

100V,120A V N-CHANNEL POWER MOSFET

GENERAL DESCRIPTION

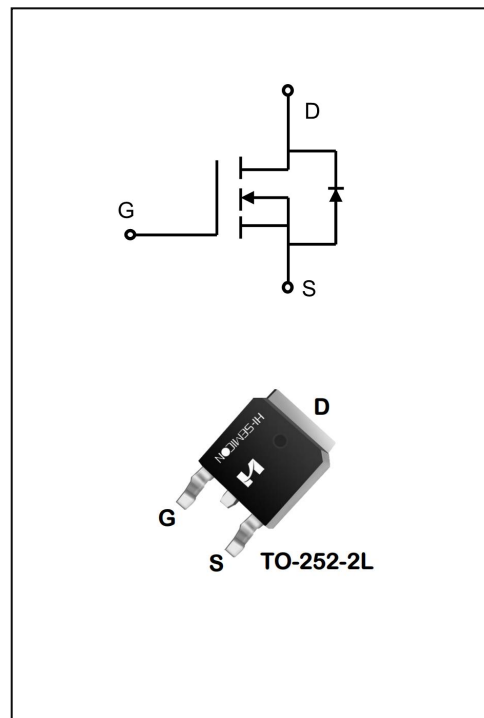
The SGD105R5T uses advanced SGT technology and design to provide excellent  $R_{DS(on)}$  with low gate charge. It can be used in a wide variety applications.

Features

- ◆  $V_{DS}=100V, I_D=120A$
- ◆  $R_{DS(on)}$   
TYP:  $5.2m\Omega @ V_{GS}=10V, I_D=50A$

Applications

- ◆ Power faction correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SGD105R5T	TO-252-2L	SGD105R5T	Pb Free	Reel

## ABSOLUTE MAXIMUM RATINGS (T<sub>J</sub>=25°C unless otherwise noted)

Characteristics	Symbol	Ratings	Unit
Drain-Source Voltage	V <sub>DS</sub>	100	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Drain Current	I <sub>D</sub>	T <sub>C</sub> = 25°C	120
		T <sub>C</sub> = 100°C	85
Drain Current Pulsed (Note 1)	I <sub>DM</sub>	480	A
Power Dissipation(T <sub>C</sub> =25°C) -Derate above 25°C	P <sub>D</sub>	158	W
		1.3	W/°C
Single Pulsed Avalanche Energy (Note 2)	E <sub>AS</sub>	342	mJ
Operation Junction Temperature Range	T <sub>J</sub>	-55~+150	°C
Storage Temperature Range	T <sub>stg</sub>	-55~+150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	TL	300	°C

## THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Unit
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	0.79	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	62.5	°C/W

## ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B <sub>VDS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	100	--	--	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V	--	--	100	nA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V	--	--	100	nA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	--	--	-100	nA
On Characteristics						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> =250μA	2.0	--	4.0	V
Static Drain- Source On State Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =50A	--	5.2	5.5	mΩ
Dynamic Characteristics						
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V; f=1.0MHZ	1	3.5	10	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =42V V <sub>GS</sub> =0V f=1.0MHZ	--	3880	--	pF
Output Capacitance	C <sub>oss</sub>		--	553	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	25	--	
Switching Characteristics						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =42V V <sub>GS</sub> =10V R <sub>G</sub> =3Ω I <sub>D</sub> =10A (Note 3.4)	--	25	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	35	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	60	--	
Turn-off Fall Time	t <sub>f</sub>		--	22	--	ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =68V, I <sub>D</sub> =50A V <sub>GS</sub> =10V (Note 3.4)	--	65	--	nc
Gate-Source Charge	Q <sub>gs</sub>		--	22	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	18	--	

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	--	--	120	A
Pulsed Source Current	$I_{SM}$		--	--	480	
Diode Forward Voltage	$V_{SD}$	$I_S=30A, V_{GS}=0V$	--		1.4	V
Reverse Recovery Time	$T_{rr}$	$I_F=20A, V_R=30V, dI/dt=100A/\mu S$	--	53	--	ns
Reverse Recovery Charge	$Q_{rr}$		--	0.08	--	$\mu C$

1. Pulse width limited by maximum junction temperature
2.  $L=0.5mH, V_{DD}=50V, V_G=10V, R_G=25\Omega$ , starting  $T_J=25^\circ C$
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

Figure1.OutputCharacteristics

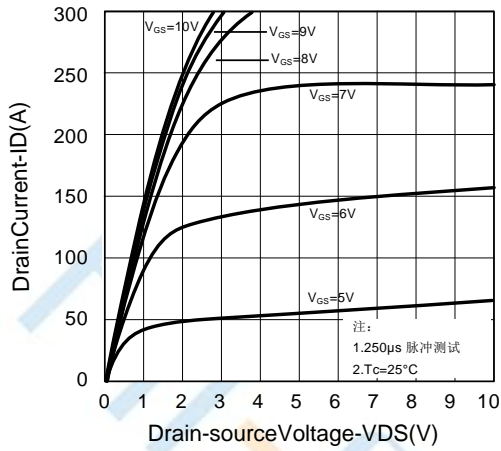


Figure2.TransferCharacteristics

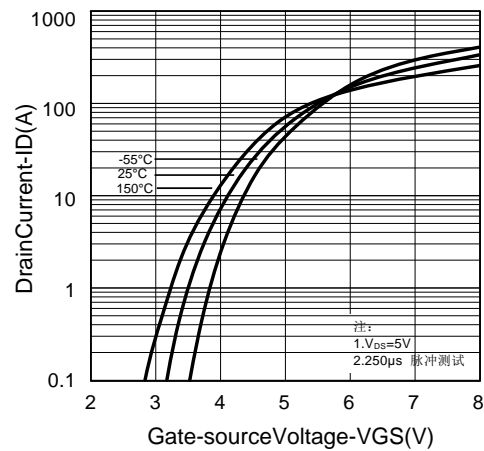


Figure3.On-resistancevs.DrainCurrent

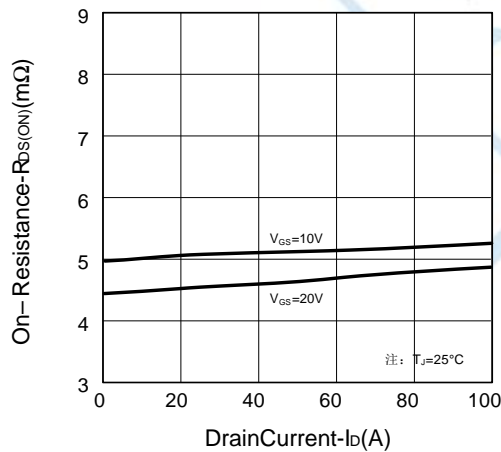


Figure4.BodyDiodeForwardVoltage Variationvs.SourceCurrentandTemperature

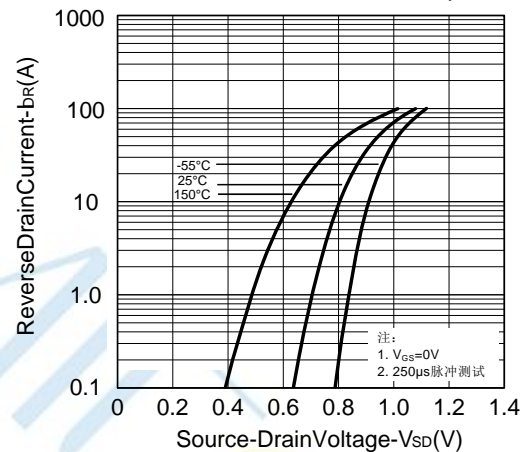


Figure5.CapacitanceCharacteristics

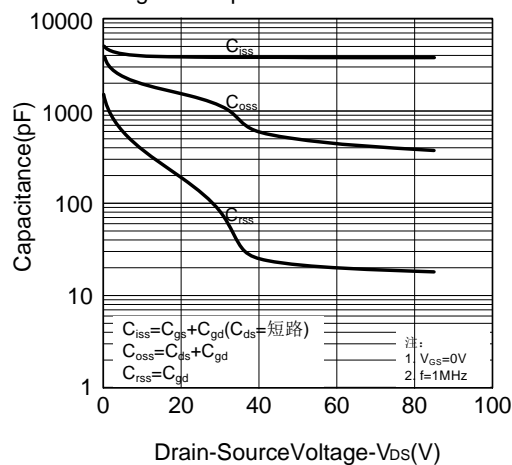
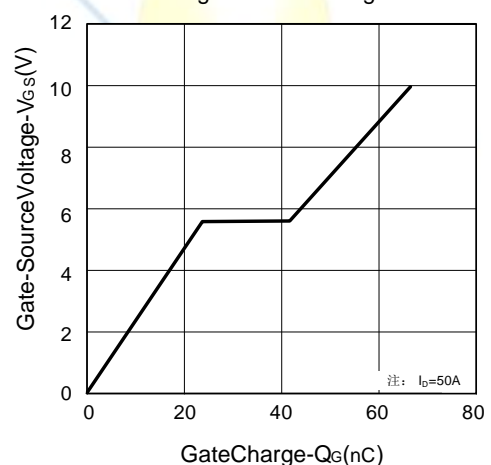


Figure6.GateCharge



Typical Performance Characteristics

Figure7. Breakdown Voltage vs. Temperature Characteristics

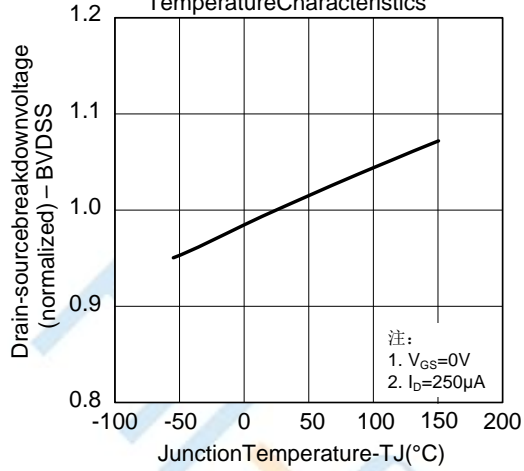


Figure8. On-resistance vs. Temperature Characteristics

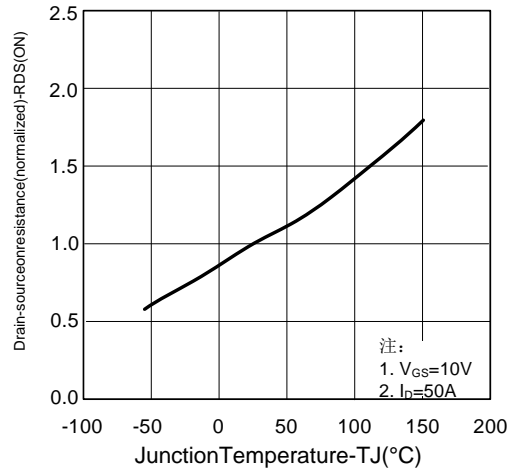
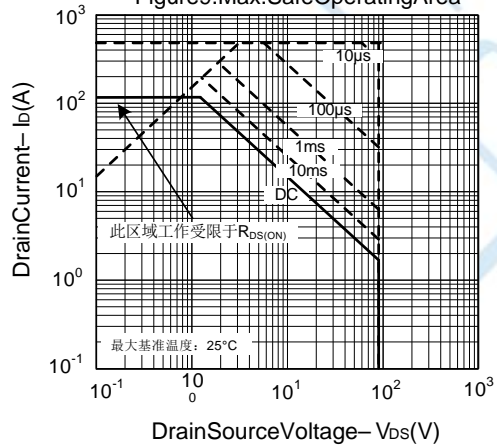
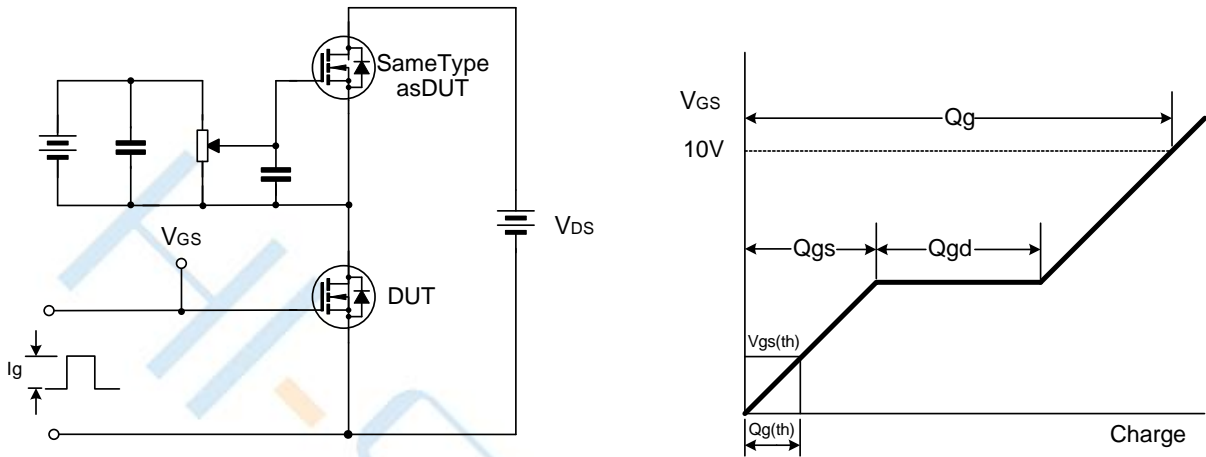


Figure9. Max. Safe Operating Area

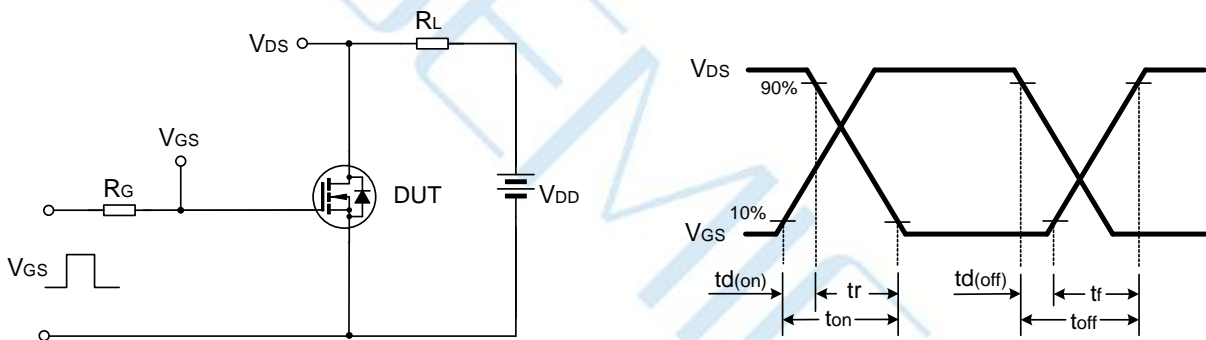


Test Circuit

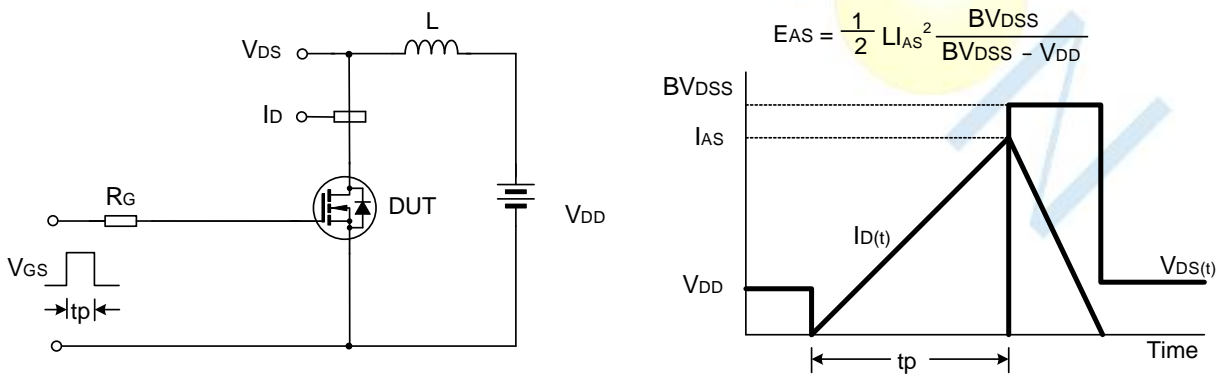
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform

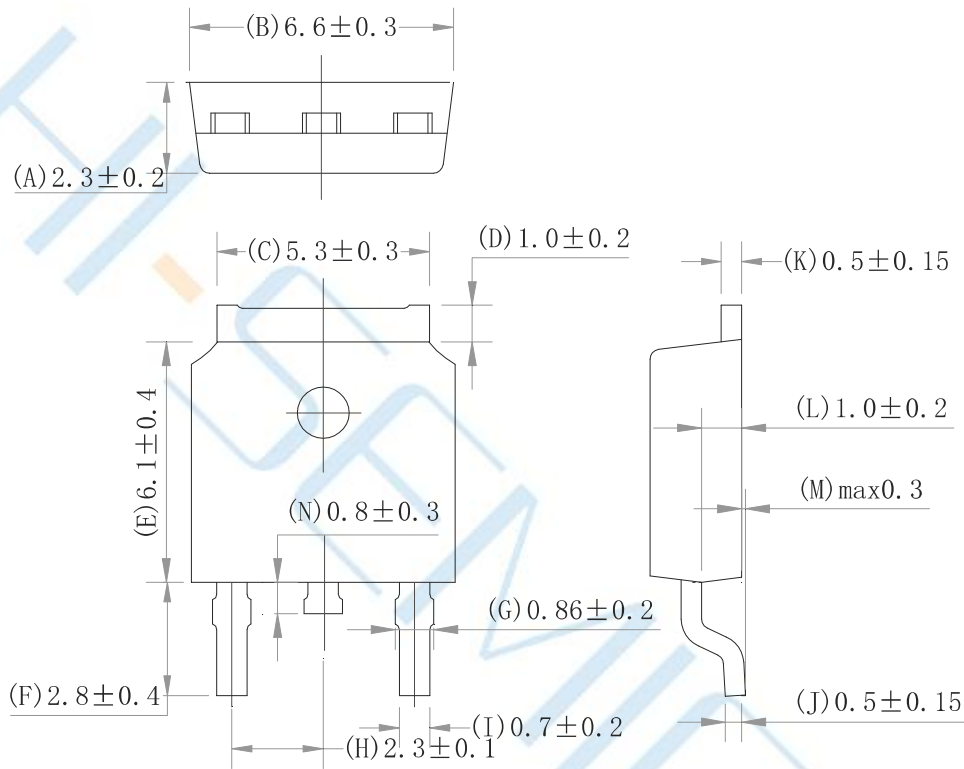


Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of TO-252-2L

Unit:mm



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