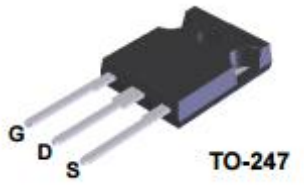
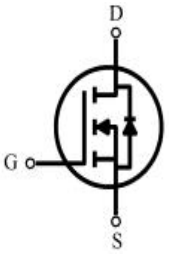
500V N-Channel MOSFET

Features

- V_{DSS}=500V I_D=25A
  $R_{DS(ON)}$=0.2Ω(Max.)@V_{GS}=10V
- Low On-Resistance
- Improved dv/dt capability
- Super Low Gate Charge
- 100% EAS Guaranteed
- Fast switching speed

PIN DESCRIPTION





Applications

- High frequency switching mode power supply
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

Part Number	Package	Marking	ROHS Status	Packing
SI25N50H	TO-247	SI25N50H	Pd-Free	Box(Tube)

Absolute Maximum Ratings (Tc=25℃ unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-Source Voltage		500	V
V_{GS}	Gate-Source Voltage		±30	V
I_D	Continuous Drain Current	Tc=25℃	25	A
		Tc=100℃	14	A
I_{DM}	Pulsed Drain Current		96	A
E_{AS}	Single Pulse Avalanche Energy		1872	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature Range		-55 to 150	°C
P_D	Total Power Dissipation	Tc=25°C	80	W

THERMAL RESISTANCE RATINGS

Symbol	Paramete	Typical	Max	Unit
$R_{\theta JA}$	Maximum Junction-to-Ambient	-	40	℃/W
$R_{\theta JC}$	Maximum Junction-to-Case	-	0.45	

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	TYP.	Max.	Unit
Static Characteristics						
$V_{(BRV)DSS}$	Drain-source breakdown voltage	V_{GS}=0V,I_D= 250uA	500	-	-	V
$V_{GS(th)}$	Gate threshold voltage	V_{DS}=V_{GS},I_D=250uA	3	-	4	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=500V,V_{GS}=0V	-	-	1	uA
		V_{DS}=400V,V_{GS}=0V,	-	-	10	uA
I_{GSS}	Gate-source leakage current	V_{DS}=0V,V_{GS}=±30V	-	-	±100	nA
$R_{DS(on)}$	Drain-source on-state resistance	V_{GS}=10V,I_D=12A	-	-	0.2	Ω
g_{FS}	Forward Transconductance	V_{DS}=20V,I_D=12A	-	30	-	S
Dynamic Characteristic						
Qg	Total Gate Charge	V_{GS}=10V,V_{DD}=400V I_D=25A	-	65	85	nC
Qgs	Gate-Source Charge		-	18	-	nC
Qgd	Gate-Drain Charge		-	26	-	nC
$T_{d(on)}$	Turn-on delay time	I_D=23A,V_{DD}=250V, R_G=25Ω,V_{GS}=10V	-	49	108	nS
T_r	Rise time		-	105	220	nS
$T_{d(off)}$	Turn-off delay time		-	165	340	nS
T_f	Fall time		-	87	185	nS
C_{iss}	Input Capacitance	V_{GS}=0V,V_{DS}=25V f=1.0MHz	-	3240	4310	pF
C_{oss}	Output Capacitance		-	450	600	pF
C_{rss}	Reverse Transfer Capacitance		-	32	48	pF
Source-Drain Diode						
V_{SD}	Diode Forward Voltage	V_{GS}=0V,I_S=14A	-	-	1.4	V
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	96	A
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	25	A
Trr	Reverse Recovery Time	V_{GS}=0V,I_F=25A, diF/dt=100A /μs	-	264	-	ns
Qrr	Reverse Recovery Charge		-	1.4	-	uC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. L=6.5mH, I_{AS}=25A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C.
3. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2% .
4. I_{SD}≤25A, di/dt≤200A/μs, V_{DD}≤B_{VDSS} , Starting T_J = 25℃.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

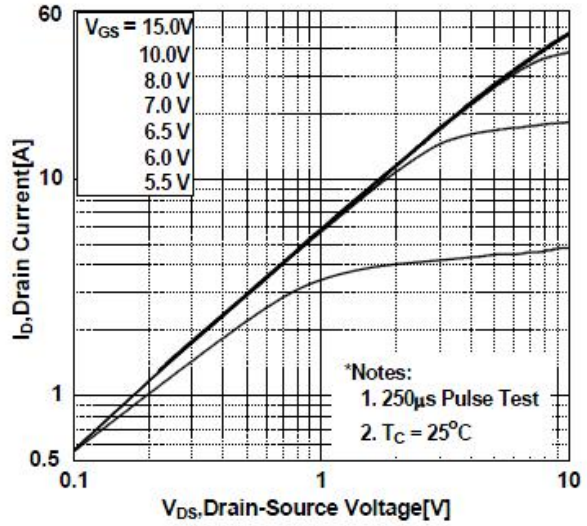


Figure 2. Transfer Characteristics

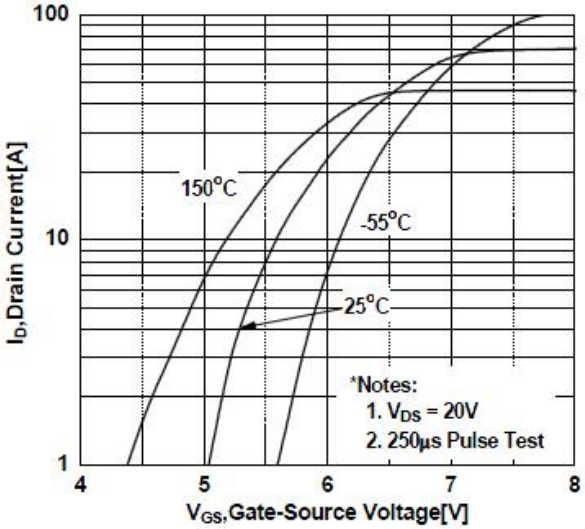


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

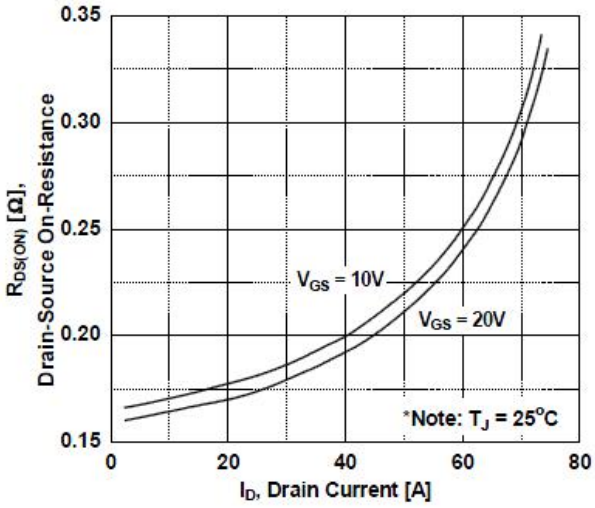


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

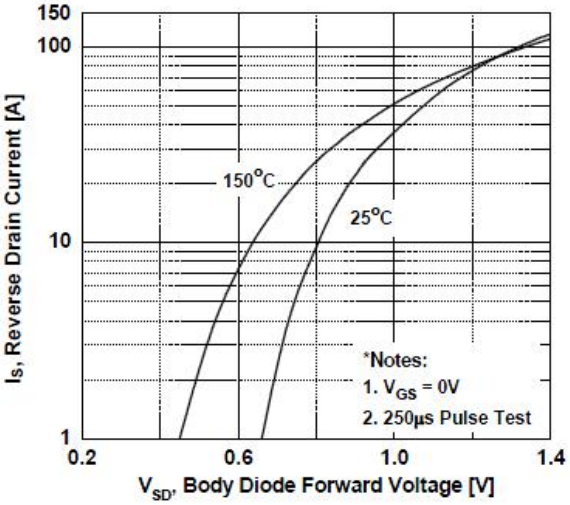


Figure 5. Capacitance Characteristics

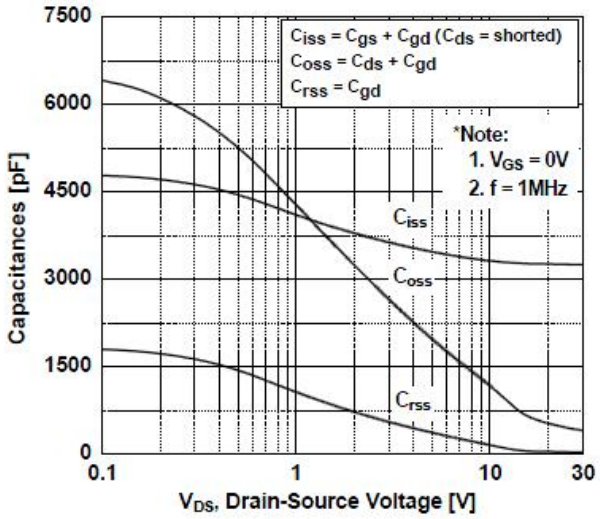
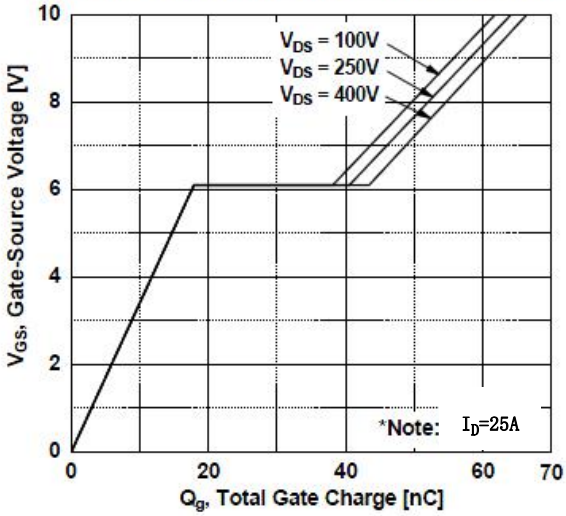


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Cont.)

Figure 7. Breakdown Voltage Variation vs. Temperature

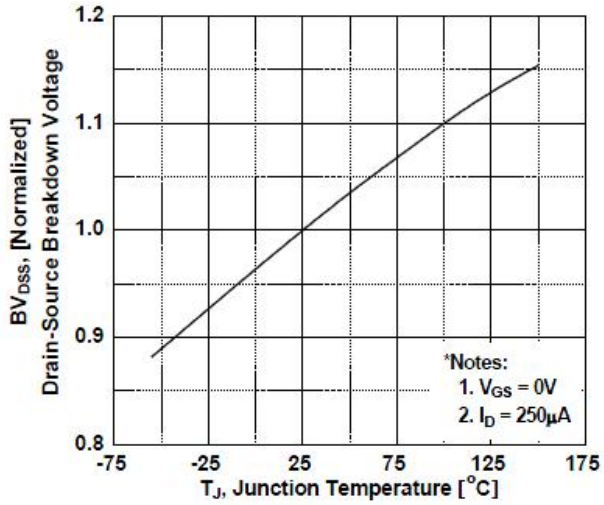


Figure 8. On-Resistance Variation vs. Temperature

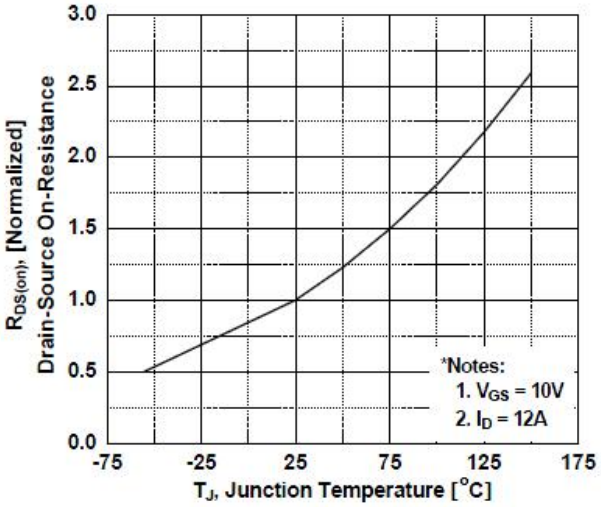


Figure 9. Maximum Safe Operating Area

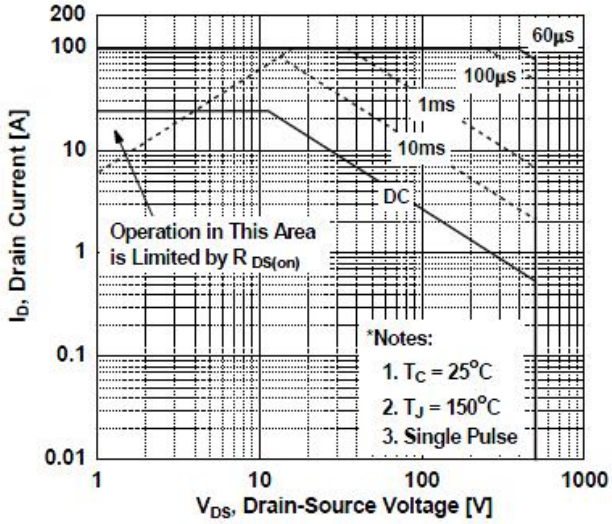


Figure 10. Maximum Drain Current vs. Case Temperature

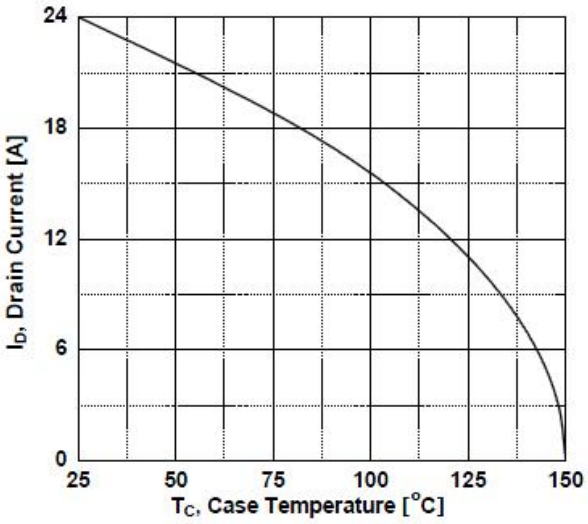
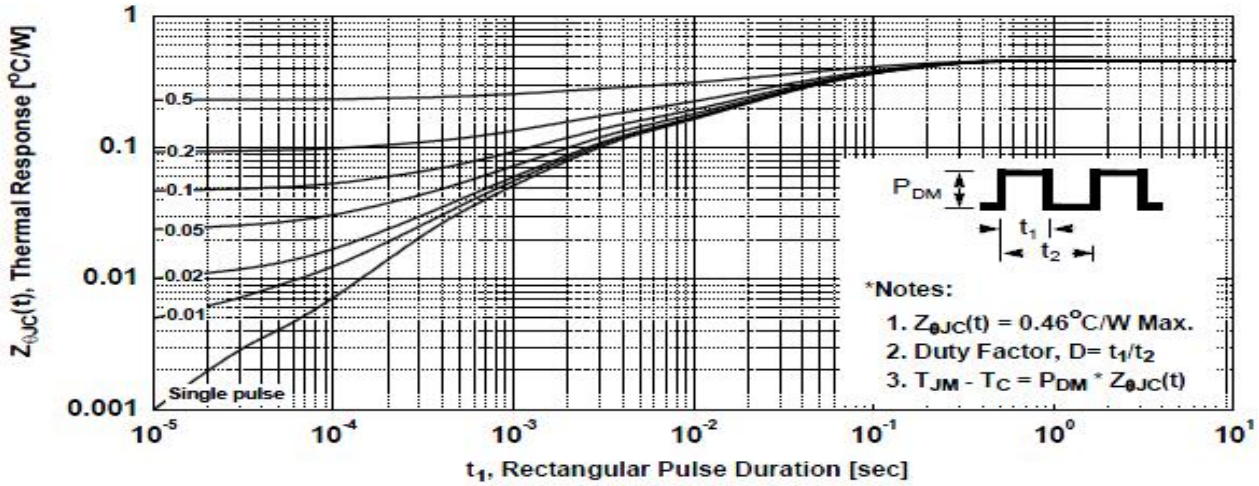


Figure 11. Transient Thermal Response Curve



Switching Time Test Circuit and Wave forms

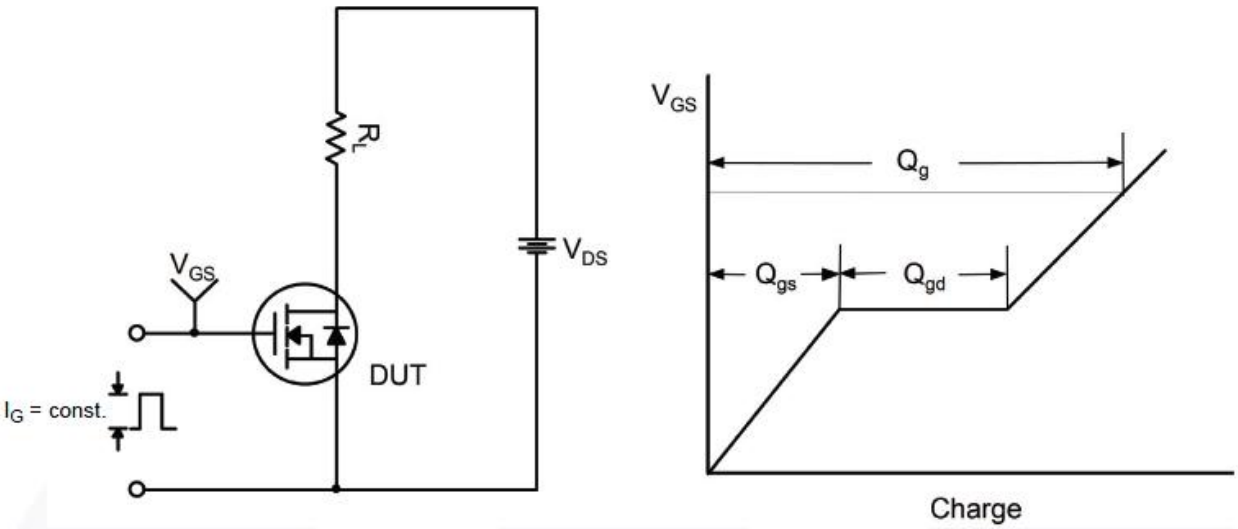


Figure 12. Gate Charge Test Circuit & Waveform

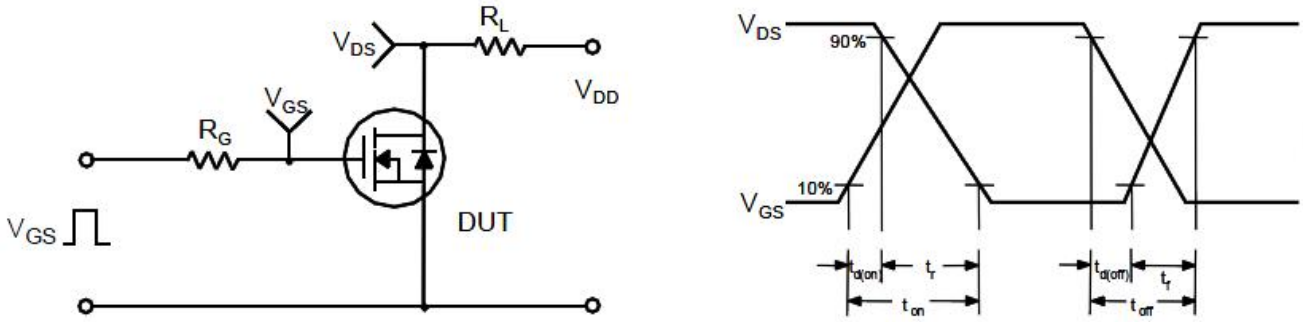


Figure 13. Resistive Switching Test Circuit & Waveforms

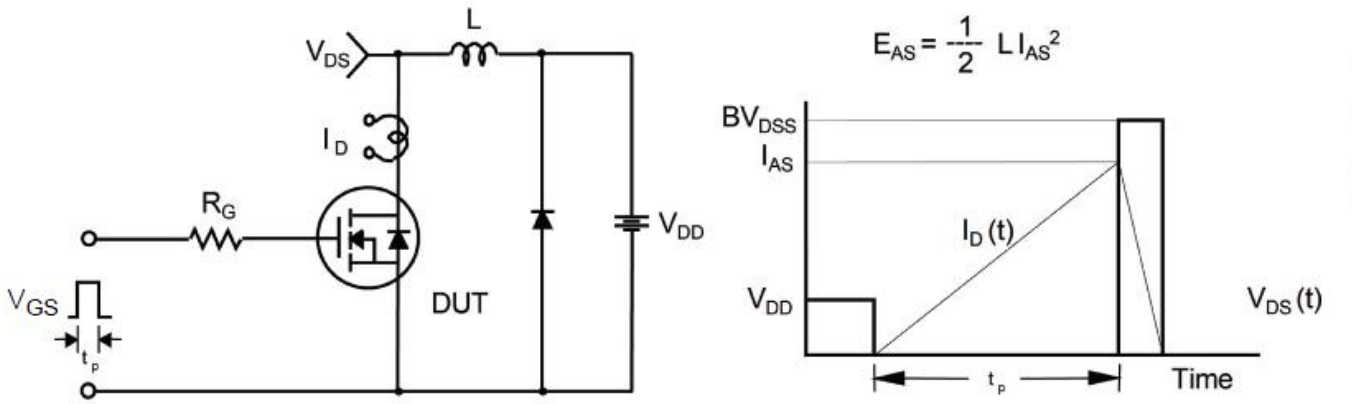
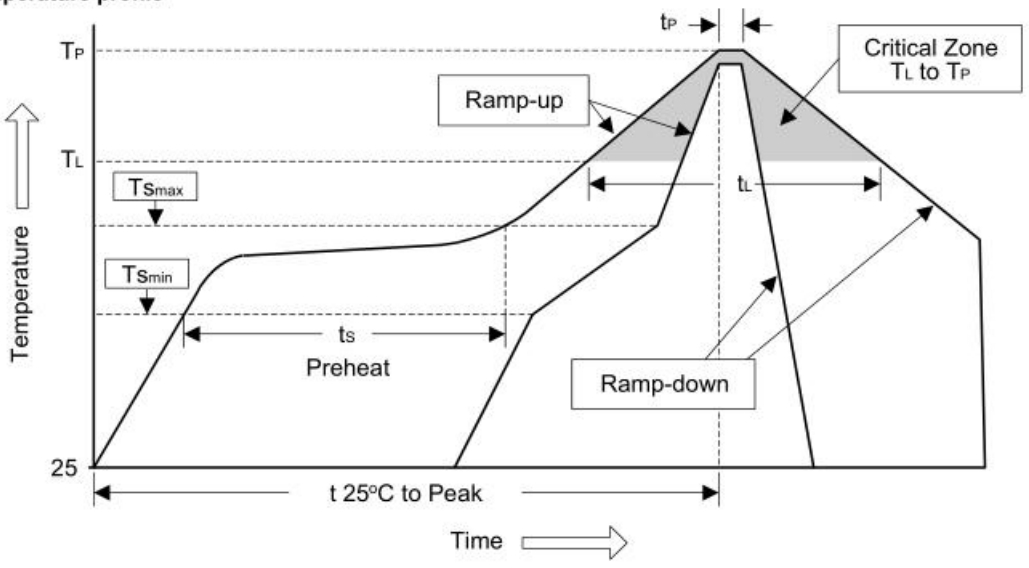


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

Soldering Methods for Products

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate(TL to TP)	<3℃/sec	<3℃/sec
Preheat -Temperature Min(Ts min) -Temperature Max(Ts max) -Time(min to max)(ts)	- 100℃ 150℃ 60 to 120 sec	- 150℃ 200℃ 60 to 180 sec
Ts max to TL - ramp-up rate	<3℃/sec	<3℃/sec
Time maintained above: -Temperature(TL) -Time(TL)	183℃ 60 to 150 sec	217℃ 60 to 150 sec
Peak Temperature(TP)	240℃+0/-5℃	250℃+0/-5℃
Time within 5℃ of actual Peak Temperature	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6℃/sec	<6℃/sec
Time 25 ℃ to Peak Temperature	<6 minutes	<8 minutes

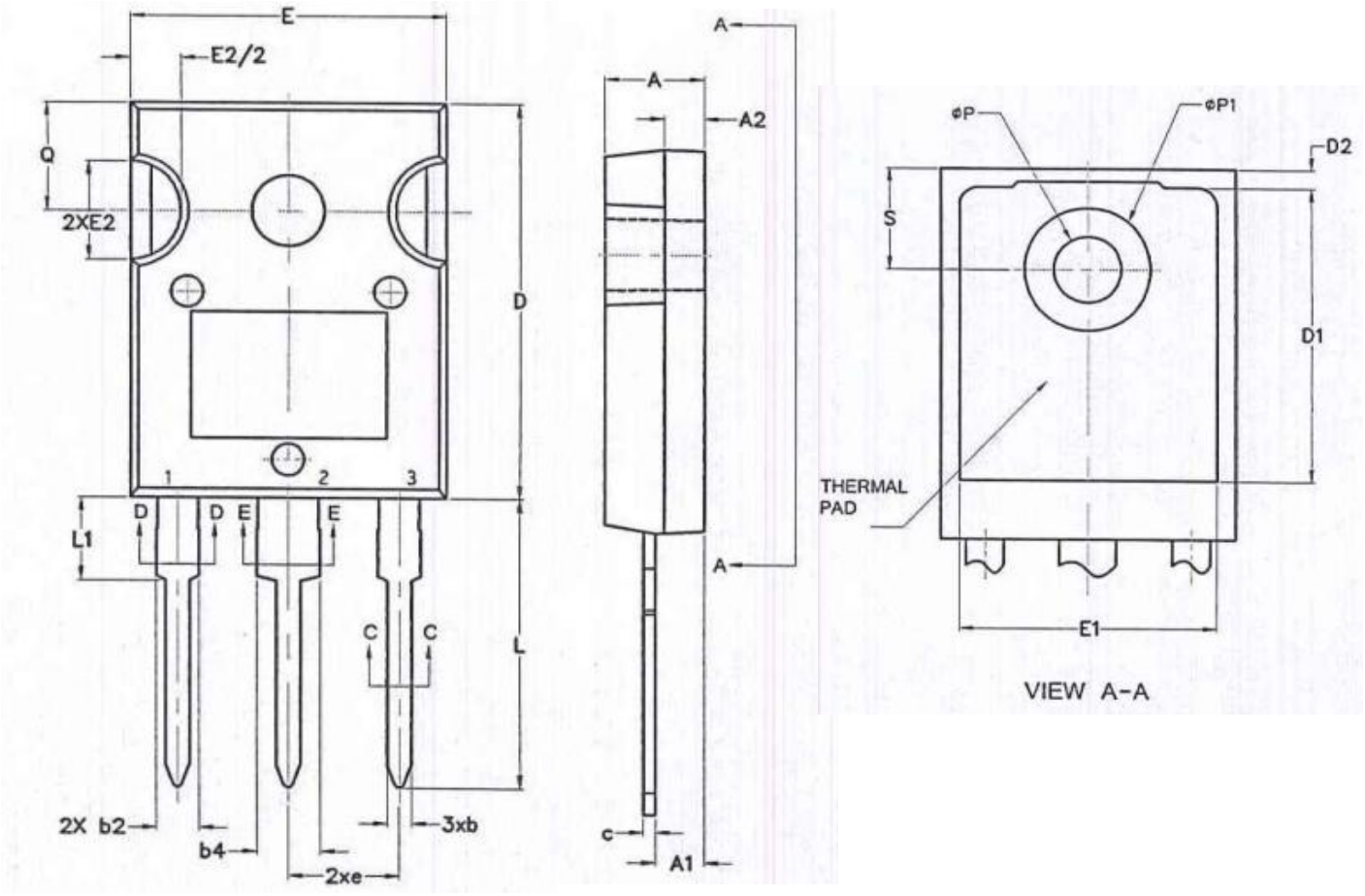
Figure 1: Temperature profile



Note : 1.Storage environment: Temperature=10℃ to 35@Humidity=45%±15%
2.Reflow soldering of surface-mount devices
3.Flow(wave) soldering(solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices	245℃±5℃	5sec±1sec
Pb-free devices	250℃+0/-5℃	5sec±1sec

Package Outline



Unit: mm					
Symbol	**Min**	**Max**	**Symbol**	**Min**	**Max**
A	4.83	5.13	D1	13.08	-
A1	2.21	2.59	D2	0.51	1.35
A2	1.50	2.49	E	15.29	15.87
b	0.99	1.40	E1	13.46	-
b1	0.99	1.35	E2	4.52	5.49
b2	1.65	2.39	e	5.46BSC	
b3	1.65	2.34	L	14.20	16.10
b4	2.59	3.43	L1	3.71	4.29
b5	2.59	3.38	ΦP	3.56	3.66
c	0.38	0.89	ΦP1	-	7.39
c1	0.38	0.84	Q	5.31	5.69
D	19.71	20.70	S	5.51BSC	

Important Notice

Si-Trend reserves the right to change all product、product specifications and data without prior notice；Our customer Please confirm to place an order confirmation before make the integrity of information complete and up-to-date。

Any semiconductor under specific conditions are possible to certain failure or malfunction rate；Customers are responsible in the use of Si-Trend products to system design and manufacturing in compliance with safety standards and adopting safety measures，To avoid the potential risk of failure may cause the personal safety and property loss。

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