

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.

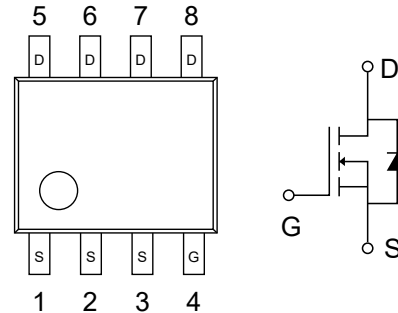
2.Features

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

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 $T_A=25^\circ C$ unless otherwise noted

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



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	ΔV _{DS} /T _J	I _D =250μA		26		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{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 Capacitance	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
				6.8	10.2	
Gate Source Charge	Q _{gs}	V _{DS} =10V, V _{GS} =5V, I _D =10A		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 I _D ≤9A, V _{GEN} =4.5V R _g =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 I _D ≤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	$T_C=25^{\circ}\text{C}$			10	A
Pulse Diode Forward Current ^a	I_{SM}				50	
Body Diode Voltage	V_{SD}	$I_S=9\text{A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F=9\text{A}, dI/dt=100\text{A}/\mu\text{s}$ $T_J=25^{\circ}\text{C}$		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		

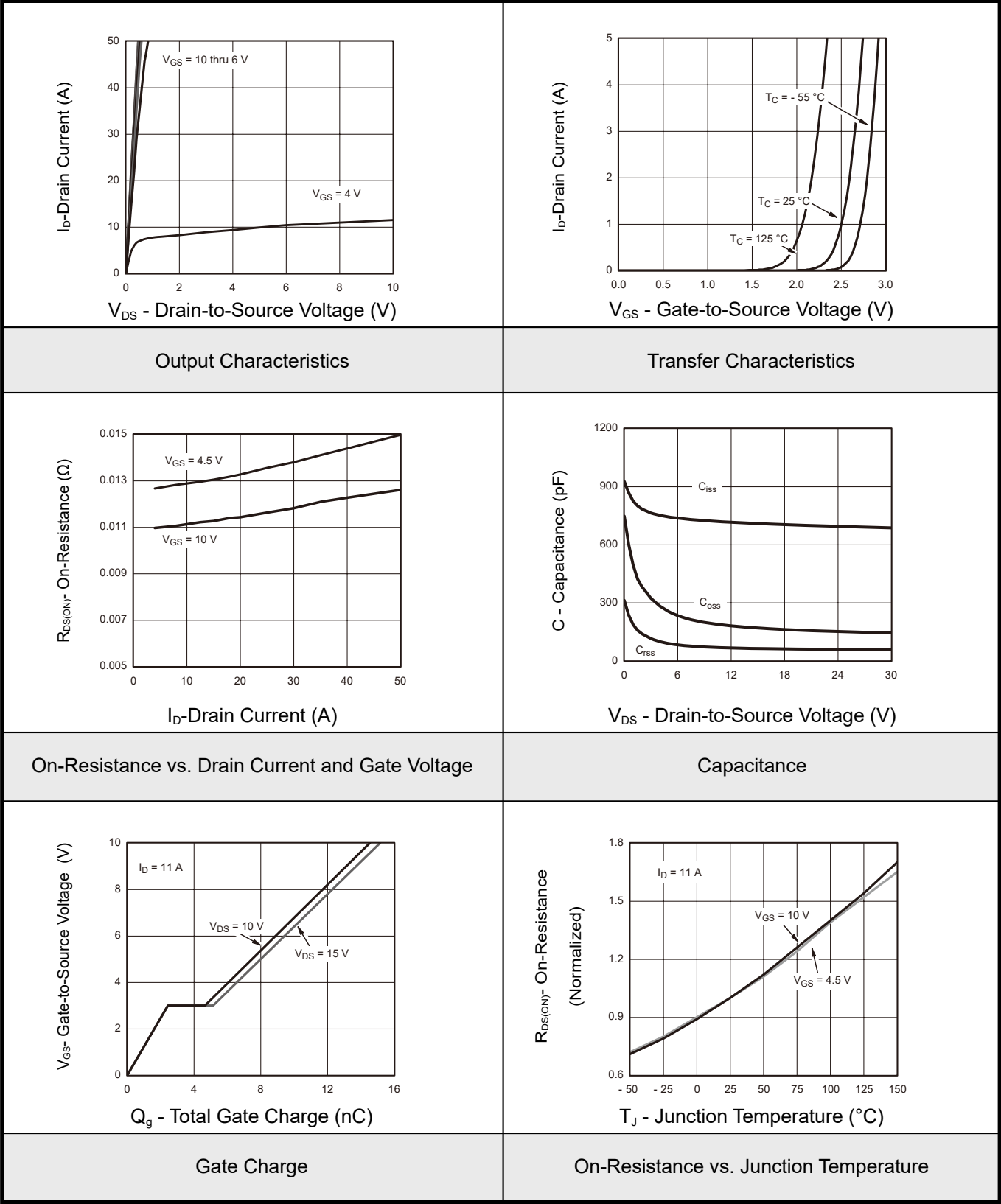
a. Pulse test; pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\ \%$.

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 maximum rating conditions for extended periods may affect device reliability.

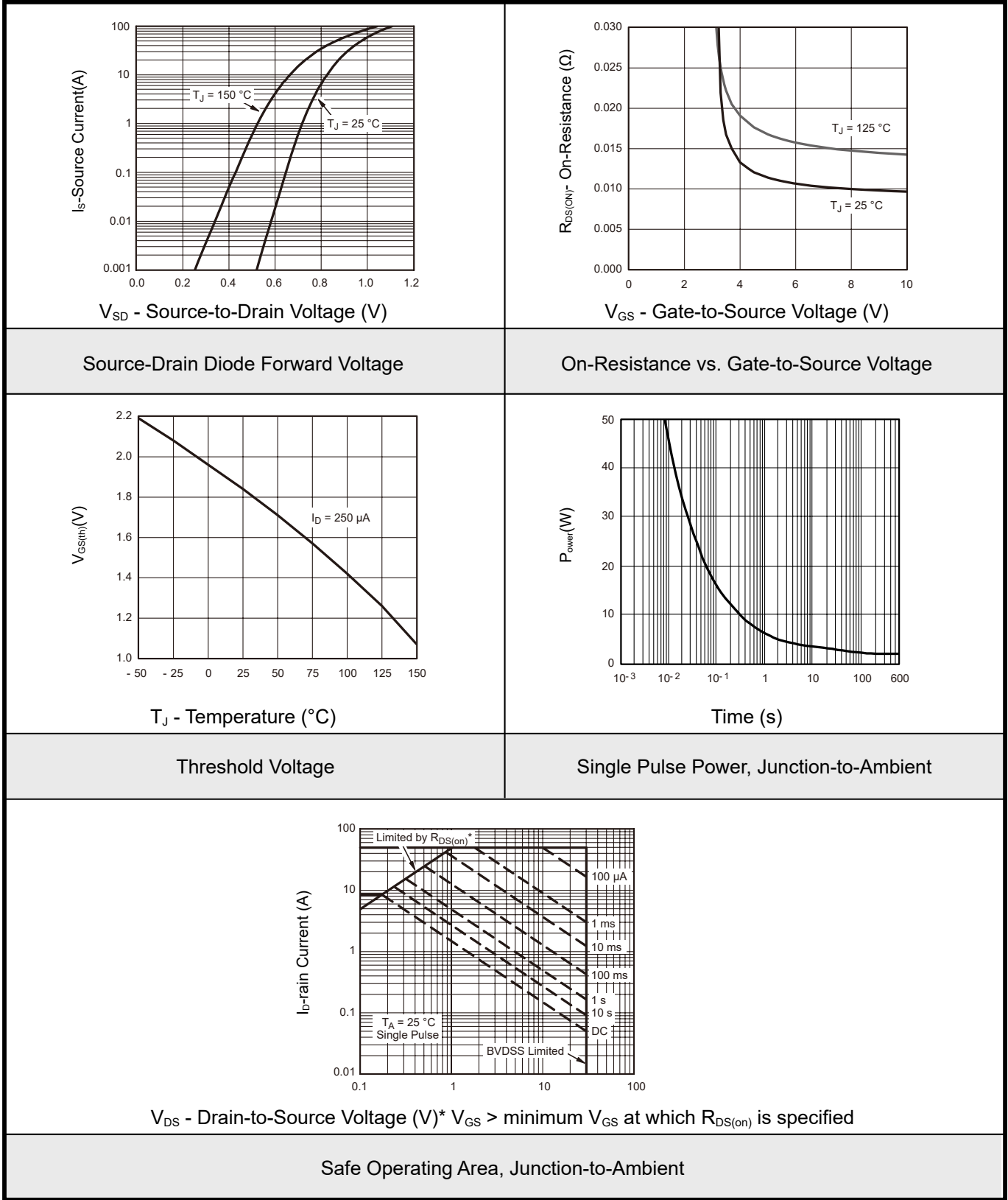


7.1Typical characteristic 25 °C, unless otherwise noted



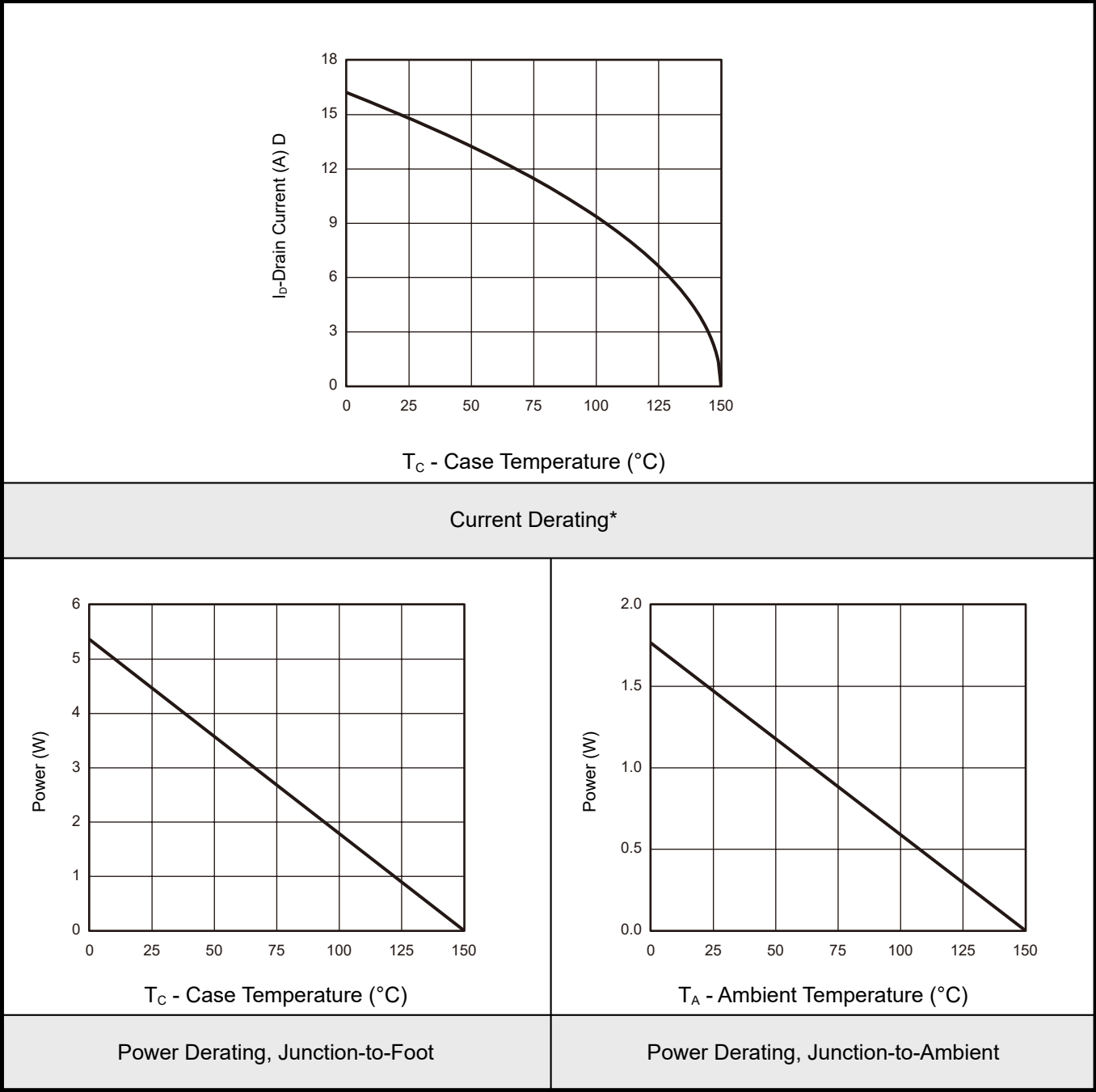


7.2Typical characteristic 25 °C, unless otherwise noted





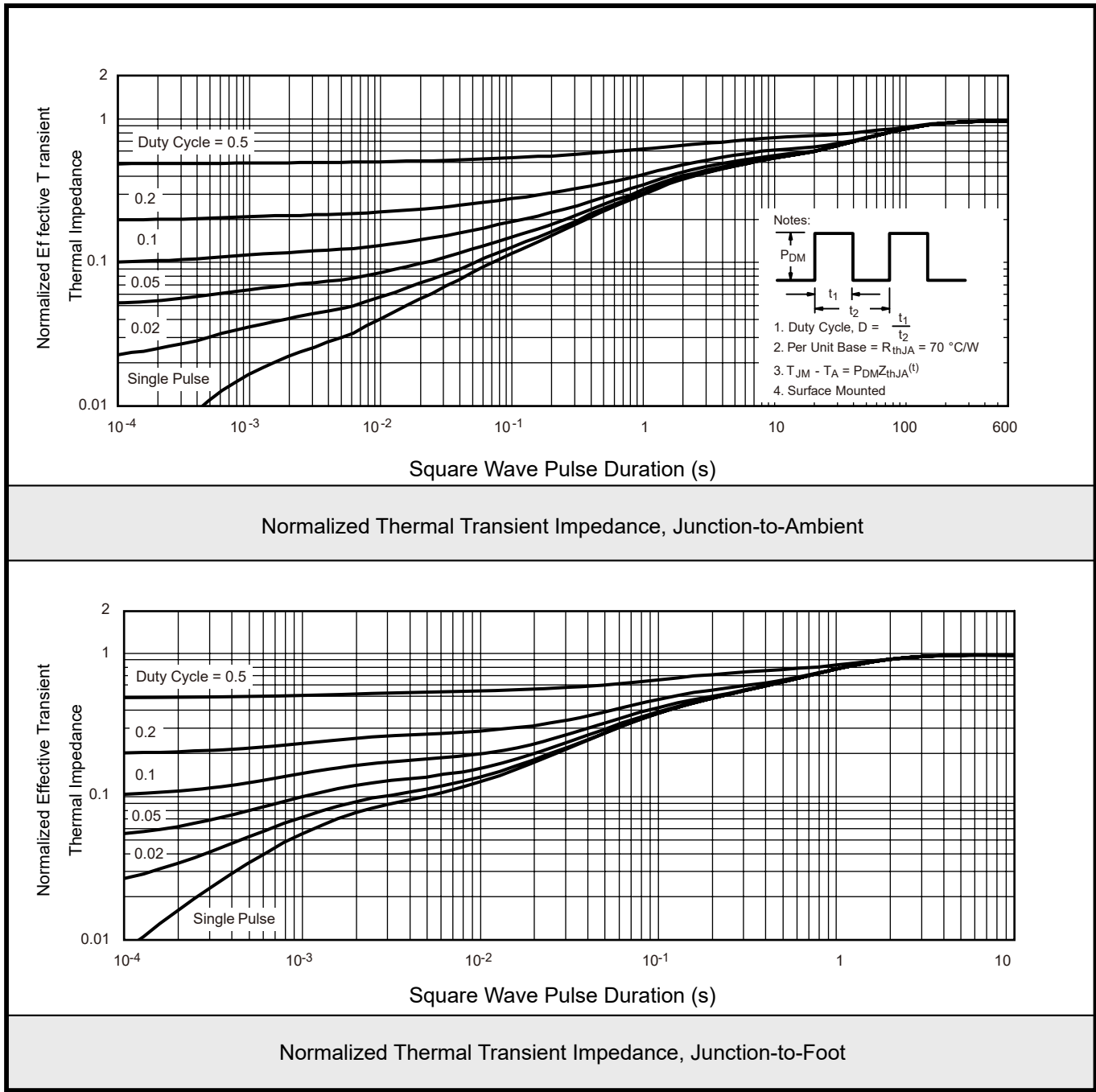
7.3Typical characteristic 25 °C, unless otherwise noted



* The power dissipation P_D is based on $T_{J(max)} = 150\text{ }^\circ\text{C}$, 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 package limit.

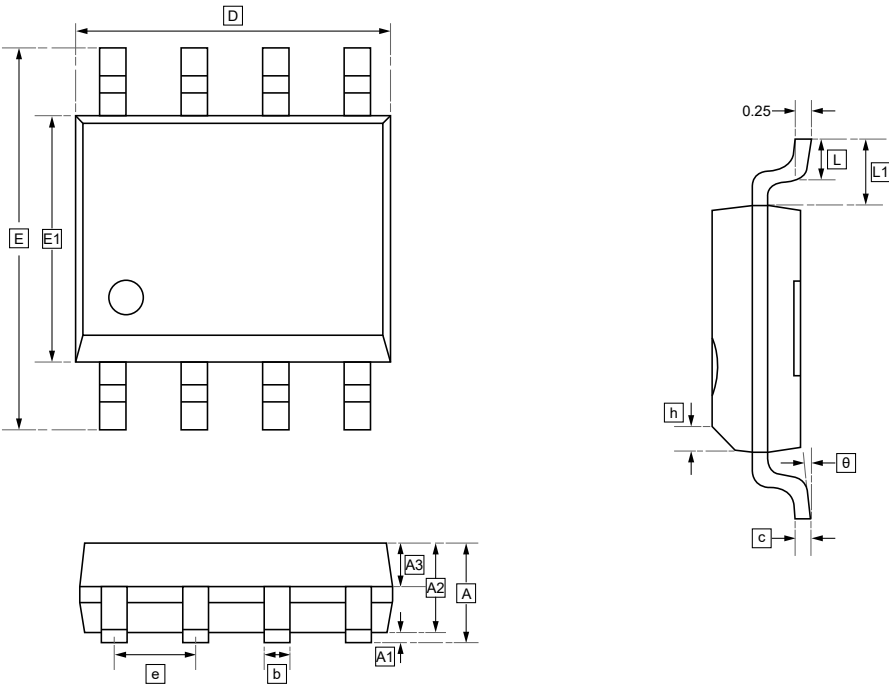


7.4Typical characteristic 25 °C, unless otherwise noted





8.SOP-8 Package Outline Dimensions



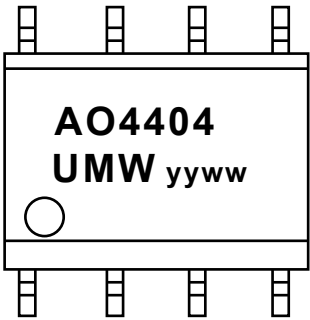
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.80	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°



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

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

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