

SOT-23 Plastic-Encapsulate MOSFETS

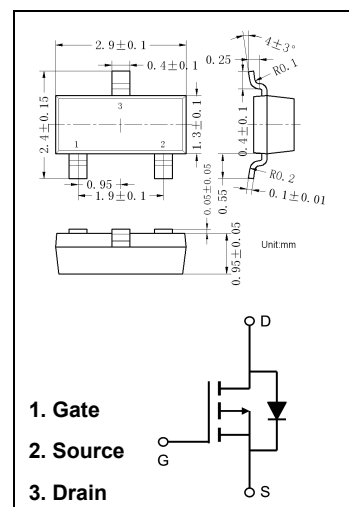
LJ3409

P-Channel MOSFET

General Description

The LJ3409 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications.

Marking:3409



Maximum Ratings ($T_a=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source voltage	-30	V
V_{GS}	Gate-Source voltage	± 20	
I_D	Continuous Drain Current	$T_A = 25^\circ\text{C}$	A
		$T_A = 70^\circ\text{C}$	
I_{DM}	Pulsed Drain Current ³⁾	-20	
P_D	Power Dissipation ²⁾	$T_A = 25^\circ\text{C}$	W
		$T_A = 70^\circ\text{C}$	W
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Maximum Junction-to-Ambient ¹⁾	70	90	$^\circ\text{C/W}$
	Maximum Junction-to-Ambient ^{1,4)}	100	125	$^\circ\text{C/W}$
$R_{\theta JL}$	Maximum Junction-to-Lead	63	80	$^\circ\text{C/W}$

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	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -30V, V _{GS} = 0V			-1	μA
		V _{DS} = -30V, V _{GS} = 0V, T _J = 55°C			-5	
I _{GSS}	Gate-body Leakage current	V _{DS} = 0V, V _{GS} = ±20V			±100	nA
V _{GS(th)}	Gate-Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-1.4	-1.9	-2.4	V
I _{D(ON)}	On state drain current	V _{GS} = -10V, V _{DS} = -5V	-20			A
R _{DS(on)}	Drain-Source On-Resistance	V _{GS} = -10V, I _D = -2.6A		77	110	mΩ
		V _{GS} = -10V, I _D = -2.6A, T _J = 125°C		100	140	mΩ
		V _{GS} = -4.5V, I _D = -2A		125	180	mΩ
g _{fs}	Forward Trans conductance	V _{DS} = -5V, I _D = -2.6A		5		S
V _{SD}	Diode Forward Voltage	I _S = -1A, V _{GS} = 0V		-0.8	-1	V
I _S	Maximum Body-Diode Continuous Current				-1.5	A
Dynamic Parameters						
C _{iss}	Input Capacitance	V _{GS} = 0V V _{DS} = -15V f = 1.0MHz		197	240	pF
C _{oss}	Output Capacitance			42		
C _{rss}	Reverse Transfer Capacitance			26	37	
R _g	Gate resistance	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	3.5	7.2	11.0	Ω
Switching Parameters						
Q _{g(10V)}	Total Gate Charge	V _{GS} = -10V, I _D = -2.6A, V _{DS} = -15V		4.3	5.2	nC
Q _{g(4.5V)}	Total Gate Charge			2.2	3	
Q _{gs}	Gate-Source Charge			0.7		
Q _{gd}	Gate-Drain Charge			1.1		
t _{d(on)}	Turn-On Delay Time	V _{GS} = -10V, V _{DS} = -15V, R _L = 5.8Ω, R _{GEN} = 3Ω		7.5		ns
t _r	Rise Time			4.1		
t _{d(off)}	Turn-Off Delay Time			11.8		
t _f	Fall Time			3.8		
t _{rr}	Body Diode Reverse Recovery Time	I _F = -2.6A, dI/dt = 100A/μs		11.3	14	ns
Q _{rr}	Body Diode Reverse Recovery Charge			4.4		nC

Notes

1. The value of R_{θJA} is measured with the device mounted on 1in² 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.
2. The power dissipation P_D is based on T_{J(MAX)} = 150°C, using ≤ 10s junction-to-ambient thermal resistance.
3. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)} = 150°C. Ratings are based on low frequency and duty cycles to keep Initial T_J = 25°C.
4. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.
5. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.
6. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)} = 150°C. The SOA curve provides a single pulse rating.

Typical Characteristics

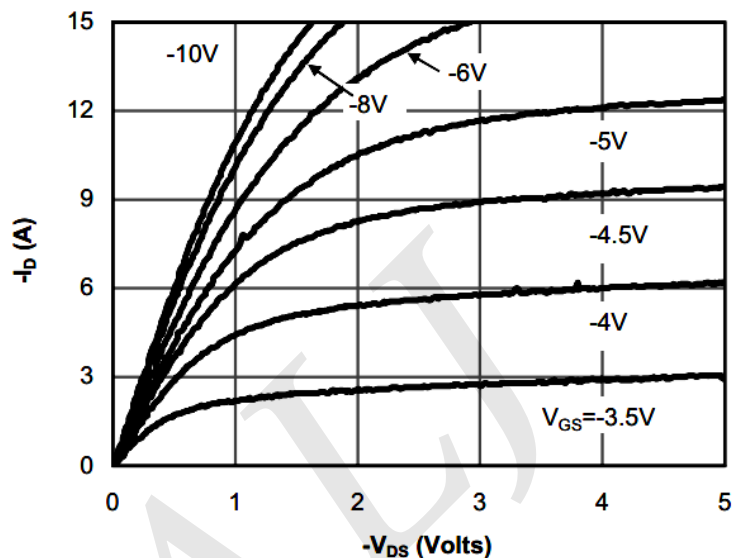


Fig 1: On-Region Characteristics (Note 4)

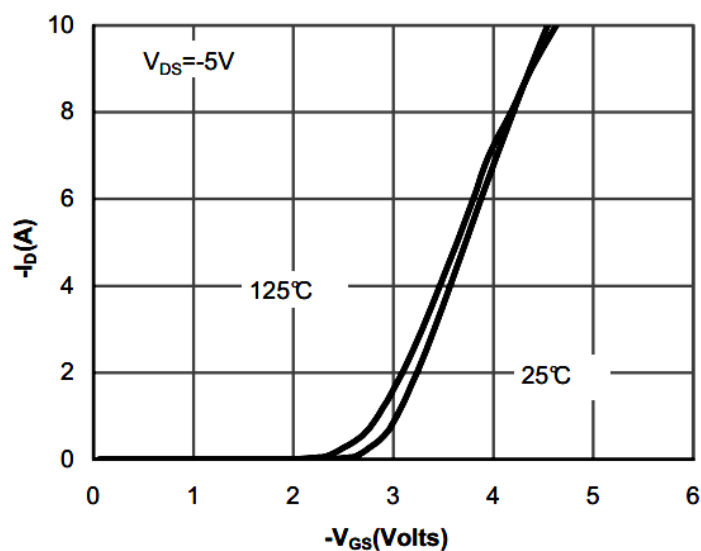


Figure 2: Transfer Characteristics (Note 4)

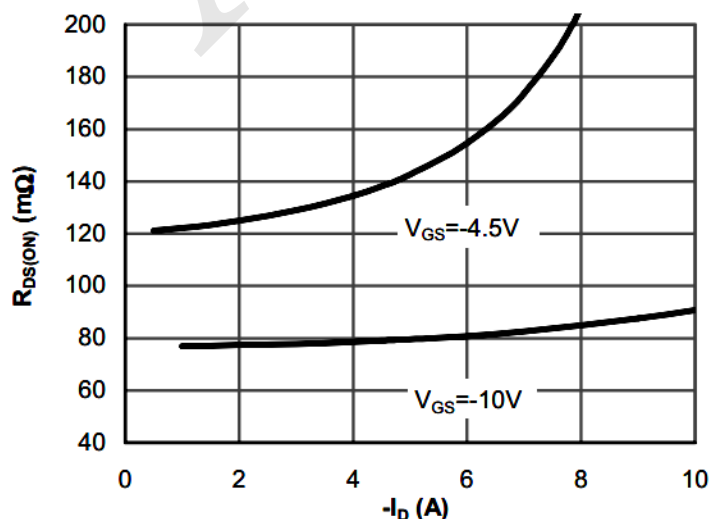


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note 4)

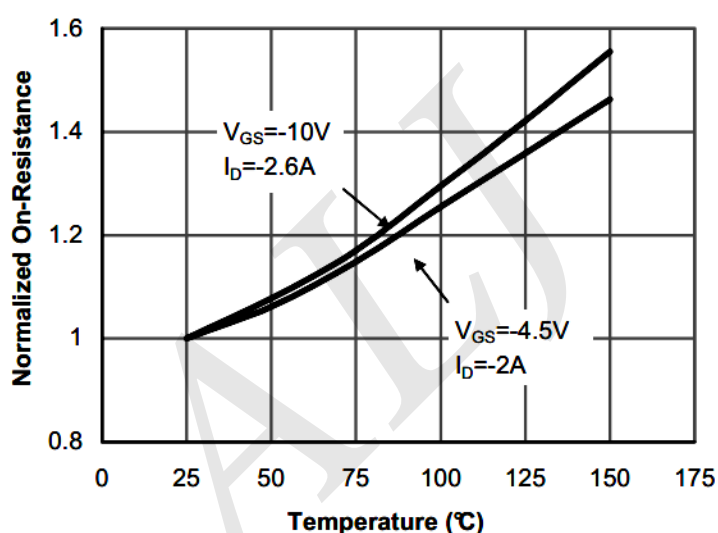


Figure 4: On-Resistance vs. Junction Temperature (Note 4)

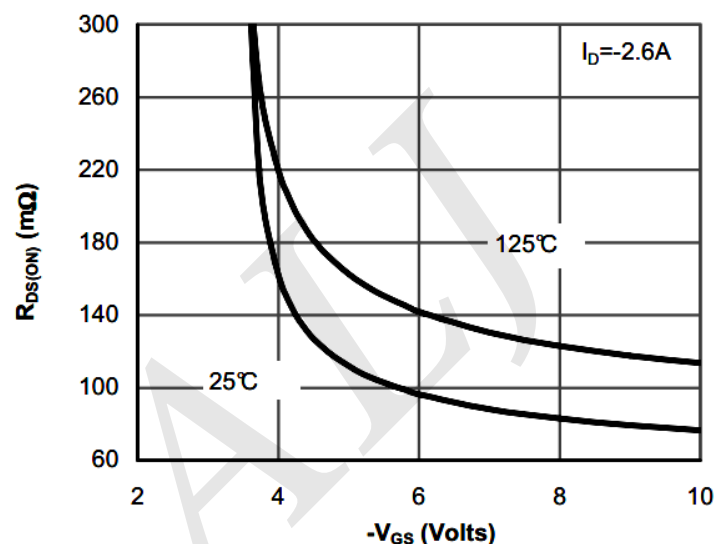


Figure 5: On-Resistance vs. Gate-Source Voltage (Note 4)

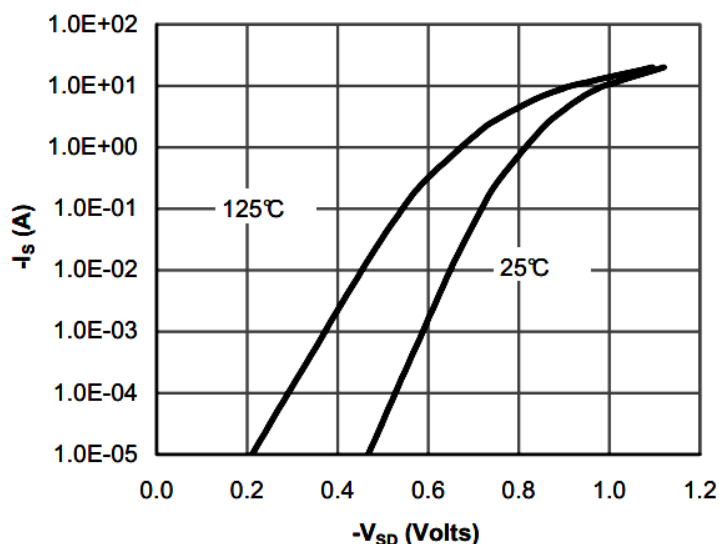


Figure 6: Body-Diode Characteristics (Note 4)

Typical Characteristics (Cont.)

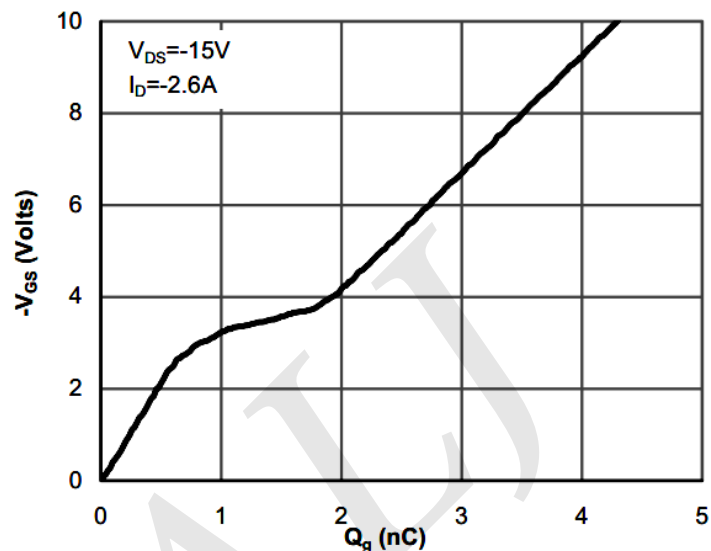


Figure 7: Gate-Charge Characteristics

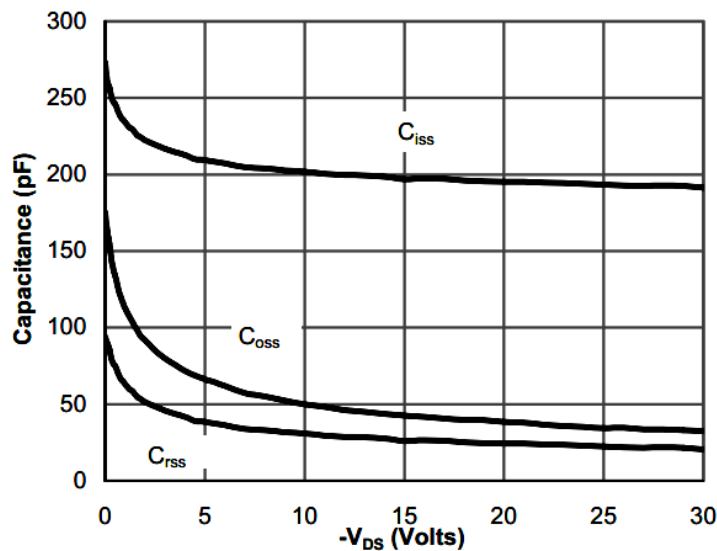


Figure 8: Capacitance Characteristics

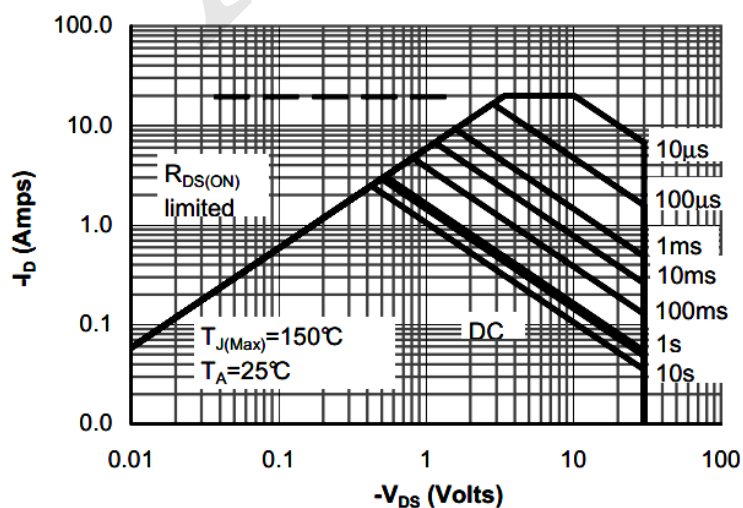


Figure 9: Maximum Forward Biased Safe Operating Area (Note 5)

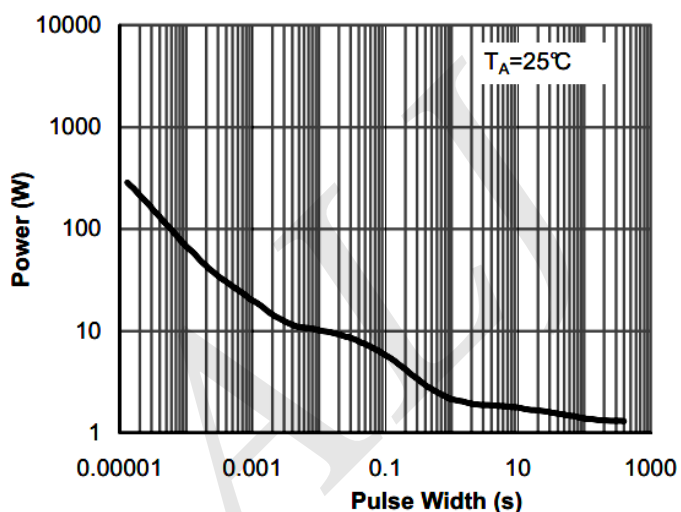


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note 5)

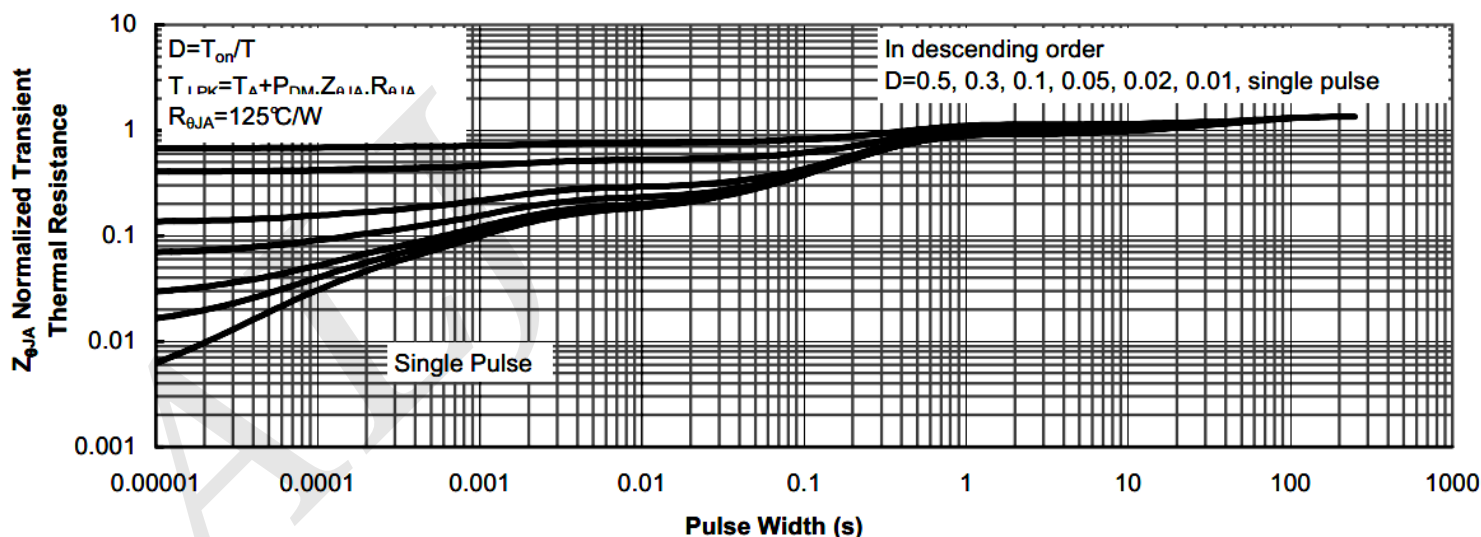
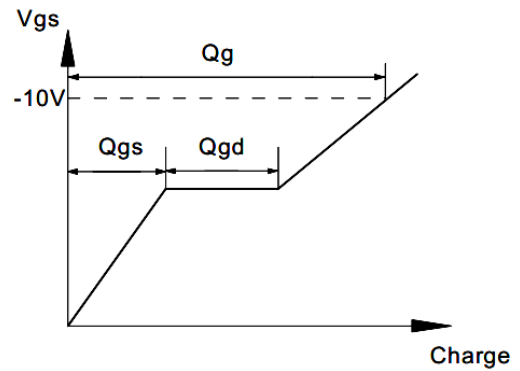
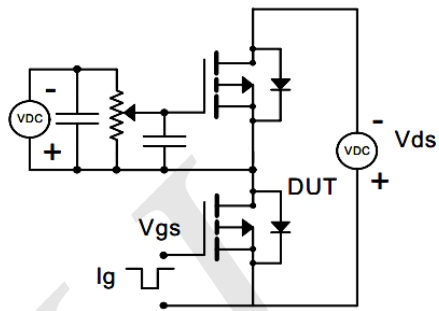
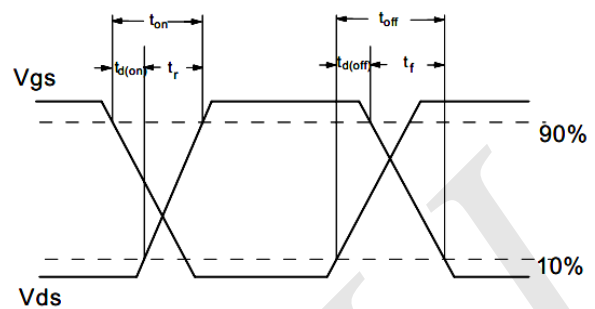
