

AOD606

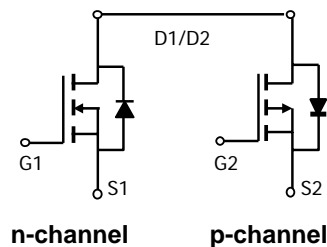
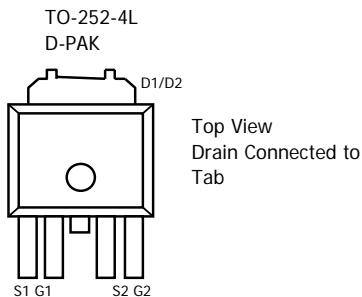
Complementary Enhancement Mode Field Effect Transistor

General Description

The AOD606 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 AOD606 is Pb free (meets ROHS & Sony 259 specifications). AOD606L is a Green Product ordering option. AOD606 and AOD606L are electrically identical.*

Features

n-channel	p-channel
$V_{DS} (V) = 40V$	-40V
$I_D = 8A (V_{GS}=10V)$	-8A ($V_{GS} = -10V$)
$R_{DS(ON)}$	$R_{DS(ON)}$
< 33 m Ω ($V_{GS}=10V$)	< 50 m Ω ($V_{GS} = -10V$)
< 47 m Ω ($V_{GS}=4.5V$)	< 70 m Ω ($V_{GS} = -4.5V$)



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}	± 20	± 20	V
Continuous Drain Current ^G	I_D	8	8	A
$T_C=25^\circ C$		8	8	
Pulsed Drain Current ^C	I_{DM}	30	-30	
Avalanche Current ^C	I_{AR}	8	-8	A
Repetitive avalanche energy $L=0.1mH$ ^C	E_{AR}	20	30	mJ
Power Dissipation ^B	P_D	20	50	W
		$T_C=100^\circ C$	10	
Power Dissipation ^A	P_{DSM}	2	2.5	W
		$T_A=70^\circ C$	1.3	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	-55 to 175	$^\circ C$

Thermal Characteristics: n-channel and p-channel

Parameter	Symbol	Device	Typ	Max	
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	n-ch	17.4	30	$^\circ C/W$
Maximum Junction-to-Ambient ^A		n-ch	50	60	$^\circ C/W$
Maximum Junction-to-Case ^B	$R_{\theta JC}$	n-ch	4	7.5	$^\circ C/W$
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	p-ch	16.7	25	$^\circ C/W$
Maximum Junction-to-Ambient ^A		p-ch	40	50	$^\circ C/W$
Maximum Junction-to-Case ^B	$R_{\theta JC}$	p-ch	2.5	3	$^\circ C/W$

N-Channel MOSFET Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=10\text{mA}$, $V_{GS}=0\text{V}$	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 5	μA
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	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=8\text{A}$		27	33	m Ω
		$T_J=125^\circ\text{C}$		39	52	
		$V_{GS}=4.5\text{V}$, $I_D=6\text{A}$		37	47	m Ω
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=8\text{A}$		25		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				8	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=20\text{V}$, $f=1\text{MHz}$		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		Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $I_D=8\text{A}$		9.2		nC
$Q_g(4.5\text{V})$	Total Gate Charge			4.5		nC
Q_{gs}	Gate Source Charge			1.6		nC
Q_{gd}	Gate Drain Charge			2.6		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=20\text{V}$, $R_L=2.5\Omega$, $R_{GEN}=3\Omega$		3.5		ns
t_r	Turn-On Rise Time			6		ns
$t_{D(off)}$	Turn-Off DelayTime			13.2		ns
t_f	Turn-Off Fall Time			3.5		ns
t_{rr}	Body Diode Reverse Recovery Time		$I_F=8\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		22.9	
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=8\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		18.3		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B: The power dissipation P_D is based on $T_{J(MAX)}=175^\circ\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=175^\circ\text{C}$.

D: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using $<300 \mu\text{s}$ pulses, duty cycle 0.5% max.

F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}=175^\circ\text{C}$.

G: The maximum current rating is limited by bond-wires.

H: These tests are performed with the device mounted on 1 in² 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 0: January 2006

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.

