

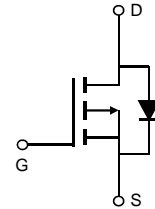
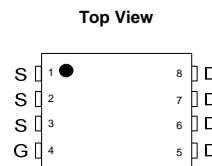
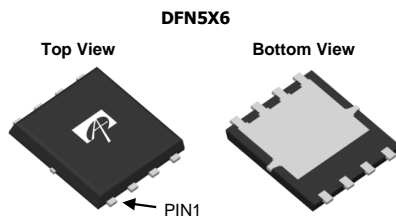
General Description

The GXN6411 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Product Summary

V_{DS}	-20
I_D (at $V_{GS} = -10V$)	-85A
$R_{DS(ON)}$ (at $V_{GS} = -10V$)	< 2.1m Ω
$R_{DS(ON)}$ (at $V_{GS} = -4.5V$)	< 2.5m Ω
$R_{DS(ON)}$ (at $V_{GS} = -2.5V$)	< 3.6m Ω

100% UIS Tested
 100% R_g Tested



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ^G	I_D	$T_C=25^\circ\text{C}$	-85
		$T_C=100^\circ\text{C}$	-67
Pulsed Drain Current ^C	I_{DM}	-340	A
Continuous Drain Current	I_{DSM}	$T_A=25^\circ\text{C}$	-47
		$T_A=70^\circ\text{C}$	-38
Avalanche Current ^C	I_{AS}	70	A
Avalanche energy $L=0.1\text{mH}$ ^C	E_{AS}	245	mJ
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	156
		$T_C=100^\circ\text{C}$	62.5
Power Dissipation ^A	P_{DSM}	$T_A=25^\circ\text{C}$	7.3
		$T_A=70^\circ\text{C}$	4.7
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	14	17	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A,D}				
Maximum Junction-to-Case	$R_{\theta JC}$	0.6	0.8	$^\circ\text{C/W}$

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-20\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 12\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-0.5	-0.85	-1.3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-10\text{V}, V_{DS}=-5\text{V}$	-340			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}, I_D=-20\text{A}$ $T_J=125^\circ\text{C}$		1.7 2.45	2.1 3	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}, I_D=-20\text{A}$		2	2.5	$\text{m}\Omega$
		$V_{GS}=-2.5\text{V}, I_D=-20\text{A}$		2.8	3.6	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-20\text{A}$		115		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}, V_{GS}=0\text{V}$		-0.57	-1	V
I_S	Maximum Body-Diode Continuous Current ^G				-85	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=-10\text{V}, f=1\text{MHz}$		10290		pF
C_{oss}	Output Capacitance			1910		pF
C_{riss}	Reverse Transfer Capacitance			1395		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		2.1	4.2	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=-10\text{V}, V_{DS}=-10\text{V}, I_D=-20\text{A}$		235	330	nC
$Q_g(4.5\text{V})$	Total Gate Charge			100	140	nC
Q_{gs}	Gate Source Charge			21		nC
Q_{gd}	Gate Drain Charge			36		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}, V_{DS}=-10\text{V}, R_L=0.5\Omega,$ $R_{GEN}=3\Omega$		9		ns
t_r	Turn-On Rise Time			18		ns
$t_{D(off)}$	Turn-Off DelayTime			282		ns
t_f	Turn-Off Fall Time			90		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-20\text{A}, dI/dt=500\text{A}/\mu\text{s}$		48		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-20\text{A}, dI/dt=500\text{A}/\mu\text{s}$		178		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.

B. The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$. Maximum UIS current limited by test equipment.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

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

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=150^\circ\text{C}$. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

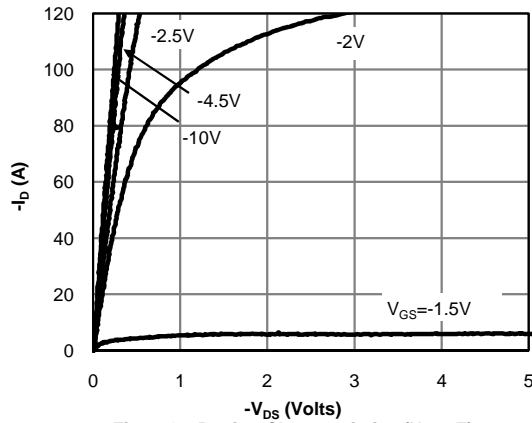


Fig 1: On-Region Characteristics (Note E)

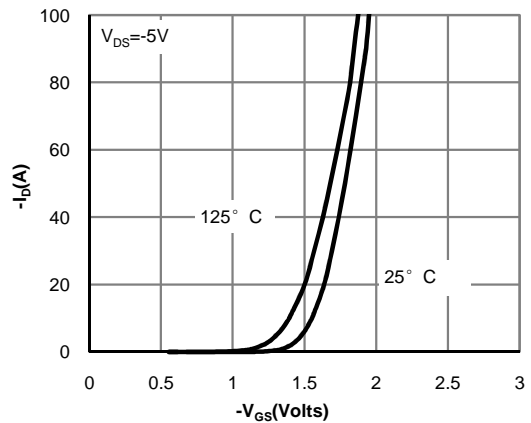


Figure 2: Transfer Characteristics (Note E)

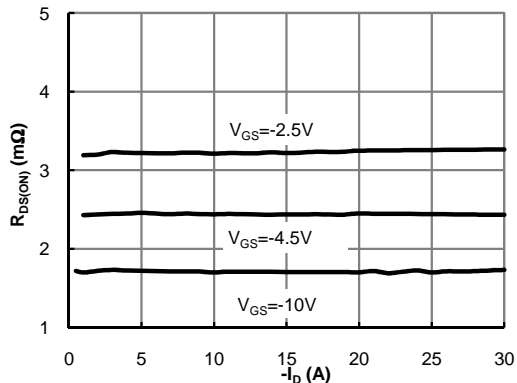


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

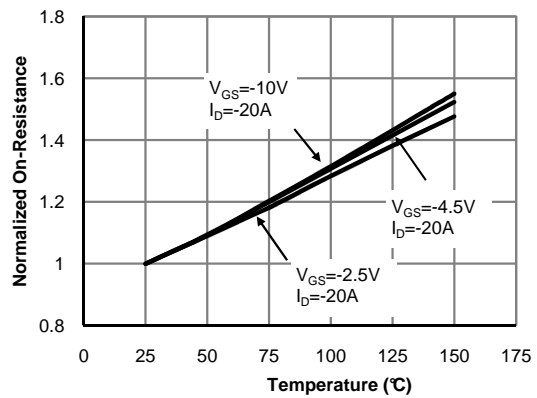


Figure 4: On-Resistance vs. Junction Temperature (Note E)

