ALPHA & OMEGA SEMICONDUCTOR

AON2411

12V P-Channel MOSFET

General Description

- Latest Trench Power MOSFET technology
- Very Low $R_{DS(ON)}$ at 1.8V V_{GS}
- Low Gate Charge
- ESD protection
- RoHS and Halogen-Free Compliant

Application

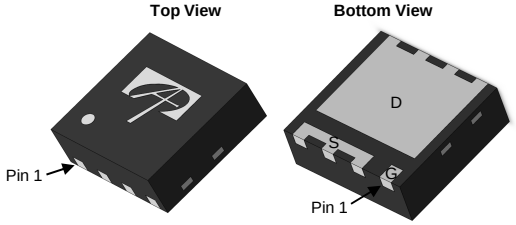
- Battery path load switch
- System load switch

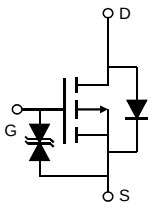
Product Summary

V_{DS}	-12V
I_D (at V_{GS}=-4.5V)	-20A
$R_{DS(ON)}$ (at V_{GS}=-4.5V)	< 8mΩ
$R_{DS(ON)}$ (at V_{GS}=-3.0V)	< 10.2mΩ
$R_{DS(ON)}$ (at V_{GS}=-2.5V)	< 11.6mΩ
$R_{DS(ON)}$ (at V_{GS}=-1.8V)	< 17.5mΩ
Typical ESD protection	**HBM Class 2**

Green Product

DFN 2x2C





Orderable Part Number	Package Type	Form	Minimum Order Quantity
AON2411	DFN 2x2C	Tape & Reel	3000

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	-12	V
Gate-Source Voltage		V_{GS}	±8	V
Continuous Drain Current [G]	T_A=25°C	I_D	-20	A
	T_A=70°C		-15.5	
Pulsed Drain Current [C]		I_{DM}	-80	
Power Dissipation [B]	T_A=25°C	P_D	5.0	W
	T_A=70°C		3.2	
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	$R_{\theta JA}$	20	25	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		45	55	°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	-12			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-12V, 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	-0.3	-0.6	-0.9	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-12A		6.6	8.0	mΩ
		T_J=125°C		8.6	10.4	
		V_{GS}=-3.0V, I_D=-11A		8.1	10.2	mΩ
		V_{GS}=-2.5V, I_D=-10A		9.2	11.6	mΩ
		V_{GS}=-1.8V, I_D=-8A		13.7	17.5	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-12A		60		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		-0.59	-1	V
I_S	Maximum Body-Diode Continuous Current				-7	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-6V, f=1MHz		2180		pF
C_{oss}	Output Capacitance			675		pF
C_{rss}	Reverse Transfer Capacitance			425		pF
R_g	Gate resistance	f=1MHz		13.5		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=-4.5V, V_{DS}=-6V, I_D=-12A		20	30	nC
Q_{gs}	Gate Source Charge			4		nC
Q_{gd}	Gate Drain Charge			5.5		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-4.5V, V_{DS}=-6V, R_L=0.5Ω, R_{GEN}=3Ω		15		ns
t_r	Turn-On Rise Time			45		ns
$t_{D(off)}$	Turn-Off DelayTime			135		ns
t_f	Turn-Off Fall Time			185		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-12A, dI/dt=100A/µs		28		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-12A, dI/dt=100A/µs		13		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 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 initialT_J=25° C.
D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ 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

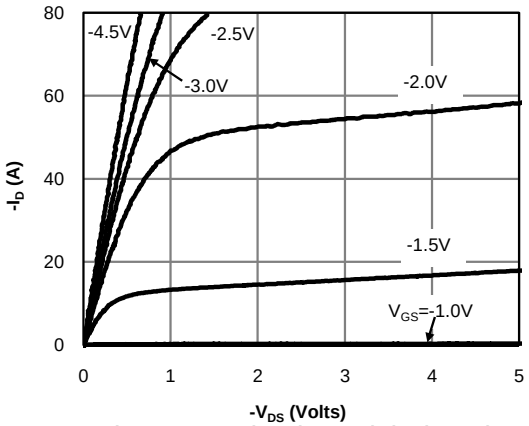


Figure 1: On-Region Characteristics (Note E)

