



ALPHA & OMEGA
SEMICONDUCTOR



AO6601

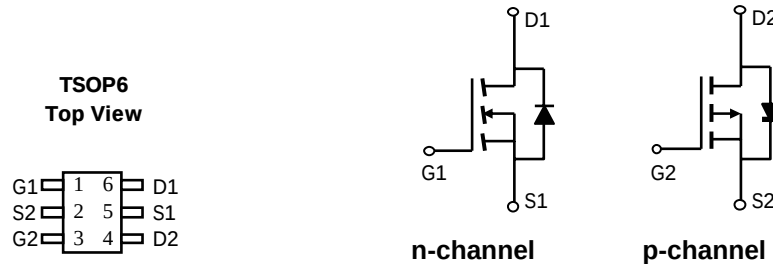
Complementary Enhancement Mode Field Effect Transistor

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	$T_A=25^\circ C$	3.4	-2.3	A
	$T_A=70^\circ C$	2.7	-1.8	
Pulsed Drain Current ^B	I_{DM}	30	-30	
Power Dissipation	$T_A=25^\circ C$	1.15	1.15	W
	$T_A=70^\circ C$	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

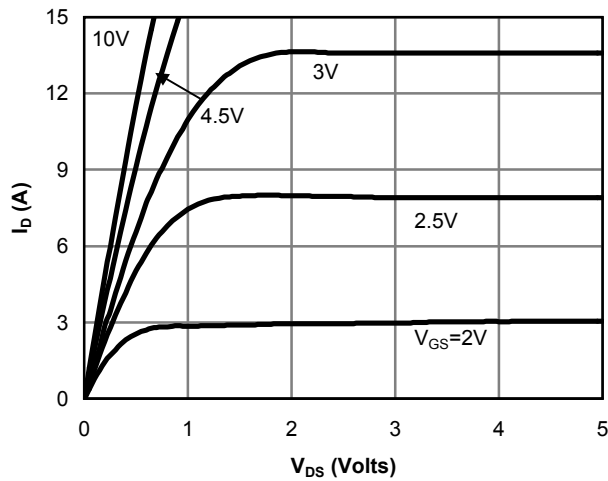


Fig 1: On-Region Characteristics

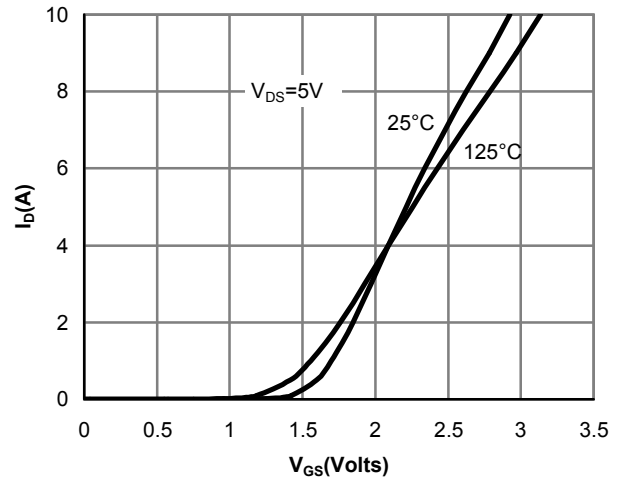


Figure 2: Transfer Characteristics

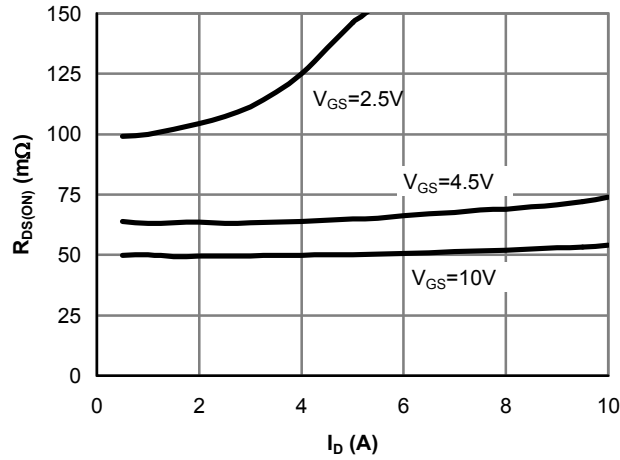


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

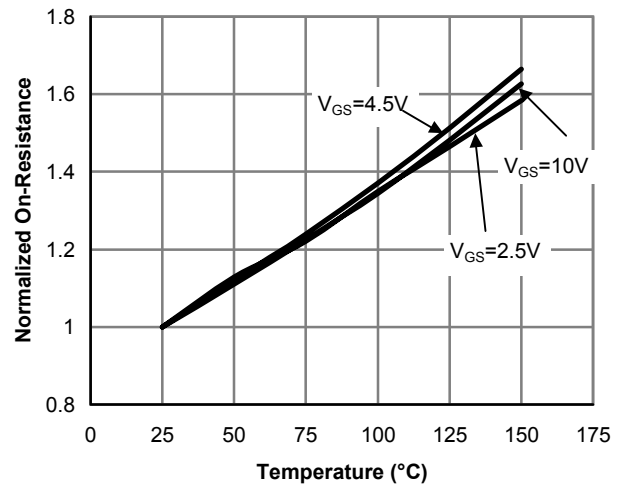


Figure 4: On-Resistance vs. Junction Temperature

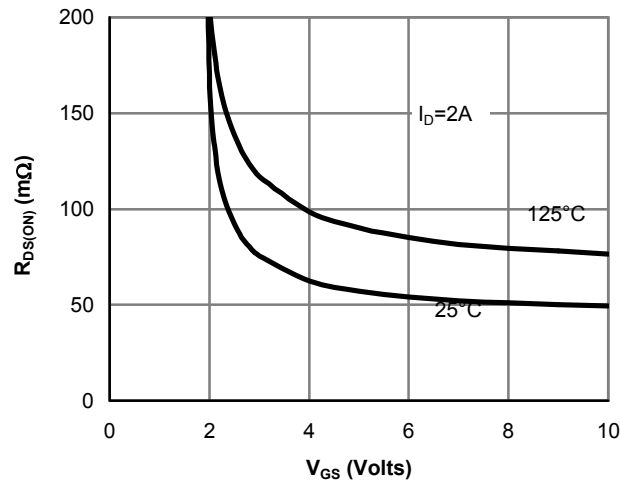


Figure 5: On-Resistance vs. Gate-Source Voltage

