UMW AO4606

30V N+P-Channel Enhancement Mode MOSFET

1.Description

The AO4606 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.

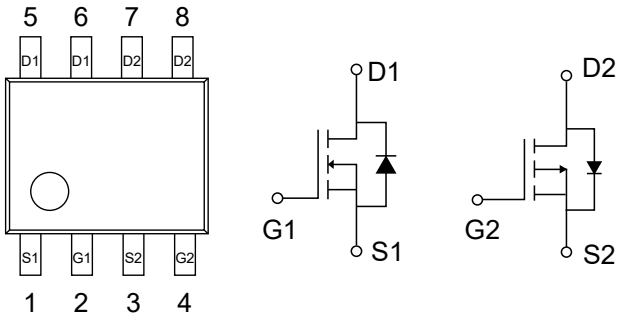
2.Features

- $V_{DS\ (V)}$=30V
- I_D=6A
- $R_{DS(ON)}$<28mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<42mΩ(V_{GS}=4.5V)
- $V_{DS\ (V)}$=-30V
- I_D=-7.6A
- $R_{DS(ON)}$<32mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<40mΩ(V_{GS}=4.5V)

3.Pinning information

Pin	Symbol	Description
2,4	G1, G2	GATE
1,3	S1, S2	SOURCE
5,6,7,8	D1, D2	DRAIN

SOP-8



4.Absolute Maximum Ratings T_A= 25°C

Parameter		Symbol	Rating		Units
			N-Ch	P-Ch	
Drain-Source Voltage		V_{DS}	30	-30	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current, V_{GS}=10V [1]	T_C=25°C	I_D	6	-7.6	A
Continuous Drain Current, V_{GS}=10V [1]	T_C=100°C		4.5	-5.9	A
Pulsed Drain Current [2]		I_{DM}	20	-15	A
Single Pulse Avalanche Energy [3]		E_{AS}	22	45	mJ
Avalanche Current		I_{AS}	21	-30	A
Total Power Dissipation [4]	T_C=25°C	P_D	2	2	W

Storage Temperature Range	T_{STG}	-55 to 150	-55 to 150	°C
Operating Junction Temperature Range	T_J	-55 to 150	-55 to 150	°C
Thermal Resistance Junction-Ambient [1]	$R_{\theta JA}$		62	°C/W
Thermal Resistance Junction-Case [1]	$R_{\theta JC}$		5	°C/W

5.1Electrical Characteristic (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	30			V
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C,I_D=1mA		0.023		V/°C
Static Drain-Source On-Resistance [2]	$R_{DS(ON)}$	V_{GS}=10V, I_D=6A		19	28	mΩ
		V_{GS}=4.5V, I_D=5A		28	42	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1	1.7	2.5	V
$V_{GS(th)}$ Temperature Coefficient	$V_{GS(th)}$			-5.2		mV/°C
Drain-Source Leakage Current	I_{DSS}	V_{DS}=24V, V_{GS}=0V, T_J=25°C			1	μA
		V_{DS}=24V, V_{GS}=0V, T_J=55°C			5	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=5A		16		S
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz		2.5	5	Ω
Total Gate Charge (4.5V)	Q_g	V_{DS}=20V, V_{GS}=4.5V, I_D=5A		7.2		nC
Gate-Source Charge	Q_{gs}			1.4		nC
Gate-Drain Charge	Q_{gd}			2.2		nC
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=15V, V_{GS}=10V R_G=3.3Ω, I_D=5A		4.1		ns
Rise Time	t_r			9.8		ns
Turn-Off Delay Time	$t_{D(off)}$			15.5		ns
Fall Time	t_f			6		ns
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, f=1MHz		572		pF
Output Capacitance	C_{oss}			81		pF
Reverse Transfer Capacitance	C_{rss}			65		pF
Continuous Source Current [1,5]	I_S	V_G=V_D=0V , Force Current			10	A
Pulsed Source Current [2,5]	I_{SM}				20	A
Diode Forward Voltage [2]	V_{SD}	V_{GS}=0V, I_S=1A, T_J=25°C			1.2	V

1.The data tested by surface mounted on a 1 inch [2] FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%

