

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

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	30	V	
V_{GSS}	Gate-Source Voltage	± 20		
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
I_S	Diode Continuous Forward Current	$T_C = 25^\circ\text{C}$	50	A
I_{DP}	300 μs Pulse Drain Current Tested	$T_C = 25^\circ\text{C}$	140	A
		$T_C = 100^\circ\text{C}$	80	
Mounted on Large Heat Sink				
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	60	A
		$T_C = 100^\circ\text{C}$	35	
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	50	W
		$T_C = 100^\circ\text{C}$	20	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.5	$^\circ\text{C/W}$	
Mounted on PCB of 1in² pad area				
I_D	Continuous Drain Current	$T_A = 25^\circ\text{C}$	13.5	A
		$T_A = 100^\circ\text{C}$	8.5	
P_D	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	2.5	W
		$T_A = 100^\circ\text{C}$	1	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	50	$^\circ\text{C/W}$	
Mounted on PCB of Minimum Footprint				
I_D	Continuous Drain Current	$T_A = 25^\circ\text{C}$	10	A
		$T_A = 100^\circ\text{C}$	6	
P_D	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	1.5	W
		$T_A = 100^\circ\text{C}$	0.5	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	75	$^\circ\text{C/W}$	

Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	APM4350KP			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 T _j =85°C			1 30	μA
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		7.5	9	mΩ
		V _{GS} =4.5V, I _{DS} =15A		11.5	14.5	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} =15A, V _{GS} =0V		0.75	1.1	V
t _{rr}	Reverse Recovery Time	I _{DS} =15A, di _{SD} /dt=100A/μs		11		ns
Q _{rr}	Reverse Recovery Charge			3		nC
Gate Charge Characteristics^b						
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =30A		28	39	nC
Q _{gs}	Gate-Source Charge			4		
Q _{gd}	Gate-Drain Charge			9		
Dynamic Characteristics^b						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		1.6		Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz		1660		pF
C _{oss}	Output Capacitance			260		
C _{riss}	Reverse Transfer Capacitance			170		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω		18	33	ns
t _r	Turn-on Rise Time			15	28	
t _{d(OFF)}	Turn-off Delay Time			47	86	
t _f	Turn-off Fall Time			22	41	

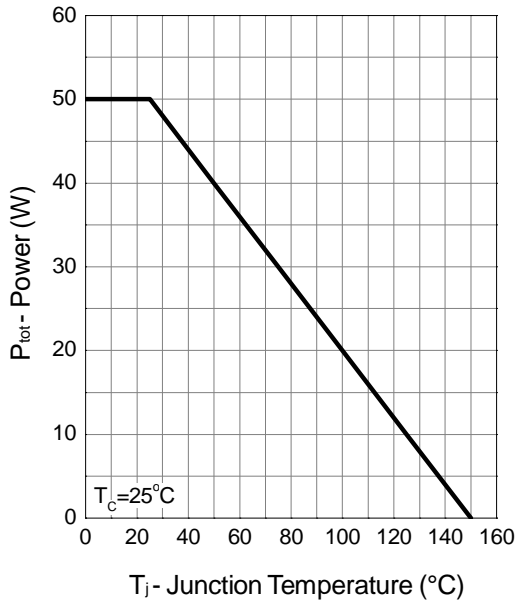
Note :

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

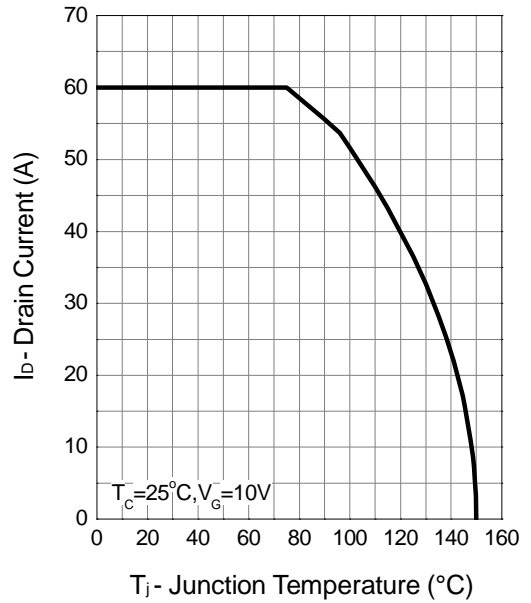
b : Guaranteed by design, not subject to production testing.

Typical Characteristics

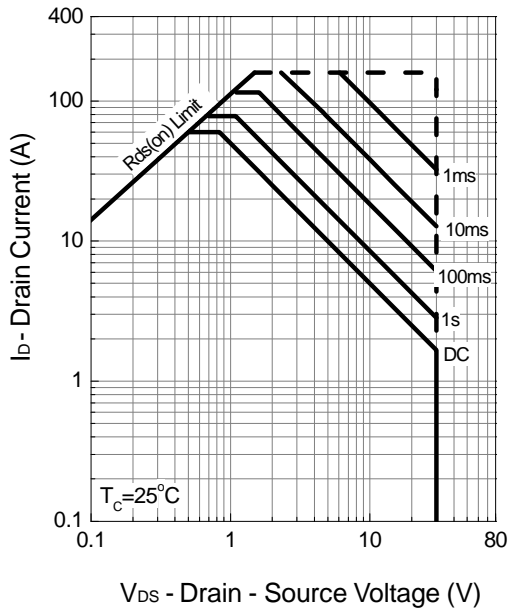
Power Dissipation



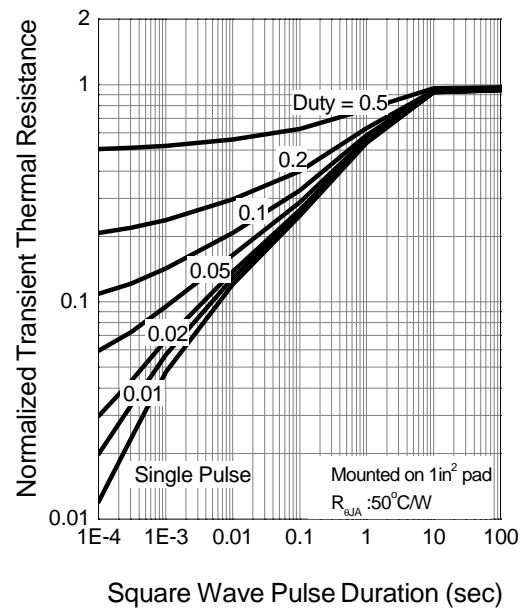
Drain Current



Safe Operation Area

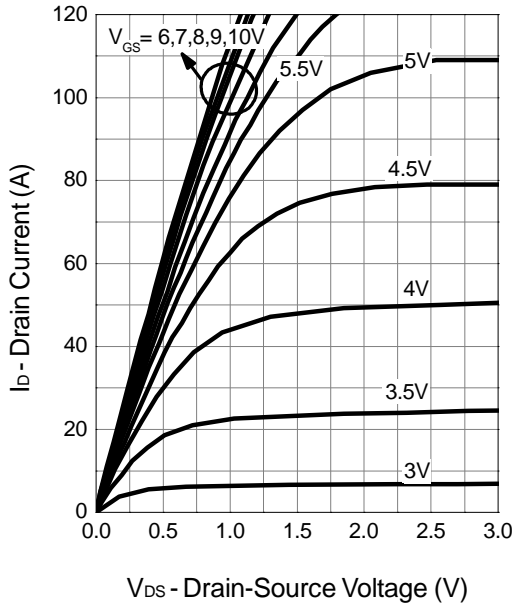


Thermal Transient Impedance

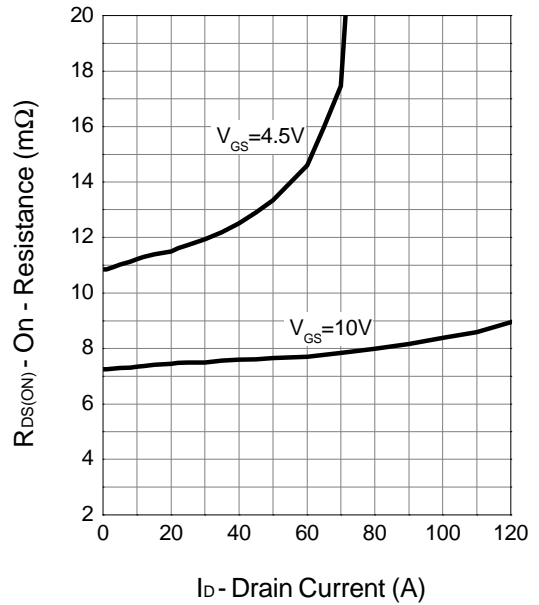


Typical Characteristics (Cont.)

