

## 1.Description

The UMW BS170FTA uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltage as low as 2.5V. This device is suitable for use as a load switch or in PWM application.

## 2.2Features

- Halogen-free According to IEC 61249-2-21 Definition
- Low Threshold: 2 V (typ.)
- Low Input Capacitance: 25 pF
- Fast Switching Speed: 25 ns

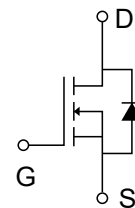
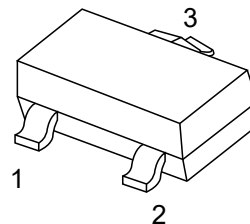
## 2.1Features

- $V_{DS(V)} = 60V$
- $I_D = 250mA$
- $R_{DS(ON)} < 2.8\Omega (V_{GS} = 10V)$
- Low Input and Output Leakage
- TrenchFET® Power MOSFET
- 1200V ESD Protection
- Compliant to RoHS Directive 2002/95/EC

## 4.Pinning information

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

### SOT-23



## 5.Absolute Maximum Ratings $T_A = 25^\circ C$

| Parameter                                                     |                     | Symbol   | Rating   | Units |
|---------------------------------------------------------------|---------------------|----------|----------|-------|
| Drain-Source Voltage                                          |                     | $V_{DS}$ | 60       | V     |
| Gate-Source Voltage                                           |                     | $V_{GS}$ | $\pm 20$ |       |
| Continuous Drain Current ( $T_J = 150^\circ C$ ) <sup>b</sup> | $T_A = 25^\circ C$  | $I_D$    | 250      | mA    |
|                                                               | $T_A = 100^\circ C$ |          | 150      |       |
| Pulsed Drain Current <sup>a</sup>                             |                     | $I_{DM}$ | 800      |       |
| Power Dissipation <sup>b</sup>                                | $T_A = 25^\circ C$  | $P_D$    | 0.3      | W     |
|                                                               | $T_A = 100^\circ C$ |          | 0.13     |       |



|                                                  |                |            |      |
|--------------------------------------------------|----------------|------------|------|
| Maximum Junction-to-Ambient <sup>b</sup>         | $R_{thJA}$     | 350        | °C/W |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 to 150 | °C   |

Notes:

- a. Pulse width limited by maximum junction temperature.
- b. Surface Mounted on FR4 board.



## 6. Electrical Characteristics $T_A = 25^\circ\text{C}$

| Parameter                               | Symbol              | Conditions                                                           | Min | Typ | Max   | Units |
|-----------------------------------------|---------------------|----------------------------------------------------------------------|-----|-----|-------|-------|
| Static                                  |                     |                                                                      |     |     |       |       |
| Drain-Source Breakdown Voltage          | V <sub>DS</sub>     | I <sub>D</sub> =10μA, V <sub>GS</sub> =0V                            | 60  |     |       | V     |
| Gate Threshold Voltage                  | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA             | 1   |     | 2.5   |       |
| Gate-Body Leakage                       | I <sub>GSS</sub>    | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                           |     |     | ±10   | μA    |
|                                         |                     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±15V                           |     |     | 1     |       |
|                                         |                     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±10V                           |     |     | ±150  | nA    |
|                                         |                     | V <sub>DS</sub> =0V,V <sub>GS</sub> =±10V,T <sub>J</sub> =85°C       |     |     | ±1000 | nA    |
|                                         |                     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±5V                            |     |     | ±100  | nA    |
| Zero Gate Voltage Drain Current         | I <sub>DSS</sub>    | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                            |     |     | 1     | μA    |
|                                         |                     | V <sub>DS</sub> =60V,V <sub>GS</sub> =0V,T <sub>J</sub> =125°C       |     |     | 500   |       |
| On-State Drain Current <sup>a</sup>     | I <sub>D(ON)</sub>  | V <sub>GS</sub> =10V, V <sub>DS</sub> =7.5V                          | 500 |     |       | mA    |
|                                         |                     | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V                          | 300 |     |       |       |
| Drain-Source On-Resistance <sup>a</sup> | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =200mA                          |     | 2.8 | 3.3   | Ω     |
|                                         |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =150mA                         |     | 3.1 | 3.8   |       |
| Forward Transconductance <sup>a</sup>   | g <sub>FS</sub>     | V <sub>DS</sub> =10V, I <sub>D</sub> =100mA                          | 100 |     |       | mS    |
| Diode Forward Voltage                   | V <sub>SD</sub>     | I <sub>S</sub> =100mA, V <sub>GS</sub> =0V                           |     |     | 1.3   | V     |
| Dynamic <sup>a</sup>                    |                     |                                                                      |     |     |       |       |
| Total Gate Charge                       | Q <sub>g</sub>      | V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V<br>I <sub>D</sub> ⩾150mA |     | 0.4 | 0.6   | nC    |
| Input Capacitance                       | C <sub>iss</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz                    |     | 25  |       | pF    |
| Output Capacitance                      | C <sub>oss</sub>    |                                                                      |     | 5   |       |       |
| Reverse Transfer Capacitance            | C <sub>rss</sub>    |                                                                      |     | 2   |       |       |
| Switching <sup>a, b, c</sup>            |                     |                                                                      |     |     |       |       |
| Turn-On Time                            | t <sub>D(on)</sub>  | V <sub>DD</sub> =30V, R <sub>L</sub> =150Ω                           |     |     | 20    | ns    |
| Turn-Off Time                           | t <sub>D(off)</sub> | I <sub>D</sub> ⩾150mA, V <sub>GEN</sub> =10V, R <sub>G</sub> =10Ω    |     |     | 30    |       |

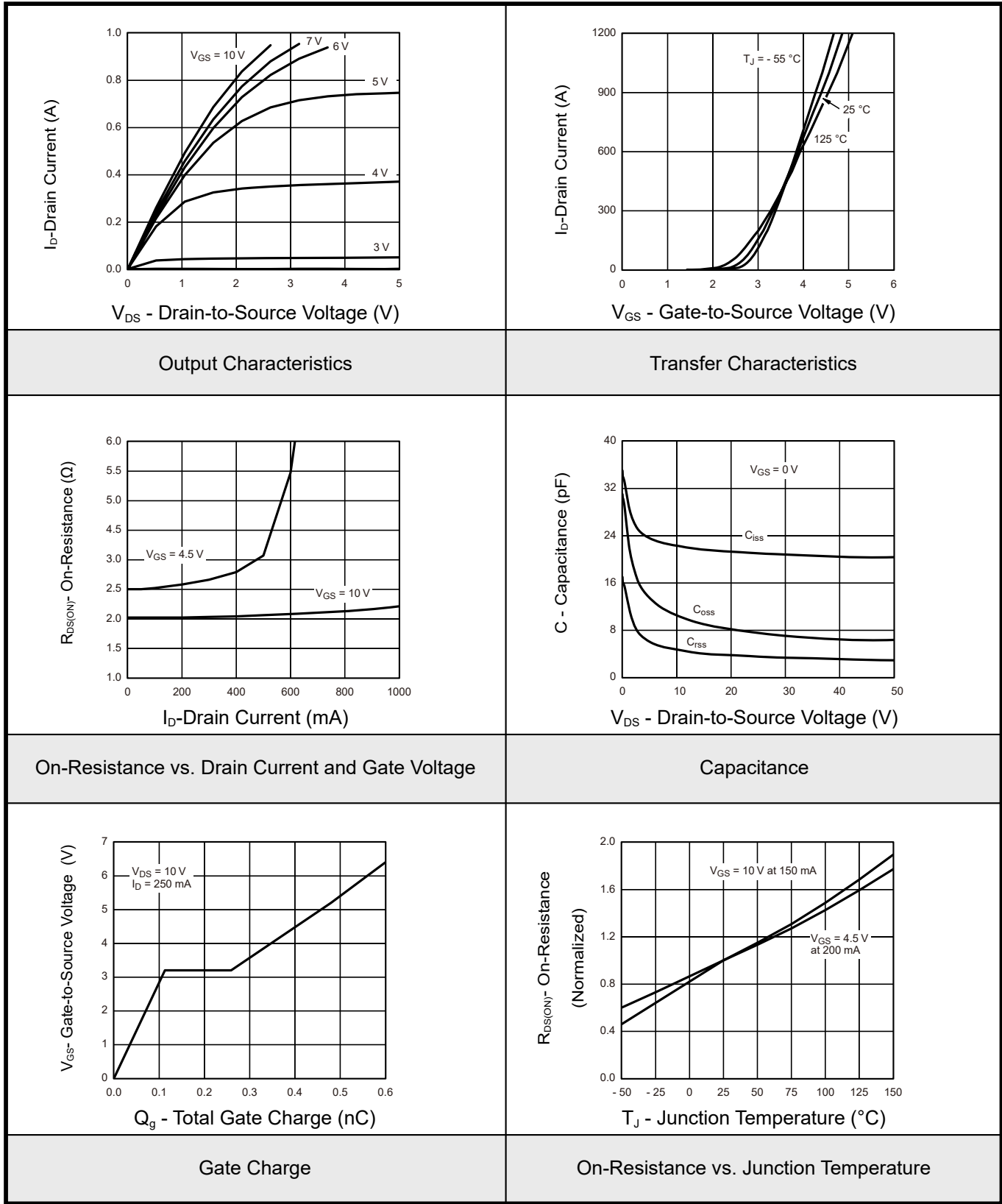
a. For DESIGN AID ONLY, not subject to production testing.

b. Pulse test:  $PW \leq 300 \mu\text{s}$  duty cycle  $\leq 2\%$ .

c. Switching time is essentially independent of operating temperature.

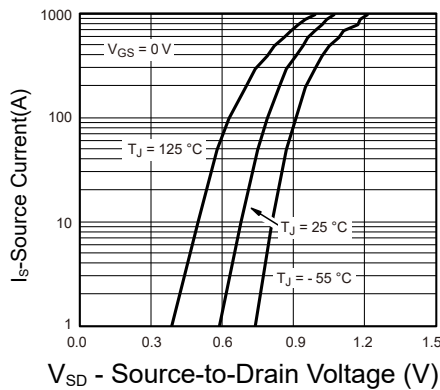


## 7.1 Typical Characteristics

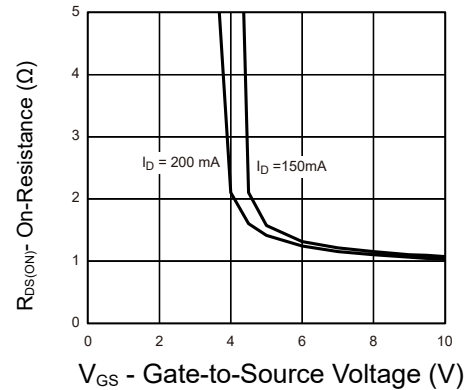




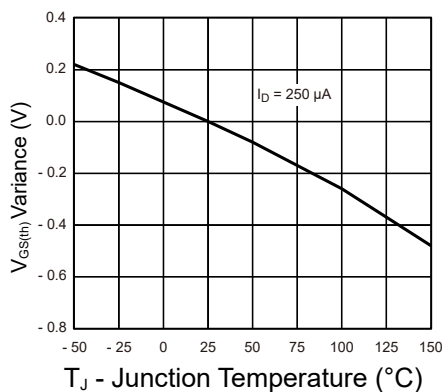
## 7.2 Typical Characteristics



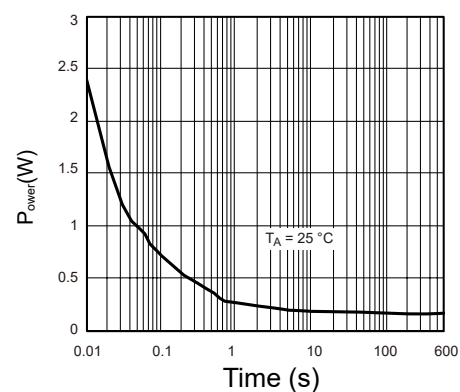
Source-Drain Diode Forward Voltage



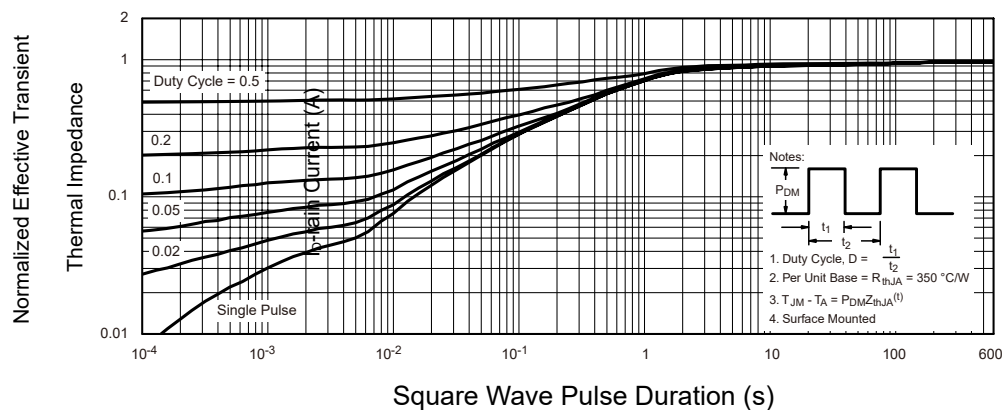
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage Variance Over Temperature



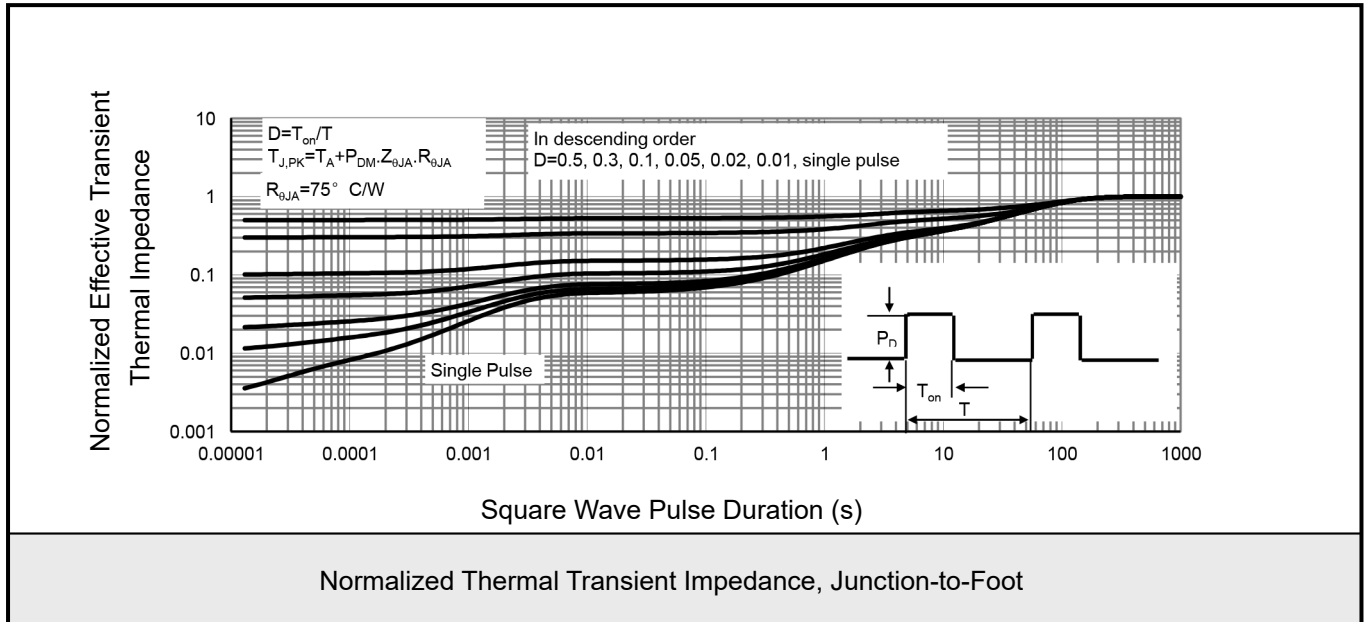
Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Ambient



### 7.3 Typical characteristic



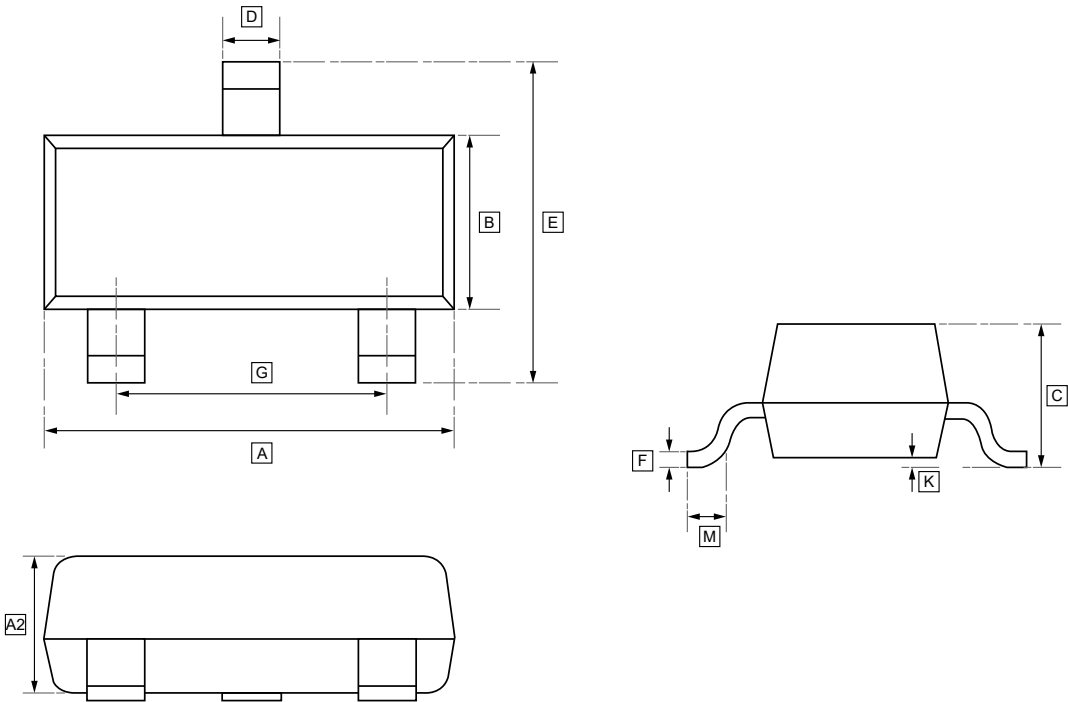
The characteristics shown in the two graphs

- Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
- Normalized Transient Thermal Impedance Junction-to-Foot (25 °C )

are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions.



8.SOT-23 Package Outline Dimensions

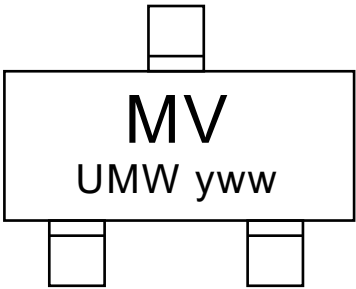


DIMENSIONS (mm are the original dimensions)

| 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 |



## 9.Ordering Information



yww: Batch Code

| Order Code   | Package | Base QTY | Delivery Mode |
|--------------|---------|----------|---------------|
| UMW BS170FTA | SOT-23  | 3000     | Tape and reel |



## 10.Disclaimer

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