3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=21A

4 .The power dissipation is limited by 150°C junction temperature

5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

5.2Electrical Characteristic (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=-250μA, V_{GS}=0V	-30			V
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C,I_D=1mA		-0.021		V/°C
Static Drain-Source On-Resistance [2]	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-7A		24	32	mΩ
		V_{GS}=-4.5V, I_D=-5A		32	40	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-1	-1.6	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	$V_{GS(th)}$			-4.2		mV/°C
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-24V, V_{GS}=0V, T_J=25°C			-1	μA
		V_{DS}=-24V, V_{GS}=0V, T_J=55°C			-5	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V			±100	nA
Forward Transconductance	g_{FS}	V_{DS}=-5V, I_D=-7A		15		S
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz		15	30	Ω
Total Gate Charge (-4.5V)	Q_g	V_{DS}=-20V		9.8		nC
Gate-Source Charge	Q_{gs}	V_{GS}=-4.5V		2.2		nC
Gate-Drain Charge	Q_{gd}	I_D=-7A		3.4		nC
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=-15V, V_{GS}=-10V		16.4		ns
Rise Time	t_r			20.2		ns
Turn-Off Delay Time	$t_{D(off)}$	R_G=3.3Ω, I_D=-5A		55		ns
Fall Time	t_f			10		ns
Input Capacitance	C_{iss}	V_{DS}=-15V, V_{GS}=0V, f=1MHz		930		pF
Output Capacitance	C_{oss}			148		pF
Reverse Transfer Capacitance	C_{rss}			115		pF
Continuous Source Current [1,5]	I_S	V_G=V_D=0V , Force Current			-7.6	A
Pulsed Source Current [2,5]	I_{SM}				-15	A
Diode Forward Voltage [2]	V_{SD}	V_{GS}=0V, I_S=-1A, T_J=25°C			-1.2	V

1.The data tested by surface mounted on a 1 inch [2] FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.

3.The EAS data shows. The power dissipation is limited by ows Max. rating.

