UMW IRLML6402TR

-20V P-Channel MOSFET

1.Description

The IRLML6402TR uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

2.1Features

- $V_{DS\ (V)}$=-20V
- $R_{DS(ON)}$<65mΩ(V_{GS}=-4.5V)
- $R_{DS(ON)}$<135mΩ(V_{GS}=-2.5V)

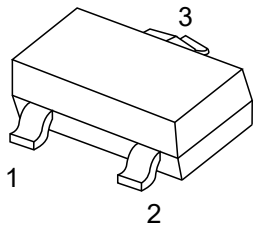
2.2Features

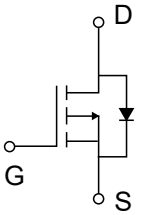
- P-Channel MOSFET
- SOT-23 Footprint
- Available in Tape and Reel
- Low profile(＜1.1mm)
- Fast Switching
- Ultra low on-resistance

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
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	±12	
Continuous Drain Current, V_{GS}=4.5V	T_A=25°C	I_D	-3.7	A
Continuous Drain Current, V_{GS}=4.5V	T_A=70°C		-2.2	
Pulsed Drain Current [a]		I_{DM}	-30	
Power Dissipation	T_A=25°C	P_D	1.3	W
Power Dissipation	T_A=70°C		0.8	
Single Pulse Avalanche Energy [b]		E_{AS}	11	mJ

Thermal Resistance.Junction- to-Ambient	R_{thJA}	100	°C/W
Linera Derating Factor		0.01	W/°C
Junction Temperature	T_J	150	°C
Junction and Storage Temperature Range	T_{STG}	-55 to 150	

Notes:

a.Repetitive Rating :Pulse width limited by maximum junction temperature.

b.Starting T_J=25°C, L=1.65mH, R_G=25Ω, I_{AS}=-3.7A.

5.Electrical Characteristics T_A=25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{DSS}	I_D=-250μA, V_{GS}=0V	-20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-20V, V_{GS}=0V			-1	μA
		V_{DS}=-20V,V_{GS}=0V,T_J=70°C			-25	
Gate-source leadage	I_{GSS}	V_{GS}=±12V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.4	-0.55	-0.95	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-3.7A		0.05	0.065	Ω
		V_{GS}=-2.5V, I_D=-3.1A		0.08	0.135	
Forward Transconductance	g_{FS}	V_{DS}=-10V, I_D=-3.7A	6			S
Input Capacitance	C_{iss}	V_{DS}=-10V		633		pF
Output Capacitance	C_{oss}	V_{GS}=0V		145		
Reverse Transfer Capacitance	C_{rss}	f=1MHz		110		
Total Gate Charge	Q_g	V_{DS}=-10V		8	12	nC
Gate Source Charge	Q_{gs}	V_{GS}=-5V		1.2	1.8	
Gate Drain Charge	Q_{gd}	I_D=-3.7A		2.8	4.2	
Turn-On DelayTime	$t_{D(on)}$	I_D=-3.7A		350		ns
Rise time	t_r	V_{DD}=-10V		48		
Turn-off delay time	$t_{D(off)}$	R_D=2.7Ω		588		
Fall time	t_f	R_G=89Ω		381		
Reverse recovery time	t_{rr}	T_J=25°C, I_F=-1A		29	43	ns
Reverse recovery charge	Q_{rr}	dI/dt=-100A/μs *2		11	17	nC
Continuous source current	I_S	MOSFET symbol			-1.3	A
Pulsed source current *1	I_{SM}	showing the integral reversep-n junction diode.			-22	
Diode forward voltage	V_{SD}	T_J=25°C, V=0V, I_S=-1A *2			-1.2	V

*1 Repetitive rating,pulse width limited by max.junction temperature.

* 2 Pulse width ≤ 400μs, Duty cycle ≤ 2%.

6.1Typical Characterisitics

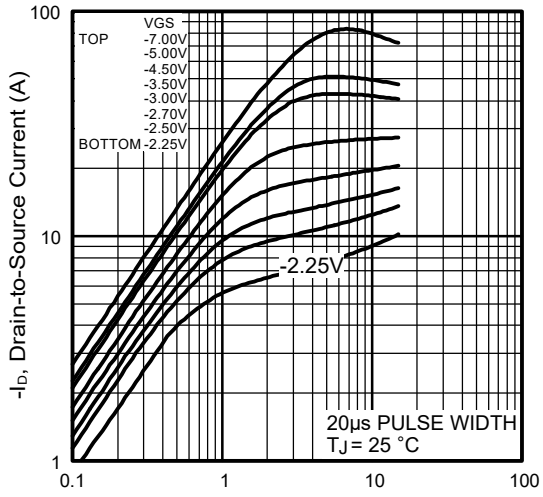


Fig 1. Typical Output Characteristics

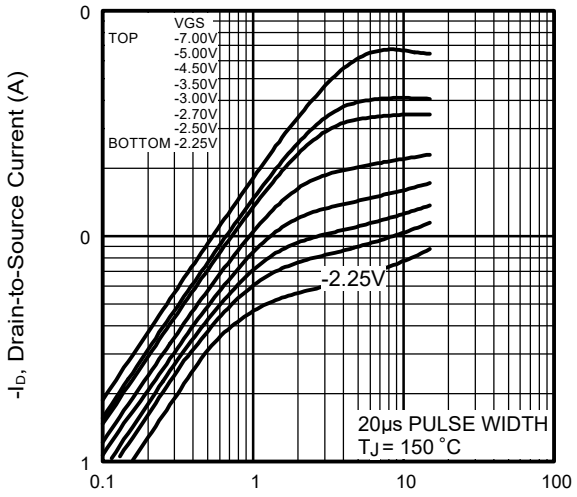


Fig 2. Typical Output Characteristics

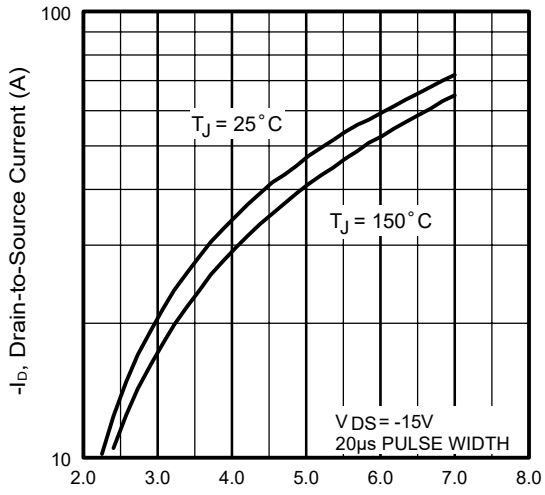


Fig 3. Typical Transfer Characteristics

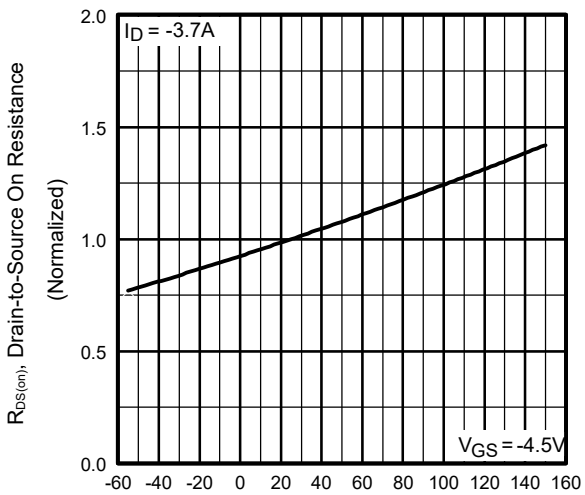
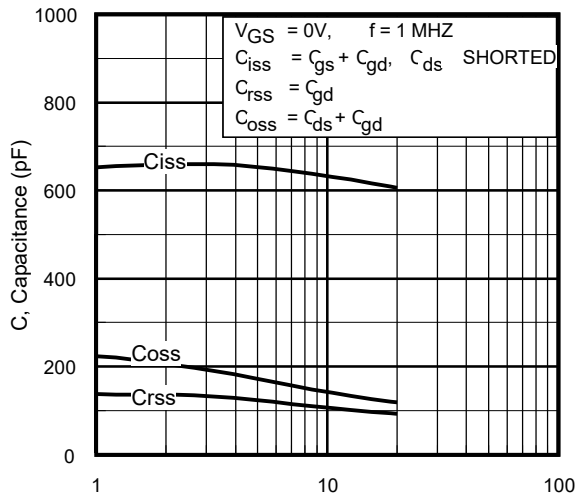


