AO6605

Complementary Enhancement Mode Field Effect Transistor

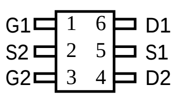
General Description

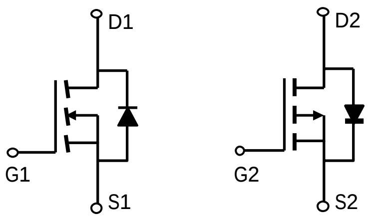
The AO6605 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs form a high-speed power inverter, suitable for a multitude of applications. *Standard Product AO6605 is Pb-free (meets ROHS & Sony 259 specifications). AO6605L is a Green Product ordering option. AO6605 and AO6605L are electrically identical.*

Features

n-channel	p-channel
V_{DS} (V) = 20V	-20V
I_D = 1.9A (V_{GS} = 4.5V)	-2.5A
$R_{DS(ON)}$	
< 200mΩ	< 97mΩ (V_{GS} = 4.5V)
< 270mΩ	< 130mΩ (V_{GS} = 2.5V)
< 400mΩ	< 190mΩ (V_{GS} = 1.8V)

TSOP6
Top View





n-channel **p-channel**

Absolute Maximum Ratings T_A=25°C unless otherwise noted					
Parameter		**Symbol**	**Max n-channel**	**Max p-channel**	**Units**
Drain-Source Voltage		V_{DS}	20	-20	V
Gate-Source Voltage		V_{GS}	±8	±8	V
Continuous Drain Current [A]	T_A=25°C	I_D	1.7	-2.5	A
	T_A=70°C		1.4	-2.0	
Pulsed Drain Current [B]		I_{DM}	15	-15	
Power Dissipation	T_A=25°C	P_D	1.15	1.15	W
	T_A=70°C		0.73	0.73	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	-55 to 150	°C

Thermal Characteristics: n-channel and p-channel					
Parameter		**Symbol**	**Typ**	**Max**	**Units**
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	78	110	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		106	150	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	64	80	°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	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=16V, V_{GS}=0V			1	µA
		T_J=55°C			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±8V			25	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250µA	0.5	0.55	0.9	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V	5			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=1.9A		165	200	mΩ
		T_J=125°C		230	280	
		V_{GS}=2.5V, I_D=1.6A		225	270	mΩ
		V_{GS}=1.8V, I_D=1.3A		325	400	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=1.9A		2.8		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.88	1	V
I_S	Maximum Body-Diode Continuous Current				0.4	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, f=1MHz		101	125	pF
C_{oss}	Output Capacitance			17		pF
C_{rss}	Reverse Transfer Capacitance			14		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		3	4	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=10V, I_D=1.9A		1.6	2	nC
Q_{gs}	Gate Source Charge			0.2		nC
Q_{gd}	Gate Drain Charge			0.4		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=5V, V_{DS}=10V, R_L=5.3Ω, R_{GEN}=3Ω		3.2		ns
t_r	Turn-On Rise Time			4		ns
$t_{D(off)}$	Turn-Off DelayTime			15.5		ns
t_f	Turn-Off Fall Time			2.4		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=1.9A, dI/dt=100A/µs		6.7	16	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=1.9A, dI/dt=100A/µs		1.6		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 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 $R_{\theta JA}$ is the sum of the thermal impedence 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 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.
Rev2: August 2005

