

# 2SK3780-01

## N-CHANNEL SILICON POWER MOSFET



### FUJI POWER MOSFET Super FAP-G Series

#### Features

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

#### Applications

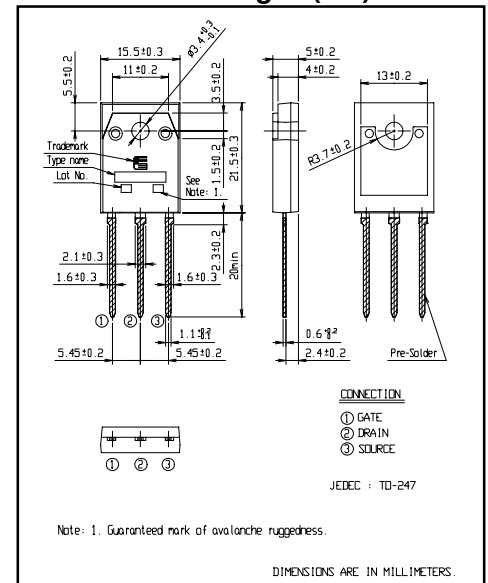
Switching regulators  
UPS (Uninterruptible Power Supply)  
DC-DC converters

#### Maximum ratings and characteristic

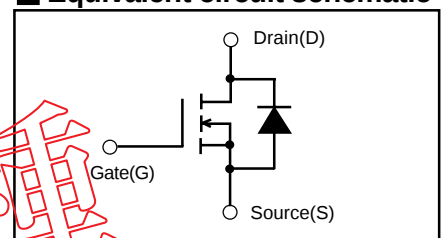
##### Absolute maximum ratings (T<sub>c</sub>=25°C unless otherwise specified)

| Item                                    | Symbol                              | Ratings     | Unit  | Remarks               |
|-----------------------------------------|-------------------------------------|-------------|-------|-----------------------|
| Drain-source voltage                    | V <sub>DS</sub>                     | 200         | V     |                       |
|                                         | V <sub>DSX</sub>                    | 200         | V     | V <sub>GS</sub> =-30V |
| Continuous Drain Current                | I <sub>D</sub>                      | 73          | A     |                       |
| Pulsed Drain Current                    | I <sub>D</sub> (puls)               | ±292        | A     |                       |
| Gate-Source Voltage                     | V <sub>GS</sub>                     | ±30         | V     |                       |
| Maximum Avalanche current               | I <sub>AR</sub>                     | 73          | A     | Note *1               |
| Non-Repetitive                          | E <sub>AS</sub>                     | 1152        | mJ    | Note *2               |
| Maximum Avalanche Energy                | E <sub>AS</sub>                     | 41          | mJ    | Note *3               |
| Repetitive                              |                                     |             |       |                       |
| Maximum Avalanche Energy                |                                     |             |       |                       |
| Maximum Drain-Source dV/dt              | dV <sub>DS</sub> /dt                | 20          | kV/μs | V <sub>DS</sub> ≤200V |
| Peak Diode Recovery dV/dt               | dV/dt                               | 5           | kV/μs | Note *4               |
| Max. Power Dissipation                  | P <sub>D</sub>                      | 410         | W     | T <sub>c</sub> =25°C  |
|                                         |                                     | 250         | W     | T <sub>a</sub> =25°C  |
| Operating and Storage Temperature range | T <sub>ch</sub><br>T <sub>stg</sub> | +150        | °C    |                       |
|                                         |                                     | -55 to +150 | °C    |                       |

#### Outline Drawings (mm) 200406



#### Equivalent circuit schematic



Note \*1: T<sub>ch</sub>≤150°C, Repetitive and Non-repetitive

Note \*2: Starting T<sub>ch</sub>=25°C, I<sub>AS</sub>=30A, L=1.98mH,

V<sub>GS</sub>=48V, R<sub>G</sub>=50Ω

E<sub>AS</sub> limited by maximum channel temperature and Avalanche current.

See to the 'Avalanche Energy' graph

Note \*3: Repetitive rating: Pulse width limited by maximum channel temperature.

See to the 'Transient Thermal impedance' graph.

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

##### 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                        | 200  |      |      | 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> =200V V <sub>GS</sub> =0V T <sub>ch</sub> =25°C  |      |      | 25   | μA    |
|                                  |                     | V <sub>DS</sub> =160V 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> =36.5A V <sub>GS</sub> =10V                       |      | 29   | 36   | mΩ    |
| Forward Transconductance         | g <sub>fs</sub>     | I <sub>D</sub> =36.5A V <sub>DS</sub> =25V                       | 12   | 24   |      | S     |
| Input Capacitance                | C <sub>iss</sub>    | V <sub>DS</sub> =75V V <sub>GS</sub> =0V                         |      | 3800 | 5400 | pF    |
| Output Capacitance               | C <sub>oss</sub>    | f=1MHz                                                           |      | 530  | 795  |       |
| Reverse Transfer Capacitance     | C <sub>rss</sub>    |                                                                  |      | 35   | 52.5 |       |
| Turn-On Time t <sub>on</sub>     | t <sub>d(on)</sub>  | V <sub>CC</sub> =48V I <sub>D</sub> =36.5A                       |      | 40   | 60   | ns    |
|                                  |                     | V <sub>GS</sub> =10V                                             |      | 94   | 141  |       |
| Turn-Off Time t <sub>off</sub>   | t <sub>d(off)</sub> | R <sub>GS</sub> =10Ω                                             |      | 60   | 90   |       |
|                                  |                     |                                                                  |      | 30   | 45   |       |
| Total Gate Charge                | Q <sub>G</sub>      | V <sub>CC</sub> =100V I <sub>D</sub> =73A V <sub>GS</sub> =10V   |      | 80   | 120  | nC    |
| Gate-Source Charge               | Q <sub>GS</sub>     |                                                                  |      | 30   | 45   |       |
| Gate-Drain Charge                | Q <sub>GD</sub>     |                                                                  |      | 25   | 38   |       |
| Diode forward on-voltage         | V <sub>SD</sub>     | I <sub>F</sub> =73A V <sub>GS</sub> =0V T <sub>ch</sub> =25°C    |      | 1.20 | 1.50 | V     |
| Reverse recovery time            | t <sub>rr</sub>     | I <sub>F</sub> =73A V <sub>GS</sub> =0V                          |      | 300  |      | ns    |
| Reverse recovery charge          | Q <sub>rr</sub>     | -di/dt=100A/μs T <sub>ch</sub> =25°C                             |      | 3.0  |      | μC    |

##### Thermal characteristics

| Item               | Symbol                | Test Conditions    | Min. | Typ. | Max.  | Units |
|--------------------|-----------------------|--------------------|------|------|-------|-------|
| Thermal resistance | R <sub>th(ch-c)</sub> | channel to case    |      |      | 0.305 | °C/W  |
|                    | R <sub>th(ch-a)</sub> | channel to ambient |      |      | 50.0  | °C/W  |

## Characteristics

