



# PJA3412-AU

## 20V N-Channel Enhancement Mode MOSFET

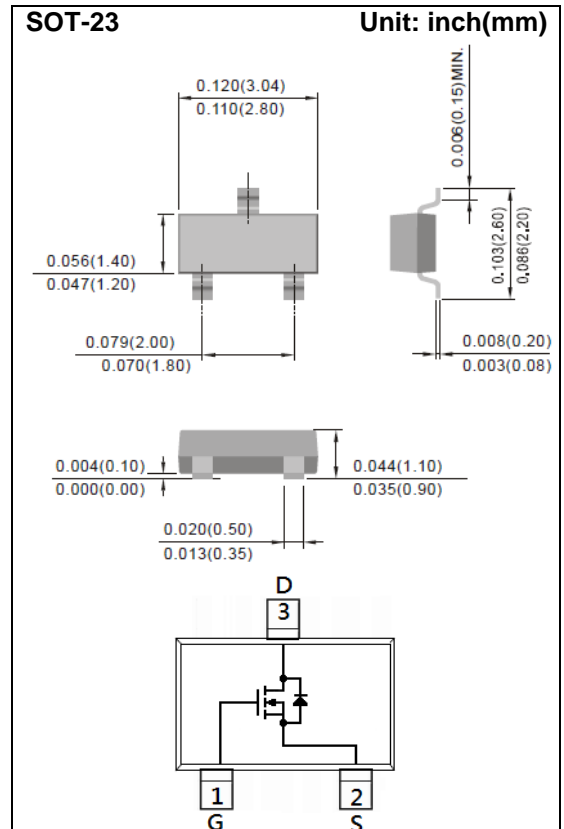
|                |             |                |             |
|----------------|-------------|----------------|-------------|
| <b>Voltage</b> | <b>20 V</b> | <b>Current</b> | <b>4.1A</b> |
|----------------|-------------|----------------|-------------|

### Features

- $R_{DS(ON)}$ ,  $V_{GS}@4.5V$ ,  $I_D@4.1A < 56m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@2.5V$ ,  $I_D@2.8A < 68m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@1.8V$ ,  $I_D@1.5A < 95m\Omega$
- Advanced Trench Process Technology
- Specially Designed for Switch Load, PWM Application, etc
- AEC-Q101 qualified
- 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



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

| PARAMETER  |                                 | SYMBOL          | LIMIT    | UNITS                |
|--|---------------------------------|-----------------|----------|----------------------|
| Drain-Source Voltage                             |                                 | $V_{DS}$        | 20       | V                    |
| Gate-Source Voltage                              |                                 | $V_{GS}$        | $\pm 12$ |                      |
| Continuous Drain Current                         |                                 | $I_D$           | 4.1      | A                    |
| Pulsed Drain Current                             |                                 | $I_{DM}$        | 16.4     |                      |
| Power Dissipation                                | $T_a=25^\circ\text{C}$          | $P_D$           | 1.25     | W                    |
|  | Derate above $25^\circ\text{C}$ |                 | 10       | mW/ $^\circ\text{C}$ |
| Operating Junction and Storage Temperature Range |                                 | $T_J, T_{STG}$  | -55~150  | $^\circ\text{C}$     |
| Typical Thermal Resistance                       |                                 | $R_{\theta JA}$ | 100      | $^\circ\text{C/W}$   |
| - 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      |
|---|--------------|---|------|------|-----------|------------|
| <b>Static</b>   |              |   |      |      |           |            |
| Drain-Source Breakdown Voltage                        | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$   | 20   | -    | -         | V          |
| Gate Threshold Voltage                                | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$   | 0.4  | 0.66 | 1.2       |            |
| Drain-Source On-State Resistance                      | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=4.1A$   | -    | 41   | 56        | m $\Omega$ |
|   |              | $V_{GS}=2.5V, I_D=2.8A$   | -    | 50   | 68        |            |
|   |              | $V_{GS}=1.8V, I_D=1.5A$   | -    | 66   | 95        |            |
| Zero Gate Voltage Drain Current                       | $I_{DSS}$    | $V_{DS}=20V, V_{GS}=0V$   | -    | -    | 1         | $\mu A$    |
| Gate-Source Leakage Current                           | $I_{GSS}$    | $V_{GS}=\pm 12V, V_{DS}=0V$   | -    | -    | $\pm 100$ | nA         |
| <b>Dynamic</b> (Note 5)                               |              |   |      |      |           |            |
| Total Gate Charge                                     | $Q_g$        | $V_{DS}=10V, I_D=4.1A,$<br>$V_{GS}=4.5V$ (Note 1,2)                   | -    | 4.6  | -         | nC         |
| Gate-Source Charge                                    | $Q_{gs}$     |   | -    | 0.8  | -         |            |
| Gate-Drain Charge                                     | $Q_{gd}$     |   | -    | 1    | -         |            |
| Input Capacitance                                     | $C_{iss}$    | $V_{DS}=10V, V_{GS}=0V,$<br>$f=1.0MHz$                                | -    | 350  | -         | pF         |
| Output Capacitance                                    | $C_{oss}$    |   | -    | 40   | -         |            |
| Reverse Transfer Capacitance                          | $C_{rss}$    |   | -    | 29   | -         |            |
| Turn-On Delay Time                                    | $t_{d(on)}$  | $V_{DD}=10V, I_D=4.1A,$<br>$V_{GS}=4.5V,$<br>$R_G=6\Omega$ (Note 1,2) | -    | 4    | -         | ns         |
| Turn-On Rise Time                                     | $t_r$        |   | -    | 47   | -         |            |
| Turn-Off Delay Time                                   | $t_{d(off)}$ |   | -    | 18   | -         |            |
| Turn-Off Fall Time                                    | $t_f$        |   | -    | 10   | -         |            |
| <b>Drain-Source Diode</b>                             |              |   |      |      |           |            |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$        | ---   | -    | -    | 1.5       | A          |
| Diode Forward Voltage                                 | $V_{SD}$     | $I_S=1.0A, V_{GS}=0V$   | -    | 0.75 | 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.



