



ALPHA & OMEGA
SEMICONDUCTOR

AO3423

P-Channel Enhancement Mode Field Effect Transistor



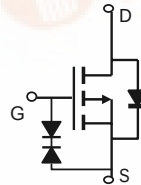
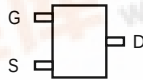
General Description

The AO3423 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected. *Standard Product AO3423 is Pb-free (meets ROHS & Sony 259 specifications). AO3423L is a Green Product ordering option. AO3423 and AO3423L are electrically identical.*

Features

V_{DS} (V) = -20V
 I_D = -2 A (V_{GS} = -10V)
 $R_{DS(ON)}$ < 92m Ω (V_{GS} = -10V)
 $R_{DS(ON)}$ < 118m Ω (V_{GS} = -4.5V)
 $R_{DS(ON)}$ < 166m Ω (V_{GS} = -2.5V)
 ESD Rating: 2000V HBM

**TO-236
(SOT-23)
Top View**



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ^A	I_D	-2	A
$T_A=25^\circ\text{C}^F$		-2	
$T_A=70^\circ\text{C}^F$	I_{DM}	-8	
Pulsed Drain Current ^B			
Power Dissipation ^A	P_D	1.4	W
		0.9	
$T_A=25^\circ\text{C}$			
$T_A=70^\circ\text{C}$			
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	$R_{\theta JA}$	65	90	$^\circ\text{C/W}$
$t \leq 10\text{s}$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	85	125	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	43	60	$^\circ\text{C/W}$
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	-20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-16V, V _{GS} =0V T _J =55°C			-0.5 -2.5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±10V			±1	μA
		V _{DS} =0V, V _{GS} =±12V			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-0.7	-0.9	-1.4	V
I _{D(ON)}	On state drain current	V _{GS} =-4.5V, V _{DS} =-5V	-8			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-2A T _J =125°C		76 90	92 108	mΩ
		V _{GS} =-4.5V, I _D =-2A		94	118	mΩ
		V _{GS} =-2.5V, I _D =-1A		128	166	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-2A		6.8		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V	-1	-0.78		V
I _S	Maximum Body-Diode Continuous Current				-1.8	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-10V, f=1MHz		512	620	pF
C _{oss}	Output Capacitance			77		pF
C _{rss}	Reverse Transfer Capacitance			62		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		9.2	13	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-2A		5.5	6.6	nC
Q _{gs}	Gate Source Charge			0.8		nC
Q _{gd}	Gate Drain Charge			1.9		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-10V, R _L =5Ω, R _{GEN} =3Ω		5		ns
t _r	Turn-On Rise Time			6.7		ns
t _{D(off)}	Turn-Off DelayTime			28		ns
t _f	Turn-Off Fall Time			13.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-2A, dI/dt=100A/μs		9.8	12	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-2A, dI/dt=100A/μs		2.7		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 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 6,12,14 are obtained using 80 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.

F: The maximum current rating is limited by bond-wires.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

