# UMW NTD25P03LG

-30V P-Channel MOSFET

## 1.Features

- $V_{DS(V)}$=-30V
- $R_{DS(ON)}$<43mΩ($V_{GS}$=-4.5V)
- $R_{DS(ON)}$<52mΩ($V_{GS}$=-2.5V)
- Halogen-free

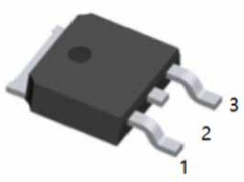
## 2.Applications

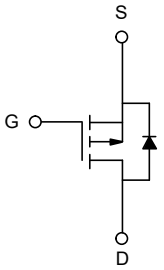
- Load Switch
- Notebook Adaptor Switch

## 3.Pinning information

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

**TO-252(DPAK)**
**top view**




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

| Parameter | | Symbol | Maximum | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous DrainCurrent ($T_J$ = 150 °C) | $T_C$=25°C | $I_D$ | -26 | A |
| | $T_C$=70°C | | -21 | |
| | $T_A$=25°C | | -12.9[a,b] | |
| | $T_A$=70°C | | -9.6[a,b] | |
| Pulsed Drain Current | | $I_{DM}$ | -112 | |
| Continuous Source-Drain Diode Current | $T_C$=25°C | $I_S$ | -4.1 | |
| | $T_A$=25°C | | -2.2[a,b] | |
| Avalanche Current Pulse | L = 0.1 mH | $I_{AS}$ | -20 | |
| Single Pulse Avalanche Energy | | $E_{AS}$ | 20 | mJ |

| | | | | |
|---|---|---|---|---|
| Maximum Power Dissipation | $T_C$=25°C | $P_D$ | 125 | W |
| | $T_C$=70°C | | 20 | |
| | $T_A$=25°C | | 2.7[a,b] | |
| | $T_A$=70°C | | 1.7[a,b] | |
| Storage Temperature Range | | $T_J$,$T_{STG}$ | -55 to 150 | °C |

## 4.Thermal resistance rating

| Parameter | | Symbol | Typ | Max | Units |
|---|---|---|---|---|---|
| Maximum Junction-to-Ambient [a,c] | t ≤ 10 s | $R_{thJA}$ | 38 | 46 | °C/W |
| Maximum Junction-to-Foot | Steady-State | $R_{thJF}$ | 20 | 25 | °C/W |

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. t=10s.

c. Maximum under Steady State conditions is 85°C/W.

d. Based on $T_C$=25 °C.

## 5.$T_J$=25°C unless otherwise specified

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{DS}$ | $V_{GS}$=0V, $I_D$=-250μA | -30 | | | V |
| $V_{DS}$ Temperature Coefficient | $\Delta V_{DS}/T_J$ | $I_D$=-250μA | | -34 | | mV/°C |
| $V_{GS(th)}$ Temperature Coefficient | $\Delta V_{GS(th)}/T_J$ | | | 5.3 | | |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -1 | | -2.5 | V |
| Gate-Source Leakage | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±25V | | | ±100 | nA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V, $V_{GS}$=0V | | | -1 | μA |
| | | $V_{DS}$=-30V, $V_{GS}$=0V, $T_J$=55°C | | | -5 | |
| On-State Drain Current[a] | $I_{D(ON)}$ | $V_{DS}$≥-10V, $V_{GS}$=-10V | -30 | | | A |
| Drain-Source On-State Resistance[a] | $R_{DS(ON)}$ | $V_{GS}$=-4.5V, $I_D$=-10A | | 33 | 43 | mΩ |
| | | $V_{GS}$=-2.5V, $I_D$=-8A | | 46 | 52 | |
| Forward Transconductance[a] | $g_{FS}$ | $V_{DS}$=-10V, $I_D$=-10A | | 28 | | S |
| **Dynamic** [b] | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=-15V, $V_{GS}$=0V, f=1MHz | | 1350 | | pF |
| Output Capacitanc | $C_{oss}$ | | | 255 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 190 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-15V,$V_{GS}$=-10V | | 27 | 43 | nC |
| | | $I_D$=-10A | | 19 | 25 | |
| Gate Source Charge | $Q_{gs}$ | $V_{DS}$=-15V, $V_{GS}$=-4.5V | | 6 | | |
| Gate Drain Charge | $Q_{gd}$ | $I_D$=-10A | | 12 | | |
| Gate Resistance | $R_g$ | f=1MHz | 0.5 | 2.2 | 4.4 | Ω |
| Turn-On DelayTime | $t_{D(on)}$ | $V_{DD}$ =-15V, $R_L$=1.5Ω | | 13 | 25 | ns |
| Rise Time | $t_r$ | $I_D$≅-10A, $V_{GEN}$=-10V | | 12 | 24 | |
| Turn-Off DelayTime | $t_{D(off)}$ | $R_g$=1Ω | | 40 | 70 | |
| Fall Time | $t_f$ | | | 9 | 18 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Turn-On DelayTime | $t_{D(on)}$ | $V_{DD}$ =-15V, $R_L$=1.5Ω<br>$I_D$≌-10A, $V_{GEN}$=-4.5V<br>$R_g$=1Ω | | 48 | 80 | ns |
| Rise Time | $t_r$ | | | 92 | 160 | ns |
| Turn-Off DelayTime | $t_{D(off)}$ | | | 34 | 60 | ns |
| Fall Time | $t_f$ | | | 19 | 35 | ns |
| **Drain-Source Body Diode Characteristics** | | | | | | |
| Continuous Source-Drain Diode Current | $I_S$ | $T_C$=25°C | | | -4.1 | A |
| Pulse Diode Forward Current | $I_{SM}$ | | | | -60 | A |
| Body Diode Voltage | $V_{SD}$ | $I_S$=-3A, $V_{GS}$=0V | | -0.75 | -1.2 | V |
| Body Diode Reverse Recovery Time | $t_{rr}$ | $I_F$=-10A, dI/dt=100A/μs<br>$T_J$=25°C | | 27 | 45 | ns |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | | | 16 | 27 | nC |
| Reverse Recovery Fall Time | $t_a$ | | | 12 | | ns |
| Reverse Recovery Rise Time | $t_b$ | | | 15 | | ns |

