N-Channel Enhancement Mode MOSFET

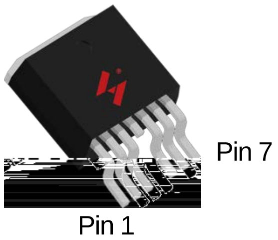
Feature

- 80V/200A
  $R_{DS(ON)}$=2.5 m (typ.)@V_{GS}=10V
- 100% Avalanche Tested
- Reliable and Rugged
- Halogen-Free and Green Devices Available
  (RoHS Compliant)

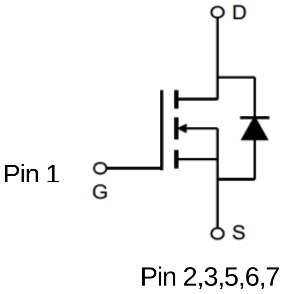
Applications

- Motor control
- Power management for inverter systems
- Battery Operated Tools

Pin Description



TO-263-6L



Single N-Channel MOSFET

Ordering and Marking Information

B6 HYG032N08 XYMXXXXXX	Package Code B6:TO-263-6L Date Code XYMXXXXXX

Note: HUAYI lead-free products contain molding compounds/die attach materials and 100% matte tin plateTermi-Nation finish; which are fully compliant with RoHS. HUAYI lead-free products meet or exceed the lead-Free requirements of IPC/JEDEC J-STD-020 for MSL classification at lead-free peak reflow temperature. HUAYI defines “Green” to mean lead-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).

Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (Tc=25°C Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage		80	V
V_{GSS}	Gate-Source Voltage		±20	V
T_J	Junction Temperature Range		-55 to 175	°C
T_{STG}	Storage Temperature Range		-55 to 175	°C
I_S	Source Current-Continuous(Body Diode)	Tc=25°C	200	A
Mounted on Large Heat Sink				
I_{DM}	Pulsed Drain Current *	Tc=25°C	600	A
I_D	Continuous Drain Current	Tc=25°C	200	A
		Tc=100°C	141.4	A
P_D	Maximum Power Dissipation	Tc=25°C	250	W
		Tc=100°C	125	W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		0.6	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient **		40	°C/W
E_{AS}	Single Pulsed-Avalanche Energy ***	L=0.3mH	640	mJ

Note: * Repetitive rating；pulse width limited by max. junction temperature.
** Surface mounted on FR-4 board.
*** Limited by $T_J$max , starting T_J=25°C, L = 0.3mH, VDS=64V, VGS =10V.

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

Symbol	Parameter	Test Conditions	HYG032N08NS1			Unit
			Min	Typ.	Max	
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_{DS}=250 A	80	-	-	V
I_{DSS}	Drain-to-Source Leakage Current	V_{DS}=80V,V_{GS}=0V	-	-	1.0	A
		T_J=125°C	-	-	50	A
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250 A	2	3	4	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}=50A	-	2.5	3.2	m
Diode Characteristics						
V_{SD}*	Diode Forward Voltage	I_{SD}=50A,V_{GS}=0V	-	0.87	1.2	V
t_{rr}	Reverse Recovery Time	I_{SD}=50A,dI_{SD}/dt=100A/	-	70	-	ns
Q_{rr}	Reverse Recovery Charge		-	132	-	nC

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

Symbol	Parameter	Test Conditions	HYG032N08NS1			Unit
			Min	Typ.	Max	
Dynamic Characteristics						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=500kHz	-	2.5	-	
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, Frequency=500kHz	-	7714	-	pF
C_{oss}	Output Capacitance		-	2664	-	
C_{rss}	Reverse Transfer Capacitance		-	176	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=40V,R_G=4 I_{DS}=50A,V_{GS}=10V	-	22	-	ns
T_r	Turn-on Rise Time		-	101	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	87	-	
T_f	Turn-off Fall Time		-	97	-	
Gate Charge Characteristics						
Q_g	Total Gate Charge	V_{DS}=64V, V_{GS}=10V, I_D=50A	-	120	-	nC
Q_{gs}	Gate-Source Charge		-	40	-	
Q_{gd}	Gate-Drain Charge		-	30	-	

