

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
650V	145mΩ@10V	20A



合肥矽普半导体

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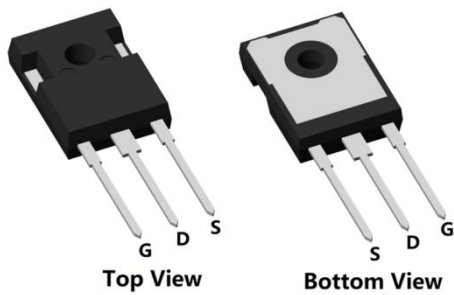
Feature

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

Applications

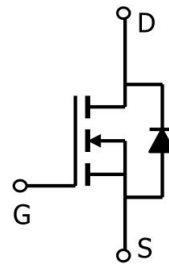
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

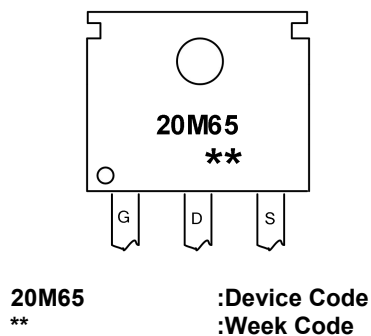


TO-247(1:G 2:D 3:S)

Circuit diagram



Marking



Order Information

Device	Package	Unit/Tube
SP20M65TF	TO-247	30

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current (Tc=25°C)	I_D	20	A
Continuous Drain Current (Tc=100°C)	I_D	13	A
Pulsed Drain Current	I_{DM}	80	A
Single Pulse Avalanche Energy ¹	E_{AS}	485	mJ
Power Dissipation (Tc=25°C)	P_D	138	W
Power Dissipation (Tc=100°C)	P_D	54	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.91	°C/W
Recovery diode dv/dt	dv/dt	50	V/ns
Storage Temperature Range	T_{STG}	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	°C

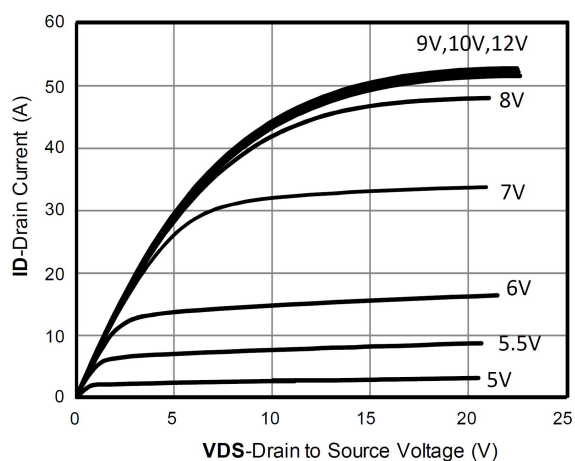
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	ID=250μA , VGS=0V	650	-	-	V
Drain-Source Leakage Current	IDSS	VDS=520V , VGS=0V	-	-	1	uA
Gate-Source Leakage Current	IGSS	VGS=±30V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VDS=VGS , ID=250μA	3	3.5	4	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=10V , ID=10A	-	145	180	mΩ
Gate Resistance	RG	VDS=100V , VGS=0V , f=1MHz	-	22	-	Ω
Dynamic characteristics						
Input Capacitance	Ciss	VDS=100V , VGS=0V , f=1MHz	-	1114	-	pF
Output Capacitance	Coss		-	68	-	
Reverse Transfer Capacitance	Crss		-	0.85	-	
Total Gate Charge	Qg	VDS=480V , VGS=10V , ID=10A	-	36	-	nC
Gate-Source Charge	Qgs		-	7.9	-	
Gate-Drain Charge	Qgd		-	18	-	
Gate Plateau Vlotage	Vplateau		-	6.1	-	V
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD=400V , VGS=10V , RG=5Ω , ID=10A	-	23	-	nS
Rise Time	Tr		-	34	-	
Turn-Off Delay Time	Td(off)		-	124	-	
Fall Time	Tf		-	30	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	20	A
Reverse recover time	Trr	IS=10A , di/dt=100A/us , TJ=25℃	-	348	-	nS
Reverse recovery charge	Qrr		-	5.6	-	uC