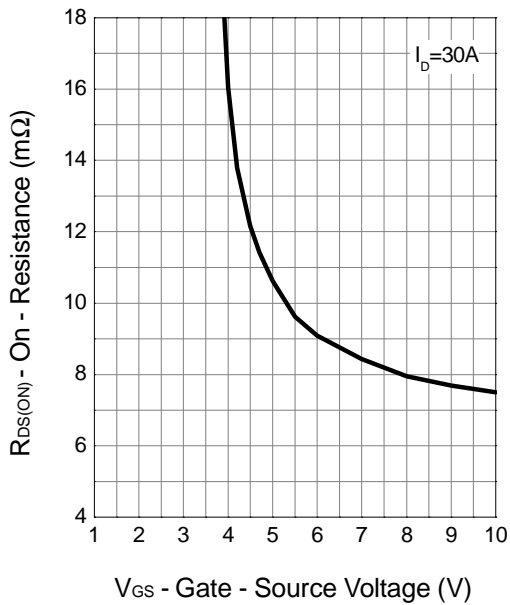
Output Characteristics



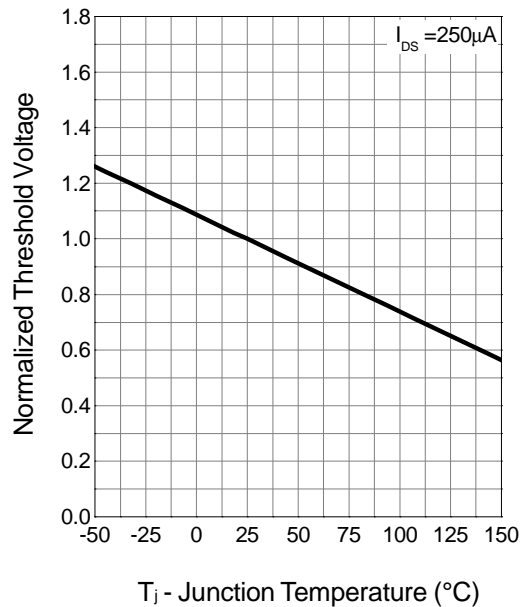
Drain-Source On Resistance



Gate-Source On Resistance

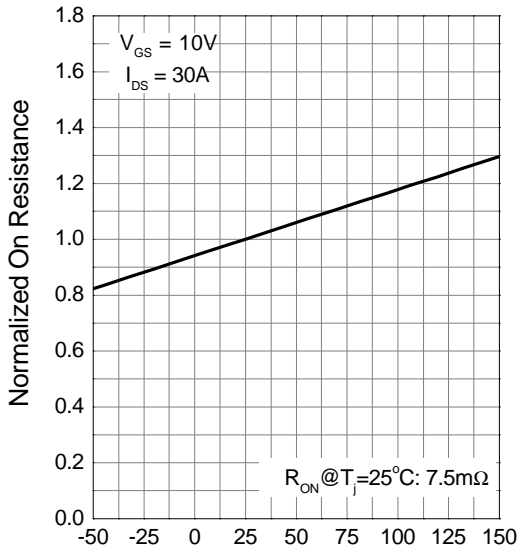


Gate Threshold Voltage



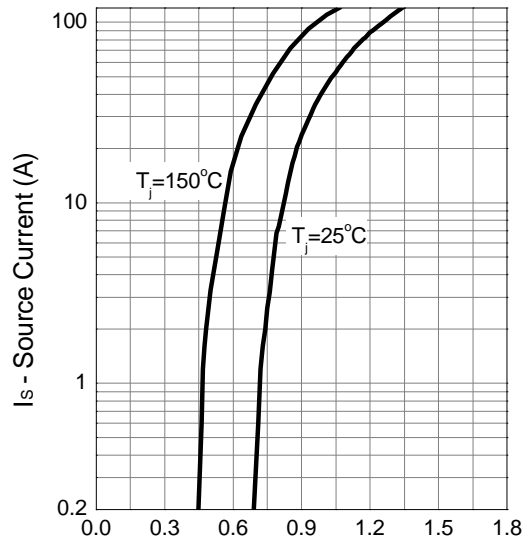
