



AO4458

N-Channel Enhancement Mode Field Effect Transistor

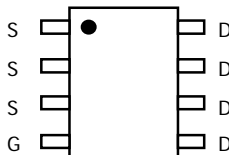
General Description

The AO4458/L uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. This device is ESD protected and it is suitable for use as a load switch or in PWM applications. *AO4458 and AO4458L are electrically identical.*

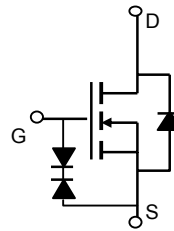
- RoHs Compliant
- AO4458L is Halogen Free

Features

V_{DS} (V) = 30V
 I_D = 20A (V_{GS} = 10V)
 $R_{DS(ON)} < 4.6m\Omega$ (V_{GS} = 10V)
 $R_{DS(ON)} < 6.4m\Omega$ (V_{GS} = 4.5V)



SOIC-8



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

Parameter	Symbol	10 Sec	Steady State	Units	
Drain-Source Voltage	V_{DS}	30		V	
Gate-Source Voltage	V_{GS}	± 20		V	
Continuous Drain Current ^A	I_D	$T_A=25^\circ\text{C}$	20	15	A
		$T_A=70^\circ\text{C}$	17	12	
Pulsed Drain Current ^B	I_{DM}	80			
Avalanche Current ^G	I_{AR}	50			
Repetitive avalanche energy $L=0.3mH$ ^G	E_{AR}	375		mJ	
Power Dissipation ^A	P_D	$T_A=25^\circ\text{C}$	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		$^\circ\text{C}$	

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	31	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		Steady State	59	75
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	16	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			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	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1.0	1.7	3	V
I _{D(ON)}	On state drain current	V _{GS} = 10V, V _{DS} = 5V	80			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 20A T _J = 125°C		3.8 5.3	4.6 6.5	mΩ
		V _{GS} = 4.5V, I _D = 18A		5.2	6.4	
g _{FS}	Forward Transconductance	V _{DS} = 5V, I _D = 20A		72		S
V _{SD}	Diode Forward Voltage	I _S = 1A, V _{GS} = 0V		0.69	1	V
I _S	Maximum Body-Diode Continuous Current				3	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		5450	6800	pF
C _{oss}	Output Capacitance			760		pF
C _{rss}	Reverse Transfer Capacitance			540		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1	1.5	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =20A		84	112	nC
Q _g (4.5V)	Total Gate Charge			42	56	nC
Q _{gs}	Gate Source Charge			12		nC
Q _{gd}	Gate Drain Charge			21		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω		13		ns
t _r	Turn-On Rise Time			9.8		ns
t _{D(off)}	Turn-Off Delay Time			49		ns
t _f	Turn-Off Fall Time			16		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, dI/dt=100A/μs		42	56	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, dI/dt=100A/μs		31		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. The current rating is based on the t ≤ 10s thermal resistance rating.

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: E_{AR} and I_{AR} ratings are based on low frequency and duty cycles to keep T_J=25°C.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

