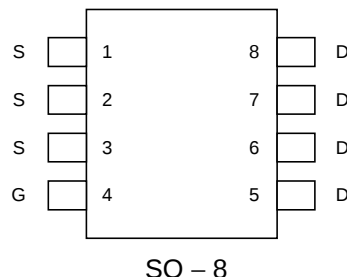


N-Channel Enhancement Mode MOSFET

Features

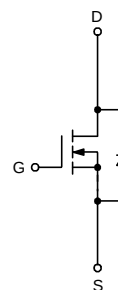
- 25V/14A, $R_{DS(ON)} = 7.5m\Omega(\text{typ.}) @ V_{GS} = 10V$
 $R_{DS(ON)} = 10m\Omega(\text{typ.}) @ V_{GS} = 4.5V$
- Super High Dense Cell Design for
Extremely Low $R_{DS(ON)}$
- Reliable and Rugged
- SOP-8 Package

Pin Description



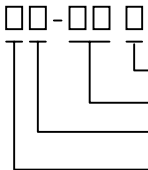
Applications

- Power Management in Desktop Computer or
DC/DC Converters.



N-Channel MOSFET

Ordering and Marking Information

APM4220 □□-□□□  Lead Free Code 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 Lead Free Code L : Lead Free Device Blank : Original Device
APM4220 K : APM4220 XXXXX	XXXXXX - Date Code

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

Symbol	Parameter	Rating	Unit
V_{DSS}	Drain-Source Voltage	25	V
V_{GSS}	Gate-Source Voltage	± 20	
I_D^*	Maximum Drain Current – Continuous	14	A
I_{DM}	Maximum Drain Current – Pulsed	60	

* Surface Mounted on FR4 Board, $t \leq 10$ 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.

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	50	$^\circ\text{C/W}$

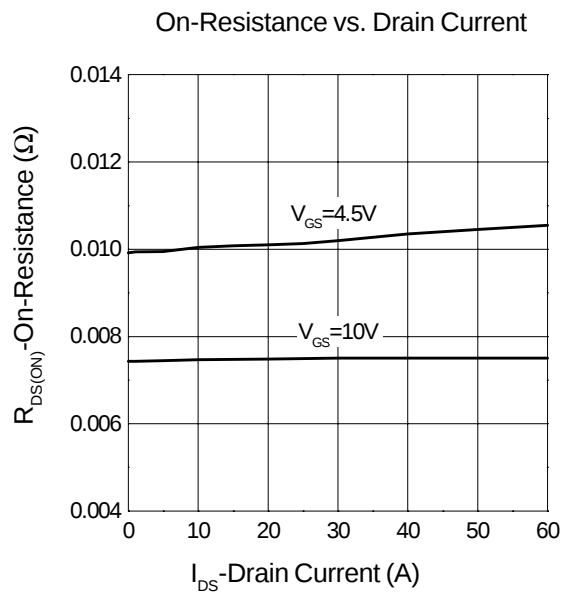
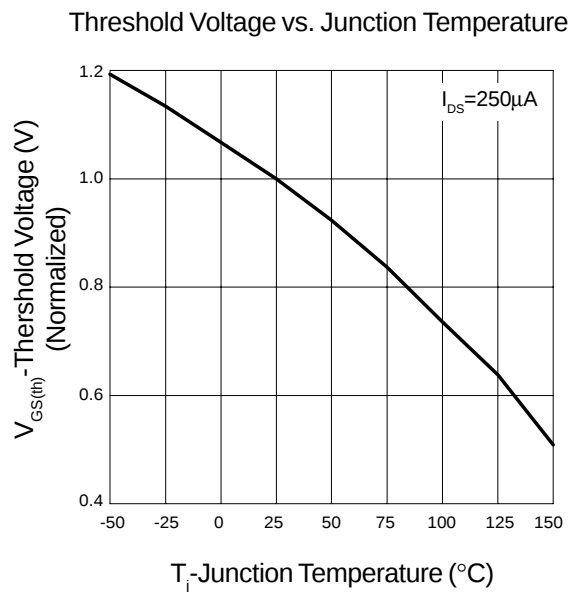
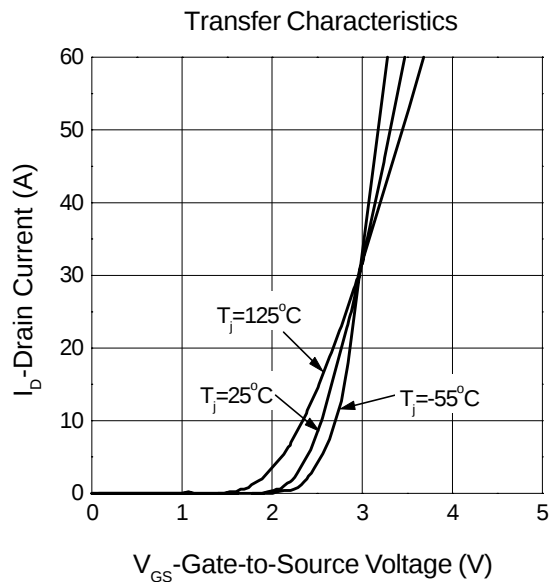
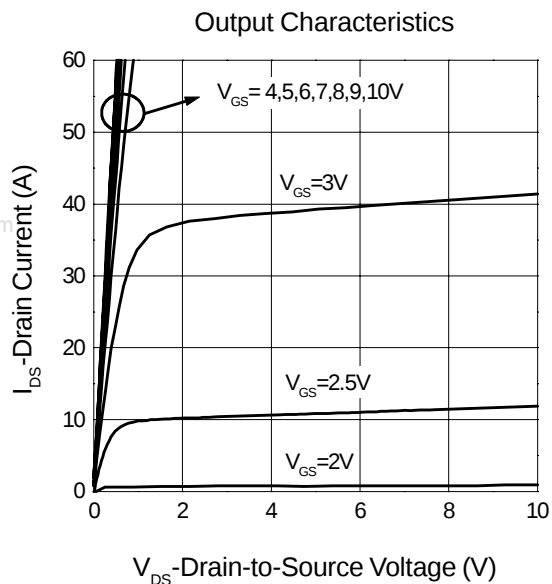
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	APM4220			Unit
			Min.	Typ.	Max.	
Static						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	25			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V , 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 Resistance	V _{GS} =10V, I _{DS} =14A		7.5	9	mΩ
		V _{GS} =4.5V,I _{DS} =8A		10	12	
V _{SD} ^a	Diode Forward Voltage	I _S =16A, V _{GS} =0V		0.7	1.2	V
Dynamic ^b						
Q _g	Total Gate Charge	V _{DS} =15V, I _{DS} =14A V _{GS} =4.5V,		16	20	nC
Q _{gs}	Gate-Source Charge			6		
Q _{gd}	Gate-Drain Charge			6		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, I _{DS} =1A, V _{GEN} =10V,R _G =6Ω,		10	15	ns
T _r	Turn-on Rise Time			7	13	
t _{d(OFF)}	Turn-off Delay Time			35	50	
T _f	Turn-off Fall Time			10	20	
C _{iss}	Input Capacitance	V _{GS} =0V V _{DS} =15V Frequency=1.0MHz		1785		pF
C _{oss}	Output Capacitance			605		
C _{rss}	Reverse Transfer Capacitance			490		

