ALPHA & OMEGA SEMICONDUCTOR

AON1610

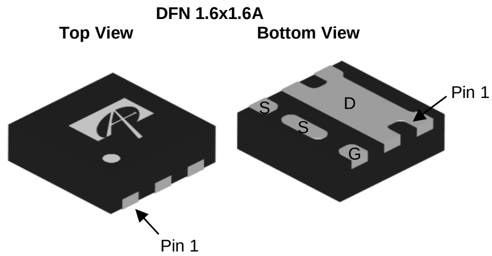
20V N-Channel MOSFET

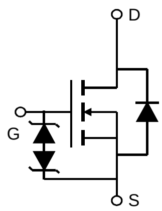
General Description

The AON1610 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}	20V
I_D (at V_{GS}=4.5V)	4A
$R_{DS(ON)}$ (at V_{GS} =4.5V)	< 29mΩ
$R_{DS(ON)}$ (at V_{GS} =2.5V)	< 34mΩ
$R_{DS(ON)}$ (at V_{GS} =1.8V)	< 44mΩ
$R_{DS(ON)}$ (at V_{GS} =1.5V)	< 60mΩ
Typical ESD protection	**HBM Class 2**





Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±8	V
Continuous Drain Current [G]	T_A=25℃	I_D	4	A
	T_A=70℃		3	
Pulsed Drain Current [C]		I_{DM}	16	
Power Dissipation [A]	T_A=25℃	P_D	1.8	W
	T_A=70℃		1.15	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	℃

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	56	70	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		88	110	℃/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}=±8V				±10	µA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250µA		0.4	0.75	1.1	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V		16			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=4A			23	29	mΩ
			T_J=125°C		31.5	38	
		V_{GS}=2.5V, I_D=3A			26.5	34	mΩ
		V_{GS}=1.8V, I_D=2A			33.5	44	mΩ
		V_{GS}=1.5V, I_D=1A			43.5		mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=4A			25		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V			0.67	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			748		pF
C_{oss}	Output Capacitance				96		pF
C_{rss}	Reverse Transfer Capacitance				67		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz			1.4		Ω
SWITCHING PARAMETERS							
$Q_{g(4.5V)}$	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=4A			7.5	14	nC
Q_{gs}	Gate Source Charge				1.5		nC
Q_{gd}	Gate Drain Charge				1.8		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=4.5V, V_{DS}=10V, R_L=2.5Ω, R_{GEN}=3Ω			4.5		ns
t_r	Turn-On Rise Time				15		ns
$t_{D(off)}$	Turn-Off DelayTime				27		ns
t_f	Turn-Off Fall Time				3		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=4A, dI/dt=100A/µs			8.5		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=4A, dI/dt=100A/µs			3		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in[2] 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 $_{\theta JA}$ t ≤ 10s 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 $T_{J(MAX)}$=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 in[2] FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

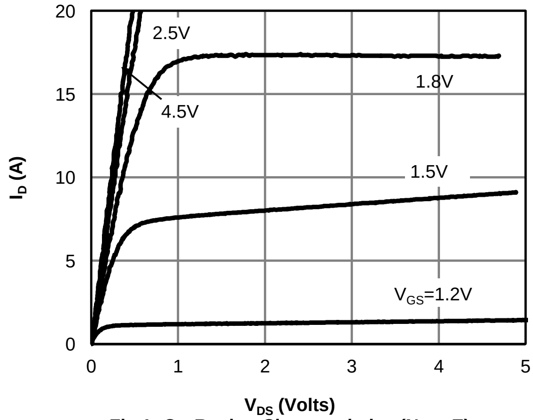


Fig 1: On-Region Characteristics (Note E)

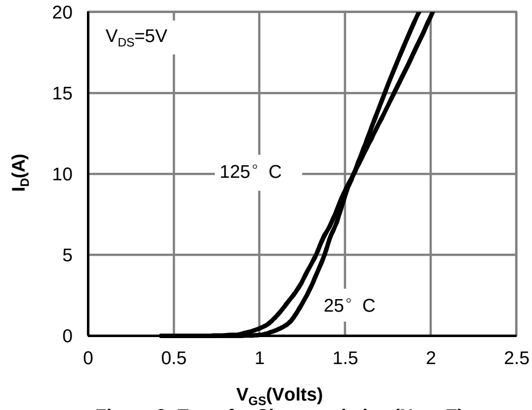


Figure 2: Transfer Characteristics (Note E)

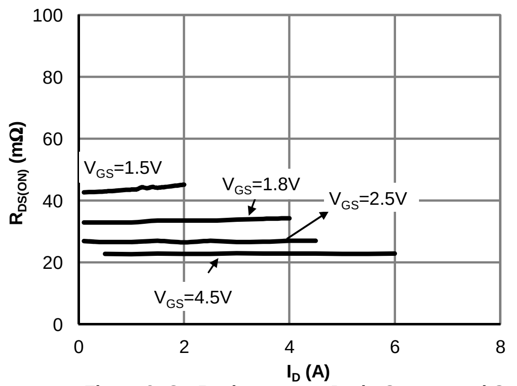


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

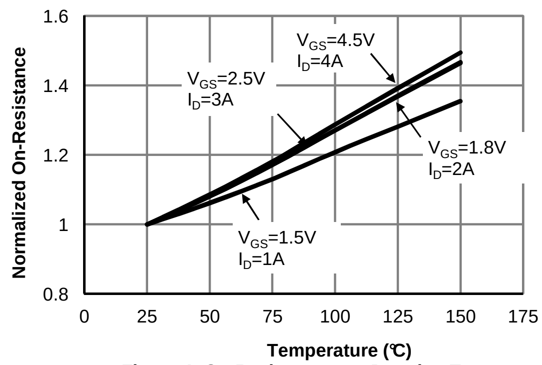


Figure 4: On-Resistance vs. Junction Temperature (Note E)

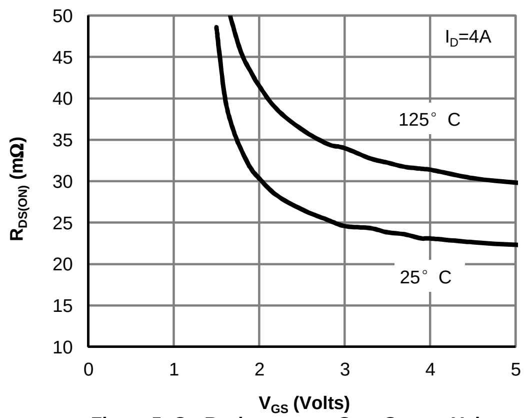


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

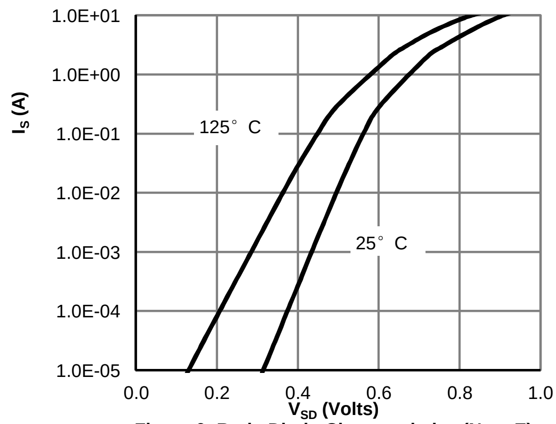


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

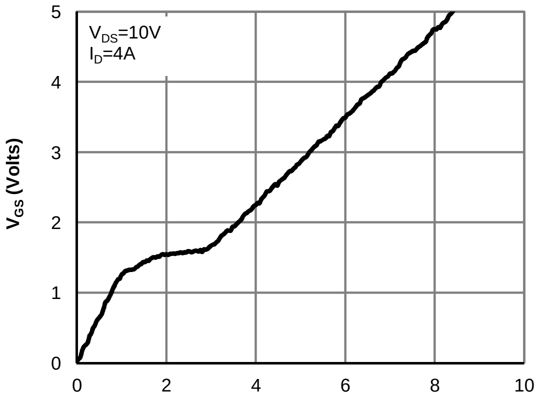


Figure 7: Gate-Charge Characteristics

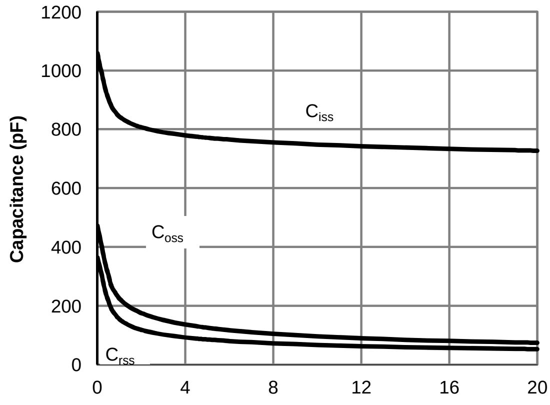
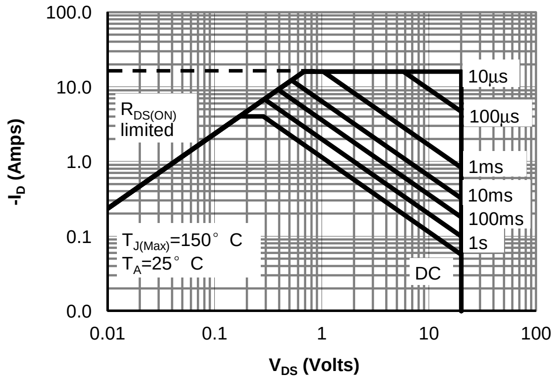


Figure 8: Capacitance Characteristics



VGS> or equal to 2.5V

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

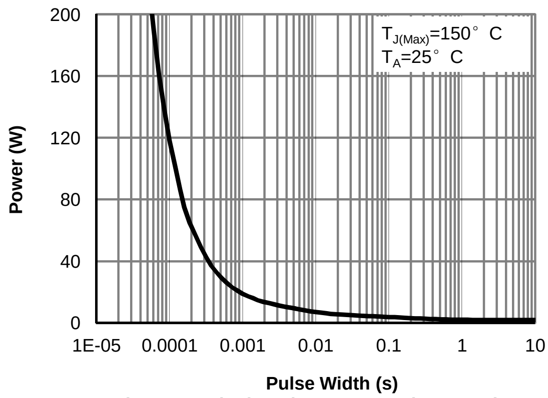


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note H)

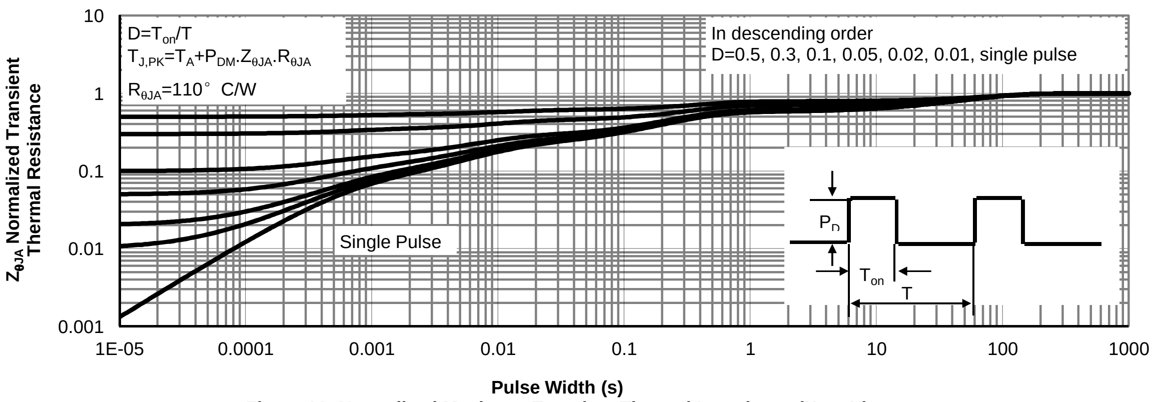
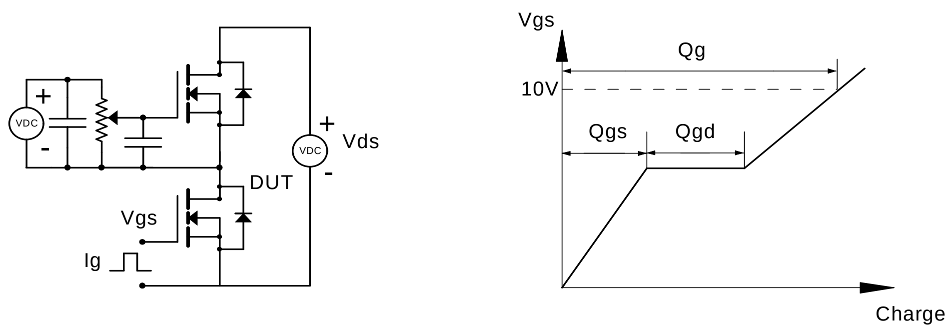
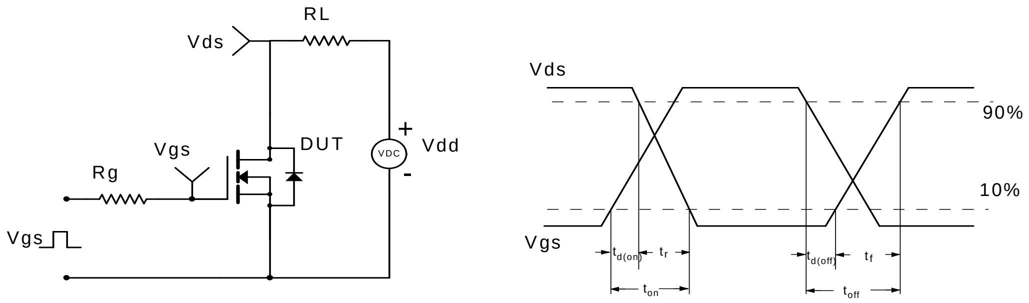


Figure 11: Normalized Maximum Transient Thermal Impedance (Note H)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms