

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
150V	6.4mΩ@10V	120A



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

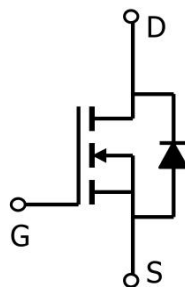
- Power switching application
- DC-DC Converter
- Power Management

Package

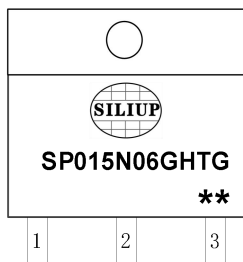


TO-220F(1:G 2:D 3:S)

Circuit diagram



Marking



SP015N06GHTG
**

:Product code
:Week code

Order Information

Device	Package	Unit/Tube
SP015N06GHTG	TO-220F	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	120	A
Continuous Drain Current (Tc=100°C)	I _D	80	A
Pulsed Drain Current	I _{DM}	480	A
Single Pulse Avalanche Energy ¹	E _{AS}	812	mJ
Power Dissipation (Tc=25°C)	P _D	34	W
Power Dissipation (Tc=100°C)	P _D	13.6	W
Thermal Resistance Junction-to-Case	R _{θJC}	3.7	°C/W
Storage Temperature Range	T _{STG}	-55 to 150	°C
Operating Junction Temperature Range	T _J	-55 to 150	°C

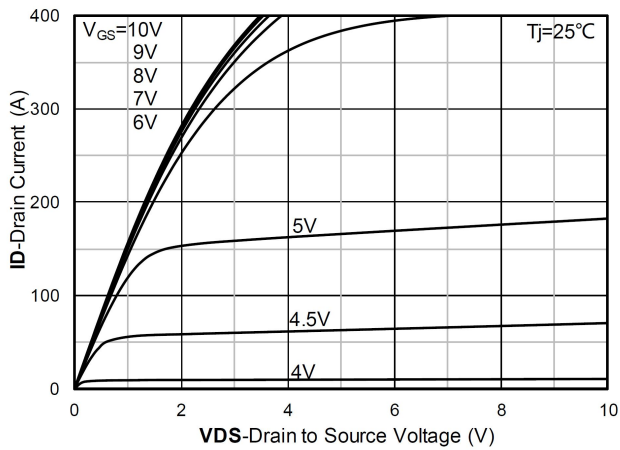
Electrical characteristics (Ta=25°C, unless otherwise noted)

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	I _{DSS}	VDS=120V , VGS=0V	-	-	1	μA
Gate Leakage Current	I _{GSS}	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	VDS=VGS , ID=250μA	2.8	3.2	3.8	V
Drain-Source ON Resistance	R _{DS(ON)}	VGS=10V , ID=20A	-	6.4	8.7	mΩ
Gate Resistance	R _G	VDS=75V , VGS=0V , f=1MHz	-	2.2	-	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	VDS=75V , VGS=0V , f=1.0MHz	-	5240	-	pF
Output Capacitance	C _{oss}		-	430	-	
Reverse Transfer Capacitance	C _{rss}		-	14	-	
Total Gate Charge	Q _g	VDS=75V , VGS=10V , ID=104A	-	70	-	nC
Gate-Source Charge	Q _{gs}		-	25	-	
Gate-Drain Charge	Q _{gd}		-	19	-	
Gate Plateau Voltage	V _{plateau}		-	4.5	-	V
Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	VGS=10V , VDS=75V , ID=104A , RG=6Ω	-	24	-	nS
Rise Time	t _r		-	35	-	
Turn-Off Delay Time	t _{d(off)}		-	46	-	
Fall Time	t _f		-	15	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V _{SD}	IS=1A , VGS=0V , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	I _S		-	-	120	A
Body Diode Reverse Recovery Time	T _{rr}	IS=50A , di/dt=100A/us , TJ=25℃	-	98	-	nS
Body Diode Reverse Recovery Charge	Q _{rr}		-	217	-	nC

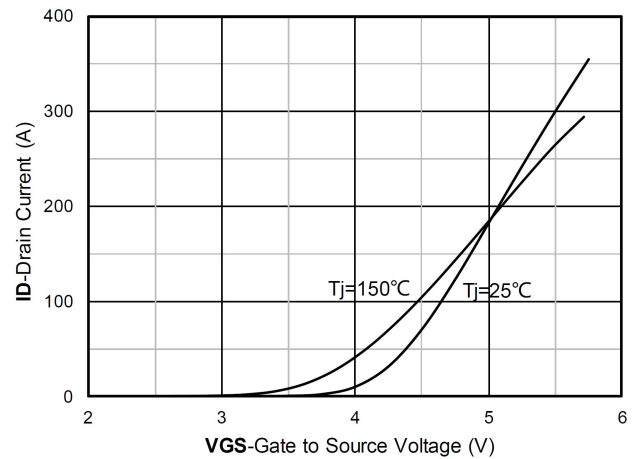
Note :

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

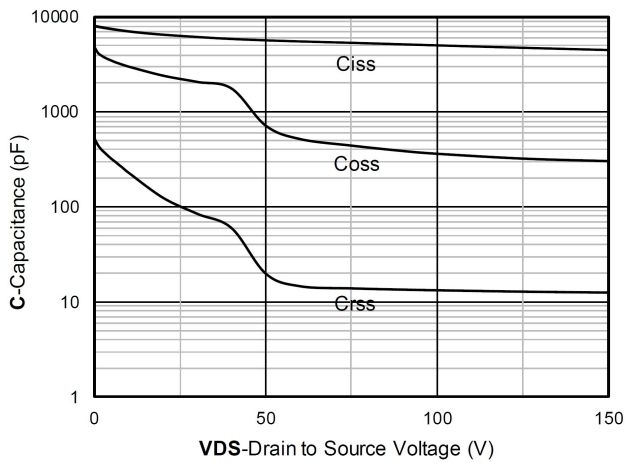
Typical Characteristics



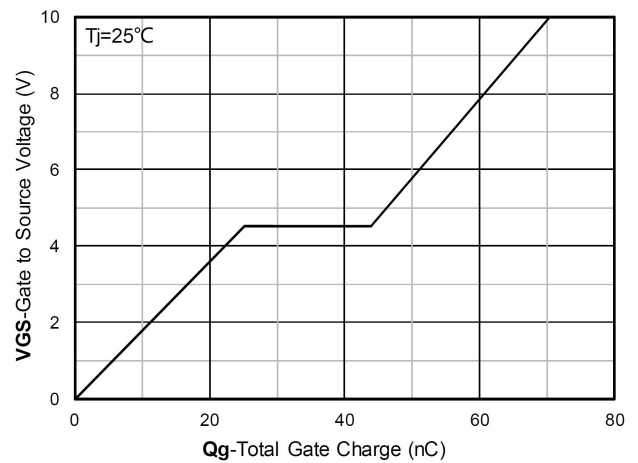
Output Characteristics



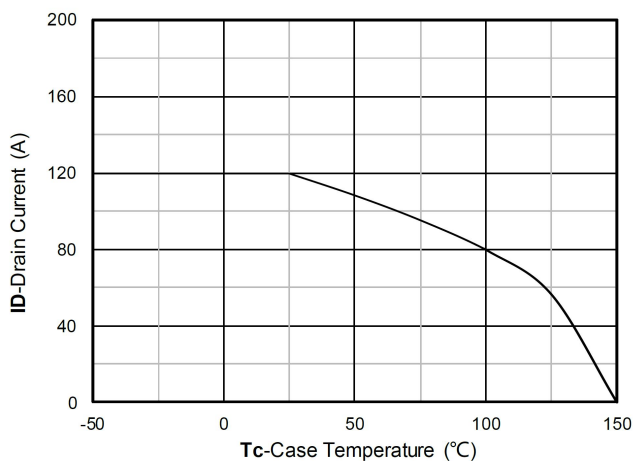
Transfer Characteristics



