## Features

- ESD Protected up to 2KV(HBM)
- 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)

# N-Channel MOSFET

## Maximum Ratings

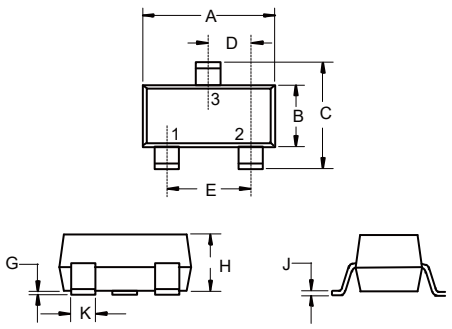
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature: -55°C to +150°C
- Thermal Resistance: 436°C/W Junction to Ambient(Note 2)

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain -source Voltage | | $V_{DS}$ | 30 | V |
| Gate -Source Voltage | | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $T_A$=25°C | $I_D$ | 100 | mA |
| | $T_A$=100°C | | 63 | |
| Pulsed Drain Current(Note 3) | | $I_{DM}$ | 400 | mA |
| Power Dissipation(Note 4) | | $P_D$ | 0.29 | W |

Note:

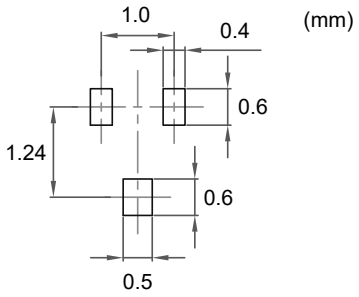
1. Halogen free "Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. The value of $R_{\theta JA}$ is measured with the device mounted on 1in$^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25°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.

## SOT-523

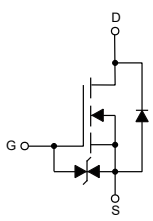



| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| DIM | INCHES | | MM | | NOTE |
| | MIN | MAX | MIN | MAX | |
| A | 0.059 | 0.067 | 1.50 | 1.70 | |
| B | 0.030 | 0.033 | 0.75 | 0.85 | |
| C | 0.057 | 0.069 | 1.45 | 1.75 | |
| D | 0.020 | | 0.50 | | TYP. |
| E | 0.035 | 0.043 | 0.90 | 1.10 | |
| G | 0.000 | 0.004 | 0.00 | 0.10 | |
| H | 0.024 | 0.031 | 0.60 | 0.80 | |
| J | 0.004 | 0.008 | 0.10 | 0.20 | |
| K | 0.006 | 0.014 | 0.15 | 0.35 | |

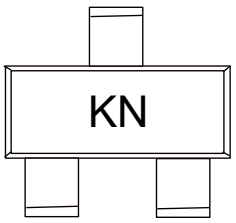
**Suggested Solder Pad Layout**




## Internal Structure and Marking Code




1. GATE
2. SOURCE
3. DRAIN



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

| Parameter | Symbol | Test conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 30 | | | V |
| Gate-Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 0.8 | 1 | 1.5 | V |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=± 20V, $V_{DS}$=0V | | | ±2 | μA |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V, $V_{GS}$=0V | | | 100 | nA |
| Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=500mA | | 1.8 | 4 | Ω |
| | | $V_{GS}$=4.5V, $I_D$=200mA | | 2 | 5 | |
| | | $V_{GS}$=2.5V, $I_D$=50mA | | 4 | 13 | |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V, $I_D$=100mA | | 200 | | mS |
| Gate Resistance | $R_g$ | f=1 MHz, Open drain | | 255 | | Ω |
| **Diode Characteristics** | | | | | | |
| Continuous Body Diode Current | $I_S$ | | | | 0.1 | A |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=500mA | | | 1.4 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=0.3A, $dI_F/dt$=100A/μs | | 11 | | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | | 3 | | nC |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=15V,$V_{GS}$=0V,f=1MHz | | 16 | | pF |
| Output Capacitance | $C_{oss}$ | | | 5.4 | | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | 3.3 | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V,$V_{GS}$=10V,$I_D$=0.3A | | 0.78 | | nC |
| Gate-Source Charge | $Q_{gs}$ | | | 0.13 | | |
| Gate-Drain Charge | $Q_{gd}$ | | | 0.14 | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}$=15V,$V_{GS}$=10V, $R_G$=3.9Ω, $I_D$=0.3A | | 2.4 | | ns |
| Turn-On Rise Time | $t_r$ | | | 2.7 | | |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 6 | | |
| Turn-Off Fall Time | $t_f$ | | | 10 | | |

