

FMH09N90E

FUJI POWER MOSFET

Super FAP-E³ series

N-CHANNEL SILICON POWER MOSFET

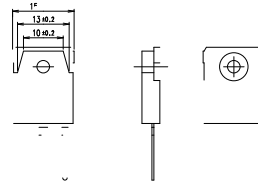
■ Features

- Maintains both low power loss and low noise
- Lower R_{DS(on)} characteristic
- More controllable switching dv/dt by gate resistance
- Smaller V_{GS} ringing waveform during switching
- Narrow band of the gate threshold voltage (4.0±0.5V)
- High avalanche durability

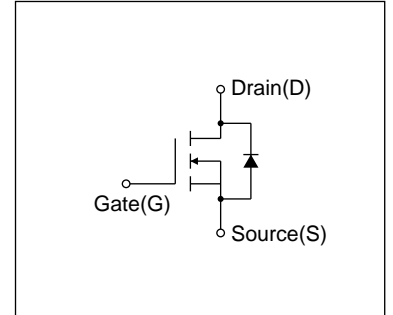
■ Applications

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

■ Outline Drawings [mm]



■ Equivalent circuit schematic



■ Maximum Ratings and Characteristics

| Parameter | Symbol | Value | Unit | Notes |
|---|------------------|--------------|-------|----------------------|
| Peak Diode Recovery dv/dt | dV/dt | 2.1 | kV/μs | Note*3 |
| Peak Diode Recovery -di/dt | -di/dt | 100 | A/μs | Note*4 |
| Maximum Power Dissipation | P _D | 2.5 | W | Note*5 |
| Operating and Storage Temperature range | T _{ch} | 150 | °C | T _a =25°C |
| | T _{slg} | -55 to + 150 | °C | T _c =25°C |

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

| Description | Symbol | Conditions | min. | typ. | max. | Unit |
|----------------------------------|---------------------|--|------|------|------|------|
| Drain-Source Breakdown Voltage | BV _{DSS} | I _D =250μA, V _{GS} =0V | 900 | - | - | V |
| Gate Threshold Voltage | V _{GS(th)} | I _D =250μA, V _{DS} =V _{GS} | 3.5 | 4.0 | 4.5 | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =900V, V _{GS} =0V | - | - | 25 | μA |
| | | V _{DS} =720V, V _{GS} =0V | - | - | 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 =4.5A, V _{GS} =10V | - | 1.16 | 1.4 | |
| Forward Transconductance | g _{fs} | I _D =4.5A, V _{DS} =25V | 5.0 | 10 | - | S |
| Input Capacitance | C _{iss} | V _{DS} =25V | - | 1700 | 2550 | pF |
| Output Capacitance | C _{oss} | V _{GS} =0V | - | 150 | 225 | |
| Reverse Transfer Capacitance | C _{rss} | f=1MHz | - | 11 | 17 | |
| Turn-On Time | td(on) | V _{cc} =600V | - | 35 | 53 | ns |
| | tr | V _{GS} =10V | - | 30 | 45 | |
| Turn-Off Time | td(off) | I _D =4.5A | - | 110 | 165 | |
| | tf | R _G =24 | - | 30 | 45 | |
| Total Gate Charge | Q _G | V _{cc} =450V | - | 50 | 75 | nC |
| Gate-Source Charge | Q _{GS} | I _D =9A | - | 15 | 23 | |
| Gate-Drain Charge | Q _{GD} | V _{GS} =10V | - | 16 | 24 | |
| Gate-Drain Crossover Charge | Q _{SW} | | - | 6 | 9 | |
| Avalanche Capability | I _{AV} | L=5.12mH, T _{ch} =25°C | 9 | - | - | A |
| Diode Forward On-Voltage | V _{SD} | I _F =9A, V _{GS} =0V, T _{ch} =25°C | - | 0.90 | 1.35 | V |
| Reverse Recovery Time | t _{rr} | I _F =9A, V _{GS} =0V | - | 1.8 | - | μs |
| Reverse Recovery Charge | Q _{rr} | -di/dt=100A/μs, T _{ch} =25°C | - | 15 | - | μC |

