



**AO3422**

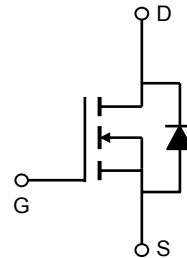
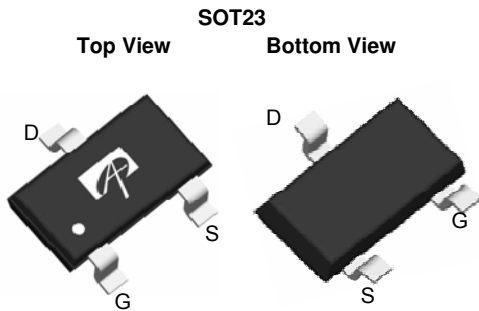
**N-Channel Enhancement Mode Field Effect Transistor**

**General Description**

The AO3422 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. It offers operation over a wide gate drive range from 2.5V to 12V. This device is suitable for use as a load switch.

**Features**

- $V_{DS}$  (V) = 55V
- $I_D$  = 2.1A ( $V_{GS}$  = 4.5V)
- $R_{DS(ON)} < 160m\Omega$  ( $V_{GS}$  = 4.5V)
- $R_{DS(ON)} < 200m\Omega$  ( $V_{GS}$  = 2.5V)



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	55	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ\text{C}$	2.1	A
		$T_A=70^\circ\text{C}$	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	10	
Power Dissipation	$T_A=25^\circ\text{C}$	1.25	W
		$T_A=70^\circ\text{C}$	
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 <sup>A</sup>	$R_{\theta JA}$	75	100	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	115	
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	48	60	$^\circ\text{C/W}$

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	$I_D=10\text{mA}$ , $V_{GS}=0\text{V}$	55			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=44\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1	$\mu\text{A}$
					5	
$I_{GSS}$	Gate-Source leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 12\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	0.6	1.3	2	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}$ , $V_{DS}=5\text{V}$	10			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=4.5\text{V}$ , $I_D=2.1\text{A}$ $T_J=125^\circ\text{C}$		125	160	m $\Omega$
				175	210	
			$V_{GS}=2.5\text{V}$ , $I_D=1.5\text{A}$	157	200	
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=2.1\text{A}$		11		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}$		0.78	1	V
$I_S$	Maximum Body-Diode Continuous Current				1	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1\text{MHz}$		214	300	pF
$C_{oss}$	Output Capacitance			31		pF
$C_{rss}$	Reverse Transfer Capacitance			12.6		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		1.3	3	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g$	Total Gate Charge	$V_{GS}=4.5\text{V}$ , $V_{DS}=27.5\text{V}$ , $I_D=2.1\text{A}$		2.6	3.3	nC
$Q_{gs}$	Gate Source Charge			0.6		nC
$Q_{gd}$	Gate Drain Charge			0.8		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$ , $V_{DS}=27.5\text{V}$ , $R_L=12\Omega$ , $R_{GEN}=3\Omega$		2.3		ns
$t_r$	Turn-On Rise Time			2.4		ns
$t_{D(off)}$	Turn-Off DelayTime			16.5		ns
$t_f$	Turn-Off Fall Time			2		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=2.1\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		20	30	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=2.1\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		17		nC

A: The value of  $R_{\theta JA}$  is measured 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 value in any 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.

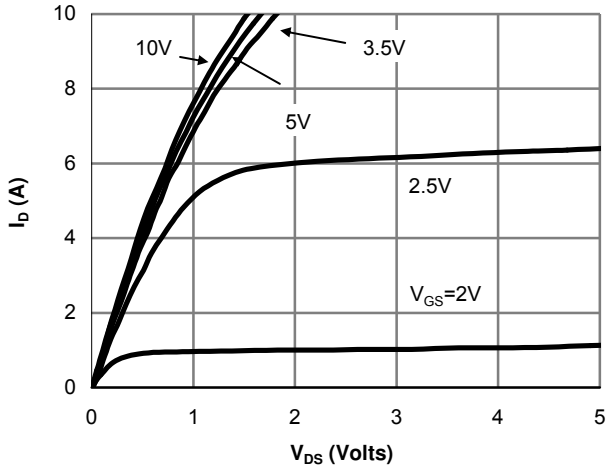
D: The static characteristics in Figures 1 to 6 are obtained using  $<300 \mu\text{s}$  pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<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.

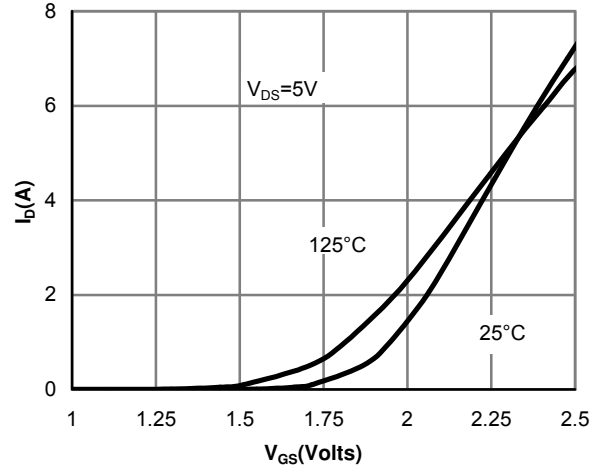
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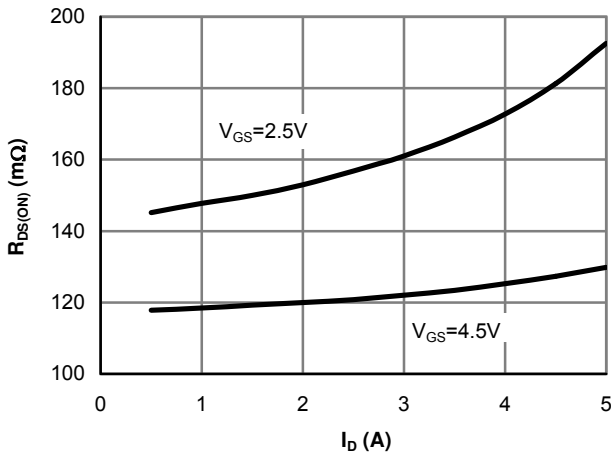
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



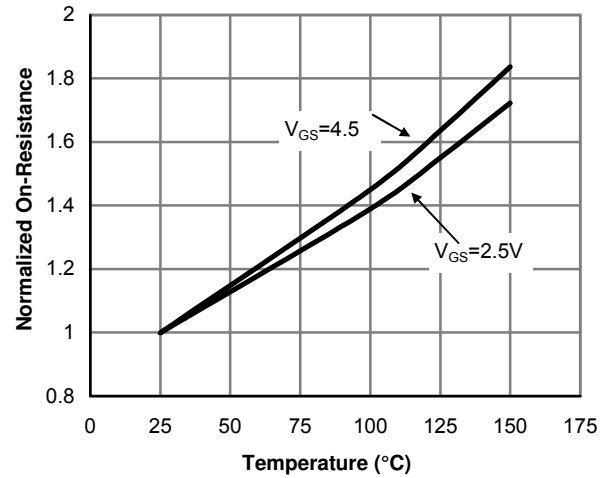
**Fig 1: On-Region characteristics**



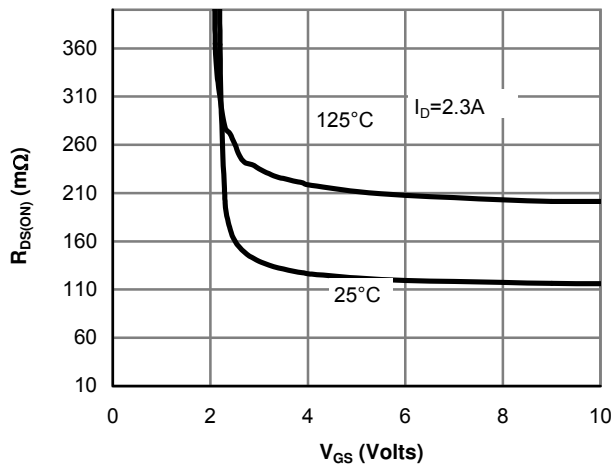
**Figure 2: Transfer Characteristics**



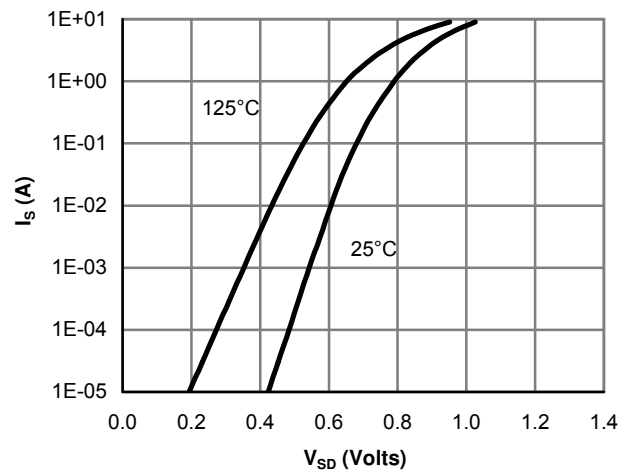
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**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

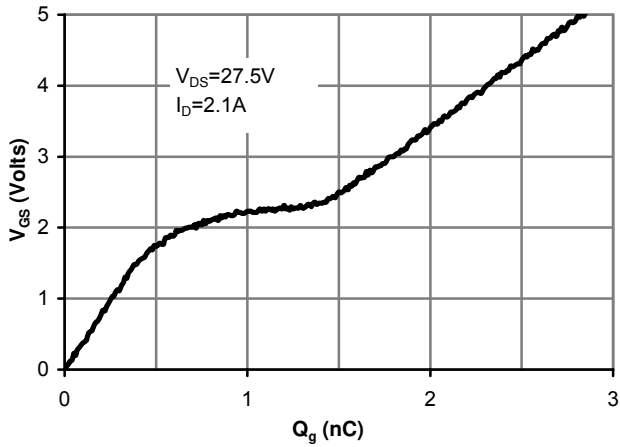


Figure 7: Gate-Charge Characteristics

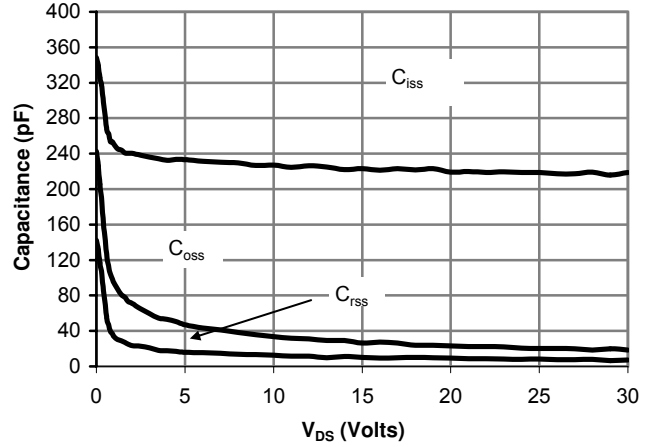


Figure 8: Capacitance Characteristics

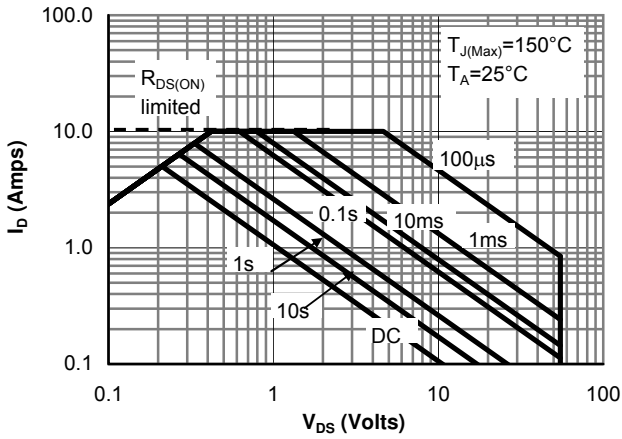


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

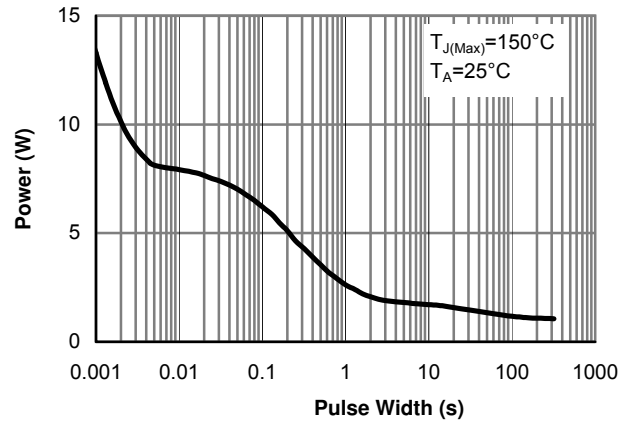


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

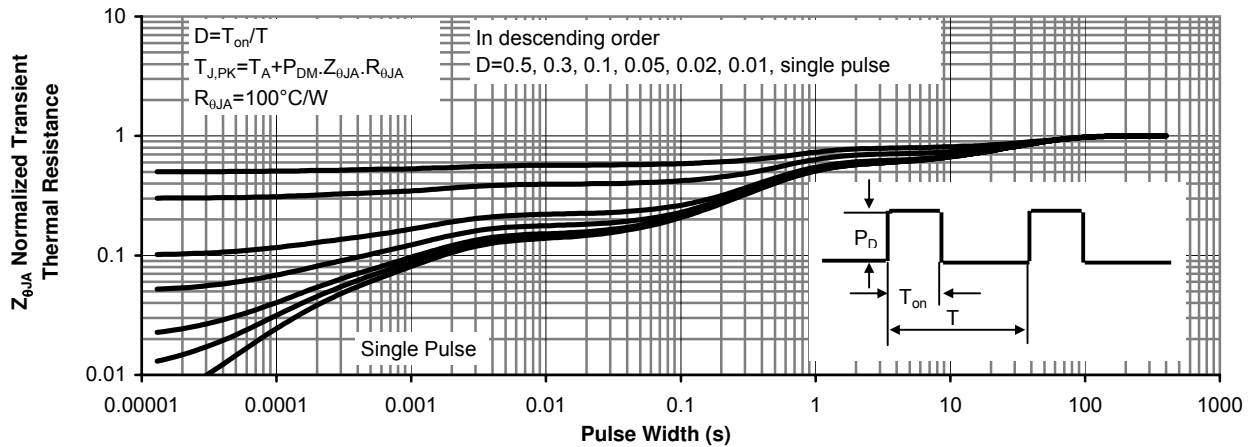
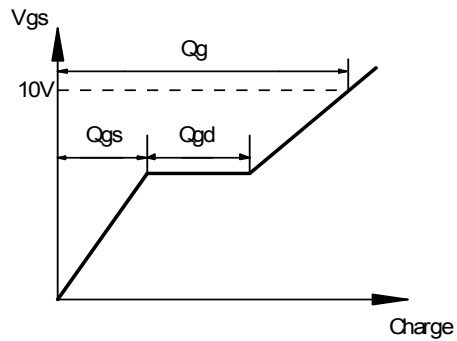
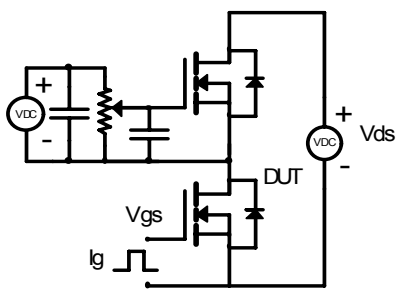
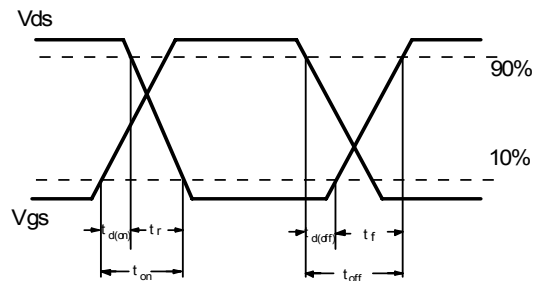
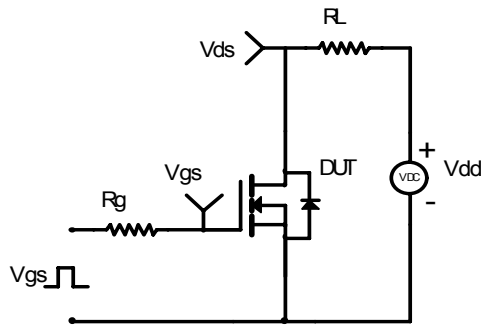


Figure 11: Normalized Maximum Transient Thermal Impedance

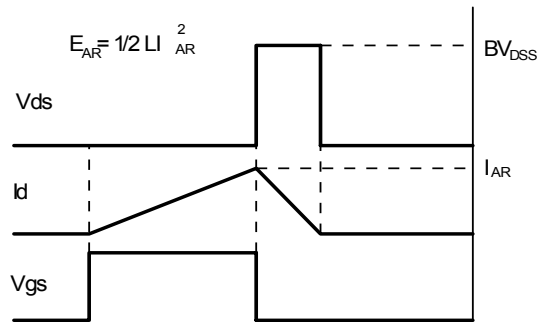
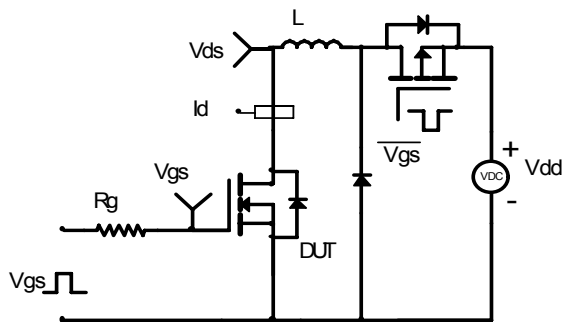
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

