

# PJA3415

## 20V P-Channel Enhancement Mode MOSFET

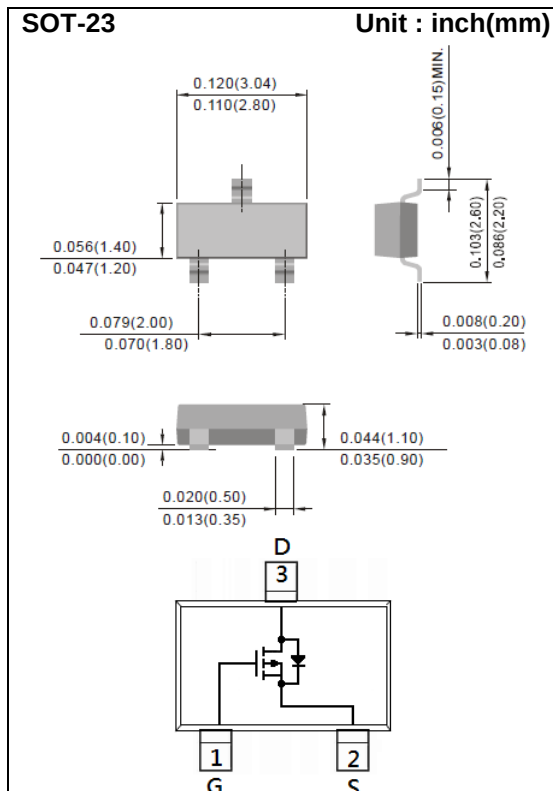
|                |              |                |              |
|----------------|--------------|----------------|--------------|
| <b>Voltage</b> | <b>-20 V</b> | <b>Current</b> | <b>-4.0A</b> |
|----------------|--------------|----------------|--------------|

### Features

- $R_{DS(ON)}$  ,  $V_{GS}@-4.5V$  ,  $I_D@-4.0A < 57m\Omega$
- $R_{DS(ON)}$  ,  $V_{GS}@-2.5V$  ,  $I_D@-2.8A < 70m\Omega$
- $R_{DS(ON)}$  ,  $V_{GS}@-1.8V$  ,  $I_D@-2.1A < 95m\Omega$
- Advanced Trench Process Technology
- Specially Designed for Switch Load, PWM Application, etc
- Lead free in compliance with EU RoHS 2011/65/EU directive.
- Green molding compound as per IEC61249 Std. (Halogen Free)

### Mechanical Data

- Case: SOT-23 Package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.0003 ounces, 0.0084 grams
- Marking: A15



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

| PARAMETER                                        |                      | SYMBOL                            | LIMIT   | UNITS |
|--------------------------------------------------|----------------------|-----------------------------------|---------|-------|
| Drain-Source Voltage                             |                      | V <sub>DS</sub>                   | -20     | V     |
| Gate-Source Voltage                              |                      | V <sub>GS</sub>                   | ±12     | V     |
| Continuous Drain Current                         |                      | I <sub>D</sub>                    | -4.0    | A     |
| Pulsed Drain Current                             |                      | I <sub>DM</sub>                   | -16     | 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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## Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

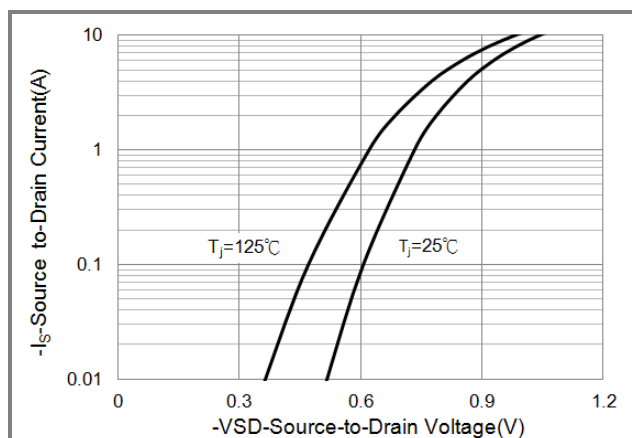
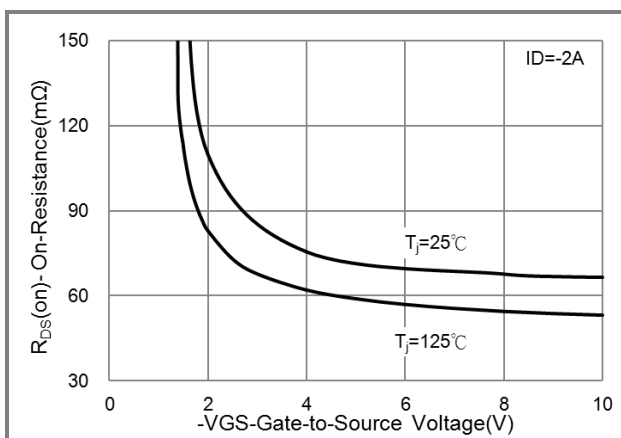
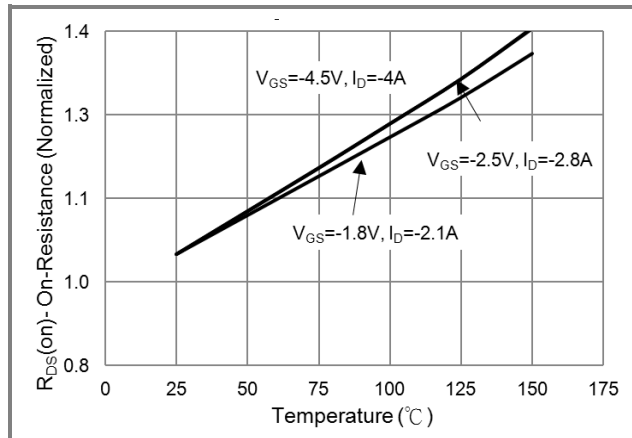
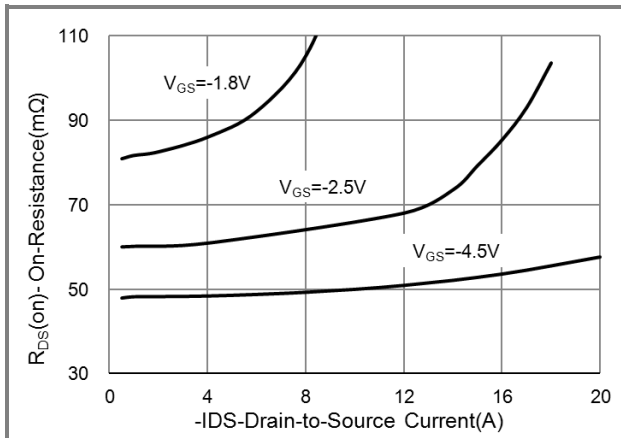
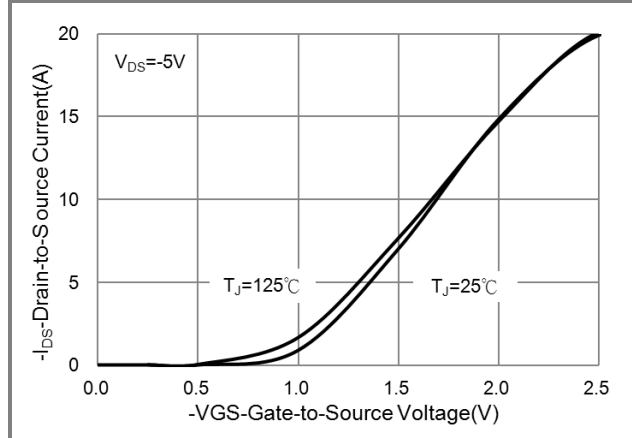
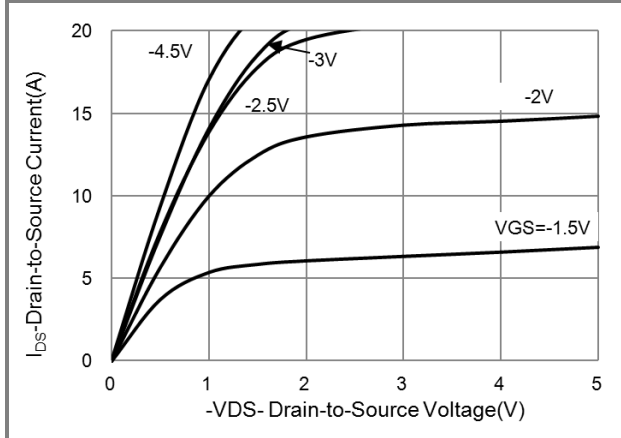
| PARAMETER                                             | SYMBOL              | TEST CONDITION                                                                                                       | MIN. | TYP.  | MAX. | UNITS |
|-------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------|------|-------|------|-------|
| 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                                                            | -0.4 | -0.62 | -1.2 | V     |
| Drain-Source On-State Resistance                      | R <sub>DS(on)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.0A                                                                        | -    | 50    | 57   | mΩ    |
|                                                       |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.8A                                                                        | -    | 59    | 70   |       |
|                                                       |                     | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-2.1A                                                                        | -    | 74    | 95   |       |
| Zero Gate Voltage Drain Current                       | I <sub>DSS</sub>    | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V                                                                           | -    | -0.01 | -1   | uA    |
| Gate-Source Leakage Current                           | I <sub>GSS</sub>    | V <sub>GS</sub> =+12V, V <sub>DS</sub> =0V                                                                           | -    | +10   | +100 | nA    |
| Dynamic                                               |                     |                                                                                                                      |      |       |      |       |
| Total Gate Charge                                     | Q <sub>g</sub>      | V <sub>DS</sub> =-10V, I <sub>D</sub> =-4.0A,<br>V <sub>GS</sub> =-4.5V <sup>(Note 1,2)</sup>                        | -    | 18    | -    | nC    |
