UMW AO4404

N-Channel 20V (D-S) MOSFET

1.Description

The AO4404 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

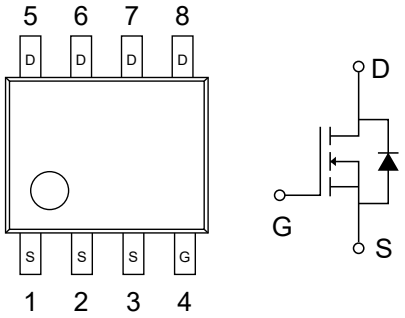
2.Features

- V_{DS}=20V
- I_D =12A
- $R_{DS(ON)}$ <20mΩ(V_{GS}=10V)

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 unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±16	
Continuous DrainCurrent (T_J = 150 °C)	T_C=25°C	I_D	12	A
	T_C=70°C		11	
	T_A=25°C		10[b,c]	
	T_A=70°C		8[b,c]	
Pulsed Drain Current		I_{DM}	47	
Continuous Source-Drain Diode Current	T_C=25°C	I_S	3.7	
	T_A=25°C		2.0[b,c]	
Single Pulse Avalanche Current	L = 0.1 mH	I_{AS}	20	
Avalanche Energy		E_{AS}	21	mJ
Maximum Power Dissipation	T_C=25°C	P_D	4.1	W
	T_C=70°C		2.5	
	T_A=25°C		2.2[b,c]	
	T_A=70°C		1.3[b,c]	
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 to 150	°C

5.Thermal resistance rating

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [b,d]	t ≤ 10s	R_{thJA}	39	55	°C/W
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	25	29	°C/W

a. Base on T_C = 25 °C.

b. Surface Mounted on 1" x 1" FR4 board.

c. t =10 s.

d. Maximum under Steady State conditions is 85 °C/W.

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS}=0V, I_D=250μA	20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D=250μA		26		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-6		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.0		3.0	V
Gate-Source Leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±16V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=20V, V_{GS}=0V			1	μA
		V_{DS}=20V, V_{GS}=0V, T_J=55°C			10	
On-State Drain Current[a]	$I_{D(ON)}$	V_{DS}≥5V, V_{GS}=10V	20			A
Drain-Source On-State Resistance[a]	$R_{DS(ON)}$	V_{GS}=10V, I_D=8A		13	20	mΩ
		V_{GS}=4.5V, I_D=3A		19	30	
Forward Transconductance[a]	g_{FS}	V_{DS}=10V, I_D=10A		50		S
Input Capacitance	C_{iss}	V_{DS}=10V, V_{DS}=0V, f=1MHz		800		pF
Output Capacitanc	C_{oss}			165		
Reverse Transfer Capacitance	C_{rss}			73		
Total Gate Charge	Q_g	V_{DS}=10V, V_{GS}=10V, I_D=10A		15	23	nC
		V_{DS}=10V, V_{GS}=5V, I_D=10A		6.8	10.2	
Gate Source Charge	Q_{gs}			2.5		
Gate Drain Charge	Q_{gd}			2.3		
Gate Resistance	R_g	f=1MHz	0.36	1.8	3.6	Ω
Turn-On DelayTime	$t_{D(on)}$	V_{DD} =10V, R_L=1.4 Ω ID≌9A, V_{GEN}=4.5V Rg=1Ω		16	23	ns
Rise Time	t_r			12	16	
Turn-Off DelayTime	$t_{D(off)}$			16	22	
Fall Time	t_f			10	18	
Turn-On Delay Time	$t_{D(on)}$	V_{DD} =10V, R_L=1.4 Ω ID≌9A, V_{GEN}=10V R_g=1Ω		8	16	
Rise Time	t_r			10	20	
Turn-Off Delay Time	$t_{D(off)}$			16	22	
Fall Time	t_f			8	15	

Continuous Source-Drain Diode Current	I_S	T_C=25°C			10	A
Pulse Diode Forward Current[a]	I_{SM}				50	
Body Diode Voltage	V_{SD}	I_S=9A		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F=9A, dI/dt=100A/μs T_J=25°C		15	30	ns
Body Diode Reverse Recovery Charge	Q_{rr}			6	12	nC
Reverse Recovery Fall Time	t_a			8		ns
Reverse Recovery Rise Time	t_b			7		

