

## Features

- Trench LV MOSFET Technology
- ESD Protected Up To 2KV (HBM)
- Fast Switching Speed
- 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

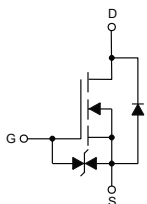
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 123°C/W Junction to Ambient (Note 2)

| Parameter                        | Symbol   | Rating                 | Unit |
|----------------------------------|----------|------------------------|------|
| Drain-Source Voltage             | $V_{DS}$ | 20                     | V    |
| Gate-Source Voltage              | $V_{GS}$ | ±12                    | V    |
| Continuous Drain Current         | $I_D$    | $T_A=25^\circ\text{C}$ | 0.75 |
|                                  |          | $T_A=70^\circ\text{C}$ | 0.6  |
| Pulsed Drain Current (Note 3)    | $I_{DM}$ | 3                      | A    |
| Total Power Dissipation (Note 4) | $P_D$    | 1                      | W    |

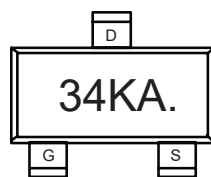
Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. 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  $T_A=25^\circ\text{C}$ .
3. Repetitive rating; pulse width limited by max. junction temperature.
4.  $P_D$  is based on max. junction temperature, using junction-ambient thermal resistance.

## Internal Structure and Marking Code

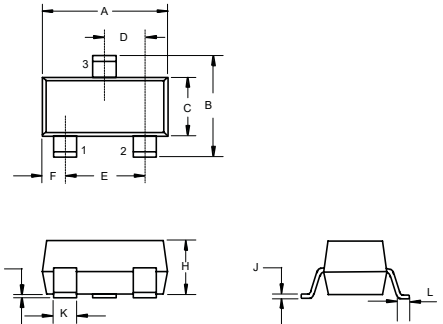


1. GATE
2. SOURCE
3. DRAIN



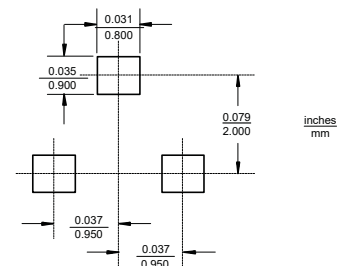
# N-Channel MOSFET

## SOT-23



| DIM | DIMENSIONS |       |      |      | NOTE |
|-----|------------|-------|------|------|------|
|     | INCHES     |       | MM   |      |      |
|     | 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

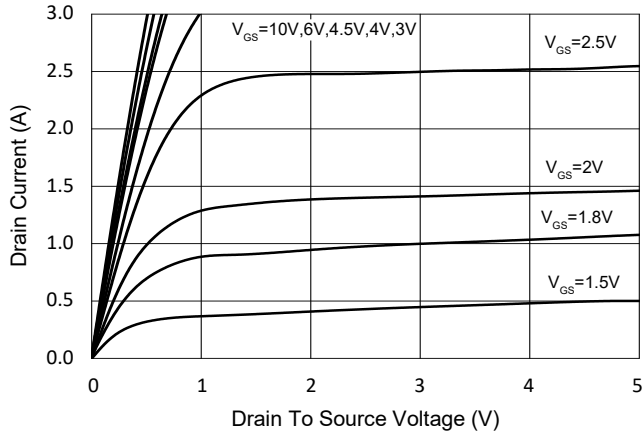


**ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)**

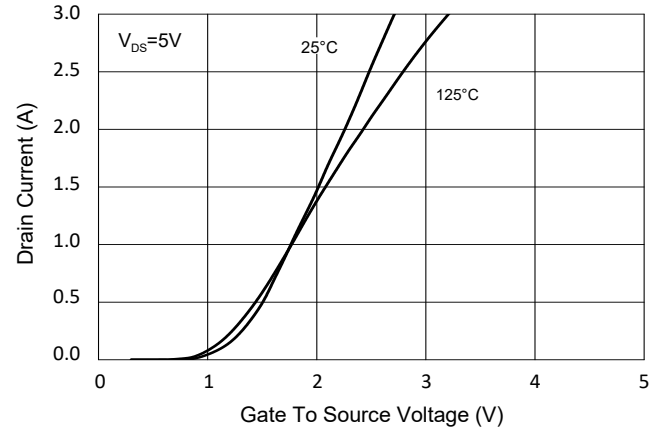
| Parameter                       | Symbol        | Test conditions                                  | Min  | Typ  | Max      | Unit       |
|---------------------------------|---------------|--|------|------|----------|------------|
| <b>Static Characteristics</b>   |               |  |      |      |          |            |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                        | 20   |      |          | V          |
| Gate-Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                    | 0.35 | 0.75 | 1.1      | V          |
| Gate-Body Leakage Current       | $I_{GSS}$     | $V_{GS}=\pm 10V, V_{DS}=0V$                      |      |      | $\pm 10$ | $\mu A$    |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=20V, V_{GS}=0V$                          |      |      | 1        | $\mu A$    |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=4.5V, I_D=500mA$                         |      | 190  | 300      | m $\Omega$ |
|                                 |               | $V_{GS}=2.5V, I_D=400mA$                         |      | 280  | 400      |            |
|                                 |               | $V_{GS}=1.8V, I_D=200mA$                         |      | 440  | 700      |            |
| Forward Transconductance        | $g_{FS}$      | $V_{DS}=5V, I_D=750mA$                           |      | 1.7  |          | S          |
| Gate Resistance                 | $R_g$         | f=1 MHz, Open drain                              |      | 37   |          | $\Omega$   |
| <b>Diode Characteristics</b>    |               |  |      |      |          |            |
| Continuous Body Diode Current   | $I_S$         |  |      |      | 750      | mA         |
| Diode Forward Voltage           | $V_{SD}$      | $V_{GS}=0V, I_S=500mA$                           |      |      | 1.2      | V          |
| Reverse Recovery Time           | $t_{rr}$      | $I_F=500mA, di_F/dt=100A/\mu s$                  |      | 12   |          | ns         |
| Reverse Recovery Charge         | $Q_{rr}$      |  |      | 0.6  |          | nC         |
| <b>Dynamic Characteristics</b>  |               |  |      |      |          |            |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=16V, V_{GS}=0V, f=1MHz$                  |      | 27   |          | pF         |
| Output Capacitance              | $C_{oss}$     |  |      | 9.3  |          |            |
| Reverse Transfer Capacitance    | $C_{rss}$     |  |      | 4.5  |          |            |
| Total Gate Charge               | $Q_g$         | $V_{DS}=10V, V_{GS}=4.5V, I_D=500mA$             |      | 1    |          | nC         |
| Gate-Source Charge              | $Q_{gs}$      |  |      | 0.25 |          |            |
| Gate-Drain Charge               | $Q_{gd}$      |  |      | 0.23 |          |            |
| Turn-On Delay Time              | $t_{d(on)}$   | $V_{DD}=10V, V_{GS}=10V, R_G=3\Omega, I_D=500mA$ |      | 2    |          | ns         |
| Turn-On Rise Time               | $t_r$         |  |      | 17   |          |            |
| Turn-Off Delay Time             | $t_{d(off)}$  |  |      | 7    |          |            |
| Turn-Off Fall Time              | $t_f$         |  |      | 4    |          |            |

