N-Channel Enhancement Mode MOSFET

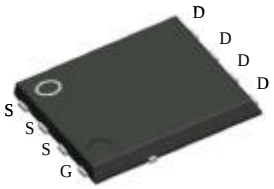
Features

- 30V/70A,
  $R_{DS(ON)}$ =4.5mΩ (typ.) @ V_{GS} = 10V
  $R_{DS(ON)}$ =6mΩ (typ.) @ V_{GS} = 4.5V
- Super High Dense Cell Design
- Avalanche Rated
- Reliable and Rugged
- Lead Free Available (RoHS Compliant)

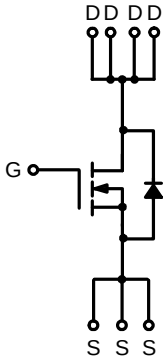
Applications

- Power Management in Notebook Computer, or Decktop Computer.

Pin Description



Top View of KPAK



N-Channel MOSFET

Ordering and Marking Information

APM4354 □□-□□ □

- Lead Free Code
- Handling Code
- Temp. Range
- Package Code

Package Code
KP : KPAK
Operating Junction Temp. Range
C : -55 to 150 °C
Handling Code
TU : Tube TR : Tape & Reel
Lead Free Code
L : Lead Free Device

APM4354 KP :

XXXXX - Date Code

Note: ANPEC lead-free products contain molding compounds/die attach materials and 100% matte in plate termination finish; which are fully compliant with RoHS and compatible with both SnPb and lead-free soldiering operations. ANPEC lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J STD-020C for MSL classification at lead-free peak reflow temperature.

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

Symbol	Parameter		Rating	Unit
Common Ratings (T_A=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_S	Diode Continuous Forward Current	T_C=25°C	50	A
I_{DP}	300µs Pulse Drain Current Tested	T_C=25°C	150	A
		T_C=100°C	90	
Mounted on Large Heat Sink				
I_D	Continuous Drain Current	T_C=25°C	70	A
		T_C=100°C	40	
P_D	Maximum Power Dissipation	T_C=25°C	50	W
		T_C=100°C	20	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		2.5	°C/W
Mounted on PCB of 1in^2 pad area				
I_D	Continuous Drain Current	T_A=25°C	17	A
		T_A=100°C	11	
P_D	Maximum Power Dissipation	T_A=25°C	2.5	W
		T_A=100°C	1	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		50	°C/W
Mounted on PCB of Minimum Footprint				
I_D	Continuous Drain Current	T_A=25°C	14	A
		T_A=100°C	8	
P_D	Maximum Power Dissipation	T_A=25°C	1.5	W
		T_A=100°C	0.5	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient		75	°C/W

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

Symbol	Parameter	Test Condition	APM4354KP			Unit
			Min.	Typ.	Max.	
Static Characteristics						
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
		T_j=85°C			30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1.3	1.8	2.5	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}=30A		4.5	5.5	mΩ
		V_{GS}=4.5V,I_{DS}=20A		6	8	
Diode Characteristics						
V_{SD} [a]	Diode Forward Voltage	I_{SD}=20A, V_{GS}=0V		0.75	1.1	V
t_{rr}	Reverse Recovery Time	I_{DS}=20A, dI_{SD}/dt=100A/μs		36		ns
Qrr	Reverse Recovery Charge			29		nC
Gate Charge Characteristics [b]						
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=10V, I_{DS}=30A		63	88	nC
Q_{gs}	Gate-Source Charge			10		
Q_{gd}	Gate-Drain Charge			19		
Dynamic Characteristics [b]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz		1		Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz		3350		pF
C_{oss}	Output Capacitance			425		
C_{rss}	Reverse Transfer Capacitance			330		
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V, R_L=15Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω		24	44	ns
t_r	Turn-on Rise Time			23	42	
$t_{d(OFF)}$	Turn-off Delay Time			73	132	
t_f	Turn-off Fall Time			27	50	