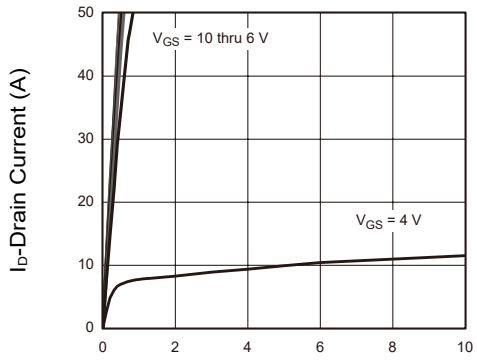
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

b. Guaranteed by design, not subject to production testing.

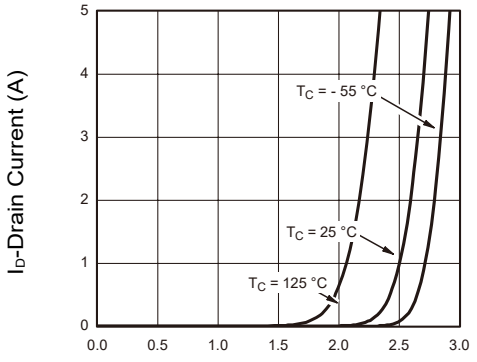
Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation

of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximumrating conditions for extended periods may affect device reliability.

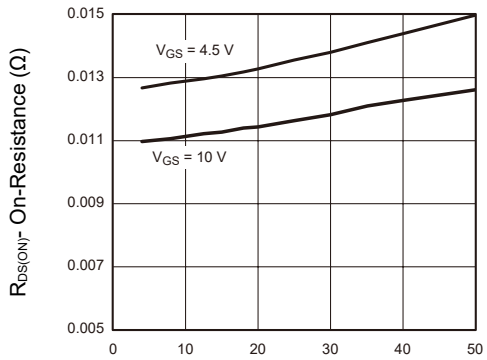
7.1Typical characteristic 25 °C, unless otherwise noted



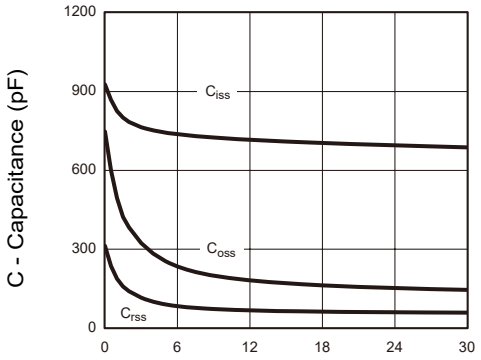
Output Characteristics



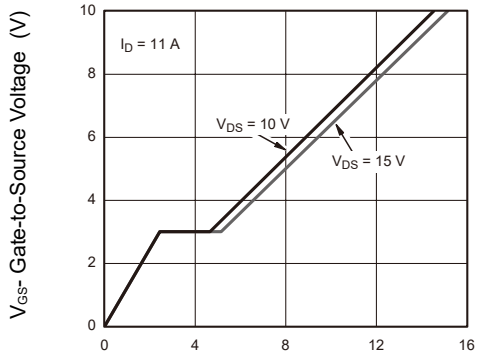
Transfer Characteristics



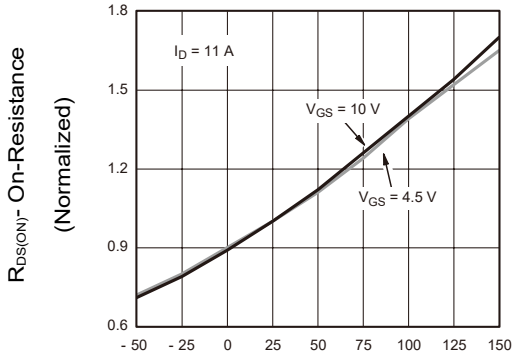
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

