SP05HF25TF

250V Super-Junction MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
250V	5.8mΩ@10V	190A

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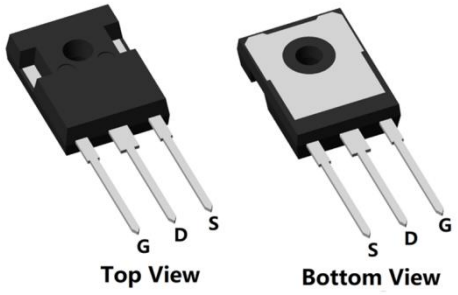
Feature

- Fast Switching
- Low Gate Charge and Rdson
- 100% Single Pulse avalanche energy Test

Applications

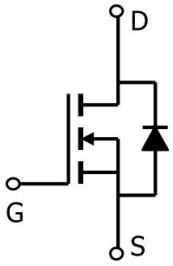
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

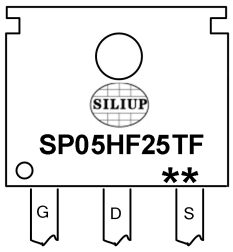


TO-247(1:G 2:D 3:S)

Circuit diagram



Marking



SP05HF25TF :Device Code
**** :Week Code**

Order Information

Device	Package	Unit/Tube
SP05HF25TF	TO-247	30

Absolute maximum ratings (Ta=25℃, unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	250	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current (Tc=25℃)	I_D	190	A
Continuous Drain Current (Tc=100℃)	I_D	127	A
Pulsed Drain Current	I_{DM}	760	A
Single Pulse Avalanche Energy[1]	E_{AS}	1704	mJ
Power Dissipation (Tc=25℃)	P_D	640	W
Power Dissipation (Tc=100℃)	P_D	256	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.2	℃/W
Recovery diode dv/dt	dv/dt	50	V/ns
Storage Temperature Range	T_{STG}	-55 to 150	℃
Operating Junction Temperature Range	T_J	-55 to 150	℃

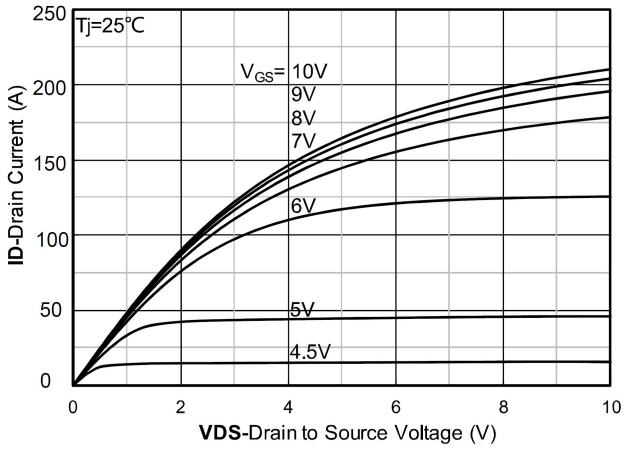
Electrical characteristics (Ta=25℃, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	VGS=0 V , ID=250uA	250	285	-	V
Drain-Source Leakage Current	I_{DSS}	VDS=200V , VGS=0V , TJ=25℃	-	-	10	uA
Gate-Source Leakage Current	I_{GSS}	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	VGS=VDS , ID=250uA	3	4	5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	VGS=10V , ID=40A	-	5.8	7.3	mΩ
Gate Resistance	R_G	VDS=50V , VGS=0V , f=1MHz	-	4.16	-	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	VDS=50V , VGS=0V , f=1MHz	-	10264	-	pF
Output Capacitance	C_{oss}		-	705	-	
Reverse Transfer Capacitance	C_{rss}		-	46	-	
Total Gate Charge	Q_g	VDS=200V , VGS=10V , ID=40A	-	178	-	nC
Gate-Source Charge	Q_{gs}		-	59	-	
Gate-Drain Charge	Q_{gd}		-	47	-	
Gate Pleteau Vlotage	$V_{pleteau}$		-	4.9	-	V
Switching Characteristics						
Turn-On Delay Time	$T_{d(on)}$	VDD=200V , VGS=10V , RG=1.6Ω , ID=40A	-	36	-	nS
Rise Time	T_r		-	38	-	
Turn-Off Delay Time	$T_{d(off)}$		-	181	-	
Fall Time	T_f		-	15	-	
Diode Characteristics						
Diode Forward Voltage	V_{SD}	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	I_S		-	-	190	A
Reverse recover time	T_{rr}	IS=40A , di/dt=100A/us , TJ=25℃	-	164	-	nS
Reverse recovery charge	Q_{rr}		-	0.55	-	nC

