

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
150V	3.05mΩ@10V	225A



合肥矽普半导体

Siliup Semiconductor Technology Co., Ltd

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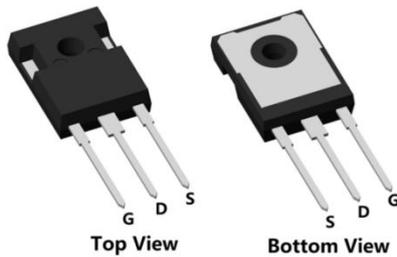
Feature

- Fast Switching
- Low Gate Charge and R_{DS(on)}
- Advanced Split Gate Trench Technology
- 100% Single Pulse avalanche energy Test
- 175°C Junction Temperature

Applications

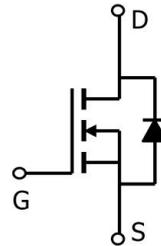
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

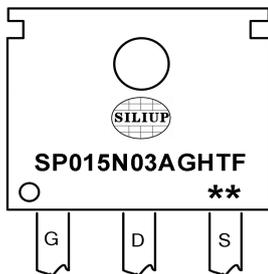


TO-247(1:G 2:D 3:S)

Circuit diagram



Marking



SP015N03AGHTF : Product code
 ** : Week code

Order Information

Device	Package	Unit/Tube
SP015N03AGHTF	TO-247	30

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Ta=25°C)	I_D	225	A
Continuous Drain Current (Ta=100°C)	I_D	162	A
Pulsed Drain Current	I_{DM}	900	A
Single Pulse Avalanche Energy ¹	E_{AS}	1308	mJ
Power Dissipation (Ta=25°C)	P_D	502	W
Power Dissipation (Ta=100°C)	P_D	251	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.3	°C/W
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	41	°C/W
Storage Temperature Range	T_{STG}	-55 to 175	°C
Operating Junction Temperature Range	T_J	-55 to 175	°C

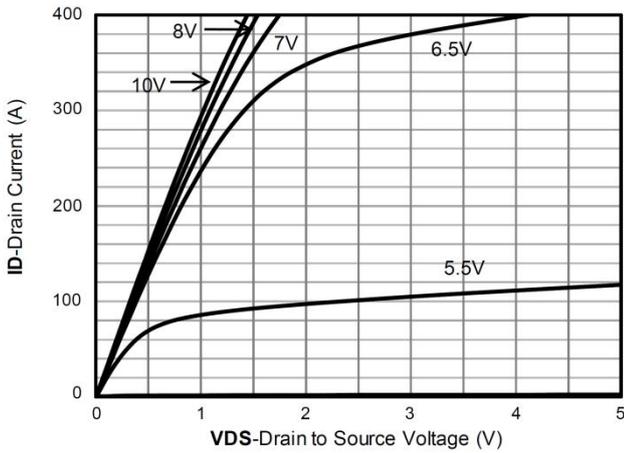
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = 250\mu A, V_{GS} = 0V$	150	170	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS} = 120V, V_{GS} = 0V$	-	-	1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.6	3.0	3.4	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 100A$	-	3.05	3.6	m Ω
Gate Resistance	R_G	$V_{DS}=75V, V_{GS}=0V, f=1MHz$	-	1.9	-	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	$V_{DS}=75V, V_{GS}=0V, f=1MHz$	-	11503	-	pF
Output Capacitance	C_{oss}		-	822	-	
Reverse Transfer Capacitance	C_{rss}		-	34	-	
Total Gate Charge	Q_g	$V_{DS}=75V, V_{GS}=10V, I_D=100A$	-	177	-	nC
Gate-Source Charge	Q_{gs}		-	72	-	
Gate-Drain Charge	Q_{gd}		-	40	-	
Gate Plateau Voltage	$V_{plateau}$		-	5.9	-	
Switching Characteristics						
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=75V, V_{GS}=10V, R_G=2.7\Omega, I_D=100A$	-	42	-	nS
Rise Time	T_r		-	86	-	
Turn-Off Delay Time	$T_{d(off)}$		-	98	-	
Fall Time	T_f		-	43	-	
Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1A, T_J=25^\circ C$	-	-	1.2	V
Maximum Body-Diode Continuous Current	I_S		-	-	275	A
Reverse Recovery Time	T_{rr}	$I_S=100A, di/dt=100A/\mu s, T_J=25^\circ C$	-	114	-	nS
Reverse Recovery Charge	Q_{rr}		-	464	-	nC

