

100V,320A N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

The SGL101R5T uses advanced SGT technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety applications.

Features

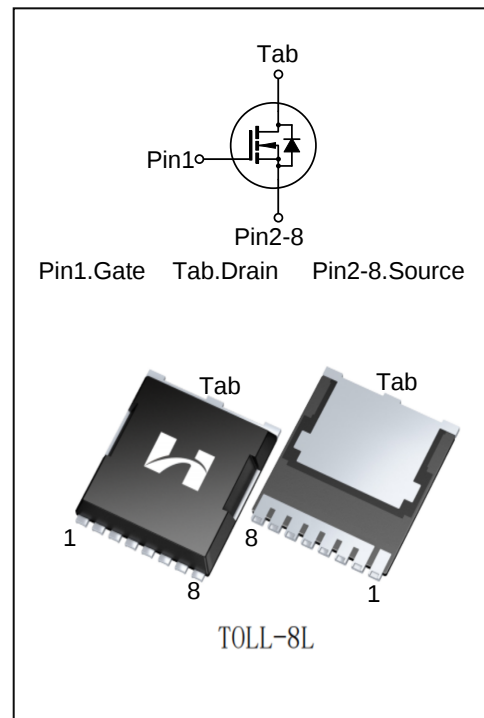
◆ $V_{DS}=100V, I_D=320A$

◆ $R_{DS(on)}$

TYP: $1.25m\Omega @ V_{GS}=10V$

Applications

- ◆ Power Management in Computing, CE, IE 4.0, Communications
- ◆ Current Switching in DC/DC & AC/DC (SR) Sub-systems
- ◆ Load Switching, Quick/ireless Charging, Motor Driving



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SGL101R5T	TOLL-8L	SGL101R5T	Pb Free	Reel

ABSOLUTE MAXIMUM RATINGS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	I_D	$T_C = 25^{\circ}\text{C}$	A
		$T_C = 100^{\circ}\text{C}$	
Drain Current Pulsed (Note 1)	I_{DM}	1300	A
Power Dissipation($T_C=25^{\circ}\text{C}$) -Derate above 25°C	P_D	313	W
		2.09	W/ $^{\circ}\text{C}$
Single Pulsed Avalanche Energy (Note 2)	E_{AS}	2812.5	mJ
Operation Junction Temperature Range	T_J	$-55\sim+150$	$^{\circ}\text{C}$
Storage Temperature Range	T_{stg}	$-55\sim+150$	$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	TL	300	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.2	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	35	$^{\circ}\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _V DSS	V _{GS} =0V, I _D =250μA	100	--	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =20V, V _{DS} =0V	--	--	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-20V, V _{DS} =0V	--	--	-100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	2.0	3.0	4.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, b=20A	--	1.25	1.5	mΩ
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V; f=1.0MHZ	--	2.4	--	Ω
Input Capacitance	C _{iss}	V _{DS} =20V	--	12625	--	pF
Output Capacitance	C _{oss}	V _{GS} =0V	--	2099	--	
Reverse Transfer Capacitance	C _{rss}	f=1.0MHZ	--	269	--	
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V V _{GS} =10V R _G =3Ω	--	40	--	ns
Turn-on Rise Time	t _r		--	67	--	
Turn-off Delay Time	t _{d(off)}		--	131	--	
Turn-off Fall Time	t _f		--	91	--	ns
Total Gate Charge	Q _g	V _{DD} =2 0V, b=20A V _{GS} =10V	--	230	--	nC
Gate-Source Charge	Q _{gs}		--	154	--	
Gate-Drain Charge	Q _{gd}		--	76	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	320	A
Pulsed Source Current	I_{SM}		--	--	1280	
Diode Forward Voltage	V_{SD}	$I_S=20A, V_{GS}=0V$	--	0.7	1.0	V
Reverse Recovery Time	T_{rr}	$I_S=15A$ $dI_F/dt=100A/\mu S$	--	113	--	ns
Reverse Recovery Charge	Q_{rr}		--	274	--	μC

1. Pulse width limited by maximum junction temperature
2. $L=0.5mH$, $V_{DD}=80V$, $V_{GS}=10V$, $R_G=25\Omega$, starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycles $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1: Saturation Characteristics

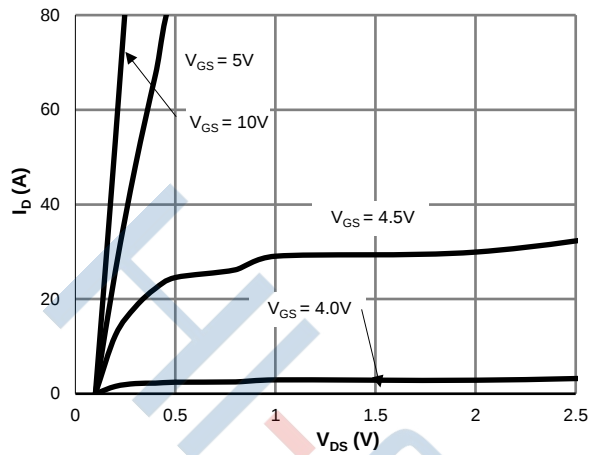


Figure 2: Transfer Characteristics

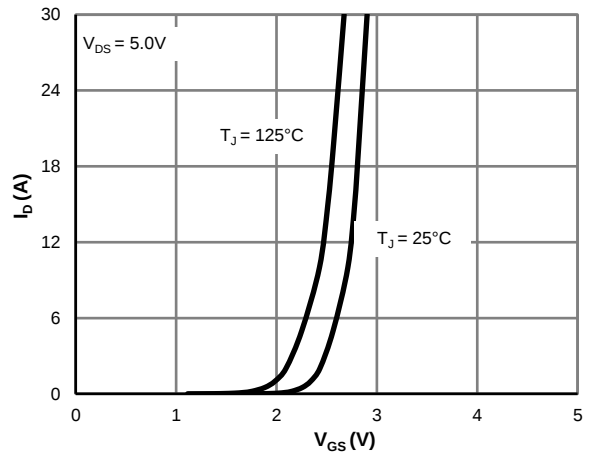


Figure 3: $R_{DS(ON)}$ vs. Drain Current

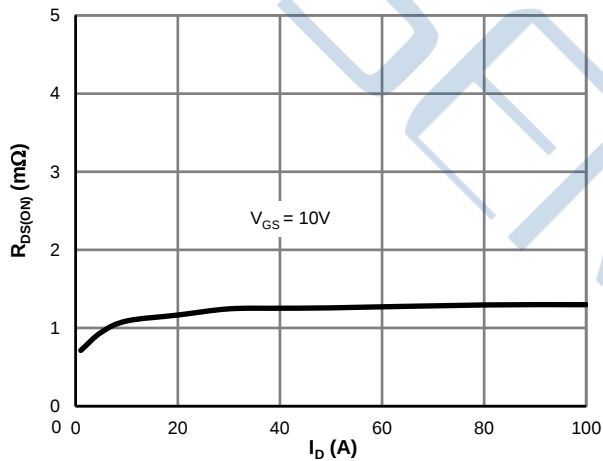


Figure 4: Body-Diode Characteristics

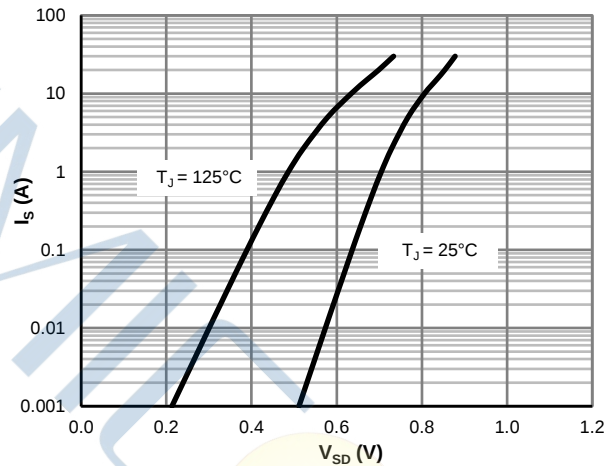


Figure 5: Capacitance Characteristics

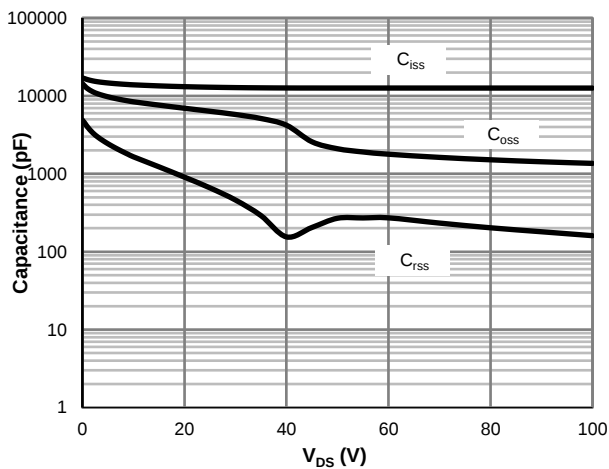
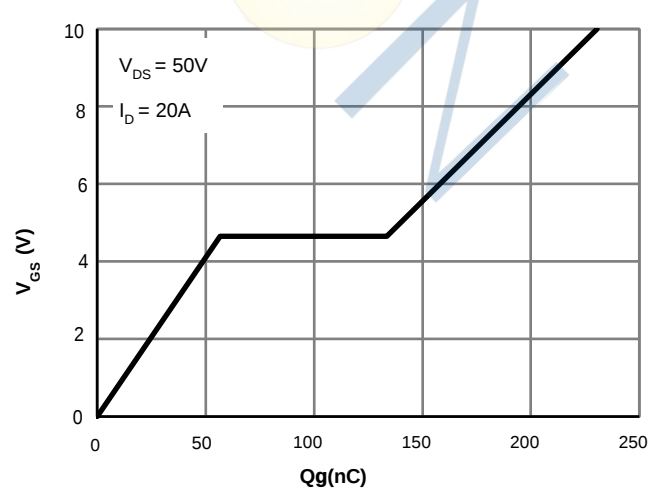


