ALPHA & OMEGA SEMICONDUCTOR

AON6362
30V N-Channel MOSFET

General Description

• Trench Power αMOS Technology
• Low $R_{DS(ON)}$
• Low Gate Charge
• High Current Capability
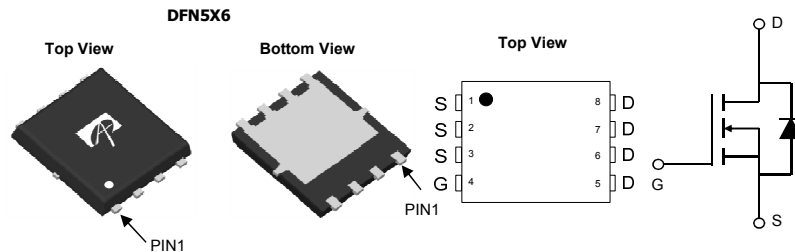• RoHS and Halogen-Free Compliant

Applications

• DC/DC Converters in Computing
• Isolated DC/DC Converters in Telecom and Industrial
• See Note I

Product Summary

V_{DS}	30V
I_D (at V_{GS}=10V)	60A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 5.2mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 8.6mΩ

100% UIS Tested
100% Rg Tested

Green Product

DFN5X6

Top View   Bottom View

Top View

S	1	8 D
S	2	7 D
S	3	6 D
G	4	5 D

PIN1

Orderable Part Number	Package Type	Form	Minimum Order Quantity
AON6362	DFN 5x6	Tape & Reel	3000

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C=25°C	I_D	60	A
	T_C=100°C		39	
Pulsed Drain Current [C]		I_{DM}	100	
Continuous Drain Current	T_A=25°C	I_{DSM}	27	A
	T_A=70°C		22	
Avalanche Current [C]		I_{AS}	38	A
Avalanche energy L=0.01mH [C]		E_{AS}	7	mJ
V_{DS} Spike 10µs		V_{SPIKE}	36	V
Power Dissipation [B]	T_C=25°C	P_D	31	W
	T_C=100°C		13	
Power Dissipation [A]	T_A=25°C	P_{DSM}	6.2	W
	T_A=70°C		4	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{θJA}$	15	20	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		40	50	°C/W
Maximum Junction-to-Case	Steady-State	$R_{θJC}$	3.1	4	°C/W

Electrical Characteristics (T$_J$=25°C unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV$_{DSS}$	Drain-Source Breakdown Voltage	ID=250µA, VGS=0V		30			V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{DS}$=30V, V$_{GS}$=0V				1	µA
			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	1.8	2.2	V
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=20A			4.3	5.2	mΩ
			T$_J$=125°C		6.3	7.6	
		V$_{GS}$=4.5V, I$_D$=20A			6.8	8.6	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=20A			67		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V			0.71	1	V
I$_S$	Maximum Body-Diode Continuous Current					30	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=15V, f=1MHz			820		pF
C$_{oss}$	Output Capacitance				340		pF
C$_{rss}$	Reverse Transfer Capacitance				40		pF
R$_g$	Gate resistance	f=1MHz		0.6	1.2	1.8	Ω
SWITCHING PARAMETERS							
Q$_g$(10V)	Total Gate Charge	V$_{GS}$=10V, V$_{DS}$=15V, I$_D$=20A			13		nC
Q$_g$(4.5V)	Total Gate Charge				6.1		nC
Q$_{gs}$	Gate Source Charge				2		nC
Q$_{gd}$	Gate Drain Charge				2.4		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=10V, V$_{DS}$=15V, R$_L$=0.75Ω, R$_{GEN}$=3Ω			6.5		ns
t$_r$	Turn-On Rise Time				16.5		ns
t$_{D(off)}$	Turn-Off DelayTime				17		ns
t$_f$	Turn-Off Fall Time				2.5		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=20A, dI/dt=500A/µs			11		ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=20A, dI/dt=500A/µs			19		nC

