



AO4614B

Complementary Enhancement Mode Field Effect Transistor

General Description

The AO4614B/L uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications. AO4614B and AO4614BL are electrically identical.

-RoHS Compliant

-AO4614BL is Halogen Free

Features

n-channel

V_{DS} (V) = 40V, I_D = 6A (V_{GS} =10V)

$R_{DS(ON)}$ < 30m Ω (V_{GS} =10V)

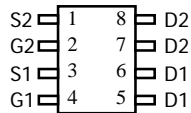
$R_{DS(ON)}$ < 38m Ω (V_{GS} =4.5V)

p-channel

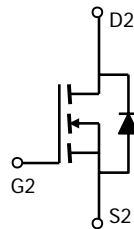
V_{DS} (V) = -40V, I_D = -5A (V_{GS} =-10V)

$R_{DS(ON)}$ < 45m Ω (V_{GS} = -10V)

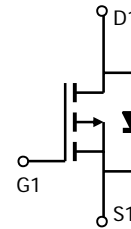
$R_{DS(ON)}$ < 63m Ω (V_{GS} = -4.5V)



SOIC-8



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}	40	-40	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current ^A	I_D	$T_A=25^\circ\text{C}$	6	A
		$T_A=70^\circ\text{C}$	5	
Pulsed Drain Current ^B	I_{DM}	30	-30	A
Avalanche Current ^B	I_{AR}	14	-20	A
Repetitive avalanche energy $L=0.1\text{mH}^B$	E_{AR}	9.8	20	mJ
Power Dissipation	P_D	$T_A=25^\circ\text{C}$	2	W
		$T_A=70^\circ\text{C}$	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		Steady-State	n-ch	74	110
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	n-ch	35	50	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	p-ch	48	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^A		Steady-State	p-ch	74	110
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	p-ch	35	50	$^\circ\text{C/W}$

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	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1	μA
					5	
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	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.7	2.5	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	$V_{GS}=10\text{V}, I_D=6\text{A}$ $T_J=125^\circ\text{C}$		24	30	m Ω
				36	45	
		$V_{GS}=4.5\text{V}, I_D=5\text{A}$		30	38	
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=6\text{A}$		19		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.76	1	V
I_S	Maximum Body-Diode Continuous Current				2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=20\text{V}, f=1\text{MHz}$		516	650	pF
C_{oss}	Output Capacitance			82		pF
C_{rss}	Reverse Transfer Capacitance			43		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		4.6		Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=20\text{V},$ $I_D=6\text{A}$		8.9	10.8	nC
$Q_g(4.5\text{V})$	Total Gate Charge			4.3	5.6	nC
Q_{gs}	Gate Source Charge			2.4		nC
Q_{gd}	Gate Drain Charge			1.4		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}, V_{DS}=20\text{V}, R_L=3.3\Omega,$ $R_{GEN}=3\Omega$		6.4		ns
t_r	Turn-On Rise Time			3.6		ns
$t_{D(off)}$	Turn-Off Delay Time			16.2		ns
t_f	Turn-Off Fall Time			6.6		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=6\text{A}, dI/dt=100\text{A}/\mu\text{s}$		18	24	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=6\text{A}, dI/dt=100\text{A}/\mu\text{s}$		10		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.