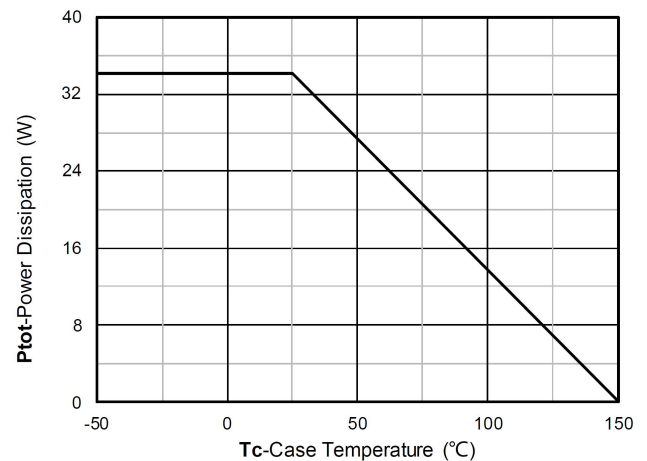
Capacitance Characteristics



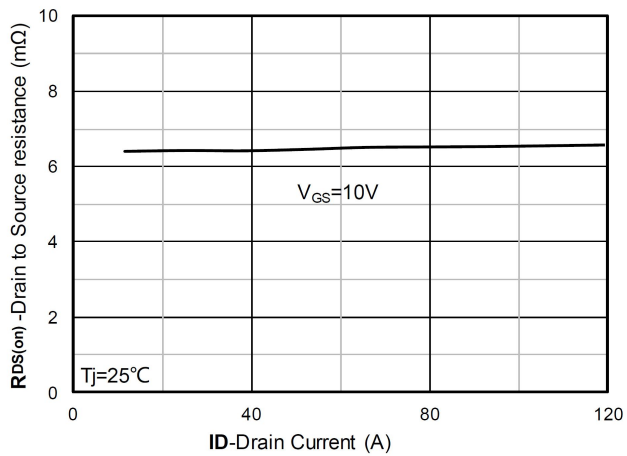
Gate Charge



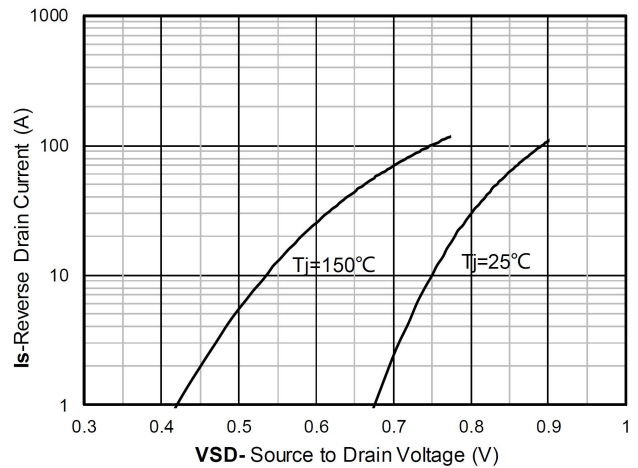
Current dissipation



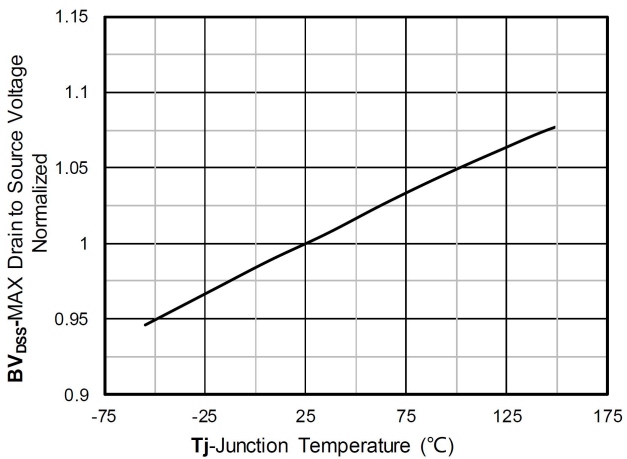
Power dissipation



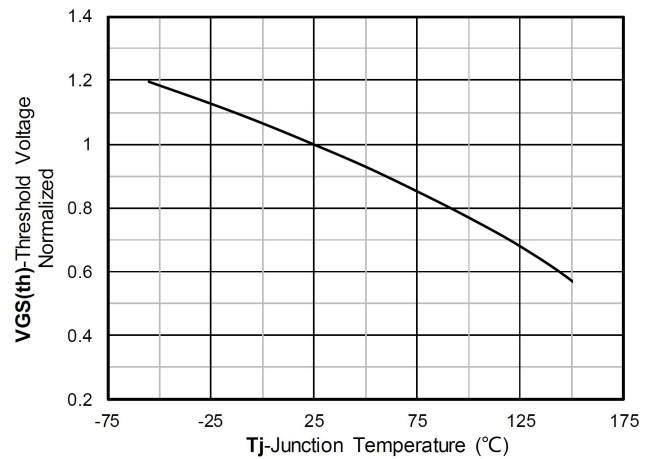
