



ALPHA & OMEGA
SEMICONDUCTOR

AOW2500

150V N-Channel MOSFET

General Description

The AOW2500 uses Trench MOSFET technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$, C_{iss} and C_{oss} . This device is ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.

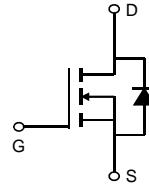
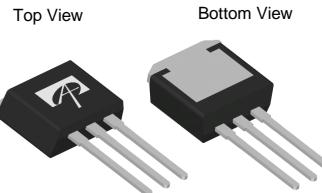
Product Summary

V_{DS}	150V
I_D (at $V_{GS}=10V$)	152A
$R_{DS(ON)}$ (at $V_{GS}=10V$)	< 6.2mΩ
$R_{DS(ON)}$ (at $V_{GS}=6V$)	< 7.3mΩ

100% UIS Tested
100% R_g Tested



TO-262



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current <small>$T_c=25^\circ C$</small>	I_D	152	A
		107	
Pulsed Drain Current ^C	I_{DM}	440	
Continuous Drain Current <small>$T_A=25^\circ C$</small>	I_{DSM}	11.5	A
		9.0	
Avalanche Current ^C	I_{AS}	65	A
Avalanche energy L=0.3mH ^C	E_{AS}	634	mJ
Power Dissipation ^B	P_D	375	W
		187.5	
Power Dissipation ^A	P_{DSM}	2.1	W
		1.3	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	12	15	°C/W
Maximum Junction-to-Ambient ^{A,D}		48	60	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	0.26	0.4	°C/W

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	$I_D=250\mu\text{A}, V_{GS}=0\text{V}$	150			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=150\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			± 100	nA
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.3	2.8	3.5	V
$R_{\text{DS(ON)}}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}, I_D=20\text{A}$		5.1	6.2	$\text{m}\Omega$
		TO262 $T_J=125^\circ\text{C}$		9.9	12	
		$V_{GS}=6\text{V}, I_D=20\text{A}$ TO262		5.6	7.3	
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}, I_D=20\text{A}$		70		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}, V_{GS}=0\text{V}$		0.66	1	V
I_S	Maximum Body-Diode Continuous Current				152	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=75\text{V}, f=1\text{MHz}$		6460		pF
C_{oss}	Output Capacitance			586		pF
C_{rss}	Reverse Transfer Capacitance			22		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$	1	2.1	3.2	Ω
SWITCHING PARAMETERS						
$Q_{g(10V)}$	Total Gate Charge	$V_{GS}=10\text{V}, V_{DS}=75\text{V}, I_D=20\text{A}$		97	136	nC
Q_{gs}	Gate Source Charge			22.5		nC
Q_{gd}	Gate Drain Charge			17		nC
$t_{D(\text{on})}$	Turn-On DelayTime	$V_{GS}=10\text{V}, V_{DS}=75\text{V}, R_L=3.75\Omega, R_{\text{GEN}}=3\Omega$		18.5		ns
t_r	Turn-On Rise Time			20		ns
$t_{D(\text{off})}$	Turn-Off DelayTime			67.5		ns
t_f	Turn-Off Fall Time			14		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=20\text{A}, dI/dt=500\text{A}/\mu\text{s}$		90		ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=20\text{A}, dI/dt=500\text{A}/\mu\text{s}$		1090		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B. The power dissipation P_D is based on $T_{J(\text{MAX})}=175^\circ\text{C}$, 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 $T_{J(\text{MAX})}=175^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$.

D. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

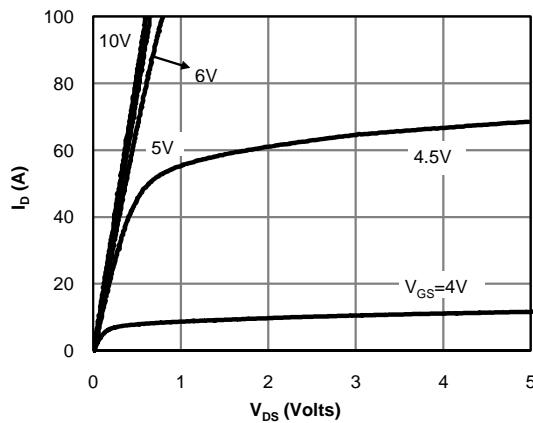
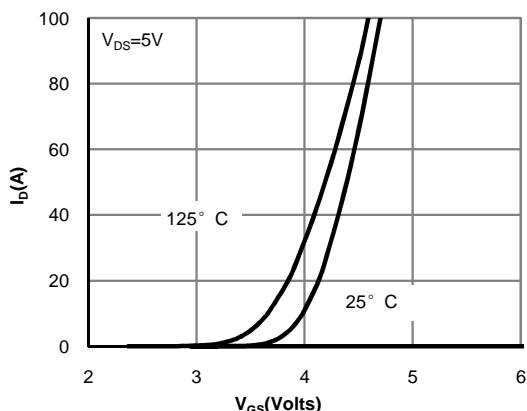
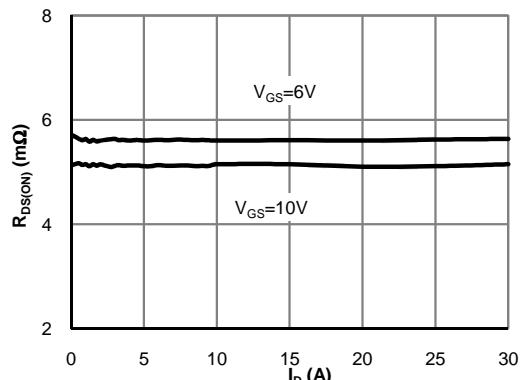
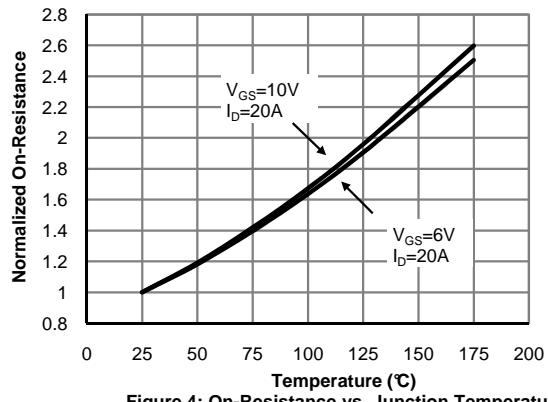
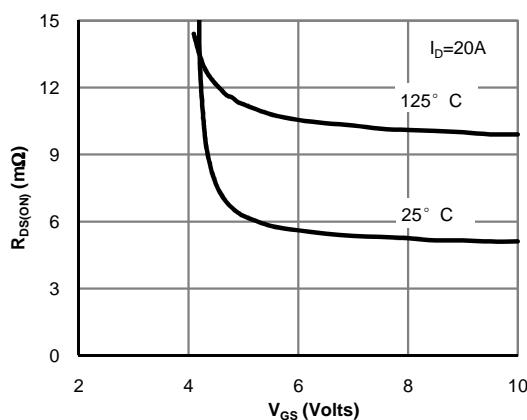
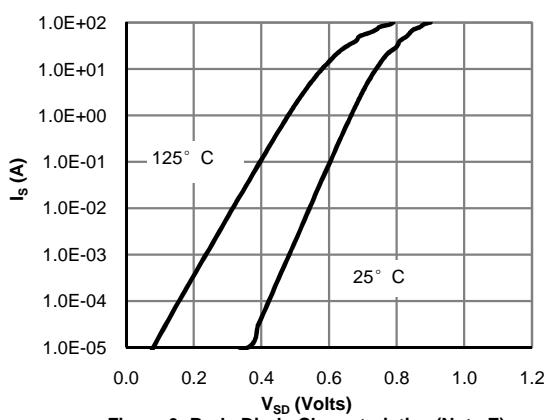
E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

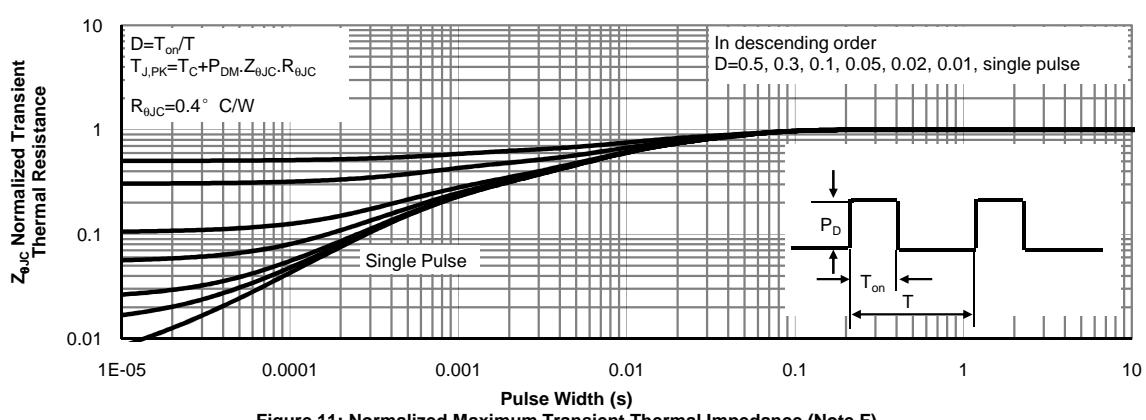
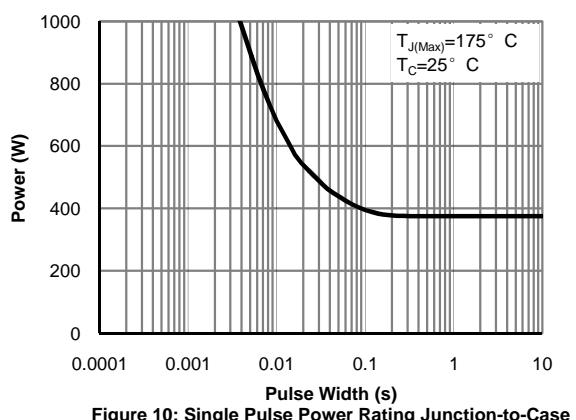
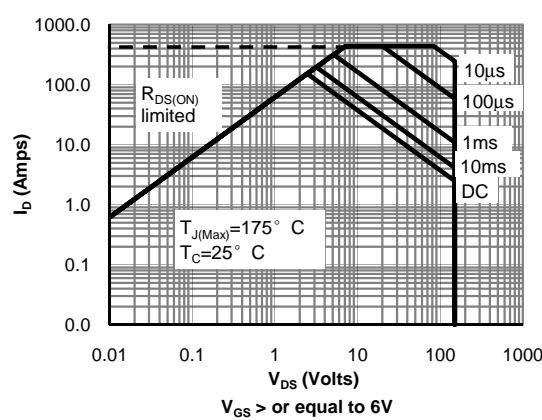
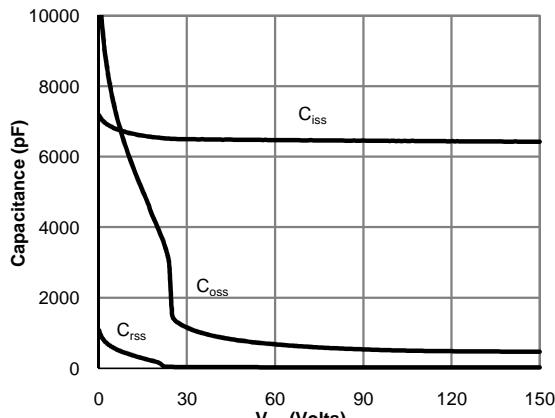
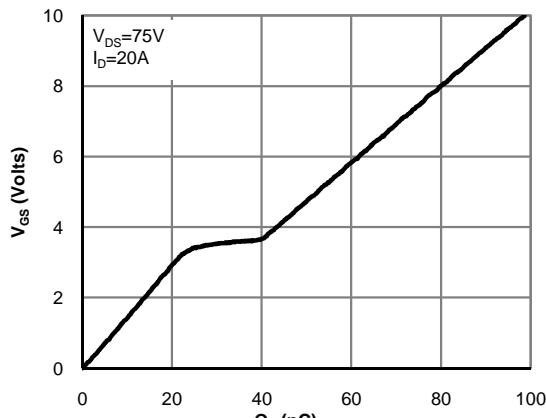
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(\text{MAX})}=175^\circ\text{C}$. The SOA curve provides a single pulse rating.

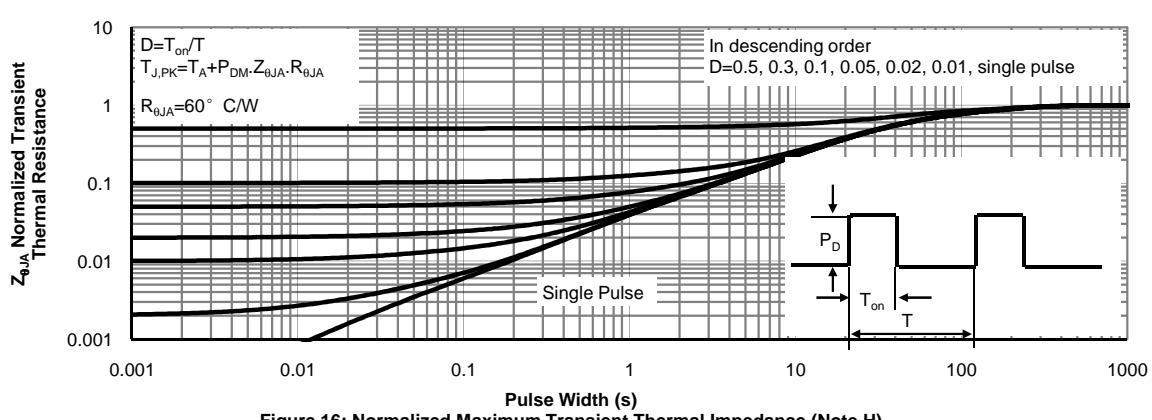
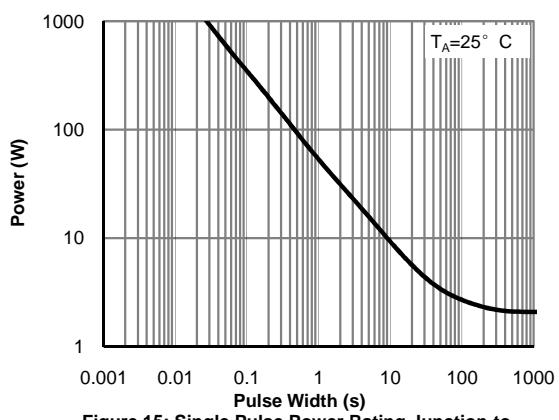
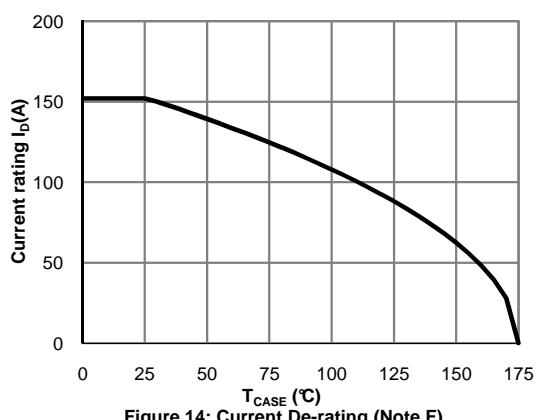
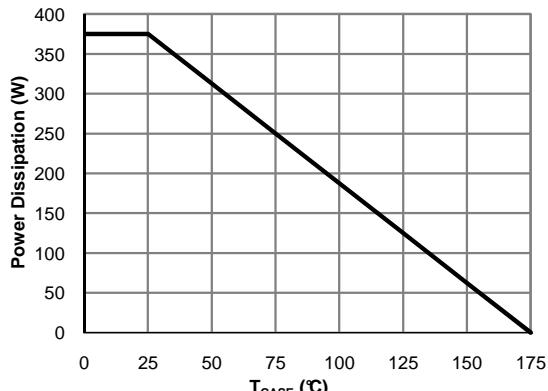
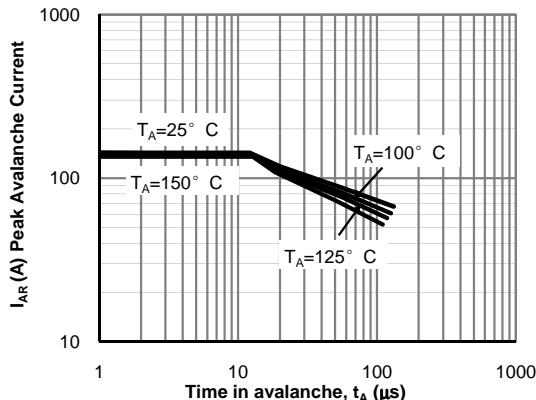
G. The maximum current limited by package.

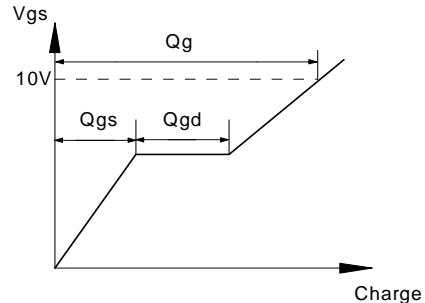
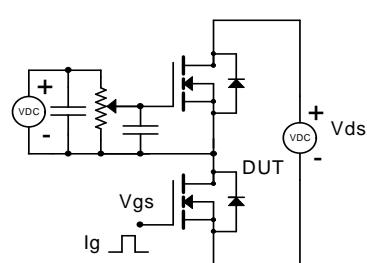
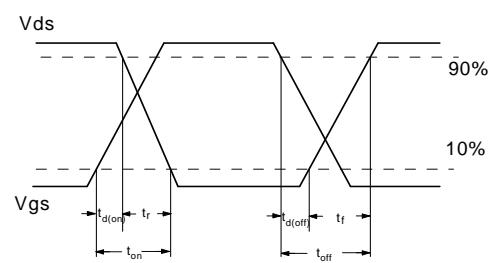
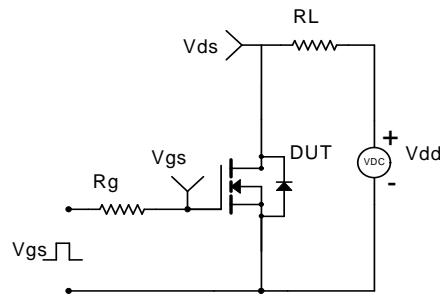
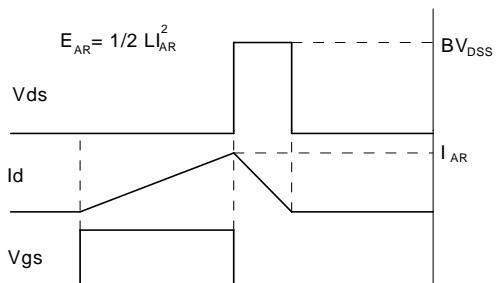
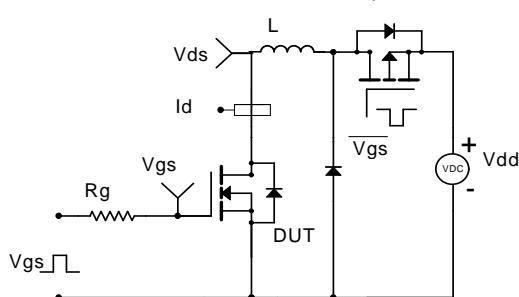
H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Fig 1: On-Region Characteristics (Note E)

Figure 2: Transfer Characteristics (Note E)

Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

Figure 4: On-Resistance vs. Junction Temperature (Note E)

Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

Diode Recovery Test Circuit & Waveforms