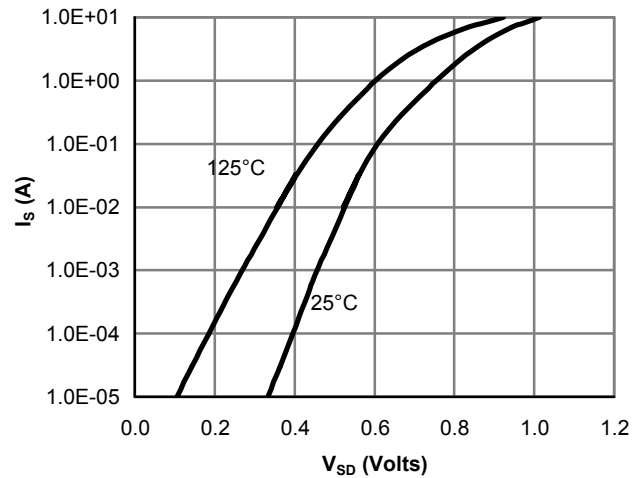


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

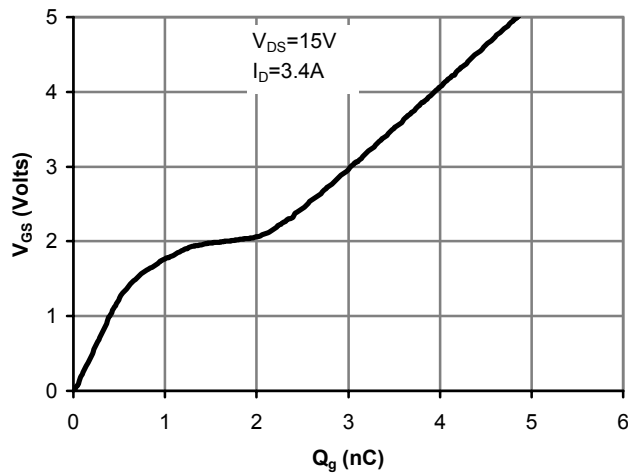


Figure 7: Gate-Charge Characteristics

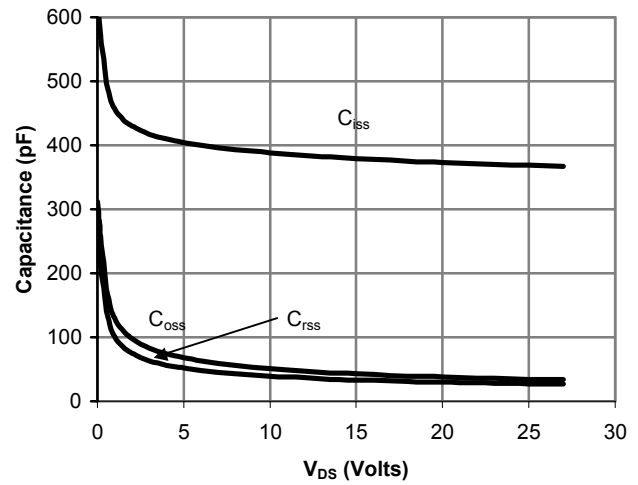


Figure 8: Capacitance Characteristics

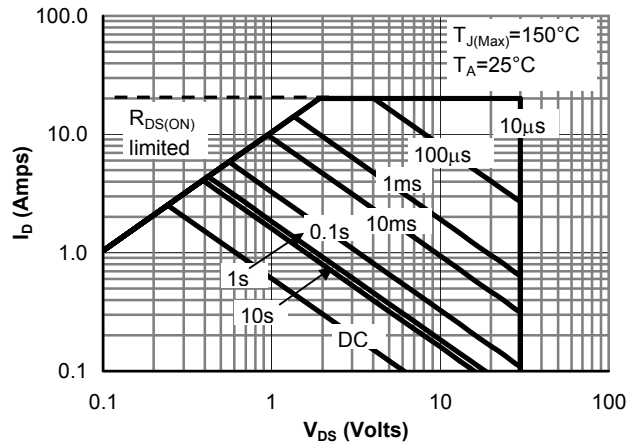


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

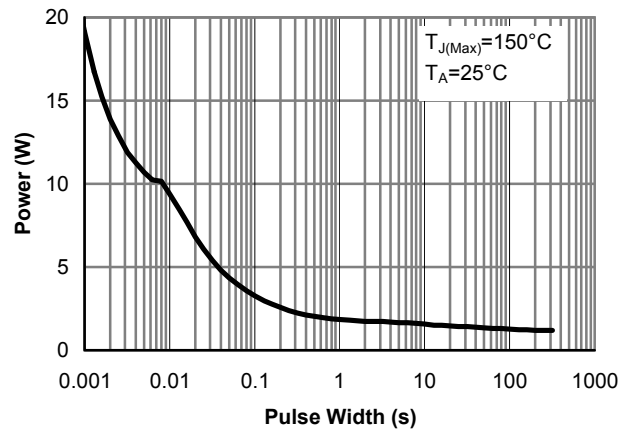


