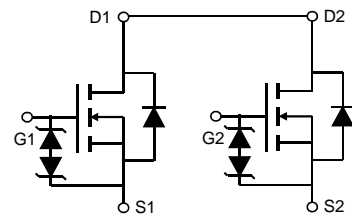
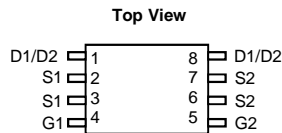
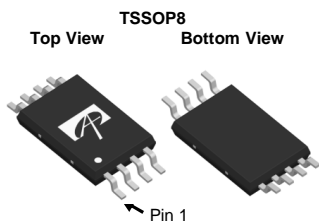


**General Description**

The AO8820 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 $V_{GS}=10V$ )	7A
$R_{DS(ON)}$ (at $V_{GS}=10V$ )	< 21m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ )	< 24m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=3.6V$ )	< 28m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=2.5V$ )	< 32m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=1.8V$ )	< 50m $\Omega$

**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	$V_{GS}$	$\pm 12$	V
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	7
		$T_A=70^\circ\text{C}$	5.5
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	30	A
Power Dissipation <sup>B</sup>	$P_D$	$T_A=25^\circ\text{C}$	1.5
		$T_A=70^\circ\text{C}$	0.96
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	64	83	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient <sup>A,D</sup>				
Maximum Junction-to-Lead	$R_{\theta JL}$	53	70	$^\circ\text{C}/\text{W}$

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	20			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±10V			10	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.5	0.8	1.1	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	30			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =7A T <sub>J</sub> =125°C	13	17.2	21	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6.6A	15	19.4	24	
		V <sub>GS</sub> =3.6V, I <sub>D</sub> =6A	16	20.7	28	
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =5.5A	18	25	32	
		V <sub>GS</sub> =1.8V, I <sub>D</sub> =2A		35	50	
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =7A		25		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.65	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				2.5	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =10V, f=1MHz		500		pF
C <sub>oss</sub>	Output Capacitance			100		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			52		pF
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =7A		6	9	nC
Q <sub>gs</sub>	Gate Source Charge			2		nC
Q <sub>gd</sub>	Gate Drain Charge			1		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =5V, V <sub>DS</sub> =10V, R <sub>L</sub> =1.4Ω, R <sub>GEN</sub> =3Ω		0.2		us
t <sub>r</sub>	Turn-On Rise Time			1.5		us
t <sub>D(off)</sub>	Turn-Off DelayTime			7.4		us
t <sub>f</sub>	Turn-Off Fall Time			18		us
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =7A, dI/dt=100A/μs		9		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =7A, dI/dt=100A/μs		10		nC

- A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C. The value in any given application depends on the user's specific board design.
- B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150° C, using ≤ 10s junction-to-ambient thermal resistance.
- C. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=150° C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25° C.
- D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead 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-ambient thermal impedance which is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=150° C. The SOA curve provides a single pulse rating.

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**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

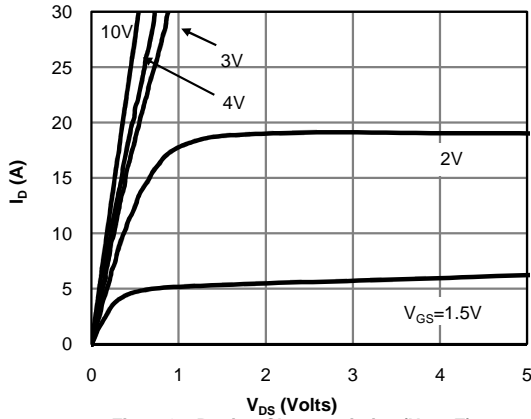


Figure 1: On-Region Characteristics (Note E)

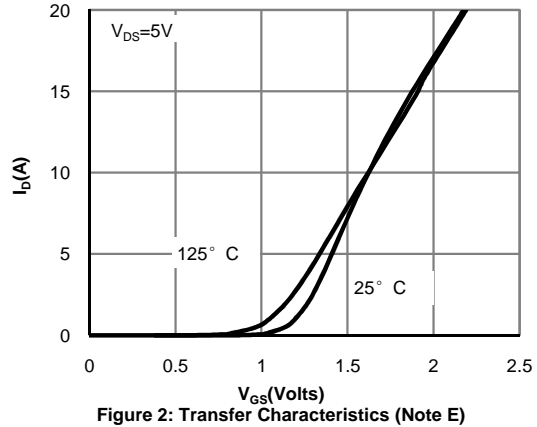


Figure 2: Transfer Characteristics (Note E)

