

SOT-23 Plastic-Encapsulate Mosfets

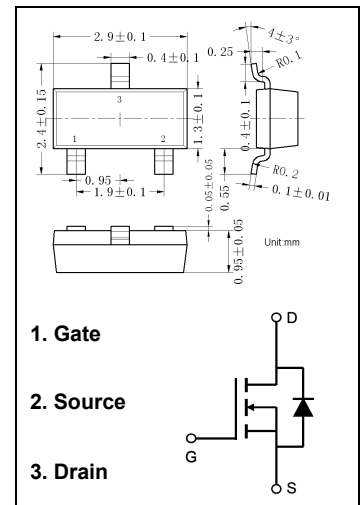
LJ4414 N-Channel Mosfet

Features

- $V_{DS} = 20V$
- $I_D = 3A$ ($V_{GS} = 4.5V$)
- $R_{DS(ON)} < 62m\Omega$ ($V_{GS} = 4.5V$)
- $R_{DS(ON)} < 70m\Omega$ ($V_{GS} = 2.5V$)
- $R_{DS(ON)} < 85m\Omega$ ($V_{GS} = 1.8V$)

Applications

The LJ4414 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications.



Marking 4414

Maximum Ratings (T_a=25°C unless otherwise specified)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source voltage	20	V
V_{GS}	Gate-Source voltage	± 8	V
I_D	Continuous Drain Current ^A	$T_a=25^{\circ}\text{C}$	A
		$T_a=70^{\circ}\text{C}$	
I_{DM}	Pulsed Drain Current ^B	16	
P_D	Power Dissipation ^B	$T_a=25^{\circ}\text{C}$	W
		$T_a=70^{\circ}\text{C}$	
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	$^{\circ}\text{C}$

Thermal Characteristics

Symbol	Parameter		Typ	Max	Unit
R_{θJA}	Maximum Junction-to-Ambient ^A	t ≤ 10s	70	90	°C/W
	Maximum Junction-to-Ambient ^A	Steady-State	100	125	°C/W
R_{θJL}	Maximum Junction-to-Lead ^C	Steady-State	63	80	°C/W

Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Static Parameters						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 20 V, V _{GS} = 0 V T _J =55°C			1 5	μA
I _{GSS}	Gate-body Leakage current	V _{DS} = 0 V, V _{GS} = ±8 V			±100	nA
V _{GS(th)}	Gate-Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	0.4	0.7	1.0	V
I _{D(ON)}	On-state Drain Current	V _{GS} = 4.5V, V _{DS} = 5V	16			A
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 4.5V, I _D = 3A T _J =125°C		51 68	62 85	mΩ
		V _{GS} = 2.5V, I _D = 2.8A		58	70	
		V _{GS} = 1.8V, I _D = 2.5A		68	85	
g _{fs}	Forward Trans conductance	V _{DS} = 5V, I _D = 3A		11		S
V _{SD}	Diode Forward Voltage	I _S = 1A, V _{GS} =0 V		0.7	1.0	V
I _S	Maximum Body-Diode Continuous Current				2	A
Dynamic Parameters						
C _{iss}	Input Capacitance	V _{GS} = 0V		260	320	pF
C _{oss}	Output Capacitance	V _{DS} = 10V		48		
C _{rss}	Reverse Transfer Capacitance	f = 1.0MHz		27		
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		3	4.5	Ω
Dynamic Parameters						
Q _g	Total Gate Charge	V _{GS} = 4.5V		2.9	3.8	nC
Q _{gs}	Gate Source Charge	V _{DS} = 10V		0.4		
Q _{gd}	Gate Drain Charge	I _D = 3A		0.6		
t _{D(on)}	Turn-On Delay Time	V _{GS} = 5V, V _{DS} = 10V, R _L = 3.3Ω, R _{GEN} = 6Ω		2.5		ns
t _r	Turn-On Rise Time			3.2		
t _{D(off)}	Turn-Off Delay Time			21		
t _f	Turn-Off Fall Time			3		
t _{rr}	Body Diode Reverse Recovery Time	I _F = 3A, dI/dt = 100A/μs		14	19	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F = 3A, dI/dt = 100A/μs		3.8		nC

A. The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. copper, in a still air environment with T_a=25°C.

The value in any given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.