Note: *Pulse test，pulse width 300us，duty cycle 2%（10V）

Typical Operating Characteristics

Figure 1: Power Dissipation

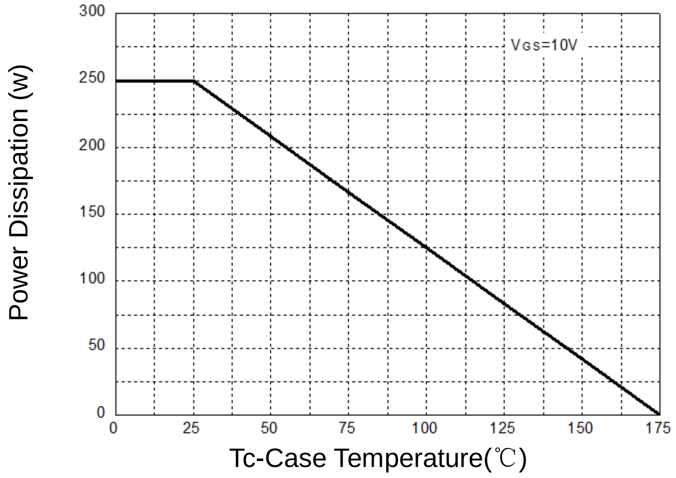


Figure 2: Drain Current

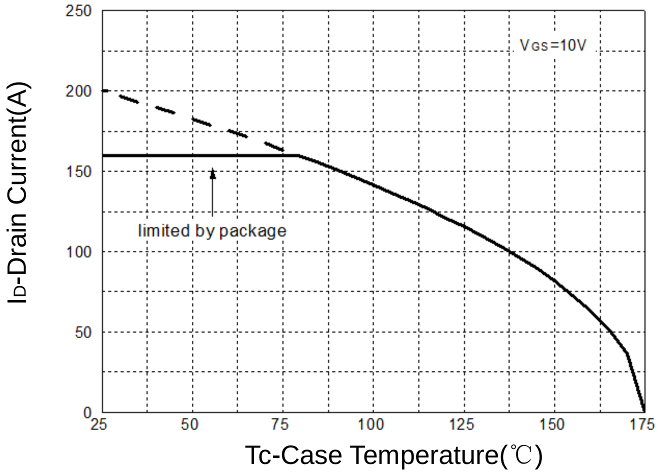


Figure 3: Safe Operation Area

