

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
100V	1.05mΩ@10V	390A



合肥矽普半导体

Siliup Semiconductor Technology Co., Ltd

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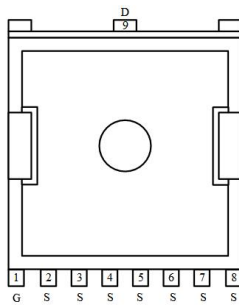
Feature

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

Applications

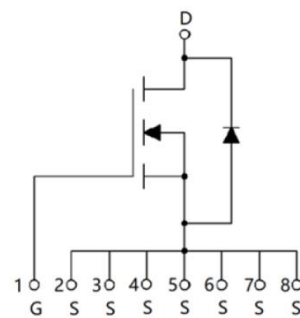
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Package

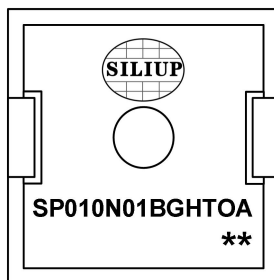


TOLL-8L

Circuit diagram



Marking



SP010N01BGHTOA
**

:Device Code
:Week Code

Order Information

Device	Package	Unit/Tape
SP010N01BGHTOA	TOLL-8L	2000

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Tc=25°C)	I_D	390	A
Continuous Drain Current (Tc=100°C)	I_D	262	A
Pulse Drain Current Tested	I_{DM}	1560	A
Single pulsed avalanche energy ¹	E_{AS}	2205	mJ
Power Dissipation (Tc=25°C)	P_D	430	W
Power Dissipation (Tc=100°C)	P_D	215	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.35	°C/W
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	44	°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)

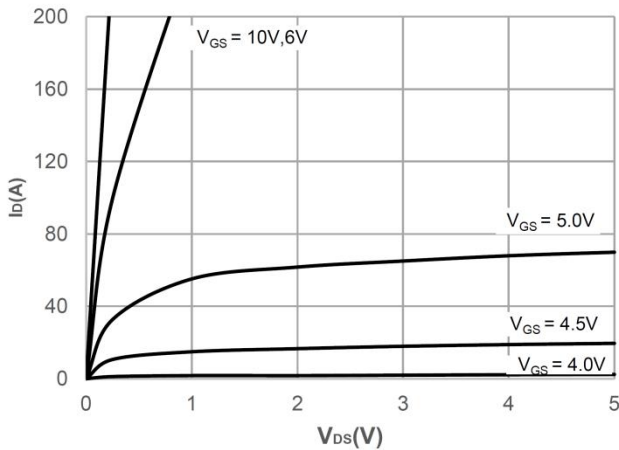
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250uA	105	110	-	V
Drain-Source Leakage Current	Idss	VDS=100V , VGS=0V , TJ=25℃	-	-	1	uA
Gate-Source Leakage Current	IGSS	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	VGS(th)	VGS=VDS , ID =250uA	2.4	3.0	3.6	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=10V , ID=50A	-	1.05	1.15	mΩ
Gate Resistance	RG	VDS=50V , VGS=0V , f=1MHz	-	3.9	-	Ω
Dynamic characteristics						
Input Capacitance	Ciss	VDS=50V , VGS=0V , f=1MHz	-	12220	-	pF
Output Capacitance	Coss		-	4400	-	
Reverse Transfer Capacitance	Crss		-	94	-	
Total Gate Charge	Qg	VDS=50V , VGS=10V , ID=125A	-	196	-	nC
Gate-Source Charge	Qgs		-	52	-	
Gate-Drain Charge	Qgd		-	33	-	
Gate Plateau Voltage	Vplateau		-	4.6	-	V
Switching Characteristics						
Turn-On Delay Time	td(on)	VDD=50V , VGS=10V , RG=1.6Ω , ID=125A	-	28	-	nS
Rise Time	tr		-	18	-	
Turn-Off Delay Time	td(off)		-	68	-	
Fall Time	tf		-	50	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Diode Continuous Current	IS		-	-	390	A
Reverse recover time	Trr	IS=20A , di/dt=100A/us , TJ=25℃	-	90	-	nS
Reverse recovery charge	Qrr		-	220	-	nC

Note :

