

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
85V	1.7mΩ@10V	310A



合肥矽普半导体

Siliup Semiconductor Technology Co., Ltd

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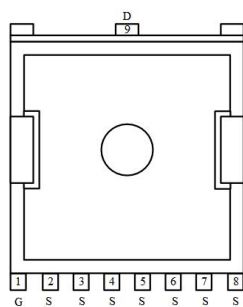
Feature

- Fast Switching
- Low Gate Charge and Rdson
- Advanced Split Gate Trench Technology
- **100% UIS TESTED**
- **100% ΔVds TESTED**

Applications

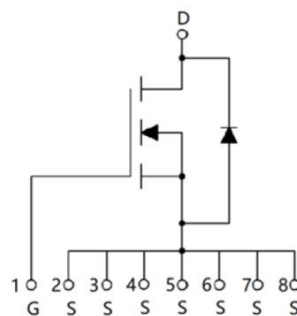
- Power switching application
- DC-DC Converter
- Power Management

Package

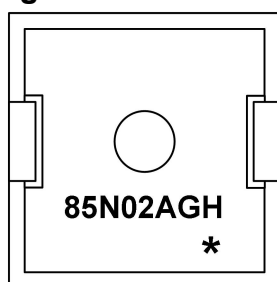


TOLL-8L

Circuit diagram



Marking



85N02AGH : Product code
* : Month code

Order Information

Device	Package	Unit/Tape
SP85N02AGHTO	TOLL-8L	2000

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	85	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current1 (Tc=25°C)	I_D	310	A
Continuous Drain Current1 (Tc=100°C)	I_D	207	A
Pulsed Drain Current	I_{DM}	1240	A
Single Pulse Avalanche Energy ¹	E_{AS}	952	mJ
Power Dissipation (Tc=25°C)	P_D	405	W
Power Dissipation (Tc=100°C)	P_D	162	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.35	°C/W
Storage Temperature Range	T_{STG}	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	°C

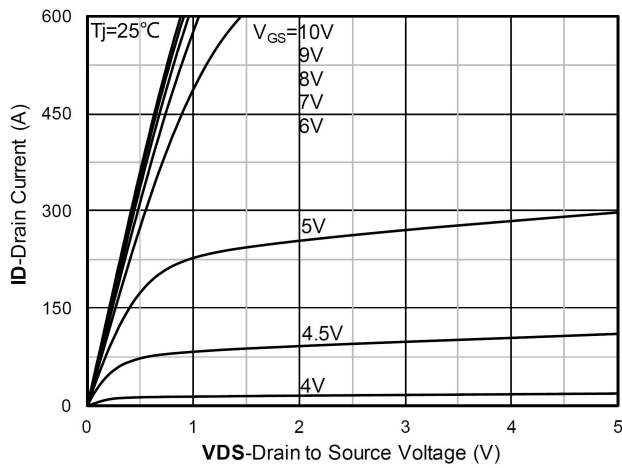
Electrical characteristics (Ta=25°C, unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	ID = 250μA, VGS = 0V	85	90	-	V
Drain Cut-Off Current	IDSS	VDS = 68V, VGS = 0V	-	-	1	μA
Gate Leakage Current	IGSS	VGS = ±20V, VDS = 0V	-	-	±0.1	
Gate Threshold Voltage	VGS(th)	VDS = VGS, ID = 250μA	2.6	3.0	3.4	V
Drain-Source ON Resistance	RDS(ON)	VGS = 10V, ID = 20A	-	1.7	2.1	mΩ
Gate Resistance	RG	f=1MHz	-	2.2	-	Ω
Dynamic Characteristics						
Input Capacitance	Ciss	VDS =40V, VGS = 0V, f = 1.0MHz	-	9222	-	pF
Output Capacitance	Coss		-	3200	-	
Reverse Transfer Capacitance	Crss		-	84	-	
Total Gate Charge	Qg	VDS=40V , VGS=10V , ID=165A	-	145	-	nC
Gate-Source Charge	Qgs		-	51	-	
Gate-Drain Charge	Qgd		-	25	-	
Gate Plateau Voltage	Vplateau		-	4.5	-	V
Switching Characteristics						
Turn-On Delay Time	td(on)	VGS = 10V, VDS = 40V, ID=165A , RG = 1.6Ω	-	27	-	nS
Rise Time	tr		-	75	-	
Turn-Off Delay Time	td(off)		-	86	-	
Fall Time	tf		-	35	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	VSD	IS = 1A, VGS = 0V	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	310	A
Reverse Recovery Time	Trr	IS=155A, di/dt=100A/us, TJ=25℃	-	115	-	nS
Reverse Recovery Charge	Qrr		-	320	-	nC

