

General Description

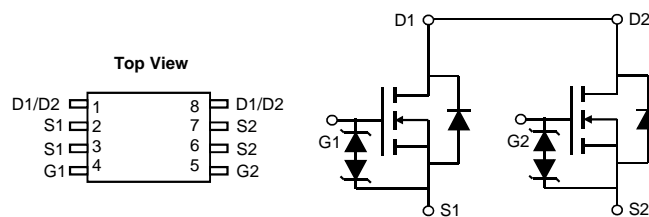
The AO8820 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V while retaining a 12V $V_{GS(MAX)}$ rating. It is ESD protected. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration.

Features

V_{DS}	20V
I_D (at $V_{GS}=10V$)	7A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 21m Ω
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 24m Ω
$R_{DS(ON)}$ (at $V_{GS}=3.6V$)	< 28m Ω
$R_{DS(ON)}$ (at $V_{GS}=2.5V$)	< 32m Ω
$R_{DS(ON)}$ (at $V_{GS}=1.8V$)	< 50m Ω



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	I_D	$T_A=25^\circ\text{C}$	7
		$T_A=70^\circ\text{C}$	5.5
Pulsed Drain Current ^C	I_{DM}	30	A
Power Dissipation ^B	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 ^A	$R_{\theta JA}$	64	83	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient ^{A,D}		Steady-State	89	120
Maximum Junction-to-Lead	$R_{\theta JL}$	53	70	$^\circ\text{C}/\text{W}$

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	20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =16V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±10V			10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.5	0.8	1.1	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	30			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =7A T _J =125°C	13	17.2	21	mΩ
		V _{GS} =4.5V, I _D =6.6A	15	19.4	24	
		V _{GS} =3.6V, I _D =6A	16	20.7	28	
		V _{GS} =2.5V, I _D =5.5A	18	25	32	
		V _{GS} =1.8V, I _D =2A		35	50	
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =7A		25		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.65	1	V
I _S	Maximum Body-Diode Continuous Current				2.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =10V, f=1MHz		500		pF
C _{oss}	Output Capacitance			100		pF
C _{rss}	Reverse Transfer Capacitance			52		pF
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =7A		6	9	nC
Q _{gs}	Gate Source Charge			2		nC
Q _{gd}	Gate Drain Charge			1		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =5V, V _{DS} =10V, R _L =1.4Ω, R _{GEN} =3Ω		0.2		us
t _r	Turn-On Rise Time			1.5		us
t _{D(off)}	Turn-Off DelayTime			7.4		us
t _f	Turn-Off Fall Time			18		us
t _{rr}	Body Diode Reverse Recovery Time	I _F =7A, dI/dt=100A/μs		9		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =7A, dI/dt=100A/μs		10		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. The power dissipation P_D is based on T_{J(MAX)}=150° C, using ≤ 10s junction-to-ambient thermal resistance.

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

D. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} 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 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

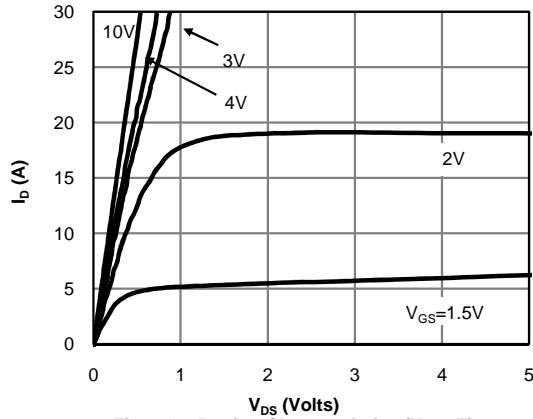


Figure 1: On-Region Characteristics (Note E)

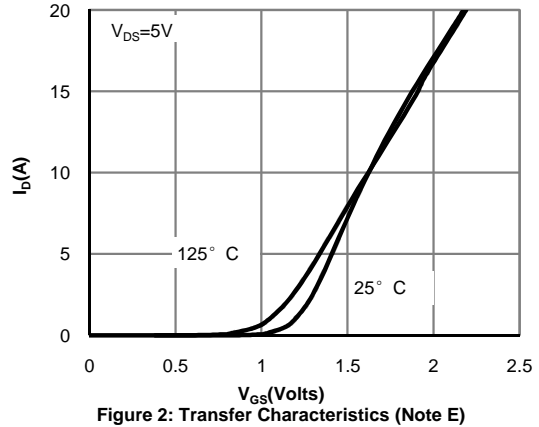


Figure 2: Transfer Characteristics (Note E)

