ALPHA & OMEGA
SEMICONDUCTOR, LTD

AO8846

Common-Drain Dual N-Channel Enhancement Mode Field Effect Transistor

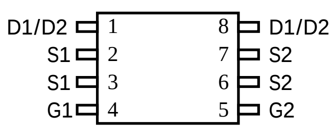
General Description

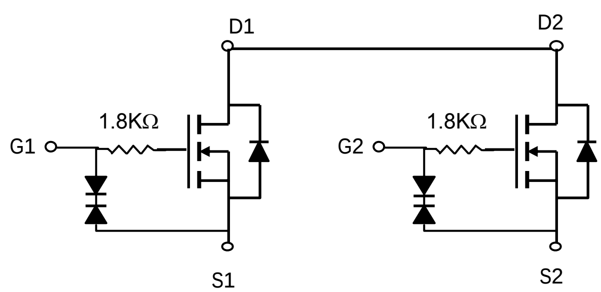
The AO8846 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It is ESD protected. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration. *Standard Product AO8846 is Pb-free (meets ROHS & Sony 259 specifications).*

Features

V_{DS} = 20V
I_D = 7.0A (V_{GS} = 4.5V)
$R_{DS(ON)}$ < 20mΩ (V_{GS} = 4.5V)
$R_{DS(ON)}$ < 20mΩ (V_{GS} = 4.0V)
$R_{DS(ON)}$ < 21mΩ (V_{GS} = 3.1V)
$R_{DS(ON)}$ < 22mΩ (V_{GS} = 2.5V)
$R_{DS(ON)}$ < 27mΩ (V_{GS} = 1.8V)

TSSOP-8
Top View





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	10 Sec	Steady State	Units
Drain-Source Voltage		V_{DS}	20		V
Gate-Source Voltage		V_{GS}	±8		V
Continuous Drain Current [A]	T_A=25°C	I_D	7	5.7	A
	T_A=70°C		5.7	4.8	
Pulsed Drain Current [B]		I_{DM}	25		
Power Dissipation [A]	T_A=25°C	P_D	1.5	1.0	W
	T_A=70°C		1.0	0.7	
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	$R_{\theta JA}$	64	83	°C/W
Maximum Junction-to-Ambient [A]	Steady State		89	120	°C/W
Maximum Junction-to-Lead [C]	Steady State	$R_{\theta JL}$	53	70	°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	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 20V, V_{GS} = 0V			1	μA
		T_J = 55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS} = 0V, V_{GS} = ±8V			±10	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} I_D = 250μA	0.5	0.7	1	V
$I_{D(ON)}$	On state drain current	V_{GS} = 4.5V, V_{DS} = 5V	25			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 4.5V, I_D = 7.0A	12	16	20	mΩ
		T_J=125°C	16	22	28	
		V_{GS} = 4.0V, I_D = 7.0A	12	16.2	20	
		V_{GS} = 3.1V, I_D = 6.5A	13	17	21	
		V_{GS} = 2.5V, I_D = 6.5A	14	18	22	
		V_{GS} = 1.8V, I_D = 6.0A	15	21	27	
g_{FS}	Forward Transconductance	V_{DS} = 4.5V, I_D = 7.0A		34		S
V_{SD}	Diode Forward Voltage	I_S = 1A,V_{GS} = 0V		0.62	1	V
I_S	Maximum Body-Diode Continuous Current				1.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz		1295	1650	pF
C_{oss}	Output Capacitance			160		pF
C_{rss}	Reverse Transfer Capacitance			87		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		1.8		kΩ
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}= 4.5V, V_{DS}= 10V, I_D= 7A		10	13	nC
Q_{gs}	Gate Source Charge			4.2		nC
Q_{gd}	Gate Drain Charge			2.6		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=4.5V, V_{DS}=10V, R_L=1.4Ω, R_{GEN}=3Ω		280		ns
t_r	Turn-On Rise Time			328		ns
$t_{D(off)}$	Turn-Off DelayTime			3.76		μs
t_f	Turn-Off Fall Time			2.24		μs
t_{rr}	Body Diode Reverse Recovery Time	I_F=7A, dI/dt=100A/μs, V_{GS}=-9V		31	41	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=7A, dI/dt=100A/μs, V_{GS}=-9V		6.8		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 < 300μs 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

