# UMW IRLML6302TR

-20V P-Channel MOSFET

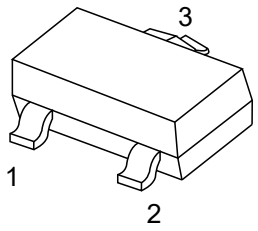
## 1.Features

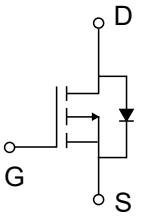
- $V_{DS\ (V)}$=-20V
- $R_{DS(ON)}$<90mΩ($V_{GS}$=-4.5V)
- $R_{DS(ON)}$<110mΩ($V_{GS}$=-2.7V)
- Lead-Free
- P-Channel MOSFET
- SOT-23 Footprint
- Available in Tape and Reel
- Fast Switching

## 2.Pinning information

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

**SOT-23**




## 3.Maximum ratings ($T_A$=25°C unless otherwise noted)

| Parameter | | Symbol | Value | Units |
|---|---|---|---|---|
| Continuous Drain Current, $V_{GS}$ @ -4.5V | $T_A$=25°C | $I_D$ | -0.78 | A |
| Continuous Drain Current, $V_{GS}$ @ -4.5V | $T_A$=70°C | | -0.62 | |
| Pulsed Drain Current ① | | $I_{DM}$ | -4.9 | |
| 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 |

## 4.Thermal resist ance rating

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

## 5.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 | | -4.9 | | mV/°C |
| Static Drain-to-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=-4.5V, $I_D$=-0.61A ③ | | | 90 | mΩ |
| | | $V_{GS}$=-2.7V, $I_D$=-0.31A ③ | | | 110 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -0.7 | | -1.5 | V |
| Forward Transconductance | $g_{fs}$ | $V_{DS}$=-10V, $I_D$=-0.31A | 0.56 | | | 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 | $Q_g$ | $I_D$=-0.61A | | 2.4 | 3.6 | nC |
| Gate-to-Source Charge | $Q_{gs}$ | $V_{DS}$=-16V | | 0.56 | 0.84 | |
| Gate-to-Drain ("Miller") Charge | $Q_{gd}$ | $V_{GS}$=-4.5V,See Fig.6 and 9 ③ | | 1 | 1.5 | |
| Turn-On Delay Time | $t_{D(on)}$ | $V_{DD}$=-10V | | 13 | | ns |
| Rise Time | $t_r$ | $I_D$=-0.61A | | 18 | | |
| Turn-Off Delay Time | $t_{D(off)}$ | $R_G$=6.2Ω | | 22 | | |
| Fall Time | $t_f$ | $R_D$=16Ω, See Fig.10 ③ | | 22 | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V | | 97 | | pF |
| Output Capacitance | $C_{oss}$ | $V_{DS}$=-15V | | 53 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | $f$=1MHz, See Fig.5 | | 28 | | |

| 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 | $I_{SM}$ | | | | -4.9 | |
| Diode Forward Voltage | $V_{SD}$ | $T_J$=25°C,$I_S$=-0.6A,$V_{GS}$=0V ③ | | | -1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $T_J$=25°C, $I_F$=-0.6A | | 35 | 53 | ns |
| Reverse Recovery Charge | $Q_{rr}$ | dI/dt=100A/μs ③ | | 26 | 39 | nC |

Notes:

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

② $I_{SD}$≤ -0.61A, di/dt ≤ 76A/μS, $V_{DD}$ ≤ $V_{(BR)DSS}$,$T_J$≤ 150°C

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

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

## 6.1Typical Characterisitics

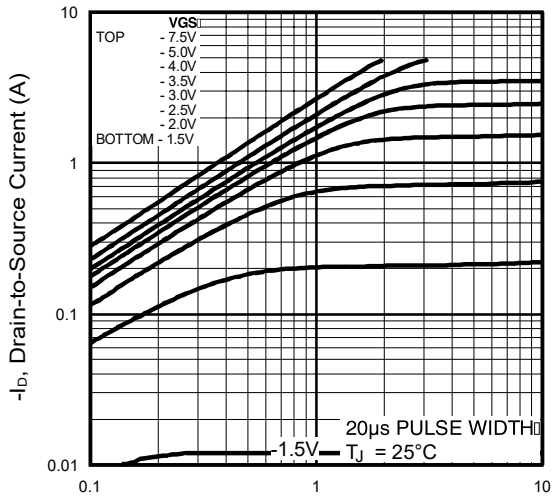



Fig 1. Typical Output Characteristics

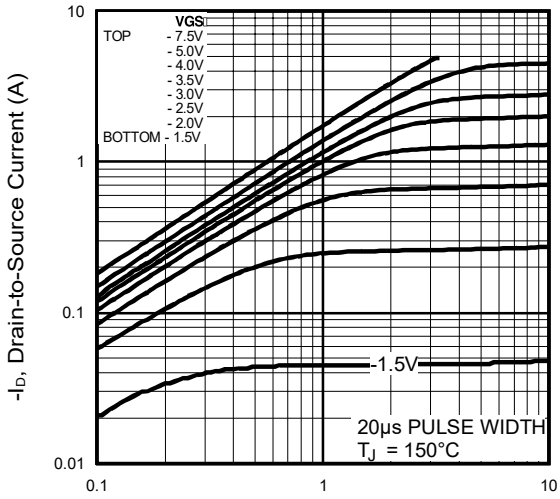



Fig 2. Typical Output Characteristics

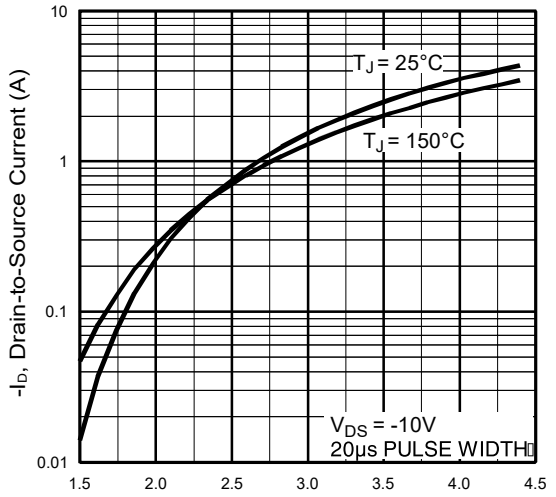



Fig 3. Typical Transfer Characteristics

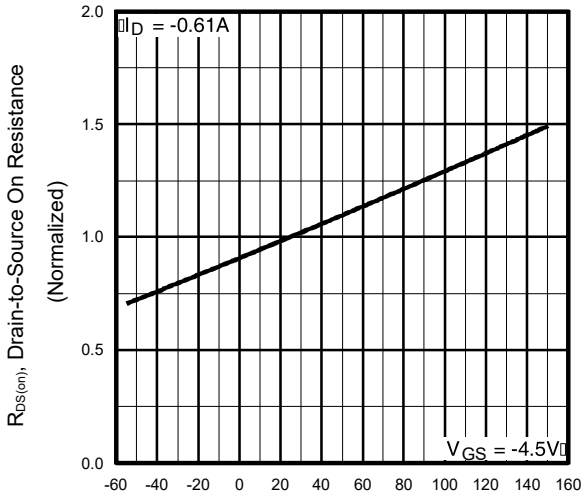
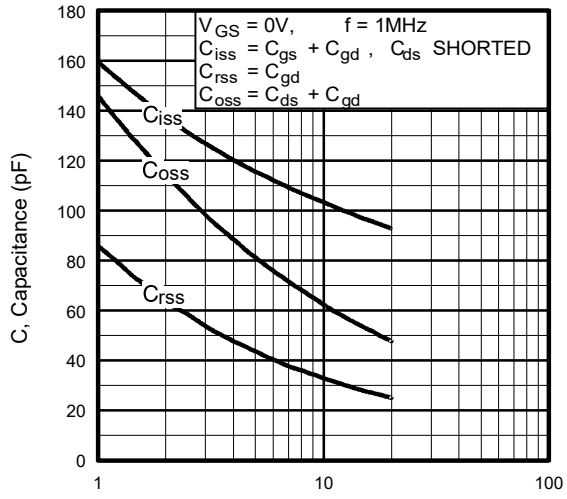


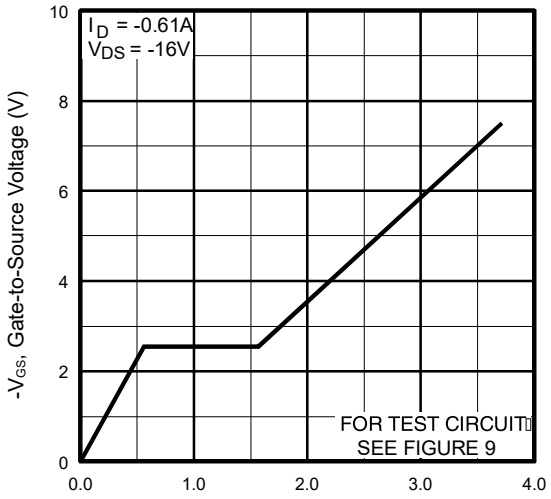

Fig 4. Nomalized On-ResistanceVs. Temperature

## 6.2Typical Characterisitics



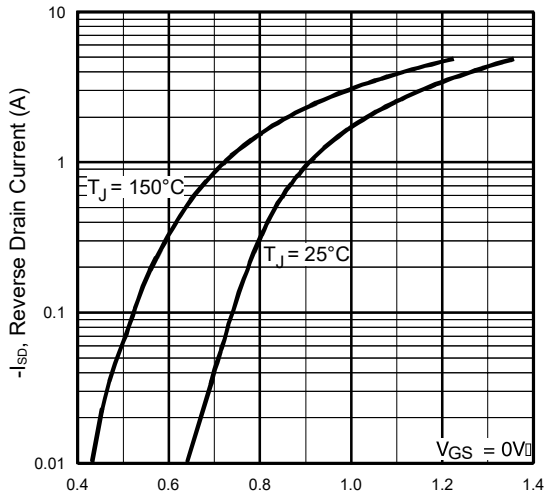

$-V_{DS}$ ,Drain-to-Source Voltage (V)

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



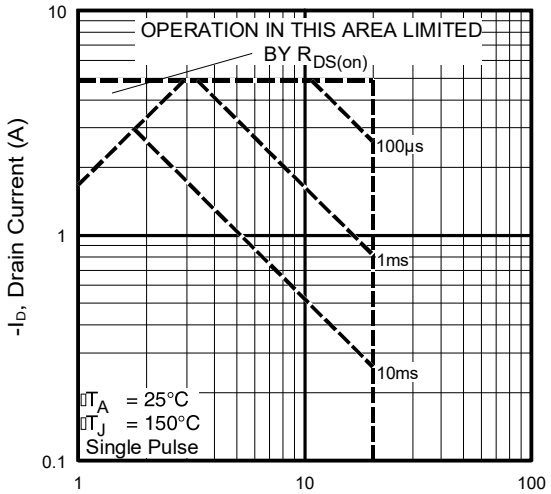

$Q_G$, Total Gate Charge (nC)

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

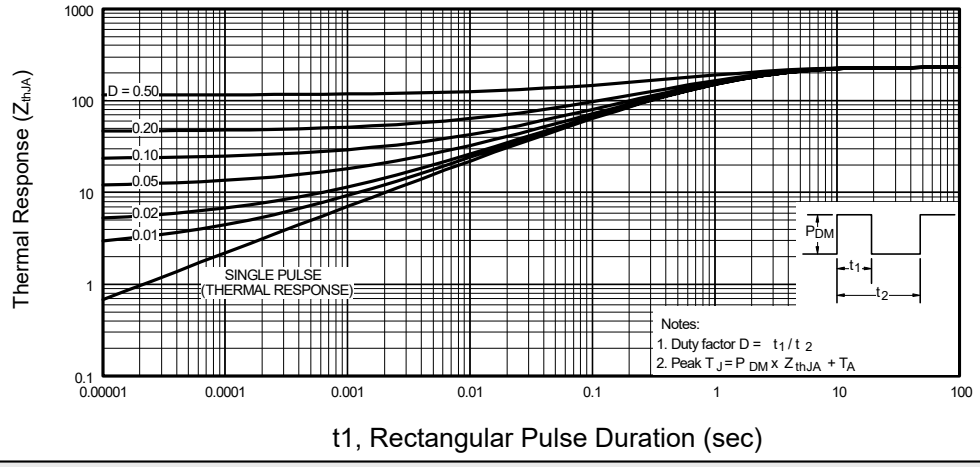



Figure 9. Maximum Effective Transient Themal Impedance, Junction-to-Ambient

## 6.4Typical Characterisitics

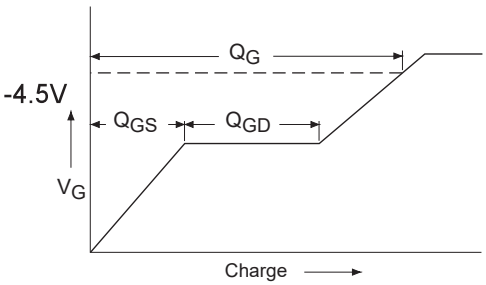



Fig 10a. Basic Gate Charge Wavefomm

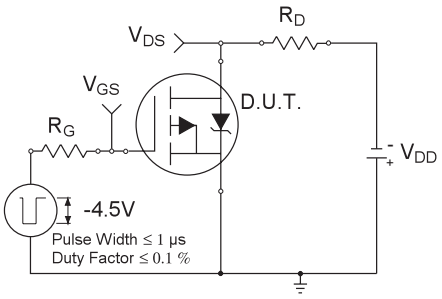



Fig 10a. Switching Time Test Circuit

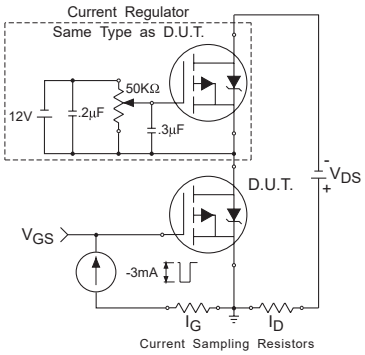



Fig 11a. Gate Charge Test Circuit

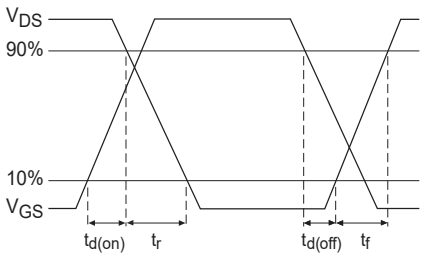
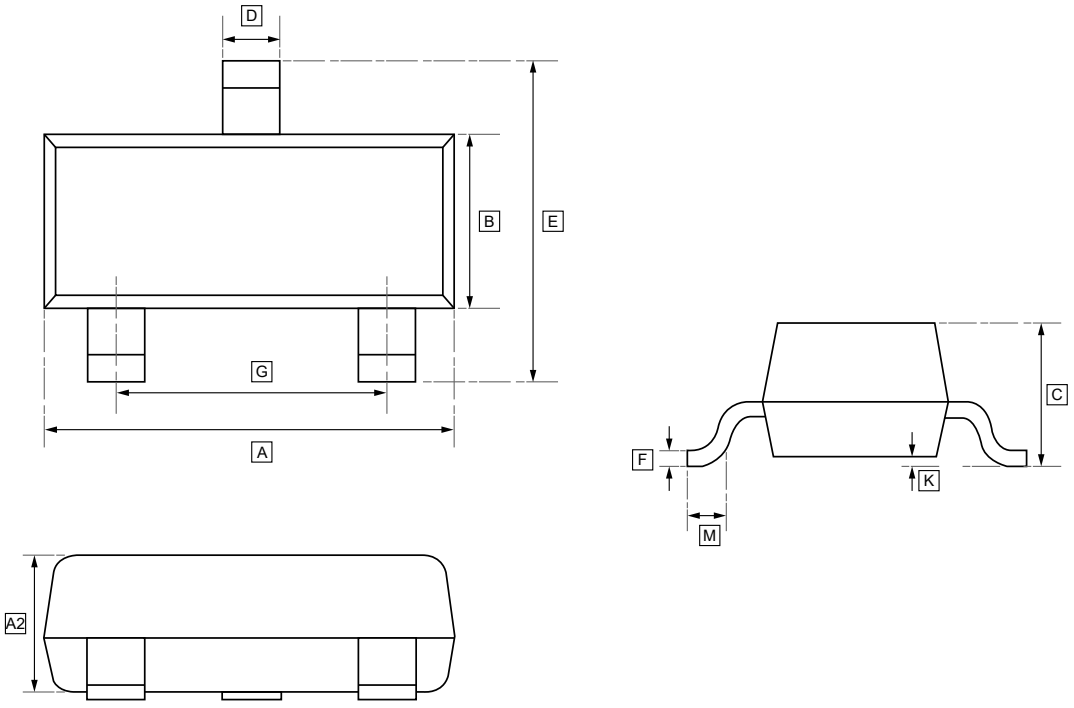



Fig 11b. Switching Time Wavefomms

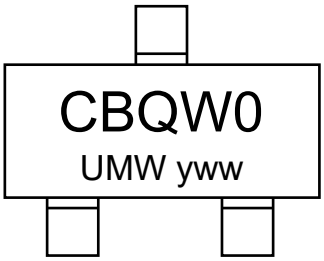
## 7.SOT-23 Package Outline Dimensions




**DIMENSIONS (mm are the original dimensions)**

| Symbol | A | B | C | D | E | G | K | M | A2 | F |
|---|---|---|---|---|---|---|---|---|---|---|
| **Min** | 2.85 | 1.20 | 0.90 | 0.40 | 2.25 | 1.80 | 0.00 | 0.30 | 0.95 | 0.095 |
| **Max** | 3.04 | 1.40 | 1.10 | 0.50 | 2.55 | 2.00 | 0.10 | - | 1.05 | 0.115 |

## 8.Ordering information




yww: Batch Code

| Order Code | Package | Base QTY | Delivery Mode |
|---|---|---|---|
| UMW IRLML6302TR | SOT-23 | 3000 | Tape and reel |

## 9.Disclaimer

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