A. The value of R$_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T$_A$ =25° C. The Power dissipation P$_{DSM}$ is based on R $_{\theta JA}$ t≤ 10s and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design.
B. The power dissipation P$_D$ is based on T$_{J(MAX)}$=150° 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. Single pulse width limited by junction temperature T$_{J(MAX)}$=150° C.
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 <300µs 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° 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 in^2 FR-4 board with 2oz. Copper, in a still air environment with T$_A$=25° C.
I. For application requiring slow >1ms turn-on/turn-off, please consult AOS FAE for proper product selection.
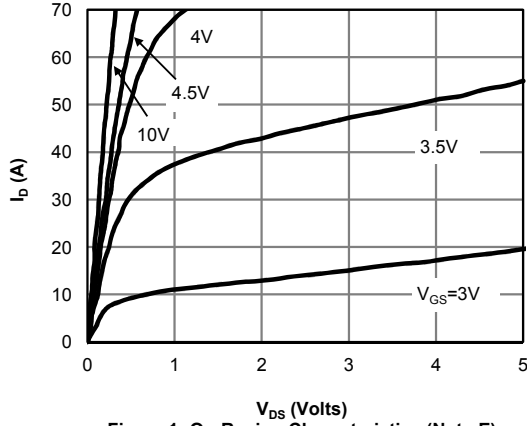
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

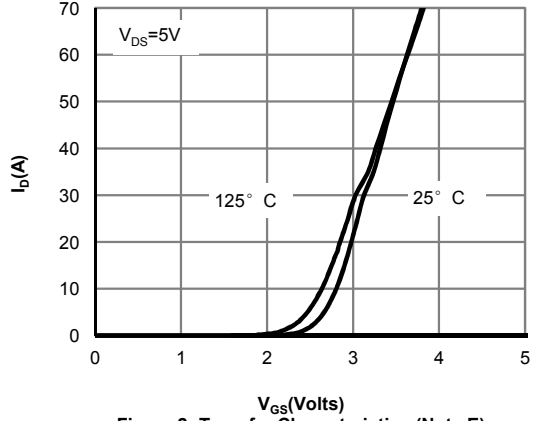Figure 1: On-Region Characteristics (Note E)
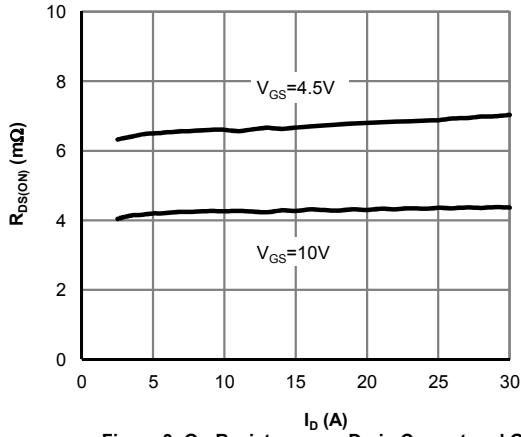
Figure 2: Transfer Characteristics (Note E)

Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)
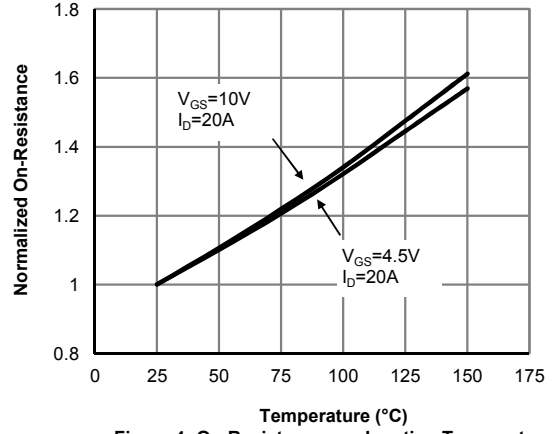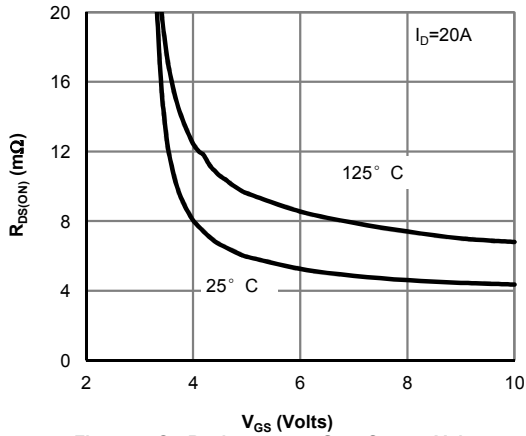
Figure 4: On-Resistance vs. Junction Temperature (Note E)
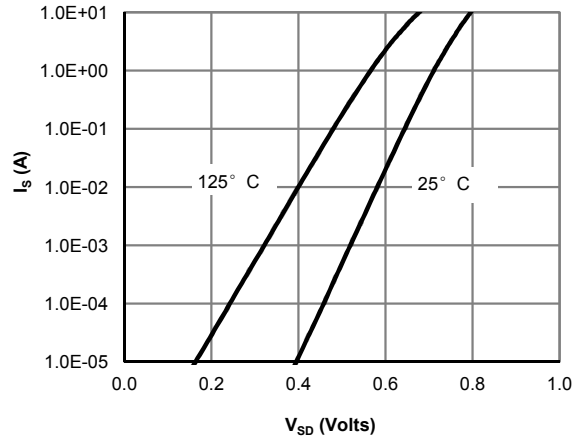
Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

