**ALPHA & OMEGA SEMICONDUCTOR**

# AON7704
## N-Channel Enhancement Mode Field Effect Transistor

**SRFET ™**

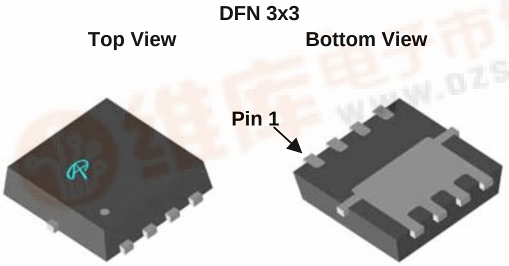
### General Description

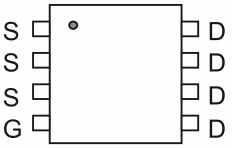
SRFET$^{TM}$ AON7704/L uses advanced trench technology with a monolithically integrated Schottky diode to provide excellent $R_{DS(ON)}$,and low gate charge.
This device is suitable for use as a low side FET in SMPS, load switching and general purpose applications.

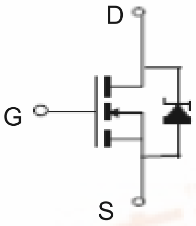
- RoHS Compliant.
- Halogen Free

### Features

$V_{DS}$ (V) = 30V
$I_D$ = 10A (V$_{GS}$ = 10V)
$R_{DS(ON)} < 20m\Omega$ ($V_{GS}$ = 10V)
$R_{DS(ON)} < 31m\Omega$ ($V_{GS}$ = 4.5V)







**SRFET$^{TM}$**
**S**oft **R**ecovery MOS**FET**:
Integrated Schottky Diode

**Absolute Maximum Ratings $T_A$=25°C unless otherwise noted**

| **Parameter** | | **Symbol** | **Maximum** | **Units** |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current [B,G] | $T_C$=25°C | $I_D$ | 14 | A |
| | $T_C$=100°C | | 14 | |
| Pulsed Drain Current [C] | | $I_{DM}$ | 50 | |
| Continuous Drain Current [B] | $T_A$=25°C | $I_{DSM}$ | 10 | |
| | $T_A$=70°C | | 7.5 | |
| Power Dissipation [B] | $T_C$=25°C | $P_D$ | 35 | W |
| | $T_C$=100°C | | 14 | |
| Power Dissipation [A] | $T_A$=25°C | $P_{DSM}$ | 3.1 | |
| | $T_A$=70°C | | 2 | |
| 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 | $R_{\theta JA}$ | 30 | 40 | °C/W |
| Maximum Junction-to-Ambient [A] | Steady-State | | 60 | 75 | °C/W |
| Maximum Junction-to-Case [D] | Steady-State | $R_{\theta JC}$ | 4.5 | 5.5 | °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 | 30 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=30V, $V_{GS}$=0V | | | 0.1 | mA |
| | | $T_J$=55°C | | | 20 | |
| $I_{GSS}$ | Gate-Body leakage current | $V_{DS}$=0V, $V_{GS}$= ±20V | | | 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$ $I_D$=250µA | 1 | 1.7 | 3 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}$=10V, $V_{DS}$=5V | 50 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=10A | | 16 | 20 | mΩ |
| | | $T_J$=125°C | | 23 | 28 | |
| | | $V_{GS}$=4.5V, $I_D$=8A | | 25 | 31 | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=5V, $I_D$=10A | | 23 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=1A,$V_{GS}$=0V | | 0.4 | 0.5 | V |
| $I_S$ | Maximum Body-Diode Continuous Current | | | | 6 | A |
| **DYNAMIC PARAMETERS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=15V, f=1MHz | | 696 | 900 | pF |
| $C_{oss}$ | Output Capacitance | | | 200 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 80 | | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | 0.6 | 1.2 | 1.8 | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| $Q_g$ (10V) | Total Gate Charge | $V_{GS}$=10V, $V_{DS}$=15V, $I_D$=10A | | 12.4 | 16 | nC |
| $Q_g$ (4.5V) | Total Gate Charge | | | 6.1 | 8 | nC |
| $Q_{gs}$ | Gate Source Charge | | | 2.04 | | nC |
| $Q_{gd}$ | Gate Drain Charge | | | 2.7 | | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}$=10V, $V_{DS}$=15V, $R_L$=1.5Ω, $R_{GEN}$=3Ω | | 2.6 | | ns |
| $t_r$ | Turn-On Rise Time | | | 6.8 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 17 | | ns |
| $t_f$ | Turn-Off Fall Time | | | 3.6 | | ns |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $I_F$=10A, dI/dt=100A/µs | | 20.2 | 26 | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | $I_F$=10A, dI/dt=100A/µs | | 7.9 | | 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.
B: Repetitive rating, pulse width limited by junction temperature.
C. The R $_{\theta JA}$ is the sum of the thermal impedence from junction to lead R $_{\theta JL}$ 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 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.
F. The current rating is based on the t ≤ 10s junction to ambient thermal resistance rating.
G.The maximum current rating is limited by bond-wires.
Rev0: Sept 2007

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

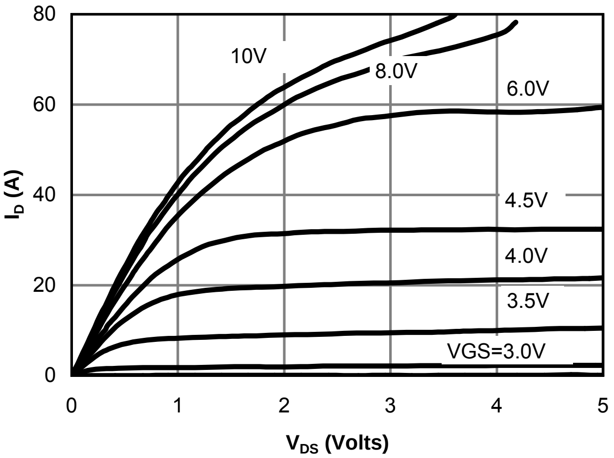

**Figure 1: On-Region Characteristics**

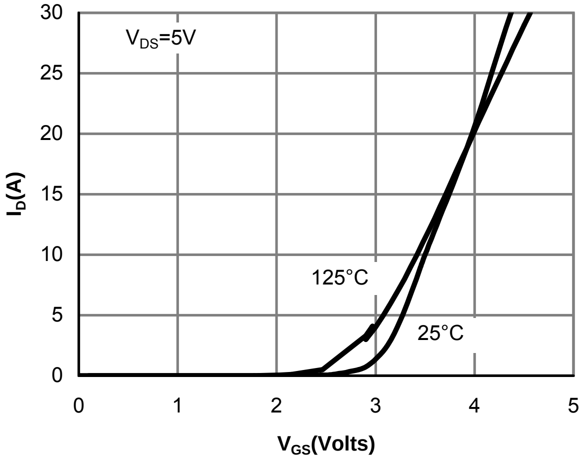

**Figure 2: Transfer Characteristics**

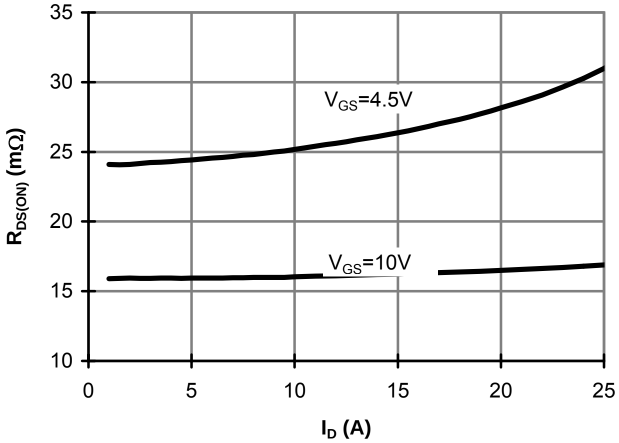

**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**

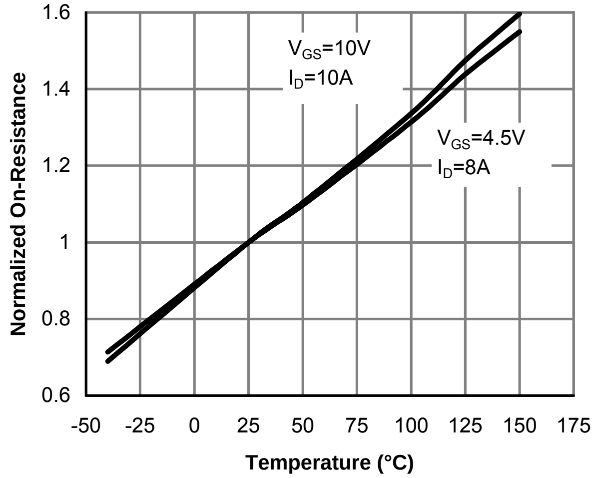

**Figure 4: On-Resistance vs. Junction Temperature**

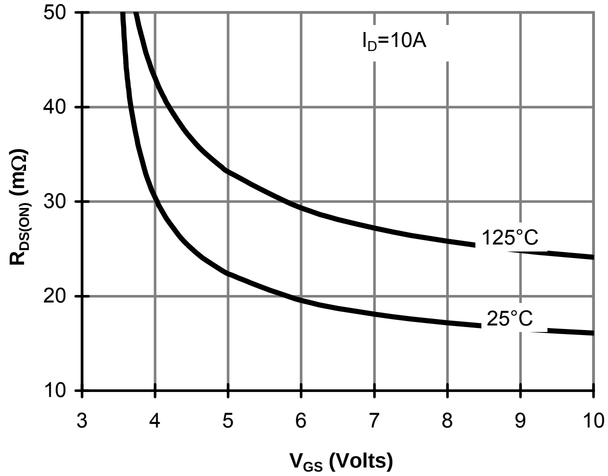

**Figure 5: On-Resistance vs. Gate-Source Voltage**

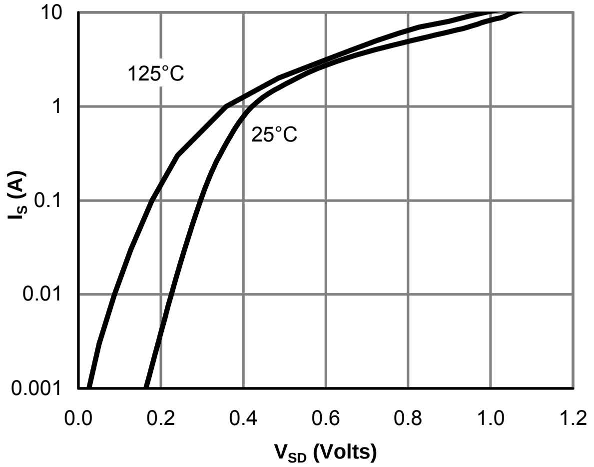

**Figure 6: Body-Diode Characteristics**

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

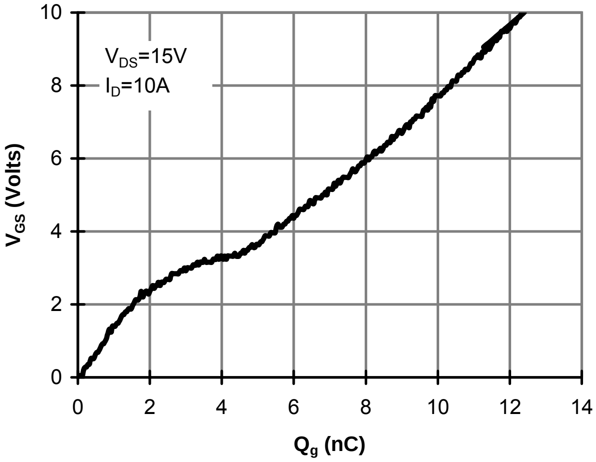

**Figure 7: Gate-Charge Characteristics**

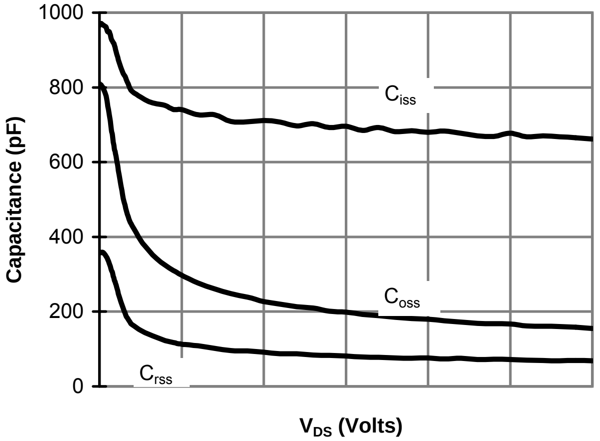

