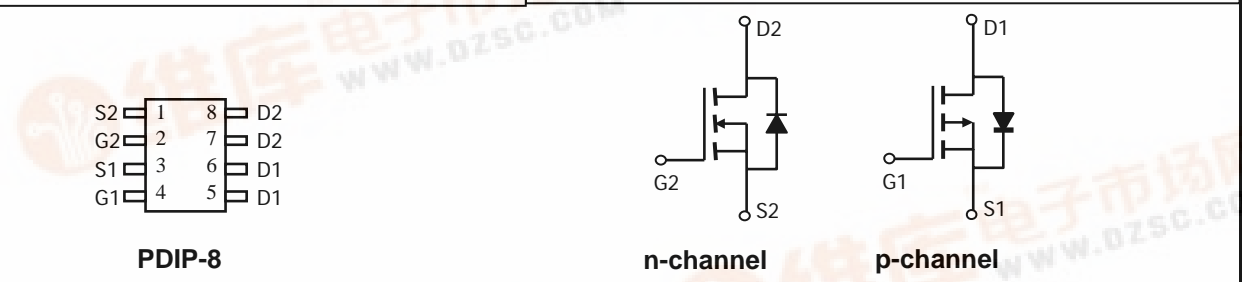




# AOP608

## Complementary Enhancement Mode Field Effect Transistor

<p><b>General Description</b></p> <p>The AOP608 uses advanced trench technology MOSFETs to provide excellent <math>R_{DS(ON)}</math> and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications. <i>Standard Product AOP608 is Pb-free (meets ROHS &amp; Sony 259 specifications). AOP608L is a Green Product ordering option. AOP608 and AOP608L are electrically identical.</i></p>	<p><b>Features</b></p> <table border="0"> <tr> <td>n-channel</td> <td>p-channel</td> </tr> <tr> <td><math>V_{DS} (V) = 40V</math></td> <td>-40V</td> </tr> <tr> <td><math>I_D = 6.3A (V_{GS}=10V)</math></td> <td>-5.5A (<math>V_{GS} = -10V</math>)</td> </tr> <tr> <td><math>R_{DS(ON)} &lt; 33m\Omega (V_{GS}=10V)</math></td> <td><math>R_{DS(ON)} &lt; 45m\Omega (V_{GS} = -10V)</math></td> </tr> <tr> <td><math>&lt; 46m\Omega (V_{GS}=4.5V)</math></td> <td><math>&lt; 63m\Omega (V_{GS} = -4.5V)</math></td> </tr> </table>	n-channel	p-channel	$V_{DS} (V) = 40V$	-40V	$I_D = 6.3A (V_{GS}=10V)$	-5.5A ( $V_{GS} = -10V$ )	$R_{DS(ON)} < 33m\Omega (V_{GS}=10V)$	$R_{DS(ON)} < 45m\Omega (V_{GS} = -10V)$	$< 46m\Omega (V_{GS}=4.5V)$	$< 63m\Omega (V_{GS} = -4.5V)$
n-channel	p-channel										
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**Absolute Maximum Ratings  $T_A=25^\circ C$  unless otherwise noted**

