

FMP16N50ES

FUJI POWER MOSFET

Super FAP-E^{3S} series

N-CHANNEL SILICON POWER MOSFET

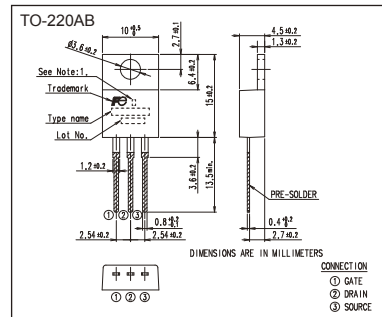
Features

- 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 (4.2±0.5V)
- High avalanche durability

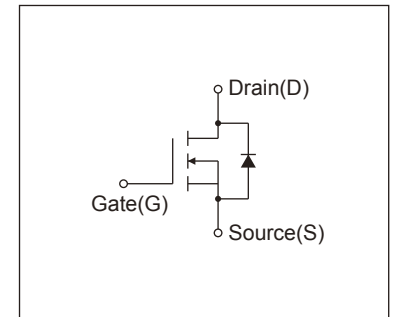
Applications

- 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 _{DSSX} | 500 | V | V _{GS} = -30V |
| Continuous Drain Current | I _D | ±16 | A | |
| Pulsed Drain Current | I _{DP} | ±64 | A | |
| Gate-Source Voltage | V _{GS} | ±30 | V | |
| Repetitive and Non-Repetitive Maximum Avalanche Current | I _{AR} | 16 | A | Note*1 |
| Non-Repetitive Maximum Avalanche Energy | E _{AS} | 485 | mJ | Note*2 |
| Repetitive Maximum Avalanche Energy | E _{AR} | 22.5 | mJ | Note*3 |
| Peak Diode Recovery dV/dt | dV/dt | 4.8 | kV/μs | Note*4 |
| Peak Diode Recovery -di/dt | -di/dt | 100 | A/μs | Note*5 |
| Maximum Power Dissipation | P _D | 2.02 | W | T _a =25°C |
| | | 225 | | 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} | 3.7 | 4.2 | 4.7 | 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 =8A, V _{GS} =10V | - | 0.33 | 0.38 | Ω |
| Forward Transconductance | g _{fs} | I _D =8A, V _{DS} =25V | 5.5 | 11 | - | S |
| Input Capacitance | C _{iss} | V _{DS} =25V | - | 1700 | 2550 | pF |
| Output Capacitance | C _{oss} | V _{GS} =0V | - | 210 | 315 | |
| Reverse Transfer Capacitance | C _{rss} | f=1MHz | - | 13 | 19.5 | |
| Turn-On Time | td(on) | V _{cc} =300V | - | 37 | 55.5 | ns |
| | | V _{GS} =10V | - | 30 | 45 | |
| Turn-Off Time | td(off) | I _D =8A | - | 87 | 130.5 | |
| | | R _{GS} =18Ω | - | 17 | 25.5 | |
| Total Gate Charge | Q _G | V _{cc} =250V | - | 48 | 72 | nC |
| Gate-Source Charge | Q _{GS} | I _D =16A | - | 17 | 25.5 | |
| Gate-Drain Charge | Q _{GD} | V _{GS} =10V | - | 18 | 27 | |
| Gate-Drain Crossover Charge | Q _{SW} | | - | 7 | 10.5 | |
| Avalanche Capability | I _{AV} | L=1.52mH, T _{ch} =25°C | 16 | - | - | A |
| Diode Forward On-Voltage | V _{SD} | I _F =16A, V _{GS} =0V, T _{ch} =25°C | - | 0.90 | 1.35 | V |
| Reverse Recovery Time | t _{rr} | I _F =16A, V _{GS} =0V | - | 0.46 | - | μs |
| Reverse Recovery Charge | Q _{rr} | -di/dt=100A/μs, T _{ch} =25°C | - | 6.0 | - | μC |

Thermal Characteristics

| Description | Symbol | Test Conditions | min. | typ. | max. | Unit |
|--------------------|------------------------|--------------------|------|------|-------|------|
| Thermal resistance | R _{th} (ch-c) | Channel to Case | | | 0.560 | °C/W |
| | R _{th} (ch-a) | Channel to Ambient | | | 62.0 | °C/W |

Note *1 : T_{ch}≤150°C.