● Thermal Characteristics

| Description | Symbol | Test Conditions | min. | typ. | max. | Unit |
|--------------------|-----------------------|--------------------|------|------|-------|------|
| Thermal resistance | R _{th(ch-c)} | Channel to case | | | 0.610 | °C/W |
| | R _{th(ch-a)} | Channel to ambient | | | 50.0 | °C/W |

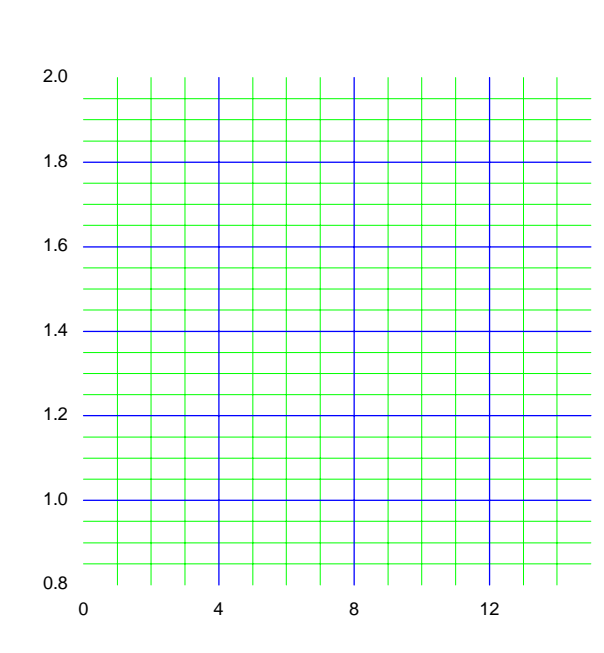
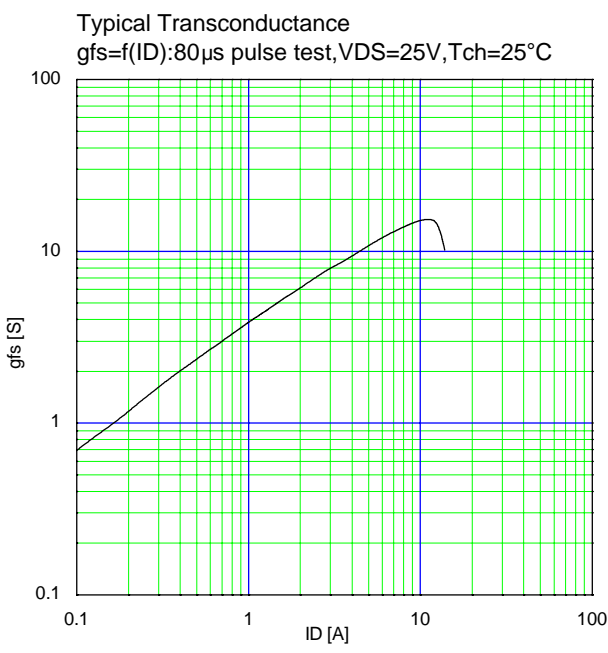
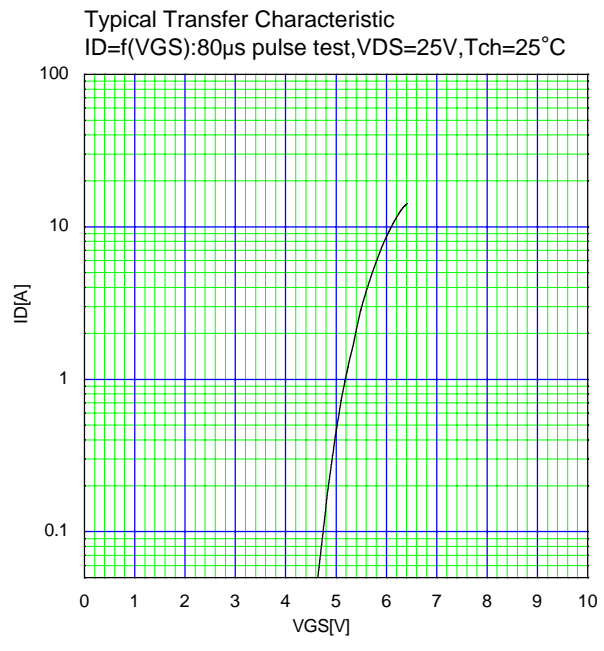
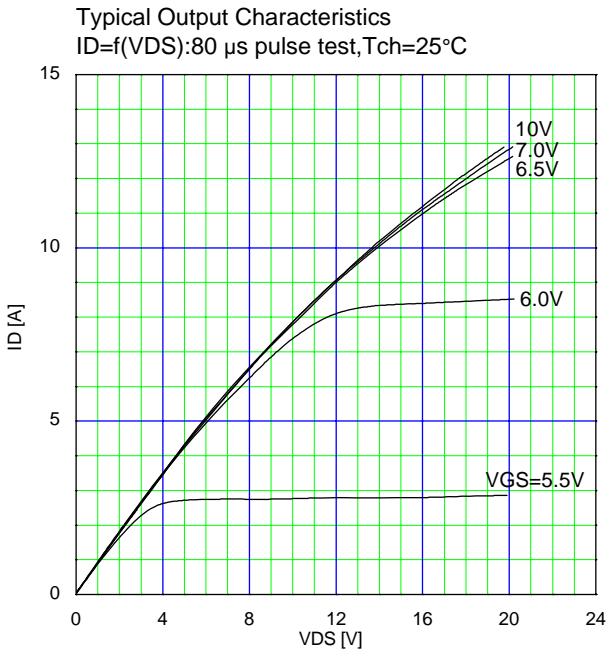
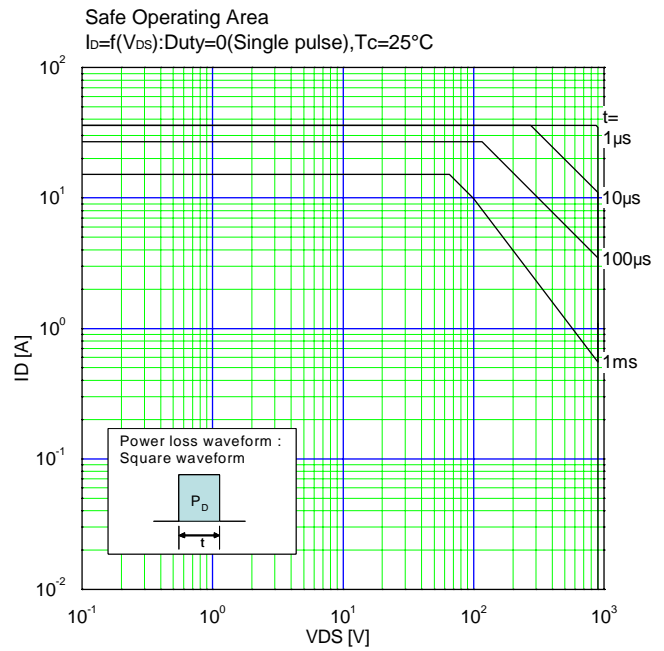
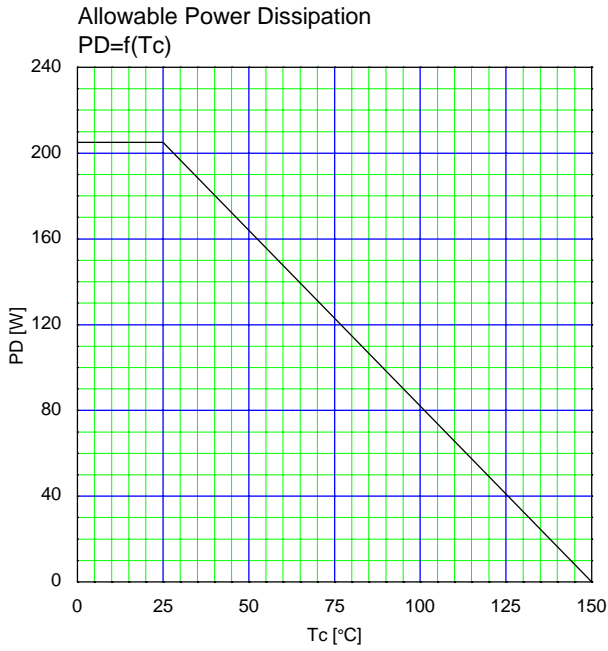
Note *1 : T_{ch} 150°C

Note *2 : Stating T_{ch}=25°C, I_{AS}=3.6A, L=80.0mH, V_{CC}=90V, R_G=10
E_{AS} limited by maximum channel temperature and avalanche current.
See to 'Avalanche current' graph.

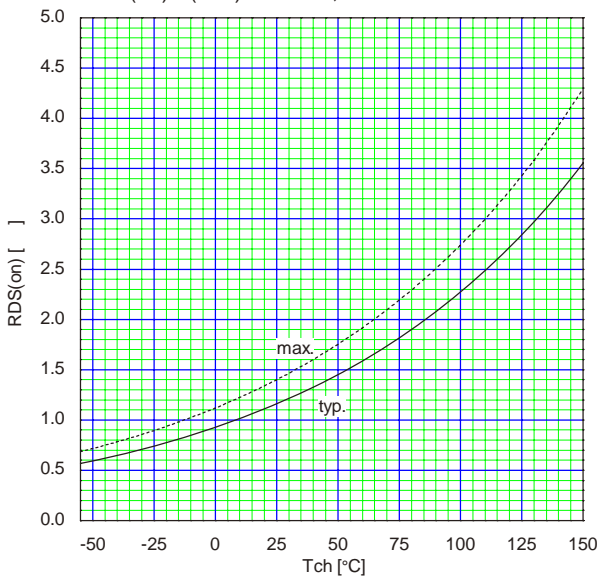
Note *3 : Repetitive rating : Pulse width limited by maximum channel temperature.
See to the 'Transient Thermal impedance' graph.

Note *4 : I_F -I_D, -di/dt=100A/μs, V_{CC} BV_{DSS}, T_{ch} 150°C.

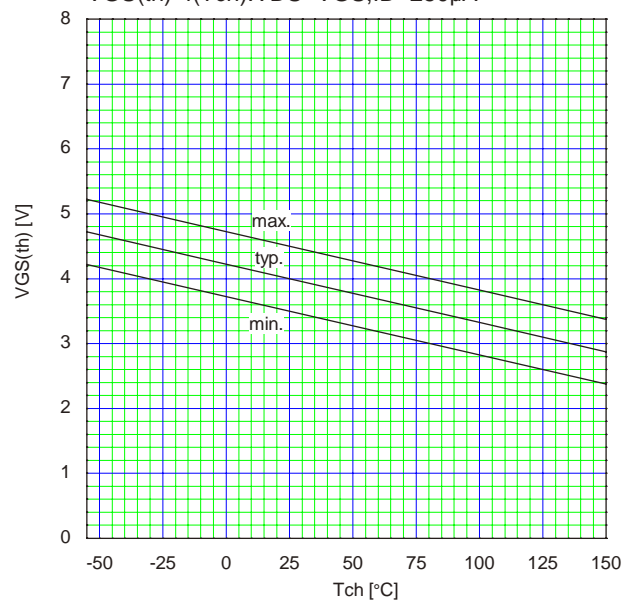
Note *5 : I_F -I_D, dv/dt=2.1kV/μs, V_{CC} BV_{DSS}, T_{ch} 150°C.



