

To all our customers

---

## **Regarding the change of names mentioned in the document, such as Mitsubishi Electric and Mitsubishi XX, to Renesas Technology Corp.**

---

The semiconductor operations of Hitachi and Mitsubishi Electric were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.)

Accordingly, although Mitsubishi Electric, Mitsubishi Electric Corporation, Mitsubishi Semiconductors, and other Mitsubishi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Note : Mitsubishi Electric will continue the business operations of high frequency & optical devices and power devices.

Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

MITSUBISHI POWER MOSFET

# FY5AEJ-03

HIGH-SPEED SWITCHING USE  
 Nch/Pch POWER MOSFET

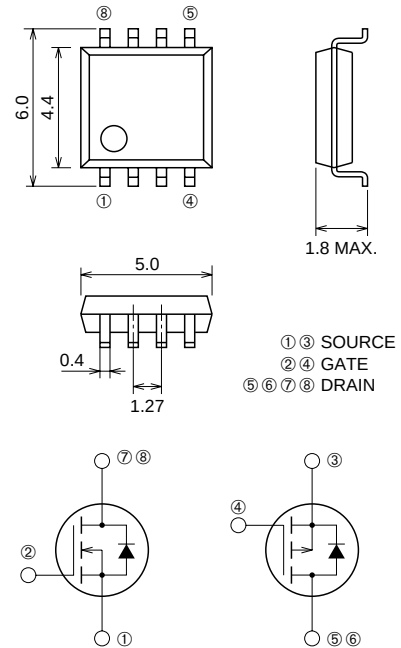
## FY5AEJ-03



- 4V DRIVE
- $V_{DS}$  .....  $\pm 30V$
- $r_{DS} (ON)$  (MAX) .....  $30/65m\Omega$
- $I_D$  .....  $5/-4A$

## OUTLINE DRAWING

Dimensions in mm



SOP-8

## APPLICATION

Motor control, Lamp control, Solenoid control,  
 DC-DC converter, Li-ionbattery, notebook p/c, etc

## MAXIMUM RATINGS ( $T_c = 25^\circ C$ )

| Symbol    | Parameter                  | Conditions    | Ratings         |          | Unit       |
|-----------|----------------------------|---------------|-----------------|----------|------------|
|           |                            |               | n-ch            | p-ch     |            |
| $V_{DS}$  | Drain-source voltage       | $V_{GS} = 0V$ | 30              | -30      | V          |
| $V_{GS}$  | Gate-source voltage        | $V_{DS} = 0V$ | $\pm 20$        | $\pm 20$ | V          |
| $I_D$     | Drain current              |               | 5               | -4       | A          |
| $I_{DM}$  | Drain current (Pulsed)     |               | 35              | -28      | A          |
| $I_{DA}$  | Avalanche current (Pulsed) | $L = 10\mu H$ | 5               | -4       | A          |
| $I_S$     | Source current             |               | 1.5             | -1.5     | A          |
| $I_{SM}$  | Source current (Pulsed)    |               | 6.0             | -6.0     | A          |
| $P_D$     | Maximum power dissipation  |               | 1.6             | 1.7      | W          |
| $T_{ch}$  | Channel temperature        |               | $-55 \sim +150$ |          | $^\circ C$ |
| $T_{stg}$ | Storage temperature        |               | $-55 \sim +150$ |          | $^\circ C$ |
| —         | Weight                     | Typical value | 0.07            |          | g          |

