

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
150V	13.5mΩ@10V	60A



合肥矽普半导体

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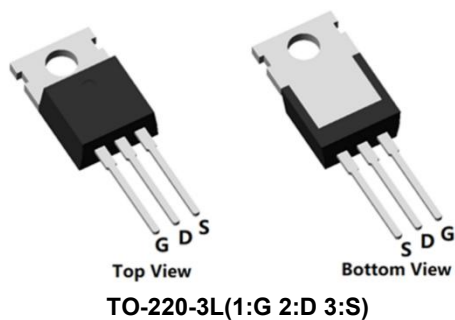
Feature

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

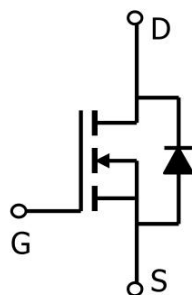
Applications

- Power switching application
- DC-DC Converter
- Power Management

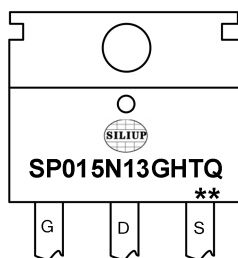
Package



Circuit diagram



Marking



SP015N13GHTQ :Product code
** :Week code

Order Information

Device	Package	Unit/Tube
SP015N13GHTQ	TO-220-3L	50

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Tc=25°C)	I_D	60	A
Continuous Drain Current (Tc=100°C)	I_D	40	A
Pulsed Drain Current	I_{DM}	240	A
Single Pulse Avalanche Energy ¹	E_{AS}	306	mJ
Power Dissipation (Tc=25°C)	P_D	160	W
Power Dissipation (Tc=100°C)	P_D	64	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.78	°C/W
Storage Temperature Range	T_{STG}	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	°C

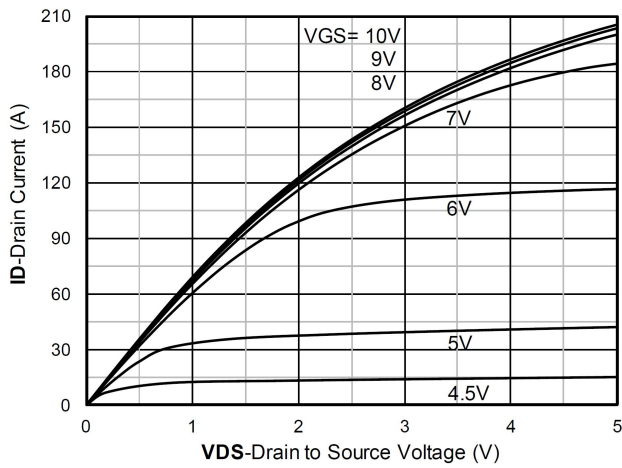
Electrical characteristics (Ta=25°C, unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	ID=250μA , VGS=0V	150	-	-	V
Drain Cut-Off Current	IDSS	VDS=120V , VGS=0V	-	-	1	μA
Gate Leakage Current	IGSS	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VDS=VGS , ID=250μA	2.8	3.2	3.8	V
Drain-Source ON Resistance	RDS(ON)	VGS=10V , ID=20A	-	13.5	16.5	mΩ
Gate Resistance	RG	VDS=75V , VGS=0V , f=1MHz	-	2.25	-	Ω
Dynamic Characteristics						
Input Capacitance	Ciss	VDS=75V , VGS=0V , f=1.0MHz	-	2230	-	pF
Output Capacitance	Coss		-	184	-	
Reverse Transfer Capacitance	Crss		-	9	-	
Total Gate Charge	Qg	VDS=75V , VGS=10V , ID=20A	-	30	-	nC
Gate-Source Charge	Qgs		-	5.8	-	
Gate-Drain Charge	Qgd		-	7	-	
Gate Plateau Voltage	Vplateau		-	4.8	-	V
Switching Characteristics						
Turn-On Delay Time	td(on)	VGS=10V , VDS=50V , ID=20A , RG=6Ω	-	13	-	nS
Rise Time	tr		-	25	-	
Turn-Off Delay Time	td(off)		-	31	-	
Fall Time	tr		-	25	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	VSD	IS=1A , VGS=0V , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	Is		-	-	60	A
Body Diode Reverse Recovery Time	Trr	IS=20A , di/dt=100A/us , TJ=25℃	-	65	-	nS
Body Diode Reverse Recovery Charge	Qrr		-	180	-	nC