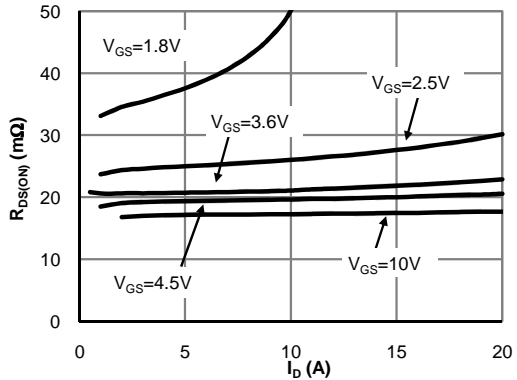


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

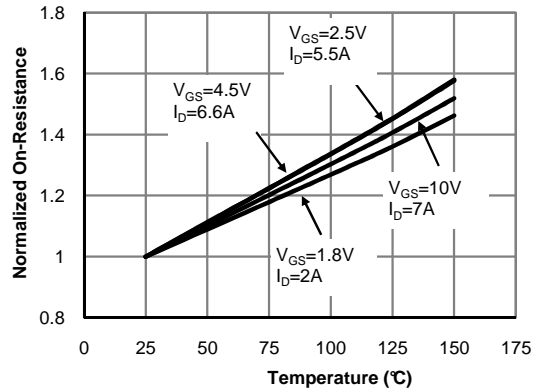


Figure 4: On-Resistance vs. Junction Temperature (Note E)

