

General Description

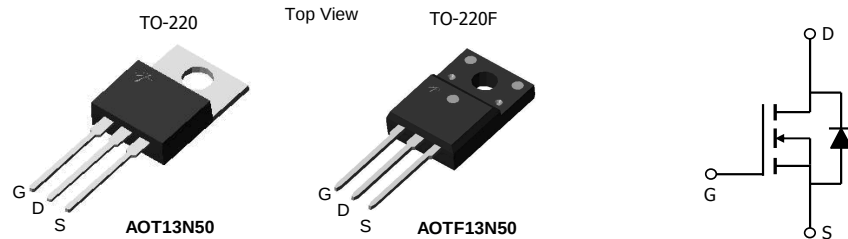
The AOT13N50 & AOTF13N50 have been fabricated using an advanced high voltage MOSFET process that is designed to deliver high levels of performance and robustness in popular AC-DC applications. By providing low $R_{DS(on)}$, C_{iss} and C_{rss} along with guaranteed avalanche capability these parts can be adopted quickly into new and existing offline power supply designs.

For Halogen Free add "L" suffix to part number:
 AOT13N50L & AOTF13N50L

Product Summary

V_{DS} 600V@150°C
 I_D (at $V_{GS}=10V$) 13A
 $R_{DS(ON)}$ (at $V_{GS}=10V$) < 0.51Ω

100% UIS Tested
 100% R_g Tested



Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	AOT13N50	AOTF13N50	Units
Drain-Source Voltage	V_{DS}	500		V
Gate-Source Voltage	V_{GS}	±30		V
Continuous Drain Current	$T_C=25^\circ\text{C}$	13	13*	A
	$T_C=100^\circ\text{C}$	8.5	8.5*	
Pulsed Drain Current ^C	I_{DM}	48		A
Avalanche Current ^C	I_{AR}	5.5		A
Repetitive avalanche energy ^C	E_{AR}	454		mJ
Single pulsed avalanche energy ^G	E_{AS}	908		mJ
Peak diode recovery dv/dt	dv/dt	5		V/ns
Power Dissipation ^B	$T_C=25^\circ\text{C}$	250	50	W
	Derate above 25°C	2	0.4	W/°C
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150		°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	T_L	300		°C

Thermal Characteristics

Parameter	Symbol	AOT13N50	AOTF13N50	Units
Maximum Junction-to-Ambient ^{A,D}	$R_{\theta JA}$	65	65	°C/W
Maximum Case-to-sink ^A	$R_{\theta CS}$	0.5	--	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	0.5	2.5	°C/W

* Drain current limited by maximum junction temperature.

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, T _J =25°C I _D =250μA, V _{GS} =0V, T _J =150°C	500			V
BV _{DSS} /ΔT _J	Zero Gate Voltage Drain Current	ID=250μA, VGS=0V		0.54		V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =500V, V _{GS} =0V V _{DS} =400V, T _J =125°C			1 10	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±30V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =5V I _D =250μA	3.3	4	4.5	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =6.5A		0.41	0.51	Ω
g _{FS}	Forward Transconductance	V _{DS} =40V, I _D =6.5A		16		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.72	1	V
I _S	Maximum Body-Diode Continuous Current				13	A
I _{SM}	Maximum Body-Diode Pulsed Current				48	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V, f=1MHz	1089	1361	1633	pF
C _{oss}	Output Capacitance		134	167	200	pF
C _{rss}	Reverse Transfer Capacitance		10	12.6	15	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	1.8	3.6	5.4	Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =400V, I _D =13A	25	30.7	37	nC
Q _{gs}	Gate Source Charge		6	7.6	9	nC
Q _{gd}	Gate Drain Charge		10	13	16	nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =250V, I _D =13A, R _G =25Ω		29		ns
t _r	Turn-On Rise Time			69		ns
t _{D(off)}	Turn-Off DelayTime			82		ns
t _f	Turn-Off Fall Time			55.5		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =13A, dI/dt=100A/μs, V _{DS} =100V	240	302	365	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =13A, dI/dt=100A/μs, V _{DS} =100V	3.5	4.7	5.5	μC

A. The value of R_{θJA} is measured with the device in a still air environment with T_A=25°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°C, Ratings are based on low frequency and duty cycles to keep initial T_J=25°C.

D. The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300 μs 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}=5.5A, V_{DD}=150V, R_G=25Ω, Starting T_J=25°C

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

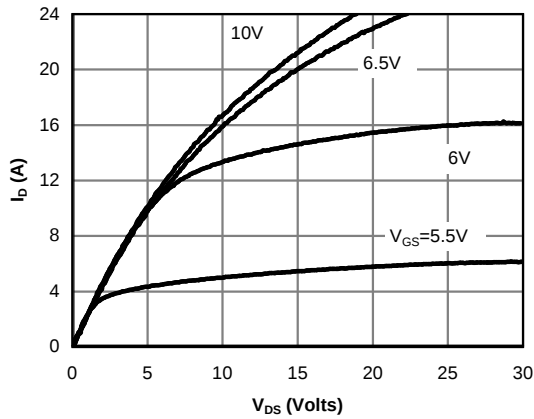


Fig 1: On-Region Characteristics

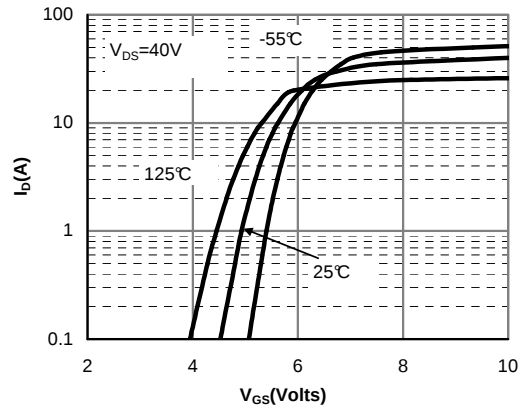


Figure 2: Transfer Characteristics

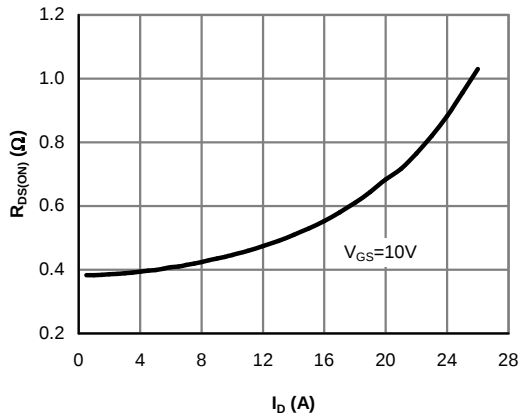


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

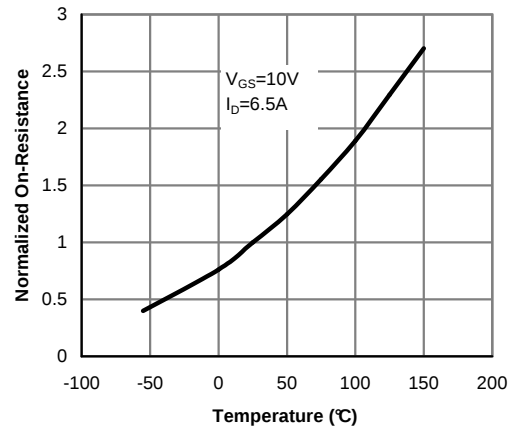


Figure 4: On-Resistance vs. Junction Temperature

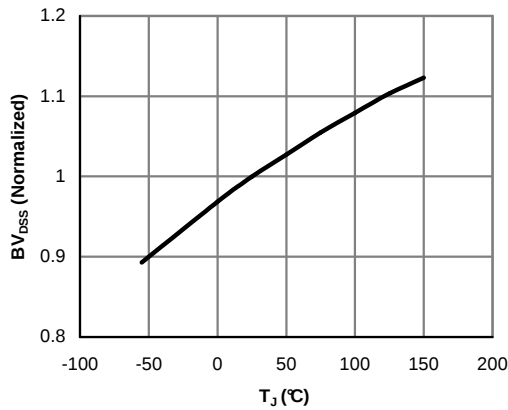


Figure 5: Break Down vs. Junction Temperature

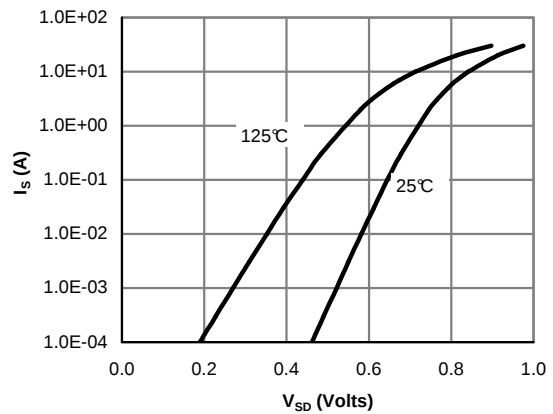


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

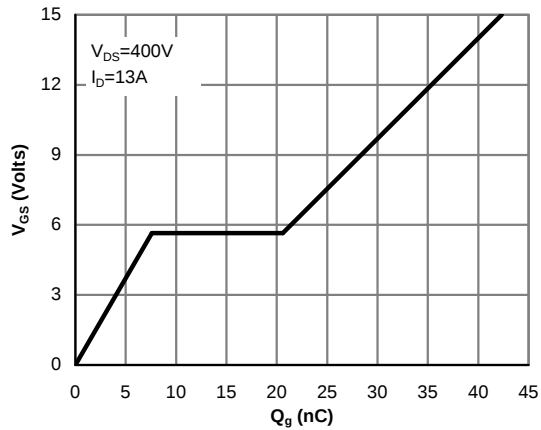


Figure 7: Gate-Charge Characteristics

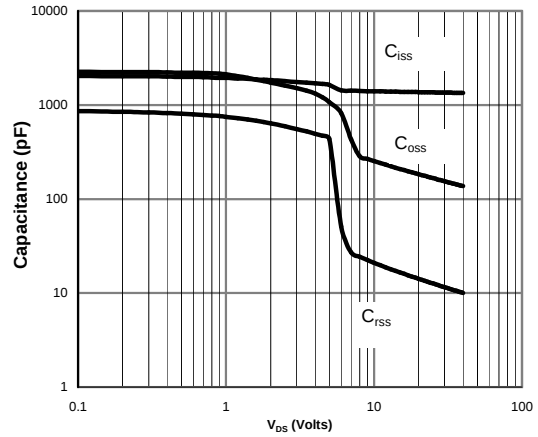


Figure 8: Capacitance Characteristics

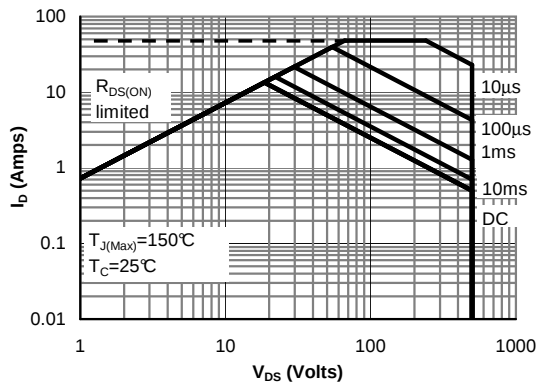


Figure 9: Maximum Forward Biased Safe Operating Area for AOT13N50 (Note F)

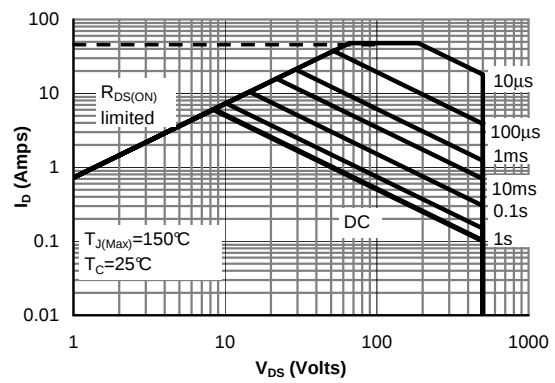


Figure 10: Maximum Forward Biased Safe Operating Area for AOTF13N50 (Note F)

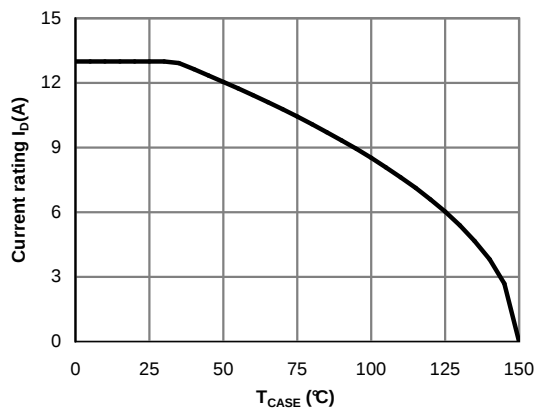


Figure 11: Current De-rating (Note B)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

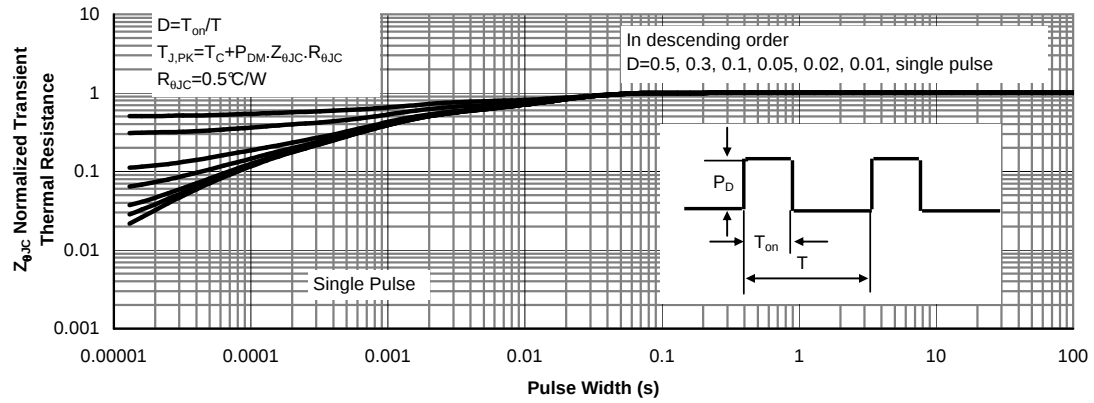


Figure 12: Normalized Maximum Transient Thermal Impedance for AOT13N50 (Note F)

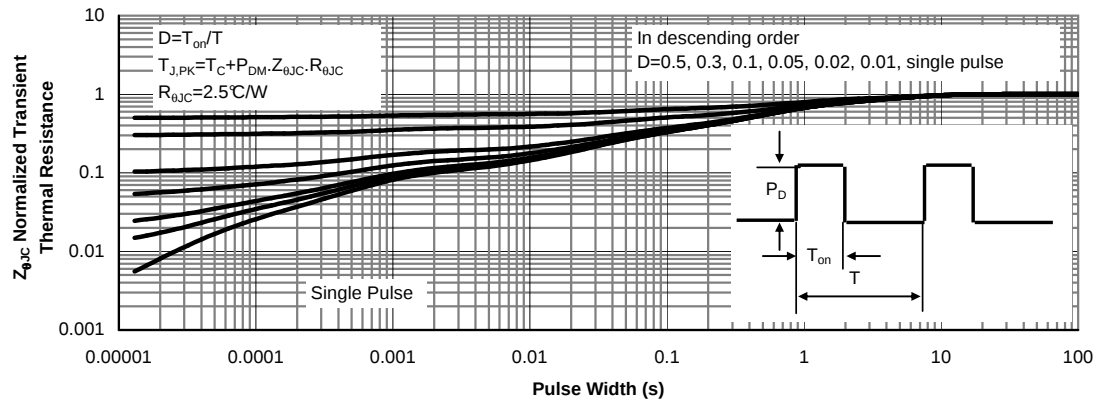
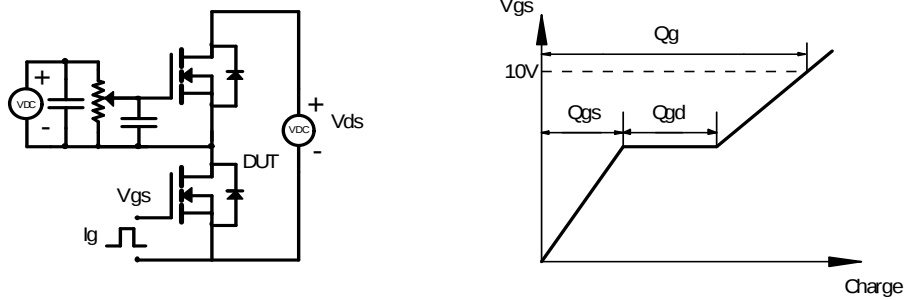
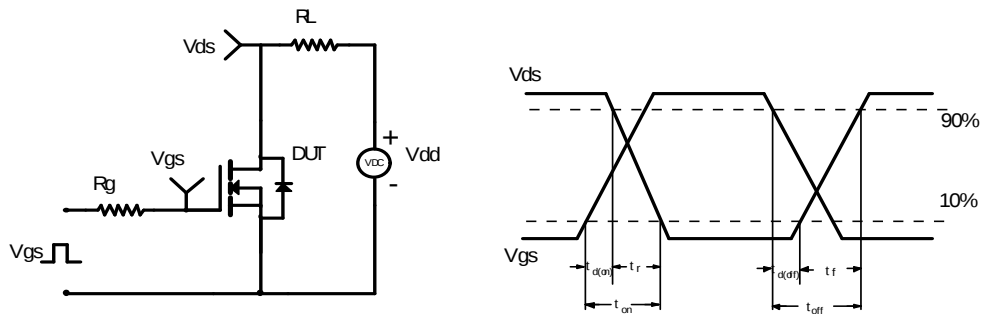


Figure 13: Normalized Maximum Transient Thermal Impedance for AOTF13N50 (Note F)

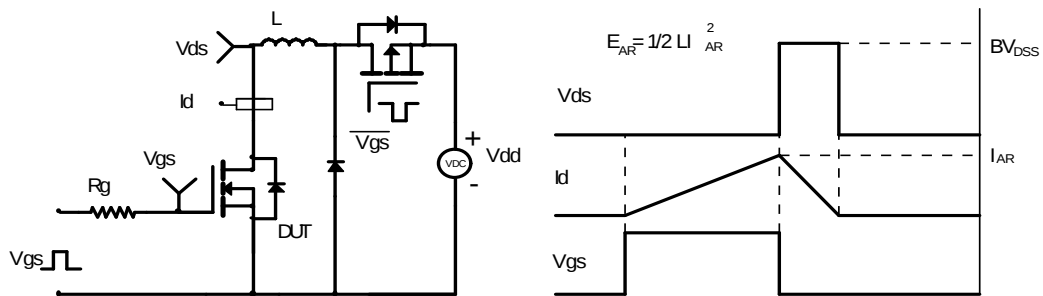
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