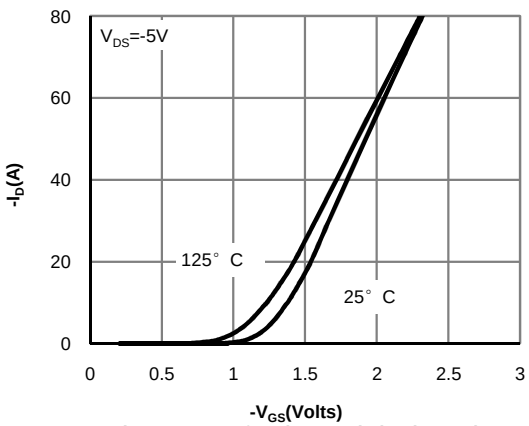


Figure 2: Transfer Characteristics (Note E)

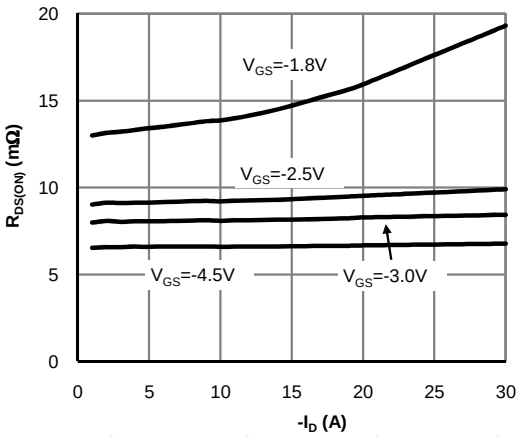


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

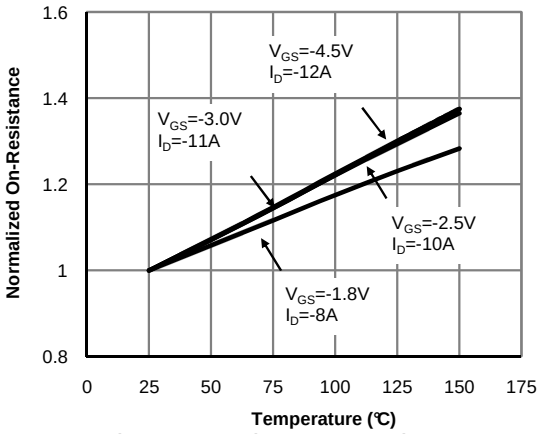


Figure 4: On-Resistance vs. Junction Temperature (Note E)

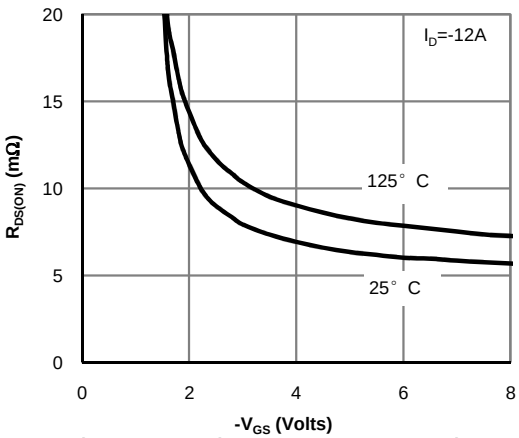


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

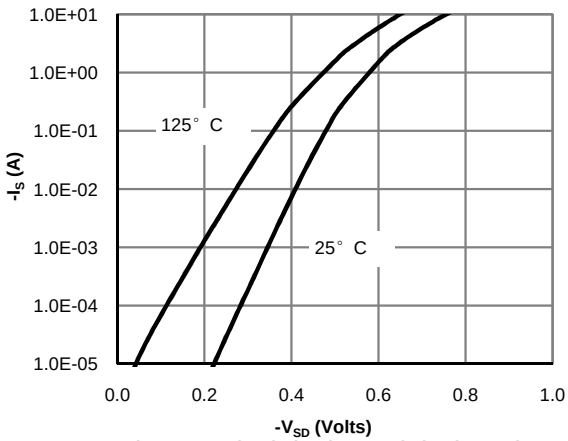


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

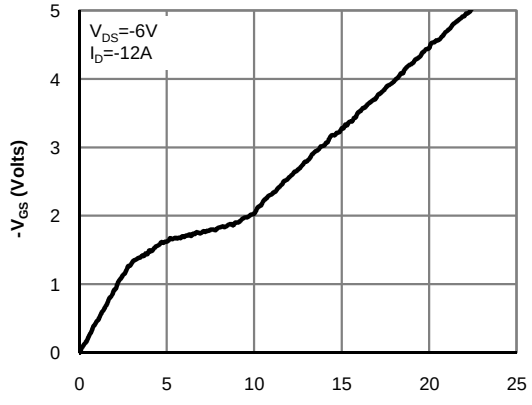


Figure 7: Gate-Charge Characteristics

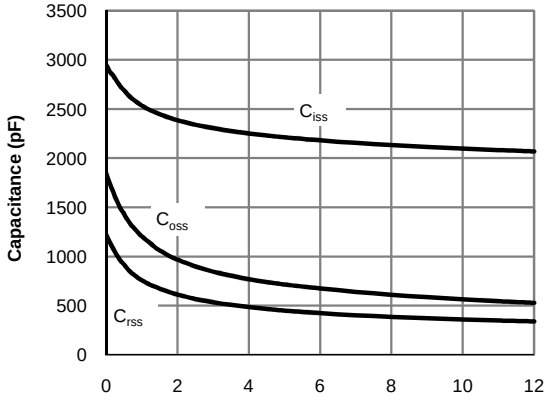
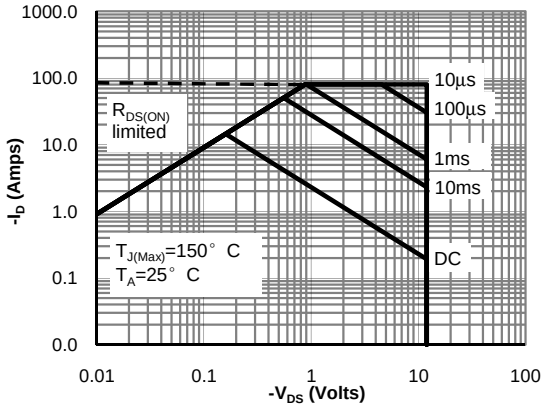


Figure 8: Capacitance Characteristics



V_{GS}> or equal to 1.8V

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

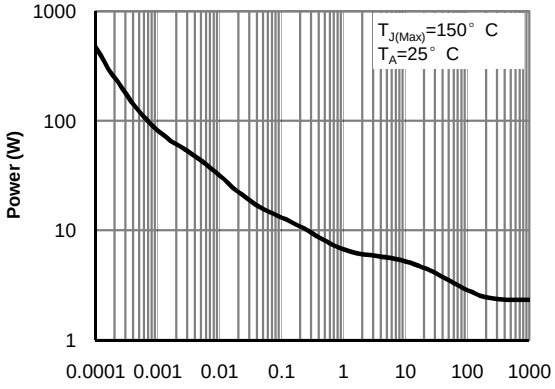


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

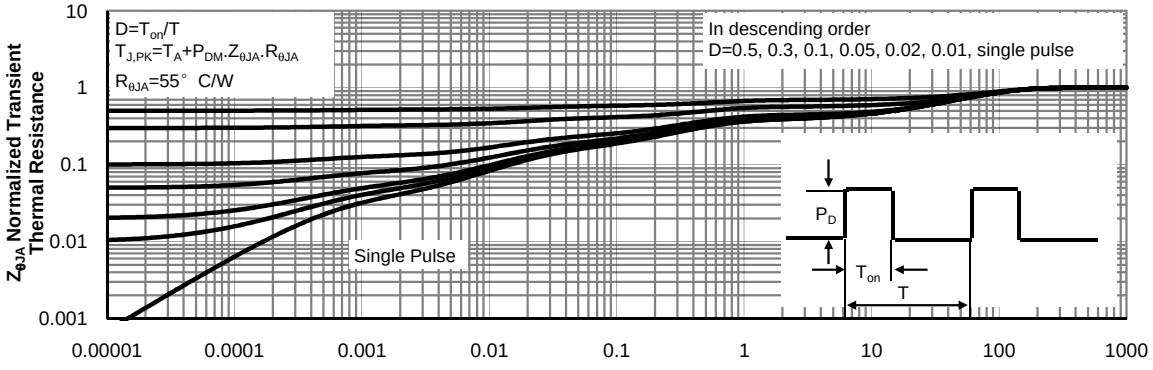
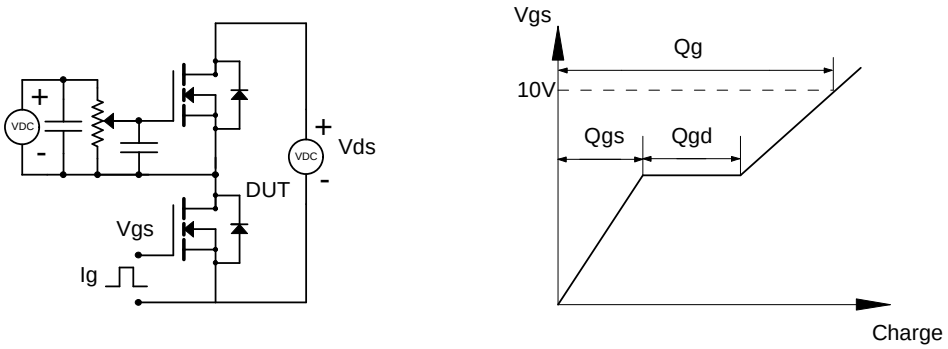
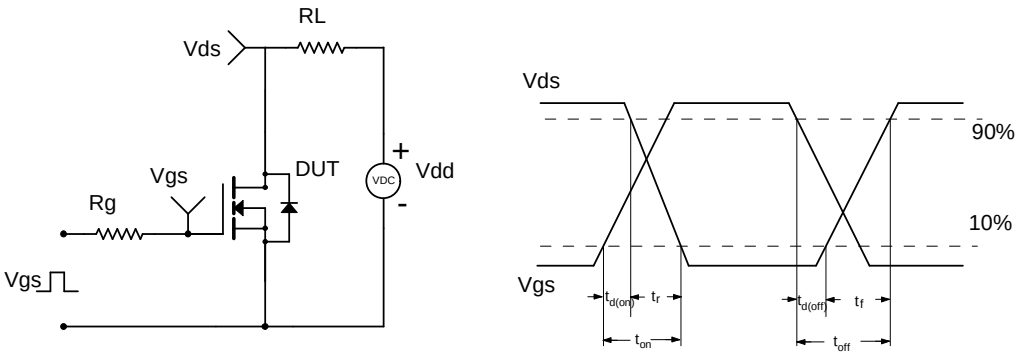


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

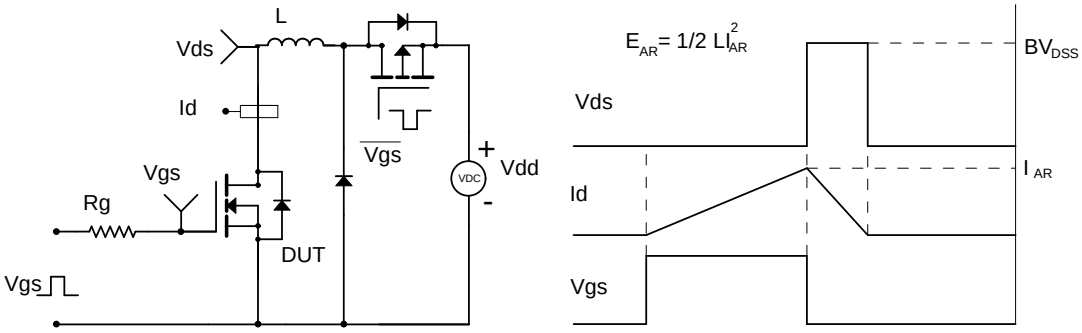
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms