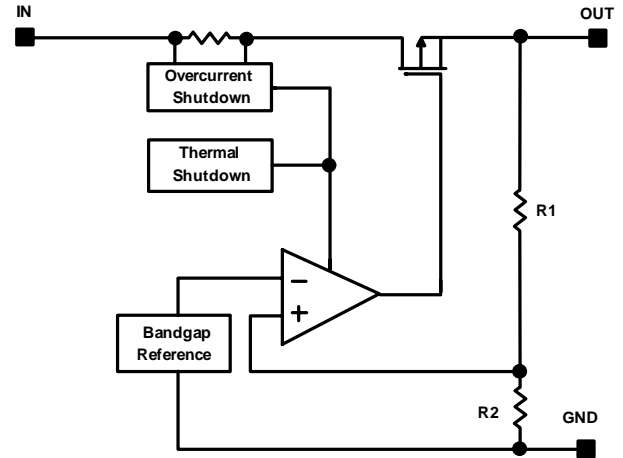
## ■ Features

- Input voltage range is from 2.8V to 5.5V
- Output Voltage Range:
  - Fixed Version is from 1.2V to 4.5V
  - ADJ Version is from 0.98V to 4.5V
- Low Dropout: 540mV @ 600mA,  $V_{OUT} = 3.3V$
- Guaranteed 600mA Drive Current
- Factory Pre-set output voltage
- Only 2.2 $\mu$ F Output Capacitor Required for Stability (Low ESR MLCC is allowable)
- Provided OTP, current limit
- Green Products Meet RoHS Standards

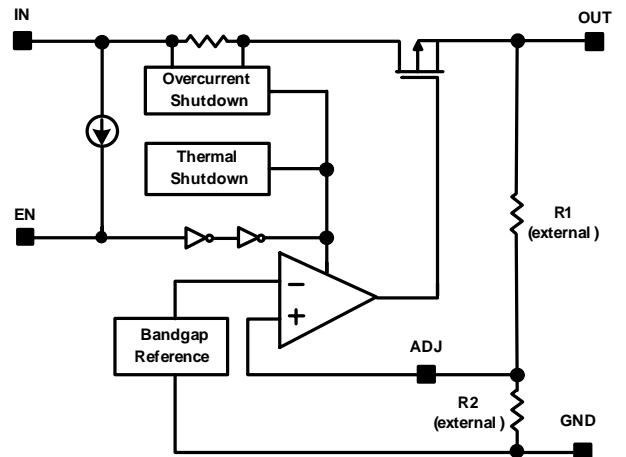
## ■ Applications

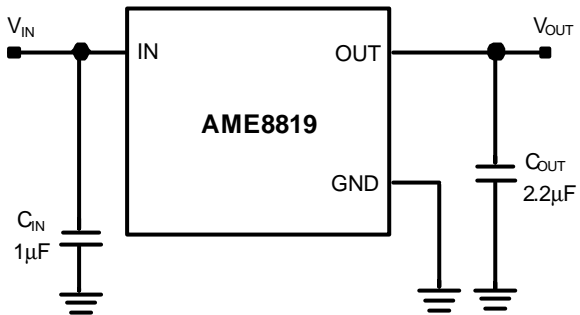
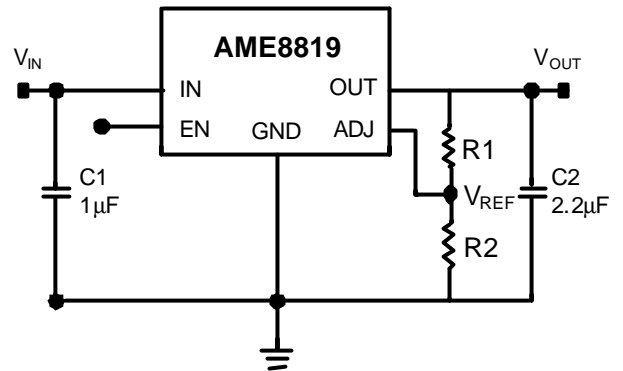
- Data-Communication
- Laptop, Palmtops, Notebook computers
- Battery Power Equipment
- Handheld Device
- PCMCIA Cards

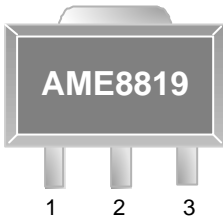
## ■ Functional Block Diagram (Fixed Version)



## (Adjustable Version)

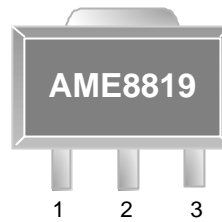


**AME8819****■ Typical Application****(Fixed Version)****(Adjustable Version)**

**■ Pin Configuration**
**SOT-89  
Top View**

**AME8819AEFT**

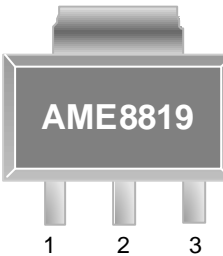
1. IN
2. GND (TAB)
3. OUT

**Die Attach:**  
Conductive Epoxy

**SOT-89  
Top View**

**AME8819BEFT**

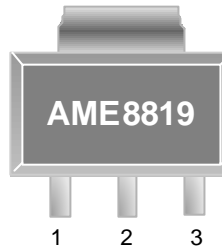
1. GND
2. IN (TAB)
3. OUT

**Die Attach:**  
Non-Conductive Epoxy

**SOT-223  
Top View**

**AME8819AEGT**

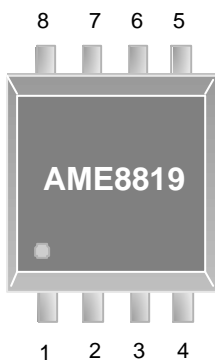
1. IN
2. GND (TAB)
3. OUT

**Die Attach:**  
Conductive Epoxy

**SOT-223  
Top View**

**AME8819BEGT**

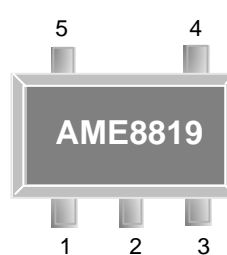
1. GND
2. OUT (TAB)
3. IN

**Die Attach:**  
Non-Conductive Epoxy

**SOP-8  
Top View**

**AME8819AEHAADJ**

1. EN
2. IN
3. OUT
4. ADJ
5. GND
6. GND
7. GND
8. GND

**Die Attach:**  
Conductive Epoxy

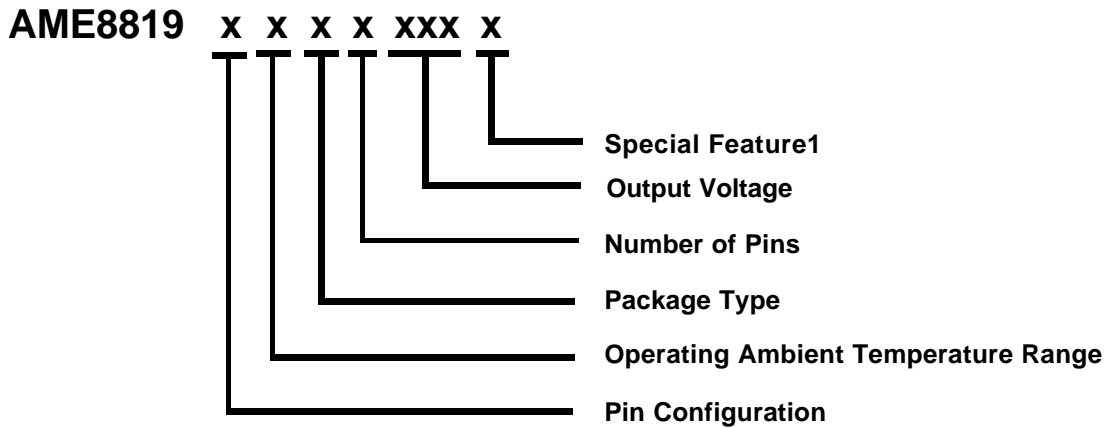
**SOT-25  
Top View**

**AME8819DEEVADJ**

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

**Die Attach:**  
Conductive Epoxy

**AME8819****■ Pin Description**

<b>Pin Name</b>	<b>Pin Description</b>
IN	Input voltage pin. It should be decoupled with 1 $\mu$ F or greater capacitor.
GND	Ground connection pin.
OUT	LDO voltage regulator output pin. It should be decoupled with a 2.2 $\mu$ F or greater value low ESR ceramic capacitor.
EN	Enable pin. When pulled low, the PMOS pass transistor turns off, current consuming less than 10 $\mu$ A.
ADJ	Feedback output voltage for adjustable device.

**■ Ordering Information**


Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Output Voltage	Special Feature 1
A: 1. IN <small>(SOT-89)</small> 2. GND <small>(SOT-223)</small> 3. OUT  B: 1.GND <small>(SOT-89)</small> 2.IN 3.OUT  B: 1.GND <small>(SOT-223)</small> 2.OUT 3.IN  A: 1.EN <small>(SOP-8)</small> 2.IN 3.OUT 4.ADJ 5.GND 6.GND 7.GND 8.GND  D: 1.IN <small>(SOT-25)</small> 2.GND 3.EN 4.ADJ 5.OUT	E: -40°C to +85°C	E: SOT-2X F: SOT-89 G: SOT-223 H: SOP	T: 3 V: 5 A: 8	120: V=1.2V 150: V=1.5V 180: V=1.8V 250: V=2.5V 280: V=2.8V 285: V=2.85V 290: V=2.9V 300: V=3.0V 310: V=3.1V 330: V=3.3V 360: V=3.6V ADJ: Adjustable	Z: Green

**AME8819**
**■ Available Options**

Part Number	Marking	Output Voltage	Package	Operating Ambient Temperature Range
AME8819AEFT120Z	A8819 CKyMXX	1.2V	SOT-89	-40°C to +85°C
AME8819AEFT150Z	A8819 CJyMXX	1.5V	SOT-89	-40°C to +85°C
AME8819AEFT180Z	A8819 ClYmXX	1.8V	SOT-89	-40°C to +85°C
AME8819AEFT250Z	A8819 CGyMXX	2.5V	SOT-89	-40°C to +85°C
AME8819AEFT300Z	A8819 CDyMXX	3.0V	SOT-89	-40°C to +85°C
AME8819AEFT330Z	A8819 CByMXX	3.3V	SOT-89	-40°C to +85°C
AME8819BEFT120Z	A8819 DKyMXX	1.2V	SOT-89	-40°C to +85°C
AME8819BEFT150Z	A8819 DJyMXX	1.5V	SOT-89	-40°C to +85°C
AME8819BEFT180Z	A8819 DlYmXX	1.8V	SOT-89	-40°C to +85°C
AME8819BEFT250Z	A8819 DGyMXX	2.5V	SOT-89	-40°C to +85°C
AME8819BEFT300Z	A8819 DDyMXX	3.0V	SOT-89	-40°C to +85°C
AME8819BEFT330Z	A8819 DByMXX	3.3V	SOT-89	-40°C to +85°C
AME8819BEFT360Z	A8819 DAyMXX	3.6V	SOT-89	-40°C to +85°C
AME8819AEGT120Z	A8819 AKyMXX	1.2V	SOT-223	-40°C to +85°C
AME8819AEGT150Z	A8819 AJyMXX	1.5V	SOT-223	-40°C to +85°C
AME8819AEGT180Z	A8819 AlYmXX	1.8V	SOT-223	-40°C to +85°C
AME8819AEGT250Z	A8819 AGyMXX	2.5V	SOT-223	-40°C to +85°C
AME8819AEGT300Z	A8819 ADyMXX	3.0V	SOT-223	-40°C to +85°C

**■ Available Options**

Part Number	Marking	Output Voltage	Package	Operating Ambient Temperature Range
AME8819AEGT310Z	A8819 ACyMXX	3.1V	SOT-223	-40°C to +85°C
AME8819AEGT330Z	A8819 AByMXX	3.3V	SOT-223	-40°C to +85°C
AME8819BEGT120Z	A8819 BKyMXX	1.2V	SOT-223	-40°C to +85°C
AME8819BEGT150Z	A8819 BJyMXX	1.5V	SOT-223	-40°C to +85°C
AME8819BEGT180Z	A8819 BlyMXX	1.8V	SOT-223	-40°C to +85°C
AME8819BEGT250Z	A8819 BGyMXX	2.5V	SOT-223	-40°C to +85°C
AME8819BEGT300Z	A8819 BDyMXX	3.0V	SOT-223	-40°C to +85°C
AME8819BEGT330Z	A8819 BByMXX	3.3V	SOT-223	-40°C to +85°C
AME8819AEHAADJZ	A8819 EMyMXX	ADJ	SOP-8	-40°C to +85°C
AME8819DEEVADJZ	A8819 CNUMXX	ADJ	SOT-25	-40°C to +85°C

**Note:**

1. The first 2 places represent product code. It is assigned by AME such as CK.
2. y is year code and is the last number of a year. Such as the year code of 2008 is 8.
3. A bar on top of first letter represents Green Part such as  $\bar{A}$ 8819.
4. The last 3 places MXX represent Marking Code. It contains M as date code in "month", XX as LN code and that is for AME internal use only. Please refer to date code rule section for detail information.
5. Please consult AME sales office or authorized Rep./Distributor for the availability of output voltage and package type.

**AME8819**
**■ Absolute Maximum Ratings**

Parameter	Symbol	Maximum	Unit
Input Voltage	$V_{IN}$	-0.3 to 6	V
EN Voltage	$V_{EN}$	-0.3 to 6	V
Output Current	$I_{OUT}$	$P_D / (V_{IN} - V_{OUT})$	mA
Output Voltage	$V_{OUT}$	-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	
Storage Temperature Range	$T_{STG}$	-65 to +150	



**■ Thermal Information**

Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance (Junction to Case)	SOT-89*	Conductive Epoxy	$\theta_{JC}$	40	°C / W
		Non-Conductive Epoxy		46	
	SOT-223*	Conductive Epoxy		25	
		Non-Conductive Epoxy		31	
	SOP-8**	Conductive Epoxy		60	
	SOT-25	Conductive Epoxy		81	
Thermal Resistance (Junction to Ambient)	SOT-89	Conductive Epoxy	$\theta_{JA}$	180	°C / W
		Non-Conductive Epoxy		180	
	SOT-223	Conductive Epoxy		120	
		Non-Conductive Epoxy		135	
	SOP-8	Conductive Epoxy		150	
	SOT-25	Conductive Epoxy		260	
Internal Power Dissipation	SOT-89	Conductive Epoxy	$P_D$	550	mW
		Non-Conductive Epoxy		550	
	SOT-223	Conductive Epoxy		900	
		Non-Conductive Epoxy		800	
	SOP-8	Conductive Epoxy		810	
	SOT-25	Conductive Epoxy		400	
Maximum Junction Temperature				150	°C
Solder Iron(10 Sec)***				350	°C

\* Measure  $\theta_{JC}$  on backside center of tab.

\*\* Measure  $\theta_{JC}$  on center of molding compound if IC has no tab.

\*\*\* MIL-STD-202G 210F

## AME8819

### ■ Electrical Specifications

$V_{IN} = V_{OUT(NOM)} + 1V$ ,  $I_{OUT} = 1mA$ ,  $C_{IN} = 1\mu F$ ,  $C_{OUT} = 4.7\mu F$ , Typical values at  $T_A = 25^\circ C$ , unless otherwise noted.

