



**AOP605**

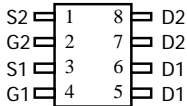
**Complementary Enhancement Mode Field Effect Transistor**

**General Description**

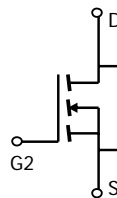
The AOP605 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. The complementary MOSFETs form a high-speed power inverter, suitable for a multitude of applications. *Standard Product AOP605 is Pb-free (meets ROHS & Sony 259 specifications). AOP605L is a Green Product ordering option. AOP605 and AOP605L are electrically identical.*

**Features**

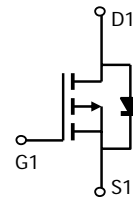
	<b>n-channel</b>	<b>p-channel</b>
$V_{DS}$ (V)	30V	-30V
$I_D$ = 7.5A ( $V_{GS}$ = 10V)		-6.6A ( $V_{GS}$ = -10V)
$R_{DS(ON)}$		
	< 28m $\Omega$ ( $V_{GS}$ = 10V)	< 35m $\Omega$ ( $V_{GS}$ = -10V)
	< 43m $\Omega$ ( $V_{GS}$ = 4.5V)	< 58m $\Omega$ ( $V_{GS}$ = -4.5V)



**PDIP-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	$V_{DS}$	30	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Continuous Drain Current <sup>A</sup>	$I_D$	$T_A=25^\circ\text{C}$	7.5	-6.6
		$T_A=70^\circ\text{C}$	6	-5.3
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	30	-30	A
Power Dissipation	$P_D$	$T_A=25^\circ\text{C}$	2.5	2.5
		$T_A=70^\circ\text{C}$	1.6	1.6
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	-55 to 150	$^\circ\text{C}$

**Thermal Characteristics: n-channel**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	$t \leq 10\text{s}$	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	67	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	33	40	$^\circ\text{C/W}$

**Thermal Characteristics: p-channel**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	$t \leq 10\text{s}$	38	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	66	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	30	40	$^\circ\text{C/W}$

n-channel MOSFET 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	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			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	1.8	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	$V_{GS}=10\text{V}$ , $I_D=7.5\text{A}$ $T_J=125^\circ\text{C}$		22.6	28	m $\Omega$
			$V_{GS}=4.5\text{V}$ , $I_D=6.0\text{A}$		33	
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=7.5\text{A}$	12	16		S
$V_{SD}$	Body Diode Forward Voltage	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$		0.76	1	V
$I_S$	Maximum Body-Diode Continuous Current				4	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=15\text{V}$ , $f=1\text{MHz}$		680	820	pF
$C_{oss}$	Output Capacitance.			102		pF
$C_{riss}$	Reverse Transfer Capacitance			77		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		3	3.6	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=4.5\text{V}$ , $V_{DS}=15\text{V}$ , $I_D=7.5\text{A}$		13.84	16.6	nC
$Q_g$	Total Gate Charge			6.74	8.1	nC
$Q_{gs}$	Gate Source Charge			1.82		nC
$Q_{gd}$	Gate Drain Charge			3.2		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $R_L=2.0\Omega$ , $R_{GEN}=6\Omega$		4.6		ns
$t_r$	Turn-On Rise Time			4.1		ns
$t_{D(off)}$	Turn-Off Delay Time			20.6		ns
$t_f$	Turn-Off Fall Time			5.2		ns
$t_{rr}$	Body Diode Reverse Recovery time	$I_F=7.5\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		16.5	20	ns
$Q_{rr}$	Body Diode Reverse Recovery charge	$I_F=7.5\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		7.8		nC

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . 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

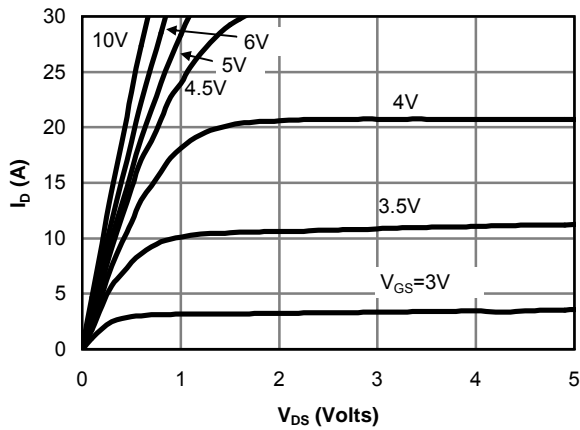


Fig 1: On-Region Characteristics

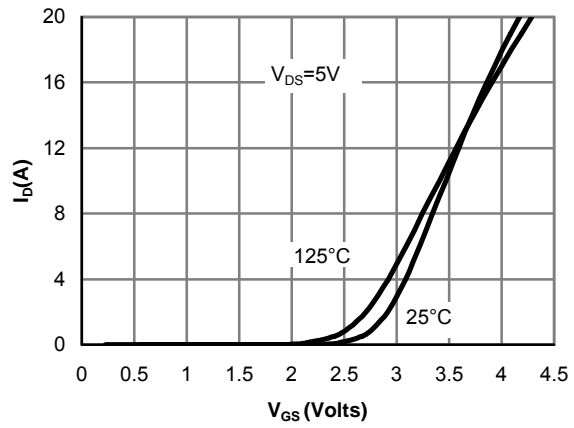


Figure 2: Transfer Characteristics

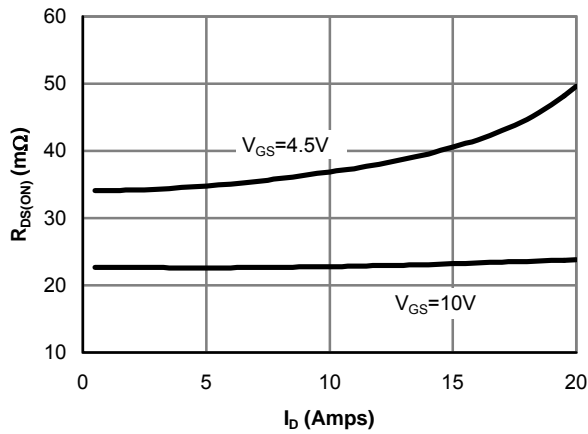


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

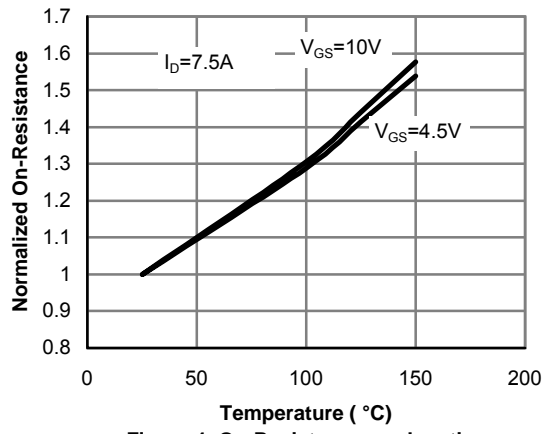


Figure 4: On-Resistance vs. Junction Temperature

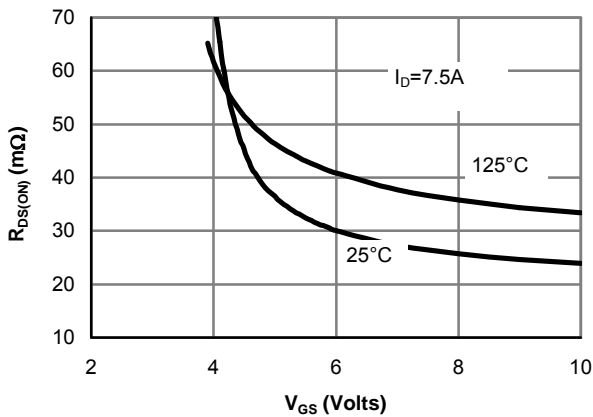


Figure 5: On-Resistance vs. Gate-Source Voltage

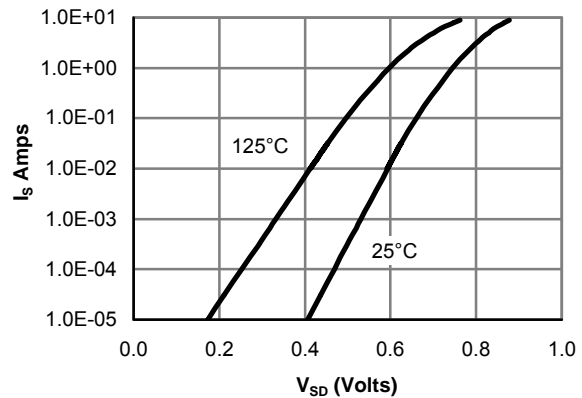


Figure 6: Body diode characteristics

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

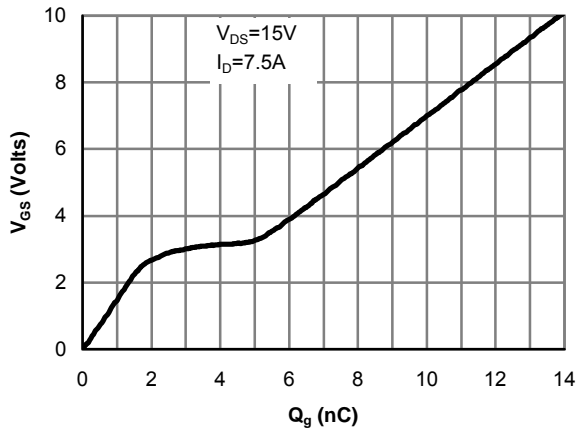


Figure 7: Gate-Charge characteristics

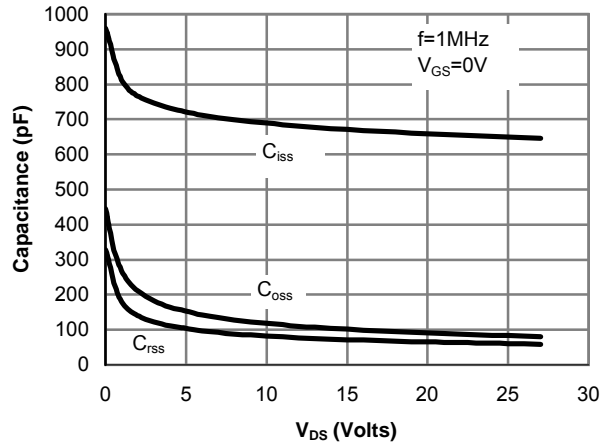


Figure 8: Capacitance Characteristics

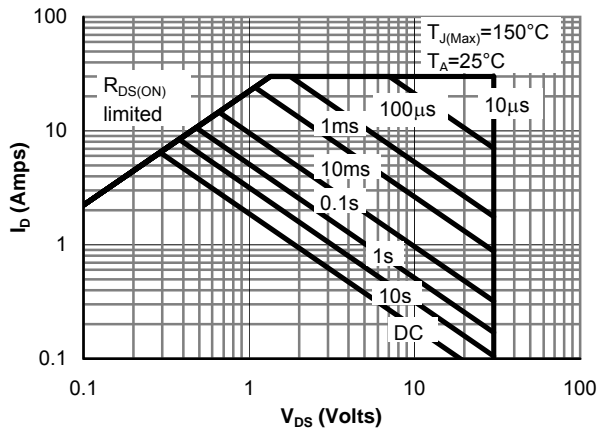


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

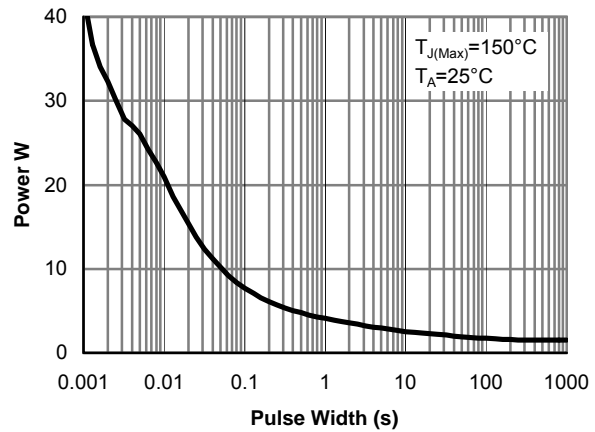


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

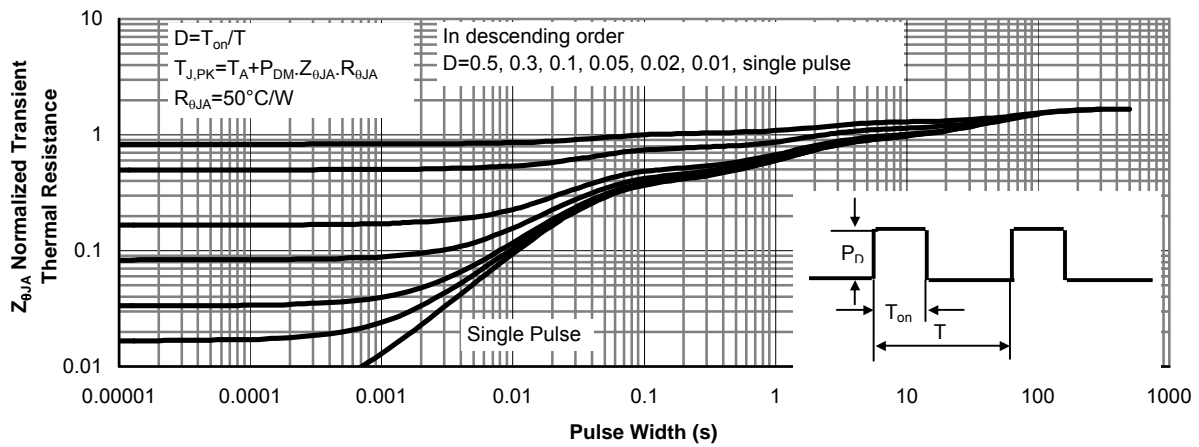


Figure 11: Normalized Maximum Transient Thermal Impedance

p-channel MOSFET 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	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$	-30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-24\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-1.2	-2	-2.4	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	$V_{GS}=-10\text{V}, I_D=-6.6\text{A}$ $T_J=125^\circ\text{C}$		28 37	35 45	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}, I_D=-5\text{A}$		44	58	$\text{m}\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-6.6\text{A}$		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				-4.2	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=-15\text{V}, f=1\text{MHz}$		920	1100	pF
$C_{oss}$	Output Capacitance			190		pF
$C_{rss}$	Reverse Transfer Capacitance			122		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		3.6	4.4	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge (10V)	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, I_D=-6.6\text{A}$		18.5	22.2	nC
$Q_g(4.5\text{V})$	Total Gate Charge (4.5V)			9.6	11.6	nC
$Q_{gs}$	Gate Source Charge			2.7		nC
$Q_{gd}$	Gate Drain Charge			4.5		nC
$t_{D(on)}$	Turn-On Delay Time			7.7		ns
$t_r$	Turn-On Rise Time	$V_{GS}=-10\text{V}, V_{DS}=-15\text{V}, R_L=2.3\Omega,$ $R_{GEN}=3\Omega$		5.7		ns
$t_{D(off)}$	Turn-Off Delay Time			20.2		ns
$t_f$	Turn-Off Fall Time			9.5		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=-6.6\text{A}, dI/dt=100\text{A}/\mu\text{s}$		20	24	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=-6.6\text{A}, dI/dt=100\text{A}/\mu\text{s}$		8.8		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.

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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 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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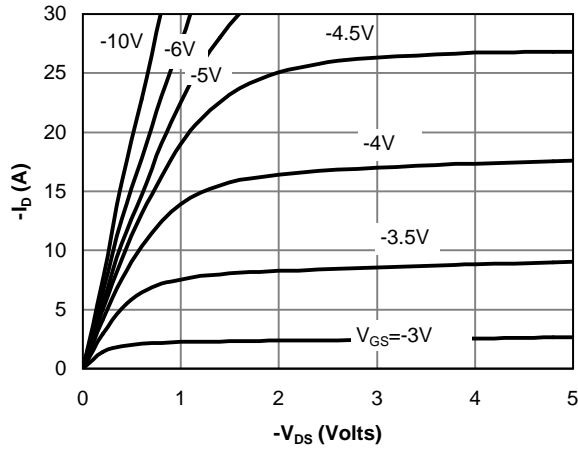


Fig 1: On-Region Characteristics

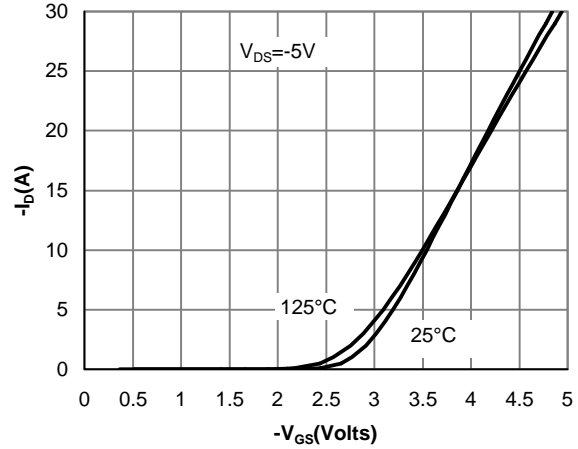


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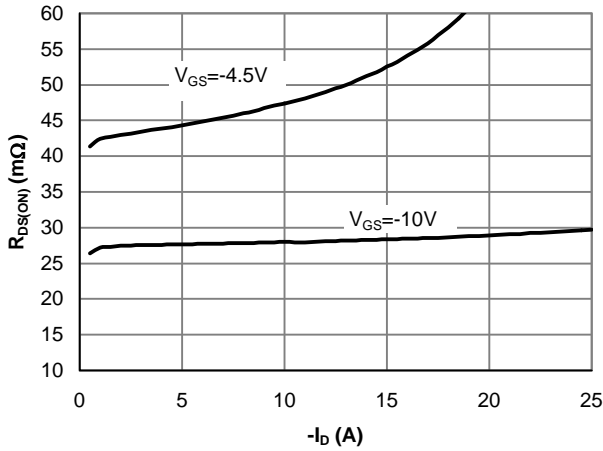


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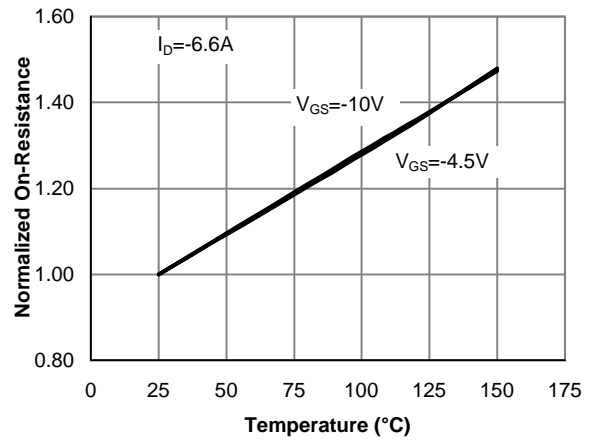


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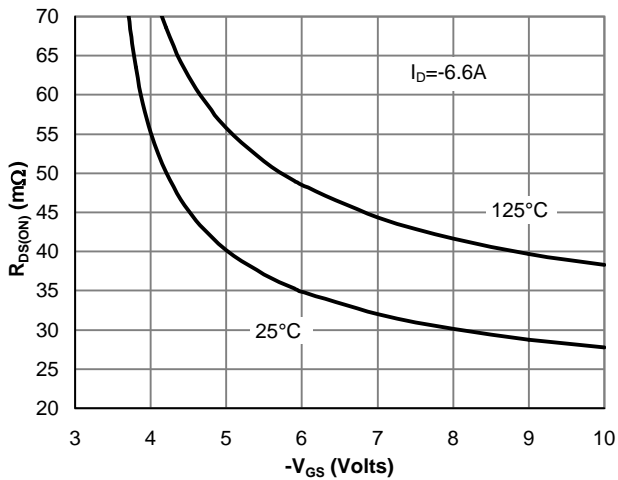


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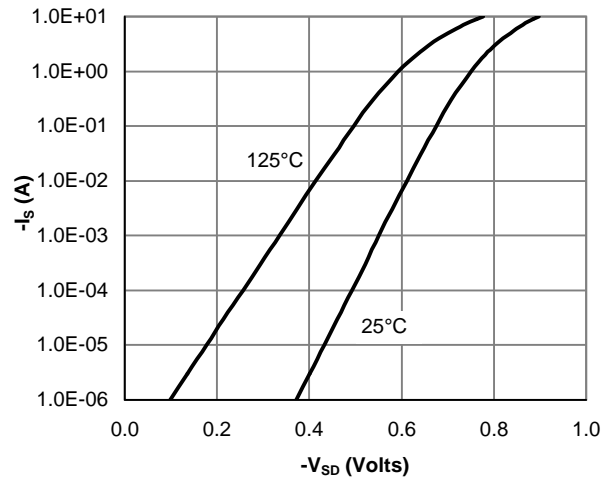


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

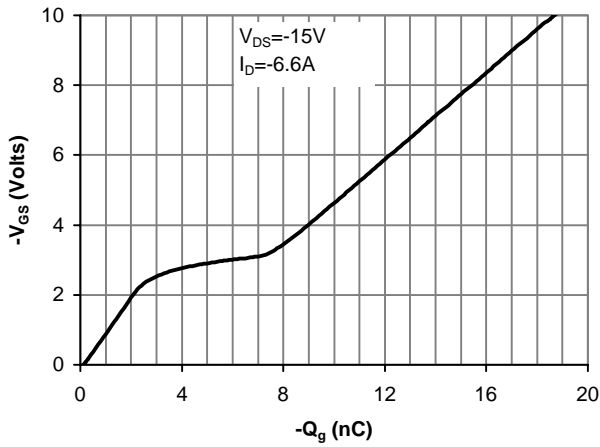


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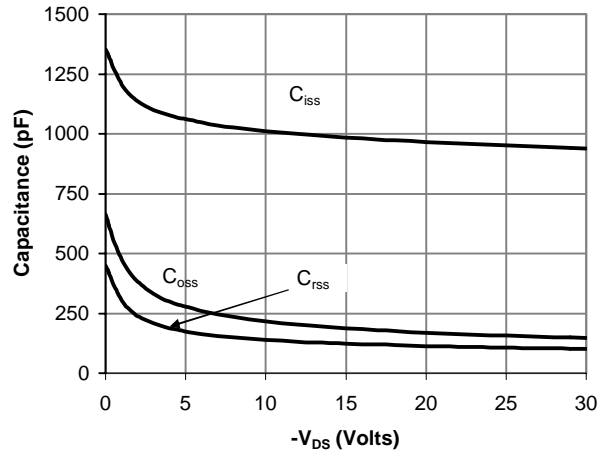