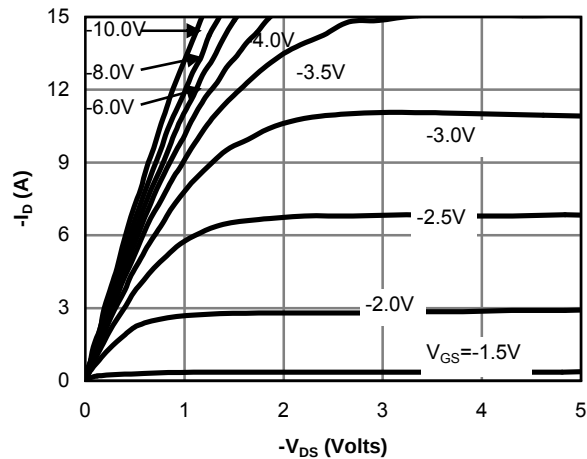


Fig 1: On-Region Characteristics

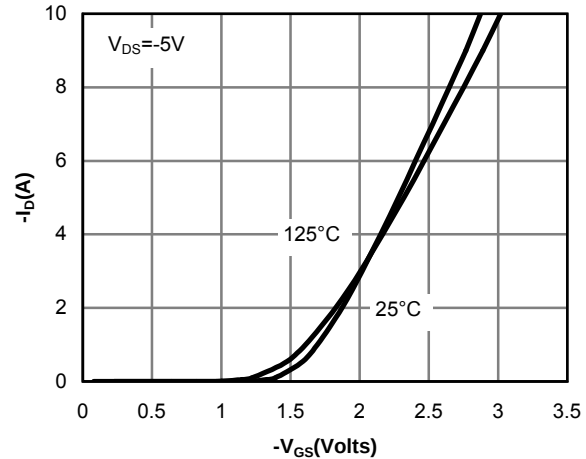


Figure 2: Transfer Characteristics

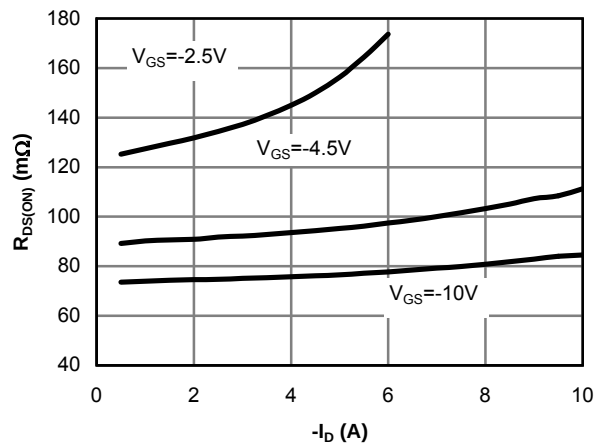


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

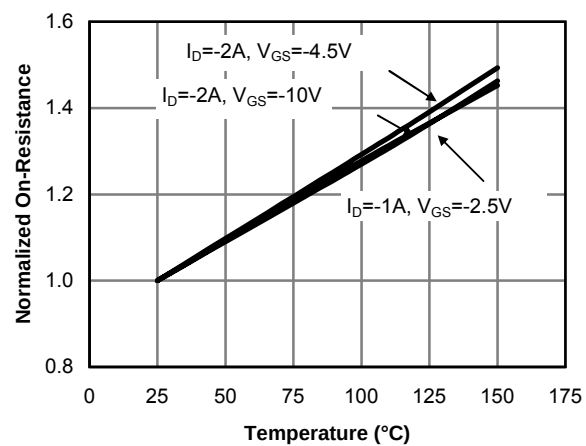


Figure 4: On-Resistance vs. Junction Temperature

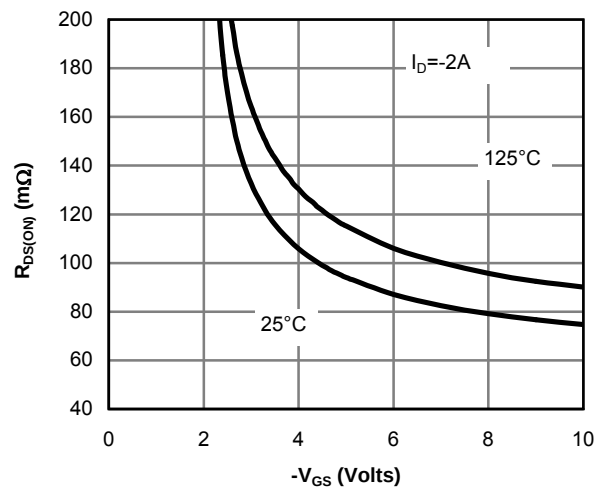


Figure 5: On-Resistance vs. Gate-Source Voltage

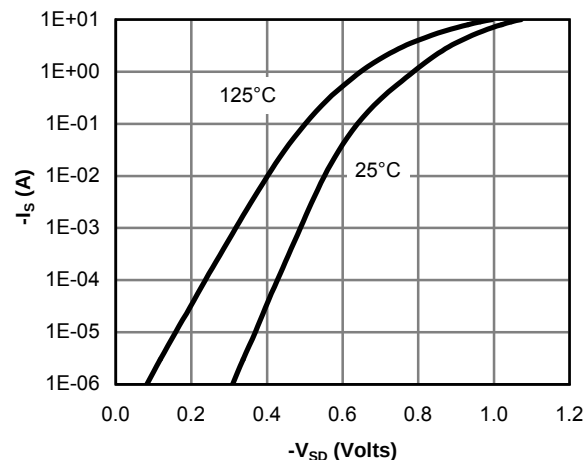


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

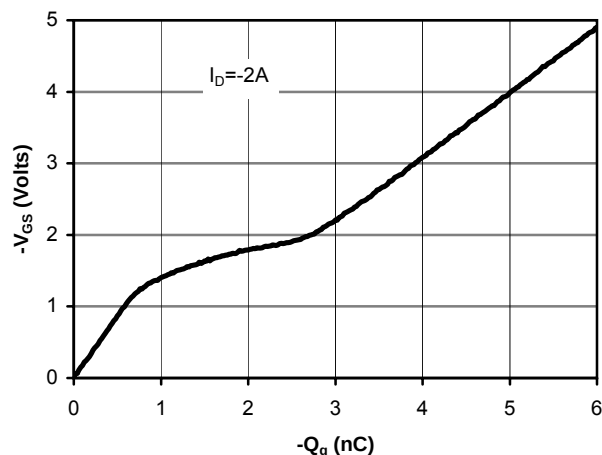


Figure 7: Gate-Charge Characteristics

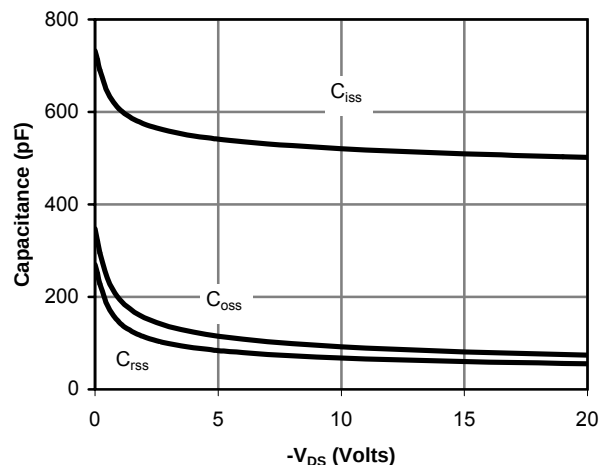


Figure 8: Capacitance Characteristics

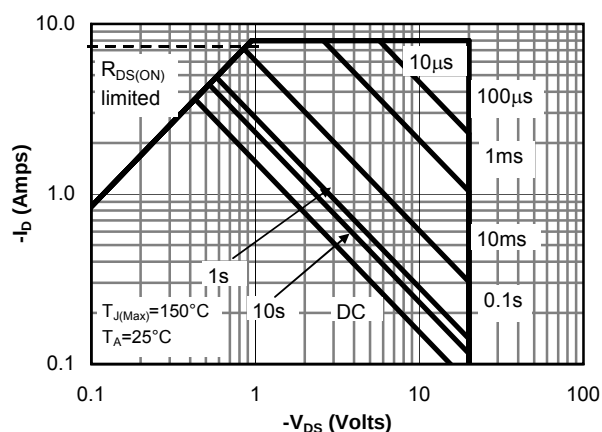


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

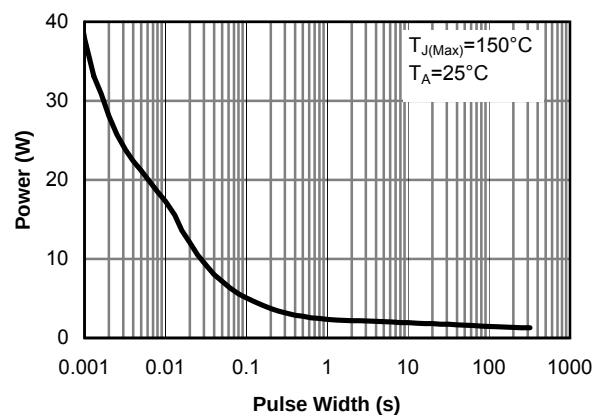


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

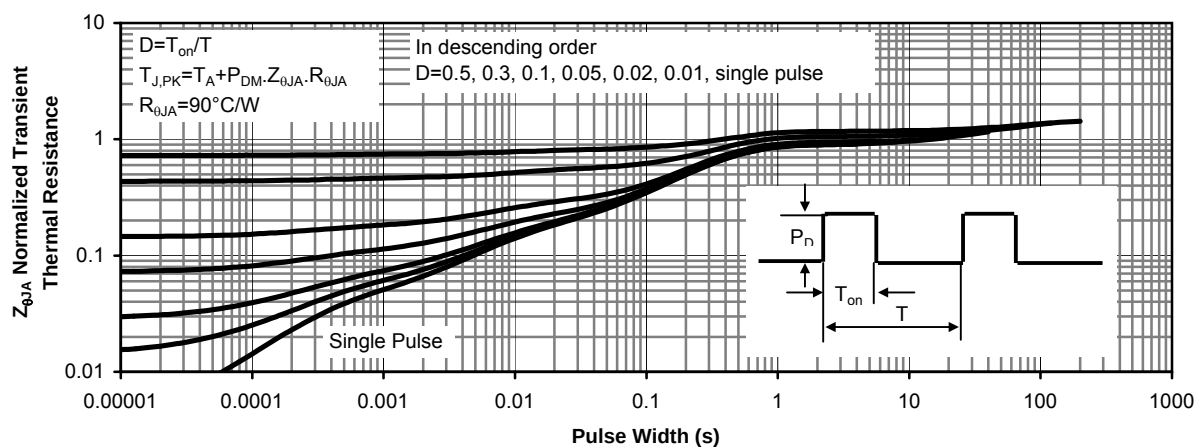


Figure 11: Normalized Maximum Transient Thermal Impedance