



AO4617

Complementary Enhancement Mode Field Effect Transistor

General Description

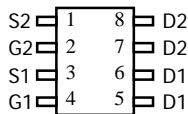
The AO4617 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications. *Standard Product AO4617 is Pb-free (meets ROHS & Sony 259 specifications). AO4617L is a Green Product ordering option. AO4617 and AO4617L are electrically identical.*

Features

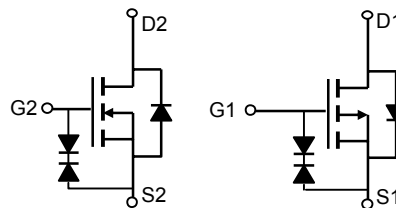
| | |
|----------------------------------|-------------------------------------|
| n-channel | p-channel |
| V_{DS} (V) = 40V | -40V |
| I_D = 6A ($V_{GS}=10V$) | -5A ($V_{GS} = -10V$) |
| $R_{DS(ON)}$ | $R_{DS(ON)}$ |
| < 32m Ω ($V_{GS}=10V$) | < 48m Ω ($V_{GS} = -10V$) |
| < 45m Ω ($V_{GS}=4.5V$) | < 75m Ω ($V_{GS} = -4.5V$) |

ESD rating: 3000V (HBM)

UIS TESTED!
Rg,Ciss,Coss,Crss Tested



SOIC-8



n-channel

p-channel

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} | 40 | -40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | ± 20 | V |
| Continuous Drain Current ^A | I_D | $T_A=25^\circ\text{C}$ | 6 | -5 |
| | | $T_A=70^\circ\text{C}$ | 5 | -4 |
| Pulsed Drain Current ^B | I_{DM} | 30 | -25 | A |
| Power Dissipation | P_D | $T_A=25^\circ\text{C}$ | 2 | 2 |
| | | $T_A=70^\circ\text{C}$ | 1.28 | 1.28 |
| Avalanche Current ^B | I_{AR} | 13 | 17 | A |
| Repetitive avalanche energy 0.3mH ^B | E_{AR} | 25 | 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 | $t \leq 10s$ | 48 | 62.5 |
| | | | Steady-State | 74 | 110 |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | n-ch | 35 | 50 | $^\circ\text{C/W}$ |
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | p-ch | $t \leq 10s$ | 48 | 62.5 |
| | | | Steady-State | 74 | 110 |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | p-ch | 35 | 50 | $^\circ\text{C/W}$ |

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 | 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 | | | ±1 | mA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 1 | 2.2 | 3 | V |
| I _{D(ON)} | On state drain current | V _{GS} =10V, V _{DS} =5V | 30 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =6A T _J =125°C | | 26 39 | 32 48 | mΩ |
| | | V _{GS} =4.5V, I _D =5A | | 36 | 45 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =5V, I _D =6A | | 18 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | 0.76 | 1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 3 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =20V, f=1MHz | | 506 | | pF |
| C _{oss} | Output Capacitance | | | 106 | | pF |
| C _{riss} | Reverse Transfer Capacitance | | | 38 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 2.6 | 3.9 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _{g(10V)} | Total Gate Charge | V _{GS} =10V, V _{DS} =20V, I _D =6A | | 8.4 | | nC |
| Q _{g(4.5V)} | Total Gate Charge | | | 4.1 | | nC |
| Q _{gs} | Gate Source Charge | | | 1.6 | | nC |
| Q _{gd} | Gate Drain Charge | | | 2.7 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =10V, V _{DS} =20V, R _L =3.3Ω, R _{GEN} =3Ω | | 4.8 | | ns |
| t _r | Turn-On Rise Time | | | 2 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 17 | | ns |
| t _f | Turn-Off Fall Time | | | 2.1 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =6A, di/dt=100A/μs | | 17.4 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =6A, di/dt=100A/μs | | 10.9 | | 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_s ≤ 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 <300μs 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: N-CHANNEL

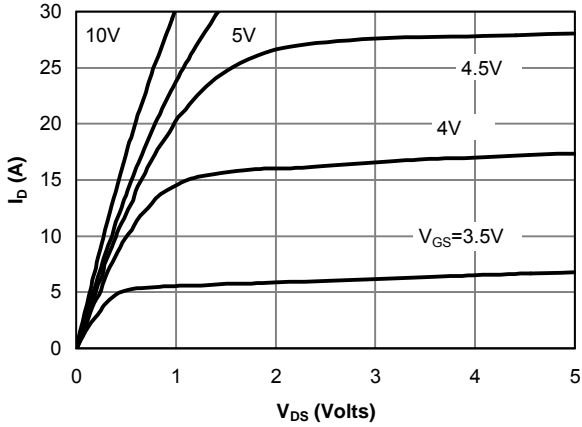


Figure 1: On-Region Characteristics

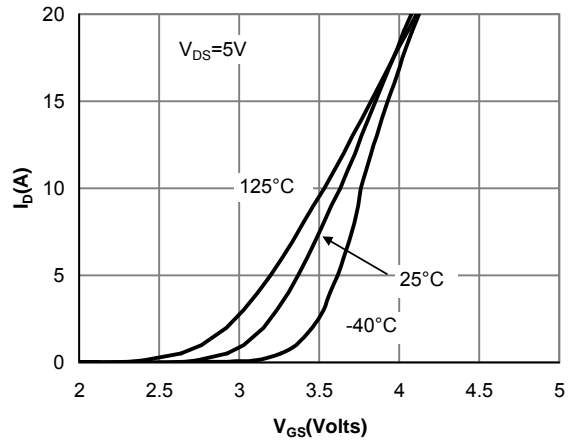


Figure 2: Transfer Characteristics

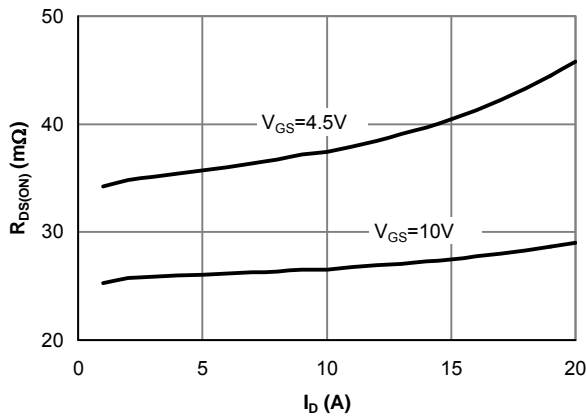


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

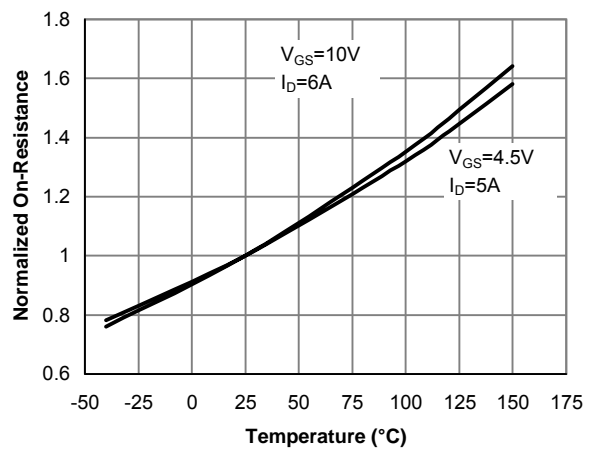


Figure 4: On-Resistance vs. Junction Temperature

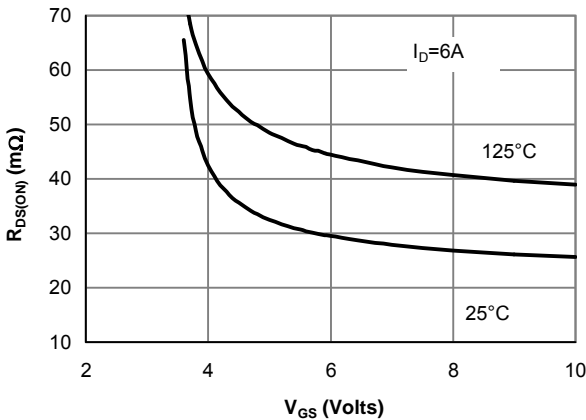


Figure 5: On-Resistance vs. Gate-Source Voltage

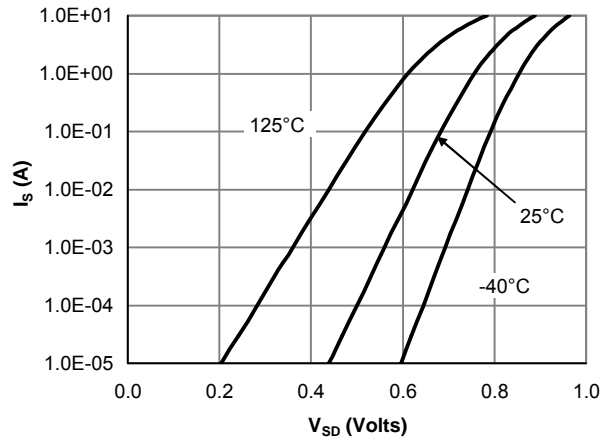


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

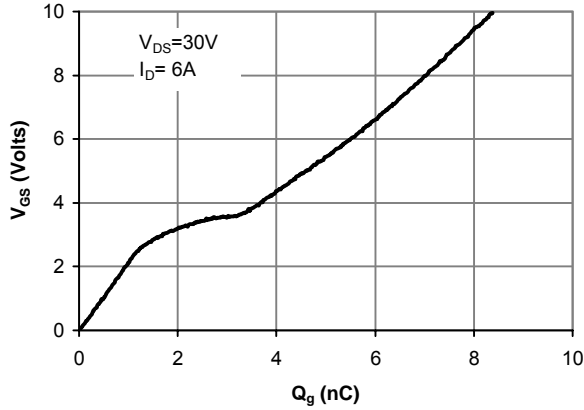


Figure 7: Gate-Charge Characteristics

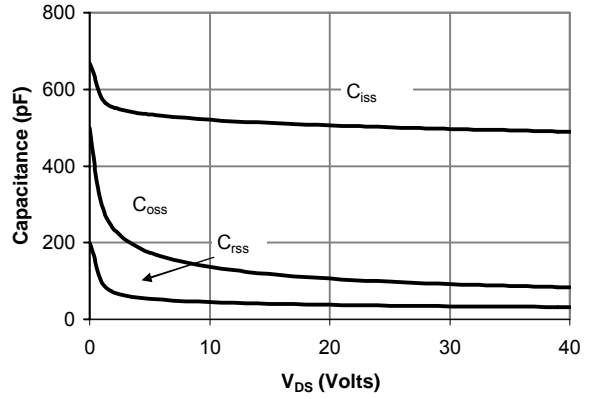


Figure 8: Capacitance Characteristics

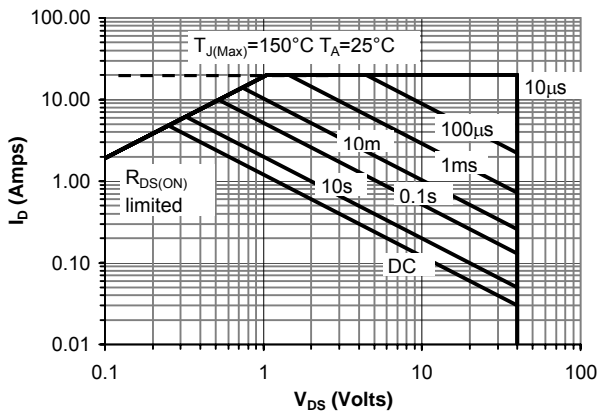


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

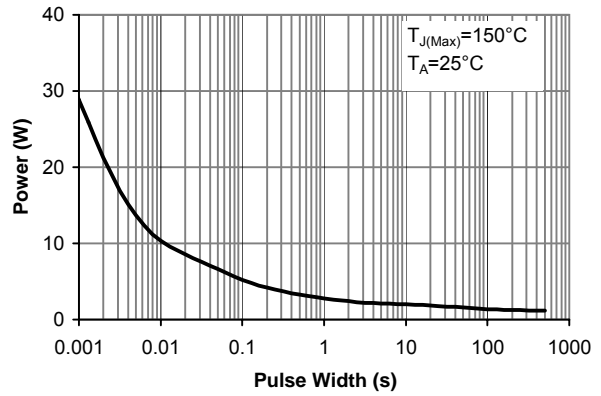


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

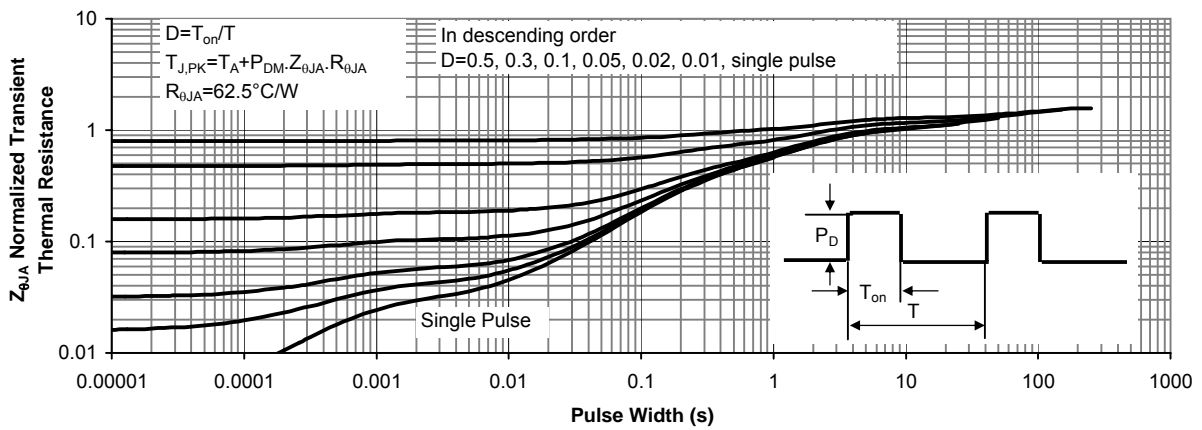


Figure 11: Normalized Maximum Transient Thermal Impedance

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 | -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 | | | ±150 | μA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =-250μA | -1 | -2 | -3 | V |
| I _{D(ON)} | On state drain current | V _{GS} =-10V, V _{DS} =-5V | -25 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =-10V, I _D =-5A T _J =125°C | | 40 56 | 48 68 | mΩ |
| | | V _{GS} =-4.5V, I _D =-4A | | 61 | 75 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =-5V, I _D =-5A | | 11 | | S |
| V _{SD} | Diode Forward Voltage | I _S =-1A, V _{GS} =0V | | -0.76 | -1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 3.5 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =-20V, f=1MHz | | 1006 | | pF |
| C _{oss} | Output Capacitance | | | 152 | | pF |
| C _{riss} | Reverse Transfer Capacitance | | | 77 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 11 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _{g(10V)} | Total Gate Charge (10V) | V _{GS} =-10V, V _{DS} =-20V, I _D =-5A | | 17.4 | | nC |
| Q _{g(4.5V)} | Total Gate Charge (4.5V) | | | 8.9 | | nC |
| Q _{gs} | Gate Source Charge | | | 3.1 | | nC |
| Q _{gd} | Gate Drain Charge | | | 4.6 | | nC |
| t _{D(on)} | Turn-On Delay Time | V _{GS} =-10V, V _{DS} =-20V, R _L =4Ω, R _{GEN} =3Ω | | 9.7 | | ns |
| t _r | Turn-On Rise Time | | | 6.3 | | ns |
| t _{D(off)} | Turn-Off Delay Time | | | 35.5 | | ns |
| t _f | Turn-Off Fall Time | | | 26 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =-5A, dI/dt=100A/μs | | 21.8 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =-5A, dI/dt=100A/μs | | 15.5 | | 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 ≤ 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 <300μs 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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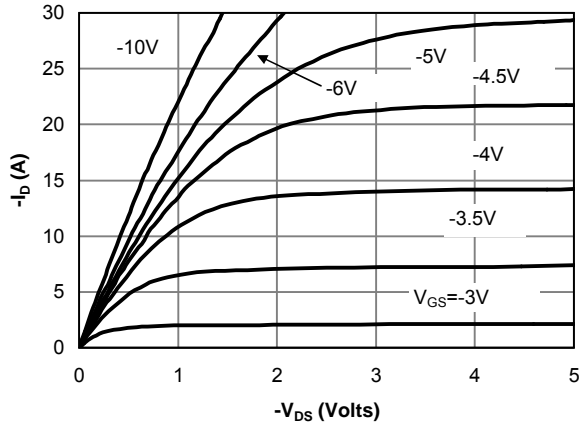


Fig 1: On-Region Characteristics

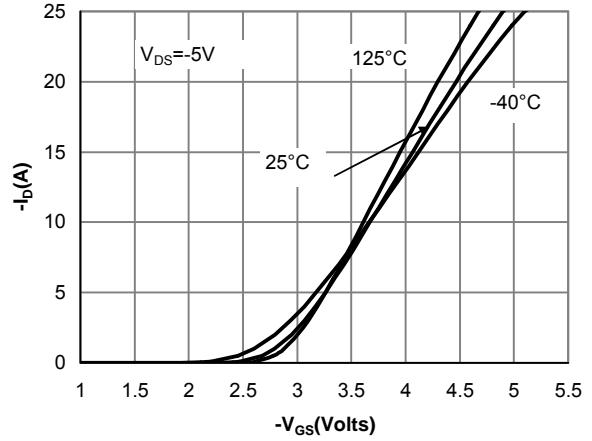


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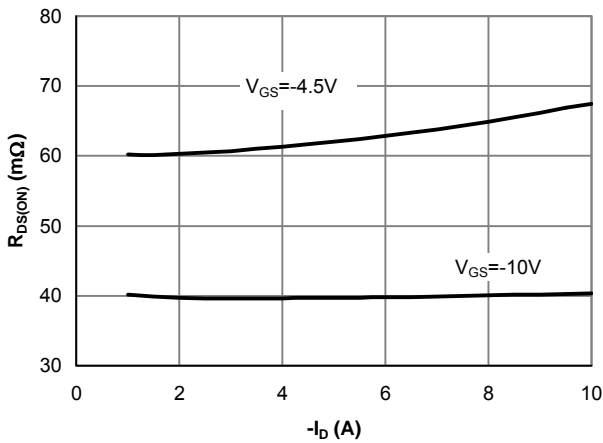


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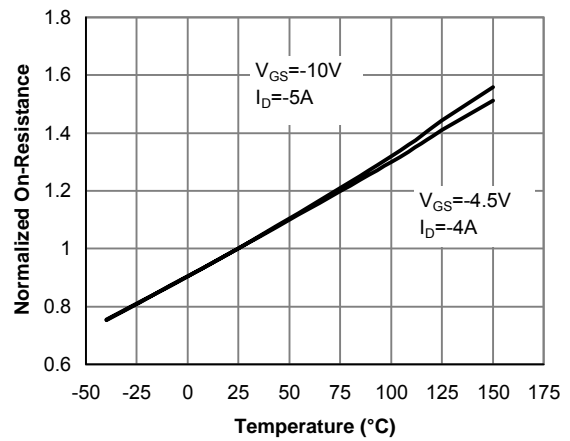


Figure 4: On-Resistance vs. Junction Temperature

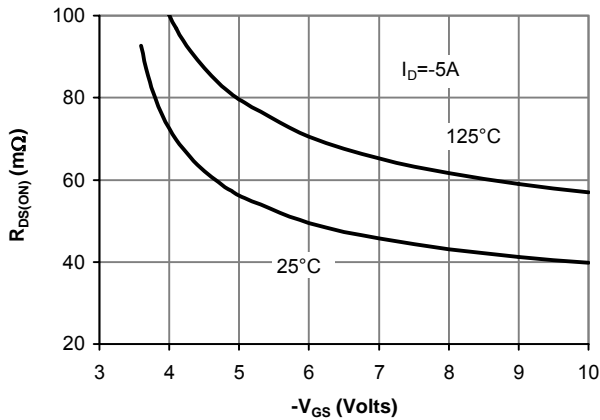


Figure 5: On-Resistance vs. Gate-Source Voltage

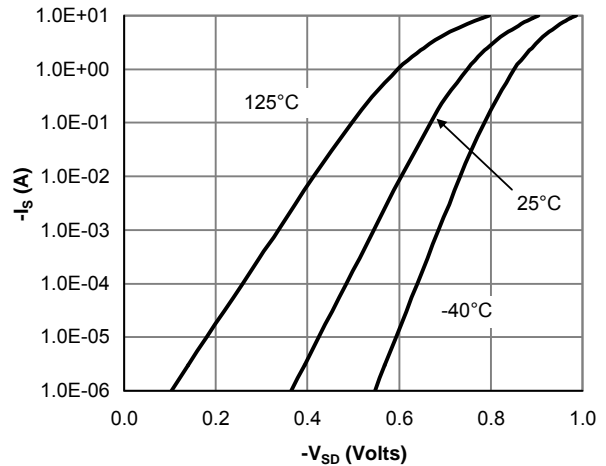


Figure 6: Body-Diode Characteristics

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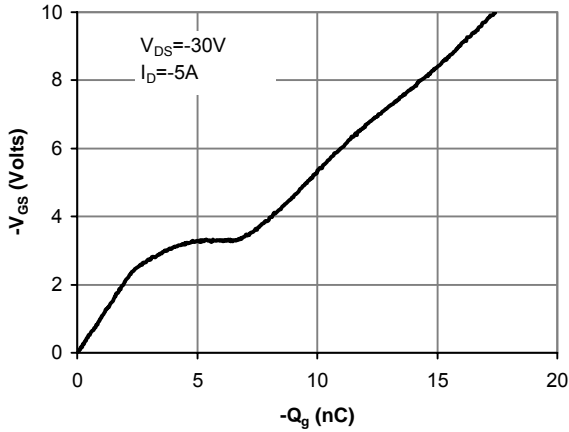