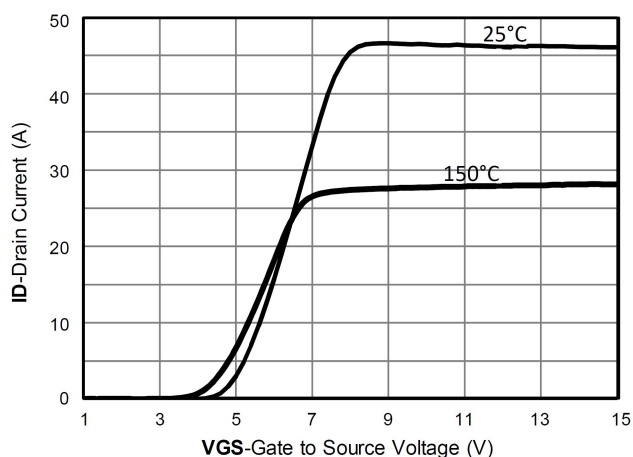
Note :

1. The test condition is $V_{DD}=150V$, $V_{GS}=10V$, $L=30mH$, $R_G=25\Omega$

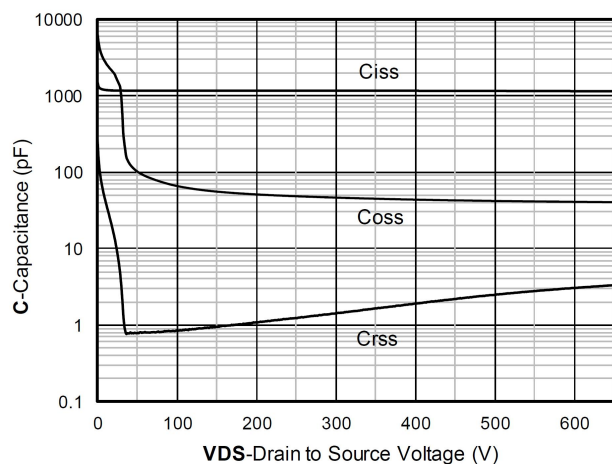
Typical Characteristics



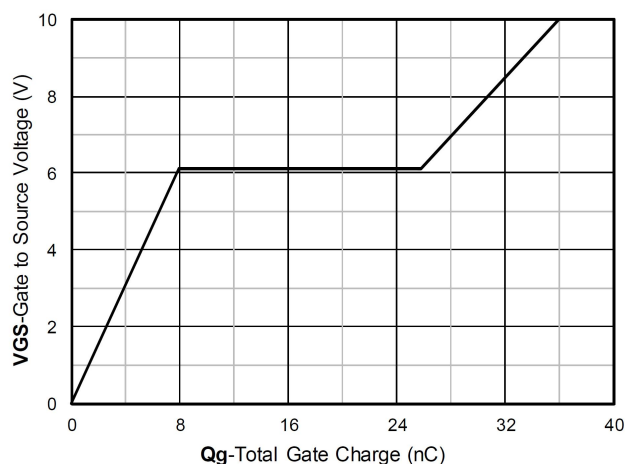
Output Characteristics; typical values



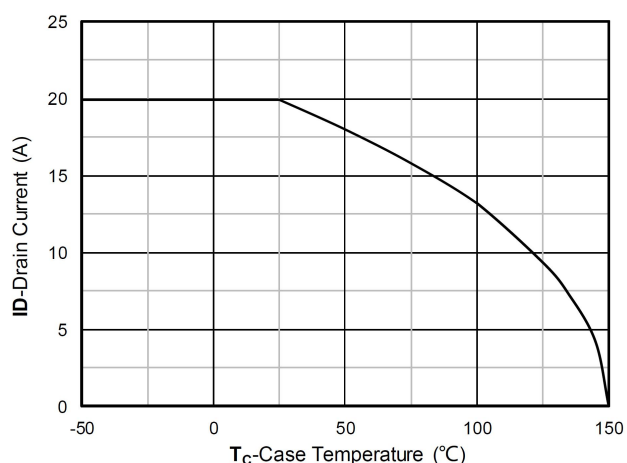
Transfer Characteristics; typical values



