





**AO4710**

**N-Channel Enhancement Mode Field Effect Transistor**

**SRFET™**



**General Description**

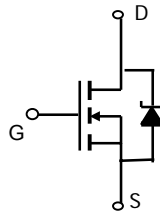
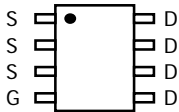
**SRFET™** The AO4710/L uses advanced trench technology with a monolithically integrated Schottky diode to provide excellent  $R_{DS(ON)}$ , and low gate charge. This device is suitable for use as a low side FET in SMPS, load switching and general purpose applications. *AO4710 and AO4710L are electrically identical.*

- RoHS Compliant
- AO4710L is Halogen Free

**Features**

- $V_{DS} (V) = 30V$
- $I_D = 12.7A (V_{GS} = 10V)$
- $R_{DS(ON)} < 11.8m\Omega (V_{GS} = 10V)$
- $R_{DS(ON)} < 14.2m\Omega (V_{GS} = 4.5V)$

**UIS TESTED!**  
**Rg,Ciss,Coss,Crss Tested**



**SRFET™**  
**Soft Recovery MOSFET:**  
**Integrated Schottky Diode**

**Absolute Maximum Ratings  $T_A=25^\circ C$  unless otherwise noted**

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current <sup>AF</sup>	$I_{DSM}$	$T_A=25^\circ C$	12.7
		$T_A=70^\circ C$	10
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	60	A
Avalanche Current <sup>C</sup>	$I_{AR}$	22	A
Repetitive avalanche energy $L=0.3mH$ <sup>C</sup>	$E_{AR}$	73	mJ
Power Dissipation	$P_{DSM}$	$T_A=25^\circ C$	3.1
		$T_A=70^\circ C$	2.0
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	$t \leq 10s$	32	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	60	$^\circ C/W$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	17	24	$^\circ C/W$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=1\text{mA}, V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}, V_{GS}=0\text{V}$ $T_J=125^\circ\text{C}$		0.02 6	0.1 20	mA
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 12\text{V}$			0.1	$\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.5	1.9	2.3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}, V_{DS}=5\text{V}$	60			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=12.7\text{A}$ $T_J=125^\circ\text{C}$		9.8 15.2	11.8 19.0	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=11\text{A}$		11.7	14.2	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}, I_D=12.7\text{A}$		78		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.38	0.5	V
$I_S$	Maximum Body-Diode + Schottky Continuous Current				5	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=15\text{V}, f=1\text{MHz}$		1980	2376	pF
$C_{oss}$	Output Capacitance			317		pF
$C_{rss}$	Reverse Transfer Capacitance			111		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		1.3	2.0	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, I_D=12.7\text{A}$		33	43	nC
$Q_g(4.5\text{V})$	Total Gate Charge			15.0	20	nC
$Q_{gs}$	Gate Source Charge			5.3		nC
$Q_{gd}$	Gate Drain Charge			6.0		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}, V_{DS}=15\text{V}, R_L=1.2\Omega,$ $R_{GEN}=3\Omega$		5.5		ns
$t_r$	Turn-On Rise Time			5.5		ns
$t_{D(off)}$	Turn-Off Delay Time			27.0		ns
$t_f$	Turn-Off Fall Time			4.3		ns
$t_{rr}$	Body Diode Reverse Recovery Time		$I_F=12.7\text{A}, dI/dt=300\text{A}/\mu\text{s}$		11.2	13
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=12.7\text{A}, dI/dt=300\text{A}/\mu\text{s}$		7		nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on a  $1\text{in}^2$  FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=150^\circ\text{C}$ .

C: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using  $<300\mu\text{s}$  pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on a  $1\text{in}^2$  FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The SOA curve provides a single pulse rating.

F: The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

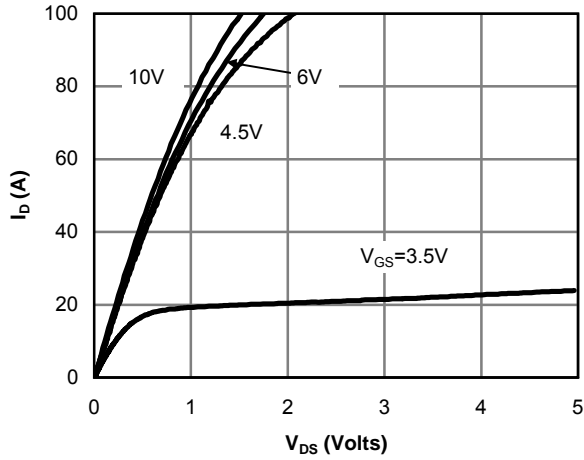


Figure 1: On-Region Characteristics

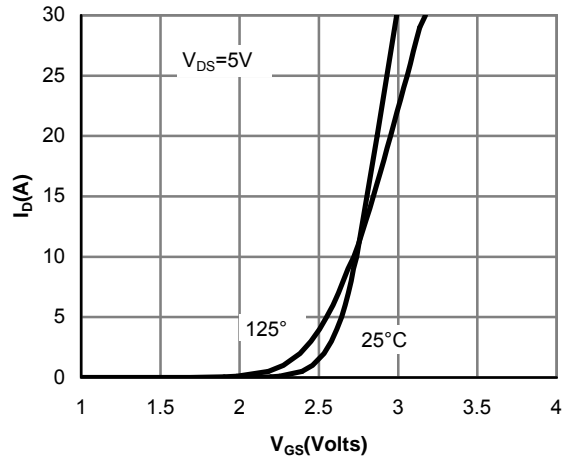


Figure 2: Transfer Characteristics

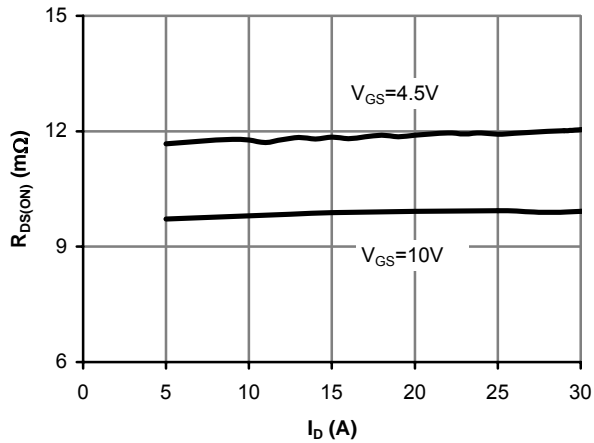


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

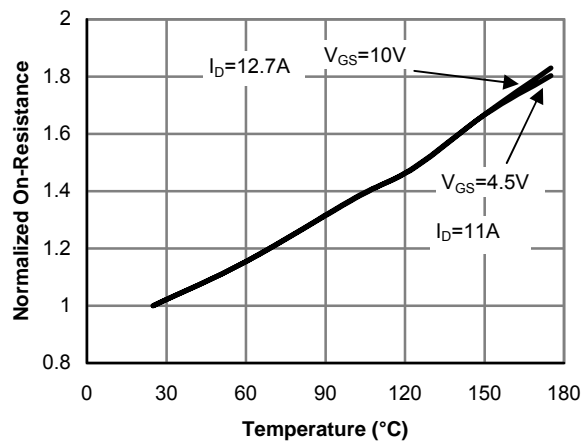


Figure 4: On-Resistance vs. Junction Temperature

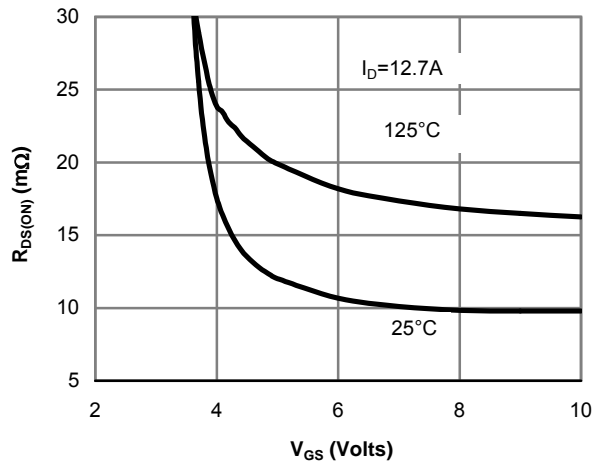


Figure 5: On-Resistance vs. Gate-Source Voltage

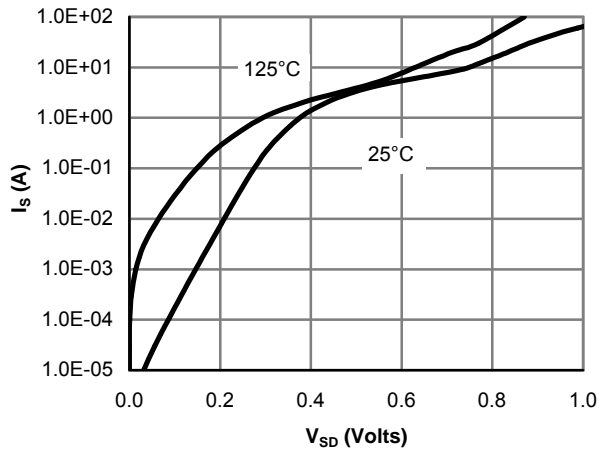


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

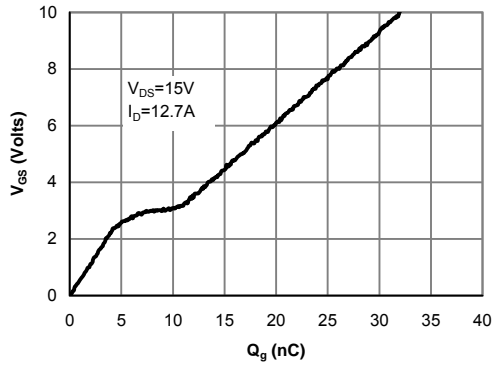


Figure 7: Gate-Charge Characteristics

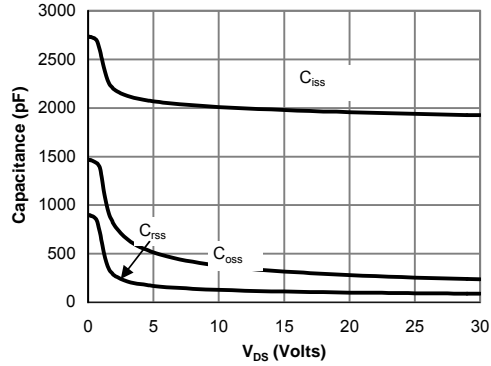


Figure 8: Capacitance Characteristics

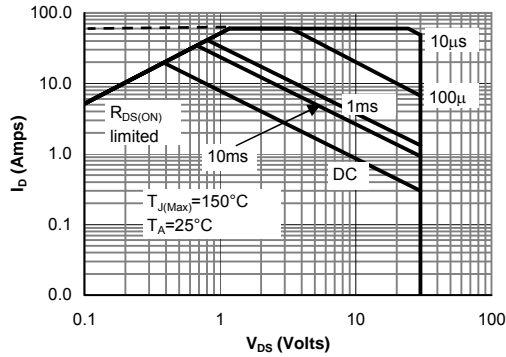


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

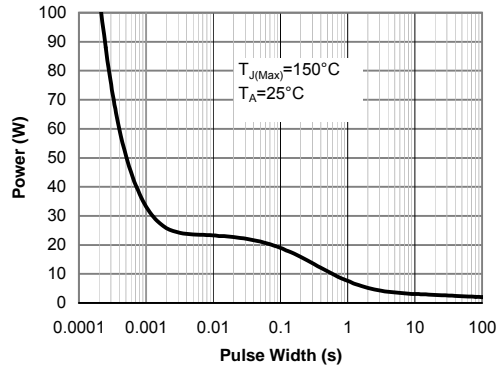


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

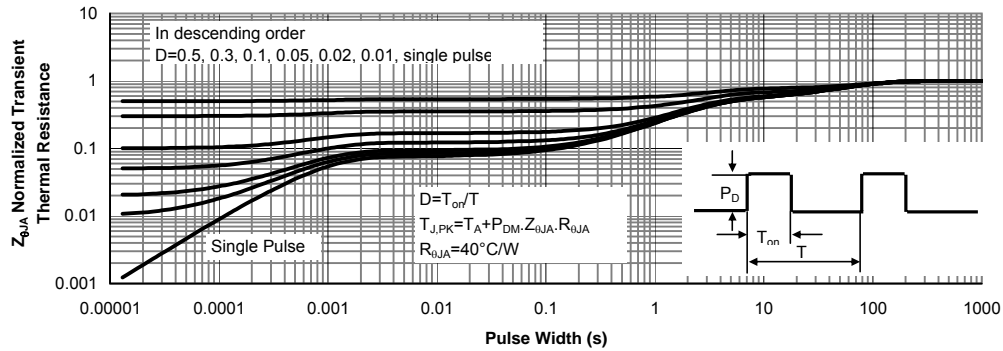


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

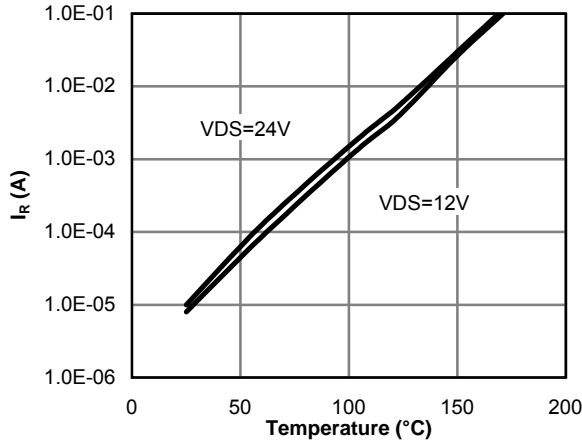


Figure 12: Diode Reverse Leakage Current vs. Junction Temperature

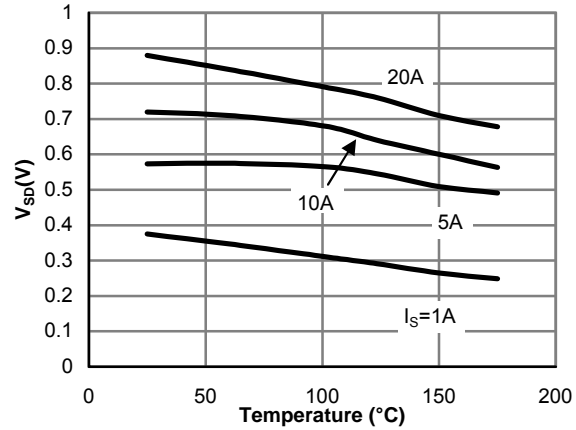


Figure 13: Diode Forward voltage vs. Junction Temperature

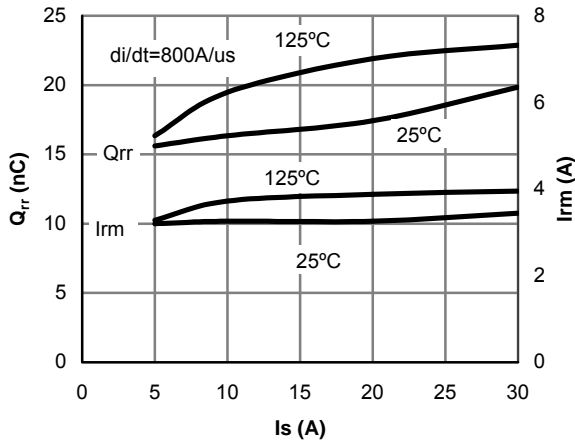


Figure 14: Diode Reverse Recovery Charge and Peak Current vs. Conduction Current

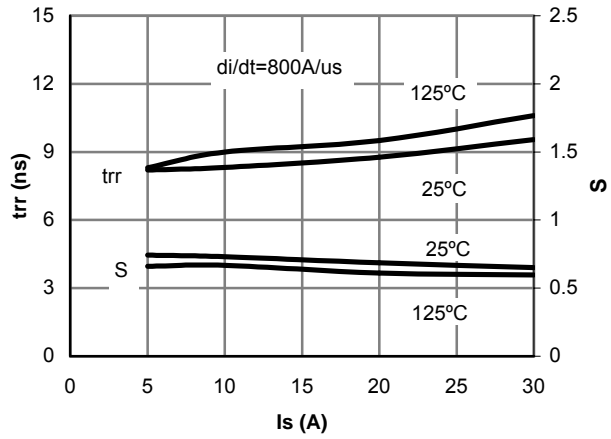


Figure 15: Diode Reverse Recovery Time and Soft Coefficient vs. Conduction Current