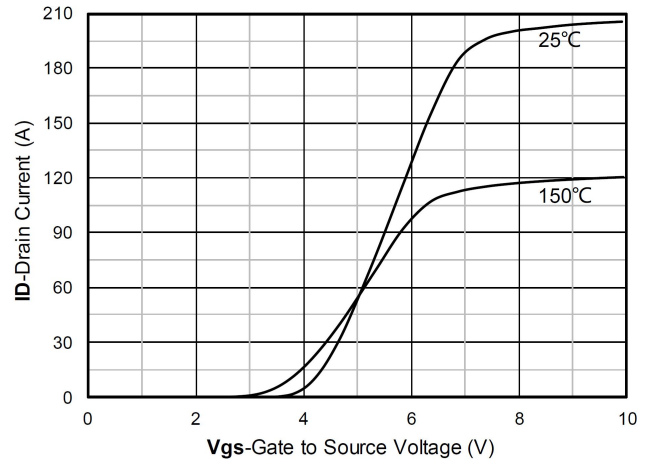
Note :

1. The test condition is $V_{DD}=50V$, $V_{GS}=10V$, $L=0.5mH$, $R_G=25\Omega$;

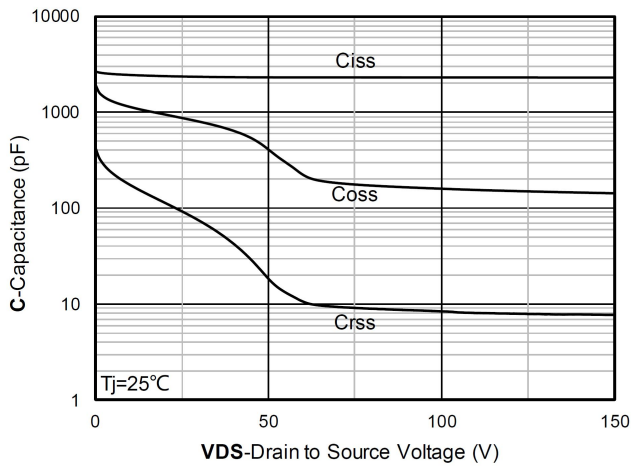
Typical Characteristic



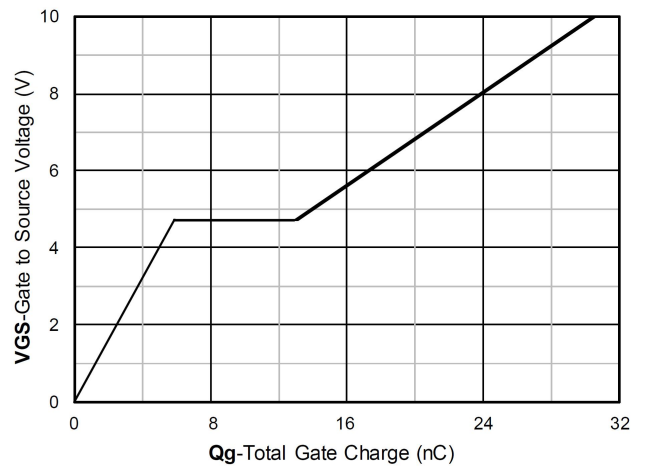
