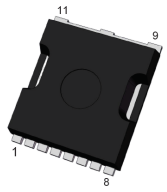
SZCJ

TOLL-8L Plastic-Encapsulate MOSFET

I04MS N-Channel Power MOSFET

TOLL-8L



Key Performance Parameters

$V_{BR(DSS)}$	$R_{DS(on)}$TYP	I_D
40V	1.0mΩ@10V	220A
	1.4mΩ@4.5V	

DESCRIPTION

The N-Channel enhancement mode power field effect transistors is using SGT technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.These devices are well suited for high efficiency fast switching applications.

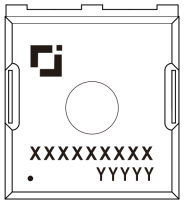
FEATURES

- High Power and current handing capability
- Good stability and uniformity with high E_{AS}
- High density cell design for ultra low $R_{DS(ON)}$
- Excellent package for good heat dissipation

APPLICATIONS

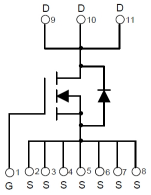
- High-Efficiency DC-DC Converters
- BLDC Motor drive applications
- Synchronous rectifier applications

MARKING



XXXXXXXXX = TL1R3SN04MS
Solid dot = Pin1 indicator.
YYYYY= Code.

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS (T_J=25℃ unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C =25℃	I_D	220	A
	T_C =100℃		139	
Pulsed Drain Current		I_{DM}①②	880	A
Continuous Drain Current	T_A =25℃	I_D	33	A
	T_A =75℃		25	
Avalanche Current		I_{AS}③	55	A
Single Pulsed Avalanche Energy		E_{AS}③	756	mJ
Power Dissipation		P_D①	278	W
Operating Junction and Storage Temperature Range		T_J,T_{stg}	-55~+150	℃

Thermal Characteristics

Parameter	Symbol	Value		Unit
		Typ	Max	
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.30	0.45	℃/W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$⑥	40	55	℃/W

Typical Characteristics

ELECTRICAL CHARACTERISTICS (T_J=25℃ unless otherwise specified)

Static Characteristics

Parameter	Symbol	Test Condition		Value			Unit
				Min	Typ	Max	
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA		40	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=40V, V_{GS}=0V	T_J=25℃	-	-	1.0	μA
			T_J=125℃	-	-	100	
Gate-body leakage current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V		-	-	±100	nA
Gate-threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA		1.0	1.9	2.5	V
Static drain-source on-sate resistance	$R_{DS(on)}$④	V_{GS}=10V, I_D=90A	T_J=25℃	-	1.0	1.3	mΩ
			T_J=125℃	-	1.4	1.8	
		V_{GS}=4.5V, I_D=45A		-	1.4	1.82	

Dynamic Characteristics⑤

Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=20V, f=1MHz	-	5498	-	pF
Output capacitance	C_{oss}		-	2149	-	
Reverse transfer capacitance	C_{rss}		-	153	-	
Gate resistance	R_g	f=1MHz	-	2.0	-	Ω
Total gate charge	Q_g	V_{GS}=4.5V, V_{DS}=20V, I_D=50A	-	39	-	nC
Total gate charge	Q_g	V_{GS}=10V, V_{DS}=20V, I_D=50A	-	82	-	
Gate charge at threshold	$Q_{G(th)}$		-	11	-	
Gate-source charge	Q_{gs}		-	18	-	
Gate-drain charge	Q_{gd}		-	14	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=20V, V_{GS}=10V, I_D=50A, R_g=3Ω	-	12	-	ns
Turn-on rise time	t_r		-	11	-	
Turn-off delay time	$t_{d(off)}$		-	41	-	
Turn-off fall time	t_f		-	20	-	

Reverse Diode Characteristics

Drain-source diode forward voltage	V_{SD}④	V_{GS}=0V, I_S=50A	-	-	1.2	V
Continuous drain-source diode forward current	I_S①		-	-	220	A
Pulsed drain-source diode forward current	I_{SM}①②		-	-	880	A
Reverse recovery time	t_{rr}	V_{DD}=20V, I_S=50A, di/dt=500A/μs	-	26	-	ns
Reverse recovery charge	Q_{rr}		-	59	-	nC

Notes:

①.T_C=25℃ Limited only by maximum temperature allowed.

