



ALPHA & OMEGA
SEMICONDUCTOR, LTD

AO8846

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

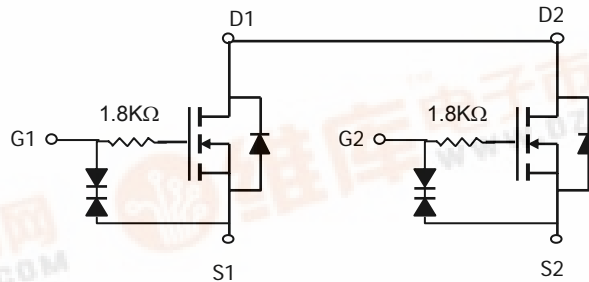
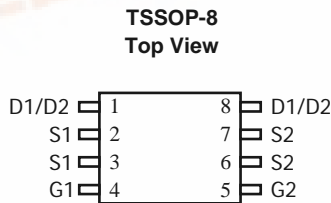


General Description

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

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



Absolute Maximum Ratings $T_A=25^\circ C$ 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	I_D	$T_A=25^\circ C$	7	A
		$T_A=70^\circ C$	5.7	
Pulsed Drain Current ^B	I_{DM}	25		
Power Dissipation ^A	P_D	$T_A=25^\circ C$	1.5	W
		$T_A=70^\circ C$	1.0	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	64	83	$^\circ C/W$
Maximum Junction-to-Ambient ^A		89	120	
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	53	70	$^\circ C/W$



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 T _J = 55°C			1 5	μA
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 T _J = 125°C	12	16	20	mΩ
			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 Delay Time	V _{GS} =4.5V, V _{DS} =10V, R _L =1.4Ω, R _{GEN} =3Ω		6.4		ns
t _r	Turn-On Rise Time			12.4		ns
t _{D(off)}	Turn-Off Delay Time			42		ns
t _f	Turn-Off Fall Time			15		ns
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_{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 < 300μs 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

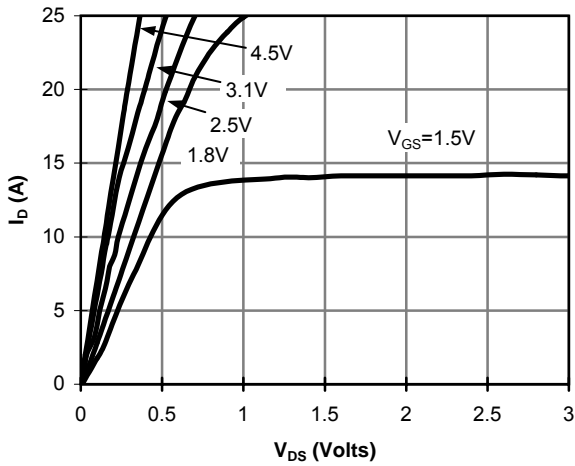


Figure 1: On-Region Characteristics

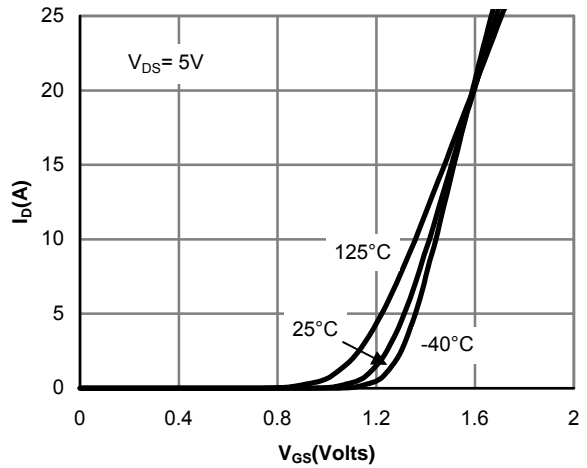


Figure 2: Transfer Characteristics

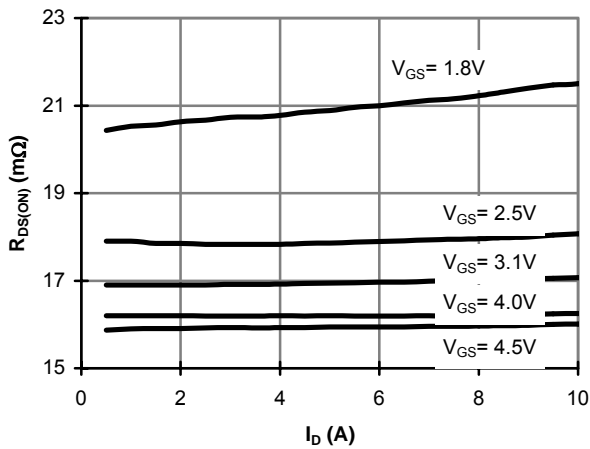


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

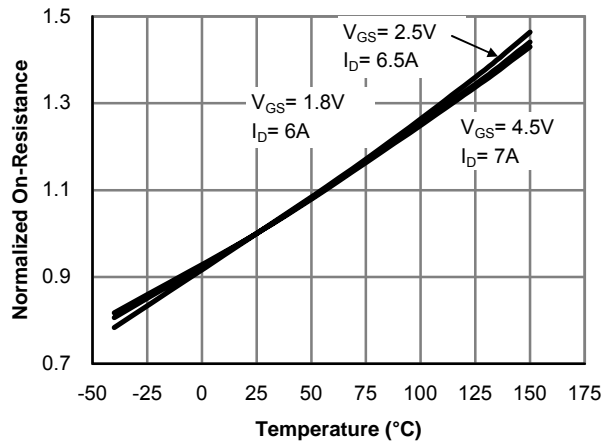


Figure 4: On-Resistance vs. Junction Temperature

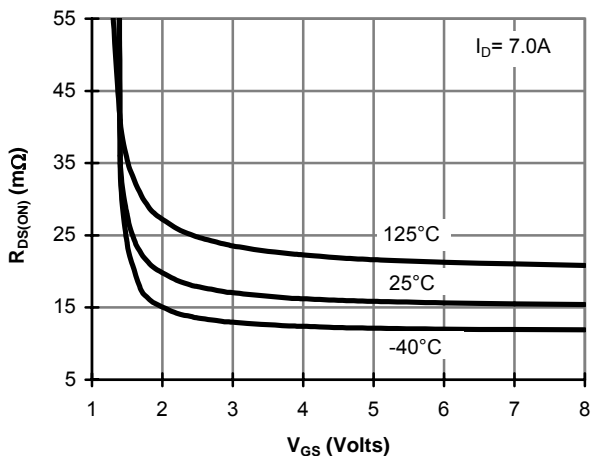


Figure 5: On-Resistance vs. Gate-Source Voltage

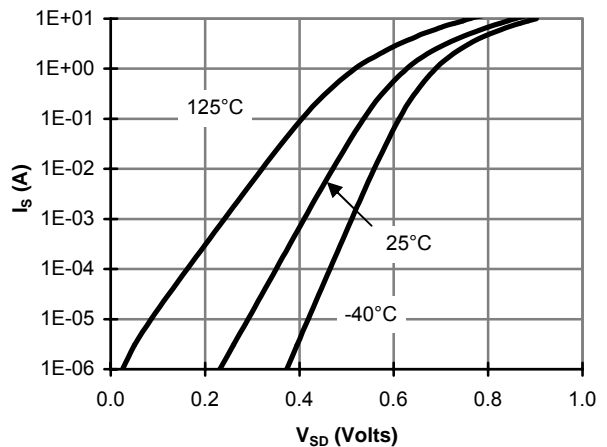


