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AON1610

20V N-Channel MOSFET

General Description

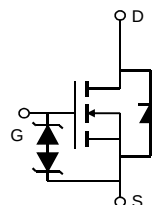
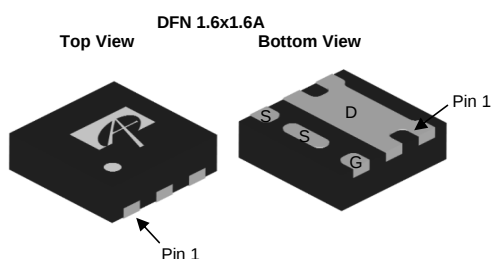
The AON1610 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

Product Summary

V_{DS}	20V
I_D (at $V_{GS}=4.5V$)	4A
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	< 29m Ω
$R_{DS(ON)}$ (at $V_{GS}=2.5V$)	< 34m Ω
$R_{DS(ON)}$ (at $V_{GS}=1.8V$)	< 44m Ω
$R_{DS(ON)}$ (at $V_{GS}=1.5V$)	< 60m Ω

Typical ESD protection

HBM Class 2



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}	± 8	V
Continuous Drain Current ^G	I_D	4	A
$T_A=25^\circ\text{C}$			
$T_A=70^\circ\text{C}$		3	
Pulsed Drain Current ^C	I_{DM}	16	
Power Dissipation ^A	P_D	1.8	W
$T_A=25^\circ\text{C}$			
$T_A=70^\circ\text{C}$		1.15	
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	$R_{\theta JA}$	56	70	$^\circ\text{C/W}$
$t \leq 10s$				
Maximum Junction-to-Ambient ^{A,D}		88	110	$^\circ\text{C/W}$
Steady-State				

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 T _J =55°C			1 5	μA
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 T _J =125°C		23 31.5	29 38	mΩ
		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_{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 Power dissipation P_{DSM} is based on R_{θJA} 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_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

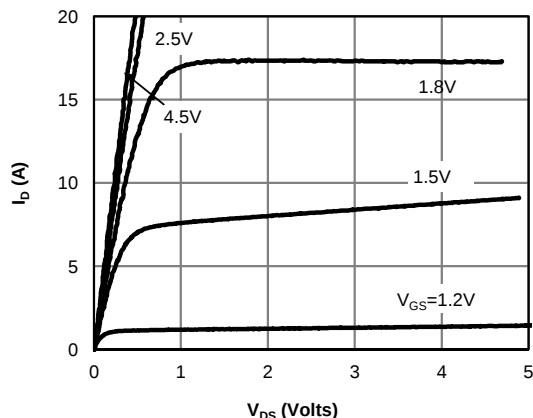


Fig 1: On-Region Characteristics (Note E)

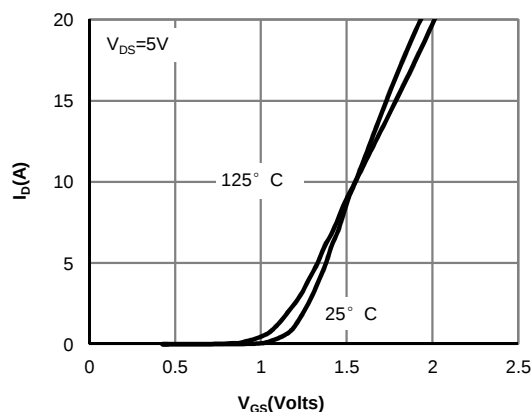


Figure 2: Transfer Characteristics (Note E)

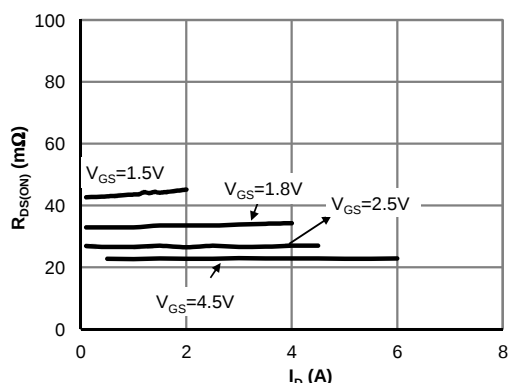


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

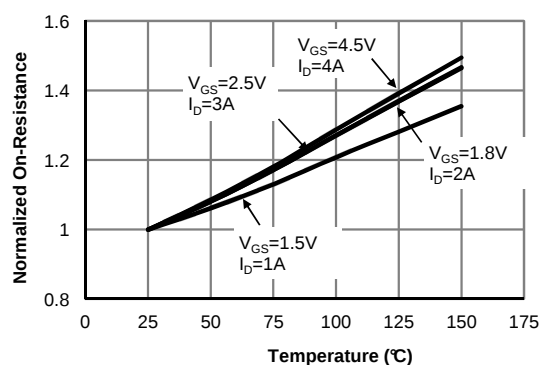


Figure 4: On-Resistance vs. Junction Temperature (Note E)

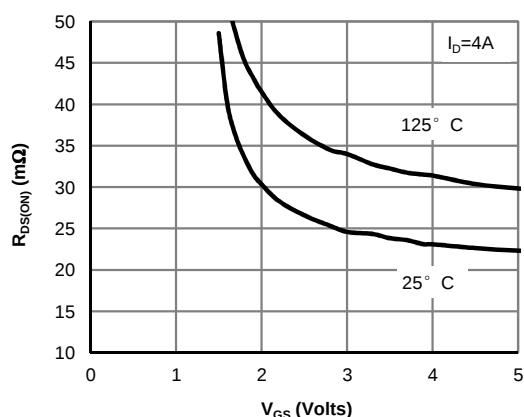


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

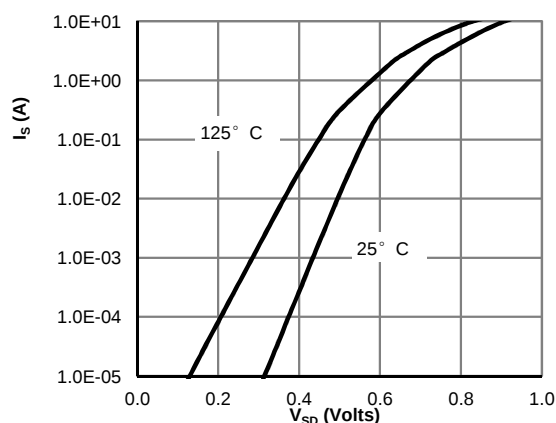


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

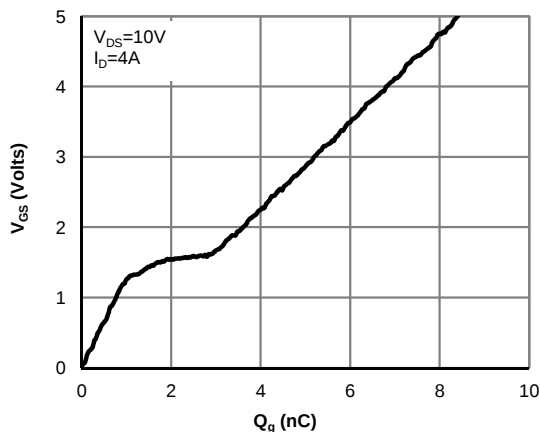


Figure 7: Gate-Charge Characteristics

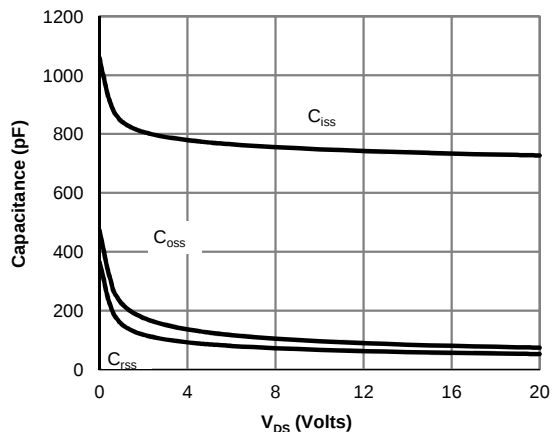


Figure 8: Capacitance Characteristics

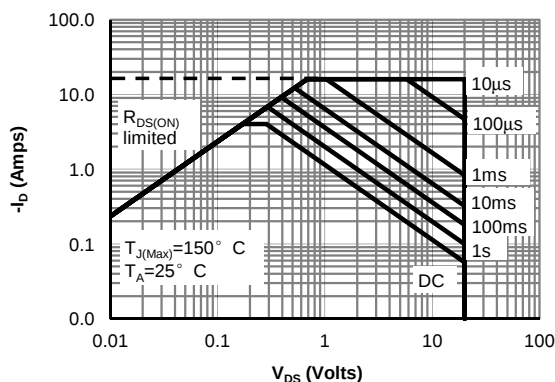


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

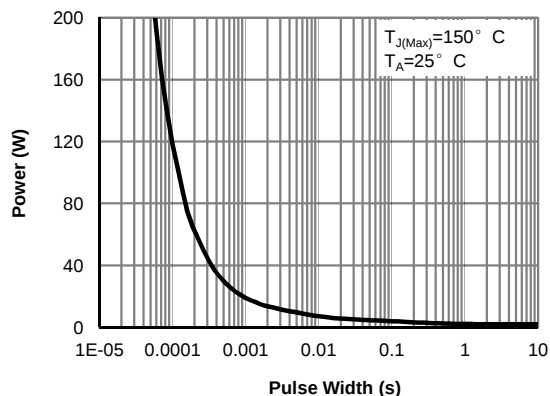


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note H)

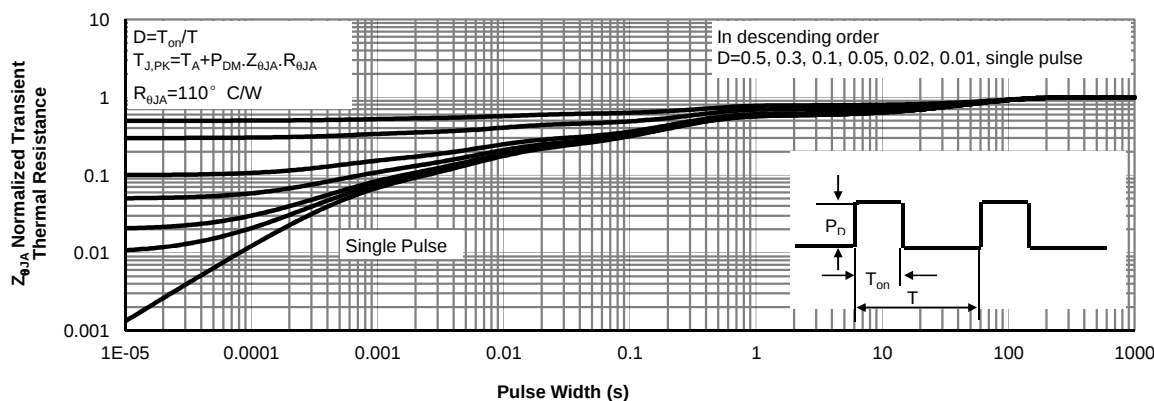
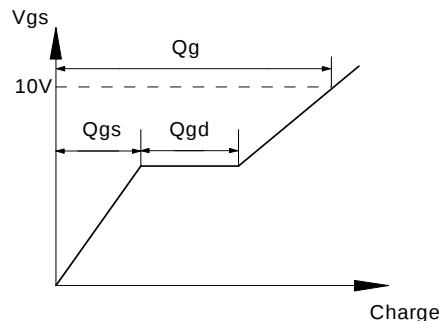
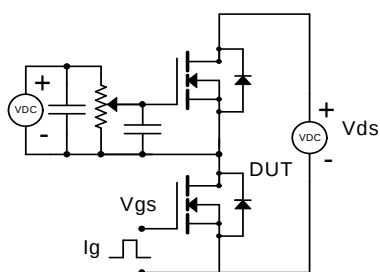
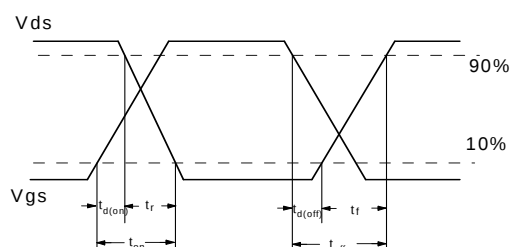
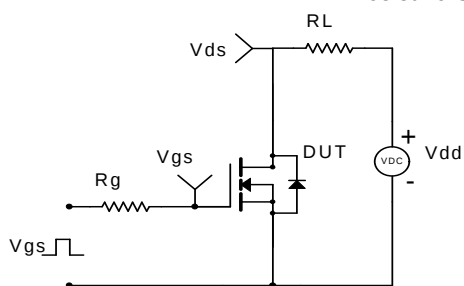


Figure 11: Normalized Maximum Transient Thermal Impedance (Note H)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

