To all our customers

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

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# 2SJ533

## Silicon P Channel MOS FET
## High Speed Power Switching

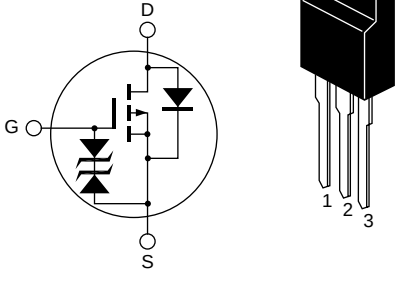
ADE-208-649B (Z)
3rd. Edition
Jul. 1998

### Features

- Low on-resistance
  $R_{DS(on)}$ = 0.028Ω typ.
- Low drive current.
- 4V gate drive devices.
- High speed switching.

### Outline

TO–220CFM




1. Gate
2. Drain
3. Source

## Absolute Maximum Ratings (Ta = 25°C)

| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain to source voltage | $V_{DSS}$ | –60 | V |
| Gate to source voltage | $V_{GSS}$ | ±20 | V |
| Drain current | $I_D$ | –30 | A |
| Drain peak current | $I_{D(pulse)}$ Note1 | –120 | A |
| Body-drain diode reverse drain current | $I_{DR}$ | –30 | A |
| Avalanche current | $I_{AP}$ Note3 | –30 | A |
| Avalanche energy | $E_{AR}$ Note3 | 77 | mJ |
| Channel dissipation | Pch Note2 | 35 | W |
| Channel temperature | Tch | 150 | °C |
| Storage temperature | Tstg | –55 to +150 | °C |

Note: 1. PW ≤ 10μs, duty cycle ≤ 1 %
2. Value at Tc = 25°C
3. Value at Tch = 25°C, Rg ≥ 50 Ω

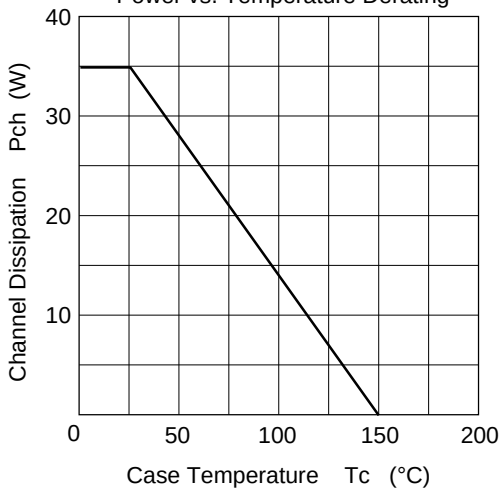
## Electrical Characteristics (Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|---|---|---|---|---|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | –60 | — | — | V | $I_D$ = –10mA, $V_{GS}$ = 0 |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ±20 | — | — | V | $I_G$ = ±100µA, $V_{DS}$ = 0 |
| Zero gate voltege drain current | $I_{DSS}$ | — | — | –10 | µA | $V_{DS}$ = –60 V, $V_{GS}$ = 0 |
| Gate to source leak current | $I_{GSS}$ | — | — | ±10 | µA | $V_{GS}$ = ±16V, $V_{DS}$ = 0 |
| Gate to source cutoff voltage | $V_{GS(off)}$ | –1.0 | — | –2.0 | V | $I_D$ = –1mA, $V_{DS}$ = –10V |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 0.028 | 0.037 | Ω | $I_D$ = –15A, $V_{GS}$ = –10V [Note4] |
| | $R_{DS(on)}$ | — | 0.038 | 0.055 | Ω | $I_D$ = –15A, $V_{GS}$ = –4V [Note4] |
| Forward transfer admittance | $\|y_{fs}\|$ | 15 | 25 | — | S | $I_D$ = –15A, $V_{DS}$ = –10V [Note4] |
| Input capacitance | Ciss | — | 2500 | — | pF | $V_{DS}$ = –10V |
| Output capacitance | Coss | — | 1300 | — | pF | $V_{GS}$ = 0 |
| Reverse transfer capacitance | Crss | — | 300 | — | pF | f = 1MHz |
| Turn-on delay time | $t_{d(on)}$ | — | 25 | — | ns | $V_{GS}$ = –10V, $I_D$ = –15A |
| Rise time | $t_r$ | — | 150 | — | ns | $R_L$ = 2Ω |
| Turn-off delay time | $t_{d(off)}$ | — | 350 | — | ns | |
| Fall time | $t_f$ | — | 220 | — | ns | |
| Body–drain diode forward voltage | $V_{DF}$ | — | –0.95 | — | V | $I_F$ = –30A, $V_{GS}$ = 0 |
| Body–drain diode reverse recovery time | $t_{rr}$ | — | 100 | — | ns | $I_F$ = –30A, $V_{GS}$ = 0<br>diF/ dt =50A/µs |

