

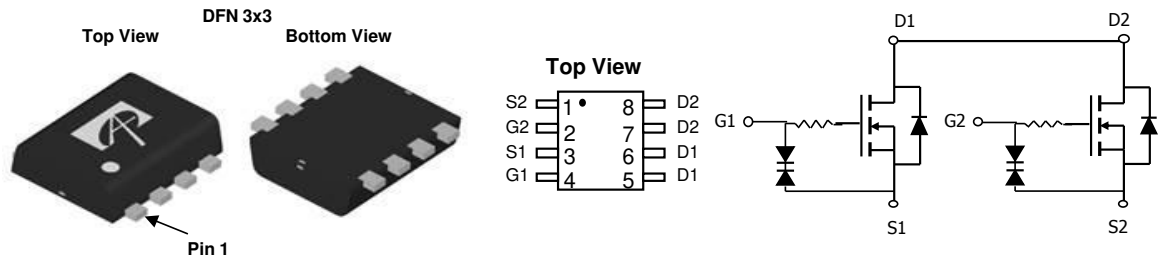
General Description

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.

Product Summary

| | |
|------------------------------------|------------------|
| 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 $T_A=25^\circ C$ 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 | $T_C=25^\circ C$ | 6 |
| | | $T_C=70^\circ C$ | 5.3 |
| Pulsed Drain Current ^B | I_{DM} | 40 | A |
| Power Dissipation ^F | P_D | $T_C=25^\circ C$ | 2.5 |
| | | $T_C=70^\circ C$ | 1.6 |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ C$ |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Units |
|--|-----------------|--------------|-----|--------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | 40 | 50 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^A | | Steady-State | 75 | 95 |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | 30 | 40 | $^\circ C/W$ |

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 | 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 18.5 | 17 24 | mΩ |
| | | 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 _{rss} | 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. The power dissipation P_D is based on T_{J(MAX)}=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J=25° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

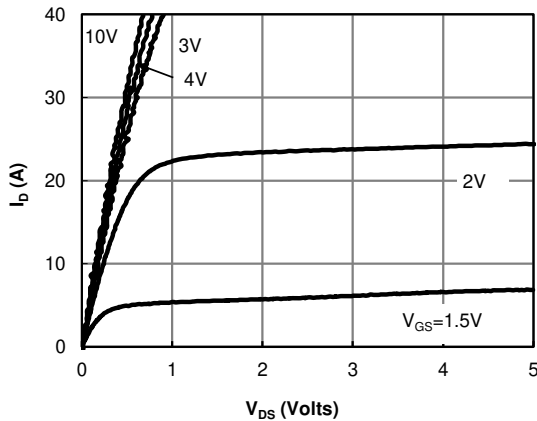


Fig 1: On-Region Characteristics (Note E)

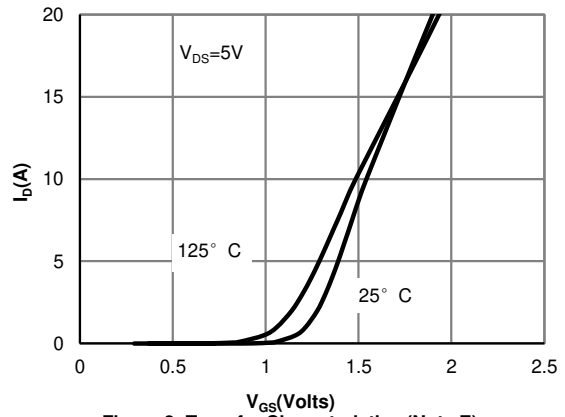


Figure 2: Transfer Characteristics (Note E)

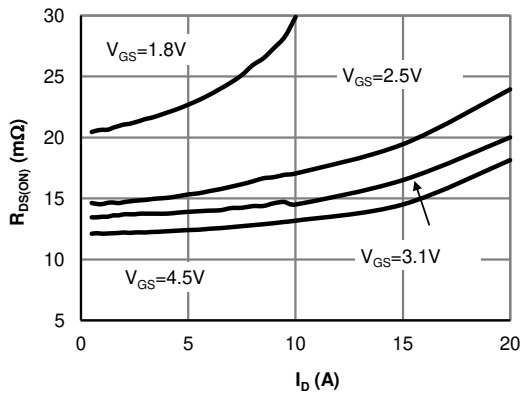


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

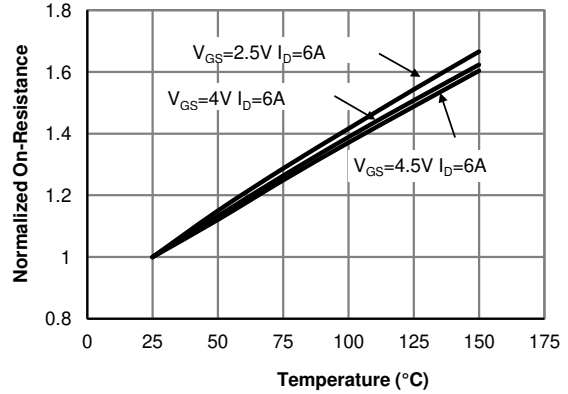


Figure 4: On-Resistance vs. Junction Temperature (Note E)

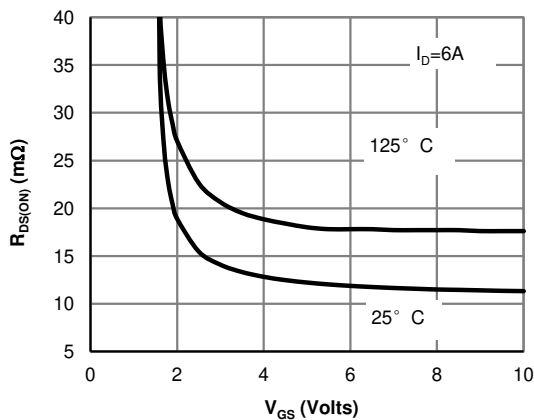


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

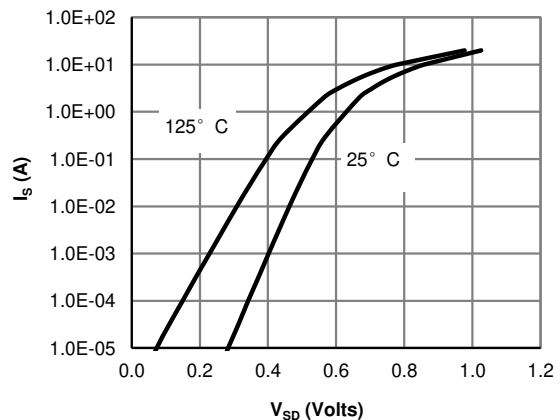


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

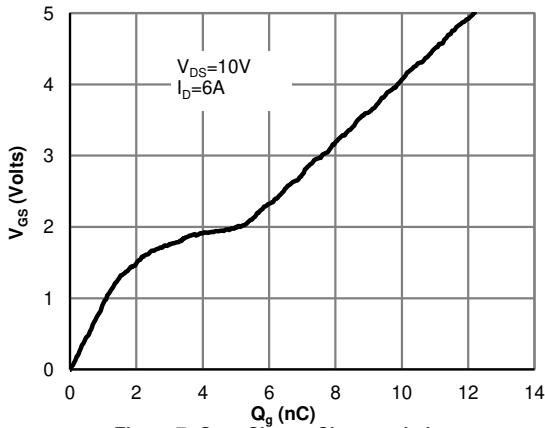


Figure 7: Gate-Charge Characteristics

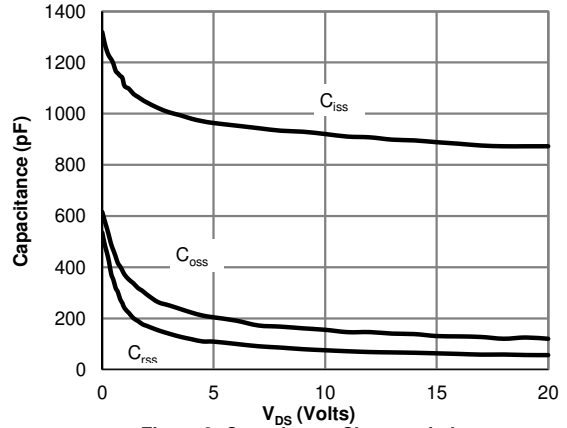


Figure 8: Capacitance Characteristics

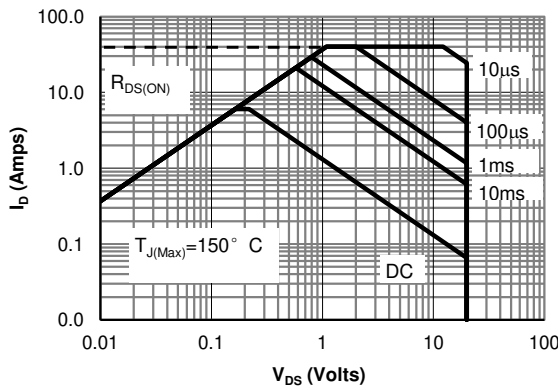


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

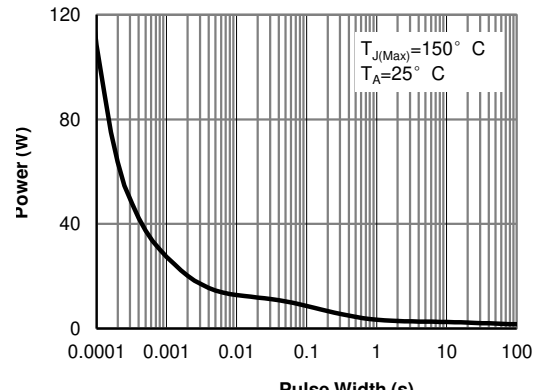


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

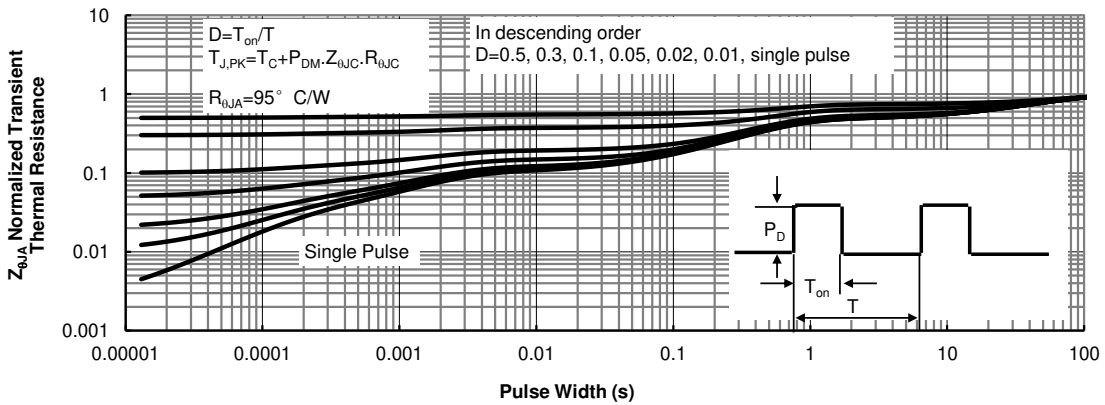
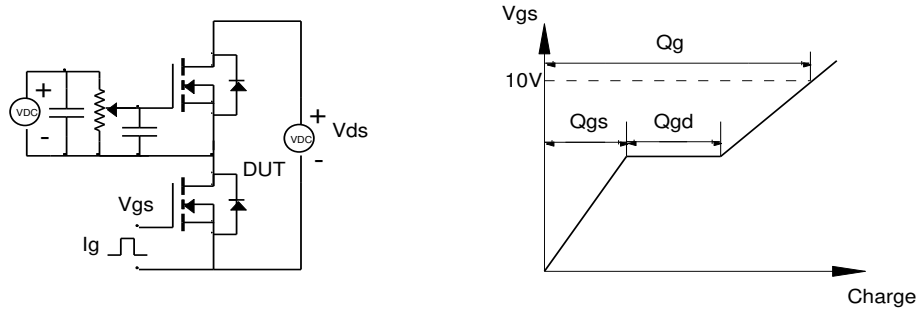
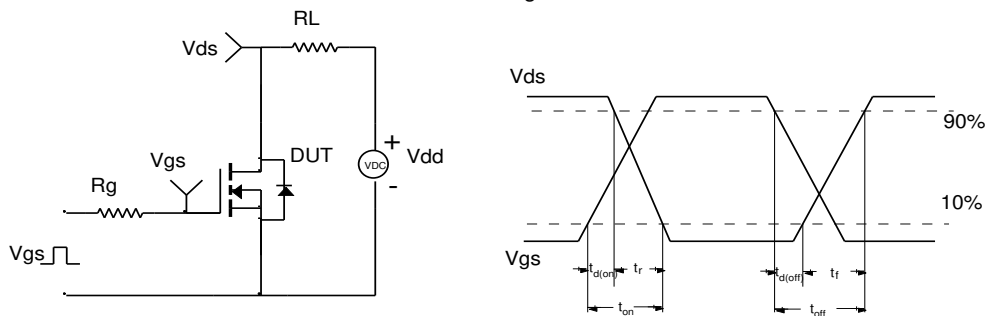


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

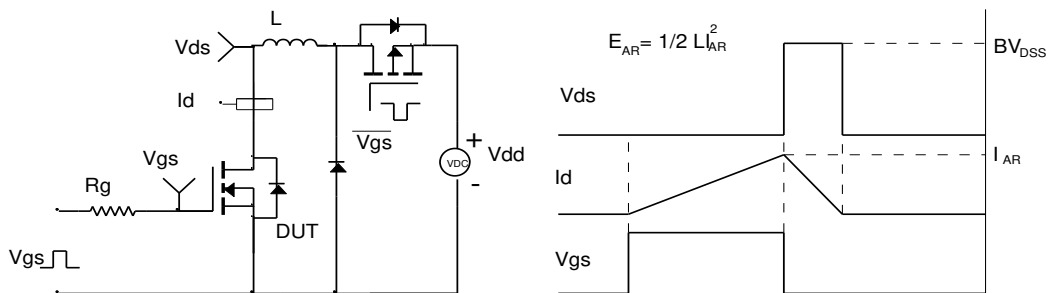
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

