# MJ P-Channel Super Trench Power MOSFET

## Description

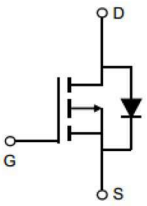
The MJ30P90G uses Super Trench technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and $Q_g$. This device is ideal for high-frequency switching and synchronous rectification.

## General Features

- $V_{DS}$=-30V,$I_D$=-90A
  $R_{DS(ON)}$<5.1mΩ (typical) @ $V_{GS}$=-10V
  $R_{DS(ON)}$<7.4mΩ (typical) @ $V_{GS}$=-4.5V
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

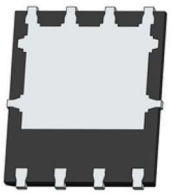
## Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification




Schematic diagram


Top View



Bottom View

**100% UIS TESTED! 100% ΔVds TESTED!**

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| MJXP30P90G | MJXP30P90G | DFN5X6-8L | - | - | - |

## Absolute Maximum Ratings ($T_C$ =25 ℃unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | -90 | A |
| Drain Current-Continuous($T_C$ =100℃) | $I_{D(100℃)}$ | -63.6 | A |
| Pulsed Drain Current | $I_{DM}$ | -300 | A |
| Maximum Power Dissipation | $P_D$ | 75 | W |
| Single pulse avalanche energy (Note 5) | $E_{AS}$ | 500 | mJ |
| Derating factor | | 0.6 | W/℃ |
| Operating Junction and Storage Temperature Range | $T_J$ ,$T_{STG}$ | -55 To 150 | ℃ |

## Thermal Characteristic

| | | | |
|---|---|---|---|
| Thermal Resistance,Junction-to-Case (Note 2) | $R_{θJC}$ | 1.0 | ℃/W |

## Electrical Characteristics ($T_C$=25℃ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=-250μA | -30 | | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-30V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{DS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$ ,$I_D$=-250μA | -1.0 | -1.5 | -2.2 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-20A | - | 5.1 | 5.6 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-20A | - | 7.4 | 8.0 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=-5V,$I_D$=-20A | - | 30 | - | S |
| **Dynamic Characteristics** (Note 4) | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=-15V,$V_{GS}$=0V, F=1.0MHz | - | 3914 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 1263 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 50 | - | PF |
| **Switching Characteristics** (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=-15V,$I_D$=-20A $V_{GS}$=-10V,$R_G$=1.6Ω | - | 10.5 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 9 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 40 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 10 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=-15V,$I_D$=-20A $V_{GS}$=-10V | - | 52 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 9.6 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 7.0 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=-20A | - | | -1.2 | V |
| Diode Forward Current (Note 2) | $I_S$ | | - | - | -90 | A |
| Reverse Recovery Time | $t_{rr}$ | $T_J$=25°C, $I_F$=-20A di/dt=100A/μs (Note 3) | - | | 24 | nS |
| Reverse Recovery Charge | $Q_{rr}$ | | - | | 68 | nC |

**Notes:**

① Repetitive Rating: Pulse width limited by maximum junction temperature.
② Surface Mounted on FR4 Board, t≤10sec.
③ Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%.
④ Guaranteed by design, not subject to production
⑤ EAS condition : Tj=25℃,$V_{DD}$=-20V,$V_G$=-10V,L=0.5mH,Rg=25Ω