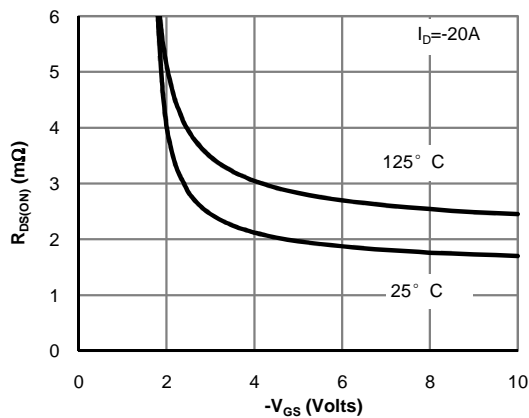


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

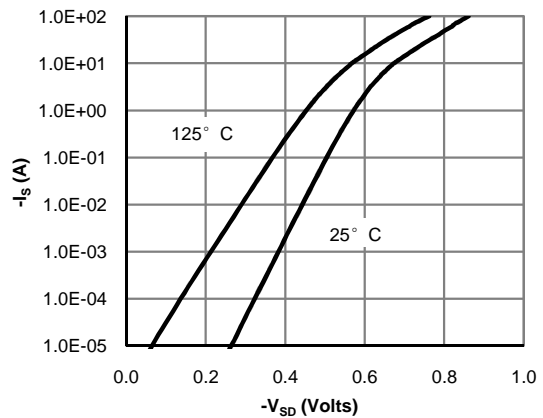


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

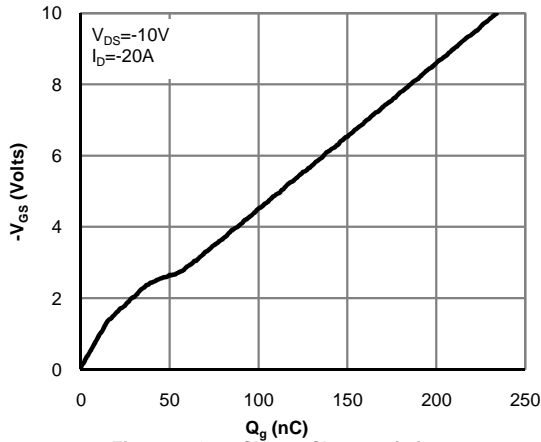


Figure 7: Gate-Charge Characteristics

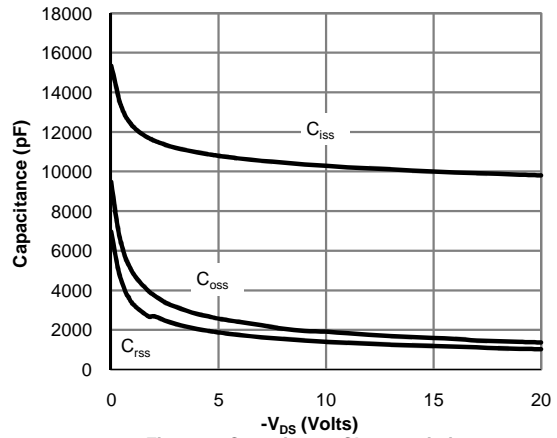


Figure 8: Capacitance Characteristics

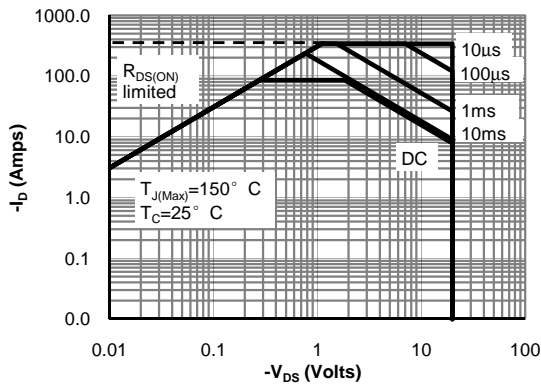


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

