



## AME385-1.2

## Micropower Voltage Reference Diode

### ■ General Description

The AME385-1.2 is a micropower 2-terminal band-gap voltage regulator diode. It operates over a 15 $\mu$ A to 20mA current range. Each circuit is trimmed at wafer sort to provide a  $\pm 0.2\%$  and  $\pm 0.5\%$  initial tolerance. The design of the AME385-1.2 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 packages as well as the space saving SOT-23.

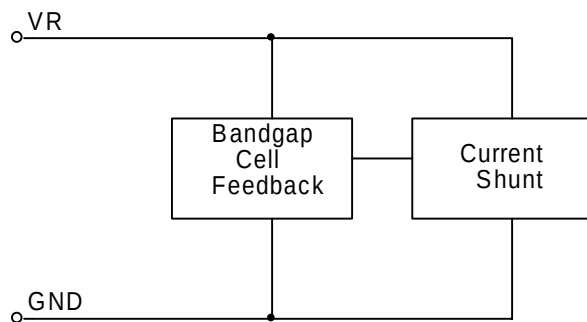
### ■ Key Features

- Small packages: SOT-23, TO-92, SO-8
- Tolerates capacitive loads
- Fixed reverse breakdown voltage of 1.235V
- Tight voltage tolerance -----  $\pm 0.20\%$ ,  $\pm 0.5\%$
- Wide operating current ----- 15 $\mu$ A to 20mA
- Wide temperature range -----  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Low temperature coefficient --- 100ppm/ $^{\circ}\text{C}$  (max)
- Excellent transient response

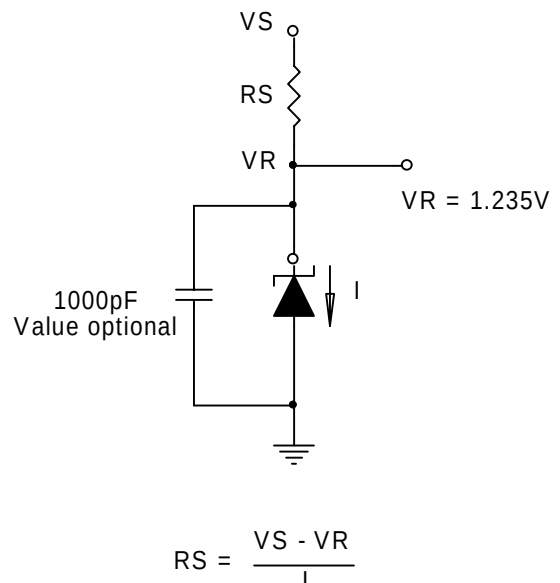
### ■ Applications

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

### ■ Functional Block Diagram

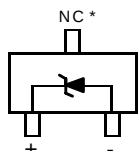


### ■ Typical Application

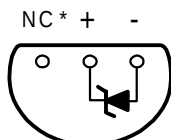


### ■ Package Outline

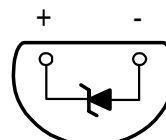
SOT-23 Top View



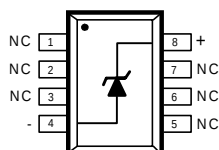
TO-92-3 Bottom View



TO-92-2 Bottom View



SO-8 Top View



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

### ■ Ordering Information

| Part Number | Accuracy | Marking                    | Package | Operating Temp. Range |
|-------------|----------|----------------------------|---------|-----------------------|
| AME385CEET  | 0.2%     | ACQww                      | SOT-23  | -40°C to +85°C        |
| AME385CEHA  | 0.2%     | AME<br>385CEHA<br>yyww     | SO-8    | -40°C to +85°C        |
| AME385AEAS  | 0.5%     | AME<br>385<br>AEAS<br>yyww | TO-92-2 | -40°C to +85°C        |
| AME385AEAT  | 0.5%     | AME<br>385<br>AEAT<br>yyww | TO-92-3 | -40°C to +85°C        |
| AME385AEET  | 0.5%     | ABXww                      | SOT-23  | -40°C to +85°C        |
| AME385AEHA  | 0.5%     | AME<br>385AEHA<br>yyww     | SO-8    | -40°C to +85°C        |

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



## ■ Absolute Maximum Ratings

| Parameter      | Maximum | Unit |
|----------------|---------|------|
| Supply Current | 50      | mA   |

## ■ Recommended Operating Conditions

| Parameter                 | Rating             | Unit         |
|---------------------------|--------------------|--------------|
| Supply Current            | 100 $\mu$ 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     |

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



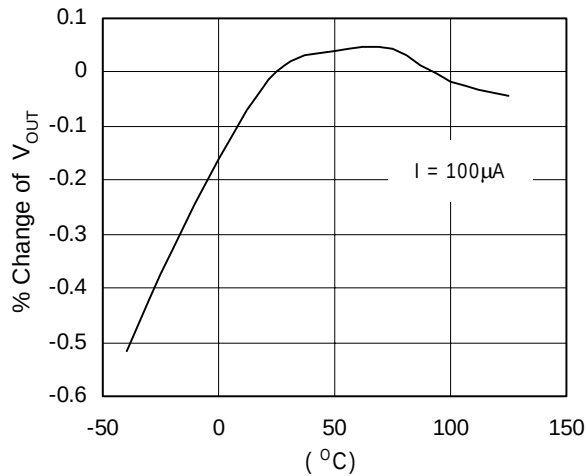
### ■ Electrical Specifications

Unless otherwise specified,  $T_A = 0 \sim 70^\circ\text{C}$ ,  $I_R = 100\mu\text{A}$

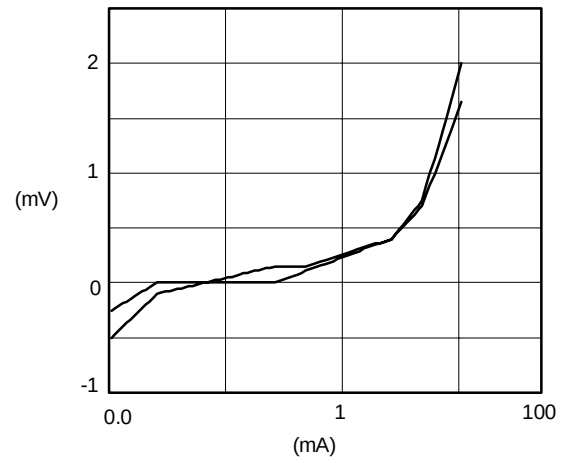
| PARAMETER                             | SYMBOL       | TEST CONDITIONS                                                     | MIN   | TYP   | MAX   | UNITS                 |
|---------------------------------------|--------------|---------------------------------------------------------------------|-------|-------|-------|-----------------------|
| Reference Voltage, $\pm 0.2\%$        | $V_{REF}$    | $I_{REF} = 100\mu\text{A}$                                          | 1.232 | 1.235 | 1.238 | V                     |
| Reference Voltage, $\pm 0.5\%$        |              |                                                                     | 1.229 | 1.235 | 1.241 | V                     |
| Minimum Current                       | $I_{MIN}$    |                                                                     |       |       | 15    | $\mu\text{A}$         |
| Reference Voltage Change With Current | $dV_{REF/I}$ | $I_{MIN} \leq I \leq 1\text{mA}$                                    |       | 1.5   | 3     | mV                    |
|                                       |              | $1\text{mA} \leq I \leq 20\text{mA}$                                |       | 5     | 20    |                       |
| Maximum Operation Current             | $I_{Lmax}$   |                                                                     | 20    |       |       | mA                    |
| Reverse Dynamic Impedence             | RDI          | $I_R = 100\mu\text{A}$ , $f = 20\text{Hz}$                          |       | 1.5   |       | Ohm                   |
| Wideband Noise (rms)                  | $V_n$        | $I_R = 100\mu\text{A}$ , $10\text{Hz} < f < 10\text{KHz}$           |       | 60    |       | $\mu\text{V}$         |
| Long term Stability                   |              | $I_R = 100\mu\text{A}$ , $T_A = 25^\circ\text{C}$ ,<br>T=1000 Hours |       | 20    |       | ppm                   |
| Reference Voltage Temp. Coeff.        | $V_{REFTC}$  | $0^\circ\text{C} < T_A < 70^\circ\text{C}$                          |       |       | 100   | ppm/ $^\circ\text{C}$ |



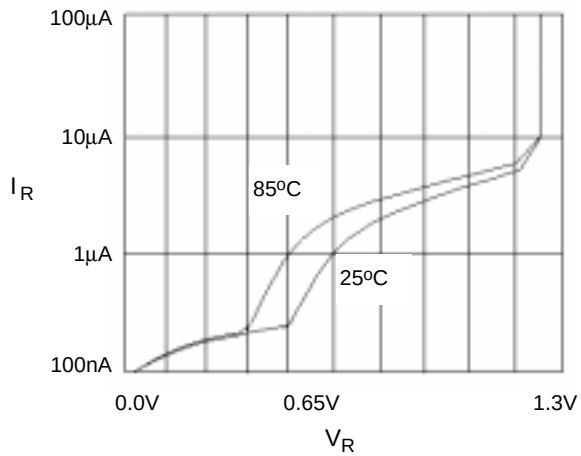
Normalized Percentage Change vs. Temperature



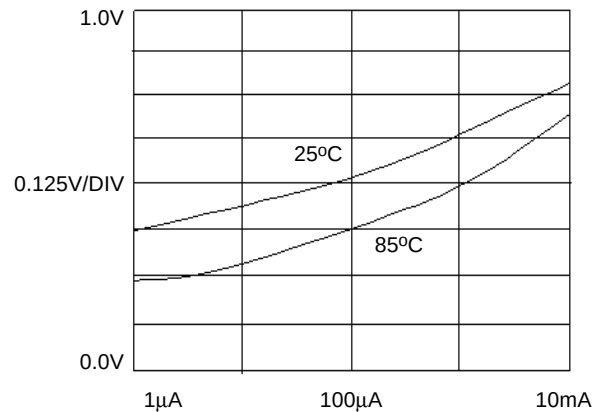
Output Voltage Change vs. Current



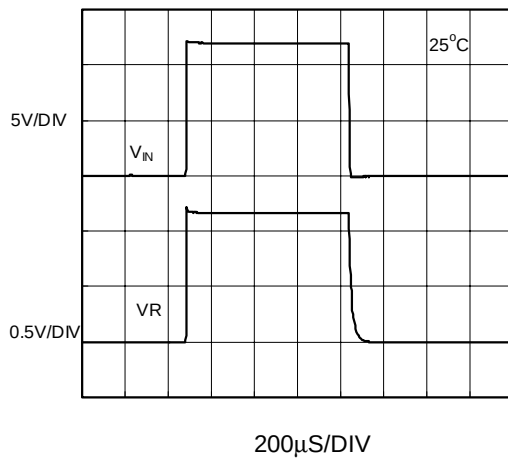
Reverse Characteristic



Forward Characteristic

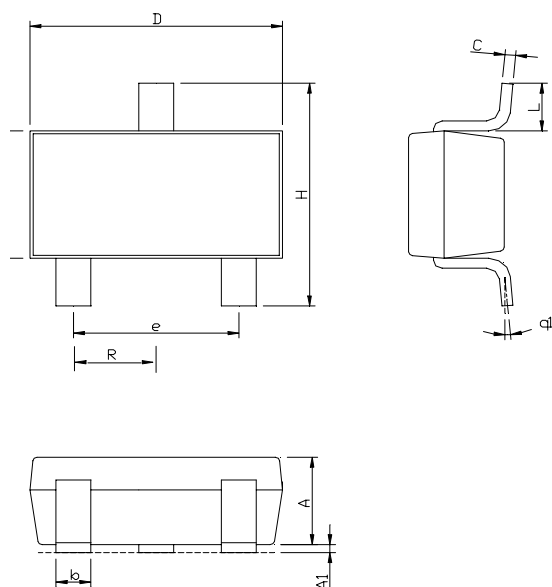


Transient Response



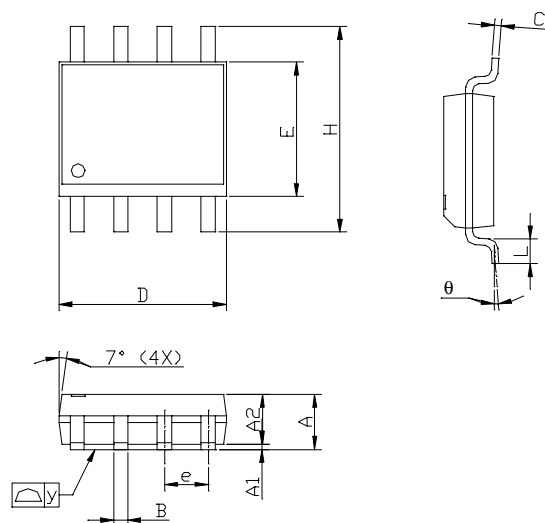
## ■ Package Dimension

### SOT-23



| SYMBOLS        | MILLIMETERS |      | INCHES      |        |
|----------------|-------------|------|-------------|--------|
|                | MIN         | MAX  | MIN         | MAX    |
| A              | 1.00        | 1.40 | 0.0394      | 0.0551 |
| A <sub>1</sub> | 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              | 2.60        | 3.00 | 0.1024      | 0.1181 |
| L              | 0.35        | 0.55 | 0.0138      | 0.0197 |
| θ1             | 0°          | 9°   | 0°          | 9°     |
| R              | 0.95(TYP)   |      | 0.0374(TYP) |        |

### SO-8

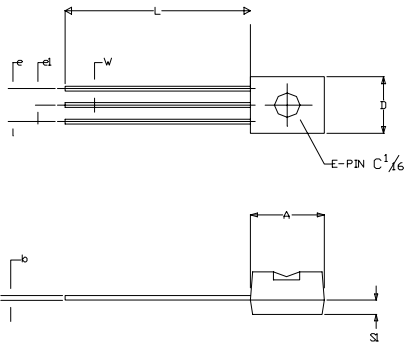


| SYMBOLS        | MILLIMETERS |      | INCHES    |        |
|----------------|-------------|------|-----------|--------|
|                | MIN         | MAX  | MIN       | MAX    |
| A              | 1.35        | 1.75 | 0.053     | 0.069  |
| A <sub>1</sub> | 0.10        | 0.25 | 0.004     | 0.010  |
| A <sub>2</sub> | 1.45 REF    |      | 0.057 REF |        |
| B              | 0.33        | 0.51 | 0.013     | 0.020  |
| C              | 0.19        | 0.25 | 0.007     | 0.010  |
| D              | 4.80        | 5.00 | 0.189     | 0.1970 |
| E              | 3.80        | 4.00 | 0.150     | 0.157  |
| e              | 1.27 BSC    |      | 0.050 BSC |        |
| H              | 5.80        | 6.20 | 0.228     | 0.244  |
| L              | 0.40        | 1.27 | 0.016     | 0.050  |
| y              |             | 0.10 |           | 0.004  |
| θ              | 0°          | 8°   | 0°        | 8°     |



## ■ Package Dimension

### TO-92-3

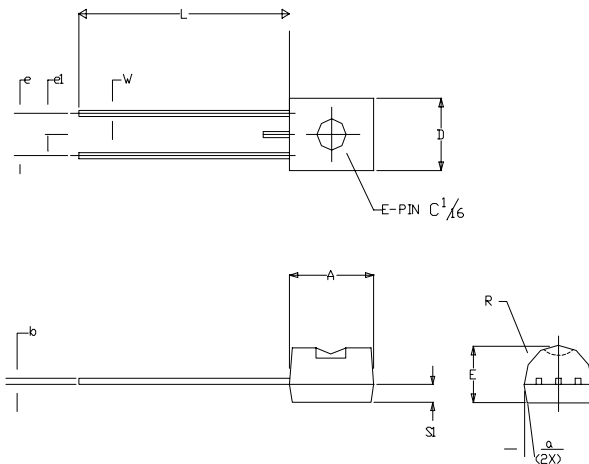


| SYMBOLS | MILLIMETERS |       | INCHES |       |
|---------|-------------|-------|--------|-------|
|         | MIN         | MAX   | MIN    | MAX   |
| A       | 4.32        | 4.95  | 0.170  | 0.195 |
| b       | 0.36        | 0.51  | 0.014  | 0.020 |
| E       | 3.30        | 3.94  | 0.130  | 0.155 |
| e       | 2.41        | 2.67  | 0.095  | 0.105 |
| e1      | 1.14        | 1.40  | 0.045  | 0.055 |
| L       | 12.70       | 15.49 | 0.500  | 0.610 |
| R       | 2.16        | 2.41  | 0.085  | 0.095 |
| S1      | 1.14        | 1.52  | 0.045  | 0.060 |
| W       | 0.41        | 0.56  | 0.016  | 0.022 |
| D       | 4.45        | 4.95  | 0.175  | 0.195 |
| a       | 4°          | 6°    | 4°     | 6°    |

#### NOTE:

1. PACKAGE OUTLINE EXCLUSIVE OF ANY MOLD FLASHES DIMENSION
2. PACKAGE OUTLINE EXCLUSIVE OF BURR DIMENSION

### TO-92-2



| SYMBOLS | MILLIMETERS |       | INCHES |       |
|---------|-------------|-------|--------|-------|
|         | MIN         | MAX   | MIN    | MAX   |
| A       | 4.32        | 4.95  | 0.170  | 0.195 |
| b       | 0.36        | 0.51  | 0.014  | 0.020 |
| E       | 3.30        | 3.94  | 0.130  | 0.155 |
| e       | 2.41        | 2.67  | 0.095  | 0.105 |
| e1      | 1.14        | 1.40  | 0.045  | 0.055 |
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