To our customers,

## Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation



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# FX50SMJ-2

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

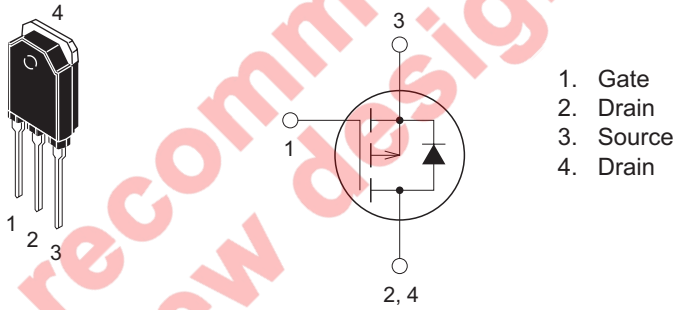
REJ03G1454-0200
(Previous: MEJ02G0285-0101)
Rev.2.00
Aug 07, 2006

### Features

- Drive voltage : 4 V
- $V_{DSS}$ : –100 V
- $r_{DS(ON)\ (max)}$ : 50 mΩ
- $I_D$ : –50 A
- Integrated Fast Recovery Diode (TYP.) : 100 ns

### Outline

RENESAS Package code: PRSS0004ZB-A
(Package name: TO-3P)




1. Gate
2. Drain
3. Source
4. Drain



### Applications

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

### Maximum Ratings

(Tc = 25°C)

| Parameter | Symbol | Ratings | Unit | Conditions |
|---|---|---|---|---|
| Drain-source voltage | $V_{DSS}$ | –100 | V | $V_{GS}$ = 0 V |
| Gate-source voltage | $V_{GSS}$ | ±20 | V | $V_{DS}$ = 0 V |
| Drain current | $I_D$ | –50 | A | |
| Drain current (Pulsed) | $I_{DM}$ | –200 | A | |
| Avalanche drain current (Pulsed) | $I_{DA}$ | –50 | A | L = 30 µH |
| Source current | $I_S$ | –50 | A | |
| Source current (Pulsed) | $I_{SM}$ | –200 | A | |
| Maximum power dissipation | $P_D$ | 150 | W | |
| Channel temperature | Tch | – 55 to +150 | °C | |
| Storage temperature | Tstg | – 55 to +150 | °C | |
| Mass | — | 4.8 | g | Typical value |

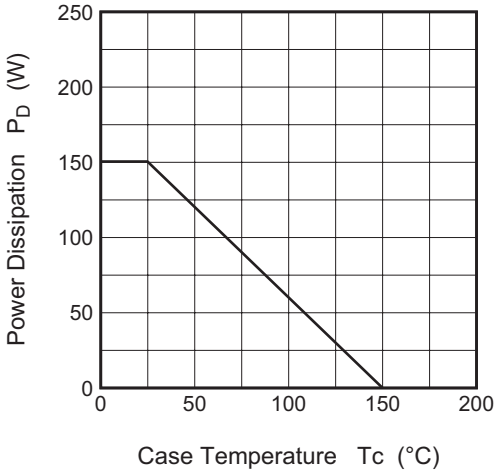
## Electrical Characteristics

(Tch = 25°C)

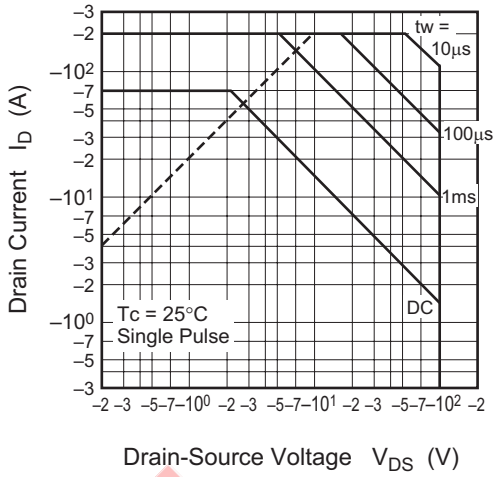
| Parameter | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | –100 | — | — | V | $I_D$ = –1 mA, $V_{GS}$ = 0 V |
| Gate-source leakage current | $I_{GSS}$ | — | — | ±0.1 | µA | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 V |
| Drain-source leakage current | $I_{DSS}$ | — | — | 0.1 | mA | $V_{DS}$ = –100 V, $V_{GS}$ = 0 V |
| Gate-source threshold voltage | $V_{GS(th)}$ | –1.3 | –1.8 | –2.3 | V | $I_D$ = –1 mA, $V_{DS}$ = –10 V |
| Drain-source on-state resistance | $r_{DS(ON)}$ | — | 39 | 50 | mΩ | $I_D$ = –25 A, $V_{GS}$ = –10 V |
| Drain-source on-state resistance | $r_{DS(ON)}$ | — | 47 | 61 | mΩ | $I_D$ = –25 A, $V_{GS}$ = –4 V |
| Drain-source on-state voltage | $V_{DS(ON)}$ | — | –0.98 | –1.25 | V | $I_D$ = –25 A, $V_{GS}$ = –10 V |
| Forward transfer admittance | $\lvert y_{fs} \rvert$ | — | 49.2 | — | S | $I_D$ = –25 A, $V_{DS}$ = –10 V |
| Input capacitance | Ciss | — | 11130 | — | pF | $V_{DS}$ = –10 V, $V_{GS}$ = 0 V, f = 1MHz |
| Output capacitance | Coss | — | 896 | — | pF | |
| Reverse transfer capacitance | Crss | — | 480 | — | pF | |
| Turn-on delay time | $t_{d(on)}$ | — | 57 | — | ns | $V_{DD}$ = –50 V, $I_D$ = –25 A, $V_{GS}$ = –10 V, $R_{GEN}$ = $R_{GS}$ = 50 Ω |
| Rise time | $t_r$ | — | 118 | — | ns | |
| Turn-off delay time | $t_{d(off)}$ | — | 828 | — | ns | |
| Fall time | $t_f$ | — | 380 | — | ns | |
| Source-drain voltage | $V_{SD}$ | — | –1.0 | –1.5 | V | $I_S$ = –25 A, $V_{GS}$ = 0 V |
| Thermal resistance | $R_{th(ch-c)}$ | — | — | 0.83 | °C/W | Channel to case |
| Reverse recovery time | $t_{rr}$ | — | 100 | — | ns | $I_S$ = –50 A, $d_{is}/d_t$ = 100 A/µs |

## Performance Curves

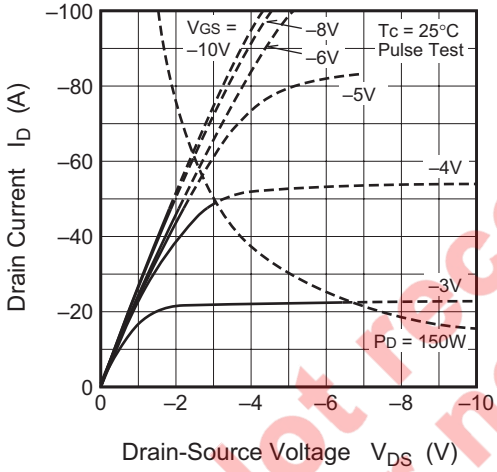
Power Dissipation Derating Curve



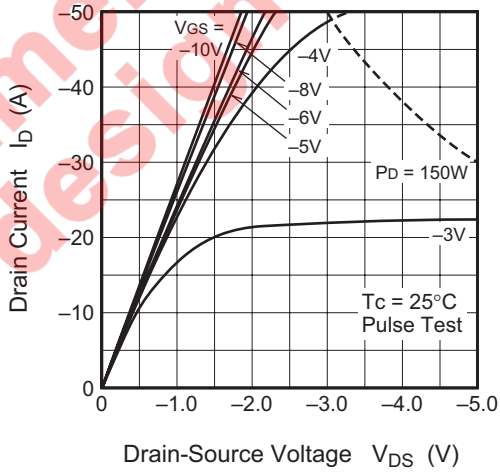

Maximum Safe Operating Area



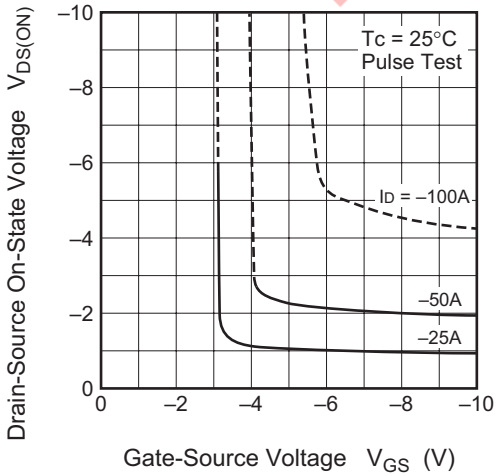

Output Characteristics (Typical)



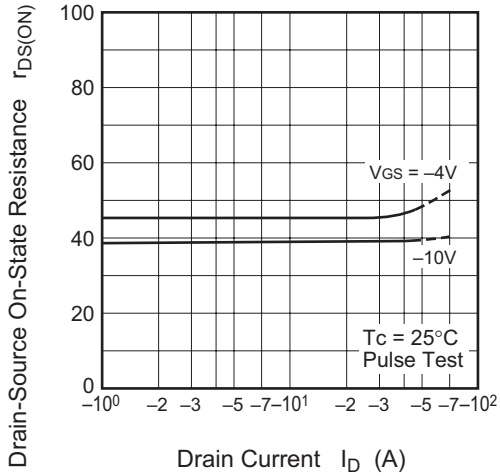

Output Characteristics (Typical)



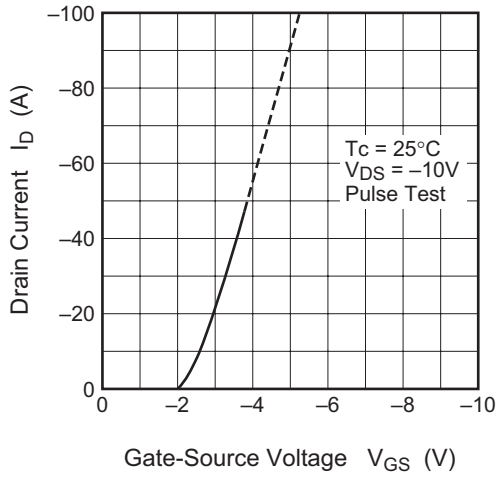

On-State Voltage vs. Gate-Source Voltage (Typical)



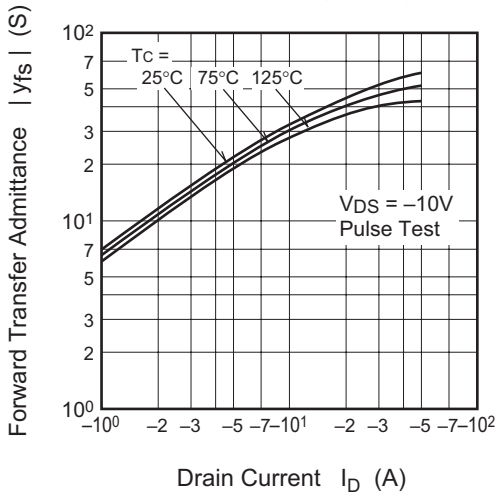

On-State Resistance vs. Drain Current (Typical)



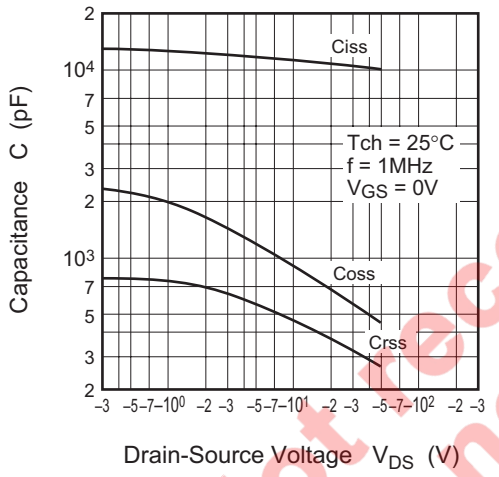
Transfer Characteristics (Typical)



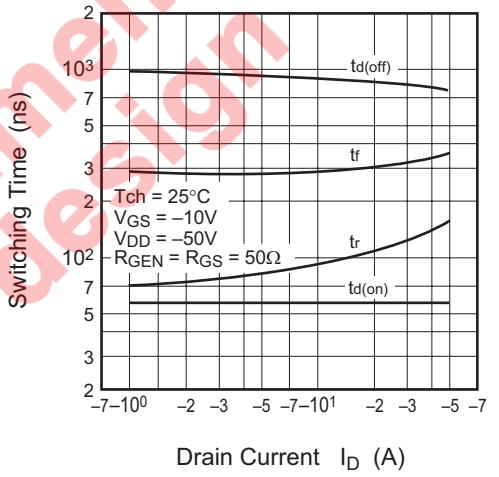

Forward Transfer Admittance vs. Drain Current (Typical)



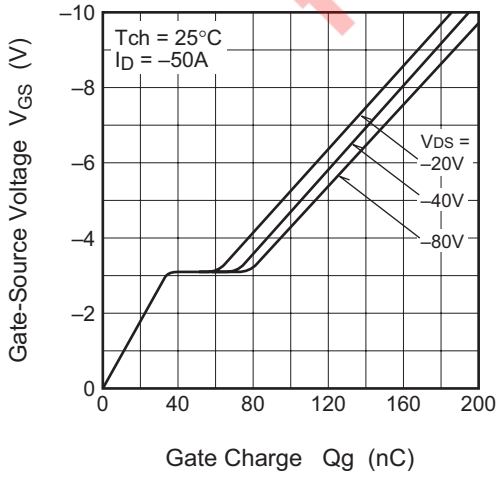

Capacitance vs. Drain-Source Voltage (Typical)



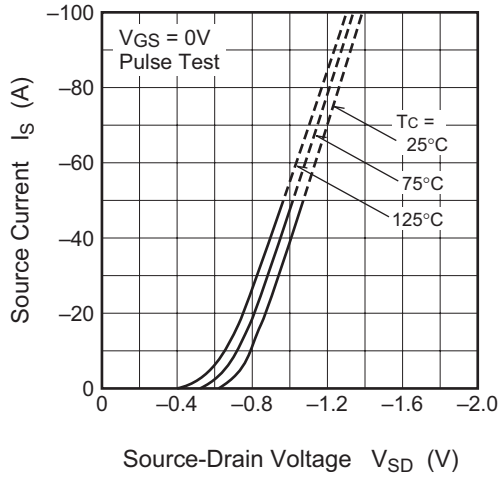

Switching Characteristics (Typical)



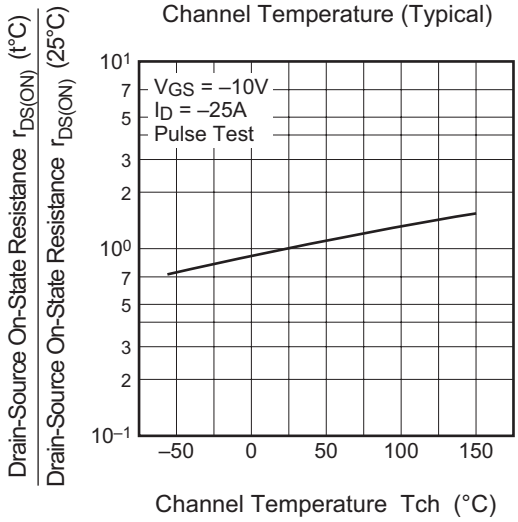

Gate-Source Voltage vs. Gate Charge (Typical)



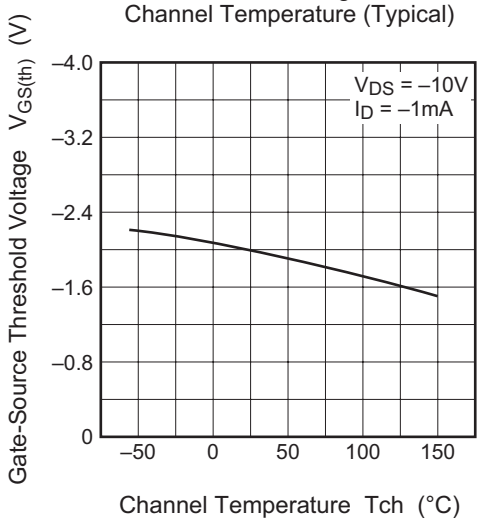

Source-Drain Diode Forward Characteristics (Typical)



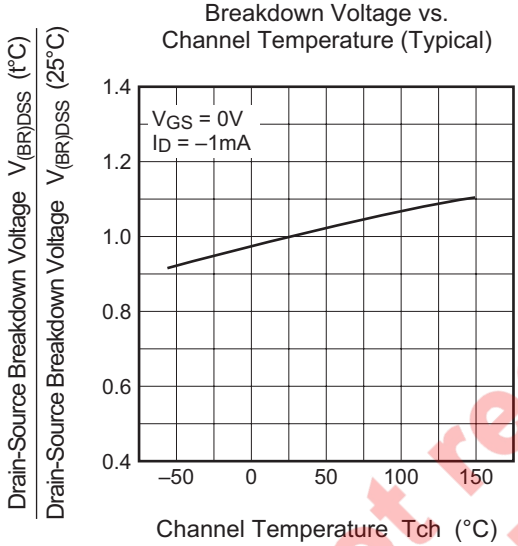
On-State Resistance vs. Channel Temperature (Typical)



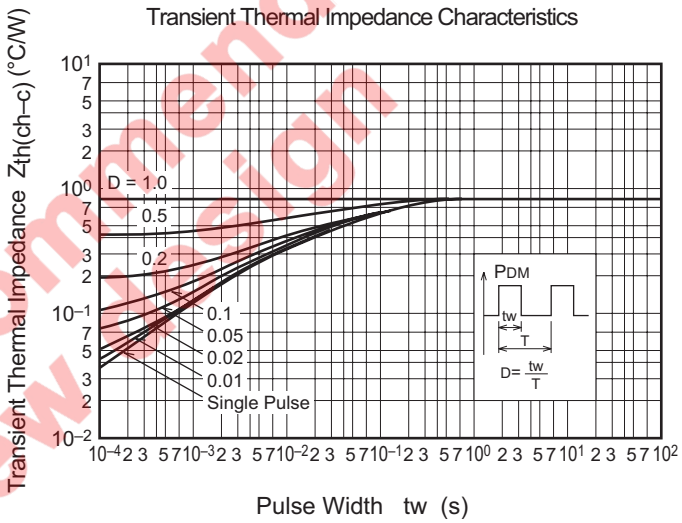

Threshold Voltage vs. Channel Temperature (Typical)




Breakdown Voltage vs. Channel Temperature (Typical)

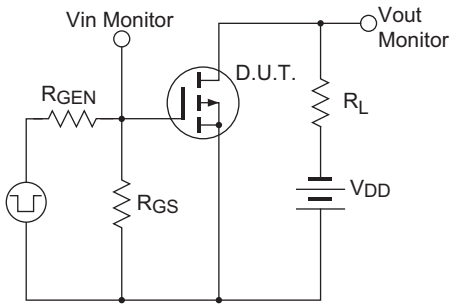



Transient Thermal Impedance Characteristics

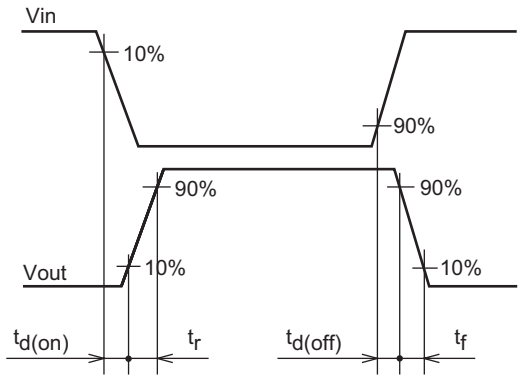





Switching Time Measurement Circuit



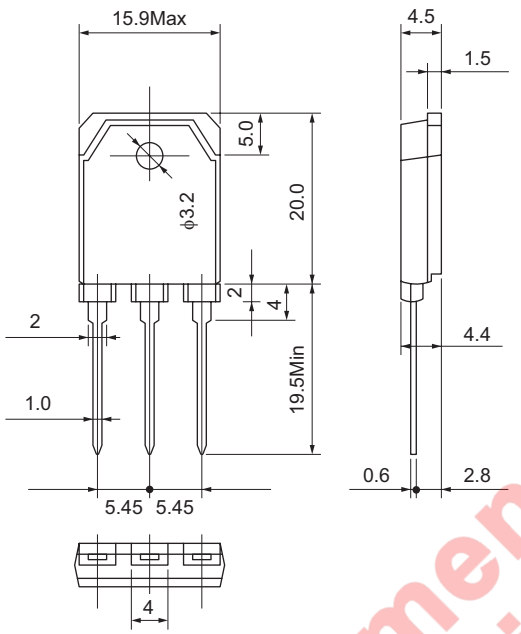

Switching Waveform



## Package Dimensions

| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|---|---|---|---|---|
| TO-3P* | SC-65 | PRSS0004ZB-A | — | 4.8g |

Unit: mm






## Order Code

| Lead form | Standard packing | Quantity | Standard order code | Standard order code example |
|---|---|---|---|---|
| Straight type | Static electricity prevention bag | 20 | Type name | FX50SMJ-2 |
| Lead form | Plastic Magazine (Tube) | 30 | Type name – Lead forming code | FX50SMJ-2-A8 |

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

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