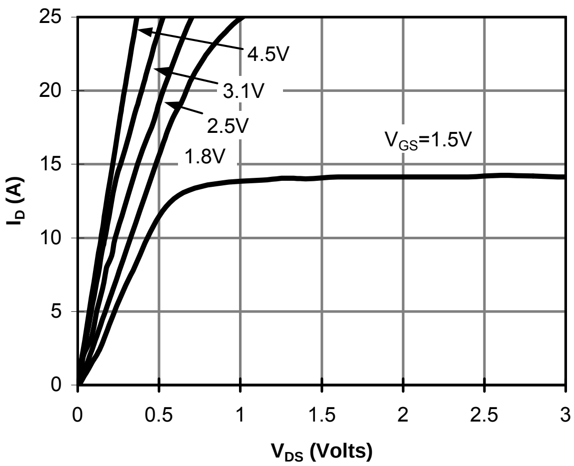

Figure 1: On-Region Characteristics

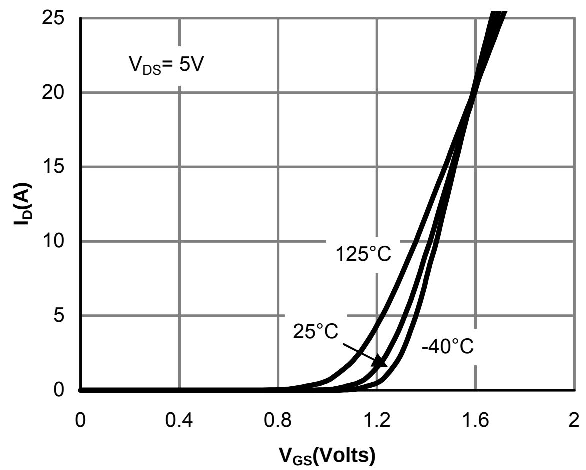

Figure 2: Transfer Characteristics

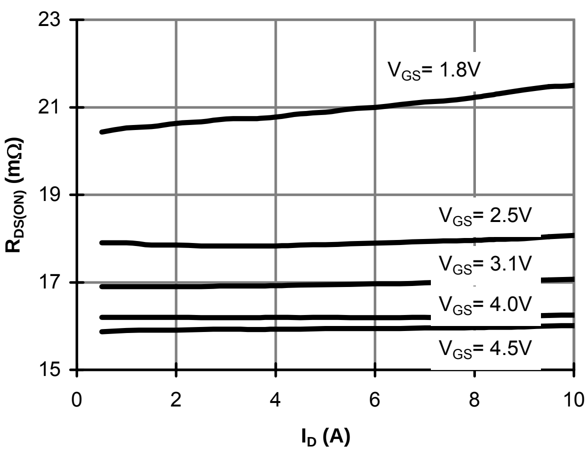

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

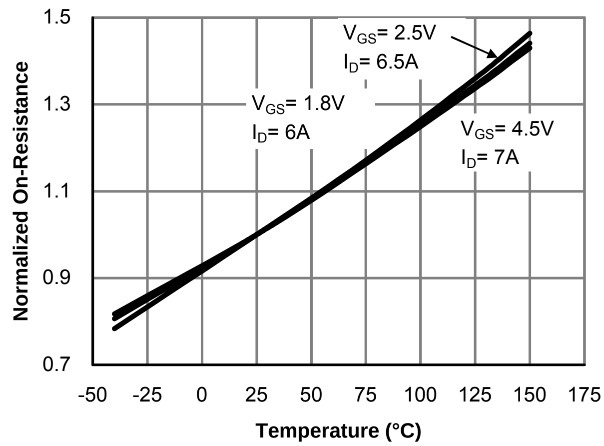

Figure 4: On-Resistance vs. Junction Temperature

