



ALPHA & OMEGA
SEMICONDUCTOR, LTD

AON4413

P-Channel Enhancement Mode Field Effect Transistor

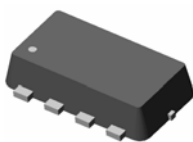


General Description

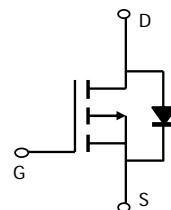
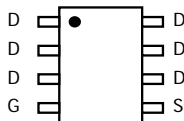
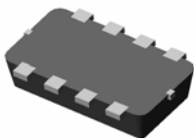
The AON4413 uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use as a load switch or in PWM applications. *Standard product AON4413 is Pb-free (meets ROHS & Sony 259 specifications).*

Features

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



DFN 3x2



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ 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	I_D	-6.5	-4.7	A
$T_A=25^\circ\text{C}$				
$T_A=70^\circ\text{C}$		-5.3	-3.7	
Pulsed Drain Current ^B	I_{DM}	-25		
Power Dissipation ^A	P_D	3.1	1.6	W
$T_A=25^\circ\text{C}$				
$T_A=70^\circ\text{C}$		2.0	1.0	
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	$R_{\theta JA}$	34	40	$^\circ\text{C/W}$
$t \leq 10\text{s}$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	66	80	$^\circ\text{C/W}$
Steady State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	20	25	$^\circ\text{C/W}$
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	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -30V, V _{GS} = 0V T _J = 55°C			-1 -5	μA
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 Delay Time	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 Delay Time			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_{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 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_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} 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 in² 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

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

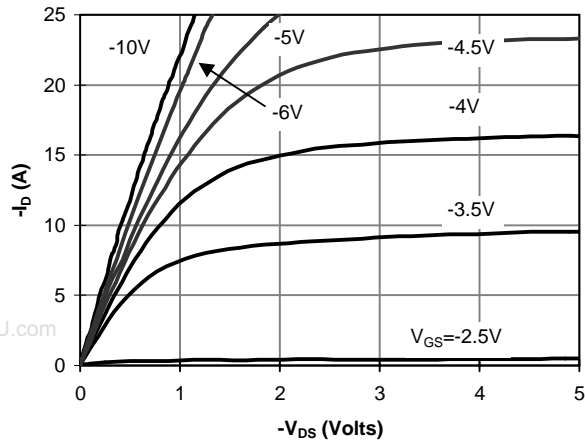


Figure 1: On-Region Characteristics

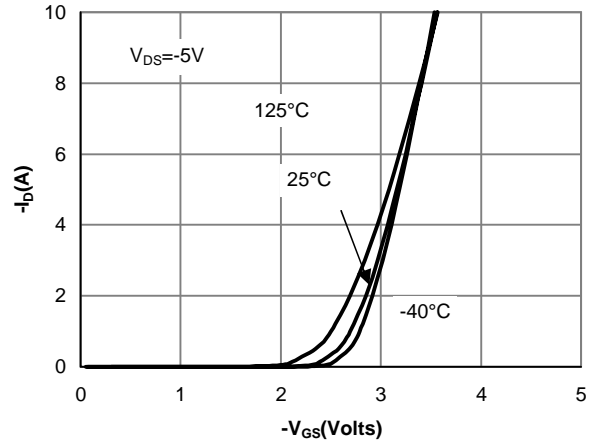


Figure 2: Transfer Characteristics

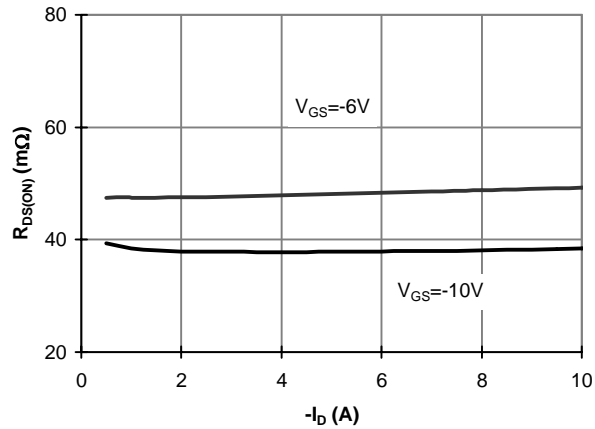


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

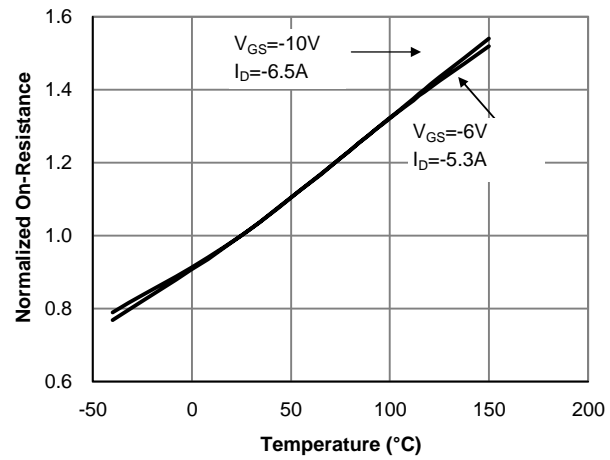


Figure 4: On-Resistance vs. Junction Temperature

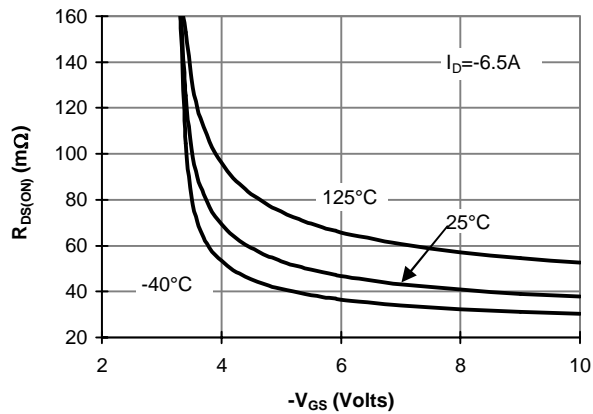


Figure 5: On-Resistance vs. Gate-Source Voltage

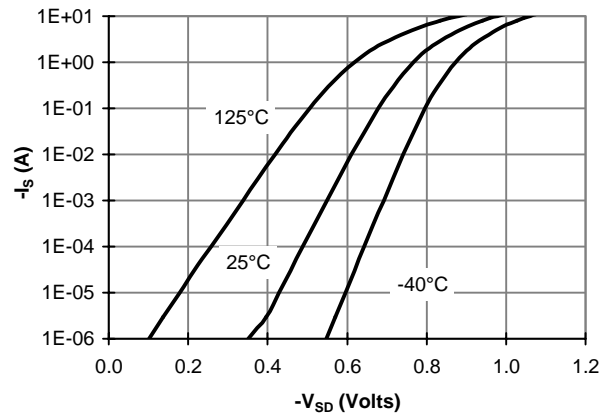


Figure 6: Body-Diode Characteristics

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