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## AOP605

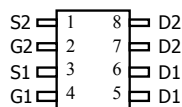
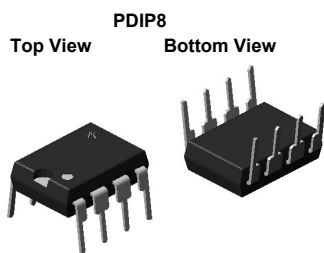
### Complementary Enhancement Mode Field Effect Transistor

#### General Description

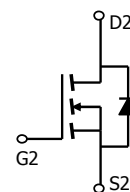
The AOP605/L uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. The complementary MOSFETs form a high-speed power inverter, suitable for a multitude of applications. AOP605 and AOP605L are electrically identical.  
 -RoHS Compliant  
 -AOP605L is Halogen Free

#### Features

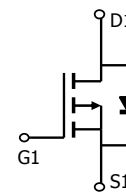
n-channel	p-channel
$V_{DS}$ (V) = 30V	-30V
$I_D$ = 7.5A ( $V_{GS}$ = 10V)	-6.6A ( $V_{GS}$ = -10V)
$R_{DS(ON)}$	
< 28m $\Omega$ ( $V_{GS}$ = 10V)	< 35m $\Omega$ ( $V_{GS}$ = -10V)
< 43m $\Omega$ ( $V_{GS}$ = 4.5V)	< 58m $\Omega$ ( $V_{GS}$ = -4.5V)



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>	$R_{\theta JA}$	40	50	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		67	80	$^\circ\text{C/W}$
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>	$R_{\theta JA}$	38	50	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		66	80	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	30	40	$^\circ\text{C/W}$

**AOP605**
**n-channel MOSFET 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> =24V, 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	1.8	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> =7.5A T <sub>J</sub> =125°C		22.6	28	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6.0A		33	43	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =7.5A	12	16		S
V <sub>SD</sub>	Body 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				4	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		680	820	pF
C <sub>OSS</sub>	Output Capacitance			102		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			77		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		1.2	2	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(10V)</sub>	Total Gate Charge	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =15V, I <sub>D</sub> =7.5A		13.84	16.6	nC
Q <sub>g</sub>	Total Gate Charge			6.74	8.1	nC
Q <sub>gs</sub>	Gate Source Charge			1.82		nC
Q <sub>gd</sub>	Gate Drain Charge			3.2		nC
t <sub>D(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =2.0Ω, R <sub>GEN</sub> =6Ω		4.6		ns
t <sub>r</sub>	Turn-On Rise Time			4.1		ns
t <sub>D(off)</sub>	Turn-Off Delay Time			20.6		ns
t <sub>f</sub>	Turn-Off Fall Time			5.2		ns
t <sub>rr</sub>	Body Diode Reverse Recovery time		I <sub>F</sub> =7.5A, di/dt=100A/μs		16.5	20
Q <sub>rr</sub>	Body Diode Reverse Recovery charge	I <sub>F</sub> =7.5A, di/dt=100A/μs		7.8		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<sub>100</sub> ≤ 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 80 μs pulses, duty cycle 0.5% max.

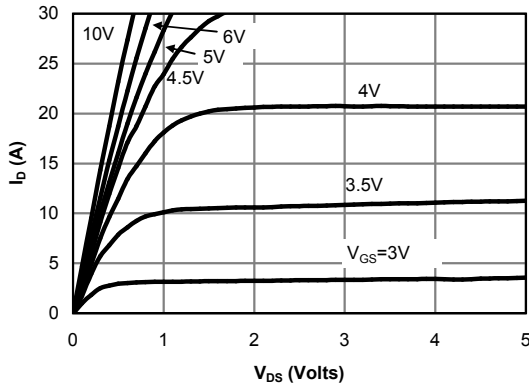
E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