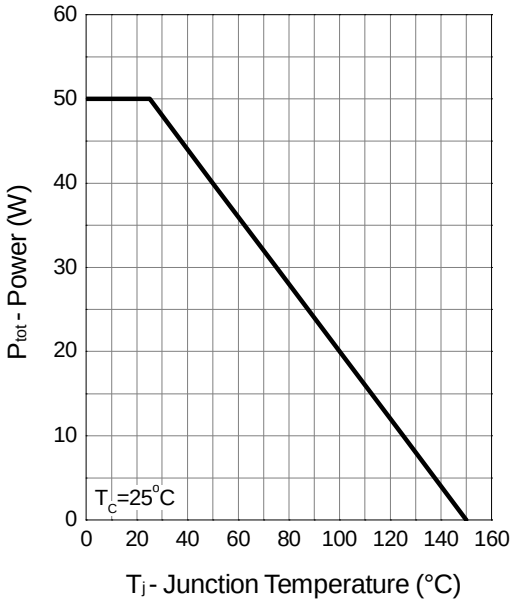
Note：

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

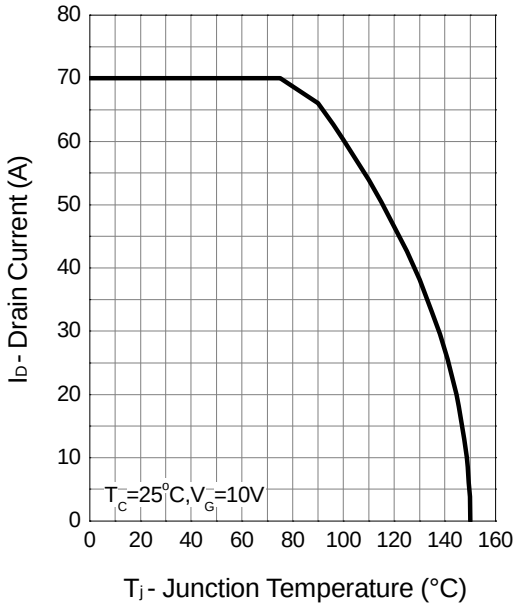
b : Guaranteed by design, not subject to production testing.