Figure 6: Body-Diode Characteristics (Note E)

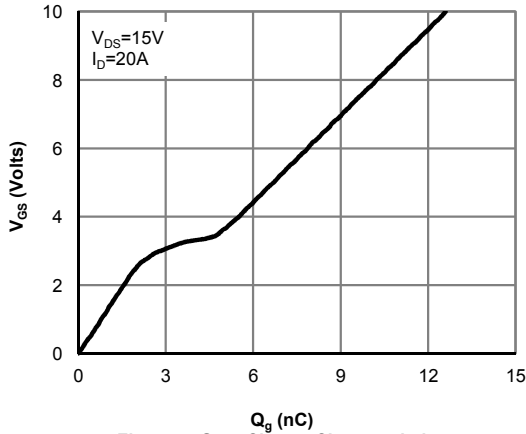## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
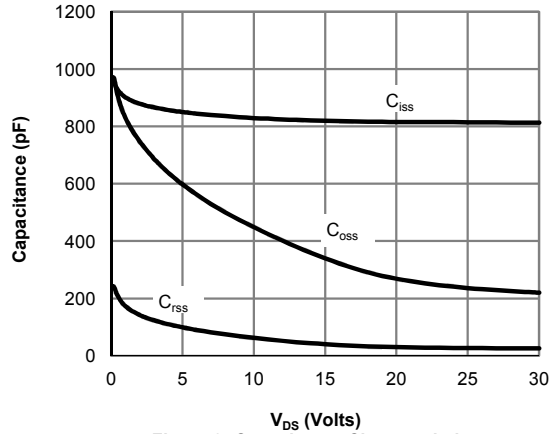
Figure 7: Gate-Charge Characteristics

(V_{DS}=15V, I_D=20A; x-axis: Q_g (nC); y-axis: V_{GS} (Volts))

Figure 8: Capacitance Characteristics

(x-axis: V_{DS} (Volts); y-axis: Capacitance (pF); curves: C_{iss}, C_{oss}, C_{rss})
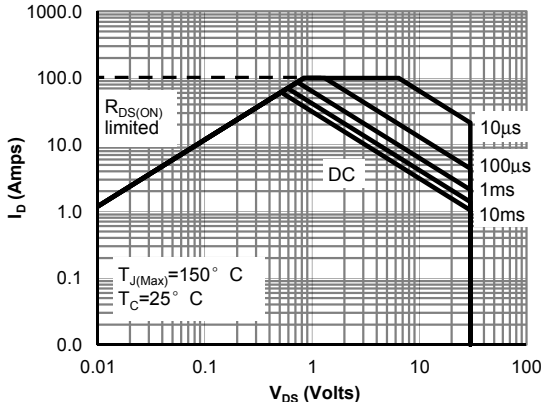
Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