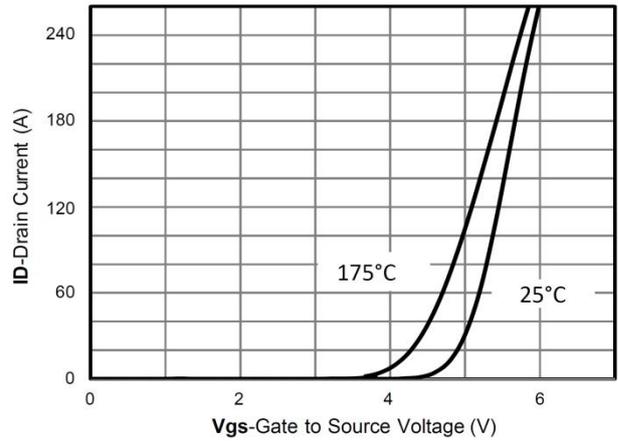
Note :

 1. The test condition is $V_{DD}=75V, V_{GS}=10V, L=0.5mH, R_G=25\Omega$

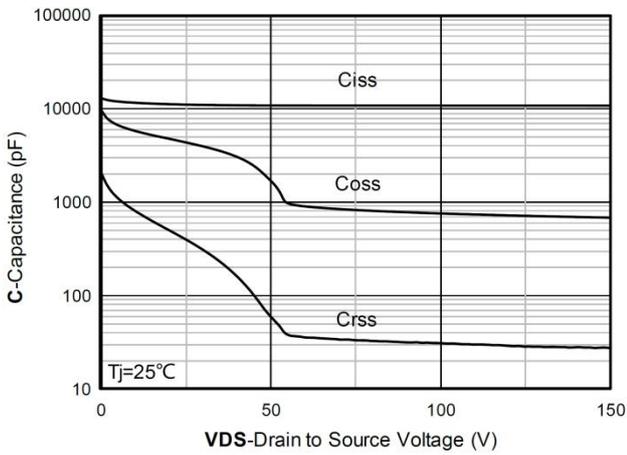
Typical Characteristics



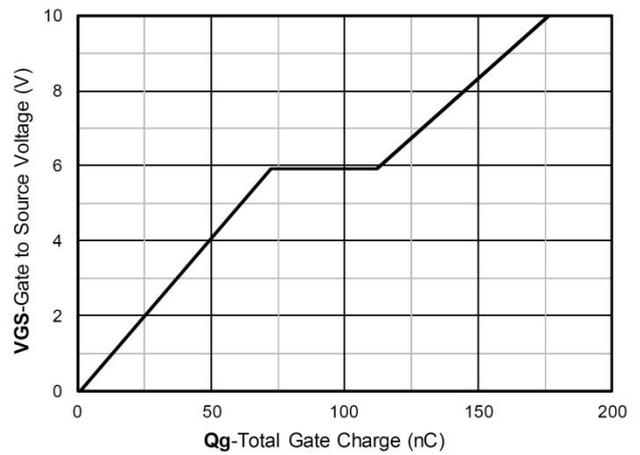
Output Characteristics



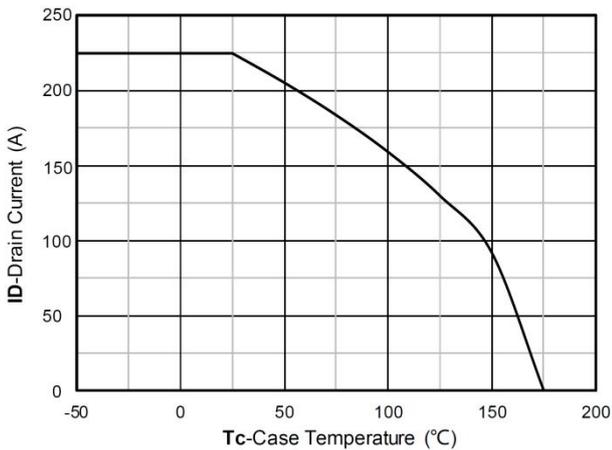
Transfer Characteristics



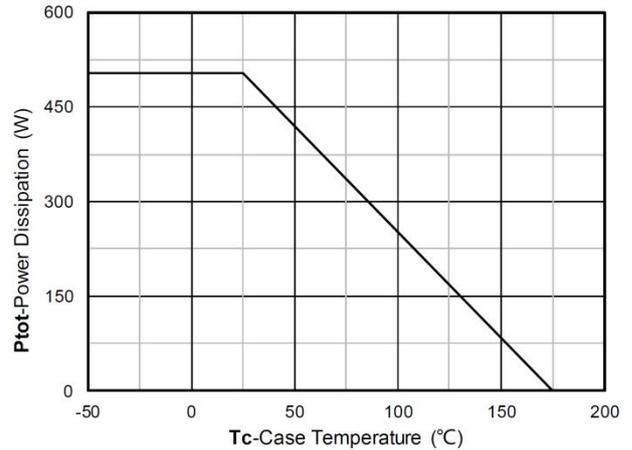