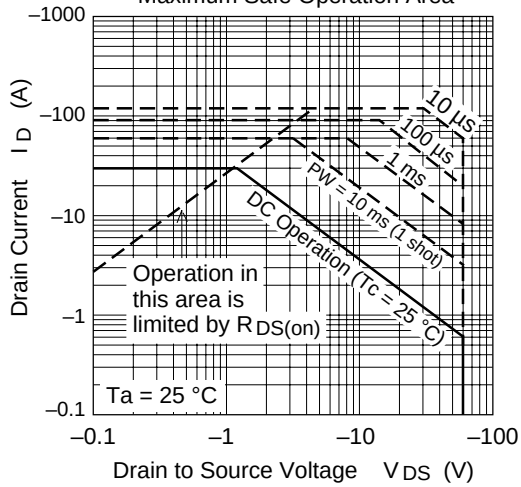
Note: 4. Pulse test

## Main Characteristics

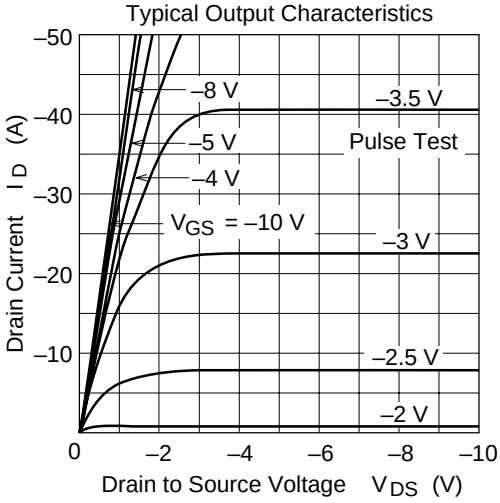
Power vs. Temperature Derating



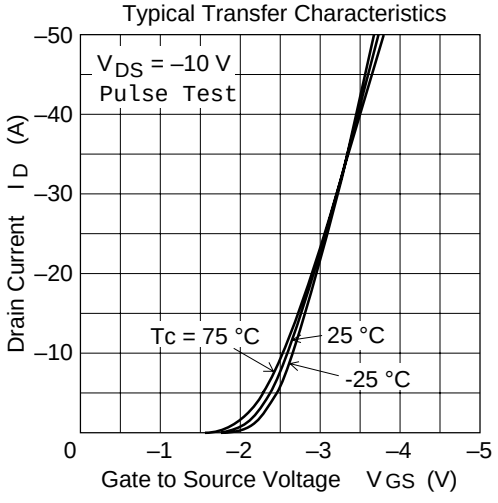

Maximum Safe Operation Area



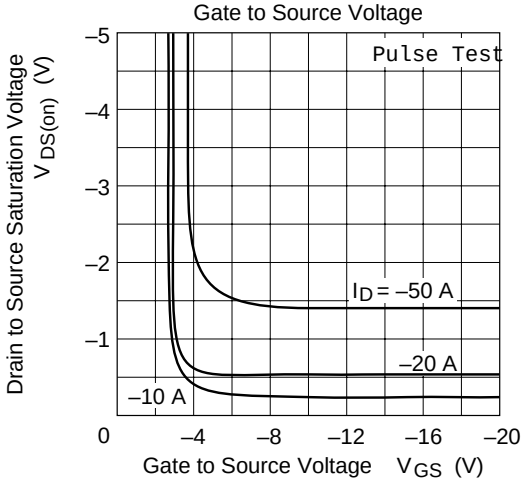

Typical Output Characteristics



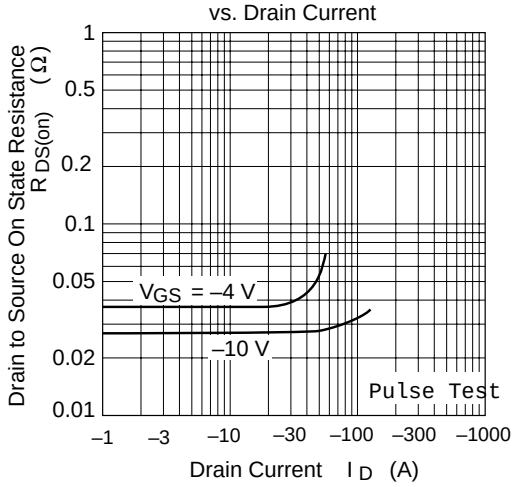

Typical Transfer Characteristics



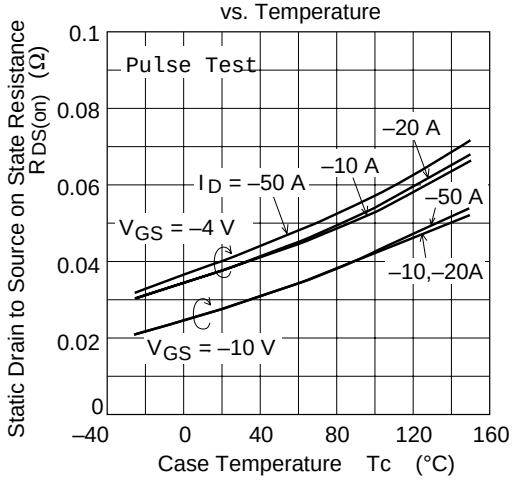
Drain to Source Saturation Voltage vs. Gate to Source Voltage



