



AO4419

P-Channel Enhancement Mode Field Effect Transistor



General Description

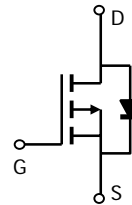
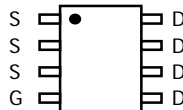
The AO4419 uses advanced trench technology to provide excellent $R_{DS(ON)}$, and low gate charge. This device is suitable for use as a load switch or in PWM applications. *Standard Product AO4419 is Pb-free (meets ROHS & Sony 259 specifications).*

Features

V_{DS} (V) = -30V
 I_D = -9.7 A (V_{GS} = -10V)
 $R_{DS(ON)}$ < 20m Ω (V_{GS} = -10V)
 $R_{DS(ON)}$ < 35m Ω (V_{GS} = -4.5V)

UIS TESTED!
Rg,Ciss,Coss,Crss Tested

SOIC-8
Top View



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^{AF}	I_D	$T_A=25^\circ\text{C}$	-9.7
		$T_A=70^\circ\text{C}$	-8.1
Pulsed Drain Current ^B	I_{DM}	-40	A
Power Dissipation ^A	P_D	$T_A=25^\circ\text{C}$	3
		$T_A=70^\circ\text{C}$	2.1
Avalanche Current ^{B, G}	I_{AR}	-30	A
Repetitive avalanche energy 0.1mH ^{B, G}	E_{AR}	45	mJ
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 ^{AF}	$R_{\theta JA}$	31	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		Steady-State	63	75
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	21	30	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
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	$V_{DS}=-30\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1.4	-2	-2.7	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	$V_{GS}=-10\text{V}$, $I_D=-9.7\text{A}$ $T_J=125^\circ\text{C}$		16 20.9	20 26	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}$, $I_D=-7\text{A}$		26	35	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-9.7\text{A}$		21.7		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.7	-1	V
I_S	Maximum Body-Diode Continuous Current				-1.2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance			1573	1900	pF
C_{oss}	Output Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-15\text{V}$, $f=1\text{MHz}$		319		pF
C_{rss}	Reverse Transfer Capacitance			211	295	pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	3.3	6.7	8	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge (10V)			26.4	32	nC
$Q_g(4.5\text{V})$	Total Gate Charge (4.5V)	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $I_D=-9.7\text{A}$		13.7	17	nC
Q_{gs}	Gate Source Charge			3.8		nC
Q_{gd}	Gate Drain Charge			6.8		nC
$t_{D(on)}$	Turn-On Delay Time			9.5		ns
t_r	Turn-On Rise Time	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $R_L=1.5\Omega$,		8		ns
$t_{D(off)}$	Turn-Off Delay Time	$R_{GEN}=3\Omega$		44.2		ns
t_f	Turn-Off Fall Time			22.2		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-9.7\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		25.2	31	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-9.7\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		14.1		nC
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-9.7\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$		23	28	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-9.7\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$		54		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design.

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 are obtained using $<300\mu\text{s}$ 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 $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

F: The current rating is based on the $t \leq 10\text{s}$ junction to ambient thermal resistance rating.

G: $L=100\mu\text{H}$, $V_{DD}=0\text{V}$, $R_G=0\Omega$, rated $V_{DS}=30\text{V}$ and $V_{GS}=10\text{V}$

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

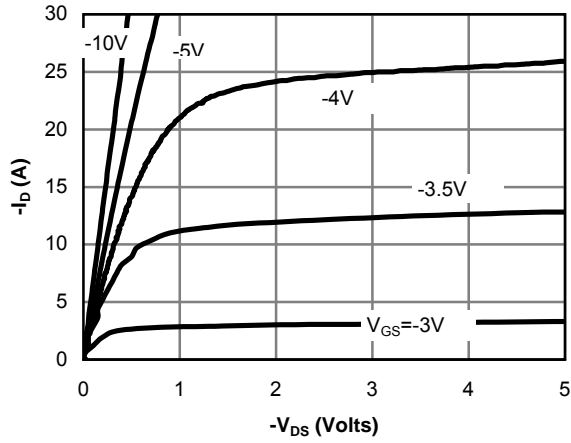


Fig 1: On-Region Characteristics

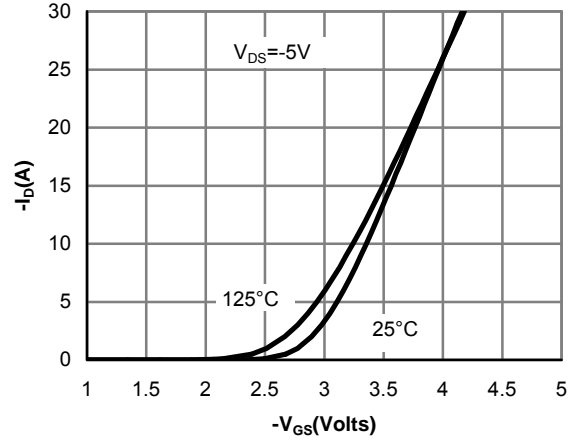


Figure 2: Transfer Characteristics

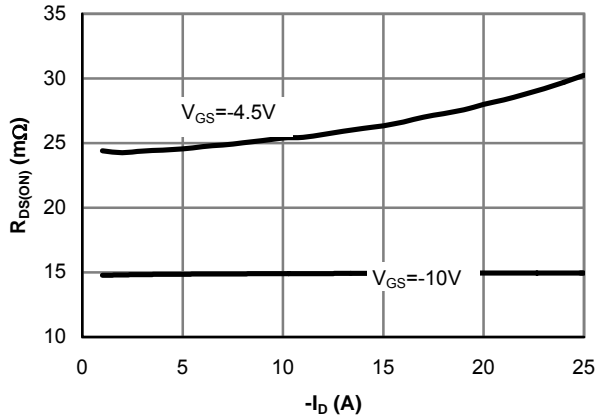


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

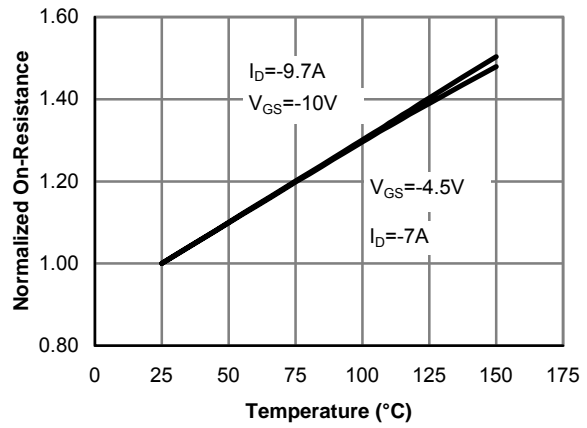


Figure 4: On-Resistance vs. Junction Temperature

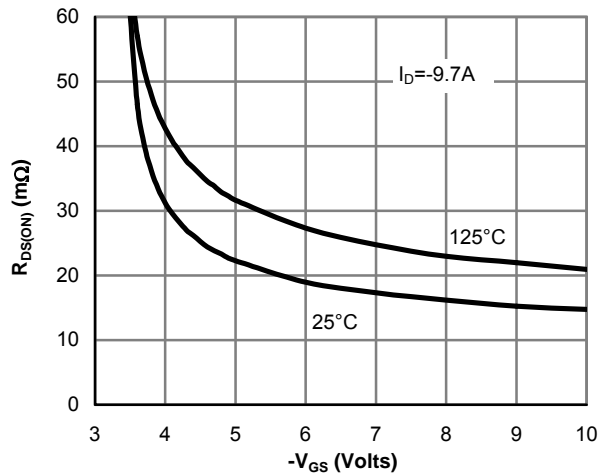


Figure 5: On-Resistance vs. Gate-Source Voltage

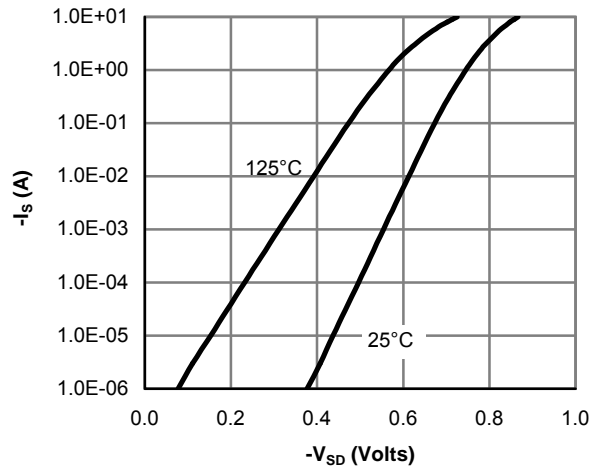


Figure 6: Body-Diode Characteristics

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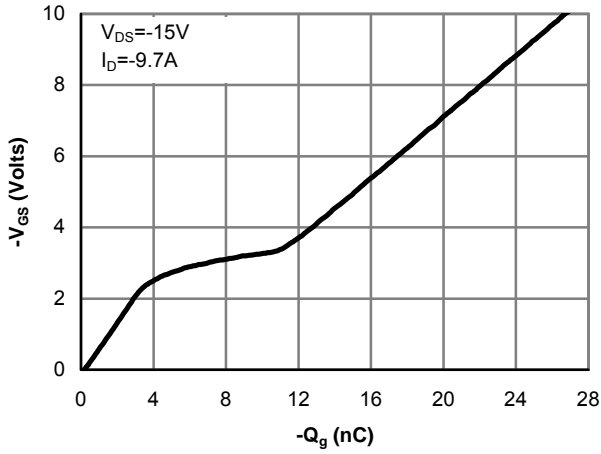


Figure 7: Gate-Charge Characteristics

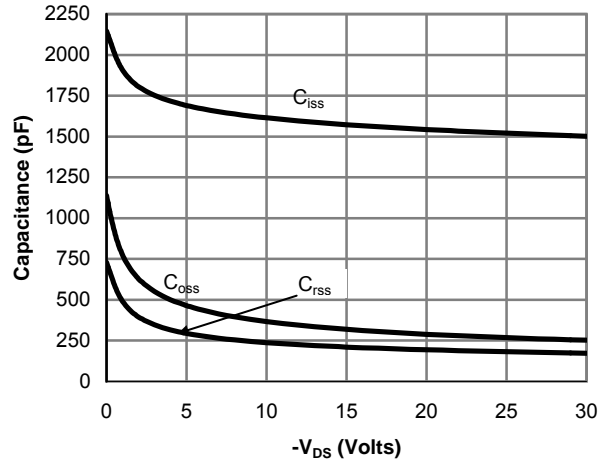


Figure 8: Capacitance Characteristics

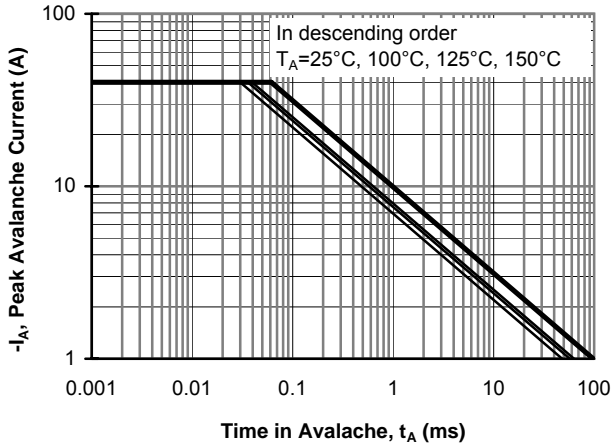


Figure 9: Single Pulse Avalanche Capability

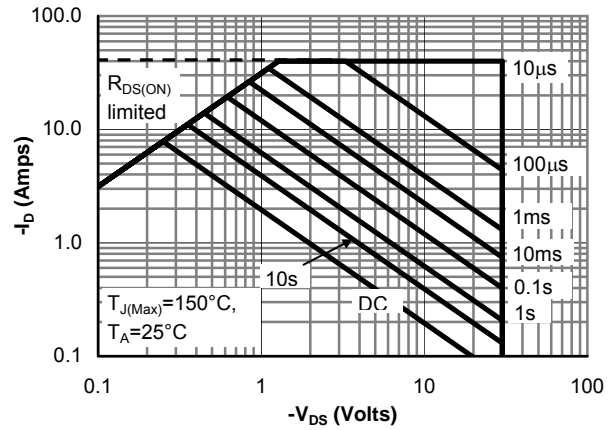


Figure 10: Maximum Forward Biased Safe Operating Area (Note E)

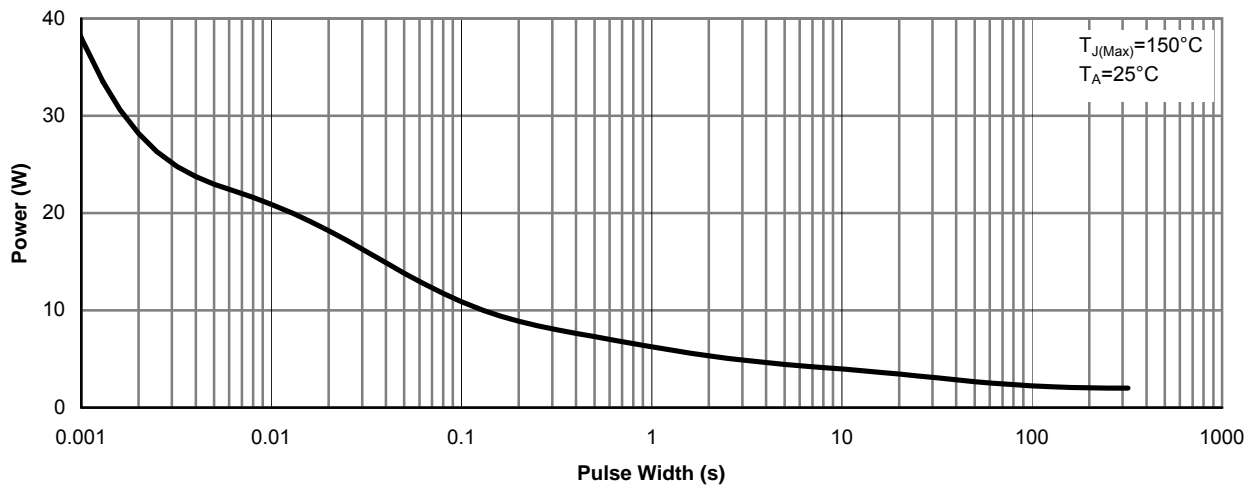


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

