ALPHA & OMEGA SEMICONDUCTOR

AOT10N60 / AOTF10N60
600V, 10A N-Channel MOSFET

formerly engineering part number AOT9608/AOTF9608

RoHS Compliant

General Description

The AOT10N60 & AOTF10N60 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.

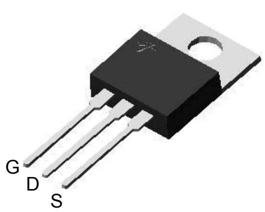
Features

V_{DS} (V) = 700V @ 150°C
I_D = 10A
$R_{DS(ON)}$ < 0.75 Ω (V_{GS} = 10V)

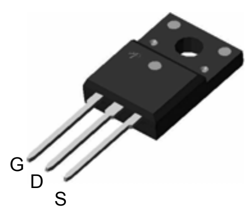
100% UIS Tested!
100% R_g Tested!
C_{iss}, C_{oss}, C_{rss} Tested!

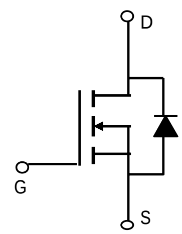
Top View

TO-220



TO-220F





Absolute Maximum Ratings T_A=25°C unless otherwise noted					
Parameter		**Symbol**	**AOT10N60**	**AOTF10N60**	**Units**
Drain-Source Voltage		V_{DS}	600		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current [B]	T_C=25°C	I_D	10	10*	A
	T_C=100°C		6.4	6.4*	
Pulsed Drain Current [C]		I_{DM}	36		
Avalanche Current [C]		I_{AR}	4.4		A
Repetitive avalanche energy [C]		E_{AR}	290		mJ
Single pulsed avalanche energy [G]		E_{AS}	580		mJ
Peak diode recovery dv/dt		dv/dt	5		V/ns
Power Dissipation [B]	T_C=25°C	P_D	208	50	W
	Derate above 25°C		1.7	0.4	W/ °C
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**	**AOT10N60**	**AOTF10N60**	**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]	$R_{\theta JC}$	0.6	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	600			V
		I_D=250µA, V_{GS}=0V, T_J=150°C		700		V
BV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D=250µA, V_{GS}=0V		0.65		V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=600V, V_{GS}=0V			1	µA
		V_{DS}=480V, T_J=125°C			10	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±30V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250µA	3	4	5	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		15		S
V_{SD}	Diode Forward Voltage	I_S=1A, V_{GS}=0V		0.73	1	V
I_S	Maximum Body-Diode Continuous Current				10	A
I_{SM}	Maximum Body-Diode Pulsed Current				36	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	1100	1320	1600	pF
C_{oss}	Output Capacitance		105	130	160	pF
C_{rss}	Reverse Transfer Capacitance		7.5	9.3	11	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	3	3.8	6	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=480V, I_D=10A		31.1	40	nC
Q_{gs}	Gate Source Charge			6.4	10	nC
Q_{gd}	Gate Drain Charge			14.4	20	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=300V, I_D=10A, R_G=25Ω		28	35	ns
t_r	Turn-On Rise Time			66	80	ns
$t_{D(off)}$	Turn-Off DelayTime			76	95	ns
t_f	Turn-Off Fall Time			64	80	ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=10A,dI/dt=100A/µs,V_{DS}=100V		290	350	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=10A,dI/dt=100A/µs,V_{DS}=100V		3.9	4.7	µC

A: The value of $R_{\theta JA}$ 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.

D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to case $R_{\theta JC}$ 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 impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C.