Rev0 : Sept 2007

COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

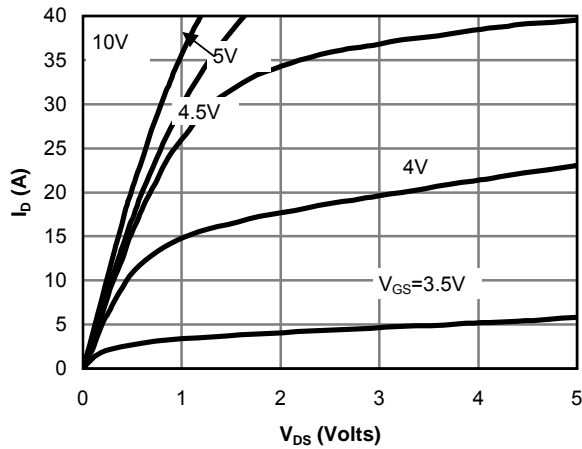


Fig 1: On-Region Characteristics

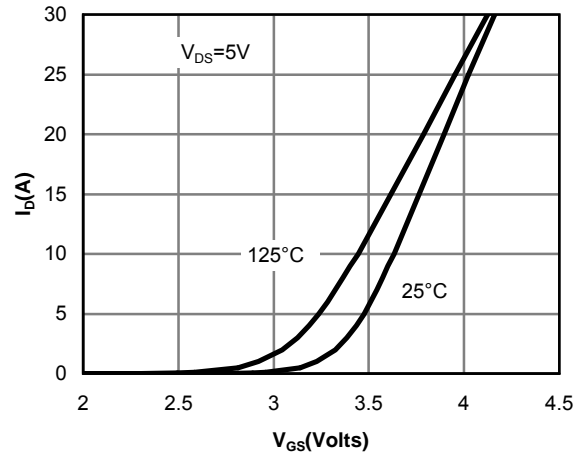


Figure 2: Transfer Characteristics

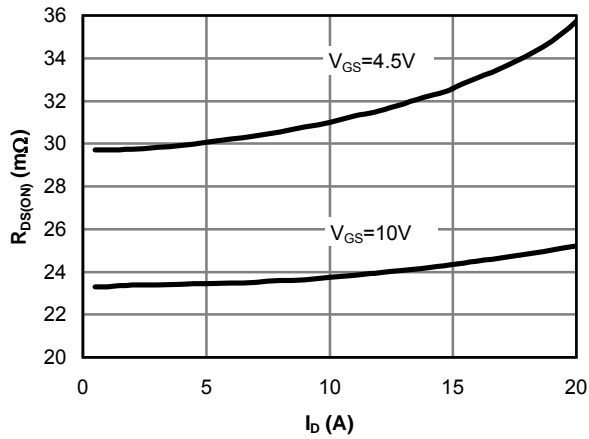


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

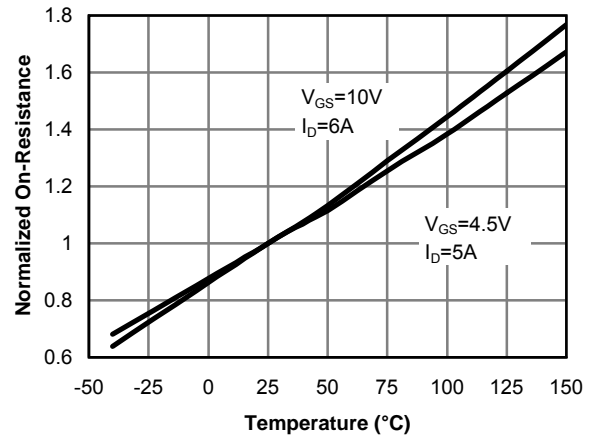


Figure 4: On-Resistance vs. Junction Temperature

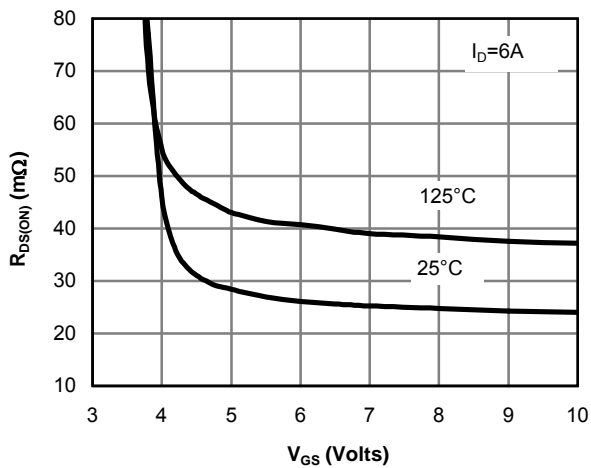


Figure 5: On-Resistance vs. Gate-Source Voltage

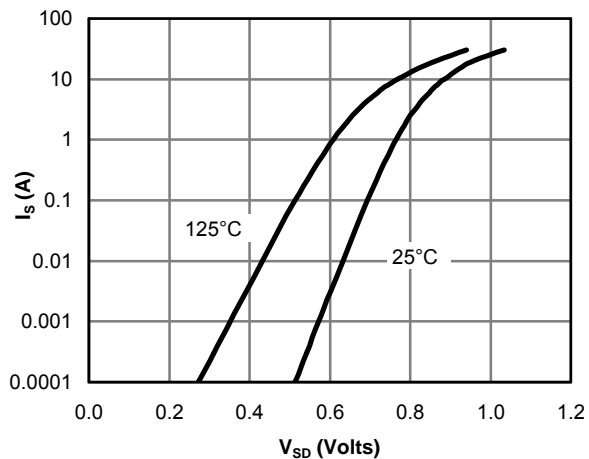


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

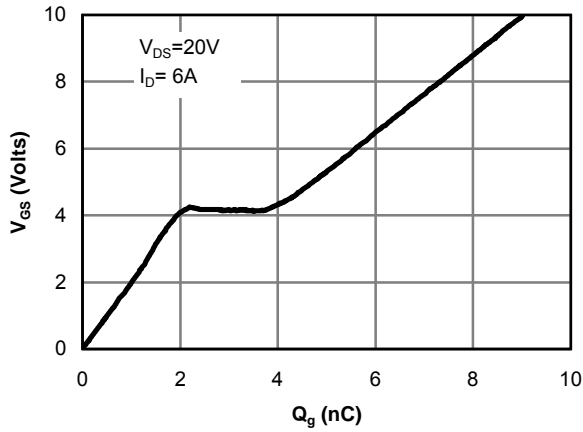


Figure 7: Gate-Charge Characteristics

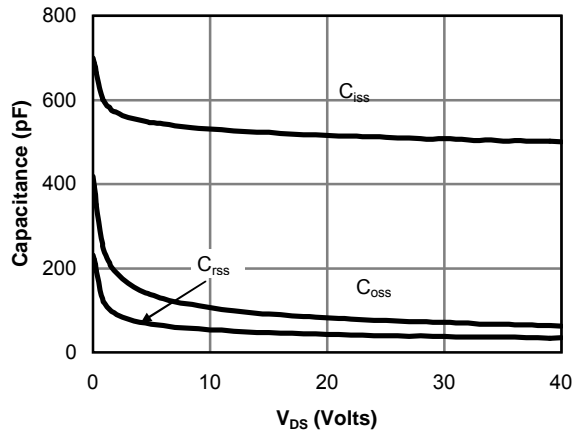


Figure 8: Capacitance Characteristics

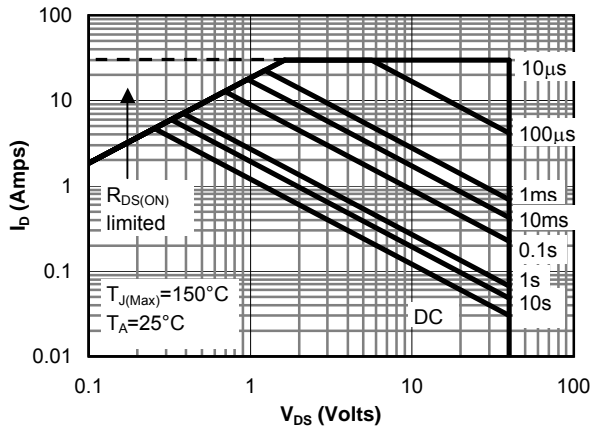


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

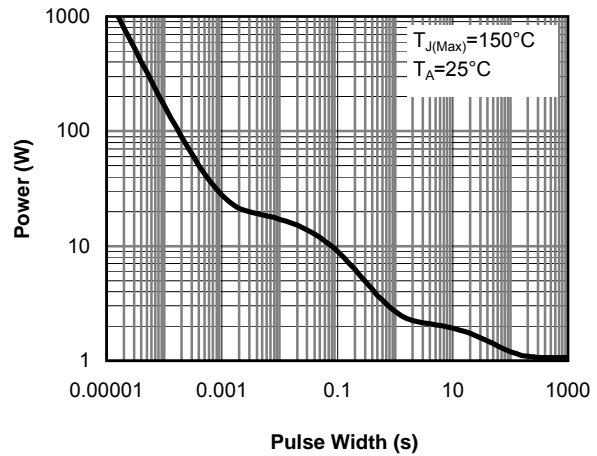


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