N-Channel MOSFET TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

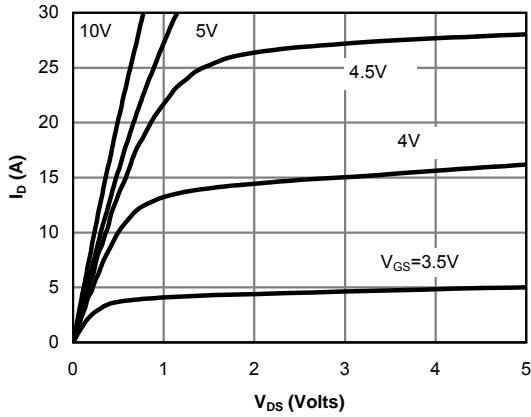


Fig 1: On-Region Characteristics

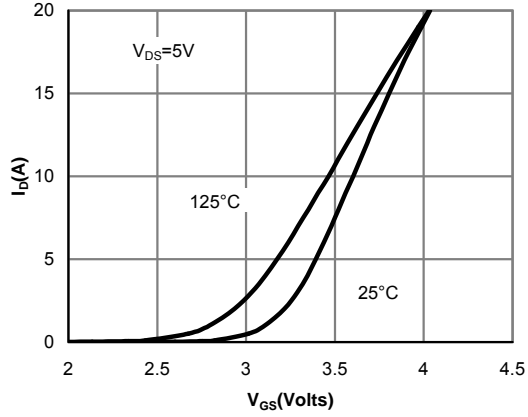


Figure 2: Transfer Characteristics

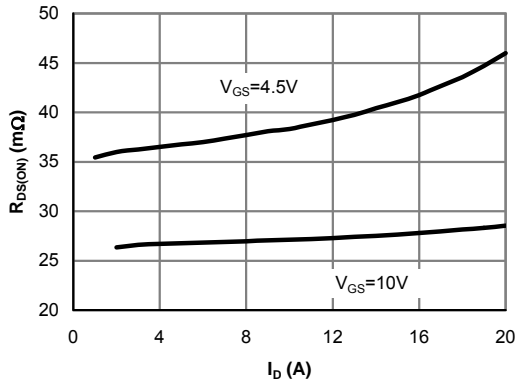


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

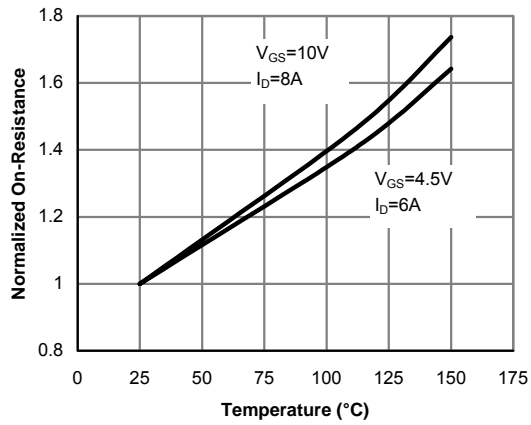


Figure 4: On-Resistance vs. Junction Temperature

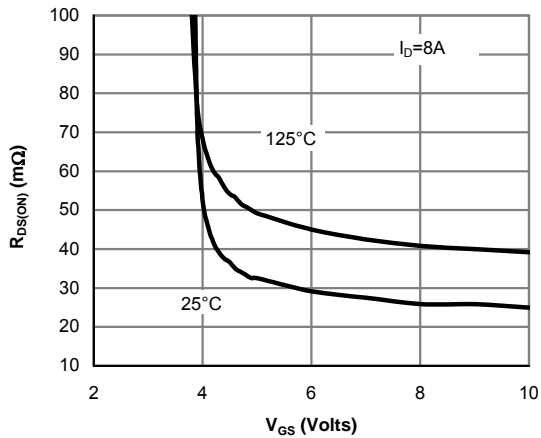


