

FMV19N60E

FUJI POWER MOSFET

Super FAP-E³ series

N-CHANNEL SILICON POWER MOSFET

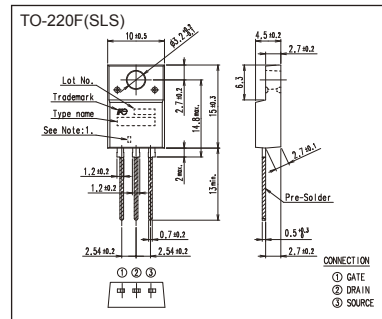
Features

- 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} | 600 | V | |
| | V _{DSSX} | 600 | V | V _{GS} = -30V |
| Continuous Drain Current | I _D | ±19 | A | |
| Pulsed Drain Current | I _{DP} | ±76 | A | |
| Gate-Source Voltage | V _{GS} | ±30 | V | |
| Repetitive and Non-Repetitive Maximum Avalanche Current | I _{AR} | 19 | A | Note*1 |
| Non-Repetitive Maximum Avalanche Energy | E _{AS} | 799 | mJ | Note*2 |
| Repetitive Maximum Avalanche Energy | E _{AR} | 13 | mJ | Note*3 |
| Peak Diode Recovery dv/dt | dv/dt | 6.5 | kV/μs | Note*4 |
| Peak Diode Recovery -di/dt | -di/dt | 100 | A/μs | Note*5 |
| Maximum Power Dissipation | P _D | 2.16 | W | T _a =25°C |
| | | 130 | | T _c =25°C |
| Operating and Storage Temperature range | T _{ch} | 150 | °C | |
| | T _{stg} | -55 to + 150 | °C | |
| Isolation Voltage | V _{ISO} | 2 | kVrms | t = 60sec, f = 60Hz |

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 | 600 | - | - | 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} =600V, V _{GS} =0V | - | - | 25 | μA |
| | | V _{DS} =480V, 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 =9.5A, V _{GS} =10V | - | 0.31 | 0.365 | Ω |
| Forward Transconductance | g _{fs} | I _D =9.5A, V _{DS} =25V | 13 | 26 | - | S |
| Input Capacitance | C _{iss} | V _{DS} =25V | - | 3600 | 5400 | pF |
| Output Capacitance | C _{oss} | V _{GS} =0V | - | 310 | 465 | |
| Reverse Transfer Capacitance | C _{rss} | f=1MHz | - | 23 | 35 | |
| Turn-On Time | td(on) | V _{cc} =300V | - | 26 | 39 | ns |
| | tr | V _{GS} =10V | - | 13 | 20 | |
| Turn-Off Time | td(off) | I _D =9.5A | - | 150 | 225 | |
| | tf | R _{GS} =8.2Ω | - | 20 | 30 | |
| Total Gate Charge | Q _G | V _{cc} =300V | - | 105 | 160 | nC |
| Gate-Source Charge | Q _{GS} | I _D =19A | - | 23 | 35 | |
| Gate-Drain Charge | Q _{GD} | V _{GS} =10V | - | 30 | 45 | |
| Avalanche Capability | I _{AV} | L=1.71mH, T _{ch} =25°C | 19 | - | - | A |
| Diode Forward On-Voltage | V _{SD} | I _F =19A, V _{GS} =0V, T _{ch} =25°C | - | 0.90 | 1.35 | V |
| Reverse Recovery Time | t _{rr} | I _F =19A, V _{GS} =0V | - | 0.6 | - | μs |
| Reverse Recovery Charge | Q _{rr} | -di/dt=100A/μs, T _{ch} =25°C | - | 10 | - | μC |

Thermal Characteristics

| Description | Symbol | Test Conditions | min. | typ. | max. | Unit |
|--------------------|------------------------|--------------------|------|------|------|------|
| Thermal resistance | R _{th} (ch-c) | Channel to case | | | 0.96 | °C/W |
| | R _{th} (ch-a) | Channel to ambient | | | 58.0 | °C/W |

Note *1 : T_{ch}≤150°C

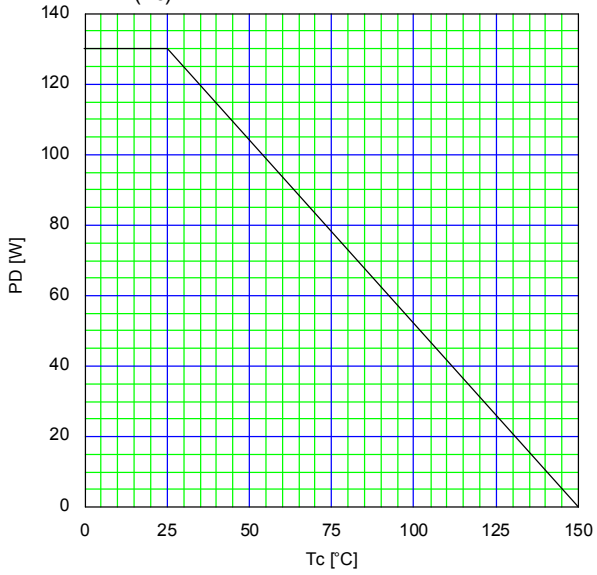
Note *2 : Stating T_{ch}=25°C, I_{AS}=8A, L=22.9mH, V_{cc}=60V, R_G=50Ω
E_{AS} limited by maximum channel temperature and avalanche current.
See to 'Avalanche Energy' graph.

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

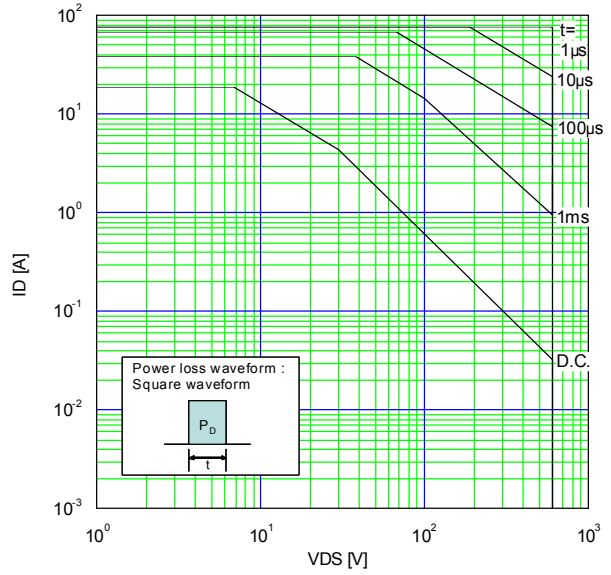
Note *4 : I_F≤10, -di/dt=100A/μs, V_{cc}≤BV_{DSS}, T_{ch}≤150°C.

Note *5 : I_F≤10, dv/dt=5.0kV/μs, V_{cc}≤BV_{DSS}, T_{ch}≤150°C.

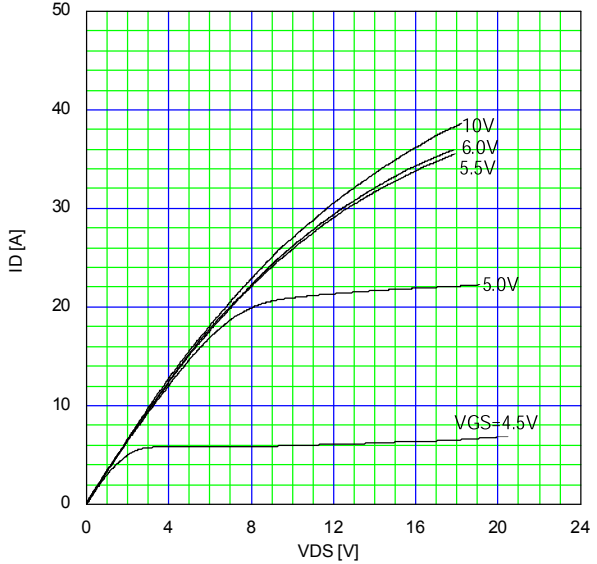
Allowable Power Dissipation
 $P_D = f(T_c)$



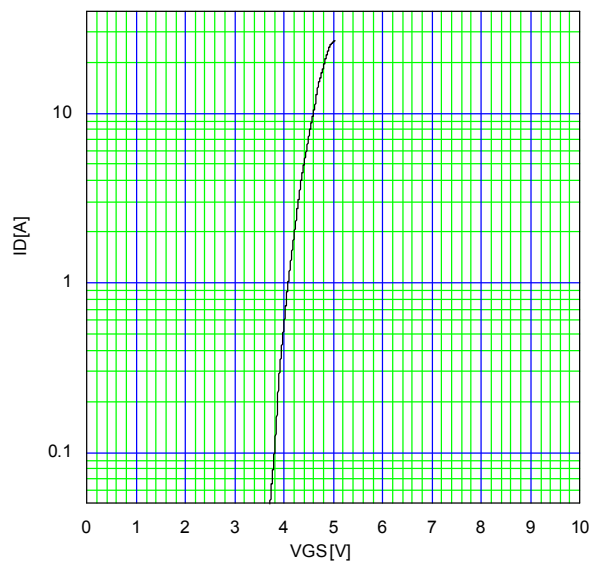
Safe Operating Area
 $I_D = f(V_{DS}): \text{Duty}=0 (\text{Single pulse}), T_c=25^\circ\text{C}$



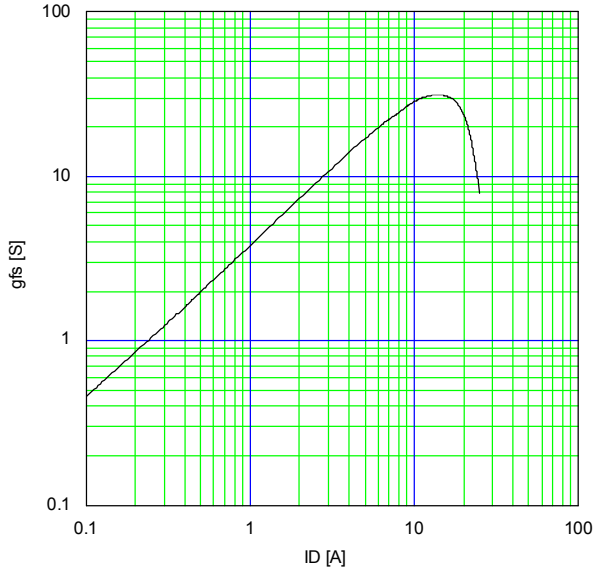
Typical Output Characteristics
 $I_D = f(V_{DS}): 80 \mu\text{s pulse test}, T_{ch}=25^\circ\text{C}$



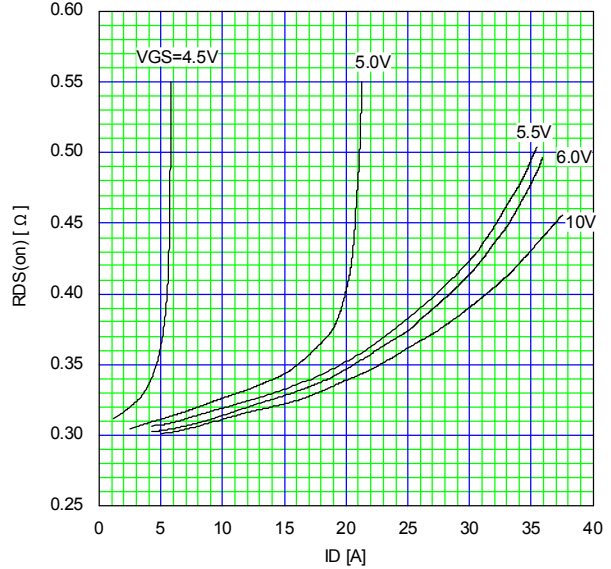
Typical Transfer Characteristic
 $I_D = f(V_{GS}): 80 \mu\text{s pulse test}, V_{DS}=25\text{V}, T_{ch}=25^\circ\text{C}$



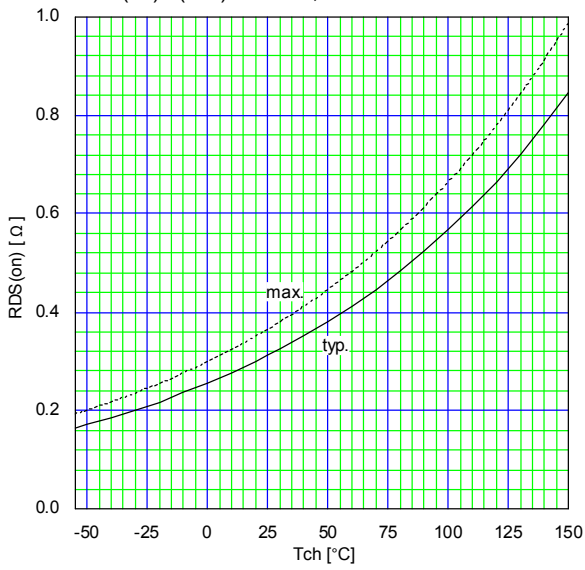
Typical Transconductance
 $g_{fs} = f(I_D): 80 \mu\text{s pulse test}, V_{DS}=25\text{V}, T_{ch}=25^\circ\text{C}$



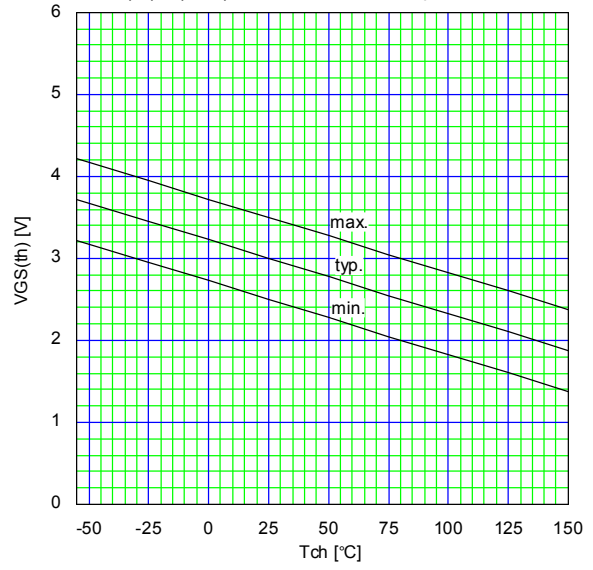
Typical Drain-Source on-state Resistance
 $R_{DS(on)} = f(I_D): 80 \mu\text{s pulse test}, T_{ch}=25^\circ\text{C}$



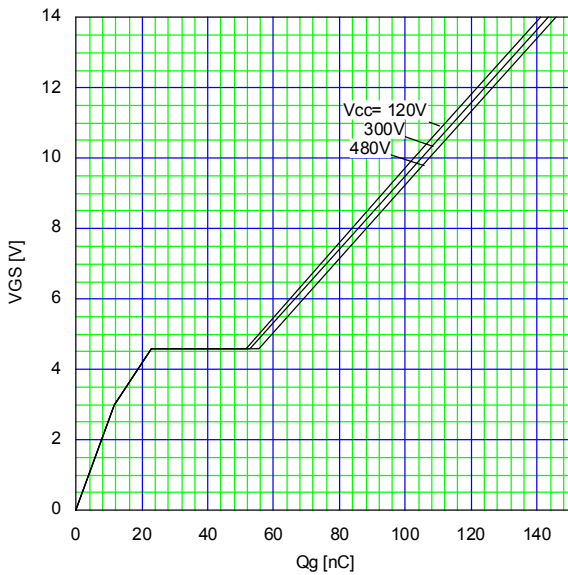
Drain-Source On-state Resistance
 $R_{DS(on)}=f(T_{ch}):I_D=9.5A, V_{GS}=10V$



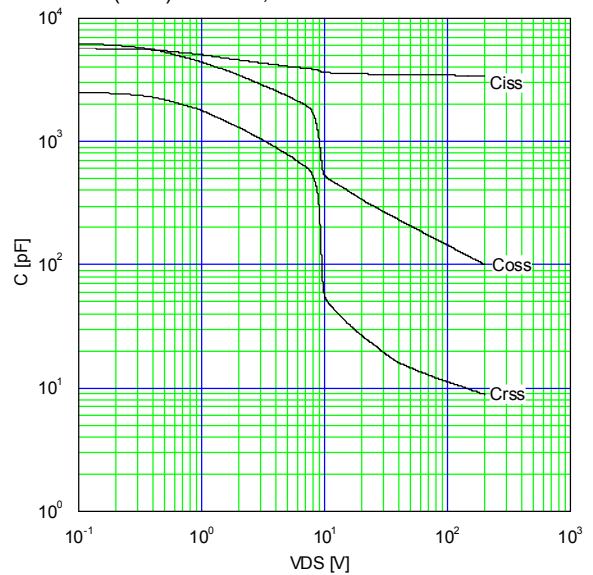
Gate Threshold Voltage vs. T_{ch}
 $V_{GS(th)}=f(T_{ch}):V_{DS}=V_{GS}, I_D=250\mu A$



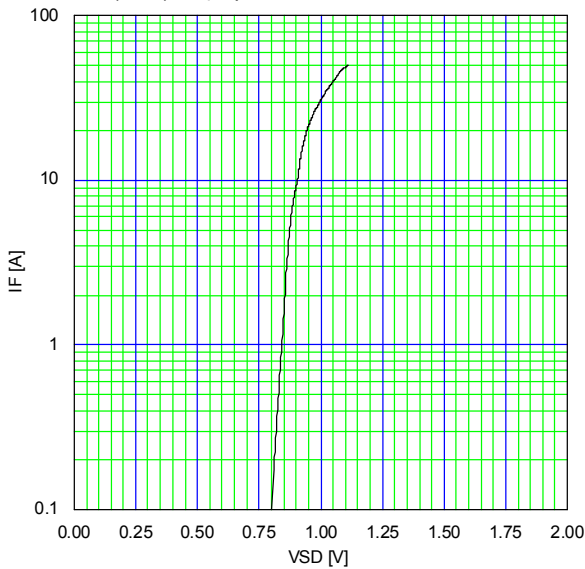
Typical Gate Charge Characteristics
 $V_{GS}=f(Q_g):I_D=19A, T_{ch}=25^\circ C$



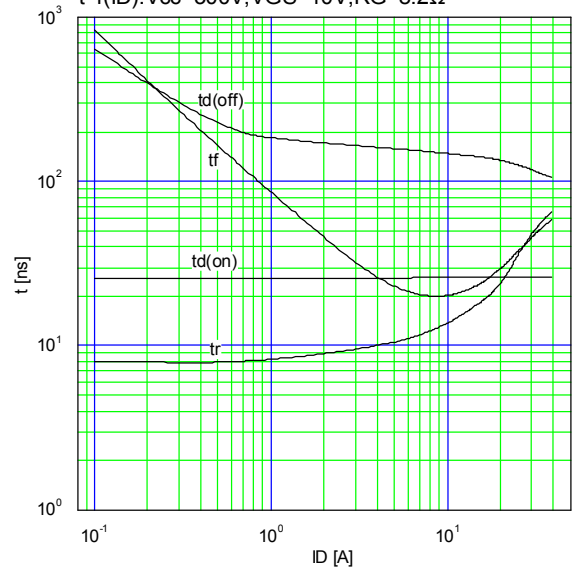
Typical Capacitance
 $C=f(V_{DS}):V_{GS}=0V, f=1MHz$



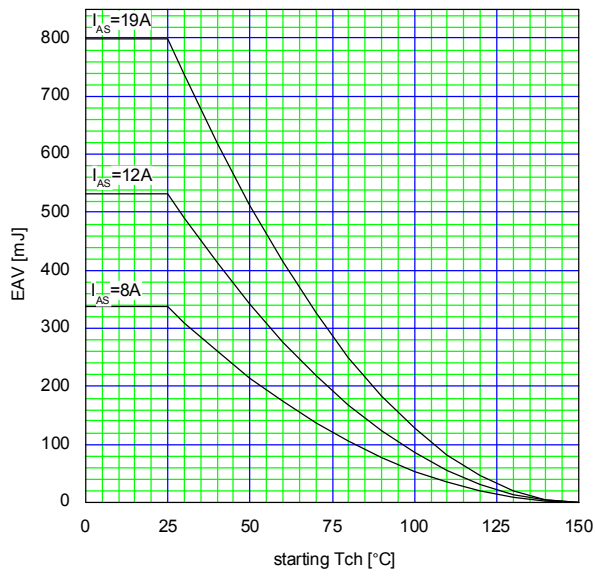
Typical Forward Characteristics of Reverse Diode
 $I_F=f(V_{SD}):80\mu s\ pulse\ test, T_{ch}=25^\circ C$



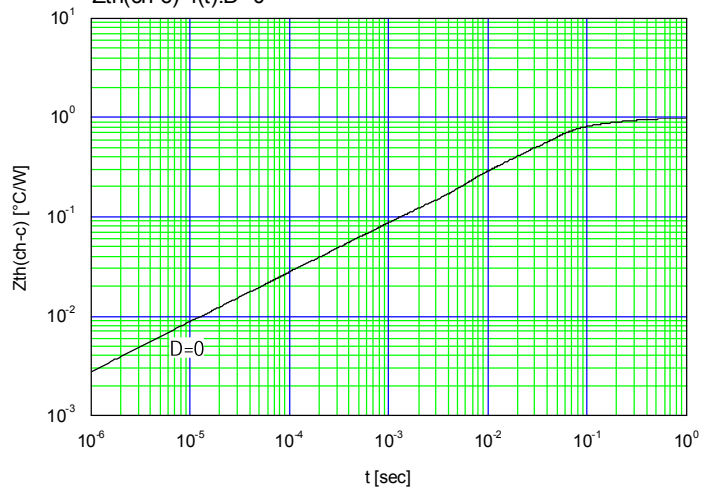
Typical Switching Characteristics vs. I_D
 $t=f(I_D):V_{cc}=300V, V_{GS}=10V, R_G=8.2\Omega$



Maximum Avalanche Energy vs. starting Tch
 $E(AV)=f(\text{starting Tch}):V_{cc}=60V, I(AV)\leq 19A$



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



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