AME

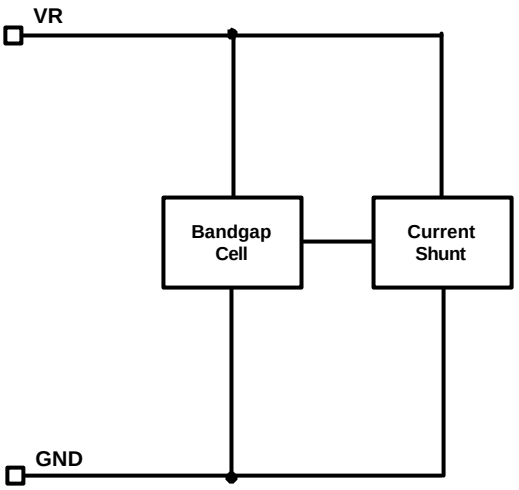
AME40 Shunt Bandgap Voltage Reference

■ General Description

The AME40 is a micropower 2-terminal band-gap voltage regulator diode. It operates over a 40μA to 20mA current range. Each circuit is trimmed at wafer sort to provide a ±0.50% initial tolerance. The design of the AME40 allows for a large range of load capacitances and operating currents. The low start-up current makes these parts ideal for battery applications.

AME offers this part in a TO-92, SOP-8 packages as well as the space saving SOT-23.

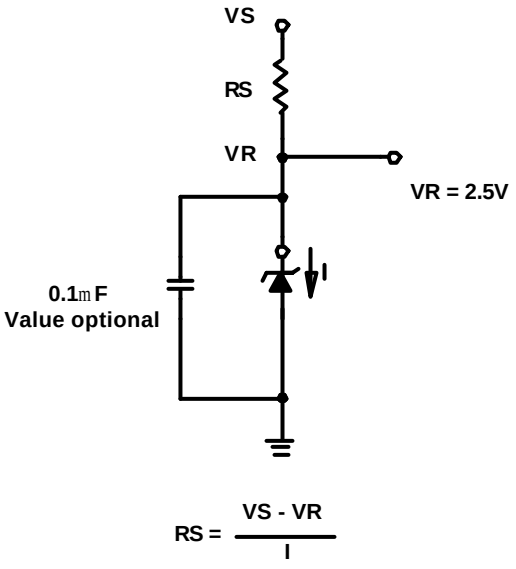
■ Functional Block Diagram



■ Features

- Small Packages: SOT-23, TO-92, SOP-8
- Tolerates Capacitive Loads
- Fixed Reverse Breakdown Voltage of 2.5V
- Tight Voltage Tolerance ------- ±0.5%
- Wide Operating Current ------- 40μA to 20mA
- Wide Temperature Range ----- -40°C to +85°C
- Low Temperature Coefficient --100ppm/°C (max)
- Excellent Transient Response
- All AME's Lead Free Products Meet RoHS Standards

■ Typical Application



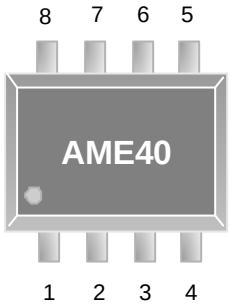
$$RS = \frac{VS - VR}{I}$$

■ Applications

- Portable Electronics
- Power Supplies
- Computer Peripherals
- Data Acquisition Systems
- Battery Chargers
- Consumer Electronics