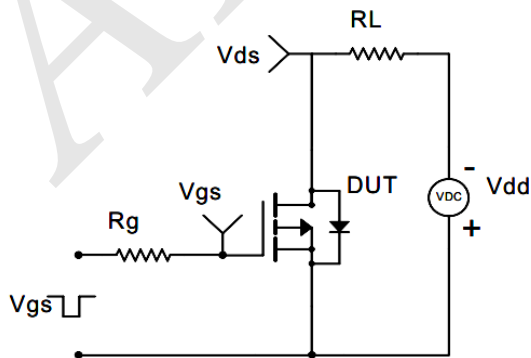


Figure 11: Normalized Maximum Transient Thermal Impedance (Note 5)

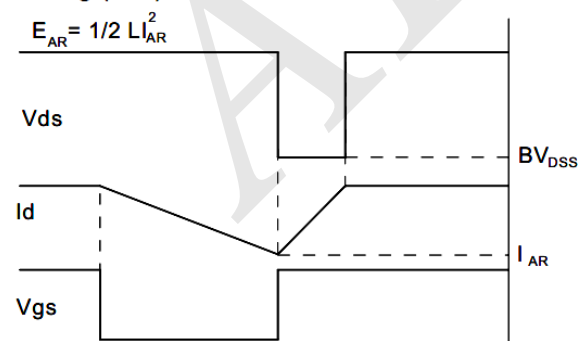
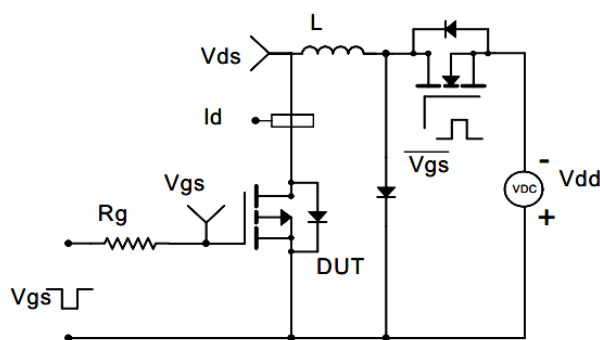
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

