

General Description

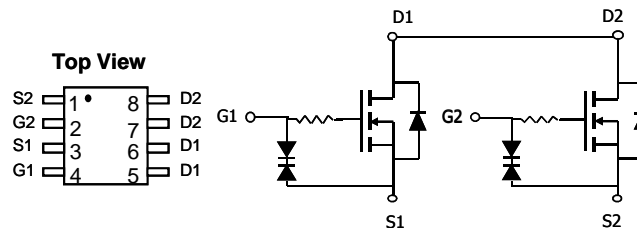
The AON3814 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V while retaining a 12V $V_{GS(MAX)}$ rating. It is ESD protected. This device is suitable for use as a uni-directional or bi-directional load switch, facilitated by its common-drain configuration.

Features

V_{DS}	20V
I_D (at $V_{GS}=4.5V$)	6A
$R_{DS(ON)}$ (at $V_{GS} = 4.5V$)	< 17m Ω
$R_{DS(ON)}$ (at $V_{GS} = 4V$)	< 18.5m Ω
$R_{DS(ON)}$ (at $V_{GS} = 3.1V$)	< 23m Ω
$R_{DS(ON)}$ (at $V_{GS} = 2.5V$)	< 24m Ω



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 ^F	I_D	$T_C=25^\circ\text{C}$	6
		$T_C=70^\circ\text{C}$	5.3
Pulsed Drain Current ^B	I_{DM}	40	A
Power Dissipation ^F	P_D	$T_C=25^\circ\text{C}$	2.5
		$T_C=70^\circ\text{C}$	1.6
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	$R_{\theta JA}$	40	50	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient ^A		Steady-State	75	95
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	30	40	$^\circ\text{C}/\text{W}$

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	20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±10V			10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.3	0.7	1.1	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	40			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =4.5V, I _D =6A T _J =125°C		12.5	17	mΩ
				18.5	24	
		V _{GS} =4V, I _D =6A		12.9	18.5	mΩ
		V _{GS} =3.1V, I _D =6A		14	23	mΩ
		V _{GS} =2.5V, I _D =6A		15.6	24	mΩ
		V _{GS} =1.8V, I _D =6A		23		mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =6A		33		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.6	1	V
I _S	Maximum Body-Diode Continuous Current				3.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =10V, f=1MHz	730	920	1100	pF
C _{oss}	Output Capacitance		110	155	200	pF
C _{riss}	Reverse Transfer Capacitance		45	75	105	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		2.4		kΩ
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =6A	8.8	11	13	nC
Q _{gs}	Gate Source Charge		1.6	2	2.4	nC
Q _{gd}	Gate Drain Charge		1.9	3.2	4.5	nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =5V, V _{DS} =10V, R _L =1.7Ω, R _{GEN} =3Ω		0.3		μs
t _r	Turn-On Rise Time			0.6		μs
t _{D(off)}	Turn-Off DelayTime			7.9		μs
t _f	Turn-Off Fall Time			4.4		μs

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.

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 are obtained using <300 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° C. The SOA curve provides a single pulse rating.

F: The power dissipation and current rating is based on the t ≤ 10s thermal resistance, and current rating is also limited by wire-bonding.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

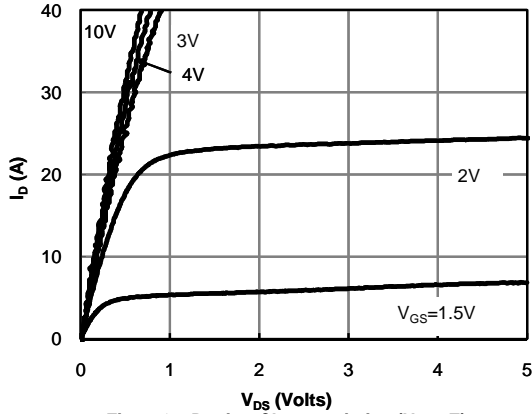


Figure 1: On-Region Characteristics (Note E)

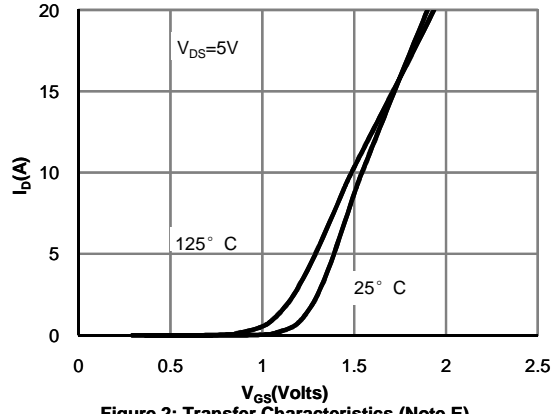


Figure 2: Transfer Characteristics (Note E)

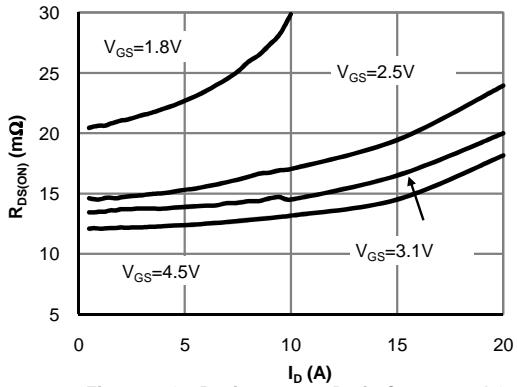


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

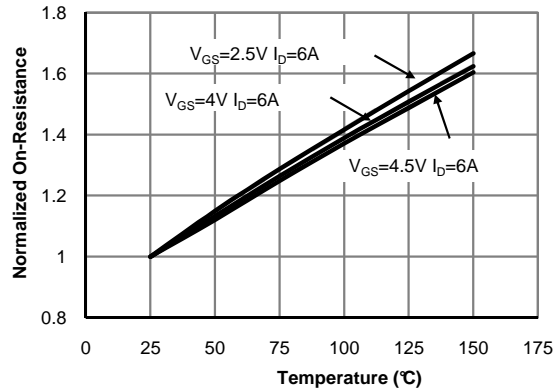


Figure 4: On-Resistance vs. Junction Temperature (Note E)