Figure 7: Gate-Charge Characteristics

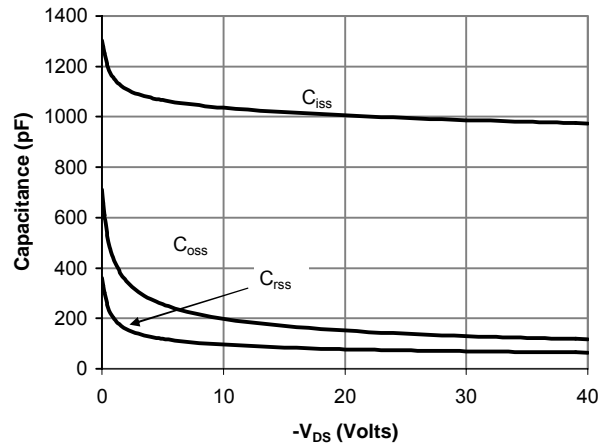


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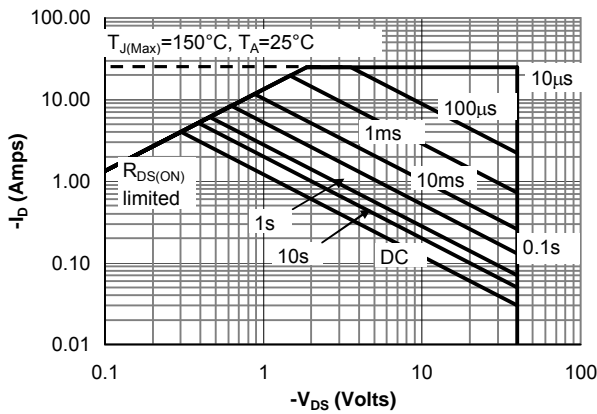


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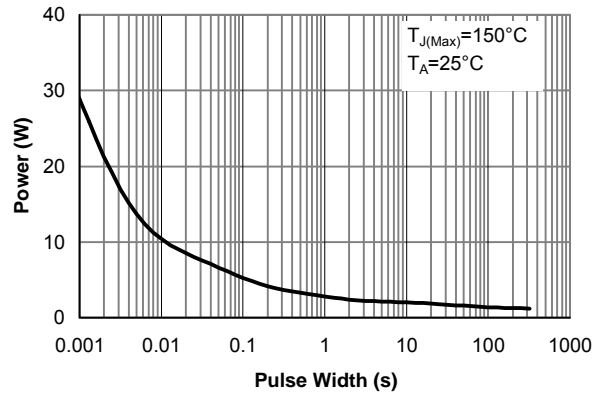


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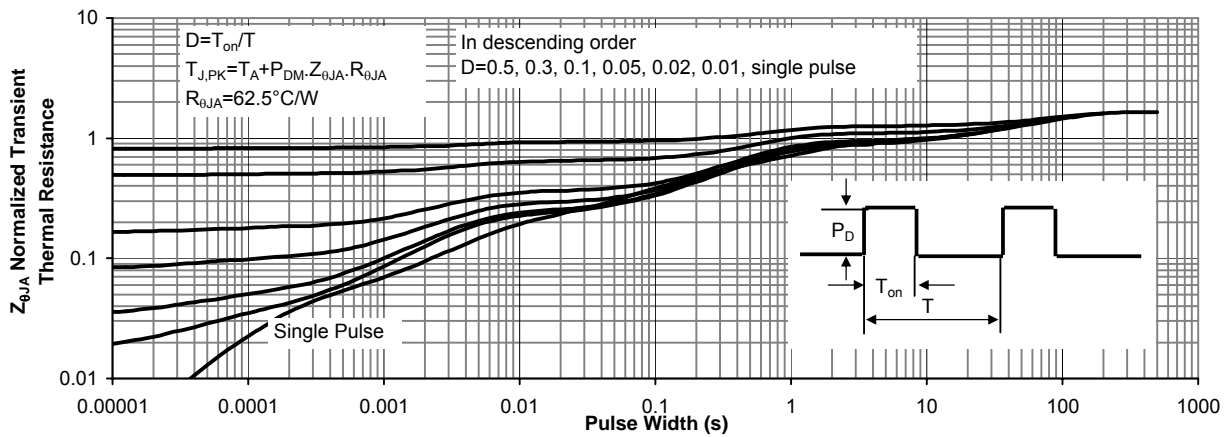


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