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

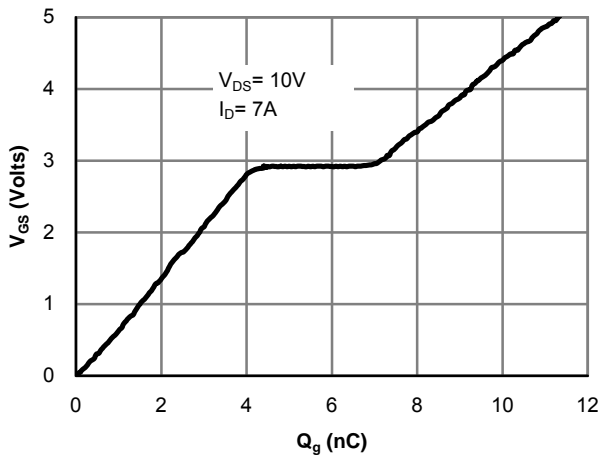


Figure 7: Gate-Charge Characteristics

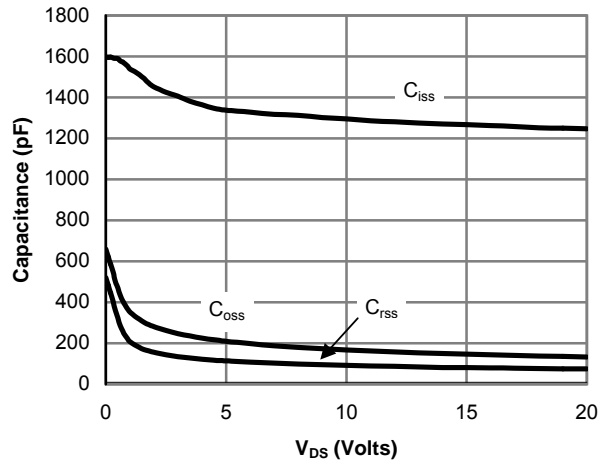


Figure 8: Capacitance Characteristics

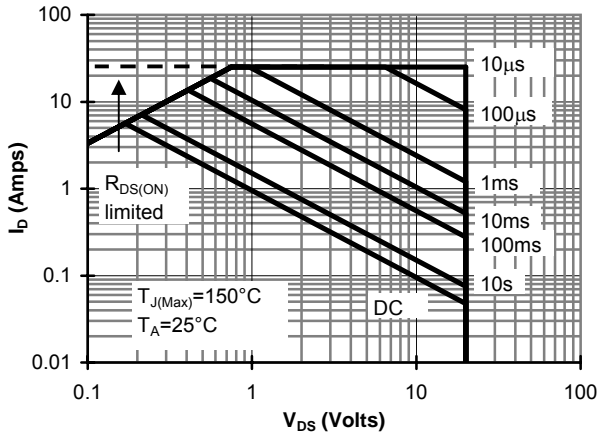


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

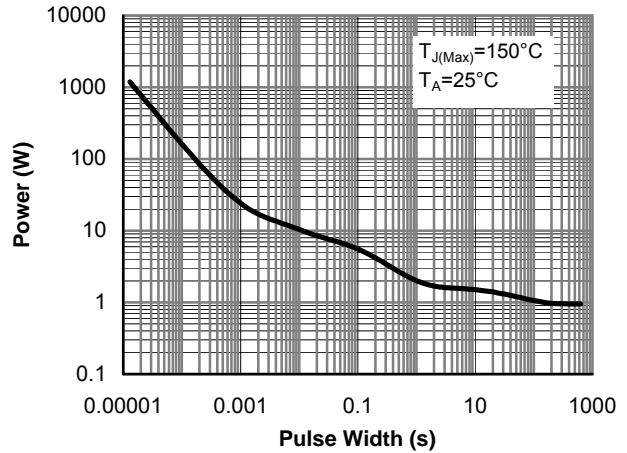


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

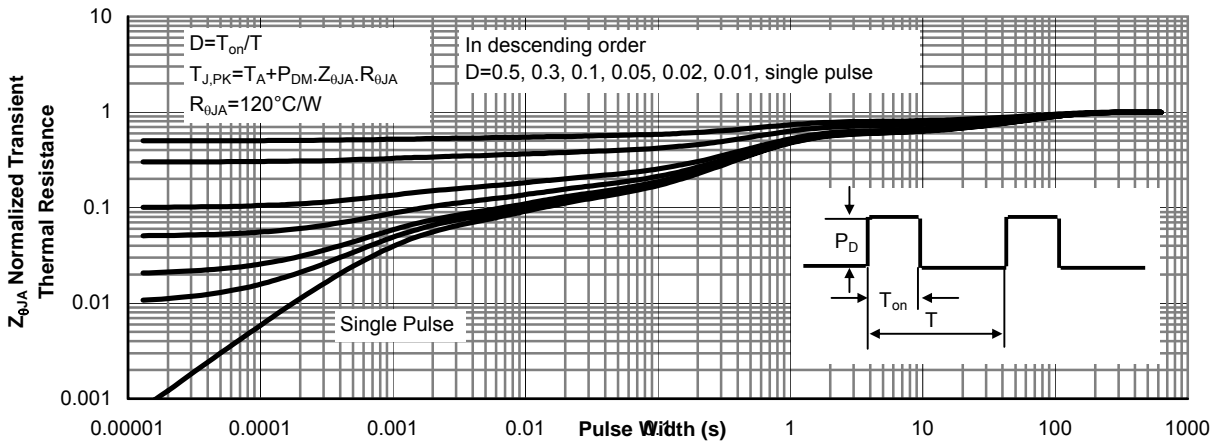


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)