



# PJ2301-AU

## 20V P-Channel Enhancement Mode MOSFET

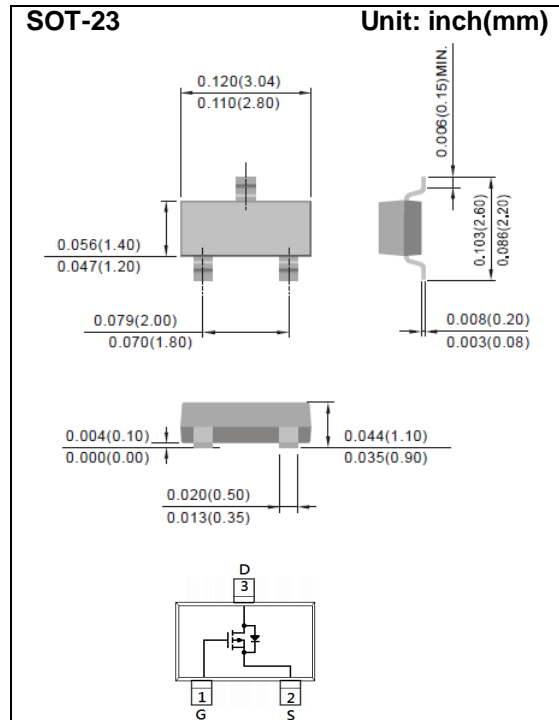
**Voltage**    **-20 V**    **Current**    **-3.1A**

### Features

- $R_{DS(ON)}$  ,  $V_{GS}@-4.5V$  ,  $I_D@-3.1A < 100m\Omega$
- $R_{DS(ON)}$  ,  $V_{GS}@-2.5V$  ,  $I_D@-2.0A < 135m\Omega$
- $R_{DS(ON)}$  ,  $V_{GS}@-1.8V$  ,  $I_D@-1.1A < 190m\Omega$
- Advanced Trench Process Technology
- Specially Designed for Switch Load, PWM Application, etc.
- Acquire quality system certificate : TS16949
- AEC-Q101 qualified
- 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



## 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                              | $V_{GS}$        | $\pm 12$                  | V            |
| Continuous Drain Current                         | $I_D$           | -3.1                      | A            |
| Pulsed Drain Current                             | $I_{DM}$        | -12.4                     | A            |
| Power Dissipation                                | $P_D$           | $T_a=25^\circ C$          | 1.25         |
|  |                 | Derate above $25^\circ C$ | 10           |
| 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 (Note 3)                   |                 |                           |              |



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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 | -0.71    | -1.2      | V          |
| Drain-Source On-State Resistance                      | $R_{DS(on)}$ | $V_{GS}=-4.5V, I_D=-3.1A$  | -    | 84       | 100       | m $\Omega$ |
|   |              | $V_{GS}=-2.5V, I_D=-2.0A$  | -    | 104      | 135       |            |
|   |              | $V_{GS}=-1.8V, I_D=-1.1A$  | -    | 134      | 190       |            |
| Zero Gate Voltage Drain Current                       | $I_{DSS}$    | $V_{DS}=-20V, V_{GS}=0V$   | -    | -0.01    | -1        | $\mu A$    |
| Gate-Source Leakage Current                           | $I_{GSS}$    | $V_{GS}=\pm 12V, V_{DS}=0V$  | -    | $\pm 10$ | $\pm 100$ | nA         |
| <b>Dynamic</b>  |              |  |      |          |           |            |
| Total Gate Charge                                     | $Q_g$        | $V_{DS}=-10V, I_D=-3.1A,$<br>$V_{GS}=-4.5V$ (Note 1,2)                   | -    | 5.4      | -         | nC         |
| Gate-Source Charge                                    | $Q_{gs}$     |  | -    | 0.7      | -         |            |
| Gate-Drain Charge                                     | $Q_{gd}$     |  | -    | 1.3      | -         |            |
| Input Capacitance                                     | $C_{iss}$    | $V_{DS}=-10V, V_{GS}=0V,$<br>$f=1.0\text{MHZ}$                           | -    | 416      | -         | pF         |
| Output Capacitance                                    | $C_{oss}$    |  | -    | 43       | -         |            |
| Reverse Transfer Capacitance                          | $C_{rss}$    |  | -    | 32       | -         |            |
| <b>Switching</b>                                      |              |  |      |          |           |            |
| Turn-On Delay Time                                    | $t_{d(on)}$  | $V_{DD}=-10V, I_D=-3.1A,$<br>$V_{GS}=-4.5V,$<br>$R_G=6\Omega$ (Note 1,2) | -    | 4        | -         | ns         |
| Turn-On Rise Time                                     | $t_r$        |  | -    | 27       | -         |            |
| Turn-Off Delay Time                                   | $t_{d(off)}$ |  | -    | 78       | -         |            |
| Turn-Off Fall Time                                    | $t_f$        |  | -    | 45       | -         |            |
| <b>Drain-Source Diode</b>                             |              |  |      |          |           |            |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$        | ---  | -    | -        | -1.5      | A          |
| Diode Forward Voltage                                 | $V_{SD}$     | $I_S=-1.0A, V_{GS}=0V$   | -    | 0.8      | -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



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## TYPICAL CHARACTERISTIC CURVES

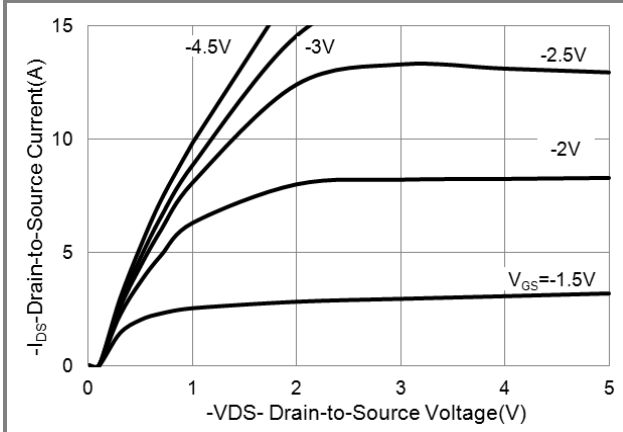


Fig.1 On-Region Characteristics

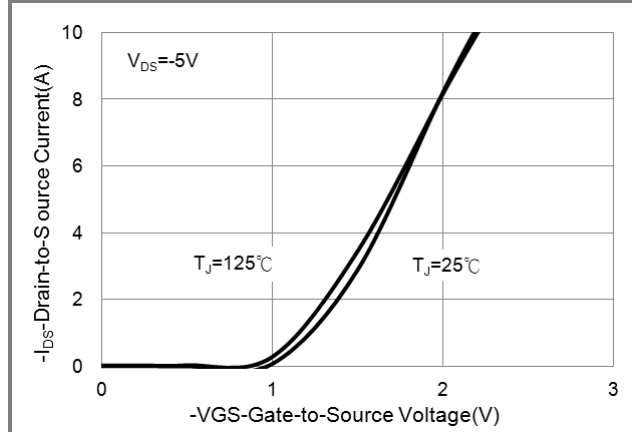


Fig.2 Transfer Characteristics

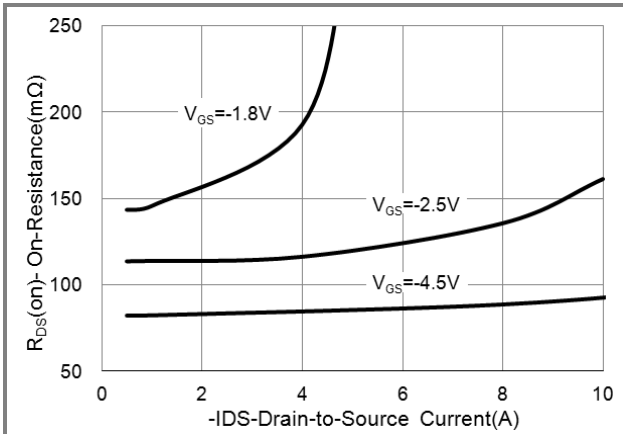


Fig.3 On-Resistance vs. Drain Current

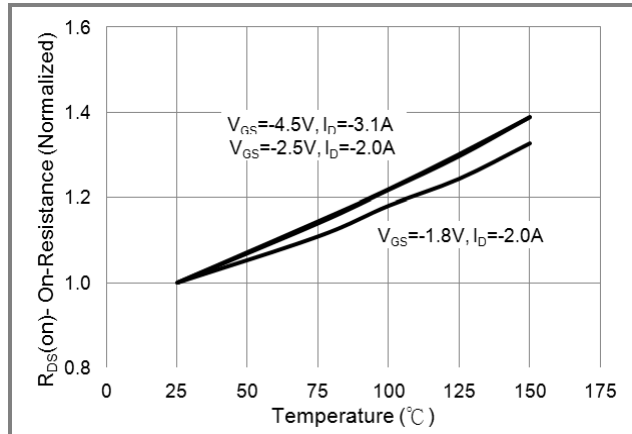


Fig.4 On-Resistance vs. Junction temperature

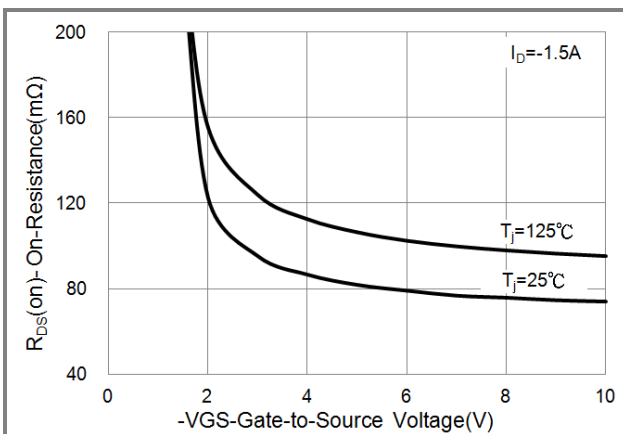


Fig.5 On-Resistance Variation with VGS.

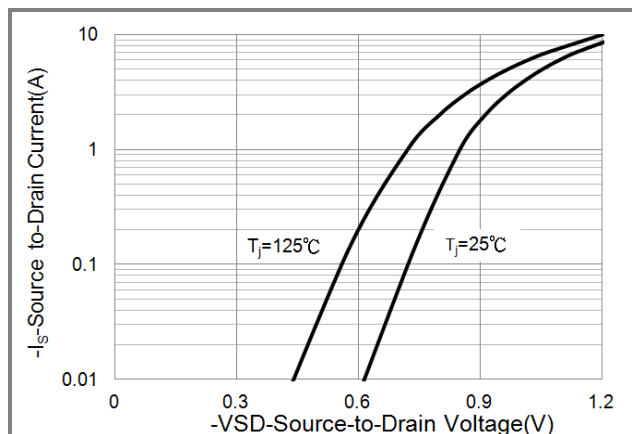


Fig.6 Body Diode Characteristics



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## TYPICAL CHARACTERISTIC CURVES

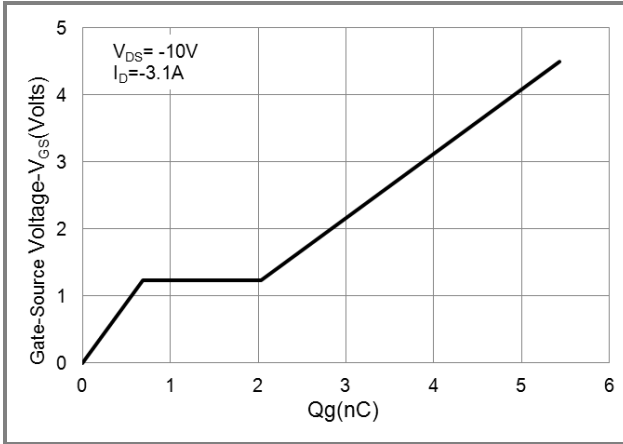


Fig.7 Gate-Charge Characteristics

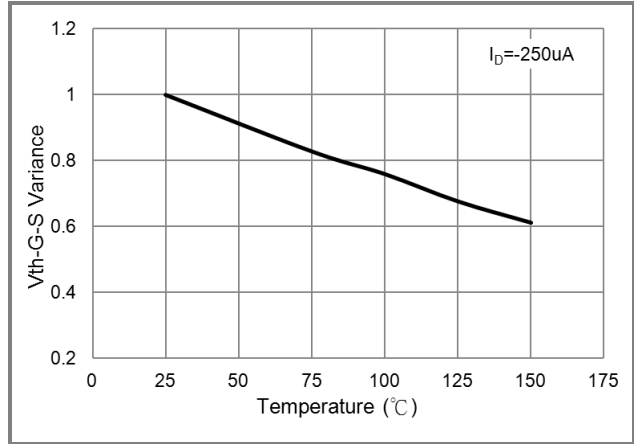


Fig.8 Threshold Voltage Variation with Temperature.

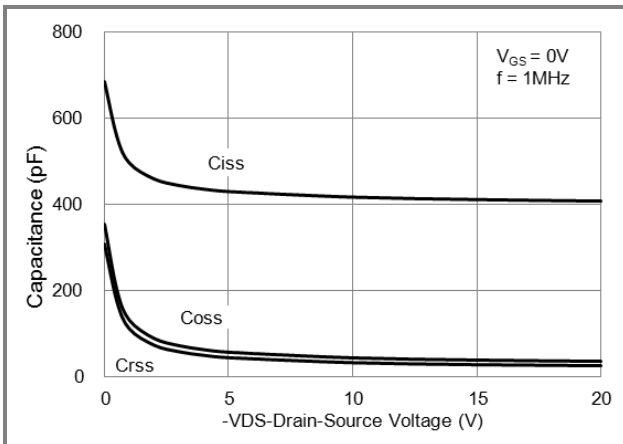


Fig.10 Capacitance vs. Drain-Source Voltage.

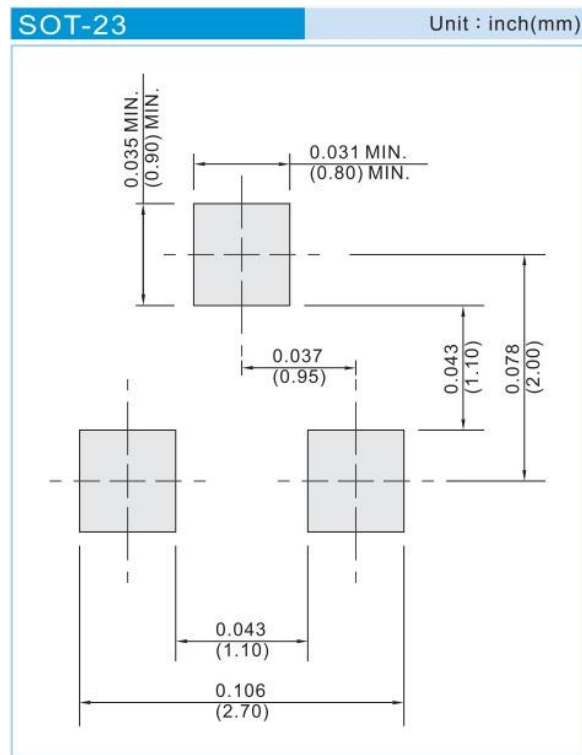


# PJ2301-AU

## PART NO PACKING CODE VERSION

| Part No Packing Code | Package Type | Packing Type       | Marking | Version      |
|----------------------|--------------|--------------------|---------|--------------|
| PJ2301-AU_R1_000A1   | SOT-23       | 3K pcs / 7" reel   | 01      | Halogen free |
| PJ2301-AU_R2_000A1   | SOT-23       | 12K pcs / 13" reel | 01      | Halogen free |

## MOUNTING PAD LAYOUT





## PJ2301-AU

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