

General Description

The AO4490 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.

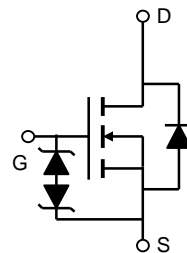
Features

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)



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}	± 20	V
Continuous Drain Current ^{AF}	$T_A=25^\circ\text{C}$	16	A
	$T_A=70^\circ\text{C}$	13	
Pulsed Drain Current ^B	I_{DM}	120	
Avalanche Current ^G	I_{AR}	30	A
Repetitive avalanche energy $L=0.3\text{mH}$ ^G	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 ^A	$R_{\theta JA}$	32	45	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		Steady-State	62	75
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	18	24	$^\circ\text{C/W}$

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	30	37		V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±16V			10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D =250μA	1.4	1.8	2.5	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	120			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =16A T _J =125°C		6 8.5	7.2 10	mΩ
		V _{GS} =4.5V, I _D =12A		8	10	
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =16A		55		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.70	1.0	V
I _S	Maximum Body-Diode Continuous Current				4	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		1803	2170	pF
C _{oss}	Output Capacitance			387		pF
C _{rss}	Reverse Transfer Capacitance			238		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1.3	2	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =16A		36	48	nC
Q _{g(4.5V)}	Total Gate Charge			19		nC
Q _{gs}	Gate Source Charge			3.9		nC
Q _{gd}	Gate Drain Charge			8.7		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =1Ω, R _{GEN} =3Ω		7.6		ns
t _r	Turn-On Rise Time			6.4		ns
t _{D(off)}	Turn-Off DelayTime			27		ns
t _f	Turn-Off Fall Time			8.5		ns
t _{rr}	Body Diode Reverse Recovery Time		I _F =16A, di/dt=100A/μs		27	33
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =16A, di/dt=100A/μs		17		nC

A: The value of R_{θJA} is measured with the device mounted on 1 in² 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 in² 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 ≤ 10s thermal resistance rating.

G: EAR and IAR ratings are based on low frequency and duty cycles such that T_{J(start)}=25°C for each pulse.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

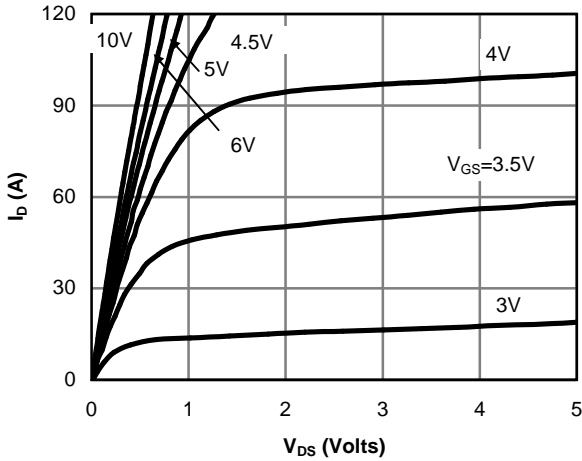


Figure 1: On-Region Characteristics

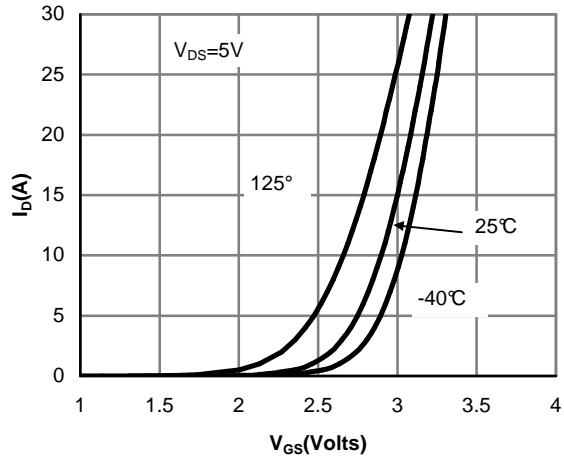


Figure 2: Transfer Characteristics

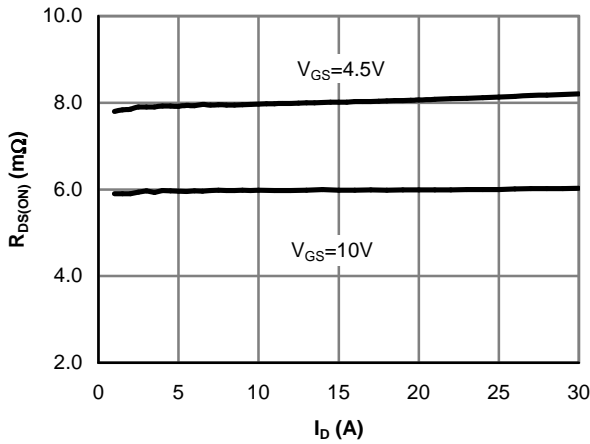


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

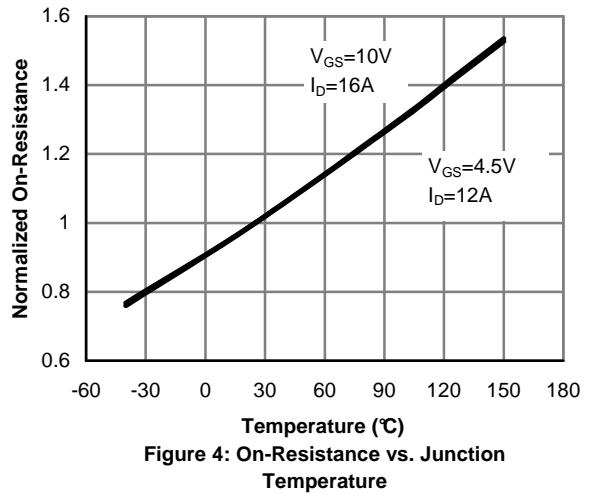


Figure 4: On-Resistance vs. Junction Temperature

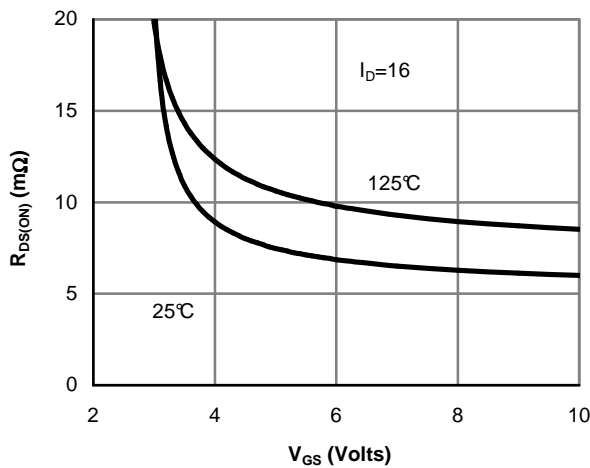


Figure 5: On-Resistance vs. Gate-Source Voltage

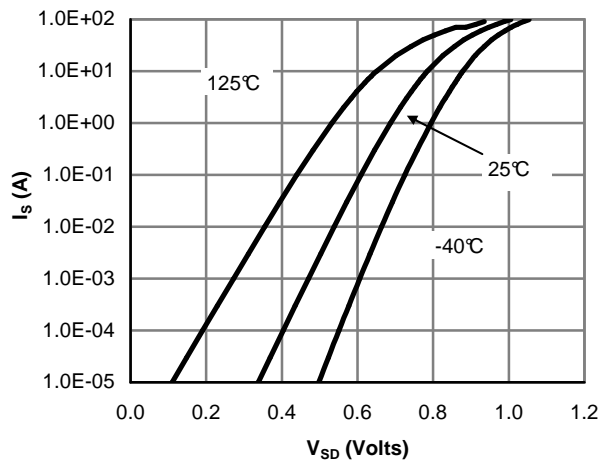


Figure 6: Body-Diode Characteristics

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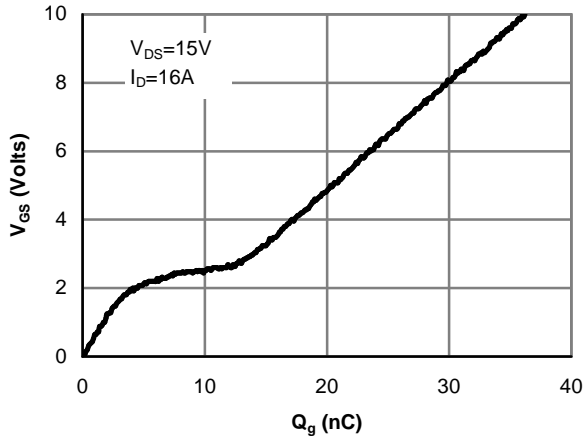


Figure 7: Gate-Charge Characteristics

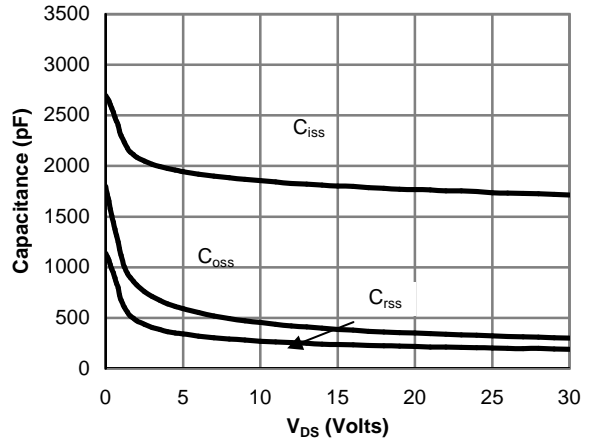


Figure 8: Capacitance Characteristics

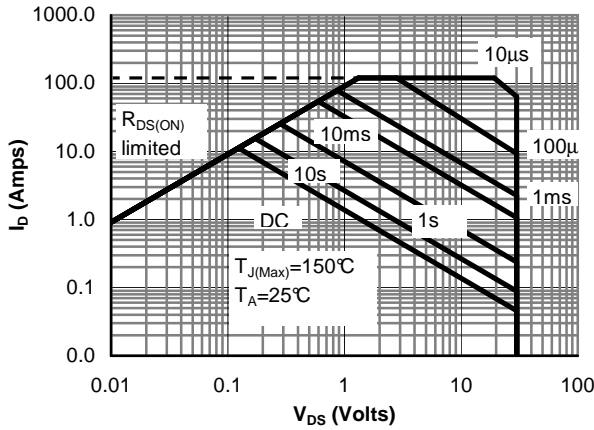


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

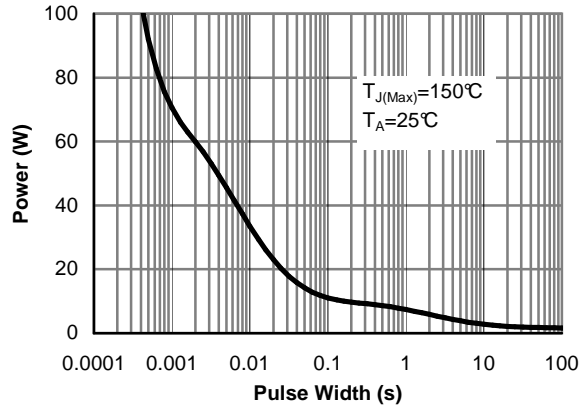


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

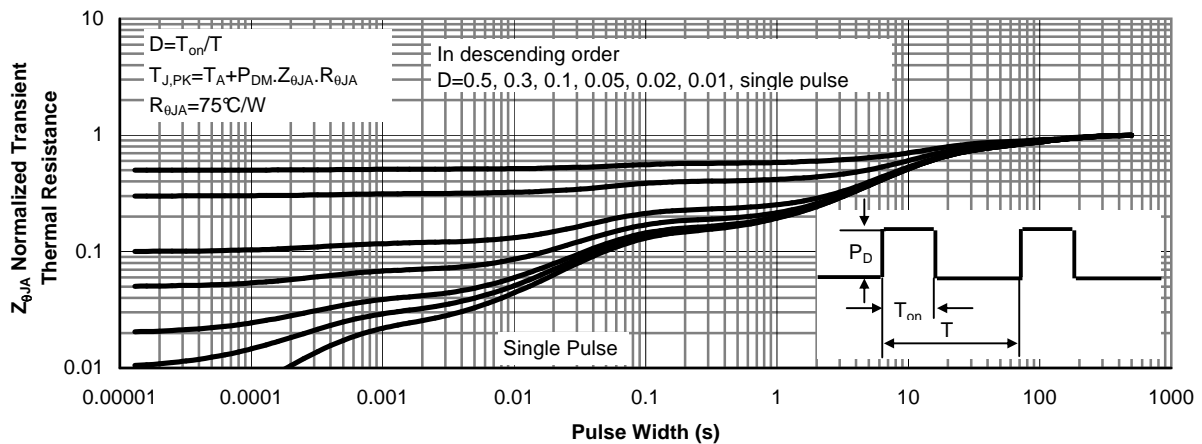


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

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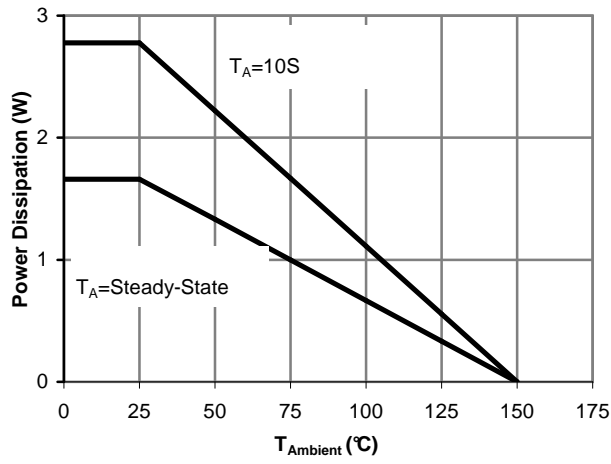
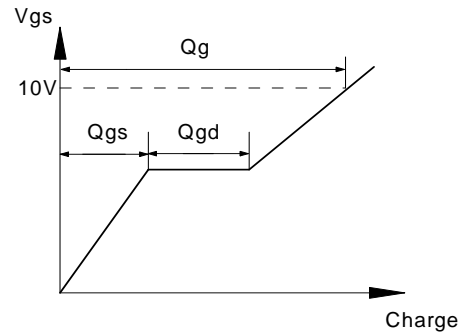
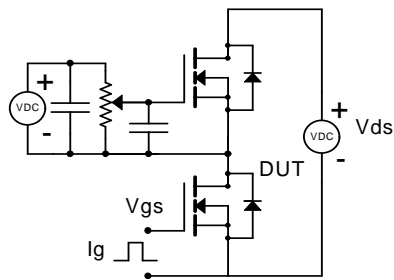
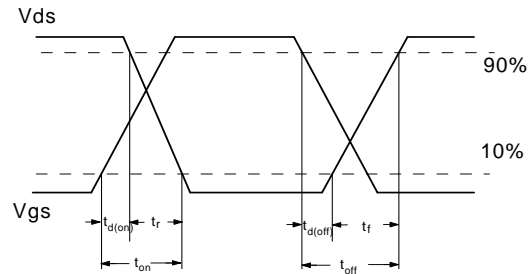
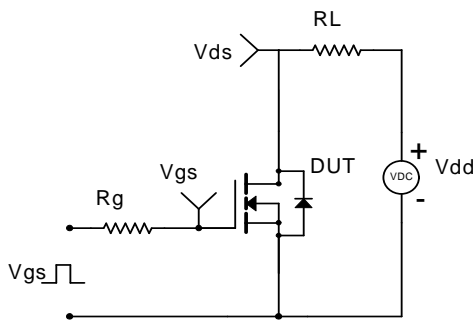


Figure 12: Power De-rating (Note A)

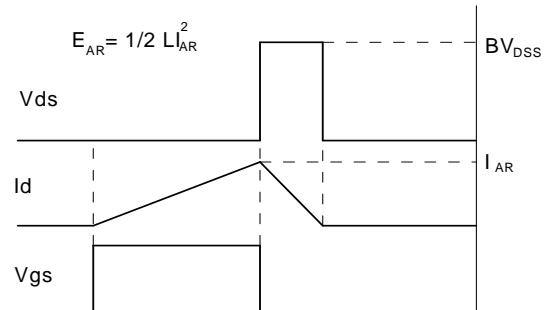
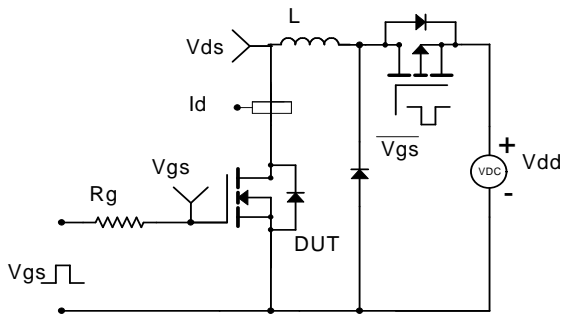
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

