

# FS10SM-12

HIGH-SPEED SWITCHING USE

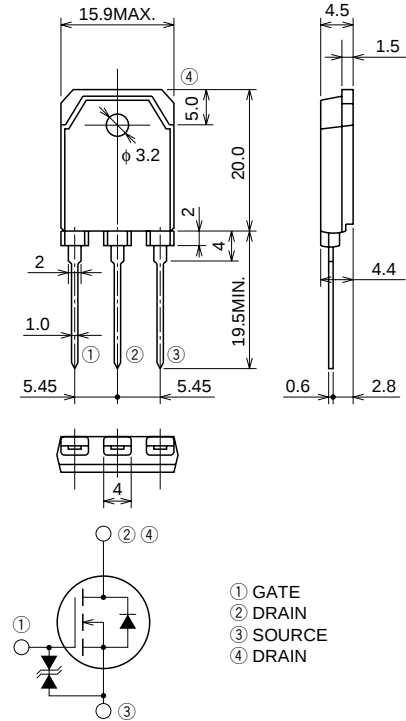
## FS10SM-12



- $V_{DS}$  ..... 600V
- $r_{DS(ON)}$  (MAX) .....  $0.94\Omega$
- $I_D$  ..... 10A

## OUTLINE DRAWING

Dimensions in mm



TO-3P

## APPLICATION

SMPS, DC-DC Converter, battery charger, power supply of printer, copier, HDD, FDD, TV, VCR, personal computer etc.

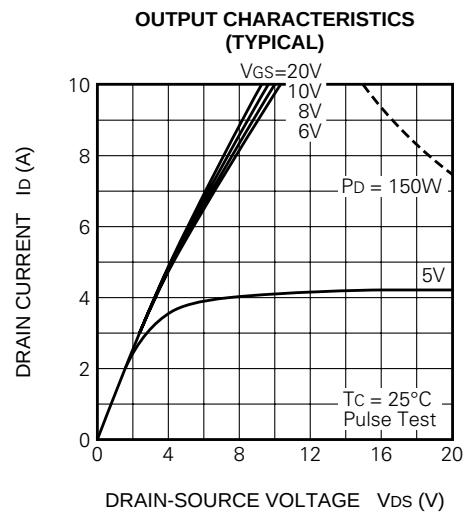
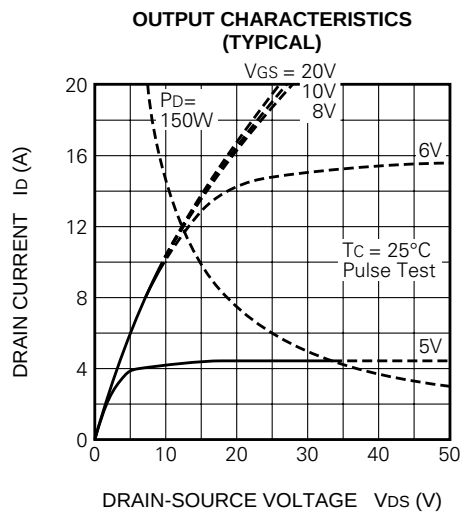
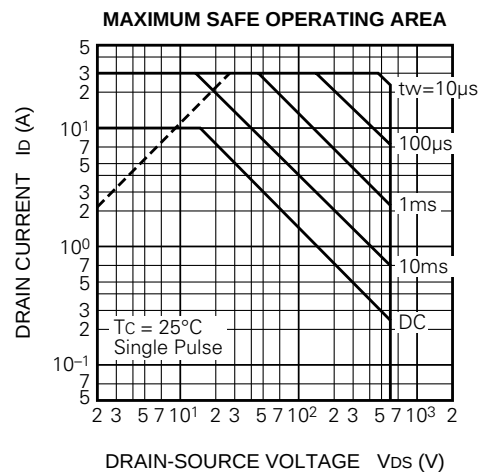
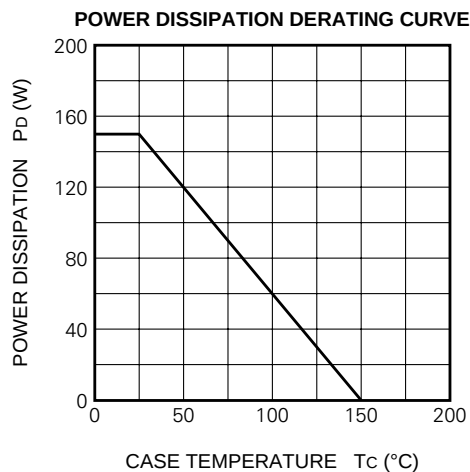
## MAXIMUM RATINGS (Tc = 25°C)

| Symbol    | Parameter                 | Conditions    | Ratings    | Unit |
|-----------|---------------------------|---------------|------------|------|
| $V_{DS}$  | Drain-source voltage      | $V_{GS} = 0V$ | 600        | V    |
| $V_{GS}$  | Gate-source voltage       | $V_{DS} = 0V$ | $\pm 30$   | V    |
| $I_D$     | Drain current             |               | 10         | A    |
| $I_{DM}$  | Drain current (Pulsed)    |               | 30         | A    |
| $P_D$     | Maximum power dissipation |               | 150        | W    |
| $T_{ch}$  | Channel temperature       |               | -55 ~ +150 | °C   |
| $T_{stg}$ | Storage temperature       |               | -55 ~ +150 | °C   |
| —         | Weight                    | Typical value | 4.8        | g    |

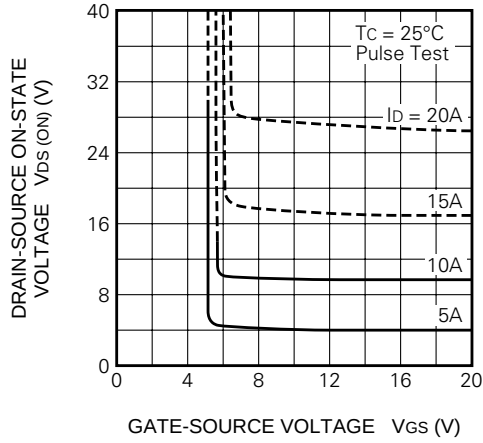
ELECTRICAL CHARACTERISTICS (T<sub>ch</sub> = 25°C)

| 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                                                                   | 600    | —    | —    | 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> = 600V, 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> = 5A, V <sub>GS</sub> = 10V                                                                   | —      | 0.72 | 0.94 | Ω    |
| V <sub>DS</sub> (ON)   | Drain-source on-state voltage    | I <sub>D</sub> = 5A, V <sub>GS</sub> = 10V                                                                   | —      | 3.6  | 4.7  | V    |
| y <sub>fs</sub>        | Forward transfer admittance      | I <sub>D</sub> = 5A, V <sub>DS</sub> = 10V                                                                   | 4.5    | 7.0  | —    | S    |
| C <sub>iss</sub>       | Input capacitance                | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1MHz                                                        | —      | 1500 | —    | pF   |
| C <sub>oss</sub>       | Output capacitance               |                                                                                                              | —      | 170  | —    | pF   |
| C <sub>rss</sub>       | Reverse transfer capacitance     |                                                                                                              | —      | 25   | —    | pF   |
| t <sub>d</sub> (on)    | Turn-on delay time               | V <sub>DD</sub> = 200V, I <sub>D</sub> = 5A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = R <sub>GS</sub> = 50Ω | —      | 25   | —    | ns   |
| t <sub>r</sub>         | Rise time                        |                                                                                                              | —      | 35   | —    | ns   |
| t <sub>d</sub> (off)   | Turn-off delay time              |                                                                                                              | —      | 130  | —    | ns   |
| t <sub>f</sub>         | Fall time                        |                                                                                                              | —      | 45   | —    | ns   |
| V <sub>SD</sub>        | Source-drain voltage             | I <sub>S</sub> = 5A, V <sub>GS</sub> = 0V                                                                    | —      | 1.5  | 2.0  | V    |
| R <sub>th</sub> (ch-c) | Thermal resistance               | Channel to case                                                                                              | —      | —    | 0.83 | °C/W |

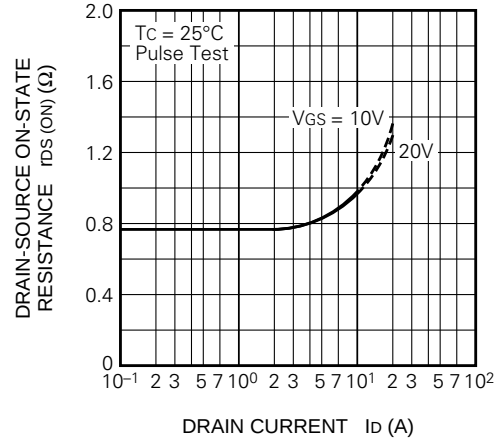
## PERFORMANCE CURVES



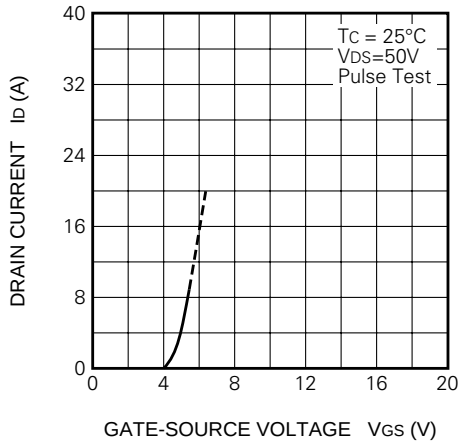
ON-STATE VOLTAGE VS.  
GATE-SOURCE VOLTAGE  
(TYPICAL)



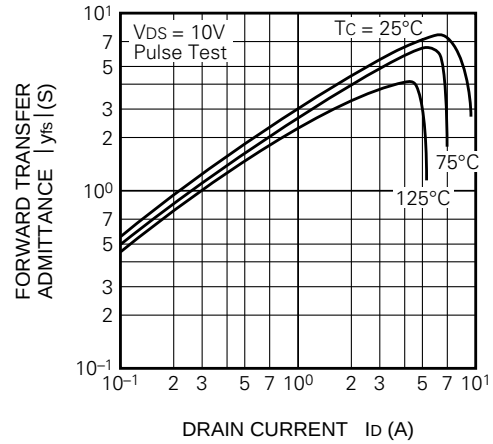
ON-STATE RESISTANCE VS.  
DRAIN CURRENT  
(TYPICAL)



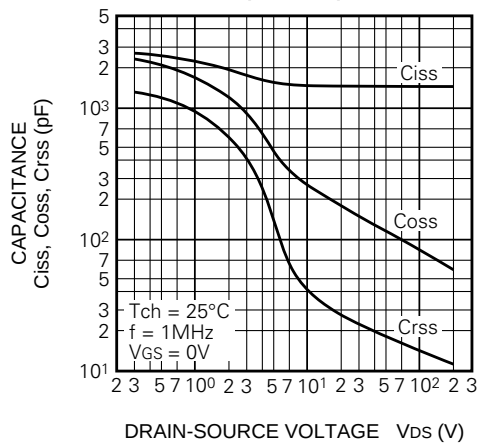
TRANSFER CHARACTERISTICS  
(TYPICAL)



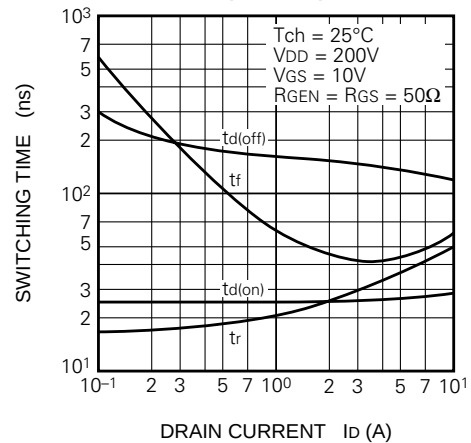
FORWARD TRANSFER ADMITTANCE  
VS. DRAIN CURRENT  
(TYPICAL)



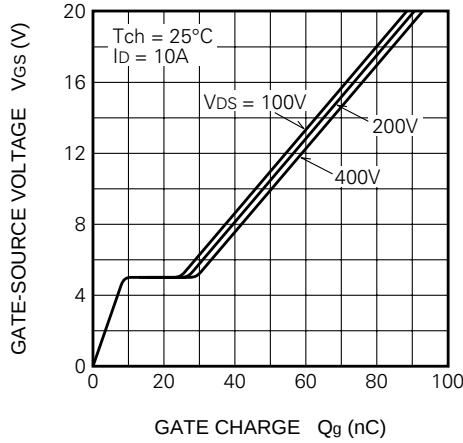
CAPACITANCE VS.  
DRAIN-SOURCE VOLTAGE  
(TYPICAL)



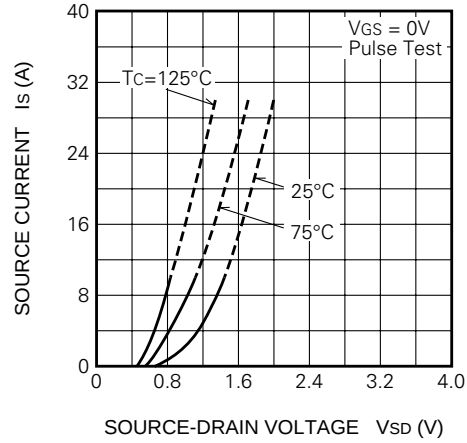
SWITCHING CHARACTERISTICS  
(TYPICAL)



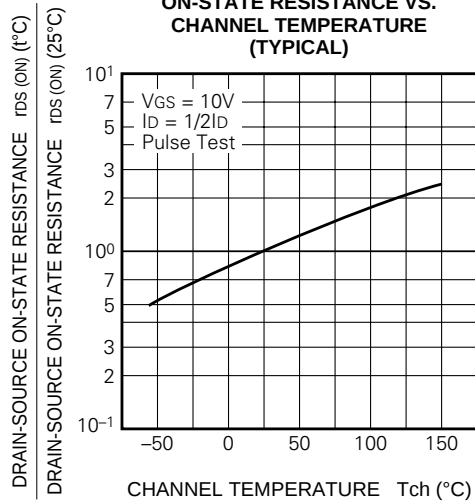
GATE-SOURCE VOLTAGE  
VS. GATE CHARGE  
(TYPICAL)



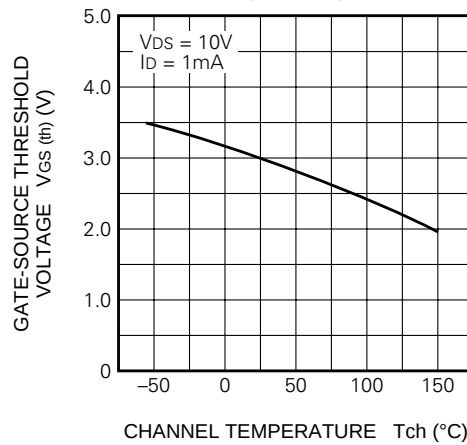
SOURCE-DRAIN DIODE  
FORWARD CHARACTERISTICS  
(TYPICAL)



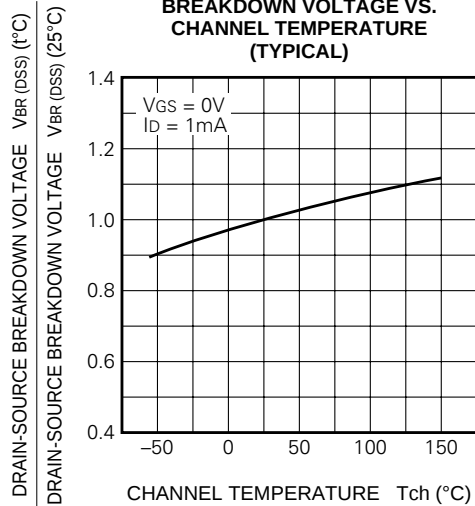
ON-STATE RESISTANCE VS.  
CHANNEL TEMPERATURE  
(TYPICAL)



THRESHOLD VOLTAGE VS.  
CHANNEL TEMPERATURE  
(TYPICAL)



BREAKDOWN VOLTAGE VS.  
CHANNEL TEMPERATURE  
(TYPICAL)



TRANSIENT THERMAL IMPEDANCE  
CHARACTERISTICS

