

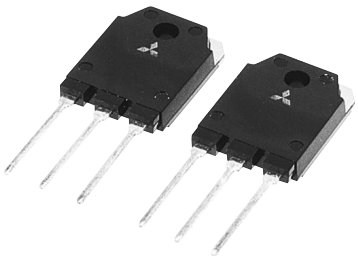
**PRELIMINARY**  
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MITSUBISHI Pch POWER MOSFET

# FX50SMJ-2

HIGH-SPEED SWITCHING USE

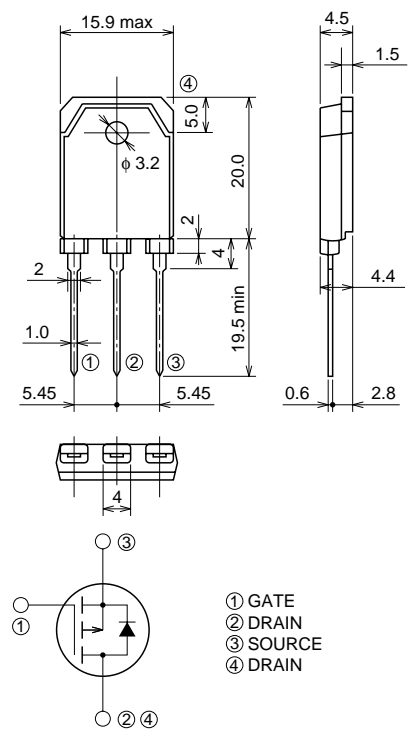
**FX50SMJ-2**



- 4V DRIVE
- $V_{DSS}$  ..... -100V
- $r_{DS(ON)}$  (MAX) .....  $50m\Omega$
- $I_D$  ..... -50A
- Integrated Fast Recovery Diode (TYP.) ..... 100ns

**OUTLINE DRAWING**

Dimensions in mm



① GATE  
 ② DRAIN  
 ③ SOURCE  
 ④ DRAIN

**TO-3P**

## APPLICATION

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

## MAXIMUM RATINGS (Tc = 25°C)

| Symbol    | Parameter                        | Conditions    | Ratings    | Unit |
|-----------|----------------------------------|---------------|------------|------|
| $V_{DSS}$ | Drain-source voltage             | $V_{GS} = 0V$ | -100       | V    |
| $V_{GSS}$ | Gate-source voltage              | $V_{DS} = 0V$ | $\pm 20$   | V    |
| $I_D$     | Drain current                    |               | -50        | A    |
| $I_{DM}$  | Drain current (Pulsed)           |               | -200       | A    |
| $I_{DA}$  | Avalanche drain current (Pulsed) | $L = 30\mu H$ | -50        | A    |
| $I_S$     | Source current                   |               | -50        | A    |
| $I_{SM}$  | Source current (Pulsed)          |               | -200       | 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    |

Jan.1999

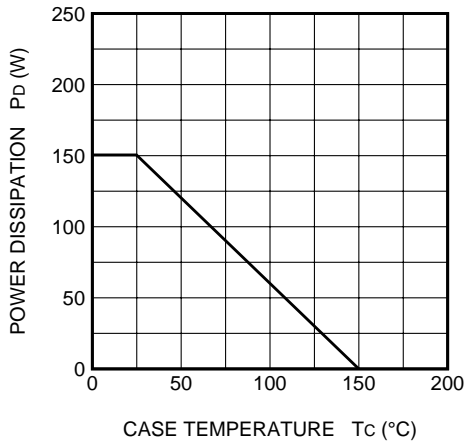
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**ELECTRICAL CHARACTERISTICS** (Tch = 25°C)

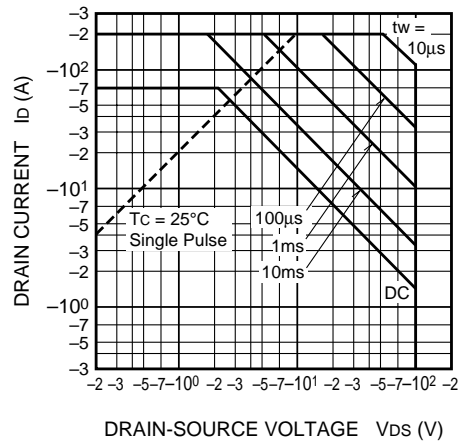
| Symbol    | Parameter                        | Test conditions                                     | Limits              |       |       | Unit |
|-----------|----------------------------------|---|---------------------|-------|-------|------|
|           |                                  |   | Min.                | Typ.  | Max.  |      |
| V(BR)DSS  | Drain-source breakdown voltage   | Id = -1mA, VGS = 0V                                 | -100                | —     | —     | V    |
| IGSS      | Gate-source leakage current      | VGS = ±20V, VDS = 0V                                | —                   | —     | ±0.1  | μA   |
| IDSS      | Drain-source leakage current     | VDS = -100V, VGS = 0V                               | —                   | —     | -0.1  | mA   |
| VGS(th)   | Gate-source threshold voltage    | Id = -1mA, VDS = -10V                               | -1.0                | -1.5  | -2.0  | V    |
| rDS(ON)   | Drain-source on-state resistance | Id = -25A, VGS = -10V                               | —                   | 39    | 50    | mΩ   |
| rDS(ON)   | Drain-source on-state resistance | Id = -25A, VGS = -4V                                | —                   | 47    | 61    | mΩ   |
| VDS(ON)   | Drain-source on-state voltage    | Id = -25A, VGS = -10V                               | —                   | -0.98 | -1.25 | V    |
| yfs       | Forward transfer admittance      | Id = -25A, VDS = -10V                               | —                   | 49.2  | —     | S    |
| Ciss      | Input capacitance                | VDS = -10V, VGS = 0V, f = 1MHz                      | —                   | 11130 | —     | pF   |
| Coss      | Output capacitance               |   | —                   | 896   | —     | pF   |
| Crss      | Reverse transfer capacitance     |   | —                   | 480   | —     | pF   |
| td(on)    | Turn-on delay time               |   | —                   | 57    | —     | ns   |
| tr        | Rise time                        | VDD = -50V, Id = -25A, VGS = -10V, RGEN = RGS = 50Ω | —                   | 118   | —     | ns   |
| td(off)   | Turn-off delay time              |   | —                   | 828   | —     | ns   |
| tf        | Fall time                        |   | —                   | 380   | —     | ns   |
| VSD       | Source-drain voltage             |   | IS = -25A, VGS = 0V | —     | -1.0  | -1.5 |
| Rth(ch-c) | Thermal resistance               | Channel to case                                     | —                   | —     | 0.83  | °C/W |
| trr       | Reverse recovery time            | IS = -50A, dis/dt = 100A/μs                         | —                   | 100   | —     | ns   |

**PERFORMANCE CURVES**

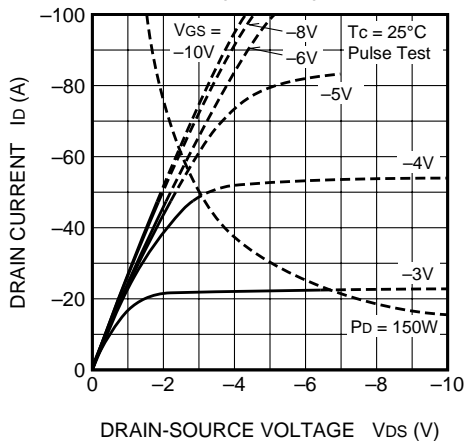
**POWER DISSIPATION DERATING CURVE**



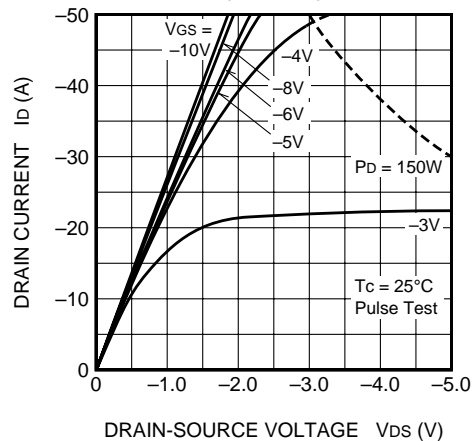
**MAXIMUM SAFE OPERATING AREA**



**OUTPUT CHARACTERISTICS (TYPICAL)**

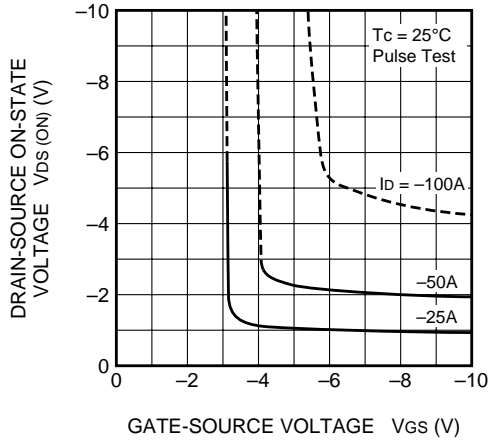


**OUTPUT CHARACTERISTICS (TYPICAL)**

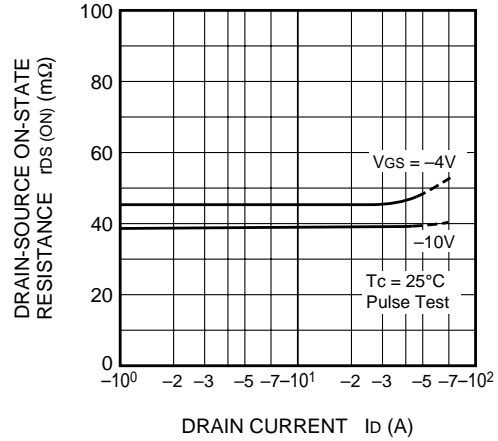


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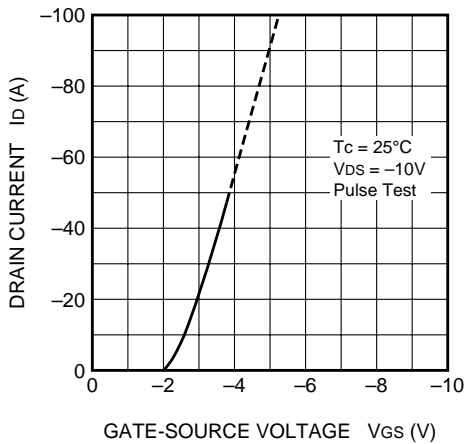
**ON-STATE VOLTAGE VS. GATE-SOURCE VOLTAGE (TYPICAL)**



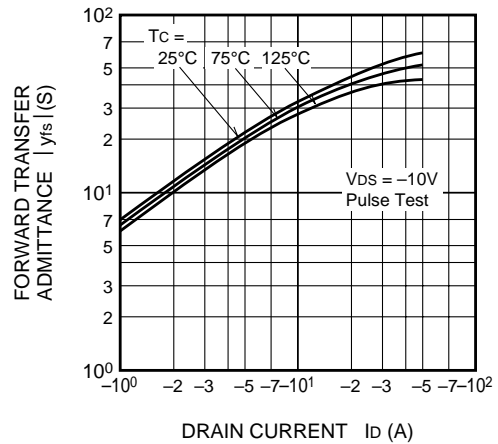
**ON-STATE RESISTANCE VS. DRAIN CURRENT (TYPICAL)**



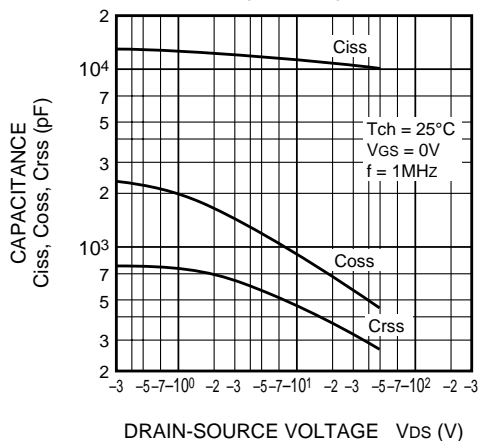
**TRANSFER CHARACTERISTICS (TYPICAL)**



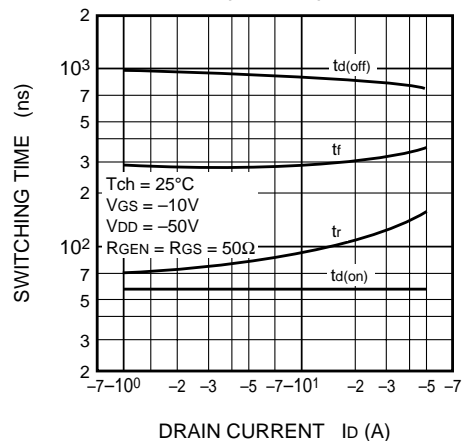
**FORWARD TRANSFER ADMITTANCE VS. DRAIN CURRENT (TYPICAL)**



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

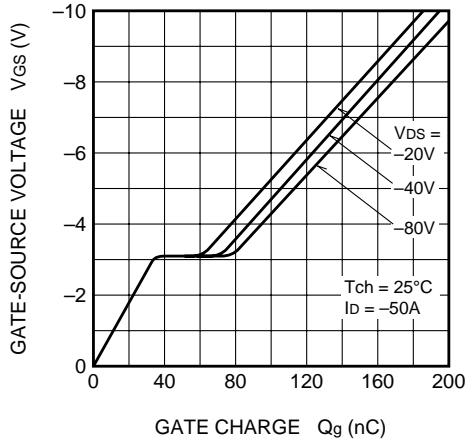


**SWITCHING CHARACTERISTICS (TYPICAL)**

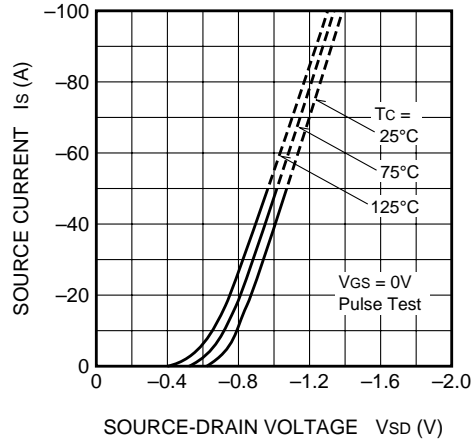


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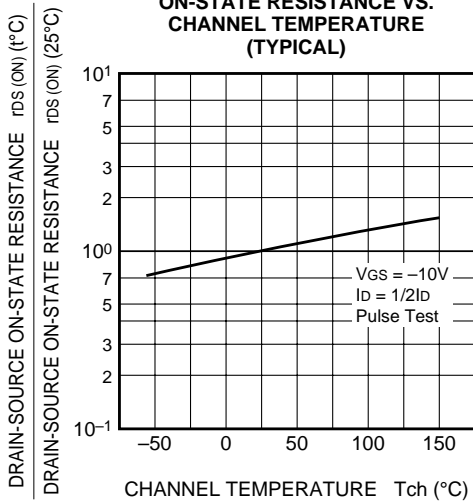
**GATE-SOURCE VOLTAGE VS. GATE CHARGE (TYPICAL)**



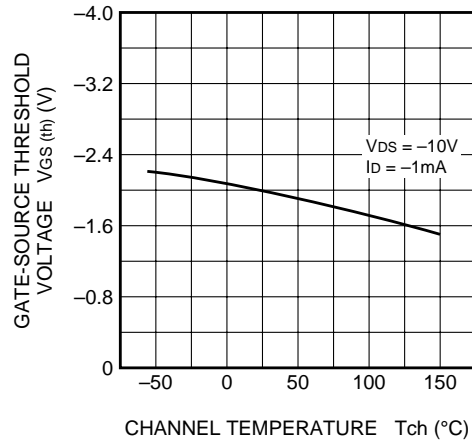
**SOURCE-DRAIN DIODE FORWARD CHARACTERISTICS (TYPICAL)**



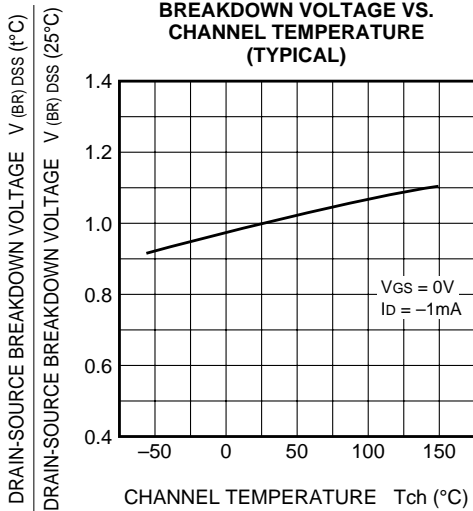
**ON-STATE RESISTANCE VS. CHANNEL TEMPERATURE (TYPICAL)**



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



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



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS**

