

**SuperMOS – SOT-23 -20V BV<sub>DSS</sub>, 82mΩ R<sub>DS(on)</sub>, P-channel MOSFET**

**1. Description**

The FDN338P is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS(ON)</sub> with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product FDN338P is Pb-free.

**2. Features**

- -20V, R<sub>DS(ON)</sub>=82mΩ(TYP.) @V<sub>GS</sub>=-4.5V
- R<sub>DS(ON)</sub>=118mΩ(TYP.) @V<sub>GS</sub>=-2.5V
- R<sub>DS(ON)</sub>=180mΩ(TYP.) @V<sub>GS</sub>=-1.8V
- Fast Switching
- High density cell design for low R<sub>DS(on)</sub>
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

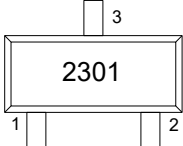
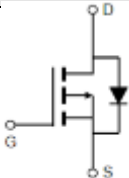
**3. Applications**

- 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 |
|-------------|---------|---------|--------------|-------------|-------------------|---------------------|-----------|
| FDN338P     | SOT-23  | 2301    | Halogen free | Tape & Reel | 3,000 PCS         | UL 94V-0            | 7 inches  |

**5. Pin Configuration and Functions**

| Pin | Function | Outline   | Circuit Diagram   |
|-----|----------|---|---|
| 1   | Gate     |  |  |

|   |        |  |  |
|---|--------|--|--|
| 2 | Source |  |  |
| 3 | Drain  |  |  |

## 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            | $V_{GS}$   | $\pm 12$          | V    |
| Continuous Drain Current       | $I_D$      | $T_A=25^\circ C$  | -2.0 |
|                                |            | $T_A=100^\circ C$ | -1.2 |
| Maximum Power Dissipation      | $P_D$      | 0.8               | W    |
| Pulsed Drain Current           | $I_{DM}$   | -8.1              | A    |
| Operating Junction Temperature | $T_J$      | 150               | °C   |
| Storage Temperature Range      | $T_{stg}$  | -55 to +150       | °C   |

### Thermal resistance ratings

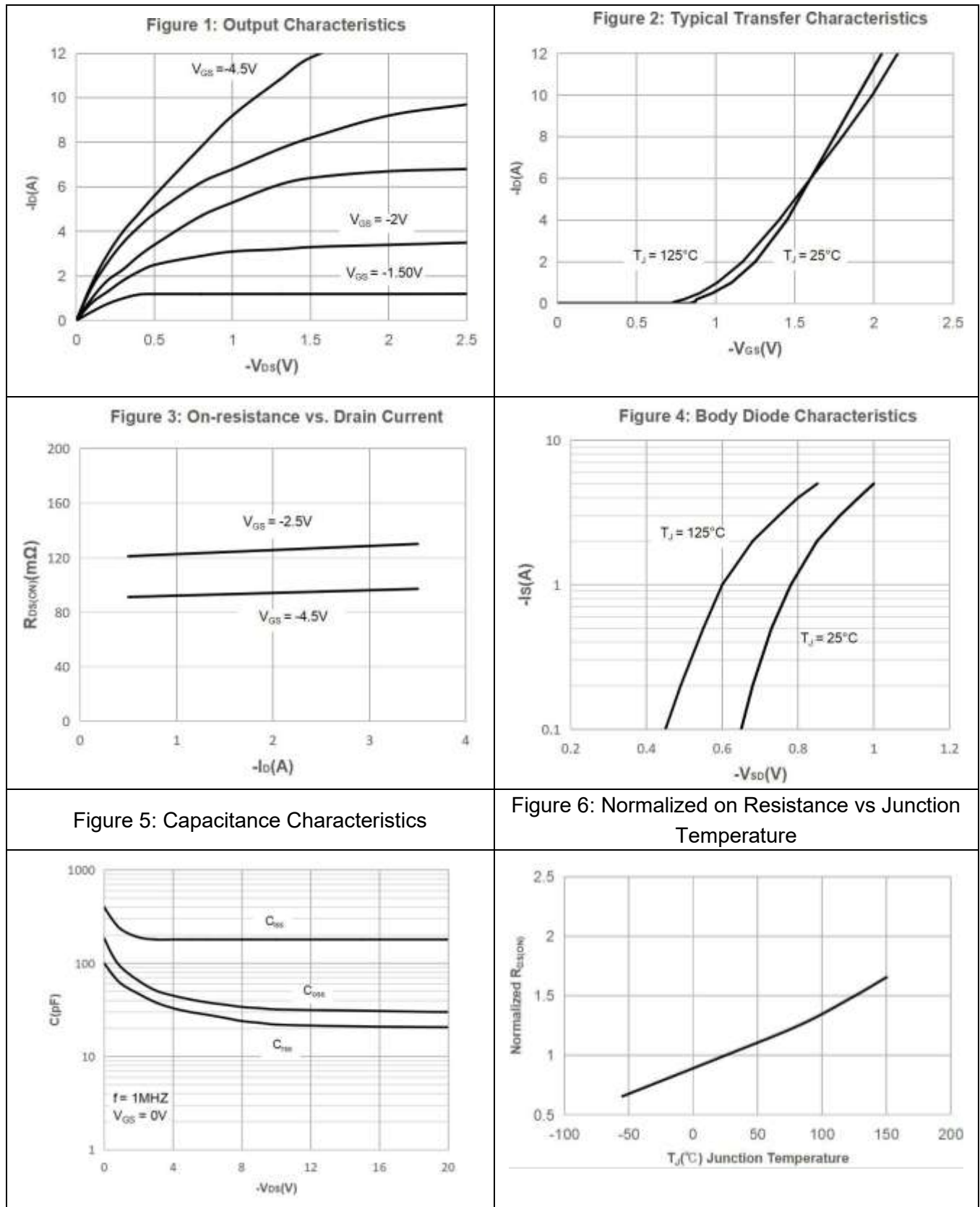
| Single Operation  |                 |         |         |      |
|---|-----------------|---------|---------|------|
| Parameter   | Symbol          | Typical | Maximum | Unit |
| Junction-to-Ambient Thermal Resistance ( $t \leq 10s$ ) | $R_{\theta JA}$ |         | 156     | °C/W |

## Electrical Characteristics

At TA = 25°C unless otherwise specified

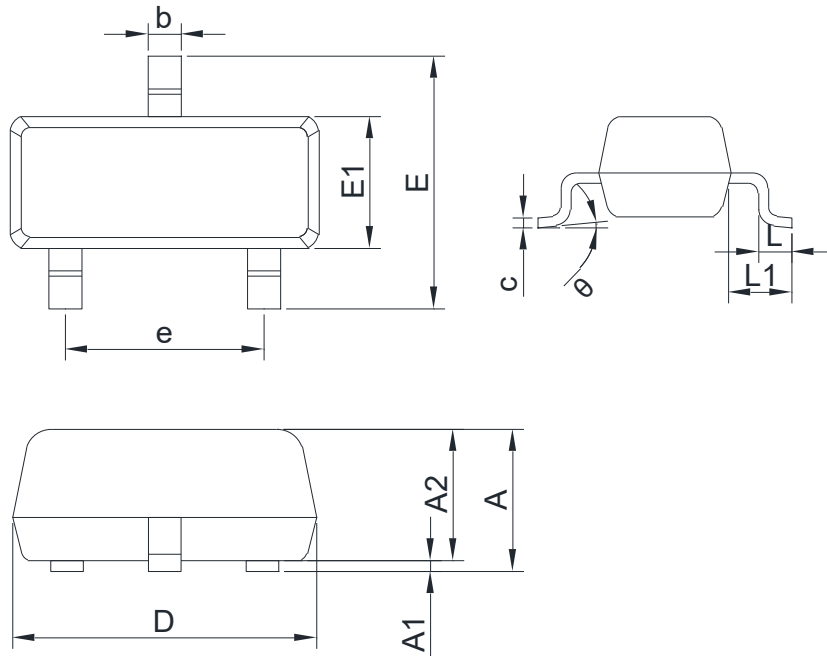
| Parameter  | Symbol       | Test Conditions   | Min. | Typ.  | Max.      | Unit       |
|--|--------------|---|------|-------|-----------|------------|
| <b>OFF CHARACTERISTICS</b>                       |              |   |      |       |           |            |
| Drain-to-Source Breakdown Voltage                | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$                                | -20  |       |           | V          |
| Zero Gate Voltage Drain Current                  | $I_{DSS}$    | $V_{DS}=-20V, V_{GS}=0V$                                  |      |       | -1        | $\mu A$    |
| Gate-to-source Leakage Current                   | $I_{GSS}$    | $V_{DS}=0V, V_{GS}=\pm 12V$                               |      |       | $\pm 100$ | nA         |
| <b>ON CHARACTERISTICS</b>                        |              |   |      |       |           |            |
| Gate Threshold Voltage                           | $V_{GS(TH)}$ | $V_{GS}=V_{DS}, I_D=-250\mu A$                            | -0.4 | -0.62 | -1.0      | V          |
| Drain-to-source On-resistance                    | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-2A$                                   |      | 82    | 115       | m $\Omega$ |
|  |              | $V_{GS}=-2.5V, I_D=-1.5A$                                 |      | 118   | 160       |            |
|  |              | $V_{GS}=-1.8V, I_D=-1A$                                   |      | 180   | 245       |            |
| <b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b> |              |   |      |       |           |            |
| Input Capacitance                                | $C_{ISS}$    | $V_{GS}=0V, V_{DS}=-10V$<br>$f=1MHz$                      |      | 185   |           | pF         |
| Output Capacitance                               | $C_{OSS}$    |   |      | 35    |           |            |
| Reverse Transfer Capacitance                     | $C_{RSS}$    |   |      | 25    |           |            |
| Total Gate Charge                                | $Q_G$        | $V_{GS}=-4.5V, V_{DS}=-10V$<br>$I_D=-2A$                  |      | 2.2   |           | nC         |
| Gate-to-Source Charge                            | $Q_{GS}$     |   |      | 0.5   |           |            |
| Gate-to-Drain Charge                             | $Q_{GD}$     |   |      | 0.5   |           |            |
| <b>SWITCHING CHARACTERISTICS</b>                 |              |   |      |       |           |            |
| Turn-On Delay Time                               | $t_{d(ON)}$  | $V_{GS}=-4.5V, V_{DS}=-10V$<br>$R_L=5\Omega, R_G=3\Omega$ |      | 10    |           | ns         |
| Rise Time  | $t_r$        |   |      | 30    |           |            |
| Turn-Off Delay Time                              | $t_{d(OFF)}$ |   |      | 62    |           |            |
| Fall Time  | $t_f$        |   |      | 50    |           |            |
| <b>BODY DIODE CHARACTERISTICS</b>                |              |   |      |       |           |            |
| Forward Voltage                                  | $V_{SD}$     | $V_{GS}=0V, I_S=-2A$                                      |      |       | -1.5      | V          |

7. Typical Characteristics



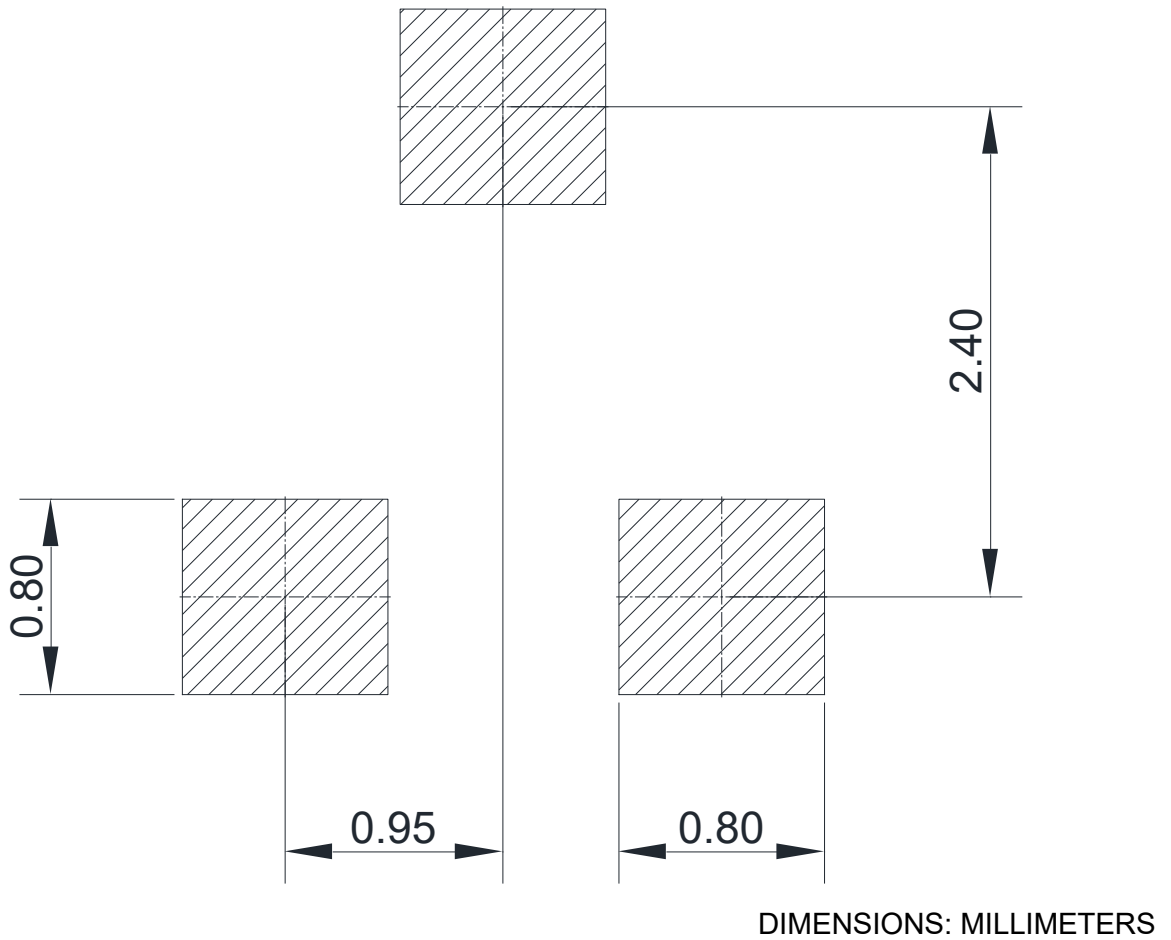
8. Dimension (SOT-23)

POD(Z)



| COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER |      |      |        |       |       |
|---|------|------|--------|-------|-------|
| SYMBOL                                      | MIN  | MAX  | SYMBOL | MIN   | MAX   |
| A   | 0.90 | 1.20 | E      | 2.25  | 2.55  |
| A1  | 0.00 | 0.10 | E1     | 1.20  | 1.40  |
| A2  | 0.90 | 1.10 | e      | 1.80  | 2.00  |
| b   | 0.30 | 0.50 | L      | 0.30  | 0.50  |
| c   | 0.07 | 0.18 | L1     | 0.475 | 0.625 |
| D   | 2.80 | 3.04 | θ      | 0°    | 8°    |

9. Recommended Soldering Footprint



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