



**AOP607**

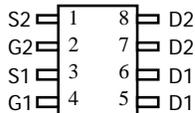
**Complementary Enhancement Mode Field Effect Transistor**

**General Description**

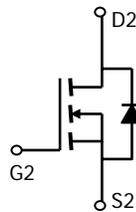
The AOP607 uses advanced trench technology MOSFETs to provide excellent  $R_{DS(ON)}$  and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications. *Standard Product AOP607 is Pb-free (meets ROHS & Sony 259 specifications). AOP607L is a Green Product ordering option. AOP607 and AOP607L are electrically identical.*

**Features**

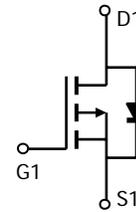
n-channel	p-channel
$V_{DS}$ (V) = 60V	-60V
$I_D$ = 4.7A ( $V_{GS}=10V$ )	-3.4A ( $V_{GS}=-10V$ )
$R_{DS(ON)}$	$R_{DS(ON)}$
< 56m $\Omega$ ( $V_{GS}=10V$ )	< 105m $\Omega$ ( $V_{GS}=-10V$ )
< 77m $\Omega$ ( $V_{GS}=4.5V$ )	< 135m $\Omega$ ( $V_{GS}=-4.5V$ )



**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	$V_{DS}$	60	-60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V
Continuous Drain Current <sup>A</sup>	$T_A=25^\circ\text{C}$	4.7	-3.4	A
	$T_A=70^\circ\text{C}$	3.8	-2.7	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	20	-20	
Power Dissipation	$T_A=25^\circ\text{C}$	2.5	2.5	W
	$T_A=70^\circ\text{C}$	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 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	$^\circ\text{C/W}$
	Steady-State		n-ch	74	90	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	n-ch	28	40	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	$R_{\theta JA}$	p-ch	35	50	$^\circ\text{C/W}$
	Steady-State		p-ch	73	90	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	Steady-State	$R_{\theta JL}$	p-ch	32	40	$^\circ\text{C/W}$

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	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	60			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=48\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	$\mu\text{A}$
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1.5	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	$V_{GS}=10\text{V}$ , $I_D=4.7\text{A}$ $T_J=125^\circ\text{C}$		42 75	56	m $\Omega$
		$V_{GS}=4.5\text{V}$ , $I_D=4\text{A}$		54	77	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=4.7\text{A}$		11		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$		0.78	1	V
$I_S$	Maximum Body-Diode Continuous Current				4	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=30\text{V}$ , $f=1\text{MHz}$		450	540	pF
$C_{oss}$	Output Capacitance			60		pF
$C_{rss}$	Reverse Transfer Capacitance			25		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		1.65	2	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $I_D=4.7\text{A}$		8.5	10.5	nC
$Q_g(4.5\text{V})$	Total Gate Charge			4.3	5.5	nC
$Q_{gs}$	Gate Source Charge			1.6		nC
$Q_{gd}$	Gate Drain Charge			2.2		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$ , $V_{DS}=30\text{V}$ , $R_L=6\Omega$ , $R_{GEN}=3\Omega$		5.1		ns
$t_r$	Turn-On Rise Time			2.6		ns
$t_{D(off)}$	Turn-Off Delay Time			15.9		ns
$t_f$	Turn-Off Fall Time			2		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=4.7\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		25.1	35	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=4.7\text{A}$ , $dI/dt=100\text{A}/\mu\text{s}$		28.7		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.

