# 2SK3586-01

FUJI ELECTRIC

## FUJI POWER MOSFET
## Super FAP-G Series

**N-CHANNEL SILICON POWER MOSFET**

### ■ Features

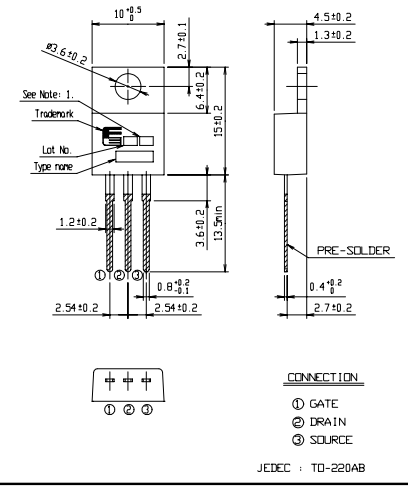
**High speed switching**
**Low on-resistance**
**No secondary breadown**
**Low driving power**
**Avalanche-proof**

### ■ Applications

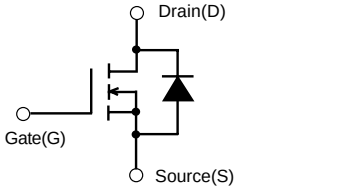
**Switching regulators**
**UPS (Uninterruptible Power Supply)**
**DC-DC converters**

### ■ Outline Drawings (mm)

TO-220AB




### ■ Equivalent circuit schematic




### ■ Maximum ratings and characteristic Absolute maximum ratings

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

| Item | Symbol | | Ratings | Unit |
|---|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | | 100 | V |
| | $V_{DSX}$ *5 | | 70 | V |
| Continuous drain current | $I_D$ | | ±50 | A |
| Pulsed drain current | $I_{D(puls)}$ | | ±200 | A |
| Gate-source voltage | $V_{GS}$ | | ±30 | V |
| Non-repetitive Avalanche current | $I_{AS}$ *2 | | 50 | A |
| Maximum Avalanche Energy | $E_{AS}$ *1 | | 465 | mJ |
| Maximum Drain-Source dV/dt | $dV_{DS}/dt$ *4 | | 20 | kV/µs |
| Peak Diode Recovery dV/dt | dV/dt *3 | | 5 | kV/µs |
| Max. power dissipation | $P_D$ | Ta=25°C | 2.02 | W |
| | | Tc=25°C | 135 | |
| Operating and storage temperature range | $T_{ch}$ | | +150 | ℃ |
| | $T_{stg}$ | | -55 to +150 | ℃ |

*1 L=223µH, Vcc=48V *2 Tch≦150°C *3 $I_F$≦ -$I_D$, -di/dt=50A/µs, Vcc≦$BV_{DSS}$, Tch≦150°C
*4 $V_{DS}$ ≦100V *5 $V_{GS}$=-30V

