

■ General Description

The AME8804 family of positive, linear regulators feature low ground current (35µA typ.) with low dropout voltage, making them ideal for battery applications. The space-saving SOT-26/TSOT-26 and SOT-25/TSOT-25 packages are attractive for "Pocket" and "Hand Held" applications.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" operating conditions.

The SOT-26/TSOT-26 version also features a "Power Good" detector, which pulls low when the output is out of regulation.

The AME8804 is stable with an output capacitance of 2.2µF or greater.

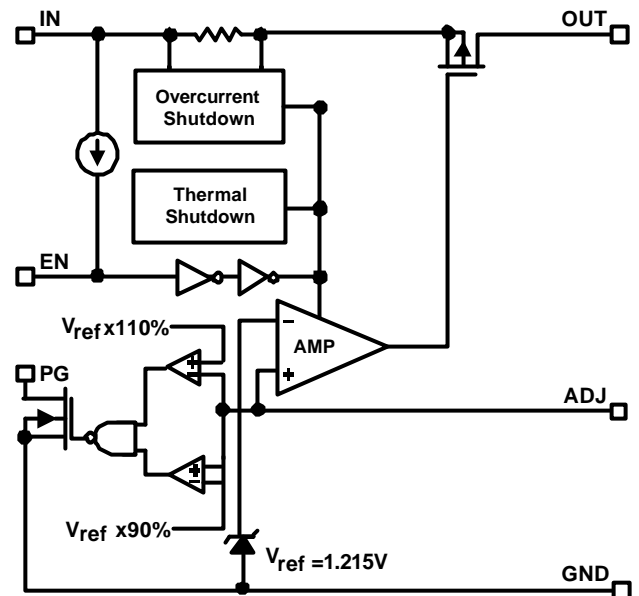
■ Features

- Very Low Dropout Voltage
- Guaranteed 300mA Output
- Accurate to within 1.5%
- Typical 35µA Ground Current
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Power Good Detector (6 pin version only)
- Power-Saving Shutdown Mode
- Space-Saving SOT-26/TSOT-26 and SOT-25 / TSOT-25
- Adjustable Output Voltages
- Low Temperature Coefficient
- All AME's Lead Free Products Meet RoHS Standards

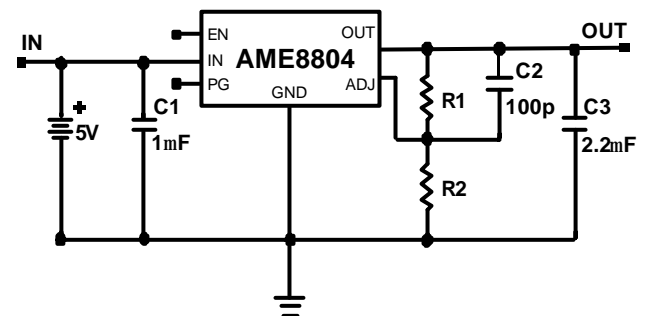
■ Applications

- Instrumentation
- Portable Electronics
- Wireless Devices
- Cordless Phones
- PC Peripherals
- Battery Powered Widgets
- Electronic Scales

■ Functional Block Diagram



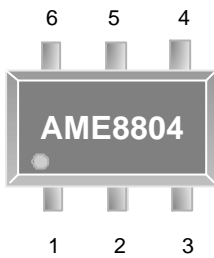
■ Typical Application



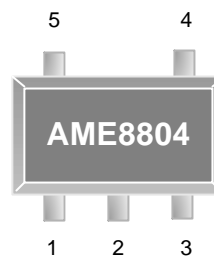
$$V_{OUT} = 1.215 (R1 + R2) / R2$$

C2 is unnecessary when R1 or R2 < 20K

PG pin is only available in the SOT-26 package option

■ Pin Configuration
**SOT-26/TSOT-26
Top View**

AME8804AEEY

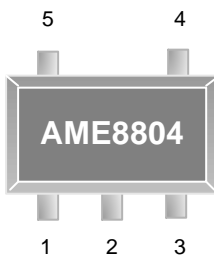
1. IN
2. GND
3. EN
4. PG
5. ADJ
6. OUT

**SOT-25 /TSOT-25
Top View**

AME8804AEEV

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

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

*** Die Attach:
Conductive Epoxy**

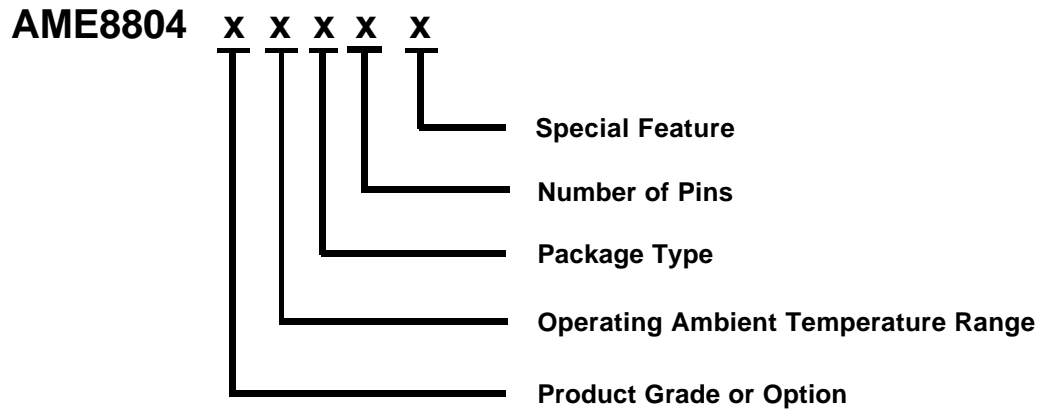
**SOT-25 /TSOT-25
Top View**

AME8804BEEVADJ

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

*** Die Attach:
Conductive Epoxy**

■ Pin Description

| Pin Name | Pin Description |
|----------|--|
| IN | Input voltage pin. It should be decoupled with 1 μ F or greater capacitor. |
| GND | Ground connection pin. |
| EN | Enable pin. When pulled low, the PMOS pass transistor turns off, current consuming less than 1 μ A. |
| PG | Power-Good output. This open-drain output is low when OUT is out of regulation. |
| OUT | LDO voltage regulator output pin. It should be decoupled with a 1 μ F or greater value low ESR ceramic capacitor. |
| ADJ | Feedback output voltage for adjustable device. |

■ Ordering Information


| Product Grade or Option | Operating Ambient Temperature Range | Package Type | Number of Pins | Special Feature |
|-------------------------|-------------------------------------|--------------|----------------|--|
| A: ADJ | E: -40°C to +85°C | E: SOT-2X | V: 5 Y: 6 | L: Low Profile Y: Lead Free & Low Profile Z: Lead Free |

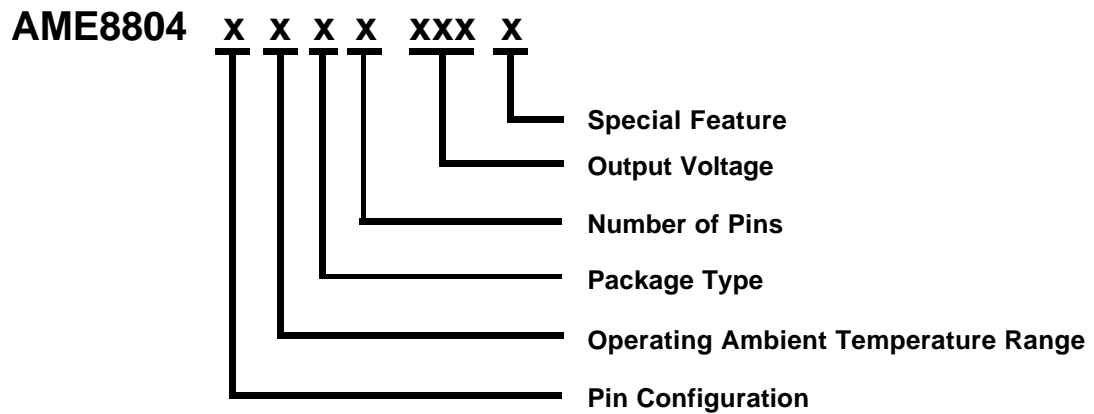
■ Ordering Information

| Part Number | Marking* | Output Voltage | Package | Operating Ambient Temperature Range |
|--------------|----------|----------------|---------|-------------------------------------|
| AME8804AEEY | AAUww | Adjustable | SOT-26 | - 40°C to +85°C |
| AME8804AEEYL | AAUww | Adjustable | TSOT-26 | - 40°C to +85°C |
| AME8804AEEYY | AAUww | Adjustable | TSOT-26 | - 40°C to +85°C |
| AME8804AEEYZ | AAUww | Adjustable | SOT-26 | - 40°C to +85°C |
| AME8804AEEV | AJCww | Adjustable | SOT-25 | - 40°C to +85°C |
| AME8804AEEVL | AJCww | Adjustable | TSOT-25 | - 40°C to +85°C |
| AME8804AEEVY | AJCww | Adjustable | TSOT-25 | - 40°C to +85°C |
| AME8804AEEVZ | AJCww | Adjustable | SOT-25 | - 40°C to +85°C |

Note: ww represents the date code and pls refer to Date Code Rule on Package Dimension.

* A line on top of the first letter represents lead free plating such as AAUww

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

■ Ordering Information (contd.)


| Pin Configuration | Operating Ambient Temperature Range | Package Type | Number of Pins | Output Voltage | Special Feature |
|--|-------------------------------------|--------------|----------------|-----------------|--|
| B: 1. EN (SOT-25) 2. GND (TSOT-25) 3. IN 4. OUT 5. ADJ | E: -40°C to +85°C | E: SOT-2X | V: 5 | ADJ: Adjustable | Z: Lead Free Y: Lead Free & Low Profile |

■ Ordering Information

| Part Number | Marking* | Output Voltage | Package | Operating Ambient Temperature Range |
|-----------------|----------|----------------|---------|-------------------------------------|
| AME8804BEEVADJZ | BJlww | Adjustable | SOT-25 | - 40°C to +85°C |
| AME8804BEEVADJY | BJlww | Adjustable | TSOT-25 | - 40°C to +85°C |

Note: ww represents the date code and pls refer to Date Code Rule on Package Dimension.

* A line on top of the first letter represents lead free plating such as BJlww

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

■ Absolute Maximum Ratings

| Parameter | Maximum | Unit |
|--------------------|----------------------------|------|
| Input Voltage | -0.3 to +8 | V |
| EN Voltage | -0.3 to +8 | V |
| Output Voltage | -0.3 to $V_{IN} + 0.3$ | V |
| PG Voltage | -0.3 to $V_{IN} + 0.3$ | V |
| Output Current | $P_D / (V_{IN} - V_{OUT})$ | mA |
| 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 | °C |
| Storage Temperature Range | T_{STG} | - 65 to +150 | °C |

■ Thermal Information

| Parameter | Package | Die Attach | Symbol | Maximum | Unit |
|---|-------------------|-------------------------|---------------|---------|--------|
| Thermal Resistance* (Junction to Case) | SOT-25 TSOT-25 | Conductive Epoxy | θ_{JC} | 81 | °C / W |
| | SOT-26 TSOT-26 | Non-Conductive Epoxy | | 140 | |
| Thermal Resistance (Junction to Ambient) | SOT-25 TSOT-25 | Conductive Epoxy | θ_{JA} | 260 | |
| | SOT-26 TSOT-26 | Non-Conductive Epoxy | | 280 | |
| Internal Power Dissipation | SOT-25 TSOT-25 | Conductive Epoxy | P_D | 400 | mW |
| | SOT-26 TSOT-26 | Non-Conductive Epoxy | | 400 | |
| Maximum Junction Temperature | | | | 150 | °C |
| 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

 TA = 25°C, V_{IN}=5V unless otherwise noted

| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|--|----------------------|--|---------------------------------|-----------|-----------------|----------------------|
| Input Voltage | V _{IN} | | Note 1 | | 7 | V |
| Output Voltage Accuracy | V _O | I _O =1mA | -1.5 | | 1.5 | % |
| Dropout Voltage | V _{DROPOUT} | I _O =300mA V _O =V _{O(NOM)} -2.0% | 1.5V<V _{O(NOM)} <=2.0V | See chart | 1300 | mV |
| | | | 2.0V<V _{O(NOM)} <=2.8V | | 400 | |
| | | | 2.8V<V _{O(NOM)} <3.8V | | 300 | |
| Output Current | I _O | V _O >1.2V | 300 | | | mA |
| Current Limit | I _{LIM} | V _O >1.2V | 300 | 450 | | mA |
| Short Circuit Current, Note2 | I _{SC} | V _O <0.8V | | 150 | 300 | mA |
| Ground Pin Current | I _{GND} | I _O =1mA to 300mA | | 35 | | μA |
| Line Regulation | REG _{LINE} | I _O =5mA V _{IN} =V _O +1 to V _O +2 | V _O < 2.0V | | 0.15 | % |
| | | | V _O >= 2.0V | | 0.02 | 0.1 |
| Load Regulation | REG _{LOAD} | I _O =1mA to 300mA | | 0.2 | 1 | % |
| Over Temperature Shutdown | OTS | | | 150 | | °C |
| Over Temperature Hysteresis | OTH | | | 30 | | °C |
| V _O Temperature Coefficient | TC | | | 30 | | ppm/°C |
| Power Supply Rejection | PSRR | I _O =100mA C _O =2.2μF | f=100Hz | | 60 | dB |
| | | | f=1kHz | | 50 | |
| | | | f=10kHz | | 20 | |
| Output Voltage Noise | eN | f=10Hz to 100kHz I _O =10mA, C _{BYP} =0μF | | | 30 | μVrms |
| ADJ Input Bias Current | I _{ADJ} | | | 1 | | μA |
| ADJ Reference Voltage | V _{REF} | | 1.2 | 1.215 | 1.23 | V |
| EN Input Threshold | V _{EH} | V _{IN} =2.7V to 7V | 2.0 | | V _{IN} | V |
| | V _{EL} | V _{IN} =2.7V to 7V | 0 | | 0.4 | V |
| EN Input Bias Current | I _{EH} | V _{EN} =V _{IN} , V _{IN} =2.7V to 7V | | | 0.1 | μA |
| | I _{EL} | V _{EN} =0V, V _{IN} =2.7V to 7V | | | 0.5 | μA |
| Shutdown Supply Current | I _{SD} | V _{IN} =5V, V _O =0V, V _{EN} <V _{EL} | | 0.5 | 1 | μA |
| Shutdown Output Voltage | V _{O,SD} | I _O =35μA, V _{EN} <V _{EL} | 0 | | 0.1 | V |
| Output Under Voltage | V _{UV} | | | | 85 | %V _{O(NOM)} |
| Output Over Voltage | V _{OV} | | 115 | | | %V _{O(NOM)} |
| PG Leakage Current | I _{LC} | V _{PG} =7V | | | 1 | μA |
| PG Voltage Rating | V _{PG} | V _O in regulation | | | 7 | V |
| PG Voltage Low | V _{OL} | I _{SINK} =0.4mA | | | 0.4 | V |

 Note1: V_{IN(MIN)}=V_{OUT}+V_{DROPOUT}

Note2: To prevent the Short Circuit Current protection feature from being prematurely activated, the input voltage must be applied before a current source load is applied.

■ Detailed Description

The AME8804 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, thermal shutdown, and Power Good detection circuitry.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150°C, or the current exceeds 300mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120°C.

The AME8804 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The AME8804 also incorporates current foldback to reduce power dissipation when the output is short circuited. This feature becomes active when the output drops below 0.8volts, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.8 volts.

■ External Capacitors

The AME8804 is stable with an output capacitor to ground of 2.2 μ F or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1 μ F ceramic capacitor with a 10 μ F Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

A second capacitor is recommended between the input and ground to stabilize V_{in} . The input capacitor should be at least 0.1 μ F to have a beneficial effect.

All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

■ Enable

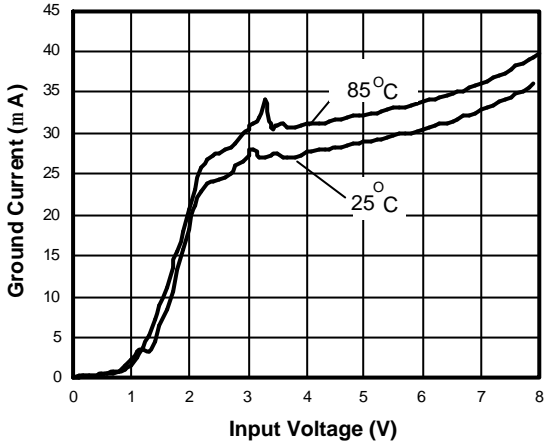
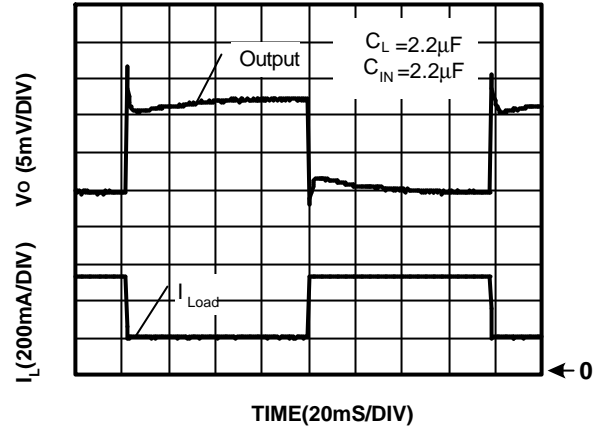
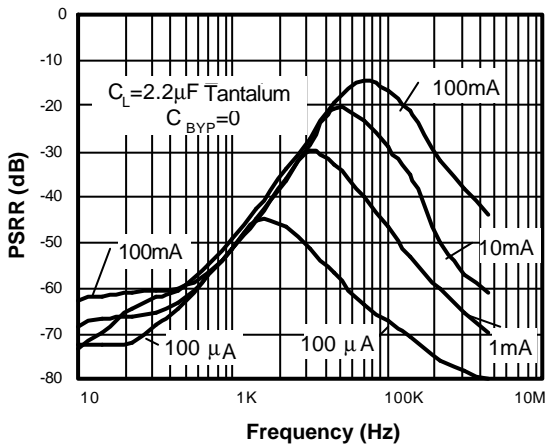
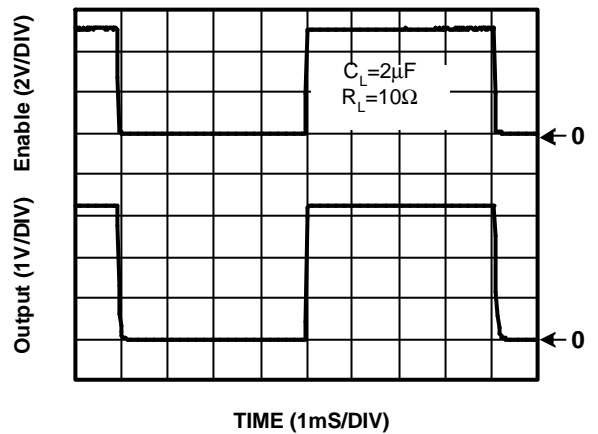
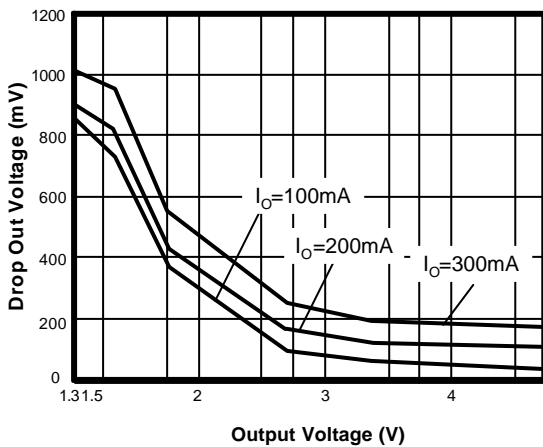
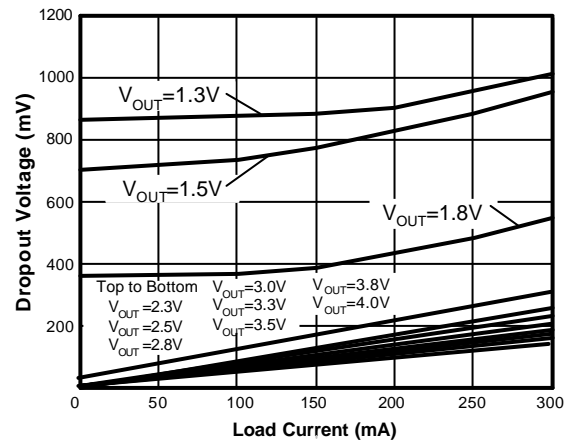
The Enable pin normally floats high. When actively, pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the quiescent current is less than 1 μ A. This pin behaves much like an electronic switch.

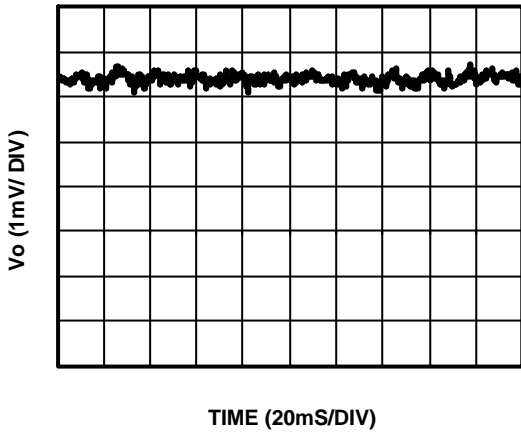
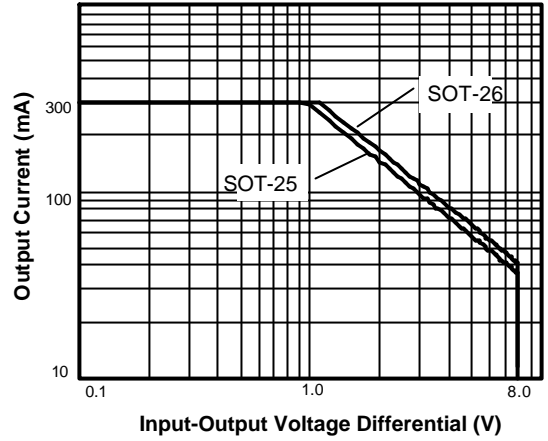
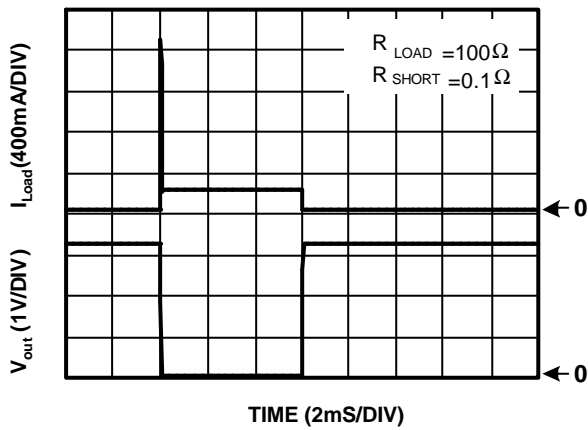
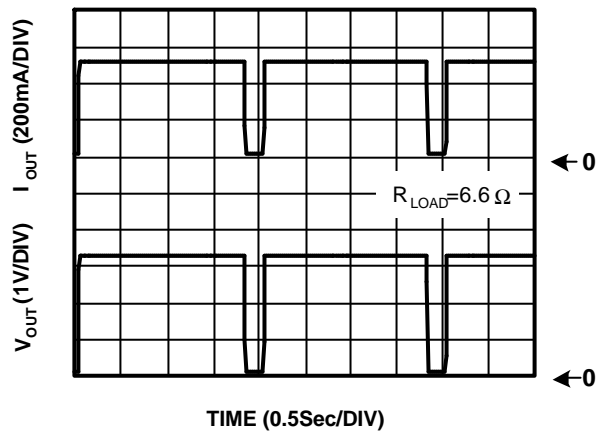
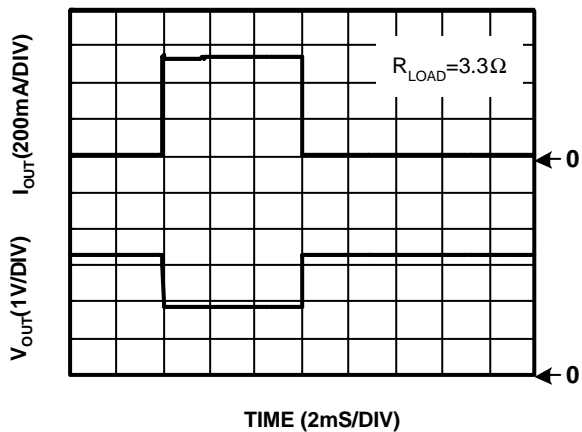
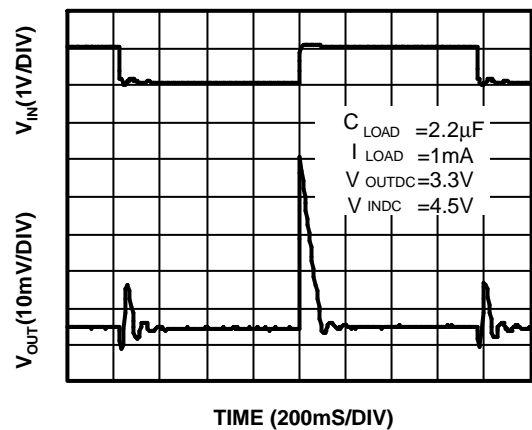
■ Power Good

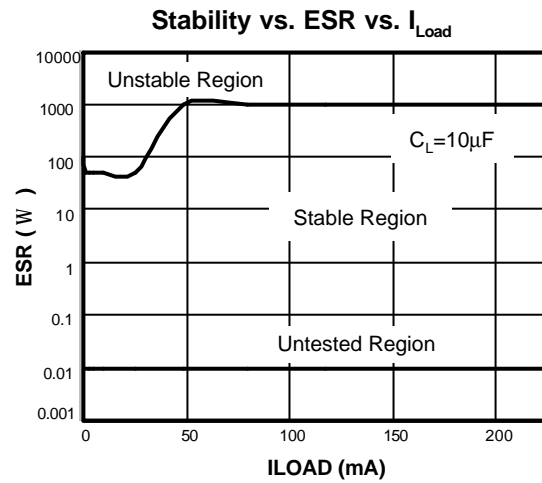
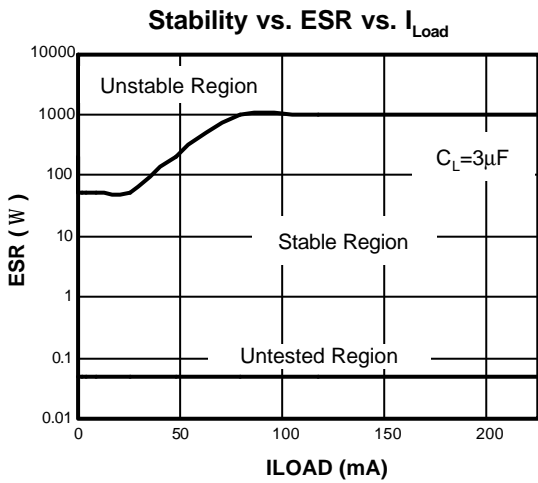
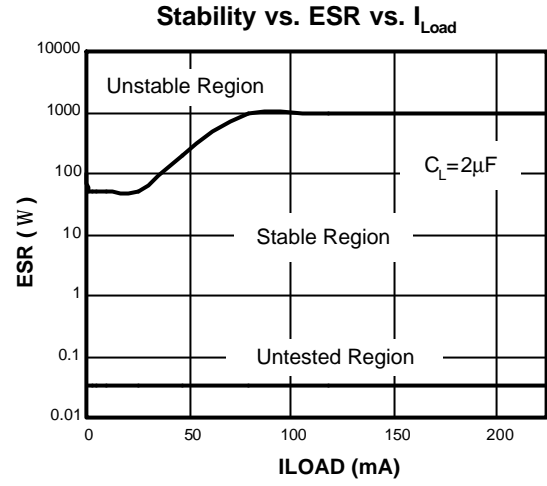
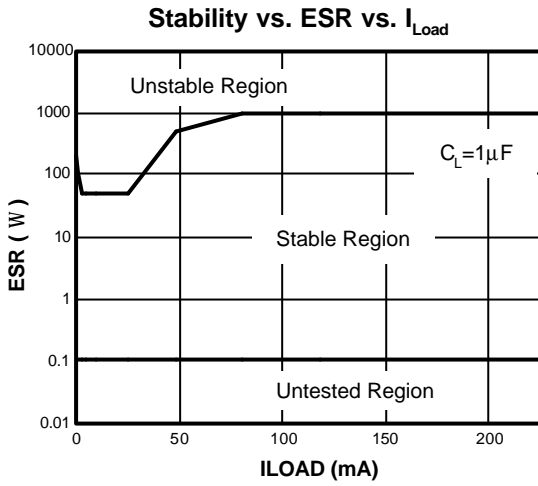
The AME8804 (SOT-26/TSOT-26 package only) includes the Power Good feature. When the output is not within $\pm 10\%$ of the specified voltage, it pulls low. This can occur under the following conditions:

- 1) Input Voltage too low.
- 2) During Over-Temperature.
- 3) During Over-Current.
- 4) If output is pulled up.

(Note: PG pin is an open-drain output.)

Ground Current vs. Input Voltage

Load Step (1mA-300mA)

Power Supply Rejection Ratio

Chip Enable Transient Response

Drop Out Voltage vs. Output Voltage

Drop Out Voltage vs. Load Current


Noise Measurement

Safe Operating Area

Short Circuit Response

Overtemperature Shutdown

Current Limit Response

Line Transient Response




External Resistor Divider Table

| R1 (K Ohm) | 1 | 2 | 5 | 10 | 20 | 50 | 100 | 200 | 500 | 1000 |
|---------------|--|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| Vout | R2(K Ohm)=(1.215*R1(K Ohm))/(Vout-1.215) | | | | | | | | | |
| 1.30 | 14.29 | 28.59 | 71.47 | 142.94 | 285.88 | 714.71 | | | | |
| 1.35 | 9.00 | 18.00 | 45.00 | 90.00 | 180.00 | 450.00 | | | | |
| 1.40 | 6.57 | 13.14 | 32.84 | 65.68 | 131.35 | 328.38 | | | | |
| 1.45 | 5.17 | 10.34 | 25.85 | 51.70 | 103.40 | 258.51 | 517.02 | | | |
| 1.50 | 4.26 | 8.53 | 21.32 | 42.63 | 85.26 | 213.16 | 426.32 | 852.63 | | |
| 1.55 | 3.63 | 7.25 | 18.13 | 36.27 | 72.54 | 181.34 | 362.69 | 725.37 | | |
| 1.60 | 3.16 | 6.31 | 15.78 | 31.56 | 63.12 | 157.79 | 315.58 | 631.17 | | |
| 1.65 | 2.79 | 5.59 | 13.97 | 27.93 | 55.86 | 139.66 | 279.31 | 558.62 | | |
| 1.70 | 2.51 | 5.01 | 12.53 | 25.05 | 50.10 | 125.26 | 250.52 | 501.03 | | |
| 1.75 | 2.27 | 4.54 | 11.36 | 22.71 | 45.42 | 113.55 | 227.10 | 454.21 | | |
| 1.80 | 2.08 | 4.15 | 10.38 | 20.77 | 41.54 | 103.85 | 207.69 | 415.38 | | |
| 1.85 | 1.91 | 3.83 | 9.57 | 19.13 | 38.27 | 95.67 | 191.34 | 382.68 | | |
| 1.90 | 1.77 | 3.55 | 8.87 | 17.74 | 35.47 | 88.69 | 177.37 | 354.74 | | |
| 1.95 | 1.65 | 3.31 | 8.27 | 16.53 | 33.06 | 82.65 | 165.31 | 330.61 | 826.53 | |
| 2.00 | 1.55 | 3.10 | 7.74 | 15.48 | 30.96 | 77.39 | 154.78 | 309.55 | 773.89 | |
| 2.05 | 1.46 | 2.91 | 7.28 | 14.55 | 29.10 | 72.75 | 145.51 | 291.02 | 727.54 | |
| 2.10 | 1.37 | 2.75 | 6.86 | 13.73 | 27.46 | 68.64 | 137.29 | 274.58 | 686.44 | |
| 2.15 | 1.30 | 2.60 | 6.50 | 12.99 | 25.99 | 64.97 | 129.95 | 259.89 | 649.73 | |
| 2.20 | 1.23 | 2.47 | 6.17 | 12.34 | 24.67 | 61.68 | 123.35 | 246.70 | 616.75 | |
| 2.25 | 1.17 | 2.35 | 5.87 | 11.74 | 23.48 | 58.70 | 117.39 | 234.78 | 586.96 | |
| 2.30 | 1.12 | 2.24 | 5.60 | 11.20 | 22.40 | 55.99 | 111.98 | 223.96 | 559.91 | |
| 2.35 | 1.07 | 2.14 | 5.35 | 10.70 | 21.41 | 53.52 | 107.05 | 214.10 | 535.24 | |
| 2.40 | 1.03 | 2.05 | 5.13 | 10.25 | 20.51 | 51.27 | 102.53 | 205.06 | 512.66 | |
| 2.45 | 0.98 | 1.97 | 4.92 | 9.84 | 19.68 | 49.19 | 98.38 | 196.76 | 491.90 | |
| 2.50 | 0.95 | 1.89 | 4.73 | 9.46 | 18.91 | 47.28 | 94.55 | 189.11 | 472.76 | |
| 2.55 | 0.91 | 1.82 | 4.55 | 9.10 | 18.20 | 45.51 | 91.01 | 182.02 | 455.06 | |
| 2.60 | 0.88 | 1.75 | 4.39 | 8.77 | 17.55 | 43.86 | 87.73 | 175.45 | 438.63 | 877.26 |
| 2.65 | 0.85 | 1.69 | 4.23 | 8.47 | 16.93 | 42.33 | 84.67 | 169.34 | 423.34 | 846.69 |
| 2.70 | 0.82 | 1.64 | 4.09 | 8.18 | 16.36 | 40.91 | 81.82 | 163.64 | 409.09 | 818.18 |
| 2.75 | 0.79 | 1.58 | 3.96 | 7.92 | 15.83 | 39.58 | 79.15 | 158.31 | 395.77 | 791.53 |
| 2.80 | 0.77 | 1.53 | 3.83 | 7.67 | 15.33 | 38.33 | 76.66 | 153.31 | 383.28 | 766.56 |
| 2.85 | 0.74 | 1.49 | 3.72 | 7.43 | 14.86 | 37.16 | 74.31 | 148.62 | 371.56 | 743.12 |
| 2.90 | 0.72 | 1.44 | 3.61 | 7.21 | 14.42 | 36.05 | 72.11 | 144.21 | 360.53 | 721.07 |
| 2.95 | 0.70 | 1.40 | 3.50 | 7.00 | 14.01 | 35.01 | 70.03 | 140.06 | 350.14 | 700.29 |
| 3.00 | 0.68 | 1.36 | 3.40 | 6.81 | 13.61 | 34.03 | 68.07 | 136.13 | 340.34 | 680.67 |
| 3.05 | 0.66 | 1.32 | 3.31 | 6.62 | 13.24 | 33.11 | 66.21 | 132.43 | 331.06 | 662.13 |
| 3.10 | 0.64 | 1.29 | 3.22 | 6.45 | 12.89 | 32.23 | 64.46 | 128.91 | 322.28 | 644.56 |