②.P_W ≤10μs, Duty cycle ≤1%.

③.EAS condition: V_{DD}=50V, V_{GS}=10V, L=0.5mH, R_g=25Ω Starting T_J=25℃.

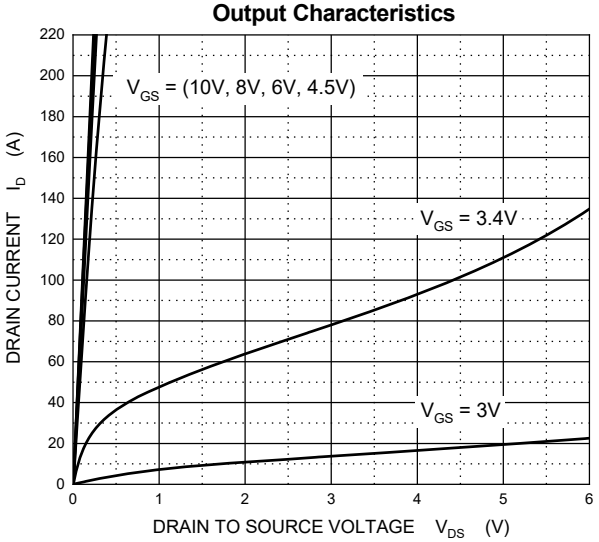
④.Pulse Test : Pulse Width ≤380μs, duty cycle ≤2%.

⑤.Guaranteed by design, not subject to production.

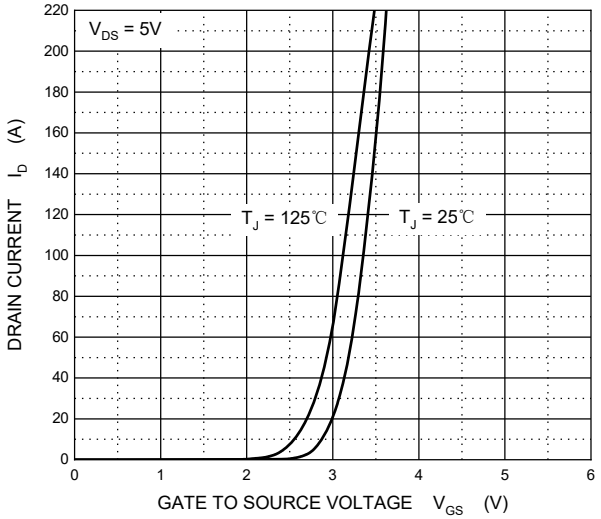
⑥.Device mounted on 1 in^2 FR-4 board with 2oz. double-sided Copper, in a still air environment with T_A=25℃.

