



ALPHA & OMEGA
SEMICONDUCTOR

AON1620

12V N-Channel MOSFET

General Description

The AON1620 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Product Summary

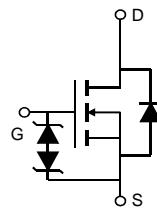
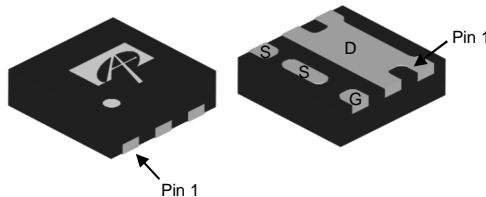
V_{DS}	12V
I_D (at $V_{GS}=4.5V$)	4A
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 22mΩ
$R_{DS(ON)}$ (at $V_{GS}=2.5V$)	< 27mΩ
$R_{DS(ON)}$ (at $V_{GS}=1.8V$)	< 36mΩ

Typical ESD protection

HBM Class 2



DFN 1.6x1.6A
Top View Bottom View



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	12	V
Gate-Source Voltage	V_{GS}	± 8	V
Continuous Drain Current ^G	I_D	4	A
$T_A=70^\circ\text{C}$		3	
Pulsed Drain Current ^C	I_{DM}	16	
Power Dissipation ^A	P_D	1.8	W
$T_A=70^\circ\text{C}$		1.15	
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 $t \leq 10\text{s}$	$R_{\theta JA}$	56	70	°C/W
Maximum Junction-to-Ambient ^{A,D} Steady-State		88	110	°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	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	12			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=12\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 8\text{V}$			± 10	μA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.4	0.7	1.0	V
$I_{\text{D(ON)}}$	On state drain current	$V_{GS}=4.5\text{V}, V_{DS}=5\text{V}$	16			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 23.5	22 29	$\text{m}\Omega$
		$V_{GS}=2.5\text{V}, I_D=3\text{A}$			21	$\text{m}\Omega$
		$V_{GS}=1.8\text{V}, I_D=2\text{A}$			27	$\text{m}\Omega$
		$V_{GS}=1.5\text{V}, I_D=1\text{A}$			35	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=4\text{A}$			25	S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.65	1	V
I_S	Maximum Body-Diode Continuous Current				2.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=6\text{V}, f=1\text{MHz}$		770		pF
C_{oss}	Output Capacitance			180		pF
C_{rss}	Reverse Transfer Capacitance			130		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		1.2		Ω
SWITCHING PARAMETERS						
$Q_g(4.5\text{V})$	Total Gate Charge	$V_{GS}=4.5\text{V}, V_{DS}=6\text{V}, I_D=4\text{A}$		8	12	nC
Q_{gs}	Gate Source Charge			1		nC
Q_{gd}	Gate Drain Charge			2		nC
$t_{\text{D(on)}}$	Turn-On DelayTime	$V_{GS}=4.5\text{V}, V_{DS}=6\text{V}, R_L=3.75\Omega, R_{\text{GEN}}=3\Omega$		2.5		ns
t_r	Turn-On Rise Time			3.5		ns
$t_{\text{D(off)}}$	Turn-Off DelayTime			25		ns
t_f	Turn-Off Fall Time			4		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=4\text{A}, dI/dt=100\text{A}/\mu\text{s}$		10		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=4\text{A}, dI/dt=100\text{A}/\mu\text{s}$		3		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 $R_{\text{JJA}}, t \leq 10\text{s}$ value 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 $T_{\text{J(MAX)}}=150^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature $T_{\text{J(MAX)}}=150^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$.

