



General Description

The AO4611 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

Product Summary

N-Channel

V_{DS} (V) = 60V
 I_D = 6.3A (V_{GS} =10V)
 $R_{DS(ON)}$
 < 25m Ω (V_{GS} =10V)
 < 30m Ω (V_{GS} =4.5V)

100% UIS Tested
 100% Rg Tested

P-Channel

-60V
 -4.9A
 < 42m Ω (V_{GS} = -10V)
 < 52m Ω (V_{GS} = -4.5V)

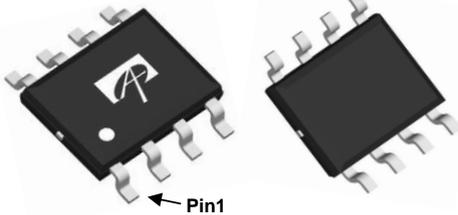
100% UIS Tested
 100% Rg Tested



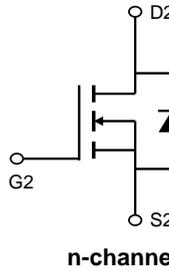
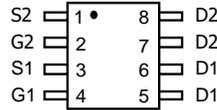
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Top View

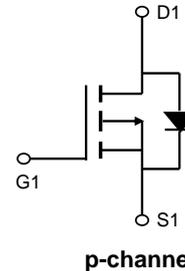
Bottom View



Top View



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}	60	-60	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current ^A	I_D	$T_A=25^\circ\text{C}$	6.3	-4.9
		$T_A=70^\circ\text{C}$	5	-3.9
		Pulsed Drain Current ^B	I_{DM}	40
Power Dissipation	P_D	$T_A=25^\circ\text{C}$	2	2
		$T_A=70^\circ\text{C}$	1.28	1.28
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	48	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		n-ch	74	110	$^\circ\text{C/W}$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	n-ch	35	60	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	p-ch	48	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		p-ch	74	110	$^\circ\text{C/W}$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	p-ch	35	40	$^\circ\text{C/W}$

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	60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} = ±20V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.5	2.1	3	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	40			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =6.3A T _J =125°C		20 34	25 42	mΩ
		V _{GS} =4.5V, I _D =5.7A		22	30	
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =6.3A		27		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.74	1	V
I _S	Maximum Body-Diode Continuous Current				3	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, f=1MHz		1920	2300	pF
C _{oss}	Output Capacitance			155		pF
C _{rss}	Reverse Transfer Capacitance			116		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		0.65	0.8	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =30V, I _D =6.3A		47.6	58	nC
Q _{g(4.5V)}	Total Gate Charge			24.2	30	nC
Q _{gs}	Gate Source Charge			6		nC
Q _{gd}	Gate Drain Charge			14.4		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =30V, R _L =4.7Ω, R _{GEN} =3Ω		7.6		ns
t _r	Turn-On Rise Time			5		ns
t _{D(off)}	Turn-Off DelayTime			28.9		ns
t _f	Turn-Off Fall Time			5.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =6.3A, dI/dt=100A/μs		33.2	40	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =6.3A, dI/dt=100A/μs		43		nC

A: The value of R_{θJA} is measured with the device mounted on 1 in² 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_{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 <300 μs 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