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units	
Input Voltage	$V_{IN}$		Note1		5.5	V	
ADJ Input Bias Current	$I_{ADJ}$	$V_{IN} = 5V$ , $V_{ADJ} = 0.980$		1		$\mu A$	
ADJ Reference Voltage	$V_{REF}$		0.965	0.980	0.995	V	
Output Voltage Accuracy	$V_{OUT,ACC}$		-2		2	%	
Output Voltage Range	$V_{OUT}$		1.2		4.5	V	
Output Current	$I_{OUT}$		600			mA	
Quiescent Current	$I_Q$	$V_{IN} = 5.5V$ , $I_{OUT} = 1mA$		70	100	$\mu A$	
Dropout Voltage	$V_{DROP}$	$I_{OUT} = 600mA$	1.2V $V_{OUT} < 1.8V$	Note2		mV	
			1.8V $V_{OUT} = 2.5V$		800		1000
			2.5V $< V_{OUT} < 3.3V$		540		800
			3.3V $< V_{OUT} < 4.5V$		470		650
Output Voltage Line Regulation [[ $\Delta V_{OUT} / \Delta V_{IN}$ ] $\times 100\%$ ] / $V_{OUT}$	REG <sub>LINE</sub>	2.8V $V_{IN} = V_{IN(MAX)}$	1.2V $V_{OUT} < 1.8V$	-0.4	0.1	%/ $V$	
		$V_{IN(MIN)}$ $V_{IN} = V_{IN(MAX)}$	1.8V $V_{OUT} < 2.5V$	-0.4	0.1		
		$V_{IN(MIN)}$ $V_{IN} = V_{IN(MAX)}$	2.5V $V_{OUT} < 3.3V$	-0.2	0.03		
		$V_{OUT} + 0.3V$ $V_{IN} = V_{IN(MAX)}$	3.3V $V_{OUT} < 4.5V$	-0.1	0.01		
Output Voltage Load Regulation [[ $\Delta V_{OUT} / V_{OUT}$ ] $\times 100\%$ ] / $\Delta I_{OUT}$	REG <sub>LOAD</sub>	1mA $I_{OUT} = 600mA$	1.2V $V_{OUT} < 1.8V$ , $V_{IN} = V_{IN(MIN)}$	-0.015		%/ $mA$	
			1.8V $V_{OUT} < 2.5V$ , $V_{IN} = V_{IN(MIN)}$	-0.015			0.01
			2.5V $V_{OUT} < 3.3V$ , $V_{IN} = V_{IN(MIN)}$	-0.005			0.004
			3.3V $V_{OUT} < 4.5V$ , $V_{IN} = V_{IN(MIN)}$	-0.003			0.002
Output Current Limit	$I_{LIM}$	$V_{OUT} = 0.8 \times V_{OUT(NOM)}$	650	800		mA	
Shutdown Current	$I_{SHDN}$	$V_{EN} = 0V$ , $V_{IN(MIN)}$ $V_{IN} = 5.5V$		5	10	$\mu A$	
Power Supply Ripple Rejection	PSRR	$f = 1KHz$ , $I_{OUT} = 100mA$ , $C_{out} = 1\mu F$		60		dB	

**■ Electrical Specifications**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Enable High (enabled)	$V_{EN(HI)}$	$V_{IN(MIN)}$ $V_{IN}$ 5.5V	1.4		$V_{IN}$	V
Enable Low (shutdown)	$V_{EN(LO)}$	$V_{IN(MIN)}$ $V_{IN}$ 5.5V	0		0.4	V
Enable Pin Current (enabled)	$I_{EN}$	$V_{EN} = V_{IN}$		0.1	1	$\mu A$
Thermal Shutdown Temperature	$T_{SHDN}$	Shutdown, temperature increasing		150		$^{\circ}C$
	$T_{RS}$	Restore, temperature decreasing		130		

Note 1: If  $V_{OUT} \geq 1.8V$ ,  $V_{IN(MIN)} = V_{OUT} + V_{DROP}$ . If  $V_{OUT} < 1.8V$ ,  $V_{IN(MIN)} = 2.8V$ .

Note 2: For  $V_{OUT}$  below 1.8V, Dropout Voltage is the input<sub>(MIN)</sub> to output differential.

**AME8819**

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**■ Detailed Description**

The AME8819 is low-dropout, low quiescent-current linear regulator designed primarily for battery-powered applications. It is available with present output voltage ranging from 1.2V to 4.5V, and can supply loads up to 600mA.

**■ Circuit Limit**

The AME8819 contains current limiters which monitor and control the pass transistor's Gate voltage, limiting the guaranteed maximum output current to 650mA minimum. The output can be shorted to ground for an indefinite time without damaging the part.

**■ Thermal-Overload Protection**

Thermal-overload protection limits total power dissipation in the AME8819. When the junction temperature arrive  $T_J = 160^\circ\text{C}$  approximately, the thermal sensor signals the shut-down logic, turning off the pass transistor and allowing the IC to cool.

**■ PSRR and Operation from sources Other than Batteries**

The AME8819 is designed to deliver low-dropout voltage and low quiescent currents in battery-powered system. Power-supply rejection ratio is 60dB(Typ.) at 1KHz (see PSRR vs Frequency Curve).When operating from sources other than batteries, PSRR and transient response can be improved by increasing input, output capacitors.

**■ Capacitor Selection and Regulator Stability**

Use 1 $\mu\text{F}$  capacitor on the OUT. Larger input capacitor values and lower ESR provide better supply noise rejection and line transient response. To reduce output noise and improve load transient voltage dips, use larger output capacitors up to 4.7 $\mu\text{F}$ . For stable operation over the full temperature range with load currents up to 600mA, input and output capacitors should be a minimum of 2.2 $\mu\text{F}$  by X7R.

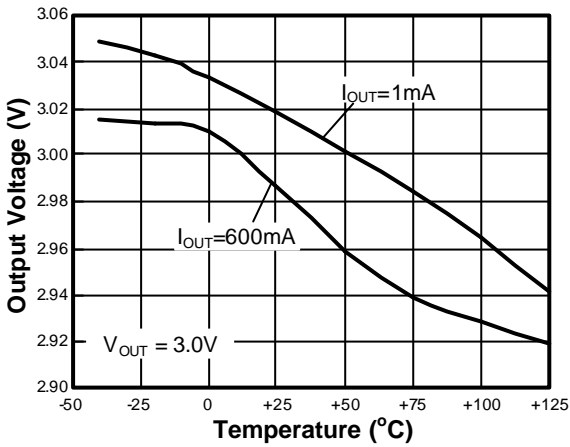
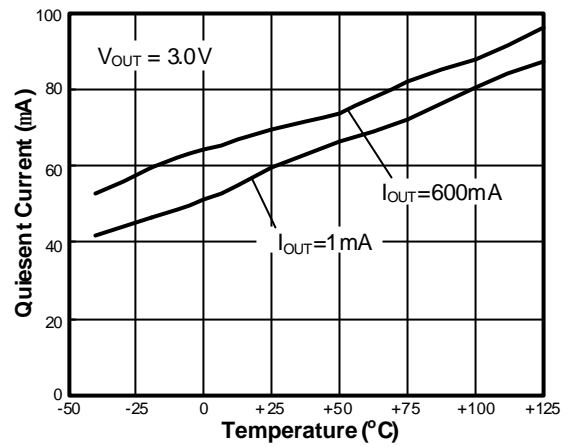
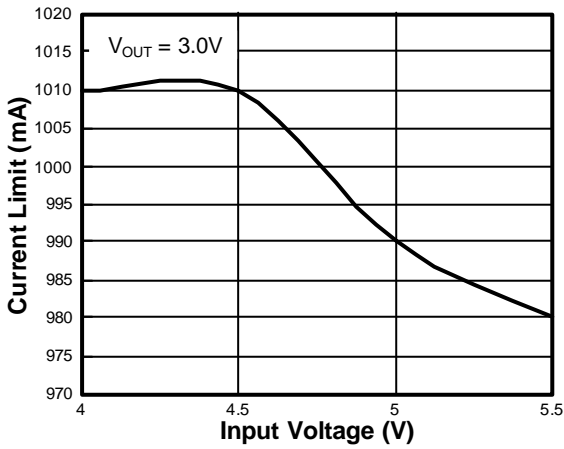
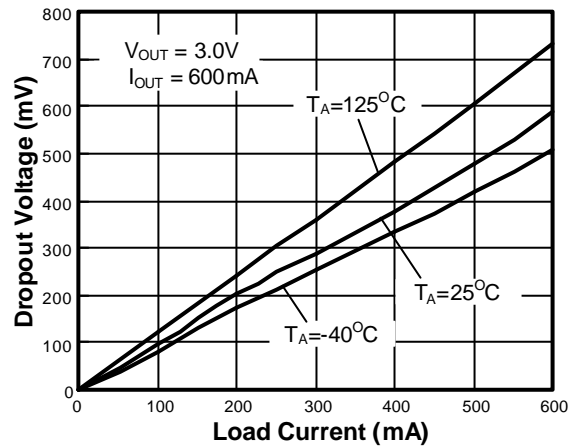
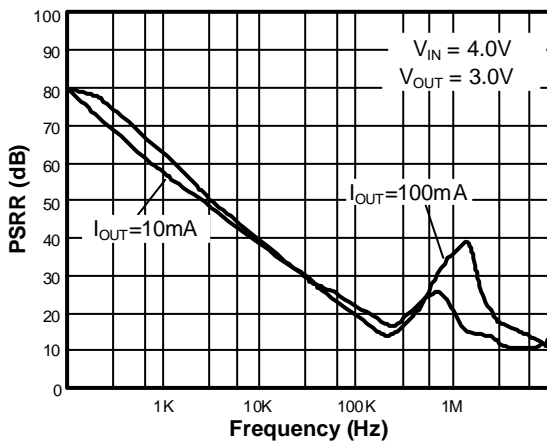
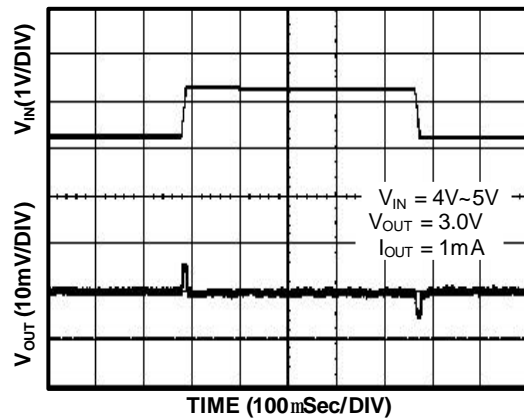
Note that some ceramic dielectrics large capacitance and ESR variation with temperature. With dielectrics such as Z5U and Y5V, it may be necessary to use 4.7 $\mu\text{F}$  or more for up to 600mA load current to ensure stability at temperatures below  $-10^\circ\text{C}$ . With X7R or X5R dielectrics, 2.2 $\mu\text{F}$  is sufficient at all operating temperatures. These regulators are optimized for ceramic capacitors. Tantalum capacitors are not recommended.

**■ Adjustable Version**

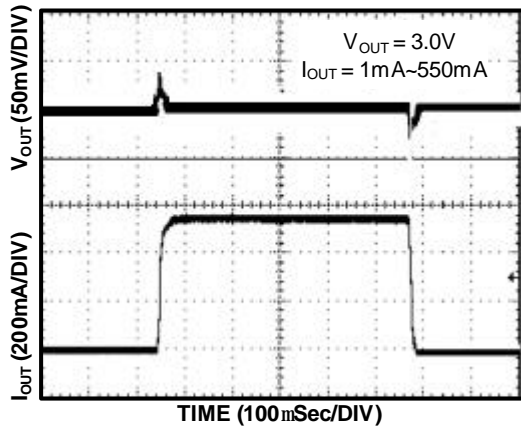
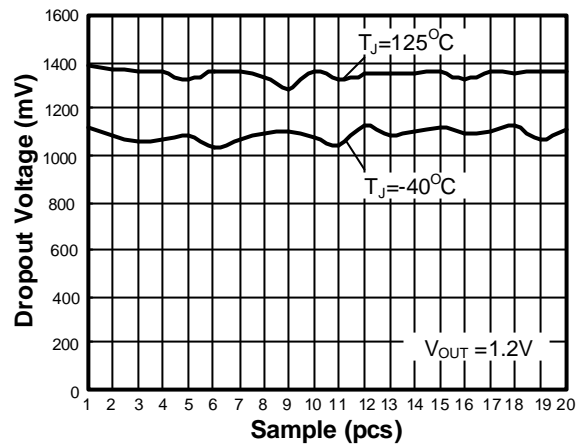
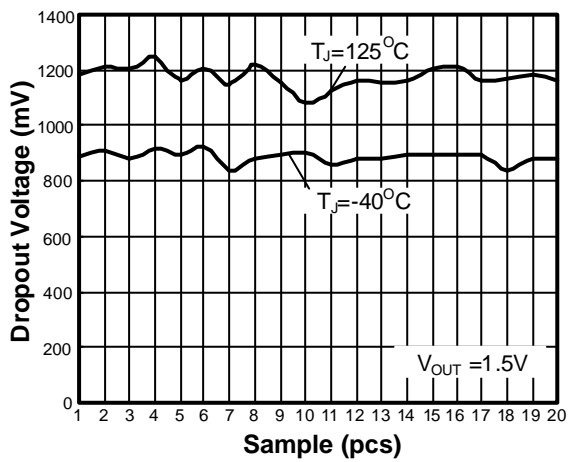
The adjustable version uses external feedback resistors to generate an output voltage anywhere from 0.98V to 4.5V.  $V_{\text{ADJ}}$  is trimmed to 0.98V and  $V_{\text{OUT}}$  is given by the equation:

$$V_{\text{OUT}} = V_{\text{ADJ}} ( 1 + R1 / R2 )$$

Feedback resistors R1 and R2 should be high enough to keep quiescent current low, but increasing R1 + R2 will reduce stability. In general, R1 and R2 in the 10's of k $\Omega$  will produce adequate stability, given reasonable layout precautions. To improve stability characteristics, keep parasitics on the ADJ pin to a minimum, and lower R1 and R2 values.

**■ Characterization Curve(For reference only)**
**Output Voltage vs Temperature**

**Quiescent Current vs Temperature**

**Current Limit vs Input Voltage**

**Dropout Voltage vs Load Current**

**Power Supply Rejection Ratio**

**Line Transient Response**


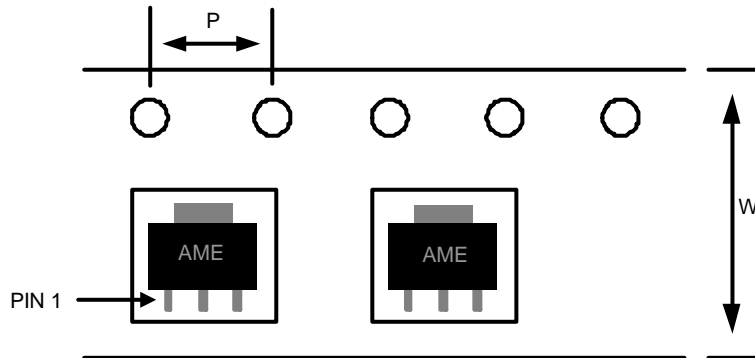
## ■ Characterization Curve(For reference only)

**Load Transient Response**

**Dropout Voltage**

**Dropout Voltage**


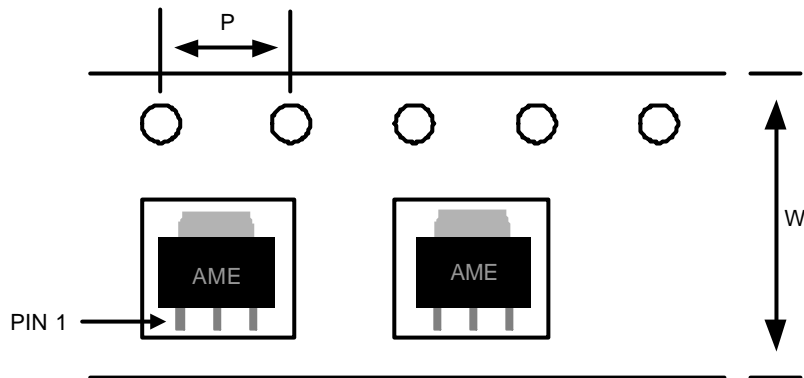
**■ Date Code Rule**

Month Code	
1: January	7: July
2: February	8: August
3: March	9: September
4: April	A: October
5: May	B: November
6: June	C: December

Marking						Year
A	A	A	M	X	X	xxx0
A	A	A	M	X	<u>X</u>	xxx1
A	A	A	M	<u>X</u>	X	xxx2
A	A	A	M	<u>X</u>	<u>X</u>	xxx3
A	A	A	<u>M</u>	X	X	xxx4
A	A	A	<u>M</u>	X	<u>X</u>	xxx5
A	A	A	<u>M</u>	<u>X</u>	X	xxx6
A	A	A	<u>M</u>	<u>X</u>	<u>X</u>	xxx7
A	A	<u>A</u>	M	X	X	xxx8
A	A	<u>A</u>	M	X	<u>X</u>	xxx9

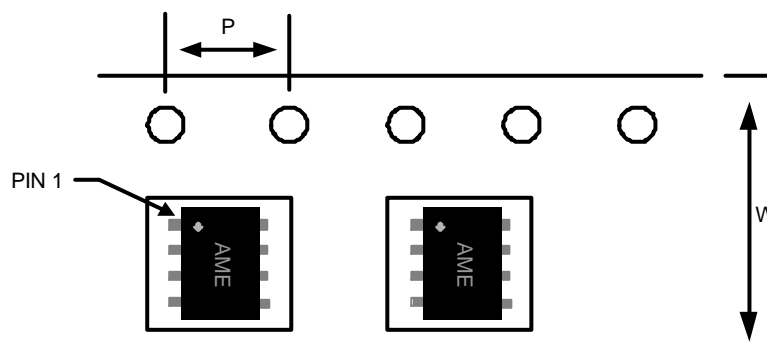
**■ Tape and Reel Dimension**
**SOT-89**

**Carrier Tape, Number of Components Per Reel and Reel Size**

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOT-89	12.0±0.1 mm	4.0±0.1 mm	1000pcs	180±1 mm

**AME8819**
**■ Tape and Reel Dimension**
**SOT-223**


**Carrier Tape, Number of Components Per Reel and Reel Size**

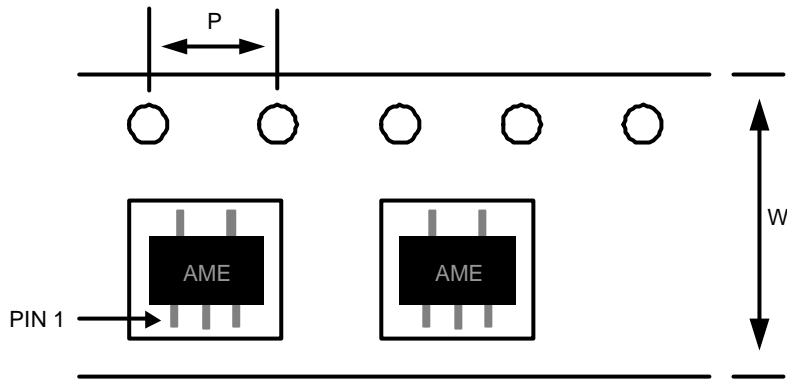
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOT-223	12.0±0.1 mm	4.0±0.1 mm	2500pcs	330±1 mm

**SOP-8**


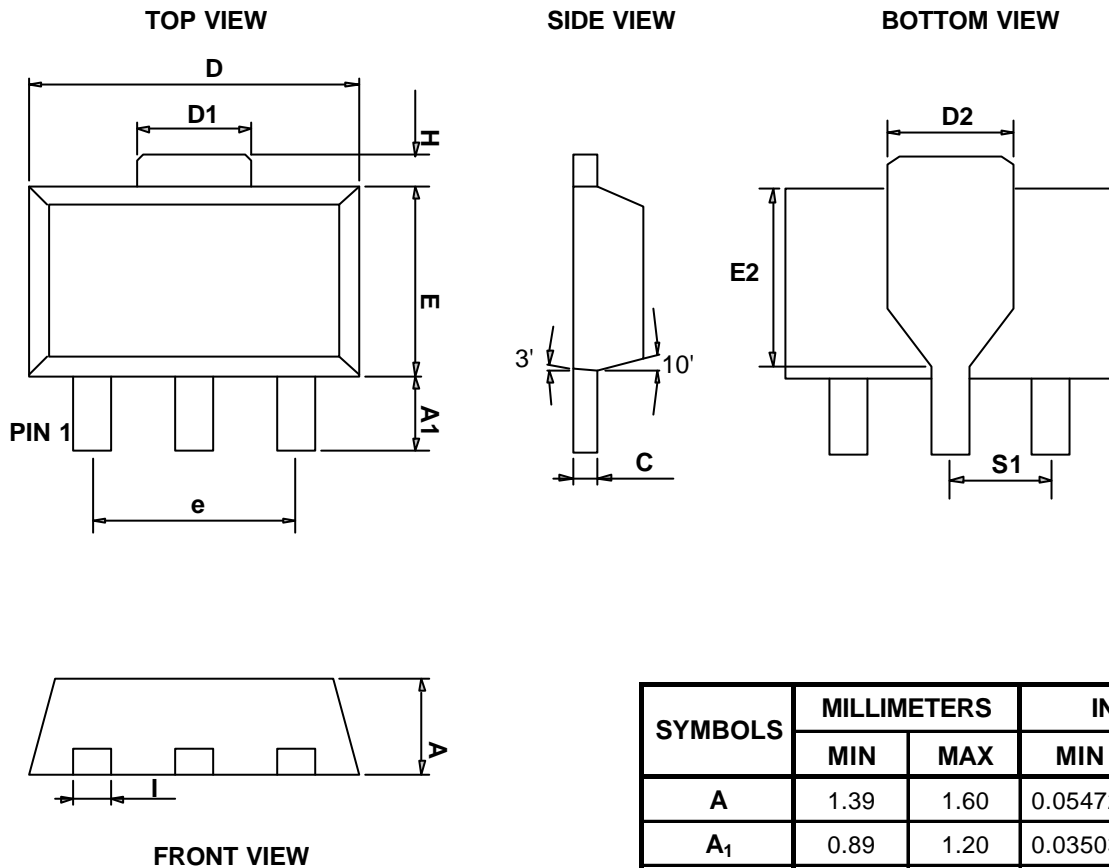
**Carrier Tape, Number of Components Per Reel and Reel Size**

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOP-8	12.0±0.1 mm	4.0±0.1 mm	2500pcs	330±1 mm

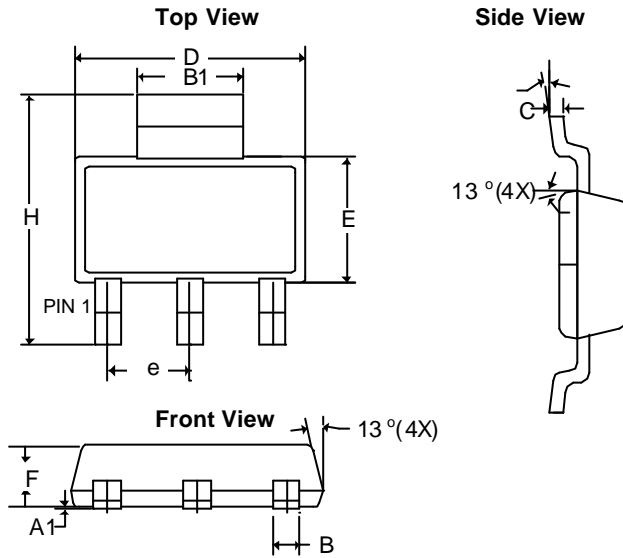


**■ Tape and Reel Dimension (Contd.)**
**SOT-25**

**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

**AME8819**
**■ Package Dimension**
**SOT-89**


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.39	1.60	0.05472	0.06299
A <sub>1</sub>	0.89	1.20	0.03503	0.04724
C	0.35	0.44	0.01378	0.01732
D	4.39	4.60	0.17283	0.18110
D <sub>1</sub>	1.35	1.83	0.05315	0.07205
E	2.28	2.60	0.08976	0.10236
l	0.36	0.56	0.01256	0.02204
e	3.00 REF		0.11811 REF	
H	0.70 REF		0.02756 REF	
S <sub>1</sub>	1.50 REF		0.05906 REF	
E <sub>2</sub>	2.05	2.60	0.08071	0.10236
D <sub>2</sub>	1.50	1.85	0.05905	0.07283

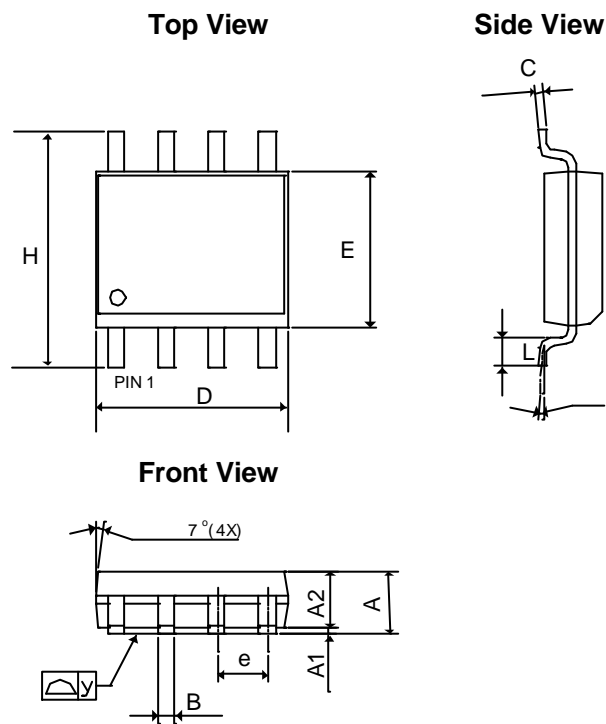
**■ Package Dimension**
**SOT-223**


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A <sub>1</sub>	0.01	0.10	0.0004	0.0039
B	0.60	0.84	0.0236	0.0330
B <sub>1</sub>	2.90	3.15	0.1140	0.1240
C	0.24	0.38	0.0094	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
q	0°	10°	0°	10°

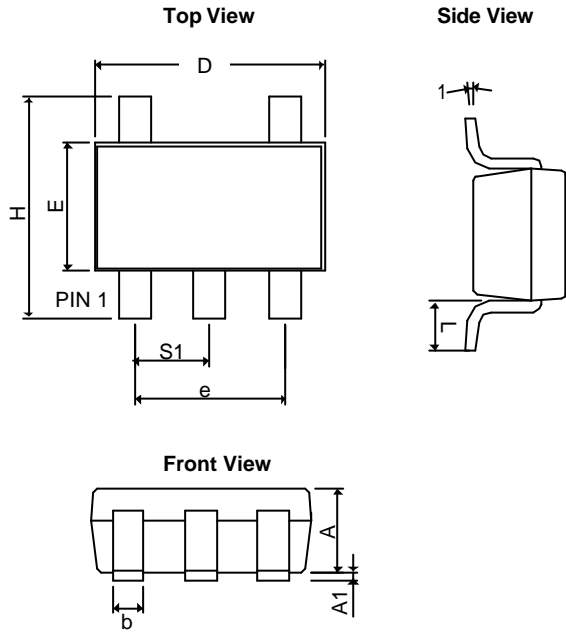
## AME8819

### ■ Package Dimension

SOP-8



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.0531	0.0689
A <sub>1</sub>	0.10	0.30	0.0039	0.0118
A <sub>2</sub>	1.473 REF		0.05799 REF	
B	0.33	0.51	0.0130	0.0201
C	0.17	0.25	0.0067	0.0098
D	4.70	5.33	0.1850	0.2098
E	3.80	4.00	0.1496	0.1575
e	1.27 BSC		0.05000 BSC	
L	0.40	1.27	0.0157	0.0500
H	5.80	6.30	0.2283	0.2480
y	-	0.10	-	0.0039
q	0°	8°	0°	8°

**■ Package Dimension (Contd.)**
**SOT-25**


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.30	0.0354	0.0512
A <sub>1</sub>	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 <sub>1</sub>	0.95BSC		0.0374BSC	



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Document: 1261-DS8819-D.04

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