ALPHA & OMEGA SEMICONDUCTOR

AON5820

20V Common-Drain Dual N-Channel MOSFET

General Description

The AON5820 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V 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.

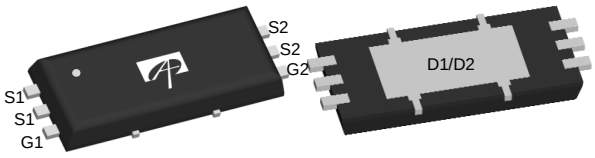
Product Summary

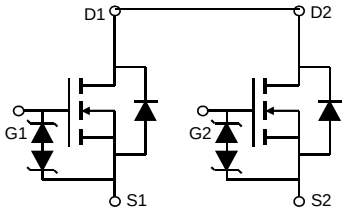
V_{DS}	20V
I_D (at V_{GS}=4.5V)	10A
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 9.5mΩ
$R_{DS(ON)}$ (at V_{GS}=4.0V)	< 10mΩ
$R_{DS(ON)}$ (at V_{GS}=3.5V)	< 10.5mΩ
$R_{DS(ON)}$ (at V_{GS}=3.1V)	< 11.5mΩ
$R_{DS(ON)}$ (at V_{GS}=2.5V)	< 13mΩ
Typical ESD protection	**HBM Class 2**

Green Product

DFN 2X5

Top View **Bottom View**





Absolute Maximum Ratings T_A=25°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	T_A=25°C	I_D	10	A
	T_A=70°C		8	
Pulsed Drain Current [C]		I_{DM}	85	
Power Dissipation [A]	T_A=25°C	P_{DSM}	1.7	W
	T_A=70°C		1	
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 ≤ 10s	$R_{\theta JA}$	30	40	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		61	75	°C/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	4.5	5.5	°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	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V			1	µA
		T_J=55°C			5	
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	0.3	0.65	1.0	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V	85			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=10A	5.5	7.4	9.5	mΩ
		T_J=125°C	8	11	14	
		V_{GS}=4.0V, I_D=10A	5.8	7.6	10	mΩ
		V_{GS}=3.5V, I_D=9A	6	8	10.5	mΩ
		V_{GS}=3.1V, I_D=9A	6.3	8.3	11.5	mΩ
		V_{GS}=2.5V, I_D=8A	6.8	9.2	13	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=10A		65		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.58	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	1000	1255	1510	pF
C_{oss}	Output Capacitance		150	220	290	pF
C_{rss}	Reverse Transfer Capacitance		100	168	235	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		2.5		KΩ
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=10A	10	12.5	15	nC
Q_{gs}	Gate Source Charge			5.5		nC
Q_{gd}	Gate Drain Charge			6.5		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=4.5V, V_{DS}=10V, R_L=1Ω, R_{GEN}=3Ω		1.1		µs
t_r	Turn-On Rise Time			2.6		µs
$t_{D(off)}$	Turn-Off DelayTime			7		µs
t_f	Turn-Off Fall Time			7.4		µs
t_{rr}	Body Diode Reverse Recovery Time	I_F=10A, dI/dt=500A/µs	8.5	11	13.5	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=10A, dI/dt=500A/µs	12	15	18	nC

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° C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ 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 $T_{J(MAX)}$=150° 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 $T_{J(MAX)}$=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J =25° C.
D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ 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 $T_{J(MAX)}$=150° 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° C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

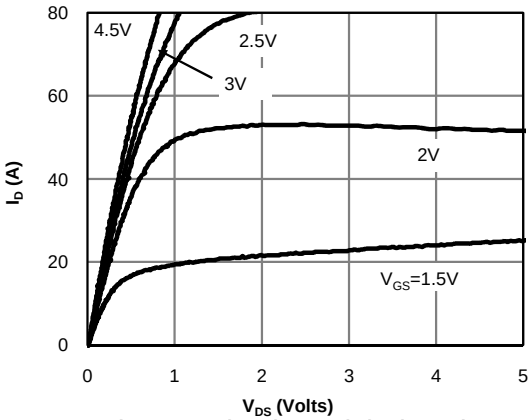


Fig 1: On-Region Characteristics (Note E)

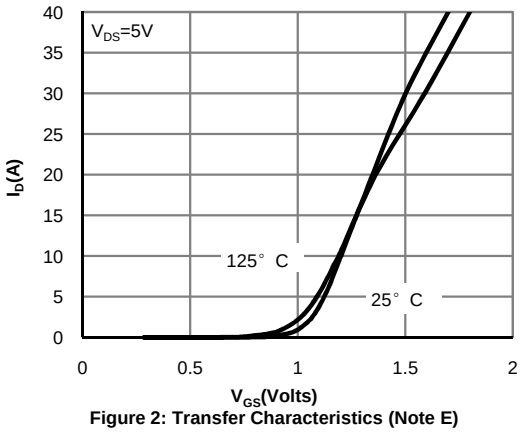


Figure 2: Transfer Characteristics (Note E)

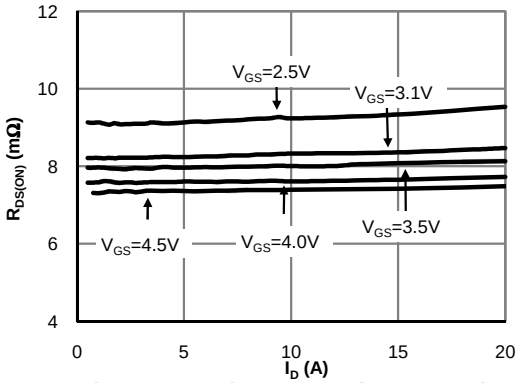


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

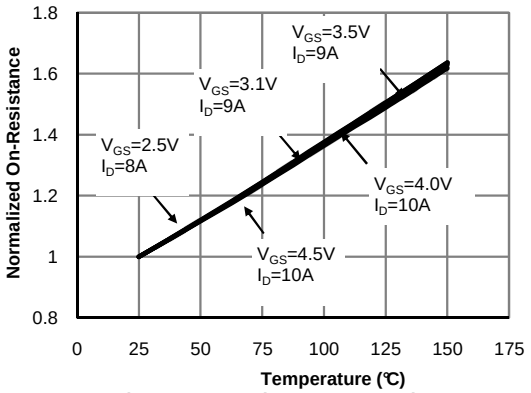


Figure 4: On-Resistance vs. Junction Temperature (Note E)

