

FMI07N50E

FUJI POWER MOSFET

Super FAP-E³ series

N-CHANNEL SILICON POWER MOSFET

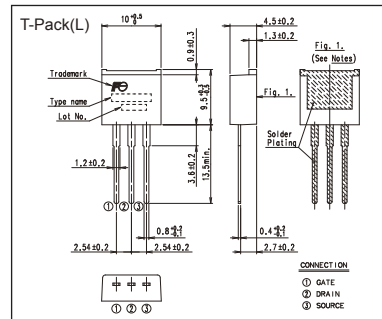
■ Features

- 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 (3.0±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

● Absolute Maximum Ratings at T_c=25°C (unless otherwise specified)

| Description | Symbol | Characteristics | Unit | Remarks |
|---|------------------|-----------------|-------|------------------------|
| Drain-Source Voltage | V _{DS} | 500 | V | |
| | V _{DSX} | 500 | V | V _{GS} = -30V |
| Continuous Drain Current | I _D | ±6.5 | A | |
| Pulsed Drain Current | I _{DP} | ±26 | A | |
| Gate-Source Voltage | V _{GS} | ±30 | V | |
| Repetitive and Non-Repetitive Maximum Avalanche Current | I _{AR} | 6.5 | A | Note*1 |
| Non-Repetitive Maximum Avalanche Energy | E _{AS} | 266 | mJ | Note*2 |
| Repetitive Maximum Avalanche Energy | E _{AR} | 9.0 | mJ | Note*3 |
| Peak Diode Recovery dv/dt | dV/dt | 5.4 | kV/μs | Note*4 |
| Peak Diode Recovery -di/dt | -di/dt | 100 | A/μs | Note*5 |
| Maximum Power Dissipation | P _D | 1.67 | W | T _a =25°C |
| | | 90 | | T _c =25°C |
| Operating and Storage Temperature range | T _{ch} | 150 | °C | |
| | T _{stg} | -55 to +150 | °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 | 500 | - | - | V |
| Gate Threshold Voltage | V _{GS(th)} | I _D =250μA, V _{DS} =V _{GS} | 2.5 | 3.0 | 3.5 | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =500V, V _{GS} =0V | - | - | 25 | μA |
| | | V _{DS} =400V, 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 =3.3A, V _{GS} =10V | - | 0.73 | 0.85 | Ω |
| Forward Transconductance | g _{fs} | I _D =3.3A, V _{DS} =25V | 3.5 | 7 | - | S |
| Input Capacitance | C _{iss} | V _{DS} =25V | - | 1050 | 1575 | pF |
| Output Capacitance | C _{oss} | V _{GS} =0V | - | 95 | 142.5 | |
| Reverse Transfer Capacitance | C _{rss} | f=1MHz | - | 7 | 10.5 | |
| Turn-On Time | td(on) | V _{cc} =300V | - | 11 | 16.5 | ns |
| | tr | V _{GS} =10V | - | 7 | 10.5 | |
| Turn-Off Time | td(off) | I _D =3.3A | - | 75 | 113 | |
| | tf | R _G =10Ω | - | 14 | 21 | |
| Total Gate Charge | Q _G | V _{cc} =250V | - | 32 | 48 | nC |
| Gate-Source Charge | Q _{GS} | I _D =6.5A | - | 8 | 12 | |
| Gate-Drain Charge | Q _{GD} | V _{GS} =10V | - | 9 | 13.5 | |
| Avalanche Capability | I _{AV} | L=4.61mH, T _{ch} =25°C | 6.5 | - | - | A |
| Diode Forward On-Voltage | V _{SD} | I _F =6.5A, V _{GS} =0V, T _{ch} =25°C | - | 0.86 | 1.30 | V |
| Reverse Recovery Time | t _{rr} | I _F =6.5A, V _{GS} =0V | - | 0.34 | - | μs |
| Reverse Recovery Charge | Q _{rr} | -di/dt=100A/μs, T _{ch} =25°C | - | 3.0 | - | μC |

● Thermal Characteristics

| Description | Symbol | Test Conditions | min. | typ. | max. | Unit |
|--------------------|-----------------------|--------------------|------|------|-------|------|
| Thermal resistance | R _{th(ch-c)} | Channel to Case | | | 1.390 | °C/W |
| | R _{th(ch-a)} | Channel to Ambient | | | 75.0 | °C/W |

Note *1 : T_{ch}≤150°C

Note *2 : Stating T_{ch}=25°C, I_{AS}=2.6A, L=72.1mH, V_{cc}=50V, R_G=50Ω

E_{AS} limited by maximum channel temperature and avalanche current.
See to 'Avalanche Energy' graph.

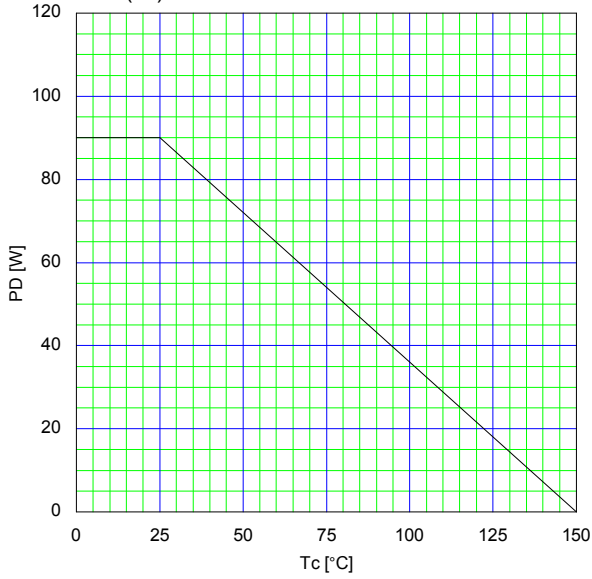
Note *3 : Repetitive rating : Pulse width limited by maximum channel temperature.

See to the 'Transient Thermal Impedance' graph.

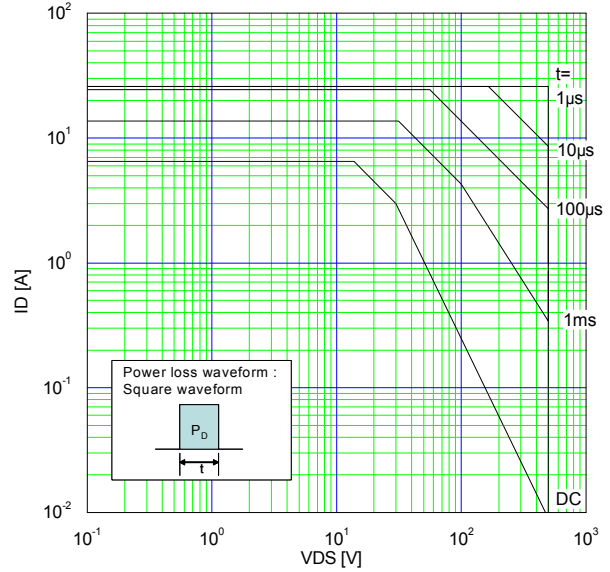
Note *4 : I_F≤I_D, -di/dt=100A/μs, V_{cc}≤BV_{DSS}, T_{ch}≤150°C.

Note *5 : I_F≤I_D, dv/dt=5.4kV/μs, V_{cc}≤BV_{DSS}, T_{ch}≤150°C.

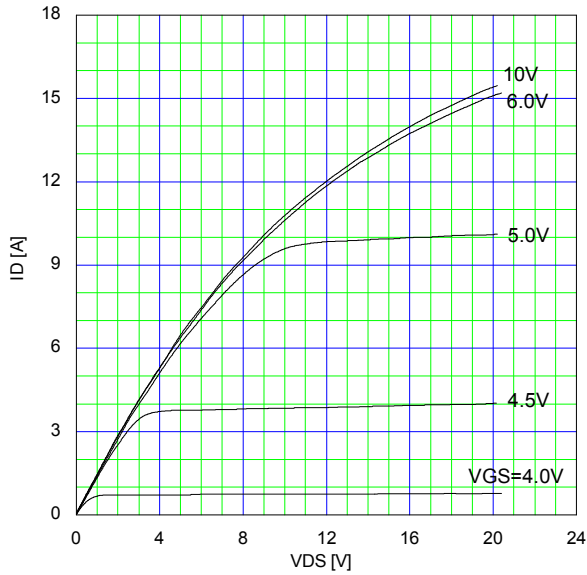
Allowable Power Dissipation
 $PD=f(T_c)$



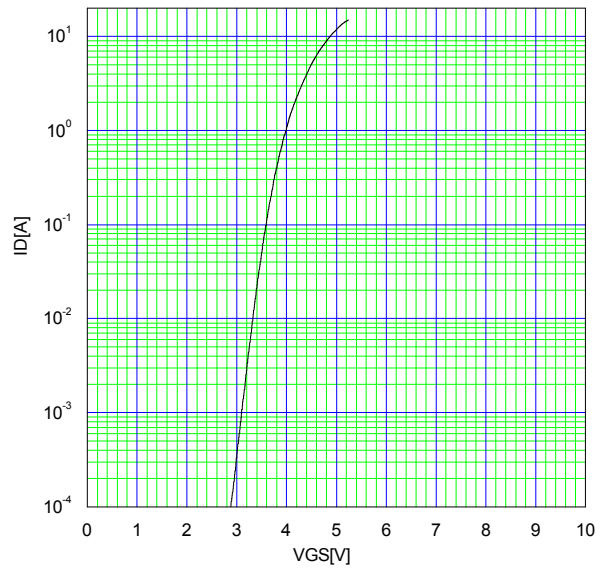
Safe Operating Area
 $I_D=f(V_{DS}): Duty=0(\text{Single pulse}), T_c=25^\circ\text{C}$



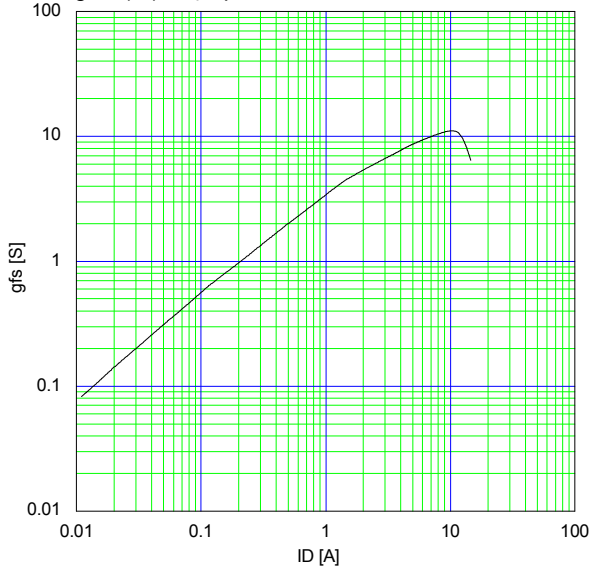
Typical Output Characteristics
 $I_D=f(V_{DS}): 80\ \mu\text{s}\ \text{pulse test}, T_{ch}=25^\circ\text{C}$



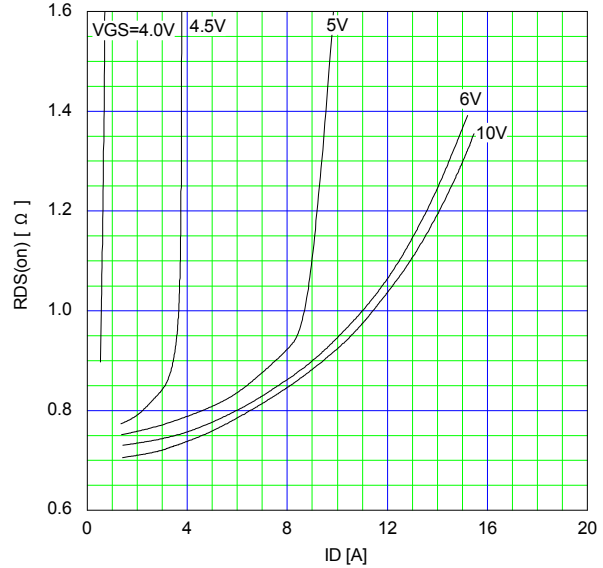
Typical Transfer Characteristic
 $I_D=f(V_{GS}): 80\ \mu\text{s}\ \text{pulse test}, V_{DS}=25\text{V}, T_{ch}=25^\circ\text{C}$



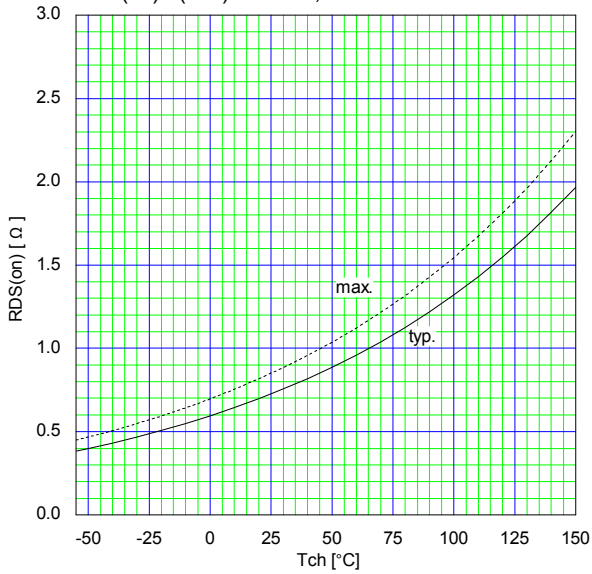
Typical Transconductance
 $g_{fs}=f(I_D): 80\ \mu\text{s}\ \text{pulse test}, V_{DS}=25\text{V}, T_{ch}=25^\circ\text{C}$



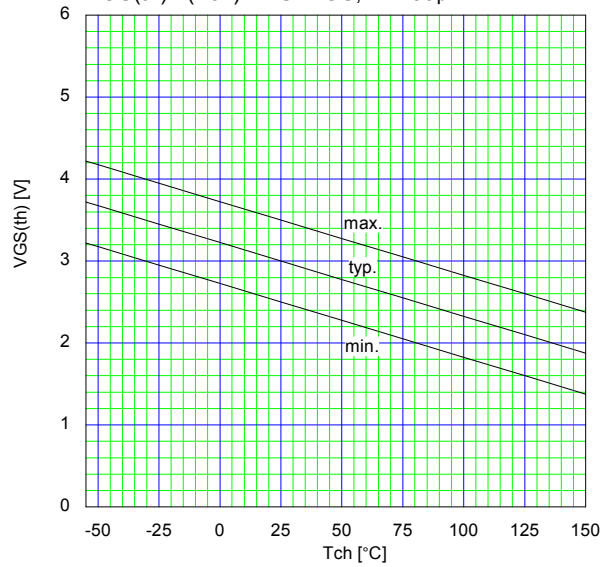
Typical Drain-Source on-state Resistance
 $R_{DS(on)}=f(I_D): 80\ \mu\text{s}\ \text{pulse test}, T_{ch}=25^\circ\text{C}$



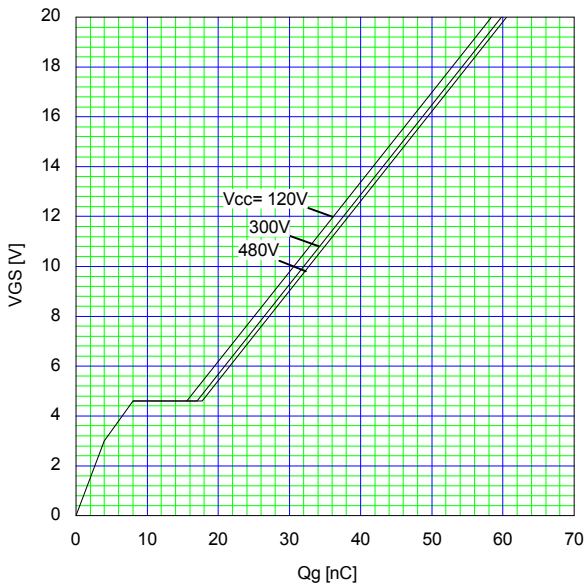
Drain-Source On-state Resistance
 $R_{DS(on)}=f(T_{ch}):I_D=3.3A, V_{GS}=10V$



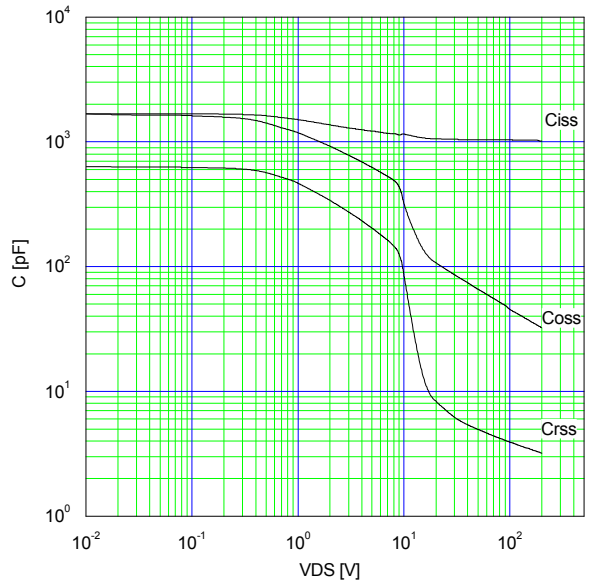
Gate Threshold Voltage vs. T_{ch}
 $V_{GS(th)}=f(T_{ch}):V_{DS}=V_{GS}, I_D=250\mu A$



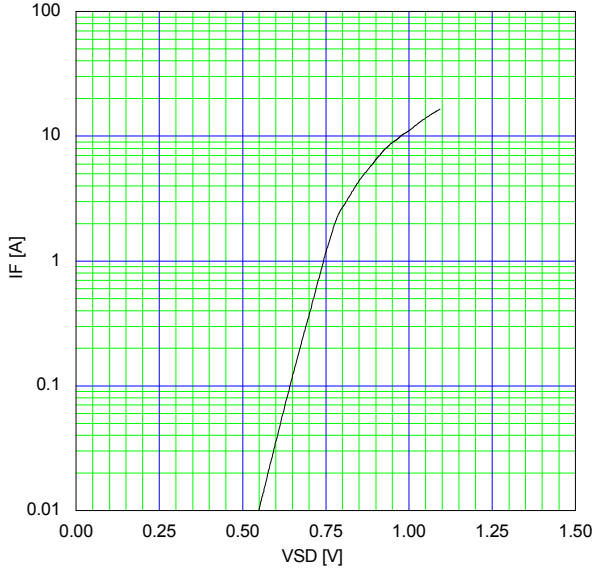
Typical Gate Charge Characteristics
 $V_{GS}=f(Q_g):I_D=6.5A, T_{ch}=25\text{ °C}$



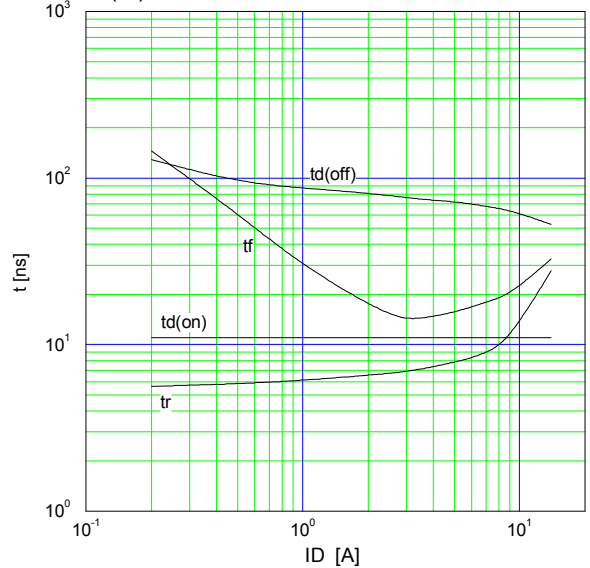
Typical Capacitance
 $C=f(V_{DS}):V_{GS}=0V, f=1MHz$

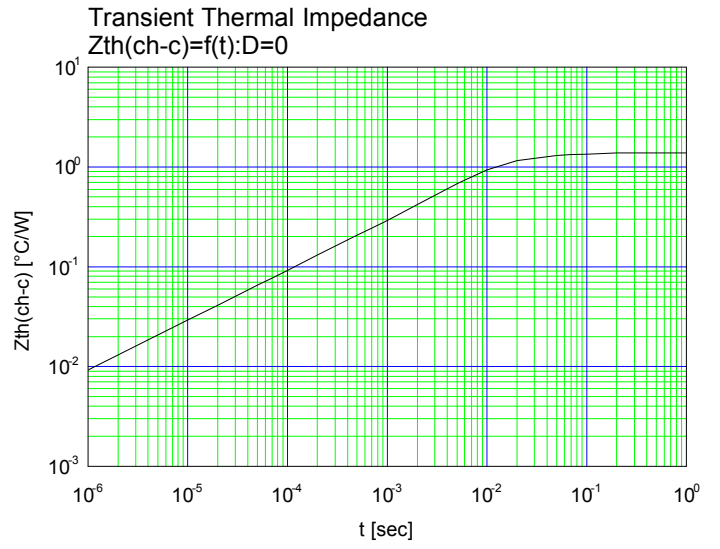
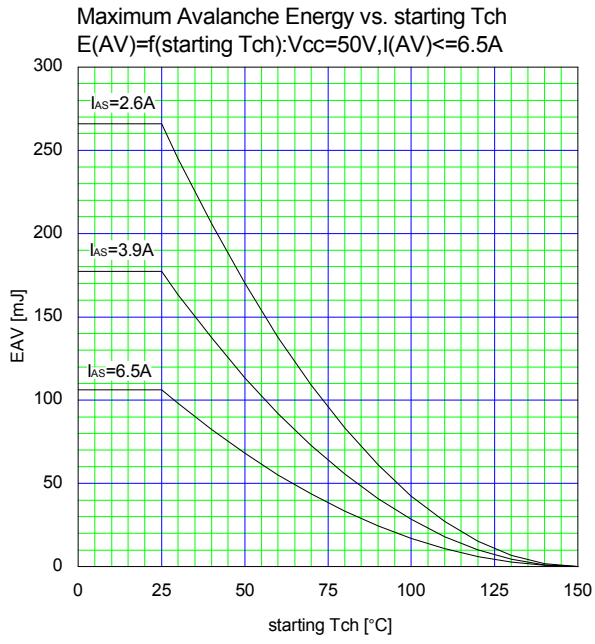


Typical Forward Characteristics of Reverse Diode
 $I_F=f(V_{SD}):80\mu s\text{ pulse test}, T_{ch}=25\text{ °C}$



Typical Switching Characteristics vs. I_D
 $t=f(I_D):V_{cc}=300V, V_{GS}=10V, R_G=22\Omega$





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