



AME385-2.5

Micropower Voltage Reference Diode

■ General Description

The AME385-2.5 is a micropower 2-terminal band-gap voltage regulator diode. It operates over a 20µA to 20mA current range. Each circuit is trimmed at wafer sort to provide a ±0.20% and ±0.50% initial tolerance. The design of the AME385-2.5 allows for a large range of load capacitances and operating currents. The low start-up current makes these part ideal for battery applications.

Analog Microelectronics offers this part in a TO-92 and SO-8 package as well as the space saving SOT-23.

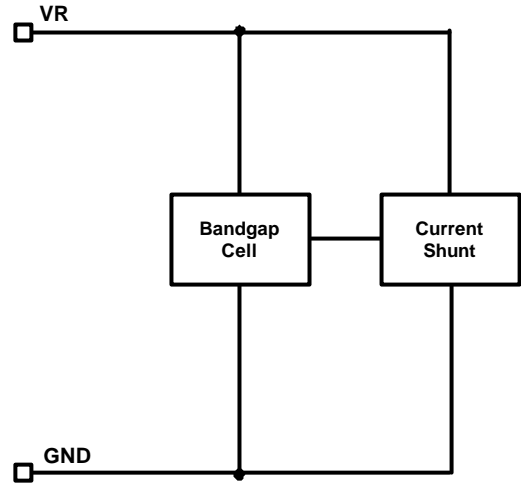
■ Features

- Small packages: SOT-23, TO-92, SO-8
- Tolerates capacitive loads
- Fixed reverse breakdown voltage of 2.5V
- Tight voltage tolerance ----- ±0.20%, ±0.5%
- Wide operating current ----- 20µA to 20mA
- Wide temperature range ----- -40°C to +85°C
- Low temperature coefficient --100ppm/°C (max)
- Excellent transient response

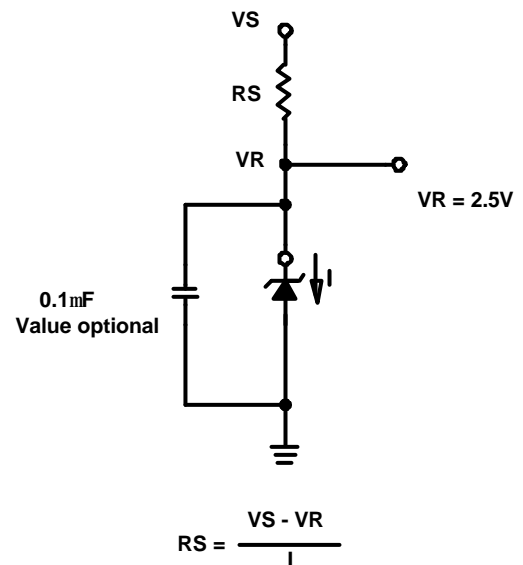
■ Applications

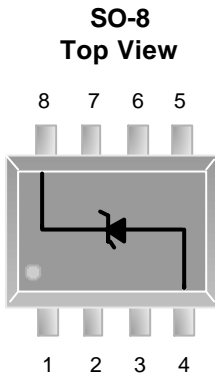
- Portable electronics
- Power supplies
- Computer peripherals
- Data acquisition systems
- Battery chargers
- Consumer electronics

■ Functional Block Diagram

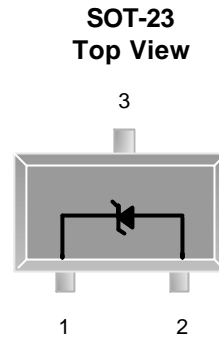


■ Typical Application

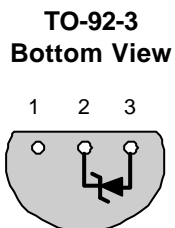


■ Pin Configuration

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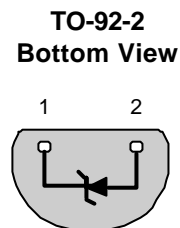
1. NC
2. NC
3. NC
4. -
5. NC
6. NC
7. NC
8. +


