

# 2SK3699-01MR

**FUJI**  
**ELECTRIC**

200305

## 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

##### ● (Tc=25°C unless otherwise specified)

| Item                                    | Symbol                  | Ratings              | Unit             |
|---|-------------------------|----------------------|------------------|
| Drain-source voltage                    | V <sub>DS</sub>         | 900                  | V                |
|   | V <sub>DSX</sub> *5     | 900                  | V                |
| Continuous drain current                | I <sub>D</sub>          | ±3.7                 | A                |
| Pulsed drain current                    | I <sub>D(puls)</sub>    | ±14.8                | A                |
| Gate-source voltage                     | V <sub>GS</sub>         | ±30                  | V                |
| Repetitive or non-repetitive            | I <sub>AR</sub> *2      | 3.7                  | A                |
| Maximum Avalanche Energy                | E <sub>AS</sub> *1      | 171.1                | mJ               |
| Maximum Drain-Source dV/dt              | dV <sub>DS</sub> /dt *4 | 40                   | kV/μs            |
| Peak Diode Recovery dV/dt               | dV/dt *3                | 5                    | kV/μs            |
| Max. power dissipation                  | P <sub>D</sub>          | T <sub>a</sub> =25°C | 2.16             |
|   |                         | T <sub>c</sub> =25°C | 43               |
| Operating and storage temperature range | T <sub>ch</sub>         | +150                 | °C               |
|   | T <sub>stg</sub>        | -55 to +150          | °C               |
| Isolation Voltage                       | V <sub>ISO</sub> *6     | 2000                 | V <sub>rms</sub> |

\*1 L=22.9mH, V<sub>CC</sub>=90V, T<sub>ch</sub>=25°C See to Avalanche Energy Graph \*2 T<sub>ch</sub>≤150°C

\*3 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 \*4 V<sub>DS</sub>≤900V \*5 V<sub>GS</sub>=-30V \*6 f=60Hz, t=60sec.

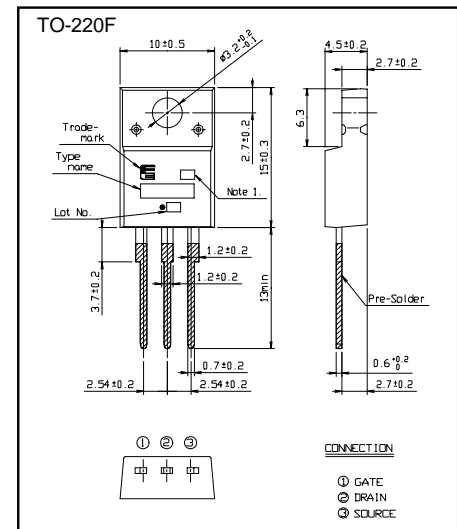
##### ● Electrical characteristics (T<sub>c</sub> =25°C unless otherwise specified)

