

N-Channel Enhancement Mode MOSFET

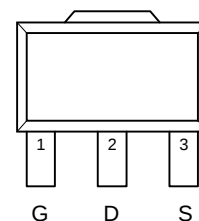
Features

- 30V/4.5A, $R_{DS(ON)} = 31m\Omega$ (typ.) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 35m\Omega$ (typ.) @ $V_{GS} = 4.5V$
 $R_{DS(ON)} = 55m\Omega$ (typ.) @ $V_{GS} = 2.5V$
- Super High Dense Cell Design for Extremely
- High Power and Current Handling Capability
- SOT-89 Package

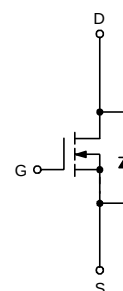
Applications

- Power Management in Notebook Computer.
- Portable Equipment and Battery Powered Systems.

Pin Description



Top View of SOT-89



N-Channel MOSFET

Ordering and Marking Information

APM3040N □□-□□ Handling Code Temp. Range Package Code	Package Code D : SOT-89 Operating Junction Temp. Range C : -55 to 125° C Handling Code TR : Tape & Reel
APM3040N D : APM3040N XXXXX	XXXXX - Date Code

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	30	V
V_{GSS}	Gate-Source Voltage	± 12	
I_D	Maximum Drain Current – Continuous	4.5	A
I_{DM}	Maximum Pulsed Drain Current (pulse width $\leq 300\mu\text{s}$)	20	

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.

Absolute Maximum Ratings (Cont.) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Rating	Unit
P_D	Maximum Power Dissipation	$T_A=25^\circ\text{C}$	W
		$T_A=100^\circ\text{C}$	
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance – Junction to Ambient	85	$^\circ\text{C/W}$

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

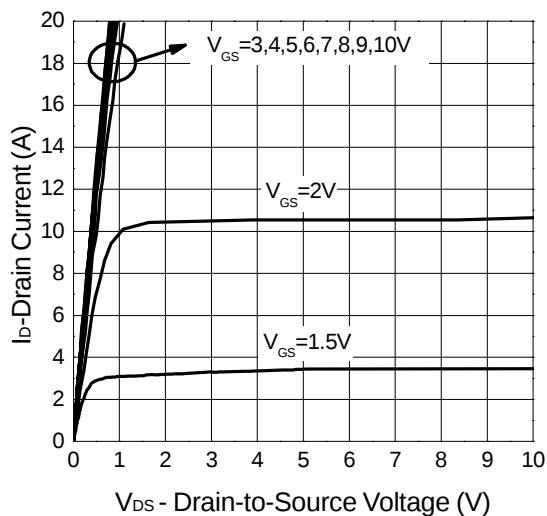
Symbol	Parameter	Test Condition	APM3040N			Unit
			Min.	Typ.	Max.	
Static						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V			1	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	0.6	0.75	1.5	V
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V			±100	nA
R _{DS(ON)} ^a	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =3A		31	40	mΩ
		V _{GS} =4.5V, I _{DS} =1.5A		35	50	
		V _{GS} =2.5V, I _{DS} =0.5A		55	70	
V _{SD} ^a	Diode Forward Voltage	I _{SD} =0.5A, V _{GS} =0V		0.7	1.3	V
Dynamic ^b						
Q _g	Total Gate Charge	V _{DS} =10V, V _{GS} =4.5V, I _{DS} =3A		9.2	13	nC
Q _{gs}	Gate-Source Charge			2.5		
Q _{gd}	Gate-Drain Charge			2		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, I _D =3A, V _{GS} =10V, R _G =6Ω		11	22	ns
t _r	Turn-on Rise Time			17	32	
t _{d(OFF)}	Turn-off Delay Time			37	68	
t _f	Turn-off Fall Time			20	38	
C _{iss}	Input Capacitance	V _{GS} =0V		426		pF
C _{oss}	Output Capacitance	V _{DS} =25V		80		
C _{rss}	Reverse Transfer	Frequency=1.0MHz		39		

Notes: ^a: Pulse test; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

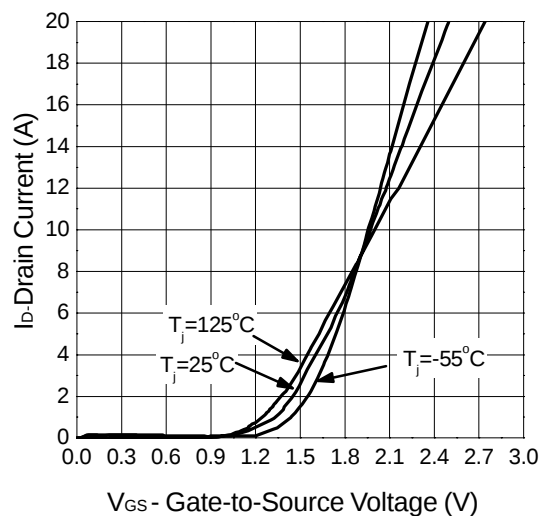
^b: Guaranteed by design, not subject to production testing.

Typical Characteristics

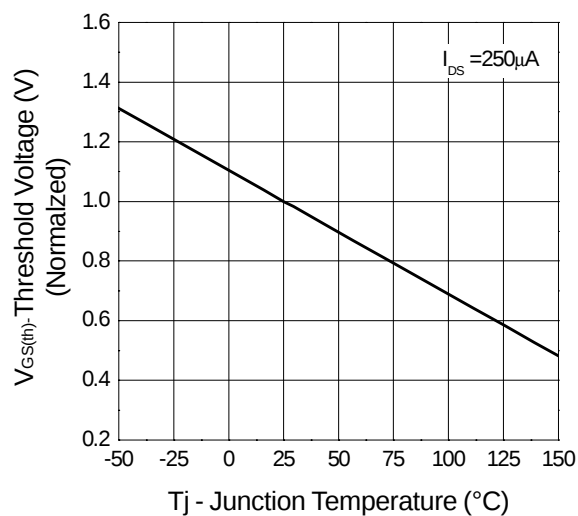
Output Characteristics



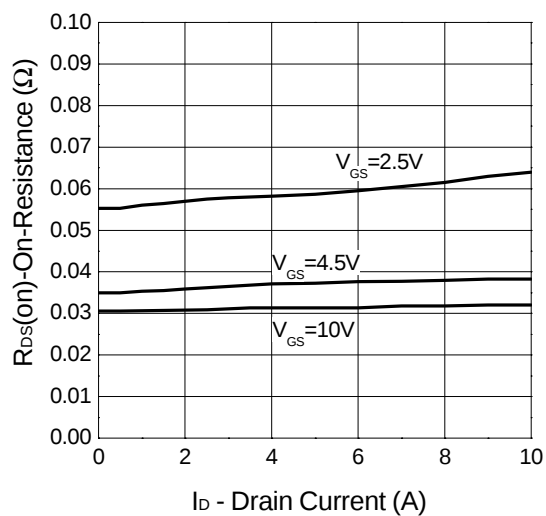
Transfer Characteristics



Threshold Voltage vs. Temperature

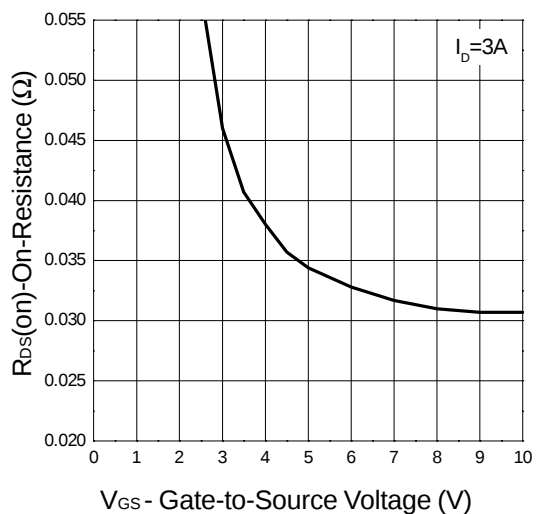


On-Resistance vs. Drain Current

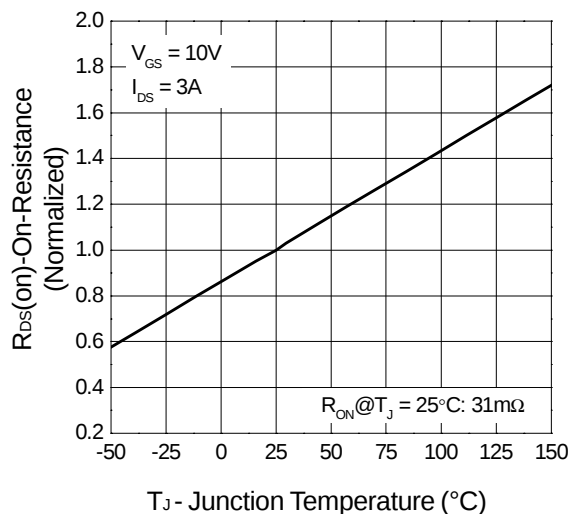


Typical Characteristics

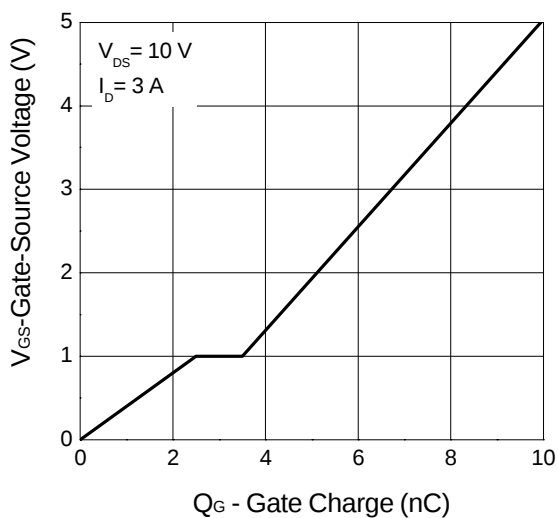
On-Resistance vs. Gate-to-Source Voltage



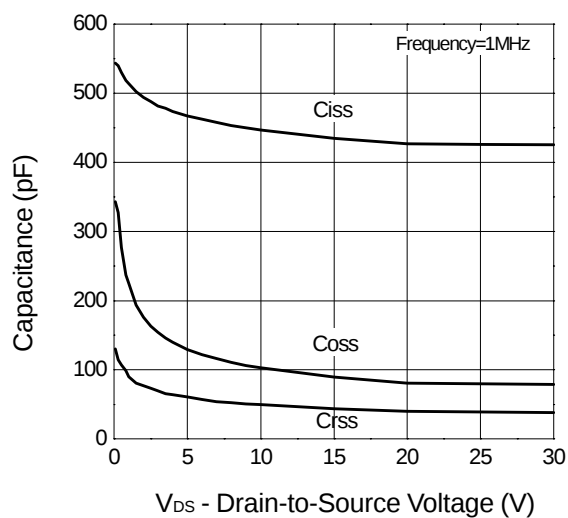
On-Resistance vs. Junction Temperature



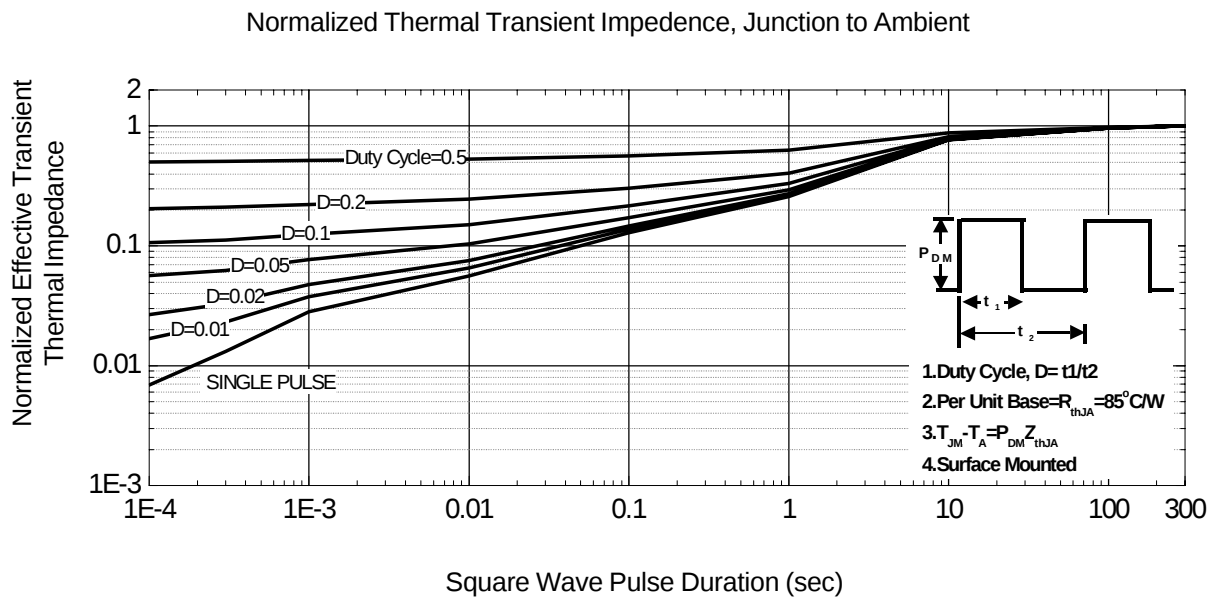
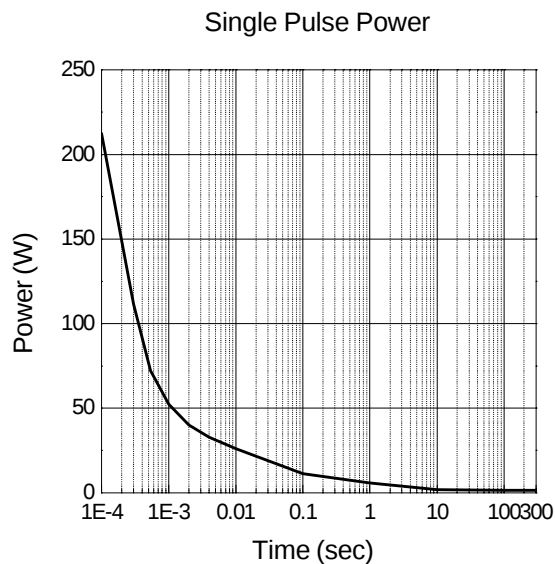
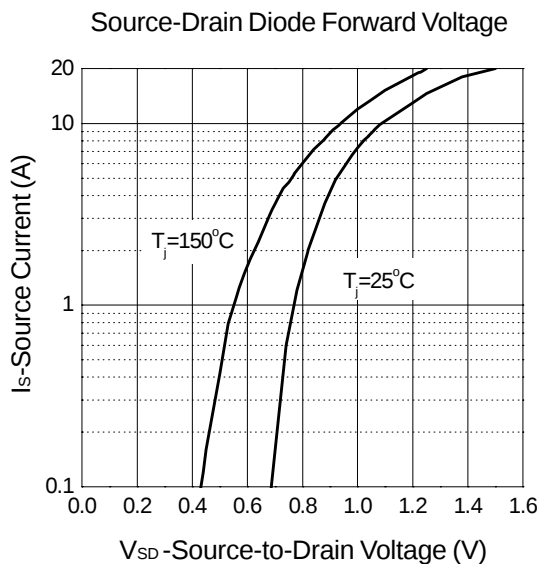
Gate Charge



Capacitance

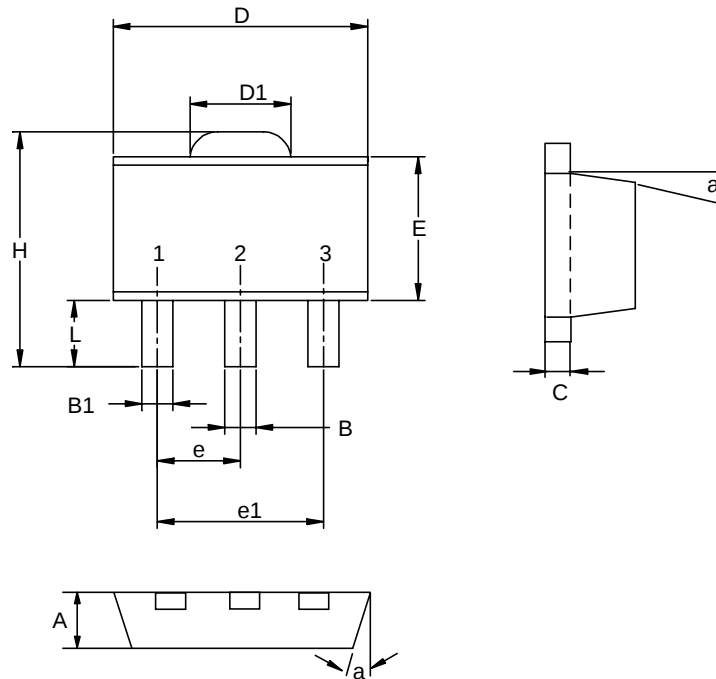


Typical Characteristics



Package Information

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



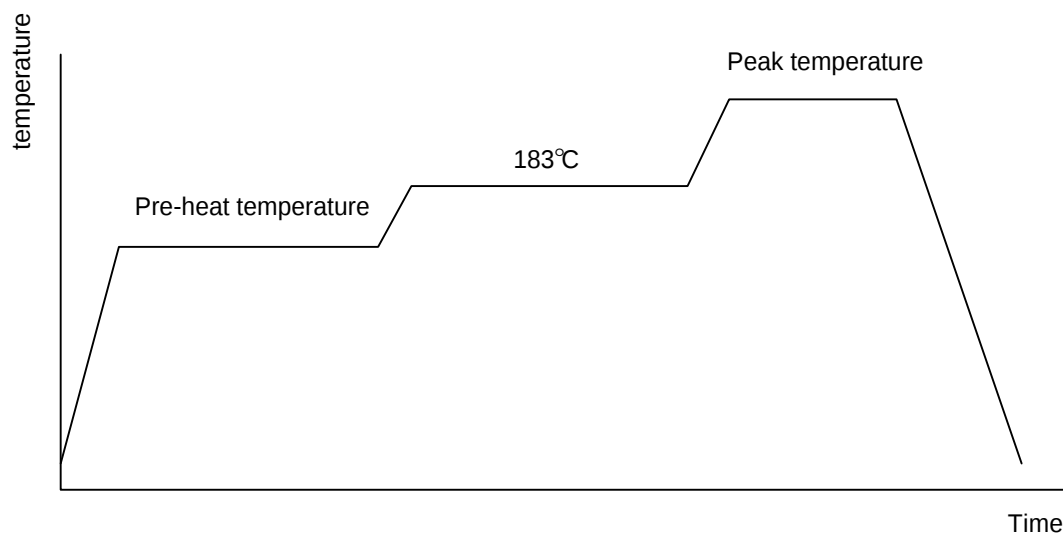
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.40	1.60	0.055	0.063
B	0.40	0.56	0.016	0.022
B1	0.35	0.48	0.014	0.019
C	0.35	0.44	0.014	0.017
D	4.40	4.60	0.173	0.181
D1	1.35	1.83	0.053	0.072
e	1.50 BSC		0.059 BSC	
e1	3.00 BSC		0.118 BSC	
E	2.29	2.60	0.090	0.102
H	3.75	4.25	0.148	0.167
L	0.80	1.20	0.031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

Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb)
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.	

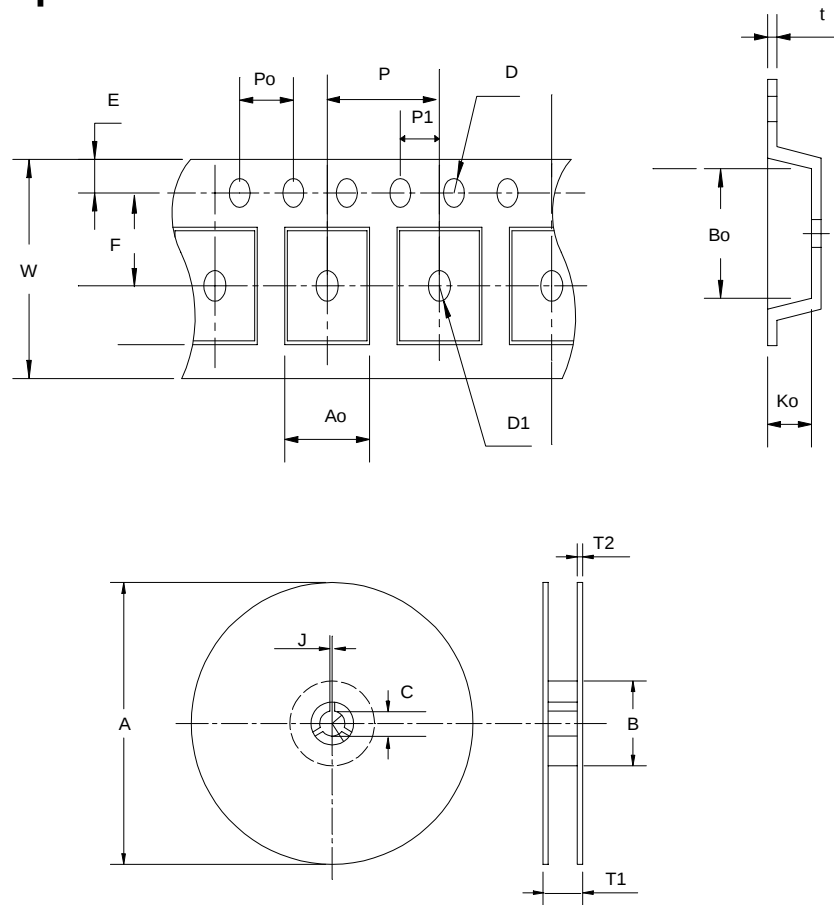
Package Reflow Conditions

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-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
	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 ± 0.1	4.8 ± 0.1	4.5 ± 0.1	1.80 ± 0.1	0.3 ± 0.013

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