AME 385-2.5

1. +
2. -
3. NC*


AME 385-2.5

1. NC*
2. +
3. -

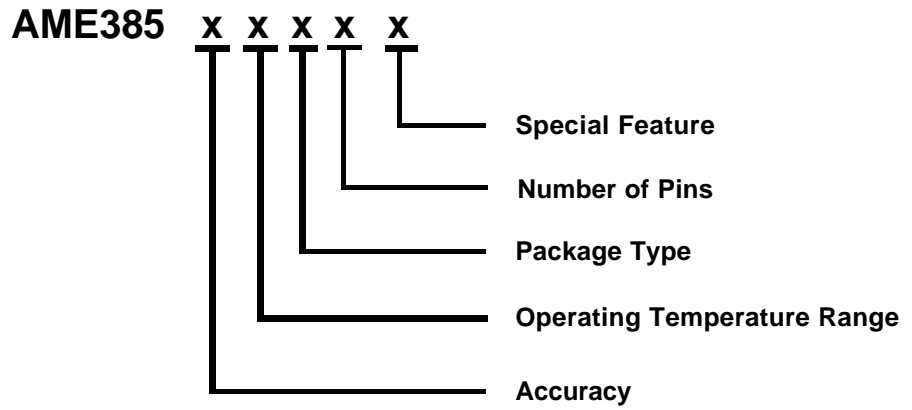

AME 385-2.5

1. +
2. -

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



■ Ordering Information



| Accuracy | Operating Temperature Range | Package Type | Number of Pins | Special Feature |
|--------------------|-----------------------------|----------------------------------|----------------------|--|
| D: 0.2% B: 0.5% | E: -40°C to 85°C | A: TO-92 E: SOT-2X H: SO-8 | A: 8 S: 2 T: 3 | L: Low Profile Y: Lead Free & Low Profile Z: Lead Free |

■ Ordering Information (contd.)

| Part Number | Marking | Accuracy | Package | Operating Temp. Range |
|-------------|----------------------------|----------|---------|-----------------------|
| AME385DEET | ACSww | 0.2% | SOT-23 | - 40°C to + 85°C |
| AME385DEETL | ACSww | 0.2% | TSOT-23 | - 40°C to + 85°C |
| AME385DEETY | ACSww | 0.2% | TSOT-23 | - 40°C to + 85°C |
| AME385DEETZ | ACSww | 0.2% | SOT-23 | - 40°C to + 85°C |
| AME385DEHA | 385 DEHA yyww | 0.2% | SO-8 | - 40°C to + 85°C |
| AME385DEHAZ | 385 DEHA yyww | 0.2% | SO-8 | - 40°C to + 85°C |
| AME385BEET | ABYww | 0.5% | SOT-23 | - 40°C to + 85°C |
| AME385BEETL | ABYww | 0.5% | TSOT-23 | - 40°C to + 85°C |
| AME385BEETY | ABYww | 0.5% | TSOT-23 | - 40°C to + 85°C |
| AME385BEETZ | ABYww | 0.5% | SOT-23 | - 40°C to + 85°C |
| AME385BEAT | AME 385 BEAT yyww | 0.5% | TO-92-3 | - 40°C to + 85°C |
| AME385BEATZ | AME 385 BEAT yyww | 0.5% | TO-92-3 | - 40°C to + 85°C |
| AME385BEAS | AME 385 BEAS yyww | 0.5% | TO-92-2 | - 40°C to + 85°C |
| AME385BEASZ | AME 385 BEAS yyww | 0.5% | TO-92-2 | - 40°C to + 85°C |
| AME385BEHA | 385 BEHA yyww | 0.5% | SO-8 | - 40°C to + 85°C |
| AME385BEHAZ | 385 BEHA yyww | 0.5% | SO-8 | - 40°C to + 85°C |

*** Package Option**

| Part Number | Package | Lead Pitch |
|--------------|--------------|------------|
| AME385XEAX | TO-92 Taping | 5.04mm |
| AME385XEAX-1 | TO-92 Bulk | 2.54mm |

Note: yyww & ww represents the date code

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

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 | 50 | 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 ~ 20mA | |
| 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 | $^{\circ}$ C / W |
| | TO-92 | 180 | |
| | SO-8 | 125 | |
| Maximum Junction Temperature | | 150 | $^{\circ}$ C |
| Maximum Lead Temperature (10 Sec) | | 300 | $^{\circ}$ C |



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Micropower Voltage Reference Diode

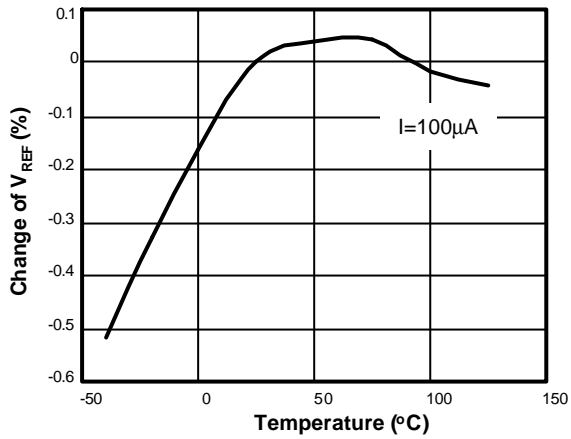
■ Electrical Specifications

Unless otherwise specified, TA = 0~70°C, I = 100µA

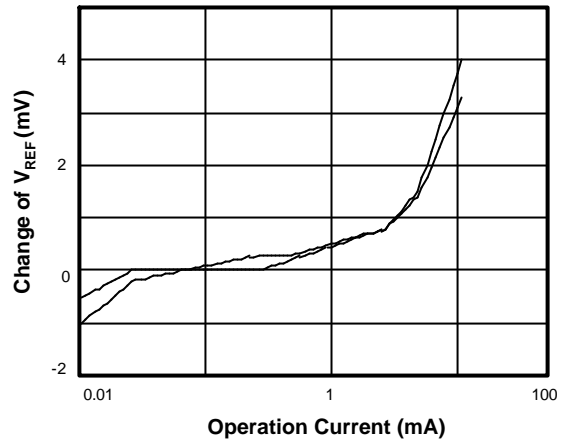
| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|---------------------------------------|---------------------|---|-------|------|-------|--------|
| Reference Voltage, ±0.2% | V _{REF} | I _{REF} = 100µA | 2.495 | 2.50 | 2.505 | V |
| Reference Voltage, ±0.5% | | | 2.487 | 2.50 | 2.513 | V |
| Minimum Current | I _{MIN} | | | | 20 | µA |
| Reference Voltage Change With Current | dV _{REF/I} | I _{MIN} ≤ I ≤ 1mA | | 1.5 | 3 | mV |
| | | 1mA ≤ I ≤ 20mA | | 5 | 20 | |
| Maximum Operation Current | I _{Lmax} | | 20 | | | mA |
| Reverse Dynamic Impedence | RDI | I _R = 100mA, f = 20Hz | | 1.5 | | Ohm |
| Wideband Noise (rms) | V _n | I _R = 100mA, 10 Hz < f < 10KHz | | 60 | | µV |
| Long term Stability | | I _R = 100mA, TA = 25°C, T = 1000 Hours | | 20 | | ppm |
| Reference Voltage Temp. Coeff. | V _{REFTC} | 0°C < T _A < 70°C | | | 100 | ppm/°C |



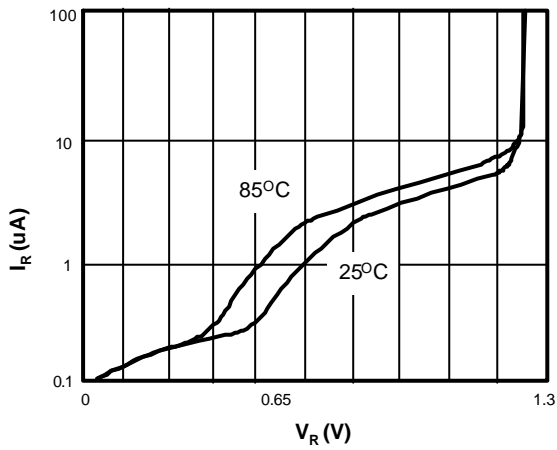
Normalized Percentage Change vs. Temp.



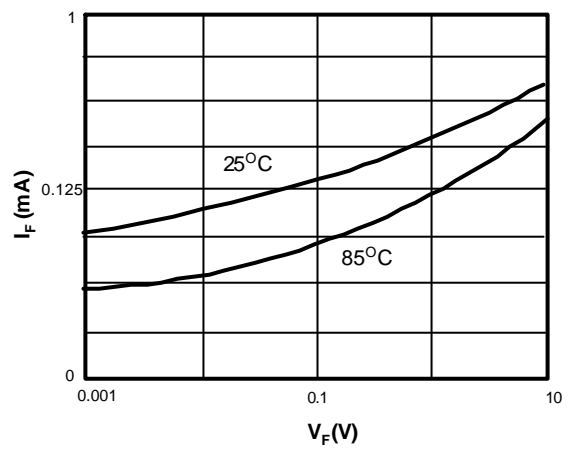
Reference Voltage Change vs. Current



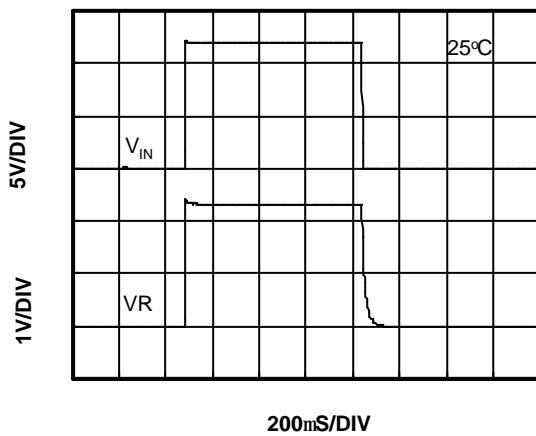
Reverse Characteristic

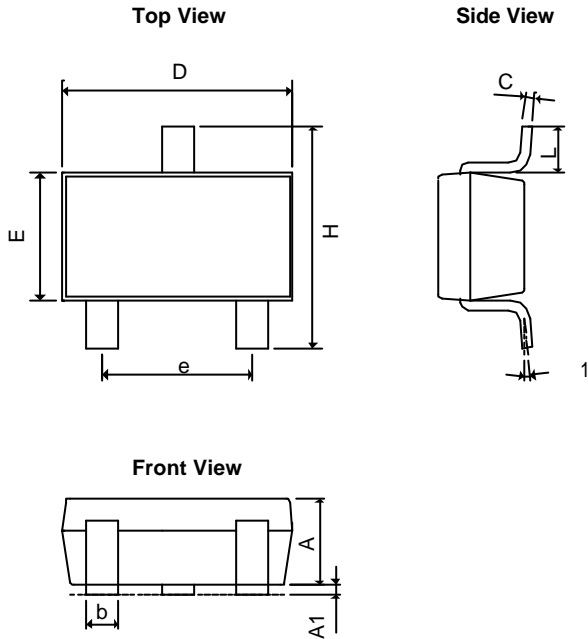


Forward Characteristic

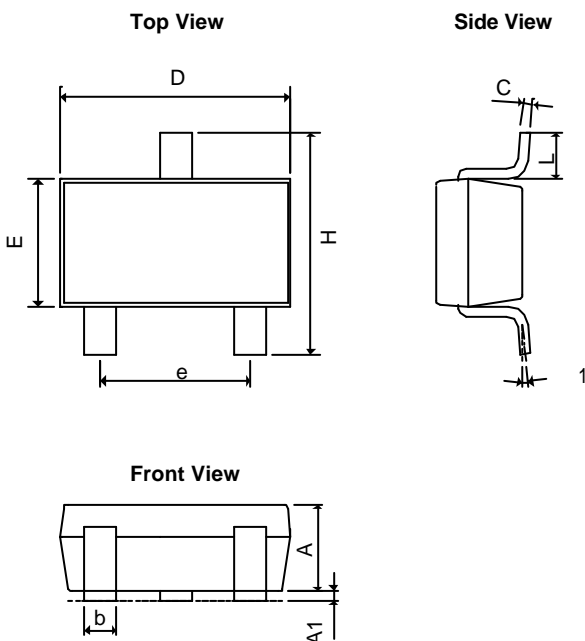


Line Transient Response



■ Package Dimension
SOT-23


| SYMBOLS | MILLIMETERS | | INCHES | |
|----------------------|-------------|------|------------|---------|
| | MIN | MAX | MIN | MAX |
| A | 1.00 | 1.40 | 0.0394 | 0.0551 |
| A₁ | 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° |