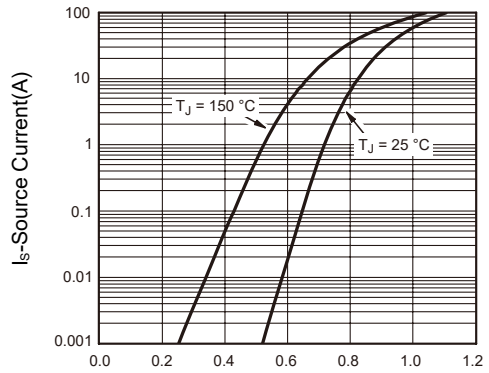


Gate Charge



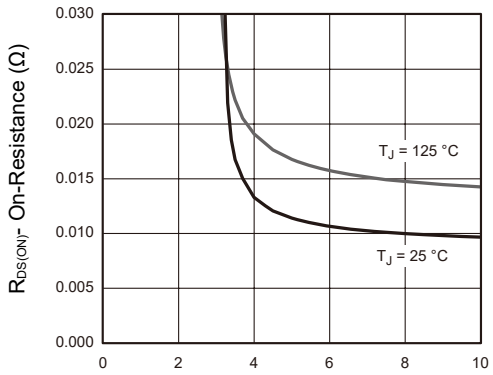
On-Resistance vs. Junction Temperature

7.2Typical characteristic 25 °C, unless otherwise noted



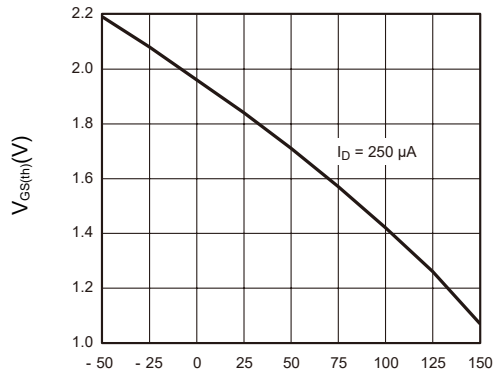
V_{SD} - Source-to-Drain Voltage (V)

Source-Drain Diode Forward Voltage



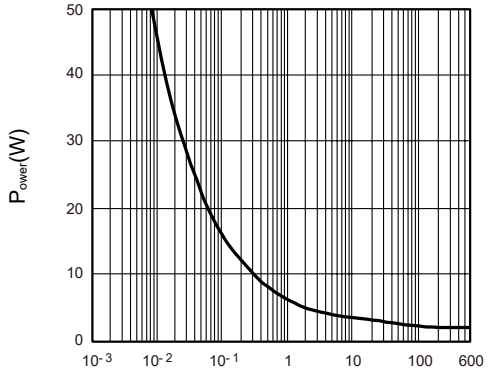
V_{GS} - Gate-to-Source Voltage (V)

On-Resistance vs. Gate-to-Source Voltage



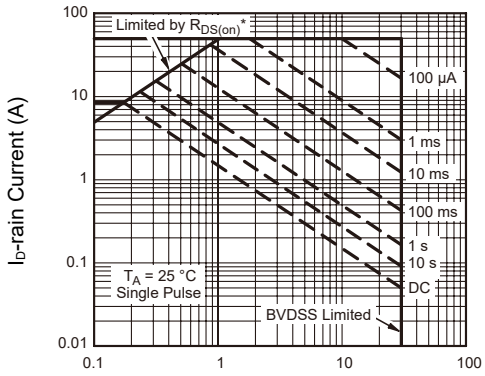
T_J - Temperature (°C)

Threshold Voltage



Time (s)

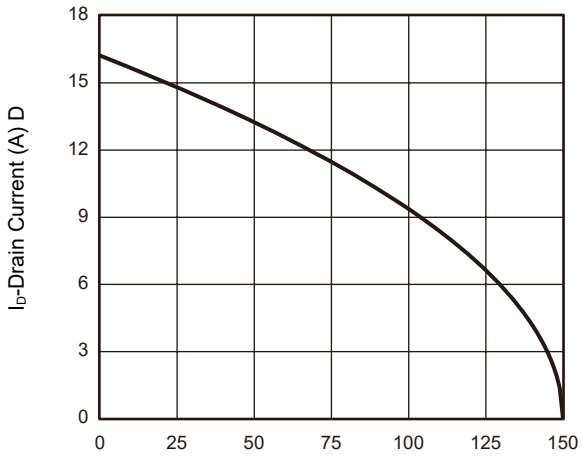
Single Pulse Power, Junction-to-Ambient



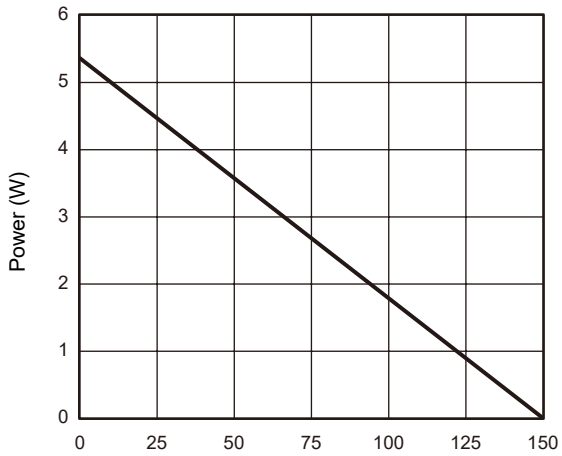
V_{DS} - Drain-to-Source Voltage (V)* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

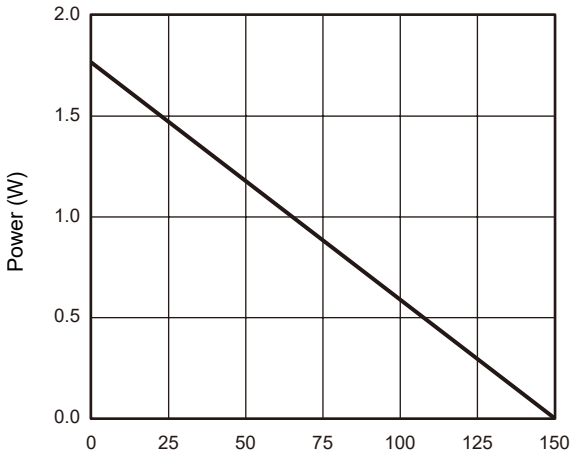
7.3Typical characteristic 25 °C, unless otherwise noted