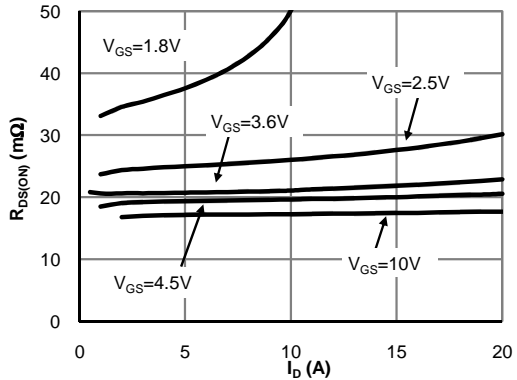


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

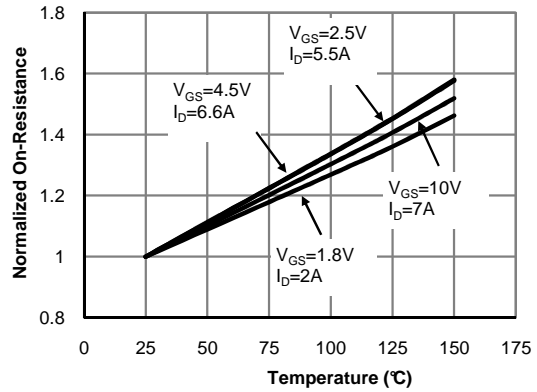


Figure 4: On-Resistance vs. Junction Temperature (Note E)

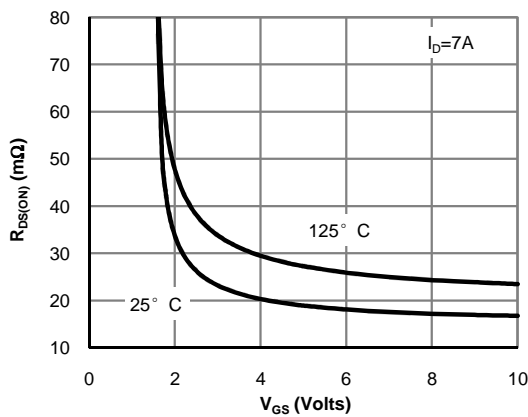


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

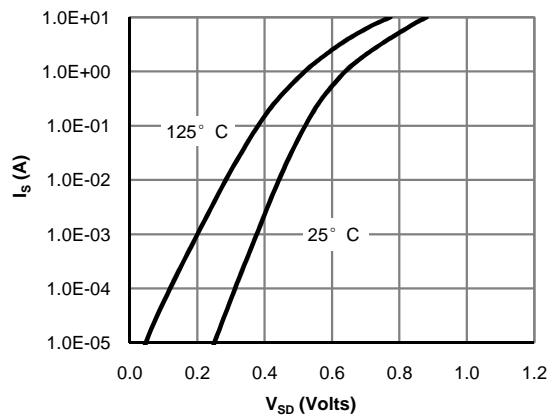
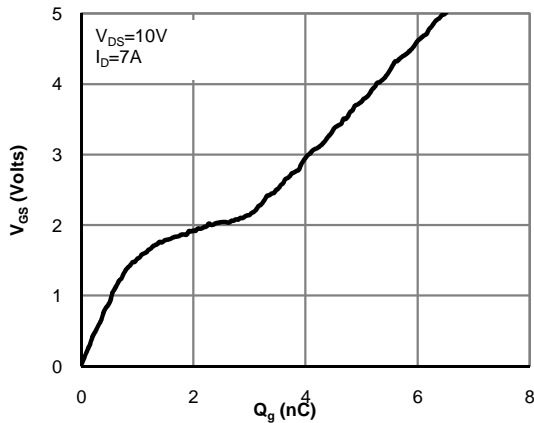
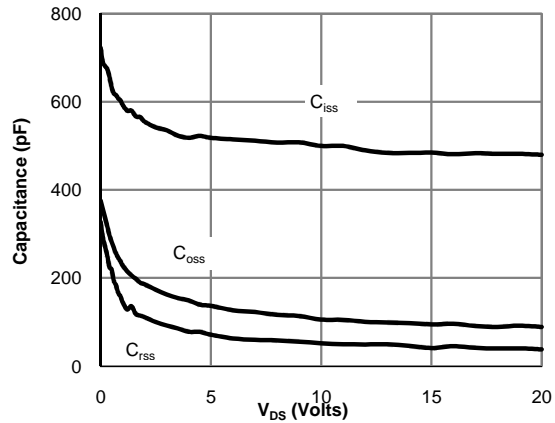