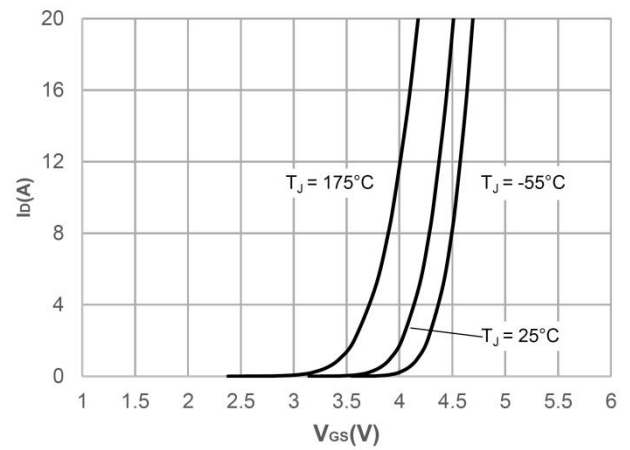
- The test condition is $V_{DD}=50V, V_{GS}=10V, L=0.5mH, R_G=25\Omega$;



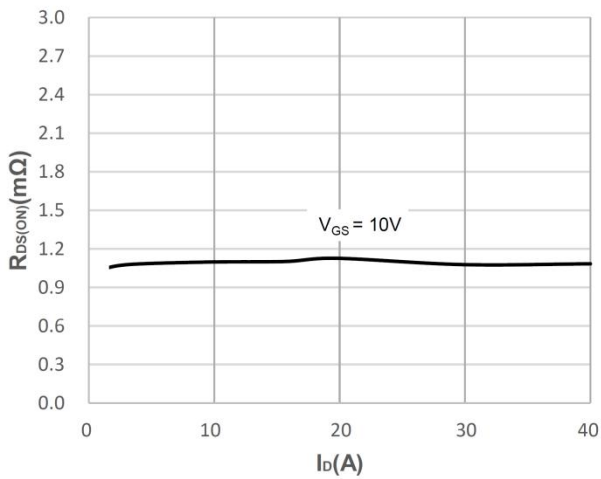
Typical Characteristics



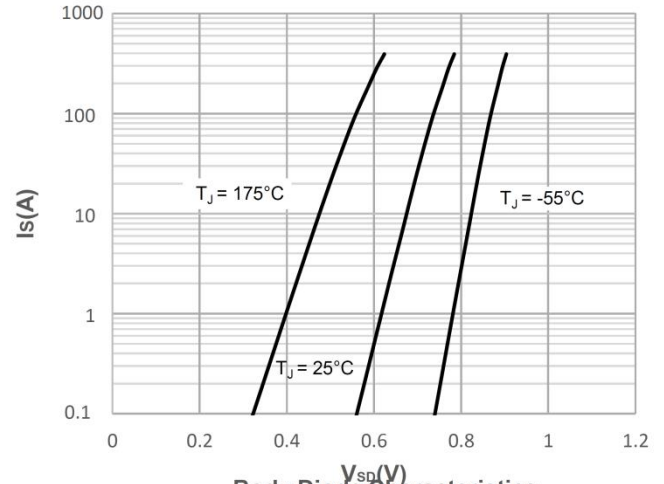
Output Characteristics



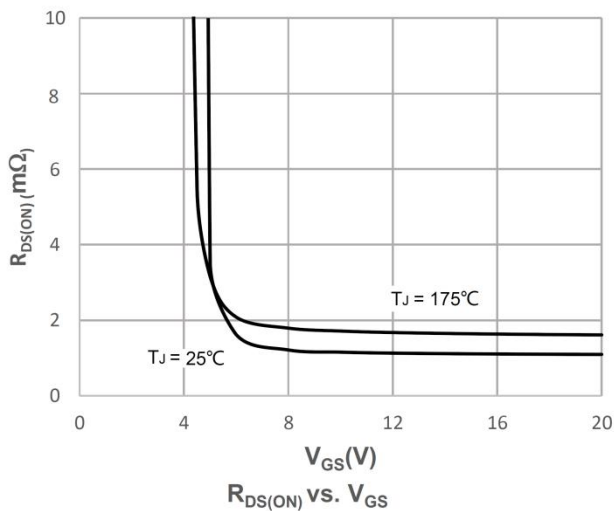
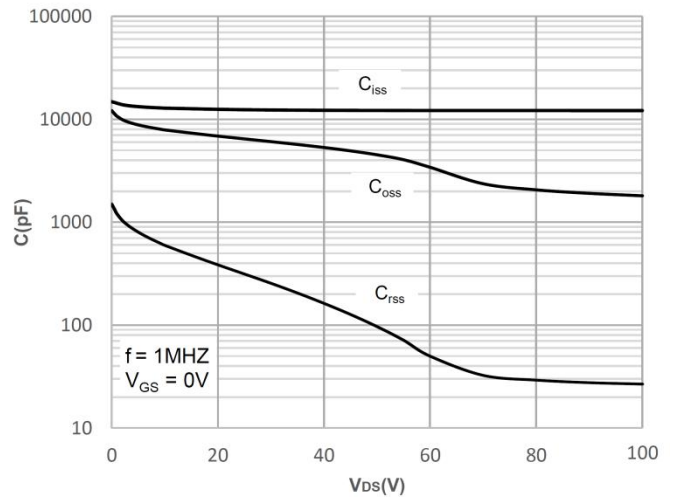
Typical Transfer Characteristics