4. The test condition is V150°C junction temperature V_{DD}=-25 V,V_{GS}=-10V,L=0.1mH,I_{AS}=-30A.

5 .The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

7.1Typical characteristic

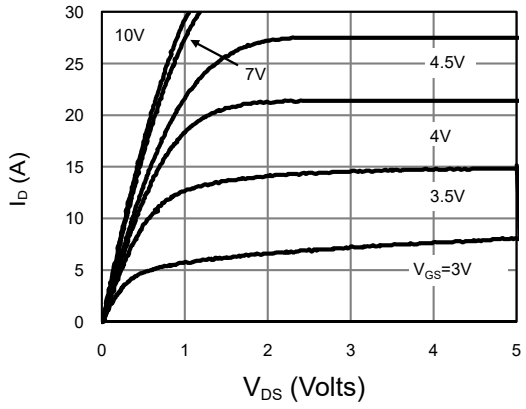


Fig.1 On-Region Characteristics

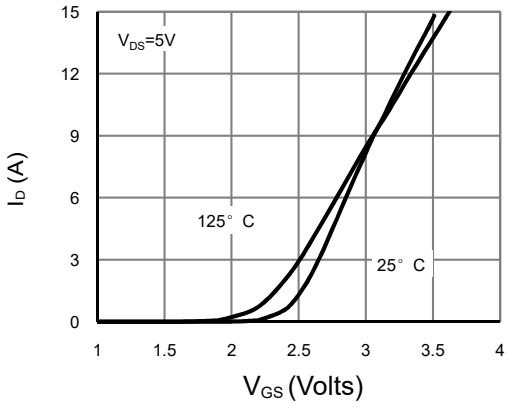


Fig.2 Transfer Characteristics

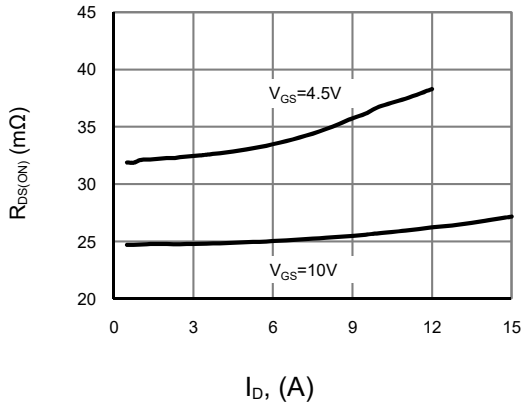


Fig.3 On-Resistance vs. Drain Current and Gate Voltage

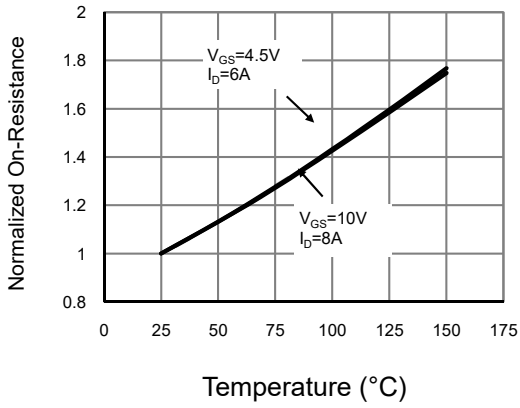


Fig.4 On-Resistance vs. Junction Temperature

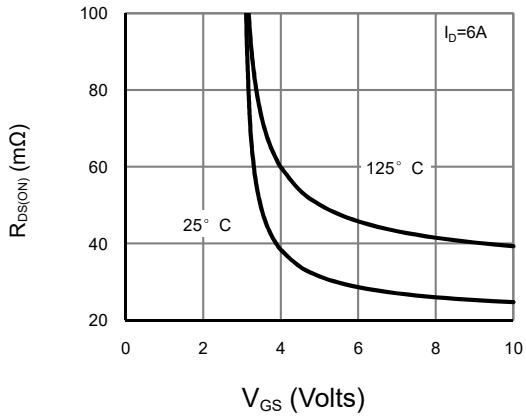


