



AO4621

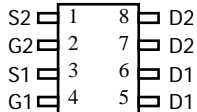
Complementary Enhancement Mode Field Effect Transistor

General Description

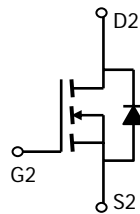
The AO4621 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications. *Standard Product AO4621 is Pb-free (meets ROHS & Sony 259 specifications). AO4621L is a Green Product ordering option. AO4621 and AO4621L are electrically identical.*

Features

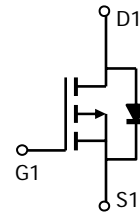
| | |
|----------------------------------|-------------------------------------|
| n-channel | p-channel |
| $V_{DS} (V) = 40V$ | -40V |
| $I_D = 6A (V_{GS}=10V)$ | -5A ($V_{GS} = -10V$) |
| $R_{DS(ON)}$ | $R_{DS(ON)}$ |
| < 31m Ω ($V_{GS}=10V$) | < 45m Ω ($V_{GS} = -10V$) |
| < 45m Ω ($V_{GS}=4.5V$) | < 63m Ω ($V_{GS} = -4.5V$) |



SOIC-8



n-channel



p-channel

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

| Parameter | Symbol | Max n-channel | Max p-channel | Units |
|--|----------------|------------------|---------------|------------|
| Drain-Source Voltage | V_{DS} | 40 | -40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | ± 20 | V |
| Continuous Drain Current ^A | I_D | $T_A=25^\circ C$ | 6 | -5 |
| | | $T_A=70^\circ C$ | 5 | -4 |
| Pulsed Drain Current ^B | I_{DM} | 20 | -20 | A |
| Power Dissipation | P_D | $T_A=25^\circ C$ | 2 | 2 |
| | | $T_A=70^\circ C$ | 1.28 | 1.28 |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | -55 to 150 | $^\circ C$ |

Thermal Characteristics: n-channel and p-channel

| Parameter | Symbol | Device | Typ | Max | Units |
|--|-----------------|--------|-----|------|--------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | n-ch | 48 | 62.5 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^A | | n-ch | 74 | 110 | $^\circ C/W$ |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | n-ch | 35 | 50 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | p-ch | 48 | 62.5 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^A | | p-ch | 74 | 110 | $^\circ C/W$ |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | p-ch | 35 | 50 | $^\circ C/W$ |

N Channel Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|---|-----|------|-----------|---------------|
| STATIC PARAMETERS | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $I_D=10\text{mA}, V_{GS}=0\text{V}$ | 40 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=32\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$ | | | 1 | μA |
| | | | | | 5 | |
| I_{GSS} | Gate-Body leakage current | $V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$ | | | ± 100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu\text{A}$ | 1 | 2.3 | 3 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}=10\text{V}, V_{DS}=5\text{V}$ | 20 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10\text{V}, I_D=6\text{A}$ $T_J=125^\circ\text{C}$ | | 23.2 | 31 | m Ω |
| | | | | 36 | 48 | |
| | | $V_{GS}=4.5\text{V}, I_D=5\text{A}$ | | 32.6 | 45 | m Ω |
| g_{FS} | Forward Transconductance | $V_{DS}=5\text{V}, I_D=6\text{A}$ | | 22 | | S |
| V_{SD} | Diode Forward Voltage | $I_S=1\text{A}, V_{GS}=0\text{V}$ | | 0.77 | 1 | V |
| I_S | Maximum Body-Diode Continuous Current | | | | 2 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C_{ISS} | Input Capacitance | $V_{GS}=0\text{V}, V_{DS}=20\text{V}, f=1\text{MHz}$ | | 404 | | pF |
| C_{OSS} | Output Capacitance | | | 95 | | pF |
| C_{RSS} | Reverse Transfer Capacitance | | | 37 | | pF |
| R_g | Gate resistance | $V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$ | | 2.7 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| $Q_g(10\text{V})$ | Total Gate Charge | $V_{GS}=10\text{V}, V_{DS}=20\text{V}, I_D=6\text{A}$ | | 8.3 | | nC |
| $Q_g(4.5\text{V})$ | Total Gate Charge | | | 4.2 | | nC |
| Q_{gs} | Gate Source Charge | | | 1.3 | | nC |
| Q_{gd} | Gate Drain Charge | | | 2.3 | | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}=10\text{V}, V_{DS}=20\text{V}, R_L=3.3\Omega,$ $R_{GEN}=3\Omega$ | | 4.2 | | ns |
| t_r | Turn-On Rise Time | | | 3.3 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 15.6 | | ns |
| t_f | Turn-Off Fall Time | | | 3 | | ns |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=6\text{A}, dI/dt=100\text{A}/\mu\text{s}$ | | 20.5 | | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | $I_F=6\text{A}, dI/dt=100\text{A}/\mu\text{s}$ | | 14.5 | | nC |

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t_s \leq 10\text{s}$ thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using 80 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 $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CANNEL

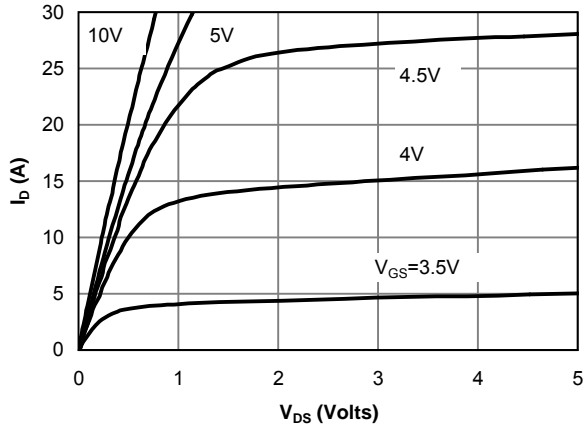


Figure 1: On-Region Characteristics

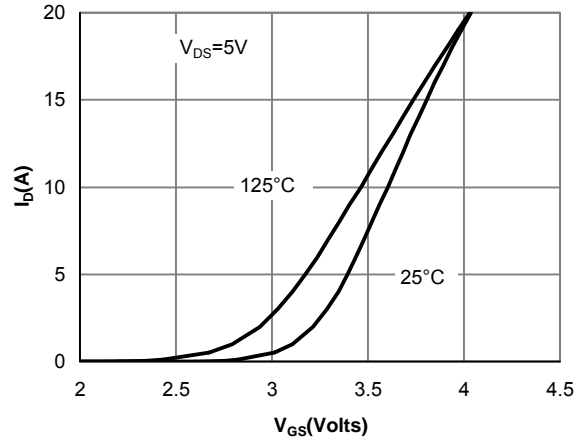


Figure 2: Transfer Characteristics

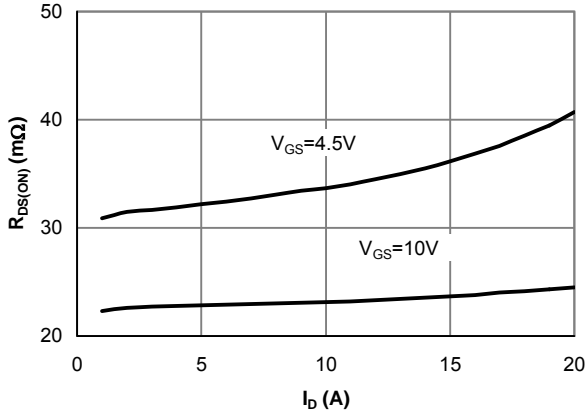


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

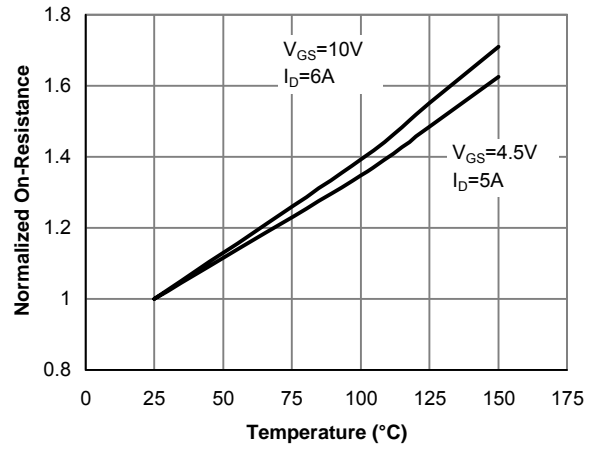


Figure 4: On-Resistance vs. Junction Temperature

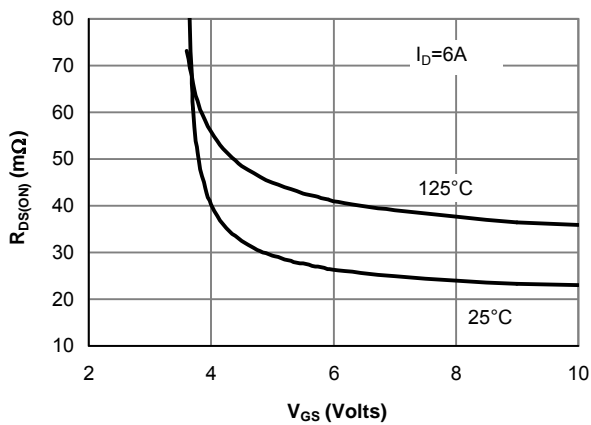


Figure 5: On-Resistance vs. Gate-Source Voltage

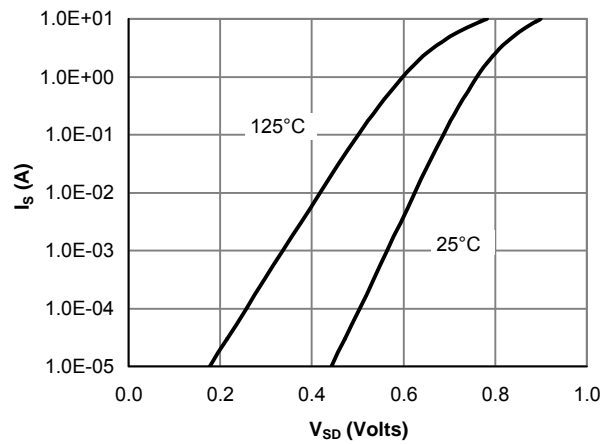


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CANNEL

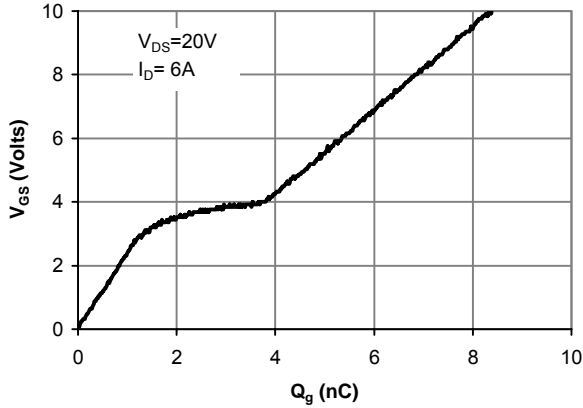


Figure 7: Gate-Charge Characteristics

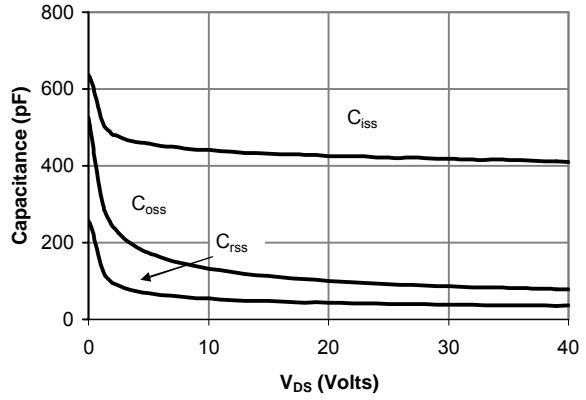


Figure 8: Capacitance Characteristics

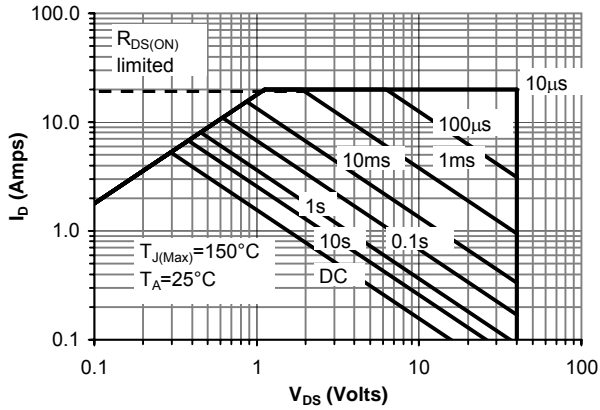


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

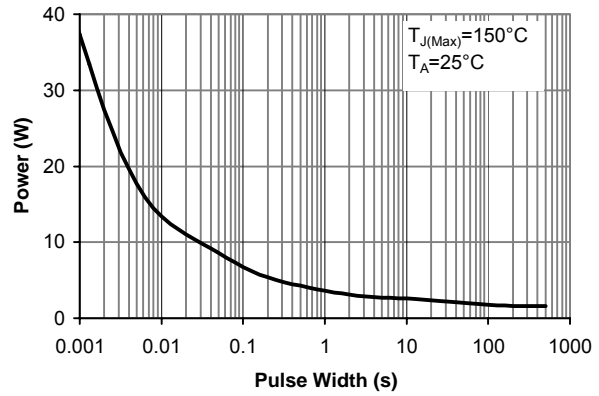


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

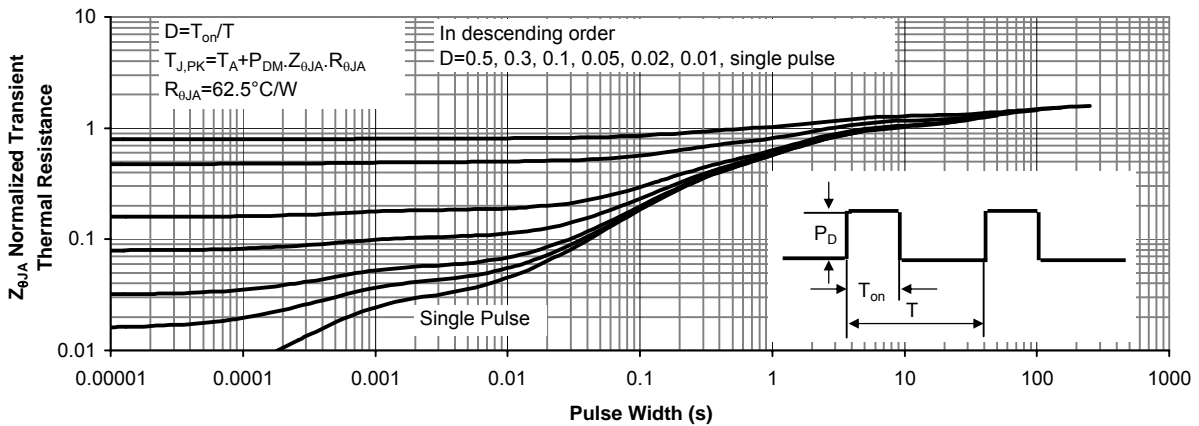


Figure 11: Normalized Maximum Transient Thermal Impedance

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 =-10mA, V _{GS} =0V | -40 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =-32V, 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 | -1.9 | -3 | V |
| I _{D(ON)} | On state drain current | V _{GS} =-10V, V _{DS} =-5V | -20 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =-10V, I _D =-5A T _J =125°C | | 32.5 52 | 45 65 | mΩ |
| | | V _{GS} =-4.5V, I _D =-2A | | 51.4 | 63 | mΩ |
| | | | | | | |
| g _{FS} | Forward Transconductance | V _{DS} =-5V, I _D =-4.8A | | 12 | | S |
| V _{SD} | Diode Forward Voltage | I _S =-1A, V _{GS} =0V | | -0.75 | -1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | -2.6 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{ISS} | Input Capacitance | V _{GS} =0V, V _{DS} =-20V, f=1MHz | | 657 | | pF |
| C _{OSS} | Output Capacitance | | | 143 | | pF |
| C _{RSS} | Reverse Transfer Capacitance | | | 63 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 6.5 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _{g(10V)} | Total Gate Charge (10V) | V _{GS} =-10V, V _{DS} =-20V, I _D =-5A | | 13.6 | | nC |
| Q _{g(4.5V)} | Total Gate Charge (4.5V) | | | 6.8 | | nC |
| Q _{gs} | Gate Source Charge | | | 1.8 | | nC |
| Q _{gd} | Gate Drain Charge | | | 3.9 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =-10V, V _{DS} =-20V, R _L =4Ω, R _{GEN} =3Ω | | 7.5 | | ns |
| t _r | Turn-On Rise Time | | | 6.7 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 26 | | ns |
| t _f | Turn-Off Fall Time | | | 11.2 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =-5A, di/dt=100A/μs | | 22.3 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =-5A, di/dt=100A/μs | | 15.2 | | 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 ≤ 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 6,12,14 are obtained using 80μs 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

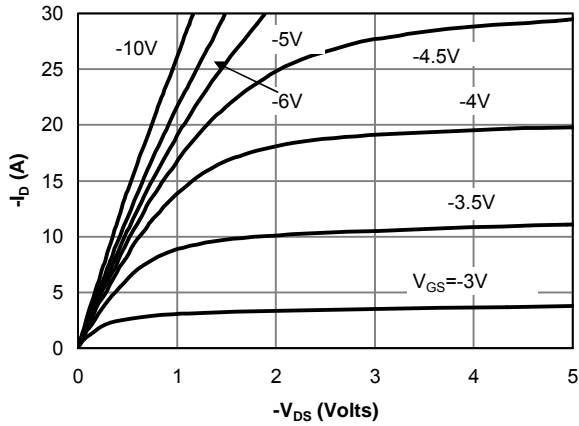


Figure 1: On-Region Characteristics

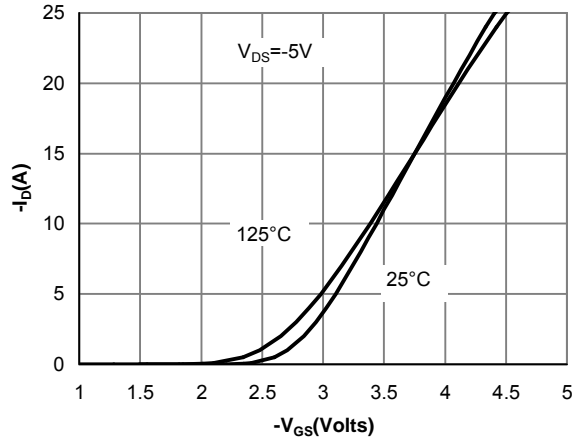


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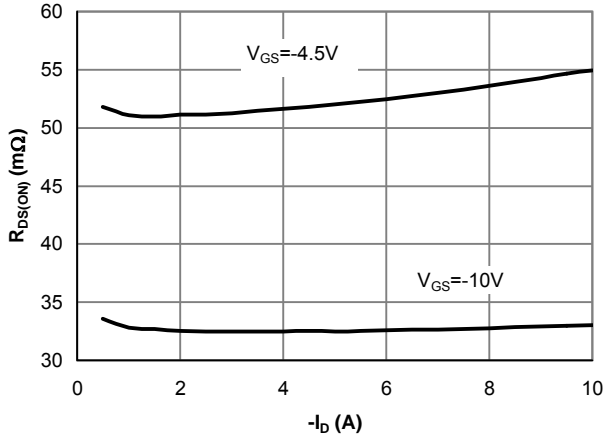


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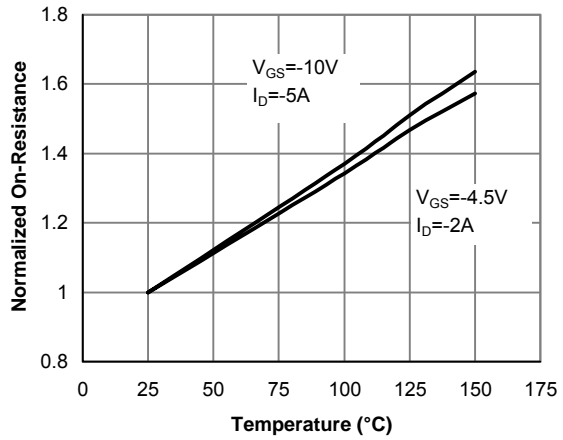


Figure 4: On-Resistance vs. Junction Temperature

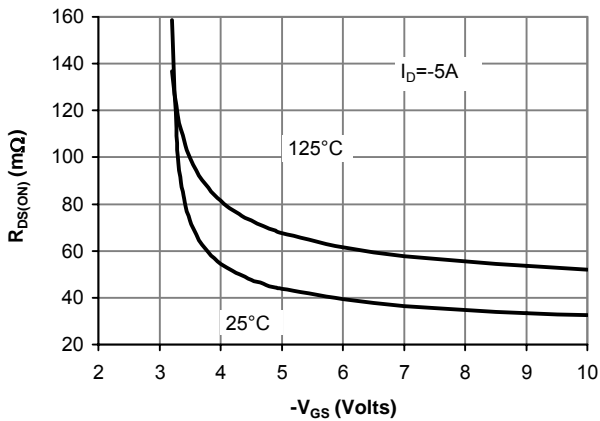


Figure 5: On-Resistance vs. Gate-Source Voltage

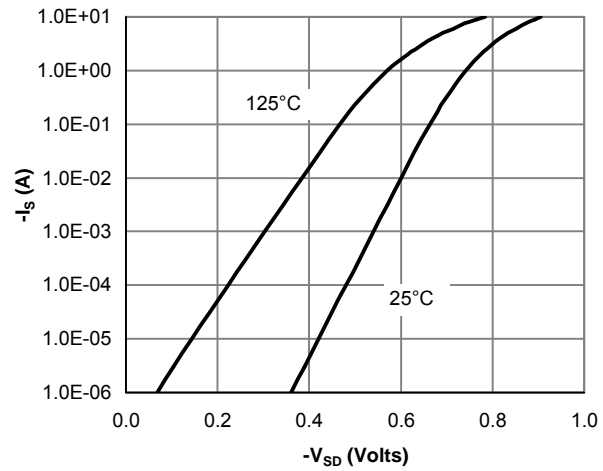


Figure 6: Body-Diode Characteristics

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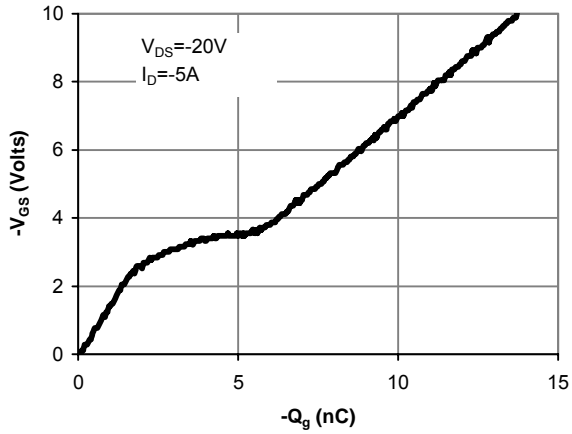


