

## PJA3415AE

### 20V P-Channel Enhancement Mode MOSFET – ESD Protected

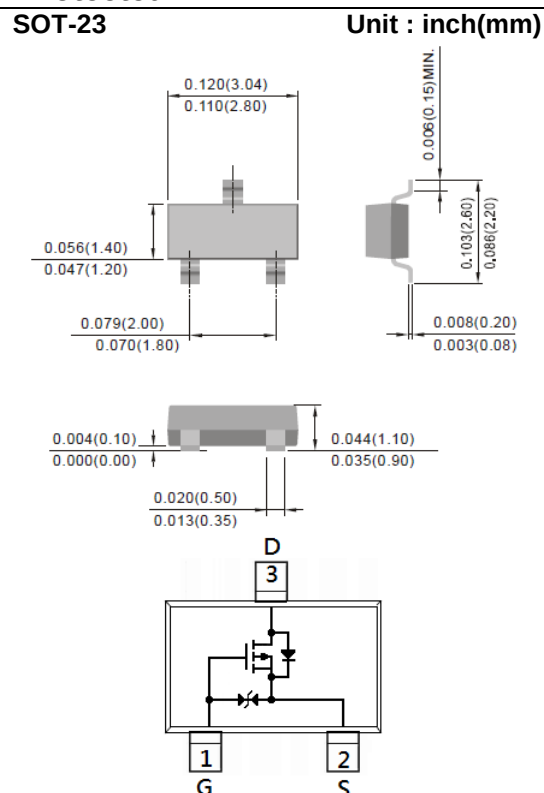
**Voltage** -20 V **Current** -4.3A

#### Features

- $R_{DS(ON)}$  ,  $V_{GS}@-4.5V$  ,  $I_D@-4.3A < 50m\Omega$
- $R_{DS(ON)}$  ,  $V_{GS}@-2.5V$  ,  $I_D@-4.0A < 58m\Omega$
- $R_{DS(ON)}$  ,  $V_{GS}@-1.8V$  ,  $I_D@-2.4A < 73m\Omega$
- Advanced Trench Process Technology
- Specially Designed for Switch Load, PWM Application, 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-23 Package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.0003 ounces, 0.0084 grams
- Marking: A5AE



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

| PARAMETER                                        |                      | SYMBOL                            | LIMIT   | UNITS |
|--------------------------------------------------|----------------------|-----------------------------------|---------|-------|
| Drain-Source Voltage                             |                      | V <sub>DS</sub>                   | -20     | V     |
| Gate-Source Voltage                              |                      | V <sub>GS</sub>                   | ±8      | V     |
| Continuous Drain Current                         |                      | I <sub>D</sub>                    | -4.3    | A     |
| Pulsed Drain Current                             |                      | I <sub>DM</sub>                   | -17.2   | 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 | -0.55 | -1.0 | V     |
| Drain-Source On-State Resistance                      | R <sub>DS(on)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.3A                                                             | -    | 42    | 50   | mΩ    |
|                                                       |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-4.0A                                                             | -    | 49    | 58   |       |
|                                                       |                     | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-2.4A                                                             | -    | 59    | 73   |       |
| 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> =±8V, V <sub>DS</sub> =0V                                                                 | -    | ±6    | ±10  | uA    |
| Dynamic (Note 5)                                      |                     |                                                                                                           |      |       |      |       |
| Total Gate Charge                                     | Q <sub>g</sub>      | V <sub>DS</sub> =-10V, I <sub>D</sub> =-4.3A,<br>V <sub>GS</sub> =-4.5V (Note 1,2)                        | -    | 24    | -    | nC    |
| Gate-Source Charge                                    | Q <sub>gs</sub>     |                                                                                                           | -    | 1.5   | -    |       |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     |                                                                                                           | -    | 2.5   | -    |       |
| Input Capacitance                                     | C <sub>iss</sub>    | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V,<br>f=1.0MHZ                                                   | -    | 907   | -    | pF    |
| Output Capacitance                                    | C <sub>oss</sub>    |                                                                                                           | -    | 90    | -    |       |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    |                                                                                                           | -    | 70    | -    |       |
| Turn-On Delay Time                                    | td <sub>(on)</sub>  | V <sub>DD</sub> =-10V, I <sub>D</sub> =-4.3A,<br>V <sub>GS</sub> =-4.5V,<br>R <sub>G</sub> =6Ω (Note 1,2) | -    | 45    | -    | ns    |
| Turn-On Rise Time                                     | tr                  |                                                                                                           | -    | 79    | -    |       |
| Turn-Off Delay Time                                   | td <sub>(off)</sub> |                                                                                                           | -    | 193   | -    |       |
| Turn-Off Fall Time                                    | tf                  |                                                                                                           | -    | 826   | -    |       |
| 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
5. Guaranteed by design, not subject to production testing.

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## TYPICAL CHARACTERISTIC CURVES

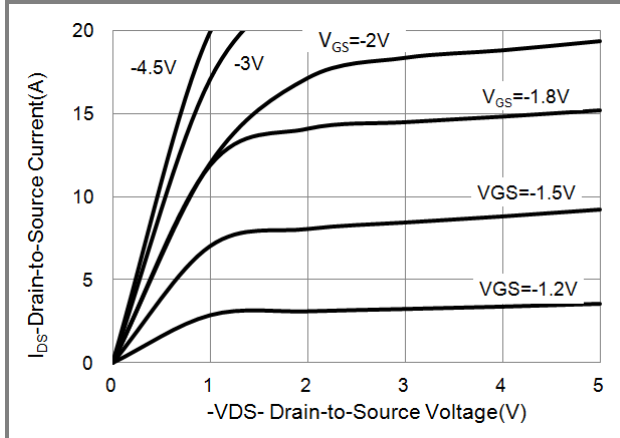


Fig.1 On-Region Characteristics

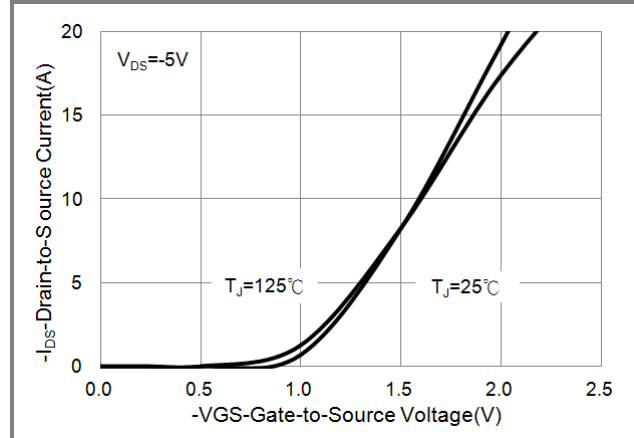


Fig.2 Transfer Characteristics

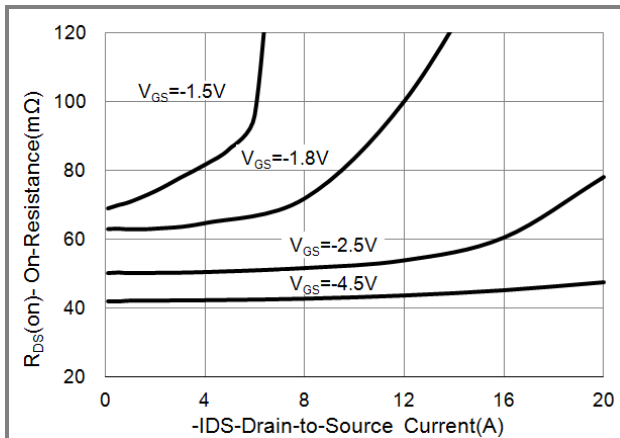


Fig.3 On-Resistance vs. Drain Current

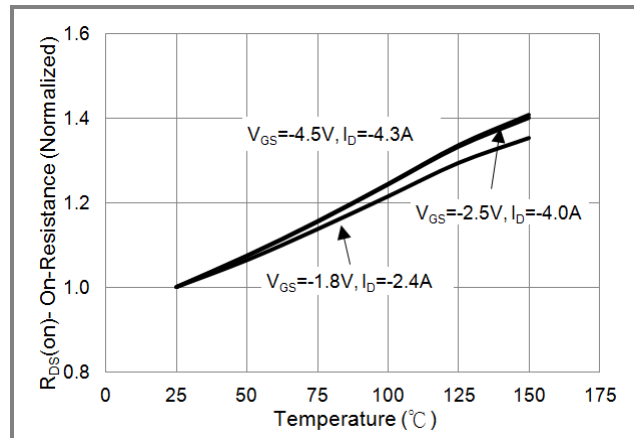


Fig.4 On-Resistance vs. Junction temperature

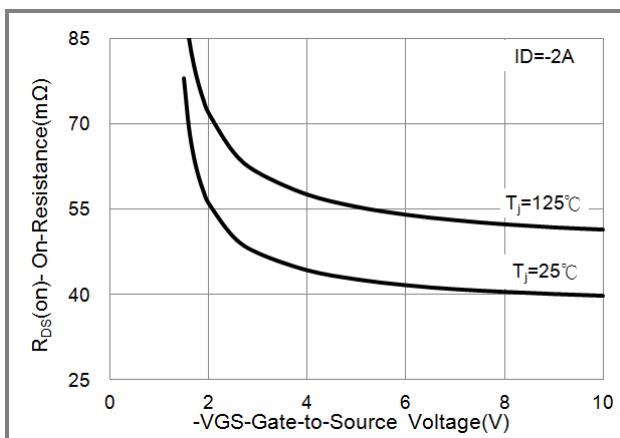


Fig.5 On-Resistance Variation with VGS.

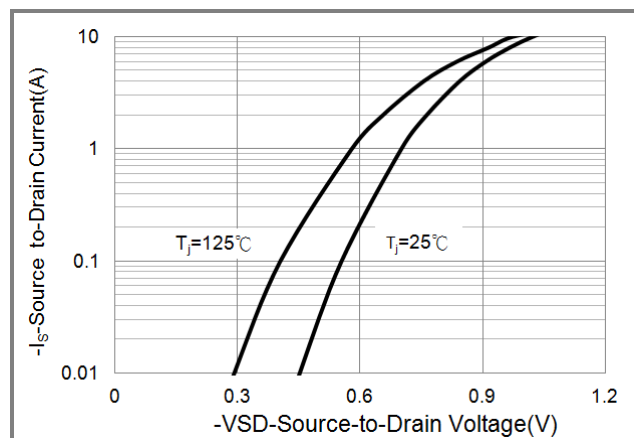


Fig.6 Body Diode Characteristics



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### TYPICAL CHARACTERISTIC CURVES

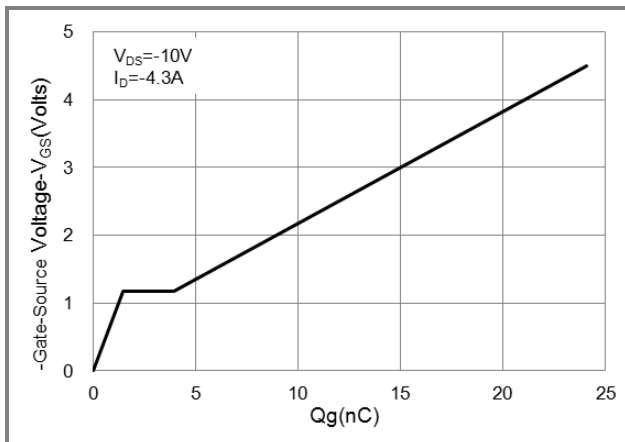


Fig.7 Gate-Charge Characteristics

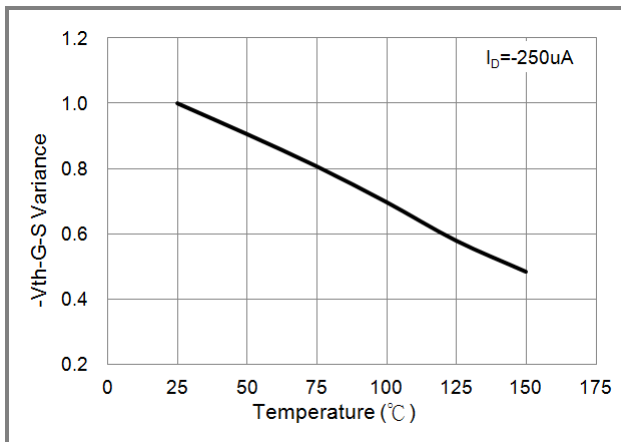


Fig.8 Threshold Voltage Variation with Temperature.

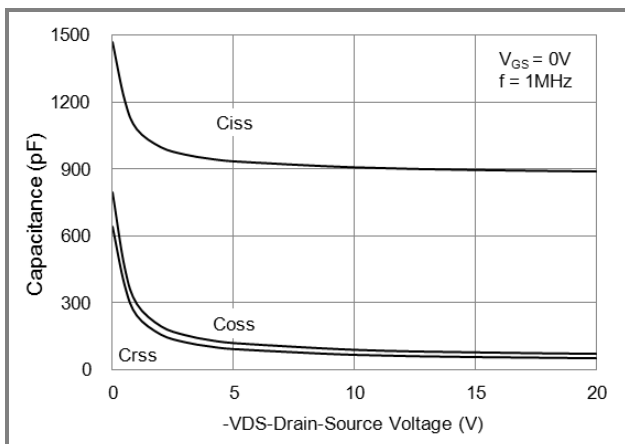


Fig.9 Capacitance vs. Drain-Source Voltage.

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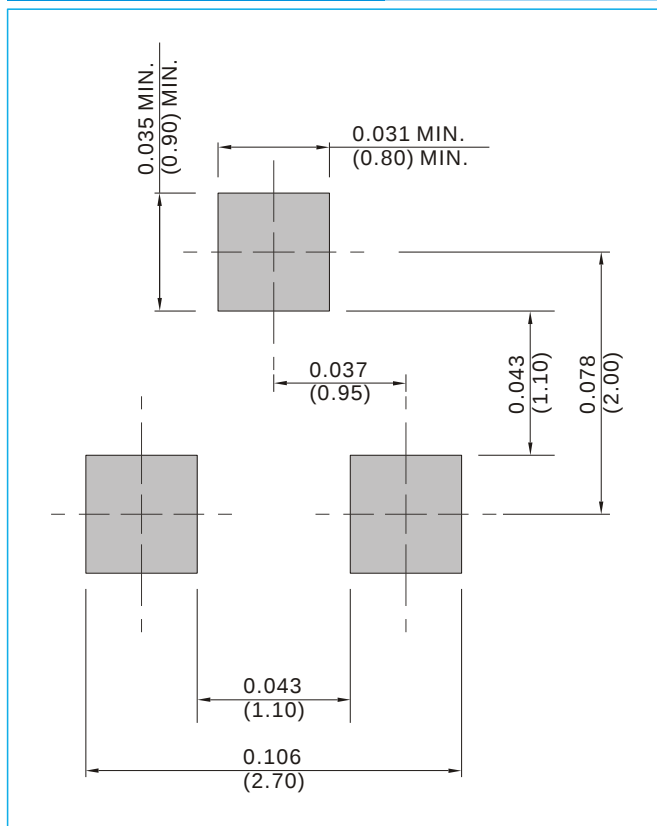
### PART NO PACKING CODE VERSION

| Part No Packing Code | Package Type | Packing Type       | Marking | Version      |
|----------------------|--------------|--------------------|---------|--------------|
| PJA3415AE_R1_00001   | SOT-23       | 3K pcs / 7" reel   | A5AE    | Halogen free |
| PJA3415AE_R2_00001   | SOT-23       | 12K pcs / 13" reel | A5AE    | Halogen free |

### MOUNTING PAD LAYOUT

#### SOT-23

Unit : inch(mm)





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