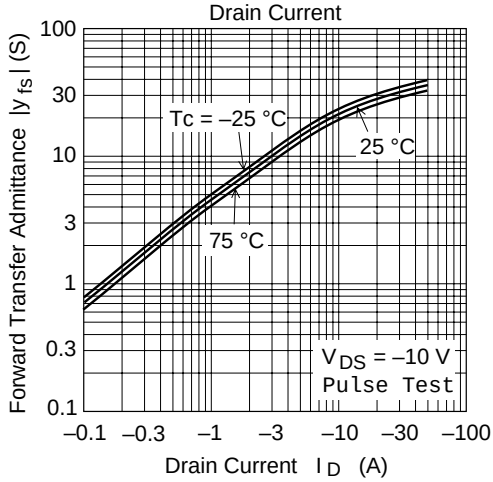

Static Drain to Source on State Resistance vs. Drain Current



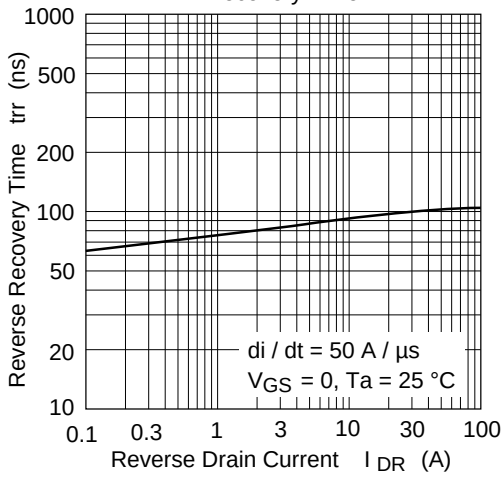

Static Drain to Source on State Resistance vs. Temperature



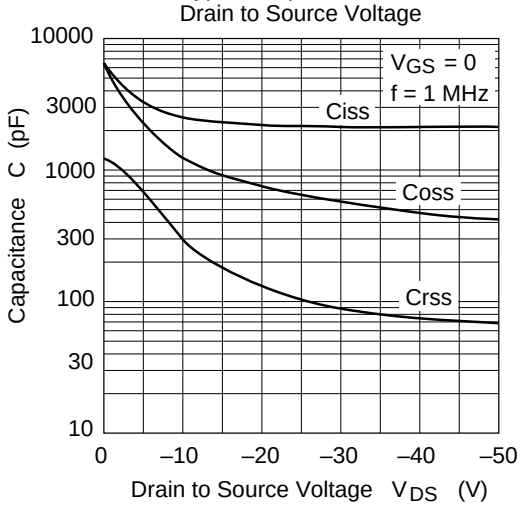

Forward Transfer Admittance vs. Drain Current



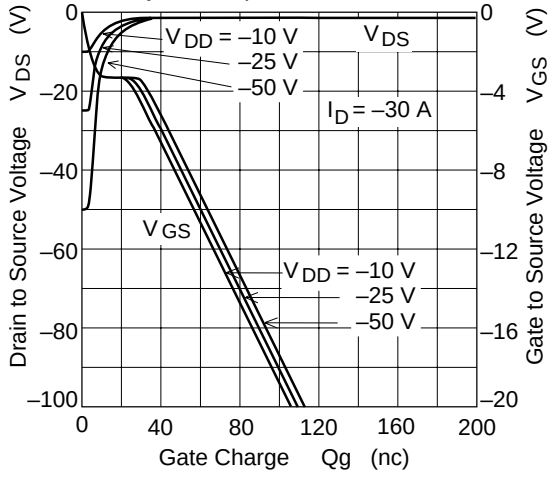
Body–Drain Diode Reverse Recovery Time



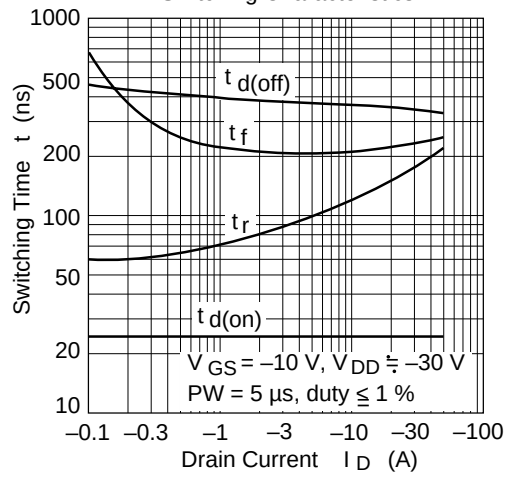

Typical Capacitance vs. Drain to Source Voltage



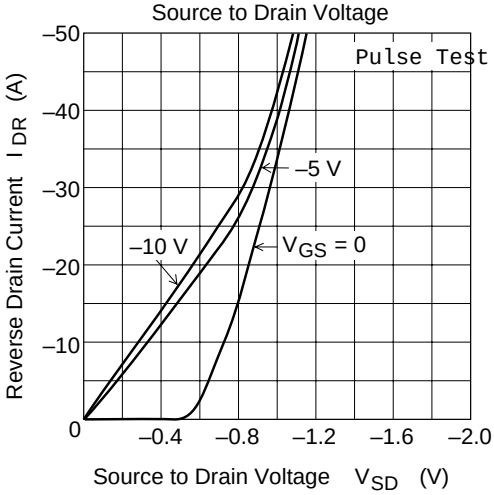

Dynamic Input Characteristics



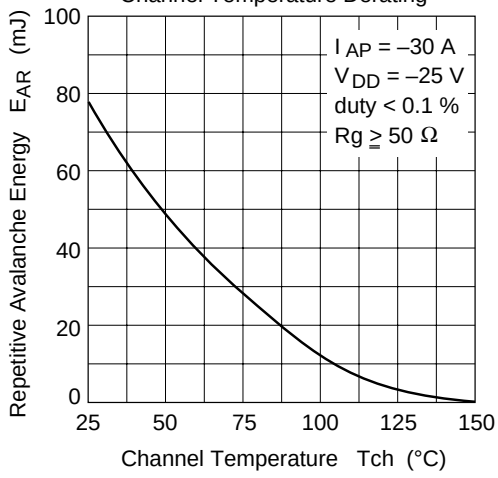

Switching Characteristics



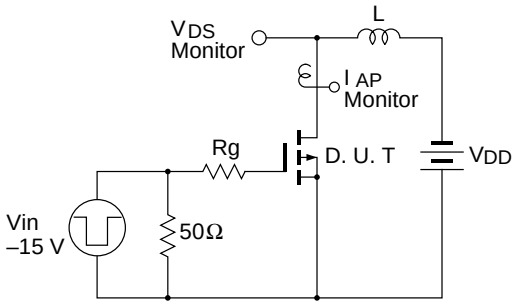
Reverse Drain Current vs.
Source to Drain Voltage




