

2SK3870-01

N-CHANNEL SILICON POWER MOSFET

■ Outline Drawings (mm) 200406

FUJI POWER MOSFET Super FAP-G Series

■ Features

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

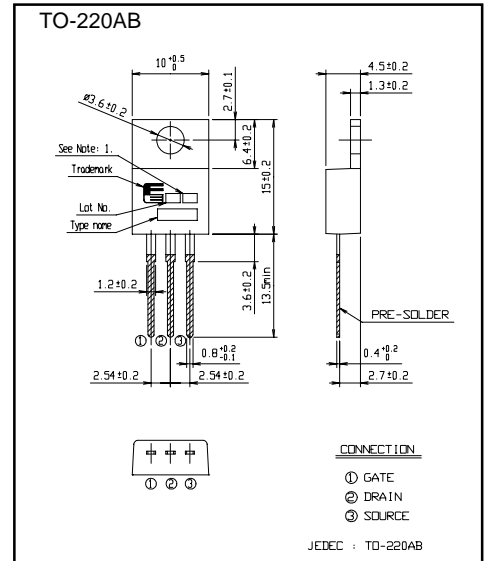
■ Applications

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

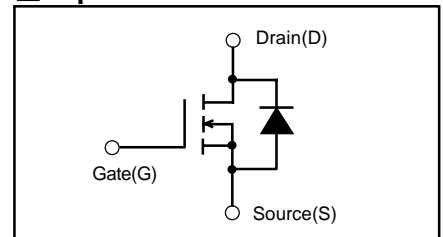
■ Maximum ratings and characteristic

● Absolute maximum ratings
(T_c=25°C unless otherwise specified)

| Item | Symbol | Ratings | Unit | Remarks |
|---|----------------------|-------------|-------|-----------------------|
| Drain-source voltage | V _{DS} | 230 | V | |
| | V _{DSX} | 230 | V | V _{GS} =-30V |
| Continuous Drain Current | I _D | 40 | A | |
| Pulsed Drain Current | I _{D(puls)} | ±160 | A | |
| Gate-Source Voltage | V _{GS} | ±30 | V | |
| Maximum Avalanche current | I _{AS} | 40 | A | Note *1 |
| Non-Repetitive Maximum Avalanche Energy | E _{AS} | 633.1 | mJ | Note *2 |
| Repetitive Maximum Avalanche Energy | E _{AR} | 27 | mJ | Note *3 |
| Maximum Drain-Source dV/dt | dV _{DS} /dt | 20 | kV/μs | V _{DS} ≤230V |
| Peak Diode Recovery dV/dt | dV/dt | 5 | kV/μs | Note *4 |
| Max. Power Dissipation | P _D | 270 | W | T _c =25°C |
| | | 2.02 | | T _a =25°C |
| Operating and Storage Temperature range | T _{ch} | +150 | °C | |
| | T _{stg} | -55 to +150 | °C | |



■ Equivalent circuit schematic



Note *1: T_{ch} ≤ 150°C, Repetitive and Non-repetitive

Note *2: Starting T_{ch}=25°C, I_{AS}=16A, L=4.09mH,

V_{CC}=48V, R_G=50Ω

E_{AS} 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.

● Electrical characteristics (T_c=25°C unless otherwise specified)

Note *4: I_r ≤ -I_D, -di/dt=50A/μs, V_{CC} ≤ BV_{DSS}, T_{ch} ≤ 150°C

| Item | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|----------------------------------|---------------------|---|------|------|------|-------|
| Drain-Source Breakdown Voltage | BV _{DSS} | I _D =250μA V _{GS} =0V | 230 | | | V |
| Gate Threshold Voltage | V _{GS(th)} | I _D =250μA V _{DS} =V _{GS} | 3.0 | | 5.0 | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =230V V _{GS} =0V | | | 25 | μA |
| | | V _{DS} =184V V _{GS} =0V | | | 250 | |
| Gate-Source Leakage Current | I _{GSS} | V _{GS} =±30V V _{DS} =0V | | | 100 | nA |
| Drain-Source On-State Resistance | R _{DS(on)} | I _D =20A V _{GS} =10V | | 58 | 76 | mΩ |
| Forward Transconductance | g _{fs} | I _D =20A V _{DS} =25V | 12 | 24 | | S |
| Input Capacitance | C _{iss} | V _{DS} =75V | | 1880 | 2820 | pF |
| Output Capacitance | C _{oss} | V _{GS} =0V | | 230 | 345 | |
| Reverse Transfer Capacitance | C _{rss} | f=1MH | | 12 | 18 | |
| Turn-On Time t _{on} | td(on) | V _{CC} =180V I _D =20A | | 28 | 42 | ns |
| | t _r | V _{GS} =10V | | 8.4 | 12.6 | |
| Turn-Off Time t _{off} | td(off) | R _{GS} =10Ω | | 56 | 84 | ns |
| | t _f | | | 6 | 9 | |
| Total Gate Charge | Q _G | V _{CC} =115V | | 42.0 | 63.0 | nC |
| Gate-Source Charge | Q _{GS} | I _D =40A | | 18.0 | 27.0 | |
| Gate-Drain Charge | Q _{GD} | V _{GS} =10V | | 12.0 | 18.0 | |
| Diode forward on-voltage | V _{SD} | I _F =40A V _{GS} =0V T _{ch} =25°C | | 1.10 | 1.50 | V |
| Reverse recovery time | t _{rr} | I _F =40A V _{GS} =0V | | 230 | | ns |
| Reverse recovery charge | Q _{rr} | -di/dt=100A/μs T _{ch} =25°C | | 2.5 | | μC |

● Thermal characteristics

| Item | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------|-----------------------|--------------------|------|------|-------|-------|
| Thermal resistance | R _{th(ch-c)} | channel to case | | | 0.463 | °C/W |
| | R _{th(ch-a)} | channel to ambient | | | 62 | °C/W |

Characteristics