Rev 1 : Aug 2005

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CANNEL

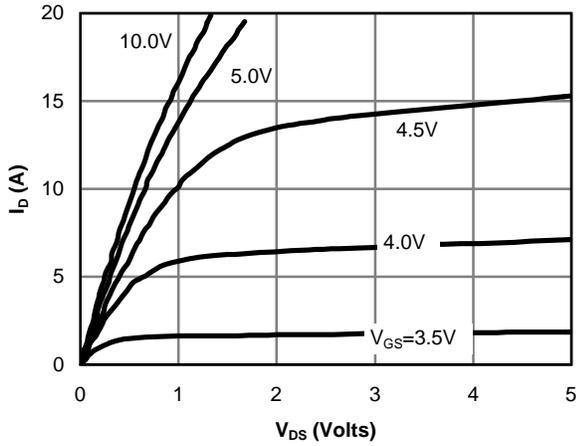


Fig 1: On-Region Characteristics

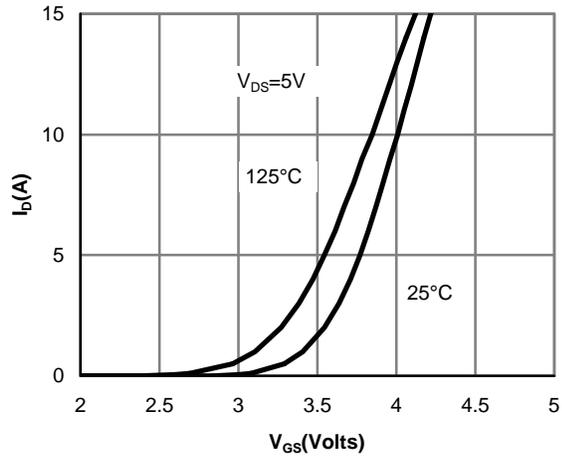


Figure 2: Transfer Characteristics

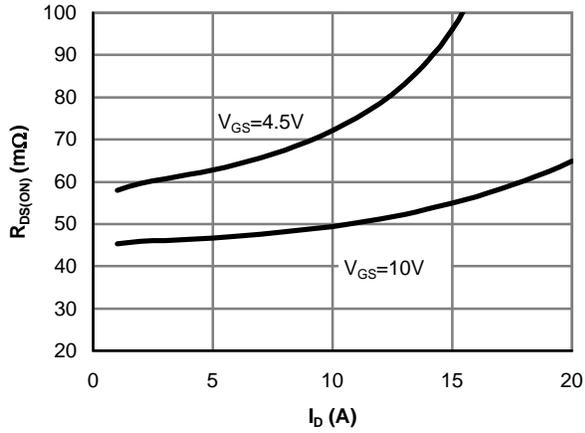


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

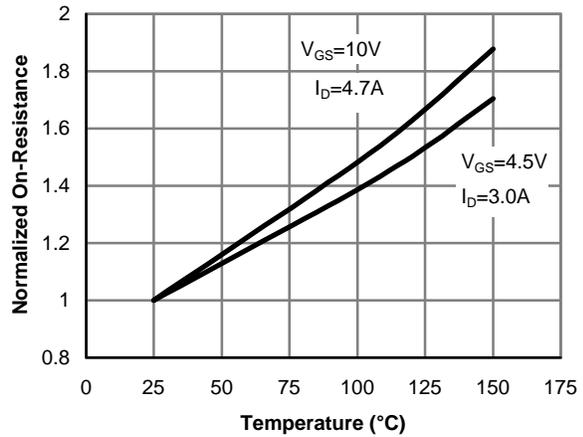


Figure 4: On-Resistance vs. Junction Temperature

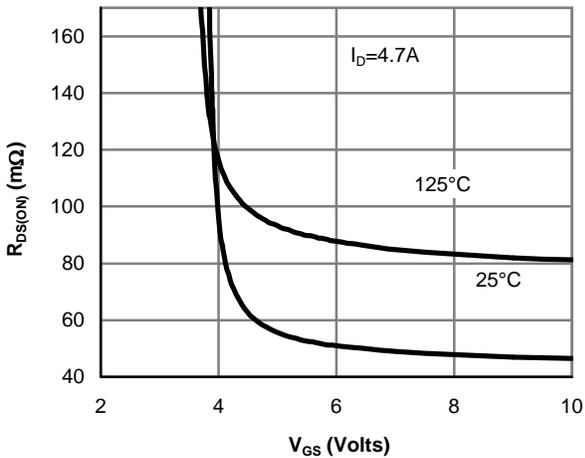


Figure 5: On-Resistance vs. Gate-Source Voltage

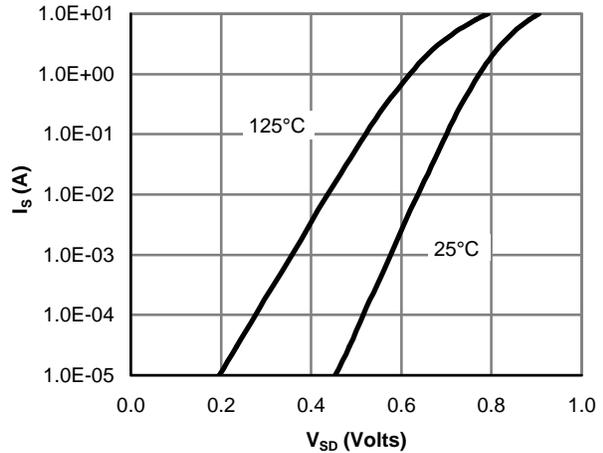


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

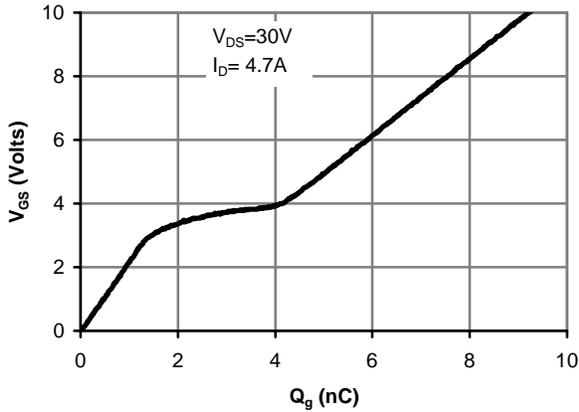


Figure 7: Gate-Charge Characteristics

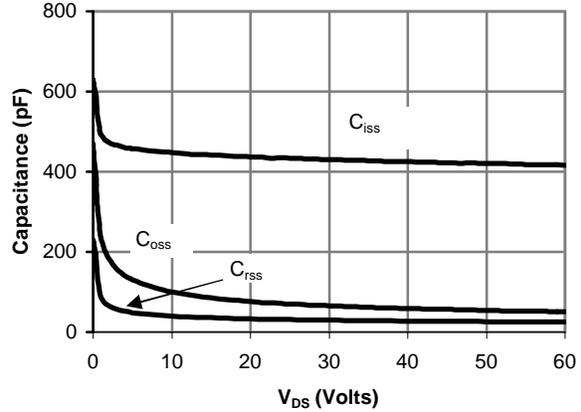


Figure 8: Capacitance Characteristics

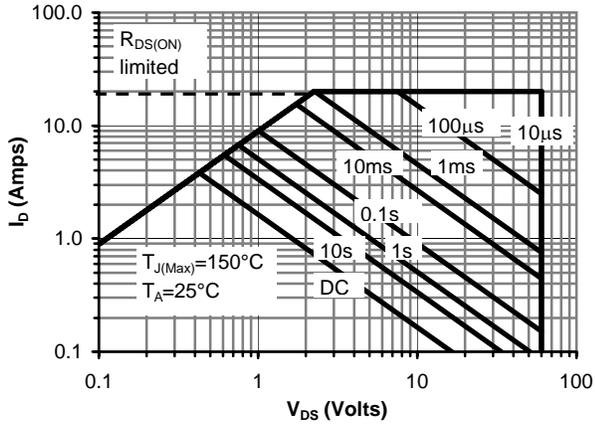


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

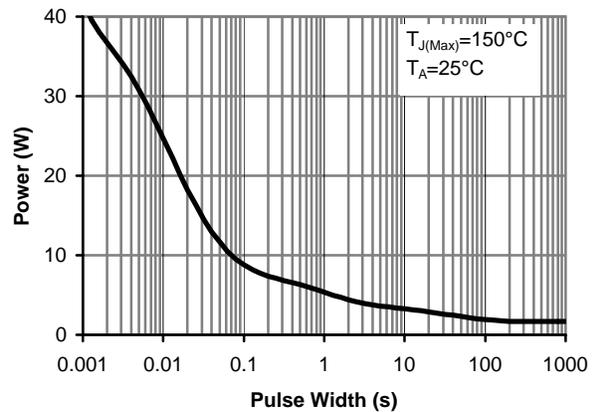


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

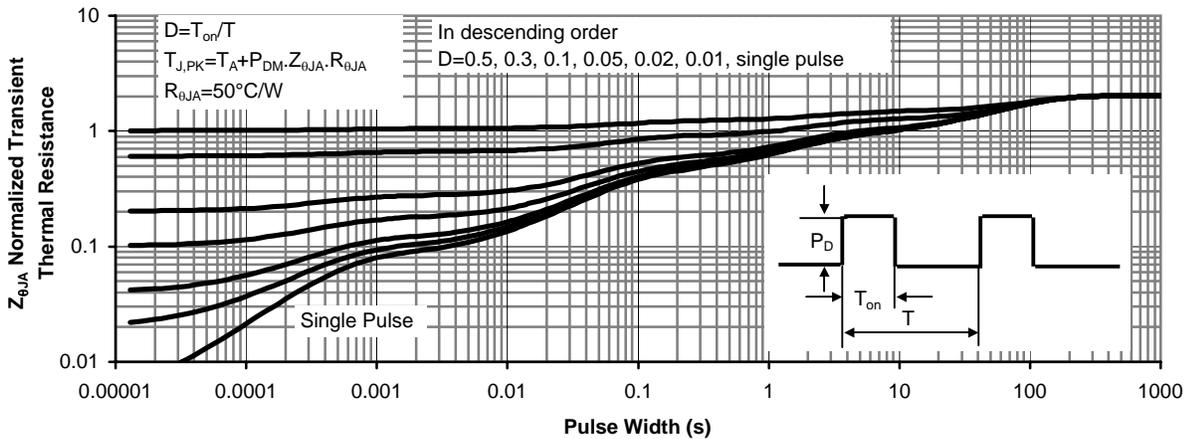


Figure 11: Normalized Maximum Transient Thermal Impedance

P-Channel 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	$I_D=-250\mu\text{A}$ , $V_{GS}=0\text{V}$	-60			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-48\text{V}$ , $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1	$\mu\text{A}$
					-5	
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=-250\mu\text{A}$	-1.5	-2.1	-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	$V_{GS}=-10\text{V}$ , $I_D=-3.4\text{A}$ $T_J=125^\circ\text{C}$		80	105	m $\Omega$
				130		
		$V_{GS}=-4.5\text{V}$ , $I_D=-2.7\text{A}$		102	135	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=-5\text{V}$ , $I_D=-3.4\text{A}$		10		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				-4	A
<b>DYNAMIC PARAMETERS</b>						
$C_{ISS}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=-30\text{V}$ , $f=1\text{MHz}$		930	1120	pF
$C_{OSS}$	Output Capacitance			85		pF
$C_{RSS}$	Reverse Transfer Capacitance			35		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		7.2	9	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge (10V)	$V_{GS}=-10\text{V}$ , $V_{DS}=-30\text{V}$ , $I_D=-3.4\text{A}$		16	20	nC
$Q_g(4.5\text{V})$	Total Gate Charge (4.5V)			8	10	nC
$Q_{gs}$	Gate Source Charge			2.5		nC
$Q_{gd}$	Gate Drain Charge			3.2		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}$ , $V_{DS}=-30\text{V}$ , $R_L=8.8\Omega$ , $R_{GEN}=3\Omega$		8		ns
$t_r$	Turn-On Rise Time			3.8		ns
$t_{D(off)}$	Turn-Off DelayTime			31.5		ns
$t_f$	Turn-Off Fall Time			7.5		ns
$t_{rr}$	Body Diode Reverse Recovery Time		$I_F=-3.4\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$		27	35
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=-3.4\text{A}$ , $di/dt=100\text{A}/\mu\text{s}$		32		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  $\leq 10\text{s}$  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 6,12,14 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.

Rev1:Aug 2005

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

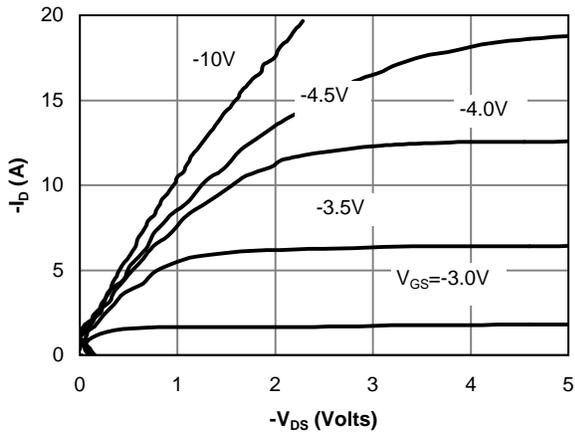


Fig 1: On-Region Characteristics

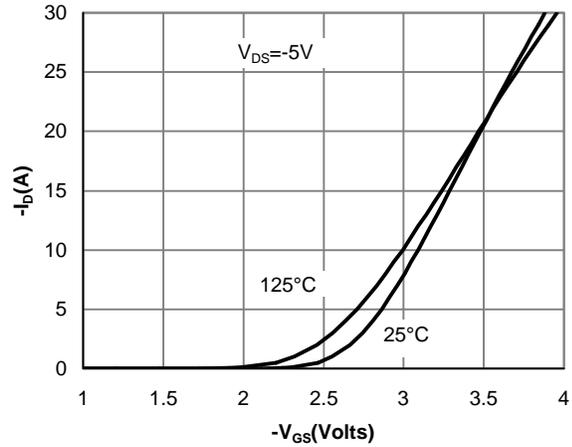


Figure 2: Transfer Characteristics

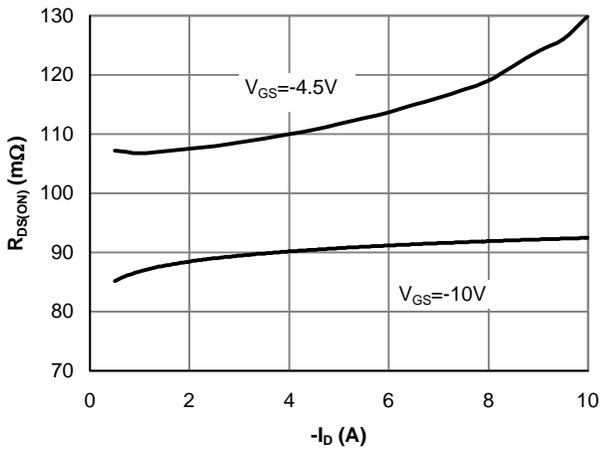


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

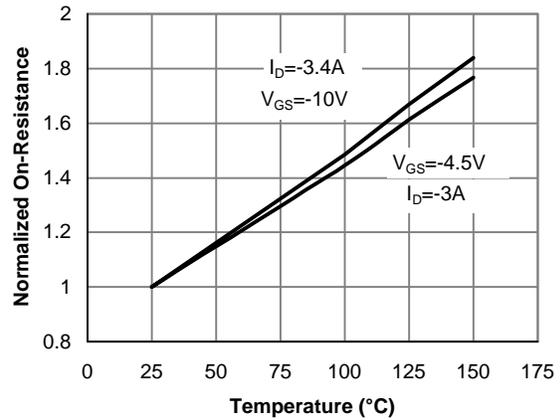


