

AOT8N60 / AOTF8N60
600V, 8A N-Channel MOSFET

formerly engineering part number AOT9606/AOTF9606


General Description

The AOT8N60 & AOTF8N60 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.

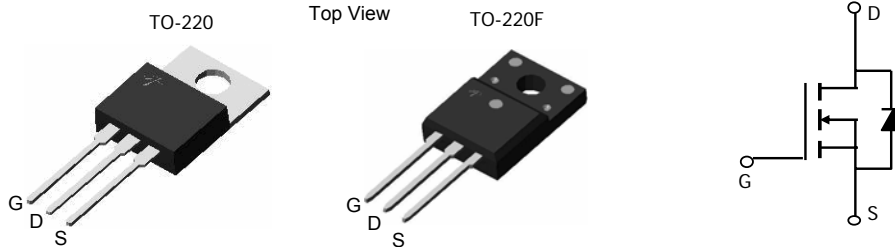
Features

V_{DS} (V) = 700V @ 150°C
 I_D = 8A
 $R_{DS(ON)} < 0.9 \Omega$ ($V_{GS} = 10V$)

100% UIS Tested!

100% R_g Tested!

C_{iss} , C_{oss} , C_{rss} Tested!


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

Parameter	Symbol	AOT8N60	AOTF8N60	Units
Drain-Source Voltage	V_{DS}	600		V
Gate-Source Voltage	V_{GS}	± 30		V
Continuous Drain Current ^B	I_D	$T_C=25^\circ\text{C}$	8	8*
		$T_C=100^\circ\text{C}$	5	5*
Pulsed Drain Current ^C	I_{DM}	32		A
Avalanche Current ^C	I_{AR}	3.2		A
Repetitive avalanche energy ^C	E_{AR}	150		mJ
Single pulsed avalanche energy ^G	E_{AS}	300		mJ
Peak diode recovery dv/dt	dv/dt	5		V/ns
Power Dissipation ^B	P_D	$T_C=25^\circ\text{C}$	147	50
		Derate above 25°C	1.17	0.4
Junction and Storage Temperature Range	T_J, T_{STG}	-50 to 150		°C
Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	T_L	300		°C

Thermal Characteristics

Parameter	Symbol	AOT8N60	AOTF8N60	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	65	65	°C/W
Maximum Case-to-Sink ^A	$R_{\theta CS}$	0.5	-	°C/W
Maximum Junction-to-Case ^{D,F}	$R_{\theta JC}$	0.85	2.5	°C/W

* Drain current limited by maximum junction temperature.

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	$I_D=250\mu\text{A}, V_{GS}=0\text{V}, T_J=25^\circ\text{C}$	600			V
		$I_D=250\mu\text{A}, V_{GS}=0\text{V}, T_J=150^\circ\text{C}$		700		V
$BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$		0.65		$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=600\text{V}, V_{GS}=0\text{V}$			1	μA
		$V_{DS}=480\text{V}, T_J=125^\circ\text{C}$			10	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 30\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	3	3.8	5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=4\text{A}$		0.74	0.9	Ω
g_{FS}	Forward Transconductance	$V_{DS}=40\text{V}, I_D=4\text{A}$		12.5		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.73	1	V
I_S	Maximum Body-Diode Continuous Current				8	A
I_{SM}	Maximum Body-Diode Pulsed Current				32	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1\text{MHz}$	912	1140	1370	pF
C_{oss}	Output Capacitance		87	109	131	pF
C_{riss}	Reverse Transfer Capacitance		6.2	7.8	9.5	pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	3.1	3.9	5.9	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=480\text{V}, I_D=8\text{A}$		28.4	35	nC
Q_{gs}	Gate Source Charge		5.8	7	nC	
Q_{gd}	Gate Drain Charge		13.4	17	nC	
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}, V_{DS}=300\text{V}, I_D=8\text{A}, R_G=25\Omega$		30	40	ns
t_r	Turn-On Rise Time		63	75	ns	
$t_{D(off)}$	Turn-Off Delay Time		69	85	ns	
t_f	Turn-Off Fall Time		51	65	ns	
t_{rr}	Body Diode Reverse Recovery Time	$I_F=8\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{DS}=100\text{V}$		270	324	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=8\text{A}, dI/dt=100\text{A}/\mu\text{s}, V_{DS}=100\text{V}$		3.3	4.0	μC

A: The value of $R_{\theta JA}$ is measured with the device in a still air environment with $T_A=25^\circ\text{C}$.