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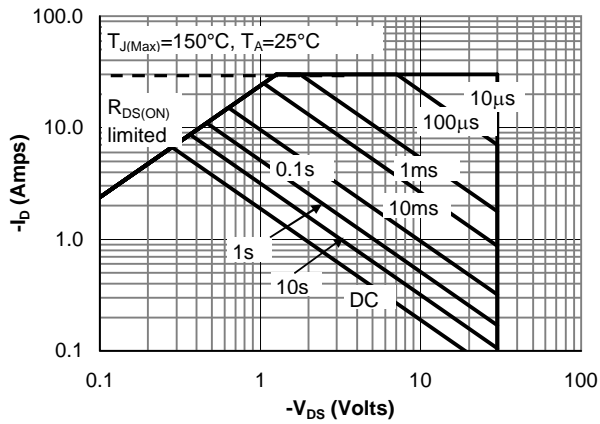


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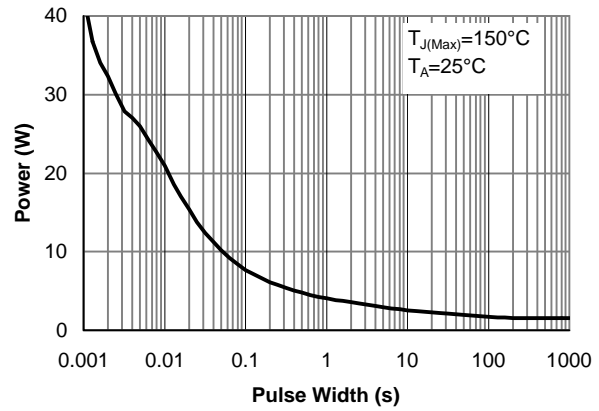


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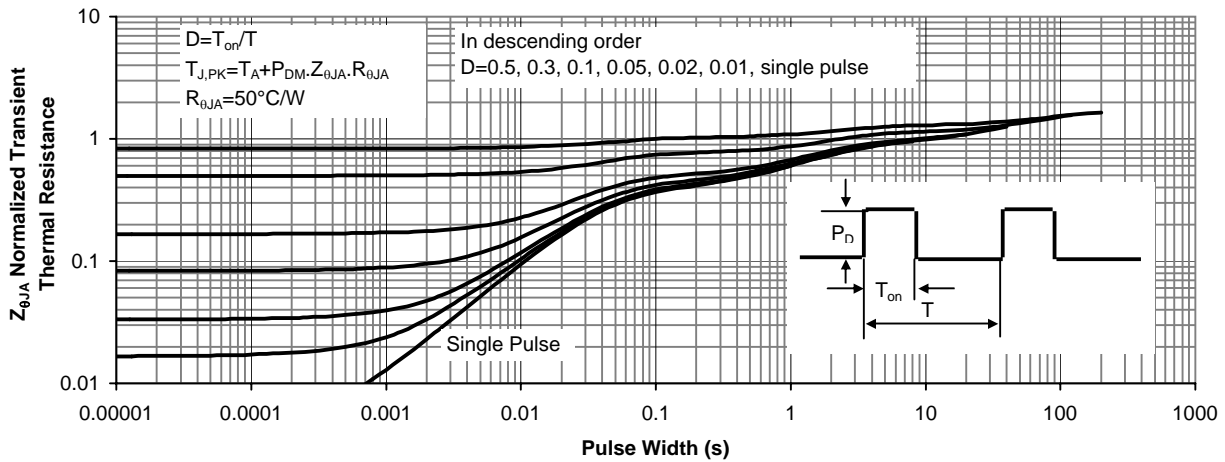


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