($R_{DS(ON)}$ limited; 10μs, 100μs, 1ms, 10ms, DC; $T_{J(Max)}$=150°C, T_C=25°C; x-axis: V_{DS} (Volts); y-axis: I_D (Amps); V_{GS}> or equal to 4.5V)
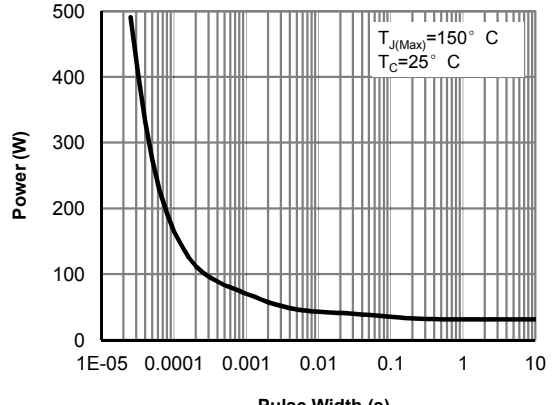
Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

($T_{J(Max)}$=150°C, T_C=25°C; x-axis: Pulse Width (s); y-axis: Power (W))
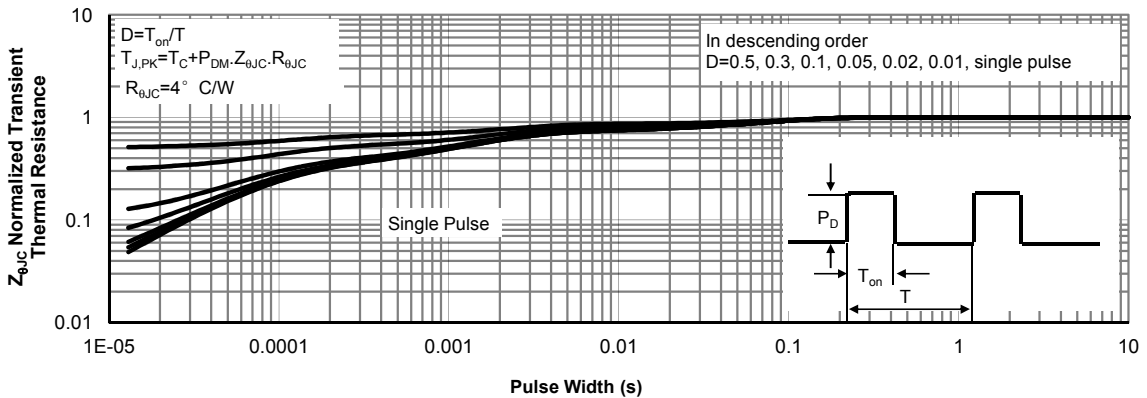
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

(D=T_{on}/T; $T_{J,PK}$=T_C+$P_{DM}\cdot Z_{\theta JC}\cdot R_{\theta JC}$; $R_{\theta JC}$=4°C/W; In descending order D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse; Single Pulse; x-axis: Pulse Width (s); y-axis: $Z_{\theta JC}$ Normalized Transient Thermal Resistance)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
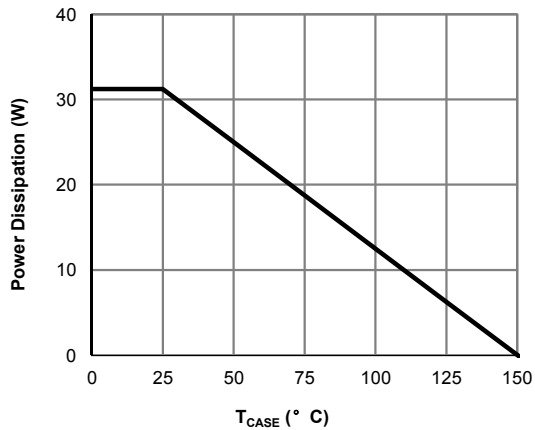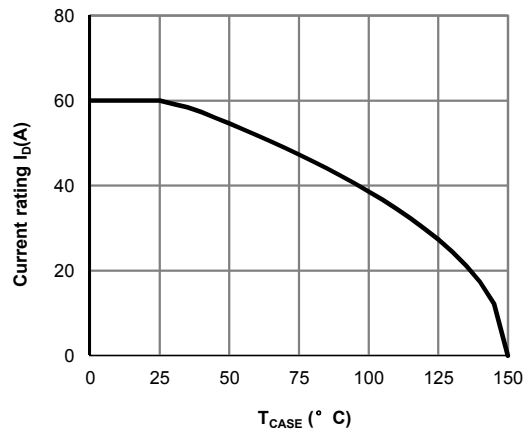