Figure 6: Gate Charge



Typical Performance Characteristics

Figure 7: $R_{DS(ON)}$ vs. Junction Temperature

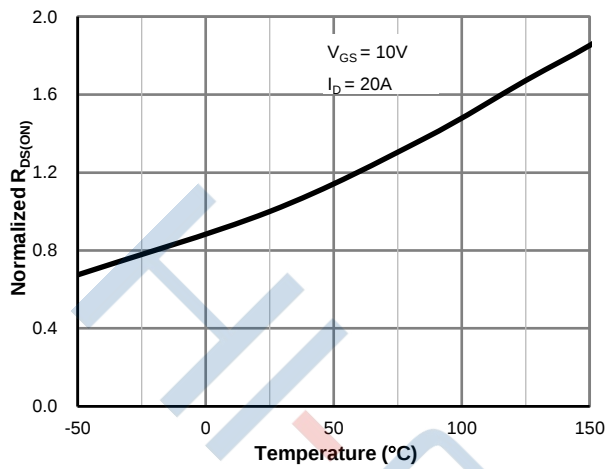


Figure 8: Maximum Safe Operating Area

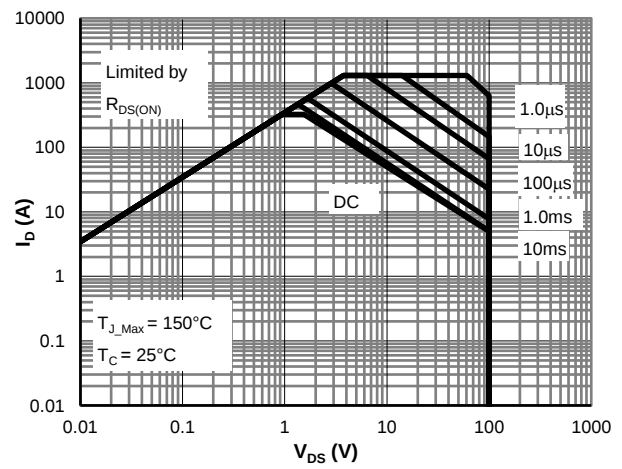


Figure 9: Current De-rating

