

### General Description

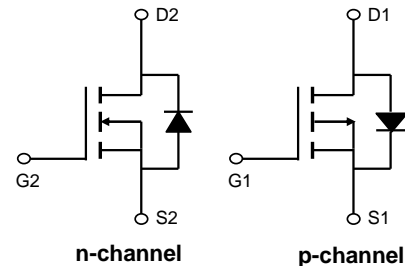
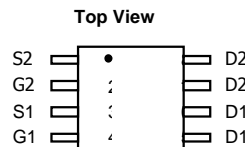
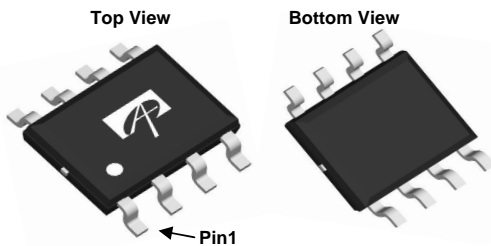
The AO4614B uses advanced trench technology MOSFETs to provide excellent  $R_{DS(ON)}$  and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications.

### Product Summary

N-Channel		P-Channel	
$V_{DS}$ (V)	= 40V,	-40V	
$I_D$	= 6A ( $V_{GS}=10V$ )	-5A ( $V_{GS}=-10V$ )	
$R_{DS(ON)}$	< 30m $\Omega$ ( $V_{GS}=10V$ )	< 45m $\Omega$ ( $V_{GS}=-10V$ )	
	< 38m $\Omega$ ( $V_{GS}=4.5V$ )	< 63m $\Omega$ ( $V_{GS}=-4.5V$ )	
100% UIS Tested		100% UIS Tested	
100% Rg Tested		100% Rg Tested	



SOIC-8



### 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	$V_{GS}$	$\pm 20$	$\pm 20$	V	
Continuous Drain Current <sup>A</sup>	$I_D$	$T_A=25^\circ\text{C}$	6	-5	A
		$T_A=70^\circ\text{C}$	5	-4	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	30	-30		
Avalanche Current <sup>B</sup>	$I_{AR}$	14	-20		
Repetitive avalanche energy $L=0.1\text{mH}$ <sup>B</sup>	$E_{AR}$	9.8	20	mJ	
Power Dissipation	$P_D$	$T_A=25^\circ\text{C}$	2	2	W
		$T_A=70^\circ\text{C}$	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 <sup>A</sup>	$R_{\theta JA}$	n-ch	48	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		n-ch	74	110	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	n-ch	35	50	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	p-ch	48	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		p-ch	74	110	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	p-ch	35	50	$^\circ\text{C/W}$

**N Channel Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
B <sub>V</sub> DSS	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA	1.7	2.5	3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	30			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =6A T <sub>J</sub> =125°C V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A		24 36 30	30 45 38	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =6A		19		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.76	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				2	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =20V, f=1MHz	410	516	650	pF
C <sub>oss</sub>	Output Capacitance			82		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			43		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		4.6		Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, I <sub>D</sub> =6A		8.9	10.8	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge			4.3	5.6	nC
Q <sub>gs</sub>	Gate Source Charge			2.4		nC
Q <sub>gd</sub>	Gate Drain Charge			1.4		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =20V, R <sub>L</sub> =3.3Ω, R <sub>GEN</sub> =3Ω		6.4		ns
t <sub>r</sub>	Turn-On Rise Time			3.6		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			16.2		ns
t <sub>f</sub>	Turn-Off Fall Time			6.6		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =6A, di/dt=100A/μs		18	24	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =6A, di/dt=100A/μs		10		nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> and lead to ambient.

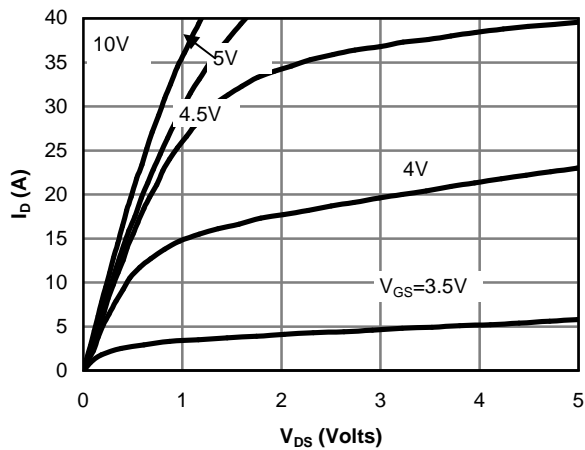
D: The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

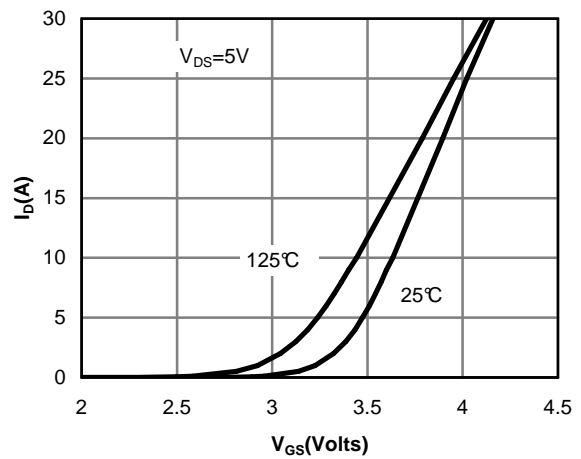
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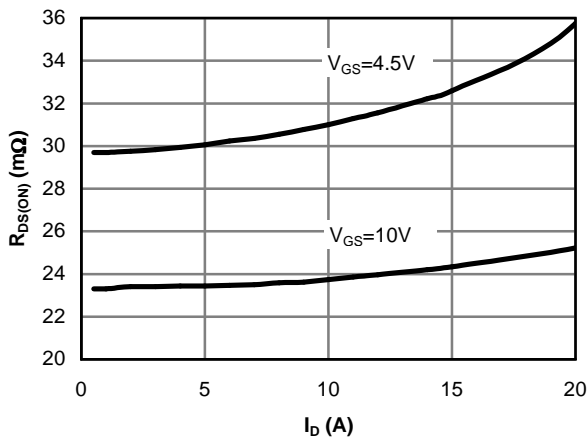
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL**



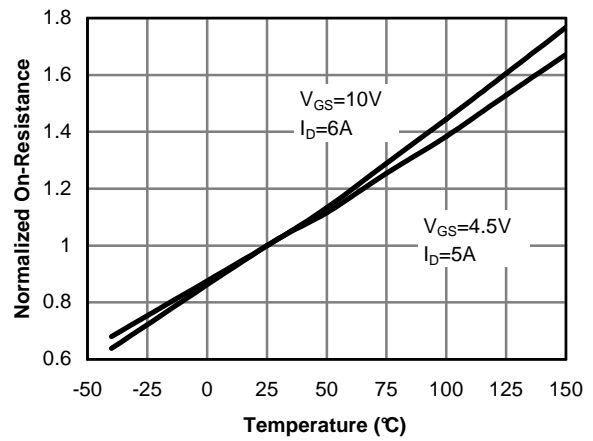
**Fig 1: On-Region Characteristics**



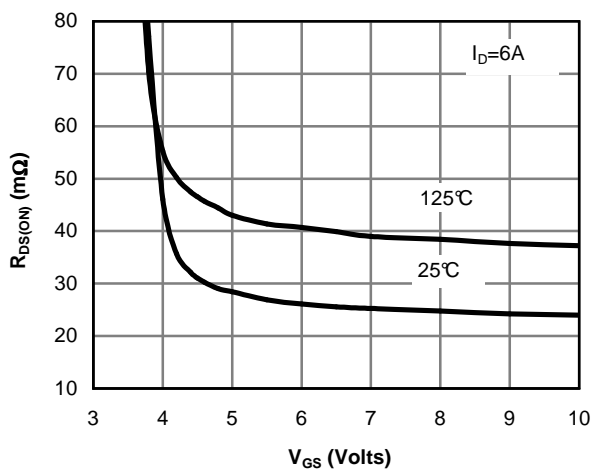
**Figure 2: Transfer Characteristics**



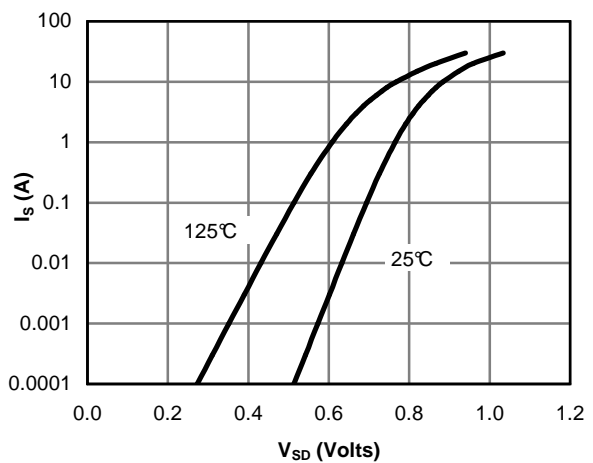
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**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

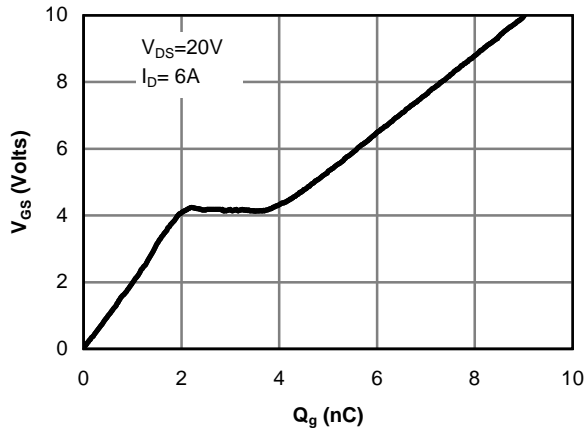


Figure 7: Gate-Charge Characteristics

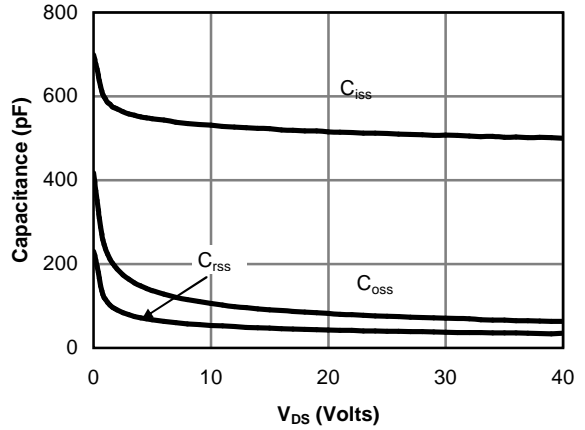


Figure 8: Capacitance Characteristics

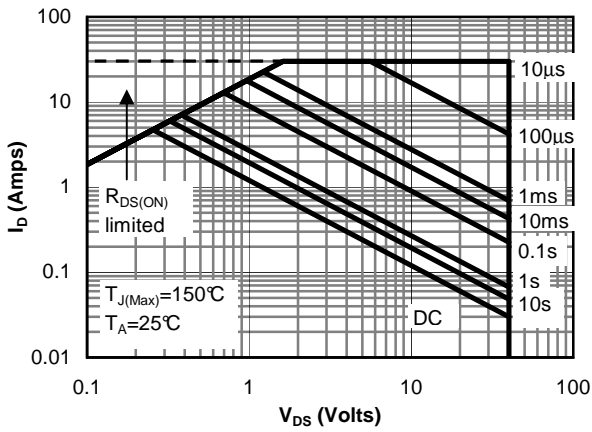


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

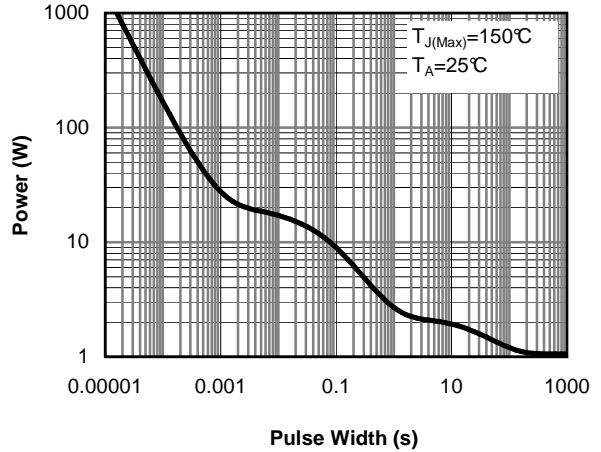


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

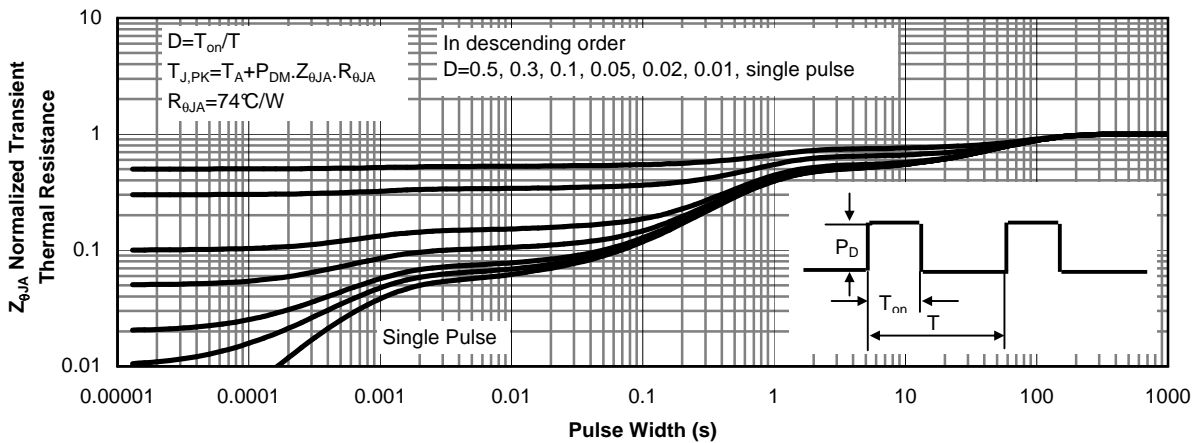


Figure 11: Normalized Maximum Transient Thermal Impedance

**P-Channel Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
B <sub>V</sub> DSS	Drain-Source Breakdown Voltage	I <sub>D</sub> = -250μA, V <sub>GS</sub> =0V	-40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -40V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			-1 -5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> = -250μA	-1.7	-2	-3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -5V	-30			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = -10V, I <sub>D</sub> = -5A T <sub>J</sub> =125°C V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4A		36 52 50	45 65 63	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = -5V, I <sub>D</sub> = -5A		13		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> = -1A, V <sub>GS</sub> =0V		-0.76	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-2	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> = -20V, f=1MHz	750	940	1175	pF
C <sub>oss</sub>	Output Capacitance		97			pF
C <sub>rss</sub>	Reverse Transfer Capacitance		72			pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		14		Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (-10V)	Total Gate Charge	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -20V, I <sub>D</sub> = -5A		17	22	nC
Q <sub>g</sub> (-4.5V)	Total Gate Charge		7.9	10	nC	
Q <sub>gs</sub>	Gate Source Charge		3.4		nC	
Q <sub>gd</sub>	Gate Drain Charge		3.2		nC	
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> = -10V, V <sub>DS</sub> = -20V, R <sub>L</sub> =4Ω, R <sub>GEN</sub> =3Ω		6.2		ns
t <sub>r</sub>	Turn-On Rise Time		8.4		ns	
t <sub>D(off)</sub>	Turn-Off DelayTime		44.8		ns	
t <sub>f</sub>	Turn-Off Fall Time		41.2		ns	
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> = -5A, di/dt=100A/μs		21	27	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> = -5A, di/dt=100A/μs		14		nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=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<sub>θJA</sub> is the sum of the thermal impedance from junction to lead R<sub>θJL</sub> 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 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating .

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

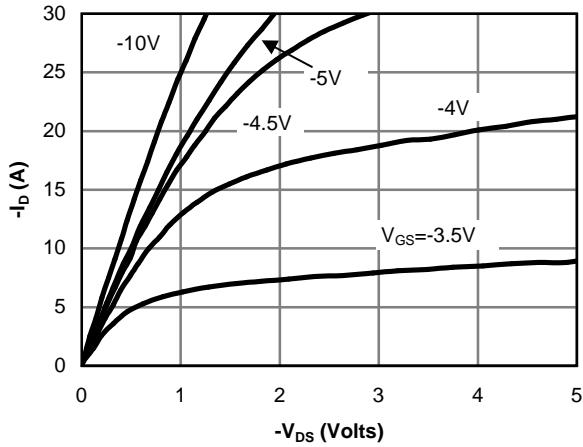


Fig 12: On-Region Characteristics

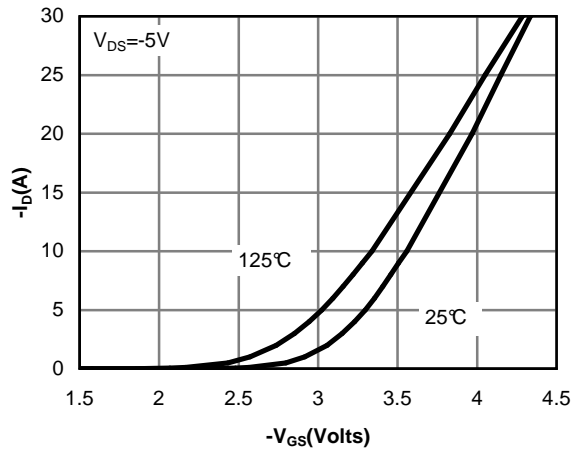


Figure 13: Transfer Characteristics

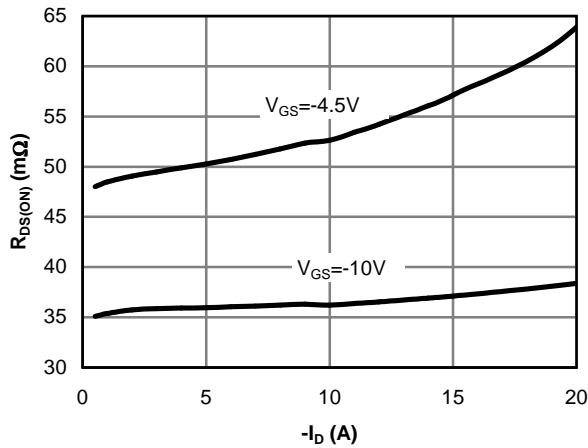


Figure 14: On-Resistance vs. Drain Current and Gate Voltage

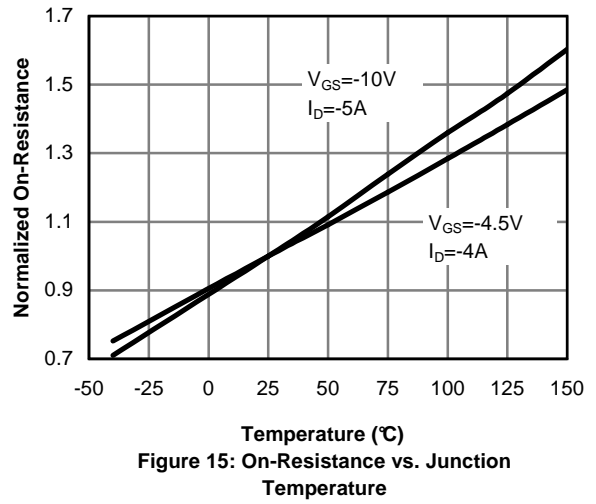


