UMW NTMS4177PR

-30V P-Channel MOSFET

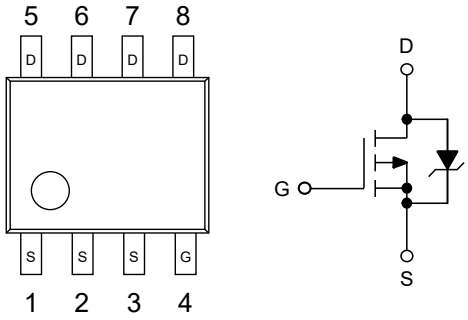
1.Features

- $V_{DS\ (V)}$=-30V
- I_D=-11.4A(V_{GS}=-10V)
- $R_{DS(ON)}$<12mΩ(V_{GS}=-10V)
- $R_{DS(ON)}$<19mΩ(V_{GS}=-4.5V)
- Low $R_{DS(ON)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- SOP-8 Surface Mount Package Saves Board Space

2.Pinning information

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

SOP-8



3.Absolute Maximum Ratings T_J=25°C unless otherwise noted

Parameter			Symbol	Maximum	Units
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	±20	
Continuous Drain Current $R_{\theta JA}$ (Note 1)	Steady State	T_A=25°C	I_D	-8.9	A
		T_A=70°C		-7.1	
Power Dissipation $R_{\theta JA}$ (Note 1)	Steady State	T_A=25°C	P_D	1.52	W
Continuous Drain Current $R_{\theta JA}$ (Note 2)	Steady State	T_A=25°C	I_D	-6.6	A
		T_A=70°C		-5.3	
Power Dissipation $R_{\theta JA}$ (Note 2)	Steady State	T_A=25°C	P_D	0.84	W
Continuous Drain Current $R_{\theta JA}$ t ≤ 10 s (Note 1)	Steady State	T_A=25°C	I_D	-11.4	A
		T_A=70°C		-9.3	
Power Dissipation $R_{\theta JA}$, t ≤ 10 s(Note 1)	Steady State	T_A=25°C	P_D	2.5	W
Pulsed Drain Current	Steady State	T_A=25°C,T_P=10μs	I_{DM}	-46	A

Operating Junction and Storage Temperature	T_J,T_{STG}	-55 to 150	°C
Source Current (Body Diode)	I_S	-2.1	A
Single Pulse Drain−to−Source Avalanche Energy(T_J=25°C, V_{DD}=30V, V_{GS}=10 V, I_L=20Apk, L=1mH, R_G=25 Ω)	E_{AS}	200	mJ
Lead Temperature for Soldering Purposes (1/8” from case for 10 s)	T_L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Surface-mounted on FR4 board using 1 inch sq pad size, 1 oz Cu.
2. Surface-mounted on FR4 board using the minimum recommended pad size.

4.Thermal resistance rating

Parameter	Symbol	Value	Units
Junction−to−Ambient – Steady State (Note 3)	R_{thJA}	82	°C/W
Junction−to−Ambient – t≤10s(Note 3)		50	°C/W
Junction−to−Foot (Drain)	R_{thJF}	20	°C/W
Junction−to−Ambient – Steady State (Note 4)	R_{thJA}	148	°C/W

3. Surface-mounted on FR4 board using 1 inch sq pad size, 1 oz Cu.
4. Surface-mounted on FR4 board using the minimum recommended pad size.

5.Electrical Characteristics T_J=25°C

Parameter	Symbol	Conditions		Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=-250μA, V_{GS}=0V		-30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				29		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS}=0V	T_J=25°C			-1	μA
		V_{DS}=-24V	T_J=85°C			-5	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V				±100	A
ON CHARACTERISTICS (Note 5)							
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=-250μA		-1.5		-2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(th)}/T_J$				6		mV/°C
Drain−to−Source On Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-11.4A			10	12	mΩ
		V_{GS}=-4.5V, I_D=-9.1A			15	19	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-1.5V, I_D=-11.4A			30		S
CHARGES, CAPACITANCES AND GATE RESISTANCE							
Input Capacitance	C_{iss}	V_{DS}=-24V, V_{GS}=0V, f=1MHz			3100		pF
Output Capacitance	C_{oss}				550		pF
Reverse Transfer Capacitance	C_{rss}				370		pF
Total Gate Charge	$Q_{g(TOT)}$	V_{GS}=-4.5V, V_{DS}=-15V I_D=-11.4A			29		nC
Threshold Gate Charge	$Q_{g(TH)}$				3.3		nC
Gate−to−Source Charge	Q_{gs}				10		nC
Gate−to−Drain Charge	Q_{gd}				13		nC
Total Gate Charge	$Q_{g(TOT)}$	V_{GS}=-10V,V_{DS}=-15V,I_D=-11.4A			55		nC
Gate Resistance	R_g				2	4	Ω

SWITCHING CHARACTERISTICS (Note 6)						
Turn−On Delay Time	$t_{D(on)}$	V_{GS}=-10V, V_{DS}=-15V I_D=-1A, R_g=6Ω		18		ns
Rise Time	t_r			13		ns
Turn−Off Delay Time	$t_{D(off)}$			64		ns
Fall Time	t_f			36		ns
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS}=0V I_S=-2.1A	T_J=25°C	-0.73	-1	V
			T_J=125°C	0.54		ns
Reverse Recovery Time	t_{rr}	V_{GS}=0V, d_{IS}/d_t=100A/μs I_S=-2.1A		34		ns
Charge Time	t_a			18		ns
Discharge Time	t_b			16		ns
Reverse Recovery Charge	Q_{rr}			30		nC

5. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

6. Switching characteristics are independent of operating junction temperatures.

6.1Typical Characterisitics

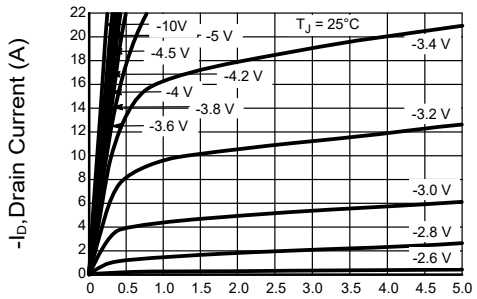


Figure 1: Output Characteristics

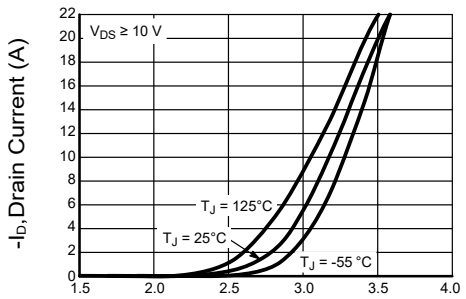


Figure 2: Transfer Characteristics

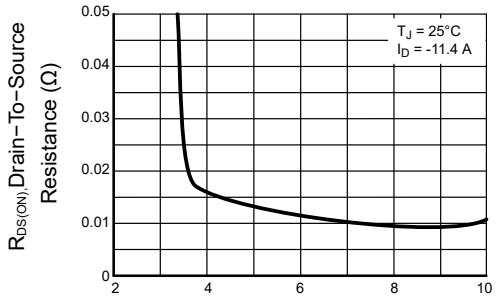


Figure 3: On-Resistance vs. Gate−to−Source Voltage

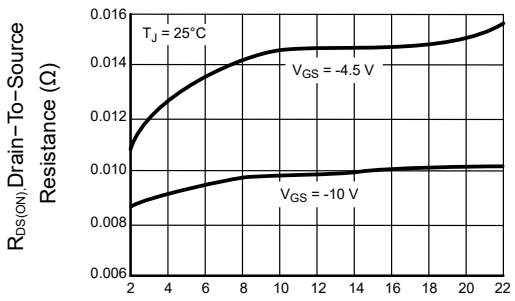


Figure 4: On−Resistance vs. Drain Current and Gate Voltage

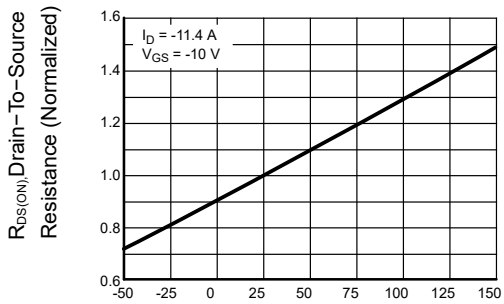


Figure 5: On−Resistance Variation with Temperature

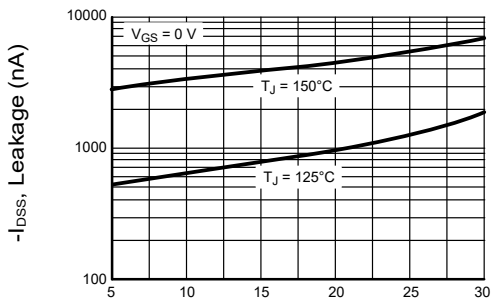


Figure 6: Drain−to−Source Leakage Current vs. Voltage

6.2Typical Characterisitics

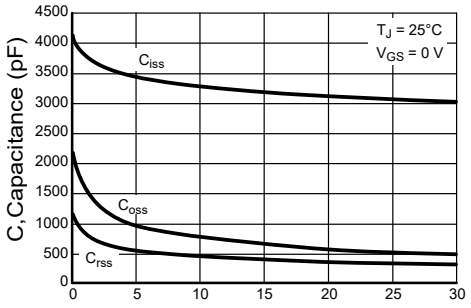


Figure 7: Capacitance Variation

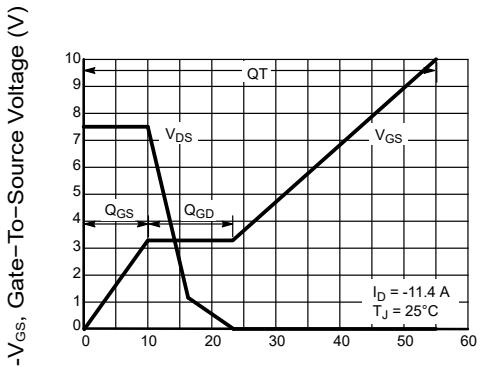


Figure 8: Gate−To−Source and Drain−To−Source Voltage vs. Total Charge

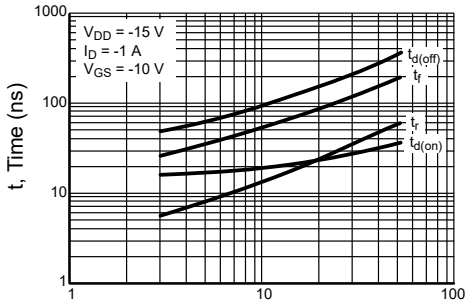


Figure 9: Resistive Switching Time Variation vs. Gate Resistance

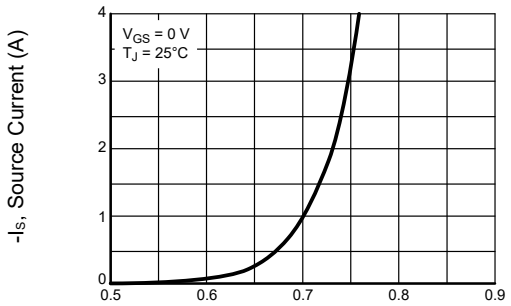


Figure 10: Diode Forward Voltage vs. Current

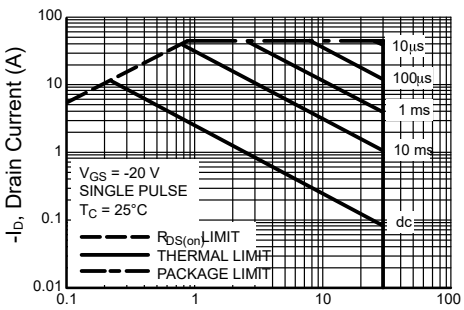


Figure 11: Maximum Rated Forward Biased Safe Operating Area

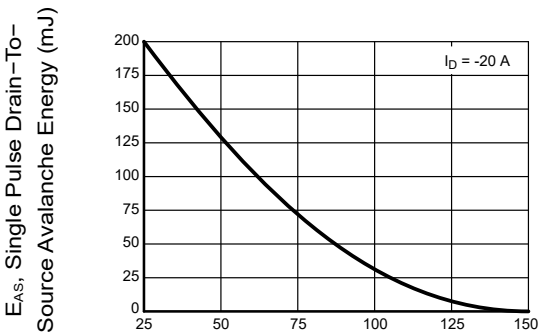
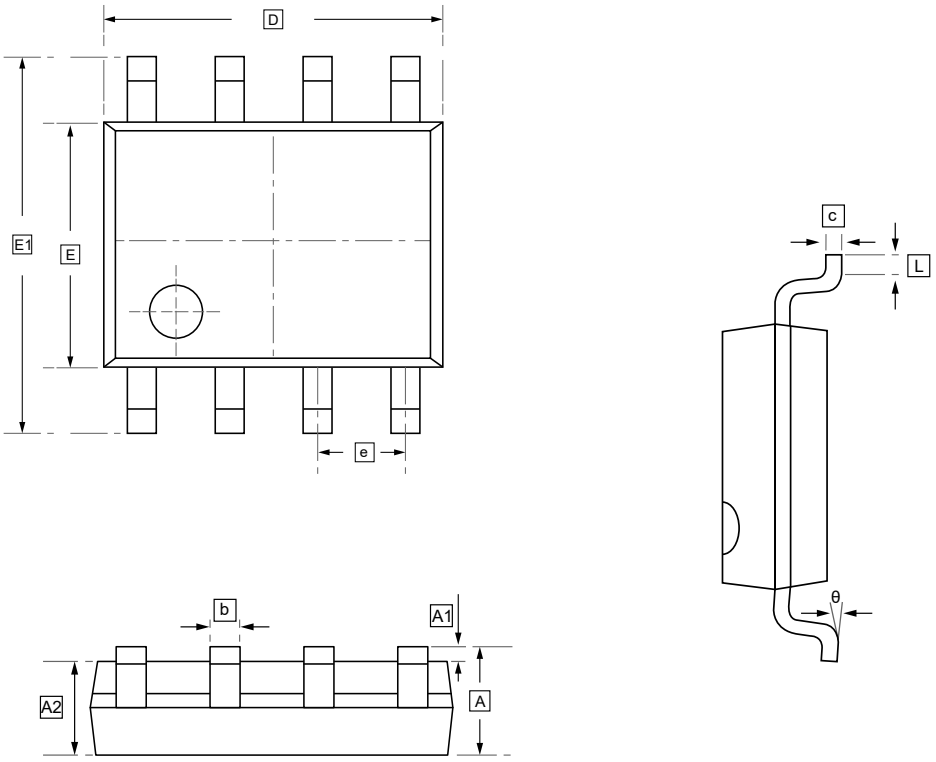


Figure 12: Maximum Avalanche Energy vs. Starting Junction Temperature

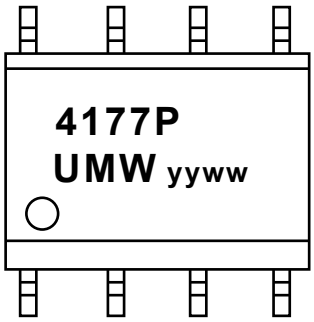
7.SOP-8 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°

8.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW NTMS4177PR	SOP-8	3000	Tape and reel

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