



ALPHA & OMEGA
SEMICONDUCTOR

AO4720

N-Channel Enhancement Mode Field Effect Transistor
SRFET™



General Description

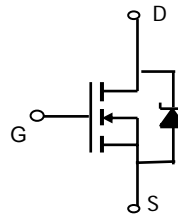
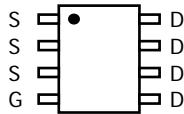
SRFET™ The AO4720 uses advanced trench technology with a monolithically integrated Schottky diode to provide excellent $R_{DS(ON)}$, and low gate charge. This device is suitable for use as a low side FET in SMPS, load switching and general purpose applications.

Standard Product AO4720 is Pb-free (meets ROHS & Sony 259 specifications).

Features

V_{DS} (V) = 30V
 I_D = 13A (V_{GS} = 10V)
 $R_{DS(ON)} < 11m\Omega$ (V_{GS} = 10V)
 $R_{DS(ON)} < 17.5m\Omega$ (V_{GS} = 4.5V)

UIS TESTED!
Rg, Ciss, Coss, Crss Tested



SRFET™
Soft Recovery MOSFET:
Integrated Schottky Diode

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

Parameter	Symbol	Max		Units	
		10 Sec	Steady State		
Drain-Source Voltage	V_{DS}	30		V	
Gate-Source Voltage	V_{GS}	±20		V	
Continuous Drain Current ^{AF}	I_{DSM}	$T_A=25^\circ\text{C}$	13	10	A
		$T_A=70^\circ\text{C}$	10.5	7.8	
Pulsed Drain Current ^B	I_{DM}	120		A	
Avalanche Current ^C	I_{AR}	21		A	
Repetitive avalanche energy $L=0.3mH$ ^C	E_{AR}	66		mJ	
Power Dissipation	P_{DSM}	$T_A=25^\circ\text{C}$	3.1	1.7	W
		$T_A=70^\circ\text{C}$	2.0	1.1	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		°C	

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	32	40	°C/W
Maximum Junction-to-Ambient ^A		60	75	
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	17	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	$V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$ $T_J=125^\circ\text{C}$			0.1 20	mA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			0.1	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.3	1.62	2	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	120			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=13\text{A}$ $T_J=125^\circ\text{C}$		9.3 13.8	11.0 17.3	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=11\text{A}$		14	17.5	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=13\text{A}$		37		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.40	0.5	V
I_S	Maximum Body-Diode + Schottky Continuous Current				5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance			1267	1600	pF
C_{oss}	Output Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$		308		pF
C_{rss}	Reverse Transfer Capacitance			118		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		1.3	2.0	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge			21	30	nC
$Q_g(4.5\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=13\text{A}$		10.4	14	nC
Q_{gs}	Gate Source Charge			3.0		nC
Q_{gd}	Gate Drain Charge			3.6		nC
$t_{D(on)}$	Turn-On Delay Time			5.2		ns
t_r	Turn-On Rise Time	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=1.2\Omega$, $R_{GEN}=3\Omega$		3.8		ns
$t_{D(off)}$	Turn-Off Delay Time			21.2		ns
t_f	Turn-Off Fall Time			4.4		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=13\text{A}$, $dI/dt=300\text{A}/\mu\text{s}$		11.2	17	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=13\text{A}$, $dI/dt=300\text{A}/\mu\text{s}$		10.5		nC

A: The value of $R_{\theta JA}$ is measured 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 value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ\text{C}$.

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 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 power dissipation and current rating is based on the $t \leq 10\text{s}$ junction to ambient thermal resistance rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

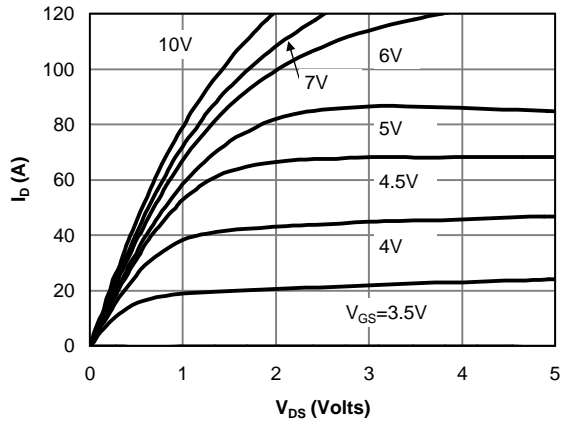


Figure 1: On-Region Characteristics

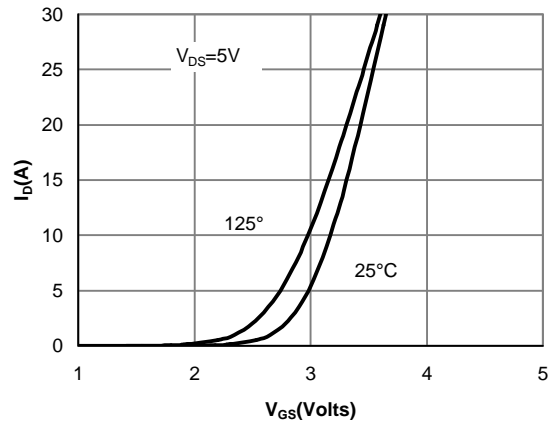


Figure 2: Transfer Characteristics

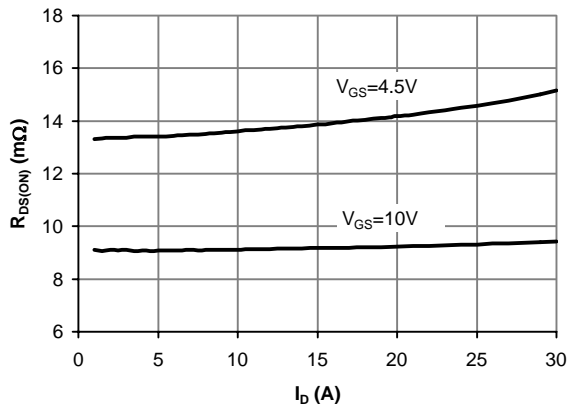


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

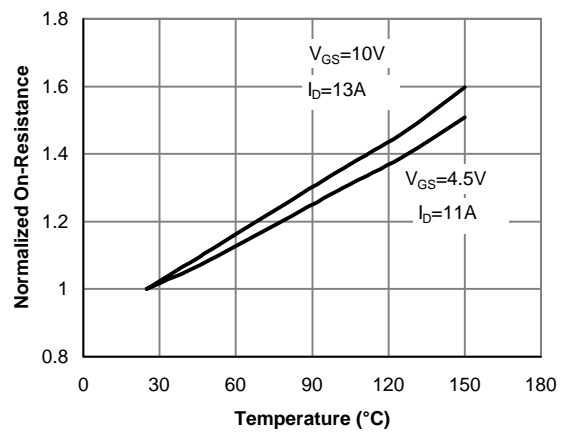


Figure 4: On-Resistance vs. Junction Temperature

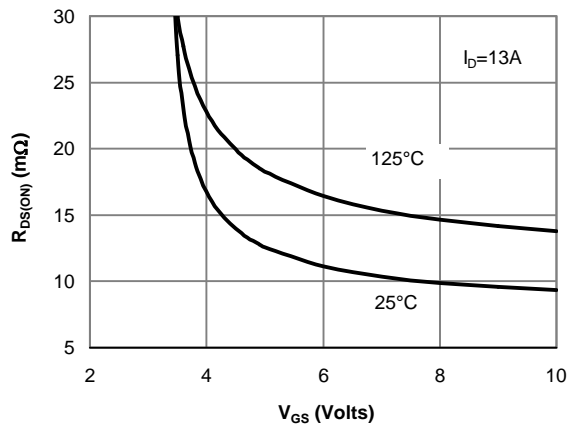


Figure 5: On-Resistance vs. Gate-Source Voltage

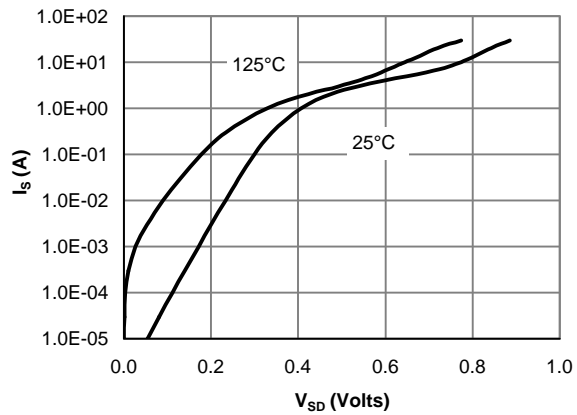


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

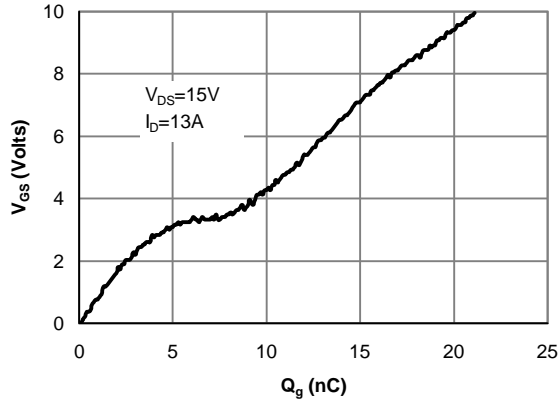


Figure 7: Gate-Charge Characteristics

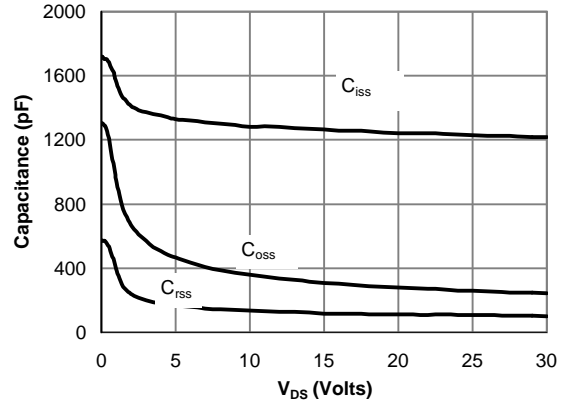


Figure 8: Capacitance Characteristics

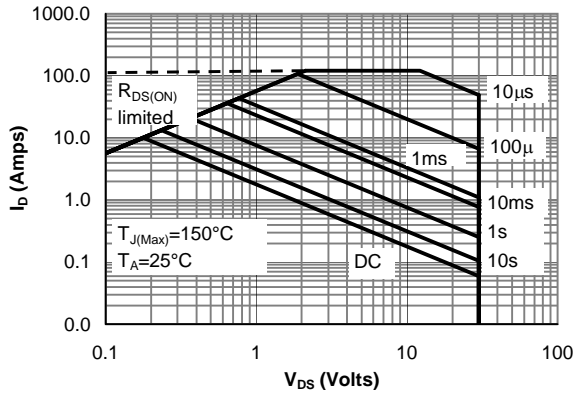


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

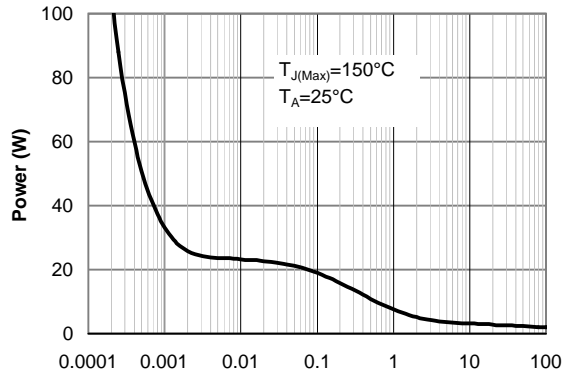


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

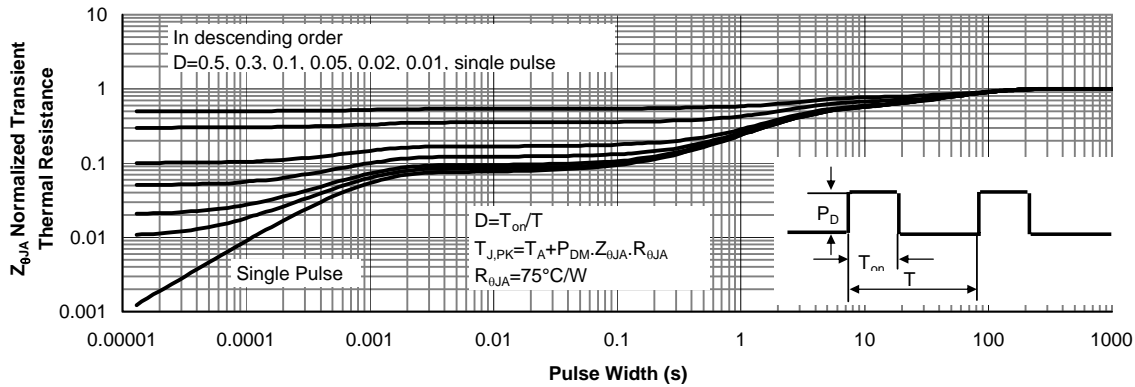


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)