AME

# AME8853

# High PSRR, Low Noise, 300mA CMOS Regulator

## ■ General Description

The AME8853 family of positive, CMOS linear regulators provide low dropout voltage(220mV@300mA), low quiescent current, and low noise CMOS LDO. These rugged devices have both Thermal Shutdown, and Current limit to prevent device failure under the "Worst" of operating conditions.

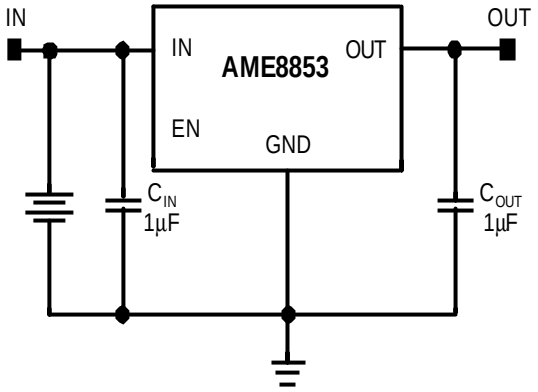
## ■ Features

- Low Dropout Voltage: 220mV@300mA
- Guaranteed Current: 300mA
- Quiescent Current: 60µA (typ.)
- Over-Temperature Shutdown
- Current Limiting protection
- PSRR: 60dB@10KHz
- Ultra-Low-Noise: 100$\mu V_{RMS}$ at 1Hz to 100KHz
- Low Temperature Coefficient
- Input Voltage Range : 2.5V~5.5V
- Output Voltage Range: 0.8V~ 4.3V
- Green Products Meet RoHS Standards

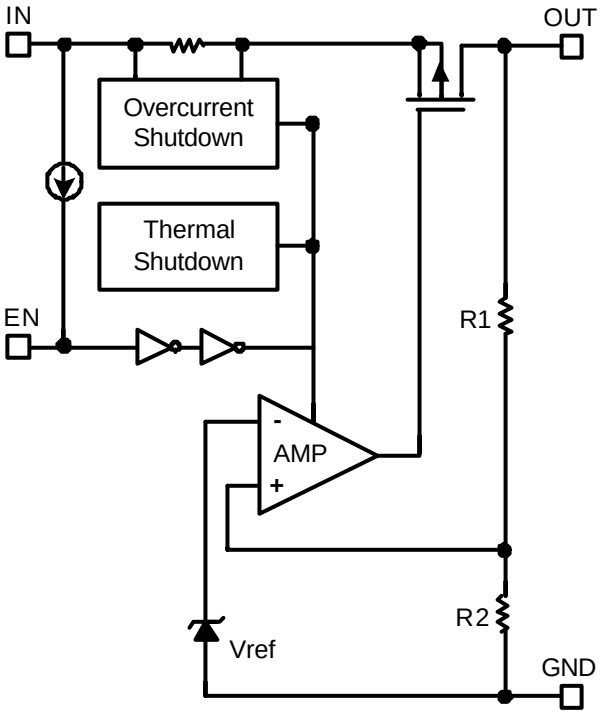
## ■ Applications

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

## ■ Typical Application

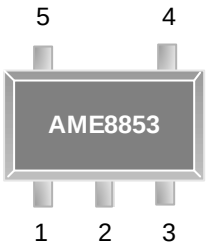



## ■ Functional Block Diagram



## ■ Pin Configuration

**SC-70-5**
**Top View**

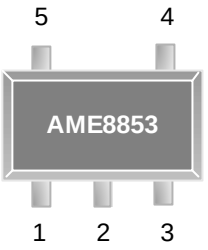



**AME8853-AIVxxx**

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

*** Die Attach:**
**Conductive Epoxy**

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

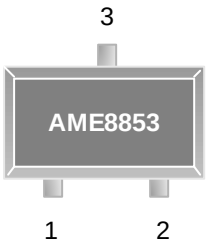



**AME8853-AEVxxxx**

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

*** Die Attach:**
**Conductive Epoxy**

**SOT-23**
**Top View**

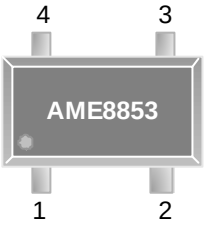



**AME8853-AETxxx**

1. GND
2. OUT
3. IN

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

**SC-70-4 (SC-82)**
**Top View**




**AME8853-AIUxxx**

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

*** Die Attach:**
**Conductive Epoxy**

## ■ Pin Description

**SC-70-5**

| Pin Number | Pin Name | Pin Description |
|---|---|---|
| 1 | IN | Input voltage pin; should be decoupled with 1µF or greater capacitor. |
| 2 | GND | Ground connection pin. |
| 3 | EN | Enable pin, Active "high". When pulled "low", the PMOS pass transistor turns off, current consuming less than 1µA. When EN pin float outside, it's weakly pulled high form internal MOS. |
| 4 | NC | No connection. |
| 5 | OUT | LDO voltage regulator output pin; should be decoupled with a 1.0µF or greater value low ESR ceramic capacitor. |

**SOT-25/TSOT-25A**

| Pin Number | Pin Name | Pin Description |
|---|---|---|
| 1 | IN | Input voltage pin; should be decoupled with 1µF or greater capacitor. |
| 2 | GND | Ground connection pin. |
| 3 | EN | Enable pin, Active "high". When pulled "low", the PMOS pass transistor turns off, current consuming less than 1µA. When EN pin float outside, it' s weakly pulled high. |
| 4 | NC | No connection. |
| 5 | OUT | LDO voltage regulator output pin; should be decoupled with a 1.0µF or greater value low ESR ceramic capacitor. |

## ■ Pin Description (Contd.)

**SOT-23**

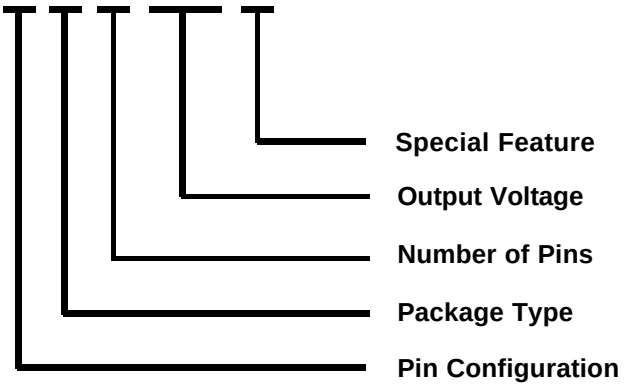
| Pin Number | Pin Name | Pin Description |
|---|---|---|
| 1 | GND | Ground connection pin. |
| 2 | OUT | LDO voltage regulator output pin; should be decoupled with a 1.0µF or greater value low ESR ceramic capacitor. |
| 3 | IN | Input voltage pin; should be decoupled with 1µF or greater capacitor. |

**SC-70-4(SC-82)**

| Pin Number | Pin Name | Pin Description |
|---|---|---|
| 1 | EN | Enable pin, Active "high". When pulled "low", the PMOS pass transistor turns off, current consuming less than 1µA. When EN pin float outside, it' s weakly pulled high. |
| 2 | GND | Ground connection pin. |
| 3 | OUT | LDO voltage regulator output pin; should be decoupled with a 1.0µF or greater value low ESR ceramic capacitor. |
| 4 | IN | Input voltage pin; should be decoupled with 1µF or greater capacitor. |

## ■ Ordering Information

**AME8853 - x x x xxx x**




| Pin Configuration | Package Type | Number of Pins | Output Voltage | Special Feature |
|---|---|---|---|---|
| A (SC-70-5)<br>1. IN<br>2. GND<br>3. EN<br>4. NC<br>5. OUT<br><br>A (SOT-25) (TSOT-25A)<br>1. IN<br>2. GND<br>3. EN<br>4. NC<br>5. OUT<br><br>A (SC-70-4/ SC-82)<br>1. EN<br>2. GND<br>3. OUT<br>4. IN<br><br>A (SOT-23)<br>1. GND<br>2. OUT<br>3. IN | E: SOT-2X<br>I: SC-70 (SC-82) | T: 3<br>U: 4<br>V: 5 | 080: 0.8V<br>090: 0.9V<br>100: 1.0V<br>110: 1.1V<br>120: 1.2V<br>130: 1.3V<br>140: 1.4V<br>150: 1.5V<br>: :<br>180: 1.8V<br>: :<br>250: 2.5V<br>: :<br>280: 2.8V<br>: :<br>: :<br>420: 4.2V<br>430: 4.3V | N/A: SOT-2X<br>K: 0.9mm max height (for TSOT-2XA Only) |

## ■ Absolute Maximum Ratings

| Parameter | Symbol | Maximum | Unit |
|---|---|---|---|
| Input Voltage | $V_{IN}$ | -0.3 to 6 | V |
| EN Voltage | $V_{EN}$ | -0.3 to 6 | V |
| Output Current | $I_{OUT}$ | $P_D/(V_{IN}-V_{OUT})$ | mA |
| Output Voltage | $V_{OUT}$ | GND-0.3 to $V_{IN}$+0.3 | V |
| ESD Classification | HBM | 2 | kV |
| | MM | 200 | V |

## ■ Recommended Operating Conditions

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Ambient Temperature Range | $T_A$ | - 40 to +85 | $^oC$ |
| Junction Temperaturen Range | $T_J$ | - 40 to +125 | $^oC$ |
| Storage Temperaturen Range | $T_{STG}$ | - 65 to +150 | $^oC$ |

## ■ Thermal Information

| Parameter | Package | Die Attach | Symbol | Maximum | Unit |
|---|---|---|---|---|---|
| Thermal Resistance* (Junction to Case) | SC-70-5 | Conductive Epoxy | $\theta_{JC}$ | 224 | °C / W |
| | SC-70-4(SC-82) | | | | |
| | SOT-25 | | | 81 | |
| | TSOT-25A | | | 81 | |
| | SOT-23 | Non-Conductive Epoxy | | 140 | |
| Thermal Resistance (Junction to Ambient) | SC-70-5 | Conductive Epoxy | $\theta_{JA}$ | 331 | °C / W |
| | SC-70-4(SC-82) | | | | |
| | SOT-25 | | | 260 | |
| | TSOT-25A | | | 230 | |
| | SOT-23 | Non-Conductive Epoxy | | 280 | |
| Internal Power Dissipation | SC-70-5 | Conductive Epoxy | $P_D$ | 300 | mW |
| | SC-70-4(SC-82) | | | | |
| | SOT-25 | | | 400 | |
| | TSOT-25A | | | 455 | |
| | SOT-23 | Non-Conductive Epoxy | | 400 | |
| Maximum Junction Temperature | | | | 150 | °C |
| Lead Temperature (Soldering, 10Sec.)** | | | | 260 | °C |

* Measure $\theta_{JC}$ on backside center of molding compound if IC has no tab.
** MIL-STD-202G 210F

## ■ Electrical Specifications

$V_{IN}$=$V_{OUT(NOM)}$ +1V, (for $V_{OUT}$<2V, $V_{IN}$=2.5V), $I_{OUT}$=1mA, and $C_{OUT}$=1µF, $C_{IN}$=1µF unless otherwise noted. Typical values are at $T_A$=25ºC.

| Parameter | Symbol | Test Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | | 2.5 | | 5.5 | V |
| Output Accuracy | $V_{OUT,ACC}$ | $I_{OUT}$=1mA | -2.0 | | 2.0 | % |
| Output Voltage Range | $V_{OUT}$ | | 0.8 | | 4.3 | V |
| Dropout Voltage (Note 1) | $V_{DROP}$ | $I_{OUT}$=300mA, 0.8V≦$V_{OUT(NOM)}$≦2.0V | | | Note2 | mV |
| | | $I_{OUT}$=300mA, 2.0V<$V_{OUT(NOM)}$≦2.4V | | | 500 | |
| | | $I_{OUT}$=300mA, 2.4V<$V_{OUT(NOM)}$≦2.8V | | | 400 | |
| | | $I_{OUT}$=300mA, 2.8V<$V_{OUT(NOM)}$ | | 220 | 300 | |
| Output Current | $I_{OUT}$ | | 300 | | | mA |
| Quiescent Current | $I_Q$ | $I_{OUT}$=0mA | | 60 | 90 | µA |
| Line Regulation $\frac{\frac{\Delta V_{OUT}}{\Delta V_{IN}} \times 100\%}{V_{OUT}}$ | $REG_{LINE}$ | $I_{OUT}$=1mA, 0.8V≦$V_{OUT}$≦1.2V, 2.5V≦$V_{IN}$≦3.5V | | 0.125 | 0.25 | %/V |
| | | $I_{OUT}$=1mA, 1.2V<$V_{OUT}$≦2.0V, 2.5V≦$V_{IN}$≦3.5V | | 0.1 | 0.2 | |
| | | $I_{OUT}$=1mA, 2.0V<$V_{OUT}$≦4.2V, $V_{IN(MIN)}$≦$V_{IN}$≦$V_{IN(MIN)}$+1V | | 0.05 | 0.1 | |
| | | $I_{OUT}$=1mA, 4.2V<$V_{OUT}$≦4.5V, $V_{IN(MIN)}$≦$V_{IN}$≦5.5V (Note2) | | 0.05 | 0.1 | |
| Load Regulation $\frac{\frac{\Delta V_{OUT}}{V_{OUT}} \times 100\%}{\Delta I_{OUT}}$ | $REG_{LOAD}$ | 1mA≦$I_{OUT}$≦300mA 0.8V≦$V_{OUT(NOM)}$≦1.2V | | 1.5 | 3.0 | %/A |
| | | 1mA≦$I_{OUT}$≦300mA 1.2V≦$V_{OUT(NOM)}$≦2.0V | | 1.25 | 2.5 | |
| | | 1mA≦$I_{OUT}$≦300mA 2.0V<$V_{OUT(NOM)}$ | | 1.0 | 2 | |

## ■ Electrical Specifications (Contd.)

| Parameter | Symbol | Test Condition | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| Power Supply Rejection Ration | PSRR | $C_{OUT}$=1uF, $V_{OUT}$=0.8V $I_{OUT}$=10mA $V_{IN}$=2.8V | F=100Hz | | 60 | | dB |
| | | | F=1KHz | | 60 | | |
| | | | F=10KHz | | 60 | | |
| Output Voltage Noise | eN | $I_{OUT}$=10mA, $V_{OUT}$=0.8V, f=1Hz to 100KHz | | | 100 | | $\mu V_{RMS}$ |
| Enable High(enabled) | $V_{EN,HI}$ | $V_{IN(MIN)} \leqq V_{IN} \leqq 5.5V$ | | 1.4 | | $V_{IN}$ | V |
| Enable Low (shutdown) | $V_{EN,LO}$ | $V_{IN(MIN)} \leqq V_{IN} \leqq 5.5V$ | | 0 | | 0.4 | |
| Enable Input Bias Current | $I_{EN,HI}$ | $V_{EN} = V_{IN}$ | | | | 1 | μA |
| | $I_{EN,LO}$ | $V_{EN}$ = 0V | | | | 2 | |
| Shutdown Current | $I_{SHDN}$ | $V_{IN}$=5.0V, $V_{EN}$=0V | | | 0.1 | 1 | μA |
| Shutdown Output Voltage | $V_{OUT,SD}$ | $I_{OUT}$=0.4mA, $V_{EN}$=0 | | | | 0.4 | V |
| **Protection** | | | | | | | |
| Output Current Limit | $I_{LIM}$ | $V_{OUT}$=0.9 x $V_{OUT(NOM)}$ | | 400 | | | mA |
| Thermal Shutdown Temperature | $T_{SHDN}$ | Shutdown, temperature increasing | | | 150 | | °C |
| Thermal Shutdown Hysteresis | $T_{SHDN(HYS)}$ | | | | 20 | | |

Note1: Dropout Voltage is measured at $V_{OUT}$=$V_{OUT(NOM)}$x98%
Note2: For $V_{OUT}$ below 2.0V, Dropout Voltage is the input$_{(MIN)}$ to output differential.

## ■ Detailed Description

The AME8853 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 more 20°C.

**Capacitor Selection and Regulator Stability**

The AME8853 is stable with an output capacitor to ground of 1µF 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 0.1µF ceramic capacitor with a 10µF 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 0.1µF to have a beneficial effect.

**Enable Pin**

The Enable Pin is normally pull-high. When activated pulled low, the MOS pass transistor shuts off, and all internal circuits are powered down. In this state, the stand by current is less than 1µA.

**Capacitor Selection and Regulator Stability**

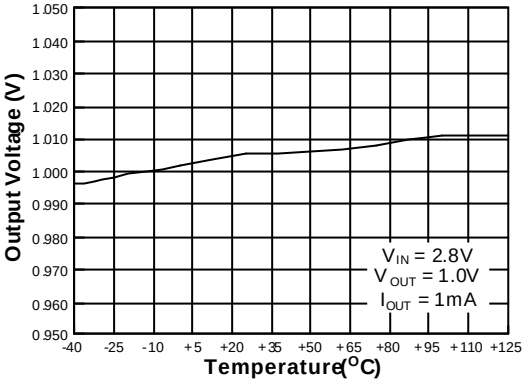
The maximum output power of the AME8853 is limited by the maximum power dissipation of the package. By calculation the power dissipation of the package as a function of the input voltage, output voltage and output current, the maximum input voltage can be obtained. The maximum power dissipation should not exceed the package's maximum power rating.

$$P_{MAX} = (V_{IN(MAX)}-V_{OUT}) \times I_{OUT}$$

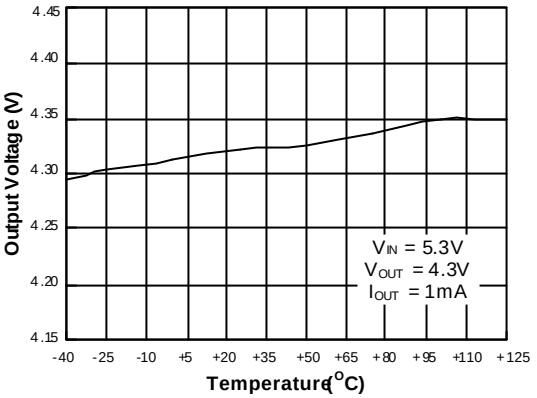
Where:
$V_{IN(MAX)}$ = maximum input voltage
$P_{MAX}$ = maximum power dissipation of the package

