UMW IRLML2402TR

20V N-Channel MOSFET

1.Description

The IRLML2402TR uses advanced trench technology to provide excellent $R_{DS(on)}$ with low gate charge. This device is suitable for use as a loads witch or in PWM applications.

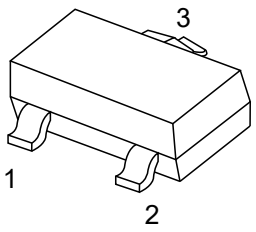
2.Features

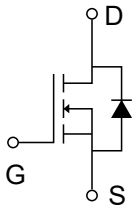
- $V_{DS\ (V)}$=20V
- I_D=1.2A(T_A=25°C)
- $Q_{g\ (typical)}$=2.6nC
- $R_{DS(ON)}$<145mΩ(V_{GS}=4.5V)

3.Pinning information

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

SOT-23





4.Maximum ratings (T_A=25°C unless otherwise noted)

Parameter		Symbol	Value	Units
Continuous Drain Current, V_{GS} @ 4.5V	T_A=25°C	I_D	1.2	A
Continuous Drain Current, V_{GS} @ 4.5V	T_A=70°C		0.95	
Pulsed Drain Current ①		I_{DM}	7.4	
Power Dissipation	T_A=25°C	P_D	540	mW
Linear Derating Factor			4.3	mW/°C
Gate-to-Source Voltage		V_{GS}	±12	V
Peak Diode Recovery dv/dt ②		dv/dt	5	V/ns
Junction and Storage Temperature Range		T_J,T_{STG}	-55 to 150	°C

5.Thermal resist ance rating

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ④	$R_{\theta JA}$		230	°C/W

6.Electrical Characteristics T_J=25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	I_D=250μA, V_{GS}=0V	20			V
Breakdown Voltage Temp. Coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	I_D=1mA, Reference to 25°C		0.024		V/°C
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=0.93A ③			145	mΩ
		V_{GS}=2.7V, I_D=0.47 ③			175	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	0.7			V
Forward Transconductance	g_{fs}	V_{DS}=10V, I_D=0.47	1.3			S
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=16V,V_{GS}=0V			1	μA
		V_{DS}=16V, V_{GS}=0V, T_J=125°C			25	
Gate-to-Source Forward Leakage	I_{GSS}	V_{GS}=-12V			-100	nA
Gate-to-Source Reverse Leakage		V_{GS}=12V			100	
Total Gate Charge	Q_g	I_D=0.93A		2.6	3.9	nC
Gate-to-Source Charge	Q_{gs}	V_{DS}=16V		0.41	0.62	
Gate-to-Drain ("Miller") Charge	Q_{gd}	V_{GS}=4.5V,See Fig.6 and 9 ③		1.1	1.7	
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=10V		2.5		ns
Rise Time	t_r	I_D=0.93A		9.5		
Turn-Off Delay Time	$t_{D(off)}$	R_G=6.2Ω		9.7		
Fall Time	t_f	R_D=11Ω, See Fig.10 ③		4.8		pF
Input Capacitance	C_{iss}	V_{GS}=0V		110		
Output Capacitance	C_{oss}	V_{DS}=15V		51		
Reverse Transfer Capacitance	C_{rss}	f=1MHz, See Fig.5		25		

Source-Drain Ratings and Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			0.54	A
Pulsed Source Current (Body Diode) ①	I_{SM}				7.4	
Diode Forward Voltage	V_{SD}	T_J=25°C,I_S=0.93A,V_{GS}=0V ③			1.2	V
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=0.93A dI/dt=100A/μs ③		25	38	ns
Reverse Recovery Charge	Q_{rr}			16	24	nC

Notes:

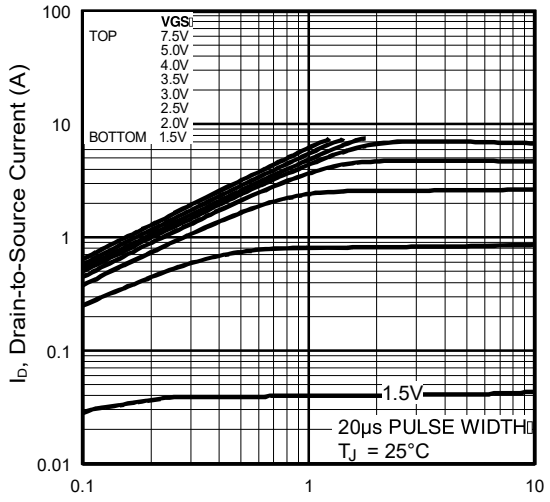
① Repetitive rating; pulse width limited by max. junction temperature. (See fig.11)

② I_{SD} ≤ 0.93A, di/dt ≤ 90A/μs, V_{DD} ≤ $V_{(BR)DSS}$,T_J≤ 150°C.

③ Pulse width ≤ 300μs; duty cycle ≤ 2%.

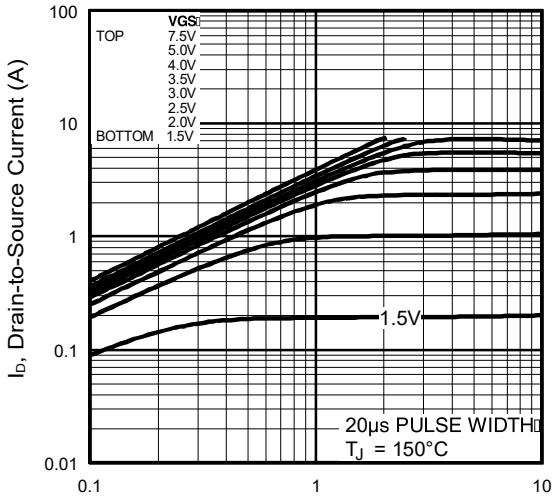
④ Surface mounted on FR-4 board, t ≤ 5sec.

7.1Typical Characterisitics



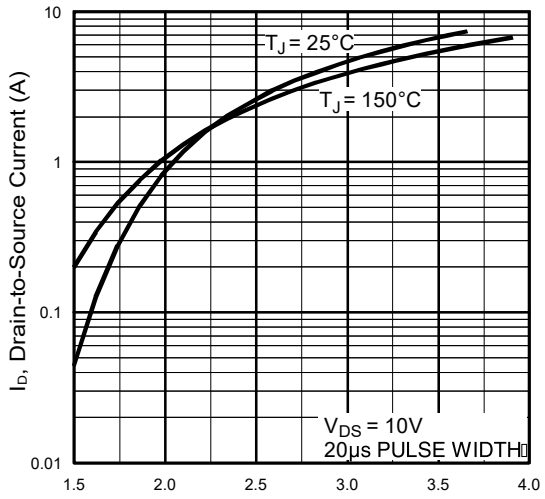
V_{DS}, Drain-to-Source Voltage (V)

Fig 1. Typical Output Characteristics



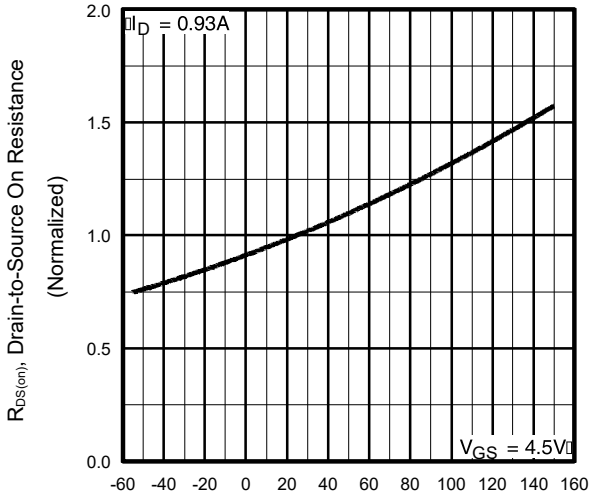
$-V_{DS}$, Drain-to-Source Voltage (V)

Fig 2. Typical Output Characteristics



V_{GS}, Gate-to-Source Voltage (V)

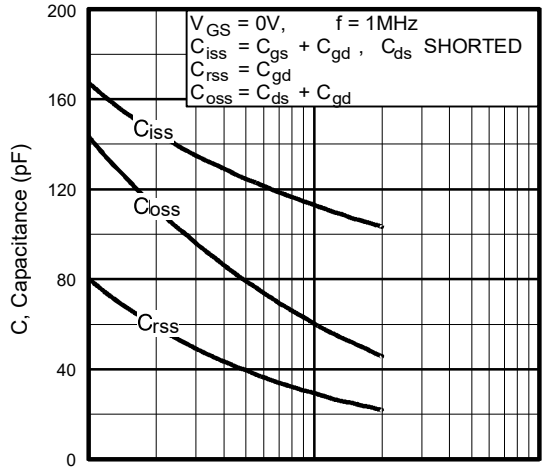
Fig 3. Typical Transfer Characteristics



T_J, Junction Temperature (°C)

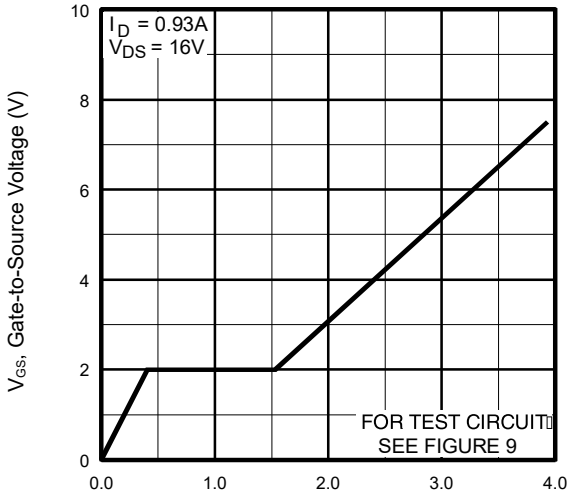
Fig 4. Nomalized On-ResistanceVs. Temperature

7.2Typical Characterisitics



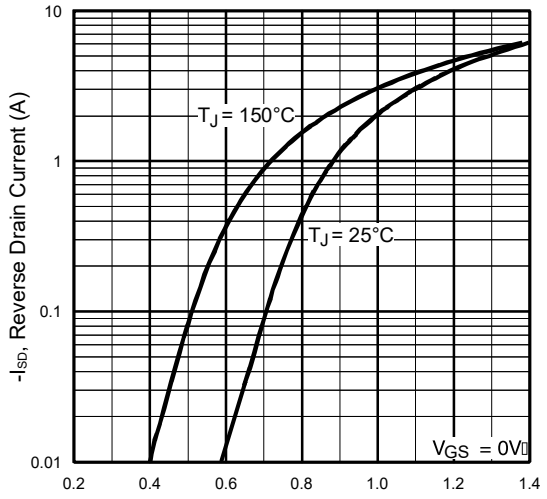
V_{DS} ,Drain-to-Source Voltage (V)

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



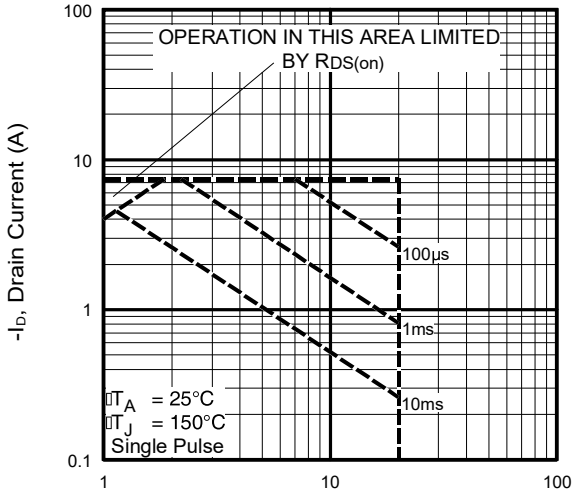
Q_G, Total Gate Charge (nC)

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



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

Fig 7. Typical Source-Drain Diode Forward Voltage



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

Fig 8. Maximum Safe Operating Area

7.3Typical Characterisitics

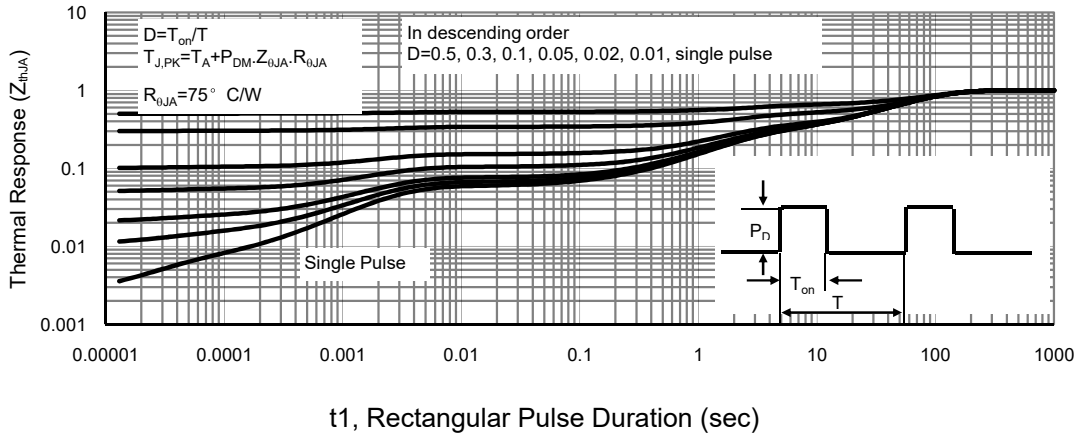


Figure 9. Maximum Effective Transient Themal Impedance, Junction-to-Ambient

7.4Typical Characterisitics

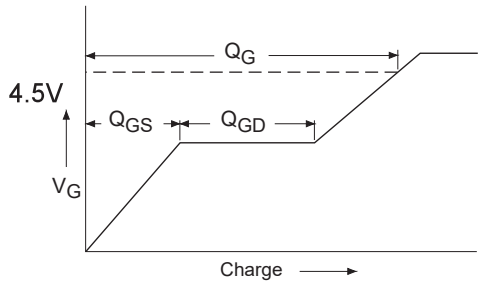


Fig 10a. Basic Gate Charge Wavefomm

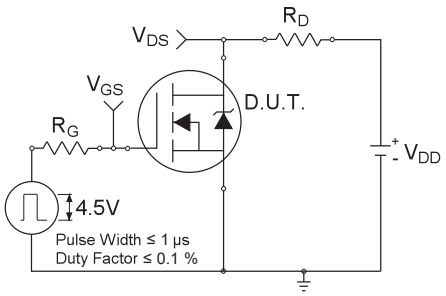


Fig 10a. Switching Time Test Circuit

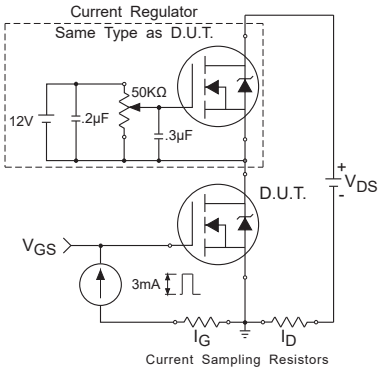


Fig 11a. Gate Charge Test Circuit

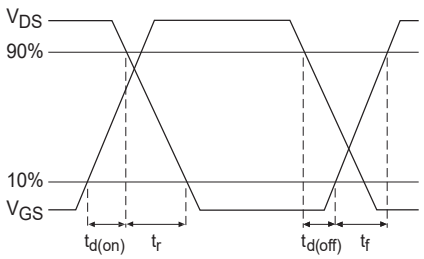
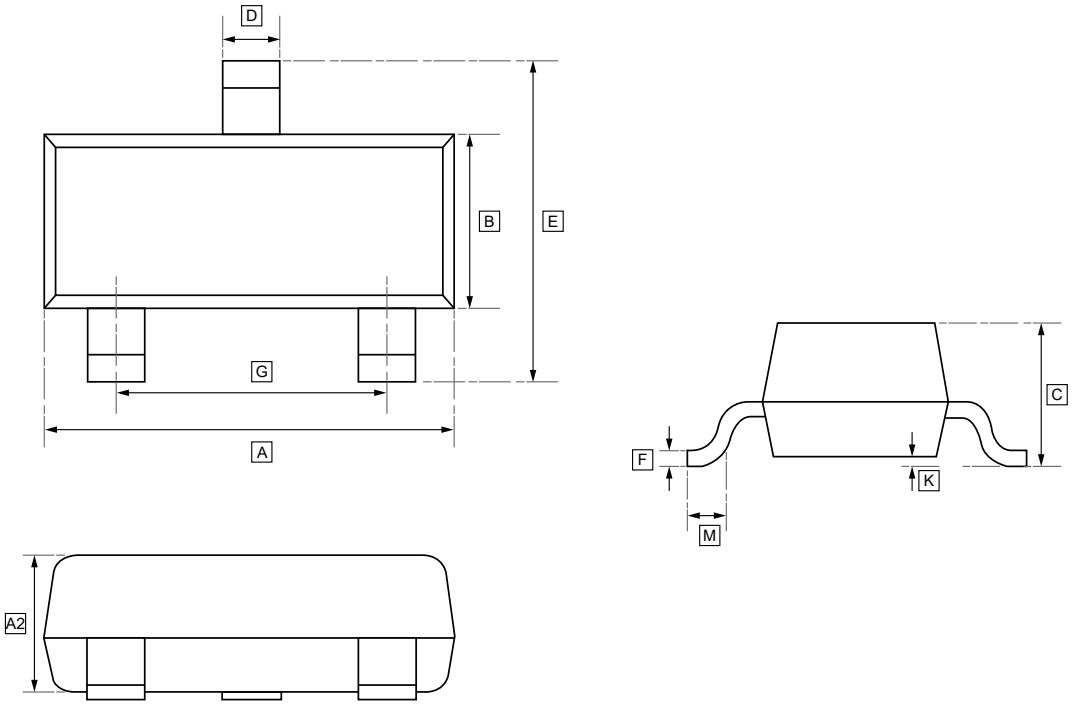


Fig 11b. Switching Time Wavefomms

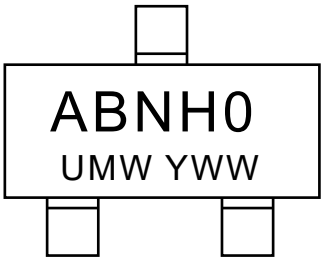
8.SOT-23 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	B	C	D	E	G	K	M	A2	F
Min	2.80	1.20	0.90	0.32	2.25	1.80	0.00	0.30	0.95	0.095
Max	3.04	1.40	1.10	0.55	2.55	2.00	0.10	-	1.05	0.115

9.Ordering information



YWW: Batch Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRLML2402TR	SOT-23	3000	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.