ALPHA & OMEGA
SEMICONDUCTOR

AOW14N50/AOWF14N50

500V, 14A N-Channel MOSFET

General Description

The AOW14N50 & AOWF14N50 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.

Product Summary

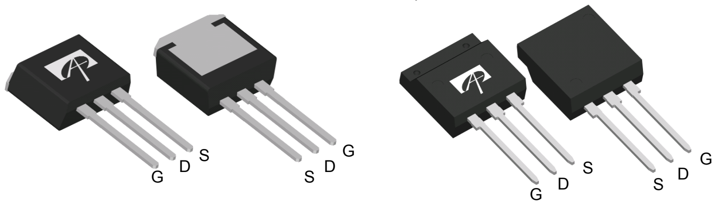
V_{DS}	600V@150℃
I_D (at V_{GS}=10V)	14A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 0.38Ω

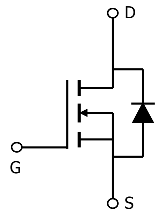
100% UIS Tested
100% R_g Tested

Green Product

TO-262 TO-262F

Top View Bottom View Top View Bottom View





Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	AOW14N50	AOWF14N50	Units
Drain-Source Voltage		V_{DS}	500		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	T_C=25°C	I_D	14	14*	A
	T_C=100°C		11	11*	
Pulsed Drain Current [C]		I_{DM}	56		
Avalanche Current [C]		I_{AR}	6		A
Repetitive avalanche energy [C]		E_{AR}	540		mJ
Single plused avalanche energy [G]		E_{AS}	1080		mJ
Peak diode recovery dv/dt		dv/dt	5		V/ns
Power Dissipation [B]	T_C=25°C	P_D	278	28	W
	Derate above 25°C		2.2	0.22	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	AOW14N50	AOWF14N50	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	$R_{\theta JC}$	0.45	4.5	°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	500			V
		I_D=250µA, V_{GS}=0V, T_J=150°C		600		
BV_{DSS} /ΔTJ	Breakdown Voltage Temperature Coefficient	I_D=250µA, V_{GS}=0V		0.5		V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=500V, V_{GS}=0V			1	µA
		V_{DS}=400V, 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}=5V I_D=250µA	3.3	4.2	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=7A		0.29	0.38	Ω
g_{FS}	Forward Transconductance	V_{DS}=40V, I_D=7A		20		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.71	1	V
I_S	Maximum Body-Diode Continuous Current				14	A
I_{SM}	Maximum Body-Diode Pulsed Current				56	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz	1531	1914	2297	pF
C_{oss}	Output Capacitance		134	191	250	pF
C_{rss}	Reverse Transfer Capacitance		9.5	16	23	pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz	1.75	3.5	5.3	Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=400V, I_D=14A	34	42.8	51	nC
Q_{gs}	Gate Source Charge		7.4	9.3	11	nC
Q_{gd}	Gate Drain Charge		10	20.3	31	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=250V, I_D=14A, R_G=25Ω		44	53	ns
t_r	Turn-On Rise Time			84	101	ns
$t_{D(off)}$	Turn-Off DelayTime			92	110	ns
t_f	Turn-Off Fall Time			50	60	ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=14A,dI/dt=100A/µs,V_{DS}=100V		289	347	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=14A,dI/dt=100A/µs,V_{DS}=100V		4.93	6	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, Ratings are based on low frequency and duty cycles to keep initial T_J =25°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. The SOA curve provides a single pulse rating.
G. L=60mH, I_{AS}=6A, V_{DD}=150V, R_G=25Ω, Starting T_J=25°C

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

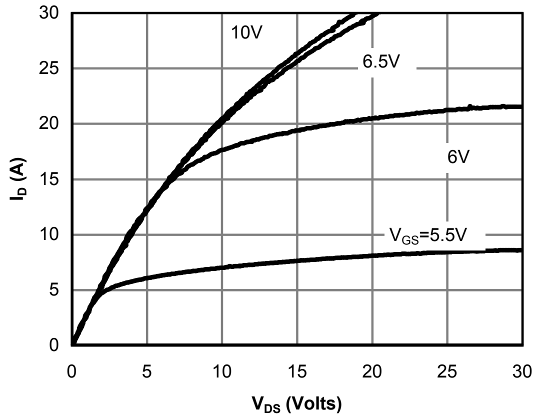


Fig 1: On-Region Characteristics

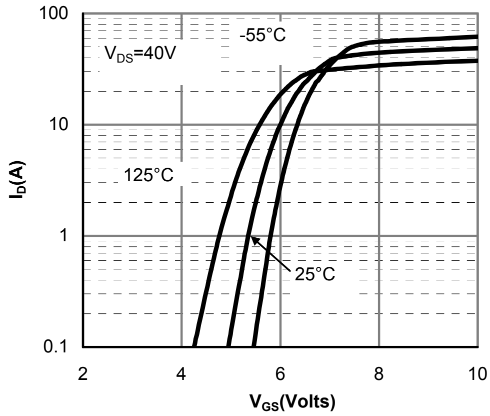


Figure 2: Transfer Characteristics

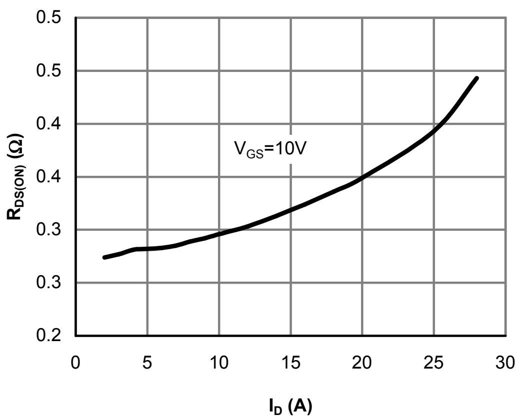


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

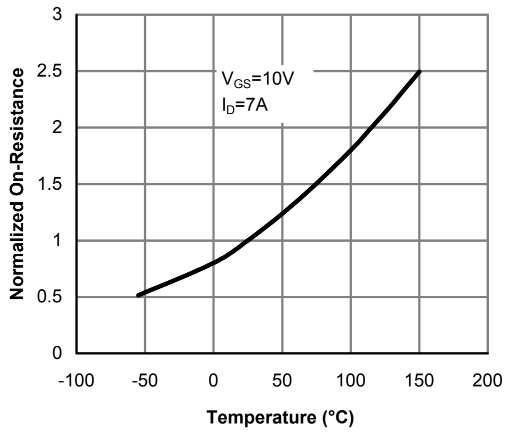


Figure 4: On-Resistance vs. Junction Temperature

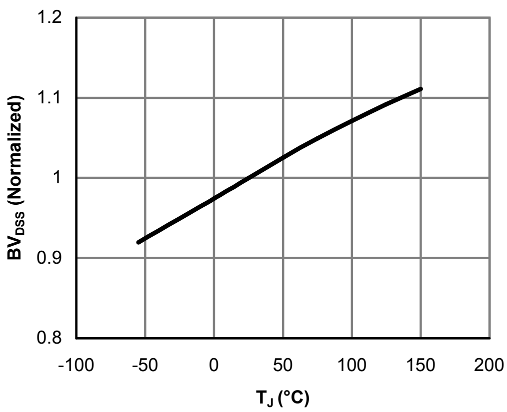


Figure 5: Break Down vs. Junction Temperature

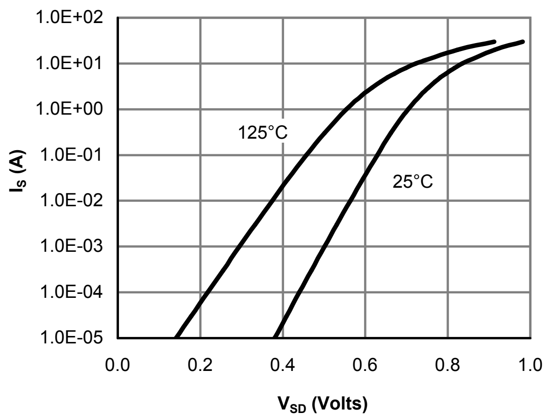


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

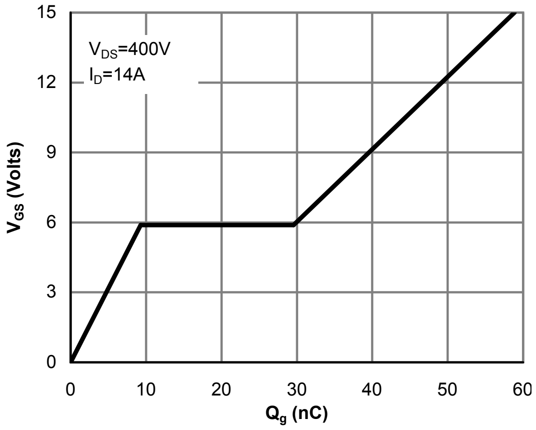


Figure 7: Gate-Charge Characteristics

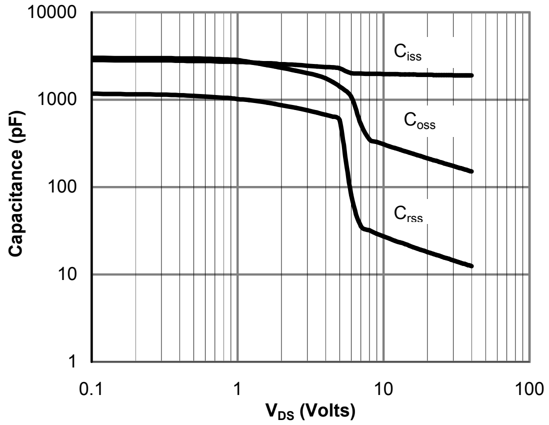


Figure 8: Capacitance Characteristics

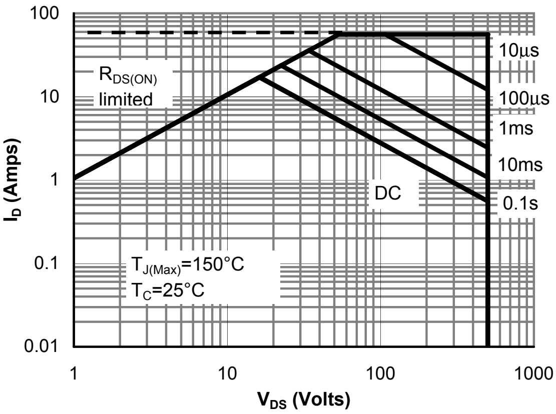


Figure 9: Maximum Forward Biased Safe Operating Area for AOW14N50 (Note F)

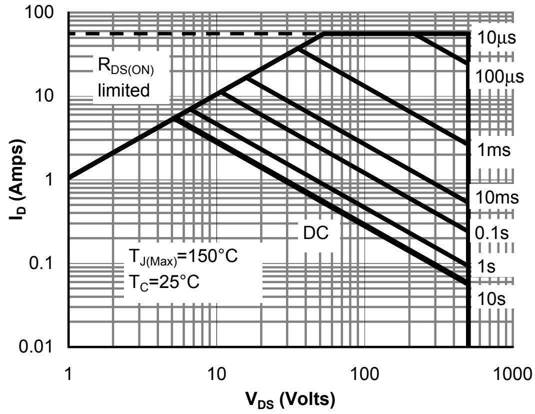


Figure 10: Maximum Forward Biased Safe Operating Area for AOWF14N50 (Note F)

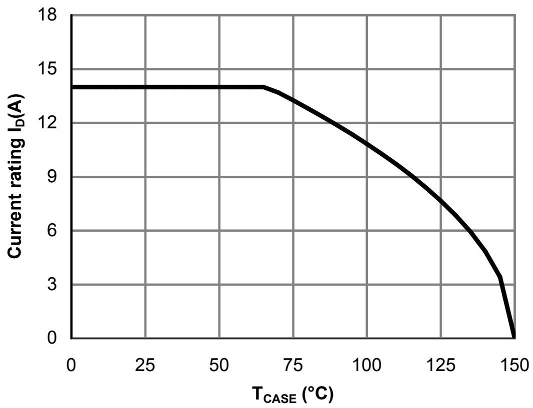


Figure 11: Current De-rating (Note B)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

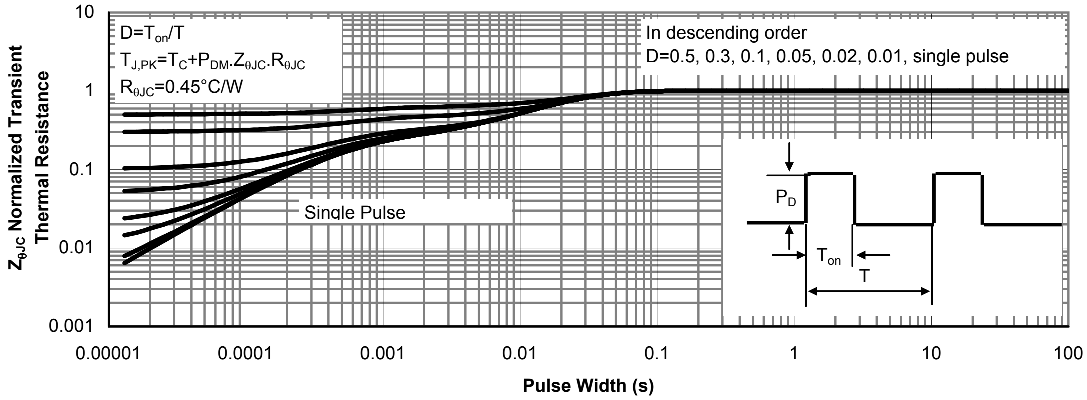


Figure 12: Normalized Maximum Transient Thermal Impedance for AOW14N50 (Note F)

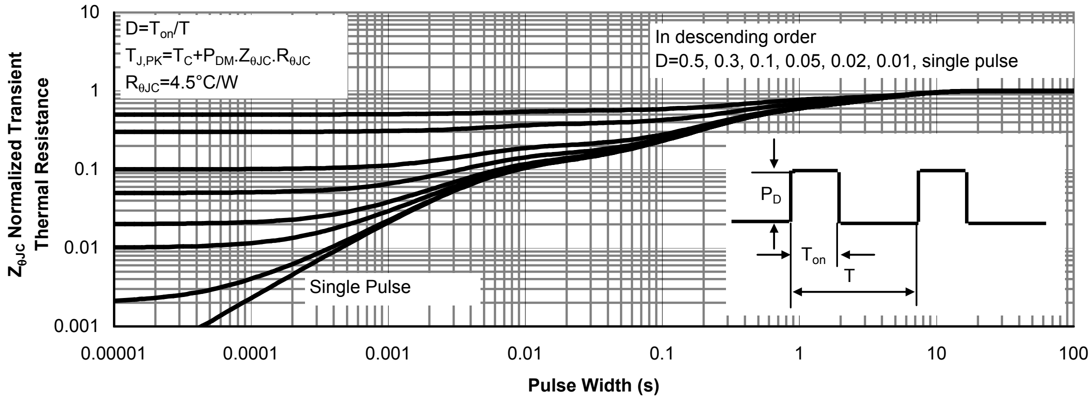
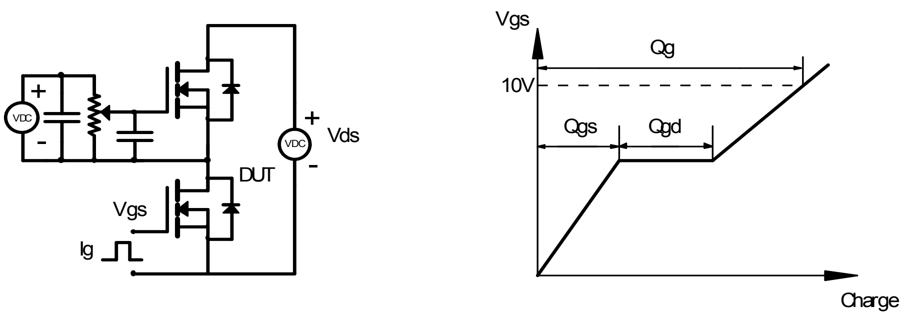
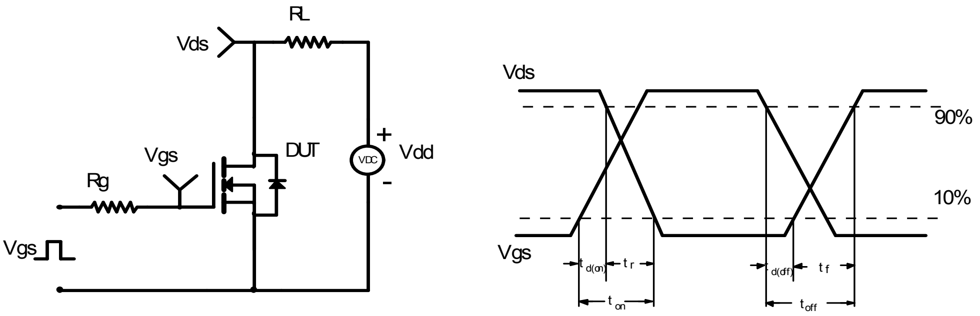


Figure 13: Normalized Maximum Transient Thermal Impedance for AOWF14N50 (Note F)

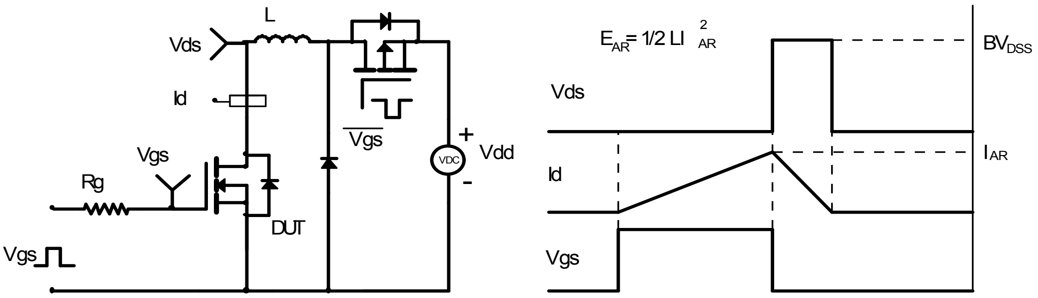
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms