



# PJS6601

## 20V Complementary Enhancement Mode MOSFET

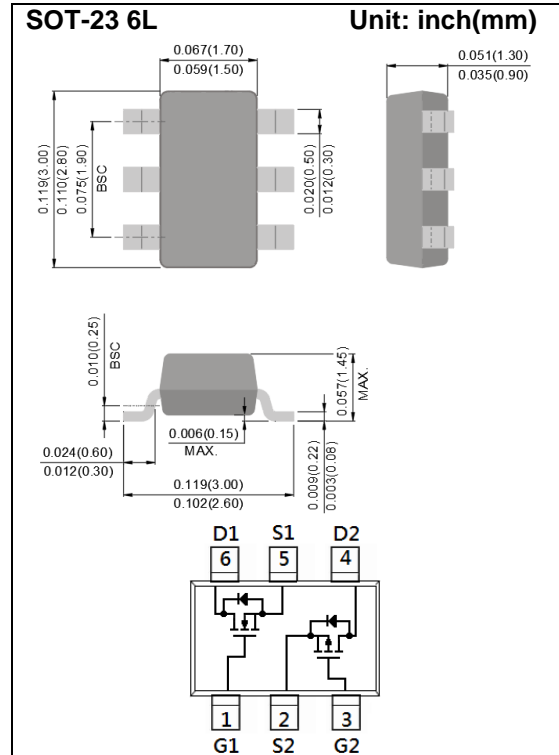
**Voltage** 20 / -20V **Current** 4.1 / -3.1A

### Features

- Advanced Trench Process Technology
- Specially Designed for Switch Load, PWM Application, etc.
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### Mechanical Data

- Case: SOT-23 6L Package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.0005 ounces, 0.014 grams
- Marking: SC1



### Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°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>                   | ±12        | ±12        | V     |
| Continuous Drain Current                         |                      | I <sub>D</sub>                    | 4.1        | -3.1       | A     |
| Pulsed Drain Current <sup>(Note 4)</sup>         |                      | I <sub>DM</sub>                   | 16.4       | -12.4      | A     |
| Power Dissipation                                | T <sub>a</sub> =25°C | P <sub>D</sub>                    | 1.25       |            | W     |
|                                                  | Derate above 25°C    |                                   | 10         |            | 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>                  | 100        |            | °C/W  |
| - Junction to Ambient <sup>(Note 3)</sup>        |                      |                                   |            |            |       |



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## N-Channel Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| PARAMETER                                             | SYMBOL              | TEST CONDITION                                                                                                    | MIN. | TYP. | MAX. | UNITS |
|-------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------|------|------|------|-------|
| <b>Static</b>                                         |                     |                                                                                                                   |      |      |      |       |
| 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                                                          | 0.4  | 0.66 | 1.2  | V     |
| Drain-Source On-State Resistance                      | R <sub>DS(on)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.1A                                                                       | -    | 41   | 56   | mΩ    |
|                                                       |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =2.8A                                                                       | -    | 50   | 68   |       |
|                                                       |                     | V <sub>GS</sub> =1.8V, I <sub>D</sub> =1.5A                                                                       | -    | 66   | 95   |       |
| Zero Gate Voltage Drain Current                       | I <sub>DSS</sub>    | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V                                                                         | -    | -    | 1    | uA    |
| Gate-Source Leakage Current                           | I <sub>GSS</sub>    | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V                                                                        | -    | -    | ±100 | nA    |
| <b>Dynamic</b> <sup>(Note 5)</sup>                    |                     |                                                                                                                   |      |      |      |       |
| Total Gate Charge                                     | Q <sub>g</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =4.1A,<br>V <sub>GS</sub> =4.5V <sup>(Note 1,2)</sup>                        | -    | 4.6  | -    | nC    |
| Gate-Source Charge                                    | Q <sub>gs</sub>     |                                                                                                                   | -    | 0.8  | -    |       |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     |                                                                                                                   | -    | 1    | -    |       |
| Input Capacitance                                     | C <sub>iss</sub>    | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V,<br>f=1.0MHZ                                                            | -    | 350  | -    | pF    |
| Output Capacitance                                    | C <sub>oss</sub>    |                                                                                                                   | -    | 40   | -    |       |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    |                                                                                                                   | -    | 29   | -    |       |
| Turn-On Delay Time                                    | t <sub>d(on)</sub>  | V <sub>DD</sub> =10V, I <sub>D</sub> =4.1A,<br>V <sub>GS</sub> =4.5V,<br>R <sub>G</sub> =6Ω <sup>(Note 1,2)</sup> | -    | 4    | -    | ns    |
| Turn-On Rise Time                                     | t <sub>r</sub>      |                                                                                                                   | -    | 47   | -    |       |
| Turn-Off Delay Time                                   | t <sub>d(off)</sub> |                                                                                                                   | -    | 18   | -    |       |
| Turn-Off Fall Time                                    | t <sub>f</sub>      |                                                                                                                   | -    | 10   | -    |       |
| <b>Drain-Source Diode</b>                             |                     |                                                                                                                   |      |      |      |       |
| Maximum Continuous Drain-Source Diode Forward Current | I <sub>S</sub>      | ---                                                                                                               | -    | -    | 1.5  | A     |
| Diode Forward Voltage                                 | V <sub>SD</sub>     | I <sub>S</sub> =1.0A, V <sub>GS</sub> =0V                                                                         | -    | 0.75 | 1.2  | V     |

**NOTES :**

1. Pulse width ≤ 300us, Duty cycle ≤ 2%
2. Essentially independent of operating temperature typical characteristics.
3. R<sub>θJA</sub> 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



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## P-Channel Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| PARAMETER                                             | SYMBOL              | TEST CONDITION                                                                                            | MIN. | TYP.  | MAX. | UNITS |
|-------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------|------|-------|------|-------|
| <b>Static</b>                                         |                     |                                                                                                           |      |       |      |       |
| 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                                                 | -0.4 | -0.71 | -1.2 | V     |
| Drain-Source On-State Resistance                      | R <sub>DS(on)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3.1A                                                             | -    | 84    | 100  | mΩ    |
|                                                       |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.0A                                                             | -    | 104   | 135  |       |
|                                                       |                     | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-1.1A                                                             | -    | 134   | 190  |       |
| Zero Gate Voltage Drain Current                       | I <sub>DSS</sub>    | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V                                                                | -    | -     | -1   | uA    |
| Gate-Source Leakage Current                           | I <sub>GSS</sub>    | V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V                                                                | -    | -     | ±100 | nA    |
| <b>Dynamic</b> (Note 5)                               |                     |                                                                                                           |      |       |      |       |
| Total Gate Charge                                     | Q <sub>g</sub>      | V <sub>DS</sub> =-10V, I <sub>D</sub> =-3.1A,<br>V <sub>GS</sub> =-4.5V (Note 1,2)                        | -    | 5.4   | -    | nC    |
| Gate-Source Charge                                    | Q <sub>gs</sub>     |                                                                                                           | -    | 0.7   | -    |       |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     |                                                                                                           | -    | 1.3   | -    |       |
| Input Capacitance                                     | C <sub>iss</sub>    | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V,<br>f=1.0MHZ                                                   | -    | 416   | -    | pF    |
| Output Capacitance                                    | C <sub>oss</sub>    |                                                                                                           | -    | 43    | -    |       |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    |                                                                                                           | -    | 32    | -    |       |
| Turn-On Delay Time                                    | t <sub>d(on)</sub>  | V <sub>DD</sub> =-10V, I <sub>D</sub> =-3.1A,<br>V <sub>GS</sub> =-4.5V,<br>R <sub>G</sub> =6Ω (Note 1,2) | -    | 4     | -    | ns    |
| Turn-On Rise Time                                     | t <sub>r</sub>      |                                                                                                           | -    | 27    | -    |       |
| Turn-Off Delay Time                                   | t <sub>d(off)</sub> |                                                                                                           | -    | 78    | -    |       |
| Turn-Off Fall Time                                    | t <sub>f</sub>      |                                                                                                           | -    | 45    | -    |       |
| <b>Drain-Source Diode</b>                             |                     |                                                                                                           |      |       |      |       |
| Maximum Continuous Drain-Source Diode Forward Current | I <sub>S</sub>      | ---                                                                                                       | -    | -     | -1.5 | A     |
| Diode Forward Voltage                                 | V <sub>SD</sub>     | I <sub>S</sub> =-1.0A, V <sub>GS</sub> =0V                                                                | -    | -0.8  | -1.2 | V     |

**NOTES :**

1. Pulse width ≤ 300us, Duty cycle ≤ 2%
2. Essentially independent of operating temperature typical characteristics.
3. R<sub>θJA</sub> 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.
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## N-Channel TYPICAL CHARACTERISTIC CURVES

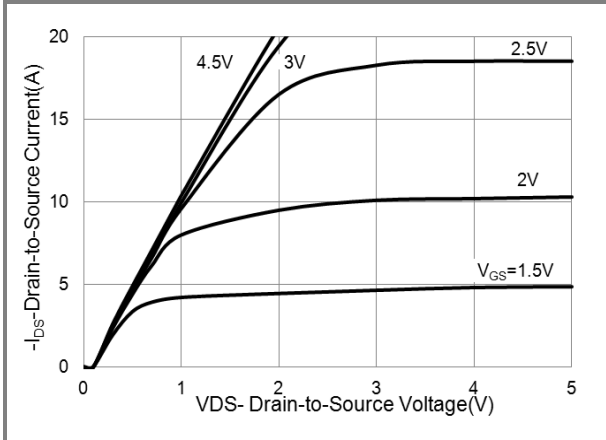


Fig.1 On-Region Characteristics

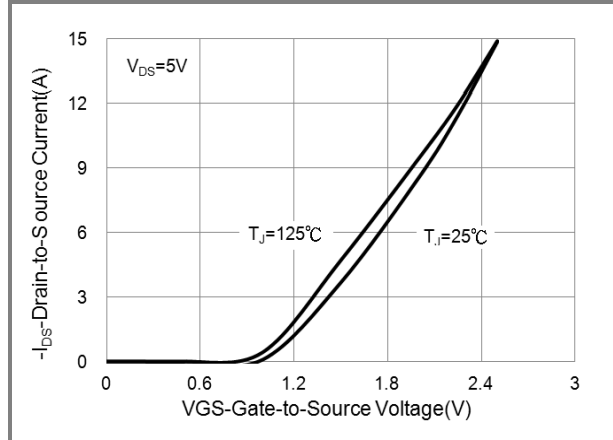


Fig.2 Transfer Characteristics

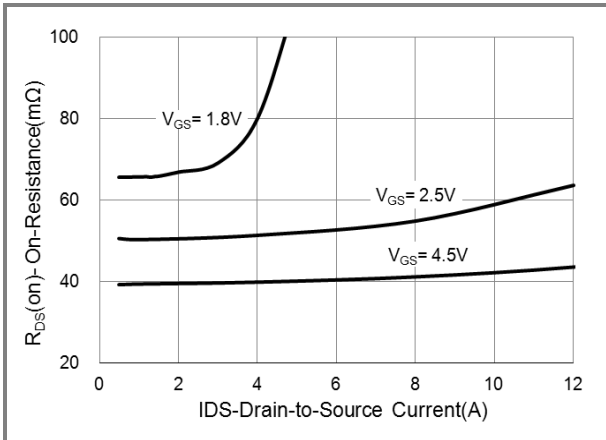


Fig.3 On-Resistance vs. Drain Current

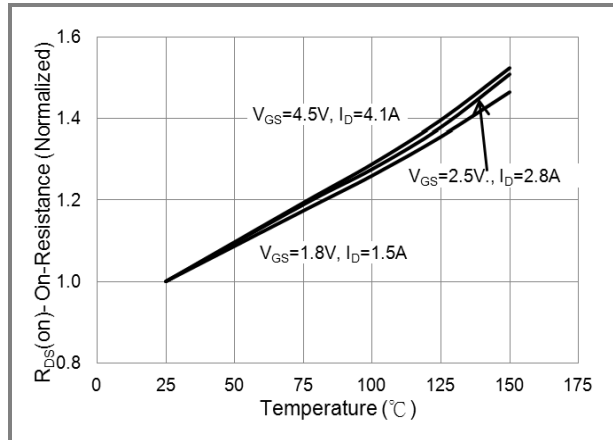


Fig.4 On-Resistance vs. Junction temperature

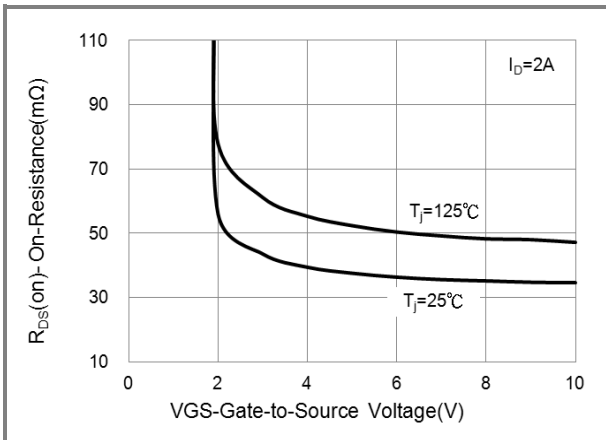


Fig.5 On-Resistance Variation with VGS.

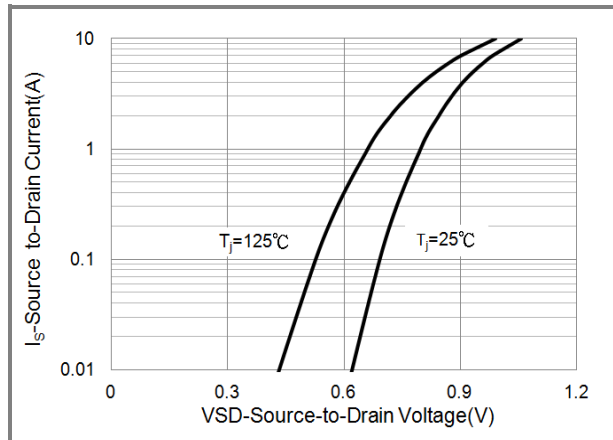


Fig.6 Body Diode Characteristics



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## N-Channel TYPICAL CHARACTERISTIC CURVES

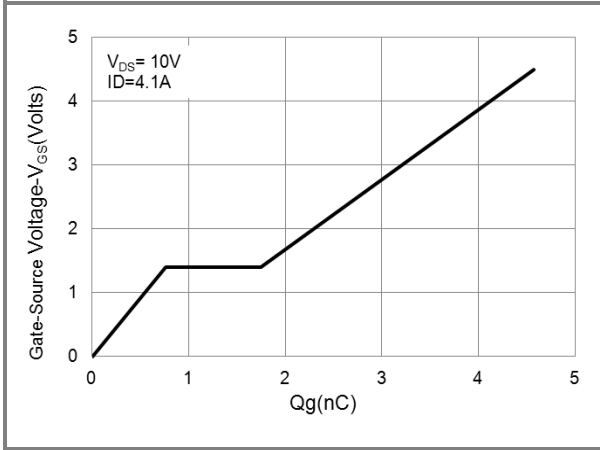


Fig.7 Gate-Charge Characteristics

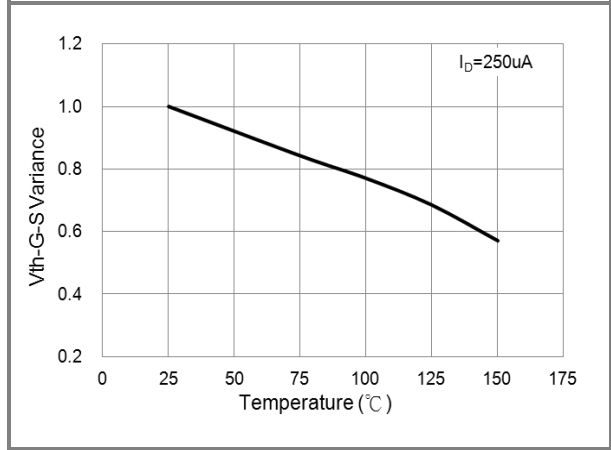


Fig.8 Threshold Voltage Variation with Temperature.

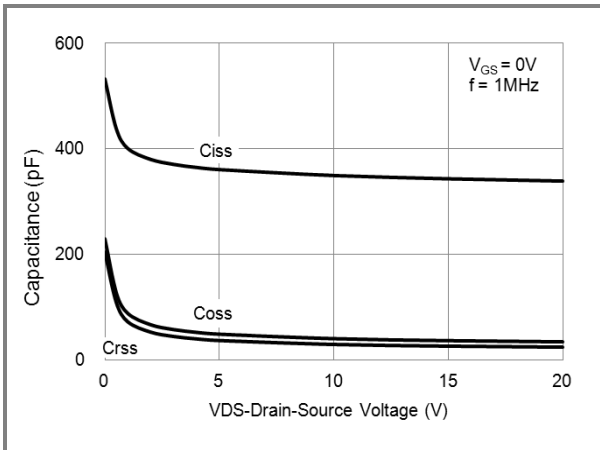


Fig.9 Capacitance vs. Drain-Source Voltage.



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## P-Channel TYPICAL CHARACTERISTIC CURVES

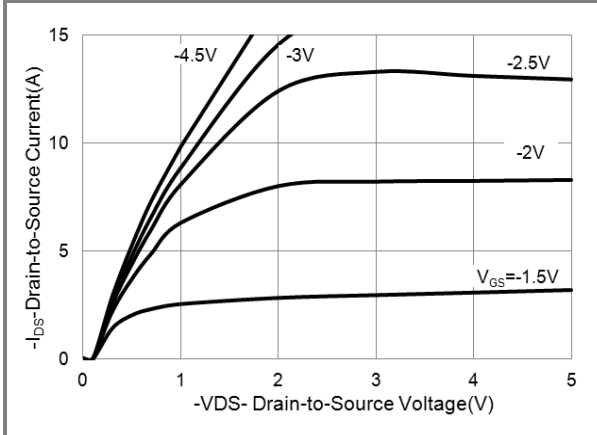


Fig.1 On-Region Characteristics

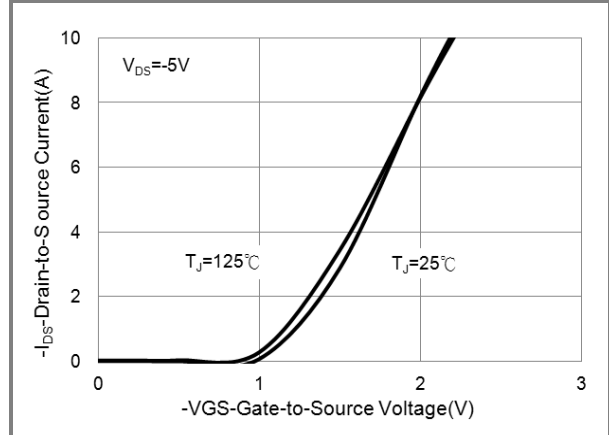


Fig.2 Transfer Characteristics

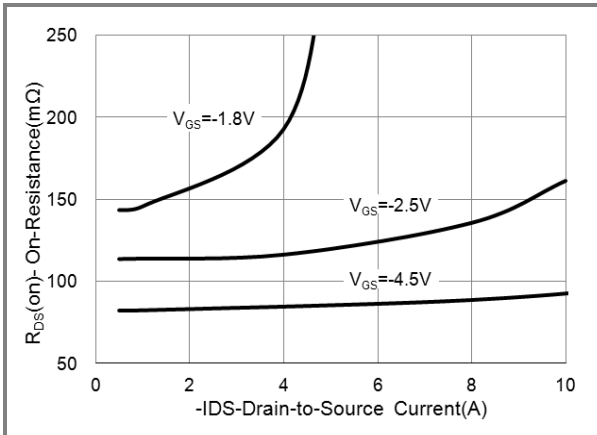


Fig.3 On-Resistance vs. Drain Current

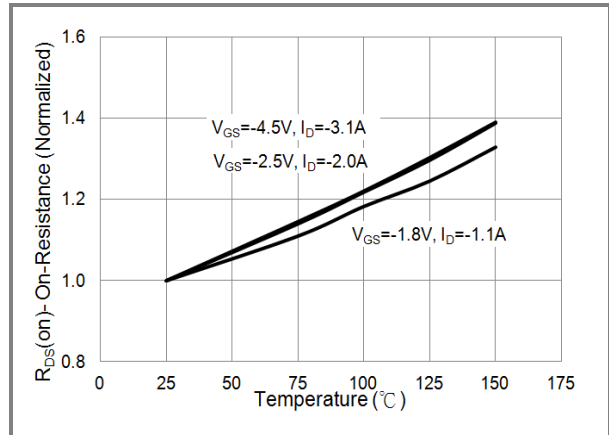


Fig.4 On-Resistance vs. Junction temperature

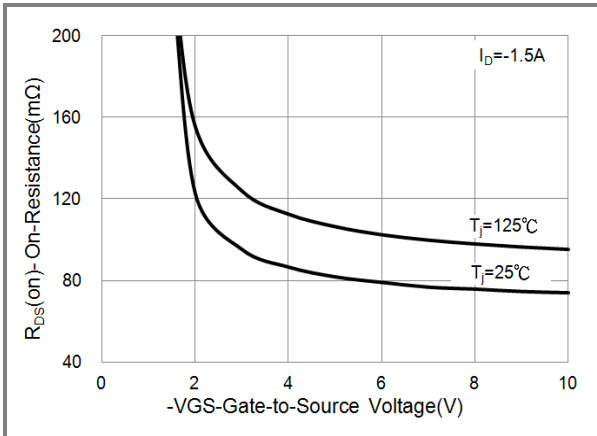


Fig.5 On-Resistance Variation with VGS.

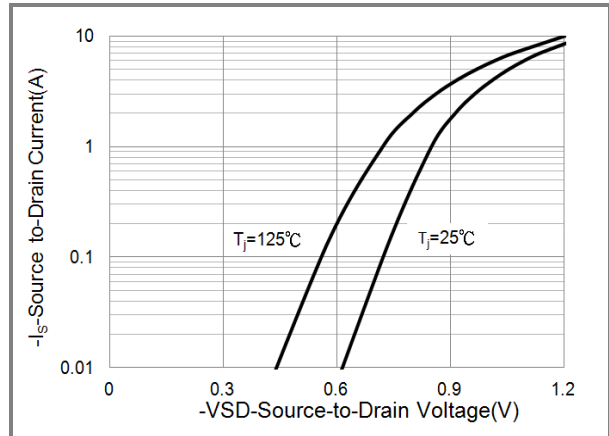


Fig.6 Body Diode Characteristics



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## P-Channel TYPICAL CHARACTERISTIC CURVES

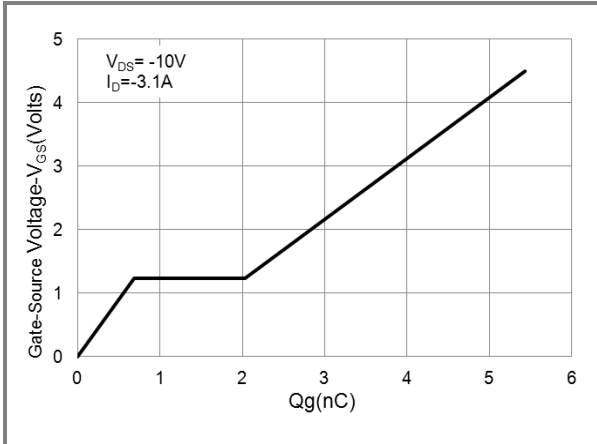


Fig.7 Gate-Charge Characteristics

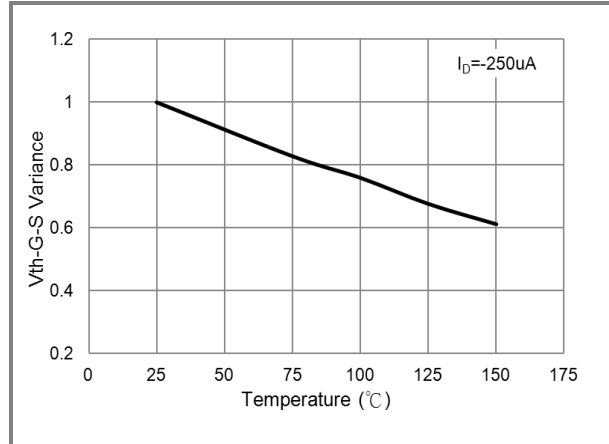


Fig.8 Threshold Voltage Variation with Temperature.

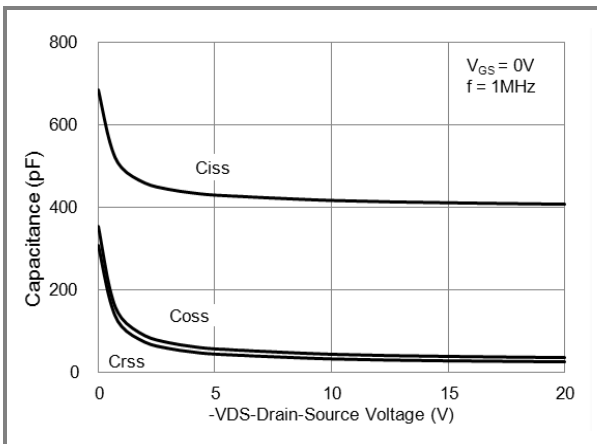


Fig.9 Threshold Voltage Variation with Temperature.

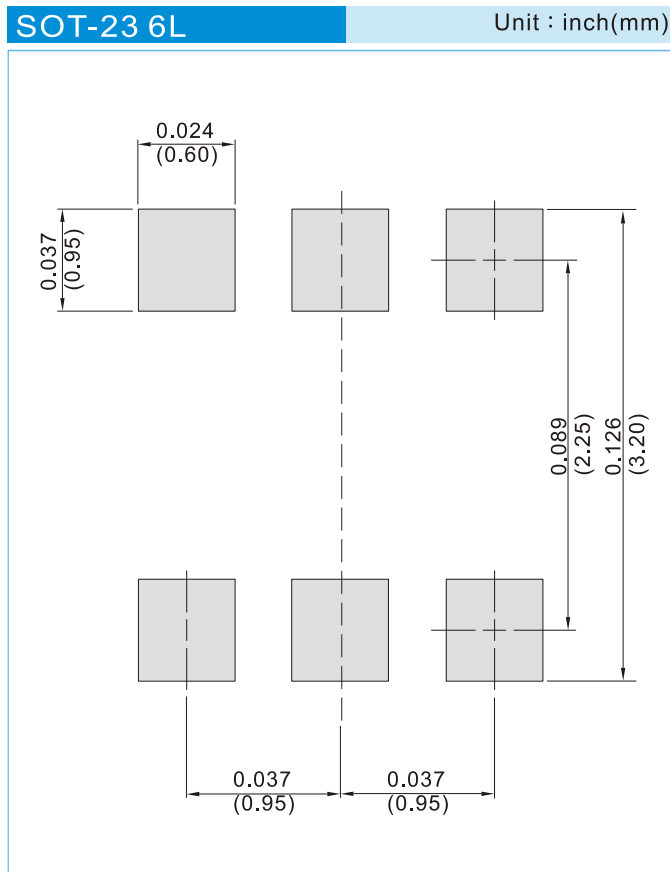


# PJS6601

## PART NO. PACKING CODE VERSION

| Part No. Packing Code | Package Type | Packing Type       | Marking | Version                        |
|-----------------------|--------------|--------------------|---------|--------------------------------|
| PJS6601_S1_00001      | SOT-23 6L    | 3K pcs / 7" reel   | SC1     | Halogen free<br>RoHS compliant |
| PJS6601_S2_00001      | SOT-23 6L    | 10K pcs / 13" reel | SC1     | Halogen free<br>RoHS compliant |

## MOUNTING PAD LAYOUT







## PJS6601

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