| Gate-Source Charge                                    | Q <sub>gs</sub>     |                                                                                                                      | -    | 2     | -    |       |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     |                                                                                                                      | -    | 7     | -    |       |
| Input Capacitance                                     | C <sub>iss</sub>    | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V,<br>f=1.0MHZ                                                              | -    | 756   | -    | pF    |
| Output Capacitance                                    | C <sub>oss</sub>    |                                                                                                                      | -    | 75    | -    |       |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    |                                                                                                                      | -    | 58    | -    |       |
| Switching                                             |                     |                                                                                                                      |      |       |      |       |
| Turn-On Delay Time                                    | td <sub>(on)</sub>  | V <sub>DD</sub> =-10V, I <sub>D</sub> =-4.0A,<br>V <sub>GS</sub> =-4.5V,<br>R <sub>G</sub> =6Ω <sup>(Note 1,2)</sup> | -    | 5     | -    | ns    |
| Turn-On Rise Time                                     | tr                  |                                                                                                                      | -    | 61    | -    |       |
| Turn-Off Delay Time                                   | td <sub>(off)</sub> |                                                                                                                      | -    | 70    | -    |       |
| Turn-Off Fall Time                                    | tf                  |                                                                                                                      | -    | 137   | -    |       |
| Drain-Source Diode                                    |                     |                                                                                                                      |      |       |      |       |
| 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                                                                           | -    | 0.76  | -1.2 | 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

# PJA3415

## TYPICAL CHARACTERISTIC CURVES





## PJA3415

### TYPICAL CHARACTERISTIC CURVES

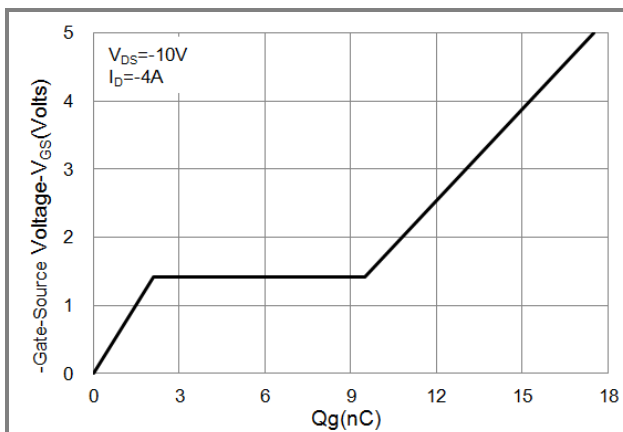


Fig.7 Gate-Charge Characteristics

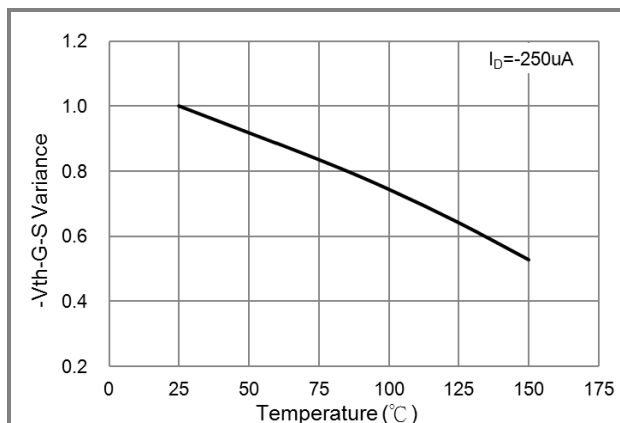


Fig.8 Threshold Voltage Variation with Temperature.

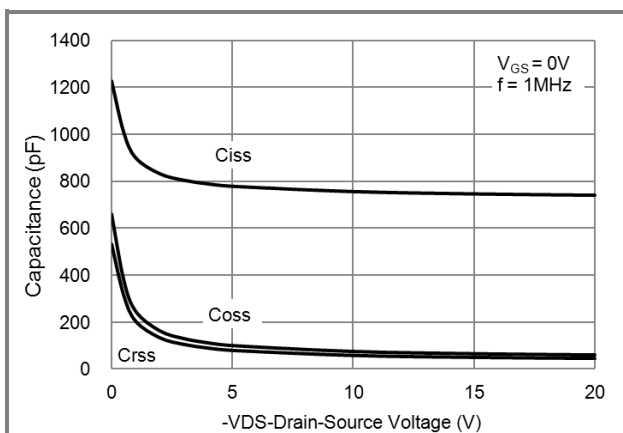


Fig.9 Capacitance vs. Drain-Source Voltage.

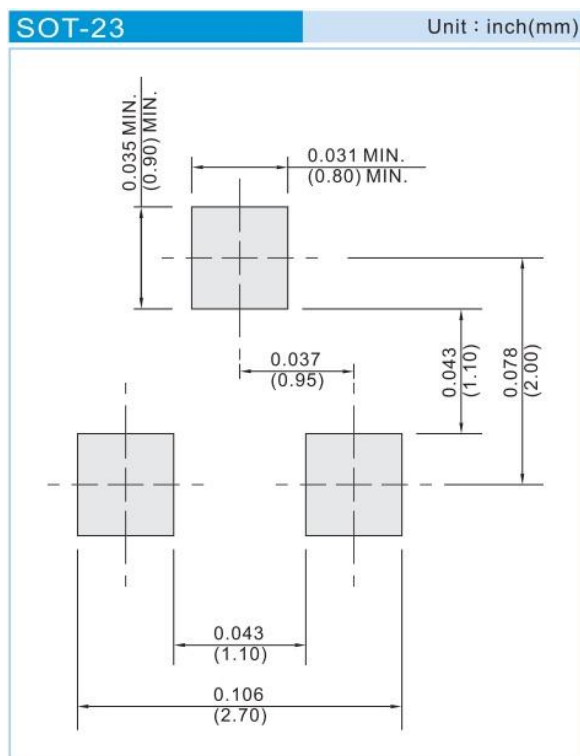


## PJA3415

### PART NO PACKING CODE VERSION

| Part No Packing Code | Package Type | Packing type       | Marking | Version      |
|----------------------|--------------|--------------------|---------|--------------|
| PJA3415_R1_00001     | SOT-23       | 3K pcs / 7" reel   | A15     | Halogen free |
| PJA3415_R2_00001     | SOT-23       | 12K pcs / 13" reel | A15     | Halogen free |

### MOUNTING PAD LAYOUT





## PJA3415

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