■ Pin Configuration

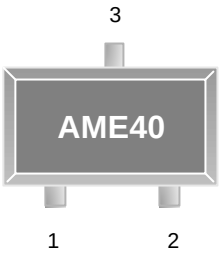
SOP-8
Top View



AME40
1. NC
2. NC
3. NC
4. -
5. NC
6. NC
7. NC
8. +

*** Die Attach:**
Conductive Epoxy

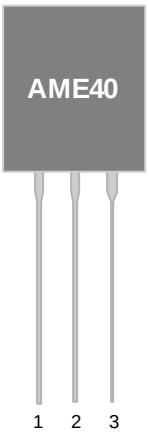
SOT-23
Top View



AME40
1. +
2. -
3. NC*

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

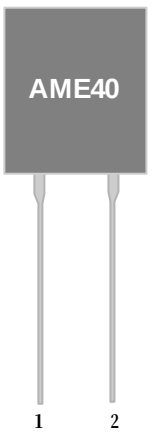
TO-92-3
Top View



AME40
1. NC*
2. +
3. -

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

TO-92-2
Top View

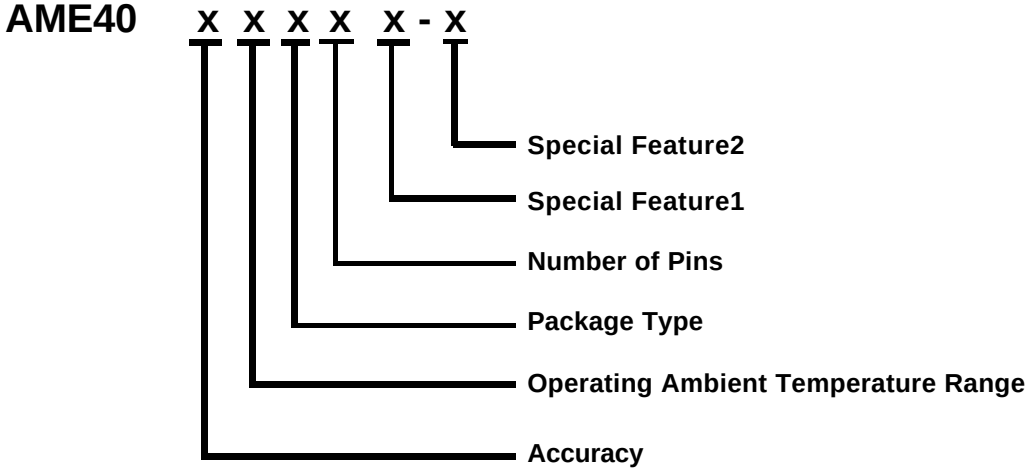


AME 40
1. +
2. -

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

* The NC pin must float or be connected to - (negative)

■ Ordering Information



Accuracy	Operating Ambient Temperature Range	Package Type	Number of Pins	Special Feature1	Special Feature2 (For TO-92 Package Only)
A: 0.5% (SOT-23) (SOP-8) (TO-92-2) (TO-92-3)	E: -40^{O}C to +85^{O}C	A: TO-92 E: SOT-2X H: SOP	A: 8 S: 2 T: 3	Z: Lead Free	Package / Lead Pitch N/A: Taping 5.08mm 1: Bulk 2.54mm

■ Ordering Information

Part Number	Marking*	Accuracy	Package	Operating Ambient Temperatre Range
AME40AEET	ABZww	0.5%	SOT-23	- 40°C to +85°C
AME40AEETZ	ABZww	0.5%	SOT-23	- 40°C to +85°C
AME40AEAS	AME 40 AEAS yyww	0.5%	TO-92-2	- 40°C to +85°C
AME40AEAS-1	AME 40 AEAS yyww	0.5%	TO-92-2	- 40°C to +85°C
AME40AEASZ	AME 40 AEAS yyww	0.5%	TO-92-2	- 40°C to +85°C
AME40AEASZ-1	AME 40 AEAS yyww	0.5%	TO-92-2	- 40°C to +85°C
AME40AEAT	AME 40 AEAT yyww	0.5%	TO-92-3	- 40°C to +85°C
AME40AEAT-1	AME 40 AEAT yyww	0.5%	TO-92-3	- 40°C to +85°C
AME40AEATZ	AME 40 AEAT yyww	0.5%	TO-92-3	- 40°C to +85°C
AME40AEATZ-1	AME 40 AEAT yyww	0.5%	TO-92-3	- 40°C to +85°C
AME40AEHA	40 AEHA yyww	0.5%	SOP-8	- 40°C to +85°C
AME40AEHAZ	40 AEHA yyww	0.5%	SOP-8	- 40°C to +85°C

Note: yyww & ww represents the date code

* A line on top of the first letter represents lead free plating such as $\overline{A}$BZ.

