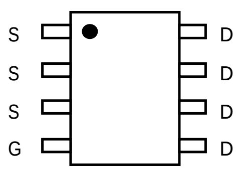
AO4458
N-Channel Enhancement Mode Field Effect Transistor

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)
$R_{DS(ON)}$ < 4.6mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 6.4mΩ (V_{GS} = 4.5V)



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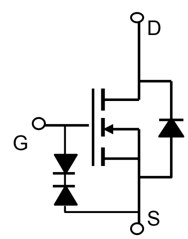

Absolute Maximum Ratings T_A=25°C unless otherwise noted					
Parameter		**Symbol**	**10 Sec**	**Steady State**	**Units**
Drain-Source Voltage		V_{DS}	30		V
Gate-Source Voltage		V_{GS}	±20		V
Continuous Drain Current [A]	T_A=25°C	I_D	20	15	A
	T_A=70°C		17	12	
Pulsed Drain Current [B]		I_{DM}	80		
Avalanche Current [G]		I_{AR}	50		
Repetitive avalanche energy L=0.3mH [G]		E_{AR}	375		mJ
Power Dissipation [A]	T_A=25°C	P_D	3.1	1.7	W
	T_A=70°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]	t ≤ 10s	$R_{\theta JA}$	31	40	°C/W
Maximum Junction-to-Ambient [A]	Steady State		59	75	°C/W
Maximum Junction-to-Lead [C]	Steady State	$R_{\theta JL}$	16	24	°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				1	µA
			T_J = 55°C			5	
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			3.8	4.6	mΩ
			T_J=125°C		5.3	6.5	
		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 DelayTime	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 DelayTime				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 $R_{\theta JA}$ is measured with the device mounted on 1in^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. The current rating is based on the t ≤ 10s thermal resistance rating.
B: Repetitive rating, pulse width limited by junction temperature.
C. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ 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 ≤ 10s thermal resistance rating.
G. E_{AR} and I_{AR} ratings are based on low frequency and duty cycles to keep T_j=25C.
Rev1: Jan 2008

