

# FS70VSH-03

HIGH-SPEED SWITCHING USE

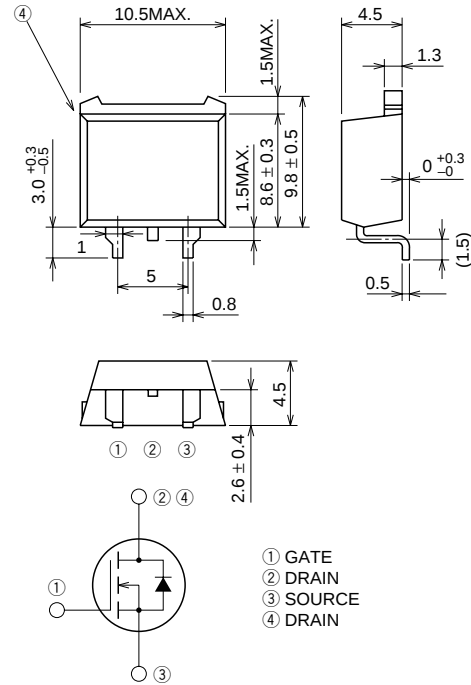
## FS70VSH-03



- 2.5V DRIVE
- $V_{DS}$  ..... 30V
- $r_{DS(ON)}$  (MAX) ..... 14m $\Omega$
- $I_D$  ..... 70A
- Integrated Fast Recovery Diode (TYP.) ..... 70ns

## OUTLINE DRAWING

Dimensions in mm



TO-220S

## APPLICATION

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

## MAXIMUM RATINGS (Tc = 25°C)

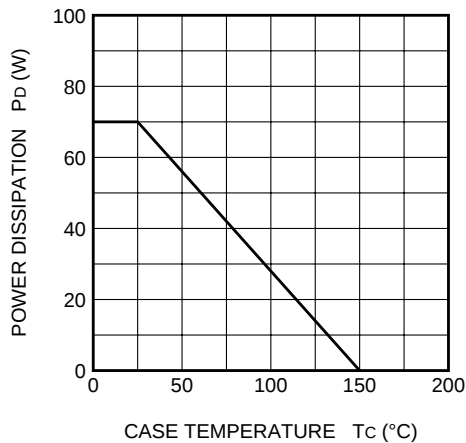
| Symbol    | Parameter                        | Conditions    | Ratings    | Unit |
|-----------|----------------------------------|---------------|------------|------|
| $V_{DS}$  | Drain-source voltage             | $V_{GS} = 0V$ | 30         | V    |
| $V_{GS}$  | Gate-source voltage              | $V_{DS} = 0V$ | $\pm 10$   | V    |
| $I_D$     | Drain current                    |               | 70         | A    |
| $I_{DM}$  | Drain current (Pulsed)           |               | 280        | A    |
| $I_{DA}$  | Avalanche drain current (Pulsed) | $L = 30\mu H$ | 70         | A    |
| $I_S$     | Source current                   |               | 70         | A    |
| $I_{SM}$  | Source current (Pulsed)          |               | 280        | 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 | 1.2        | g    |

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

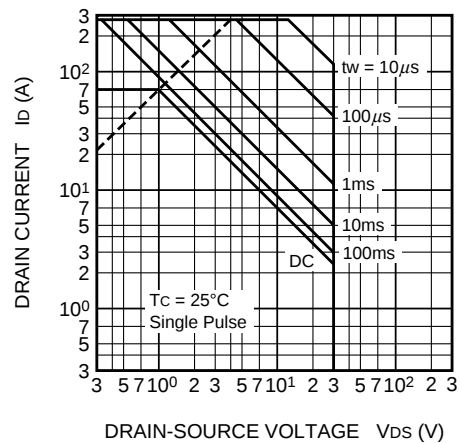
| Symbol                | Parameter                        | Test conditions                                                                                             | Limits |      |      | Unit |
|-----------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------|--------|------|------|------|
|                       |                                  |                                                                                                             | Min.   | Typ. | Max. |      |
| V <sub>(BR)DSS</sub>  | Drain-source breakdown voltage   | I <sub>D</sub> = 1mA, V <sub>GS</sub> = 0V                                                                  | 30     | —    | —    | V    |
| I <sub>GSS</sub>      | Gate-source leakage current      | V <sub>GS</sub> = ±10V, V <sub>DS</sub> = 0V                                                                | —      | —    | ±0.1 | μA   |
| I <sub>DSS</sub>      | Drain-source leakage current     | V <sub>DS</sub> = 30V, 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                                                                 | 0.6    | 0.9  | 1.2  | V    |
| r <sub>DS(on)</sub>   | Drain-source on-state resistance | I <sub>D</sub> = 35A, V <sub>GS</sub> = 4V                                                                  | —      | 10   | 14   | mΩ   |
| r <sub>DS(on)</sub>   | Drain-source on-state resistance | I <sub>D</sub> = 35A, V <sub>GS</sub> = 2.5V                                                                | —      | 13   | 20   | mΩ   |
| V <sub>DS(on)</sub>   | Drain-source on-state voltage    | I <sub>D</sub> = 35A, V <sub>GS</sub> = 4V                                                                  | —      | 0.35 | 0.49 | V    |
| y <sub>fs</sub>       | Forward transfer admittance      | I <sub>D</sub> = 35A, V <sub>DS</sub> = 10V                                                                 | —      | 60   | —    | S    |
| C <sub>iss</sub>      | Input capacitance                | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz                                                       | —      | 4000 | —    | pF   |
| C <sub>oss</sub>      | Output capacitance               |                                                                                                             | —      | 800  | —    | pF   |
| C <sub>rss</sub>      | Reverse transfer capacitance     |                                                                                                             | —      | 420  | —    | pF   |
| t <sub>d(on)</sub>    | Turn-on delay time               | V <sub>DD</sub> = 15V, I <sub>D</sub> = 35A, V <sub>GS</sub> = 4V, R <sub>GEN</sub> = R <sub>GS</sub> = 50Ω | —      | 50   | —    | ns   |
| t <sub>r</sub>        | Rise time                        |                                                                                                             | —      | 250  | —    | ns   |
| t <sub>d(off)</sub>   | Turn-off delay time              |                                                                                                             | —      | 350  | —    | ns   |
| t <sub>f</sub>        | Fall time                        |                                                                                                             | —      | 350  | —    | ns   |
| V <sub>SD</sub>       | Source-drain voltage             | I <sub>S</sub> = 35A, V <sub>GS</sub> = 0V                                                                  | —      | 1.0  | 1.5  | V    |
| R <sub>th(ch-c)</sub> | Thermal resistance               | Channel to case                                                                                             | —      | —    | 1.79 | °C/W |
| t <sub>rr</sub>       | Reverse recovery time            | I <sub>S</sub> = 35A, di <sub>S</sub> /dt = -50A/μs                                                         | —      | 70   | —    | ns   |

PERFORMANCE CURVES

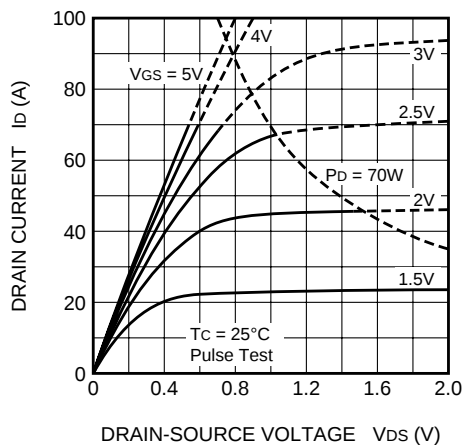
POWER DISSIPATION DERATING CURVE



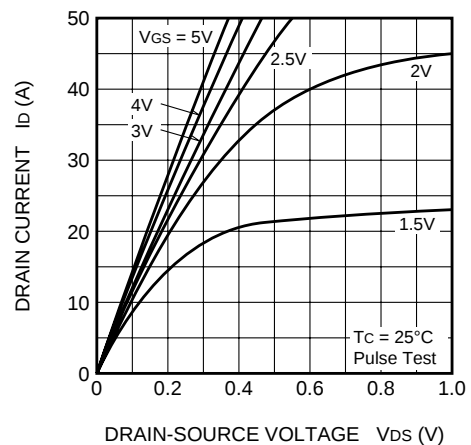
MAXIMUM SAFE OPERATING AREA



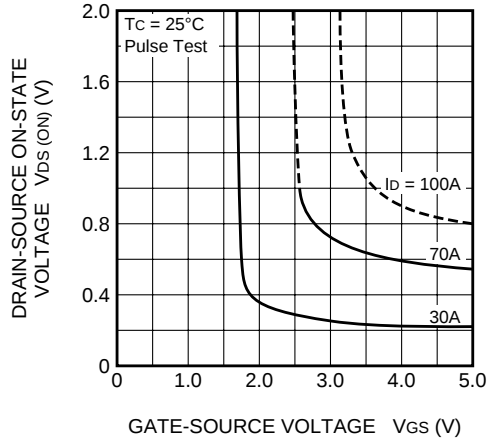
OUTPUT CHARACTERISTICS (TYPICAL)



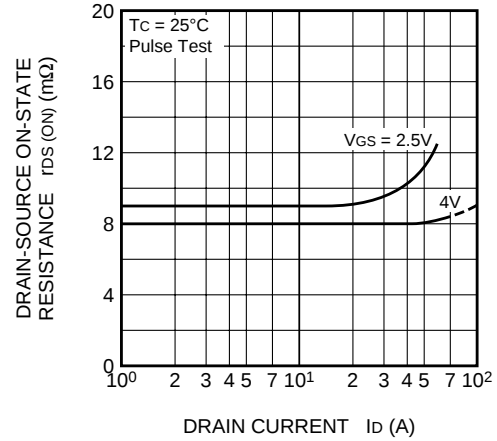
OUTPUT CHARACTERISTICS (TYPICAL)



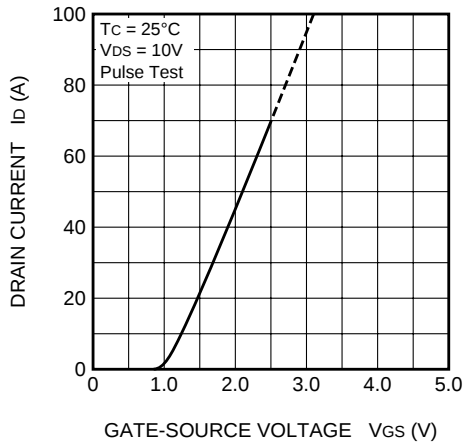
ON-STATE VOLTAGE VS.  
GATE-SOURCE VOLTAGE  
(TYPICAL)



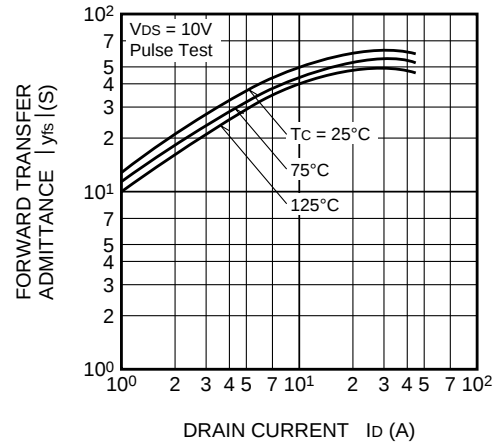
ON-STATE RESISTANCE VS.  
DRAIN CURRENT  
(TYPICAL)



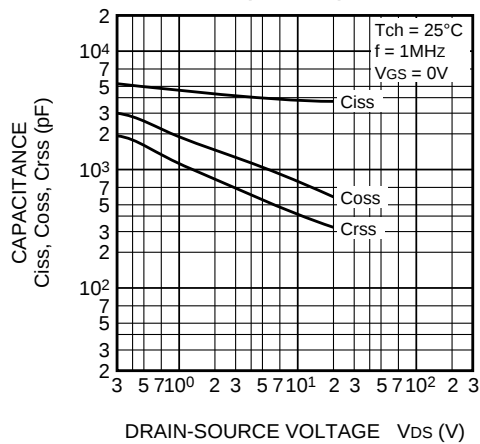
TRANSFER CHARACTERISTICS  
(TYPICAL)



FORWARD TRANSFER ADMITTANCE  
VS. DRAIN CURRENT  
(TYPICAL)



CAPACITANCE VS.  
DRAIN-SOURCE VOLTAGE  
(TYPICAL)



SWITCHING CHARACTERISTICS  
(TYPICAL)