## Curve Characteristics

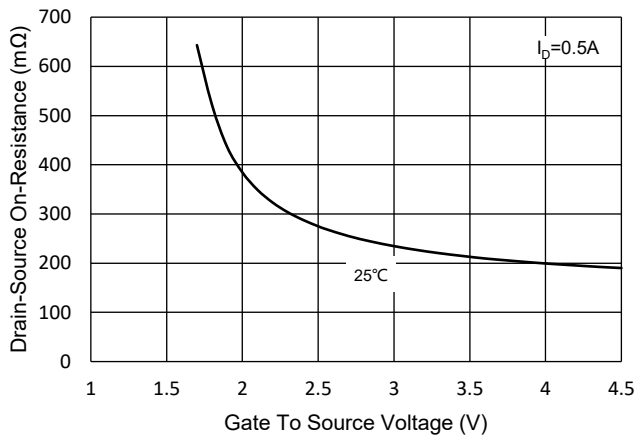
**Fig.1 - Typical Output Characteristics**



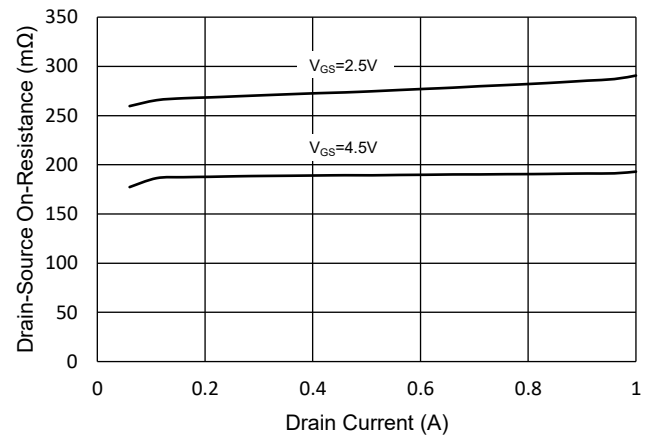
**Fig.2 - Transfer Characteristic**



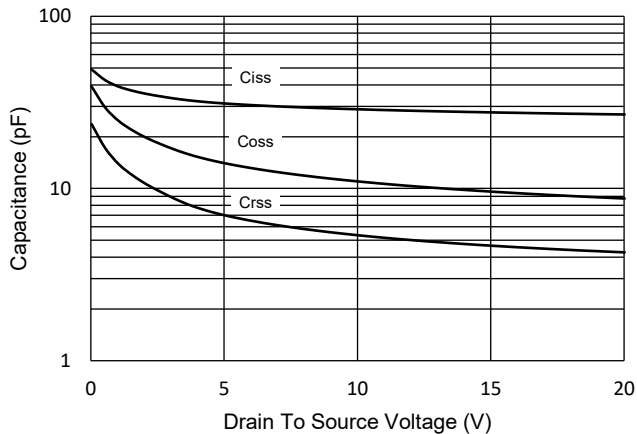
**Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$**



