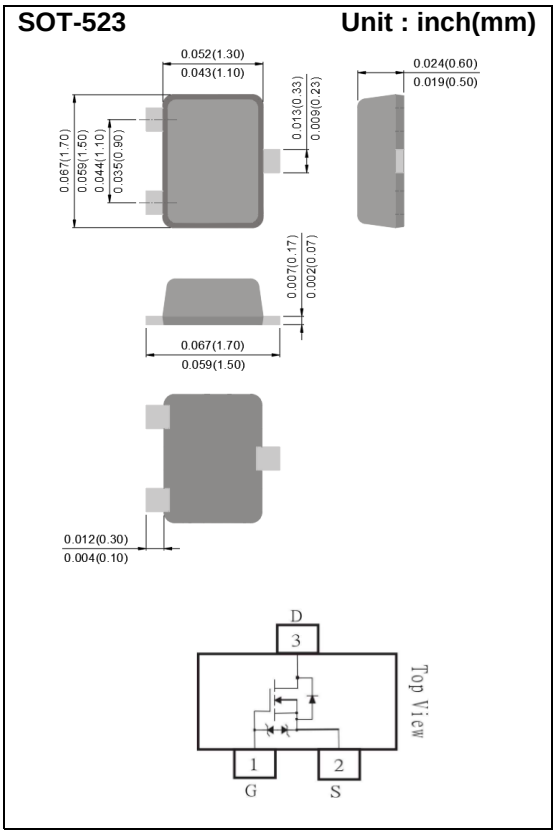
# PJE138K

## 50V N-Channel Enhancement Mode MOSFET – ESD Protected

| Voltage | 50 V | Current | 350mA |
|---|---|---|---|




### Features

- RDS(ON) , VGS@10V, ID@500mA<1.6Ω
- RDS(ON) , VGS@4.5V, ID@200mA<2.5Ω
- RDS(ON) , VGS@2.5V, ID@100mA<4.5Ω
- Advanced Trench Process Technology
- Specially Designed for Battery Operated Systems, Solid-State Relays Drivers: Relay, Displays, Memories, etc.
- ESD Protected 2KV HBM
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case : SOT-523 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.002 grams

### Maximum Ratings and Thermal Characteristics ($T_A$=25°C unless otherwise noted)

| PARAMETER | | SYMBOL | LIMIT | UNITS |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 50 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | | $I_D$ | 350 | mA |
| Pulsed Drain Current | | $I_{DM}$ | 1200 | mA |
| Power Dissipation | $T_A$=25°C | $P_D$ | 223 | mW |
| | Derate above 25°C | | 1.8 | mW/°C |
| Operating Junction and Storage Temperature Range | | $T_J$,$T_{STG}$ | -55~150 | °C |
| Typical Thermal Resistance<br>- Junction to Ambient(Note 3) | | $R_{\theta JA}$ | 560 | °C/W |

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## Electrical Characteristics ($T_A$=25°C unless otherwise noted)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=250uA | 50 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 0.8 | 1.0 | 1.5 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}$=10V,$I_D$=500mA | - | 0.96 | 1.6 | Ω |
| | | $V_{GS}$=4.5V,$I_D$=200mA | - | 1.25 | 2.5 | |
| | | $V_{GS}$=2.5V,$I_D$=100mA | - | 2.73 | 4.5 | |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=50V,$V_{GS}$=0V | - | 0.01 | 1 | uA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | ±3.0 | ±10 | uA |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=25V, $I_D$=250mA, $V_{GS}$=4.5V(Note 1,2) | - | 0.63 | 1 | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 0.2 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 0.23 | - | |
| Input Capacitance | Ciss | $V_{DS}$=25V, $V_{GS}$=0V, f=1.0MHZ | - | 25 | 50 | pF |
| Output Capacitance | Coss | | - | 9.5 | 20 | |
| Reverse Transfer Capacitance | Crss | | - | 2.1 | 5 | |
| **Switching** | | | | | | |
| Turn-On Delay Time | $td_{(on)}$ | $V_{DD}$=25V, $I_D$=500mA, $V_{GS}$=10V, $R_G$=6Ω(Note 1,2) | - | 2.2 | 5 | ns |
| Turn-On Rise Time | tr | | - | 19.2 | 38 | |
| Turn-Off Delay Time | $td_{(off)}$ | | - | 6.2 | 12 | |
| Turn-Off Fall Time | tf | | - | 23 | 50 | |
| **Drain-Source Diode** | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | --- | - | - | 500 | mA |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=500mA, $V_{GS}$=0V | - | 0.86 | 1.5 | V |

NOTES:

1. Pulse width≤300us, Duty cycle≤2%
2. Essentially independent of operating temperature typical characteristics.
3. $R_{\Theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. mounted on a 1 inch square pad of copper

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## TYPICAL CHARACTERISTIC CURVES

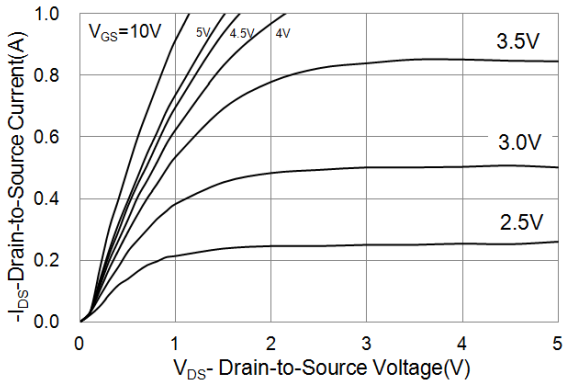


Fig.1 On-Region Characteristics

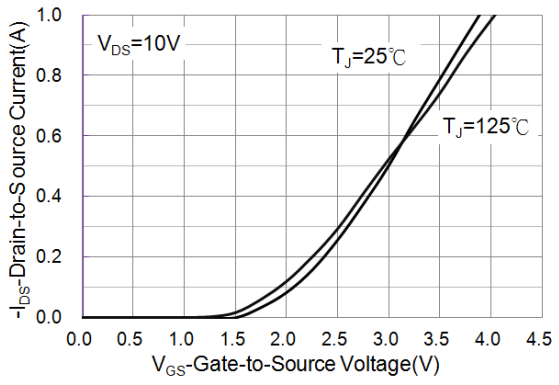


Fig.2 Transfer Characteristics

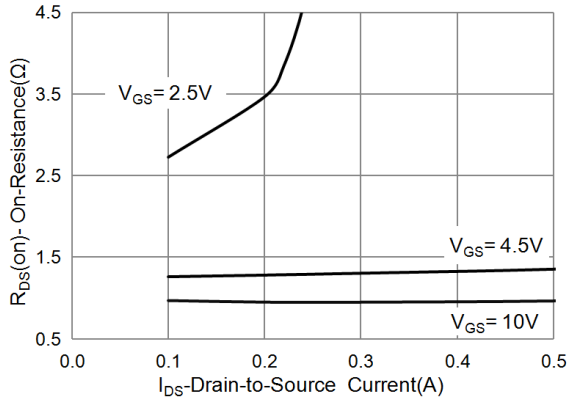


Fig.3 On-Resistance vs. Drain Current

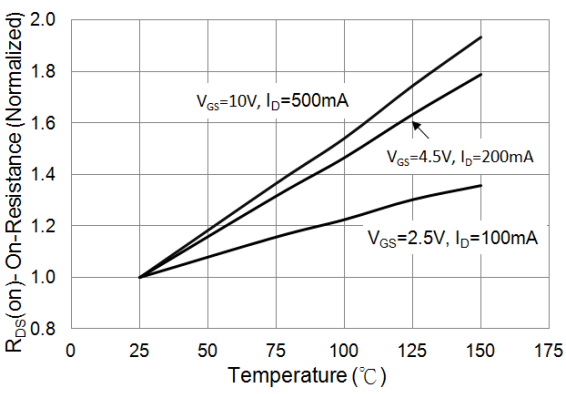


Fig.4 On-Resistance vs. Junction temperature

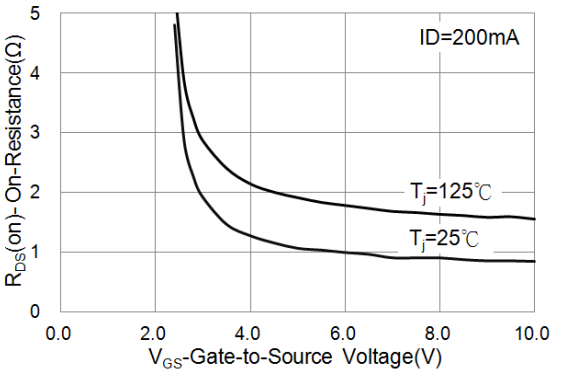


Fig.5 On-Resistance Variation with VGS.

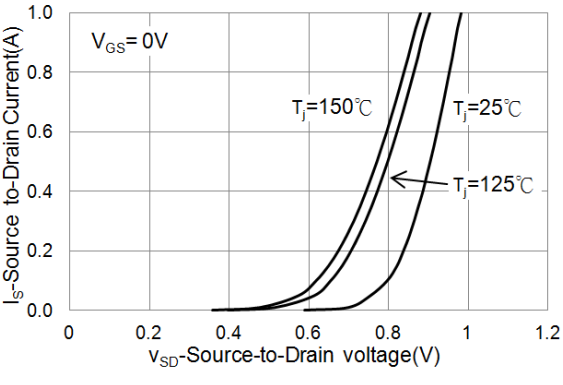


Fig.6 Body Diode CharacterIsIcs

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## TYPICAL CHARACTERISTIC CURVES

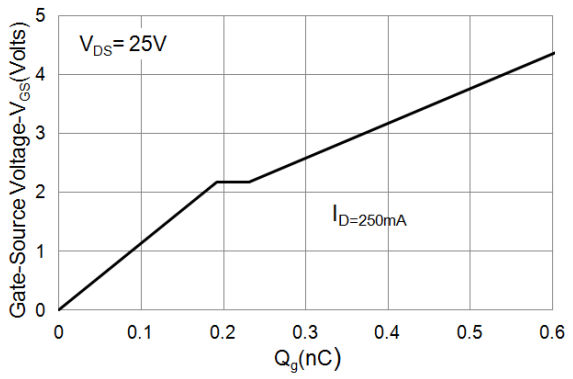



Fig.7 Gate-Charge Characteristics

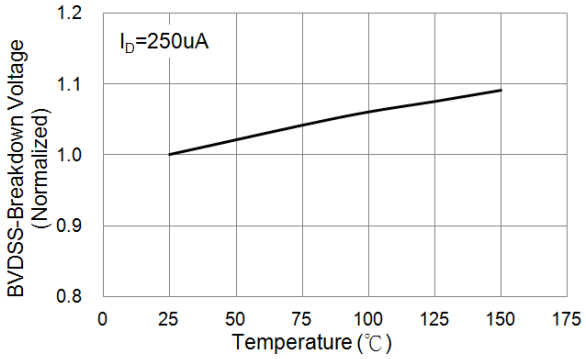



Fig.8 Breakdown Voltage Variation vs. Temperature

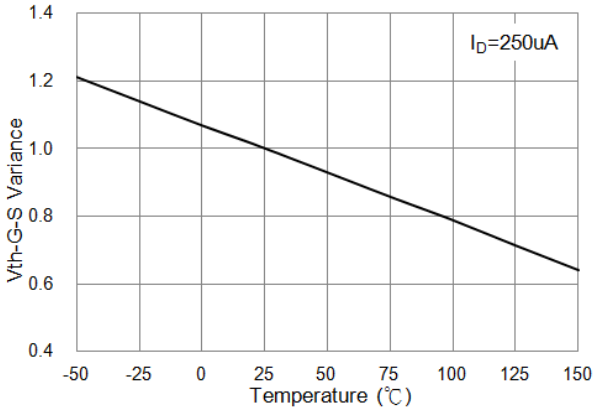



Fig.9 Threshold Voltage Variation with Temperature.

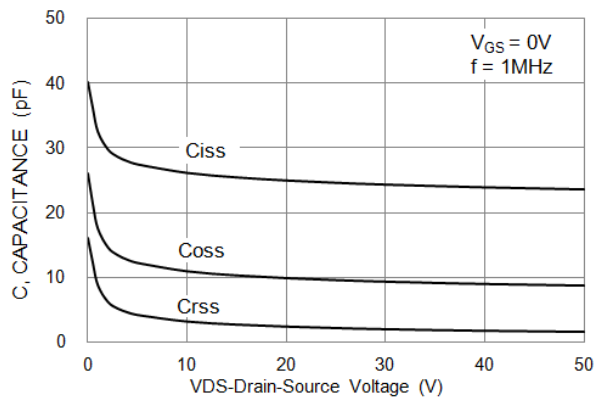



Fig.10 Capacitance vs. Drain-Source Voltage.

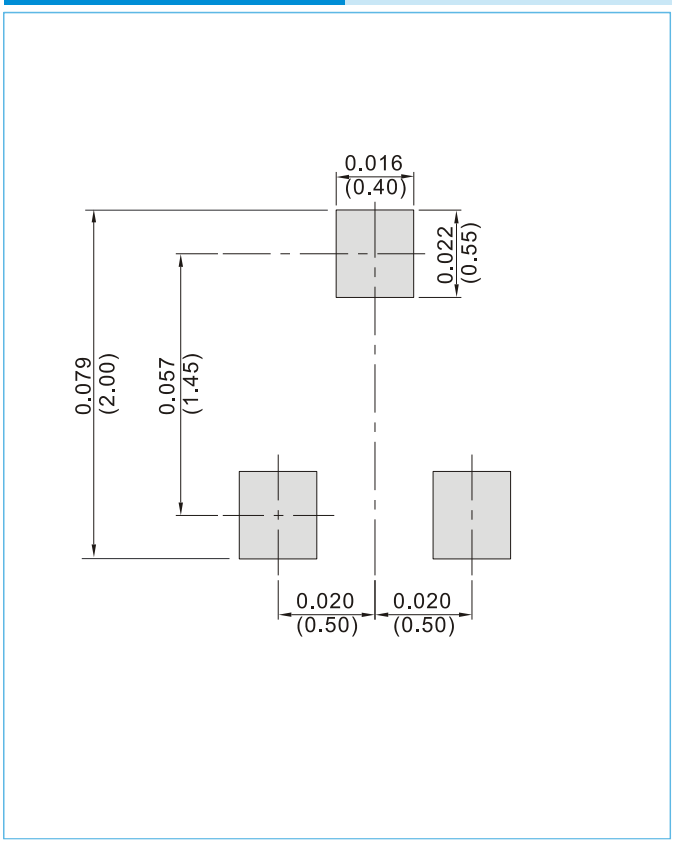
# PJE138K

## Product and Packing Information

| Part No. | Package Type | Packing Type | Marking |
|---|---|---|---|
| PJE138K | SOT-523 | 4K pcs / 7” reel | 8KT |

## Mounting Pad Layout

SOT-523 Unit : inch(mm)



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