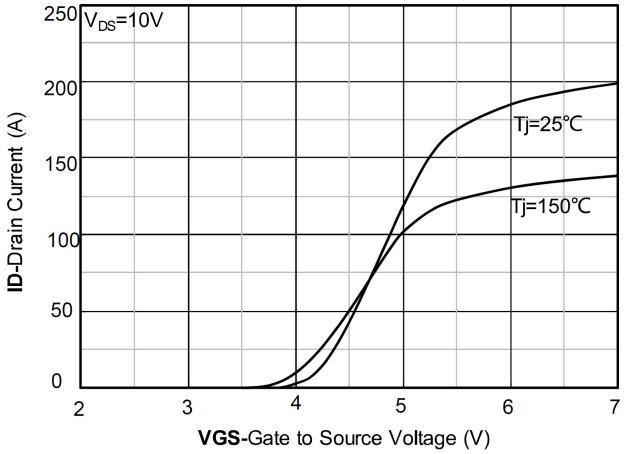
Note :

1. The test condition is VDD=50V, VGS=10V, L=0.5mH, RG=25Ω

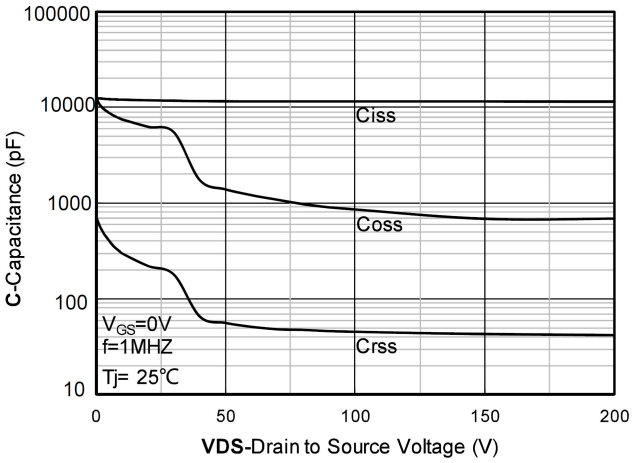
Typical Characteristics



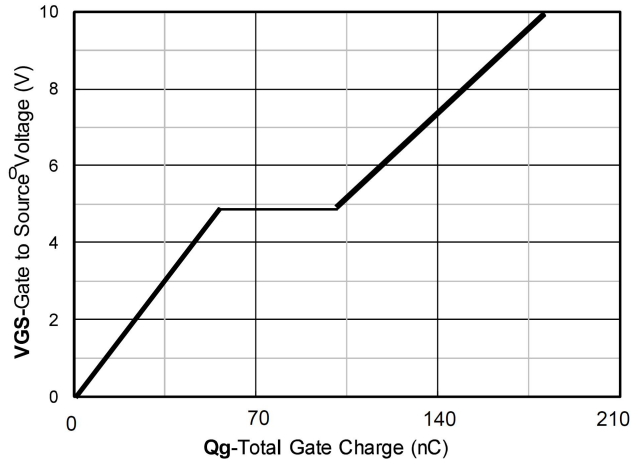
Output Characteristics



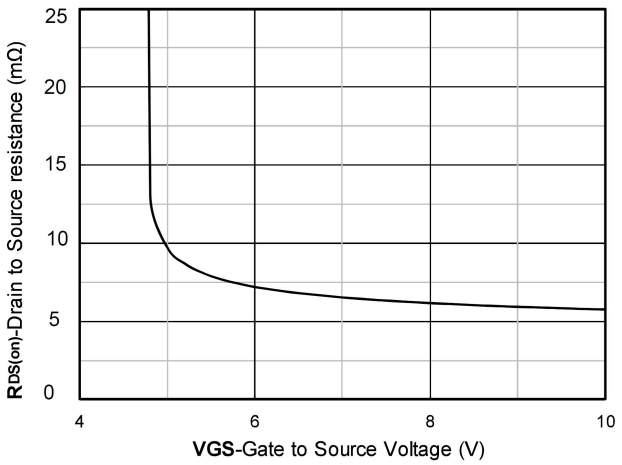
Transfer Characteristics



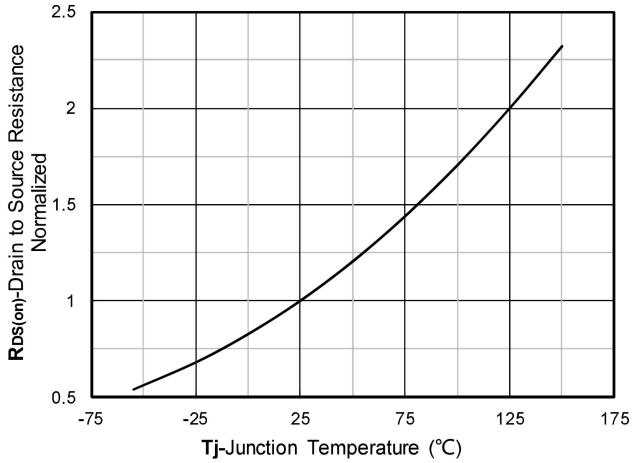
Capacitance Characteristics



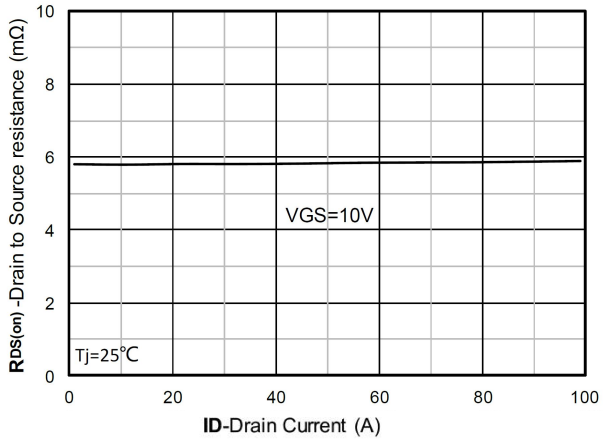
Gate Charge



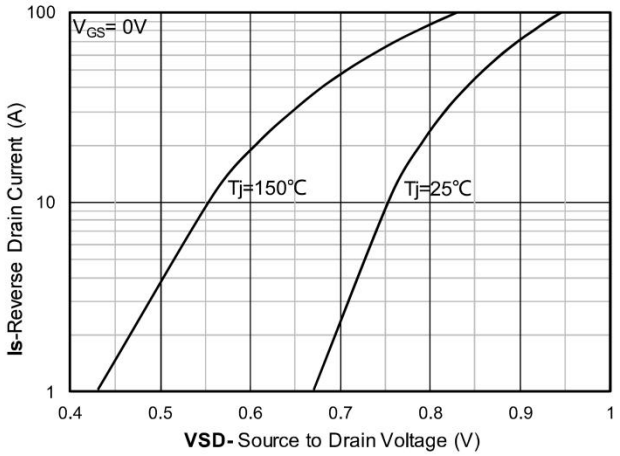
On-Resistance vs Gate to Source Voltage



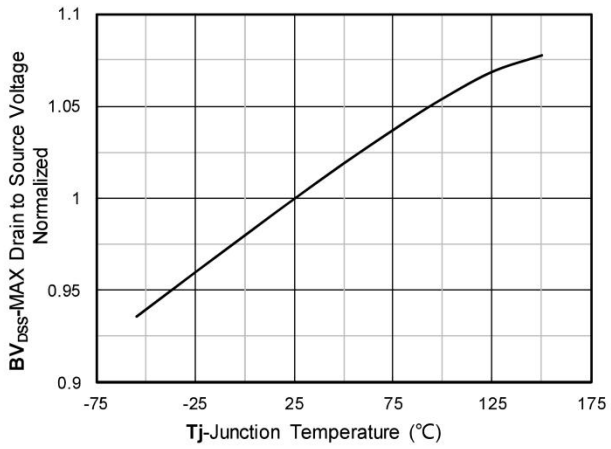
Normalized On-Resistance



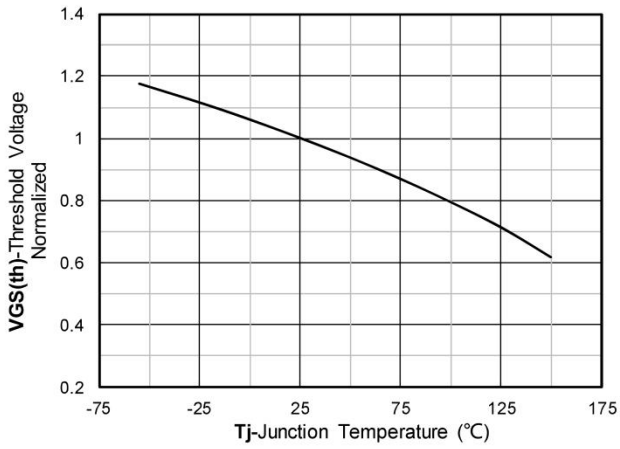
RDS(on) VS Drain Current; typical values



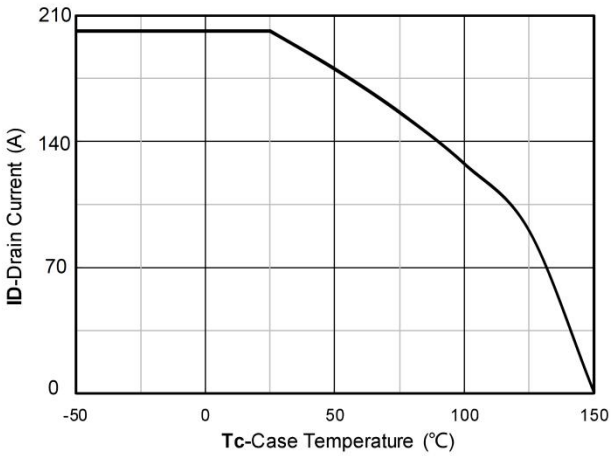
Forward characteristics of reverse diode; typical values



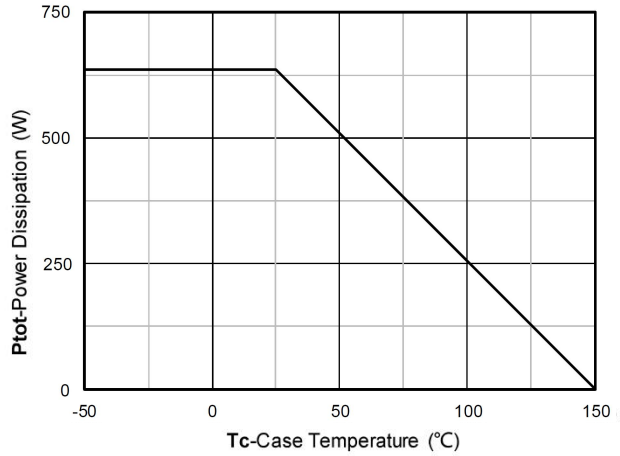
Normalized breakdown voltage



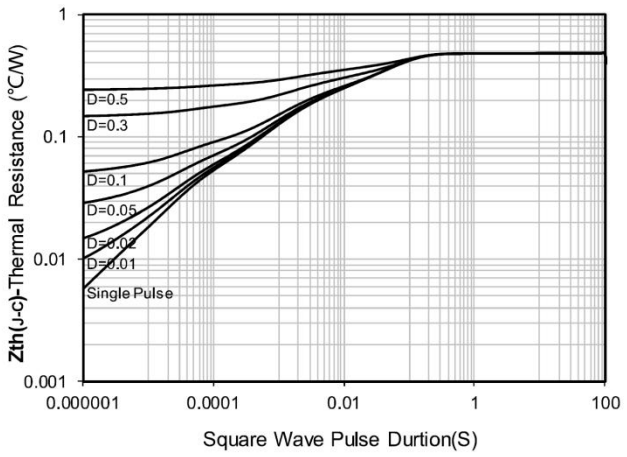
Normalized Threshold voltage



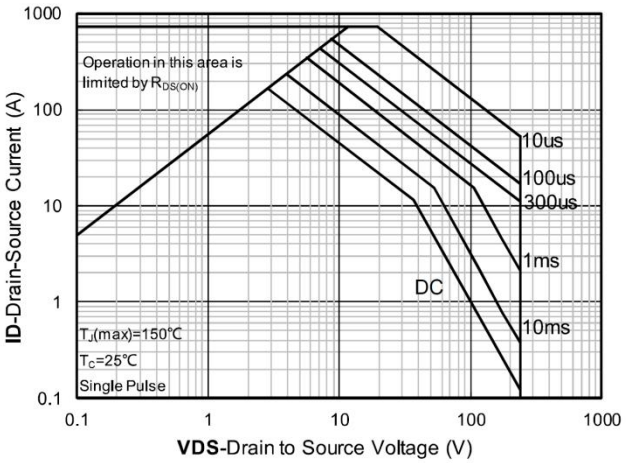
Current dissipation



Power dissipation



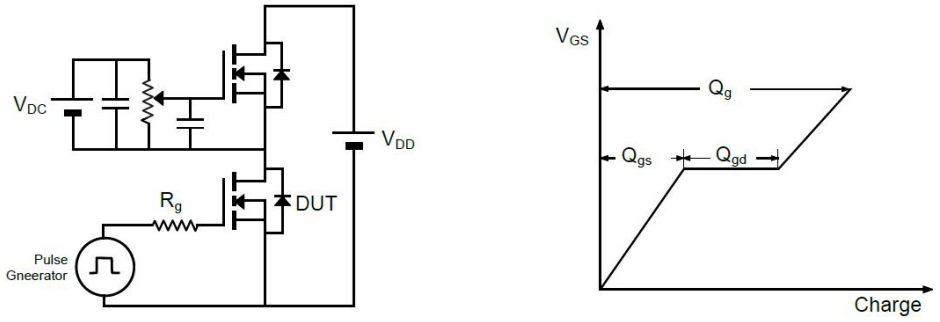
Maximum Transient Thermal Impedance



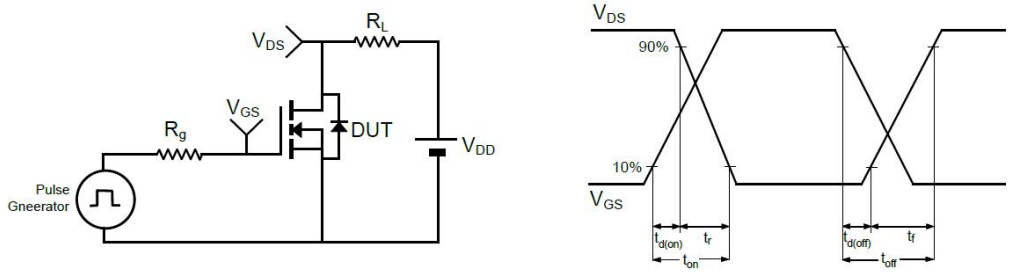
Safe Operation Area

Test Circuit

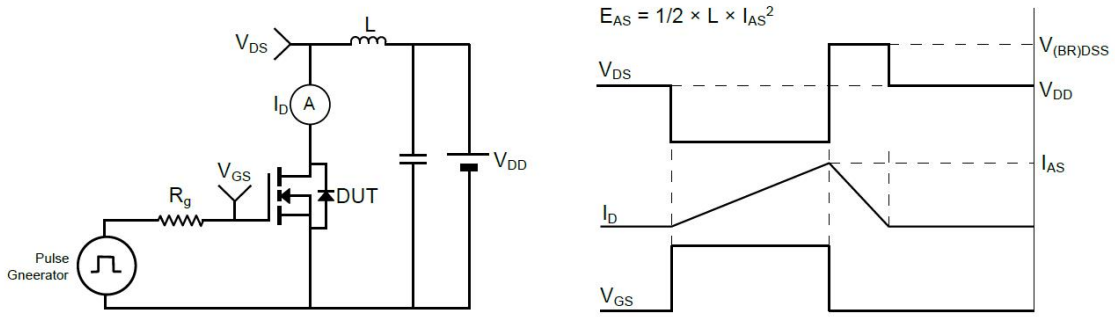
Gate Charge



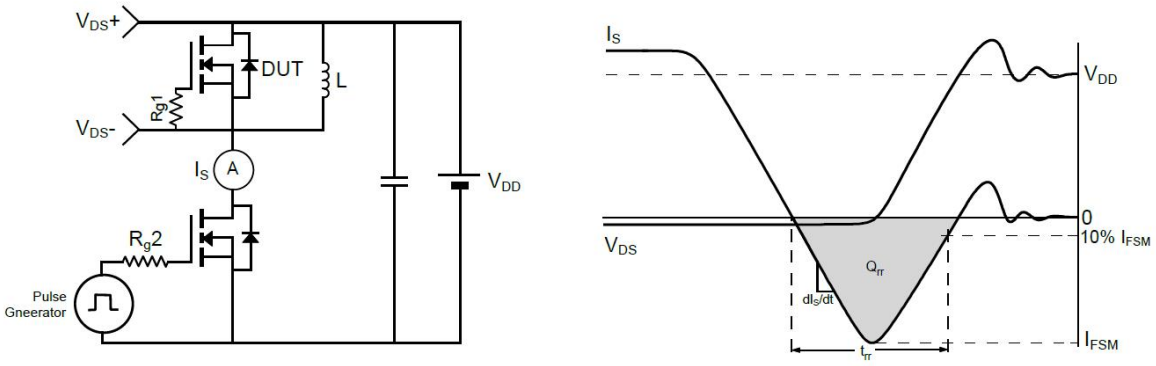
Resistive Load Switching Time



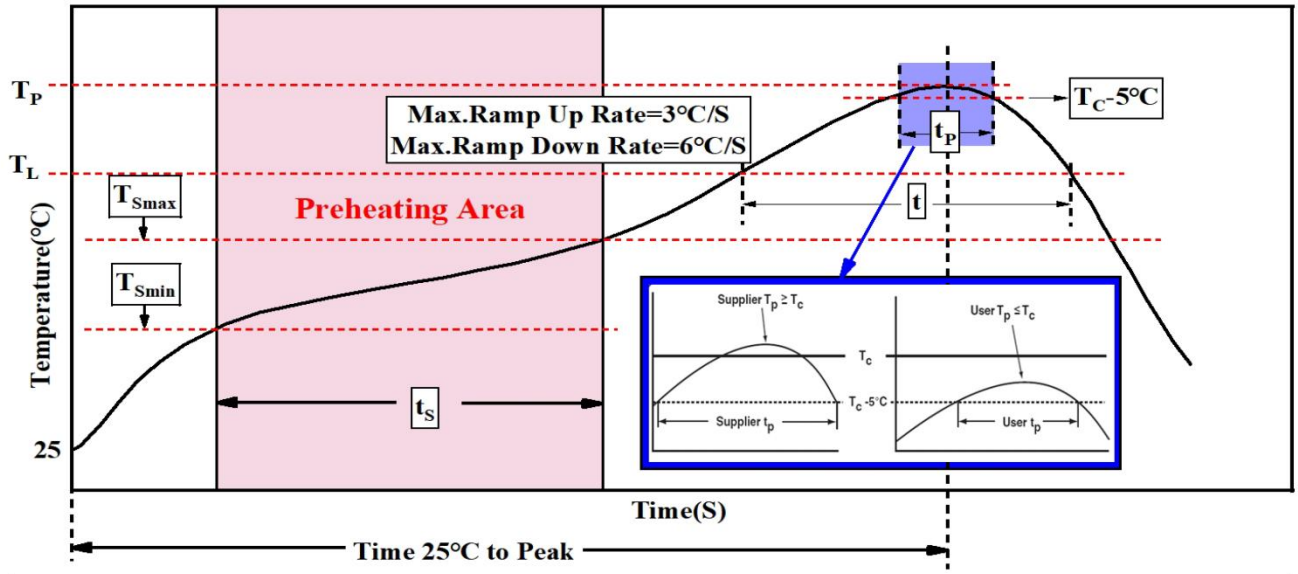
Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (Tsmin) Temperature max (Tsmax) Time (Tsmin to Tsmax) (ts)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-120 seconds
Average ramp-up rate (Tsmax to Tp)	3 °C/second max.	3°C/second max.
Liquidous temperature (TL) Time at liquidous (tL)	183 °C 60-150 seconds	217°C 60-150 seconds
Peak package body Temperature e (Tp)*	See Classification Temp in table 1	See Classification Temp in table 2
Time (tp)** within 5°C of the specified classification temperature (Tc)	20** seconds	30** seconds
Average ramp-down rate (Tp to Tsmax)	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 (Tp) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum		

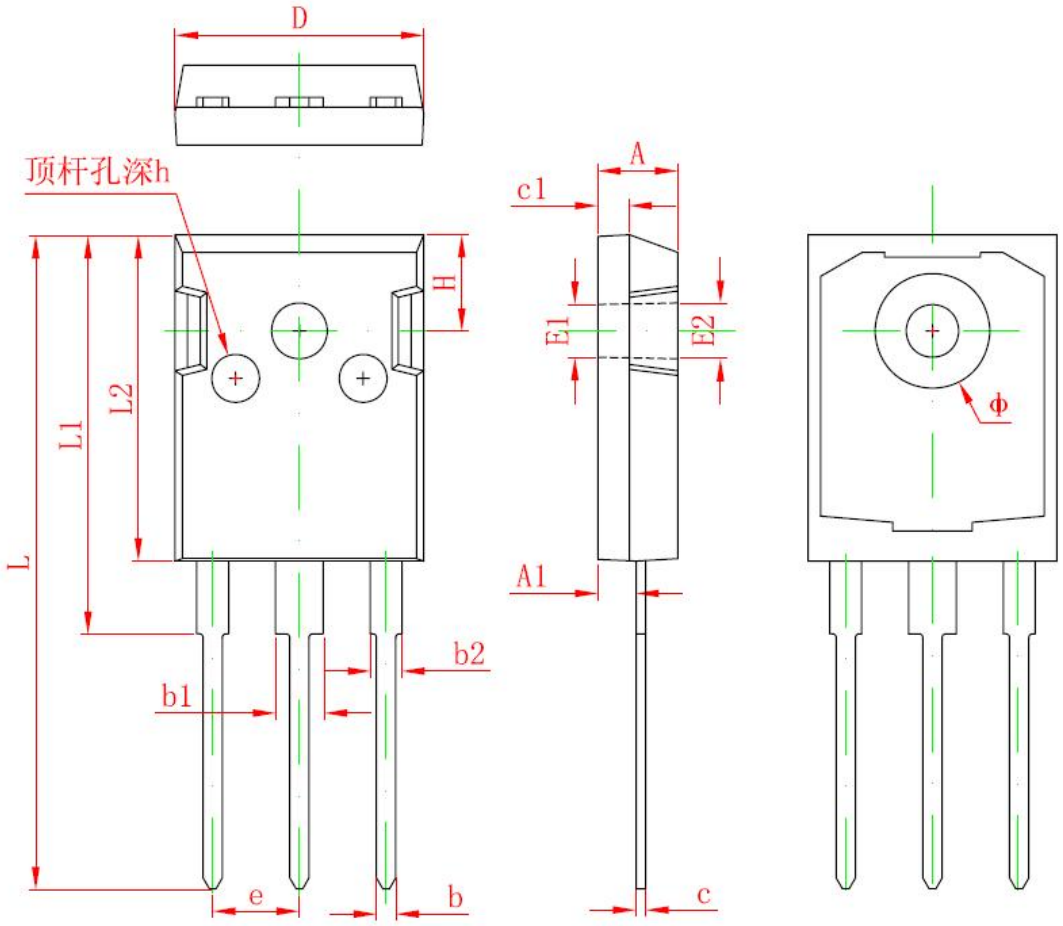
Table 1. SnPb Eutectic Process – Classification Temperatures (Tc)

Package Thickness	Volume mm^3 <350	Volume mm^3 ≥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 mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >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

TO-247 Package Information



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.700	5.300
A1	2.100	2.600
b	1.000	1.400
b1	2.800	3.200
b2	1.800	2.200
c	0.500	0.700
c1	1.900	2.500
D	15.450	16.200
E1	3.500 REF.	
E2	3.600 REF.	
L	40.400	41.600
L1	24.750	25.750
L2	20.300	21.300
Φ	7.100	7.300
e	5.450 TYP.	
H	5.980 REF.	
h	0.000	0.300