# UMW FDN339AN

20V N-Channel MOSFET

## 1.Description

This N-Channel 2.5V specified MOSFET is has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

## 2.Features

- $V_{DS(V)}$=20V
- $R_{DS(ON)}$<38mΩ($V_{GS}$=4.5V)
- $R_{DS(ON)}$<50mΩ($V_{GS}$=2.5V)

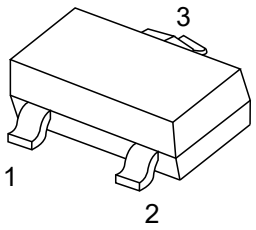
## 3.Application

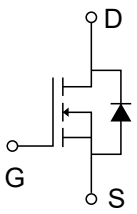
- DC/DC converter
- Load switch

## 4.Pinning information

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

**SOT-23**




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

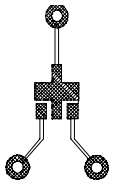
| Parameter | Symbol | Value | Units |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 20 | V |
| Gate-Source Voltage - Continuous | $V_{GSS}$ | ±8 | V |
| Drain/Outpu Current – Continuous (Note 1a) | $I_D$ | 3 | A |
| – Pulsed | | 20 | |
| Power Dissipation for Single Operation (Note 1a) | $P_D$ | 0.5 | W |
| (Note 1b) | | 0.46 | |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{STG}$ | -55 to 150 | °C |
| **Thermal Characteristics** | | | |
| Thermal Resistance, Junction-to-Ambient (Note 1a) | $R_{\theta JA}$ | 250 | °C/W |
| Thermal Resistance, Junction-to-Case (Note 1) | $R_{\theta JC}$ | 75 | °C/W |

## 6.$T_A$=25°C unless otherwise specified

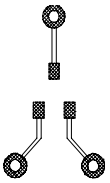
| Parameter | Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 20 | | | V |
| Breakdown Voltage Temp. Coefficient | $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | $I_D$=250μA<br>Referenced to 25°C | | 14 | | mV/°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=16V, $V_{GS}$=0V | | | 1 | μA |
| Gate - Body Leakage, Forward | $I_{GSSF}$ | $V_{GS}$=8V, $V_{DS}$=0V | | | 100 | nA |
| Gate - Body Leakage, Reverse | $I_{GSSR}$ | $V_{GS}$=-8V, $V_{DS}$=0V | | | -100 | nA |
| **ON CHARACTERISTICS (Note 2)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 0.4 | 0.85 | 1.5 | V |
| Gate Threshold Voltage Temp. Coefficient | $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | $I_D$=250μA<br>Referenced to 25°C | | -3 | | mV/°C |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=3A | | 29 | 38 | mΩ |
| | | $V_{GS}$=2.5V, $I_D$=2.4A | | 39 | 50 | |
| On-State Drain Current | $I_{D(ON)}$ | $V_{GS}$=4.5V, $V_{DS}$=5V | 10 | | | A |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V, $I_D$=3A | | 11 | | S |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=10V, $V_{GS}$=0V, f=1MHz | | 700 | | pF |
| Output Capacitance | $C_{oss}$ | | | 175 | | pF |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 85 | | pF |
| **SWITCHING CHARACTERISTICS (Note 2)** | | | | | | |
| Turn - On Delay Time | $t_{D(on)}$ | $V_{DD}$=10V, $I_D$=1A<br>$V_{GS}$=4.5V, $R_{GEN}$=6Ω | | 8 | 16 | ns |
| Turn - On Rise Time | $t_r$ | | | 10 | 18 | ns |
| Turn - Off Delay Time | $t_{D(off)}$ | | | 18 | 29 | ns |
| Turn - Off Fall Time | $t_f$ | | | 5 | 10 | ns |

| | | | | | | |
|---|---|---|---|---|---|---|
| Total Gate Charge | $Q_g$ | $V_{DS}$=10V, $I_D$=3A<br>$V_{GS}$=4.5V | | 7 | 10 | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 1.2 | | nC |
| Gate-Drain Charge | $Q_{gd}$ | | | 1.9 | | nC |
| **Drain–Source Diode Characteristics and Maximum Ratings** | | | | | | |
| Maximum Continuous Drain–Source Diode Forward Current | $I_S$ | | | | 0.42 | A |
| Drain–Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=0.42A (Note 2) | | 0.65 | 1.2 | V |

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface ofthe drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 250°C/W when mounted on a 0.02 $in^2$ pad of 2oz Cu.



b) 270°C/W when mounted on a 0.001 $in^2$ pad of 2oz Cu.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%

## 7.1Typical Characterisitics

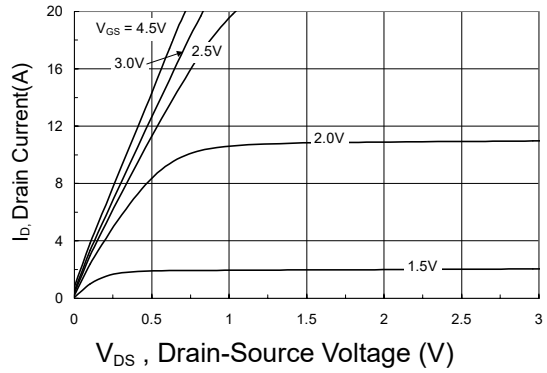



Figure 1: On-Region Characteristics.

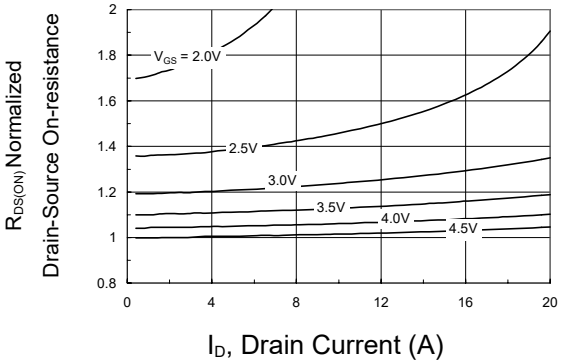



Figure 2: On-Resistance Variation with Drain Current and Gate Voltage.

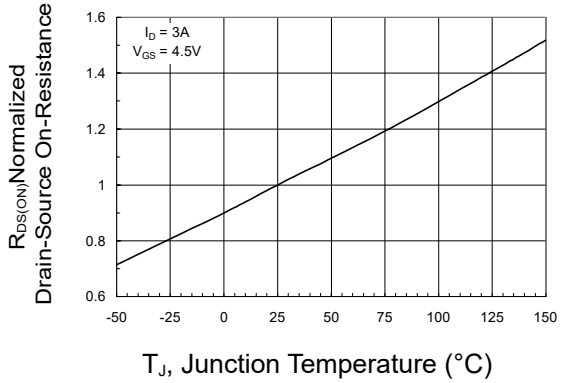



Figure 3: On-Resistance Variation with Temperature.

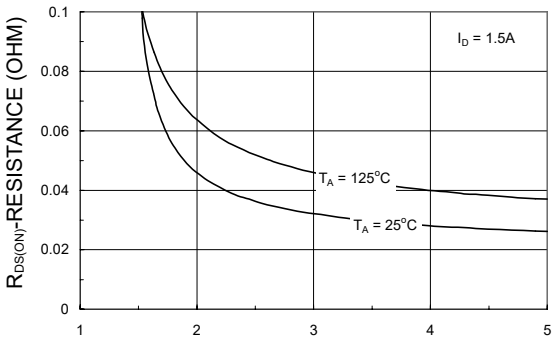



Figure 4: On-Resistance Variation with Gate-to-Source Voltage.

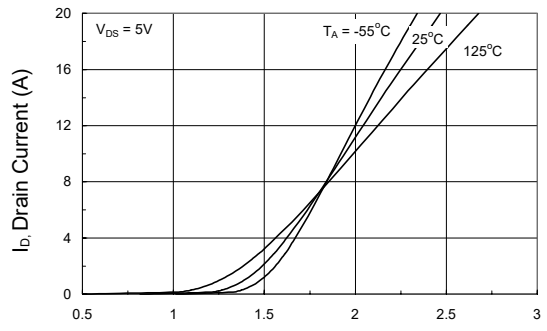



Figure 5: Transfer Characteristics.

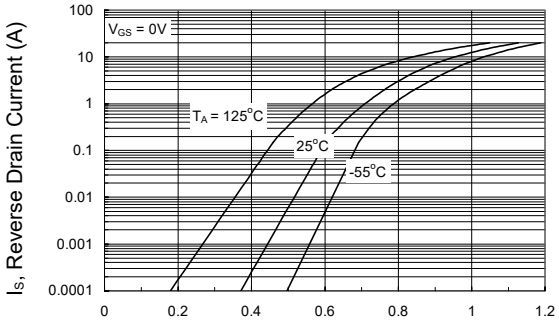



Figure 6: . Body Diode Forward Voltage Variation with Source Current and Temperature.

## 7.2Typical Characterisitics

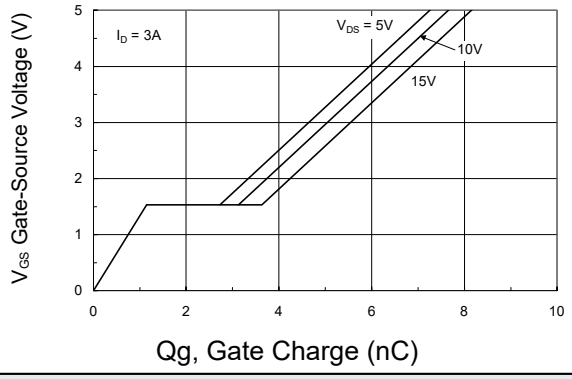



Figure 7: Gate-Charge Characteristics

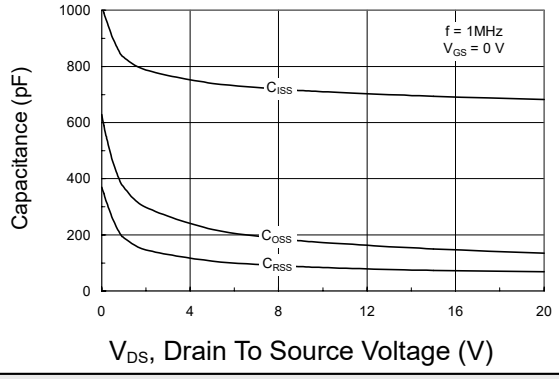



Figure 8: Capacitance Characteristics

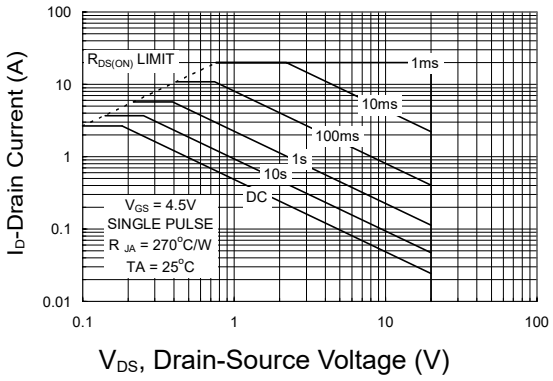



Figure 9: Maximum Safe Operating Area.

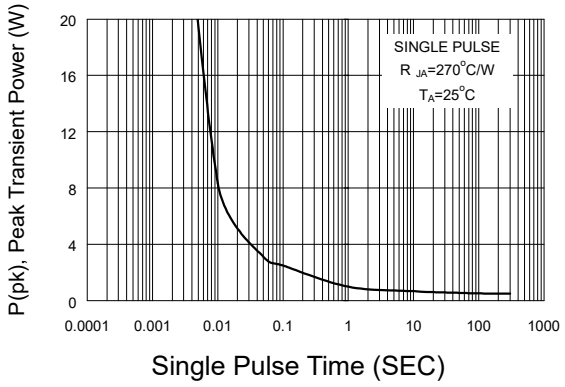



Figure 10: Single Pulse Maximum Power Dissipation.