Capacitance Characteristics



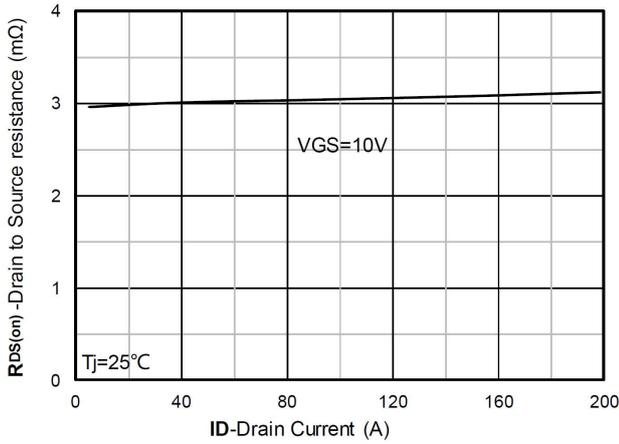
Gate Charge



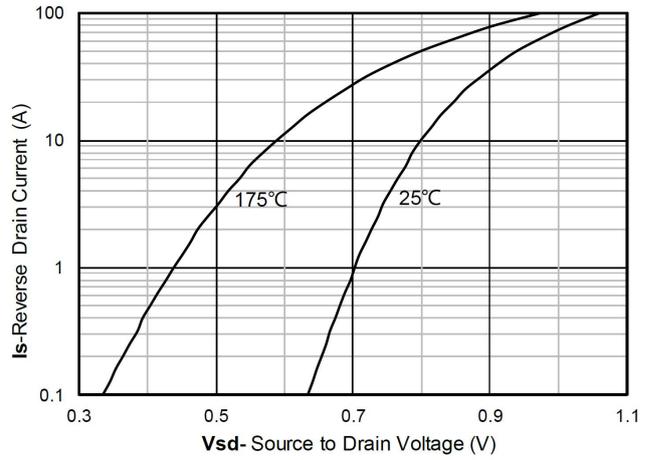
Current dissipation



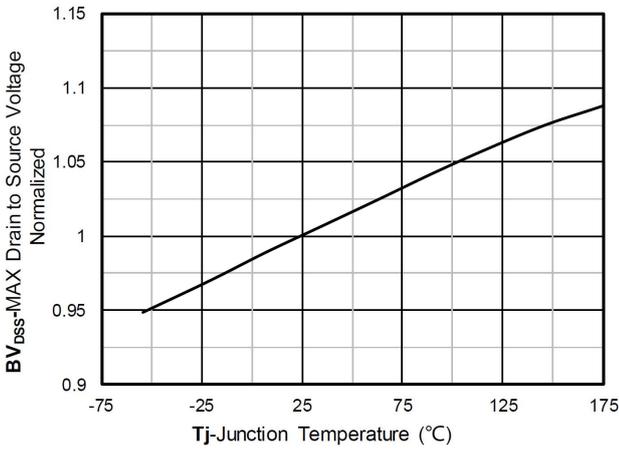
Power dissipation



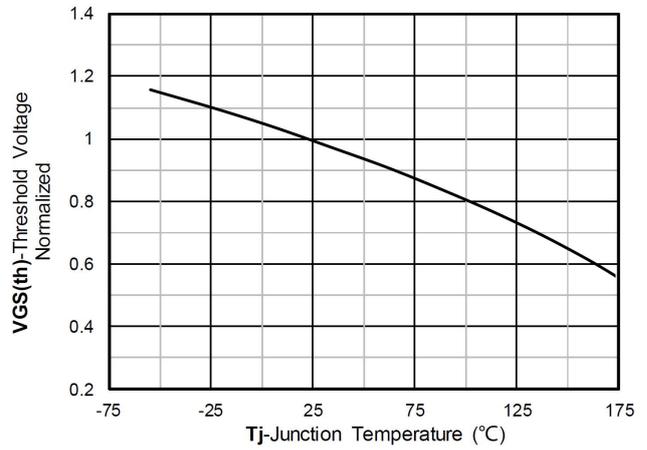
RDS(on) VS Drain Current



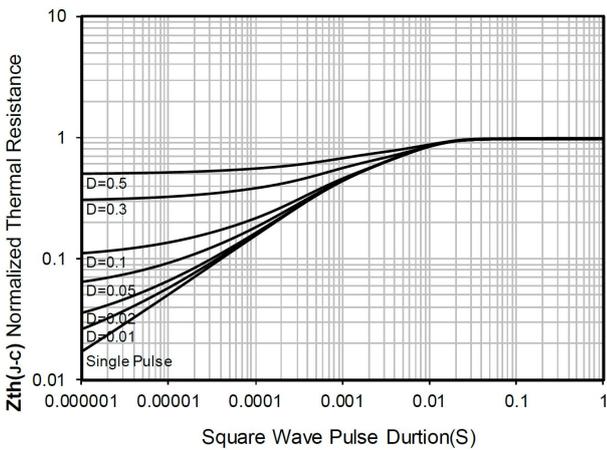
Forward characteristics of reverse diode



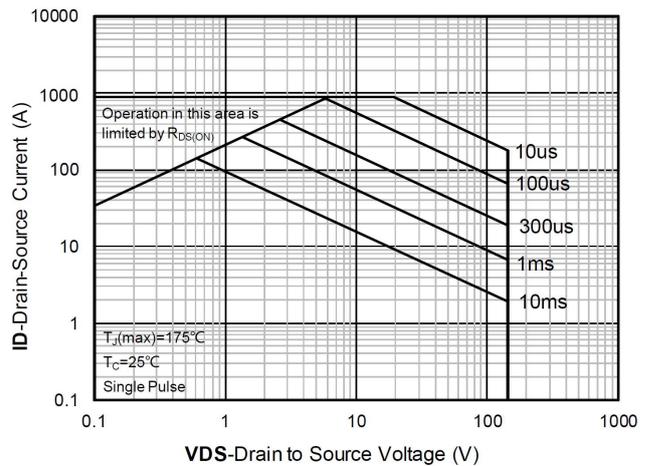
Normalized breakdown voltage



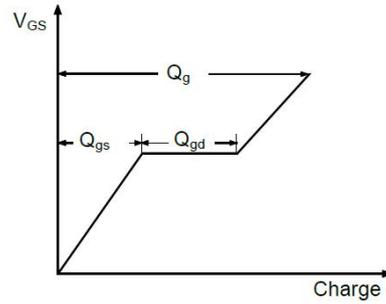
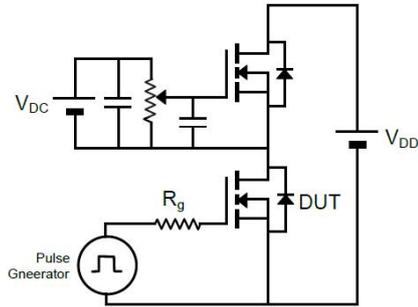
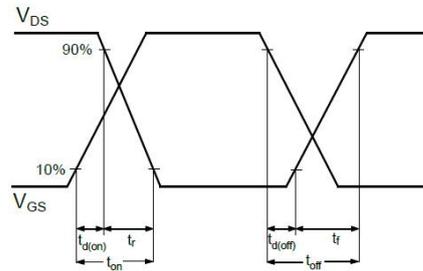
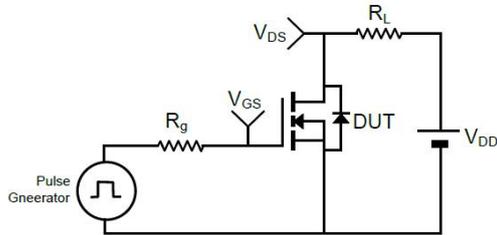
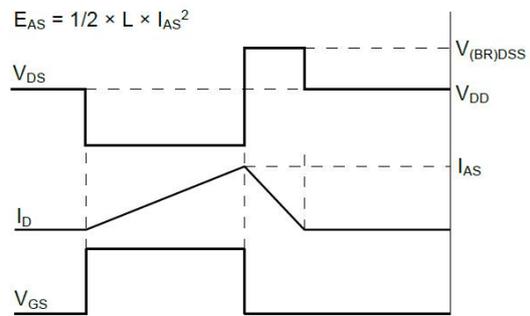
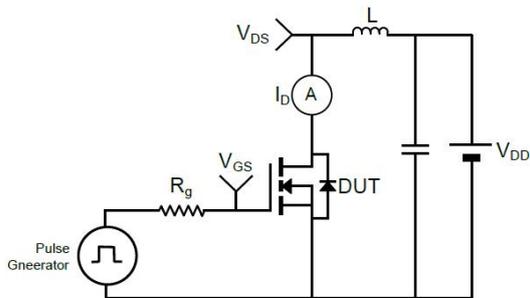
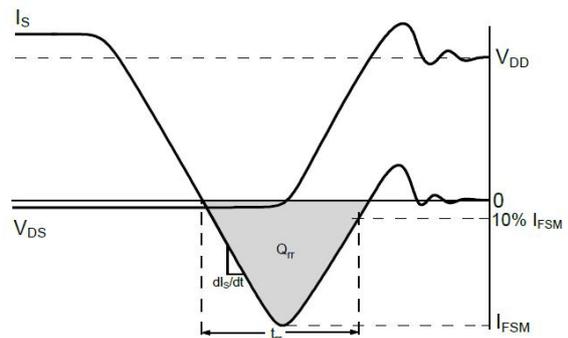
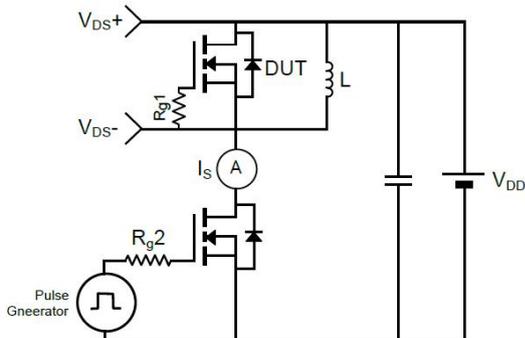
Normalized Threshold voltage



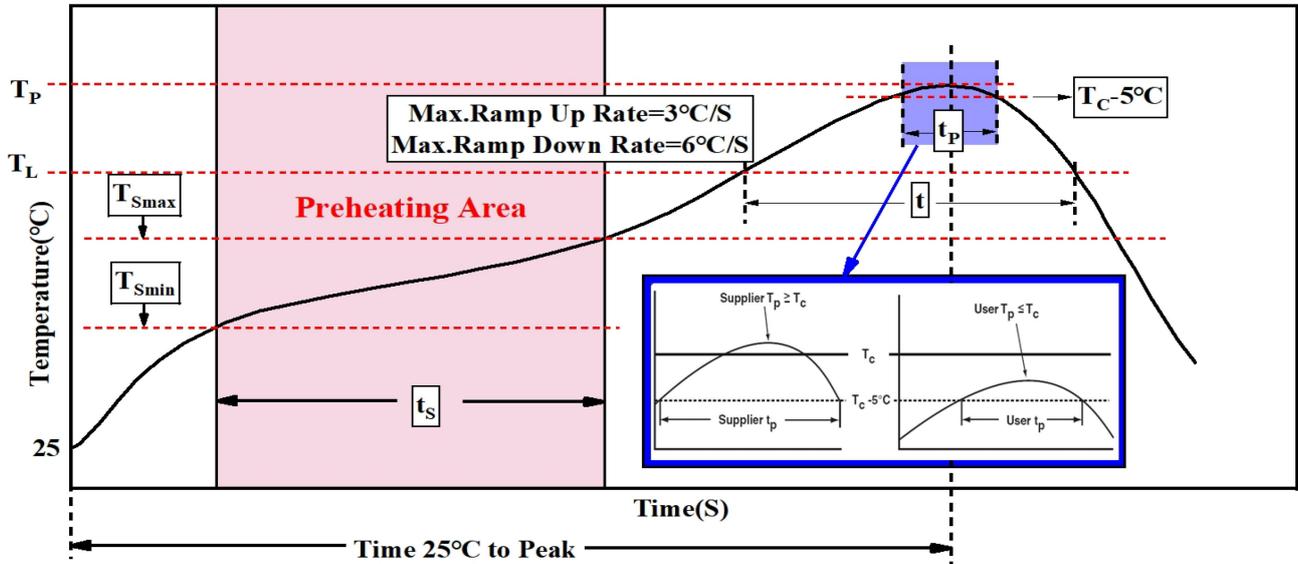
Maximum Transient Thermal Impedance



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(Pb-Free)



