

N-Channel Enhancement Mode MOSFET
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## Feature

## Pin Description

- 80V/100A  
 $R_{DS(ON)}=4.1\text{ m } (\text{typ.})@V_{GS} = 10\text{V}$
- 100% Avalanche Tested
- Reliable and Rugged
- Halogen-Free Devices Available  
(RoHS Compliant)

## Applications

<b>Mounted on</b>
I <sub>DM</sub>
I <sub>D</sub>
P <sub>D</sub>
R <sub>θJC</sub>
R <sub>θJA</sub>
E <sub>AS</sub>

Note: \* R<sub>θJC</sub>  
 \*\* S<sub>DC</sub>  
 \*\*\* L<sub>eff</sub>

**Electrical**

<b>Symbol</b>
<b>Static Char</b>

BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> = 250 A	80	-	-	V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	V <sub>GS</sub> =0V, V <sub>DS</sub> = 80V	10	-	-	μA

# HYG050N08NS1C2

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

Symbol	Parameter	Test Conditions	HYG050N08NS1			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=1MHz	-	2.6	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> = 25V, Frequency=1.0MHz	-	4280	-	pF
C <sub>oss</sub>	Output Capacitance		-	1770	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	25	-	
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DD</sub> = 40V, R <sub>G</sub> =4.0 I <sub>DS</sub> = 50A, V <sub>GS</sub> = 10V	-	17	-	ns
T <sub>r</sub>	Turn-on Rise Time		-	87	-	
t <sub>d(OFF)</sub>	Turn-off Delay Time		-	47	-	
T <sub>f</sub>	Turn-off Fall Time		-	101	-	
<b>Gate Charge Characteristics</b>						

Q<sub>g</sub> Total Gate Charge

17(0)1D(T)6-14(4)29(7)34(r)8(s)6(e)14(7)25(T)-6.1D(o)17

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## Typical Operating Characteristics

Figure 1: Power Dissipation

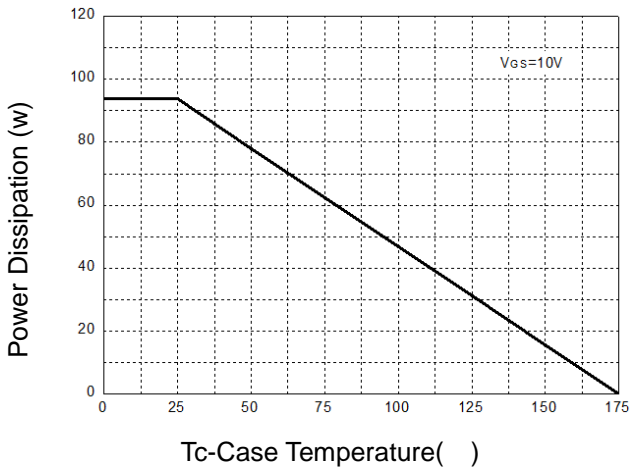


Figure 2: Drain Current

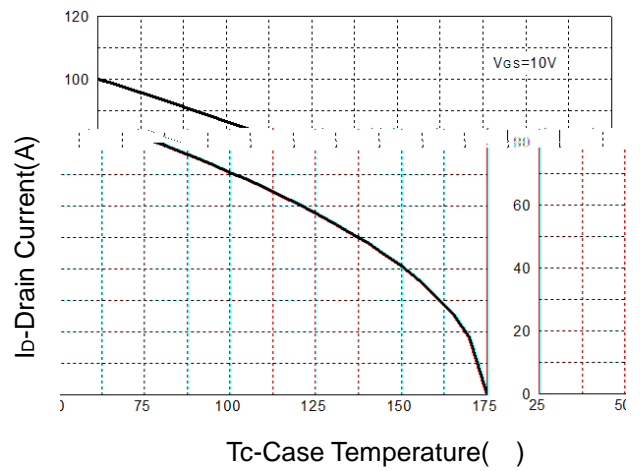


Figure 3: Safe Operation Area

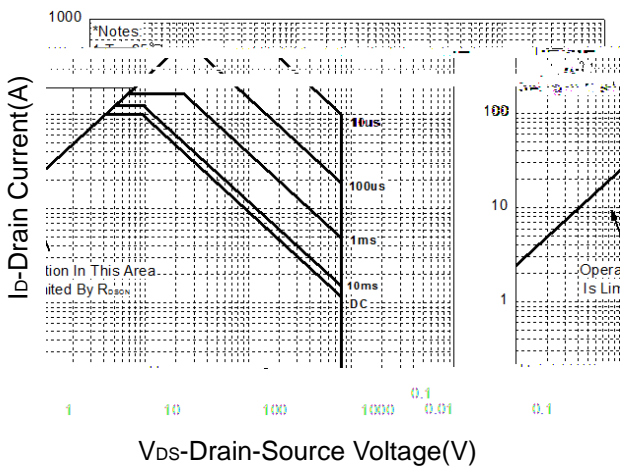


Figure 4: Thermal Transient Impedance

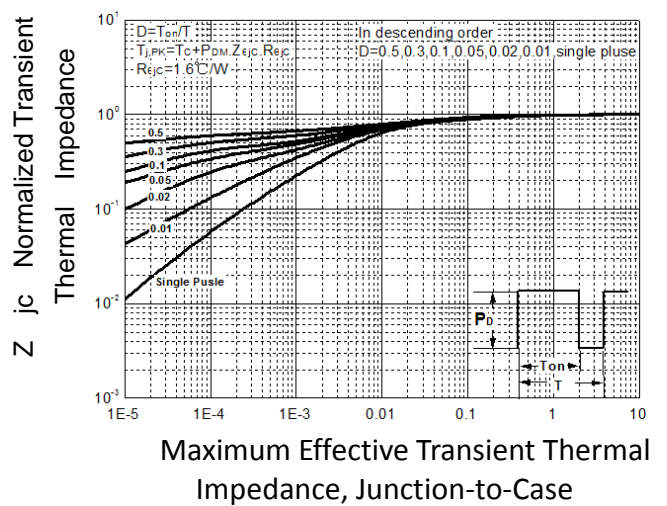


Figure 5: Output Characteristics

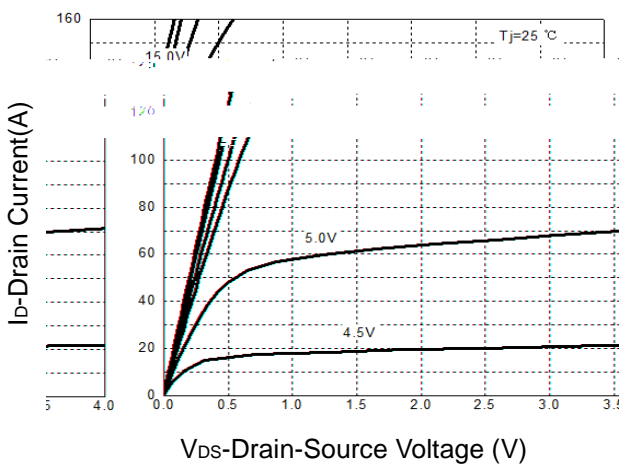
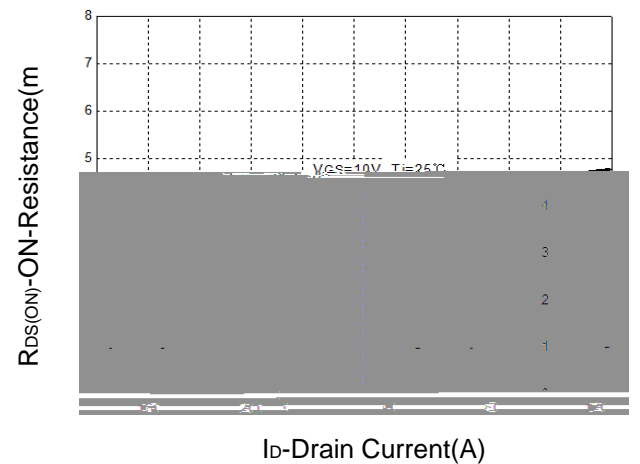


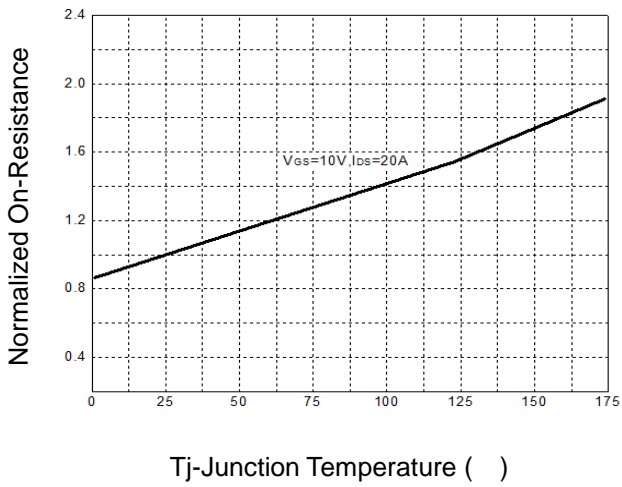
Figure 6: Drain-Source On Resistance



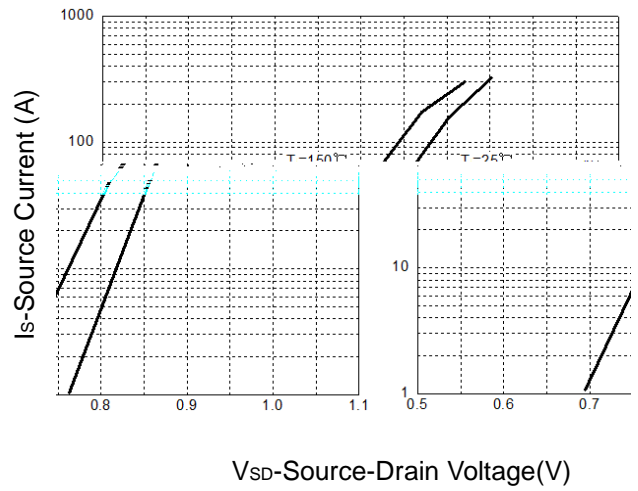
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## Typical Operating Characteristics(Cont.)

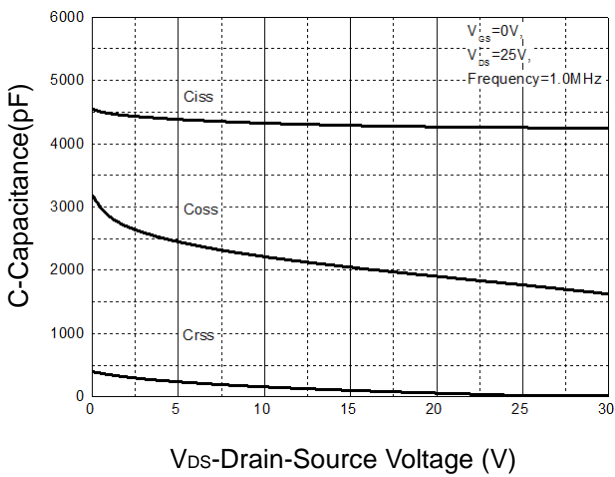
**Figure 7: On-Resistance vs. Temperature**



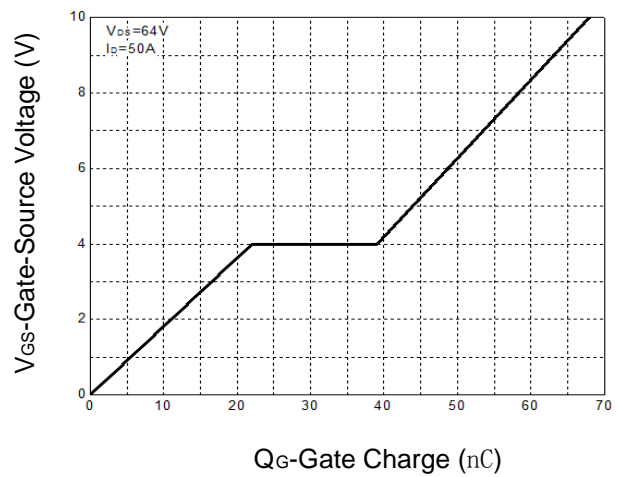
**Figure 8: Source-Drain Diode Forward**



**Figure 9: Capacitance Characteristics**

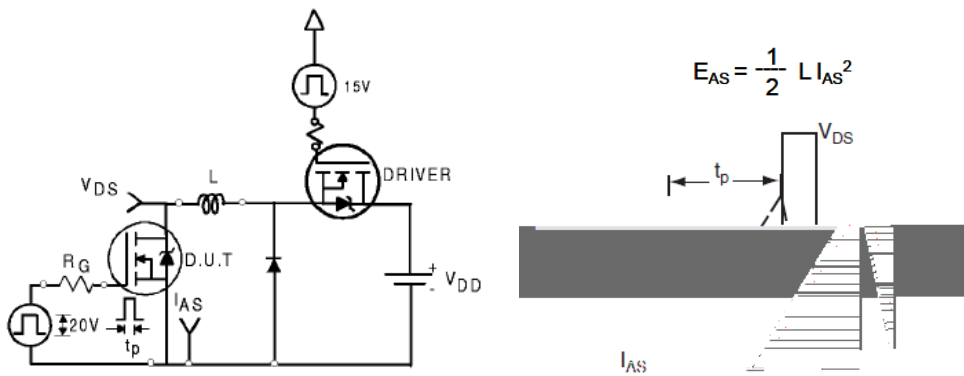


**Figure 10: Gate Charge Characteristics**

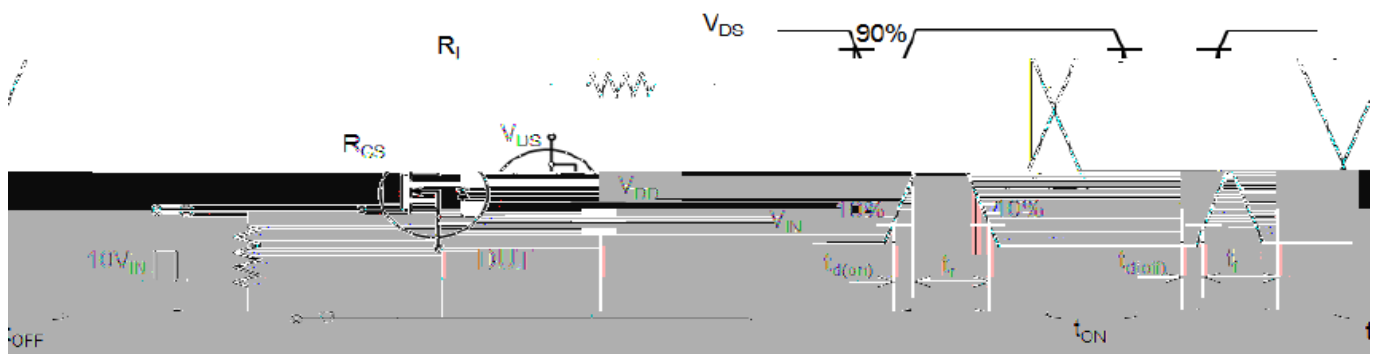


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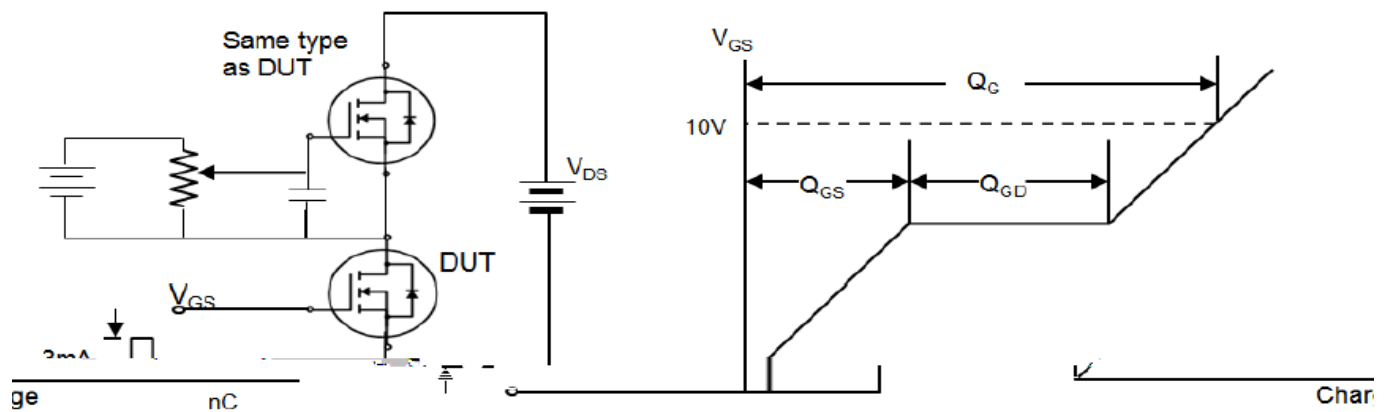
## Avalanche Test Circuit



## Switching Time Test Circuit



## Gate Charge Test Circuit



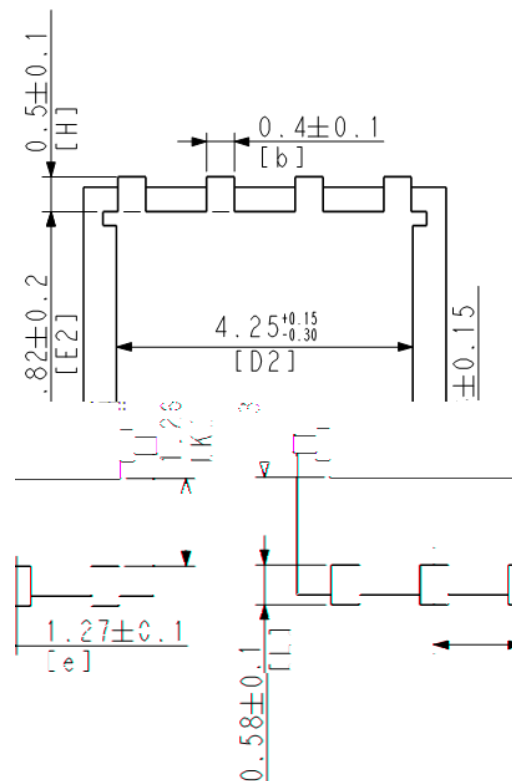
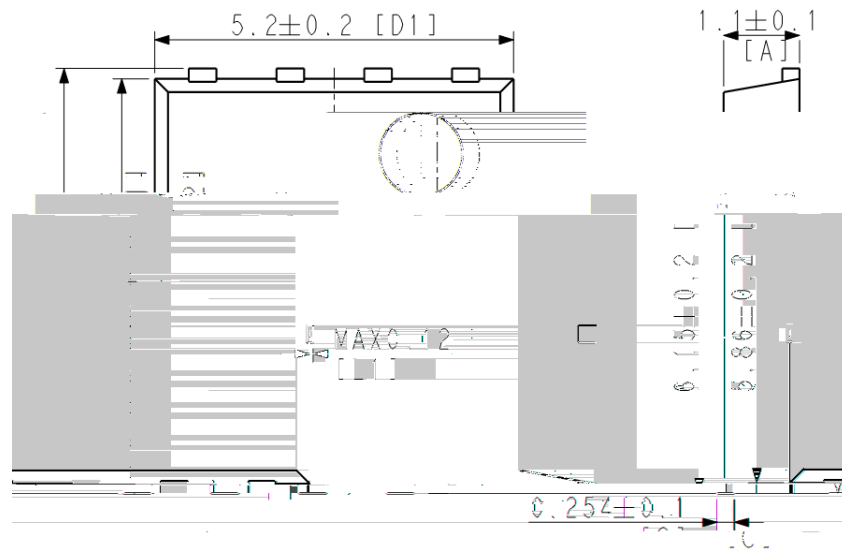
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## Device Per Unit

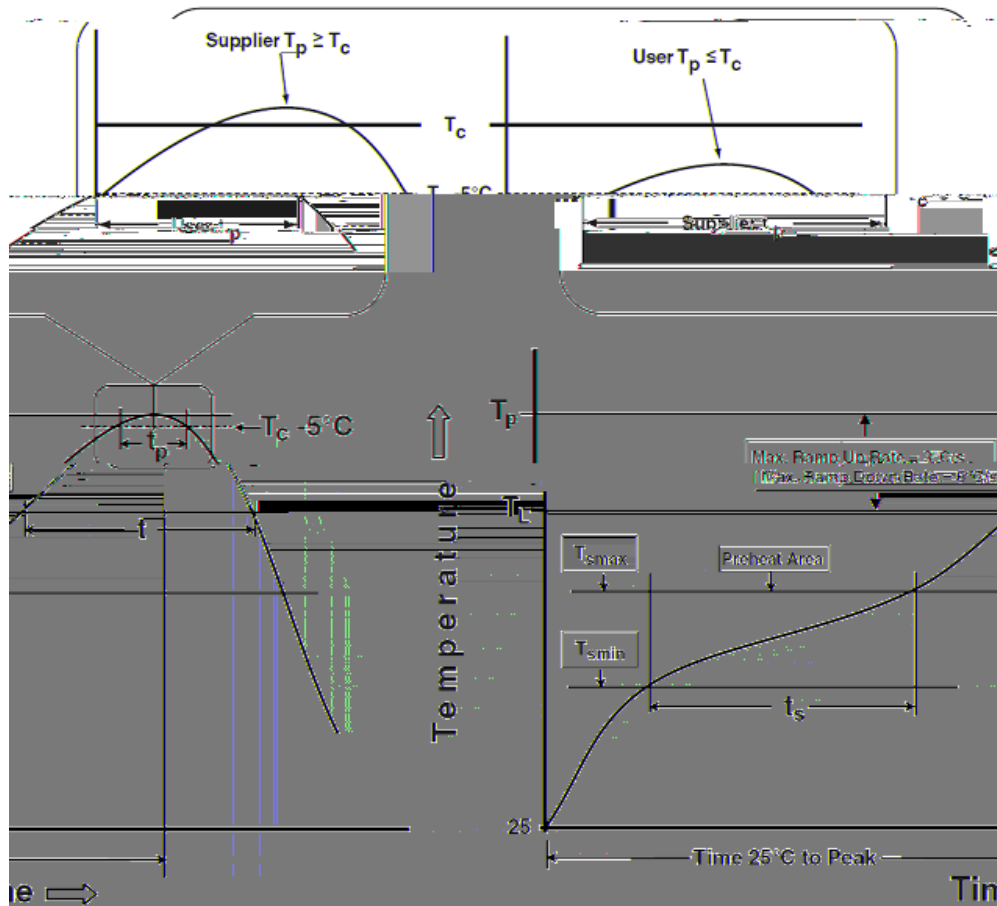
Package Type	Unit	Quantity
PPAK5*6-8L	Reel	5000

## Package Information

PPAK5\*6-8L



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.



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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
PRECON	JESD-22, A113	30°C/60%/192Hrs