

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
150V	3.3mΩ@10V	260A



合肥矽普半导体

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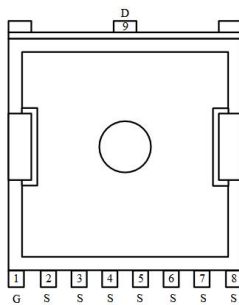
Feature

- Fast Switching
- Low Gate Charge and Rdson
- Advanced Split Gate Trench Technology
- 175°C Junction Temperature
- **100% UIS TESTED**
- **100% ΔVds TESTED**

Applications

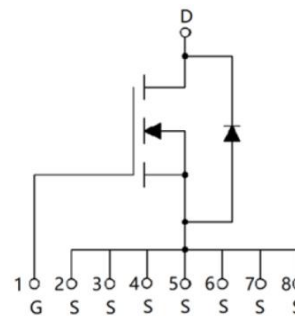
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

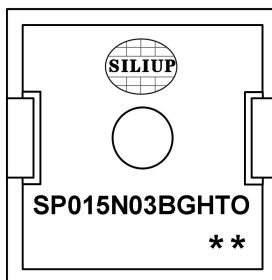


TOLL-8L

Circuit diagram



Marking



SP015N03BGHTO : Product code
** : Week code

Order Information

Device	Package	Unit/Tape
SP015N03BGHTO	TOLL-8L	2000

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V _{DS}	150	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current (Tc=25°C)	I _D	260	A
Continuous Drain Current (Tc=100°C)	I _D	173	A
Pulsed Drain Current	I _{DM}	1040	A
Single Pulse Avalanche Energy ¹	E _{AS}	1681	mJ
Power Dissipation (Tc=25°C)	P _D	525	W
Power Dissipation(Tc=100°C)	P _D	262.5	W
Thermal Resistance Junction-to-Case	R _{θJC}	0.28	°C/W
Thermal Resistance Junction-to-Ambient	R _{θJA}	42	°C/W
Storage Temperature Range	T _{STG}	-55 to 175	°C
Operating Junction Temperature Range	T _J	-55 to 175	°C

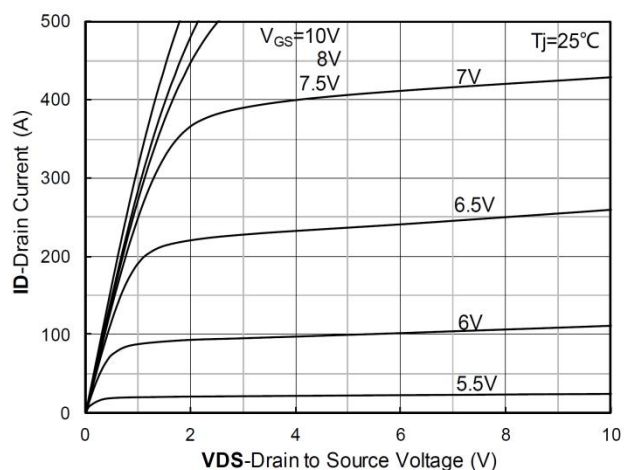
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit	
Static Characteristics							
Drain-Source Breakdown Voltage	BV _{DSS}	ID=250μA , VGS=0V	150	170	-	V	
Drain-Source Leakage Current	I _{DSS}	VDS=120V , VGS=0V	-	-	1	uA	
Gate-Source Leakage Current	I _{GSS}	VGS=±20V , VDS=0V	-	-	±100	nA	
Gate Threshold Voltage	V _{GS(th)}	VDS=VGS , ID=250μA	2.6	3.0	3.4	V	
Static Drain-Source On-Resistance	R _{DS(ON)}	VGS=10V , ID=20A	-	3.3	3.8	mΩ	
Gate Resistance	R _G	f=1MHz	-	1.2	-	Ω	
Dynamic characteristics							
Input Capacitance	C _{iss}	VDS=75V , VGS=0V , f=1MHz	-	10402	-	pF	
Output Capacitance	C _{oss}		-	635	-		
Reverse Transfer Capacitance	C _{rss}		-	24	-		
Total Gate Charge	Q _g	VDS=75V , VGS=10V , ID=20A	-	148	-	nC	
Gate-Source Charge	Q _{gs}		-	58	-		
Gate-Drain Charge	Q _{gd}		-	40	-		
Gate Plateau Voltage	V _{plateau}		-	5.1	-		V
Switching Characteristics							
Turn-On Delay Time	T _{d(on)}	VDD=75V , VGS=10V , RG=3.0Ω , ID=20A	-	40	-	nS	
Rise Time	T _r		-	72	-		
Turn-Off Delay Time	T _{d(off)}		-	108	-		
Fall Time	T _f		-	58	-		
Diode Characteristics							
Diode Forward Voltage	V _{SD}	VGS=0V , IS=1A , TJ=25°C	-	-	1.2	V	
Maximum Body-Diode Continuous Current	I _S		-	-	260	A	
Reverse Recovery Time	T _{rr}	IS=15A , di/dt=100A/us , TJ=25°C	-	112	-	nS	
Reverse Recovery Charge	Q _{rr}		-	426	-	nC	

