UMW 4N50L

500V N-Channel MOSFET

1.Description

The Power MOSFET is fabricated using the advanced planar VDMOS technology. The resulting device has low conduction resistance,superior switching performance and high avalanche energy.

2.1Features

- V_{DSS}=500V
- I_D=4A
- $R_{DS(ON)}$=2.05Ω (V_{GS}=10V)

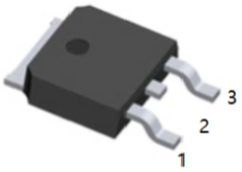
2.2Features

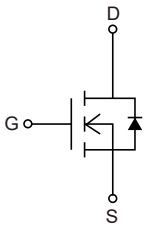
- Power factor correction
- Switched mode power supplies
- LED driver

3.Pinning information

Pin	Symbol	Description
1	G	GATE
3	S	SOURCE
2	D	DRAIN

TO-252(DPAK)
top view





4.Absolute Maximum Ratings T_A= 25°C

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DSS}	500	V
Continuous drain current [1]	T_C=25°C	I_D	4	A
	T_C=100°C		2.5	
Pulsed drain current [2]		I_{DM}	15	
Gate-Source voltage		V_{GSS}	±30	V
Avalanche energy, single pulse [3]		E_{AS}	106	mJ
Power Dissipation		P_D	76	W
Operating Junction Temperature Range		T_{STG}, T_J	-55 to 150	°C
Continuous diode forward current		I_S	4	A
Diode pulse current		$I_{S,pulse}$	15	A

5.Thermal resistance rating

Parameter	Symbol	Value	Units
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	1.65	°C/W
Thermal Resistance, Junction-to-Ambient, minimal footprint 4)	$R_{\theta JA}$	62	°C/W
Soldering temperature, wave soldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	°C

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=0.25mA	500			V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25mA	2		4	V
Drain cut-off current	I_{DSS}	V_{GS}=500V, V_{GS}=0V, T_J=25°C			1	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=30V, V_{DS}=0V			100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30V, V_{DS}=0V			-100	nA
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=2A		2.05	2.4	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=250kHz		391		pF
Output Capacitance	C_{oss}			38.3		pF
Reverse Transfer Capacitance	C_{rss}			2.5		pF
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=250V, I_D=4A R_G=10VΩ, V_{GS}=10V		2.9		ns
Rise Time	t_r			29.9		ns
Turn-Off Delay Time	$t_{D(off)}$			15.7		ns
Fall Time	t_f			7.6		ns
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=400V, I_D=2A,V_{GS}=0 to 0V		1.9		nC
Gate to drain charge	Q_{gd}			4.3		nC
Gate charge total	Q_g			9.5		nC
Gate plateau voltage	$V_{plateau}$			4.9		V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=3A			1.3	V
Reverse recovery time	t_{rr}	V_R=400V, I_F=3A d_{IF}/d_t=100A/μs		248		ns
Reverse recovery charge	Q_{rr}			1263.5		μC
Peak reverse recovery current	I_{rrm}			7.3		A

Notes:

1. Drain current limited by maximum junction temperature and duty cycle.

2. Repetitive Rating: Pulse width limited by maximum junction temperature， maximum duty cycle is 0.7.

3. I_{AS}=4.6A, L=10mH, V_{DD}=60V, Starting T_J= 25°C.

4. The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot..

7.1Typical Characterisitics

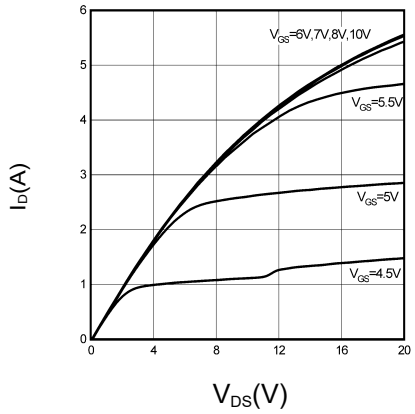


Figure 1: Typ. Output Characteristics

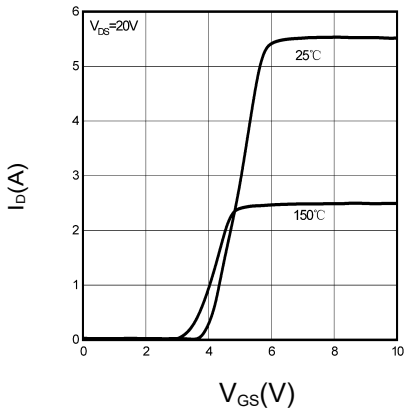


Figure 2: Transfer Characteristics

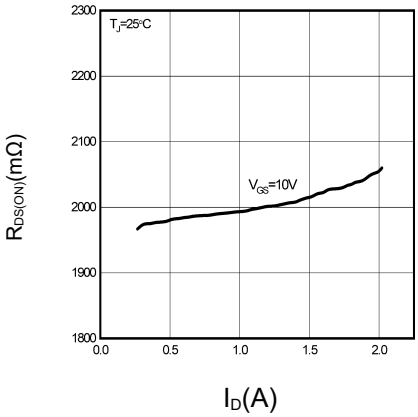


Figure 3: On-resistance vs. Drain Current

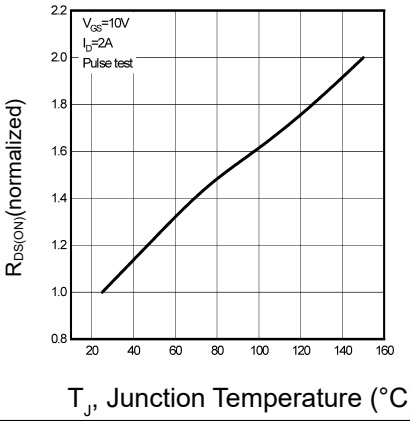


Figure 4: On-Resistance vs.Temperature

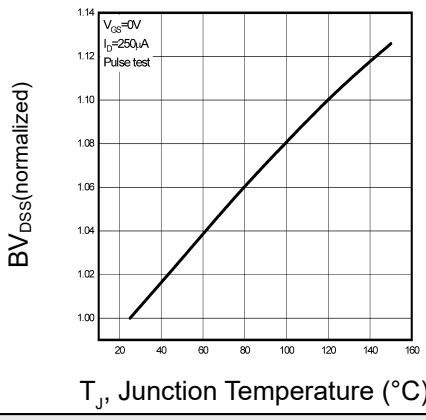


