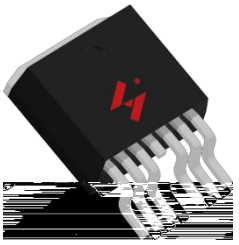
N-Channel Enhancemen Mode MOSFET

Feature

- 135V/200A
  $R_{DS(ON)}$=3.8m (p.) @ V_{GS} = 10V
- 100% A alanche Te ed
- Reliable and R gged
- Lead-F ee and G een De ice A ailable
  (RoHS Complian)

Pin Description



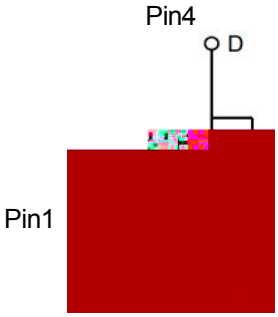
Pin7

Pin1

TO-263-6L

Applications

- Po e S i ching applica ion
- Unin e p ible Po e S ppl



Pin2,3,5,6,7

N-Channel MOSFET

Ordering and Marking Information

B6 G050N13 XYMXXXXXX	Package Code B6:TO-263-6L Da e Code XYMXXXXXX

No e: HUAYI lead-f ee p od c con ain molding compo nd /die a ach ma e ial and 100% ma e in pla eTe mi-Na ion fini h; hich a e f ll complian i h RoHS. HUAYI lead-f ee p od c mee o e ceed he lead-F ee eq i e-men of IPC/JEDEC J-STD-020 fo MSL cla ifica ion a lead-f ee peak eflo empe a e. HUAYI define G een o mean lead-f ee (RoHS complian) and halogen f ee (B o Cl doe no e ceed 900ppm b eigh in homogeneo ma e ial and o al of B and Cl doe no e ceed 1500ppm b eigh).

HUAYI e e e he igh o make change , co ec ion , enhancemen , modifica ion , and imp o emen o hi p -od c and/o o hi doc men a an ime i ho no ice.

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25 C Unle O he i e No ed)				
VDSS	D ain-So ce Vol age		135	V
VGSS	Ga e-So ce Vol age		20	V
TJ	Ma im m J nc ion Tempe a e		175	C
TSTG	S o age Tempe a e Range		-55 o 175	C
IS	So ce C en -Con in o (Bod Diode)	Tc=25 C	200	A
Mounted on Large Heat Sink				
IDM	P l ed D ain C en *	Tc=25 C	690	A
ID	Con in o D ain C en	Tc=25 C	200	A
		Tc=100 C	141.4	A
PD	Ma im m Po e Di ipa ion	Tc=25 C	375	W
		Tc=100 C	187.5	W
RθJC	The mal Re i ance, J nc ion- o-Ca e		0.40	C/W
RθJA	The mal Re i ance, J nc ion- o-Ambien **		62	C/W
EAS	Single P l ed-A alanche Ene g ***	L=0.3mH	1050	mJ

No e: * Repe i i e a ing p l e id h limi ed b ma . j nc ion empe a e.
** S face mo n ed on FR-4 boa d.
*** Limi ed b TJma , a ing TJ=25 C, L = 0.3mH, VDS=100V, VGS =10V

Electrical Characteristics(Tc =25 C Unle O he i e No ed)

Symbol	Parameter	Test Conditions	HYG050N13NS1			Unit
			Min	Typ.	Max	
Static Characteristics						
BVDSS	D ain-So ce B eakdo n Vol age	VGS=0V,IDS=250 A	135	-	-	V
IDSS	D ain- o-So ce Leakage C en	VDS=135V,VGS=0V	-	-	1.0	A
		TJ=125 C	-	-	50	A
VGS(h)	Ga e Th e hold Vol age	VDS=VGS, IDS=250 A	2	3	4	V
IGSS	Ga e-So ce Leakage C en	VGS= 20V,VDS=0V	-	-	100	nA
RDS(ON)*	D ain-So ce On-S a e Re i ance	VGS=10V,IDS=50A	-	3.8	5.0	
Diode Characteristics						
VSD*	Diode Fo a d Vol age	ISD=50A,VGS=0V	-	0.83	1.3	V
	Re e e Reco e Time	ISD=50A,dISD/d =100A/	-	93.8	-	n
Q	Re e e Reco e Cha ge		-	262.6	-	nC

Electrical Characteristics (Cont.) (Tc =25 C Unle O he i e No ed)

Symbol	Parameter	Test Conditions	HYG050N13NS1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Ga e Re i ance	V_{GS}=0V,V_{DS}=0V,F=1 MH	-	2.6	-	
C_i	Inp Capaci ance	V_{GS}=0V,	-	11662	-	pF
C_o	O p Capaci ance	V_{DS}=75V,	-	887	-	
C	Re e e T an fe Capaci ance	F eq enc =1.0MH	-	181	-	
d(ON)	T n-on Dela Time	V_{DD}=75V,R_G=4 , I_{DS}=50A,V_{GS}=10V	-	44.9	-	n
T	T n-on Ri e Time		-	116.6	-	
d(OFF)	T n-off Dela Time		-	102.7	-	
T_f	T n-off Fall Time		-	112.5	-	
Gate Charge Characteristics						
Q_g	To al Ga e Cha ge	V_{DS}=75V, V_{GS}=10V I_D=50A	-	165	-	nC
Q_g	Ga e-So ce Cha ge		-	63	-	
Q_{gd}	Ga e-D ain Cha ge		-	30	-	

No e: *P l e e p l e id h 300 d c cle 2%

Typical Operating Characteristics

Figure 1: Power Dissipation

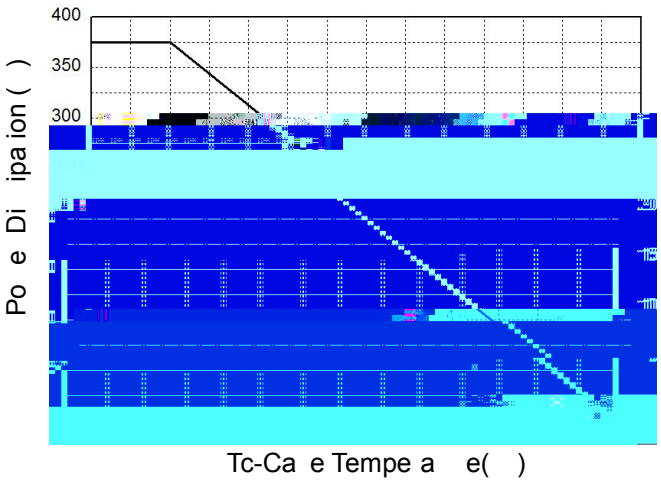


Figure 2: Drain Current

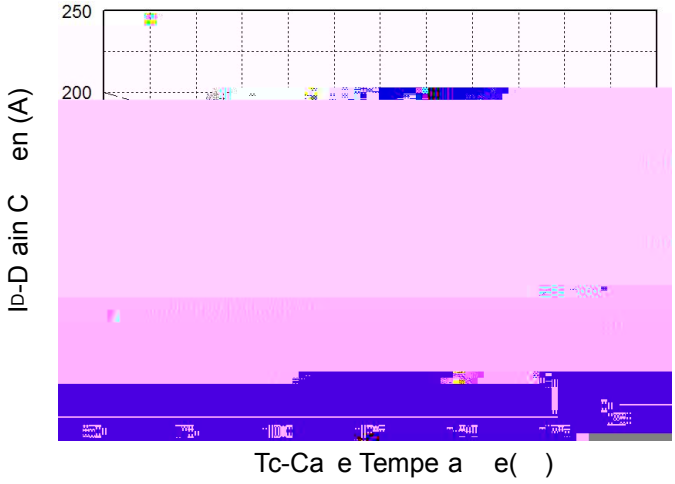


Figure 3: Safe Operation Area

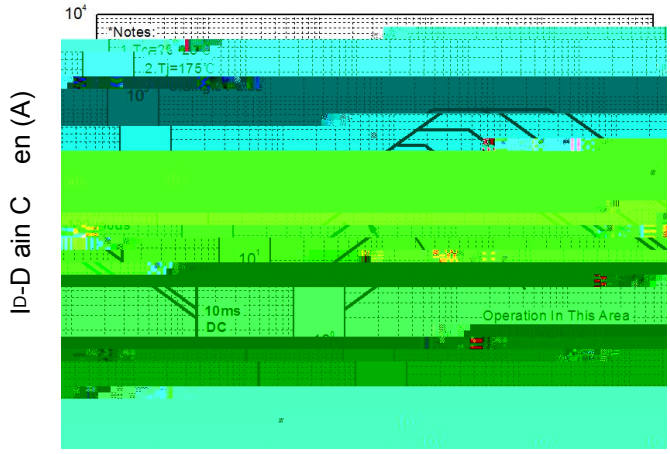


Figure 4: Thermal Transient Impedance

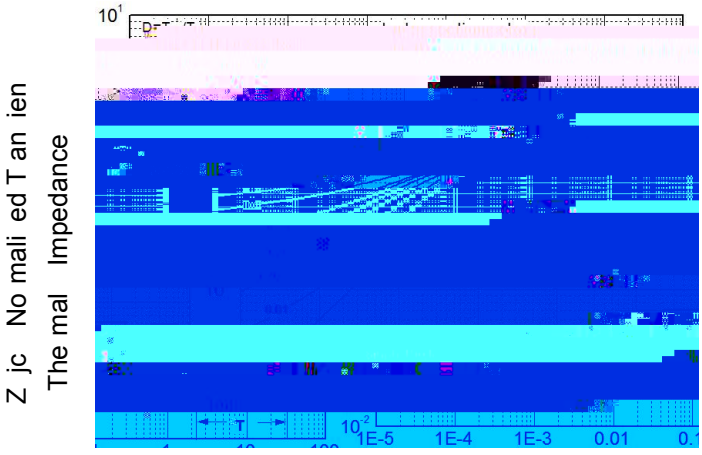


Figure 5: Output Characteristics

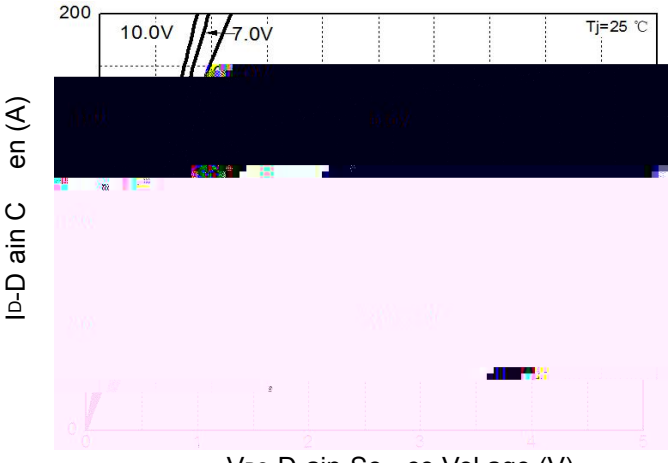
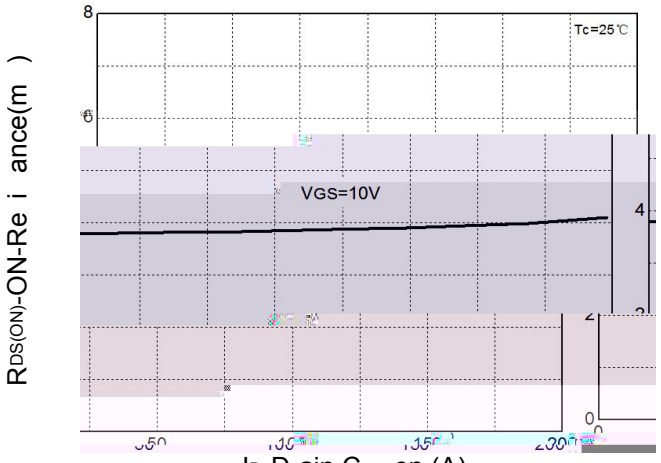
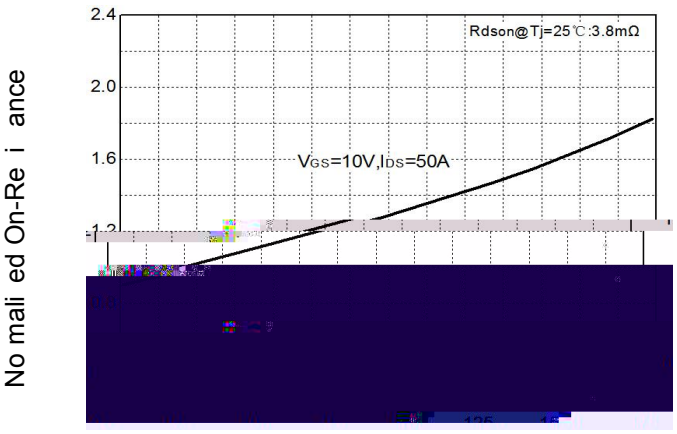


Figure 6: Drain-Source On Resistance



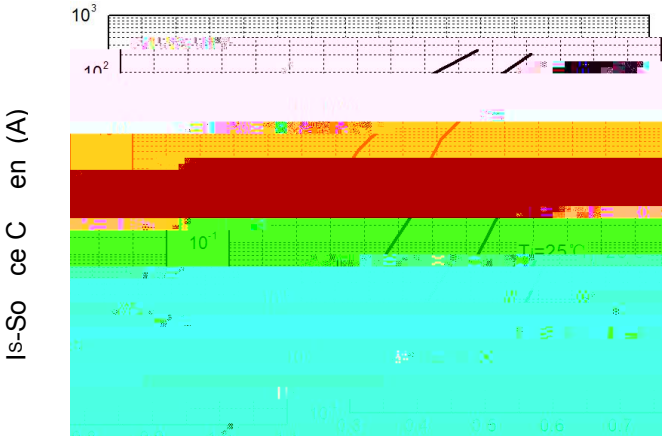
Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature



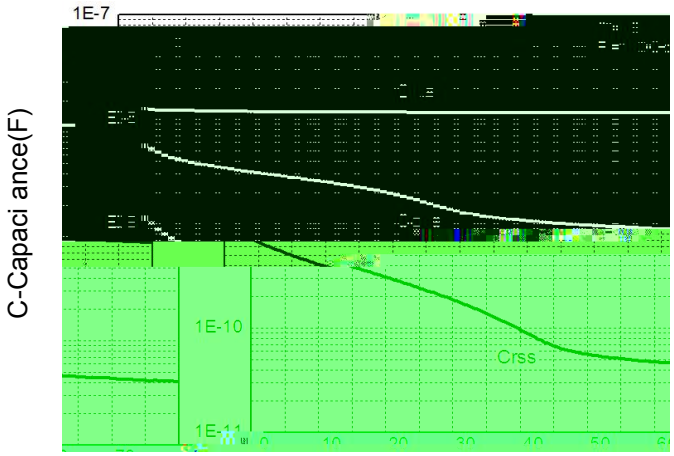
Tj-J nc ion Tempe a e ( )

Figure 8: Source-Drain Diode Forward



VSD-So ce-D ain Vol age(V)