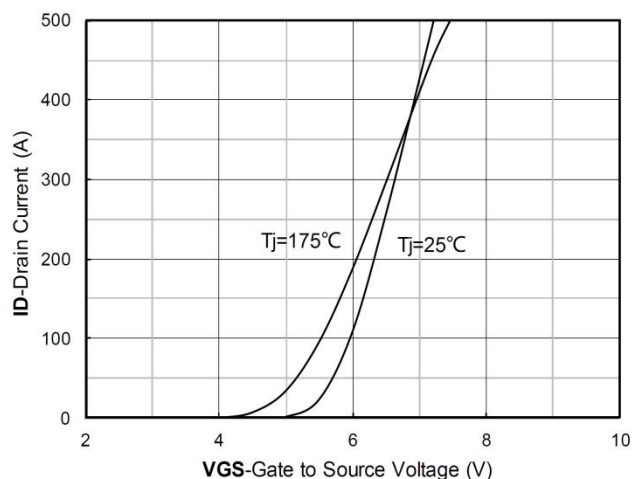
Note :

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

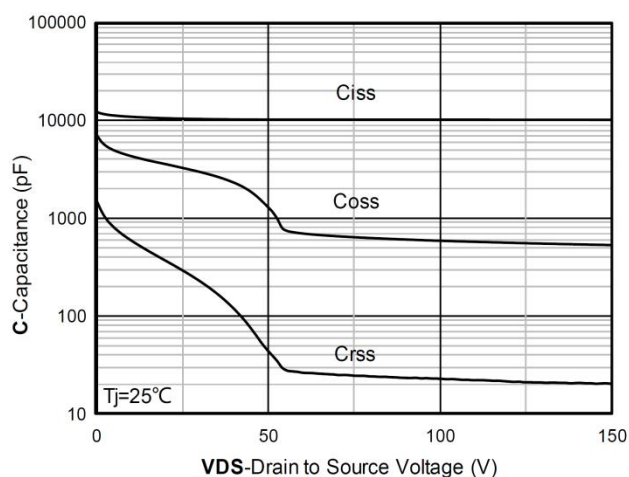
Typical Characteristics



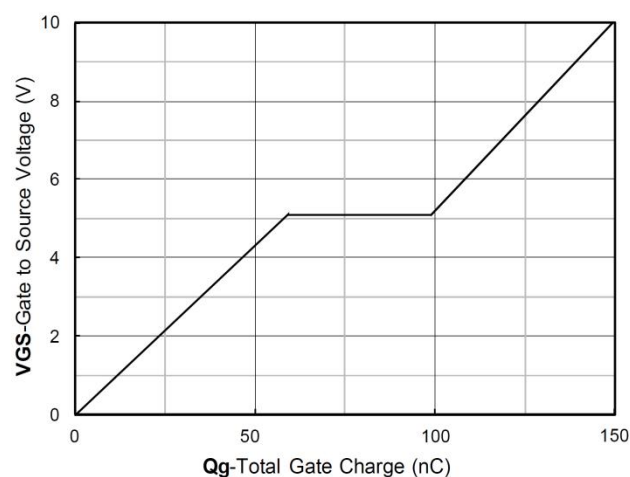
Output Characteristics



