

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
85V	0.85mΩ@10V	460A



合肥矽普半导体

Siliup Semiconductor Technology Co., Ltd

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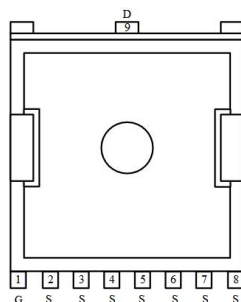
Feature

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

Applications

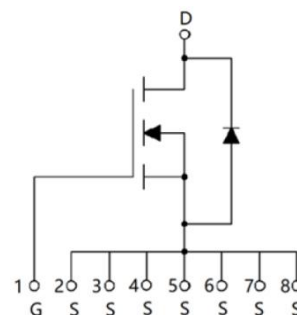
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

Package

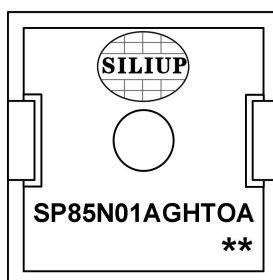


TOLL-8L

Circuit diagram



Marking



SP85N01AGHTOA : Product code
** : Week code

Order Information

Device	Package	Unit/Tape
SP85N01AGHTOA	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 Current (Tc=25°C)	I_D	460	A
Continuous Drain Current (Tc=100°C)	I_D	307	A
Pulsed Drain Current	I_{DM}	1840	A
Single Pulse Avalanche Energy ¹	E_{AS}	3600	mJ
Power Dissipation (Tc=25°C)	P_D	680	W
Power Dissipation (Tc=100°C)	P_D	340	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.22	°C/W
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	36	°C/W
Storage Temperature Range	T_{STG}	-55 to 175	°C
Operating Junction Temperature Range	T_J	-55 to 175	°C

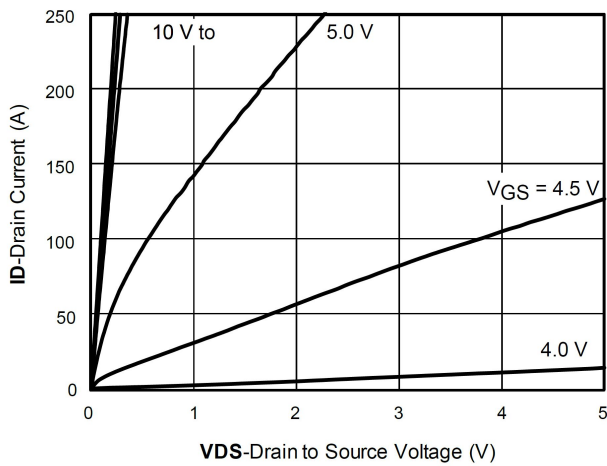
Electrical characteristics (Ta=25°C, unless otherwise noted)

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	I _{DSS}	VDS=85V , VGS=0V	-	-	1	μA
Gate Leakage Current	I _{GSS}	VGS=±20V , VDS=0V	-	-	±100	nA
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	-	0.85	1.0	mΩ
Gate Resistance	R _G	f=1.0MHz	-	1.9	-	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	VDS=40V , VGS=0V , f=1.0MHz	-	13000	-	pF
Output Capacitance	C _{oss}		-	5232	-	
Reverse Transfer Capacitance	C _{rss}		-	171	-	
Total Gate Charge	Q _g	VDS=40V , VGS=10V , ID=100A	-	207	-	nC
Gate-Source Charge	Q _{gs}		-	68	-	
Gate-Drain Charge	Q _{gd}		-	44	-	
Gate Plateau Voltage	V _{plateau}		-	5	-	V
Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	VGS=10V , VDS=40V , ID=100A , RG=2.5Ω	-	12	-	nS
Rise Time	t _r		-	47	-	
Turn-Off Delay Time	t _{d(off)}		-	34	-	
Fall Time	t _f		-	48	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V _{SD}	IS=1A , VGS=0V , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	I _S		-	-	460	A
Reverse Recovery Time	Trr	IS=100A , di/dt=100A/us , TJ=25℃	-	110	-	nS
Reverse Recovery Charge	Qrr		-	190	-	nC

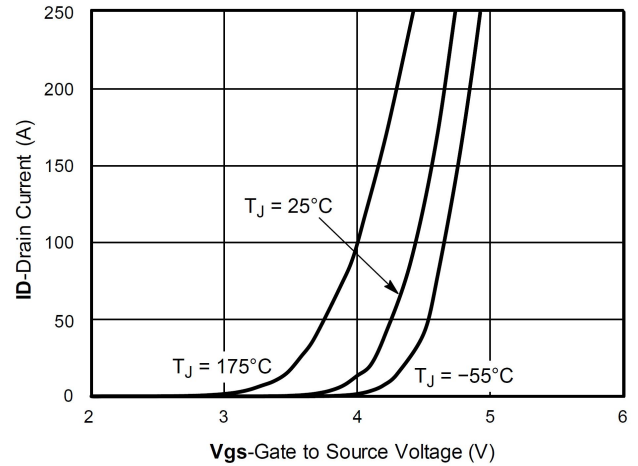
Note :

1. The test condition is $V_{DD}=40V$, $V_{GS}=10V$, $L=0.5mH$, $R_G=25\Omega$;

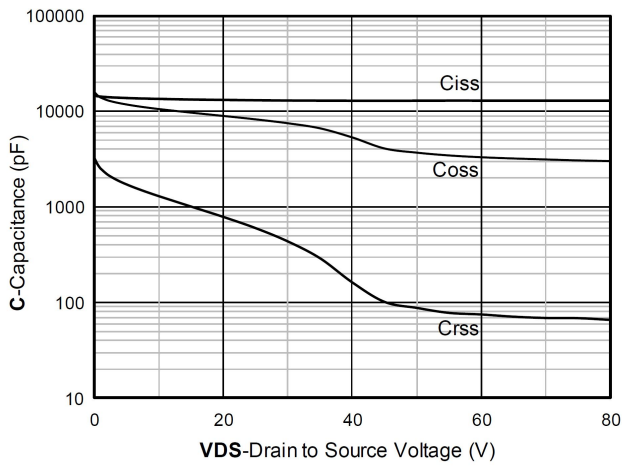
Typical Characteristics



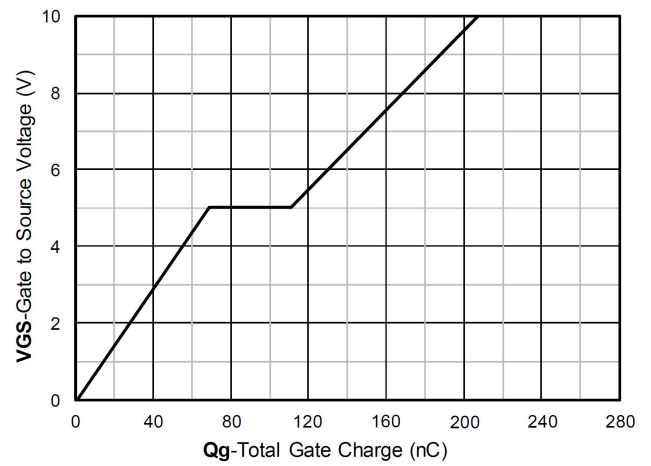
Output Characteristics



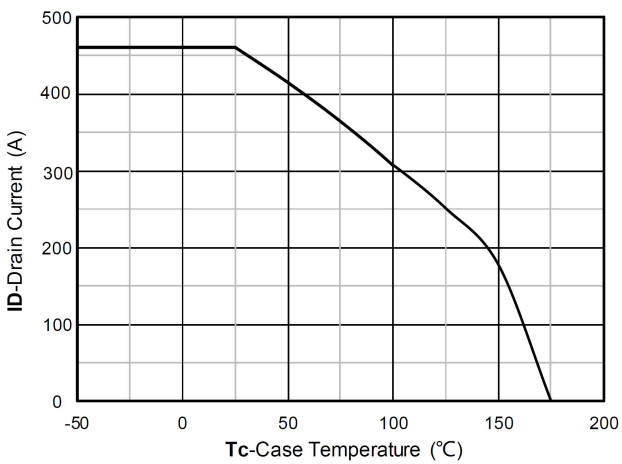
Transfer Characteristics



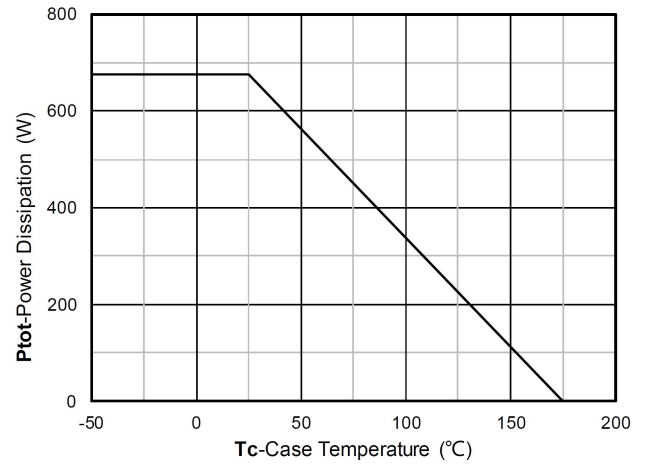
Capacitance Characteristics



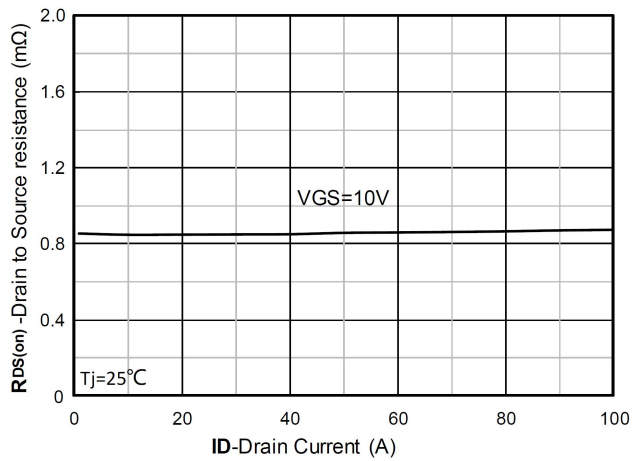
Gate Charge



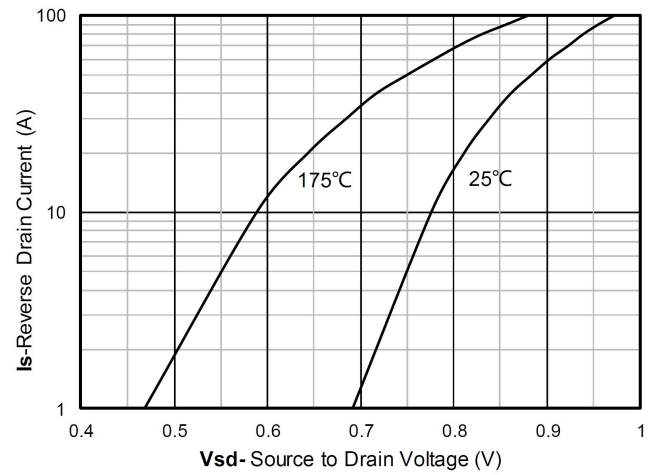
Current dissipation



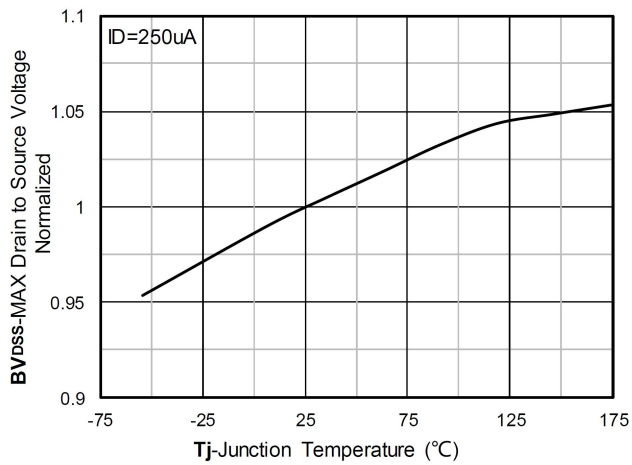
Power dissipation



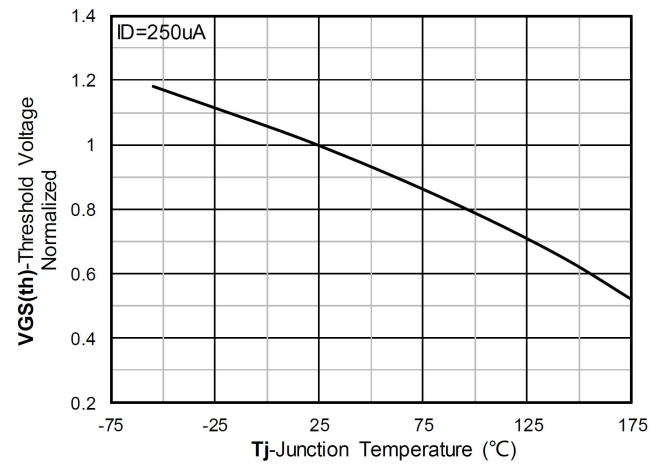
$R_{DS(on)}$ VS Drain Current



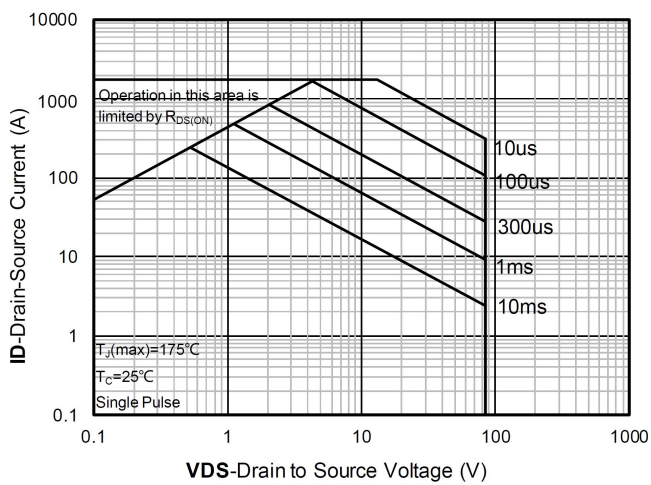
Forward characteristics of reverse diode



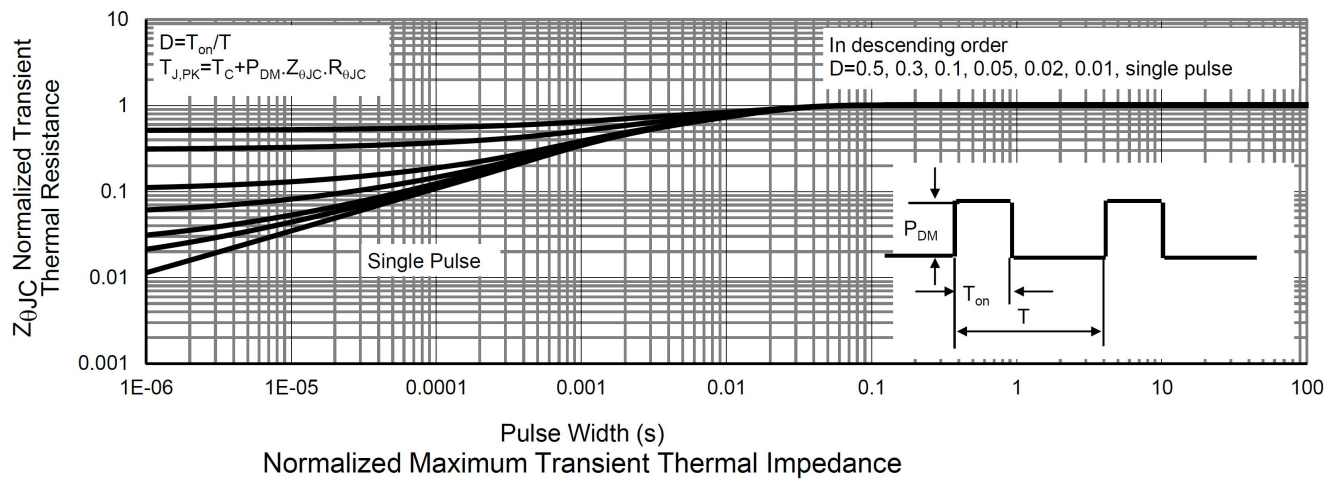
Normalized breakdown voltage



Normalized Threshold voltage

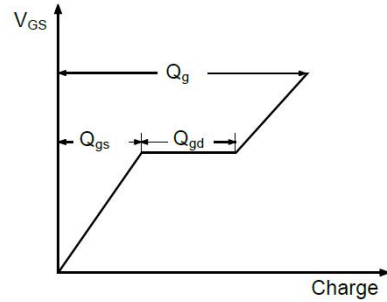
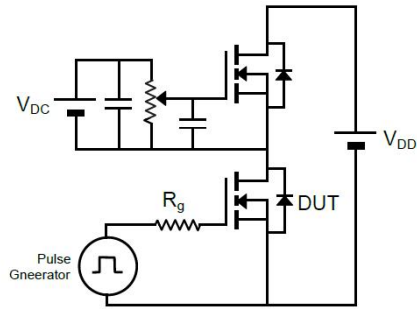


Safe Operation Area

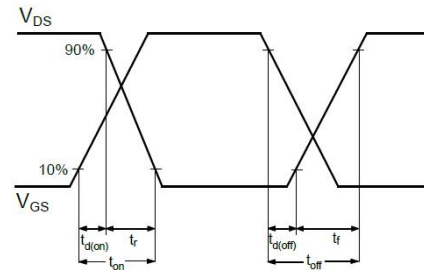
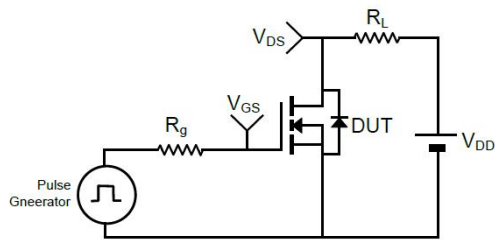


Test Circuit

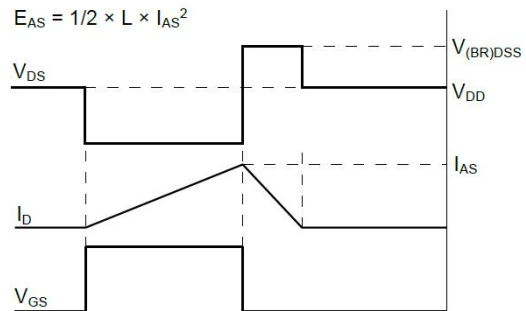
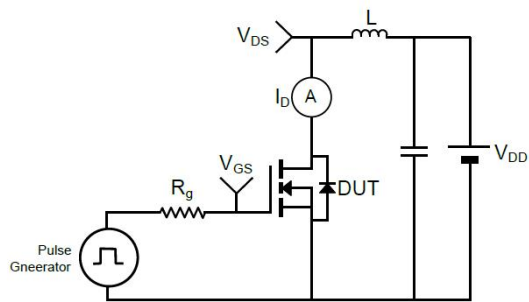
Gate Charge



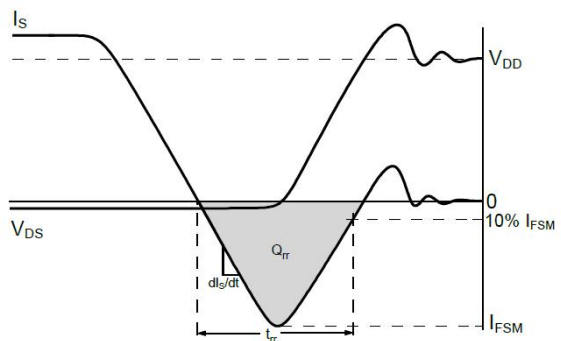
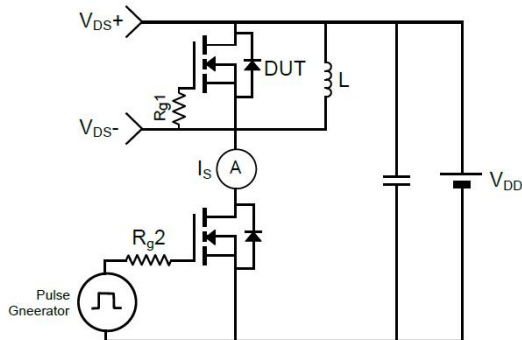
Resistive Load Switching Time

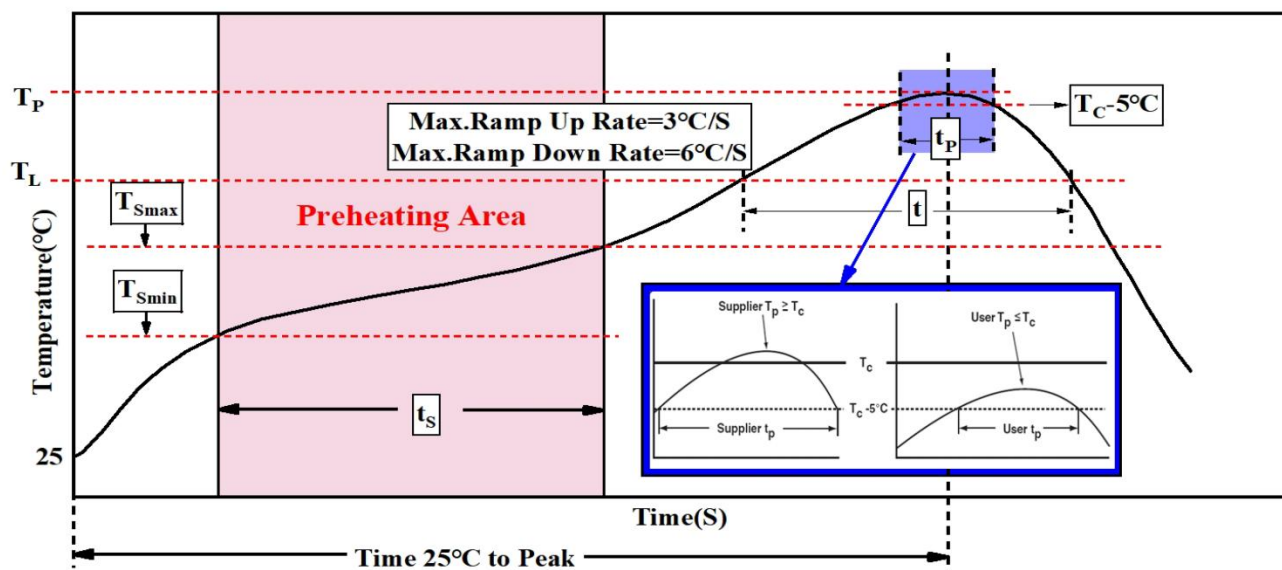


Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering


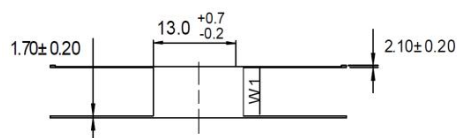
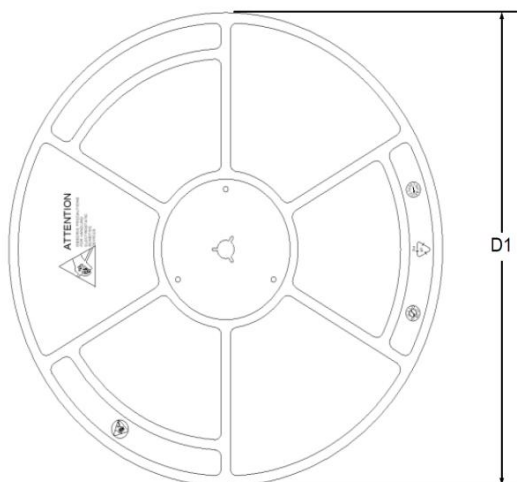
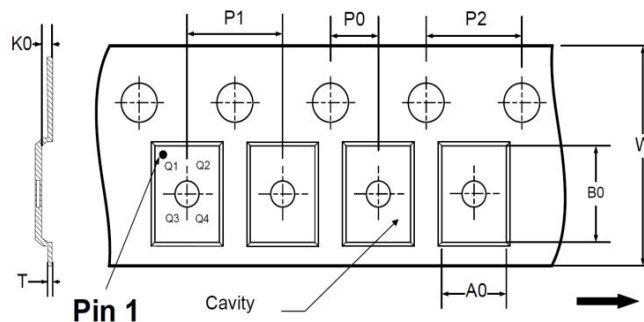
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T _{smin})	100°C	150°C
Temperature max (T _{smax})	150°C	200°C
Time (T _{smin} to T _{smax}) (t _s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T _{smax} to T _p)	3 °C/second max.	3°C/second max.
Liquidous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

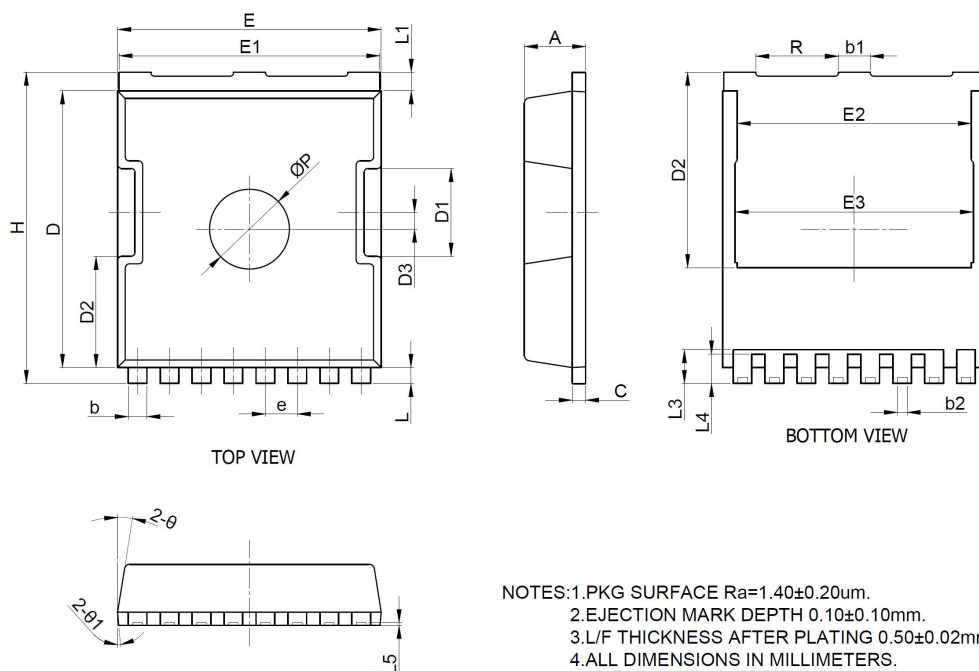
Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

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 Outline Dimensions


Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A	2.20	2.30	2.40
b	0.60	0.70	0.80
b1	1.10	1.20	1.30
b2	0.36 REF.		
C	0.40	0.50	0.60
D	10.30	10.40	10.50
D1	3.20	3.30	3.40
D2	4.08	4.18	4.28
D3	0.53	0.63	0.73
D4	7.35 REF.		
E	9.80	9.9	10.00
E1	9.70	9.80	9.90
E2	8.80 REF.		
E3	8.95 REF.		
e	1.20 BSC.		
H	11.5	11.7	11.90
L	0.5	0.6	0.7
L1	0.60	0.7	0.80
L2	0.10 REF.		
L3	1.27 REF.		
L4	1.10 REF.		
P	2.00	3.00	4.00
R	3.00	3.10	3.20
θ	7°	9°	11°
θ1	3°	5°	7°