Figure 15: On-Resistance vs. Junction Temperature

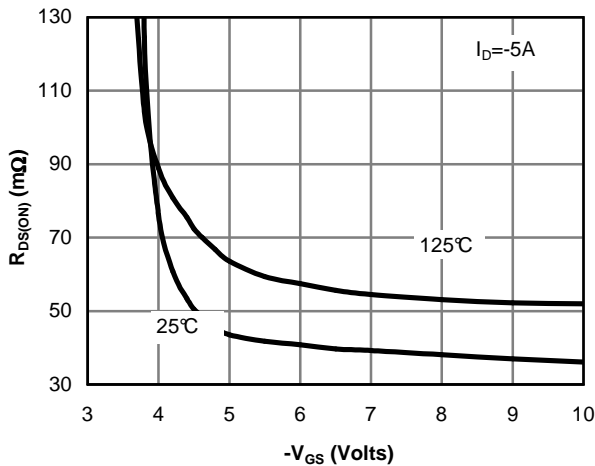


Figure 16: On-Resistance vs. Gate-Source Voltage

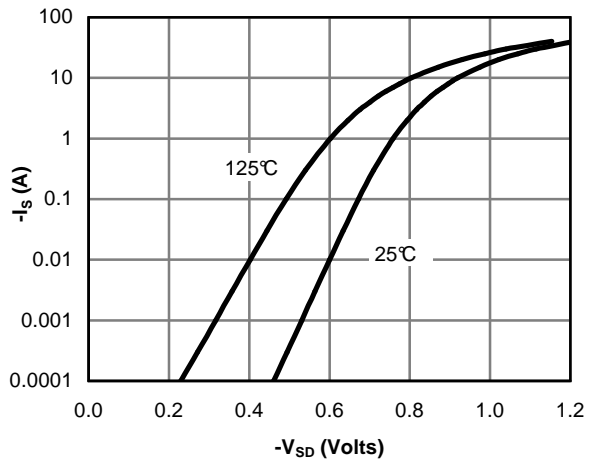


Figure 17: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

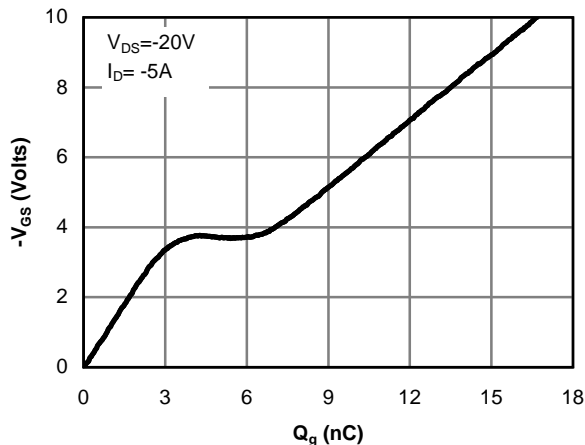


Figure 18: Gate-Charge Characteristics

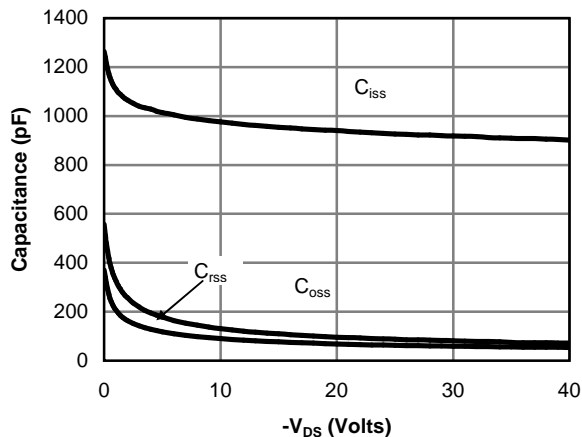


Figure 19: Capacitance Characteristics

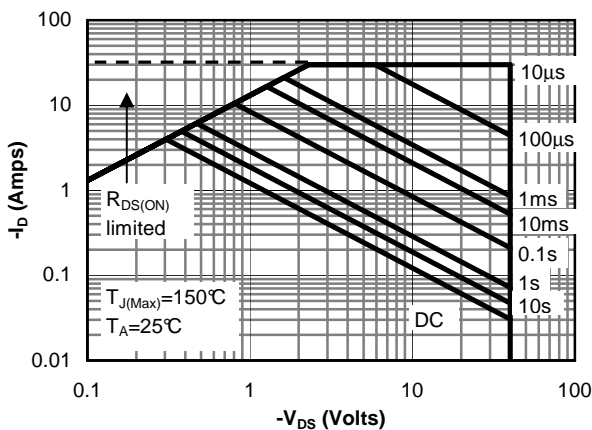


Figure 20: Maximum Forward Biased Safe Operating Area (Note E)

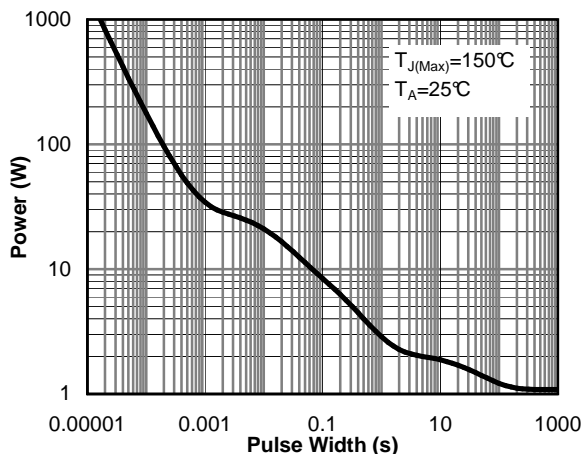


Figure 21: Single Pulse Power Rating Junction-to-Ambient (Note E)

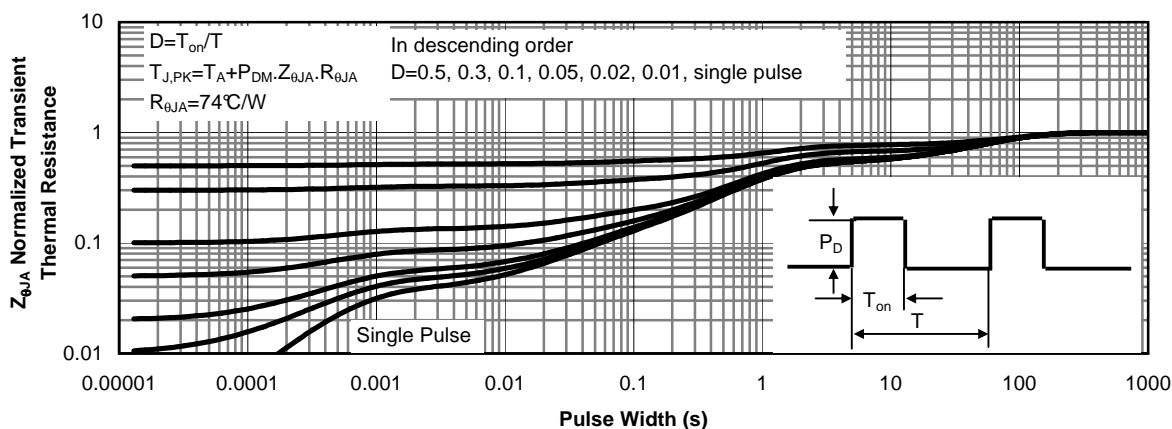


Figure 22: Normalized Maximum Transient Thermal Impedance