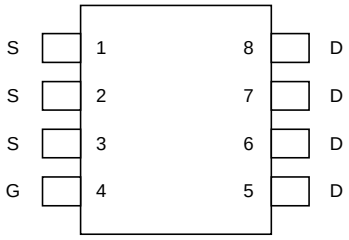
N-Channel Enhancement Mode MOSFET

Features

- 20V/10A, $R_{DS(ON)}$ = 10mΩ(typ.) @ V_{GS} = 4.5V
  $R_{DS(ON)}$ = 15mΩ(typ.) @ V_{GS} = 2.5V
- Super High Density Cell Design
- Reliable and Rugged
- SO-8 Package

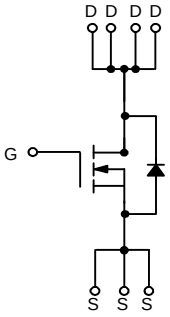
Pin Description



SO – 8

Applications

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



N-Channel MOSFET

Ordering and Marking Information

APM9424 □□-□□

- Handling Code
- Temp. Range
- Package Code

Package Code
K : SO-8
Operation Junction Temp. Range
C : -55 to 150°C
Handling Code
TU : Tube
TR : Tape & Reel

APM9424 K : APM9424 XXXXX

XXXXX - Date Code

Absolute Maximum Ratings (T$_A$ = 25°C unless otherwise noted)

Symbol	Parameter		Rating	Unit
V_{DSS}	Drain-Source Voltage		20	V
V_{GSS}	Gate-Source Voltage		±16	
I_D*	Maximum Drain Current – Continuous	T_A = 25°C	10	A
I_{DM}	Maximum Drain Current – Pulsed		30	

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

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.

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Rev. A.1 - Jul., 2003

Absolute Maximum Ratings (Cont.) (T_A = 25°C unless otherwise noted)

Symbol	Parameter		Rating	Unit
P_D	Maximum Power Dissipation	T_A = 25°C	2.5	W
		T_A = 100°C	1.0	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	
$R_{\theta JA}$*	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	APM9424			Unit
			Min.	Typ.	Max.	
Static						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_{DS}=250µA	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=16V , V_{GS}=0V			1	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} , I_{DS}=250µA	0.7	0.9	1.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±16V , V_{DS}=0V			±100	nA
$R_{DS(ON)}$ [a]	Drain-Source On-state Resistance	V_{GS}=4.5V , I_{DS}=10A		10	13	mΩ
		V_{GS}=2.5V , I_{DS}=8A		15	20	
V_{SD} [a]	Diode Forward Voltage	I_{SD}=2.3A , V_{GS}=0V		0.8	1.3	V
Dynamic[b]						
Q_g	Total Gate Charge	V_{DS}=10V , V_{GS}=4.5V , I_{DS}=10A		28.2	37	nC
Q_{gs}	Gate-Source Charge			5.2		
Q_{gd}	Gate-Drain Charge			7.6		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V , I_{DS}=10A , V_{GEN}=4.5V , R_G=6Ω		35	70	ns
T_r	Turn-on Rise Time			80	160	
$t_{d(OFF)}$	Turn-off Delay Time			115	235	
T_f	Turn-off Fall Time			40	85	
C_{iss}	Input Capacitance	V_{GS}=0V , V_{DS}=15V Frequency=1.0MHz		2400		pF
C_{oss}	Output Capacitance			720		
C_{rss}	Reverse Transfer			480		