Typical Characteristics (Cont.)

Drain-Source On Resistance



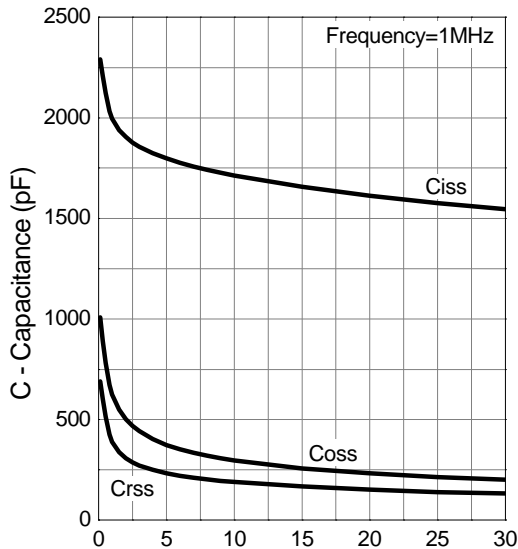
T_j - Junction Temperature (°C)

Source-Drain Diode Forward



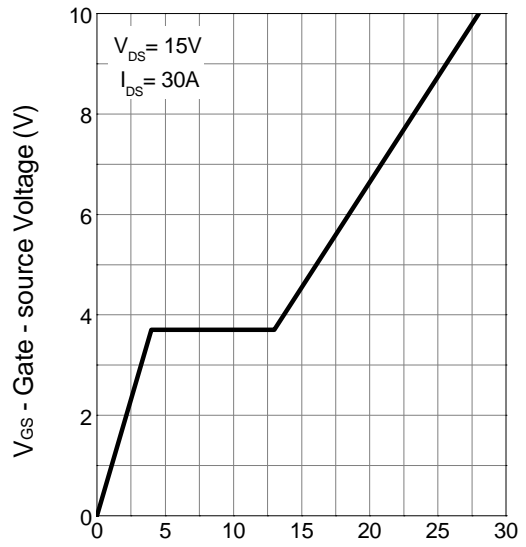
V_{SD} - Source - Drain Voltage (V)