G. L=60mH, I_{AS}=4.4A, V_{DD}=50V, R_G=25Ω, Starting T_J=25°C

Rev 0. July 2008

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

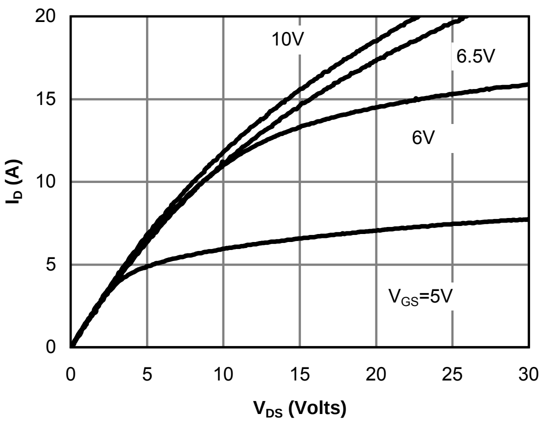


Fig 1: On-Region Characteristics

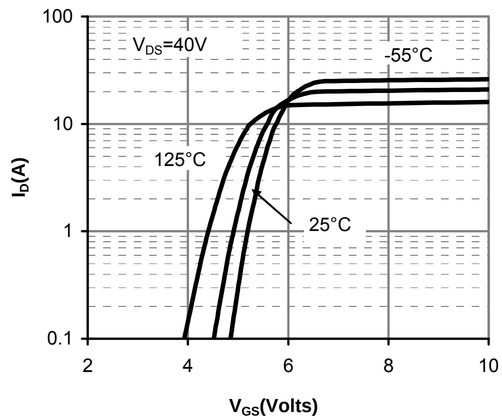


Figure 2: Transfer Characteristics

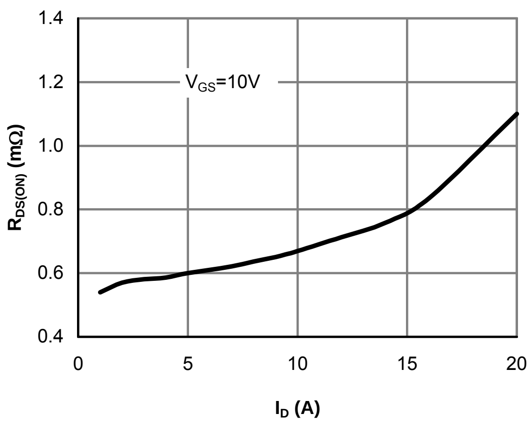


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

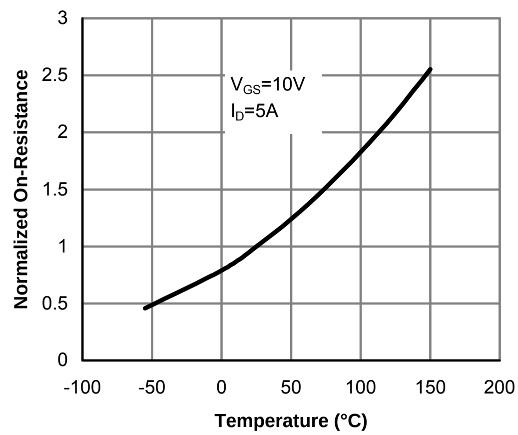


Figure 4: On-Resistance vs. Junction Temperature

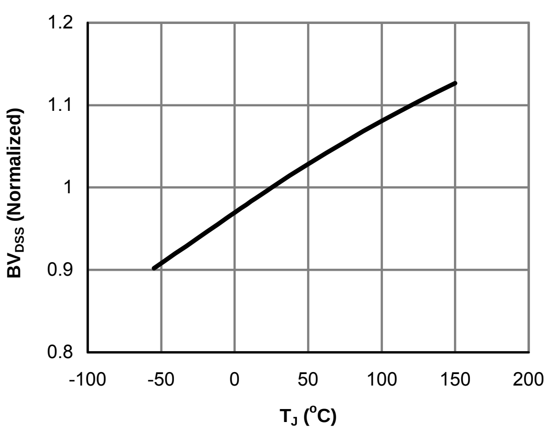


