ALPHA & OMEGA SEMICONDUCTOR, LTD

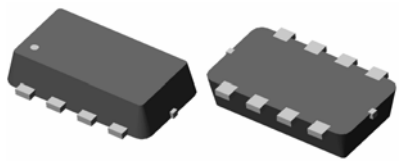
AON4413
P-Channel Enhancement Mode Field Effect Transistor

General Description

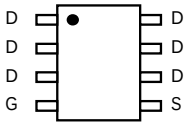
The AON4413 uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use as a load switch or in PWM applications. *Standard product AON4413 is Pb-free (meets ROHS & Sony 259 specifications).*

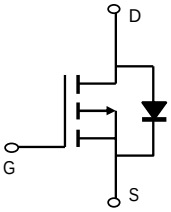
Features

V_{DS} (V) = -30V
I_D = -6.5A (V_{GS} = -10V)
$R_{DS(ON)}$ < 46mΩ (V_{GS} = -10V)
$R_{DS(ON)}$ < 60mΩ (V_{GS} = -6V)



DFN 3x2





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	10 Sec	Steady State	Units
Drain-Source Voltage		V_{DS}	-30		V
Gate-Source Voltage		V_{GS}	±20		V
Continuous Drain Current [A]	T_A=25°C	I_D	-6.5	-4.7	A
	T_A=70°C		-5.3	-3.7	
Pulsed Drain Current [B]		I_{DM}	-25		
Power Dissipation [A]	T_A=25°C	P_D	3.1	1.6	W
	T_A=70°C		2.0	1.0	
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	$R_{\theta JA}$	34	40	°C/W
Maximum Junction-to-Ambient [A]	Steady State		66	80	°C/W
Maximum Junction-to-Lead [C]	Steady State	$R_{\theta JL}$	20	25	°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	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -30V, V_{GS} = 0V			-1	µA
		T_J = 55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} I_D = -250µA	-1.5	-2	-2.5	V
$I_{D(ON)}$	On state drain current	V_{GS} = -10V, V_{DS} = -5V	-25			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = -10V, I_D = -6.5A		38	46	mΩ
		T_J=125°C		54	65	
		V_{GS} = -6V, I_D = -5.3A		48	60	mΩ
g_{FS}	Forward Transconductance	V_{DS} = -5V, I_D = -6.5A		11		S
V_{SD}	Diode Forward Voltage	I_S = -1A,V_{GS} = 0V		0.77	-1	V
I_S	Maximum Body-Diode Continuous Current				-3	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz		668	830	pF
C_{oss}	Output Capacitance			126		pF
C_{rss}	Reverse Transfer Capacitance			92		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		6	9	Ω
SWITCHING PARAMETERS						
Q_g (10V)	Total Gate Charge (10V)	V_{GS}=-10V, V_{DS}=-15V, I_D=-6.5A		12.7	17	nC
Q_g (4.5V)	Total Gate Charge (4.5V)			6.4	8.5	nC
Q_{gs}	Gate Source Charge			2		nC
Q_{gd}	Gate Drain Charge			4		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=2.3Ω, R_{GEN}=3Ω		7.7		ns
t_r	Turn-On Rise Time			6.8		ns
$t_{D(off)}$	Turn-Off DelayTime			20		ns
t_f	Turn-Off Fall Time			10		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-6.5A, dI/dt=100A/µs		22	30	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-6.5A, dI/dt=100A/µs		15		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 a given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

