



ALPHA & OMEGA
SEMICONDUCTOR

AO4480

N-Channel Enhancement Mode Field Effect Transistor



General Description

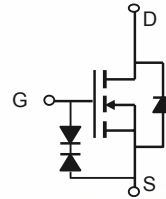
The AO4480 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It is ESD Protected. This device is suitable for use as a low side switch in SMPS and general purpose applications. *Standard Product AO4480 is Pb-free (meets ROHS & Sony 259 specifications).*

Features

V_{DS} (V) = 40V
 I_D = 14A (V_{GS} = 10V)
 $R_{DS(ON)} < 11.5m\Omega$ (V_{GS} = 10V)
 $R_{DS(ON)} < 15.5m\Omega$ (V_{GS} = 4.5V)
 ESD Rating: 4KV HBM

UIS Tested

Rg,Ciss,Coss,Crss Tested



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^{AF}	I_{DSM}	14	A
$T_A=25^\circ\text{C}$			
$T_A=70^\circ\text{C}$		11	
Pulsed Drain Current ^B	I_{DM}	70	
Power Dissipation	P_D	3.1	W
		2.0	
$T_A=25^\circ\text{C}$			
$T_A=70^\circ\text{C}$			
Avalanche Current ^B	I_{AR}	30	A
Repetitive avalanche energy 0.3mH ^B	E_{AR}	135	mJ
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	$R_{\theta JA}$	30	40	$^\circ\text{C/W}$
$t \leq 10s$				
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	59	75	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	16	24	$^\circ\text{C/W}$
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	40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =32V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±20V			±100	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D =250μA	1	2	3	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	70			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =14A T _J =125°C		9 13	11.5	mΩ
		V _{GS} =4.5V, I _D =5A		12	15.5	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =14A		50		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.7	1	V
I _S	Maximum Body-Diode Continuous Current				4	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =20V, f=1MHz		1600	1920	pF
C _{oss}	Output Capacitance			320		pF
C _{rss}	Reverse Transfer Capacitance			100		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		3.4		Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =20V, I _D =14A		22		nC
Q _g (4.5V)	Total Gate Charge			10.5		nC
Q _{gs}	Gate Source Charge			4.2		nC
Q _{gd}	Gate Drain Charge			4.8		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =20V, R _L =1.5Ω, R _{GEN} =3Ω		3.5		ns
t _r	Turn-On Rise Time			6		ns
t _{D(off)}	Turn-Off DelayTime			13.2		ns
t _f	Turn-Off Fall Time			3.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =14A, dI/dt=100A/μs		31		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =14A, dI/dt=100A/μs		33		nC

A: The value of R_{θJA} 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°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_{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 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_A=25°C. The SOA curve provides a single pulse rating.

F: The current rating is based on the t_s ≤ 10s junction to ambient thermal resistance rating.

Rev0: Oct 2006

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

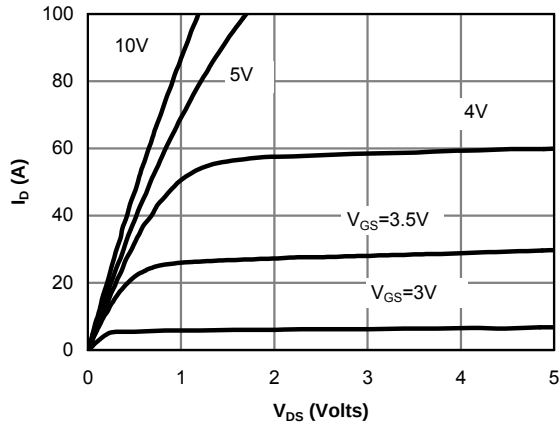


Figure 1: On-Region Characteristics

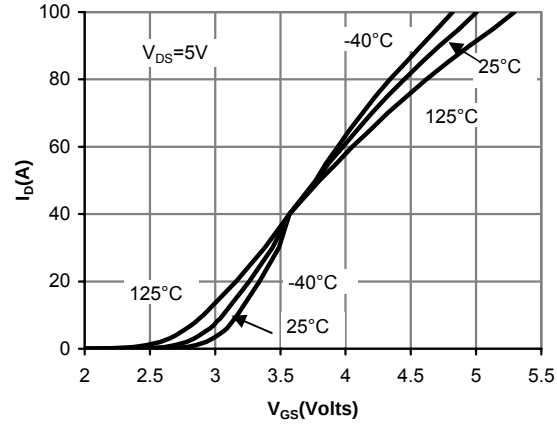


Figure 2: Transfer Characteristics

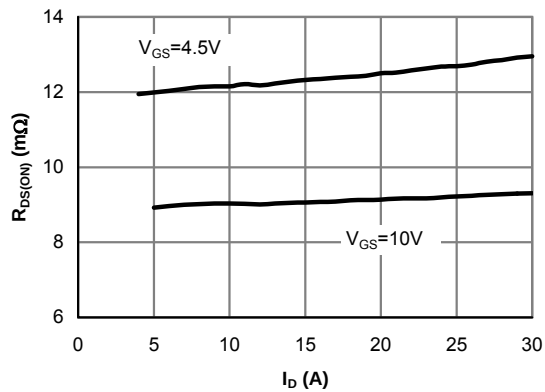


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

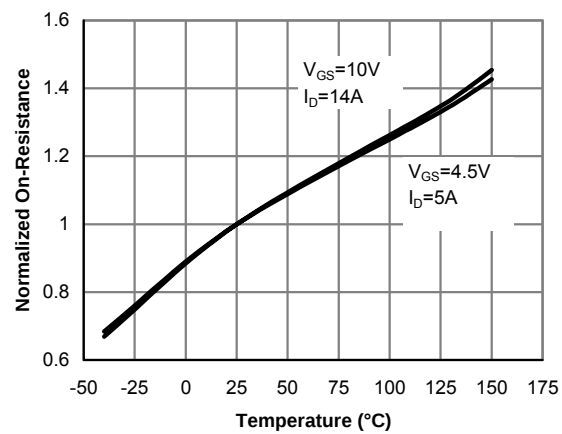


Figure 4: On-Resistance vs. Junction Temperature

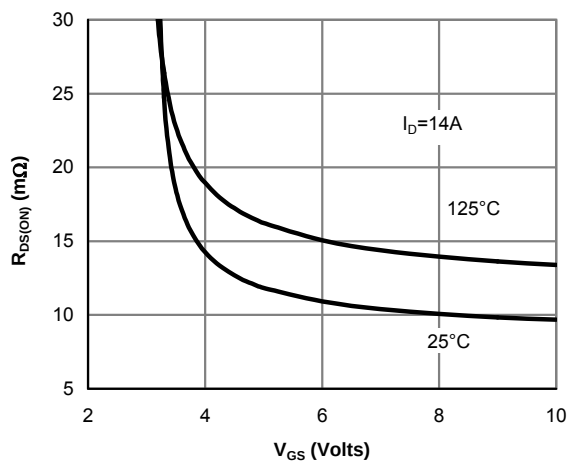


Figure 5: On-Resistance vs. Gate-Source Voltage

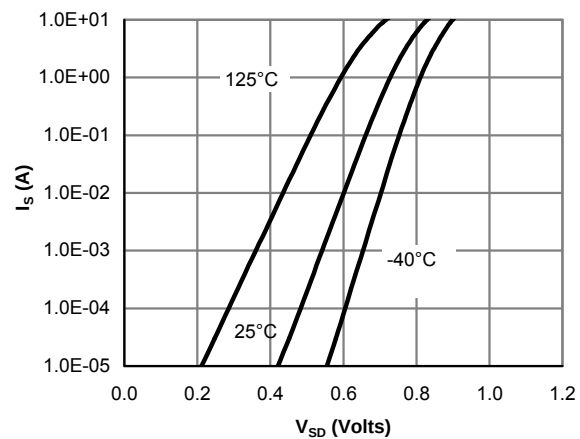


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

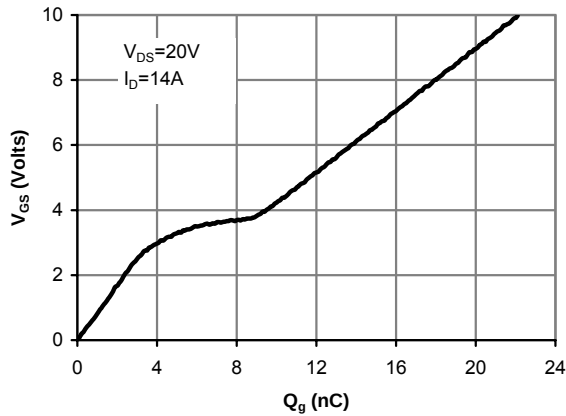


Figure 7: Gate-Charge Characteristics

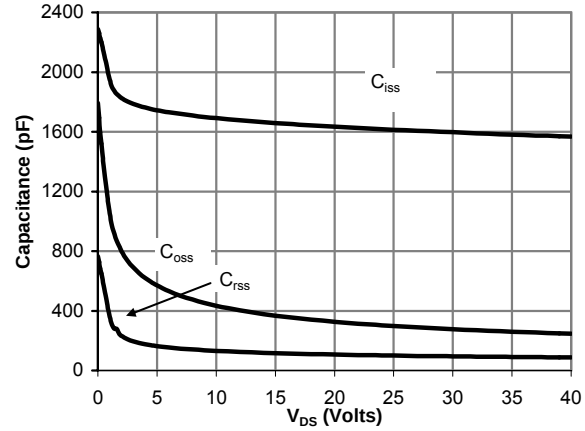


Figure 8: Capacitance Characteristics

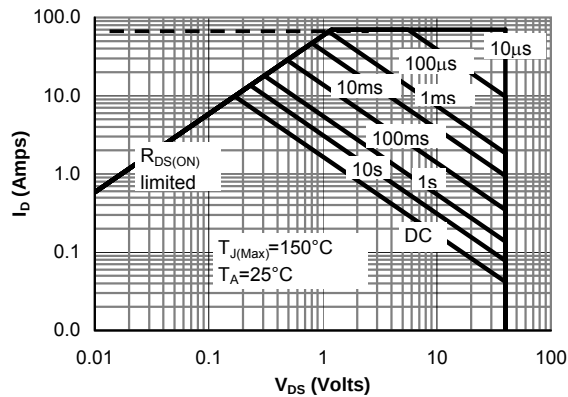


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

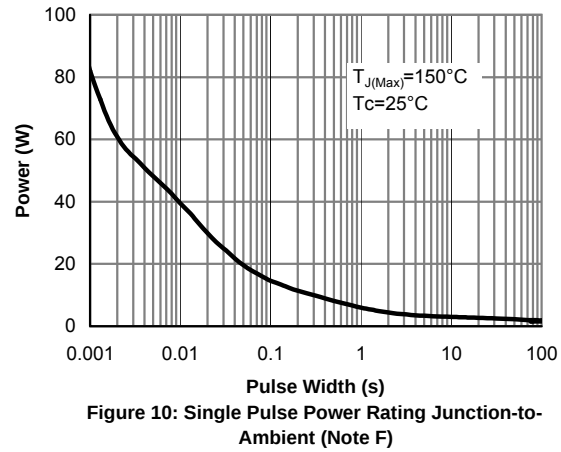


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

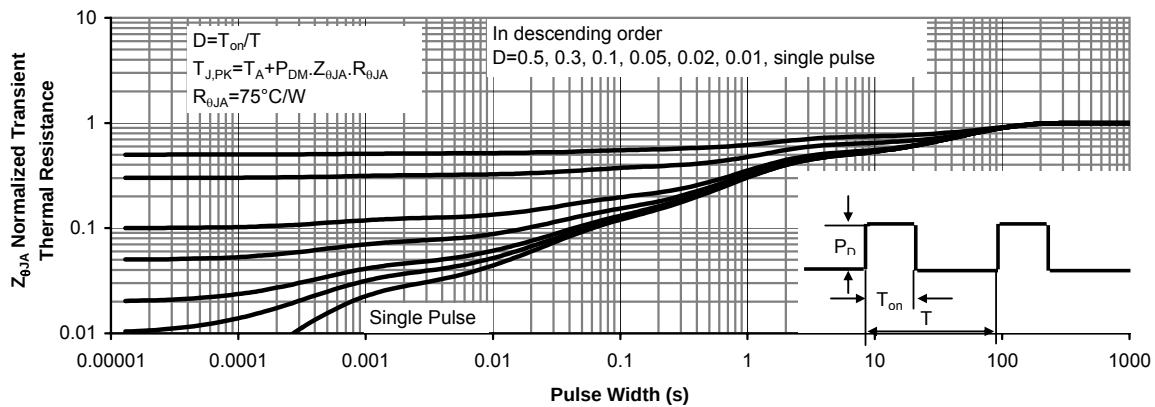


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)