ALPHA & OMEGA
SEMICONDUCTOR, LTD.

AO8822
Common-Drain Dual N-Channel Enhancement Mode Field Effect Transistor
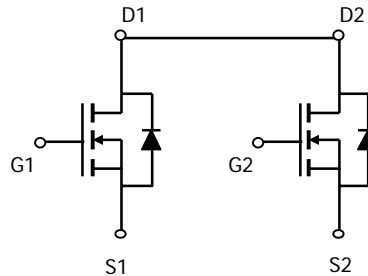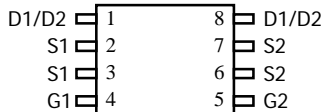
Pb Free

General Description

The AO8822 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. *Standard Product AO8822 is Pb-free (meets ROHS & Sony 259 specifications). AO8822L is a Green Product ordering option. AO8822 and AO8822L are electrically identical.*

Features

V_{DS} (V) = 20V
I_D = 7 A (V_{GS} = 10V)
$R_{DS(ON)}$ < 21mΩ (V_{GS} = 10V)
$R_{DS(ON)}$ < 24mΩ (V_{GS} = 4.5V)
$R_{DS(ON)}$ < 32mΩ (V_{GS} = 2.5V)
$R_{DS(ON)}$ < 50mΩ (V_{GS} = 1.8V)

TSSOP-8
Top View

D1/D2	1		8	D1/D2
S1	2		7	S2
S1	3		6	S2
G1	4		5	G2

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [A]	T_A=25°C	I_D	7	A
	T_A=70°C		5.7	
Pulsed Drain Current [B]		I_{DM}	30	
Power Dissipation [A]	T_A=25°C	P_D	1.5	W
	T_A=70°C		0.96	
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	$R_{θJA}$	63	83	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		101	130	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{θJL}$	64	83	°C/W

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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$_{DS}$=16V, V$_{GS}$=0V				1	µA
			T$_J$=55°C			5	
I$_{GSS}$	Gate-Body leakage current	V$_{DS}$=0V, V$_{GS}$=±10V				100	nA
BV$_{GSO}$	Gate-Source Breakdown Voltage	V$_{DS}$=0V, I$_G$=±250uA		±12			V
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS}$ I$_D$=250uA		0.5	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$_D$=7A			16.4	21	mΩ
			T$_J$=125°C		23	28	mΩ
		V$_{GS}$=4.5V, I$_D$=6.6A			19	24	mΩ
		V$_{GS}$=2.5V, I$_D$=5.5A			25	32	mΩ
		V$_{GS}$=1.8V, I$_D$=2A			36	50	mΩ
g$_{FS}$	Forward Transconductance	V$_{DS}$=5V, I$_D$=7A			24		S
V$_{SD}$	Diode Forward Voltage	I$_S$=1A,V$_{GS}$=0V			0.7	1	V
I$_S$	Maximum Body-Diode Continuous Current					2.5	A
DYNAMIC PARAMETERS							
C$_{iss}$	Input Capacitance	V$_{GS}$=0V, V$_{DS}$=10V, f=1MHz			630		pF
C$_{oss}$	Output Capacitance				164		pF
C$_{rss}$	Reverse Transfer Capacitance				137		pF
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz			1.5		Ω
SWITCHING PARAMETERS							
Q$_g$	Total Gate Charge	V$_{GS}$=4.5V, V$_{DS}$=10V, I$_D$=7A			9.3		nC
Q$_{gs}$	Gate Source Charge				0.6		nC
Q$_{gd}$	Gate Drain Charge				3.6		nC
t$_{D(on)}$	Turn-On DelayTime	V$_{GS}$=5V, V$_{DS}$=10V, R$_L$=1.4Ω, R$_{GEN}$=3Ω			5.7		ns
t$_r$	Turn-On Rise Time				11.5		ns
t$_{D(off)}$	Turn-Off DelayTime				31.5		ns
t$_f$	Turn-Off Fall Time				9.7		ns
t$_{rr}$	Body Diode Reverse Recovery Time	I$_F$=7A, dI/dt=100A/µs			15.2		ns
Q$_{rr}$	Body Diode Reverse Recovery Charge	I$_F$=7A, dI/dt=100A/µs			6.3		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 and power rating is based on the ≤ 10s 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 6,12,14 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.

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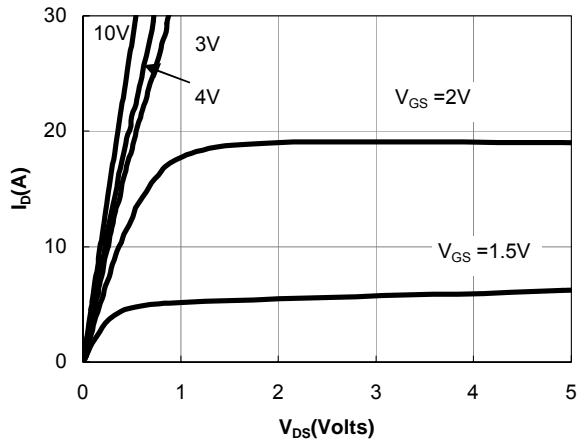## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
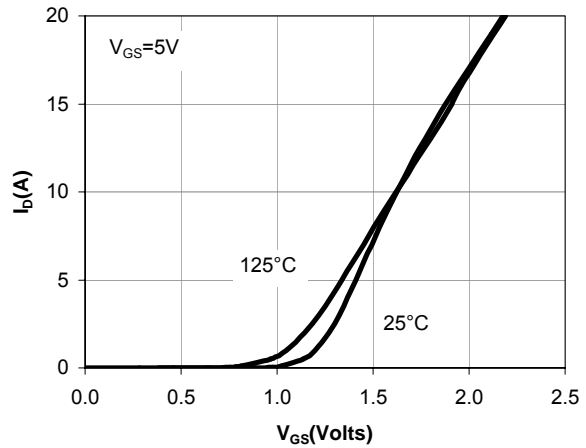
Figure 1: On-Regions Characteristics

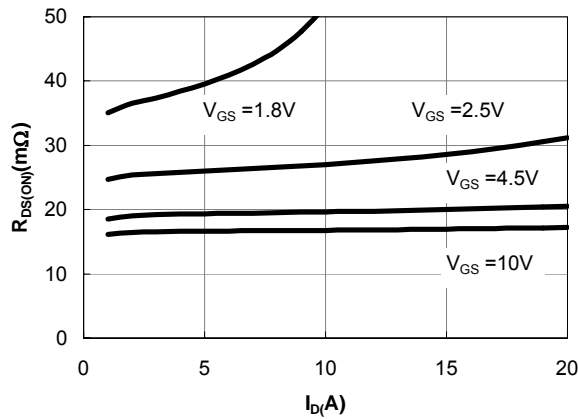**Figure 2: Transfer Characteristics**

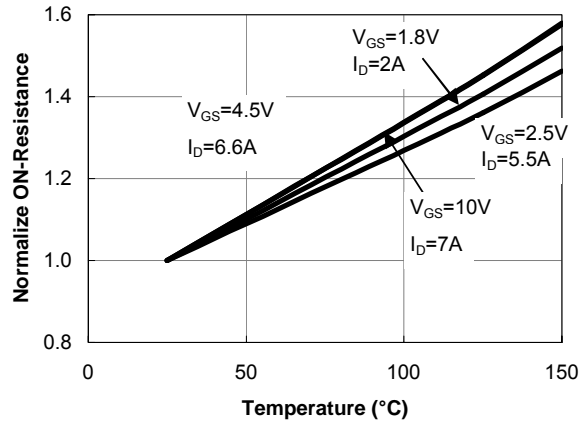**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**

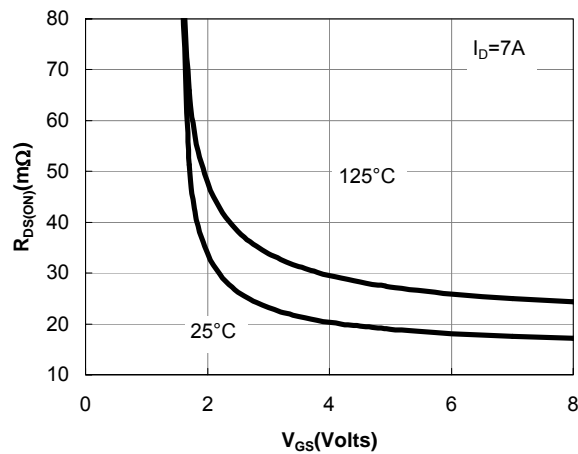**Figure 4: On-Resistance vs. Junction Temperature**

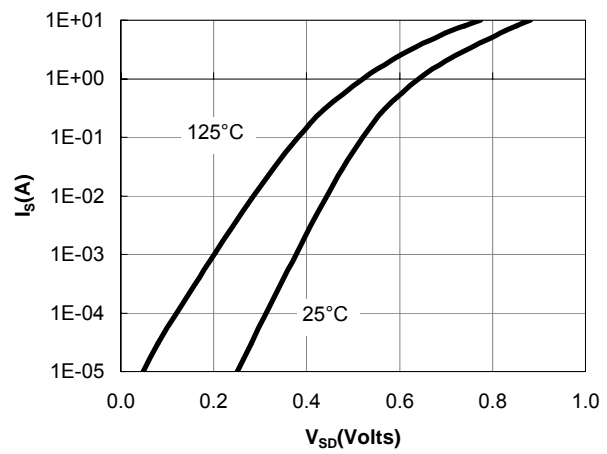**Figure 5: On-Resistance vs. Gate-Source Voltage**

Figure 6: Body-Diode Characteristics

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS
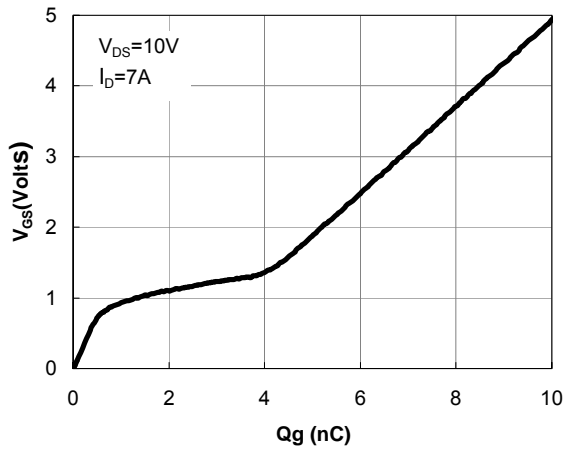
Figure 7: Gate-Charge Characteristics

V_{DS}=10V
I_D=7A

X-axis: **Qg (nC)**
Y-axis: **V_{GS}(VoltS)**
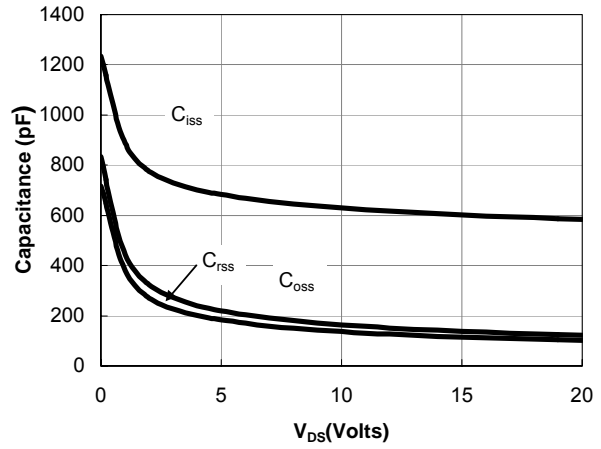
Figure 8: Capacitance Characteristics

C_{iss}
C_{rss}
C_{oss}

X-axis: **V_{DS}(Volts)**
Y-axis: **Capacitance (pF)**
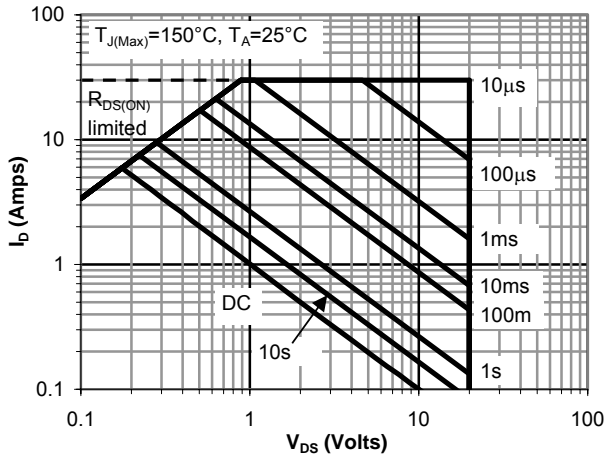
Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

$T_{J(Max)}$=150°C, T_A=25°C
$R_{DS(ON)}$ limited
10µs
100µs
1ms
10ms
100m
DC
10s
1s

X-axis: **V_{DS} (Volts)**
Y-axis: **I_D (Amps)**
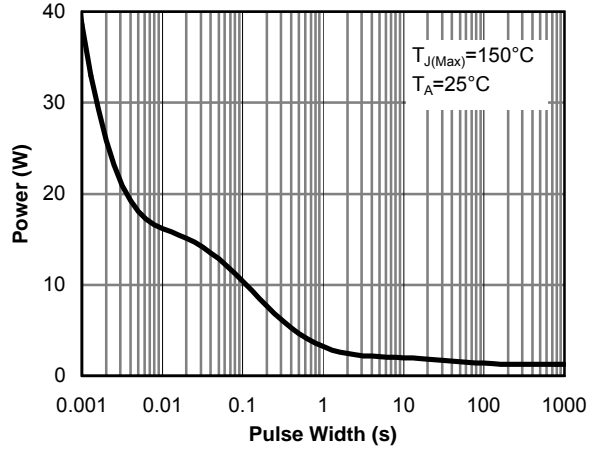
Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

$T_{J(Max)}$=150°C
T_A=25°C

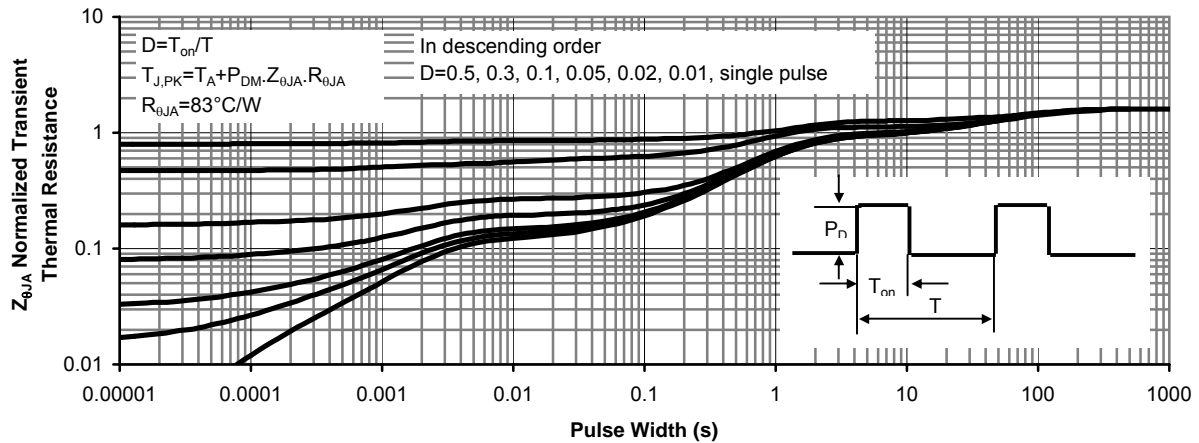X-axis: **Pulse Width (s)**
Y-axis: **Power (W)**

Figure 11: Normalized Maximum Transient Thermal Impedance

$D=T_{on}/T$
$T_{J,PK}=T_A+P_{DM} \cdot Z_{\theta JA} \cdot R_{\theta JA}$
$R_{\theta JA}$=83°C/W
In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

P_D
T_{on}
T

X-axis: **Pulse Width (s)**
Y-axis: **$Z_{\theta JA}$ Normalized Transient Thermal Resistance**