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

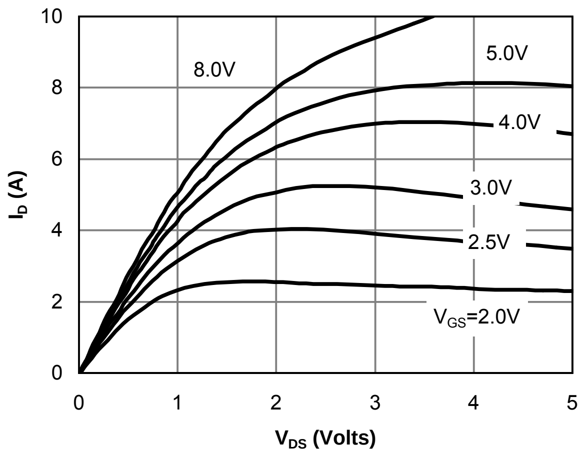


Fig 1: On-Region Characteristics

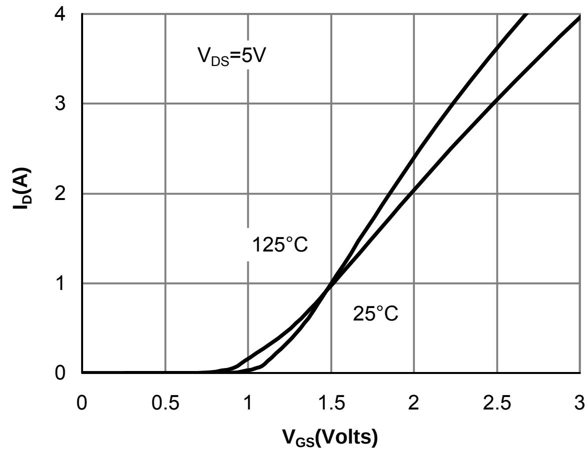


Figure 2: Transfer Characteristics

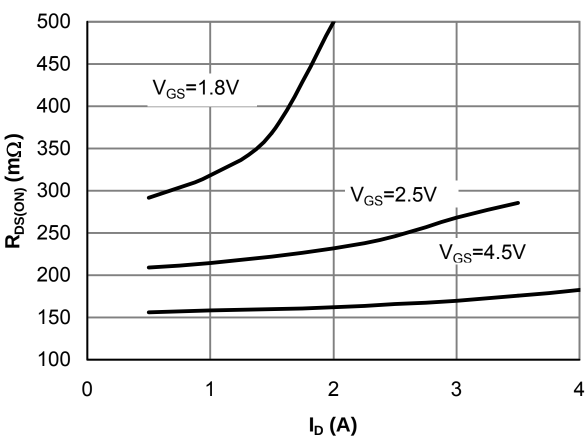


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

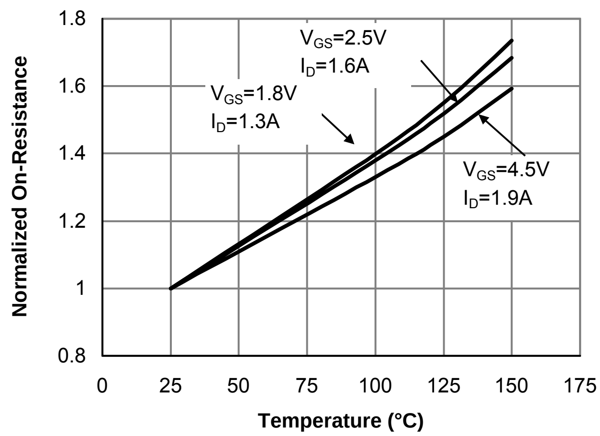


Figure 4: On-Resistance vs. Junction Temperature

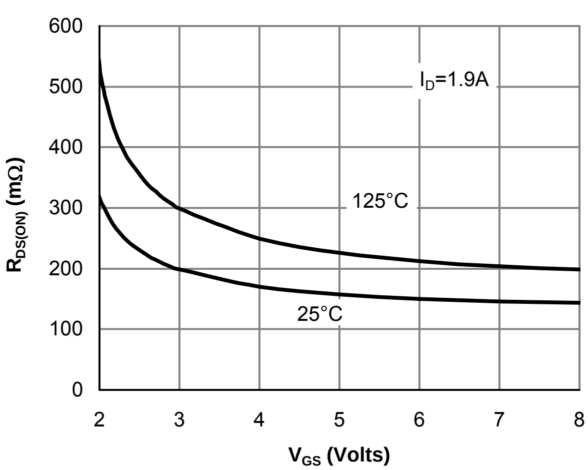


Figure 5: On-Resistance vs. Gate-Source Voltage

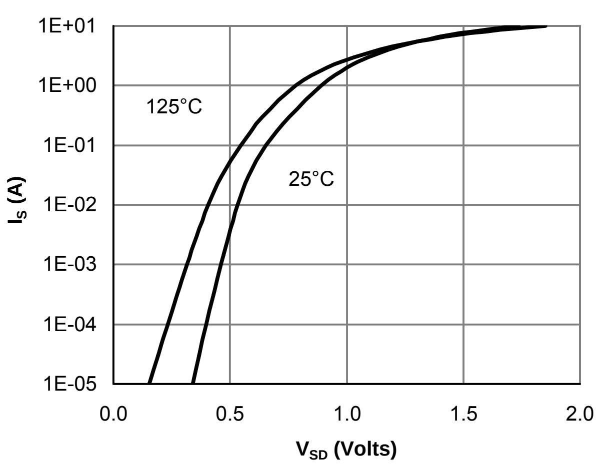


Figure 6: Body-Diode Characteristics

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

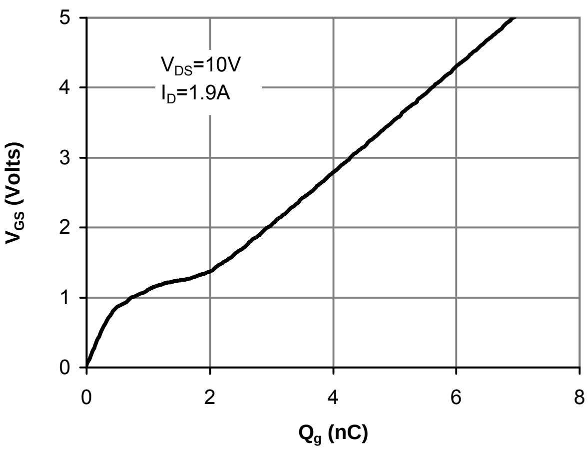


Figure 7: Gate-Charge Characteristics

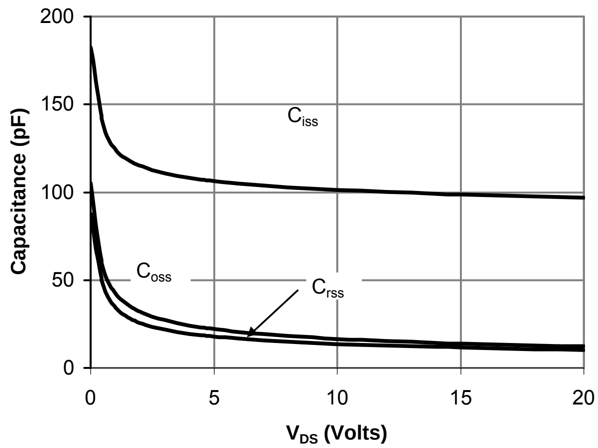


Figure 8: Capacitance Characteristics

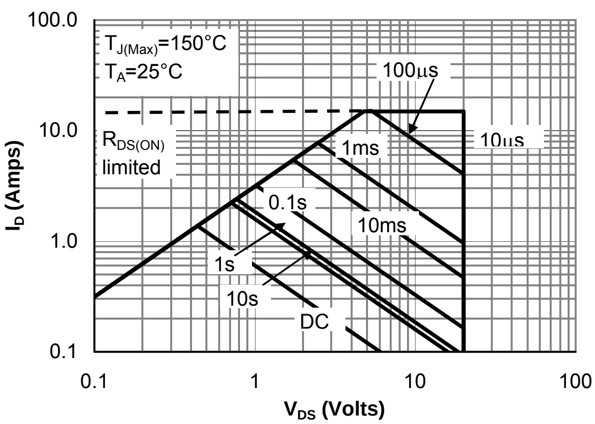


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

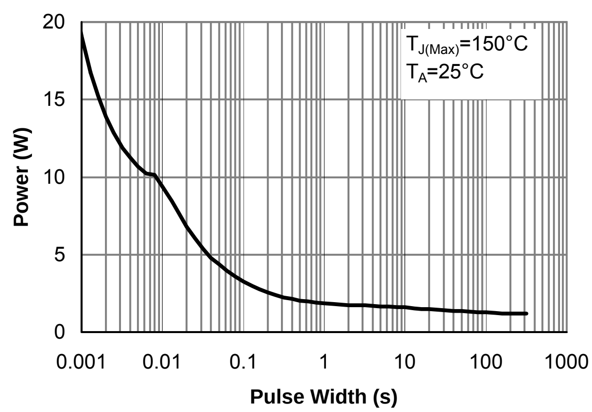


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

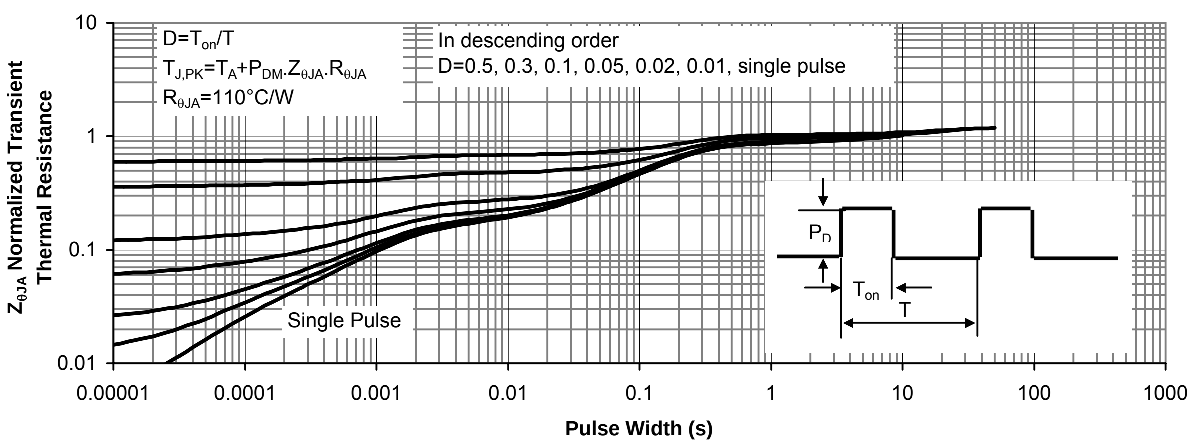


Figure 11: Normalized Maximum Transient Thermal Impedance

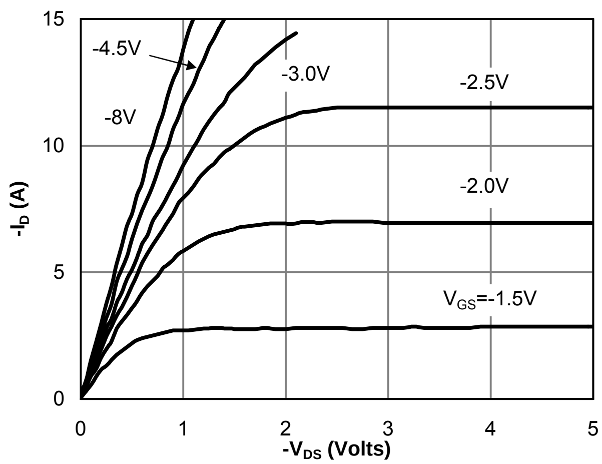
P-channel MOSFET Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=-250µA, V_{GS}=0V		-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-16V, V_{GS}=0V				-1	µA
			T_J=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±8V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250µA		-0.3	-0.55	-1	V
$I_{D(ON)}$	On state drain current	V_{GS}=-4.5V, V_{DS}=-5V		-15			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-2.5A			81	97	mΩ
			T_J=125°C		111	135	
		V_{GS}=-2.5V, I_D=-2A			108	130	mΩ
		V_{GS}=-1.8V, I_D=-1A			146	190	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-3A		4	6		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V			-0.78	-1	V
I_S	Maximum Body-Diode Continuous Current					-2	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-10V, f=1MHz			540	700	pF
C_{oss}	Output Capacitance				72		pF
C_{rss}	Reverse Transfer Capacitance				49		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz			15	19.5	Ω
SWITCHING PARAMETERS							
Q_g	Total Gate Charge	V_{GS}=-4.5V, V_{DS}=-10V, I_D=-2.5A			6.1	7.5	nC
Q_{gs}	Gate Source Charge				0.6		nC
Q_{gd}	Gate Drain Charge				1.6		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-4.5V, V_{DS}=-10V, R_L=3.9Ω, R_{GEN}=3Ω			12		ns
t_r	Turn-On Rise Time				15		ns
$t_{D(off)}$	Turn-Off DelayTime				49		ns
t_f	Turn-Off Fall Time				27		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-2.5A, dI/dt=100A/µs			22	26	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-2.5A, dI/dt=100A/µs			16		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The value in any a 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 $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.
D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80 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.

Rev2: August 2005

P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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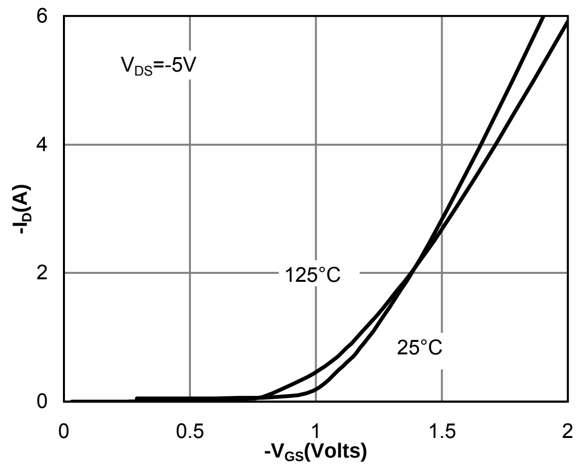

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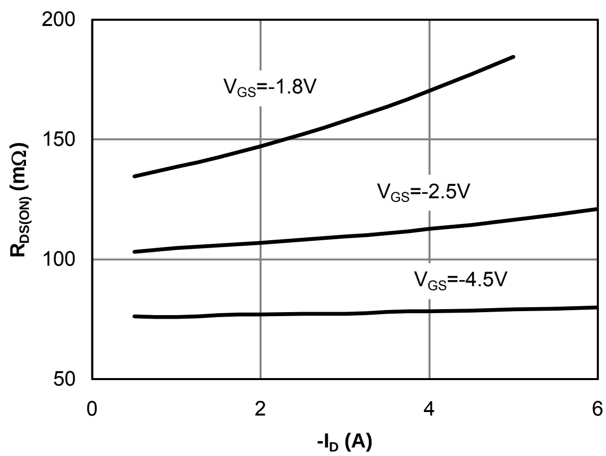
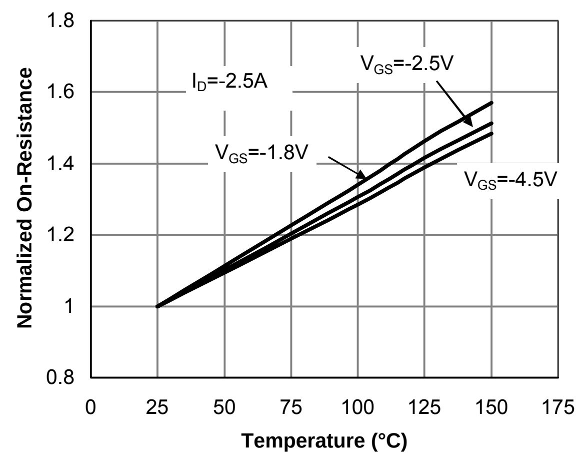


Figure 3: On-Resistance vs. Drain Current and Gate Voltage



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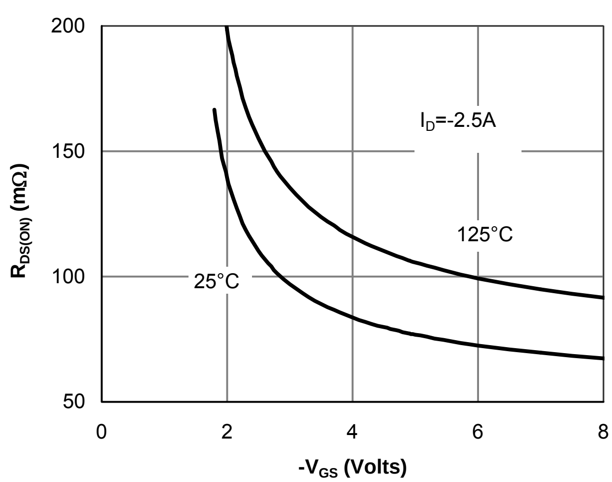

Figure 5: On-Resistance vs. Gate-Source Voltage

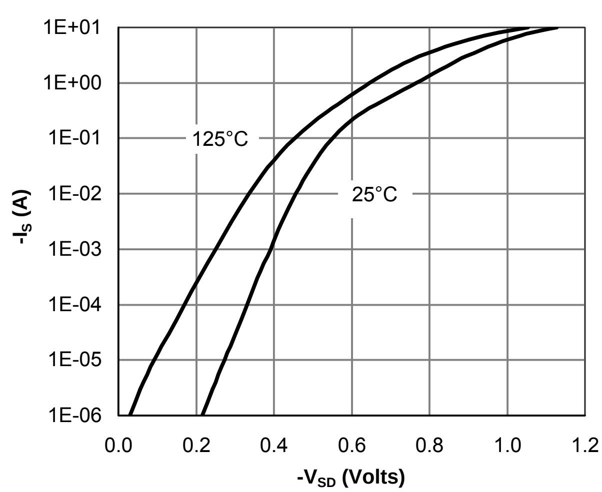

Figure 6: Body-Diode Characteristics

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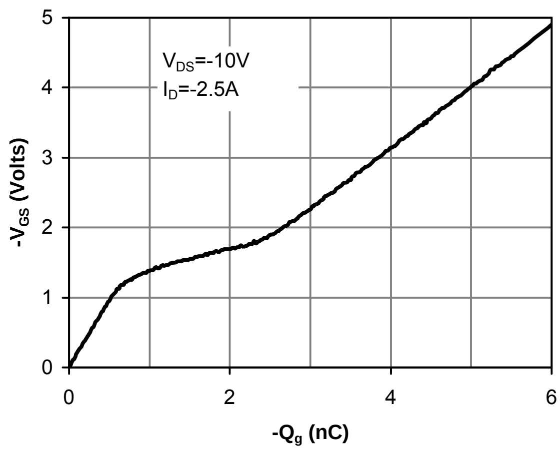

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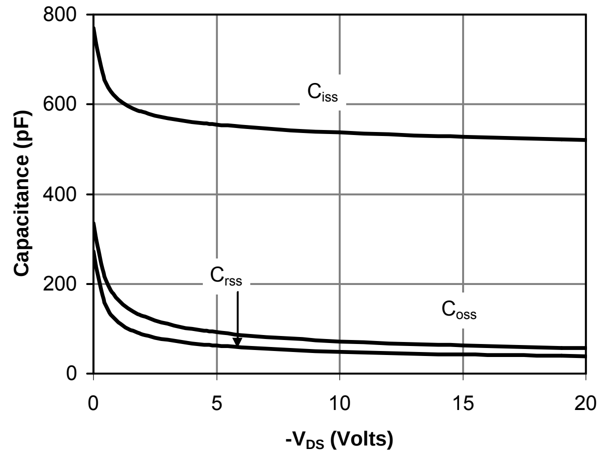