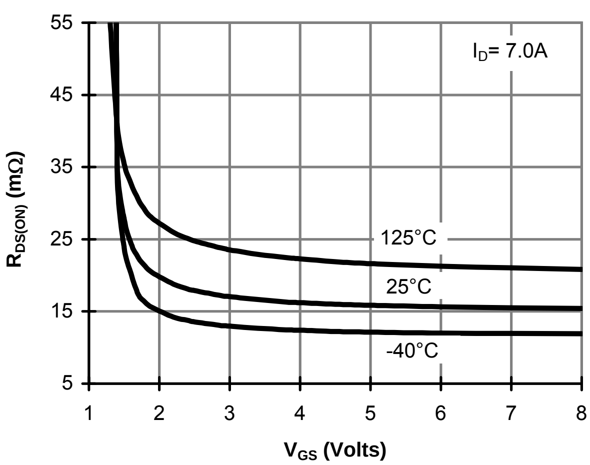

Figure 5: On-Resistance vs. Gate-Source Voltage

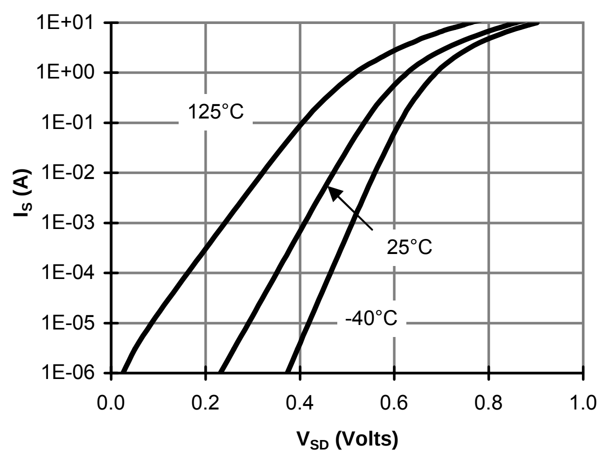

Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

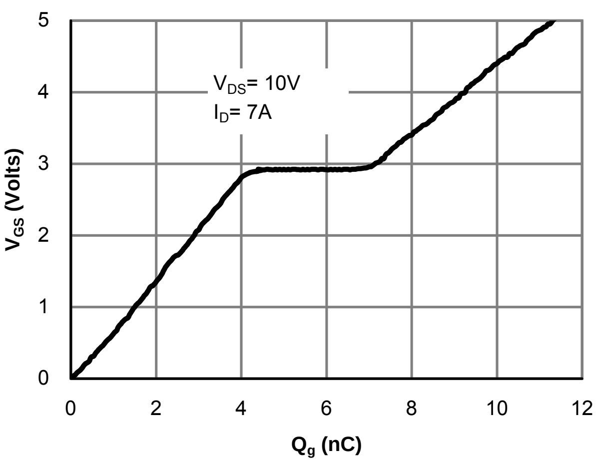

Figure 7: Gate-Charge Characteristics

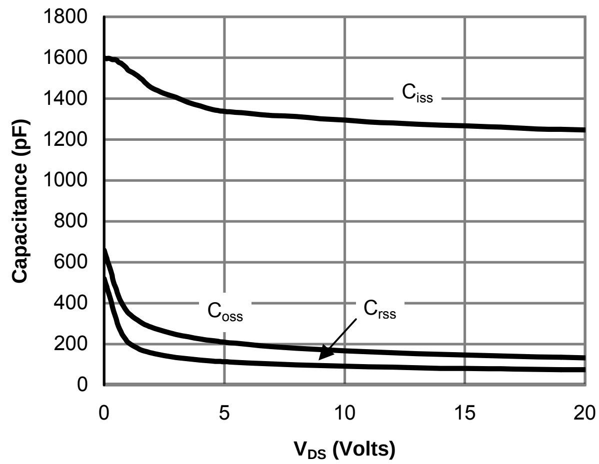