D. The static characteristics in Figures 1 to 6 are obtained using < 300 µs pulses, duty cycle 0.5% max.

E. 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. The SOA curve provides a single pulse rating.

Rev1: June 2007

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

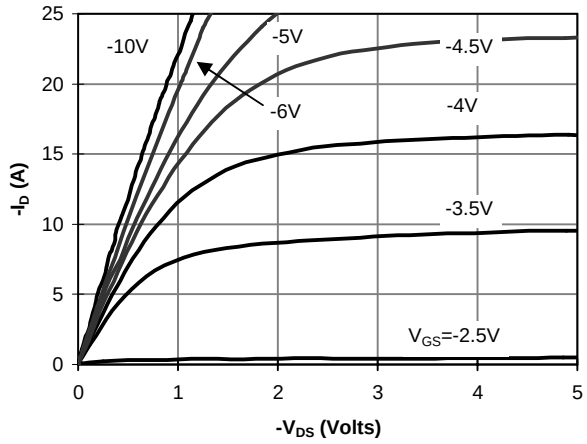


Figure 1: On-Region Characteristics

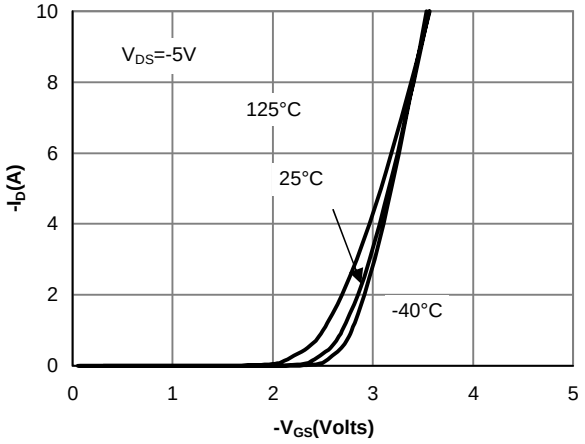


Figure 2: Transfer Characteristics

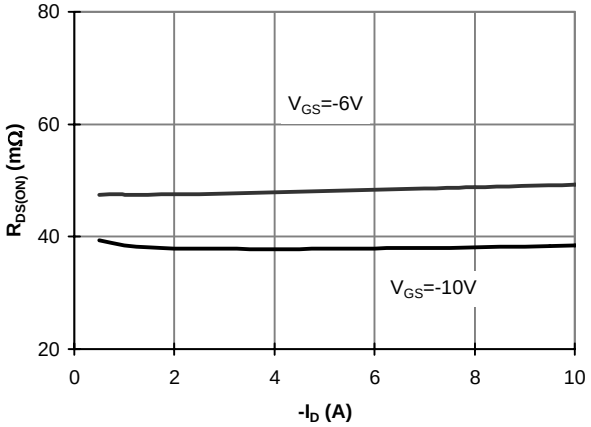


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

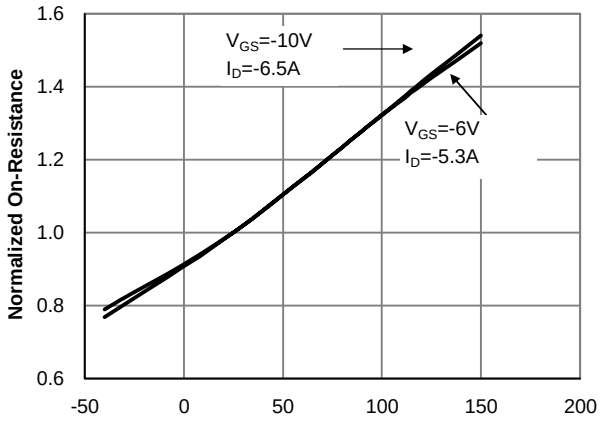


Figure 4: On-Resistance vs. Junction Temperature

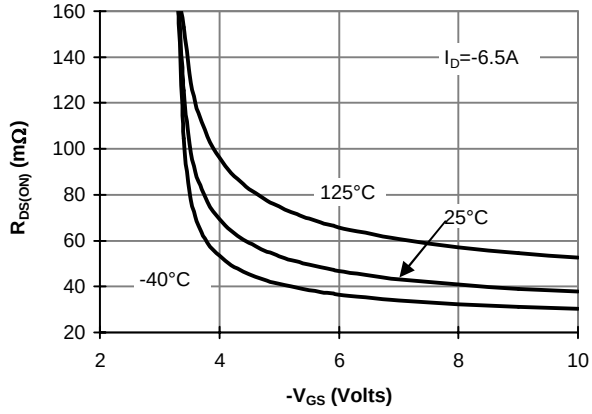


Figure 5: On-Resistance vs. Gate-Source Voltage

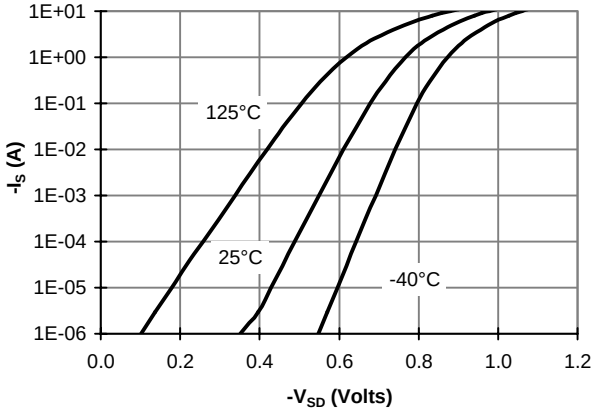


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

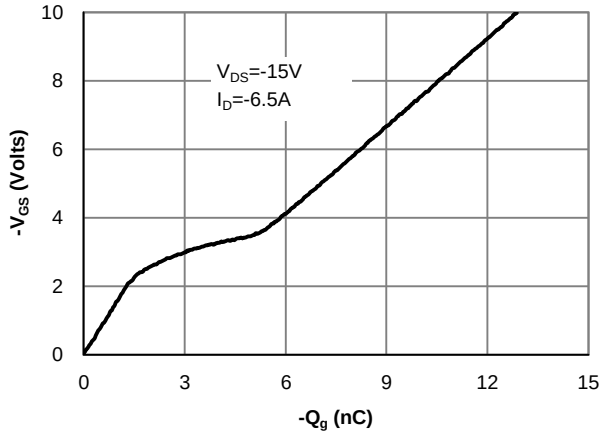


Figure 7: Gate-Charge Characteristics

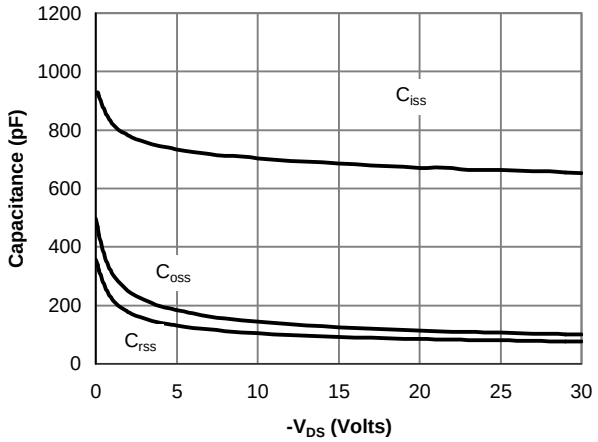


Figure 8: Capacitance Characteristics

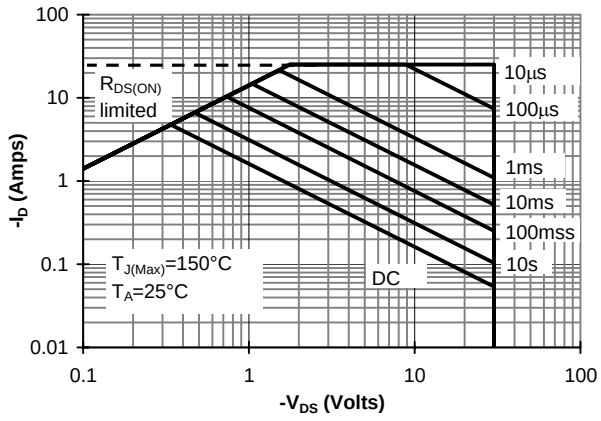


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

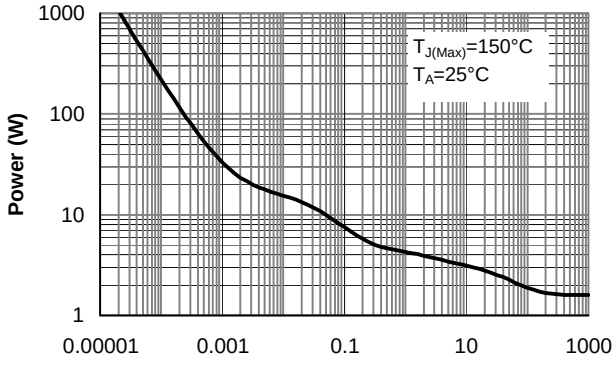


Figure 10: Single Pulse Power Rating Junction-to Ambient (Note E)

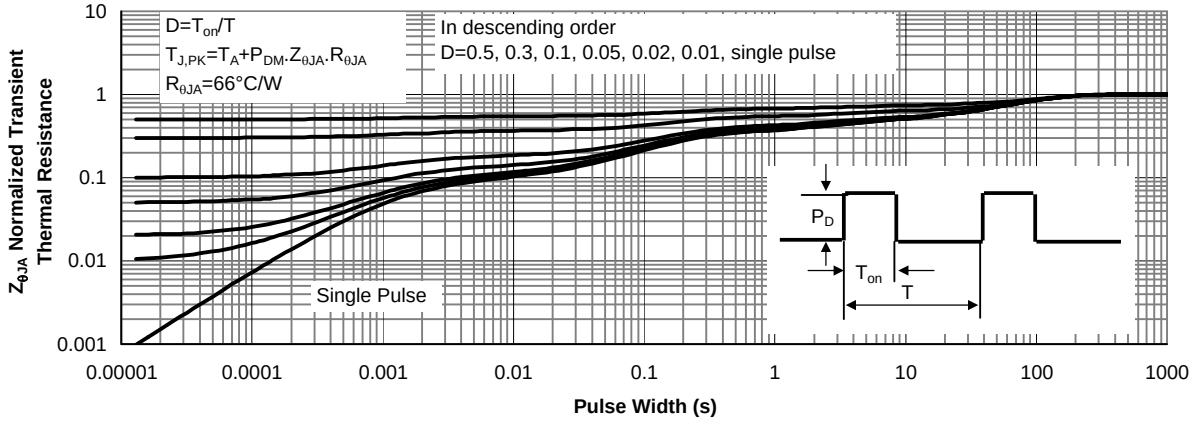


Figure 11: Normalized Maximum Transient Thermal Impedance(Note E)