MITSUBISHI Nch POWER MOSFET

# FS50SM-06

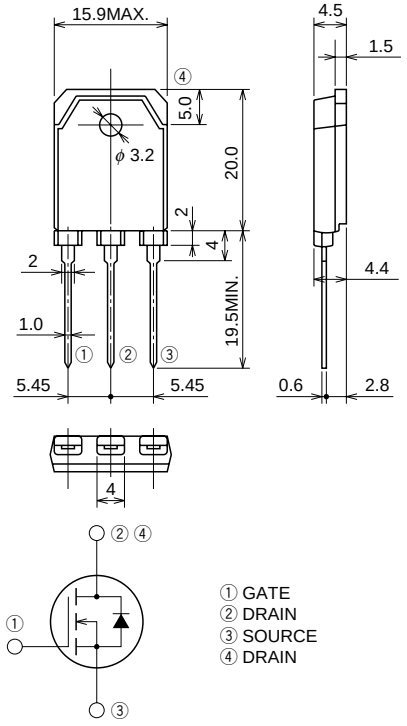
HIGH-SPEED SWITCHING USE

**FS50SM-06**



- 10V DRIVE
- $V_{DSS}$ ..... 60V
- $r_{DS\ (ON)\ (MAX)}$ ..... 22mΩ
- $I_D$ ..... 50A
- Integrated Fast Recovery Diode (TYP.) ..... 65ns

**OUTLINE DRAWING** Dimensions in mm




**TO-3P**

## APPLICATION

Motor control, Lamp control, Solenoid control
DC-DC converter, etc.

**MAXIMUM RATINGS** ($T_c$ = 25°C)

| Symbol | Parameter | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain-source voltage | $V_{GS}$ = 0V | 60 | V |
| $V_{GSS}$ | Gate-source voltage | $V_{DS}$ = 0V | ±20 | V |
| $I_D$ | Drain current | | 50 | A |
| $I_{DM}$ | Drain current (Pulsed) | | 200 | A |
| $I_{DA}$ | Avalanche drain current (Pulsed) | L = 100μH | 50 | A |
| $I_S$ | Source current | | 50 | A |
| $I_{SM}$ | Source current (Pulsed) | | 200 | A |
| $P_D$ | Maximum power dissipation | | 70 | W |
| $T_{ch}$ | Channel temperature | | –55 ~ +150 | °C |
| $T_{stg}$ | Storage temperature | | –55 ~ +150 | °C |
| — | Weight | Typical value | 4.8 | g |



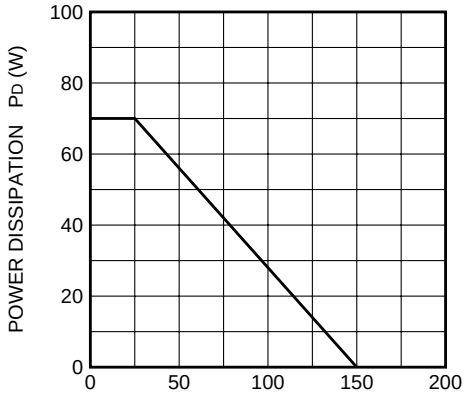
MITSUBISHI ELECTRIC

## ELECTRICAL CHARACTERISTICS (Tch = 25°C)

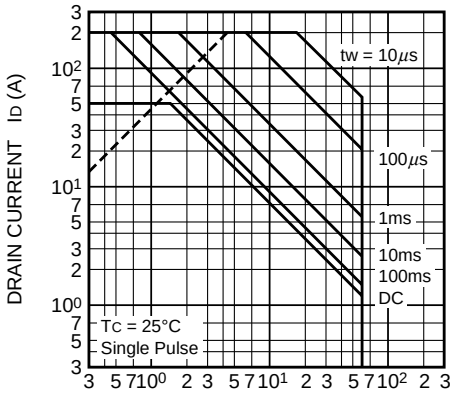
| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $V_{(BR)DSS}$ | Drain-source breakdown voltage | $I_D$ = 1mA, $V_{GS}$ = 0V | 60 | — | — | V |
| $I_{GSS}$ | Gate-source leakage current | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | — | — | ±0.1 | μA |
| $I_{DSS}$ | Drain-source leakage current | $V_{DS}$ = 60V, $V_{GS}$ = 0V | — | — | 0.1 | mA |
| $V_{GS(th)}$ | Gate-source threshold voltage | $I_D$ = 1mA, $V_{DS}$ = 10V | 2.0 | 3.0 | 4.0 | V |
| $r_{DS(ON)}$ | Drain-source on-state resistance | $I_D$ = 25A, $V_{GS}$ = 10V | — | 17 | 22 | mΩ |
| $V_{DS(ON)}$ | Drain-source on-state voltage | $I_D$ = 25A, $V_{GS}$ = 10V | — | 0.43 | 0.55 | V |
| $\lvert y_{fs} \rvert$ | Forward transfer admittance | $I_D$ = 25A, $V_{DS}$ = 10V | — | 32 | — | S |
| $C_{iss}$ | Input capacitance | $V_{DS}$ = 10V, $V_{GS}$ = 0V, f = 1MHz | — | 2300 | — | pF |
| $C_{oss}$ | Output capacitance | | — | 570 | — | pF |
| $C_{rss}$ | Reverse transfer capacitance | | — | 280 | — | pF |
| $t_{d(on)}$ | Turn-on delay time | $V_{DD}$ = 30V, $I_D$ = 25A, $V_{GS}$ = 10V, $R_{GEN}$ = $R_{GS}$ = 50Ω | — | 35 | — | ns |
| $t_r$ | Rise time | | — | 95 | — | ns |
| $t_{d(off)}$ | Turn-off delay time | | — | 95 | — | ns |
| $t_f$ | Fall time | | — | 80 | — | ns |
| $V_{SD}$ | Source-drain voltage | $I_S$ = 25A, $V_{GS}$ = 0V | — | 1.0 | 1.5 | V |
| $R_{th(ch-c)}$ | Thermal resistance | Channel to case | — | — | 1.78 | °C/W |
| $t_{rr}$ | Reverse recovery time | $I_S$ = 50A, dis/dt = –100A/μs | — | 65 | — | ns |

## PERFORMANCE CURVES

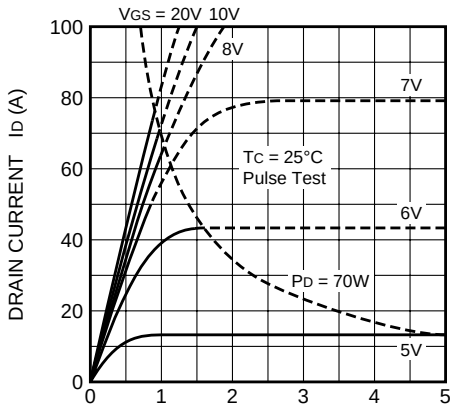
**POWER DISSIPATION DERATING CURVE**



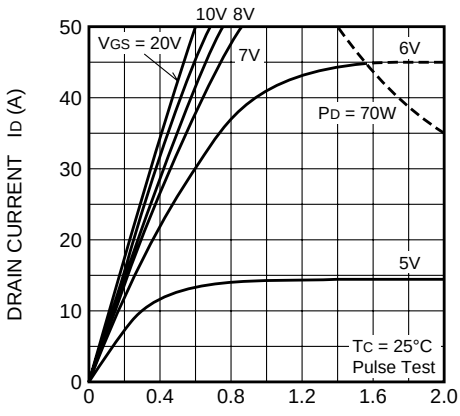

**MAXIMUM SAFE OPERATING AREA**



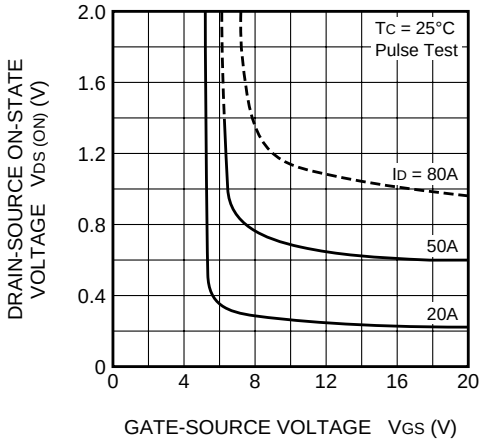

**OUTPUT CHARACTERISTICS (TYPICAL)**



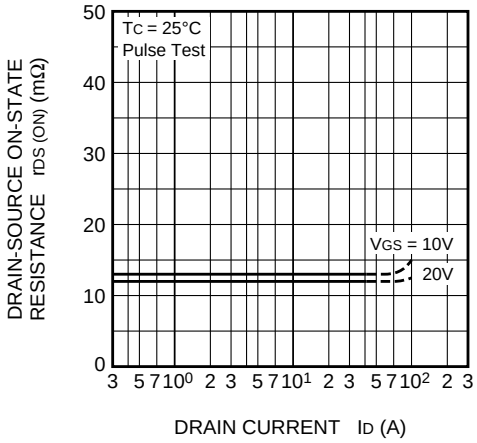

**OUTPUT CHARACTERISTICS (TYPICAL)**



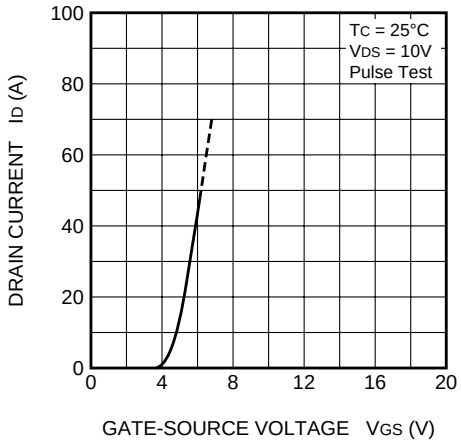
**ON-STATE VOLTAGE VS. GATE-SOURCE VOLTAGE (TYPICAL)**



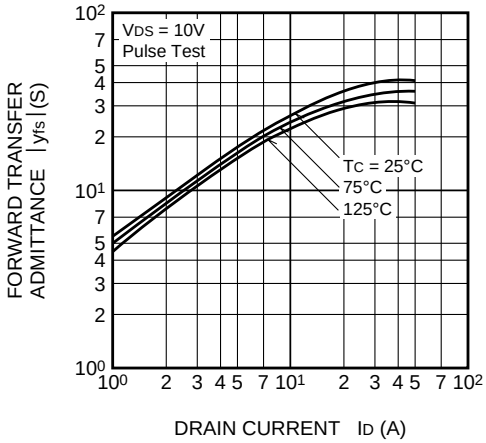

**ON-STATE RESISTANCE VS. DRAIN CURRENT (TYPICAL)**



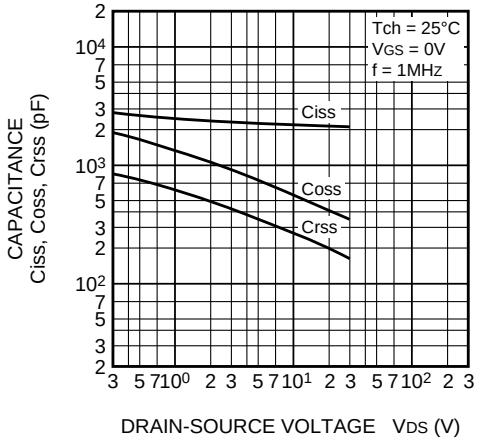

**TRANSFER CHARACTERISTICS (TYPICAL)**



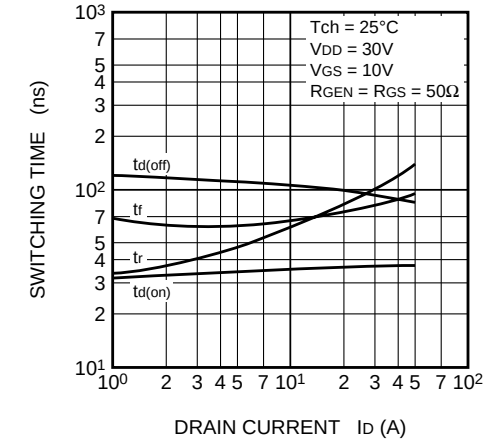

**FORWARD TRANSFER ADMITTANCE VS.DRAIN CURRENT (TYPICAL)**



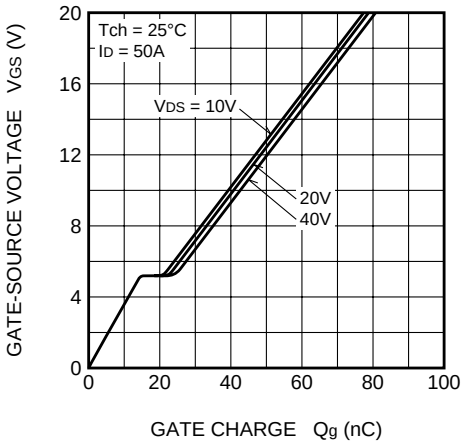

**CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)**



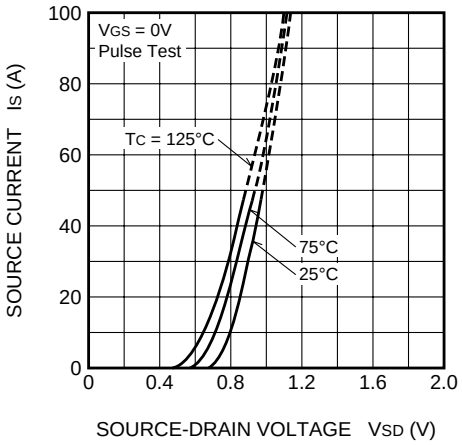

**SWITCHING CHARACTERISTICS (TYPICAL)**



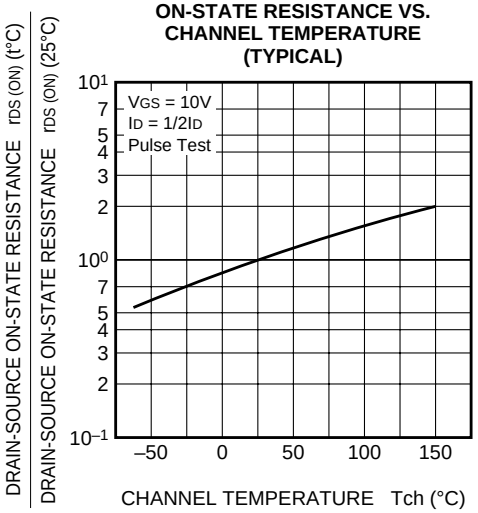
**GATE-SOURCE VOLTAGE VS.GATE CHARGE (TYPICAL)**



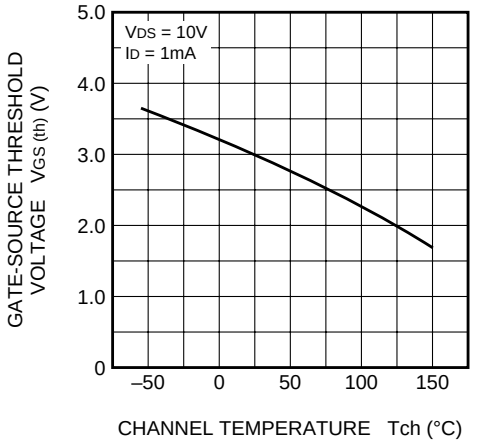

**SOURCE-DRAIN DIODE FORWARD CHARACTERISTICS (TYPICAL)**



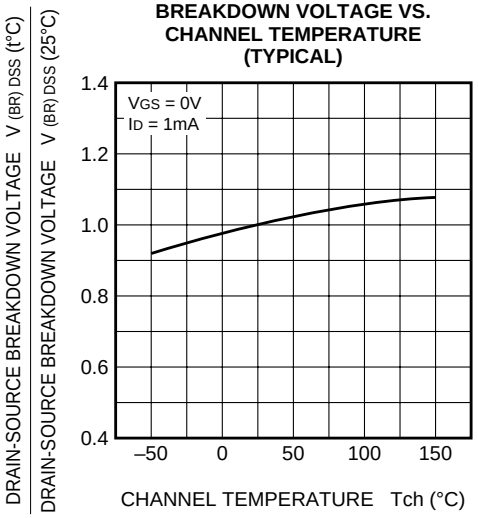

**ON-STATE RESISTANCE VS. CHANNEL TEMPERATURE (TYPICAL)**




**THRESHOLD VOLTAGE VS. CHANNEL TEMPERATURE (TYPICAL)**




**BREAKDOWN VOLTAGE VS. CHANNEL TEMPERATURE (TYPICAL)**




**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS**

