HY3708P/M/B/PS/PM

N-Channel Enhancement Mode MOSFET

Features

- 80V/170A
  $R_{DS(ON)}$ = 3.8 m (typ.) @ V_{GS}=10V
- 100% avalanche tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

Pin Description

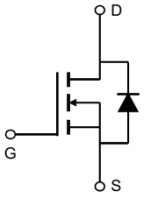
G D S

TO-220FB-3L TO-220FB-3S

TO-3PS-3L TO-3PM-3S

Applications

Power Management for Inverter Systems.



N-Channel MOSFET

Ordering and Marking Information

P HY3708 YYXXXJWW G M HY3708 YYXXXJWW G B HY3708 YYXXXJWW G PS HY3708 YYXXXJWW G PM HY3708 YYXXXJWW G	Package Code P : TO-220FB-3L M : TO-220FB-3S B: TO-263-2L PS: TO-3PS-3L PM: TO-3PM-3S Date Code Assembly Material YYXXX WW G : Lead Free Device

Note: HUAYI lead -free products contain molding compounds/die attach materials and 100% matte tin plate Termination finish;which are fully compliant with RoHS. HUAYI 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. HUAYI 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).

HUAYI reserves the right to make changes, corrections, enhancements, modifications, and improvements to this pr-oduct and/or to this document at any time without notice.

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T_C=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		80	V
V_{GSS}	Gate-Source Voltage		±25	
T_J	Maximum Junction Temperature		175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Diode Continuous Forward Current	T_C=25°C	170	A
Mounted on Large Heat Sink				
I_{DM}		T_C=25°C	660**	A
I_D	Continuous Drain Current	T_C=25°C	170	A
		T_C=100°C	114	
P_D	Maximum Power Dissipation	T_C=25°C	288	
		T_C=100°C	1168***	

80

3.8 5.0

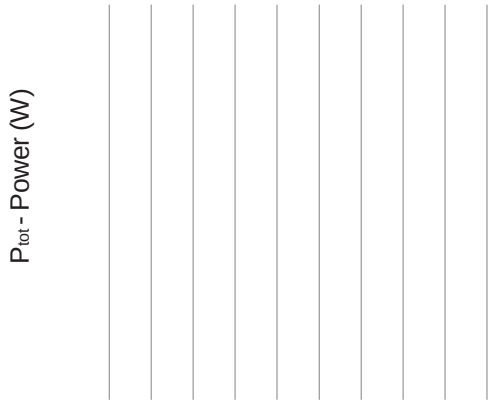
Electrical Characteristics (Cont.) (T_C = 25 C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	HY3708			Unit
			Min.	Typ.	Max.	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1.8	-	
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, Frequency=1.0MHz	-	6109	-	pF
C_{oss}	Output Capacitance		-	995	-	
C_{rss}	Reverse Transfer Capacitance		-	530	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=40V, R_G=6 , I_{DS} =85A, V_{GS}=10V,	-	28	-	ns
T_r	Turn-on Rise Time		-	18	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	42	-	
T_f	Turn-off Fall Time		-	54	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS}=64V, V_{GS}=10V, I_{DS}=85A	-	152	-	nC
Q_{gs}	Gate-Source Charge		-	25	-	
Q_{gd}	Gate-Drain Charge		-	53	-	

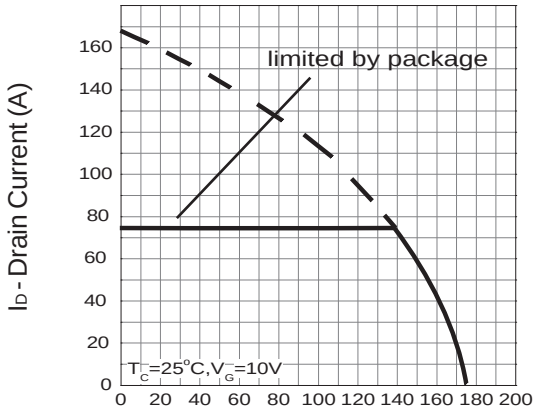
Note * : Pulse test ; pulse width 300 s, duty cycle 2%.

Typical Operating Characteristics

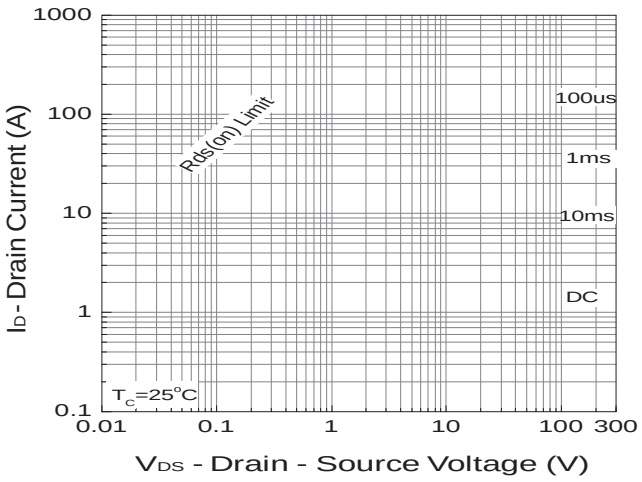
Power Dissipation



Drain Current

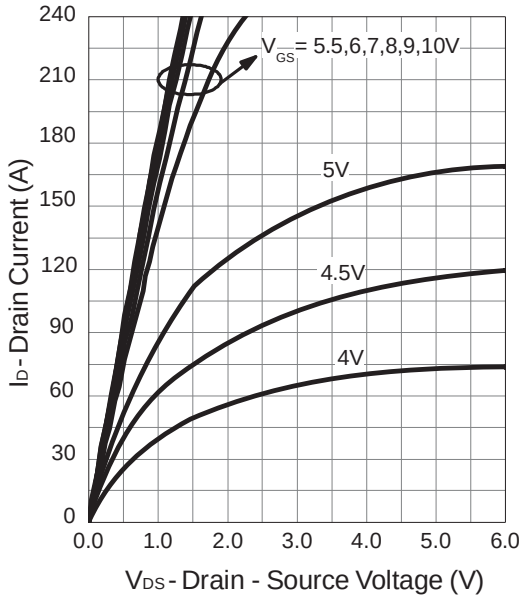


Safe Operation Area

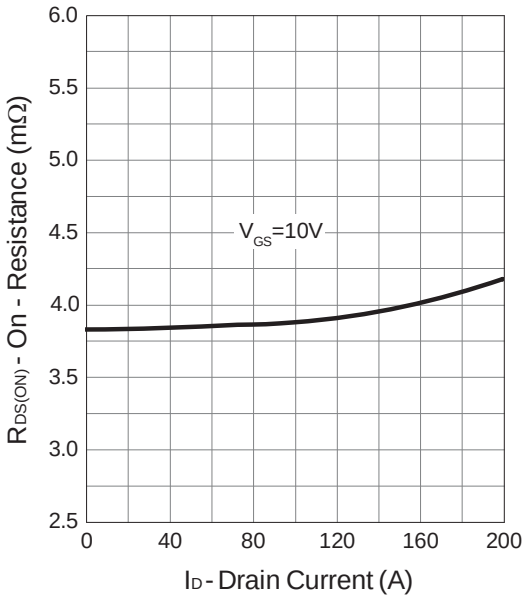


Typical Operating Characteristics (Cont.)

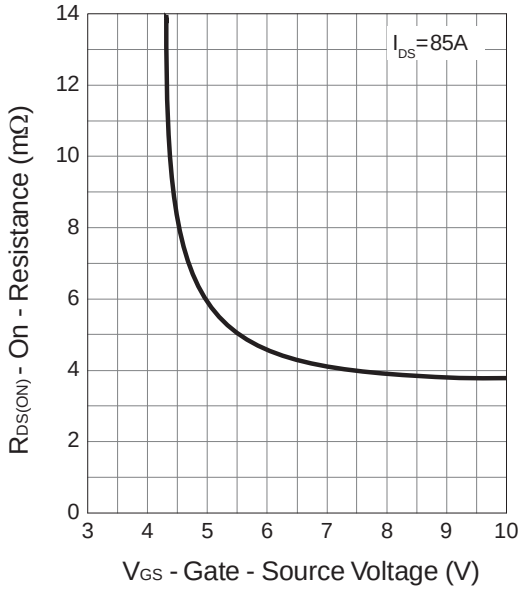
Output Characteristics



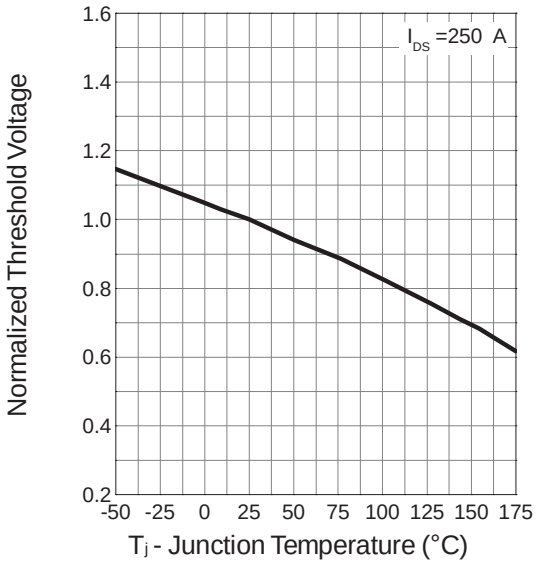
Drain-Source On Resistance



Gate-Source On Resistance

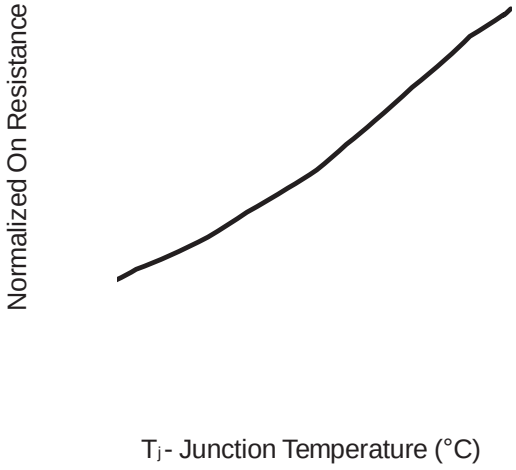


Gate Threshold Voltage

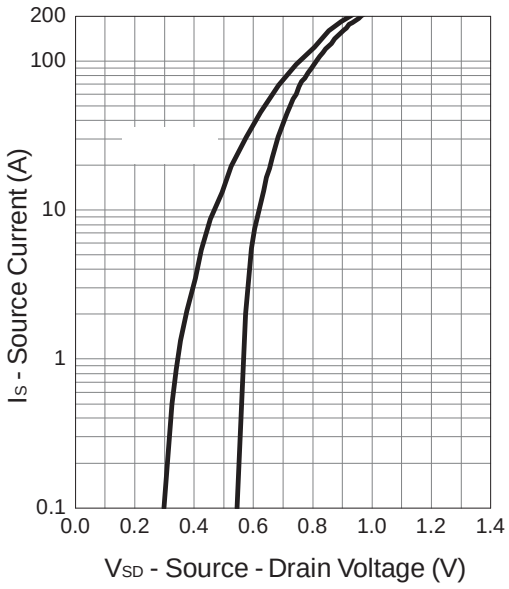


Typical Operating Characteristics (Cont.)

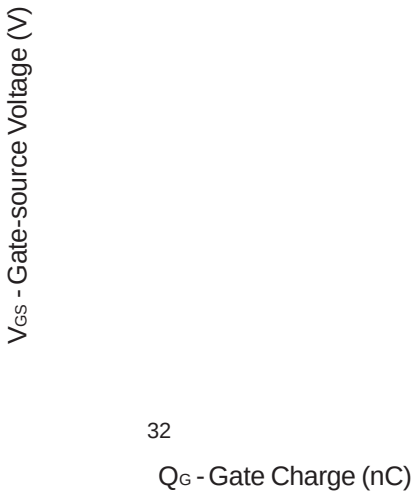
Drain-Source On Resistance



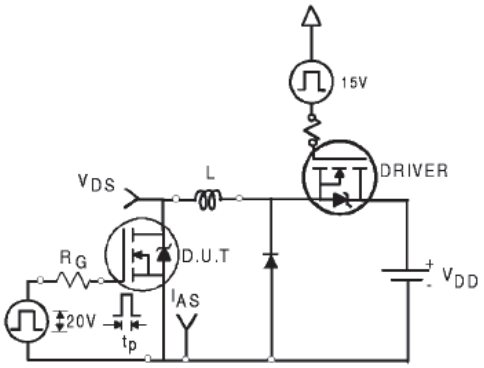
Source-Drain Diode Forward

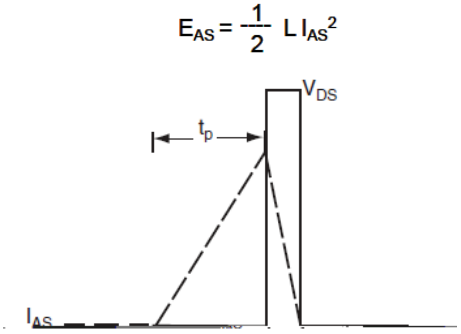


Gate Charge

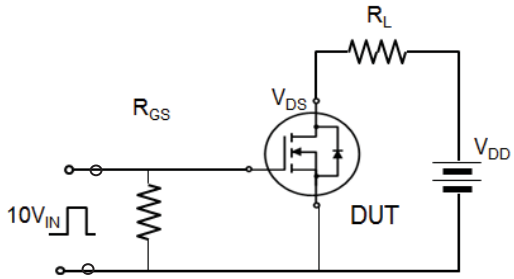


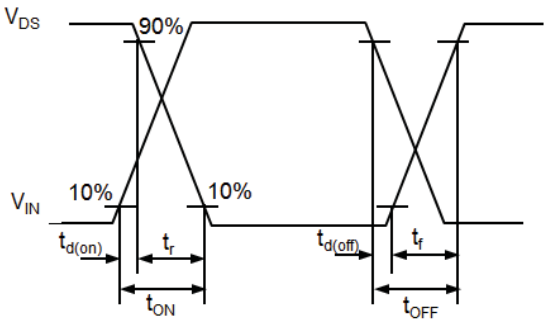
Avalanche Test Circuit



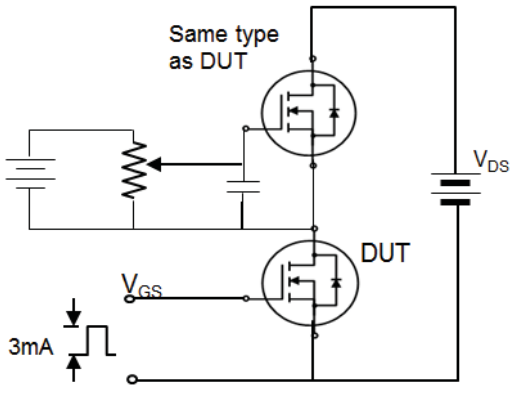


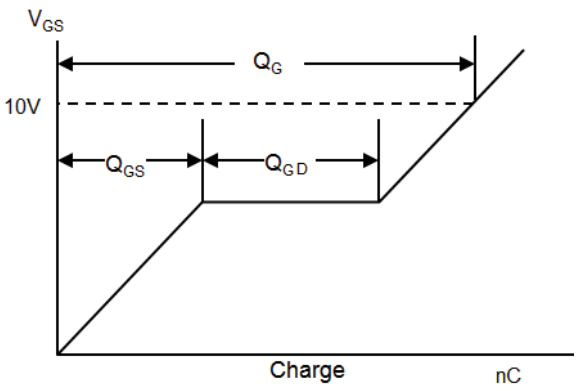
Switching Time Test Circuit

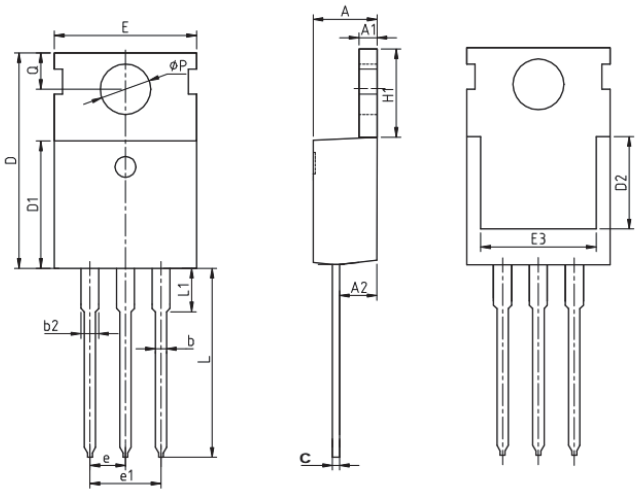




Gate Charge Test Circuit



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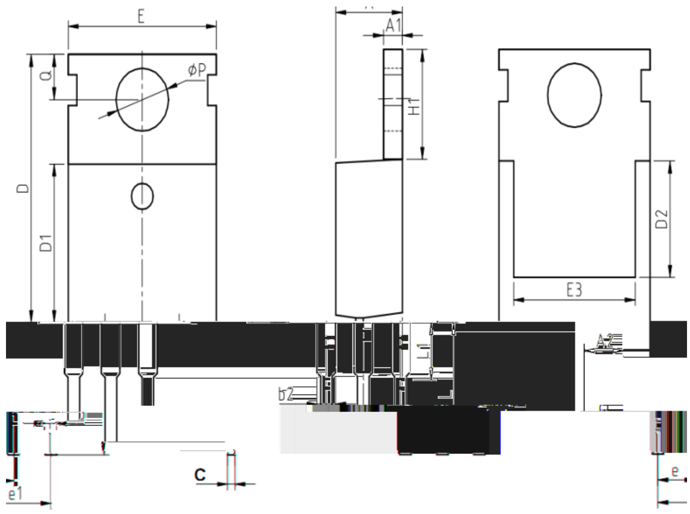
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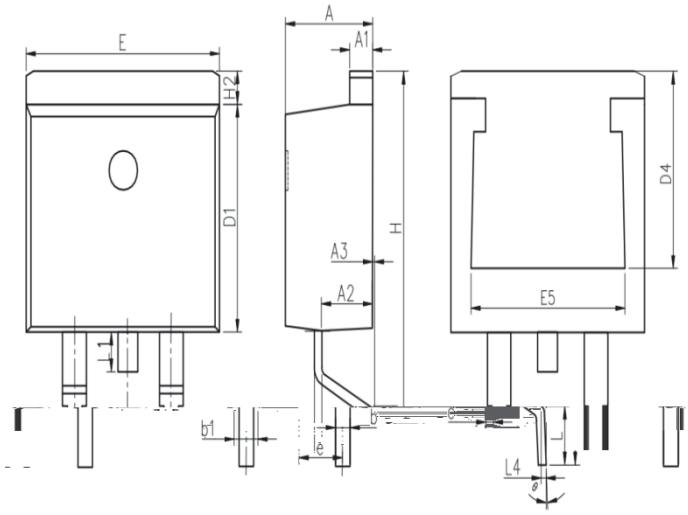
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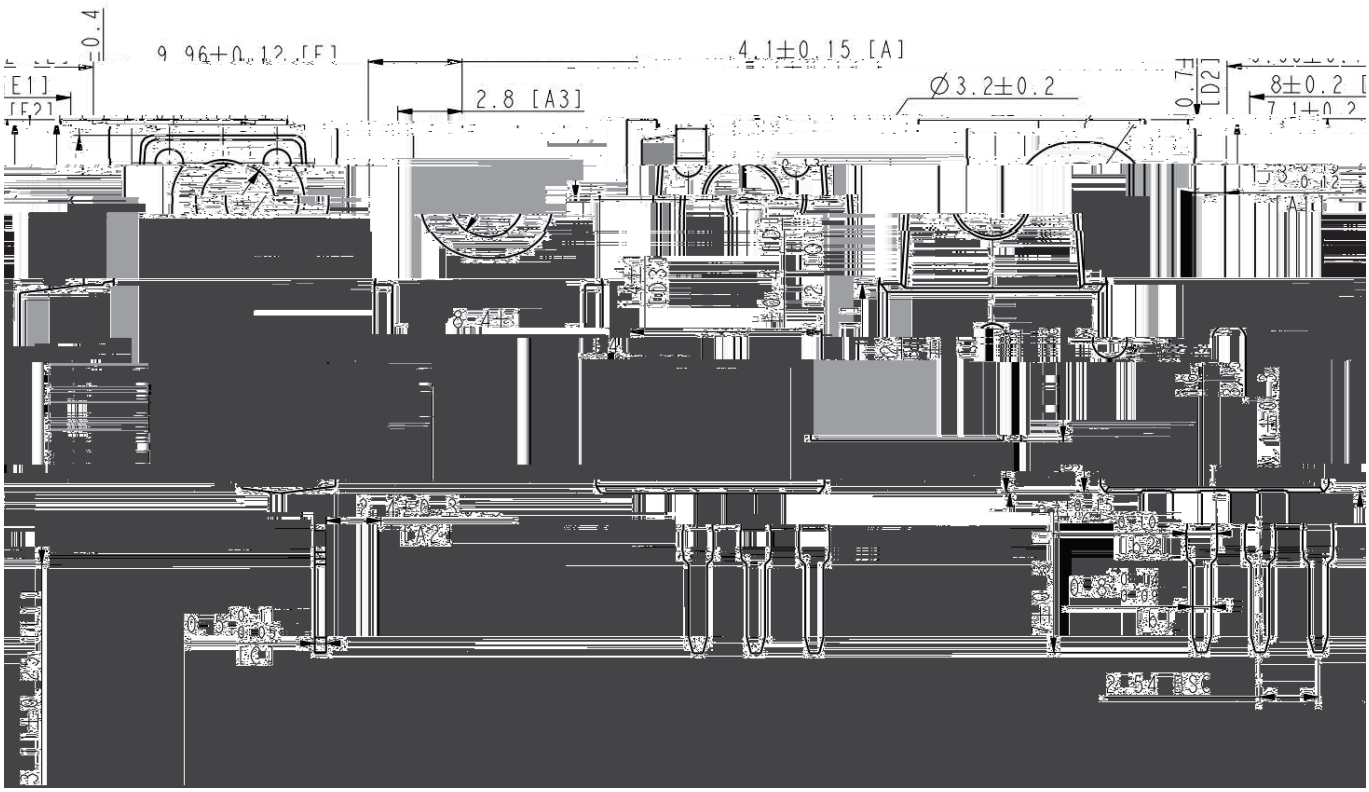
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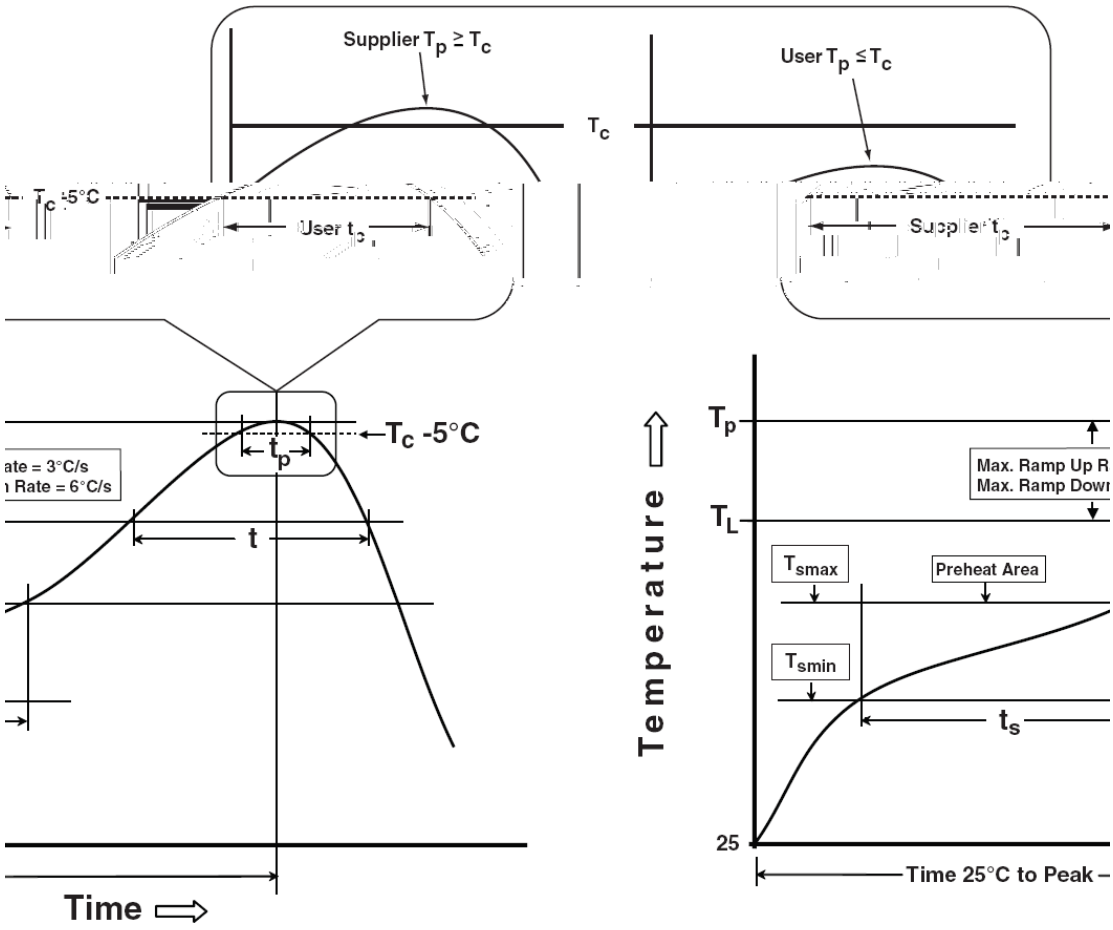
Ø3.2±0.2
2.54 BSC

Classification Profile



C

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (T_{smin} to T_{smax}) (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	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^3 <350	Volume mm^3 ≥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^3 <350	Volume mm^3 350-2000	Volume mm^3 >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 @ 125 C
PCT	JESD-22, A102	96 Hrs, 100 RH, 2atm, 121 C
TCT	JESD-22, A104	500 Cycles, -55 C~150 C