D. The R_{JJA} is the sum of the thermal impedance from junction to case R_{JJC} and case to ambient.

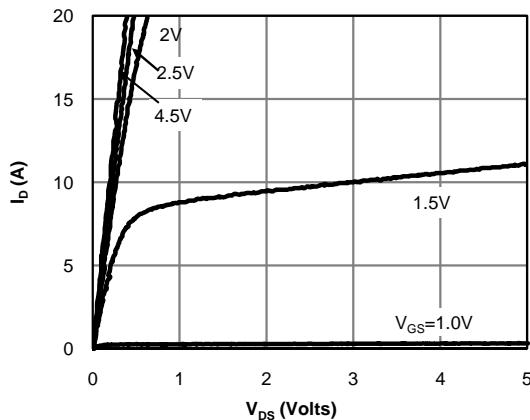
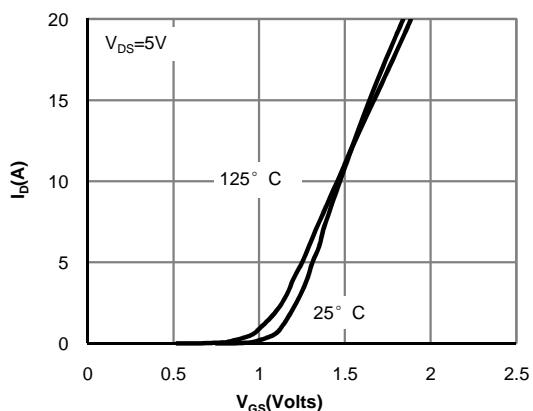
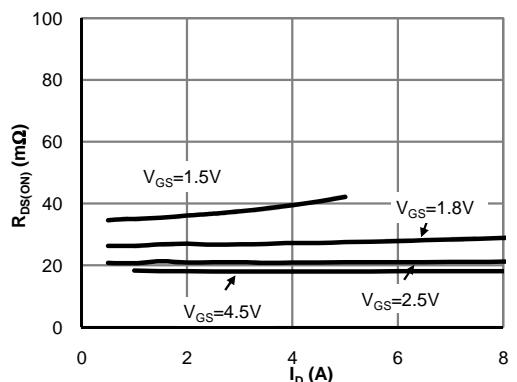
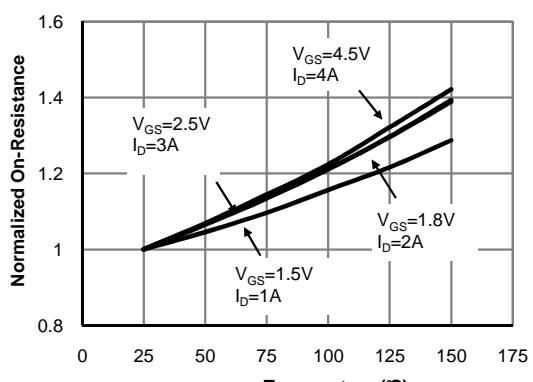
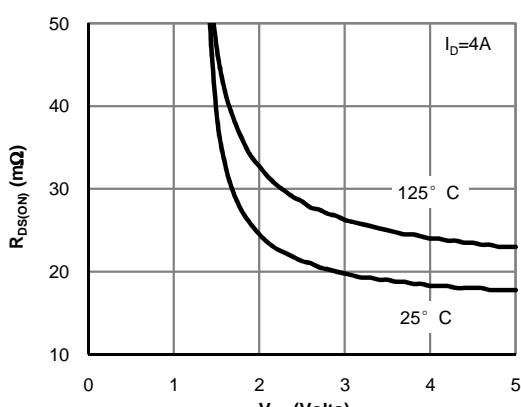
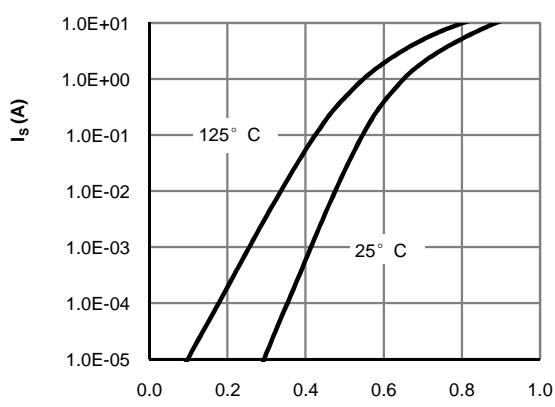
E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