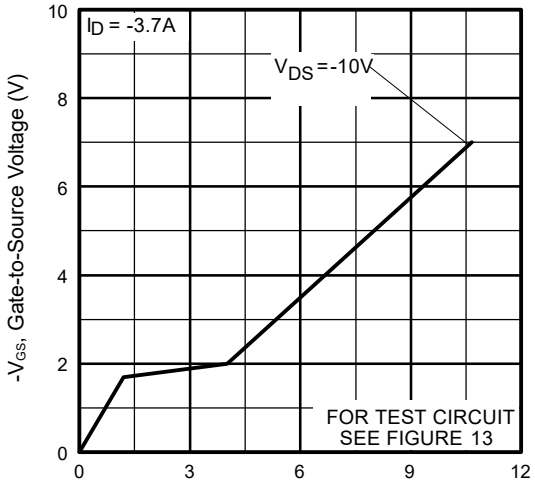
Fig 4. Nomalized On-ResistanceVs. Temperature

6.2Typical Characterisitics



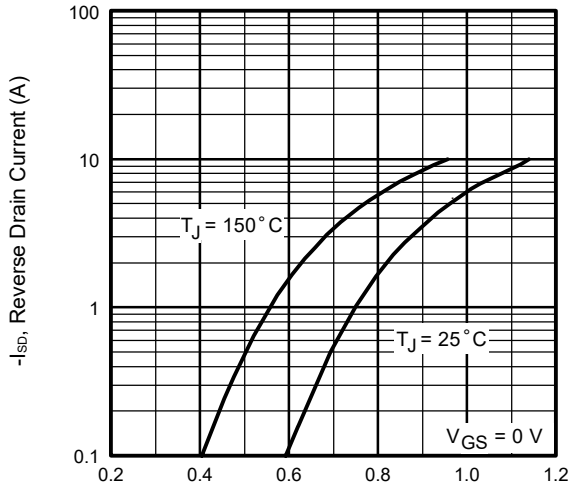
V_{DS} ,Drain-to-Source Voltage (V)

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



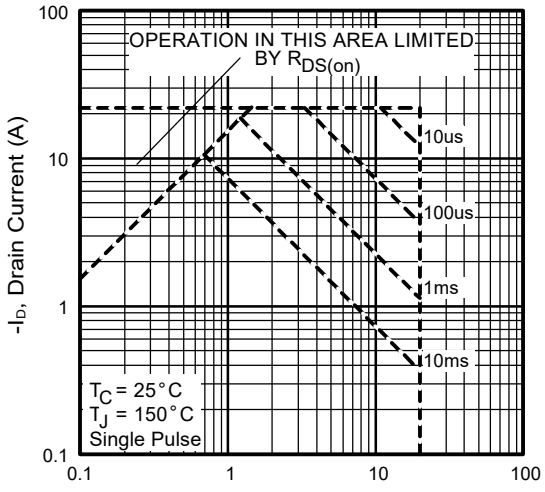
Q_G, Total Gate Charge (nC)

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

6.3Typical Characterisitics

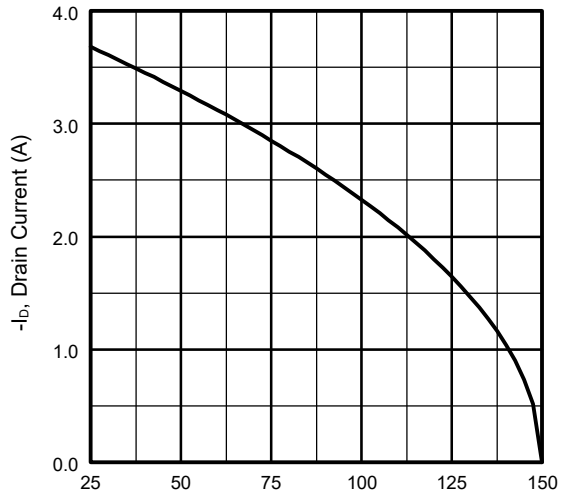


Fig 9. Maximum Drain Current Vs. Case Temperature

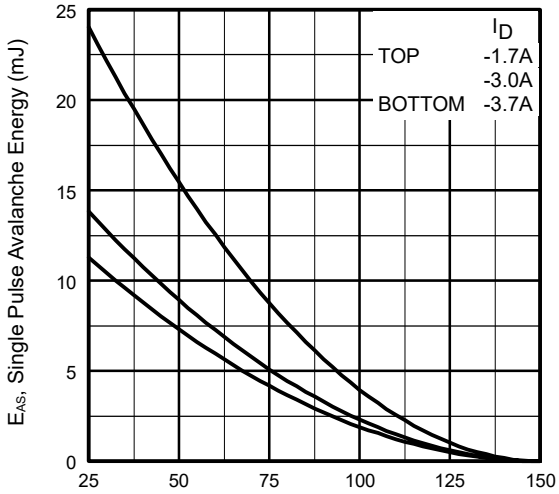


Fig 10. Maximum Avalanche Energy Vs. Drain Current

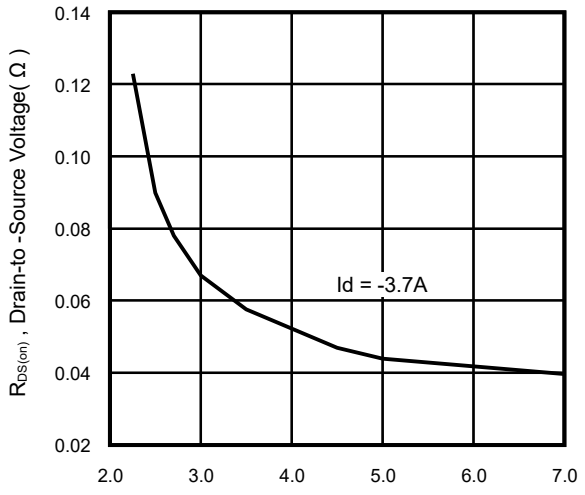


Fig 11. Typical On-Resistance Vs. Gate Voltage

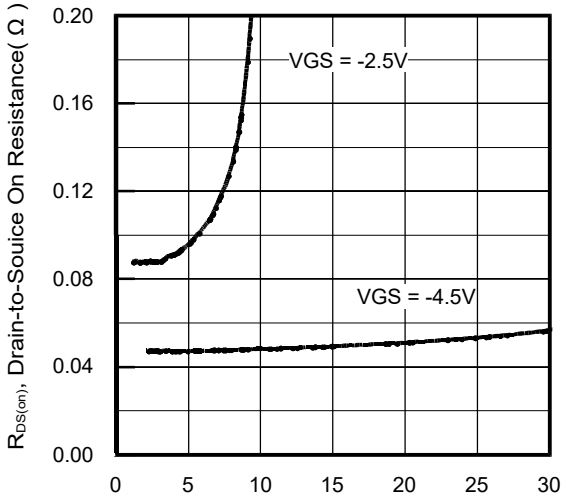
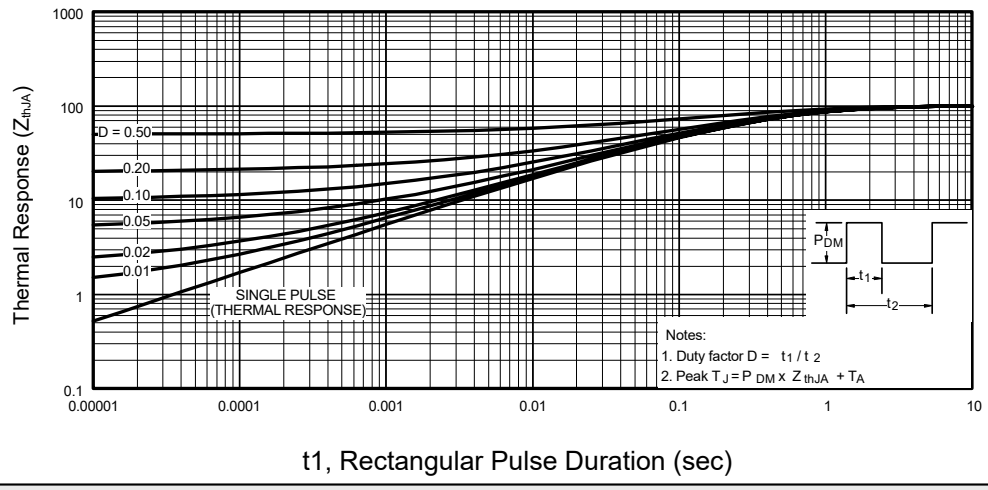


Fig 12. Typical On-Resistance Vs.Drain Current

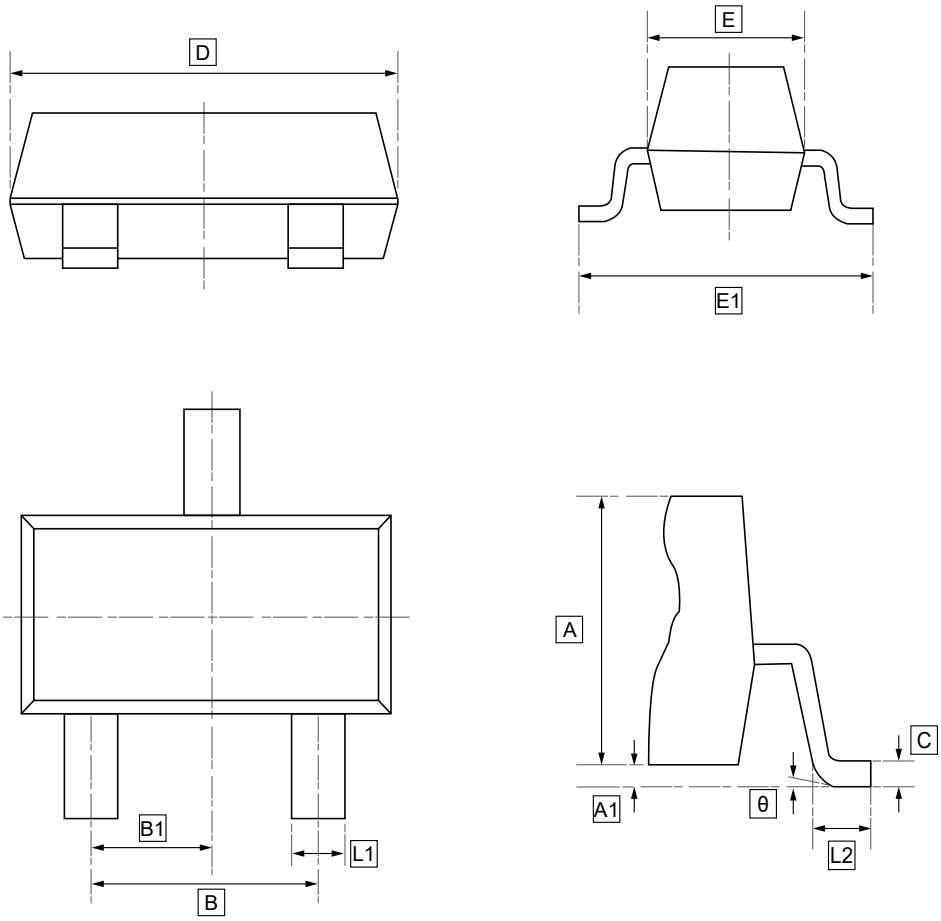
6.4Typical Characterisitics



t1, Rectangular Pulse Duration (sec)

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

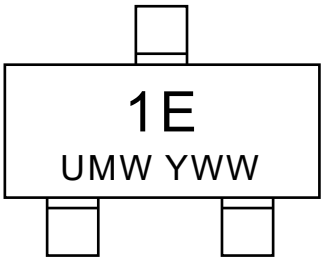
7.SOT-23 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	L1	L2	C	D	E	E1	B	B1	θ
Min	1.050	0.000	0.300	0.350	0.100	2.820	1.500	2.700	1.800	0.950	0°
Max	1.150	0.100	0.500	0.550	0.200	3.020	1.700	2.900	2.000	TYP	8°

8.Ordering information



YWW: Batch Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRLML6402TR	SOT-23	3000	Tape and reel

9.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.