Figure 5: On-Resistance vs. Gate-Source Voltage

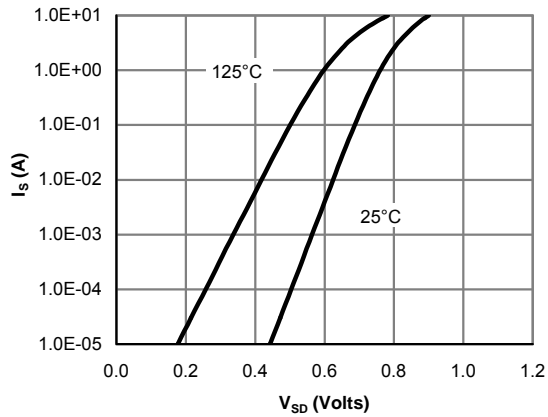


Figure 6: Body-Diode Characteristics

N-Channel MOSFET TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

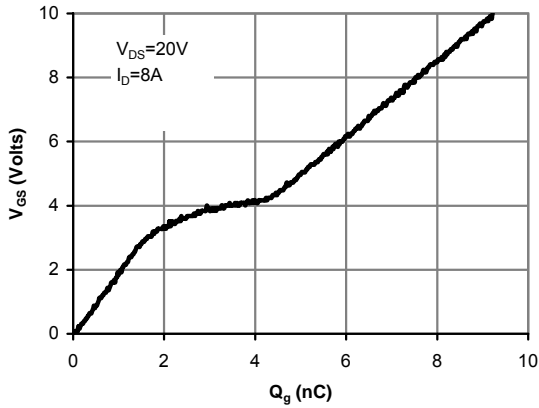


Figure 7: Gate-Charge Characteristics

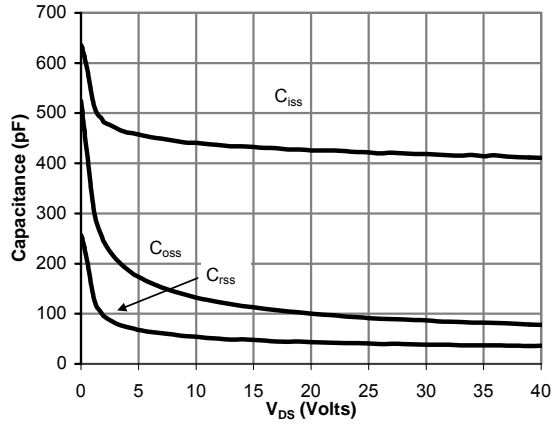


Figure 8: Capacitance Characteristics

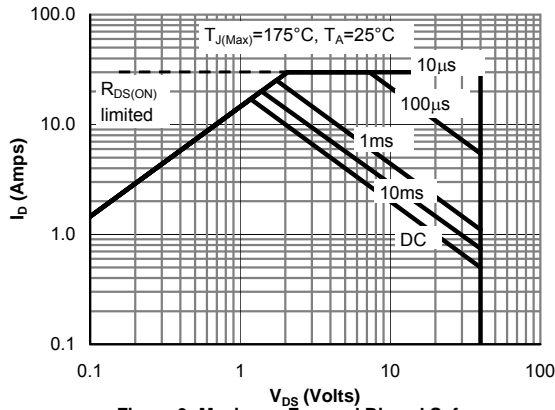


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

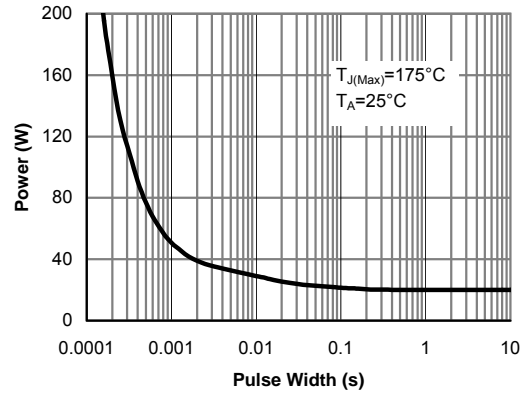


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

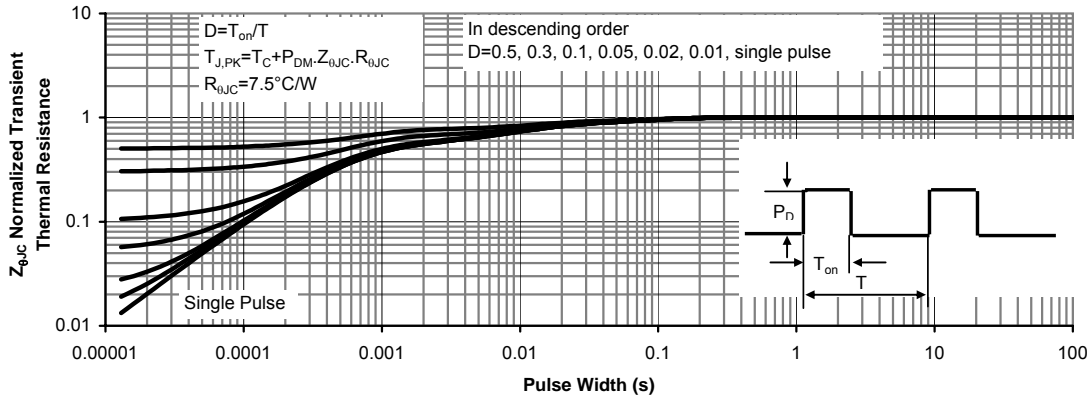


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

N-Channel MOSFET TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

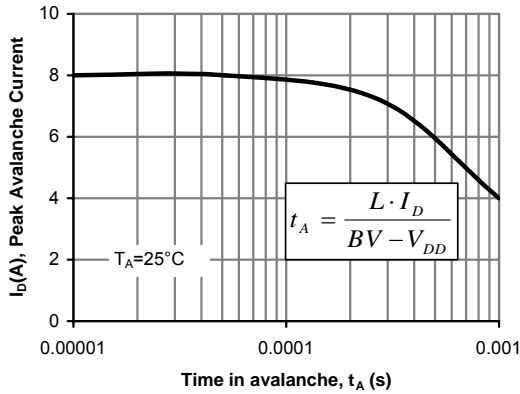


Figure 12: Single Pulse Avalanche capability

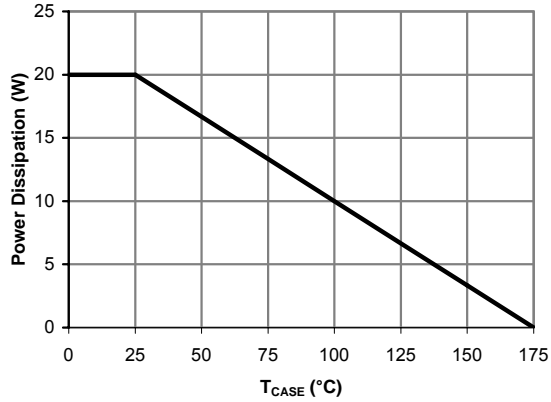


Figure 13: Power De-rating (Note B)

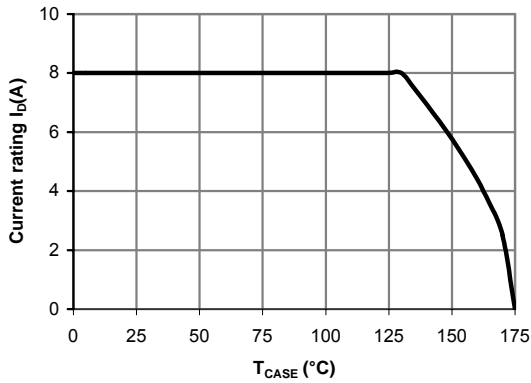


Figure 14: Current De-rating (Note B)

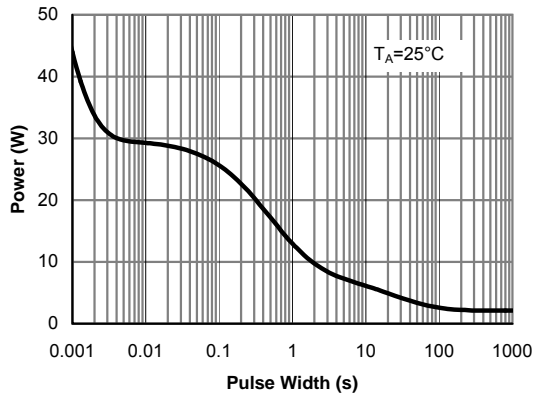


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

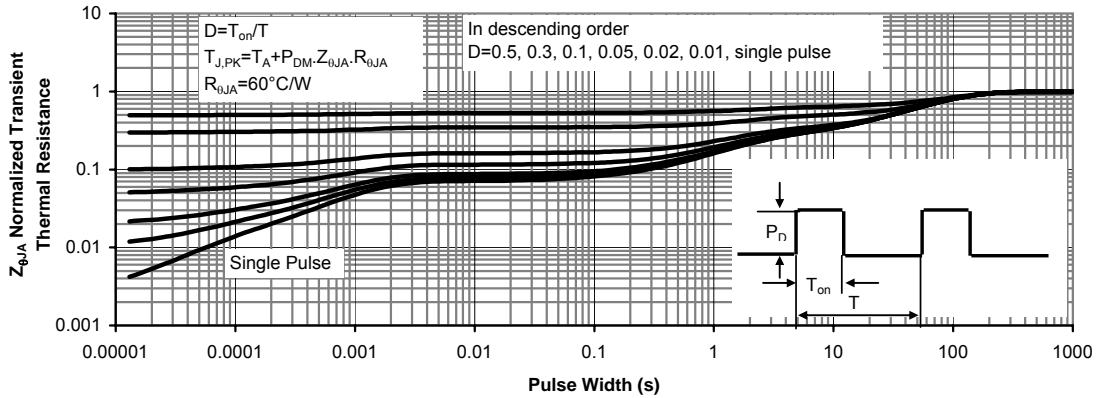


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

P-Channel MOSFET Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =-250μA, V _{GS} =0V	-40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-32V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1	-1.8	-3	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-30			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-8A T _J =125°C		35 62	50	mΩ
		V _{GS} =-4.5V, I _D =-4A		55	70	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-8A		16		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.75	-1	V
I _S	Maximum Body-Diode Continuous Current				-8	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-20V, f=1MHz		657		pF
C _{oss}	Output Capacitance			143		pF
C _{rss}	Reverse Transfer Capacitance			63		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		6.5		Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge (10V)	V _{GS} =-10V, V _{DS} =-20V, I _D =-8A		14.1		nC
Q _g (4.5V)	Total Gate Charge (4.5V)			7		nC
Q _{gs}	Gate Source Charge			2.2		nC
Q _{gd}	Gate Drain Charge			4.1		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =-10V, V _{DS} =-20V, R _L =2.5Ω, R _{GEN} =3Ω		8		ns
t _r	Turn-On Rise Time			12.2		ns
t _{D(off)}	Turn-Off Delay Time			24		ns
t _f	Turn-Off Fall Time			12.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-8A, dI/dt=100A/μs		23.2		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-8A, dI/dt=100A/μs		18.2		nC

A: The value of R_{qJA} is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation PDSM is based on R_{qJA} and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B: The power dissipation PD is based on T_{J(MAX)}=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=175°C.

D: The R_{qJA} is the sum of the thermal impedance from junction to case R_{qJC} and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300 ms pulses, duty cycle 0.5% max.

F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=175°C.

G: The maximum current rating is limited by bond-wires.

H: These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

Rev 0 : January 2006

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.