Fig.5 On-Resistance vs. Gate-Source Voltage

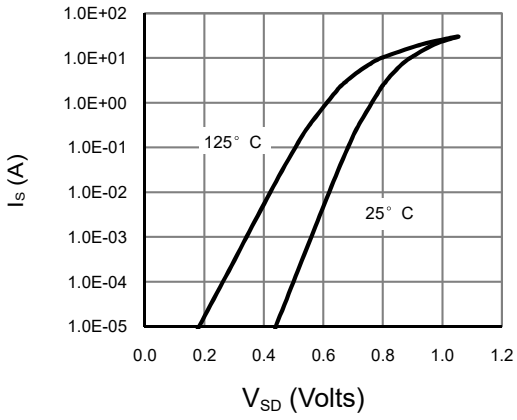


Fig.6 Body-Diode Characteristics

7.2Typical characteristic

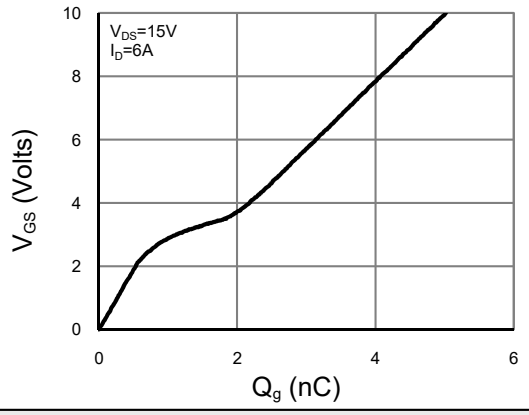


Fig.7 Gate-Charge Characteristics

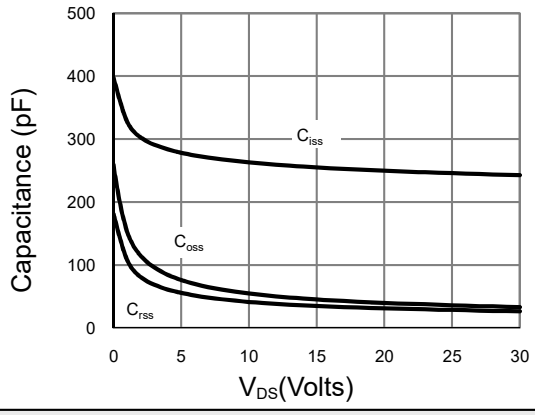


Fig.8 Capacitance Characteristics

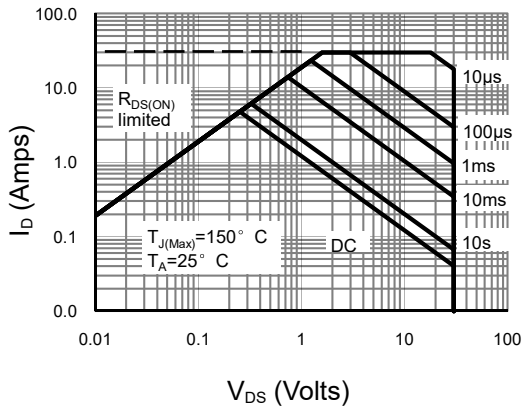


Fig.9 Maximum Forward Biased Safe Operating Area

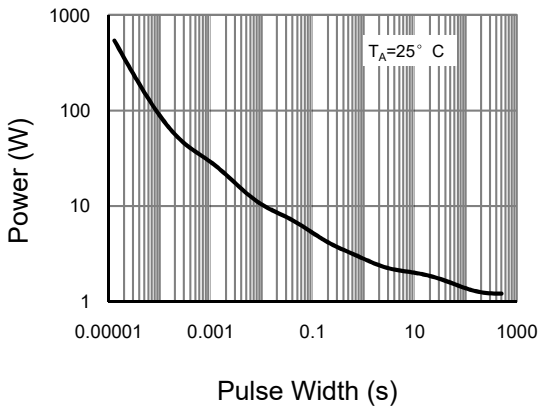


Fig.10 Single Pulse Power Rating Junction-to-Ambient

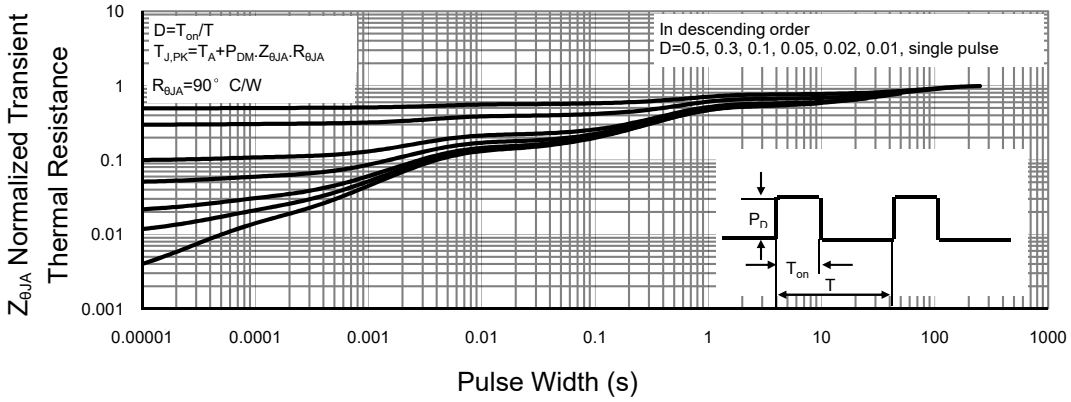


Fig.11 Normalized Maximum Transient Thermal Impedance

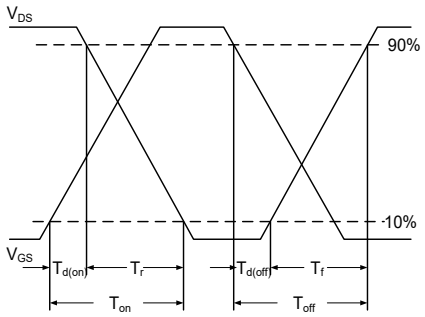


Fig.12 Switching Time Waveform

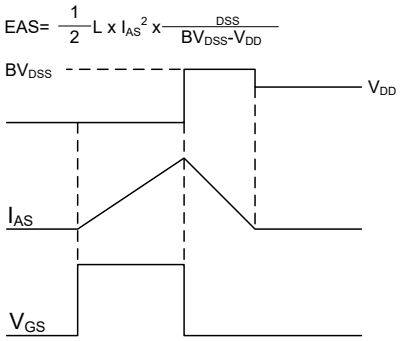


Fig.13 Unclamped Inductive Switching Waveform

7.3Typical characteristic

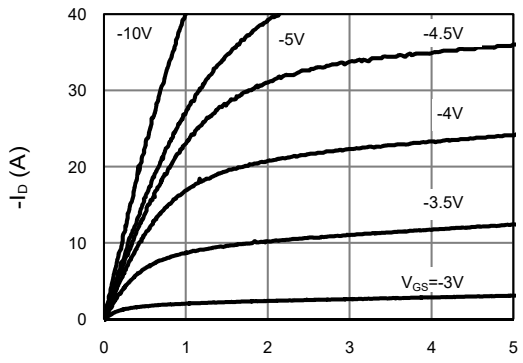


Fig.14 On-Region Characteristics

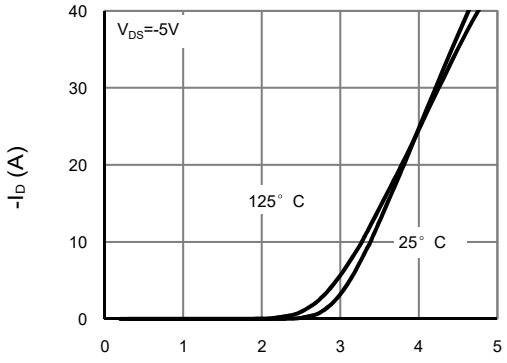


Fig. 15 Transfer Characteristics

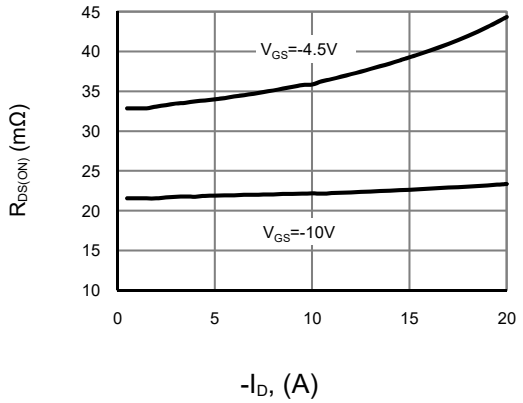


Fig.16 On-Resistance vs. Drain Current and Gate Voltage

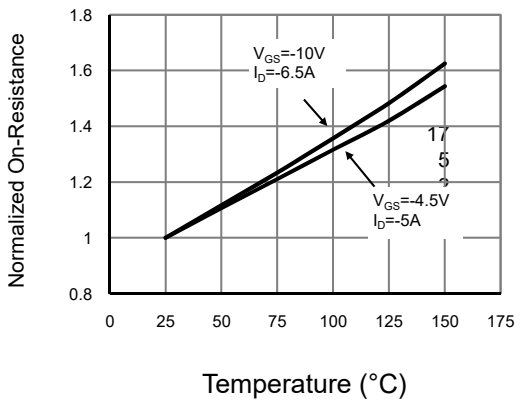


Fig.17 On-Resistance vs. Junction Temperature

