

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
30V	0.55mΩ@10V	530A
	0.80mΩ@4.5V	



合肥矽普半导体

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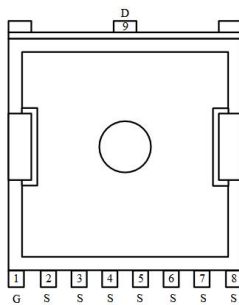
Feature

- Fast Switching
- Low Gate Charge and $R_{DS(on)}$
- Advanced Split Gate Trench Technology
- **100% UIS TESTED**
- **100% ΔV_{ds} TESTED**

Applications

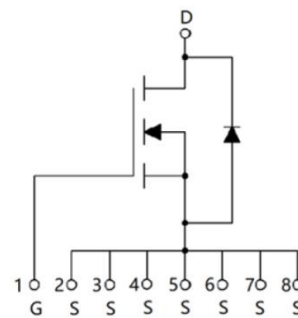
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

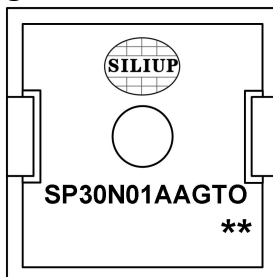


TOLL-8L

Circuit diagram



Marking



SP30N01AAGTO :Device Code
** :Week Code

Order Information

Device	Package	Unit/Tape
SP30N01AAGTO	TOLL-8L	2000

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current1 (Tc=25°C)	I_D	530	A
Continuous Drain Current1 (Tc=100°C)	I_D	343	A
Pulsed Drain Current	I_{DM}	2120	A
Single Pulse Avalanche Energy ¹	E_{AS}	1369	mJ
Power Dissipation (Tc=25°C)	P_D	270	W
Power Dissipation (Ta=100°C)	P_D	98	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.46	°C/W
Storage Temperature Range	T_{STG}	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	°C

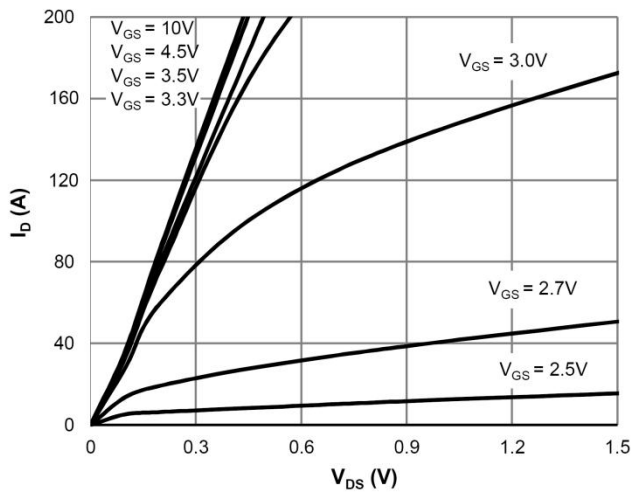
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250uA	30	35	-	V
Drain-Source Leakage Current	IDSS	VDS=24V , 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	1.3	1.7	2.3	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=10V , ID=50A	-	0.55	0.68	mΩ
		VGS=4.5V , ID=50A	-	0.80	1.05	
Gate Resistance	RG	VDS=15V , VGS=0V , f=1MHz	-	2.15	-	Ω
Dynamic characteristics						
Input Capacitance	Ciss	VDS=20V , VGS=0V , f=1MHz	-	6800	-	pF
Output Capacitance	Coss		-	2900	-	
Reverse Transfer Capacitance	Crss		-	121	-	
Total Gate Charge	Qg	VDS=20V , VGS=10V , ID=85A	-	116	-	nC
Gate-Source Charge	Qgs		-	52	-	
Gate-Drain Charge	Qgd		-	16	-	
Gate Plateau Voltage	Vplateau		-	2.5	-	V
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD=20V , VGS=10V , RG=1.6Ω, ID=85A	-	5.5	-	nS
Rise Time	Tr		-	19.6	-	
Turn-Off Delay Time	Td(off)		-	126	-	
Fall Time	Tf		-	56	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	IS		-	-	530	A
Reverse Recovery Time	Trr	IS=20A, di/dt=100A/us, TJ=25℃	-	78	-	nS
Reverse Recovery Charge	Qrr		-	102	-	nC

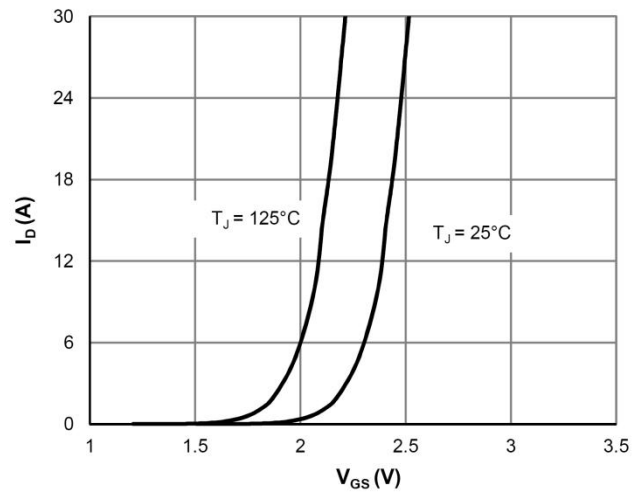
Note :

1. The test condition is $V_{DD}=15V$, $V_{GS}=10V$, $L=0.5mH$, $R_G=25\Omega$;

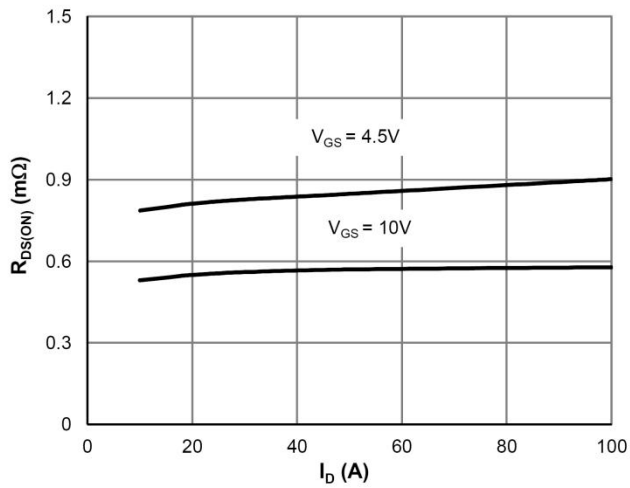
Typical Characteristics



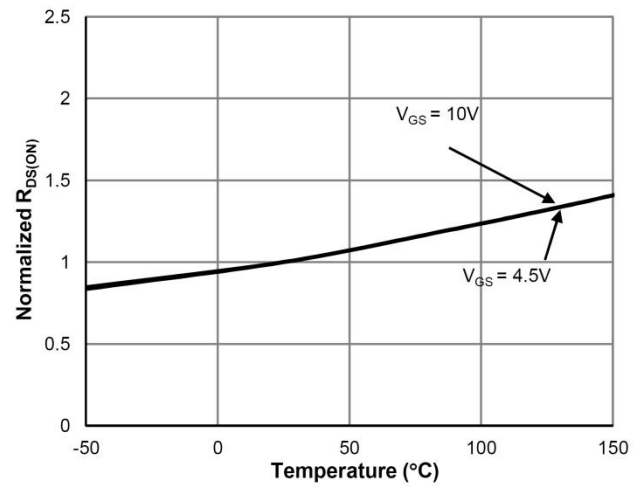
Saturation Characteristics



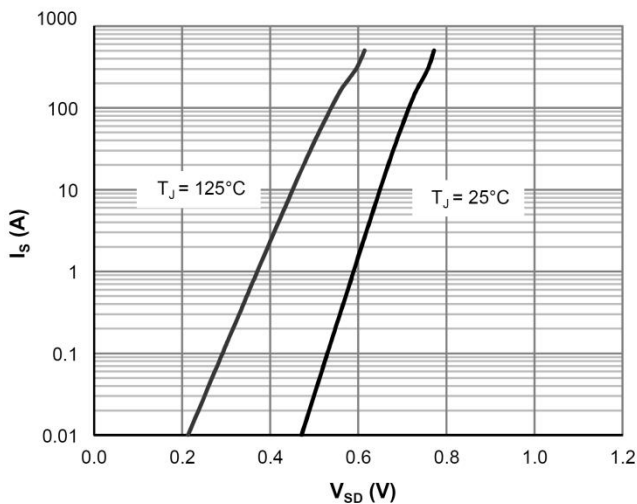
Transfer Characteristics



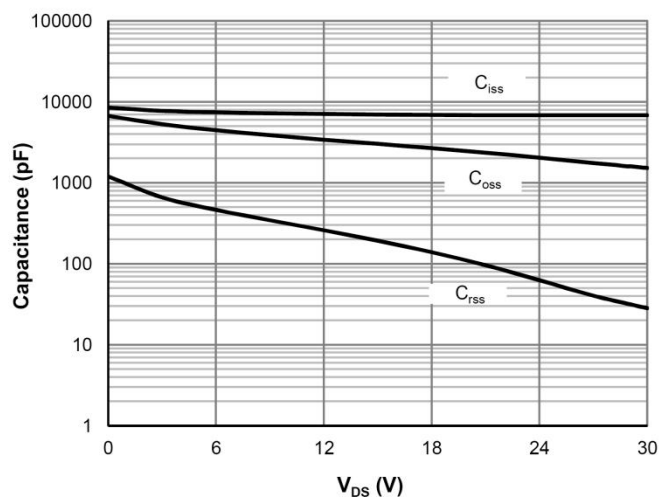
$R_{DS(on)}$ vs. Drain Current



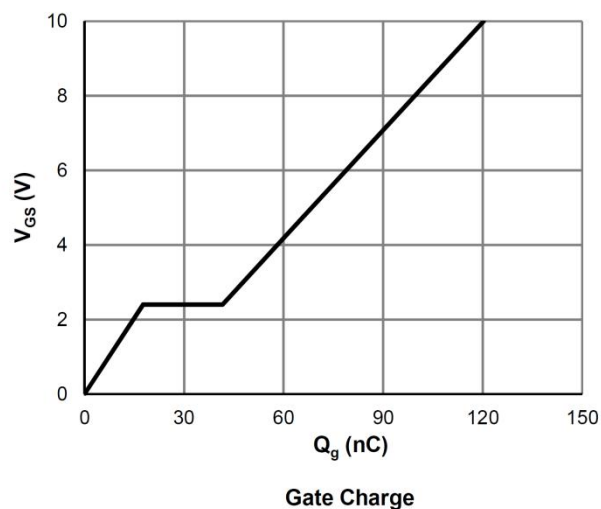