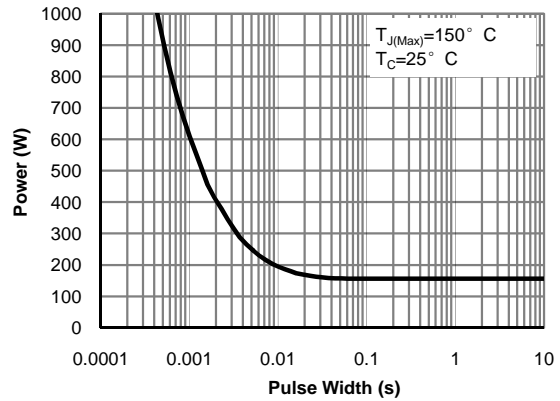


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

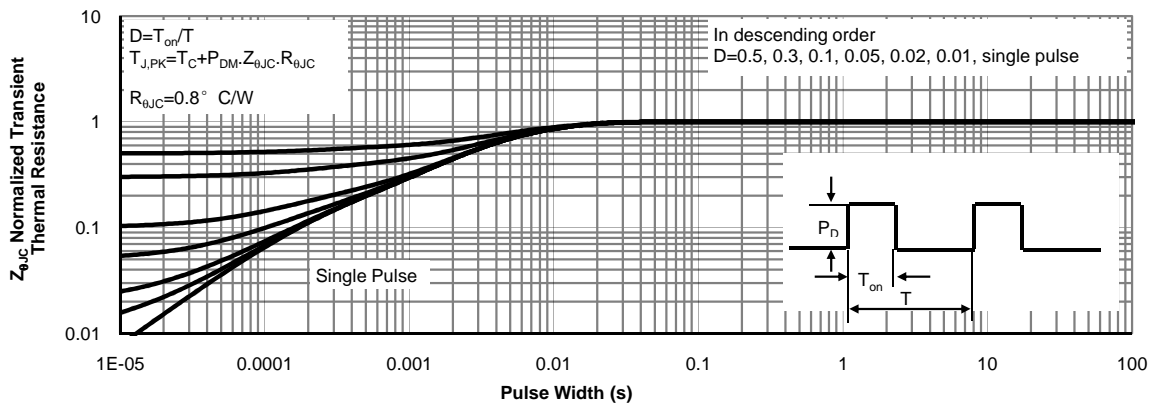


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

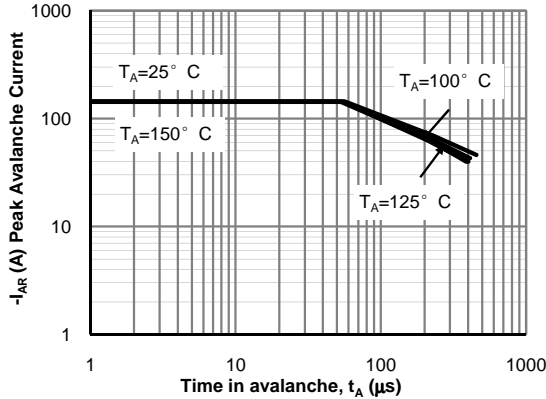


Figure 12: Single Pulse Avalanche capability (Note C)

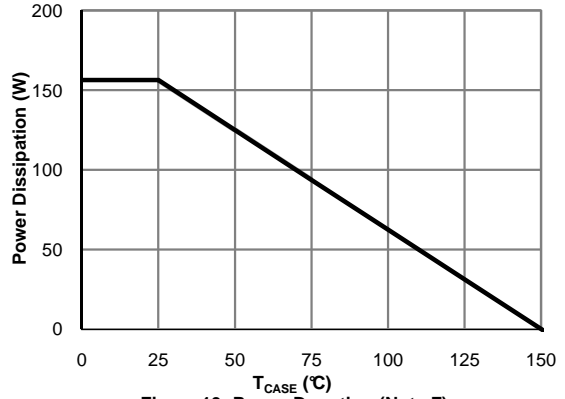


Figure 13: Power De-rating (Note F)

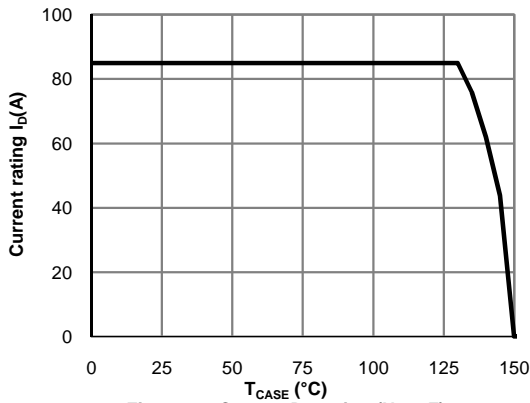


Figure 14: Current De-rating (Note F)

