ALPHA & OMEGA SEMICONDUCTOR

AOD444/AOI444
60V N-Channel MOSFET

General Description

The AOD444/AOI444 combine advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. Those devices are suitable for use in PWM, load switching and general purpose applications.

Product Summary

V_{DS}	60V
I_D (at V_{GS}=10V)	12A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 60mΩ
$R_{DS(ON)}$ (at V_{GS} = 4.5V)	< 85mΩ

100% UIS Tested
100% Rg Tested

Green Product

TO252 DPAK TopView Bottom View

TO-251A IPAK TopView Bottom View
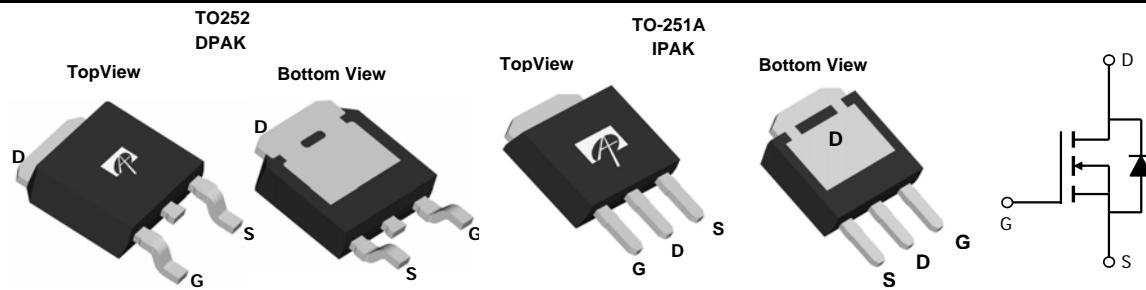
Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [G]	T_C=25°C	I_D	12	A
	T_C=100°C		9	
Pulsed Drain Current [C]		I_{DM}	30	
Continuous Drain Current	T_A=25°C	I_{DSM}	4	A
	T_A=70°C		3	
Avalanche Current [C]		I_{AS}, I_{AR}	19	A
Avalanche energy L=0.1mH [C]		E_{AS}, E_{AR}	18	mJ
Power Dissipation [B]	T_C=25°C	P_D	20	W
	T_C=100°C		10	
Power Dissipation [A]	T_A=25°C	P_{DSM}	2.1	W
	T_A=70°C		1.3	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{θJA}$	17.4	30	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		50	60	°C/W
Maximum Junction-to-Case	Steady-State	$R_{θJC}$	4	7.5	°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	I_D=250µA, V_{GS}=0V		60			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=48V, 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	2.4	3	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V		30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=12A			47	60	mΩ
			T_J=125°C		85	100	mΩ
		V_{GS}=4.5V, I_D=6A			67	85	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=20A			14		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V			0.74	1	V
I_S	Maximum Body-Diode Continuous Current					12	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=30V, f=1MHz		360	450	540	pF
C_{oss}	Output Capacitance			40	61	80	pF
C_{rss}	Reverse Transfer Capacitance			16	27	40	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		0.6	1.4	2.0	Ω
SWITCHING PARAMETERS							
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=30V, I_D=12A			7.5	10	nC
Q_g(4.5V)	Total Gate Charge				3.8	5	nC
Q_{gs}	Gate Source Charge				1.2		nC
Q_{gd}	Gate Drain Charge				1.9		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=30V, R_L=2.5Ω, R_{GEN}=3Ω			4.2		ns
t_r	Turn-On Rise Time				3.4		ns
$t_{D(off)}$	Turn-Off DelayTime				16		ns
t_f	Turn-Off Fall Time				2		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=12A, dI/dt=100A/µs			27	35	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=12A, dI/dt=100A/µs			30		nC

A. The value of $R_{θJA}$ 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 $R_{θJA}$ 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 175°C may be used if the PCB allows it.

B. The power dissipation P_D is based on $T_{J(MAX)}$=175°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 $T_{J(MAX)}$=175°C. Ratings are based on low frequency and duty cycles to keep initial T_J =25°C.

D. The $R_{θJA}$ is the sum of the thermal impedence from junction to case $R_{θJC}$ 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 impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=175°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.

ALPHA & OMEGA SEMICONDUCTOR

AOD444/AOI444

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
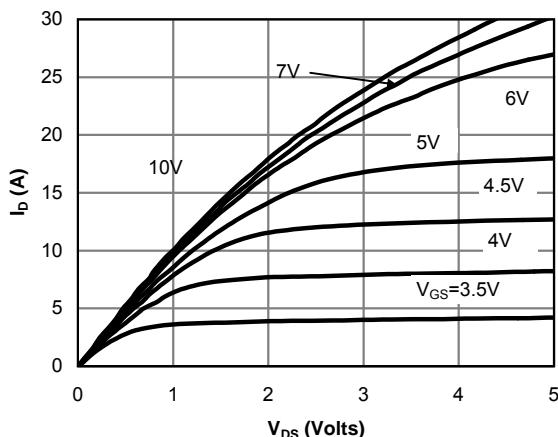
Fig 1: On-Region Characteristics (Note E)
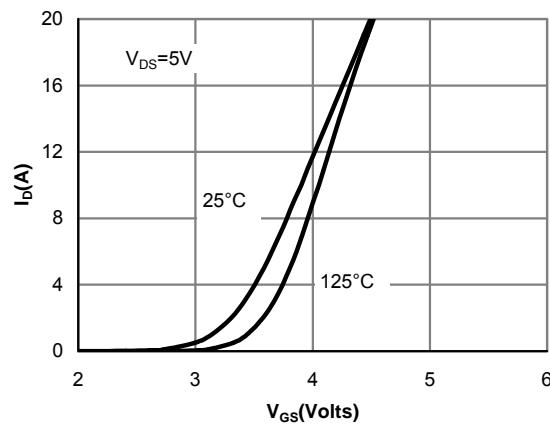

Figure 2: Transfer Characteristics (Note E)
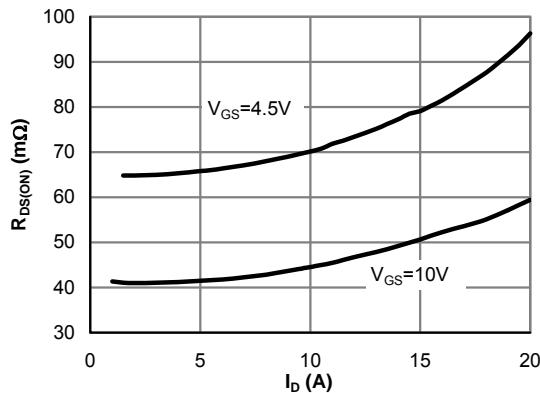
Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)
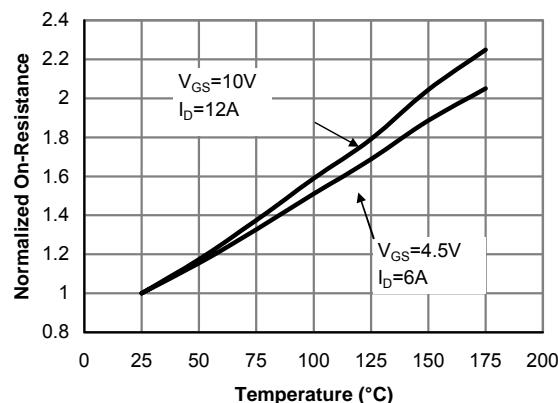
Figure 4: On-Resistance vs. Junction Temperature (Note E)
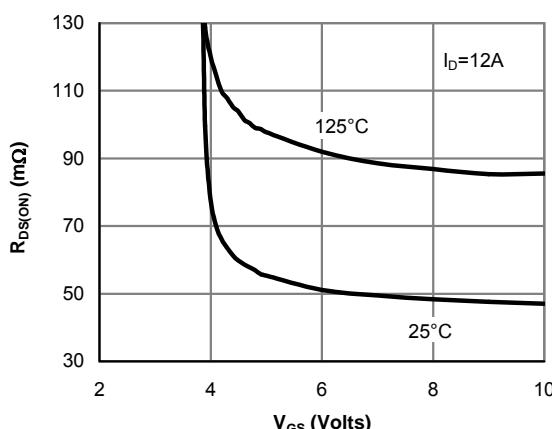
Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)
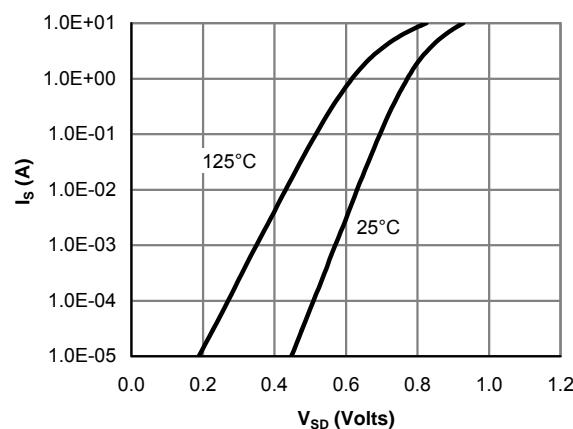
Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
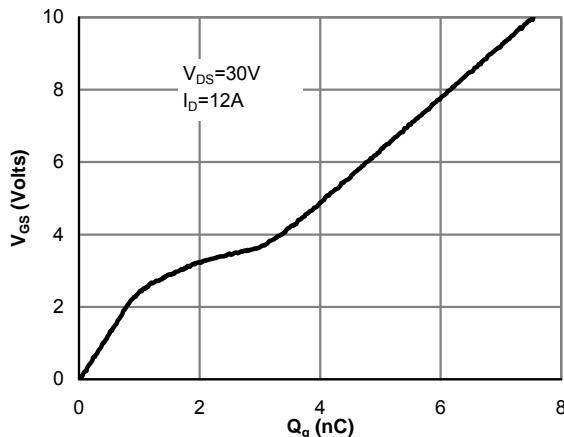
Figure 7: Gate-Charge Characteristics
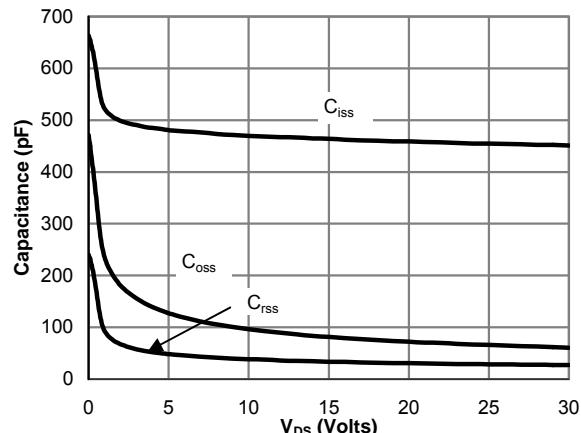
Figure 8: Capacitance Characteristics
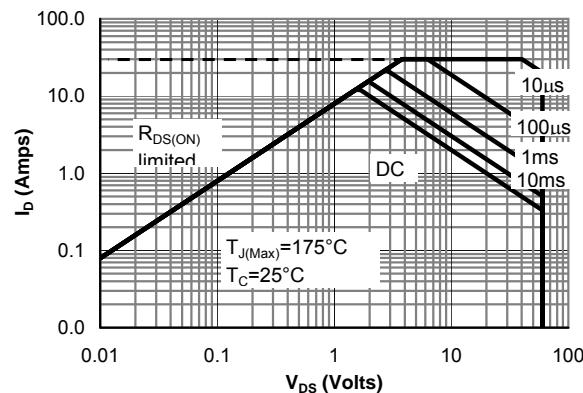
Figure 9: Maximum Forward Biased Safe
Operating Area (Note F)
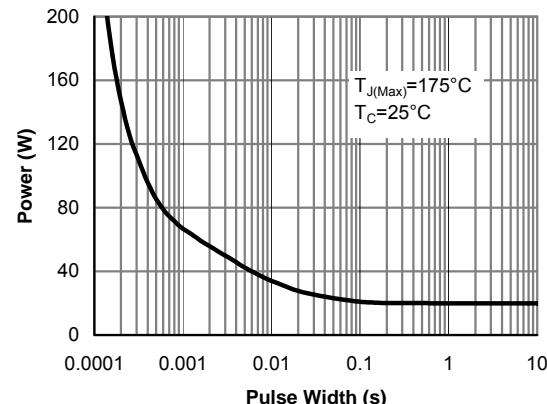
Figure 10: Single Pulse Power Rating Junction-to-
Case (Note F)
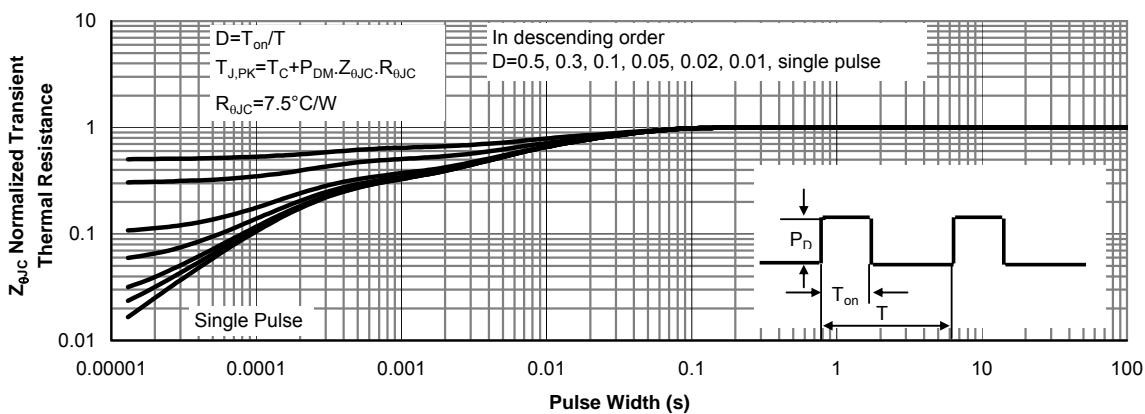
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
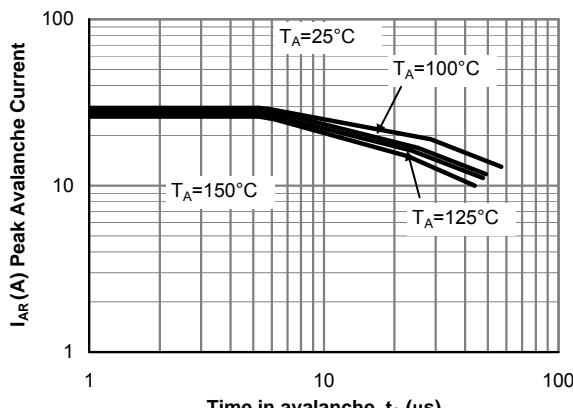

Figure 12: Single Pulse Avalanche capability (Note C)
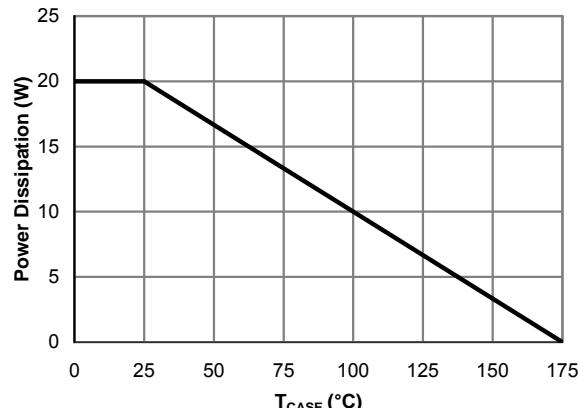
Figure 13: Power De-rating (Note F)
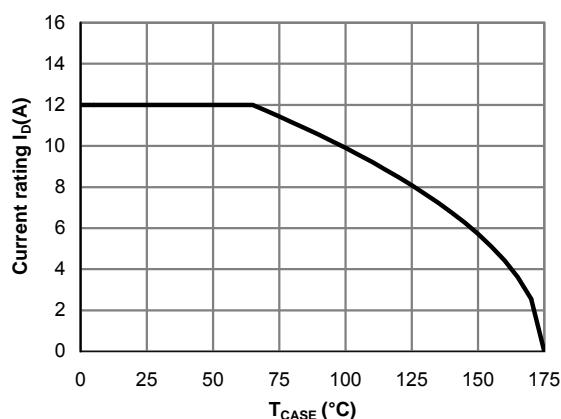
Figure 14: Current De-rating (Note F)
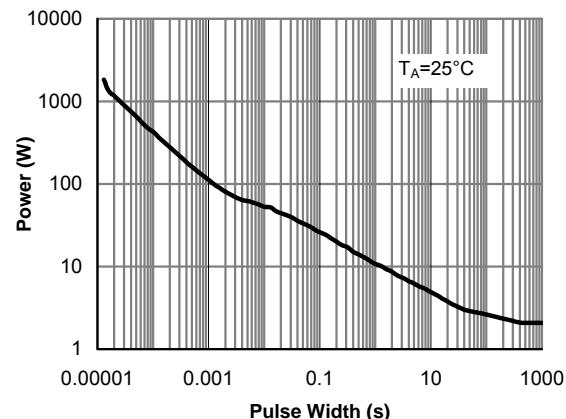
Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

