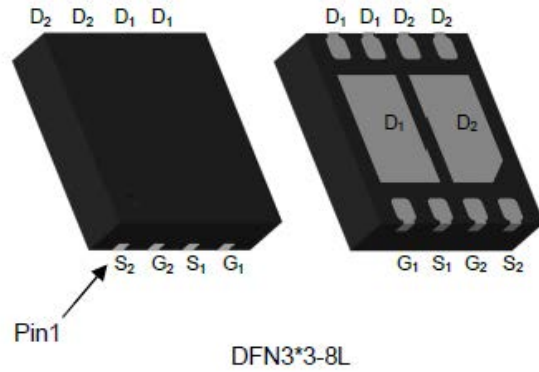


Dual N-Channel Enhancement Mode MOSFET

Feature

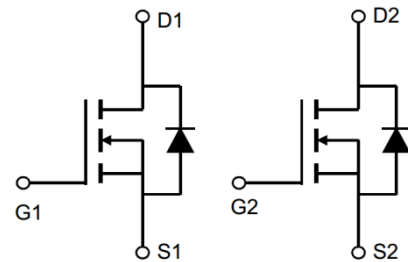
- 100V/10A  
 $R_{DS(ON)} = 74\text{ m}\Omega(\text{typ}) @ V_{GS} = 10\text{V}$   
 $R_{DS(ON)} = 90\text{ m}\Omega(\text{typ}) @ V_{GS} = 4.5\text{V}$
- 100% Avalanche Tested
- Reliable and Rugged
- Halogen Free and Green Devices Available (RoHS Compliant)

Pin Description



Applications

- Switching Application
- Power Management for DC/DC
- Battery Protection



Dual N-Channel MOSFET

Ordering and Marking Information

<p>HMS10DN10Q YYWW</p>	<p>Package Code Q: DFN3*3-8L</p> <p>Date Code YYWW</p>
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Note: Hongmei lead-free products contain molding compounds/die attach materials and 100% matte tin plate Termination finish, which are fully compliant with RoHS. Hongmei lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J-STD-020 for MSL classification at lead-free peak reflow temperature. Hongmei defines "Green" to mean lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

Hongmei reserves the right to make changes, corrections, enhancements, modifications, and improvements to this product and/or to this document at any time without notice.

### Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
<b>Common Ratings</b> (Tc=25°C Unless Otherwise Noted)				
V <sub>DSS</sub>	Drain-Source Voltage		100	V
V <sub>GSS</sub>	Gate-Source Voltage		±20	V
T <sub>J</sub>	Junction Temperature Range		-55 to 150	°C
T <sub>STG</sub>	Storage Temperature Range		-55 to 150	°C
I <sub>S</sub>	Source Current-Continuous(Body Diode)	Tc=25°C	10	A
<b>Mounted on Large Heat Sink</b>				
I <sub>DM</sub>	Pulsed Drain Current *	Tc=25°C	30	A
I <sub>D</sub>	Continuous Drain Current	Tc=25°C	10	A
		Tc=100°C	7	A
P <sub>D</sub>	Maximum Power Dissipation	Tc=25°C	17.8	W
		Tc=100°C	7.1	W
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case		7	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient		75	°C/W
E <sub>AS</sub>	SinglePulsed-Avalanche Energy **	L=0.1mH	10	mJ

Note: \* R epetitive rating; pulse width limited by max.junction temperature.  
 \*\* Limited by T<sub>Jmax</sub> , starting T<sub>J</sub>=25°C, L = 0.1mH, R<sub>G</sub>= 25Ω, V<sub>GS</sub>=10V.

### Electrical Characteristics(Tc =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HMS10DN10Q			Unit
			Min	Typ.	Max	
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	100	-		V
I <sub>DSS</sub>	Drain-to-Source LeakageCurrent	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V	-	-	1	μA
		T <sub>J</sub> =125°C	-	-	50	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1	1.8	2.5	V
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =± 20V, V <sub>DS</sub> =0V	-	-	±100	nA
R <sub>DS(ON)*</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =6A	-	74	85	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =4A		90	115	
<b>Diode Characteristics</b>						
V <sub>SD*</sub>	Diode Forward Voltage	I <sub>SD</sub> =1A, V <sub>GS</sub> =0V	-	0.7	1.0	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =6A, dI <sub>SD</sub> /dt=100A/μs	-	8	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	19	-	nC

**Electrical Characteristics (Cont.)** (Tc =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HMS10DN10Q			Unit
			Min	Typ.	Max	
<b>Dynamic Characteristics</b>						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1 MHz	-	2.0	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, Frequency=1.0MHz	-	354	-	pF
C <sub>oss</sub>	Output Capacitance					
C <sub>rss</sub>	Reverse Transfer Capacitance					
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DD</sub> =10V, R <sub>G</sub> =4Ω, I <sub>DS</sub> =6A, V <sub>GS</sub> =10V	-	3.9	-	ns
T <sub>r</sub>	Turn-on Rise Time					
t <sub>d(OFF)</sub>	Turn-off Delay Time					
T <sub>f</sub>	Turn-off Fall Time					
<b>Gate Charge Characteristics</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =24V, V <sub>GS</sub> =10V, I <sub>D</sub> =6A	-	9	-	nC
Q <sub>gs</sub>	Gate-Source Charge					
Q <sub>gd</sub>	Gate-Drain Charge					

Note: \*Pulse test, pulse width ≤ 300us, duty cycle ≤ 2%

Typical Operating Characteristics

Figure 1: Power Dissipation

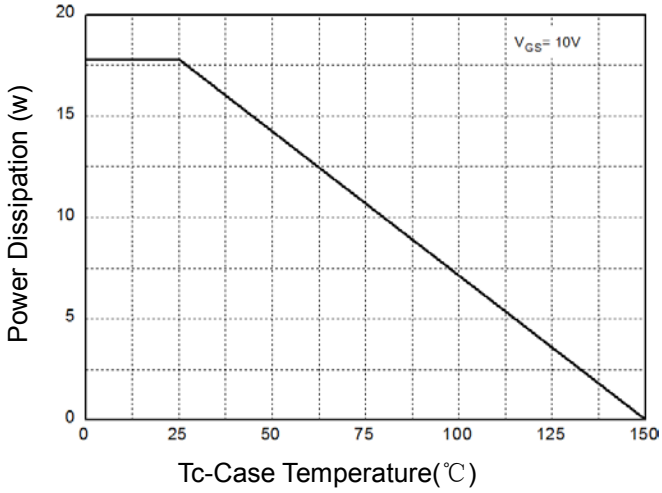


Figure 2: Drain Current

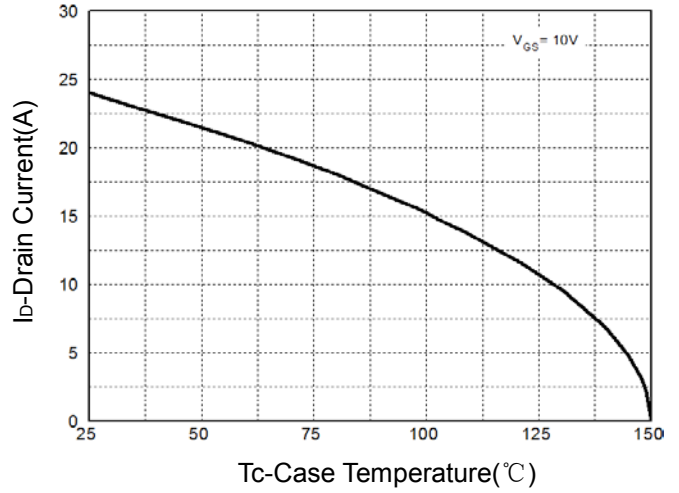


Figure 3: Safe Operation Area

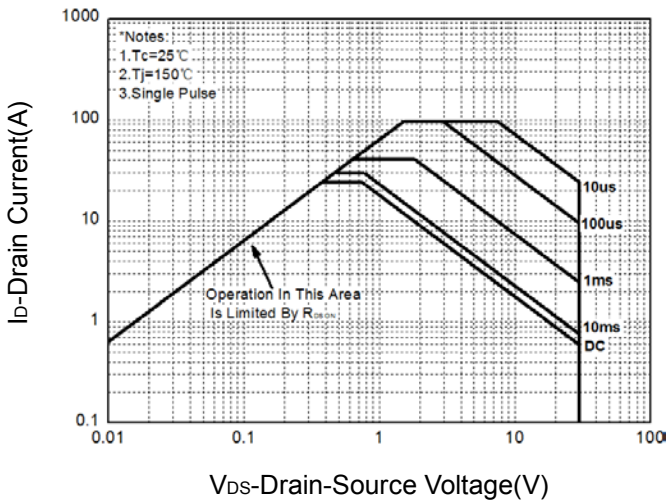


Figure 4: Thermal Transient Impedance

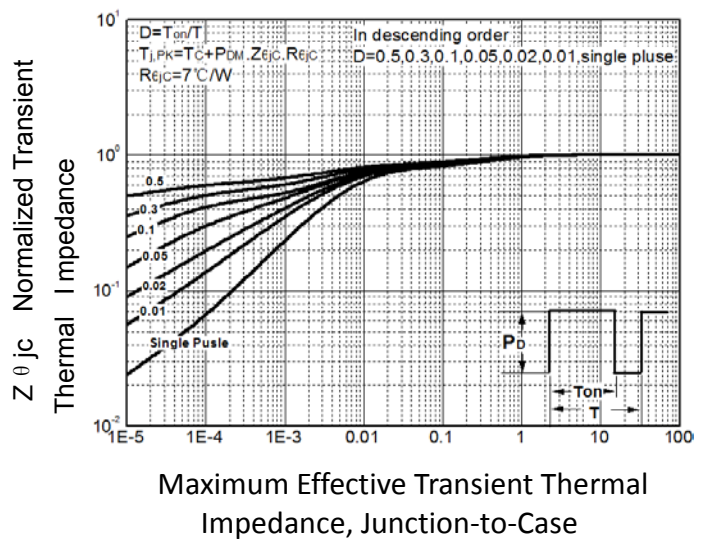


Figure 5: Output Characteristics

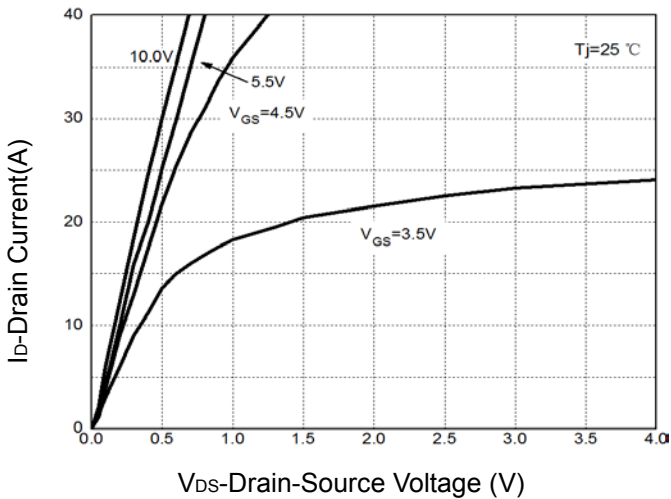
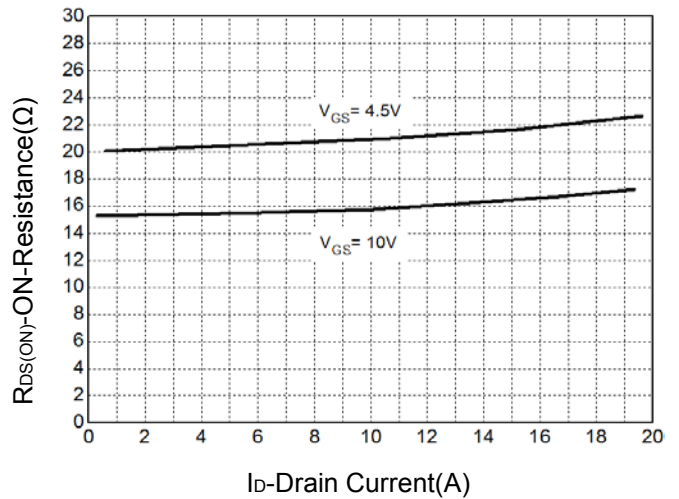


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics

Figure 7: On-Resistance vs. Temperature

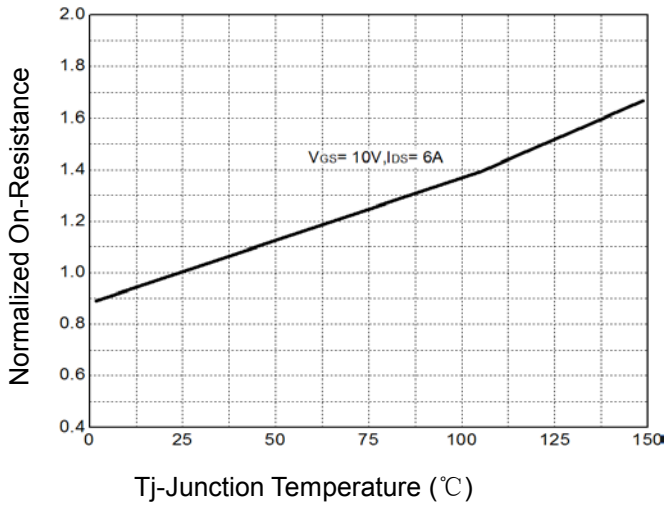


Figure 8: Source-Drain Diode Forward

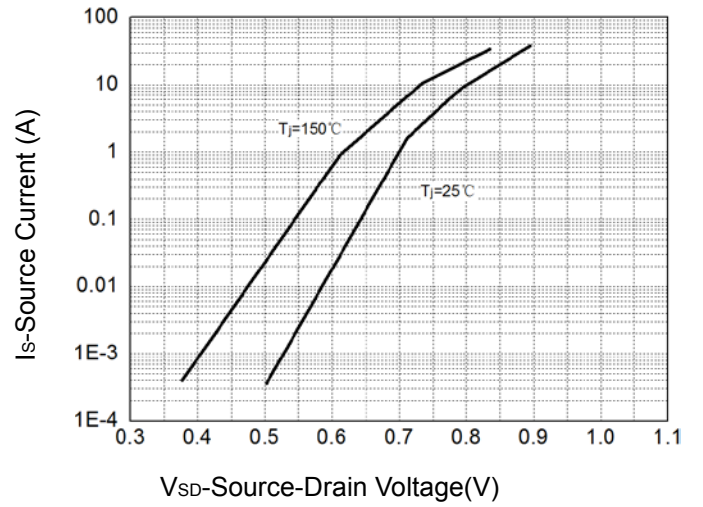


Figure 9: Capacitance Characteristics

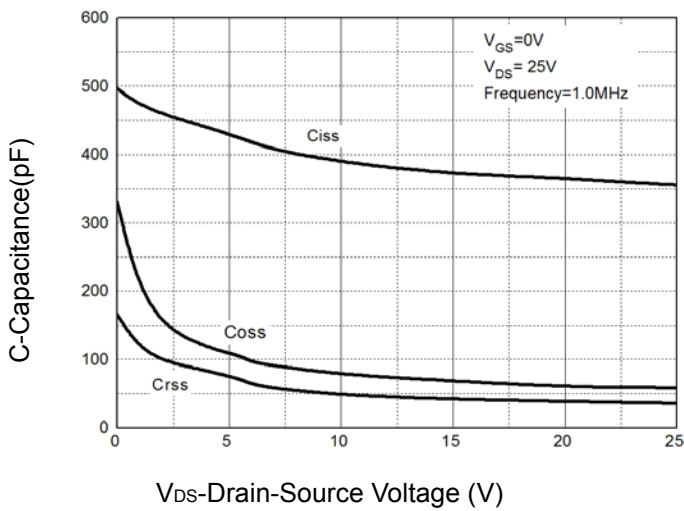
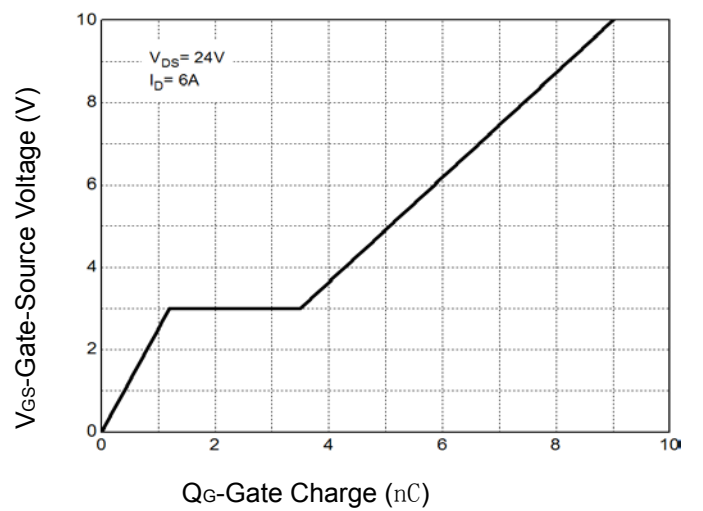
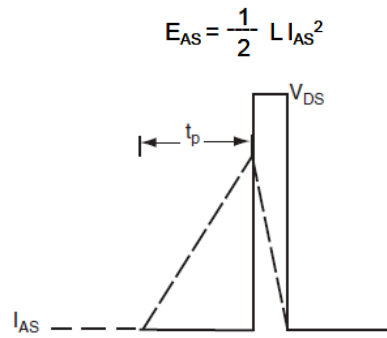


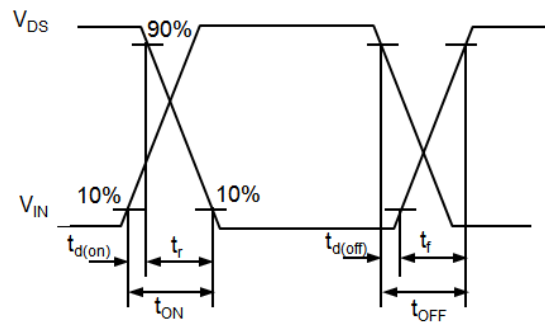
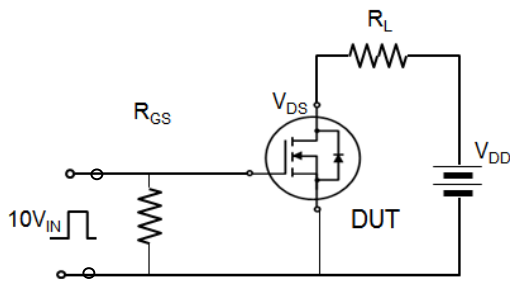
Figure 10: Gate Charge Characteristics



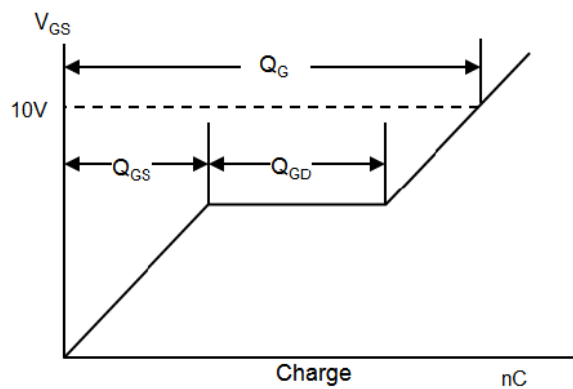
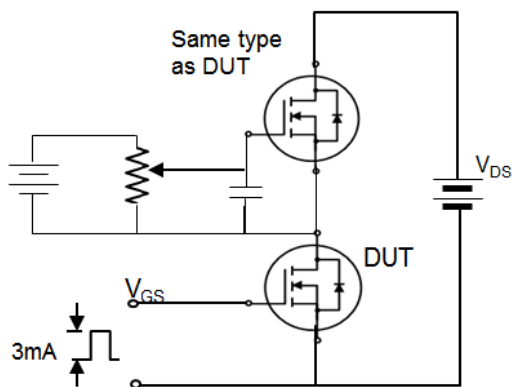
### Avalanche Test Circuit



### Switching Time Test Circuit



### Gate Charge Test Circuit

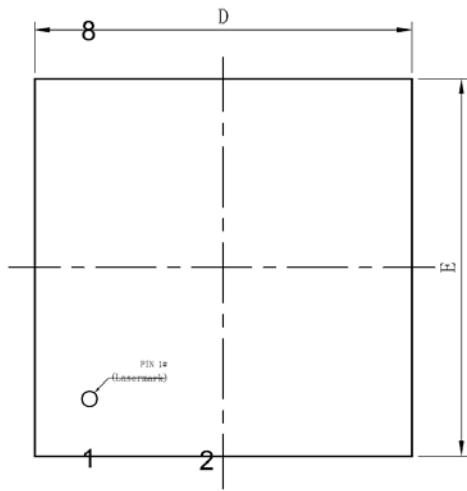


Device Per Unit

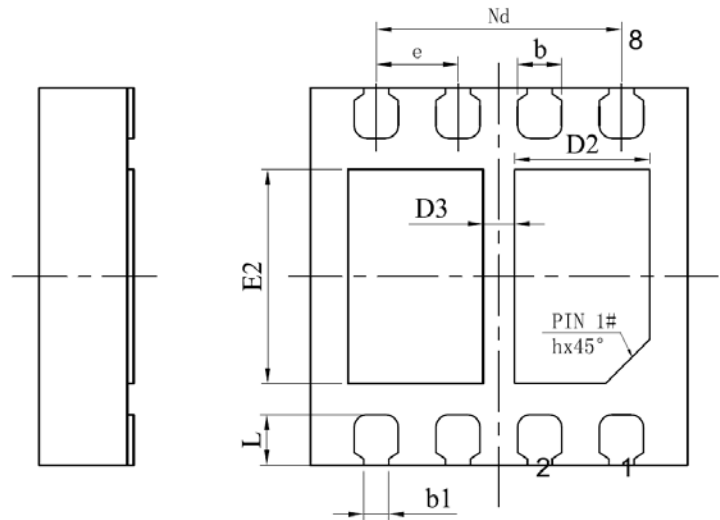
Package Type	Unit	Quantity
DFN3*3-8L	Reel	3000

Package Information

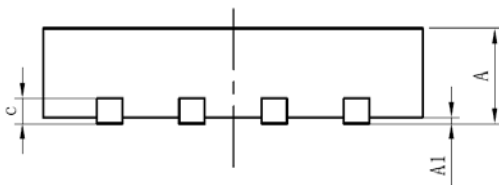
DFN3\*3-8L



TOP VIEW



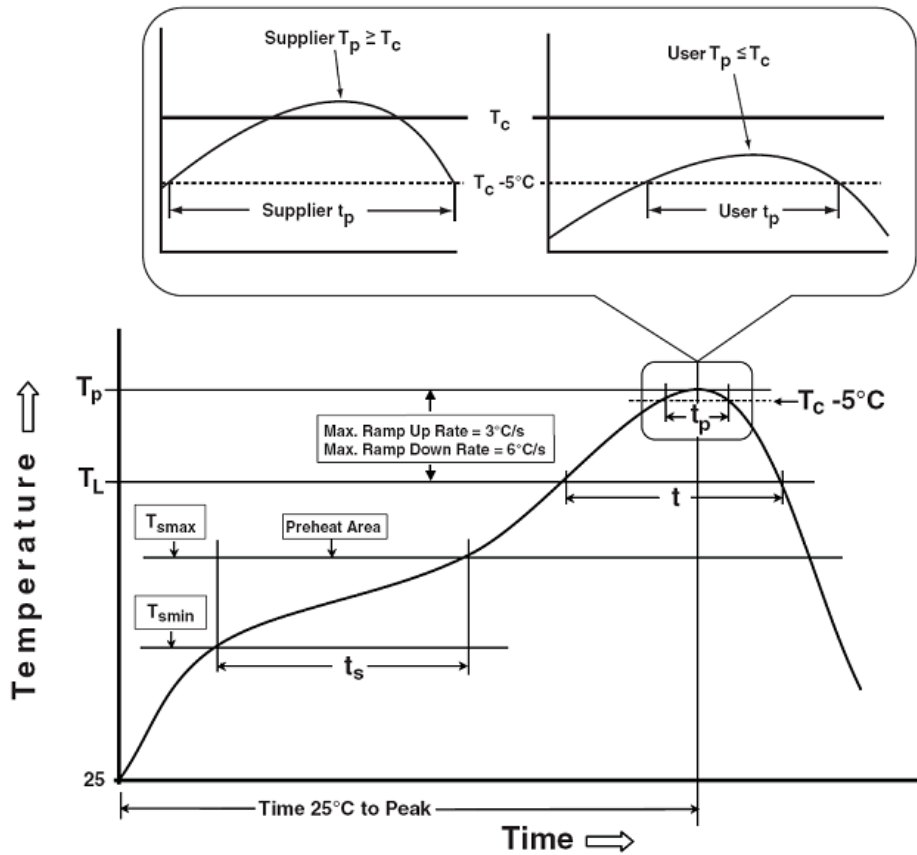
BOTTOM VIEW



SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b	0.25	0.30	0.35
b1	0.20REF		
c	0.18	0.20	0.23
D	2.90	3.00	3.10
D2	0.975	1.075	1.175
D3	0.25REF		
Nd	1.90	1.95	2.00
E	2.90	3.00	3.10
E2	1.60	1.70	1.80
e	0.65BSC		
L	0.35	0.40	0.45
h	0.30	0.35	0.40

Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
<b>Preheat &amp; Soak</b>		
Temperature min ( $T_{smin}$ )	100 °C	150 °C
Temperature max ( $T_{smax}$ )	150 °C	200 °C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60-120 seconds	60-120 seconds
Average ramp-up rate ( $T_{smax}$ to $T_P$ )	3 °C/second max.	3 °C/second max.
Liquidous temperature ( $T_L$ )	183 °C	217 °C
Time at liquidous ( $t_L$ )	60-150 seconds	60-150 seconds
Peak package body Temperature ( $T_p$ )*	See Classification Temp in table 1	See Classification Temp in table 2
Time ( $t_p$ )** within 5°C of the specified classification temperature ( $T_c$ )	20** seconds	30** seconds
Average ramp-down rate ( $T_p$ to $T_{smax}$ )	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.
*Tolerance for peak profile Temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.		
** Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.		



Table 1.SnPb Eutectic Process – Classification Temperatures (Tc)

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2.Pb-free Process – Classification Temperatures (Tc)

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350-2000	Volume mm <sup>3</sup> ≥2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

### Reliability Test Program

Test item	Method	Description
SOLDERABILITY	JESD-22, B102	5 Sec, 245°C
HTRB	JESD-22, A108	168 Hrs \ 500Hrs\ 1000 Hrs, Bias @ 125°C
PCT	JESD-22, A102	96 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -55°C~150°C