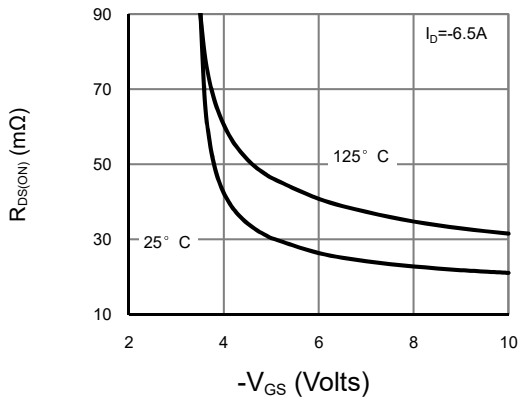


Fig.18 On-Resistance vs. Gate-Source Voltage

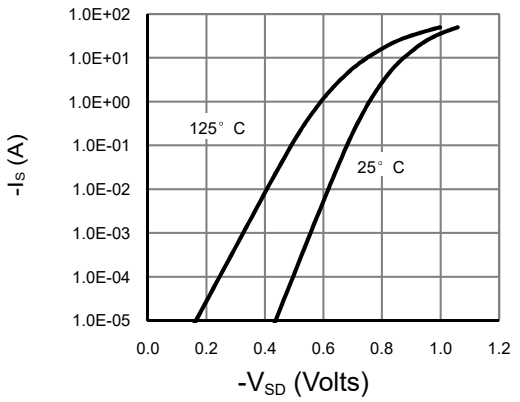


Fig.19 Body-Diode Characteristics

7.4Typical characteristic

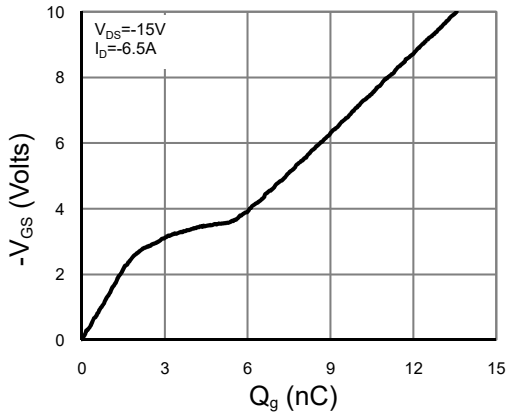


Fig.20 Gate-Charge Characteristics

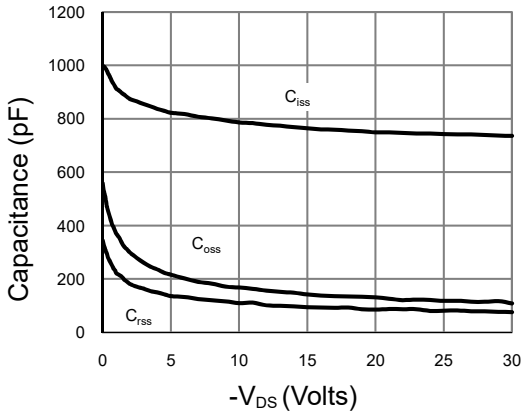


Fig.21 Capacitance Characteristics

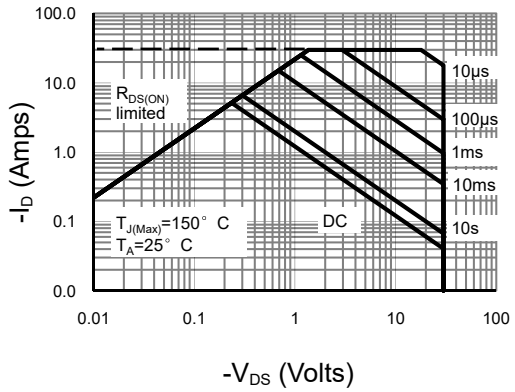


Fig.22 Maximum Forward Biased Safe Operating Area

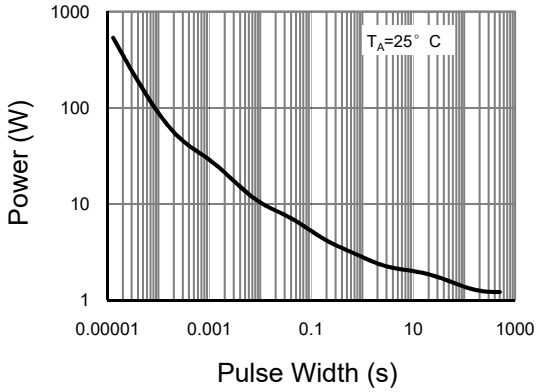


Fig.23 Single Pulse Power Rating Junction-to-Ambient