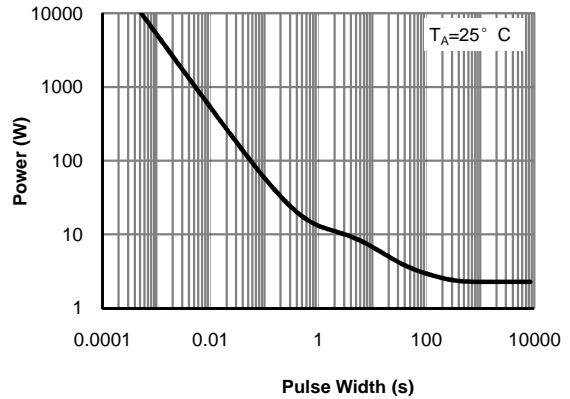


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

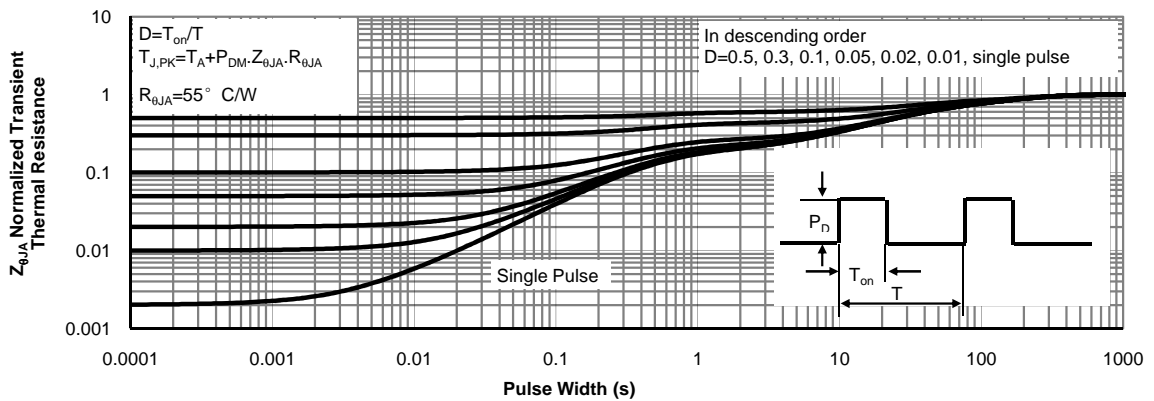
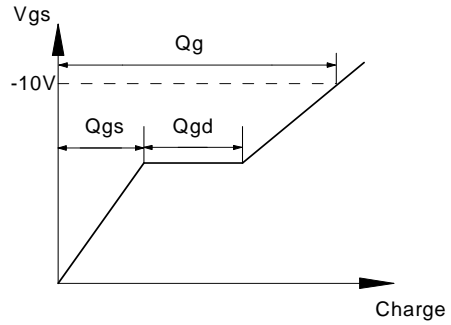
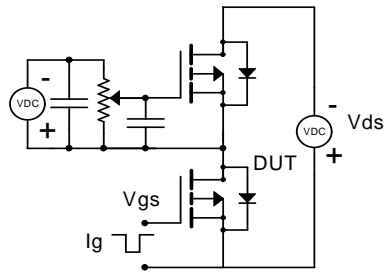
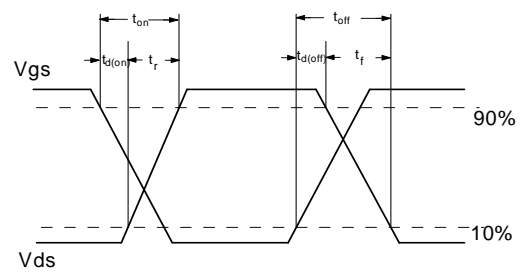
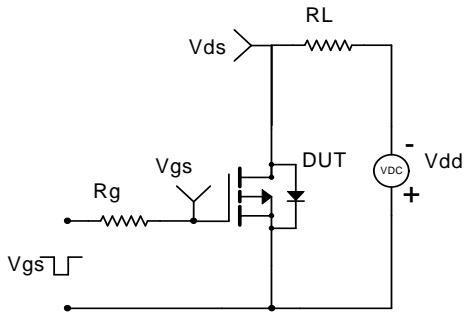


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

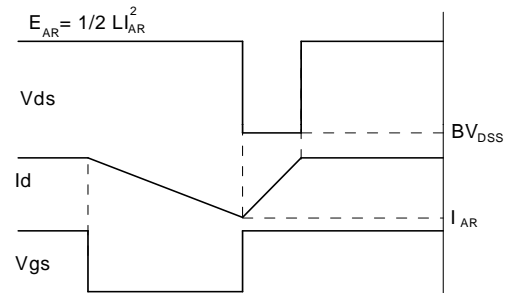
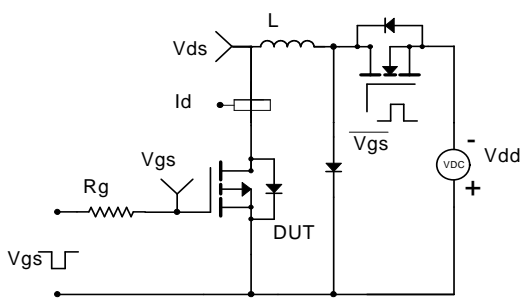
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

