

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
150V	3.7mΩ@10V	250A



合肥矽普半导体

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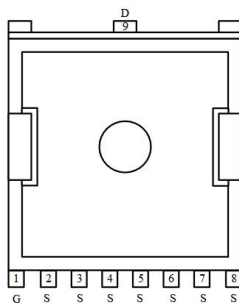
Feature

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

Applications

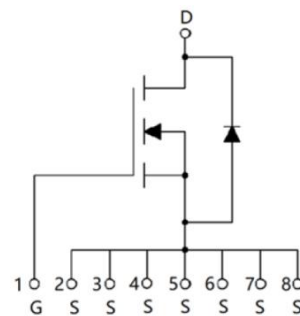
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

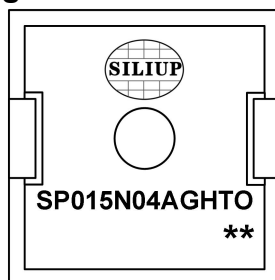


TOLL-8L

Circuit diagram



Marking



SP015N04AGHTO : Device Code
** : Week Code

Order Information

Device	Package	Unit/Tape
SP015N04AGHTO	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	250	A
Continuous Drain Current(Tc=100°C)	I _D	167	A
Pulsed Drain Current	I _{DM}	1000	A
Single Pulse Avalanche Energy ¹	E _{AS}	1386	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 _{θJC}	0.35	°C/W
Thermal Resistance Junction-to-Ambient	R _{θJA}	46	°C/W
Storage Temperature Range	T _{STG}	-55 to 175	°C
Operating Junction Temperature Range	T _J	-55 to 175	°C

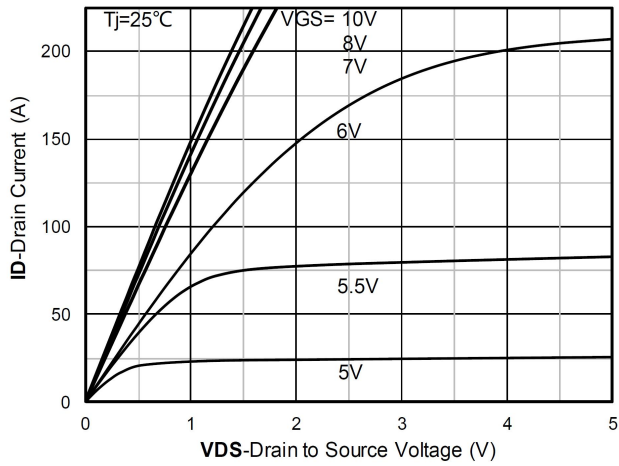
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	ID=250μA , VGS=0V	150	-	-	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	-	3.7	4.2	mΩ
Gate Resistance	R _G	f=1MHz	-	1.1	-	Ω
Dynamic characteristics						
Input Capacitance	C _{iss}	VDS=75V , VGS=0V , f=1MHz	-	4786	-	pF
Output Capacitance	C _{oss}		-	1256	-	
Reverse Transfer Capacitance	C _{rss}		-	38	-	
Total Gate Charge	Q _g	VDS=75V , VGS=10V , ID=20A	-	68	-	nC
Gate-Source Charge	Q _{gs}		-	23	-	
Gate-Drain Charge	Q _{gd}		-	15	-	
Gate Plateau Voltage	V _{plateau}		-	4.7	-	
Switching Characteristics						
Turn-On Delay Time	T _{d(on)}	VDD=75V , VGS=10V , RG=3.0Ω , ID=20A	-	13.8	-	nS
Rise Time	T _r		-	20.7	-	
Turn-Off Delay Time	T _{d(off)}		-	28.6	-	
Fall Time	T _f		-	11	-	
Diode Characteristics						
Diode Forward Voltage	V _{SD}	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	I _S		-	-	250	A
Reverse Recovery Time	T _{rr}	IS=140A , di/dt=100A/us , TJ=25℃	-	93	-	nS
Reverse Recovery Charge	Q _{rr}		-	288.5	-	nC

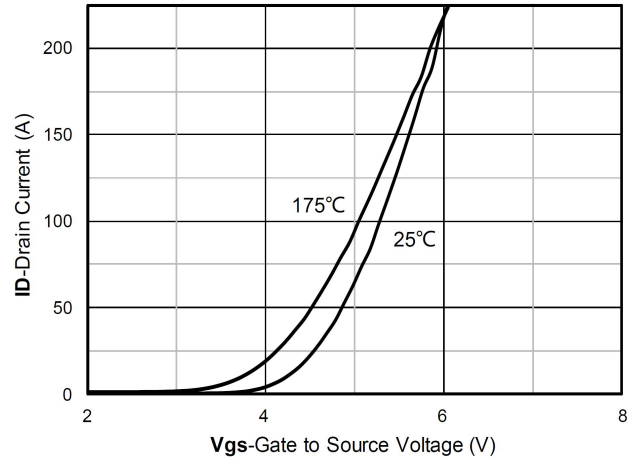
Note :

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

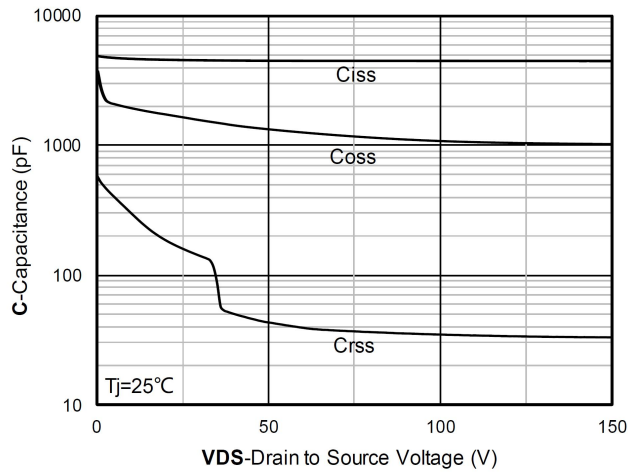
Typical Characteristics



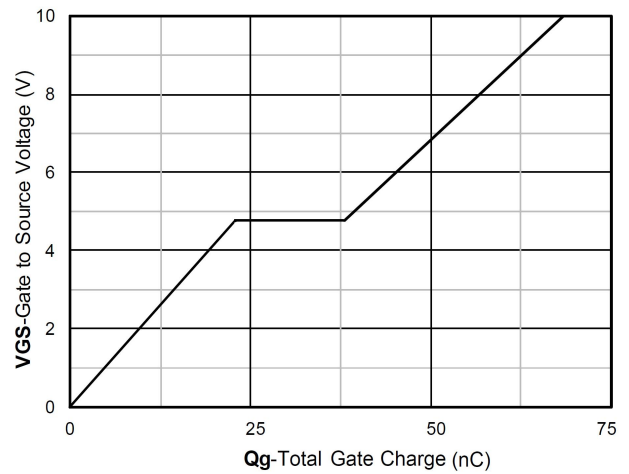
Output Characteristics



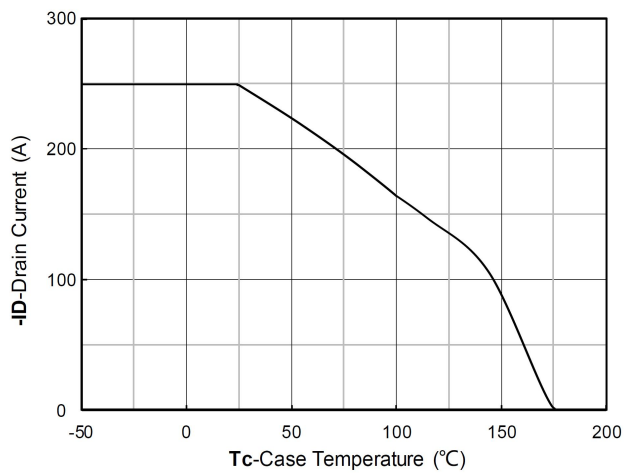
Transfer Characteristics



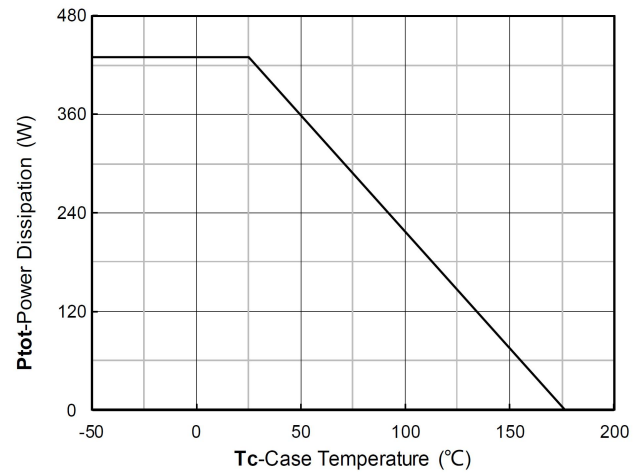
Capacitance Characteristics



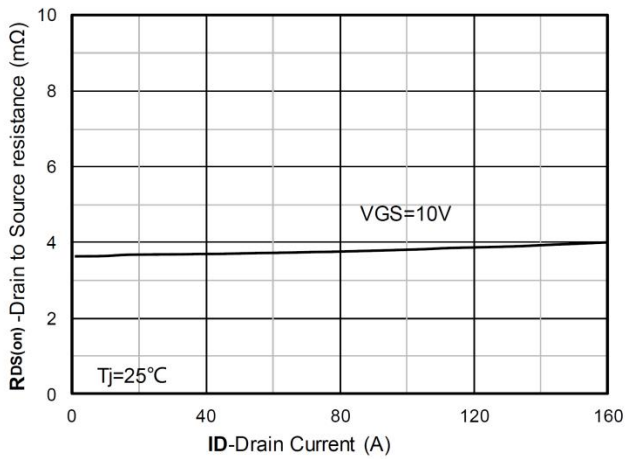
Gate Charge



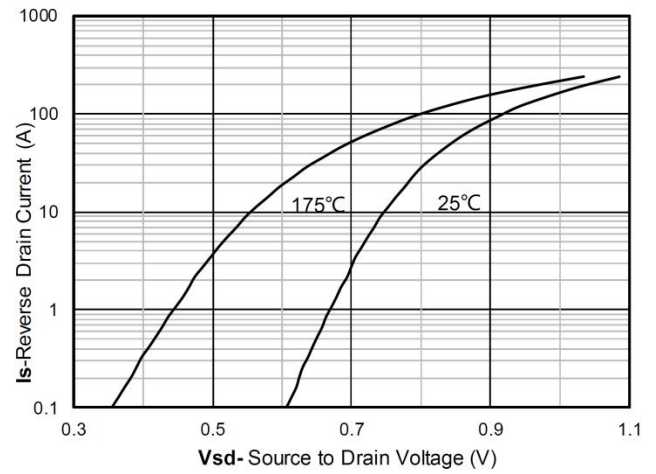
Current dissipation



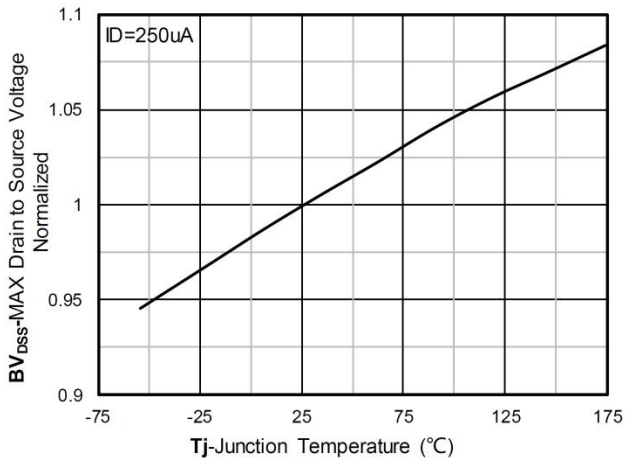
Power dissipation



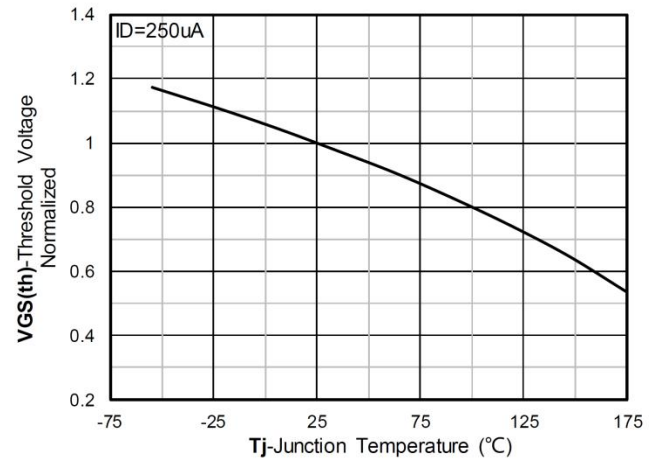
RDS(on) VS Drain Current



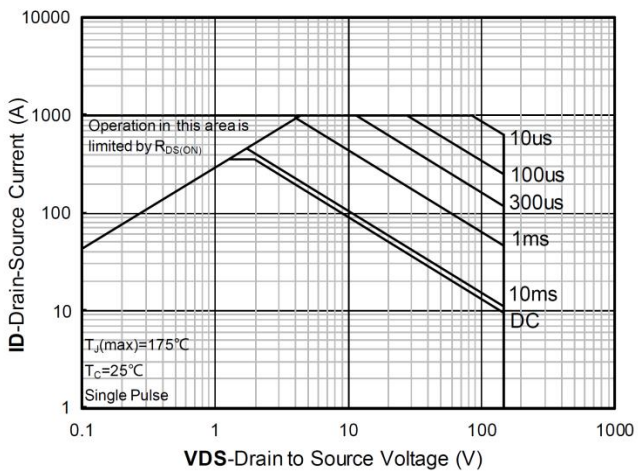
Forward characteristics of reverse diode



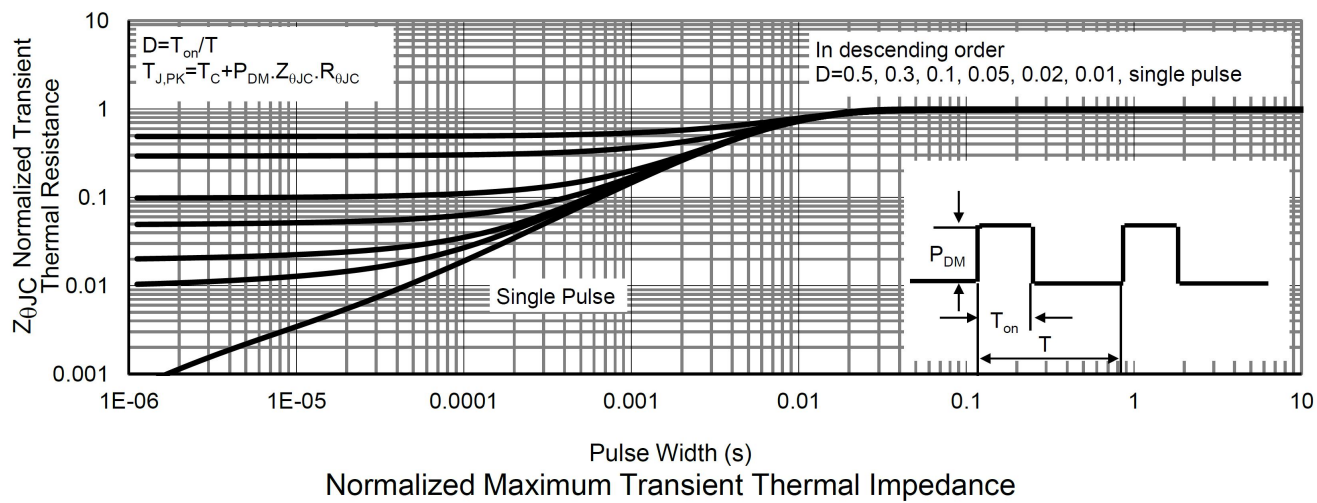
Normalized breakdown voltage



Normalized Threshold voltage

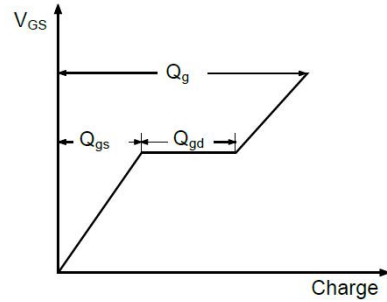
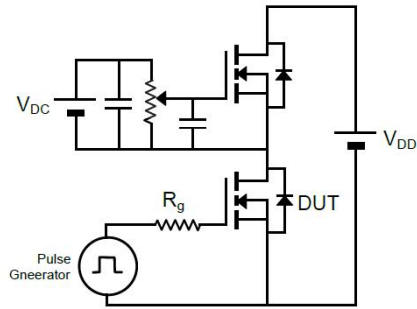


Safe Operation Area

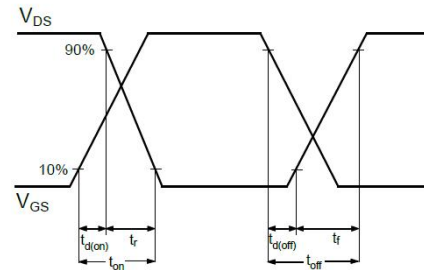
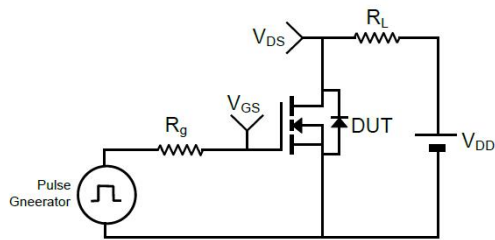


Test Circuit

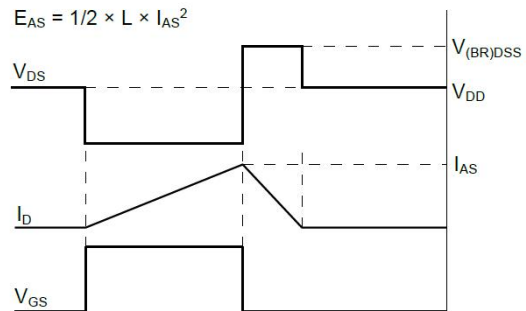
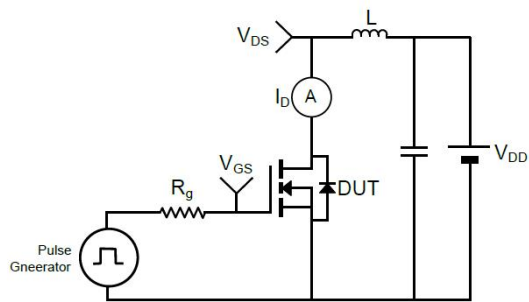
Gate Charge



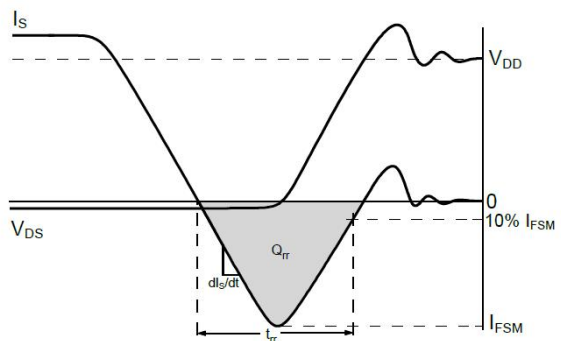
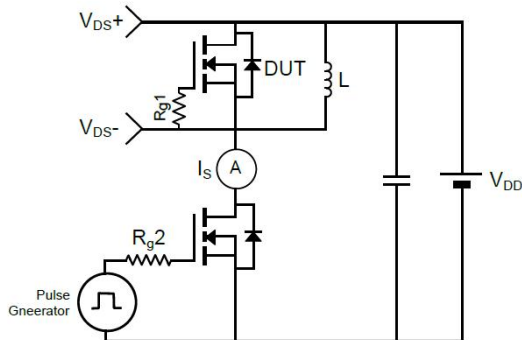
Resistive Load Switching Time



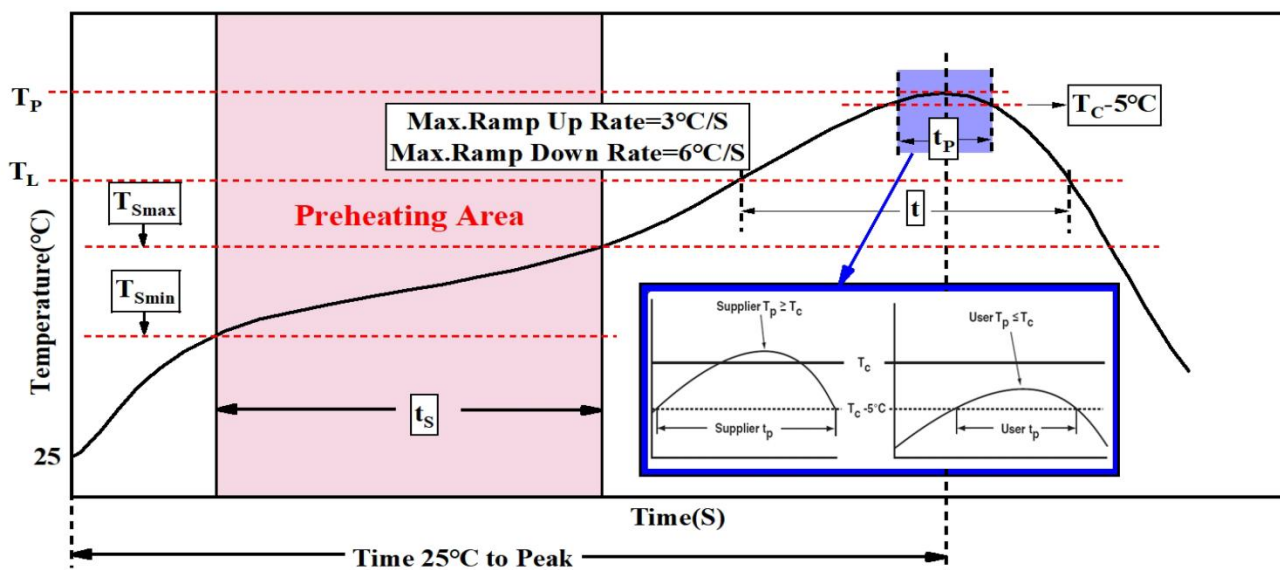
Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering



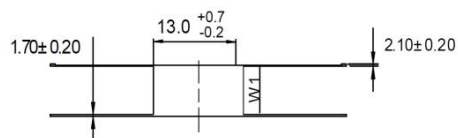
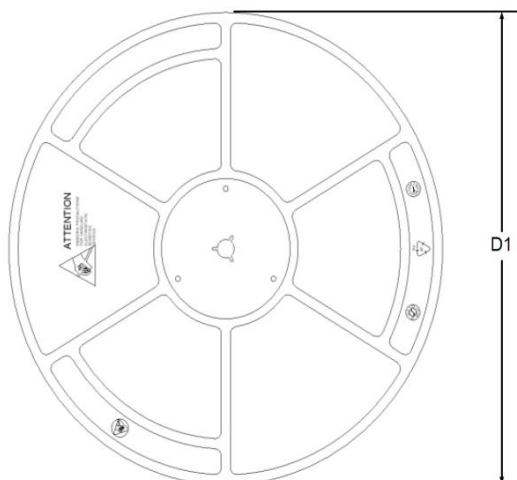
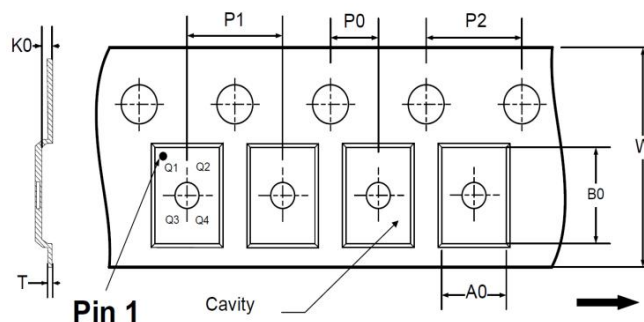
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T _{smin})	100°C	150°C
Temperature max (T _{smax})	150°C	200°C
Time (T _{smin} to T _{smax}) (t _s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T _{smax} to T _p)	3 °C/second max.	3°C/second max.
Liquidous 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

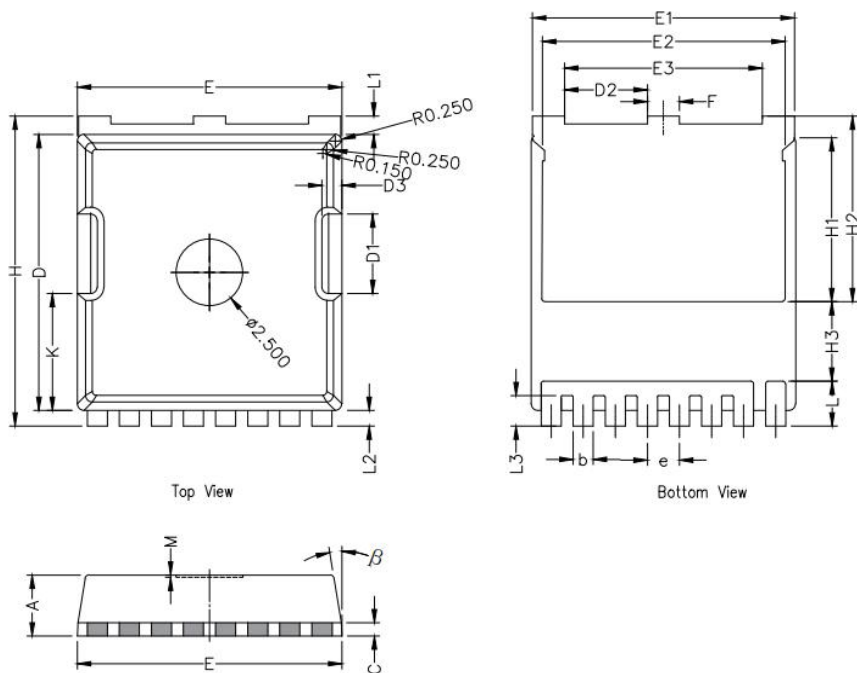
Table 2. Pb-free Process – Classification Temperatures (T_c)

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°