

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
250V	16mΩ@10V	90A



合肥矽普半导体

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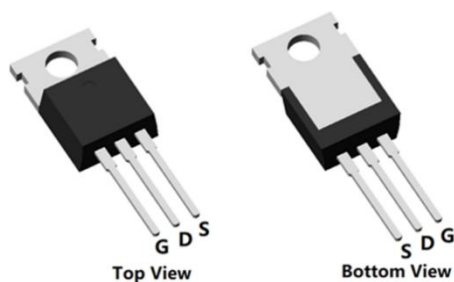
Feature

- Fast Switching
- Low Gate Charge and Rdson
- **100% UIS TESTED**

Applications

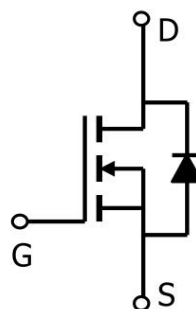
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

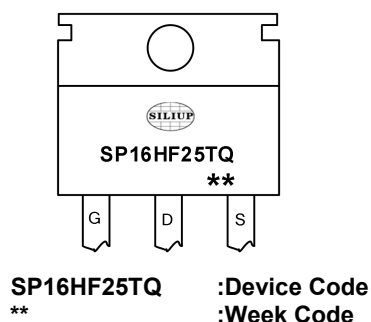


TO-220-3L(1:G 2:D 3:S)

Circuit diagram



Marking



Order Information

Device	Package	Unit/Tube
SP16HF25TQ	TO-220-3L	50

Absolute maximum ratings (Ta=25°C, 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°C)	I_D	90	A
Continuous Drain Current (Tc=100°C)	I_D	60	A
Pulsed Drain Current	I_{DM}	360	A
Single Pulse Avalanche Energy ¹	E_{AS}	720	mJ
Power Dissipation (Tc=25°C)	P_D	500	W
Power Dissipation (Tc=100°C)	P_D	200	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.25	°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

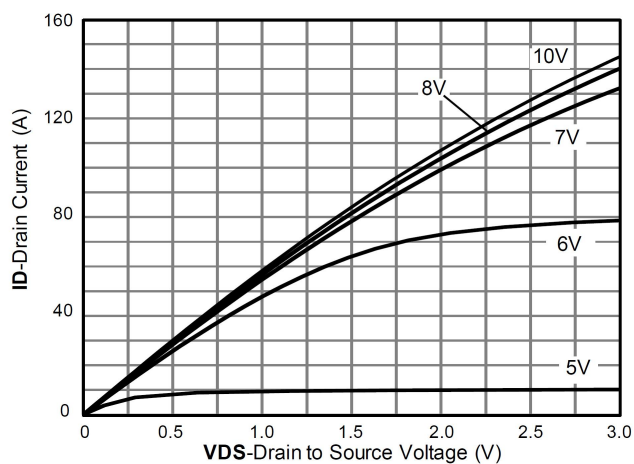
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	ID=250uA , VGS=0V	250	285	-	V
Drain-Source Leakage Current	IDSS	VDS=200V , VGS=0V , TJ=25℃	-	-	1	uA
Gate-Source Leakage Current	IGSS	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VGS=VDS , ID=250uA	2.5	3.5	4.5	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=10V , ID=20A	-	16	20	mΩ
Gate Resistance	RG	f=1MHz	-	2.4	-	Ω
Dynamic characteristics						
Input Capacitance	Ciss	VDS=50V , VGS=0V , f=1MHz	-	3080	-	pF
Output Capacitance	Coss		-	138	-	
Reverse Transfer Capacitance	Crss		-	2.8	-	
Total Gate Charge	Qg	VDS=200V , VGS=10V , ID=40A	-	48	-	nC
Gate-Source Charge	Qgs		-	12.5	-	
Gate-Drain Charge	Qgd		-	10.2	-	
Gate Plateau Voltage	Vplateau		-	4.5	-	V
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD=200V , VGS=10V , RG=5Ω , ID=40A	-	46	-	nS
Rise Time	Tr		-	58	-	
Turn-Off Delay Time	Td(off)		-	78	-	
Fall Time	Tf		-	7	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	90	A
Reverse recover time	Trr	IS=20A , di/dt=100A/us , TJ=25℃	-	86	-	nS
Reverse recovery charge	Qrr		-	0.2	-	uC

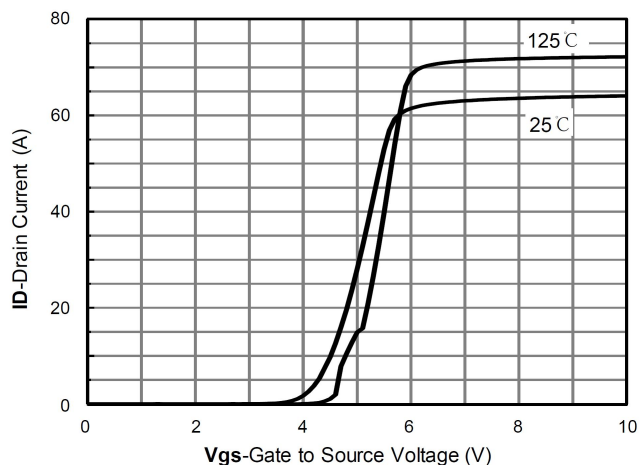
Note :

1. The test condition is $V_{DD}=100V$, $V_{GS}=10V$, $L=10mH$, $R_G=25\Omega$;

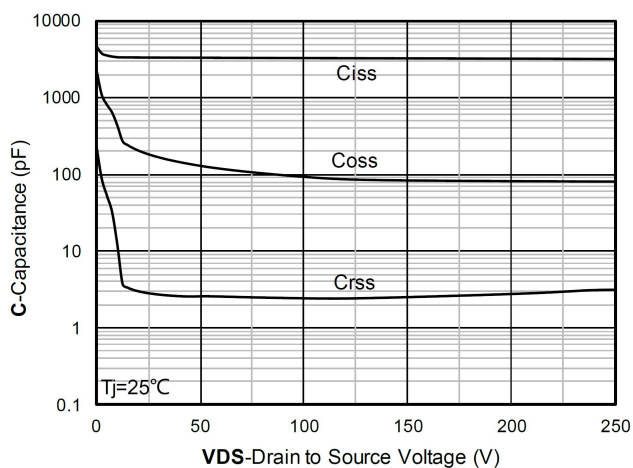
Typical Characteristics



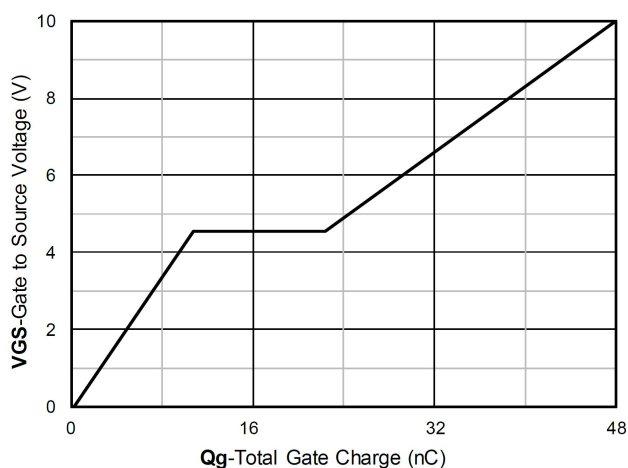
Output Characteristics



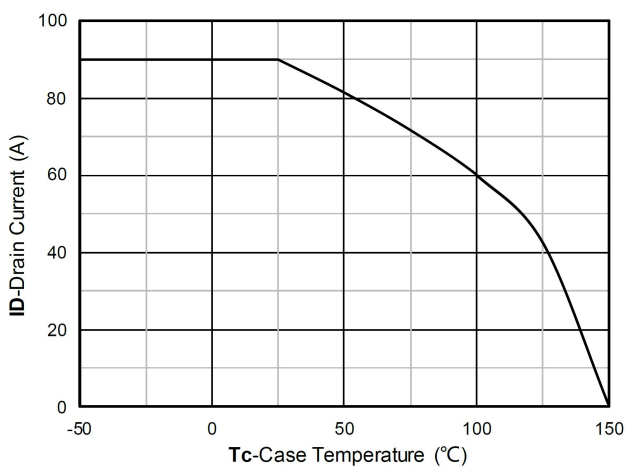
