



AO8846

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

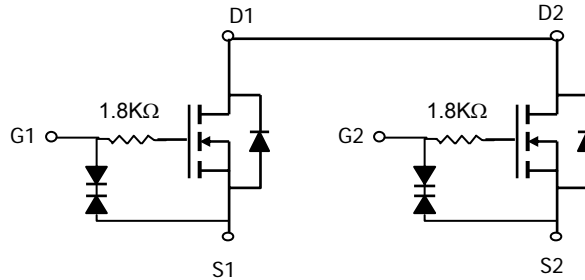
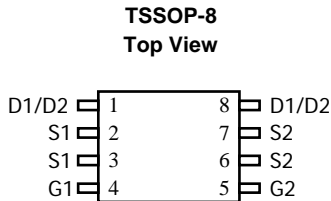


General Description

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	5.7	A
		$T_A=70^\circ C$	5.7	4.8	
Pulsed Drain Current ^B	I_{DM}	25			
Power Dissipation ^A	P_D	$T_A=25^\circ C$	1.5	1.0	W
		$T_A=70^\circ C$	1.0	0.7	
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 $t \leq 10s$	$R_{\theta JA}$	64	83	$^\circ C/W$
Maximum Junction-to-Ambient ^A Steady State		89	120	$^\circ C/W$
Maximum Junction-to-Lead ^C Steady State	$R_{\theta JL}$	53	70	$^\circ C/W$

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	20			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS} = 0\text{V}, V_{GS} = \pm 8\text{V}$			± 10	μA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	0.5	0.7	1	V
$I_{D(ON)}$	On state drain current	$V_{GS} = 4.5\text{V}, V_{DS} = 5\text{V}$	25			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 4.5\text{V}, I_D = 7.0\text{A}$ $T_J = 125^\circ\text{C}$	12	16	20	m Ω
		$V_{GS} = 4.0\text{V}, I_D = 7.0\text{A}$	12	16.2	20	
		$V_{GS} = 3.1\text{V}, I_D = 6.5\text{A}$	13	17	21	
		$V_{GS} = 2.5\text{V}, I_D = 6.5\text{A}$	14	18	22	
		$V_{GS} = 1.8\text{V}, I_D = 6.0\text{A}$	15	21	27	
g_{FS}	Forward Transconductance	$V_{DS} = 4.5\text{V}, I_D = 7.0\text{A}$		34		S
V_{SD}	Diode Forward Voltage	$I_S = 1\text{A}, V_{GS} = 0\text{V}$		0.62	1	V
I_S	Maximum Body-Diode Continuous Current				1.5	A
DYNAMIC PARAMETERS						
C_{ISS}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=10\text{V}, f=1\text{MHz}$		1295	1650	pF
C_{OSS}	Output Capacitance			160		pF
C_{RSS}	Reverse Transfer Capacitance			87		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		1.8		k Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS} = 4.5\text{V}, V_{DS} = 10\text{V}, I_D = 7\text{A}$		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	$V_{GS}=4.5\text{V}, V_{DS}=10\text{V}, R_L=1.4\Omega,$ $R_{GEN}=3\Omega$		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	$I_F=7\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{GS}=-9\text{V}$		31	41	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=7\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{GS}=-9\text{V}$		6.8		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using $< 300\mu\text{s}$ 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 $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

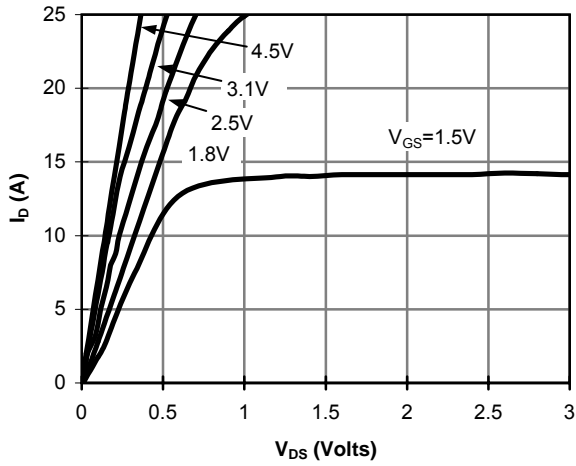


Figure 1: On-Region Characteristics

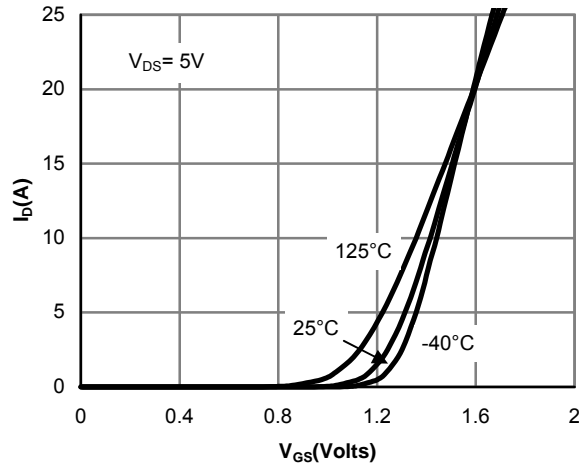


Figure 2: Transfer Characteristics

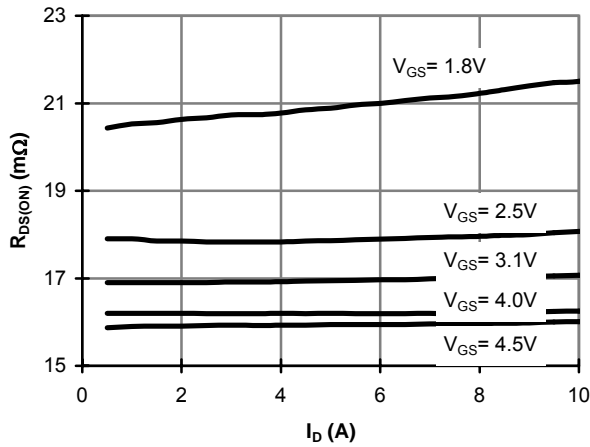


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

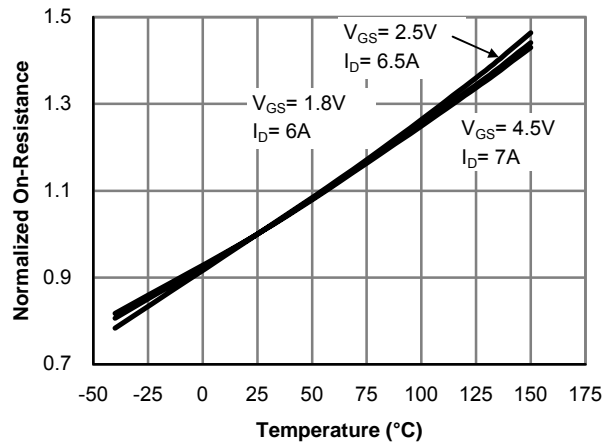


Figure 4: On-Resistance vs. Junction Temperature

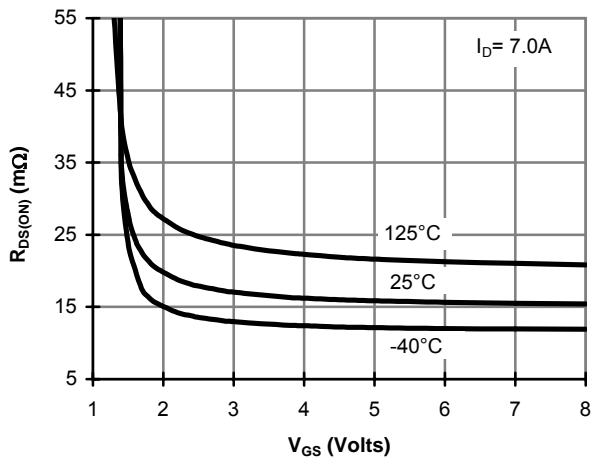


Figure 5: On-Resistance vs. Gate-Source Voltage

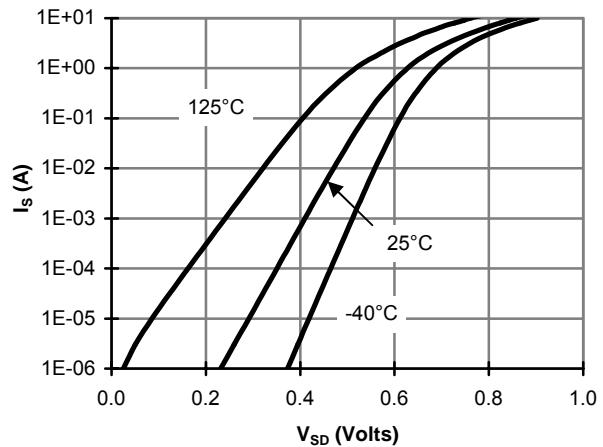


Figure 6: Body-Diode Characteristics

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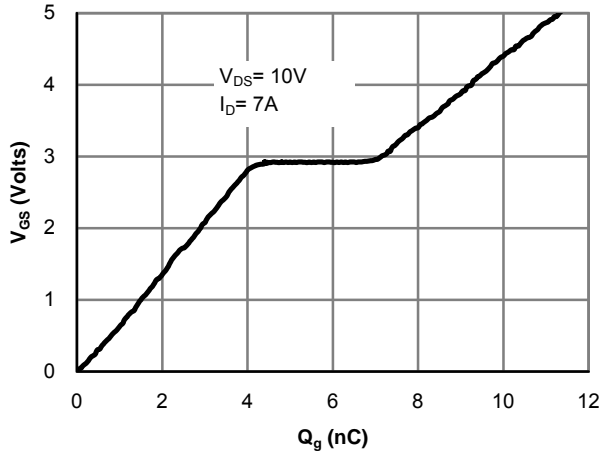


Figure 7: Gate-Charge Characteristics

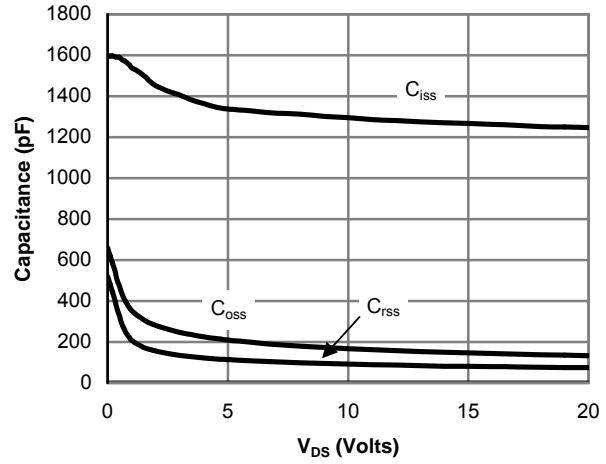


Figure 8: Capacitance Characteristics

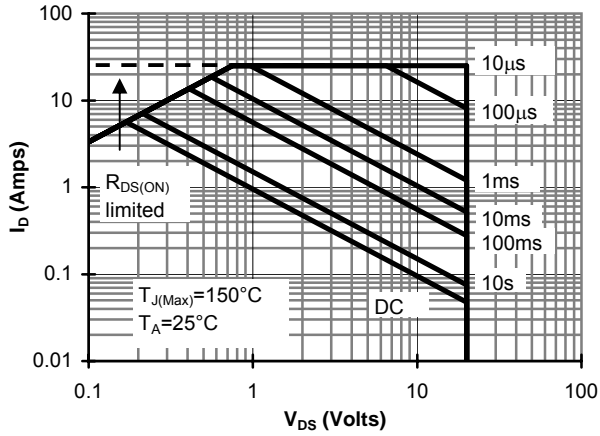


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

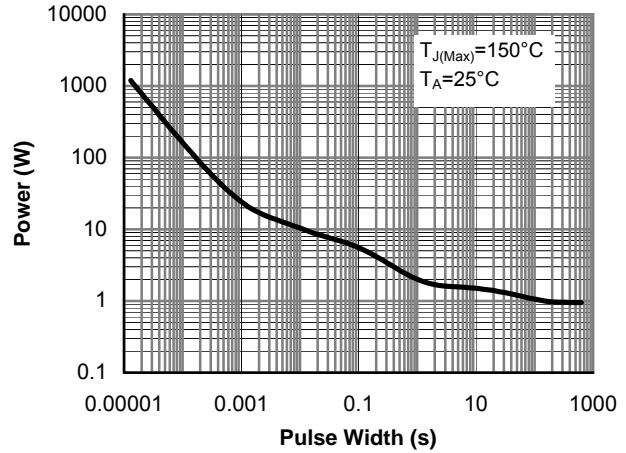


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

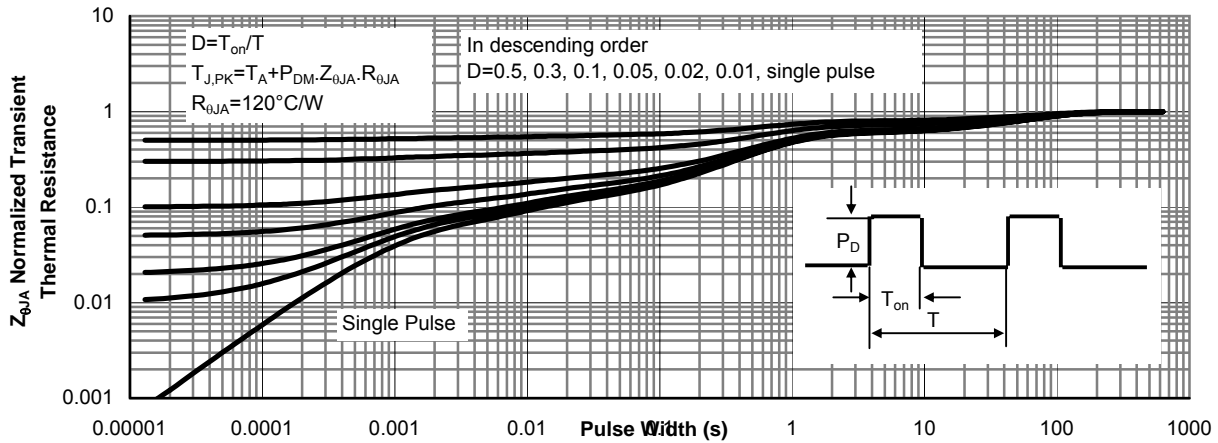


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)