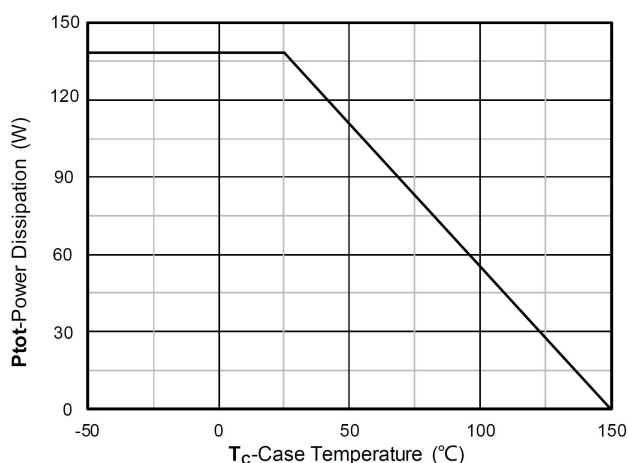
Capacitance Characteristics; typical values



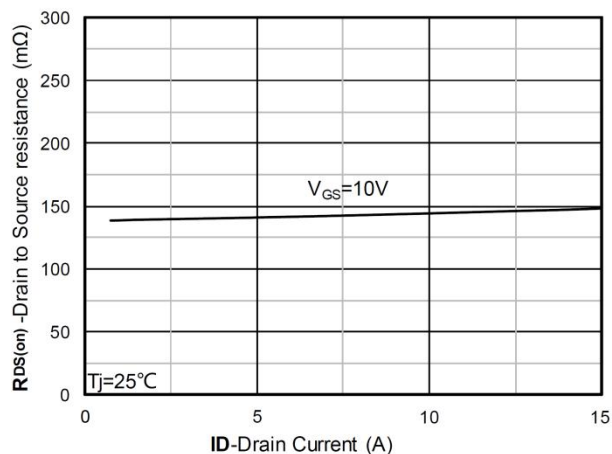
Gate Charge; typical values



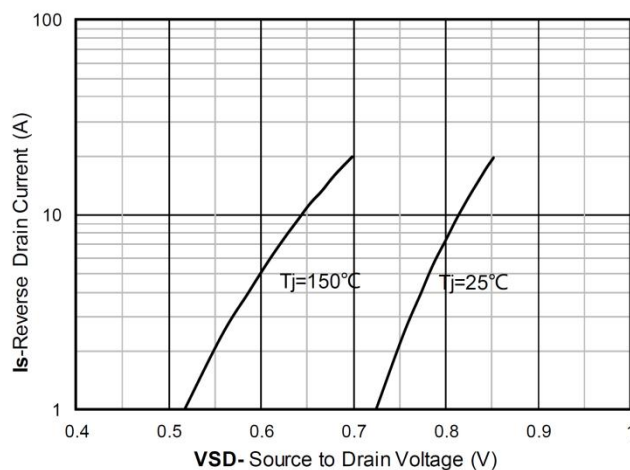
Current dissipation



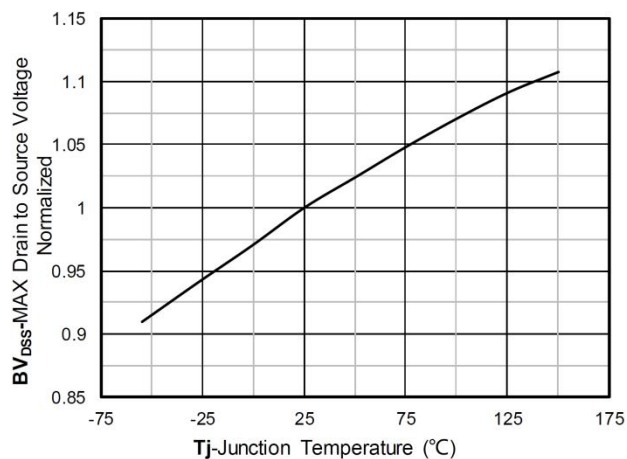
Power dissipation



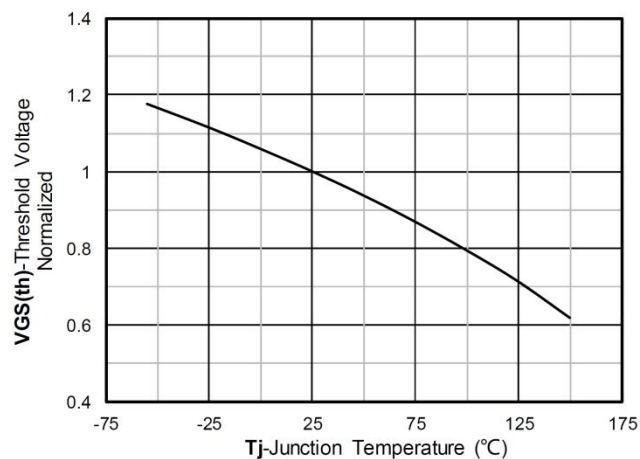
RDS(on) vs. Drain Current; typical values



