Lonten N-channel 500V, 5A Power MOSFET

Description

The Power MOSFET is fabricated using the advanced planar **VDMOS** technology. The resulting device has low conduction resistance,superior switching performance and high avalanche energy.

Features

- Low $R_{DS(on)}$
- Low gate charge (typ. Q_g =13.2nC)
- 100% UIS tested
- RoHS compliant

Applications

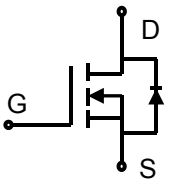
- Power factor correction.
- Switched mode power supplies.
- LED driver.

Product Summary

V_{DSS}	500V
I_D	5A
$R_{DS(on),max}$	1.6Ω
$Q_{g,typ}$	13.2nC

Pin Configuration

TO-252



N-Channel MOSFET

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	500	V
Continuous drain current [1] (T_C = 25°C)	I_D	5	A
(T_C = 100°C)		3	A
Pulsed drain current [2]	I_{DM}	20	A
Gate-Source voltage	V_{GSS}	±30	V
Avalanche energy, single pulse [3]	E_{AS}	211	mJ
Power Dissipation	P_D	80	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	5	A
Diode pulse current	$I_{S,pulse}$	50	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.57	°C/W
Thermal Resistance, Junction-to-Ambient [4]	$R_{\theta JA}$	96.05	°C/W
Soldering temperature, wavesoldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	°C

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Reel
LNG5N50	TO-252	LNG5N50	2500

Electrical Characteristics

T_c = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=0.25mA	500	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25mA	2.0	-	4.0	V
Drain cut-off current	I_{DSS}	V_{DS}=500V, V_{GS}=0 V,T_j = 25°C	-	-	1	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V	-	-	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=2.5A T_j = 25°C T_j = 150°C	 - -	 1.38 3.17	 1.6	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 25V, V_{GS} = 0 V,	-	549.83	-	pF
Output capacitance	C_{oss}	f = 250kHz	-	56.73	-	
Reverse transfer capacitance	C_{rss}		-	2.93	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 250V, I_D = 5A	-	37.9	-	ns
Rise time	t_r	R_G = 10Ω, V_{GS}=10V	-	7.2	-	
Turn-off delay time	$t_{d(off)}$		-	18.0	-	
Fall time	t_f		-	8.1	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=400V, I_D=2.5A	-	2.6	-	nC
Gate to drain charge	Q_{gd}	V_{GS}=0 to 10V	-	5.8	-	
Gate charge total	Q_g		-	13.2	-	
Gate plateau voltage	$V_{plateau}$		-	4.7	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=5A	-	-	1.3	V
Reverse recovery time	t_{rr}	V_R=250V, I_F=2.5A,	-	201.4	-	ns
Reverse recovery charge	Q_{rr}	dI_F/dt=100 A/μs	-	832.8	-	μC
Peak reverse recovery current	I_{rrm}		-	6.89	-	A

Notes:

1. Drain current limited by maximum junction temperature.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. I_{AS}=6.5A, L=10mH, V_{DD}=60V, Starting T_j= 25° C.
4. The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.