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

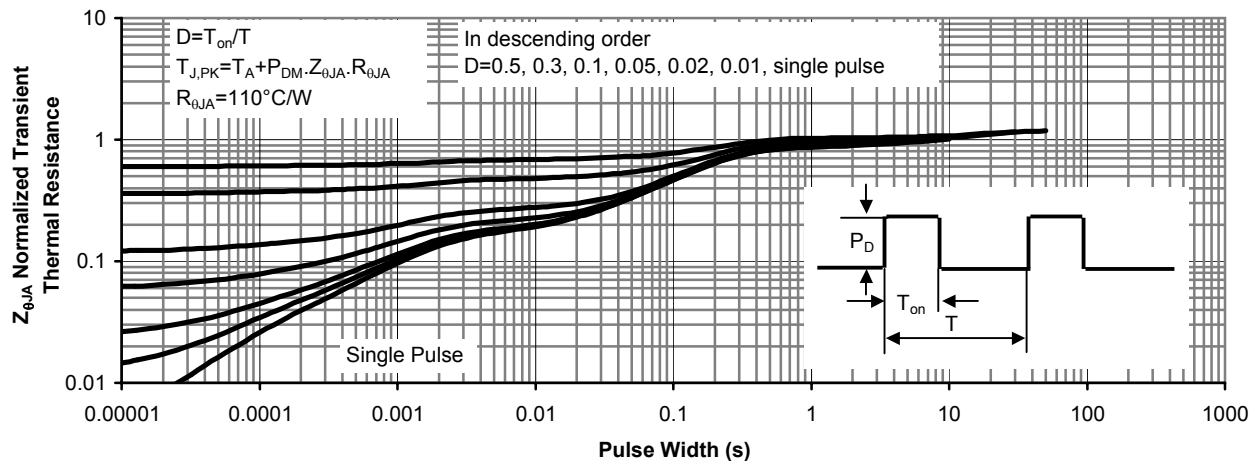


Figure 11: Normalized Maximum Transient Thermal Impedance

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

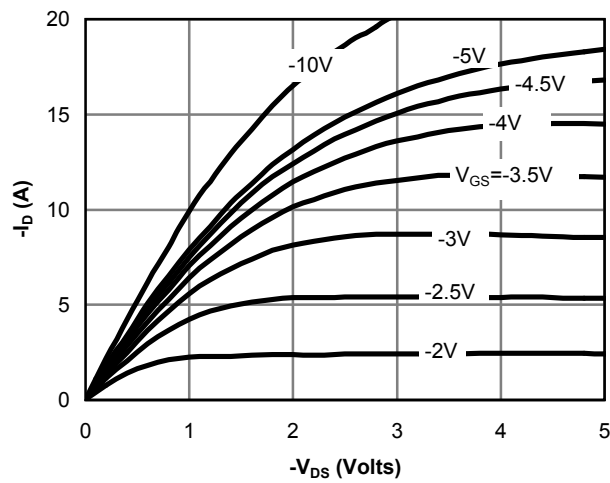


Fig 1: On-Region Characteristics

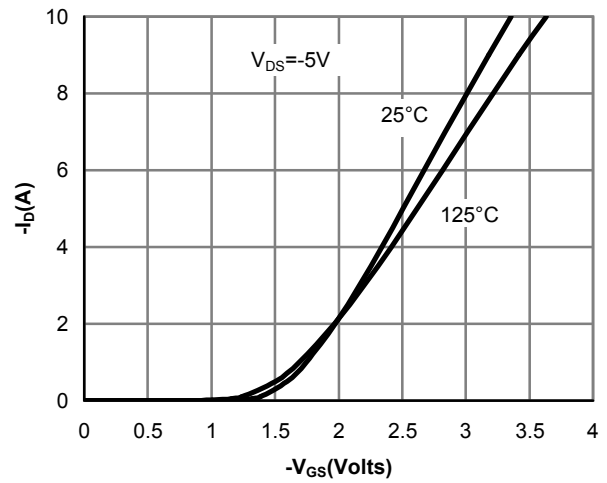


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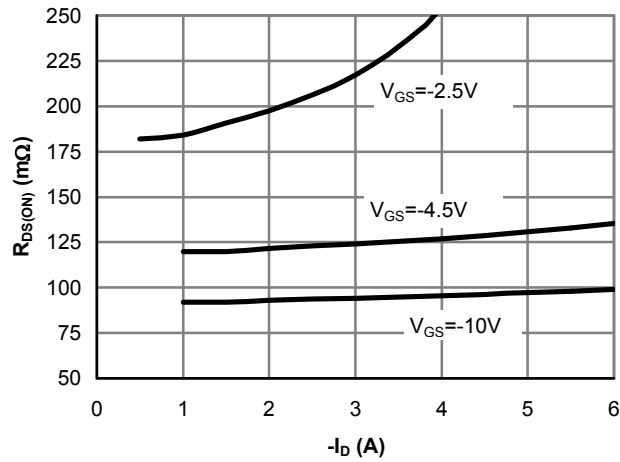


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

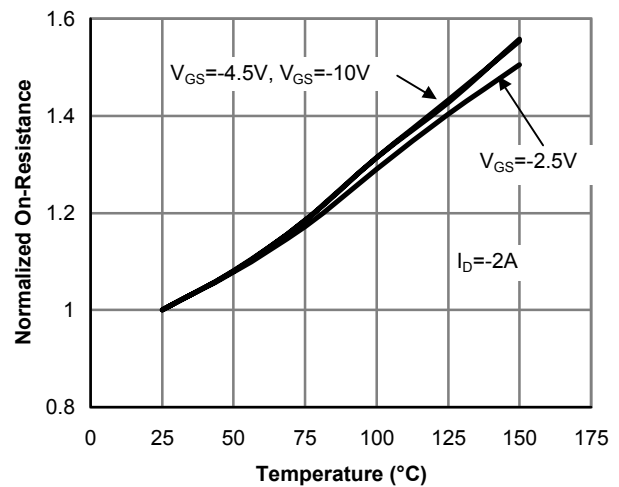


Figure 4: On-Resistance vs. Junction Temperature

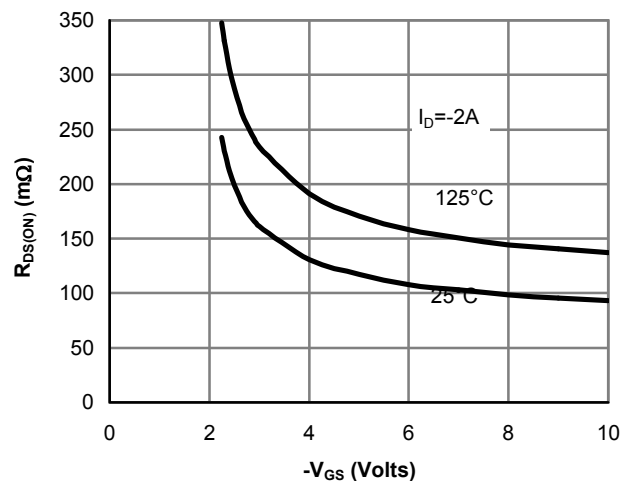


Figure 5: On-Resistance vs. Gate-Source Voltage

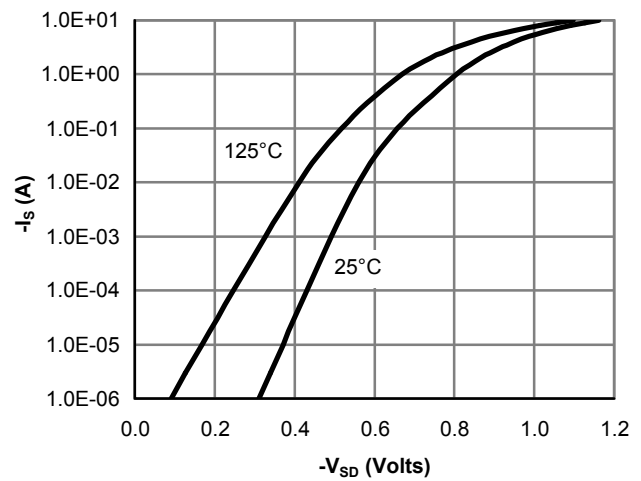


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

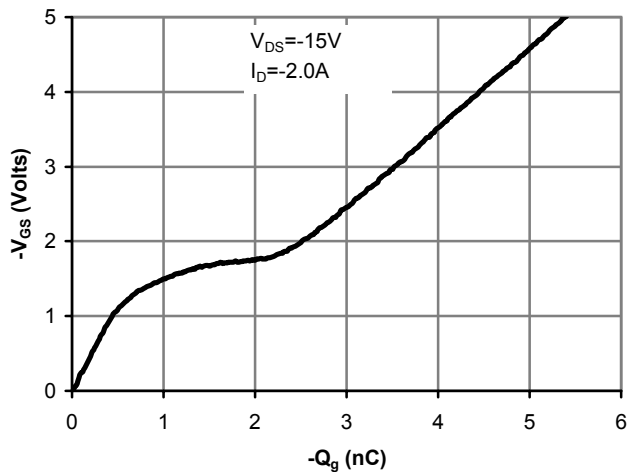


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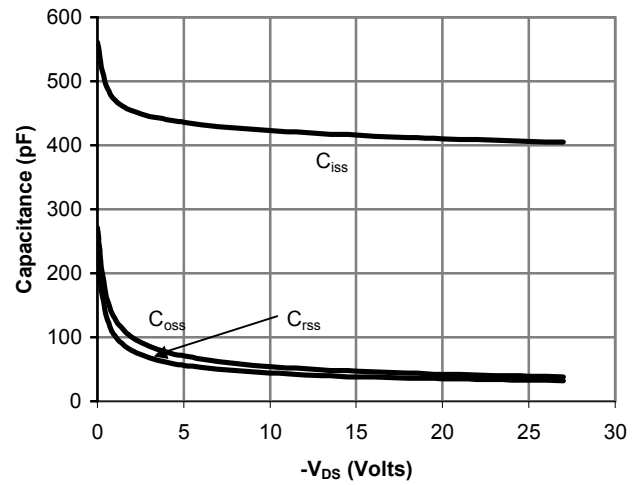


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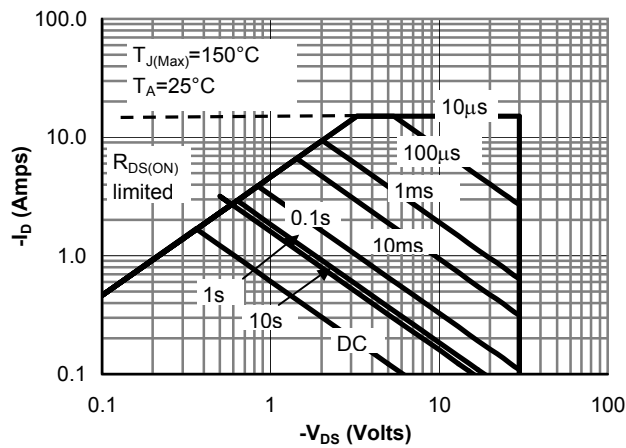


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

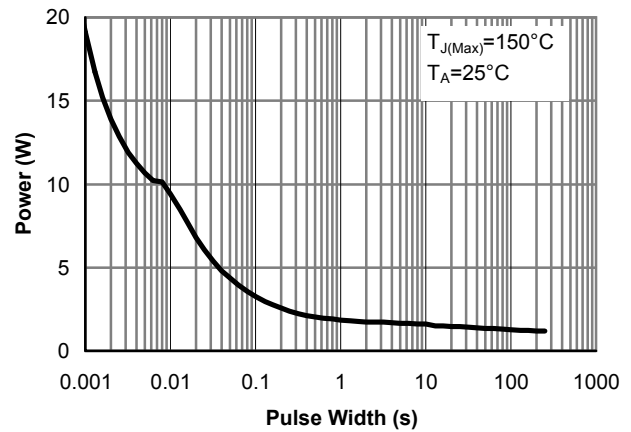


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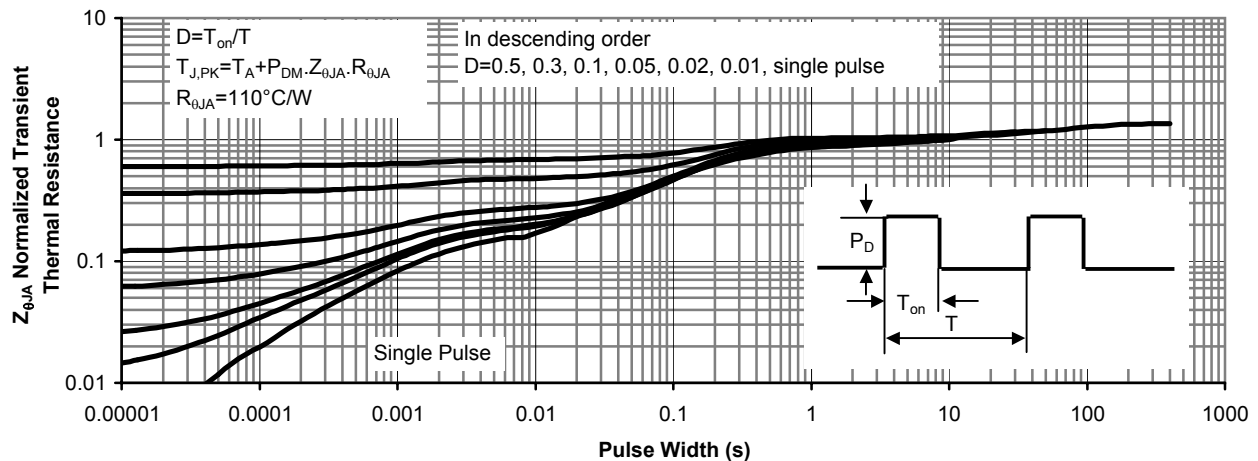


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