ALPHA & OMEGA SEMICONDUCTOR 500V, 10A N-Channel MOSFET with Fast Recovery Diode										
General Description			Product Summary							
The AOTF10N50FD has been fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability this part can be adopted quickly into new and existing offline power supply designs.			V_{DS} I _D (at V _{GS} =10V) R _{DS(ON)} (at V _{GS} =10V)	600V@150℃ 10A < 0.75Ω						
			100% UIS Tested 100% R _g Tested	Green						
	TO-220F									
	DTF10N50FD G D	s								
Absolute Maximum	C	ss otherwise n	oted							
Absolute Maximum Parameter	DTF10N50FD ^G Ratings T _A =25°C unles	ss otherwise n	oted AOTF10N50FD	Units						
Absolute Maximum Parameter Drain-Source Voltage	DTF10N50FD ^G Ratings T _A =25°C unles	ss otherwise n Symbol V _{DS}	AOTF10N50FD 500	Units V						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage	DTF10N50FD ^G Ratings T _A =25°C unles	ss otherwise n	AOTF10N50FD 500 ±30	Units						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current	DTF10N50FD G Ratings $T_A=25^{\circ}C$ unles $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	ss otherwise n Symbol V _{DS}	AOTF10N50FD 500	Units V						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current	DTF10N50FD G Ratings $T_A=25^{\circ}C$ unles $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	ss otherwise n Symbol V _{DS} V _{GS}	AOTF10N50FD 500 ±30 10*	Units V V						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^c	Tr 10N50FD G Ratings $T_A=25^{\circ}C$ unles $T_C=25^{\circ}C$ $T_C=100^{\circ}C$ C	ss otherwise n Symbol V _{DS} V _{GS}	AOTF10N50FD 500 ±30 10* 6*	Units V V						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche	Tr = 100°C G Ratings T _A =25°C unles $T_c=25°C$ $T_c=100°C$ energy ^C	SS otherwise n Symbol V _{DS} V _{GS} I _D I _{DM} I _{AR}	AOTF10N50FD 500 ±30 10* 6* 33	Units V V A						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche	Tr = 100°C G Ratings T _A =25°C unles $T_c=25°C$ $T_c=100°C$ energy ^C	SS otherwise normalized by the second	AOTF10N50FD 500 ±30 10* 6* 33 3.8	Units V V A A A						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^c	DTF10N50FD G Ratings $T_A=25^{\circ}C$ unles $T_C=25^{\circ}C$ $T_C=100^{\circ}C$ c energy C che energy G	SS otherwise n Symbol V _{DS} V _{GS} I _D I _{DM} I _{AR}	AOTF10N50FD 500 ±30 10* 6* 33 3.8 216	Units V V A A M M J						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche Single pulsed avalance Peak diode recovery of	DTF10N50FD G Ratings $T_A=25^{\circ}C$ unles $T_C=25^{\circ}C$ $T_C=100^{\circ}C$ c energy C che energy G	ss otherwise n Symbol V_{DS} V_{GS} I_D I_{DM} I_{AR} E_{AR} E_{AS} dv/dt	AOTF10N50FD 500 ±30 10* 6* 33 3.8 216 433	Units V V A A M M M J mJ						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche Single pulsed avalance	DTF10N50FD G Ratings $T_A=25^{\circ}C$ unles $T_C=25^{\circ}C$ $T_C=100^{\circ}C$ c energy C che energy G dv/dt	SS otherwise n Symbol V _{DS} V _{GS} I _D I _{DM} I _{AR} E _{AR} E _{AS}	AOTF10N50FD 500 ±30 10* 6* 33 3.8 216 433 5	Units V V A A M A MJ MJ V/ns						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche Single pulsed avalance Peak diode recovery of	DTF10N50FD G Ratings $T_A=25^{\circ}C$ unles $T_C=25^{\circ}C$ $T_C=100^{\circ}C$ c energy c che energy G dv/dt $T_C=25^{\circ}C$ Derate above 25^{\circ}C	ss otherwise n Symbol V_{DS} V_{GS} I_D I_{DM} I_{AR} E_{AR} E_{AS} dv/dt P_D	AOTF10N50FD 500 ±30 10* 6* 33 3.8 216 433 5 50	Units V V A A A MJ MJ V/ns W						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche Single pulsed avalance Peak diode recovery of Power Dissipation ^B Junction and Storage Maximum lead tempe	G G Ratings T_A =25°C unles T_c=25°C T_c=100°C C energy C che energy G dv/dt T_c=25°C Derate above 25°C Temperature Range rature for soldering	SS otherwise n Symbol V _{DS} V _{GS} I _D I _{DM} I _{AR} E _{AR} E _{AS} dv/dt P _D T _J , T _{STG}	AOTF10N50FD 500 ±30 10* 6* 33 3.8 216 433 5 500 0.4 -55 to 150	Units V V A MJ W/ns W W/°C °C						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche Single pulsed avalance Peak diode recovery of Power Dissipation ^B Junction and Storage Maximum lead tempe purpose, 1/8" from ca	G G Ratings $T_A=25^{\circ}C$ unles $T_C=25^{\circ}C$ $T_C=100^{\circ}C$ c energy C che energy G dv/dt $T_C=25^{\circ}C$ Derate above $25^{\circ}C$ Temperature Range rature for soldering se for 5 seconds	ss otherwise n Symbol V_{DS} V_{GS} I_D I_{DM} I_{AR} E_{AR} E_{AS} dv/dt P_D	AOTF10N50FD 500 ±30 10* 6* 33 3.8 216 433 5 50 0.4	Units V V A A A M A M J MJ V/ns V/ns W W/°C						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche Single pulsed avalance Peak diode recovery of Power Dissipation ^B Junction and Storage Maximum lead tempe purpose, 1/8" from ca Thermal Characteris	G Ratings $T_A=25^{\circ}C$ unles T_C=25^{\circ}C T_C=100^{\circ}C C energy C che energy G dv/dt T_C=25^{\circ}C Derate above 25^{\circ}C Temperature Range rature for soldering se for 5 seconds	ss otherwise m Symbol V_{DS} V_{GS} I_D I_{DM} I_{AR} E_{AR} E_{AS} dv/dt P_D T_J, T_{STG} T_L	AOTF10N50FD 500 ±30 10* 6* 33 3.8 216 433 5 50 0.4 -55 to 150 300	Units V V A MJ MJ V/ns W V/°C °C °C						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche Single pulsed avalance Peak diode recovery of Power Dissipation ^B Junction and Storage Maximum lead tempe purpose, 1/8" from ca Thermal Characteris	G G Ratings T_A =25°C unles T_c=25°C T_c=100°C C C energy C che energy G dv/dt T_c=25°C T_c=25°C Derate above 25°C Temperature Range rature for soldering se for 5 seconds stics rameter	SS otherwise m Symbol V _{DS} V _{GS} I _D I _D I _{DM} I _{AR} E _{AR} E _{AR} E _{AS} dv/dt P _D T _J , T _{STG} T _L	AOTF10N50FD 500 ±30 10* 6* 33 3.8 216 433 5 500 0.4 -55 to 150 300	Units V V A MJ MJ W V/ns W OC OC Units						
Absolute Maximum Parameter Drain-Source Voltage Gate-Source Voltage Continuous Drain Current Pulsed Drain Current Avalanche Current ^C Repetitive avalanche Single pulsed avalance Peak diode recovery of Power Dissipation ^B Junction and Storage Maximum lead tempe purpose, 1/8" from ca Thermal Characteris	G G Ratings $T_A=25^{\circ}C$ unles T_c=25^{\circ}C T_c=100^{\circ}C c energy C che energy G dv/dt T_c=25^{\circ}C Derate above 25^{\circ}C Temperature Range rature for soldering se for 5 seconds tics rameter -Ambient A,D	ss otherwise m Symbol V_{DS} V_{GS} I_D I_{DM} I_{AR} E_{AR} E_{AS} dv/dt P_D T_J, T_{STG} T_L	AOTF10N50FD 500 ±30 10* 6* 33 3.8 216 433 5 50 0.4 -55 to 150 300	Units V V A MJ MJ V/ns W V/°C °C °C						

* Drain current limited by maximum junction temperature.



Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Тур	Мах	Units
STATIC I	PARAMETERS	·				
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =10mA, V _{GS} =0V, T _J =25°C	500			
		I_D =10mA, V_{GS} =0V, T_J =150°C		600		V
BV _{DSS} /∆TJ	Breakdown Voltage Temperature Coefficient	I _D =10mA, V _{GS} =0V		0.56		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =500V, V _{GS} =0V V _{DS} =400V, T _J =125°C			10 100	μA
I _{GSS}	Gate-Body leakage current	$V_{DS}=0V, V_{GS}=\pm 30V$			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =5V, I _D =250μA	2.5	3.1	4.2	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V_{GS} =10V, I_{D} =5A		0.6	0.75	Ω
g _{FS}	Forward Transconductance	V_{DS} =40V, I_{D} =5A		10		S
V_{SD}	Diode Forward Voltage	I _S =10A,V _{GS} =0V		0.93	1.6	V
I _S	Maximum Body-Diode Continuous Current				10	Α
I _{SM}	Maximum Body-Diode Pulsed Current				33	А
DYNAMI	C PARAMETERS					
C _{iss}	Input Capacitance		820	1030	1240	pF
C _{oss}	Output Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz	75	112	150	pF
C _{rss}	Reverse Transfer Capacitance		5	10	15	pF
R _g	Gate resistance	V_{GS} =0V, V_{DS} =0V, f=1MHz	1.7	3.4	5.2	Ω
SWITCH	NG PARAMETERS					
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =400V, I _D =10A	20	26	35	nC
Q _{gs}	Gate Source Charge			4.8		nC
Q_{gd}	Gate Drain Charge			9.5		nC
t _{D(on)}	Turn-On DelayTime			24		ns
t _r	Turn-On Rise Time	V_{GS} =10V, V_{DS} =250V, I_{D} =10A,		65		ns
t _{D(off)}	Turn-Off DelayTime	$R_{G}=25\Omega$		69		ns
t _f	Turn-Off Fall Time			50		ns
t _{rr}	Body Diode Reverse Recovery Time	$I_F=10A, dI/dt=100A/\mu s, V_{DS}=100V$		116	190	ns
Q _{rr}	Body Diode Reverse Recovery Charge	e I _F =10A,dI/dt=100A/µs,V _{DS} =100V		0.3	0.6	μC

A. The value of R $_{\rm 0JA}$ is measured with the device in a still air environment with T $_{\rm A}$ =25 $^{\circ}$ C.

B. The power dissipation P_D is based on $T_{J(MAX)}$ =150° 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 $T_{J(MAX)}=150^{\circ}$ C, Ratings are based on low frequency and duty cycles to keep initial $T_{J}=25^{\circ}$ C.

D. The R $_{\text{0JA}}$ is the sum of the thermal impedance from junction to case R $_{\text{0JC}}$ and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300 μ 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 $T_{J(MAX)}$ =150° C. The SOA curve provides a single pulse rating.

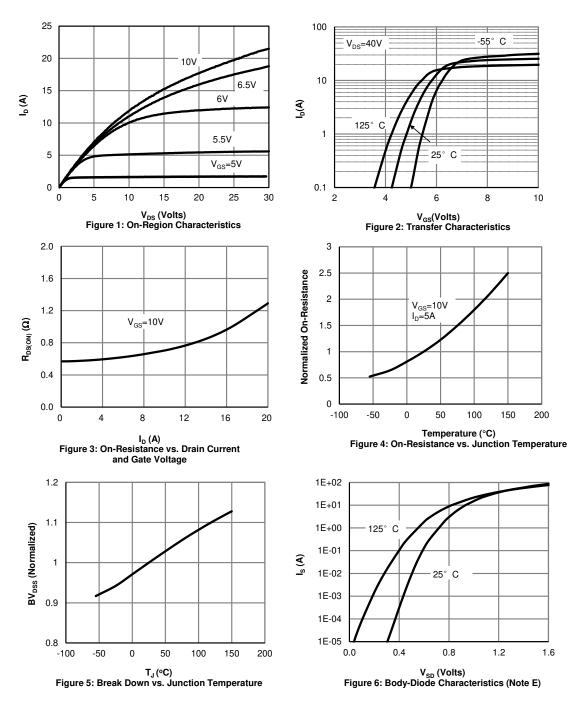
G. L=60mH, I_{AS} =3.8A, V_{DD} =150V, R_{G} =25 Ω , Starting T_{J} =25 $^{\circ}$ C

