

Low I_Q , Low Dropout 700mA Fixed Voltage Regulator

Features

- Low Quiescent Current : 60 μ A (No load)
- Low Dropout Voltage : 700mV (@700mA)
- Very low Shutdown Current : < 0.5 μ A
- Fixed Output Voltage : 1.5V ~ 3.5V by step 0.1V increment
- Stable with 2.2 μ F Output Capacitor
- Stable with Aluminum, Tantalum or Ceramic Capacitors .
- No Protection Diodes Needed
- Built in Thermal Protection
- Built in Current Limit Protection
- Controlled Short Circuit Current : 50mA
- Fast Transient Response
- Short Setting Time
- SOT-223 Package

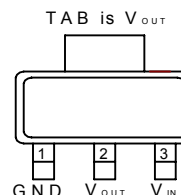
Applications

- 5V to 3.3~3.5V Linear Regulators
- 3.3V to 1.5~2.5V Linear Regulators
- CD-R/W, DVD Player
- LAN Card, ADSL/Cable Modem
- Computers

General Description

The APL5708R series are micropower, low dropout linear regulators, which operate from 2.7V to 6V input voltage and deliver up to 700mA. Typical dropout voltage is only 700mV at 700mA loading. Designed for use in battery-powered system, the low 60 μ A quiescent current makes it an ideal choice. Design with an internal P-channel MOSFET pass transistor, the APL5708R maintain a low supply current, independent of the load current and dropout voltage. Other features include thermal-shutdown protection, current limit protection to ensure specified output current and controlled short-circuit current. The APL5708R regulators come in a miniature SOT-223 package.

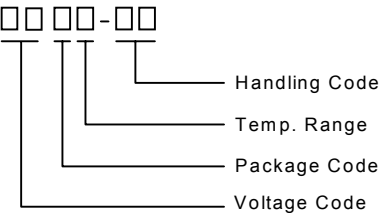
Pin Configuration



SOT-223 (Top View)

APL5708R

Ordering and Marking Information

<p>APL5708R - □□□□-□□</p>  <p>Handling Code</p> <p>Temp. Range</p> <p>Package Code</p> <p>Voltage Code</p>	<p>Package Code V : SOT-223</p> <p>Temp. Range C : 0 to 70°C</p> <p>Handling Code TR : Tape & Reel</p> <p>Voltage Code : 15 : 1.5V ~ 35 : 3.5V</p>
<p>APL5708R -15 V :</p> <div style="border: 1px solid black; padding: 2px; display: inline-block;"> <p>APL5708R XXXXX15</p> </div>	<p>XXXXX - Date Code ; 15 - 1.5V</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.

Pin Description

PIN		I/O	Description
No.	Name		
1	V _{IN}	I	Supply voltage input.
2	GND		Ground pins of the circuitry.
3	V _{OUT}	O	Output pin of the regulator.

Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V _{IN} , V _{OUT}	Input Voltage or Out Voltage	6	V
R _{TH,JA}	Thermal Resistance – Junction to Ambient	135	°C/W
P _D	Power Dissipation	Internally Limited	W
T _J	Operating Junction Temperature		°C
	Control Section Power Transistor	0 to 125 0 to 150	
T _{STG}	Storage Temperature Range	-65 to +150	°C
T _L	Lead Temperature (Soldering, 10 second)	260	°C

Electrical Characteristics

Unless otherwise noted these specifications apply over full temperature, C_{IN}=1μF, C_{OUT}=2.2μF, T_J=0 to 125°C. Typical values refer to T_J=25°C.

Symbol	Parameter	Test Conditions	APL5708R			Unit
			Min.	Typ.	Max.	
V _{IN}	Input Voltage		2.7		6	V
V _{OUT}	Output Voltage	V _{OUT} +1.0V < V _{CC} < 6.0V, 0mA < I _{OUT} < I _{MAX}	V _{OUT} -2%	V _{OUT}	V _{OUT} +2%	V
I _{LIMIT}	Circuit Current Limit	V _{IN} =V _{OUT} +1V		900		mA
I _{SHORT}	Short Current	V _{OUT} =0V		50		mA
I _{OUT}	Load Current	V _{IN} =V _{OUT} +1V	700			mA
REG _{LINE}	Line Regulation	V _{OUT} +1V < V _{CC} < 6.0V, I _{OUT} =1mA		1	10	mV
REG _{LOAD}	Load Regulation	V _{IN} =V _{OUT} +1V, 0mA < I _{OUT} < I _{MAX}		25	40	mV
	Load Transient	V _{IN} = V _{OUT} +1V , I _{OUT} =1mA-700mA in 1μs		150	250	mV
V _{DROP}	Dropout Voltage ^(Note1)	I _{OUT} =700mA	1.5V ≤ V _{OUT} < 2.0V	1.1	1.3	V
			2.0V ≤ V _{OUT} < 2.5V	0.9	1.0	
			2.5V ≤ V _{OUT} < 3V	0.8	0.9	
			3V ≤ V _{OUT} ≤ 3.5V	0.7	0.8	
PSRR	Ripple Rejection	F ≤ 1kHz, 1Vpp at V _{IN} = V _{OUT} +1.0V	45	55		dB
I _Q	Quiescent Current	No load		60	100	μA
		I _{OUT} =700mA		450	500	

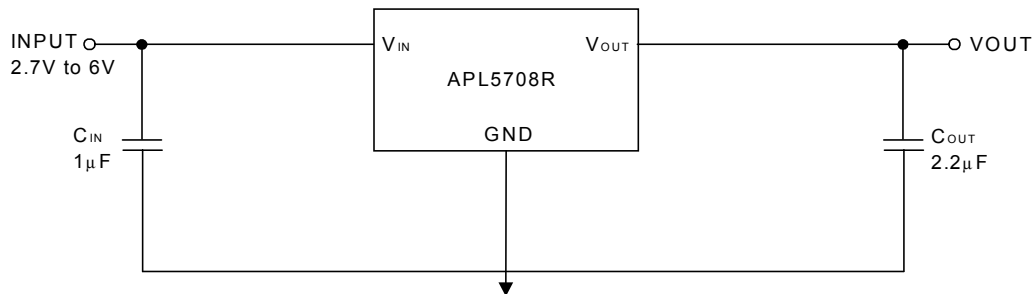
Electrical Characteristics (Cont.)

Unless otherwise noted these specifications apply over full temperature, $C_{IN}=1\mu F$, $C_{OUT}=2.2\mu F$, $T_J=0$ to $125^\circ C$. Typical values refer to $T_J=25^\circ C$.

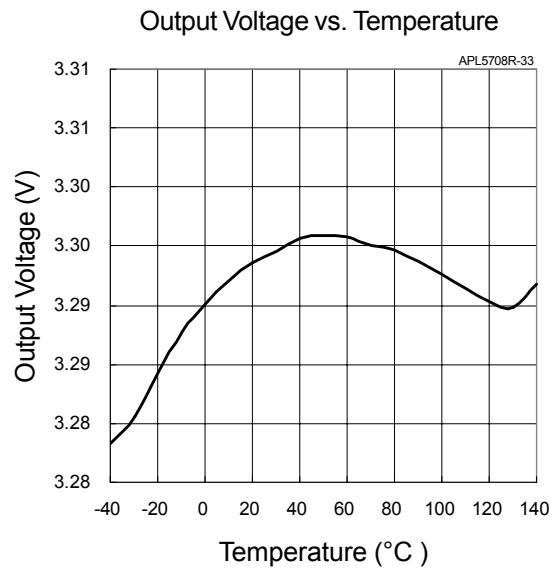
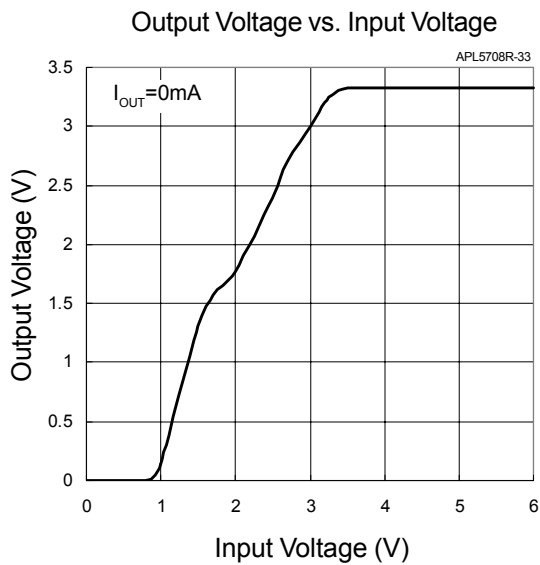
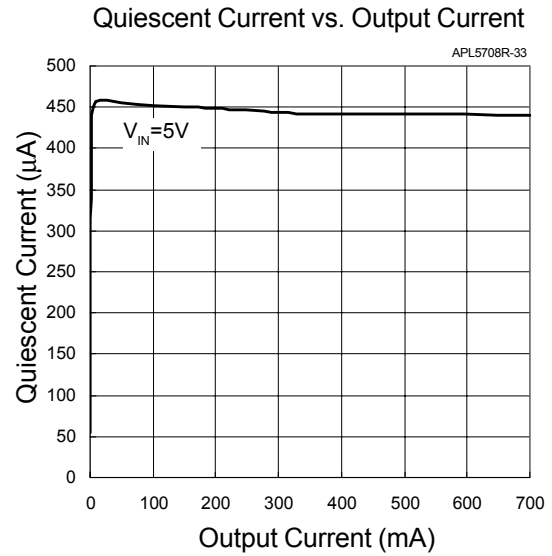
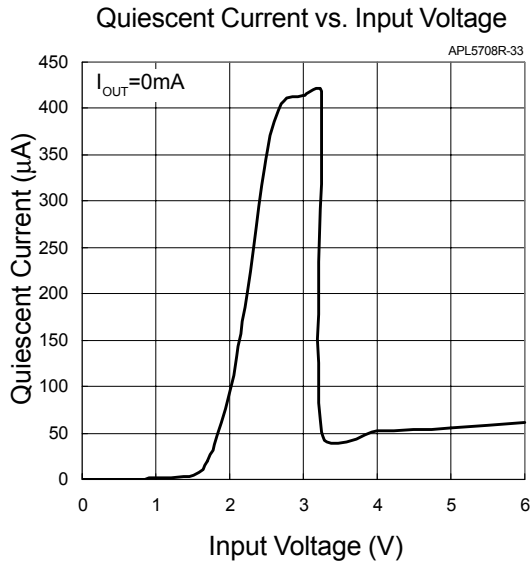
Symbol	Parameter	Test Conditions	APL5708R			Unit
			Min.	Typ.	Max.	
OTS	Over Temperature Shutdown			150		$^\circ C$
	Over Temperature Shutdown Hysteresis	Hysteresis		30		$^\circ C$
TC	Output Voltage Temperature Coefficient			50		ppm/ $^\circ C$
C_{OUT}	Output Capacitor			2.2		μF
	ESR		0.01	0.1	1	Ohm

Note1 : Dropout voltage definition : $V_{IN}-V_{OUT}$ when V_{OUT} is 2% below the value of V_{OUT} for $V_{IN} = V_{OUT}+1V$

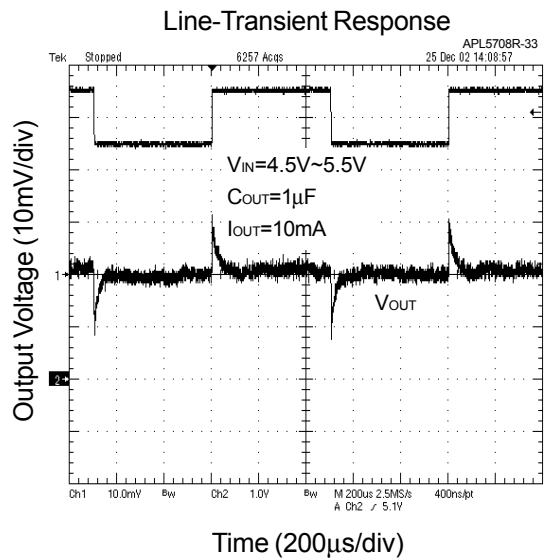
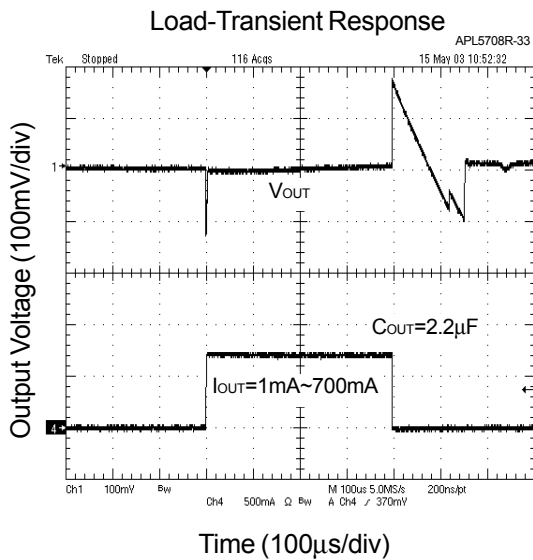
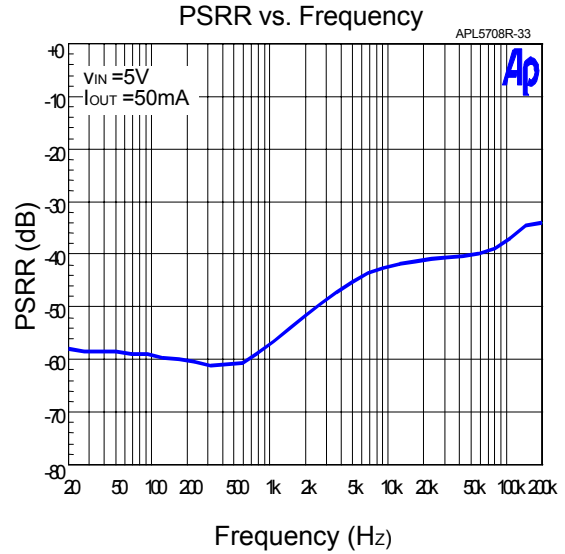
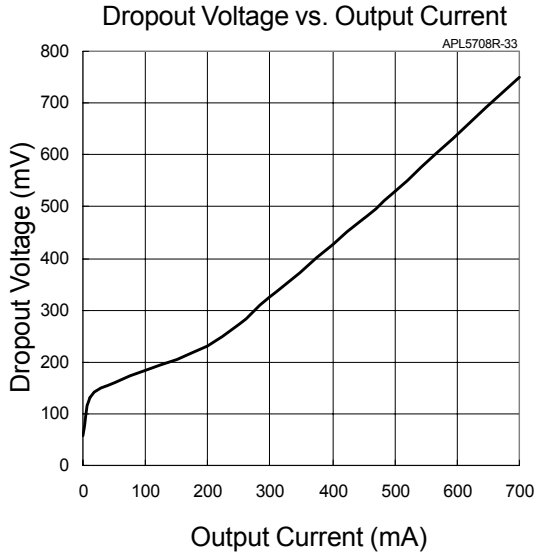
Application Circuit



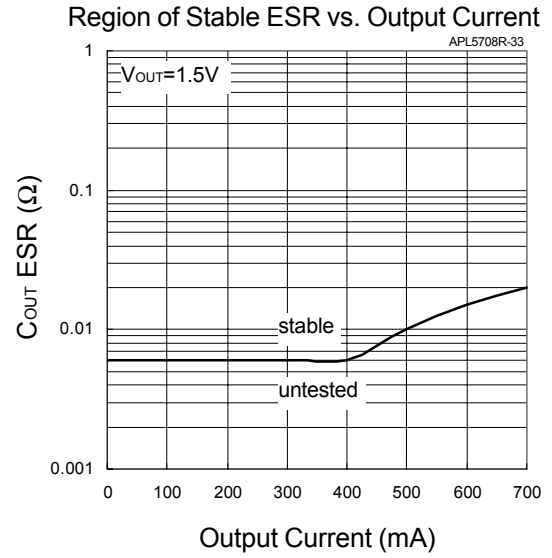
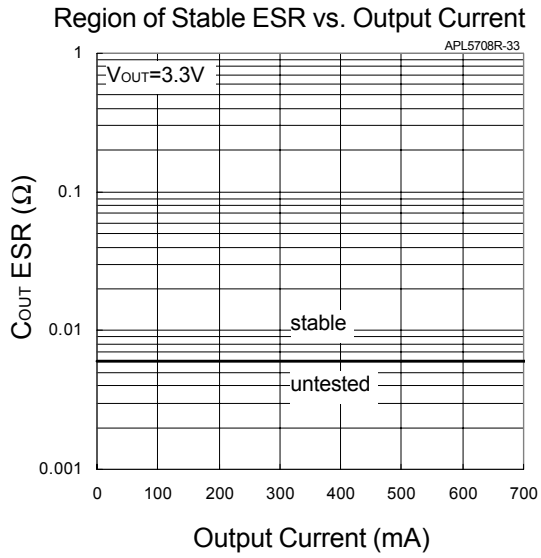
Typical Characteristics



Typical Characteristics

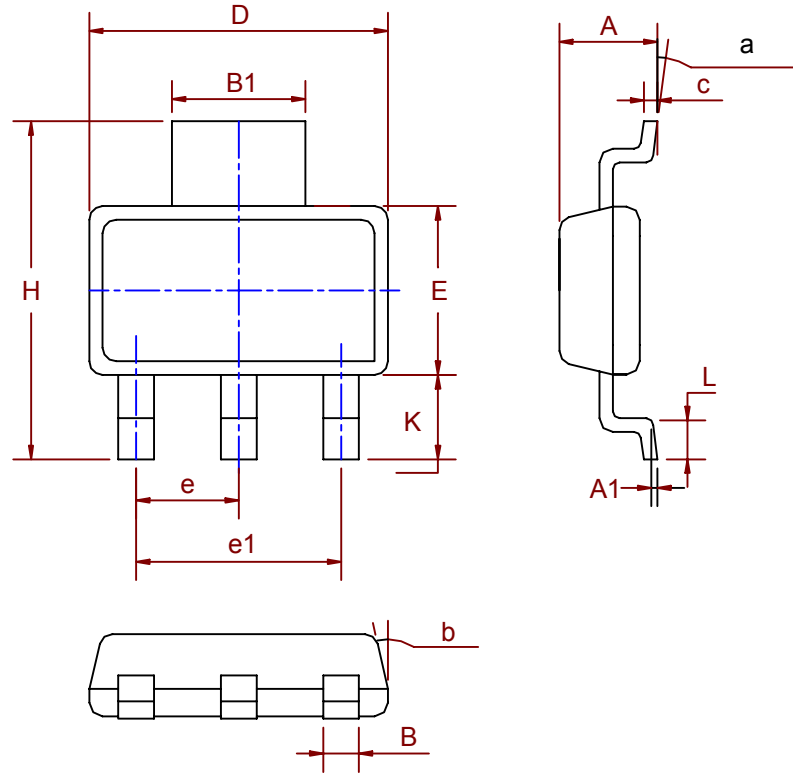


Typical Characteristics



Package Information

SOT-223(Reference JEDEC Registration SOT-223)



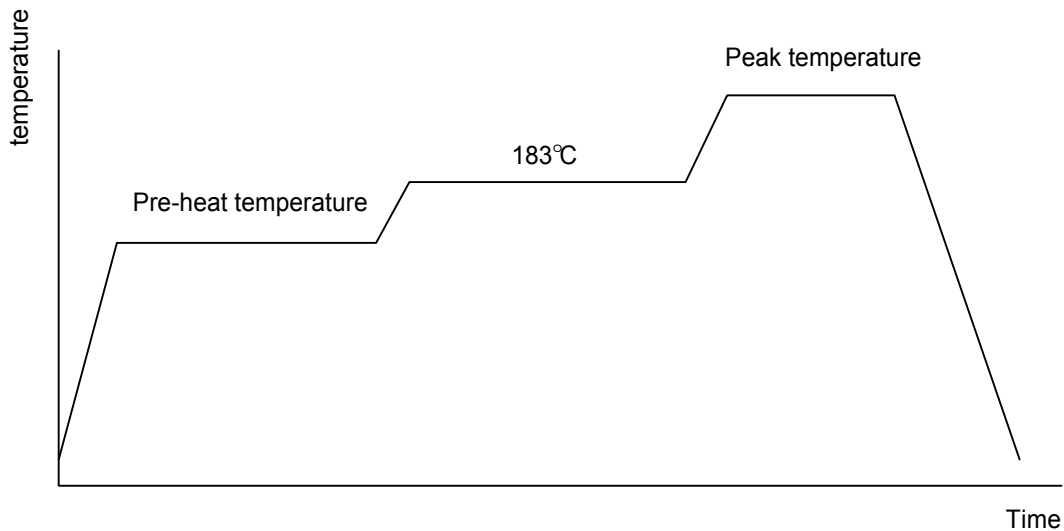
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.50	1.80	0.06	0.07
A1	0.02	0.08		
B	0.60	0.80	0.02	0.03
B1	2.90	3.10	0.11	0.12
c	0.28	0.32	0.01	0.01
D	6.30	6.70	0.25	0.26
E	3.30	3.70	0.13	0.15
e	2.3 BSC		0.09 BSC	
e1	4.6 BSC		0.18 BSC	
H	6.70	7.30	0.26	0.29
L	0.91	1.10	0.04	0.04
K	1.50	2.00	0.06	0.08
α	0°	10°	0°	10°
β	13°		13°	