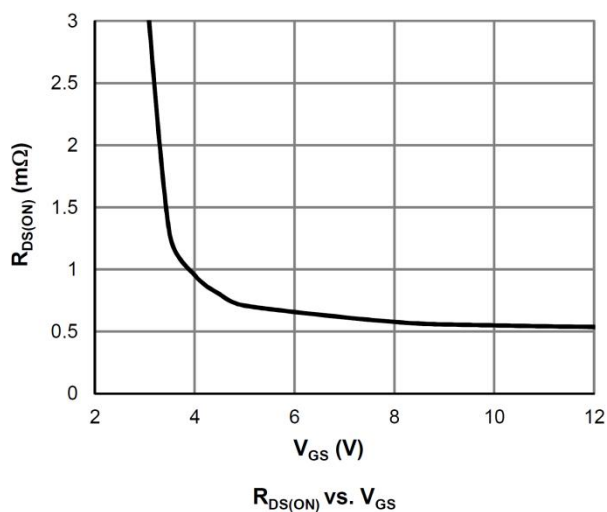
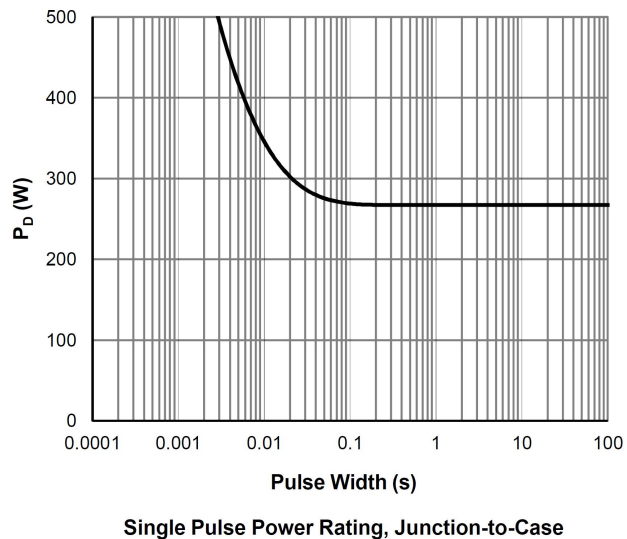
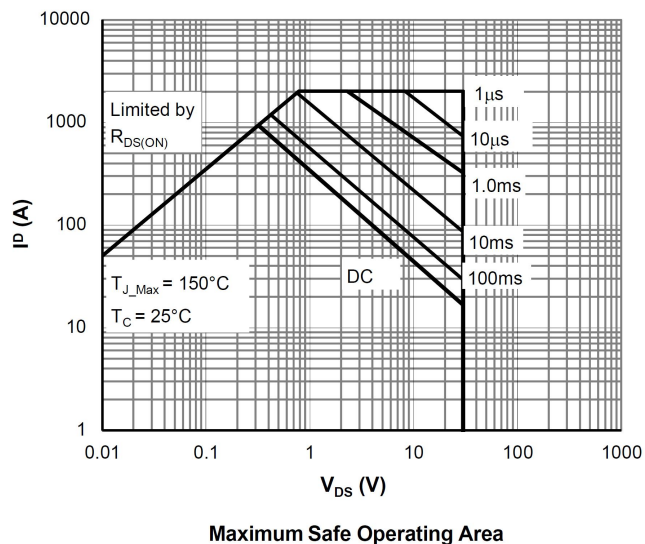
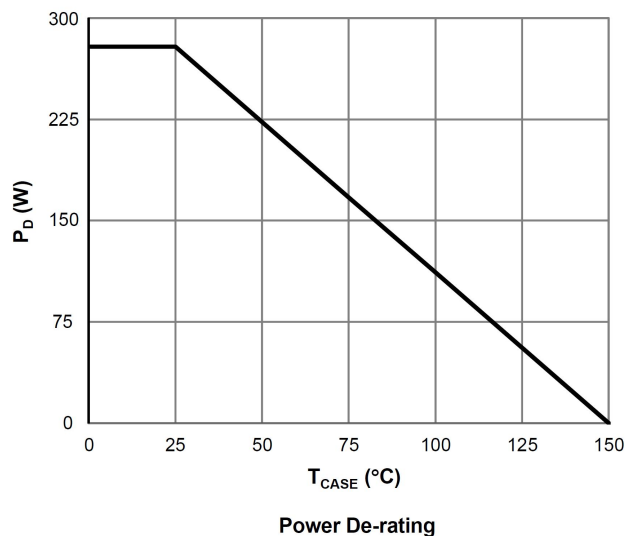
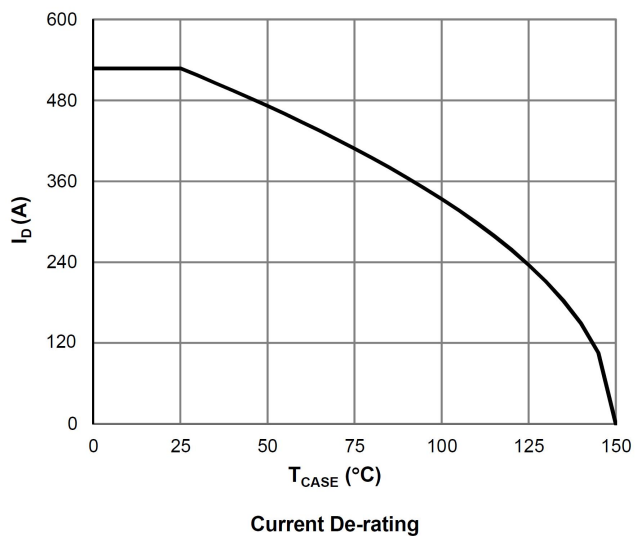
$R_{DS(on)}$ vs. Junction Temperature

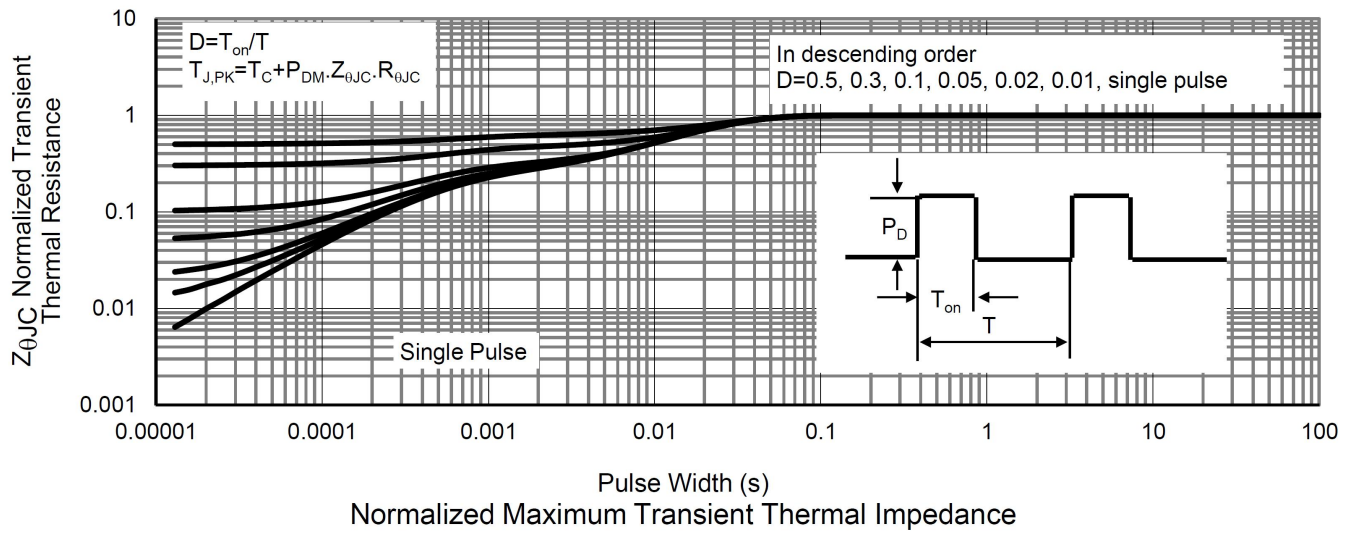


Body-Diode Characteristics



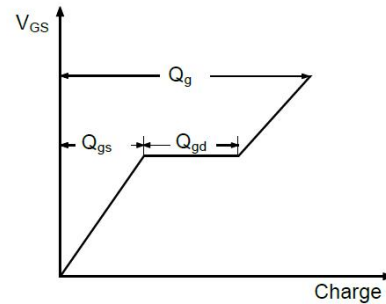
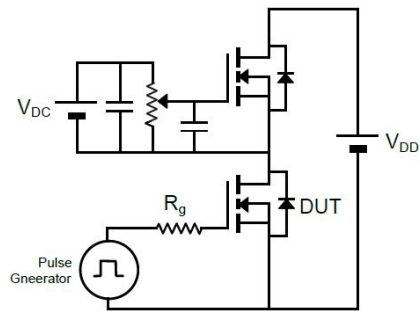
Capacitance Characteristics



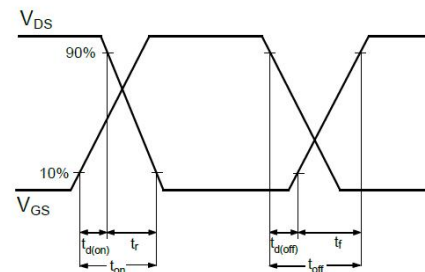
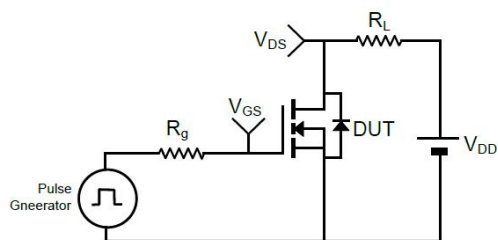


Test Circuit

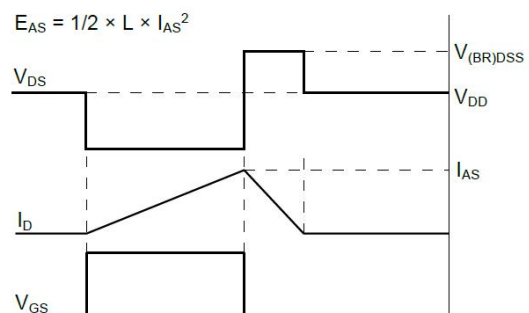
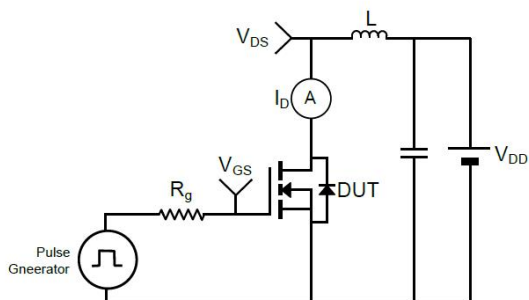
Gate Charge



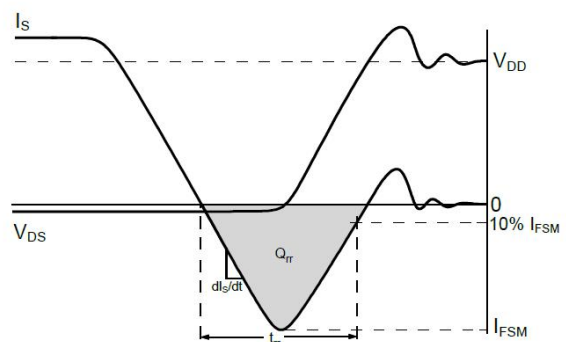
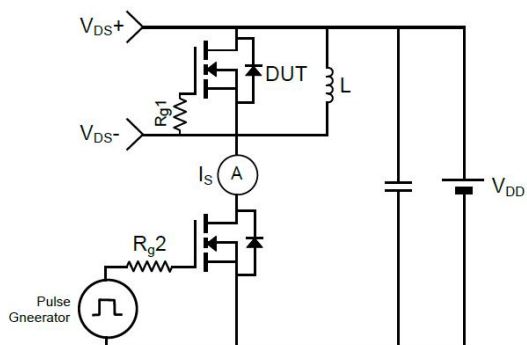
Resistive Load Switching Time



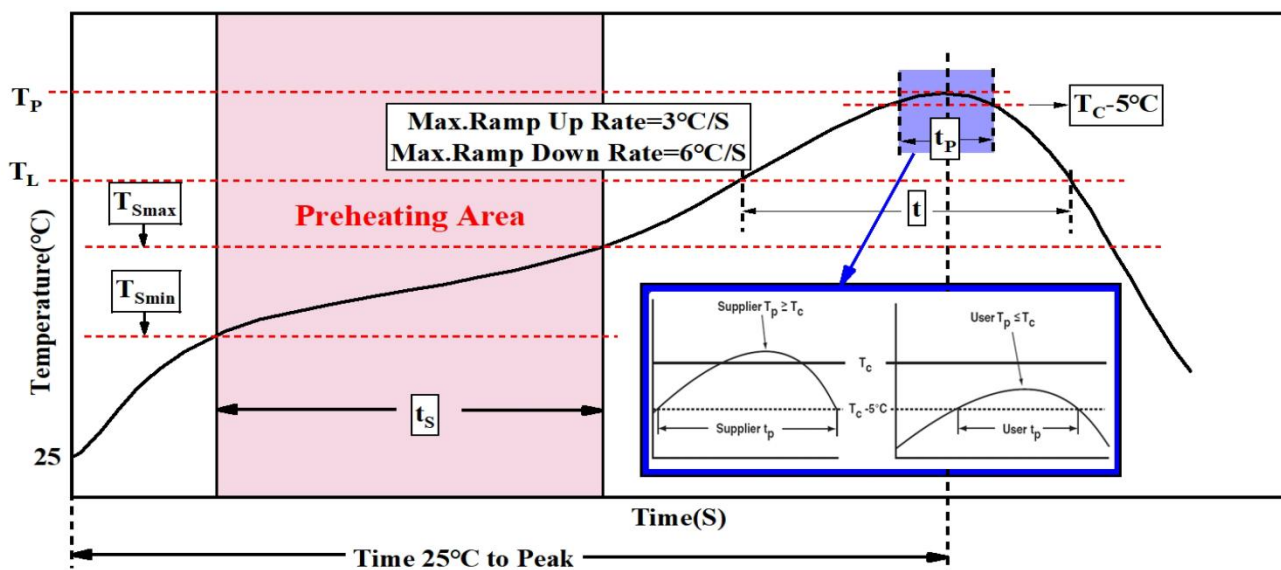
Un-clamped Inductive Load Switching



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		

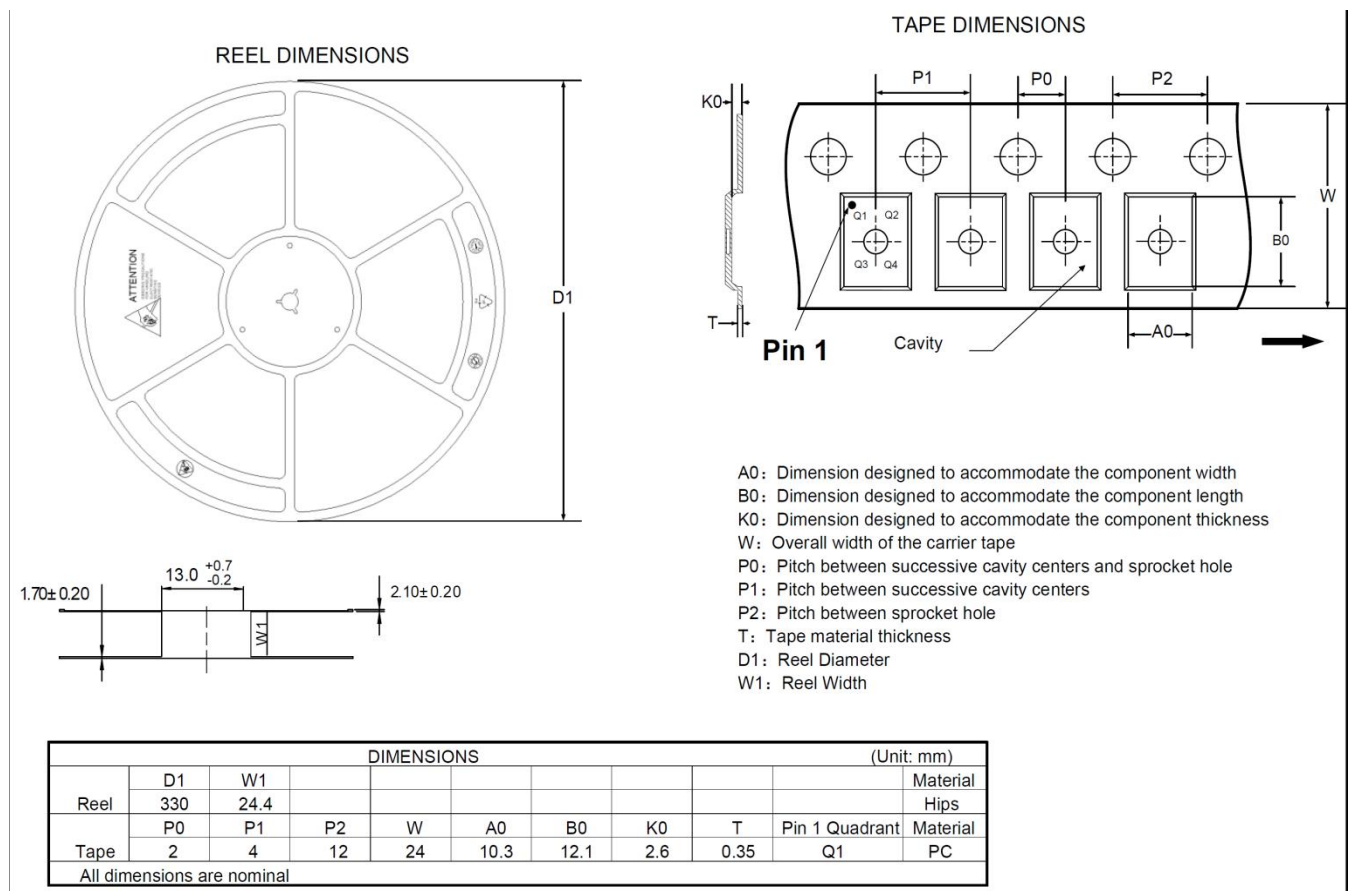
Table 1. SnPb Eutectic Process – Classification Temperatures (T_C)

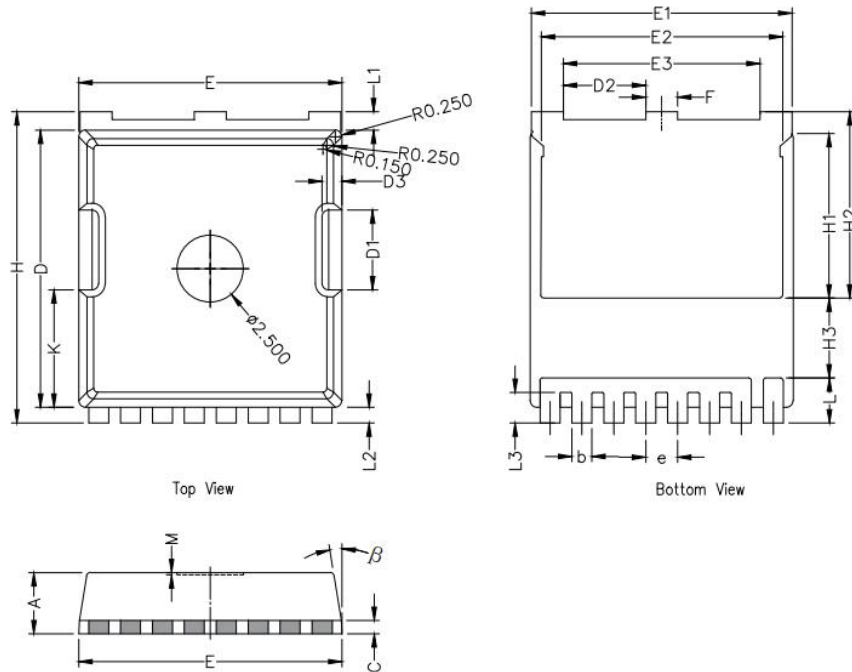
Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

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



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°