

# PJX8601

## Complementary Enhancement Mode MOSFET – ESD Protected

**Voltage**

**20 / -20V**

**Current**

**0.5A / -0.5A**

### Features

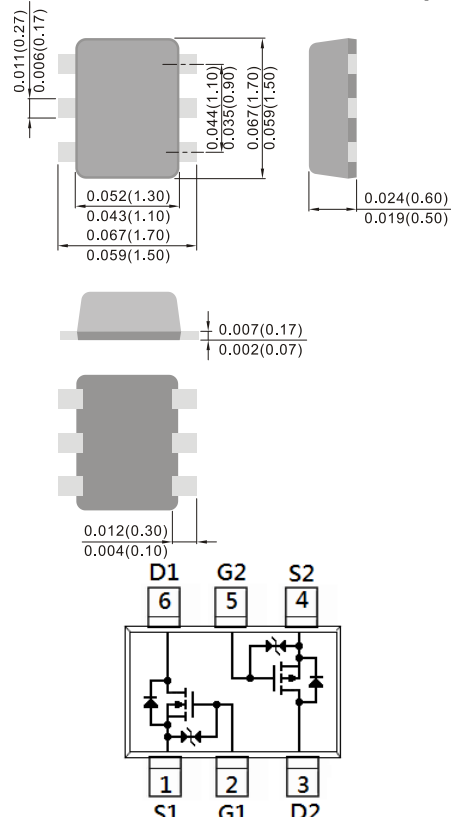
- Low Voltage Drive (1.2V)
- Advanced Trench Process Technology
- Specially Designed for Switch Load, PWM Application, etc.
- ESD Protected
- Lead free in compliance with EU RoHS2.0 (2011/65/EU & 2015/865/EU directive)
- Green molding compound as per IEC61249 Std.. (Halogen Free)

### Mechanical Data

- Case: SOT-563 Package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.00009 ounces, 0.026 grams

**SOT-563**

**Unit: inch(mm)**



## Maximum Ratings and Thermal Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

| PARAMETER                                        |                      | SYMBOL                            | N-Ch LIMIT | P-Ch LIMIT | UNITS |
|--------------------------------------------------|----------------------|-----------------------------------|------------|------------|-------|
| Drain-Source Voltage                             |                      | V <sub>DS</sub>                   | 20         | -20        | V     |
| Gate-Source Voltage                              |                      | V <sub>GS</sub>                   | ±10        | ±10        | V     |
| Continuous Drain Current                         |                      | I <sub>D</sub>                    | 0.5        | -0.5       | A     |
| Pulsed Drain Current (Note 4)                    |                      | I <sub>DM</sub>                   | 1.0        | -1.0       | A     |
| Power Dissipation                                | T <sub>a</sub> =25°C | P <sub>D</sub>                    | 300        |            | mW    |
|                                                  | Derate above 25°C    |                                   | 2.4        |            | mW/°C |
| Operating Junction and Storage Temperature Range |                      | T <sub>J</sub> , T <sub>STG</sub> | -55~150    |            | °C    |
| Typical Thermal Resistance                       |                      | R <sub>θJA</sub>                  | 417        |            | °C/W  |
| - Junction to Ambient (Note 3)                   |                      |                                   |            |            |       |