B. Repetitive rating, pulse width limited by junction temperature.

C. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

D. The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_a=25°C.

The SOA curve provides a single pulse rating.

Typical Characteristics

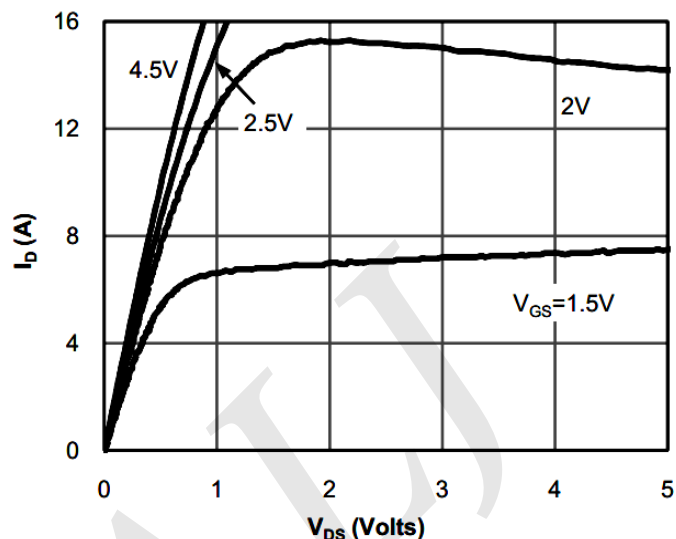


Figure 1: On-Region Characteristics

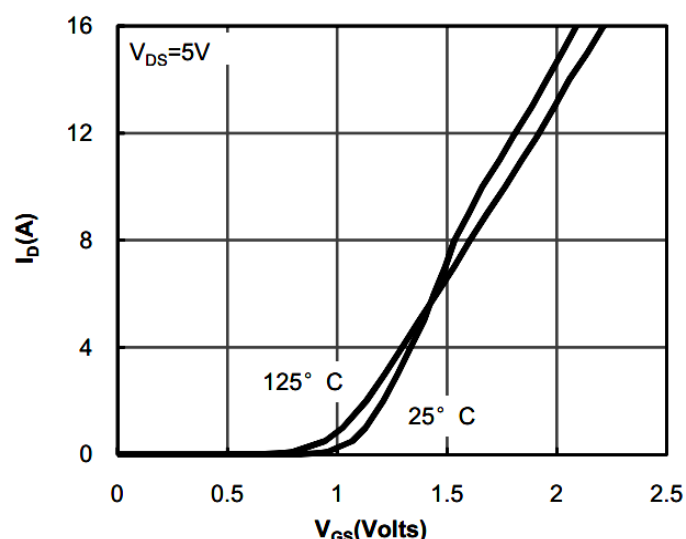


Figure 2: Transfer Characteristics

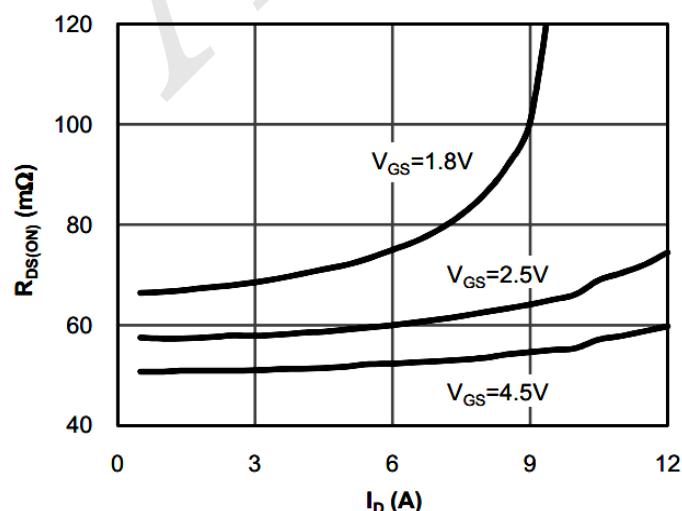


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

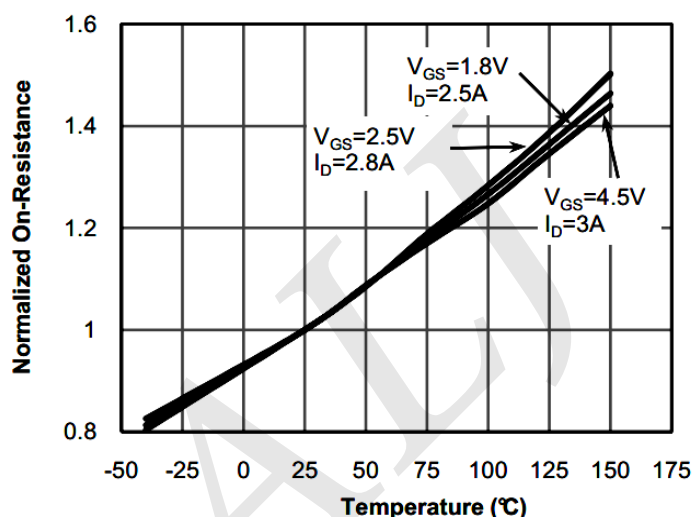


Figure 4: On-Resistance vs. Junction Temperature

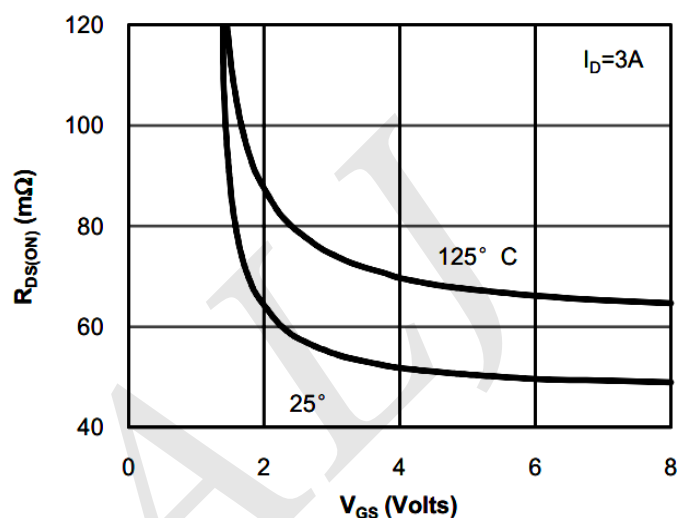


Figure 5: On-Resistance vs. Gate-Source Voltage

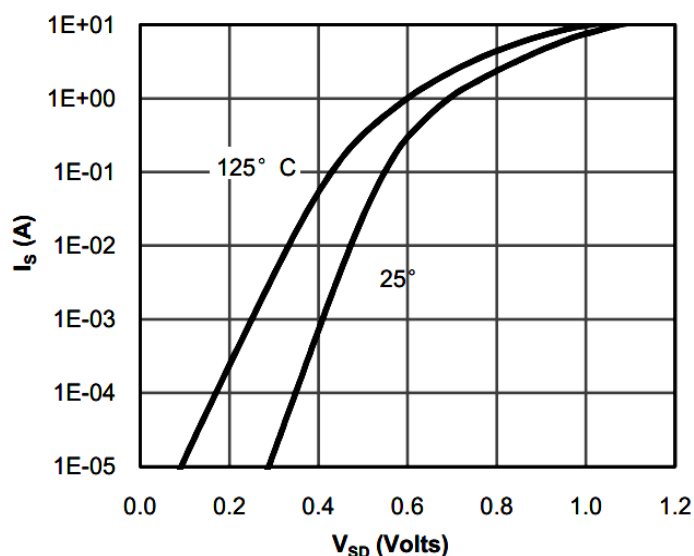


Figure 6: Body-Diode Characteristics

Typical Characteristics (Continued)