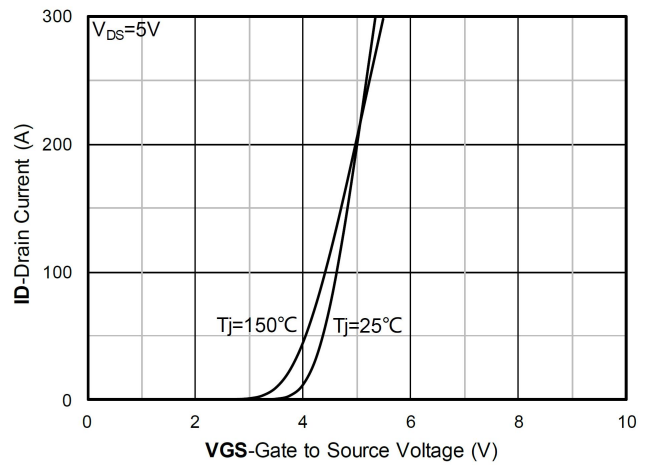
Note :

1. The test condition is VDD=45V, VGS=10V, L=0.1mH, RG=25 Ω ;

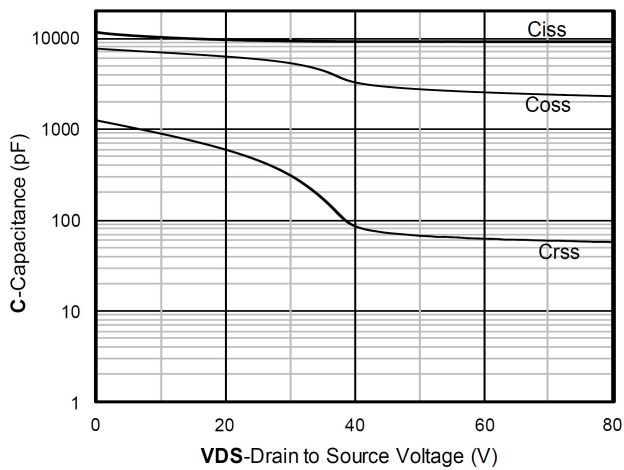
Typical Characteristics



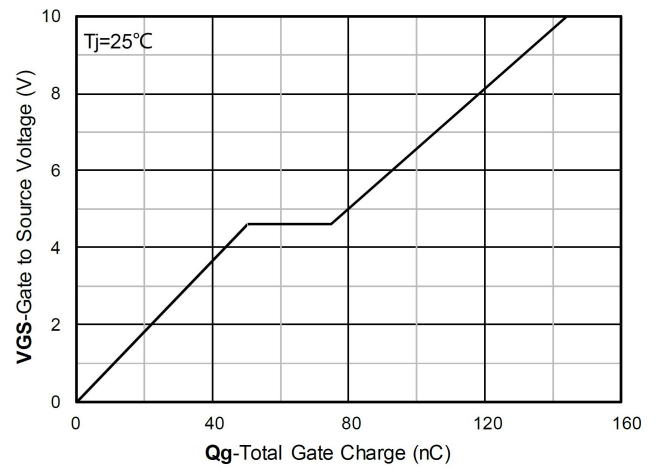
Output Characteristics