## Typical Electrical and Thermal Characteristics

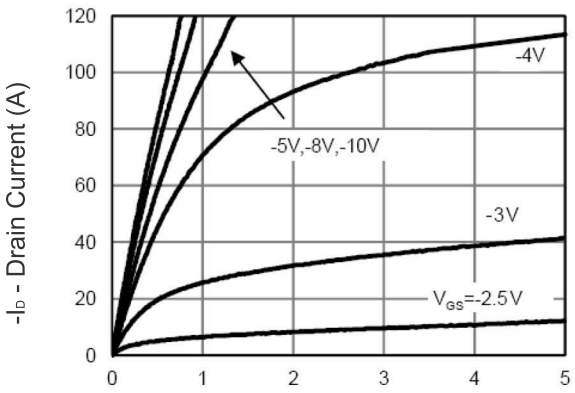



Figure 1 Output Characteristics

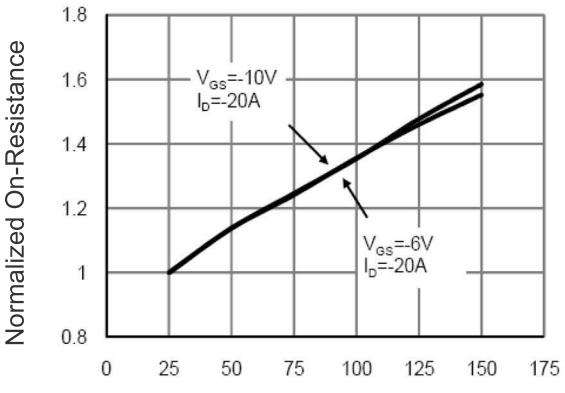



Figure 4 Rdson-Junction Temperature

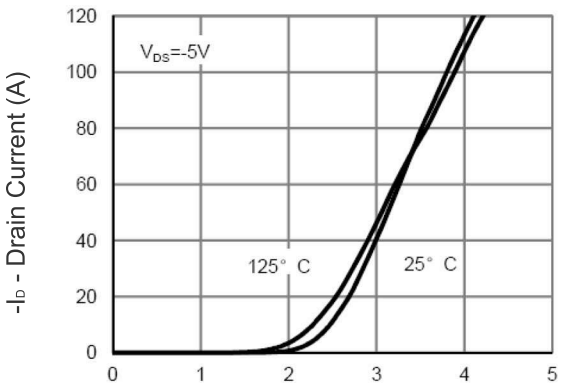



Figure 2 Transfer Characteristics

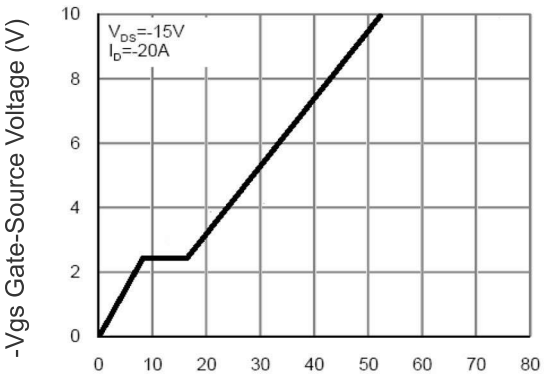



Figure 5 Gate Charge

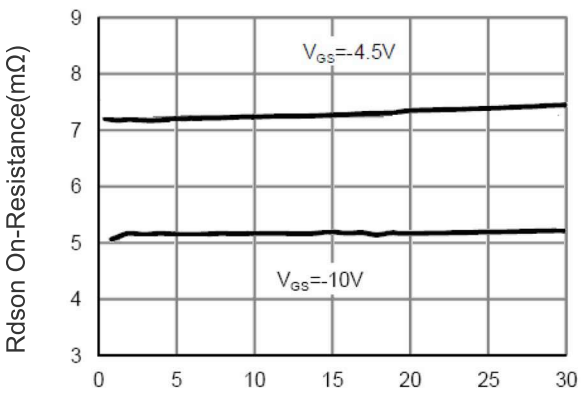



Figure 3 Rdson- Drain Current

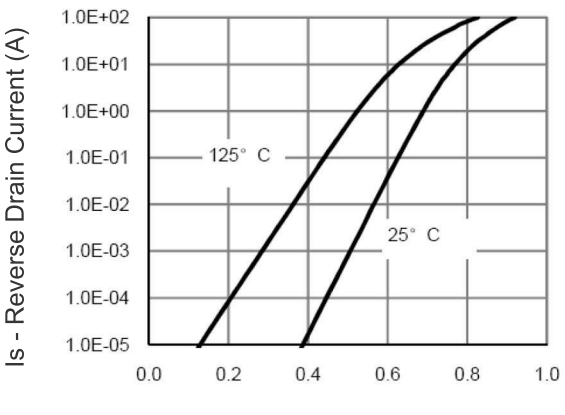



Figure 6 Drain-Source On-Resistance

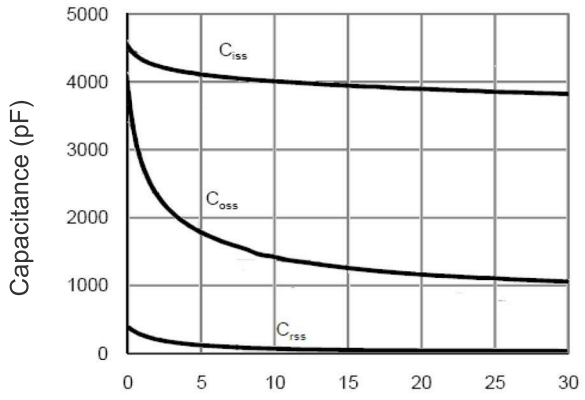



Figure 7 Capacitance vs Vds

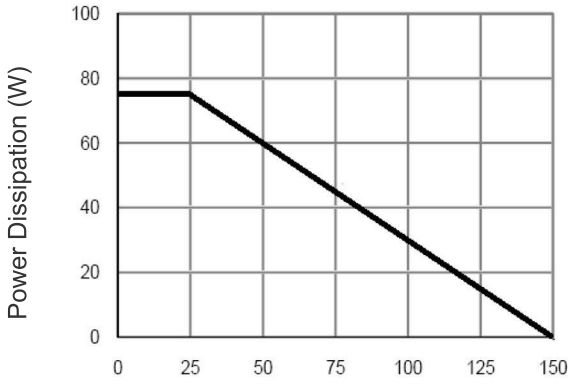



Figure 9 Power De-rating

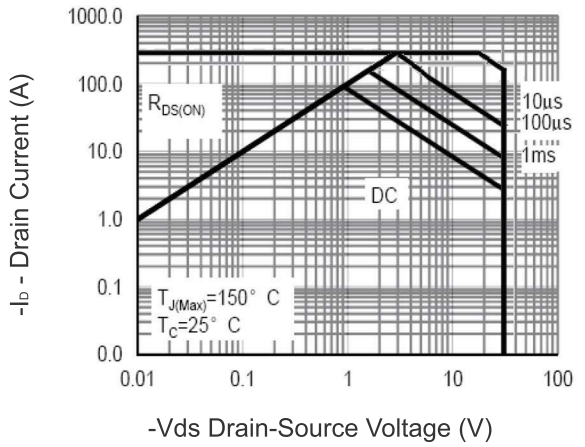



Figure 8 Safe Operation Area

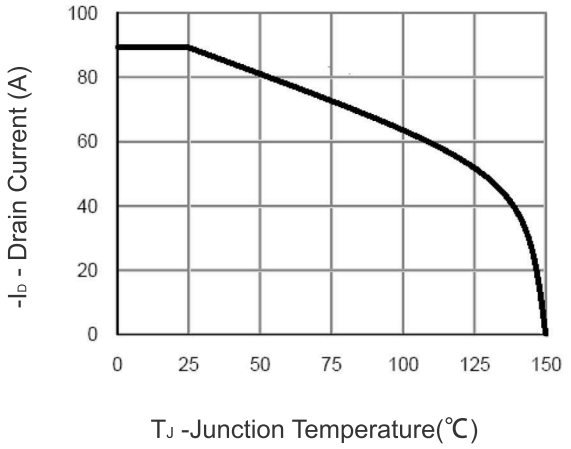



Figure 10 Current De-rating

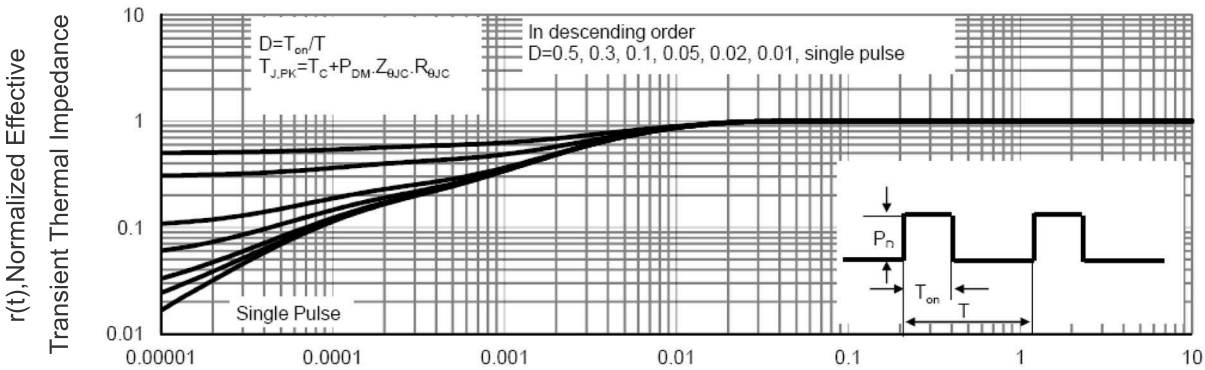
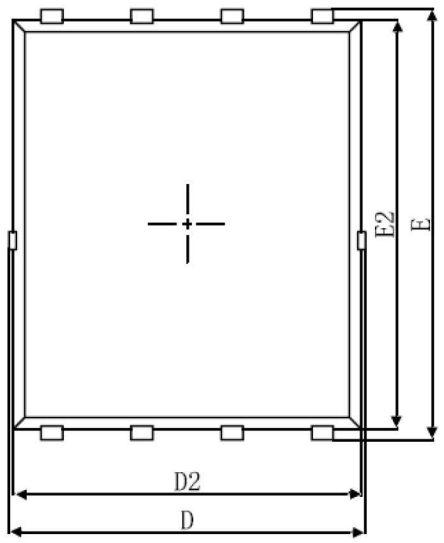
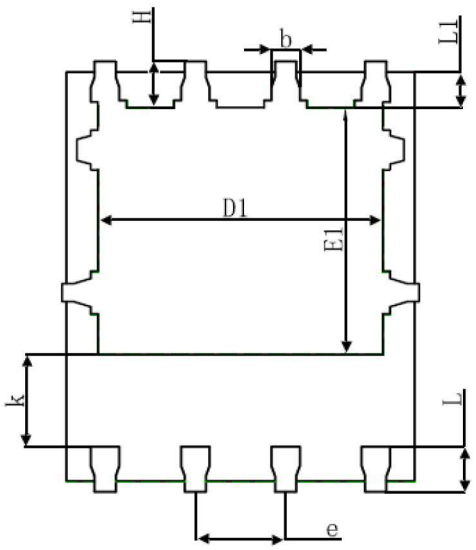



Figure 11 Normalized Maximum Transient Thermal Impedance

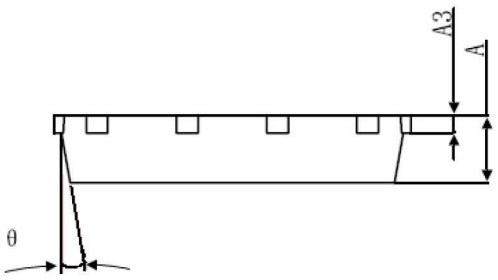
## DFN5X6-8L Package Information




Top View
[顶视图]




Bottom View
[背视图]




Side View
[侧视图]

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.000 | 0.035 | 0.039 |
| A3 | 0.254REF. | | 0.010REF. | |
| D | 4.944 | 5.096 | 0.195 | 0.201 |
| E | 5.974 | 6.126 | 0.235 | 0.241 |
| D1 | 3.910 | 4.110 | 0.154 | 0.162 |
| E1 | 3.375 | 3.575 | 0.133 | 0.141 |
| D2 | 4.824 | 4.976 | 0.190 | 0.196 |
| E2 | 5.674 | 5.826 | 0.223 | 0.229 |
| k | 1.190 | 1.390 | 0.047 | 0.055 |
| b | 0.350 | 0.450 | 0.014 | 0.018 |
| e | 1.270TYP. | | 0.050TYP. | |
| L | 0.559 | 0.711 | 0.022 | 0.028 |
| L1 | 0.424 | 0.576 | 0.017 | 0.023 |
| H | 0.574 | 0.726 | 0.023 | 0.029 |
| θ | 8° | 12° | 8° | 12° |

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