Dual P-Channel Enhancement Mode MOSFET

Feature

- -20V/-3.5A
  $R_{DS(ON)}$= 65 m (typ.) @V_{GS} = -4.5V
  $R_{DS(ON)}$= 87 m (typ.) @V_{GS} = -2.5V
  $R_{DS(ON)}$= 128 m (typ.) @V_{GS} = -1.8V
- Reliable and Rugged
- Halogen Free and Green Devices Available
  (RoHS Compliant)

Pin Description

Applications

- Switching Application
- Lithium battery protect board

Ordering and Marking Information

C6
850PD2
XYMXXN

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		-20	V
V_{GSS}	Gate-Source Voltage		±10	V
T_J	Junction Temperature Range		-55 to 175	℃
T_{STG}	Storage Temperature Range		-55 to 175	℃
I_S	Source Current-Continuous(Body Diode)	Tc=25°C	-3.5	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25°C	-14	A
I_D	Continuous Drain Current	Tc=25°C	-3.5	A
		Tc=100°C	-2.5	A
P_D	Maximum Power Dissipation	Tc=25°C	2	W
		Tc=100°C	1	W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient **		75	°C/W

Note: * Repetitive rating pulse width limited by max.junction temperature.
** Surface mounted on 1in2 FR-4 board.

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

Symbol	Parameter	Test Conditions	HYG850PD02KA1			Unit
			Min	Typ.	Max	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_{DS}=-250 A	-20	-	-	V
I_{DSS}	Drain-to-Source Leakage Current	V_{DS}=-20V,V_{GS}=0V	-	-	-1	A
		T_j=125°C	-		-50	A
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250 A	-0.4	-0.65	-1.0	V
I_{GSS}	Gate-Source Leakage Current	V_{GS}= 10V,V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$*	Drain-Source On-State Resistance	V_{GS}=-4.5V,I_{DS}=-3A	-	65	95	m
		V_{GS}=-2.5V,I_{DS}=-3A		87	120	m
		V_{GS}=-1.8V,I_{DS}=-2A		128	180	m
Diode Characteristics						
V_{SD}*	Diode Forward Voltage					

Electrical Characteristics (Cont.) (Tc =25°C Unless Otherwise Noted) 15

Symbol	Parameter	Test Conditions	HYG850PD02KA1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V, Frequency=1.0MHz	-	20	-	
C_{iss}	Input Capacitance	V_{GS}=0V,	-	582	-	pF
C_{oss}	Output Capacitance	V_{DS}=-16V,	-	50	-	
C_{rss}	Reverse Transfer Capacitance	Frequency=1.0MHz	-	43	-	
$t_{d(ON)}$	Turn-on Delay Time		-	9.5	-	ns
T_r	Turn-on Rise Time	V_{DD}=-10V,R_G=2.5 I_{DS}=-2A,V_{GS}=-4.5V	-	15	-	