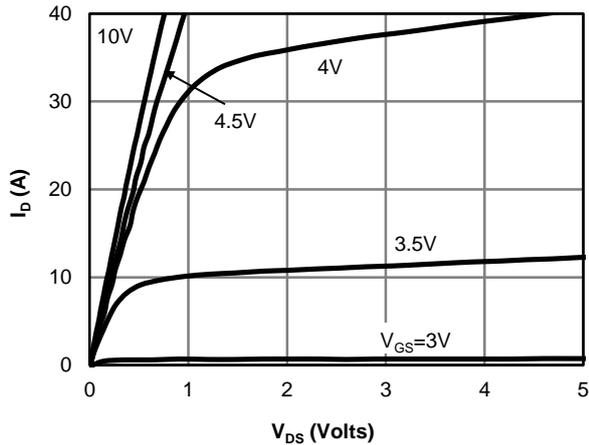


Fig 1: On-Region Characteristics

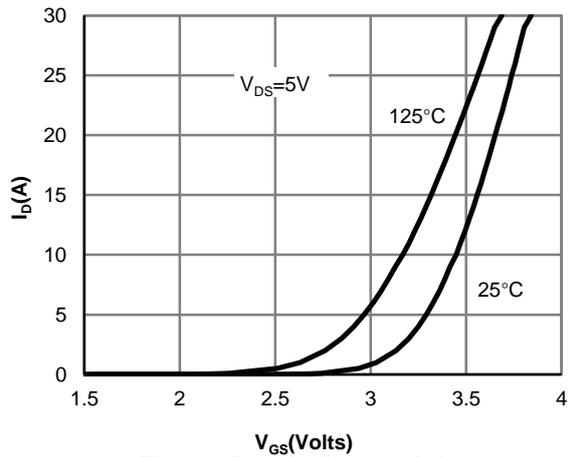


Figure 2: Transfer Characteristics

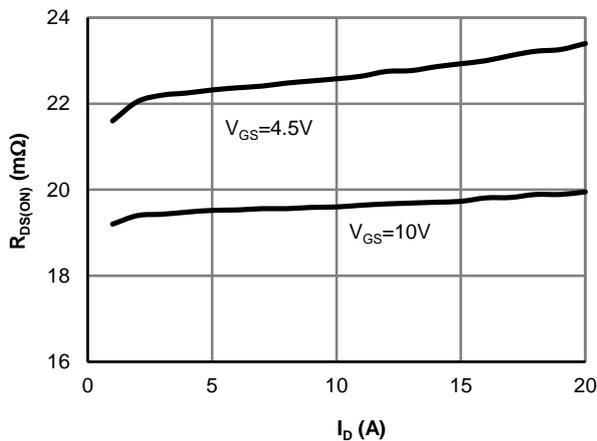


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

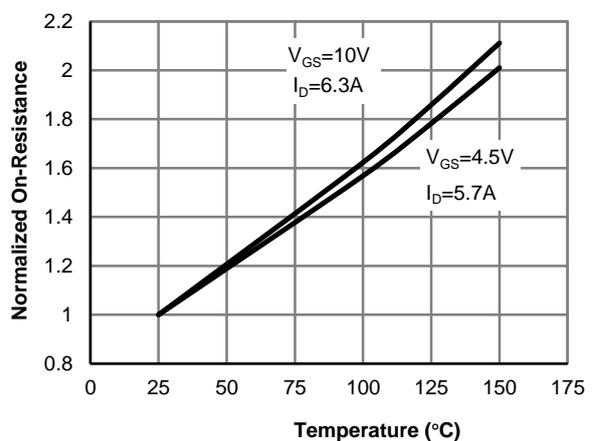


Figure 4: On-Resistance vs. Junction Temperature

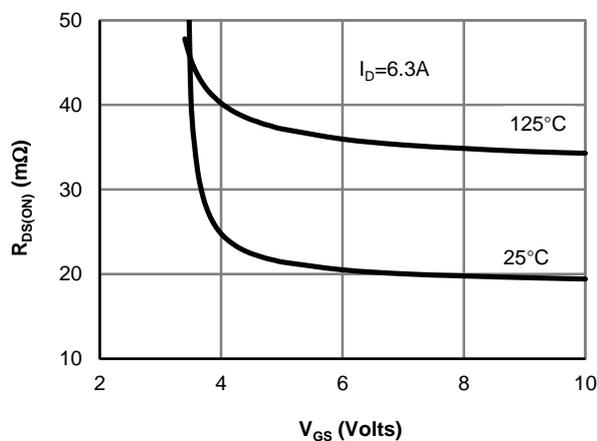


Figure 5: On-Resistance vs. Gate-Source Voltage

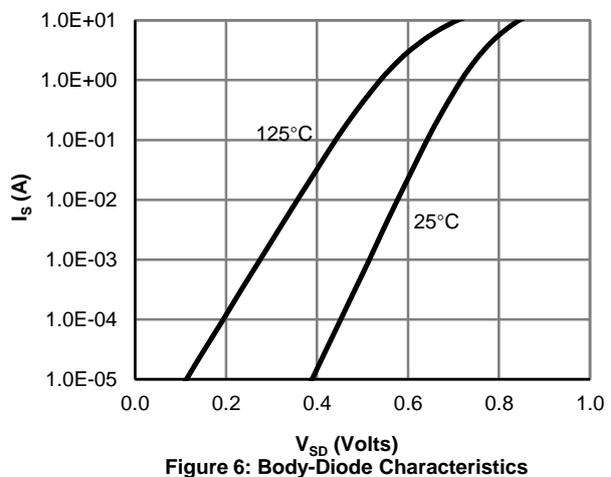


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

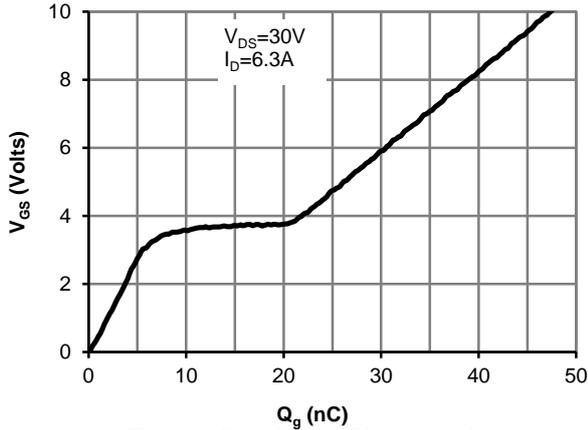


Figure 7: Gate-Charge Characteristics

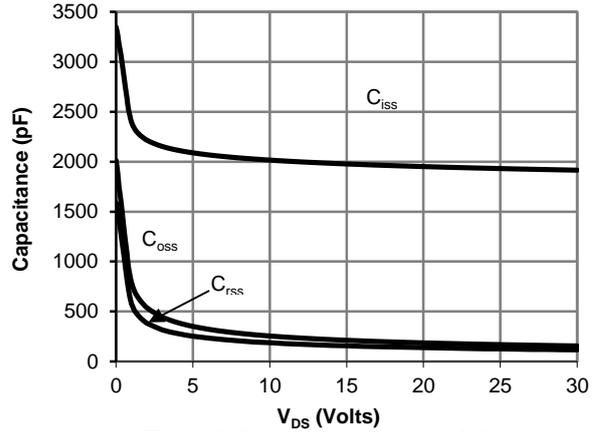


Figure 8: Capacitance Characteristics

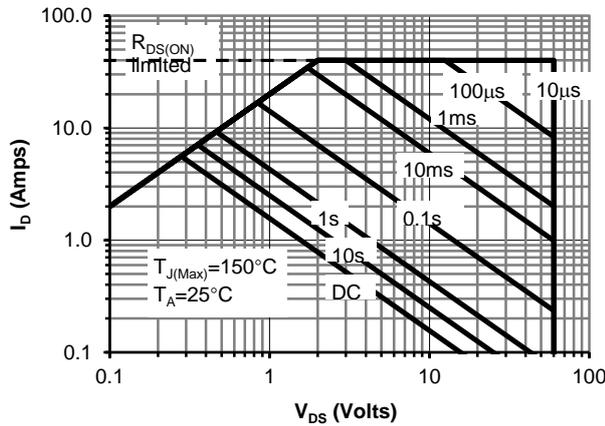


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

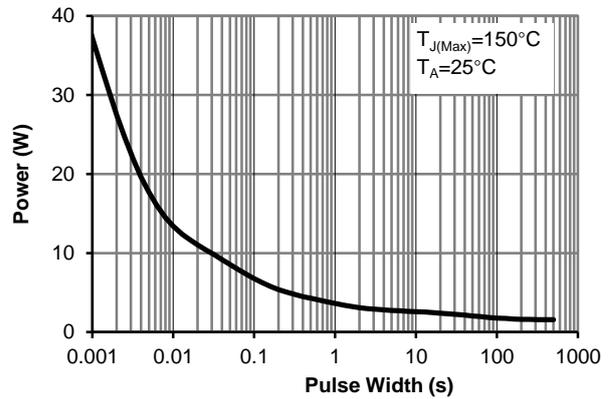


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