B: The power dissipation P_D is based on $T_{J(MAX)}=150^\circ\text{C}$, 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 $T_{J(MAX)}=150^\circ\text{C}$.

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 $T_{J(MAX)}=150^\circ\text{C}$.

G: $L=60\text{mH}, I_{AS}=3.2\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

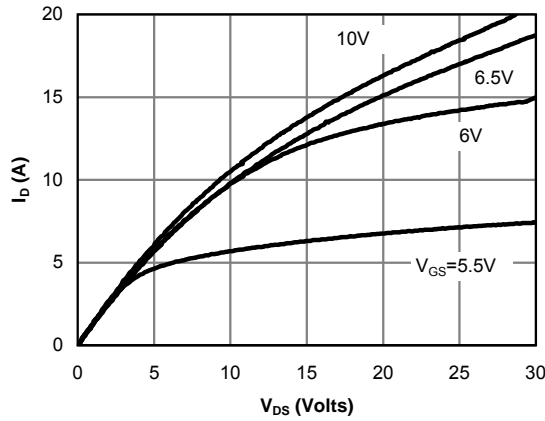


Fig 1: On-Region Characteristics

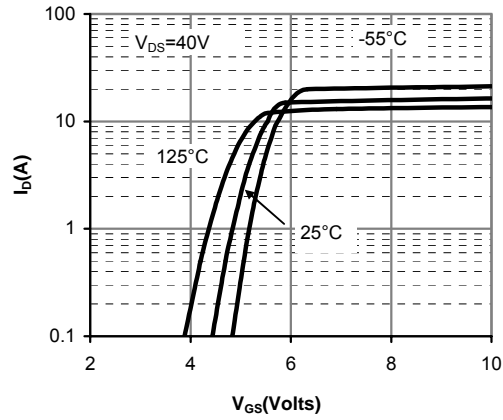


Figure 2: Transfer Characteristics

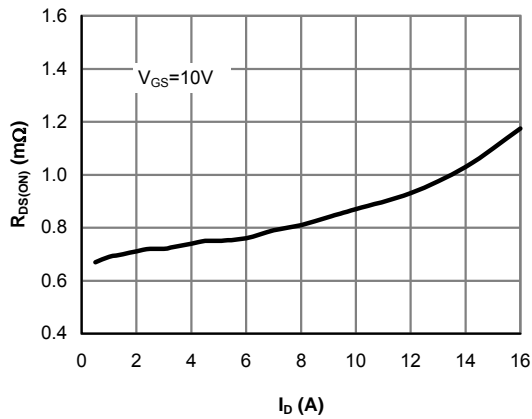


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

