



ALPHA & OMEGA
SEMICONDUCTOR

AON3816

20V Dual N-Channel MOSFET

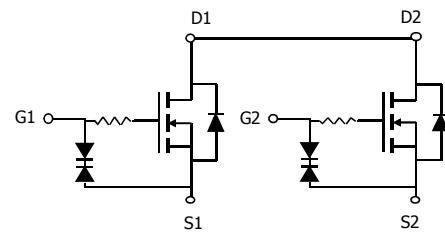
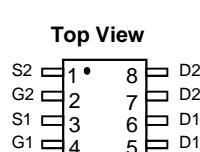
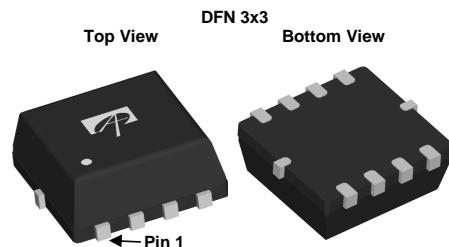
General Description

The AON3816 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V while retaining a 12V $V_{GS(MAX)}$ rating. It is ESD protected. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration.

Product Summary

V_{DS}	20V
I_D (at $V_{GS}=4.5V$)	4A
$R_{DS(ON)}$ (at $V_{GS} = 4.5V$)	< 22mΩ
$R_{DS(ON)}$ (at $V_{GS} = 4V$)	< 23mΩ
$R_{DS(ON)}$ (at $V_{GS} = 2.5V$)	< 28mΩ

ESD Protected



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ^F	I_D	4	A
$T_C=70^\circ\text{C}$		3.1	
Pulsed Drain Current ^B	I_{DM}	40	
Power Dissipation ^F	P_D	2.5	W
$T_C=70^\circ\text{C}$		1.6	
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	$R_{\theta JA}$	40	50	°C/W
Maximum Junction-to-Ambient ^A		75	95	°C/W
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	30	40	°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	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=20\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 10\text{V}$			10	μA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.3	0.7	1.1	V
$I_{\text{D(ON)}}$	On state drain current	$V_{GS}=4.5\text{V}, V_{DS}=5\text{V}$	40			A
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=4.5\text{V}, I_D=4\text{A}$ $T_J=125^\circ\text{C}$		18 23	22	$\text{m}\Omega$
		$V_{GS}=4\text{V}, I_D=4\text{A}$		19	23	$\text{m}\Omega$
		$V_{GS}=2.5\text{V}, I_D=4\text{A}$		22.5	28	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=4\text{A}$		33		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.6	1	V
I_S	Maximum Body-Diode Continuous Current				3.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=10\text{V}, f=1\text{MHz}$	730	920	1100	pF
C_{oss}	Output Capacitance		110	155	200	pF
C_{rss}	Reverse Transfer Capacitance		45	75	105	pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		2.4		$\text{k}\Omega$
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=4.5\text{V}, V_{DS}=10\text{V}, I_D=4\text{A}$	8.8	11	13	nC
Q_{gs}	Gate Source Charge		1.6	2	2.4	nC
Q_{gd}	Gate Drain Charge		1.9	3.2	4.5	nC
$t_{\text{D(on)}}$	Turn-On Delay Time	$V_{GS}=5\text{V}, V_{DS}=10\text{V}, R_L=2.5\Omega, R_{\text{GEN}}=3\Omega$		0.3		μs
t_r	Turn-On Rise Time			0.6		μs
$t_{\text{D(off)}}$	Turn-Off Delay Time			7.9		μs
t_f	Turn-Off Fall Time			4.4		μs

A: The value of $R_{\theta JA}$ 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 value in any given application depends on the user's specific board design.

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

C. The $R_{\theta JA}$ 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 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 $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

F. The power dissipation and current rating is based on the $t \leq 10\text{s}$ thermal resistance, and current rating is also limited by wire-bonding.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

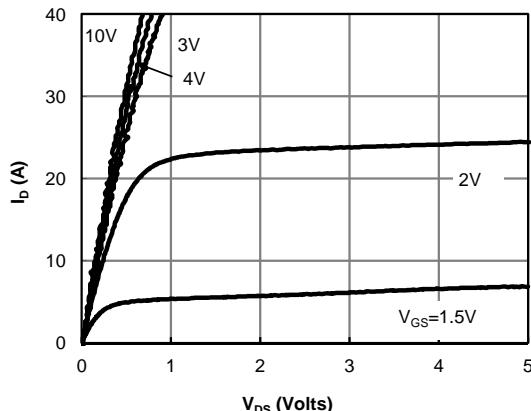


Fig 1: On-Region Characteristics (Note E)

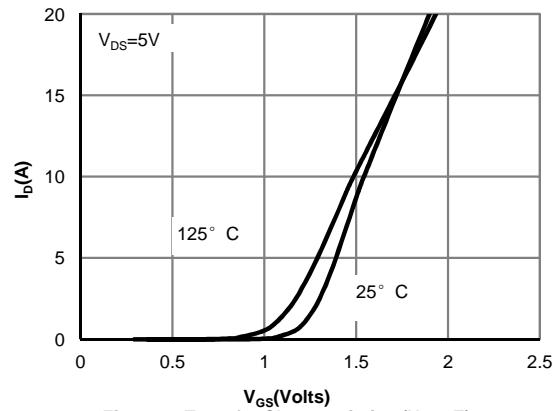


Figure 2: Transfer Characteristics (Note E)

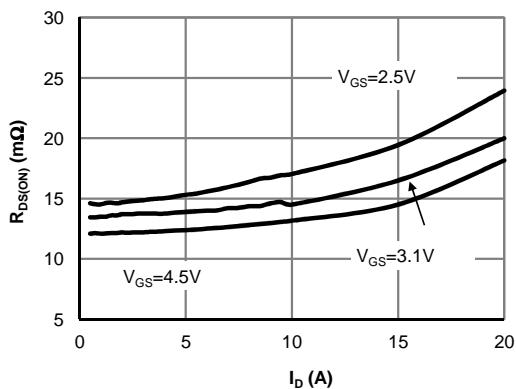


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

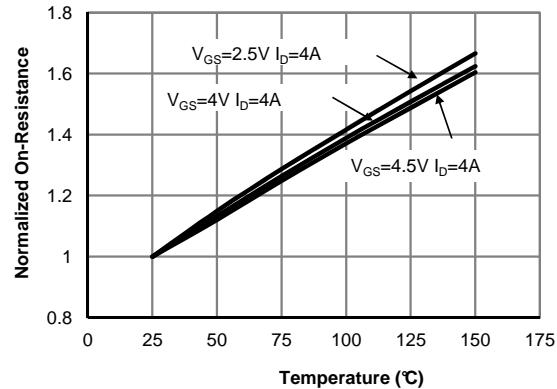


Figure 4: On-Resistance vs. Junction Temperature (Note E)

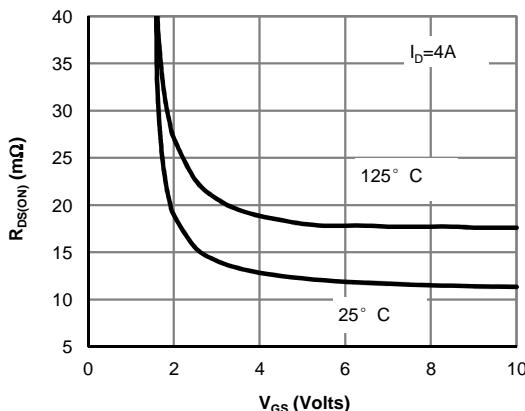


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

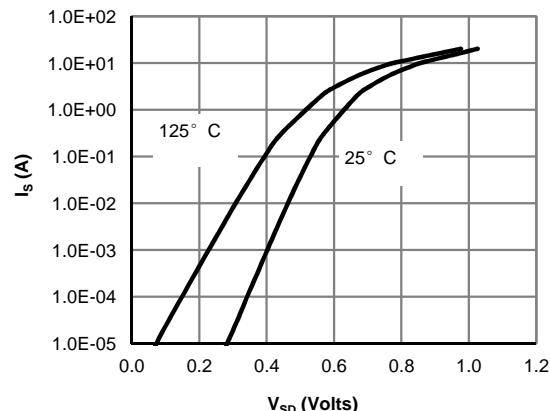


Figure 6: Body-Diode Characteristics (Note E)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

