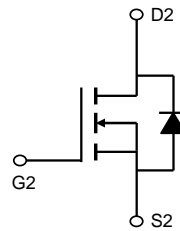
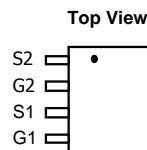
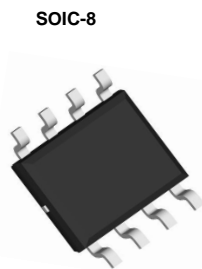


General Description

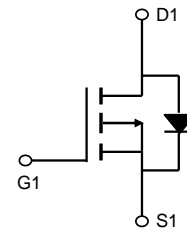
The AO4611 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

Features

N-Channel	P-Channel
$V_{DS} = 60V$	-60V
$I_D = 6.3A (V_{GS}=10V)$	-4.9A
$R_{DS(ON)}$	
< 25m Ω ($V_{GS}=10V$)	< 42m Ω ($V_{GS} = -10V$)
< 30m Ω ($V_{GS}=4.5V$)	< 52m Ω ($V_{GS} = -4.5V$)



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}	60	-60	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current ^A	$T_A=25^\circ C$	6.3	-4.9	A
	$T_A=70^\circ C$	5	-3.9	
Pulsed Drain Current ^B	I_{DM}	40	-30	
Power Dissipation	$T_A=25^\circ C$	2	2	W
	$T_A=70^\circ C$	1.28	1.28	
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	48	62.5	$^\circ C/W$
		n-ch	74	110	$^\circ C/W$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	n-ch	35	60	$^\circ C/W$
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	p-ch	48	62.5	$^\circ C/W$
		p-ch	74	110	$^\circ C/W$
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	p-ch	35	40	$^\circ C/W$

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. Rev5: Nov. 2010

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

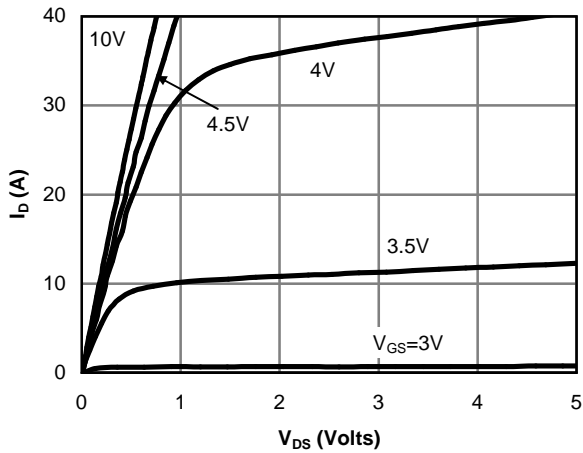


Fig 1: On-Region Characteristics

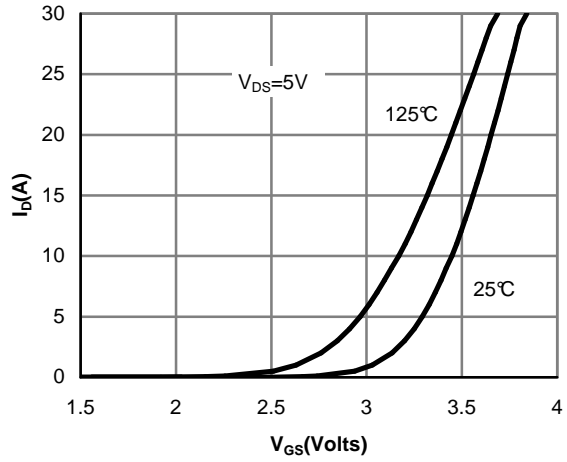


Figure 2: Transfer Characteristics

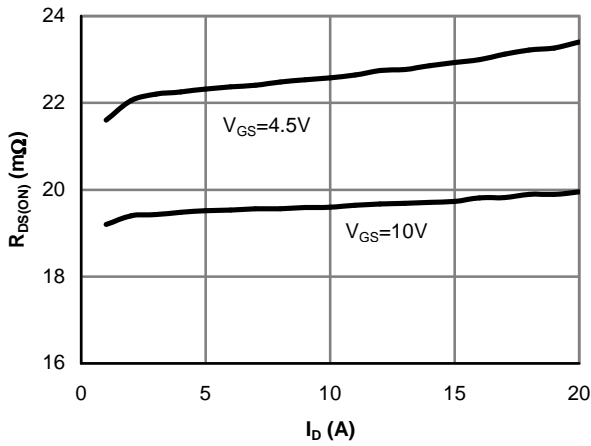


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

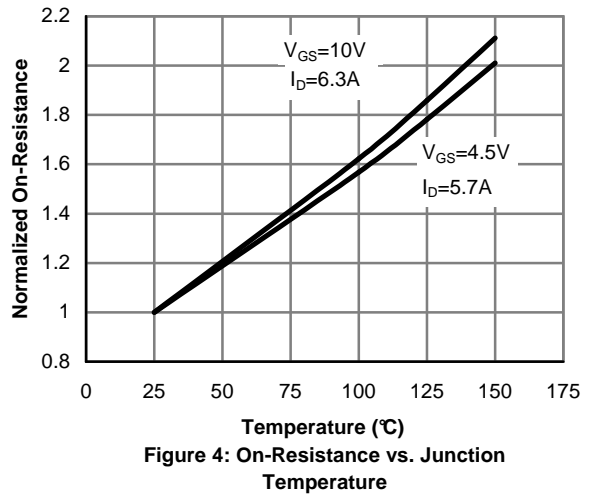


Figure 4: On-Resistance vs. Junction Temperature

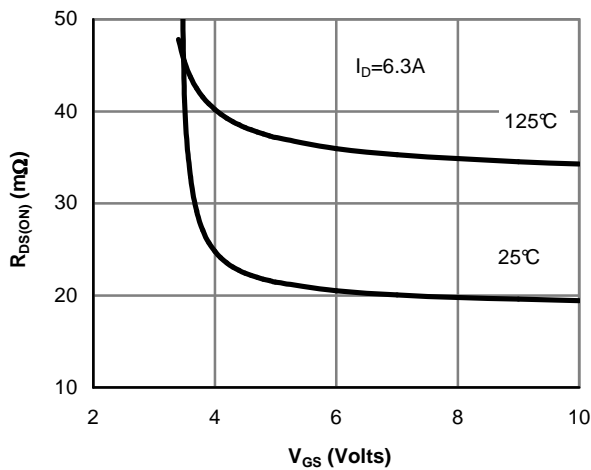


Figure 5: On-Resistance vs. Gate-Source Voltage

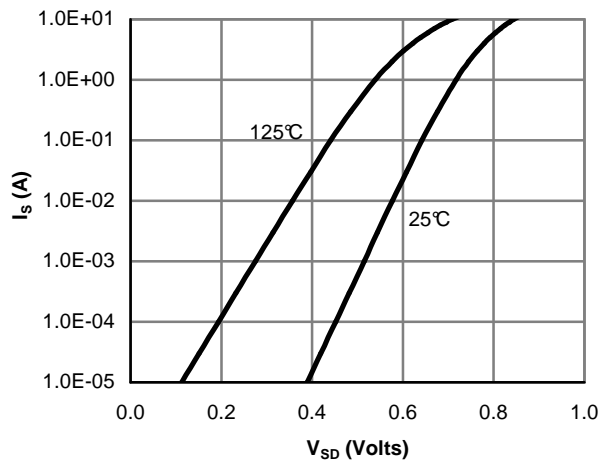


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