P-Channel MOSFET Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

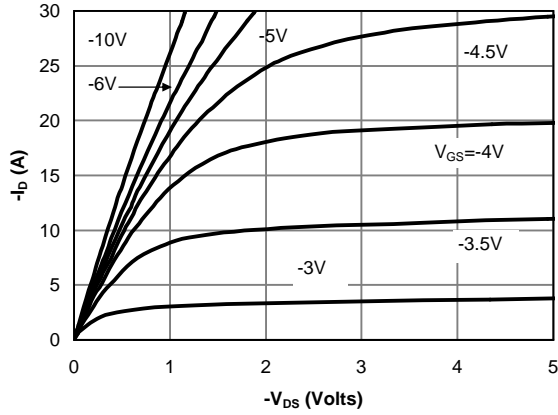


Fig 1: On-Region Characteristics

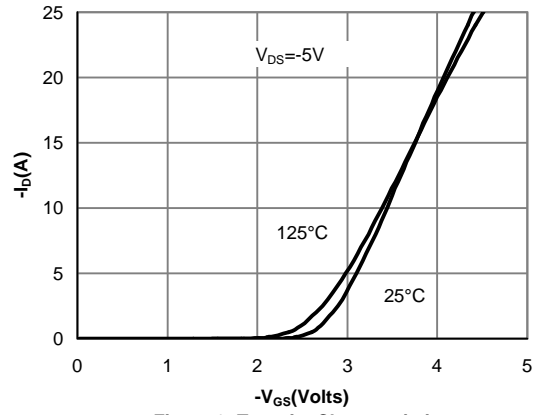


Figure 2: Transfer Characteristics

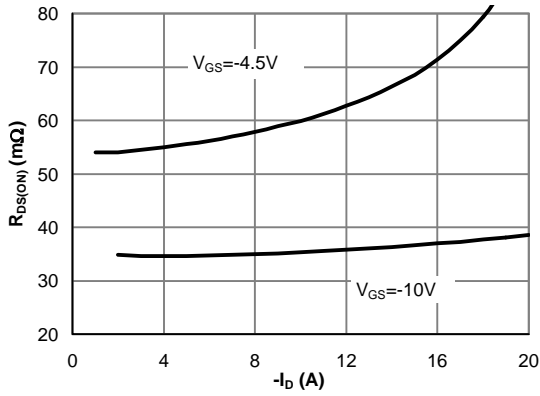


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

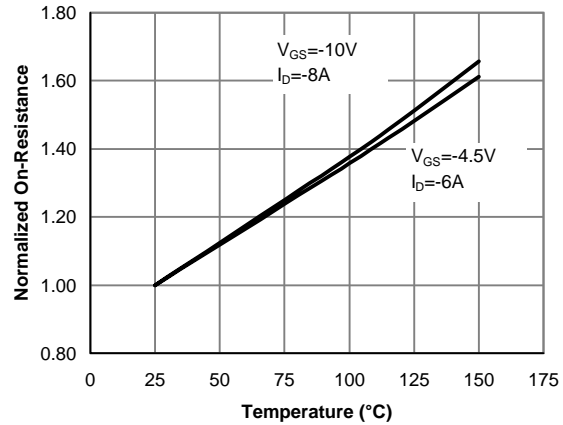


Figure 4: On-Resistance vs. Junction Temperature

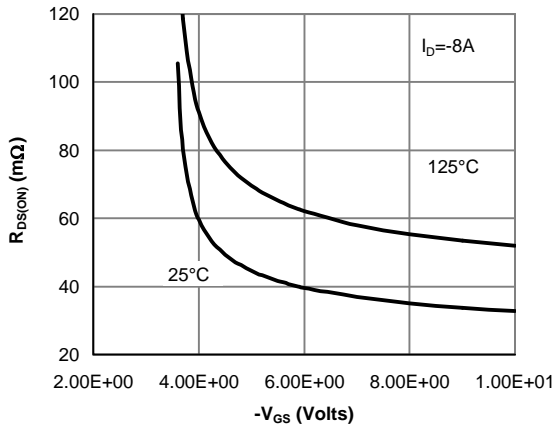


Figure 5: On-Resistance vs. Gate-Source Voltage

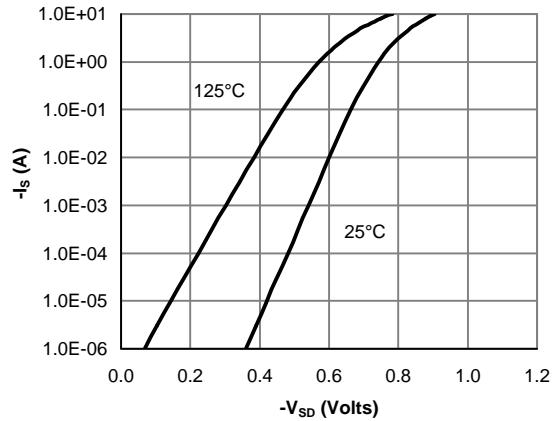


Figure 6: Body-Diode Characteristics