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

■ 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	Symbol	Rating	Unit
Ambient Temperature Range	T_A	- 40 to +85	^oC
Junction Temperature Range	T_J	- 40 to +125	^oC
Storage Temperature Range	T_{STG}	- 65 to +150	^oC
Supply Current	60μA ~ 12mA		

■ Thermal Information

Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance* (Junction to Case)	SOT-23	Non-Conductive Epoxy	θ_{JC}	140	°C / W
	TO-92-2 TO-92-3			80	
	SOP-8	Conductive Epoxy		60	
Thermal Resistance (Junction to Ambient)	SOT-23	Non-Conductive Epoxy	θ_{JA}	280	°C / W
	TO-92-2 TO-92-3			150	
	SOP-8	Conductive Epoxy		150	
Internal Power Dissipation	SOT-23	Non-Conductive Epoxy	P_D	400	mW
	TO-92-2 TO-92-3			625	
	SOP-8	Conductive Epoxy		810	
Maximum Junction Temperature				150	oC
Solder Iron (10 Sec)**				350	°C

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

** MIL-STD-202G 210F

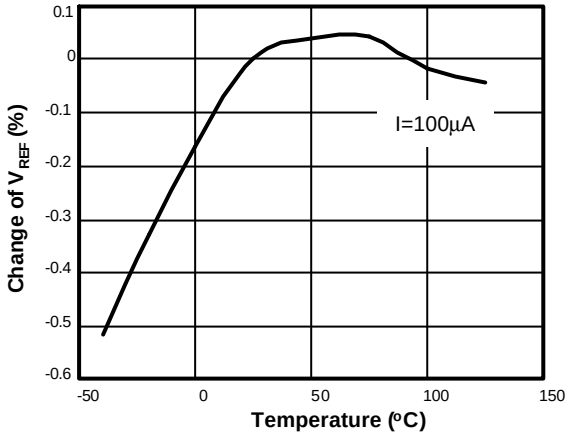
■ Electrical Specifications

Unless otherwise specified, T_A = 25°C, I =100μA

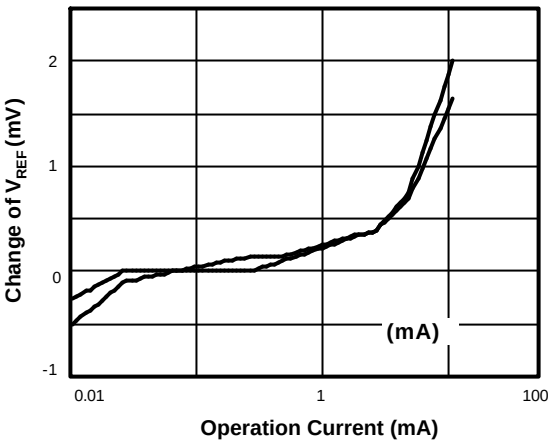
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Reference Voltage, ±0.5%	V_{REF}	T_A = 25°C, I_{REF} = 100μA	2.487	2.500	2.513	V
Minimum Current	I_{MIN}				40	μA
Reference Voltage Change With Current	$dV_{REF/I}$	$I_{MIN} \leq I \leq$ 1mA		1.5	3	mV
		1mA $\leq I \leq$ 20mA		4	8	
Reference Voltage Temp. Coeff.	V_{REFTC}	0°C < T_A < 70°C			100	ppm/°C

■ Characterization Curve(For reference only)

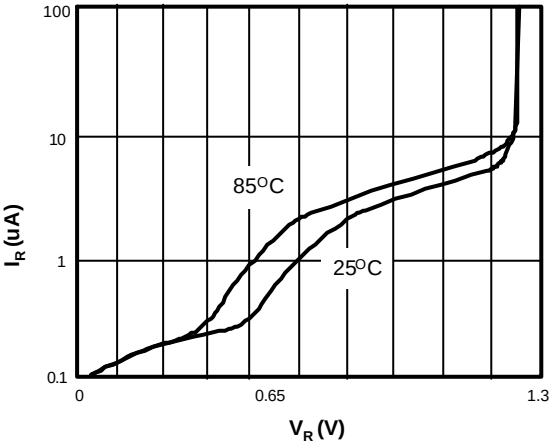
Normalized Percentage Change vs. Temp.



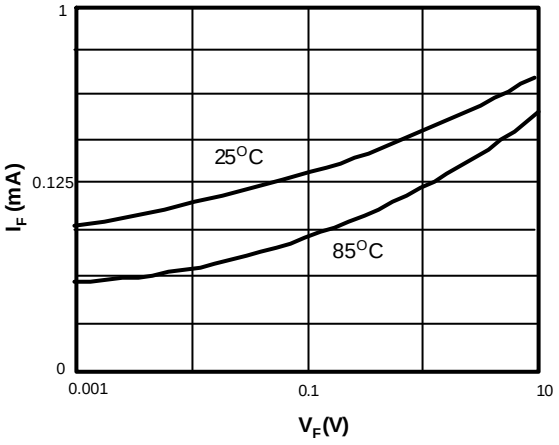
Reference Voltage Change vs. Current



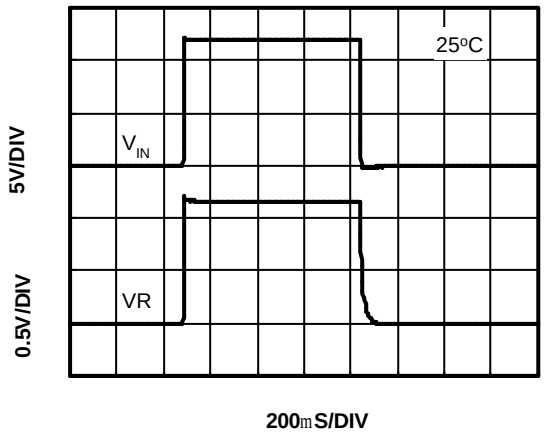
Reverse Characteristic



Forward Characteristic



Line Transient Response

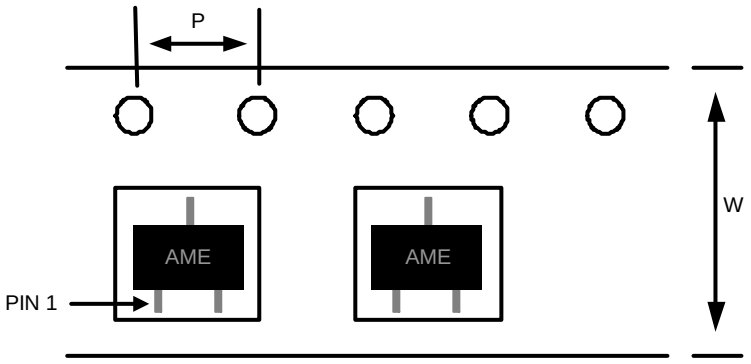


■ Date Code Rule

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

■ Tape and Reel Dimension

SOT-23

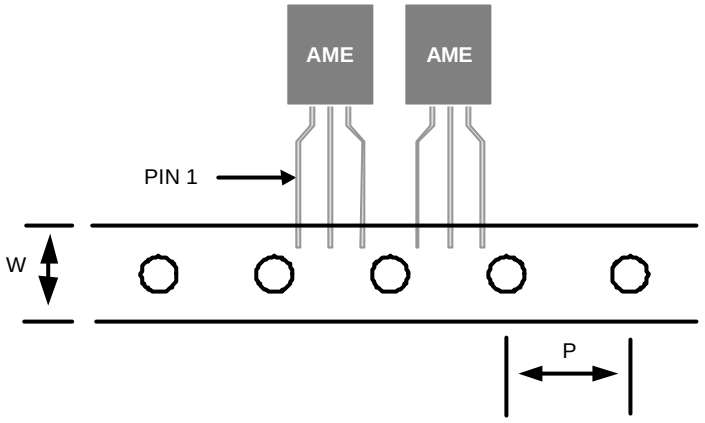


Carrier Tape, Number of Components Per Reel and Reel Size

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

■ Tape and Reel Dimension

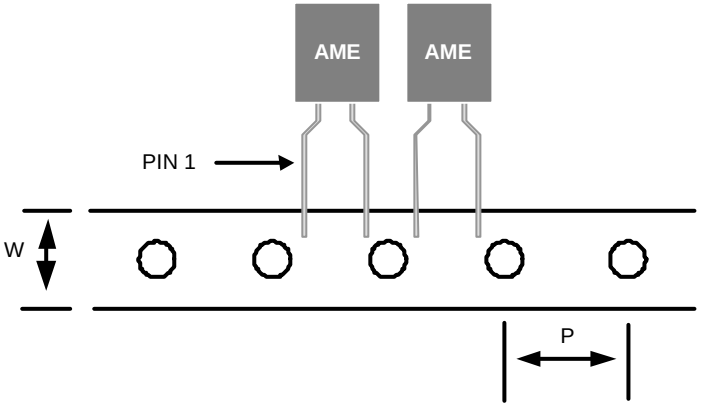
TO-92-3



Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
TO-92-3	$18.0^{+1.0}_{-0.5}$ mm	12.7±0.2 mm	2000pcs	N/A

TO-92-2

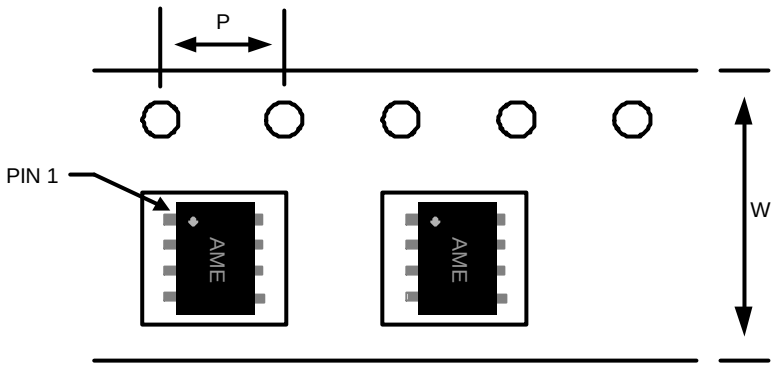


Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
TO-92-2	$18.0^{+1.0}_{-0.5}$ mm	12.7±0.2 mm	2000pcs	N/A