● **Electrical characteristics ($T_C$ =25°C unless otherwise specified)**

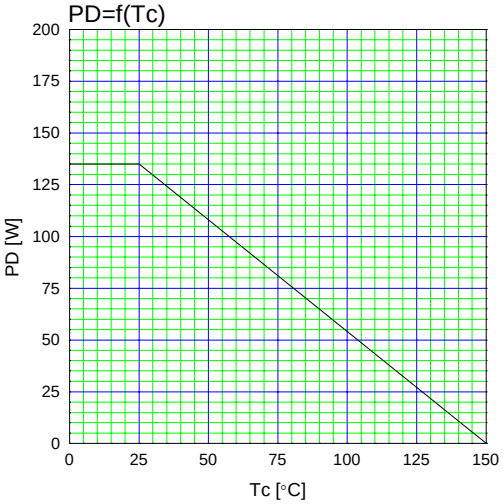
| Item | Symbol | Test Conditions | | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|---|
| Drain-source breakdown voltaget | $V_{(BR)DSS}$ | $I_D$= 250µA $V_{GS}$=0V | | 100 | | | V |
| Gate threshold voltage | $V_{GS(th)}$ | $I_D$= 250µA $V_{DS}$=$V_{GS}$ | | 3.0 | | 5.0 | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$=100V $V_{GS}$=0V | Tch=25°C | | | 25 | µA |
| | | $V_{DS}$=80V $V_{GS}$=0V | Tch=125°C | | | 250 | |
| Gate-source leakage current | $I_{GSS}$ | $V_{GS}$=±30V $V_{DS}$=0V | | | 10 | 100 | nA |
| Drain-source on-state resistance | $R_{DS(on)}$ | $I_D$=25A $V_{GS}$=10V | | | 19 | 25 | mΩ |
| Forward transcondutance | $g_{fs}$ | $I_D$=25A $V_{DS}$=25V | | 15 | 30 | | S |
| Input capacitance | $C_{iss}$ | $V_{DS}$=75V | | | 1830 | 2745 | pF |
| Output capacitance | $C_{oss}$ | $V_{GS}$=0V | | | 460 | 690 | |
| Reverse transfer capacitance | $C_{rss}$ | f=1MHz | | | 38 | 57 | |
| Turn-on time $t_{on}$ | $t_{d(on)}$ | $V_{CC}$=48V $I_D$=25A | | | 20 | 30 | ns |
| | $t_r$ | $V_{GS}$=10V | | | 35 | 53 | |
| Turn-off time $t_{off}$ | $t_{d(off)}$ | $R_{GS}$=10 Ω | | | 50 | 75 | |
| | $t_f$ | | | | 23 | 35 | |
| Total Gate Charge | $Q_G$ | $V_{CC}$=50V | | | 52 | 78 | nC |
| Gate-Source Charge | $Q_{GS}$ | $I_D$=50A | | | 16 | 24 | |
| Gate-Drain Charge | $Q_{GD}$ | $V_{GS}$=10V | | | 18 | 27 | |
| Avalanche capability | $I_{AV}$ | L=100µH Tch=25°C | | 50 | | | A |
| Diode forward on-voltage | $V_{SD}$ | $I_F$=50A $V_{GS}$=0V Tch=25°C | | | 1.10 | 1.65 | V |
| Reverse recovery time | $t_{rr}$ | $I_F$=50A $V_{GS}$=0V | | | 0.1 | | µs |
| Reverse recovery charge | $Q_{rr}$ | -di/dt=100A/µs Tch=25°C | | | 0.4 | | µC |

● **Thermalcharacteristics**

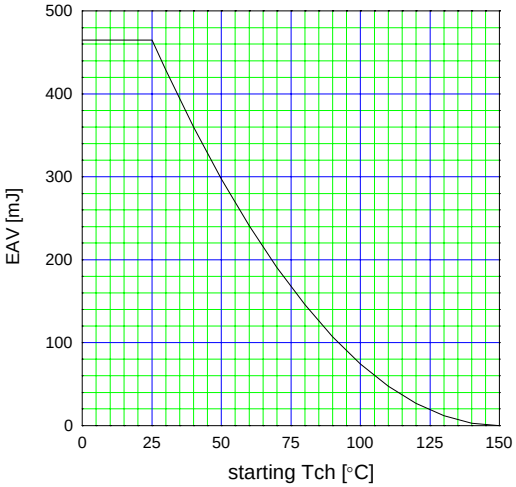
| Item | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Thermal resistance | $R_{th(ch-c)}$ | channel to case | | | 0.926 | °C/W |
| | $R_{th(ch-a)}$ | channel to ambient | | | 62.0 | °C/W |

## Characteristics

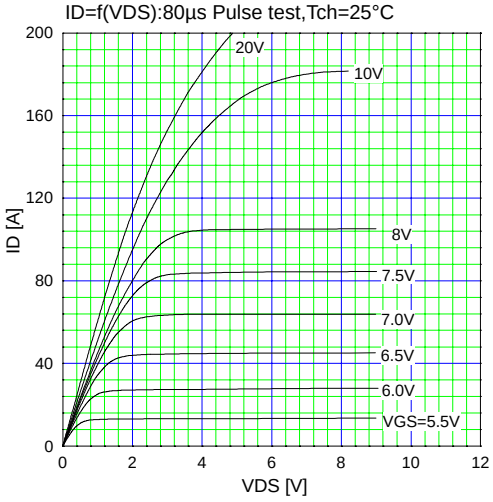
Allowable Power Dissipation
PD=f(Tc)



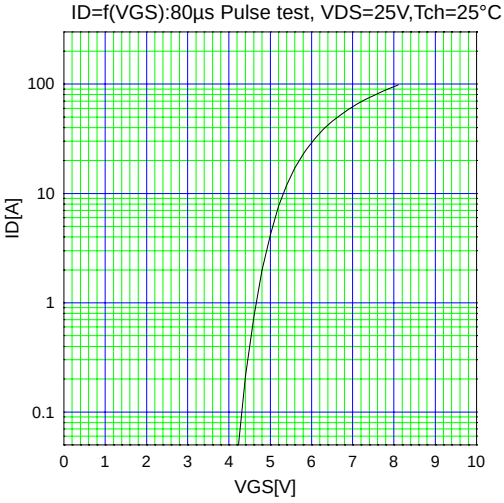

Maximum Avalanche Energy vs. starting Tch
E(AV)=f(starting Tch):Vcc=48V,I(AV)<=50A



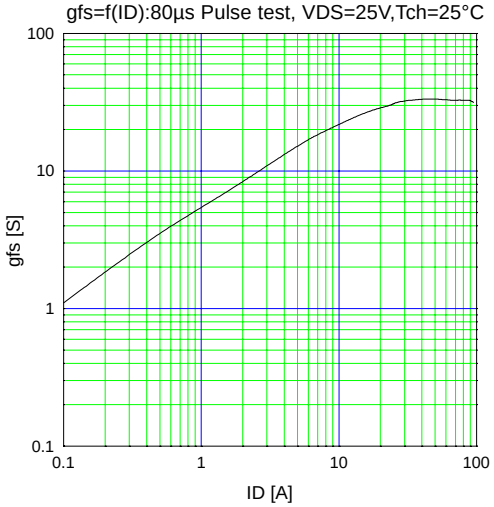

Typical Output Characteristics
ID=f(VDS):80µs Pulse test,Tch=25°C



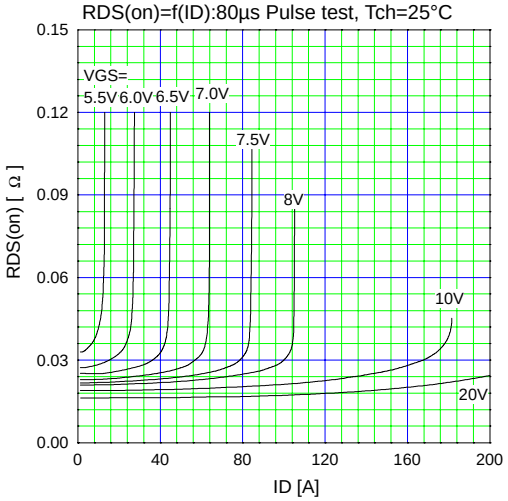

Typical Transfer Characteristic
ID=f(VGS):80µs Pulse test, VDS=25V,Tch=25°C



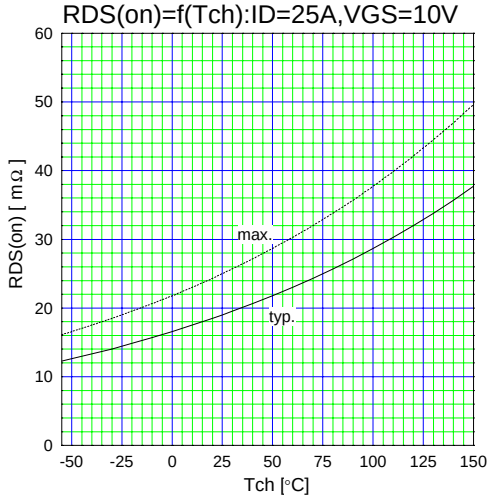

Typical Transconductance
gfs=f(ID):80µs Pulse test, VDS=25V,Tch=25°C



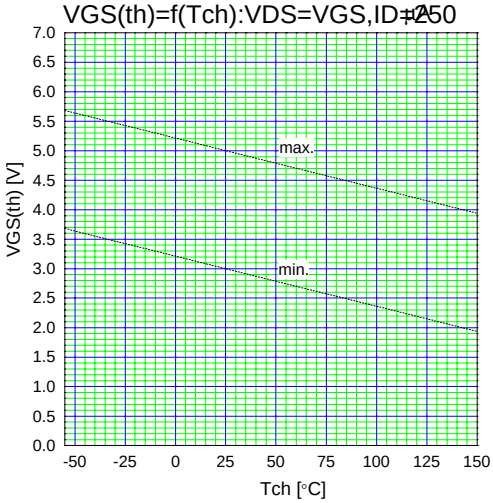

Typical Drain-Source on-state Resistance
RDS(on)=f(ID):80µs Pulse test, Tch=25°C



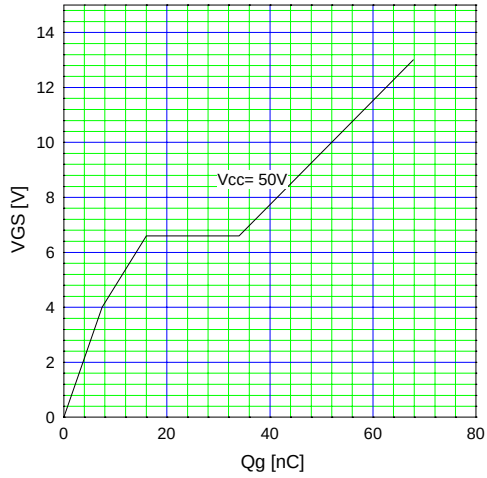
Drain-Source On-state Resistance
RDS(on)=f(Tch):ID=25A,VGS=10V