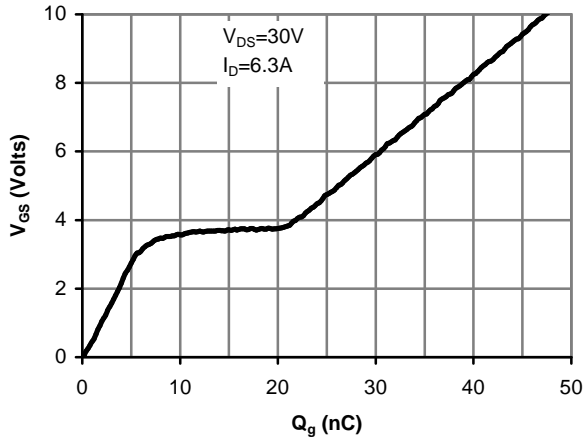


Figure 7: Gate-Charge Characteristics

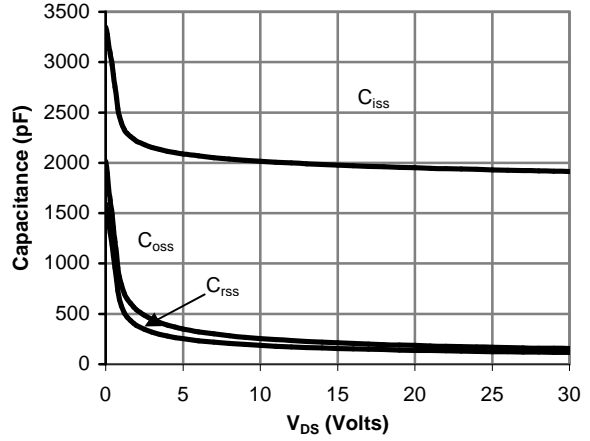


Figure 8: Capacitance Characteristics

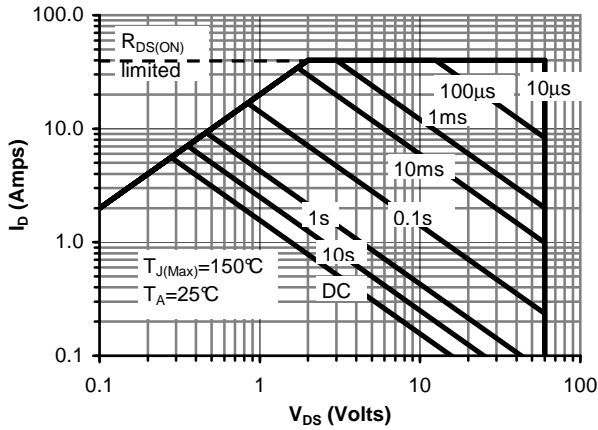


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

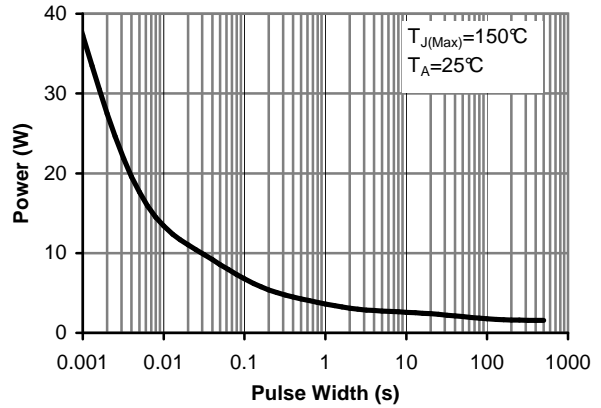


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

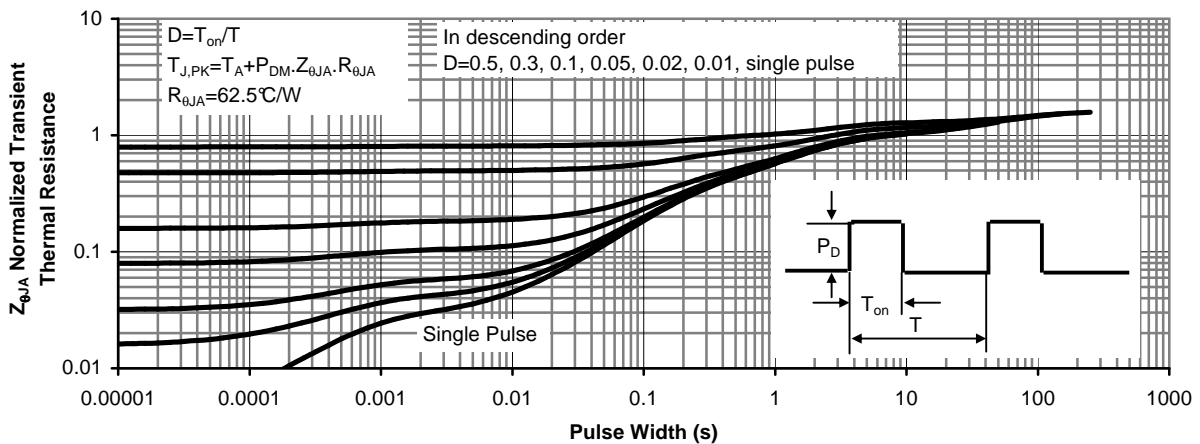


Figure 11: Normalized Maximum Transient Thermal Impedance

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	
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
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. Rev5: Nov. 2010

