

## 300mA Low Dropout Linear Regulator of Fixed 2.85V, 3.3V and 3.5V

### Features

- Low Dropout Voltage of 1.2V 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
- Available Output Voltages - 2.85V, 3.3V and 3.5V
- Various SOT-89 and TO-92 Packages Available

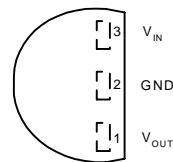
### Applications

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

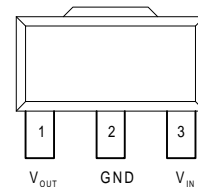
### General Description

The APL5833 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 APL5833 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.

### Pin Configuration

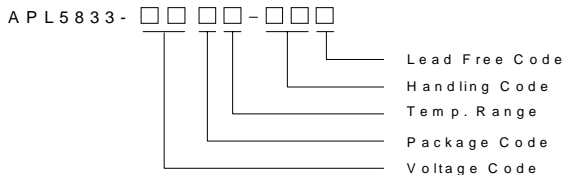


TO-92 (Top View)

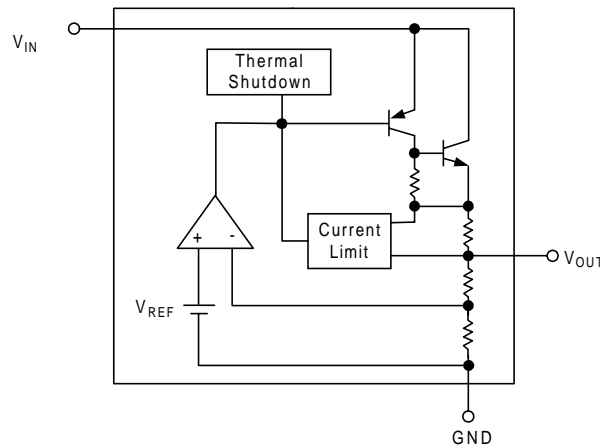


SOT-89 (Top View)

## Ordering and Marking Information

	Package Code D : SOT-89                      E : TO-92 Temp. Range C : 0 to 70 °C Handling Code TU : Tube                      TR : Tape & Reel Voltage Code 28 : 2.85V                      33 : 3.3V 35 : 3.5V                      Blank : Adjustable Version Lead Free Code L : Lead Free Device                      Blank : Original Device
APL5833 D : <span style="border: 1px solid black; padding: 2px;">APL5833 XXXXX</span> XXXXX - Date Code	APL5833 E : <span style="border: 1px solid black; padding: 2px;">APL 5833 XXXXX</span> XXXXX - Date Code
APL5833 -28 D : <span style="border: 1px solid black; padding: 2px;">APL5833 XXXXX28</span> XXXXX - Date Code	APL5833-28 E : <span style="border: 1px solid black; padding: 2px;">APL 5833 XXXXX28</span> XXXXX - Date Code
APL5833 -33 D : <span style="border: 1px solid black; padding: 2px;">APL5833 XXXXX33</span> XXXXX - Date Code	APL5833 -33 E : <span style="border: 1px solid black; padding: 2px;">APL 5833 XXXXX33</span> XXXXX - Date Code
APL5833 -35 D : <span style="border: 1px solid black; padding: 2px;">APL5833 XXXXX35</span> XXXXX - Date Code	APL5833 -35 E : <span style="border: 1px solid black; padding: 2px;">APL 5833 XXXXX35</span> XXXXX - Date Code

## Block Diagram



## Absolute Maximum Ratings

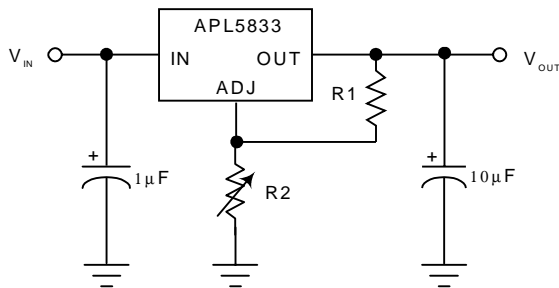
Symbol	Parameter	Rating	Unit	
$V_{IN}$	Input Voltage	9	V	
$I_{OUT}$	Output Current	300	mA	
$T_A$	Operating Ambient Temperature Range	0 to 70	°C	
$T_J$	Operating Junction Temperature Range	-40 to +150	°C	
$T_{STG}$	Storage Temperature Range	-65 to +150	°C	
$P_D$	Power Dissipation Package	SOT-89	550	mW
		TO-92	550	
$\theta_{JA}$	Thermal Resistance	SOT-89	180	°C / W
		TO-92	180	

## Electrical Characteristics (T<sub>A</sub>=25°C, unless otherwise noted)

Symbol	Parameter	Test Conditions	APL5833			Unit
			Min.	Typ.	Max.	
V <sub>IN</sub>	Input Voltage		V <sub>OUT</sub> +1.2V		9	V
V <sub>OUT</sub>	Output Voltage	I <sub>OUT</sub> =10mA	0.98 V <sub>OUT</sub>		1.02 V <sub>OUT</sub>	V
I <sub>OUT</sub>	Output Current Capability	V <sub>OUT</sub> =3.3V, Δ V <sub>OUT</sub> =2%	300			mA
I <sub>SC</sub>	Short Circuit Current	V <sub>OUT</sub> < 0.4V		500		mA
I <sub>Q</sub>	Quiescent Current	V <sub>IN</sub> =5V, No Load		6	10	mA
REG <sub>LINE</sub>	Line Regulation	I <sub>OUT</sub> =10mA, V <sub>IN</sub> = 5V to 8V		1	6	mV
REG <sub>LOAD</sub>	Load Regulation	I <sub>OUT</sub> =1mA~300mA		6	12	mV
V <sub>DROPOUT</sub>	Dropout Voltage	I <sub>OUT</sub> =300mA, Δ V <sub>OUT</sub> =1%		1200	1300	mV
PSRR	Power Supply Rejection Ratio	at 1kHz		55		dB
OTS	Over Temperature Shutdown			150		°C
E <sub>N</sub>	Output Noise			100		μVrms
TC	Output Voltage Temperature Coefficient			100		ppm/°C

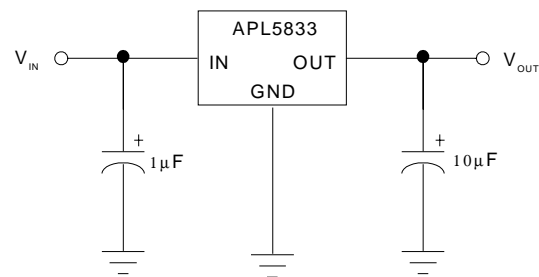
## Application Schematic

1.25V to 7V Adjustable Regulator



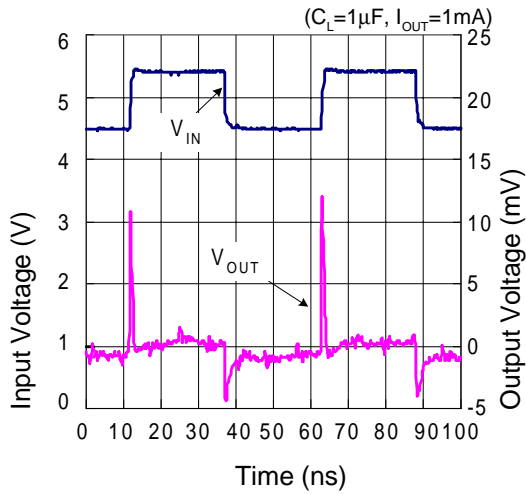
$$V_{OUT} = 1.250V \times \frac{R1 + R2}{R1}$$

