

AO4466
N-Channel Enhancement Mode Field Effect Transistor
General Description

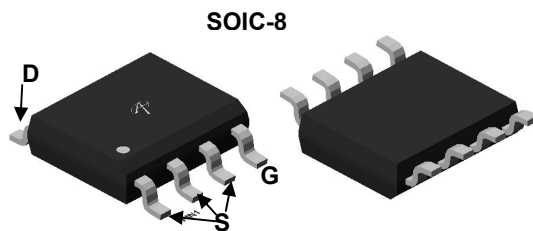
The AO4466/L uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. This device is suitable for use as a load switch or in PWM applications. The source leads are separated to allow a Kelvin connection to the source, which may be used to bypass the source inductance. AO4466 and AO4466L are electrically identical.

- RoHS Compliant
- AO4466L is Halogen Free

Features

V_{DS} (V) = 30V
 I_D = 9.4A (V_{GS} = 10V)
 $R_{DS(ON)}$ < 23m Ω (V_{GS} = 10V)
 $R_{DS(ON)}$ < 35m Ω (V_{GS} = 4.5V)

100% UIS Tested!
100% Rg Tested!


Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

| Parameter | Symbol | Maximum | Units |
|---|----------------|------------------------|------------------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current ^{AF} | I_D | $T_A=25^\circ\text{C}$ | A |
| | | $T_A=70^\circ\text{C}$ | |
| Pulsed Drain Current ^B | I_{DM} | 50 | |
| Power Dissipation | P_D | $T_A=25^\circ\text{C}$ | W |
| | | $T_A=70^\circ\text{C}$ | |
| Avalanche Current ^{B, G} | I_{AR} | 18 | A |
| Repetitive avalanche energy 0.1mH ^{B, G} | E_{AR} | 16 | mJ |
| 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 | $R_{\theta JA}$ | 34 | 40 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient ^A | | 62 | 75 | |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | 18 | 24 | $^\circ\text{C/W}$ |

Electrical Characteristics (T_J=25°C unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|---|-----|----------|----------|-------|
| STATIC PARAMETERS | | | | | | |
| B _V 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 T _J =55°C | | | 1 5 | μA |
| 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 | 1.6 | 3 | V |
| I _{D(ON)} | On state drain current | V _{GS} =4.5V, V _{DS} =5V | 20 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =9.4A T _J =125°C | | 17 24 | 23 30 | mΩ |
| | | V _{GS} =4.5V, I _D =5A | | 27 | 35 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =5V, I _D =9.4A | 10 | 24 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | 0.75 | 1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 4.3 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =15V, f=1MHz | | 621 | 820 | pF |
| C _{oss} | Output Capacitance | | | 118 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 85 | 119 | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | 0.4 | 0.8 | 1.5 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _{g(10V)} | Total Gate Charge | V _{GS} =10V, V _{DS} =15V, I _D =9.4A | | 11.3 | 17 | nC |
| Q _{g(4.5V)} | Total Gate Charge | | | 5.7 | 8 | nC |
| Q _{gs} | Gate Source Charge | | | 2.1 | | nC |
| Q _{gd} | Gate Drain Charge | | | 3 | | nC |
| t _{D(on)} | Turn-On Delay Time | V _{GS} =10V, V _{DS} =15V, R _L =1.6Ω, R _{GEN} =3Ω | | 4.5 | 6.5 | ns |
| t _r | Turn-On Rise Time | | | 3.1 | 5 | ns |
| t _{D(off)} | Turn-Off Delay Time | | | 15.1 | 23 | ns |
| t _f | Turn-Off Fall Time | | | 2.7 | 5 | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =9.4A, di/dt=100A/μs | | 15.5 | 21 | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =9.4A, di/dt=100A/μs | | 7.1 | | nC |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =9.4A, di/dt=500A/μs | | 8.1 | 11 | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =9.4A, di/dt=500A/μs | | 10.8 | | nC |

A: The value of R_{θJA} is measured 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 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 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: L=100uH, V_{DD}=0V, R_G=0Ω, rated V_{DS}=30V and V_{GS}=10V

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

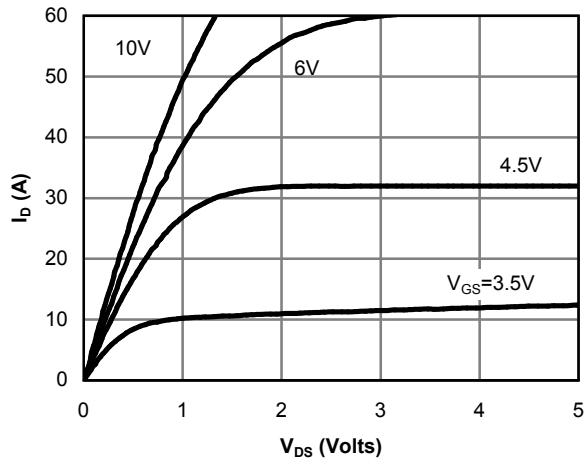


Fig 1: On-Region Characteristics

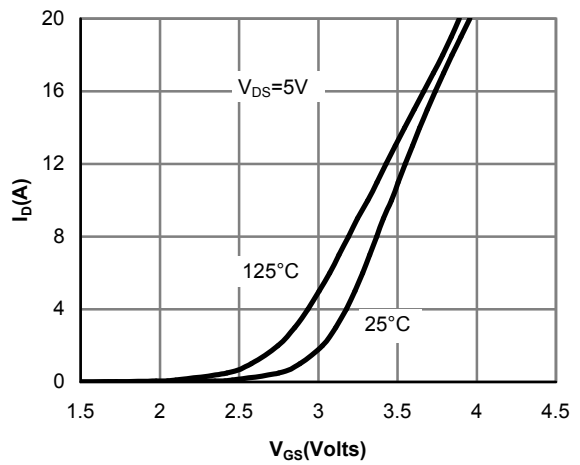


Figure 2: Transfer Characteristics

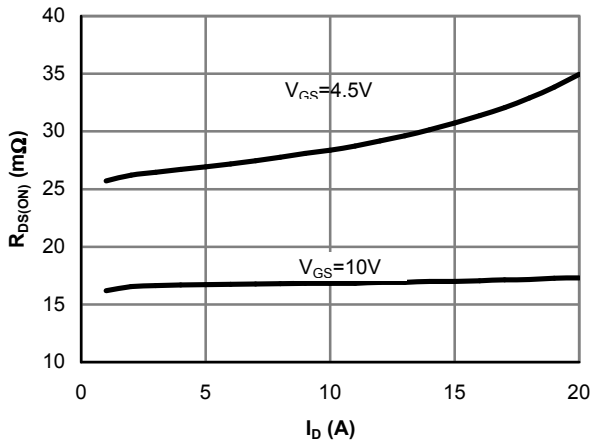


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

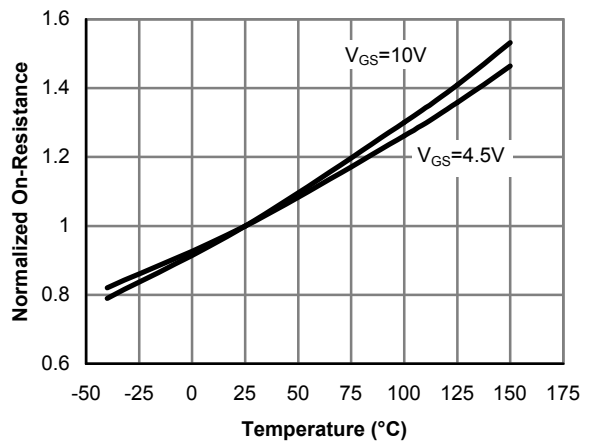


Figure 4: On-Resistance vs. Junction Temperature

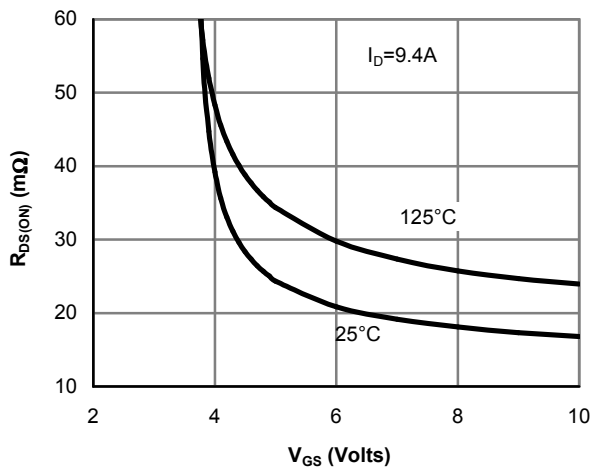


Figure 5: On-Resistance vs. Gate-Source Voltage

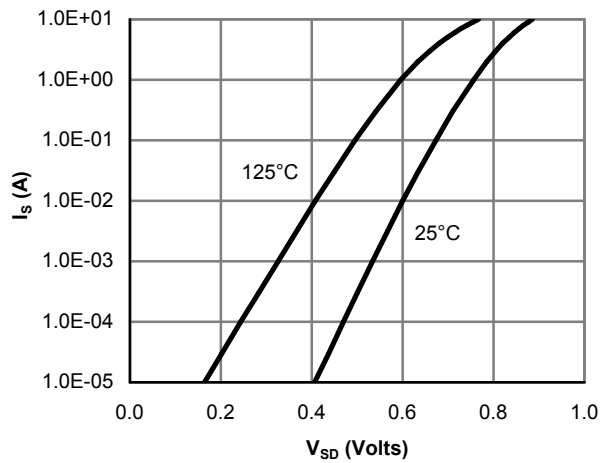


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

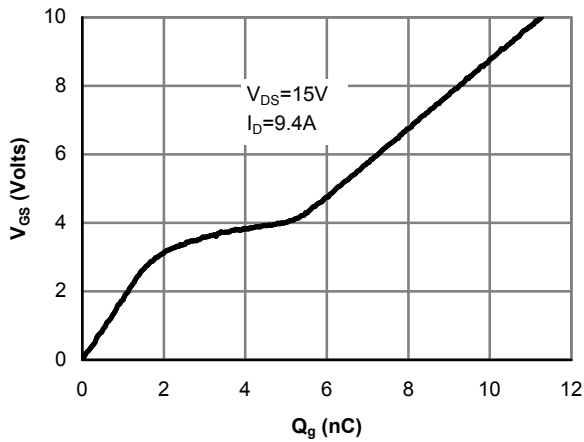


Figure 7: Gate-Charge Characteristics

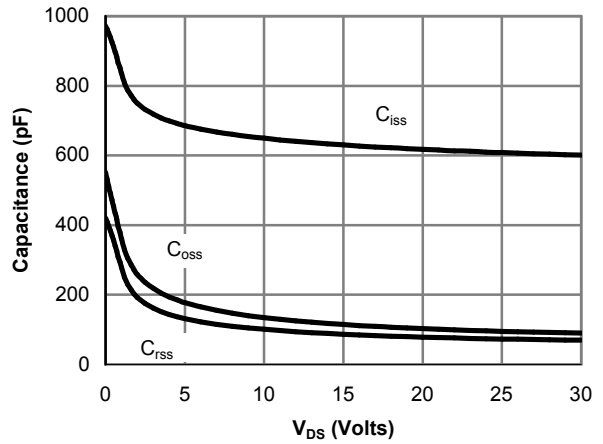


Figure 8: Capacitance Characteristics

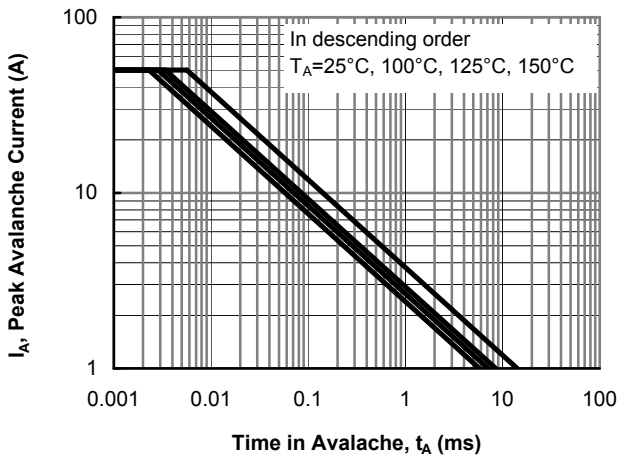


Figure 9: Single Pulse Avalanche Capability

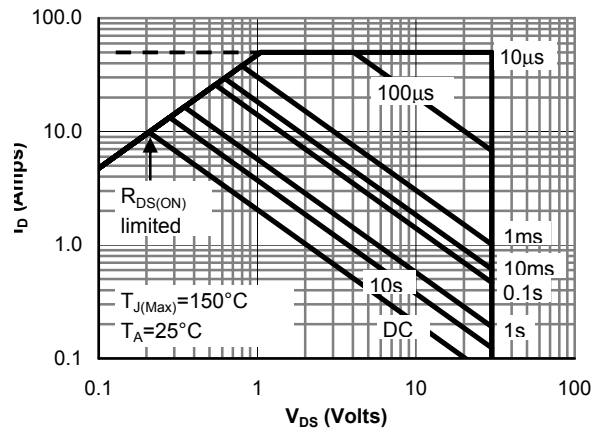


Figure 10: Maximum Forward Biased Safe Operating Area (Note E)

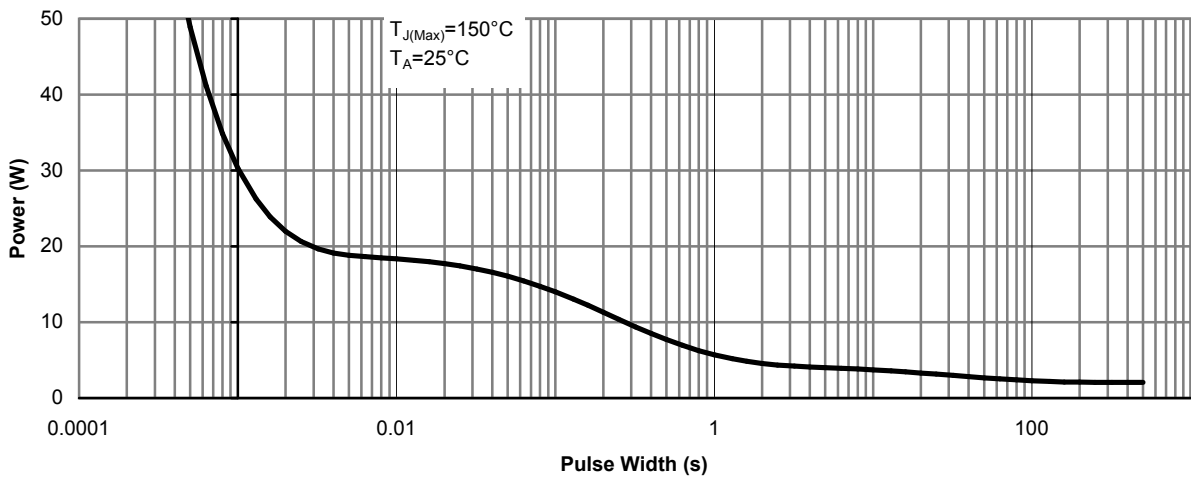


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

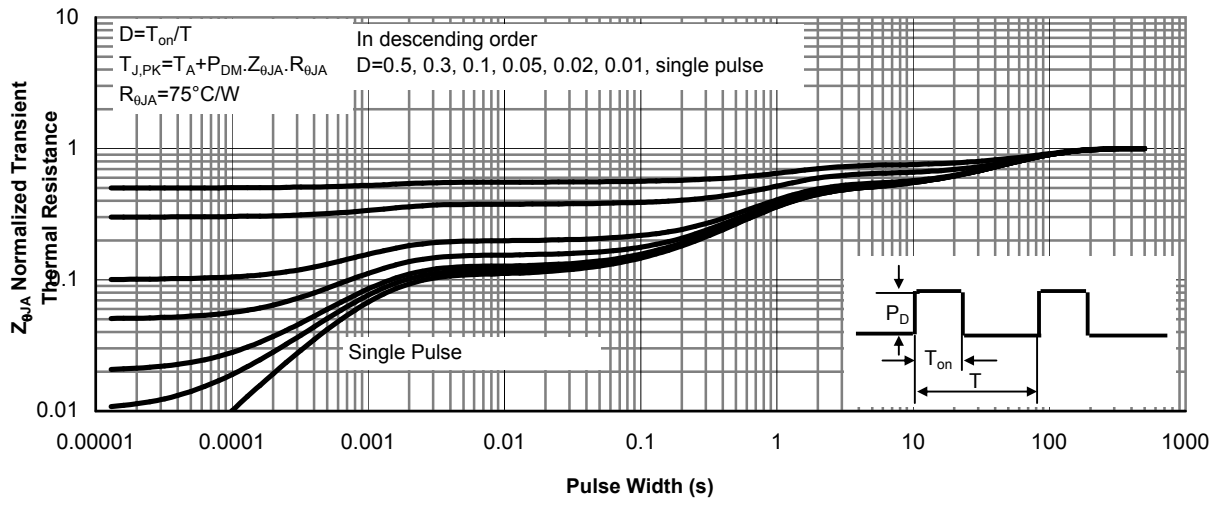
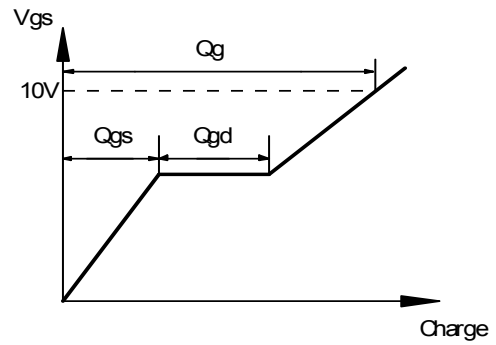
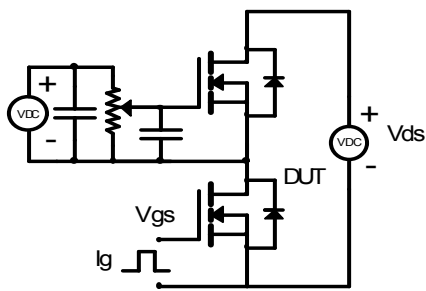
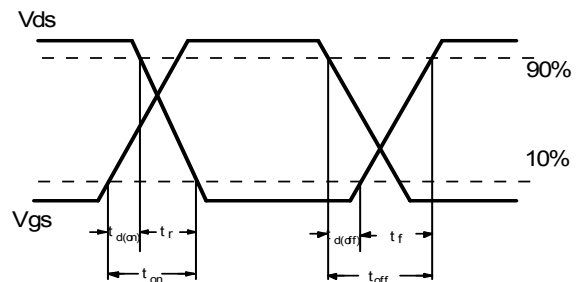
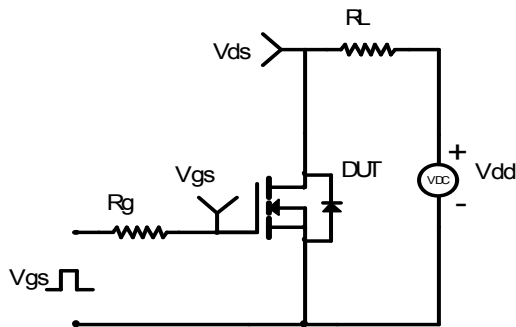


Figure 12: Normalized Maximum Transient Thermal Impedance

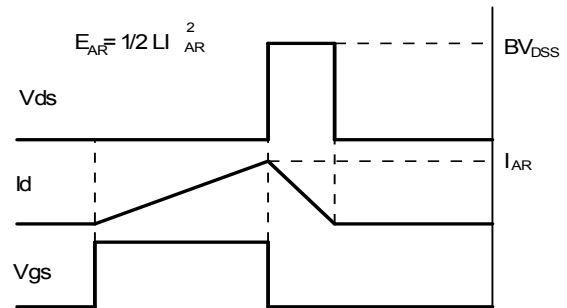
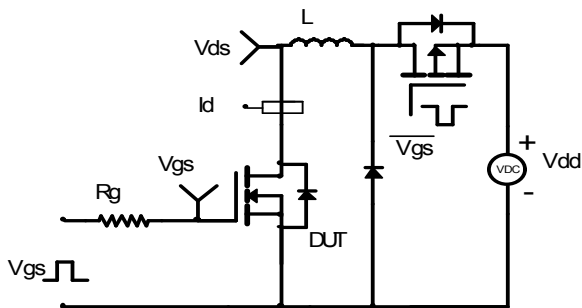
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

