

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 _{DS} | 500 | V |
| Continuous drain current | I _D | ±9 | A |
| Pulsed drain current | I _D [puls] | ±36 | A |
| Gate-source voltage | V _{GS} | ±30 | V |
| Repetitive or non-repetitive | I _{AR} *2 | 9 | A |
| Maximum Avalanche Energy | E _{AS} *1 | 155.3 | 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 | T _a =25°C | 2.16 |
| | | T _c =25°C | 48 |
| Operating and storage temperature range | T _{ch} | +150 | °C |
| | T _{stg} | -55 to +150 | °C |
| Isolation Voltage | V _{ISO} *5 | 2 | kVrms |

*1 L=3.5mH, V_{CC}=50V, See to Avalanche Energy Graph *2 T_{ch}≤150°C

*3 I_F≤-I_D, -di/dt=50A/μs, V_{CC}≤BV_{DSS}, T_{ch}≤150°C *4 V_{DS}≤500V *5 t=60sec, f=60Hz

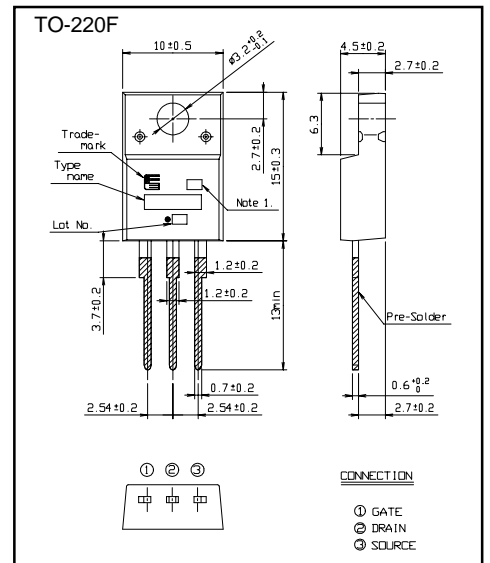
Electrical characteristics (Tc =25°C unless otherwise specified)

| Item | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|----------------------------------|----------------------|--|------|------|------|-------|
| Drain-source breakdown voltage | V _{(BR)DSS} | I _D = 250μA V _{GS} =0V | 500 | | | 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} =500V V _{GS} =0V | | | 25 | μA |
| | | V _{DS} =400V V _{GS} =0V | | | 250 | μA |
| 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 =4A V _{GS} =10V | | 0.65 | 0.85 | Ω |
| Forward transconductance | g _{fs} | I _D =4A V _{DS} =25V | 3.5 | 7 | | S |
| Input capacitance | C _{iss} | V _{DS} =25V | | 750 | 1130 | pF |
| Output capacitance | C _{oss} | V _{GS} =0V | | 100 | 150 | pF |
| Reverse transfer capacitance | C _{rss} | f=1MHz | | 4.0 | 6.0 | pF |
| Turn-on time t _{on} | td(on) | V _{CC} =300V I _D =4A | | 14 | 21 | ns |
| | t _r | V _{GS} =10V | | 9 | 14 | |
| Turn-off time t _{off} | td(off) | R _{GS} =10 Ω | | 24 | 36 | ns |
| | t _r | | | 6 | 9 | |
| Total Gate Charge | Q _G | V _{CC} =250V | | 20 | 30 | nC |
| Gate-Source Charge | Q _{GS} | I _D =8A | | 8.5 | 13 | |
| Gate-Drain Charge | Q _{GD} | V _{GS} =10V | | 5.5 | 8.5 | |
| Avalanche capability | I _{AV} | L=3.5mH T _{ch} =25°C | 9 | | | A |
| Diode forward on-voltage | V _{SD} | I _F =8A V _{GS} =0V T _{ch} =25°C | | 1.00 | 1.50 | V |
| Reverse recovery time | t _{rr} | I _F =8A V _{GS} =0V | | 0.65 | | μs |
| Reverse recovery charge | Q _{rr} | -di/dt=100A/μs T _{ch} =25°C | | 3.5 | | μC |

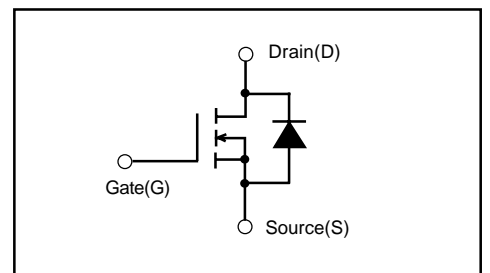
Thermal characteristics

| Item | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------|-----------------------|--------------------|------|------|------|-------|
| Thermal resistance | R _{th(ch-c)} | channel to case | | | 2.60 | °C/W |
| | R _{th(ch-a)} | channel to ambient | | | | |

Outline Drawings [mm]

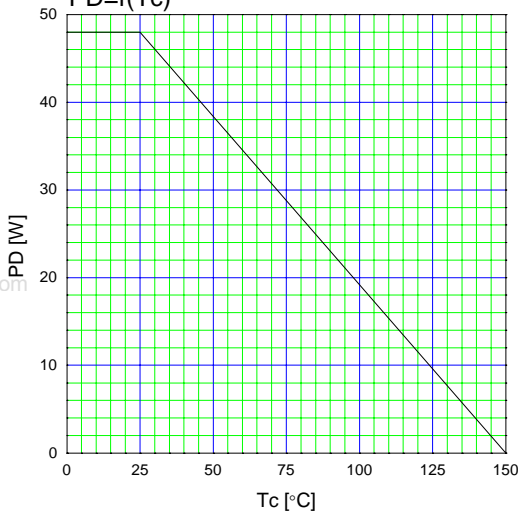


Equivalent circuit schematic



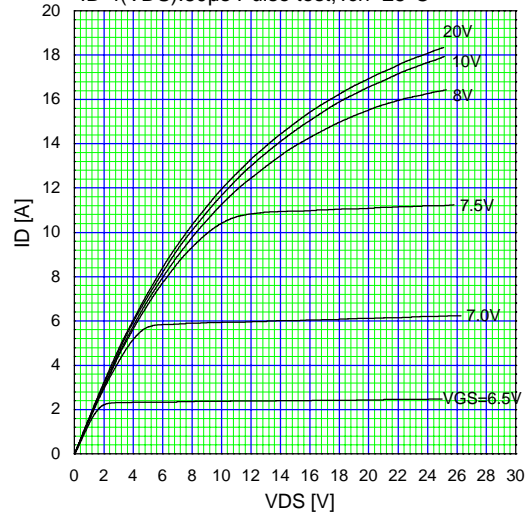
Characteristics

Allowable Power Dissipation
 $PD=f(T_c)$



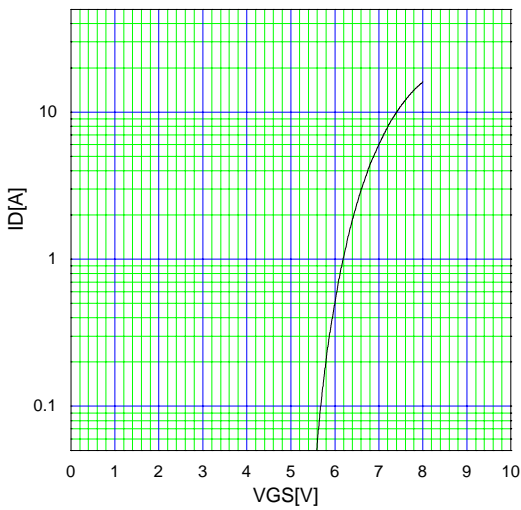
Typical Output Characteristics

$ID=f(V_{DS}): 80\mu s$ Pulse test, $T_{ch}=25^\circ C$



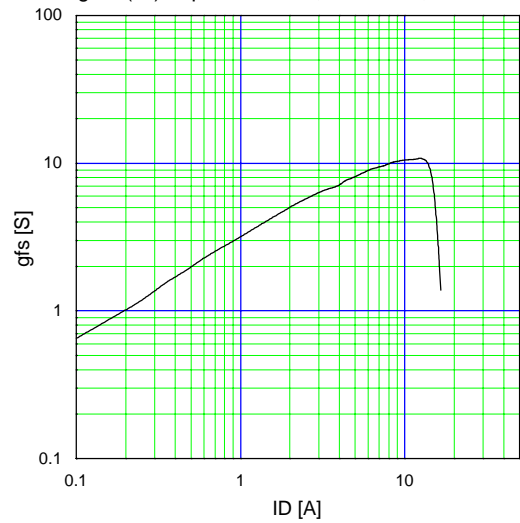
Typical Transfer Characteristic

$ID=f(V_{GS}): 80\mu s$ Pulse test, $V_{DS}=25V, T_{ch}=25^\circ C$



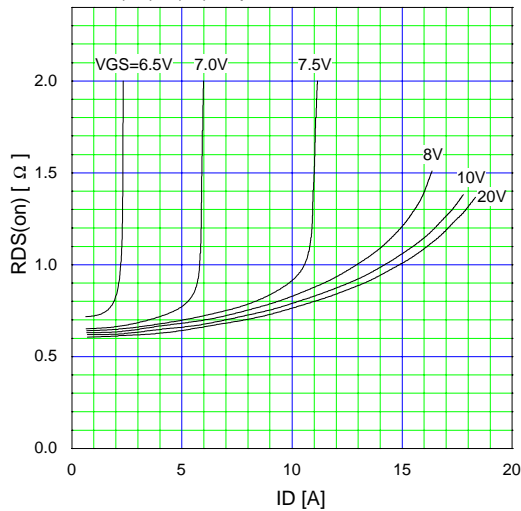
Typical Transconductance

$g_{fs}=f(ID): 80\mu s$ Pulse test, $V_{DS}=25V, T_{ch}=25^\circ C$



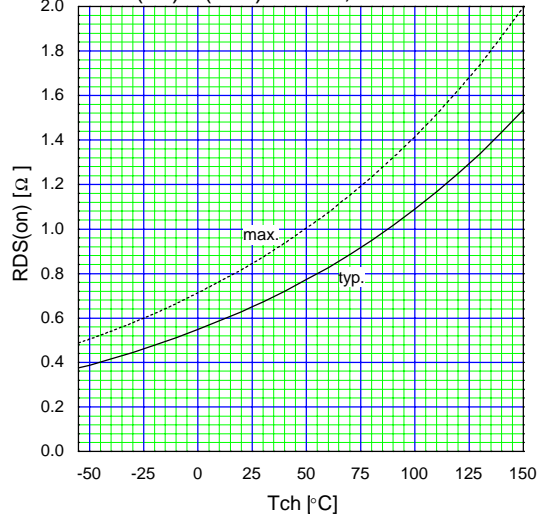
Typical Drain-Source on-state Resistance

$R_{DS(on)}=f(ID): 80\mu s$ Pulse test, $T_{ch}=25^\circ C$

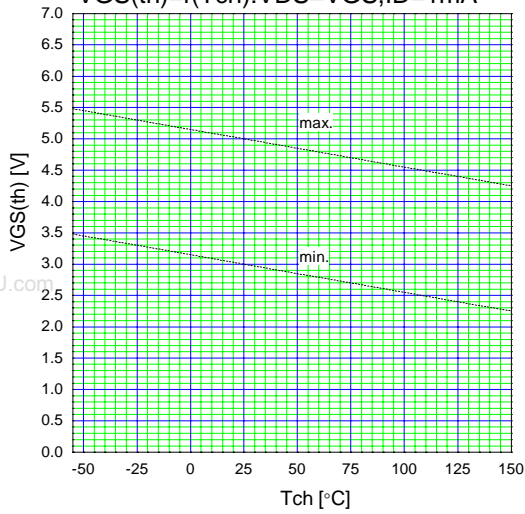


Drain-Source On-state Resistance

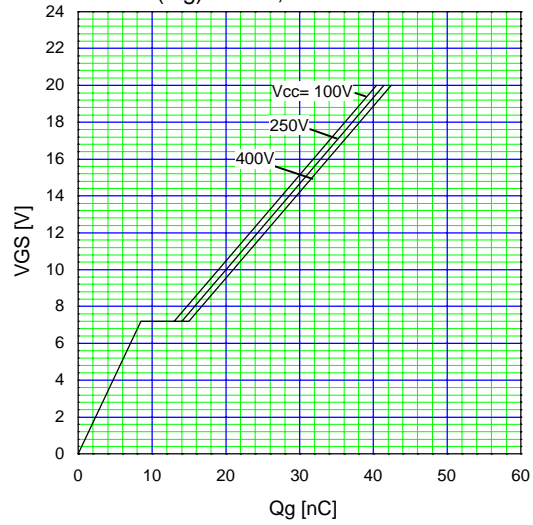
$R_{DS(on)}=f(T_{ch}): ID=4A, V_{GS}=10V$



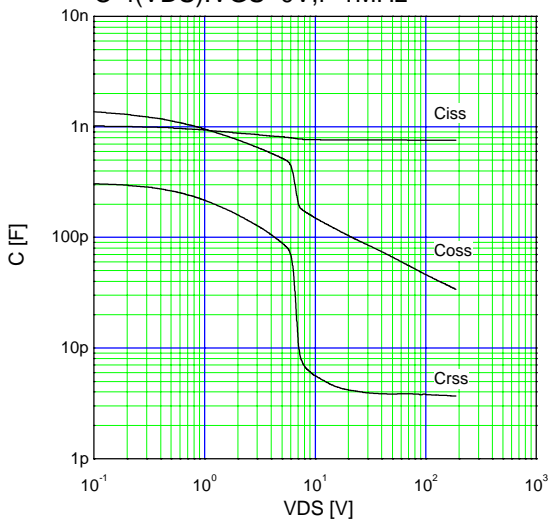
Gate Threshold Voltage vs. T_{ch}
 $V_{GS(th)} = f(T_{ch}) : V_{DS} = V_{GS}, I_D = 1\text{mA}$



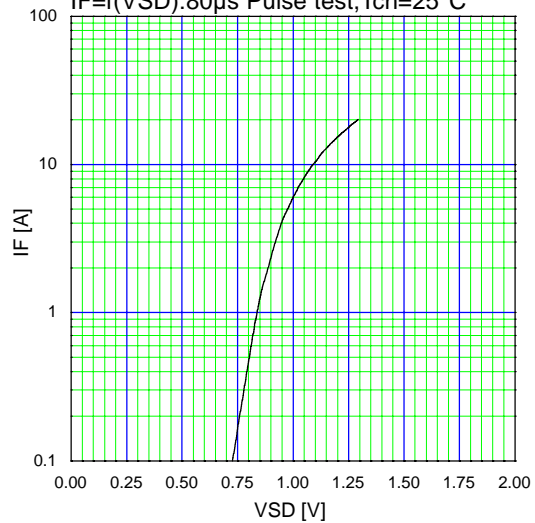
Typical Gate Charge Characteristics
 $V_{GS} = f(Q_g) : I_D = 8\text{A}, T_{ch} = 25^\circ\text{C}$



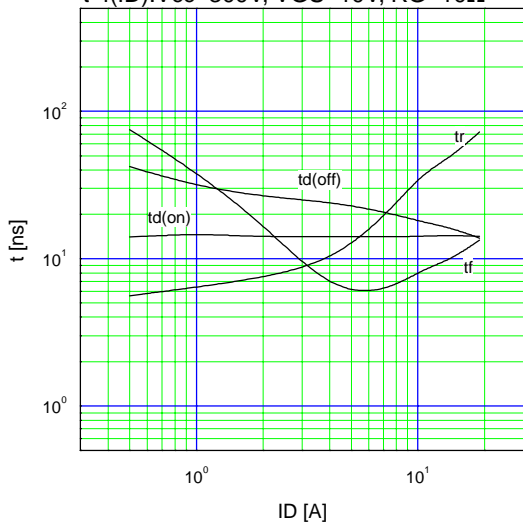
Typical Capacitance
 $C = f(V_{DS}) : V_{GS} = 0\text{V}, f = 1\text{MHz}$



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



Typical Switching Characteristics vs. I_D
 $t = f(I_D) : V_{cc} = 300\text{V}, V_{GS} = 10\text{V}, R_G = 10\Omega$



Maximum Avalanche Energy vs. starting T_{ch}
 $E_{AS} = f(\text{starting } T_{ch}) : V_{cc} = 50\text{V}$