Figure 6: Body-Diode Characteristics (Note E)

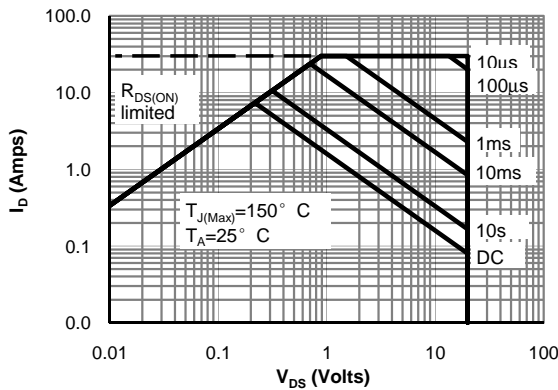
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



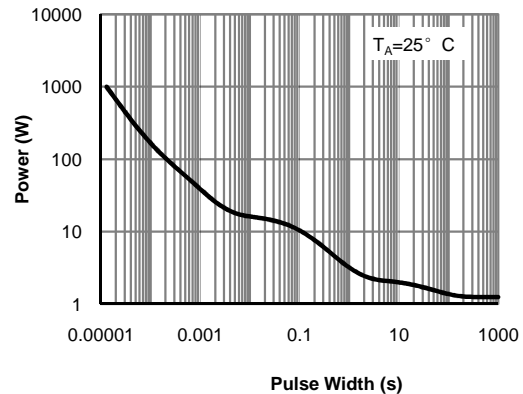
**Figure 7: Gate-Charge Characteristics**



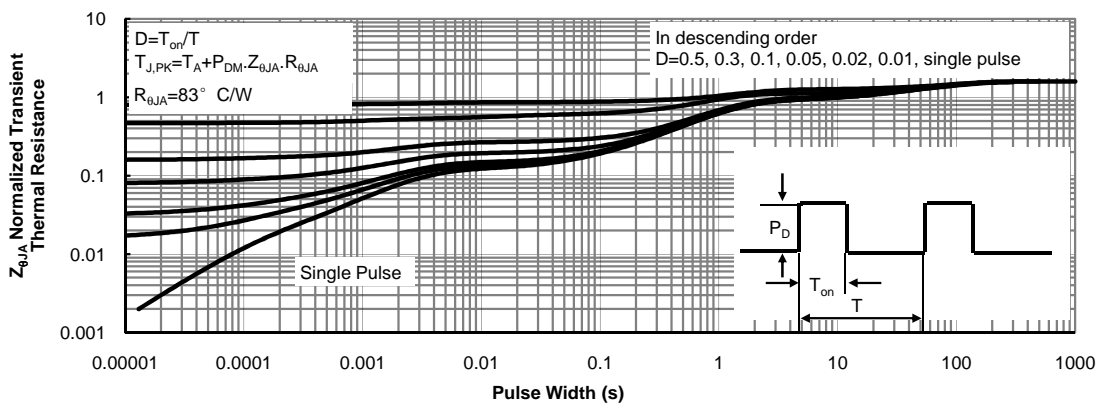
**Figure 8: Capacitance Characteristics**



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

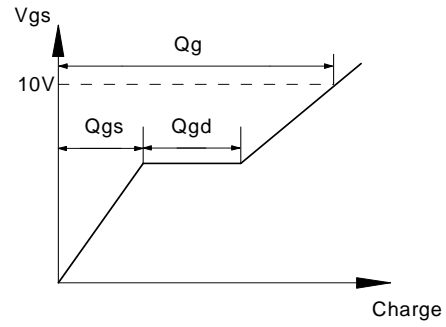


**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)**



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

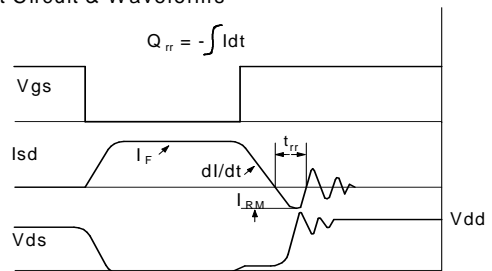
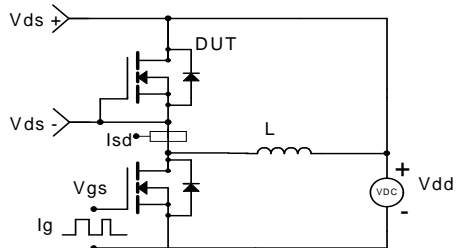
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



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