



## AO4411

### P-Channel Enhancement Mode Field Effect Transistor

#### General Description

The AO4411 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , and ultra-low low gate charge. This device is suitable for use as a load switch or in PWM applications.

#### Features

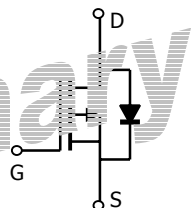
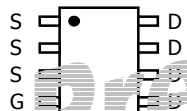
$$V_{DS} (V) = -30V$$

$$I_D = -7.5 A$$

$$R_{DS(ON)} < 35m\Omega (V_{GS} = -10V)$$

$$R_{DS(ON)} < 60m\Omega (V_{GS} = -4.5V)$$

**SOIC-8**  
**Top View**



#### Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>A</sup>	$I_D$	-7.5	A
$T_A=25^\circ C$			
$T_A=70^\circ C$		-6.3	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	-40	
Power Dissipation <sup>A</sup>	$P_D$	3	W
$T_A=25^\circ C$			
$T_A=70^\circ C$		2.1	
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

#### Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	24	40	$^\circ C/W$
$t \leq 10s$				
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	54	75	$^\circ C/W$
Steady-State				
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	21		$^\circ C/W$
Steady-State				

Electrical Characteristics ( $T_J=25^{\circ}\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}$ , $V_{GS}=0\text{V}$	-30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-24\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^{\circ}\text{C}$			-1 -5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=-250\mu\text{A}$	-1.2	-1.8	-2.2	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-10\text{V}$ , $V_{DS}=-5\text{V}$	40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}$ , $I_D=-5\text{A}$ $T_J=125^{\circ}\text{C}$		26 37	35	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}$ , $I_D=-5\text{A}$		36	60	
$g_{FS}$	Forward Transconductance	$V_{DS}=-5\text{V}$ , $I_D=-10\text{A}$				S
$V_{SD}$	Diode Forward Voltage	$I_S=-1\text{A}$ , $V_{GS}=0\text{V}$		-0.75	-1	V
$I_S$	Maximum Body-Diode Continuous Current				-4.2	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=-15\text{V}$ , $f=1\text{MHz}$		920		pF
$C_{oss}$	Output Capacitance			190		pF
$C_{rss}$	Reverse Transfer Capacitance			122		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		3.6		$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g$	Total Gate Charge	$V_{GS}=-10\text{V}$ , $V_{DS}=-15\text{V}$ , $I_D=-7.5\text{A}$		2.4		nC
$Q_{gs}$	Gate Source Charge			4.5		nC
$Q_{gd}$	Gate Drain Charge			9.3		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}$ , $V_{DS}=-15\text{V}$ , $R_L=2\Omega$ , $R_{GEN}=3\Omega$		7.6		ns
$t_r$	Turn-On Rise Time			5.2		ns
$t_{D(off)}$	Turn-Off DelayTime			21.6		ns
$t_f$	Turn-Off Fall Time			8		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=-7.5\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$				ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=-7.5\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$				nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^{\circ}\text{C}$ . The value in any a given application depends on the user's specific board design. The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

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

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

D: The static characteristics in Figures 1 to 6,12,14 are obtained using 80 $\mu\text{s}$  pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^{\circ}\text{C}$ . The SOA curve provides a single pulse rating.