



ALPHA & OMEGA
SEMICONDUCTOR

AO4423/AO4423L

30V P-Channel MOSFET

General Description

The AO4423/AO4423L uses advanced trench technology to provide excellent $R_{DS(ON)}$, and ultra-low low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications.

* RoHS and Halogen-Free Compliant

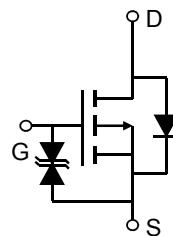
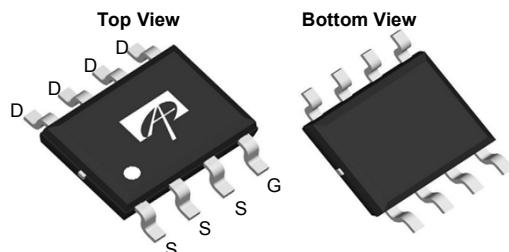
Product Summary

V_{DS} (V) = -30V	$(V_{GS} = -20V)$
I_D = -17A	$(V_{GS} = -20V)$
$R_{DS(ON)} < 6.2m\Omega$	$(V_{GS} = -10V)$
$R_{DS(ON)} < 7.2m\Omega$	

ESD Protected
100% UIS tested
100% R_g tested (note *)



SOIC-8



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}	± 25	V
Continuous Drain Current ^{AF}	I_D	-17	A
$T_A=70^\circ C$		-14	
Pulsed Drain Current ^B	I_{DM}	-182	
Power Dissipation ^A	P_D	3.1	W
$T_A=70^\circ C$		2	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^{AF}	$R_{\theta JA}$	26	40	°C/W
Maximum Junction-to-Ambient ^A		50	75	°C/W
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	14	24	°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	$V_{DS}=0\text{V}, V_{GS}=\pm20\text{V}$ $V_{DS}=0\text{V}, V_{GS}=\pm25\text{V}$			±1 ±10	μA
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-1.5	-2.1	-2.6	V
$I_{D(\text{ON})}$	On state drain current	$V_{GS}=-10\text{V}, V_{DS}=-5\text{V}$	-182			A
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=-20\text{V}, I_D=-15\text{A}$ $T_J=125^\circ\text{C}$		5.1 7.4	6.2 9	$\text{m}\Omega$
		$V_{GS}=-10\text{V}, I_D=-15\text{A}$		5.9	7.2	$\text{m}\Omega$
		$V_{GS}=-6\text{V}, I_D=-10\text{A}$		7.5	9.5	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-15\text{A}$		48		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}, V_{GS}=0\text{V}$		-0.71	-1	V
I_S	Maximum Body-Diode Continuous Current				-4.2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=-15\text{V}, f=1\text{MHz}$		2527	3033	pF
C_{oss}	Output Capacitance			583		pF
C_{rss}	Reverse Transfer Capacitance			397	556	pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	2.1	4.3	6.4	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, I_D=-15\text{A}$		47	57	nC
Q_{gs}	Gate Source Charge			8		nC
Q_{gd}	Gate Drain Charge			14		nC
$t_{D(\text{on})}$	Turn-On Delay Time	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, R_L=1.0\Omega,$ $R_{\text{GEN}}=3\Omega$		12		ns
t_r	Turn-On Rise Time			8		ns
$t_{D(\text{off})}$	Turn-Off Delay Time			54		ns
t_f	Turn-Off Fall Time			87		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-15\text{A}, dI/dt=100\text{A}/\mu\text{s}$		26.1	32	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-15\text{A}, dI/dt=100\text{A}/\mu\text{s}$		12.3		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 $T_A=25^\circ\text{C}$. 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 $R_{\theta UL}$ 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.

Note *: This device is guaranteed RG 100% tested after date code 8V11 (Jan 1st 2008)

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

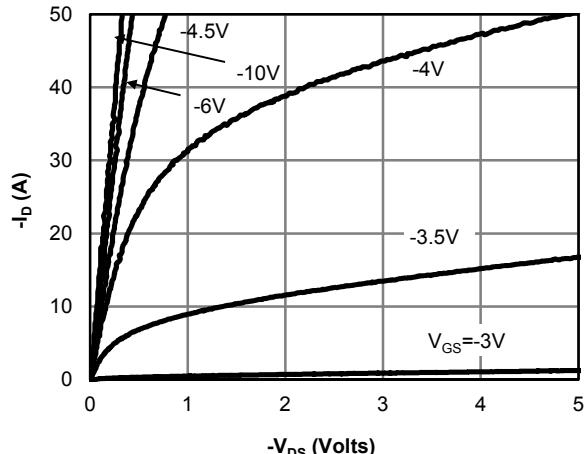


Fig 1: On-Region Characteristics

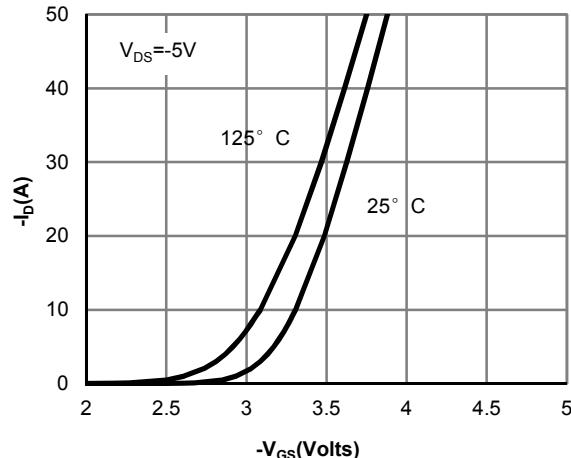


Figure 2: Transfer Characteristics

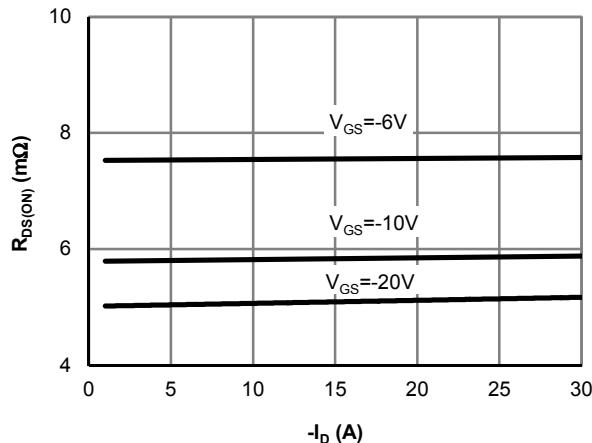


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

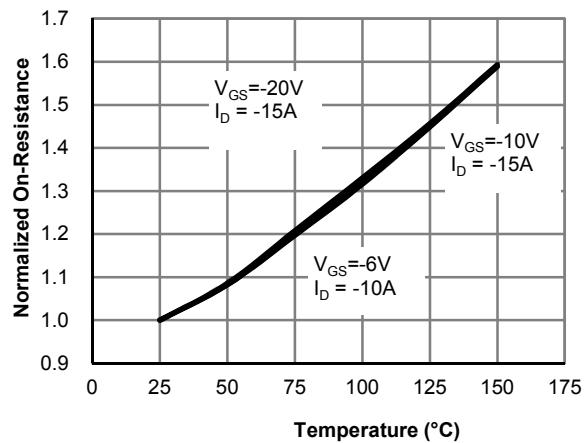


Figure 4: On-Resistance vs. Junction Temperature

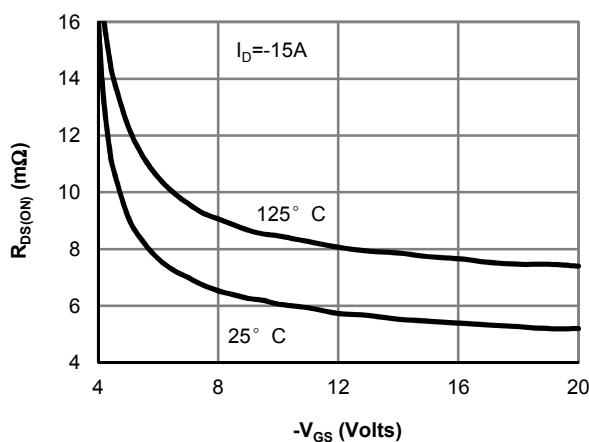


Figure 5: On-Resistance vs. Gate-Source Voltage

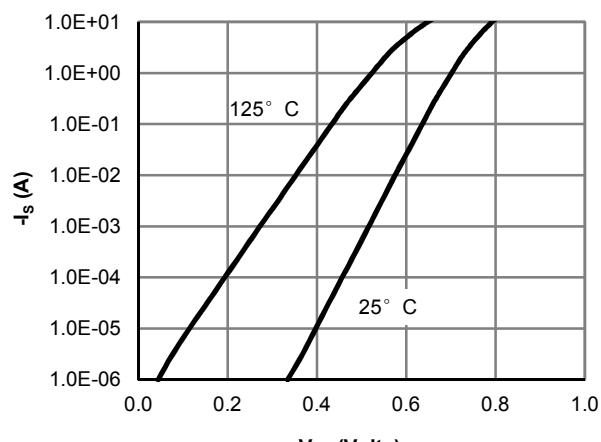
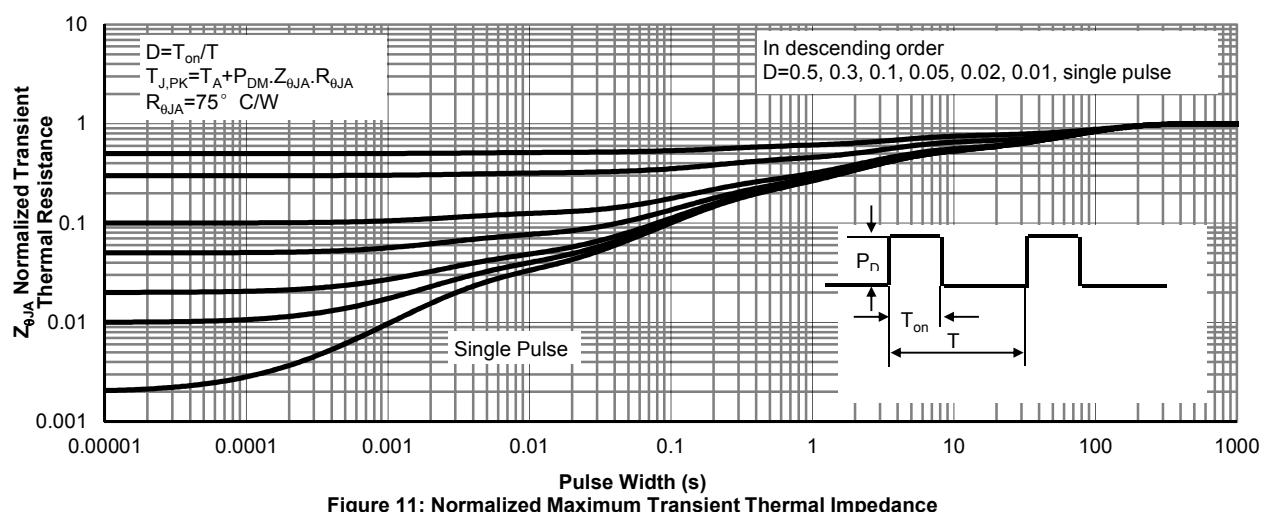
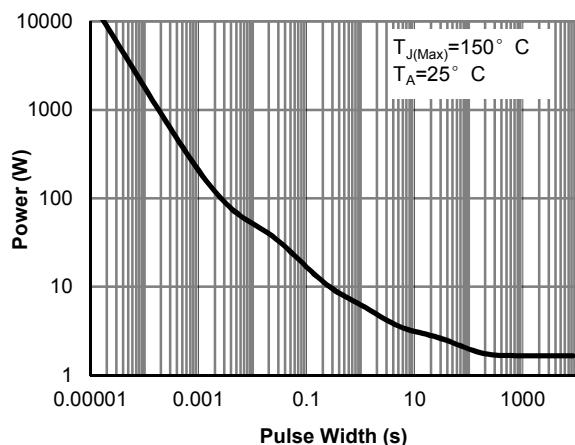
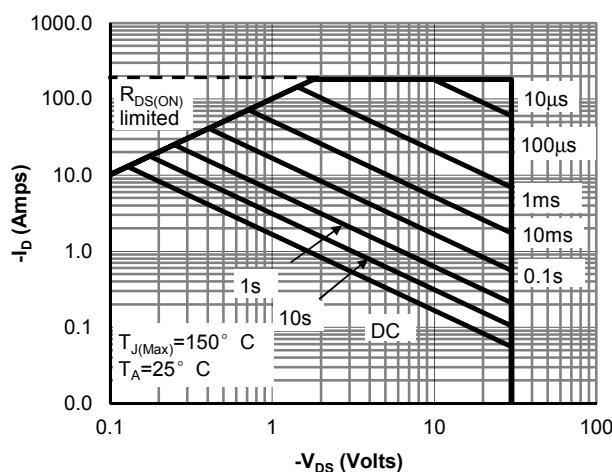
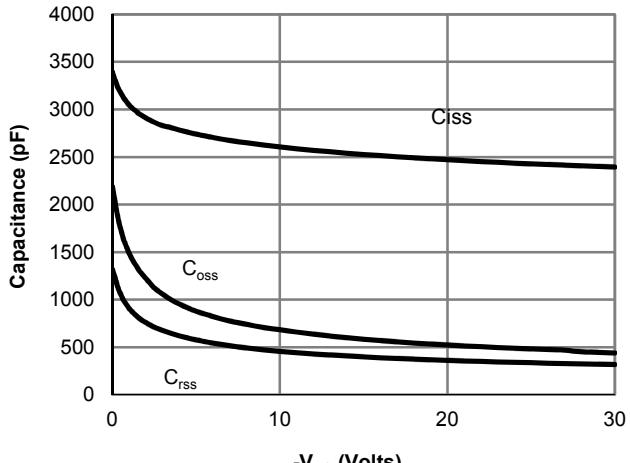
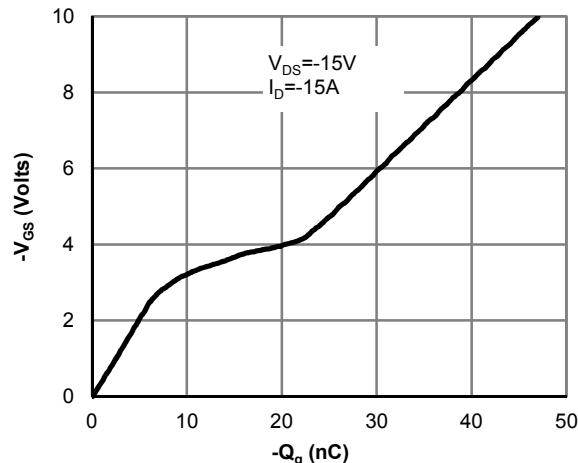
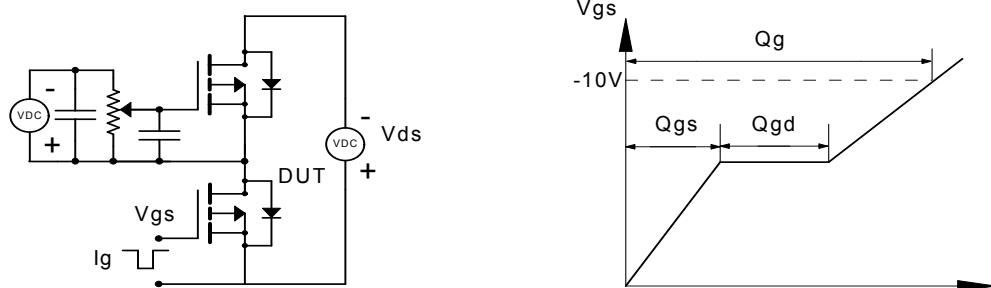


Figure 6: Body-Diode Characteristics

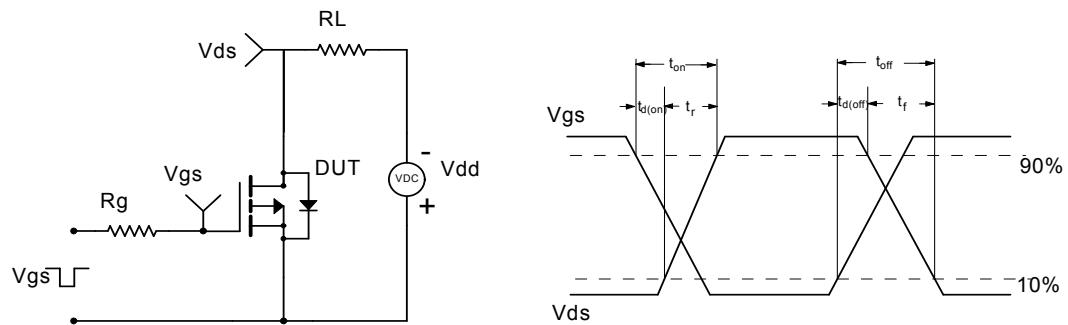
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



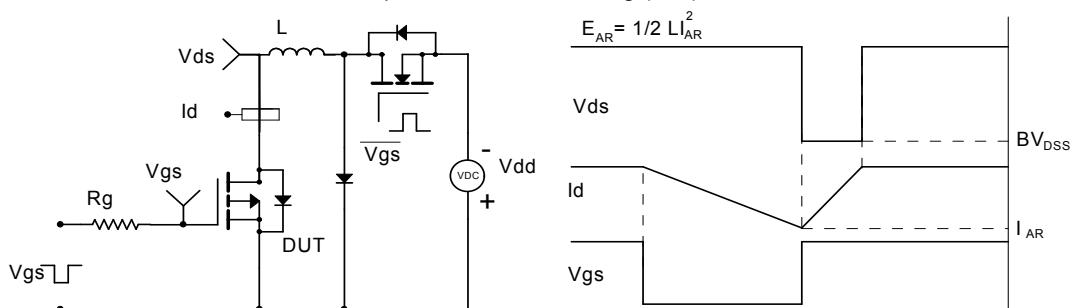
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

