

## Features

- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

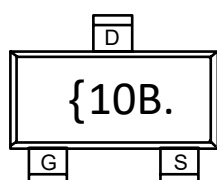
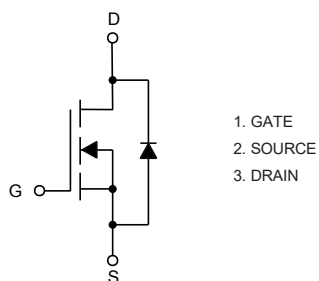
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 105°C/W Junction to Ambient (Note 2)

| Parameter                                   |                       | Symbol          | Rating | Unit |
|---------------------------------------------|-----------------------|-----------------|--------|------|
| Drain-Source Voltage                        |                       | V <sub>DS</sub> | 60     | V    |
| Gate-Source Voltage                         |                       | V <sub>GS</sub> | ±16    | V    |
| Continuous Drain Current                    | T <sub>A</sub> =25°C  | I <sub>D</sub>  | 3      | A    |
|                                             | T <sub>A</sub> =100°C |                 | 1.9    |      |
| Pulsed Drain Current <sup>(Note 3)</sup>    |                       | I <sub>DM</sub> | 12     | A    |
| Total Power Dissipation <sup>(Note 4)</sup> |                       | P <sub>D</sub>  | 1.2    | W    |

Note:

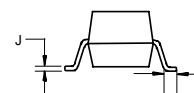
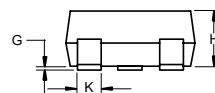
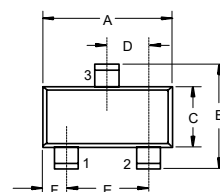
- Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$ .
- Repetitive rating; pulse width limited by max. junction temperature.
- $P_D$  is based on max. junction temperature, using junction-ambient thermal resistance.

## Internal Structure and Marking Code



## N-CHANNEL MOSFET

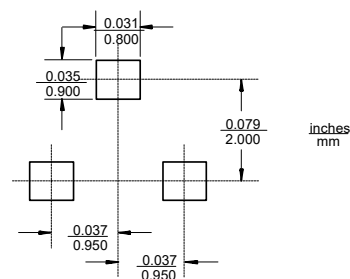
### SOT-23



### DIMENSIONS

| DIM | INCHES |       | MM   |      | NOTE |
|-----|--------|-------|------|------|------|
|     | MIN    | MAX   | MIN  | MAX  |      |
| A   | 0.110  | 0.120 | 2.80 | 3.04 |      |
| B   | 0.083  | 0.104 | 2.10 | 2.64 |      |
| C   | 0.047  | 0.055 | 1.20 | 1.40 |      |
| D   | 0.034  | 0.041 | 0.85 | 1.05 |      |
| E   | 0.067  | 0.083 | 1.70 | 2.10 |      |
| F   | 0.018  | 0.024 | 0.45 | 0.60 |      |
| G   | 0.0004 | 0.006 | 0.01 | 0.15 |      |
| H   | 0.035  | 0.043 | 0.90 | 1.10 |      |
| J   | 0.003  | 0.007 | 0.08 | 0.18 |      |
| K   | 0.012  | 0.020 | 0.30 | 0.51 |      |
| L   | 0.007  | 0.020 | 0.20 | 0.50 |      |

### Suggested Solder Pad Layout



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

| Parameter                       | Symbol               | Test Conditions                                                                        | Min | Typ | Max  | Unit |
|---------------------------------|----------------------|----------------------------------------------------------------------------------------|-----|-----|------|------|
| Static Characteristics          |                      |                                                                                        |     |     |      |      |
| Drain-Source Breakdown Voltage  | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                             | 60  |     |      | V    |
| Gate-Source Leakage Current     | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±16V                                             |     |     | ±100 | nA   |
|                                 |                      | V <sub>DS</sub> =0V, V <sub>GS</sub> =±10V                                             |     |     | ±50  |      |
| Zero Gate Voltage Drain Current | I <sub>DSS</sub>     | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                                              |     |     | 1    | μA   |
| Gate-Threshold Voltage          | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 0.5 | 0.9 | 1.3  | V    |
| Drain-Source On-Resistance      | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =3A                                               |     | 67  | 100  | mΩ   |
|                                 |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A                                              |     | 70  | 120  |      |
| Gate Resistance                 | R <sub>g</sub>       | f=1 MHz, Open drain                                                                    |     | 2   |      | Ω    |
| Forward Tranconductance         | g <sub>FS</sub>      | V <sub>DS</sub> =15V, I <sub>D</sub> =2A                                               |     | 13  |      | S    |
| Diode Characteristics           |                      |                                                                                        |     |     |      |      |
| Continuous Body Diode Current   | I <sub>S</sub>       |                                                                                        |     |     | 3    | A    |
| Diode Forward Voltage           | V <sub>SD</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =3A                                                |     |     | 1.2  | V    |
| Reverse Recovery Time           | t <sub>rr</sub>      | I <sub>F</sub> =1.5A, di/dt=530A/μs                                                    |     | 6.6 |      | ns   |
| Reverse Recovery Charge         | Q <sub>rr</sub>      |                                                                                        |     | 9.1 |      | nC   |
| Dynamic Characteristics         |                      |                                                                                        |     |     |      |      |
| Input Capacitance               | C <sub>iss</sub>     | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHz                                      |     | 638 |      | pF   |
| Output Capacitance              | C <sub>oss</sub>     |                                                                                        |     | 25  |      |      |
| Reverse Transfer Capacitance    | C <sub>rss</sub>     |                                                                                        |     | 21  |      |      |
| Total Gate Charge               | Q <sub>g</sub>       | V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =3A                         |     | 16  |      | nC   |
| Gate-Source Charge              | Q <sub>gs</sub>      |                                                                                        |     | 1.3 |      |      |
| Gate-Drain Charge               | Q <sub>gd</sub>      |                                                                                        |     | 2.4 |      |      |
| Turn-On Delay Time              | t <sub>d(on)</sub>   | V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, R <sub>G</sub> =2.2Ω, I <sub>D</sub> =1.5A |     | 2.1 |      | ns   |
| Turn-On Rise Time               | t <sub>r</sub>       |                                                                                        |     | 14  |      |      |
| Turn-Off Delay Time             | t <sub>d(off)</sub>  |                                                                                        |     | 21  |      |      |
| Turn-Off Fall Time              | t <sub>f</sub>       |                                                                                        |     | 1.7 |      |      |