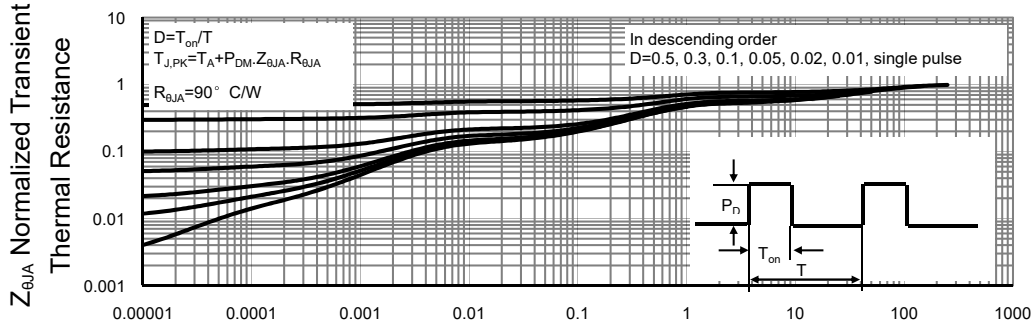


Fig.24 Normalized Maximum Transient Thermal Impedance

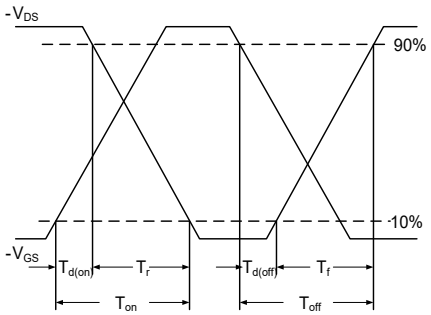


Fig.25 Switching Time Waveform

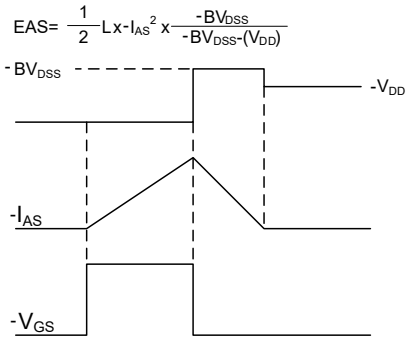
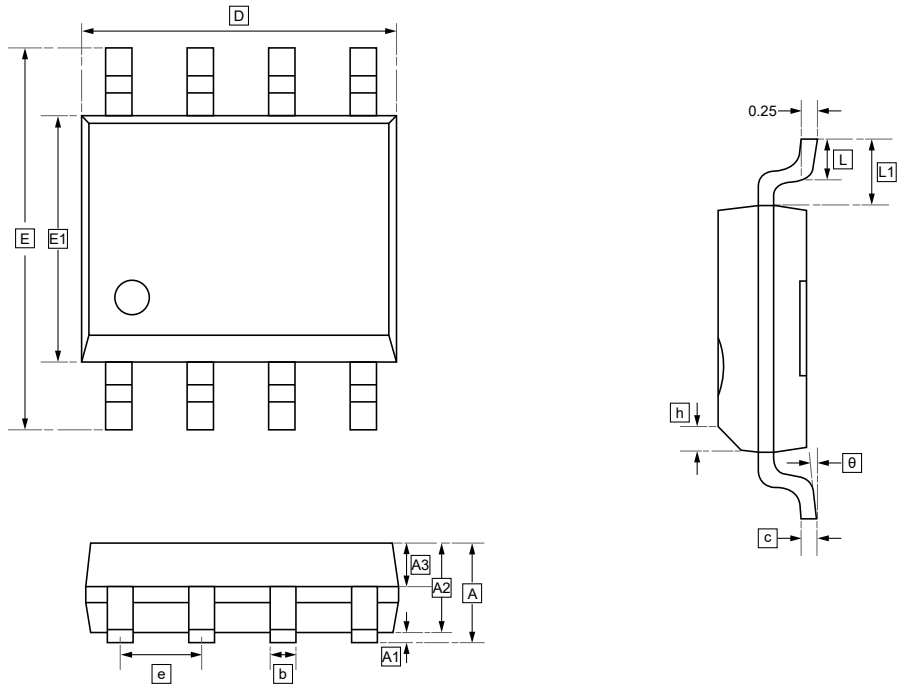


Fig.26 Unclamped Inductive Switching Waveform

8.SOP-8 Package Outline Dimensions

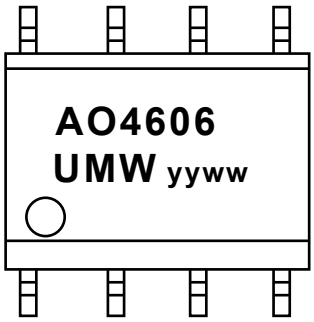


DIMENSIONS (mm are the original dimensions)

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 AO4606	SOP-8	3000	Tape and reel

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