Fixed 2.85, 3.3V and 3.5V Regulator

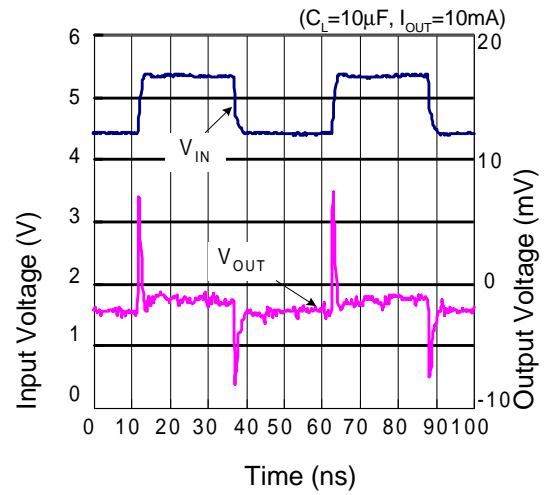


## Typical Characteristics

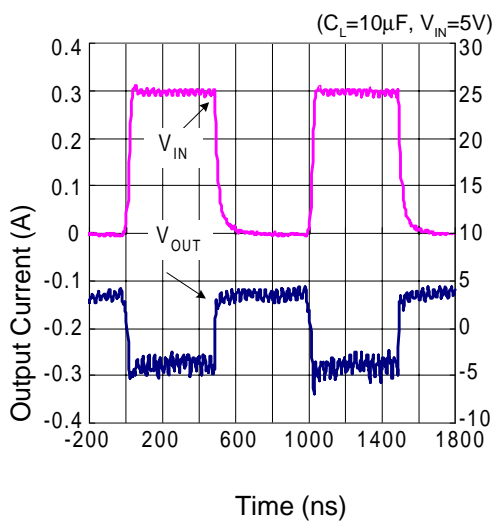
Line Transient Response



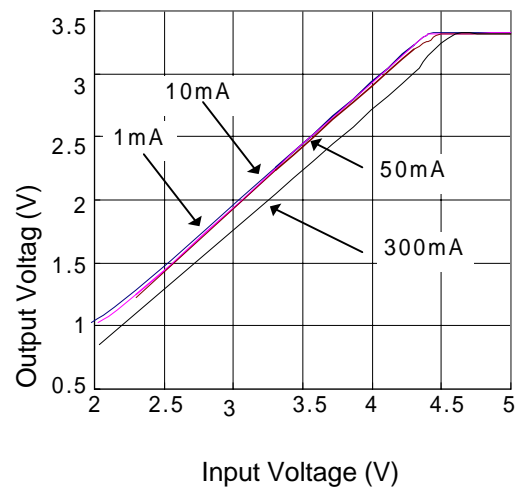
Line Transient Response



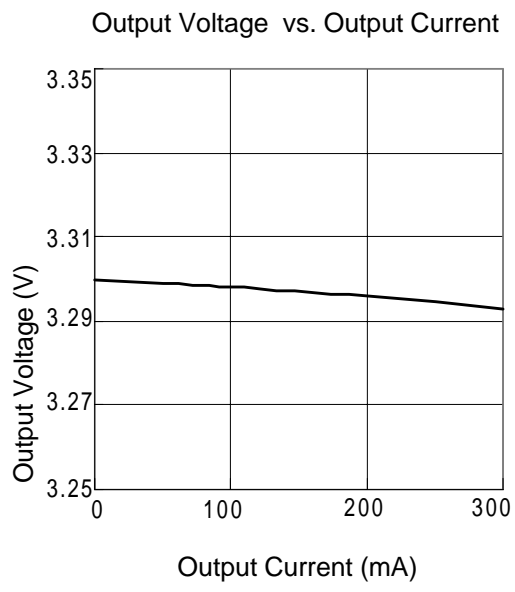
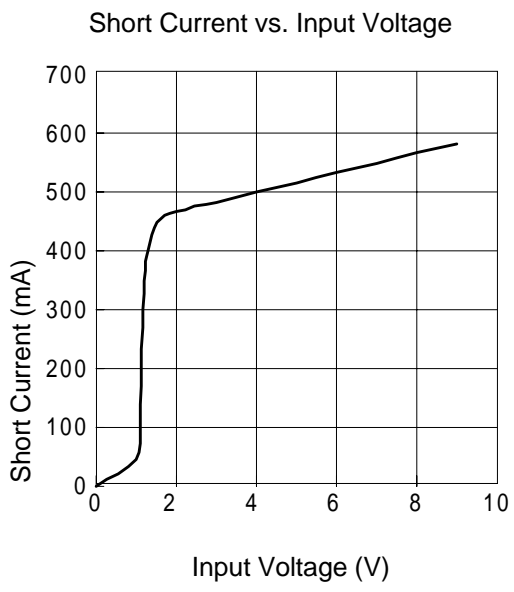
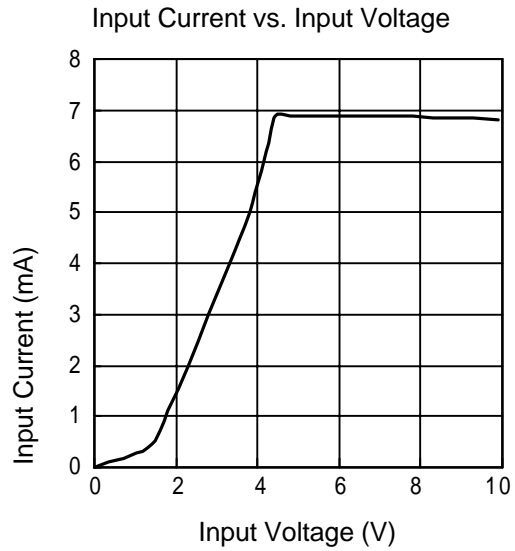
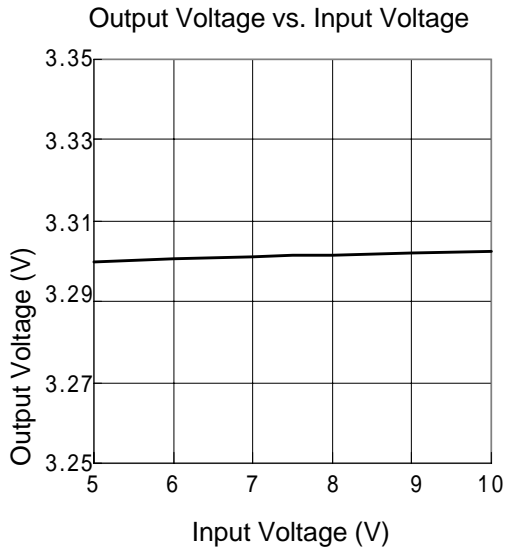
Load Transient Response