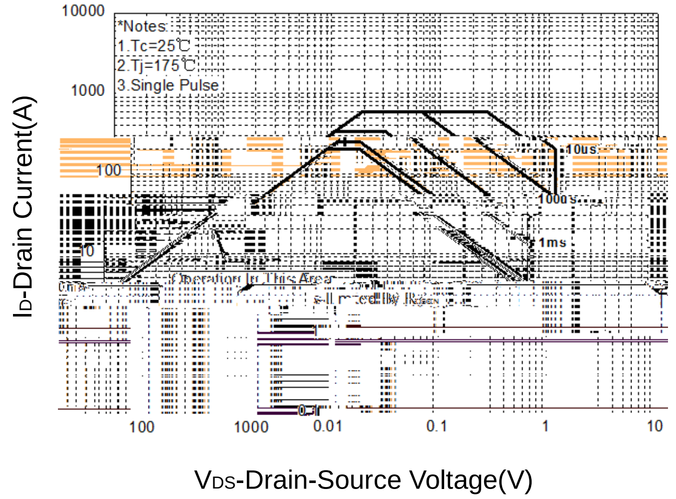


Figure 4: Thermal Transient Impedance

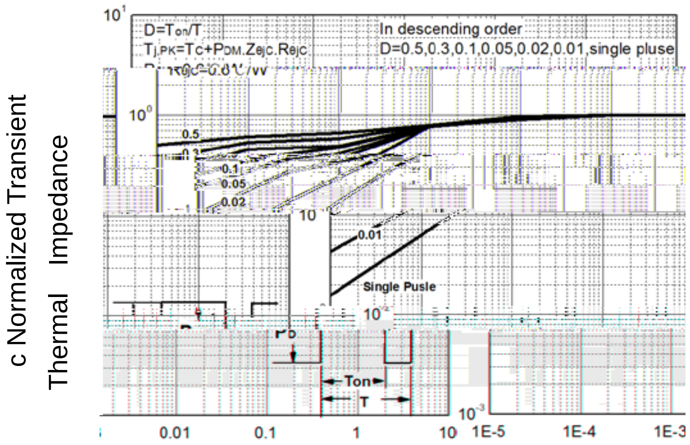


Figure 5: Output Characteristics

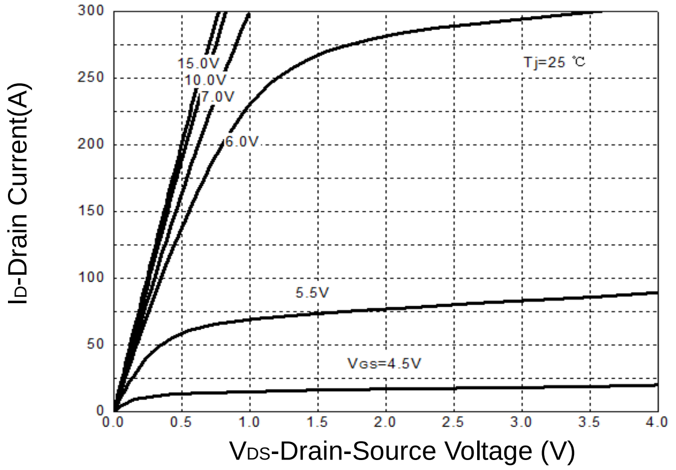
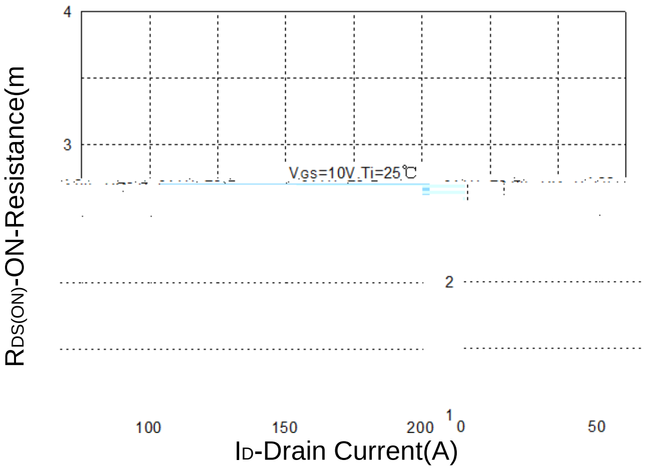


Figure 6: Drain-Source On Resistance



Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

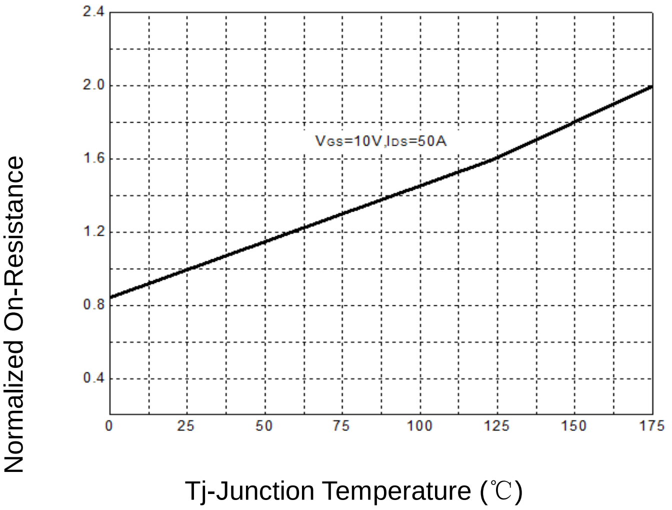


Figure 8: Source-Drain Diode Forward

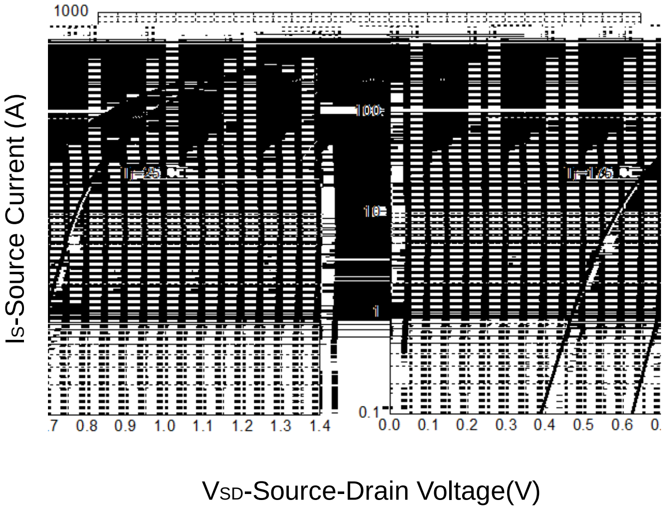


Figure 9: Capacitance Characteristics

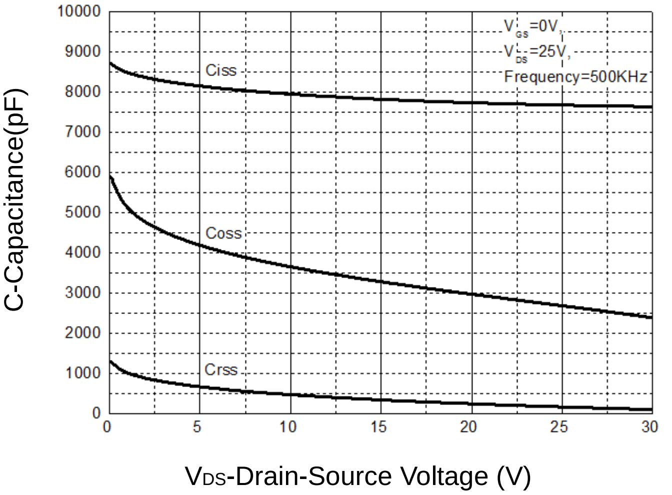
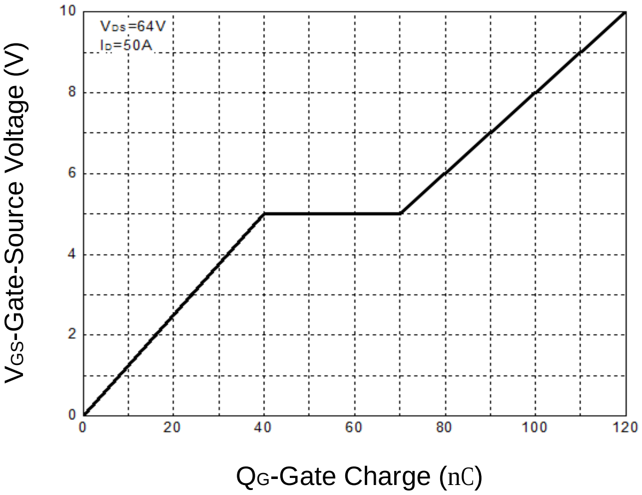
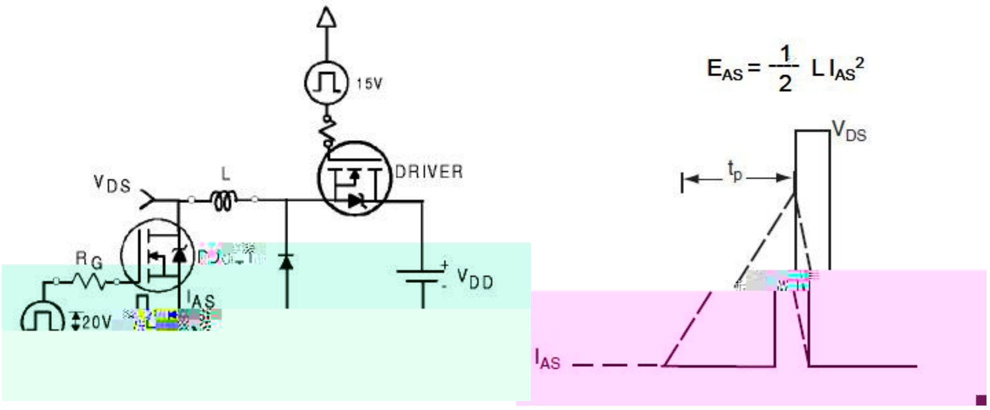


