ALPHA & OMEGA SEMICONDUCTOR, INC.

July 2001

AO8800
Common-Drain Dual N-Channel Enhancement Mode Field Effect Transistor

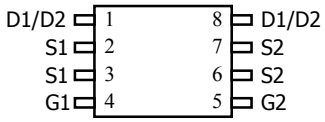
General Description

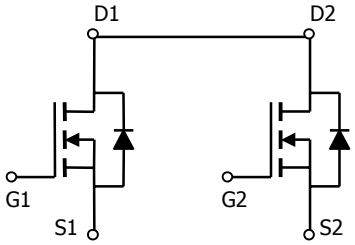
The AO8800 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V while retaining a 12V $V_{GS(MAX)}$ rating. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration.

Features

V_{DS} (V) = 30V
I_D = 6.4A
$R_{DS(ON)}$ < 24mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 30mΩ (V_{GS} = 4.5V)
$R_{DS(ON)}$ < 40mΩ (V_{GS} = 2.5V)
$R_{DS(ON)}$ < 70mΩ (V_{GS} = 1.8V)

TSSOP-8
Top View





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [A]	T_A=25°C	I_D	6.4	A
	T_A=70°C		5.4	
Pulsed Drain Current [B]		I_{DM}	30	
Power Dissipation [A]	T_A=25°C	P_D	1.5	W
	T_A=70°C		1.08	
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	30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=24V, V_{GS}=0V			1	µA
		T_J=55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±12V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	0.6	0.8	1	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=6.4A		20	24	mΩ
		T_J=125°C		28	36	
		V_{GS}=4.5V, I_D=6A		23	30	mΩ
		V_{GS}=2.5V, I_D=5A		32	40	mΩ
		V_{GS}=1.8V, I_D=2.5A		51	70	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=5A	10	17		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.66	1	V
I_S	Maximum Body-Diode Continuous Current				2.4	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		767		pF
C_{oss}	Output Capacitance			111		pF
C_{rss}	Reverse Transfer Capacitance			82		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		1.3		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=15V, I_D=6.4A		10		nC
Q_{gs}	Gate Source Charge			1.2		nC
Q_{gd}	Gate Drain Charge			3.1		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=2.4Ω, R_{GEN}=6Ω		5		ns
t_r	Turn-On Rise Time			5.5		ns
$t_{D(off)}$	Turn-Off DelayTime			39		ns
t_f	Turn-Off Fall Time			4.7		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=5A, dI/dt=100A/µs		15		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=5A, dI/dt=100A/µs		7.1		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 a 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 6,12,14 are obtained using 80µs 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.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

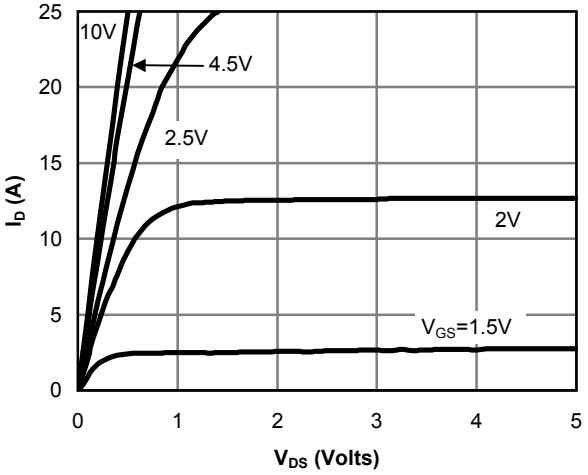


Fig 1: On-Region Characteristics

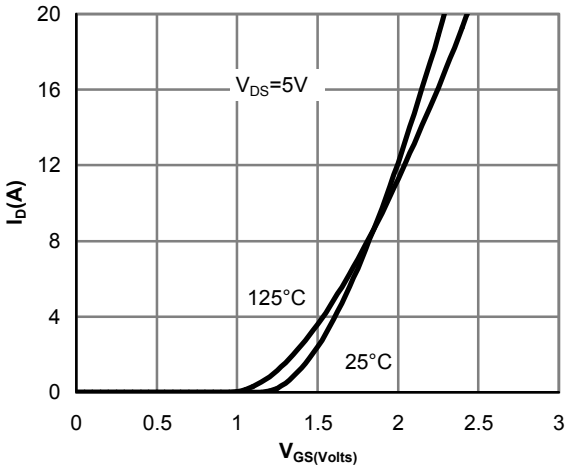


Figure 2: Transfer Characteristics

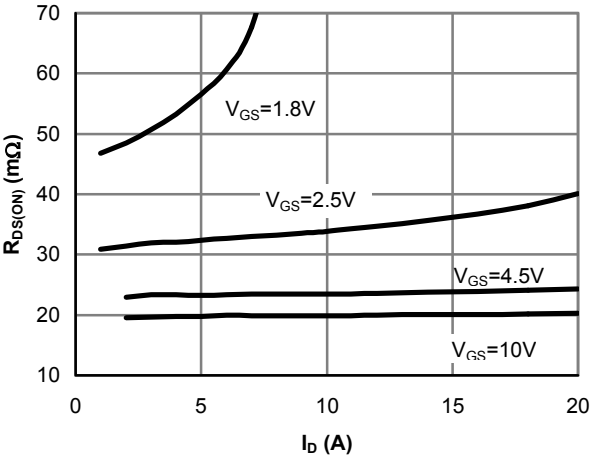


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

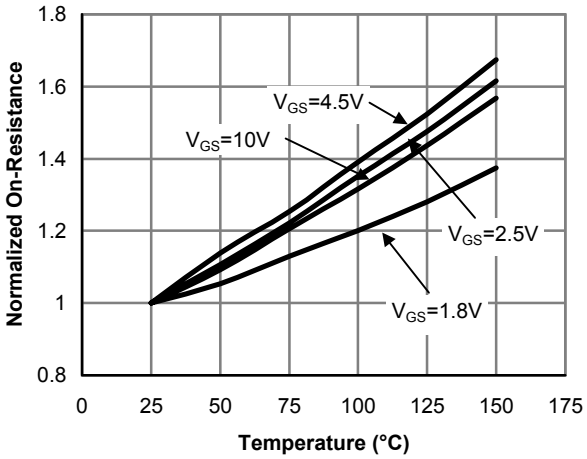


Figure 4: On-Resistance vs. Junction Temperature

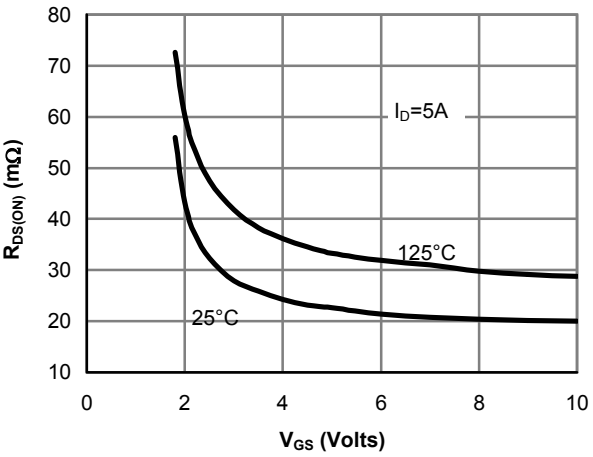


Figure 5: On-Resistance vs. Gate-Source Voltage

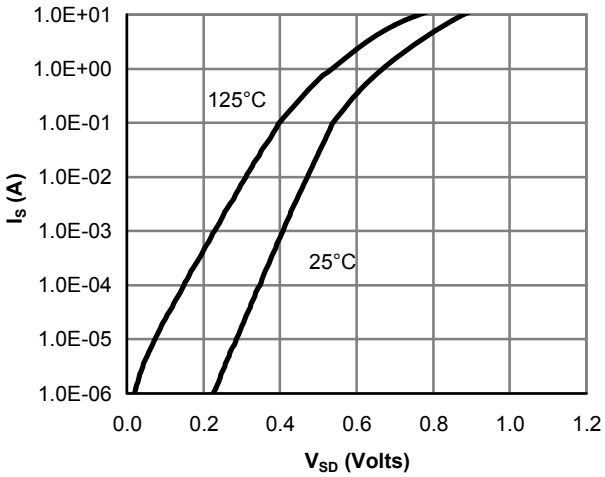


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

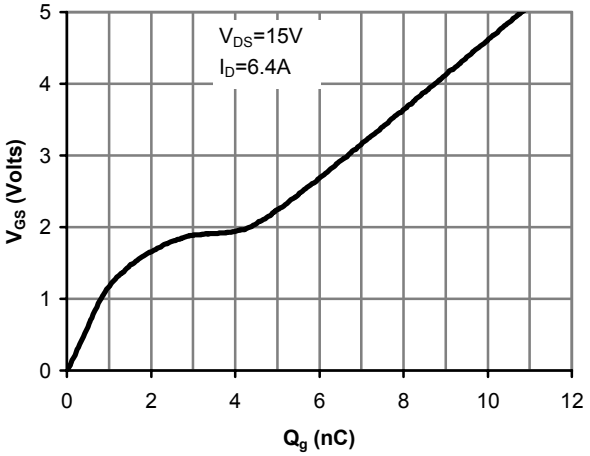


Figure 7: Gate-Charge Characteristics

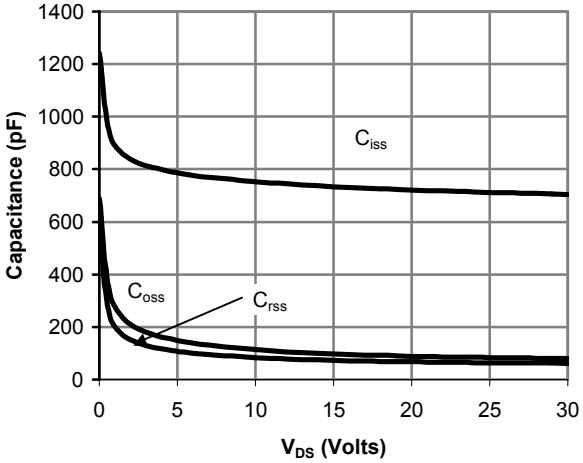


Figure 8: Capacitance Characteristics

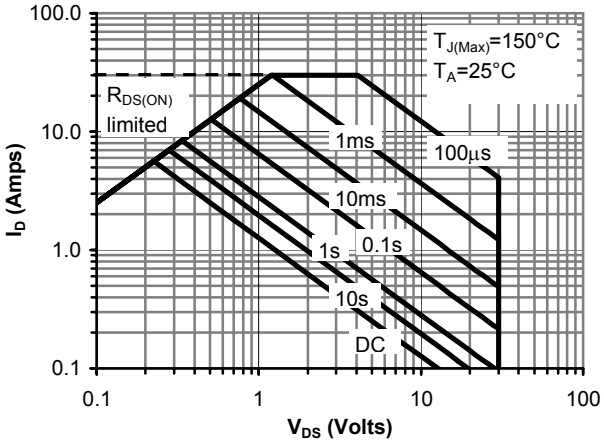


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

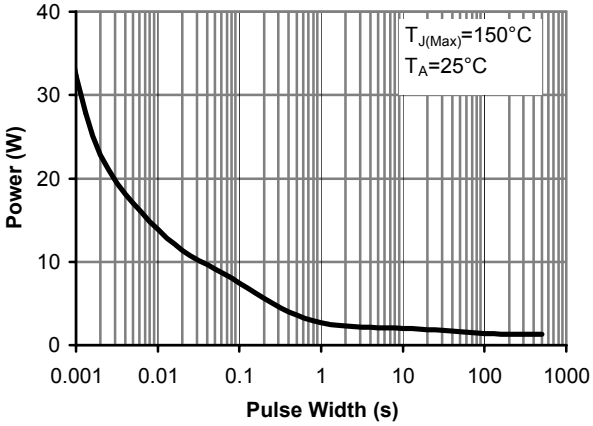


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

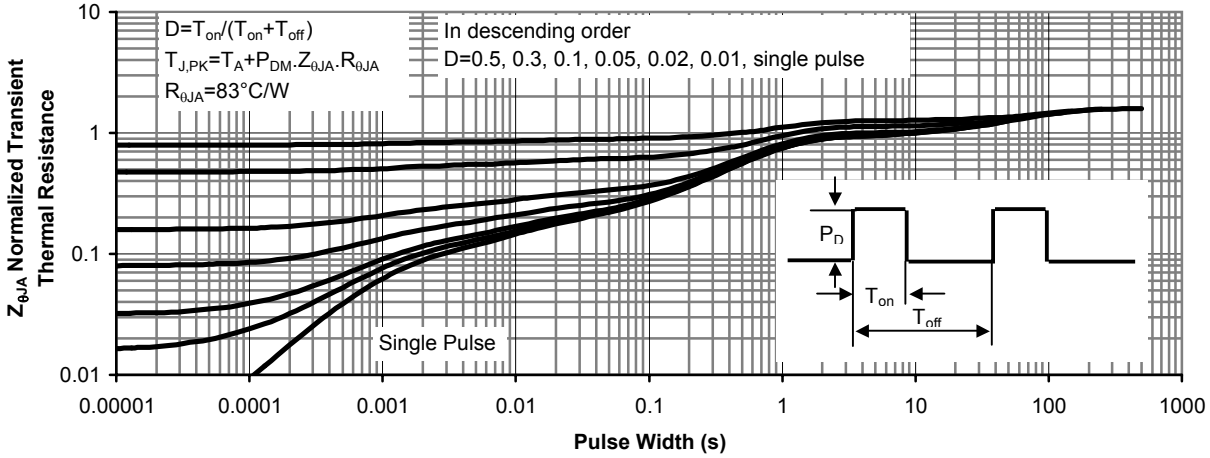


Figure 11: Normalized Maximum Transient Thermal Impedance

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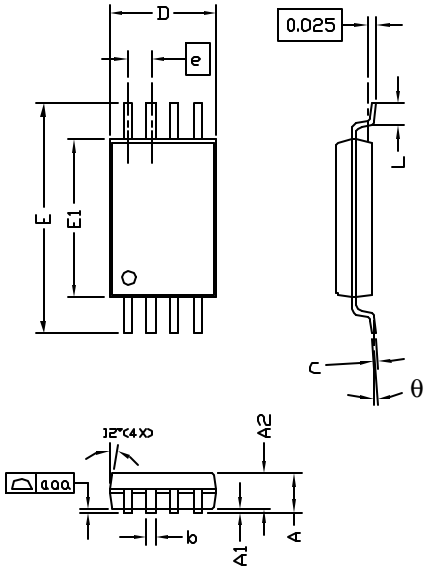
TSSOP-8 Package Data



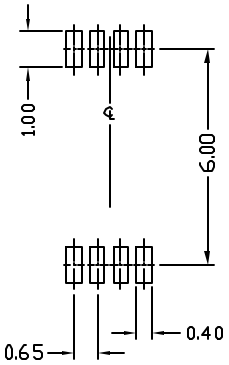
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	—	—	1.20	—	—	0.047
A1	0.05	—	0.15	0.002	—	0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19	—	0.30	0.007	—	0.012
c	0.09	—	0.20	0.004	—	0.008
D	2.90	3.00	3.10	0.114	0.118	0.122
E	6.40 BSC			0.252 BSC		
E1	4.30	4.40	4.50	0.169	0.173	0.177
e	0.65 BSC			0.0259 (REF)		
L	0.45	0.60	0.75	0.018	0.024	0.030
y	—	—	0.10	—	—	0.004
θ	0°	—	8°	0°	—	8°

NOTE:
1. LEAD FINISH: 150 MICROINCHES (3.8 um) MIN. THICKNESS OF Tin/Lead (SOLDER) PLATED ON LEAD
2. TOLERANCE ±0.100 mm (4 mil) UNLESS OTHERWISE SPECIFIED
3. COPLANARITY : 0.1000 mm
4. DIMENSION L IS MEASURED IN GAGE PLANE

PACKAGE MARKING DESCRIPTION

NOTE:
LG - AOS LOGO
PARTN - PART NUMBER CODE.
F - FAB LOCATION
A - ASSEMBLY LOCATION
W - WEEK CODE.
L N - ASSEMBLY LOT CODE

RECOMMENDED LAND PATTERN



UNIT: mm

TSSOP-8 PART NO. CODE

PART NO.	CODE	PART NO.	CODE	PART NO.	CODE
AO8800	8800				
AO8701	8701				

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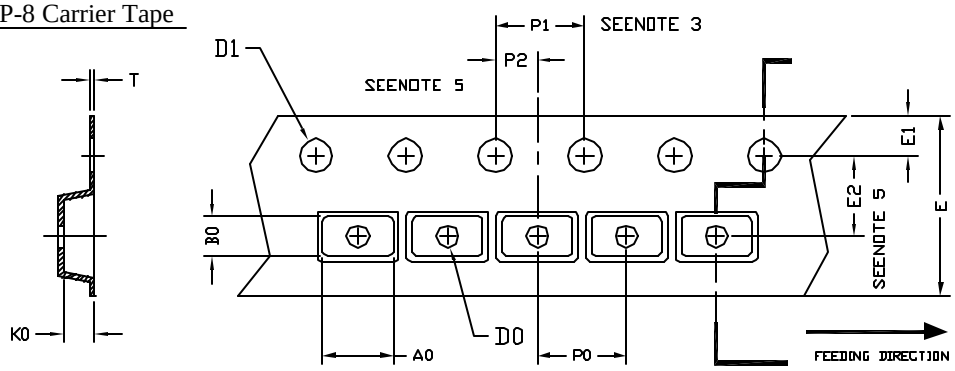
TSSOP-8 Tape and Reel Data

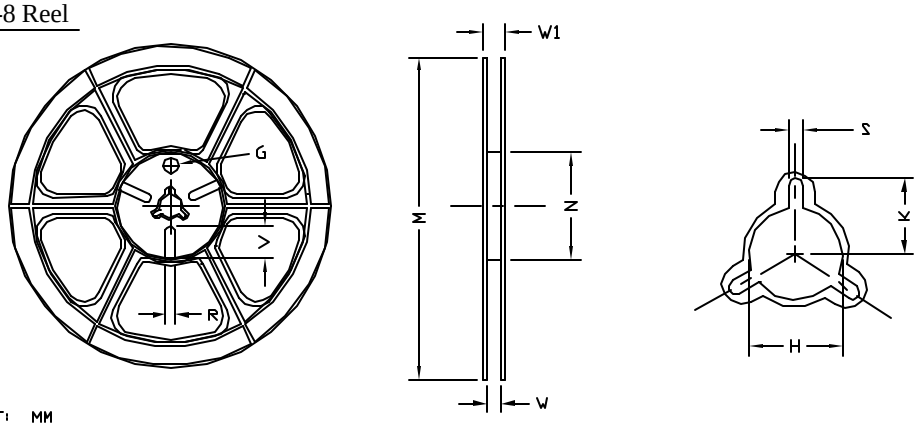
TSSOP-8 Carrier Tape



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T
SO-8 (12 mm)	6.80 ±0.10	3.40 ±0.10	1.60 ±0.10	1.50 ±0.10	1.50 MIN.	12.00 ±0.30	1.75 ±0.10	5.50 ±0.05	8.00 ±0.10	4.00 ±0.10	2.00 ±0.10	0.30 ±0.05

TSSOP-8 Reel



UNIT: MM

TAPE SIZE	REEL SIZE	M	N	W	W1	H	K	S	G	R	V
12 mm	ø330	ø178.00 ±0.50	ø60.00 ±0.50	13.00 +1.50 −0.00	16.00 ±1.00	ø13.50 ±0.50	10.60	2.20 ±0.50	---	---	---

TSSOP-8 Tape

Leader / Trailer
& Orientation