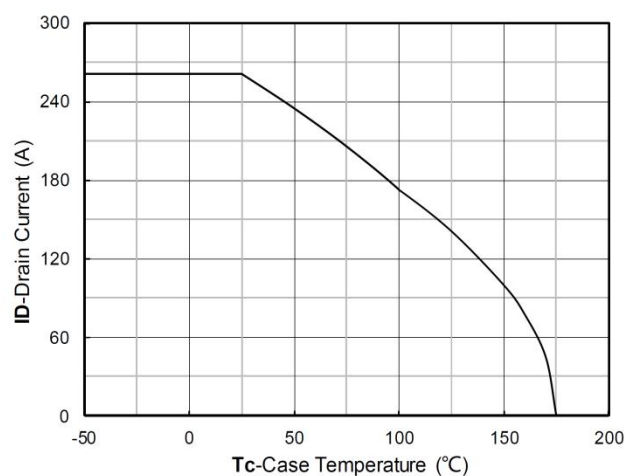
Transfer Characteristics



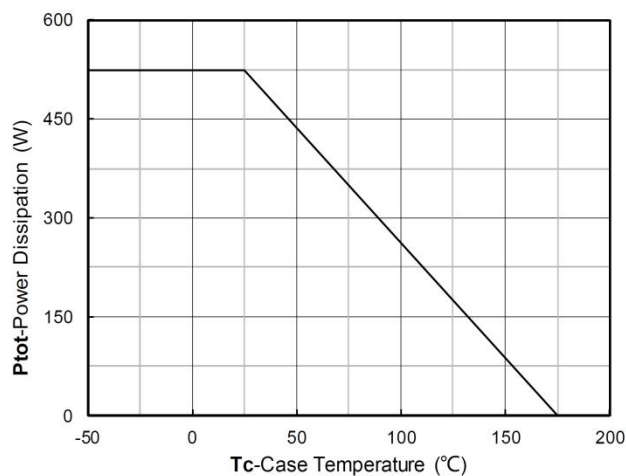
Capacitance Characteristics



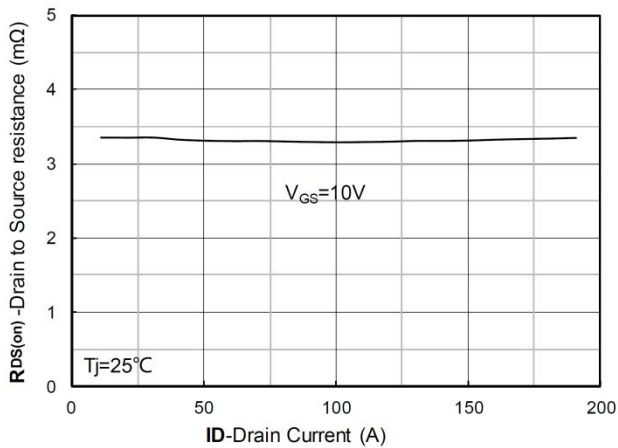
Gate Charge



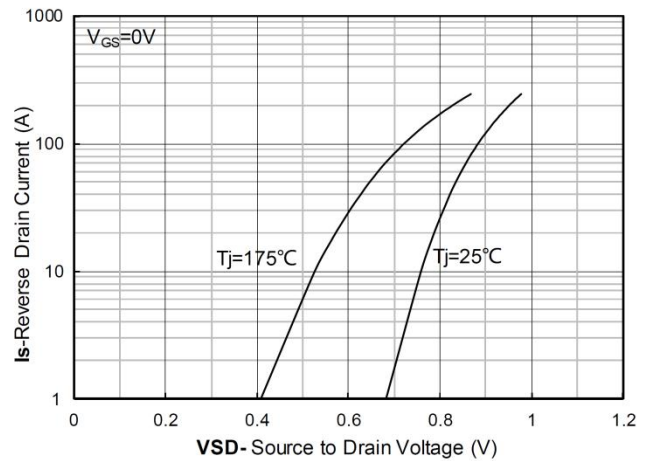
