# FX6KMJ-3

## High-Speed Switching Use
## Pch Power MOS FET

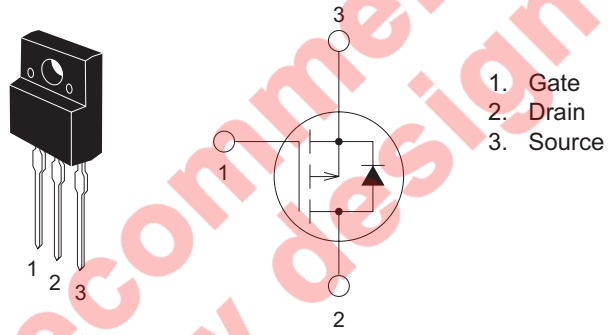
REJ03G0263-0100
Rev.1.00
Aug.20.2004

### Features

- Drive voltage : 4 V
- $V_{DSS}$ : – 150 V
- $r_{DS(ON)\ (max)}$ : 0.53 Ω
- $I_D$ : – 6 A
- Recovery Time of the Integrated Fast Recovery Diode (TYP.) : 100 ns

### Outline

TO-220FN






### Applications

Motor control, lamp control, solenoid control, DC-DC converters, etc.

### Maximum Ratings

(Tc = 25°C)

| Parameter | Symbol | Ratings | Unit | Conditions |
|---|---|---|---|---|
| Drain-source voltage | $V_{DSS}$ | –150 | V | $V_{GS}$ = 0 V |
| Gate-source voltage | $V_{GSS}$ | ±20 | V | $V_{DS}$ = 0 V |
| Drain current | $I_D$ | –6 | A | |
| Drain current (Pulsed) | $I_{DM}$ | –24 | A | |
| Avalanche current (Pulsed) | $I_{DA}$ | –6 | A | L = 100 µH |
| Source current | $I_S$ | –6 | A | |
| Source current (Pulsed) | $I_{SM}$ | –24 | A | |
| Maximum power dissipation | $P_D$ | 25 | W | |
| Channel temperature | Tch | – 55 to +150 | °C | |
| Storage temperature | Tstg | – 55 to +150 | °C | |
| Isolation voltage | Viso | 2000 | V | AC 1 minute, Terminal to case |
| Mass | — | 2.0 | g | Typical value |

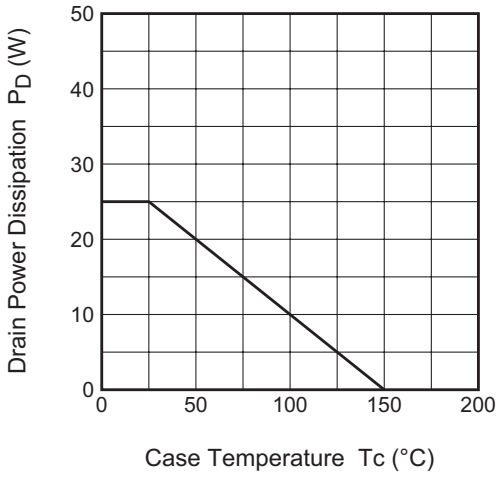
## Electrical Characteristics

(Tch = 25°C)

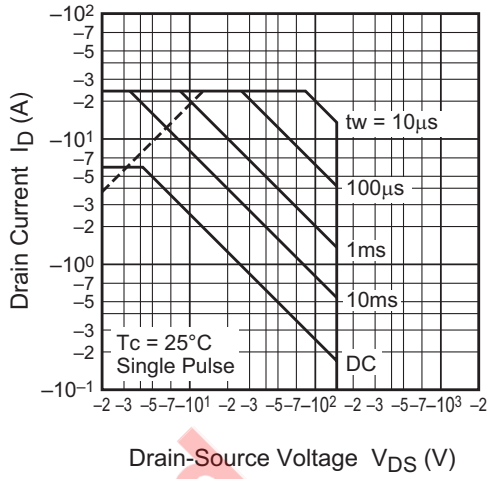
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test conditions |
|---|---|---|---|---|---|---|
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | –150 | — | — | V | $I_D$ = –1 mA, $V_{GS}$ = 0 V |
| Gate-source leakage current | $I_{GSS}$ | — | — | ±0.1 | µA | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 V |
| Drain-source leakage current | $I_{DSS}$ | — | — | –0.1 | mA | $V_{DS}$ = –150 V, $V_{GS}$ = 0 V |
| Gate-source threshold voltage | $V_{GS(th)}$ | –1.0 | –1.5 | –2.0 | V | $I_D$ = –1 mA, $V_{DS}$ = –10 V |
| Drain-source on-state resistance | $r_{DS(ON)}$ | — | 0.41 | 0.53 | Ω | $I_D$ = –3 A, $V_{GS}$ = –10 V |
| Drain-source on-state resistance | $r_{DS(ON)}$ | — | 0.45 | 0.59 | Ω | $I_D$ = –3 A, $V_{GS}$ = – 4 V |
| Drain-source on-state voltage | $V_{DS(ON)}$ | — | –1.23 | –1.59 | V | $I_D$ = –3 A, $V_{GS}$ = –10 V |
| Forward transfer admittance | $\lvert y_{fs} \rvert$ | — | 7.9 | — | S | $I_D$ = –3 A, $V_{DS}$ = –10 V |
| Input capacitance | Ciss | — | 2420 | — | pF | $V_{DS}$ = –10 V, $V_{GS}$ = 0 V, f = 1MHz |
| Output capacitance | Coss | — | 152 | — | pF | |
| Reverse transfer capacitance | Crss | — | 69 | — | pF | |
| Turn-on delay time | $t_{d(on)}$ | — | 14 | — | ns | $V_{DD}$ = – 80 V, $I_D$ = –3 A, $V_{GS}$ = –10 V, $R_{GEN}$ = $R_{GS}$ = 50 Ω |
| Rise time | $t_r$ | — | 18 | — | ns | |
| Turn-off delay time | $t_{d(off)}$ | — | 156 | — | ns | |
| Fall time | $t_f$ | — | 58 | — | ns | |
| Source-drain voltage | $V_{SD}$ | — | –1.0 | –1.5 | V | $I_S$ = –3 A, $V_{GS}$ = 0 V |
| Thermal resistance | Rth(ch-c) | — | — | 5.00 | °C/W | Channel to case |
| Reverse recovery time | $t_{rr}$ | — | 100 | — | ns | $I_S$ = – 6 A, dis/dt = 100 A/µs |

## Performance Curves

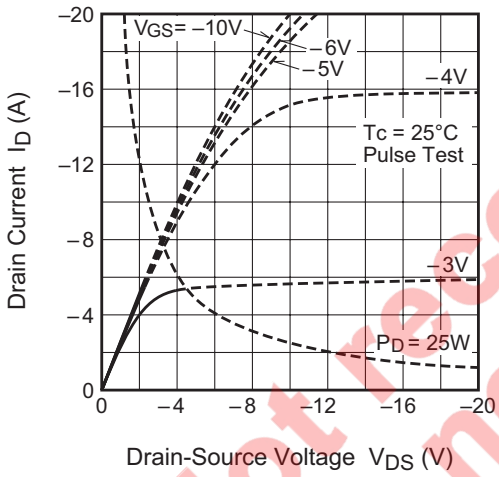
Drain Power Dissipation Derating Curve



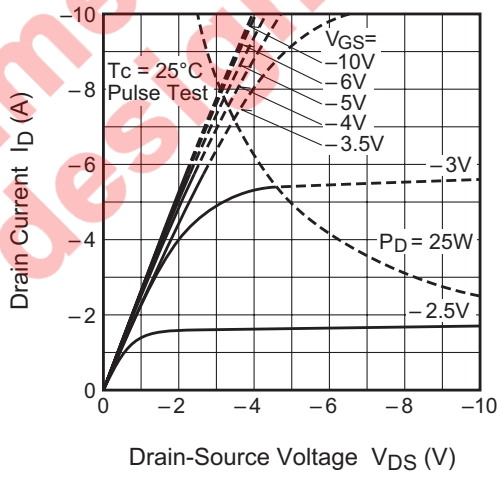

Maximum Safe Operating Area



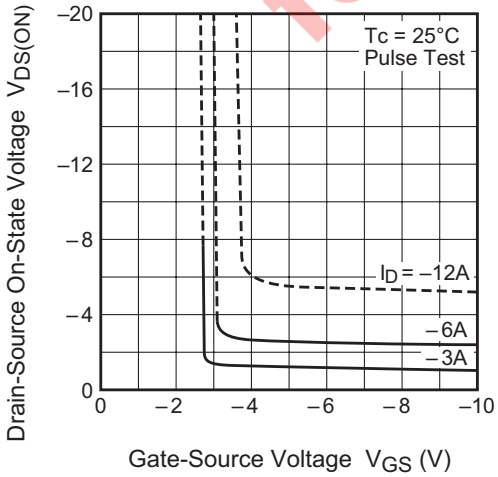

Output Characteristics (Typical)



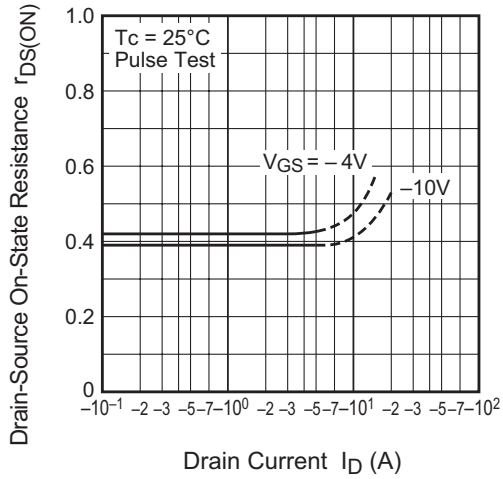

Output Characteristics (Typical)



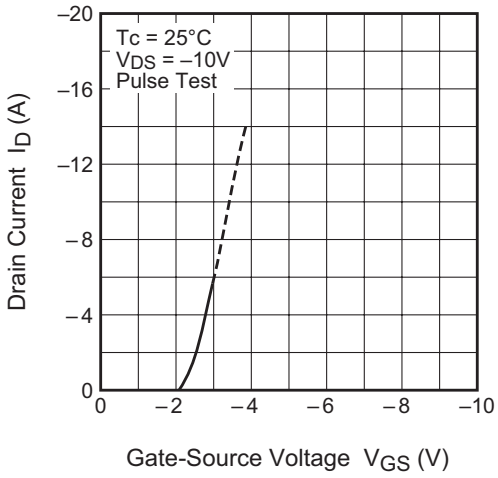

On-State Voltage vs. Gate-Source Voltage (Typical)



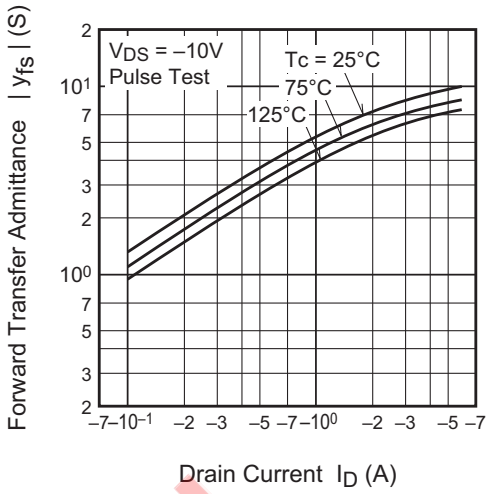

On-State Resistance vs. Drain Current (Typical)



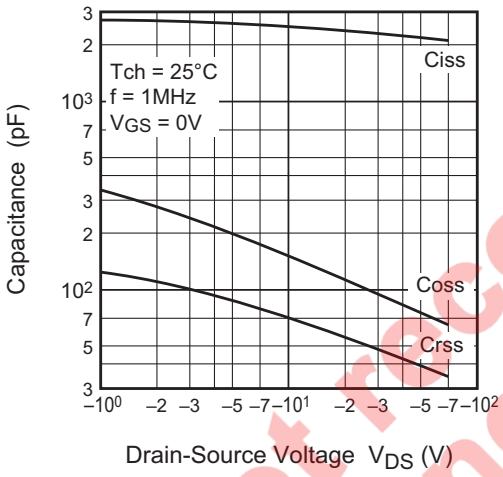
Transfer Characteristics (Typical)



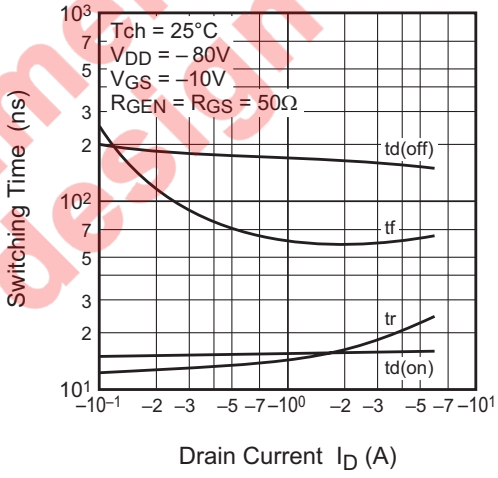

Forward Transfer Admittance vs. Drain Current (Typical)



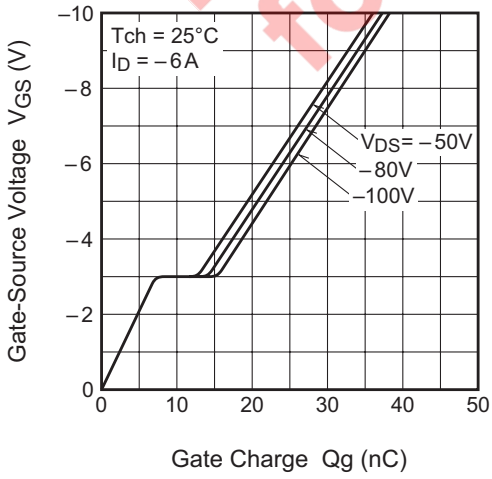

Capacitance vs. Drain-Source Voltage (Typical)



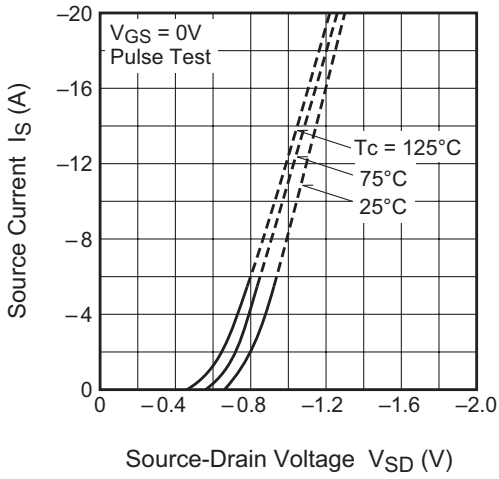

Switching Characteristics (Typical)



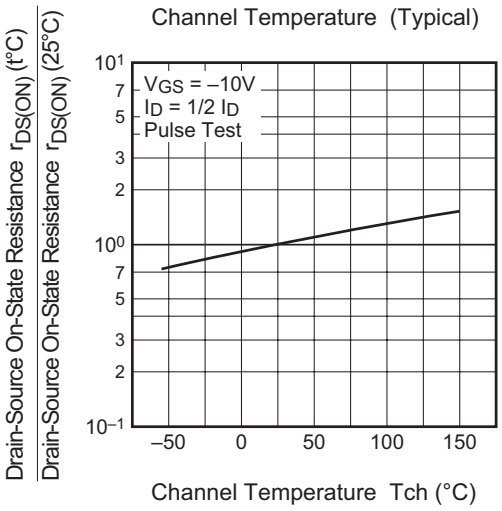

Gate-Source Voltage vs. Gate Charge (Typical)



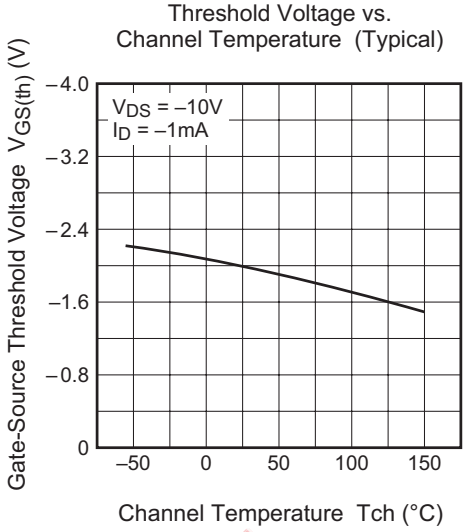

Source-Drain Diode Forward Characteristics (Typical)



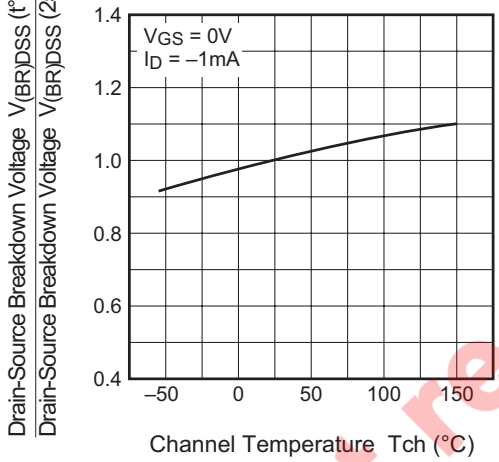
On-State Resistance vs. Channel Temperature (Typical)



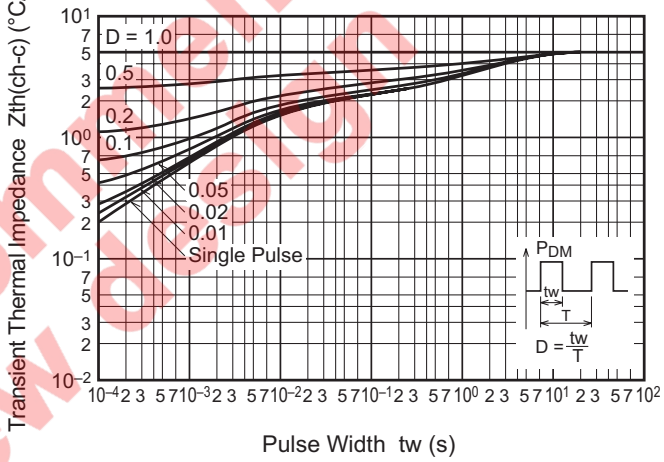

Threshold Voltage vs. Channel Temperature (Typical)



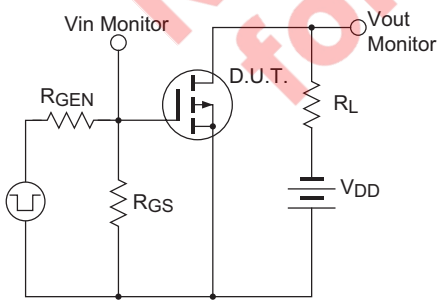

Breakdown Voltage vs. Channel Temperature (Typical)



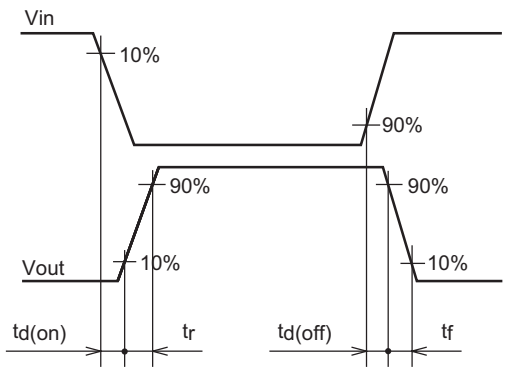

Transient Thermal Impedance Characteristics




Switching Time Measurement Circuit



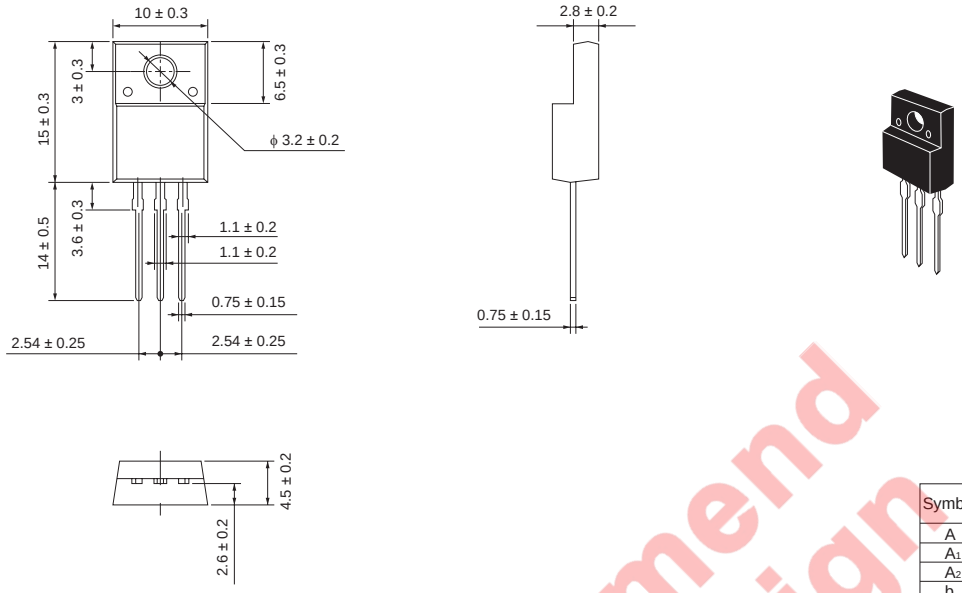

Switching Waveform



## Package Dimensions

**TO-220FN**

| EIAJ Package Code | JEDEC Code | Mass (g) (reference value) | Lead Material |
|---|---|---|---|
| — | — | 2.0 | Cu alloy |




| Symbol | Dimension in Millimeters | | |
|---|---|---|---|
| | Min | Typ | Max |
| A | | | |
| $A_1$ | | | |
| $A_2$ | | | |
| b | | | |
| D | | | |
| E | | | |
| e | | | |
| x | | | |
| y | | | |
| $y_1$ | | | |
| ZD | | | |
| ZE | | | |

Note 1) The dimensional figures indicate representative values unless otherwise the tolerance is specified.



## Order Code

| Lead form | Standard packing | Quantity | Standard order code | Standard order code example |
|---|---|---|---|---|
| Straight type | Plastic Magazine (Tube) | 50 | Type name | FX6KMJ-3 |
| Lead form | Plastic Magazine (Tube) | 50 | Type name – Lead forming code | FX6KMJ-3-A8 |

Note : Please confirm the specification about the shipping in detail.

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