## Curve Characteristics

Fig.1 - Typical Output Characteristics

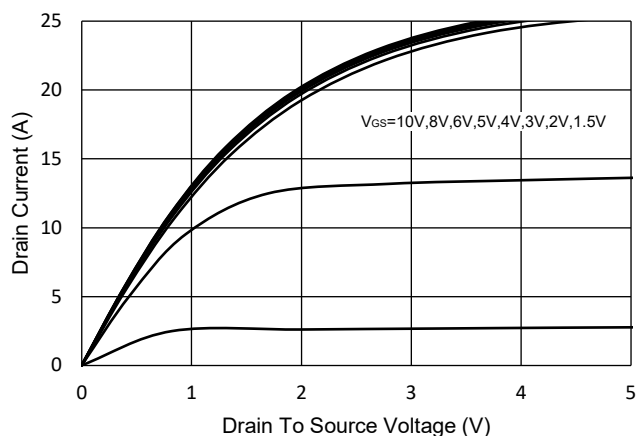


Fig.2 - Transfer Characteristic

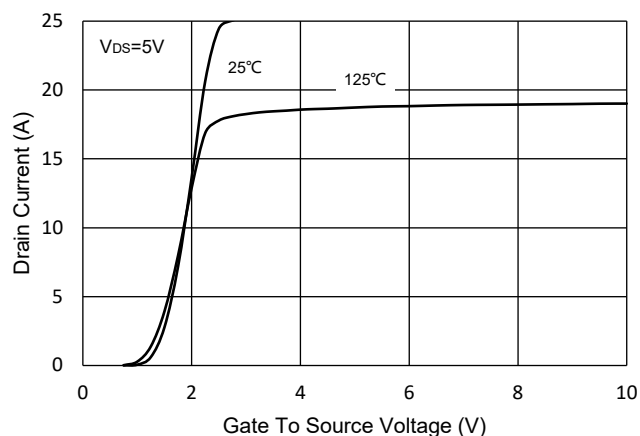


Fig.3 -  $R_{DS(ON)} - V_{GS}$

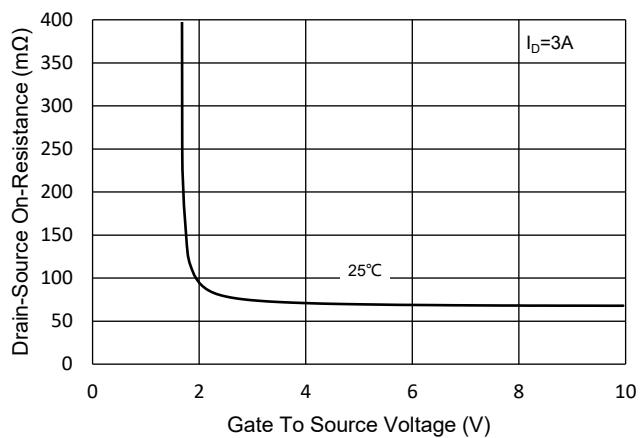


Fig. 4 -  $R_{DS(ON)} - I_D$

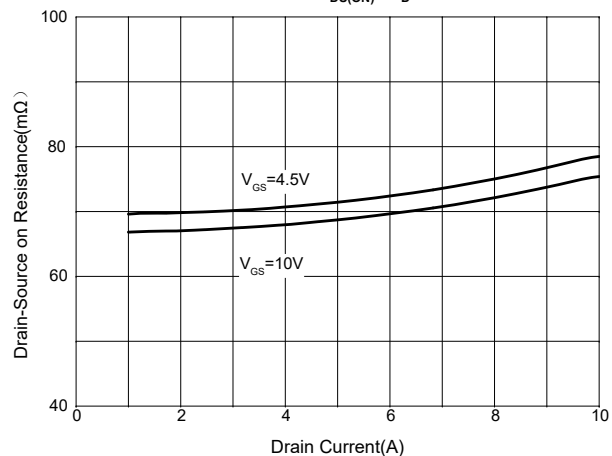


Fig.5 - Capacitance Characteristics

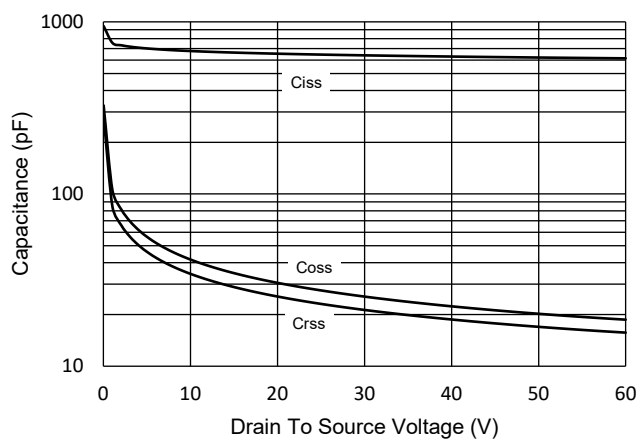
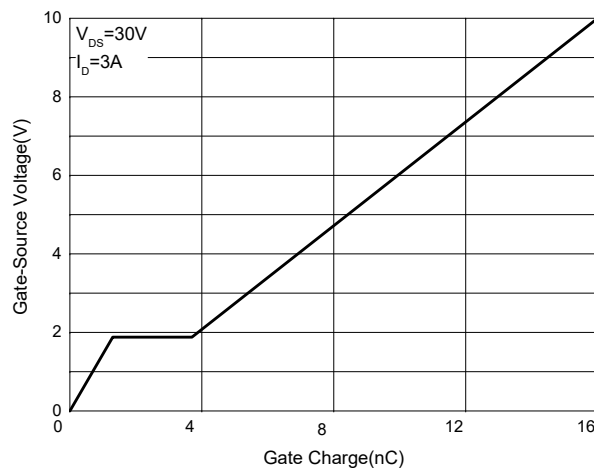
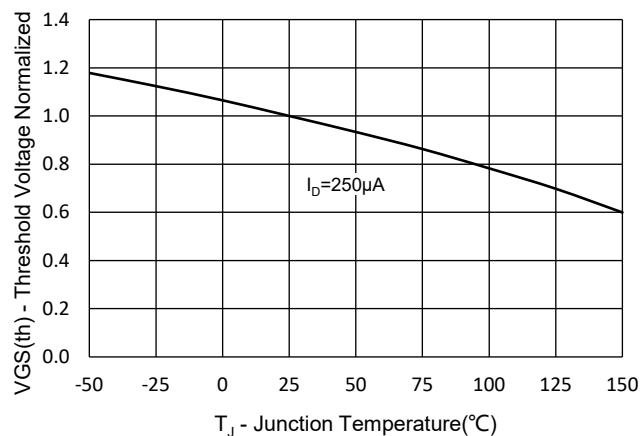


Fig. 6 - Gate Charge

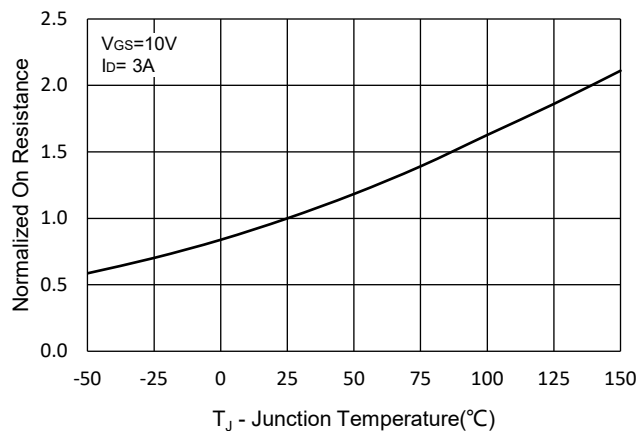


## Curve Characteristics

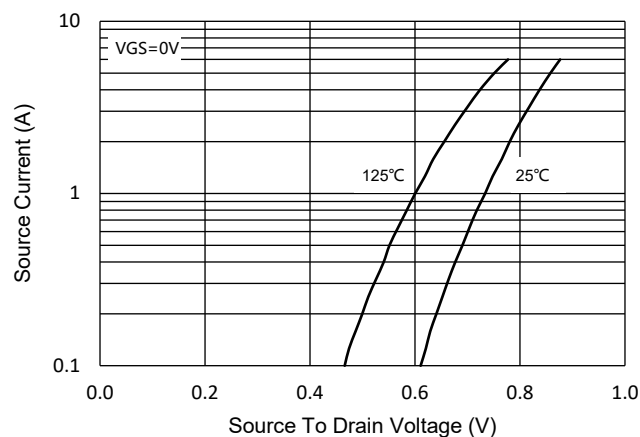
**Fig.7 - Normalized Threshold Voltage**



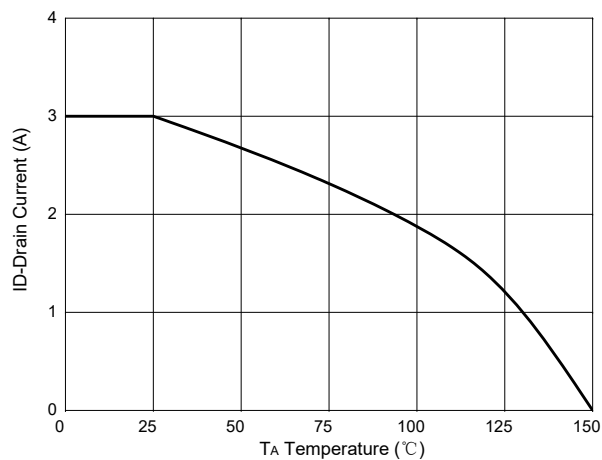
**Fig.8 - Normalized On Resistance Characteristics**



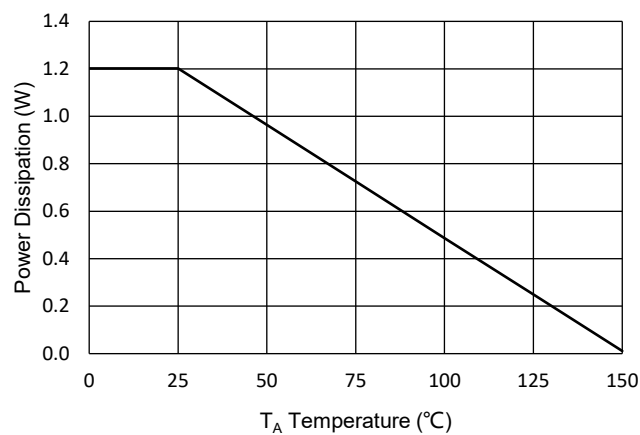
**Fig.9 -  $I_S$  -  $V_{SD}$**



**Fig. 10 - Drain Current**



**Fig.11 - PD Dissipation**



## Curve Characteristics

Fig.12 - Safe Operation Area

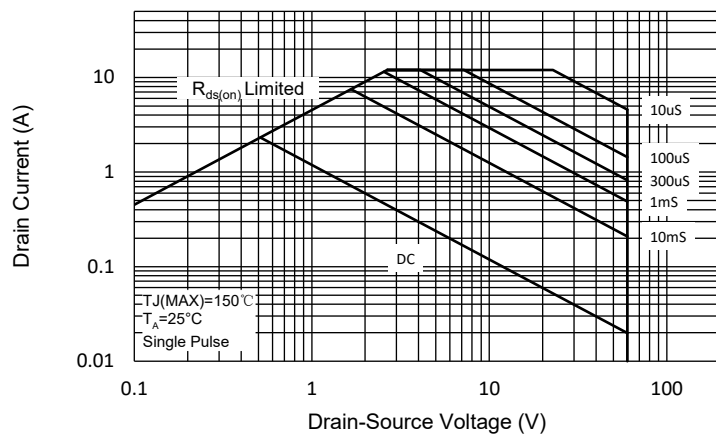
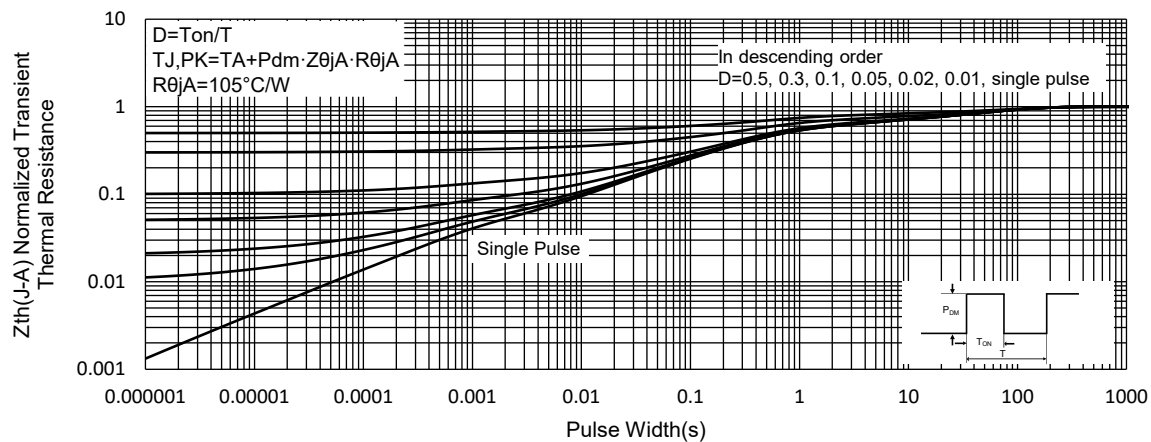


Fig.13 - Normalized Transient Thermal Impedance



## Ordering Information

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

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