



AO4620

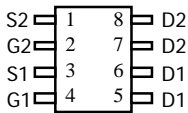
Complementary Enhancement Mode Field Effect Transistor

General Description

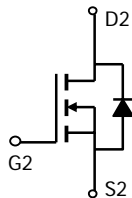
The AO4620 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in inverter and other applications. *Standard Product AO4620 is Pb-free (meets ROHS & Sony 259 specifications).*

Features

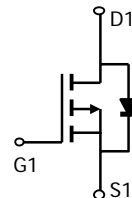
| | |
|----------------------------------|-------------------------------------|
| n-channel | p-channel |
| $V_{DS} (V) = 30V$ | -30V |
| $I_D = 7.2A (V_{GS}=10V)$ | -5.3A ($V_{GS} = -10V$) |
| $R_{DS(ON)}$ | $R_{DS(ON)}$ |
| < 24m Ω ($V_{GS}=10V$) | < 38m Ω ($V_{GS} = -10V$) |
| < 36m Ω ($V_{GS}=4.5V$) | < 60m 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} | 30 | -30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | ± 20 | V |
| Continuous Drain Current ^F | I_D | $T_A=25^\circ C$ | 7.2 | -5.3 |
| | | $T_A=70^\circ C$ | 6.2 | -4.5 |
| Pulsed Drain Current ^B | I_{DM} | 30 | -30 | A |
| Power Dissipation ^F | P_D | $T_A=25^\circ C$ | 2 | 2 |
| | | $T_A=70^\circ C$ | 1.44 | 1.44 |
| 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 | $^\circ C$ |

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

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 | $I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$ | 30 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$ | | | 1 5 | μA |
| 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 | 1.6 | 3 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$ | 30 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=10\text{V}$, $I_D=7.2\text{A}$ $T_J=125^\circ\text{C}$ | | 20 26 | 24 32 | $\text{m}\Omega$ |
| | | $V_{GS}=4.5\text{V}$, $I_D=5\text{A}$ | | 29 | 36 | $\text{m}\Omega$ |
| g_{FS} | Forward Transconductance | $V_{DS}=5\text{V}$, $I_D=7.2\text{A}$ | | 24 | | 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 | | | | 2.5 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$ | | 660 | 792 | pF |
| C_{oss} | Output Capacitance | | | 110 | | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 87 | | pF |
| R_g | Gate resistance | $V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$ | | 0.8 | 1.5 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| $Q_g(10\text{V})$ | Total Gate Charge | $V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=7.2\text{A}$ | | 11.3 | 14.125 | nC |
| $Q_g(4.5\text{V})$ | Total Gate Charge | | | 5.7 | | nC |
| Q_{gs} | Gate Source Charge | | | 2.1 | | nC |
| Q_{gd} | Gate Drain Charge | | | 3 | | nC |
| $t_{D(on)}$ | Turn-On Delay Time | $V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=2.1\Omega$, $R_{GEN}=3\Omega$ | | 4.5 | | ns |
| t_r | Turn-On Rise Time | | | 3.1 | | ns |
| $t_{D(off)}$ | Turn-Off Delay Time | | | 15.1 | | ns |
| t_f | Turn-Off Fall Time | | | 2.7 | | ns |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=7.2\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$ | | 15.5 | 20 | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | $I_F=7.2\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$ | | 7.1 | | 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 $\leq 10\text{s}$ 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 $<300\mu\text{s}$ 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.

F: The power dissipation and current rating are based on the $\leq 10\text{s}$ thermal resistance rating.

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N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

