UMW 5N50L

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=5A
- $R_{DS(ON)}$=1.6Ω

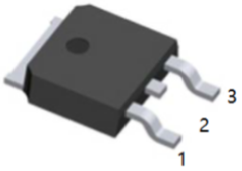
2.2Features

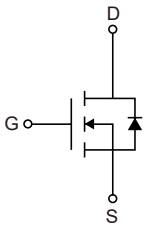
- Low $R_{DS(ON)}$
- Low gate charge (typ. Q_g=12.8nC)
- 100% UIS tested
- RoHS compliant

3.Pinning information

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

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	T_C=25°C	I_D	5	A
	T_C=100°C		3.1	
Pulsed drain current [1]		I_{DM}	20	
Gate-Source voltage		V_{GSS}	±30	V
Avalanche energy, single pulse [2]		E_{AS}	210	mJ
Peak diode recovery dv/dt [3]		dv/dt	5	V/ns

Power Dissipation TO-220F (T_C=25°C)	P_D	30	W
Derate above 25°C		0.24	W/°C
Power Dissipation TO-220\TO-251\TO-252(T_C=25°C)		75	W
Derate above 25°C		0.6	W/°C
storage temperature range	T_J,T_{STG}	-55 to 150	°C
Continuous diode forward current	I_S	5	A
Diode pulse current	$I_{S,pulse}$	20	A

5.Thermal resistance rating

Parameter	Symbol	Value	Units
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	1.67	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	110	°C/W

6.SPECIFICATIONS (T_C= 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
		T_J=125°C			100	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=2.5A		1.35	1.6	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1MHz		537.5		pF
Output Capacitance	C_{oss}			80.3		pF
Reverse Transfer Capacitance	C_{rss}			4		pF
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=250V, I_D=5A R_G=10VΩ, V_{GS}=15V		10.3		ns
Rise Time	t_r			33.1		ns
Turn-Off Delay Time	$t_{D(off)}$			29.4		ns
Fall Time	t_f			13.2		ns
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=400V, I_D=5A,V_{GS}=0 to 0V		3.9		nC
Gate to drain charge	Q_{gd}			4.6		nC
Gate charge total	Q_g			12.8		nC
Gate plateau voltage	$V_{plateau}$			5		V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=5A			1.5	V
Reverse recovery time	t_{rr}	V_R=250V, I_F=5A d_{IF}/d_t=100A/μs		319.2		ns
Reverse recovery charge	Q_{rr}			1.6		μC
Peak reverse recovery current	I_{rrm}			10.2		A

Notes:

1. Pulse width limited by maximum junction temperature.

2. L=10mH, I_{AS}=6.5A, Starting T_J=25°C.

3. I_{SD}= 5A, di/dt≤100A/us, V_{DD}≤BV_{DS}, Starting T_J=25°C.

7.1Typical Characterisitics

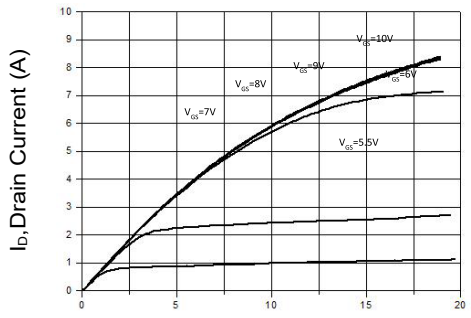


Figure 1: Output Characteristics

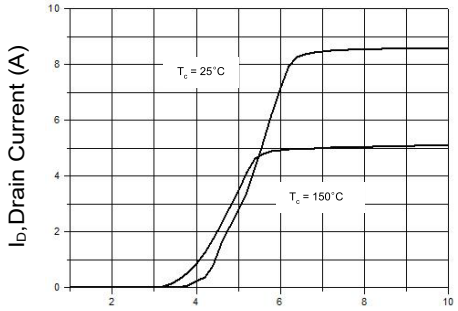


Figure 2: Transfer Characteristics

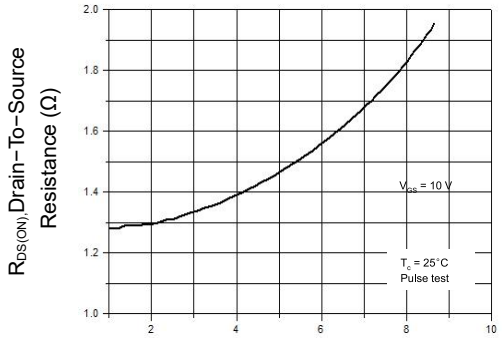


Figure 3: On-Resistance vs. Gate−to−Source Voltage

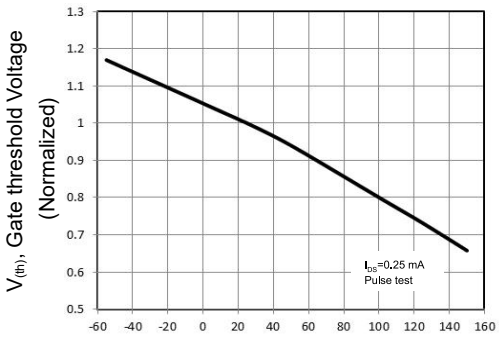


Figure 4: Threshold Voltage vs. Temperature

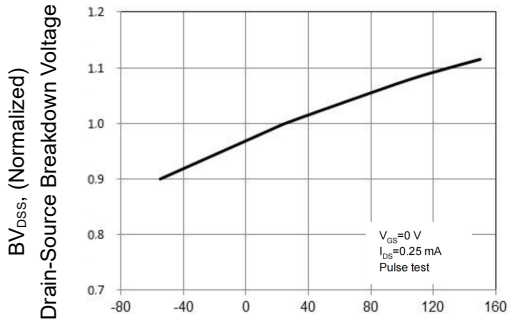


Figure 5: Breakdown Voltage vs. Temperature

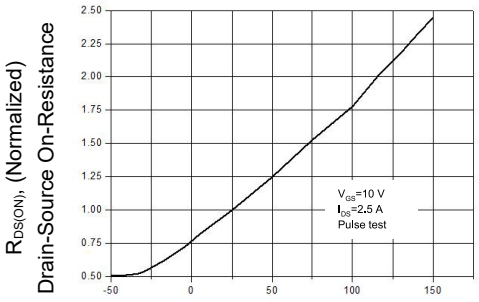
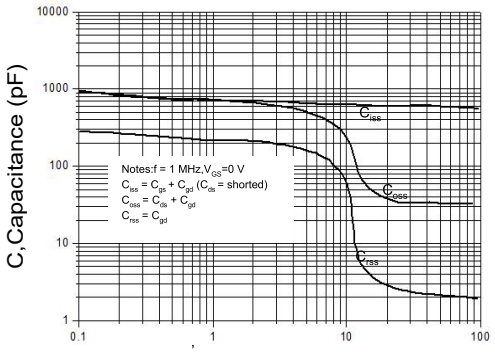


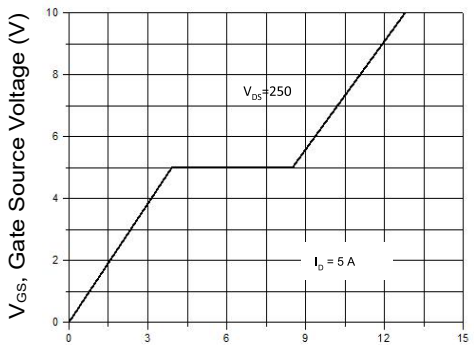
Figure 6: On-Resistance vs. Temperature

7.2Typical Characterisitics



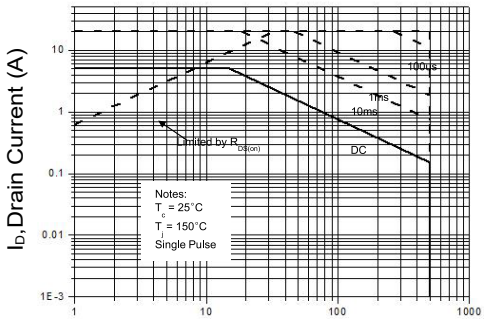
V_{DS},Drain Source Voltage (V)

Figure 7: Capacitance Characteristics



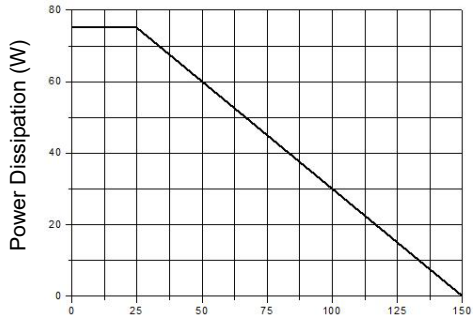
Q_G, Total Gate Charge (nC)

Figure 8: Gate Charge Characteristics



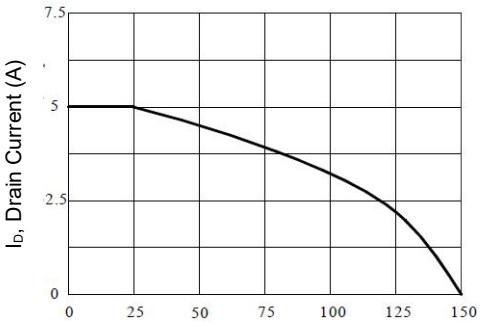
V_{DS},Drain Source Voltage (V)

Figure 9: Maximum Safe Operating Area



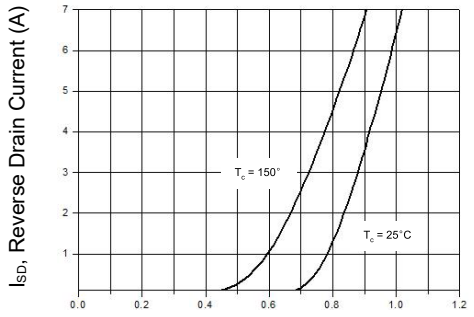
T_C,Case Temperature (°C)

Figure 10: Power Dissipation vs. Temperature



T_C,Case Temperature (°C)

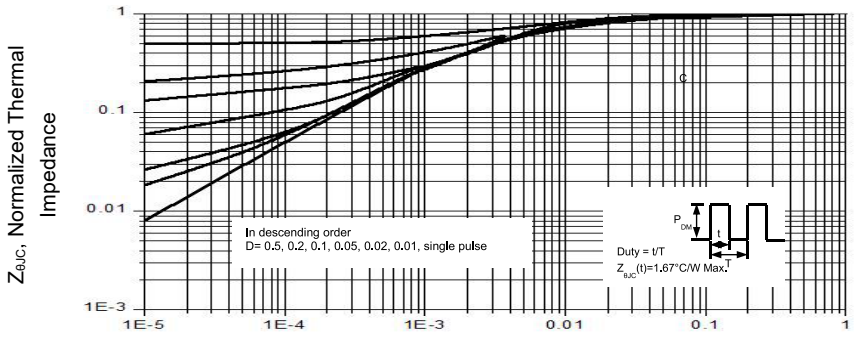
Figure 11: Continuous Drain Current vs. Temperature



V_{SD},Source Drain Voltage (V)

