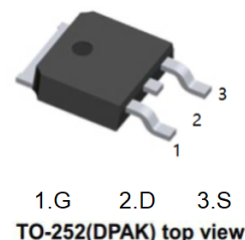


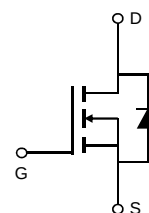
General Description

The AOD478 is ideal for boost converters and synchronous rectifiers for consumer, telecom, industrial power supplies and LED backlighting.



Product Summary

- $V_{DS}=100V$
- I_D (at $V_{GS}=10V$) 11A
- $R_{DS(ON)}$ (at $V_{GS}=10V$) < 140m Ω
- $R_{DS(ON)}$ (at $V_{GS} = 5V$) < 152m Ω



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	11	A
$T_C=25^{\circ}C$		8	
Pulsed Drain Current ^C	I_{DM}	24	A
Continuous Drain Current	I_{DSM}	2.5	A
$T_A=25^{\circ}C$		2	
Avalanche Current ^C	I_{AS}, I_{AR}	10	A
Avalanche energy $L=0.1mH$ ^C	E_{AS}, E_{AR}	5	mJ
Power Dissipation ^B	P_D	45	W
$T_C=25^{\circ}C$		23	
Power Dissipation ^A	P_{DSM}	2.1	W
$T_A=25^{\circ}C$		1.3	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^{\circ}C$

Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$t \leq 10s$	$R_{\theta JA}$	17	25	$^{\circ}C/W$
Maximum Junction-to-Ambient ^{A, D}	Steady-State		55	60	$^{\circ}C/W$
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	2.7	3.3	$^{\circ}C/W$

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	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	100			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$			1	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1.7	2.2	2.8	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	24			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=4.5\text{A}$		116	140	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=3\text{A}$		121	152	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=4.5\text{A}$		17		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.76	1	V
I_S	Maximum Body-Diode Continuous Current ^G				12	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=50\text{V}$, $f=1\text{MHz}$	350	445	540	pF
C_{oss}	Output Capacitance		18	29	35	pF
C_{rss}	Reverse Transfer Capacitance		9	16	23	pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	1	2	3	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$, $V_{DS}=50\text{V}$, $I_D=4.5\text{A}$	8	10.3	13	nC
$Q_g(4.5\text{V})$	Total Gate Charge		4	5.1	6.5	nC
Q_{gs}	Gate Source Charge			1.6		nC
Q_{gd}	Gate Drain Charge			2.4		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=50\text{V}$, $R_L=8.6\Omega$, $R_{GEN}=3\Omega$		8		ns
t_r	Turn-On Rise Time			3		ns
$t_{D(off)}$	Turn-Off DelayTime			17		ns
t_f	Turn-Off Fall Time			4.5		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=4.5\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$	14.5	21	27.5	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=4.5\text{A}$, $dI/dt=500\text{A}/\mu\text{s}$	68	97	126	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 $T_{J(MAX)}=175^{\circ}\text{C}$, 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 $T_{J(MAX)}=175^{\circ}\text{C}$. 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 $<300\mu\text{s}$ 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 $T_{J(MAX)}=175^{\circ}\text{C}$. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

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

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

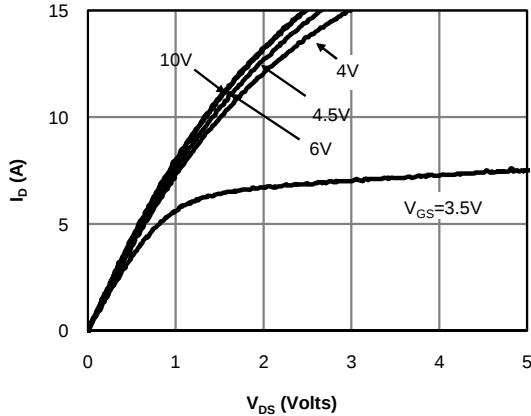


Fig 1: On-Region Characteristics (Note E)

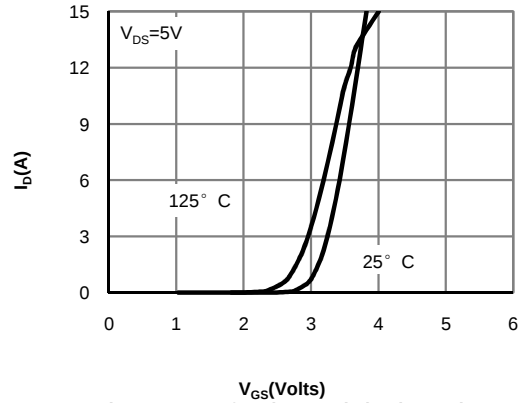


Figure 2: Transfer Characteristics (Note E)

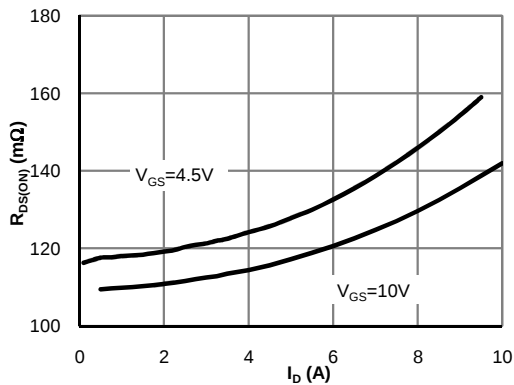


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

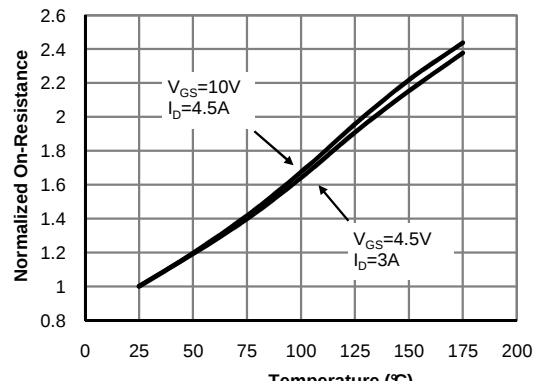


Figure 4: On-Resistance vs. Junction Temperature (Note E)

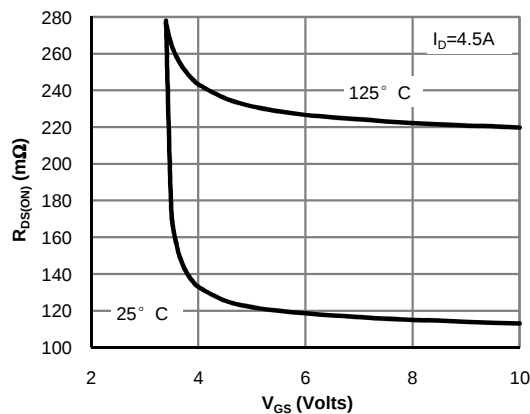


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

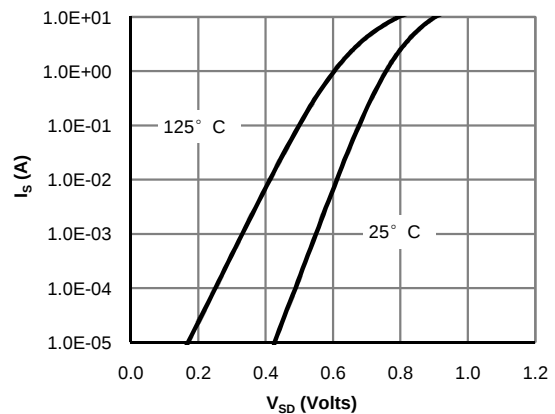
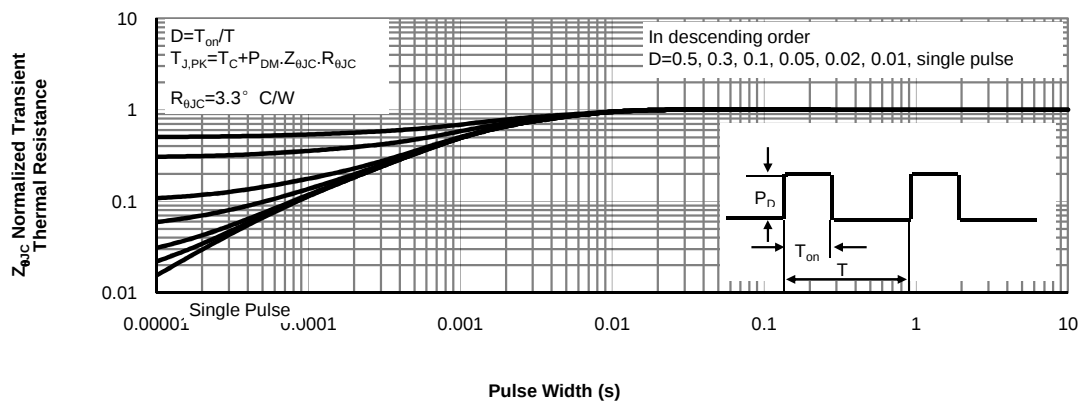
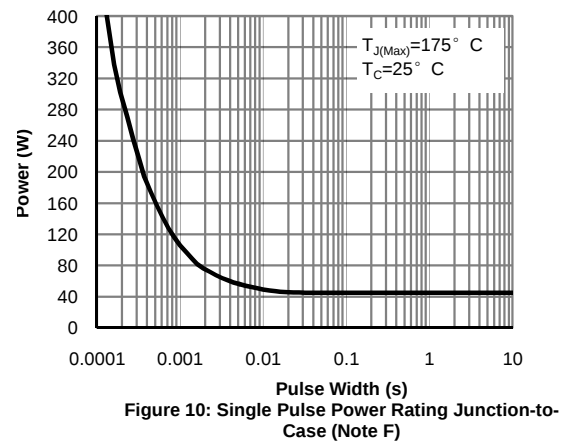
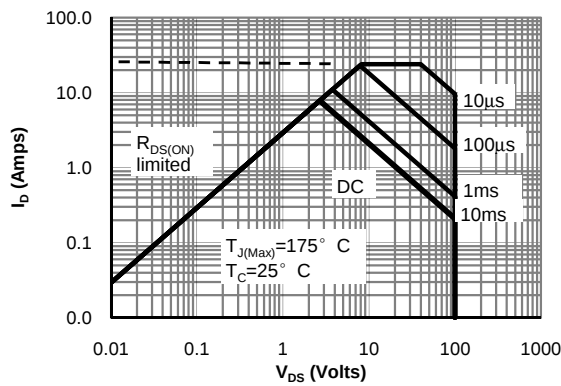
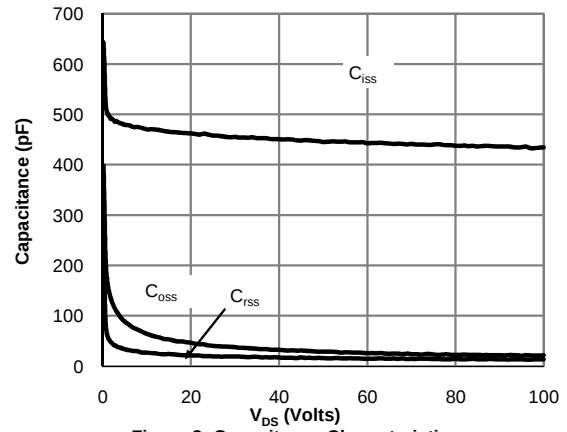
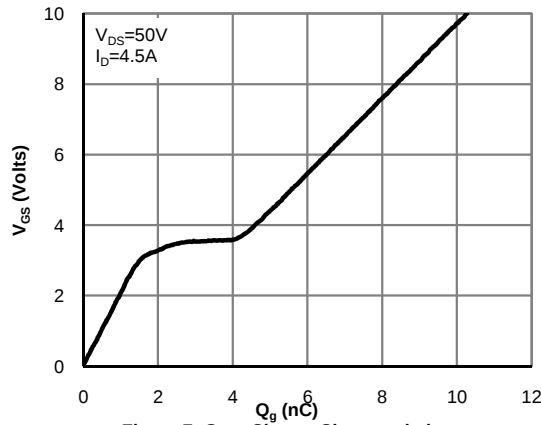


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

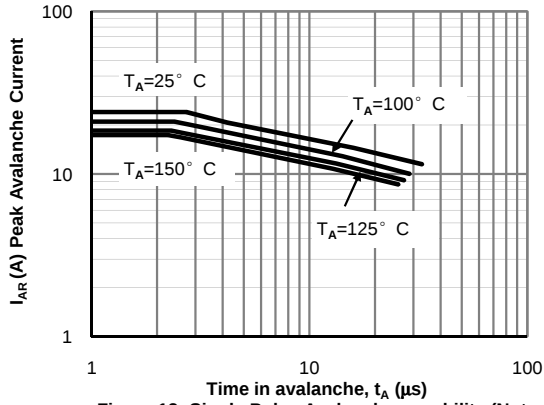


Figure 12: Single Pulse Avalanche capability (Note C)

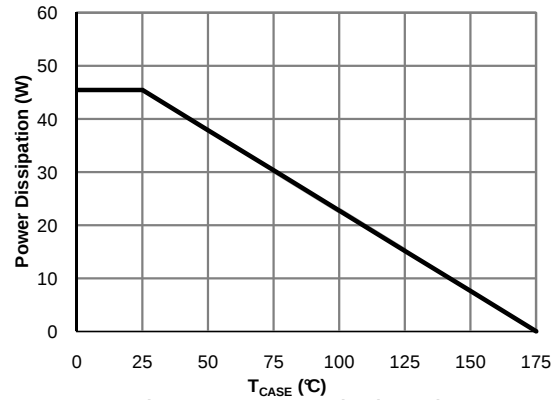


Figure 13: Power De-rating (Note F)

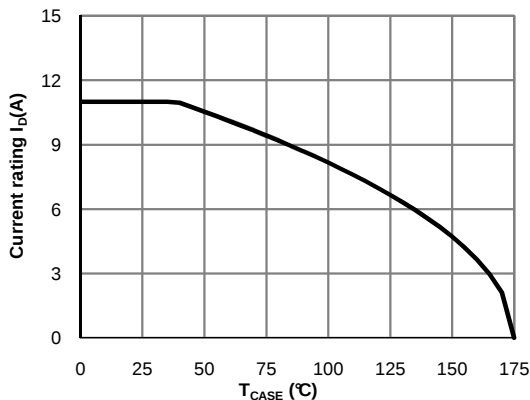


Figure 14: Current De-rating (Note F)

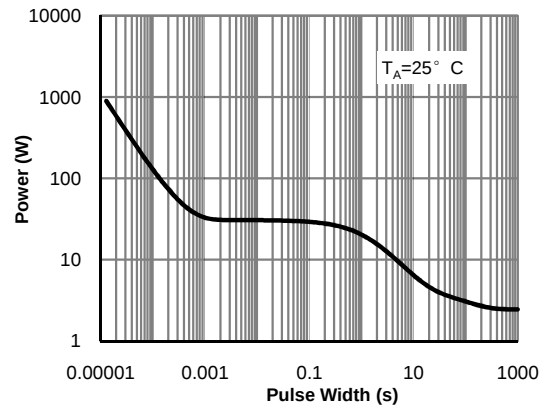


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

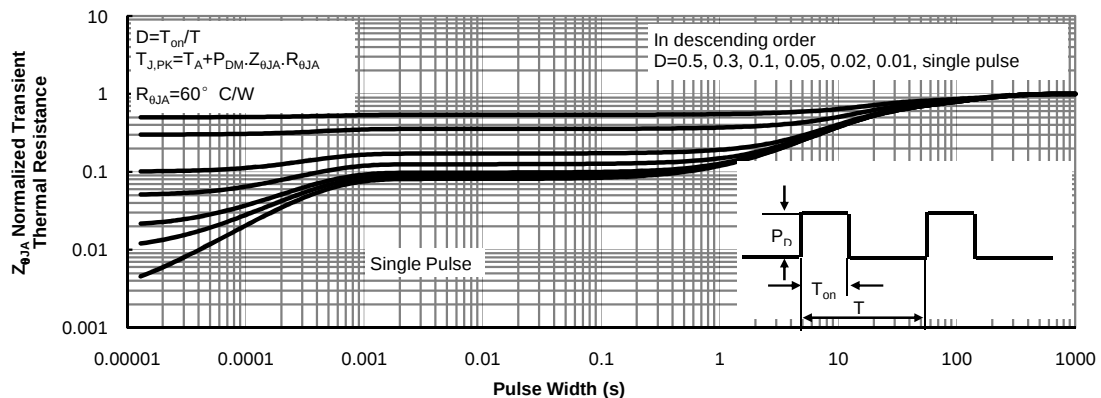
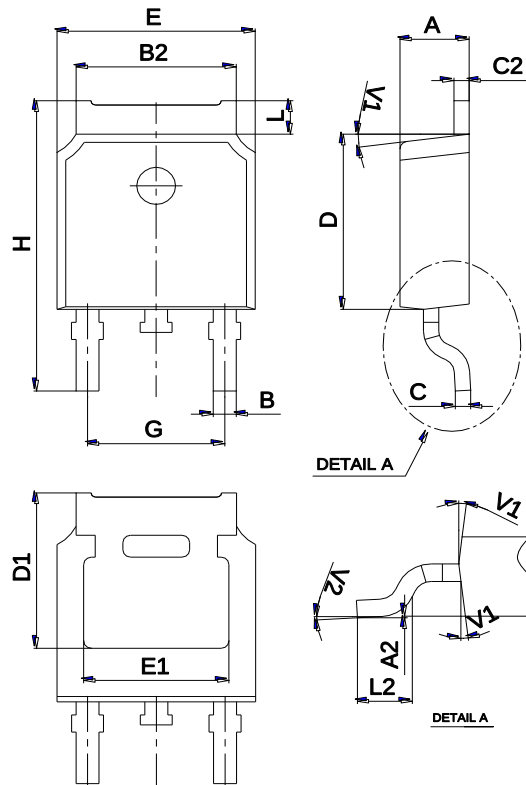


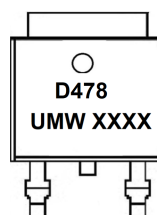
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW AOD478	TO-252	2500	Tape and reel