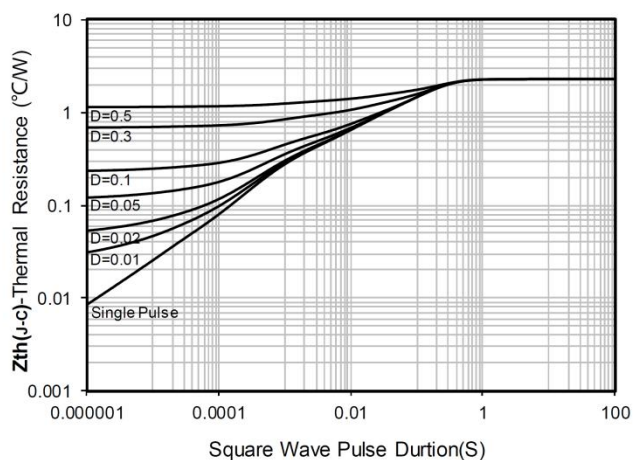
Forward characteristics of reverse diode; typical values



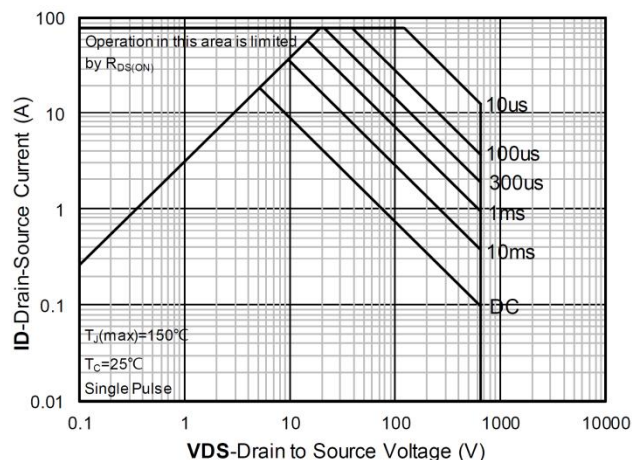
Normalized breakdown voltage



Normalized Threshold voltage



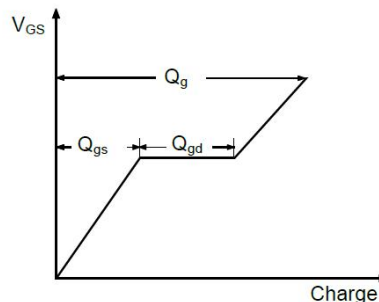
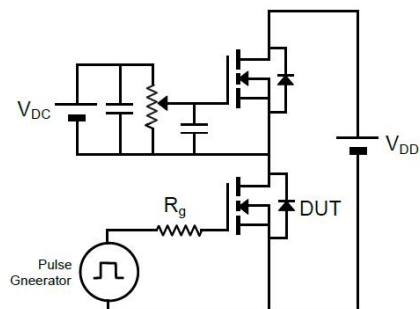
Maximum Transient Thermal Impedance



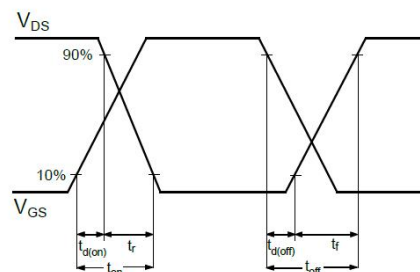
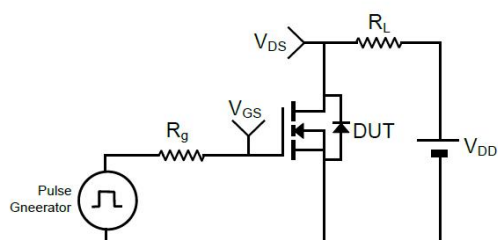
Safe Operation Area

Test Circuit

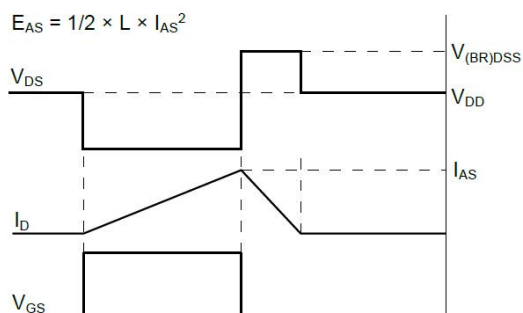
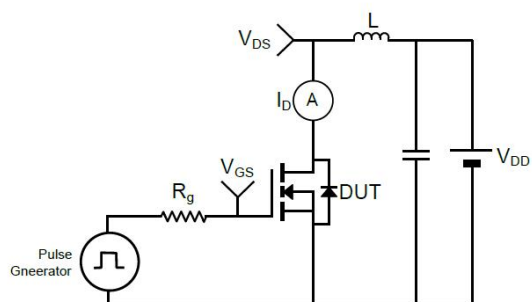
Gate Charge



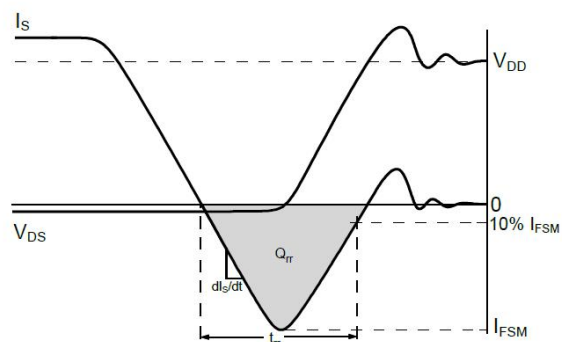
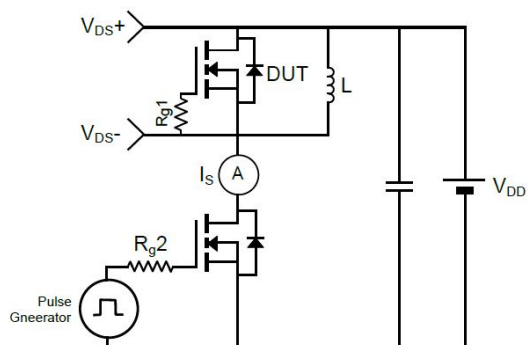
Resistive Load Switching Time

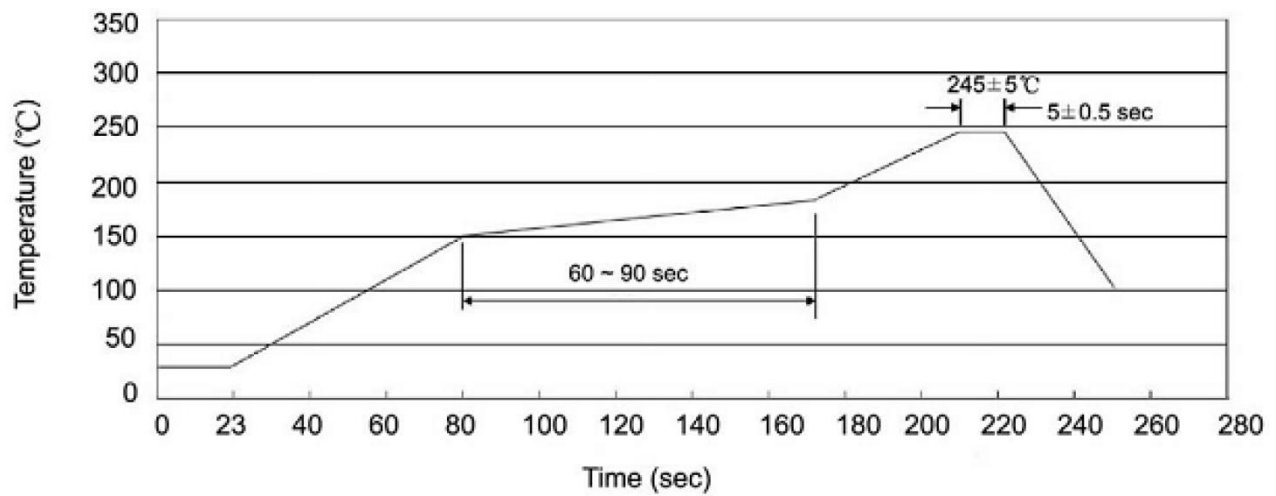


Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



**Temperature Profile for IR Reflow Soldering(Pb-Free)****Note:**

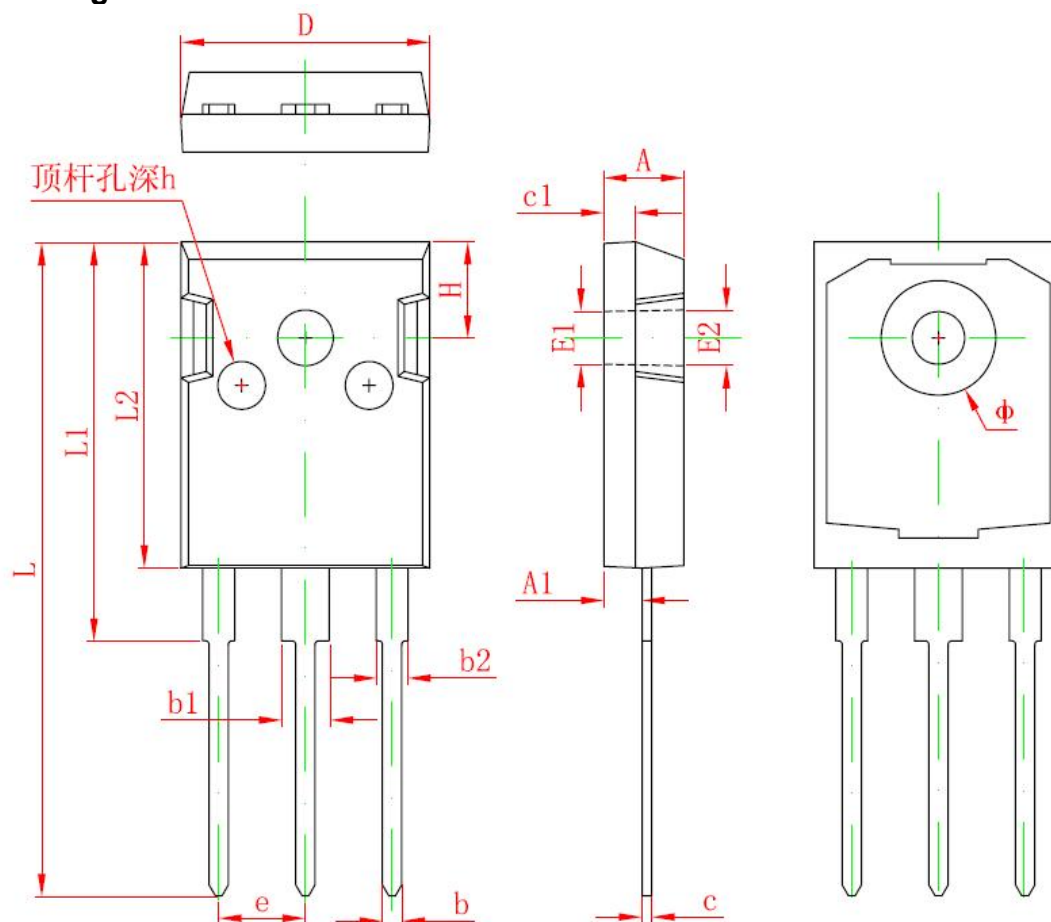
1. Preheating: 25 ~ 150 °C, Time: 60 ~ 90 sec.
2. Peak Temp.: 245 ± 5 °C, Duration: 5 ± 0.5 sec.
3. Cooling Speed: 2 ~ 10 °C/sec.

Resistance to Soldering Heat Test Conditions

Temp.: 260 ± 5 °C Time: 10 ± 1 sec



TO-247 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.850	5.150	0.191	0.200
A1	2.200	2.600	0.087	0.102
b2	1.800	2.200	0.071	0.087
b	1.000	1.400	0.039	0.055
b1	2.800	3.200	0.110	0.126
c	0.500	0.700	0.020	0.028
c1	1.900	2.100	0.075	0.083
D	15.450	15.750	0.608	0.620
E1	3.500 REF.		0.138 REF.	
E2	3.600 REF.		0.142 REF.	
L	40.900	41.300	1.610	1.626
L1	24.800	25.100	0.976	0.988
L2	20.300	20.600	0.799	0.811
Φ	7.100	7.300	0.280	0.287
e	5.450 TYP.		0.215 TYP.	
H1	5.980 REF.		0.235 REF.	
h	0.000	0.300	0.000	0.012