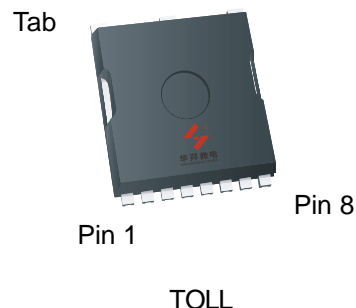


N-Channel Enhancement Mode MOSFET

Feature

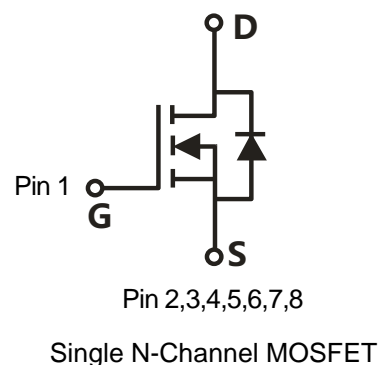
- 40V/600A
 $R_{DS(ON)} = 0.48 \text{ m}\Omega(\text{typ.}) @ V_{GS} = 10\text{V}$
 $R_{DS(ON)} = 0.61 \text{ m}\Omega(\text{typ.}) @ V_{GS} = 4.5\text{V}$
- 100% Avalanche Tested
- 100% DVDS
- Reliable and Rugged
- Halogen Free and Green Devices Available
 (RoHS Compliant)

Pin Description




Applications

- Switching application
- Li-battery protection
- Motor control



Ordering and Marking Information

 <p>TA HYG006N04 XYMXXXXXX</p>	<p>Package Code TA: TOLL</p> <p>Date Code XYMXXXXXX</p>
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Note: HUA YI halogen free products contain molding compounds/die attach materials and 100% matte tin plate Termination finish; which are fully compliant with RoHS. HUA YI halogen free products meet or exceed the halogen free requirements of IPC/JEDEC J-STD-020 for MSL classification at halogen free peak reflow temperature. HUA YI defines "Green" to mean halogen 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).

HUA YI 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
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V _{DSS}	Drain-Source Voltage		40	V
V _{GSS}	Gate-Source Voltage		± 20	V
T _J	Junction Temperature Range		-55 to 175	°C
T _{STG}	Storage Temperature Range			°C
I _S	Source Current-Continuous(Body Diode)	Tc=25°C	600	A
Mounted on Large Heat Sink				
I _{DM}	Pulsed Drain Current *	Tc=25°C	1800	A
I _D	Continuous Drain Current	Tc=25°C	600	A
		Tc=100°C	430	A
P _D	Maximum Power Dissipation	Tc=25°C	430	W
		Tc=100°C	215	W
R _{θJC}	Thermal Resistance, Junction-to-Case		0.35	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient **		45	°C/W
E _{AS}	Single Pulsed-Avalanche Energy ***	L=0.3mH	2300	mJ

Note: * Repetitive rating; pulse width limited by max.junction temperature.

** Surface mounted on 1in2 FR-4 board.

*** Limited by T_{Jmax}, 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	HYG006N04LS1			Unit
			Min	Typ.	Max	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} = 250μA	40	-	-	V
I _{DSS}	Drain-to-Source Leakage Current	V _{DS} =40V, V _{GS} =0V	-	-	1	μA
			T _J =125°C	-	-	50
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1	1.7	3	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} =80A	-	0.48	0.58	mΩ
		V _{GS} =4.5V, I _{DS} =80A	-	0.61	0.73	mΩ
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _{SD} =80A, V _{GS} =0V	-	0.77	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} =40A, dI _{SD} /dt=100A/μs	-	80.7	-	ns
Q _{rr}	Reverse Recovery Charge		-	148.1	-	nC

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

Symbol	Parameter	Test Conditions	HYG006N04LS1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R _G	Gate Resistance	V _{GS} =0V,V _{DS} =0V,F=1MHz	-	1.5	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, Frequency=1MHz	-	15400	-	pF
C _{oss}	Output Capacitance		-	3196	-	
C _{rss}	Reverse Transfer Capacitance		-	115	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =20V,R _G =2.5Ω, I _{DS} =80A,V _{GS} =10V	-	27.3	-	ns
T _r	Turn-on Rise Time		-	104	-	
t _{d(OFF)}	Turn-off Delay Time		-	125.1	-	
T _f	Turn-off Fall Time		-	114.4	-	
Gate Charge Characteristics						
Q _g	Total Gate Charge(V _{GS} =10V)	V _{DS} =32V, I _{DS} =80A	-	231	-	nC
	Total Gate Charge(V _{GS} =4.5V)		-	108	-	
Q _{gs}	Gate-Source Charge		-	49.5	-	
Q _{gd}	Gate-Drain Charge		-	37.2	-	
V _{plateau}	Gate plateau voltage			-	3.3	-

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

Typical Operating Characteristics

Figure 1: Power Dissipation

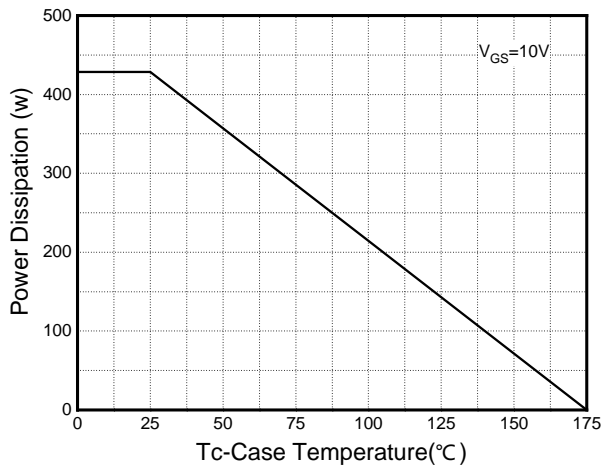


Figure 2: Drain Current

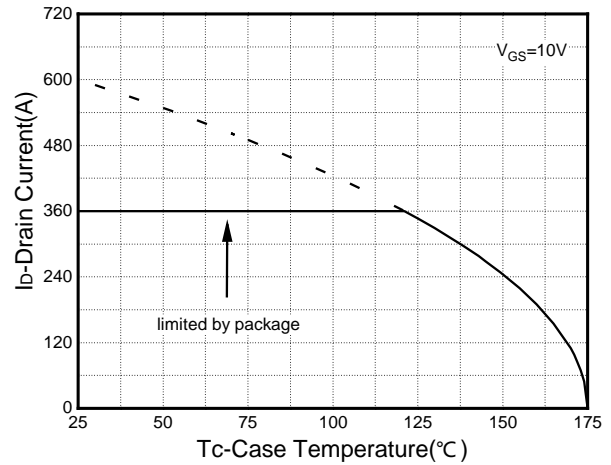


Figure 3: Safe Operation Area

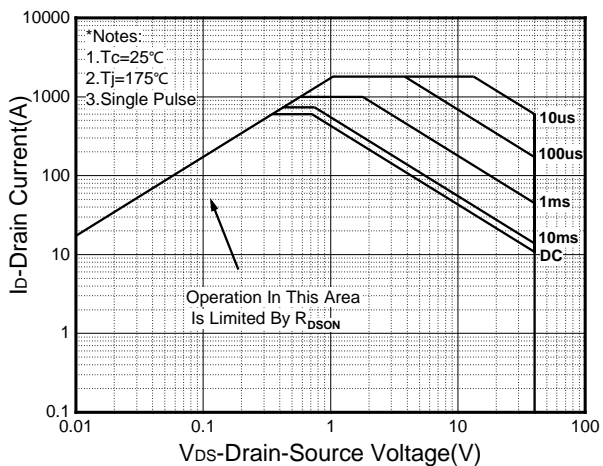


Figure 4: Thermal Transient Impedance

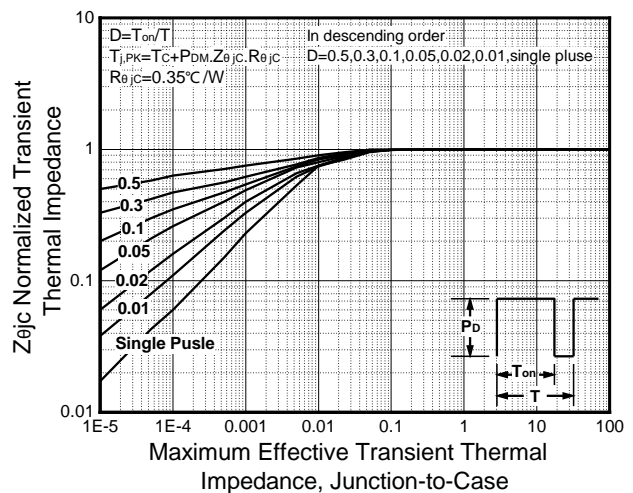


Figure 5: Output Characteristics

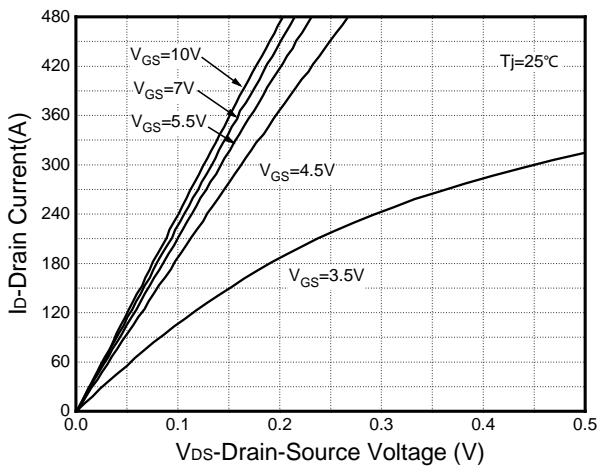
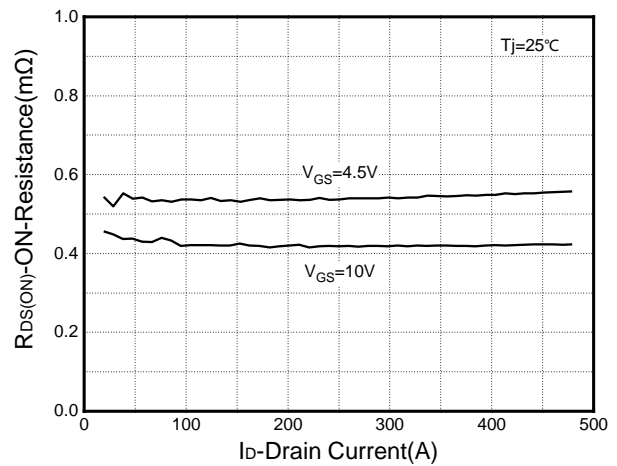


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

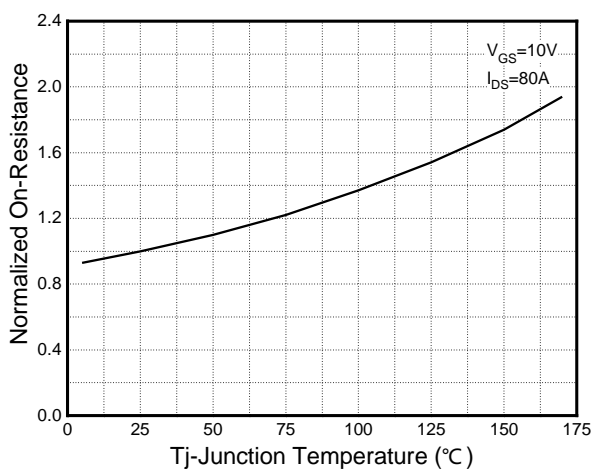


Figure 8: Source-Drain Diode Forward

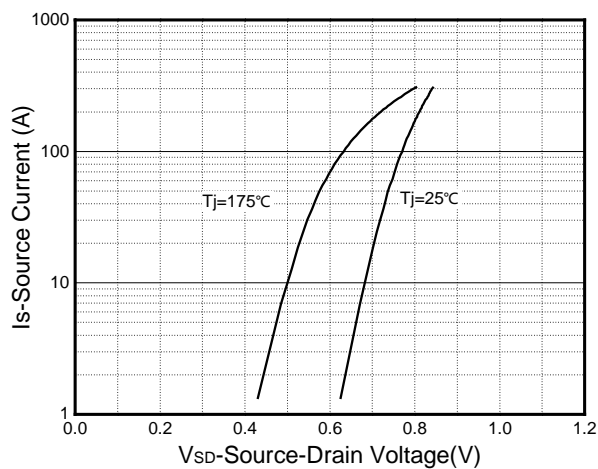


Figure 9: Capacitance Characteristics

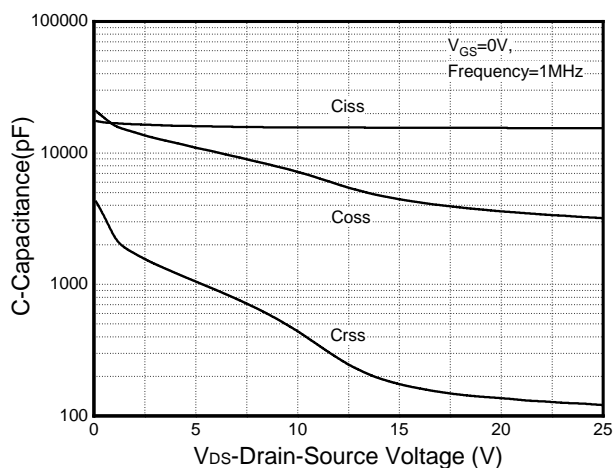
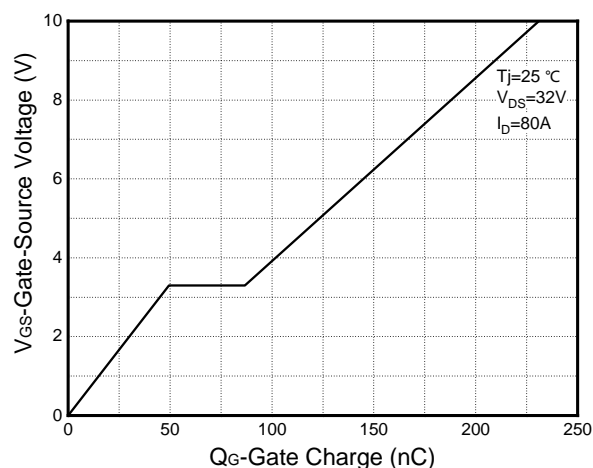
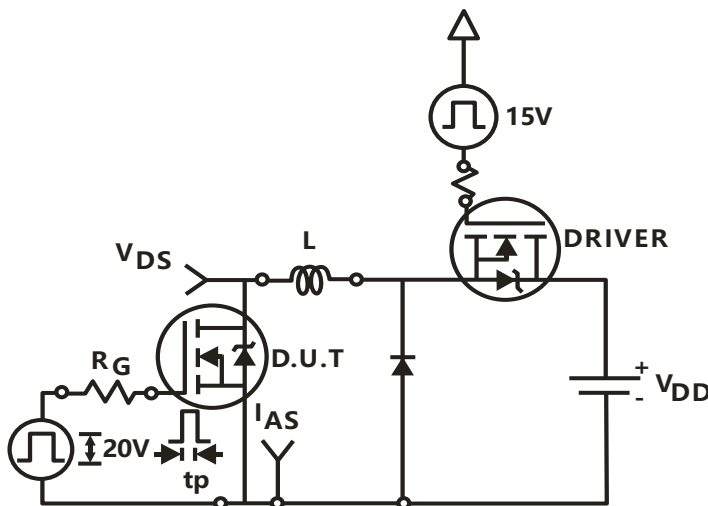


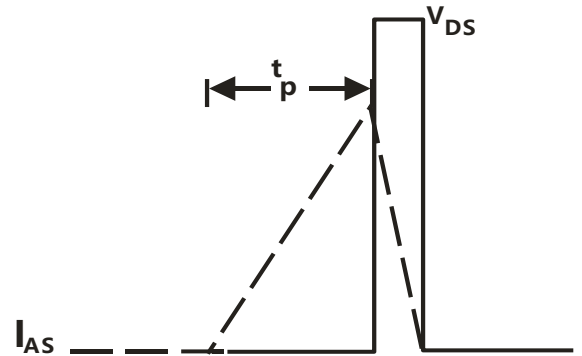
Figure 10: Gate Charge Characteristics



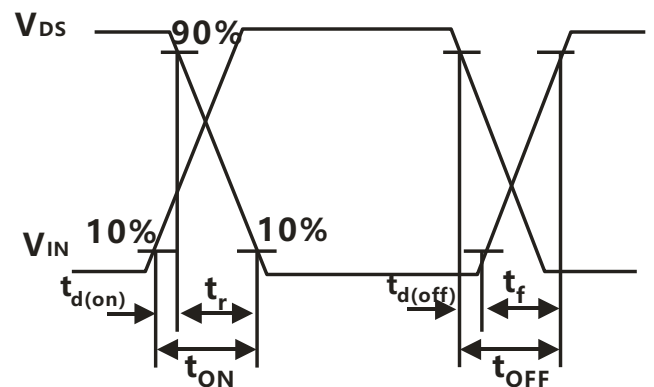
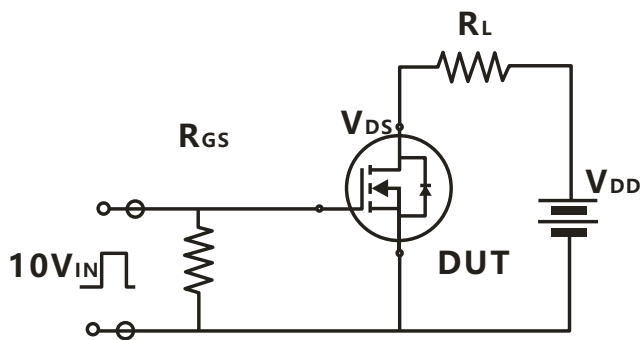
Avalanche Test Circuit



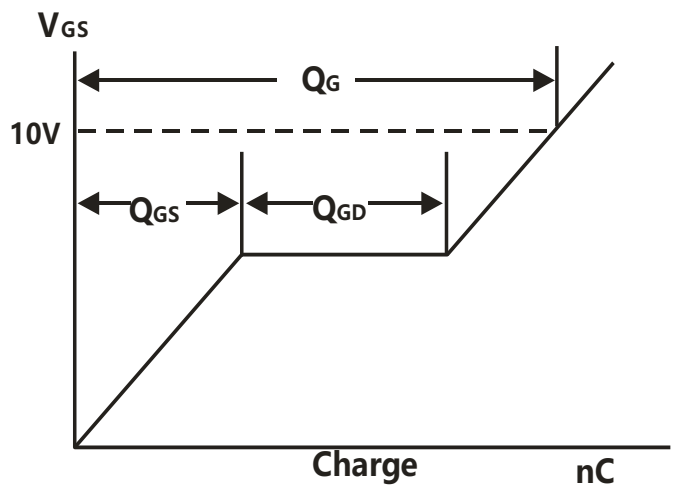
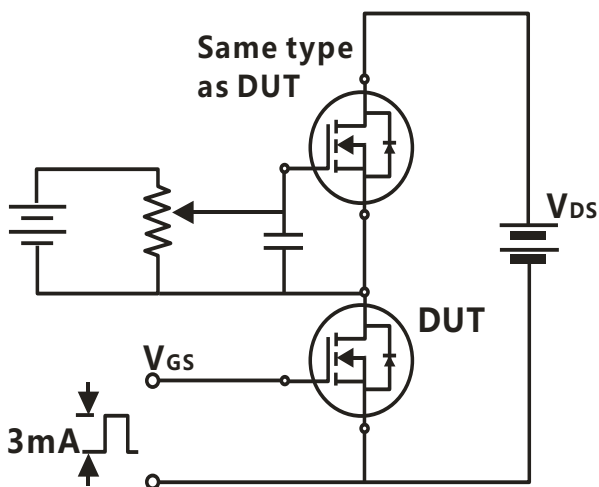
$$E_{AS} = \frac{1}{2} L I_{AS}^2$$



Switching Time Test Circuit



Gate Charge Test Circuit

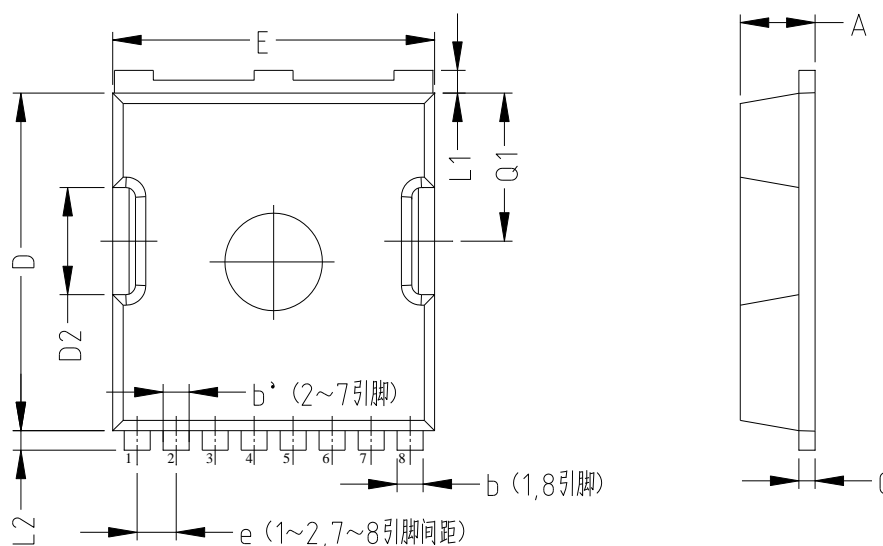


Device Per Unit

Package Type	Unit	Quantity
TOLL	Reel	1200

Package Information

TOLL



COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	2.15	2.30	2.45
b	0.70	0.75	0.85
b'	0.65	0.70	0.80
b1	9.65	9.80	9.95
C	0.45	0.50	0.60
D	10.18	10.38	10.58
D2	3.15	3.30	3.45
E	9.70	9.90	10.10
E1	7.95	8.10	8.25
e	BSC 1.225		
e'	BSC 1.20		
Q1	4.40	4.55	4.70
H	11.48	11.68	11.88
H1	6.80	6.95	7.10
L	1.60	1.80	2.00
L1	0.50	0.70	0.90
L2	0.48	0.60	0.72
L4	1.00	1.15	1.30