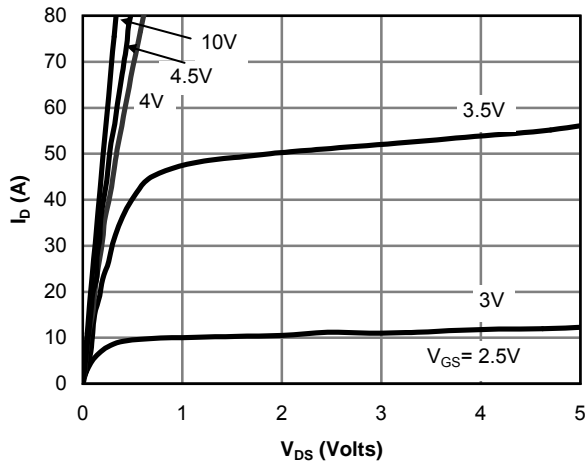


Figure 1: On-Region Characteristics

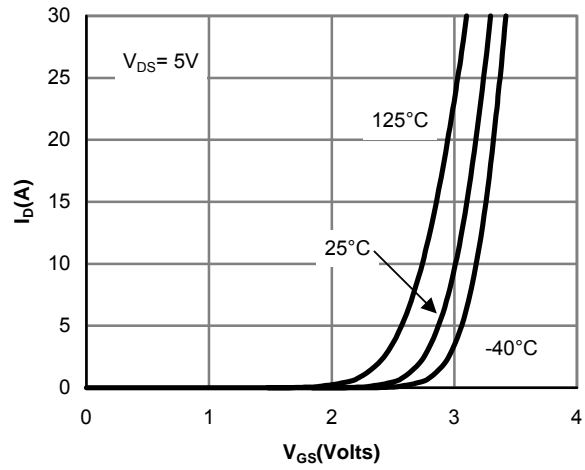


Figure 2: Transfer Characteristics

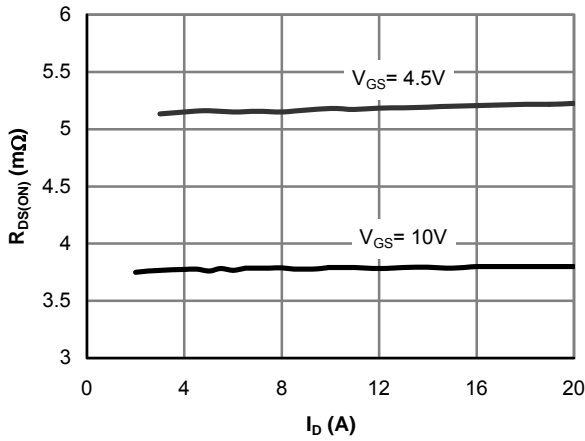


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

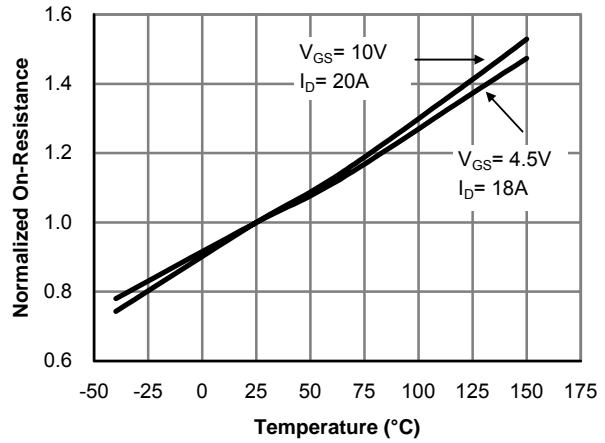


Figure 4: On-Resistance vs. Junction Temperature

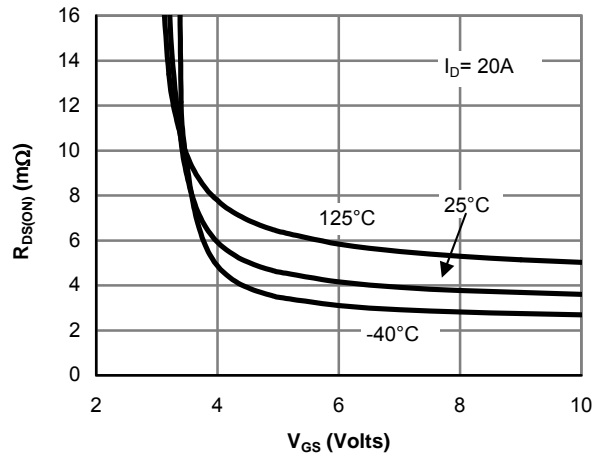


Figure 5: On-Resistance vs. Gate-Source Voltage

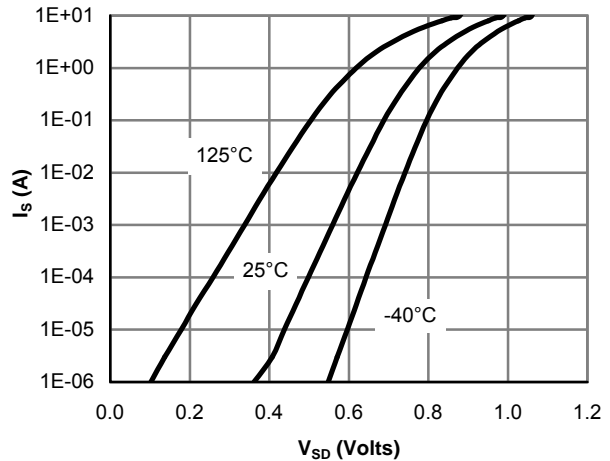


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

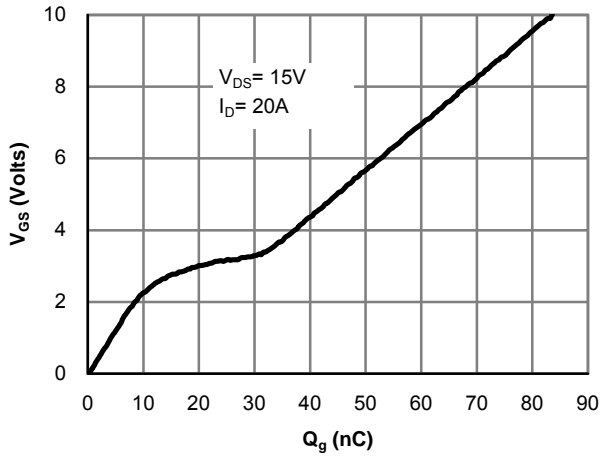


Figure 7: Gate-Charge Characteristics

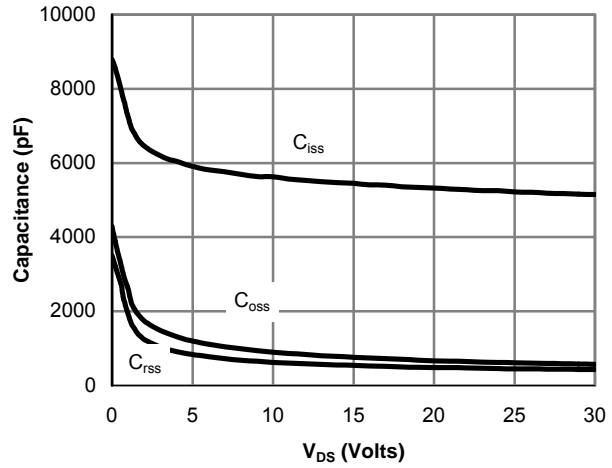


Figure 8: Capacitance Characteristics

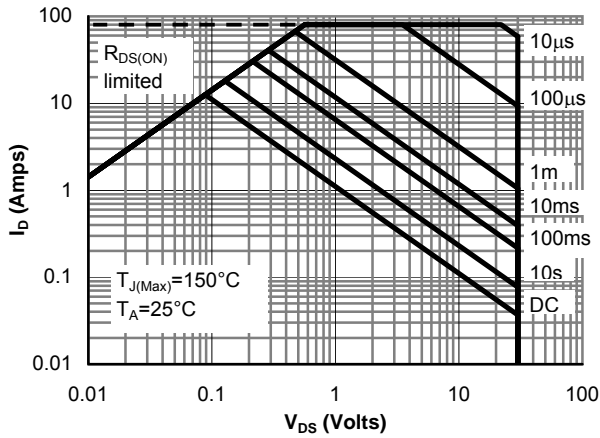


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

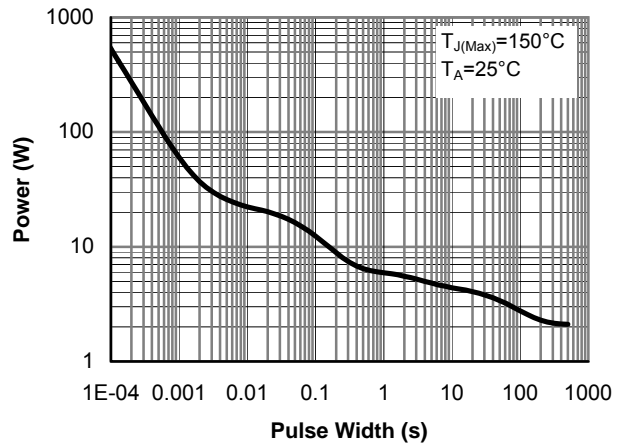


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

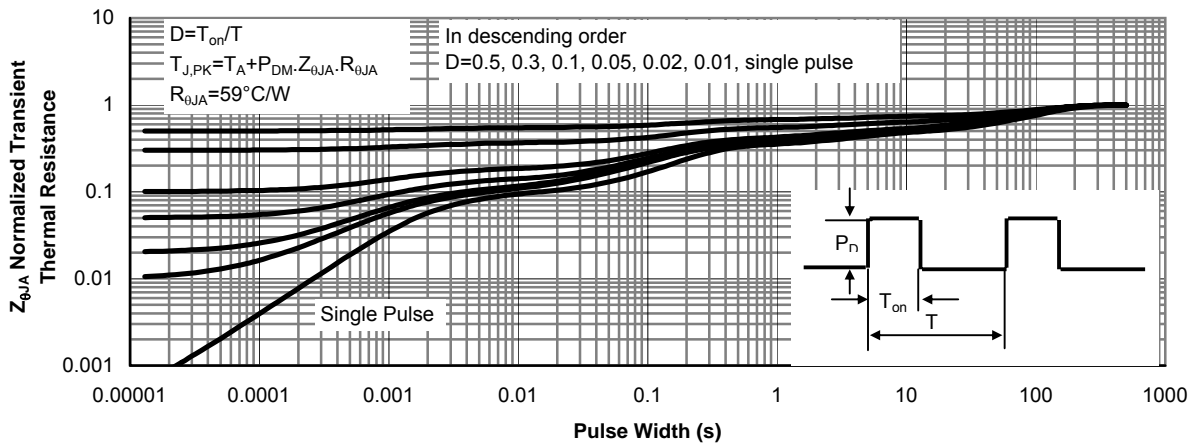


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)