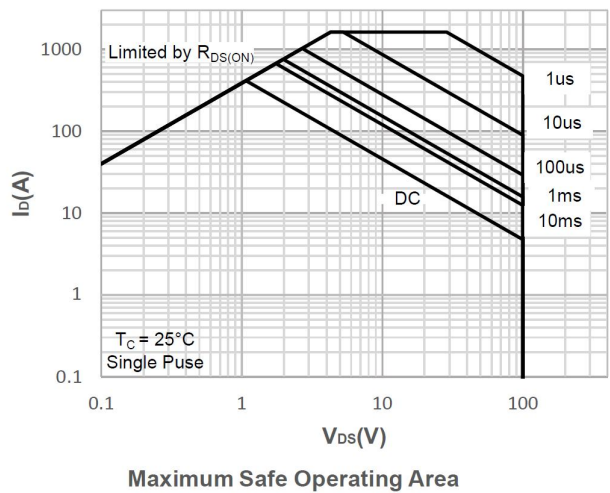
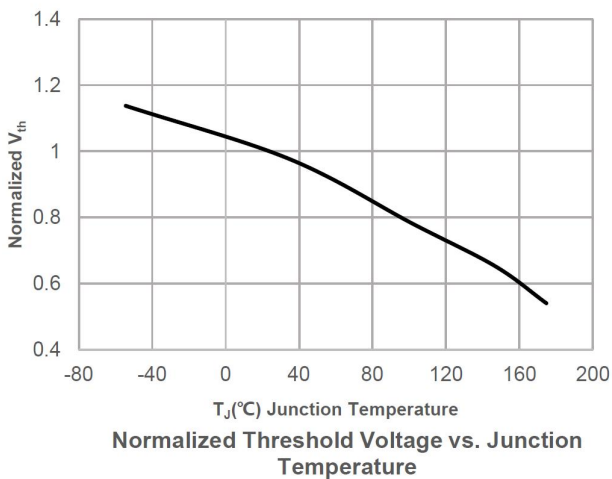
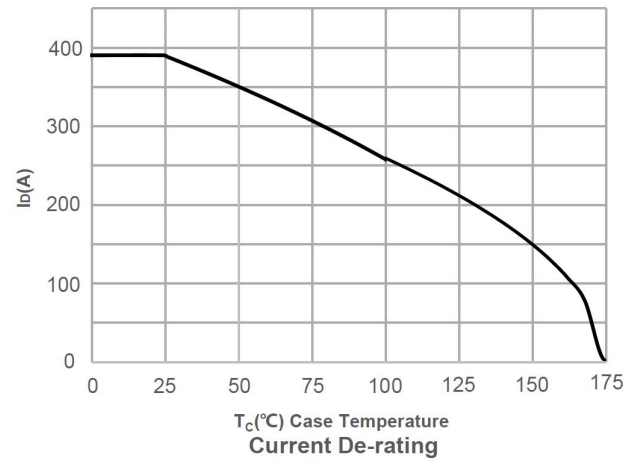
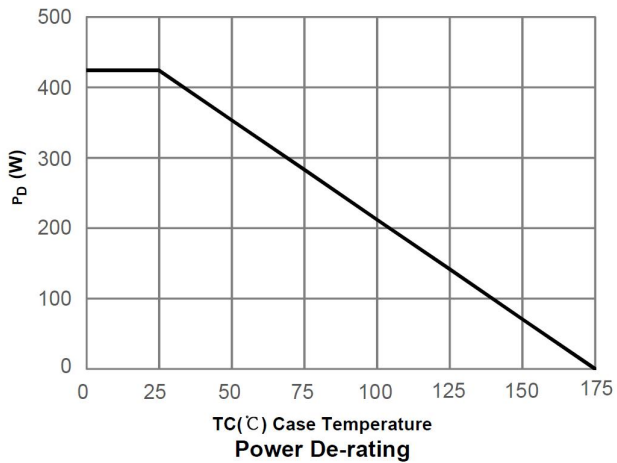
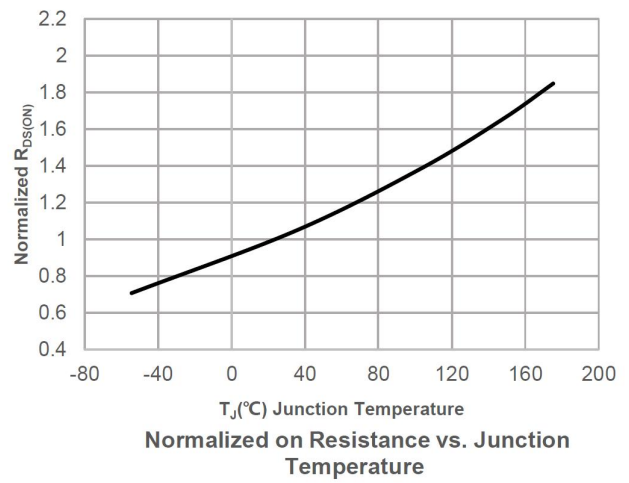
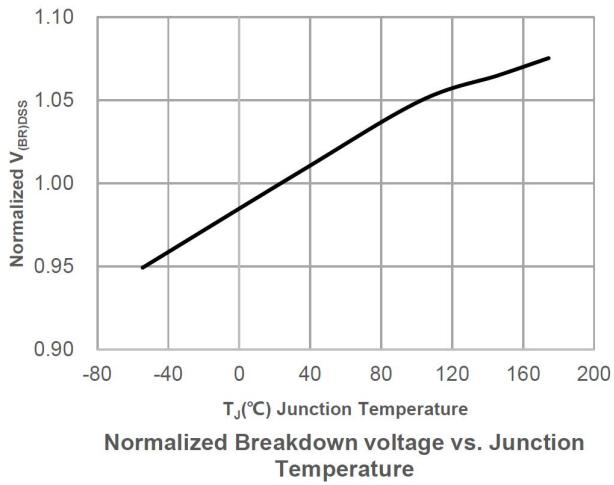
On-resistance vs. Drain Current