Parameter	Symbol	Max n-channel	Max p-channel	Units
Drain-Source Voltage	$V_{DS}$	40	-40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ C$	6.3	-5.5	A
		$T_A=70^\circ C$	5	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	20	-20	
Power Dissipation	$T_A=25^\circ C$	2.5	2.5	W
		$T_A=70^\circ C$	1.6	
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 <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	n-ch	37	50	$^\circ C/W$
			p-ch	74	90	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State	$R_{\theta JA}$			$^\circ C/W$	
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	n-ch	28	40	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	p-ch	35	50	$^\circ C/W$
			p-ch	73	90	$^\circ C/W$
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	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
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	40			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=32\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1	$\mu\text{A}$
					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	2.3	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$ , $V_{DS}=5\text{V}$	20			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$ , $I_D=6.3\text{A}$ $T_J=125^\circ\text{C}$		24.1	33	m $\Omega$
				40		
			$V_{GS}=4.5\text{V}$ , $I_D=5\text{A}$		33.7	46
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=6.3\text{A}$		22		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				6.3	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=30\text{V}$ , $f=1\text{MHz}$		404		pF
$C_{oss}$	Output Capacitance			95		pF
$C_{rss}$	Reverse Transfer Capacitance			37		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		2.7		$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=20\text{V}$ , $I_D=6.3\text{A}$		9.2		nC
$Q_g(4.5\text{V})$	Total Gate Charge			4.6		nC
$Q_{gs}$	Gate Source Charge			1.6		nC
$Q_{gd}$	Gate Drain Charge			2.5		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$ , $V_{DS}=20\text{V}$ , $R_L=3\Omega$ , $R_{GEN}=3\Omega$		4.3		ns
$t_r$	Turn-On Rise Time			3.4		ns
$t_{D(off)}$	Turn-Off DelayTime			15		ns
$t_f$	Turn-Off Fall Time			2.8		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=6.3\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		21.2		ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=6.3\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		15.8		nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> 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 80 $\mu\text{s}$  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  $T_A=25^\circ\text{C}$ . The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CANNEL

