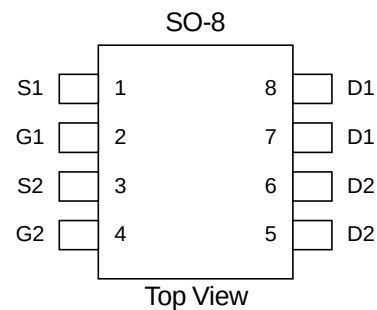


Dual N-Channel Enhancement Mode MOSFET

Features

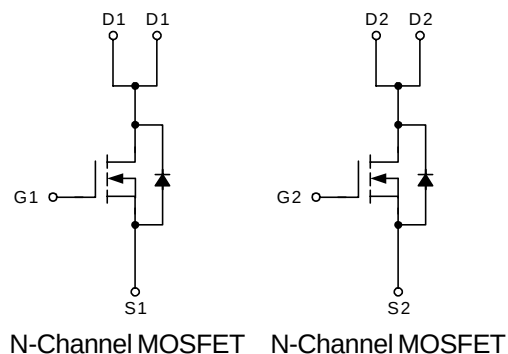
- 30V/6A , $R_{DS(ON)} = 21m\Omega (typ.) @ V_{GS} = 10V$
 $R_{DS(ON)} = 27m\Omega (typ.) @ V_{GS} = 4.5V$
- Super High Dense Cell Design for Extremely Low $R_{DS(ON)}$
- Reliable and Rugged
- SO-8 Package

Pin Description



Applications

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



Ordering and Marking Information

APM7313 □□-□□ Handling Code Temp. Range Package Code	Package Code K : SO-8 Operating Junction Temp. Range C : -55 to 150°C Handling Code TU : Tube TR : Tape & Reel
APM7313 K : APM7313 XXXXX	XXXXX - Date Code

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

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	30	V
V_{GSS}	Gate-Source Voltage	± 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°C unless otherwise noted)

Symbol	Parameter		Rating	Unit
I _D [*]	Maximum Drain Current – Continuous		6	A
I _{DM}	Maximum Drain Current – Pulsed		24	
P _D	Maximum Power Dissipation	T _A =25°C	2.5	W
		T _A =100°C	1.0	W
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-55 to 150	°C
R _{θJA}	Thermal Resistance – Junction to Ambient		50	°C/W

* Surface Mounted on FR4 Board, t ≤ 10 sec.

Electrical Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	APM7313			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	1	1.5	2	V
I _{GSS}	Gate Leakage Current	V _{GS} =±20V , V _{DS} =0V			±100	nA
R _{DS(ON)} ^a	Drain-Source On-state	V _{GS} =10V , I _{DS} =3.5A		21	28	mΩ
	Resistance	V _{GS} =4.5V , I _{DS} =2A		27	42	
V _{SD} ^a	Diode Forward Voltage	I _{SD} =2A , V _{GS} =0V		0.7	1.3	V
Dynamic ^b						
Q _g	Total Gate Charge	V _{DS} =15V , I _{DS} = 10A V _{GS} =10V		30	36	nC
Q _{gs}	Gate-Source Charge			5.8		
Q _{gd}	Gate-Drain Charge			3.8		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V , I _{DS} =2A , V _{GEN} =10V , R _G =6Ω		11	22	ns
T _r	Turn-on Rise Time			17	33	
t _{d(OFF)}	Turn-off Delay Time			37	68	
T _f	Turn-off Fall Time			20	38	
C _{iss}	Input Capacitance	V _{GS} =0V		1200		pF
C _{oss}	Output Capacitance	V _{DS} =25V		210		
C _{rss}	Reverse Transfer Capacitance	Frequency=1.0MHz		95		