## Curve Characteristics

**Fig.1 - Typical Output Characteristics**

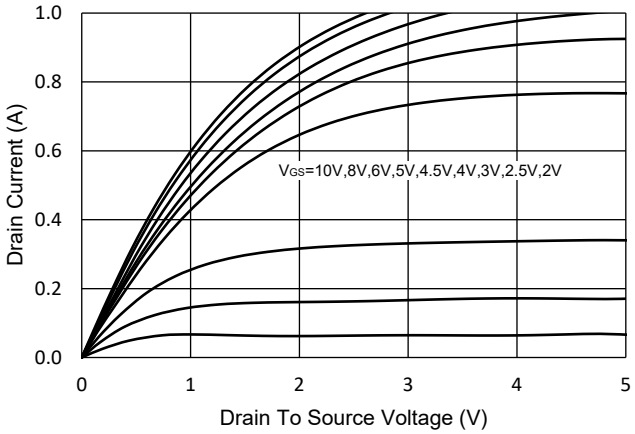



**Fig.2 - Transfer Characteristic**

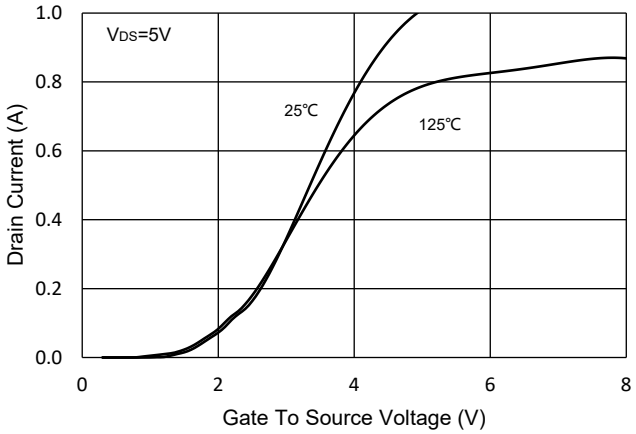



**Fig.3 - $R_{DS(ON)}$ - $V_{GS}$**

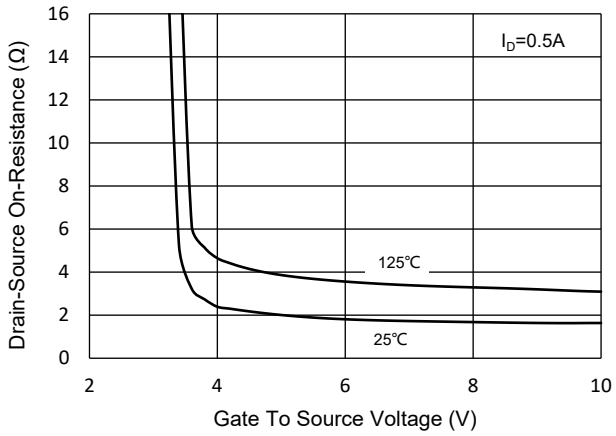



**Fig.4 - $R_{DS(ON)}$ - $I_D$**

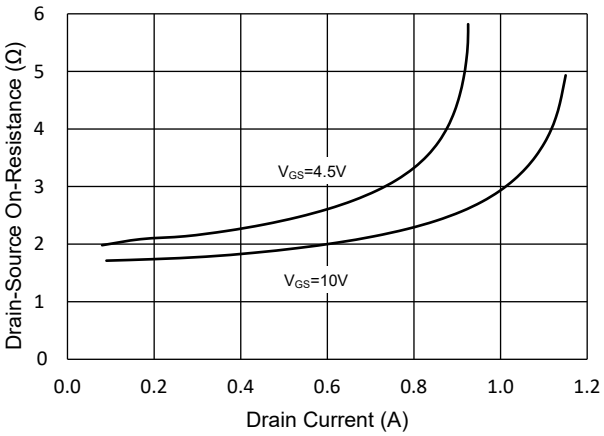



**Fig.5 - Capacitance Characteristics**

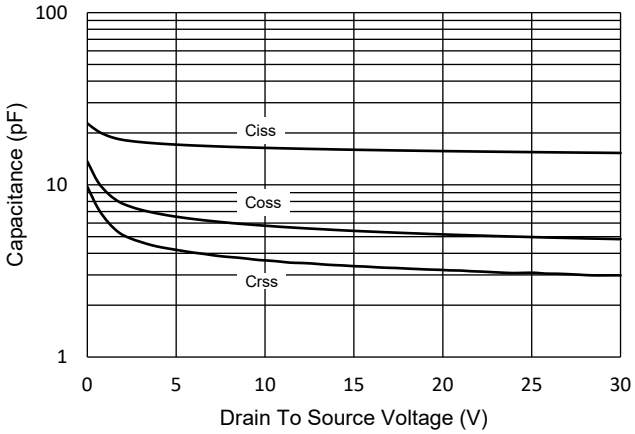
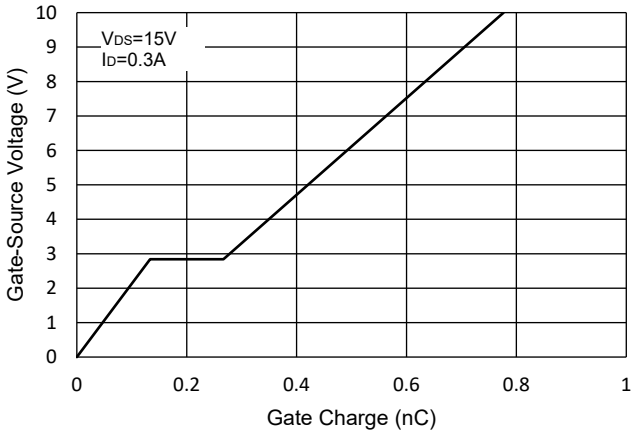



**Fig.6 - Gate Charge**



## Curve Characteristics

**Fig.7 - Normalized Threshold Voltage**

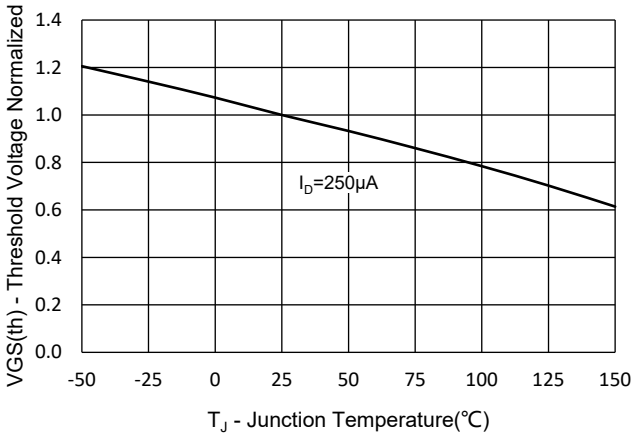



**Fig.8 - Normalized On Resistance Characteristics**

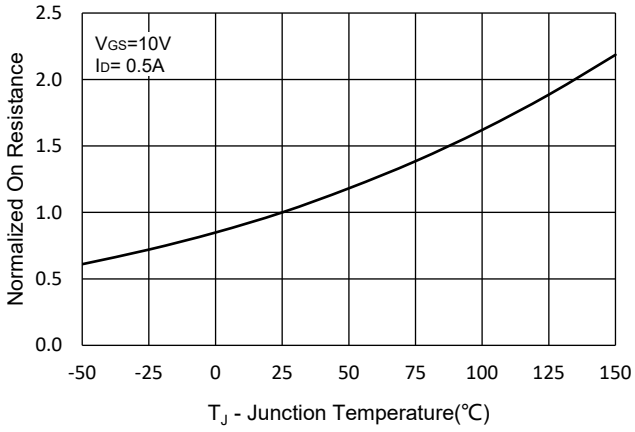



**Fig.9 - $I_S$ - $V_{SD}$**

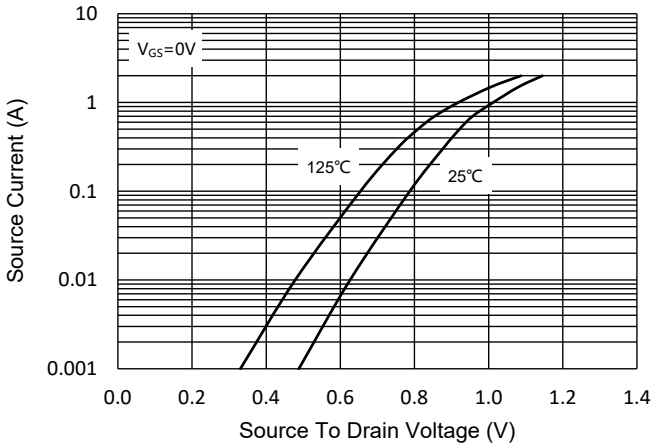



**Fig.10 - Drain Current**

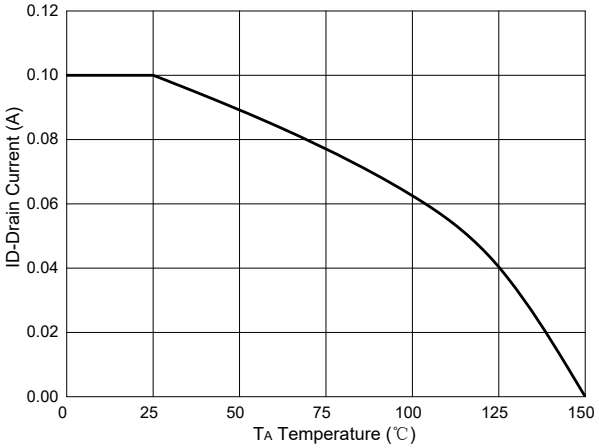
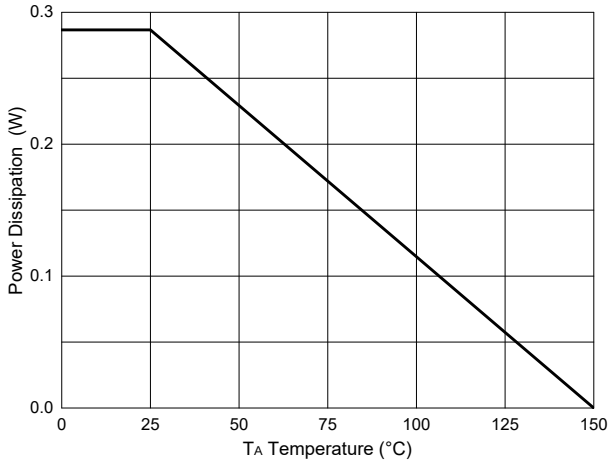



**Fig.11 - PD Dissipation**



## Curve Characteristics

**Fig.12 - Safe Operation Area**

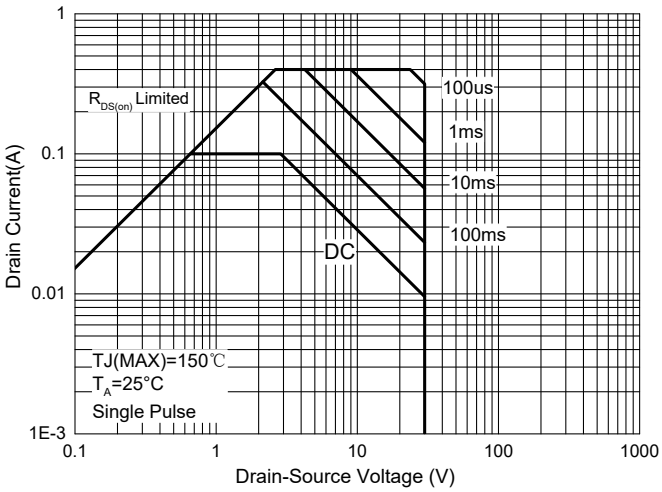
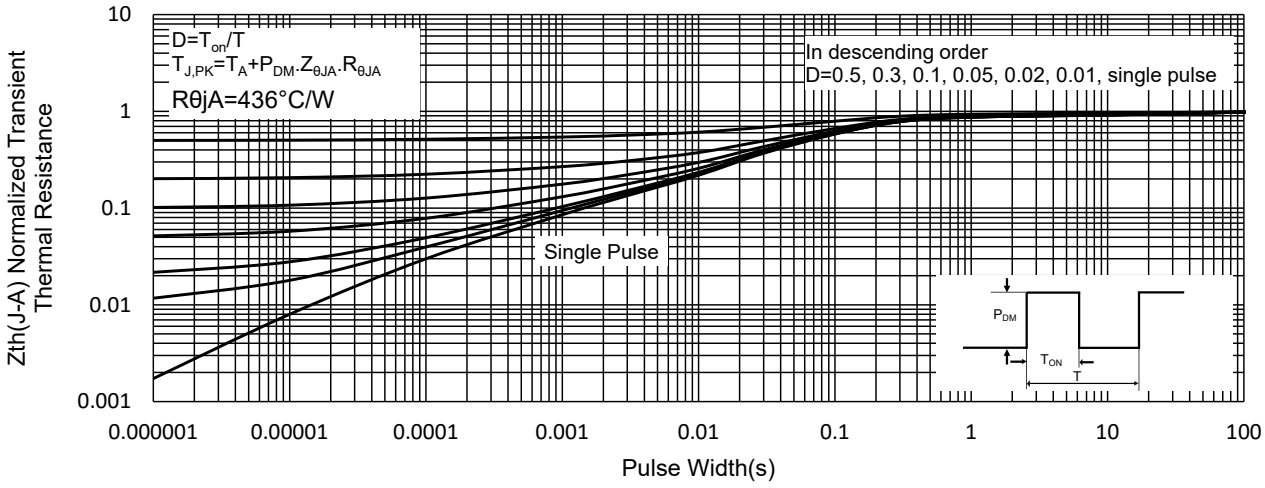



**Fig.13 - Normalized Transient Thermal Impedance**



## Ordering Information

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

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