Figure 5: Breakdown Voltage vs.Temperature

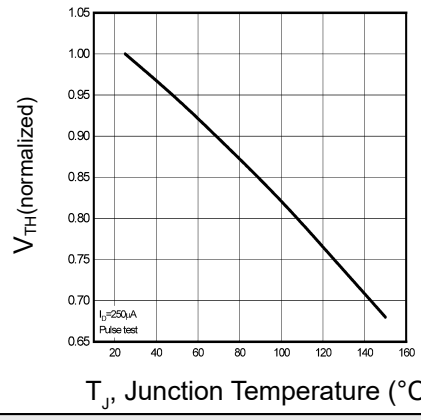


Figure 6: Threshold Voltage vs.Temperature

7.2Typical Characterisitics

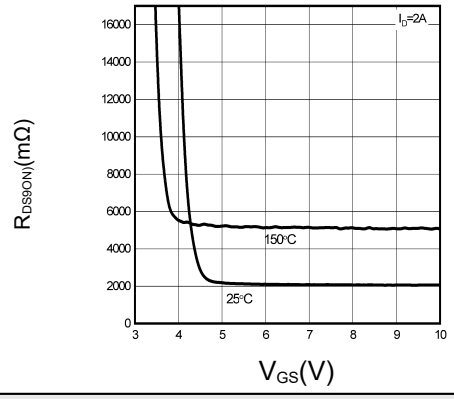


Figure 5: $R_{DS(ON)}$vs. Gate Voltage

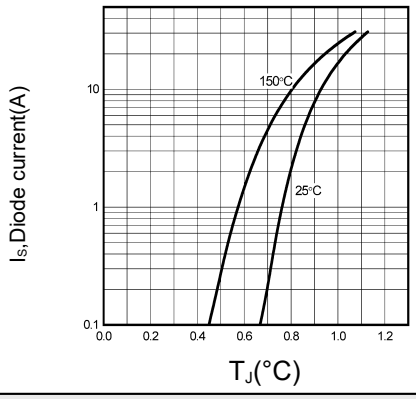


Figure 6: Body-Diode Characteristics

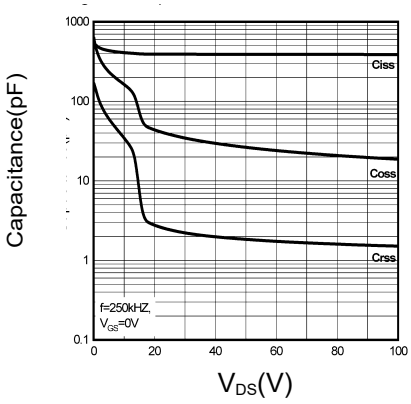


Figure 7: Capacitance Characteristics

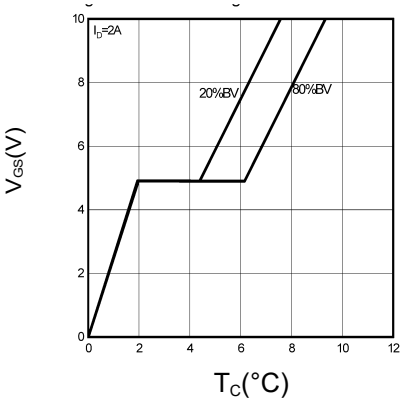


Figure 8: Gate Charge Characteristics

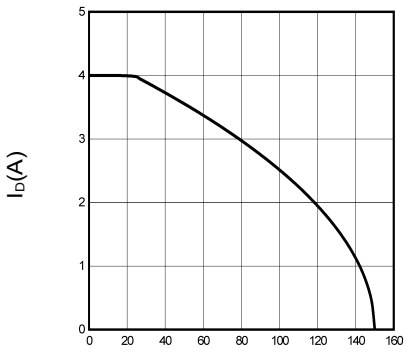


Figure 7: Drain Current Derating

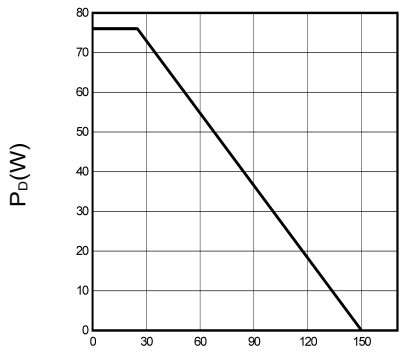


Figure 8: Power Dissipation vs.Temperature

7.3Typical Characterisitics

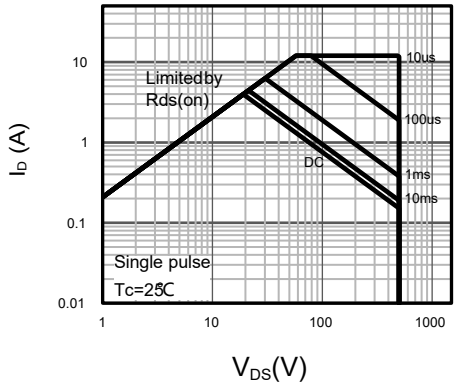


Figure 9: Safe Operating Area

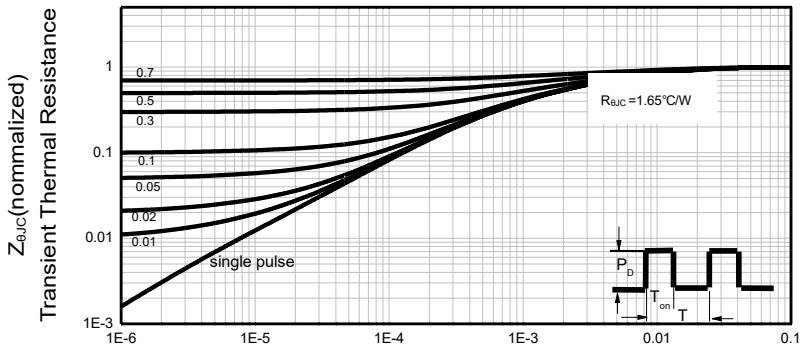
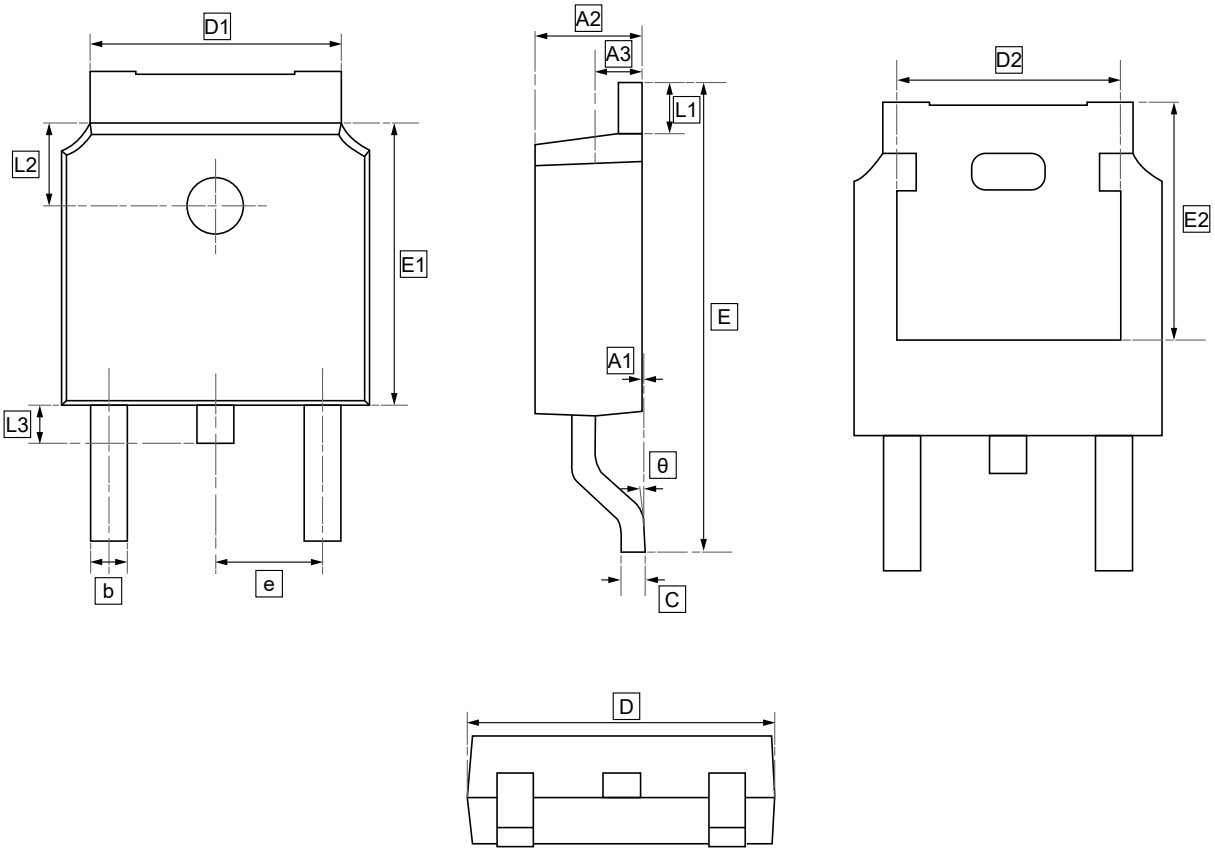


Figure 10: Normalized Maximum Transient Thermal impedance (R_{thJC})

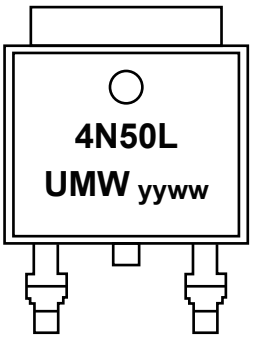
8.TO-252 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
Min	0.00	2.18	0.90	0.65	0.46	6.35	4.95	4.32	9.40	5.97	5.21	2.286	0.89	1.70	0.60	0.00
Max	0.13	2.39	1.10	0.85	0.61	6.73	5.46	4.90	10.41	6.22	5.38	BSC	1.27	1.90	1.00	8.00

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW 4N50L	TO-252	2500	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.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.