



AO4620

Complementary Enhancement Mode Field Effect Transistor

General Description

The AO4620 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in inverter and other applications.

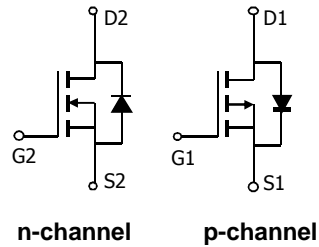
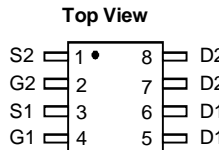
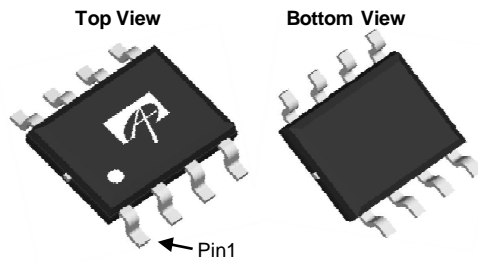
Features

| | |
|----------------------------------|-------------------------------------|
| n-channel | p-channel |
| $V_{DS} (V) = 30V$ | -30V |
| $I_D = 7.2A (V_{GS}=10V)$ | -5.3A ($V_{GS} = -10V$) |
| $R_{DS(ON)}$ | $R_{DS(ON)}$ |
| < 24m Ω ($V_{GS}=10V$) | < 32m Ω ($V_{GS} = -10V$) |
| < 36m Ω ($V_{GS}=4.5V$) | < 55m Ω ($V_{GS} = -4.5V$) |

100% UIS tested
100% Rg tested



SOIC-8



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

| Parameter | Symbol | Max n-channel | Max p-channel | Units |
|--|----------------|------------------------|---------------|------------------|
| Drain-Source Voltage | V_{DS} | 30 | -30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | ± 20 | V |
| Continuous Drain Current ^F | I_D | $T_A=25^\circ\text{C}$ | 7.2 | -5.3 |
| | | $T_A=70^\circ\text{C}$ | 6.2 | -4.5 |
| Pulsed Drain Current ^B | I_{DM} | 64 | -40 | A |
| Power Dissipation ^F | P_D | $T_A=25^\circ\text{C}$ | 2 | 2 |
| | | $T_A=70^\circ\text{C}$ | 1.44 | 1.44 |
| Avalanche Current ^B | I_{AR} | 9 | 17 | A |
| Repetitive avalanche energy 0.3mH ^B | E_{AR} | 12 | 43 | mJ |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | -55 to 150 | $^\circ\text{C}$ |

Thermal Characteristics: n-channel and p-channel

| Parameter | Symbol | Device | Typ | Max | Units |
|--|-----------------|--------|-----|------|--------------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | n-ch | 50 | 62.5 | $^\circ\text{C/W}$ |
| | | p-ch | 80 | 100 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | n-ch | 32 | 40 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | p-ch | 50 | 62.5 | $^\circ\text{C/W}$ |
| | | n-ch | 80 | 100 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | p-ch | 32 | 40 | $^\circ\text{C/W}$ |

N-CHANNEL 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 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 | 1.5 | 2.1 | 2.6 | V |
| I _{D(ON)} | On state drain current | V _{GS} =10V, V _{DS} =5V | 64 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =7.2A T _J =125°C | | 17.7 25 | 24 32 | mΩ |
| | | V _{GS} =4.5V, I _D =5A | | 24.8 | 36 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =5V, I _D =7.2A | | 20 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | 0.74 | 1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 2.5 | A |
| I _{SM} | Pulsed Body-Diode Current ^B | | | | 64 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =15V, f=1MHz | | 373 | 448 | pF |
| C _{oss} | Output Capacitance | | | 67 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 41 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 1.8 | 2.8 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _g (10V) | Total Gate Charge | V _{GS} =10V, V _{DS} =15V, I _D =7.2A | | 7.2 | 11 | nC |
| Q _g (4.5V) | Total Gate Charge | | | 3.5 | | nC |
| Q _{gs} | Gate Source Charge | | | 1.3 | | nC |
| Q _{gd} | Gate Drain Charge | | | 1.7 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =10V, V _{DS} =15V, R _L =2.1Ω, R _{GEN} =3Ω | | 4.5 | | ns |
| t _r | Turn-On Rise Time | | | 2.7 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 14.9 | | ns |
| t _f | Turn-Off Fall Time | | | 2.9 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =7.2A, di/dt=100A/μs | | 10.5 | 12.6 | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =7.2A, di/dt=100A/μs | | 4.5 | | nC |

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. The current rating is based on the t ≤ 10s thermal resistance rating.

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 are based on the t ≤ 10s thermal resistance rating.

Rev 8: May 2012

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

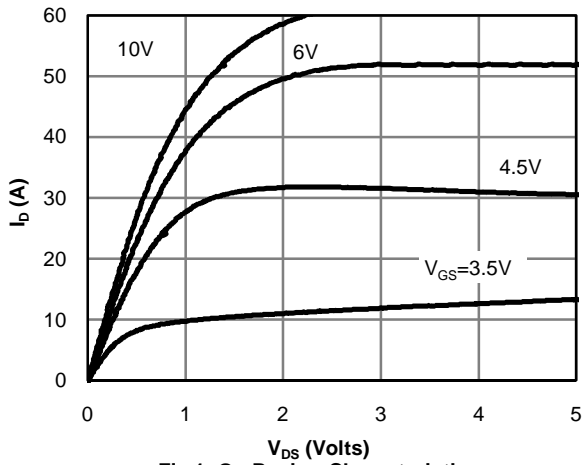


Fig 1: On-Region Characteristics

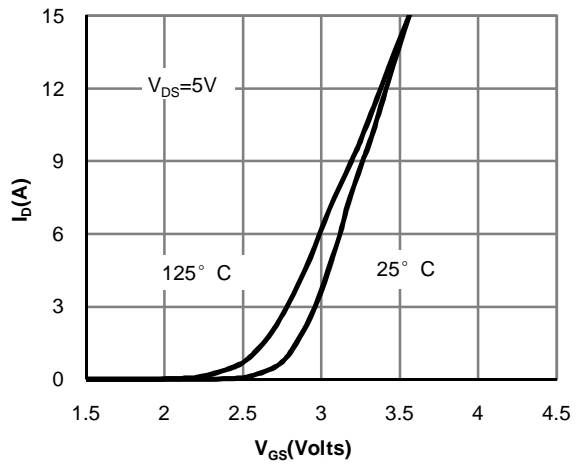


Figure 2: Transfer Characteristics

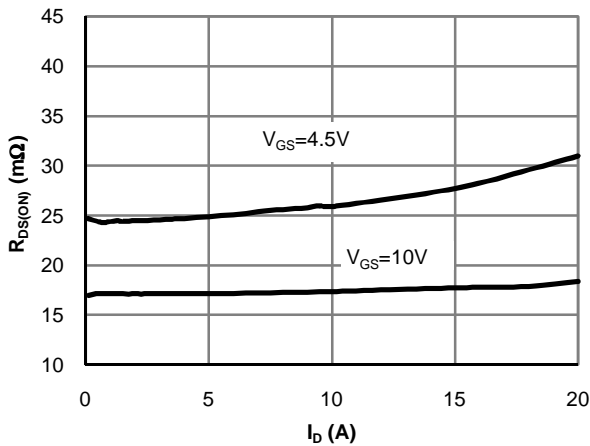


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

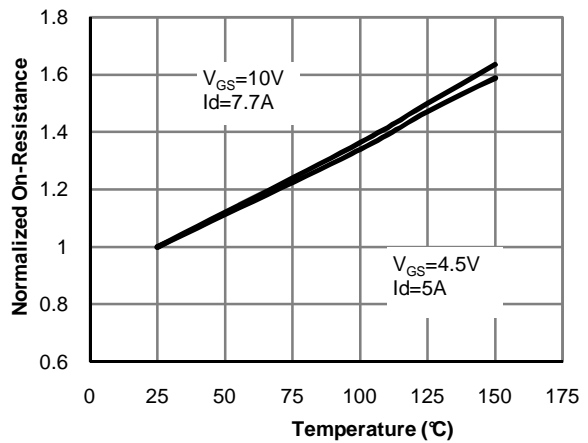


Figure 4: On-Resistance vs. Junction Temperature

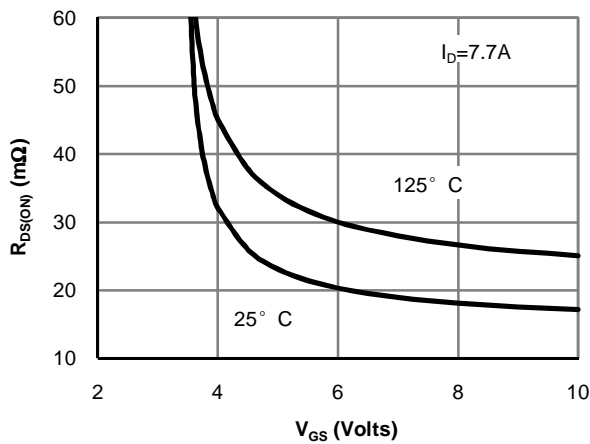


Figure 5: On-Resistance vs. Gate-Source Voltage

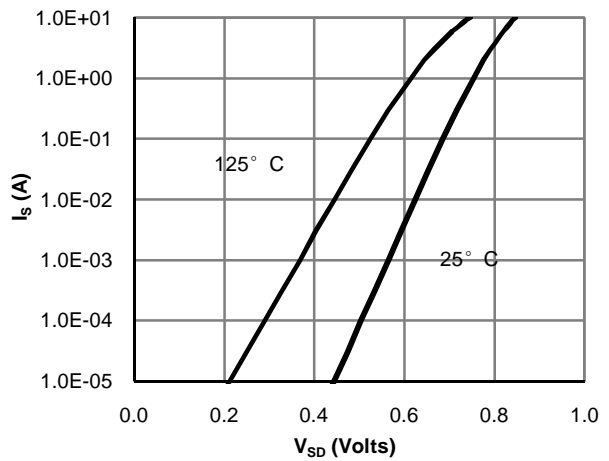


Figure 6: Body-Diode Characteristics

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

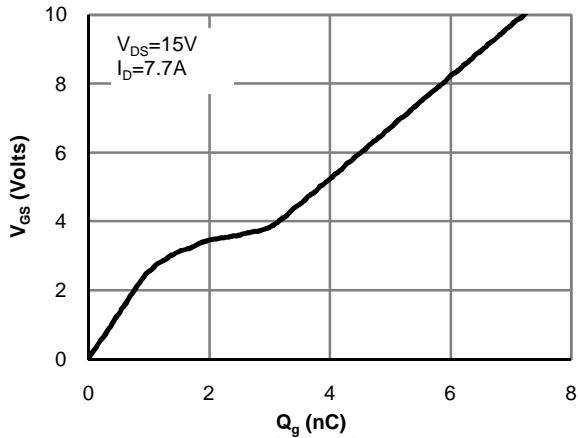


Figure 7: Gate-Charge Characteristics

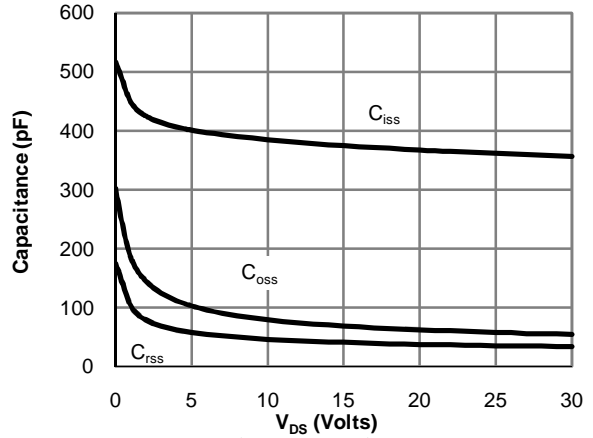


Figure 8: Capacitance Characteristics

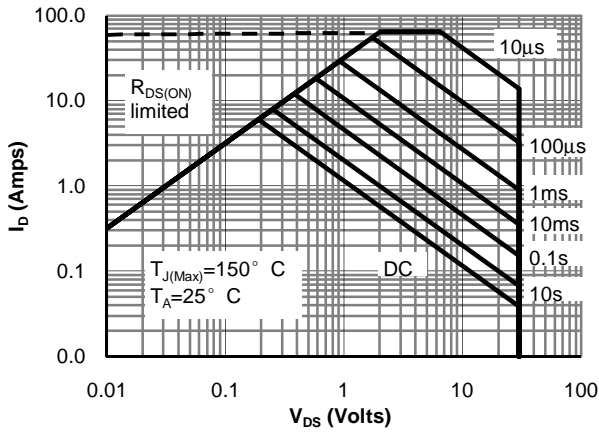


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

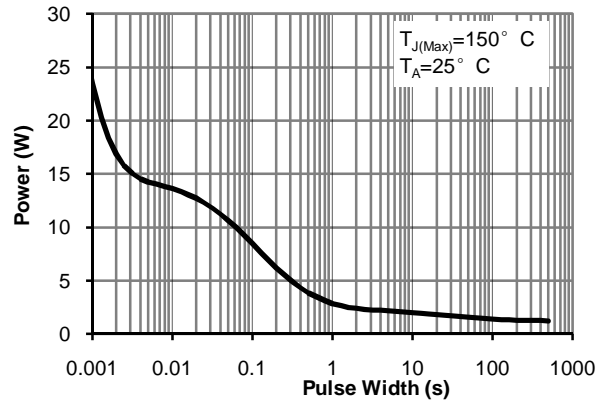


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

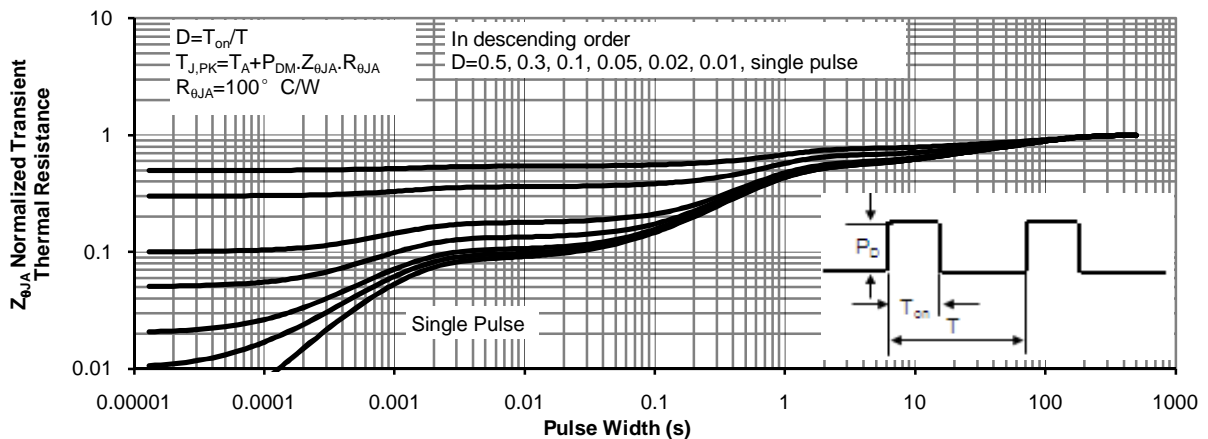


Figure 11: Normalized Maximum Transient Thermal Impedance

P-CHANNEL 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 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 | -1.3 | -1.85 | -2.4 | V |
| I _{D(ON)} | On state drain current | V _{GS} =-10V, V _{DS} =-5V | -40 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =-10V, I _D =-5.3A T _J =125°C | | 23 31.5 | 32 | mΩ |
| | | V _{GS} =-4.5V, I _D =-4.5A | | 33 | 55 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =-5V, I _D =-5.3A | | 19 | | S |
| V _{SD} | Diode Forward Voltage | I _S =-1A, V _{GS} =0V | | -0.8 | -1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | -3.5 | A |
| I _{SM} | Pulsed Body-Diode Current ^B | | | | -40 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =-15V, f=1MHz | | 760 | | pF |
| C _{oss} | Output Capacitance | | | 140 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 95 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 3.2 | 5 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _g (10V) | Total Gate Charge (10V) | V _{GS} =-10V, V _{DS} =-15V, I _D =-5.3A | | 13.6 | 16 | nC |
| Q _g (4.5V) | Total Gate Charge (4.5V) | | | 6.7 | | nC |
| Q _{gs} | Gate Source Charge | | | 2.5 | | nC |
| Q _{gd} | Gate Drain Charge | | | 3.2 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =-10V, V _{DS} =-15V, R _L =2.8Ω, R _{GEN} =3Ω | | 8 | | ns |
| t _r | Turn-On Rise Time | | | 6 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 17 | | ns |
| t _f | Turn-Off Fall Time | | | 5 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =-5.3A, dI/dt=100A/μs | | 15 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =-5.3A, dI/dt=100A/μs | | 9.7 | | nC |

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. The current rating is based on the t ≤ 10s thermal resistance rating.

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 thermal resistance rating.

Rev8: May 2012

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

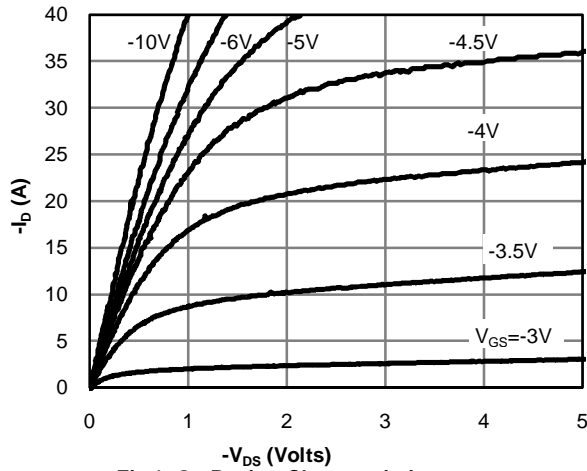


Fig 1: On-Region Characteristics

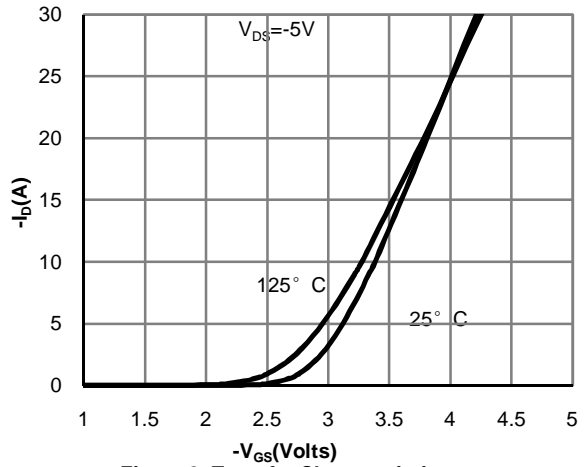


Figure 2: Transfer Characteristics

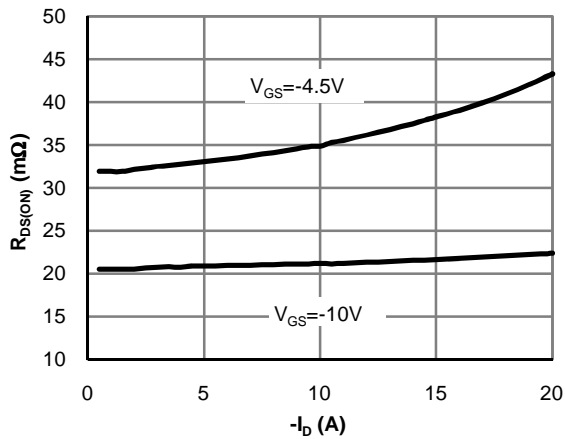


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

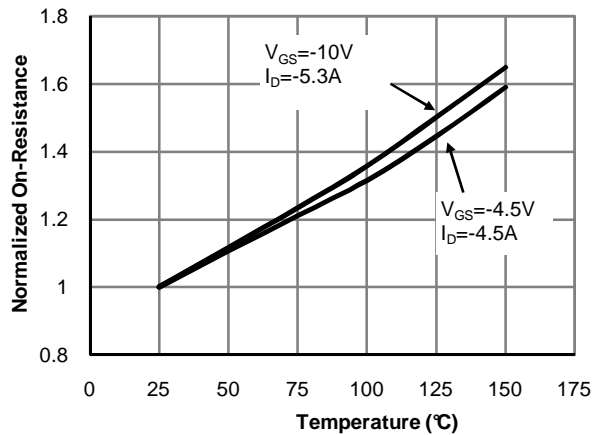


Figure 4: On-Resistance vs. Junction Temperature

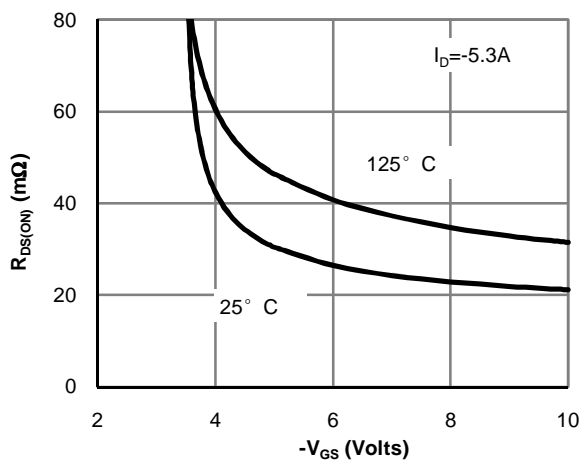


Figure 5: On-Resistance vs. Gate-Source Voltage

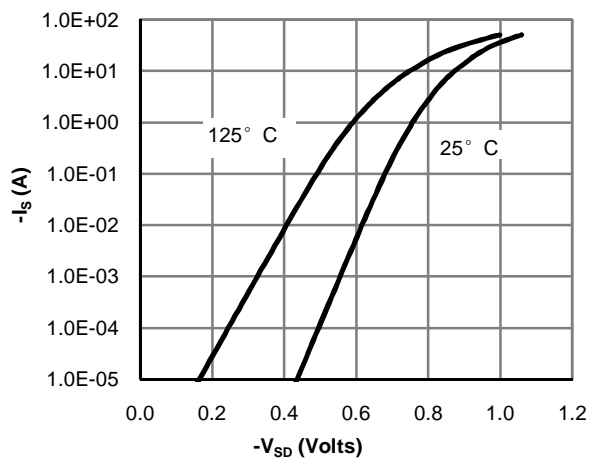


Figure 6: Body-Diode Characteristics

P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

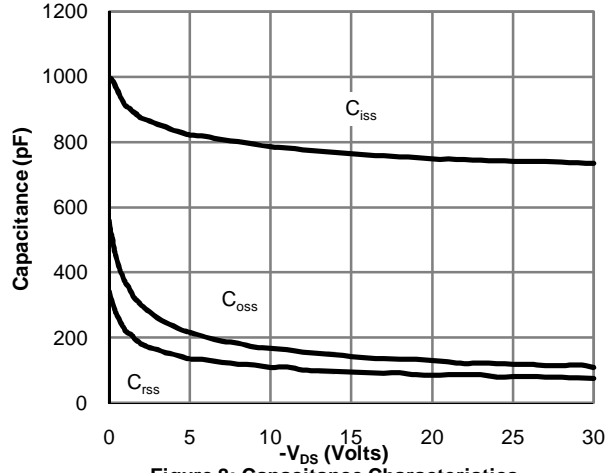
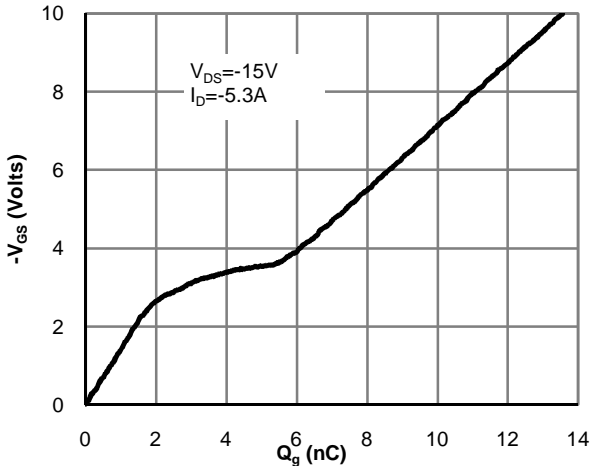


Figure 8: Capacitance Characteristics

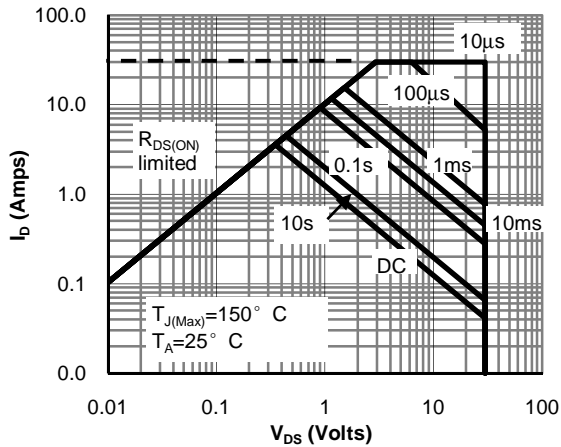


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

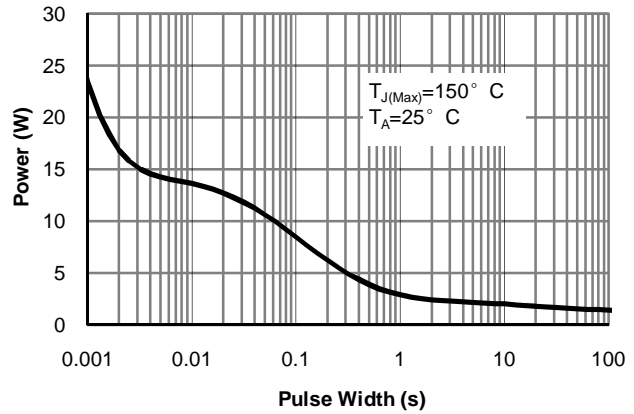


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

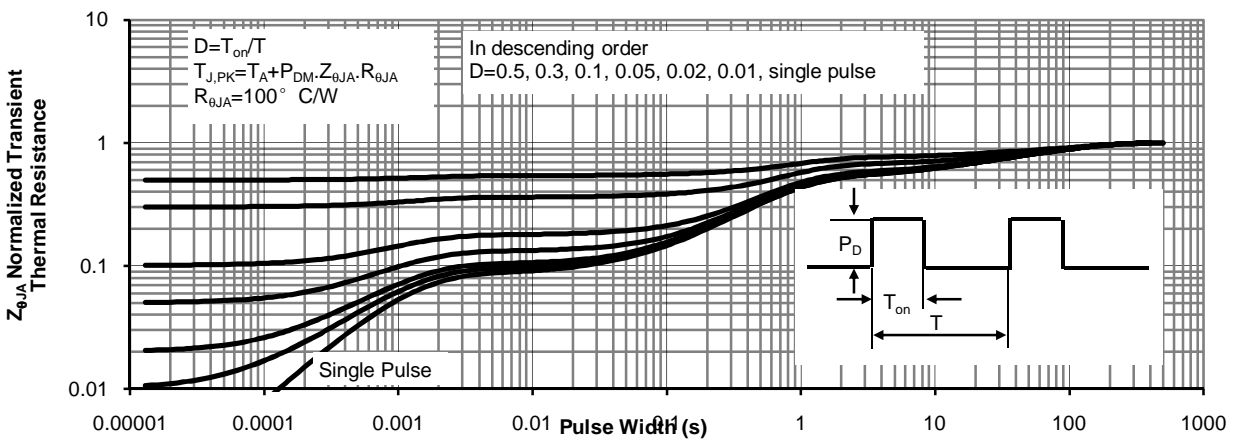


Figure 11: Normalized Maximum Transient Thermal Impedance