## ■ Characterization Curve

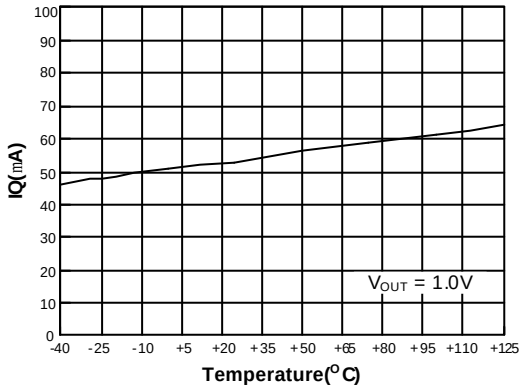
**Output Voltage**



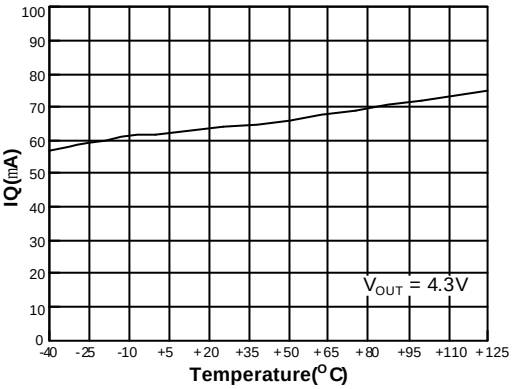

**Output Voltage**



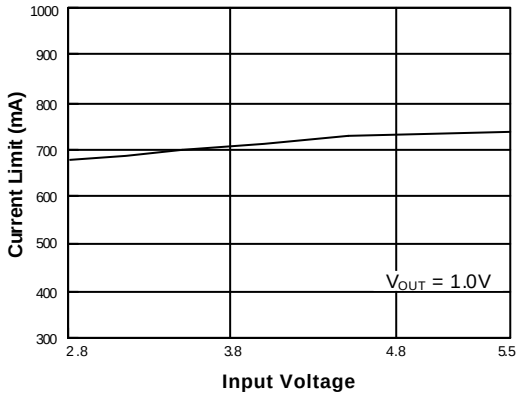

**Quiescent Current**



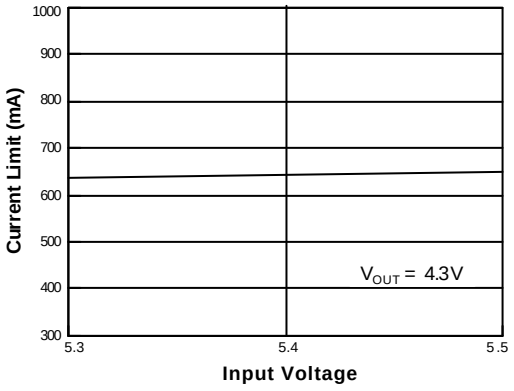

**Quiescent Current**




**Current Limit vs. Input Voltage**

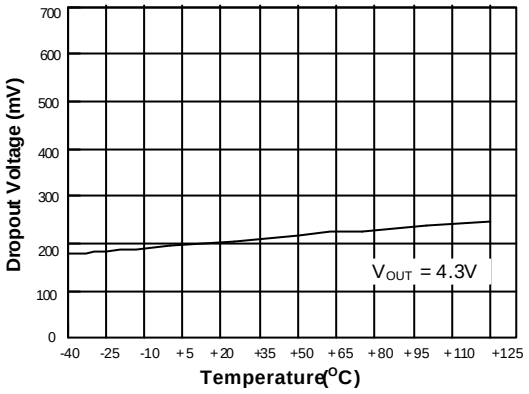



**Current Limit vs. Input Voltage**

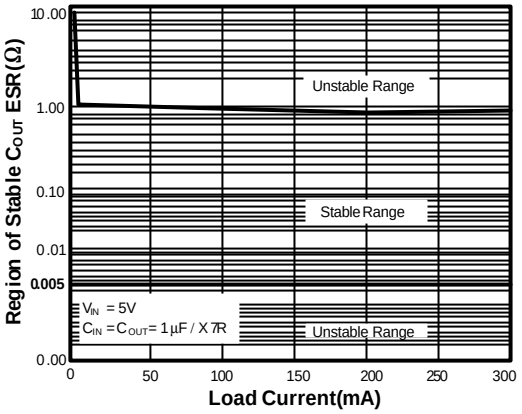


## ■ Characterization Curve (Contd.)

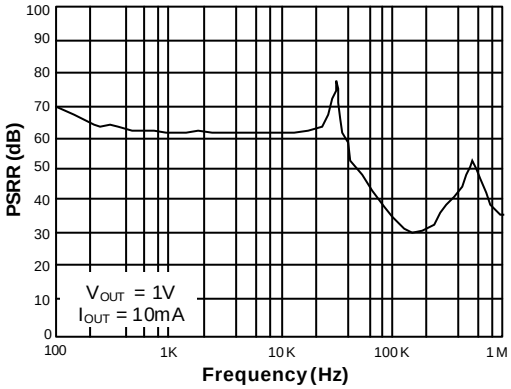
**Dropout Voltage**



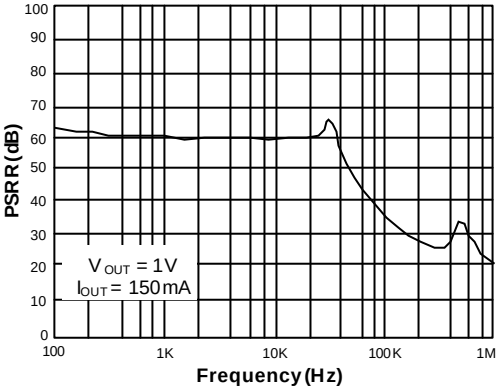

**Stability vs. ESR vs. Load Current**



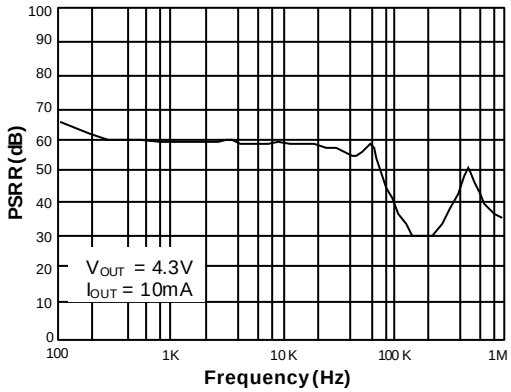

**PSRR vs. Frequency**



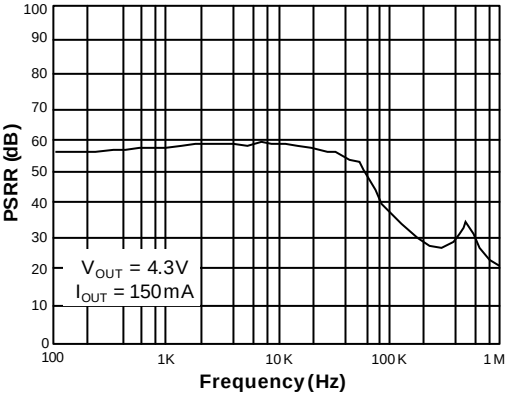

**PSRR vs. Frequency**




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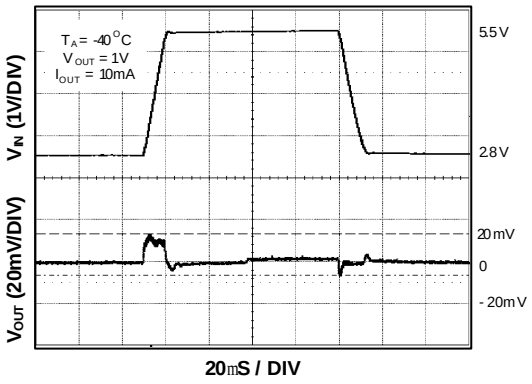