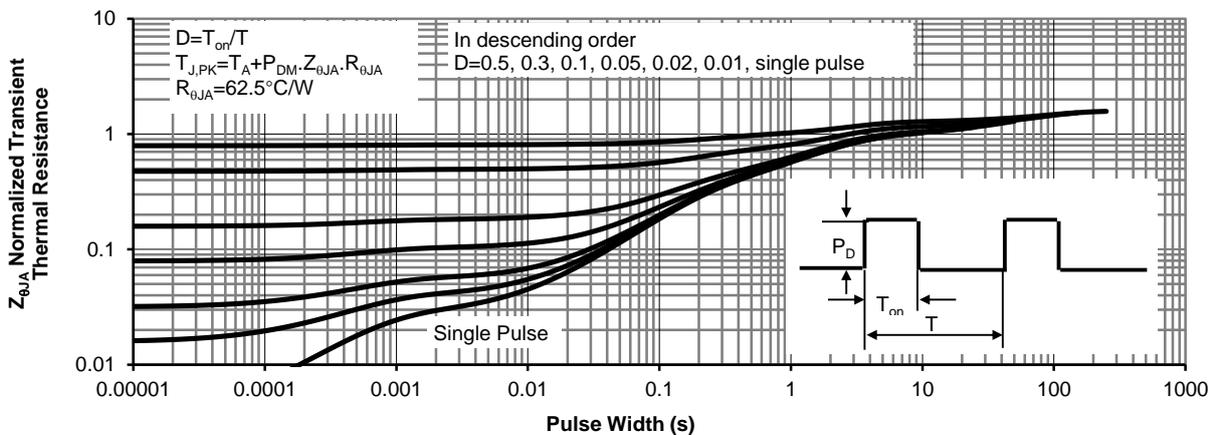


Figure 11: Normalized Maximum Transient Thermal Impedance

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	-60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-48V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D =-250μA	-1.5	-1.9	-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 =-4.9A T _J =125°C		34 58	42 72	mΩ
		V _{GS} =-4.5V, I _D =-4.4A		42	52	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-4.9A		17.8		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.73	-1	V
I _S	Maximum Body-Diode Continuous Current				-3	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-30V, f=1MHz		2417	2900	pF
C _{oss}	Output Capacitance			179		pF
C _{rss}	Reverse Transfer Capacitance			120		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1.9	2.3	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge (10V)	V _{GS} =-10V, V _{DS} =-30V, I _D =-4.9A		45.2	55	nC
Q _{g(4.5V)}	Total Gate Charge (4.5V)			22.8	28	nC
Q _{gs}	Gate Source Charge			5.8		nC
Q _{gd}	Gate Drain Charge			9.6		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-30V, R _L =6.2Ω, R _{GEN} =3Ω		9.8		ns
t _r	Turn-On Rise Time			6.1		ns
t _{D(off)}	Turn-Off DelayTime			44		ns
t _f	Turn-Off Fall Time			12.7		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-4.9A, di/dt=100A/μs		32	42	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-4.9A, di/dt=100A/μs		42		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 ≤ 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 <300 μs 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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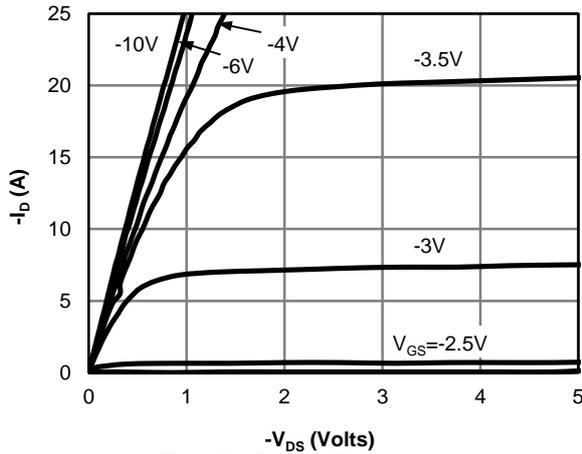


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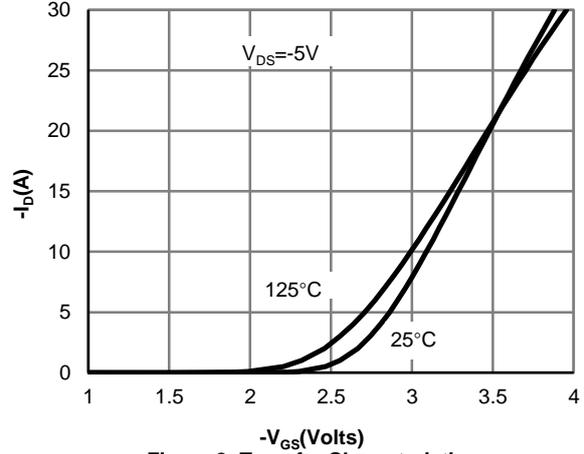


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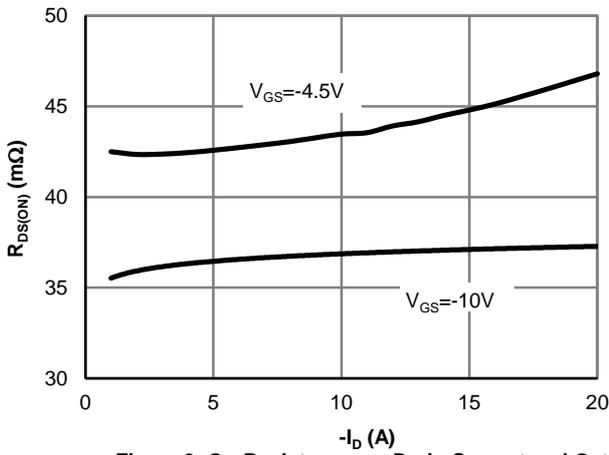


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

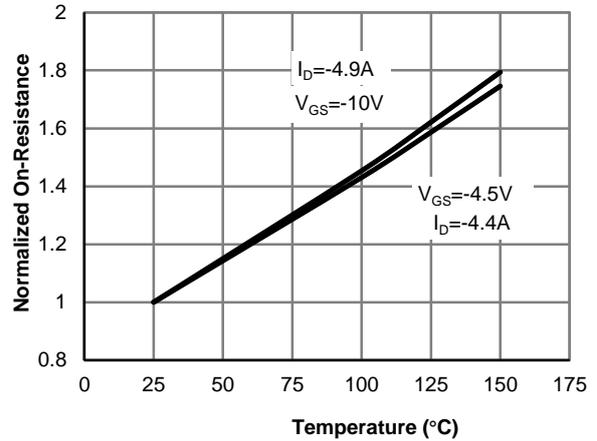


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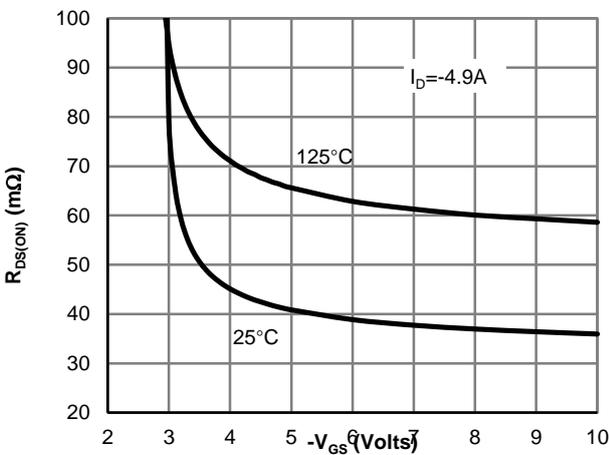


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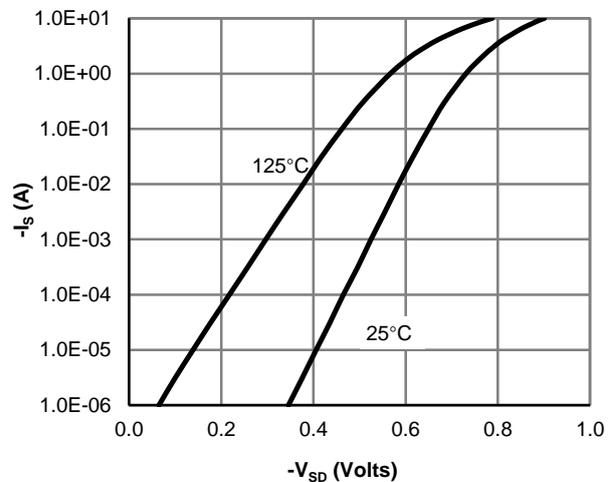


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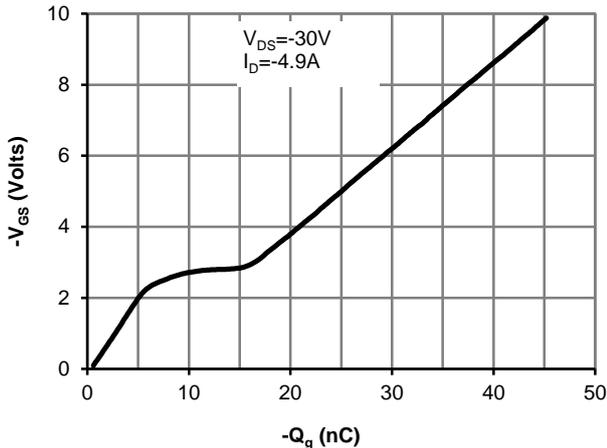