# PJA3412-AU

## TYPICAL CHARACTERISTIC CURVES

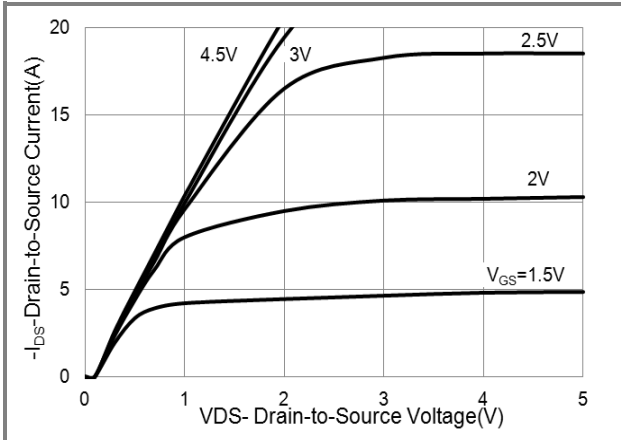


Fig.1 On-Region Characteristics

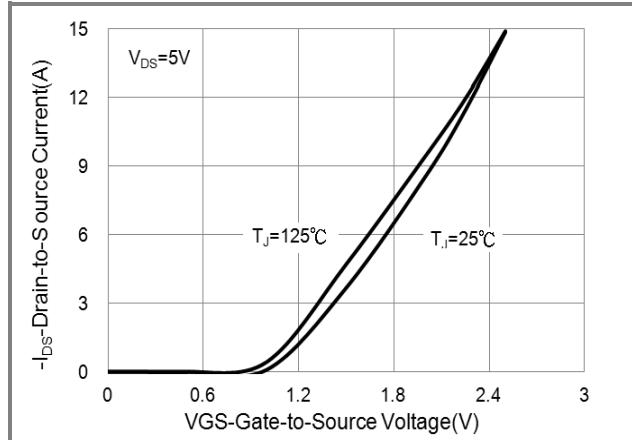


Fig.2 Transfer Characteristics

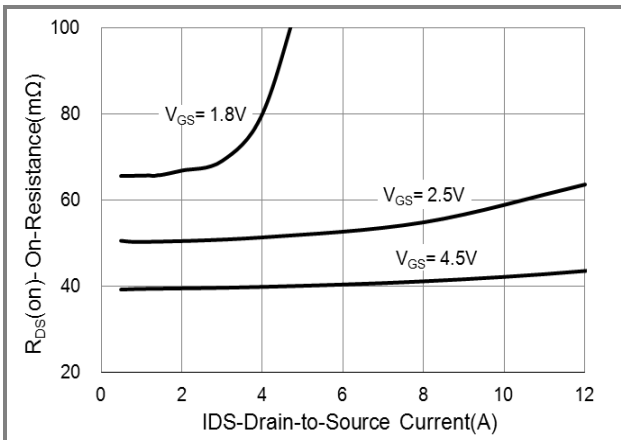


Fig.3 On-Resistance vs. Drain Current

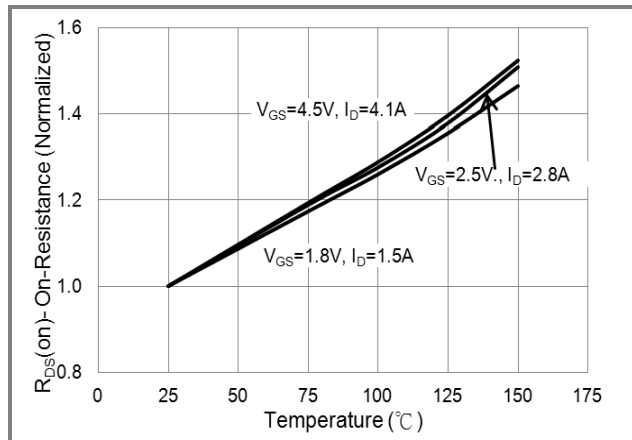


Fig.4 On-Resistance vs. Junction temperature

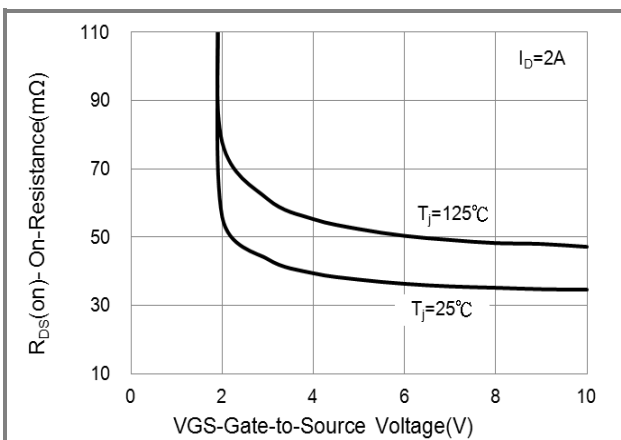


Fig.5 On-Resistance Variation with  $V_{GS}$

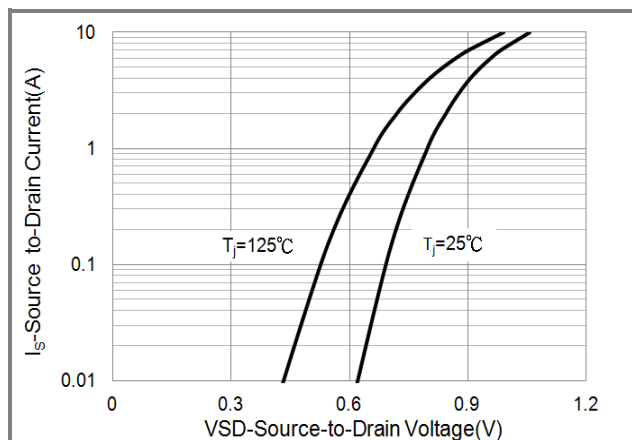


Fig.6 Body Diode Characteristics



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## TYPICAL CHARACTERISTIC CURVES

