# UMW 25N06

60V N-Channel MOSFET

## 1.Description

These N-channel enhancement mode power mosfets used advanced trench technology design, provided excellent $R_{DS(ON)}$ and low gate charge. Which accords with the RoHS standard.

## 2.Features

- $V_{DS}$=60V, $I_D$=25A
- $R_{DS(ON)}$, 23 mΩ(Typ) @ $V_{GS}$=10V
- $R_{DS(ON)}$, 30 mΩ(Typ) @ $V_{GS}$=4.5V
- Fast Switching
- Low ON Resistance (Rdson≤29mΩ)
- Low Gate Charge
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

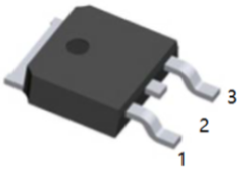
## 3.Application

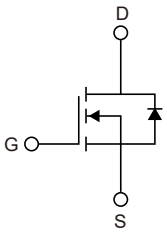
- Power switch circuit of adaptor and charger
- LED backlight driver
- Synchronousrectification

## 4.Pinning Information

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

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



## 5.Absolute Maximum Ratings $T_A$= 25°C

| Parameter | | Symbol | Rating | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 60 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | |
| Continuous Drain Current | $T_C$=25°C | $I_D$ | 25 | A |
| | $T_C$=100°C | | 17.5 | |
| Pulsed Drain Current [1)] | | $I_{DM}$ | 100 | |
| Single Pulse Avalanche Energy [2)] | | $E_{AS}$ | 56.2 | mJ |
| Maximum Power Dissipation | $T_C$=25°C | $P_D$ | 36.2 | W |
| Storage Temperature Range | | $T_{STG}$ | -55 to 150 | °C |
| Operating Junction Temperature Range | | $T_J$ | -55 to 150 | °C |

## 5.Thermal Resistance Rating

| Parameter | Symbol | Typ | Max | Units |
|---|---|---|---|---|
| Thermal Resistance,Junction-to-Case | $R_{\theta JC}$ | | 3.45 | °C/W |
| Thermal Resistance,Junction to Ambient | $R_{\theta JA}$ | | 111.5 | °C/W |

## 6.Electrical Characteristics ($T_J$= 25°C, unless otherwise noted)

| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_{DS}$=250μA | 60 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=60V, $V_{GS}$=0V | | | 1 | μA |
| Gate-Body Leakage | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | | | ±100 | nA |
| **ON CHARACTERISTIC** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_{DS}$=250μA | 1 | 1.5 | 2 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_{DS}$=19A | | 23 | 29 | mΩ |
| | | $V_{GS}$=4.5V, $I_{DS}$=19A | | 30 | 38 | mΩ |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=30V, $V_{GS}$=0V, f=1MHz | | 939 | | pF |
| Output Capacitance | $C_{oss}$ | | | 73.5 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 52.7 | | pF |
| Gate Resisitance | $R_g$ | $V_{DD}$=0V, $V_{GS}$=0V, f=1MHz | | 1.9 | | Ω |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Turn-On Delay Time | $t_{D(on)}$ | $V_{GS}$=10V, $V_{DS}$=30V<br>$R_{GEN}$=3Ω, $I_D$=20A | | 8.4 | | ns |
| Rise Time | $t_r$ | | | 8.5 | | ns |
| Turn-Off Delay Time | $t_{D(off)}$ | | | 35.4 | | ns |
| Fall Time | $t_f$ | | | 4.8 | | ns |
| Total Gate Charge | $Q_g$ | $V_{DS}$=30V, $I_{DS}$=20A, $V_{GS}$=10V | | 21.2 | | nC |
| Gate to Source Gate Charge | $Q_{gs}$ | | | 3.6 | | nC |
| Gate to Drain“Miller”Charge | $Q_{gd}$ | | | 5.5 | | nC |

| DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS | | | | | | |
|---|---|---|---|---|---|---|
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_{DS}$=20A | | | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $T_J$=25°C, $I_F$=20A | | 18.8 | | nS |
| Reverse Recovery Charge | $Q_{rr}$ | di/dt=100A/μs | | 13.4 | | nC |

Notes:

1) Repetitive rating; pulse width limited by maximum junction temperature .

2) L=0.5mH,$V_{DD}$=30V,$I_{AS}$=15A Start $T_J$=25°C.

3) Recommend soldering temperature defined by IPC/JEDEC J-STD 020.

## 7.1 Typical Characterisitics

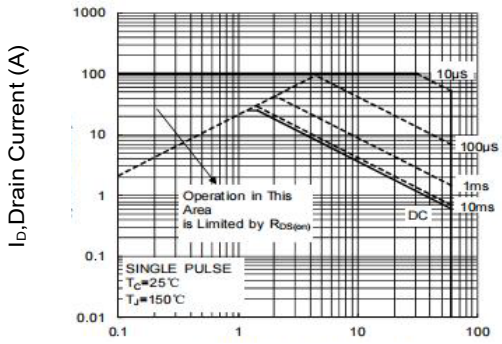



Figure 1: Maximum Safe Operating Area

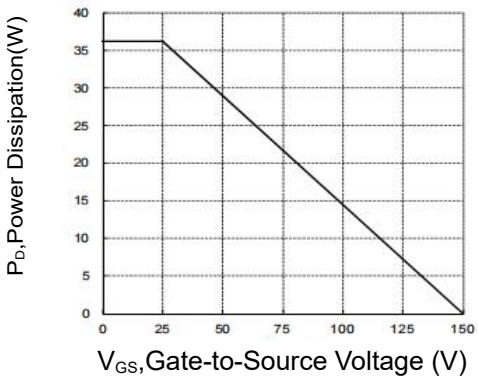



Figure 2: Maximum Power Dissipation vs Case Temperature

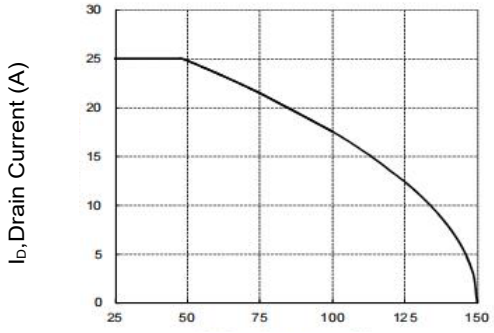



Figure 3: Maximum Continuous Drain Currentvs Case Temperature

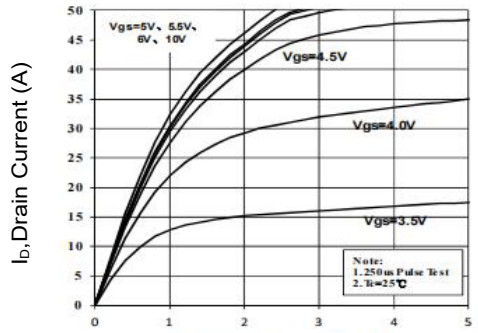



Figure 4: Typical output Characteristics

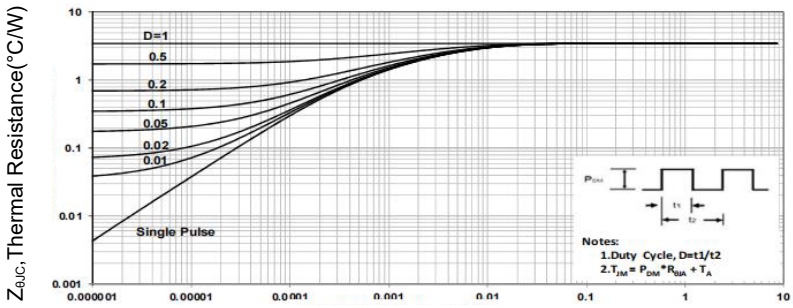



Figure 5: Maximum Effective ThermalImpedance ,Junction to case

## 7.2 Typical Characterisitics

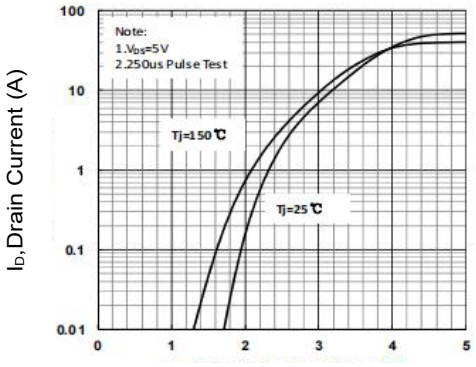



Figure 6: TypicalTransfer Characteristics

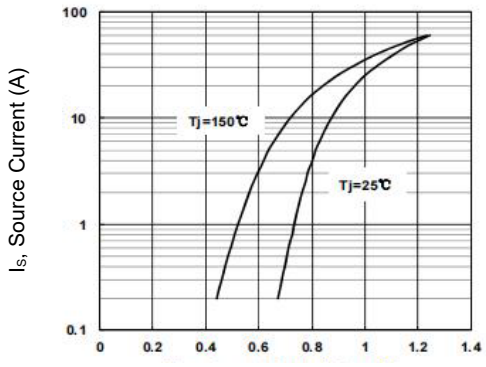



Figure 7: Typical Body Diode TransferCharacteristics

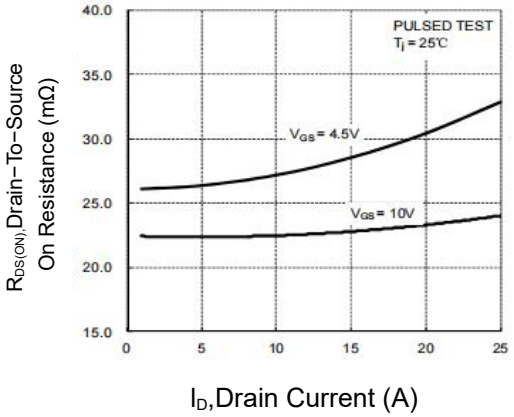



Figure 8: Drain-to-Source On Resistance vs Drain Curent

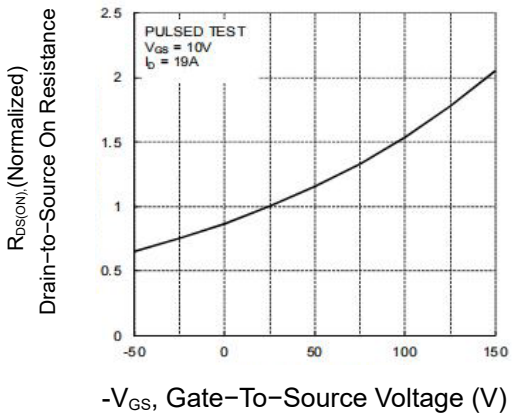



Figure 9: Normalized On Resistance vs Junction Temperature

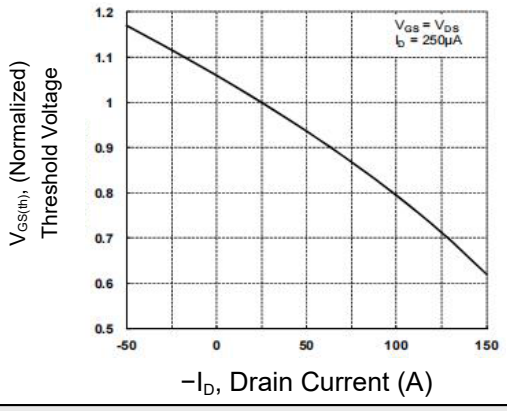



Figure 10: Normalized Threshold Voltage vs Junction Temperature

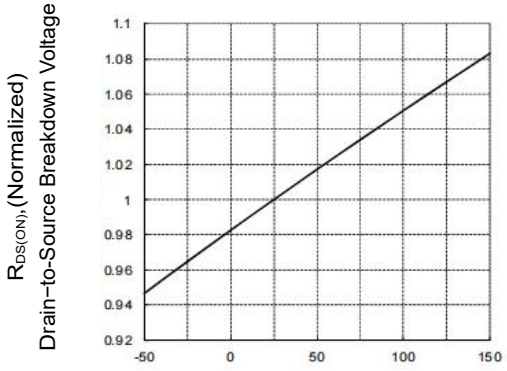
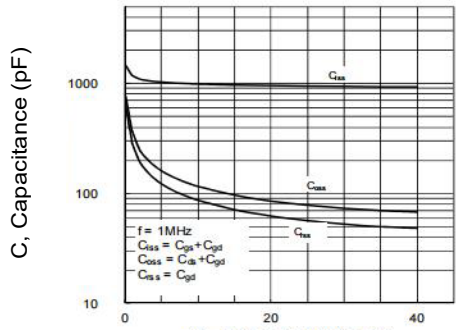


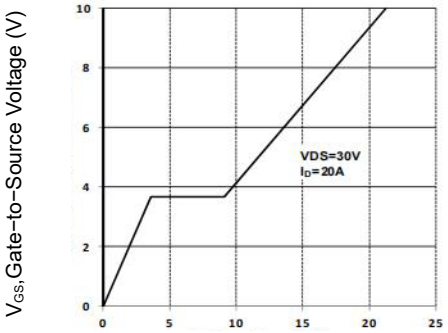

Figure 11: Normalized Breakdown Voltage vs Junction Temperature

## 7.3 Typical Characterisitics




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

Figure 12: Capacitance Characteristics




$Q_g$,Gate Charge(nC)

Figure 13: Typical Gate Chargevs Gate to Source Voltage

## 8.Test Circuit and Waveform

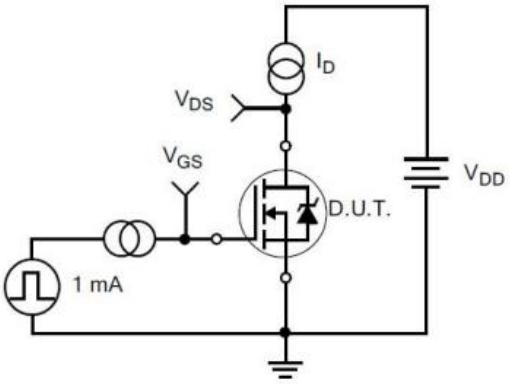



Figure 14: Gate Charge Test Circuit

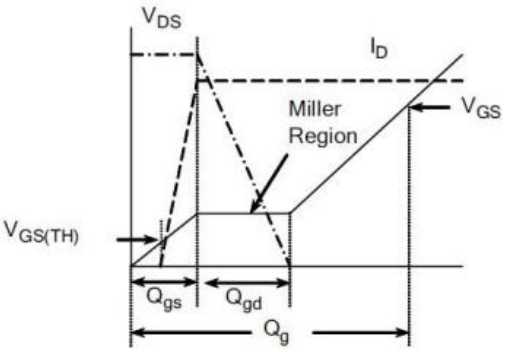



Figure 15: Gate Charge Waveforms

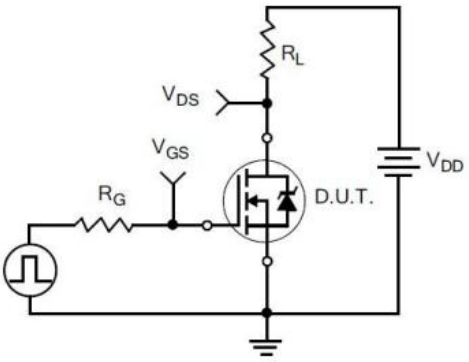



Figure 16: Resistive Switching Test Circuit

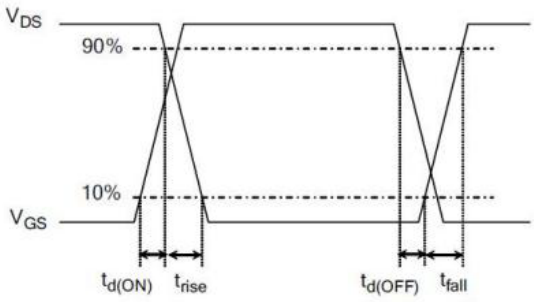



Figure 17: Resistive Switching Waveforms

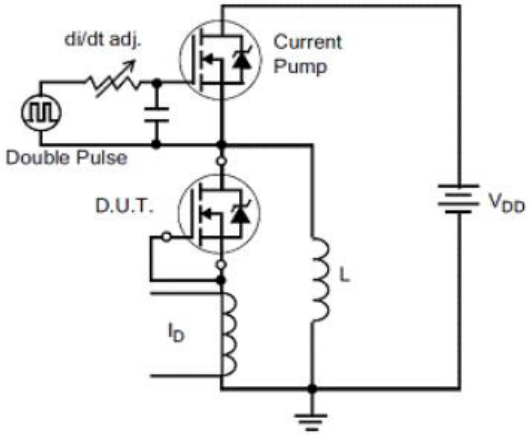



Figure 18: Diode Reverse Recovery Test Circuit

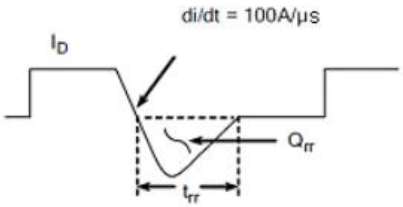



Figure 19: Diode Reverse Recovery Waveform

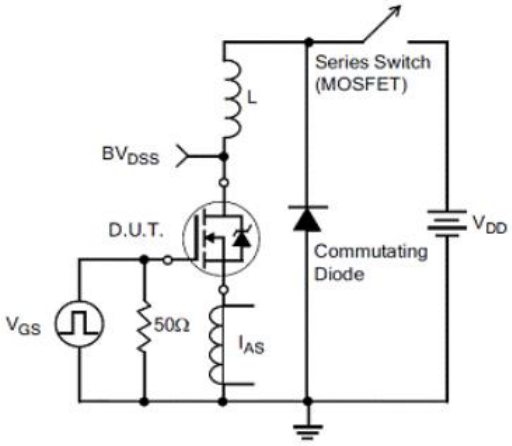



Figure 20: Uncla mped Inductive Swite hing Test Cireuit

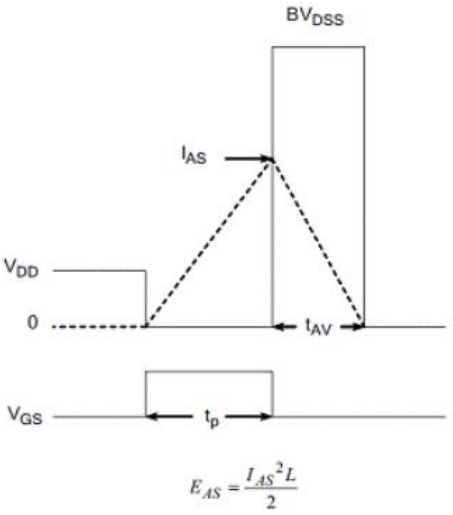
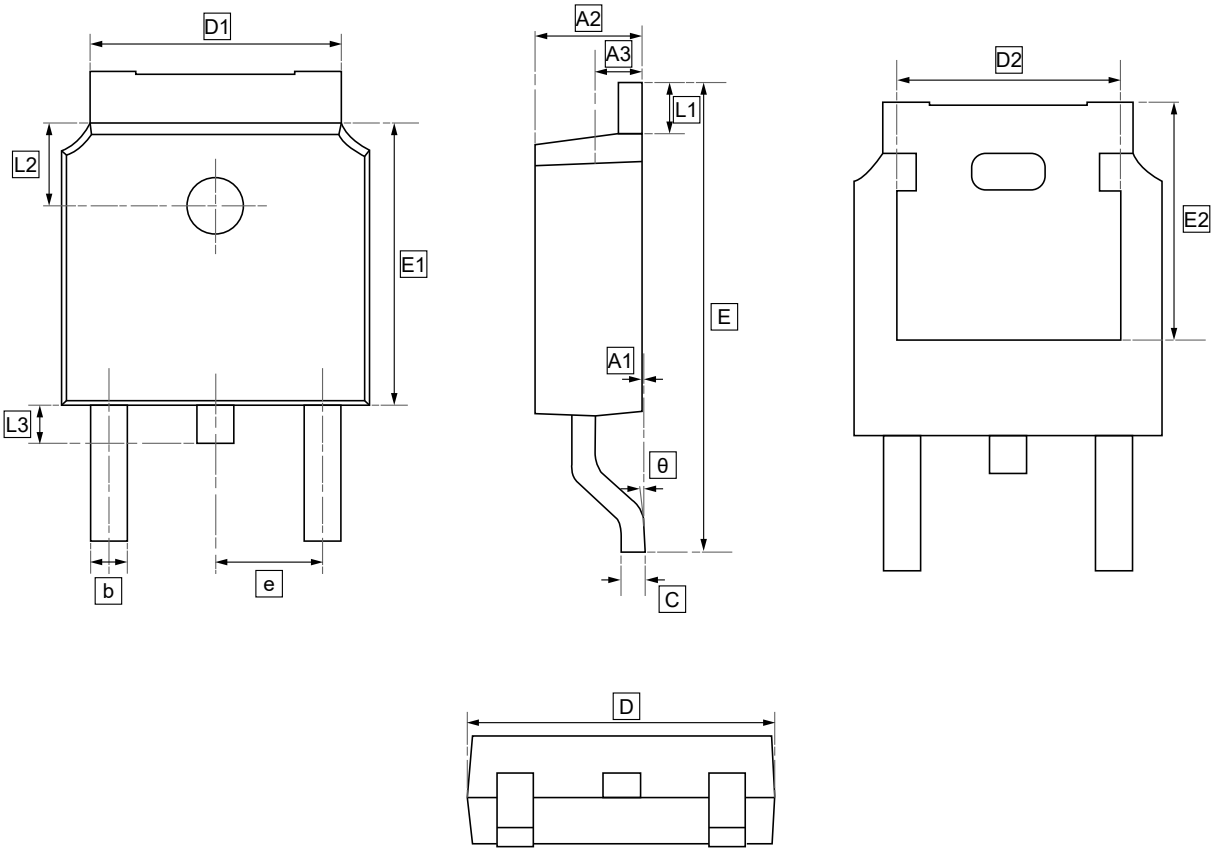



Figure 21: Unclamped Inductive Switching Waveform

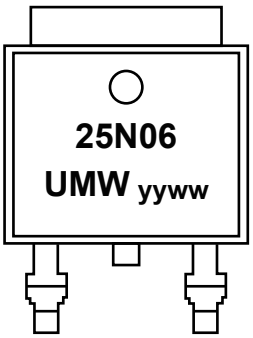
## 8.TO-252 Package Outline Dimensions




**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 |

## 9.Ordering Information




yy: Year Code
ww: Week Code

| Order Code | Package | Base QTY | Delivery Mode |
|---|---|---|---|
| UMW 25N06 | TO-252 | 2500 | Tape and reel |

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