

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
110V	1.1mΩ@10V	375A



合肥矽普半导体

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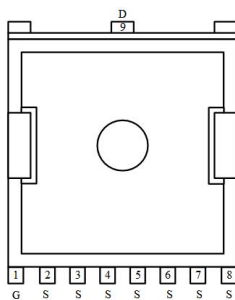
Feature

- Fast Switching
- Low Gate Charge and Rdson
- Advanced Split Gate Trench Technology
- 100% Single Pulse avalanche energy Test

Applications

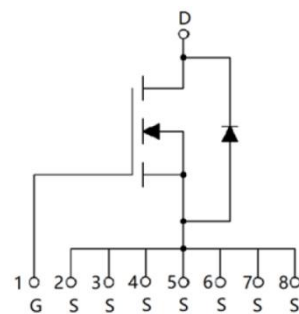
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

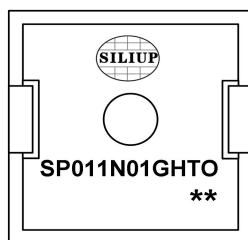


TOLL

Circuit diagram



Marking



SP011N01GHTO : Product code
** : Week code

Order Information

Device	Package	Unit/Tape
SP011N01GHTO	TOLL	2000

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	110	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Tc=25°C)	I_D	375	A
Continuous Drain Current (Tc=100°C)	I_D	250	A
Pulsed Drain Current	I_{DM}	1500	A
Single Pulse Avalanche Energy ¹	E_{AS}	2250	mJ
Power Dissipation (Tc=25°C)	P_D	396	W
Power Dissipation (Tc=100°C)	P_D	158	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.31	°C/W
Storage Temperature Range	T_{STG}	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	°C

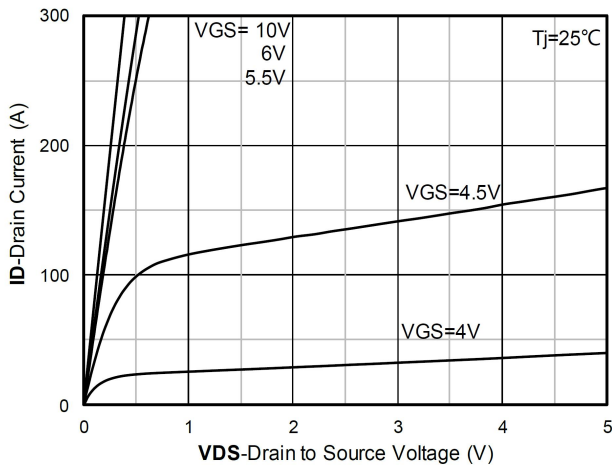
Electrical characteristics (Ta=25°C, unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250uA	110	116	-	V
Drain Cut-Off Current	I _{DSS}	VDS=90V , VGS=0V , TJ=25℃	-	-	1	μA
Gate Leakage Current	I _{GSS}	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	VGS=VDS , ID =250uA	2.6	3.0	3.4	V
Drain-Source ON Resistance	R _{DS(ON)}	VGS=10V , ID=50A	-	1.1	1.4	mΩ
Gate Resistance	R _G	VDS=55V , VGS=0V , f=1MHz	-	4.0	-	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	VDS=55V , VGS=0V , f=1MHz	-	12132	-	pF
Output Capacitance	C _{oss}		-	2947	-	
Reverse Transfer Capacitance	C _{rss}		-	203	-	
Total Gate Charge	Q _g	VDS=55V , VGS=10V , ID=100A	-	206	-	nC
Gate-Source Charge	Q _{gs}		-	68	-	
Gate-Drain Charge	Q _{gd}		-	69	-	
Gate Plateau Vlotage	V _{plateau}		-	4.5	-	V
Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	VDD=55V , VGS=10V , RG=6Ω , ID=100A	-	81	-	nS
Rise Time	t _r		-	176	-	
Turn-Off Delay Time	t _{d(off)}		-	165	-	
Fall Time	t _f		-	62	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V _{SD}	IS=1A , VGS=0V	-	-	1.2	V
Maximum Body-Diode Continuous Current	I _S		-	-	375	A
Reverse Recovery Time	Trr	IS=100A , di/dt=100A/us , TJ=25℃	-	87	-	nS
Reverse Recovery Charge	Qrr		-	201	-	nC

