

# PJ2301

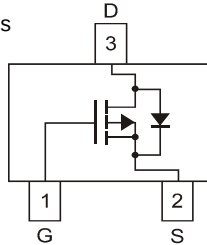
## 20V P-Channel Enhancement Mode MOSFET

### FEATURES

- $R_{DS(ON)}$ ,  $V_{GS}@-1.8V, I_D@-1.5A=200m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@-4.5V, I_D@-2.2A=105m\Omega$
- Advanced Trench Process Technology
- High Density Cell Design For Ultra Low On-Resistance
- Specially Designed for DC/DC converters
- Low gate charge
- Lead free in compliance with EU RoHS 2011/65/EU directive
- Green molding compound as per IEC61249 Std. . (Halogen Free)

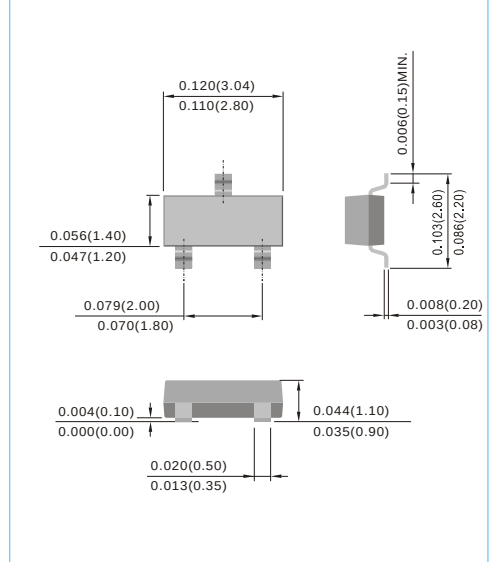
### MECHANICAL DATA

- Case : SOT-23 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.0003 ounces, 0.0084 grams
- Marking : 01



### SOT-23

Unit : inch(mm)



## 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                              |                                             |                                                                            | $V_{GS}$        | $\pm 8$             | V                  |
| Continuous Drain Current (Notes 1)               | Steady-State<br>Steady-State<br>$t \leq 5s$ | $T_A=25^\circ\text{C}$<br>$T_A=70^\circ\text{C}$<br>$T_A=25^\circ\text{C}$ | $I_D$           | -1.75<br>-1.4<br>-2 | A                  |
| Pulsed Drain Current (Notes 1)                   |                                             |                                                                            | $I_{DM}$        | 10                  | A                  |
| Power Dissipation (Notes 2)                      |                                             | $T_A=25^\circ\text{C}$<br>$T_A=70^\circ\text{C}$                           | $P_D$           | 700<br>450          | mW                 |
| Typical Thermal Resistance (Notes 1)             |                                             |                                                                            | $R_{\theta JA}$ | 175                 | $^\circ\text{C/W}$ |
| Typical Thermal Resistance (Notes 1)             |                                             |                                                                            | $R_{\theta JL}$ | 65                  | $^\circ\text{C/W}$ |
| Operating Junction and Storage Temperature Range |                                             |                                                                            | $T_J, T_{STG}$  | -55 to + 150        | $^\circ\text{C}$   |

### NOTES:

1. Mounted on minimum pad layout.
2. Mounted on 48cm<sup>2</sup> FR-4 PCB board.

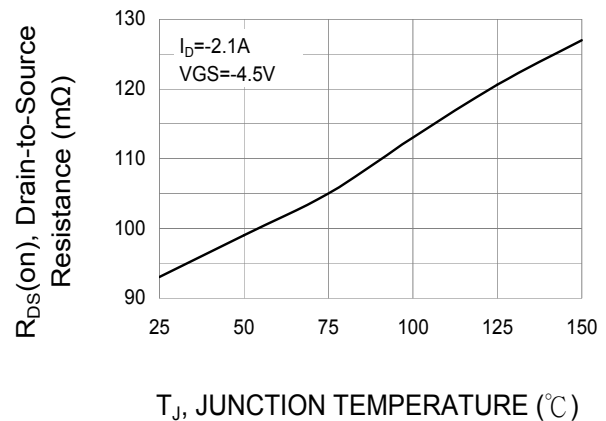
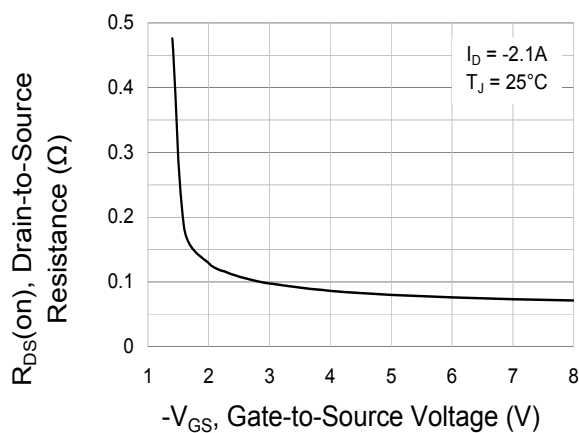
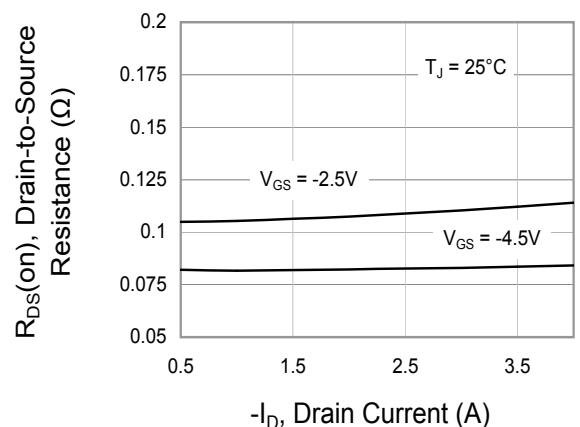
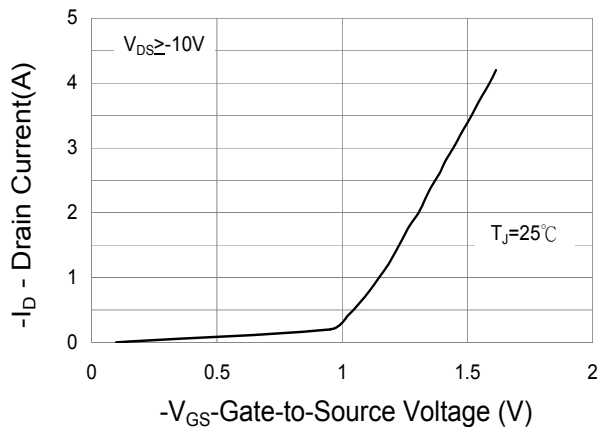
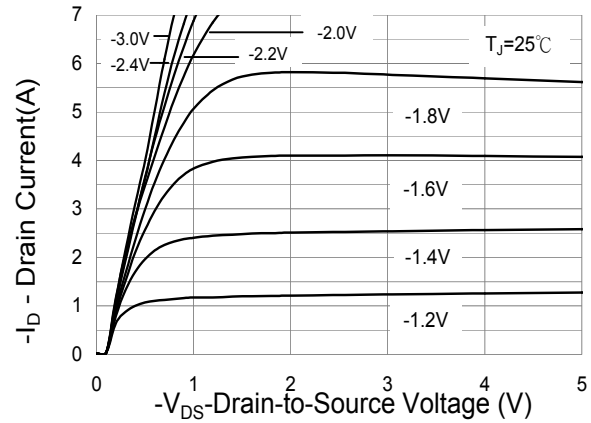
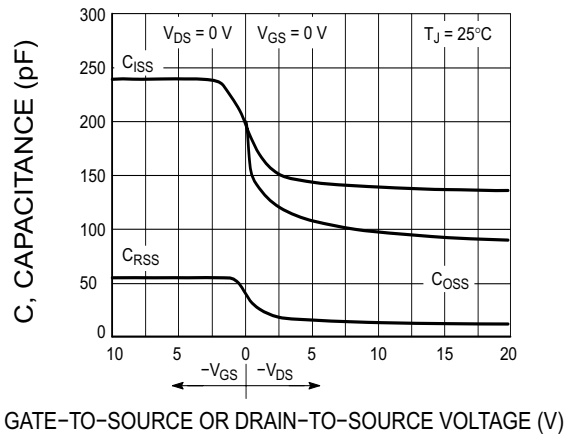
# PJ2301

## ELECTRICAL CHARACTERISTICS

| Parameter                          | Symbol       | Test Condition                                                           | Min. | Typ.  | Max. | Units |
|------------------------------------|--------------|--------------------------------------------------------------------------|------|-------|------|-------|
| Static                             |              |                                                                          |      |       |      |       |
| Drain-Source Breakdown Voltage     | $BV_{DSS}$   | $V_{GS}=0V, I_D = -250\mu A$                                             | -20  | -     | -    | V     |
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D = -250\mu A$                                         | -0.5 | -0.7  | -0.9 | V     |
| Drain-Source On-State Resistance   | $R_{DS(on)}$ | $V_{GS} = -4.5V, I_D = -2.2A$                                            | -    | 90    | 105  | mΩ    |
| Drain-Source On-State Resistance   | $R_{DS(on)}$ | $V_{GS} = -2.5V, I_D = -1.7A$                                            | -    | 120   | 140  |       |
| Drain-Source On-State Resistance   | $R_{DS(on)}$ | $V_{GS} = -1.8V, I_D = -1.5A$                                            | -    | 170   | 200  |       |
| Zero Gate Voltage Drain Current    | $I_{DSS}$    | $V_{DS} = -16V, V_{GS}=0V$                                               | -    | -     | -1   | μA    |
| Gate Body Leakage                  | $I_{GSS}$    | $V_{GS} = \pm 8V, V_{DS}=0V$                                             | -    | -     | ±100 | nA    |
| Dynamic                            |              |                                                                          |      |       |      |       |
| Forward Transconductance           | $g_{FS}$     | $V_{DS} = -10V, I_D = -1.7A$                                             | 4    | 6     | -    | S     |
| Total Gate Charge                  | $Q_g$        | $V_{DS} = -10V, I_D = -2.2A$<br>$V_{GS} = -4.5V$                         | -    | 4     | -    | nC    |
| Gate-Source Charge                 | $Q_{gs}$     |                                                                          | -    | 0.5   | -    |       |
| Gate-Drain Charge                  | $Q_{gd}$     |                                                                          | -    | 1     | -    |       |
| Turn-On Time                       | $t_{on}$     | $V_{DD} = -16V,$<br>$I_D = -2.2A, V_{GS} = -4.5V$<br>$R_{GEN}=2.5\Omega$ | -    | 8     | -    | ns    |
| Turn-Off Time                      | $t_{off}$    |                                                                          | -    | 35    | -    |       |
| Turn-On Rise Time                  | $t_r$        |                                                                          | -    | 15    | -    |       |
| Turn-Off Fall Time                 | $t_f$        |                                                                          | -    | 25    | -    |       |
| Input Capacitance                  | $C_{iss}$    | $V_{DS} = -10V, V_{GS}=0V$<br>$f=1.0MHz$                                 | -    | 200   | 300  | pF    |
| Output Capacitance                 | $C_{oss}$    |                                                                          | -    | 90    | 140  |       |
| Reverse Transfer Capacitance       | $C_{rss}$    |                                                                          | -    | 40    | 60   |       |
| Gate Resistance                    | $R_g$        | $V_{DS}=0V, V_{GS}=0V$<br>$f=1.0MHz$                                     | -    | 12    | -    | Ω     |
| Source-Drain Diode                 |              |                                                                          |      |       |      |       |
| Max. Diode Forward Current         | $I_s$        | -                                                                        | -    | -     | -2   | A     |
| Diode Forward Voltage              | $V_{SD}$     | $I_s = -1A, V_{GS}=0V$                                                   | -    | -0.79 | -1   | V     |
| Body-Diode Reverse Recovery Time   | $t_{rr}$     | $I_s = -2.1A, di/dt=100A/\mu s$                                          | -    | 30    | -    | ns    |
| Body-Diode Reverse Recovery Charge | $Q_{rr}$     |                                                                          | -    | 12    | -    | nC    |

# PJ2301

## CHARACTERISTIC CURVES



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## CHARACTERISTIC CURVES

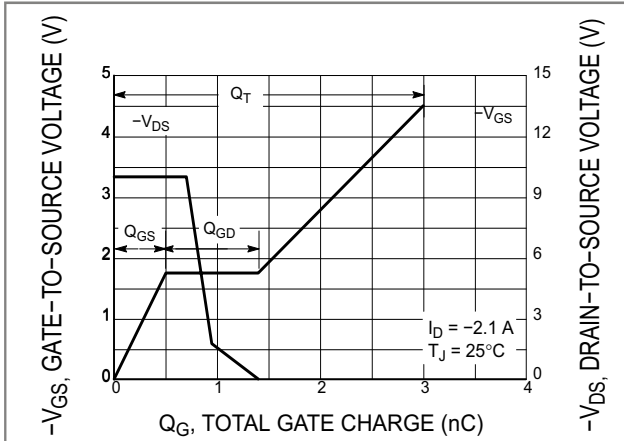


Fig.7 Gate-to-Source and Drain-to-Source vs. Total Charge

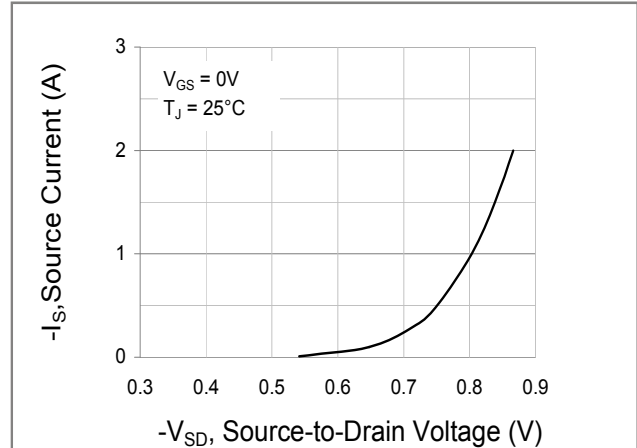


Fig.8 Diode Forward Voltage vs. Current

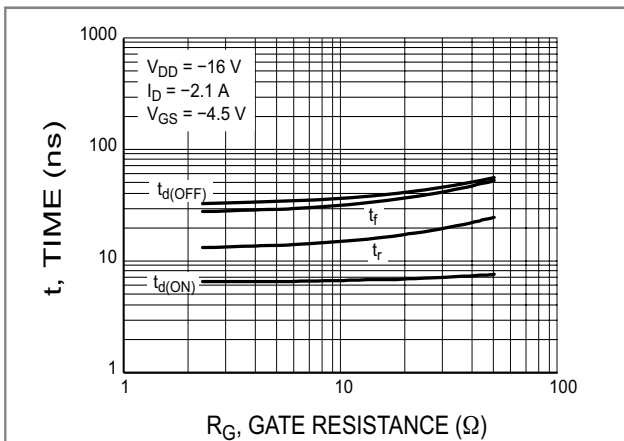


Fig.9 Resistive Switching Time Variation vs. Gate Resistance

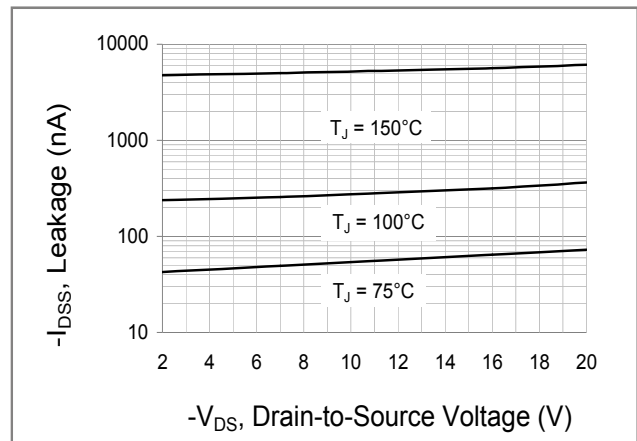


Fig.10 Drain-to-Source Leakage Current vs. Voltage

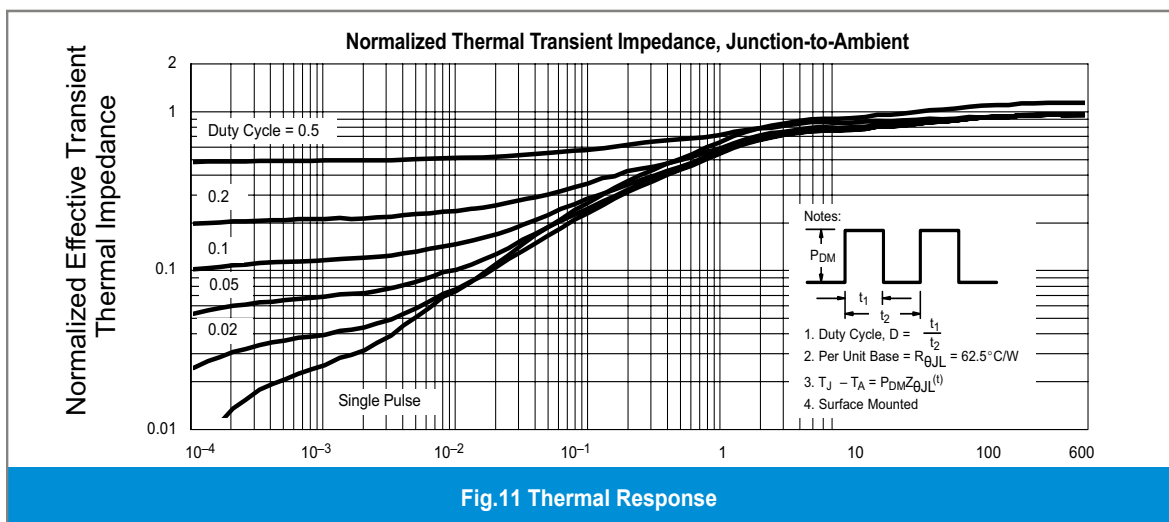


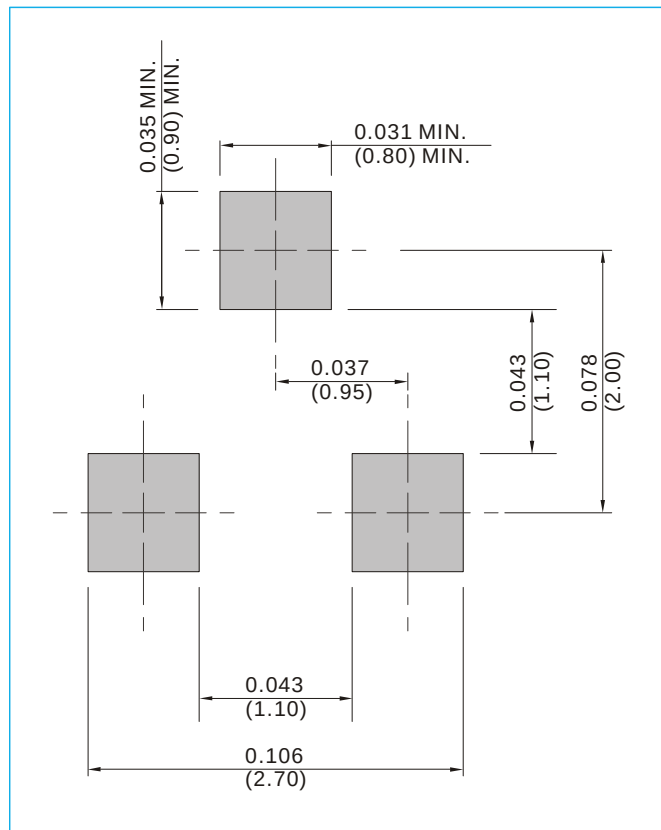
Fig.11 Thermal Response

# PJ2301

## MOUNTING PAD LAYOUT

SOT-23

Unit : inch(mm)



## ORDER INFORMATION

- Packing information
  - T/R - 12K per 13" plastic Reel
  - T/R - 3K per 7" plastic Reel

# PJ2301

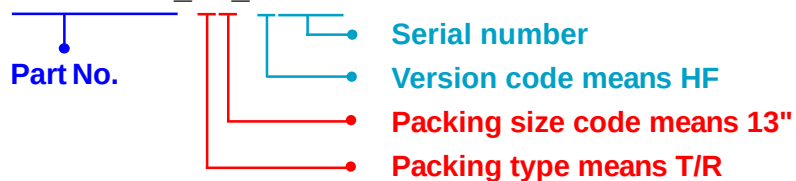
## Part No\_packing code\_Version

PJ2301\_R1\_00001

PJ2301\_R2\_00001

For example :

RB500V-40\_R2\_00001



| Packing Code <b>XX</b>               |                      |                                  |                      | Version Code <b>XXXXX</b> |                      |                                       |
|--------------------------------------|----------------------|----------------------------------|----------------------|---------------------------|----------------------|---------------------------------------|
| Packing type                         | 1 <sup>st</sup> Code | Packing size code                | 2 <sup>nd</sup> Code | HF or RoHS                | 1 <sup>st</sup> Code | 2 <sup>nd</sup> ~5 <sup>th</sup> Code |
| Tape and Ammunition Box (T/B)        | <b>A</b>             | N/A                              | <b>0</b>             | HF                        | <b>0</b>             | serial number                         |
| Tape and Reel (T/R)                  | <b>R</b>             | 7"                               | <b>1</b>             | RoHS                      | <b>1</b>             | serial number                         |
| Bulk Packing (B/P)                   | <b>B</b>             | 13"                              | <b>2</b>             |                           |                      |                                       |
| Tube Packing (T/P)                   | <b>T</b>             | 26mm                             | <b>X</b>             |                           |                      |                                       |
| Tape and Reel (Right Oriented) (TRR) | <b>S</b>             | 52mm                             | <b>Y</b>             |                           |                      |                                       |
| Tape and Reel (Left Oriented) (TRL)  | <b>L</b>             | PANASERT T/B CATHODE UP (PBCU)   | <b>U</b>             |                           |                      |                                       |
| FORMING                              | <b>F</b>             | PANASERT T/B CATHODE DOWN (PBCD) | <b>D</b>             |                           |                      |                                       |



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