Notes:

a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %.

b. Guaranteed by design, not subject to production testing.

## 6.1Typical Characterisitics

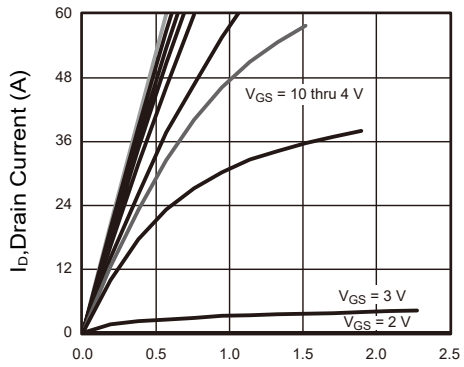



Figure 1: Output Characteristics

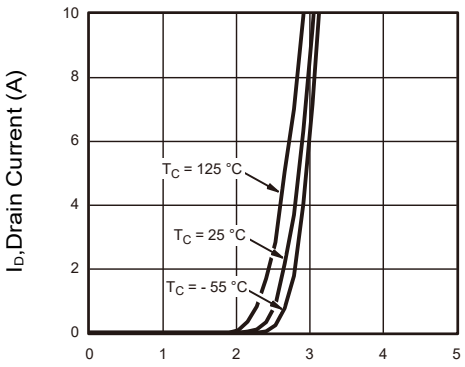



Figure 2: Transfer Characteristics

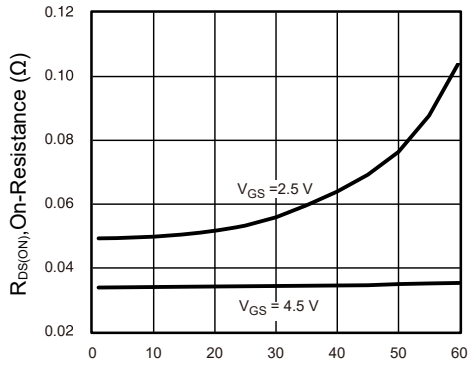



Figure 3: On-Resistance vs. Drain Current

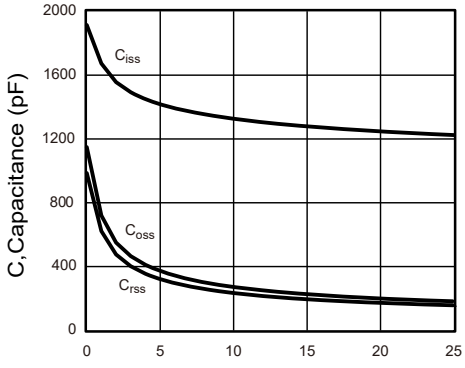



Figure 4: Capacitance

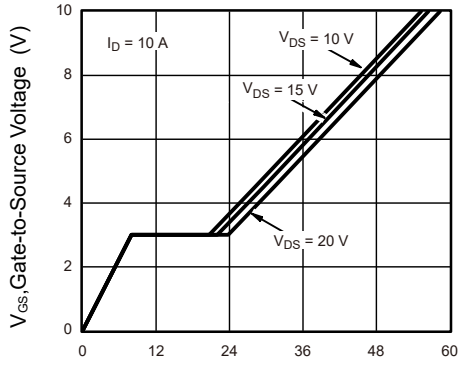



Figure 5: Gate Charge

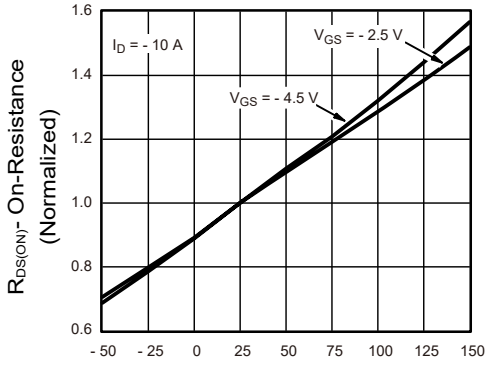



Figure 6: On-Resistance vs. Junction Temperature

## 6.2Typical Characterisitics

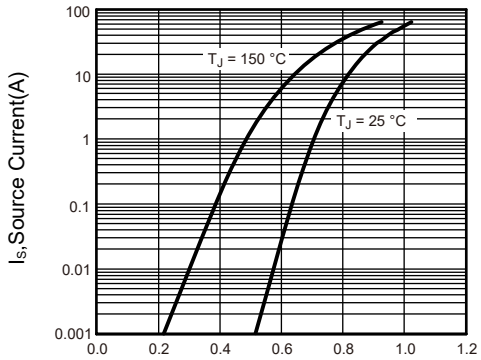



Figure 7: Source-Drain Diode Forward Voltage

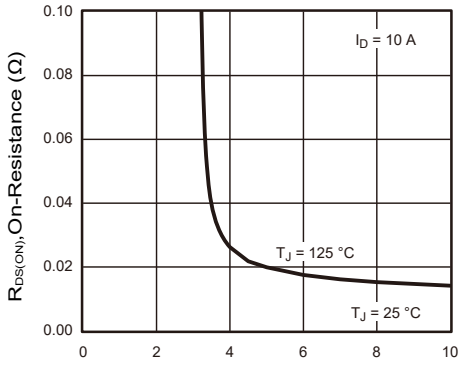



Figure 8: On-Resistance vs. Gate-to-Source Voltage

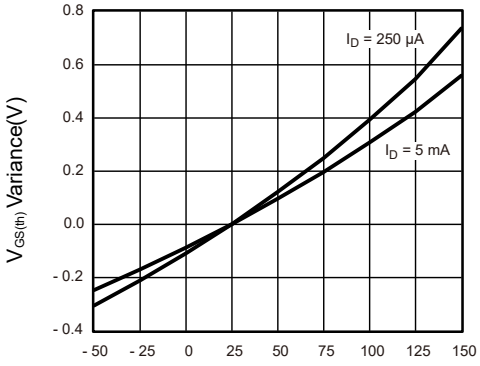



Figure 9: Threshold Voltage

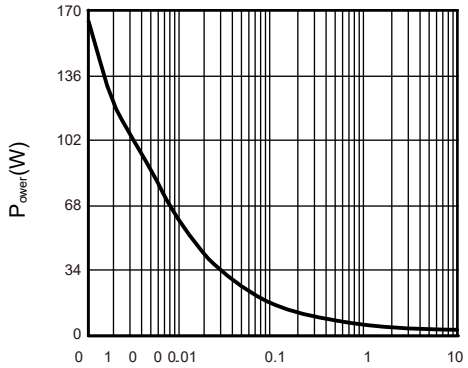



Figure 10: Single Pulse Power, Junction-to-Ambient

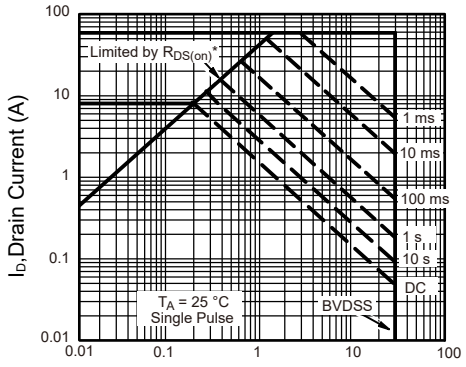



Figure 11: Safe Operating Area

## 6.3Typical Characterisitics

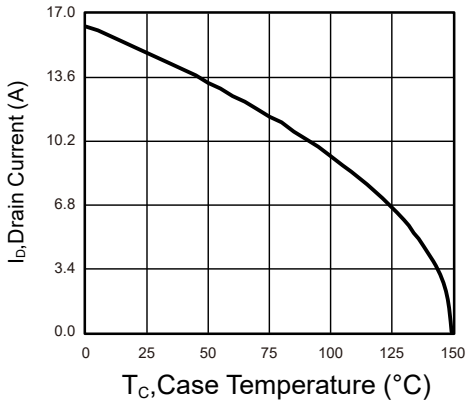



Figure 12: Current Derating*

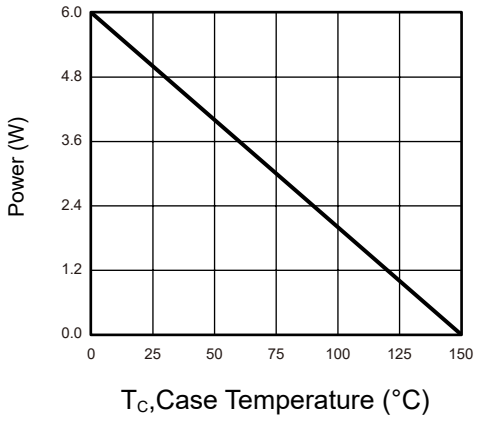



Figure 13: Power, Junction-to-Foot

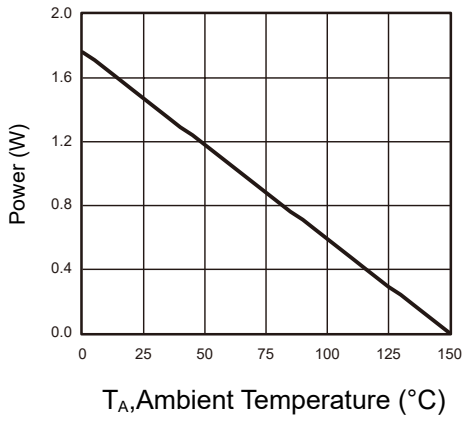



Figure 14: Power, Junction-to-Ambient

* The power dissipation $P_D$ is based on $T_{J(max)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

## 6.4Typical Characterisitics

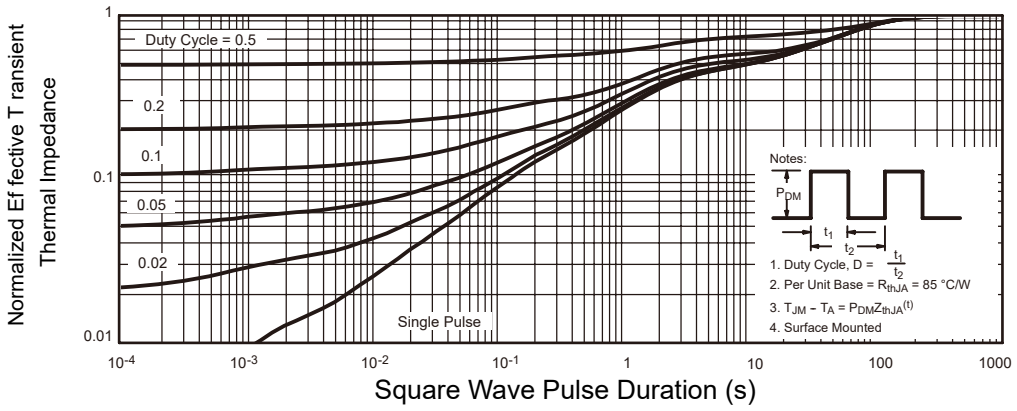



Figure 15: Normalized Thermal Transient Impedance, Junction-to-Ambient

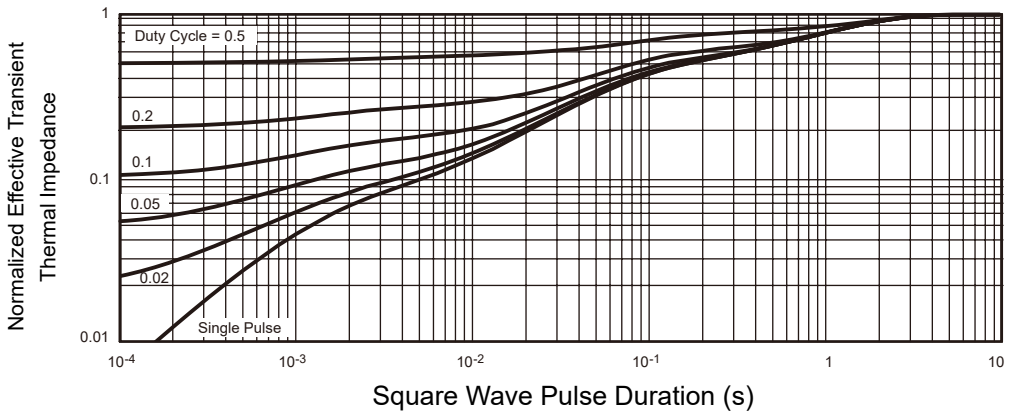
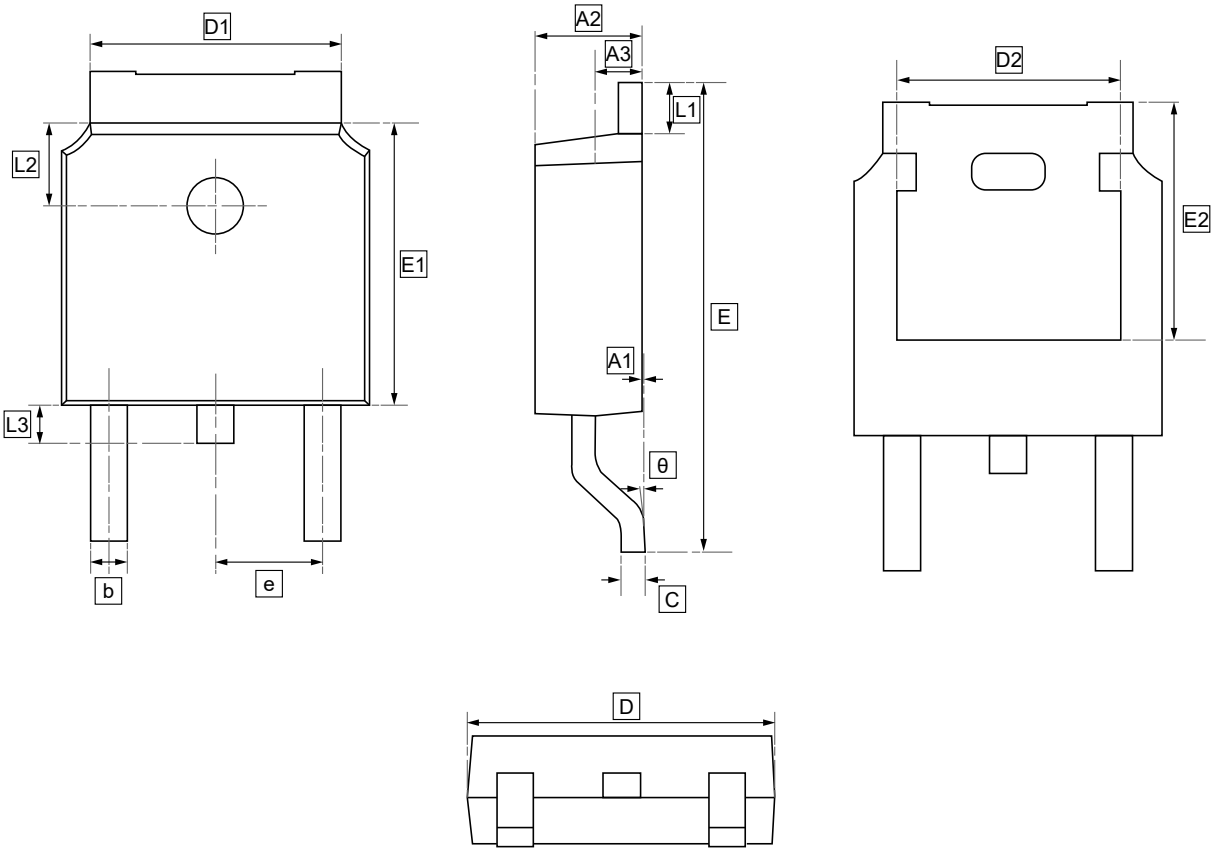



Figure 16: Normalized Thermal Transient Impedance, Junction-to-Foot

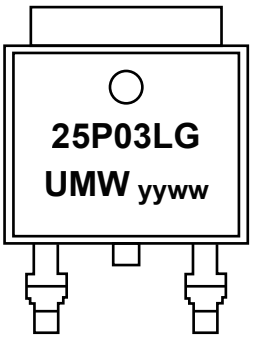
## 7.TO-252 Package Outline Dimensions




**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 |

## 8.Ordering information




yy: Year Code
ww: Week Code

| Order Code | Package | Base QTY | Delivery Mode |
|---|---|---|---|
| UMW NTD25P03LG | TO-252 | 2500 | 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.