**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

## MITSUBISHI POWER MOSFET

### FY5AEJ-03

#### HIGH-SPEED SWITCHING USE Nch/Pch POWER MOSFET

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

##### N-ch

| 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                                                                  | 30     | —    | —    | 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> = 30V, V <sub>GS</sub> = 0V                                                                 | —      | —    | 0.1  | mA   |
| V <sub>GS</sub> (th)   | Gate-source threshold voltage    | I <sub>D</sub> = 1mA, V <sub>DS</sub> = 10V                                                                 | 1.0    | 1.5  | 2.0  | V    |
| r <sub>DS</sub> (ON)   | Drain-source on-state resistance | I <sub>D</sub> = 5A, V <sub>GS</sub> = 10V                                                                  | —      | 23   | 30   | mΩ   |
| r <sub>DS</sub> (ON)   | Drain-source on-state resistance | I <sub>D</sub> = 2A, V <sub>GS</sub> = 4V                                                                   | —      | 40   | 55   | mΩ   |
| y <sub>fs</sub>        | Forward transfer admittance      | I <sub>D</sub> = 5A, V <sub>DS</sub> = 10V                                                                  | —      | 9    | —    | S    |
| C <sub>iss</sub>       | Input capacitance                | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1MHz                                                       | —      | 550  | —    | pF   |
| C <sub>oss</sub>       | Output capacitance               |                                                                                                             | —      | 220  | —    | pF   |
| C <sub>rss</sub>       | Reverse transfer capacitance     |                                                                                                             | —      | 115  | —    | pF   |
| t <sub>d</sub> (on)    | Turn-on delay time               | V <sub>DD</sub> = 15V, I <sub>D</sub> = 2A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = R <sub>GS</sub> = 50Ω | —      | 12   | —    | ns   |
| t <sub>r</sub>         | Rise time                        |                                                                                                             | —      | 20   | —    | ns   |
| t <sub>d</sub> (off)   | Turn-off delay time              |                                                                                                             | —      | 40   | —    | ns   |
| t <sub>f</sub>         | Fall time                        |                                                                                                             | —      | 40   | —    | ns   |
| V <sub>SD</sub>        | Source-drain voltage             | I <sub>S</sub> = 1.5A, V <sub>GS</sub> = 0V                                                                 | —      | 0.75 | 1.10 | V    |
| R <sub>th</sub> (ch-a) | Thermal resistance               | Channel to ambient                                                                                          | —      | —    | 78.1 | °C/W |
| t <sub>rr</sub>        | Reverse recovery time            | I <sub>S</sub> = 1.5A, di <sub>s</sub> /dt = -50A/μs                                                        | —      | 100  | —    | ns   |

##### P-ch

| 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                                                                     | -30    | —     | —     | 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> = -30V, V <sub>GS</sub> = 0V                                                                   | —      | —     | -0.1  | mA   |
| V <sub>GS</sub> (th)   | Gate-source threshold voltage    | I <sub>D</sub> = -1mA, V <sub>DS</sub> = -10V                                                                  | -1.5   | -2.0  | -2.5  | V    |
| r <sub>DS</sub> (ON)   | Drain-source on-state resistance | I <sub>D</sub> = -4A, V <sub>GS</sub> = -10V                                                                   | —      | 50    | 65    | mΩ   |
| r <sub>DS</sub> (ON)   | Drain-source on-state resistance | I <sub>D</sub> = -2A, V <sub>GS</sub> = -4V                                                                    | —      | 90    | 135   | mΩ   |
| y <sub>fs</sub>        | Forward transfer admittance      | I <sub>D</sub> = -4A, V <sub>DS</sub> = -10V                                                                   | —      | 6     | —     | S    |
| C <sub>iss</sub>       | Input capacitance                | V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1MHz                                                         | —      | 870   | —     | pF   |
| C <sub>oss</sub>       | Output capacitance               |                                                                                                                | —      | 230   | —     | pF   |
| C <sub>rss</sub>       | Reverse transfer capacitance     |                                                                                                                | —      | 110   | —     | pF   |
| t <sub>d</sub> (on)    | Turn-on delay time               | V <sub>DD</sub> = -15V, I <sub>D</sub> = -2A, V <sub>GS</sub> = -10V, R <sub>GEN</sub> = R <sub>GS</sub> = 50Ω | —      | 10    | —     | ns   |
| t <sub>r</sub>         | Rise time                        |                                                                                                                | —      | 10    | —     | ns   |
| t <sub>d</sub> (off)   | Turn-off delay time              |                                                                                                                | —      | 60    | —     | ns   |
| t <sub>f</sub>         | Fall time                        |                                                                                                                | —      | 30    | —     | ns   |
| V <sub>SD</sub>        | Source-drain voltage             | I <sub>S</sub> = -1.5A, V <sub>GS</sub> = 0V                                                                   | —      | -0.88 | -1.20 | V    |
| R <sub>th</sub> (ch-a) | Thermal resistance               | Channel to ambient                                                                                             | —      | —     | 73.5  | °C/W |
| t <sub>rr</sub>        | Reverse recovery time            | I <sub>S</sub> = 1.5A, di <sub>s</sub> /dt = 50A/μs                                                            | —      | 100   | —     | ns   |

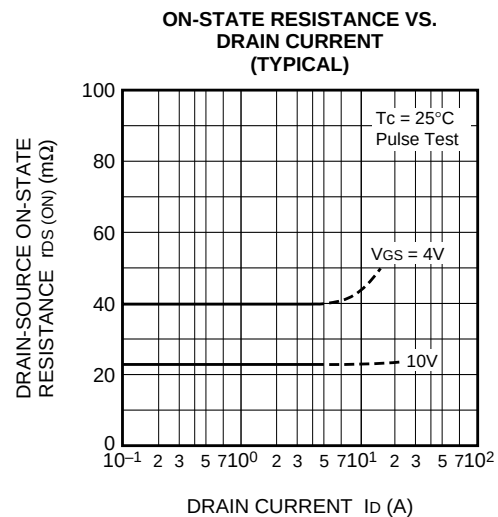
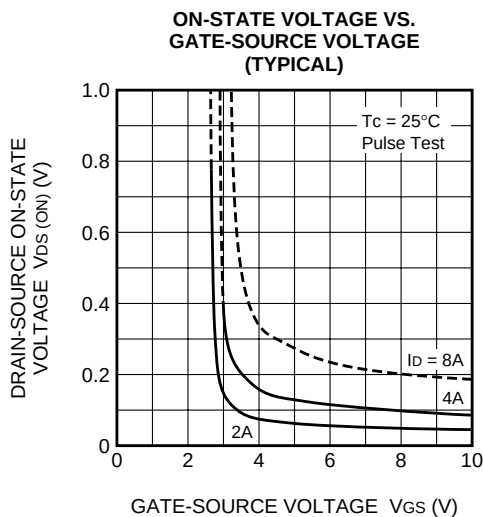
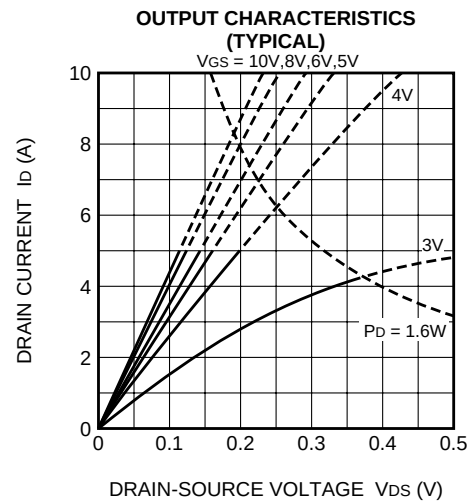
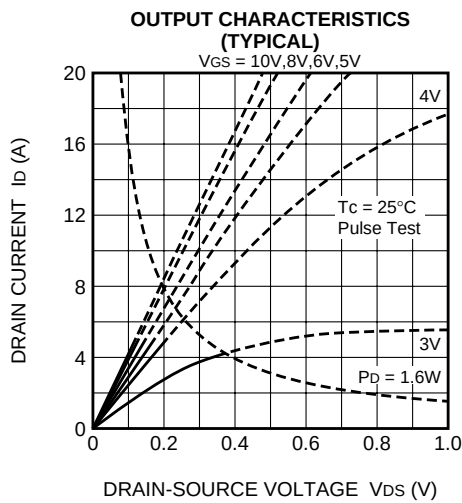
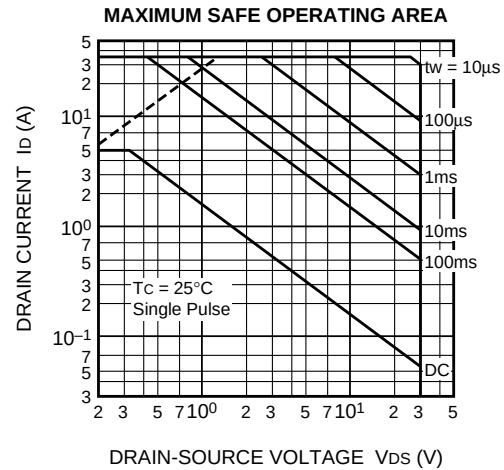
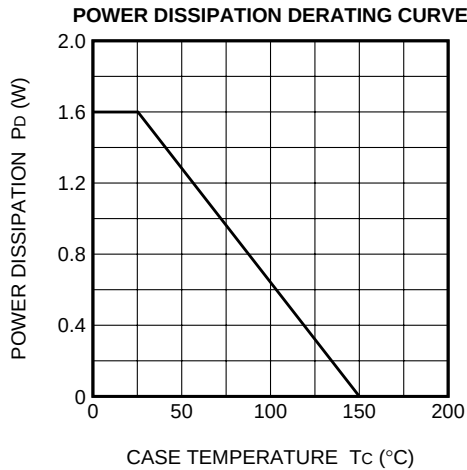
**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

MITSUBISHI POWER MOSFET

**FY5AEJ-03**

**HIGH-SPEED SWITCHING USE**  
**Nch/Pch POWER MOSFET**

**PERFORMANCE CURVES (N-ch)**



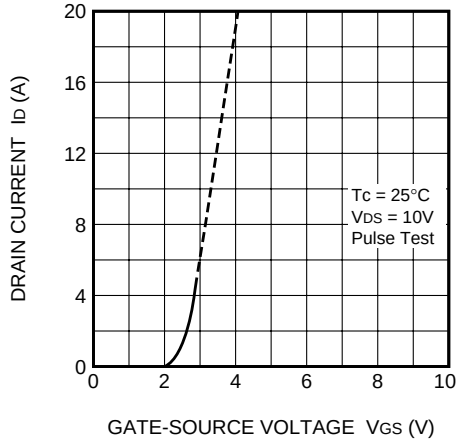
**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

# MITSUBISHI POWER MOSFET

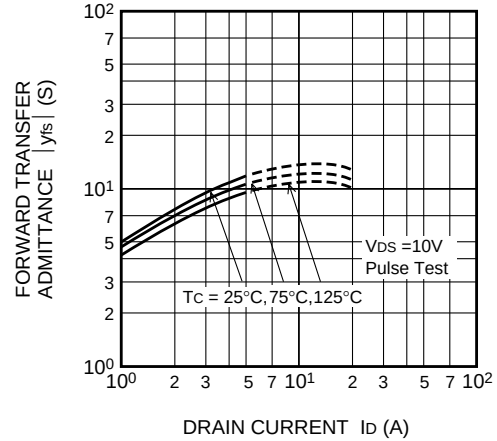
## FY5AEJ-03

### HIGH-SPEED SWITCHING USE Nch/Pch POWER MOSFET

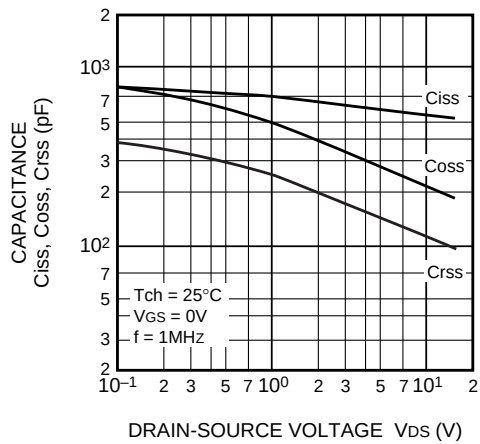
**TRANSFER CHARACTERISTICS  
 (TYPICAL)**