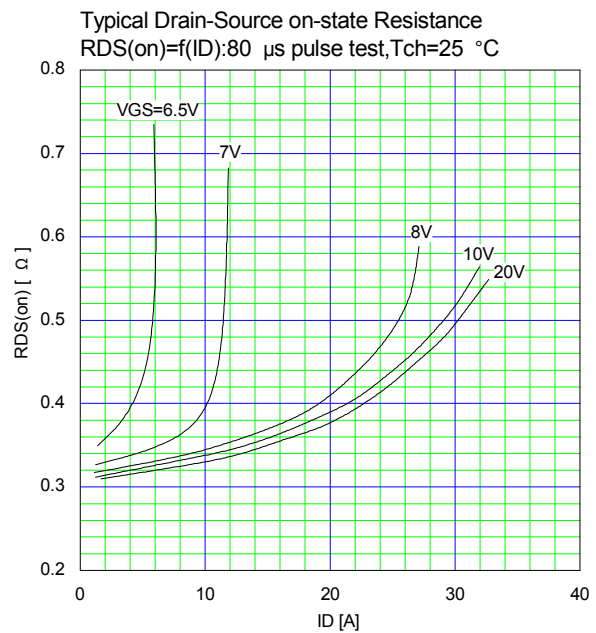
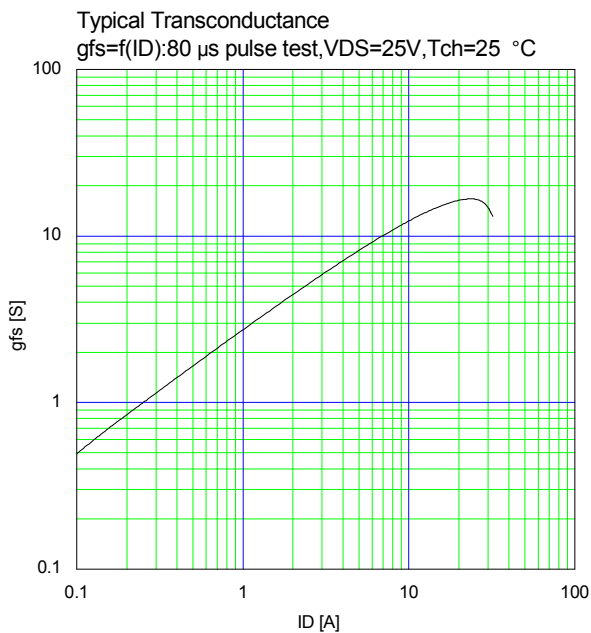
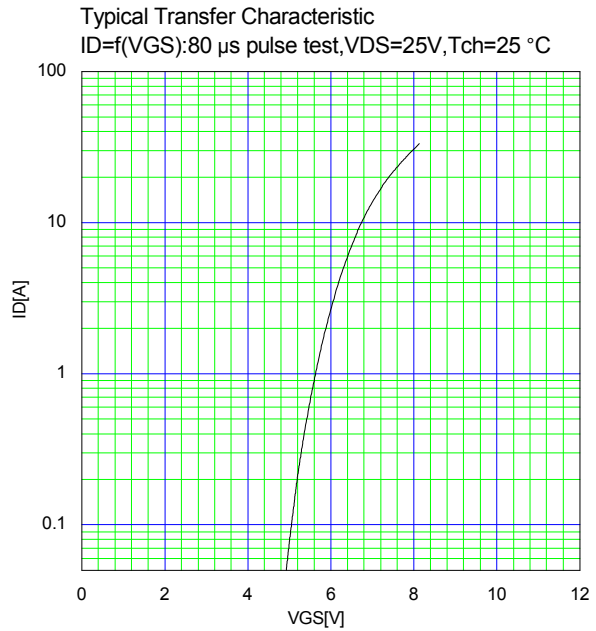
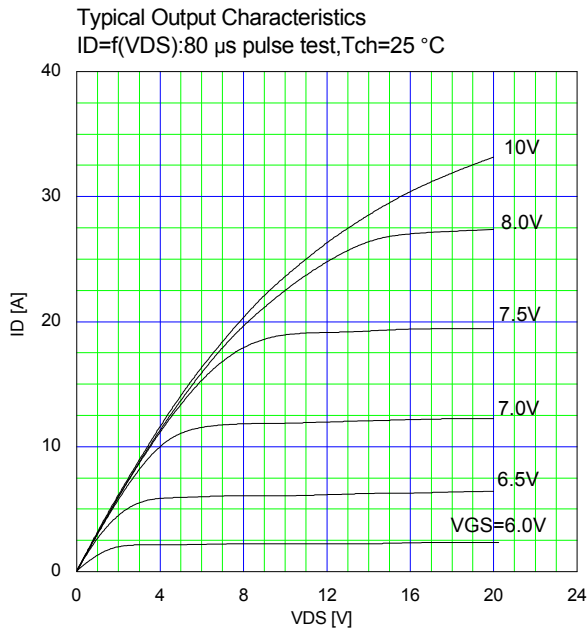
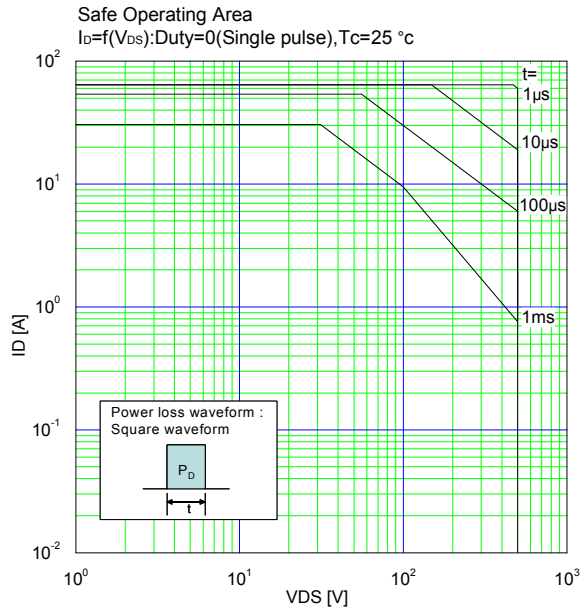
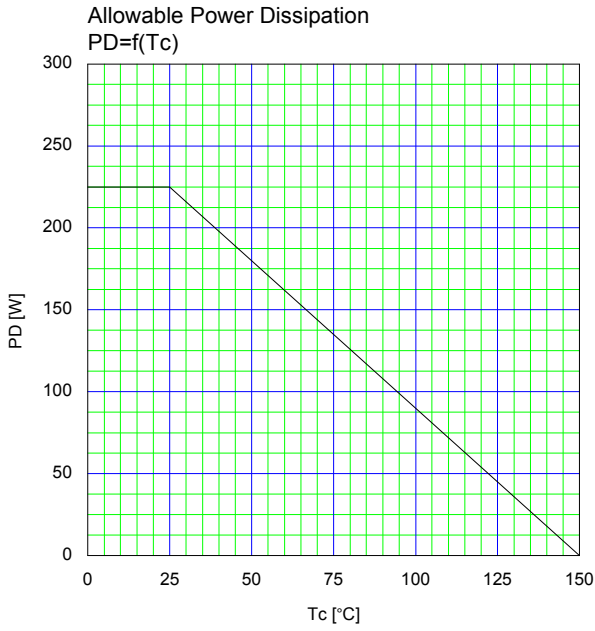
Note *2 : Stating T_{ch}=25°C, I_{AS}=7A, L=18.1mH, V_{cc}=50V, R_G=50Ω.

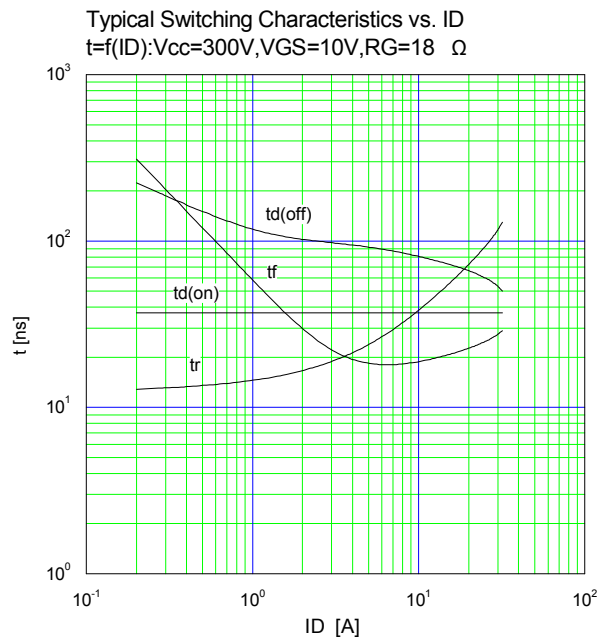
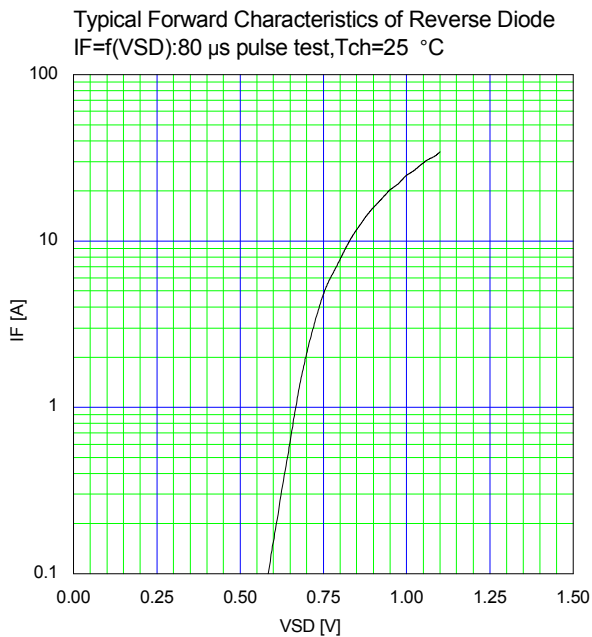
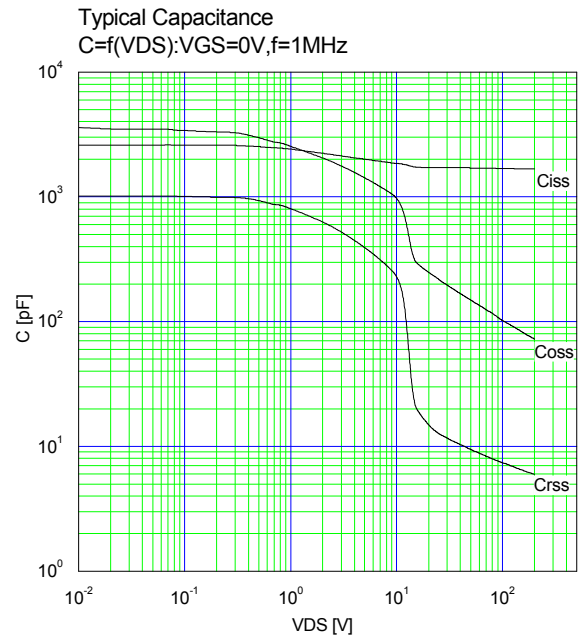
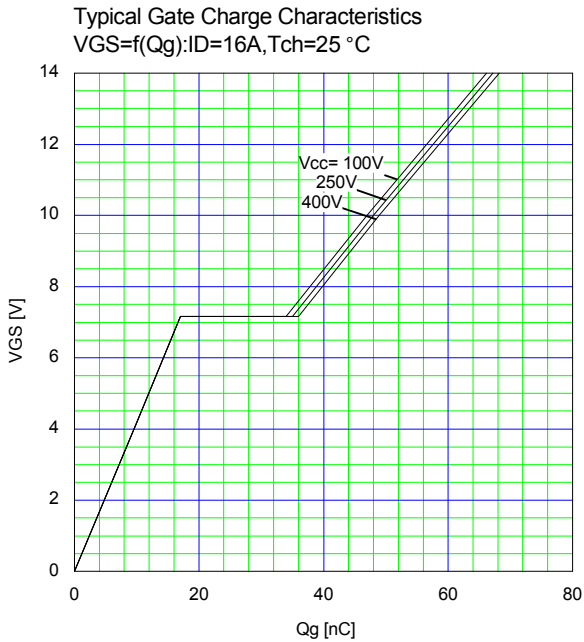
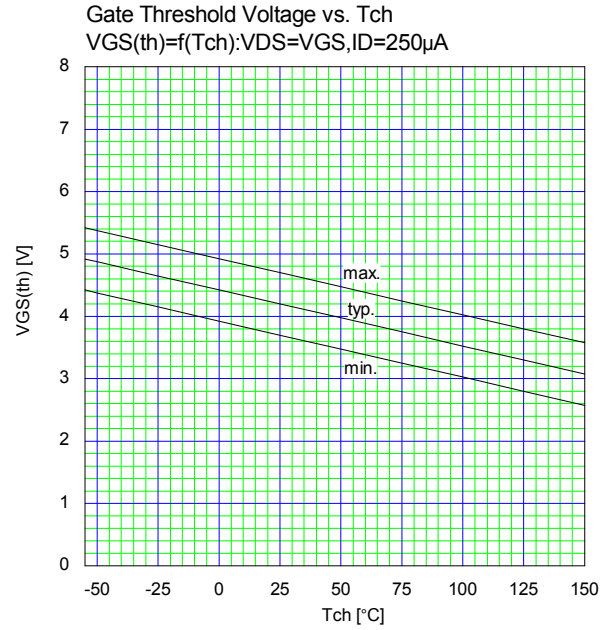
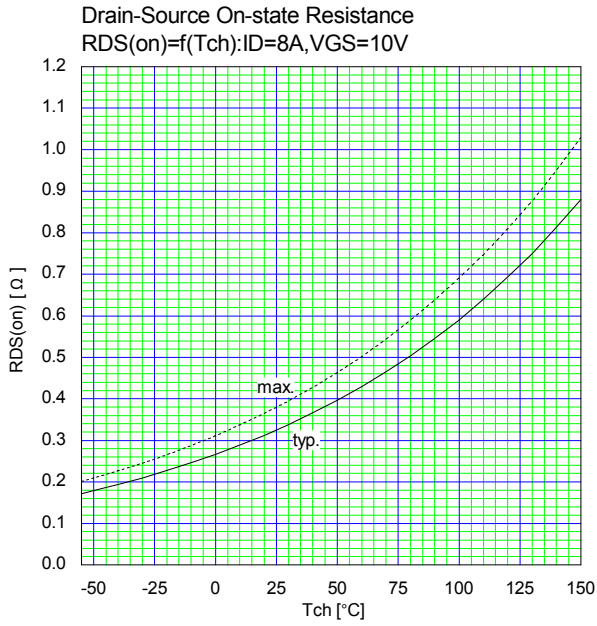
E_{AS} limited by maximum channel temperature and avalanche current.
See to 'Avalanche Energy' graph.

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

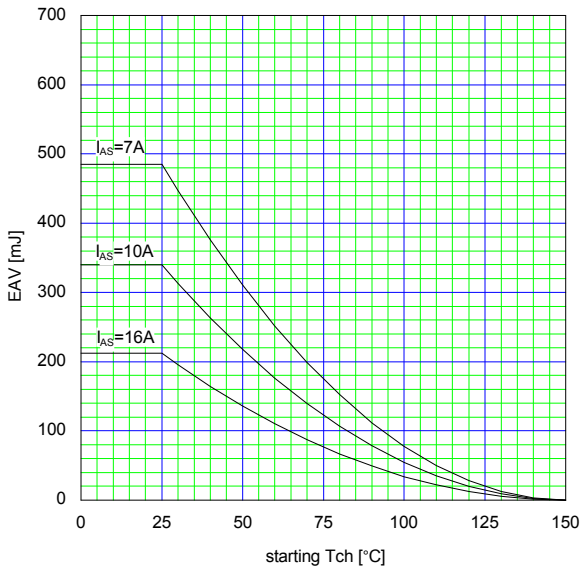
Note *4 : I_F=I_D, -di/dt=100A/μs, V_{ccs}=BV_{DSS}, T_{ch}≤150°C.

Note *5 : I_F=I_D, dv/dt=4.8kV/μs, V_{ccs}=BV_{DSS}, T_{ch}≤150°C.

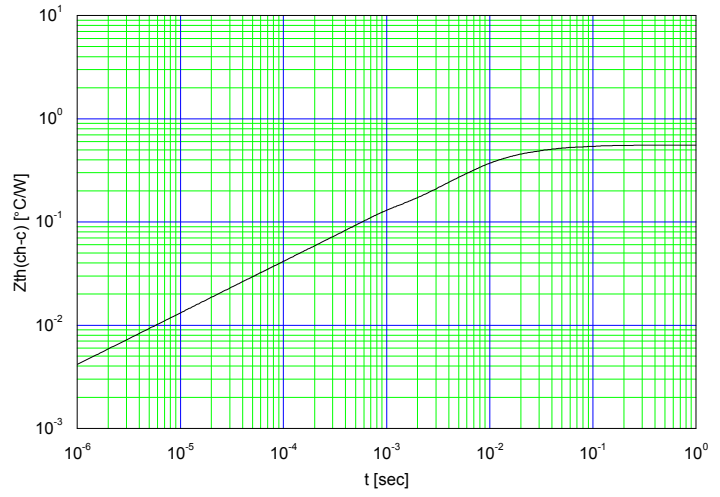




Maximum Avalanche Energy vs. starting Tch
 $E(AV)=f(\text{starting Tch}):V_{cc}=50V, I(AV)\leq 16A$



Maximum Transient Thermal Impedance
 $Z_{th}(ch-c)=f(t):D=0$



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