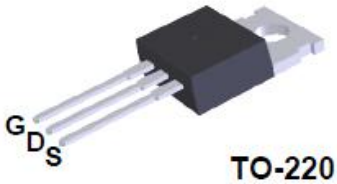
130V N-Channel Trench Power MOSFET

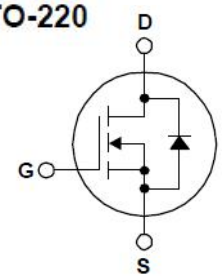
Features

- 130V/104A
  $R_{DS(ON)}$=8.5mΩ(Typ.)@V_{GS}=10V
- Ultra Low On-Resistance
- High UIS and UIS 100% Test
- Special Designed for E-Bike Controller Application

PIN DESCRIPTION



TO-220



Applications

- 96V E-Bike controller applications
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

Part Number	Package	Marking	ROHS Status	Packing
SI130N01B	TO-220	SI130N01B	Pb-Free	Box (Tube)

Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

Symbol	Parameter		Typical	Unit
V_{DSS}	Drain-Source Voltage (V_{GS}=0V)		130	V
V_{GSS}	Gate-Source Voltage (V_{DS}=0V)		±25	V
I_D	Continuous Drain Current	T_C=25°C	104	A
		T_C=100°C	73	A
I_{DM}	Pulsed Drain Current Tested		416	A
T_{STG};T_J	Storage Temperature and Operating Junction Range		-55~150	°C
dv/dt	Peak Diode Recovery Voltage		7	V/ns
E_{AS}	Single pulse Avalanche energy		1600	mJ
P_D	Power dissipation	Tc=25°C	348	W

1. **Repetitive Rating: Pulse width limited by maximum junction temperature**
2. **E AS condition:T J =25℃,V DD =50V,V G =10V, R G =25Ω**

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction - case. Max	R_{thJC}	0.43	℃/W

Electrical Characteristics (T_A=25°C unless otherwise noted)

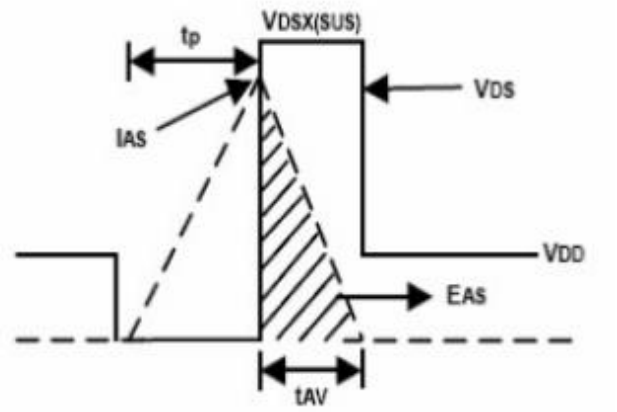
Symbol	Parameter	Test Conditions	Min	TYP	Max	Unit
Static Characteristics						
BV_{DSS}	Drain-source breakdown voltage	V_{GS}=0V,I_D=250uA	130	-	-	V
$V_{GS(th)}$	Gate threshold voltage	V_{DS}=V_{GS} ,I_D=250uA	3	-	5	V
I_{DSS}	Zero gate voltage drain current	V_{DS}=130V,V_{GS}=0V	-	-	1	uA
		Tc=125°C	-	-	10	
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_D=40A	-	8.5	12	mΩ
Dynamic Characteristic						
G_{FS}	Forward Transconductance	V_{DS}=10V,I_D=15A	20	-	-	S
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	-	9152	-	pF
C_{oss}	Output Capacitance		-	799	-	pF
C_{rss}	Reverse Transfer Capacitance		-	406	-	pF
$t_{d(on)}$	Turn-on delay time	I_D=40A, V_{GS}=10V, V_{DD}=65V, R_L=15Ω R_G=2.5Ω	-	40	-	nS
t_r	Rise time		-	72	-	
$t_{d(off)}$	Turn-off delay time		-	103	-	
t_f	Fall time		-	35	-	
Gate Charge Characteristics						
Q_G	Gate Total Charge	V_{GS}=10V, V_{DS}=50V, I_D=40A	-	274	-	nC
Q_{gs}	Gate-Source charge		-	56	-	
Q_{gd}	Gate-Drain charge		-	113	-	
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current(Body Diode)	-	-	104	-	A
I_{SDM}	Pulsed Source-Drain Current(Body Diode)	-	-	416	-	A
V_{SD}	Body Diode Forward Voltage	V_{GS}=0V,I_{SD}=40A T_J=25℃	-	0.85	0.99	V
t_{rr}	Body Diode Reverse Recovery Time	T_J =25℃,I_F=40A, dI/dt=100A/μs	-	80	-	nS
Q_{rr}	Body Diode Reverse Recovery Charge		-	200	-	nC