**Figure 8: Capacitance Characteristics**

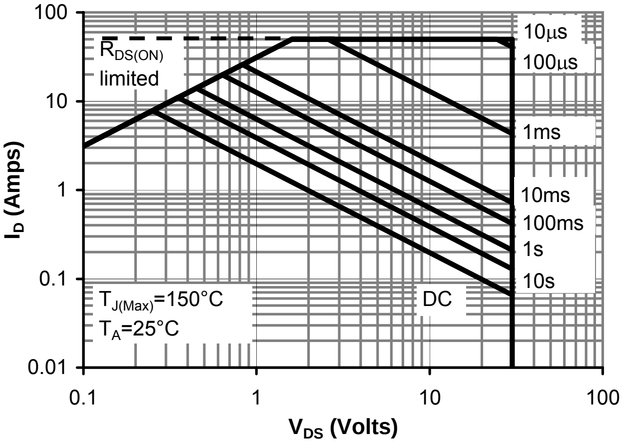

**Figure 9: Maximum Forward Biased Safe Operating Area (Note F)**

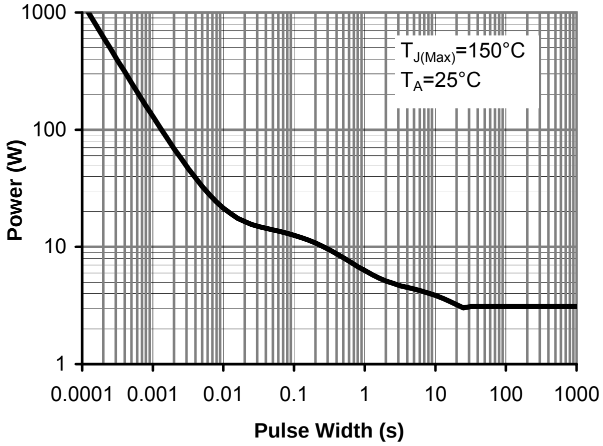

**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)**

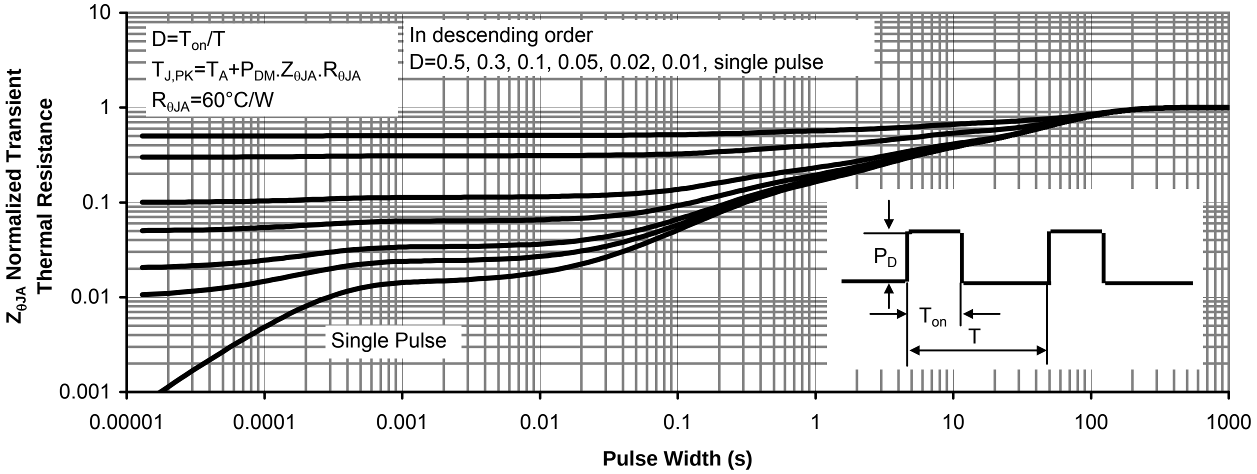

**Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)**