



# THE DATASHEET OF SI2102-TP



## Features

- Leading Trench Technology for Low  $R_{DS(on)}$
- High Speed Switching
- Epoxy Meets UL 94 V-0 Flammability Rating
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

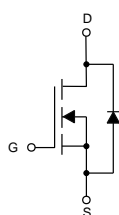
## Maximum Ratings

- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 625°C/W Junction to Ambient

| Parameter                | Symbol   | Rating  | Unit |
|--------------------------|----------|---------|------|
| Drain-Source Voltage     | $V_{DS}$ | 20      | V    |
| Gate-Source Voltage      | $V_{GS}$ | $\pm 8$ | V    |
| Continuous Drain Current | $I_D$    | 2.1     | A    |
| Pulsed Drain Current     | $I_{DM}$ | 4       | A    |
| Total Power Dissipation  | $P_D$    | 0.2     | W    |

Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Internal Structure

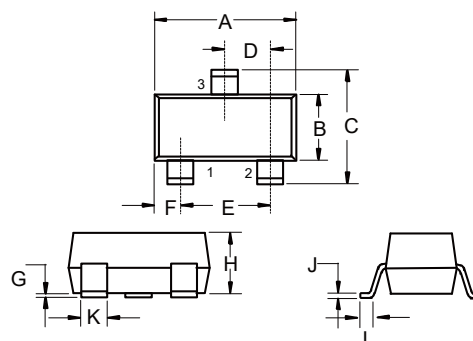


1. GATE
2. SOURCE
3. DRAIN

Marking: TS2

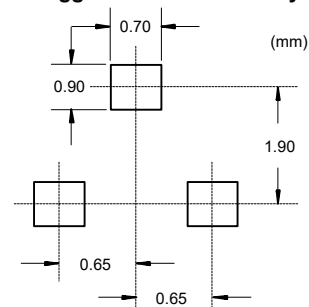
# N-CHANNEL MOSFET

## SOT-323



| DIM | INCHES |       | MM   |      | NOTE |
|-----|--------|-------|------|------|------|
|     | MIN    | MAX   | MIN  | MAX  |      |
| A   | 0.071  | 0.087 | 1.80 | 2.20 |      |
| B   | 0.045  | 0.053 | 1.15 | 1.35 |      |
| C   | 0.083  | 0.096 | 2.10 | 2.45 |      |
| D   | 0.026  |       | 0.65 |      | TYP. |
| E   | 0.047  | 0.055 | 1.20 | 1.40 |      |
| F   | 0.012  | 0.016 | 0.30 | 0.40 |      |
| G   | 0.000  | 0.004 | 0.00 | 0.10 |      |
| H   | 0.035  | 0.044 | 0.90 | 1.10 |      |
| J   | 0.002  | 0.010 | 0.05 | 0.25 |      |
| K   | 0.006  | 0.016 | 0.15 | 0.40 |      |
| L   | 0.010  | 0.018 | 0.26 | 0.46 |      |

### Suggested Solder Pad Layout



**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

| Parameter   | Symbol        | Test Conditions   | Min | Typ  | Max       | Unit       |
|---|---------------|---|-----|------|-----------|------------|
| <b>Static Characteristics</b>                     |               |   |     |      |           |            |
| Drain-Source Breakdown Voltage                    | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=10\mu A$  | 20  |      |           | V          |
| Gate-Source Leakage Current                       | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 8V$  |     |      | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current                   | $I_{DSS}$     | $V_{DS}=20V, V_{GS}=0V$   |     |      | 1         | $\mu A$    |
| Gate-Threshold Voltage                            | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=50\mu A$  | 0.6 | 0.9  | 1.2       | V          |
| Drain-Source On-Resistance <sup>(Note 2)</sup>    | $R_{DS(on)}$  | $V_{GS}=4.5V, I_D=3.6A$   |     | 50   | 60        | m $\Omega$ |
|   |               | $V_{GS}=2.5V, I_D=3.1A$   |     | 60   | 110       |            |
| Diode Forward Voltage                             | $V_{SD}$      | $V_{GS}=0V, I_S=0.94A$  |     |      | 1.2       | V          |
| Forward Transconductance <sup>(Note 2)</sup>      | $g_{FS}$      | $V_{DS}=5V, I_D=3.6A$   |     | 8    |           | S          |
| <b>Dynamic Characteristics<sup>(Note 3)</sup></b> |               |   |     |      |           |            |
| Input Capacitance                                 | $C_{iss}$     | $V_{DS}=10V, V_{GS}=0V, f=1MHz$   |     | 300  |           | pF         |
| Output Capacitance                                | $C_{oss}$     |   |     | 120  |           |            |
| Reverse Transfer Capacitance                      | $C_{rss}$     |   |     | 80   |           |            |
| Total Gate Charge                                 | $Q_g$         | $V_{DS}=10V, V_{GS}=4.5V, I_D=3.6A$   |     | 4    | 10        | nC         |
| Gate-Source Charge                                | $Q_{gs}$      |   |     | 0.65 |           |            |
| Gate-Drain Charge                                 | $Q_{gd}$      |   |     | 1.5  |           |            |
| Turn-On Delay Time                                | $t_{d(on)}$   | $V_{DD}=10V,$<br>$R_L=5.5\Omega, I_D\approx 3.6A,$<br>$V_{GEN}=4.5V, R_g=6\Omega$ |     | 7    | 15        | ns         |
| Turn-On Rise Time                                 | $t_r$         |   |     | 55   | 80        |            |
| Turn-Off Delay Time                               | $t_{d(off)}$  |   |     | 16   | 60        |            |
| Turn-Off Fall Time                                | $t_f$         |   |     | 10   | 20        |            |

 Note 2. Pulse Test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

3. Guaranteed by Design, Not Subject to Production Testing.

Curve Characteristics

Fig. 1 - Output Characteristics

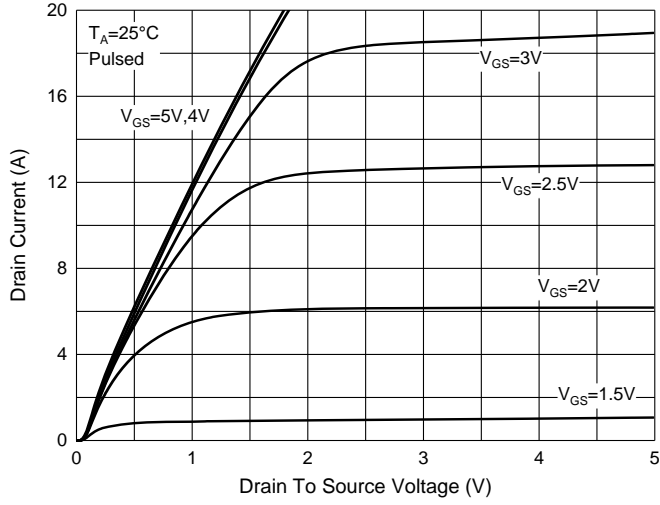


Fig. 2 - Transfer Characteristics

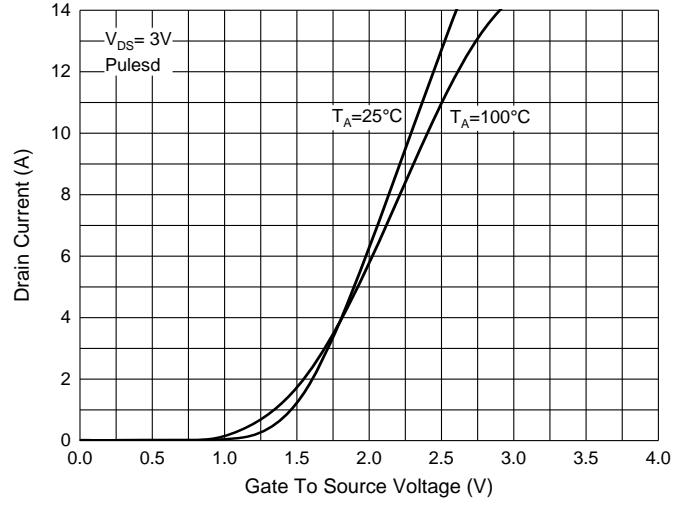


Fig. 3 -  $R_{DS(ON)} - I_D$

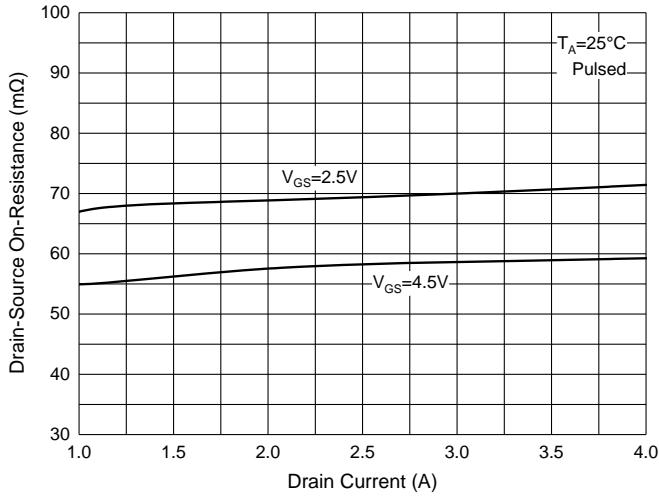


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

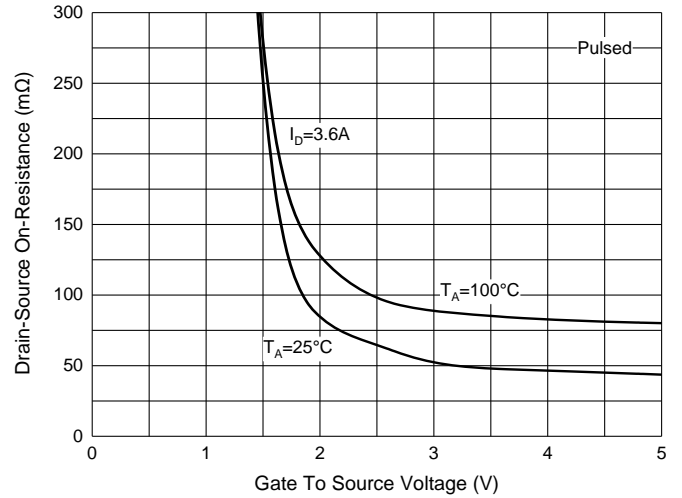


Fig. 5 -  $I_S - V_{SD}$

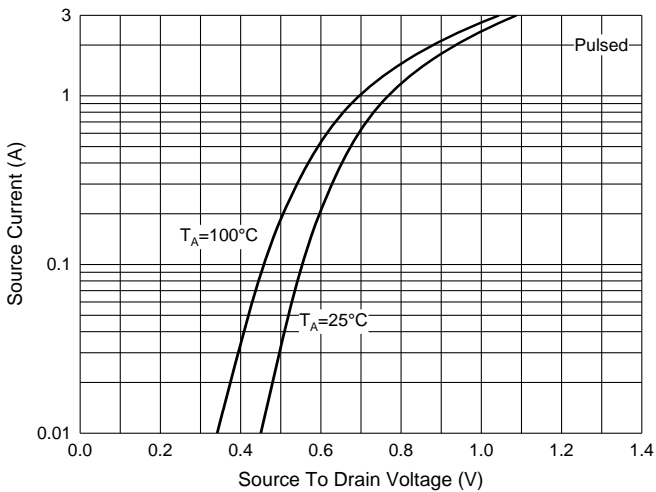
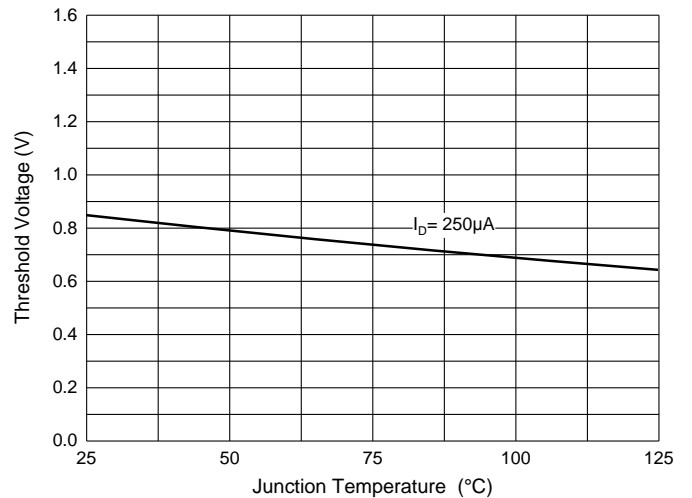


Fig. 6 - Threshold Voltage



## Ordering Information

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 3Kpcs/Reel |

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