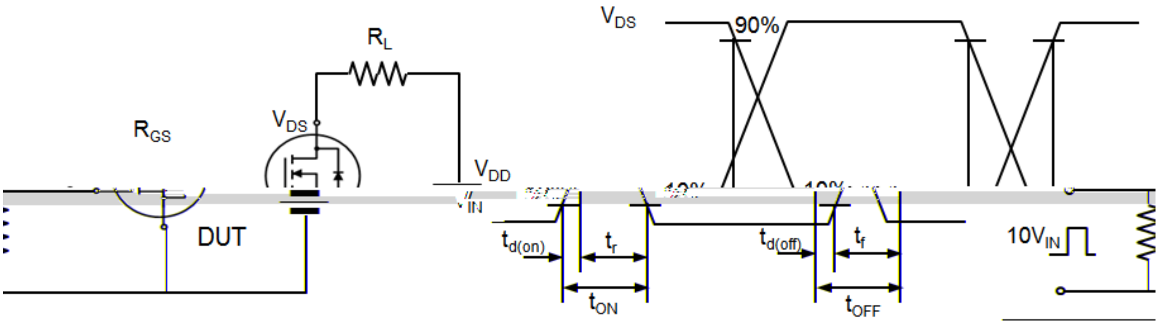
Figure 10: Gate Charge Characteristics



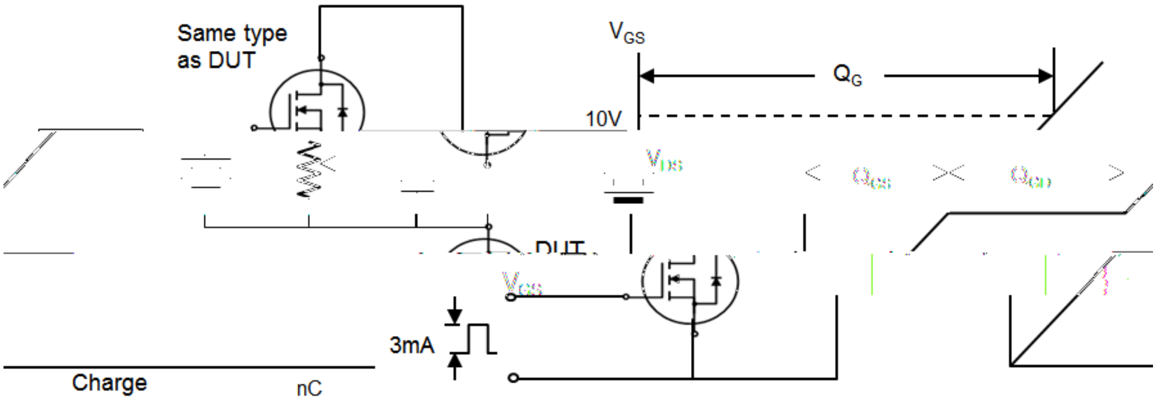
Avalanche Test Circuit



Switching Time Test Circuit



Gate Charge Test Circuit

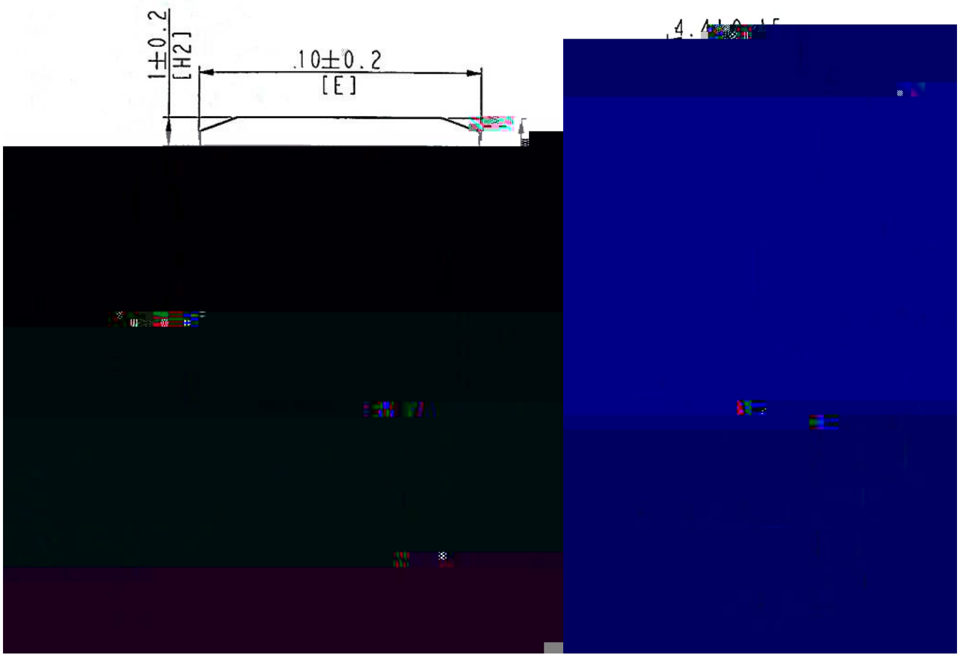


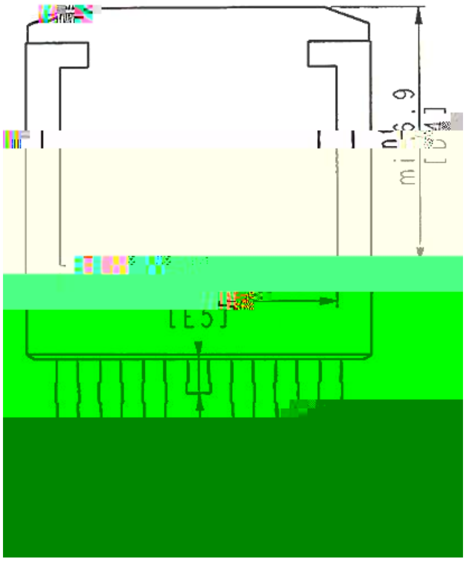
Device Per Unit

Package Type	Unit	Quantity
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 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	SeeClassification Tempin 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.

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

Package Thickness	**Volume mm³ <350**	**Volume mm³ ⩾350**
＜2.5 mm	235 °C	220 °C
	220 °C	220 °C

Table 2.Pb-free Process – Classification Temperatures (Tc)

Package Thickness	**Volume mm³ <350**	**Volume mm³ 350-2000**	**Volume mm³ ⩾2000**