**PSRR vs. Frequency**

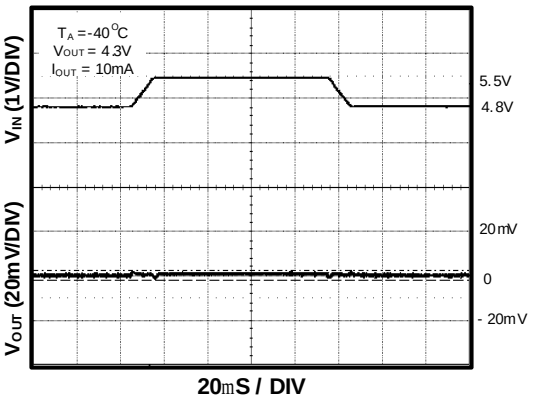


## ■ Characterization Curve (Contd.)

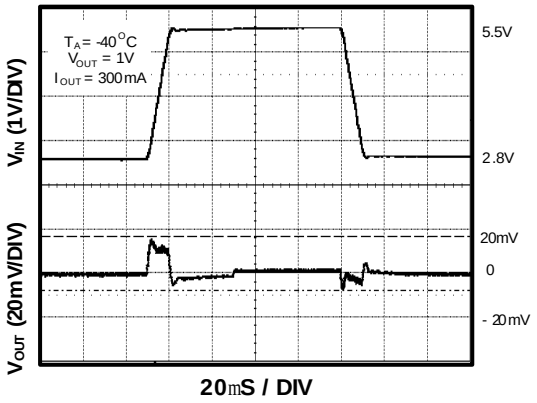
**Line Transient Response**



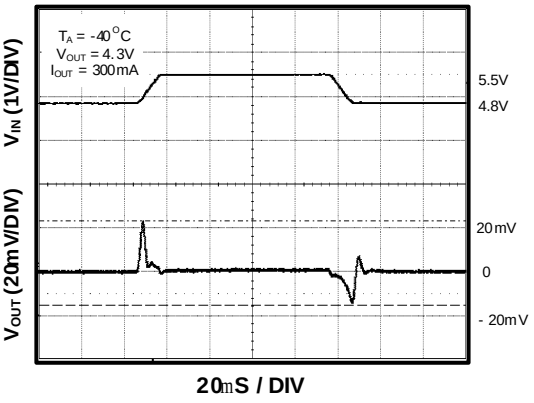

**Line Transient Response**



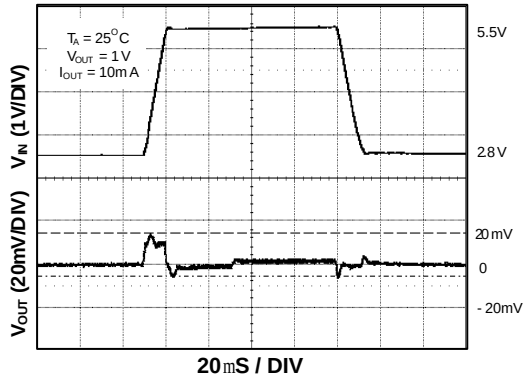

**Line Transient Response**



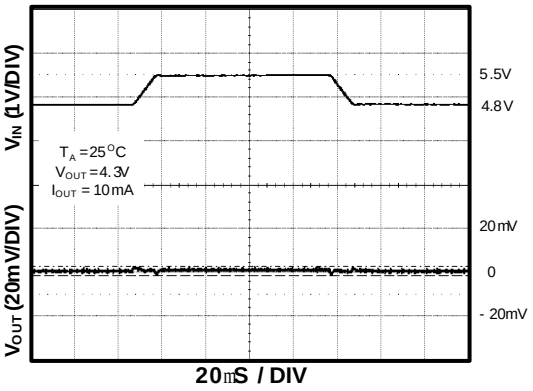

**Line Transient Response**




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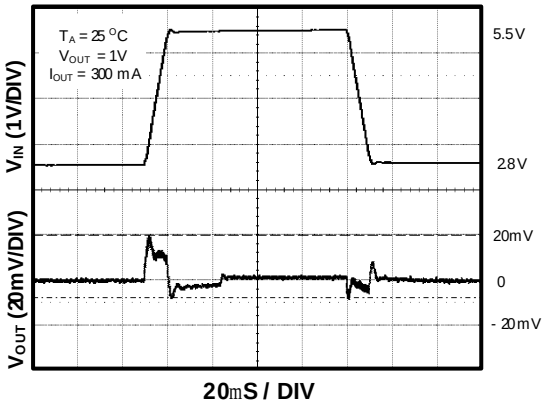



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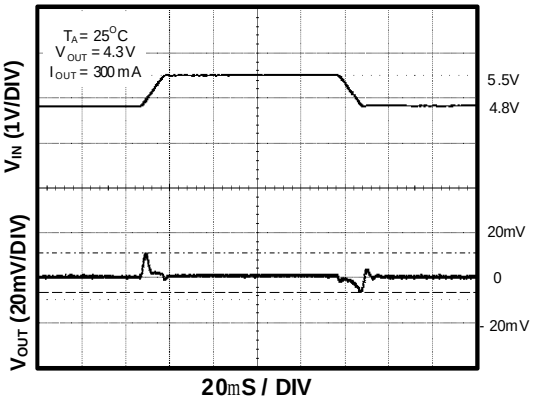


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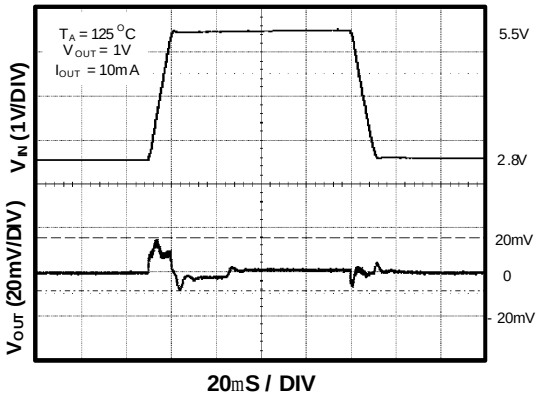
**Line Transient Response**



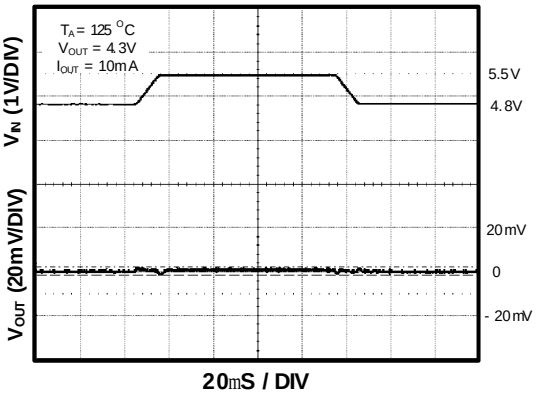

**Line Transient Response**



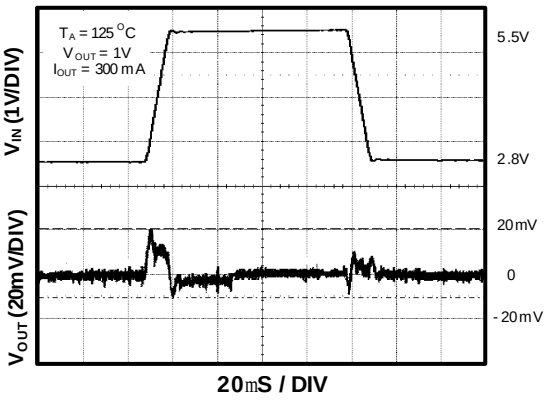

**Line Transient Response**



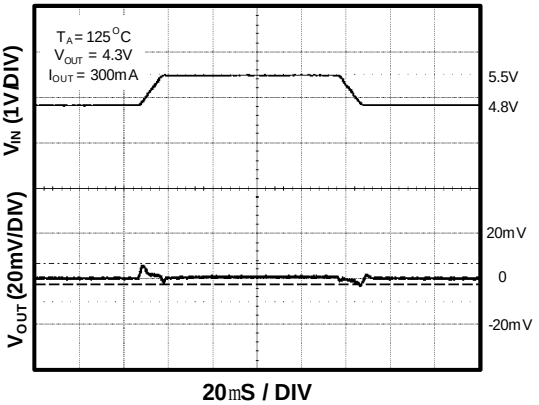

**Line Transient Response**




**Line Transient Response**

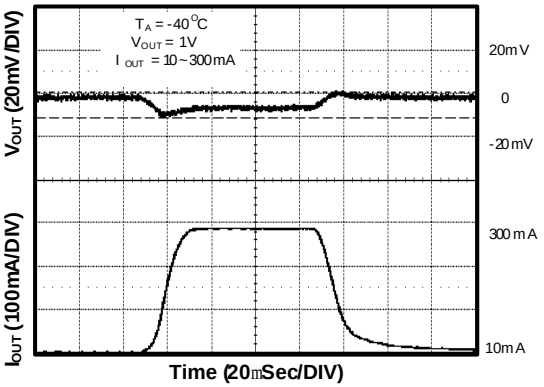



**Line Transient Response**

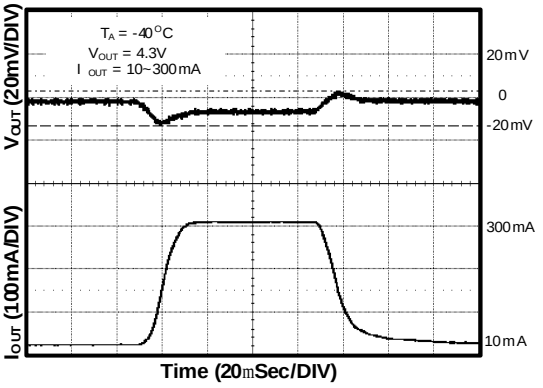


## ■ Characterization Curve (Contd.)

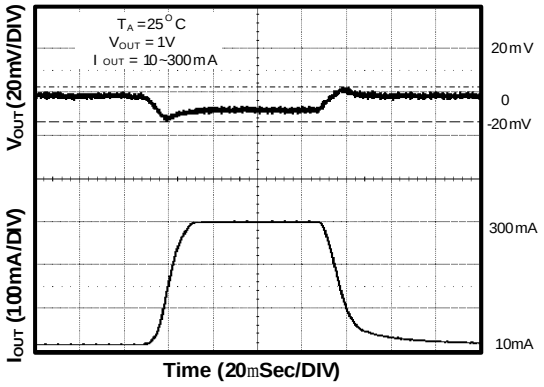
**Load Transient Response**



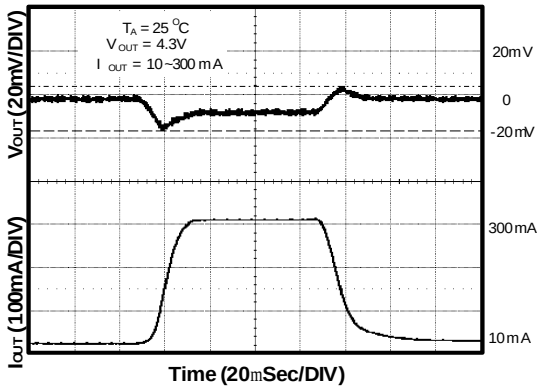

**Load Transient Response**



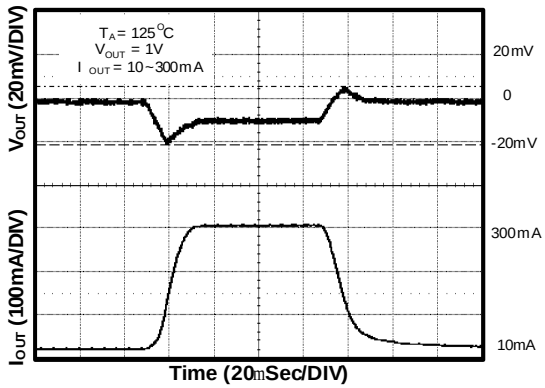

**Load Transient Response**



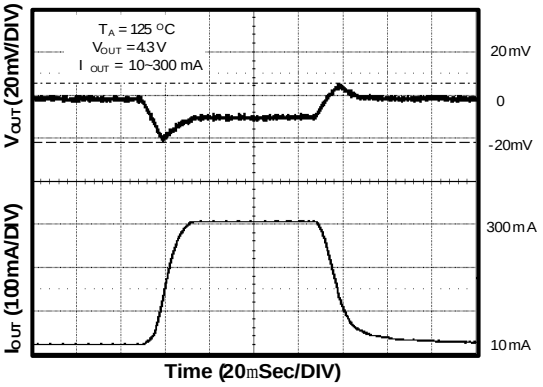

**Load Transient Response**




**Load Transient Response**

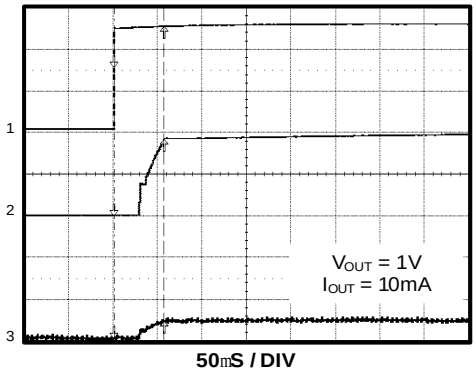



**Load Transient Response**



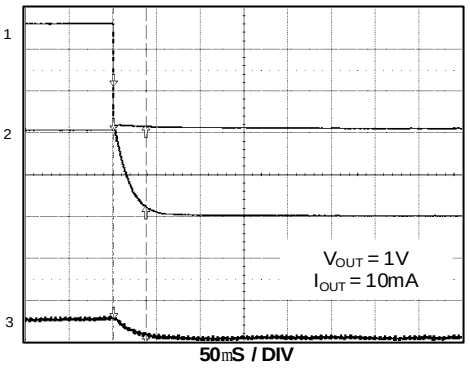
## ■ Characterization Curve (Contd.)

**Chip Enable Transient Response**



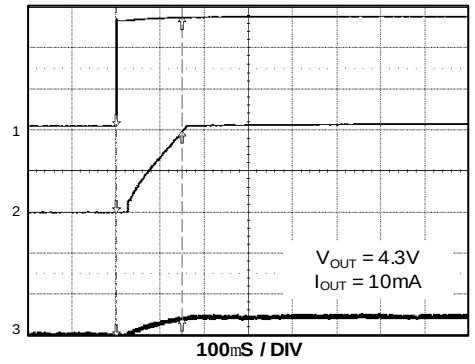

1) EN= 1V/div
2) $V_{OUT}$= 500mV/div
3) $I_{OUT}$ = 20mA/div

**Chip Enable Transient Response**



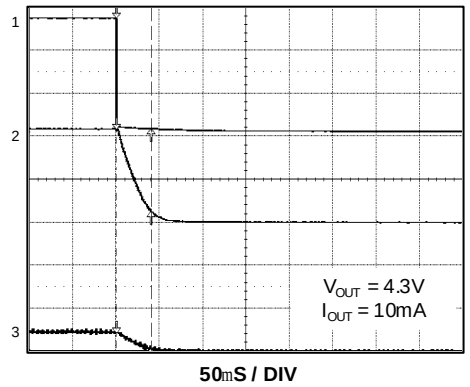

1) EN= 1V/div
2) $V_{OUT}$= 500V/div
3) $I_{OUT}$ = 20mA/div

**Chip Enable Transient Response**




1) EN= 2V/div
2) $V_{OUT}$= 2V/div
3) $I_{OUT}$ = 20mA/div

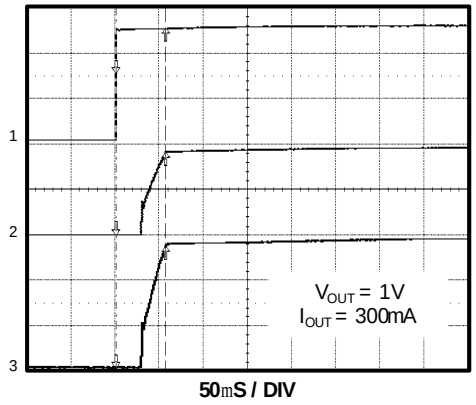
**Chip Enable Transient Response**




1) EN= 2V/div
2) $V_{OUT}$= 2V/div
3) $I_{OUT}$ = 20mA/div

## ■ Characterization Curve (Contd.)

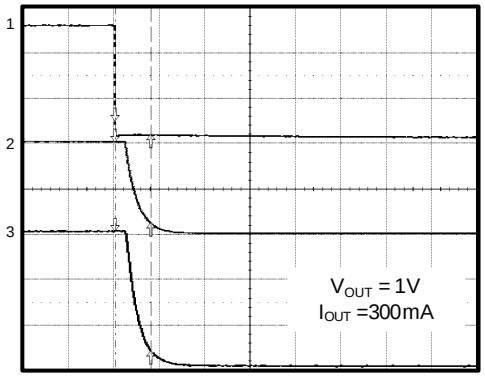
**Chip Enable Transient Response**




**50㎳S / DIV**

1) EN= 1V/div
2) $V_{OUT}$= 500mV/div
3) $I_{OUT}$ = 100mA/div

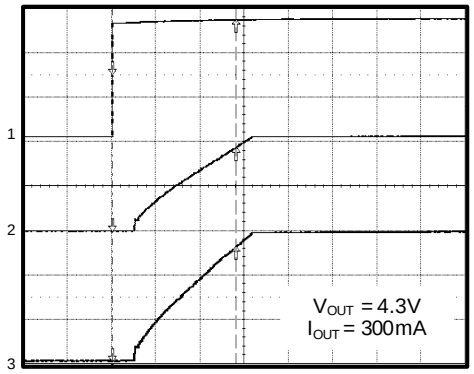
**Chip Enable Transient Response**




**10㎳S / DIV**

1) EN= 1V/div
2) $V_{OUT}$= 500mV/div
3) $I_{OUT}$ = 100mA/div

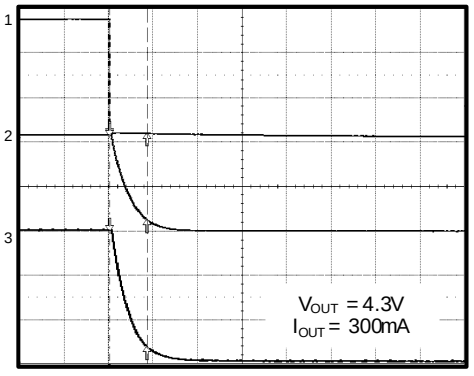
**Chip Enable Transient Response**




**50㎳S / DIV**

1) EN= 2V/div
2) $V_{OUT}$= 2V/div
3) $I_{OUT}$ = 100mA/div

**Chip Enable Transient Response**

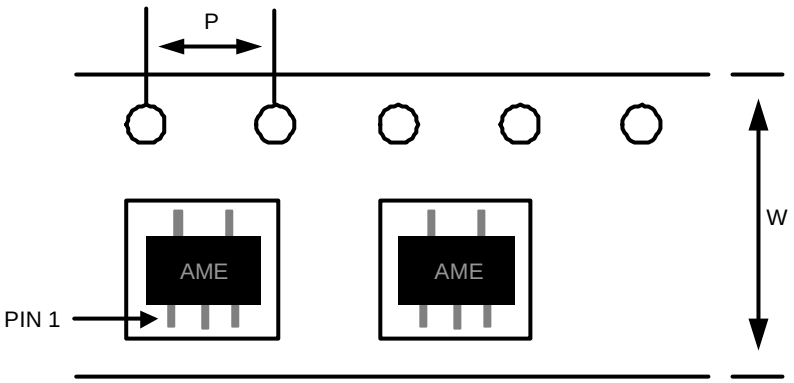



**20㎳S / DIV**

1) EN= 2V/div
2) $V_{OUT}$= 2V/div
3) $I_{OUT}$ = 100mA/div

## ■ Tape and Reel Dimension

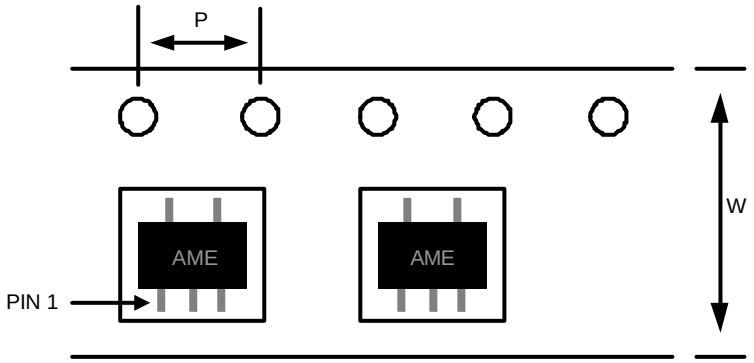
### SC-70-5




**Carrier Tape, Number of Components Per Reel and Reel Size**

| Package | Carrier Width (W) | Pitch (P) | Part Per Full Reel | Reel Size |
|---|---|---|---|---|
| SC-70-5 | 8.0±0.1 mm | 4.0±0.1 mm | 3000pcs | 180±1 mm |