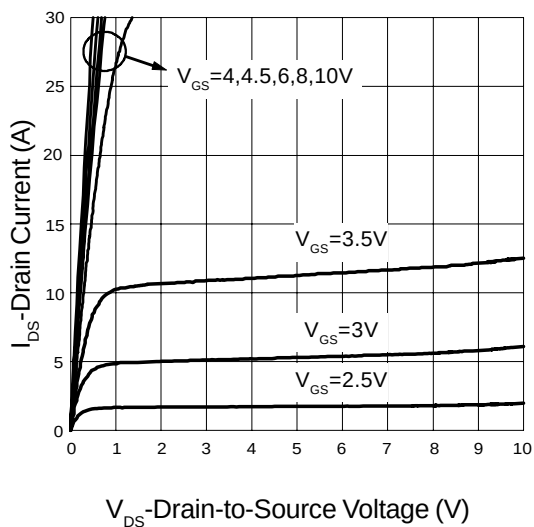
Notes

^a : Pulse test ; pulse width ≤300μs, duty cycle ≤ 2%

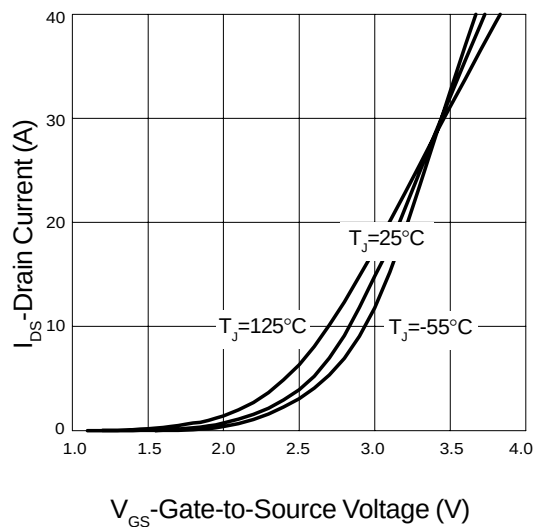
^b : Guaranteed by design, not subject to production testing

Typical Characteristics

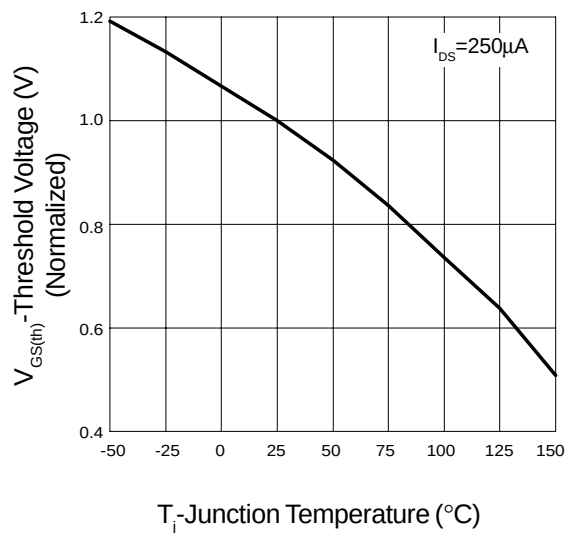
Output Characteristics



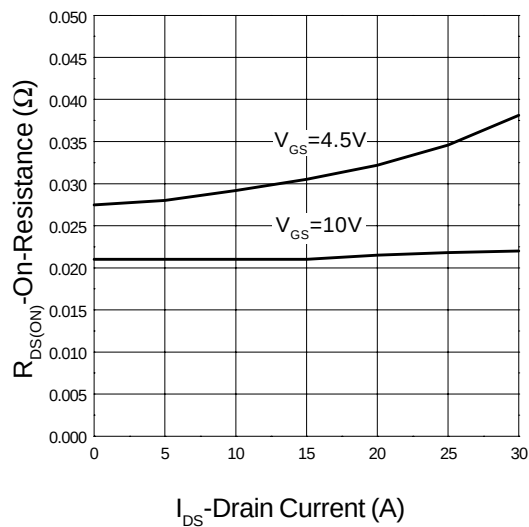
Transfer Characteristics



Threshold Voltage vs. Junction Temperature

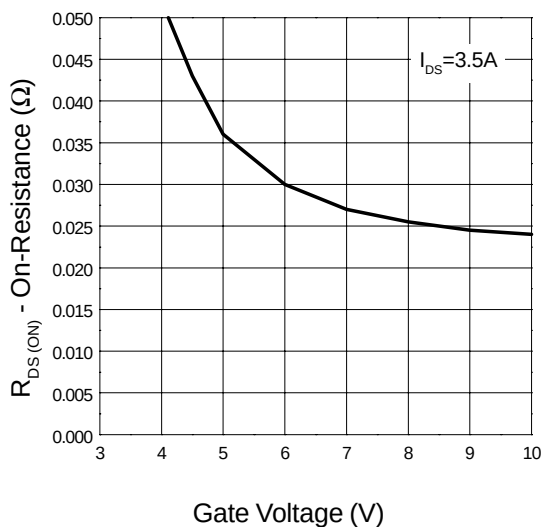


On-Resistance vs. Drain Current

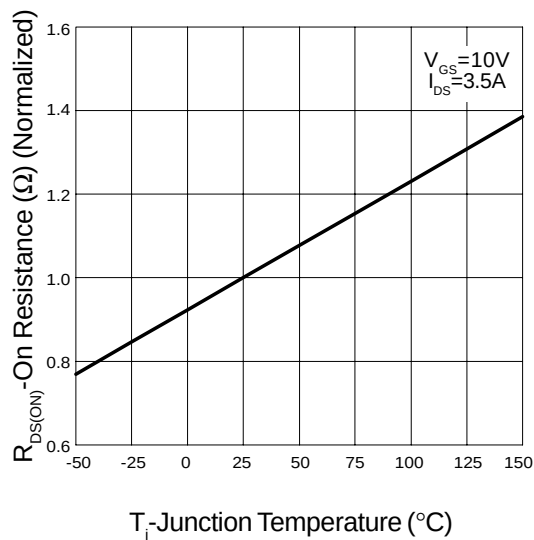


Typical Characteristics (Cont.)

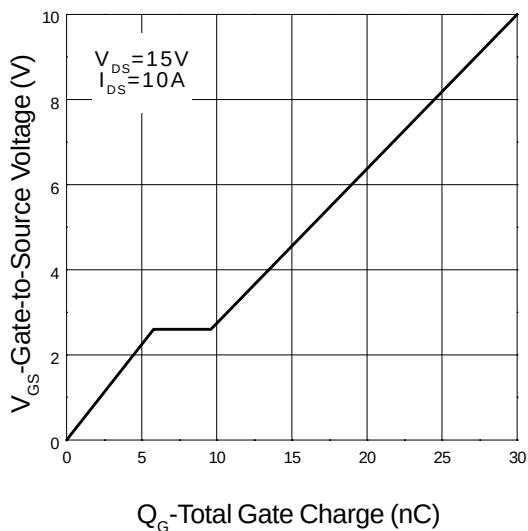
On-Resistance vs. Gate-to-Source Voltage



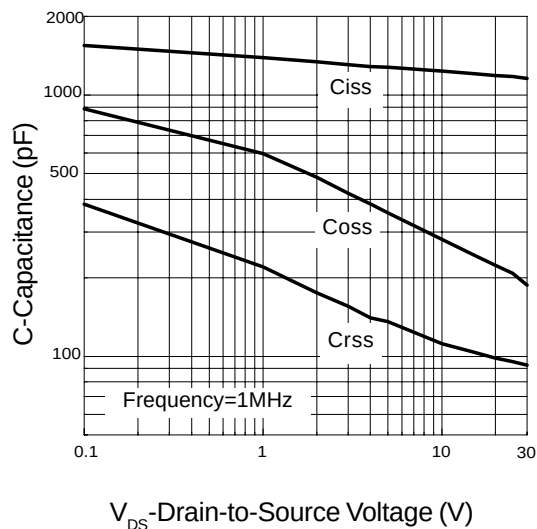
On-Resistance vs. Junction Temperature



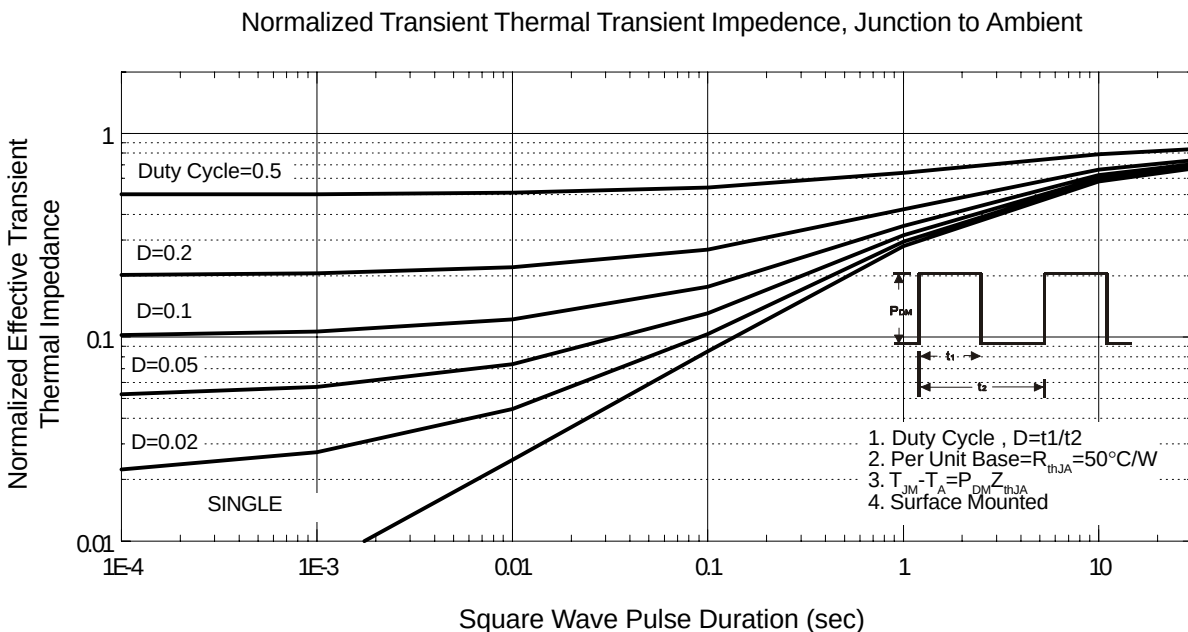
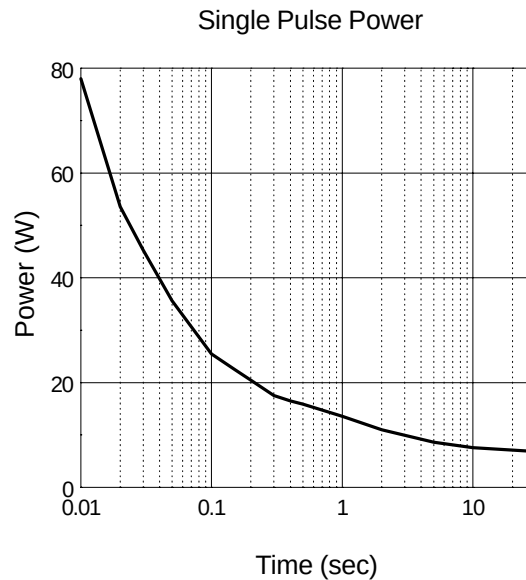
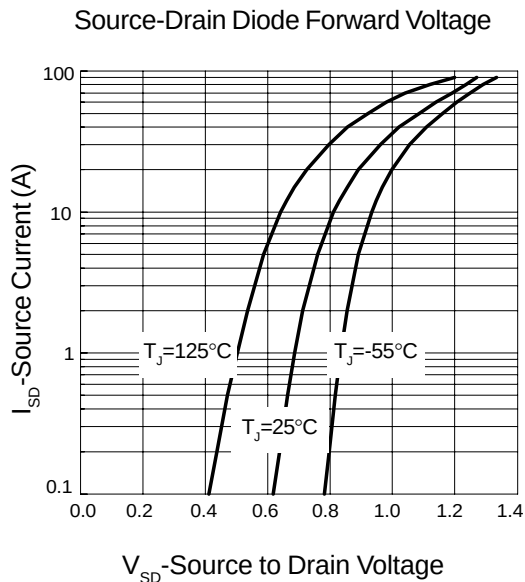
Gate Charge



Capacitance Characteristics

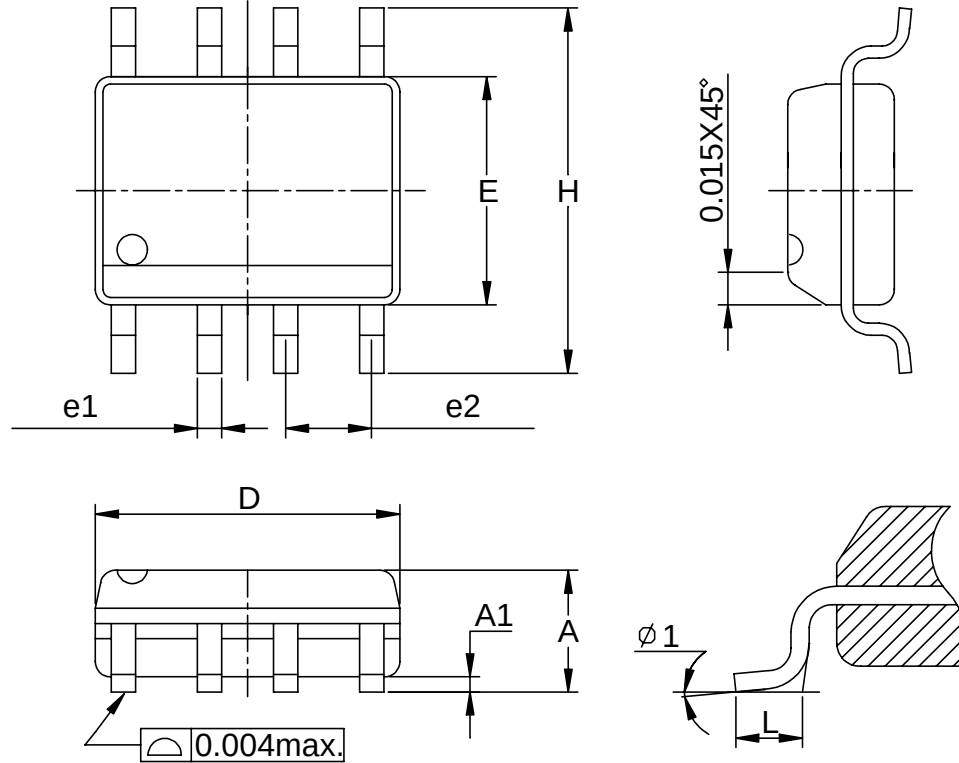


Typical Characteristics (Cont.)



Packaging Information

SOP-8 pin (Reference JEDEC Registration MS-012)



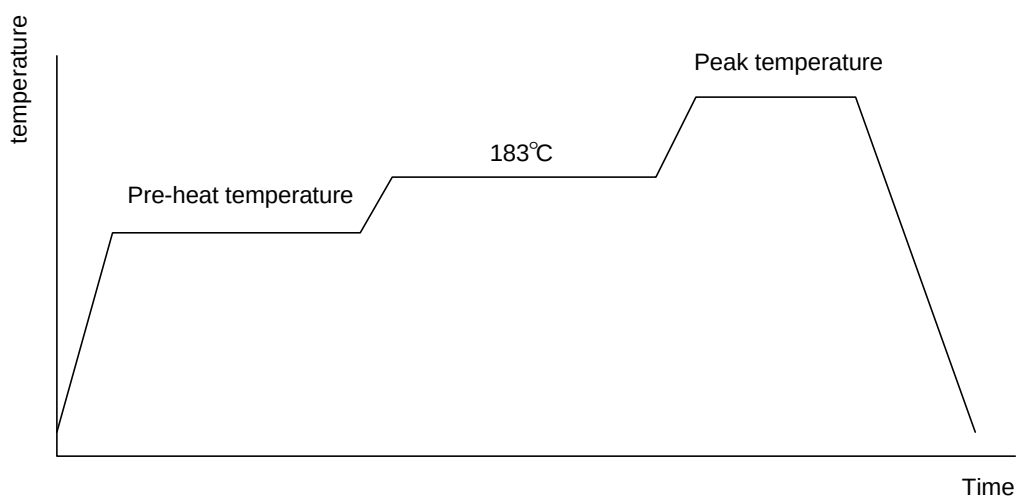
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	5.00	0.189	0.197
E	3.80	4.00	0.150	0.157
H	5.80	6.20	0.228	0.244
L	0.40	1.27	0.016	0.050
e1	0.33	0.51	0.013	0.020
e2	1.27BSC		0.50BSC	
$\phi 1$	8°		8°	