Electrical Characteristics Diagrams

Figure 1. Typ. Output Characteristics

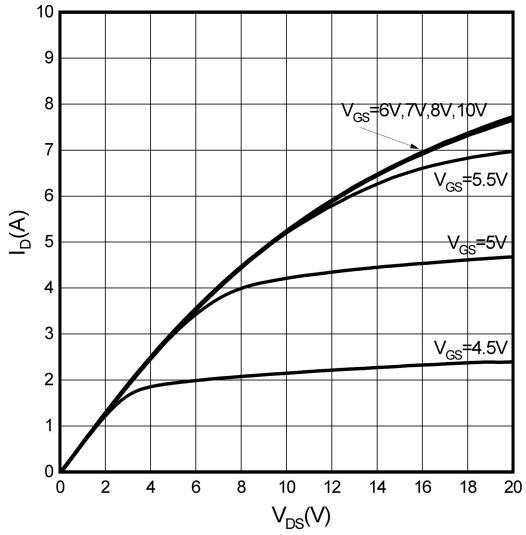


Figure 2. Transfer Characteristics

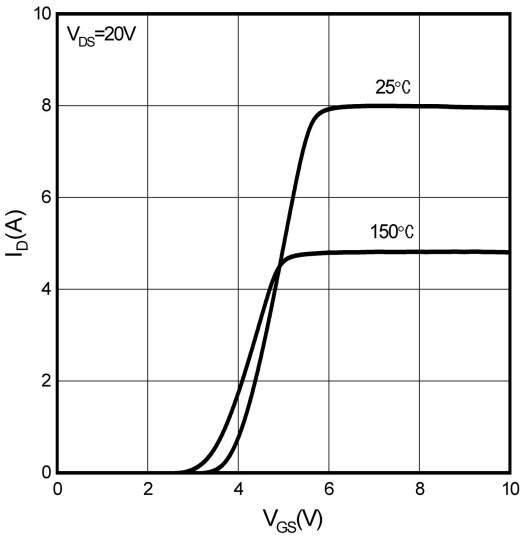


Figure 3. On-Resistance vs. Drain Current

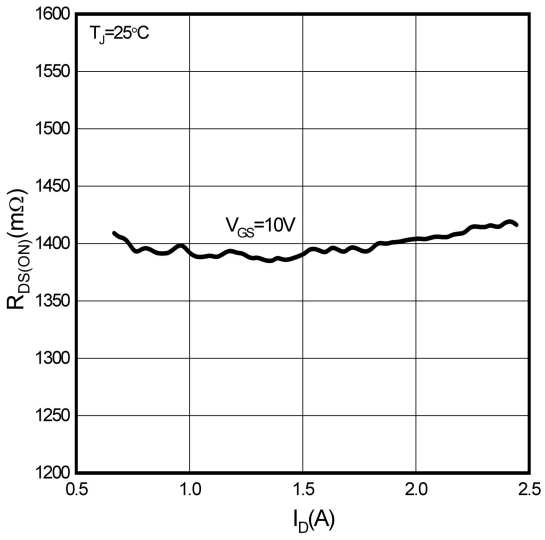


Figure 4.On-Resistance vs.Temperature

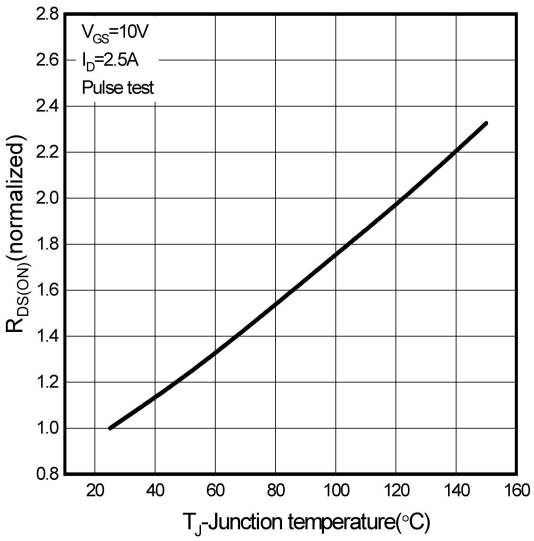


Figure 5.Breakdown Voltage vs.Temperature

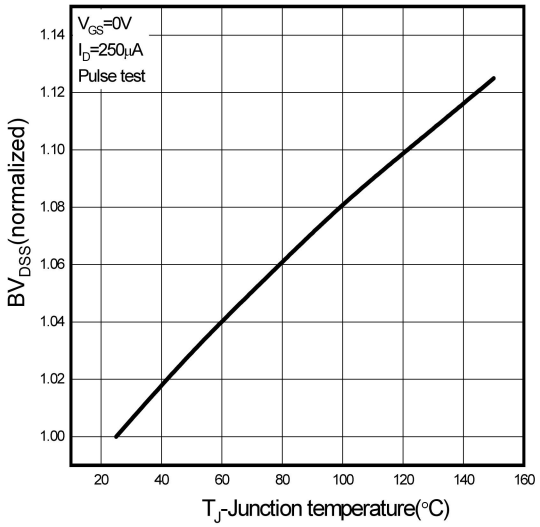


Figure 6.Threshold Voltage vs.Temperature

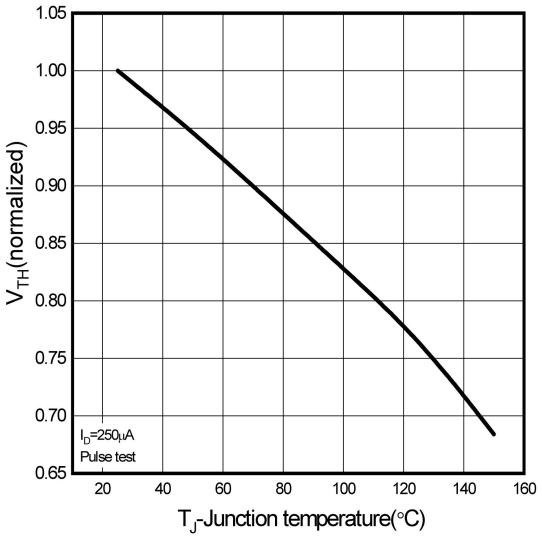


Figure 7.Rds(on) vs. Gate Voltage

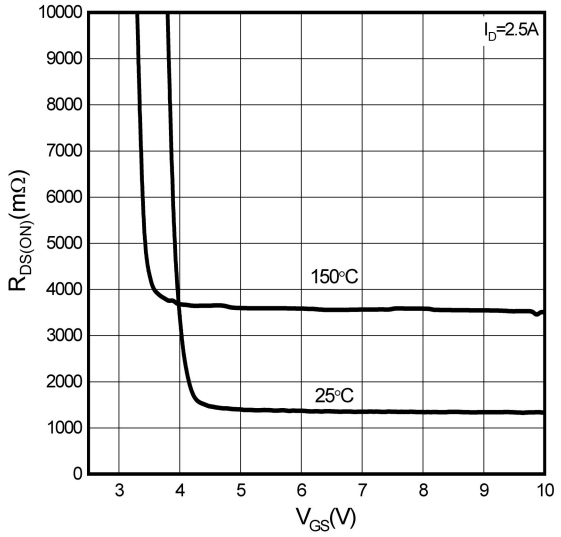


Figure 8.Body-Diode Characteristics

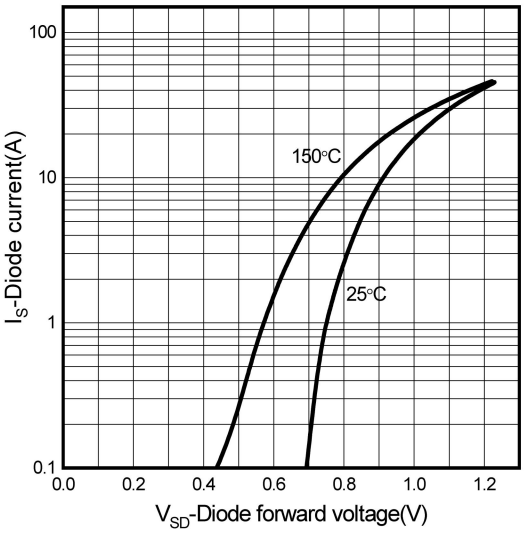


Figure 9.Capacitance Characteristics

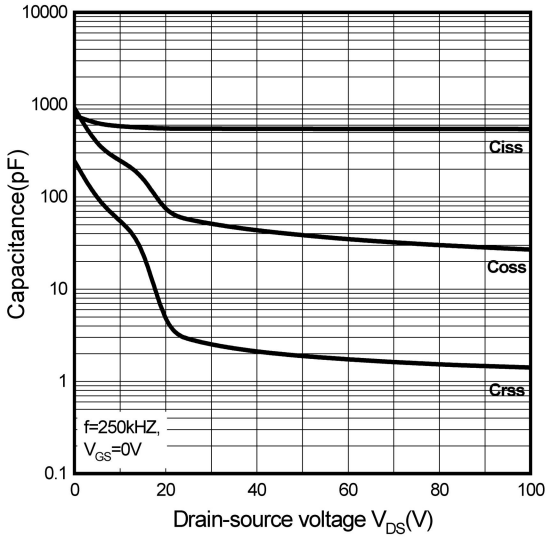


Figure 10.Gate Charge Characteristics

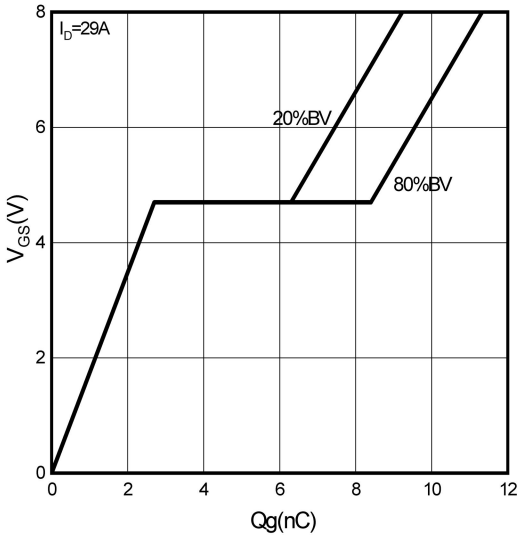


Figure 11.Drain Current Derating

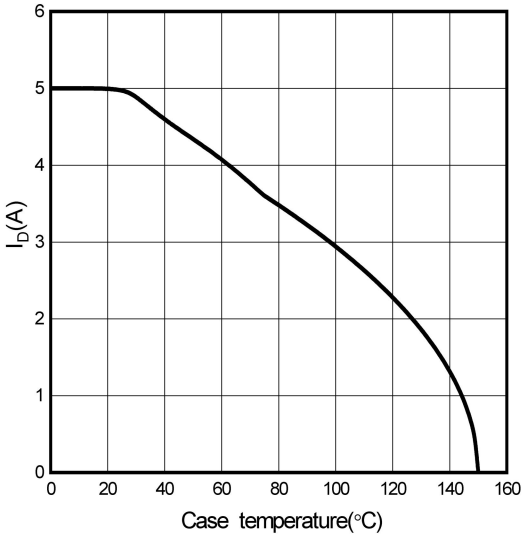


Figure 12.Power Dissipation vs.Temperature

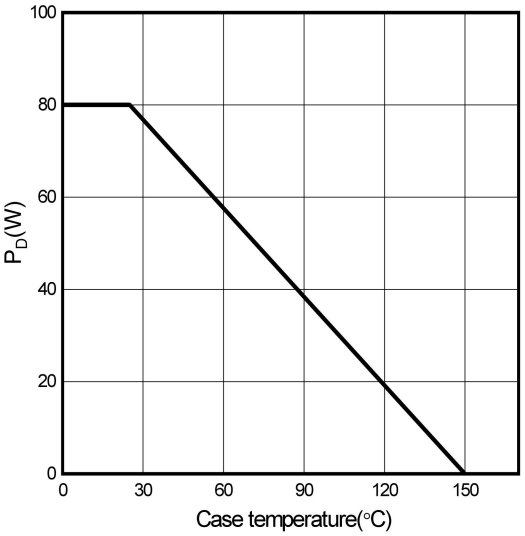


Figure 13. Safe Operating Area

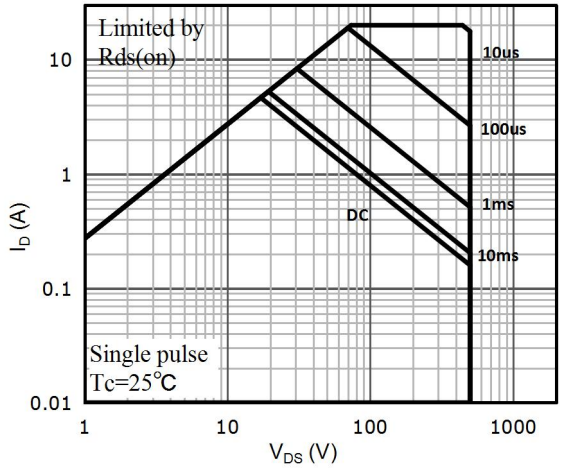
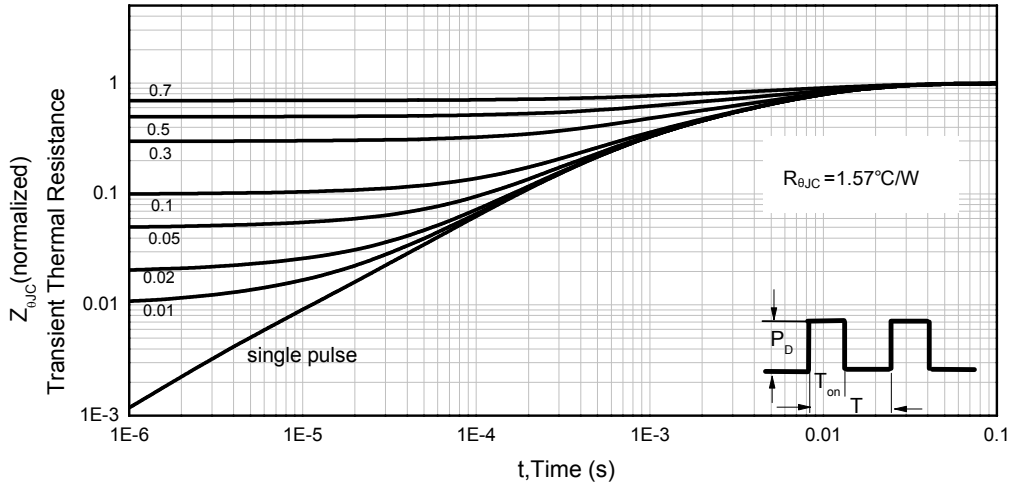
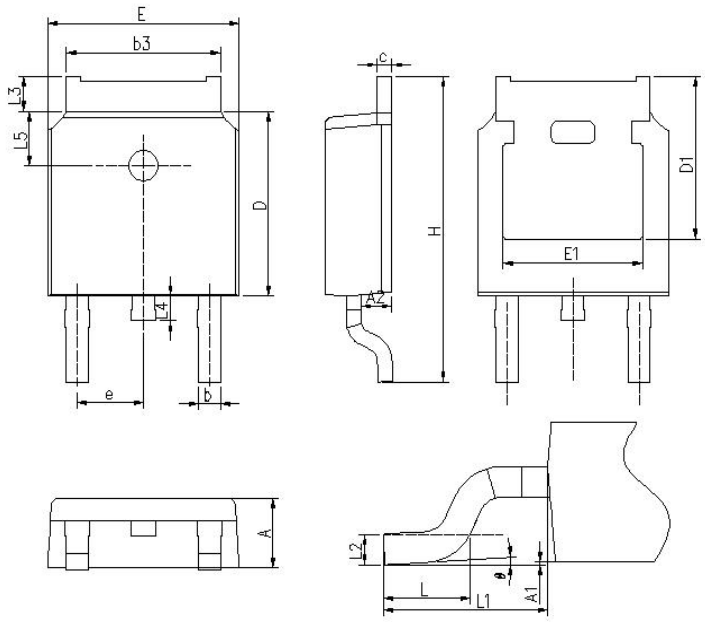


Figure 14. Normalized Maximum Transient Thermal Impedance (R_{thJC})



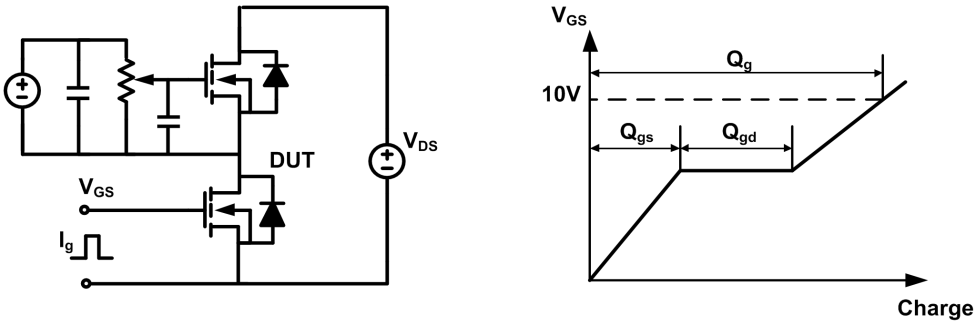
Mechanical Dimensions for TO-252



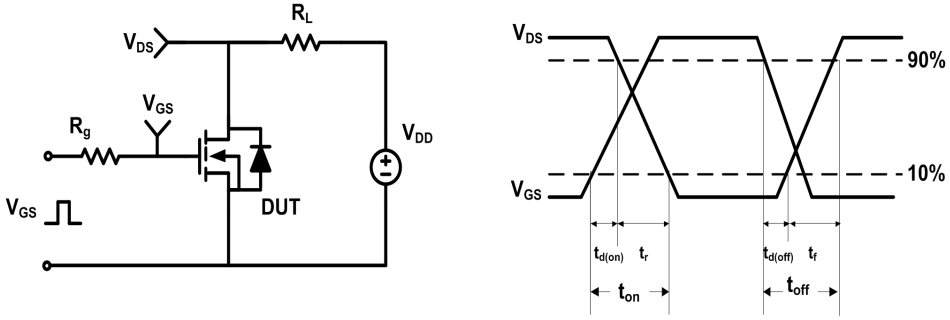
DIMENSIONS IN MILLITMETERS		
SYMBOL	MIN	MAX
A	2.18	2.4
A1	-	0.2
A2	0.9	1.17
b	0.65	0.9
b3	4.95	5.5
c	0.43	0.89
D	5.97	6.22
D1	5.21	-
E	6.35	6.8
E1	4.32	-
e	2.286BSC	
H	9.4	10.5
L	0.38	1.78
L1	2.90BSC	
L2	0.51BSC	
L3	0.88	1.28
L4	-	1.02
L5	1.65	1.95
θ	0°	10°

Test Circuit & Waveforms

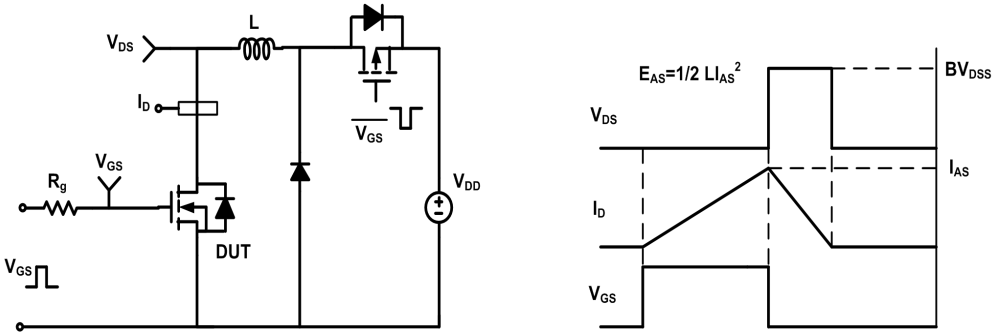
Gate Charge Test Circuit & Waveform



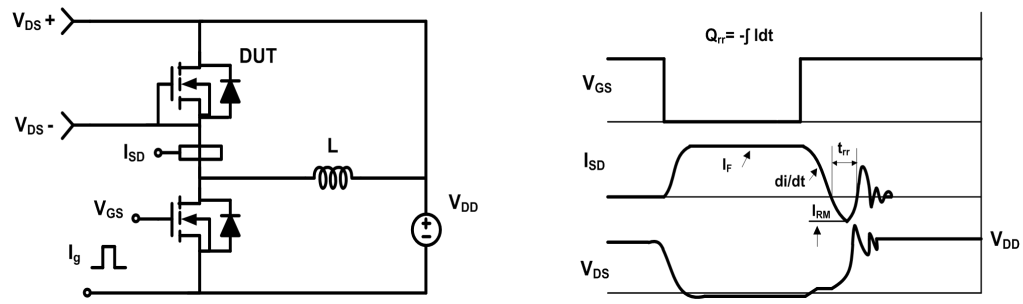
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform



Diode Recovery Test Circuit & Waveform



Version Information

LNG5N50

Revision:2023-07-31,Rev 1.0

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