

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
85V	$3.8m\Omega@10V$	160A



合肥矽普半导体

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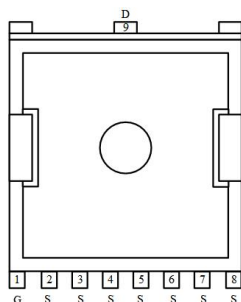
Feature

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

Applications

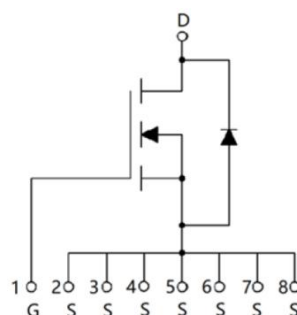
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

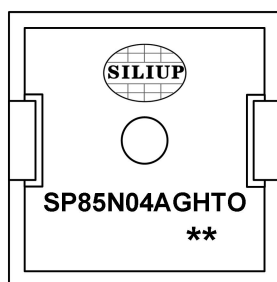


TOLL-8L

Circuit diagram



Marking



SP85N04AGHTO : Product code
****** : Week code

Order Information

Device	Package	Unit/Tape
SP85N04AGHTO	TOLL-8L	2000

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V _{DSS}	85	V
Gate-Source Voltage	V _{GSS}	±20	V
Continuous Drain Current (Tc=25°C)	I _D	160	A
Continuous Drain Current (Tc=100°C)	I _D	107	A
Pulse Drain Current Tested	I _{DM}	640	A
Single Pulse Avalanche Energy ¹	E _{AS}	646	mJ
Power Dissipation (Tc=25°C)	P _D	246	W
Power Dissipation (Tc=100°C)	P _D	98.4	W
Thermal Resistance Junction-to-Case	R _{θJC}	0.51	°C/W
Maximum Junction Temperature	T _J	-55 to 150	°C
Storage Temperature Range	T _{STG}	-55 to 150	°C

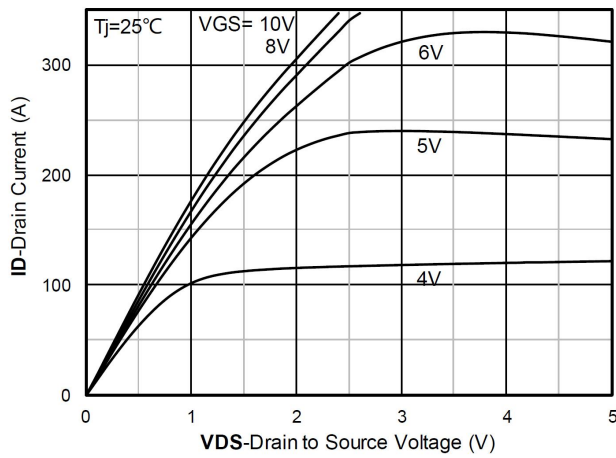
Electrical characteristics (Ta=25°C, unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	ID = 250μA, VGS = 0V	85	-	-	V
Zero Gate Voltage Drain Current	IDSS	VDS = 68V, VGS = 0V	-	-	1	uA
Gate Leakage Current	IGSS	VGS = ±20V, VDS = 0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VDS = VGS, ID = 250μA	2.6	3.0	3.4	V
Drain-Source On-state Resistance	RDS(ON)	VGS = 10V, ID = 50A	-	3.8	5.1	mΩ
Gate Resistance	RG	VDS=40V , VGS=0V , f=1MHz	-	2.0	-	Ω
Dynamic Characteristics						
Input Capacitance	Ciss	VGS=0V, VDS=40V,F=1MHz	-	3444	-	pF
Output Capacitance	Coss		-	760	-	
Reverse Transfer Capacitance	Crss		-	33	-	
Total Gate Charge	Qg	VDS=40V, VGS=10V, ID=50A	-	56	-	nC
Gate-Source Charge	Qgs		-	18.2	-	
Gate-Drain Charge	Qgd		-	15	-	
Gate Plateau Voltage	Vplateau		-	4.7	-	V
Switching Characteristics						
Turn-On Delay Time	td(on)	VDD=40V, ID=50A, VGS=10V, RG=3Ω	-	17	-	nS
Rise Time	tr		-	39	-	
Turn-Off Delay Time	td(off)		-	64	-	
Fall Time	tf		-	42	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	160	A
Reverse Recovery Time	Trr	IS=50 A,di/dt=100 A/μs, TJ=25℃	-	45	-	nS
Reverse Recovery Charge	Qrr		-	56	-	nC

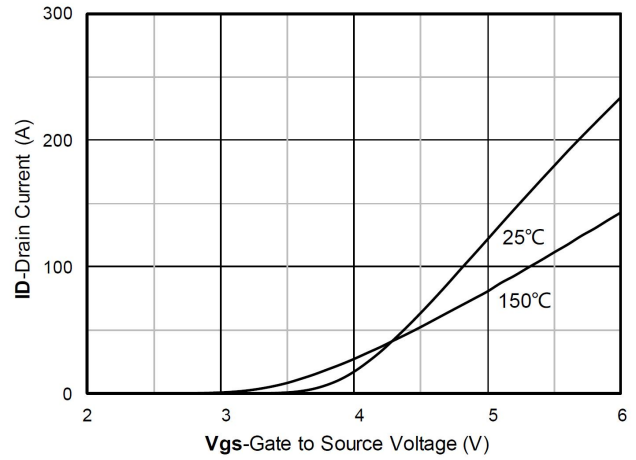
Note :

1. The test condition is VDD=40V, VGS=10V, L=0.5mH, RG=25Ω;

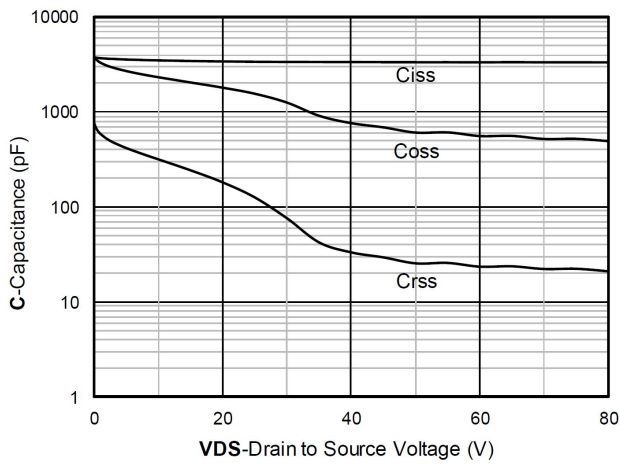
Typical Characteristics



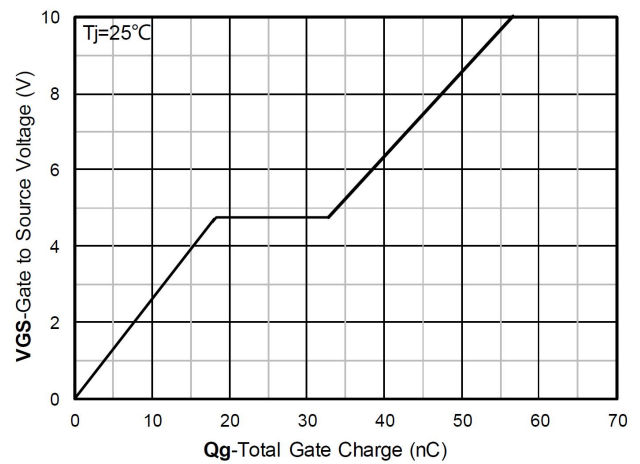
Output Characteristics



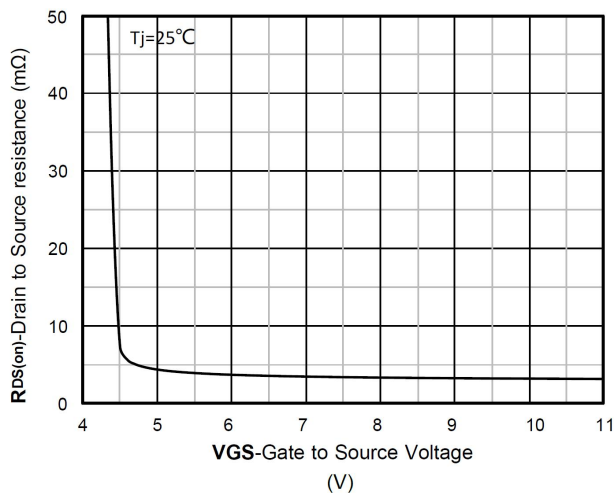
Transfer Characteristics



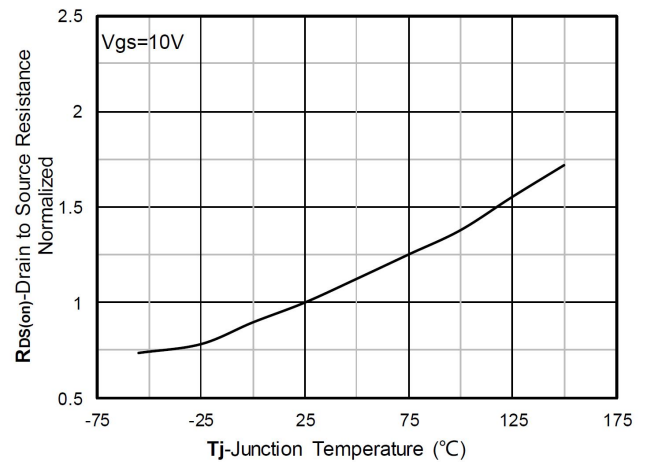
Capacitance Characteristics



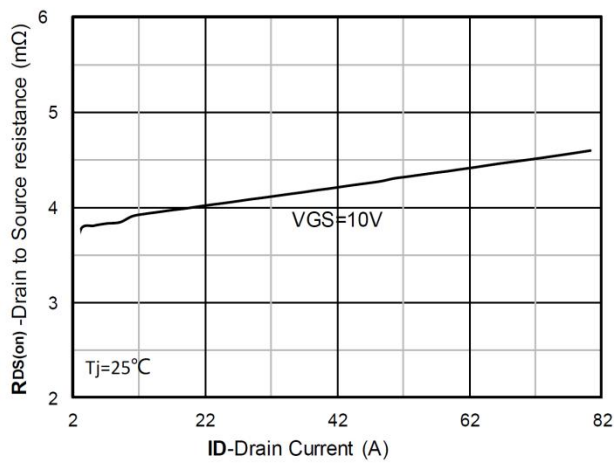
Gate Charge



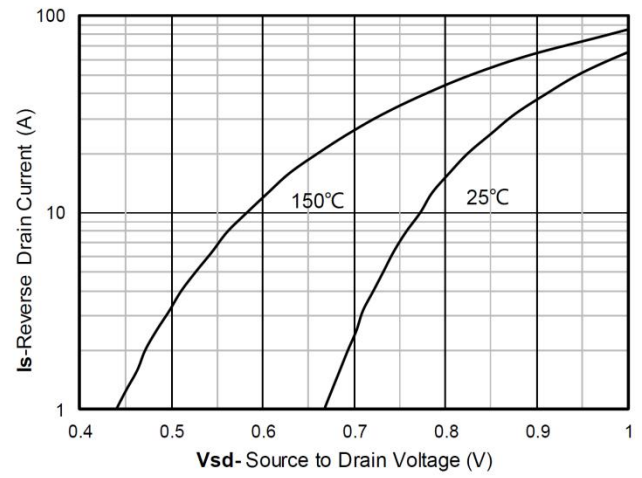
On-Resistance vs Gate to Source Voltage



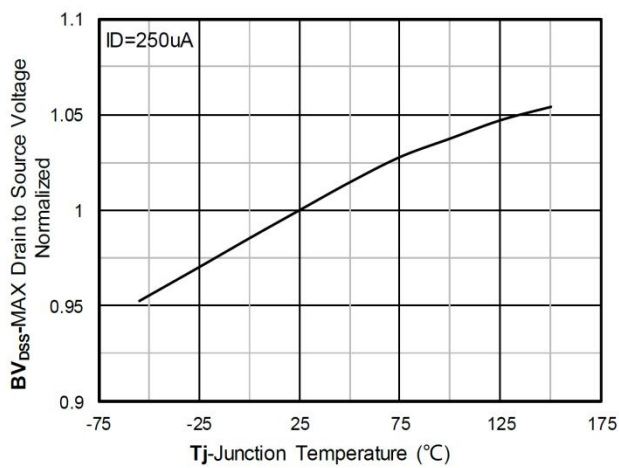
Normalized On-Resistance



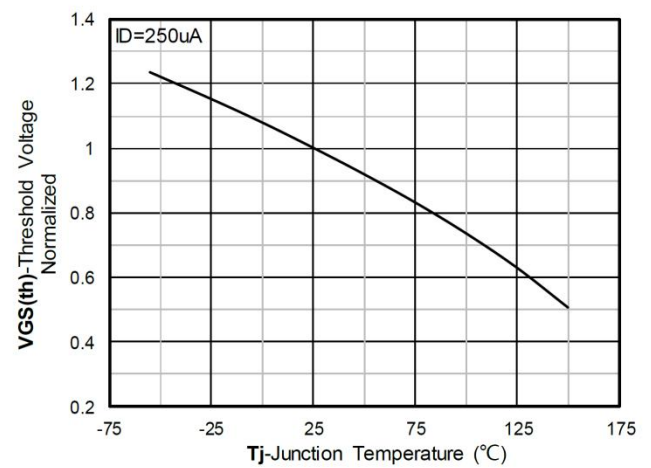
RDS(on) VS Drain Current



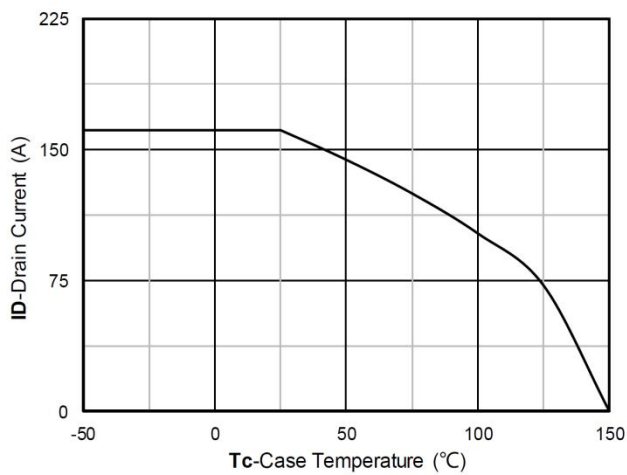
Forward characteristics of reverse diode



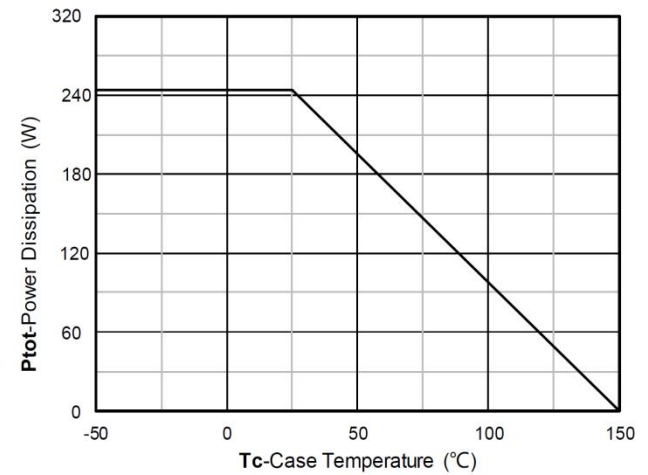
Normalized breakdown voltage



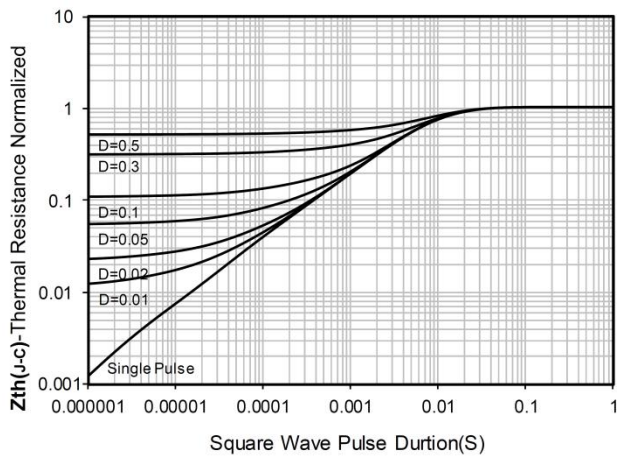
Normalized Threshold voltage



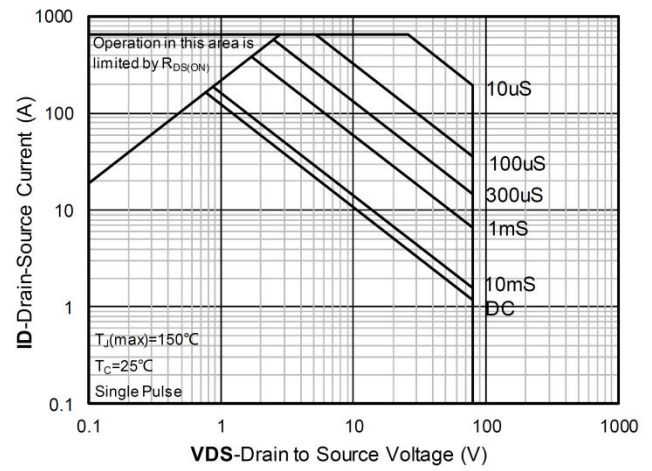
Current dissipation



Power dissipation



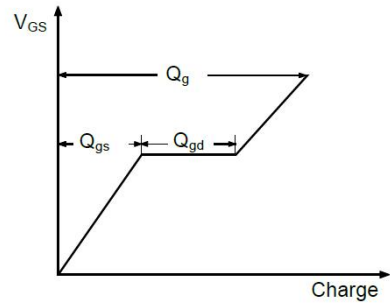
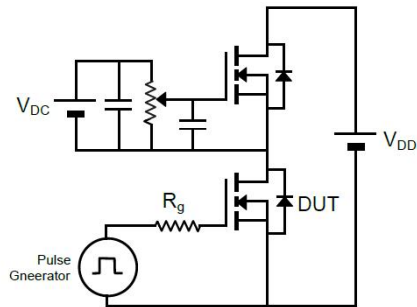
Normalized Maximum Transient Thermal Impedance



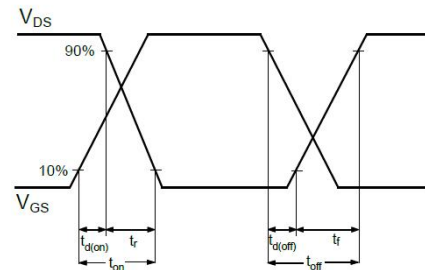
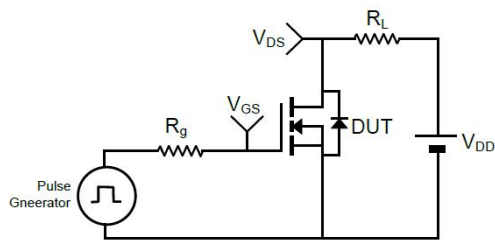
Safe Operation Area

Test Circuit

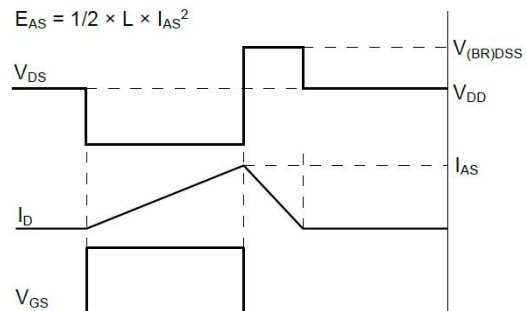
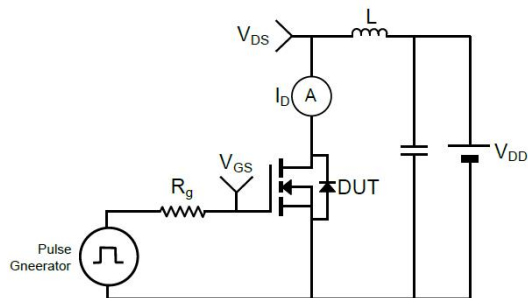
Gate Charge



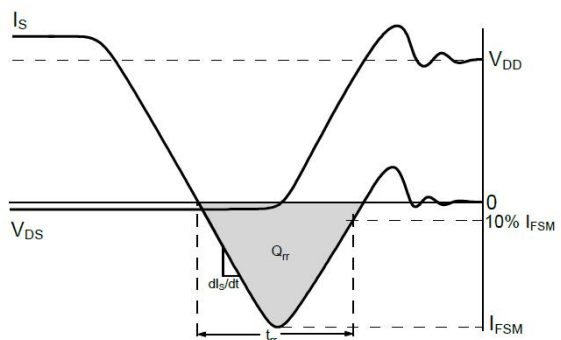
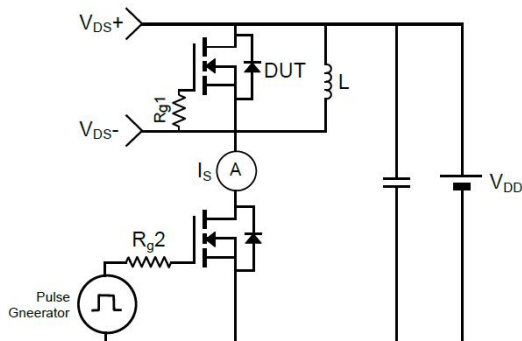
Resistive Load Switching Time



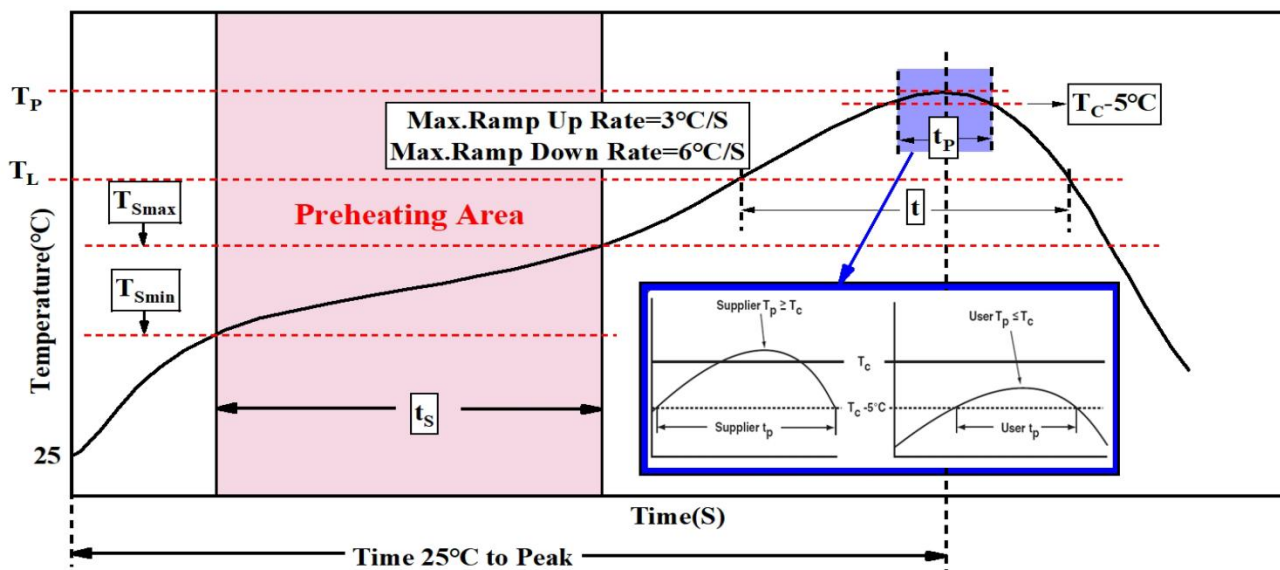
Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering



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