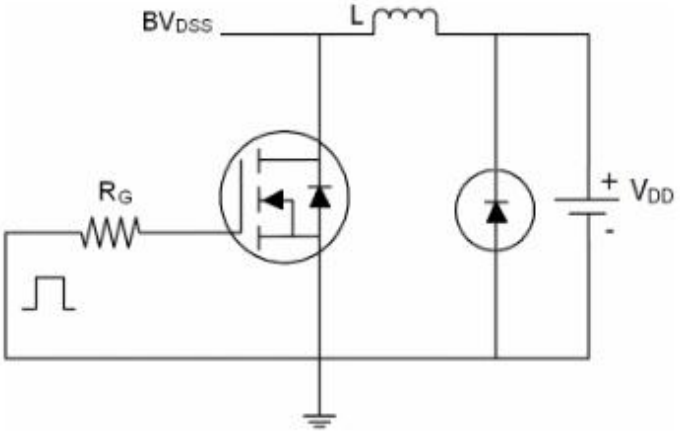
Notes:

1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 1.5%, R_G=25Ω, Starting T_J=25 ℃

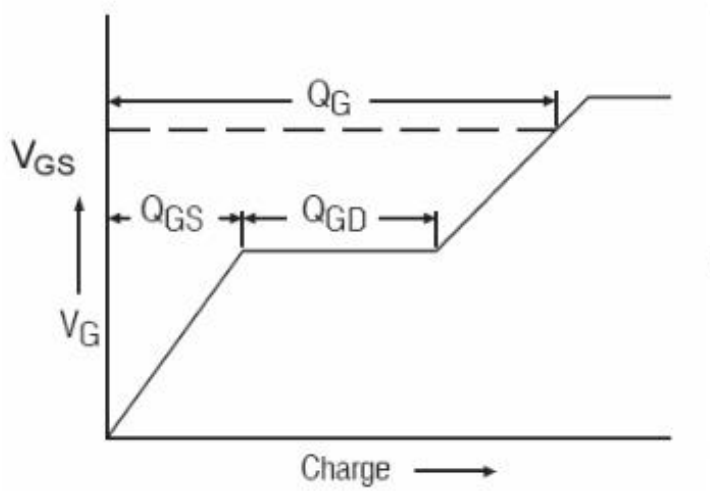
Switching Time Test Circuit and Wave forms

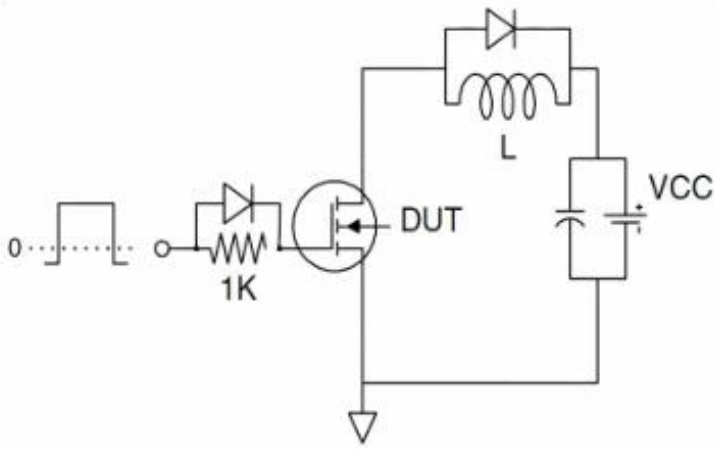
1) E_{AS} Test Circuits



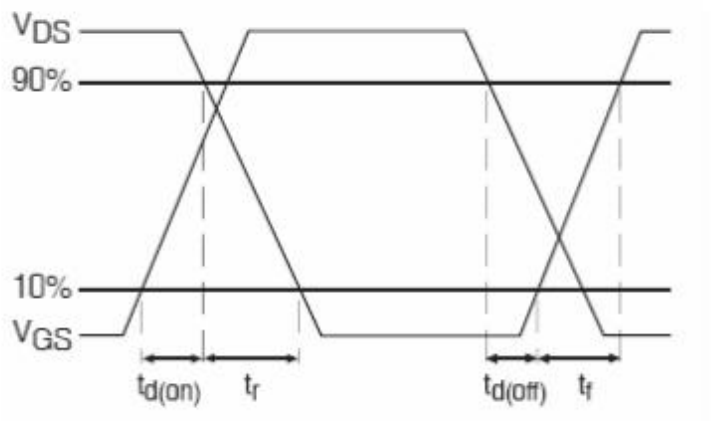


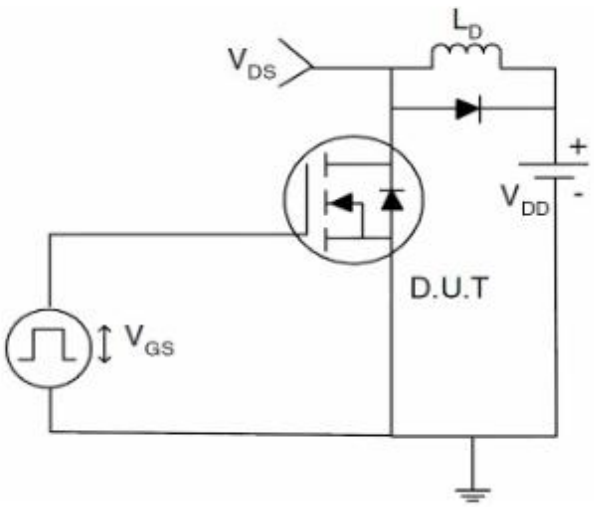
2) Gate Charge Test Circuit:





3) Switch Time Test Circuit:





Typical Operating Characteristics

Figure1. Output Characteristics

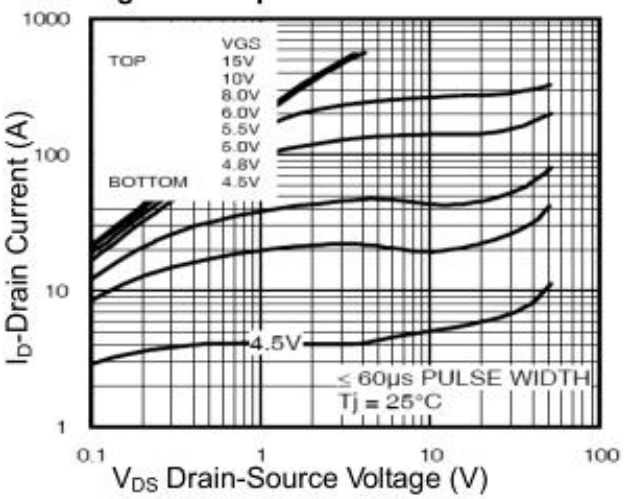


Figure2. Transfer Characteristics

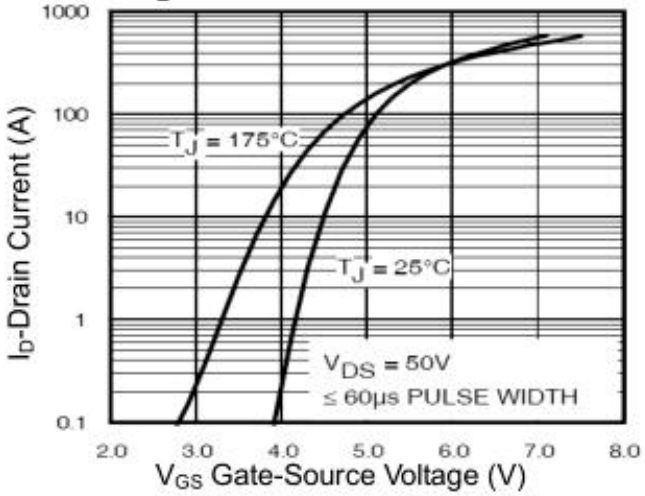


Figure3. BVDSS vs Junction Temperature

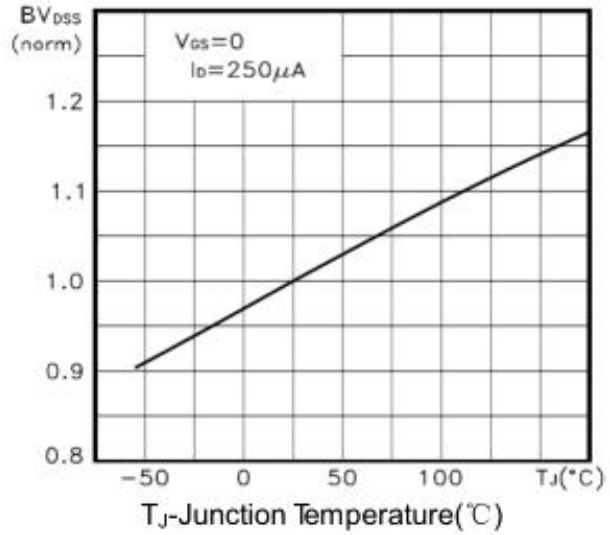


Figure4. ID vs Junction Temperature

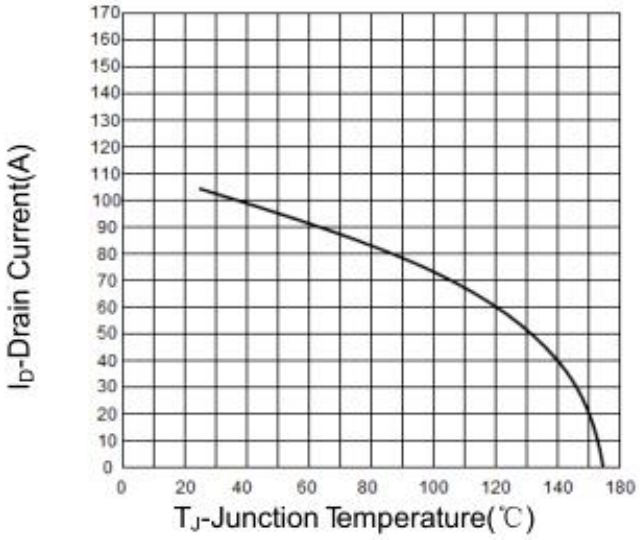


Figure5. VGS(th) vs Junction Temperature

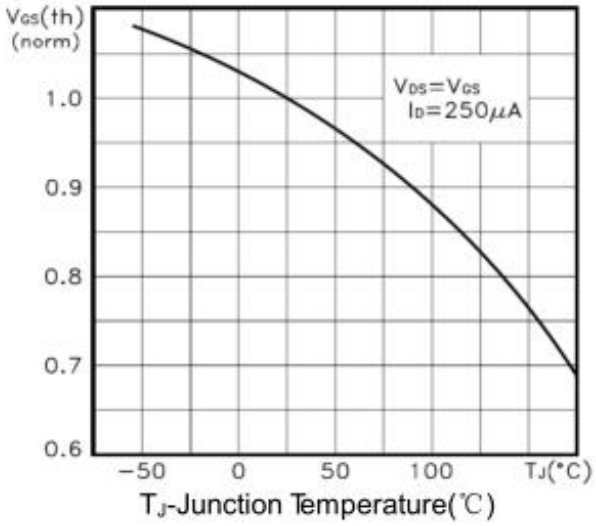
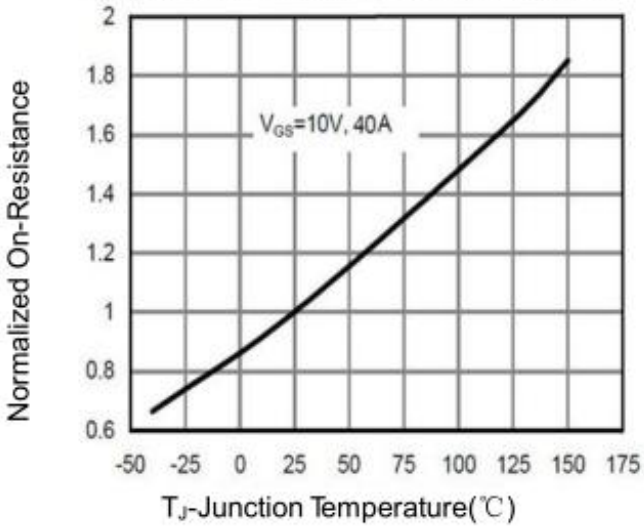


Figure6. Rdson Vs Junction Temperature



Typical Operating Characteristics (CONT.)

Figure7. Gate Charge

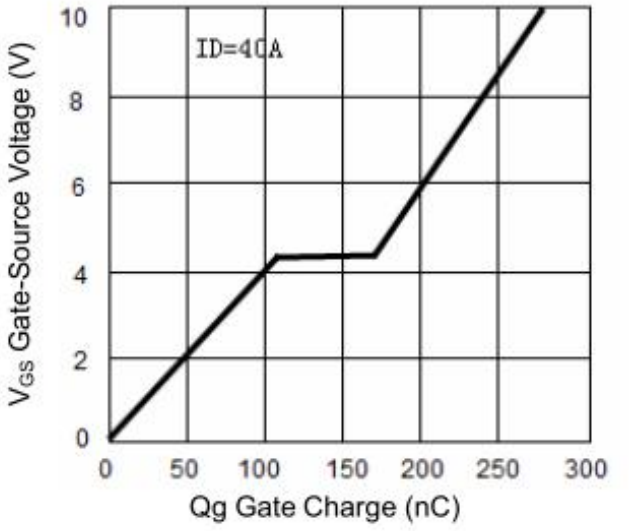


Figure8. Capacitance vs Vds

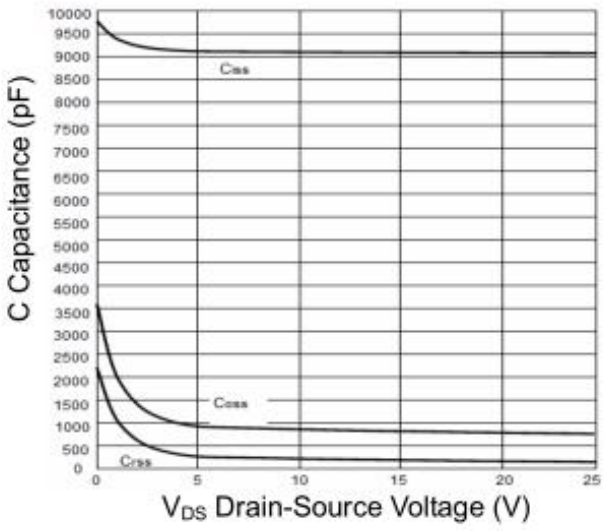


Figure9. Source- Drain Diode Forward

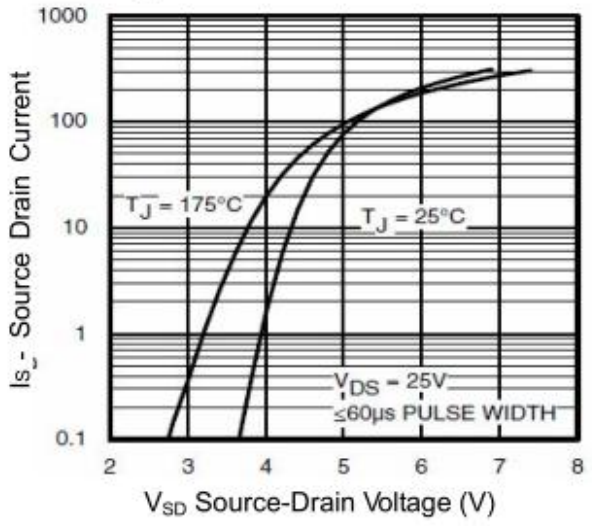


Figure10. Safe Operation Area

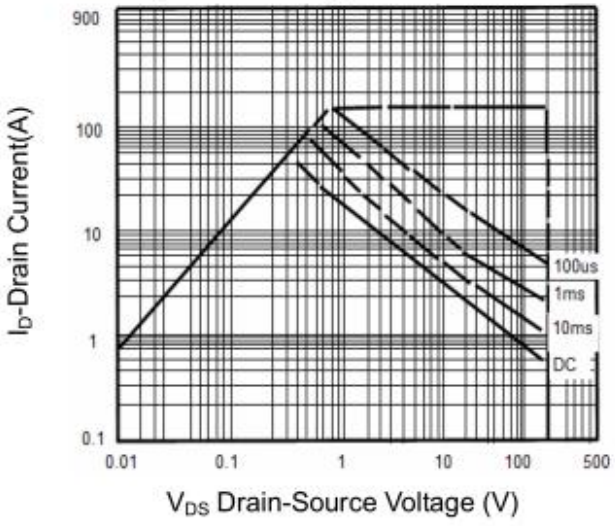
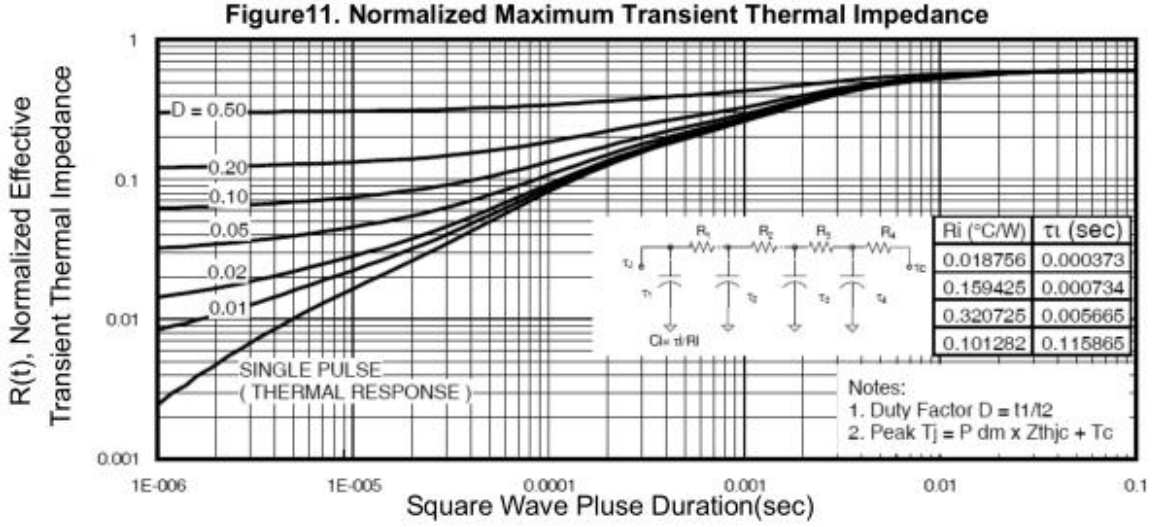


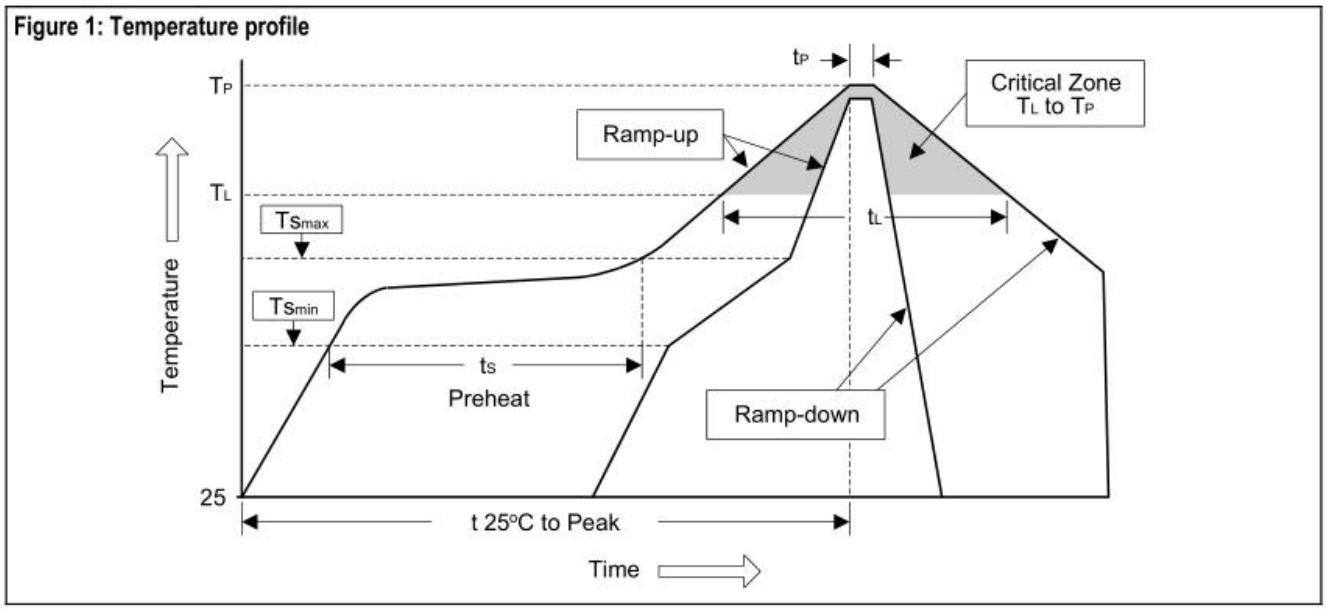
Figure11. Normalized Maximum Transient Thermal Impedance



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

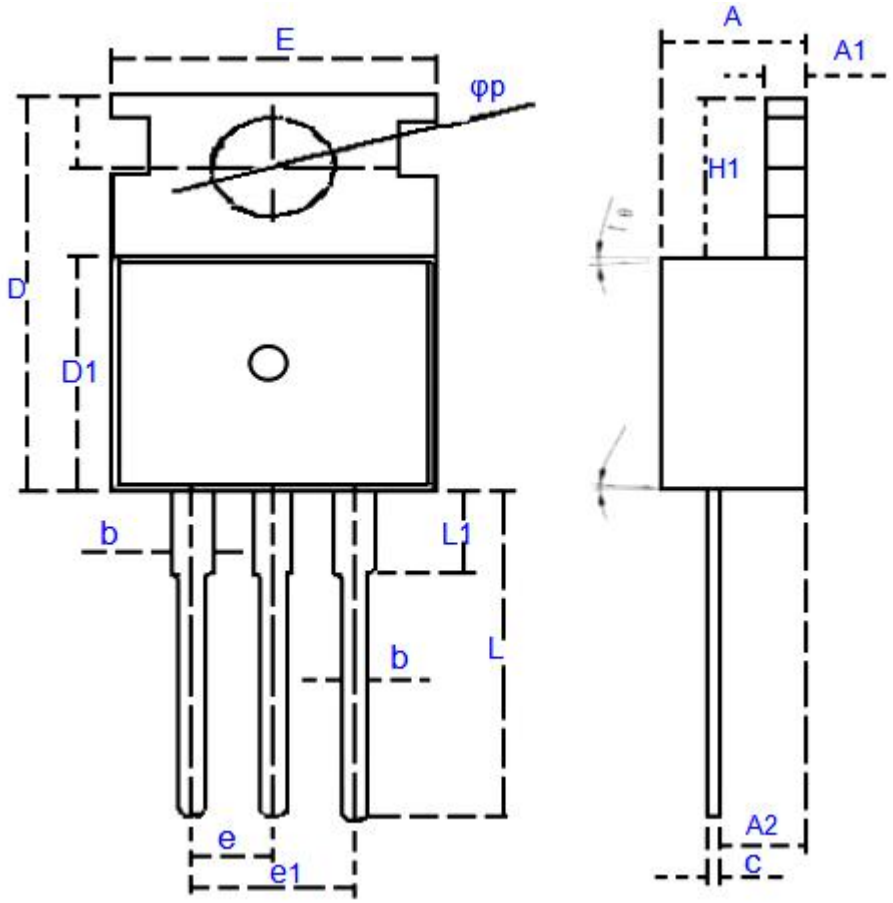
Figure 1: Temperature profile



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



Millimeters					
Symbol	Min	Max	Symbol	Min	Max
A	4.2	4.8	E	9.6	10.5
A1	1.28	1.34	e	2.54 Typ.	
A2	2.2	2.6	e1	5.08	5.18
b	0.69	0.91	H1	6.1	7.0
b1	1.17	1.37	L	12.9	13.5
c	0.42	0.51	L1	2.9	3.7
D	15.1	16.3	ΦP	3.4	3.8
D1	9.0	9.5	θ1（°）	1	5

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。

Si-Trend Always refine on to provide more excellent products

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20190820	A.1	/	8