UMW IRLR7843TR

30V N-Channel MOSFET

1.Features

- $V_{DS\ (V)}$=30V
- Q_g=34nC
- $R_{DS(ON)}$<3.3mΩ(V_{GS}=10V)

2.Benefits

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

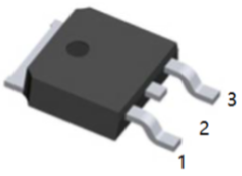
3.Applications

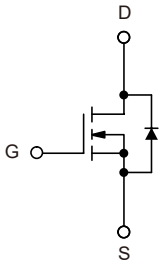
- High Frequency Synchronous Buck Converters for Computer Processor Power

4.Pinning information

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

TO-252(DPAK)
top view





5.Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain- Source Voltage		V_{DS}	30	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current, V_{GS}=10V	T_C=25°C	I_D	161 ④	A
Continuous Drain Current, V_{GS}=10V	T_C=100°C		113 ④	A
Pulsed Drain Current ①		I_{DM}	620	A
Maximum Power Dissipation ⑤	T_C=25°C	P_D	140	W
Maximum Power Dissipation ⑤	T_C=100°C		71	W
Linear Derating Factor			0.95	W/°C
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C
Soldering Temperature, for 10 seconds			300 (1.6mm from case)	°C

6.Thermal resist ance rating

Parameter	Symbol	Typ	Max	Units
Junction-to-Case	$R_{\theta JC}$		1.05	°C/W
Junction-to-Ambient (PCB Mount) ⑤	$R_{\theta JA}$		50	°C/W
Junction-to-Ambient	$R_{\theta JA}$		110	°C/W

7.Electrical Characteristics @ T_J= 25°C (unless otherwise specified)

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		19		mV/°C
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=15A ③		2.6	3.3	mΩ
		V_{GS}=4.5V, I_D=12A ③		3.2	4	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1		2.5	V
Gate Threshold Voltage Coefficient	$\Delta V_{GS(th)}/\Delta T_J$			-5.4		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=12A	37			S
Total Gate Charge	Q_g	V_{DS}=15V, V_{GS}=4.5V I_D=12A, See Fig. 16		34	50	nC
Pre-Vth Gate-to-Source Charge	Q_{gs1}			9.1		nC
Post-Vth Gate-to-Source Charge	Q_{gs2}			2.5		nC
Gate-to-Drain Charge	Q_{gd}			12		nC
Gate Charge Overdrive	Q_{gdor}			10		nC
Switch Charge (Q_{gs2} + Q_{gd})	Q_{sw}			15		nC
Output Charge	Q_{oss}	V_{DS}=15V, V_{GS}=0V		21		nC
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=15V, V_{GS}=4.5V ③ I_D=12A, See Fig.13		25		ns
Rise Time	t_r			42		ns
Turn-Off Delay Time	$t_{D(off)}$			34		ns
Fall Time	t_f			19		ns
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=15V f = 1.0MHz		4380		pF
Output Capacitance	C_{oss}			940		pF
Reverse Transfer Capacitance	C_{rss}			430		pF

Avalanche Characteristics						
Single Pulse Avalanche Energy ②	E_{AS}				1440	mJ
Avalanche Current ①	I_{AR}				12	A
Repetitive Avalanche Energy ①	E_{AR}				14	mJ
Diode Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			161④	A
Pulsed Source Current (Body Diode) ①	I_{SM}				620	
Diode Forward Voltage	V_{SD}	T_J=25°C,I_S=12A,V_{GS}=0V ③			1	V
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=12A dI/dt=100A/μs ③		39	59	ns
Reverse Recovery Charge	Q_{rr}			36	54	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

8.1Typical Characterisitics

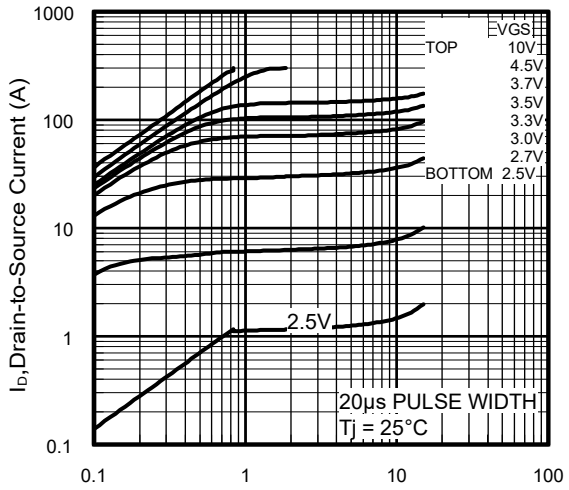


Figure 1: Typical Output Characteristics

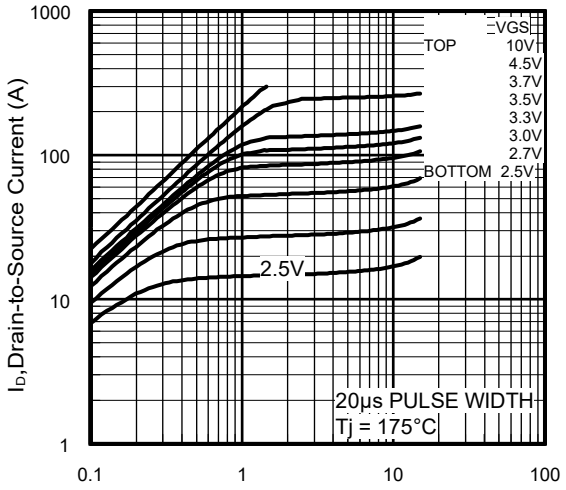


Figure 2: Typical Output Characteristics

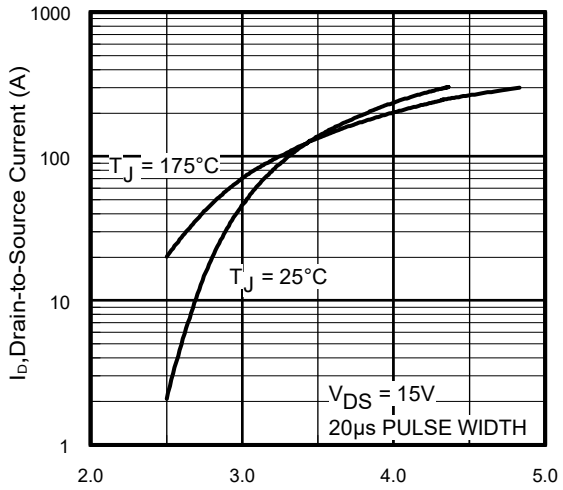


Figure 3: Typical Transfer Characteristics

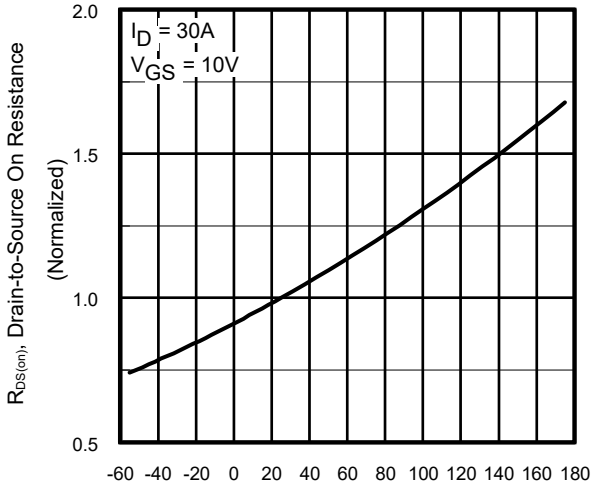
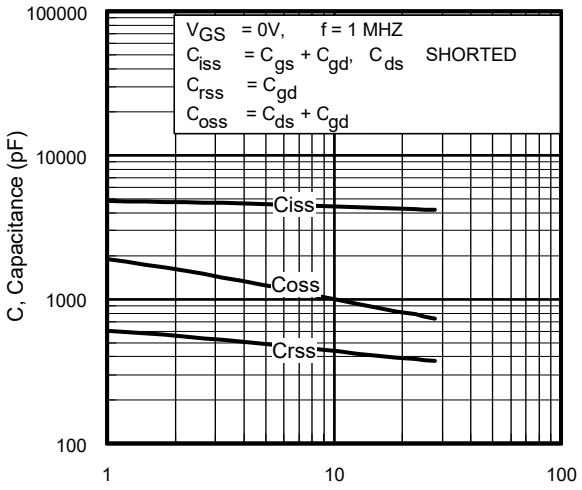


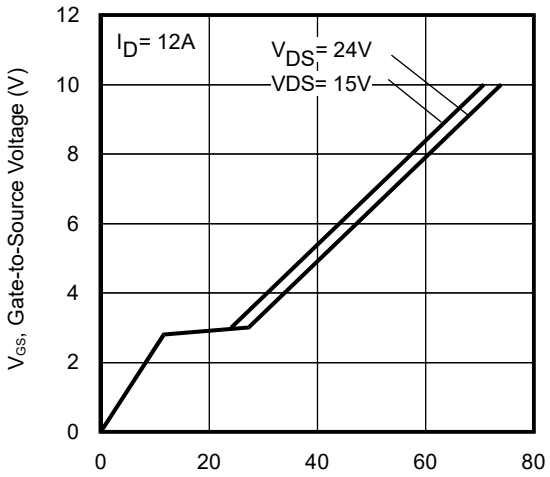
Figure 4: Nomalized On-ResistanceVs. Temperature

8.2Typical Characterisitics



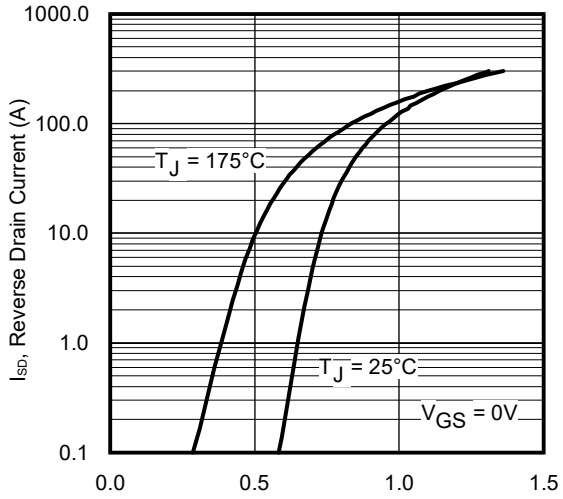
V_{DS} ,Drain-to-Source Voltage (V)

Figure 5: Typical Capacitance Vs. Drain-to-Source Voltage



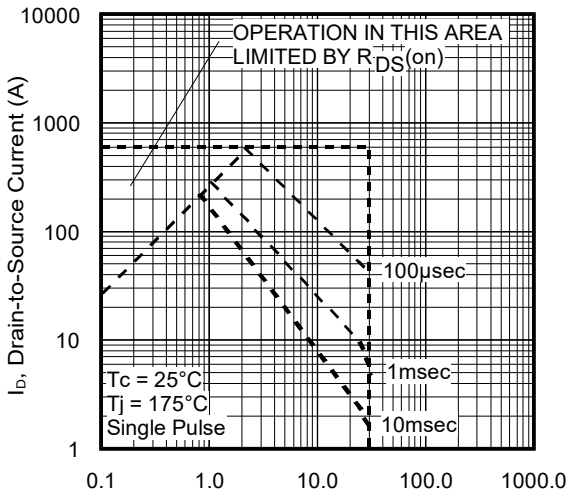
Q_G, Total Gate Charge (nC)

