



AO4620

Complementary Enhancement Mode Field Effect Transistor

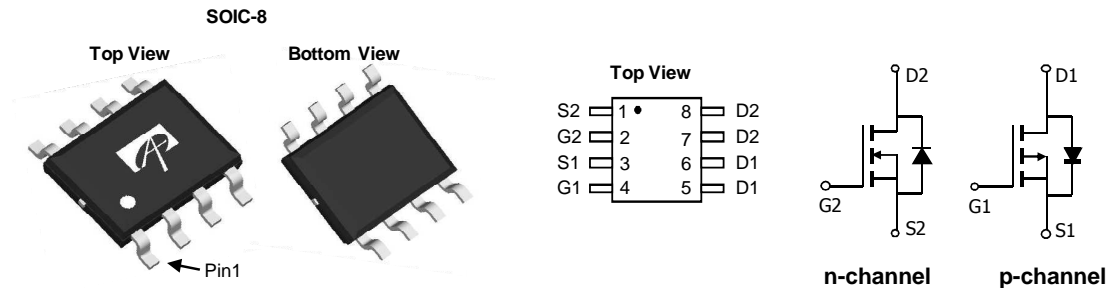
General Description

The AO4620 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in inverter and other applications.

Features

n-channel	p-channel
$V_{DS} (V) = 30V$	-30V
$I_D = 7.2A (V_{GS}=10V)$	-5.3A ($V_{GS} = -10V$)
$R_{DS(ON)}$	$R_{DS(ON)}$
< 24m Ω ($V_{GS}=10V$)	< 38m Ω ($V_{GS} = -10V$)
< 36m Ω ($V_{GS}=4.5V$)	< 60m Ω ($V_{GS} = -4.5V$)

100% UIS tested
100% Rg tested



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}	± 20	± 20	V
Continuous Drain Current ^F	$T_A=25^\circ C$	7.2	-5.3	A
	$T_A=70^\circ C$	6.2	-4.5	
Pulsed Drain Current ^B	I_{DM}	30	-30	
Power Dissipation ^F	$T_A=25^\circ C$	2	2	W
	$T_A=70^\circ C$	1.44	1.44	
Avalanche Current ^B	I_{AR}	13	17	A
Repetitive avalanche energy 0.3mH ^B	E_{AR}	25	43	mJ
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	$t \leq 10s$	n-ch	50	62.5	$^\circ C/W$
	Steady-State		80	100	
Maximum Junction-to-Lead ^C	Steady-State	n-ch	32	40	$^\circ C/W$
Maximum Junction-to-Ambient ^A	$t \leq 10s$	p-ch	50	62.5	$^\circ C/W$
	Steady-State		80	100	
Maximum Junction-to-Lead ^C	Steady-State	p-ch	32	40	$^\circ C/W$

N-CHANNEL Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.3	1.6	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=7.2\text{A}$ $T_J=125^\circ\text{C}$		20 26	24 32	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=5\text{A}$		29	36	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=7.2\text{A}$		24		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.77	1	V
I_S	Maximum Body-Diode Continuous Current				2.5	A
I_{SM}	Pulsed Body-Diode Current ^B				30	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance			660	792	pF
C_{oss}	Output Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$		110		pF
C_{riss}	Reverse Transfer Capacitance			87		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		0.8	1.5	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge			11.3	14.125	nC
$Q_g(4.5\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $I_D=7.2\text{A}$		5.7		nC
Q_{gs}	Gate Source Charge			2.1		nC
Q_{gd}	Gate Drain Charge			3		nC
$t_{D(on)}$	Turn-On DelayTime			4.5		ns
t_r	Turn-On Rise Time	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=2.1\Omega$, $R_{GEN}=3\Omega$		3.1		ns
$t_{D(off)}$	Turn-Off DelayTime			15.1		ns
t_f	Turn-Off Fall Time			2.7		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=7.2\text{A}$, $di/dt=100\text{A}/\mu\text{s}$		15.5	20	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=7.2\text{A}$, $di/dt=100\text{A}/\mu\text{s}$		7.1		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using $<300\mu\text{s}$ 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 $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

F: The power dissipation and current rating are based on the $t \leq 10\text{s}$ thermal resistance rating.

