



ALPHA & OMEGA
SEMICONDUCTOR, LTD

AO6422

N-Channel Enhancement Mode Field Effect Transistor



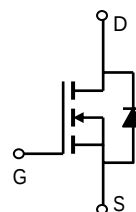
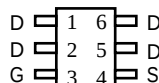
General Description

The AO6422/L uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for general purpose application. *AO6422 and AO6422L are electrically identical.*
-RoHS Compliant
-AO6422L is Halogen Free

Features

$V_{DS} = 20V$
 $I_D = 5A$ ($V_{GS} = 4.5V$)
 $R_{DS(ON)} < 44m\Omega$ ($V_{GS} = 4.5V$)
 $R_{DS(ON)} < 55m\Omega$ ($V_{GS} = 2.5V$)
 $R_{DS(ON)} < 72m\Omega$ ($V_{GS} = 1.8V$)

TSOP6
Top View



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

Parameter	Symbol	10 Sec	Steady State	Units
Drain-Source Voltage	V_{DS}	20		V
Gate-Source Voltage	V_{GS}	± 8		V
Continuous Drain Current ^A	$T_A=25^\circ C$	5	3.9	A
	$T_A=70^\circ C$	4.2	3	
Pulsed Drain Current ^B	I_{DM}	30		
Power Dissipation ^A	$T_A=25^\circ C$	2.0	1.1	W
	$T_A=70^\circ C$	1.3	0.7	
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 ^A $t \leq 10s$	$R_{\theta JA}$	47.5	62.5	$^\circ C/W$
Maximum Junction-to-Ambient ^A Steady State		74	110	$^\circ C/W$
Maximum Junction-to-Lead ^C Steady State	$R_{\theta JL}$	54	68	$^\circ C/W$

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	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 20\text{V}$, $V_{GS} = 0\text{V}$ $T_J = 55^{\circ}\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 8\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	0.4	0.65	1	V
$I_{D(ON)}$	On state drain current	$V_{GS} = 4.5\text{V}$, $V_{DS} = 5\text{V}$	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 4.5\text{V}$, $I_D = 5.0\text{A}$ $T_J = 125^{\circ}\text{C}$		35 48	44 60	$\text{m}\Omega$
		$V_{GS} = 2.5\text{V}$, $I_D = 4.5\text{A}$		43	55	$\text{m}\Omega$
		$V_{GS} = 1.8\text{V}$, $I_D = 3.5\text{A}$		55	72	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{V}$, $I_D = 5.0\text{A}$		14		S
V_{SD}	Diode Forward Voltage	$I_S = 1\text{A}$, $V_{GS} = 0\text{V}$		0.8	1	V
I_S	Maximum Body-Diode Continuous Current				2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=10\text{V}$, $f=1\text{MHz}$		450	560	pF
C_{oss}	Output Capacitance			74		pF
C_{rss}	Reverse Transfer Capacitance			52		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		4.9	7.5	Ω
SWITCHING PARAMETERS						
$Q_g(4.5\text{V})$	Total Gate Charge	$V_{GS} = 4.5\text{V}$, $V_{DS} = 10\text{V}$, $I_D = 5\text{A}$		6.2	8.2	nC
Q_{gs}	Gate Source Charge			0.4		nC
Q_{gd}	Gate Drain Charge			1.3		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=4.5\text{V}$, $V_{DS}=10\text{V}$, $R_L=2\Omega$, $R_{GEN}=3\Omega$		4.5		ns
t_r	Turn-On Rise Time			6		ns
$t_{D(off)}$	Turn-Off DelayTime			33		ns
t_f	Turn-Off Fall Time			7.1		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		13	17	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=5\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		3.3		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^{\circ}\text{C}$. 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 $t \leq 300\mu\text{s}$ 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 $T_A=25^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

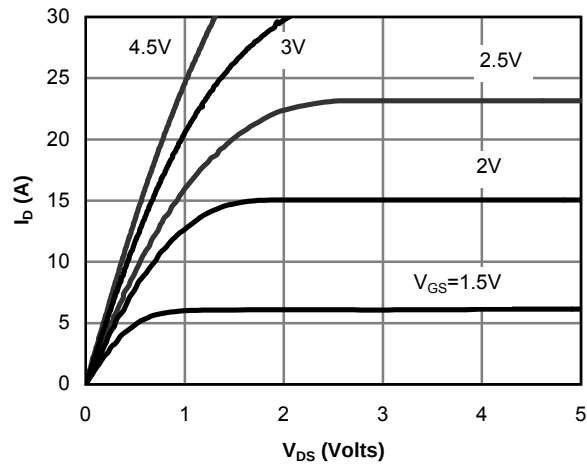


Figure 1: On-Region Characteristics

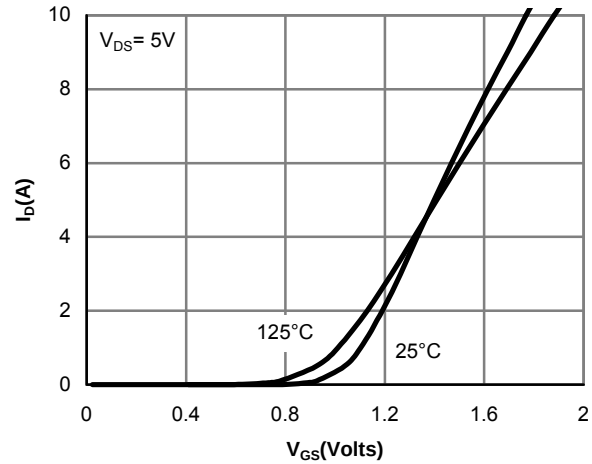


Figure 2: Transfer Characteristics

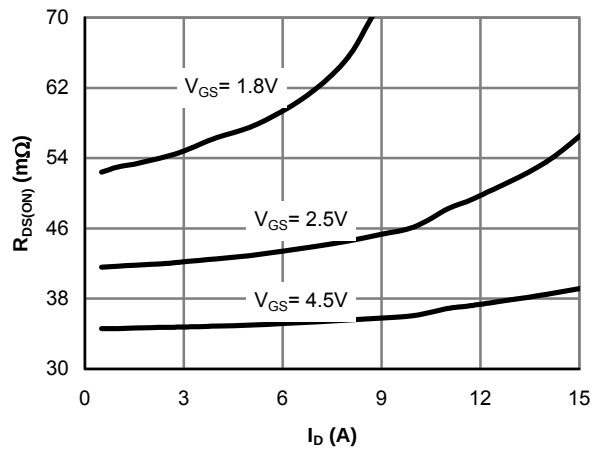


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

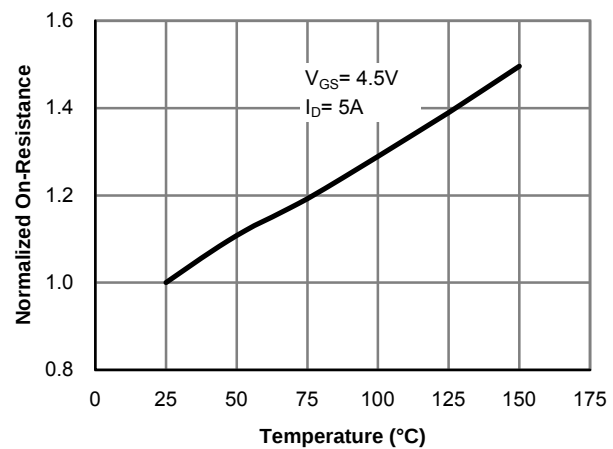


Figure 4: On-Resistance vs. Junction Temperature

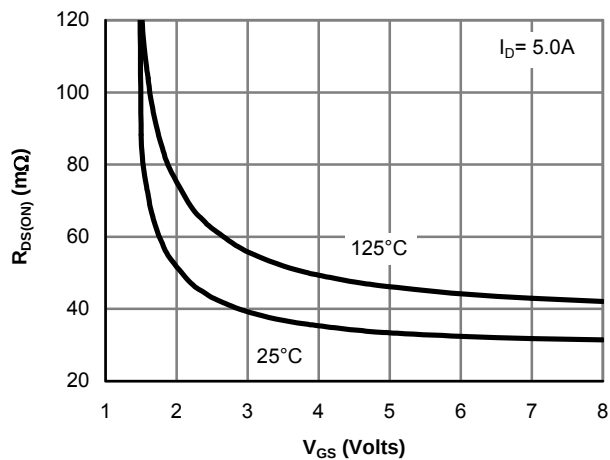


Figure 5: On-Resistance vs. Gate-Source Voltage

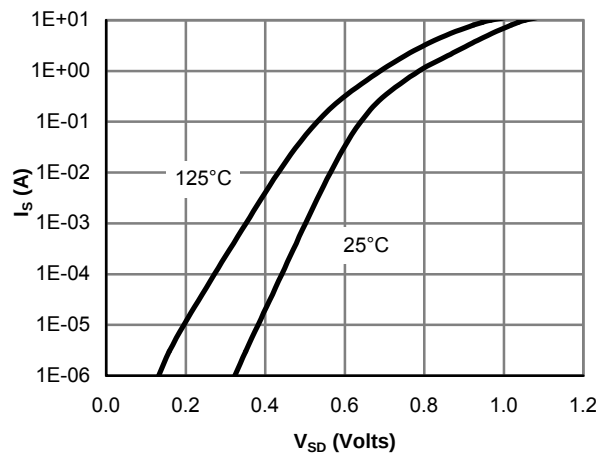


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

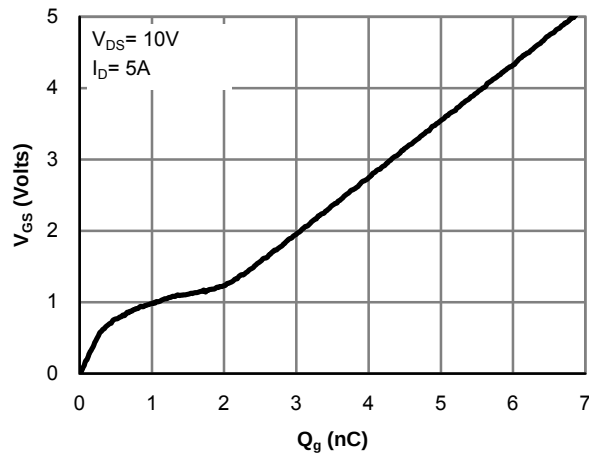


Figure 7: Gate-Charge Characteristics

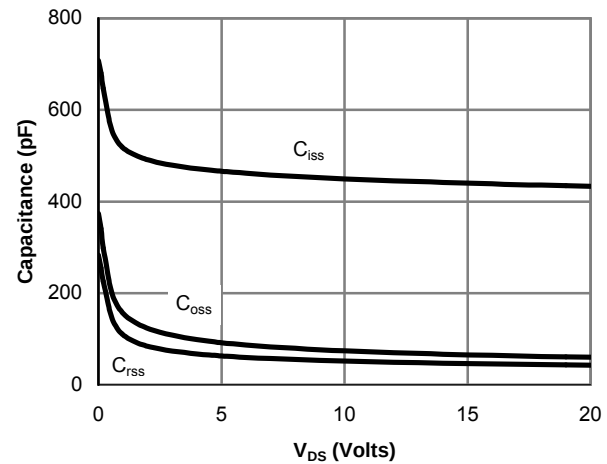


Figure 8: Capacitance Characteristics

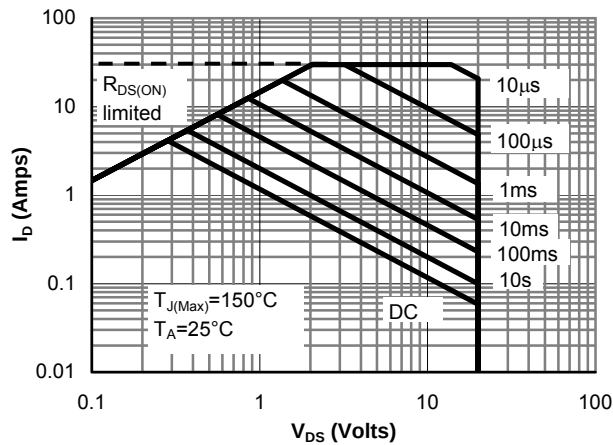


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

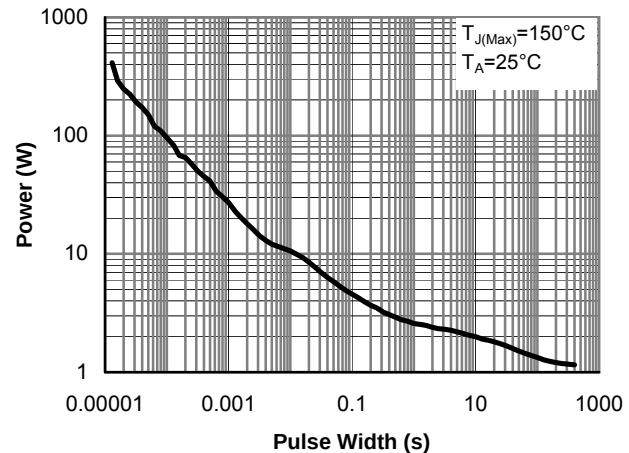


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

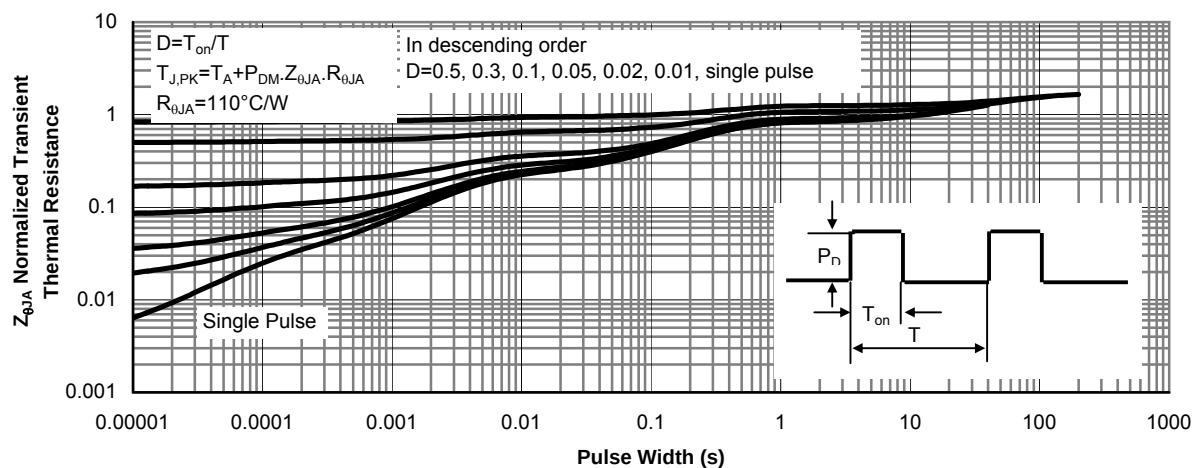


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)