Figure 12: Power De-rating (Note F)

Figure 13: Current De-rating (Note F)

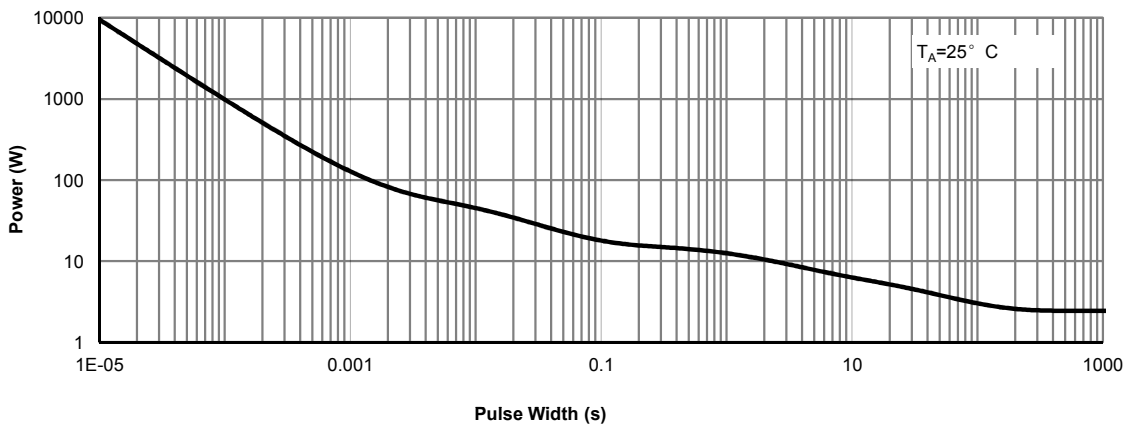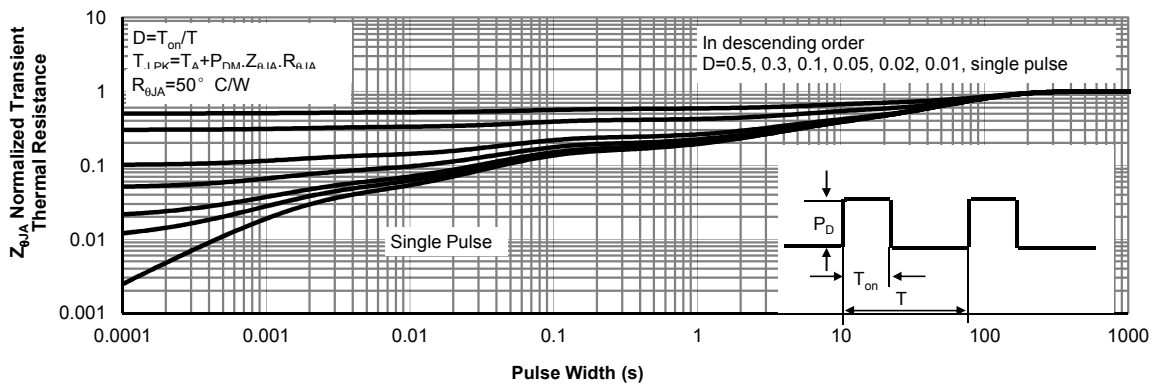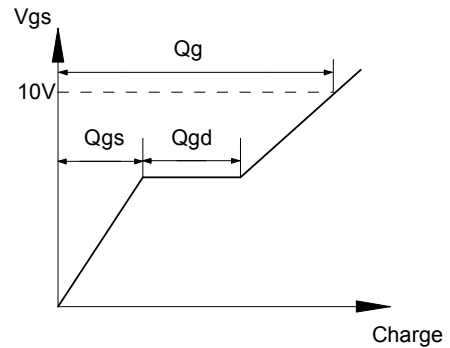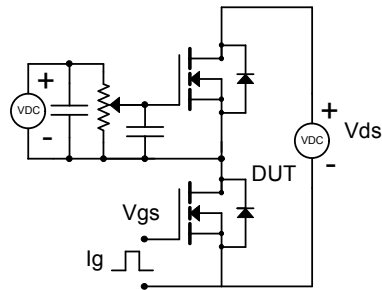Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)
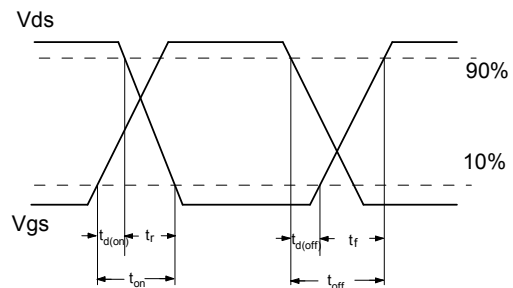