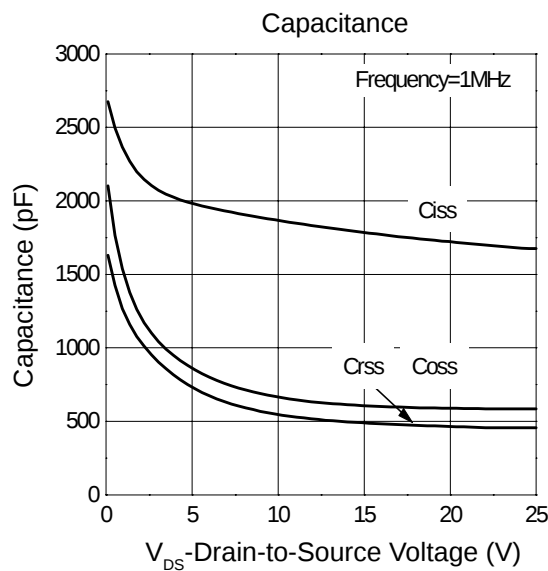
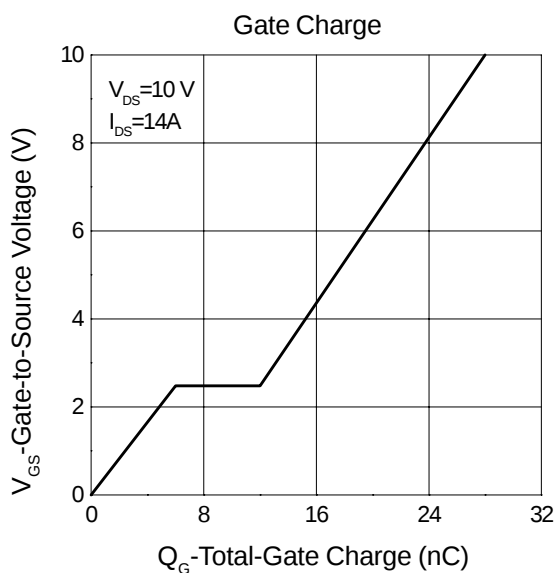
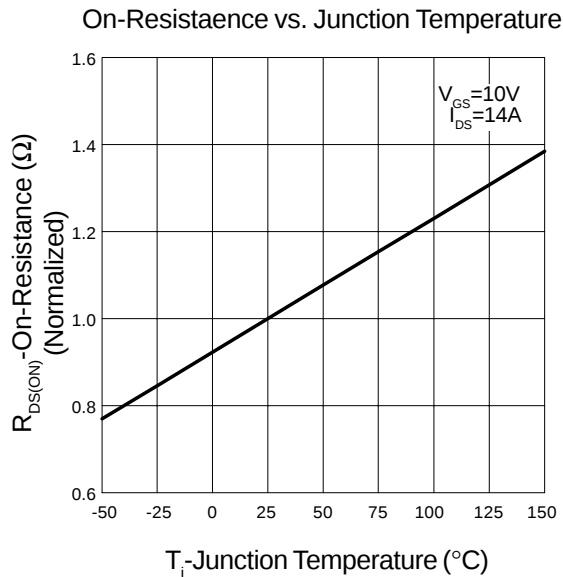
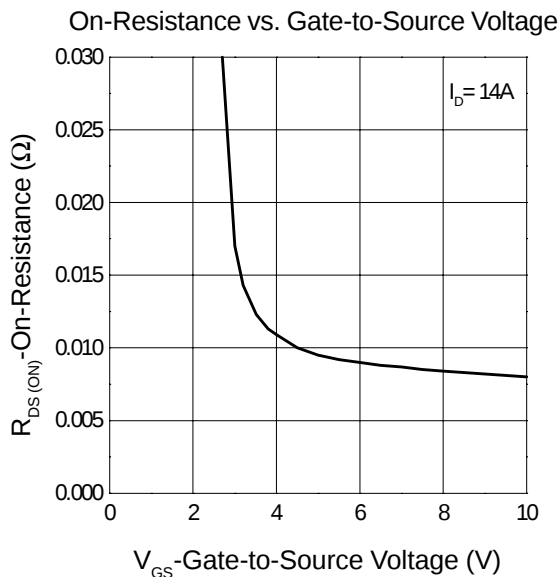
Notes
^a : Guaranteed by design, not subject to production testing

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

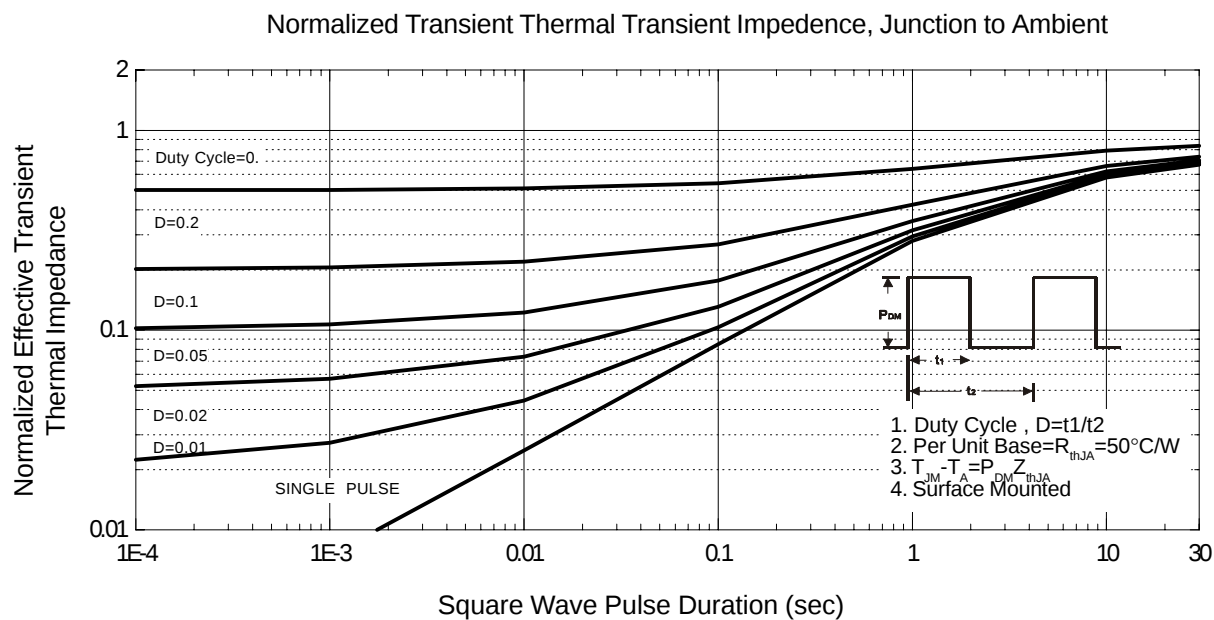
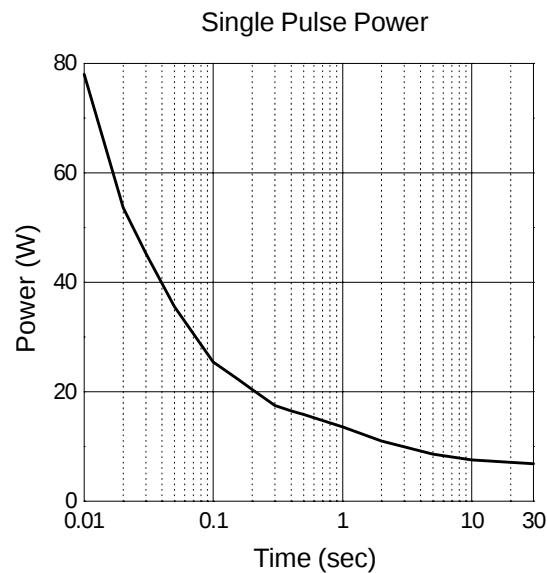
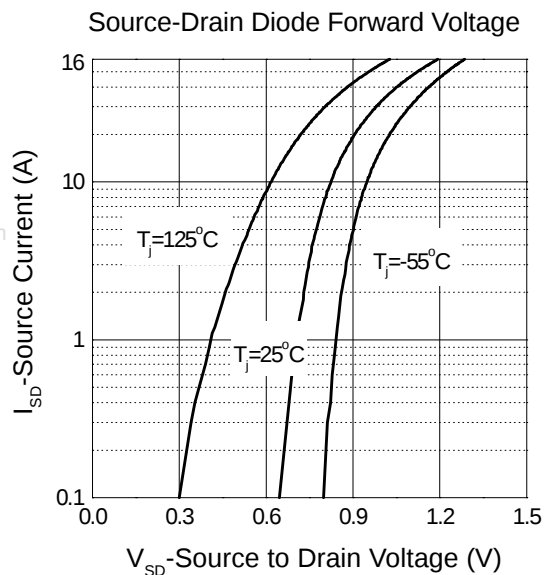
Typical Characteristics



Typical Characteristics (Cont.)

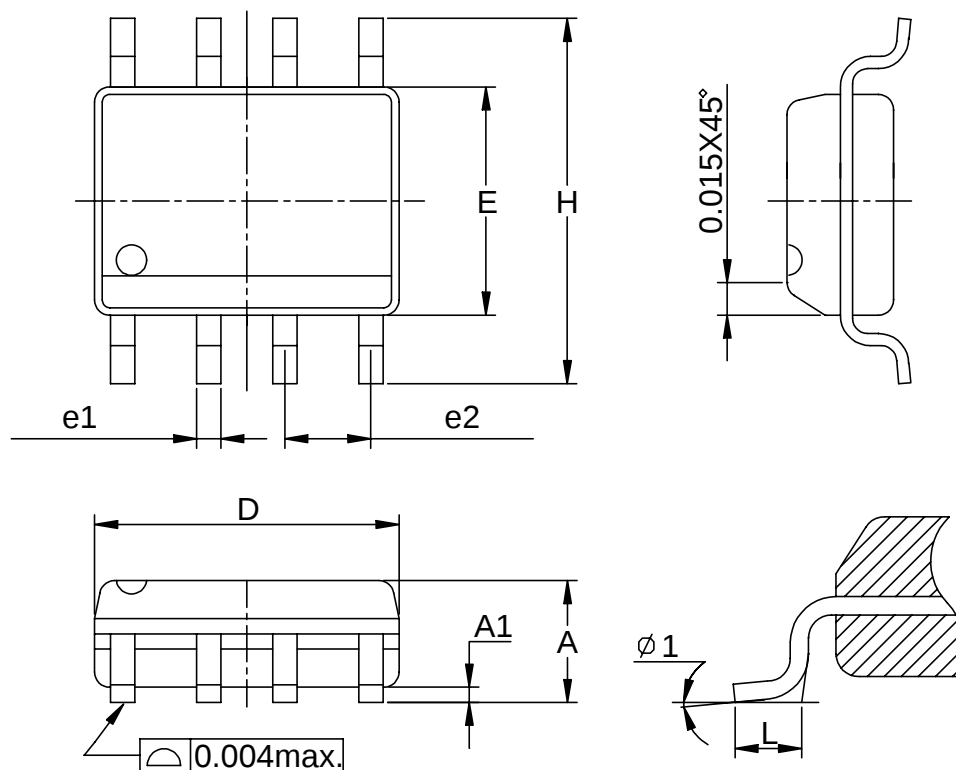


Typical Characteristics (Cont.)



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°	

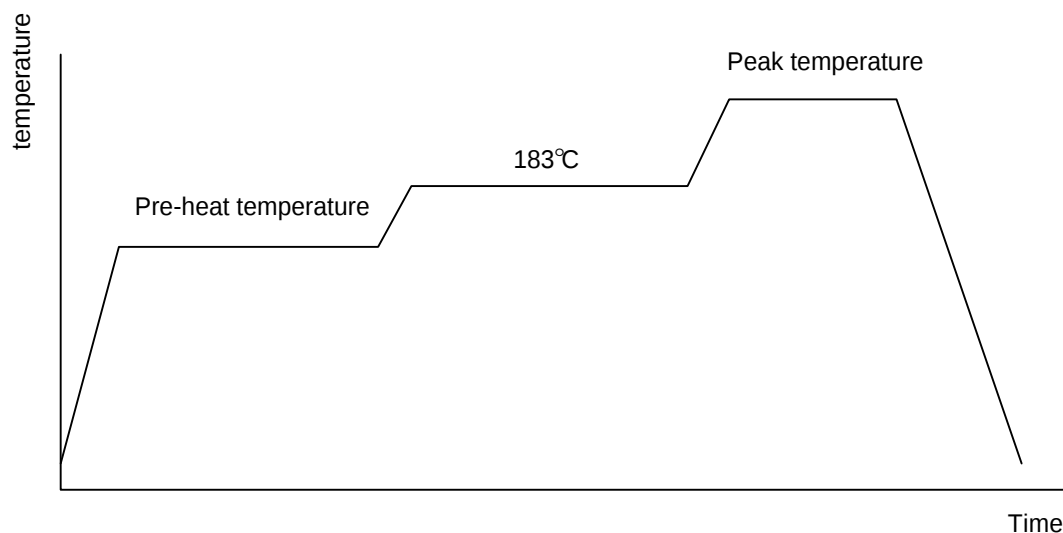
Physical Specifications

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

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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

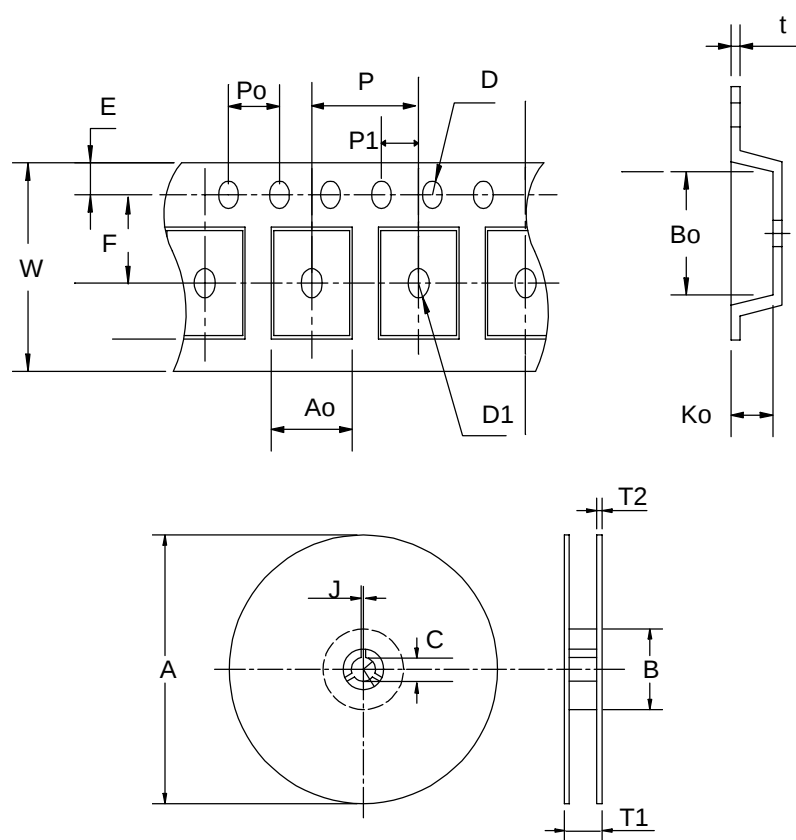
pkg. thickness ≥ 2.5mm and all bgas	pkg. thickness < 2.5mm and pkg. volume ≥ 350 mm ³	pkg. thickness < 2.5mm and pkg. volume < 350mm ³
Convection 220 +5/-0 °C		Convection 235 +5/-0 °C
VPR 215-219 °C		VPR 235 +5/-0 °C
IR/Convection 220 +5/-0 °C		IR/Convection 235 +5/-0 °C

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

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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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