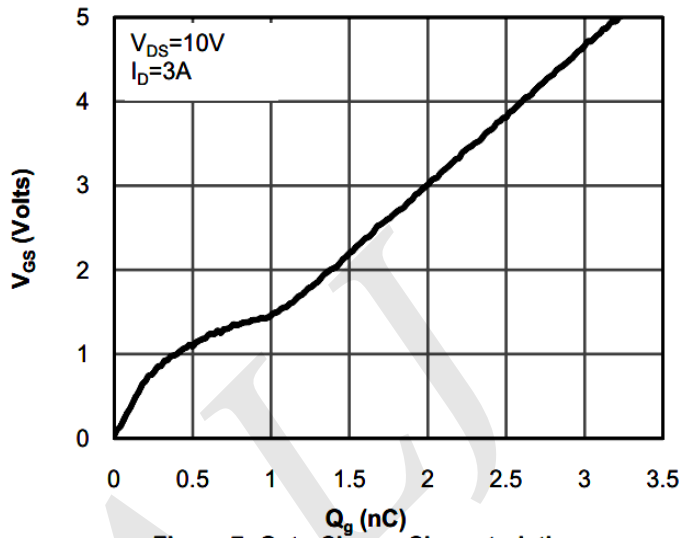


Figure 7: Gate-Charge Characteristics

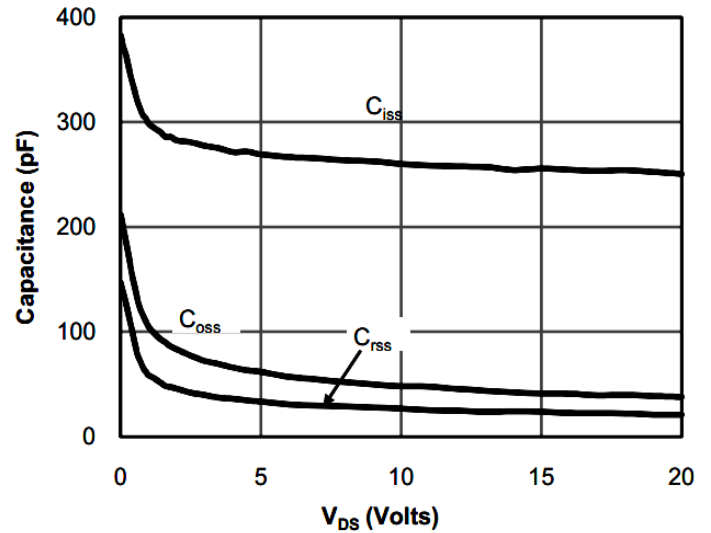


Figure 8: Capacitance Characteristics

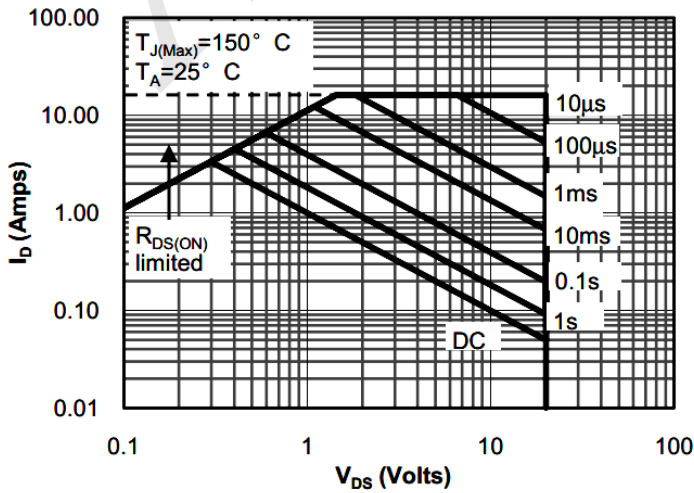


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

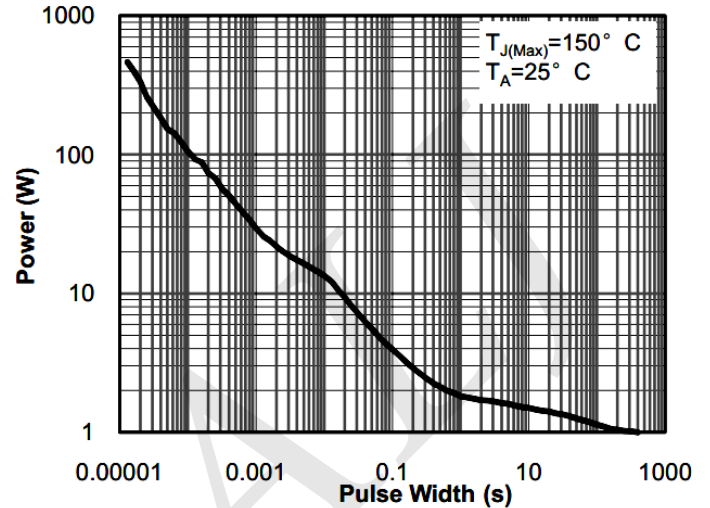


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

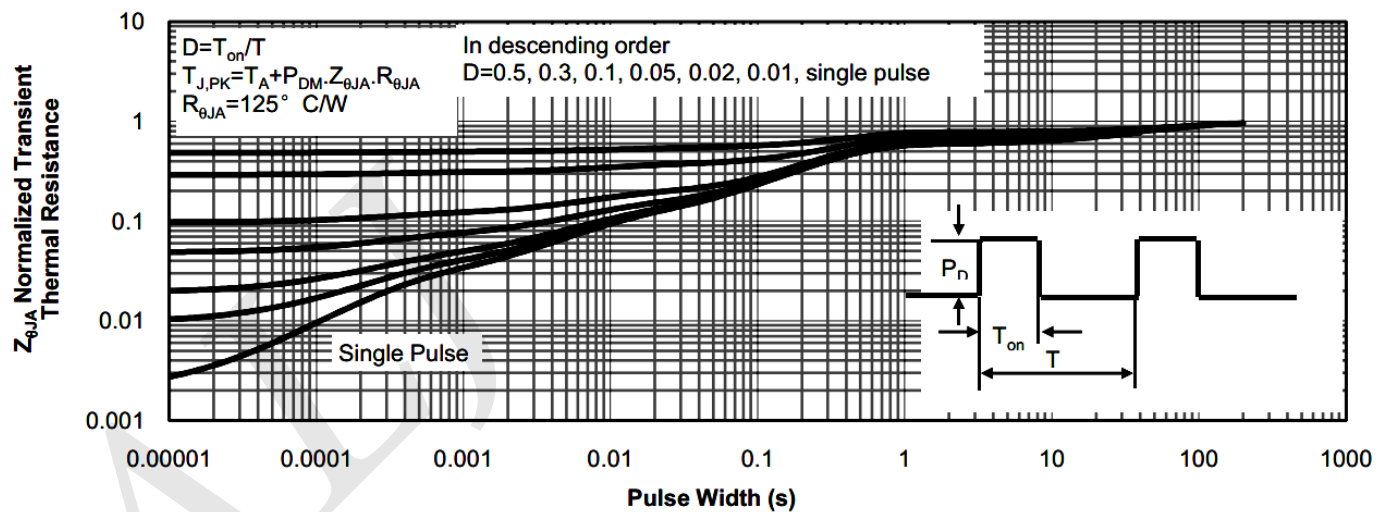
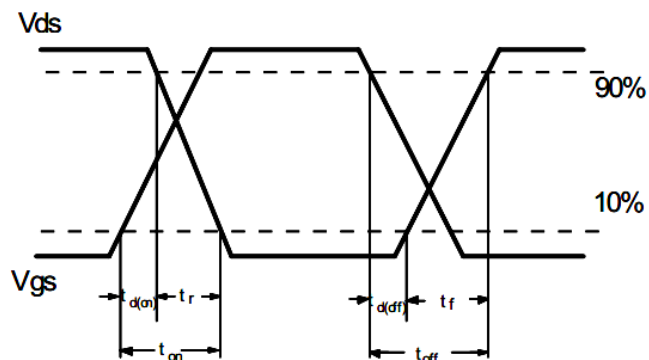
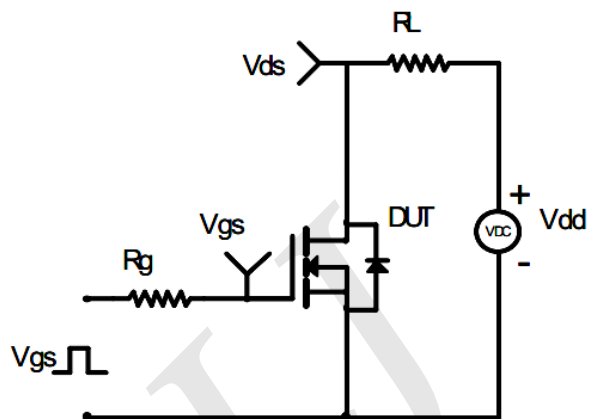
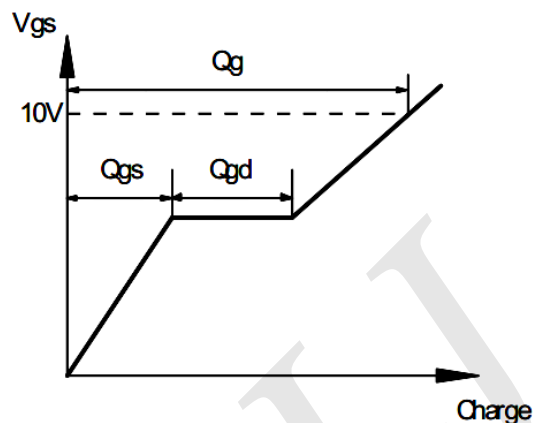
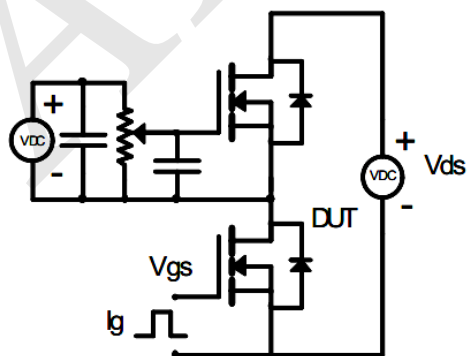


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

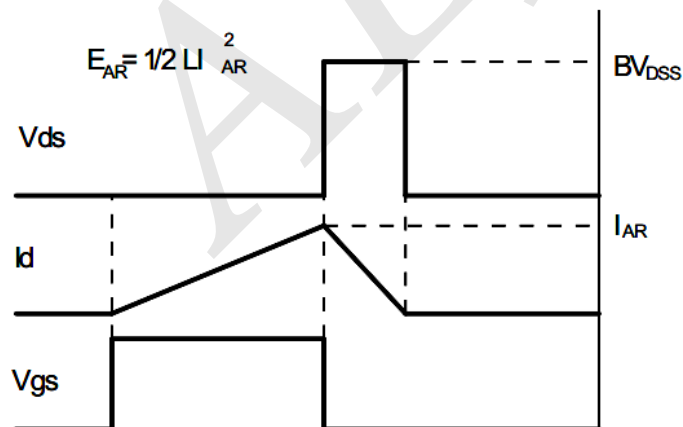
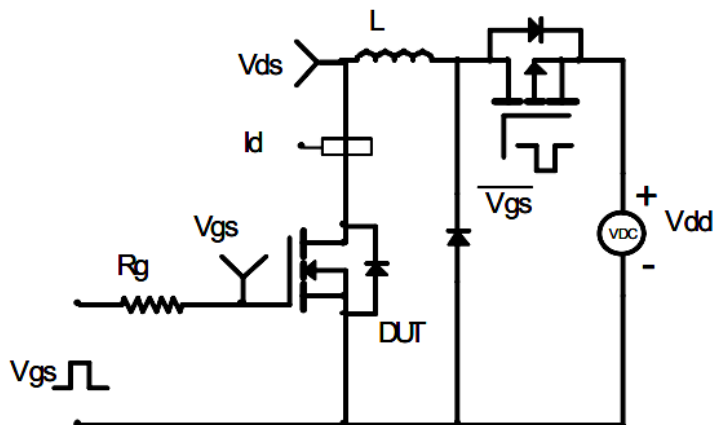
Resistive Switching Test Circuit & Waveforms



Gate Charge Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

