

## FUJI POWER MOSFET Super FAP-G Series

### N-CHANNEL SILICON POWER MOSFET

#### Features

- High speed switching
- Low on-resistance
- No secondary breakdown
- Low driving power
- Avalanche-proof

#### Applications

- Switching regulators
- UPS (Uninterruptible Power Supply)
- DC-DC converters

#### Maximum ratings and characteristic Absolute maximum ratings

( $T_c=25^\circ\text{C}$  unless otherwise specified)

| Item                                    | Symbol          | Ratings                | Unit              |
|-----------------------------------------|-----------------|------------------------|-------------------|
| Drain-source voltage                    | $V_{DS}$        | 250                    | V                 |
|                                         | $V_{DSX}^*5$    | 220                    | V                 |
| Continuous drain current                | $I_D$           | $\pm 37$               | A                 |
| Pulsed drain current                    | $I_{D(puls)}$   | $\pm 148$              | A                 |
| Gate-source voltage                     | $V_{GS}$        | $\pm 30$               | V                 |
| Non-repetitive Avalanche current        | $I_{AS}^*2$     | 37                     | A                 |
| Maximum Avalanche Energy                | $E_{AS}^*1$     | 251.9                  | mJ                |
| Maximum Drain-Source dV/dt              | $dV_{DS}/dt^*4$ | 20                     | kV/ $\mu\text{s}$ |
| Peak Diode Recovery dV/dt               | $dV/dt^*3$      | 5                      | kV/ $\mu\text{s}$ |
| Max. power dissipation                  | $P_D$           | $T_a=25^\circ\text{C}$ | 3.10              |
|                                         |                 | $T_c=25^\circ\text{C}$ | 115               |
| Operating and storage temperature range | $T_{ch}$        | +150                   | $^\circ\text{C}$  |
|                                         | $T_{stg}$       | -55 to +150            | $^\circ\text{C}$  |
| Isolation voltage                       | $V_{ISO}^*6$    | 2                      | kVrms             |

\*1  $L=309\mu\text{H}$ ,  $V_{CC}=48\text{V}$  \*2  $T_{ch} \leq 150^\circ\text{C}$  \*3  $I_F \leq -I_D$ ,  $-di/dt=50\text{A}/\mu\text{s}$ ,  $V_{CC} \leq BV_{DSS}$ ,  $T_{ch} \leq 150^\circ\text{C}$

\*4  $V_{DS} \leq 250\text{V}$  \*5  $V_{GS} = -30\text{V}$  \*6  $t = 60\text{sec}$   $f = 60\text{Hz}$

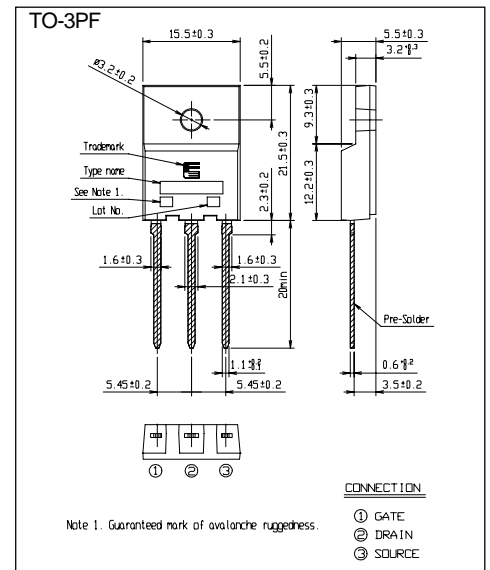
#### Electrical characteristics ( $T_c = 25^\circ\text{C}$ unless otherwise specified)

| Item                             | Symbol        | Test Conditions                                                     | Min. | Typ. | Max. | Units            |
|----------------------------------|---------------|---------------------------------------------------------------------|------|------|------|------------------|
| Drain-source breakdown voltage   | $V_{(BR)DSS}$ | $I_D = 250\mu\text{A}$ $V_{GS} = 0\text{V}$                         | 250  |      |      | V                |
| Gate threshold voltage           | $V_{GS(th)}$  | $I_D = 250\mu\text{A}$ $V_{DS} = V_{GS}$                            | 3.0  |      | 5.0  | V                |
| Zero gate voltage drain current  | $I_{DSS}$     | $V_{DS} = 250\text{V}$ $V_{GS} = 0\text{V}$                         |      |      | 25   | $\mu\text{A}$    |
|                                  |               | $V_{DS} = 200\text{V}$ $V_{GS} = 0\text{V}$                         |      |      | 250  | $\mu\text{A}$    |
| Gate-source leakage current      | $I_{GSS}$     | $V_{GS} = \pm 30\text{V}$ $V_{DS} = 0\text{V}$                      |      | 10   | 100  | nA               |
| Drain-source on-state resistance | $R_{DS(on)}$  | $I_D = 12.5\text{A}$ $V_{GS} = 10\text{V}$                          |      | 75   | 100  | $\text{m}\Omega$ |
| Forward transconductance         | $g_{fs}$      | $I_D = 12.5\text{A}$ $V_{DS} = 25\text{V}$                          | 8    | 16   |      | S                |
| Input capacitance                | $C_{iss}$     | $V_{DS} = 75\text{V}$                                               |      | 2000 | 3000 | pF               |
| Output capacitance               | $C_{oss}$     | $V_{GS} = 0\text{V}$                                                |      | 400  | 600  | pF               |
| Reverse transfer capacitance     | $C_{rss}$     | $f = 1\text{MHz}$                                                   |      | 25   | 38   | pF               |
| Turn-on time $t_{on}$            | $t_{d(on)}$   | $V_{CC} = 72\text{V}$ $I_D = 12.5\text{A}$                          |      | 20   | 30   | ns               |
|                                  | $t_r$         | $V_{GS} = 10\text{V}$                                               |      | 30   | 45   |                  |
| Turn-off time $t_{off}$          | $t_{d(off)}$  | $R_{GS} = 10\Omega$                                                 |      | 60   | 90   | ns               |
|                                  | $t_f$         |                                                                     |      | 20   | 30   |                  |
| Total Gate Charge                | $Q_G$         | $V_{CC} = 72\text{V}$                                               |      | 44   | 66   | nC               |
| Gate-Source Charge               | $Q_{GS}$      | $I_D = 12\text{A}$                                                  |      | 14   | 21   |                  |
| Gate-Drain Charge                | $Q_{GD}$      | $V_{GS} = 10\text{V}$                                               |      | 16   | 24   |                  |
| Avalanche capability             | $I_{AV}$      | $L = 309\mu\text{H}$ $T_{ch} = 25^\circ\text{C}$                    | 37   |      |      | A                |
| Diode forward on-voltage         | $V_{SD}$      | $I_F = 25\text{A}$ $V_{GS} = 0\text{V}$ $T_{ch} = 25^\circ\text{C}$ |      | 1.10 | 1.65 | V                |
| Reverse recovery time            | $t_{rr}$      | $I_F = 25\text{A}$ $V_{GS} = 0\text{V}$                             |      | 0.45 |      | $\mu\text{s}$    |
| Reverse recovery charge          | $Q_{rr}$      | $-di/dt = 100\text{A}/\mu\text{s}$ $T_{ch} = 25^\circ\text{C}$      |      | 1.5  |      | $\mu\text{C}$    |

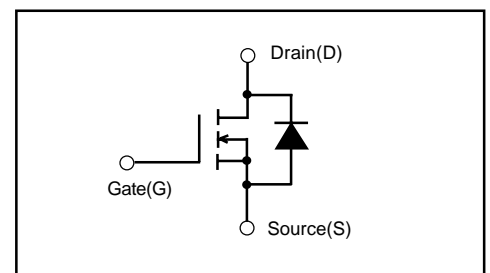
#### Thermal characteristics

| Item               | Symbol         | Test Conditions    | Min. | Typ. | Max.  | Units                     |
|--------------------|----------------|--------------------|------|------|-------|---------------------------|
| Thermal resistance | $R_{th(ch-c)}$ | channel to case    |      |      | 1.087 | $^\circ\text{C}/\text{W}$ |
|                    | $R_{th(ch-a)}$ | channel to ambient |      |      | 40.0  | $^\circ\text{C}/\text{W}$ |

#### Outline Drawings (mm)



#### Equivalent circuit schematic



## Characteristics

