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AO8830

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

General Description

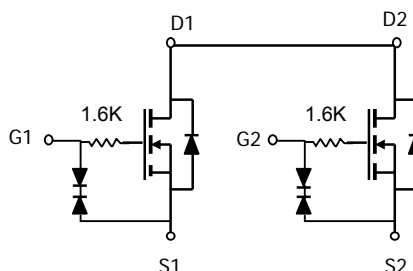
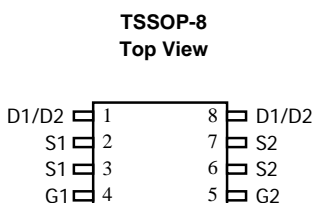
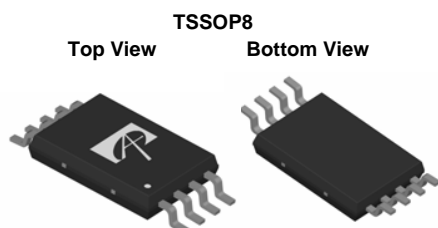
The AO8830/L uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V while retaining a 12V $V_{GS(MAX)}$ rating. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration. AO8830 and AO8830L are electrically identical.

- RoHs Compliant
- AO8830L is Halogen Free

Features

- V_{DS} (V) = 20V
- I_D = 6 A (V_{GS} = 10V)
- $R_{DS(ON)} < 27m\Omega$ (V_{GS} = 10V)
- $R_{DS(ON)} < 30m\Omega$ (V_{GS} = 4.5V)
- $R_{DS(ON)} < 37m\Omega$ (V_{GS} = 3.1V)
- $R_{DS(ON)} < 41m\Omega$ (V_{GS} = 2.5V)
- $R_{DS(ON)} < 55m\Omega$ (V_{GS} = 1.8V)

ESD PROTECTED!



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ 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	I_D	$T_A=25^\circ\text{C}$	6
		$T_A=70^\circ\text{C}$	4.8
Pulsed Drain Current ^B	I_{DM}	30	A
Power Dissipation ^A	P_D	$T_A=25^\circ\text{C}$	1.5
		$T_A=70^\circ\text{C}$	0.94
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	64	83	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		Steady-State	115	140
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	70	85	$^\circ\text{C/W}$

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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 T _J =55°C			1	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±10V			10	
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 =1mA	0.5	0.6	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 =6A T _J =125°C	16	22	27	mΩ
				31		
		V _{GS} =4.5V, I _D =5A	19	25	30	mΩ
		V _{GS} =3.1V, I _D =4A	22	30	37	
		V _{GS} =2.5V, I _D =4A	25	32	41	mΩ
	V _{GS} =1.8V, I _D =2A	32	42	55	mΩ	
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =6A		21		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.75	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		290		pF
C _{oss}	Output Capacitance			120		pF
C _{rss}	Reverse Transfer Capacitance			40		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1.6		kΩ
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =6A		5.2		nC
Q _{gs}	Gate Source Charge			2.1		nC
Q _{gd}	Gate Drain Charge			1.9		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =4.5V, V _{DS} =10V, R _L =1.7Ω, R _{GEN} =3Ω		280		ns
t _r	Turn-On Rise Time			972		ns
t _{D(off)}	Turn-Off DelayTime			2.35		μs
t _f	Turn-Off Fall Time			2.2		μs
t _{rr}	Body Diode Reverse Recovery Time	I _F =6A, di/dt=100A/μs, V _{GS} =-9V		25		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =6A, di/dt=100A/μs, V _{GS} =-9V		8		nC

A: The value of R_{θJA} is measured with the device mounted on 1in² 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 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 6,12,14 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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AO8830