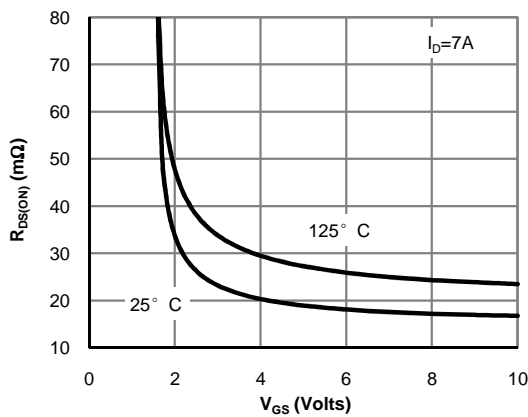


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

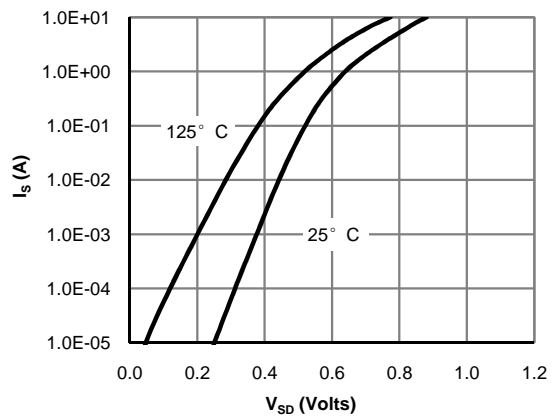


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

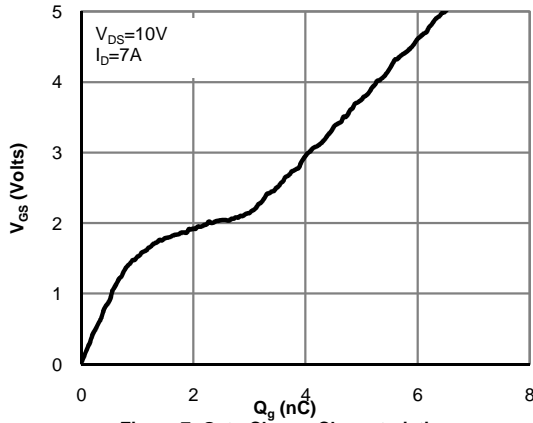


Figure 7: Gate-Charge Characteristics

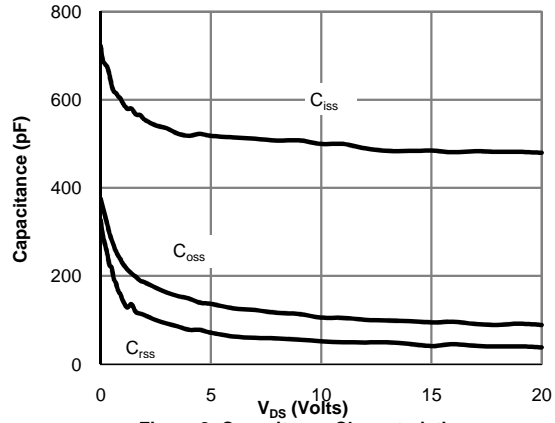


Figure 8: Capacitance Characteristics

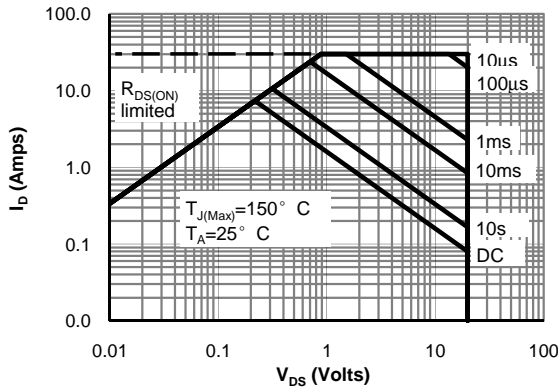


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

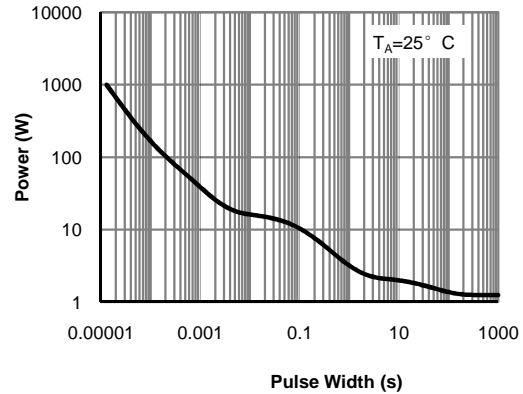


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

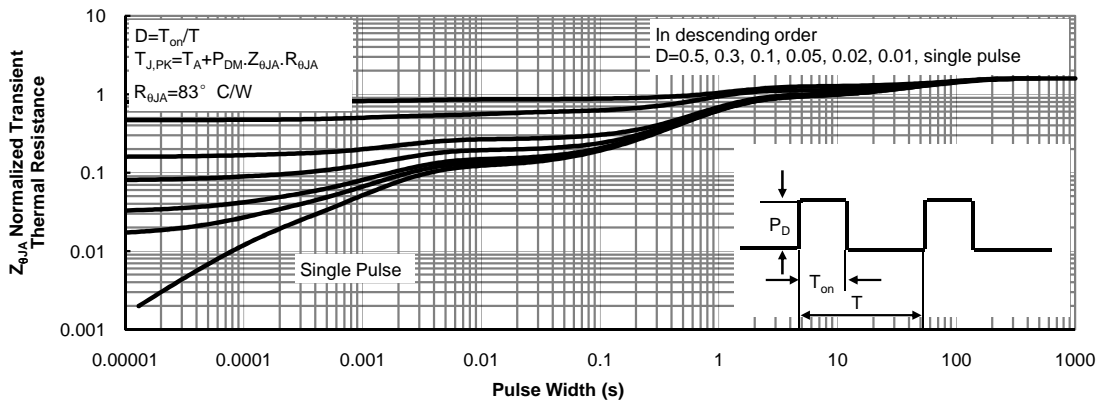
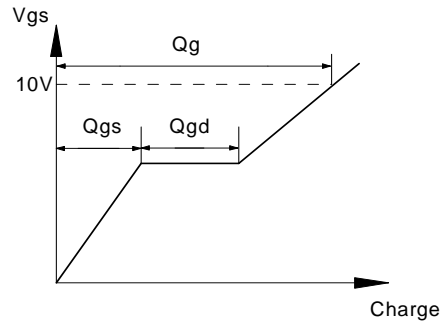
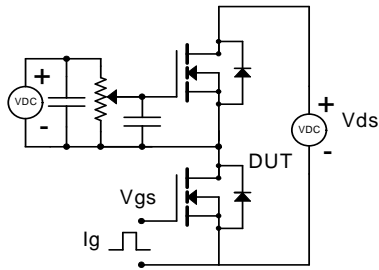
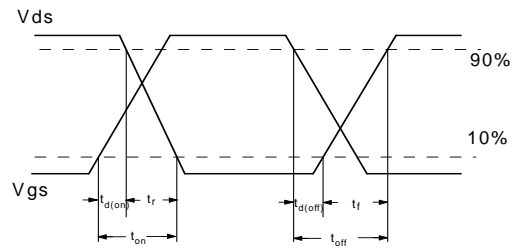
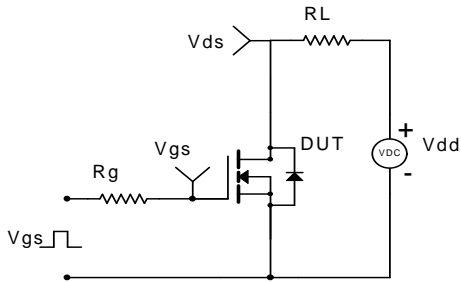


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