Typical Characteristics

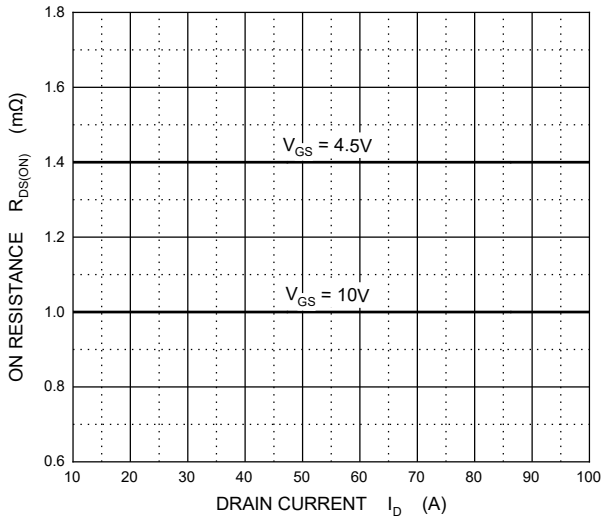
Output Characteristics



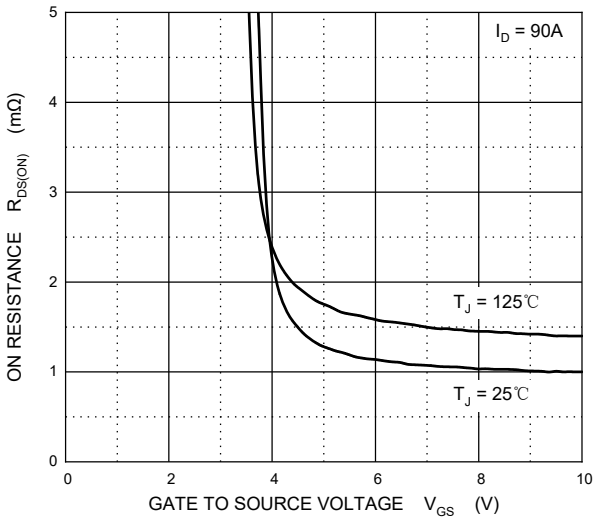
Transfer Characteristics



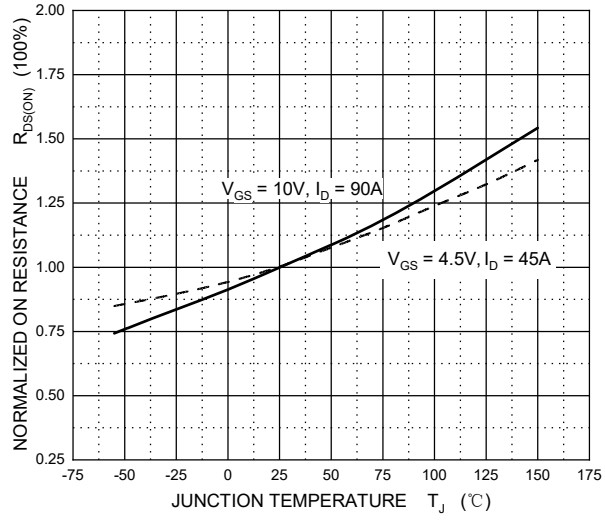
On Resistance vs. Drain Current



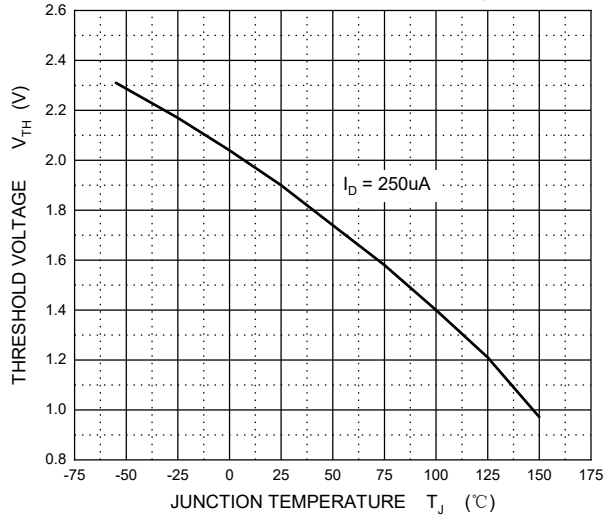
On Resistance vs. Gate-Source Bias



On Resistance vs. Junction Temperature

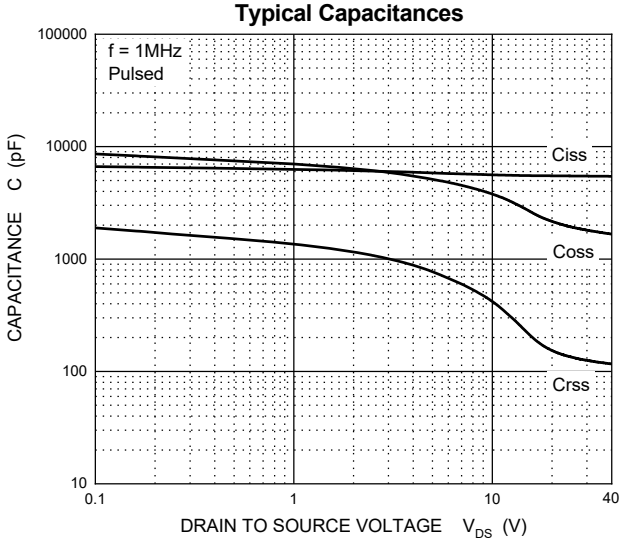


Gate-Source Threshold Voltage

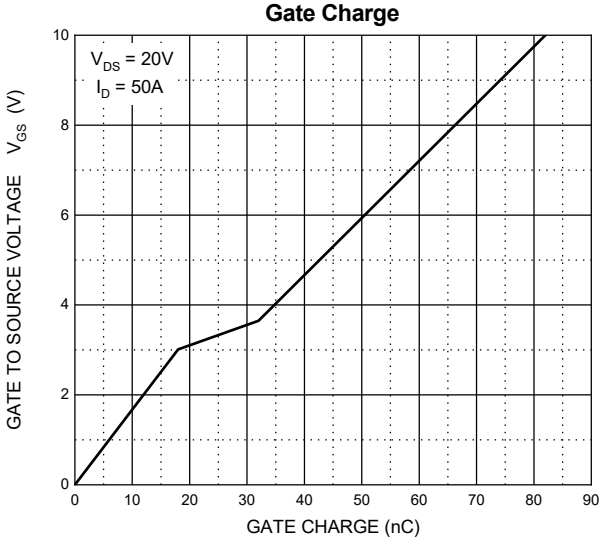


Typical Characteristics

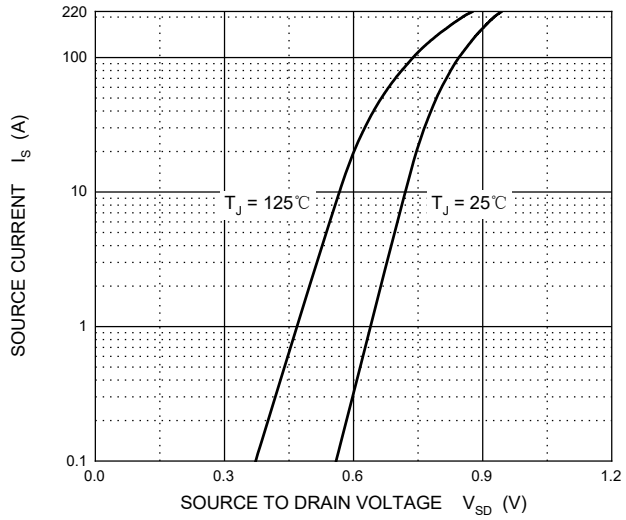
Typical Capacitances



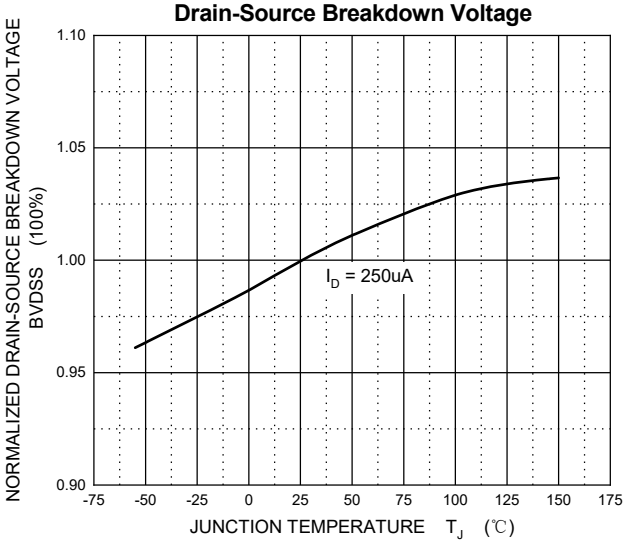
Gate Charge



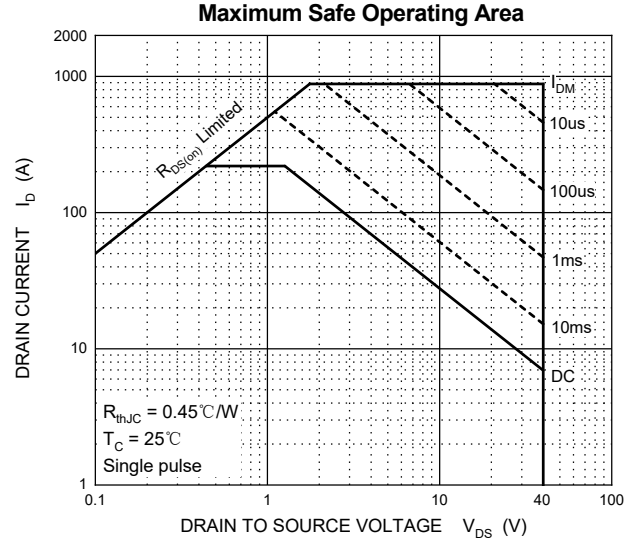
Source-Drain Diode Forward Characteristics



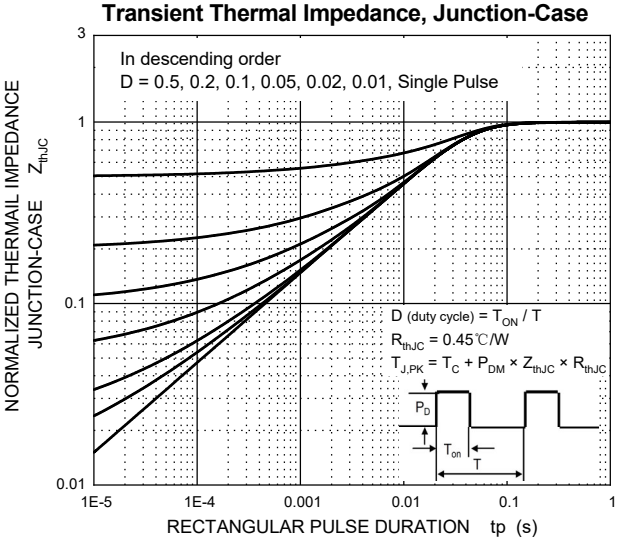
Drain-Source Breakdown Voltage



Maximum Safe Operating Area

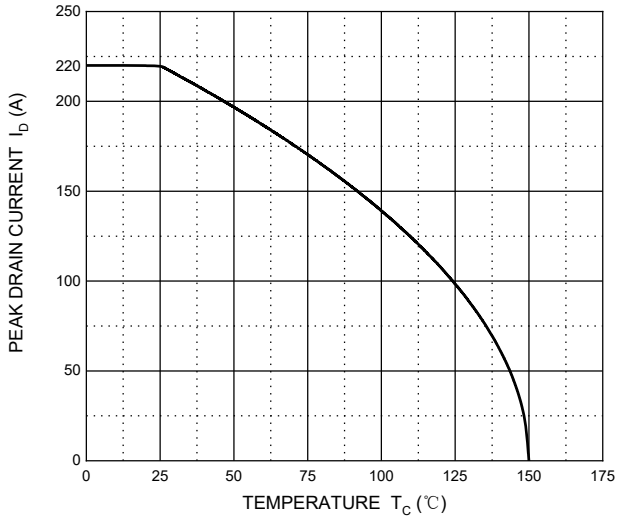


Transient Thermal Impedance, Junction-Case

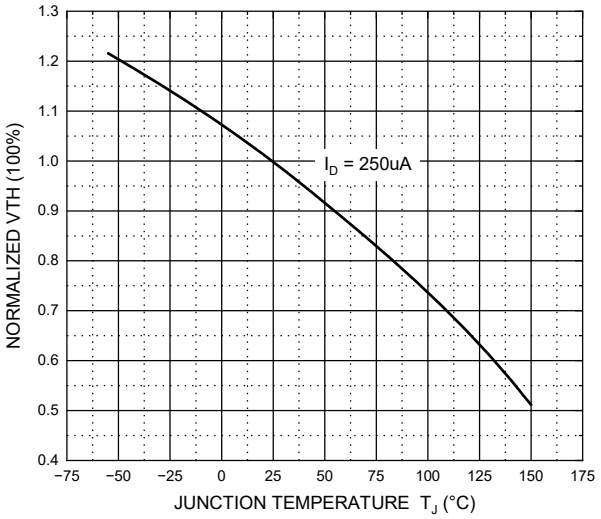


Typical Characteristics

ID vs. TC

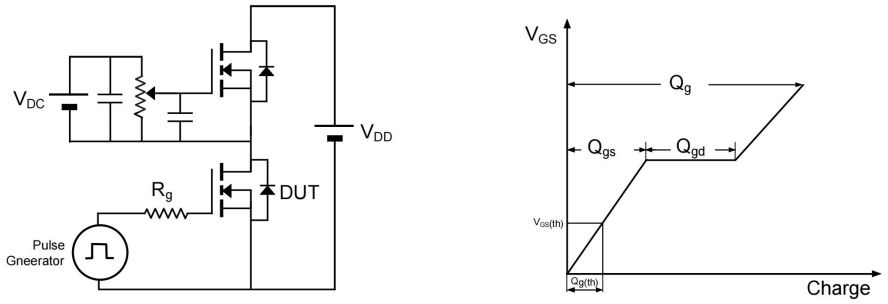


Normalized Threshold Voltage vs. Junction Temperature

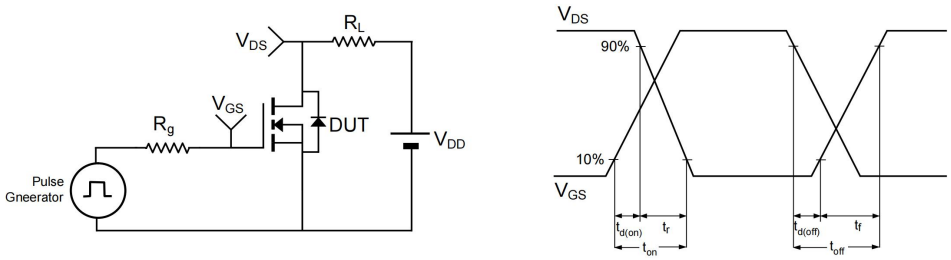


TEST CIRCUIT AND WAVEFOMRS

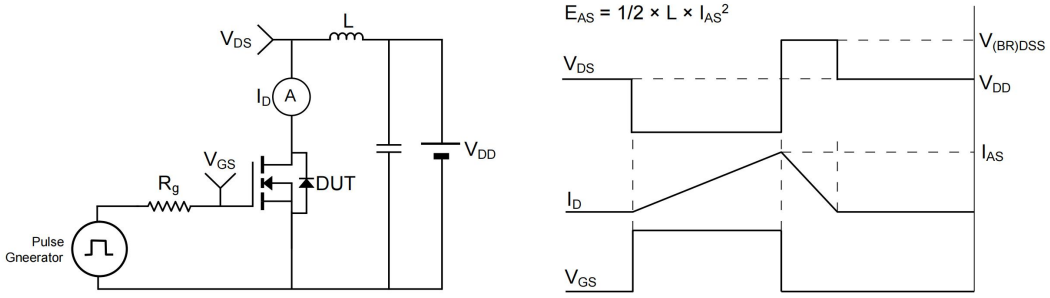
Gate Charge



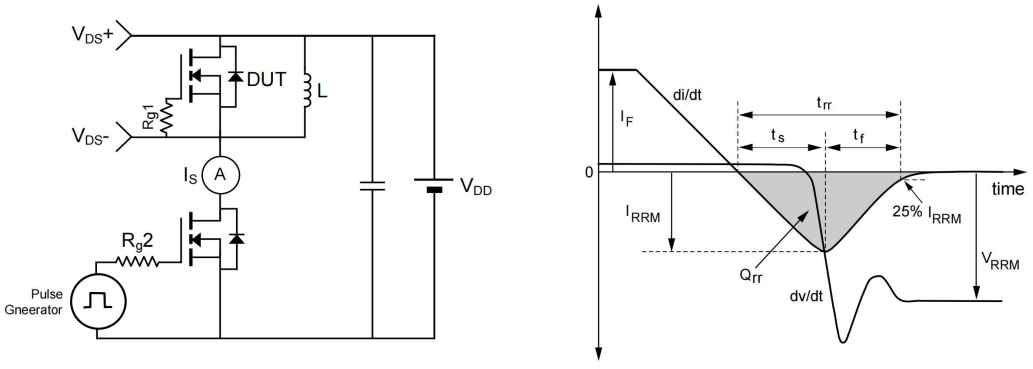
Resistive Load Switching Time



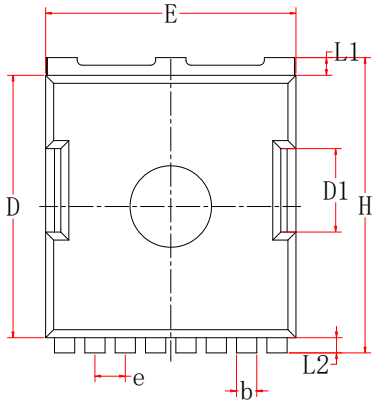
Un-clamped Inductive Load Switching



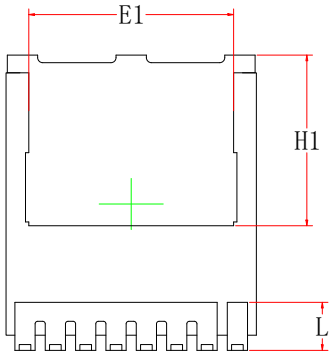
Drain-Source Body Diode Reverse Recovery



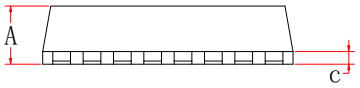
TOLL-8L PACKAGE OUTLINE DIMENSIONS



Top View
[顶视图]



Bottom View
[背视图]

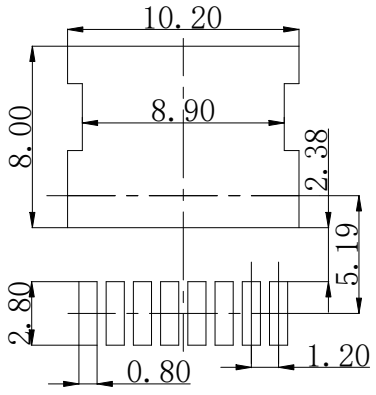


Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.40	0.087	0.094
b	0.70	0.90	0.028	0.035
c	0.40	0.60	0.016	0.024
D	10.28	10.58	0.405	0.417
D1	3.30BSC.		0.130BSC.	
E	9.70	10.10	0.382	0.398
E1	8.00	8.40	0.315	0.331
e	1.20BSC.		0.047BSC.	
H	11.48	11.88	0.452	0.468
H1	7.10BSC.		0.280 BSC.	
L	1.55	1.95	0.061	0.077
L1	0.50	0.90	0.020	0.035
L2	0.50	0.70	0.020	0.028

Notes：
1 Dimensions exclusive of mold gate burrs。
2 Dimensions exclusive of mold flash and cutting burrs。

TOLL-8L Suggested Pad Layout



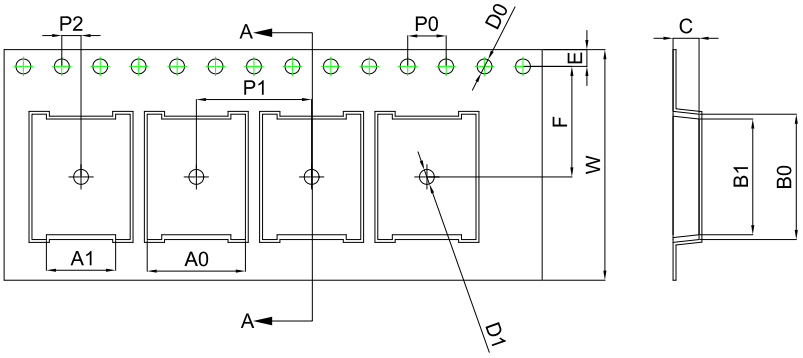
Controlling dimension：in millimeters.

NOTICE

SZCJ reserves the right to make modifications,enhancements,improvements,corrections or other changes without further notice to any product herein.SZCJ does not assume any liability arising out of the application or use of any product described herein.

TOLL-8L Tape and Reel

TOLL-8L Embossed Carrier Tape

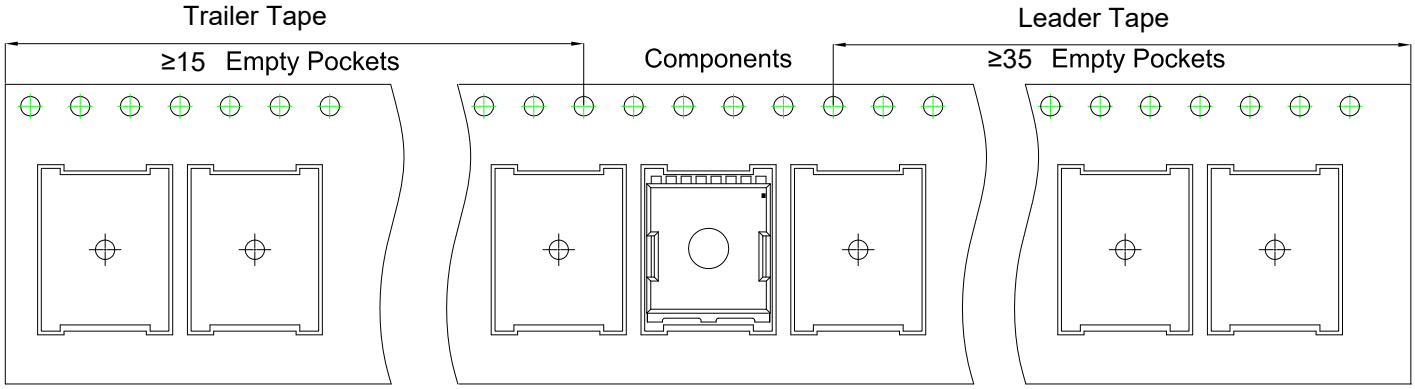


Packaging Description:

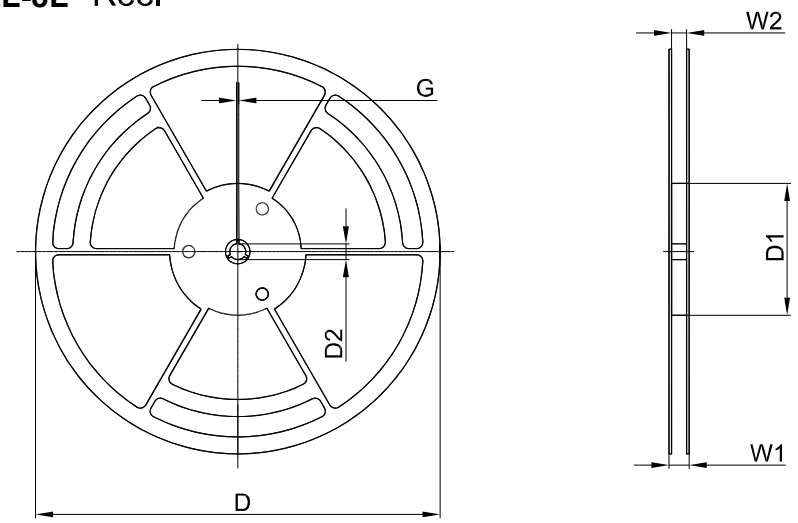
TOLL-8L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with **2,000** units per 13" or 33.0 cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

Dimensions are in millimeter													
Pkg type	A0	A1	B0	B1	C	D0	D1	E	F	P0	P1	P2	W
TOLL-8L	10.22	7.20	12.04	13.04	2.70	1.55	1.55	1.75	11.50	4.00	12.00	2.00	24.00

TOLL-8L Tape Leader and Trailer



TOLL-8L Reel



Dimensions are in millimeter						
Reel Option	**D**	**D1**	**D2**	**G**	**W1**	**W2**
13" Dia	φ330.00	100.00	13.00	2.00	28.7	24.4

Reel	Reel Size	Box	Box Size (mm)	Carton	Carton Size (mm)
2,000 pcs	13 inch	2,000 pcs	360×360×65	10,000 pcs	378×358×382