



**AO4490**

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

**General Description**

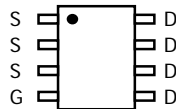
The AO4490/L uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V, while retaining a 20V  $V_{GS(MAX)}$  rating. It is ESD protected. This device is suitable for use as a load switch and general purpose applications. *AO4490 and AO4490L are electrically identical.*  
-RoHS Compliant  
-AO4490L is Halogen Free

**Features**

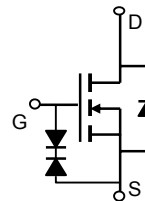
$V_{DS}$  (V) = 30V  
 $I_D$  = 16A ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 7.2m\Omega$  ( $V_{GS}$  = 10V)  
 $R_{DS(ON)} < 10m\Omega$  ( $V_{GS}$  = 4.5V)

ESD protected

**UIS Tested!**  
**Rg, Ciss, Coss, Crss Tested**



**SOIC-8**



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>AF</sup>	$T_A=25^\circ\text{C}$	16	A
	$T_A=70^\circ\text{C}$	13	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	120	
Avalanche Current <sup>G</sup>	$I_{AR}$	30	A
Repetitive avalanche energy $L=0.3\text{mH}$ <sup>G</sup>	$E_{AR}$	135	mJ
Power Dissipation	$T_A=25^\circ\text{C}$	2.8	W
	$T_A=70^\circ\text{C}$	1.8	
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>	$R_{\theta JA}$	32	45	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	62	
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	18	24	$^\circ\text{C/W}$

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	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 16\text{V}$			10	$\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1.4	1.8	2.5	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	$V_{GS}=10\text{V}$ , $I_D=16\text{A}$ $T_J=125^\circ\text{C}$ $V_{GS}=4.5\text{V}$ , $I_D=12\text{A}$		6 8.5 8	7.2 10 10	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=16\text{A}$		55		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$		0.70	1.0	V
$I_S$	Maximum Body-Diode Continuous Current				4	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance			1803	2170	pF
$C_{oss}$	Output Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=15\text{V}$ , $f=1\text{MHz}$		387		pF
$C_{rss}$	Reverse Transfer Capacitance			238		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		1.3	2	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge			36	48	nC
$Q_g(4.5\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $I_D=16\text{A}$		19		nC
$Q_{gs}$	Gate Source Charge			3.9		nC
$Q_{gd}$	Gate Drain Charge			8.7		nC
$t_{D(on)}$	Turn-On Delay Time			7.6		ns
$t_r$	Turn-On Rise Time	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $R_L=1\Omega$ , $R_{GEN}=3\Omega$		6.4		ns
$t_{D(off)}$	Turn-Off Delay Time			27		ns
$t_f$	Turn-Off Fall Time			8.5		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=16\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		27	33	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=16\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		17		nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<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.

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.

F: The current rating is based on the  $t \leq 10\text{s}$  thermal resistance rating.

G: EAR and IAR ratings are based on low frequency and duty cycles such that  $T_J(\text{start})=25^\circ\text{C}$  for each pulse.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

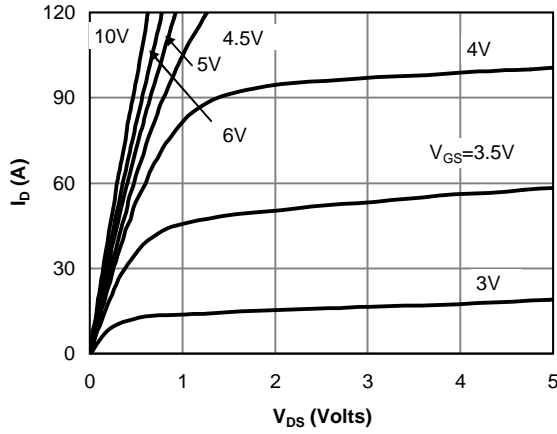


Figure 1: On-Region Characteristics

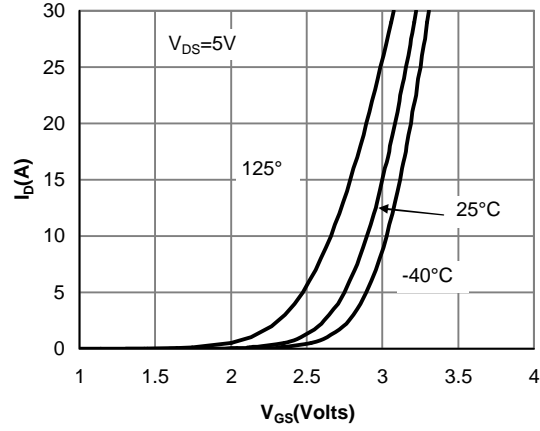


Figure 2: Transfer Characteristics

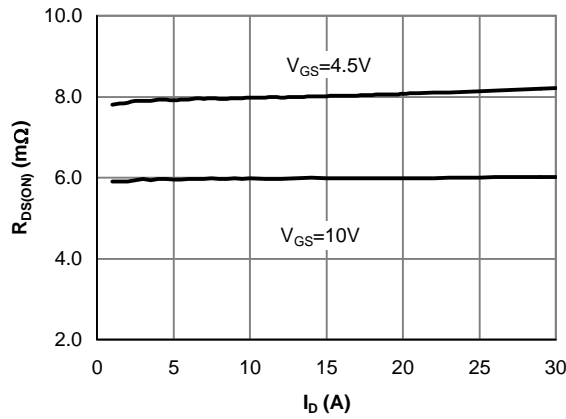


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

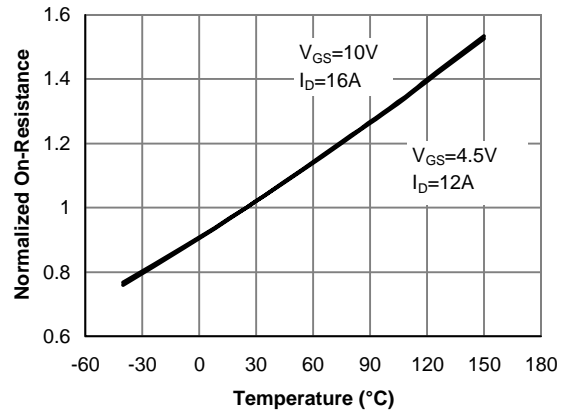


Figure 4: On-Resistance vs. Junction Temperature

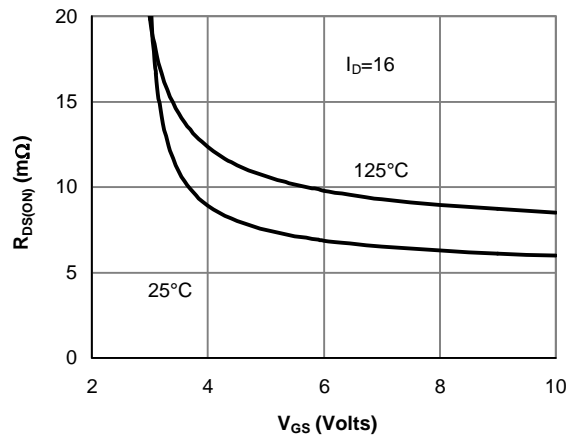


Figure 5: On-Resistance vs. Gate-Source Voltage

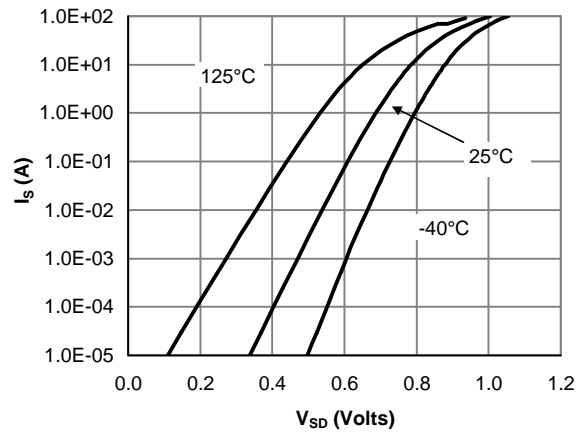


Figure 6: Body-Diode Characteristics

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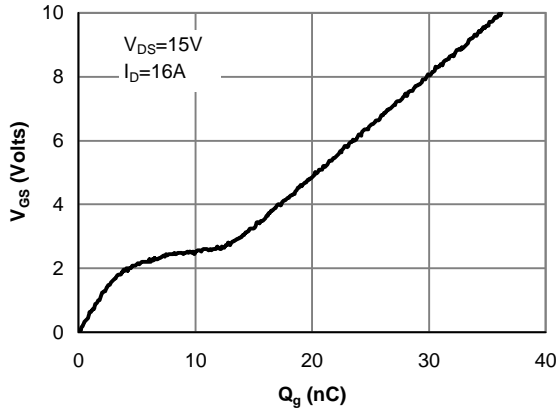


Figure 7: Gate-Charge Characteristics

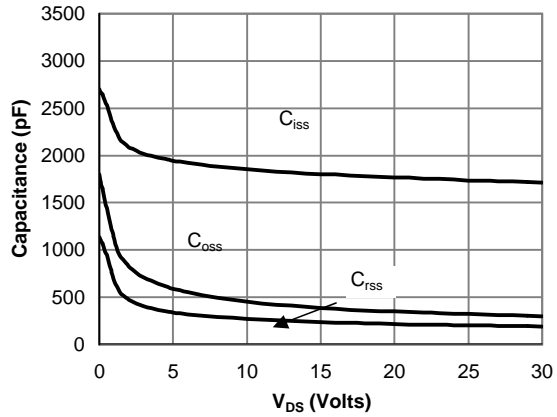


Figure 8: Capacitance Characteristics

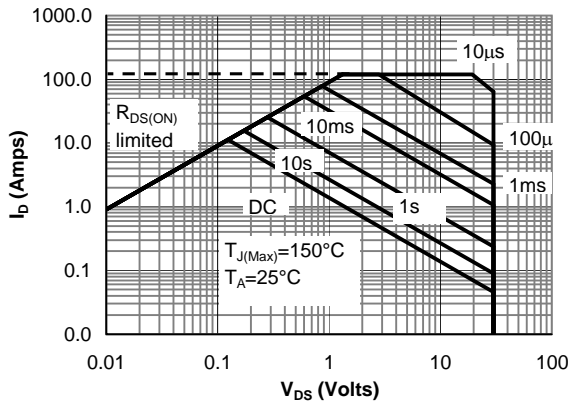


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

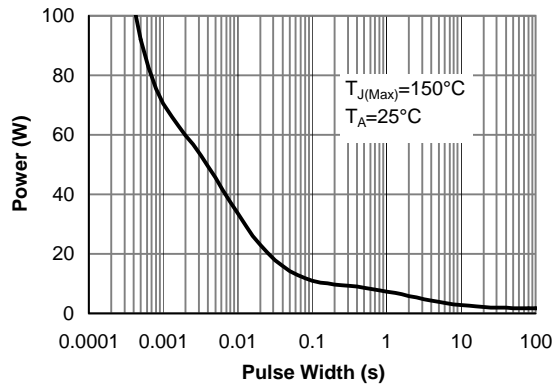


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

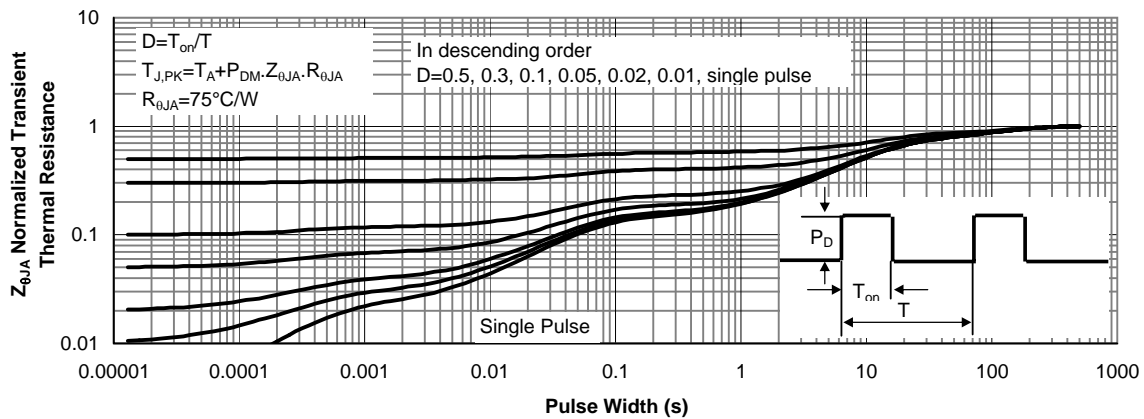


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

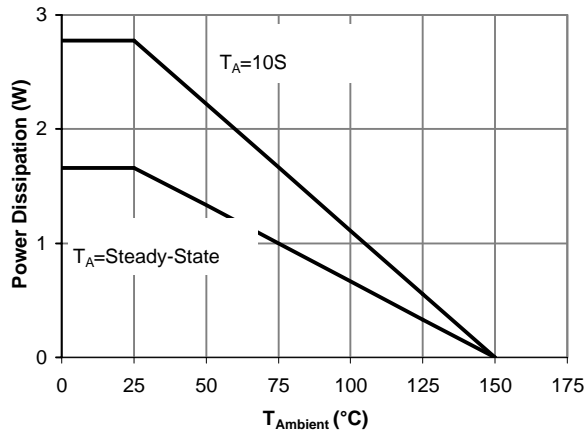


Figure 12: Power De-rating (Note A)

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