# PJX8601

## N-Channel Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

| PARAMETER                                             | SYMBOL              | TEST CONDITION                                                                                         | MIN. | TYP. | MAX. | UNITS |
|-------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------|------|------|------|-------|
| Static                                                |                     |                                                                                                        |      |      |      |       |
| Drain-Source Breakdown Voltage                        | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> = 250uA                                                            | 20   | -    | -    | V     |
| Gate Threshold Voltage                                | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> = 250uA                                              | 0.3  | 0.64 | 0.9  | V     |
| Drain-Source On-State Resistance                      | R <sub>DS(on)</sub> | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 500mA                                                         | -    | 0.31 | 0.4  | Ω     |
|                                                       |                     | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 200mA                                                         | -    | 0.36 | 0.65 |       |
|                                                       |                     | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 100mA                                                         | -    | 0.43 | 0.8  |       |
|                                                       |                     | V <sub>GS</sub> = 1.5V, I <sub>D</sub> = 50mA                                                          | -    | 0.51 | 1.2  |       |
|                                                       |                     | V <sub>GS</sub> = 1.2V, I <sub>D</sub> = 20mA                                                          | -    | 0.71 | 3.0  |       |
| Zero Gate Voltage Drain Current                       | I <sub>DSS</sub>    | V <sub>DS</sub> = 16V, V <sub>GS</sub> =0V                                                             | -    | -    | 1    | uA    |
| Gate-Source Leakage Current                           | I <sub>GSS</sub>    | V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V                                                              | -    | ±0.5 | ±10  | uA    |
| Dynamic (Note 5)                                      |                     |                                                                                                        |      |      |      |       |
| Total Gate Charge                                     | Q <sub>g</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =500mA,<br>V <sub>GS</sub> =4.5V                                  | -    | 1.4  | -    | nC    |
| Gate-Source Charge                                    | Q <sub>gs</sub>     |                                                                                                        | -    | 0.22 | -    |       |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     |                                                                                                        | -    | 0.21 | -    |       |
| Input Capacitance                                     | C <sub>iss</sub>    | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V,<br>f=1.0MHZ                                                 | -    | 67   | -    | pF    |
| Output Capacitance                                    | C <sub>oss</sub>    |                                                                                                        | -    | 19   | -    |       |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    |                                                                                                        | -    | 6    | -    |       |
| Turn-On Delay Time                                    | td <sub>(on)</sub>  | V <sub>DD</sub> =10V, I <sub>D</sub> =150mA,<br>V <sub>GS</sub> =4V,<br>R <sub>G</sub> =10Ω (Note 1,2) | -    | 2.8  | -    | ns    |
| Turn-On Rise Time                                     | tr                  |                                                                                                        | -    | 20   | -    |       |
| Turn-Off Delay Time                                   | td <sub>(off)</sub> |                                                                                                        | -    | 23   | -    |       |
| Turn-Off Fall Time                                    | tf                  |                                                                                                        | -    | 23   | -    |       |
| Drain-Source Diode                                    |                     |                                                                                                        |      |      |      |       |
| Maximum Continuous Drain-Source Diode Forward Current | I <sub>S</sub>      | ---                                                                                                    | -    | -    | 500  | mA    |
| Diode Forward Voltage                                 | V <sub>SD</sub>     | I <sub>S</sub> = 500mA, V <sub>GS</sub> =0V                                                            | -    | 0.87 | 1.3  | V     |



# PJX8601

## P-Channel Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

| PARAMETER                                             | SYMBOL              | TEST CONDITION                                                                                             | MIN. | TYP. | MAX. | UNITS |
|-------------------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------|------|------|------|-------|
| Static                                                |                     |                                                                                                            |      |      |      |       |
| Drain-Source Breakdown Voltage                        | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA                                                                | -20  | -    | -    | V     |
| Gate Threshold Voltage                                | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA                                                  | -0.3 | -0.6 | -1.0 | V     |
| Drain-Source On-State Resistance                      | R <sub>DS(on)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-500mA                                                             | -    | 0.9  | 1.2  | Ω     |
|                                                       |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-200mA                                                             | -    | 1.07 | 1.5  |       |
|                                                       |                     | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-100mA                                                             | -    | 1.25 | 2.2  |       |
|                                                       |                     | V <sub>GS</sub> =-1.5V, I <sub>D</sub> =-40mA                                                              | -    | 1.42 | 3.6  |       |
|                                                       |                     | V <sub>GS</sub> =-1.2V, I <sub>D</sub> =-10mA                                                              | -    | 1.7  | 6.0  |       |
| Zero Gate Voltage Drain Current                       | I <sub>DSS</sub>    | V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V                                                                 | -    | -    | -1   | uA    |
| Gate-Source Leakage Current                           | I <sub>GSS</sub>    | V <sub>GS</sub> =+8V, V <sub>DS</sub> =0V                                                                  | -    | +2   | +10  | uA    |
| Dynamic (Note 5)                                      |                     |                                                                                                            |      |      |      |       |
| Total Gate Charge                                     | Q <sub>g</sub>      | V <sub>DS</sub> =-10V, I <sub>D</sub> =-500mA,<br>V <sub>GS</sub> =-4.5V                                   | -    | 1.4  | -    | nC    |
| Gate-Source Charge                                    | Q <sub>gs</sub>     |                                                                                                            | -    | 0.19 | -    |       |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     |                                                                                                            | -    | 0.2  | -    |       |
| Input Capacitance                                     | C <sub>iss</sub>    | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V,<br>f=1.0MHZ                                                    | -    | 38   | -    | pF    |
| Output Capacitance                                    | C <sub>oss</sub>    |                                                                                                            | -    | 15   | -    |       |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    |                                                                                                            | -    | 9    | -    |       |
| Turn-On Delay Time                                    | td <sub>(on)</sub>  | V <sub>DD</sub> =-10V, I <sub>D</sub> =-500mA,<br>V <sub>GS</sub> =-4.5V,<br>R <sub>G</sub> =6Ω (Note 1,2) | -    | 7.2  | -    | ns    |
| Turn-On Rise Time                                     | tr                  |                                                                                                            | -    | 21   | -    |       |
| Turn-Off Delay Time                                   | td <sub>(off)</sub> |                                                                                                            | -    | 85   | -    |       |
| Turn-Off Fall Time                                    | tf                  |                                                                                                            | -    | 116  | -    |       |
| Drain-Source Diode                                    |                     |                                                                                                            |      |      |      |       |
| Maximum Continuous Drain-Source Diode Forward Current | I <sub>S</sub>      | ---                                                                                                        | -    | -    | -500 | mA    |
| Diode Forward Voltage                                 | V <sub>SD</sub>     | I <sub>S</sub> =-500mA, V <sub>GS</sub> =0V                                                                | -    | -0.9 | -1.3 | V     |

### NOTES :

1. Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
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 FR-4 with 2oz. square pad of copper.
4. The maximum current rating is package limited.
5. Guaranteed by design, not subject to production testing.

# PJX8601

## N-Channel TYPICAL CHARACTERISTIC CURVES

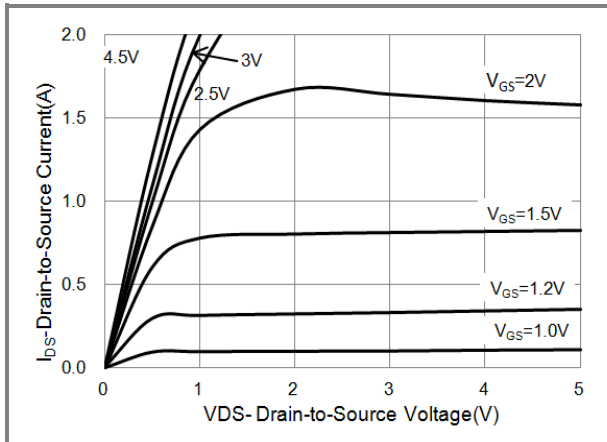


Fig.1 On-Region Characteristics

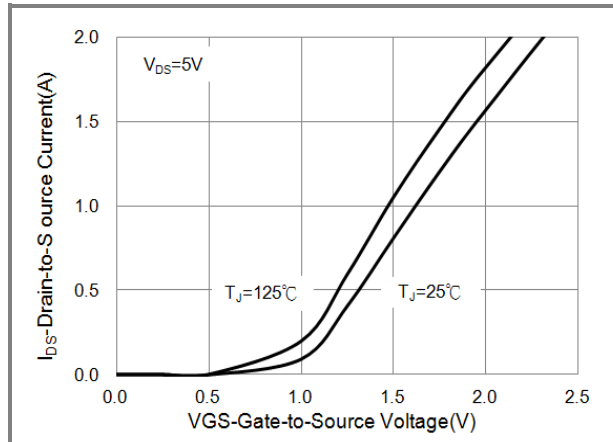


Fig.2 Transfer Characteristics

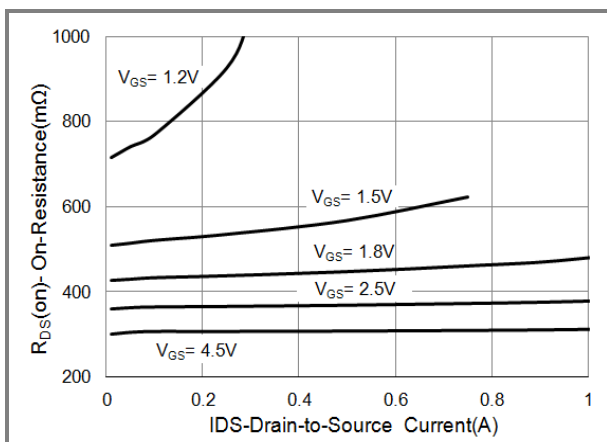


Fig.3 On-Resistance vs. Drain Current

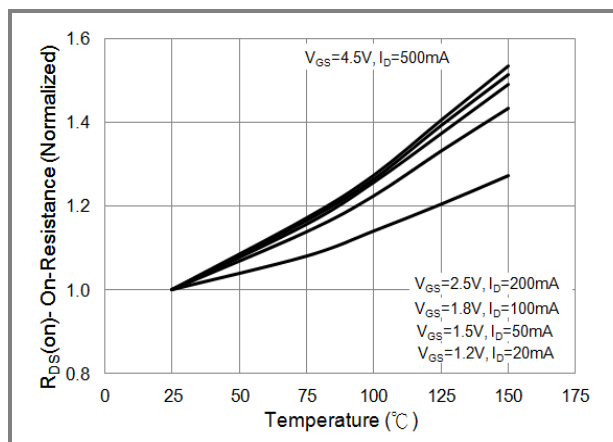


Fig.4 On-Resistance vs. Junction temperature

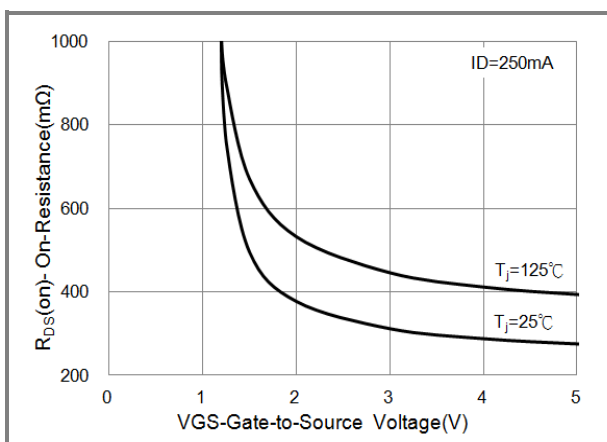


Fig.5 On-Resistance Variation with V\_GS.

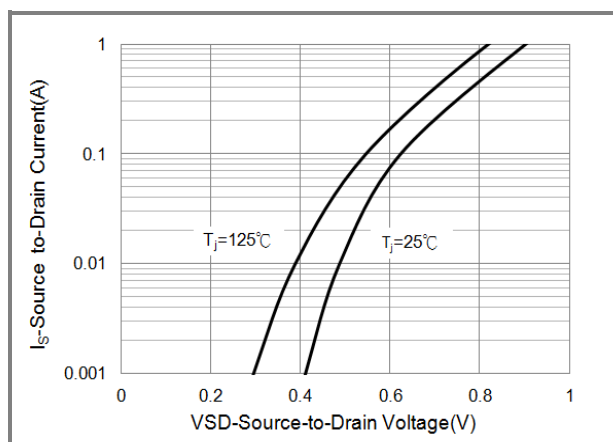


Fig.6 Body Diode Characteristics



## PJX8601

### N-Channel TYPICAL CHARACTERISTIC CURVES

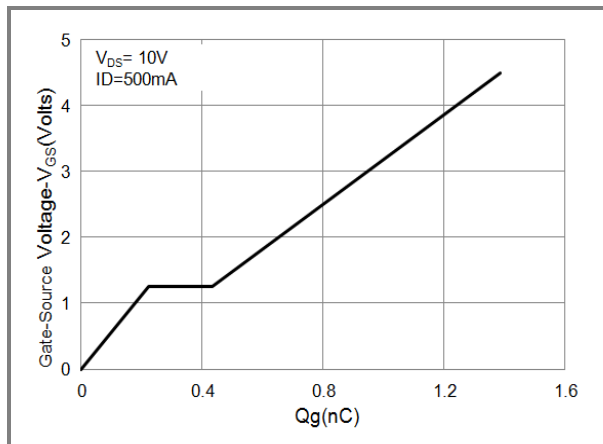


Fig.7 Gate-Charge Characteristics

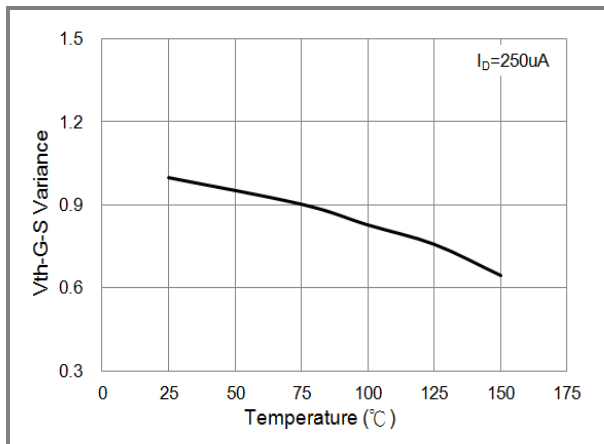


Fig.8 Threshold Voltage Variation with Temperature.

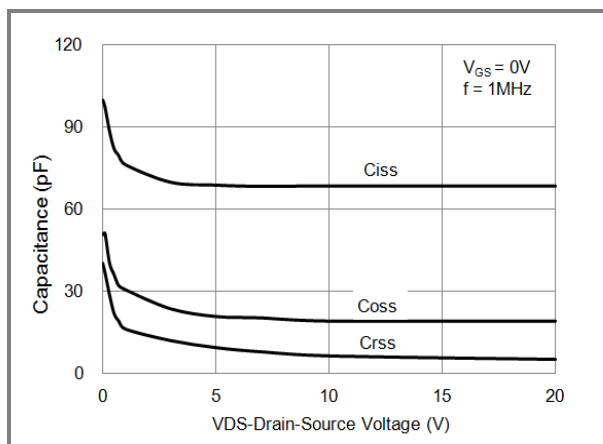


Fig.9 Capacitance vs. Drain-Source Voltage.

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## P-Channel TYPICAL CHARACTERISTIC CURVES

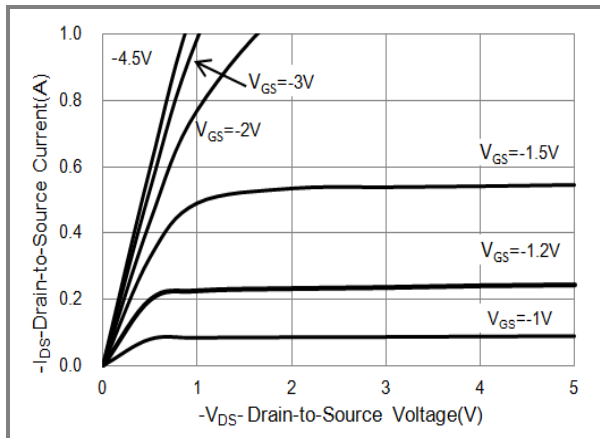


Fig.1 On-Region Characteristics

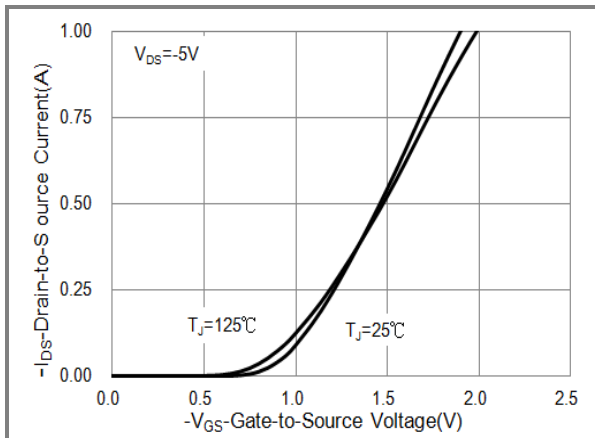


Fig.2 Transfer Characteristics

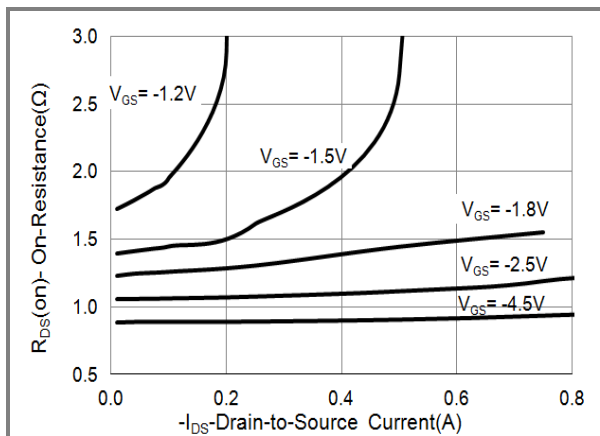


Fig.3 On-Resistance vs. Drain Current

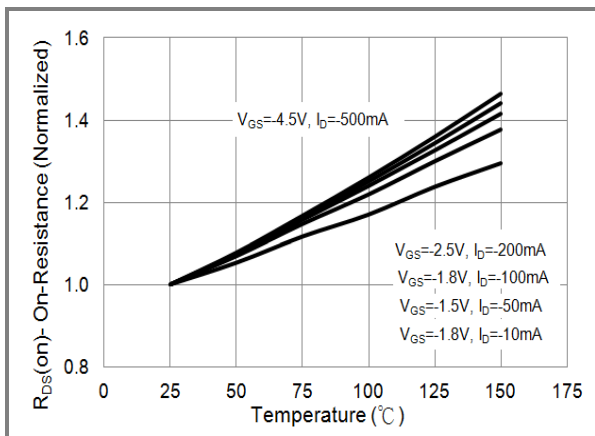


Fig.4 On-Resistance vs. Junction temperature

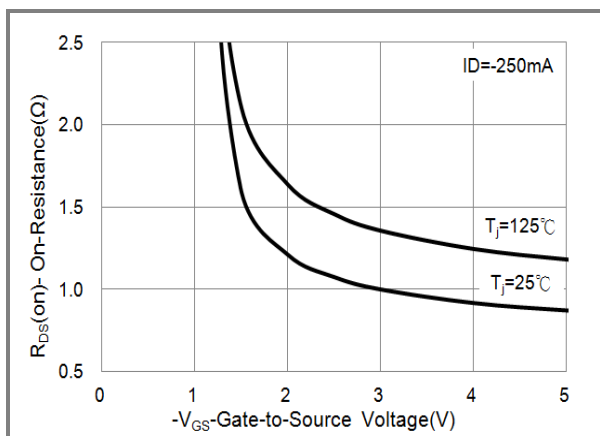


Fig.5 On-Resistance Variation with V\_GS.

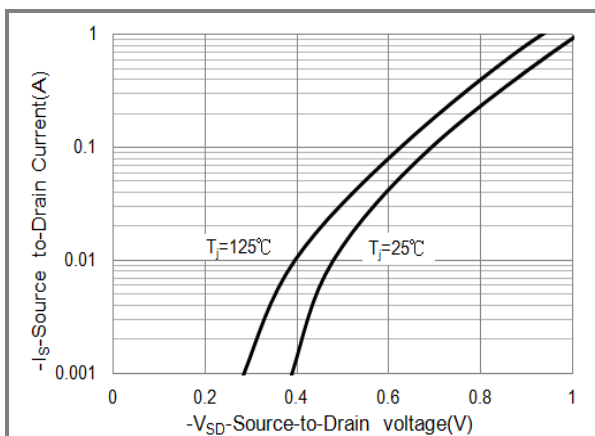


Fig.6 Body Diode Characteristics



## PJX8601

### P-Channel TYPICAL CHARACTERISTIC CURVES

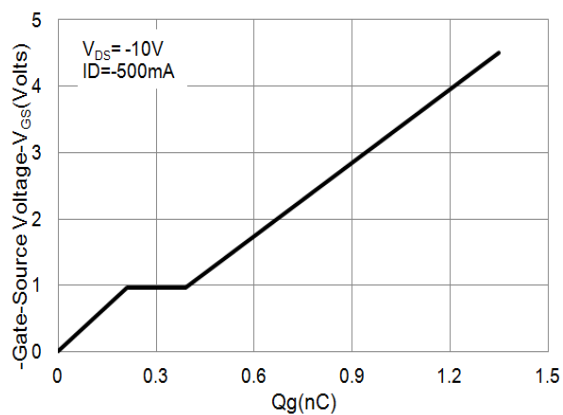


Fig.7 Gate-Charge Characteristics

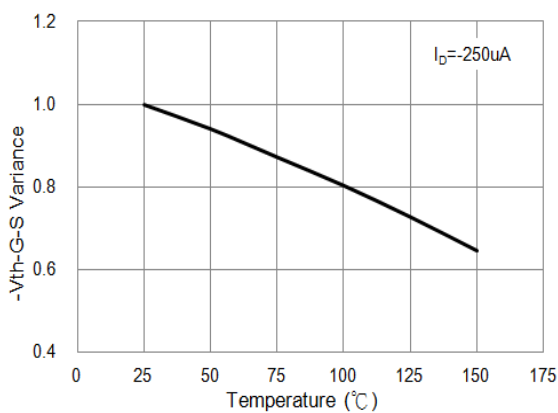


Fig.8 Threshold Voltage Variation with Temperature.

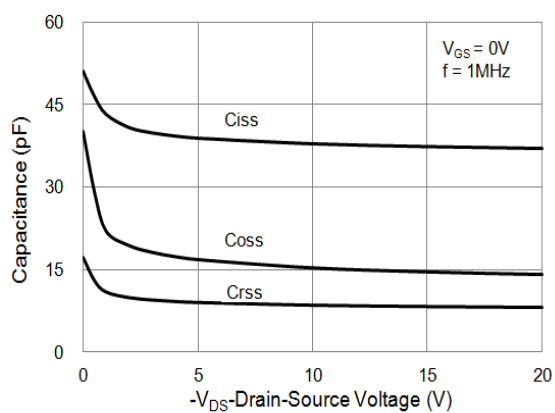
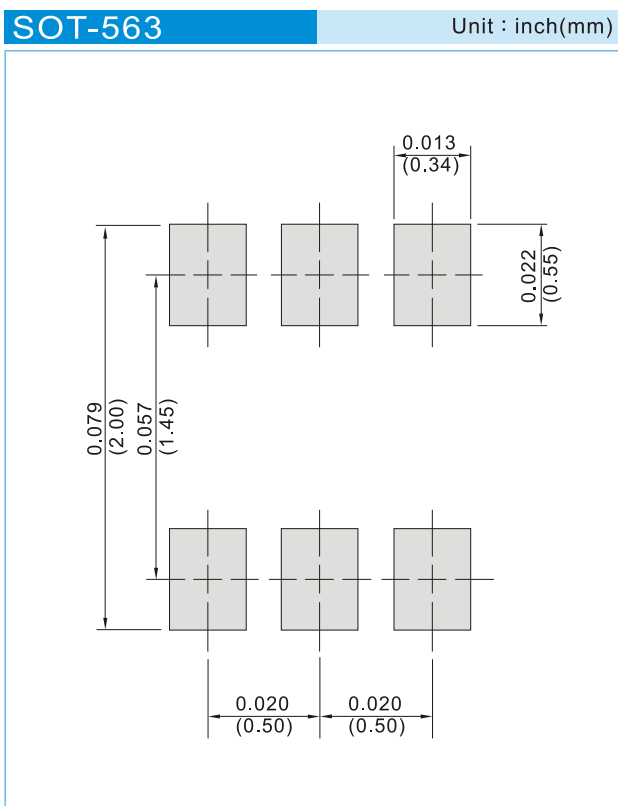


Fig.9 Threshold Voltage Variation with Temperature.

## PART NO PACKING CODE VERSION

| Part No Packing Code | Package Type | Packing Type     | Marking | Version      |
|----------------------|--------------|------------------|---------|--------------|
| PJX8601_R1_00001     | SOT-563      | 4K pcs / 7" reel | X61     | Halogen free |

## MOUNTING PAD LAYOUT







## PJX8601

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