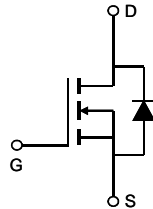


General Description

The AO3160 is fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability this device can be adopted quickly into new and existing offline powersupply designs.

Features

V_{DS}	700V @ 150°C
I_D (at $V_{GS}=10V$)	0.04A
$R_{DS(on)}$ (at $V_{GS}=10V$)	< 500Ω
$R_{DS(on)}$ (at $V_{GS}=4.5V$)	< 600Ω



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current ^{A,F}	I_D	$T_A=25^\circ\text{C}$	0.04
		$T_A=70^\circ\text{C}$	0.03
Pulsed Drain Current ^B	I_{DM}	0.12	
Peak diode recovery dv/dt	dv/dt	5	V/ns
Power Dissipation ^A	P_D	$T_A=25^\circ\text{C}$	1.39
		$T_A=70^\circ\text{C}$	0.89
Junction and Storage Temperature Range	T_J, T_{STG}	-50 to 150	°C

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	70	90	°C/W
Maximum Junction-to-Ambient ^A		Steady-State	100	125
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	63	80	°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, T _J =25°C	600	-	-	V
		I _D =250μA, V _{GS} =0V, T _J =150°C	-	700	-	
BV _{DSS} /ΔT _J	Zero Gate Voltage Drain Current	I _D =250μA, V _{GS} =0V	-	0.64	-	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =600V, V _{GS} =0V	-	-	1	μA
		V _{DS} =480V, T _J =125°C	-	-	10	
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =5V, I _D =8μA	1.4	2	3.2	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =0.016A	-	232	500	Ω
	Static Drain-Source On-Resistance	V _{GS} =4.5V, I _D =0.016A	-	315	600	Ω
g _{FS}	Forward Transconductance	V _{DS} =40V, I _D =0.016A	-	0.024	-	S
V _{SD}	Diode Forward Voltage	I _S =0.016A, V _{GS} =0V	-	0.74	1	V
I _S	Maximum Body-Diode Continuous Current		-	-	0.04	A
I _{SM}	Maximum Body-Diode Pulsed Current		-	-	0.12	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz	-	10	15	pF
C _{oss}	Output Capacitance		-	1.8	3	pF
C _{rss}	Reverse Transfer Capacitance		-	0.7	1	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	5	10	15	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =400V, I _D =0.01A	-	1	1.5	nC
Q _{gs}	Gate Source Charge		-	0.1	0.15	nC
Q _{gd}	Gate Drain Charge		-	0.52	0.8	nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =300V, I _D =0.01A, R _G =6Ω	-	4	12	ns
t _r	Turn-On Rise Time		-	5.2	8	ns
t _{D(off)}	Turn-Off DelayTime		-	12.5	19	ns
t _f	Turn-Off Fall Time		-	55	82.5	ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =0.016A, dI/dt=100A/μs, V _{DS} =300V	-	105	160	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =0.016A, dI/dt=100A/μs, V _{DS} =300V	-	9.5	14.3	nC

A: The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

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

E: 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° C. The SOA curve provides a single pulse rating.

F: The current rating is based on the t ≤ 10s thermal resistance rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