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

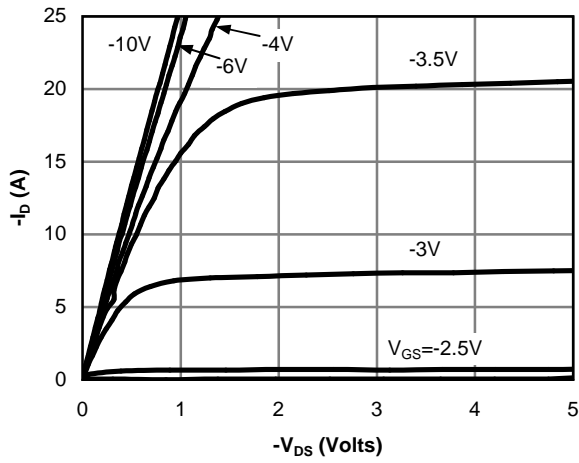


Fig 1: On-Region Characteristics

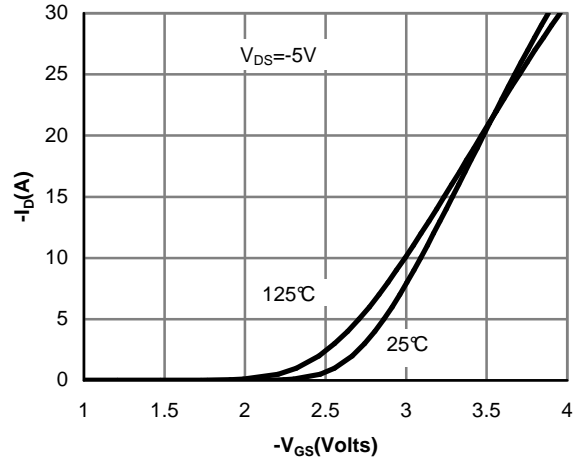


Figure 2: Transfer Characteristics

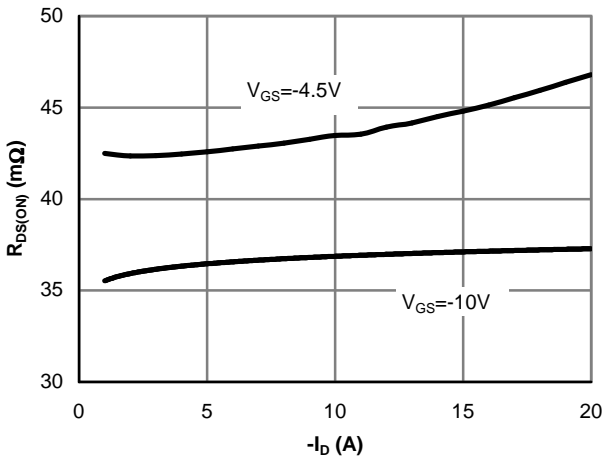


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

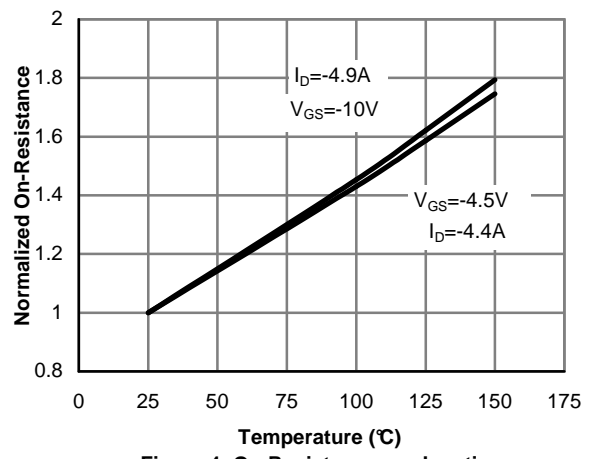


Figure 4: On-Resistance vs. Junction Temperature

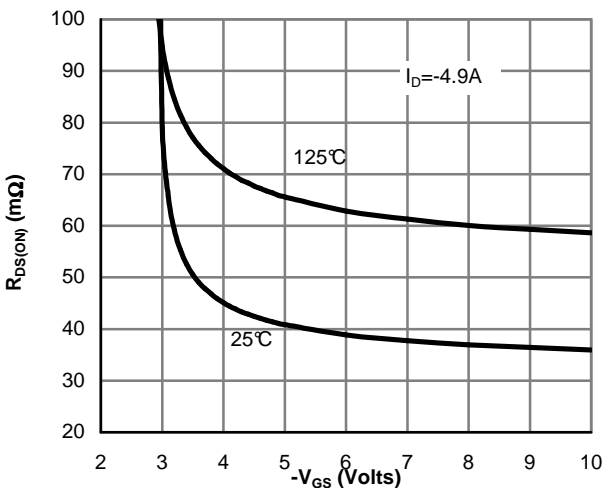


Figure 5: On-Resistance vs. Gate-Source Voltage

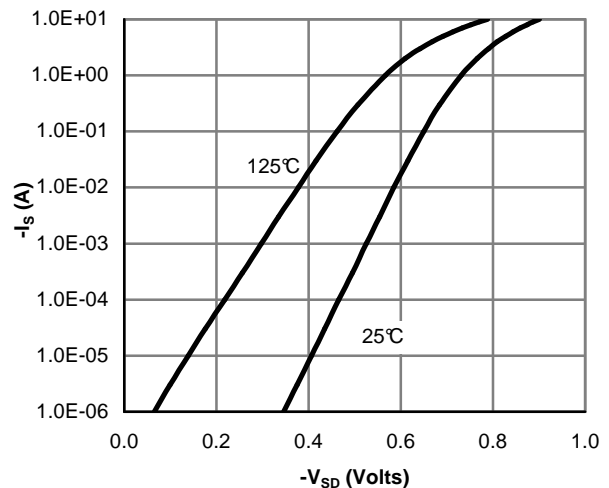


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

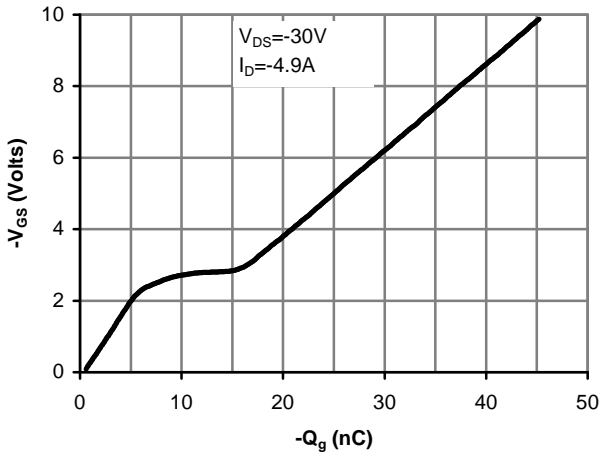


Figure 7: Gate-Charge Characteristics

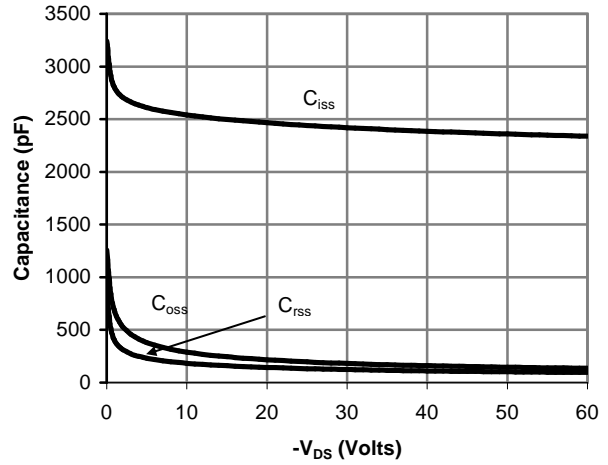


