



ALPHA & OMEGA
SEMICONDUCTOR

AOD2544

150V N-Channel AlphaMOS

General Description

- Latest Trench Power AlphaMOS (α MOS MV) technology
- Very Low $R_{DS(ON)}$
- Low Gate Charge
- Optimized for fast-switching applications
- RoHS and Halogen-Free Compliant

Application

- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

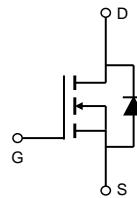
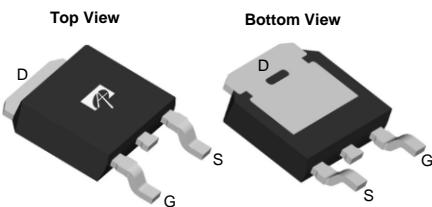
Product Summary

V_{DS}	150V
I_D (at $V_{GS}=10V$)	23A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 54m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 66m Ω

100% UIS Tested
100% R_g Tested



TO-252
DPAK



Orderable Part Number

Package Type

Form

Minimum Order Quantity

AOD2544	TO-252	Tape & Reel	2500
---------	--------	-------------	------

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

Parameter	Symbol	Maximum	Units	
Drain-Source Voltage	V_{DS}	150	V	
Gate-Source Voltage	V_{GS}	± 20	V	
Continuous Drain Current	$T_C=25^\circ\text{C}$	I_D	A	
Current		23		
Pulsed Drain Current	I_{DM}	16		
Continuous Drain Current	$T_A=25^\circ\text{C}$	45	A	
Current		6.5		
Avalanche Current ^c	I_{AS}	5.0		
Avalanche energy $L=0.3\text{mH}^{\text{c}}$	E_{AS}	15	A	
V_{DS} Spike	$10\mu\text{s}$	V_{SPIKE}	34	mJ
Power Dissipation ^B	$T_C=25^\circ\text{C}$	P_D	W	
		75		
Power Dissipation ^A	$T_C=100^\circ\text{C}$	37.5		
		6.2	W	
Power Dissipation ^A	$T_A=25^\circ\text{C}$	4.0		
		-55 to 175	$^\circ\text{C}$	
Junction and Storage Temperature Range	T_J, T_{STG}			

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$t \leq 10\text{s}$	15	20	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A,D}		40	50	$^\circ\text{C/W}$
Maximum Junction-to-Case	R_{JJC}	1.6	2.0	$^\circ\text{C/W}$

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	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	150			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=150\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		1	5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm20\text{V}$			±100	nA
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.7	2.15	2.7	V
$R_{DS(\text{ON})}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=5\text{A}$ $T_J=125^\circ\text{C}$	45	54	107	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=2\text{A}$	89	52.5	66	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=5\text{A}$		17		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.72	1	V
I_S	Maximum Body-Diode Continuous Current				23	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=75\text{V}, f=1\text{MHz}$		675		pF
C_{oss}	Output Capacitance			78		pF
C_{rss}	Reverse Transfer Capacitance			4		pF
R_g	Gate resistance	$f=1\text{MHz}$	1.4	2.9	4.4	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=75\text{V}, I_D=5\text{A}$		11.5	20	nC
$Q_g(4.5\text{V})$	Total Gate Charge			5.5	10	nC
Q_{gs}	Gate Source Charge			2		nC
Q_{gd}	Gate Drain Charge			2.5		nC
$t_{D(\text{on})}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=75\text{V}, R_L=15\Omega, R_{\text{GEN}}=3\Omega$		6		ns
t_r	Turn-On Rise Time			3		ns
$t_{D(\text{off})}$	Turn-Off DelayTime			20		ns
t_f	Turn-Off Fall Time			5		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=5\text{A}, dI/dt=500\text{A}/\mu\text{s}$		37		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=5\text{A}, dI/dt=500\text{A}/\mu\text{s}$		210		nC

A. The value of R_{JJA} 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 $R_{\text{JJA}} \leq 10\text{s}$ 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 $T_{J(\text{MAX})}=175^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Single pulse width limited by junction temperature $T_{J(\text{MAX})}=175^\circ\text{C}$.

D. The R_{JJA} is the sum of the thermal impedance from junction to case R_{JJC} 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 $T_{J(\text{MAX})}=175^\circ\text{C}$. The SOA curve provides a single pulse rating.

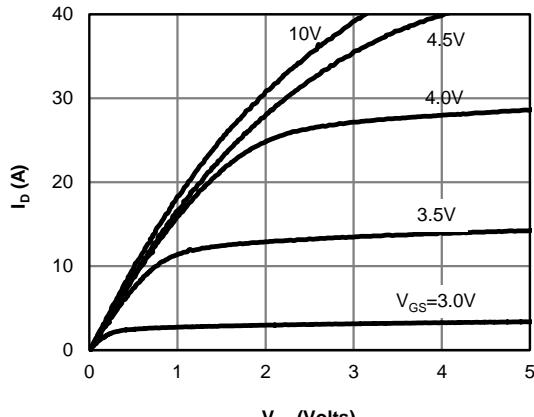
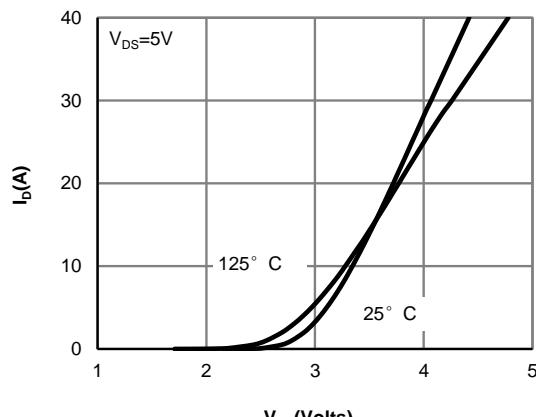
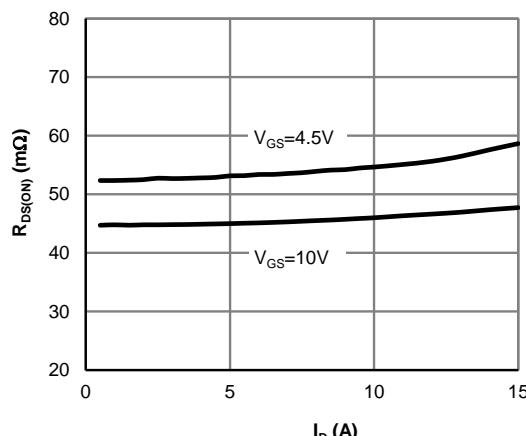
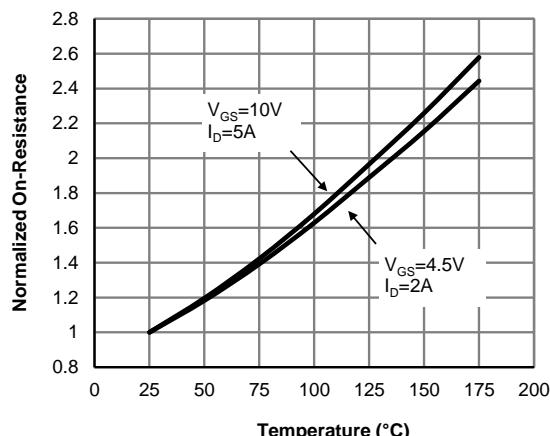
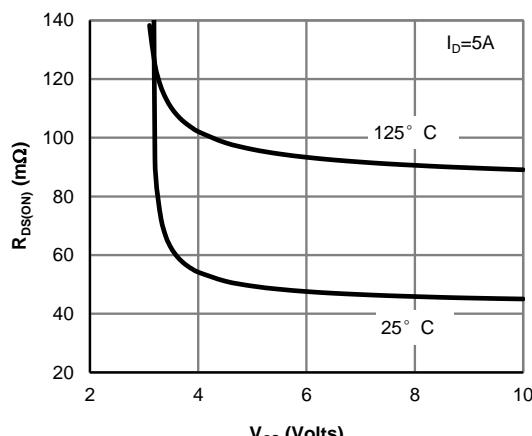
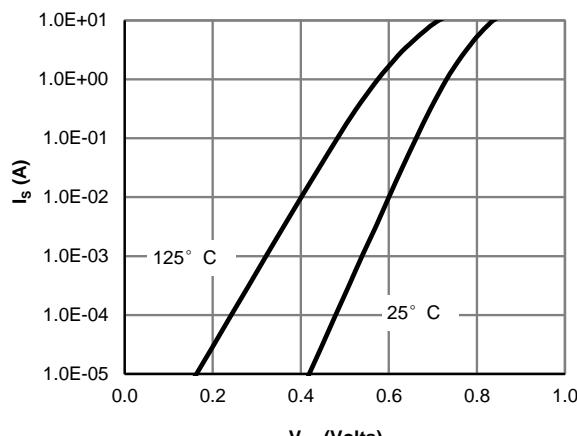
G. The maximum current rating is package limited.

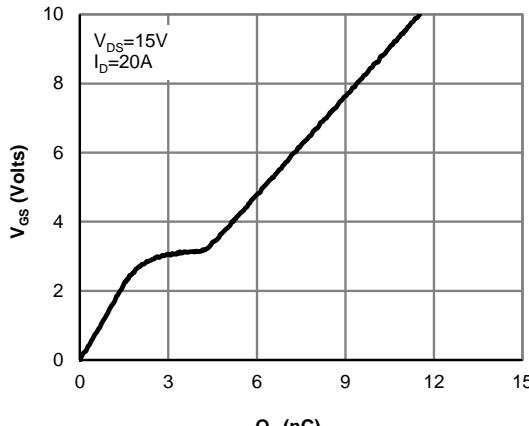
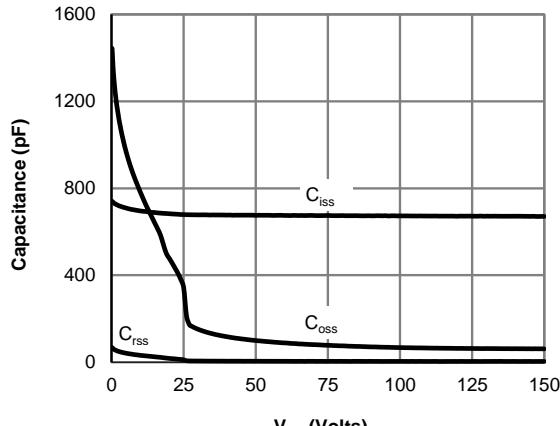
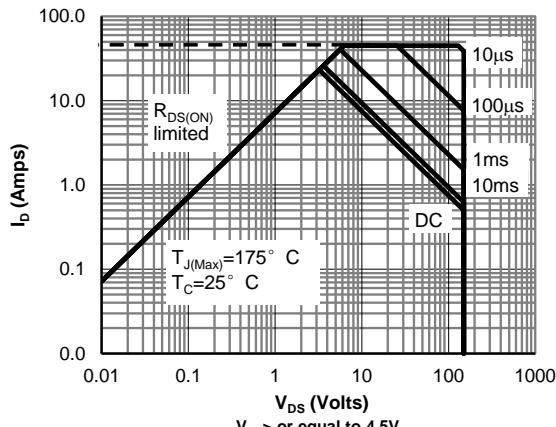
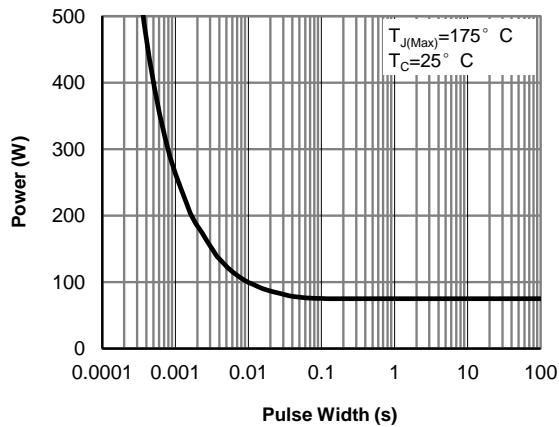
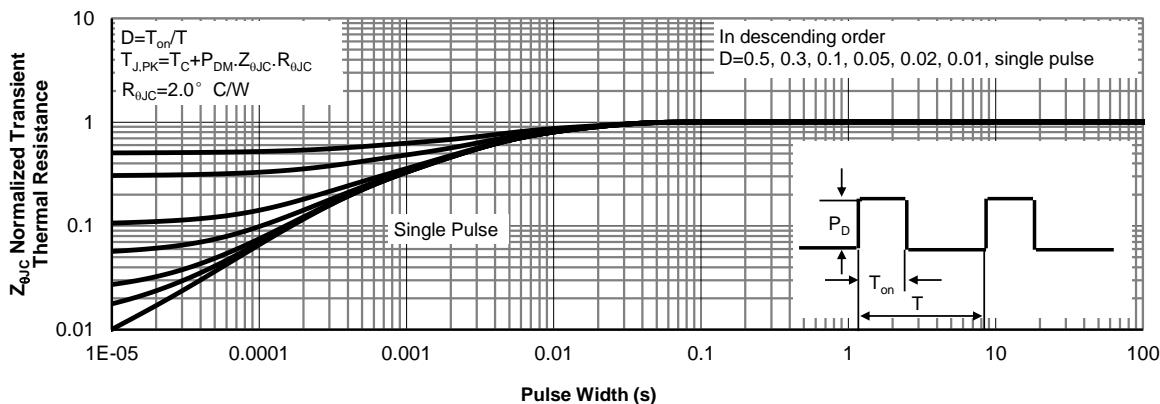
H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.

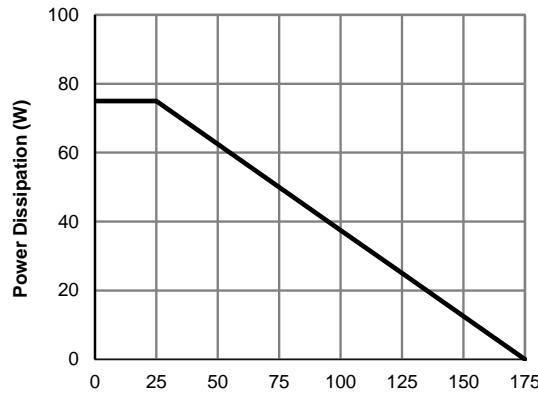
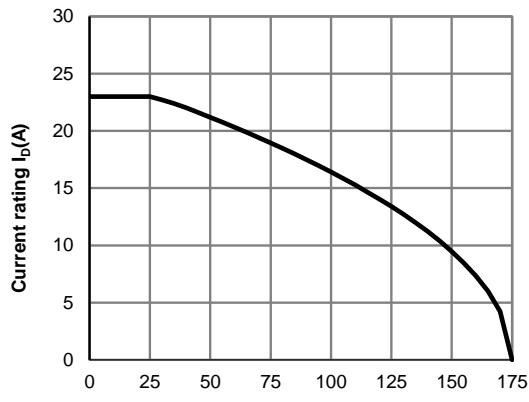
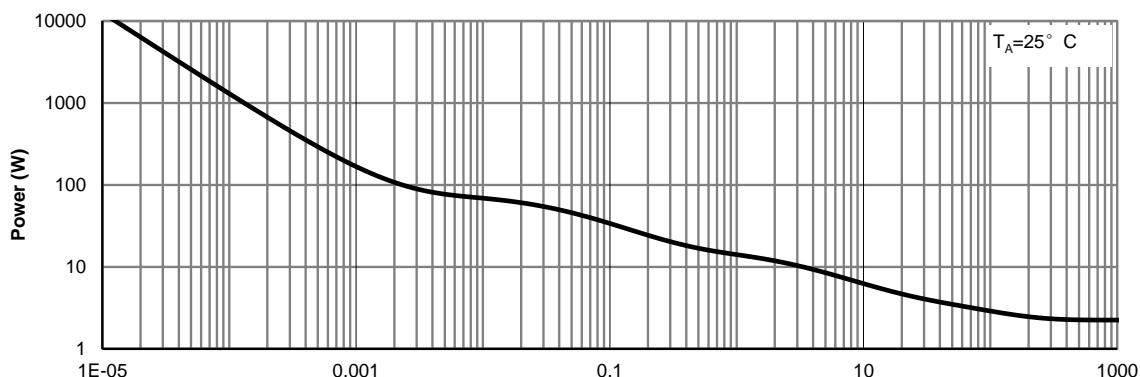
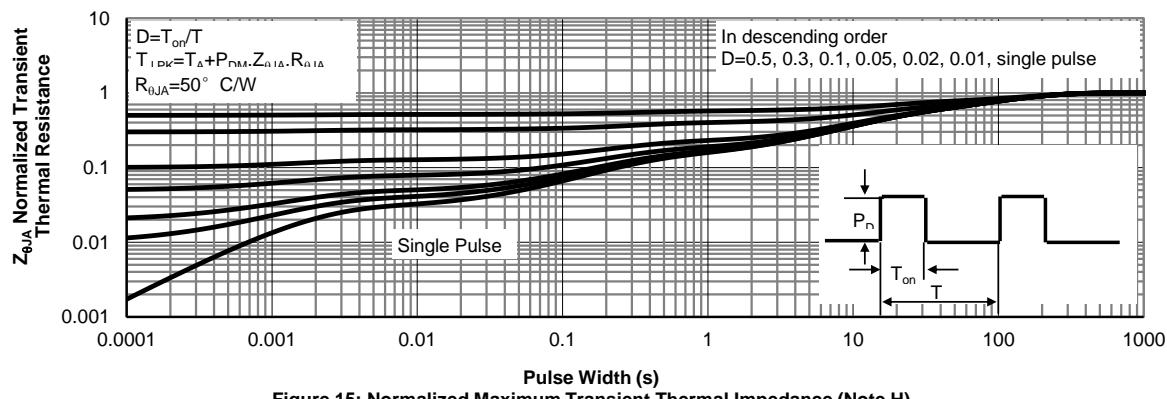
APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO MAKE CHANGES TO PRODUCT SPECIFICATIONS WITHOUT NOTICE. IT IS THE RESPONSIBILITY OF THE CUSTOMER TO EVALUATE SUITABILITY OF THE PRODUCT FOR THEIR INTENDED APPLICATION. CUSTOMER SHALL COMPLY WITH APPLICABLE LEGAL REQUIREMENTS, INCLUDING ALL APPLICABLE EXPORT CONTROL RULES, REGULATIONS AND LIMITATIONS.

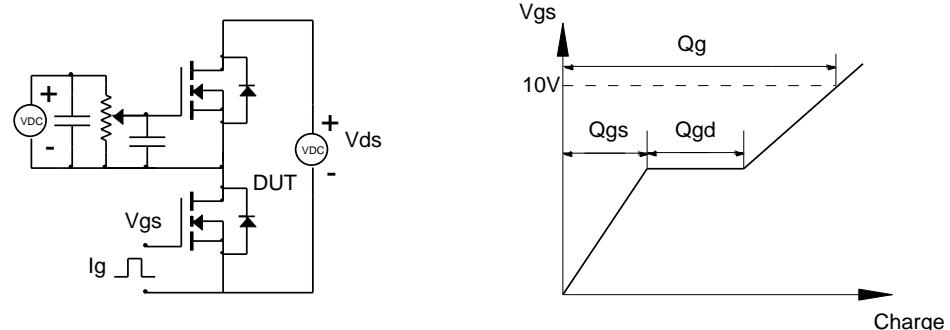
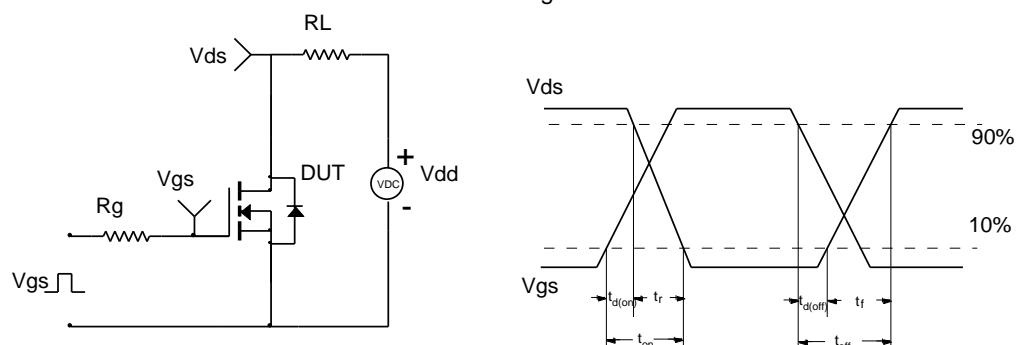
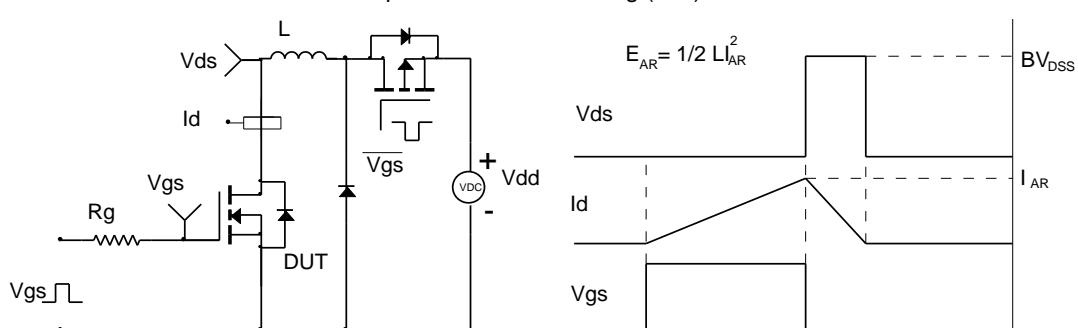
AOS' products are provided subject to AOS' terms and conditions of sale which are set forth at:

http://www.aosmd.com/terms_and_conditions_of_sale

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

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: Power De-rating (Note F)

Figure 13: Current De-rating (Note F)

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

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

Diode Recovery Test Circuit & Waveforms
