

## AO4620

### Complementary Enhancement Mode Field Effect Transistor

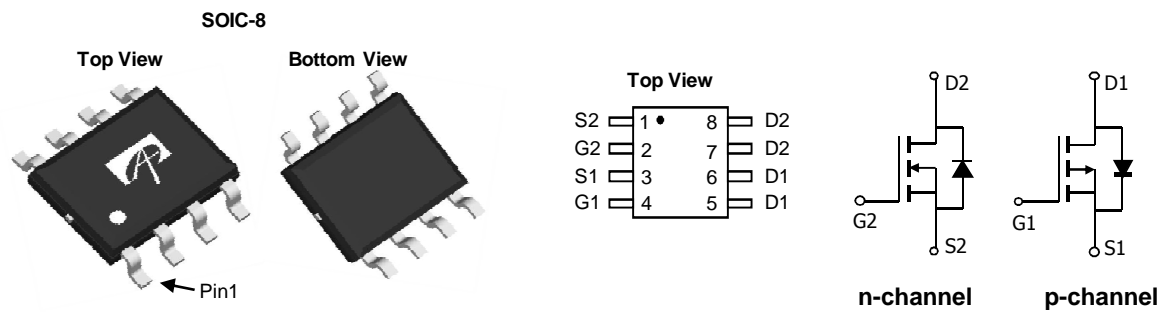
#### General Description

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 $\Omega$ ( $V_{GS}=10V$ )	< 32m $\Omega$ ( $V_{GS} = -10V$ )
< 36m $\Omega$ ( $V_{GS}=4.5V$ )	< 55m $\Omega$ ( $V_{GS} = -4.5V$ )

100% UIS tested  
 100% Rg tested



#### Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Max n-channel	Max p-channel	Units
Drain-Source Voltage	$V_{DS}$	30	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Continuous Drain Current <sup>F</sup>	$I_D$	$T_A=25^\circ\text{C}$	7.2	-5.3
		$T_A=70^\circ\text{C}$	6.2	-4.5
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	64	-40	A
Power Dissipation <sup>F</sup>	$P_D$	$T_A=25^\circ\text{C}$	2	2
		$T_A=70^\circ\text{C}$	1.44	1.44
Avalanche Current <sup>B</sup>	$I_{AR}$	9	17	A
Repetitive avalanche energy 0.3mH <sup>B</sup>	$E_{AR}$	12	43	mJ
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	50	62.5	$^\circ\text{C/W}$
		p-ch	80	100	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	n-ch	32	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	p-ch	50	62.5	$^\circ\text{C/W}$
		p-ch	80	100	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	p-ch	32	40	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, 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	1.5	2.1	2.6	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	64			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =7.2A T <sub>J</sub> =125°C		17.7 25	24 32	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A		24.8	36	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =7.2A		20		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.74	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				2.5	A
I <sub>SM</sub>	Pulsed Body-Diode Current <sup>B</sup>				64	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		373	448	pF
C <sub>oss</sub>	Output Capacitance			67		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			41		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.8	2.8	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =7.2A		7.2	11	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge			3.5		nC
Q <sub>gs</sub>	Gate Source Charge			1.3		nC
Q <sub>gd</sub>	Gate Drain Charge			1.7		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =2.1Ω, R <sub>GEN</sub> =3Ω		4.5		ns
t <sub>r</sub>	Turn-On Rise Time			2.7		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			14.9		ns
t <sub>f</sub>	Turn-Off Fall Time			2.9		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =7.2A, di/dt=100A/μs		10.5	12.6	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =7.2A, di/dt=100A/μs		4.5		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 are obtained using <300 μs pulses, duty cycle 0.5% max.

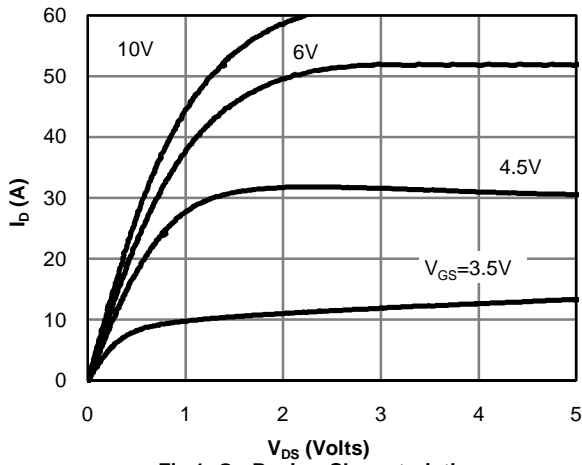
E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C. The SOA curve provides a single pulse rating.

F: The power dissipation and current rating are based on the t ≤ 10s thermal resistance rating.

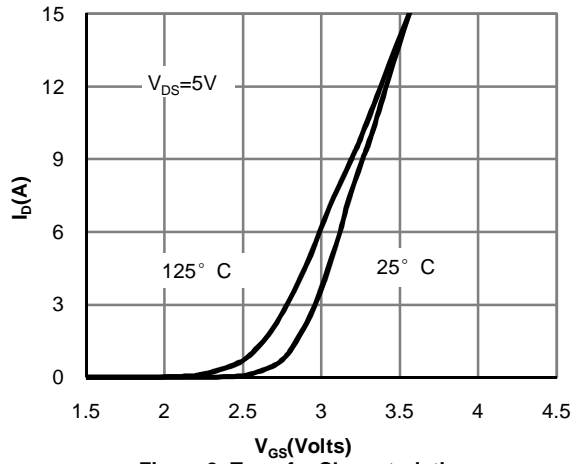
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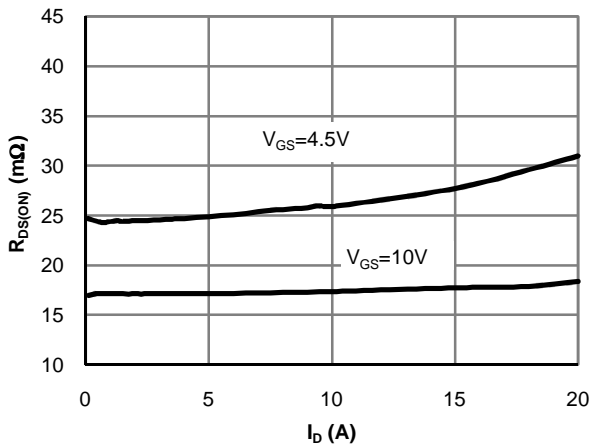
**N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



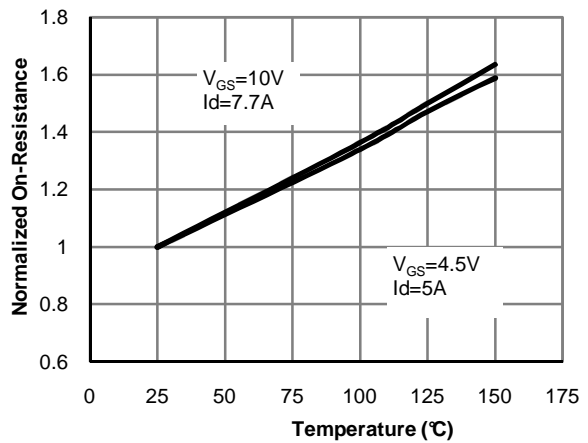
**Fig 1: On-Region Characteristics**



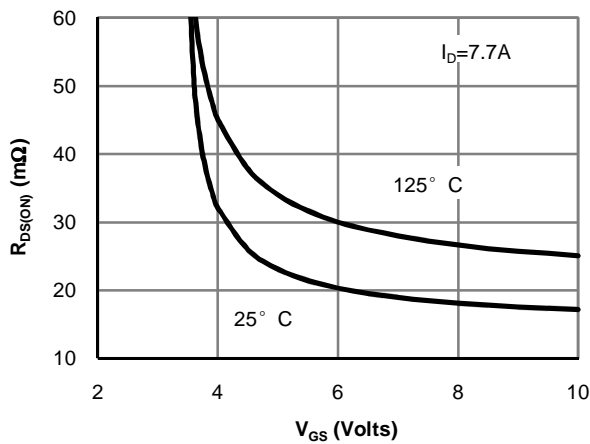
**Figure 2: Transfer Characteristics**



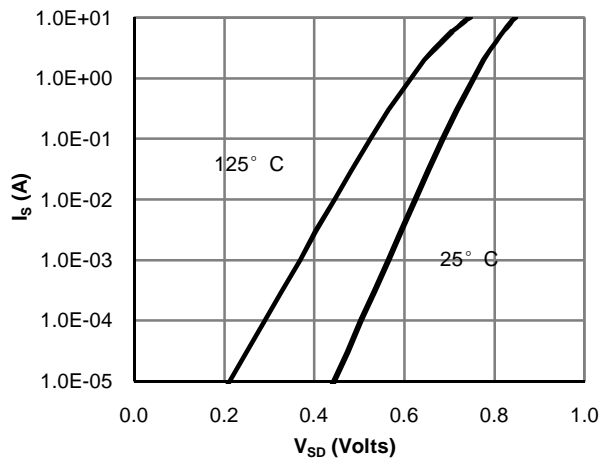
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**Figure 4: On-Resistance vs. Junction Temperature**



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



**Figure 6: Body-Diode Characteristics**

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

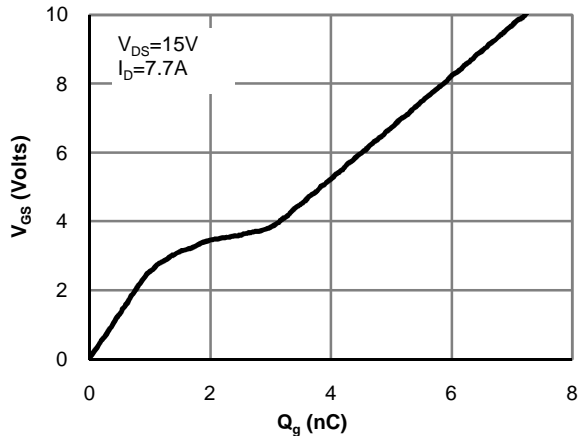


Figure 7: Gate-Charge Characteristics

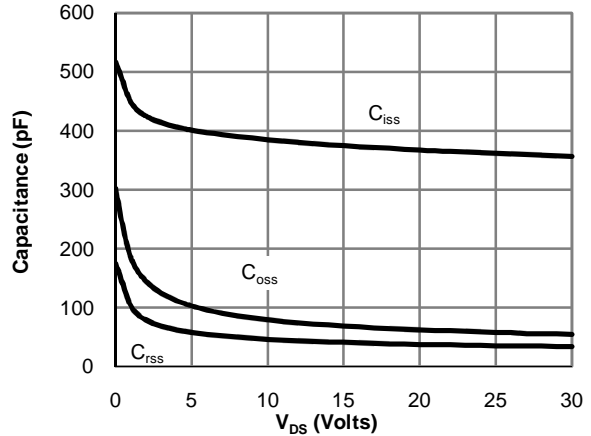


Figure 8: Capacitance Characteristics

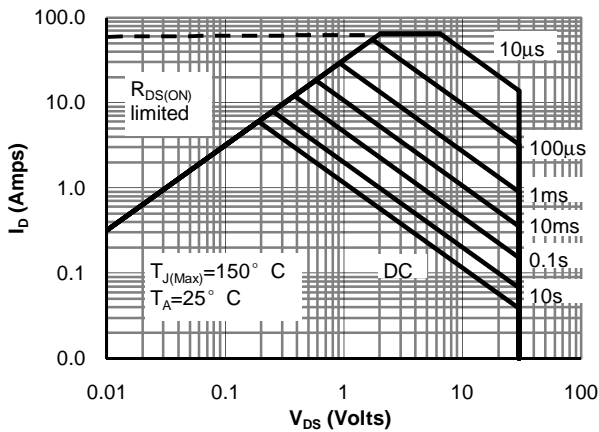


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

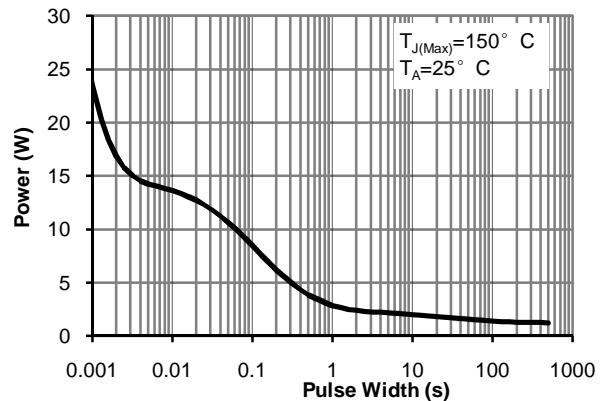


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

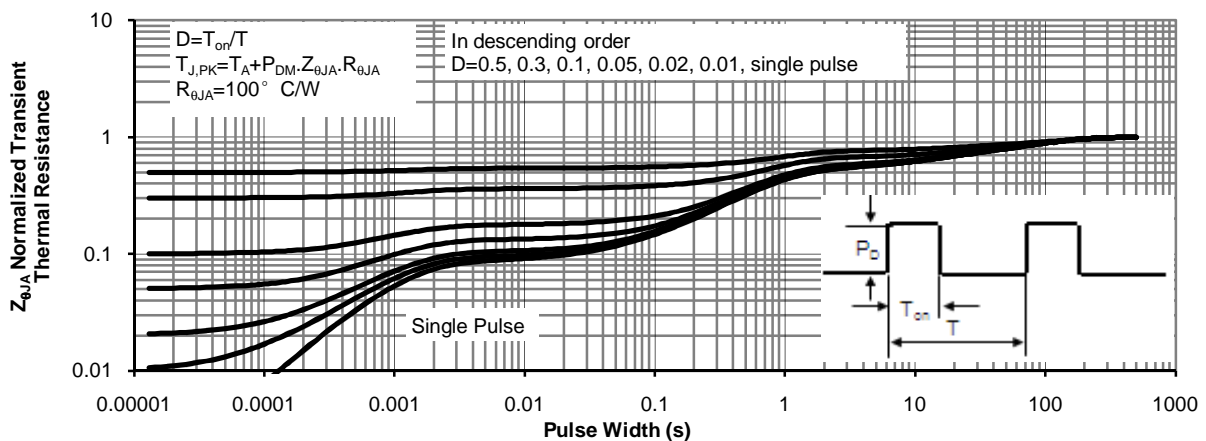


Figure 11: Normalized Maximum Transient Thermal Impedance

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-30V, 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	-1.3	-1.85	-2.4	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-40			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-5.3A T <sub>J</sub> =125°C		23 31.5	32	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.5A		33	55	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-5.3A		19		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.8	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-3.5	A
I <sub>SM</sub>	Pulsed Body-Diode Current <sup>B</sup>				-40	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz		760		pF
C <sub>oss</sub>	Output Capacitance			140		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			95		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		3.2	5	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge (10V)	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-5.3A		13.6	16	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge (4.5V)			6.7		nC
Q <sub>gs</sub>	Gate Source Charge			2.5		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> =-15V, R <sub>L</sub> =2.8Ω, R <sub>GEN</sub> =3Ω		8		ns
t <sub>r</sub>	Turn-On Rise Time			6		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			17		ns
t <sub>f</sub>	Turn-Off Fall Time			5		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-5.3A, dI/dt=100A/μs		15		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-5.3A, dI/dt=100A/μs		9.7		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 are obtained using <300 μs pulses, duty cycle 0.5% max.

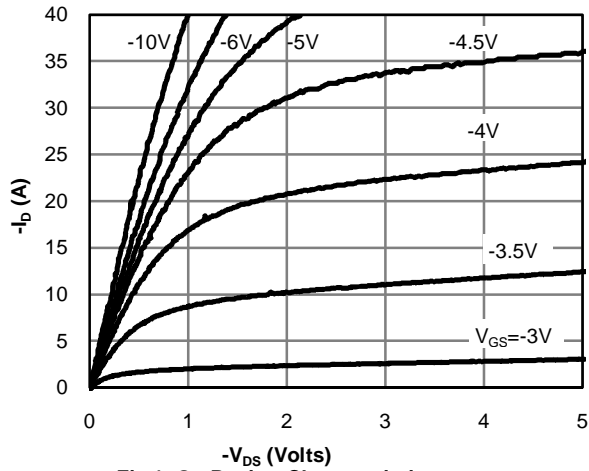
E: These tests are performed with the device mounted on 1 in <sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C. The SOA curve provides a single pulse rating.

F: The current rating is based on the t ≤ 10s thermal resistance rating.

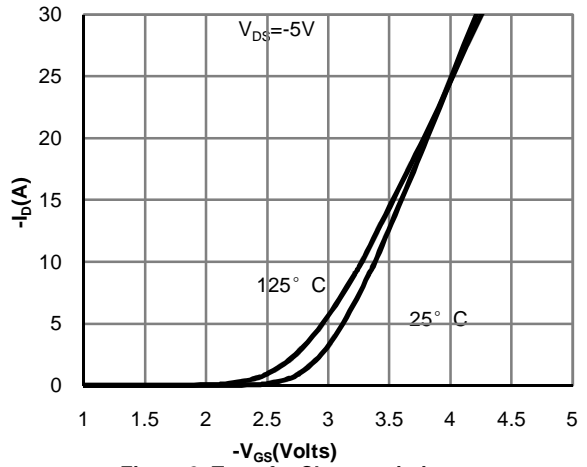
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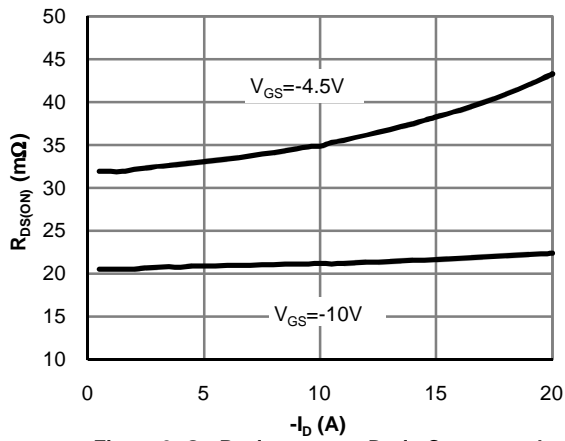
**P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



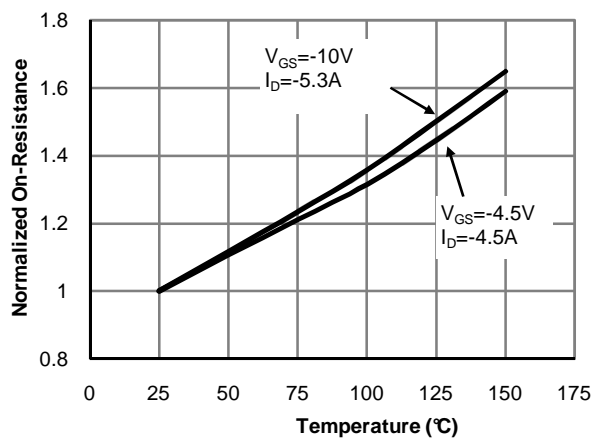
**Fig 1: On-Region Characteristics**



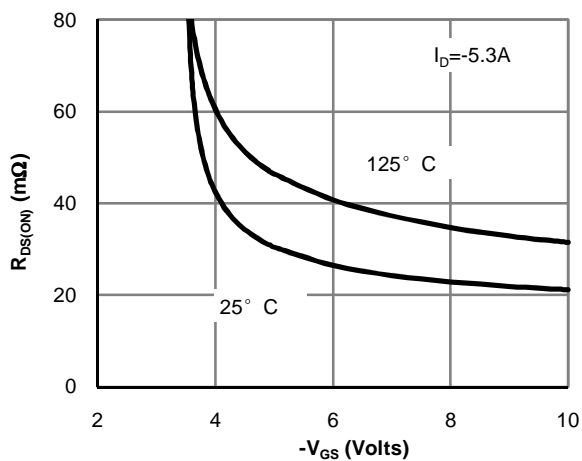
**Figure 2: Transfer Characteristics**



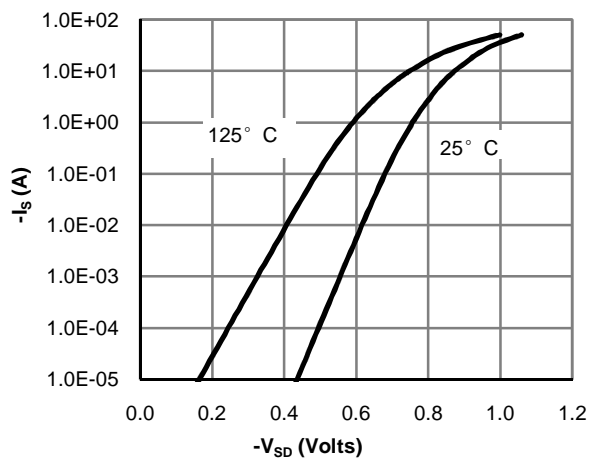
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**Figure 4: On-Resistance vs. Junction Temperature**

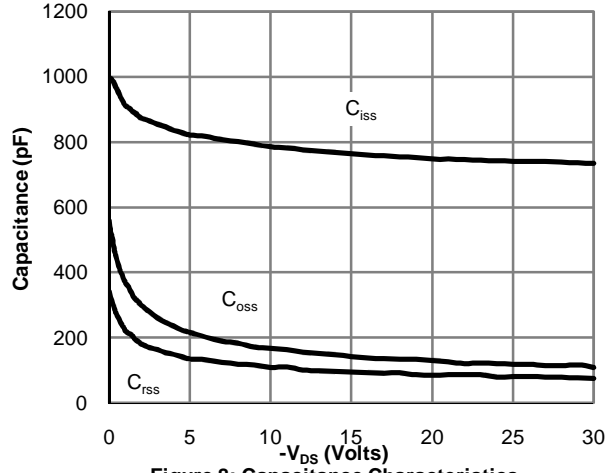
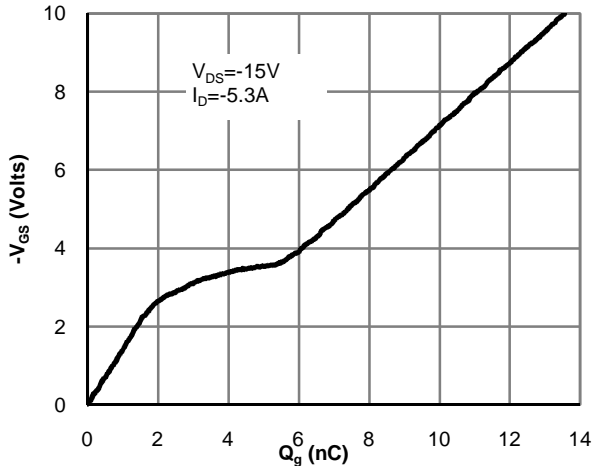


**Figure 5: On-Resistance vs. Gate-Source Voltage**

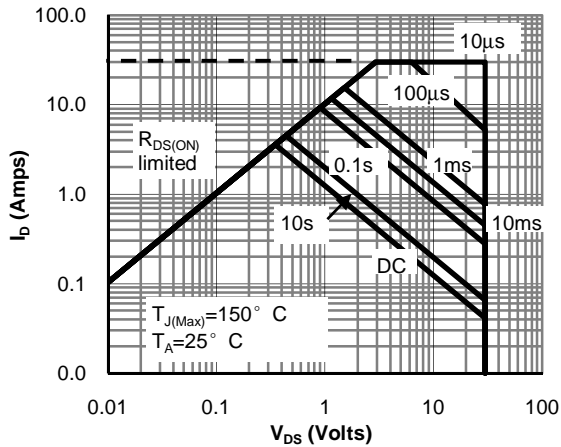


**Figure 6: Body-Diode Characteristics**

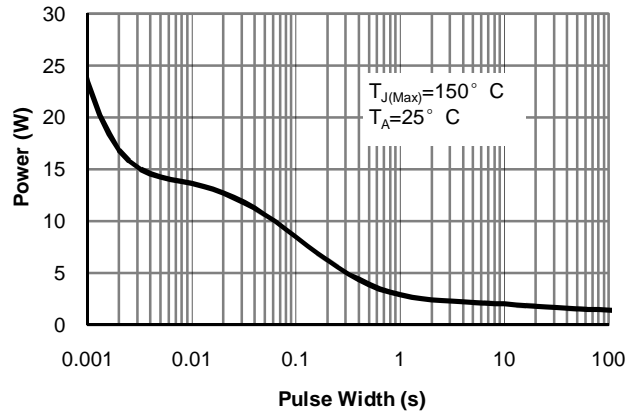
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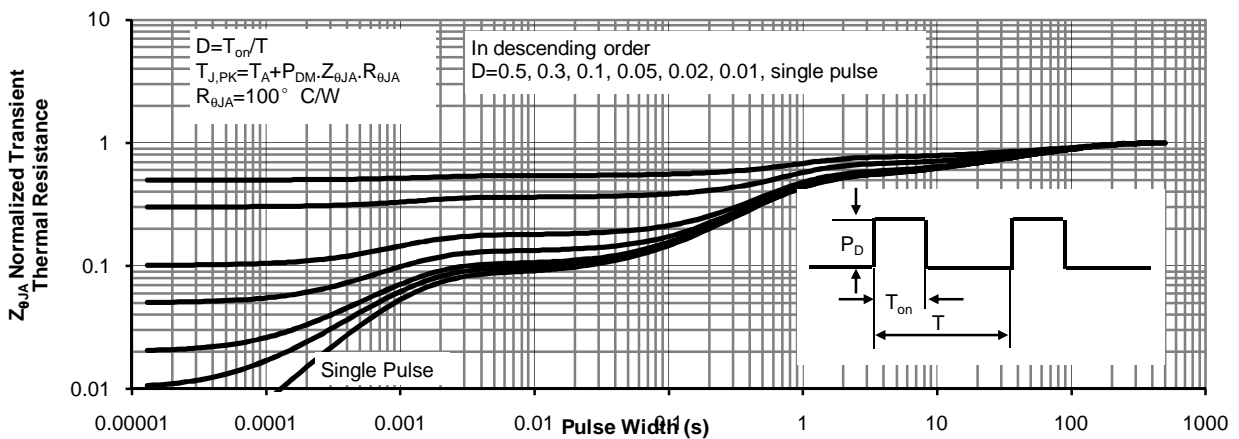
**Figure 8: Capacitance Characteristics**



**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**