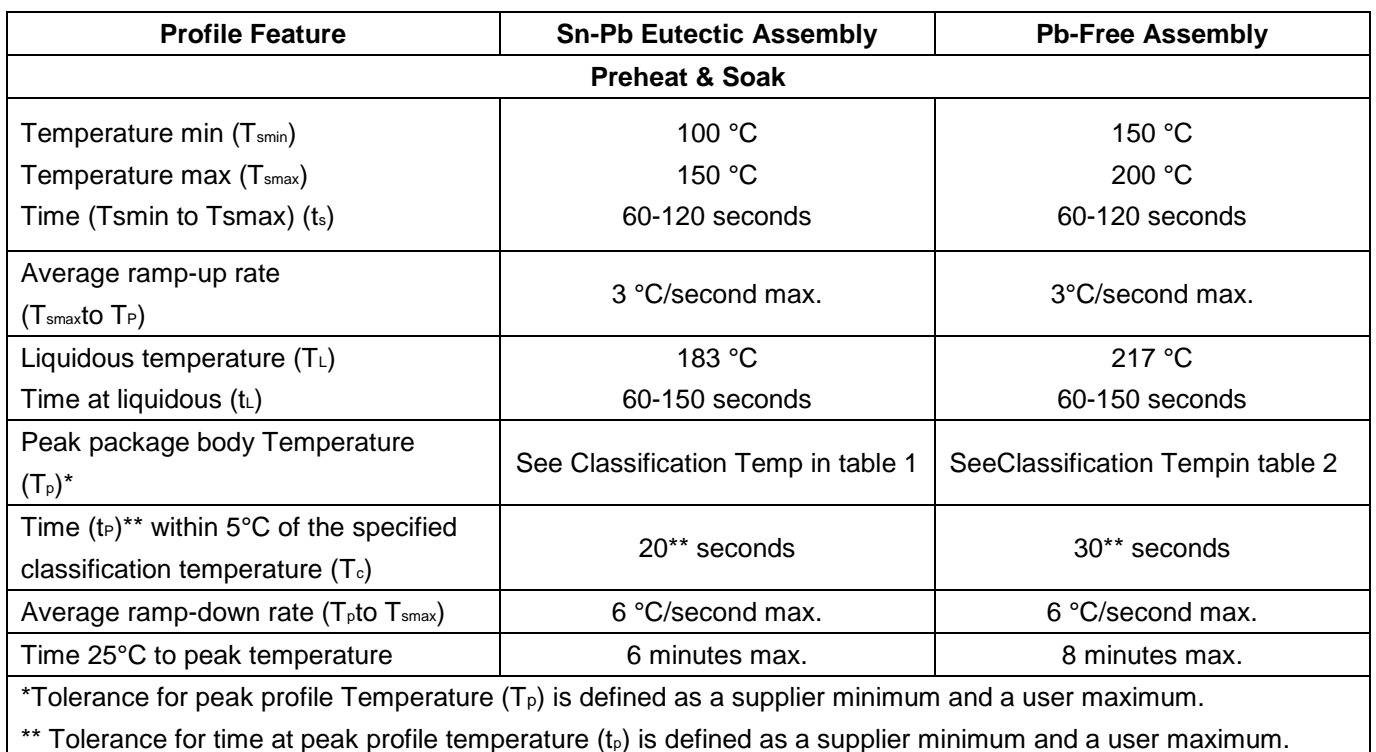


Table 1.SnPb Eutectic Process – Classification Temperatures (Tc)

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	168/500/1000 Hrs, Bias @ 150°C
HTGB	JESD-22, A108	168/500/1000 Hrs, V _{gs} 100% @ 150°C
PCT	JESD-22, A102	96 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	250/500/1000 Cycles, -55°C~150°C

Customer Service

Worldwide Sales and Service: sales@hymexa.com

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