Typical Operating Characteristics

Figure 1: Power Dissipation

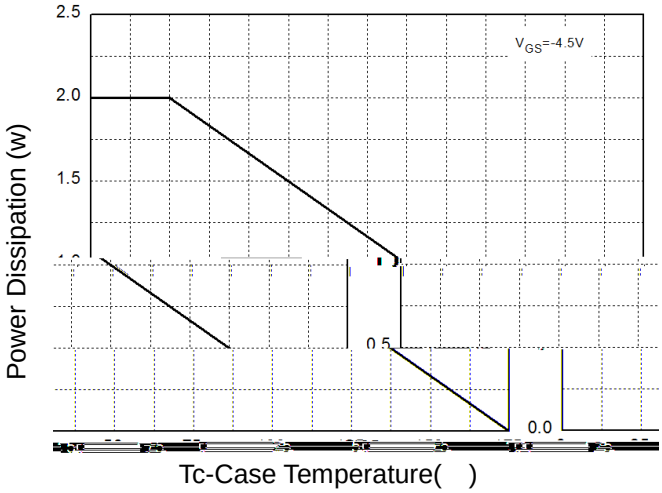


Figure 2: Drain Current

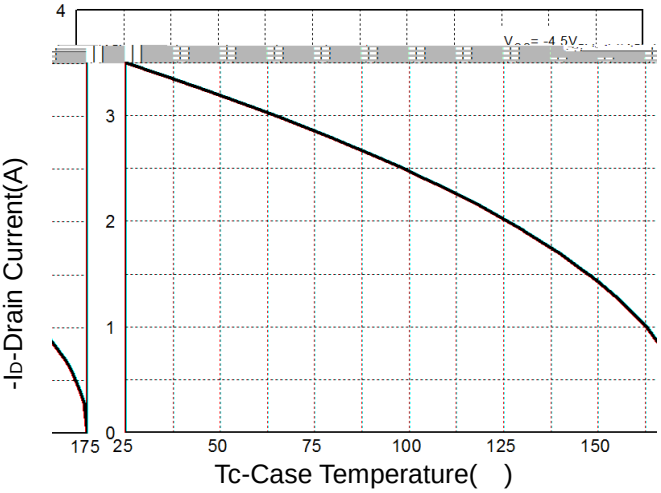


Figure 3: Safe Operation Area

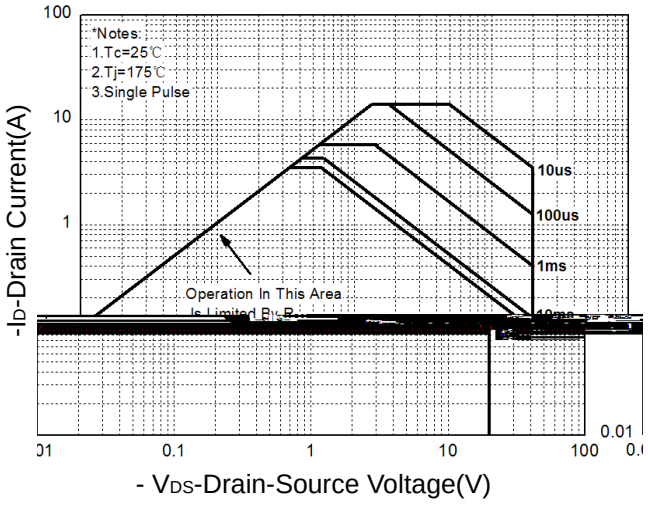


Figure 4: Thermal Transient Impedance

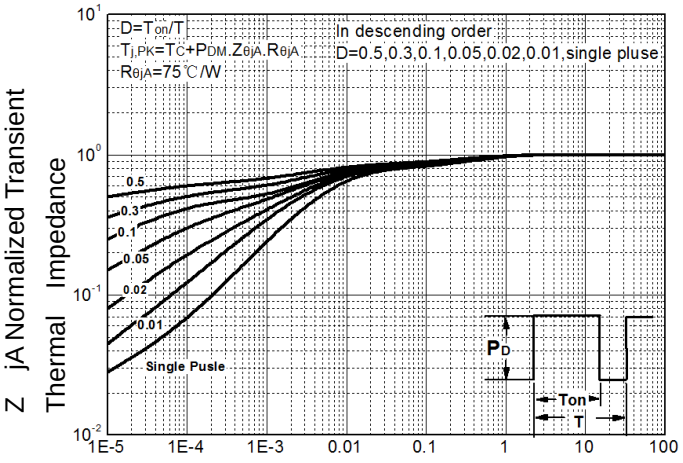


Figure 5: Output Characteristics

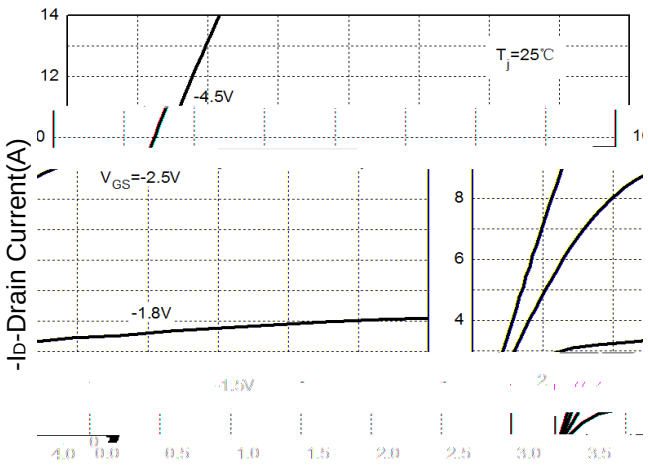
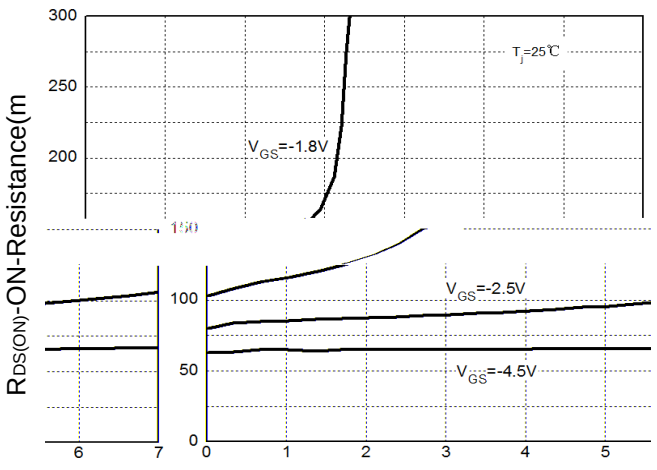


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

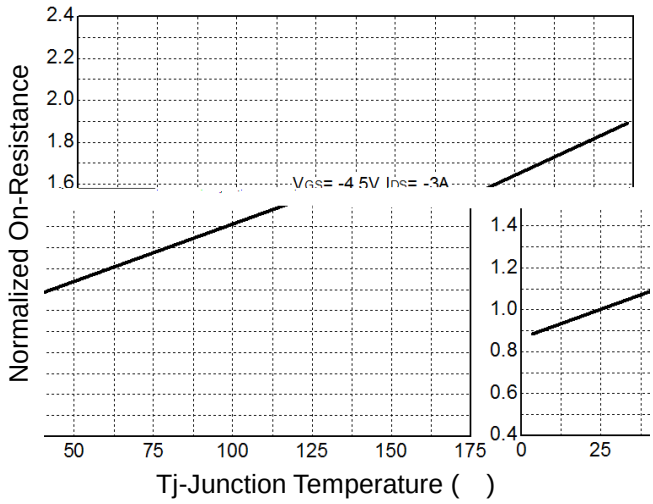


Figure 8: Source-Drain Diode Forward

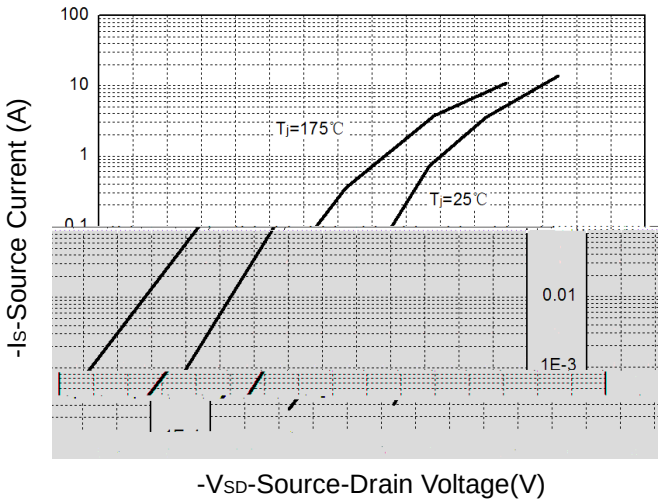


Figure 9: Capacitance Characteristics

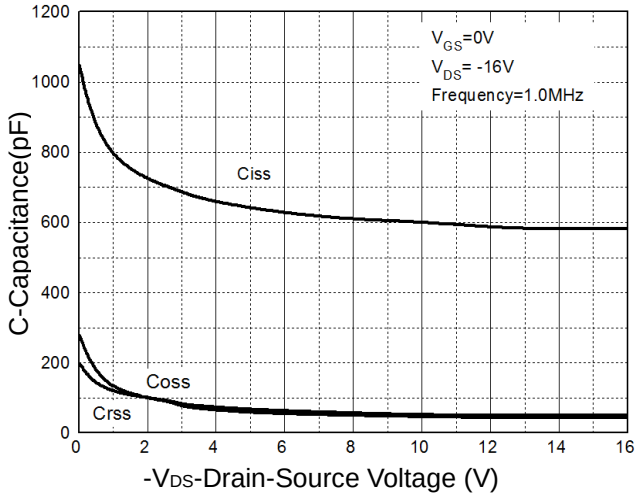
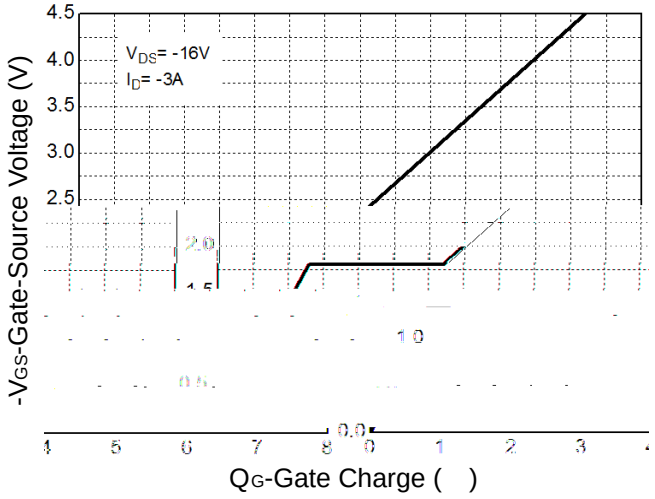
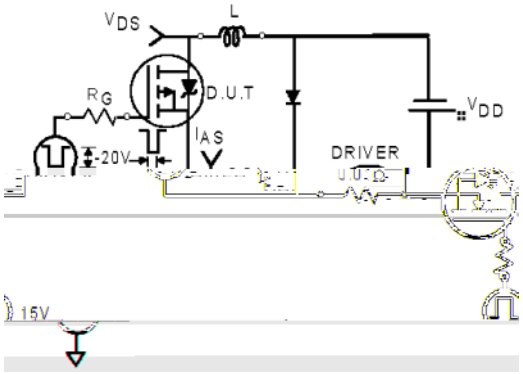
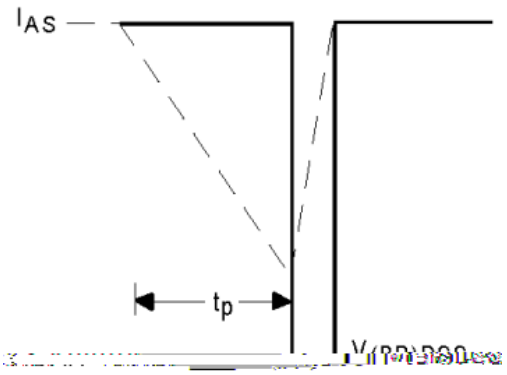