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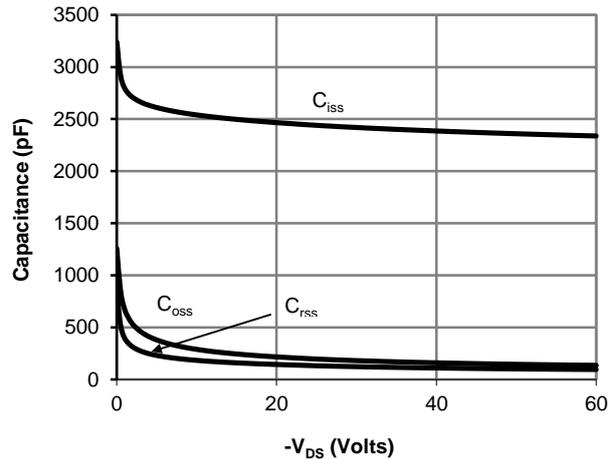


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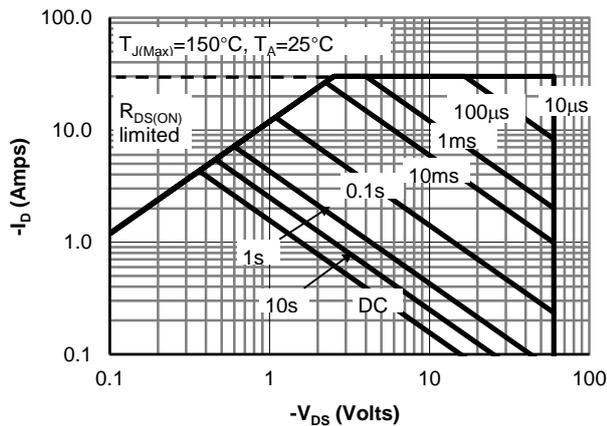


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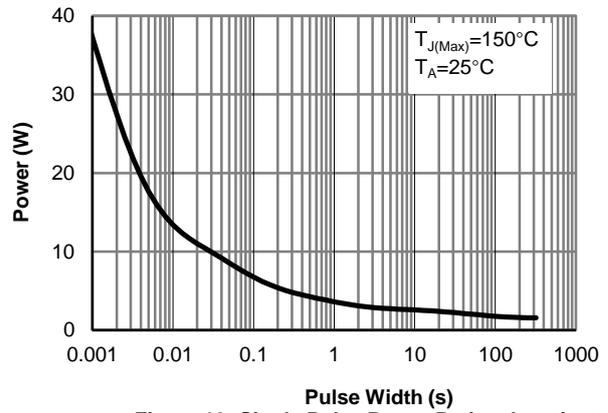


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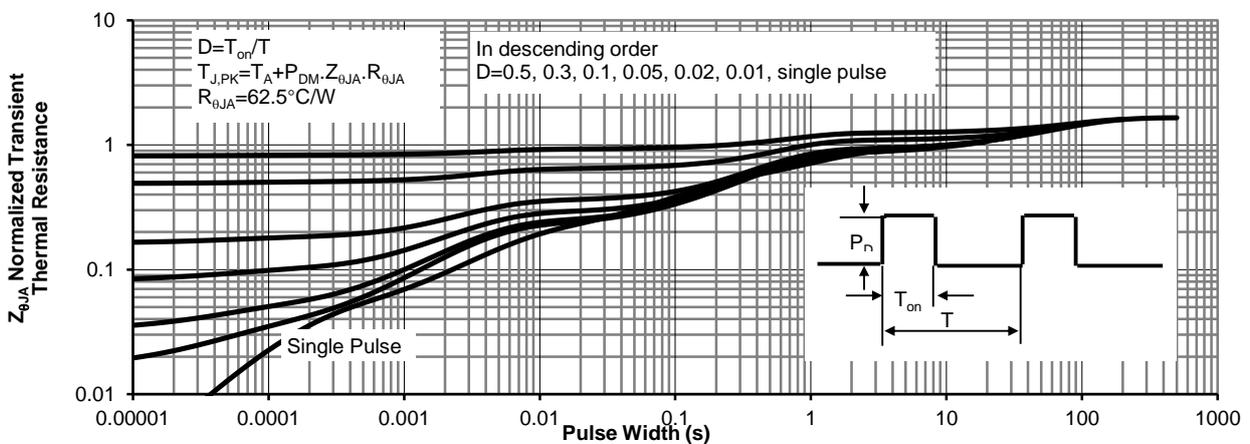


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