

## 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                 |
| Repetitive or non-repetitive            | $I_{AR}^*2$     | 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                  | $P_D$           | $T_a=25^\circ\text{C}$ | 2.16              |
|   |                 | $T_c=25^\circ\text{C}$ | 95                |
| 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  $L=309\mu\text{H}$ ,  $V_{CC}=48\text{V}$ , See to Avalanche Energy Graph \*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  $t=60\text{sec}$   $f=60\text{Hz}$

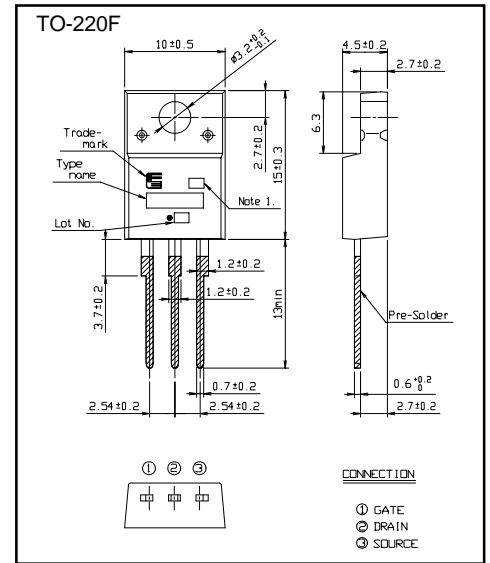
### Electrical characteristics ( $T_c=25^\circ\text{C}$ unless otherwise specified)

| 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  | $I_{DSS}$     | $V_{DS}=250\text{V}$ $V_{GS}=0\text{V}$ $T_{ch}=25^\circ\text{C}$  |      |      | 25   | $\mu\text{A}$    |
|                                  |               | $V_{DS}=200\text{V}$ $V_{GS}=0\text{V}$ $T_{ch}=125^\circ\text{C}$ |      |      | 250  |                  |
| 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               | $C_{oss}$     | $V_{GS}=0\text{V}$   |      | 220  | 330  |                  |
| Reverse transfer capacitance     | $C_{rss}$     | $f=1\text{MHz}$  |      | 15   | 30   |                  |
| 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   |                  |
|                                  | $t_f$         |  |      | 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  |      | $\mu\text{C}$    |

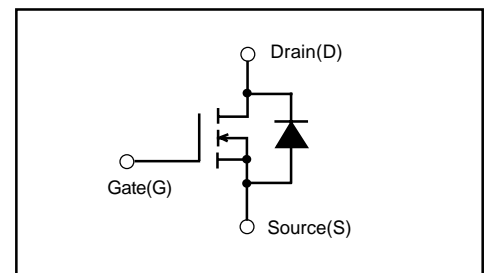
### Thermal characteristics

| Item               | Symbol         | Test Conditions    | Min. | Typ. | Max.  | Units                     |
|--------------------|----------------|--------------------|------|------|-------|---------------------------|
| Thermal resistance | $R_{th(ch-c)}$ | channel to case    |      |      | 1.316 | $^\circ\text{C}/\text{W}$ |
|                    | $R_{th(ch-a)}$ | channel to ambient |      |      | 58.0  | $^\circ\text{C}/\text{W}$ |