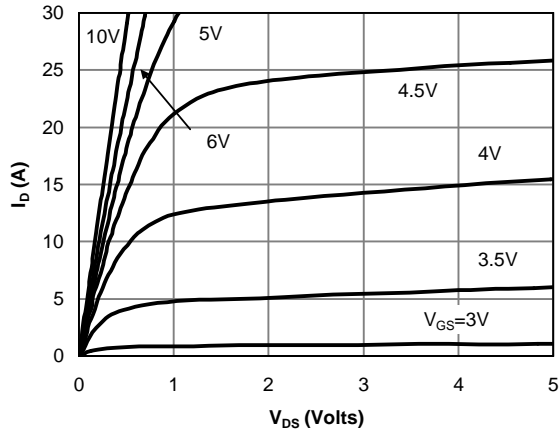


Figure 1: On-Region Characteristics

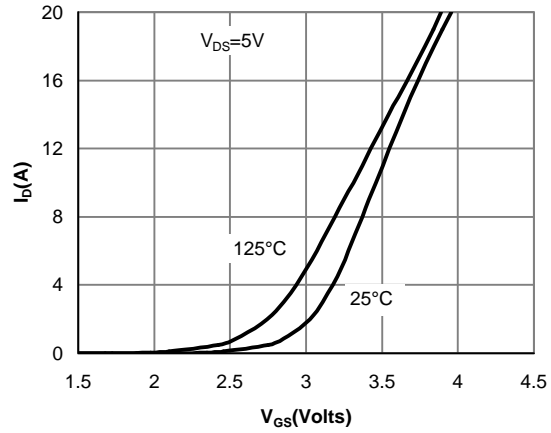


Figure 2: Transfer Characteristics

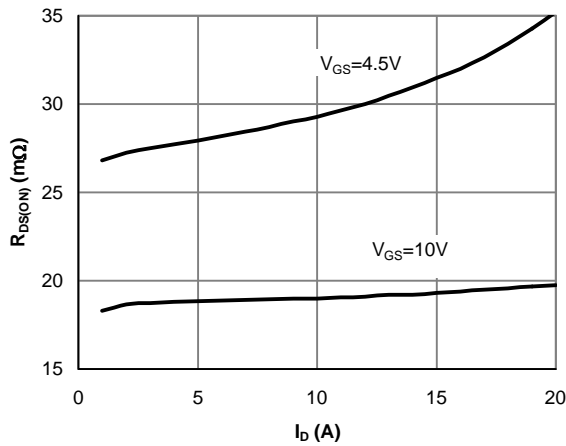


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

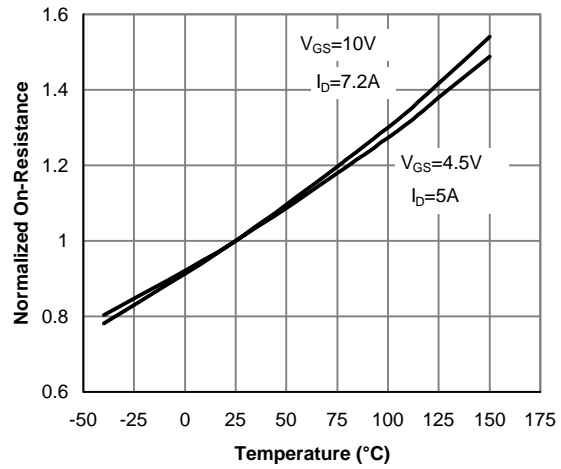


Figure 4: On-Resistance vs. Junction Temperature

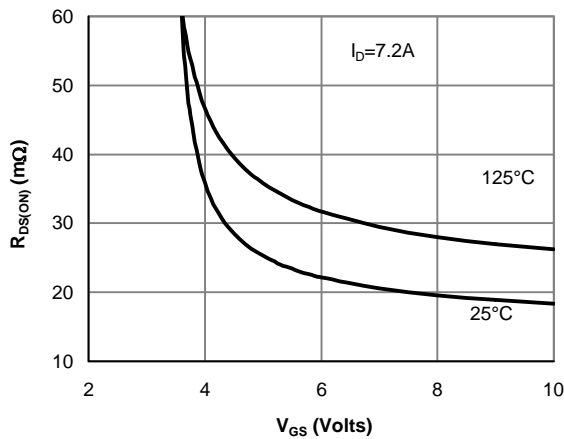


Figure 5: On-Resistance vs. Gate-Source Voltage

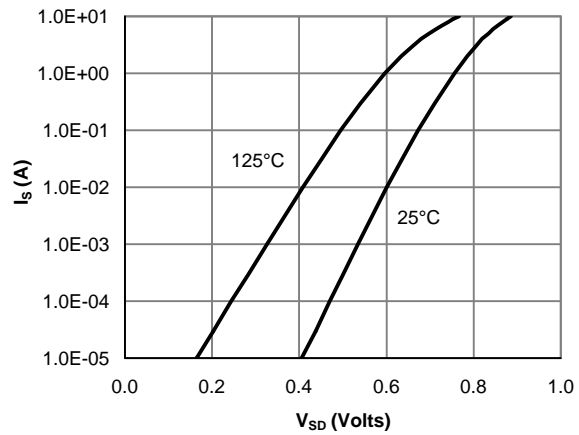


Figure 6: Body-Diode Characteristics

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

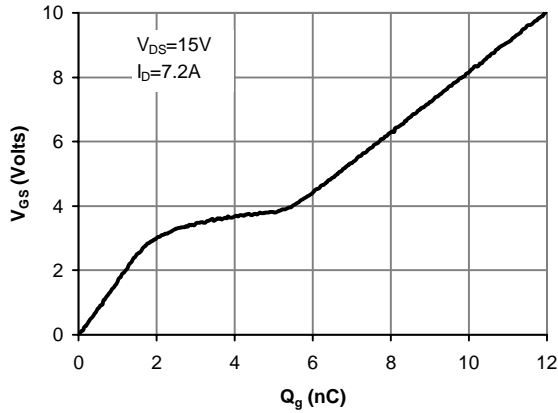


Figure 7: Gate-Charge Characteristics

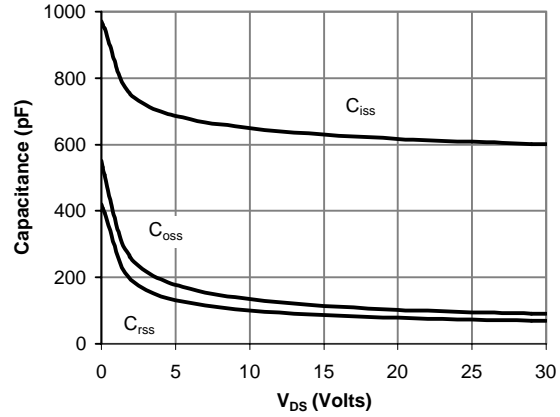


Figure 8: Capacitance Characteristics

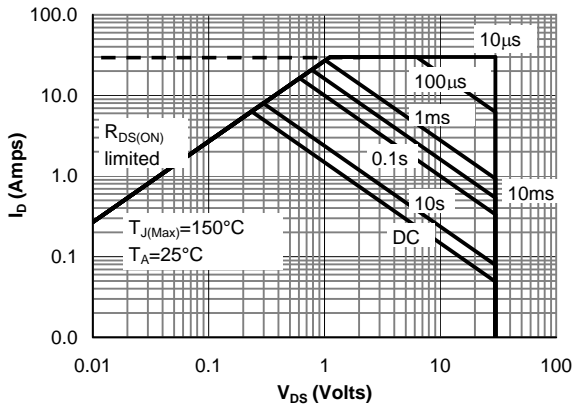


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

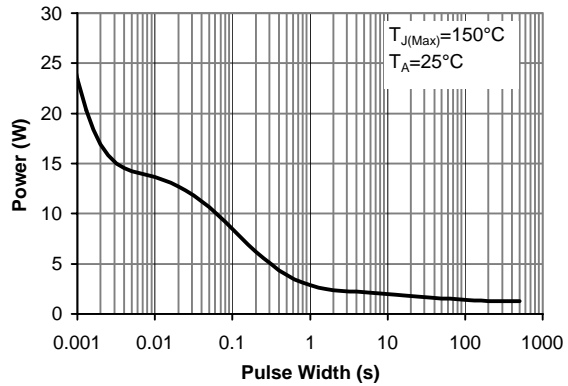


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

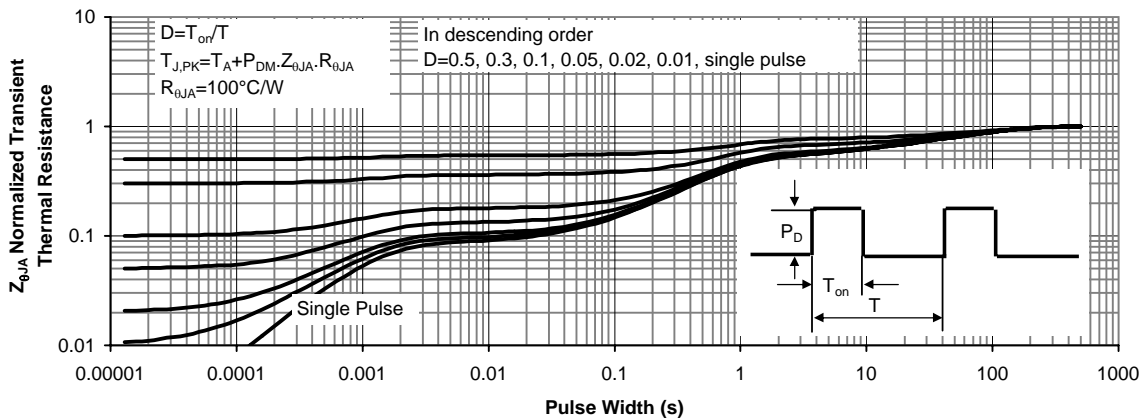


Figure 11: Normalized Maximum Transient Thermal Impedance

P-CHANNEL Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|--|-----|----------|-----------|------------------|
| STATIC PARAMETERS | | | | | | |
| BV_{DSS} | Drain-Source Breakdown Voltage | $I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$ | -30 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=-30\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$ | | | -1 -5 | μA |
| 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 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}=-10\text{V}$, $V_{DS}=-5\text{V}$ | -30 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}=-10\text{V}$, $I_D=-5.3\text{A}$ $T_J=125^\circ\text{C}$ | | 31 42 | 38 | $\text{m}\Omega$ |
| | | $V_{GS}=-4.5\text{V}$, $I_D=-4.5\text{A}$ | | 48 | 60 | $\text{m}\Omega$ |
| g_{FS} | Forward Transconductance | $V_{DS}=-5\text{V}$, $I_D=-5.3\text{A}$ | | 15 | | 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 | | | | -2.5 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C_{iss} | Input Capacitance | $V_{GS}=0\text{V}$, $V_{DS}=-15\text{V}$, $f=1\text{MHz}$ | | 980 | 1225 | pF |
| C_{oss} | Output Capacitance | | | 150 | | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 115 | | pF |
| R_g | Gate resistance | $V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$ | | 2.2 | 3.3 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| $Q_g(10\text{V})$ | Total Gate Charge (10V) | $V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $I_D=-5.3\text{A}$ | | 18.7 | 24 | nC |
| $Q_g(4.5\text{V})$ | Total Gate Charge (4.5V) | | | 9.6 | | nC |
| Q_{gs} | Gate Source Charge | | | 3.2 | | nC |
| Q_{gd} | Gate Drain Charge | | | 4.8 | | nC |
| $t_{D(on)}$ | Turn-On Delay Time | $V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $R_L=2.8\Omega$, $R_{GEN}=3\Omega$ | | 7.7 | | ns |
| t_r | Turn-On Rise Time | | | 6 | | ns |
| $t_{D(off)}$ | Turn-Off Delay Time | | | 20 | | ns |
| t_f | Turn-Off Fall Time | | | 7 | | ns |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=-5.3\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$ | | 21 | 26 | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | $I_F=-5.3\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$ | | 13 | | 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 $\leq 10\text{s}$ thermal resistance rating.

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

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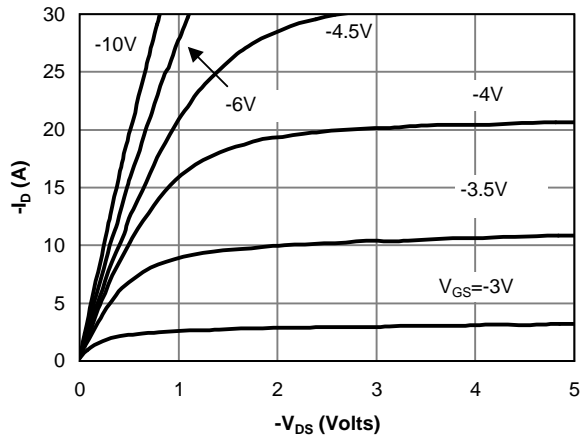


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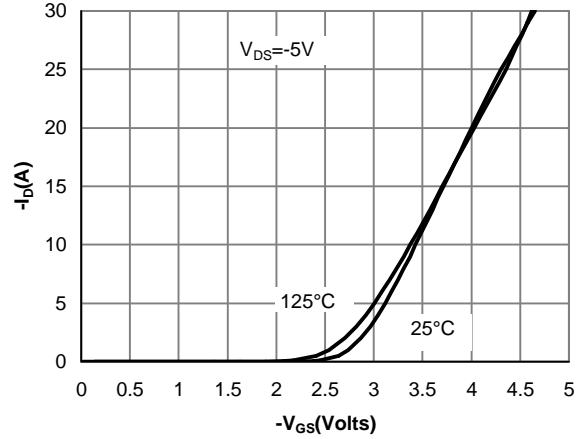


