

APL5883



300mA Low Dropout Linear Regulator of Adjustable and Fixed 2.85V , 3.3V

Features

- Low Dropout Voltage of 1.3V at 300mA
- Output Voltage Accuracy $\pm 2.0\%$
- Line Regulation - 1mV (typ.)
- Load Regulation - 6mV (typ.)
- Input Voltage Range up to 9V
- Internal Current Limiting and Thermal Shutdown Protections
- Adjustable Output : 1.25V ~ 7.75V
- Available Output Voltages - Adjustable , 2.85V and 3.3V
- Various SOT-89 and TO-92 Packages Available

- Portable Consumer Equipment
- Low Voltage Systems

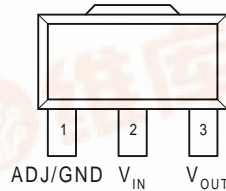
General Description

The APL5883 is a 3-pin low dropout linear regulator with 2.0% accuracy of output voltage over line, load and temperature variations. Dropout voltage at 300mA output current is less than 1.2V. Both output current limiting and thermal shutdown are built in to provide maximal protection to the APL5883 against fault conditions. The over current and thermal shutdown circuits become active when the current exceed 300mA, or the junction temperature reach 150°C. Normal operation is recovered when junction temperature drops below 130°C.

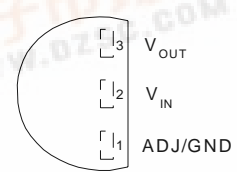
Applications

- Voltage Regulator for CD-ROM Drivers
- Voltage Regulator for LAN Cards
- Wireless Communication Systems
- Portable Instrument

Pin Configuration



SOT-89 (Top View)



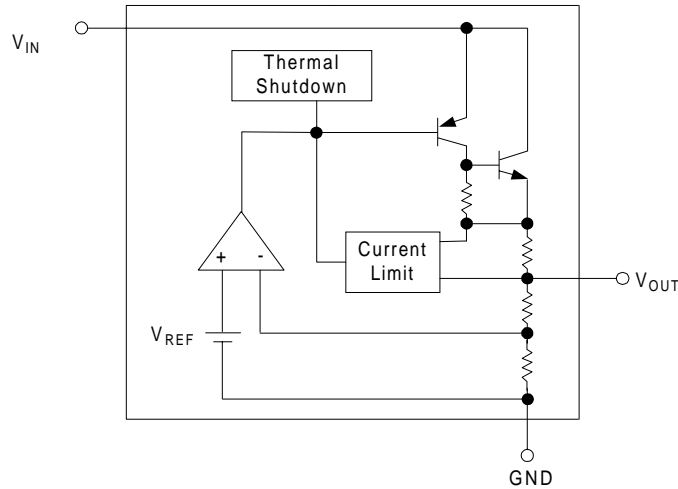
TO-92 (Top View)

Ordering and Marking Information

| | |
|---|--|
| <p>APL5883 - □□□□ - □□□□</p> | <p>Package Code D : SOT-89 E : TO-92</p> <p>Temp. Range C : 0 to 70 °C</p> <p>Handling Code TU : Tube TR : Tape & Reel</p> <p>Voltage Code 28 : 2.85V 33 : 3.3V</p> <p>Blank : Adjustable Version</p> <p>Lead Free Code L : Lead Free Device Blank : Original Device</p> |
| <p>APL5883 D : APL5883 XXXXX XXXXX - Date Code</p> | <p>APL5883 E : APL 5883 XXXXX XXXXX - Date Code</p> |
| <p>APL5883 -28 D : APL5883 XXXXX28 XXXXX - Date Code</p> | <p>APL5883-28 E : APL 5883 XXXXX28 XXXXX - Date Code</p> |
| <p>APL5883 -33 D : APL5883 XXXXX33 XXXXX - Date Code</p> | <p>APL5883 -33 E : APL 5883 XXXXX33 XXXXX - Date Code</p> |

ANPEC reserves the right to make changes to improve reliability or manufacturability without notice, and advise customers to obtain the latest version of relevant information to verify before placing orders.

Block Diagram



Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit | |
|---------------|-------------------------------------|------------------|------|--------|
| V_{IN} | Input Voltage | 9 | V | |
| I_{OUT} | Output Current | 300 | mA | |
| T_A | Operating Ambient Temperature Range | 0 to 70 | °C | |
| T_J | Operating Ambient Temperature Range | -40 to +150 | °C | |
| T_{STG} | Storage Temperature Range | -65 to +150 | °C | |
| P_D | Power Dissipation Package | Internal Limited | | |
| θ_{JA} | Thermal Resistance | SOT-89 | 180 | °C / W |
| | | TO-92 | 180 | |

Electrical Characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)

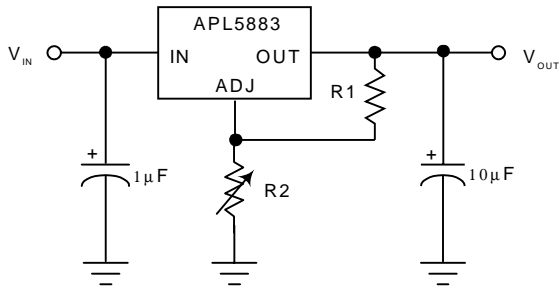
| Symbol | Parameter | Test Condition | APL5883 | | | Unit |
|-----------|---------------------------|---|------------------|-------|----------------|------|
| | | | Min. | Typ. | Max. | |
| V_{REF} | Reference Voltage | $1.5V \leq (V_{IN} - V_{OUT}) \leq 7.75V$ $10mA \leq I_{OUT} \leq 300mA$, $T_J = 0 \sim 125^\circ\text{C}$ | 1.225 | 1.250 | 1.275 | V |
| V_{IN} | Input Voltage | | $V_{OUT} + 1.3V$ | | 9 | V |
| V_{OUT} | Output Voltage | $I_{OUT} = 10mA$ | $0.98 V_{OUT}$ | | $1.02 V_{OUT}$ | V |
| I_{OUT} | Output Current Capability | $V_{OUT} = 3.3V$, $\Delta V_{OUT} = 2\%$ | 300 | | | mA |
| I_{SC} | Short Circuit Current | $V_{OUT} < 0.4V$ | | 500 | | mA |
| I_Q | Quiescent Current | $V_{IN} = 5V$, No Load | | 6 | 10 | mA |

Electrical Characteristics cont. ($T_A=25^{\circ}\text{C}$, unless otherwise noted)

| Symbol | Parameter | Test Condition | APL5883 | | | Unit |
|----------------------------|--|---|---------|------|------|-------------------------|
| | | | Min. | Typ. | Max. | |
| REG_{LINE} | Line Regulation | $I_{\text{OUT}}=10\text{mA}$, $V_{\text{IN}}=5\text{V to }8\text{V}$ | | 1 | 6 | mV |
| REG_{LOAD} | Load Regulation | $I_{\text{OUT}}=1\text{mA}\sim 300\text{mA}$ | | 6 | 12 | mV |
| V_{DROPOUT} | Dropout Voltage | $I_{\text{OUT}}=300\text{mA}$, $\Delta V_{\text{OUT}}=1\%$ | | 1200 | 1300 | mV |
| PSRR | Power Supply Rejection Ratio | at 1kHz | | 55 | | dB |
| OTS | Over Temperature Shutdown | | | 150 | | $^{\circ}\text{C}$ |
| E_{N} | Output Noise | | | 100 | | μVrms |
| TC | Output Voltage Temperature Coefficient | | | 100 | | ppm/ $^{\circ}\text{C}$ |

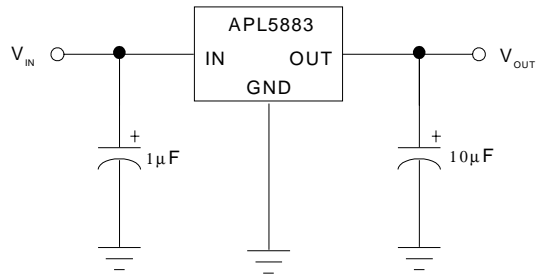
Application Schematic

1.25V to 7V Adjustable Regulator



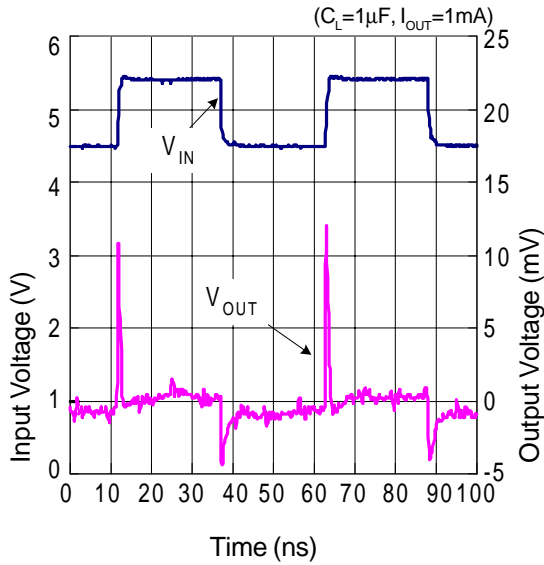
$$V_{\text{OUT}} = 1.250\text{V} \times \frac{R1 + R2}{R1}$$

Fixed 2.85 and 3.3V Regulator

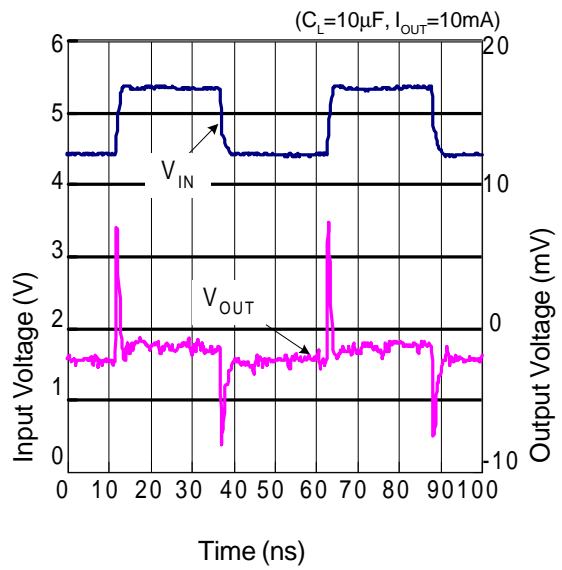


Typical Characteristics

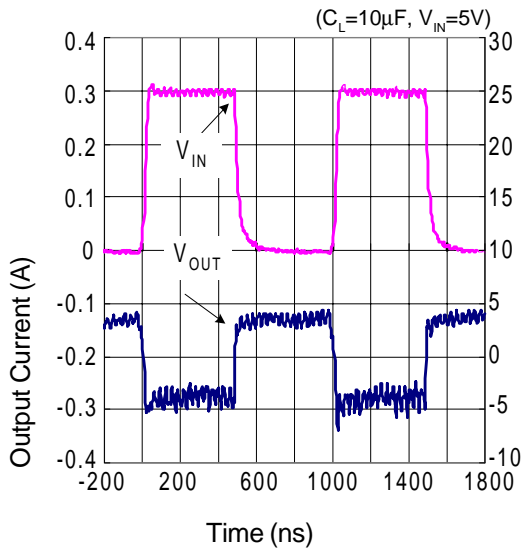
Line Transient Response



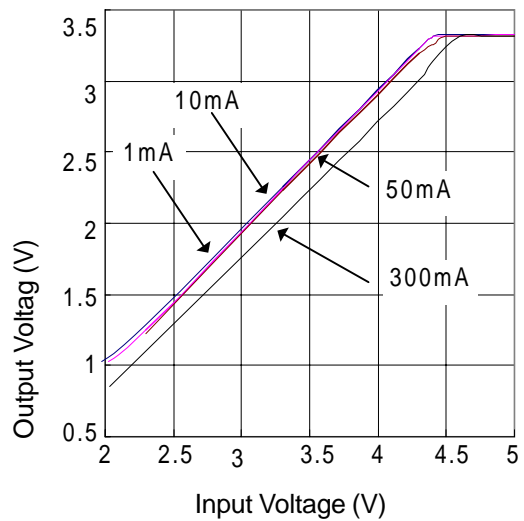
Line Transient Response



Load Transient Response

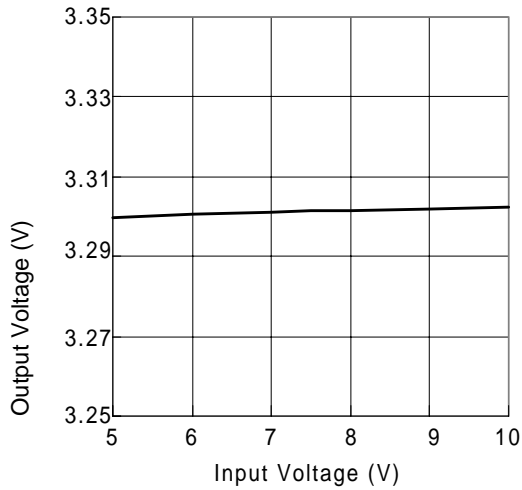


Output Voltage vs. Input Voltage

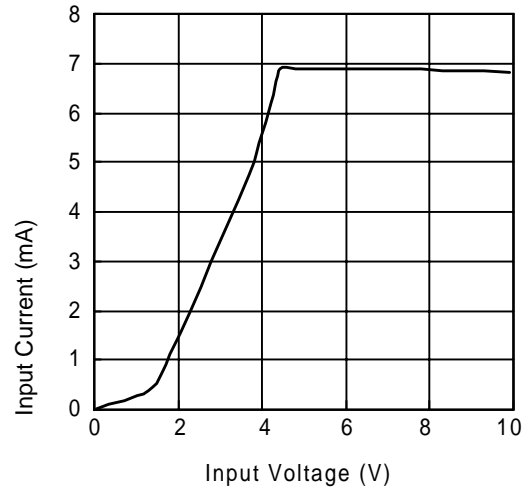


Typical Characteristics (Cont.)

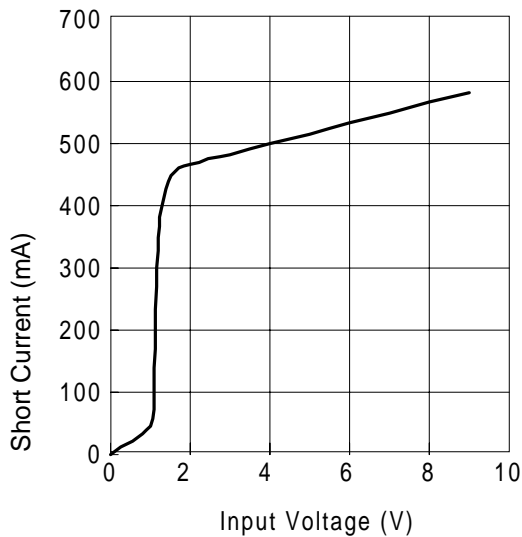
Output Voltage vs. Input Voltage



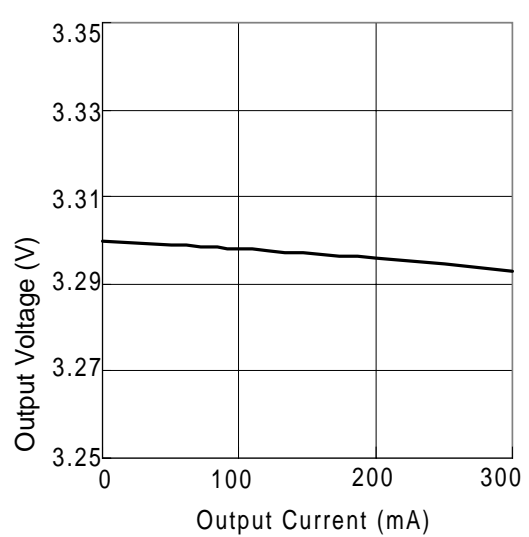
Input Current vs. Input Voltage



Short Current vs. Input Voltage

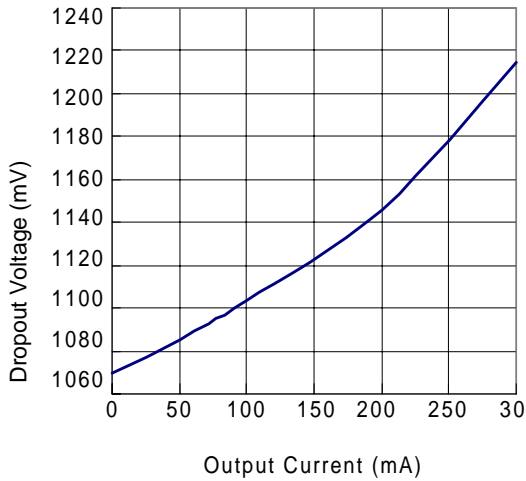


Output Voltage vs. Output Current

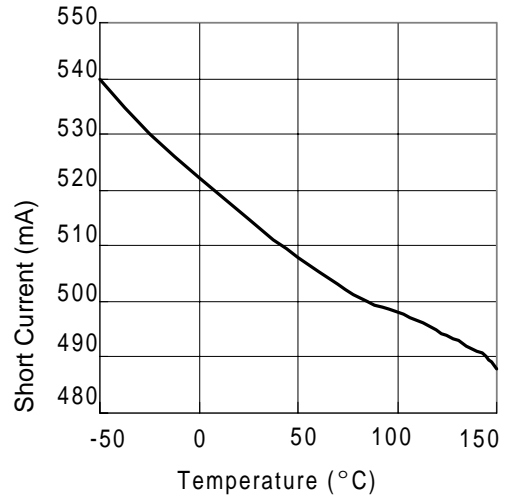


Typical Characteristics (Cont.)

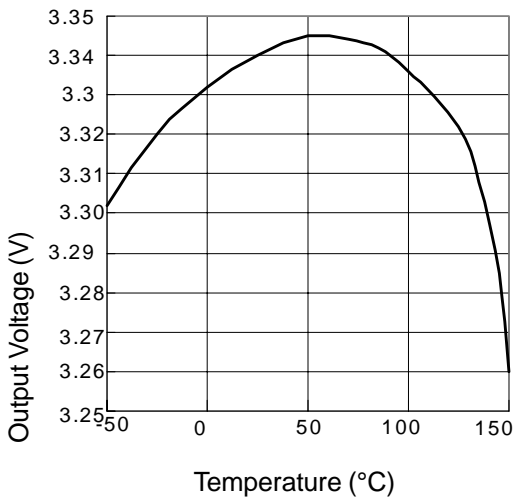
Dropout Voltage vs. Output Current



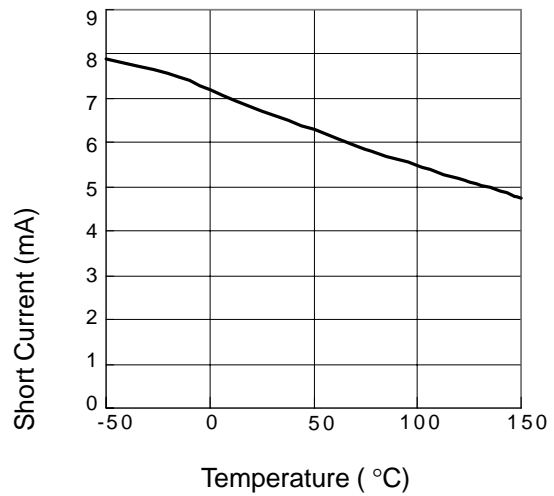
Short Current vs. Temperature



Output Voltage vs. Temperature

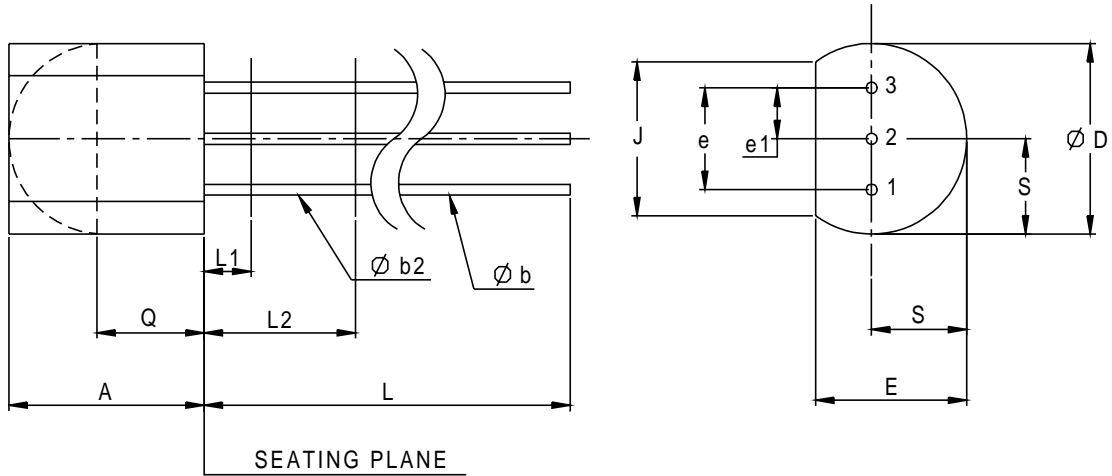


Input Current vs. Temperature



Packaging Information

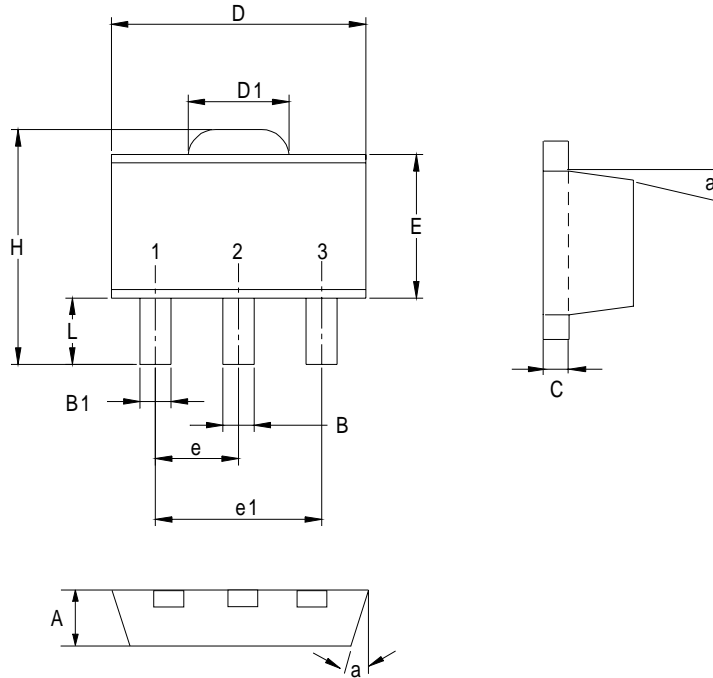
TO-92



| Dim | Millimeters | | Inches | |
|-----------|-------------|------|--------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.58 | 5.33 | 0.170 | 0.210 |
| ϕb | 0.41 | 0.53 | 0.160 | 0.021 |
| $\phi b2$ | 0.41 | 0.48 | 0.160 | 0.019 |
| ϕD | 4.96 | 5.20 | 0.175 | 0.205 |
| E | 3.94 | 4.19 | 0.125 | 0.165 |
| e | 2.42 | 2.66 | 0.095 | 0.105 |
| e1 | 1.15 | 1.39 | 0.045 | 0.055 |
| J | 3.43 | | 0.135 | |
| L | 12.70 | | 0.500 | |
| L1 | | 1.27 | | 0.050 |
| L2 | 6.35 | | 0.250 | |
| Q | 2.93 | | 0.115 | |
| S | 2.42 | 2.66 | 0.080 | 0.105 |

Packaging Information

SOT-89 (Reference EIAJ ED-7500A Registration SC-62)

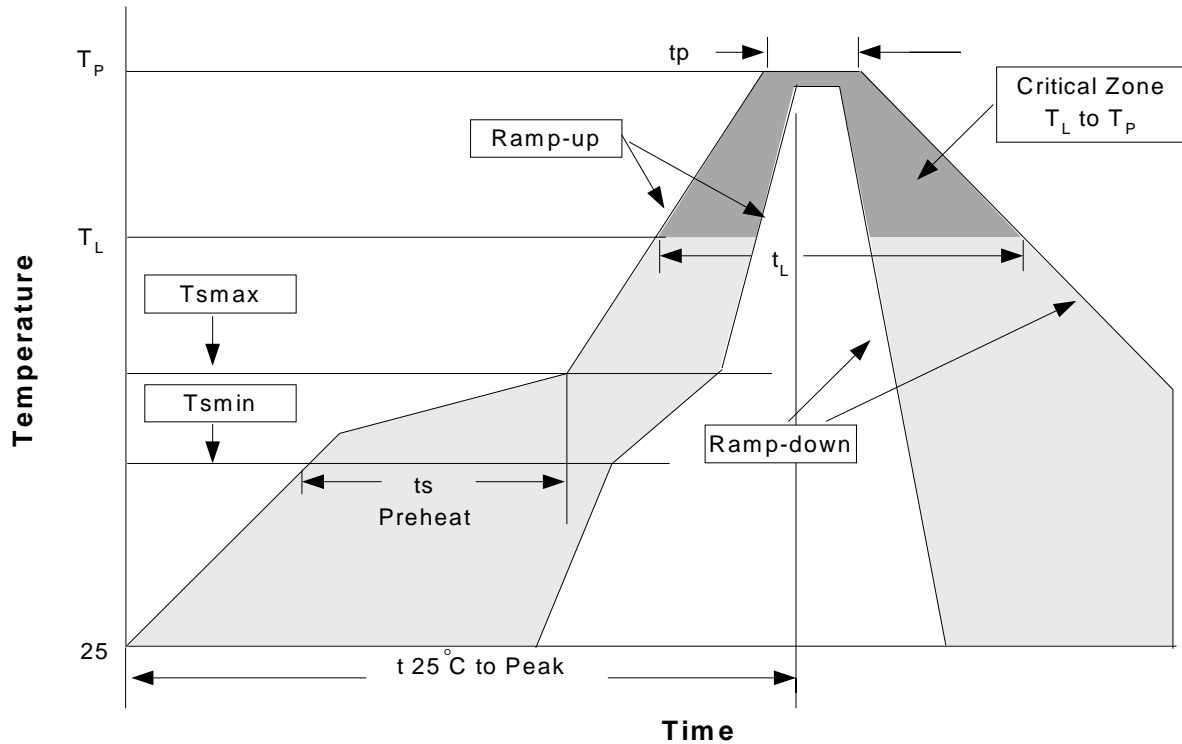


| Dim | Millimeters | | Inches | |
|-----|-------------|------|-----------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.40 | 1.60 | 0.055 | 0.063 |
| B | 0.40 | 0.56 | 0.016 | 0.022 |
| B1 | 0.35 | 0.48 | 0.014 | 0.019 |
| C | 0.35 | 0.44 | 0.014 | 0.017 |
| D | 4.40 | 4.60 | 0.173 | 0.181 |
| D1 | 1.35 | 1.83 | 0.053 | 0.072 |
| e | 1.50 BSC | | 0.059 BSC | |
| e1 | 3.00 BSC | | 0.118 BSC | |
| E | 2.29 | 2.60 | 0.090 | 0.102 |
| H | 3.75 | 4.25 | 0.148 | 0.167 |
| L | 0.80 | 1.20 | 0.031 | 0.047 |
| α | | 10° | | 10° |

Physical Specifications

| | |
|--------------------|--|
| Terminal Material | Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb), 100%Sn |
| Lead Solderability | Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3. |

Reflow Condition (IR/Convection or VPR Reflow)



Classification Reflow Profiles

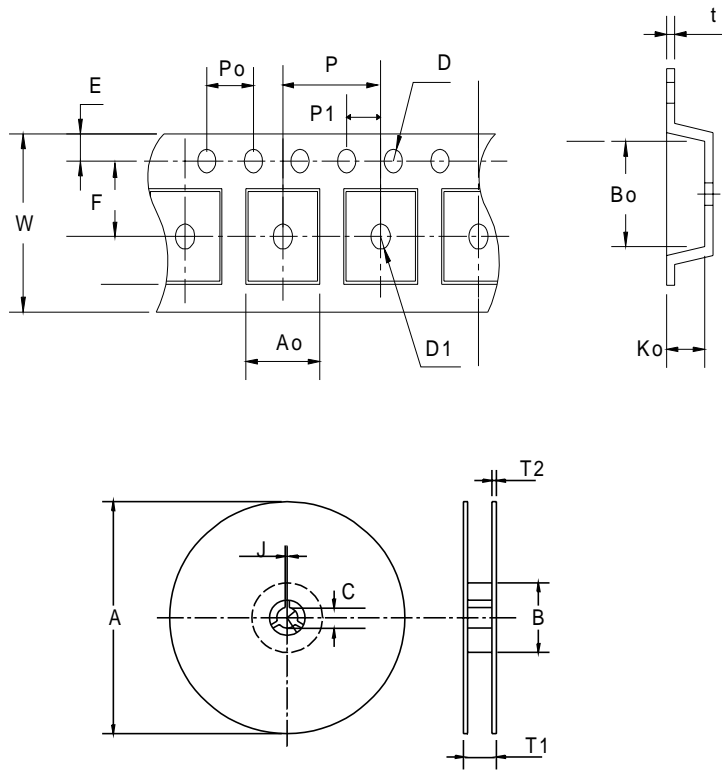
| Profile Feature | Sn-Pb Eutectic Assembly | | Pb-Free Assembly | |
|---|-------------------------|---------------|------------------|---------------|
| | Large Body | Small Body | Large Body | Small Body |
| Average ramp-up rate (T _L to T _P) | 3°C/second max. | | 3°C/second max. | |
| Preheat | | | | |
| - Temperature Min (T _{smin}) | 100°C | | 150°C | |
| - Temperature Mix (T _{smax}) | 150°C | | 200°C | |
| - Time (min to max)(t _s) | 60-120 seconds | | 60-180 seconds | |
| T _{smax} to T _L | | | 3°C/second max | |
| - Ramp-up Rate | | | | |
| T _{smax} to T _L | | | | |
| - Temperature(T _L) | 183°C | | 217°C | |
| - Time (t _L) | 60-150 seconds | | 60-150 seconds | |
| Peak Temperature(T _p) | 225 +0/-5°C | 240 +0/-5°C | 245 +0/-5°C | 250 +0/-5°C |
| Time within 5°C of actual Peak Temperature(t _p) | 10-30 seconds | 10-30 seconds | 10-30 seconds | 20-40 seconds |
| Ramp-down Rate | 6°C/second max. | | 6°C/second max. | |
| Time 25°C to Peak Temperature | 6 minutes max. | | 8 minutes max. | |

Note: All temperatures refer to topside of the package. Measured on the body surface.

Reliability test Program

| Test item | Method | Description |
|---------------|---------------------|--------------------------------|
| SOLDERABILITY | MIL-STD-883D-2003 | 245° C , 5 SEC |
| HOLT | MIL-STD-883D-1005.7 | 1000 Hrs Bias @ 125 °C |
| PCT | JESD-22-B, A102 | 168 Hrs, 100 % RH , 121 °C |
| TST | MIL-STD-883D-1011.9 | -65°C ~ 150°C , 200 Cycles |
| ESD | MIL-STD-883D-3015.7 | VHBM > 2KV, VMM > 200V |
| Latch-Up | JESD 78 | 10ms , I _{tr} > 100mA |

Carrier Tape & Reel Dimensions



| | | | | | | | | | |
|--------------------|------------|-----------|-------------|-----------|-----------|-----------|----------------------|------------|-------------|
| Application | A | B | C | J | T1 | T2 | W | P | E |
| SOT-89 | 178 ± 1 | 70 ± 2 | 13.5 ± 0.15 | 3 ± 0.15 | 14 ± 2 | 1.3 ± 0.3 | 12 + 0.3 12 - 0.1 | 8 ± 0.1 | 1.75 ± 0.1 |
| Application | F | D | D1 | Po | P1 | Ao | Bo | Ko | t |
| SOT-89 | 5.5 ± 0.05 | 1.5 ± 0.1 | 1.5 ± 0.1 | 4.0 ± 0.1 | 2.0 ± 0.1 | 4.8 ± 0.1 | 4.5 ± 0.1 | 1.80 ± 0.1 | 0.3 ± 0.013 |

(mm)

Cover Tape Dimensions

| Application | Carrier Width | Cover Tape Width | Devices Per Reel |
|-------------|---------------|------------------|------------------|
| SOT- 89 | 12 | 9.3 | 1000 |

Customer Service**Anpec Electronics Corp.**

Head Office :

5F, No. 2 Li-Hsin Road, SBIP,

Hsin-Chu, Taiwan, R.O.C.

Tel : 886-3-5642000

Fax : 886-3-5642050

Taipei Branch :

7F, No. 137, Lane 235, Pac Chiao Rd.,

Hsin Tien City, Taipei Hsien, Taiwan, R. O. C.

Tel : 886-2-89191368

Fax : 886-2-89191369