Current dissipation



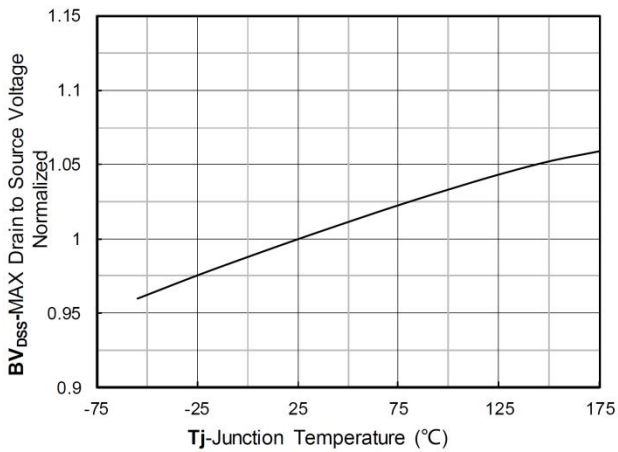
Power dissipation



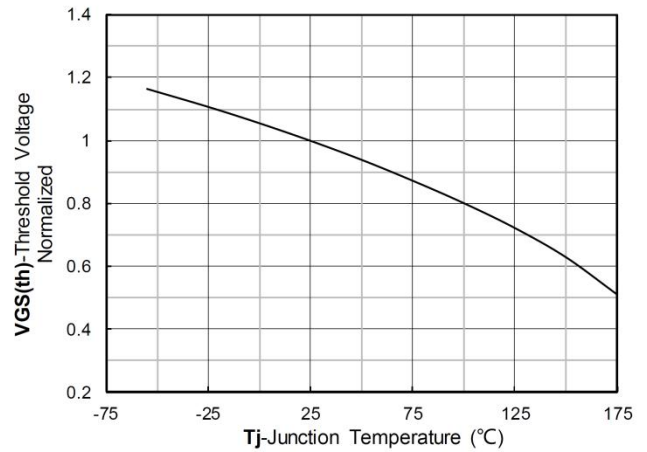
$R_{DS(on)}$ vs. Drain Current



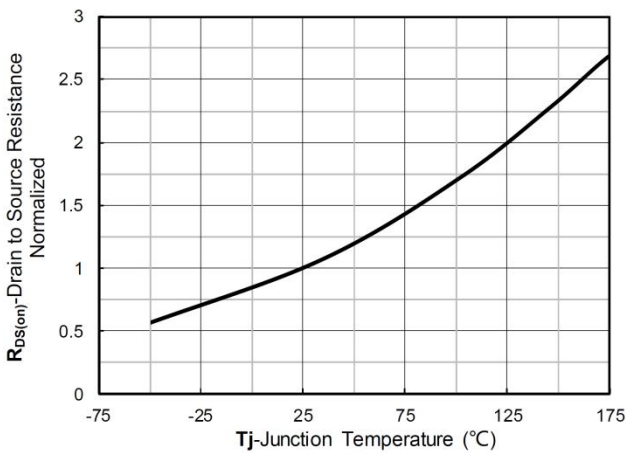
Forward characteristics of reverse diode



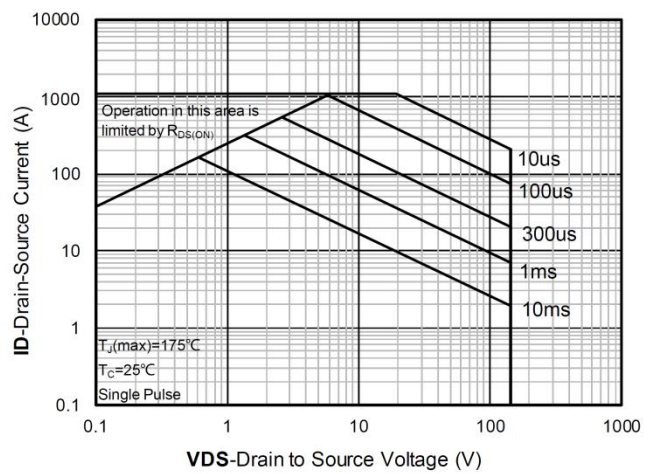
Normalized breakdown voltage



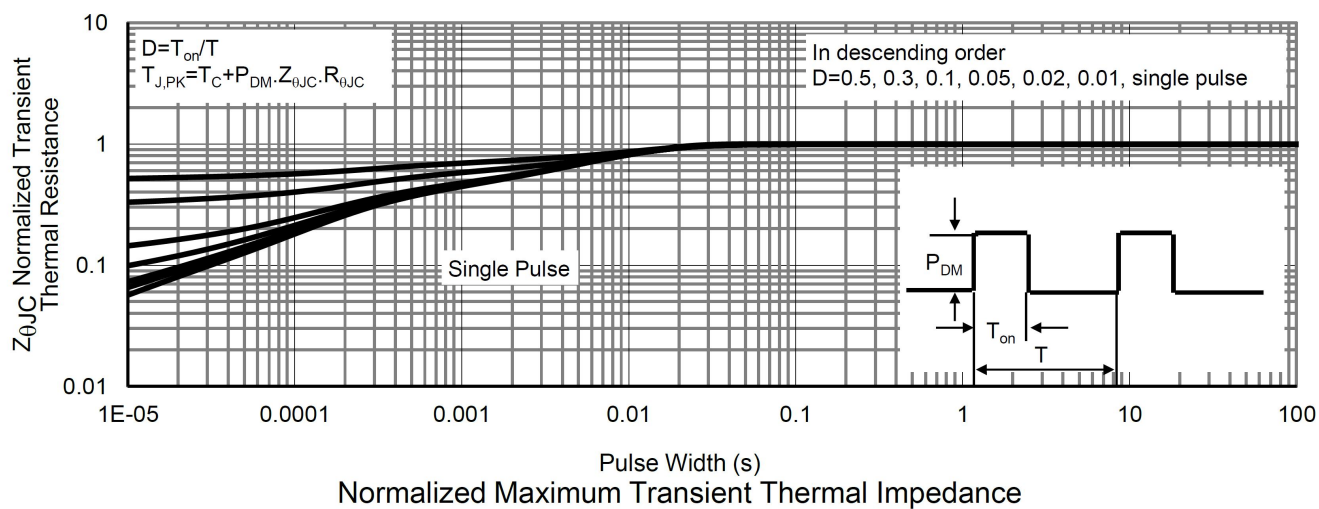
Normalized Threshold voltage



Normalized On-Resistance

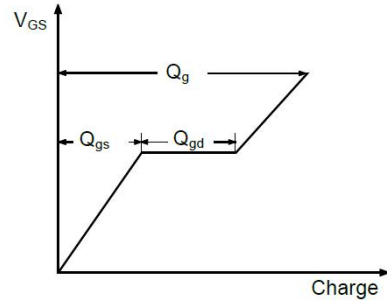
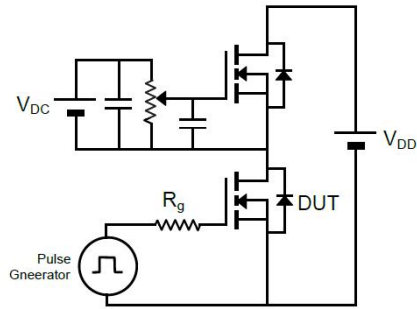