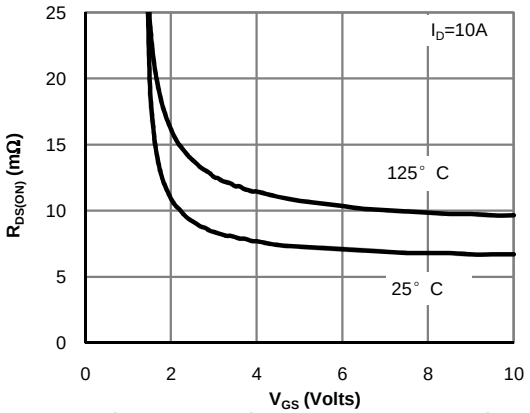


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

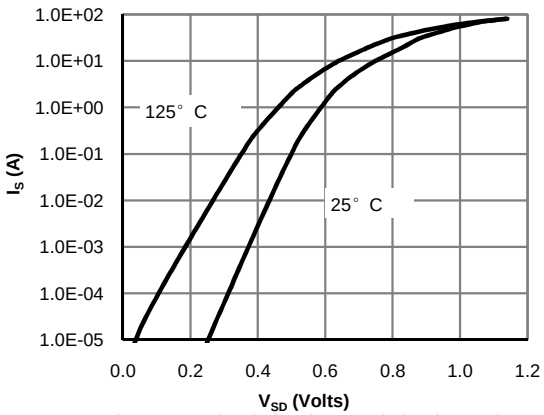


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

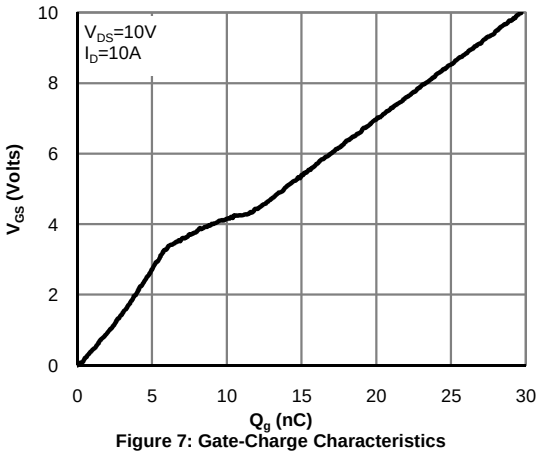


Figure 7: Gate-Charge Characteristics

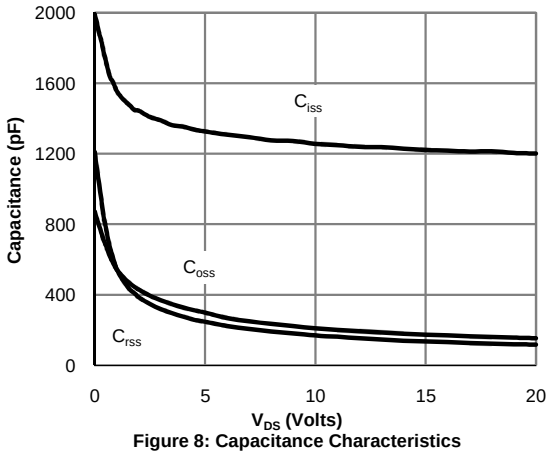


Figure 8: Capacitance Characteristics

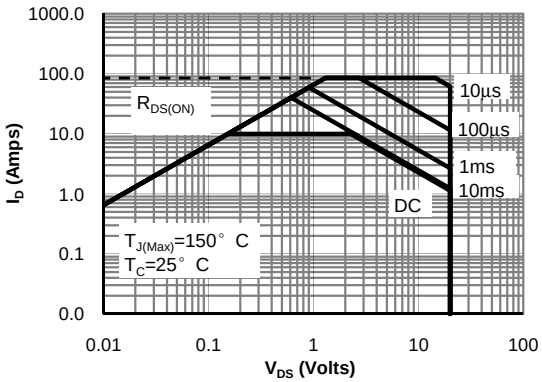


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

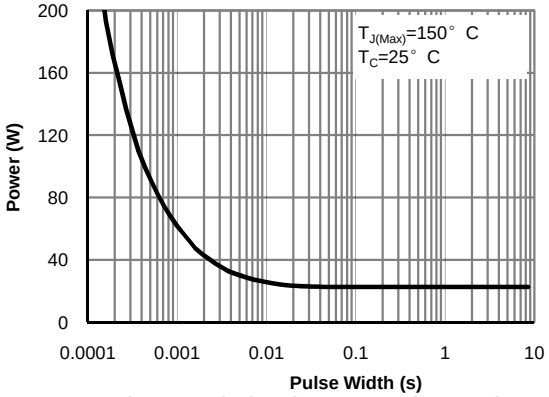


Figure 10: Single Pulse Power Rating Junction-to-Ca (Note F)

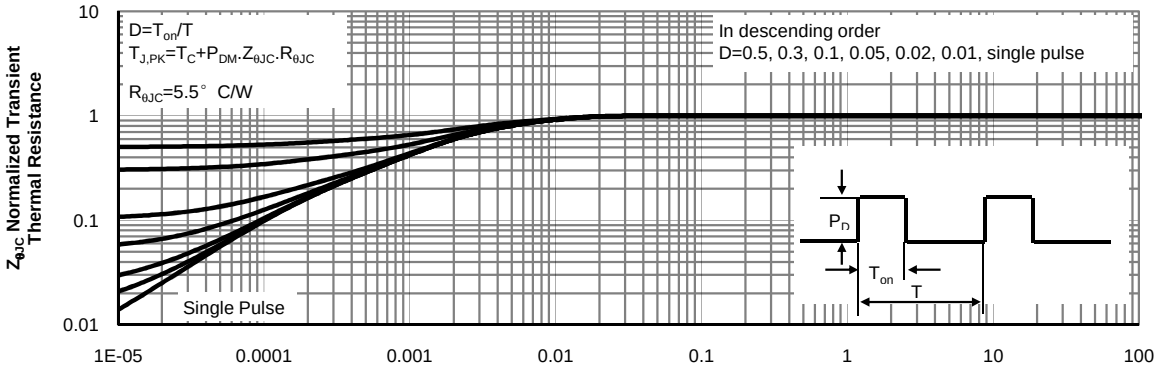


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

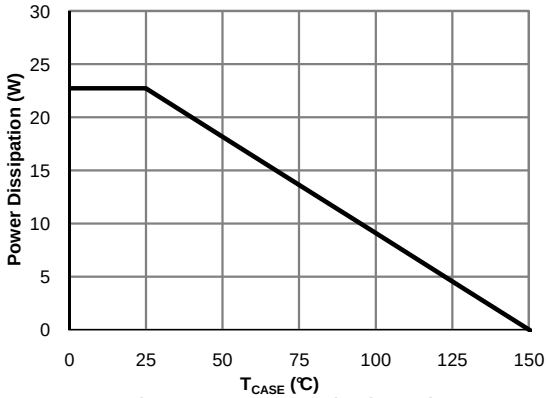


Figure 12: Power De-rating (Note F)

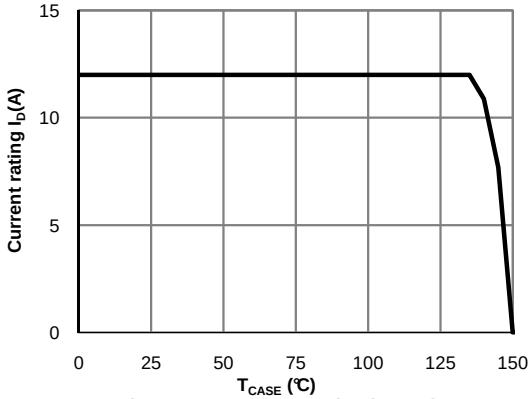


Figure 13: Current De-rating (Note F)