Figure 12: Body Diode Transfer Characteristics

7.3Typical Characterisitics

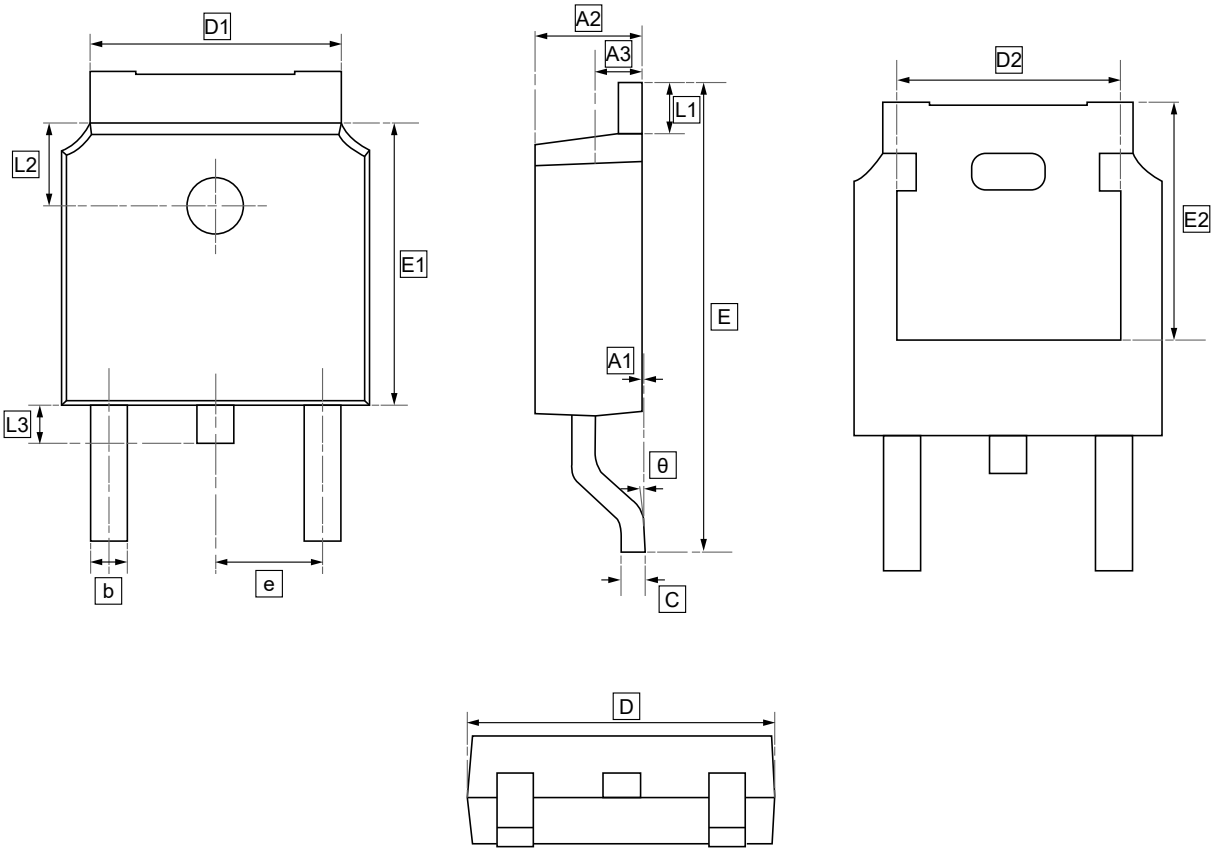


$Z_{\theta JC}$, Normalized Thermal Impedance

t ,Pulse Width (s)

Figure 13: Transient Thermal Impedance, Junction to Case

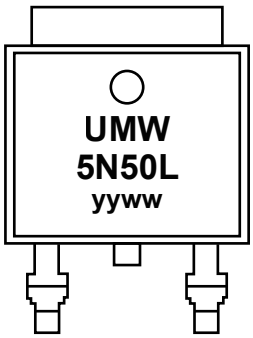
8.TO-252 Package Outline Dimensions



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 5N50L	TO-252	2500	Tape and reel

10.Disclaimer

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