Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		80	V
V_{GSS}	Gate-Source Voltage		20	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	120	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25°C	**400	A
I_D	Continuous Drain Current	Tc=25°C	120	A
		Tc=100°C	84.8	A
P_D	Maximum Power Dissipation	Tc=25°C	187.5	W
		Tc=100°C	93.7	W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		0.8	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient **		62.5	°C/W
E_{AS}	SinglePulsed-Avalanche Energy ***	L=0.3mH	350***	mJ

Note: * Repetitive rating pulse width limited by max.junction temperature.
** Surface mounted on 1in2 FR-4 board.
*** Limited by $T_J$max , starting T_J=25°C, L = 0.3mH, R_G= 25Ω, V_{GS} =10V.

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

Symbol	Parameter	Test Conditions	HYG055N08NS1			Unit
			Min	Typ.	Max	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_{DS}= 250μA	80	-	-	V
I_{DSS}	Drain-to-Source Leakage Current	V_{DS}= 80V,V_{GS}=0V	-	-	1	μA
		T_J=125°C	-	-	50	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}= 250μA	2	3	4	V
I_{GSS}	Gate-Source Leakage Current	V_{GS}= 20V,V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}= 10V,I_{DS}=50A	-	5.3	6.8	mΩ
Diode Characteristics						
V_{SD}	Diode Forward Voltage	I_{SD}=50A,V_{GS}=0V	-	0.92	1.2	V
t_{rr}	Reverse Recovery Time	I_{SD}=50A,dI_{SD}/dt=100A/μs	-	57	-	ns
Q_{rr}	Reverse Recovery Charge		-	98	-	nC

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

Symbol	Parameter	Test Conditions	HYG055N08NS1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	3	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V,	-	3660	-	pF
C_{oss}	Output Capacitance	V_{DS}= 25V,	-	1540	-	
C_{rss}	Reverse Transfer Capacitance	Frequency=1.0MHz	-	15	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}= 40V,R_G=4.0Ω,	-	16	-	ns
T_r	Turn-on Rise Time		-	89	-	
$t_{d(OFF)}$	Turn-off Delay Time	I_{DS}= 50A,V_{GS}= 10V	-	44	-	
T_f	Turn-off Fall Time			93	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS} = 64V, V_{GS}= 10V,	-	60	-	nC
Q_{gs}	Gate-Source Charge	I_{DS}= 50A	-	20	-	
Q_{gd}	Gate-Drain Charge		-	14	-	

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

Typical Operating Characteristics

Figure 1: Power Dissipation

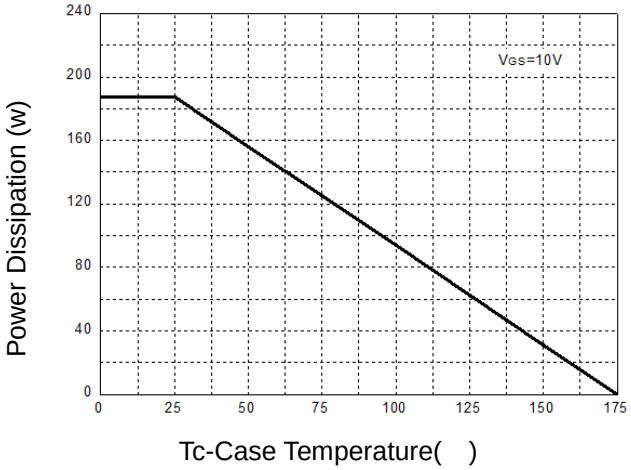


Figure 2: Drain Current

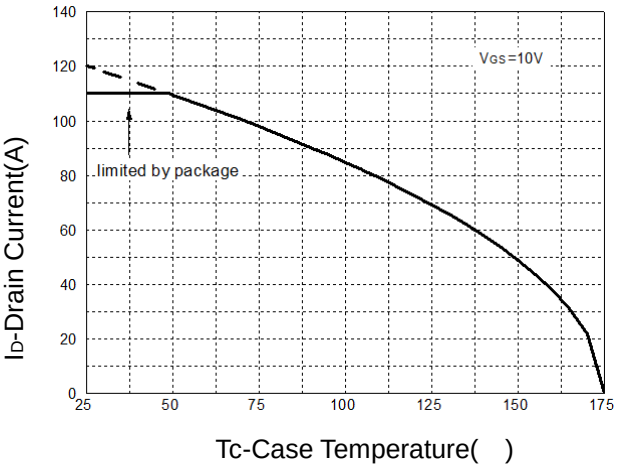


Figure 3: Safe Operation Area

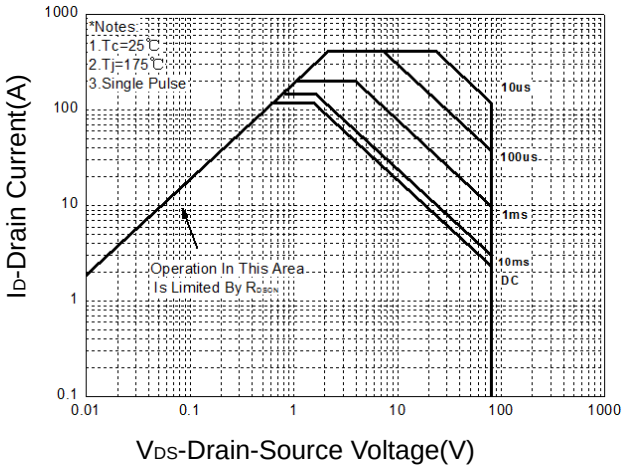


Figure 4: Thermal Transient Impedance

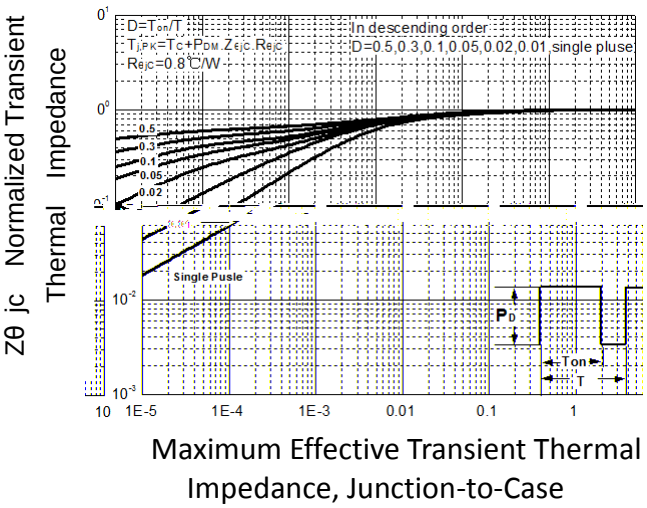


Figure 5: Output Characteristics

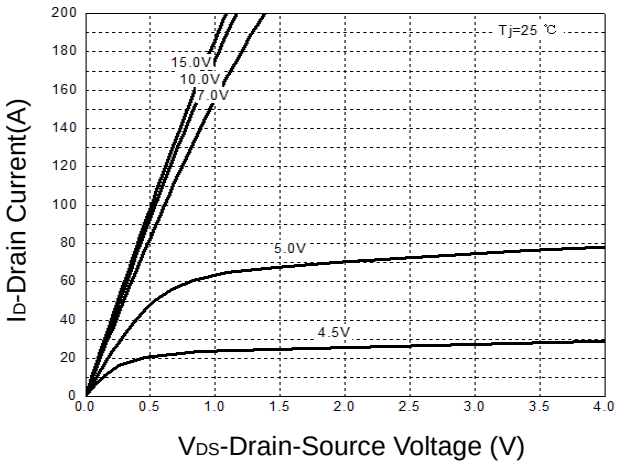
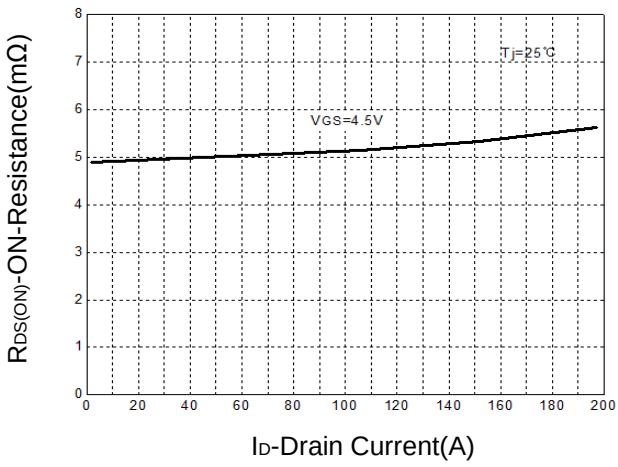


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

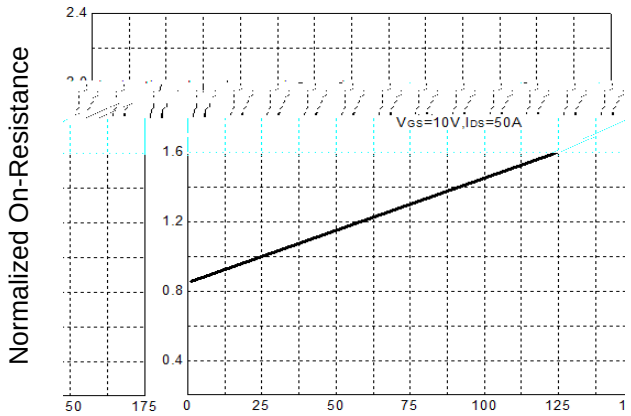


Figure 8: Source-Drain Diode Forward

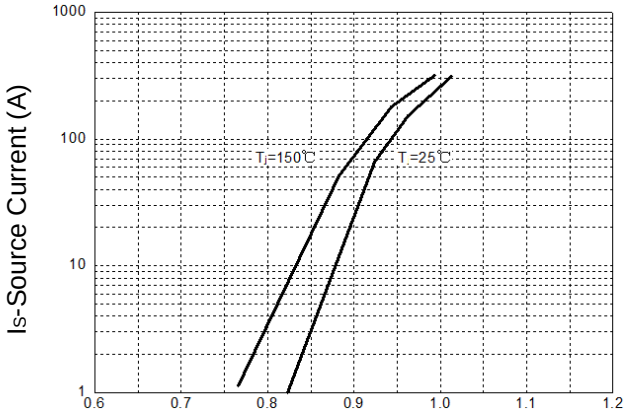


Figure 9: Capacitance Characteristics

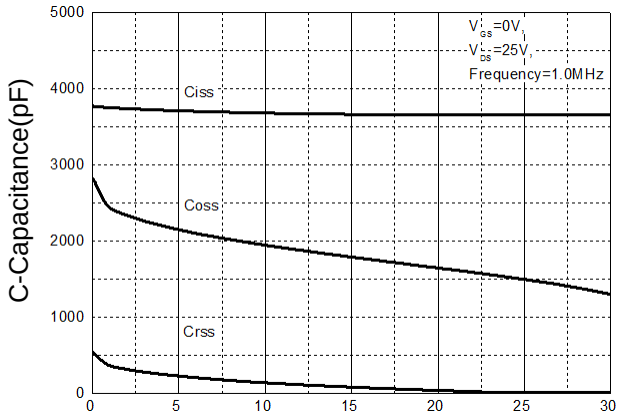
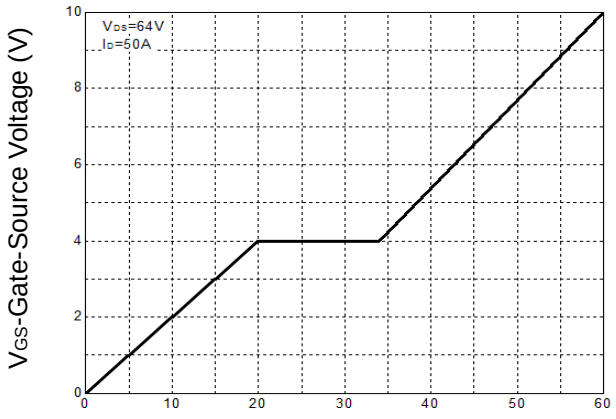
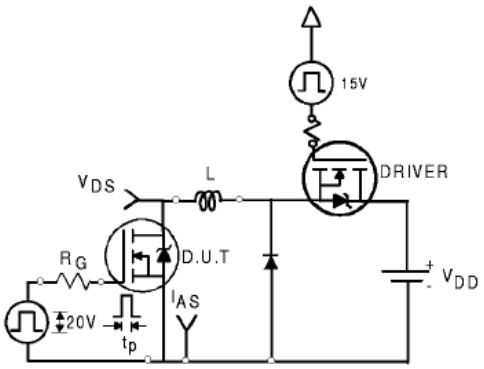


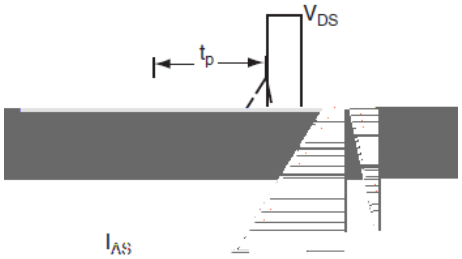
Figure 10: Gate Charge Characteristics



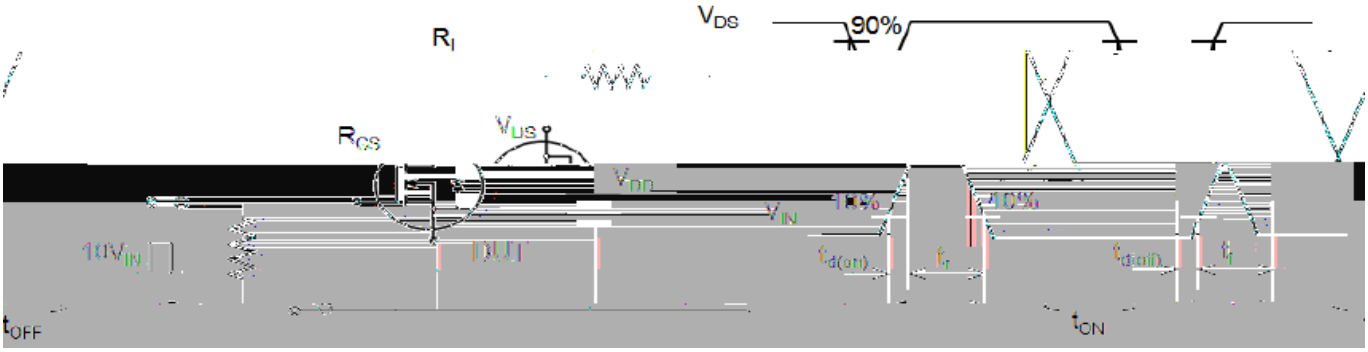
Avalanche Test Circuit



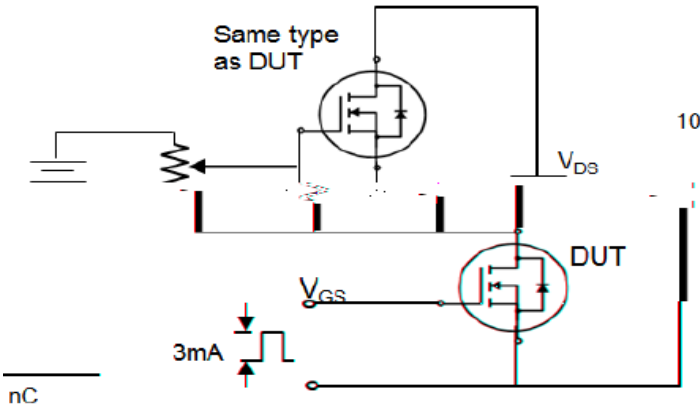
$$E_{AS} = \frac{1}{2} L I_{AS}^2$$

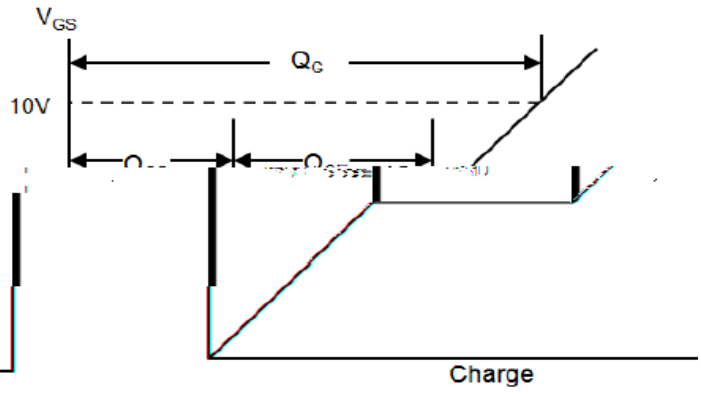


Switching Time Test Circuit



Gate Charge Test Circuit



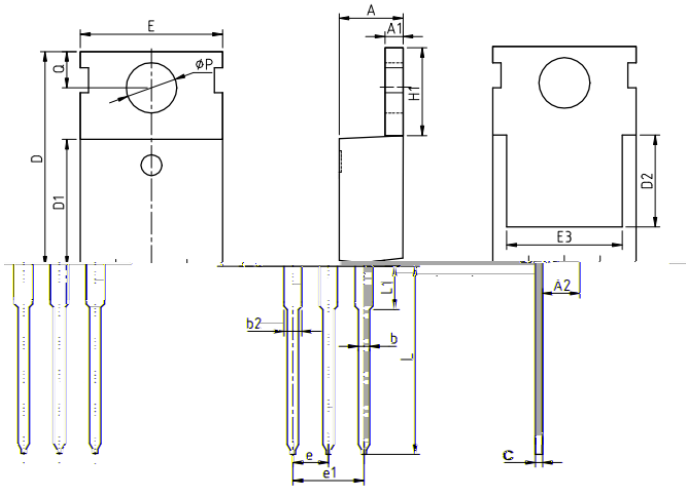


Device Per Unit

Package Type	Unit	Quantity
TO-220FB-3L	Tube	50

Package Information

TO-220FB-3L



COMMON DIMENSIONS

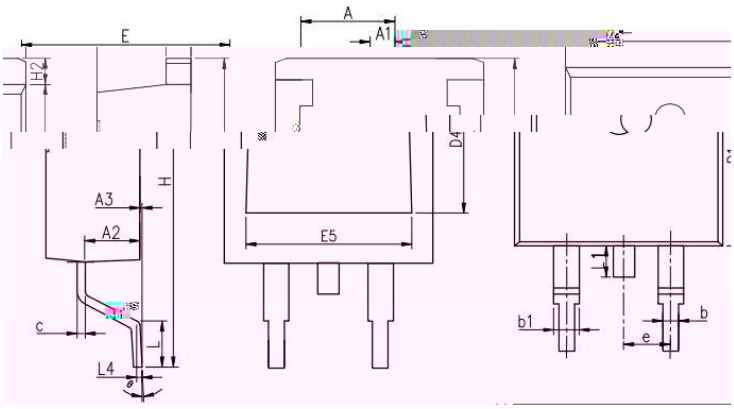
SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.25	1.30	1.45
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

Device Per Unit

Package Type	Unit	Quantity
TO-263-2L	Tube	50

Package Information

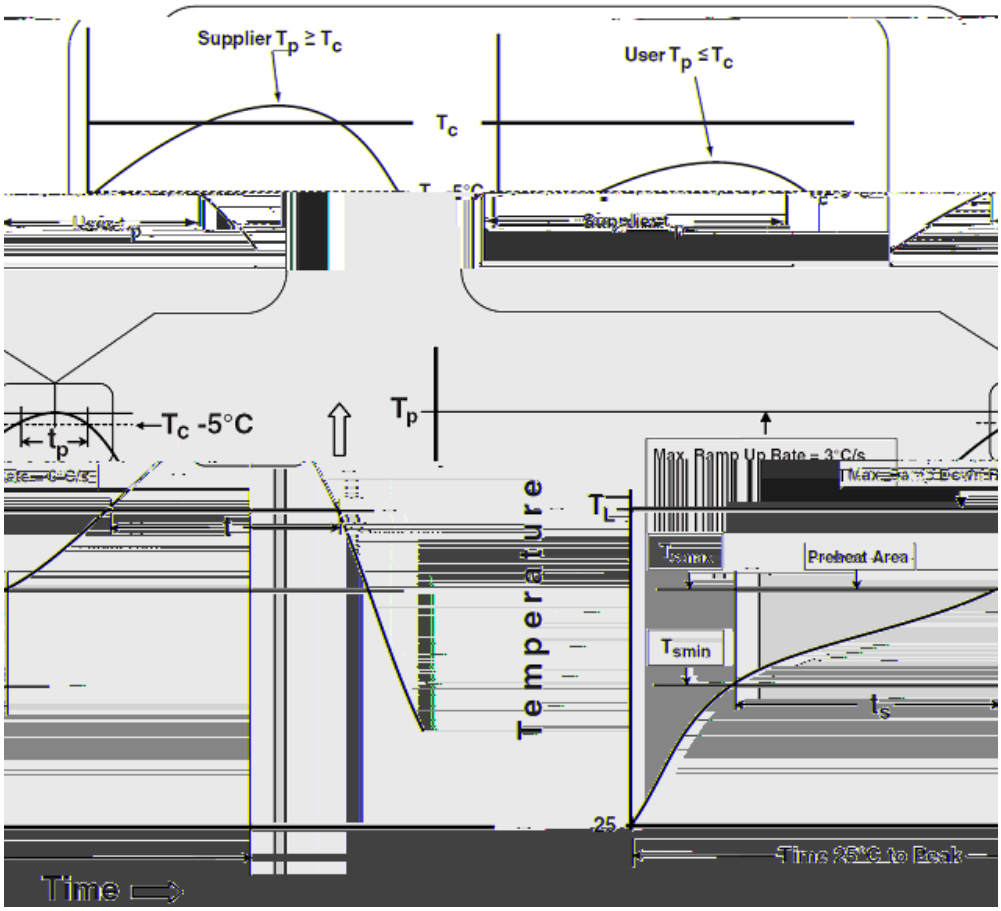
TO-263-2L



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0	0.13	0.25
b	0.7	0.81	0.96
b1	1.17	1.27	1.47
c	0.3	0.38	0.53
D1	8.5	8.7	8.9
D4	6.6	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.7	15.1	15.5
H2	1.07	1.27	1.47
L	2	2.3	2.6
L1	1.4	1.55	1.7
L4	0.25 BSC		
θ	0°	5°	9°

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 Tempin 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
≥2.5 mm	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 Hrs/500 Hrs/1000 Hrs, 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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