Figure 4: On-Resistance vs. Junction Temperature

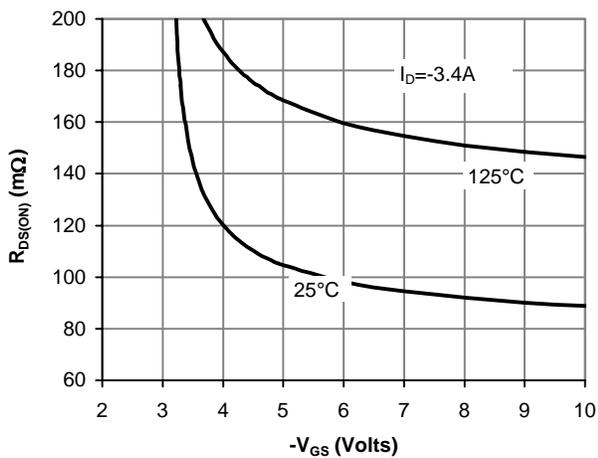


Figure 5: On-Resistance vs. Gate-Source Voltage

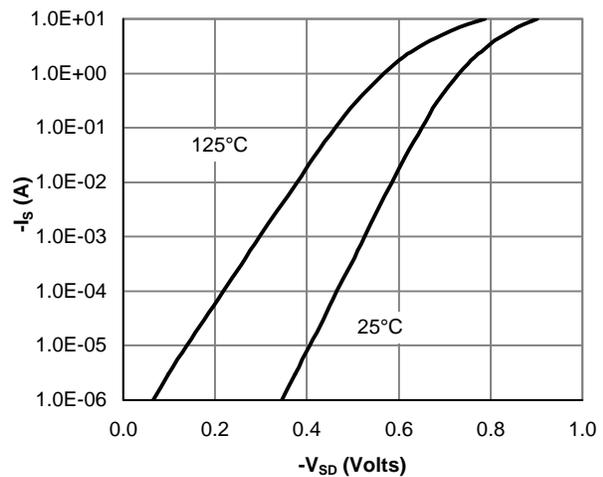


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

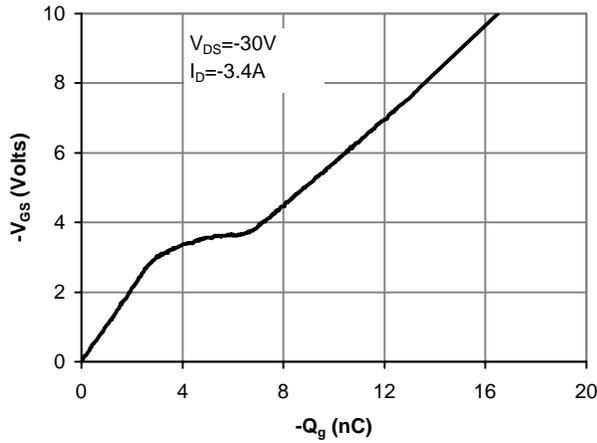


Figure 7: Gate-Charge Characteristics

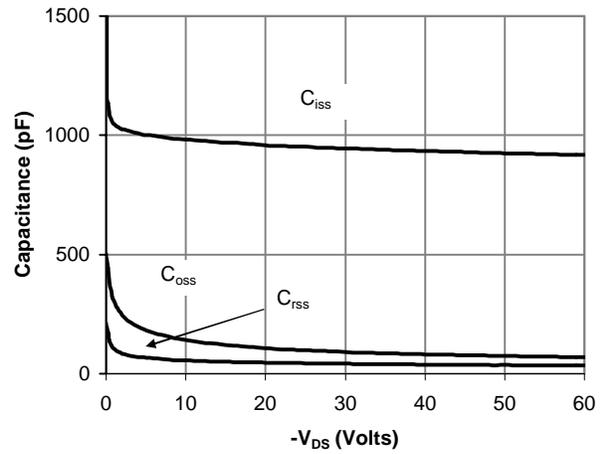