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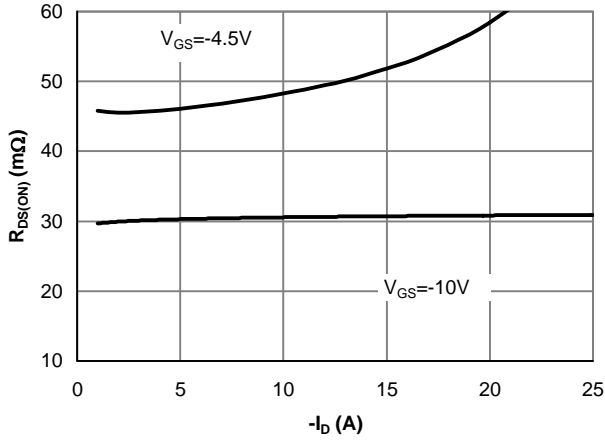


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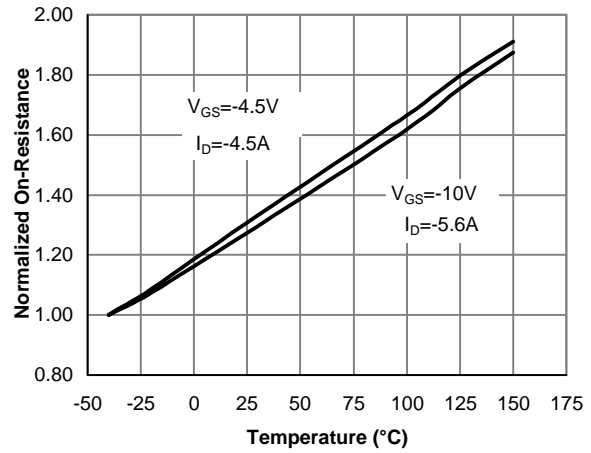


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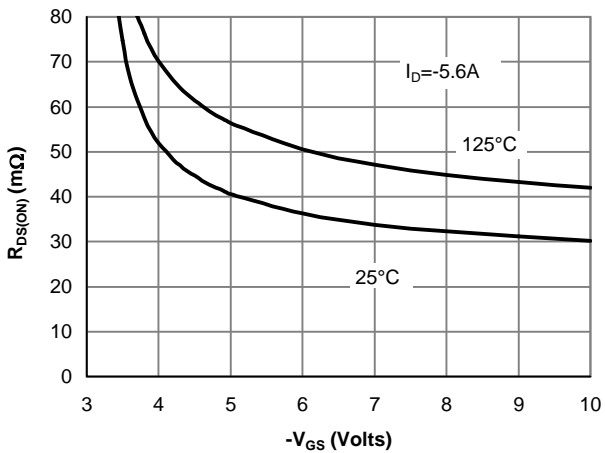


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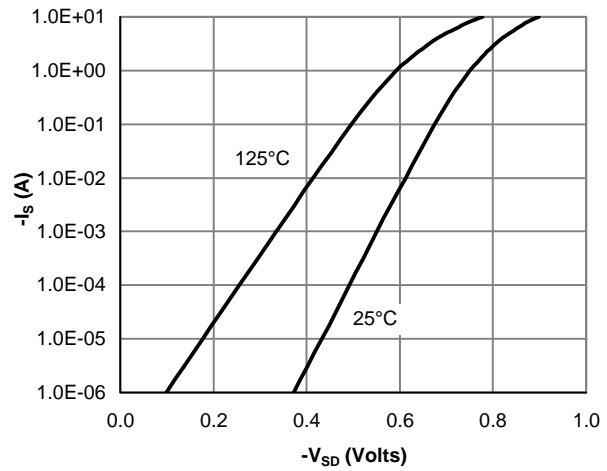


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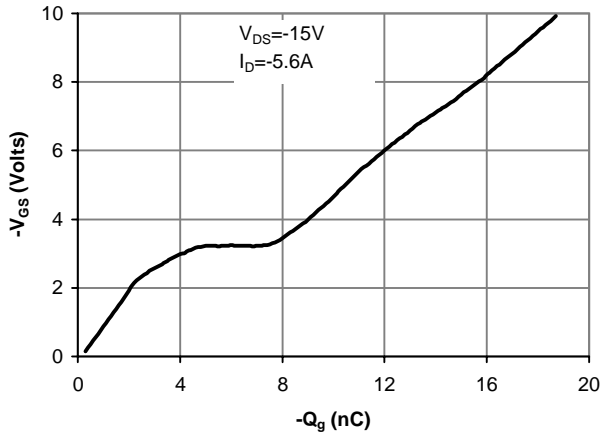


