UMW IRF7821TR

30V N-Channel MOSFET

1.Features

- $V_{DS\ (V)}$=30V
- I_D=13.6A
- $R_{DS(ON)}$<7mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<9.5mΩ(V_{GS}=4.5V)

2.Applications

- High Frequency Point-of-Load Synchronous Buck Converter for Applications in Networking & Computing Systems.
- Lead-Free

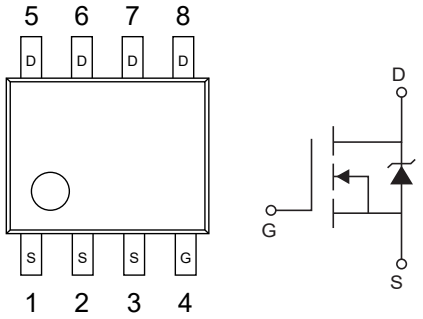
3.Benefits

- Very Low $R_{DS(ON)}$ at 4.5V V_{GS}
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current

4.Pinning information

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

SOP-8



5.Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Rating	Units
Drain- Source Voltage		V_{DS}	30	V
Gate-to-Source Voltage		V_{GS}	±20	A
Continuous Drain Current, V_{GS}=10V	T_A=25°C	I_D	13.6	A
Continuous Drain Current, V_{GS}=10V	T_A=70°C		11	A
Pulsed Drain Current ①		I_{DM}	100	A
Maximum Power Dissipation ④	T_A=25°C	P_D	2.5	W
Maximum Power Dissipation ④	T_A=70°C		1.6	W/°C
Linear Derating Factor			0.02	V
Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

6.Thermal Resistance Rating

Parameter	Symbol	Typ	Max	Units
Junction-to-Drain Lead ⑤	$R_{\theta JL}$		20	°C/W
Junction-to-Ambient ④ ⑤	$R_{\theta JA}$		50	°C/W

7.Electrical Characteristics T_J=25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	30			V
Breakdown Voltage Temp. Coefficient	$\Delta BV_{DSS}/\Delta T_J$	I_D=1mA,Reference to 25°C		0.025		V/°C
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=13A ③		7	9.1	mΩ
		V_{GS}=4.5V, I_D=10A ③		9.5	12.5	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1			V
Gate Threshold Voltage Coefficient	$\Delta V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA		-4.9		mV/°C
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=24V, V_{GS}=0V			1	μA
		V_{DS}=24V, V_{GS}=0V, T_J=125°C			150	μA
Gate-to-Source Forward Leakage	I_{GSS}	V_{GS}=20V			100	nA
Gate-to-Source Reverse Leakage		V_{GS}=-20V			-100	nA
Forward Transconductance	g_{FS}	V_{DS}=15V, I_D=10A	22			S
Total Gate Charge	Q_g	V_{DS}=15V V_{GS}=4.5V I_D=10A See Fig. 16		9.3	14	nC
Pre-Vth Gate-to-Source Charge	Q_{gs1}			2.5		nC
Post-Vth Gate-to-Source Charge	Q_{gs2}			0.8		nC
Gate-to-Drain Charge	Q_{gd}			2.9		nC
Gate Charge Overdrive	Q_{godr}			3.1		nC
Switch Charge (Q_{gs2} + Q_{gd})	Q_{sw}			3.7		nC
Output Charge	Q_{oss}	V_{GS}=0V, V_{DS}=10V		6.1		nC
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=15V V_{GS}=4.5V ③ I_D=10A Clamped Inductive Load		6.3		ns
Rise Time	t_r			2.7		ns
Turn-Off Delay Time	$t_{D(off)}$			9.7		ns
Fall Time	t_f			7.3		ns
Input Capacitance	C_{iss}	V_{GS}=0V V_{DS}=15V f=1.0MHz		1010		pF
Output Capacitance	C_{oss}			360		pF
Reverse Transfer Capacitance	C_{rss}			110		pF

Avalanche Characteristics						
Single Pulse Avalanche Energy ② ⑥	E_{AS}				44	mJ
Avalanche Current ①	I_{AR}				10	A
Diode Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			3.1	A
Pulsed Source Current (Body Diode) ①	I_{SM}				100	A
Diode Forward Voltage	V_{SD}	T_J=25°C,I_S=10A,V_{GS}=0V ③			1	V
Reverse Recovery Time	t_{rr}	T_J=25°C,I_F=10A, V_{DD}=20V dI/dt=100A/μs ③		28	42	ns
Reverse Recovery Charge	Q_{rr}			23	35	nC

8.1Typical Characterisitics

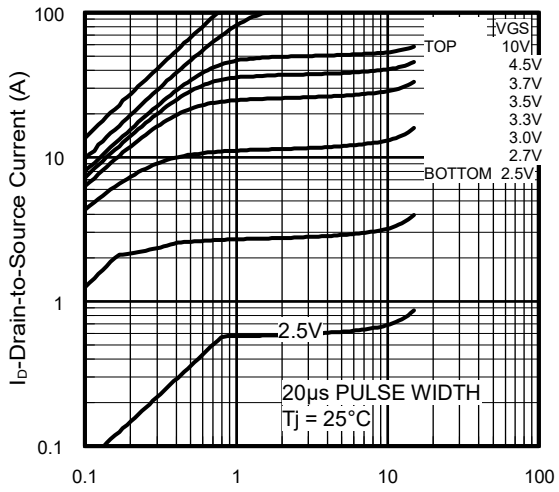


Fig 1. Typical Output Characteristics

