



# PJA3413-AU

## 20V P-Channel Enhancement Mode MOSFET

**Voltage**

**-20 V**

**Current**

**-3.4A**

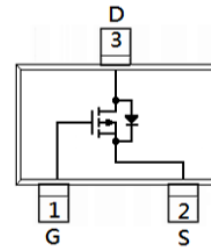
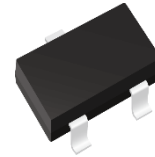
### Features

- $R_{DS(ON)}$ ,  $V_{GS}@-4.5V$ ,  $I_D@-3.4A < 82m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@-2.5V$ ,  $I_D@-2.2A < 110m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@-1.8V$ ,  $I_D@-1.2A < 146m\Omega$
- 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

SOT-23



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

| PARAMETER  |                           | SYMBOL          | LIMIT    | UNITS          |
|--|---------------------------|-----------------|----------|----------------|
| Drain-Source Voltage                             |                           | $V_{DS}$        | -20      | V              |
| Gate-Source Voltage                              |                           | $V_{GS}$        | $\pm 12$ |                |
| Continuous Drain Current <sup>(Note 4)</sup>     |                           | $I_D$           | -3.4     | A              |
| Pulsed Drain Current <sup>(Note 1)</sup>         |                           | $I_{DM}$        | -13.6    |                |
| Power Dissipation                                | $T_a=25^\circ C$          | $P_D$           | 1.25     | W              |
|  | Derate above $25^\circ C$ |                 | 10       | mW/ $^\circ C$ |
| Operating Junction and Storage Temperature Range |                           | $T_J, T_{STG}$  | -55~150  | $^\circ C$     |
| Typical Thermal Resistance                       |                           | $R_{\theta JA}$ | 100      | $^\circ C/W$   |
| - Junction to Ambient <sup>(Note 3,4)</sup>      |                           |                 |          |                |



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## 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 | -0.65 | -1.2 |       |
| Drain-Source On-State Resistance                      | R <sub>DS(on)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3.4A   | -    | 65    | 82   | mΩ    |
|   |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.2A   | -    | 82    | 110  |       |
|   |                     | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-1.2A   | -    | 103   | 146  |       |
| 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> =-3.4A,<br>V <sub>GS</sub> =-4.5V (Note 1,2)                        | -    | 7     | -    | nC    |
| Gate-Source Charge                                    | Q <sub>gs</sub>     |   | -    | 1     | -    |       |
| Gate-Drain Charge                                     | Q <sub>gd</sub>     |   | -    | 1.8   | -    |       |
| Input Capacitance                                     | C <sub>iss</sub>    | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V,<br>f=1MHZ   | -    | 522   | -    | pF    |
| Output Capacitance                                    | C <sub>oss</sub>    |   | -    | 55    | -    |       |
| Reverse Transfer Capacitance                          | C <sub>rss</sub>    |   | -    | 40    | -    |       |
| Turn-On Delay Time                                    | t <sub>d(on)</sub>  | V <sub>DD</sub> =-10V, I <sub>D</sub> =-3.4A,<br>V <sub>GS</sub> =-4.5V,<br>R <sub>G</sub> =6Ω (Note 1,2) | -    | 10    | -    | ns    |
| Turn-On Rise Time                                     | t <sub>r</sub>      |   | -    | 4     | -    |       |
| Turn-Off Delay Time                                   | t <sub>d(off)</sub> |   | -    | 34    | -    |       |
| Turn-Off Fall Time                                    | t <sub>f</sub>      |   | -    | 5     | -    |       |
| <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> =-1A, V <sub>GS</sub> =0V  | -    | -0.77 | -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.



# PJA3413-AU

## TYPICAL CHARACTERISTIC CURVES

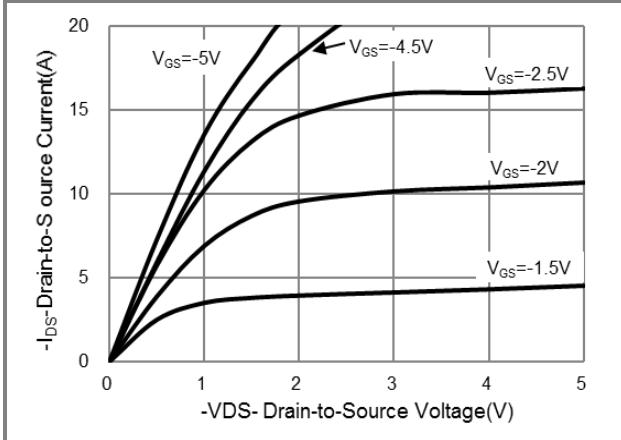


Fig.1 On-Region Characteristics

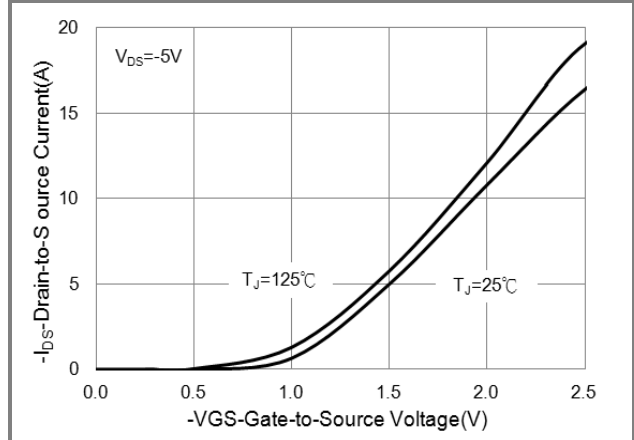


Fig.2 Transfer Characteristics

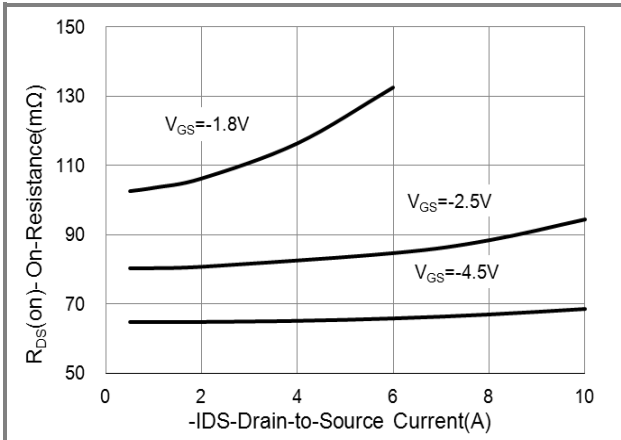


Fig.3 On-Resistance vs. Drain Current

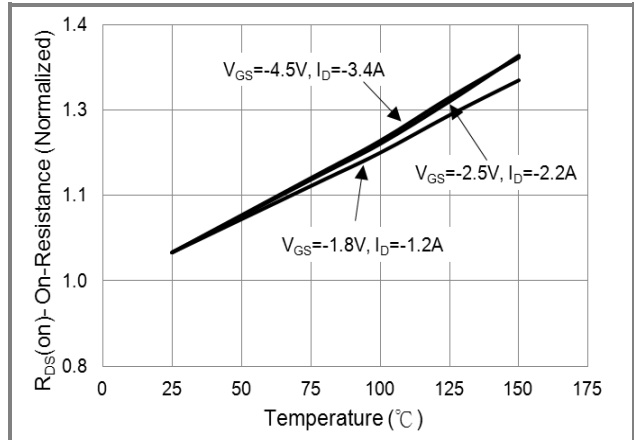


Fig.4 On-Resistance vs. Junction temperature

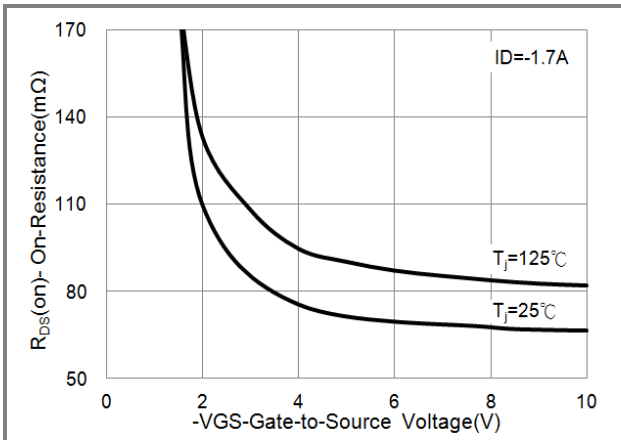


Fig.5 On-Resistance Variation with  $V_{G_S}$