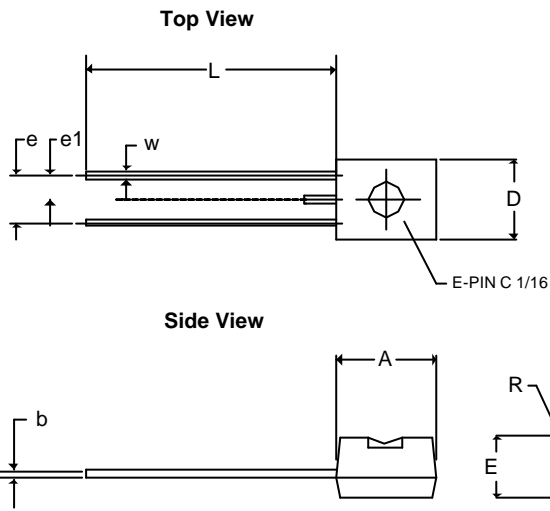
TSOT-23


| SYMBOLS | MILLIMETERS | | INCHES | |
|------------------------|-------------|------|------------|---------|
| | MIN | MAX | MIN | MAX |
| A+A₁ | 0.80 | 1.30 | 0.0315 | 0.0512 |
| b | 0.35 | 0.50 | 0.0138 | 0.0197 |
| C | 0.08 | 0.25 | 0.0031 | 0.0098 |
| D | 2.70 | 3.10 | 0.1063 | 0.1220 |
| E | 1.20 | 1.80 | 0.0472 | 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° |



■ Package Dimension

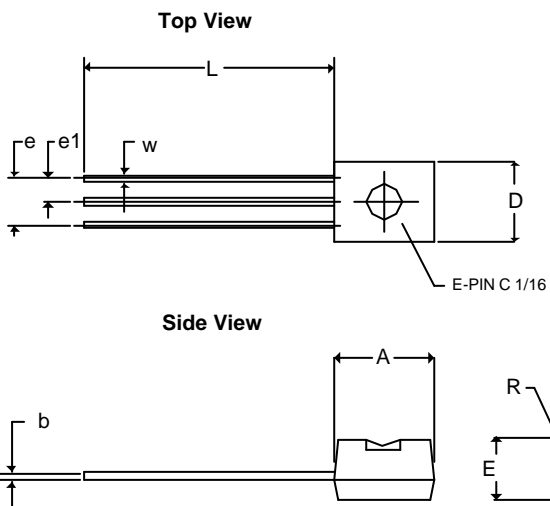
TO-92-2 (bulk pack)



| 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 |

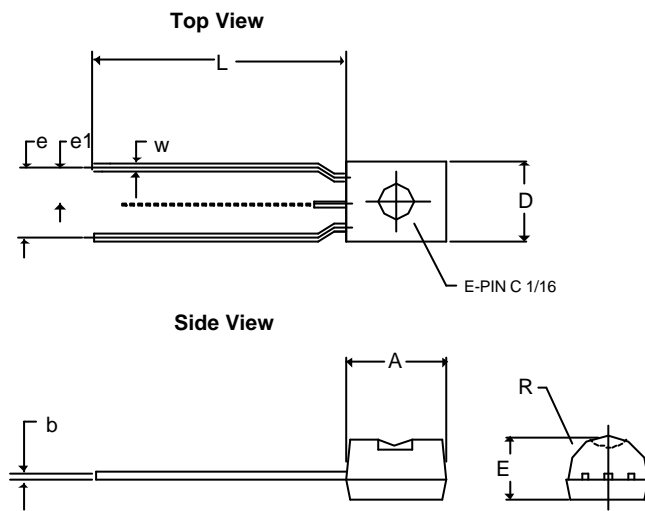
- Notes:
1. Package outline exclusive of any mold flashes dimension.
 2. Package outline exclusive of burr dimension.
 3. Lead pitch=2.54mm is bulk pack.
 4. Lead pitch=5.08mm is tape pack.

