



# AO4423

## 30V P-Channel MOSFET

### General Description

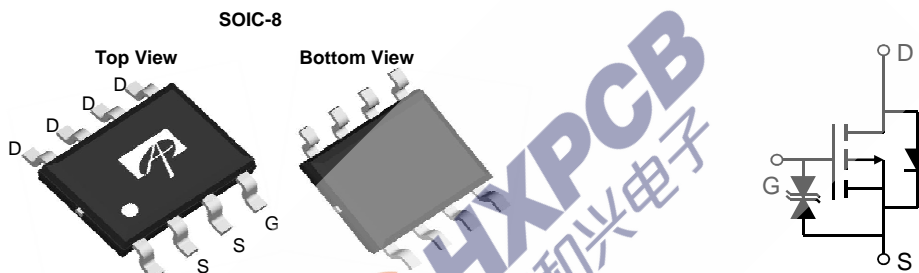
The AO4423 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , and ultra-low gate charge with a 25V gate rating. This device is suitable for use as a load switch or in PWM applications.

\* RoHS and Halogen-Free Compliant

### Product Summary

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

ESD Protected  
 100% UIS tested  
 100% Rg tested (note \*)



### 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	$V_{GS}$	$\pm 25$	V
Continuous Drain Current <sup>AF</sup>	$I_D$	$T_A=25^\circ C$	-17
		$T_A=70^\circ C$	-14
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	-182	A
Power Dissipation <sup>A</sup>	$P_D$	$T_A=25^\circ C$	3.1
		$T_A=70^\circ C$	2
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>AF</sup>	$R_{\theta JA}$	$t \leq 10s$	26	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	50	$^\circ C/W$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	14	24	$^\circ C/W$

**Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			-1 -5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V V <sub>DS</sub> =0V, V <sub>GS</sub> =±25V			±1 ±10	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =-250μA	-1.5	-2.1	-2.6	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-182			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-20V, I <sub>D</sub> =-15A T <sub>J</sub> =125°C V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A V <sub>GS</sub> =-6V, I <sub>D</sub> =-10A		5.1 7.4 7.5	6.2 9 9.5	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-15A		48		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.71	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-4.2	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz		2527	3033	pF
C <sub>oss</sub>	Output Capacitance		583			pF
C <sub>rss</sub>	Reverse Transfer Capacitance		397	556		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	2.1	4.3	6.4	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-15A		47	57	nC
Q <sub>gs</sub>	Gate Source Charge		8			nC
Q <sub>gd</sub>	Gate Drain Charge		14			nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =1.0Ω, R <sub>GEN</sub> =3Ω		12		ns
t <sub>r</sub>	Turn-On Rise Time		8			ns
t <sub>D(off)</sub>	Turn-Off DelayTime		54			ns
t <sub>f</sub>	Turn-Off Fall Time		87			ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-15A, dI/dt=100A/μs		26.1	32	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-15A, dI/dt=100A/μs		12.3		nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° 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<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> 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<sub>A</sub>=25° C. The SOA curve provides a single pulse rating.

F: The current rating is based on the t ≤ 10s 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

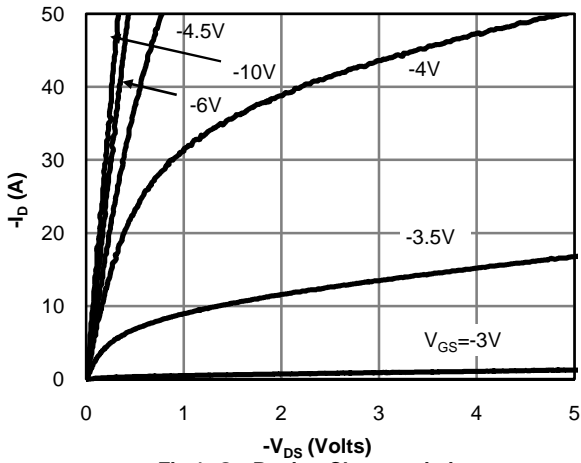


Fig 1: On-Region Characteristics

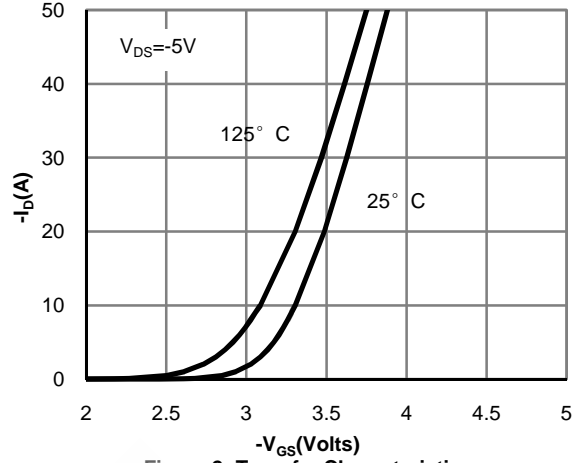


Figure 2: Transfer Characteristics

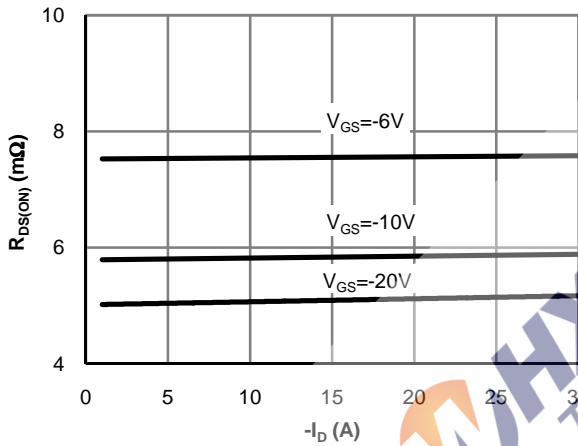


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

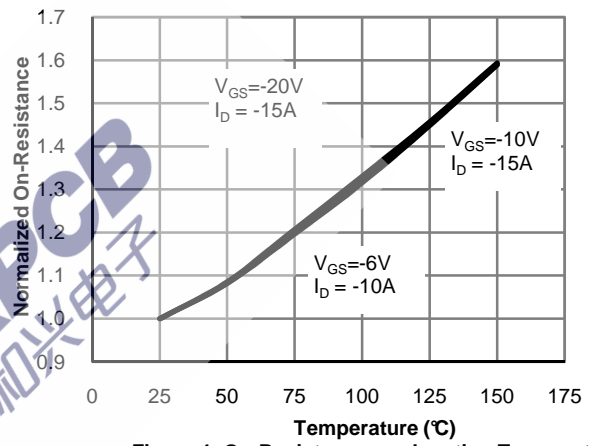


Figure 4: On-Resistance vs. Junction Temperature

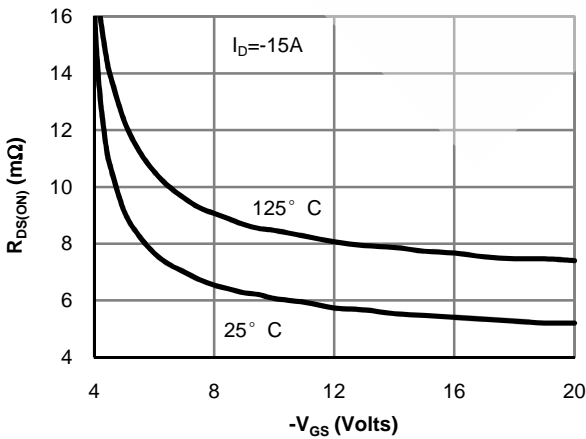


Figure 5: On-Resistance vs. Gate-Source Voltage

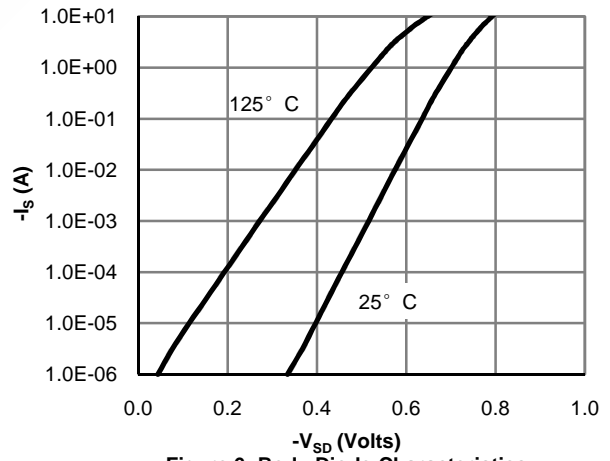


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

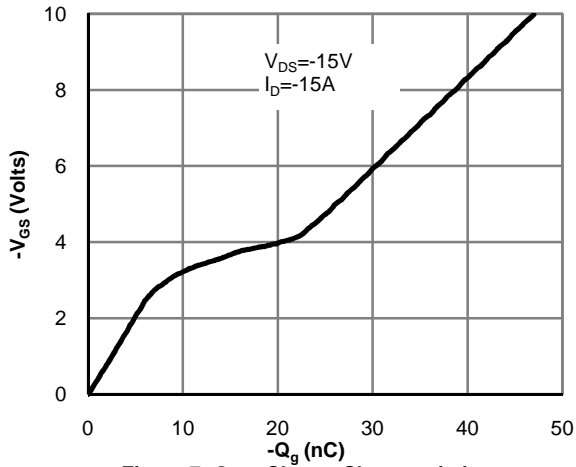


Figure 7: Gate-Charge Characteristics

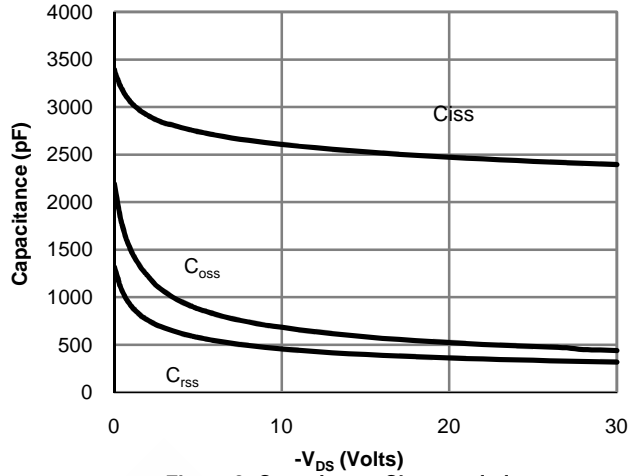


Figure 8: Capacitance Characteristics

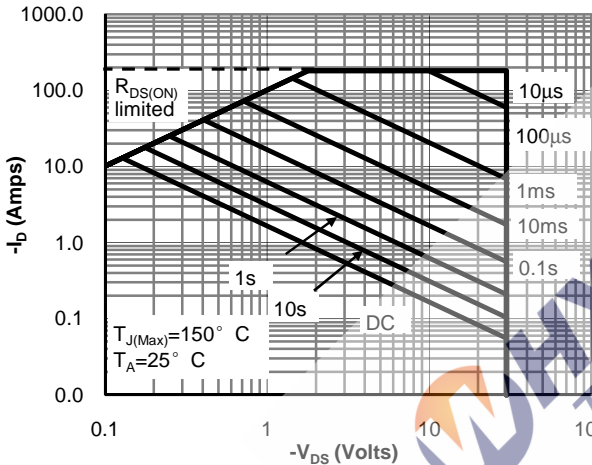


Figure 9: Maximum Forward Biased Safe

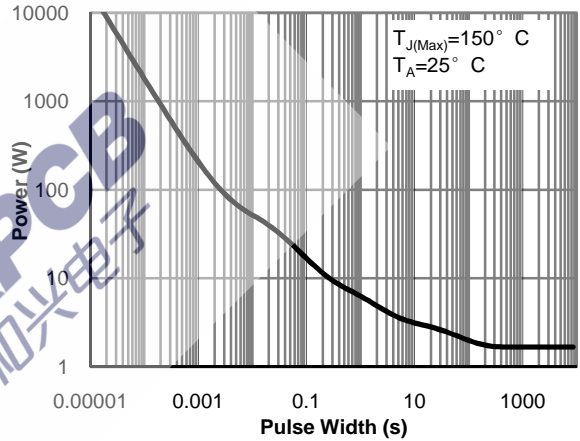


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

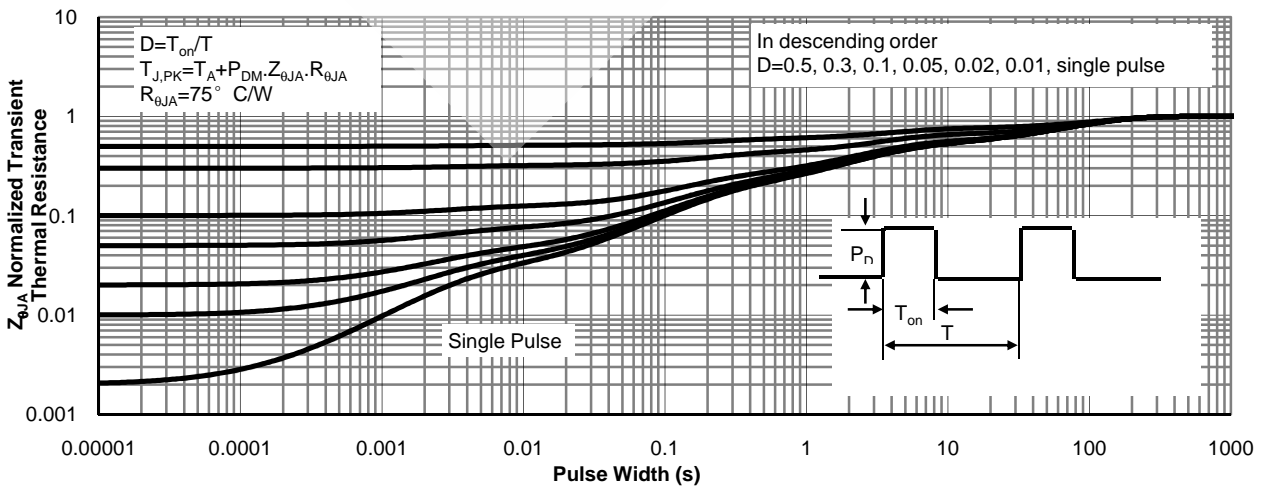
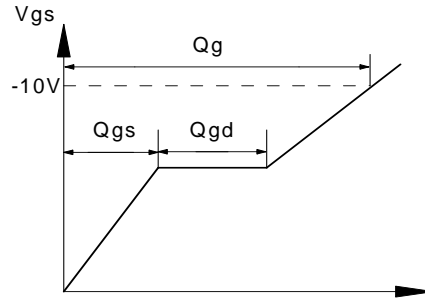
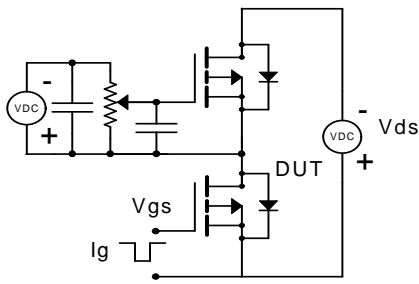
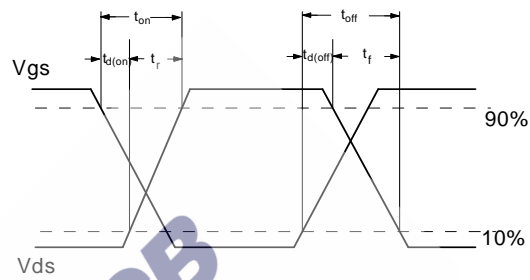
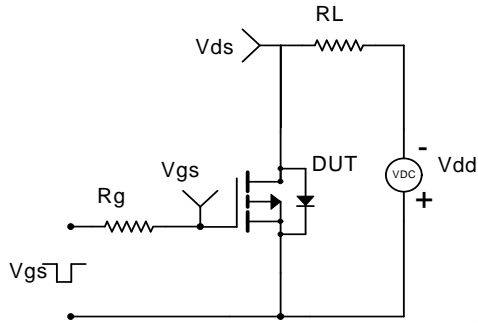


Figure 11: Normalized Maximum Transient Thermal Impedance

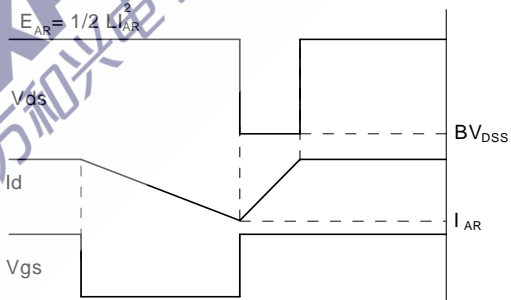
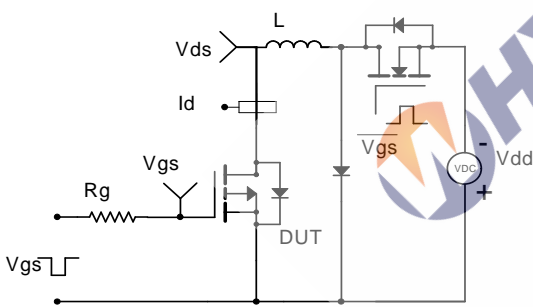
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