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T _{Smin})	100°C	150°C
Temperature max (T _{Smax})	150°C	200°C
Time (T _{Smin} to T _{Smax}) (t _s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T _{Smax} to T _p)	3 °C/second max.	3°C/second max.
Liquidous temperature (T _L)	183 °C	217°C
Time at liquidous (t _L)	60-150 seconds	60-150 seconds
Peak package body Temperature e (T _p)*	See Classification Temp in table 1	See Classification Temp in 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.
* Tolerance for peak profile Temperature (T _p) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (t _p) is defined as a supplier minimum and a user maximum		

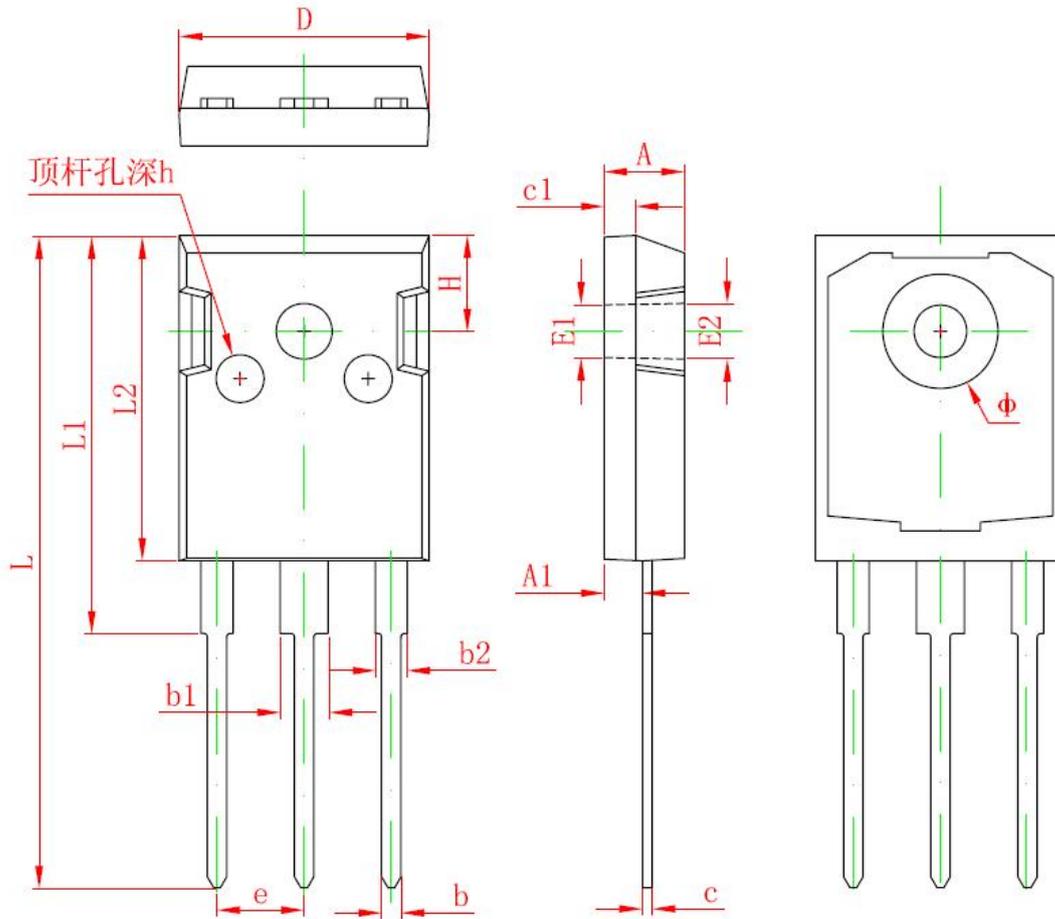
Table 1. SnPb Eutectic Process – Classification Temperatures (T_c)

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 (T_c)

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