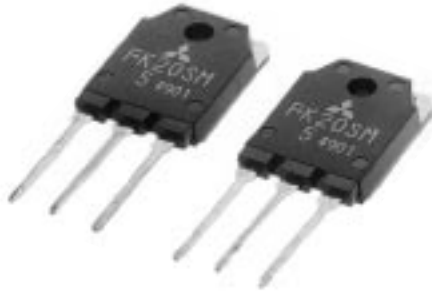


# FK20SM-5

HIGH-SPEED SWITCHING USE

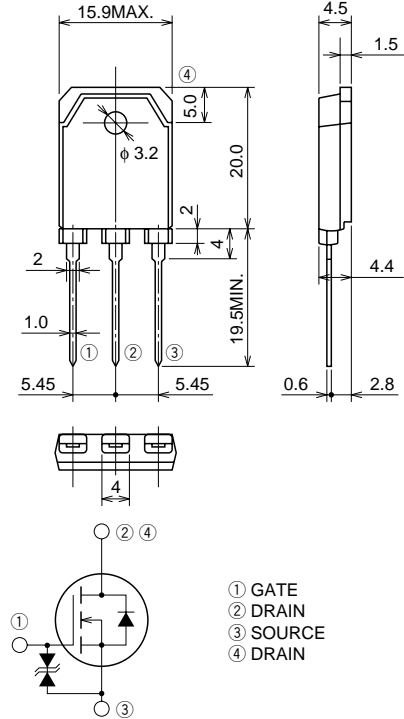
## FK20SM-5



- V<sub>DSS</sub> ..... 250V
- r<sub>DS (ON)</sub> (MAX) ..... 0.24Ω
- I<sub>D</sub> ..... 20A
- Integrated Fast Recovery Diode (MAX.) ..... 150ns

## OUTLINE DRAWING

Dimensions in mm



TO-3P

## APPLICATION

Servo motor drive, Robot, UPS, Inverter Fluorecent lamp, etc.

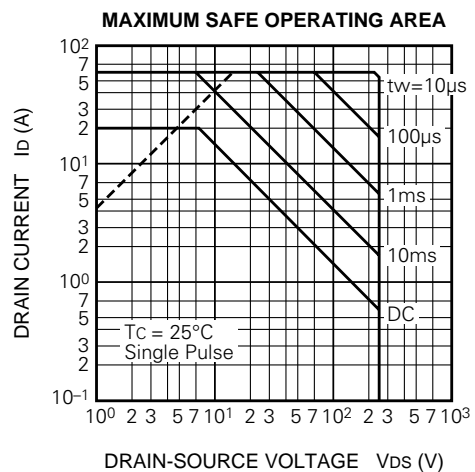
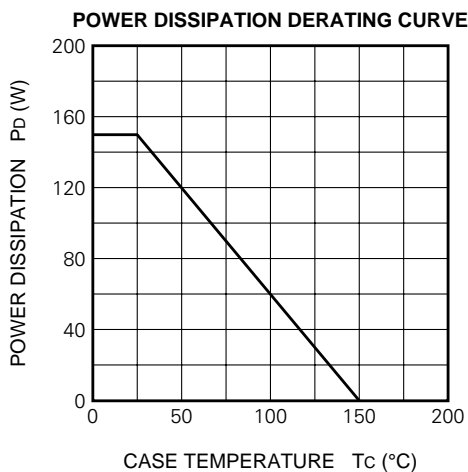
## MAXIMUM RATINGS (T<sub>c</sub> = 25°C)

| Symbol           | Parameter                 | Conditions           | Ratings    | Unit |
|------------------|---------------------------|----------------------|------------|------|
| V <sub>DSS</sub> | Drain-source voltage      | V <sub>GS</sub> = 0V | 250        | V    |
| V <sub>GSS</sub> | Gate-source voltage       | V <sub>DS</sub> = 0V | ±30        | V    |
| I <sub>D</sub>   | Drain current             |                      | 20         | A    |
| I <sub>DM</sub>  | Drain current (Pulsed)    |                      | 60         | A    |
| I <sub>S</sub>   | Source current            |                      | 20         | A    |
| I <sub>SM</sub>  | Source current (Pulsed)   |                      | 60         | A    |
| P <sub>D</sub>   | Maximum power dissipation |                      | 150        | 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    |

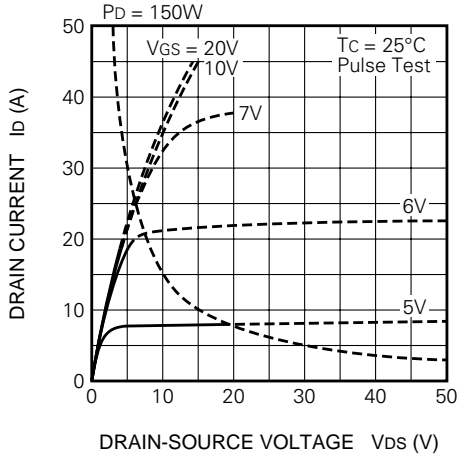
**ELECTRICAL CHARACTERISTICS** (T<sub>ch</sub> = 25°C)

| Symbol                 | Parameter                        | Test conditions                                                                                               | Limits                                     |      |      | Unit |
|------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------|------|------|------|
|                        |                                  |                                                                                                               | Min.                                       | Typ. | Max. |      |
| V (BR) DSS             | Drain-source breakdown voltage   | I <sub>D</sub> = 1mA, V <sub>GS</sub> = 0V                                                                    | 250                                        | —    | —    | V    |
| V (BR) GSS             | Gate-source breakdown voltage    | I <sub>G</sub> = ±100μA, V <sub>DS</sub> = 0V                                                                 | ±30                                        | —    | —    | V    |
| I <sub>GSS</sub>       | Gate-source leakage current      | V <sub>GS</sub> = ±25V, V <sub>DS</sub> = 0V                                                                  | —                                          | —    | ±10  | μA   |
| I <sub>DSS</sub>       | Drain-source leakage current     | V <sub>DS</sub> = 250V, V <sub>GS</sub> = 0V                                                                  | —                                          | —    | 1    | mA   |
| V <sub>GS</sub> (th)   | Gate-source threshold voltage    | I <sub>D</sub> = 1mA, V <sub>DS</sub> = 10V                                                                   | 2                                          | 3    | 4    | V    |
| r <sub>DS</sub> (ON)   | Drain-source on-state resistance | I <sub>D</sub> = 10A, V <sub>GS</sub> = 10V                                                                   | —                                          | 0.19 | 0.24 | Ω    |
| V <sub>DS</sub> (ON)   | Drain-source on-state voltage    | I <sub>D</sub> = 10A, V <sub>GS</sub> = 10V                                                                   | —                                          | 1.9  | 2.4  | V    |
| y <sub>fs</sub>        | Forward transfer admittance      | I <sub>D</sub> = 10A, V <sub>DS</sub> = 10V                                                                   | 8.5                                        | 13.0 | —    | S    |
| C <sub>iss</sub>       | Input capacitance                | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1MHz                                                         | —                                          | 1400 | —    | pF   |
| C <sub>oss</sub>       | Output capacitance               |                                                                                                               | —                                          | 280  | —    | pF   |
| C <sub>rss</sub>       | Reverse transfer capacitance     |                                                                                                               | —                                          | 55   | —    | pF   |
| t <sub>d</sub> (on)    | Turn-on delay time               |                                                                                                               | —                                          | 25   | —    | ns   |
| t <sub>r</sub>         | Rise time                        | V <sub>DD</sub> = 150V, I <sub>D</sub> = 10A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = R <sub>GS</sub> = 50Ω | —                                          | 50   | —    | ns   |
| t <sub>d</sub> (off)   | Turn-off delay time              |                                                                                                               | —                                          | 150  | —    | ns   |
| t <sub>f</sub>         | Fall time                        |                                                                                                               | —                                          | 65   | —    | ns   |
| V <sub>SD</sub>        | Source-drain voltage             |                                                                                                               | I <sub>S</sub> = 10A, V <sub>GS</sub> = 0V | —    | 1.5  | 2.0  |
| R <sub>th</sub> (ch-c) | Thermal resistance               | Channel to case                                                                                               | —                                          | —    | 0.83 | °C/W |
| t <sub>rr</sub>        | Reverse recovery time            | I <sub>S</sub> = 20A, di <sub>s</sub> /dt = -100A/μs                                                          | —                                          | —    | 150  | ns   |

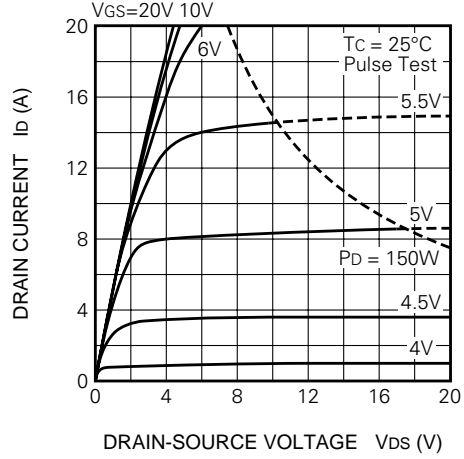
**PERFORMANCE CURVES**



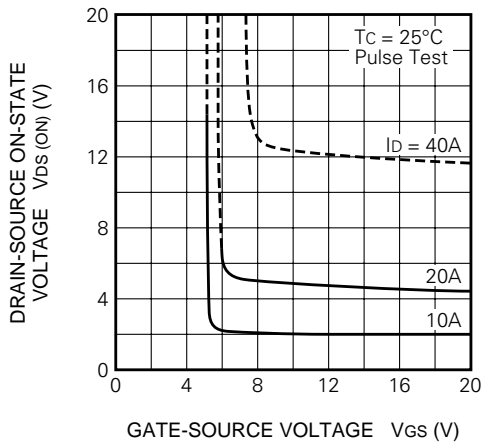
OUTPUT CHARACTERISTICS (TYPICAL)



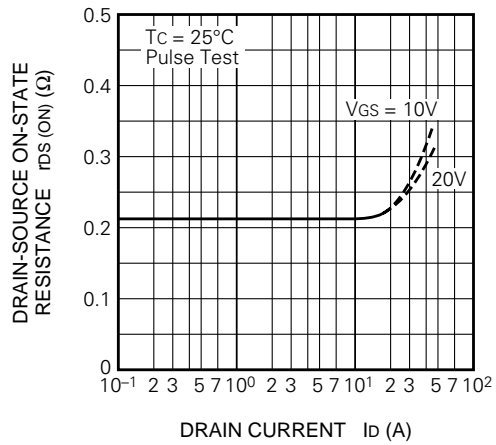
OUTPUT CHARACTERISTICS (TYPICAL)



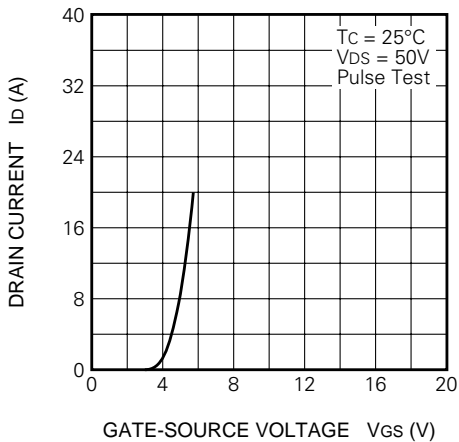
ON-STATE VOLTAGE VS. GATE-SOURCE VOLTAGE (TYPICAL)



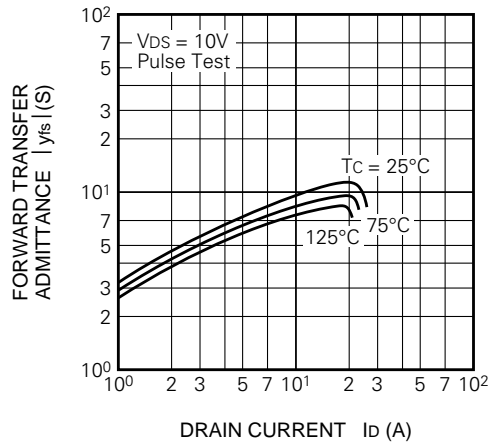
ON-STATE RESISTANCE VS. DRAIN CURRENT (TYPICAL)



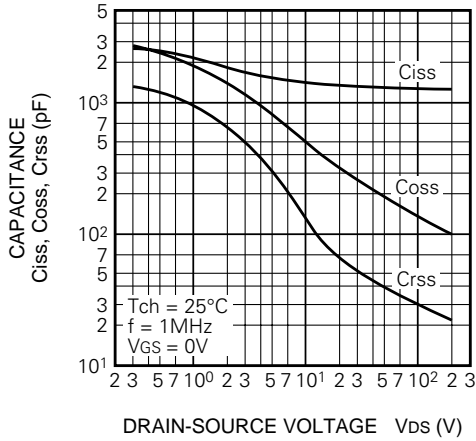
TRANSFER CHARACTERISTICS (TYPICAL)



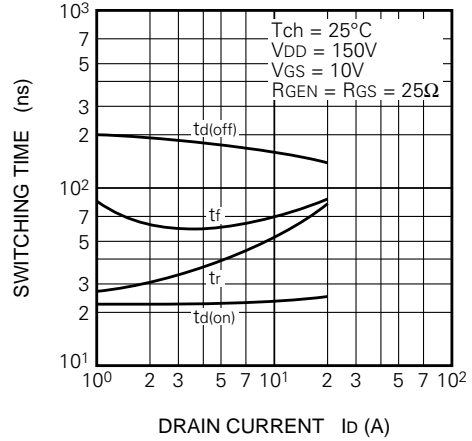
FORWARD TRANSFER ADMITTANCE VS. DRAIN CURRENT (TYPICAL)



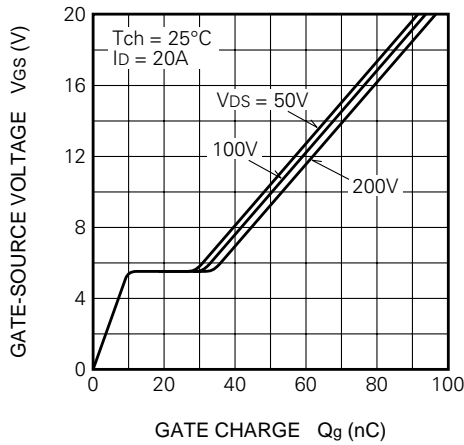
**CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)**



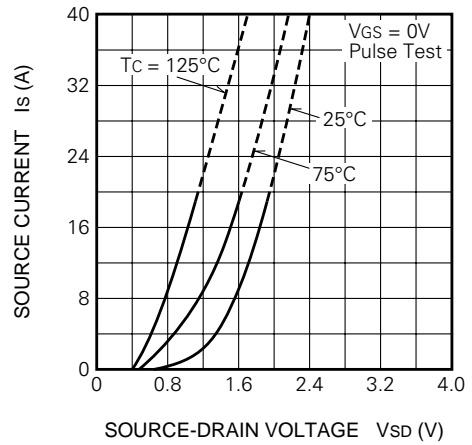
**SWITCHING CHARACTERISTICS (TYPICAL)**



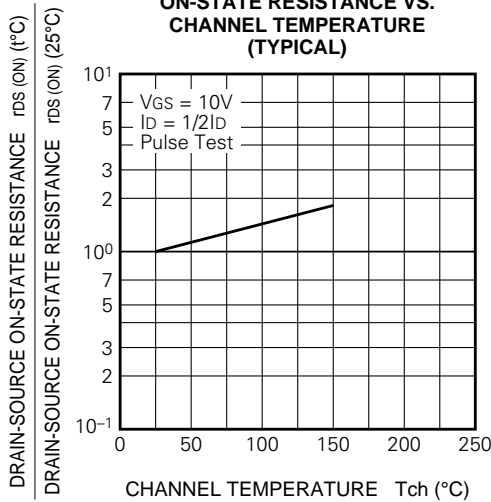
**GATE-SOURCE VOLTAGE VS. GATE CHARGE (TYPICAL)**



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



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



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