Safe Operation Area

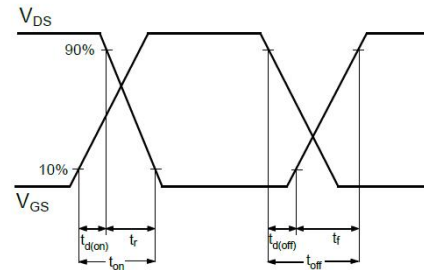
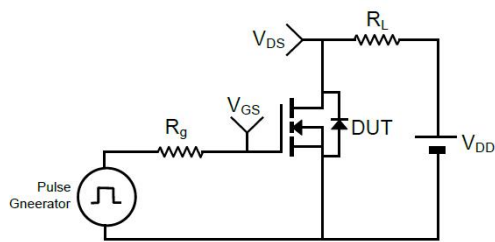


Test Circuit

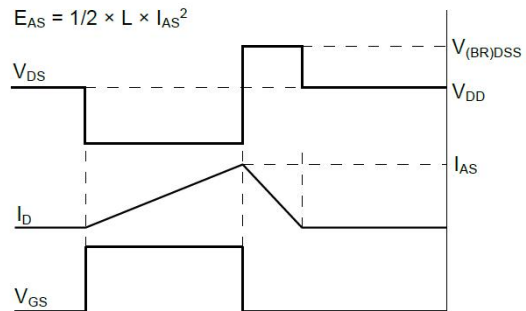
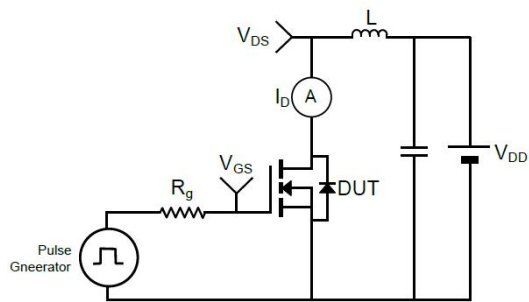
Gate Charge



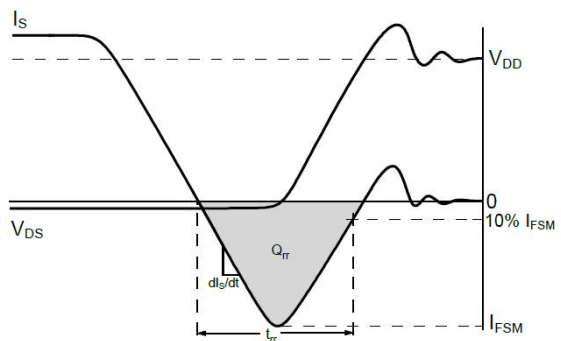
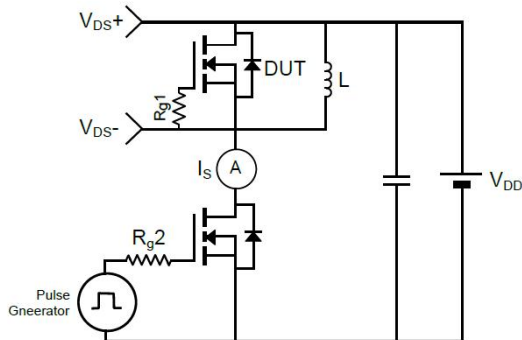
Resistive Load Switching Time



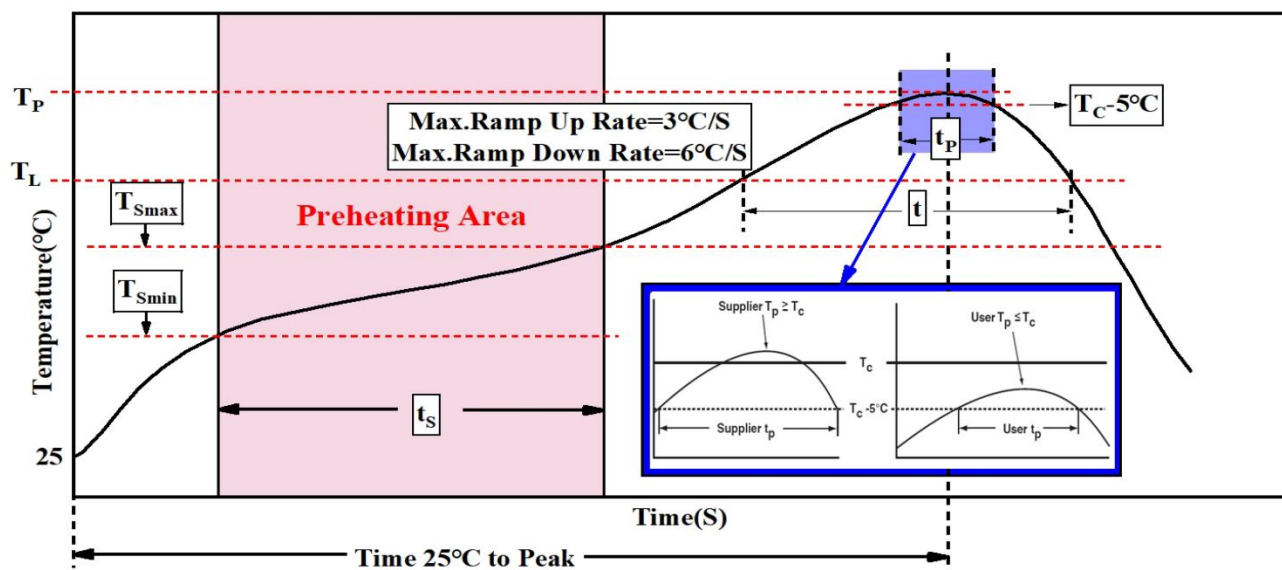
Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering



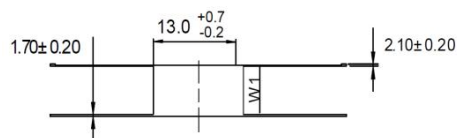
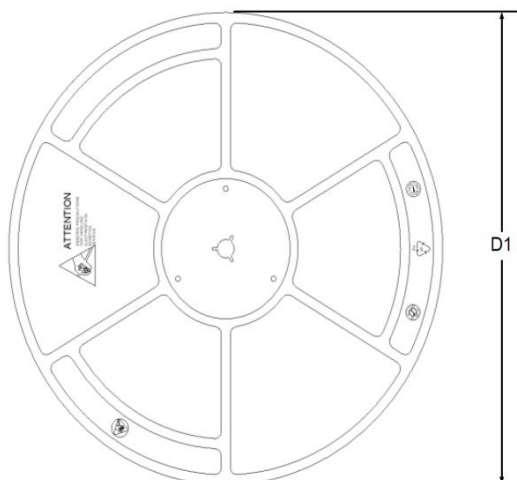
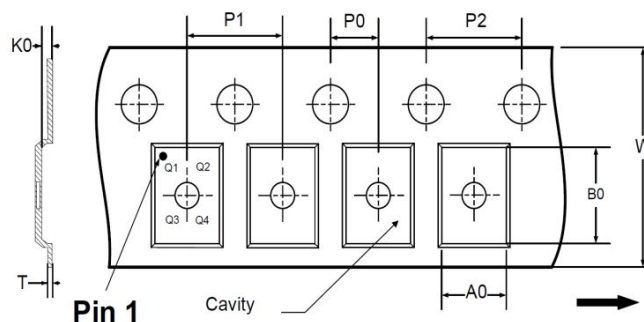
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{Smin})	100°C	150°C
Temperature max (T_{Smax})	150°C	200°C
Time (T_{Smin} to T_{Smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T_{Smax} to T_P)	3 °C/second max.	3°C/second max.
Liquidous temperature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