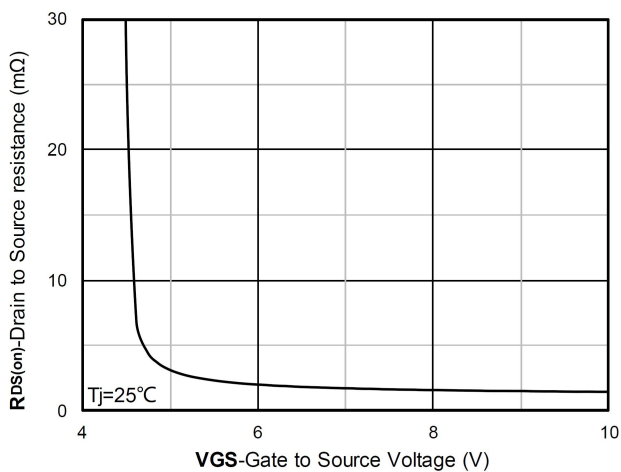
Transfer Characteristics



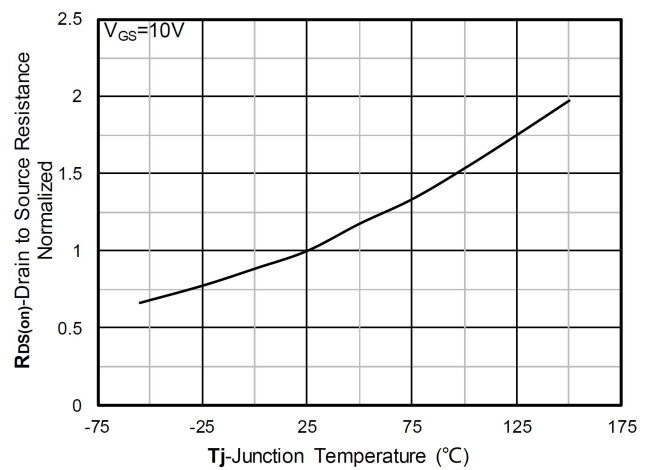
Capacitance Characteristics



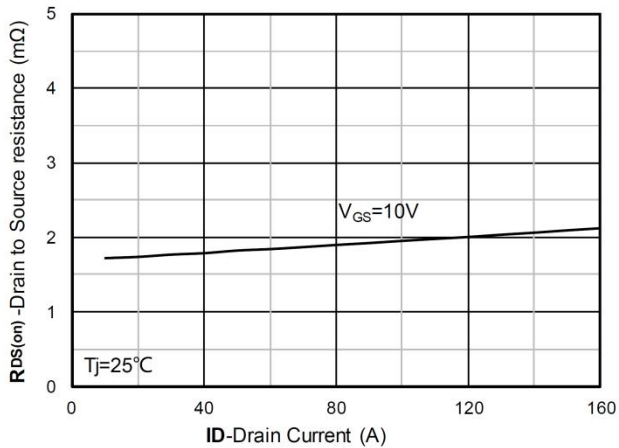
Gate Charge



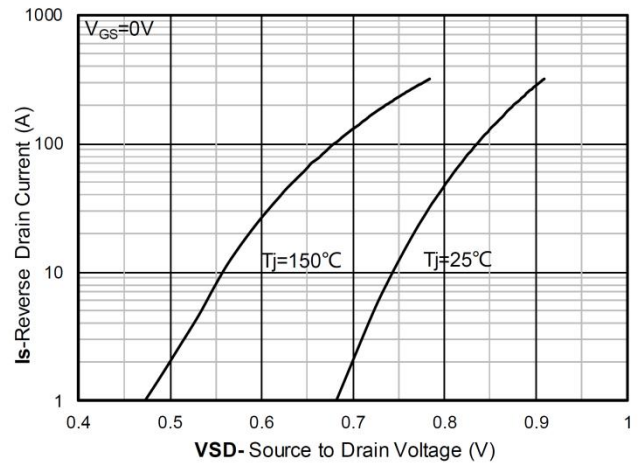
On-Resistance vs. Gate to Source Voltage