Figure 8: Capacitance Characteristics

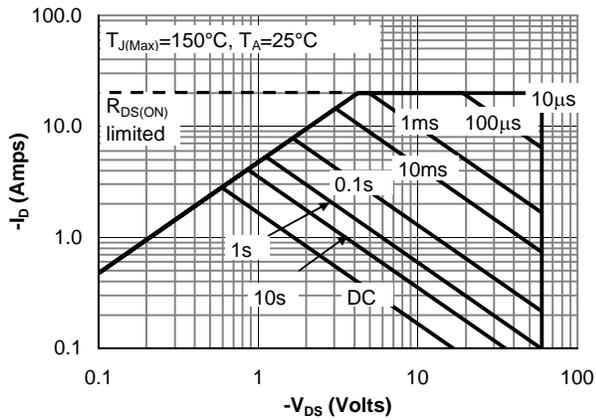


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

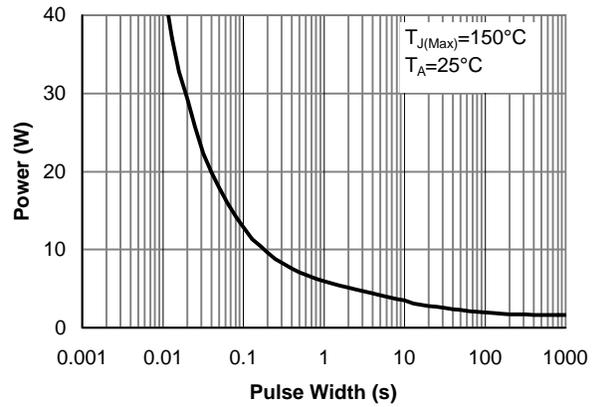


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

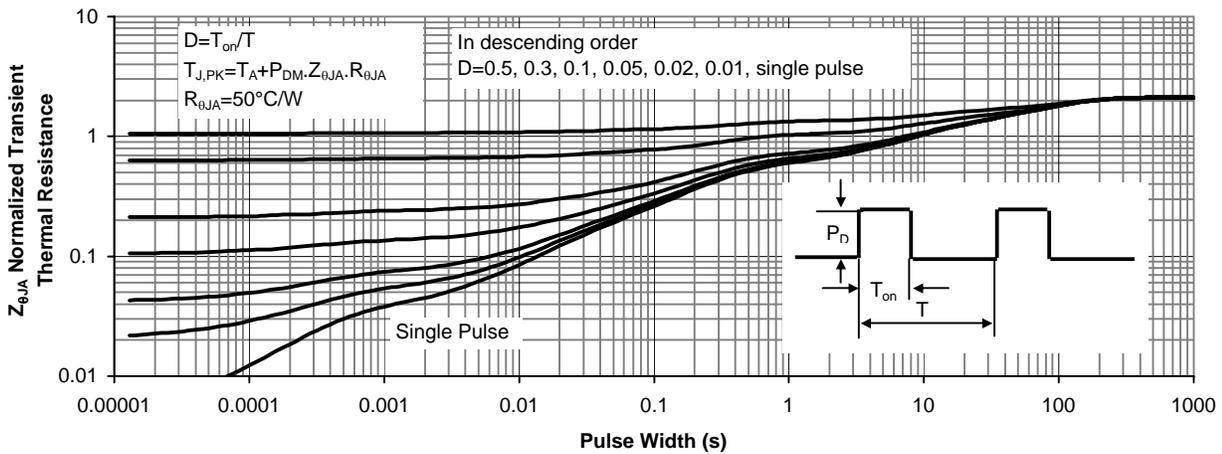


Figure 11: Normalized Maximum Transient Thermal Impedance