

1. Description

The AO4406A 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.

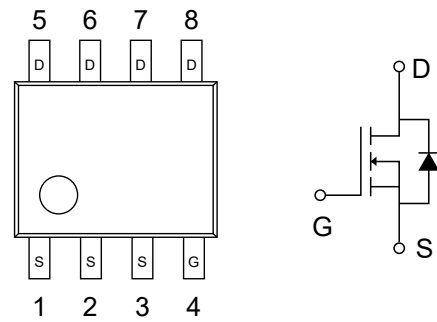
2. Features

- $V_{DS}=30V$
- $I_D=12A$
- $R_{DS(ON)} < 13m\Omega (V_{GS}=10V)$

3. Pinning information

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

SOP-8



4. Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, $V_{GS}@10V^1$	$I_D@T_A=25^\circ C$	12	A
Continuous Drain Current, $V_{GS}@10V^1$	$I_D@T_A=70^\circ C$	8	A
Pulsed Drain Current ²	I_{DM}	30	A
Single Pulse Avalanche Energy ³	E_{AS}	20	mJ
Avalanche Current	I_{AS}	22	A
Total Power Dissipation ⁴	$P_D@T_A=25^\circ C$	4.5	W
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to 150	$^\circ C$
Thermal Resistance Junction-ambient ¹	$R_{\theta JA}$	50	$^\circ C/W$
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	30	$^\circ C/W$



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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	30			V
BV _{DSS} Temperature Coefficient	ΔBV _{DSS} /ΔT _J	Reference to 25°C, I _D =1mA		0.027		V/°C
Static Drain-Source On-Resistance ²	R _{DS(on)}	V _{GS} =10V, I _D =10A		10	13	mΩ
		V _{GS} =4.5V, I _D =8A		12	16	
Gate Threshold Voltage	V _{GS(th)}		1.2	1.5	2.5	V
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)}	V _{GS} =V _{DS} , I _D =250μA		5.8		mV/°C
Drain-Source Leakage Current	I _{DSS}	V _{DS} =24V, V _{GS} =0V			1	μA
		V _{DS} =24V, V _{GS} =0V, T _J =55°C			5	
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =10A		5.8		S
Gate Resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1MHz		2.2	3.8	Ω
Total Gate Charge (4.5V)	Q _g	V _{DS} =15V, V _{GS} =4.5V, I _D =10A		12.6	17.6	nC
Gate-Source Charge	Q _{gs}			4.2	5.9	
Gate-Drain Charge	Q _{gd}			5.1	7.1	
Turn-On Delay Time	t _{D(on)}	V _{DD} =15V, V _{GS} =10V R _G =3.3, I _D =10A	3.5	6.2	12.4	ns
Rise Time	t _r			59	106	
Turn-Off Delay Time	t _{D(off)}			27.6	55	
Fall Time	t _f			8.4	16.8	
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, f=1MHz		960		pF
Output Capacitance	C _{oss}			139		
Reverse Transfer Capacitance	C _{rss}			87		
Continuous Source Current ^{1,5}	I _S	V _G =V _D =0V, Force Current			10.3	A
Pulsed Source Current ^{2,5}	I _{SM}				42	A
Diode Forward Voltage ²	V _{SD}	V _{GS} =0V, I _S =1A, T _J =25°C			1.2	V
Reverse Recovery Time	t _{rr}	I _F =10A, dI/dt=100A/μs T _J =25°C		12.5		nS
Reverse Recovery Charge	Q _{rr}			5		nC

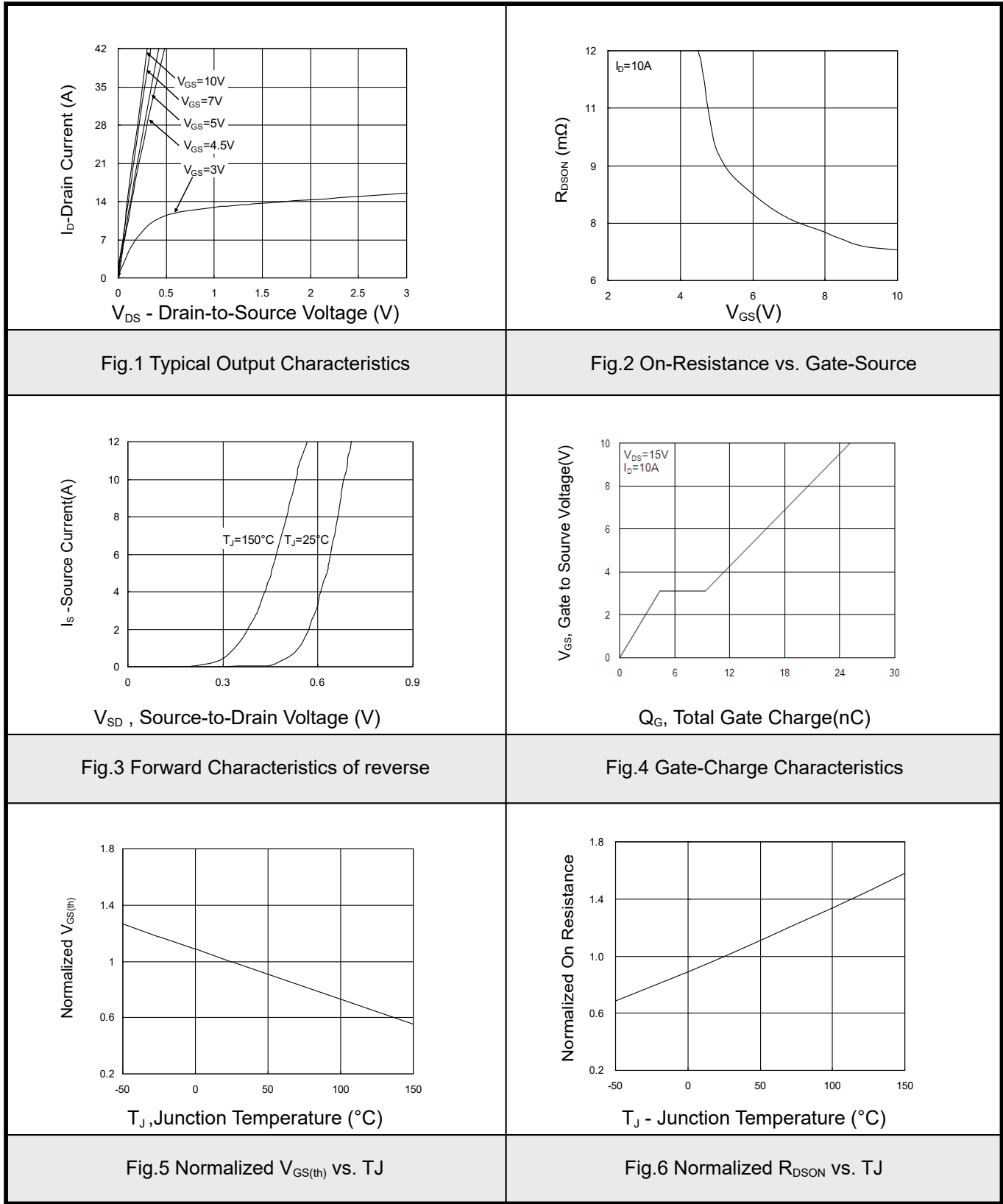


Nots:

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 3.The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=35A$.
- 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.



6.1 Typical Characteristic





6.2 Typical Characteristic

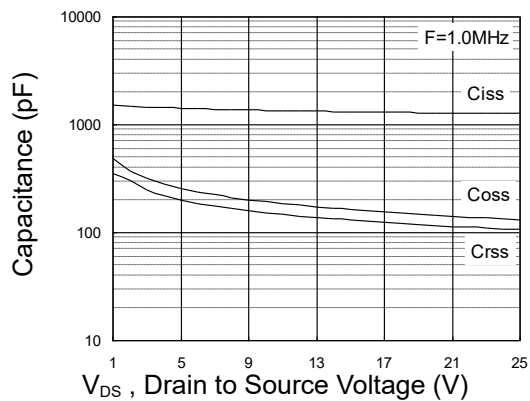


Fig.7 Capacitance

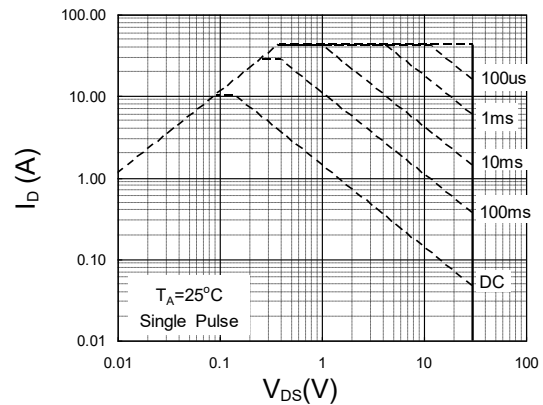


Fig.8 Safe Operating Area

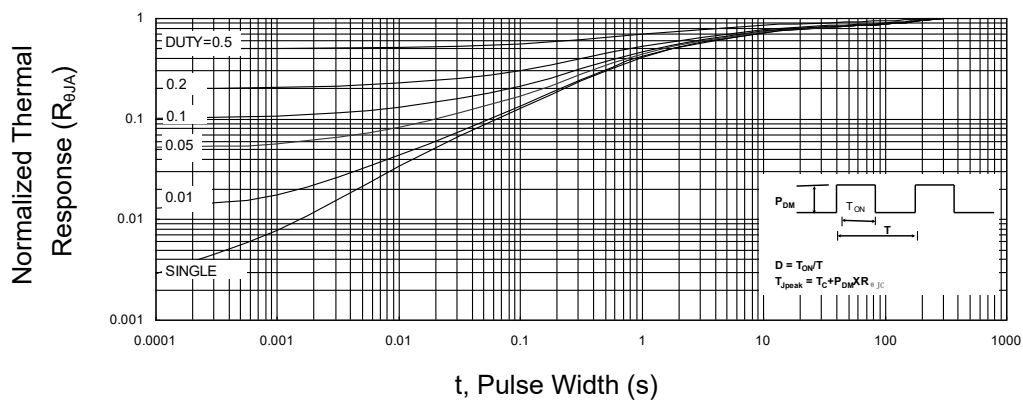


Fig.9 Normalized Maximum Transient Thermal Impedance

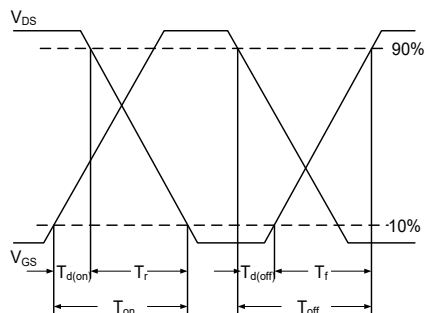


Fig.10 Switching Time Waveform

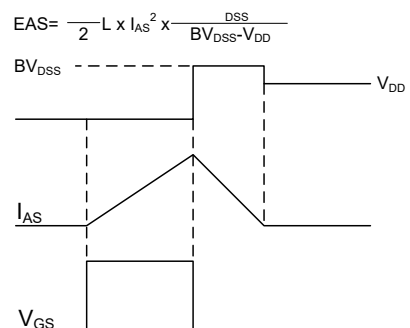
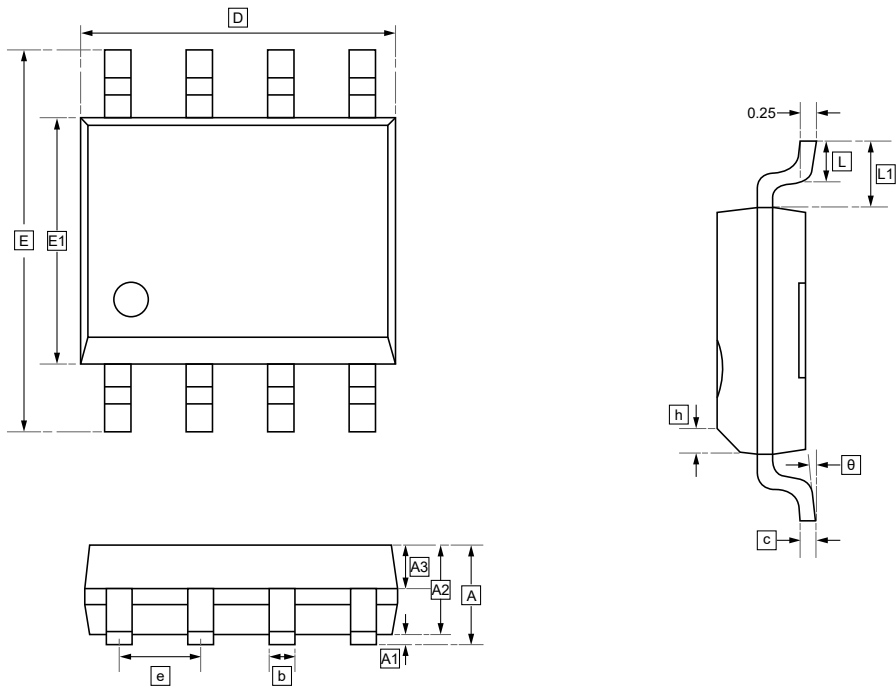


Fig.11 Unclamped Inductive Switching Waveform



7.SOP-8 Package Outline Dimensions



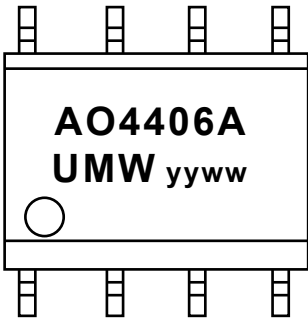
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.80	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.00	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°



8.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW AO4406A	SOP-8	3000	Tape and reel



9.Disclaimer

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