Capacitance



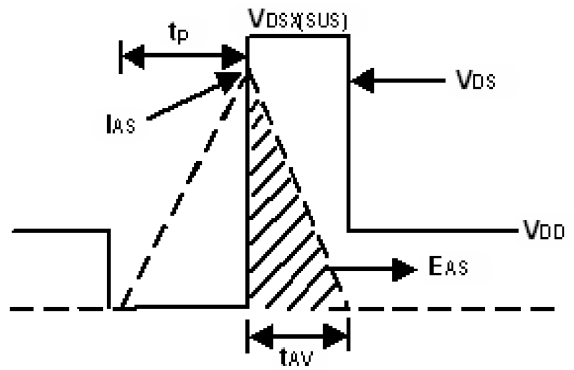
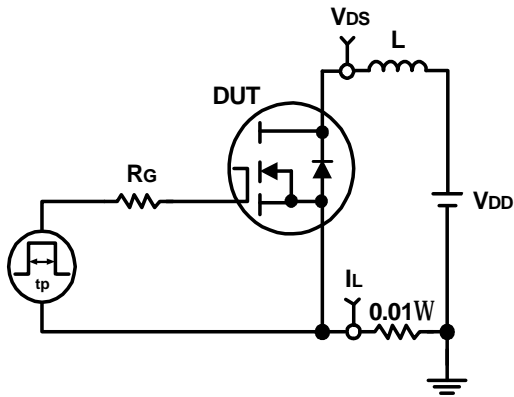
V_{DS} - Drain - Source Voltage (V)

Gate Charge

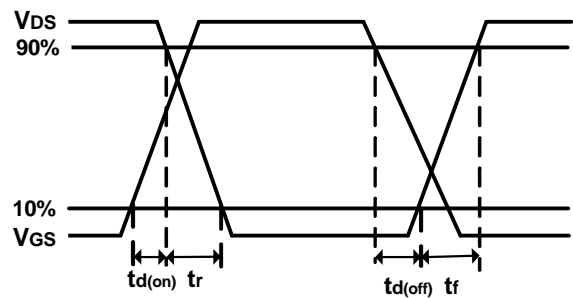
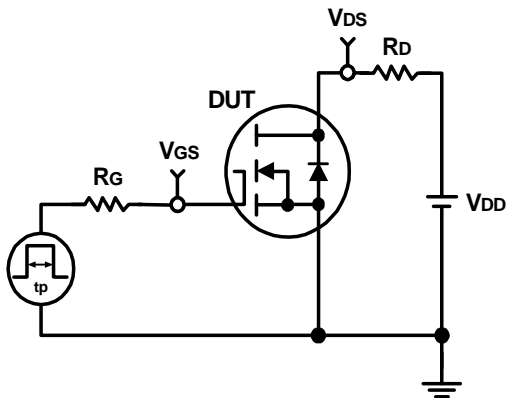


Q_G - Gate Charge (nC)

Avalanche Test Circuit and Waveforms

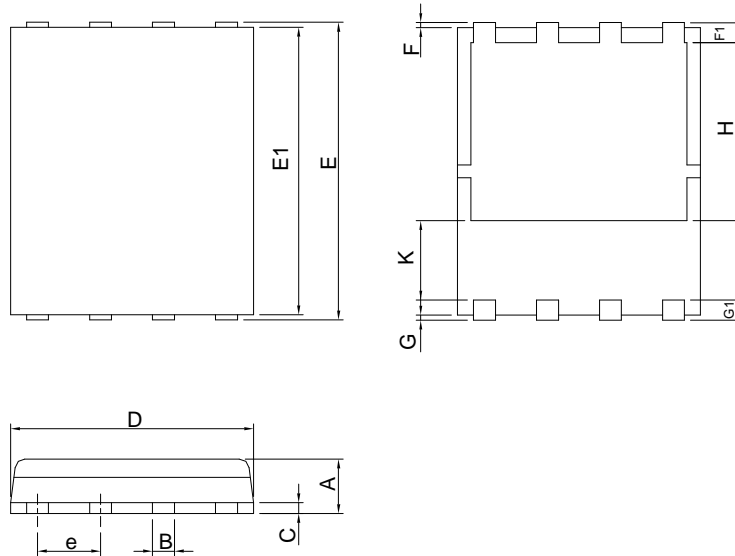


Switching Time Test Circuit and Waveforms



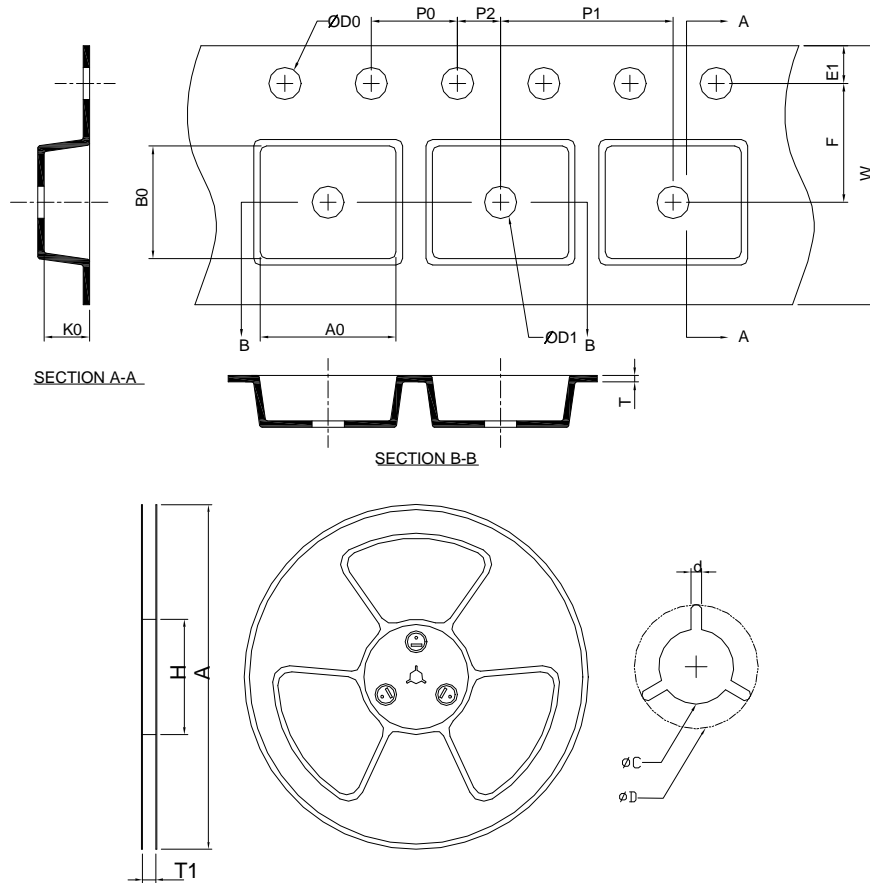
Package Information

KPAK



SYMBOL	KPAK			
	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	5.70	5.80	0.224	0.228
e	1.27 BSC		0.050 BSC	
F	0.05	0.15	0.002	0.006
F1	0.35	0.45	0.014	0.018
G	0.05	0.15	0.002	0.006
G1	0.35	0.45	0.014	0.018
H	3.49	3.69	0.137	0.145
K	1.60		0.063	

Carrier Tape & Reel Dimensions



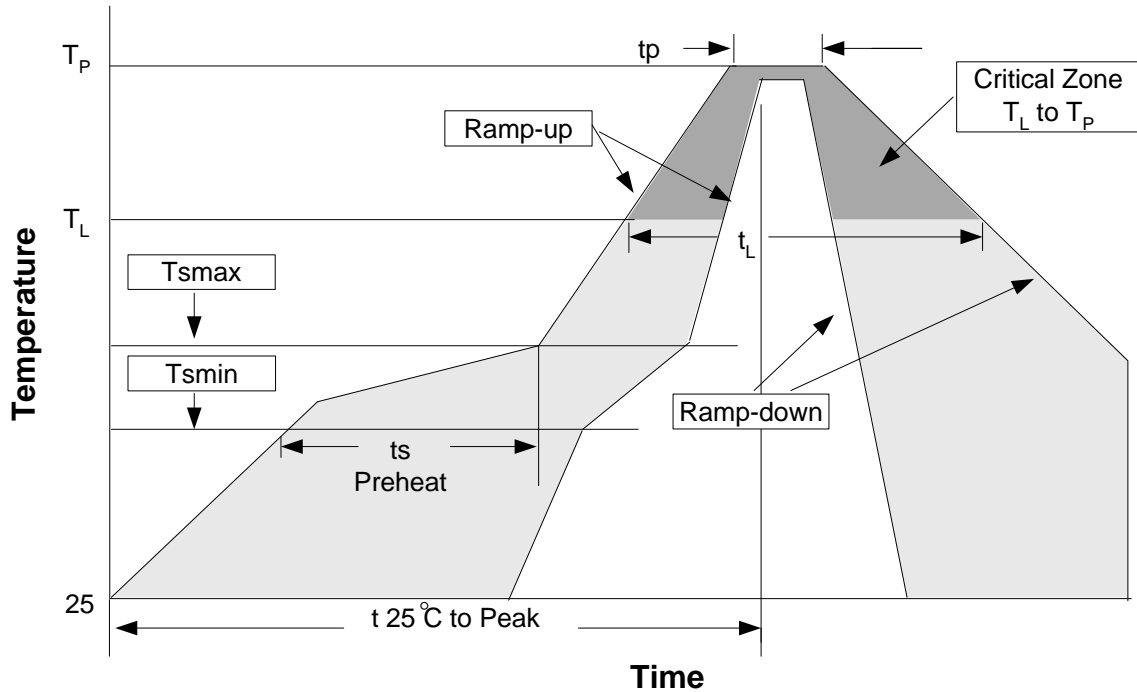
Application	A	H	T1	C	d	D	W	E1	F
KPAK	330.0 ± 2.00	50 MIN.	$12.4+2.00$ -0.00	$13.0+0.50$ -0.20	1.5 MIN.	20.2 MIN.	12.0 ± 0.30	1.75 ± 0.10	5.5 ± 0.10
	P0	P1	P2	D0	D1	T	A0	B0	K0
	4.0 ± 0.10	8.0 ± 0.10	2.0 ± 0.10	$1.5+0.10$ -0.00	1.5 MIN.	0.3 ± 0.05	6.5 ± 0.10	5.3 ± 0.10	1.4 ± 0.10

(mm)

Devices Per Unit

Package Type	Unit	Quantity
KPAK	Tape & Reel	2500

Reflow Condition (IR/Convection or VPR Reflow)



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

Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T _L to T _P)	3°C/second max.	3°C/second max.
Preheat		
- Temperature Min (T _{min})	100°C	150°C
- Temperature Max (T _{max})	150°C	200°C
- Time (min to max) (t _s)	60-120 seconds	60-180 seconds
Time maintained above:		
- Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	60-150 seconds
Peak/Classification Temperature (T _p)	See table 1	See table 2
Time within 5°C of actual Peak Temperature (t _p)	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.

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

Classification Reflow Profiles (Con.)

Table 1. SnPb Eutectic Process – Package Peak Reflow Temperatures

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	240 +0/-5°C	225 +0/-5°C
≥2.5 mm	225 +0/-5°C	225 +0/-5°C

Table 2. Pb-free Process – Package Classification Reflow Temperatures

Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
<1.6 mm	260 +0°C*	260 +0°C*	260 +0°C*
1.6 mm – 2.5 mm	260 +0°C*	250 +0°C*	245 +0°C*
≥2.5 mm	250 +0°C*	245 +0°C*	245 +0°C*

*Tolerance: The device manufacturer/supplier **shall** assure process compatibility up to and including the stated classification temperature (this means Peak reflow temperature +0°C. For example 260°C+0°C) at the rated MSL level.

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