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 MAKE CHANGES TO PRODUCT SPECIFICATIONS WITHOUT NOTICE. IT IS THE RESPONSIBILITY OF THE CUSTOMER TO EVALUATE SUITABILITY OF THE PRODUCT FOR THEIR INTENDED APPLICATION. CUSTOMER SHALL COMPLY WITH APPLICABLE LEGAL REQUIREMENTS, INCLUDING ALL APPLICABLE EXPORT CONTROL RULES, REGULATIONS AND LIMITATIONS.

AOS' products are provided subject to AOS' terms and conditions of sale which are set forth at: http://www.aosmd.com/terms and conditions of sale



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

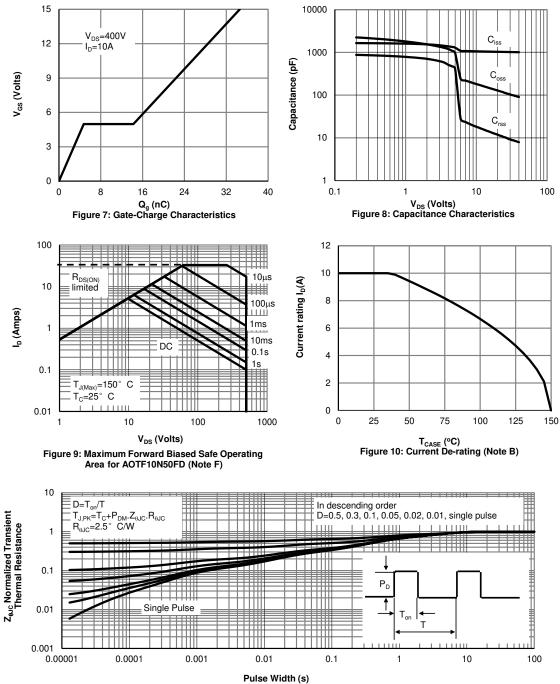
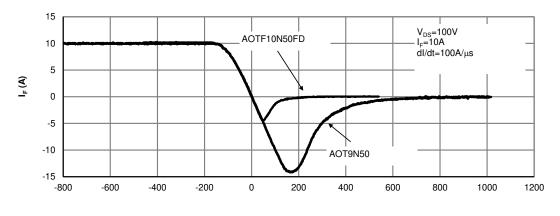


Figure 11: Normalized Maximum Transient Thermal Impedance for AOTF10N50FD (Note F)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

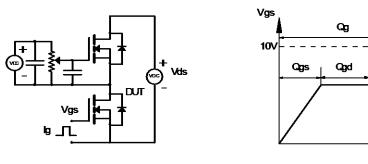


Trr (nS) Figure 12: Diode Recovery Characteristics

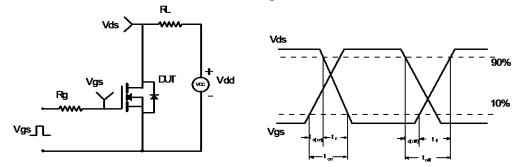


Charge

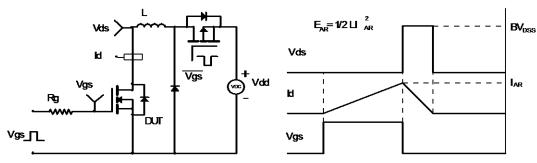
Gate Charge Test Circuit & Wave form



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