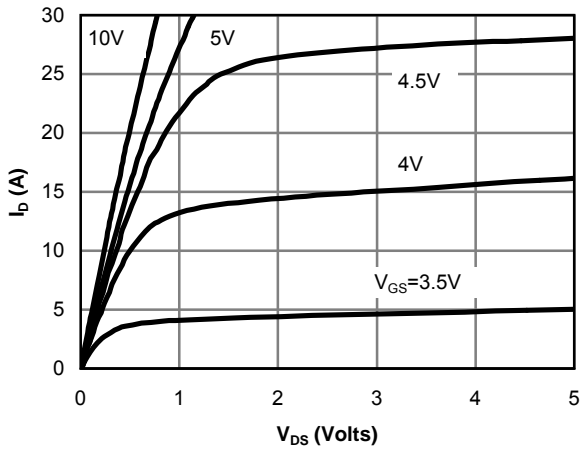


Fig 1: On-Region Characteristics

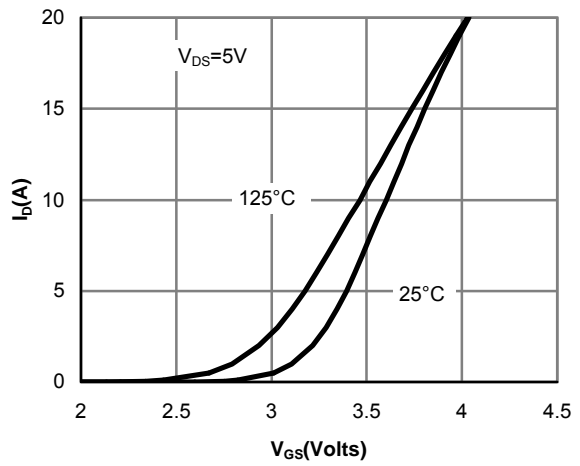


Figure 2: Transfer Characteristics

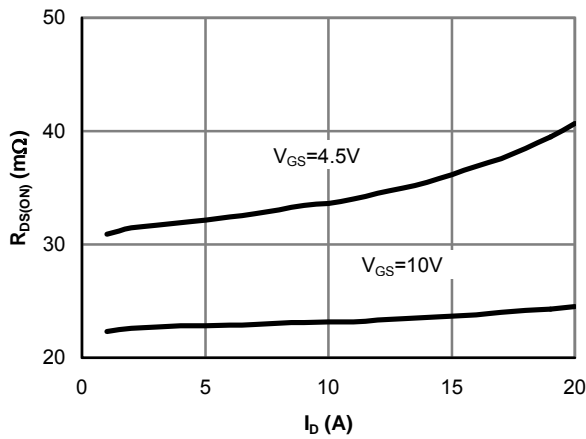


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

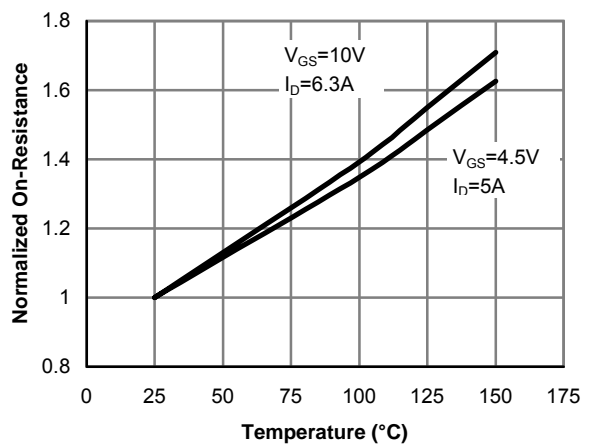


Figure 4: On-Resistance vs. Junction Temperature

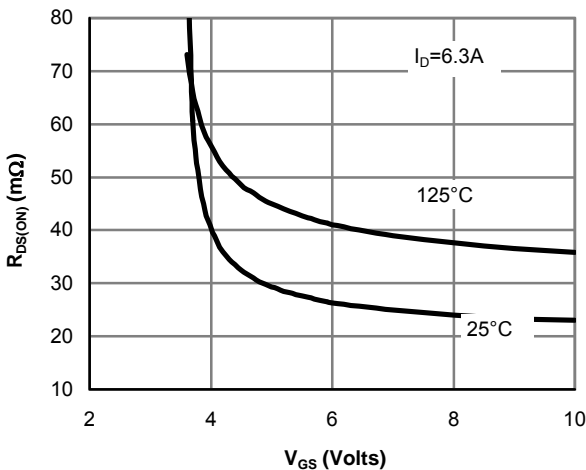


Figure 5: On-Resistance vs. Gate-Source Voltage

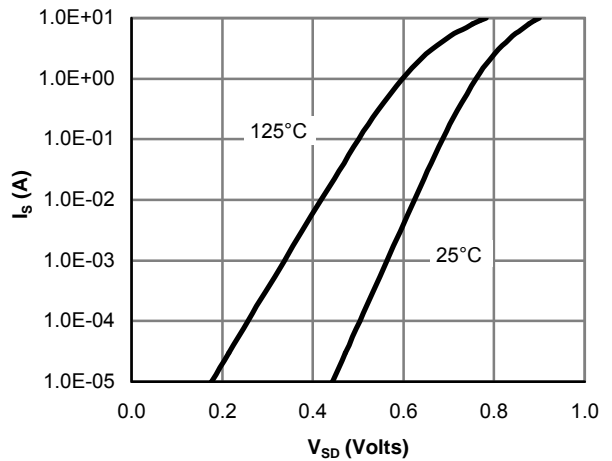


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

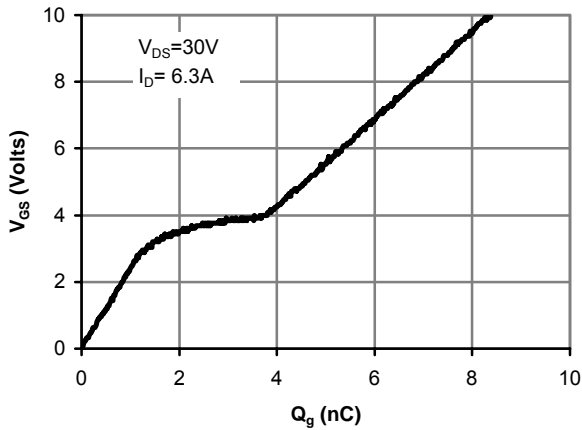


Figure 7: Gate-Charge Characteristics

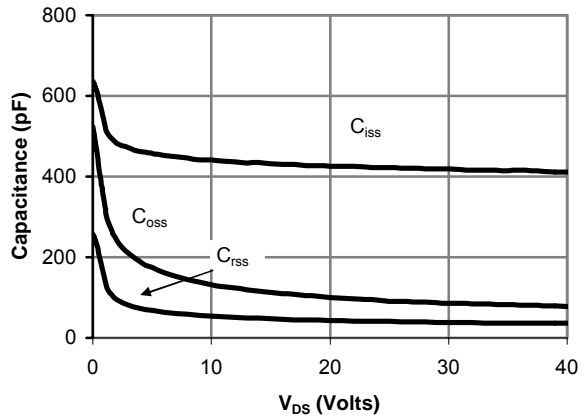


Figure 8: Capacitance Characteristics

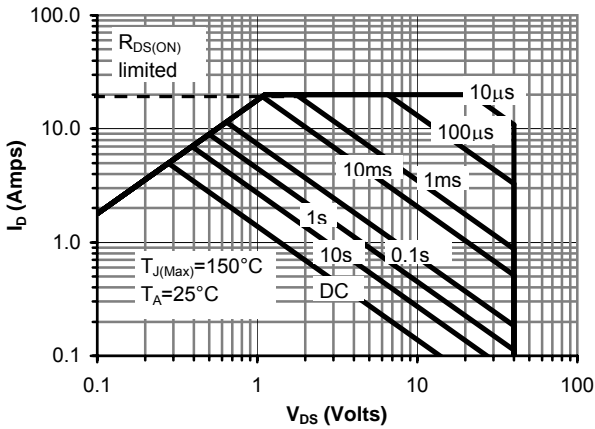


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

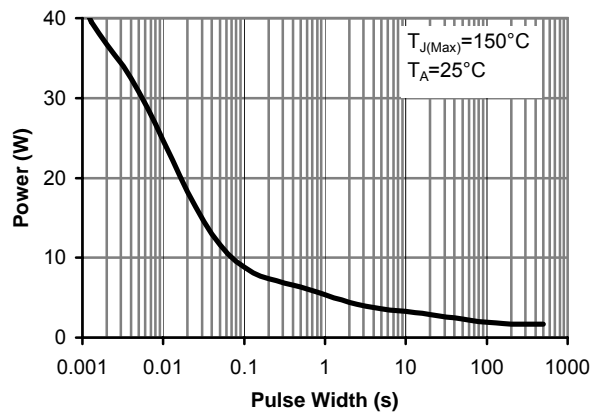


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