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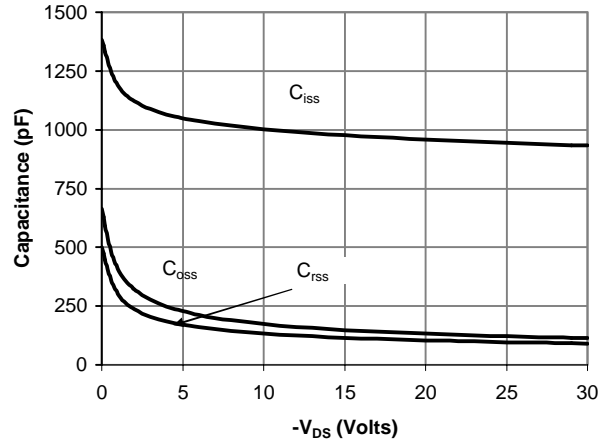


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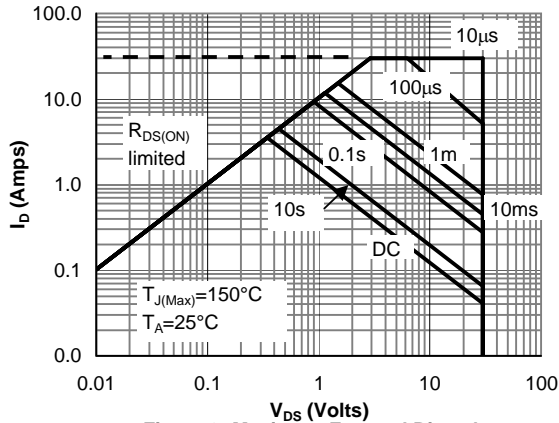


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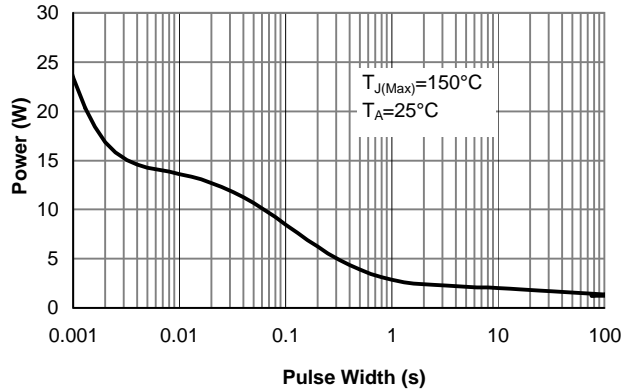


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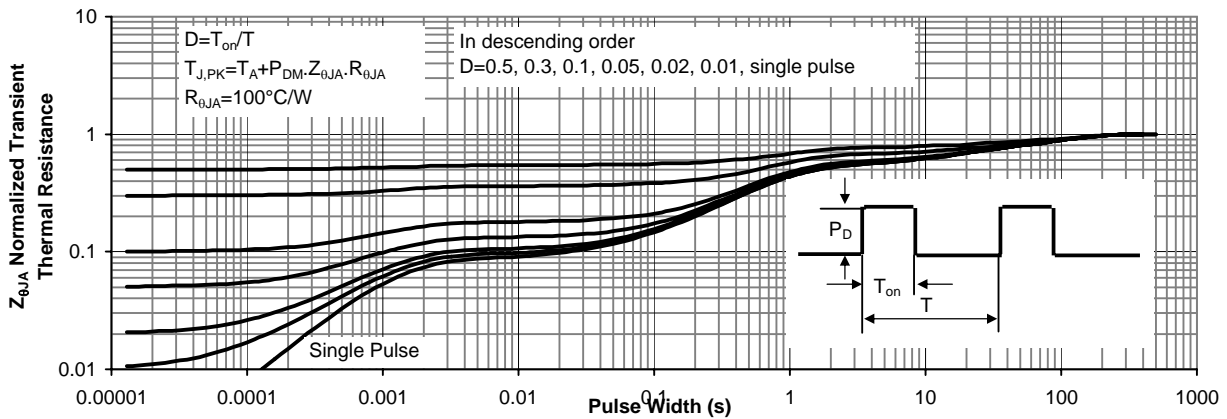


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