

Features

- Uses advanced SGT technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)

Application

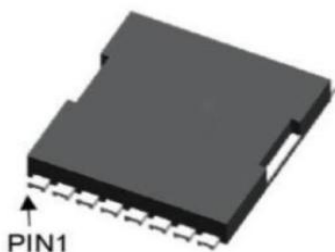
- Motor control and drive
- Battery management
- DC/DC

Product Summary

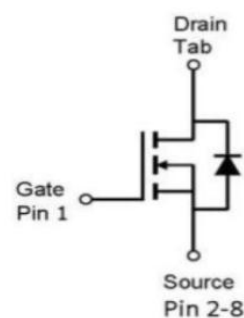
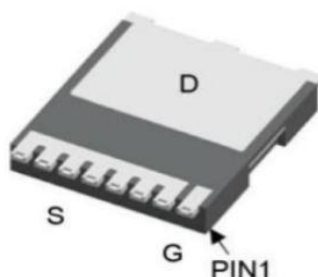
Package	TOLL
V_{DS}	120V
$R_{DS(on)}@V_{GS}=10V$	2.1mΩ
I_D	220A

Package Marking

TOLL Top View



TOLL Bottom View



Type	Package	Marking	Reel Size	Tape Width	Packing	Qty
LR025N12SM10	TOLL	LR025N12SM10	330*28.5mm	24mm	Reel&Tape	2000

Maximum Ratings (TC=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	120	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous drain current $T_c=25^{\circ}C$ (Silicon limit) $T_c=100^{\circ}C$ (Silicon limit)	I_D	220 129	A
Pulsed Drain Current	I_{DM}	880	A
Maximum Power Dissipation	P_d	250	W
Single pulse avalanche energy	E_{AS}	1849	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C

Thermal Characteristic

Thermal Resistance,Junction-to-Case	R_{thJC}	0.5	°C/W
Thermal resistance, junction-to-ambient	R_{thJA}	40	

Electrical Characteristics (T_C=25°C unless otherwise noted)

Parameter	Symbol	Condition	min	typ	max	Unit
-----------	--------	-----------	-----	-----	-----	------

Static Characteristic

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	120	132	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3.4	4	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=120V, V_{GS}=0V$	-	-	1	μA
Gate-source leakage current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	±100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$I_D=50A, V_{GS}=10V$	-	2.1	2.5	mΩ
Forward transconductance	g_{fs}	$I_D=50A, V_{DS}=5V$	-	159	-	S

Dynamic Characteristic

Input Capacitance	C_{iss}	$V_{DS}=40V, V_{GS}=0V,$ $f=1MHz$	-	9318	-	pF
Output Capacitance	C_{oss}		-	2859	-	
Reverse Transfer Capacitance	C_{rss}		-	156	-	
Gate resistance	R_g	$f=1MHz$	-	2.2	-	Ω
Gate Total Charge	Q_G	$V_{DS}=60V, I_D=50A,$ $V_{GS}=10V$	-	144	-	nC
Gate-Source charge	Q_{gs}		-	48	-	
Gate-Drain charge	Q_{gd}		-	35	-	
Turn-on delay time	$t_{d(on)}$	$V_{GS}=10V, V_{DS}=60V,$ $R_G=3\Omega$	-	58	-	ns
Rise time	t_r		-	90	-	
Turn-off delay time	$t_{d(off)}$		-	102	-	
Fall time	t_f		-	91	-	

Body Diode Characteristic

Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=100A$	-	-	1.1	v
Reverse Recovery Time	t_{rr}	$I_F=50A$ $di/dt = 100A/\mu s$	-	85	-	ns
Reverse Recovery Charge	Q_{rr}		-	182	-	nC

Typical Performance Characteristics

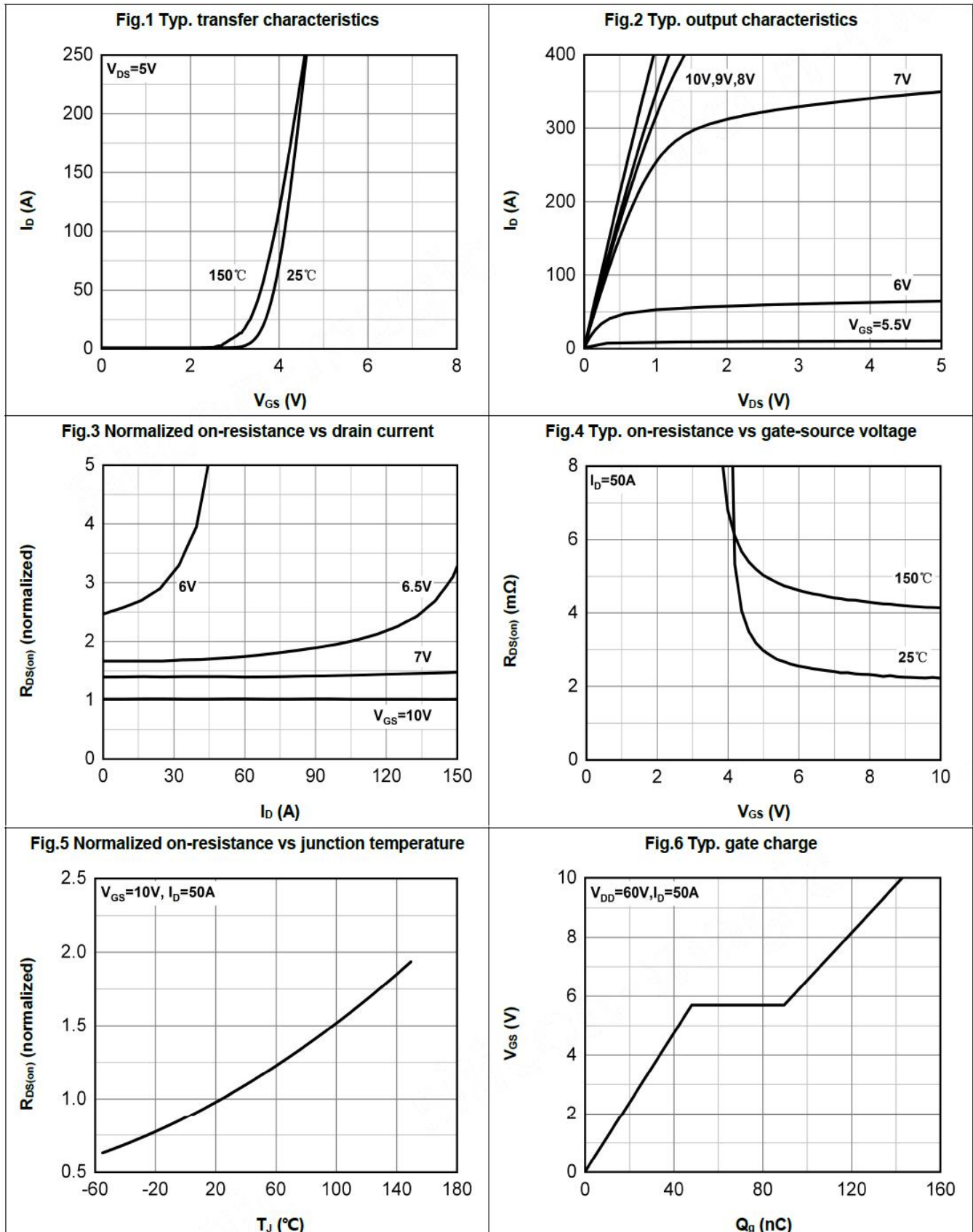


Fig.7 Typ. forward characteristics of body diode

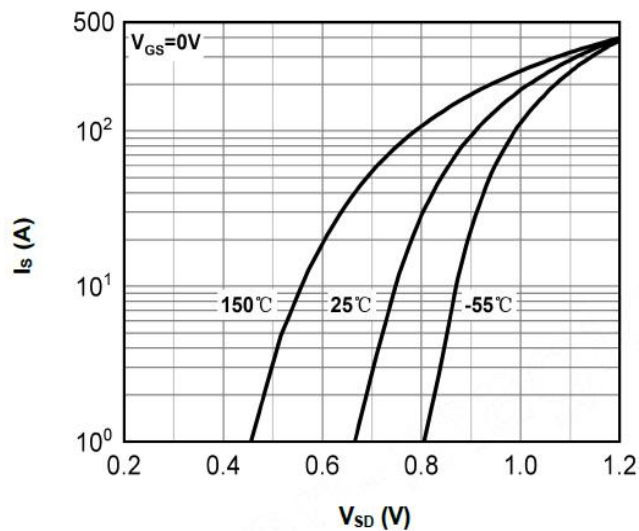


Fig.8 Safe operating area

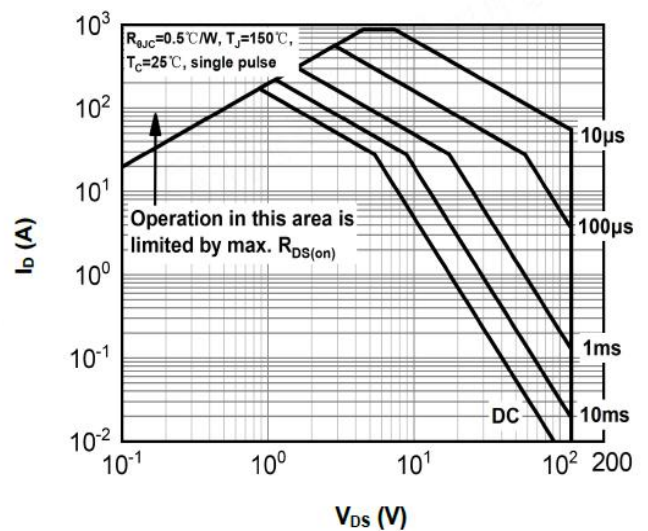


Fig.9 Typ. Capacitance

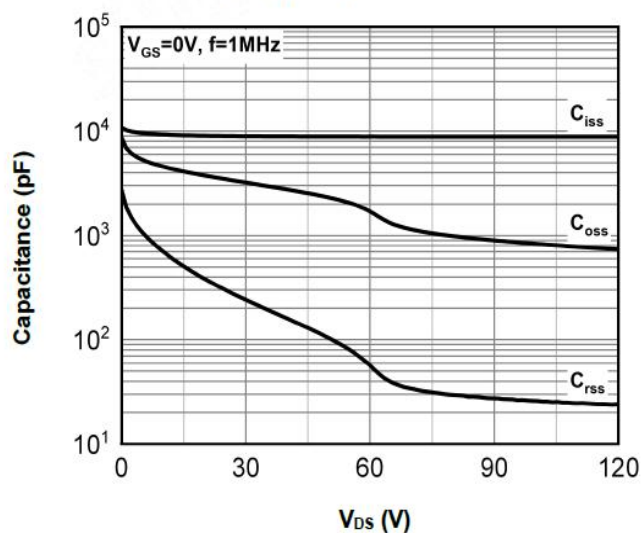


Fig.10 Single pulse maximum power dissipation

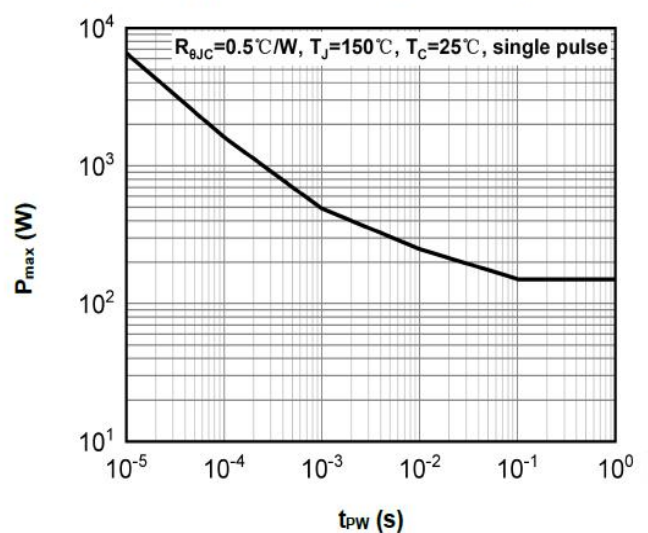


Fig.11 Max. power dissipation vs case temperature

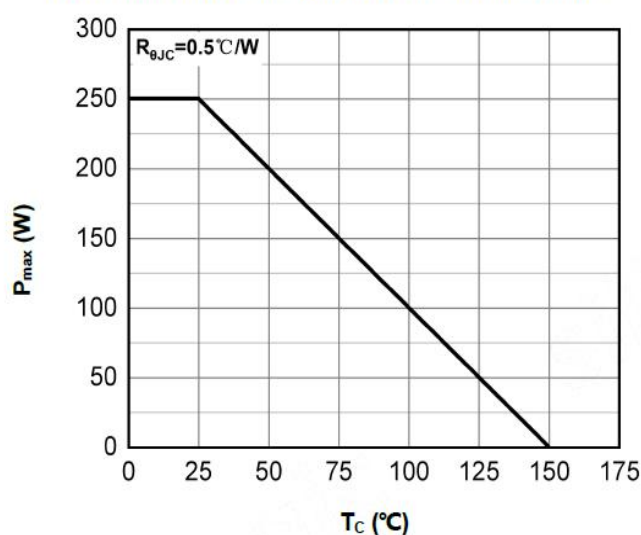


Fig.12 Max. continuous drain current vs case temperature

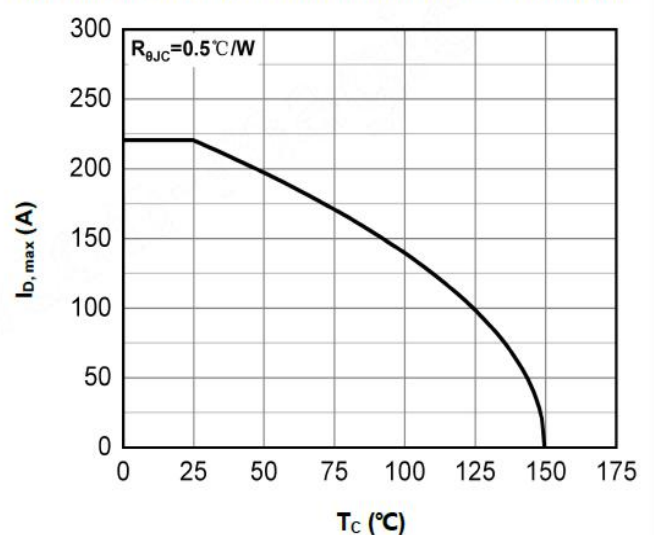


Fig.13 Normalized $V_{(BR)DSS}$ vs junction temperature

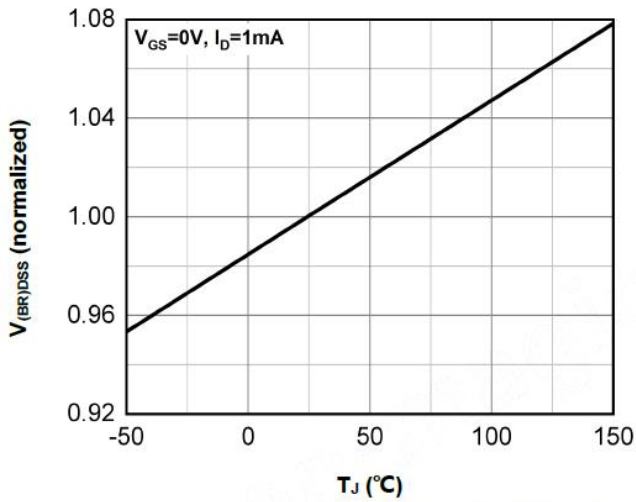


Fig.14 Normalized $V_{GS(th)}$ vs junction temperature

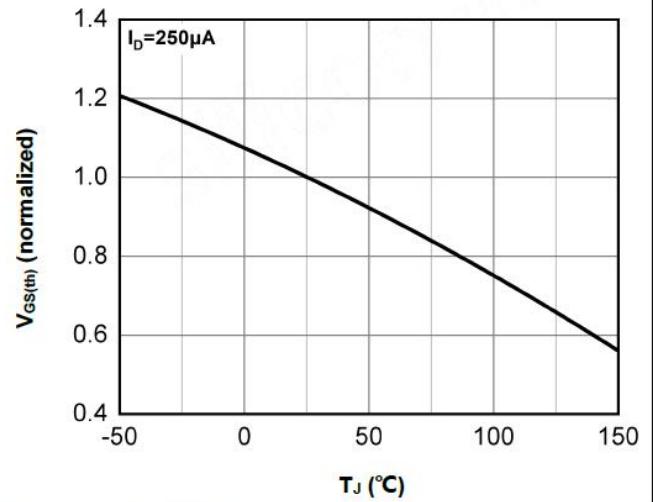
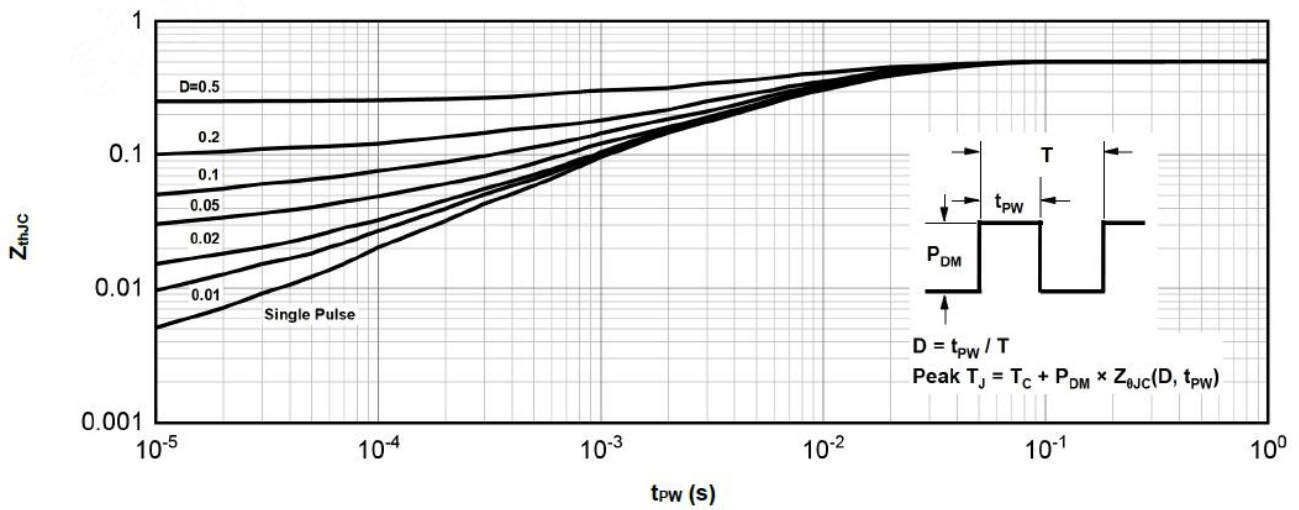
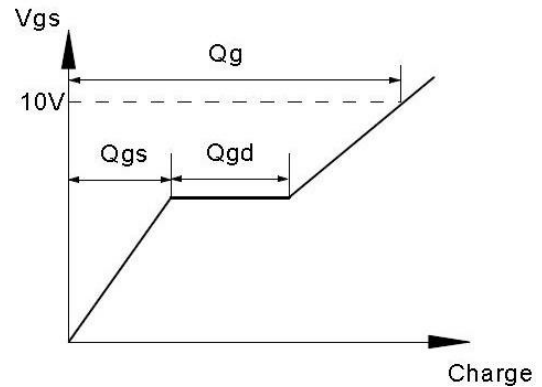
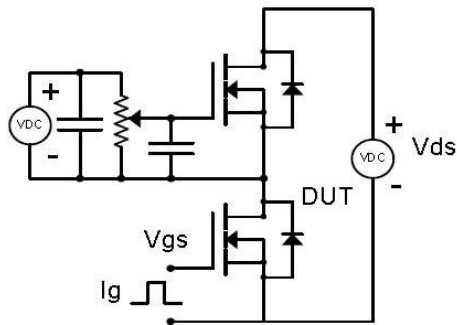


Fig.15 Transient thermal impedance from junction to case

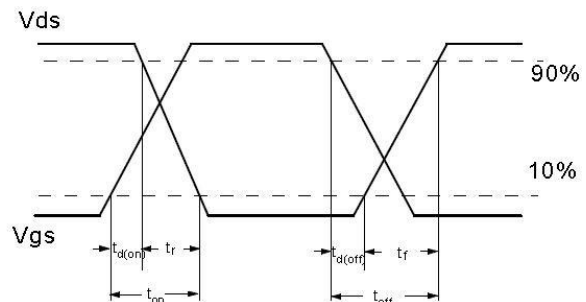
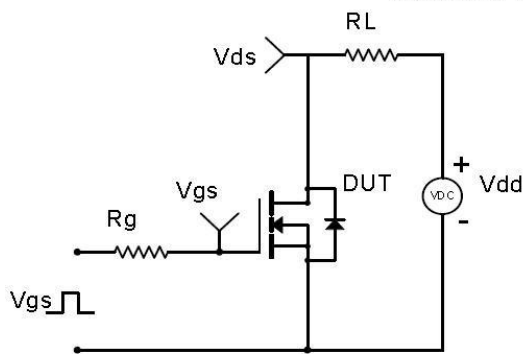


Test Circuit & Waveform

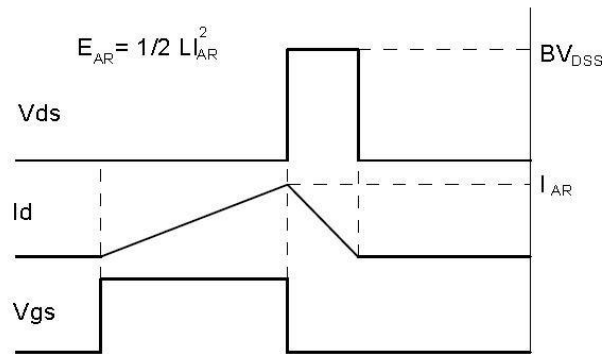
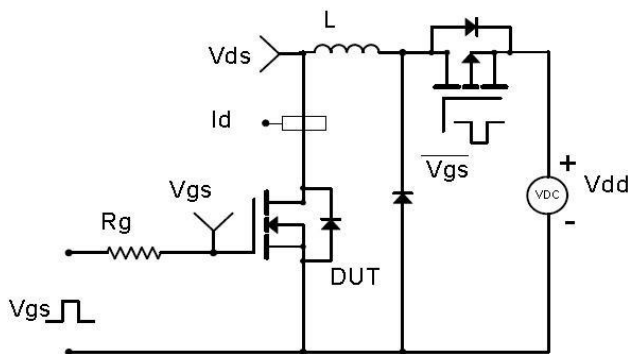
Gate Charge Test Circuit & Waveform



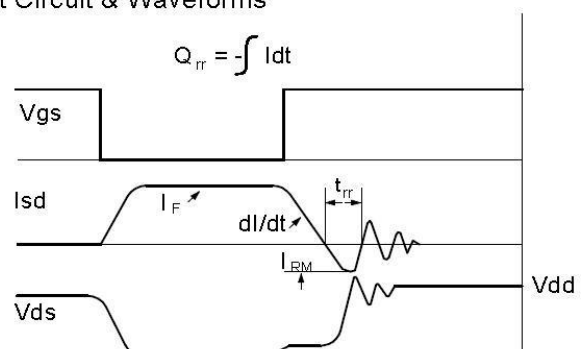
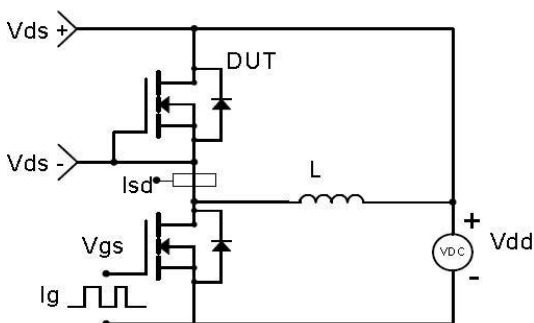
Resistive Switching Test Circuit & Waveforms

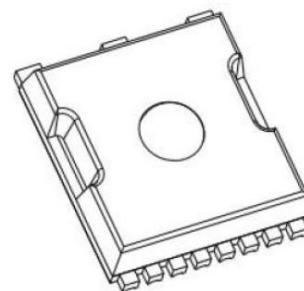
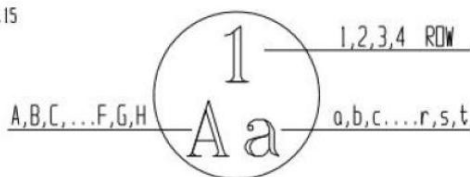
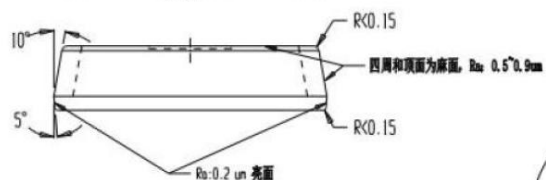
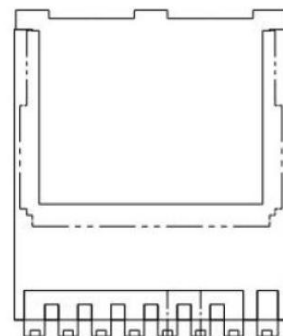
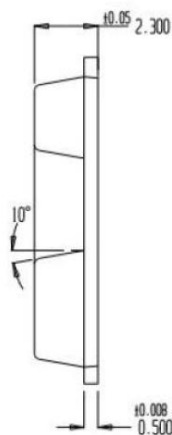


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms





Revision History:

Revision	Date	Major changes
1.0	2025/6/6	Release of Preliminary version.
2.0	2025/9/23	Release of official version.