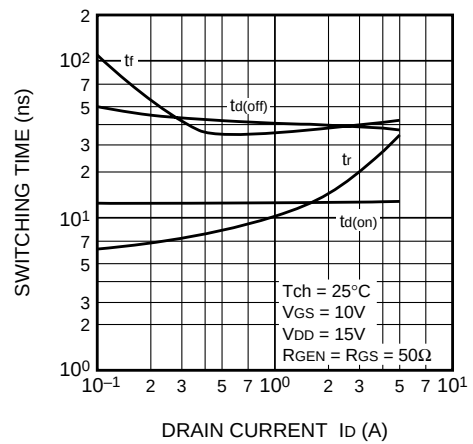
**FORWARD TRANSFER ADMITTANCE  
 VS. DRAIN CURRENT  
 (TYPICAL)**



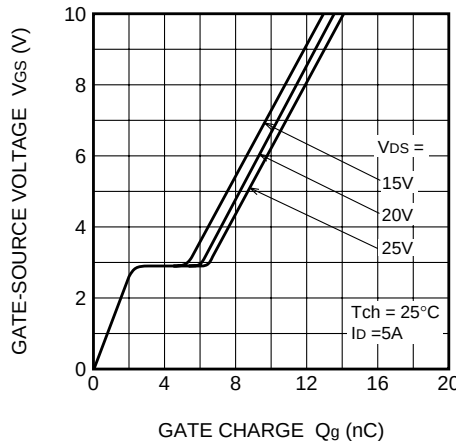
**CAPACITANCE VS.  
 DRAIN-SOURCE VOLTAGE  
 (TYPICAL)**



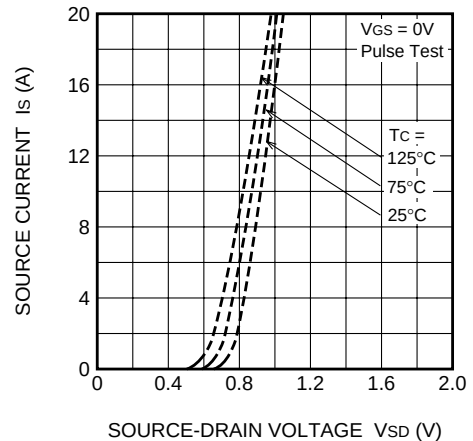
**SWITCHING CHARACTERISTICS  
 (TYPICAL)**