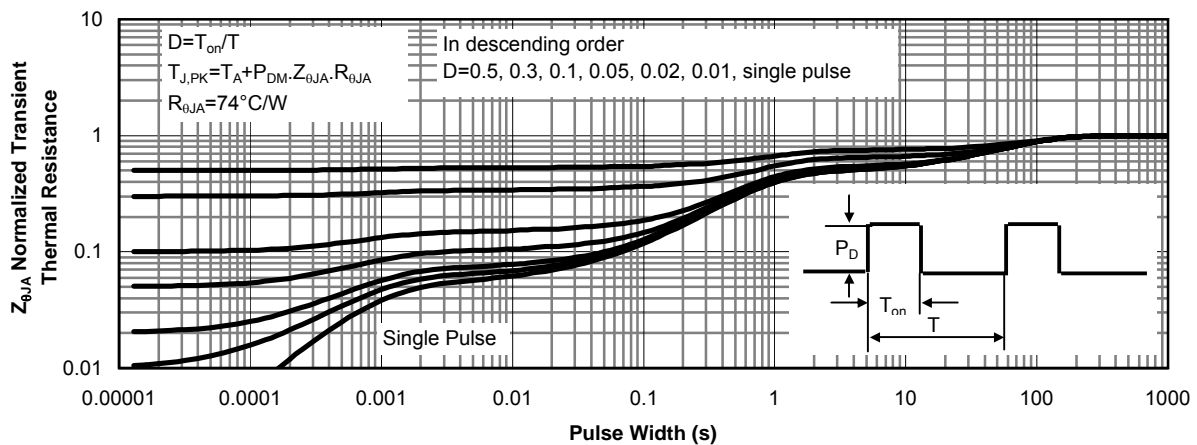


Figure 11: Normalized Maximum Transient Thermal Impedance

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D = -250\mu\text{A}$, $V_{GS} = 0\text{V}$	-40			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -40\text{V}$, $V_{GS} = 0\text{V}$ $T_J = 55^\circ\text{C}$			-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	$V_{DS} = V_{GS}$, $I_D = -250\mu\text{A}$	-1.7	-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	$V_{GS} = -10\text{V}$, $I_D = -5\text{A}$ $T_J = 125^\circ\text{C}$ $V_{GS} = -4.5\text{V}$, $I_D = -4\text{A}$		36 52 50	45 65 63	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{V}$, $I_D = -5\text{A}$		13		S
V_{SD}	Diode Forward Voltage	$I_S = -1\text{A}$, $V_{GS} = 0\text{V}$		-0.76	-1	V
I_S	Maximum Body-Diode Continuous Current				-2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance			940	1175	pF
C_{oss}	Output Capacitance	$V_{GS} = 0\text{V}$, $V_{DS} = -20\text{V}$, $f = 1\text{MHz}$		97		pF
C_{rss}	Reverse Transfer Capacitance			72		pF
R_g	Gate resistance	$V_{GS} = 0\text{V}$, $V_{DS} = 0\text{V}$, $f = 1\text{MHz}$		14		Ω
SWITCHING PARAMETERS						
$Q_g(-10\text{V})$	Total Gate Charge			17	22	nC
$Q_g(-4.5\text{V})$	Total Gate Charge	$V_{GS} = -10\text{V}$, $V_{DS} = -20\text{V}$, $I_D = -5\text{A}$		7.9	10	nC
Q_{gs}	Gate Source Charge			3.4		nC
Q_{gd}	Gate Drain Charge			3.2		nC
$t_{D(on)}$	Turn-On Delay Time			6.2		ns
t_r	Turn-On Rise Time	$V_{GS} = -10\text{V}$, $V_{DS} = -20\text{V}$, $R_L = 4\Omega$, $R_{GEN} = 3\Omega$		8.4		ns
$t_{D(off)}$	Turn-Off Delay Time			44.8		ns
t_f	Turn-Off Fall Time			41.2		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F = -5\text{A}$, $dI/dt = 100\text{A}/\mu\text{s}$		21	27	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F = -5\text{A}$, $dI/dt = 100\text{A}/\mu\text{s}$		14		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 6,12,14 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.

Rev0 : Sept 2007

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

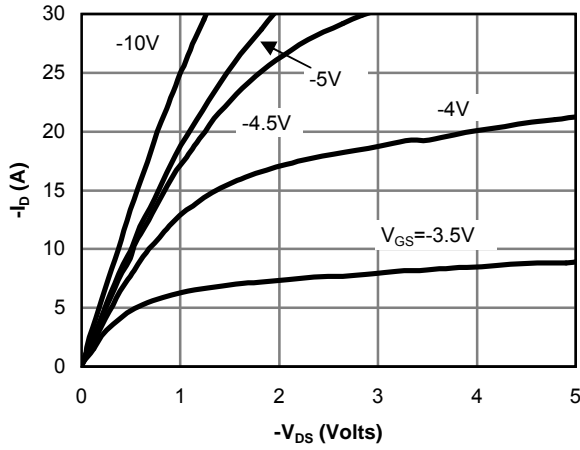


Fig 12: On-Region Characteristics

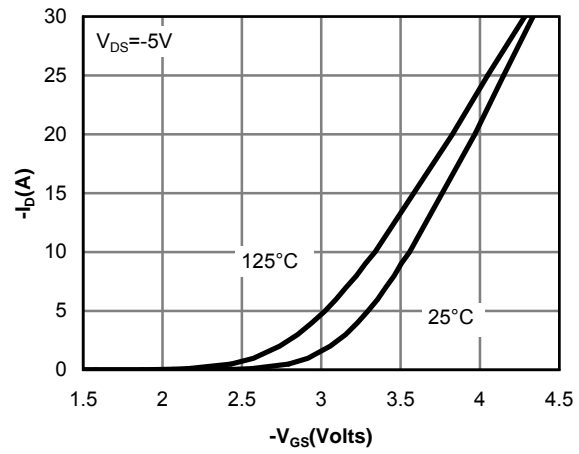


Figure 13: Transfer Characteristics

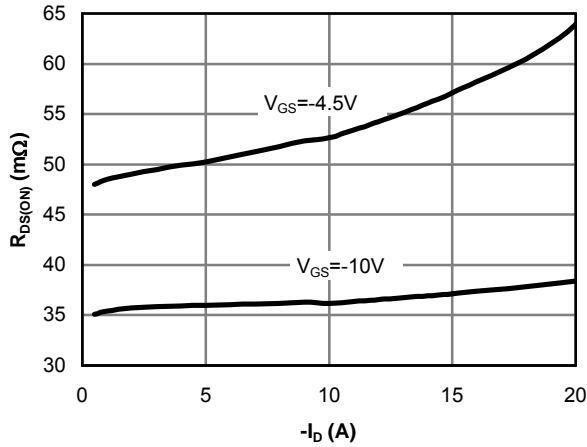


Figure 14: On-Resistance vs. Drain Current and Gate Voltage

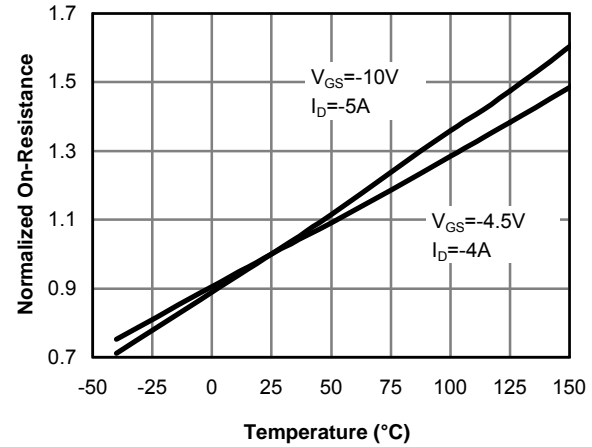


Figure 15: On-Resistance vs. Junction Temperature

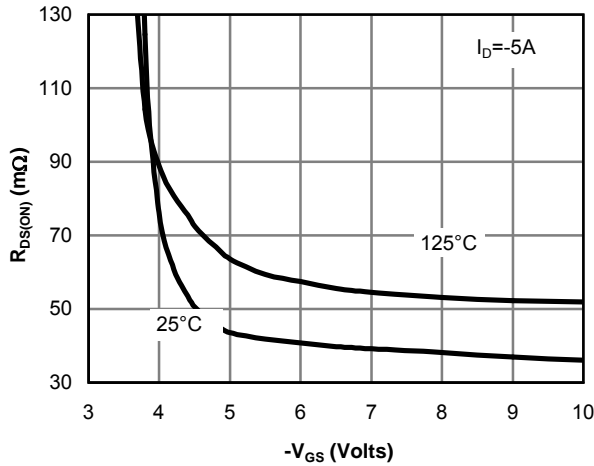


Figure 16: On-Resistance vs. Gate-Source Voltage

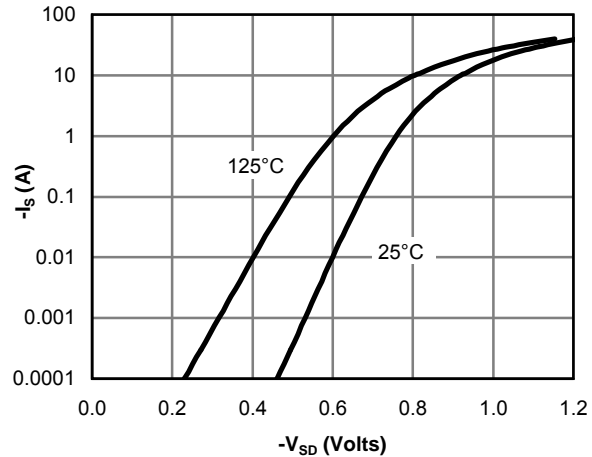


Figure 17: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

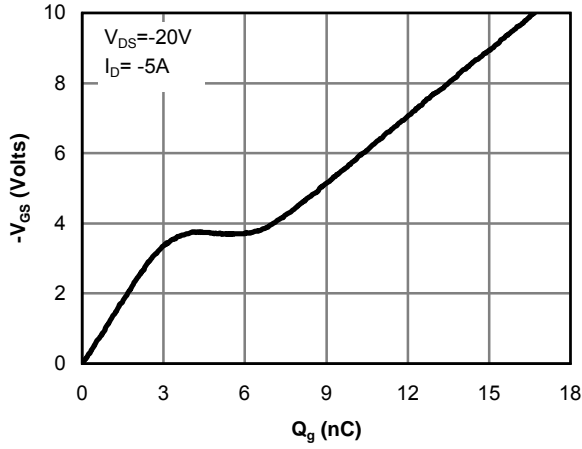


Figure 18: Gate-Charge Characteristics

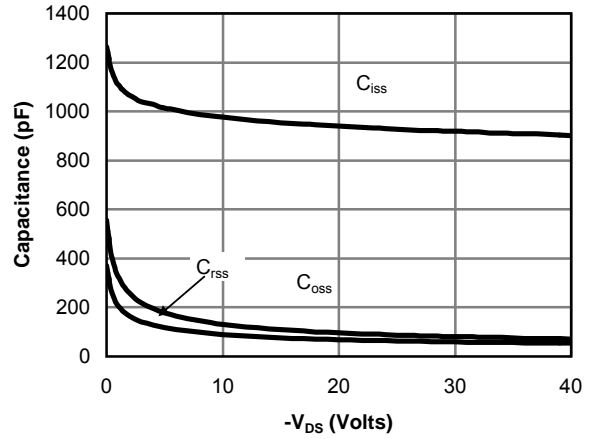