Figure 10: Gate Charge Characteristics

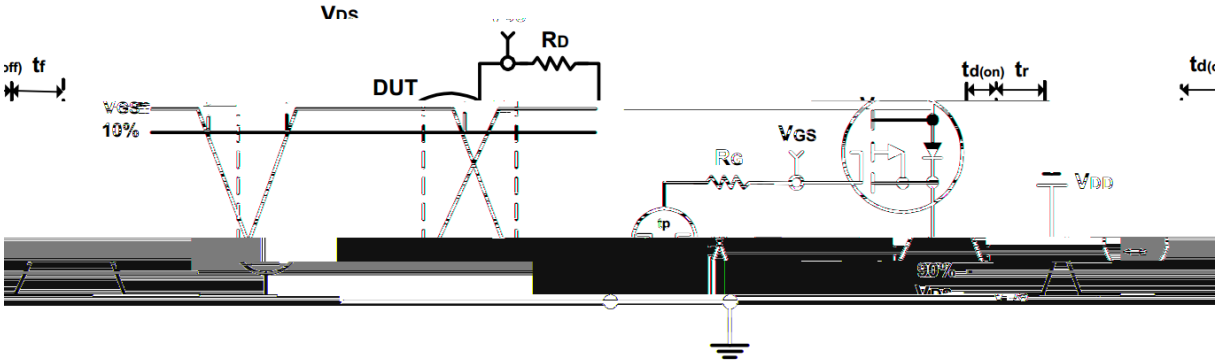


Avalanche Test Circuit

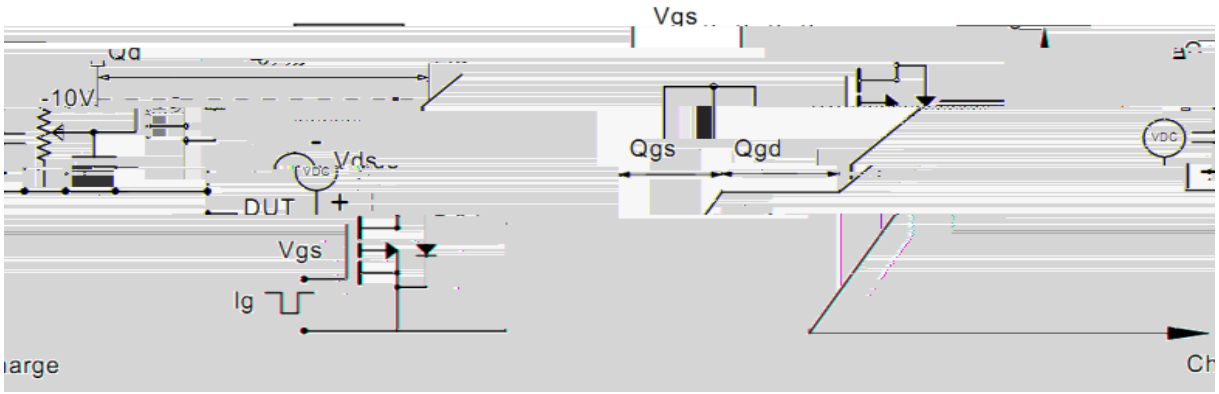




Switching Time Test Circuit



Gate Charge Test Circuit

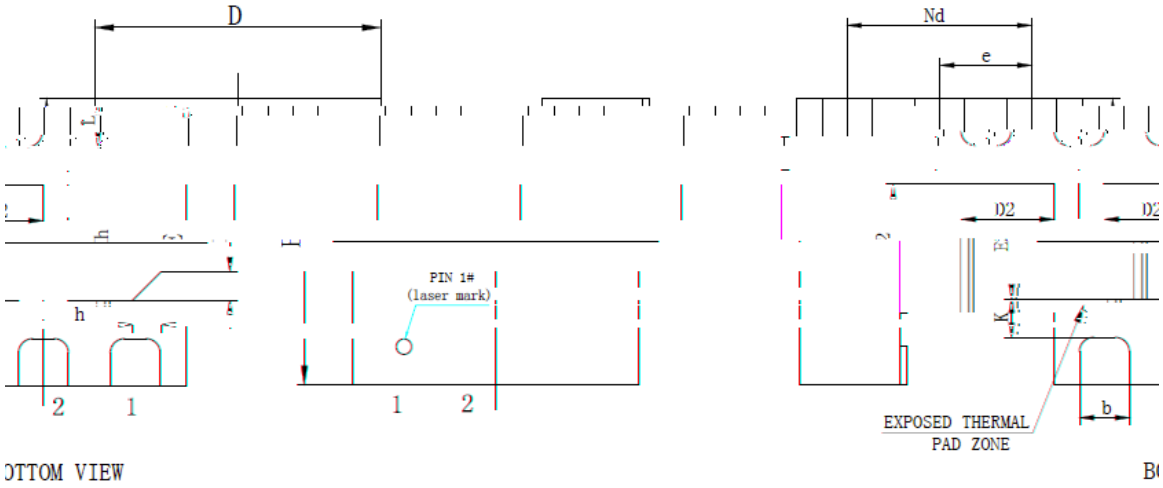


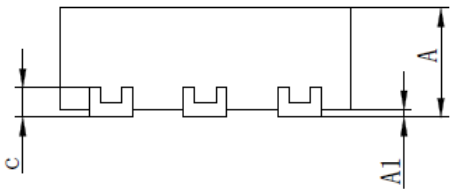
Device Per Unit

Package Type	Unit	Quantity
DFN2*2-6L	Reel	3000

Package Information

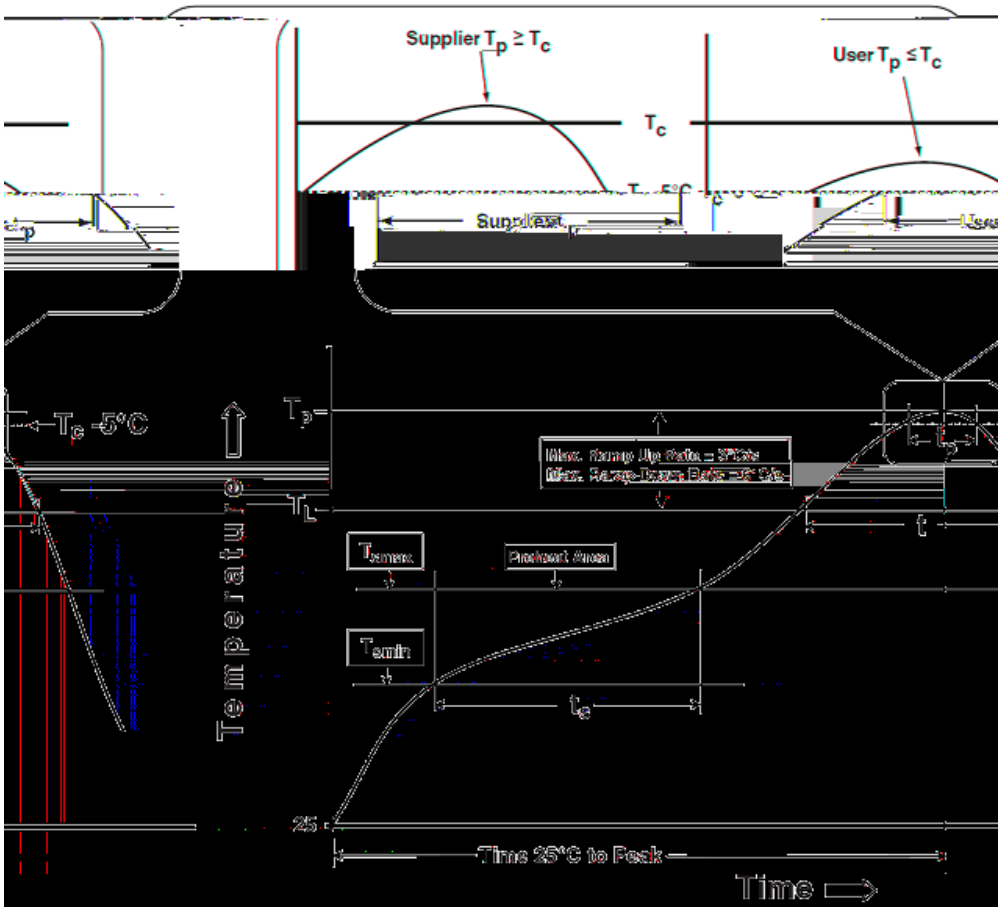
DFN2*2-6L





SYMBOL			
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b	0.30	0.35	0.40
b1	1.55	1.60	1.65
c	0.19	0.20	0.21
D	1.95	2.00	2.05
D2	0.60	0.65	0.70
e	0.65BSC		
Nd	1.30BSC		
E	1.95	2.00	2.05
E2	0.75	0.80	0.85
K	0.20	-	-
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
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (Tsmin to Tsmax) (t_s)	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate ($T_{smax}$to T_P)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L) Time at liquidous (t_L)	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body Temperature (T_p)*	See Classification Temp in table 1	SeeClassification 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 <350	Volume mm 350
2.5 mm	235 °C	220 °C
	220 °C	220 °C

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

Package Thickness	Volume mm <350	Volume mm 350-2000	Volume mm 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	168/500/1000Hrs, Bias @ 150°C
PCT	JESD-22, A102	96 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -55°C~150°C

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