RDS(on) VS Drain Current



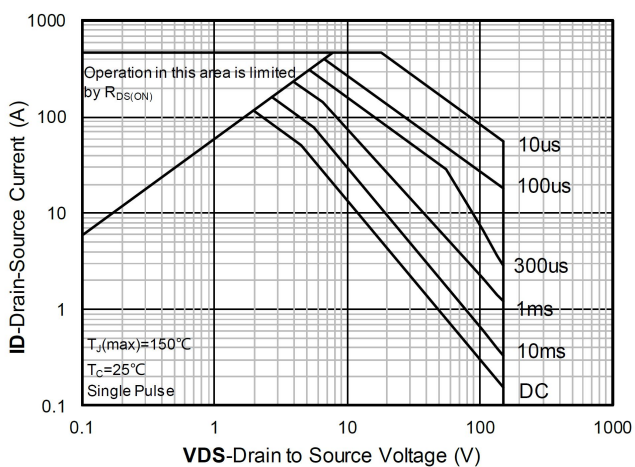
Forward characteristics of reverse diode



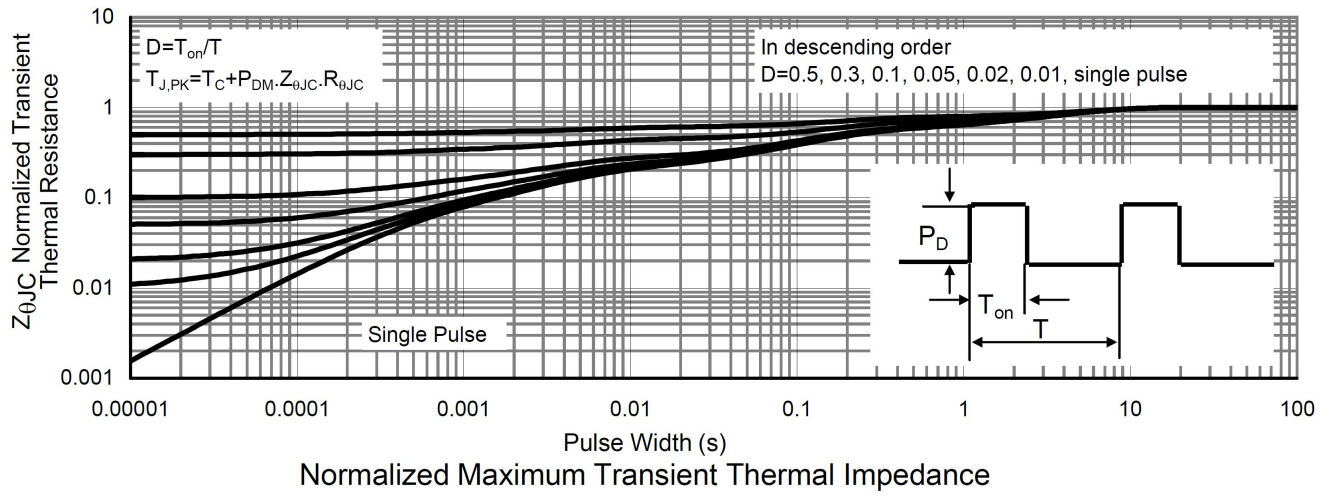
Normalized breakdown voltage



Normalized Threshold voltage

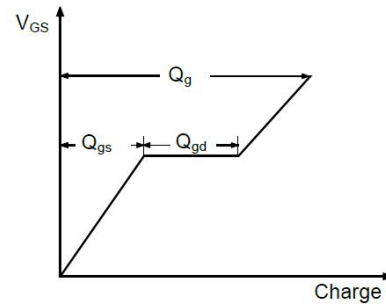
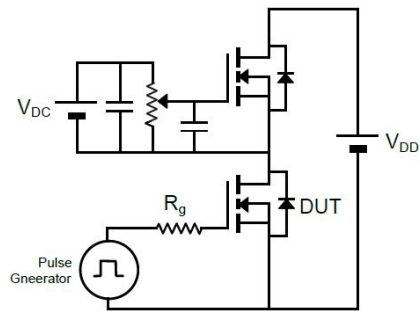


Safe Operation Area

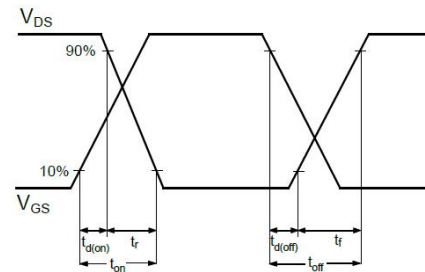
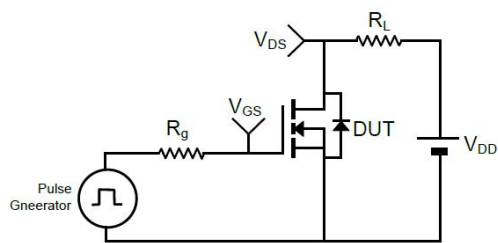


Test Circuit

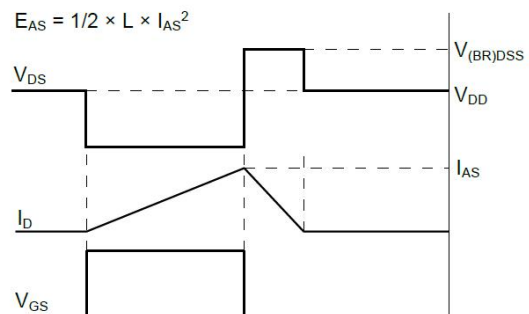
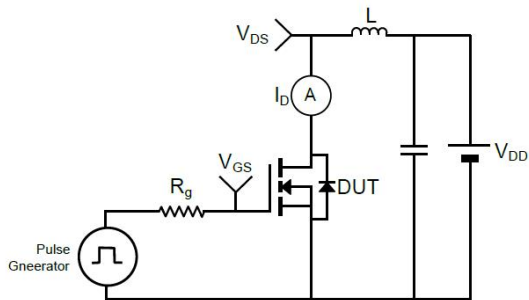
Gate Charge



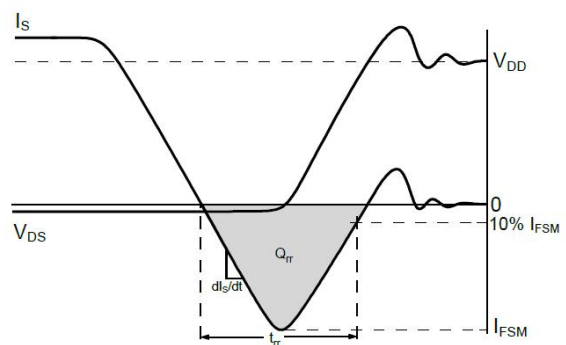
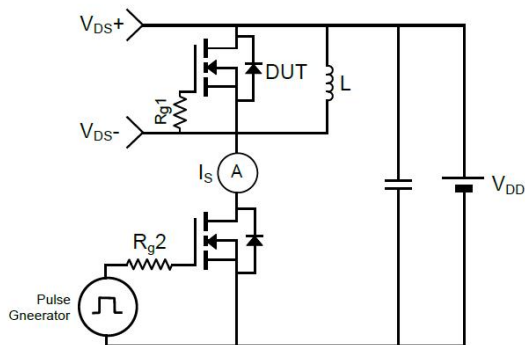
Resistive Load Switching Time



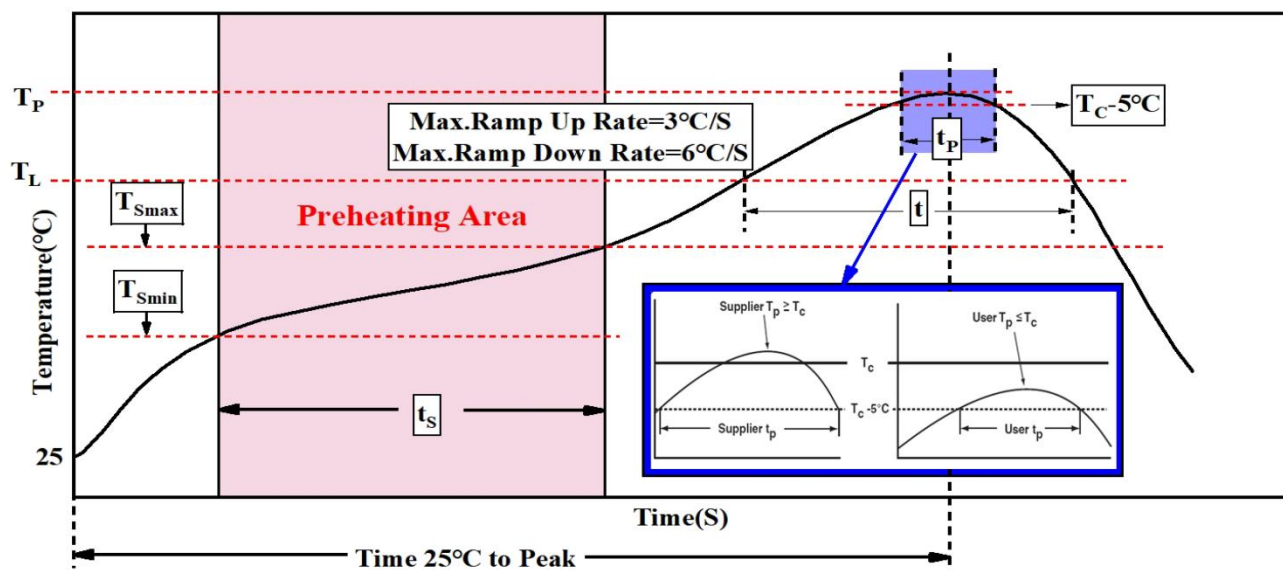
Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering



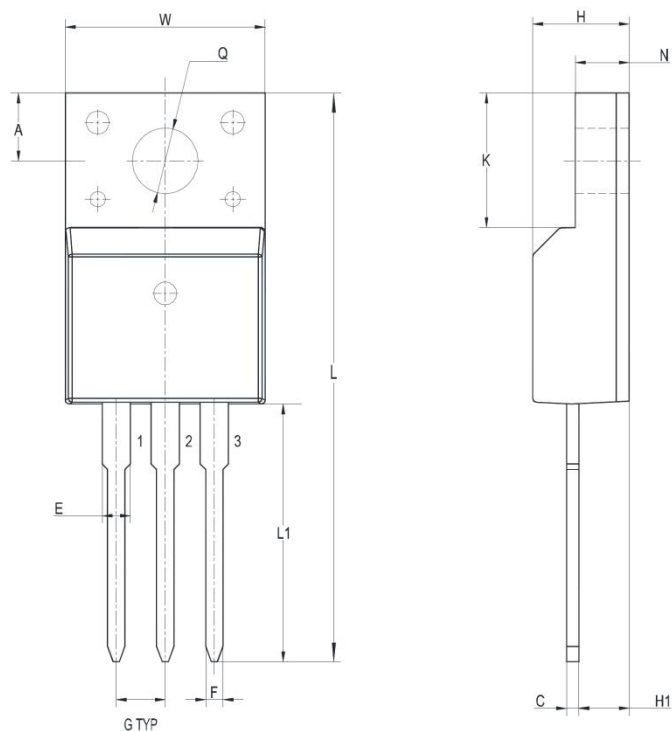
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{Smin})	100°C	150°C
Temperature max (T_{Smax})	150°C	200°C
Time (T_{Smin} to T_{Smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T_{Smax} to T_P)	3 °C/second max.	3°C/second max.
Liquidous temperature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


Symbol	Dimensions In Millimeters	
	Min.	Max.
A	2.80	3.50
C	0.40	0.60
E	1.15	1.45
F	0.70	0.90
G	2.54 TYP.	
W	9.50	10.50
H	4.50	4.90
H1	2.50	2.95
Q	2.90	3.55
L	28.00	29.50
L1	12.50	13.50
K	6.20	6.77
N	2.30	2.80