

# Super FAP-G Series

## N-CHANNEL SILICON POWER MOSFET

### Features

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

### Applications

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

### Maximum ratings and characteristic Absolute maximum ratings (Tc=25°C unless otherwise specified)

| Item                                    | Symbol                              | Ratings             | Unit  | Remarks                |
|-----------------------------------------|-------------------------------------|---------------------|-------|------------------------|
| Drain-source voltage                    | V <sub>DS</sub>                     | 500                 | V     |                        |
|                                         | V <sub>DSX</sub>                    | 500                 | V     | V <sub>GS</sub> =-30V  |
| Continuous drain current                | I <sub>D</sub>                      | 3.6                 | A     |                        |
| Pulsed drain current                    | I <sub>D(puls)</sub>                | ±14.4               | A     |                        |
| Gate-source voltage                     | V <sub>GS</sub>                     | ±30                 | V     |                        |
| Repetitive or non-repetitive            | I <sub>AR</sub>                     | 3.6                 | A     | Note *1                |
| Non-repetitive Maximum avalanche energy | E <sub>AS</sub>                     | 227.9               | mJ    | Note *2                |
| Repetitive Maximum avalanche energy     | E <sub>AR</sub>                     | 6.0                 | mJ    | Note *3                |
| Maximum drain-source dV/dt              | dV <sub>DS</sub> /dt                | 20                  | kV/μs | V <sub>DS</sub> ≤ 500V |
| Peak diode recovery dV/dt               | dV/dt                               | 5                   | kV/μs | Note *4                |
| Maximum power dissipation               | P <sub>D</sub>                      | 60                  | W     | T <sub>c</sub> =25°C   |
|                                         |                                     | 2.02                | W     | T <sub>a</sub> =25°C   |
| Operating and storage temperature range | T <sub>ch</sub><br>T <sub>stg</sub> | +150<br>-55 to +150 | °C    |                        |

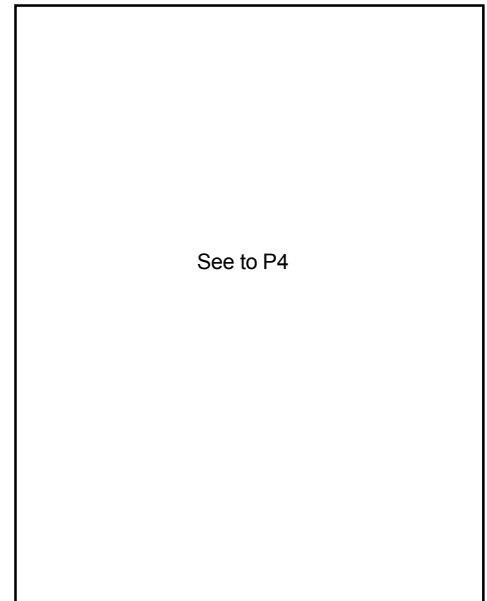
Note \*1 T<sub>ch</sub> ≤ 150°C

Note \*2 Starting T<sub>ch</sub>=25°C, I<sub>AS</sub>=1.5A, L=186mH, V<sub>CC</sub>=50V, R<sub>G</sub>=50Ω  
E<sub>AS</sub> limited by maximum channel temperature and avalanche current.  
See to 'Avalanche Energy' graph.

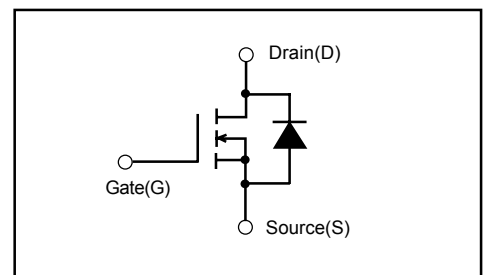
Note \*3 Repetitive rating : Pulse width limited by maximum channel temperature.  
See to 'Transient Thermal Impedance' graph.

Note \*4 I<sub>F</sub> ≤ -I<sub>D</sub>, -di/dt=50A/μs, V<sub>CC</sub> ≤ BV<sub>DSS</sub>, T<sub>ch</sub> ≤ 150°C

### Outline Drawings [mm]



### Equivalent circuit schematic



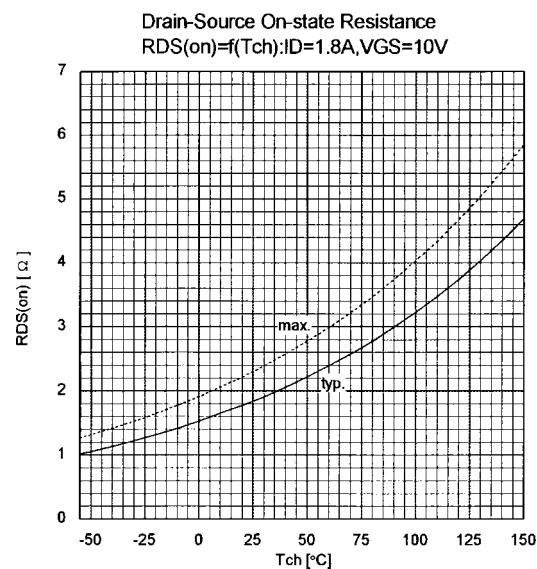
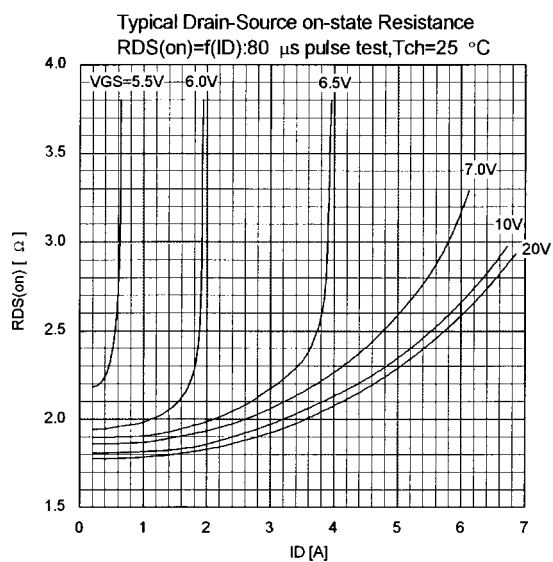
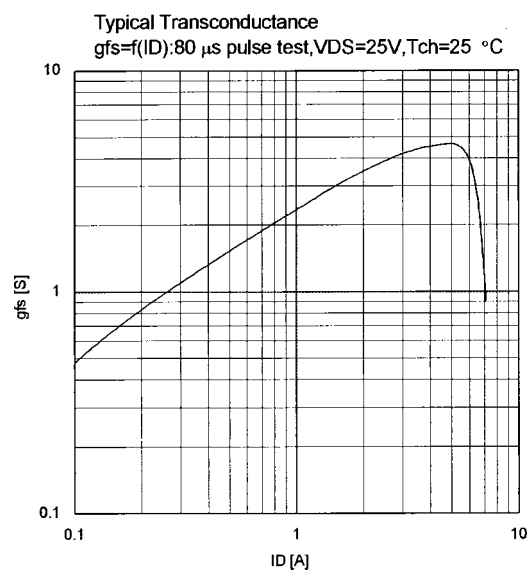
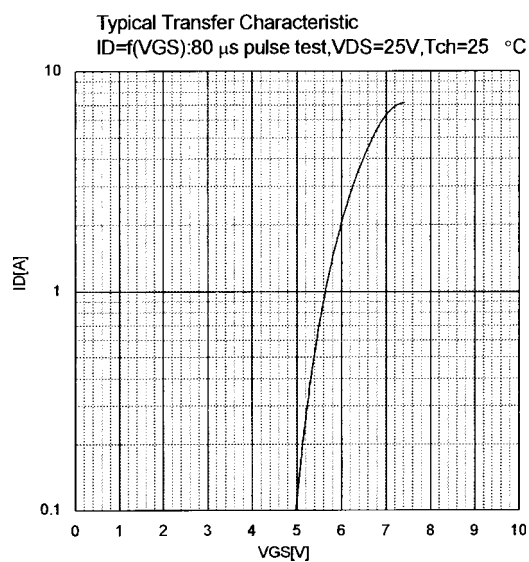
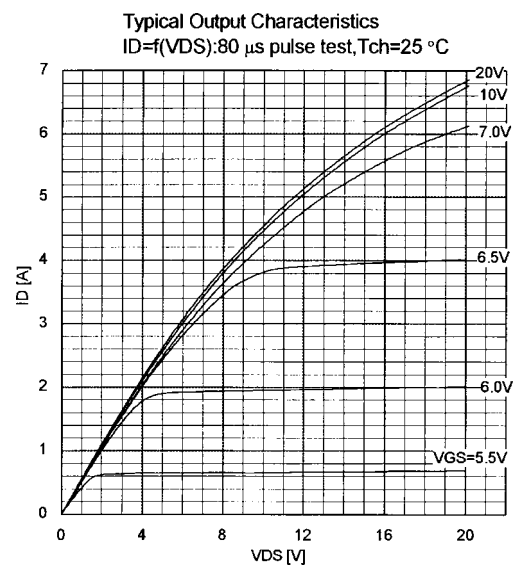
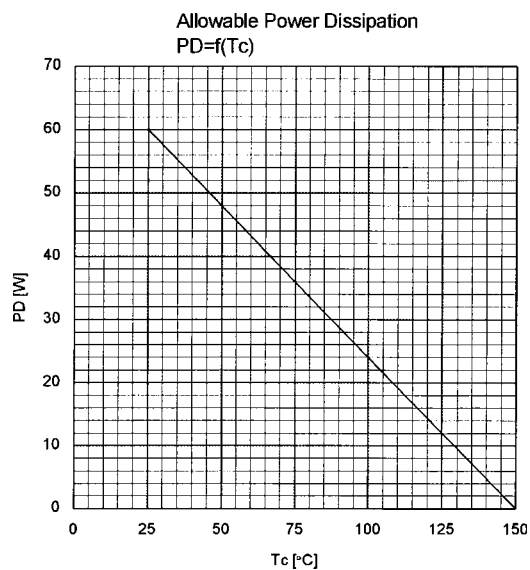
### Electrical characteristics (T<sub>c</sub> =25°C unless otherwise specified)

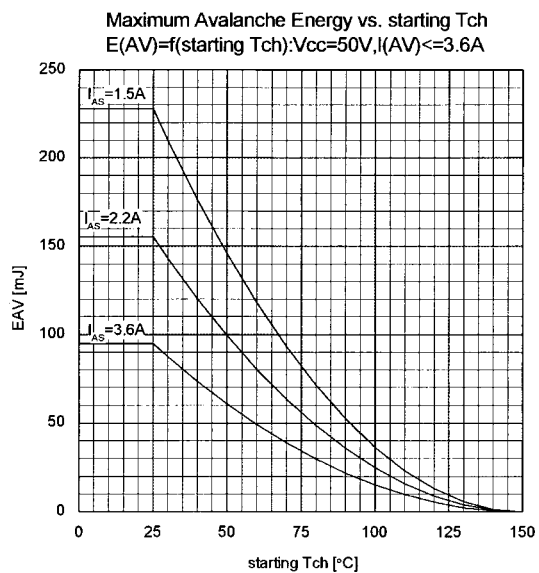
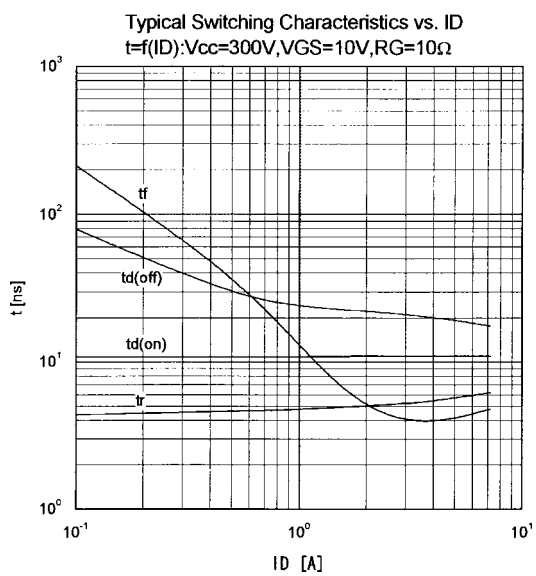
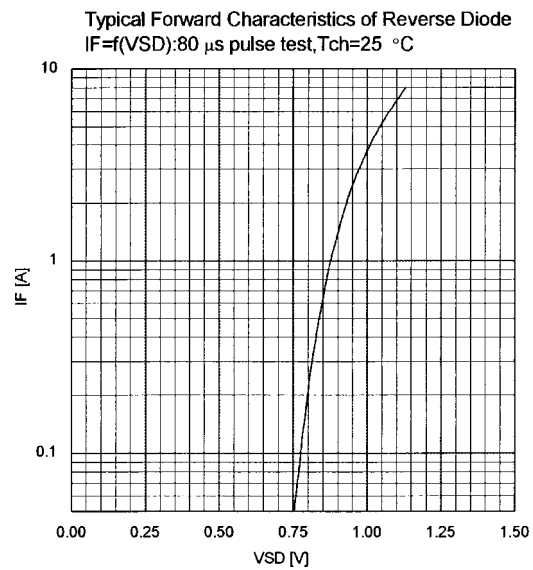
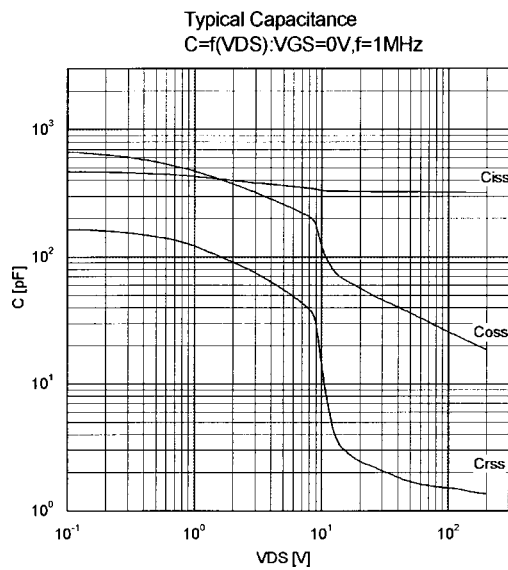
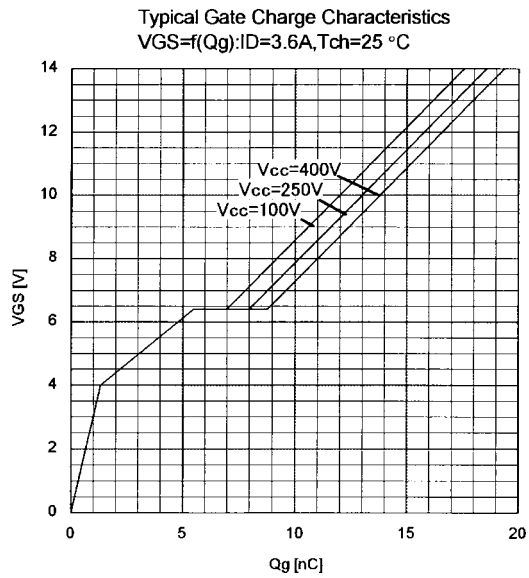
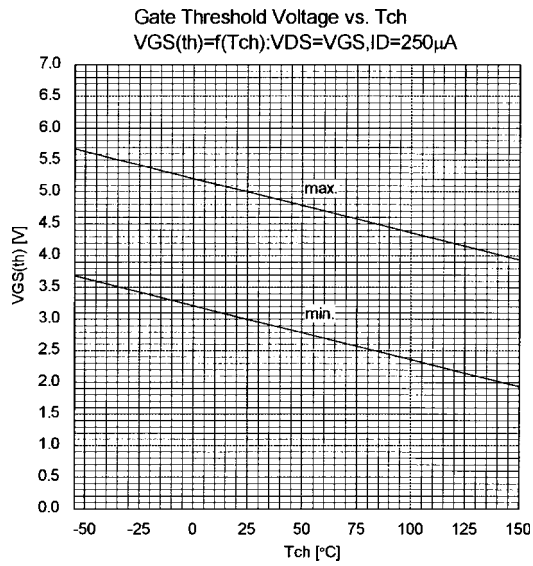
| Item                             | Symbol              | Test Conditions                                                  | Min. | Typ. | Max. | Units |
|----------------------------------|---------------------|------------------------------------------------------------------|------|------|------|-------|
| Drain-source breakdown voltage   | BV <sub>DSS</sub>   | I <sub>D</sub> = 250μA V <sub>GS</sub> =0V                       | 500  |      |      | V     |
| Gate threshold voltage           | V <sub>GS(th)</sub> | I <sub>D</sub> = 250μA V <sub>DS</sub> =V <sub>GS</sub>          | 3.0  |      | 5.0  | V     |
| Zero gate voltage drain current  | I <sub>DSS</sub>    | V <sub>DS</sub> =500V V <sub>GS</sub> =0V T <sub>ch</sub> =25°C  |      |      | 25   | μA    |
|                                  |                     | V <sub>DS</sub> =400V V <sub>GS</sub> =0V T <sub>ch</sub> =125°C |      |      | 250  |       |
| Gate-source leakage current      | I <sub>GSS</sub>    | V <sub>GS</sub> =±30V V <sub>DS</sub> =0V                        |      |      | 100  | nA    |
| Drain-source on-state resistance | R <sub>DS(on)</sub> | I <sub>D</sub> =1.8A V <sub>GS</sub> =10V                        |      | 1.84 | 2.3  | Ω     |
| Forward transconductance         | g <sub>fs</sub>     | I <sub>D</sub> =1.8A V <sub>DS</sub> =25V                        | 1.7  | 3.4  |      | S     |
| Input capacitance                | C <sub>iss</sub>    | V <sub>DS</sub> =25V V <sub>GS</sub> =0V                         |      | 330  | 500  | pF    |
| Output capacitance               | C <sub>oss</sub>    | f=1MHz                                                           |      | 50   | 75   |       |
| Reverse transfer capacitance     | C <sub>rss</sub>    |                                                                  |      | 2.5  | 5.0  |       |
| Turn-on time t <sub>on</sub>     | td(on)              | V <sub>CC</sub> =300V I <sub>D</sub> =1.8A                       |      | 11   | 18   | ns    |
|                                  | t <sub>r</sub>      | V <sub>GS</sub> =10V                                             |      | 5.0  | 7.5  |       |
| Turn-off time t <sub>off</sub>   | td(off)             | R <sub>G</sub> =10 Ω                                             |      | 23   | 35   |       |
|                                  | t <sub>r</sub>      |                                                                  |      | 6.0  | 9.0  |       |
| Total Gate Charge                | Q <sub>G</sub>      | V <sub>CC</sub> =250V I <sub>D</sub> =3.6A V <sub>GS</sub> =10V  |      | 13   | 20   | nC    |
| Gate-Source Charge               | Q <sub>GS</sub>     |                                                                  |      | 5.5  | 8.5  |       |
| Gate-Drain Charge                | Q <sub>GD</sub>     |                                                                  |      | 2.5  | 3.8  |       |
| Diode forward on-voltage         | V <sub>SD</sub>     | I <sub>F</sub> =3.6A V <sub>GS</sub> =0V T <sub>ch</sub> =25°C   |      | 1.00 | 1.50 | V     |
| Reverse recovery time            | t <sub>rr</sub>     | I <sub>F</sub> =3.6A V <sub>GS</sub> =0V                         |      | 0.5  |      | μs    |
| Reverse recovery charge          | Q <sub>rr</sub>     | -di/dt=100A/μs T <sub>ch</sub> =25°C                             |      | 2.3  |      | μC    |

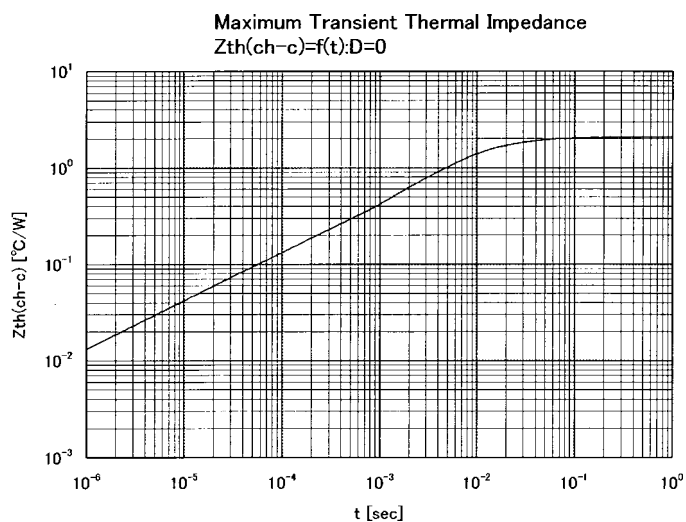
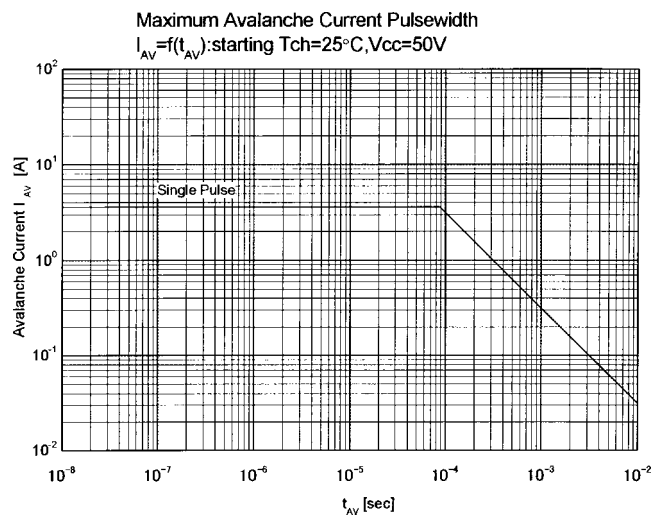
### Thermal characteristics

| Item               | Symbol                | Test Conditions    | Min. | Typ. | Max.  | Units |
|--------------------|-----------------------|--------------------|------|------|-------|-------|
| Thermal resistance | R <sub>th(ch-c)</sub> | channel to case    |      |      | 2.083 | °C/W  |
|                    | R <sub>th(ch-a)</sub> | channel to ambient |      |      | 62.0  | °C/W  |

## Characteristics

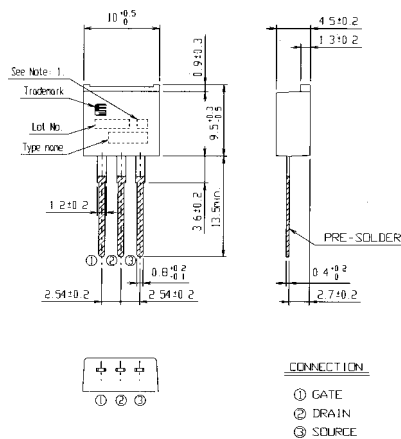






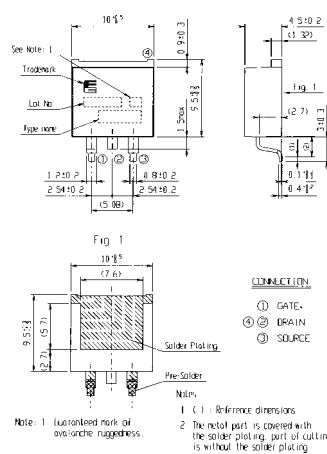
## Outline Drawings [mm]

T-pack(L)



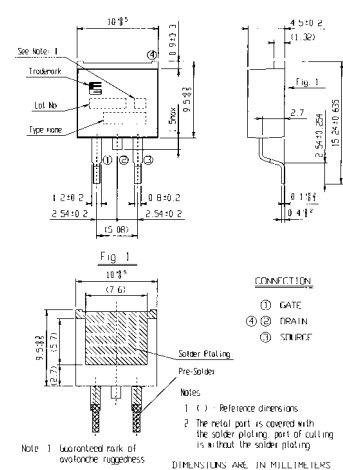
Note: 1 Guaranteed mark of avalanche ruggedness.

T-pack(S)



Note: 1 Guaranteed mark of avalanche ruggedness.  
 2 The metal part is covered with the solder plating, part of cutting is without the solder plating.

T-pack(SJ) [D2-pack]



Note: 1 Guaranteed mark of avalanche ruggedness.  
 2 The metal part is covered with the solder plating, part of cutting is without the solder plating.

DIMENSIONS ARE IN MILLIMETERS