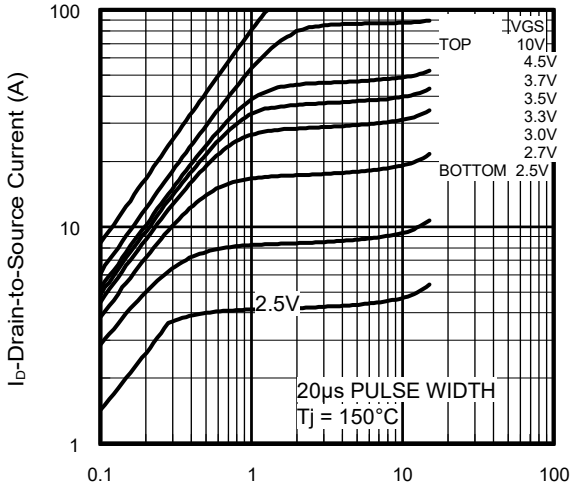


Fig 2. Typical Output Characteristics

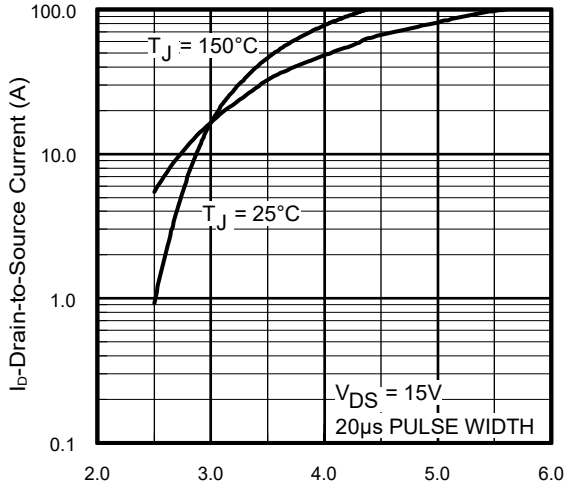


Fig 3. Typical Transfer Characteristics

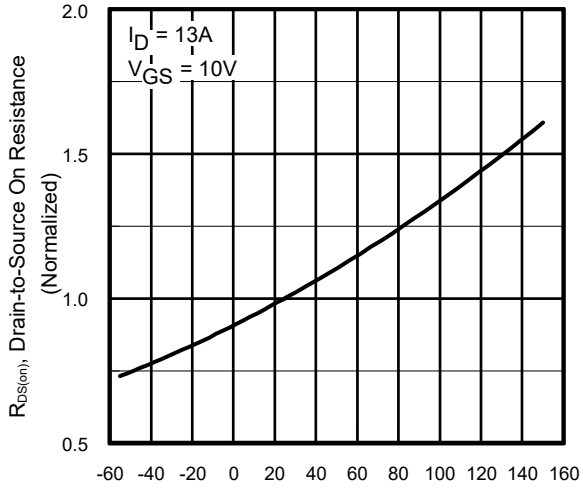


Fig 4. Nomalized On-ResistanceVs. Temperature

8.2Typical Characterisitics

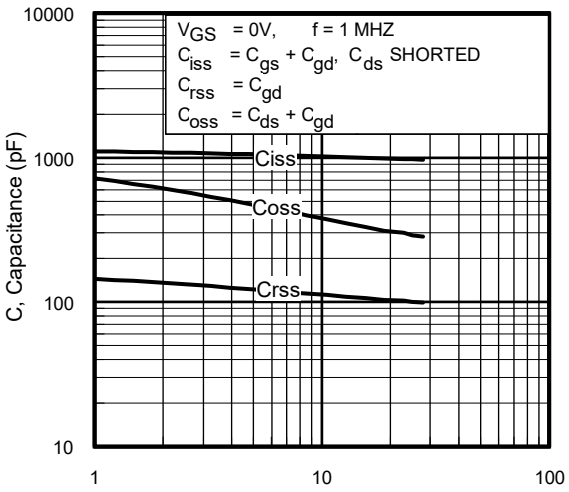


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

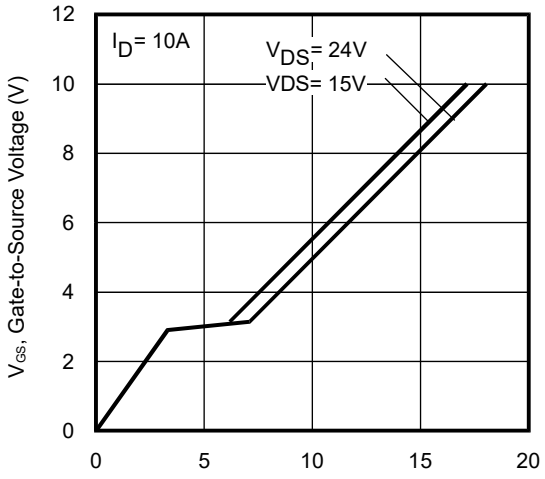


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

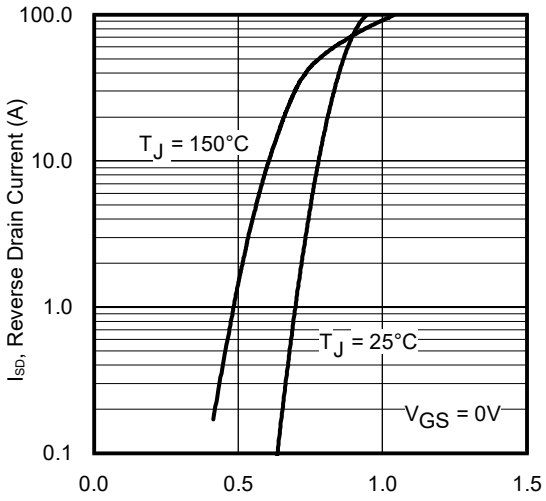


Fig 7. Typical Source-Drain Diode Forward Voltage

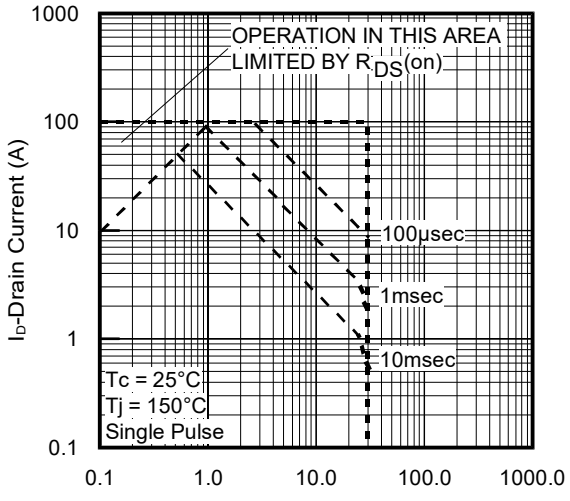


Fig 8. Maximum Safe Operating Area

8.3Typical Characterisitics

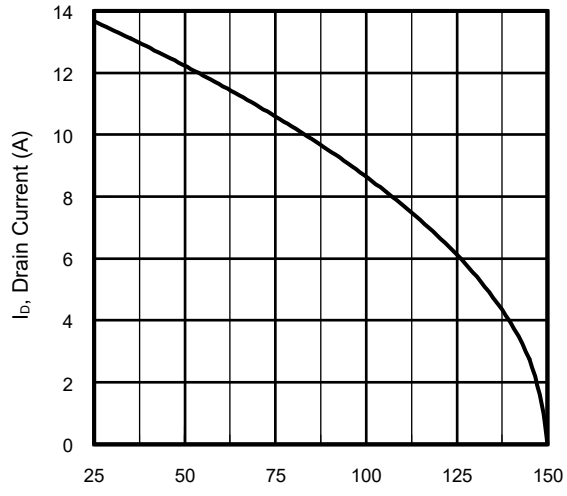


Fig 9. Maximum Drain Current Vs. Case Temperature

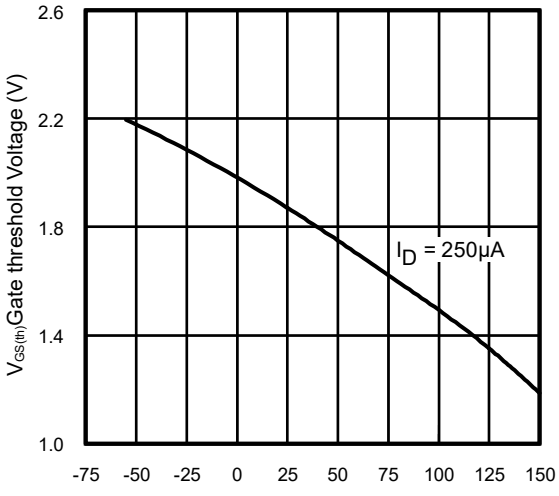


Fig 10. Threshold Voltage Vs. Temperature

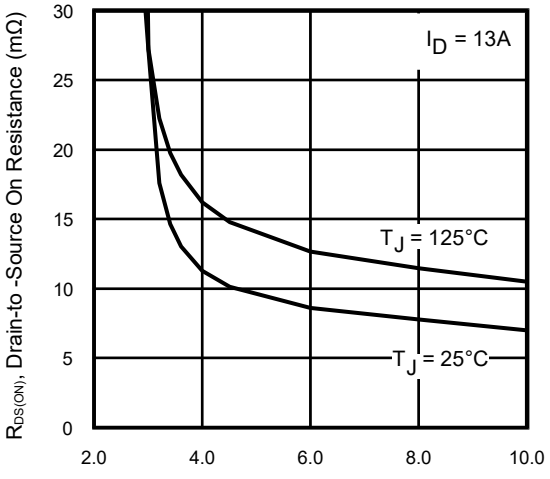


Fig 11. On-Resistance Vs. Drain Current

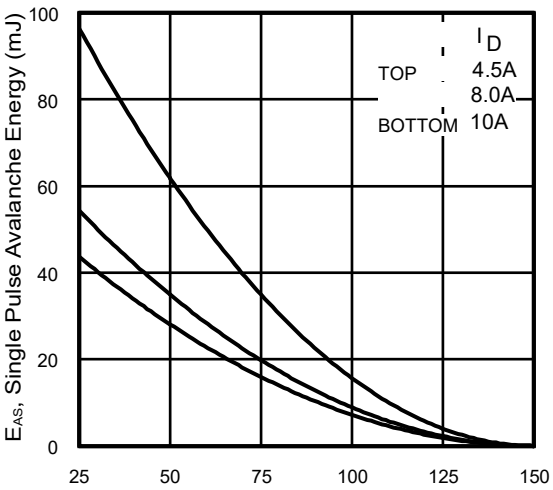


Fig 12. Maximum Avalanche Energy Vs. Drain Current

8.4Typical Characterisitics

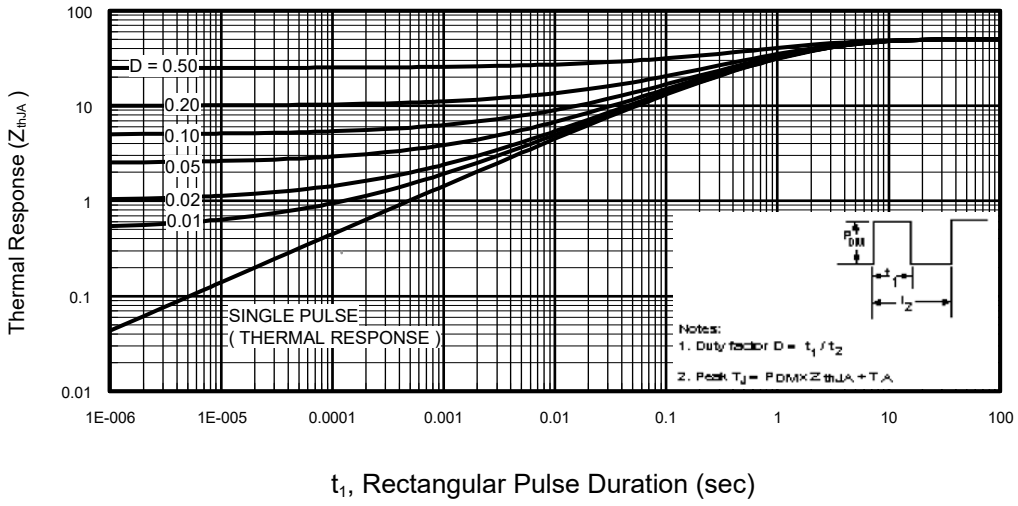


Fig 13. Maximum Effective Transient Themal Impedance, Junction-to-Ambient

8.5Typical Characterisitics

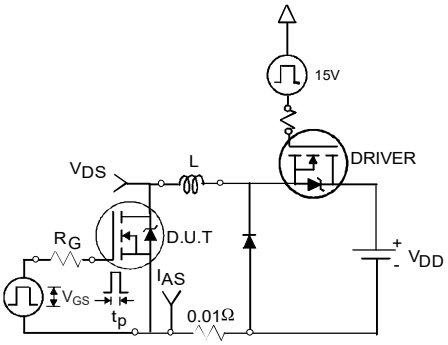


Fig 14a. Unclamped Inductive Test Circuit

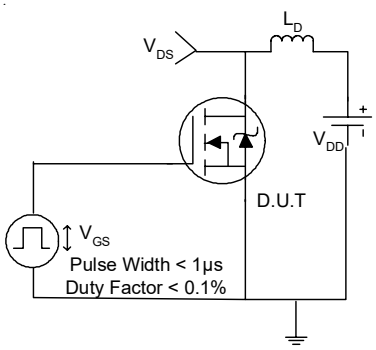


Fig 14b. Switching Time Test Circuit

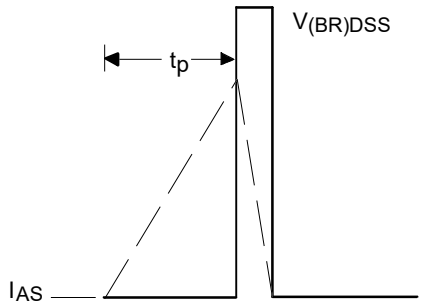


Fig 15a. Unclamped Inductive Waveforms

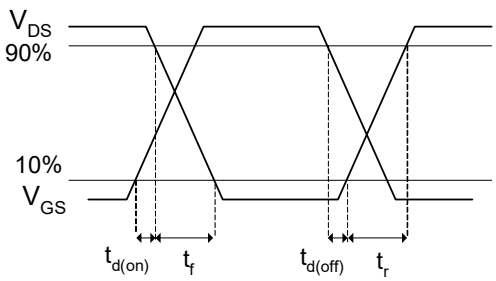


Fig 15b. Switching Time Waveforms

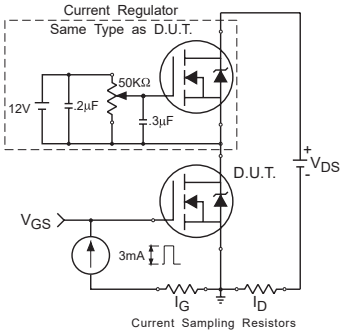


Fig 16a. Gate Charge Test Circuit

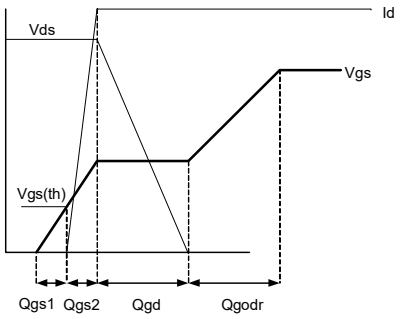
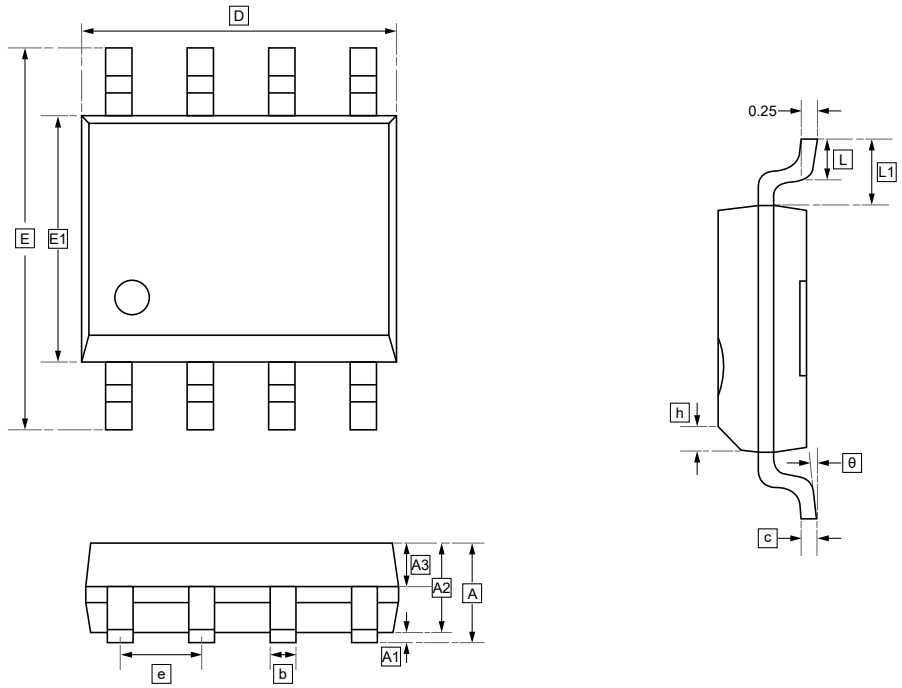


Fig 16b. Gate Charge Waveform

9.SOP-8 Package Outline Dimensions

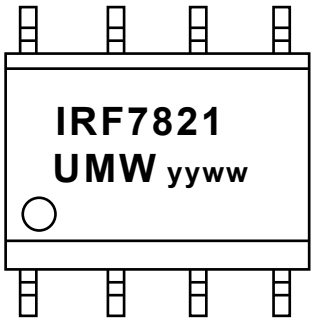


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	b	c	D	E	E1	e	h	L
Min	-	0.05	1.30	0.60	0.39	0.20	4.70	5.80	3.80	1.24	0.30	0.50
Max	1.75	0.20	1.50	0.70	0.47	0.24	5.10	6.20	4.00	1.30	0.50	0.80

Symbol	L1	θ
Min	1.00	0°
Max	1.10	8°

10.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRF7821TR	SOP-8	3000	Tape and reel

11.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.