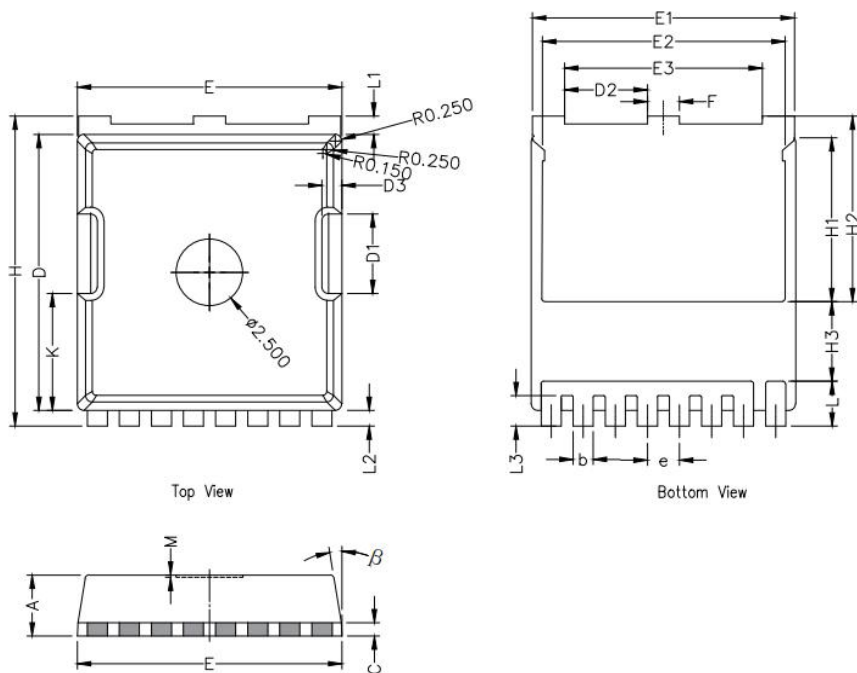
Table 2. Pb-free Process – Classification Temperatures (T_C)

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

TOLL-8L Reel Information
REEL DIMENSIONS

TAPE DIMENSIONS


A0: Dimension designed to accommodate the component width
 B0: Dimension designed to accommodate the component length
 K0: Dimension designed to accommodate the component thickness
 W: Overall width of the carrier tape
 P0: Pitch between successive cavity centers and sprocket hole
 P1: Pitch between successive cavity centers
 P2: Pitch between sprocket hole
 T: Tape material thickness
 D1: Reel Diameter
 W1: Reel Width

DIMENSIONS										(Unit: mm)
Reel	D1	W1								Material
	330	24.4								Hips
Tape	P0	P1	P2	W	A0	B0	K0	T	Pin 1 Quadrant	Material
	2	4	12	24	10.3	12.1	2.6	0.35	Q1	PC
All dimensions are nominal										

TOLL-8L Package Information


Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	2.15	2.30	2.45
b	0.60	0.75	0.90
C	0.40	0.50	0.60
D	10.18	10.38	10.58
D1	3.15	3.3	3.45
E	9.70	9.90	10.10
E1	9.65	9.80	9.95
E2	7.90	--	9.15
E3	7.20	--	8.40
e	1.20 BSC		
F	1.05	1.20	1.35
H	11.45	11.70	11.95
H2	6.75	7.00	7.3
H3	3.00 BSC		
L	1.20	--	2.10
L1	0.50	0.75	0.90
L2	0.45	0.6	0.75
M	0.08 REF.		
β	8°	10°	12°