ALPHA & OMEGA SEMICONDUCTOR, LTD

Green Product

AON4407
12V P-Channel MOSFET

General Description

The AON4407 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch.

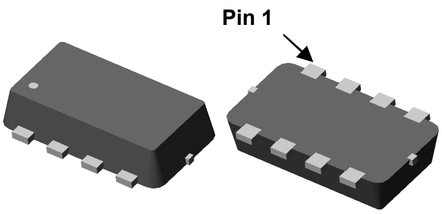
Features

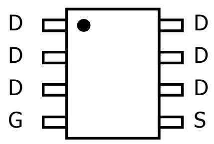
V_{DS} (V) = -12V
I_D = -9 A (V$_{GS}$ = -4.5V)
$R_{DS(ON)}$ < 20mΩ (V_{GS} = -4.5V)
$R_{DS(ON)}$ < 25mΩ (V_{GS} = -2.5V)
$R_{DS(ON)}$ < 31mΩ (V_{GS} = -1.8V)

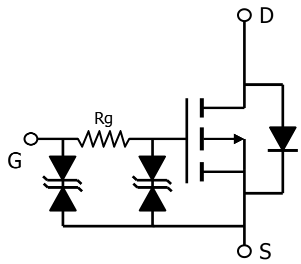
ESD Protected

DFN 3x2

Top View Bottom View







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	T_A=25°C	I_D	-9	A
	T_A=70°C		-7	
Pulsed Drain Current [C]		I_{DM}	-60	
Power Dissipation [B]	T_A=25°C	P_D	2.5	W
	T_A=70°C		1.6	
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	$R_{\theta JA}$	42	50	°C/W
Maximum Junction-to-Ambient [A D]	Steady State		74	90	°C/W
Maximum Junction-to-Lead	Steady State	$R_{\theta JL}$	25	30	°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	-0.35	-0.5	-0.85	V
$I_{D(ON)}$	On state drain current	V_{GS}=-4.5V, V_{DS}=-5V	-60			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-9A		16.5	20	mΩ
		T_J=125°C		22	26	
		V_{GS}=-2.5V, I_D=-8.5A		20	25	mΩ
		V_{GS}=-1.8V, I_D=-7.5A		24	31	mΩ
		V_{GS}=-1.5V, I_D=-7A		29	38	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-9A		45		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V		-0.53	-1	V
I_S	Maximum Body-Diode Continuous Current				-2.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-6V, f=1MHz		1740	2100	pF
C_{oss}	Output Capacitance			334		pF
C_{rss}	Reverse Transfer Capacitance			200		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		1.3	1.7	kΩ
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=-4.5V, V_{DS}=-6V, I_D=-9A		19	23	nC
Q_{gs}	Gate Source Charge			4.5		nC
Q_{gd}	Gate Drain Charge			5.3		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-4.5V, V_{DS}=-6V, R_L=0.67Ω, R_{GEN}=3Ω		240		ns
t_r	Turn-On Rise Time			580		ns
$t_{D(off)}$	Turn-Off DelayTime			7		µs
t_f	Turn-Off Fall Time			4.2		µs
t_{rr}	Body Diode Reverse Recovery Time	I_F=-9A, dI/dt=100A/µs		22	27	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-9A, dI/dt=100A/µs		17		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 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 $R_{\theta JA}$ is the sum of the thermal impedence 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 impedence which is measured with the device mounted on 1in^2 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.
Rev 1: June 2009

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

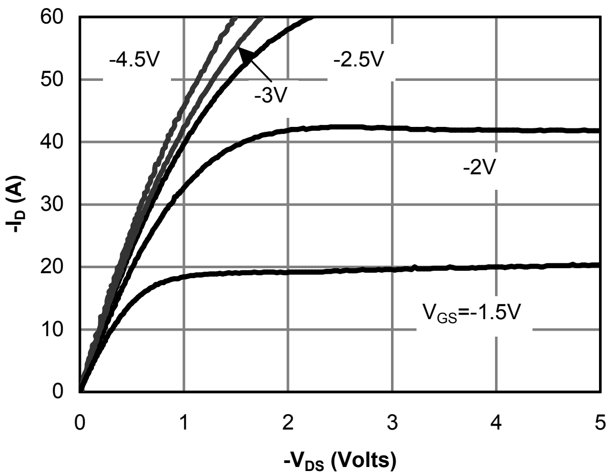


Figure 1: On-Region Characteristics(Note E)

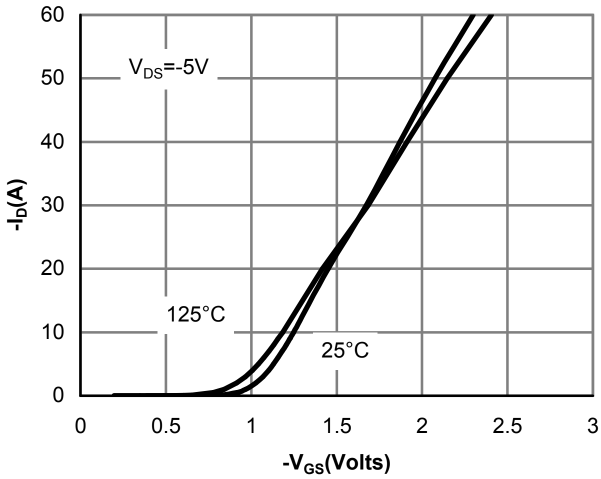


Figure 2: Transfer Characteristics(Note E)

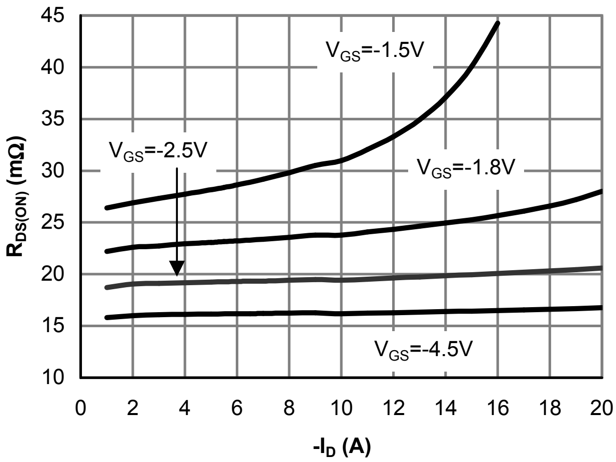


Figure 3: On-Resistance vs. Drain Current and Gate Voltage(Note E)

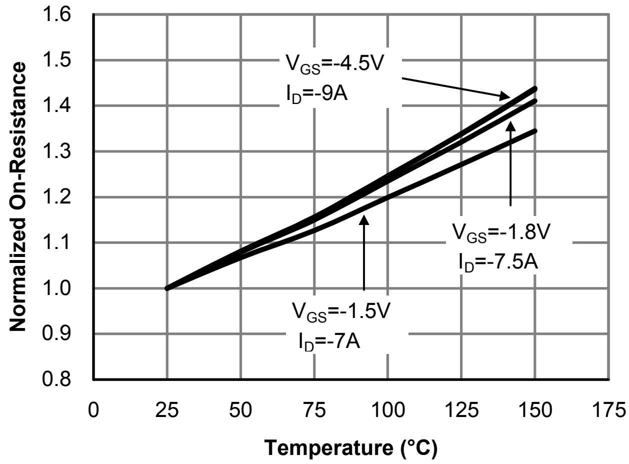


Figure 4: On-Resistance vs. Junction Temperature(Note E)

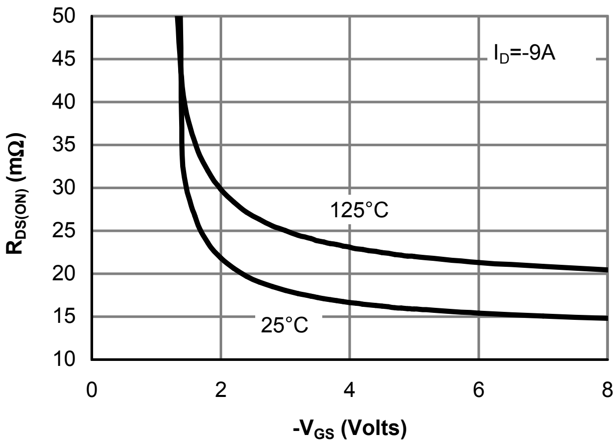


Figure 5: On-Resistance vs. Gate-Source Voltage(Note E)

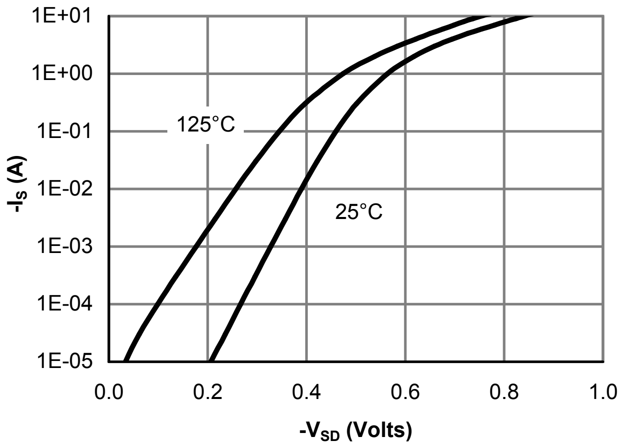


Figure 6: Body-Diode Characteristics(Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

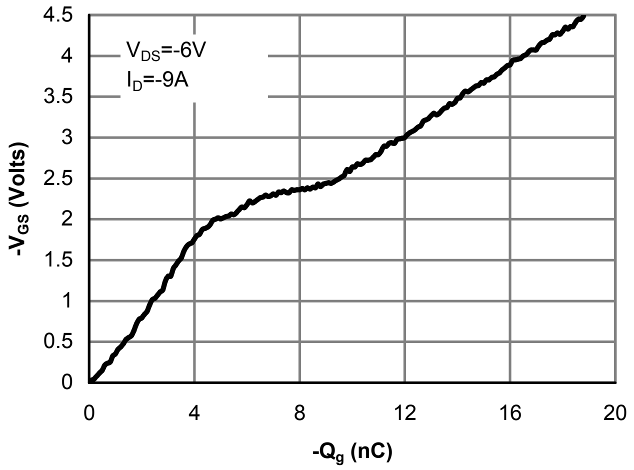


Figure 7: Gate-Charge Characteristics

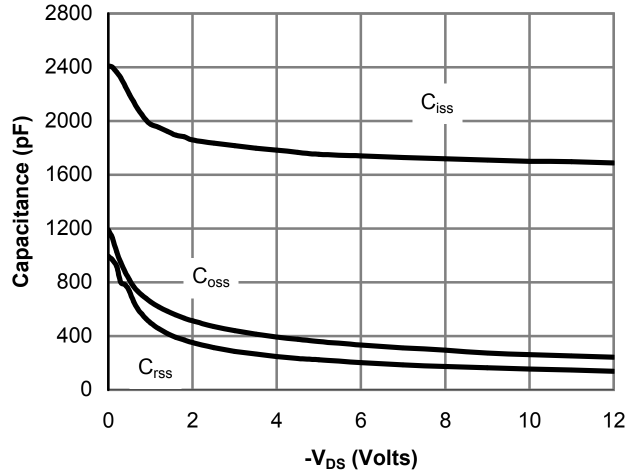


Figure 8: Capacitance Characteristics

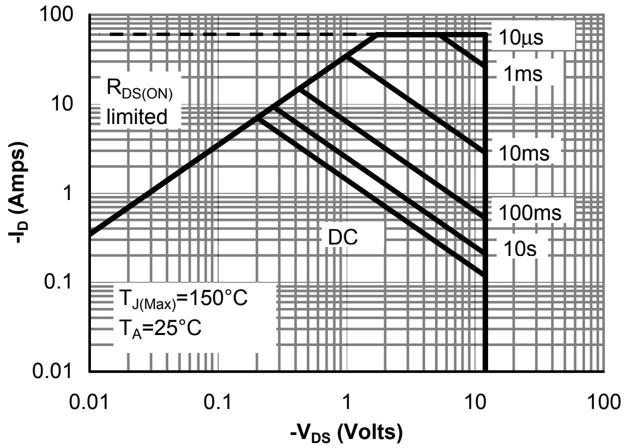


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

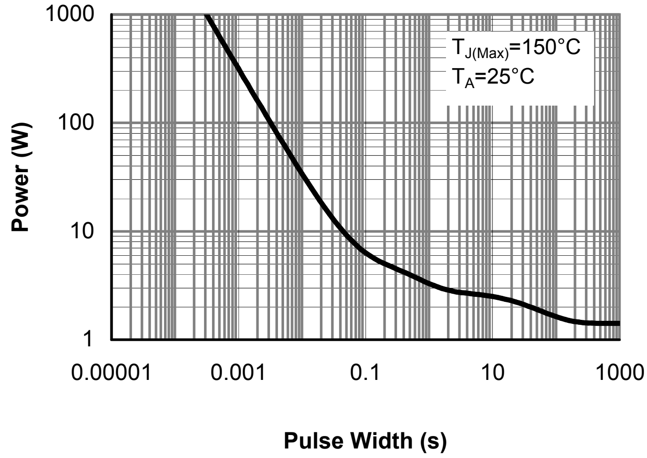


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

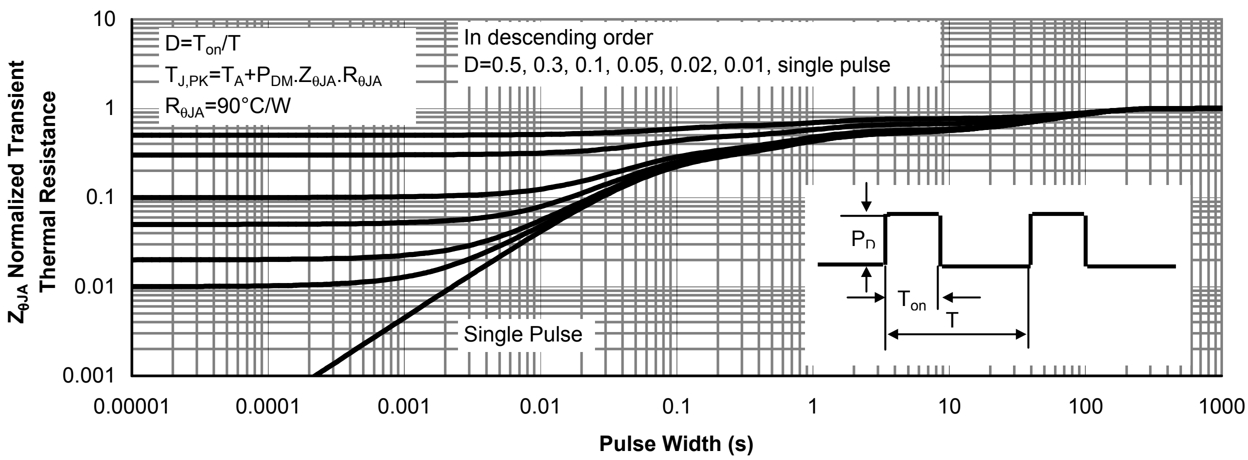
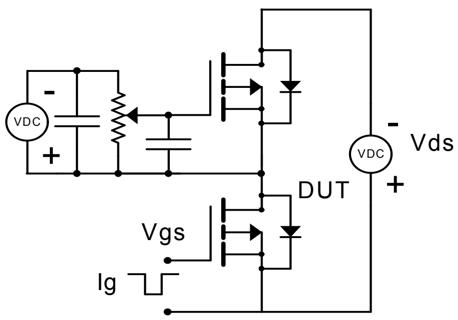
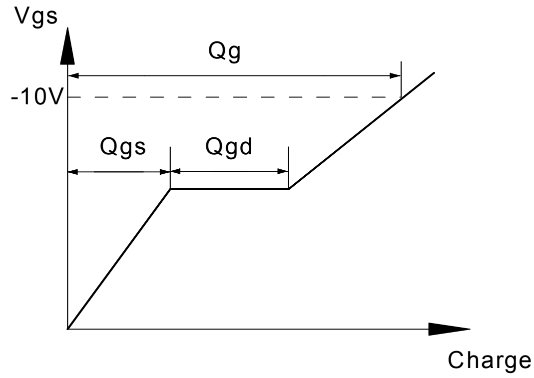


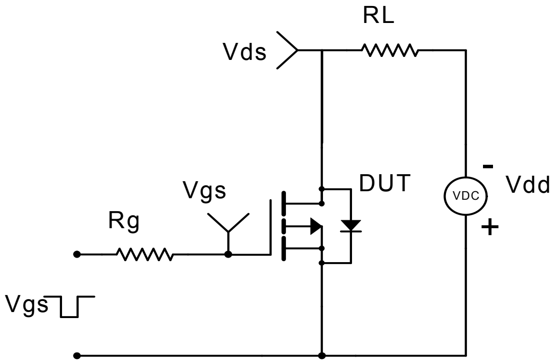
Figure 11: Normalized Maximum Transient Thermal Impedance(Note F)

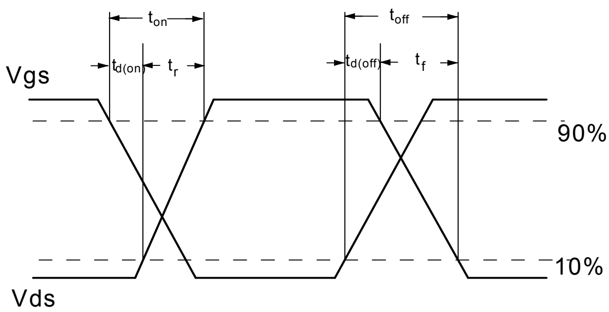
Gate Charge Test Circuit & Waveform



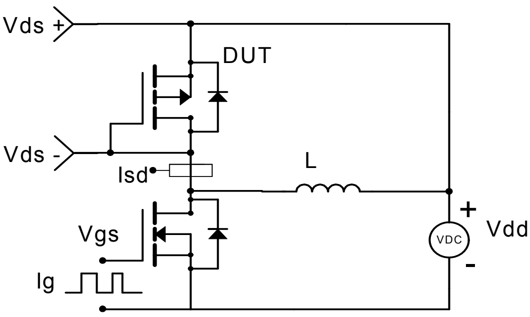


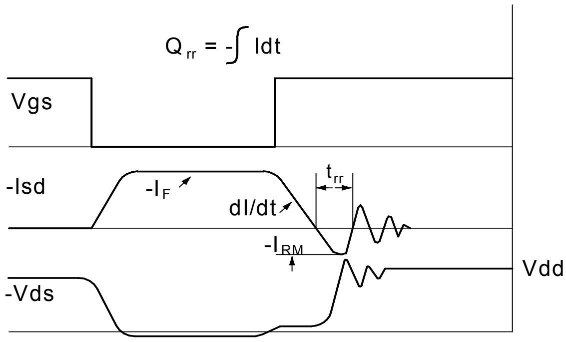
Resistive Switching Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms





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