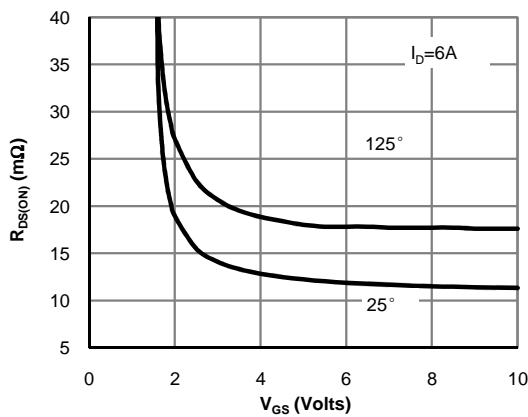


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

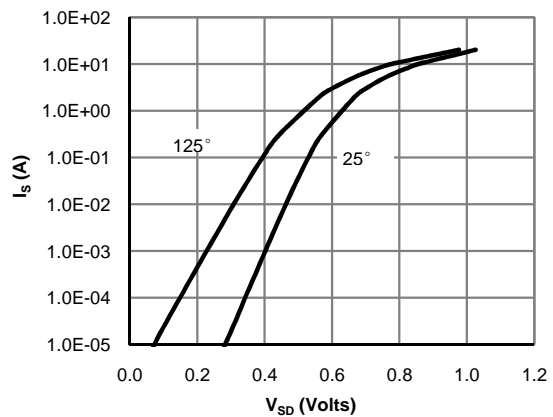


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

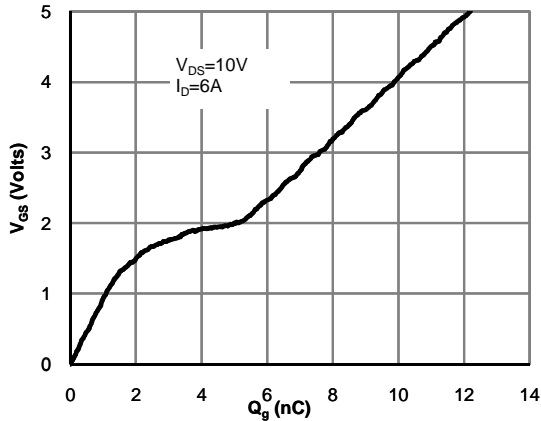


Figure 7: Gate-Charge Characteristics

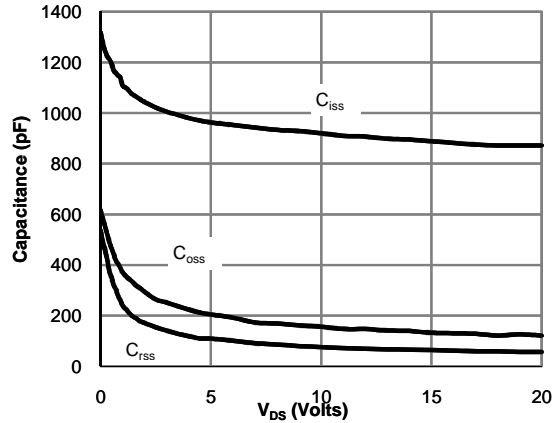


Figure 8: Capacitance Characteristics

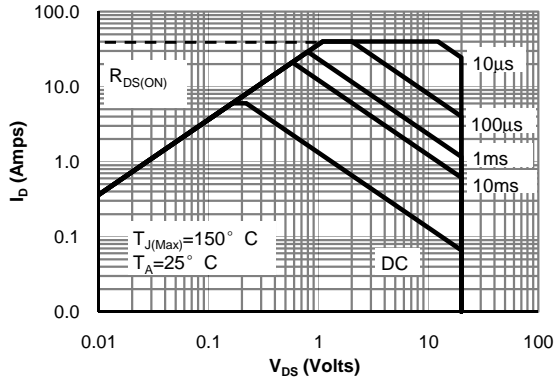


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

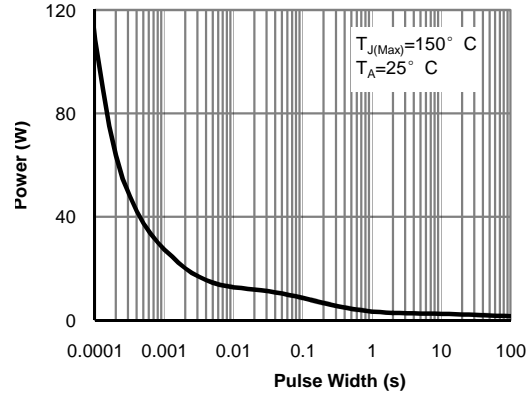


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

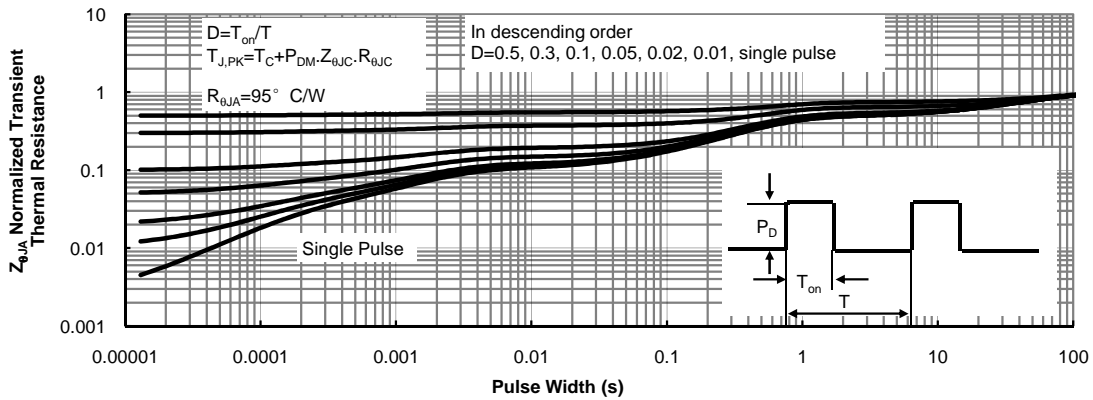
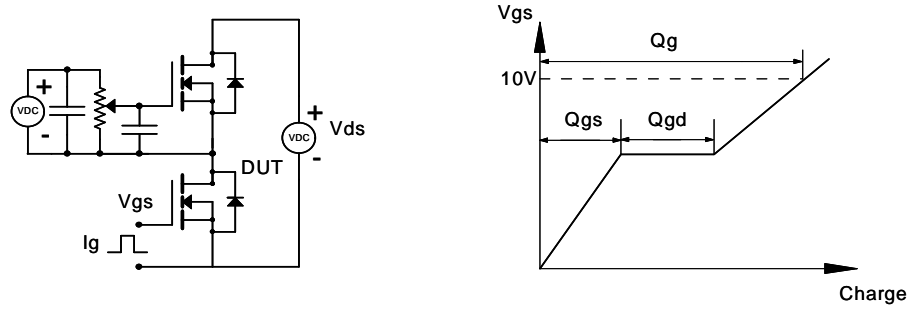
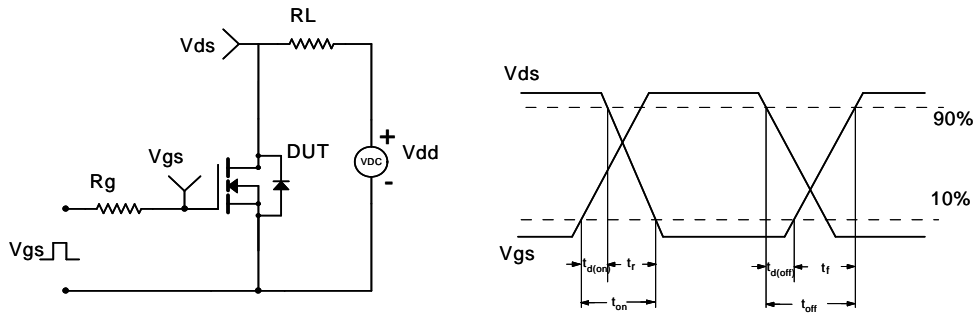


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

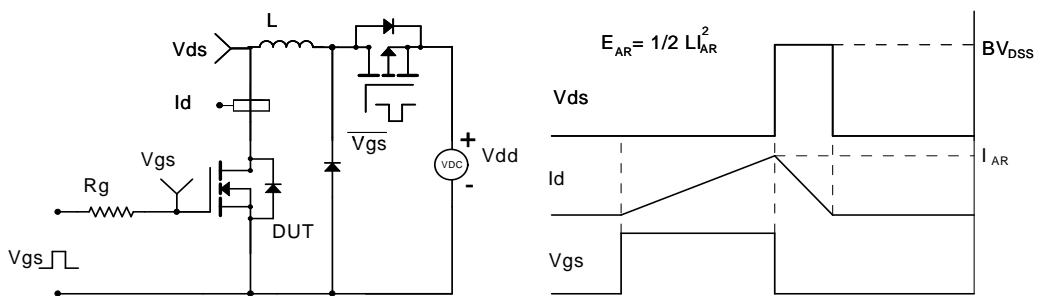
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

