



AO6601

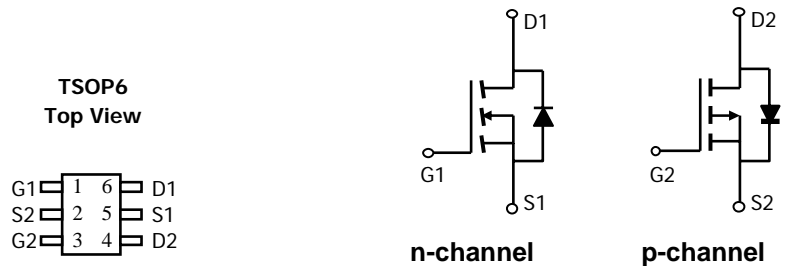
Complementary Enhancement Mode Field Effect Transistor

General Description

The AO6601 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs form a high-speed power inverter, suitable for a multitude of applications. *Standard Product AO6601 is Pb-free (meets ROHS & Sony 259 specifications). AO6601L is a Green Product ordering option. AO6601 and AO6601L are electrically identical.*

Features

| | |
|--------------------------------|---------------------------------|
| n-channel | p-channel |
| $V_{DS} (V) = 30V$ | $-30V$ |
| $I_D = 3.4A (V_{GS} = 10V)$ | $-2.3A (V_{GS} = -10V)$ |
| $R_{DS(ON)}$ | |
| $< 60m\Omega (V_{GS} = 10V)$ | $< 135m\Omega (V_{GS} = -10V)$ |
| $< 75m\Omega (V_{GS} = 4.5V)$ | $< 185m\Omega (V_{GS} = -4.5V)$ |
| $< 115m\Omega (V_{GS} = 2.5V)$ | $< 265m\Omega (V_{GS} = -2.5V)$ |



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} | ± 12 | ± 12 | V |
| Continuous Drain Current ^A | I_D | $T_A=25^\circ C$ | 3.4 | -2.3 |
| | | $T_A=70^\circ C$ | 2.7 | -1.8 |
| Pulsed Drain Current ^B | I_{DM} | 30 | -30 | A |
| Power Dissipation | P_D | $T_A=25^\circ C$ | 1.15 | 1.15 |
| | | $T_A=70^\circ C$ | 0.73 | 0.73 |
| 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 | Typ | Max | Units |
|--|-----------------|-----|-----|--------------|
| Maximum Junction-to-Ambient ^A | $R_{\theta JA}$ | 78 | 110 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^A | | 106 | 150 | $^\circ C/W$ |
| Maximum Junction-to-Lead ^C | $R_{\theta JL}$ | 64 | 80 | $^\circ C/W$ |

n-channel MOSFET 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} =24V, V _{GS} =0V T _J =55°C | | | 1 5 | μA |
| I _{GSS} | Gate-Body leakage current | V _{DS} =0V, V _{GS} =±12V | | | 100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} , I _D =250μA | 0.6 | 1 | 1.4 | V |
| I _{D(ON)} | On state drain current | V _{GS} =4.5V, V _{DS} =5V | 10 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =3A T _J =125°C | | 50 75 | 60 | mΩ |
| | | V _{GS} =4.5V, I _D =3A | | 60 | 75 | |
| | | V _{GS} =2.5V, I _D =2A | | 88 | 115 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =5V, I _D =3A | | 7.8 | | S |
| V _{SD} | Diode Forward Voltage | I _S =1A, V _{GS} =0V | | 0.8 | 1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | 1.5 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =15V, f=1MHz | | 390 | | pF |
| C _{oss} | Output Capacitance | | | 54.5 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 41 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 3 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _g | Total Gate Charge | V _{GS} =4.5V, V _{DS} =15V, I _D =3A | | 4.34 | | nC |
| Q _{gs} | Gate Source Charge | | | 1.38 | | nC |
| Q _{gd} | Gate Drain Charge | | | 0.6 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =10V, V _{DS} =15V, R _L =5Ω, R _{GEN} =6Ω | | 4 | | ns |
| t _r | Turn-On Rise Time | | | 2 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 22 | | ns |
| t _f | Turn-Off Fall Time | | | 3 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =3A, dI/dt=100A/μs | | 11 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =3A, dI/dt=100A/μs | | 5.5 | | 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_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 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