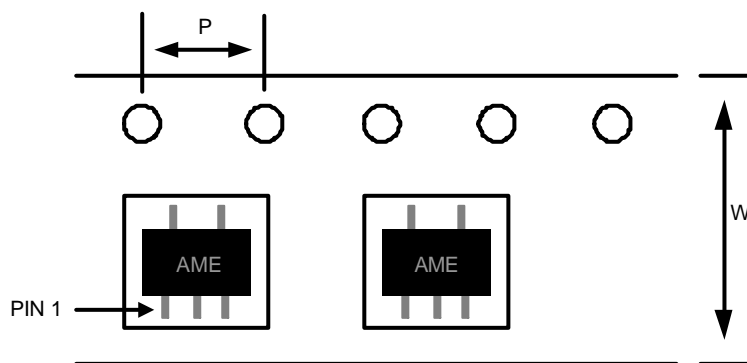
External Resistor Divider Table (contd.)

| R1 (K Ohm) | 1 | 2 | 5 | 10 | 20 | 50 | 100 | 200 | 500 | 1000 |
|---------------|--|------|------|------|-------|-------|-------|--------|--------|--------|
| Vout | $R2(K\text{ Ohm})=(1.215 \cdot R1(K\text{ Ohm})) / (Vout-1.215)$ | | | | | | | | | |
| 3.15 | 0.63 | 1.26 | 3.14 | 6.28 | 12.56 | 31.40 | 62.79 | 125.58 | 313.95 | 627.91 |
| 3.20 | 0.61 | 1.22 | 3.06 | 6.12 | 12.24 | 30.60 | 61.21 | 122.42 | 306.05 | 612.09 |
| 3.25 | 0.60 | 1.19 | 2.99 | 5.97 | 11.94 | 29.85 | 59.71 | 119.41 | 298.53 | 597.05 |
| 3.30 | 0.58 | 1.17 | 2.91 | 5.83 | 11.65 | 29.14 | 58.27 | 116.55 | 291.37 | 582.73 |
| 3.35 | 0.57 | 1.14 | 2.85 | 5.69 | 11.38 | 28.45 | 56.91 | 113.82 | 284.54 | 569.09 |
| 3.40 | 0.56 | 1.11 | 2.78 | 5.56 | 11.12 | 27.80 | 55.61 | 111.21 | 278.03 | 556.06 |
| 3.45 | 0.54 | 1.09 | 2.72 | 5.44 | 10.87 | 27.18 | 54.36 | 108.72 | 271.81 | 543.62 |
| 3.50 | 0.53 | 1.06 | 2.66 | 5.32 | 10.63 | 26.59 | 53.17 | 106.35 | 265.86 | 531.73 |
| 3.55 | 0.52 | 1.04 | 2.60 | 5.20 | 10.41 | 26.02 | 52.03 | 104.07 | 260.17 | 520.34 |
| 3.60 | 0.51 | 1.02 | 2.55 | 5.09 | 10.19 | 25.47 | 50.94 | 101.89 | 254.72 | 509.43 |
| 3.65 | 0.50 | 1.00 | 2.49 | 4.99 | 9.98 | 24.95 | 49.90 | 99.79 | 249.49 | 498.97 |
| 3.70 | 0.49 | 0.98 | 2.44 | 4.89 | 9.78 | 24.45 | 48.89 | 97.79 | 244.47 | 488.93 |
| 3.75 | 0.48 | 0.96 | 2.40 | 4.79 | 9.59 | 23.96 | 47.93 | 95.86 | 239.64 | 479.29 |
| 3.80 | 0.47 | 0.94 | 2.35 | 4.70 | 9.40 | 23.50 | 47.00 | 94.00 | 235.01 | 470.02 |
| 3.85 | 0.46 | 0.92 | 2.31 | 4.61 | 9.22 | 23.06 | 46.11 | 92.22 | 230.55 | 461.10 |
| 3.90 | 0.45 | 0.91 | 2.26 | 4.53 | 9.05 | 22.63 | 45.25 | 90.50 | 226.26 | 452.51 |
| 3.95 | 0.44 | 0.89 | 2.22 | 4.44 | 8.88 | 22.21 | 44.42 | 88.85 | 222.12 | 444.24 |
| 4.00 | 0.44 | 0.87 | 2.18 | 4.36 | 8.73 | 21.81 | 43.63 | 87.25 | 218.13 | 436.27 |
| 4.05 | 0.43 | 0.86 | 2.14 | 4.29 | 8.57 | 21.43 | 42.86 | 85.71 | 214.29 | 428.57 |
| 4.10 | 0.42 | 0.84 | 2.11 | 4.21 | 8.42 | 21.06 | 42.11 | 84.23 | 210.57 | 421.14 |
| 4.15 | 0.41 | 0.83 | 2.07 | 4.14 | 8.28 | 20.70 | 41.40 | 82.79 | 206.98 | 413.97 |
| 4.20 | 0.41 | 0.81 | 2.04 | 4.07 | 8.14 | 20.35 | 40.70 | 81.41 | 203.52 | 407.04 |
| 4.25 | 0.40 | 0.80 | 2.00 | 4.00 | 8.01 | 20.02 | 40.03 | 80.07 | 200.16 | 400.33 |
| 4.30 | 0.39 | 0.79 | 1.97 | 3.94 | 7.88 | 19.69 | 39.38 | 78.77 | 196.92 | 393.84 |
| 4.35 | 0.39 | 0.78 | 1.94 | 3.88 | 7.75 | 19.38 | 38.76 | 77.51 | 193.78 | 387.56 |
| 4.40 | 0.38 | 0.76 | 1.91 | 3.81 | 7.63 | 19.07 | 38.15 | 76.30 | 190.74 | 381.48 |
| 4.45 | 0.38 | 0.75 | 1.88 | 3.76 | 7.51 | 18.78 | 37.56 | 75.12 | 187.79 | 375.58 |
| 4.50 | 0.37 | 0.74 | 1.85 | 3.70 | 7.40 | 18.49 | 36.99 | 73.97 | 184.93 | 369.86 |
| 4.55 | 0.36 | 0.73 | 1.82 | 3.64 | 7.29 | 18.22 | 36.43 | 72.86 | 182.16 | 364.32 |
| 4.60 | 0.36 | 0.72 | 1.79 | 3.59 | 7.18 | 17.95 | 35.89 | 71.79 | 179.47 | 358.94 |
| 4.65 | 0.35 | 0.71 | 1.77 | 3.54 | 7.07 | 17.69 | 35.37 | 70.74 | 176.86 | 353.71 |
| 4.70 | 0.35 | 0.70 | 1.74 | 3.49 | 6.97 | 17.43 | 34.86 | 69.73 | 174.32 | 348.64 |
| 4.75 | 0.34 | 0.69 | 1.72 | 3.44 | 6.87 | 17.19 | 34.37 | 68.74 | 171.85 | 343.71 |
| 4.80 | 0.34 | 0.68 | 1.69 | 3.39 | 6.78 | 16.95 | 33.89 | 67.78 | 169.46 | 338.91 |
| 4.85 | 0.33 | 0.67 | 1.67 | 3.34 | 6.69 | 16.71 | 33.43 | 66.85 | 167.13 | 334.25 |
| 4.90 | 0.33 | 0.66 | 1.65 | 3.30 | 6.59 | 16.49 | 32.97 | 65.94 | 164.86 | 329.72 |
| 4.95 | 0.33 | 0.65 | 1.63 | 3.25 | 6.51 | 16.27 | 32.53 | 65.06 | 162.65 | 325.30 |
| 5.00 | 0.32 | 0.64 | 1.61 | 3.21 | 6.42 | 16.05 | 32.10 | 64.20 | 160.50 | 321.00 |

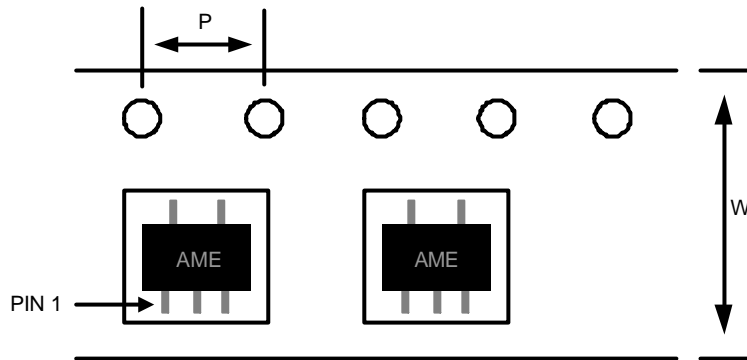
Note: Small load (greater than 2 mA) is necessary as R1 or R2 is larger than 50 Kohm. Otherwise, output voltage probably cannot be pulled down to 0 V on disable mode.

■ Date Code Rule

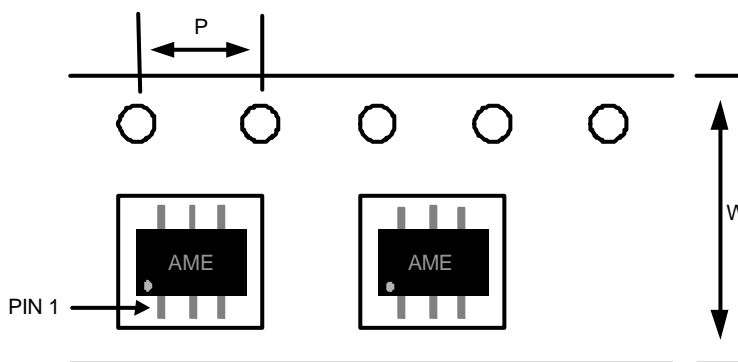
| Marking | | | Date Code | | Year |
|---------|----------|----------|-----------|----------|------|
| A | A | A | W | W | xxx0 |
| A | A | A | W | <u>W</u> | xxx1 |
| A | A | A | <u>W</u> | W | xxx2 |
| A | A | A | <u>W</u> | <u>W</u> | xxx3 |
| A | A | <u>A</u> | W | W | xxx4 |
| A | A | <u>A</u> | W | <u>W</u> | xxx5 |
| A | A | <u>A</u> | <u>W</u> | W | xxx6 |
| A | A | <u>A</u> | <u>W</u> | <u>W</u> | xxx7 |
| A | <u>A</u> | A | W | W | xxx8 |
| A | <u>A</u> | A | W | <u>W</u> | xxx9 |

■ Tape and Reel Dimension
SOT-25

Carrier Tape, Number of Components Per Reel and Reel Size

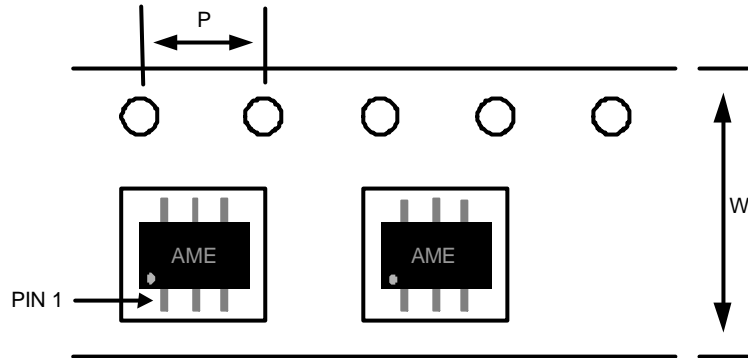
| Package | Carrier Width (W) | Pitch (P) | Part Per Full Reel | Reel Size |
|---------|-------------------|------------|--------------------|-----------|
| SOT-25 | 8.0±0.1 mm | 4.0±0.1 mm | 3000pcs | 180±1 mm |

■ Tape and Reel Dimension
TSOT-25

Carrier Tape, Number of Components Per Reel and Reel Size

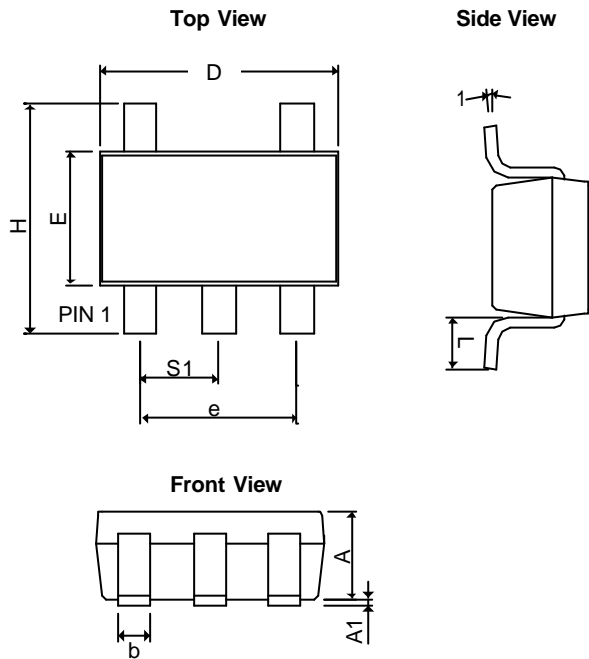
| Package | Carrier Width (W) | Pitch (P) | Part Per Full Reel | Reel Size |
|---------|-------------------|------------|--------------------|-----------|
| TSOT-25 | 8.0±0.1 mm | 4.0±0.1 mm | 3000pcs | 180±1 mm |