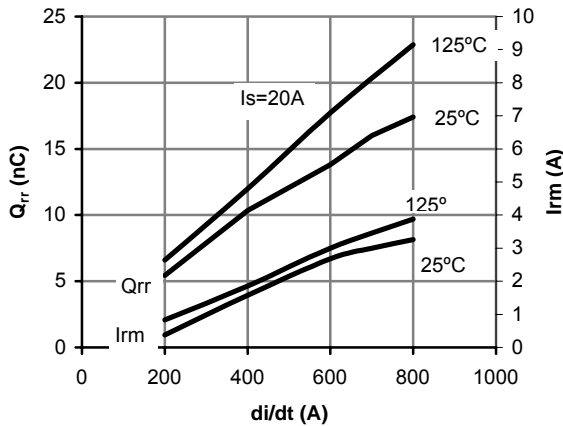


Figure 16: Diode Reverse Recovery Charge and Peak Current vs. di/dt

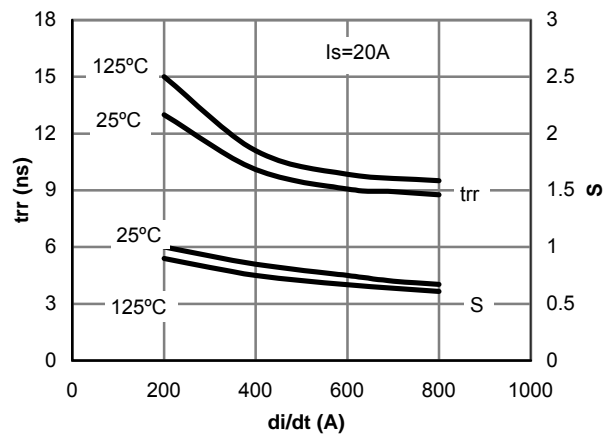
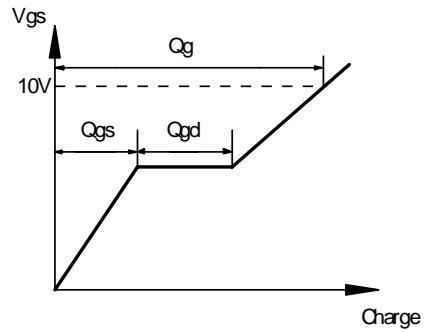
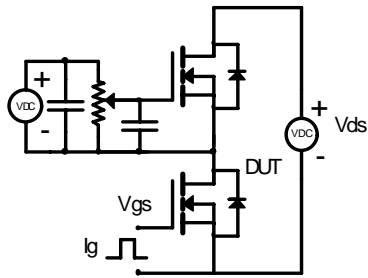
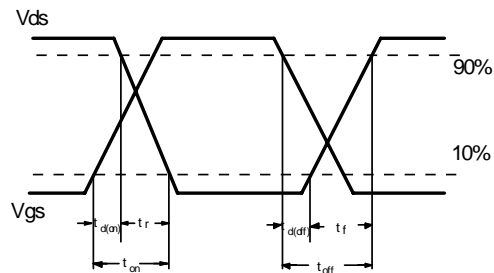
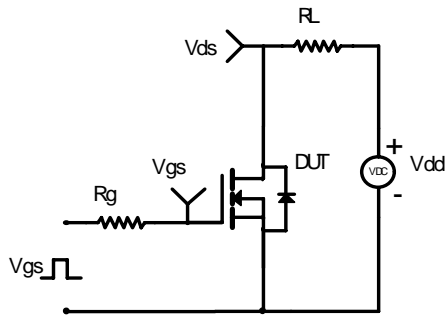


Figure 17: Diode Reverse Recovery Time and Soft Coefficient vs. di/dt

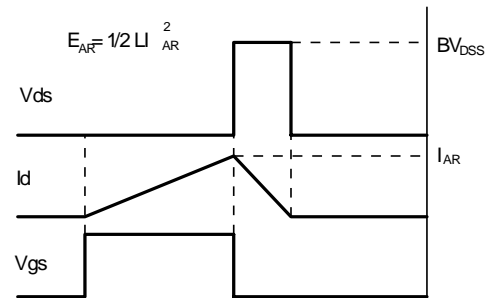
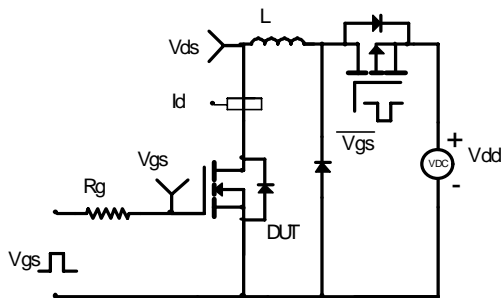
Gate Charge Test Circuit & Waveform



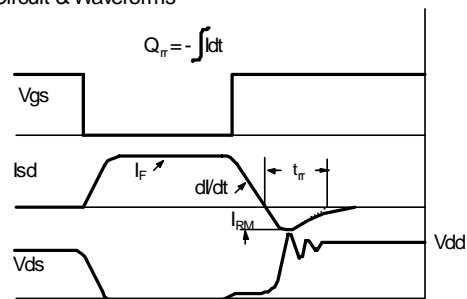
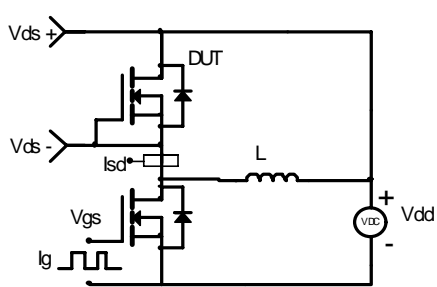
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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