# PJ2301

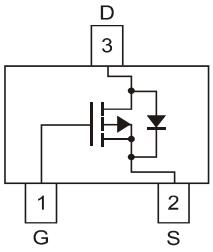
## 20V P-Channel Enhancement Mode MOSFET

### FEATURES

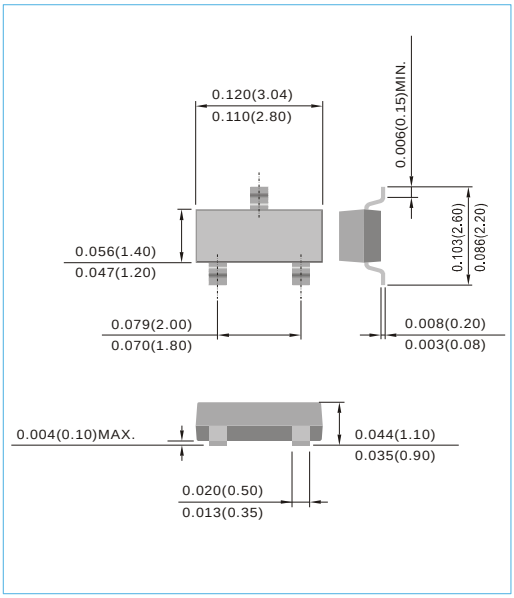
- $R_{DS(ON)}$, $V_{GS}$@-1.8V,$I_D$@-1.5A=200mΩ
- $R_{DS(ON)}$, $V_{GS}$@-4.5V,$I_D$@-2.2A=105mΩ
- Advanced Trench Process Technology
- High Density Cell Design For Ultra Low On-Resistance
- Specially Designed for DC/DC converters
- Low gate charge
- In compliance with EU RoHS 2002/95/EC directives

### MECHANICAL DATA

- Case: SOT-23 Package
- Terminals : Solderable per MIL-STD-750,Method 2026
- Marking : 01




**SOT-23** Unit : inch(mm)




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

| PARAMETER | | | Symbol | Limit | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | | | $V_{GS}$ | ±8 | V |
| Continuous Drain Current (Notes 1) | Steady-State<br>Steady-State<br>t ≤ 5s | $T_A$=25°C<br>$T_A$=70°C<br>$T_A$=25°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°C<br>$T_A$=70°C | $P_D$ | 700<br>450 | mW |
| Typical Thermal Resistance (Notes 1) | | | $R_{\theta JA}$ | 175 | °C/W |
| Typical Thermal Resistance (Notes 1) | | | $R_{\theta JL}$ | 65 | °C/W |
| Operating Junction and Storage Temperature Range | | | $T_J$,$T_{STG}$ | -55 to + 150 | °C |

NOTES:

1. Mounted on minimum pad layout.
2. Mounted on 50cm$^2$ copper pad area.

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## ELECTRICAL CHARACTERISTICS

| Parameter | Symbol | Test Condition | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Static | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$= -250μA | -20 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$= -250μA | -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 | $I_{GSS}$ | $V_{GS}$= ±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>$R_{GEN}$=2.5Ω | - | 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=1.0$MH_Z$ | - | 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=1.0$MH_Z$ | - | 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/μs | - | 30 | - | ns |
| Body-Diode Reverse Recovery Charge | $Q_{rr}$ | | - | 12 | - | nC |

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## CHARACTERISTIC CURVES

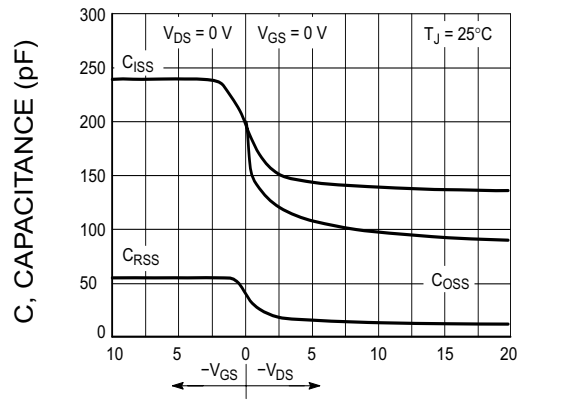


Fig.1 Capacitance Variation

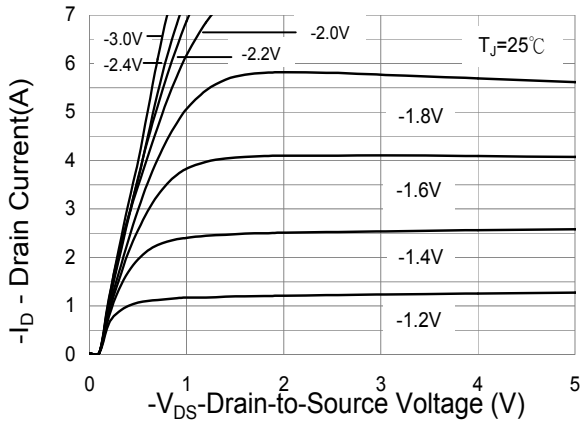


Fig.2 On-Region Characteristics

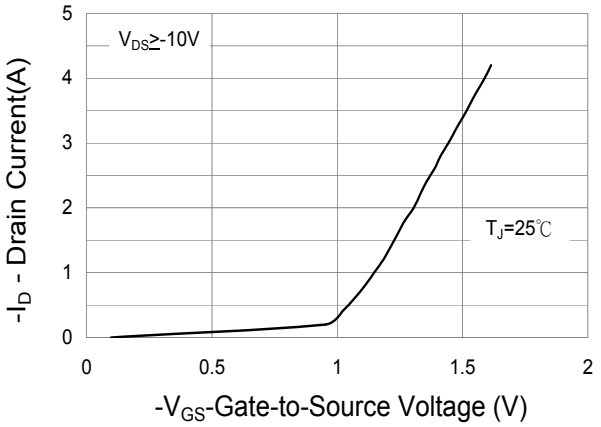


Fig.3 Transfer Characteristics

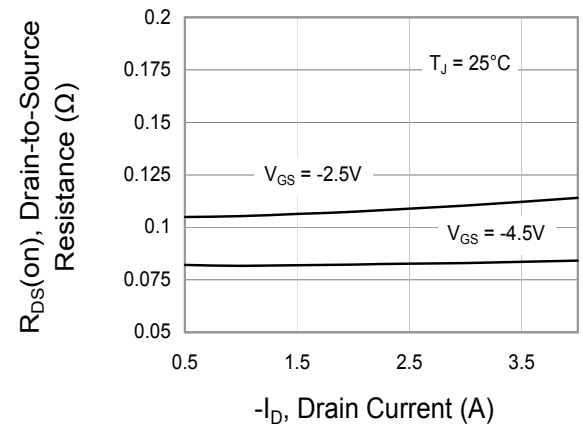


Fig.4 On-Resistance vs. Drain Current and Gate Voltage

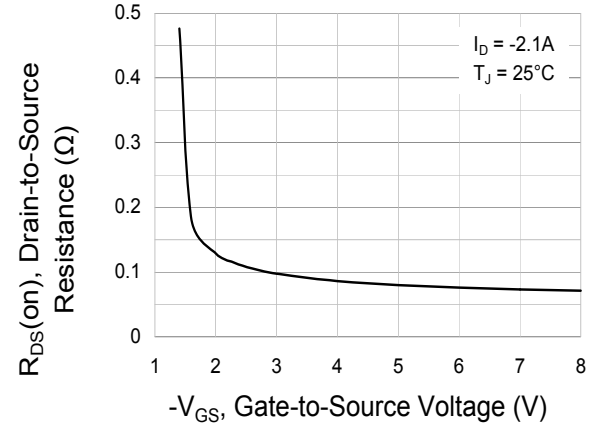


Fig.5 On-Resistance vs. Gate-Source Voltage

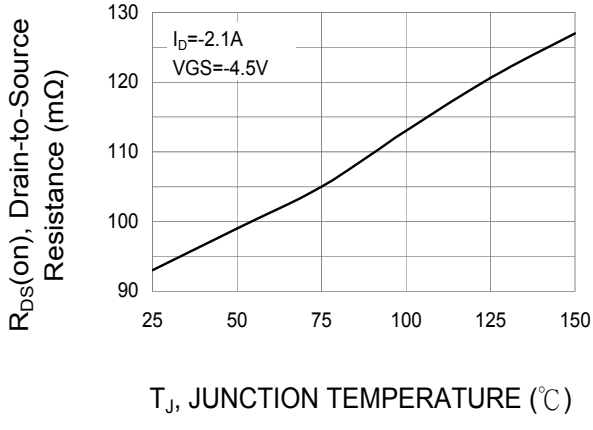


Fig.6 On-Resistance Variation with Temperature

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## CHARACTERISTIC CURVES

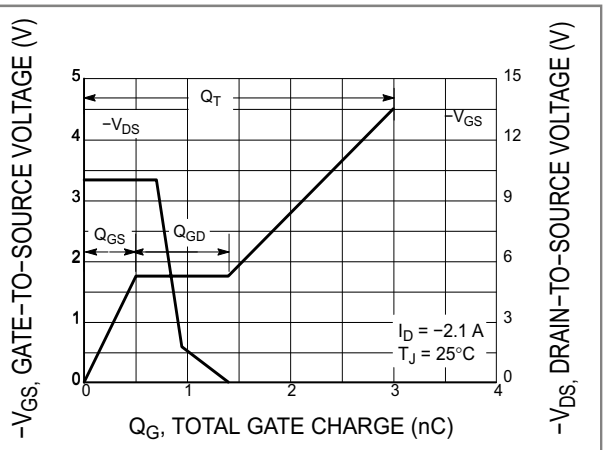


Fig.7 Gate-to-Source and Drain-to-Source vs. Total Charge

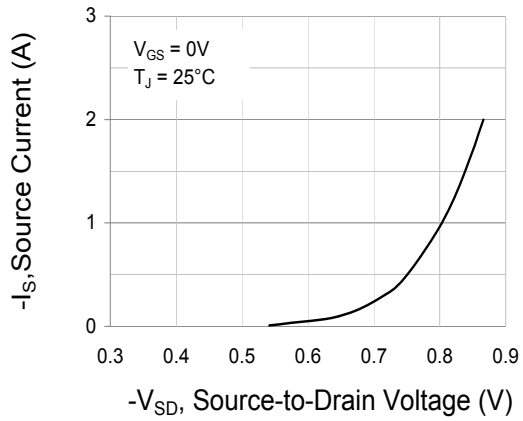


Fig.8 Diode Forward Voltage vs. Current

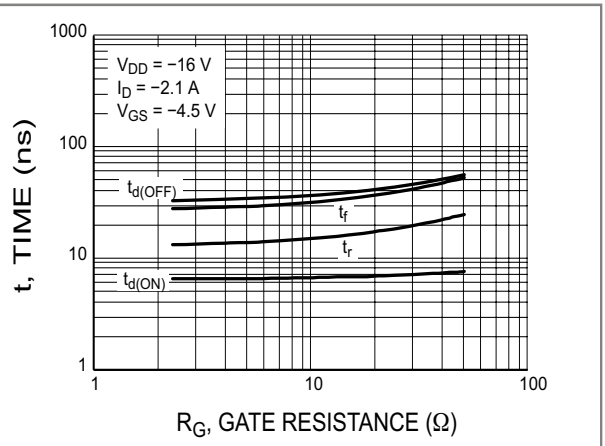


Fig.9 Resistive Switching Time Variation vs. Gate Resistance

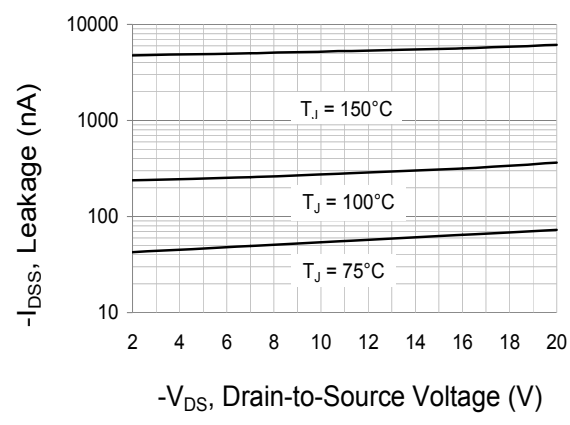


Fig.10 Drain-to-Source Leakage Current vs. Voltage

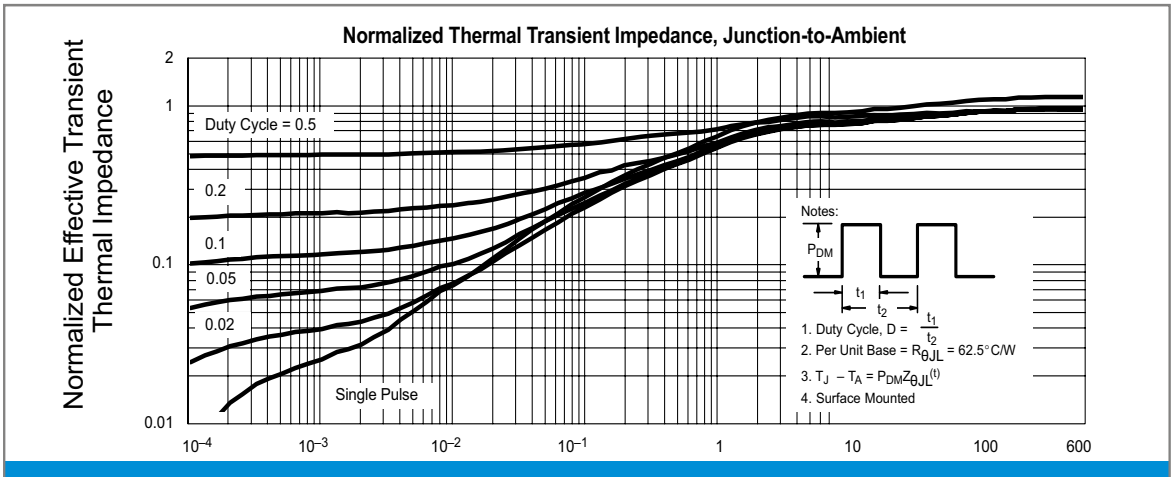


Fig.11 Thermal Response

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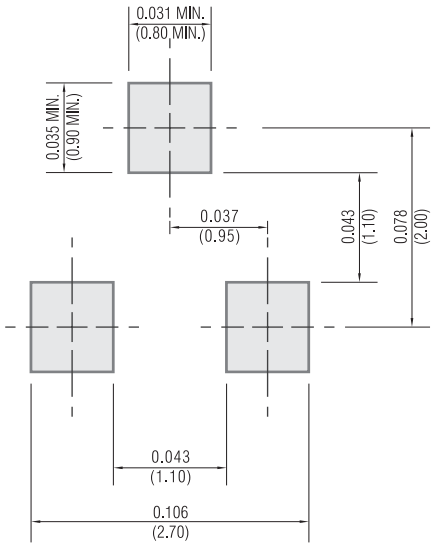
## MOUNTING PAD LAYOUT

SOT-23 Unit: inch ( mm )




## ORDER INFORMATION

- Packing information

  T/R - 12K per 13" plastic Reel

  T/R - 3K per 7” plastic Reel

## LEGAL STATEMENT