SOT-26

Carrier Tape, Number of Components Per Reel and Reel Size

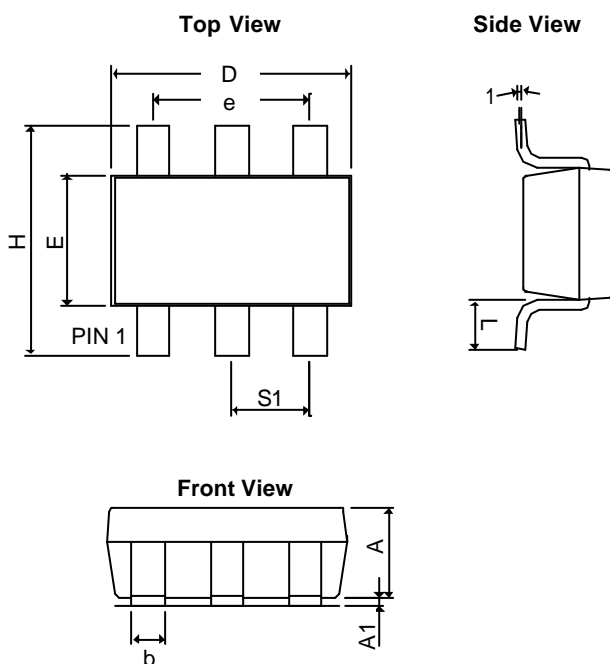
| Package | Carrier Width (W) | Pitch (P) | Part Per Full Reel | Reel Size |
|---------|-------------------|------------|--------------------|-----------|
| SOT-26 | 8.0±0.1 mm | 4.0±0.1 mm | 3000pcs | 180±1 mm |

■ Tape and Reel Dimension
TSOT-26

Carrier Tape, Number of Components Per Reel and Reel Size

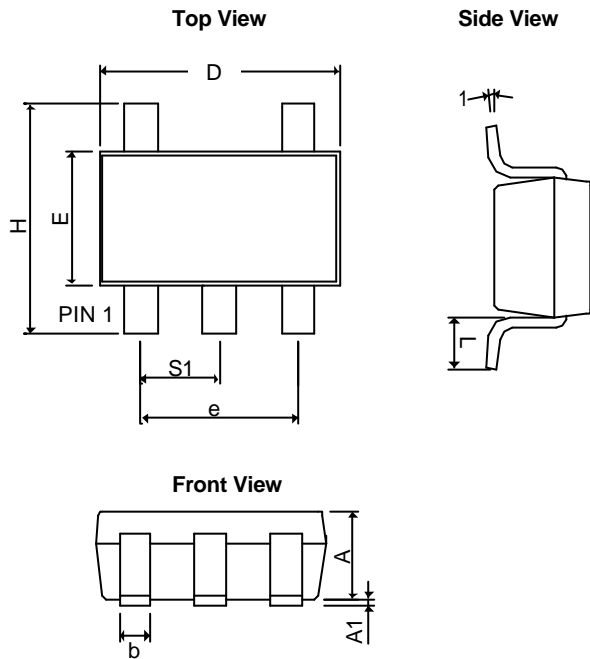
| Package | Carrier Width (W) | Pitch (P) | Part Per Full Reel | Reel Size |
|---------|-------------------|------------|--------------------|-----------|
| TSOT-26 | 8.0±0.1 mm | 4.0±0.1 mm | 3000pcs | 180±1 mm |

■ Package Dimension
SOT-25


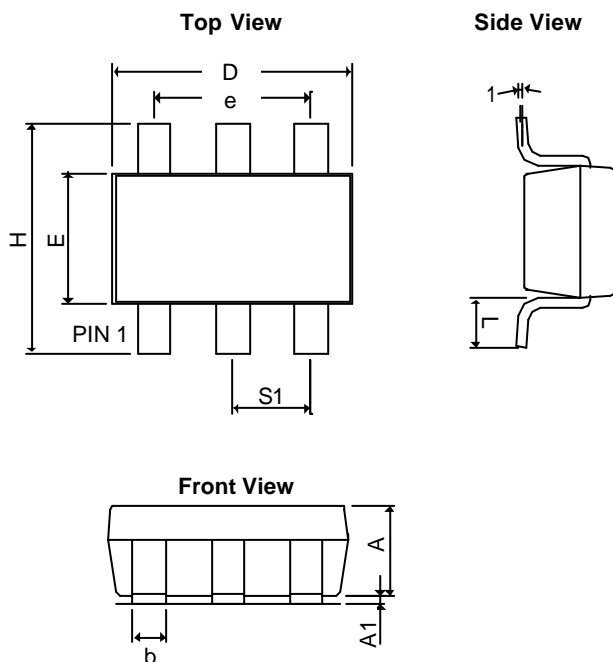
| SYMBOLS | MILLIMETERS | | INCHES | |
|----------------|-------------|------|-------------|---------|
| | MIN | MAX | MIN | MAX |
| A | 1.20REF | | 0.0472REF | |
| A ₁ | 0.00 | 0.15 | 0.0000 | 0.0059 |
| b | 0.30 | 0.55 | 0.0118 | 0.0217 |
| D | 2.70 | 3.10 | 0.1063 | 0.1220 |
| E | 1.40 | 1.80 | 0.0551 | 0.0709 |
| e | 1.90 BSC | | 0.07480 BSC | |
| H | 2.60 | 3.00 | 0.10236 | 0.11811 |
| L | 0.37BSC | | 0.0146BSC | |
| q1 | 0° | 10° | 0° | 10° |
| S ₁ | 0.95BSC | | 0.0374BSC | |

SOT-26


| 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 | | 0.0748 BSC | |
| H | 2.60 | 3.00 | 0.10236 | 0.11811 |
| L | 0.37REF | | 0.0146REF | |
| q1 | 0° | 10° | 0° | 10° |
| S ₁ | 0.95REF | | 0.0374REF | |

■ Package Dimension
TSOT-25


| SYMBOLS | MILLIMETERS | | INCHES | |
|------------|-------------|------|-------------|---------|
| | MIN | MAX | MIN | MAX |
| $A+A_1$ | 0.90 | 1.25 | 0.0354 | 0.0492 |
| b | 0.30 | 0.50 | 0.0118 | 0.0197 |
| D | 2.70 | 3.10 | 0.1063 | 0.1220 |
| E | 1.40 | 1.80 | 0.0551 | 0.0709 |
| e | 1.90 BSC | | 0.07480 BSC | |
| H | 2.40 | 3.00 | 0.09449 | 0.11811 |
| L | 0.35BSC | | 0.0138BSC | |
| $\delta 1$ | 0° | 10° | 0° | 10° |
| S_1 | 0.95BSC | | 0.0374BSC | |

TSOT-26


| SYMBOLS | MILLIMETERS | | INCHES | |
|------------|-------------|------|-------------|---------|
| | MIN | MAX | MIN | MAX |
| $A+A_1$ | 0.90 | 1.25 | 0.0354 | 0.0492 |
| b | 0.30 | 0.50 | 0.0118 | 0.0197 |
| D | 2.70 | 3.10 | 0.1063 | 0.1220 |
| E | 1.40 | 1.80 | 0.0551 | 0.0709 |
| e | 1.90 BSC | | 0.07480 BSC | |
| H | 2.40 | 3.00 | 0.09449 | 0.11811 |
| L | 0.35BSC | | 0.0138BSC | |
| $\delta 1$ | 0° | 10° | 0° | 10° |
| S_1 | 0.95BSC | | 0.0374BSC | |



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