P-Channel Enhancement Mode MOSFET

Feature

Pin Description

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		-30	V
V_{GSS}	Gate-Source Voltage		±20	V
T_J	Junction TemperatureRange		-55 to 175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Source Current-Continuous(Body Diode)	Tc=25°C	-17	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25°C	-68	A
I_D	Continuous Drain Current	Tc=25°C	-17	A
		Tc=100°C	-12	A
P_D	Maximum Power Dissipation	Tc=25°C	3.75	W
		Tc=100°C	1.88	W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient**		40	°C/W
E_{AS}	SinglePulsed-Avalanche Energy***	L=0.3mH	349.8***	mJ

Note: * Repetitive rating; pulse width limited by max.junction temperature.
** Surface mounted on 1in2 FR-4 board t≤10sec.
*** Limited by $T_J$max , 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	HYG045P03LQ1			Unit
			Min	Typ.	Max	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_{DS}=-250uA	-30	-	-	V
I_{DSS}	Drain-to-Source LeakageCurrent	V_{DS}=-30V,V_{GS}=0V	-	-	-1	μA
		T_J=125°C	-	-	-50	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=-250uA	-1.0	-1.5	-3.0	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}=-10A	-	5.9	7.0	mΩ
		V_{GS}=-4.5V,I_{DS}=-7A	-	7.9	9.5	
Diode Characteristics						
V_{SD}*	Diode Forward Voltage	I_{SD}=-10A,V_{GS}=0V	-	-0.82	-1	V
t_{rr}	Reverse Recovery Time	I_{SD}=-10 A,dI_{SD}/dt=100A/us	-	25.1	-	ns
Q_{rr}	Reverse Recovery Charge		-	16.1	-	nC

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

Symbol	Parameter	Test Conditions	HYG045P03LQ1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V, Frequency=1.0MHz	-	5.5	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V,	-	7328	-	pF
C_{oss}	Output Capacitance	V_{DS}=-25V,	-	607	-	
C_{rss}	Reverse Transfer Capacitance	Frequency=1.0MHz	-	553	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=-15V,R_G=4Ω, I_{DS}=-10A,V_{GS}=-10V	-	13.3	-	ns
T_r	Turn-on Rise Time		-	35.0	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	164.7	-	
T_f	Turn-off Fall Time		-	60.5	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS} = -24V, V_{GS}= -10V, I_D= -10A	-	139.1	-	nC
$Q_{g(V_{GS}=-4.5V)}$	Total Gate Charge(V_{GS}=-4.5V)			68.0		
Q_{gs}	Gate-Source Charge		-	25.0	-	
Q_{gd}	Gate-Drain Charge		-	23.6	-	

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

Typical Operating Characteristics

Figure 1: Power Dissipation

Figure2: Drain Current

Figure 3: Safe Operation Area

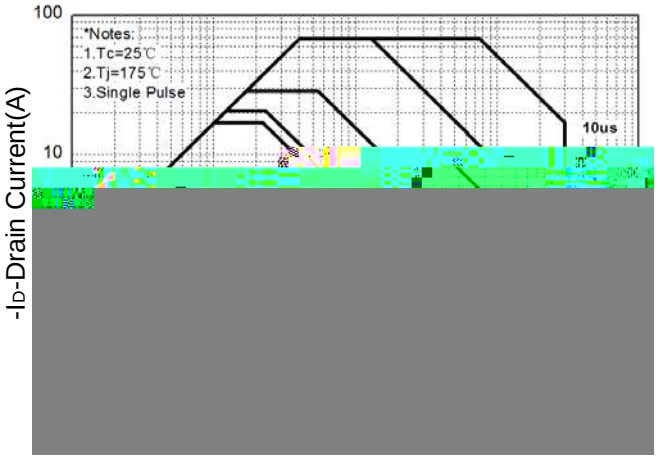


Figure4: Thermal Transient Impedance

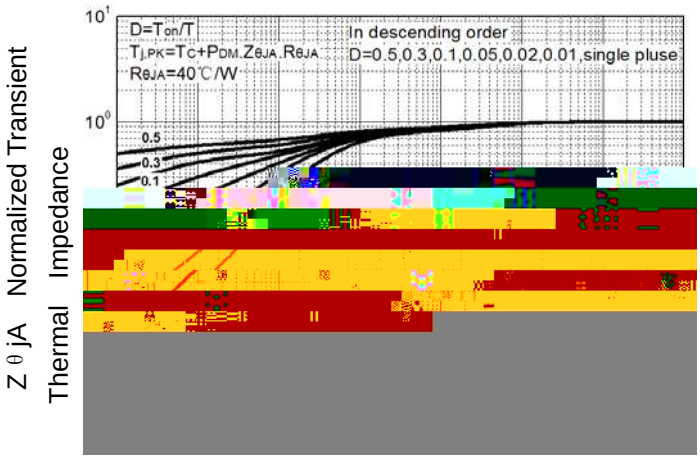


Figure 5: Output Characteristics

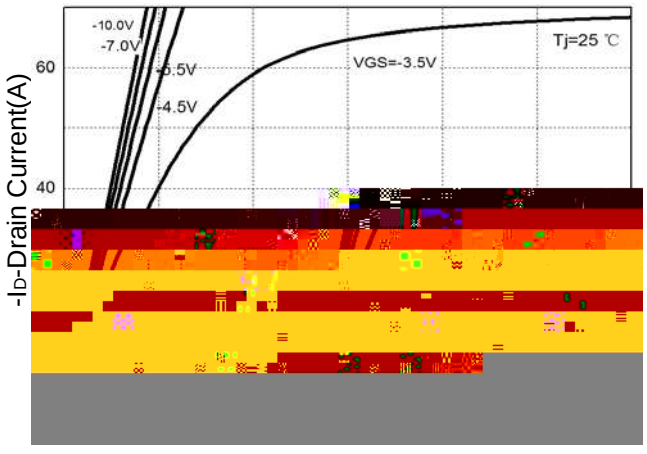
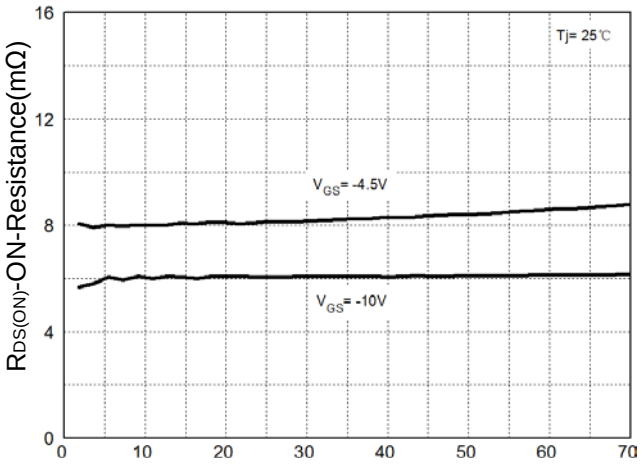


Figure6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

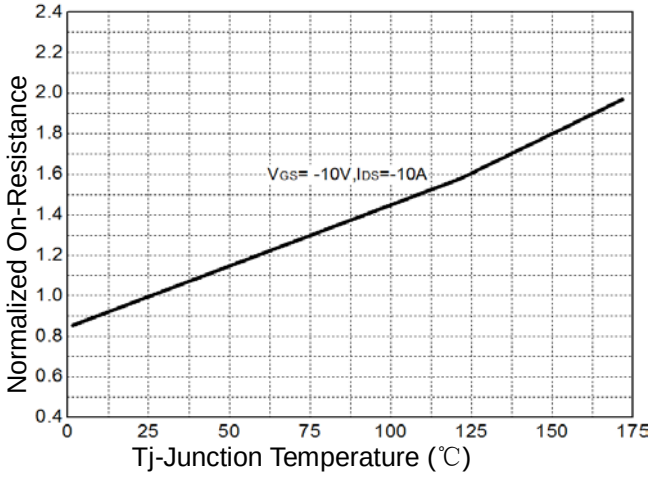


Figure8: Source-Drain Diode Forward

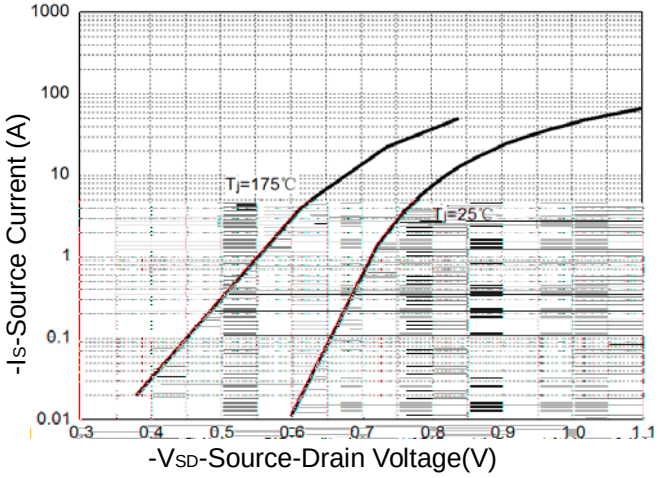


Figure 9: Capacitance Characteristics

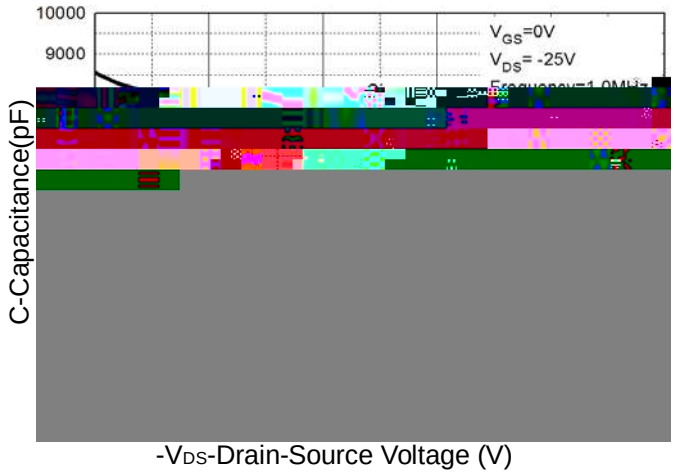
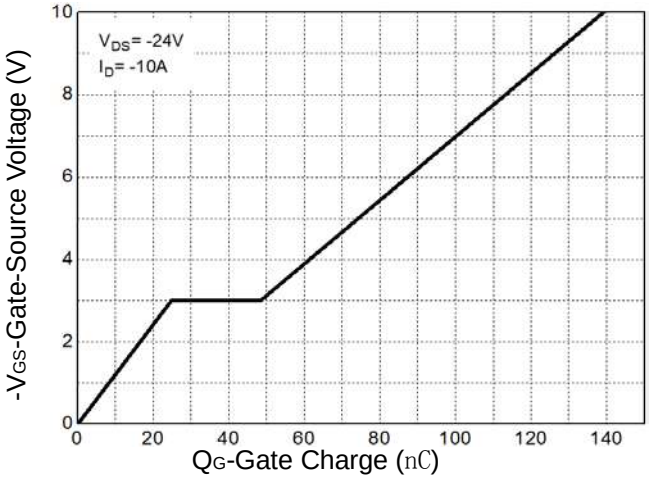
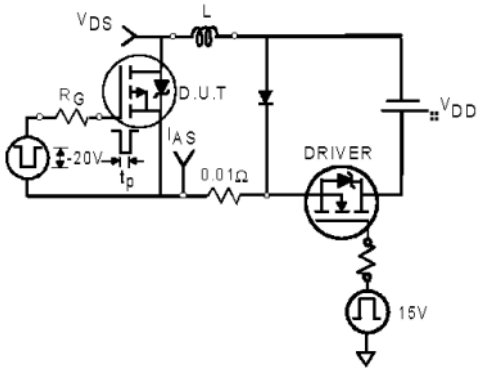
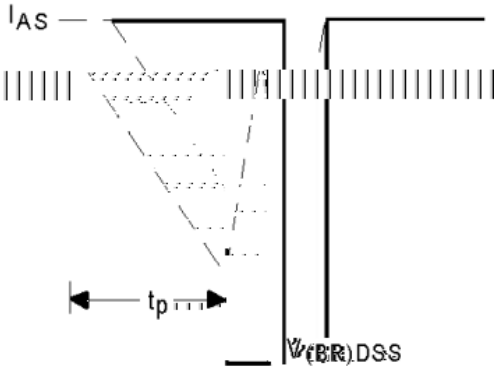


Figure 10: Gate Charge Characteristics

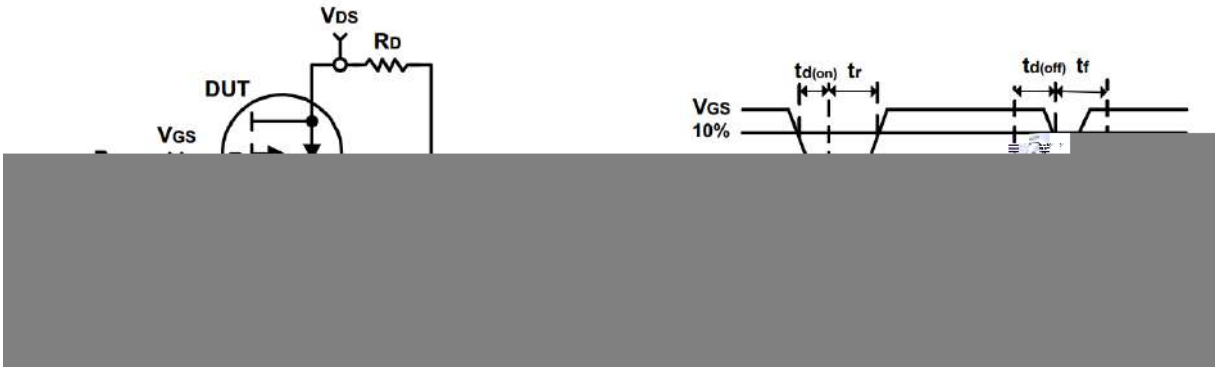


Avalanche Test Circuit

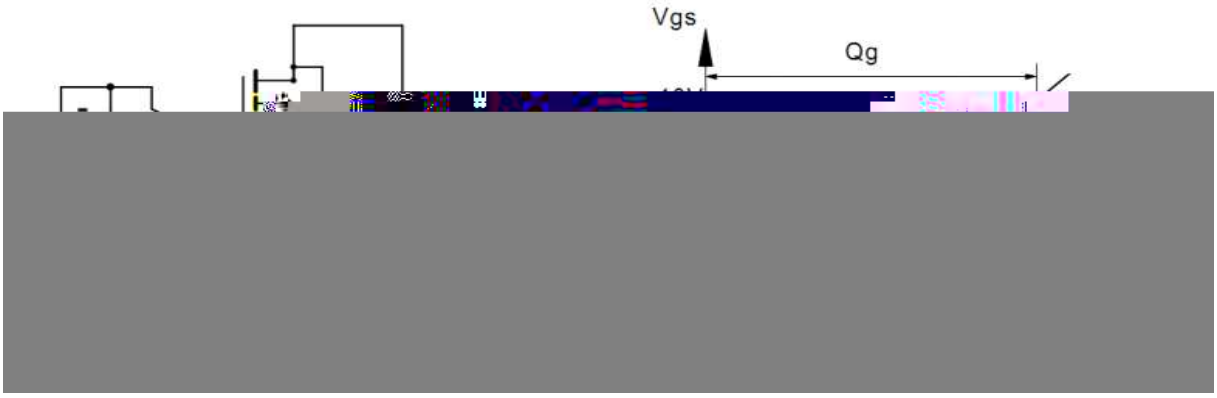




Switching Time Test Circuit



Gate Charge Test Circuit

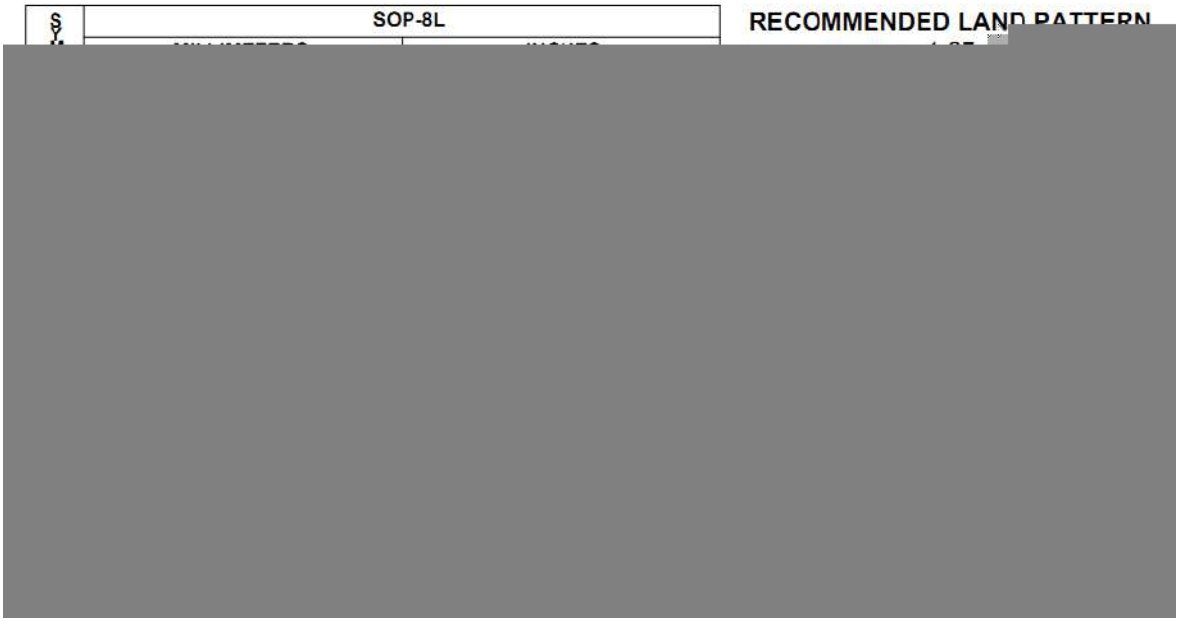


Device Per Unit

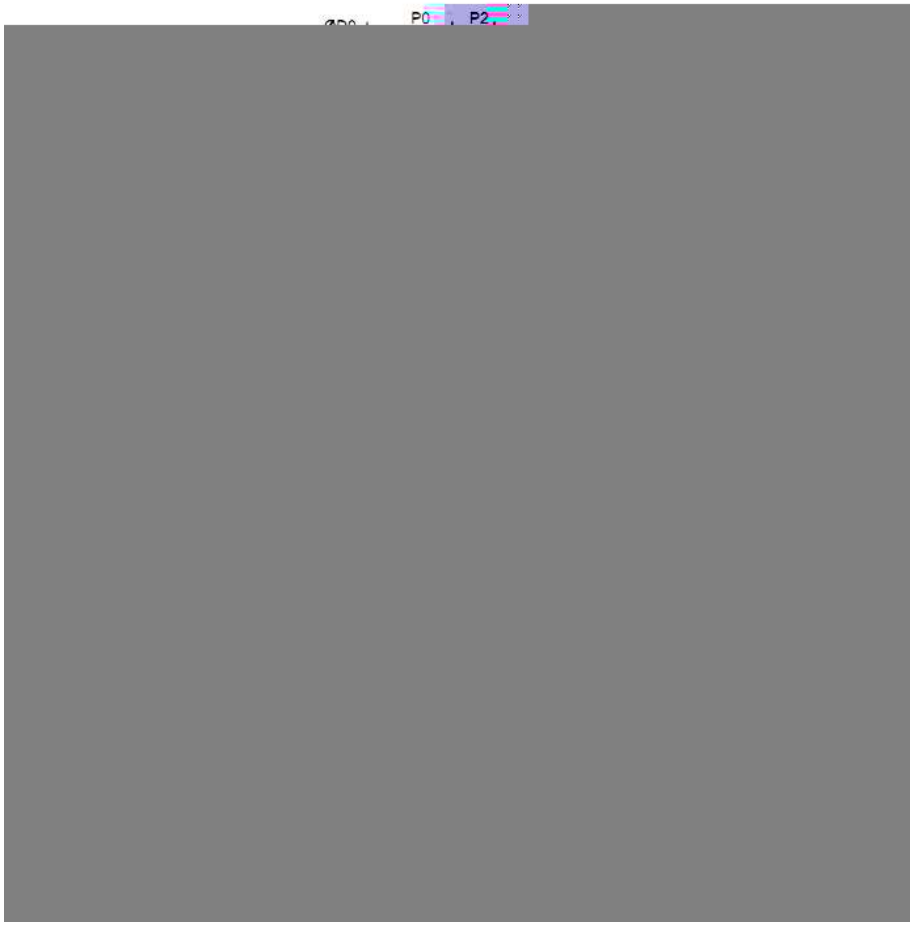
Package Type	Unit	Quantity
SOP-8L	Reel	2500

Package Information

SOP-8L



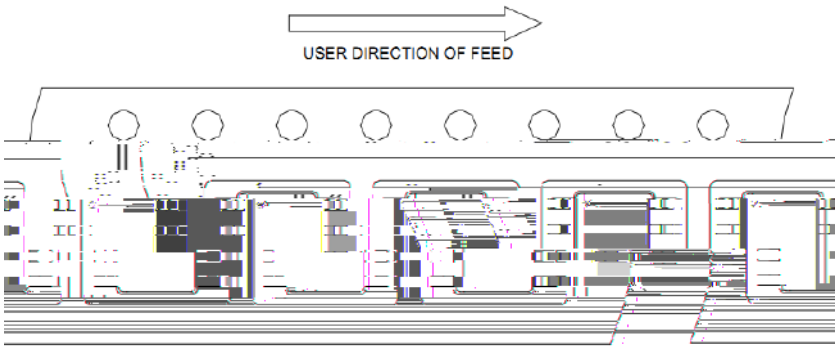
Carrier Tape & Reel Dimensions



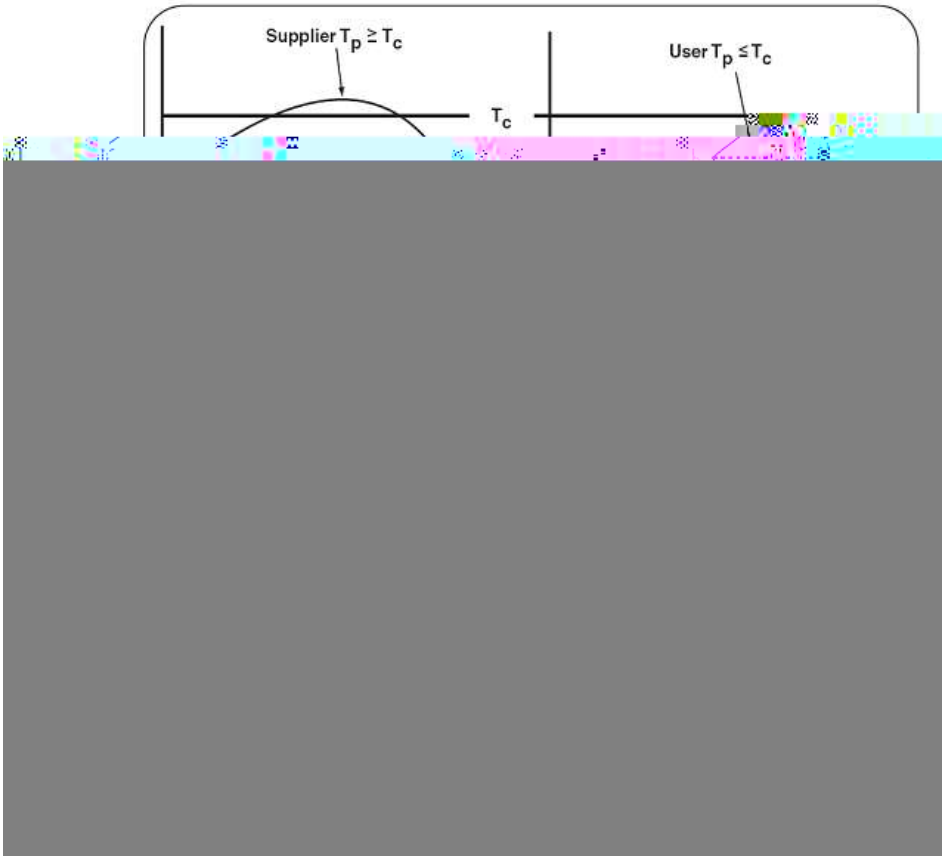
.5 0.05		330.0 2.00	50 MIN.	12.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	12.0 0.30	1.75 0.10	
K0	SOP-8L	P0	P1	P2	D0	D1	T	A0	B0	
.10 0.20		4.0 0.10	8.0 0.10	2.0 0.05	1.5+0.10 -0.00	1.5 MIN.	0.6+0.00 -0.40	6.40 0.20	5.20 0.20	2

(mm)

Taping Direction Information



Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (Tsmin to Tsmax) (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	SeeClassificationTempin table 2
Time (t_P)** within 5°C of the specified classification temperature (T_c)	20** seconds	30** seconds
Average ramp-down rate ($T_p$toT_{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 mm³ <350	Volume mm³ ⩾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 mm³ <350	Volume mm³ 350-2000	Volume mm³ ⩾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
HTRB	JESD-22, A108	168Hrs\500Hrs\ 1000 Hrs, Bias @ 125°C
HTGB	JESD-22, A108	168Hrs\500Hrs\ 1000 Hrs,Vgs 100%@150℃
PCT	JESD-22, A102	96Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -55°C~150°C

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