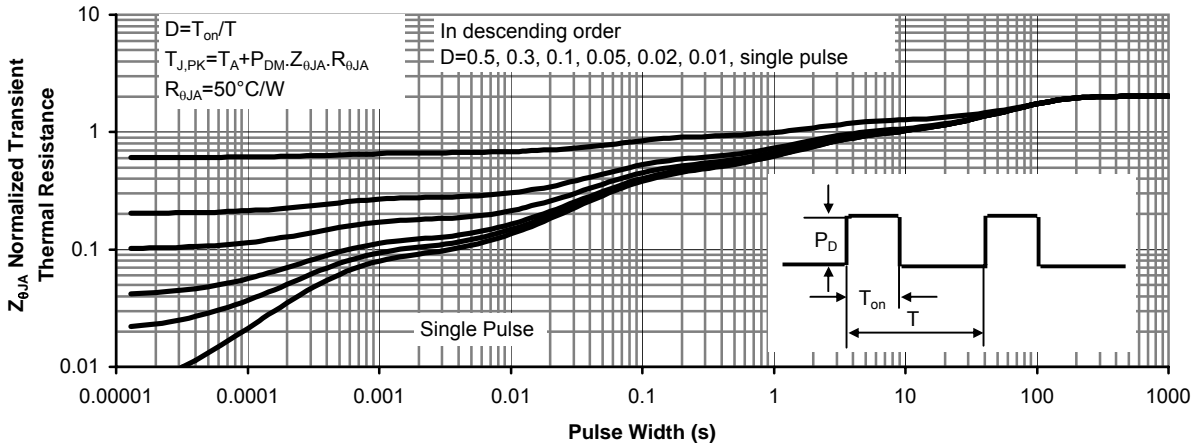


Figure 11: Normalized Maximum Transient Thermal Impedance

AOP608

**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	-40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-32V, 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	-1.9	-3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-20			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-5.5A T <sub>J</sub> =125°C		34.7 56	45 70	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.6A		50.6	63	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-5.5A		12		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.75	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-5.5	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-20V, f=1MHz		657		pF
C <sub>oss</sub>	Output Capacitance			143		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			63		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		6.5		Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(10V)</sub>	Total Gate Charge (10V)	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-20V, I <sub>D</sub> =-5.5A		14.2		nC
Q <sub>g(4.5V)</sub>	Total Gate Charge (4.5V)			7.1		nC
Q <sub>gs</sub>	Gate Source Charge			2.2		nC
Q <sub>gd</sub>	Gate Drain Charge			4.1		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-20V, R <sub>L</sub> =3.6Ω, R <sub>GEN</sub> =3Ω		7.7		ns
t <sub>r</sub>	Turn-On Rise Time			8		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			26.5		ns
t <sub>f</sub>	Turn-Off Fall Time			11.5		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-5.5A, dI/dt=100A/μs		21.9		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-5.5A, dI/dt=100A/μs		14.9		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 80μs 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