P-Channel MOSFET Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

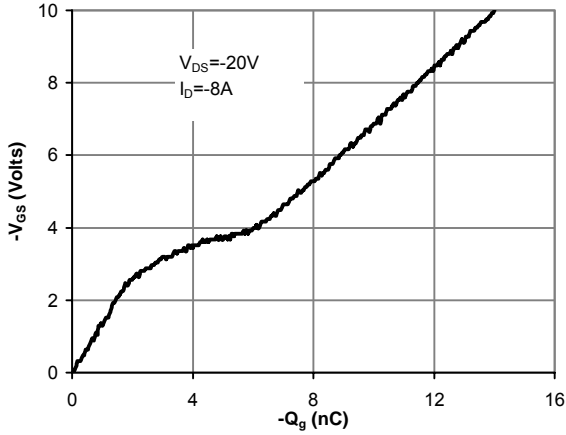


Figure 7: Gate-Charge Characteristics

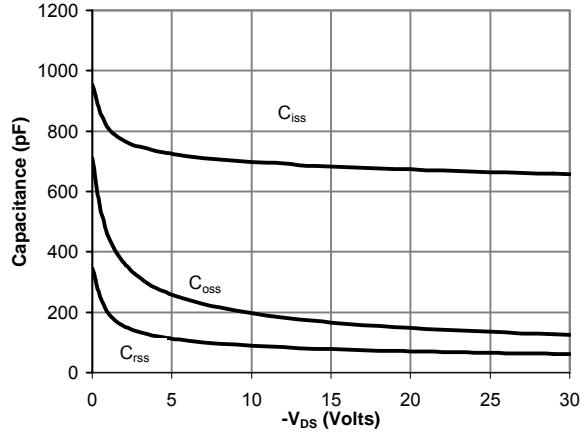


Figure 8: Capacitance Characteristics

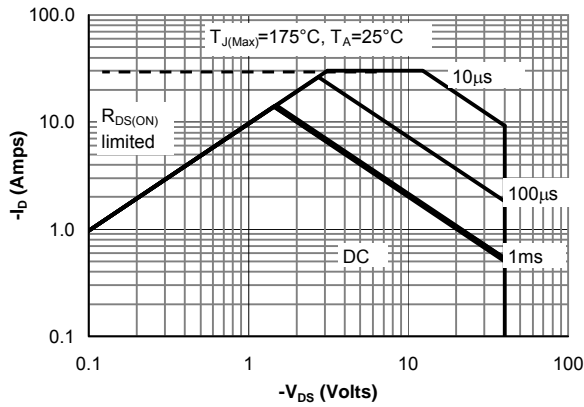


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

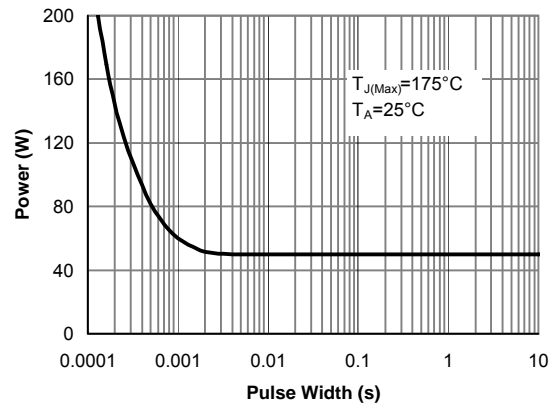


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

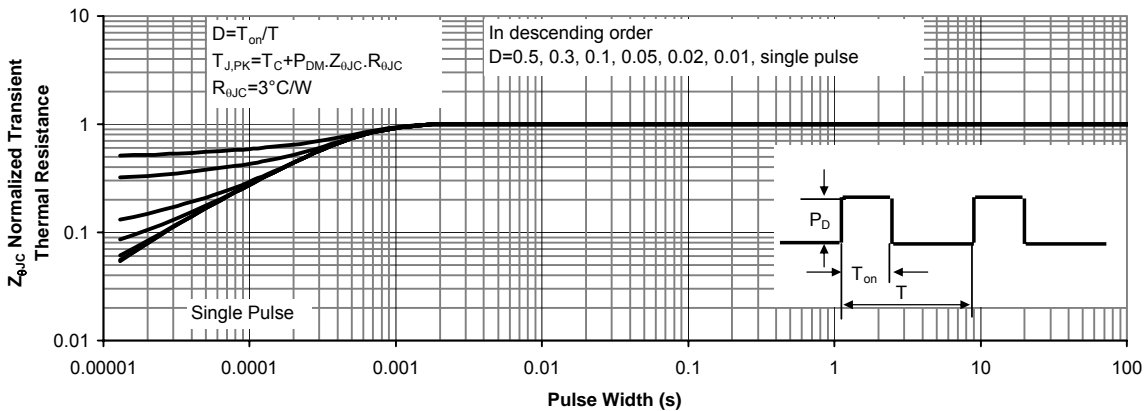


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

P-Channel MOSFET Electrical Characteristics (T_J=25°C unless otherwise noted)