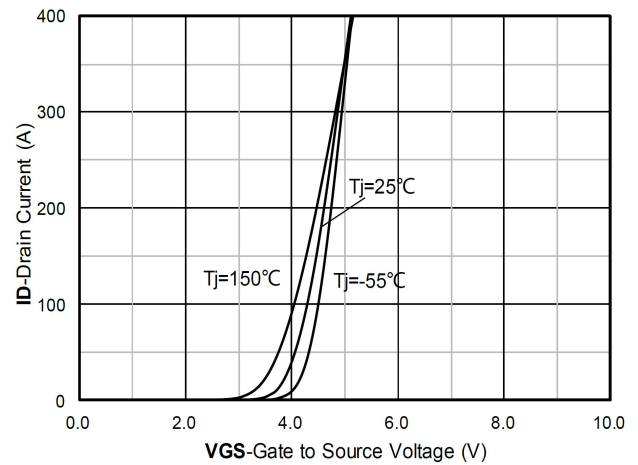
Note :

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

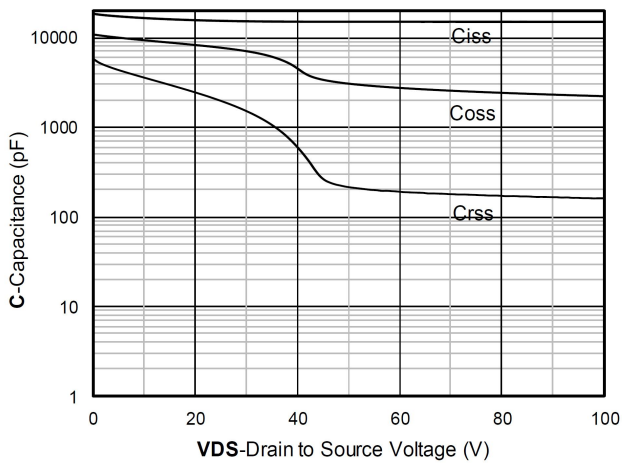
Typical Characteristics



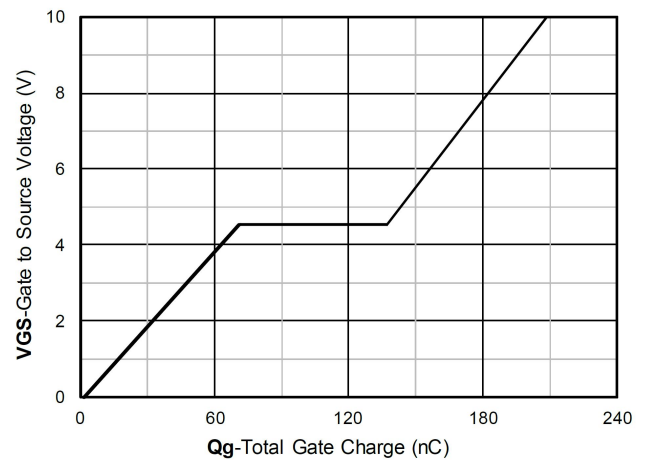
Output Characteristics



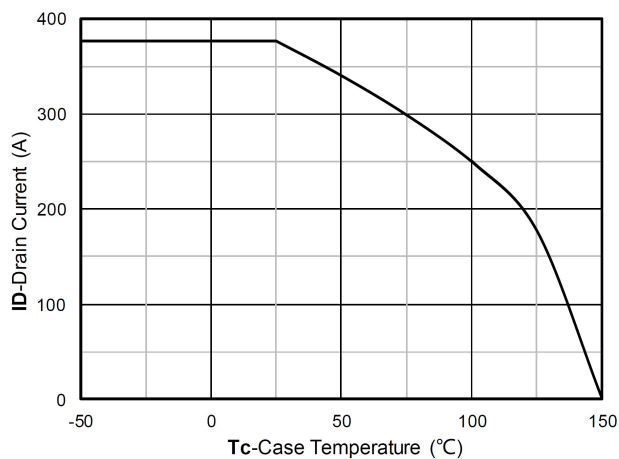
Transfer Characteristics



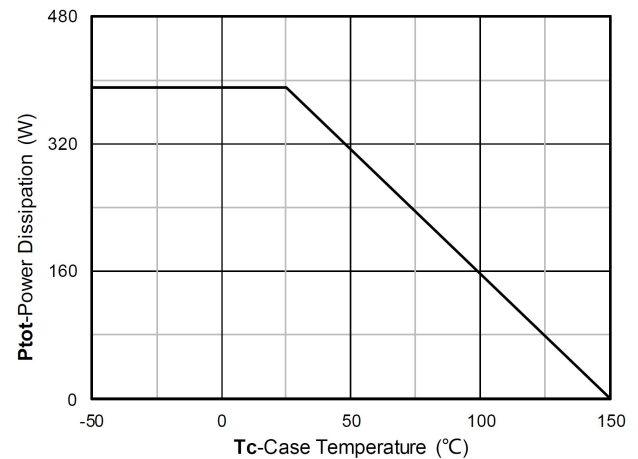
Capacitance Characteristics



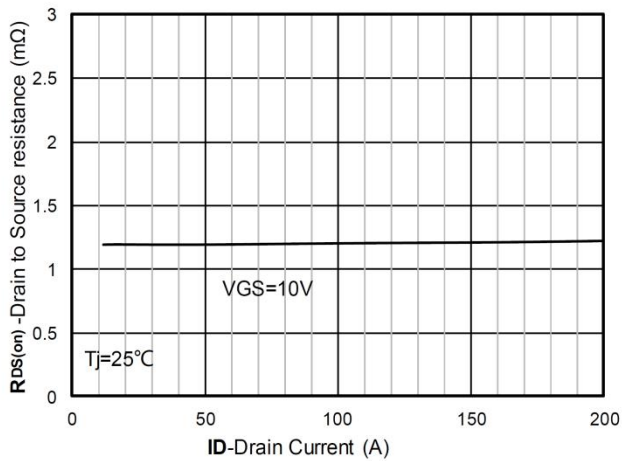
Gate Charge



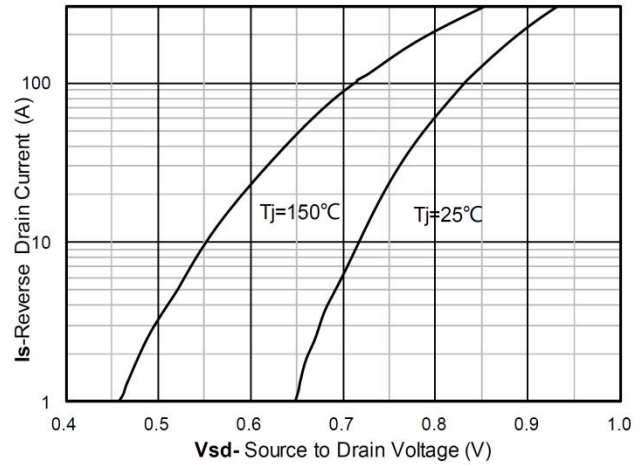
Current dissipation



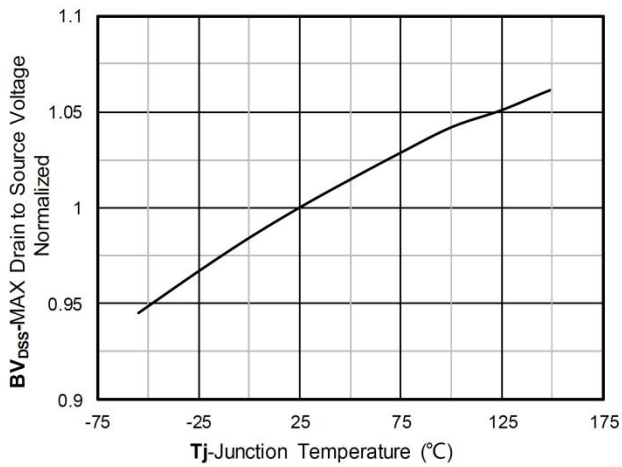
Power dissipation



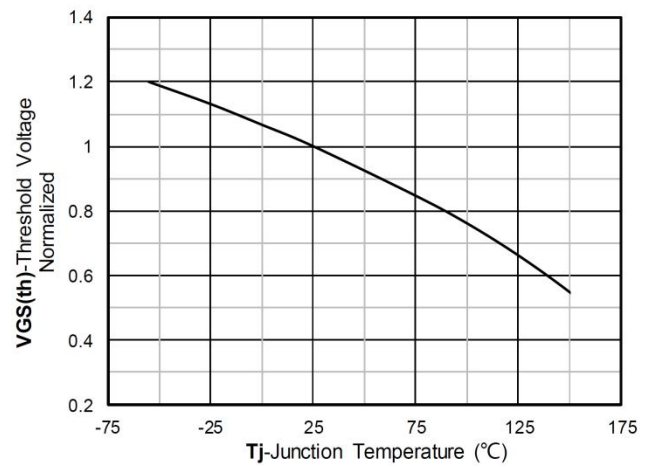
RDS(on) VS Drain Current



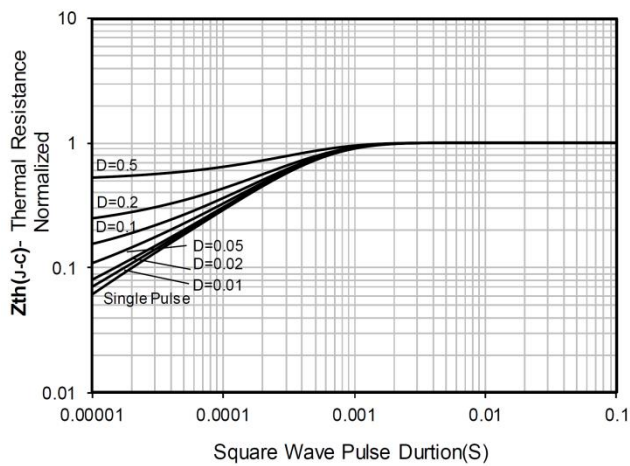
Forward characteristics of reverse diode



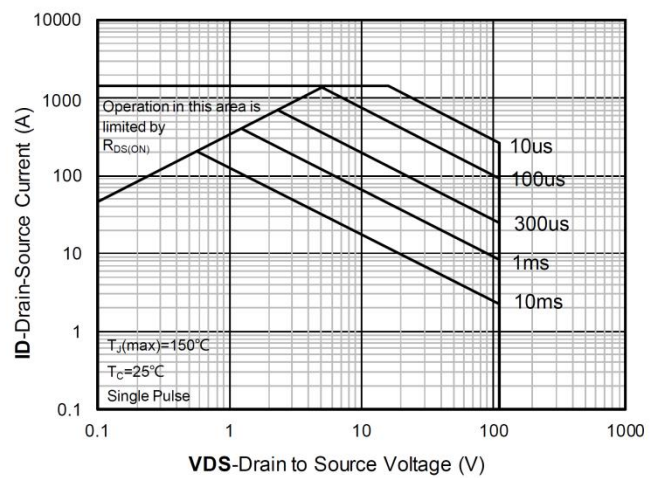
Normalized breakdown voltage



Normalized Threshold voltage



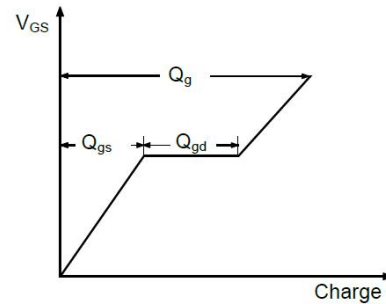
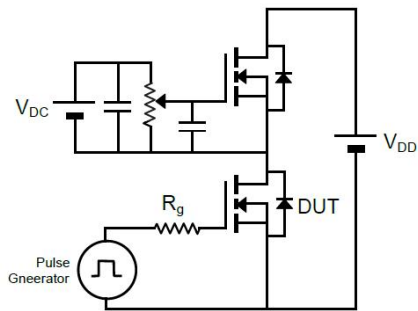
Maximum Transient Thermal Impedance



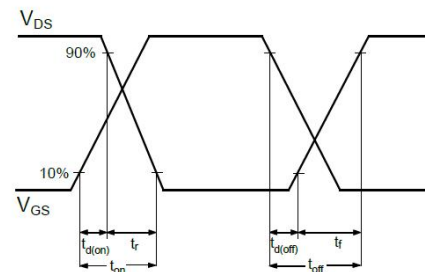
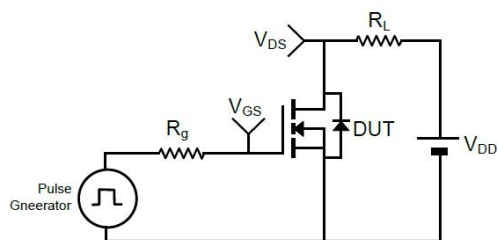
Safe Operation Area

Test Circuit

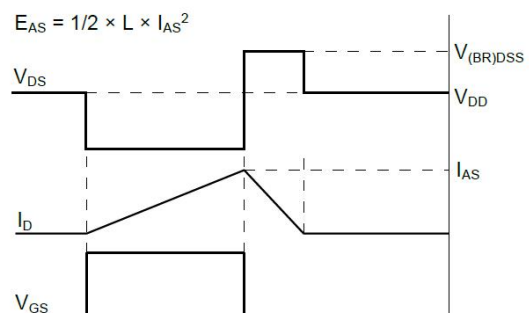
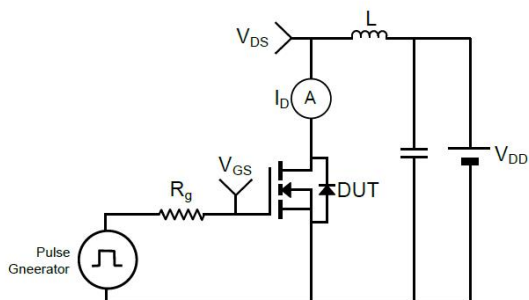
Gate Charge



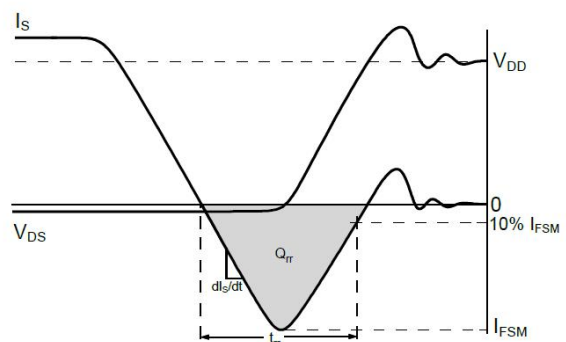
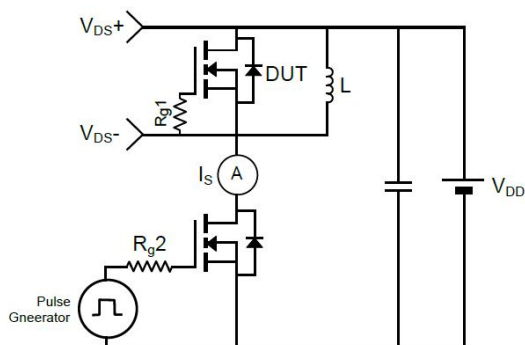
Resistive Load Switching Time



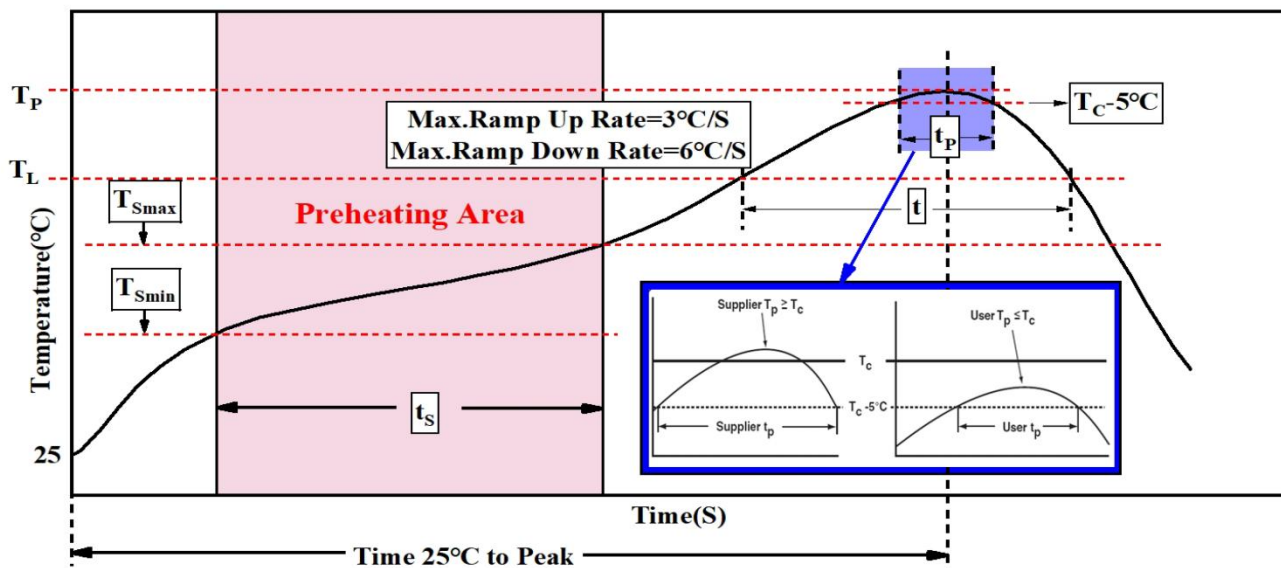
Un-clamped Inductive Load Switching



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)

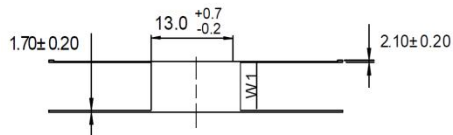
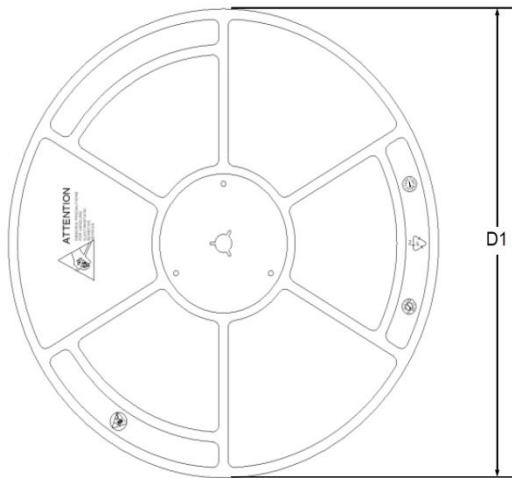
Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

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

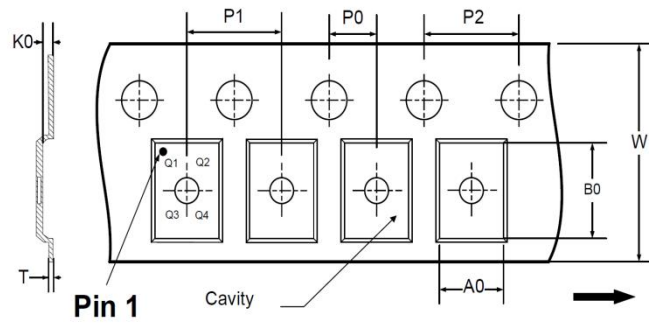
Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

TOLL Reel Information

REEL DIMENSIONS



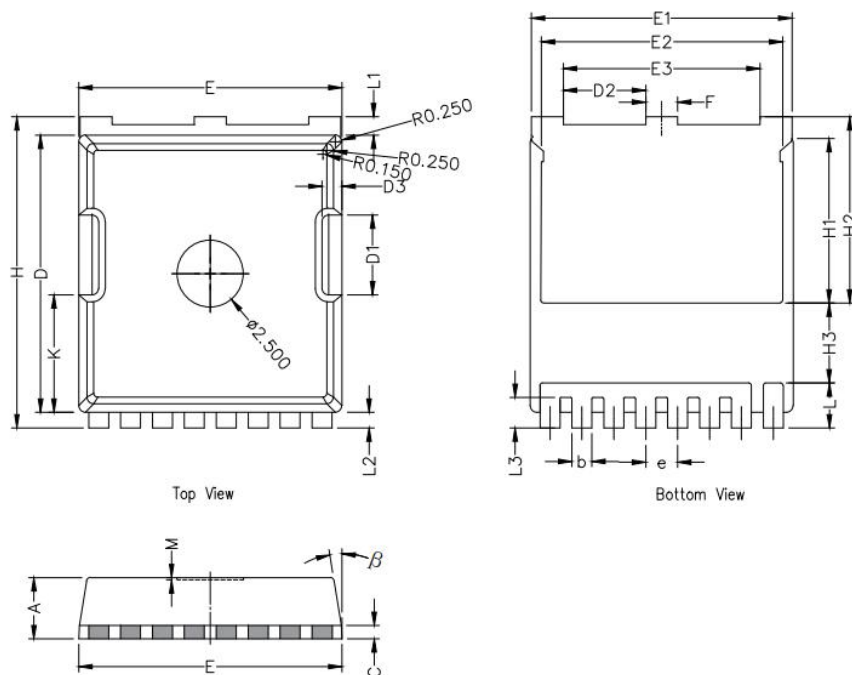
TAPE DIMENSIONS



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 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°