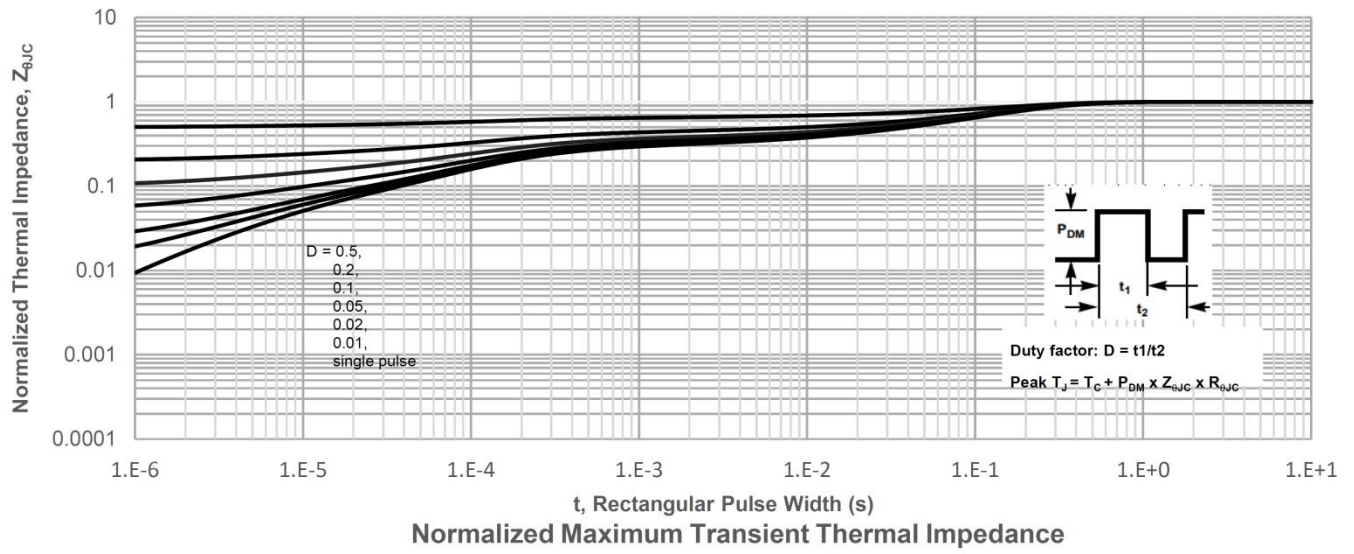


Body Diode Characteristics

 $R_{DS(on)}$ vs. V_{GS} 

Capacitance Characteristics

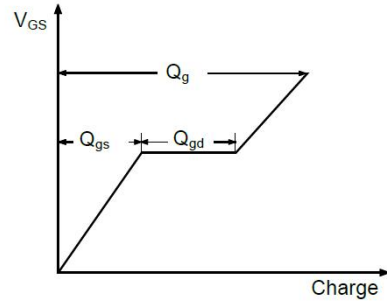
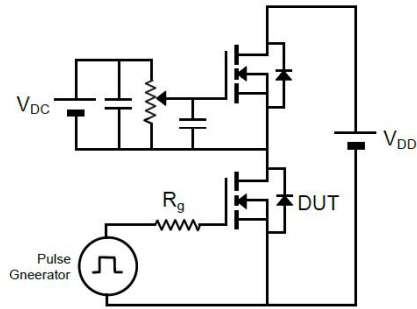




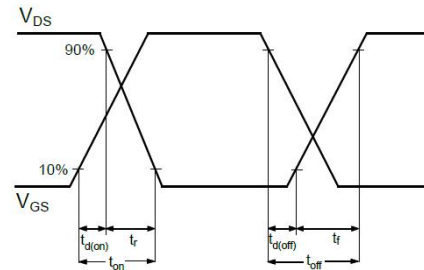
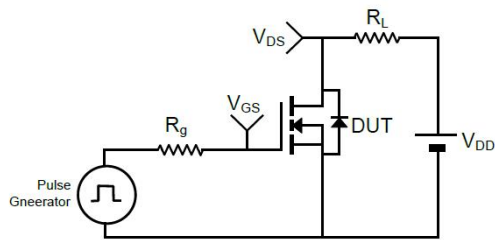


Test Circuit

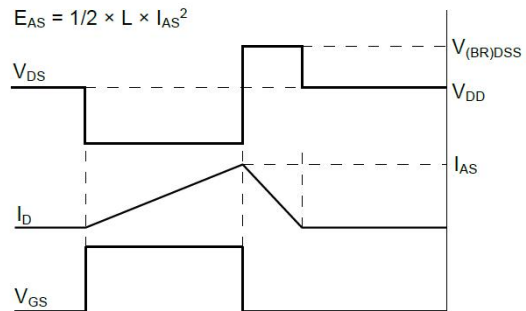
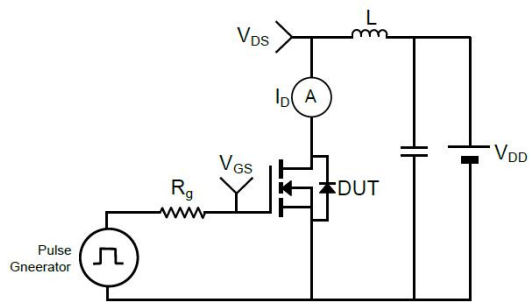
Gate Charge