Maximum Avalanche Energy vs.
Channel Temperature Derating

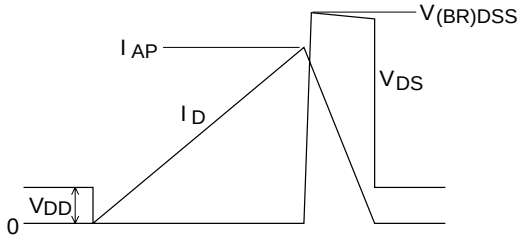


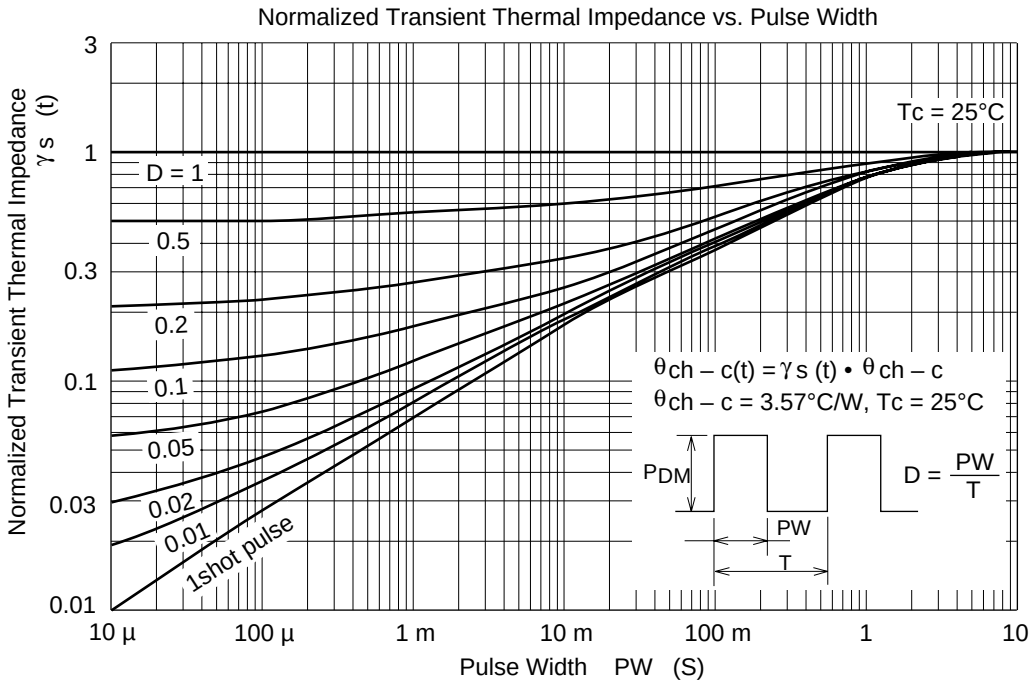

Avalanche Test Circuit



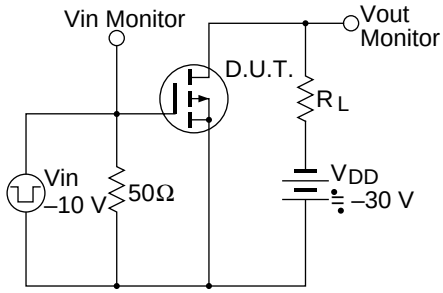

Avalanche Waveform

$$E_{AR} = \frac{1}{2} \bullet L \bullet I_{AP}^{2} \bullet \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

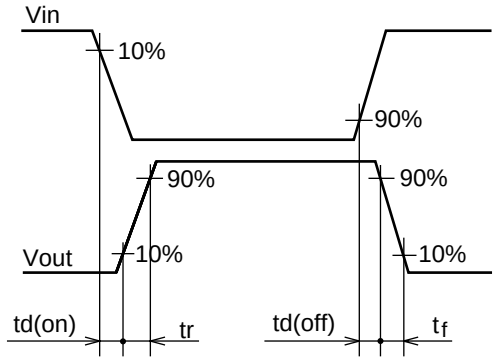





Switching Time Test Circuit



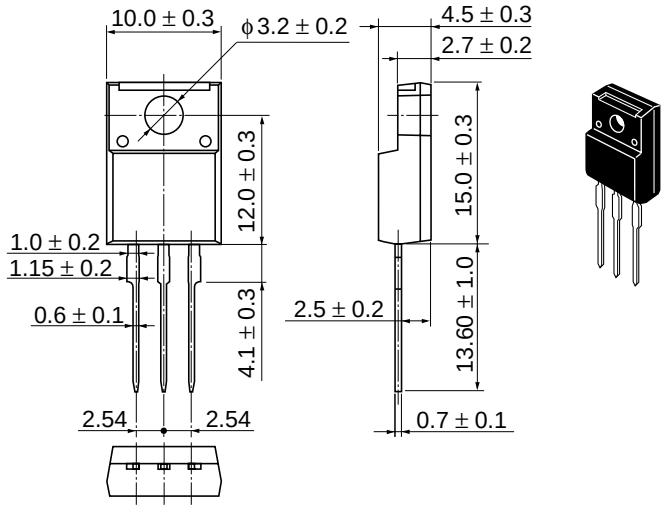

Waveform



## Package Dimensions

As of January, 2001

Unit: mm




| | |
|---|---|
| Hitachi Code | TO-220CFM |
| JEDEC | — |
| EIAJ | — |
| Mass (reference value) | 1.9 g |

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