

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	0.8mΩ@10V	290A
	1.2mΩ@4.5V	



合肥矽普半导体

Siliup Semiconductor Technology Co., Ltd

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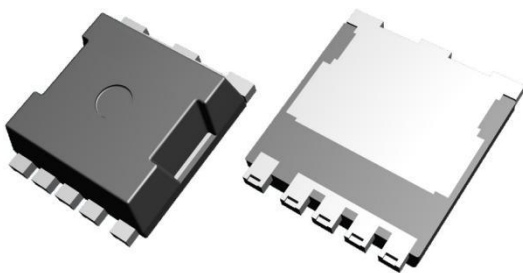
Feature

- Fast Switching
- Low Gate Charge and Rdson
- Advanced Split Gate Trench Technology
- 100% Single Pulse avalanche energy Test
- 175°C Junction Temperature

Applications

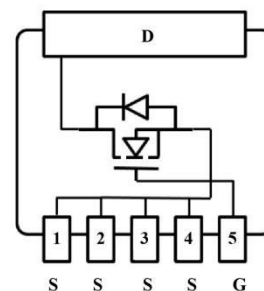
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

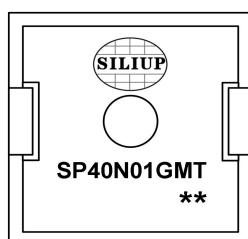


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Circuit diagram



Marking



SP40N01GMT
**

:Device Code
:Week Code

Order Information

Device	Package	Unit/Tape
SP40N01GMT	sTOLL	2000

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

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Tc=25°C)	I_D	290	A
Continuous Drain Current (Tc=100°C)	I_D	219	A
Pulsed Drain Current	I_{DM}	1160	A
Single Pulse Avalanche Energy ¹	E_{AS}	989	mJ
Total Power Dissipation (Tc=25°C)	P_D	438	W
Total Power Dissipation (Tc=100°C)	P_D	210	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.34	°C/W
Storage Temperature Range	T_{STG}	-55 to 175	°C
Operating Junction Temperature Range	T_J	-55 to 175	°C

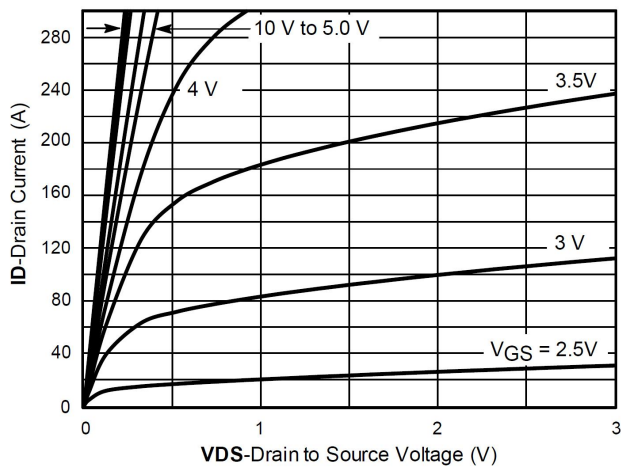
Electrical characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	VGS=0V , ID=250uA	40	47	-	V
Drain-Source Leakage Current	IDSS	VDS=32V , 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	1.1	1.5	2.1	V
Static Drain-Source On-Resistance	RDS(ON)	VGS=10V , ID=50A	-	0.8	1.0	mΩ
		VGS=4.5V , ID=50A	-	1.2	1.6	
Gate Resistance	RG	VDS=20V , VGS=0V , f=1MHz	-	3.6	-	Ω
Dynamic characteristics						
Input Capacitance	Ciss	VDS=20V , VGS=0V , f=1MHz	-	5423	-	pF
Output Capacitance	Coss		-	1850	-	
Reverse Transfer Capacitance	Crss		-	119	-	
Total Gate Charge	Qg	VDS=20V , VGS=10V , ID=30A	-	81	-	nC
Gate-Source Charge	Qgs		-	20	-	
Gate-Drain Charge	Qgd		-	18	-	
Gate Plateau Vlotage	Vplateau		-	3.5	-	V
Switching Characteristics						
Turn-On Delay Time	Td(on)	VDD=20V , VGS=10V , RG=1.6Ω , ID=30A	-	8	-	nS
Rise Time	Tr		-	16	-	
Turn-Off Delay Time	Td(off)		-	52	-	
Fall Time	Tf		-	12	-	
Diode Characteristics						
Diode Forward Voltage	VSD	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	Is		-	-	290	A
Reverse Recovery Time	Trr	IS=30A , di/dt=100A/us , TJ=25℃	-	22	-	nS
Reverse Recovery Charge	Qrr		-	38	-	nC

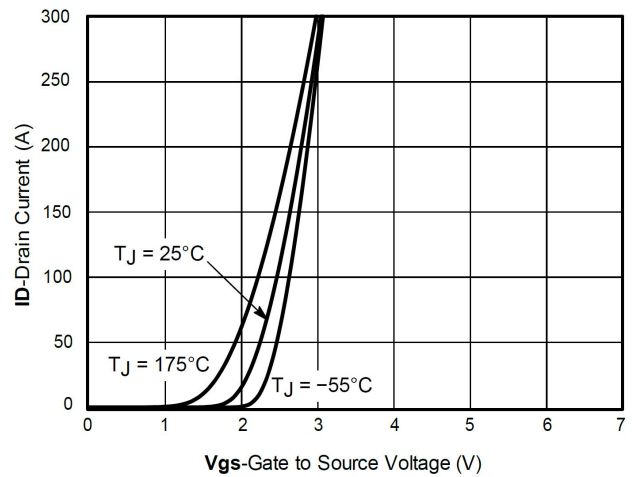
Note :

1. The test condition is $V_{DD}=20V, V_{GS}=10V, L=0.5mH, R_G=25\Omega$

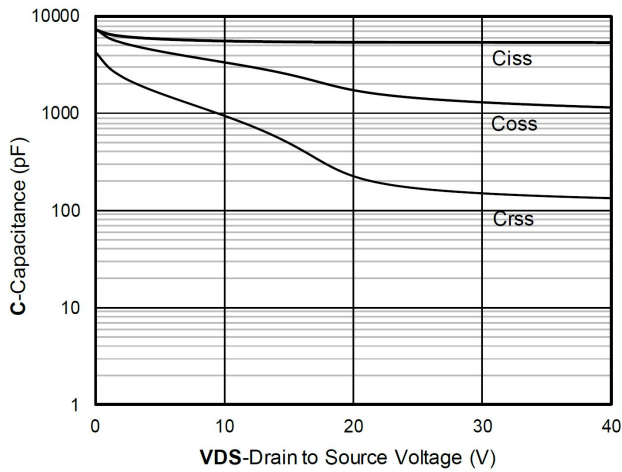
Typical Characteristics



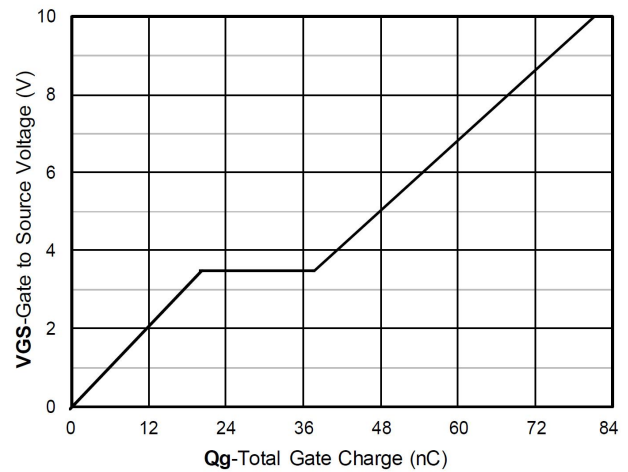
Output Characteristics



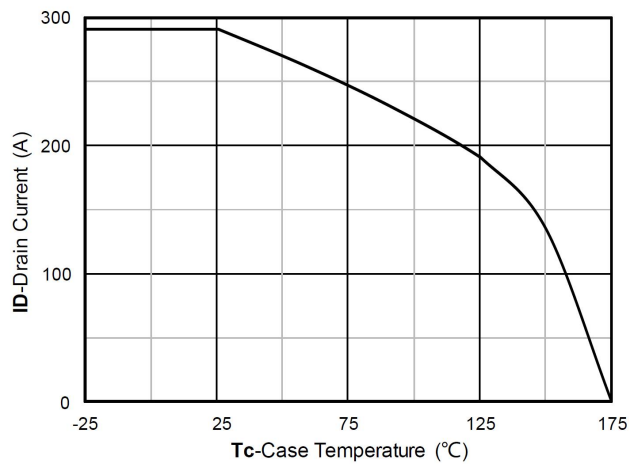
Transfer Characteristics



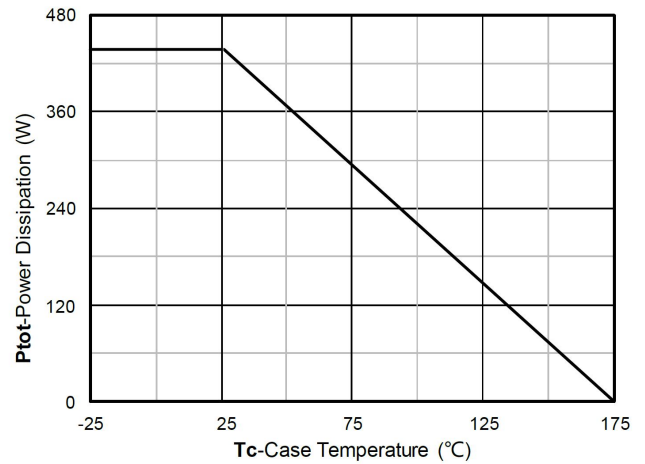
Capacitance Characteristics



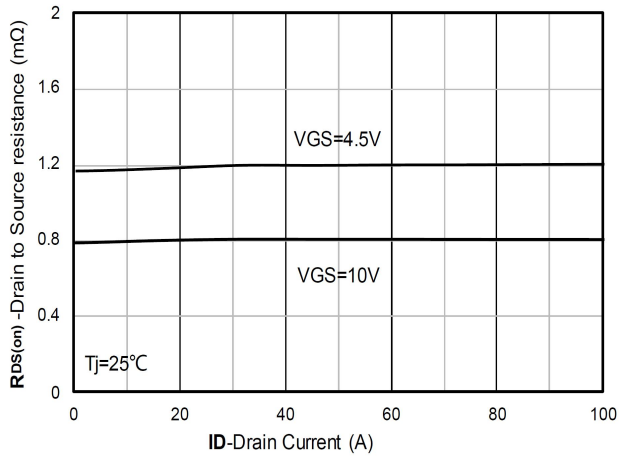
Gate Charge



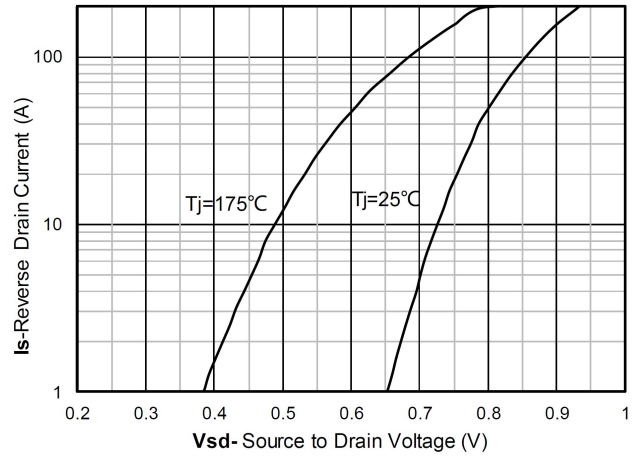
Current dissipation



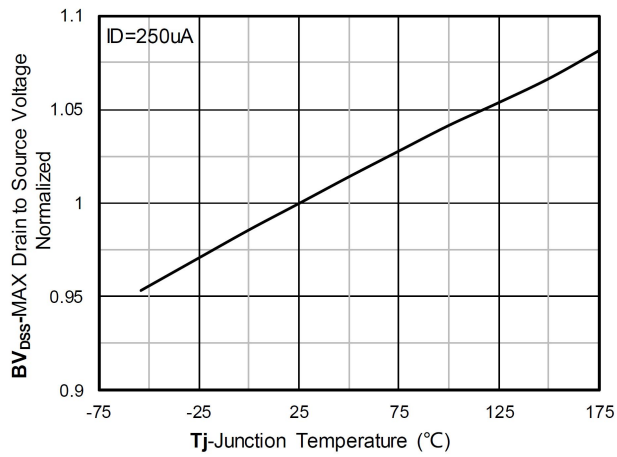
Power dissipation



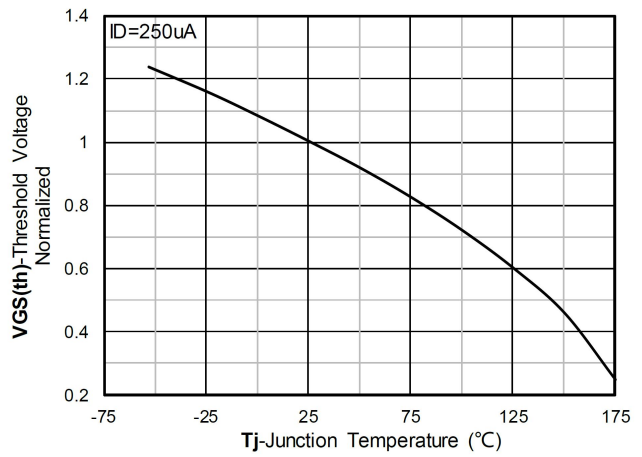
$R_{DS(on)}$ VS Drain Current



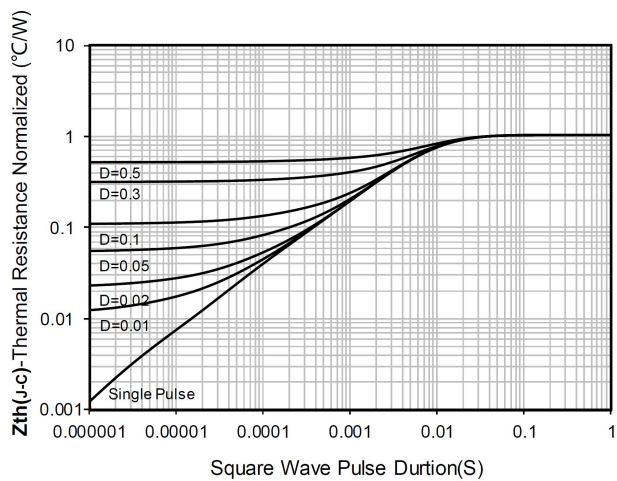
Forward characteristics of reverse diode



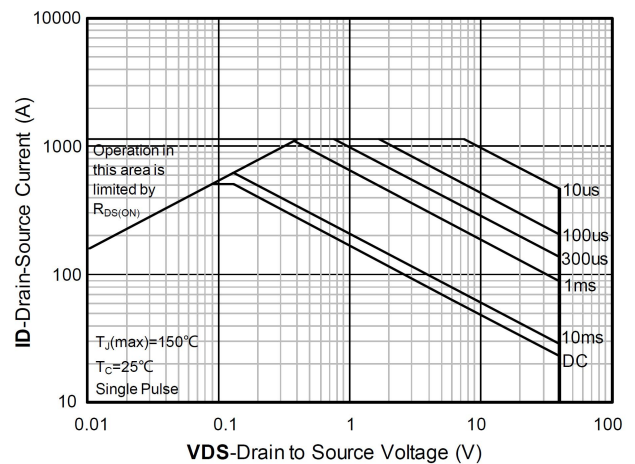
Normalized breakdown voltage



Normalized Threshold voltage



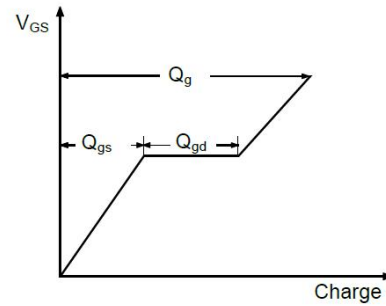
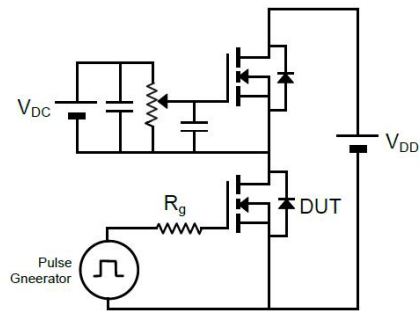
Maximum Transient Thermal Impedance



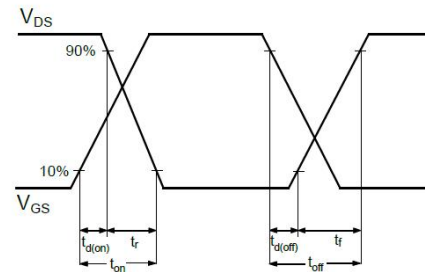
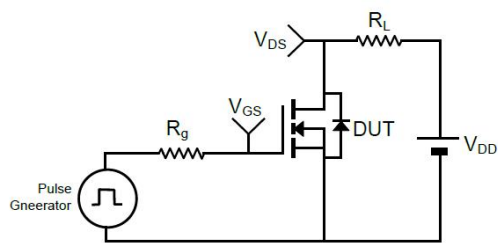
Safe Operation Area

Test Circuit

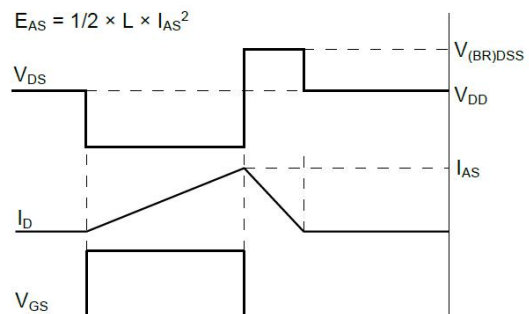
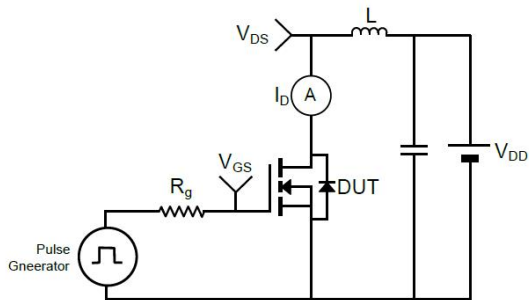
Gate Charge



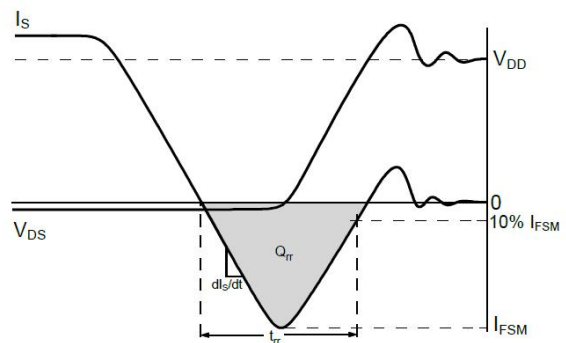
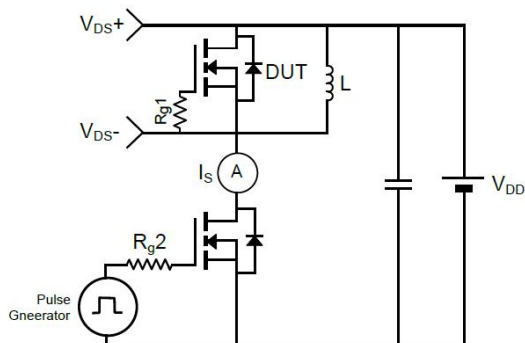
Resistive Load Switching Time

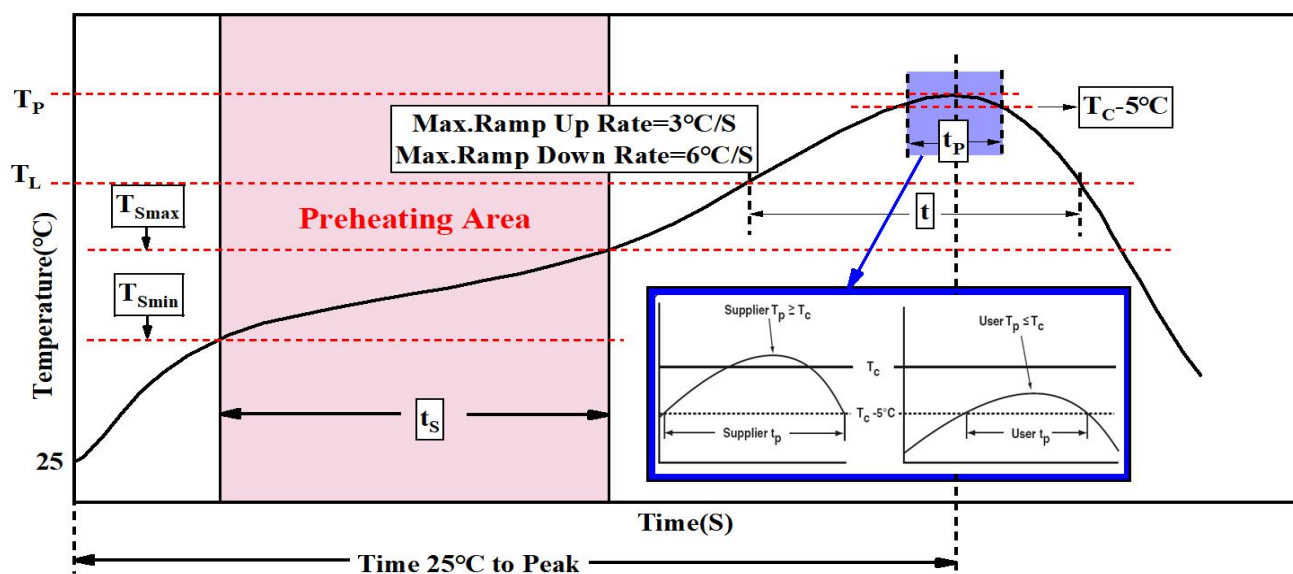


Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering(Sn-Pb Eutectic&Pb-Free)


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)

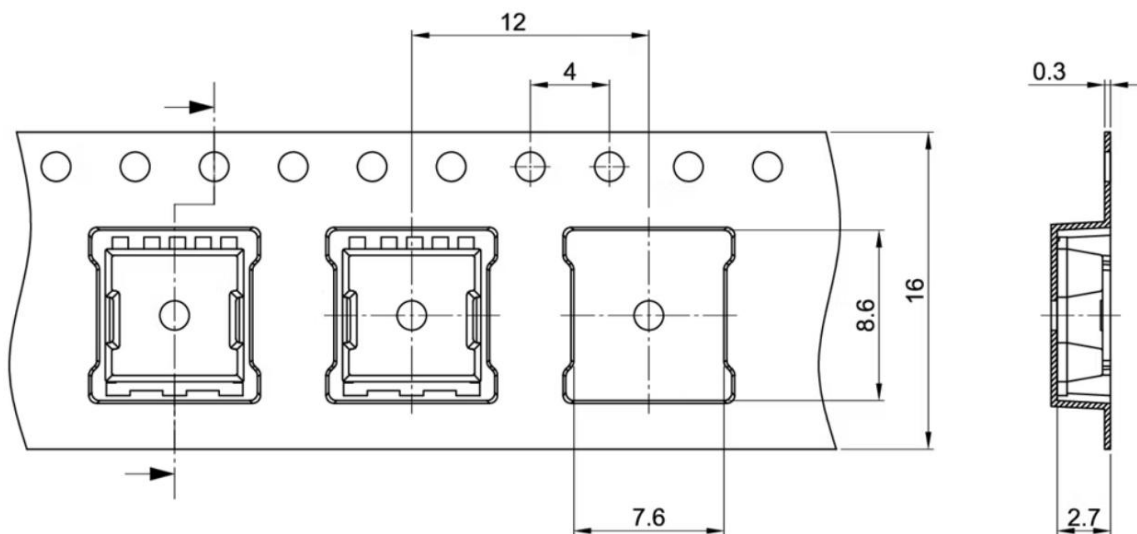
Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

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

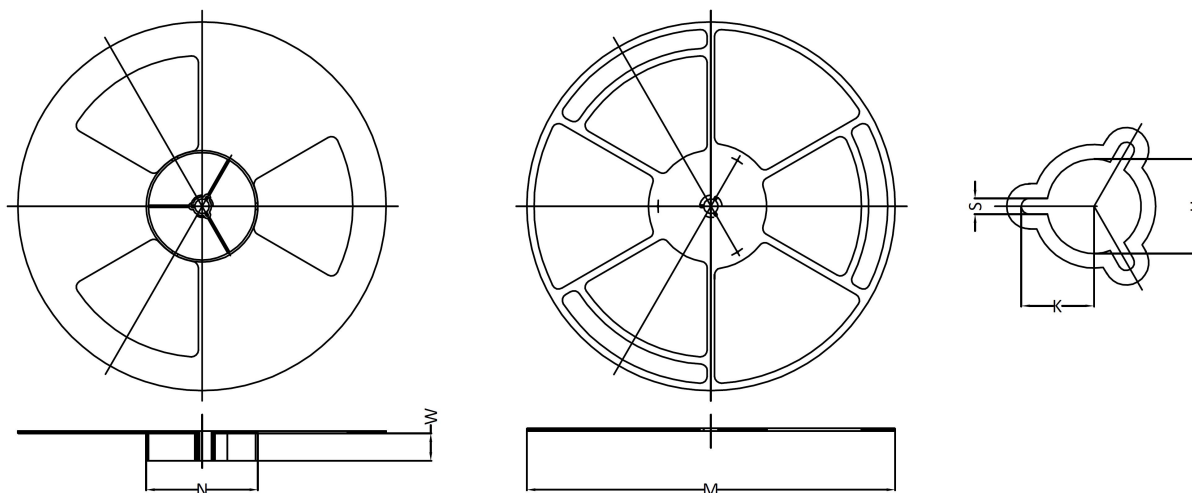
sTOLL Tape and Reel

sTOLL Embossed Carrier Tape



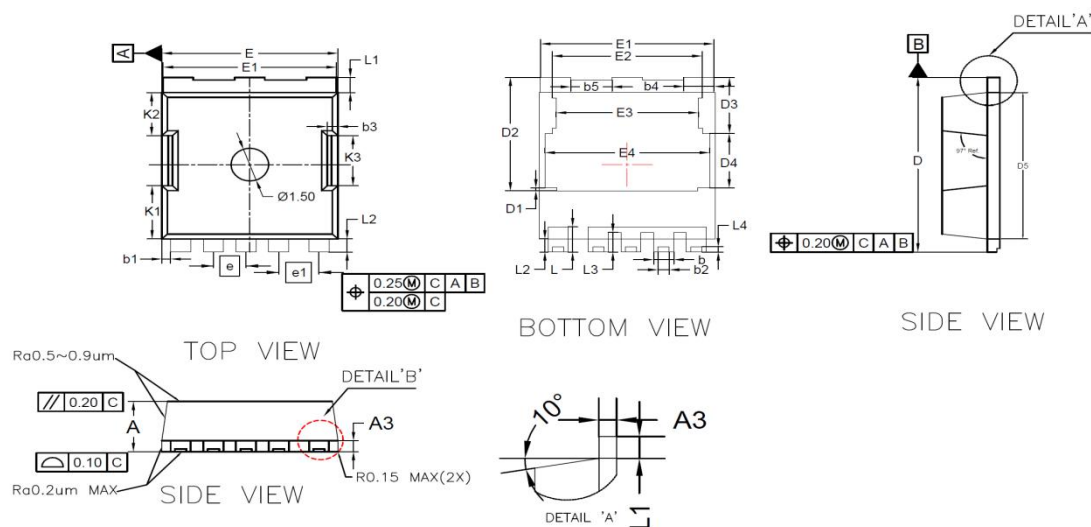
All dimensions are in units mm

sTOLL Reel



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	H	K	S
24 mm	Ø330	Ø330.00 +0.25 -4.00	Ø100.00 ±0.2	24.4 +2.0 -0.0	Ø13.00 +0.50 -0.20	10.5 ±0.25	2.2 ±0.25

sTOLL Package Information


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	2.262	2.300	2.338
A3	0.492	0.500	0.508
D	7.950	8.000	8.050
D5	6.650	6.700	6.750
E	6.950	7.000	7.050
e	1.30 BCS		
e1	1.60 BCS		
D1	0.130 ref		
D2	5.150	5.200	5.250
D3	2.520	2.570	2.620
D4	2.450	2.500	2.550
b	0.750	0.800	0.850
b1	0.350 ref		
b2	0.350	0.450	0.550
b3	0.400	0.425	0.450
b4	1.100	1.200	1.300
b5	1.550	1.650	1.750
L	1.100	1.150	1.200
L1	0.650	0.700	0.750
L2	0.550	0.600	0.650
L3	0.850	0.900	0.950
L4	0.185	0.235	0.285
E1	6.850	6.900	6.950
E2	5.910	5.960	6.010
E3	5.610	5.660	5.710
E4	6.510	6.560	6.610
K1	2.430 ref		
K2	1.970 ref		
K3	2.275	2.300	2.325