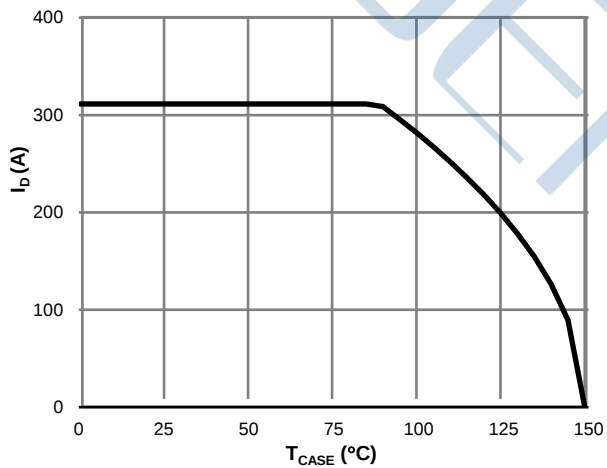
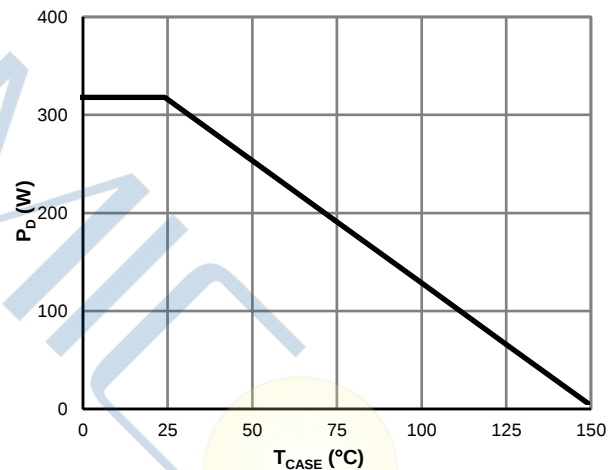
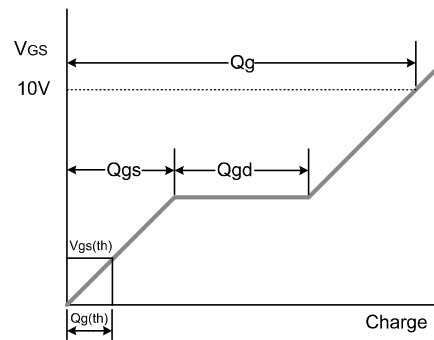
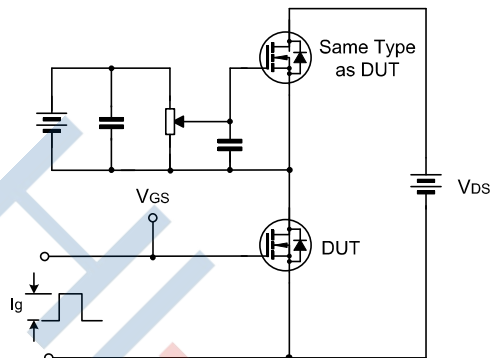


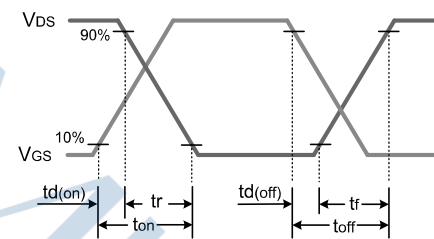
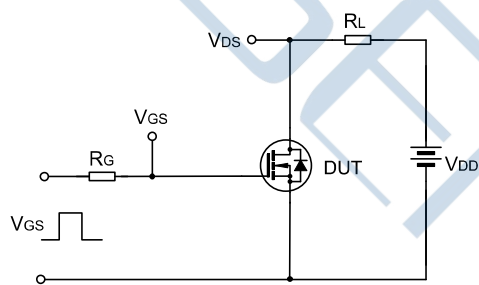
Figure 10: Power De-rating



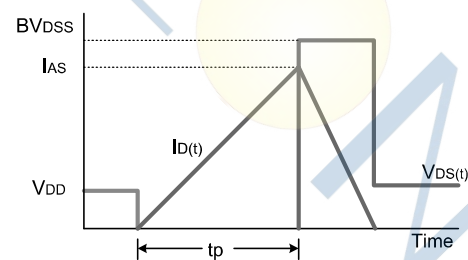
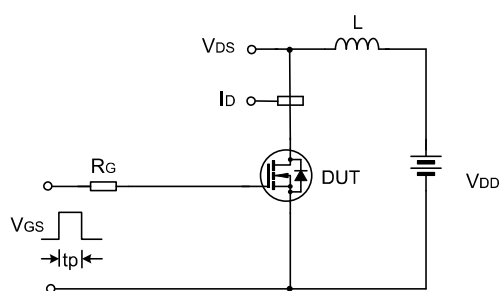
Test Circuit



Gate Charge Test Circuit & Waveform

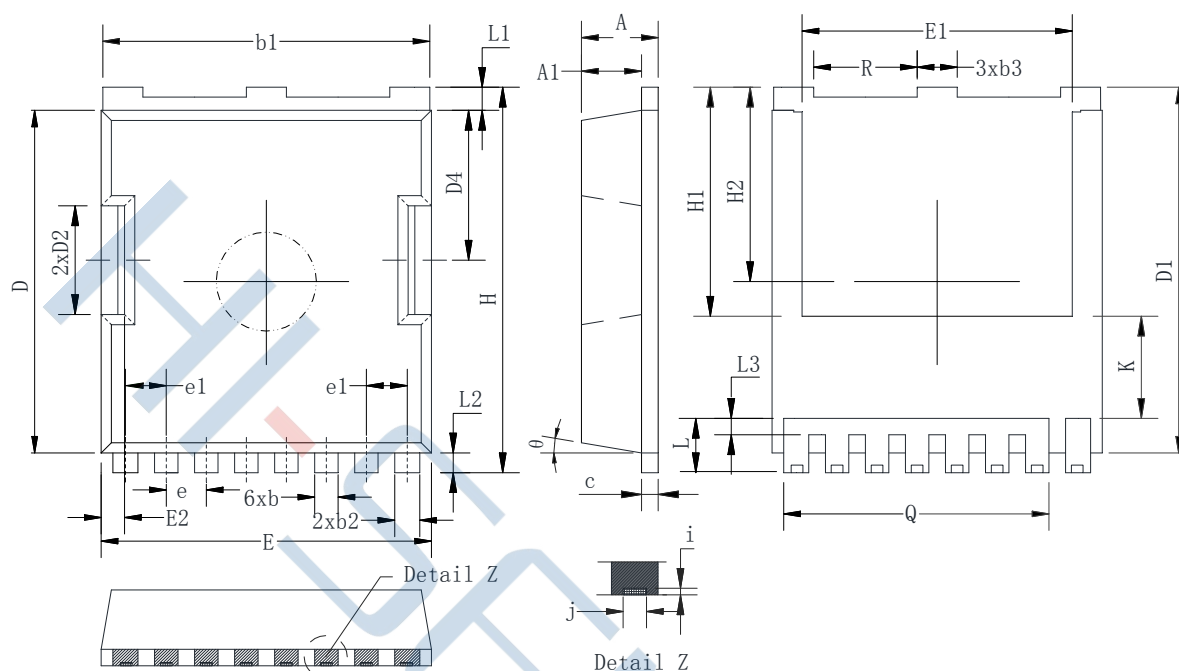


Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform

Package Dimensions of TOLL-8L



Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.25	2.30	2.35	E2	0.65	0.70	0.75
A1	1.75	1.80	1.85	H	11.60	11.70	11.80
b	0.65	0.70	0.75	H1	6.95 BSC		
b1	9.75	9.80	9.85	H2	5.90 BSC		
b2	0.70	0.75	0.80	i	0.10 REF		
b3	1.15	1.20	1.25	j	0.35 REF		
c	0.45	0.50	0.55	K	3.10 REF		
D	10.35	10.40	10.45	L	1.55	1.65	1.75
D1	11.00	11.10	11.20	L1	0.65	0.70	0.75
D2	3.25	3.30	3.35	L2	0.50	0.60	0.70
D4	4.50	4.55	4.60	L3	0.40	0.50	0.60
e	1.20 BSC			Q	7.95 REF		
e1	1.225 BSC			R	3.05	3.10	3.15
E	9.85	9.90	9.95	θ	10°REF		
E1	8.00	8.10	8.20				

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