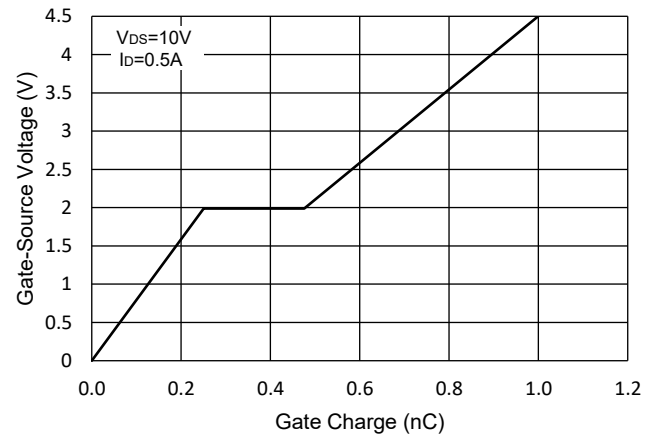
**Fig.4 -  $R_{DS(ON)}$  -  $I_D$**



**Fig.5 - Capacitance Characteristics**

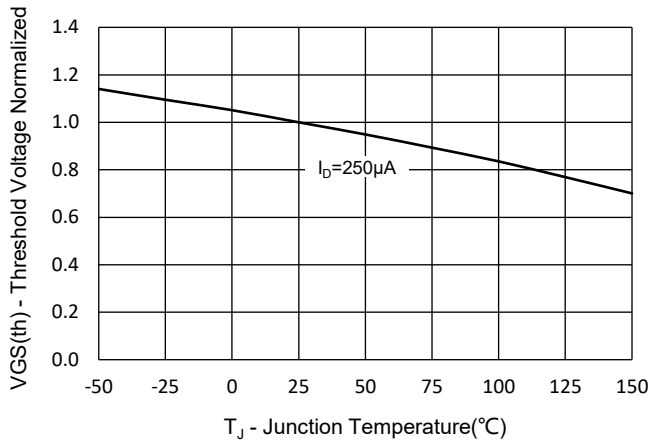


**Fig.6 - Gate Charge**

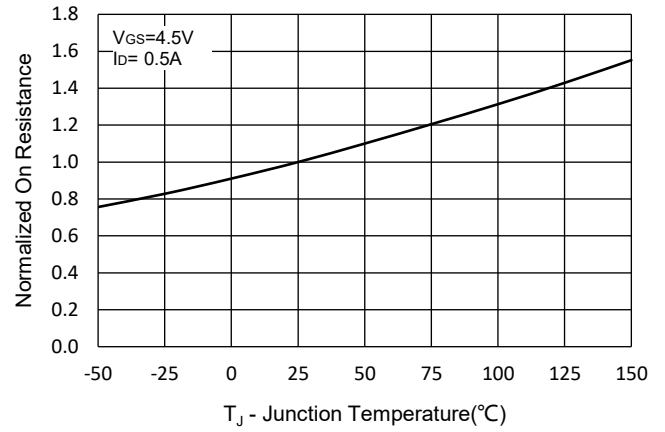


**Curve Characteristics**

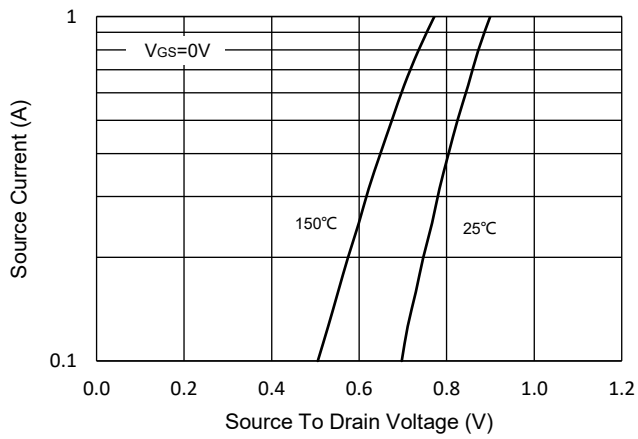
**Fig.7 - Normalized Threshold Voltage**



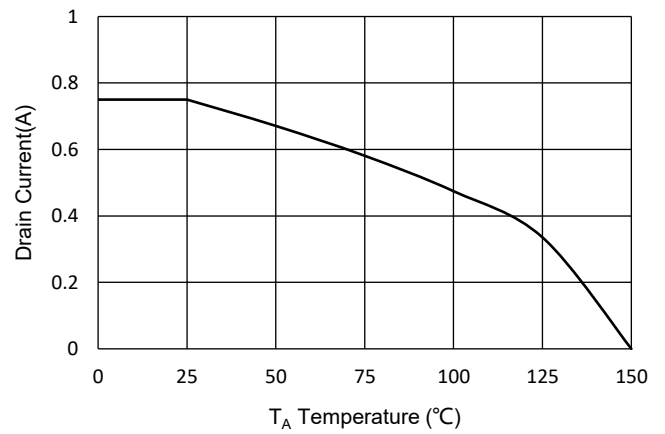
**Fig.8 - Normalized On Resistance Characteristics**



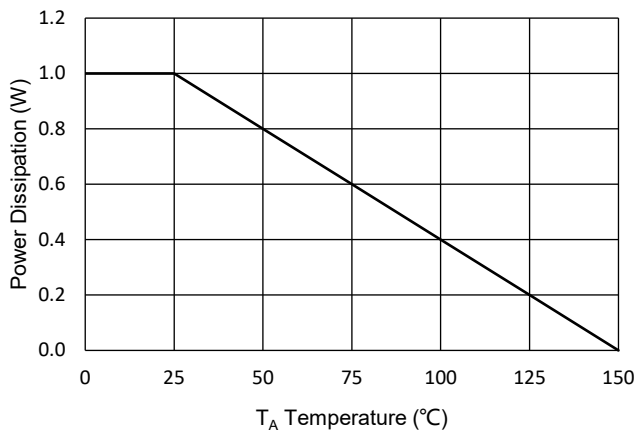
**Fig.9 - I<sub>S</sub> - V<sub>SD</sub>**



**Fig.10 - Drain Current**



**Fig.11 - PD Dissipation**



Curve Characteristics

Fig.12 - Safe Operation Area

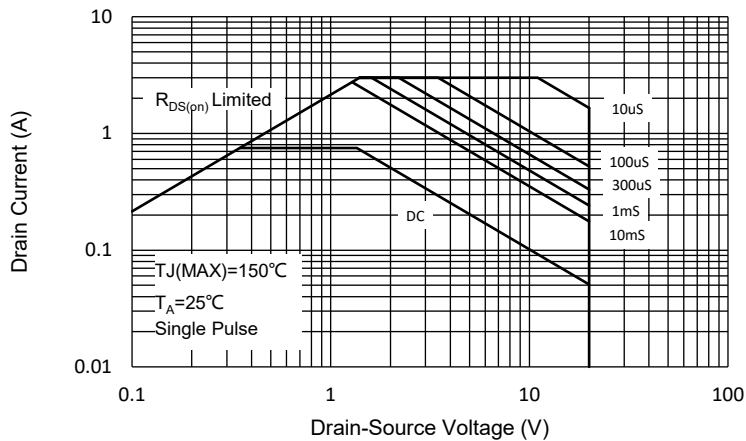
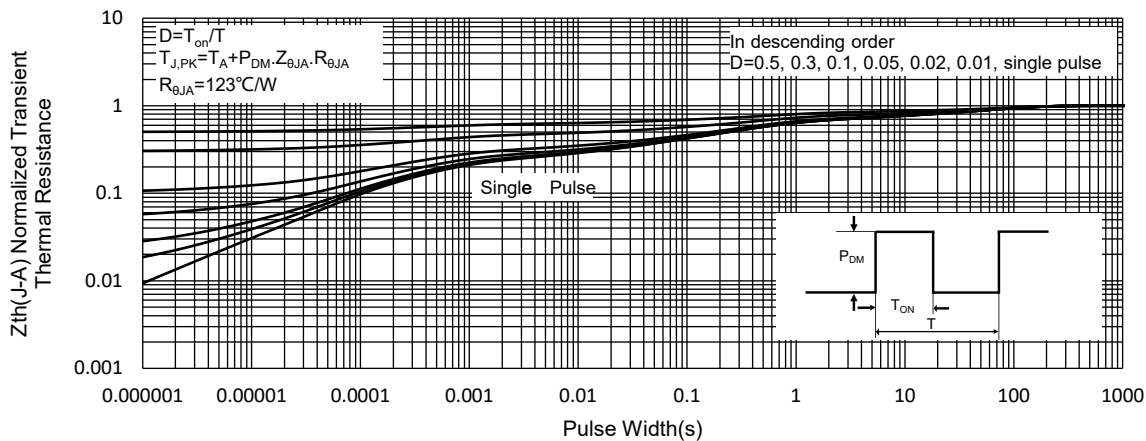


Fig.13 - Normalized Transient Thermal Impedance



## Ordering Information

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

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