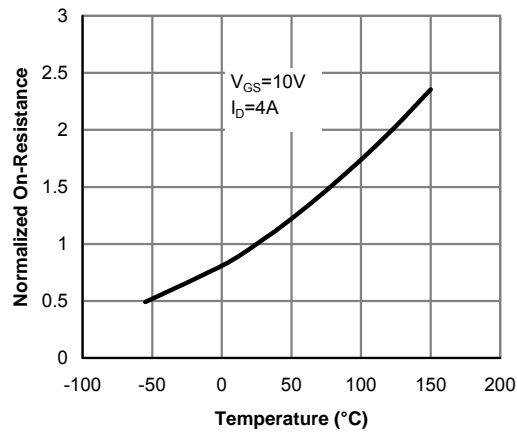


Figure 4: On-Resistance vs. Junction Temperature

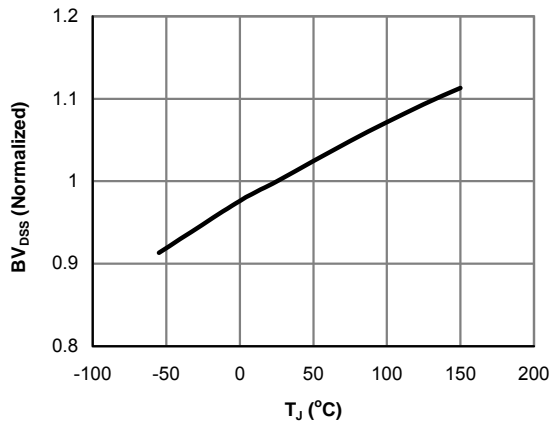


Figure 5: Break Down vs. Junction Temperature

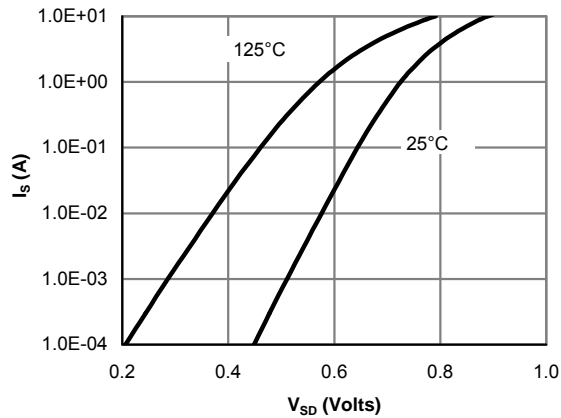


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

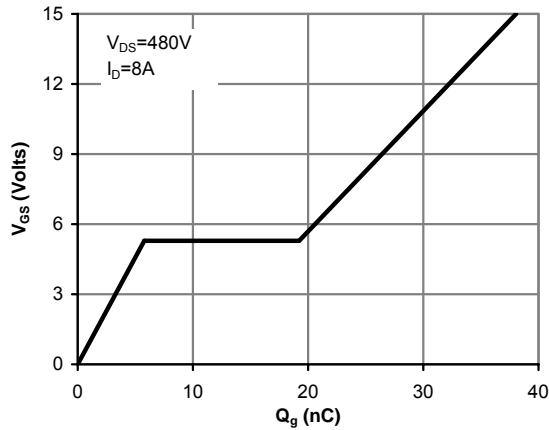


Figure 7: Gate-Charge Characteristics

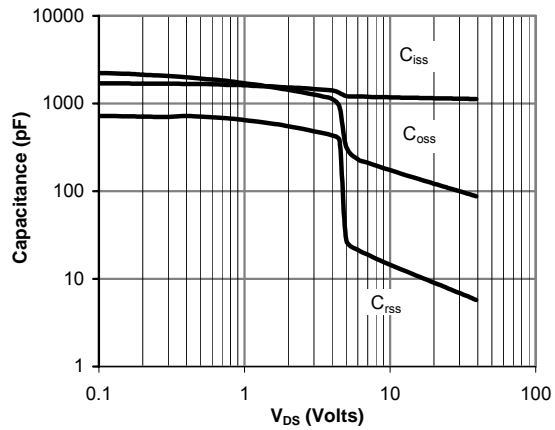


Figure 8: Capacitance Characteristics

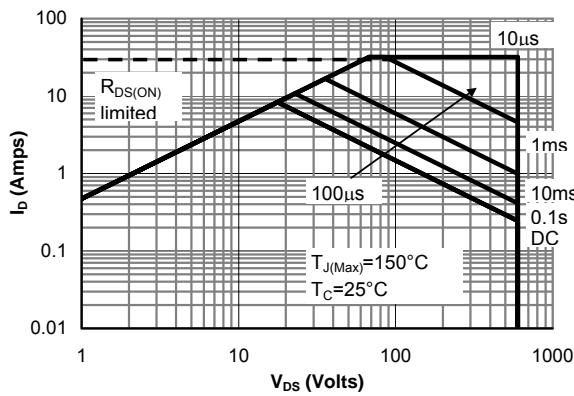


Figure 9: Maximum Forward Biased Safe Operating Area for AOT8N60 (Note F)

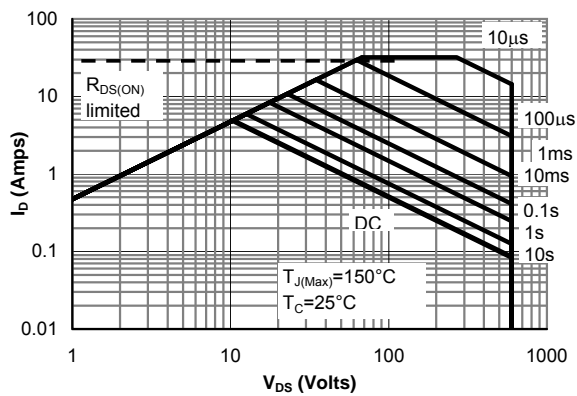


Figure 10: Maximum Forward Biased Safe Operating Area for AOTF8N60 (Note F)

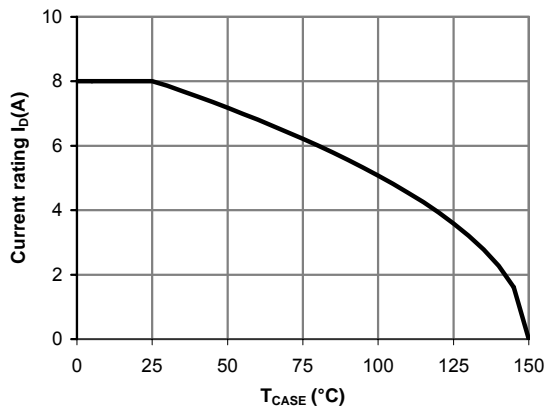


Figure 11: Current De-rating (Note B)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

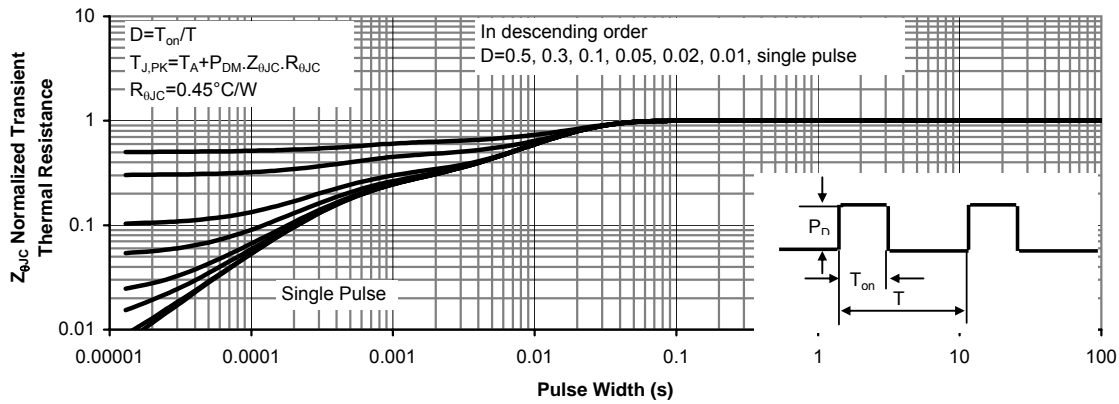


Figure 12: Normalized Maximum Transient Thermal Impedance for AOT8N60 (Note F)

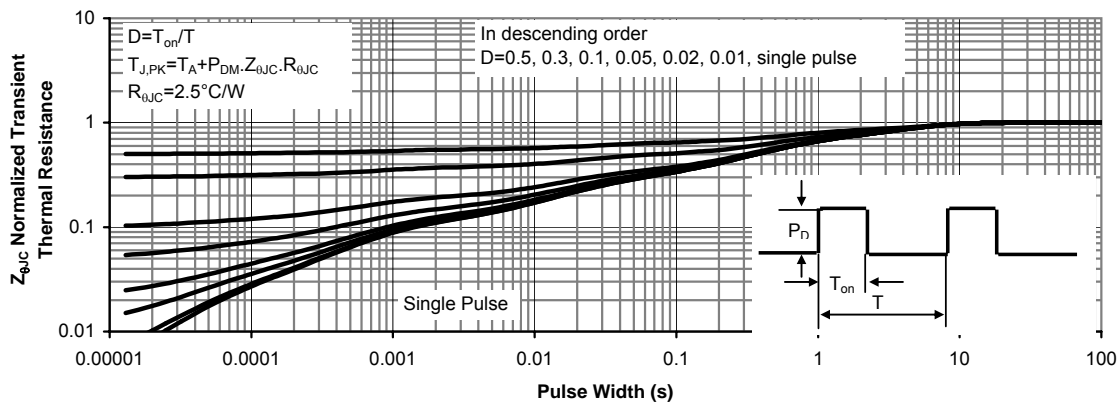
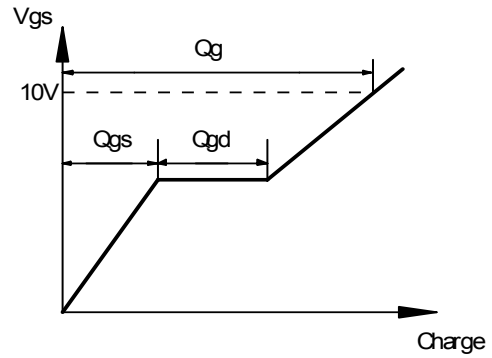
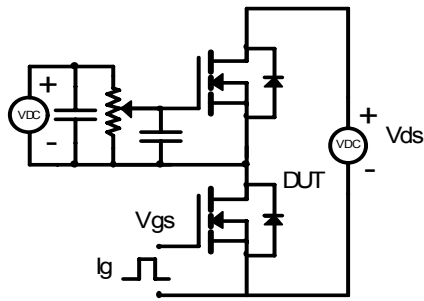
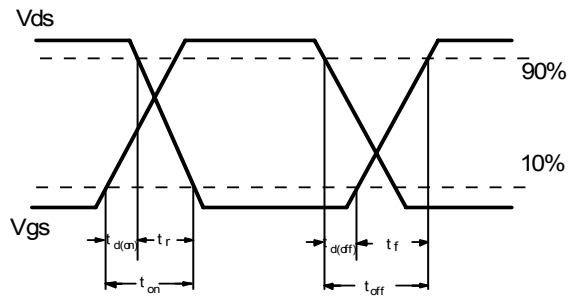
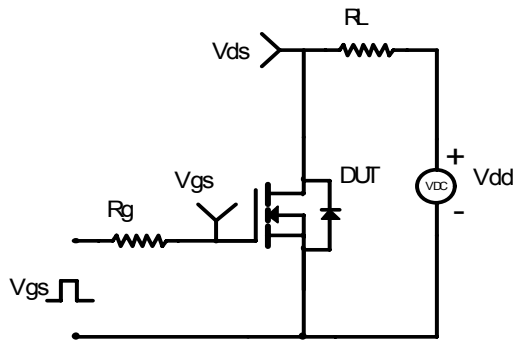


Figure 13: Normalized Maximum Transient Thermal Impedance for AOTF8N60 (Note F)

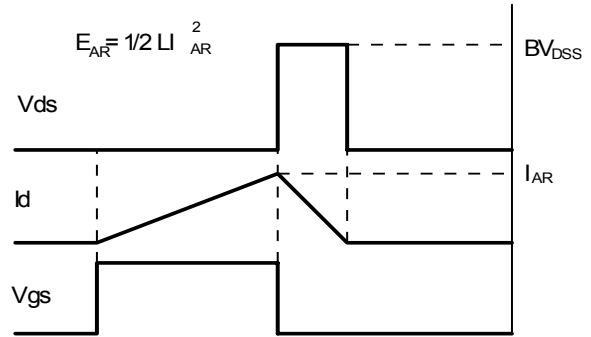
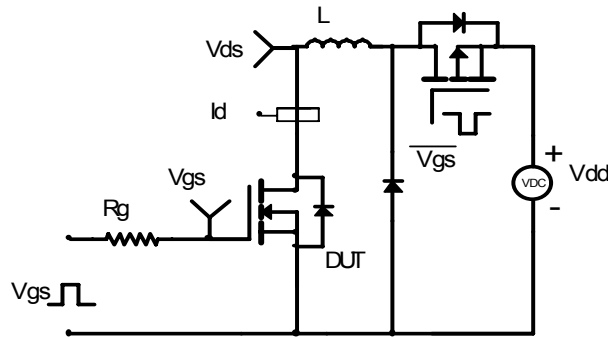
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