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

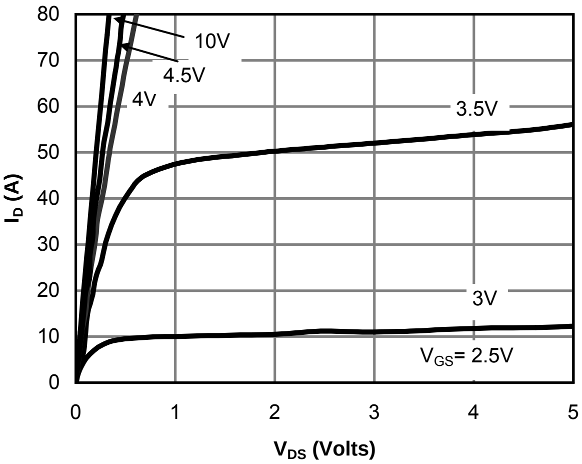

Figure 1: On-Region Characteristics

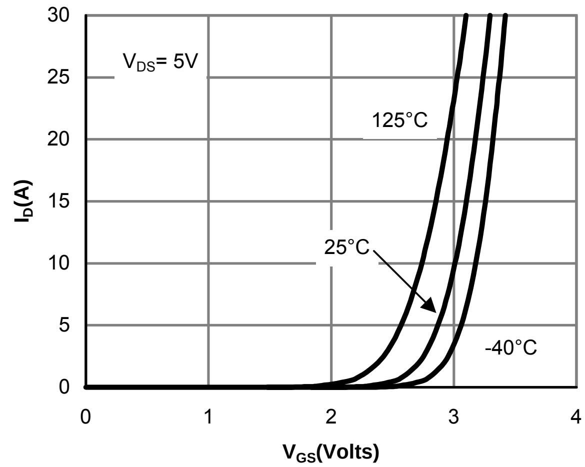

Figure 2: Transfer Characteristics

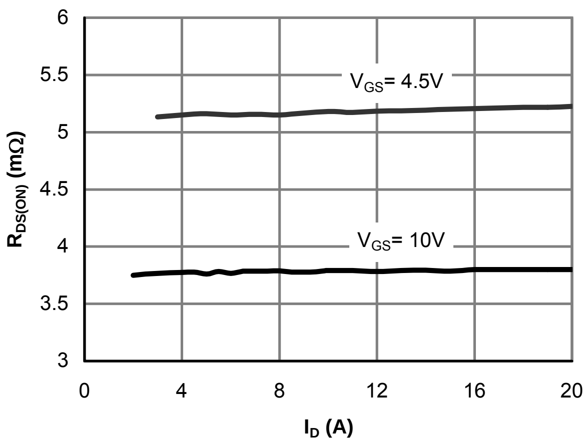

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

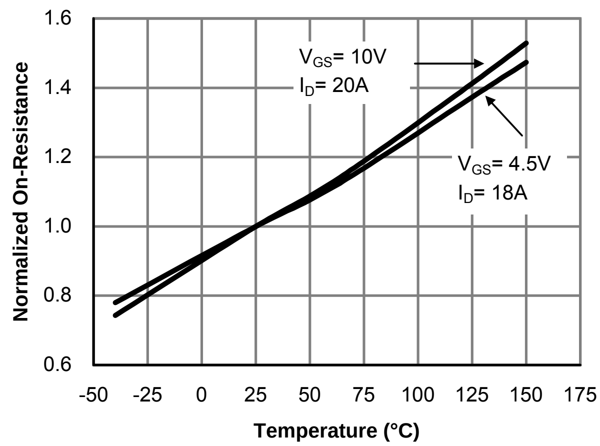

Figure 4: On-Resistance vs. Junction Temperature

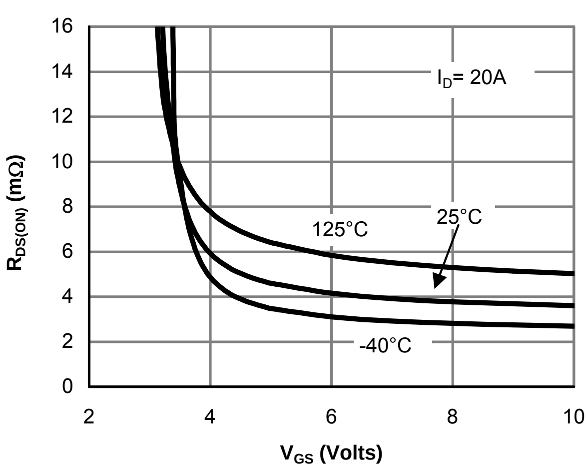

Figure 5: On-Resistance vs. Gate-Source Voltage

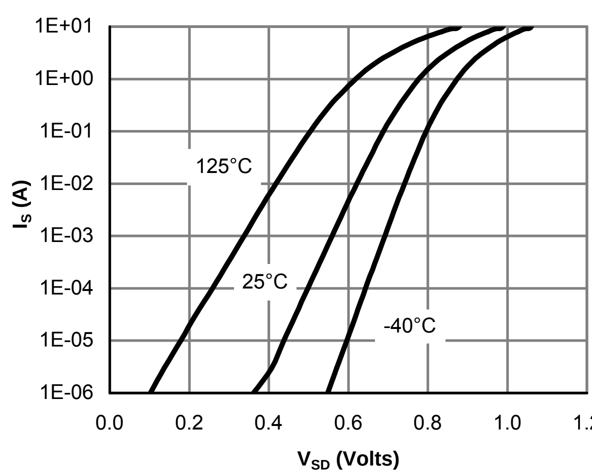

Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

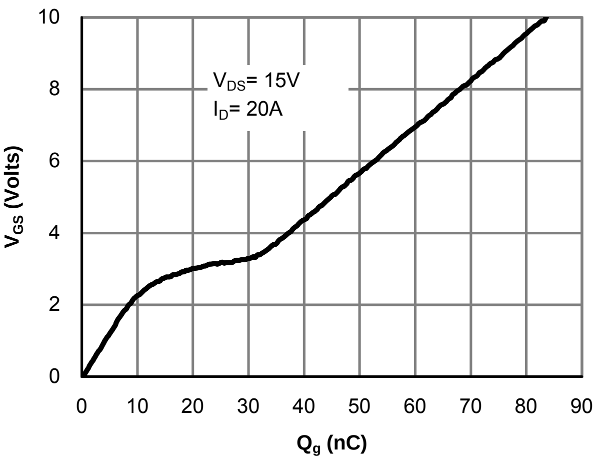

Figure 7: Gate-Charge Characteristics

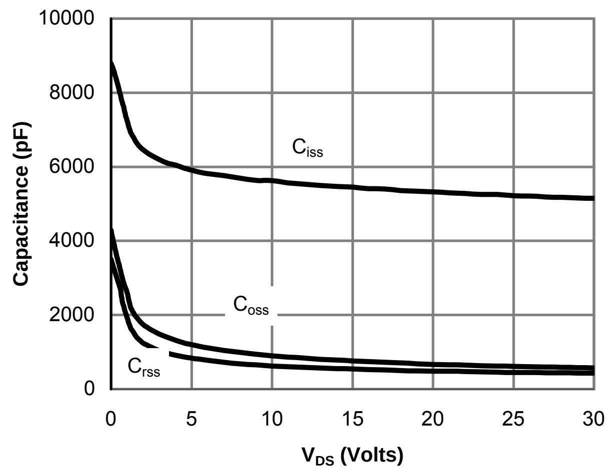

Figure 8: Capacitance Characteristics

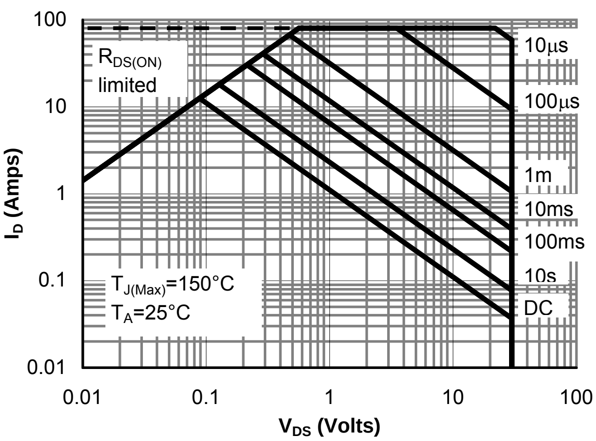

Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

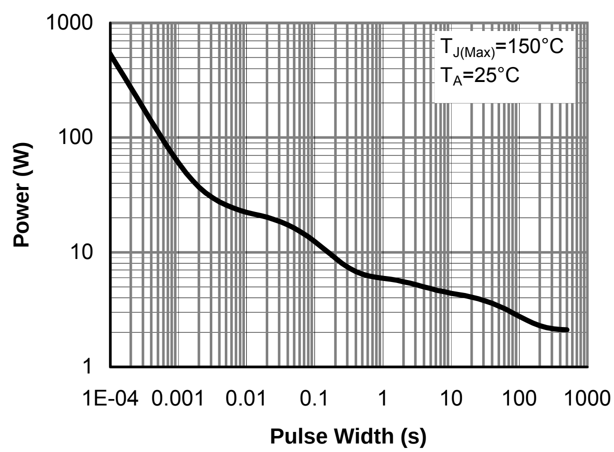

Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

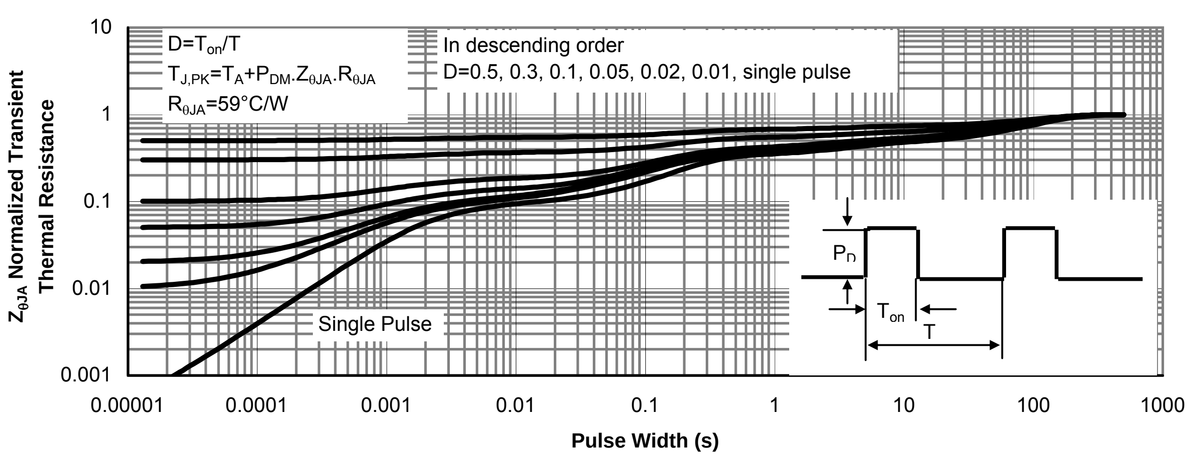

Figure 11: Normalized Maximum Transient Thermal Impedance(Note E)