Figure 8: Capacitance Characteristics

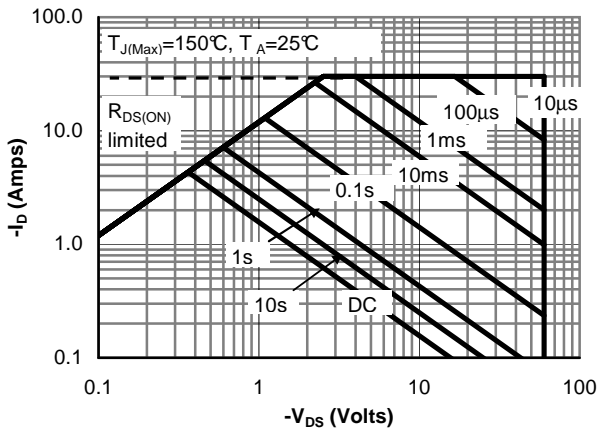


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

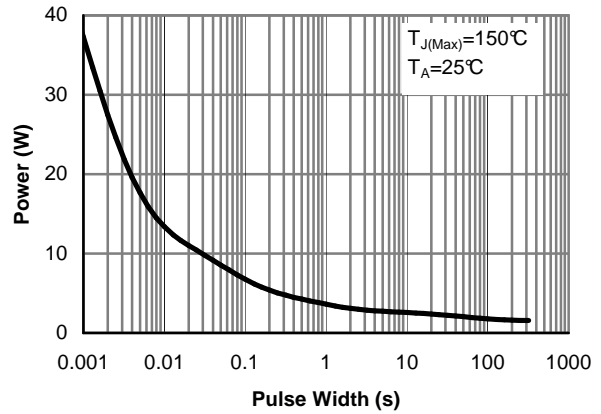


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

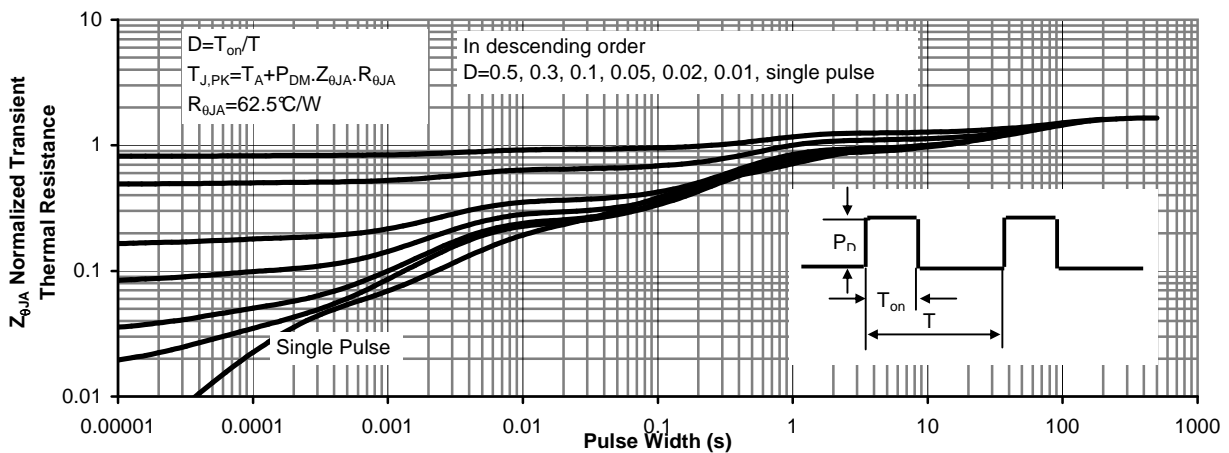


Figure 11: Normalized Maximum Transient Thermal Impedance