Rev 5: Oct 2010

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P-CHANNEL Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-30\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1.5	-2	-3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-10\text{V}$, $V_{DS}=-5\text{V}$	-30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}$, $I_D=-5.6\text{A}$ $T_J=125^\circ\text{C}$		31 42	36	m Ω
		$V_{GS}=-4.5\text{V}$, $I_D=-4.5\text{A}$		48	55	
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-6\text{A}$		15		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.77	-1	V
I_S	Maximum Body-Diode Continuous Current				-2.5	A
I_{SM}	Pulsed Body-Diode Current ^B				-30	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance			980	1225	pF
C_{oss}	Output Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-15\text{V}$, $f=1\text{MHz}$		150		pF
C_{riss}	Reverse Transfer Capacitance			115		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		2.2	3.3	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge (10V)			18.7	24	nC
$Q_g(4.5\text{V})$	Total Gate Charge (4.5V)	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $I_D=-5.6\text{A}$		9.6		nC
Q_{gs}	Gate Source Charge			3.2		nC
Q_{gd}	Gate Drain Charge			4.8		nC
$t_{D(on)}$	Turn-On DelayTime			7.7		ns
t_r	Turn-On Rise Time	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $R_L=2.7\Omega$, $R_{GEN}=3\Omega$		6		ns
$t_{D(off)}$	Turn-Off DelayTime			20		ns
t_f	Turn-Off Fall Time			7		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-5.6\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		21	26	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-5.6\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		13		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

D: The static characteristics in Figures 1 to 6 are obtained using $<300\mu\text{s}$ 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 $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

F: The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

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N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

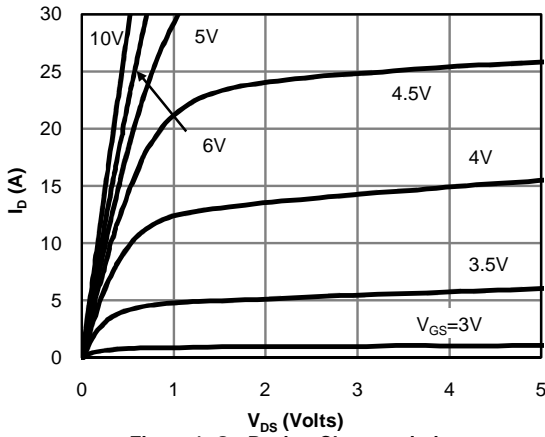


Figure 1: On-Region Characteristics

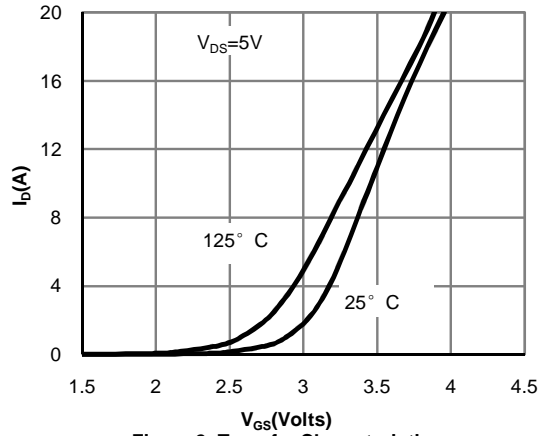


Figure 2: Transfer Characteristics

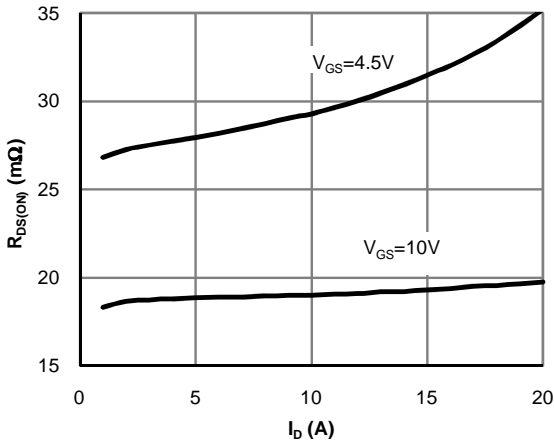


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

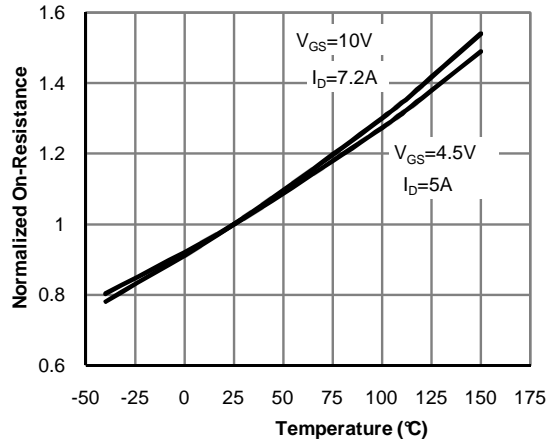


Figure 4: On-Resistance vs. Junction Temperature

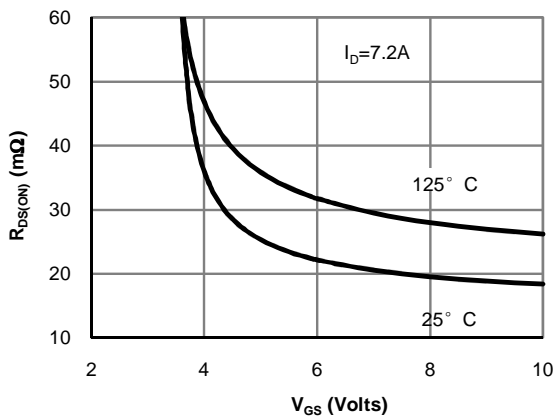


Figure 5: On-Resistance vs. Gate-Source Voltage

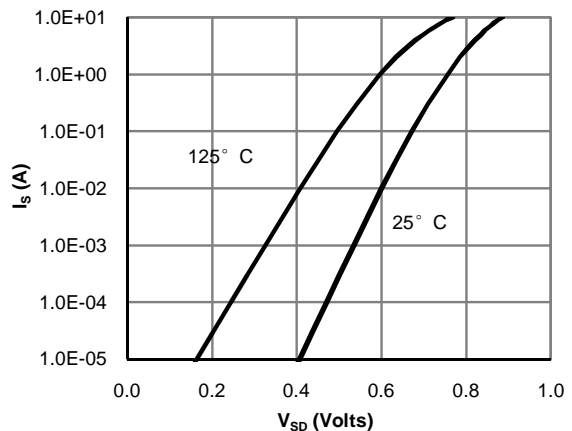


Figure 6: Body-Diode Characteristics

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

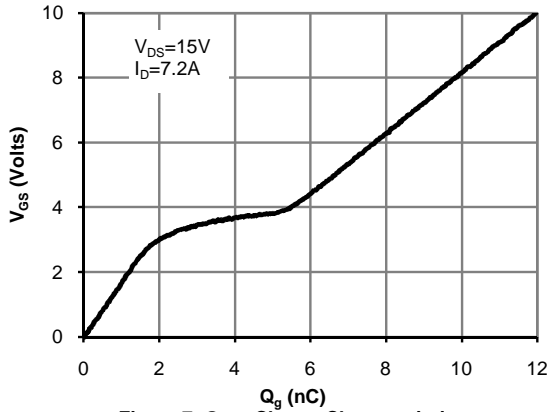


Figure 7: Gate-Charge Characteristics

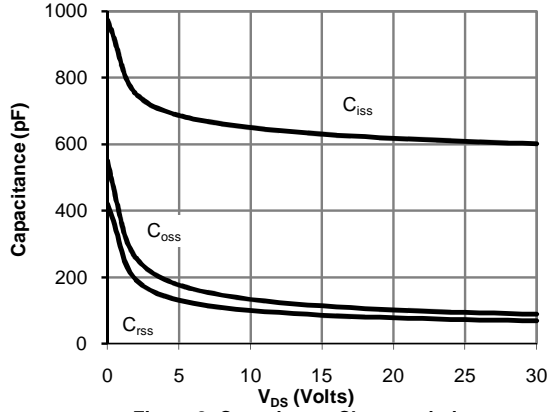


Figure 8: Capacitance Characteristics

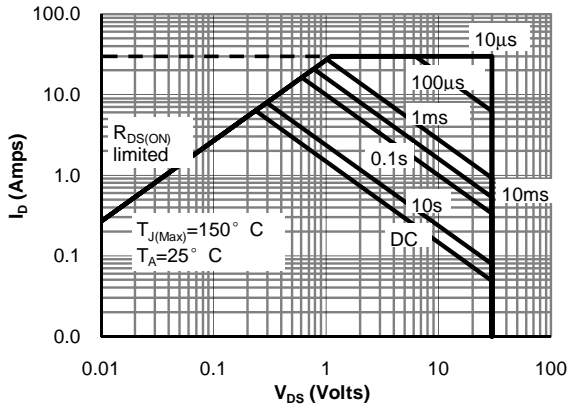


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

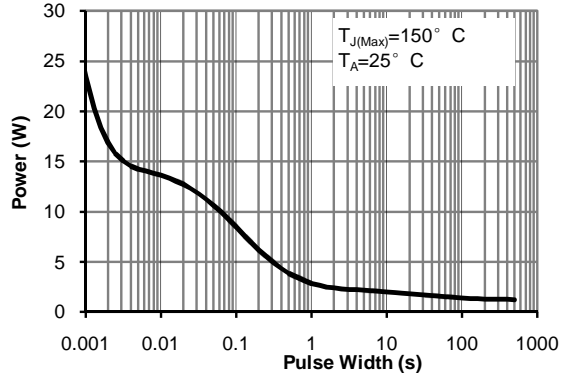


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

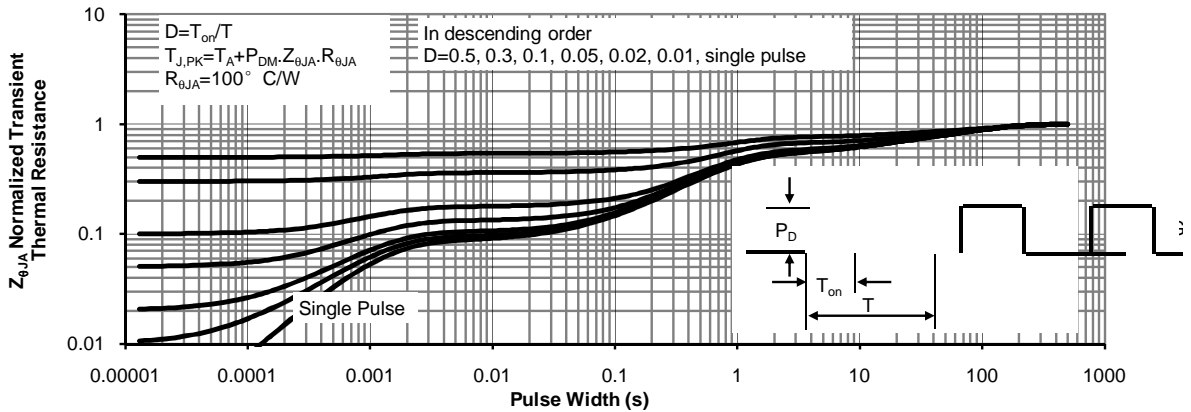


Figure 11: Normalized Maximum Transient Thermal Impedance

P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

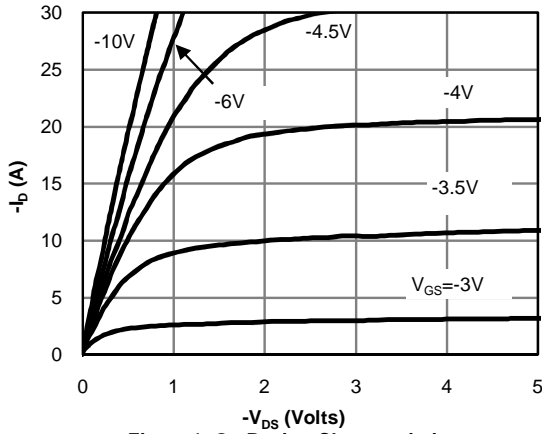


Figure 1: On-Region Characteristics

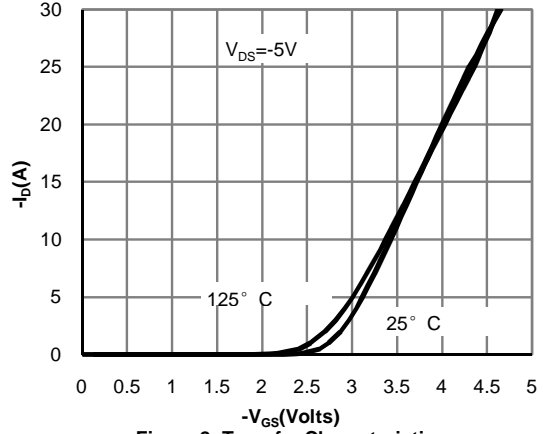


Figure 2: Transfer Characteristics

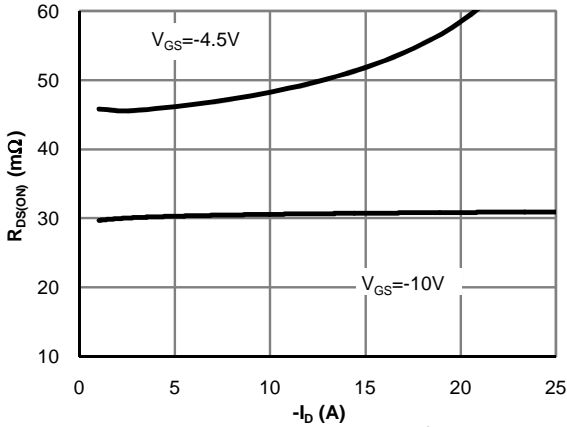


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

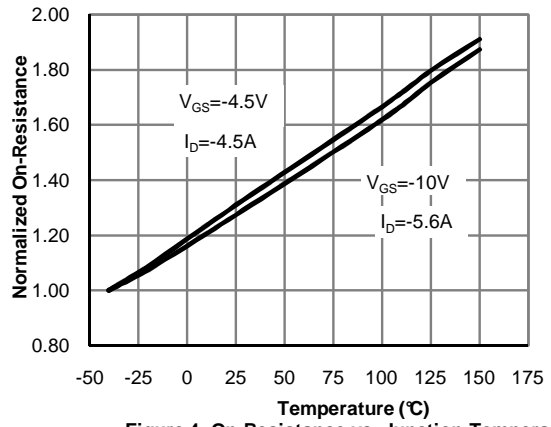


Figure 4: On-Resistance vs. Junction Temperature

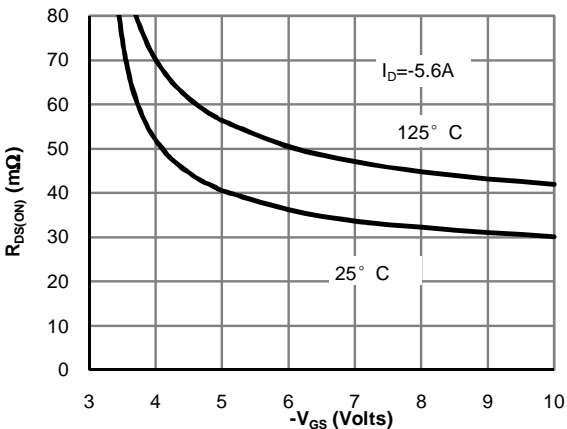


Figure 5: On-Resistance vs. Gate-Source Voltage

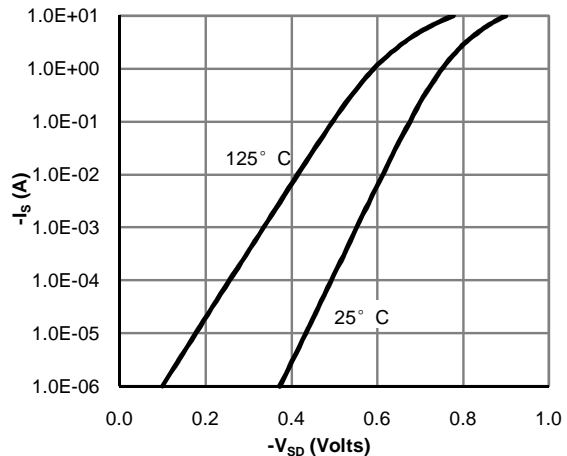


Figure 6: Body-Diode Characteristics

P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

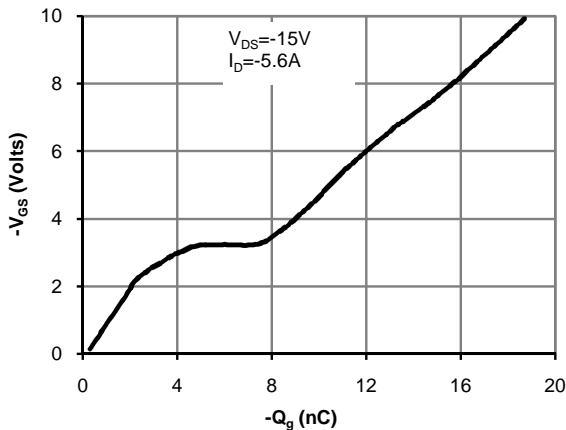


Figure 7: Gate-Charge Characteristics

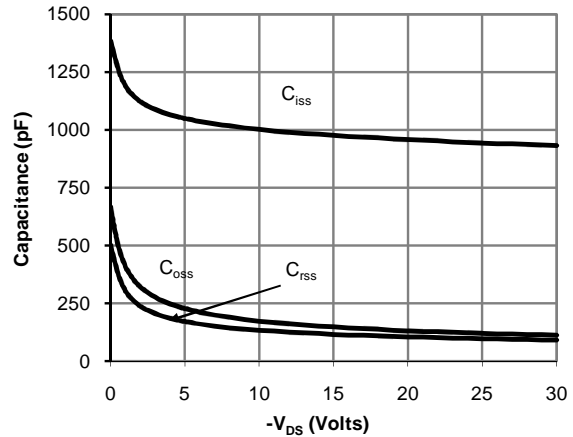


Figure 8: Capacitance Characteristics

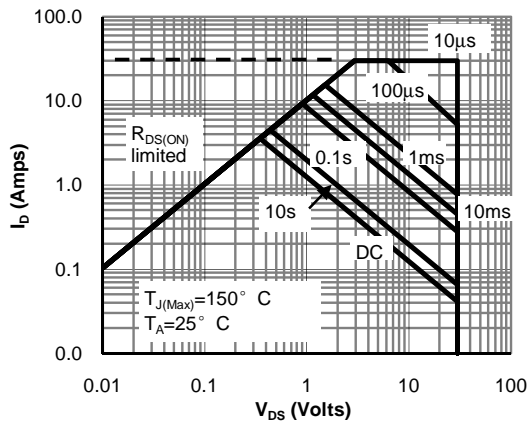


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

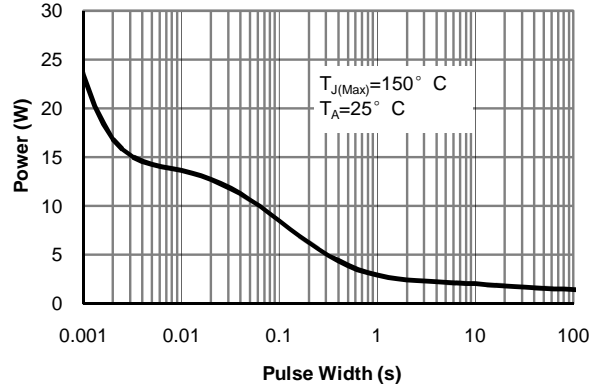


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

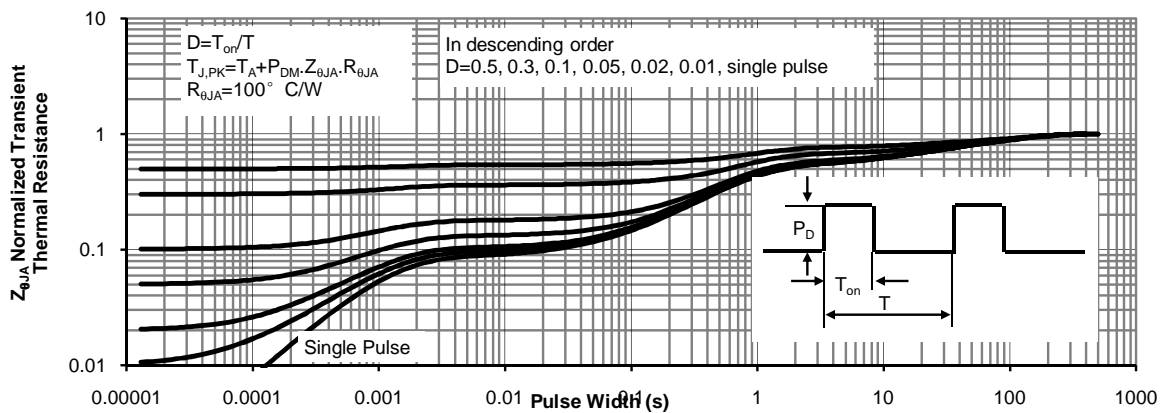


Figure 11: Normalized Maximum Transient Thermal Impedance