Figure 8: Capacitance Characteristics

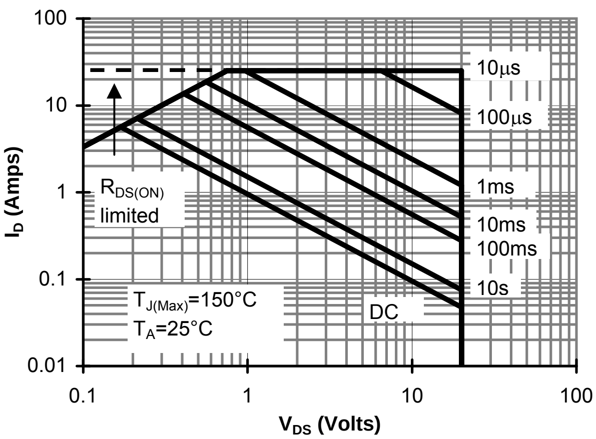

Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

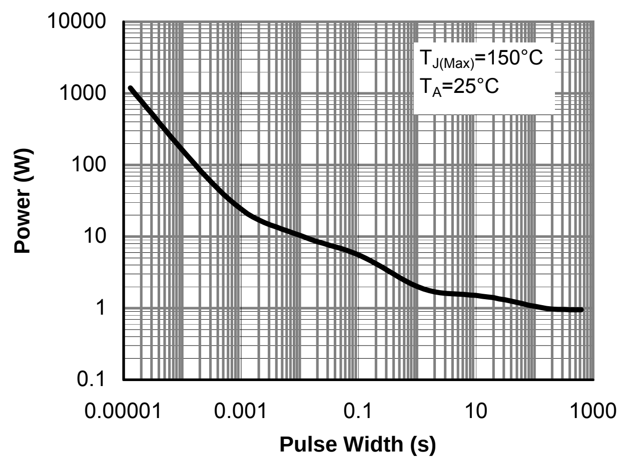

Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

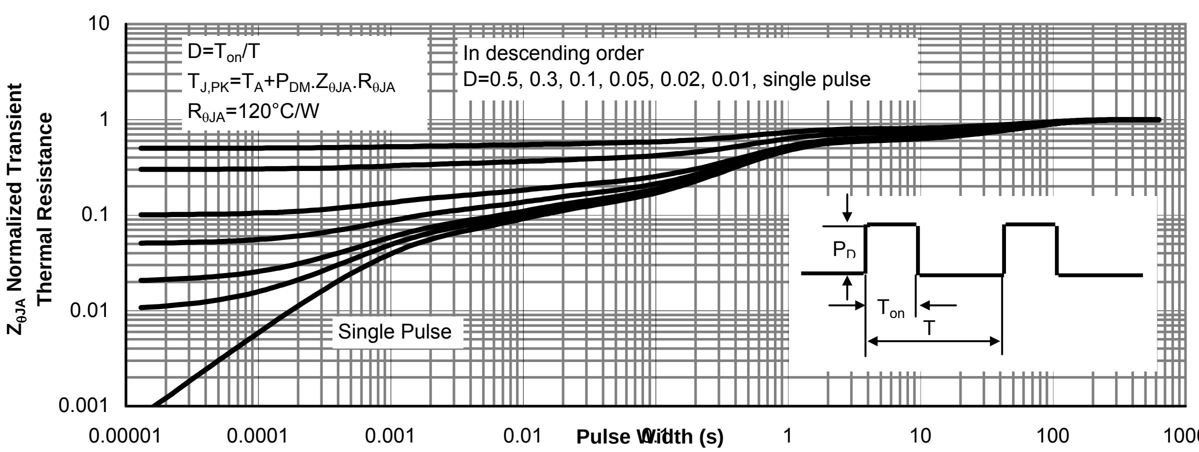

Figure 11: Normalized Maximum Transient Thermal Impedance(Note E)