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Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
Common Ratings (T _c =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)	T _c =25°C	57	A
Mounted on Large Heat Sink				
I _{DM}	Pulsed Drain Current *	T _c =25°C	204	A
I _D	Continuous Drain Current	T _c =25°C	57	A
		T _c =100°C	40	A
P _D	Maximum Power Dissipation	T _c =25°C	42	W
		T _c =100°C	21	W
R _{JC}	Thermal Resistance, Junction-to-Case		3.6	°C/W
R _{JA}	Thermal Resistance, Junction-to-Ambient **		80	°C/W
E _{AS}	Single Pulsed-Avalanche Energy ***	L=0.3mH	55	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_c= 25 , V_{GS} =10V.

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

Symbol	Parameter	Test Conditions	HYA060N04LS1			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	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	1	1.5	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} =20A	-	5.3	6.5	m
		V _{GS} =4.5V, I _{DS} =20A	-	7.3	10.2	m
Diode Characteristics						
V _{SD}	Diode Forward Voltage	I _{SD} =20A, V _{GS} =0V	-	0.84	1.2	V
t _{rr}	Reverse Recovery Time	I _{SD} =20A, dI _{SD} /dt=100A/μs	-	15	-	ns
Q _{rr}	Reverse Recovery Charge		-	6	-	nC



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

Symbol	Parameter	Test Conditions	HYA060N04LS1	Unit
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Typical Operating Characteristics

Figure 1: Power Dissipation

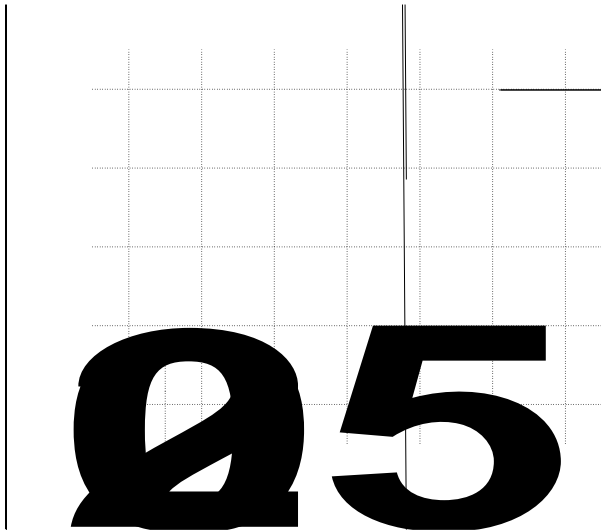


Figure 3: Safe Operation Area

Figure 2: Drain Current

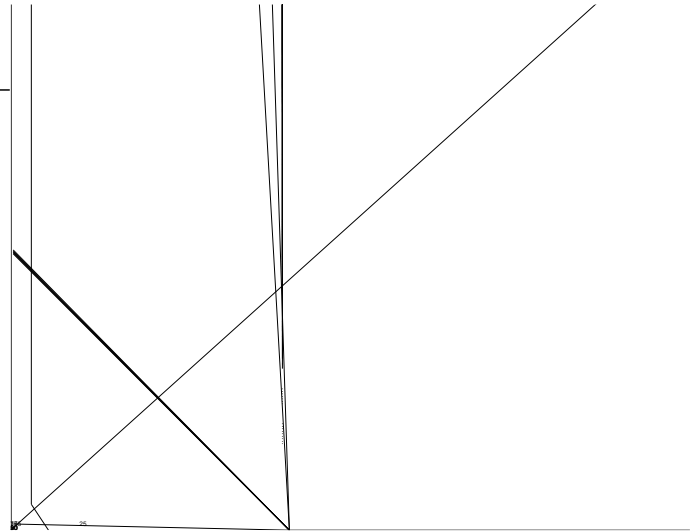


Figure 4: Thermal Transient Impedance

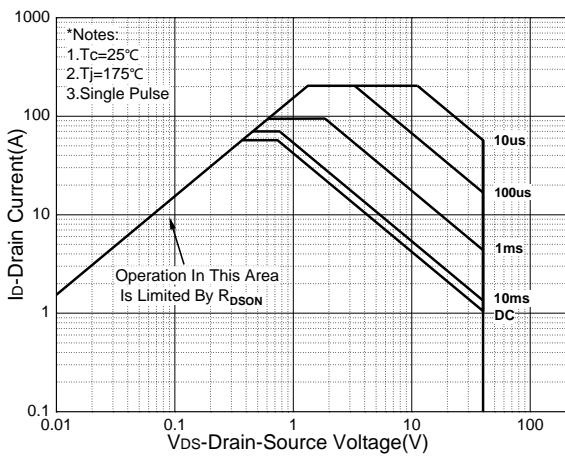
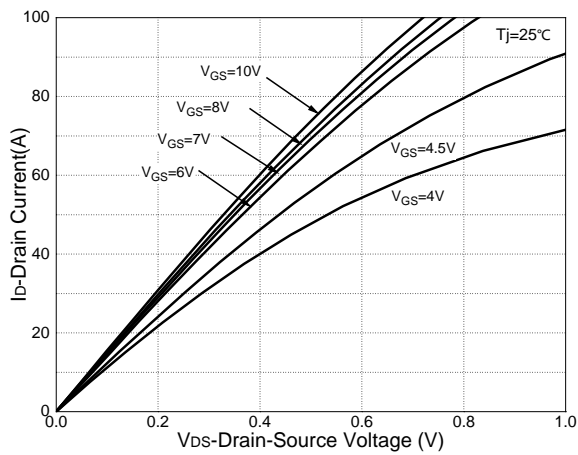