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.	

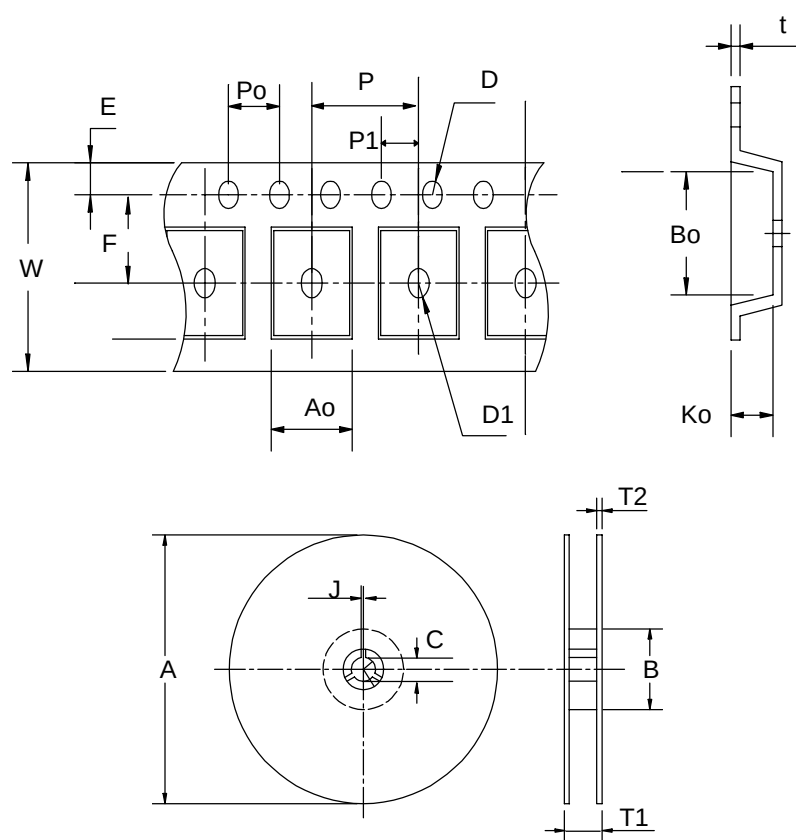
Package Reflow Conditions

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 & Reel Dimensions



Application	A	B	C	J	T ₁	T ₂	W	P	E
SOP-8	330±1	62 ± 1.5	12.75 + 0.15	2 + 0.5	12.4 +0.2	2± 0.2	12 + 0.3 - 0.1	8± 0.1	1.75± 0.1
Application	F	D	D ₁	P ₀	P ₁	A ₀	B ₀	K ₀	t
SOP-8	5.5 ± 0.1	1.55±0.1	1.55+ 0.25	4.0 ± 0.1	2.0 ± 0.1	6.4 ± 0.1	5.2± 0.1	2.1± 0.1	0.3±0.013

(mm)

Cover Tape Dimensions

Application	Carrier Width	Cover Tape Width	Devices Per Reel
SOP- 8	12	9.3	2500

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