Output Characteristics



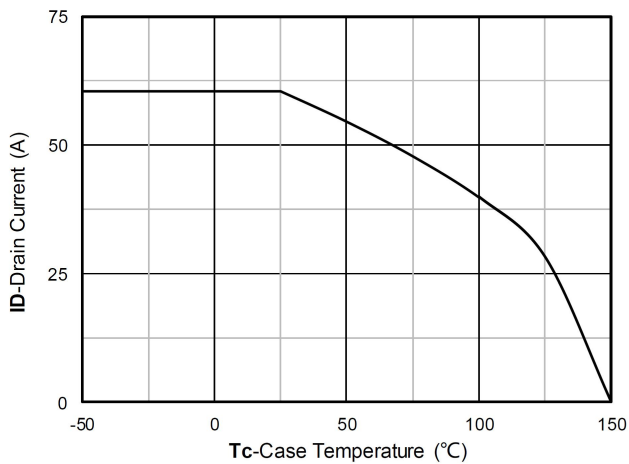
Transfer Characteristics



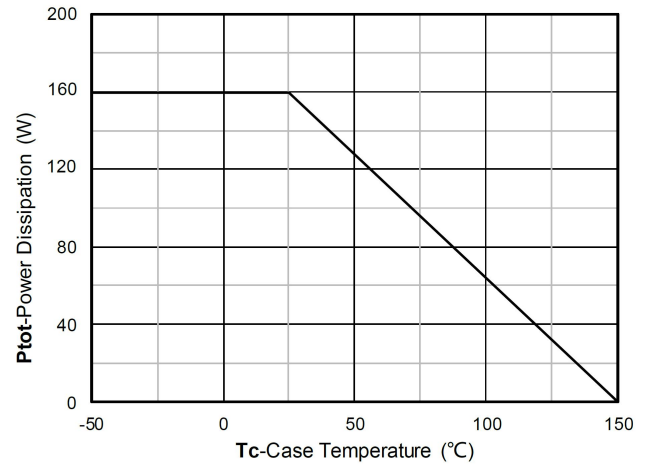
Capacitance Characteristics



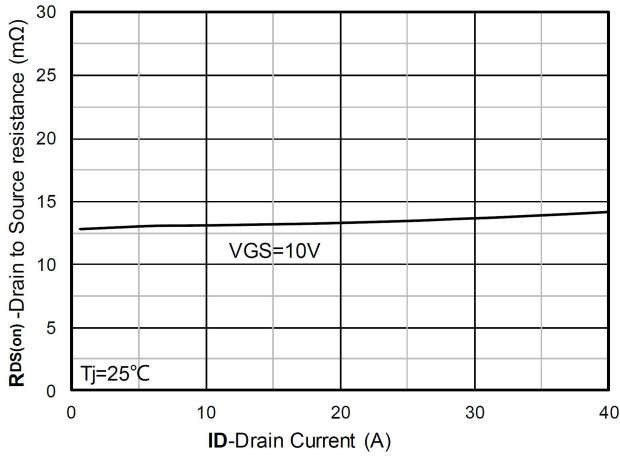
Gate Charge



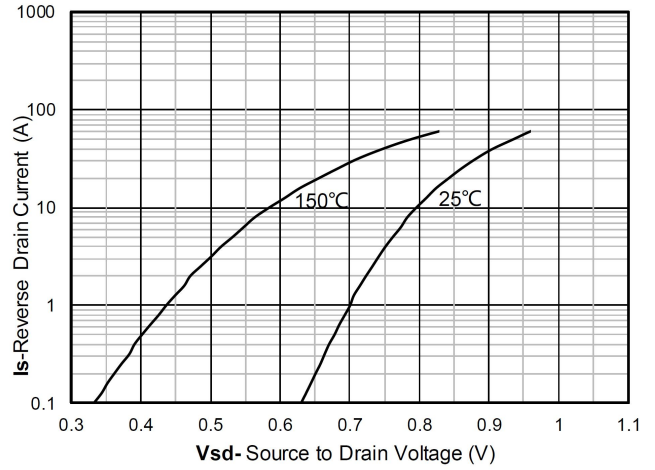
Current dissipation



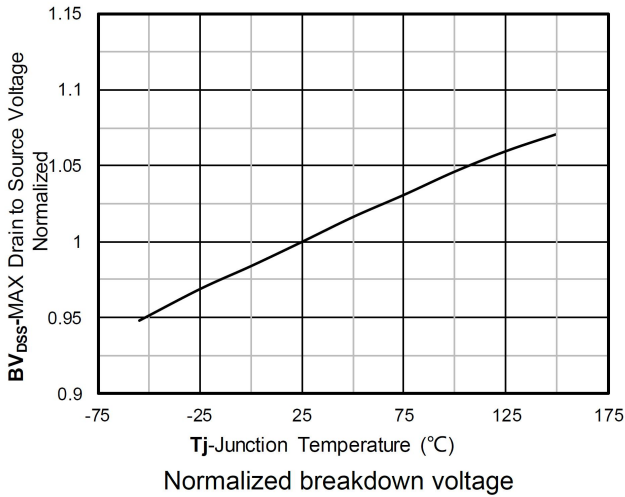
Power dissipation



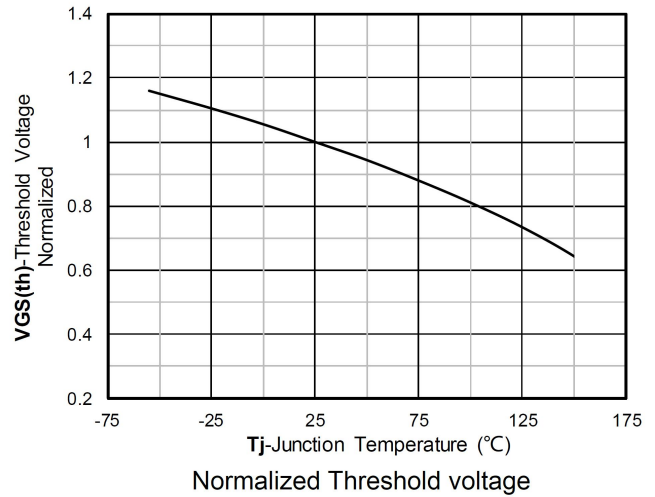
RDS(on) VS Drain Current



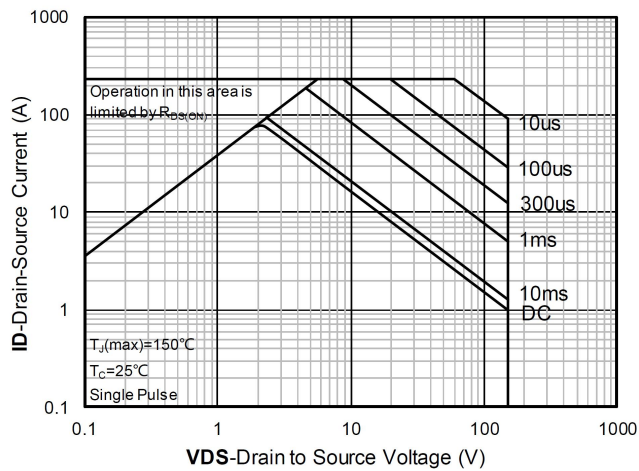
Forward characteristics of reverse diode



