

**SuperMOS – SOT-23 -20V  $BV_{DSS}$ , 90m $\Omega$   $R_{DS(on)}$ , P-channel MOSFET**

**1. Description**

The WPM2015-3/TR-ES is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM2015-3/TR-ES is Pb-free.

**2. Features**

- -20V,  $R_{DS(ON)}$ =90m $\Omega$ (TYP.) @ $V_{GS}$ =-4.5V
- $R_{DS(ON)}$ =110m $\Omega$ (TYP.) @ $V_{GS}$ =-2.5V
- Fast Switching
- High density cell design for low  $R_{DS(on)}$
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

**3. Applications**

- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

**4. Ordering Information**

| Part Number     | Package | Marking | Material     | Packing     | Quantity per reel | Flammability Rating | Reel Size |
|-----------------|---------|---------|--------------|-------------|-------------------|---------------------|-----------|
| WPM2015-3/TR-ES | SOT-23  | 2301    | Halogen free | Tape & Reel | 3,000 PCS         | UL 94V-0            | 7inches   |

Table-1 Ordering information

**5. Pin Configuration and Functions**

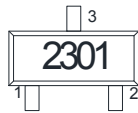
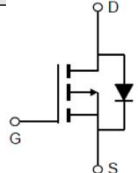
| Pin | Function | Outline   | Circuit Diagram   |
|-----|----------|---|---|
| 1   | Gate     |  |  |
| 2   | Source   |   |   |
| 3   | Drain    |   |   |

Table-2 Pin configuration

## 6. Specification

### Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

| Parameter                      | Symbol     | Limit             | Unit |
|--------------------------------|------------|-------------------|------|
| Drain-Source Voltage           | $BV_{DSS}$ | -20               | V    |
| Gate-Source Voltage            | $V_{GS}$   | ±8                | V    |
| Continuous Drain Current       | $I_D$      | $T_A=25^{\circ}C$ | 2.3  |
|                                |            | $T_A=75^{\circ}C$ | 1.7  |
| Maximum Power Dissipation      | $P_D$      | $T_A=25^{\circ}C$ | 1.4  |
|                                |            | $T_A=75^{\circ}C$ | 0.84 |
| Pulsed Drain Current           | $I_{DM}$   | 9.2               | A    |
| Operating Junction Temperature | $T_J$      | 150               | °C   |
| Storage Temperature Range      | $T_{stg}$  | -55 to +150       | °C   |

### Thermal resistance ratings

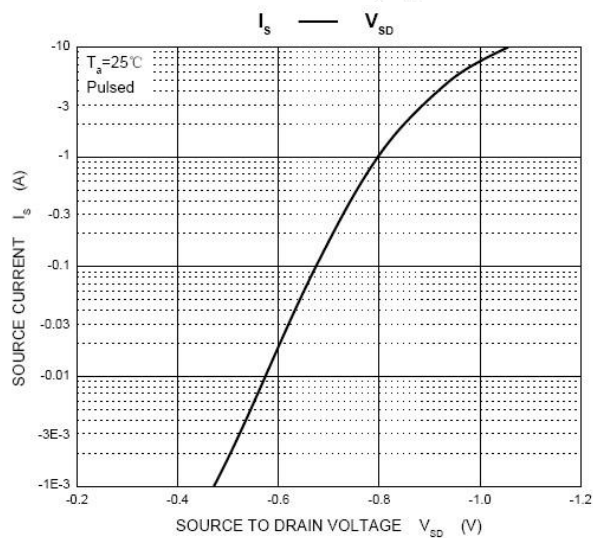
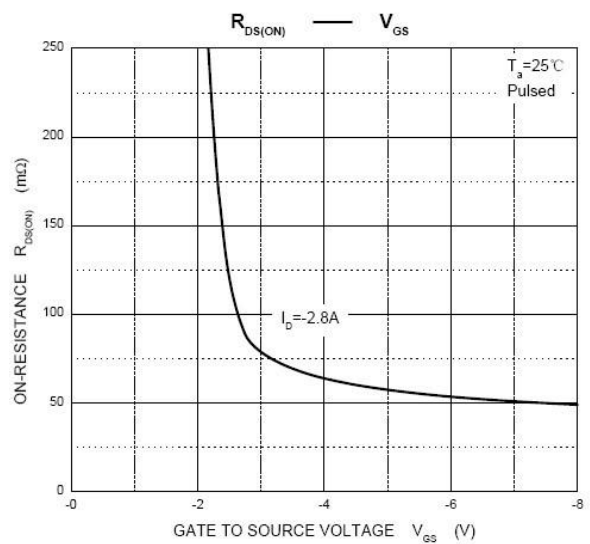
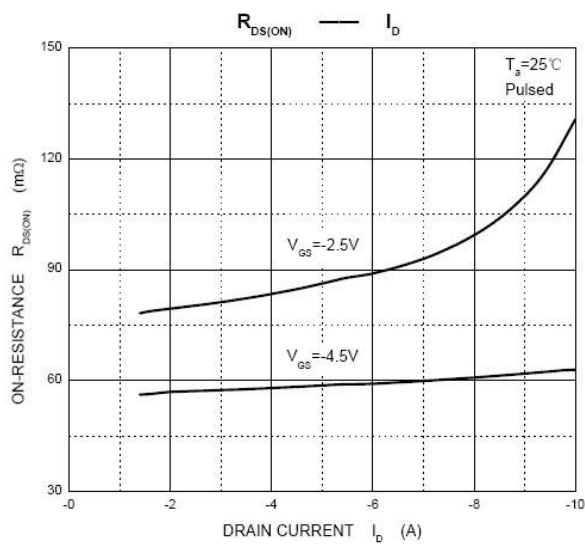
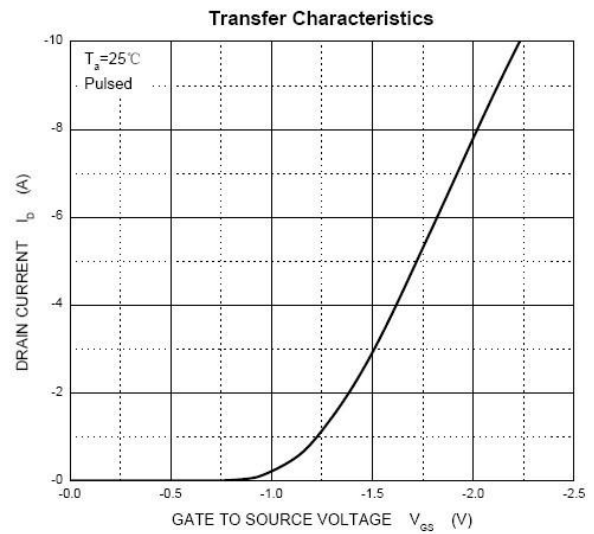
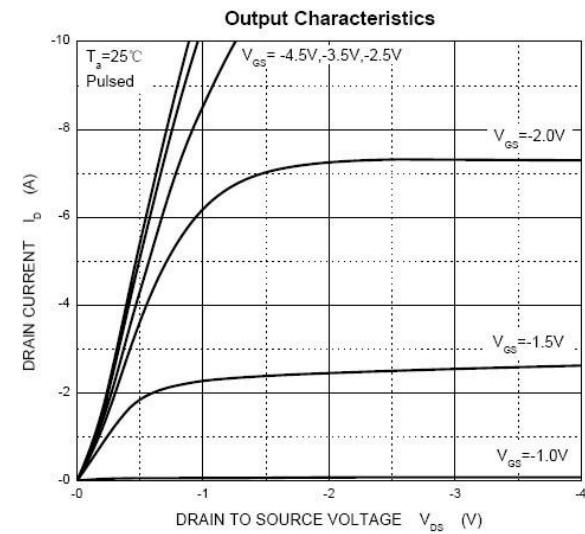
| Single Operation                       |                 |         |      |
|--|-----------------|---------|------|
| Parameter                              | Symbol          | Typical | Unit |
| Junction-to-Ambient Thermal Resistance | $R_{\theta JA}$ | 90      | °C/W |

## Electrical Characteristics

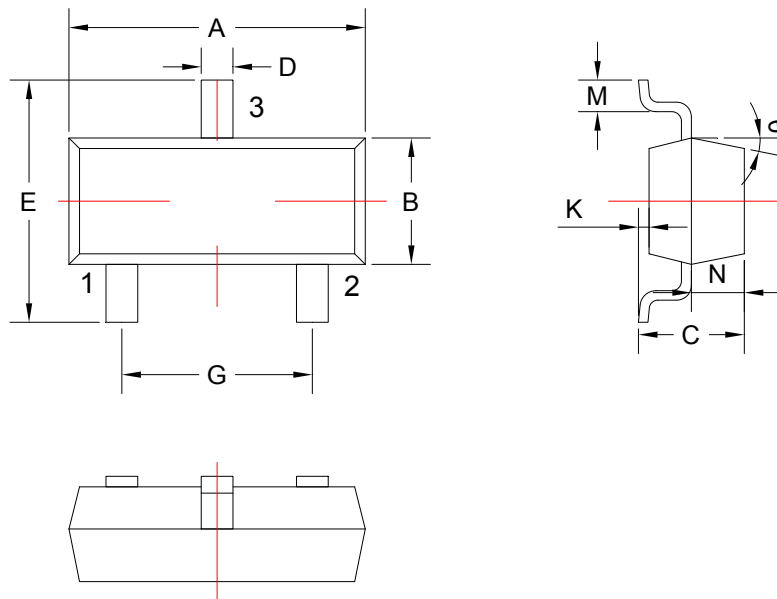
At TA = 25°C unless otherwise specified

| Parameter  | Symbol       | Test Conditions  | Min. | Typ. | Max.      | Unit       |
|--|--------------|--|------|------|-----------|------------|
| <b>OFF CHARACTERISTICS</b>                       |              |  |      |      |           |            |
| Drain-to-Source Breakdown Voltage                | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$   | -20  |      |           | V          |
| Zero Gate Voltage Drain Current                  | $I_{DSS}$    | $V_{DS}=-20V, V_{GS}=0V$   |      |      | -1        | $\mu A$    |
| Gate-to-source Leakage Current                   | $I_{GSS}$    | $V_{DS}=0V, V_{GS}=\pm 8V$   |      |      | $\pm 100$ | nA         |
| <b>ON CHARACTERISTICS</b>                        |              |  |      |      |           |            |
| Gate Threshold Voltage                           | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=-250\mu A$   | -0.4 | -0.7 | -1.0      | V          |
| Drain-to-source On-resistance                    | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-2.3A$  |      | 90   | 112       | m $\Omega$ |
|  |              | $V_{GS}=-2.5V, I_D=-2A$  |      | 110  | 142       |            |
| Forward trans conductance(a)                     | gfs          | $V_{DS}=-5V, I_D=-2.3A$  |      | 6.5  |           | S          |
| <b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b> |              |  |      |      |           |            |
| Input Capacitance                                | $C_{ISS}$    | $V_{GS}=0V, V_{DS}=-10V,$<br>$f=1MHz$                                    |      |      | 405       | pF         |
| Output Capacitance                               | $C_{OSS}$    |  |      |      | 75        |            |
| Reverse Transfer Capacitance                     | $C_{RSS}$    |  |      |      | 55        |            |
| Gate Resistance                                  | $R_g$        | $f=1MHz$   |      | 6    |           | $\Omega$   |
| Total Gate Charge                                | $Q_{G(TOT)}$ | $V_{GS}=-2.5V, V_{DS}=-10V,$<br>$I_D=-2.3A$                              |      | 3.3  | 6         | nC         |
| Gate-to-Source Charge                            | $Q_{GS}$     |  |      | 0.7  |           |            |
| Gate-to-Drain Charge                             | $Q_{GD}$     |  |      | 1.3  |           |            |
| <b>SWITCHING CHARACTERISTICS</b>                 |              |  |      |      |           |            |
| Turn-On Delay Time                               | $t_{d(ON)}$  | $V_{GS}=-4.5V, V_{DS}=10V,$<br>$R_L=10\Omega, I_D=-1A,$<br>$R_G=1\Omega$ |      | 11   | 20        | ns         |
| Rise Time  | $t_r$        |  |      | 35   | 60        |            |
| Turn-Off Delay Time                              | $t_{d(OFF)}$ |  |      | 30   | 50        |            |
| Fall Time  | $t_f$        |  |      | 10   | 20        |            |
| <b>BODY DIODE CHARACTERISTICS</b>                |              |  |      |      |           |            |
| Forward Voltage                                  | $V_{SD}$     | $V_{GS}=0V, I_S=-1.0A$   |      | -0.8 | -1.5      | V          |

## 7. Typical Characteristic



8. Dimension (SOT-23)



| COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER |      |      |        |      |      |
|---|------|------|--------|------|------|
| SYMBOL                                      | MIN  | MAX  | SYMBOL | MIN  | MAX  |
| A   | 2.85 | 3.04 | G      | 1.80 | 2.00 |
| B   | 1.20 | 1.40 | K      | 0    | 0.10 |
| C   | 0.90 | 1.10 | M      | 0.20 | -    |
| D   | 0.40 | 0.50 | N      | 0.50 | 0.70 |
| E   | 2.25 | 2.55 | θ      | 5°   | 9°   |

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