Figure 7: Gate-Charge Characteristics

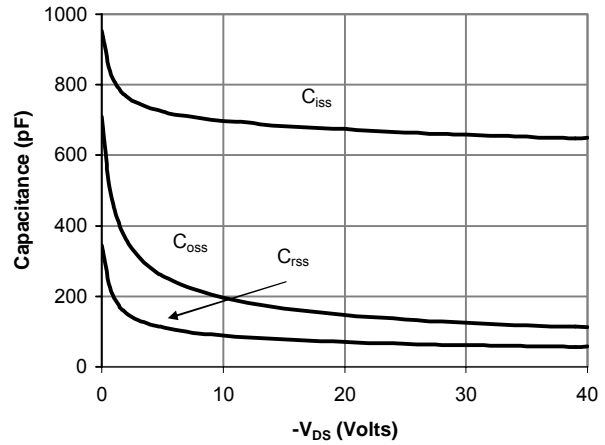


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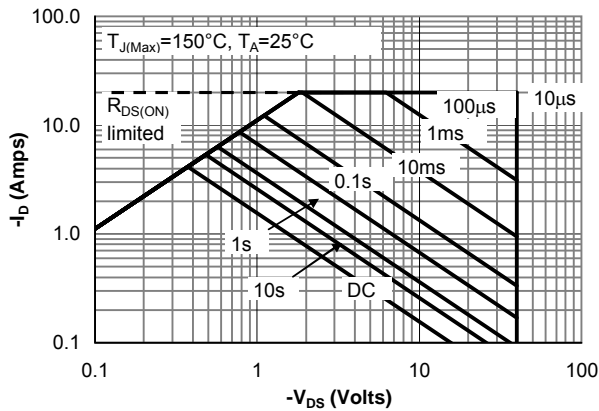


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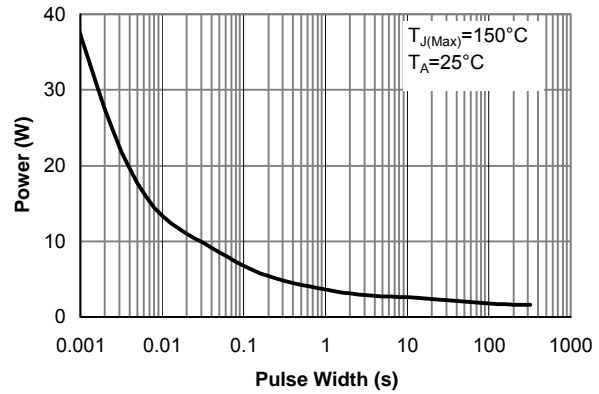


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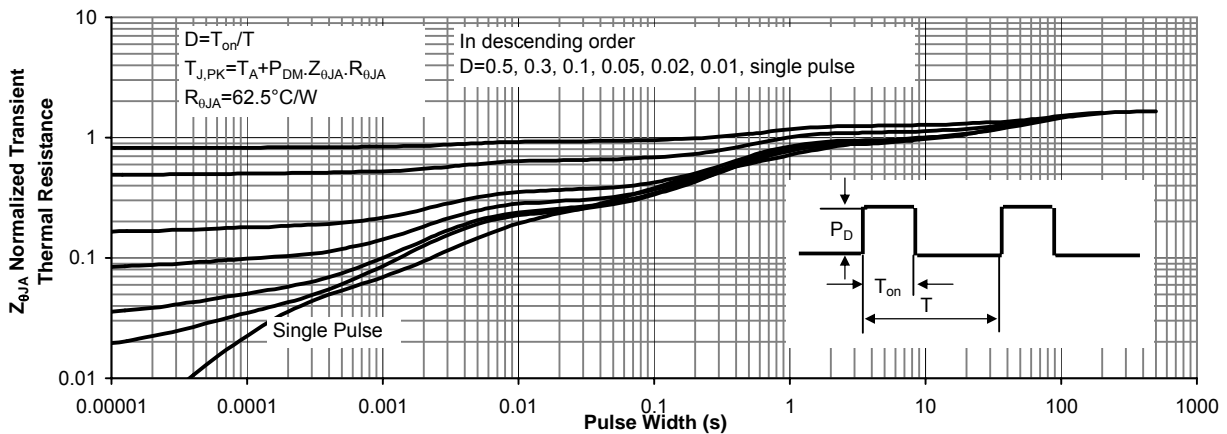


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