| Item                             | Symbol               | Test Conditions  | Min. | Typ. | Max. | Units |
|----------------------------------|----------------------|--|------|------|------|-------|
| Drain-source breakdown voltage   | V <sub>(BR)DSS</sub> | I <sub>D</sub> = 250μA V <sub>GS</sub> =0V                       | 900  |      |      | 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> =900V V <sub>GS</sub> =0V T <sub>ch</sub> =25°C  |      |      | 25   | μA    |
|                                  |                      | V <sub>DS</sub> =720V V <sub>GS</sub> =0V T <sub>ch</sub> =125°C |      |      | 250  | μA    |
| 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> =1.85A V <sub>GS</sub> =10V                       |      | 3.31 | 4.30 | Ω     |
| Forward transconductance         | g <sub>fs</sub>      | I <sub>D</sub> =1.85A V <sub>DS</sub> =25V                       | 2    | 4    |      | S     |
| Input capacitance                | C <sub>iss</sub>     | V <sub>DS</sub> =25V V <sub>GS</sub> =0V                         |      | 430  | 650  | pF    |
| Output capacitance               | C <sub>oss</sub>     | f=1MHz   |      | 60   | 90   | pF    |
| Reverse transfer capacitance     | C <sub>rss</sub>     |  |      | 3.5  | 5    | pF    |
| Turn-on time t <sub>on</sub>     | td(on)               | V <sub>CC</sub> =600V I <sub>D</sub> =1.85A                      |      | 19   | 29   | ns    |
|                                  | tr                   | V <sub>GS</sub> =10V   |      | 7    | 11   | ns    |
| Turn-off time t <sub>off</sub>   | td(off)              | R <sub>GS</sub> =10Ω   |      | 32   | 48   | ns    |
|                                  | tr                   |  |      | 17   | 26   | ns    |
| Total Gate Charge                | Q <sub>G</sub>       | V <sub>CC</sub> =450V  |      | 16.5 | 24.8 | nC    |
| Gate-Source Charge               | Q <sub>GS</sub>      | I <sub>D</sub> =3.7A   |      | 6.4  | 9.6  | nC    |
| Gate-Drain Charge                | Q <sub>GD</sub>      | V <sub>GS</sub> =10V   |      | 3.7  | 5.6  | nC    |
| Avalanche capability             | I <sub>AV</sub>      | L=22.9mH T <sub>ch</sub> =25°C                                   | 3.7  |      |      | A     |
| Diode forward on-voltage         | V <sub>SD</sub>      | I <sub>F</sub> =3.7A V <sub>GS</sub> =0V T <sub>ch</sub> =25°C   |      | 0.9  | 1.50 | V     |
| Reverse recovery time            | t <sub>rr</sub>      | I <sub>F</sub> =3.7A V <sub>GS</sub> =0V                         |      | 1.0  |      | μs    |
| Reverse recovery charge          | Q <sub>rr</sub>      | -di/dt=100A/μs T <sub>ch</sub> =25°C                             |      | 4.0  |      | μC    |

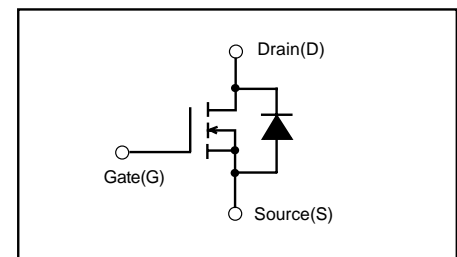
##### ● Thermal characteristics

| Item               | Symbol                | Test Conditions    | Min. | Typ. | Max.  | Units |
|--------------------|-----------------------|--------------------|------|------|-------|-------|
| Thermal resistance | R <sub>th(ch-c)</sub> | channel to case    |      |      | 2.907 | °C/W  |
|                    | R <sub>th(ch-a)</sub> | channel to ambient |      |      | 38.0  | °C/W  |

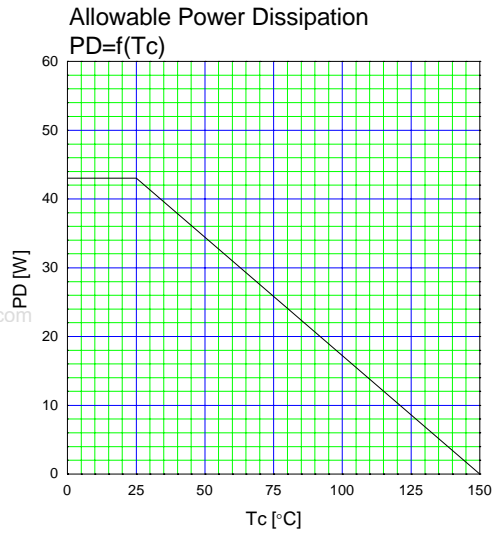
#### ■ Outline Drawings [mm]