$D=T_{on}/T$

$T_{J,PK}=T_A+P_{DM}\cdot Z_{\theta JA}\cdot R_{\theta JA}$

$R_{\theta JA}=60°C/W$

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

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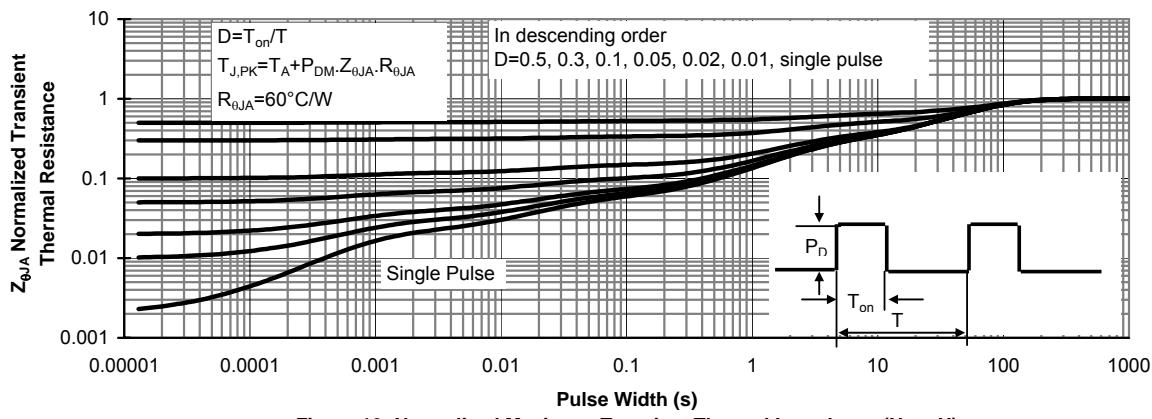
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

Gate Charge Test Circuit & Waveform
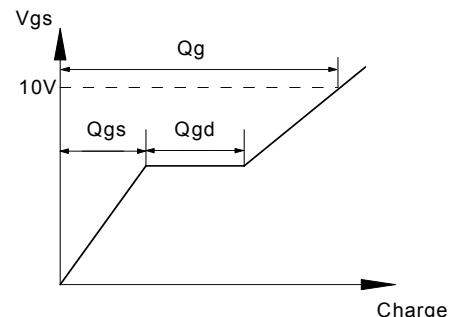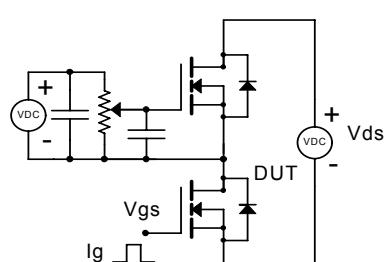
Resistive Switching Test Circuit & Waveforms
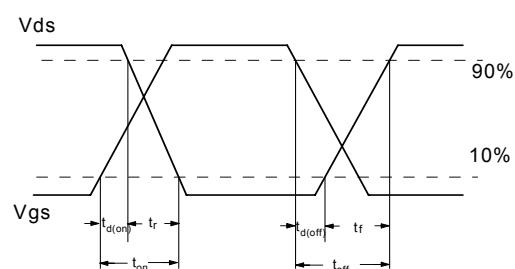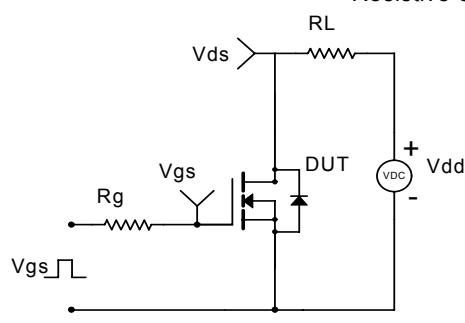
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

$E_{AR} = 1/2 \, LI_{AR}^2$
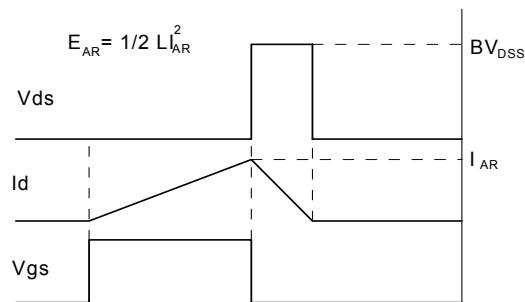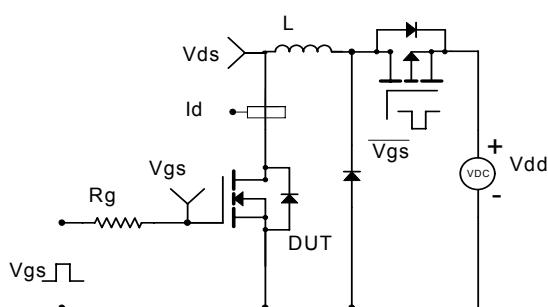
Diode Recovery Test Circuit & Waveforms

$Q_{rr} = -\int Idt$
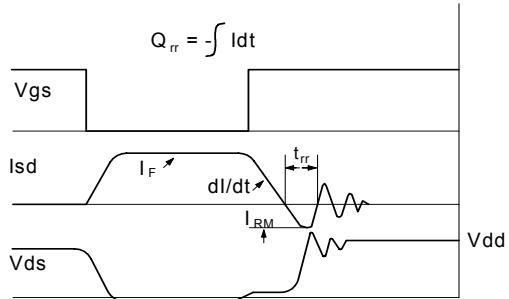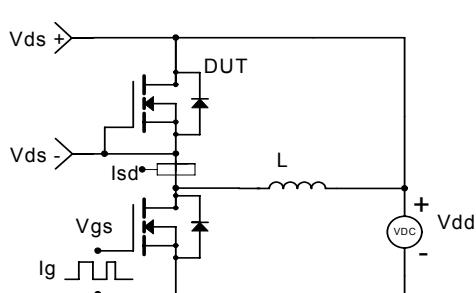
X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET *category:*

Click to view products by Alpha & Omega *manufacturer:*

Other Similar products are found below :

614233C 648584F MCH3443-TL-E MCH6422-TL-E FDPF9N50NZ FW216A-TL-2W FW231A-TL-E APT5010JVR NTNS3A92PZT5G IRF100S201 JANTX2N5237 2SK2464-TL-E 2SK3818-DL-E FCA20N60_F109 FDZ595PZ STD6600NT4G FSS804-TL-E 2SJ277-DL-E 2SK1691-DL-E 2SK2545(Q,T) D2294UK 405094E 423220D MCH6646-TL-E TPCC8103,L1Q(CM 367-8430-0972-503 VN1206L 424134F 026935X 051075F SBVS138LT1G 614234A 715780A NTNS3166NZT5G 751625C 873612G IRF7380TRHR IPS70R2K0CEAKMA1 RJK60S3DPP-E0#T2 RJK60S5DPK-M0#T0 APT5010JVFR APT12031JFLL APT12040JVR DMN3404LQ-7 NTE6400 JANTX2N6796U JANTX2N6784U JANTXV2N5416U4 SQM110N05-06L-GE3 SIHF35N60E-GE3