### SOT-25

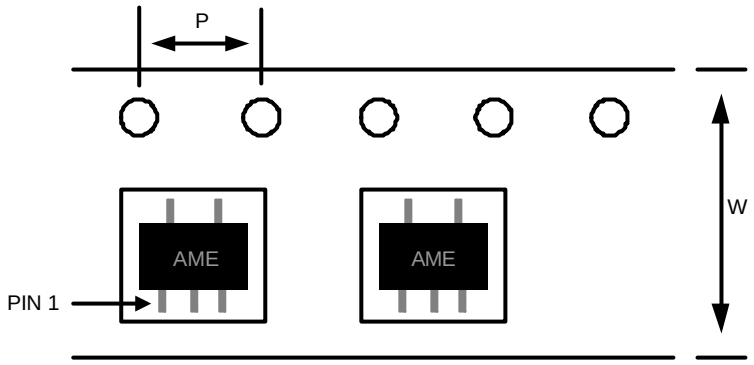



**Carrier Tape, Number of Components Per Reel and Reel Size**

| 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 (Contd.)

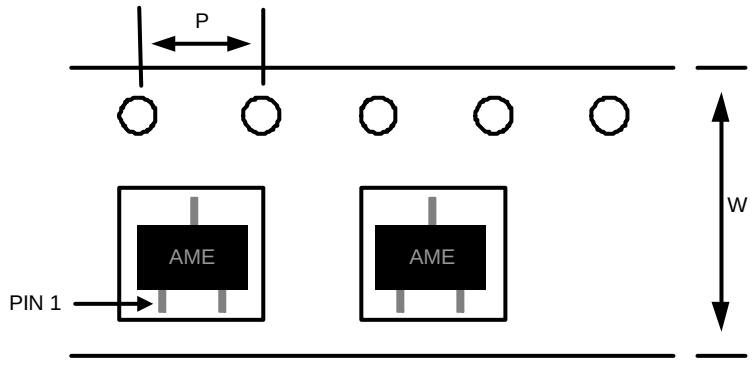
### TSOT-25A




**Carrier Tape, Number of Components Per Reel and Reel Size**

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

### SOT-23

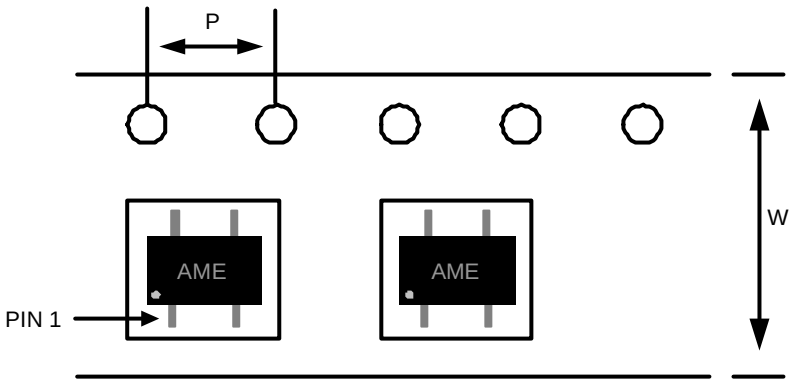



**Carrier Tape, Number of Components Per Reel and Reel Size**

| 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 (Contd.)

**SC-70-4 (SC-82)**

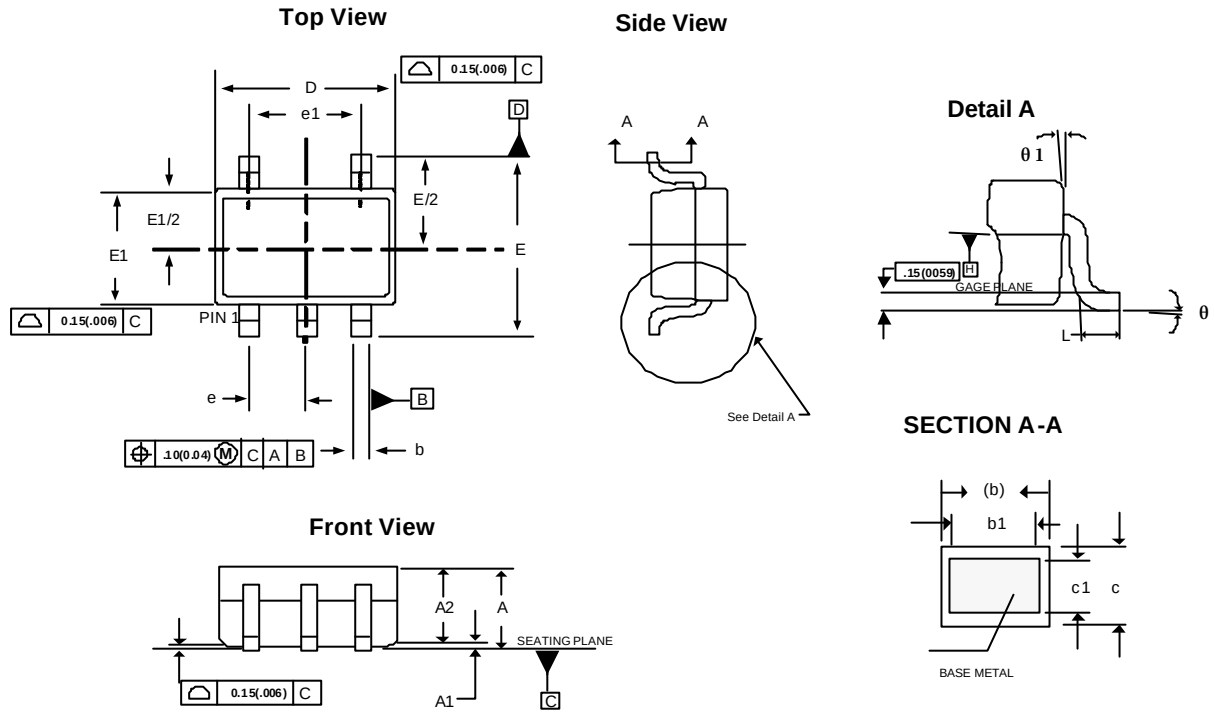



**Carrier Tape, Number of Components Per Reel and Reel Size**

| Package | Carrier Width (W) | Pitch (P) | Part Per Full Reel | Reel Size |
|---|---|---|---|---|
| SC-70-4 | 8.0±0.1 mm | 4.0±0.1 mm | 3000pcs | 180±1 mm |

## ■ Package Dimension

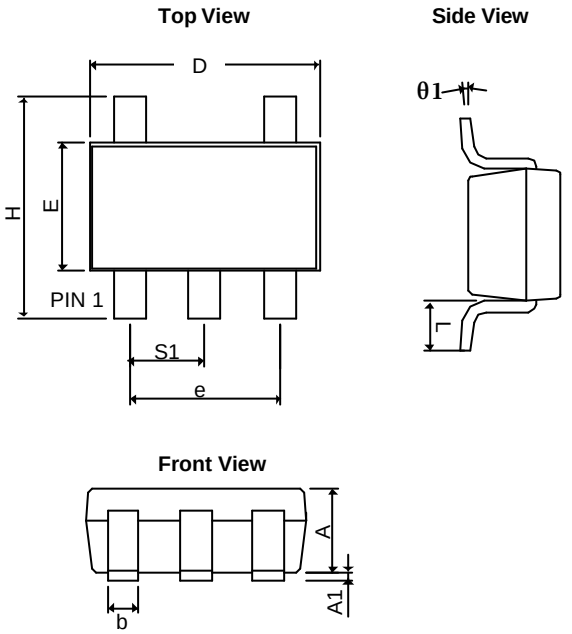
### SC-70-5




| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| **A** | 0.80 | 1.10 | 0.0315 | 0.0433 |
| **A1** | 0.00 | 0.10 | 0.0000 | 0.0039 |
| **A2** | 0.80 | 1.00 | 0.0315 | 0.0394 |
| **b** | 0.15 | 0.35 | 0.0059 | 0.0138 |
| **b1** | 0.15 | 0.25 | 0.0059 | 0.0098 |
| **c** | 0.08 | 0.25 | 0.0031 | 0.0098 |
| **c1** | 0.08 | 0.20 | 0.0031 | 0.0079 |
| **D** | 1.85 | 2.20 | 0.0728 | 0.0866 |
| **E** | 1.80 | 2.45 | 0.0709 | 0.0965 |
| **E1** | 1.10 | 1.40 | 0.0433 | 0.0551 |
| **e** | 0.65 BSC | | 0.0255 BSC | |
| **e1** | 1.20 | 1.40 | 0.0472 | 0.0551 |
| **L** | 0.26 | 0.46 | 0.0102 | 0.0181 |
| **q1** | $0^o$ | $8^o$ | $0^o$ | $8^o$ |
| **q** | $4^o$ | $10^o$ | $4^o$ | $10^o$ |

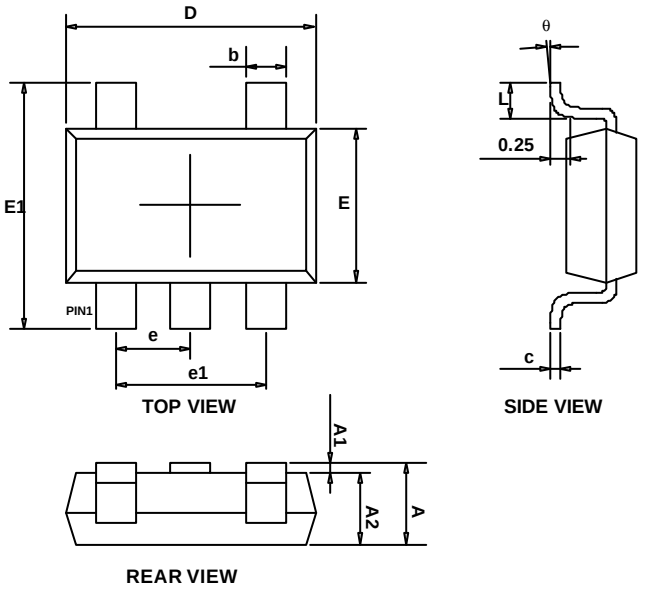
## ■ Package Dimension (Contd.)

### SOT-25




| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.90 | 1.30 | 0.0354 | 0.0512 |
| $A_1$ | 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 | $0^o$ | $10^o$ | $0^o$ | $10^o$ |
| $S_1$ | 0.95BSC | | 0.0374BSC | |

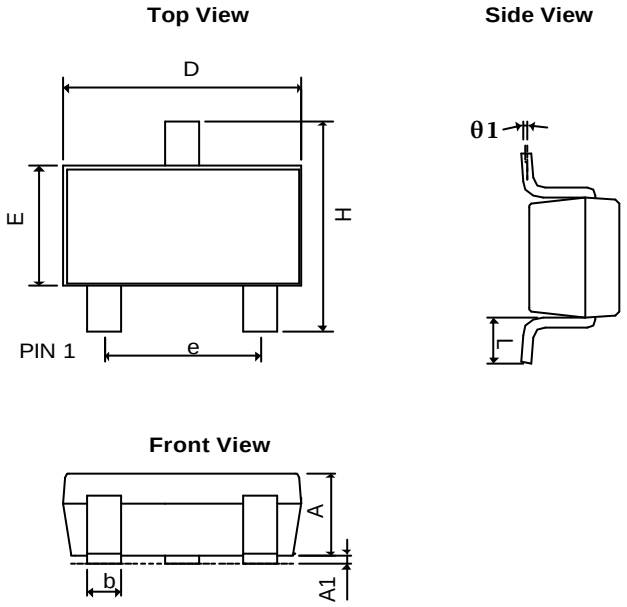
### TSOT-25A




| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.700 | 0.900 | 0.028 | 0.035 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.700 | 0.800 | 0.028 | 0.031 |
| b | 0.350 | 0.500 | 0.014 | 0.020 |
| c | 0.080 | 0.200 | 0.003 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.600 | 1.700 | 0.063 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.95 BSC | | 0.037 BSC | |
| e1 | 1.90 BSC | | 0.075 BSC | |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| q | $0^o$ | $8^o$ | $0^o$ | $8^o$ |

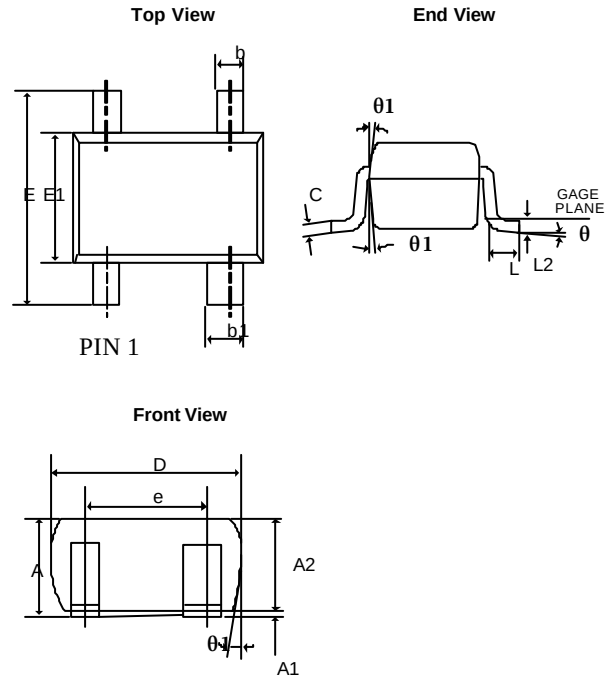
## ■ Package Dimension (Contd.)

### SOT-23




| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.90 | 1.40 | 0.0354 | 0.0551 |
| $A_1$ | 0.00 | 0.15 | 0.0000 | 0.0059 |
| 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 | | 0.0748 BSC | |
| H | 2.40 | 3.00 | 0.0945 | 0.1181 |
| L | 0.35BSC | | 0.0138 BSC | |
| q1 | $0^o$ | $10^o$ | $0^o$ | $10^o$ |

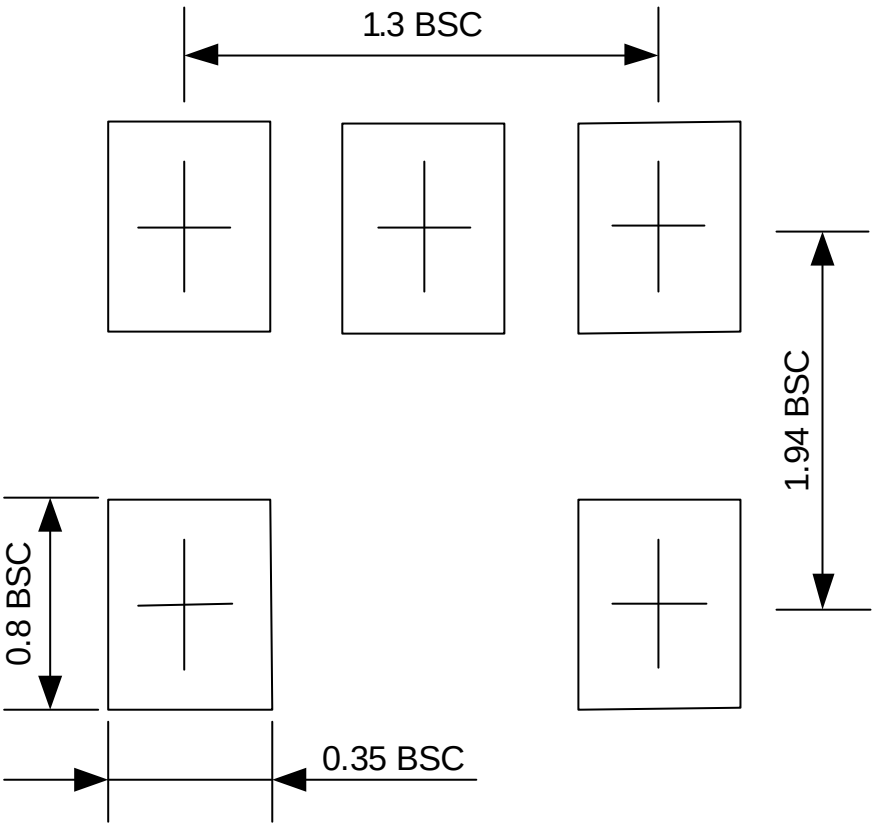
### SC-70-4 (SC-82)




| SYMBOLS | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | - | 1.10 | - | 0.0433 |
| A1 | 0.00 | 0.10 | 0.0000 | 0.0039 |
| A2 | 0.70 | 1.00 | 0.0276 | 0.0394 |
| b | 0.25 | 0.35 | 0.0098 | 0.0138 |
| b1 | 0.35 | 0.45 | 0.0138 | 0.0177 |
| C | 0.08 | 0.22 | 0.0031 | 0.0087 |
| D | 2.00 TYP | | 0.079 TYP | |
| E1 | 1.25 TYP | | 0.049 TYP | |
| E | 2.10 TYP | | 0.083 TYP | |
| e | 1.30 TYP | | 0.051 TYP | |
| L | 0.26 | 0.46 | 0.0102 | 0.0181 |
| L2 | 0.15 TYP | | 0.006 TYP | |
| y | - | 0.10 | - | 0.0039 |
| q | $0^o$ | $8^o$ | $0^o$ | $8^o$ |
| q1 | $4^o$ | $12^o$ | $4^o$ | $12^o$ |

## ■ Lead Pattern

**SC-70-5**

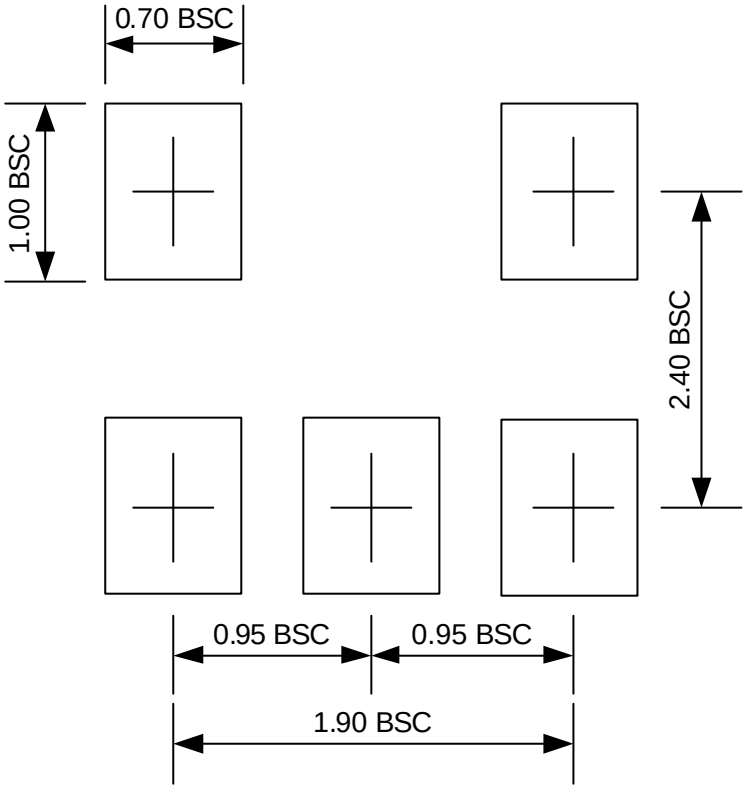



Note:

1. Lead pattern unit description:
   BSC: Basic. Represents theoretical exact dimension or dimension target.
2. Dimensions in Millimeters.
3. General tolerance ±0.05mm unless otherwise specified.

## ■ Lead Pattern (Contd.)

**SOT-25**

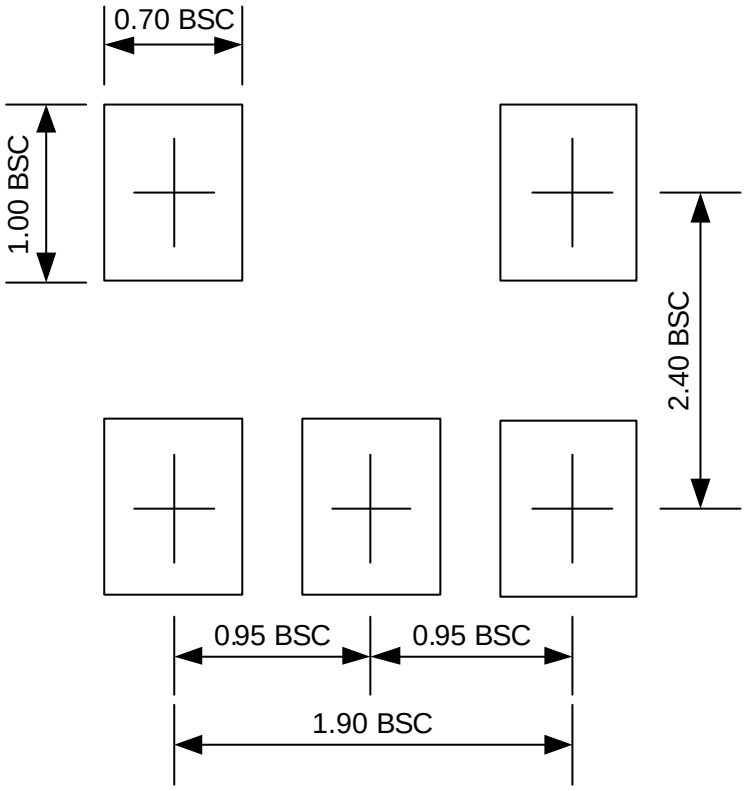



Note:

1. Lead pattern unit description:
   BSC: Basic. Represents theoretical exact dimension or dimension target.
2. Dimensions in Millimeters.
3. General tolerance ±0.05mm unless otherwise specified.

## ■ Lead Pattern (Contd.)

**TSOT-25A**

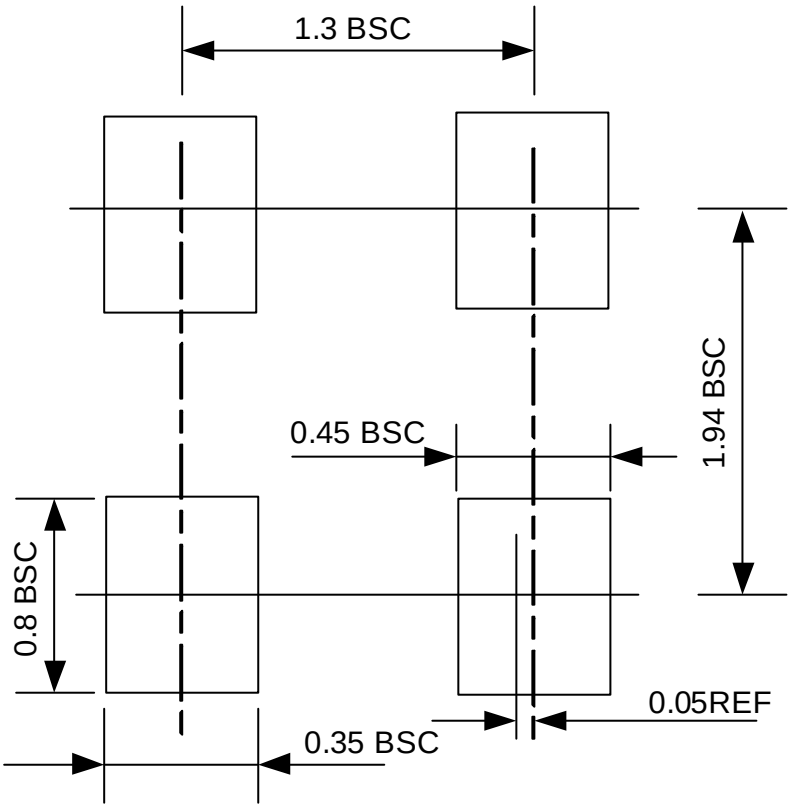



Note:

1. Lead pattern unit description:
   BSC: Basic. Represents theoretical exact dimension or dimension target.
2. Dimensions in Millimeters.
3. General tolerance ±0.05mm unless otherwise specified.

## ■ Lead Pattern (Contd.)

**SC-70-4/SC-82**

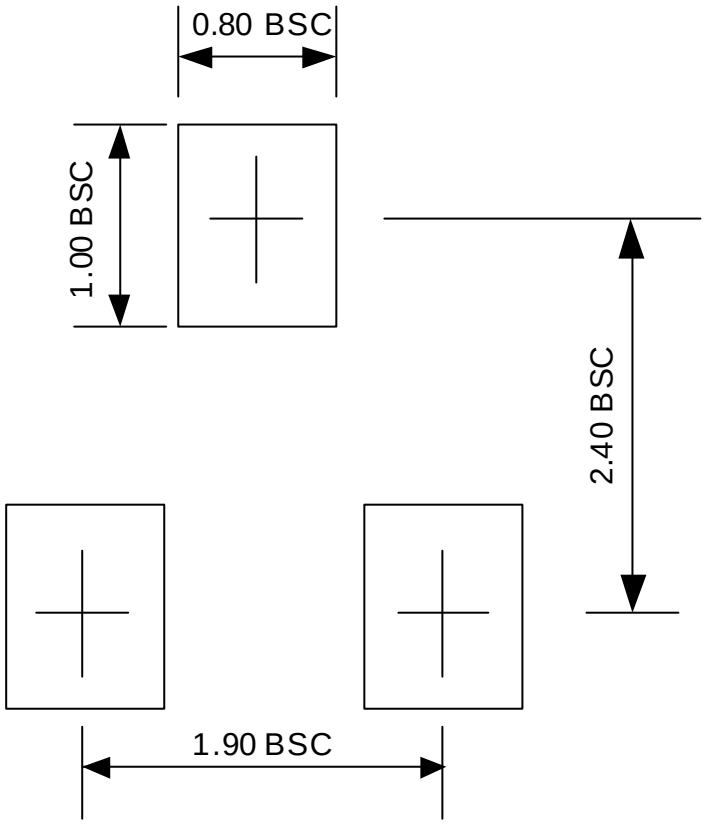



Note:

1. Lead pattern unit description:
   BSC: Basic. Represents theoretical exact dimension or dimension target.
2. Dimensions in Millimeters.
3. General tolerance ±0.05mm unless otherwise specified.

## ■ Lead Pattern (Contd.)

**SOT-23**




Note:

1. Lead pattern unit description:
   BSC: Basic. Represents theoretical exact dimension or dimension target.
2. Dimensions in Millimeters.
3. General tolerance ±0.05mm unless otherwise specified.



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