



AME4311

Low Voltage Shunt Regulator

General Description

The AME4311 is a low voltage version of the industry standard 431 shunt regulator. The AME4311 reference is set to 1.24 volts. The output voltage can be set to any value between 1.24V and 8V with two external resistors. (For factory set internal feedback resistors see the AME4312.) When used with an optocoupler these devices are ideal for isolated 3.3V switching supplies.

Analog Microelectronics offers this part in a TO-92 package as well as the space saving SOT-23 and SOT-25 packages.

For isolated switching power supplies requiring voltages lower than 2.7V see the AME4315.

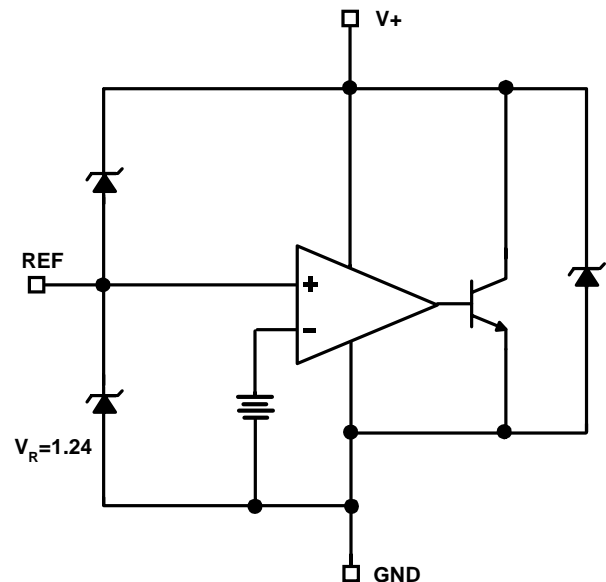
Features

- Small packages: SOT-23, SOT-25, TO-92
- Low voltage operation, 1.24V
- Tight voltage tolerance --- $\pm 0.5\%$, $\pm 1.0\%$, $\pm 1.5\%$
- Wide operating current ----- $80\mu\text{A}$ to 15mA
- Wide temperature range ----- -40°C to $+85^\circ\text{C}$
- Low temperature coefficient -- $100\text{ppm}/^\circ\text{C}_{(\text{max})}$
- Excellent transient response

Applications

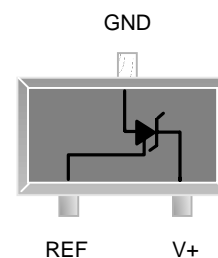
- Battery Operating Equipments
- Adjustable Supplies
- Switching Power Supplies
- Error Amplifiers
- Single Supply Amplifier
- Monitors / VCR / TV
- Personal Computers

Functional Block Diagram

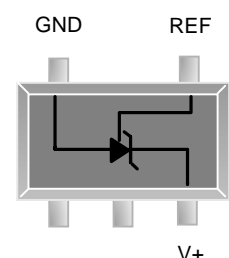


Pin Configuration

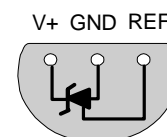
SOT-23
Top View



SOT-25
Top View



TO-92
Top View



**AME4311****Low Voltage Shunt Regulator**

■ Ordering Information

Part Number	Marking	Output Voltage	Tolerance	Package	Temp. Range
AME4311EEAT	AME 4311 EEAT yyww	1.24	0.5%	TO-92	- 40°C to + 85°C
AME4311EEET	AVVww	1.24	0.5%	SOT-23	- 40°C to + 85°C
AME4311FEET	AVWww	1.24	1.0%	SOT-23	- 40°C to + 85°C
AME4311GEET	AVXww	1.24	1.5%	SOT-23	- 40°C to + 85°C
AME4311EEEEV	AGFww	1.24	0.5%	SOT-25	- 40°C to + 85°C

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

**AME4311****Low Voltage Shunt Regulator**

■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Supply Current	20	mA

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

■ Recommended Operating Conditions

Parameter	Rating	Unit
Supply Current	100 μ A ~ 15mA	
Ambient Temperature Range	-40 to +85	$^{\circ}$ C
Junction Temperature	-40 to +125	$^{\circ}$ C

■ Thermal Information

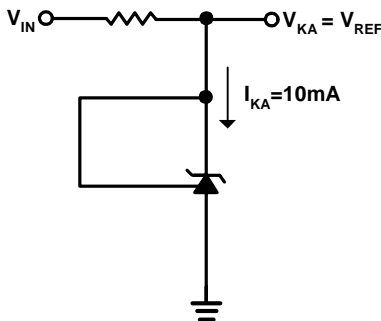
Parameter	Maximum	Unit
Thermal Resistance	SOT-23	325
	SOT-25	325
	TO-92	180
Maximum Junction Temperature	150	$^{\circ}$ C
Maximum Lead Temperature (10 Sec)	300	$^{\circ}$ C