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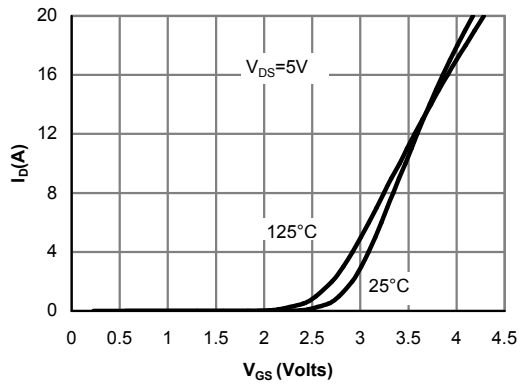
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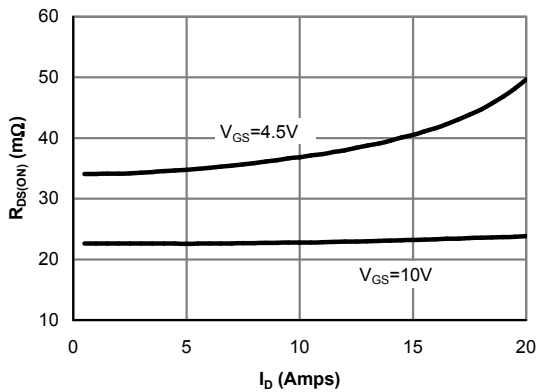
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL**



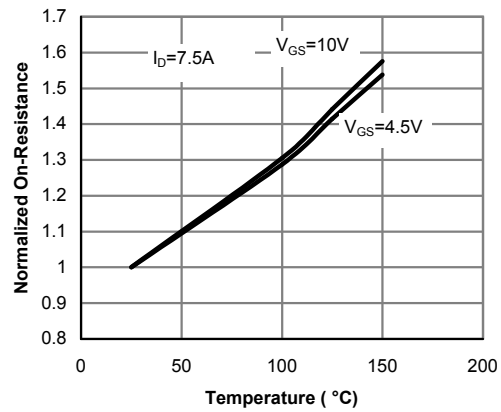
**Fig 1: On-Region Characteristics**



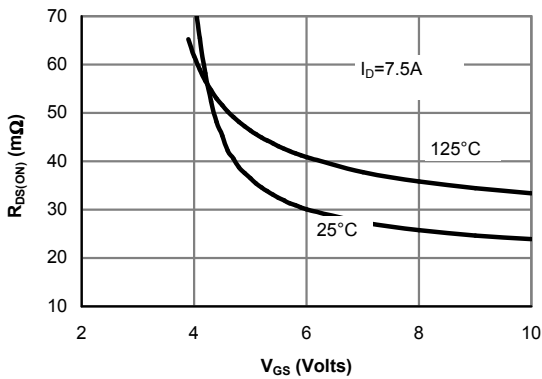
**Figure 2: Transfer Characteristics**



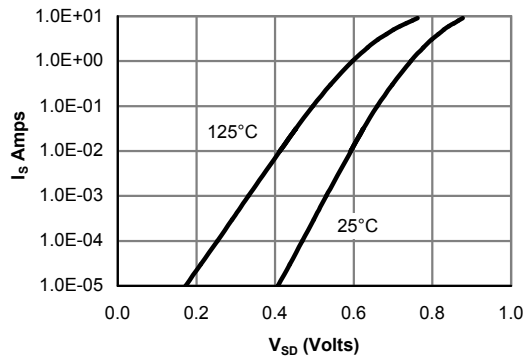
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



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



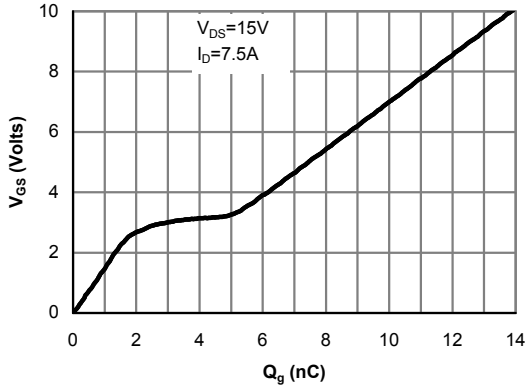
**Figure 5: On-Resistance vs. Gate-Source Voltage**



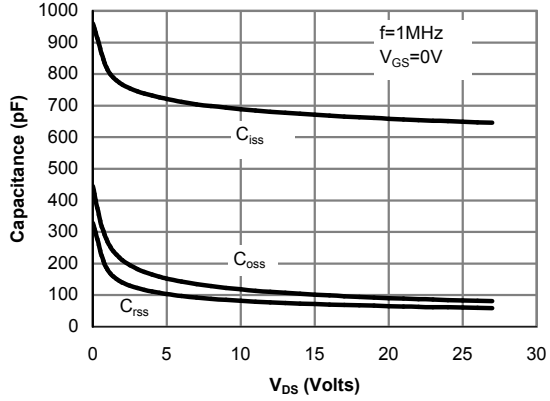
**Figure 6: Body diode characteristics**

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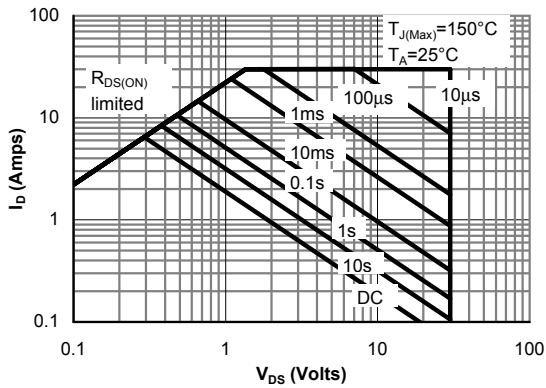
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL**



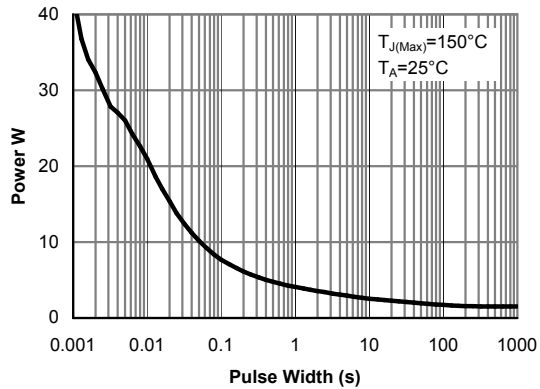
**Figure 7: Gate-Charge characteristics**



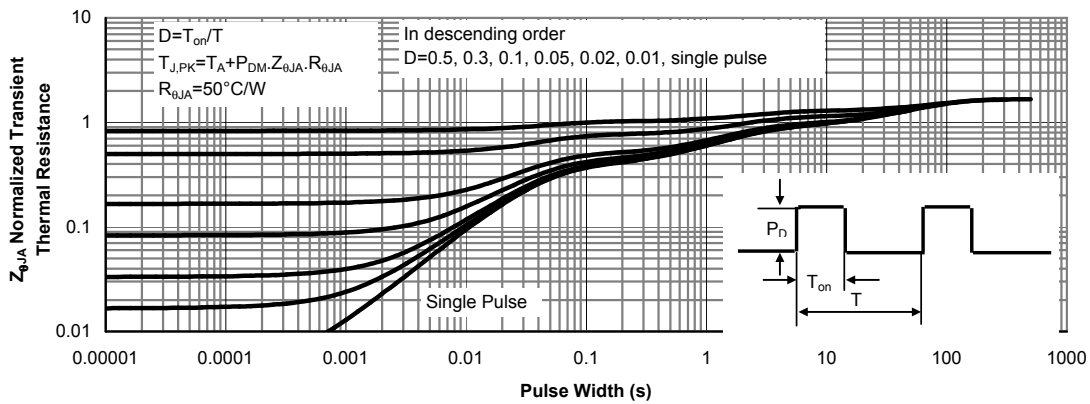
**Figure 8: Capacitance Characteristics**



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



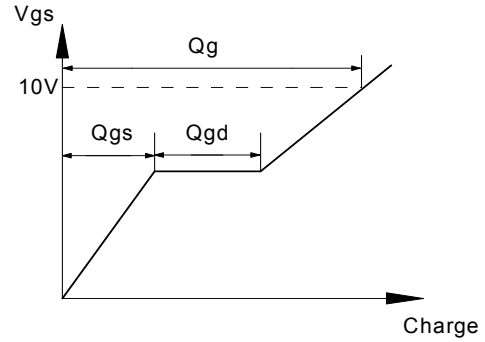
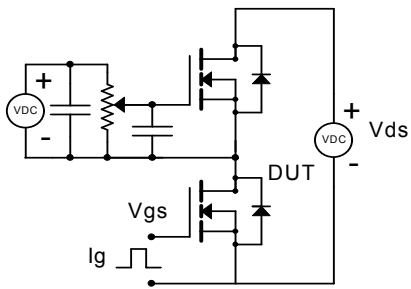
**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)**



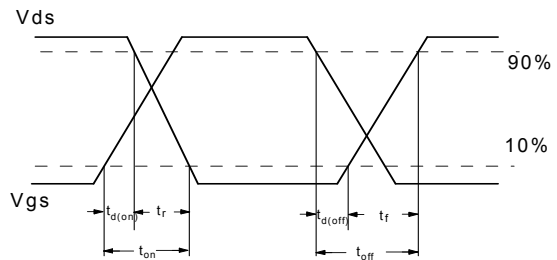
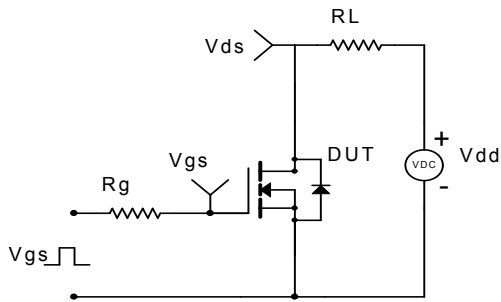
**Figure 11: Normalized Maximum Transient Thermal Impedance**

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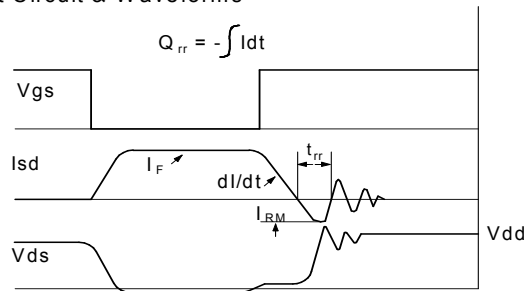
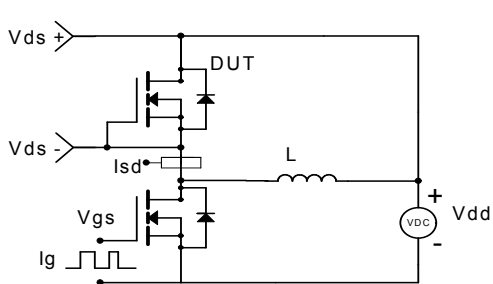
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**



**AOP605**
**p-channel MOSFET 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> =-24V, 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	-1.2	-2	-2.4	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> =-6.6A T <sub>J</sub> =125°C		28 37	35 45	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A		44	58	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-6.6A		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				-4.2	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz		920	1100	pF
C <sub>OSS</sub>	Output Capacitance		190			pF
C <sub>RSS</sub>	Reverse Transfer Capacitance		122			pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		3.6	4.4	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(10V)</sub>	Total Gate Charge (10V)	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-6.6A		18.5	22.2	nC
Q <sub>g(4.5V)</sub>	Total Gate Charge (4.5V)		9.6	11.6		nC
Q <sub>gs</sub>	Gate Source Charge		2.7			nC
Q <sub>gd</sub>	Gate Drain Charge		4.5			nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =2.3Ω, R <sub>GEN</sub> =3Ω		7.7		ns
t <sub>r</sub>	Turn-On Rise Time		5.7			ns
t <sub>D(off)</sub>	Turn-Off DelayTime		20.2			ns
t <sub>f</sub>	Turn-Off Fall Time		9.5			ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time		I <sub>F</sub> =-6.6A, dI/dt=100A/μs		20	24
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-6.6A, dI/dt=100A/μs		8.8		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<sub>100</sub> ≤ 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 80 μs pulses, duty cycle 0.5% max.

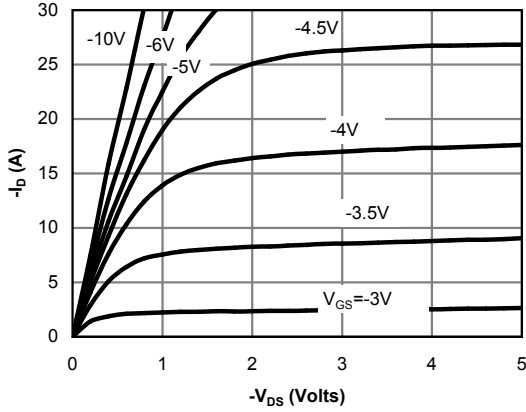
E: These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

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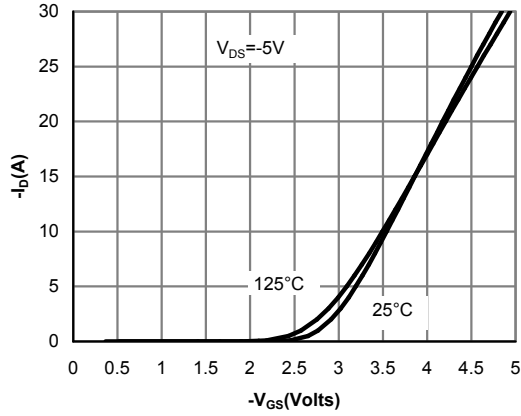
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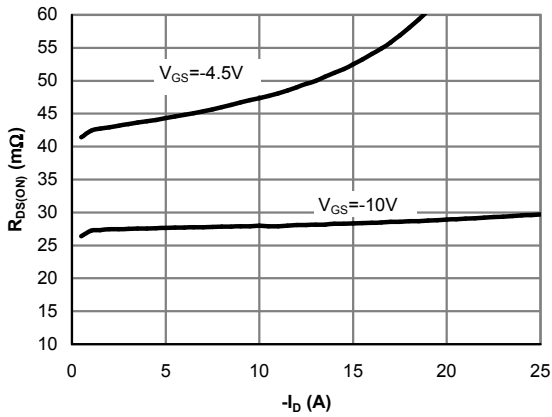
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL**



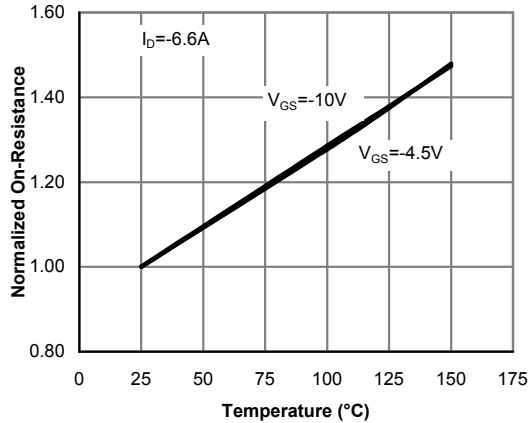
**Fig 1: On-Region Characteristics**



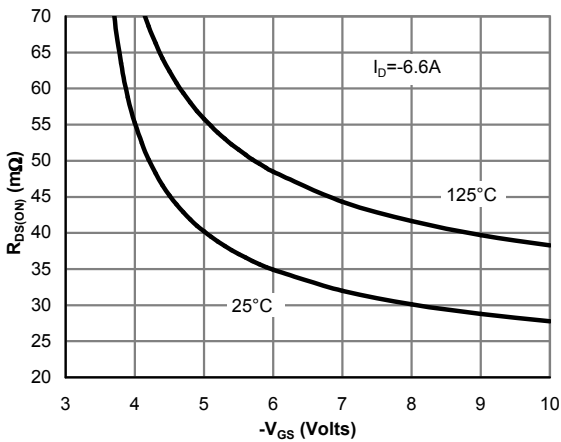
**Figure 2: Transfer Characteristics**



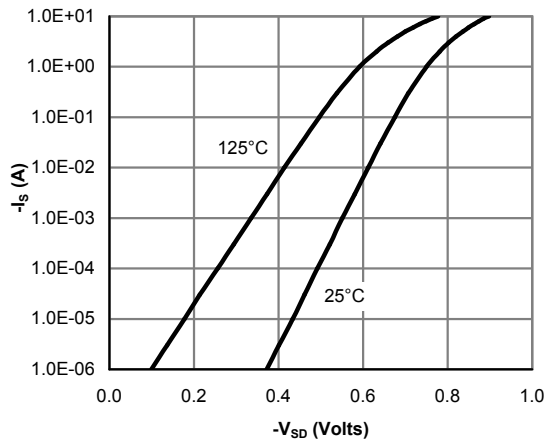
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



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



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



**Figure 6: Body-Diode Characteristics**



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

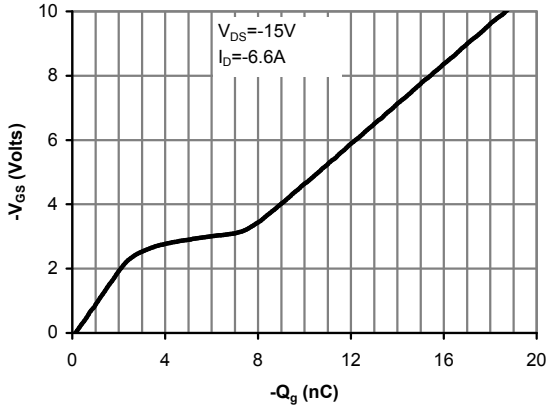


Figure 7: Gate-Charge Characteristics

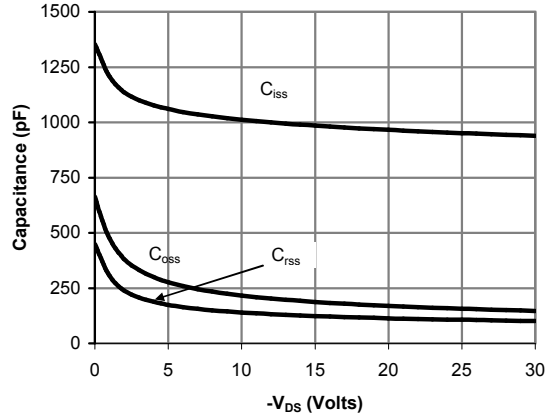


Figure 8: Capacitance Characteristics

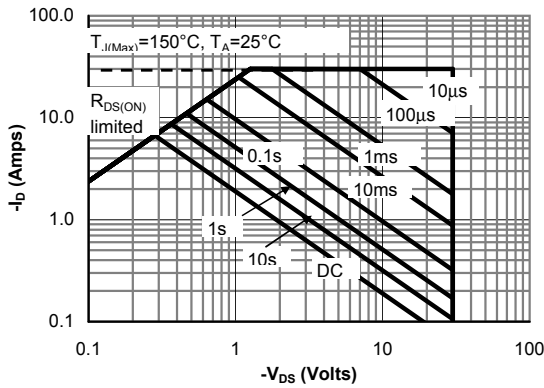


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

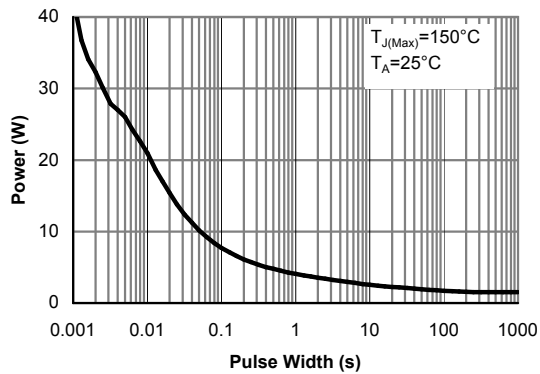


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

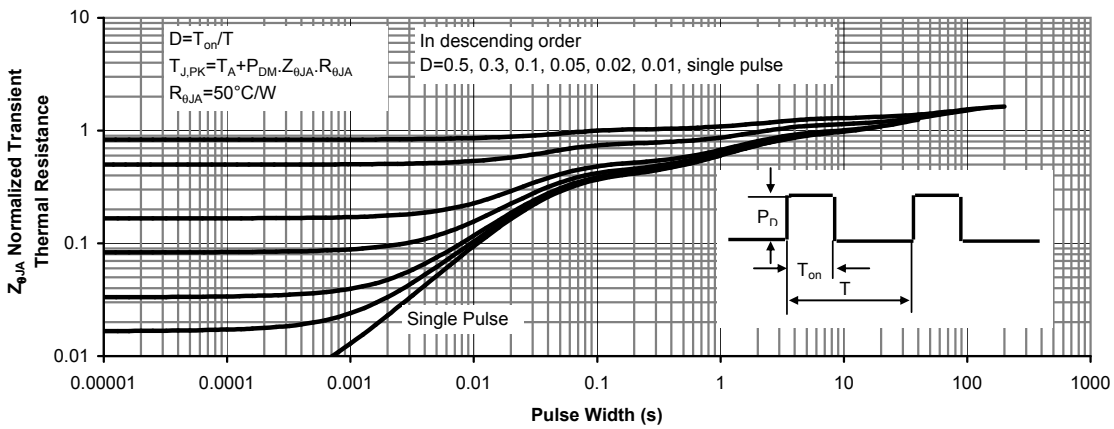
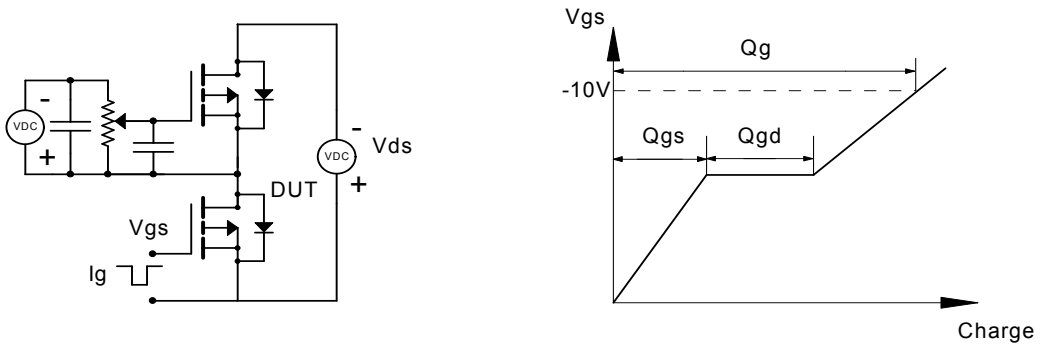


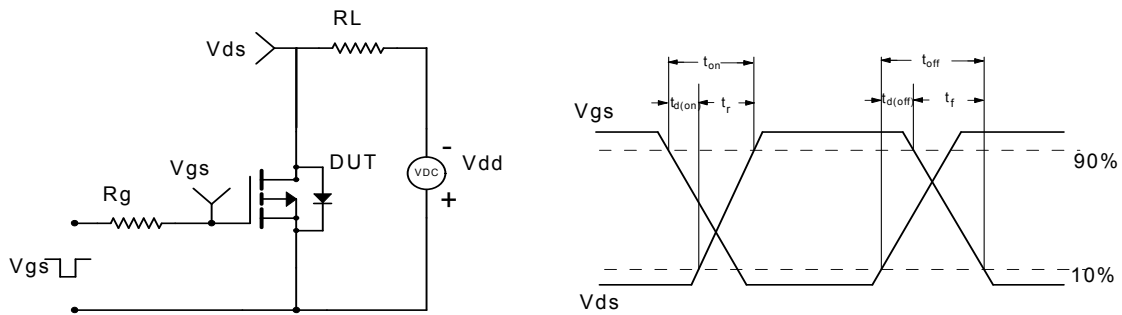
Figure 11: Normalized Maximum Transient Thermal Impedance

**AOP605**

**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**