Figure 5: Output Characteristics

Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

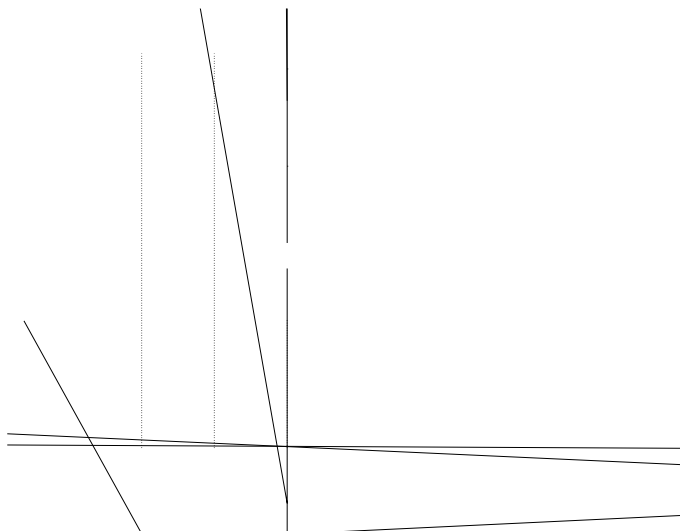


Figure 8: Source-Drain Diode Forward

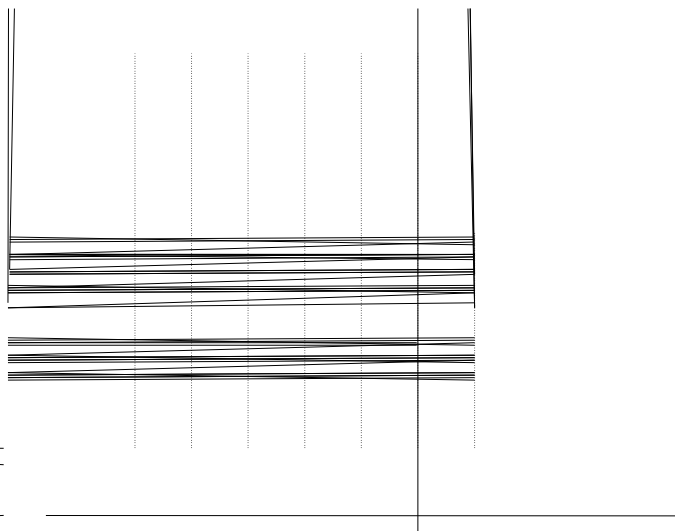


Figure 9: Capacitance Characteristics

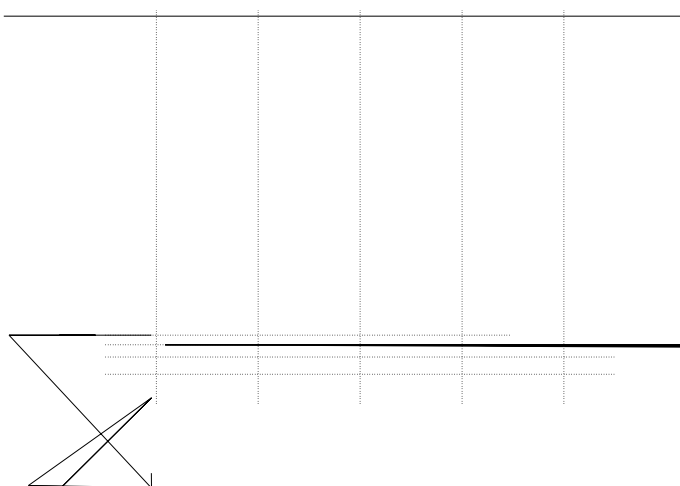


Figure 10: Gate Charge Characteristics

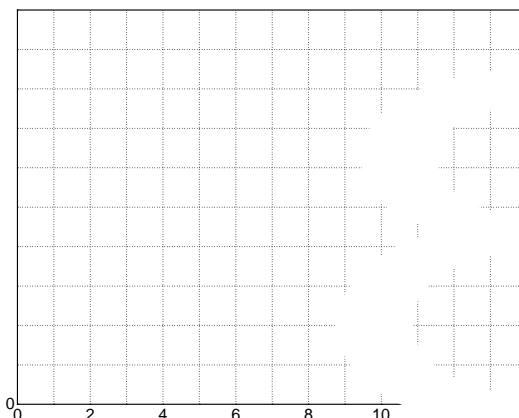


Figure 11: Transfer Characteristics

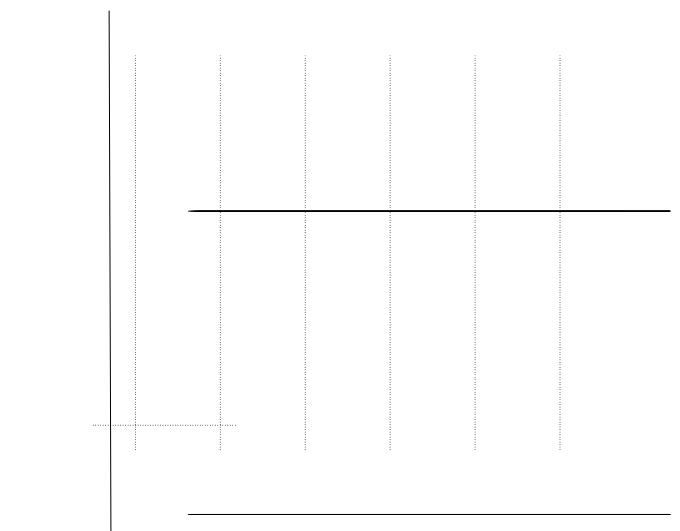


Figure 12: Gate Threshold Voltage



Typical Operating Characteristics(Cont.)