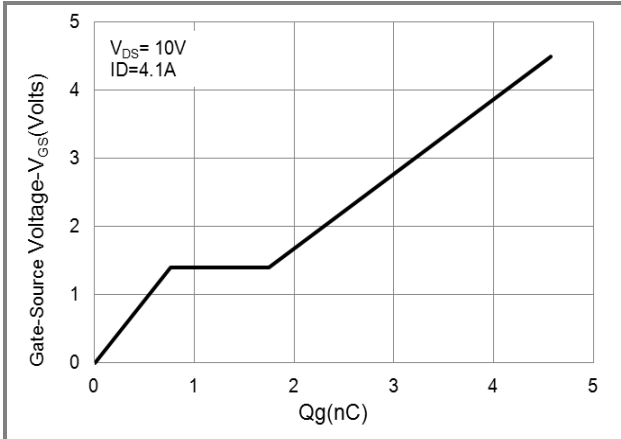


Fig.7 Gate-Charge Characteristics

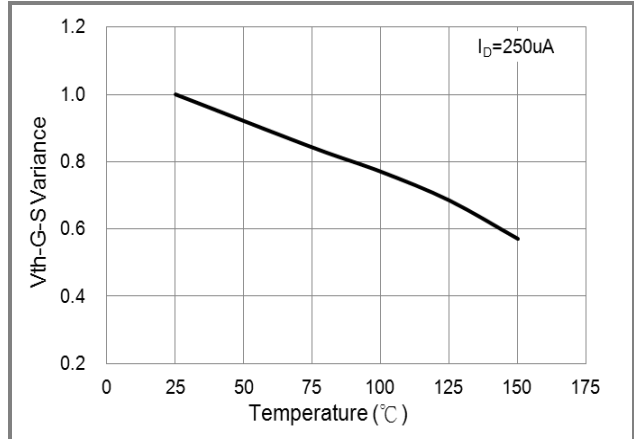


Fig.8 Threshold Voltage Variation with Temperature

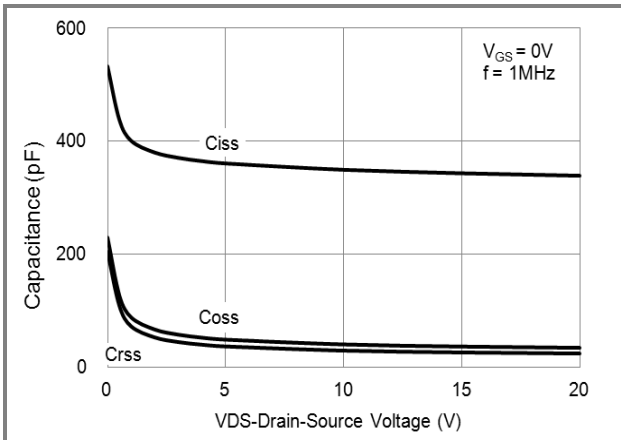


Fig.9 Capacitance vs. Drain-Source Voltage

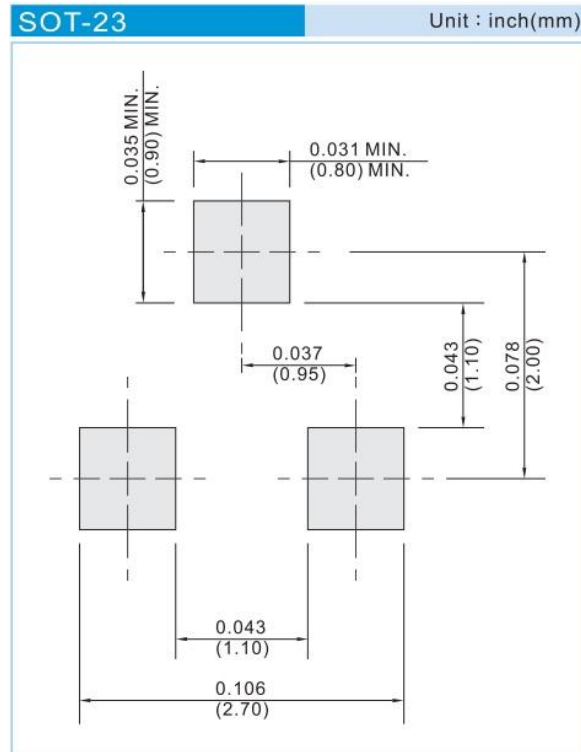


# PJA3412-AU

## Part No Packing Code Version

| Part No Packing Code | Package Type | Packing Type     | Marking | Version      |
|----------------------|--------------|------------------|---------|--------------|
| PJA3412-AU_R1_000A1  | SOT-23       | 3K pcs / 7" reel | A12     | Halogen free |

## Mounting Pad Layout





## PJA3412-AU

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