■ Tape and Reel Dimension

SOP-8

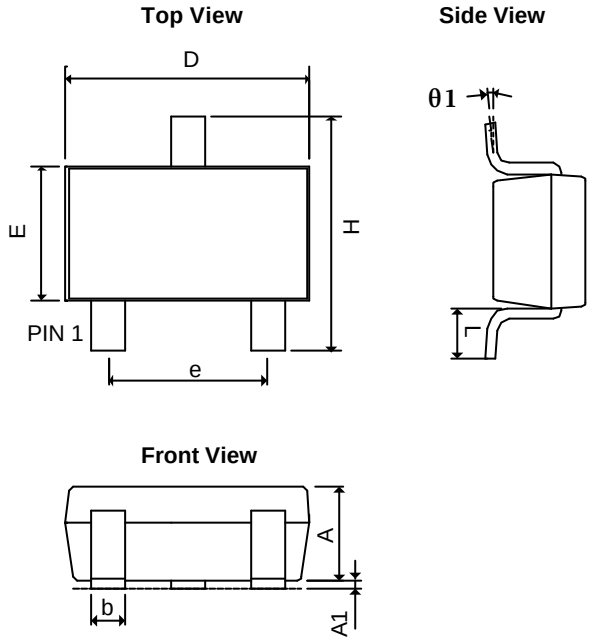


Carrier Tape, Number of Components Per Reel and Reel Size

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

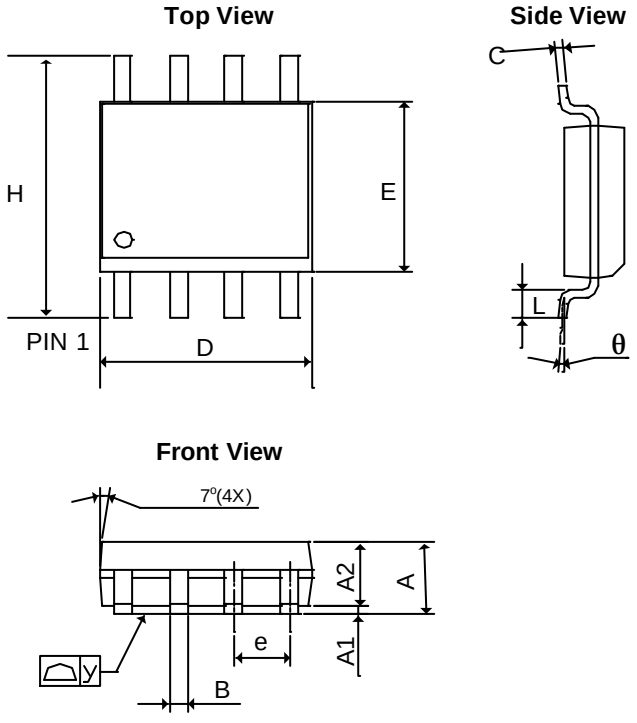
■ Package Dimension

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
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°

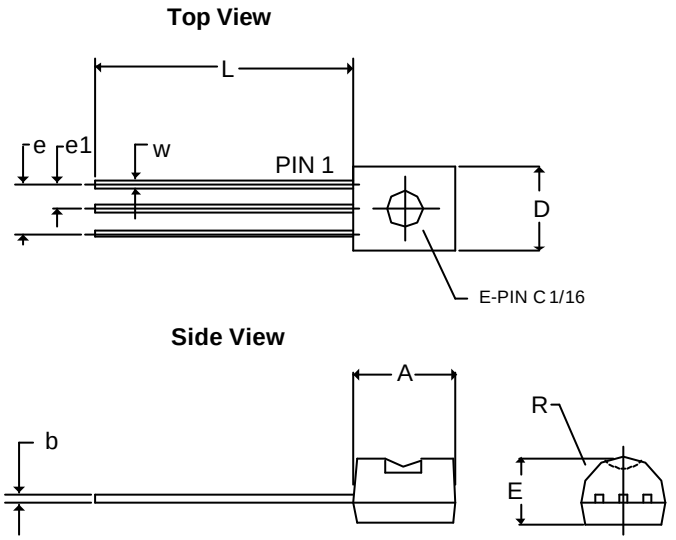
SOP-8



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.05315	0.0689
A_1	0.10	0.30	0.00394	0.01181
A2	1.473 REF		0.05799 REF	
B	0.33	0.51	0.01299	0.02008
C	0.19	0.25	0.00748	0.00984
D	4.80	5.33	0.18898	0.20984
E	3.80	4.00	0.14961	0.15748
e	1.27 BSC		0.05000 BSC	
L	0.40	1.27	0.01575	0.05000
H	5.80	6.30	0.22835	0.24803
y	-	0.10	-	0.00394
q	0°	8°	0°	8°

■ Package Dimension

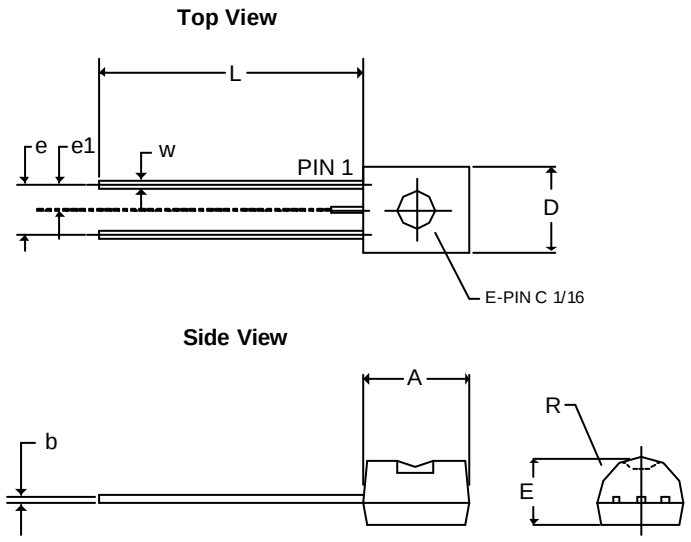
TO-92-3 (bulk pack)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	4.95	0.1102	0.1949
b	0.40REF		0.0157REF	
E	3.94REF		0.1551REF	
e	2.54REF		0.1000REF	
e1	1.27REF		0.0500REF	
L	12.70	15.49	0.5000	0.6098
R	2.29		0.0902	
W	0.35	0.76	0.0138	0.0299
D	3.80	4.95	0.1496	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-92-2 (bulk pack)

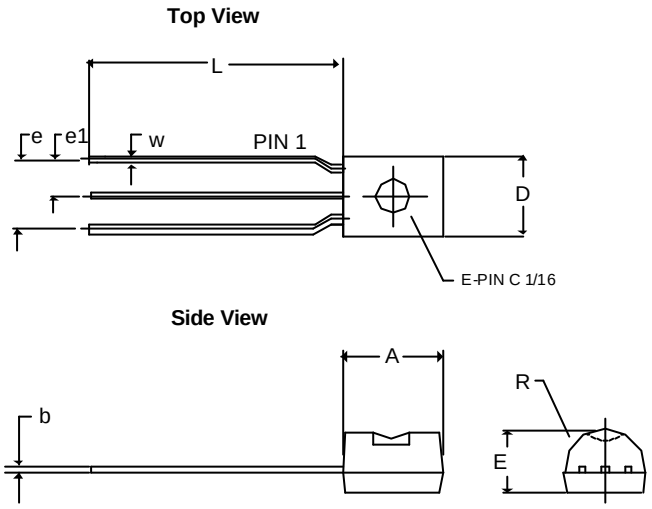


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.00	4.95	0.1575	0.1949
b	0.40REF		0.0157REF	
E	3.94REF		0.1551REF	
e	2.54REF		0.1000REF	
e1	1.27REF		0.0500REF	
L	12.70	15.49	0.5000	0.6098
R	2.29		0.0902	
W	0.35	0.76	0.0138	0.0299
D	3.80	4.95	0.1496	0.1949

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.

■ Package Dimension

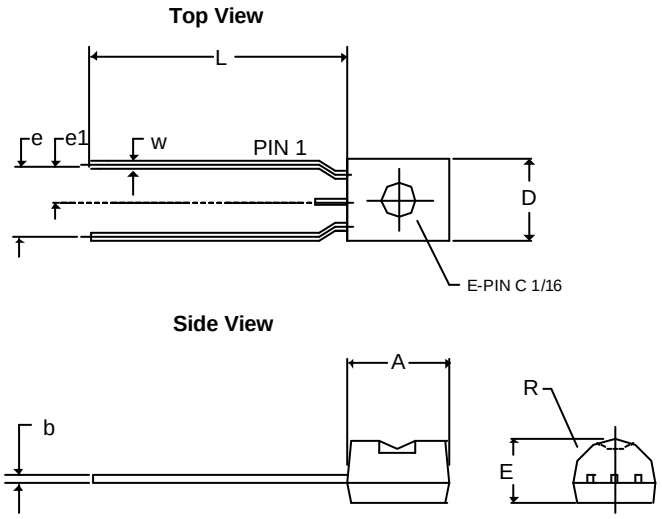
TO-92-3 (tape pack)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	4.95	0.1102	0.1949
b	0.40REF		0.0157REF	
E	2.40	3.94	0.0945	0.1551
e	5.08REF		0.2REF	
e1	2.54REF		0.1REF	
L	12.70	15.49	0.5000	0.6098
R	2.00		0.0787	
W	0.35	0.76	0.0138	0.0299
D	3.80	4.95	0.1496	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.

TO-92-2 (tape pack)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.80	4.95	0.1102	0.1949
b	0.40REF		0.0157REF	
E	2.40	3.94	0.0945	0.1551
e	5.08REF		0.2REF	
e1	2.54REF		0.1REF	
L	12.70	15.49	0.5000	0.6098
R	2.00		0.0787	
W	0.35	0.76	0.0138	0.0299
D	3.80	4.95	0.1496	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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