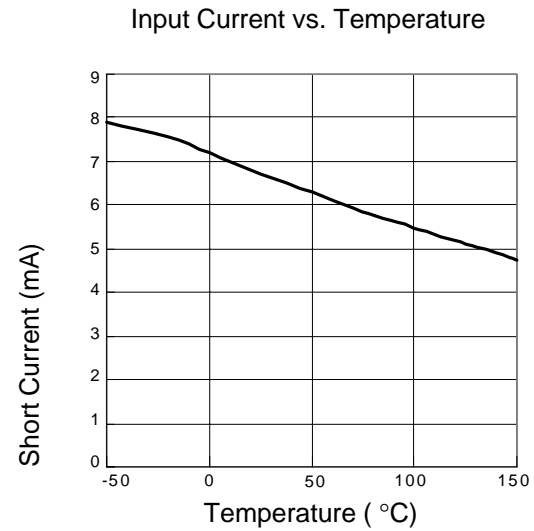
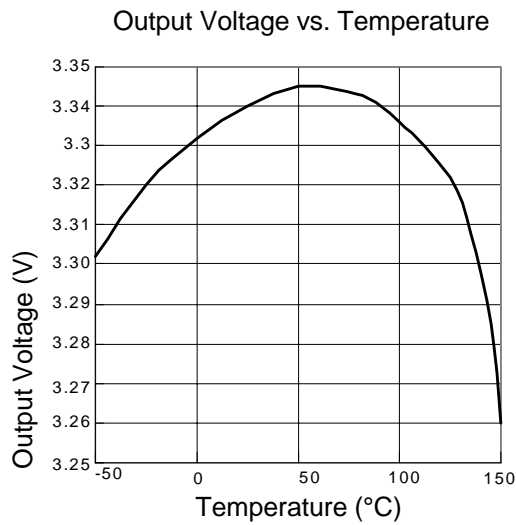
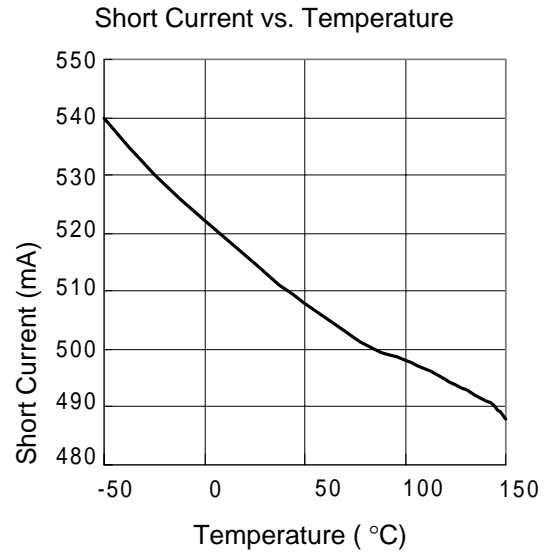
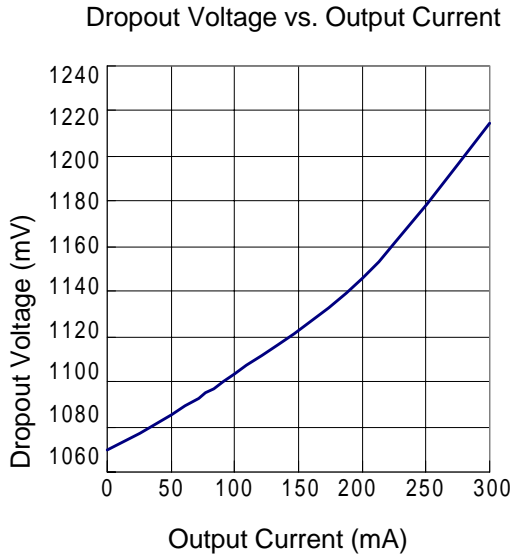
Output Voltage vs. Input Voltage



**Typical Characteristics (Cont.)**

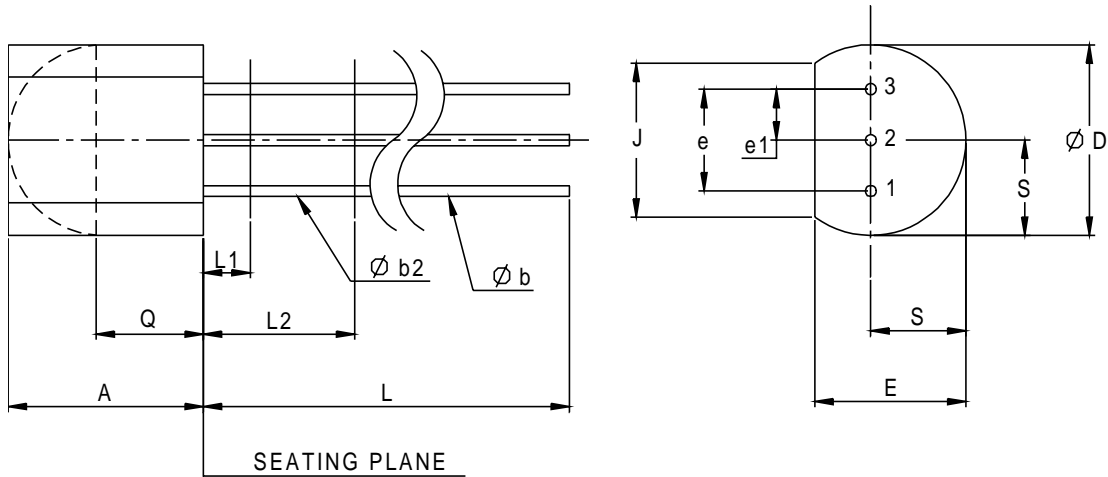


**Typical Characteristics (Cont.)**



**Packaging Information**

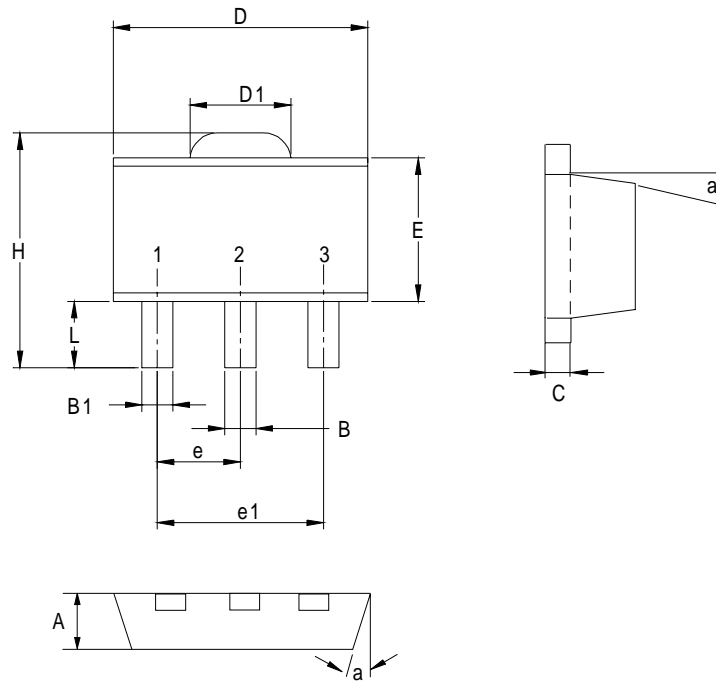
TO-92



Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.58	5.33	0.170	0.210
$\phi b$	0.41	0.53	0.160	0.021
$\phi b2$	0.41	0.48	0.160	0.019
$\phi D$	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)



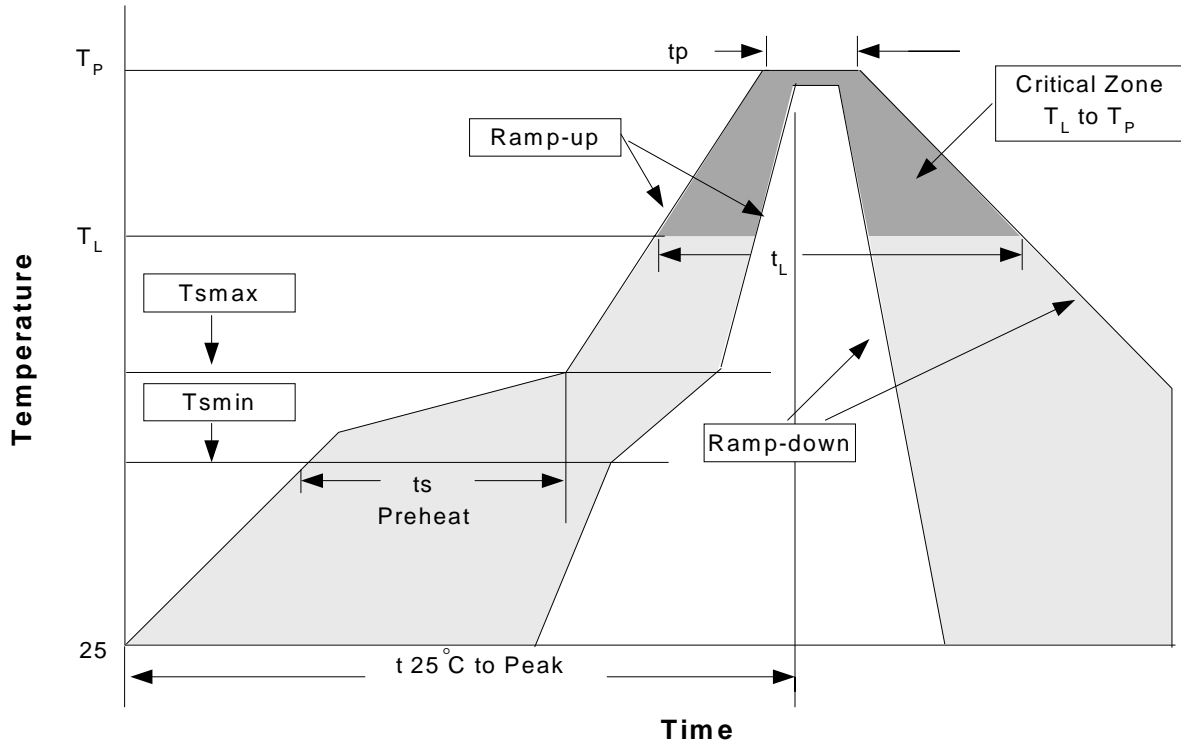
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.40	1.60	0.055	0.063
B	0.40	0.56	0.016	0.022
B1	0.35	0.48	0.014	0.019
C	0.35	0.44	0.014	0.017
D	4.40	4.60	0.173	0.181
D1	1.35	1.83	0.053	0.072
e	1.50 BSC		0.059 BSC	
e1	3.00 BSC		0.118 BSC	
E	2.29	2.60	0.090	0.102
H	3.75	4.25	0.148	0.167
L	0.80	1.20	0.031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