Figure 5: Break Down vs. Junction Temperature

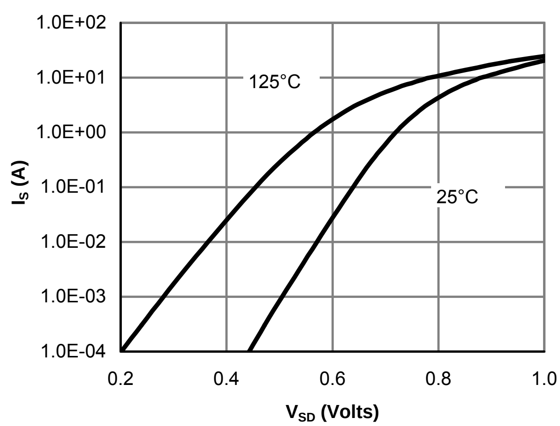


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

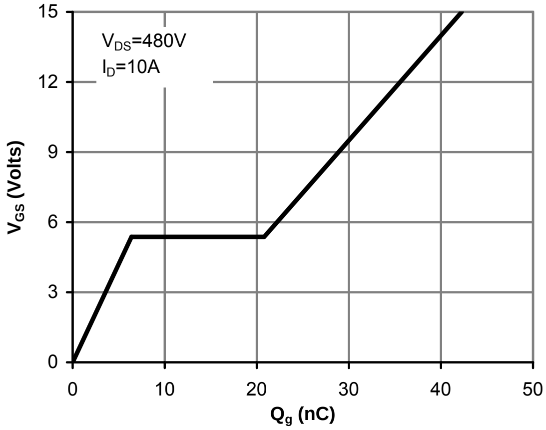


Figure 7: Gate-Charge Characteristics

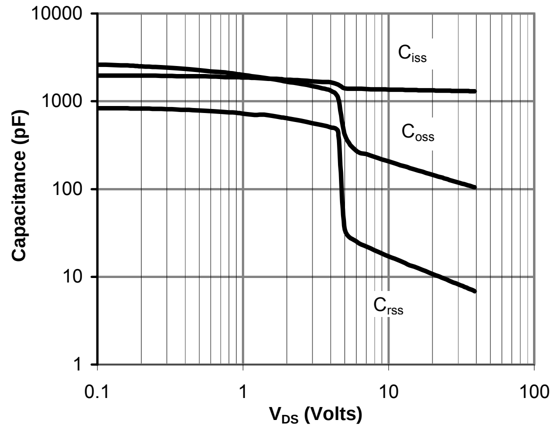


Figure 8: Capacitance Characteristics

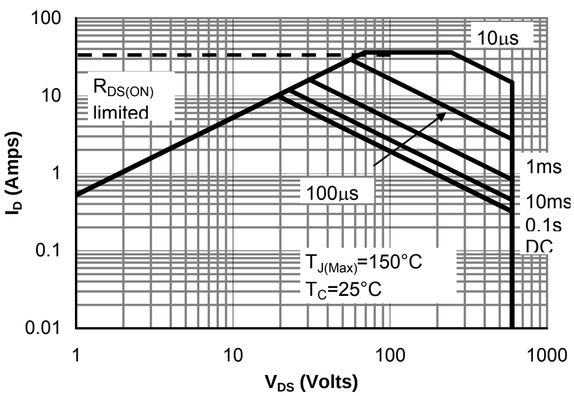


Figure 9: Maximum Forward Biased Safe Operating Area for AOT10N60 (Note F)

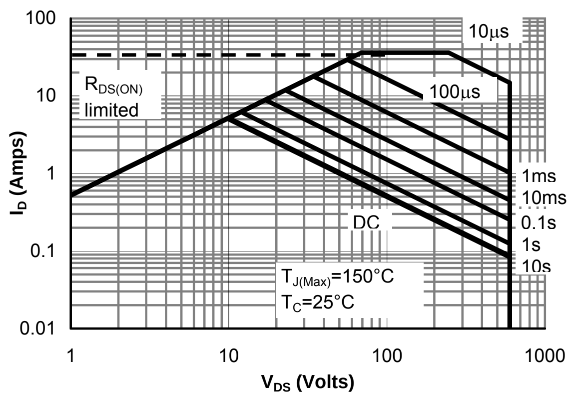


Figure 10: Maximum Forward Biased Safe Operating Area for AOTF10N60 (Note F)