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

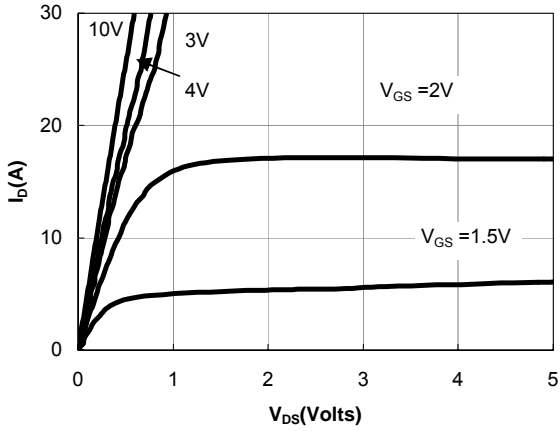


Figure 1: On-Regions Characteristics

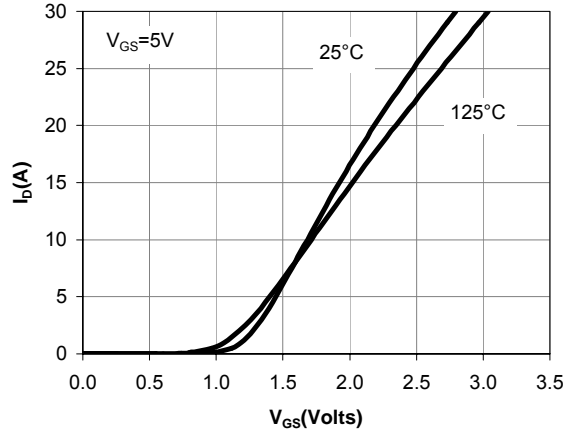


Figure 2: Transfer Characteristics

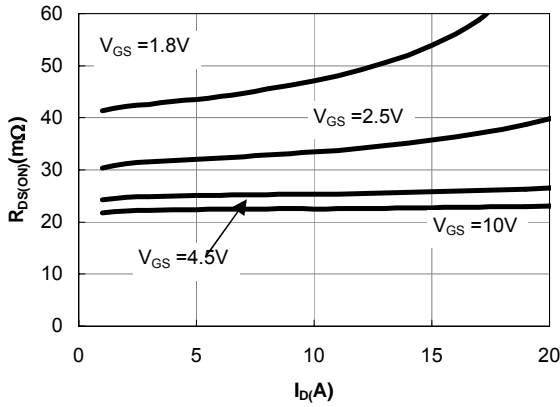


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

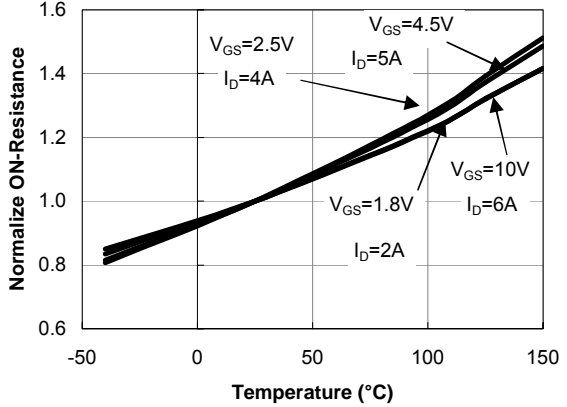


Figure 4: On-Resistance vs. Junction Temperature

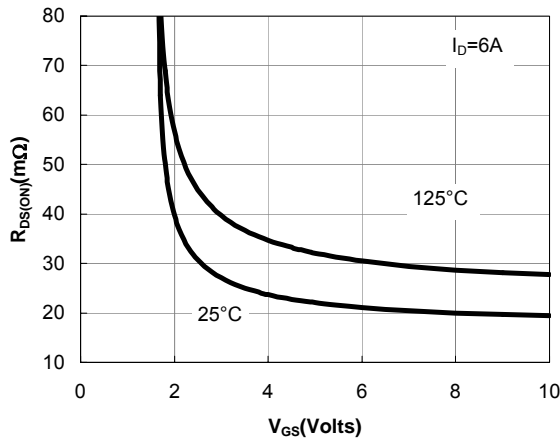


Figure 5: On-Resistance vs. Gate-Source Voltage

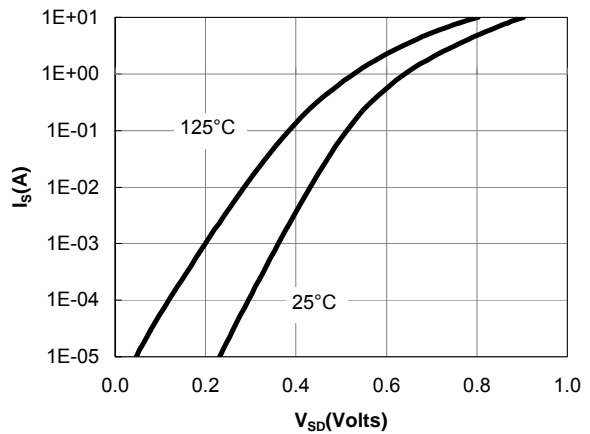


Figure 6: Body-Diode Characteristics

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

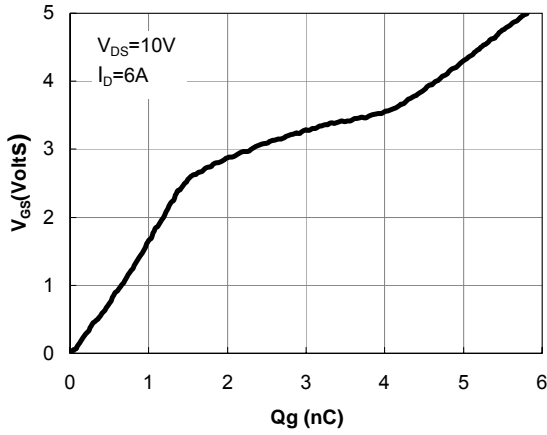


Figure 7: Gate-Charge Characteristics

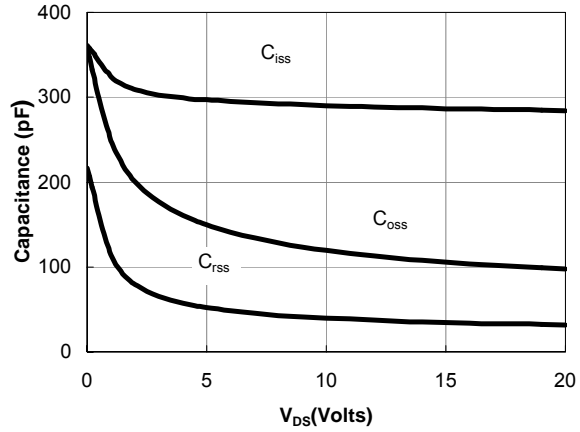


Figure 8: Capacitance Characteristics

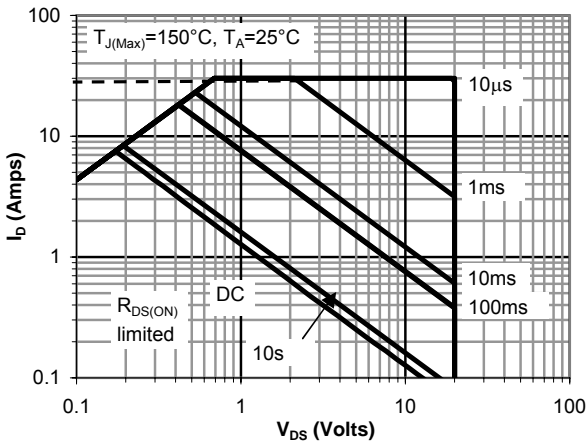


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

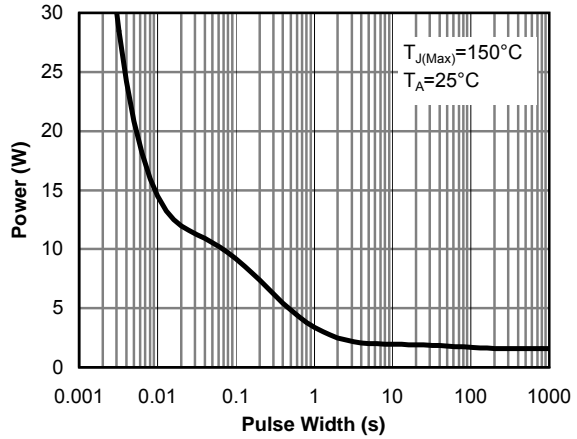


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

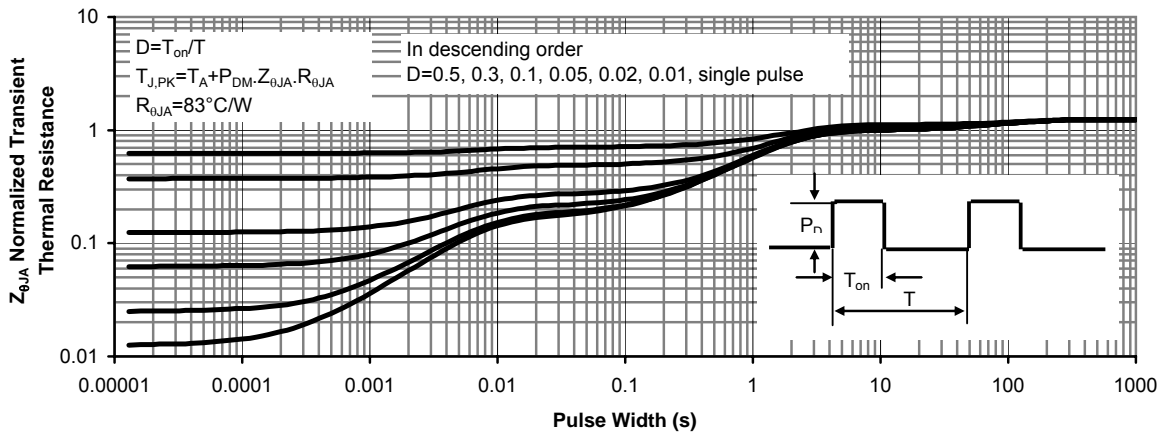
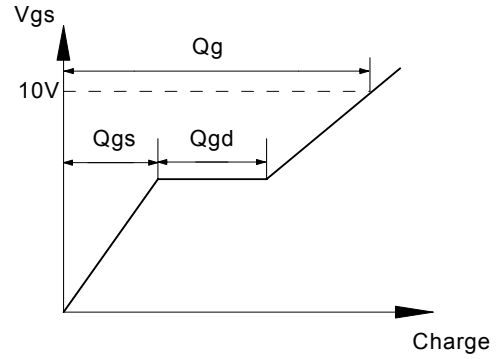
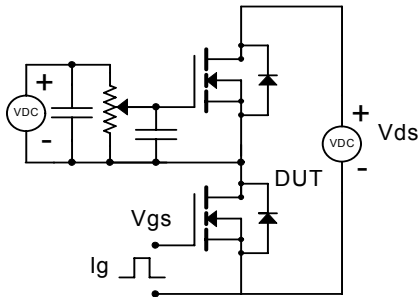


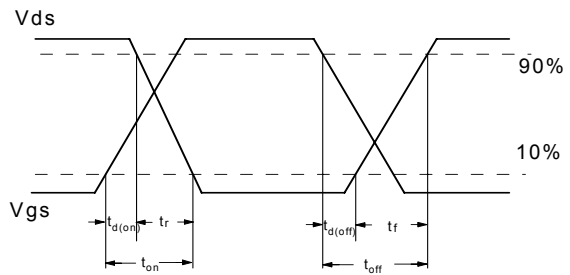
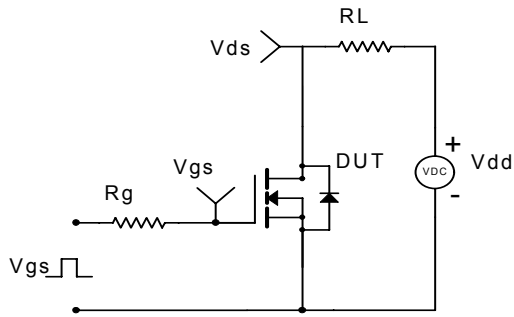
Figure 11: Normalized Maximum Transient Thermal Impedance

AO8830

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