Figure 13: Drain-Source Breakdown



Figure 14: R_{dson} vs. Gate Voltage

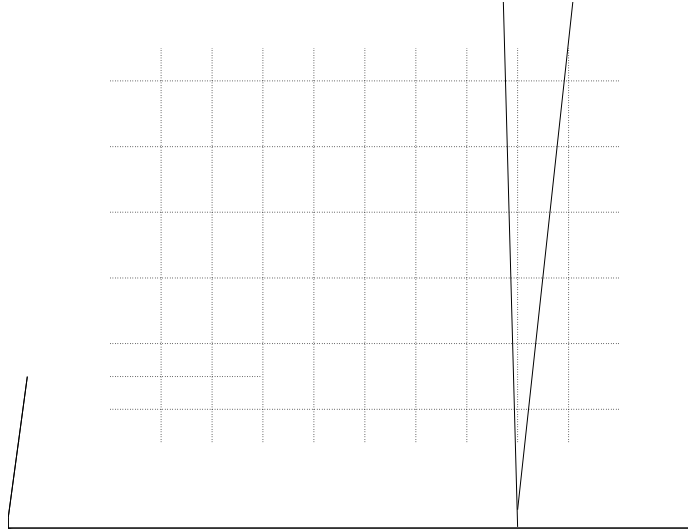
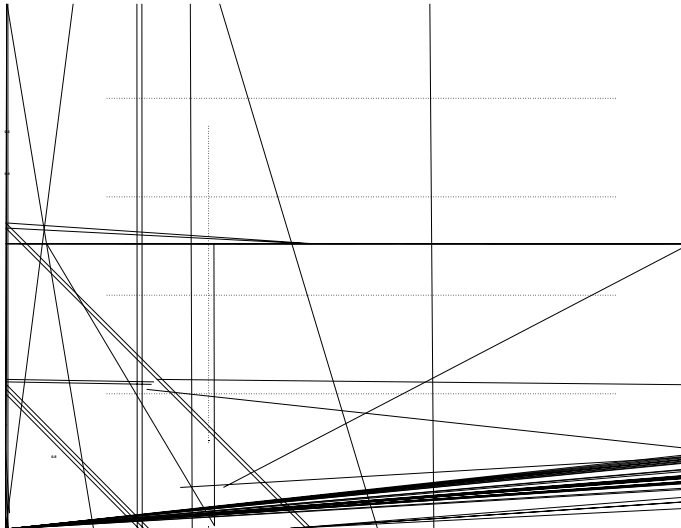
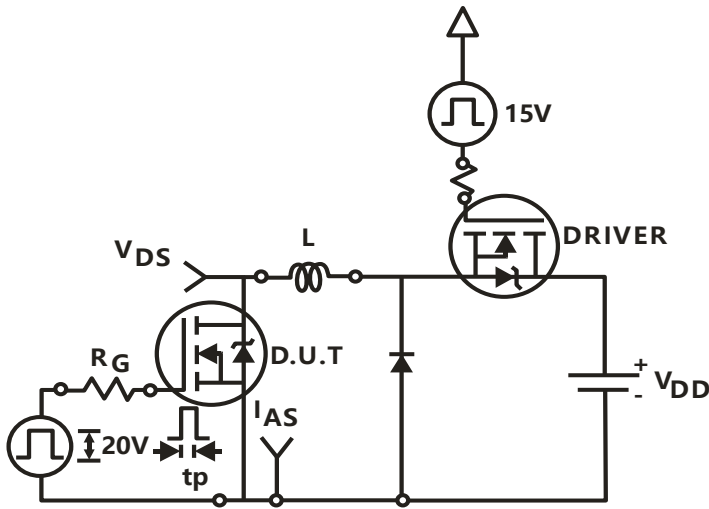


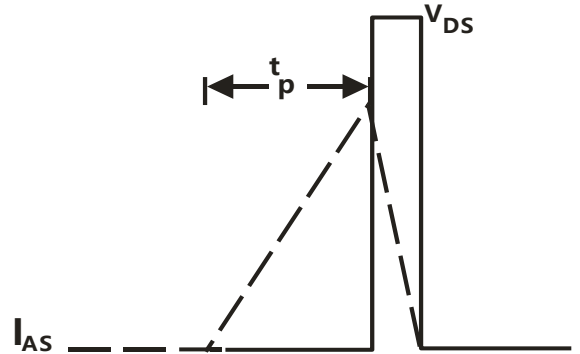
Figure 15: Output Characteristics (125°C)



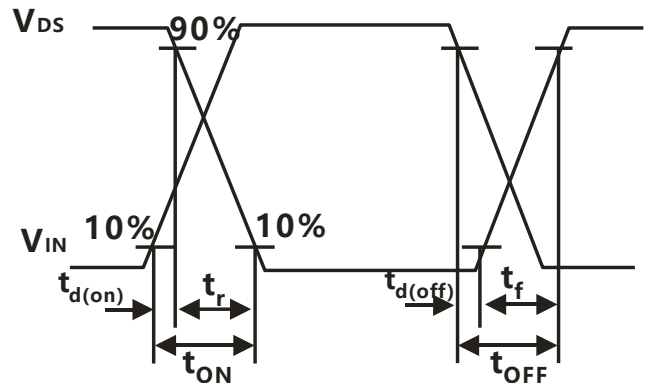
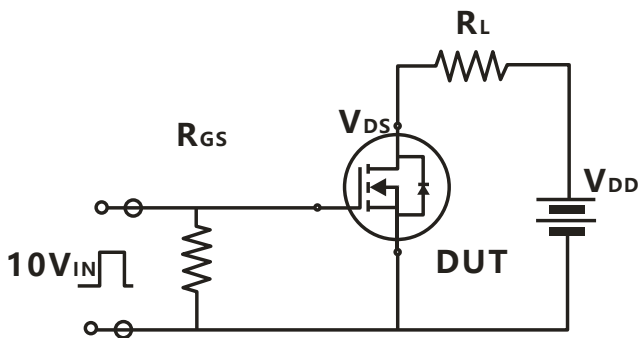
Avalanche Test Circuit



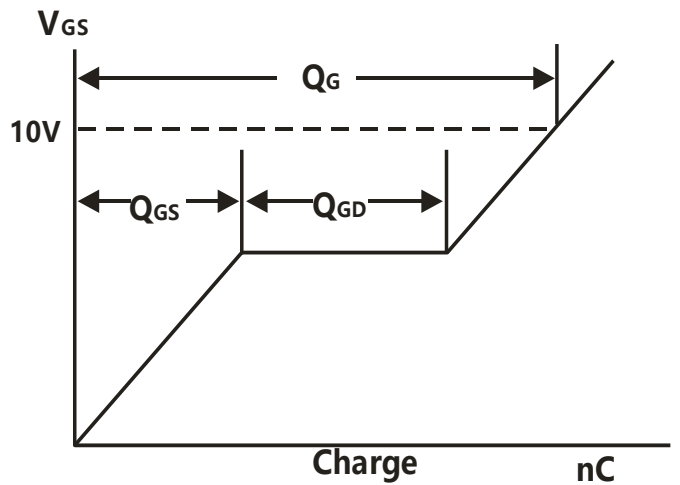
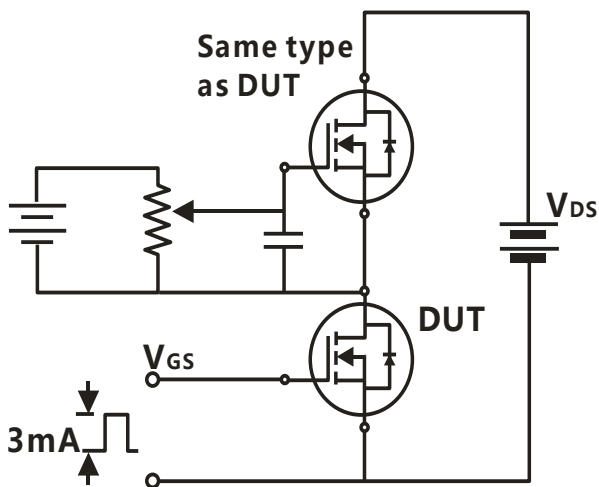
$$E_{AS} = \frac{1}{2} L I_{AS}^2$$



Switching Time Test Circuit



Gate Charge Test Circuit

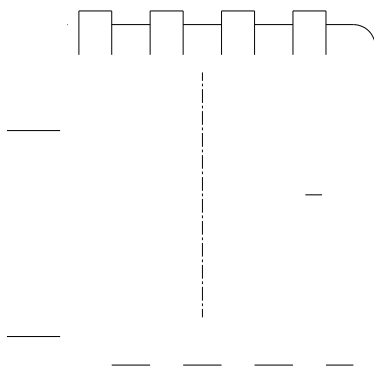
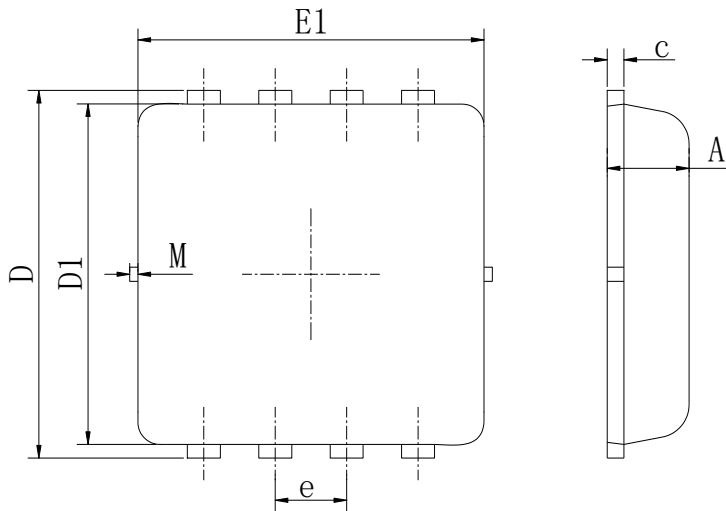


Device Per Unit

Package Type	Unit	Quantity
PDFN8L(3.3x3.3)	Reel	6500

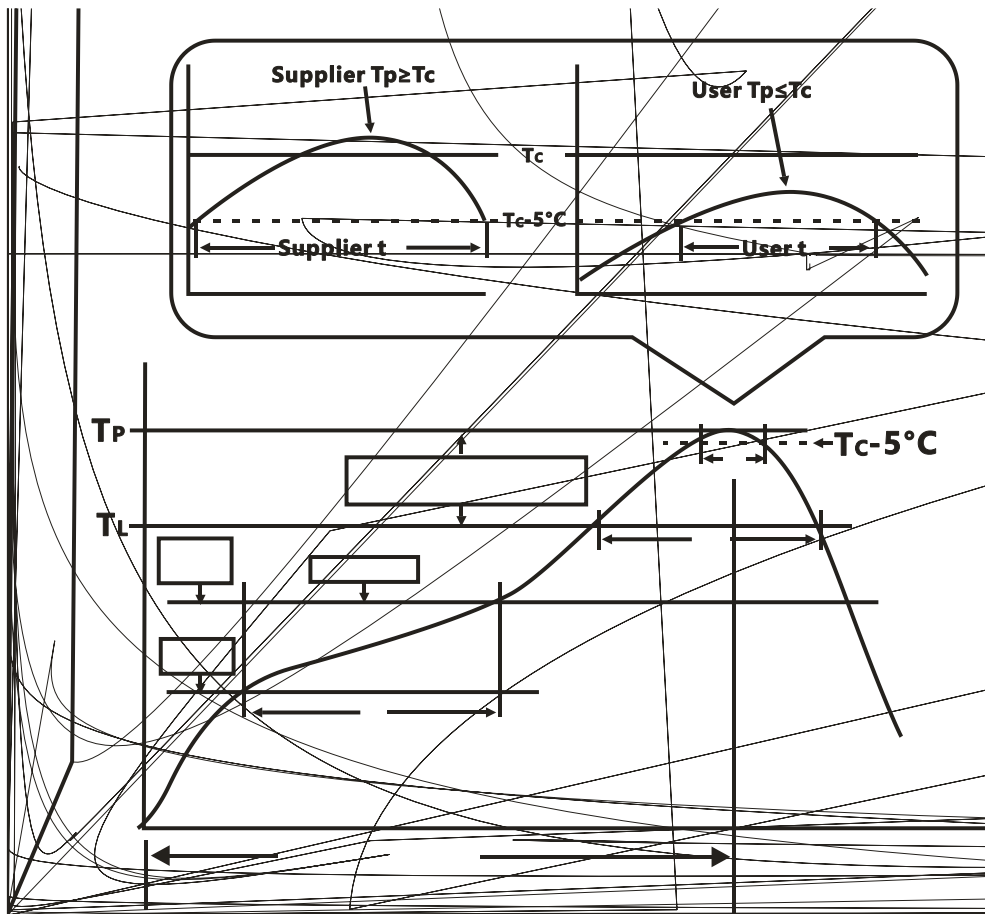
Package Information

PDFN8L(3.3x3.3)



COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
E1	3.10	3.20	3.30
E2	2.44	2.54	2.64
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
M	\	\	0.10
*Not specified			

Classification Profile



Classification Reflow Profiles

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

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
PCT	JESD22-A102	121°C, 100%RH, 96hours, 205KPa
TCT	JESD22-A104	250/500/1000 Cycles, -55°C~150°C
HTRB	JESD22-A108B	168/500/1000 Hrs, 100% BV _{DSS} @ 175°C
HTGB	JESD22-A108B	168/500/1000 Hrs, 100%V _{gs} @ 175°C
BHAST	JESD22-A110D	130°C, 85%RH, 230KPA;U=32V
IOL	MIL-STD-750	Ta=25°C, ΔTj≥100°C, Ton/Toff 2min, 15000cycles

Customer Service

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