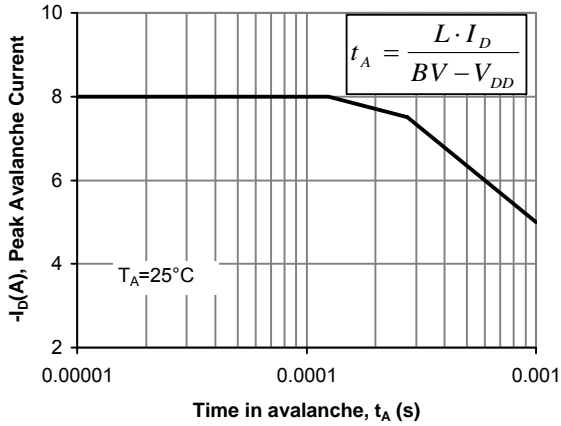


Figure 12: Single Pulse Avalanche capability

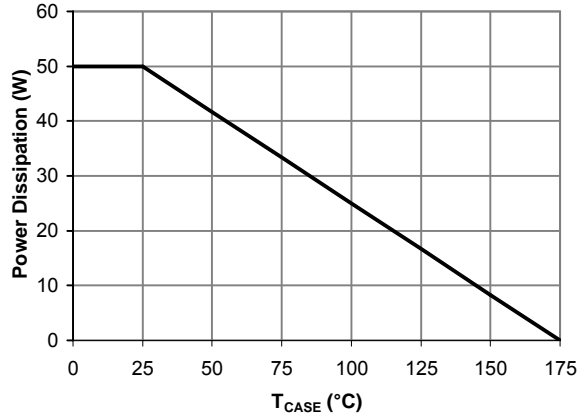


Figure 13: Power De-rating (Note B)

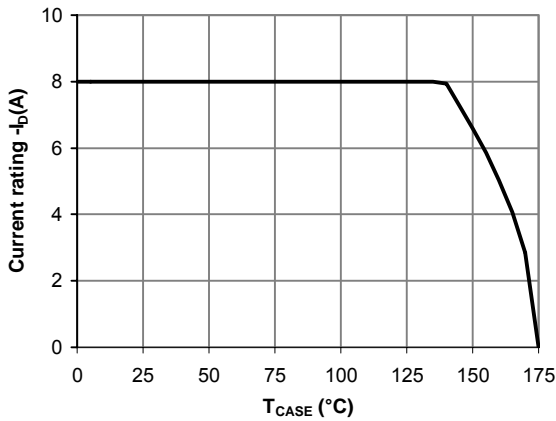


Figure 14: Current De-rating (Note B)

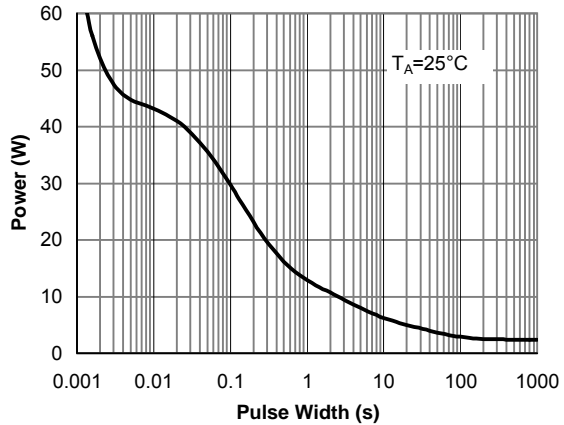


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

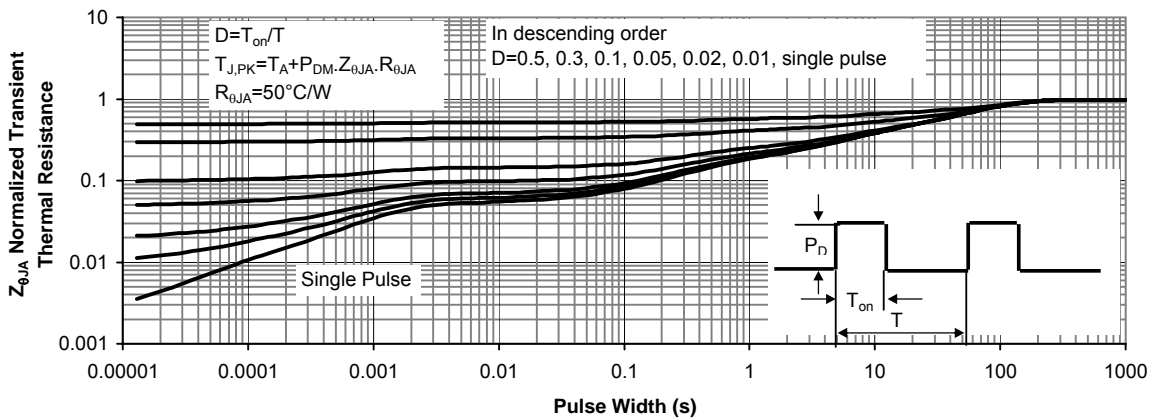


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)