Figure 19: Capacitance Characteristics

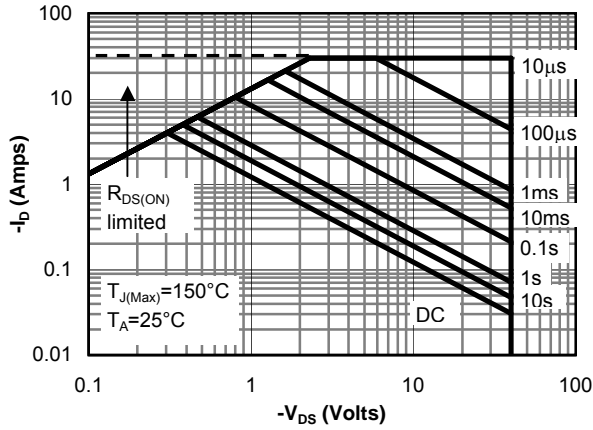


Figure 20: Maximum Forward Biased Safe Operating Area (Note E)

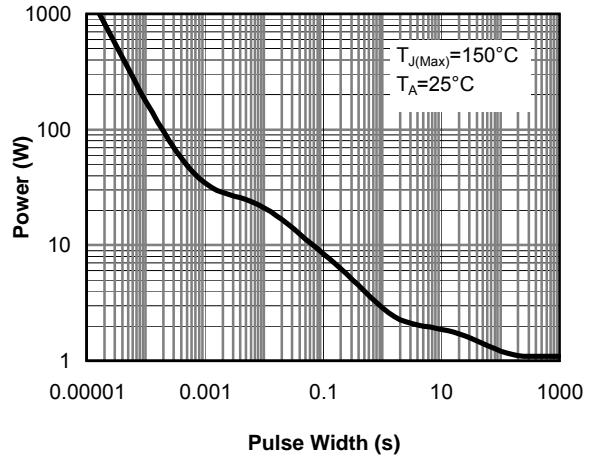


Figure 21: Single Pulse Power Rating Junction-to-Ambient (Note E)

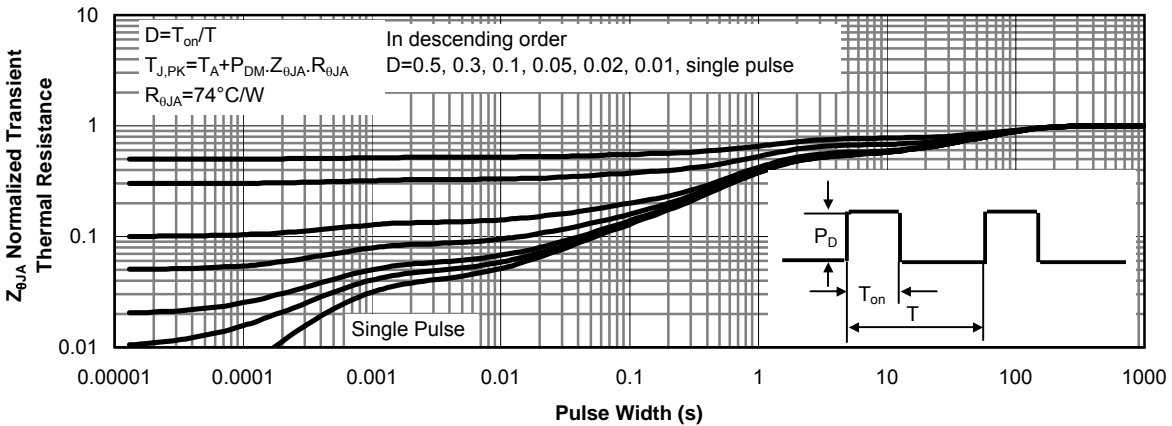


Figure 22: Normalized Maximum Transient Thermal Impedance