Transfer Characteristics



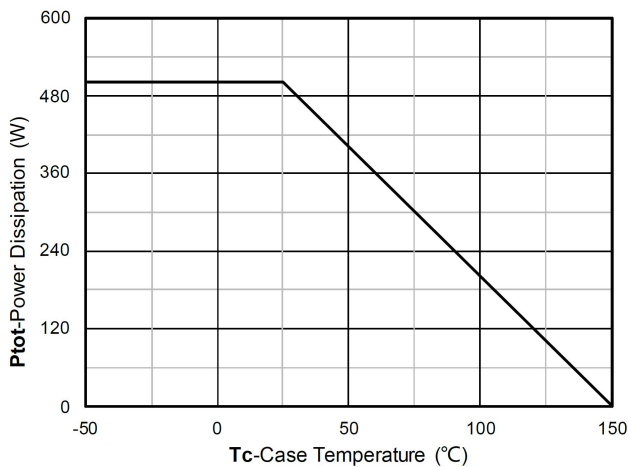
Capacitance Characteristics



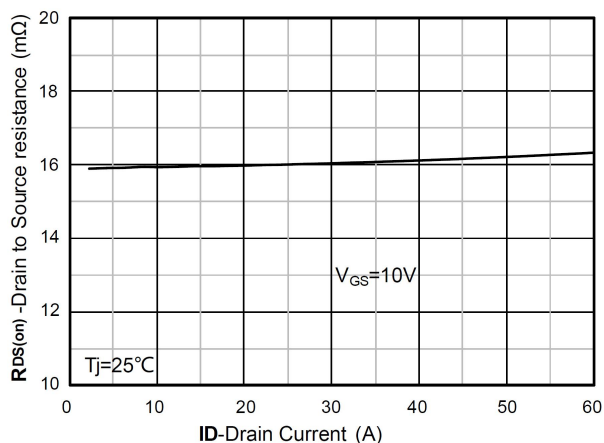
Gate Charge



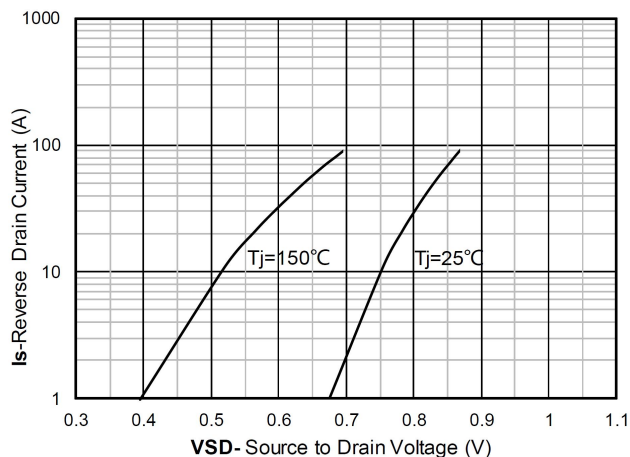
Current dissipation



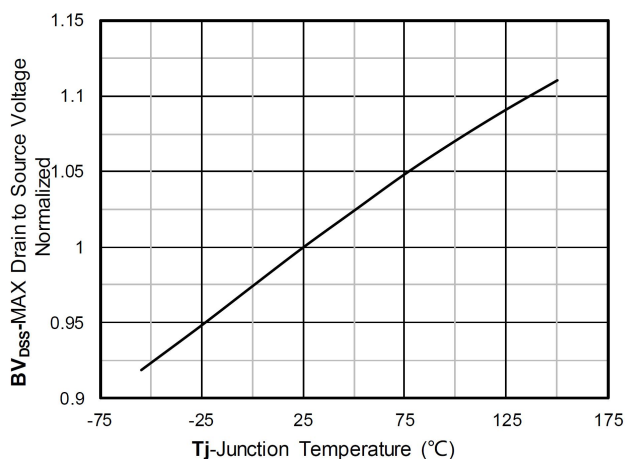
Power dissipation



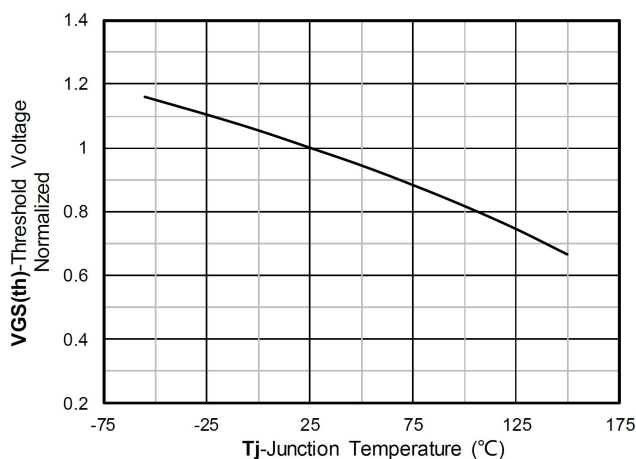
RDS(on) VS Drain Current



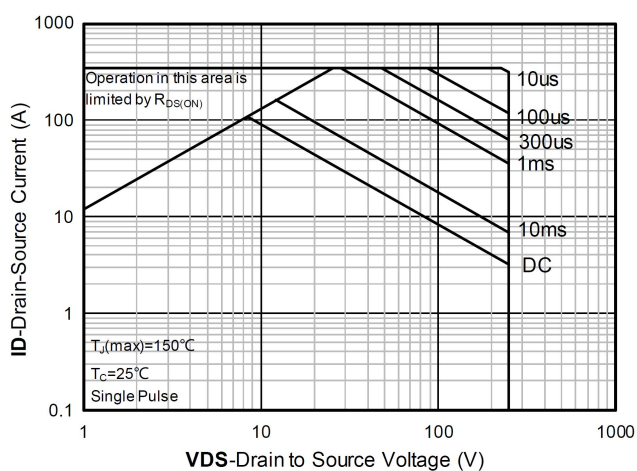
Forward characteristics of reverse diode



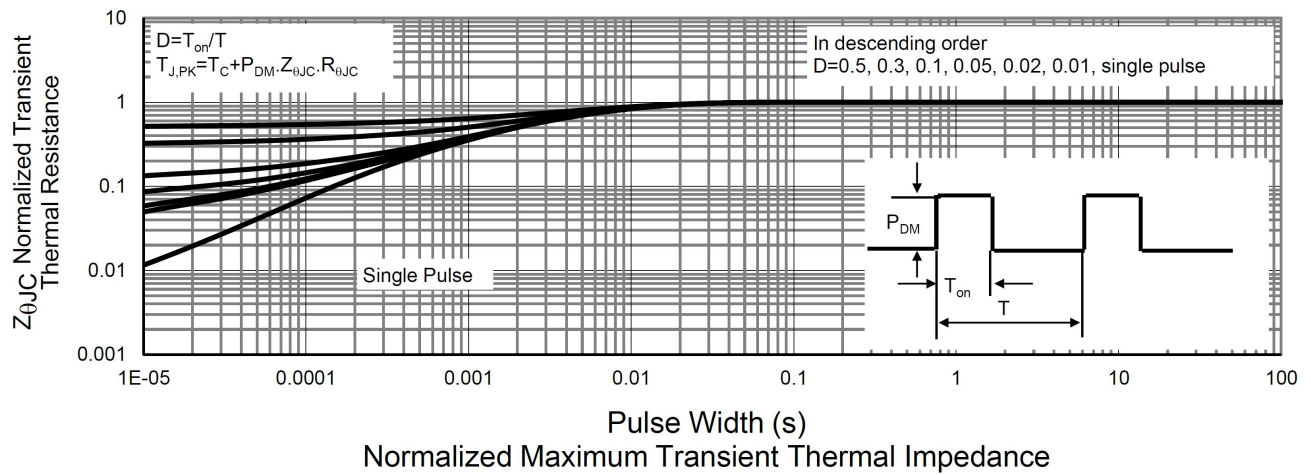
Normalized breakdown voltage



Normalized Threshold voltage

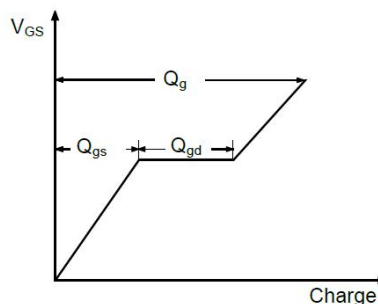
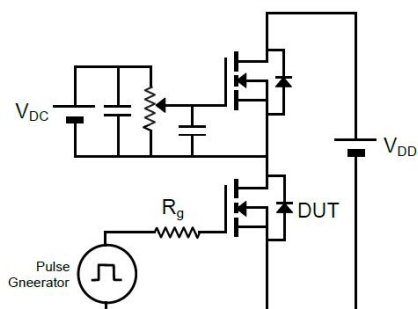


Safe Operation Area

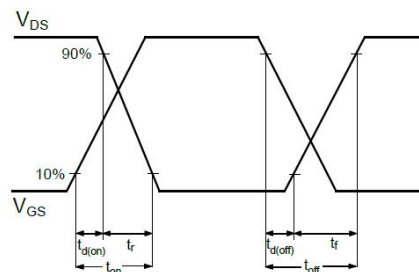
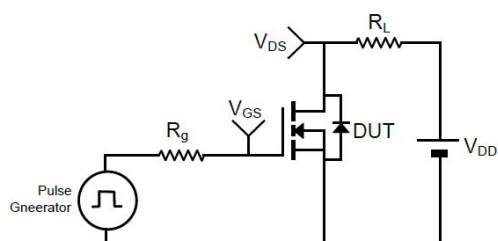


Test Circuit

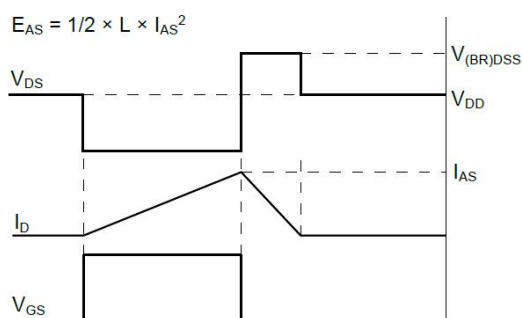
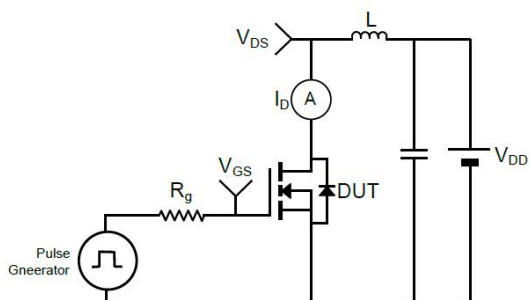
Gate Charge



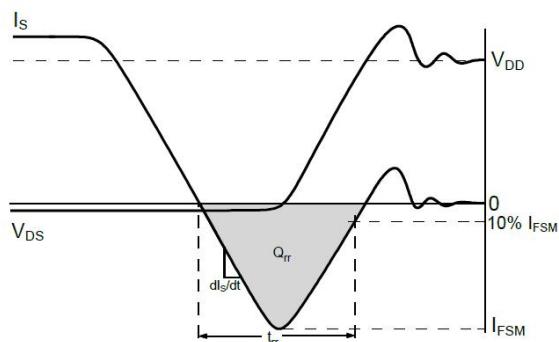
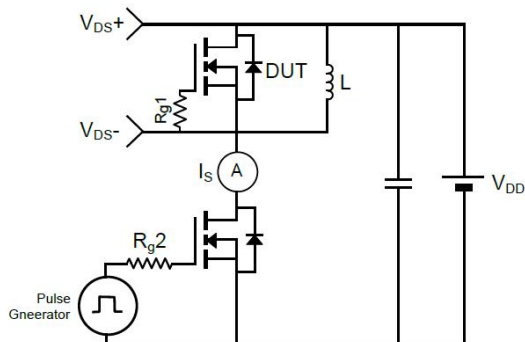
Resistive Load Switching Time



