

AON3810

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



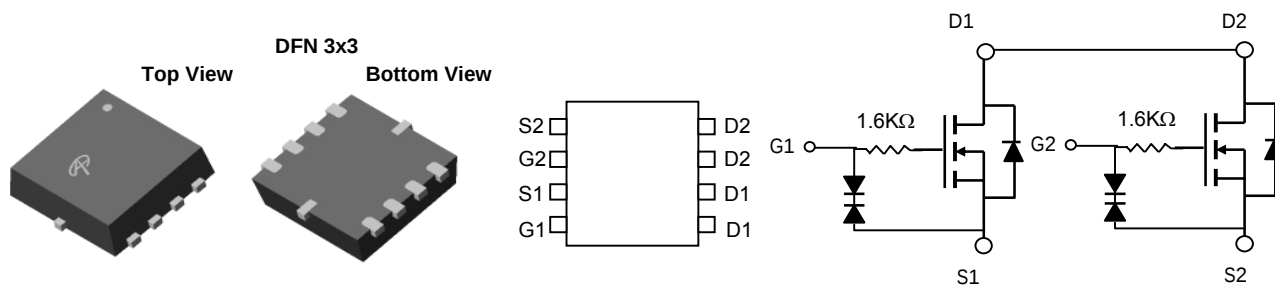
General Description

The AON3810 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. 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 AON3810 is Pb-free (meets ROHS & Sony 259 specifications). AON3810L is a Green Product ordering option. AON3810 and AON3810L are electrically identical.*

Features

V_{DS} (V) = 20V
 I_D = 7A (V_{GS} = 10V)
 $R_{DS(ON)} < 24m\Omega$ (V_{GS} = 10V)
 $R_{DS(ON)} < 28m\Omega$ (V_{GS} = 4.5V)
 $R_{DS(ON)} < 39m\Omega$ (V_{GS} = 2.5V)
 $R_{DS(ON)} < 55m\Omega$ (V_{GS} = 1.8V)

ESD Rating: 2000V HBM



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	7	A
	$T_A=25^\circ\text{C}$		
	$T_A=70^\circ\text{C}$	6	
Pulsed Drain Current ^B	I_{DM}	30	
Power Dissipation ^A	P_D	2.2	W
	$T_A=25^\circ\text{C}$		
	$T_A=70^\circ\text{C}$	1.4	
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	$R_{\theta JA}$	43	56	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		77	110	$^\circ\text{C/W}$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	36	50	$^\circ\text{C/W}$

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	$V_{DS}=16\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^{\circ}\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 10\text{V}$			10	
BV_{GSO}	Gate-Source Breakdown Voltage	$V_{DS}=0\text{V}$, $I_G=\pm 250\mu\text{A}$	± 12			V
$V_{GS(th)}$	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	$V_{GS}=4.5\text{V}$, $V_{DS}=5\text{V}$	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=7\text{A}$ $T_J=125^{\circ}\text{C}$		20 28	24	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=6\text{A}$		24	29	$\text{m}\Omega$
		$V_{GS}=2.5\text{V}$, $I_D=5\text{A}$		32	39	$\text{m}\Omega$
		$V_{GS}=1.8\text{V}$, $I_D=2\text{A}$		46	55	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=7\text{A}$		21		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.66	1	V
I_S	Maximum Body-Diode Continuous Current				2.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=10\text{V}$, $f=1\text{MHz}$		280		pF
C_{oss}	Output Capacitance			105		pF
C_{rss}	Reverse Transfer Capacitance			35		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		1.6		k Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=4.5\text{V}$, $V_{DS}=10\text{V}$, $I_D=7\text{A}$		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	$V_{GS}=4.5\text{V}$, $V_{DS}=10\text{V}$, $R_L=1.5\Omega$, $R_{GEN}=3\Omega$		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	$I_F=7\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$, $V_{GS}=-9\text{V}$		25		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=7\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$, $V_{GS}=-9\text{V}$		8		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² 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 and power rating is based on the $\leq 10\text{s}$ 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, 12, 14 are obtained using 80 μs 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

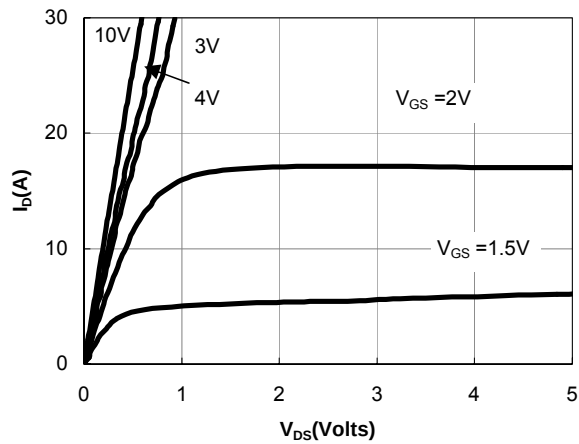


Figure 1: On-Regions Characteristics

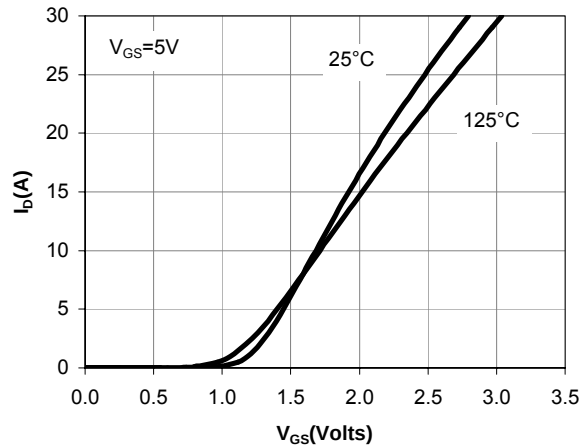


Figure 2: Transfer Characteristics

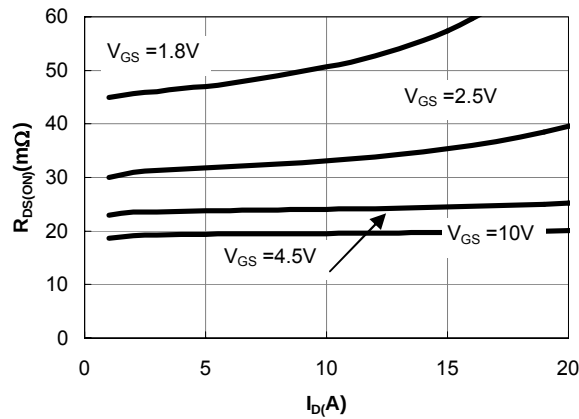


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

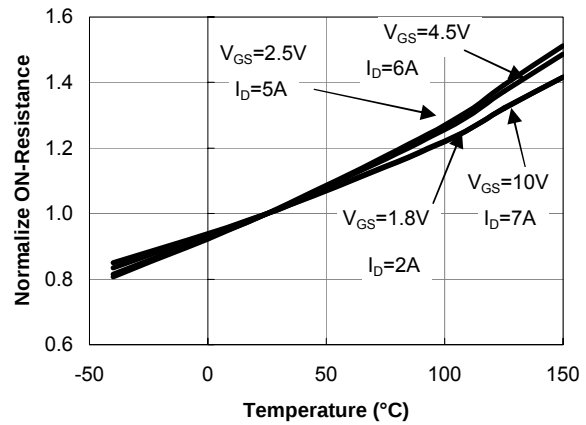


Figure 4: On-Resistance vs. Junction Temperature

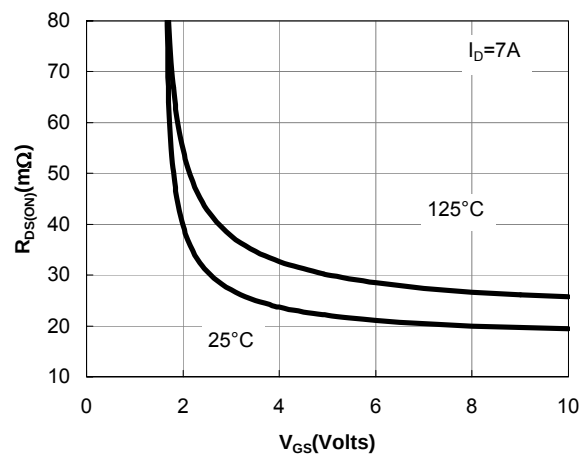


Figure 5: On-Resistance vs. Gate-Source Voltage

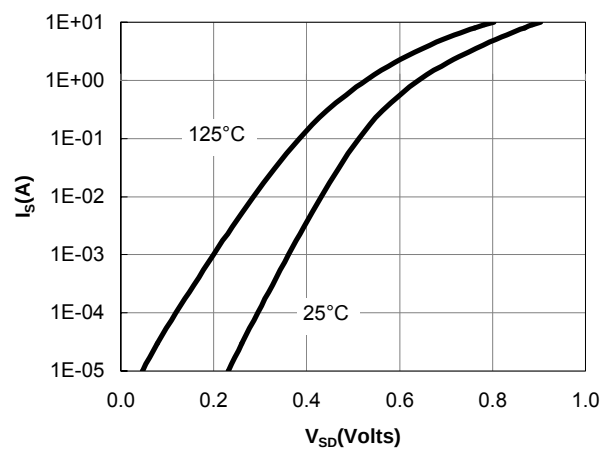


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

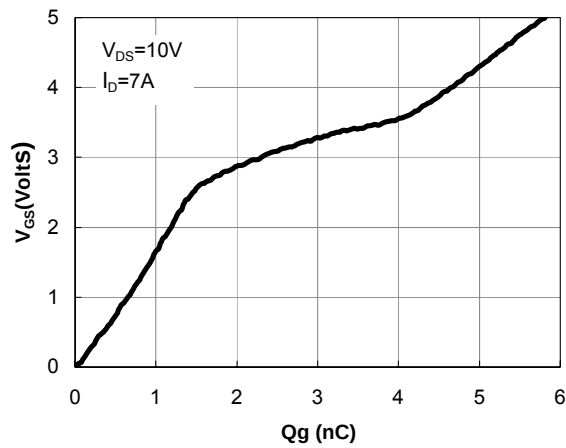


Figure 7: Gate-Charge Characteristics

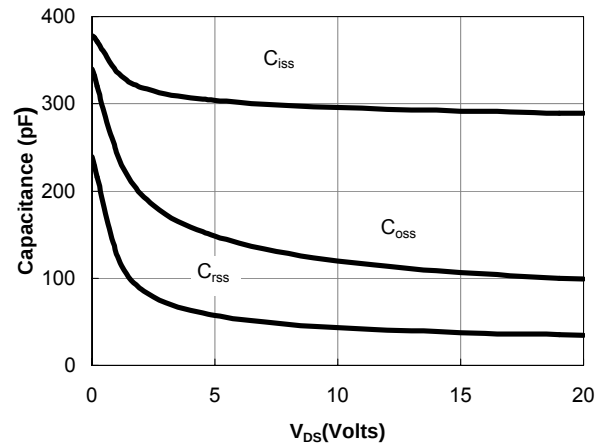


Figure 8: Capacitance Characteristics

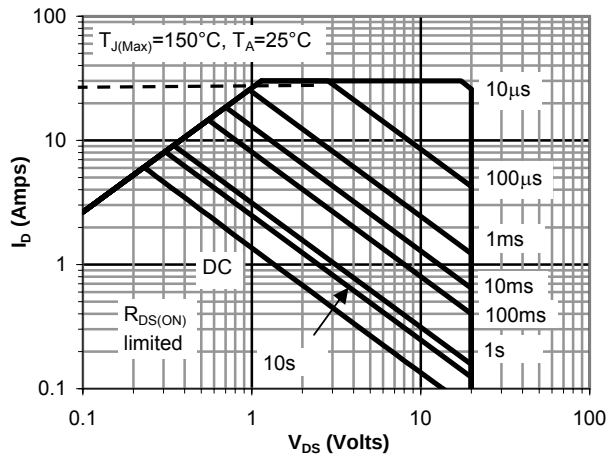


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

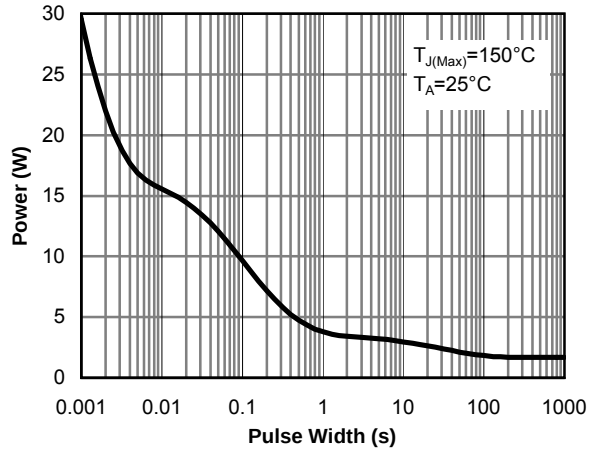


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

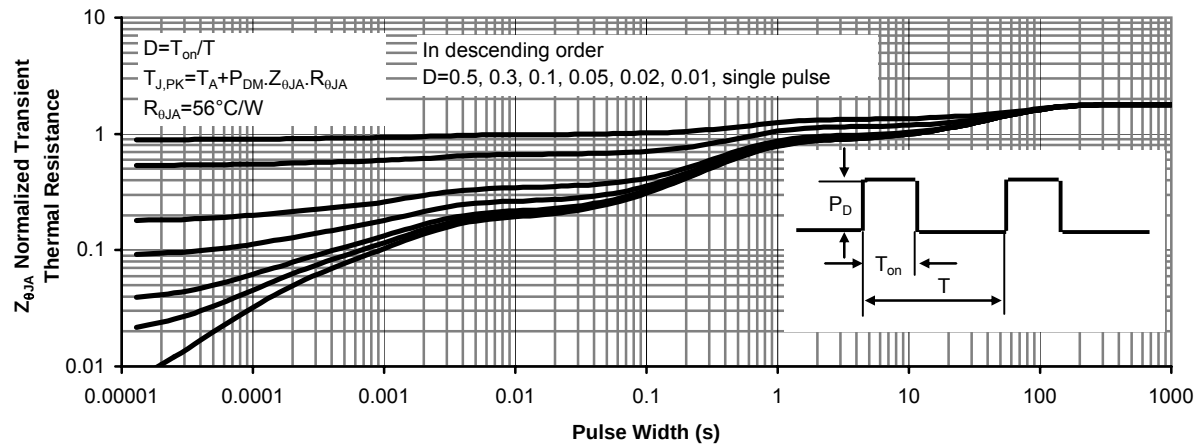


Figure 11: Normalized Maximum Transient Thermal Impedance