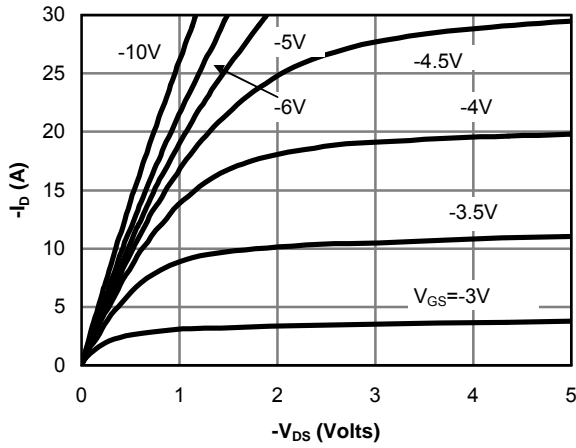


Fig 1: On-Region Characteristics

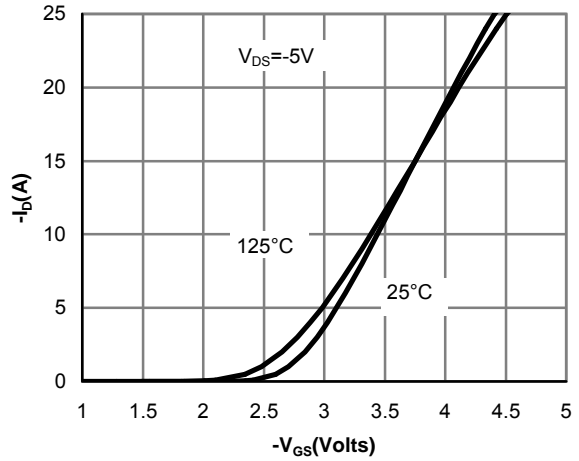


Figure 2: Transfer Characteristics

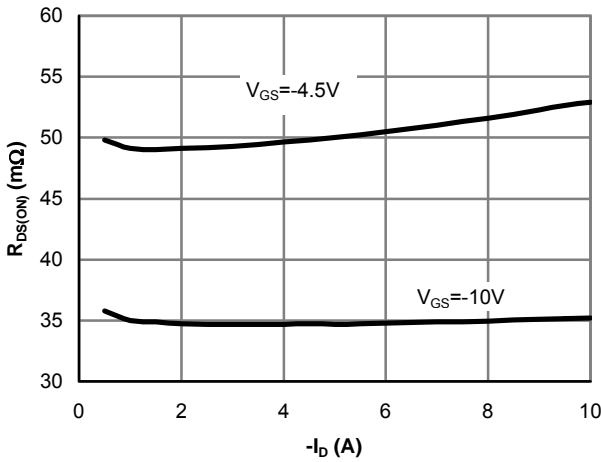


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

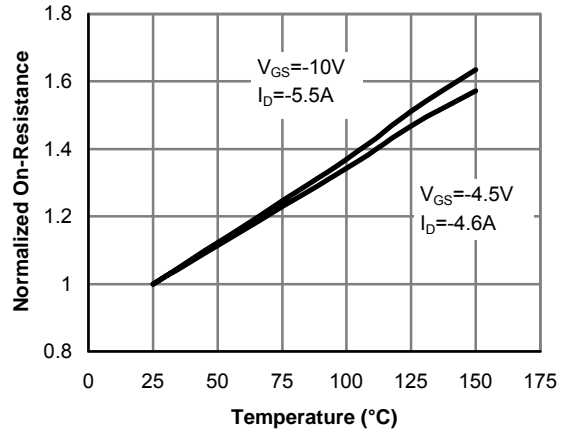


Figure 4: On-Resistance vs. Junction Temperature

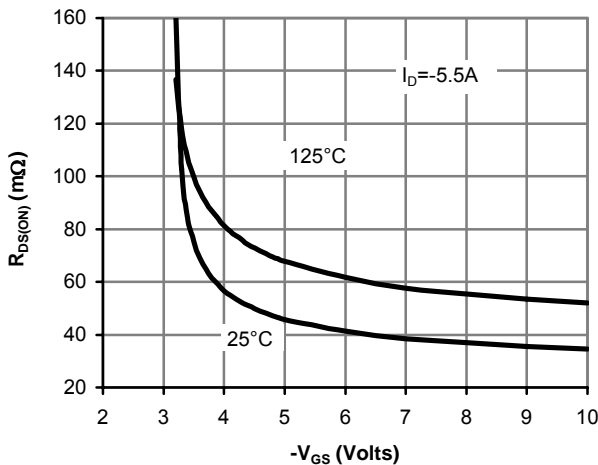


Figure 5: On-Resistance vs. Gate-Source Voltage

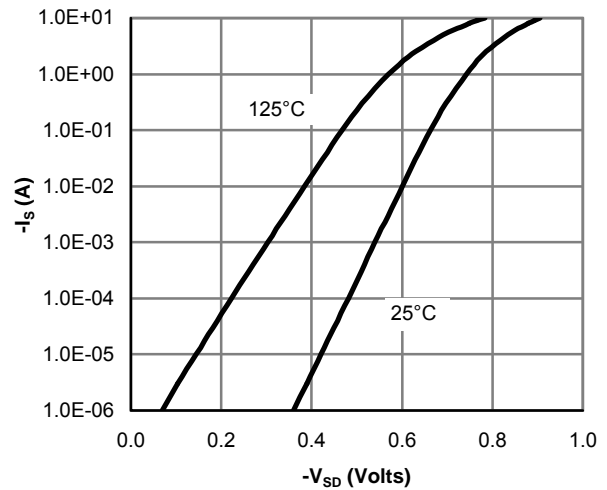


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

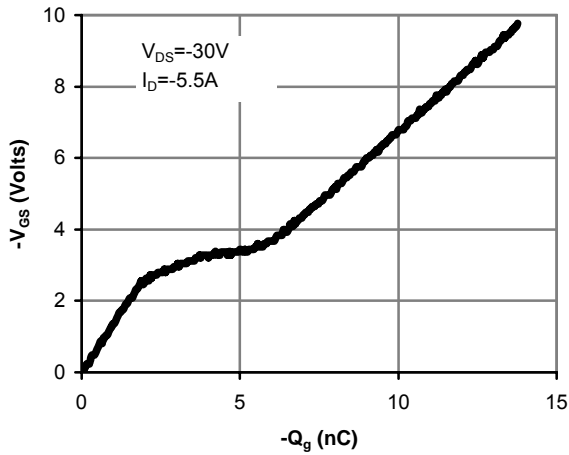


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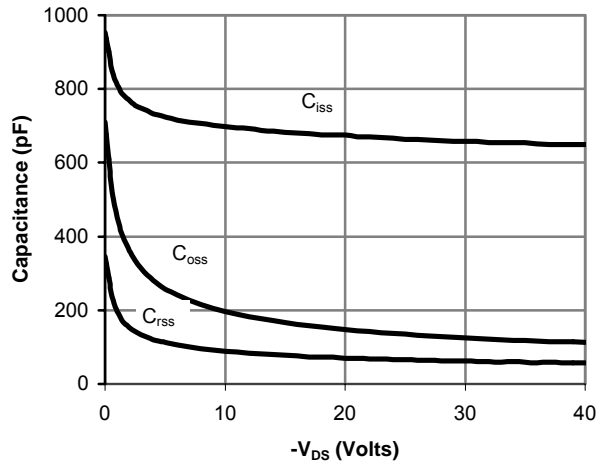