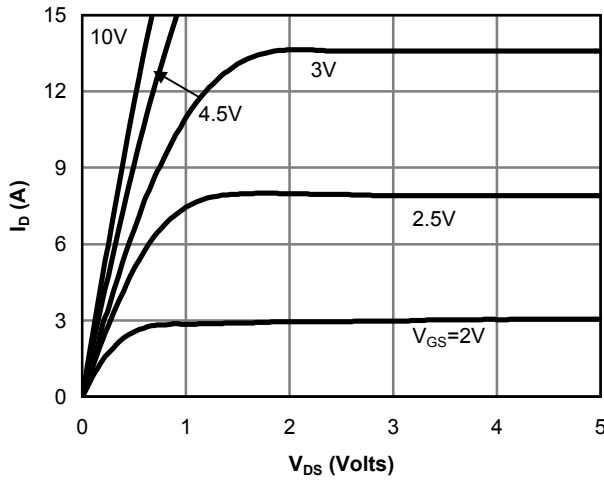


Fig 1: On-Region Characteristics

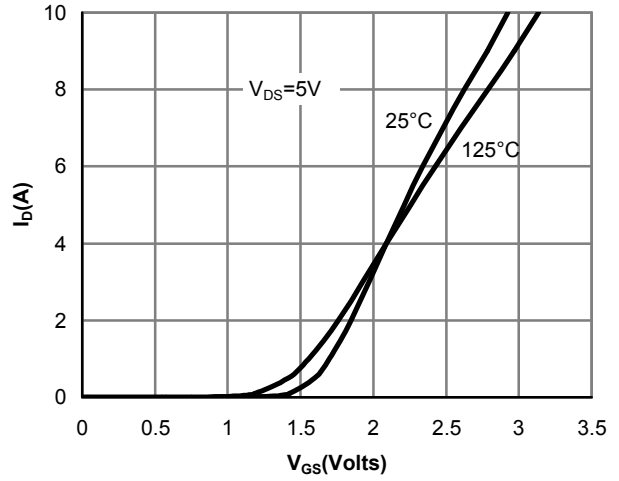


Figure 2: Transfer Characteristics

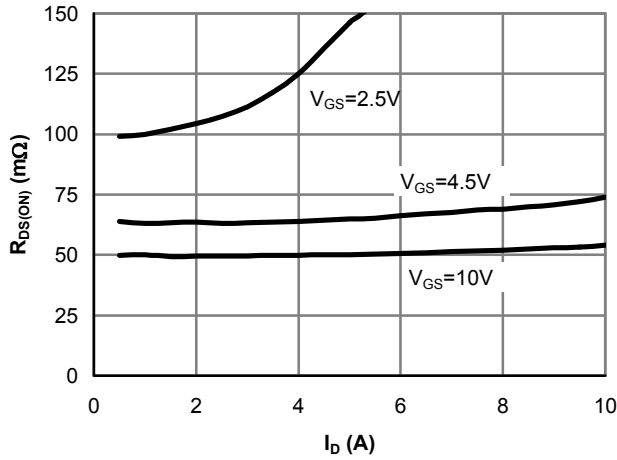


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

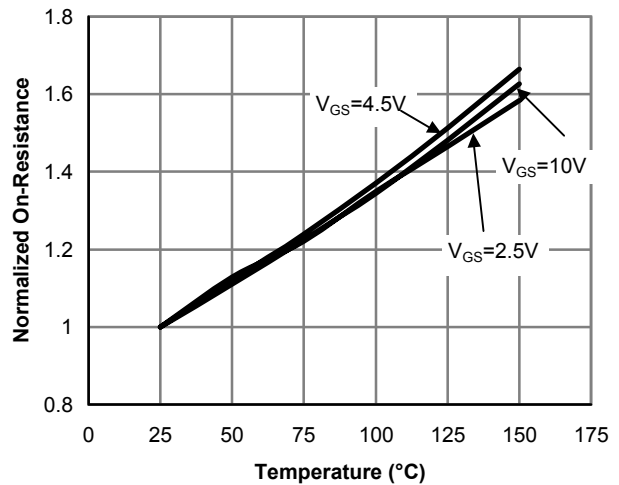


Figure 4: On-Resistance vs. Junction Temperature

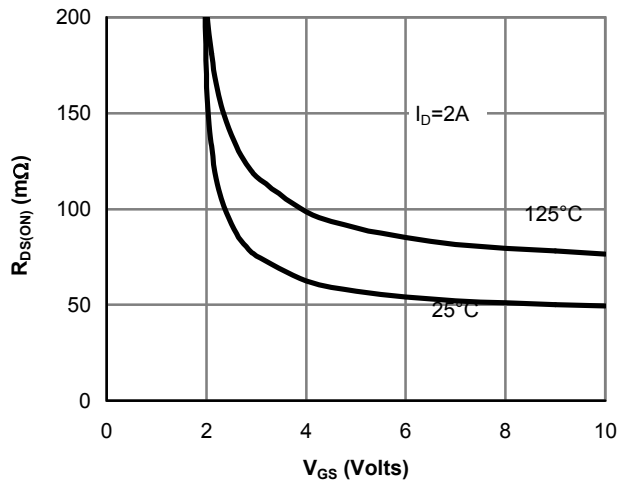


Figure 5: On-Resistance vs. Gate-Source Voltage

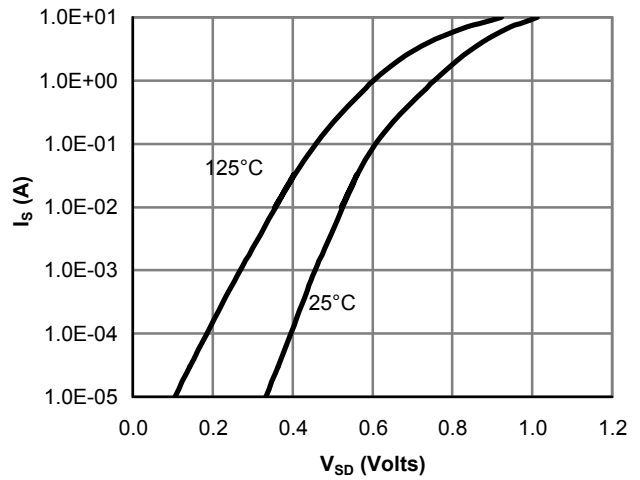


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

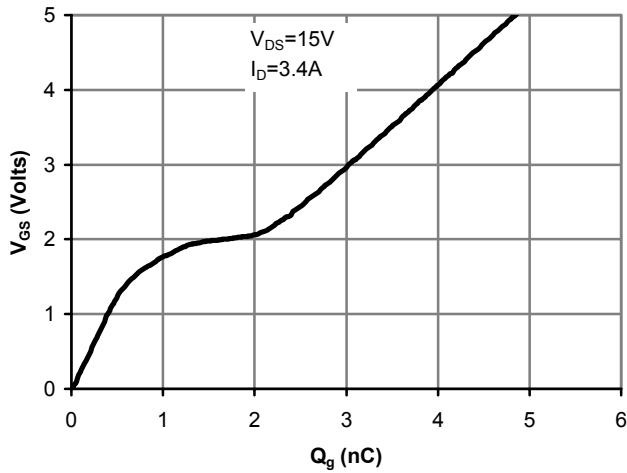


Figure 7: Gate-Charge Characteristics

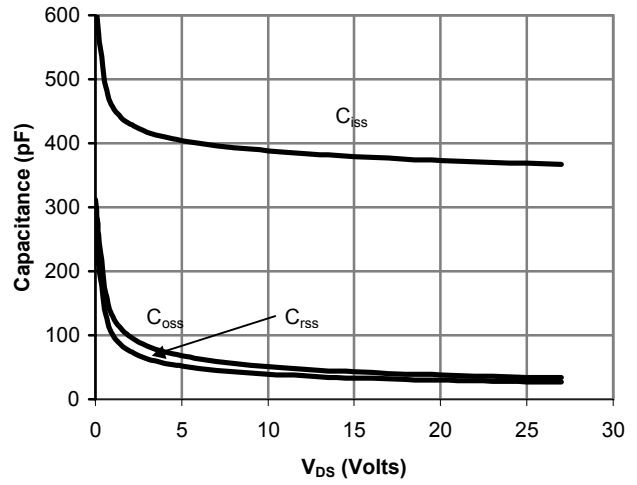


Figure 8: Capacitance Characteristics

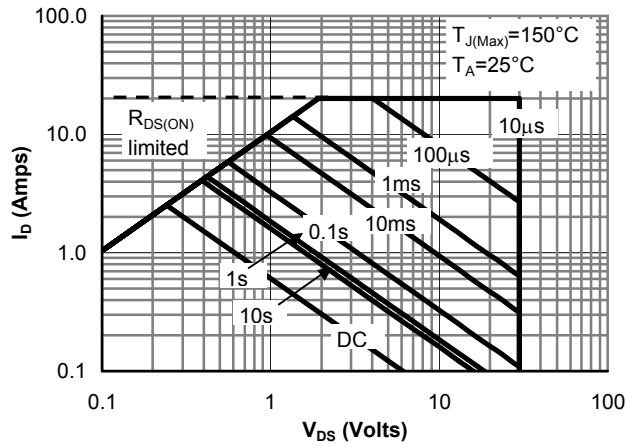


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

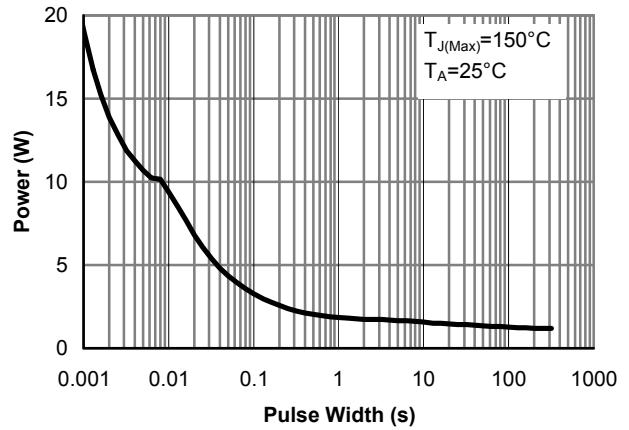


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

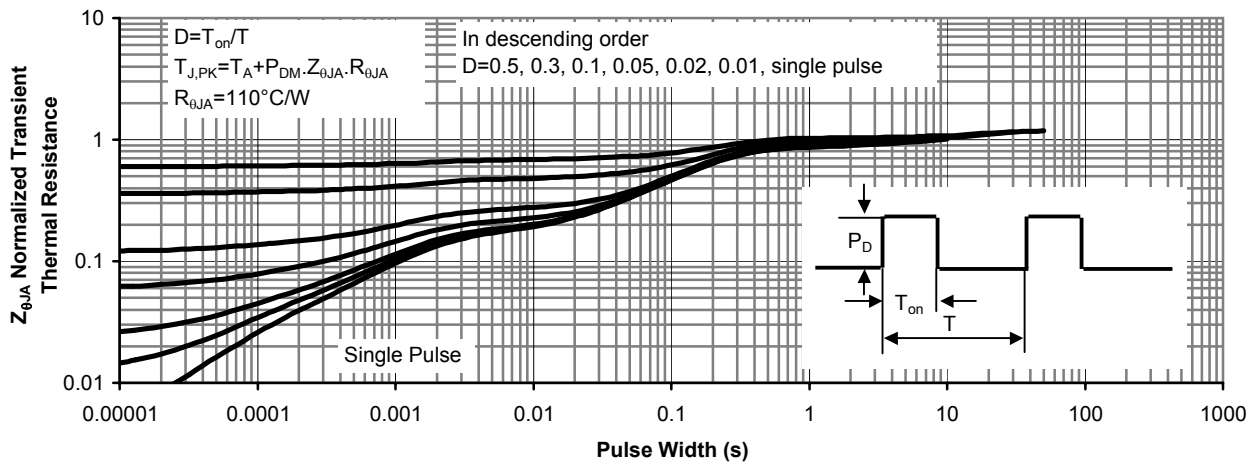


Figure 11: Normalized Maximum Transient Thermal Impedance

p-channel MOSFET 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} =-24V, V _{GS} =0V T _J =55°C | | | -1 -5 | μA |
| I _{GSS} | Gate-Body leakage current | V _{DS} =0V, V _{GS} =±12V | | | ±100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} =V _{GS} I _D =-250μA | -0.6 | -1 | -1.4 | V |
| I _{D(ON)} | On state drain current | V _{GS} =-4.5V, V _{DS} =-5V | -10 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =-10V, I _D =-2.3A T _J =125°C | | 107 | 135 | mΩ |
| | | V _{GS} =-4.5V, I _D =-2A | | 135 | 185 | mΩ |
| | | V _{GS} =-2.5V, I _D =-1A | | 195 | 265 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =-5V, I _D =-2.3A | | 8 | | S |
| V _{SD} | Diode Forward Voltage | I _S =-1A, V _{GS} =0V | | -0.85 | -1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | -1.35 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =-15V, f=1MHz | | 409 | | pF |
| C _{oss} | Output Capacitance | | | 55 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 42 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | | 12 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _g | Total Gate Charge | V _{GS} =-4.5V, V _{DS} =-15V, I _D =-2.5A | | 4.8 | | nC |
| Q _{gs} | Gate Source Charge | | | 1.34 | | nC |
| Q _{gd} | Gate Drain Charge | | | 0.72 | | nC |
| t _{D(on)} | Turn-On DelayTime | V _{GS} =-10V, V _{DS} =-15V, R _L =6Ω, R _{GEN} =6Ω | | 13 | | ns |
| t _r | Turn-On Rise Time | | | 10 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 28 | | ns |
| t _f | Turn-Off Fall Time | | | 13 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =-2.5A, di/dt=100A/μs | | 26 | | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =-2.5A, di/dt=100A/μs | | 15.6 | | 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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P-CHANNEL: TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

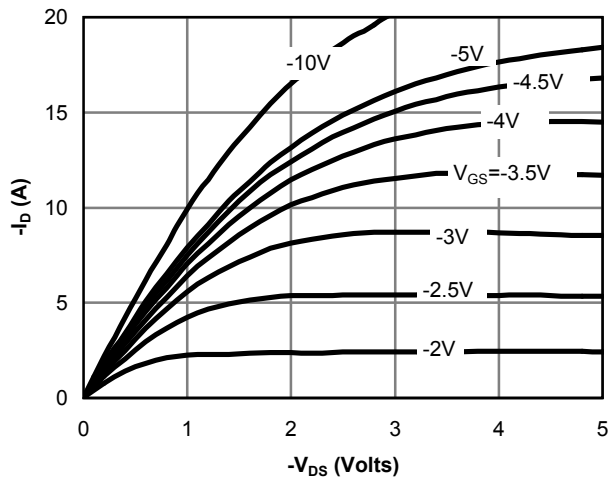


Fig 1: On-Region Characteristics

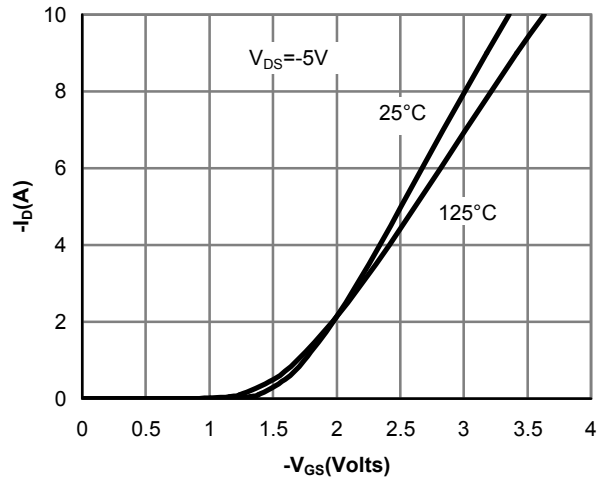


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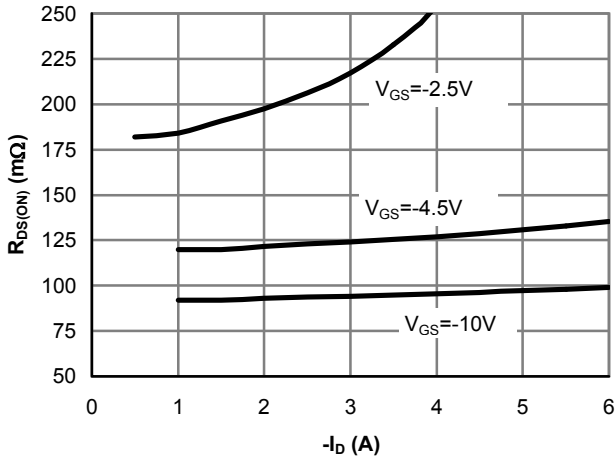


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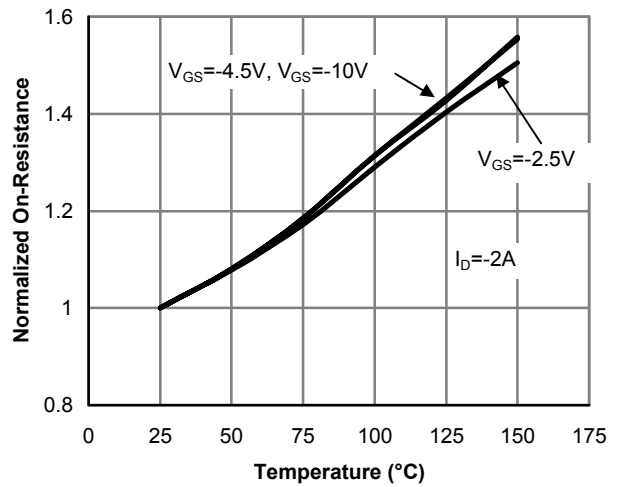


Figure 4: On-Resistance vs. Junction Temperature

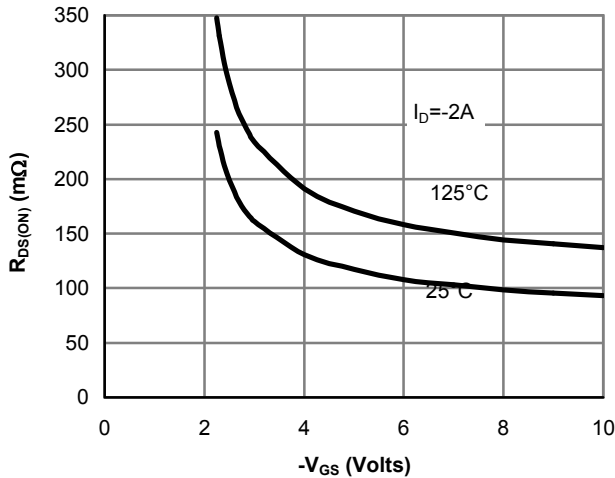


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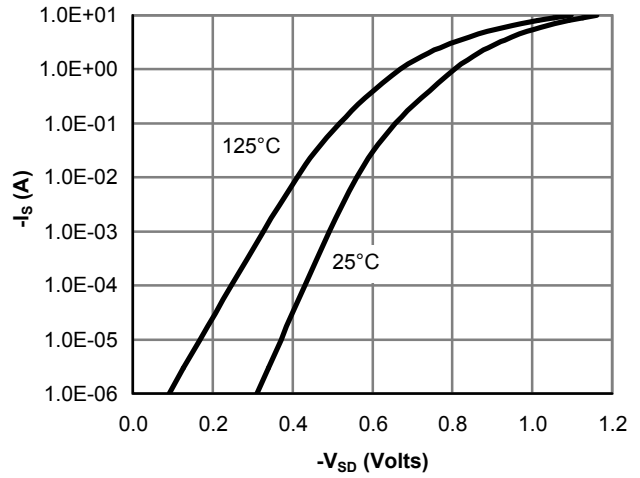


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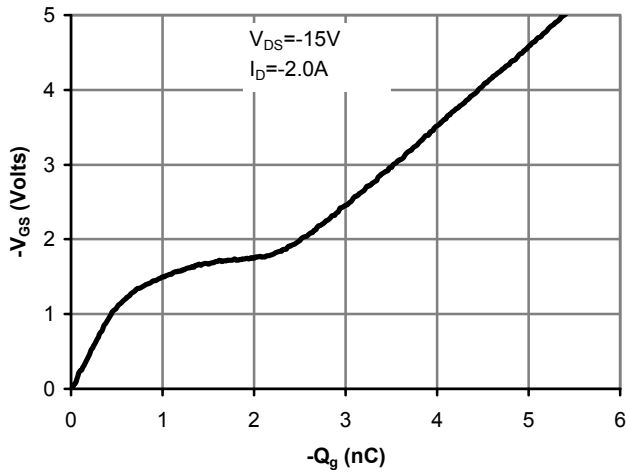


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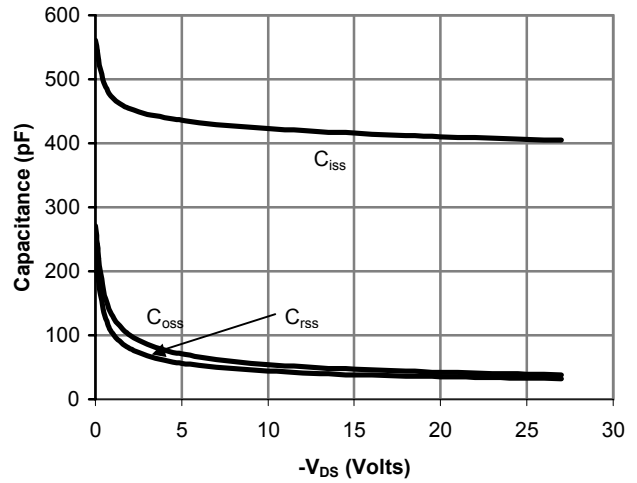


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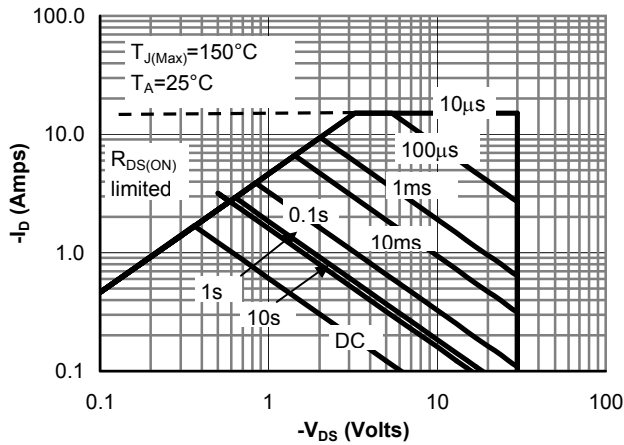


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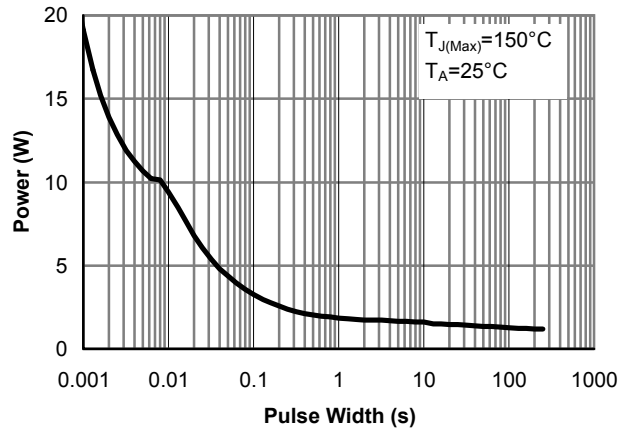


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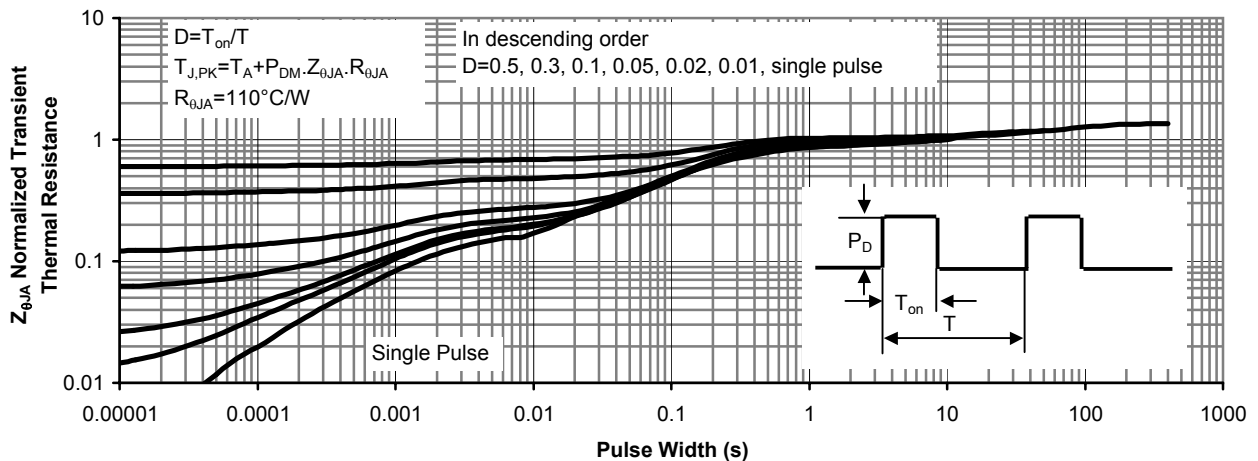


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