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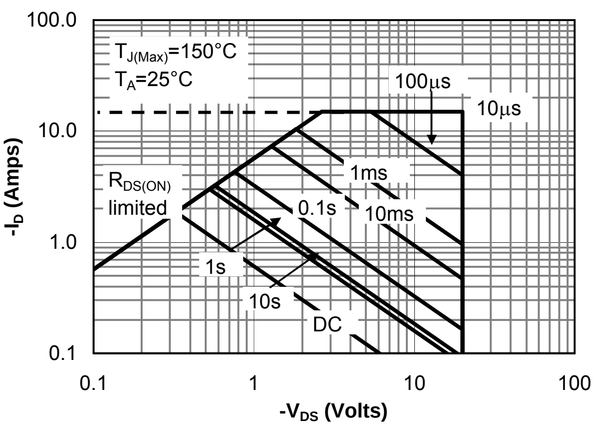

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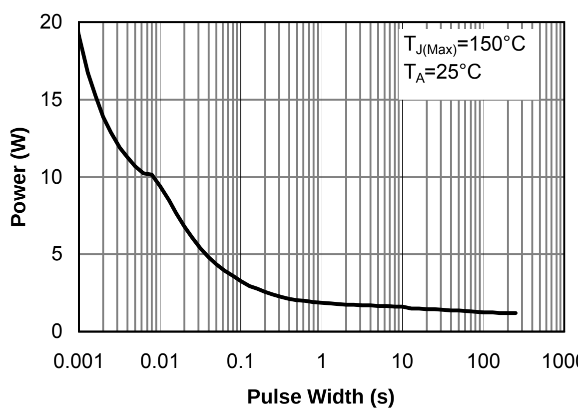

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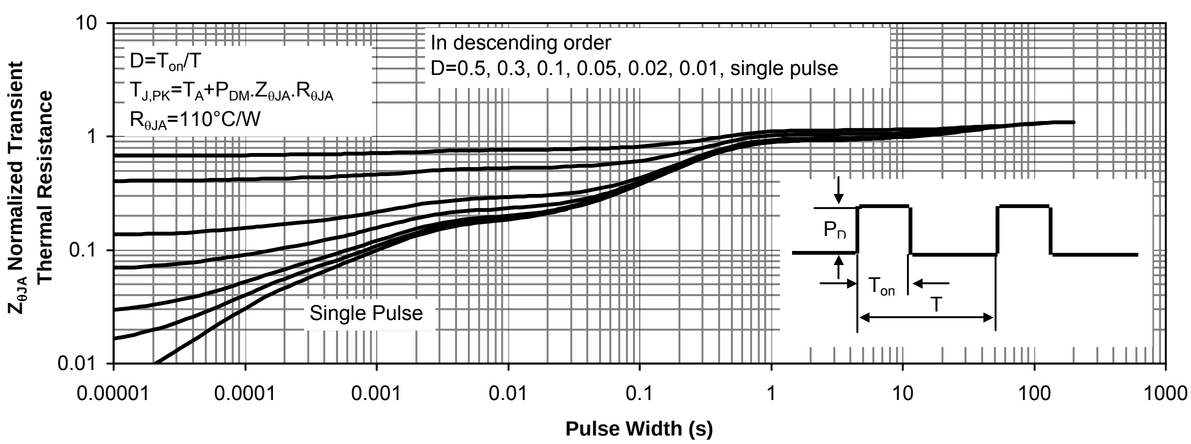

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