Notes

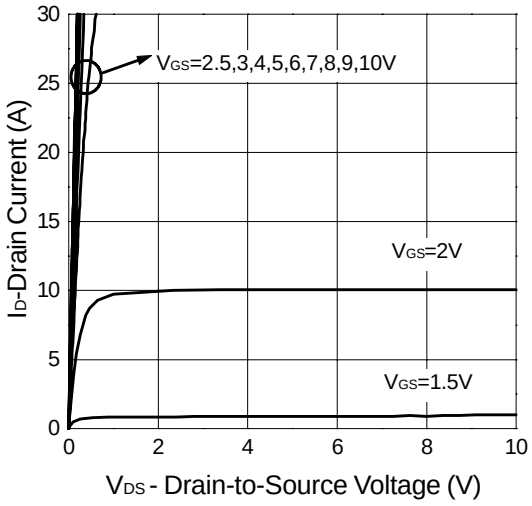
[a] : Guaranteed by design, not subject to production testing

[b] : Pulse test ; pulse width ≤ 500µs, duty cycle ≤ 2%

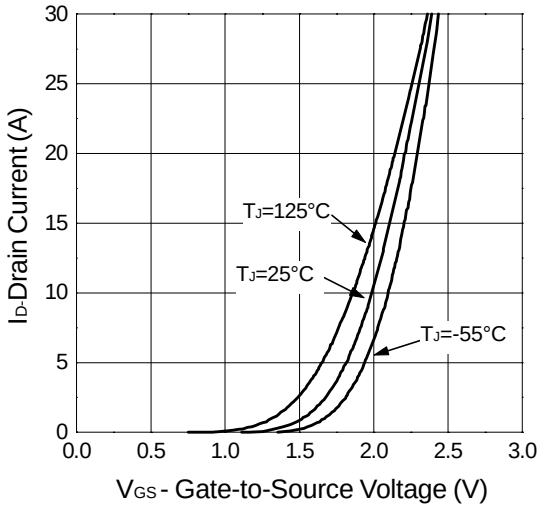
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Typical Characteristics

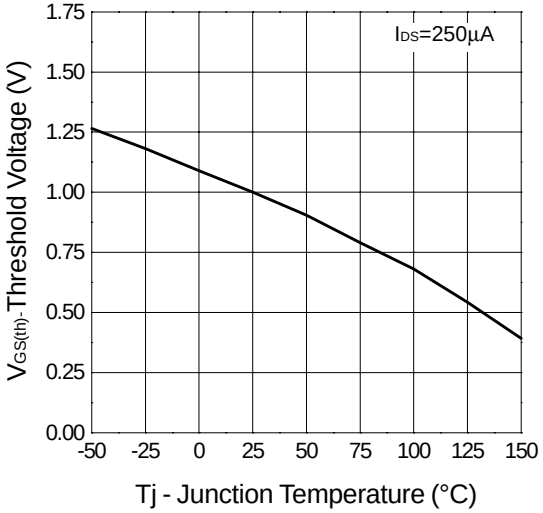
Output Characteristics



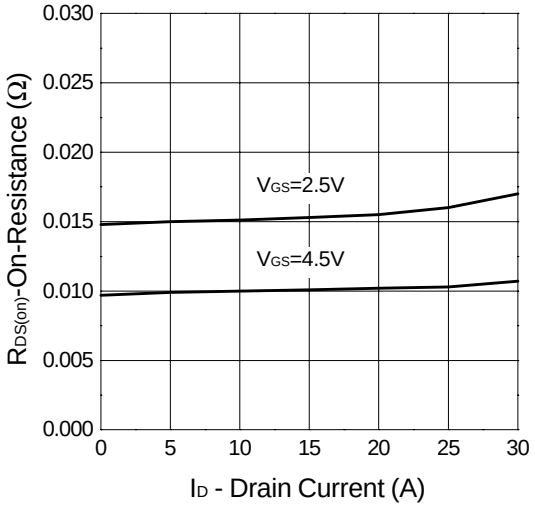
Transfer Characteristics



Threshold Voltage vs. Junction Temperature



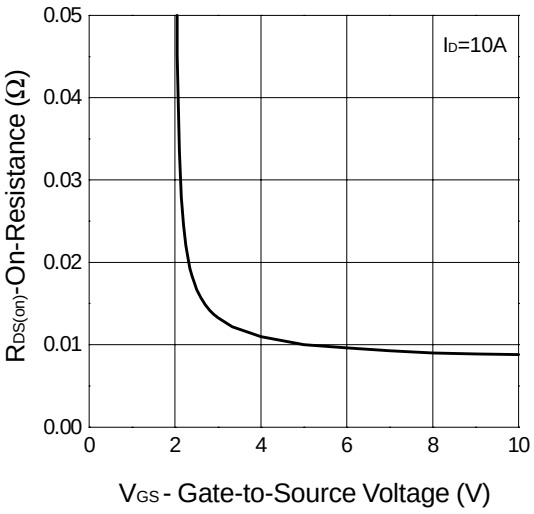
On-Resistance vs. Drain Current



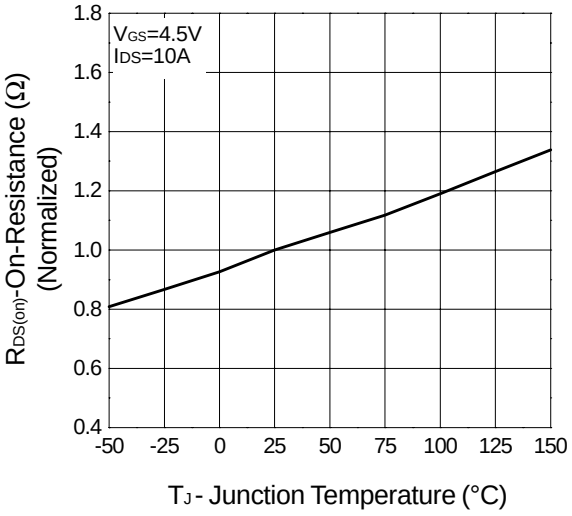
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Typical Characteristics

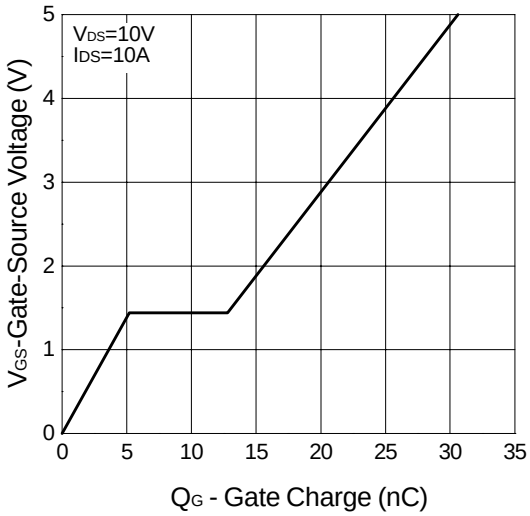
On-Resistance vs. Gate-to-Source Voltage



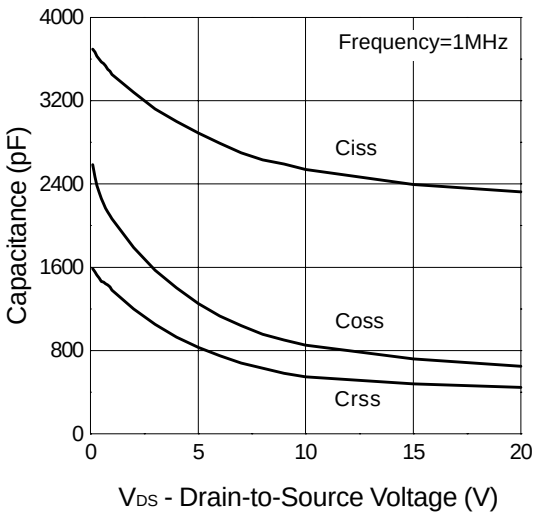
On-Resistance vs. Junction Temperature



Gate Charge



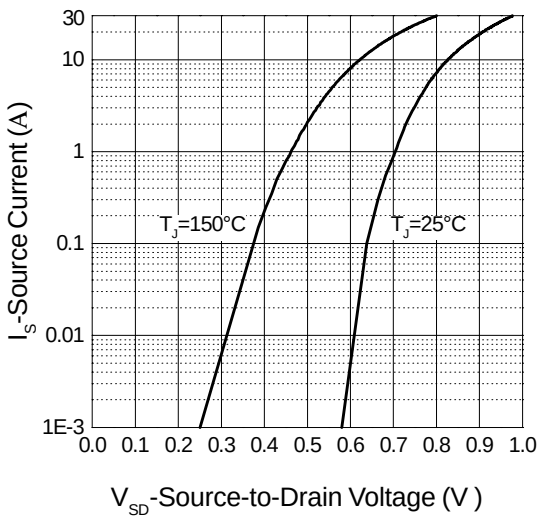
Capacitance



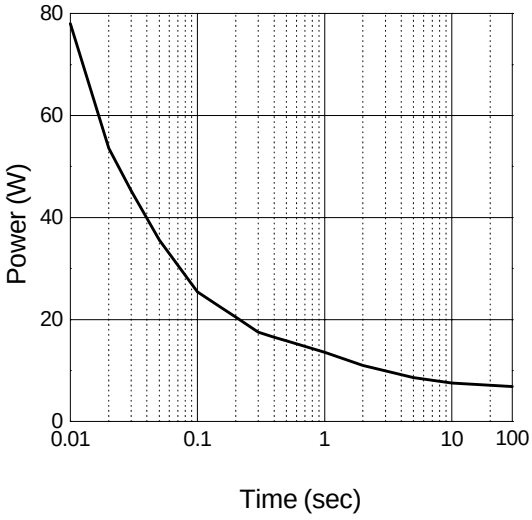
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Typical Characteristics

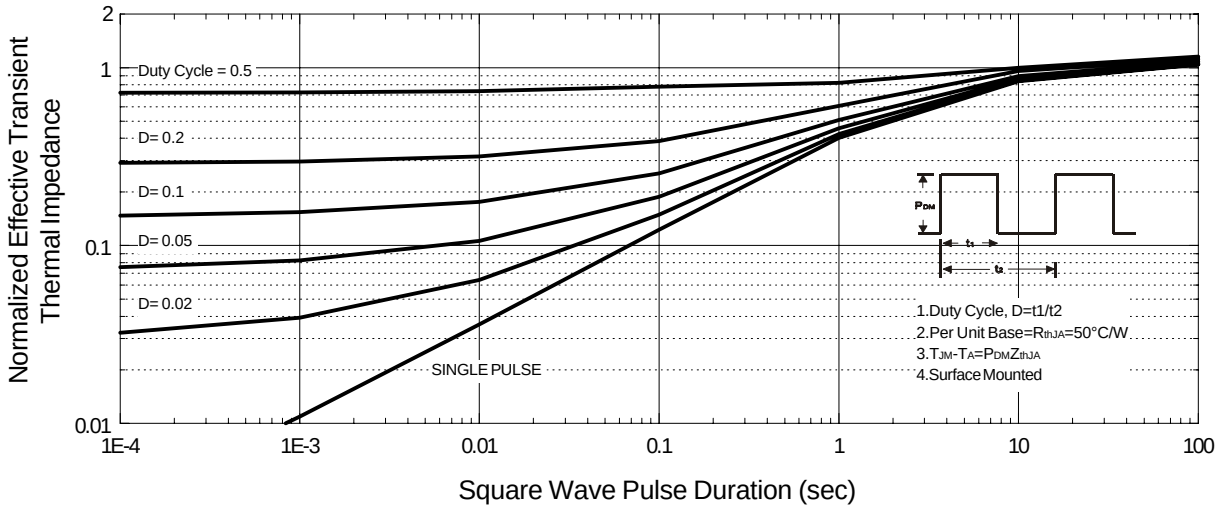
Source-Drain Diode Forward Voltage



Single Pulse Power

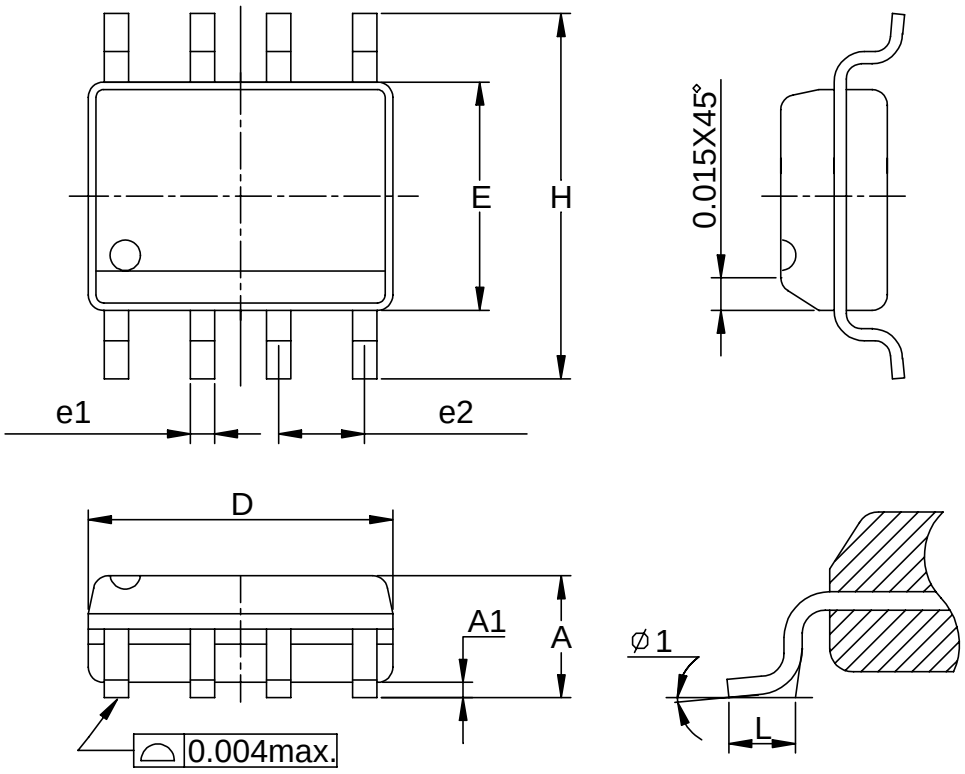


Normalized Thermal Transient Impedance, Junction to Ambient



Packaging Information

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



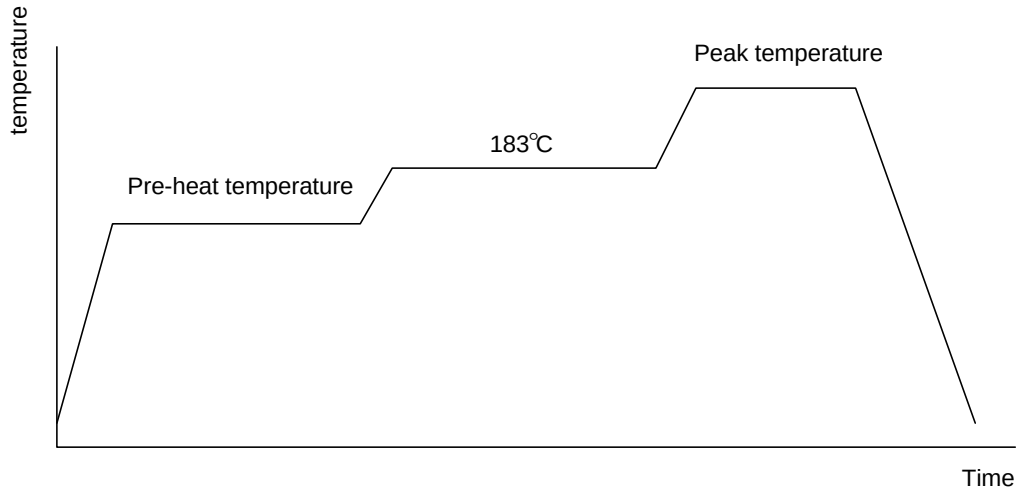
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	5.00	0.189	0.197
E	3.80	4.00	0.150	0.157
H	5.80	6.20	0.228	0.244
L	0.40	1.27	0.016	0.050
e1	0.33	0.51	0.013	0.020
e2	1.27BSC		0.50BSC	
ϕ 1	8°		8°	

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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)



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

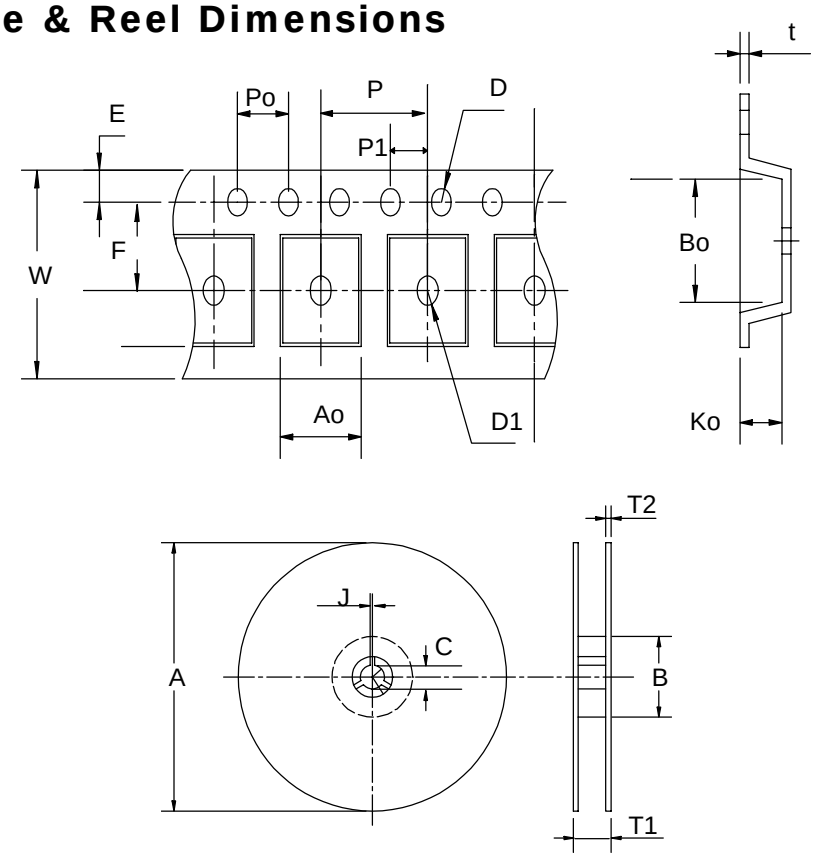
pkg. thickness ≥ 2.5mm and all bgas	pkg. thickness < 2.5mm and pkg. volume ≥ 350 mm³	pkg. thickness < 2.5mm and pkg. volume < 350mm³
Convection 220 +5/-0 °C		Convection 235 +5/-0 °C
VPR 215-219 °C		VPR 235 +5/-0 °C
IR/Convection 220 +5/-0 °C		IR/Convection 235 +5/-0 °C

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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

Carrier Tape & Reel Dimensions



Application	A	B	C	J	T1	T2	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	8± 0.1	1.75±0.1
	F	D	D1	Po	P1	Ao	Bo	Ko	t
	5.5± 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

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Cover Tape Dimensions

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

Customer Service

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