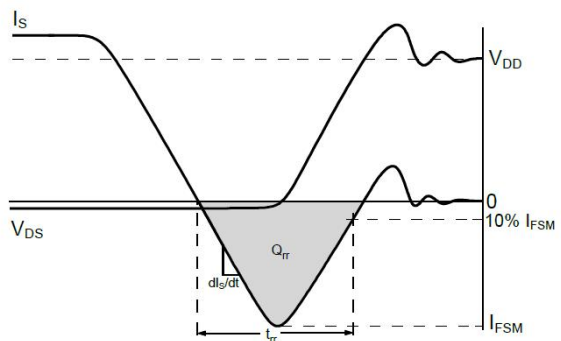
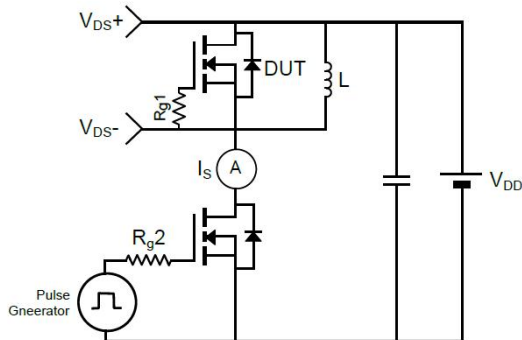
Resistive Load Switching Time



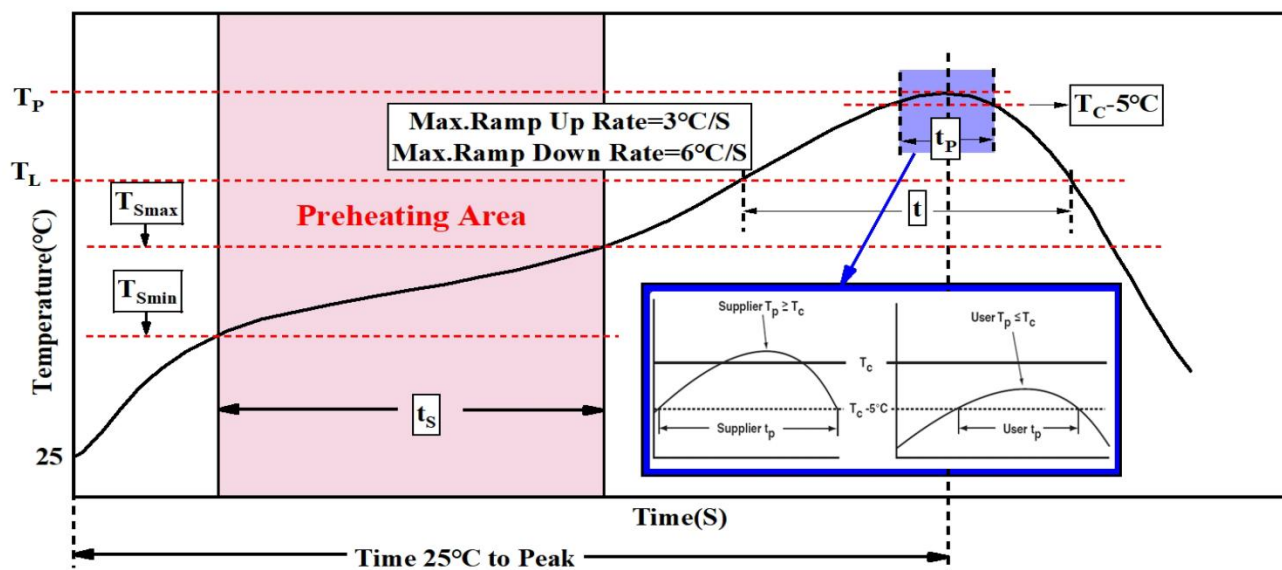
Un-clamped Inductive Load Switching



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)

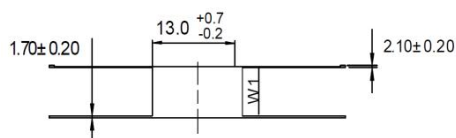
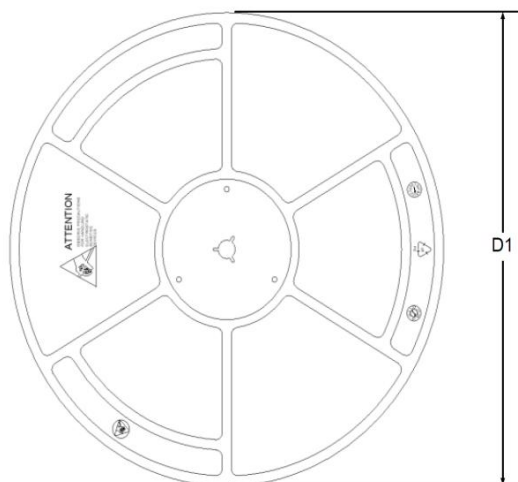
Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