Figure 9: Capacitance Characteristics

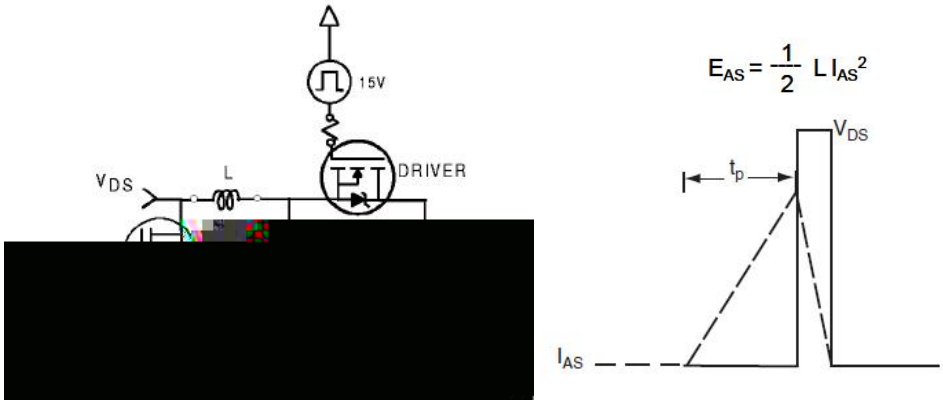


VDS-D ain-So ce Vol age (V)

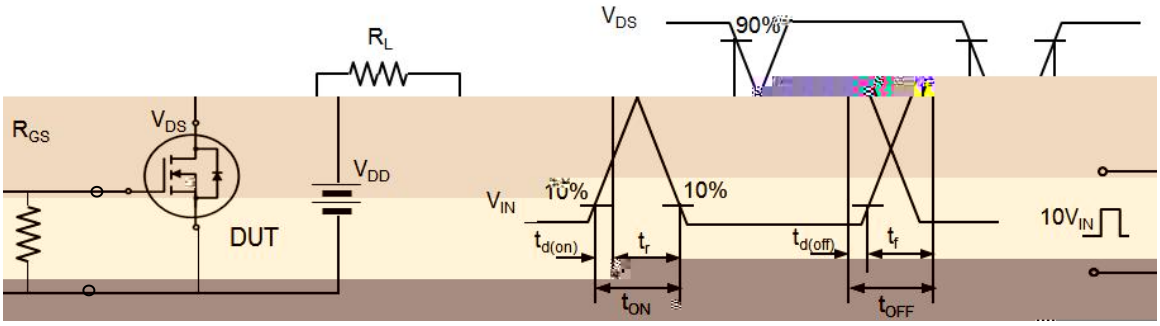
Figure 10: Gate Charge Characteristics

QG-Ga e Cha ge ( )

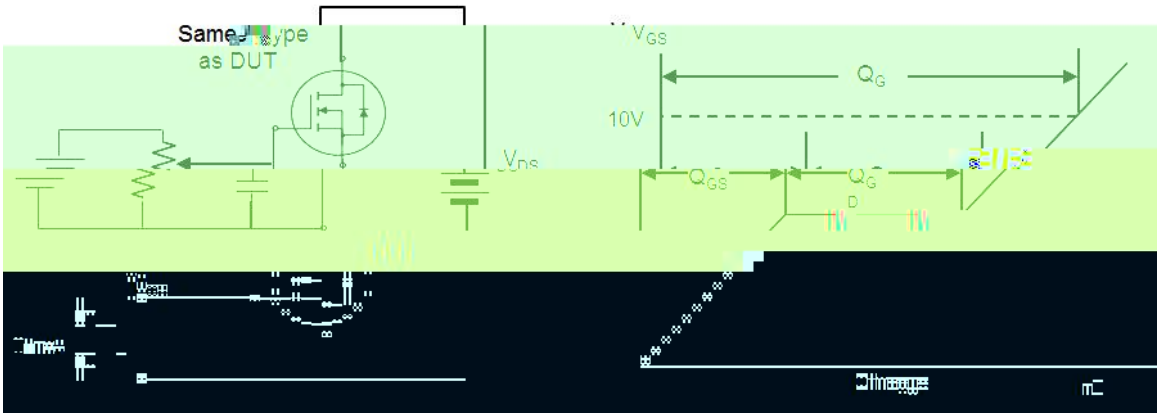
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit

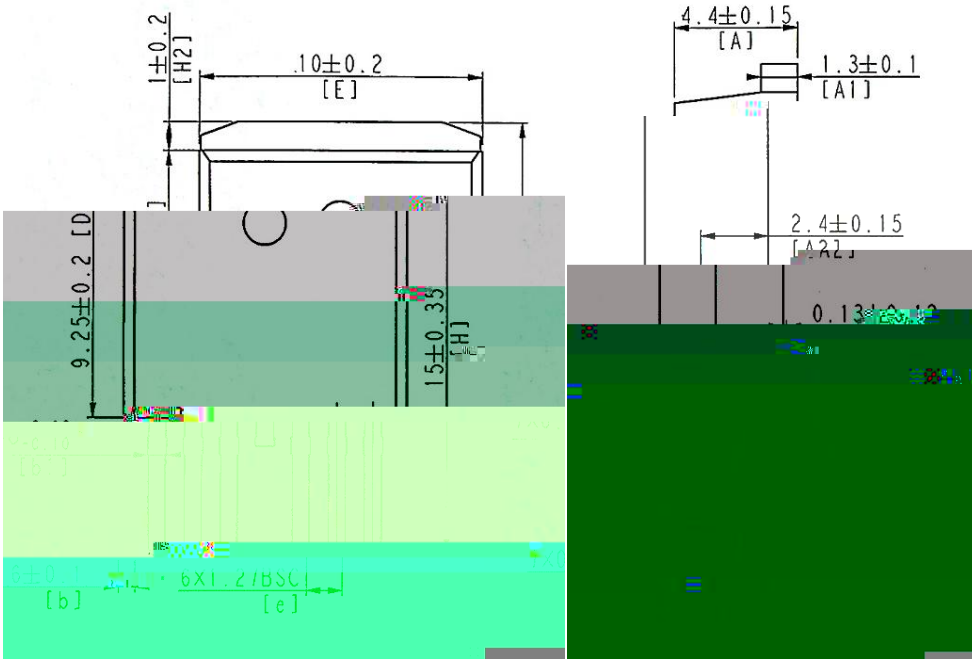


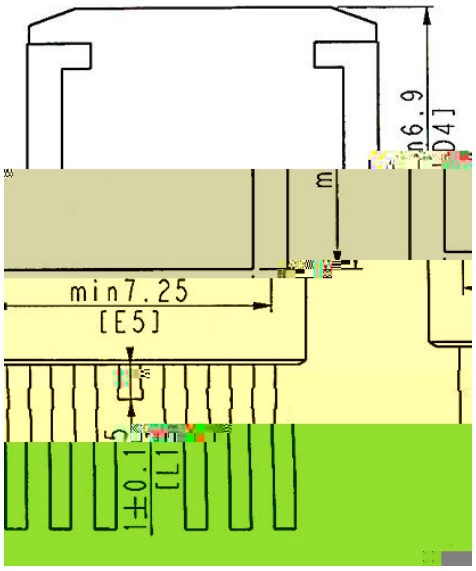
Device Per Unit

Package Type	Unit	Quantity
TO-263-6L	T be	50
TO-263-6L	Reel	800

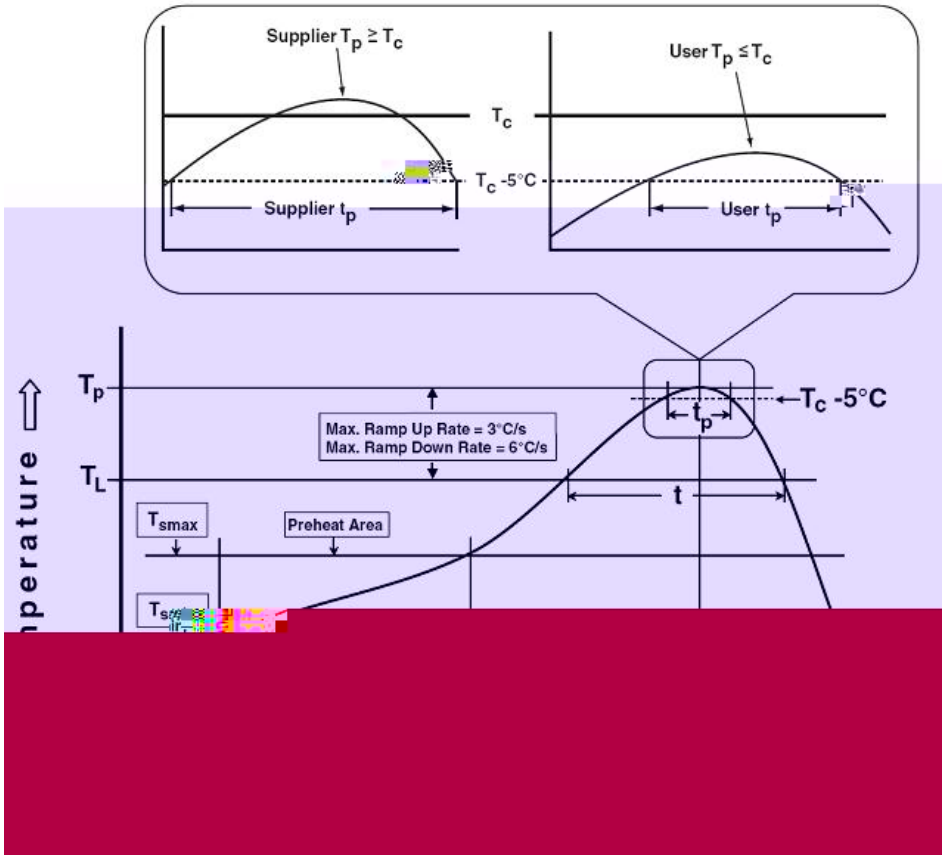
Package Information

TO-263-6L





Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Tempe a e min (T_{min}) Tempe a e ma (T_{ma}) Time (T_{min} o T_{ma}) ( )	100 C 150 C 60-120 econd	150 C 200 C 60-120 econd
A e age amp- p a e (T_{ma} o T_P)	3 C/ econd ma .	3 C/ econd ma .
Liq ido empe a e (T_L) Time a liq ido ($_L$)	183 C 60-150 econd	217 C 60-150 econd
Peak package bod Tempe a e (T_p)*	See Cla ifica ion Temp in able 1	SeeCla ifica ion Tempin able 2
Time ($_P$)** i hin 5 C of he pecified cla ifica ion empe a e (T_c)	20** econd	30** econd
A e age amp-do n a e (T_p o T_{ma})	6 C/ econd ma .	6 C/ econd ma .
Time 25 C o peak empe a e	6 min e ma .	8 min e ma .
*Tole ance fo peak p ofile Tempe a e (T_p) i defined a a pplie minim m and a e ma im m. ** Tole ance fo ime a peak p ofile empe a e ($_p$) i defined a a pplie minim m and a e ma im m.		

Table 1.SnPb E ec ic P oce Cla ifica ion Tempe a e (Tc)

Package Thickness	Volume mm <350	Volume mm 350
2.5 mm	235 C	220 C
2.5 mm	220 C	220 C

Table 2.Pb-f ee P oce Cla ifica ion Tempe a e (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
HTRB	JESD-22, A108	168/500/1000 H , Bia @ 150 C
HTGB	JESD-22, A108	168/500/1000 H , V_g 100% @ 150 C
PCT	JESD-22, A102	96 H , 100%RH, 2a m, 121 C
TCT	JESD-22, A104	500 C cle , -55 C 150 C

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