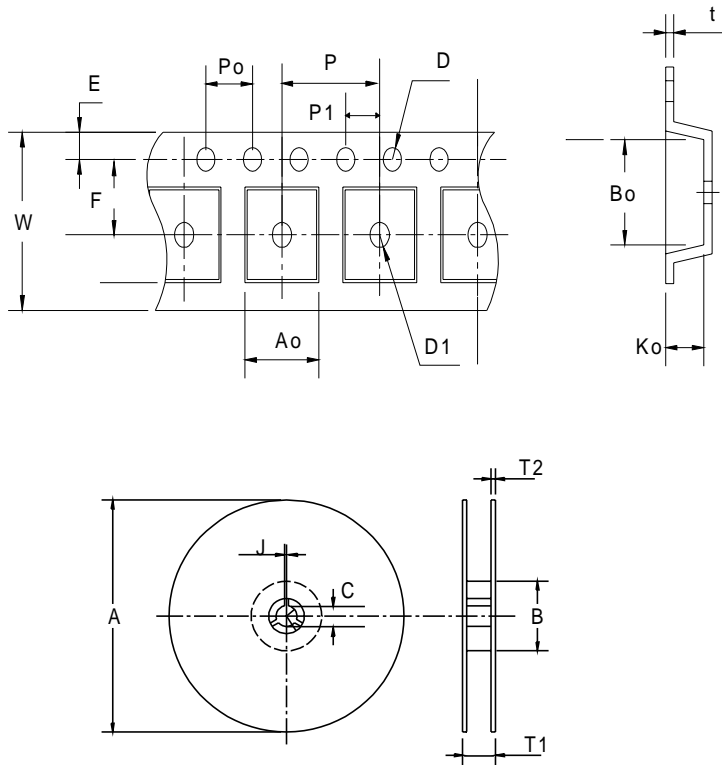
Profile Feature	Sn-Pb Eutectic Assembly		Pb-Free Assembly	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate ( $T_L$ to $T_P$ )	3°C/second max.		3°C/second max.	
Preheat				
- Temperature Min ( $T_{smin}$ )	100°C		150°C	
- Temperature Mix ( $T_{smax}$ )	150°C		200°C	
- Time (min to max)( $t_s$ )	60-120 seconds		60-180 seconds	
$T_{smax}$ to $T_L$				
- Ramp-up Rate			3°C/second max	
$T_{smax}$ 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
<b>SOT-89</b>	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
<b>SOT-89</b>	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