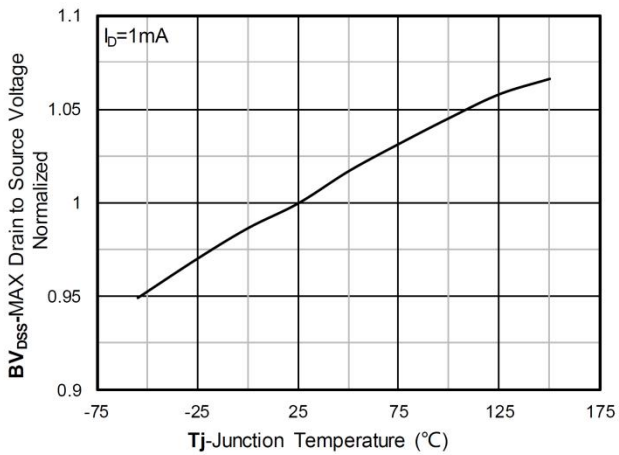
Normalized On-Resistance



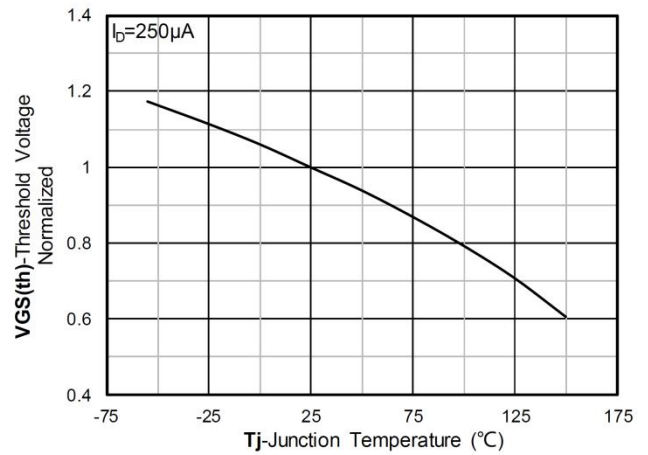
$R_{DS(on)}$ vs. Drain Current



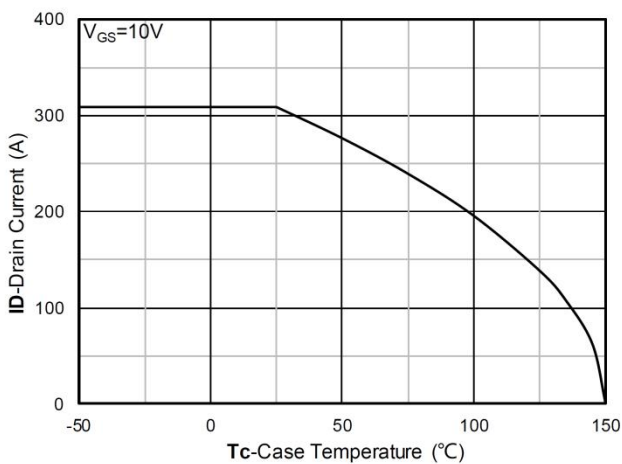
Forward characteristics of reverse diode



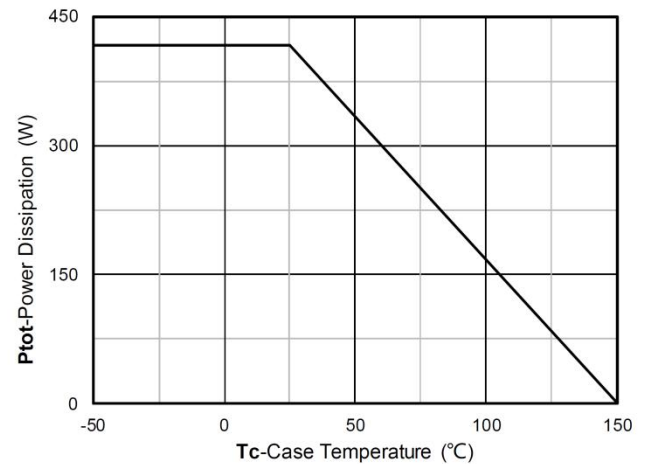
Normalized breakdown voltage



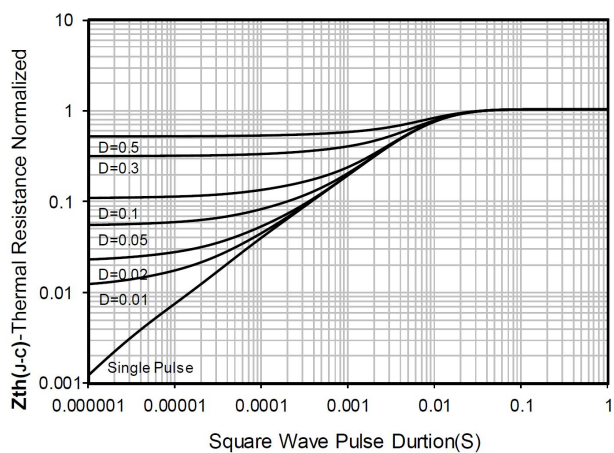
Normalized Threshold voltage



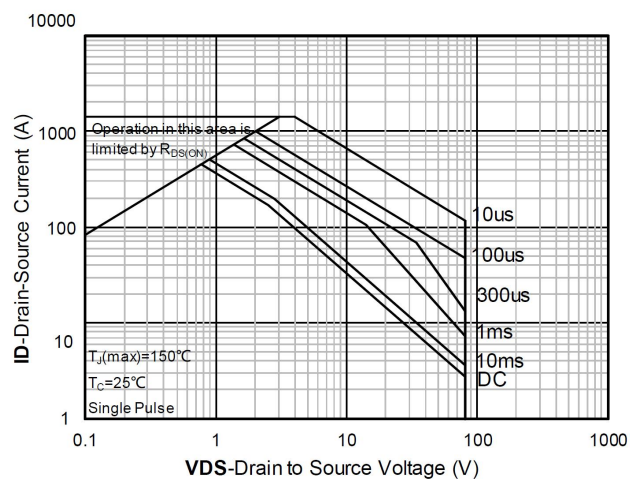
Current dissipation



Power dissipation



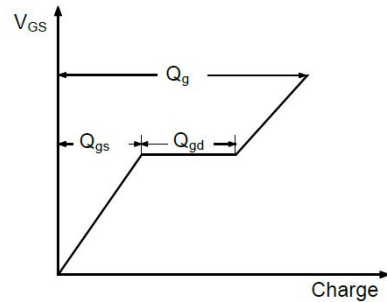
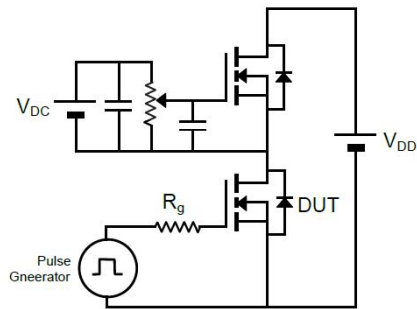
Normalized Maximum Transient Thermal Impedance



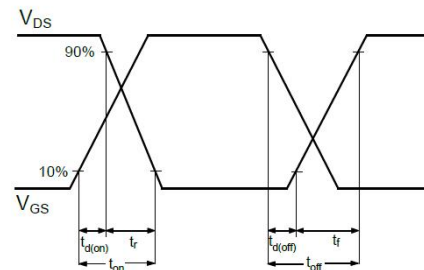
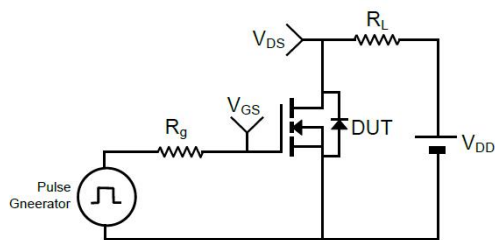
Safe Operation Area

Test Circuit

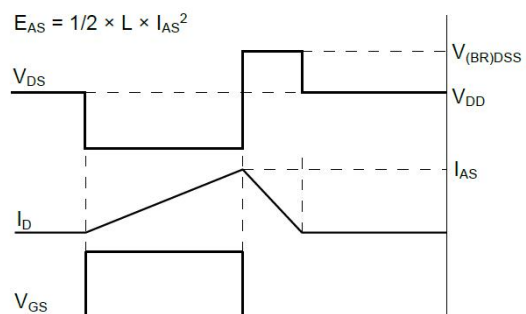
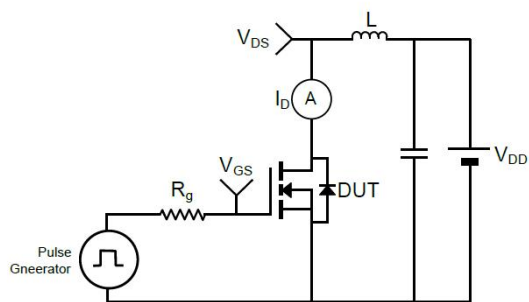
Gate Charge



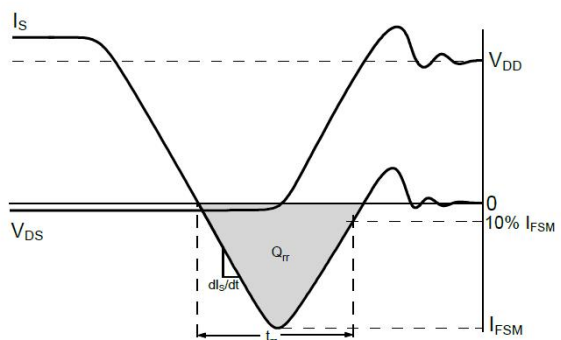
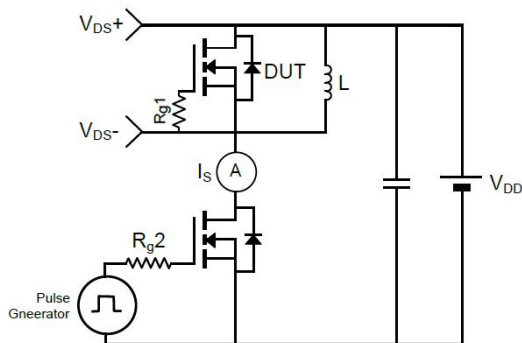
Resistive Load Switching Time



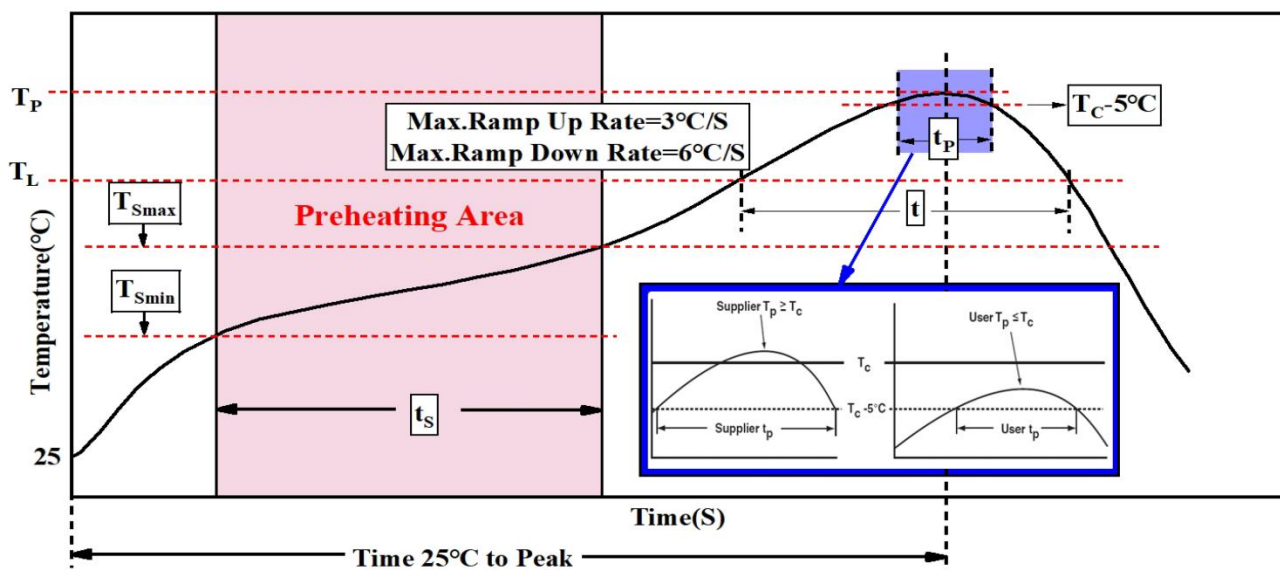
Un-clamped Inductive Load Switching



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)