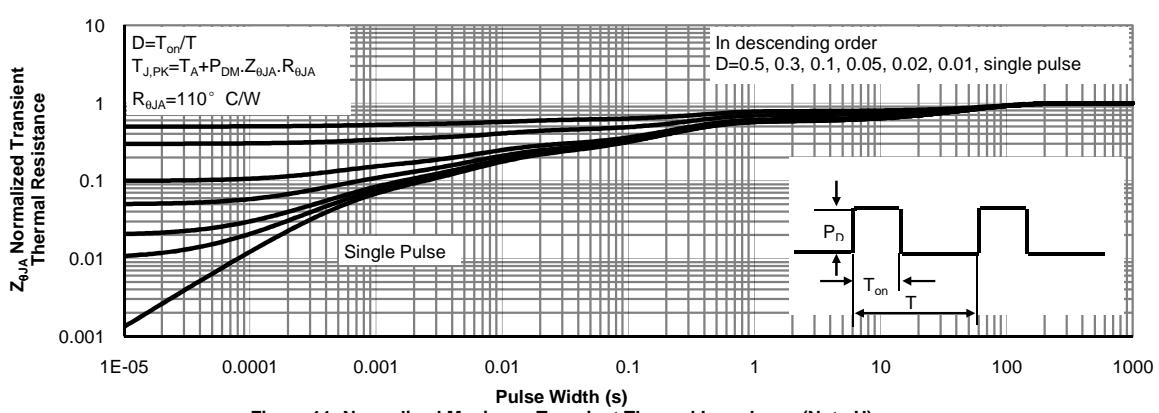
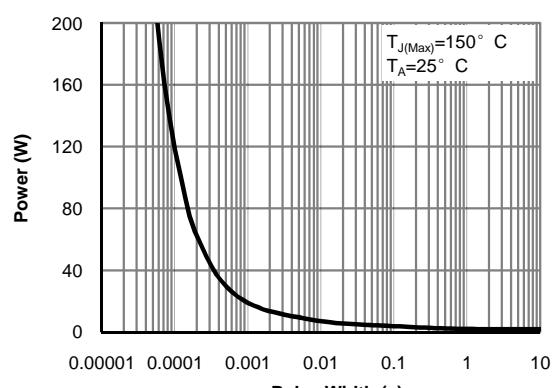
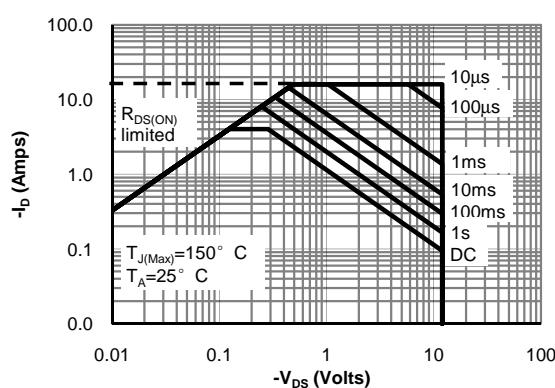
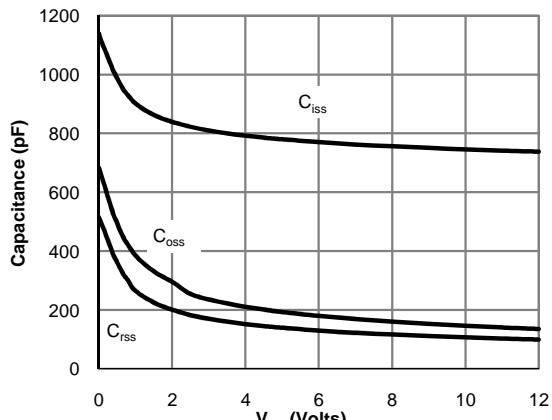
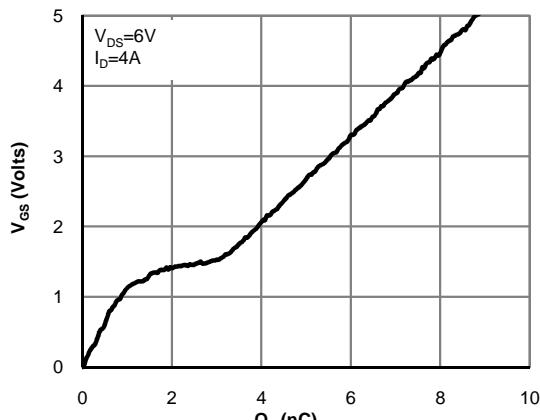
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{\text{J(MAX)}}=150^\circ\text{C}$. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

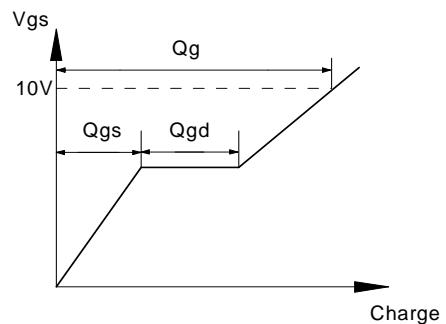
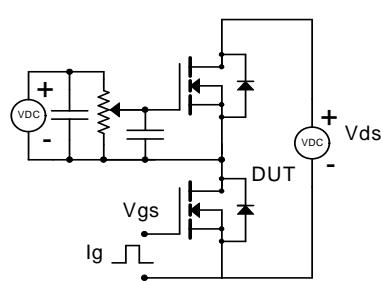
H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.

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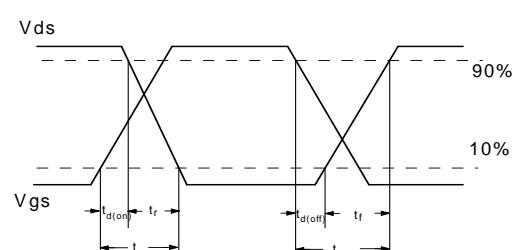
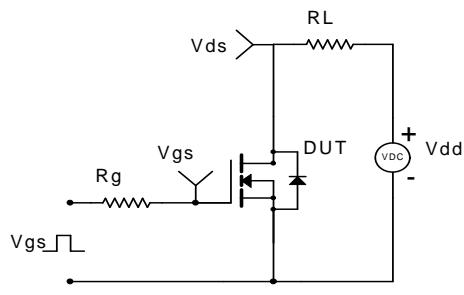
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

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


Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