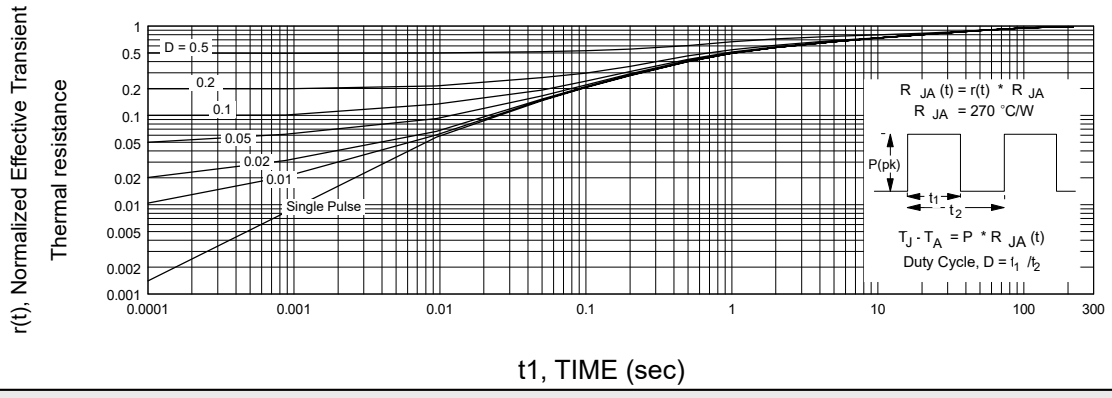
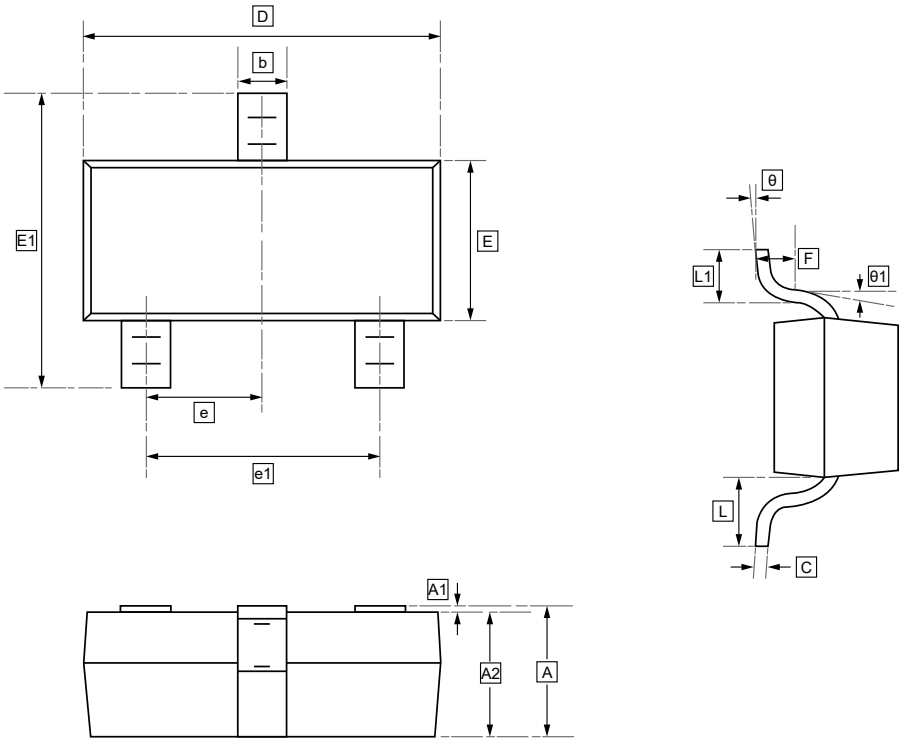



Figure 11. Transient Thermal Response Curve.

## 8.SOT-23 Package Outline Dimensions

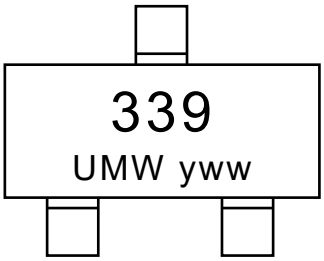



**DIMENSIONS (mm are the original dimensions)**

| Symbol | A | A1 | A2 | b | C | D | E | E1 | e | e1 | L | L1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Min** | 0.90 | 0.00 | 0.90 | 0.30 | 0.08 | 2.80 | 1.20 | 2.25 | 0.95 | 1.80 | 0.55 | 0.30 |
| **Max** | 1.15 | 0.10 | 1.05 | 0.50 | 0.15 | 3.00 | 1.40 | 2.55 | TYP. | 2.00 | REF | 0.50 |

| Symbol | F | θ | θ1 |
|---|---|---|---|
| **Min** | 0.25 | 0° | 2° |
| **Max** | | 8° | 12° |

## 9.Ordering information




yww: Batch Code

| Order Code | Package | Base QTY | Delivery Mode |
|---|---|---|---|
| UMW FDN339AN | SOT-23 | 3000 | Tape and reel |

## 10.Disclaimer

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