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 |

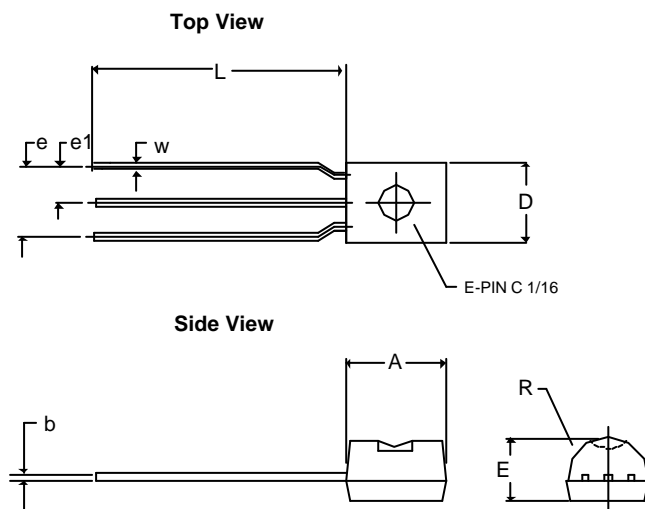
- Notes:
1. Package outline exclusive of any mold flashes dimension.
 2. Package outline exclusive of burr dimension.
 3. Lead pitch=2.54mm is bulk pack.
 4. Lead pitch=5.08mm is tape pack.

■ Package Dimension
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.

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 |

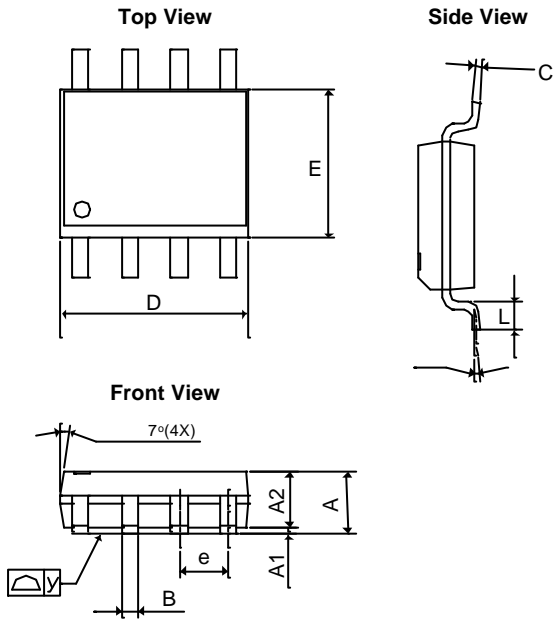
Notes:

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.



■ Package Dimension

SO-8



| SYMBOLS | MILLIMETERS | | INCHES | |
|----------------|-------------|------|-----------|---------|
| | MIN | MAX | MIN | MAX |
| A | 1.35 | 1.75 | 0.05315 | 0.0689 |
| A ₁ | 0.10 | 0.25 | 0.00394 | 0.00984 |
| A ₂ | 1.473 REF | | 0.058 REF | |
| B | 0.33 | 0.51 | 0.01299 | 0.02008 |
| C | 0.19 | 0.25 | 0.00748 | 0.00984 |
| D | 4.80 | 5.00 | 0.18898 | 0.19685 |
| E | 3.80 | 4.00 | 0.14961 | 0.15748 |
| e | 1.27 BSC | | 0.050 BSC | |
| L | 0.40 | 1.27 | 0.01575 | 0.05 |
| y | - | 0.10 | - | 0.004 |
| q | 0° | 8° | 0° | 8° |



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These products of AME, Inc. are not authorized for use as critical components in life-support devices or systems, without the express written approval of the president of AME, Inc.

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Document: 2006-DS8803/8814-G

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