Physical Specifications

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

Reflow Condition (IR/Convection or VPR Reflow)

Reference JEDEC Standard J-STD-020A APRIL 1999



Classification Reflow Profiles

	Convection or IR/ Convection	VPR
Average ramp-up rate(183°C to Peak)	3°C/second max.	10 °C /second max.
Preheat temperature 125 ± 25°C)	120 seconds max	
Temperature maintained above 183°C	60 – 150 seconds	
Time within 5°C of actual peak temperature	10 –20 seconds	60 seconds
Peak temperature range	220 +5/-0°C or 235 +5/-0°C	215-219°C or 235 +5/-0°C
Ramp-down rate	6 °C /second max.	10 °C /second max.
Time 25°C to peak temperature	6 minutes max.	

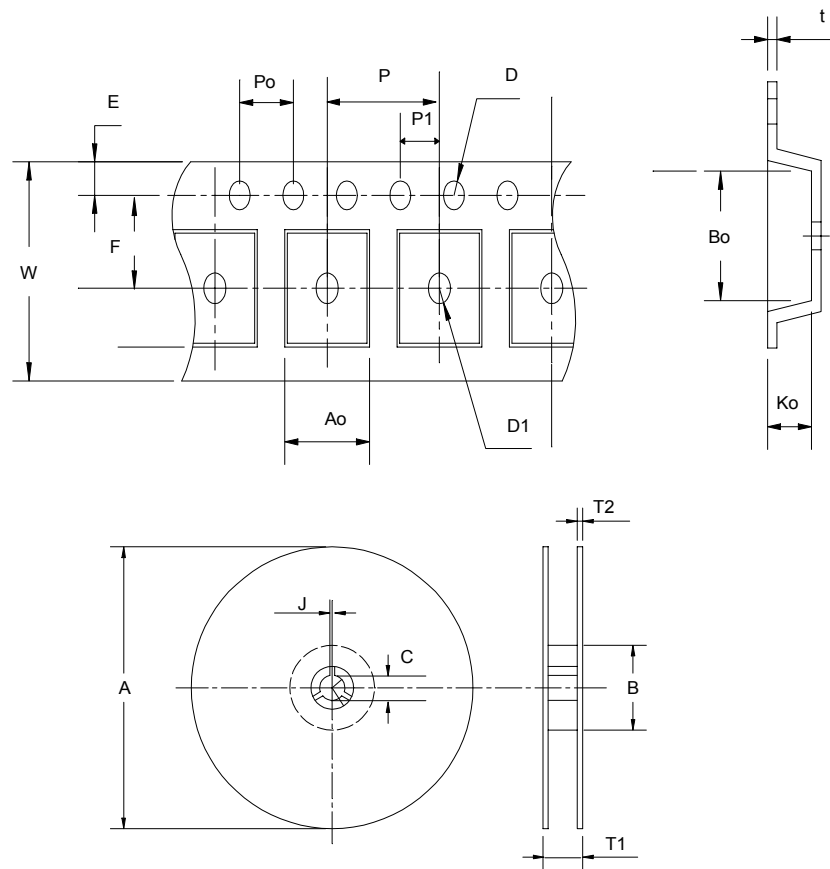
Package Reflow Conditions

pkg. thickness ≥ 2.5mm and all bgas	pkg. thickness < 2.5mm and pkg. volume ≥ 350 mm ³	pkg. thickness < 2.5mm and pkg. volume < 350mm ³
Convection 220 +5/-0 °C		Convection 235 +5/-0 °C
VPR 215-219 °C		VPR 235 +5/-0 °C
IR/Convection 220 +5/-0 °C		IR/Convection 235 +5/-0 °C

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



Application	A	B	C	J	T1	T2	W	P	E
SOT-223	330±1	62±1.5	12.75±0.15	2 ± 0.6	12.4 +0.2	2± 0.2	12 ± 0.3	8 ± 0.1	1.75± 0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	5.5 ± 0.05	1.5+ 0.1	1.5+ 0.1	4.0 ± 0.1	2.0 ± 0.05	6.9 ± 0.1	7.5± 0.1	2.1± 0.1	0.3±0.05

Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOT- 223	12	9.3	2500

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