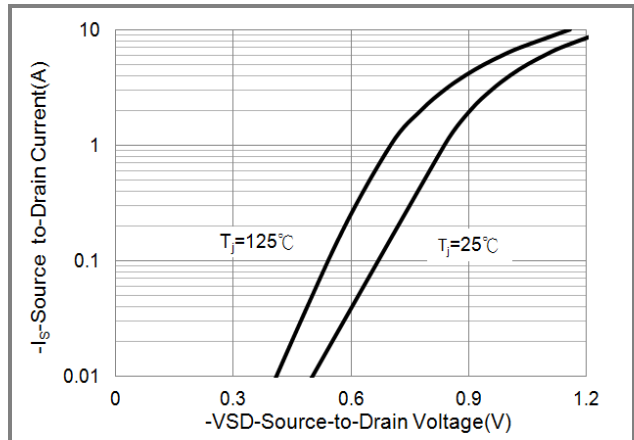


Fig.6 Body Diode Characteristics



# PJA3413-AU

## TYPICAL CHARACTERISTIC CURVES

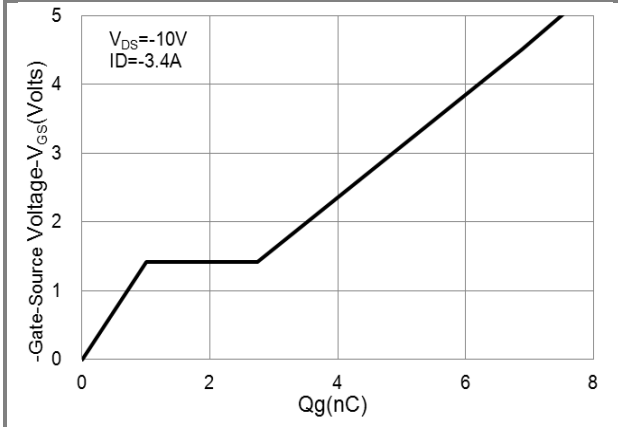


Fig.7 Gate-Charge Characteristics

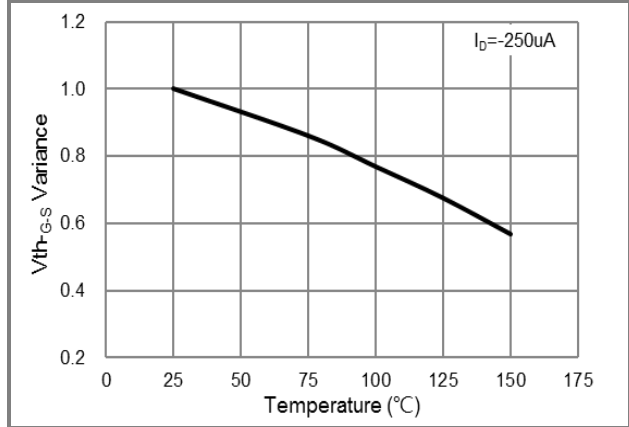


Fig.8 Threshold Voltage Variation with Temperature

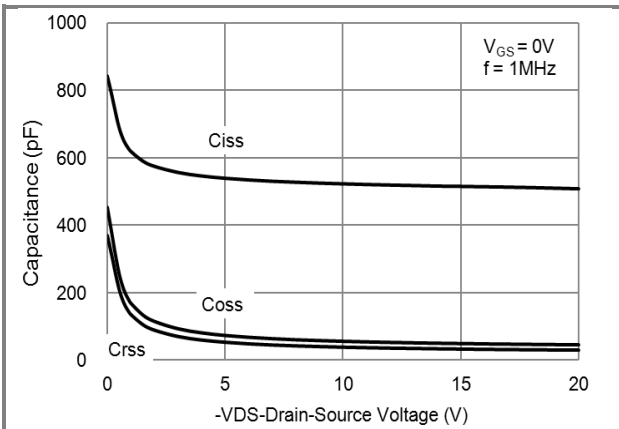


Fig.9 Capacitance vs. Drain-Source Voltage

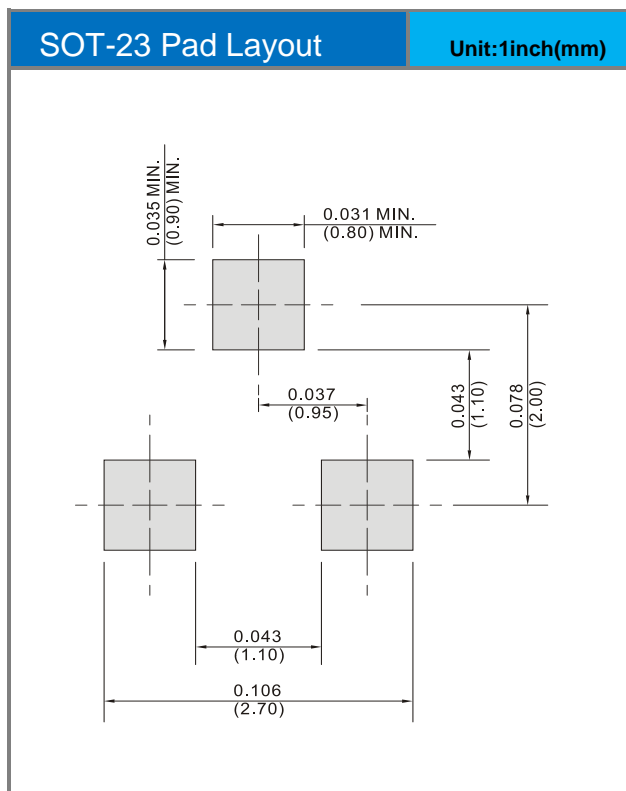
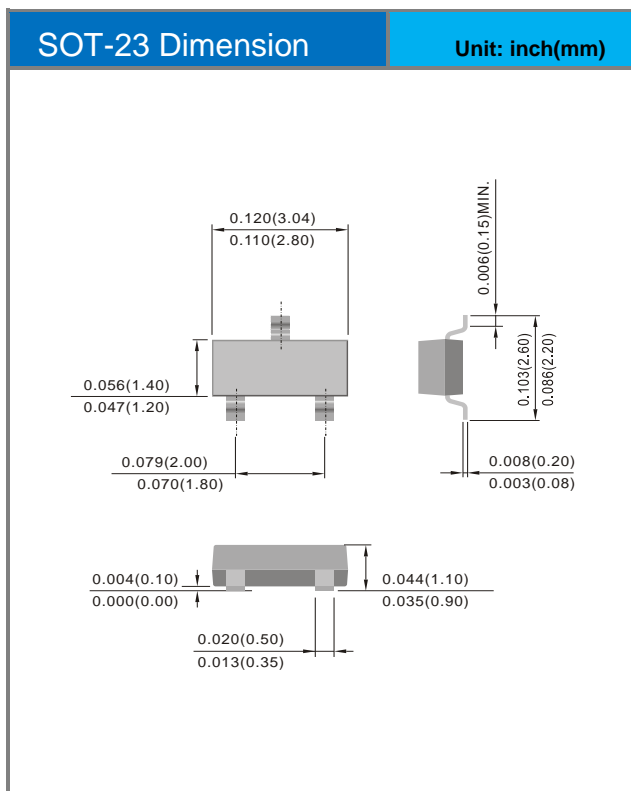


# PJA3413-AU

Part No. Packing Code Version

| Part No. Packing Code | Package Type | Packing Type     | Marking | Version                        |
|-----------------------|--------------|------------------|---------|--------------------------------|
| PJA3413-AU_R1_000A1   | SOT-23       | 3K pcs / 7" reel | A13     | Halogen free<br>RoHS compliant |

## Packaging Information & Mounting Pad Layout





## PJA3413-AU

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