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

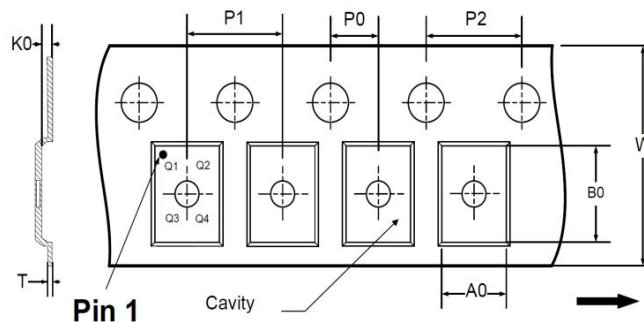
Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

TOLL-8L Reel Information

REEL DIMENSIONS



TAPE DIMENSIONS



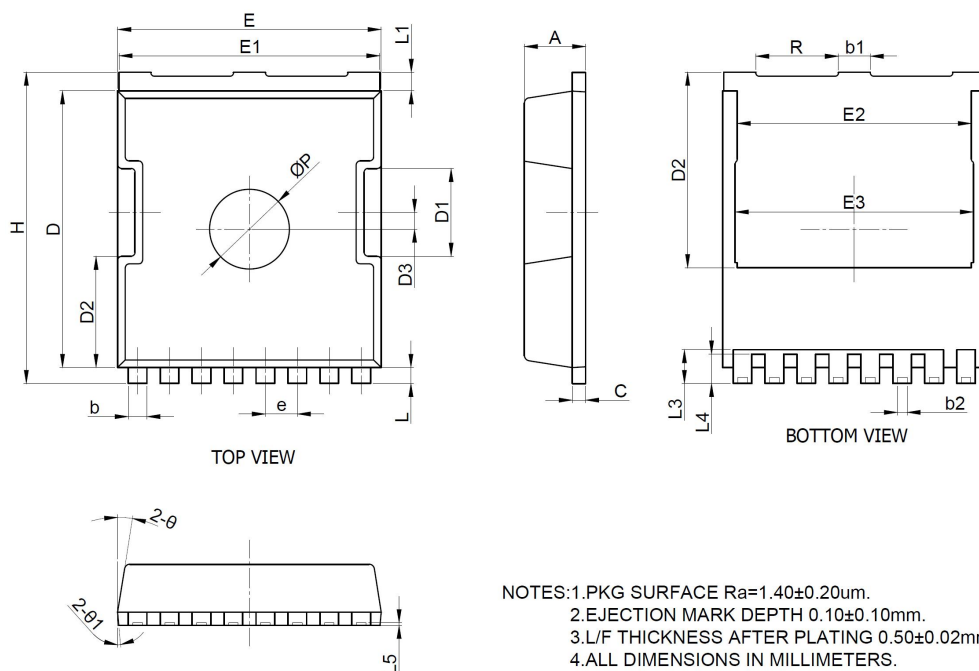
- A0: Dimension designed to accommodate the component width
- B0: Dimension designed to accommodate the component length
- K0: Dimension designed to accommodate the component thickness
- W: Overall width of the carrier tape
- P0: Pitch between successive cavity centers and sprocket hole
- P1: Pitch between 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 Outline Dimensions



Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	2.20	2.30	2.40
b	0.60	0.70	0.80
b1	1.10	1.20	1.30
b2	0.36 REF.		
C	0.40	0.50	0.60
D	10.30	10.40	10.50
D1	3.20	3.30	3.40
D2	4.08	4.18	4.28
D3	0.53	0.63	0.73
D4	7.35 REF.		
E	9.80	9.9	10.00
E1	9.70	9.80	9.90
E2	8.80 REF.		
E3	8.95 REF.		
e	1.20 BSC.		
H	11.5	11.7	11.90
L	0.5	0.6	0.7
L1	0.60	0.7	0.80
L2	0.10 REF.		
L3	1.27 REF.		
L4	1.10 REF.		
P	2.00	3.00	4.00
R	3.00	3.10	3.20
θ	7°	9°	11°
θ1	3°	5°	7°