$D=T_{on}/T$
$T_{JPK}=T_A+P_{DM} \cdot Z_{\theta JA} \cdot R_{\theta JA}$
$R_{\theta JA}=50°$ C/W

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

Single Pulse
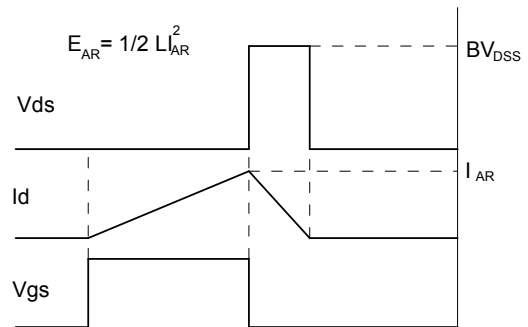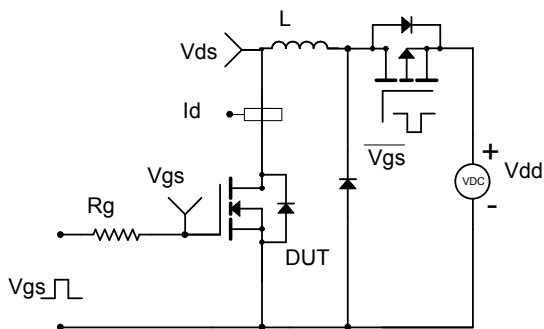
Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)
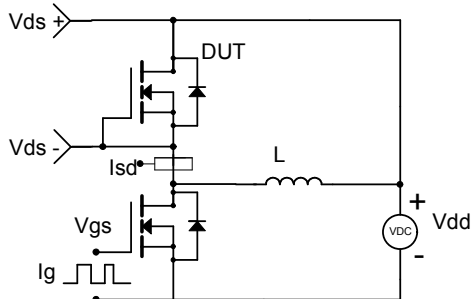
Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms
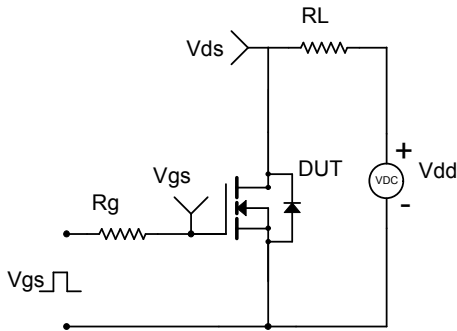
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$$E_{AR} = 1/2 \, LI_{AR}^2$$

Diode Recovery Test Circuit & Waveforms

$$Q_{rr} = -\int Idt$$
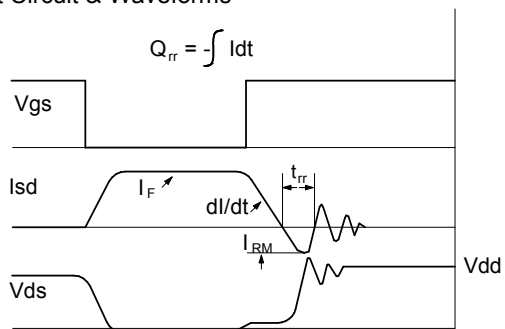
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