

## Features

- Ultra Low Gate Charge
- Low Reverse Transfer Capacitance
- Fast Switching Capability
- 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)

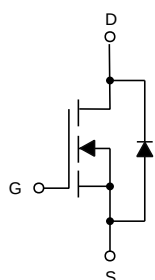
## Maximum Ratings

- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 100°C/W Junction to Ambient

| Parameter                | Symbol   | Rating   | Unit |
|--------------------------|----------|----------|------|
| Drain-Source Voltage     | $V_{DS}$ | 100      | V    |
| Gate-Source Voltage      | $V_{GS}$ | $\pm 20$ | V    |
| Continuous Drain Current | $I_D$    | 3.7      | A    |
| Pulsed Drain Current     | $I_{DM}$ | 14.8     | A    |

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

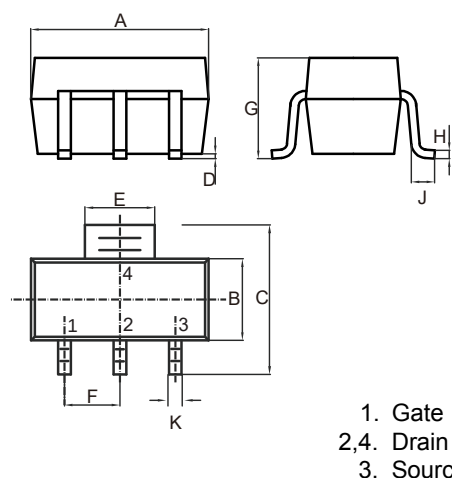
## Internal Structure



Marking: T04N10

## N-CHANNEL MOSFET

### SOT-223



| DIMENSIONS |        |       |      |      |      |
|------------|--------|-------|------|------|------|
| DIM        | INCHES |       | MM   |      | NOTE |
|            | MIN    | MAX   | MIN  | MAX  |      |
| A          | 0.248  | 0.264 | 6.30 | 6.70 |      |
| B          | 0.130  | 0.146 | 3.30 | 3.70 |      |
| C          | 0.264  | 0.287 | 6.70 | 7.30 |      |
| D          | 0.001  | 0.004 | 0.02 | 0.10 |      |
| E          | 0.114  | 0.122 | 2.90 | 3.10 |      |
| F          | 0.091  |       | 2.30 |      | TYP. |
| G          | ---    | 0.071 | ---  | 1.80 |      |
| H          | 0.009  | 0.014 | 0.23 | 0.35 |      |
| J          | 0.030  | ---   | 0.75 | ---  |      |
| K          | 0.026  | 0.033 | 0.66 | 0.84 |      |

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

| Parameter                                              | Symbol               | Test Conditions                                                                      | Min | Typ   | Max  | Unit |
|--------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------|-----|-------|------|------|
| Off Characteristics                                    |                      |                                                                                      |     |       |      |      |
| Drain-Source Breakdown Voltage                         | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                           | 100 |       |      | V    |
| Zero Gate Voltage Drain Current                        | I <sub>DSS</sub>     | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V                                           |     |       | 1    | μA   |
| Gate-Source Leakage Current                            | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                           |     |       | ±100 | nA   |
| On Characteristics <sup>(Note 2)</sup>                 |                      |                                                                                      |     |       |      |      |
| Gate-Threshold Voltage                                 | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                             | 1.2 | 2     | 2.5  | V    |
| Drain-Source On-Resistance                             | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =5A                                             |     | 0.115 | 0.14 | Ω    |
| Dynamic Characteristics <sup>(Note 3)</sup>            |                      |                                                                                      |     |       |      |      |
| Input Capacitance                                      | C <sub>iss</sub>     | V <sub>DS</sub> =25V,V <sub>GS</sub> =0V,f =1MHz                                     |     | 690   |      | pF   |
| Output Capacitance                                     | C <sub>oss</sub>     |                                                                                      |     | 120   |      |      |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>     |                                                                                      |     | 90    |      |      |
| Switching Characteristics <sup>(Note 3)</sup>          |                      |                                                                                      |     |       |      |      |
| Turn-On Delay Time                                     | t <sub>d(on)</sub>   | V <sub>DD</sub> =30V, R <sub>G</sub> =2.5Ω, I <sub>D</sub> =2A, V <sub>GS</sub> =10V |     | 11    |      | ns   |
| Turn-On Rise Time                                      | t <sub>r</sub>       |                                                                                      |     | 7.4   |      |      |
| Turn-Off Delay Time                                    | t <sub>d(off)</sub>  |                                                                                      |     | 35    |      |      |
| Turn-Off Fall Time                                     | t <sub>f</sub>       |                                                                                      |     | 9.1   |      |      |
| Total Gate Charge                                      | Q <sub>g</sub>       | V <sub>DS</sub> =30V, I <sub>D</sub> =3A,V <sub>GS</sub> =10V                        |     | 15.5  |      | nC   |
| Gate-Source Charge                                     | Q <sub>gs</sub>      |                                                                                      |     | 3.2   |      |      |
| Gate-Drain Charge                                      | Q <sub>gd</sub>      |                                                                                      |     | 4.7   |      |      |
| Drain-Source Diode Characteristics and Maximum Ratings |                      |                                                                                      |     |       |      |      |
| Continuous Drain-Source Diode Forward Current          | I <sub>S</sub>       |                                                                                      |     |       | 9.6  | A    |
| Pulsed Drain-Source Diode Forward Current              | I <sub>SM</sub>      |                                                                                      |     |       | 38.4 |      |
| Diode Forward Voltage <sup>(Note 2)</sup>              | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =9A                                              |     |       | 1.2  | V    |

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

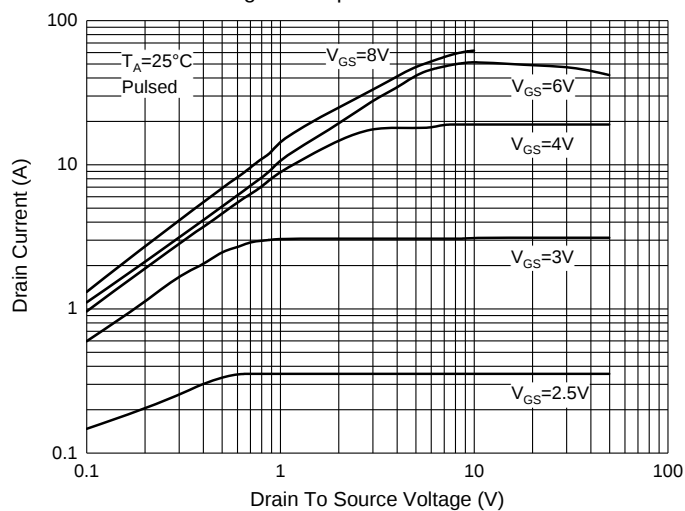


Fig. 2 - Transfer Characteristics

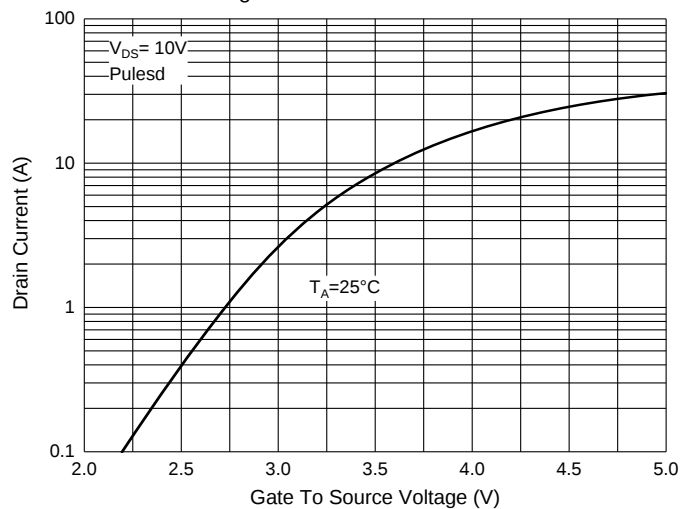


Fig. 3 -  $R_{DS(ON)} - I_D$

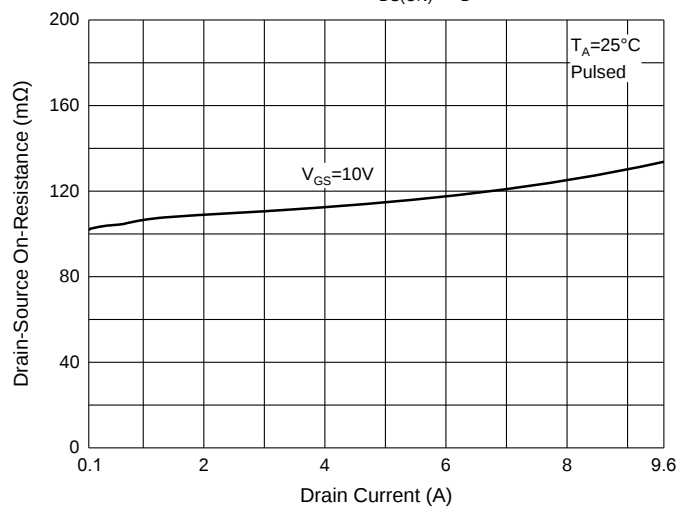


Fig. 4 -  $R_{DS(ON)} - V_{GS}$

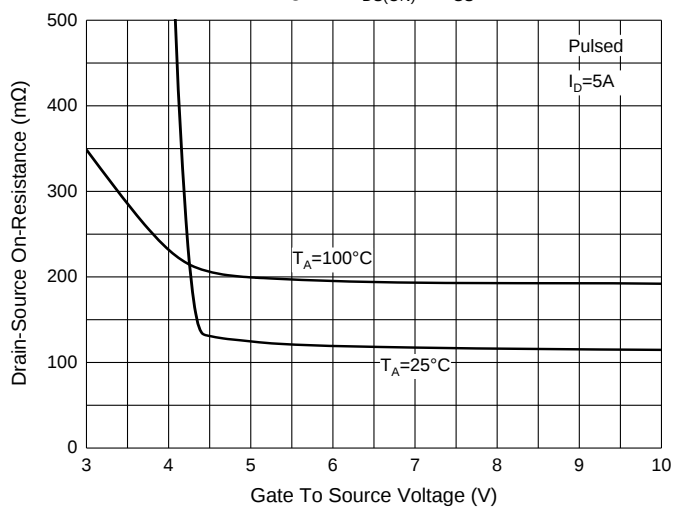


Fig. 5 -  $I_S - V_{SD}$

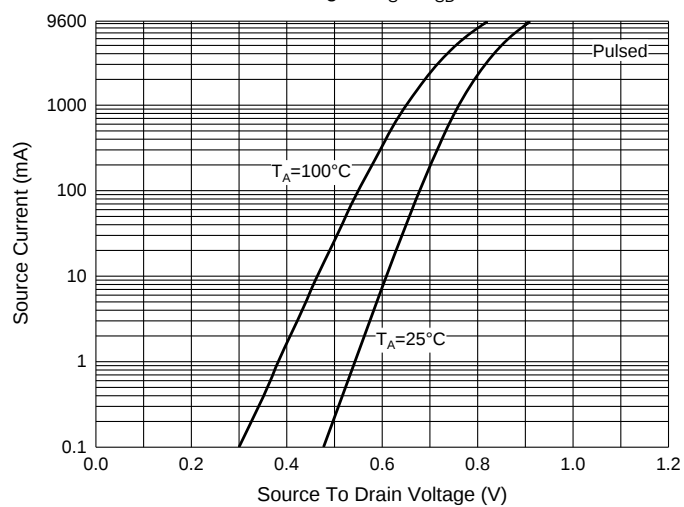
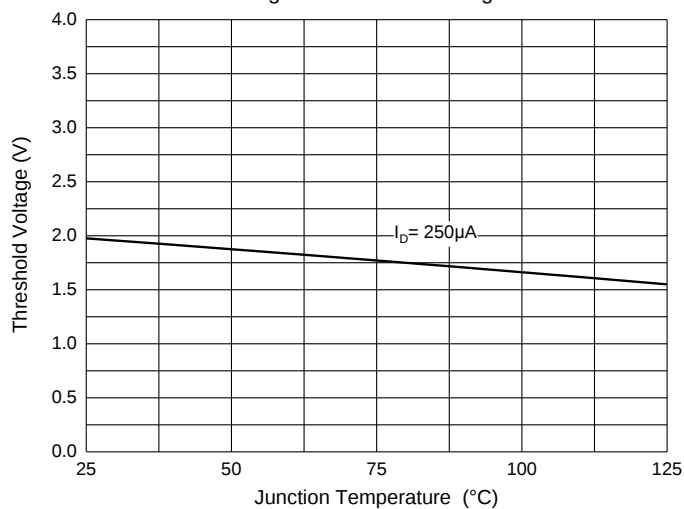


Fig. 6 - Threshold Voltage



## Ordering Information

| Device         | Packing                 |
|----------------|-------------------------|
| Part Number-TP | Tape&Reel: 2.5Kpcs/Reel |

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