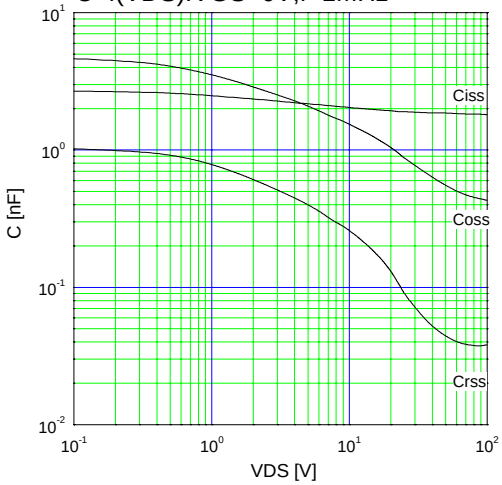

Gate Threshold Voltage vs. Tch
VGS(th)=f(Tch):VDS=VGS,ID=250μA



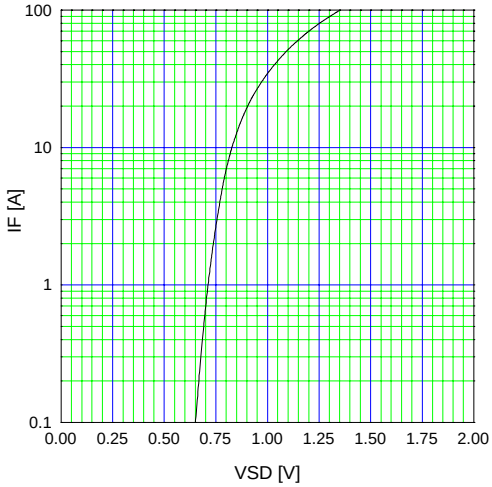

Typical Gate Charge Characteristics
VGS=f(Qg):ID=50A, Tch=25°C



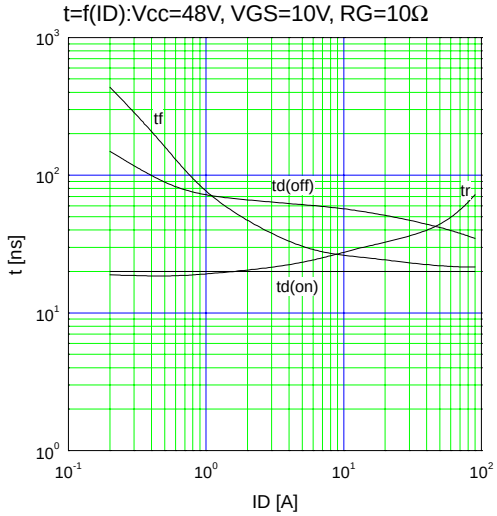

Typical Capacitance
C=f(VDS):VGS=0V,f=1MHz




Typical Forward Characteristics of Reverse Diode
IF=f(VSD):80μs Pulse test,Tch=25°C

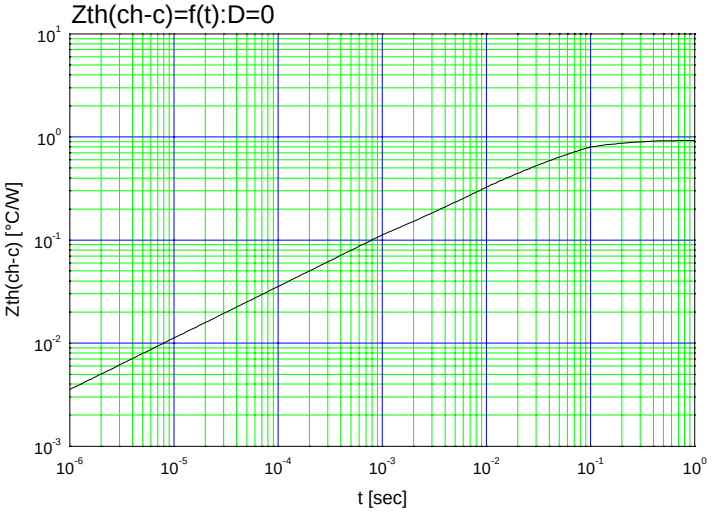



Typical Switching Characteristics vs. ID
t=f(ID):Vcc=48V, VGS=10V, RG=10Ω



Transient Thermal Impedance

Zth(ch-c)=f(t):D=0




Maximum Avalanche Current Pulsewidth

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