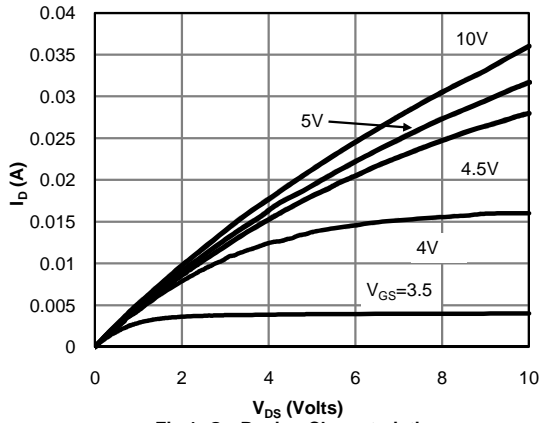


Fig 1: On-Region Characteristics

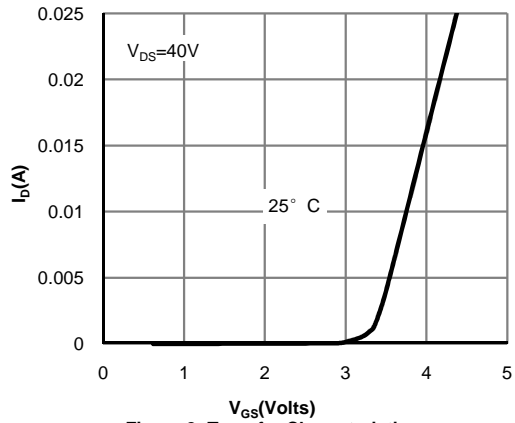


Figure 2: Transfer Characteristics

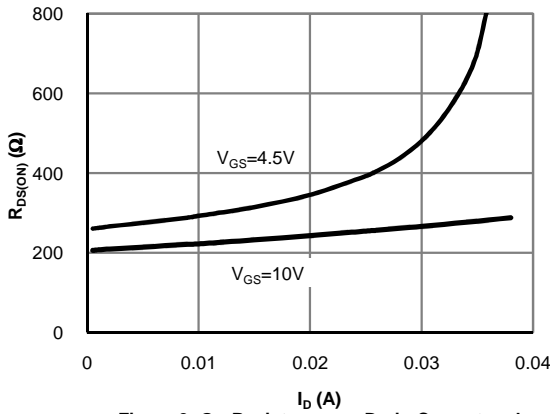


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

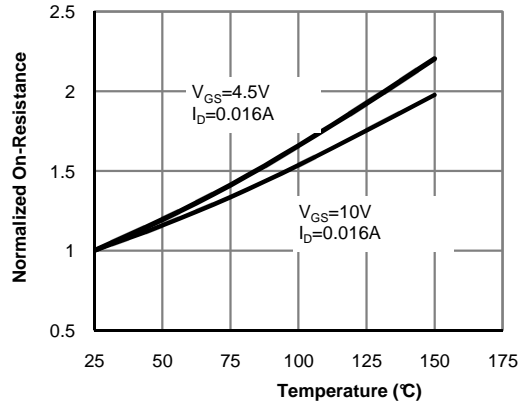


Figure 4: On-Resistance vs. Junction Temperature

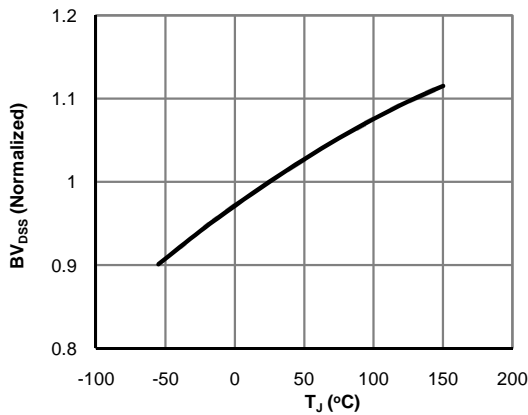


Figure 5: Break Down vs. Junction Temperature

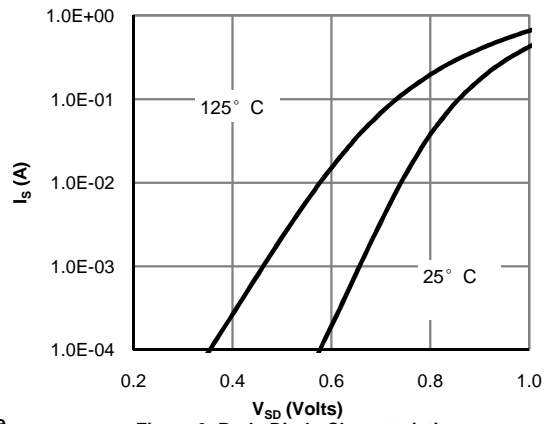


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

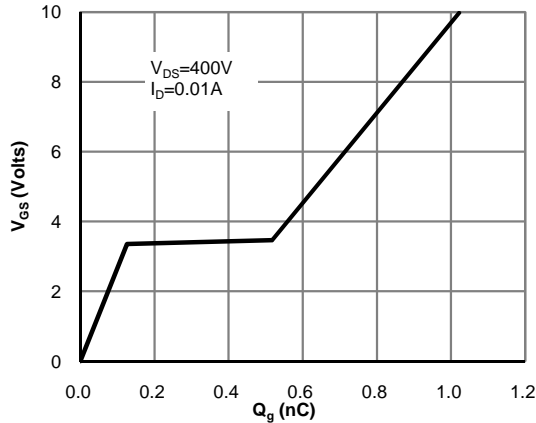


Figure 7: Gate-Charge Characteristics

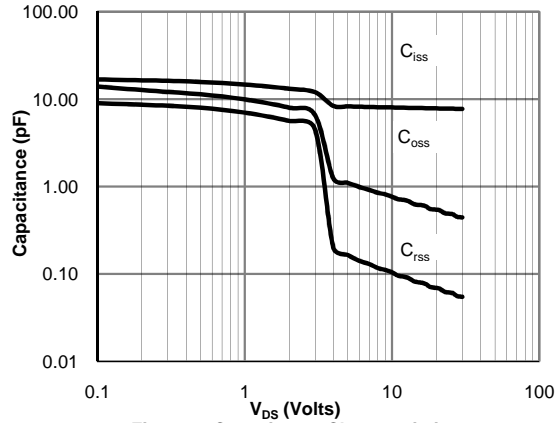


Figure 8: Capacitance Characteristics

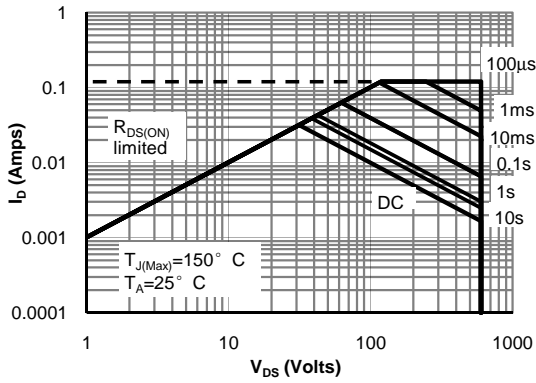


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

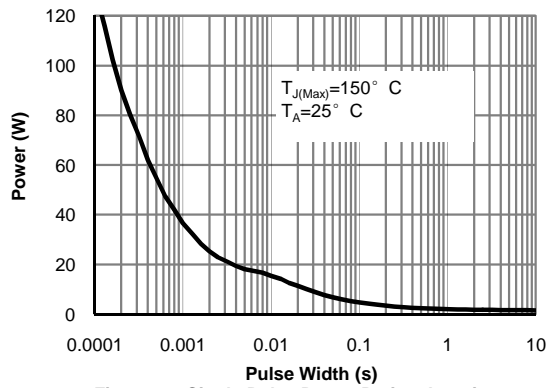


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

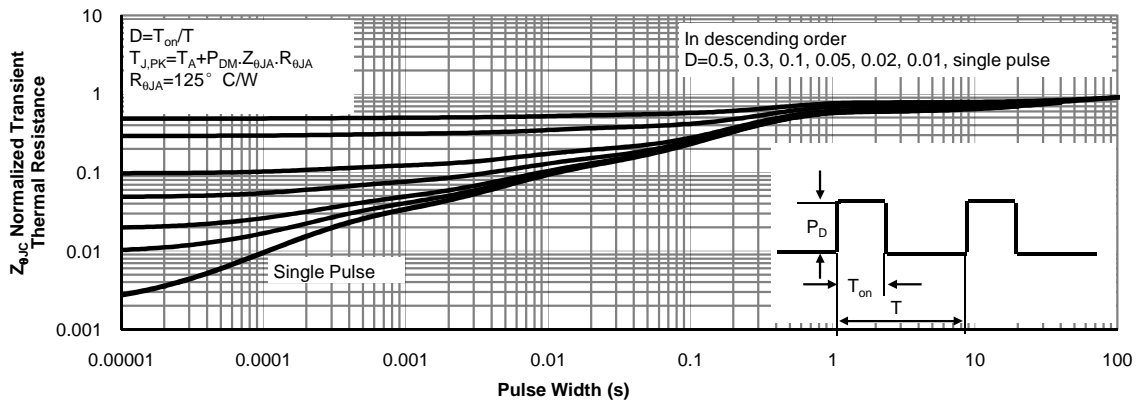
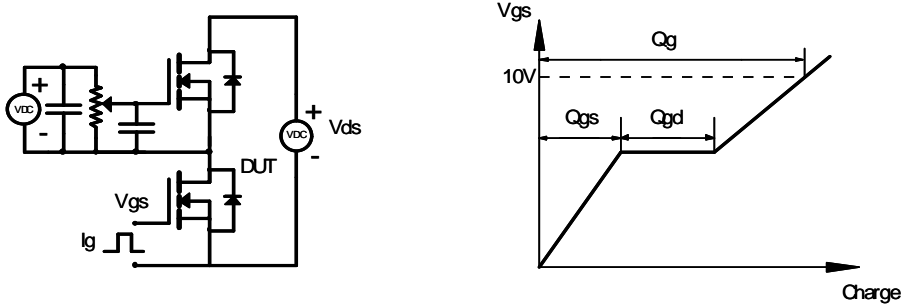
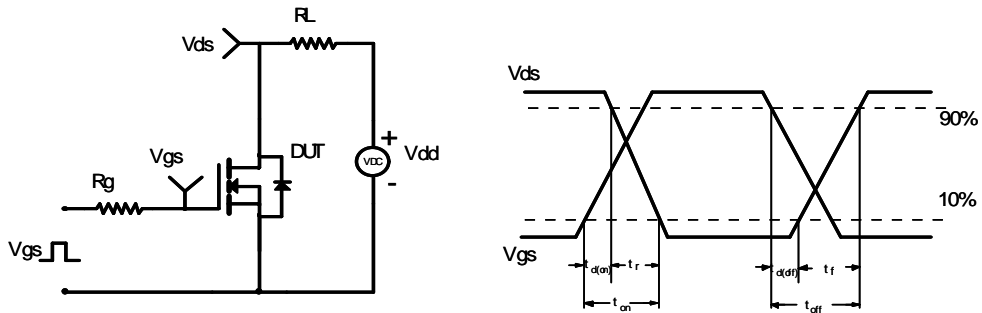


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

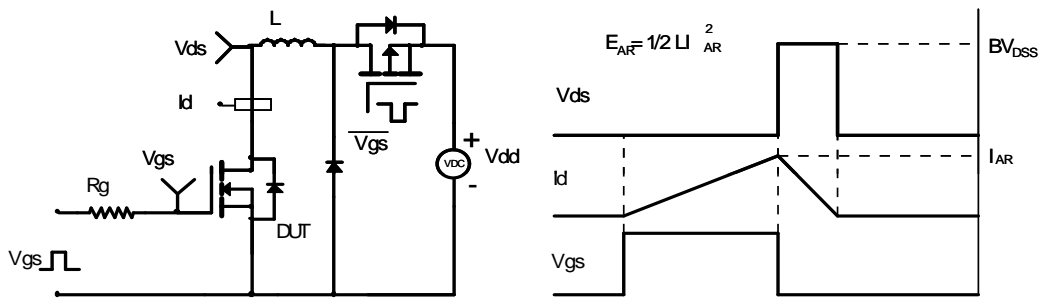
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