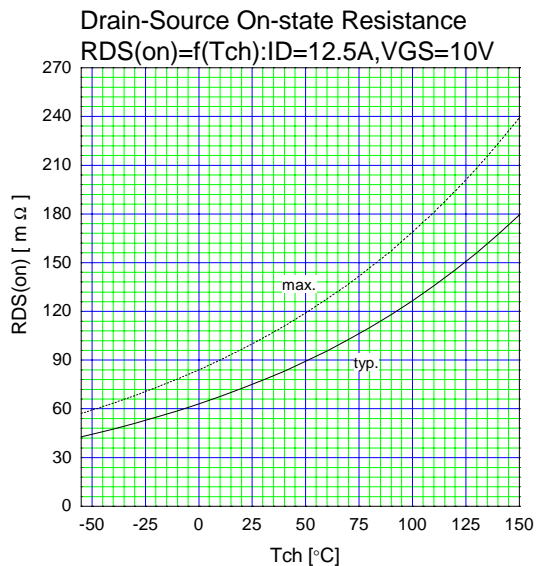
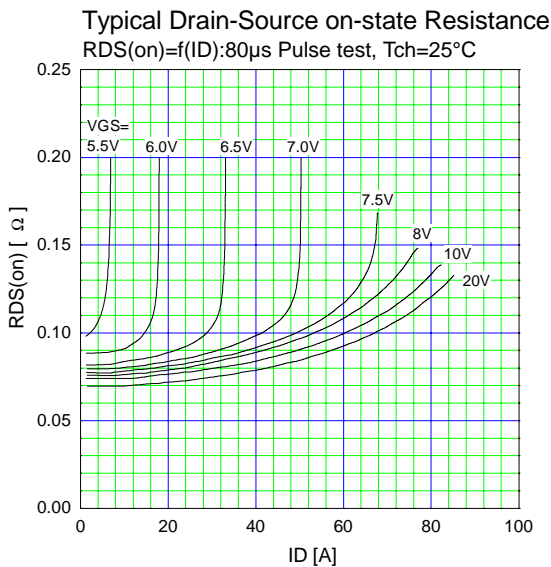
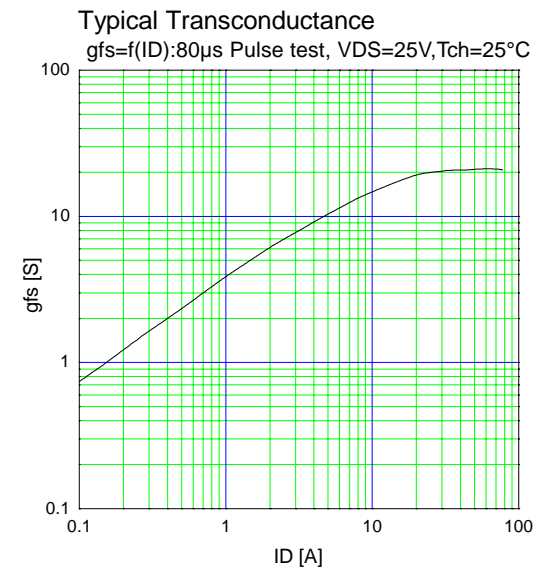
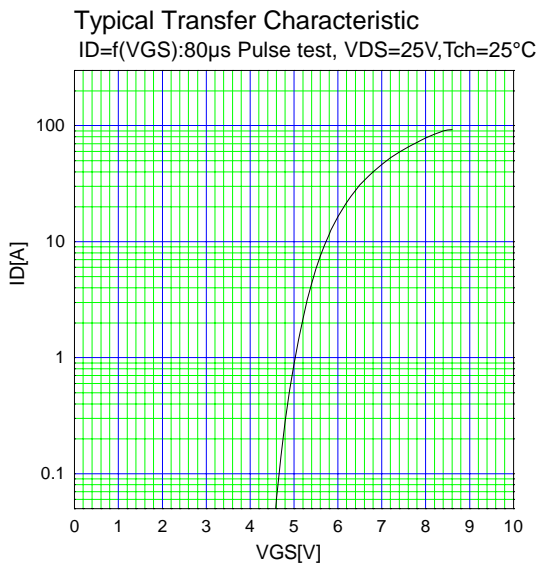
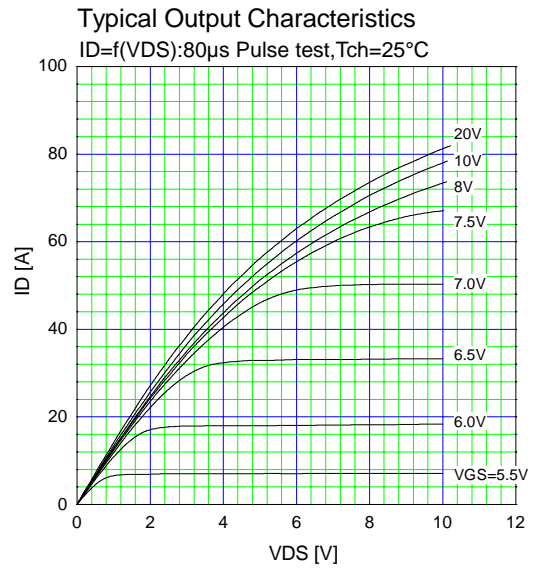
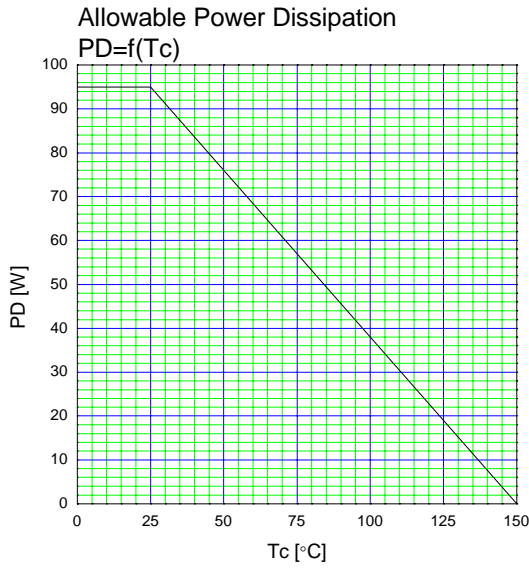
### Outline Drawings [mm]

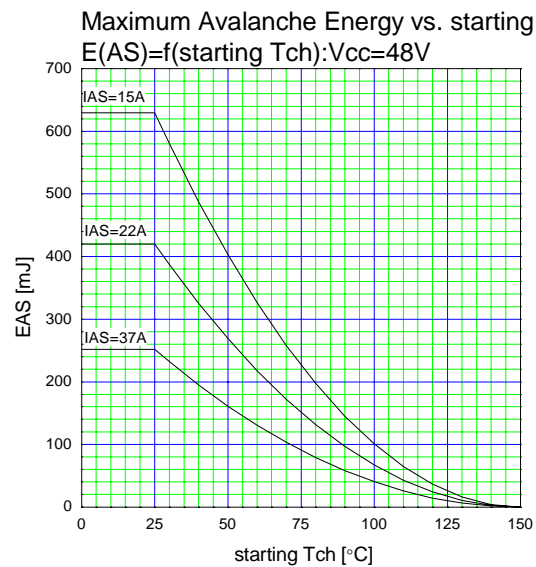
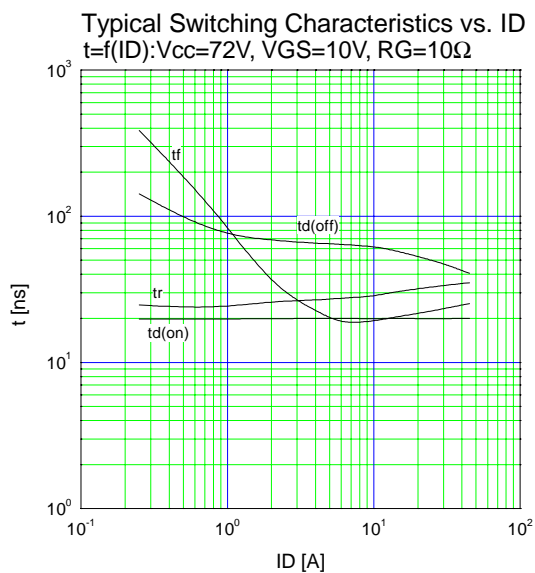
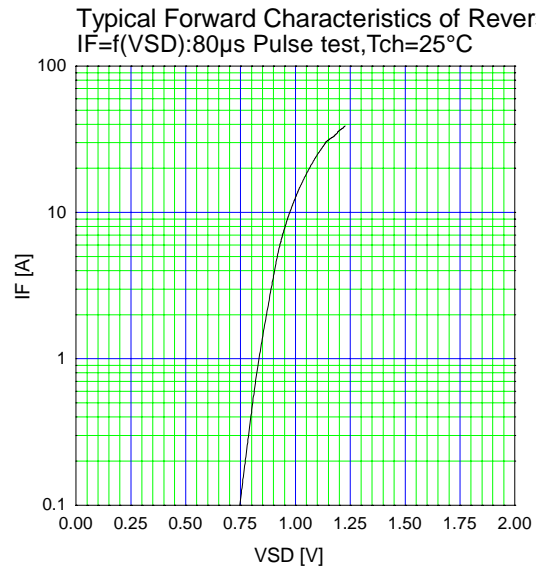
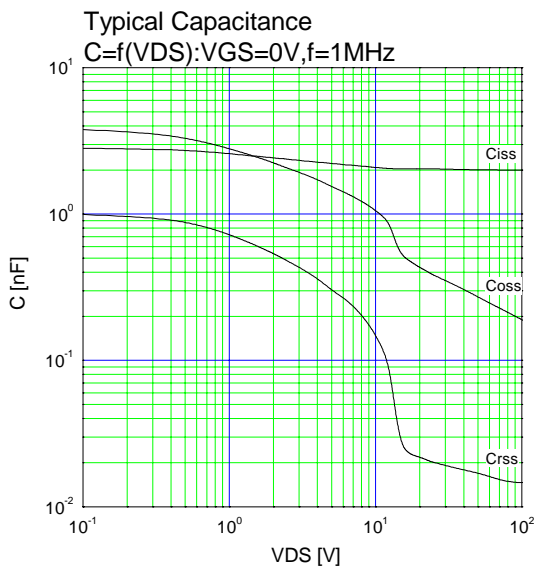
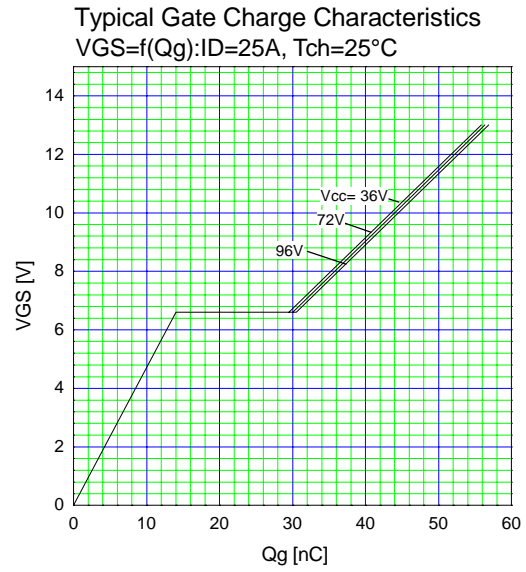
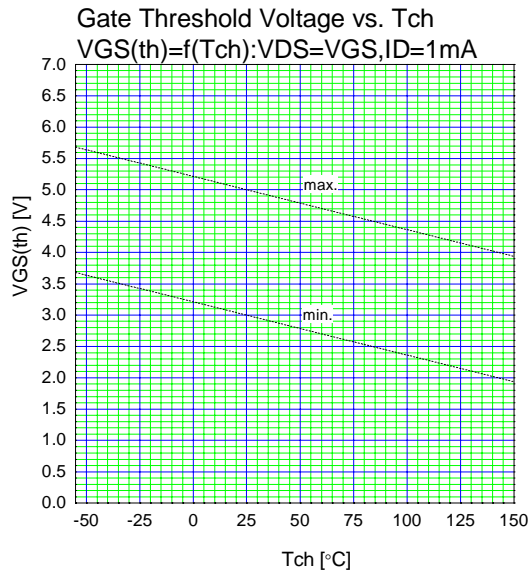


### Equivalent circuit schematic



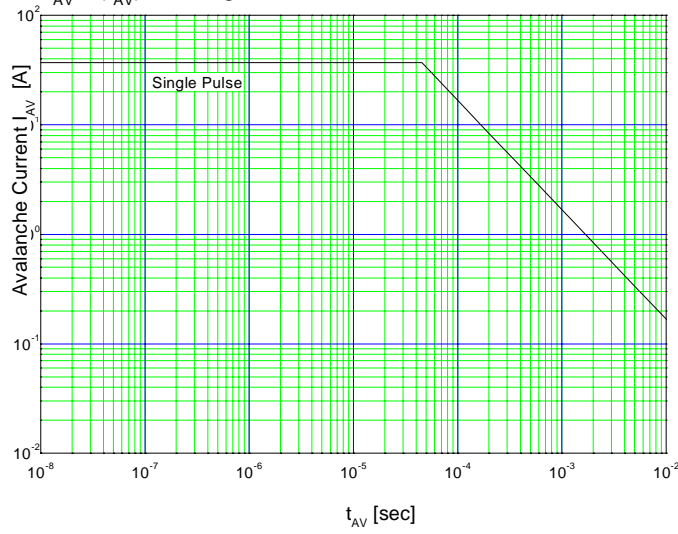
Characteristics





Maximum Avalanche Current Pulsewidth

$I_{AV}=f(t_{AV})$ :starting Tch=25°C,Vcc=48V



Maximum Transient Thermal Impedance

$Z_{th}(ch-c)=f(t)$ :D=0