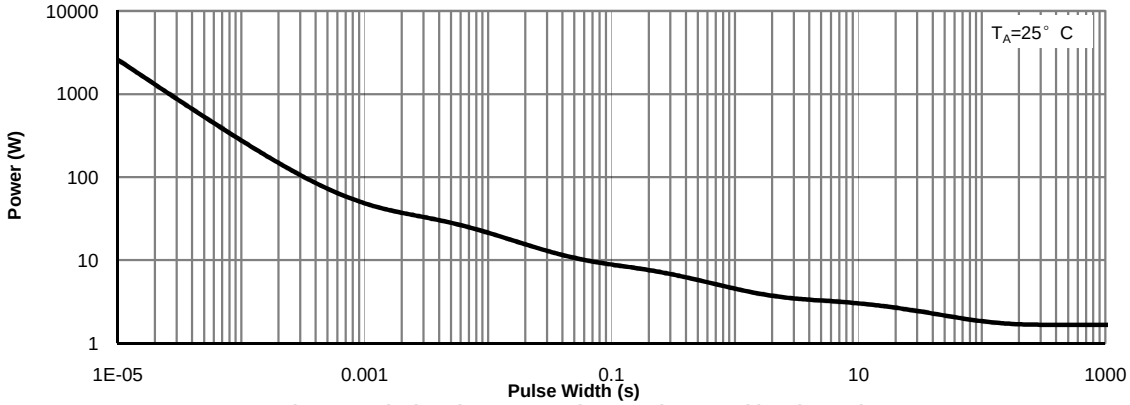


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note H)

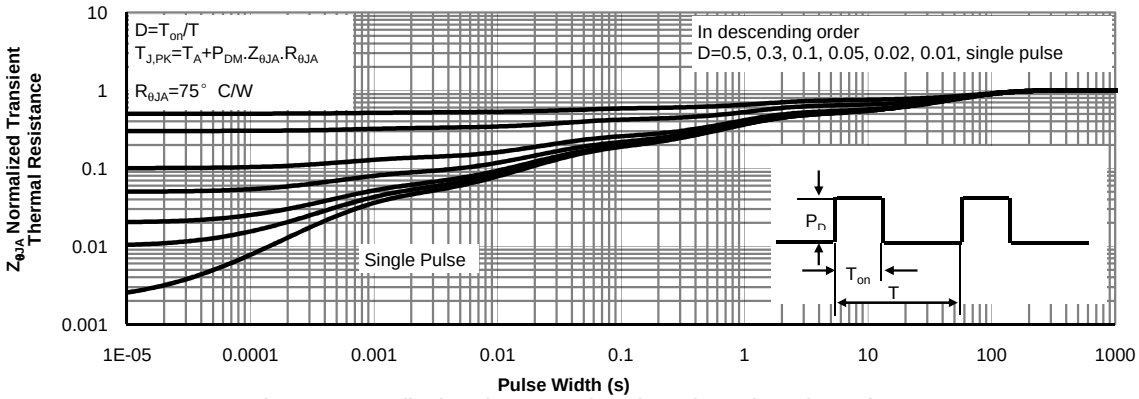
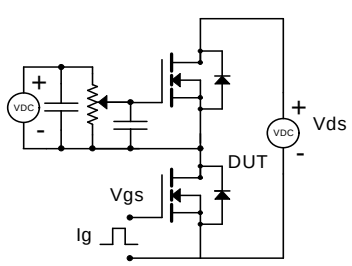
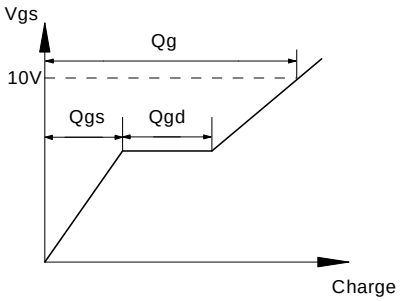


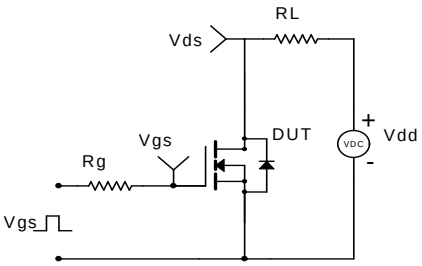
Figure 15: Normalized Maximum Transient Thermal Impedance (Note H)

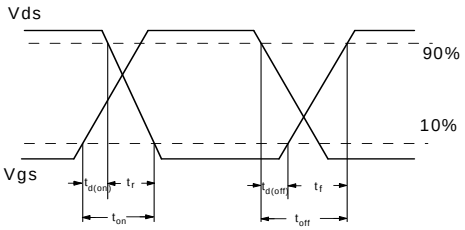
Gate Charge Test Circuit & Waveform





Resistive Switching Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms