# HYA024N04NS1C2

HUAYI Microelectronics

N-Channel Enhancement Mode MOSFET

Feature

- 40V/145A

  $R_{DS(ON)}$= 2.1 m (typ.) @VGS = 10V

- 100% Avalanche Tested
- 100% DVDS
- Reliable and Rugged
- MSL1 up to 260℃ Peak Reflow
- AEC-Q101 Qualified
- 175℃ operating temperature
- Halogen Free and Green Devices Available
- (RoHS Compliant)
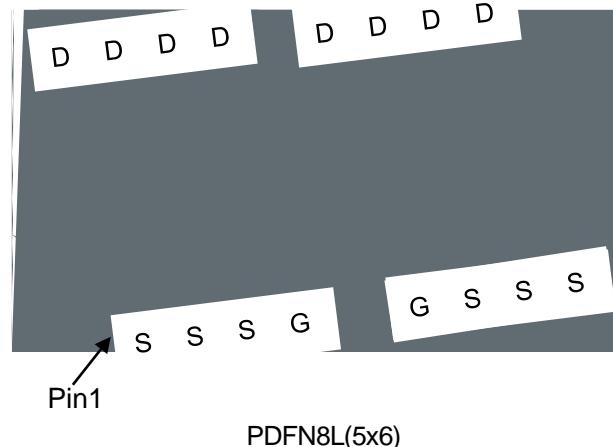
Applications

- Switching application
- Li-battery protection
- DC-DC
- Motor control

Pin Description
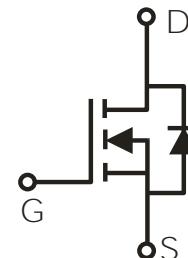
PDFN8L(5x6)

Single N-Channel MOSFET

Ordering and Marking Information

	Package Code
C2 HYA024N04 XYMXXXXXX	C2: PDFN8L(5x6) Date Code XYMXXXXXX

Note: HUAYI halogen free products contain molding compounds/die attach materials and 100% matte tin plate Termi-Nation finish;which are fully compliant with RoHS. HUAYI halogen free products meet or exceed the halogen free require-ments of IPC/JEDEC J-STD-020 for MSL classification at halogen free peak reflow temperature. HUAYI 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).

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 (Tc=25℃ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		40	V
V_{GSS}	Gate-Source Voltage		$\pm$2000	V
T_J	Junction Temperature Range		-55 to 175	℃
T_{STG}	Storage Temperature Range			℃
I_S	Source Current-Continuous(Body Diode)	Tc=25℃	145	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25℃	435	A
I_D	Continuous Drain Current	Tc=25℃	145	A
		Tc=100℃	100	A

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

Symbol	Parameter	Test Conditions	HYA024N04NS1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=500KHz	-	2.2	-	
C_{iss}	Input Capacitance	V_{GS}=0V,	-	1882	-	pF
C_{oss}	Output Capacitance	V_{DS}=25V,	-	440	-	
C_{rss}	Reverse Transfer Capacitance	Frequency=500KHz	-	46	-	
$t_{d(ON)}$	Turn-on Delay Time		-	16.3	-	
T_r	Turn-on Rise Time	V_{DD}=20V,R_G=4 ,	-	50.7	-	ns
$t_{d(OFF)}$	Turn-off Delay Time	I_{DS}=20A,V_{GS}=10V	-	43.4	-	
T_f	Turn-off Fall Time		-	39.1	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge(V_{GS}=10V)		-	32.7	-	nC
Q_{gs}	Gate-Source Charge	V_{DS}=32V, I_{DS}=20A	-	10.6	-	
Q_{gd}	Gate-Drain Charge		-	5.8	-	
$V_{plateau}$	Gate plateau voltage		-	4.7	-	V

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

Typical Operating Characteristics

Figure 1: Power Dissipation

Power Dissipation (w) vs Tc-Case Temperature(℃)

$V_{GS}=10V$
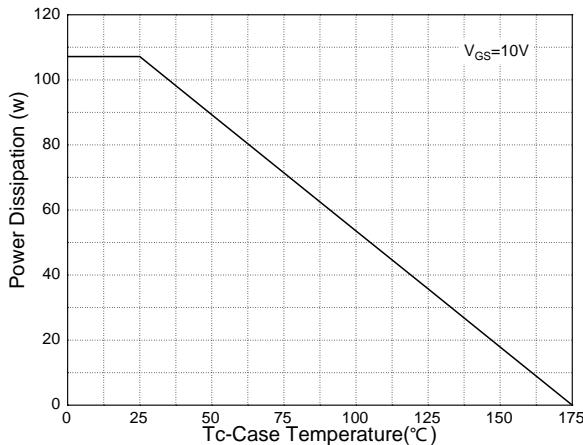
Figure 2: Drain Current
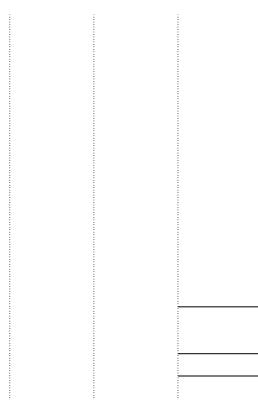
Figure 3: Safe Operation Area
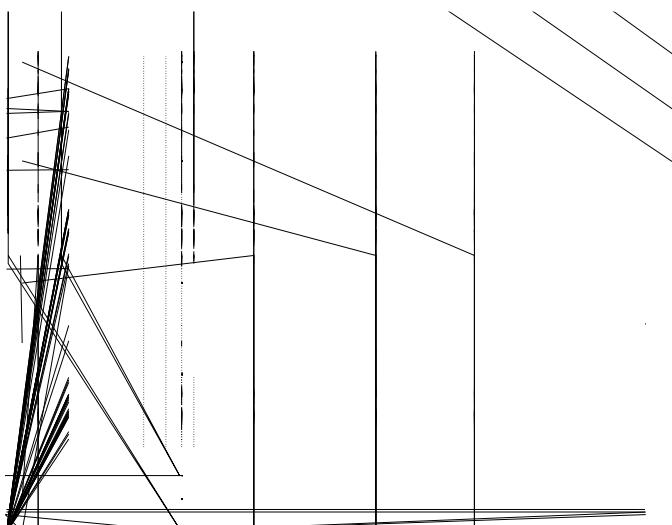
### Figure 4: Thermal Transient Impedance

Figure 5: Output Characteristics
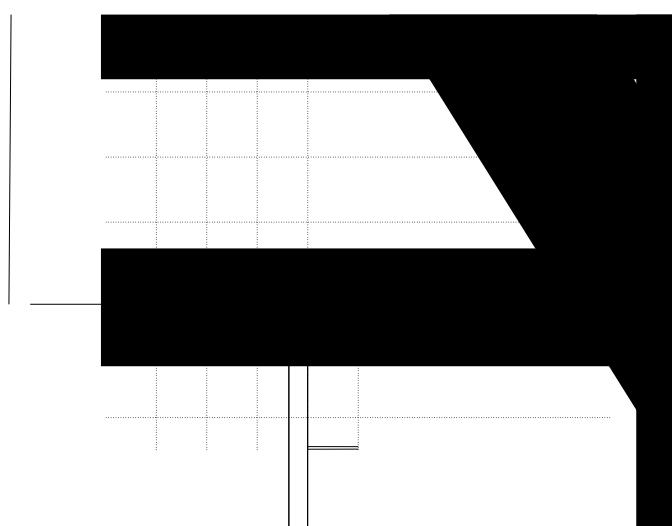
Figure 6: Drain-Source On Resistance

RDS(ON)-ON-Resistance(m) vs ID-Drain Current(A)

$Tj=25℃$

$Vgs=10V$
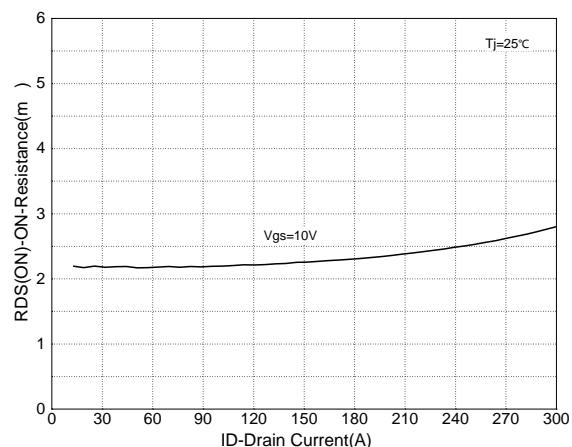
Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature   **Figure 8: Source-Drain Diode Forward**
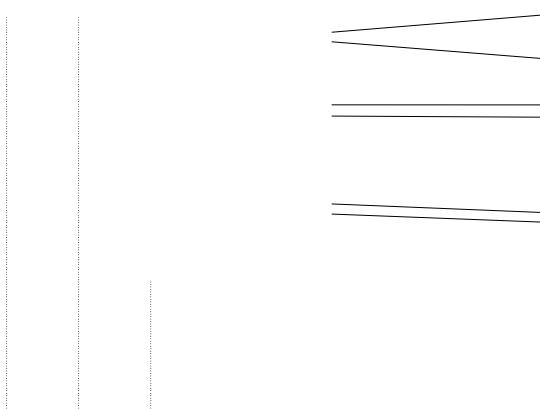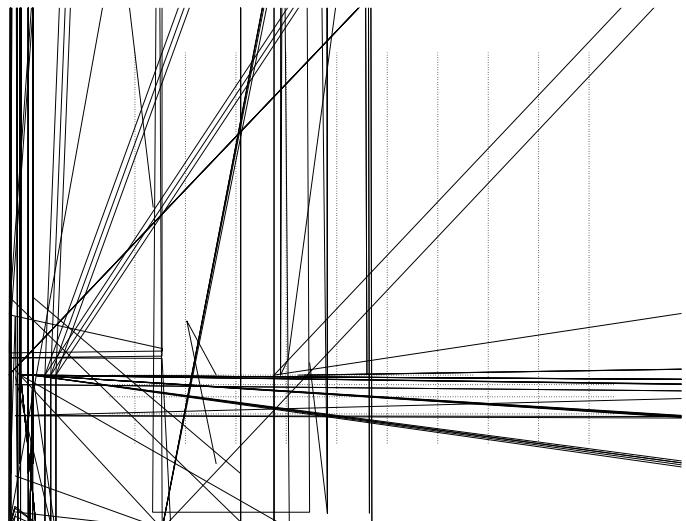
Figure 9: Capacitance Characteristics   **Figure 10: Gate Charge Characteristics**
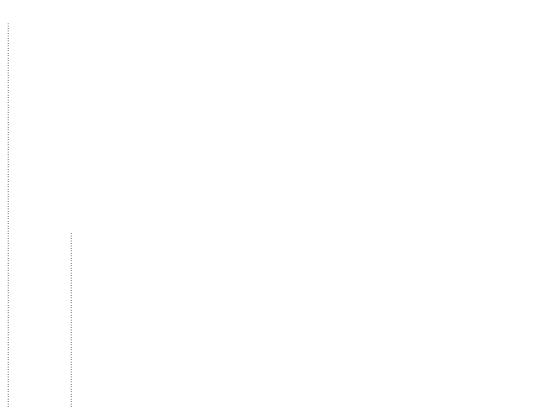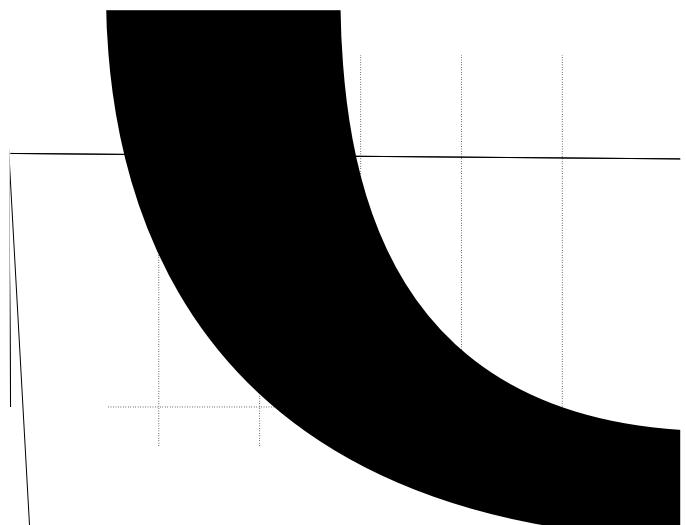
Figure 11: Transfer Characteristics   **Figure 12: Gate Threshold Voltage**
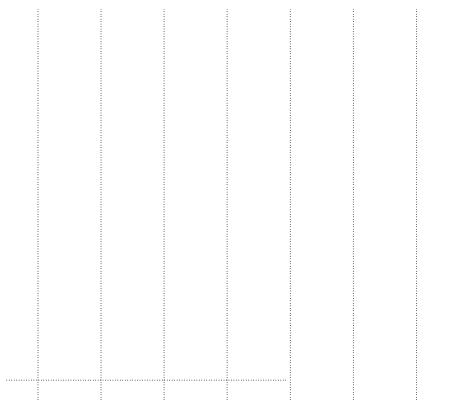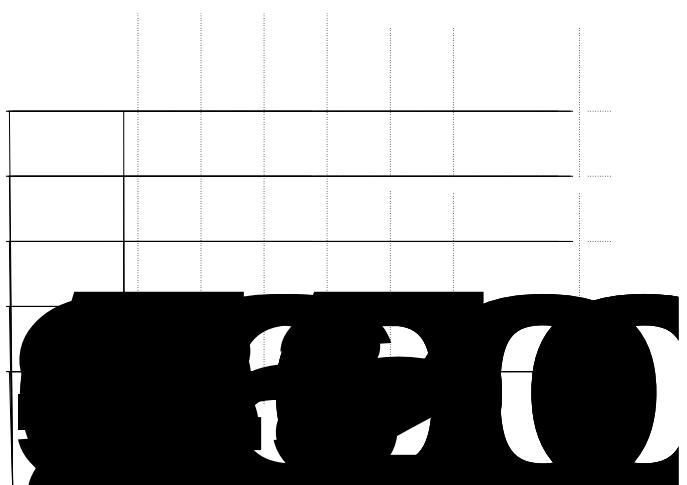
Typical Operating Characteristics(Cont.)

Figure 13: Drain-Source Breakdown
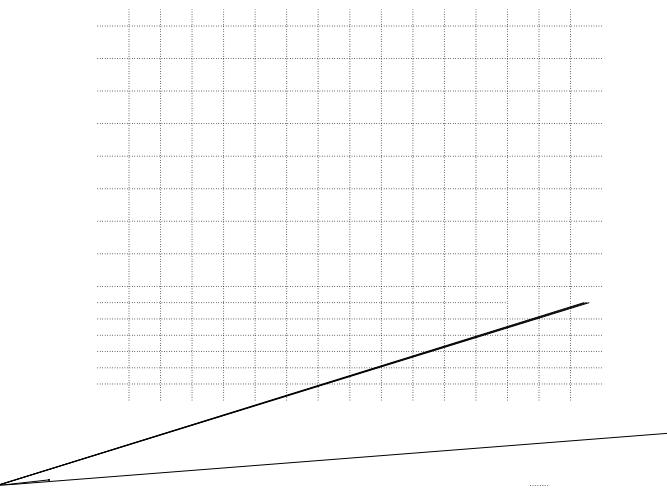
Figure 14: R_dson vs. Gate Voltage

Figure 15: Output Characteristics（125℃）

Avalanche Test Circuit

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

V_{DS}

V_{DS}

R_G D.U.T

I_{AS}

L DRIVER

$+ \quad V_{DD}$

20V

tp

I_{AS}
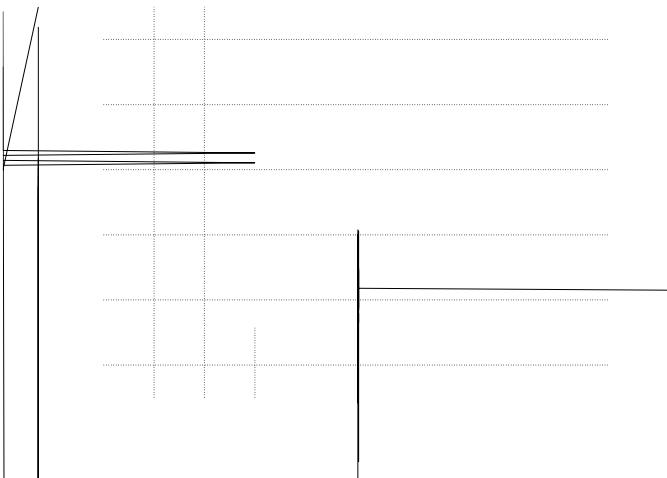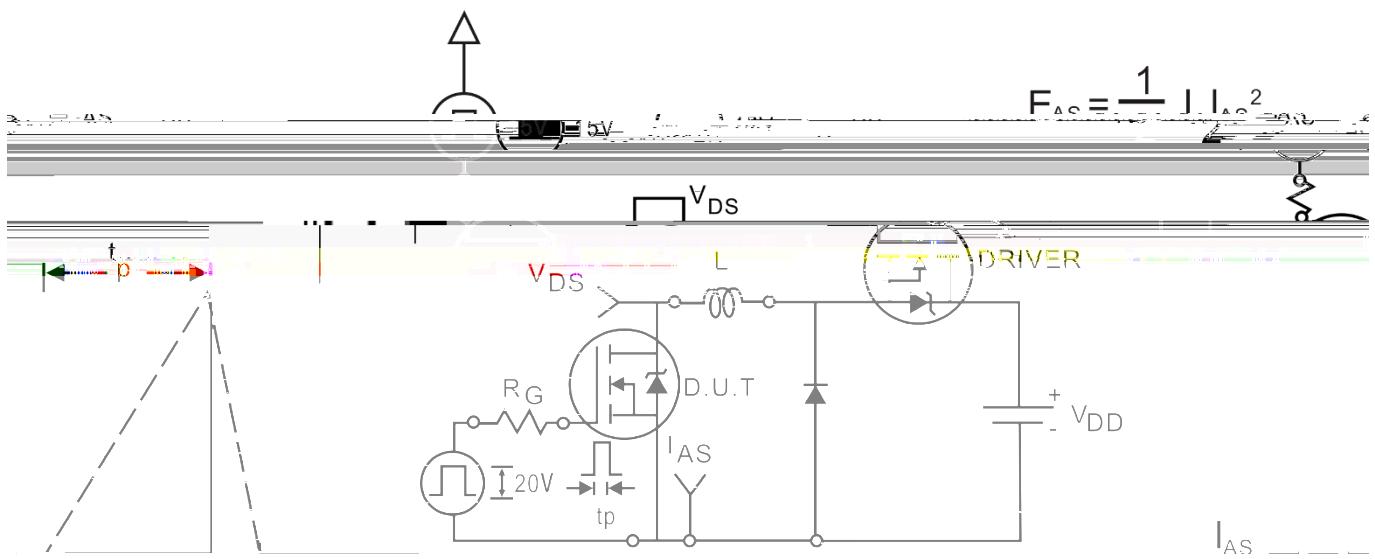
Switching Time Test Circuit

R_L

V_{DS} 90%
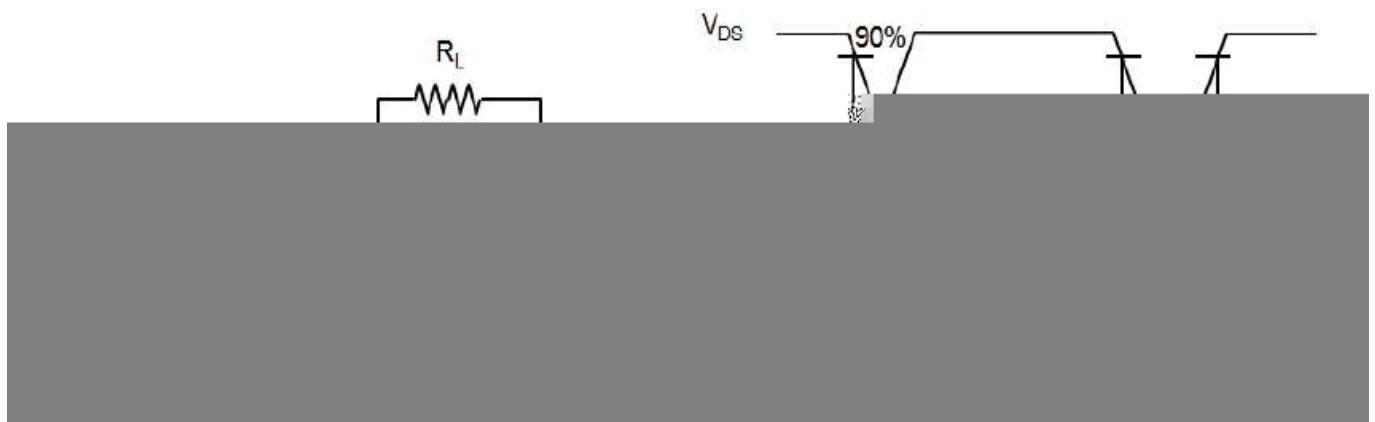
Gate Charge Test Circuit

Same type as DUT

V_{DS}

DUT

V_{GS}

Q_G

10V

Q_{GS} Q_{GD}

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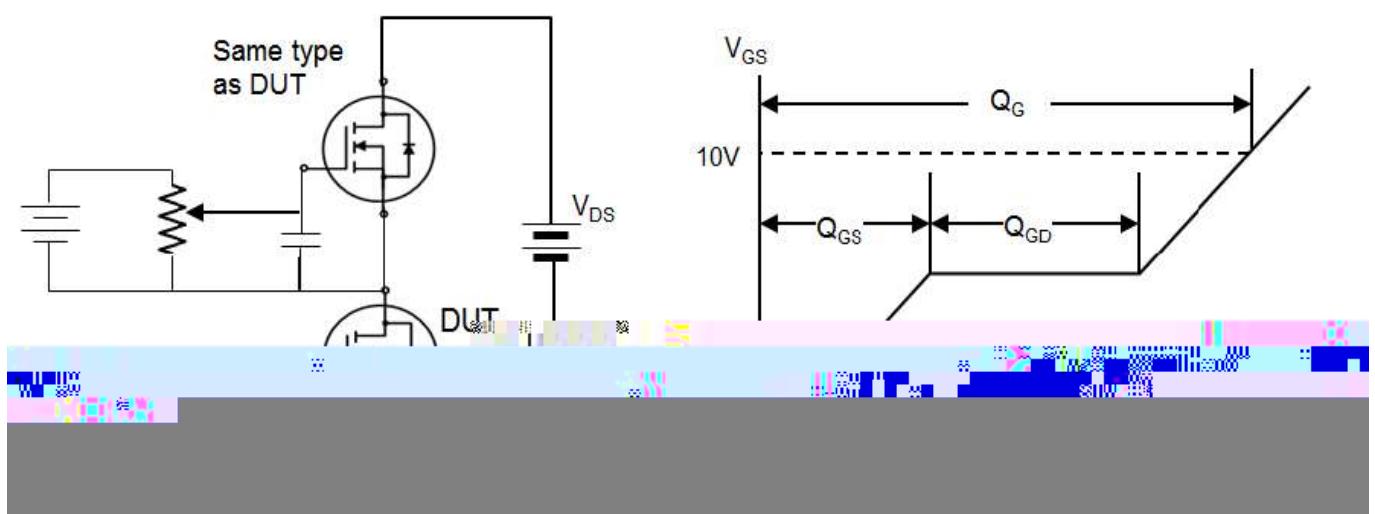
Device Per Unit

Package Type	Unit	Quantity
PDFN8L(5x6)	Reel	5000

Package Information

PDFN8L(5x6)

(unit:mm)

5.8
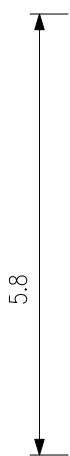
Classification Profile

Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		

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

Package Thickness	Volume mm³ <350	Volume mm³ ≥350