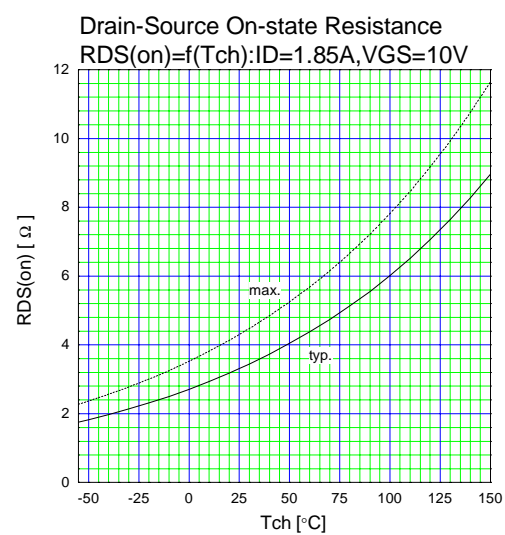
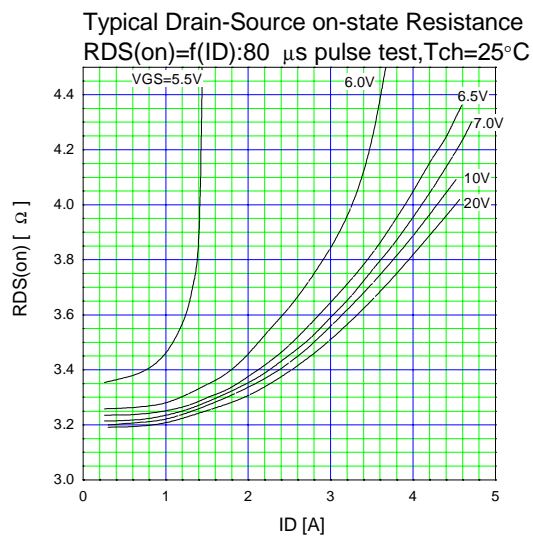
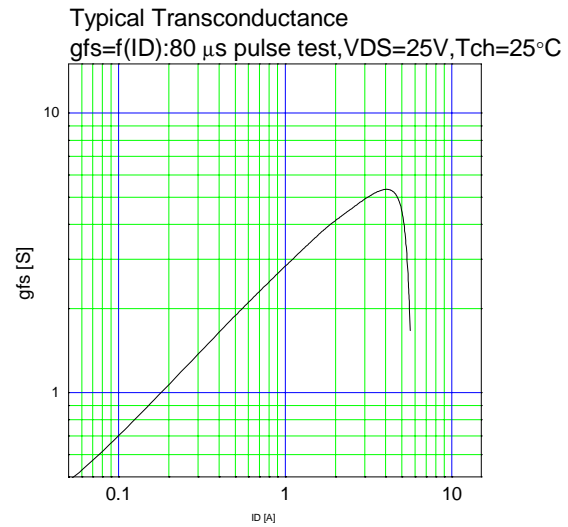
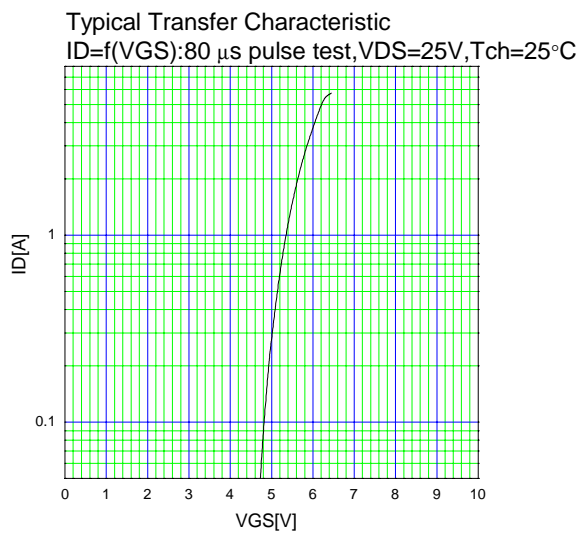
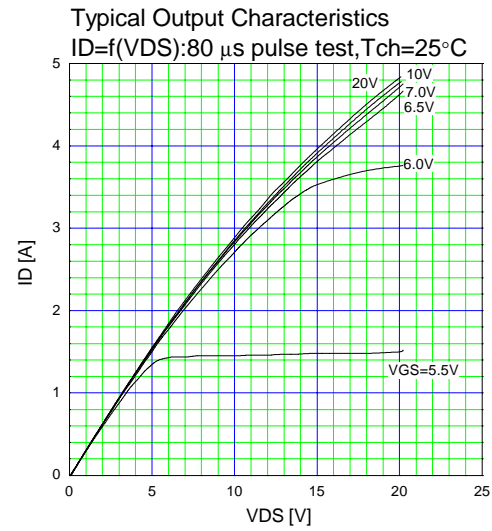
#### ■ Equivalent circuit schematic



## Characteristics

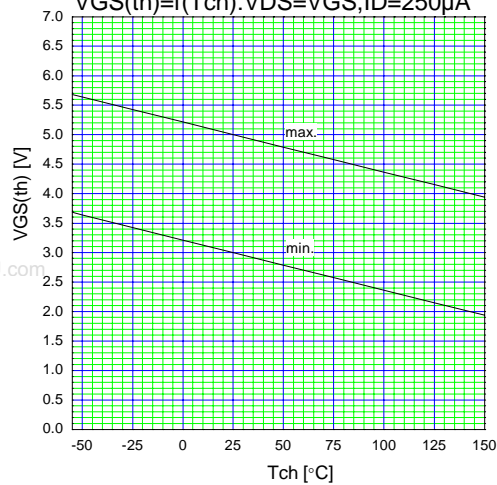


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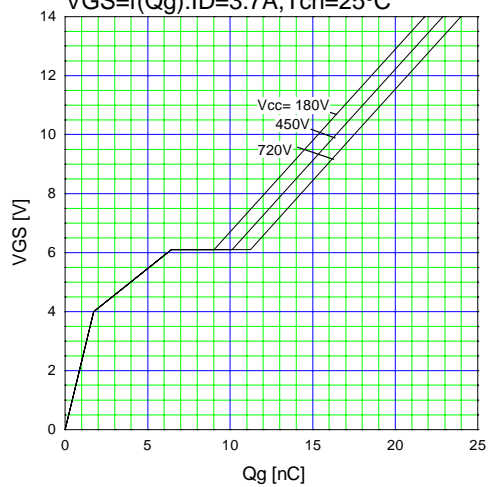
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Gate Threshold Voltage vs. T<sub>ch</sub>  
 $V_{GS(th)} = f(T_{ch}): V_{DS} = V_{GS}, I_D = 250 \mu A$

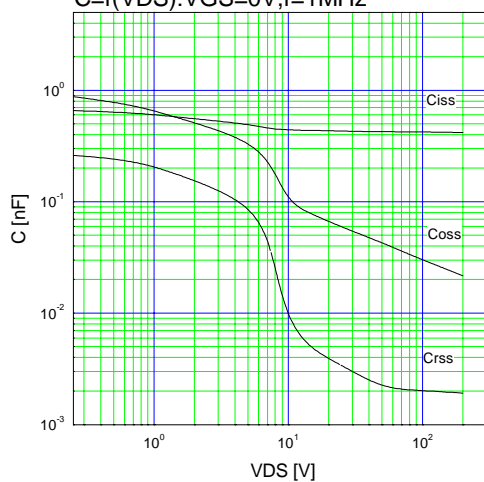


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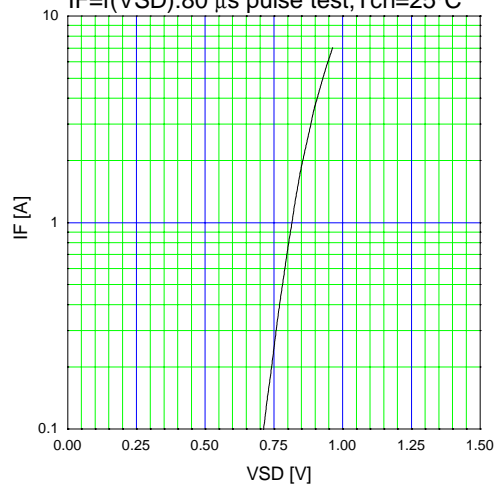
Typical Gate Charge Characteristics  
 $V_{GS} = f(Q_g): I_D = 3.7 A, T_{ch} = 25^\circ C$



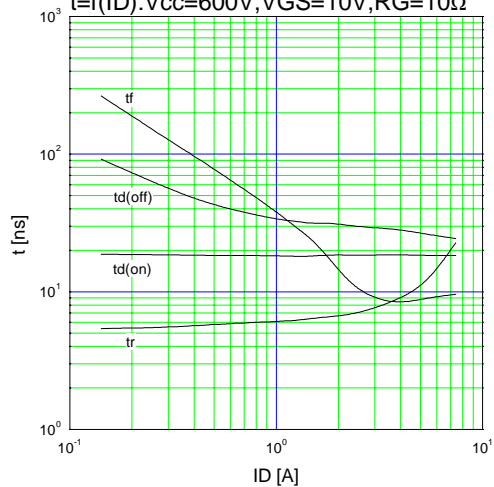
Typical Capacitance  
 $C = f(V_{DS}): V_{GS} = 0V, f = 1MHz$



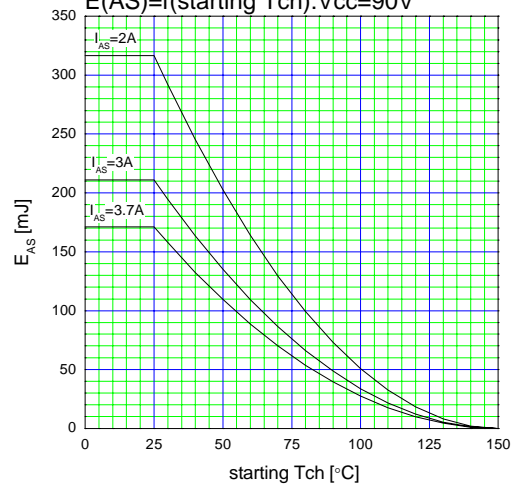
Typical Forward Characteristics of Reverse Diode  
 $I_F = f(V_{SD}): 80 \mu s \text{ pulse test}, T_{ch} = 25^\circ C$



Typical Switching Characteristics vs.  $I_D$   
 $t = f(I_D): V_{CC} = 600V, V_{GS} = 10V, R_G = 10 \Omega$

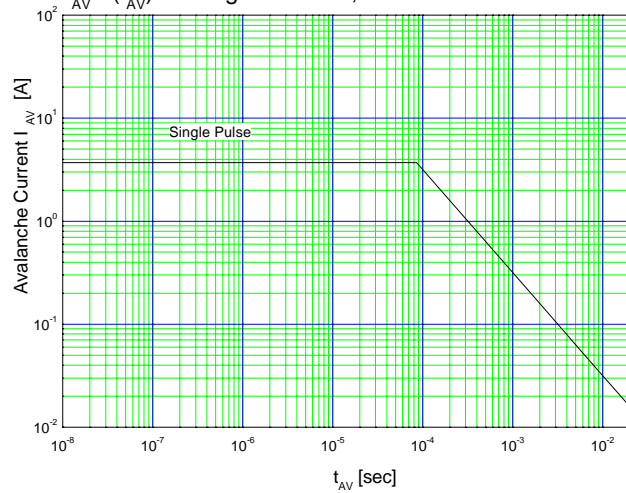


Maximum Avalanche Energy vs. starting  $T_{ch}$   
 $E_{AS} = f(\text{starting } T_{ch}): V_{CC} = 90V$



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Maximum Avalanche Current Pulsewidth

 $I_{AV} = f(t_{AV})$ : starting  $T_{ch}=25^{\circ}\text{C}$ ,  $V_{CC}=90\text{V}$ [www.DataSheet4U.com](http://www.DataSheet4U.com)

Maximum Transient Thermal Impedance

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