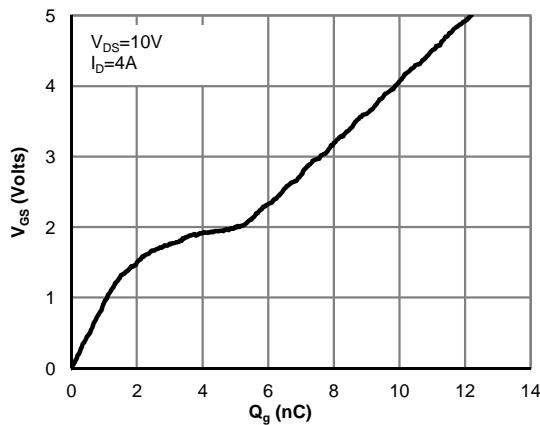


Figure 7: Gate-Charge Characteristics

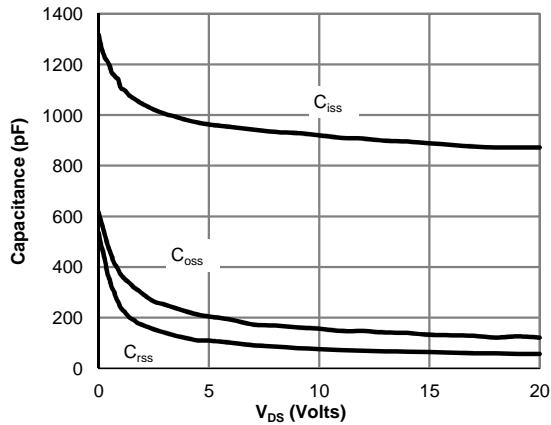


Figure 8: Capacitance Characteristics

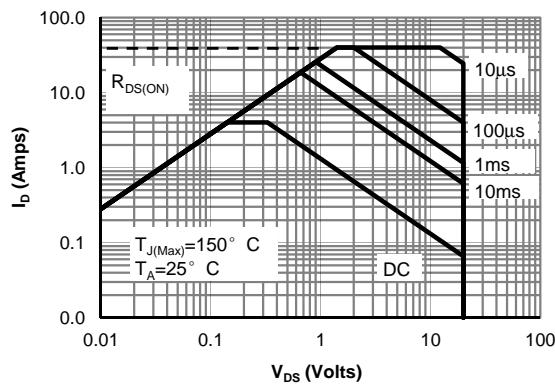


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

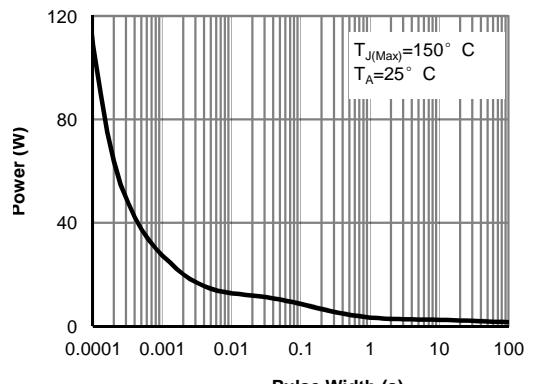


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

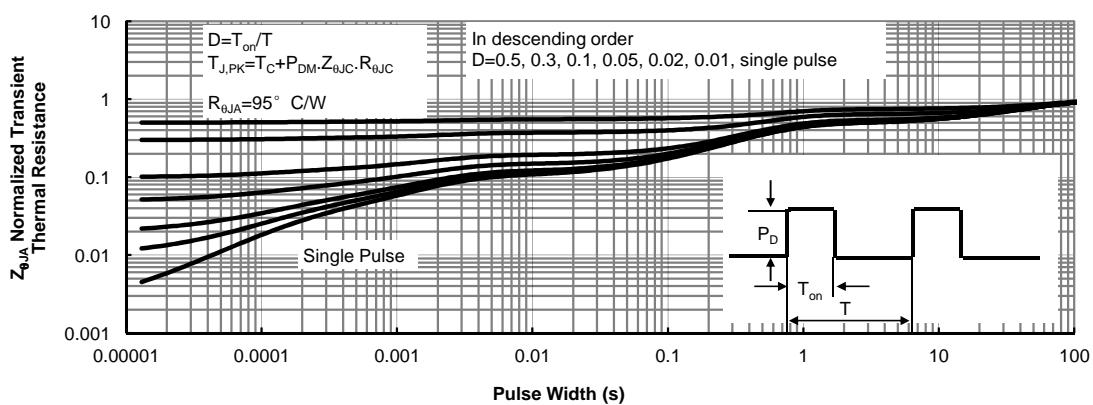
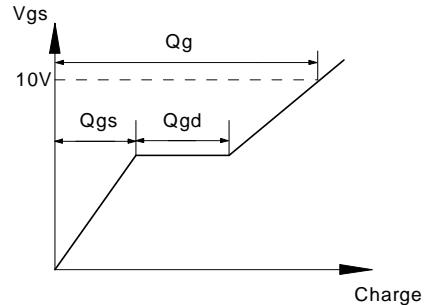
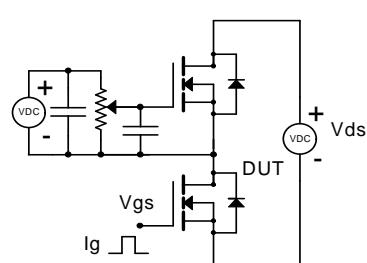


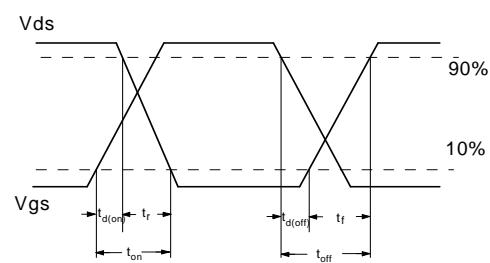
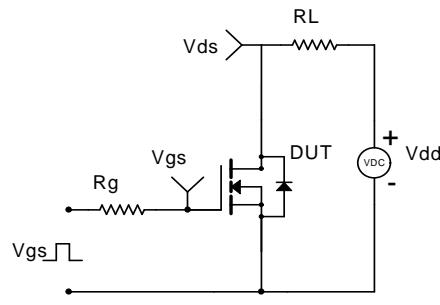
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



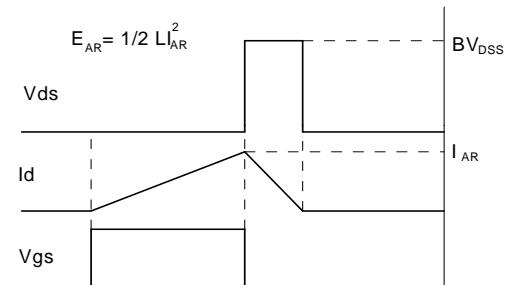
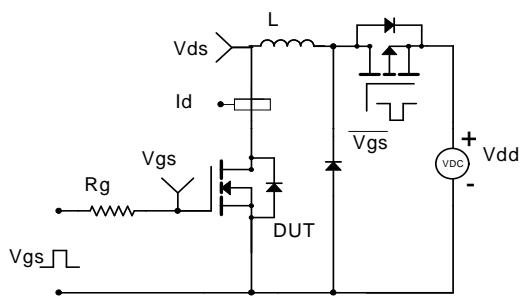
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