Figure 6: Typical Gate Charge Vs. Gate-to-Source Voltage



V_{SD}, Source-to-Drain Voltage (V)

Figure 7: Typical Source-Drain Diode Forward Voltage



V_{DS}, Drain-to-Source Voltage (V)

Figure 8: Maximum Safe Operating Area

8.3Typical Characterisitics

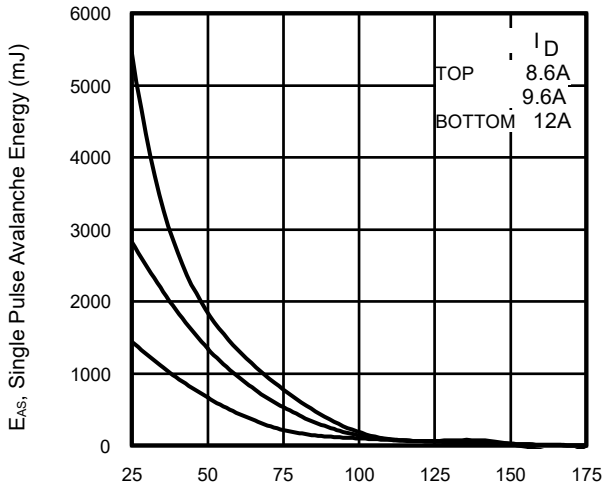


Figure 9: Maximum Avalanche Energy Vs. Drain Current

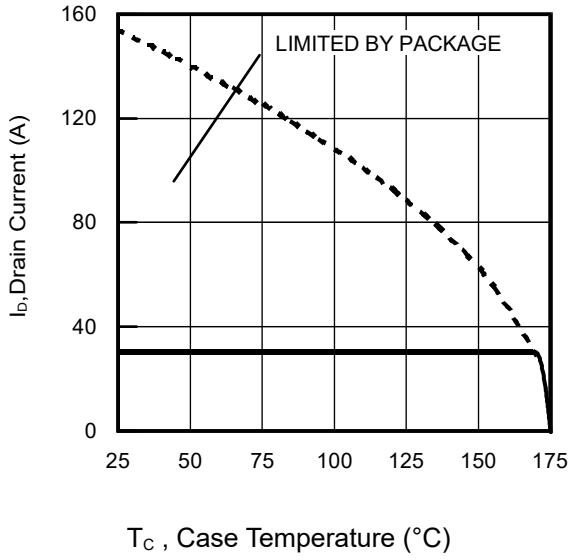


Figure 10: Maximum Drain Current vs. Case Temperature

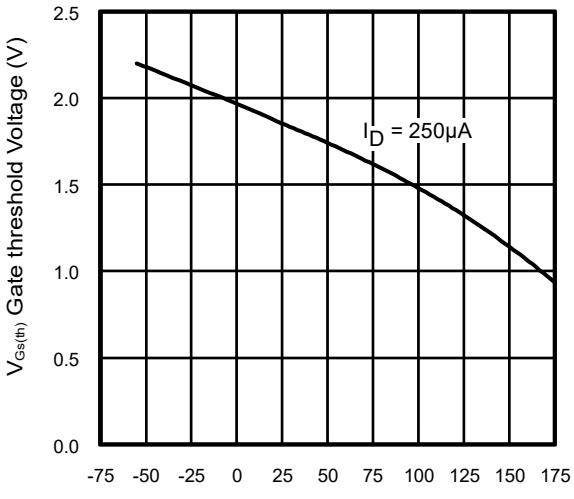


Figure 11: Threshold Voltage vs. Temperature

8.4Typical Characterisitics

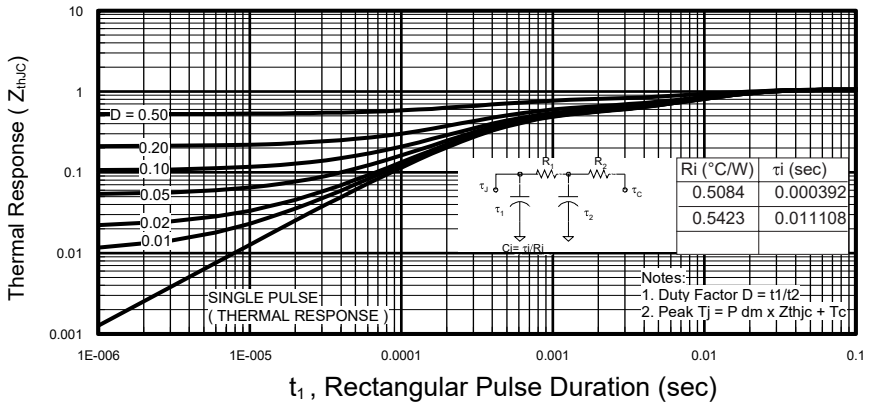


Figure 12: Maximum Effective Transient Thermal Impedance, Junction-to-Case

8.5Typical Characterisitics

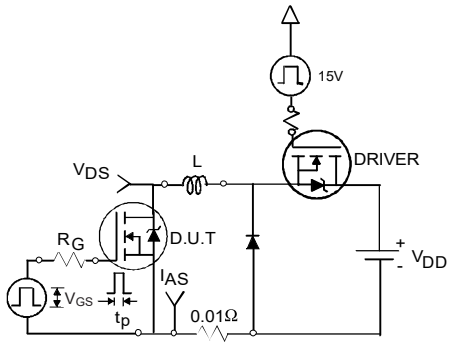


Figure 13a: Unclamped Inductive Test Circuit

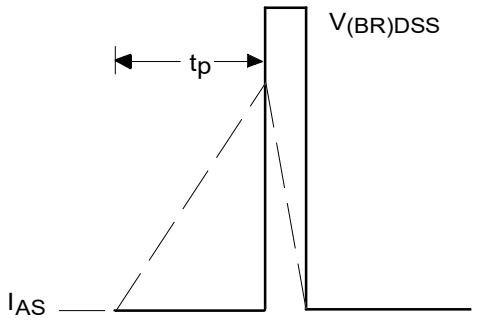


Figure 13b: Unclamped Inductive Waveforms

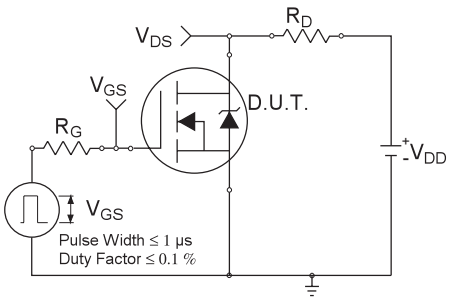


Figure 14a: Switching Time Test Circuit

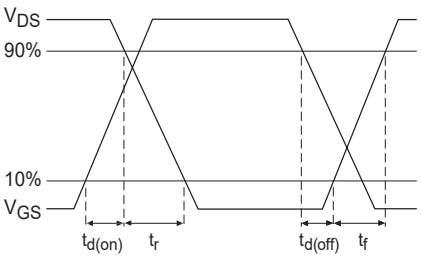


Figure 14b: USwitching Time Waveforms

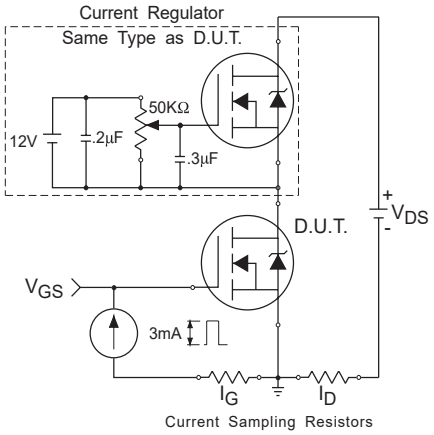
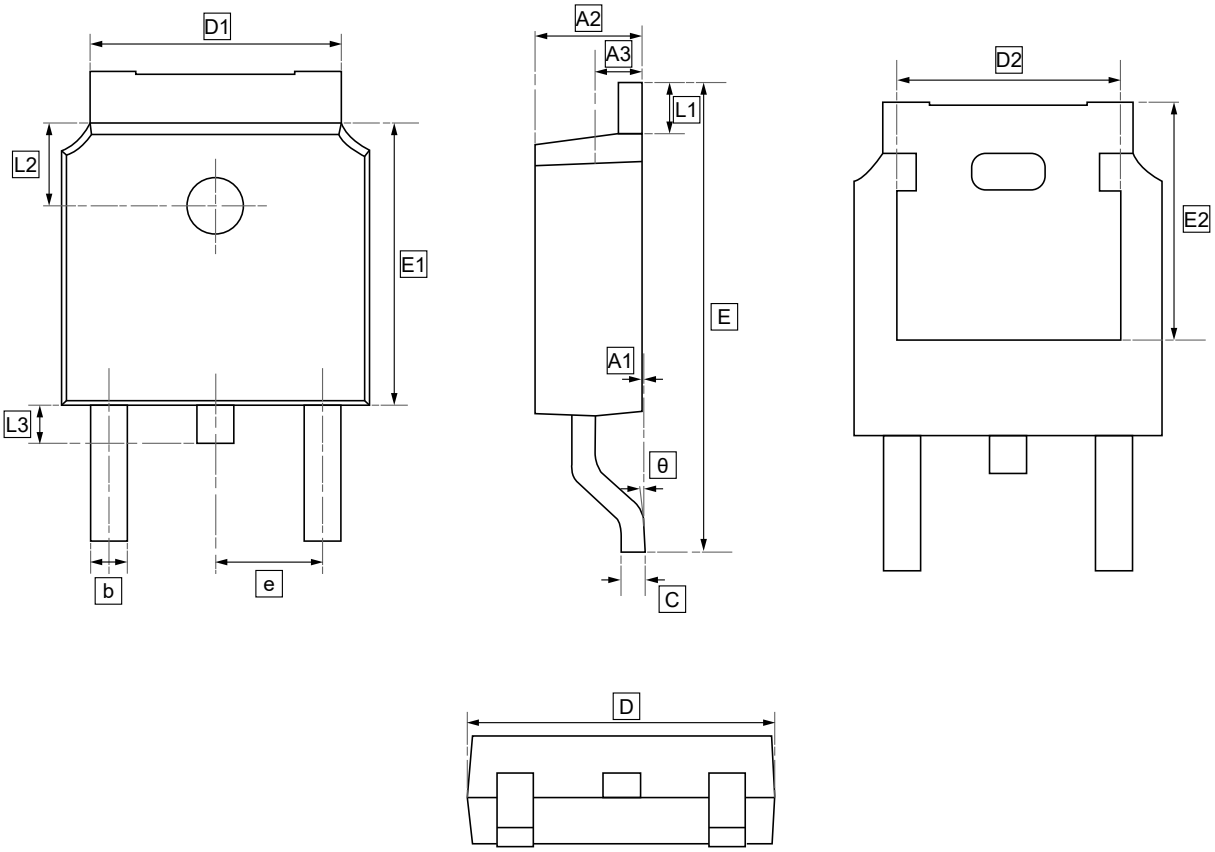


Figure 15: Gate Charge Test Circuit

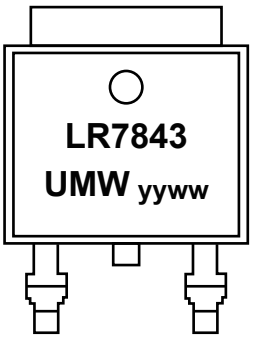
9.TO-252 Package Outline Dimensions



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

10.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRLR7843TR	TO-252	2500	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.