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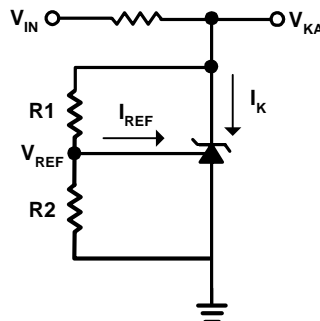
■ Electrical Specifications

$T_A = 25^\circ\text{C}$, $I_{\text{REF}} = 10\text{mA}$ unless otherwise specified

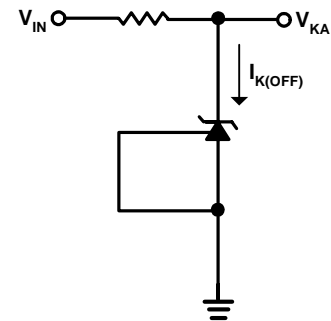
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Reference Voltage (Test Circuit 1)	$V_{\text{REF}} 0.5\%$	$T_A = 25^\circ\text{C}$, $I_{\text{REF}} = 10\text{mA}$	1.234	1.240	1.246	V
	$V_{\text{REF}} 1.0\%$	$T_A = 25^\circ\text{C}$, $I_{\text{REF}} = 10\text{mA}$	1.228	1.240	1.252	V
	$V_{\text{REF}} 1.5\%$	$T_A = 25^\circ\text{C}$, $I_{\text{REF}} = 10\text{mA}$	1.221	1.240	1.258	V
Ratio of Change in V_{REF} to Cathode Voltage	$\frac{\Delta V_{\text{REF}}}{\Delta V_K}$	$V_{\text{KA}} = 6\text{V to } 8\text{V}$ (Test Circuit 2)	-2.7		0.3	mV/V
Reference Input Current	I_{REF}	Test Circuit 2			1.0	μA
Off State Leakage	$I_{\text{K(OFF)}}$	$V_{\text{REF}} = 0\text{V}$ $V_K = 7\text{V}$ (Test Circuit 3)			1000	nA
Minimum Current I_K	I_{MIN}		80			μA
Reference Voltage Temp. Coeff.	V_{REFTC}	$0^\circ\text{C} < T_A < 70^\circ\text{C}$		100		ppm/ $^\circ\text{C}$
Dynamic Output Impedance	r_Z	$V_Z = V_{\text{REF}}$, $I_Z = 0.1\text{mA to } 15\text{mA}$, Frequency = OHZ		0.3	0.4	Ω



Test Circuit 1



Test Circuit 2



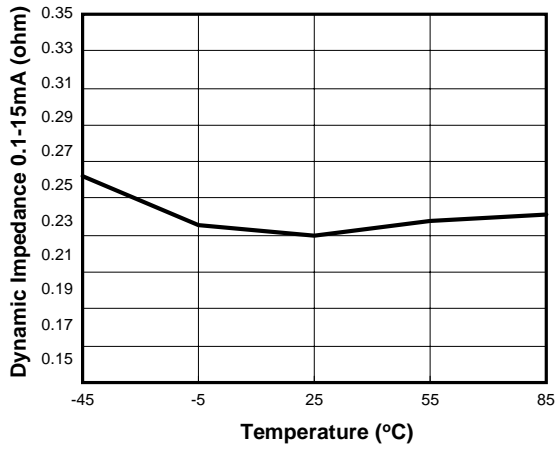
Test Circuit 3



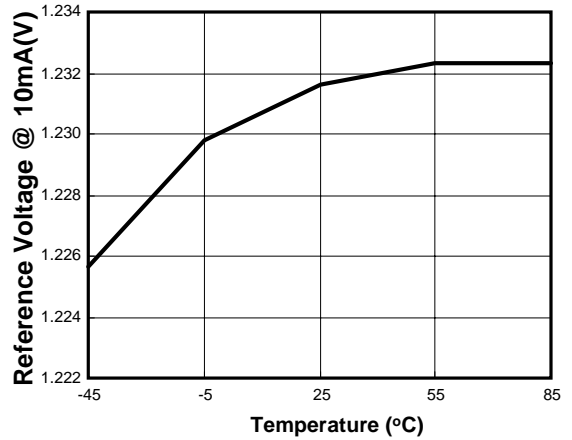
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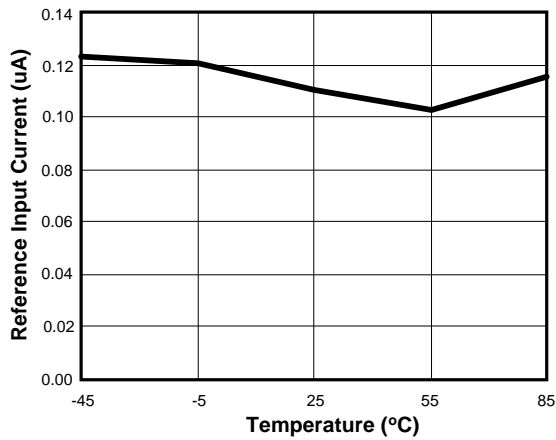
Dynamic Impedance vs. Temperature



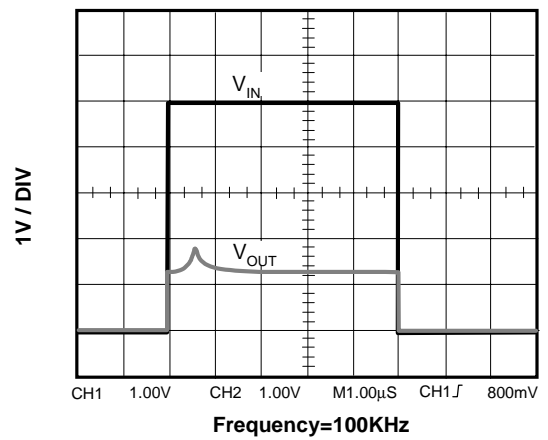
Reference Voltage vs. Temperature



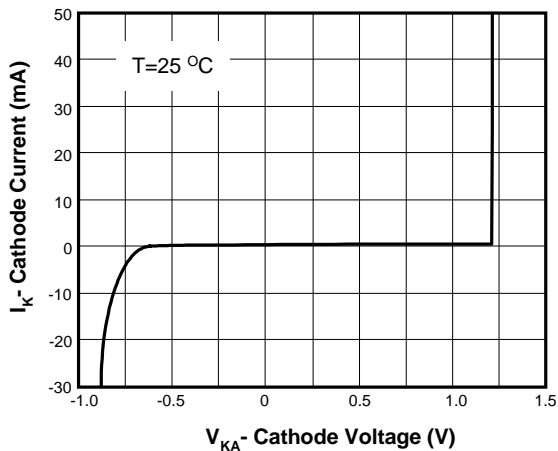
Reference Input Current vs. Temperature



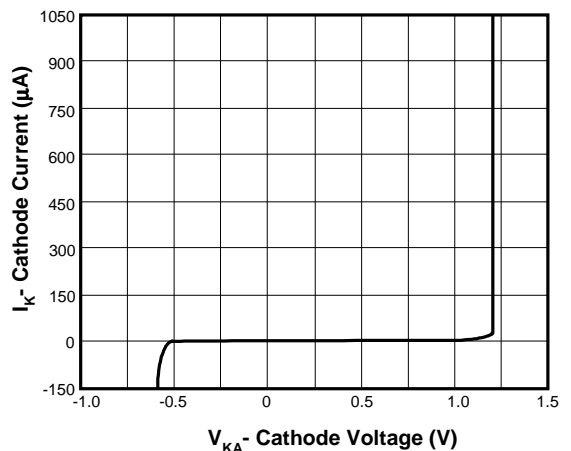
Line Transient Response, I_K=10mA

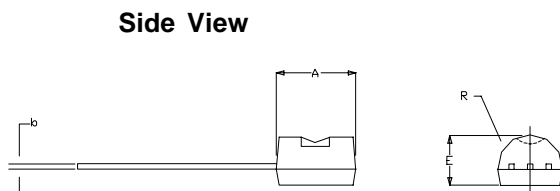
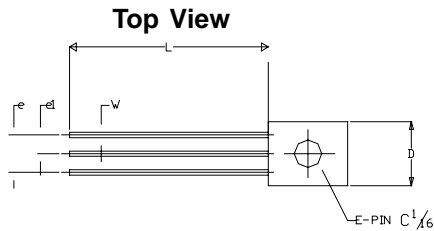


High Current Operating Characteristics



Low Current Operating Characteristics

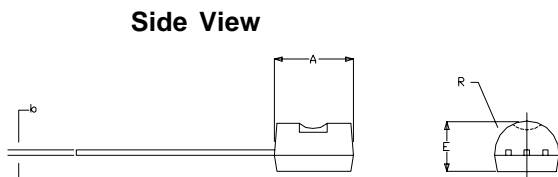
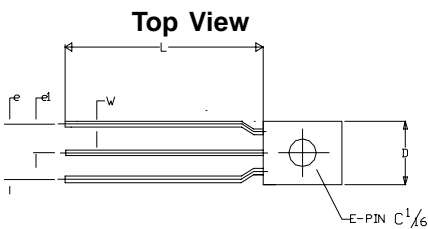


AME4311
Low Voltage Shunt Regulator
■ Package Dimension
TO-92-3 (bulk pack)


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.32	4.95	0.1701	0.1949
b	0.36	0.51	0.0142	0.0201
E	3.30	3.94	0.1299	0.1551
e	2.41	2.67	0.0949	0.1051
e1	1.14	1.40	0.0449	0.0551
L	12.70	15.49	0.5000	0.6098
R	2.16	2.41	0.0850	0.0949
W	0.41	0.56	0.0161	0.0220
D	4.45	4.95	0.1752	0.1949

Notes:

1. Package outline exclusive of any mold flashes dimension.
2. Package outline exclusive of burr dimension.
3. Lead pitch=2.54mm is bulk pack.
4. Lead pitch=5.08mm is tape pack.

TO-92-3 (tape pack)


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.32	4.95	0.1701	0.1949
b	0.36	0.51	0.0142	0.0201
E	3.30	3.94	0.1299	0.1551
e	4.98	5.08	0.1961	0.2000
e1	2.49	2.54	0.0980	0.1000
L	12.70	15.49	0.5000	0.6098
R	2.16	2.41	0.0850	0.0949
W	0.41	0.56	0.0161	0.0220
D	4.45	4.95	0.1752	0.1949

Notes:

1. Package outline exclusive of any mold flashes.
2. Package outline exclusive of burr dimension.
3. Lead pitch=2.54mm is bulk pack.
4. Lead pitch=5.08mm is tape pack.

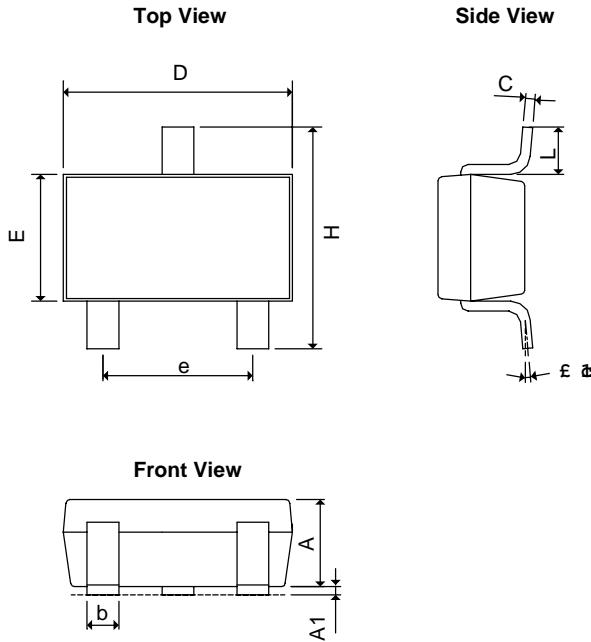


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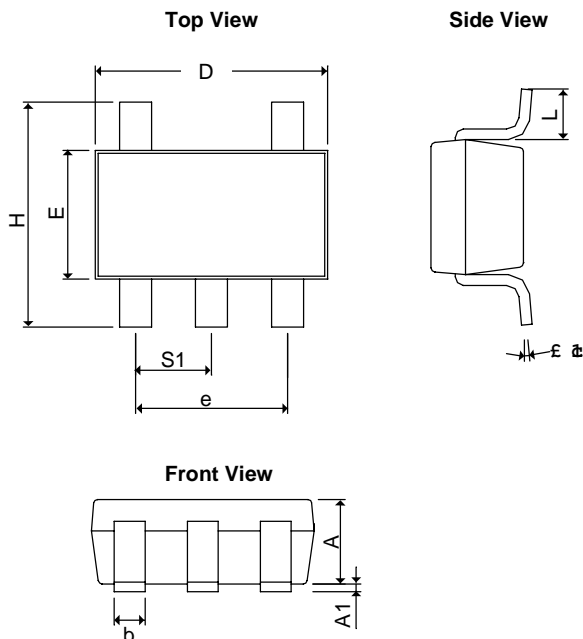
■ Package Dimension

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	
θ1	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	
θ1	0°	10°	0°	10°
S ₁	0.95BSC		0.0374BSC	



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