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



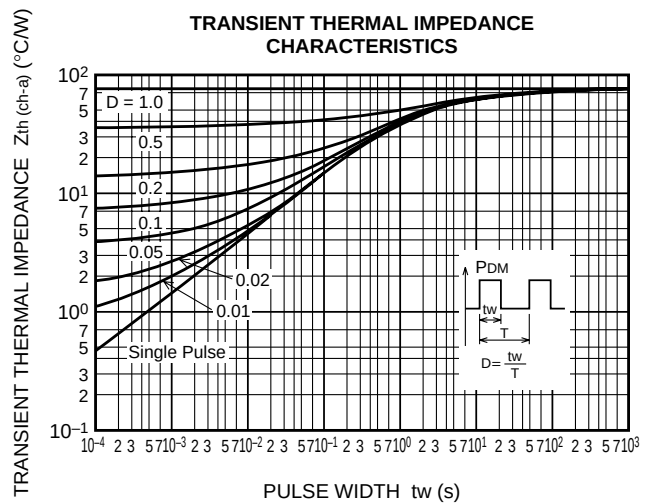
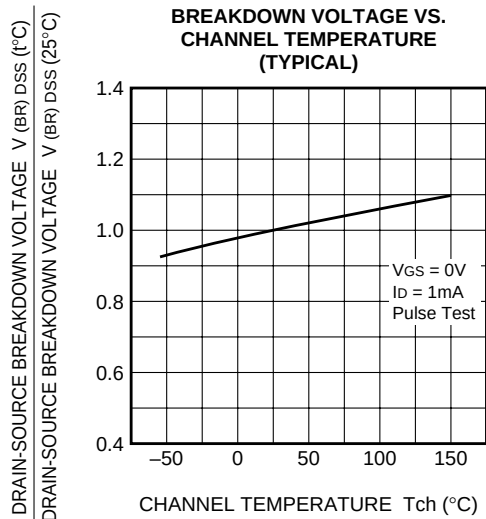
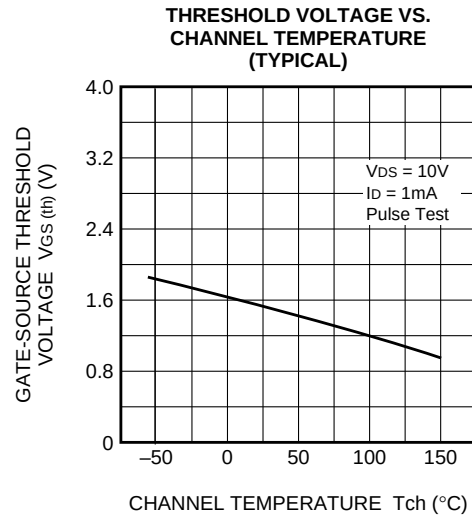
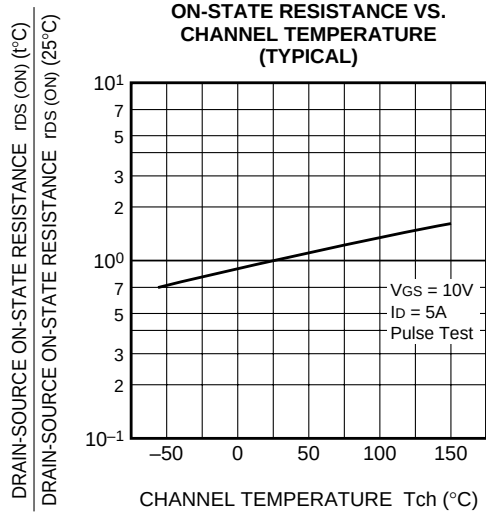
**SOURCE-DRAIN DIODE  
 FORWARD CHARACTERISTICS  
 (TYPICAL)**