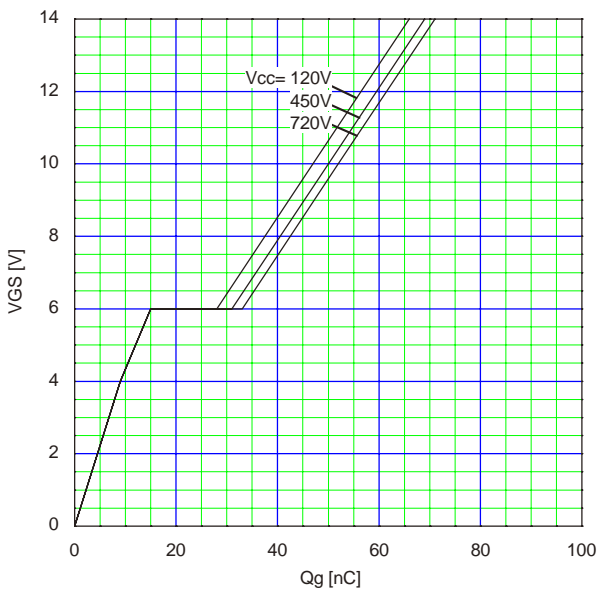
Drain-Source On-state Resistance
 $R_{DS(on)} = f(T_{ch}) : I_D = 4.5A, V_{GS} = 10V$



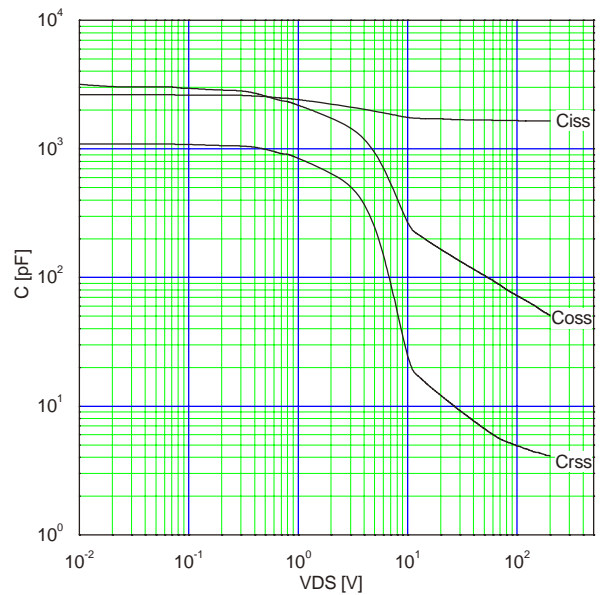
Gate Threshold Voltage vs. T_{ch}
 $V_{GS(th)} = f(T_{ch}) : V_{DS} = V_{GS}, I_D = 250\mu A$



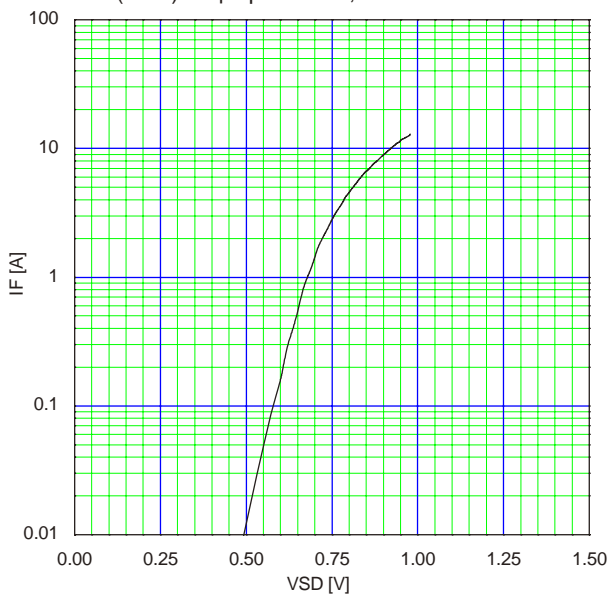
Typical Gate Charge Characteristics
 $V_{GS} = f(Q_g) : I_D = 9A, T_{ch} = 25^\circ C$



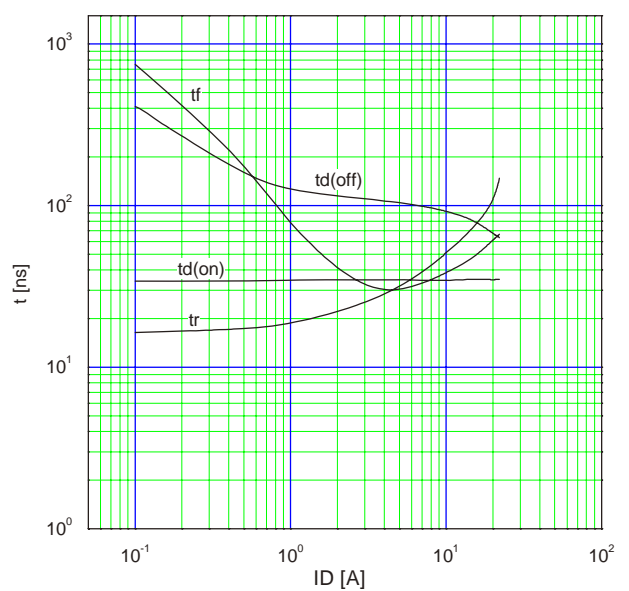
Typical Capacitance
 $C = f(V_{DS}) : V_{GS} = 0V, f = 1MHz$



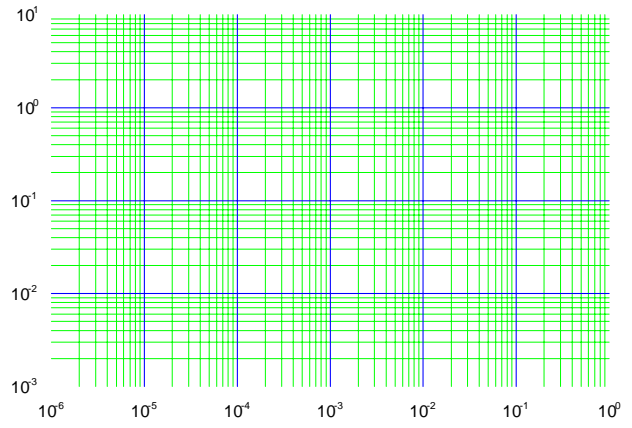
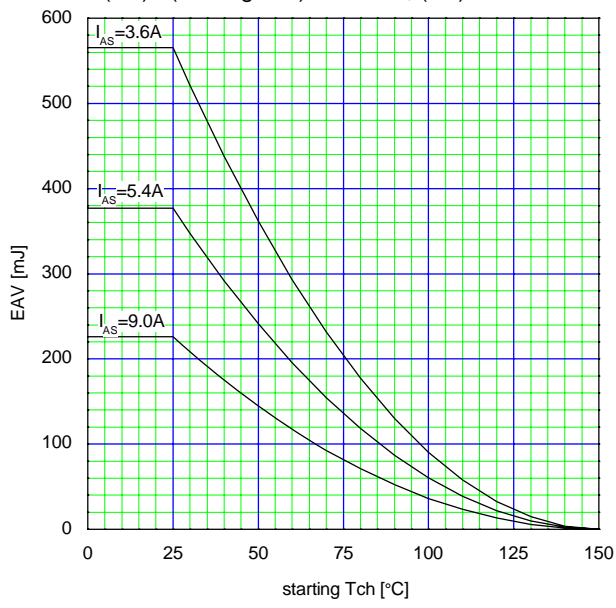
Typical Forward Characteristics of Reverse Diode
 $I_F = f(V_{SD}) : 80 \mu s \text{ pulse test}, T_{ch} = 25^\circ C$



Typical Switching Characteristics vs. I_D
 $t = f(I_D) : V_{cc} = 600V, V_{GS} = 10V, R_G = 24$



Maximum Avalanche Energy vs. starting Tch
 $E(AV)=f(\text{starting Tch}):V_{CC}=90V, I(AV)\leq 9A$



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