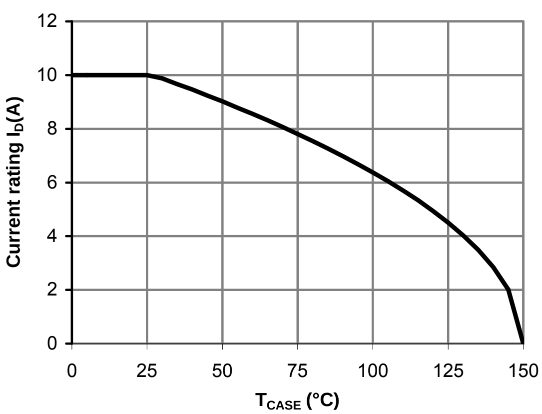


Figure 11: Current De-rating (Note B)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

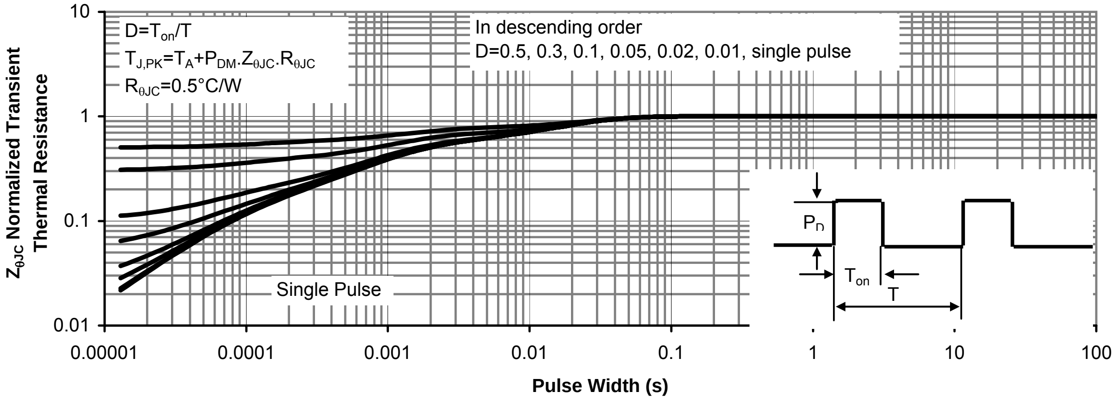


Figure 12: Normalized Maximum Transient Thermal Impedance for AOT10N60 (Note F)

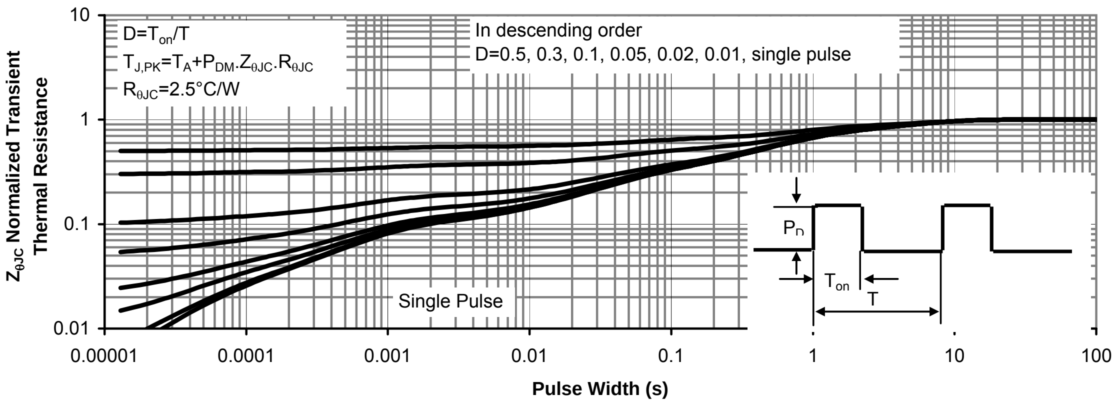
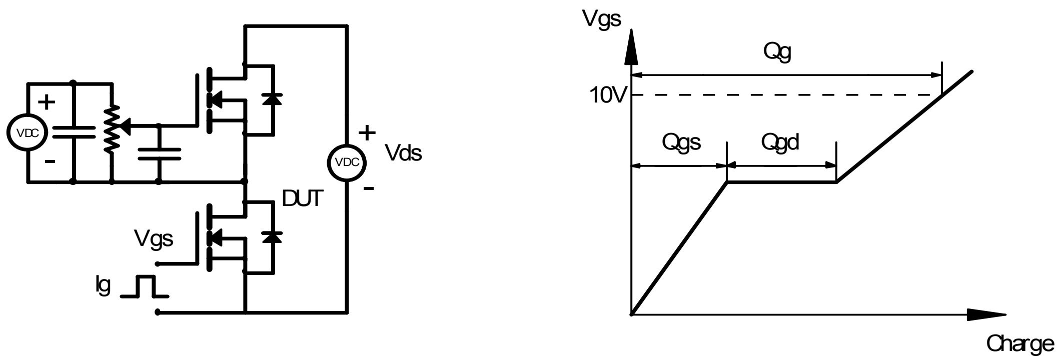
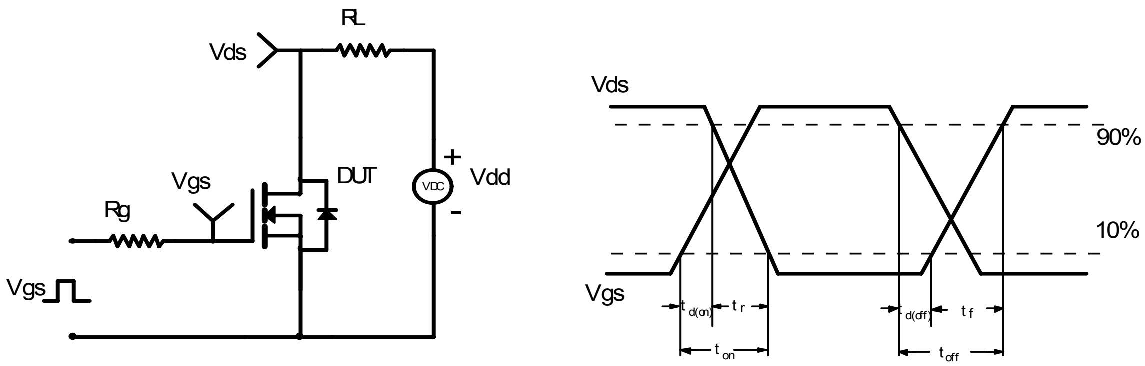


Figure 13: Normalized Maximum Transient Thermal Impedance for AOTF10N60 (Note F)

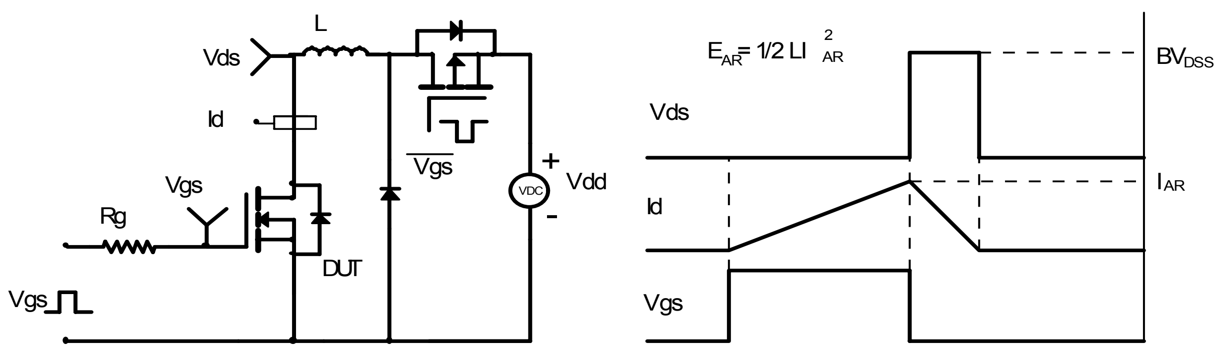
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms