

# FS50SM-06

HIGH-SPEED SWITCHING USE

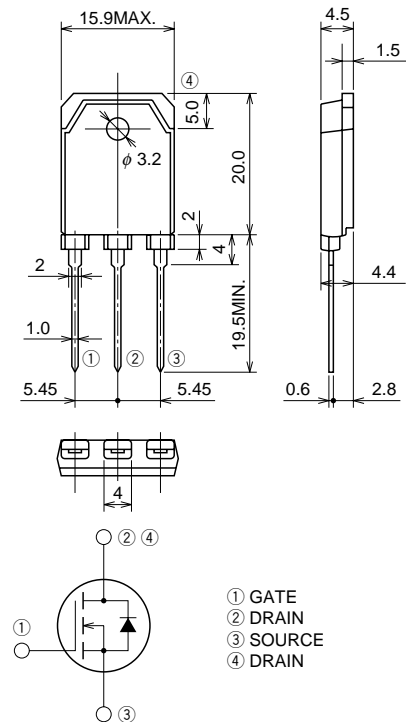
## FS50SM-06



- 10V DRIVE
- V<sub>DSS</sub> ..... 60V
- r<sub>DS (ON)</sub> (MAX) ..... 22mΩ
- I<sub>D</sub> ..... 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.

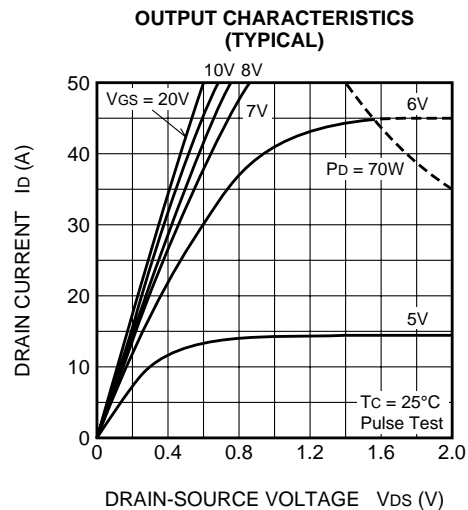
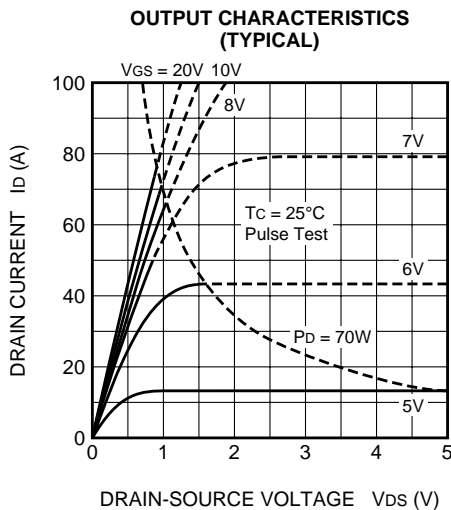
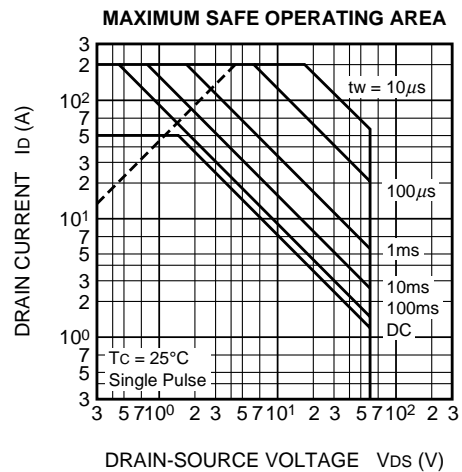
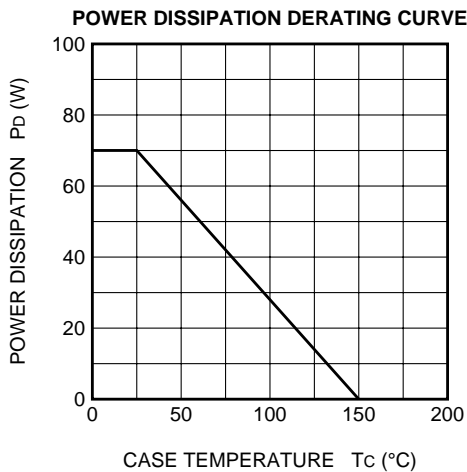
## MAXIMUM RATINGS (T<sub>c</sub> = 25°C)

| Symbol           | Parameter                        | Conditions           | Ratings    | Unit |
|------------------|----------------------------------|----------------------|------------|------|
| V <sub>DSS</sub> | Drain-source voltage             | V <sub>GS</sub> = 0V | 60         | V    |
| V <sub>GSS</sub> | Gate-source voltage              | V <sub>DS</sub> = 0V | ±20        | V    |
| I <sub>D</sub>   | Drain current                    |                      | 50         | A    |
| I <sub>DM</sub>  | Drain current (Pulsed)           |                      | 200        | A    |
| I <sub>DA</sub>  | Avalanche drain current (Pulsed) | L = 100μH            | 50         | A    |
| I <sub>S</sub>   | Source current                   |                      | 50         | A    |
| I <sub>SM</sub>  | Source current (Pulsed)          |                      | 200        | A    |
| P <sub>D</sub>   | Maximum power dissipation        |                      | 70         | W    |
| T <sub>ch</sub>  | Channel temperature              |                      | -55 ~ +150 | °C   |
| T <sub>stg</sub> | Storage temperature              |                      | -55 ~ +150 | °C   |
| —                | Weight                           | Typical value        | 4.8        | g    |

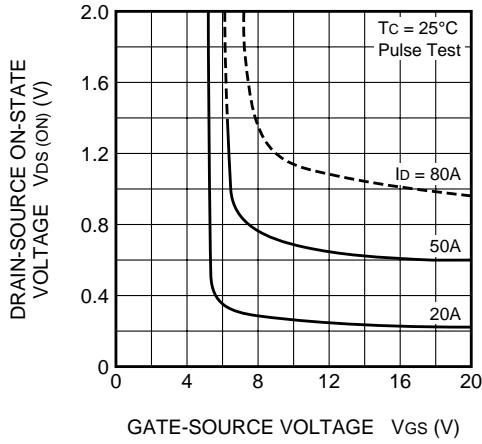
**ELECTRICAL CHARACTERISTICS** (Tch = 25°C)

| Symbol    | Parameter                        | Test conditions                                  | Limits |      |      | Unit |
|-----------|----------------------------------|--|--------|------|------|------|
|           |                                  |  | Min.   | Typ. | Max. |      |
| V(BR)DSS  | Drain-source breakdown voltage   | ID = 1mA, VGS = 0V                               | 60     | —    | —    | V    |
| IGSS      | Gate-source leakage current      | VGS = ±20V, VDS = 0V                             | —      | —    | ±0.1 | μA   |
| IDSS      | Drain-source leakage current     | VDS = 60V, VGS = 0V                              | —      | —    | 0.1  | mA   |
| VGS(th)   | Gate-source threshold voltage    | ID = 1mA, VDS = 10V                              | 2.0    | 3.0  | 4.0  | V    |
| rDS(ON)   | Drain-source on-state resistance | ID = 25A, VGS = 10V                              | —      | 17   | 22   | mΩ   |
| VDS(ON)   | Drain-source on-state voltage    | ID = 25A, VGS = 10V                              | —      | 0.43 | 0.55 | V    |
| yfs       | Forward transfer admittance      | ID = 25A, VDS = 10V                              | —      | 32   | —    | S    |
| Ciss      | Input capacitance                | VDS = 10V, VGS = 0V, f = 1MHz                    | —      | 2300 | —    | pF   |
| Coss      | Output capacitance               |  | —      | 570  | —    | pF   |
| Crss      | Reverse transfer capacitance     |  | —      | 280  | —    | pF   |
| td(on)    | Turn-on delay time               | VDD = 30V, ID = 25A, VGS = 10V, RGEN = RGS = 50Ω | —      | 35   | —    | ns   |
| tr        | Rise time                        |  | —      | 95   | —    | ns   |
| td(off)   | Turn-off delay time              |  | —      | 95   | —    | ns   |
| tf        | Fall time                        |  | —      | 80   | —    | ns   |
| VSD       | Source-drain voltage             | IS = 25A, VGS = 0V                               | —      | 1.0  | 1.5  | V    |
| Rth(ch-c) | Thermal resistance               | Channel to case                                  | —      | —    | 1.78 | °C/W |
| trr       | Reverse recovery time            | IS = 50A, dis/dt = -100A/μs                      | —      | 65   | —    | ns   |

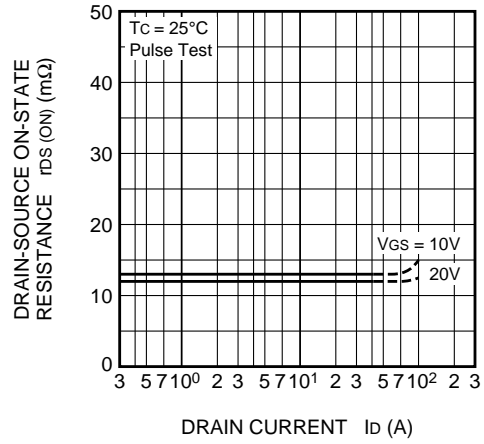
**PERFORMANCE CURVES**



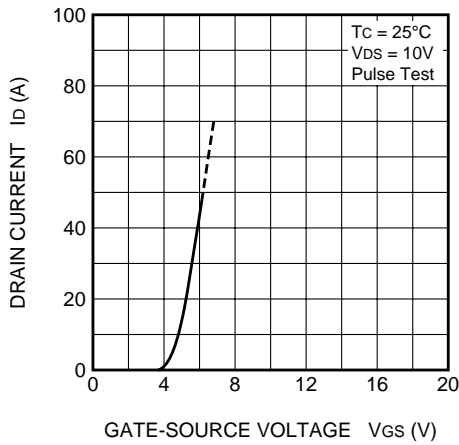
ON-STATE VOLTAGE VS. GATE-SOURCE VOLTAGE (TYPICAL)



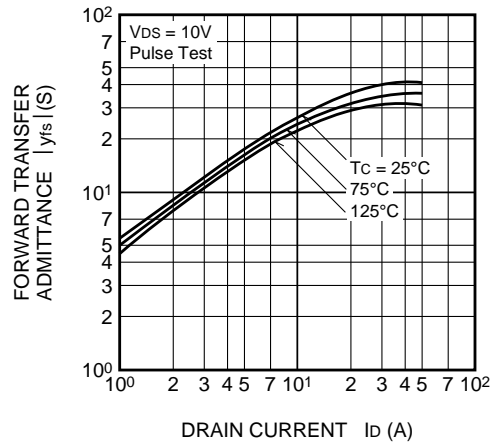
ON-STATE RESISTANCE VS. DRAIN CURRENT (TYPICAL)



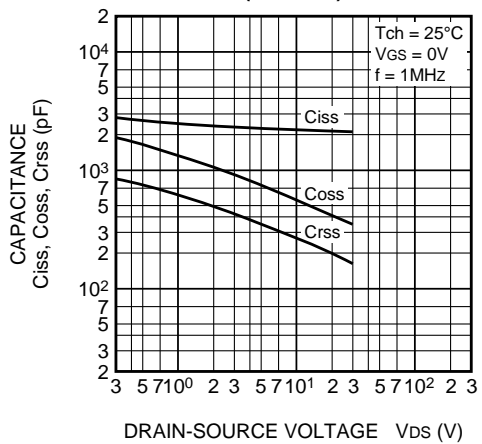
TRANSFER CHARACTERISTICS (TYPICAL)



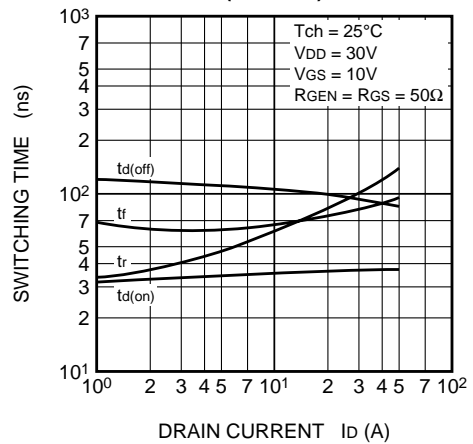
FORWARD TRANSFER ADMITTANCE VS. DRAIN CURRENT (TYPICAL)



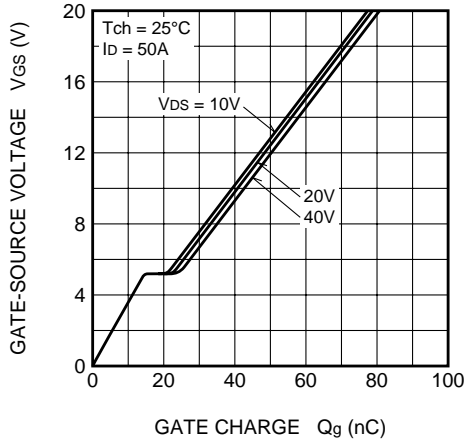
CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)



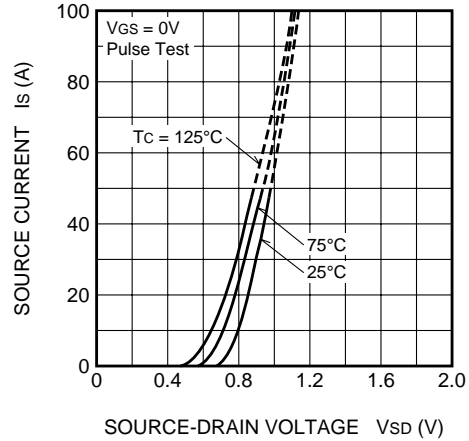
SWITCHING CHARACTERISTICS (TYPICAL)



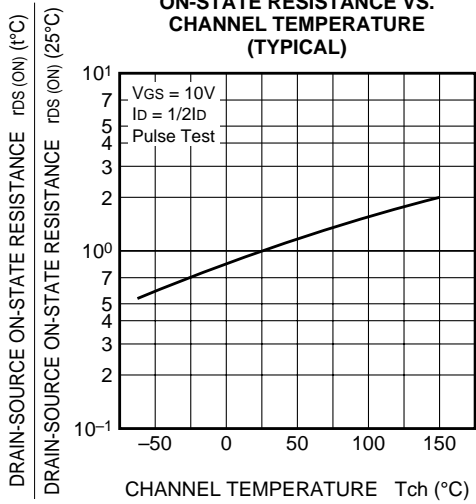
**GATE-SOURCE VOLTAGE VS. GATE CHARGE (TYPICAL)**



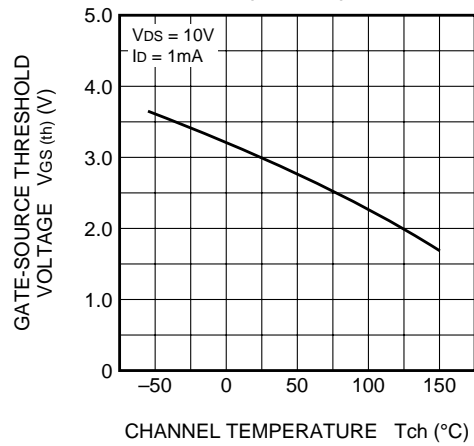
**SOURCE-DRAIN DIODE FORWARD CHARACTERISTICS (TYPICAL)**



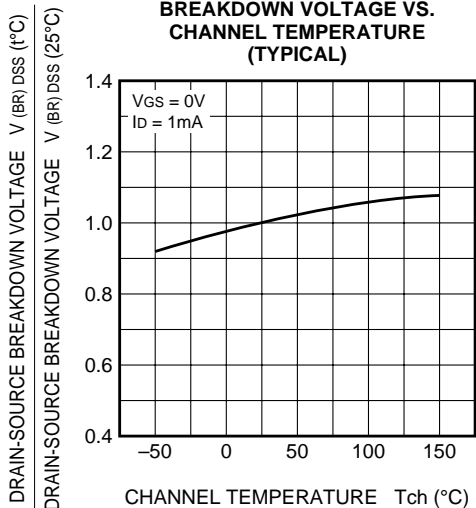
**ON-STATE RESISTANCE VS. CHANNEL TEMPERATURE (TYPICAL)**



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



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



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS**