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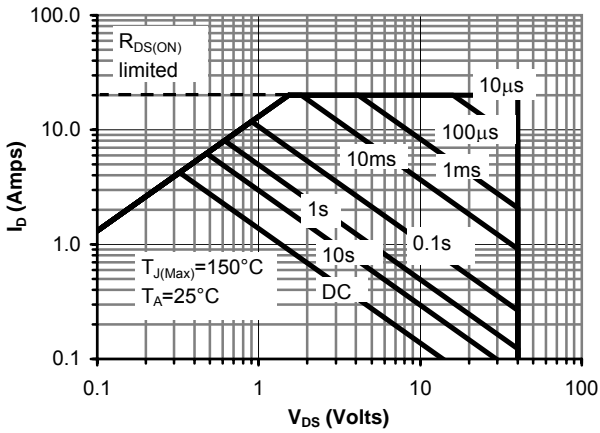


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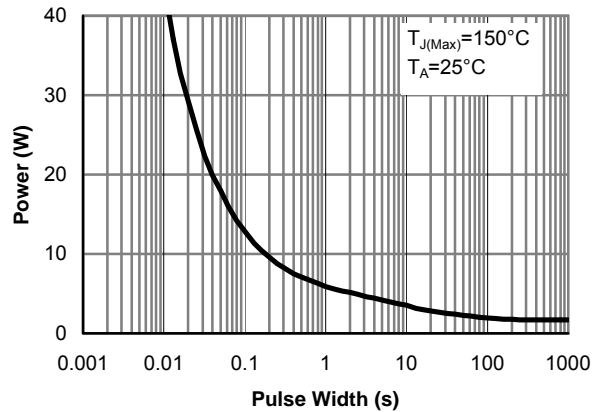


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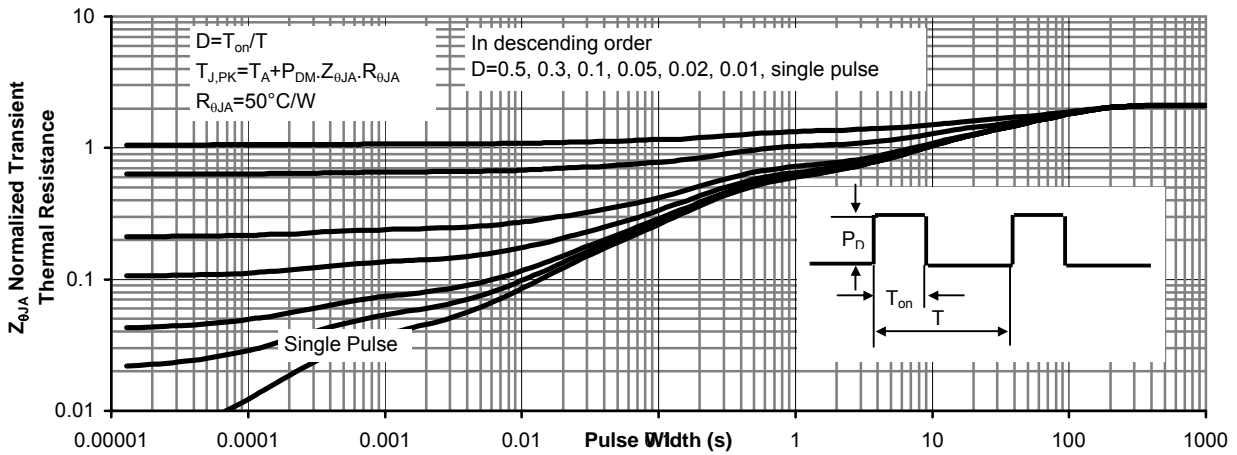


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