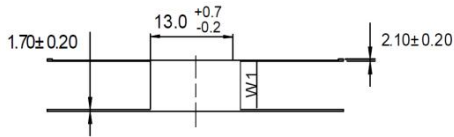
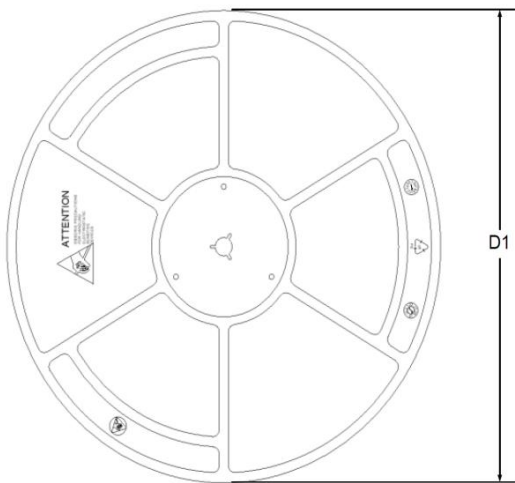
Package Thickness	Volume mm^3 <350	Volume mm^3 ≥ 350
<2.5 mm	235 °C	220 °C
≥ 2.5 mm	220 °C	220 °C

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

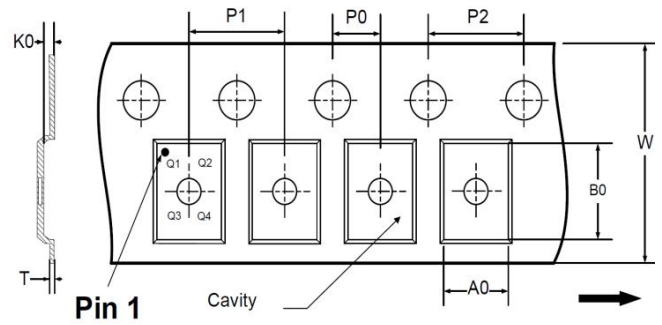
Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥ 2.5 mm	250 °C	245 °C	245 °C

TOLL-8L Reel Information

REEL DIMENSIONS

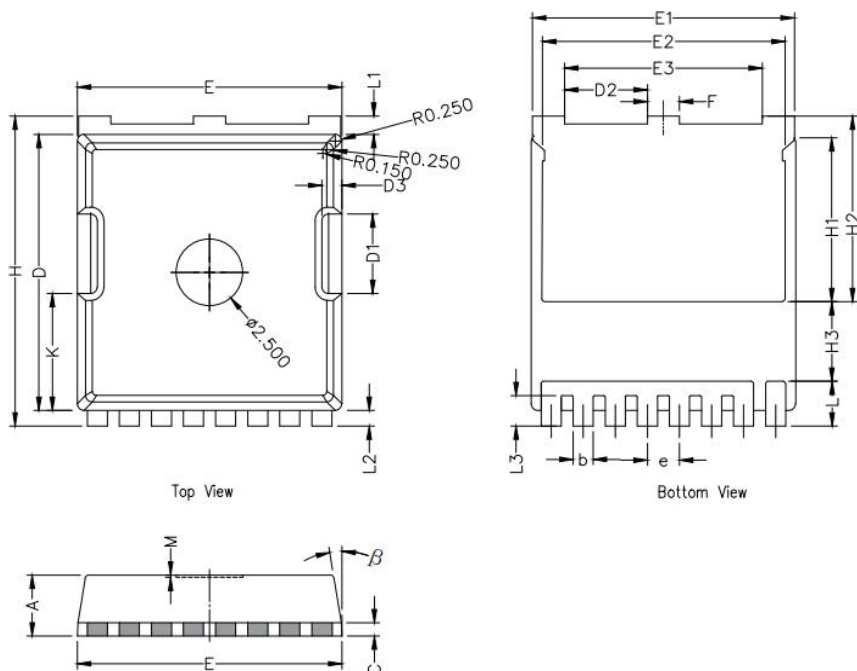


TAPE DIMENSIONS



- 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°