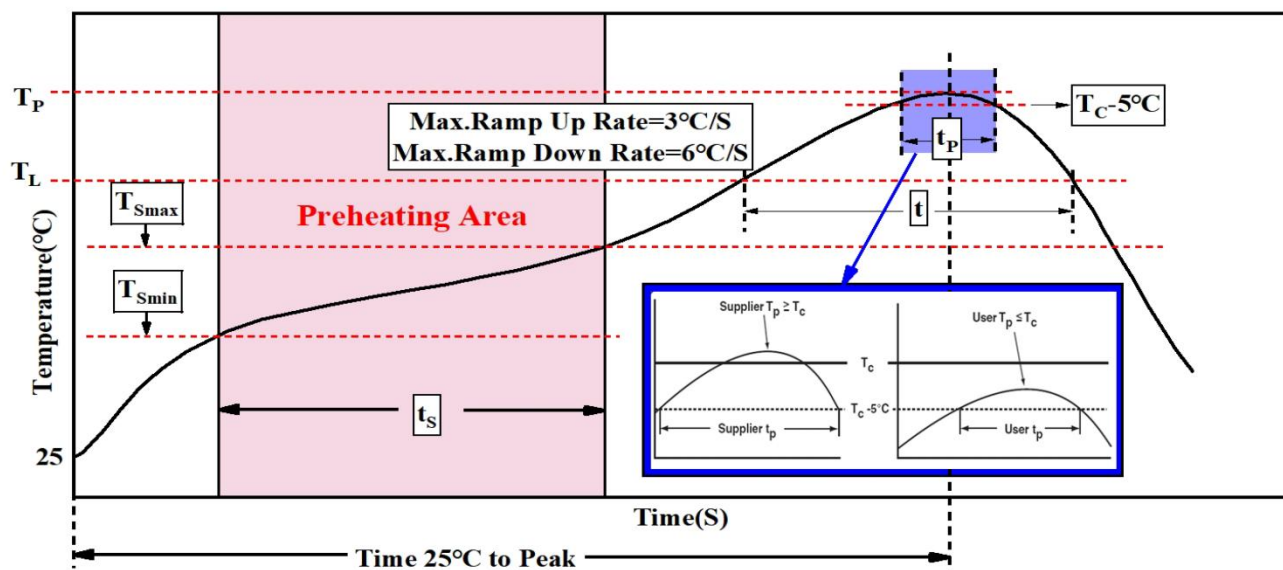
Un-clamped Inductive Load Switching



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 _{min})	100°C	150°C
Temperature max (T _{max})	150°C	200°C
Time (T _{min} to T _{max}) (t _s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T _{max} 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 _{max})	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)

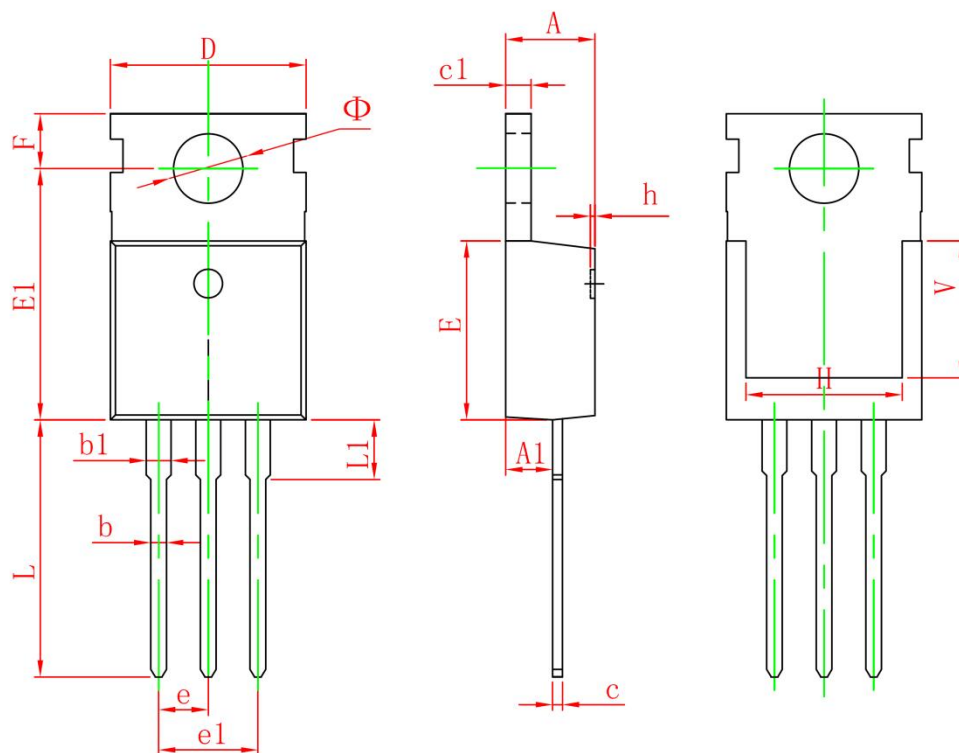
Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

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