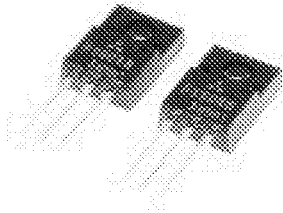


# FS50KM-3

HIGH-SPEED SWITCHING USE

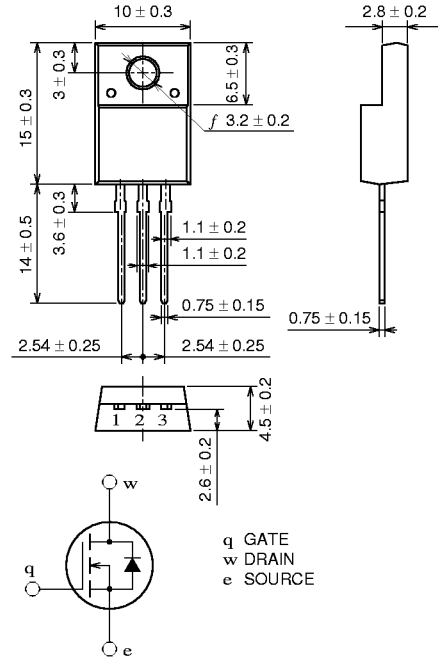
## FS50KM-3



- ˆ 10V DRIVE
- ˆ V<sub>DSS</sub> ..... 150V
- ˆ r<sub>DS</sub> (ON) (MAX) ..... 31mΩ
- ˆ I<sub>D</sub> ..... 50A
- ˆ Integrated Fast Recovery Diode (TYP.) ..... 130ns
- ˆ V<sub>iso</sub> ..... 2000V

## OUTLINE DRAWING

Dimensions in mm



TO-220FN

## APPLICATION

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

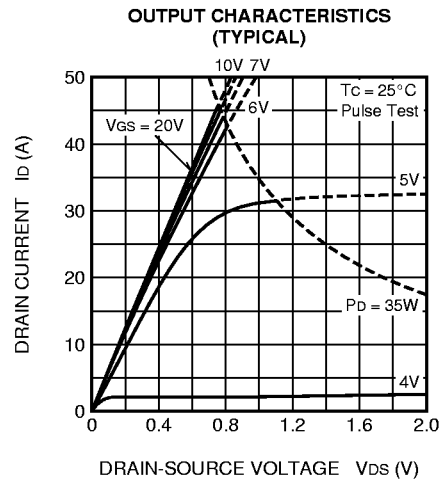
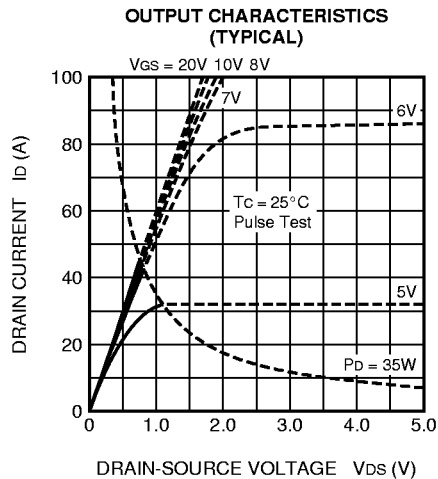
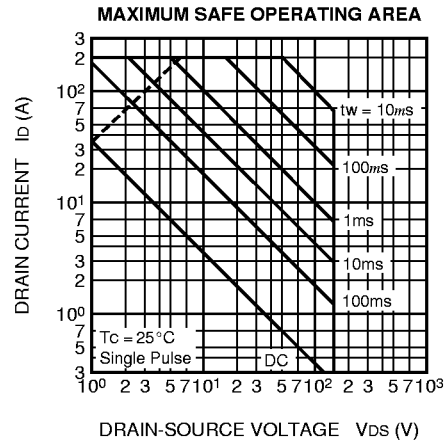
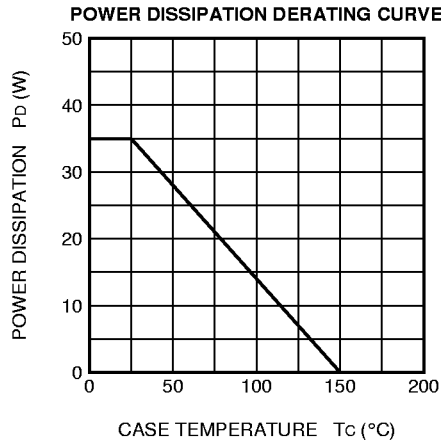
## MAXIMUM RATINGS (T<sub>c</sub> = 25°C)

| Symbol           | Parameter                        | Conditions                       | Ratings    | Unit |
|------------------|----------------------------------|----------------------------------|------------|------|
| V <sub>DSS</sub> | Drain-source voltage             | V <sub>GS</sub> = 0V             | 150        | 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        |                                  | 35         | W    |
| T <sub>ch</sub>  | Channel temperature              |                                  | -55 ~ +150 | °C   |
| T <sub>stg</sub> | Storage temperature              |                                  | -55 ~ +150 | °C   |
| V <sub>iso</sub> | Isolation voltage                | AC for 1minute, Terminal to case | 2000       | V    |
| —                | Weight                           | Typical value                    | 2.0        | g    |

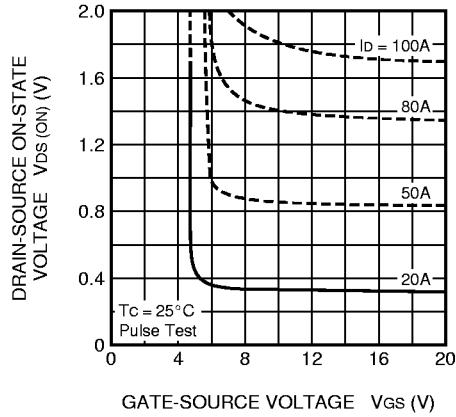
ELECTRICAL CHARACTERISTICS (T<sub>ch</sub> = 25°C)

| Symbol                | Parameter                        | Test conditions                                                                                              | Limits |       |       | Unit |
|-----------------------|----------------------------------|--------------------------------------------------------------------------------------------------------------|--------|-------|-------|------|
|                       |                                  |                                                                                                              | Min.   | Typ.  | Max.  |      |
| V <sub>(BR)DSS</sub>  | Drain-source breakdown voltage   | I <sub>D</sub> = 1mA, V <sub>GS</sub> = 0V                                                                   | 150    | —     | —     | V    |
| I <sub>GSS</sub>      | Gate-source leakage current      | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                                                 | —      | —     | ±0.1  | μA   |
| I <sub>DSS</sub>      | Drain-source leakage current     | V <sub>DS</sub> = 150V, V <sub>GS</sub> = 0V                                                                 | —      | —     | 0.1   | mA   |
| V <sub>GS(th)</sub>   | Gate-source threshold voltage    | I <sub>D</sub> = 1mA, V <sub>DS</sub> = 10V                                                                  | 2.0    | 3.0   | 4.0   | V    |
| r <sub>DS(on)</sub>   | Drain-source on-state resistance | I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V                                                                  | —      | 24    | 31    | mΩ   |
| V <sub>DS(on)</sub>   | Drain-source on-state voltage    | I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V                                                                  | —      | 0.600 | 0.775 | V    |
| y <sub>fs</sub>       | Forward transfer admittance      | I <sub>D</sub> = 25A, V <sub>DS</sub> = 10V                                                                  | —      | 55    | —     | S    |
| C <sub>iss</sub>      | Input capacitance                | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz                                                        | —      | 6540  | —     | pF   |
| C <sub>oss</sub>      | Output capacitance               |                                                                                                              | —      | 860   | —     | pF   |
| C <sub>rss</sub>      | Reverse transfer capacitance     |                                                                                                              | —      | 360   | —     | pF   |
| t <sub>d(on)</sub>    | Turn-on delay time               | V <sub>DD</sub> = 80V, I <sub>D</sub> = 25A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = R <sub>GS</sub> = 50Ω | —      | 95    | —     | ns   |
| t <sub>r</sub>        | Rise time                        |                                                                                                              | —      | 155   | —     | ns   |
| t <sub>d(off)</sub>   | Turn-off delay time              |                                                                                                              | —      | 380   | —     | ns   |
| t <sub>f</sub>        | Fall time                        |                                                                                                              | —      | 180   | —     | ns   |
| V <sub>SD</sub>       | Source-drain voltage             | I <sub>S</sub> = 25A, V <sub>GS</sub> = 0V                                                                   | —      | 1.0   | 1.5   | V    |
| R <sub>th(ch-c)</sub> | Thermal resistance               | Channel to case                                                                                              | —      | —     | 3.57  | °C/W |
| t <sub>rr</sub>       | Reverse recovery time            | I <sub>S</sub> = 50A, di/dt = -100A/μs                                                                       | —      | 130   | —     | ns   |

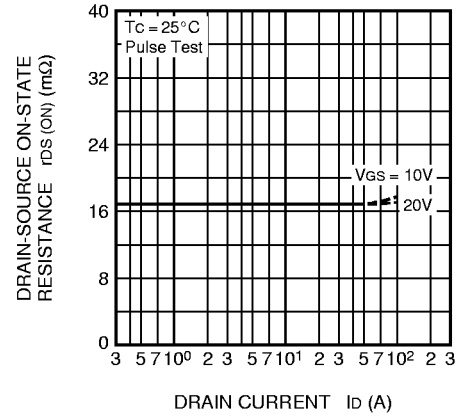
PERFORMANCE CURVES



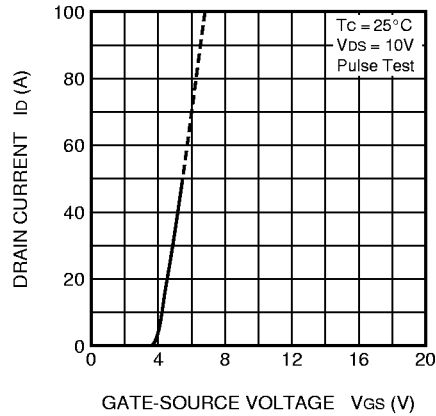
ON-STATE VOLTAGE VS.  
GATE-SOURCE VOLTAGE  
(TYPICAL)



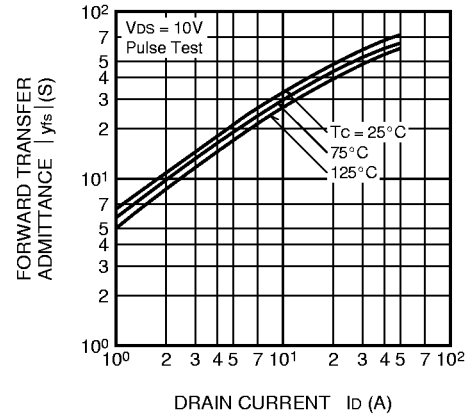
ON-STATE RESISTANCE VS.  
DRAIN CURRENT  
(TYPICAL)



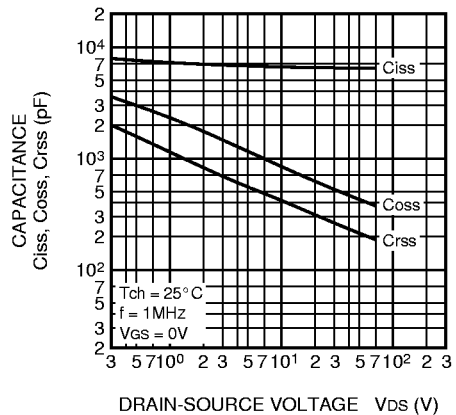
TRANSFER CHARACTERISTICS  
(TYPICAL)



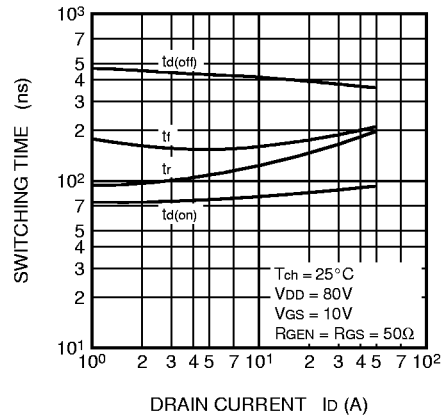
FORWARD TRANSFER ADMITTANCE  
VS.DRAIN CURRENT  
(TYPICAL)



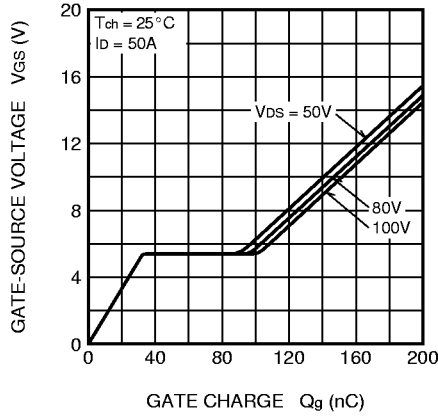
CAPACITANCE VS.  
DRAIN-SOURCE VOLTAGE  
(TYPICAL)



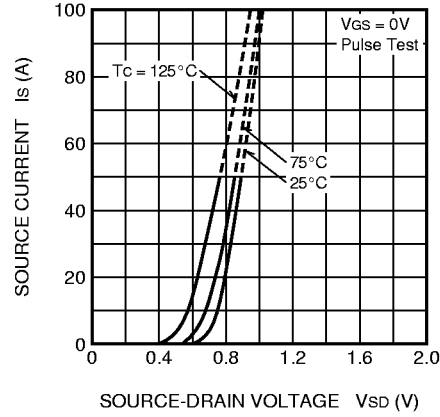
SWITCHING CHARACTERISTICS  
(TYPICAL)



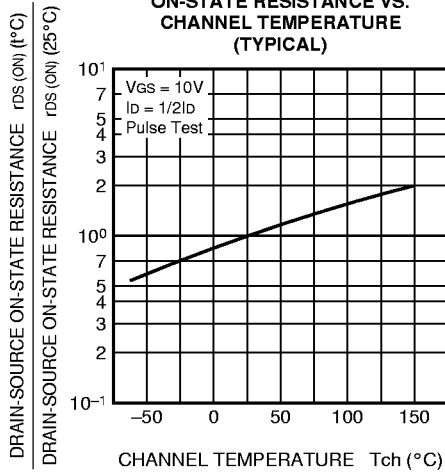
GATE-SOURCE VOLTAGE  
VS. GATE CHARGE  
(TYPICAL)



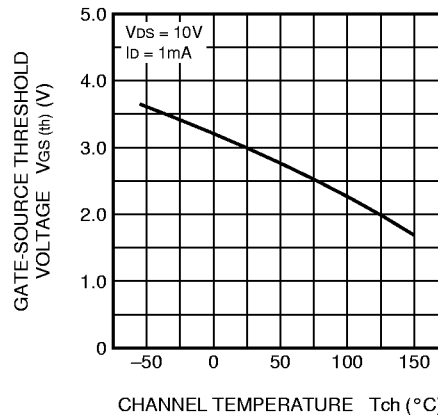
SOURCE-DRAIN DIODE  
FORWARD CHARACTERISTICS  
(TYPICAL)



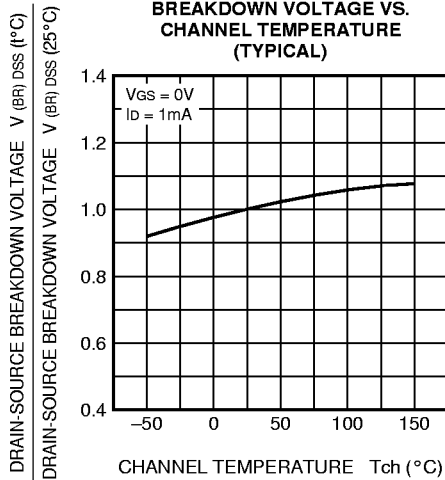
ON-STATE RESISTANCE VS.  
CHANNEL TEMPERATURE  
(TYPICAL)



THRESHOLD VOLTAGE VS.  
CHANNEL TEMPERATURE  
(TYPICAL)



BREAKDOWN VOLTAGE VS.  
CHANNEL TEMPERATURE  
(TYPICAL)



TRANSIENT THERMAL IMPEDANCE  
CHARACTERISTICS

