UMW AO4421

-60V P-Channel MOSFET

1.Description

The AO4421 combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$. This device is ideal for load switch and battery protection applications.

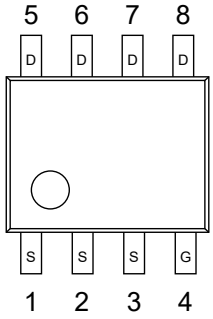
2.Features

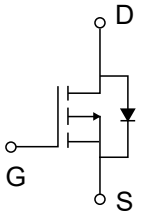
- $V_{DS\ (V)}$=-60V
- I_D=-6.2A
- $R_{DS(ON)}$<32mΩ(V_{GS}=-10V)
- $R_{DS(ON)}$<40mΩ(V_{GS}=-4.5V)

3.Pinning information

Pin	Symbol	Description
4	G	GATE
1,2,3	S	SOURCE
5,6,7,8	D	DRAIN

SOP-8





4.Absolute Maximum Ratings T_A= 25°C

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	-60	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current [A]	T_A=25°C	I_D	-6.2	A
	T_A=70°C		-5	
Pulsed Drain Current [B]		I_{DM}	-40	
Power Dissipation [A]	T_A=25°C	P_D	3.1	W
	T_A=70°C		2	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

5.Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	24	40	°C/W
Maximum Junction-to-Ambient [A D]	Steady-State		54	75	°C/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	21	30	°C/W

6.Electrical Characteristic (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=-250μA, V_{GS}=0V	-60			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-48V, V_{GS}=0V			-1	μA
		T_J=55°C			-5	
Gate-Body leakage current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-1	-2	-3	V
On state drain current	$I_{D(ON)}$	V_{GS}=-10V, V_{DS}=-5V	-40			A
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-6.2A		32	40	mΩ
		V_{GS}=-4.5V, I_D=-5A		40	50	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V, I_D=-6.2A		18		S
Diode Forward Voltage	V_{SD}	I_S=-1A, V_{GS}=0V		-0.74	-1	V
Maximum Body-Diode Continuous Current	I_S				-4.2	A
DYNAMIC PARAMETERS						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=30V, f=1MHz		2417	2900	pF
Output Capacitance	C_{oss}			179		pF
Reverse Transfer Capacitance	C_{rss}			120		pF
Gate resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz		1.9	2.3	Ω
SWITCHING PARAMETERS						
Total Gate Charge	Q_g(10V)	V_{GS}=-10V, V_{DS}=-30V, I_D=-6.2A		46.5	55	nC
Total Gate Charge	Q_g(4.5V)			22.7		nC
Gate Source Charge	Q_{gs}			9.1		nC
Gate Drain Charge	Q_{gd}			9.2		nC

Turn-On DelayTime	$t_{D(on)}$	V_{GS}=-10V, V_{DS}=-30V R_L=4.7Ω,R_{GEN}=3Ω		9.8		ns
Turn-On Rise Time	t_r			6.1		ns
Turn-Off DelayTime	$t_{D(off)}$			44		ns
Turn-Off Fall Time	t_f			12.7		ns
Body Diode Reverse Recovery Time	t_{rr}	I_F=-6.2A, dI/dt=100A/μs		34	42	ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=-6.2A, dI/dt=100A/μs		47		nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using ≤ 10s junction-to-ambient thermal resistance.

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 lead $R_{\theta JL}$ and lead 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-ambient thermal impedence which is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.

7.1Typical characteristic

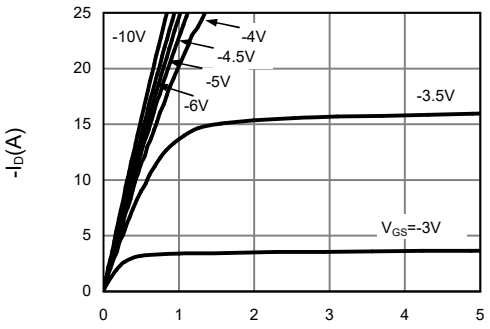


Fig 1: On-Region Characteristics

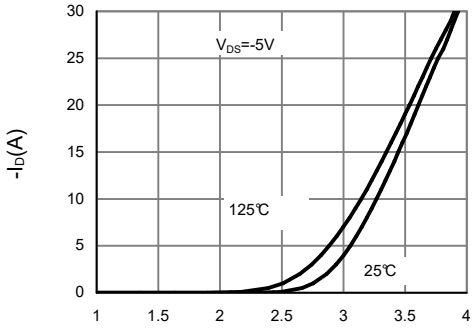


Figure 2: Transfer Characteristics

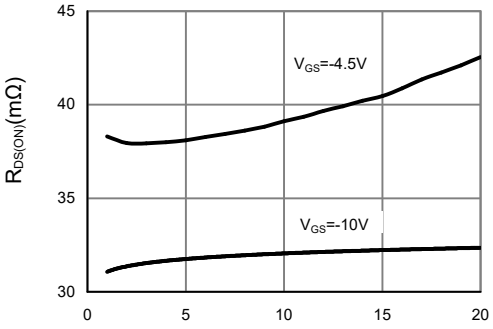


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

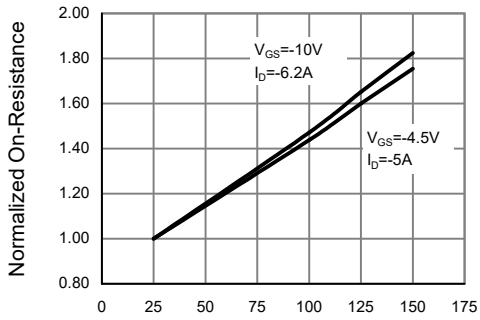


Figure 4: On-Resistance vs. Junction Temperature

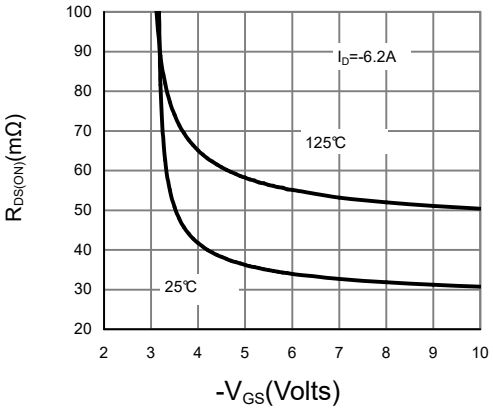


Figure 5: On-Resistance vs. Gate-Source Voltage

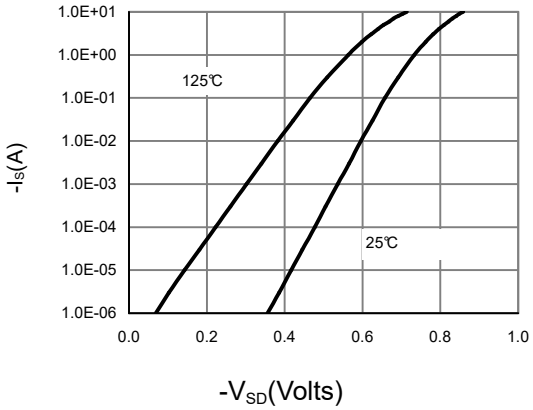


Figure 6: Body-Diode Characteristics

7.2Typical characteristic

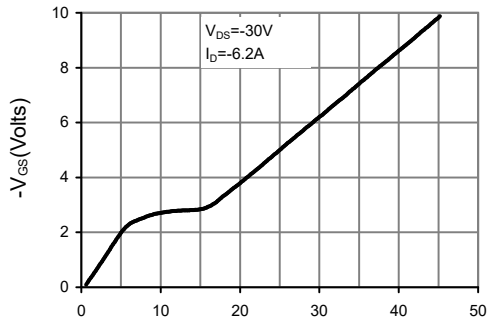


Figure 7: Gate-Charge Characteristics

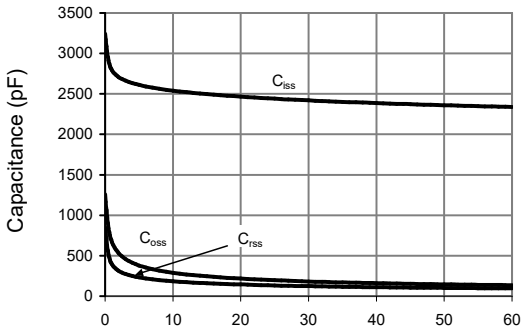


Figure 8: Capacitance Characteristics

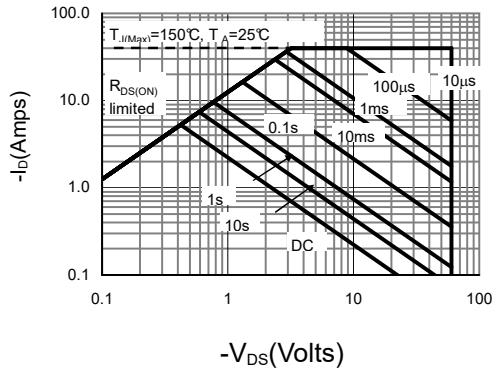


Figure 9: : Maximum Forward Biased Safe Operating Area (Note E)

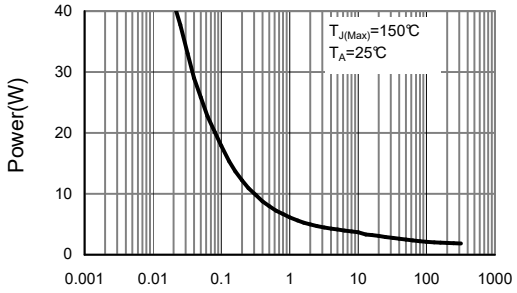


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

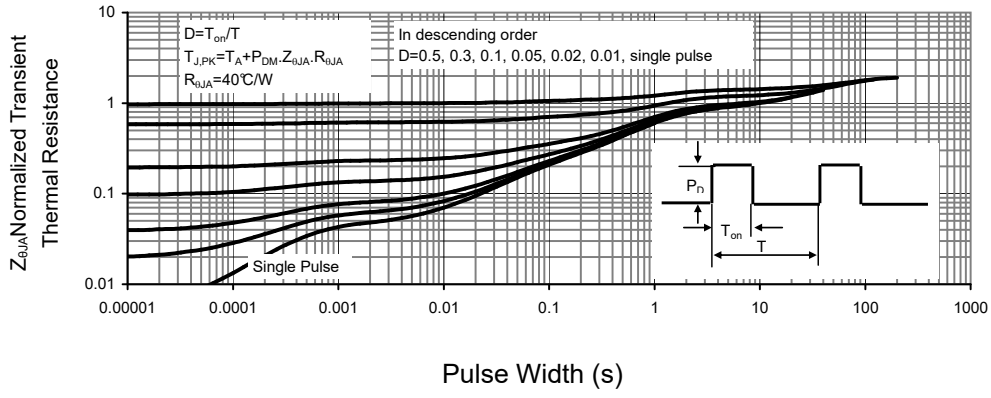
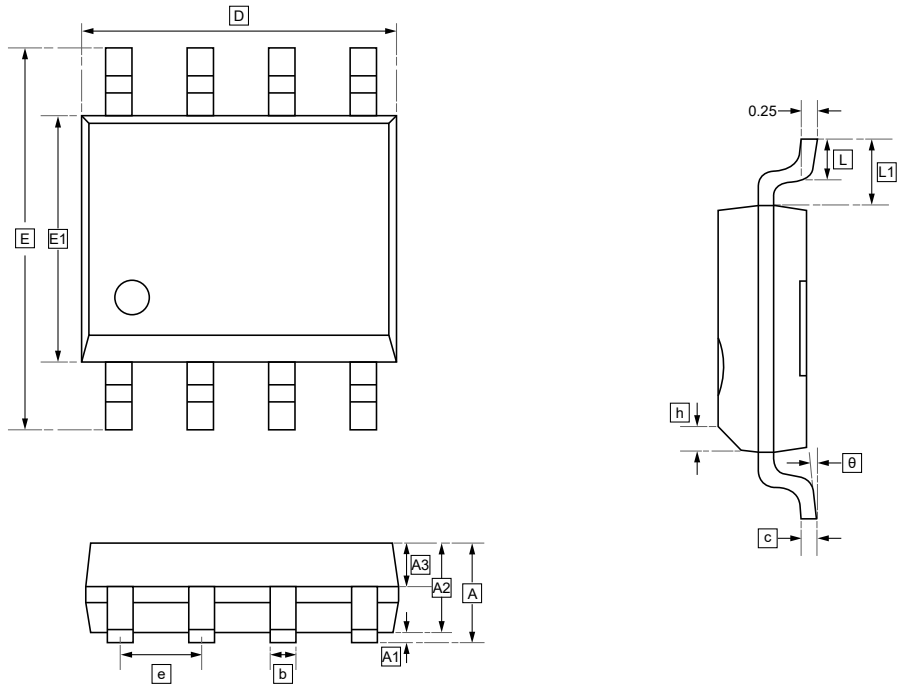


Figure 12: Normalized Maximum Transient Thermal Impedance

8.SOP-8 Package Outline Dimensions

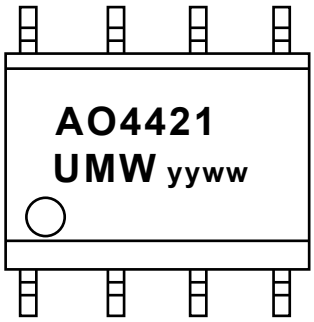


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.70	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.10	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW AO4421	SOP-8	3000	Tape and reel

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