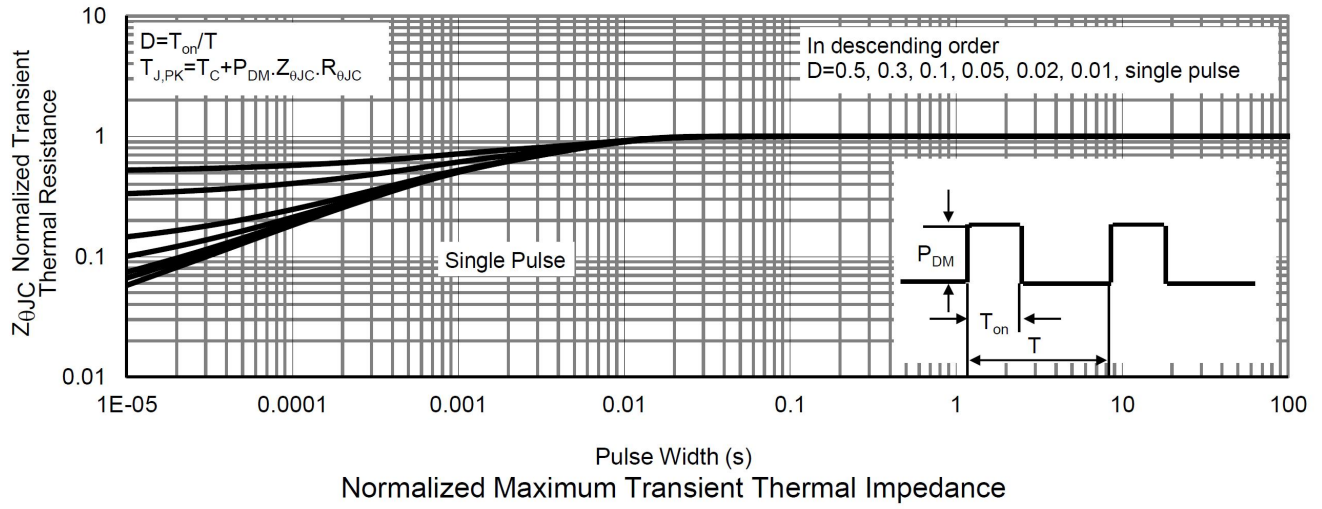
Normalized breakdown voltage



Normalized Threshold voltage

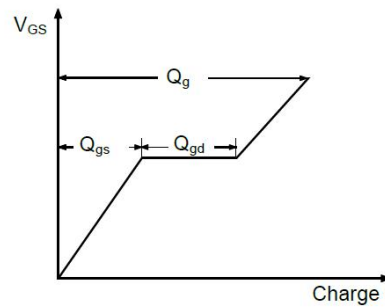
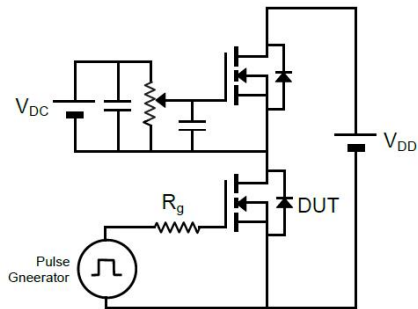


Safe Operation Area

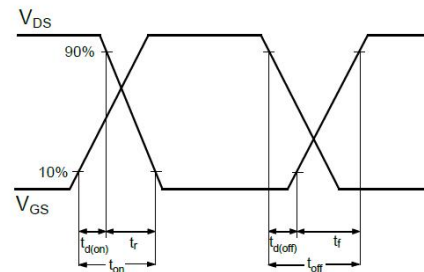
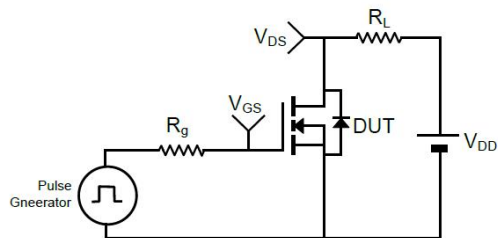


Test Circuit

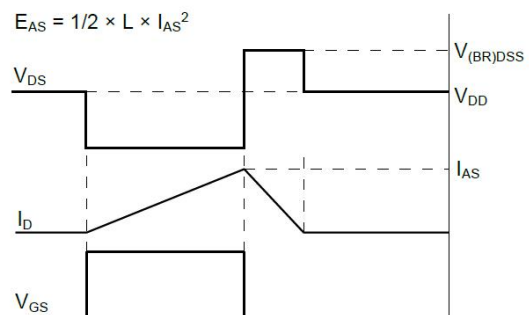
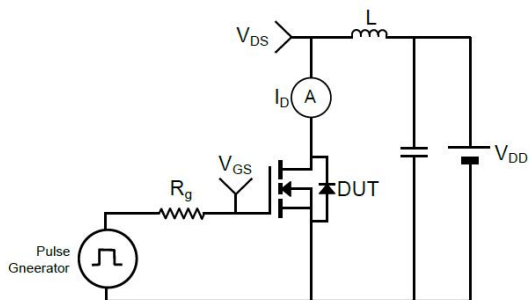
Gate Charge



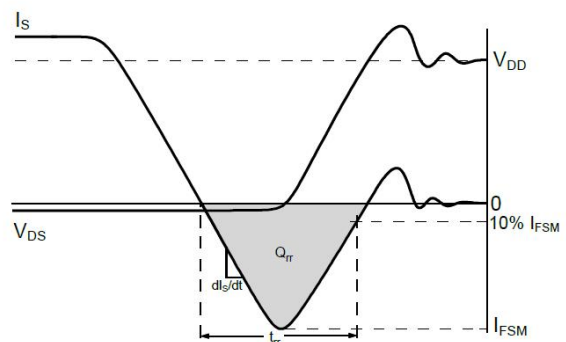
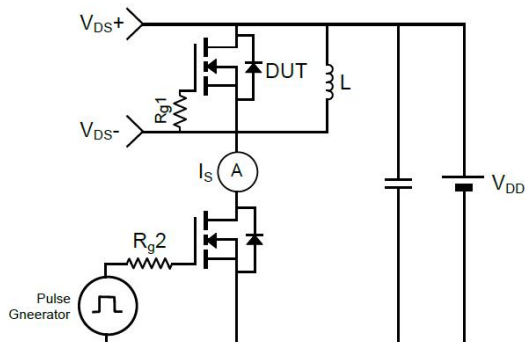
Resistive Load Switching Time



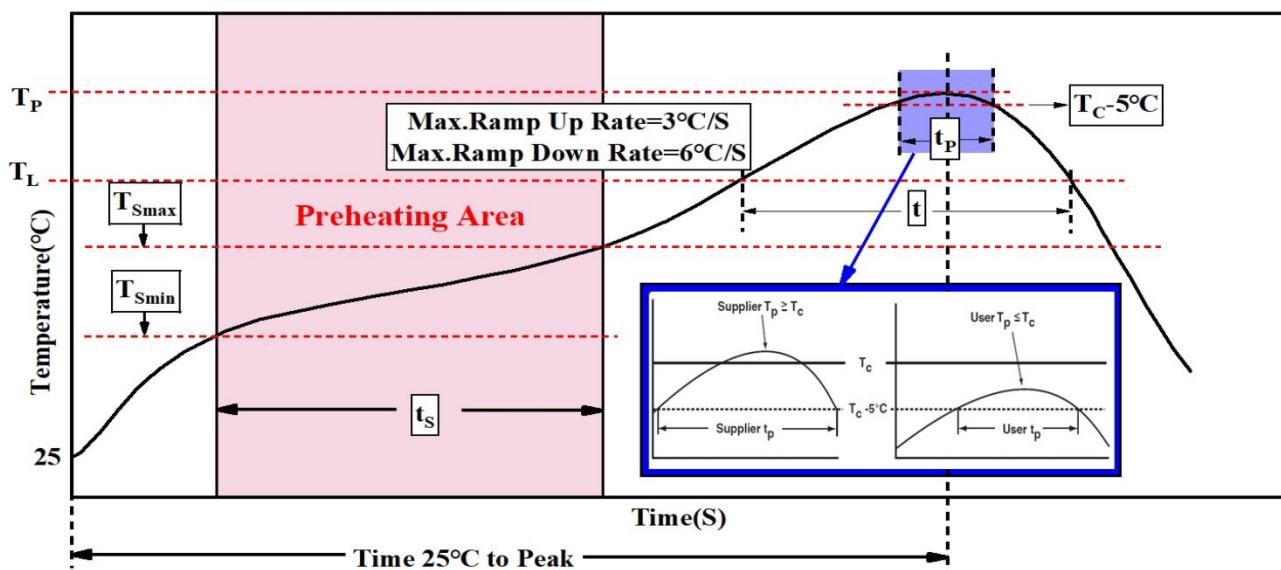
Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering



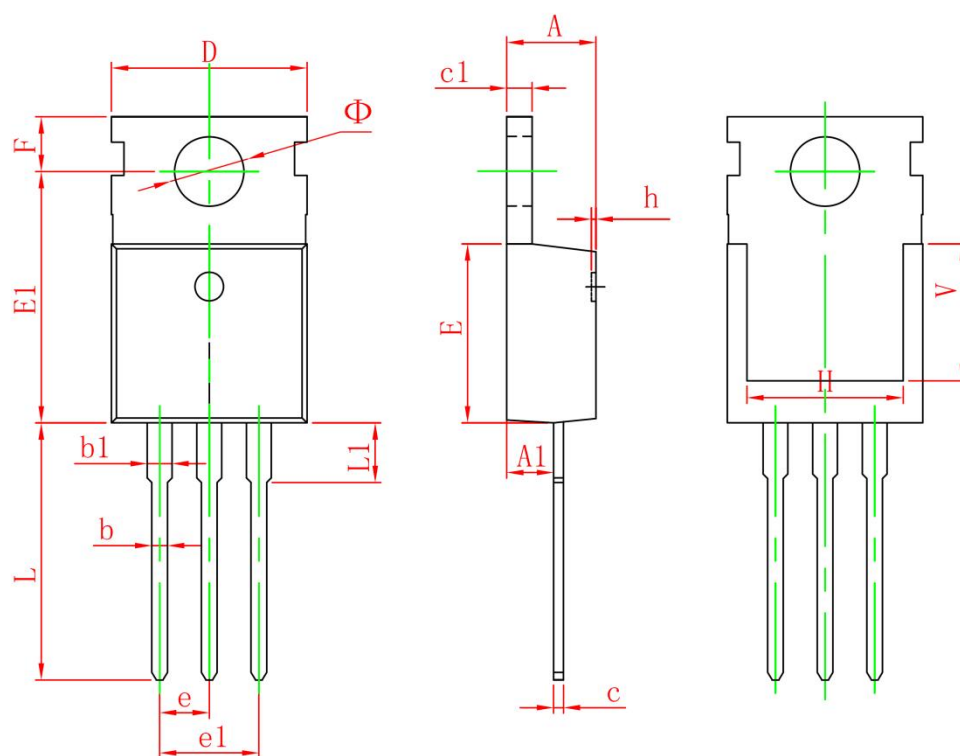
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{Smin})	100°C	150°C
Temperature max (T_{Smax})	150°C	200°C
Time (T_{Smin} to T_{Smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T_{Smax} to T_P)	3 °C/second max.	3°C/second max.
Liquidous temperature (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-220-3L Package Information


Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.300	4.700
A1	2.200	2.500
b	0.700	0.900
b1	1.100	1.400
c	0.300	0.700
c1	1.200	1.400
D	9.800	10.200
E	9.000	9.400
E1	12.700	13.500
e	2.490	2.590
e1	4.980	5.180
F	2.650	2.950
H	7.600	8.400
h	0.000	0.300
L	12.700	13.500
L1	2.850	3.250
V	6.900 REF.	
Φ	3.400	3.800