**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

**FY5AEJ-03**

**HIGH-SPEED SWITCHING USE**  
**Nch/Pch POWER MOSFET**



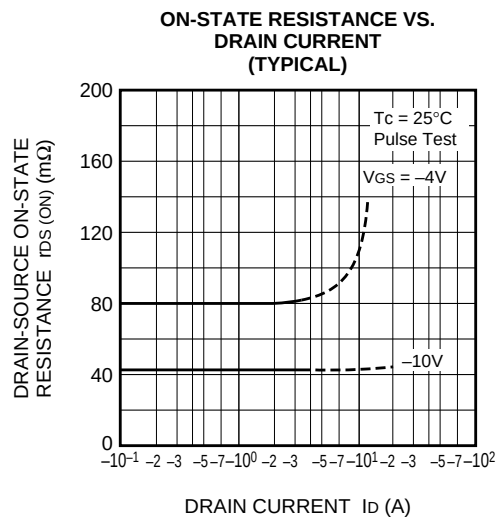
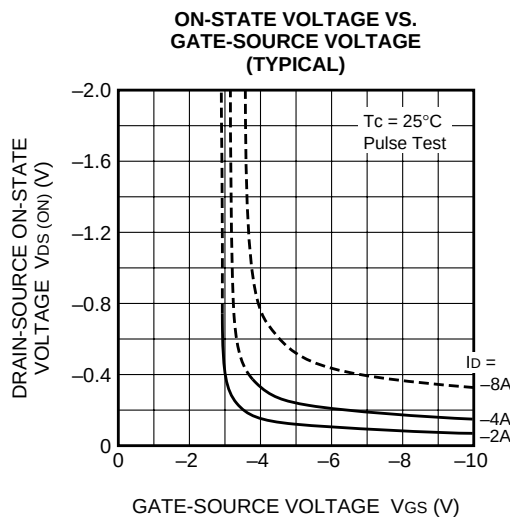
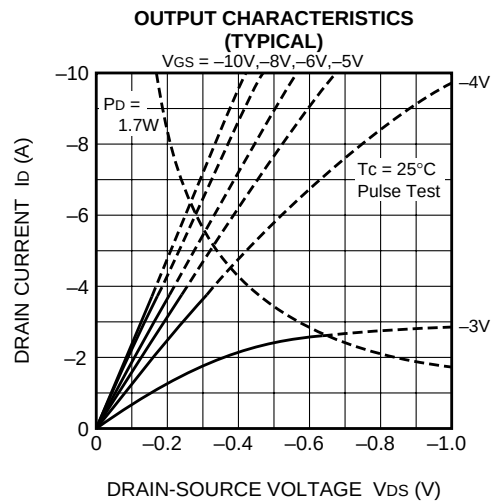
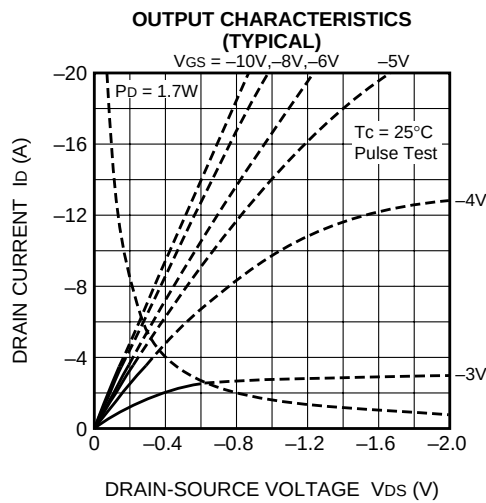
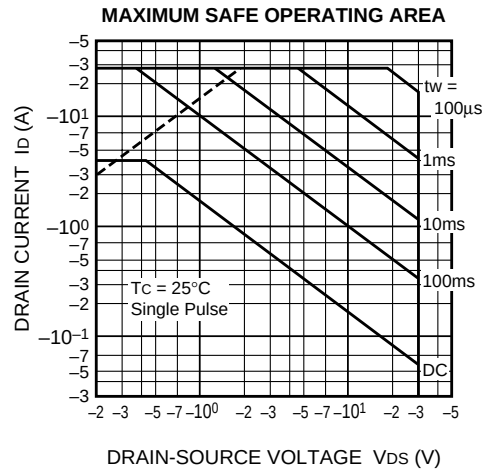
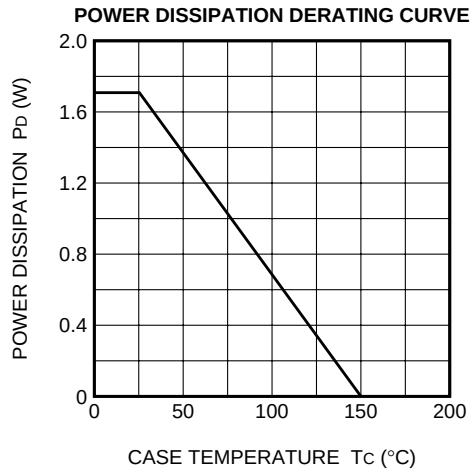
**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

MITSUBISHI POWER MOSFET

**FY5AEJ-03**

**HIGH-SPEED SWITCHING USE**  
**Nch/Pch POWER MOSFET**

**PERFORMANCE CURVES (P-ch)**



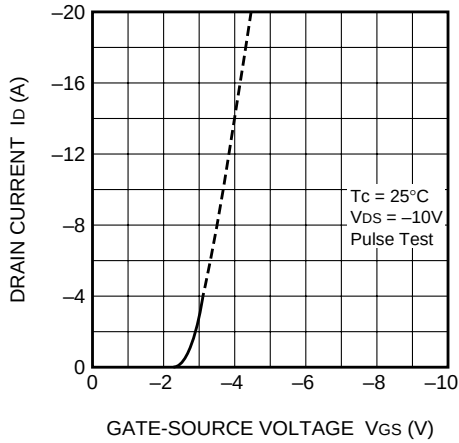
**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

MITSUBISHI POWER MOSFET

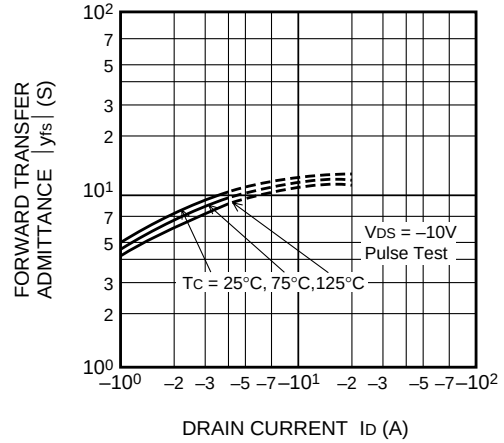
**FY5AEJ-03**

**HIGH-SPEED SWITCHING USE**  
**Nch/Pch POWER MOSFET**

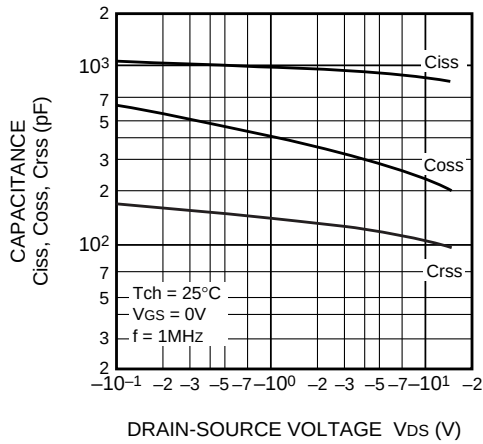
**TRANSFER CHARACTERISTICS  
(TYPICAL)**



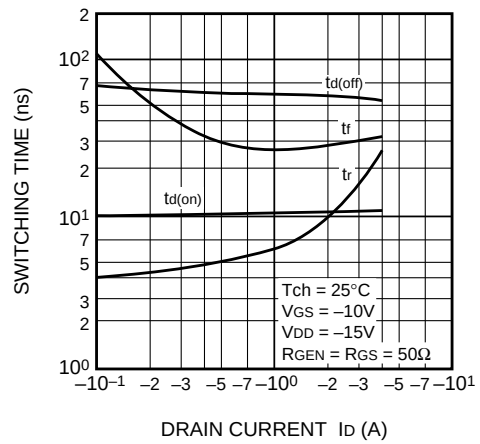
**FORWARD TRANSFER ADMITTANCE  
VS.DRAIN CURRENT  
(TYPICAL)**



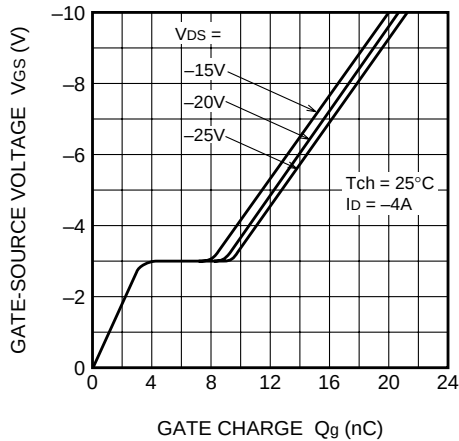
**CAPACITANCE VS.  
DRAIN-SOURCE VOLTAGE  
(TYPICAL)**



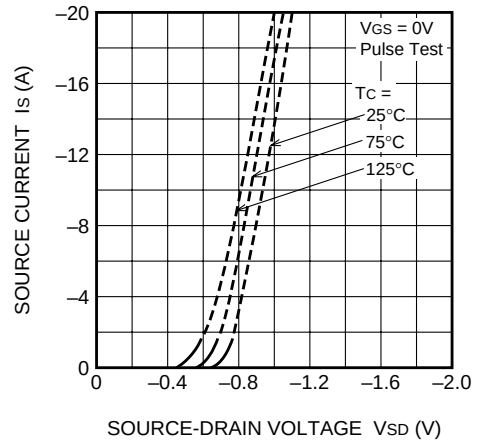
**SWITCHING CHARACTERISTICS  
(TYPICAL)**



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



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





**PRELIMINARY**  
 Notice: This is not a final specification.  
 Some parametric limits are subject to change.

MITSUBISHI POWER MOSFET

**FY5AEJ-03**

**HIGH-SPEED SWITCHING USE**  
**Nch/Pch POWER MOSFET**