Current Derating*



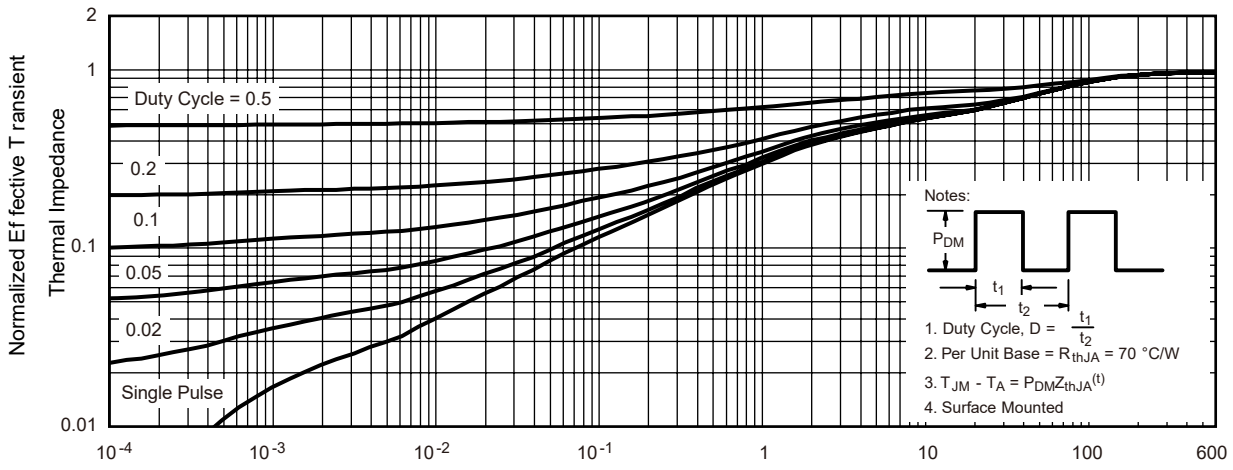
Power Derating, Junction-to-Foot



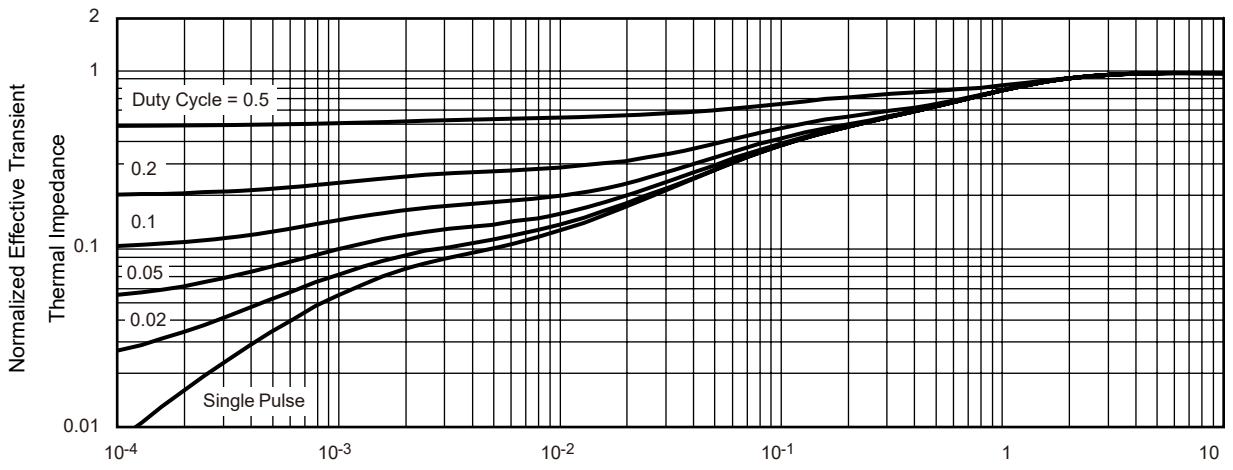
Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upperdissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the packagelimit.

7.4Typical characteristic 25 °C, unless otherwise noted

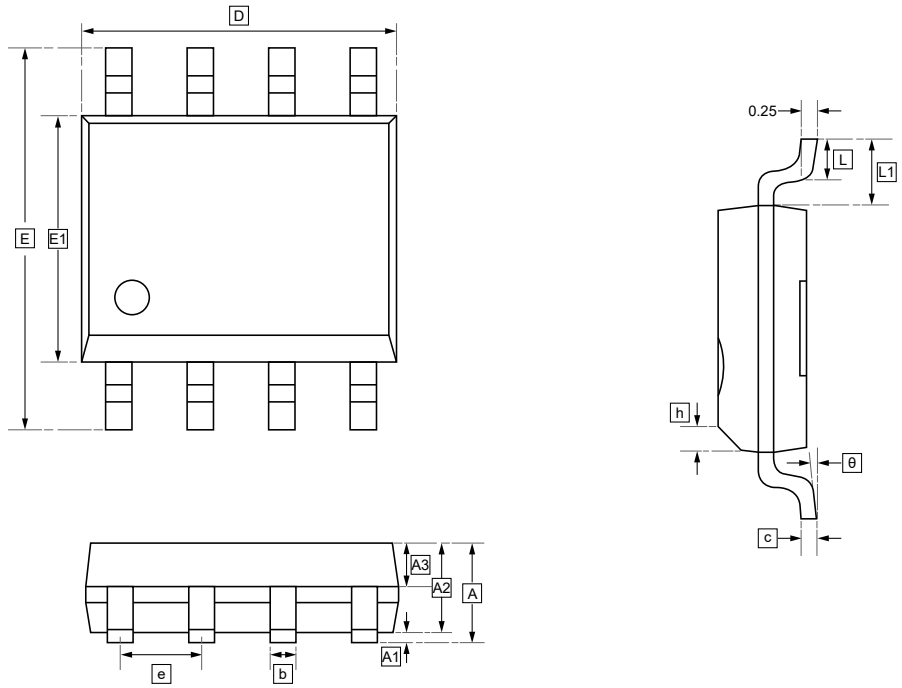


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Foot

8.SOP-8 Package Outline Dimensions

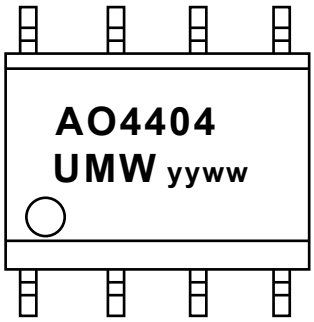


DIMENSIONS (mm are the original dimensions)

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 AO4404	SOP-8	3000	Tape and reel

10.Disclaimer

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