Typical Characteristics

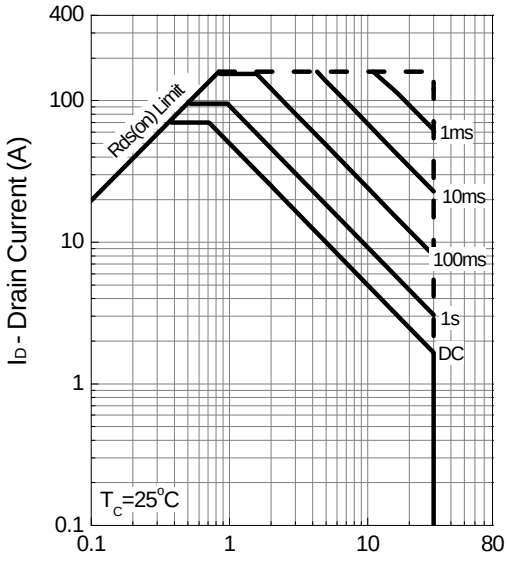
Power Dissipation



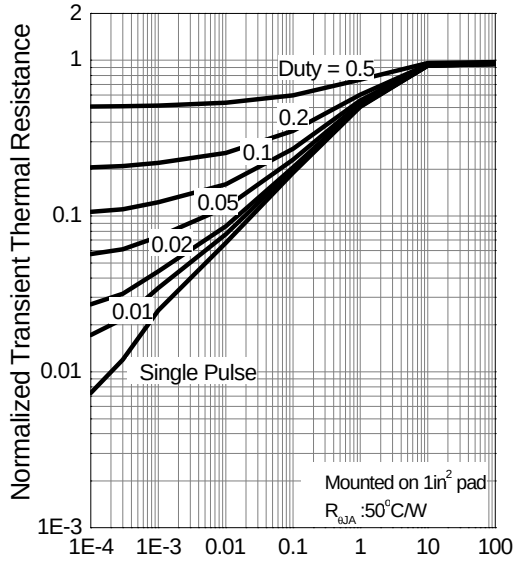
Drain Current



Safe Operation Area

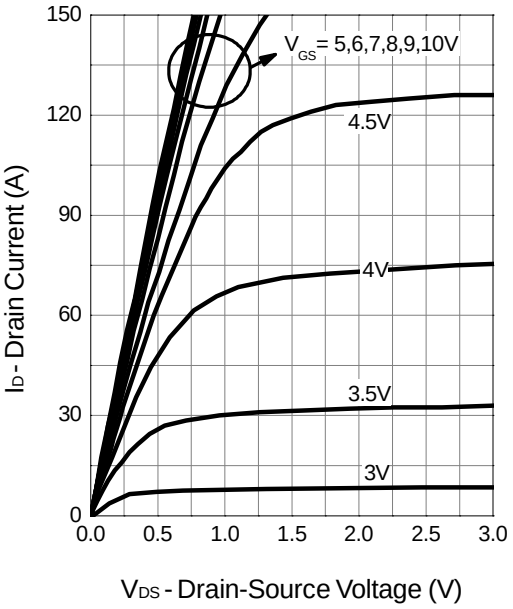


Thermal Transient Impedance

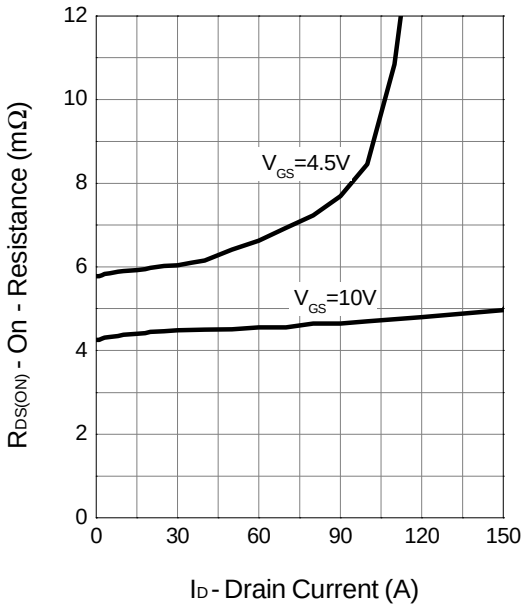


Typical Characteristics (Cont.)

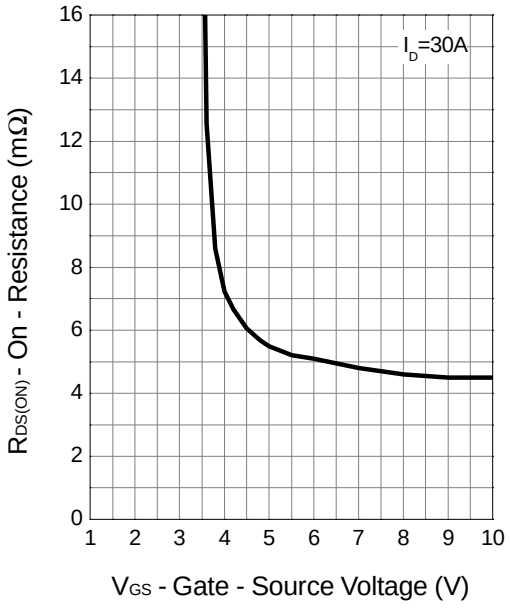
Output Characteristics



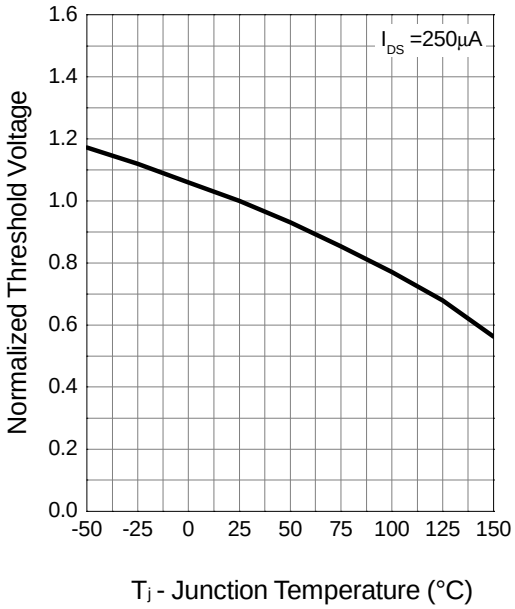
Drain-Source On Resistance



Gate-Source On Resistance

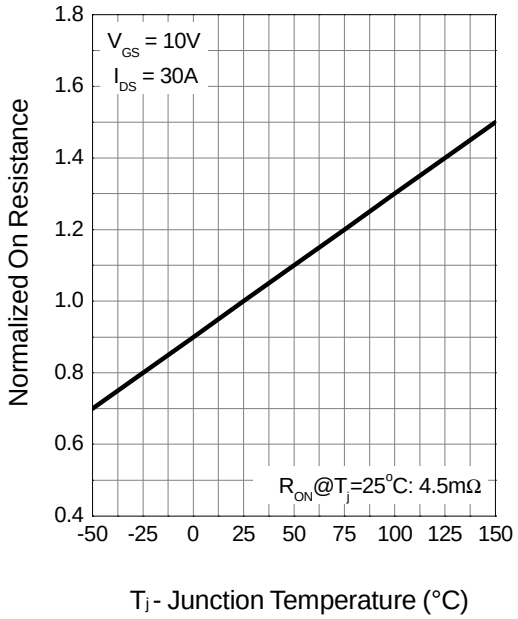


Gate Threshold Voltage

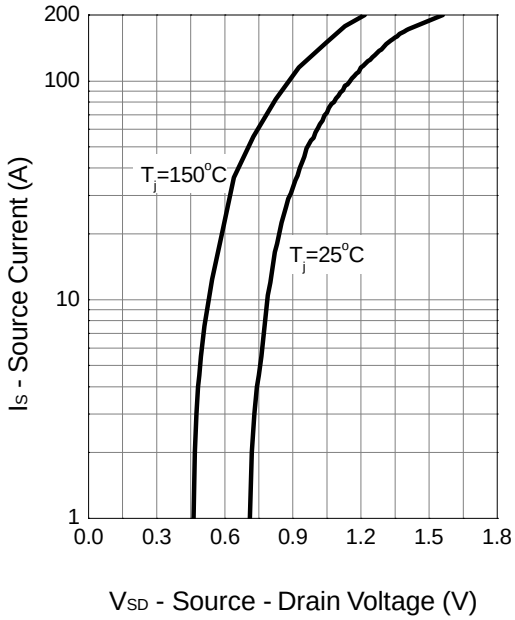


Typical Characteristics (Cont.)

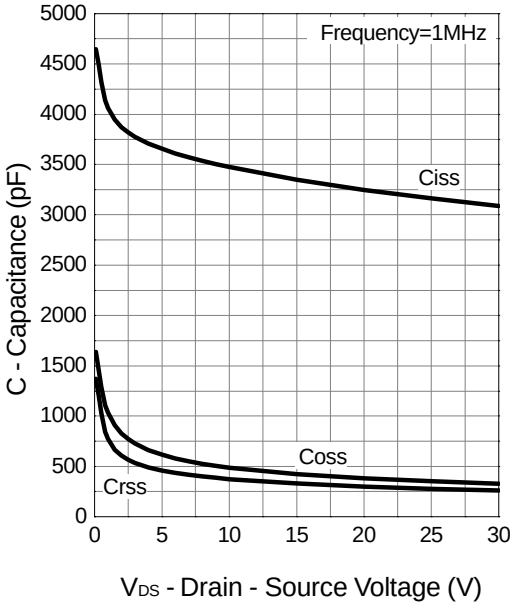
Drain-Source On Resistance



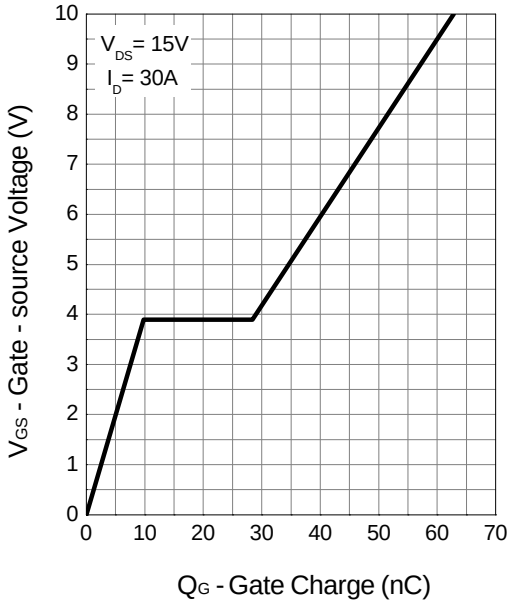
Source-Drain Diode Forward



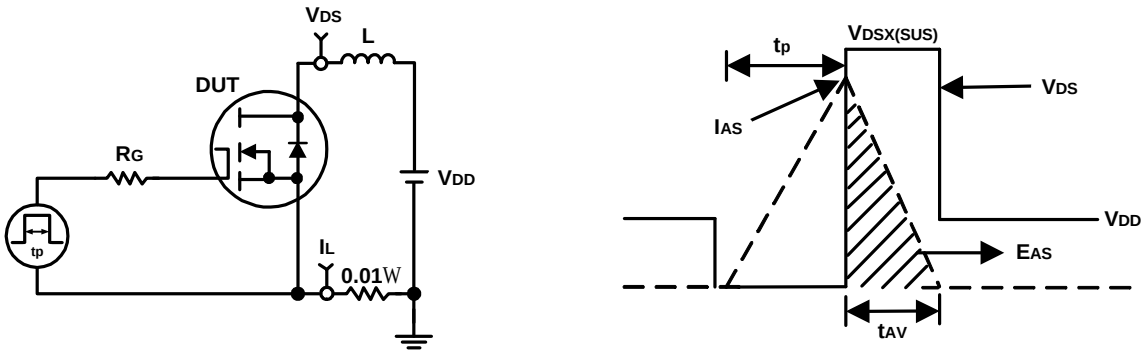
Capacitance



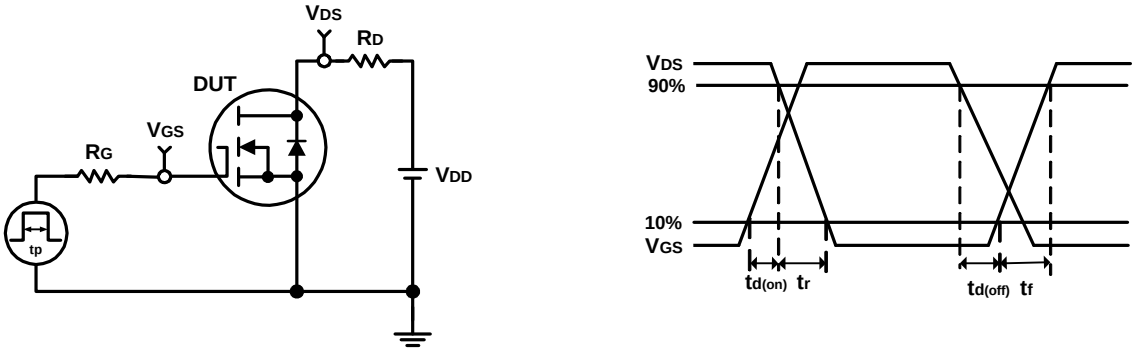
Gate Charge



Avalanche Test Circuit and Waveforms

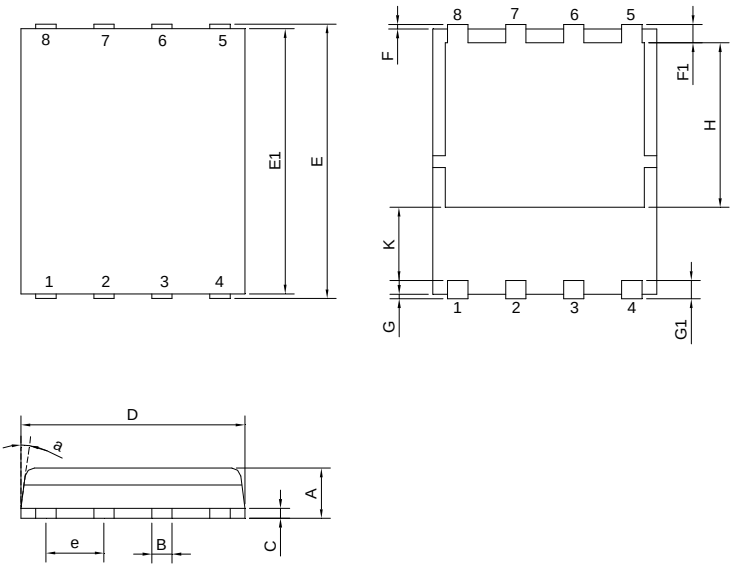


Switching Time Test Circuit and Waveforms



Packaging Information

KPAK (Reference JEDEC Registration MS-012)



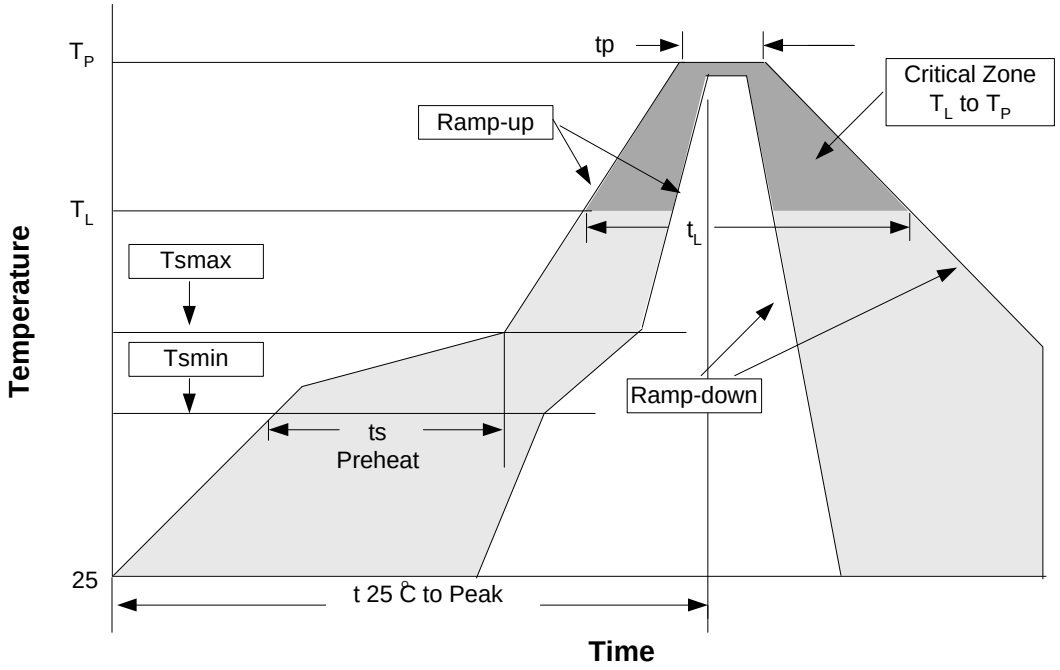
Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.00	1.20	0.039	0.047
B	0.38	0.51	0.015	0.020
C	0.19	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.90	6.10	0.232	0.240
E1	5.696	5.796	0.224	0.228
e	1.27 BSC		0.050 BSC	
F	0.052	0.152	0.002	0.006
F1	0.352	0.452	0.014	0.018
G	0.052	0.152	0.002	0.006
G1	0.352	0.452	0.014	0.018
H	3.491	3.691	0.137	0.145
K	1.60	-	0.063	-
a	0°	12°	0°	12°

Physical Specifications

Terminal Material	Solder-Plated Copper (Solder Material : 90/10 or 63/37 SnPb,100%Sn).
Lead Solderability	Meets EIA Specification RSI86-91, ANSI/J-STD-002 Category 3.

Reflow Condition

(IR/Convection or VPR Reflow)



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly		Pb-Free Assembly	
	Large Body	Small Body	Large Body	Small Body
Average ramp-up rate (T_L to T_P)	3°C/second max.		3°C/second max.	
Preheat - Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (min to max) (ts)	100°C 150°C 60-120 seconds		150°C 200°C 60-180 seconds	
Tsmax to T_L - Ramp-up Rate			3°C/second max	
Time maintained above: - Temperature (T_L) - Time (t_L)	183°C 60-150 seconds		217°C 60-150 seconds	
Peak Temperature (Tp)	225 +0/-5°C	240 +0/-5°C	245 +0/-5°C	250 +0/-5°C
Time within 5°C of actual Peak Temperature (tp)	10-30 seconds	10-30 seconds	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second max.		6°C/second max.	
Time 25°C to Peak Temperature	6 minutes max.		8 minutes max.	

Notes: All temperatures refer to topside of the package .Measured on the body surface.

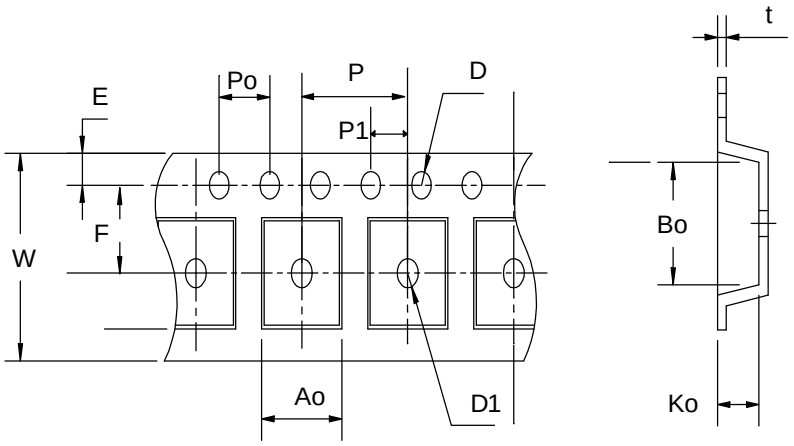
Package Refolw Conditions

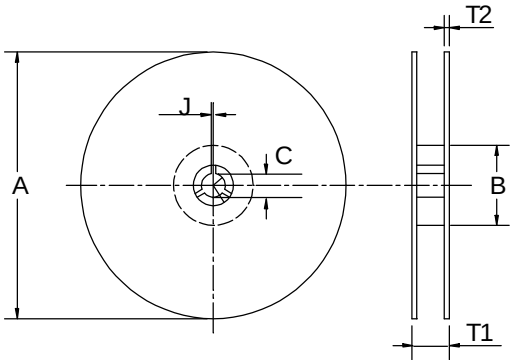
pkg. thickness ³ 2.5mm and all bags	pkg. thickness < 2.5mm and pkg. volume ³ 350mm³	pkg. thickness < 2.5mm and pkg. volume < 350mm³
Convection 220 +5/-0 ℃		Convection 235 +5/-0 ℃
VPR 215-219 ℃		VPR 235 +5/-0 ℃
IR/Convection 220 +5/-0 ℃		IR/Convection 220 +5/-0 ℃

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





Carrier Tape & Reel Dimensions(Cont.)

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

Cover Tape Dimensions

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

Customer Service

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