

To all our customers

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

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Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.

Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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2SK2738

Silicon N Channel MOS FET
High Speed Power Switching

RENESAS

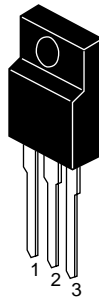
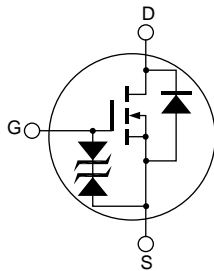
ADE-208-483 (Z)
1st. Edition
Jun 1997

Features

- Low on-resistance
 $R_{DS} = 15 \text{ m}\Omega$ typ
- High speed switching
- 4V gate drive device can be driven from 5V source

Outline

TO-220CFM



1. Gate
2. Drain
3. Source

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Item | Symbol | Ratings | Unit |
|---|---------------------|----------------|------------------|
| Drain to source voltage | V_{DSS} | 60 | V |
| Gate to source voltage | V_{GSS} | ± 20 | V |
| Drain current | I_D | 40 | A |
| Drain peak current | $I_{D(pulse)}^{*1}$ | 160 | A |
| Body to drain diode reverse drain current | I_{DR} | 40 | A |
| Avalanche current | I_{AP}^{*3} | 40 | A |
| Avalanche Energy | E_{AR}^{*3} | 137 | mJ |
| Channel dissipation | P_{ch}^{*2} | 30 | W |
| Channel temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 to +150 | $^\circ\text{C}$ |

Notes: 1. $PW \leq 10\mu\text{s}$, duty cycle $\leq 1\%$

2. Value at $T_c = 25^\circ\text{C}$

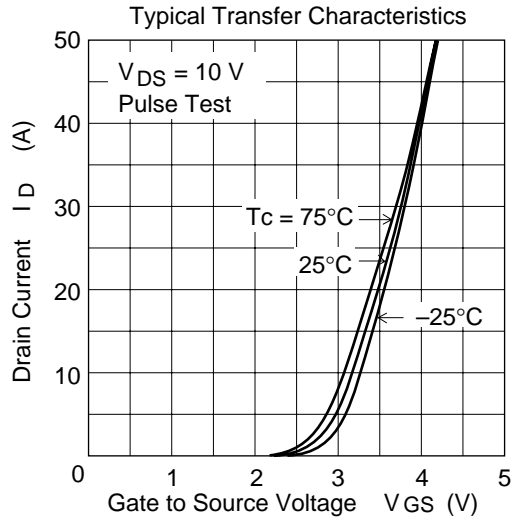
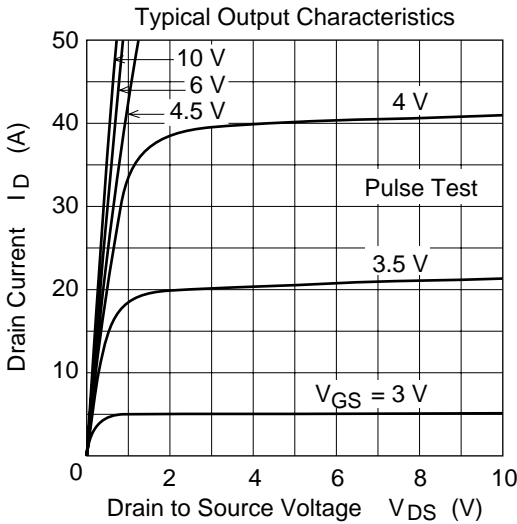
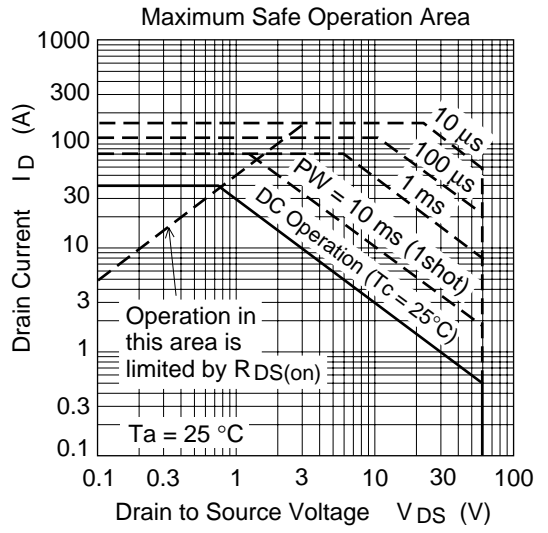
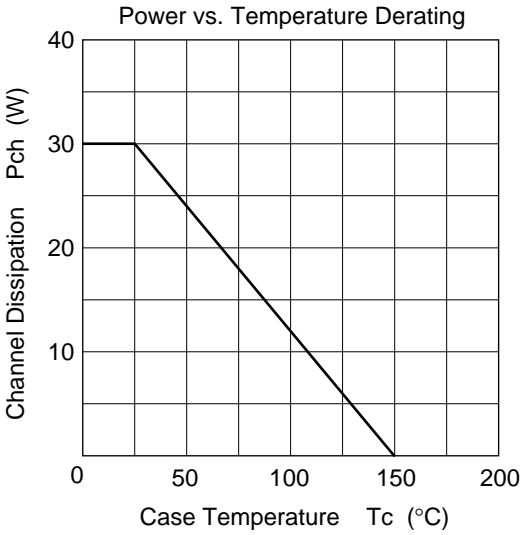
3. Value at $T_{ch} = 25^\circ\text{C}$, $R_g = 50\ \Omega$

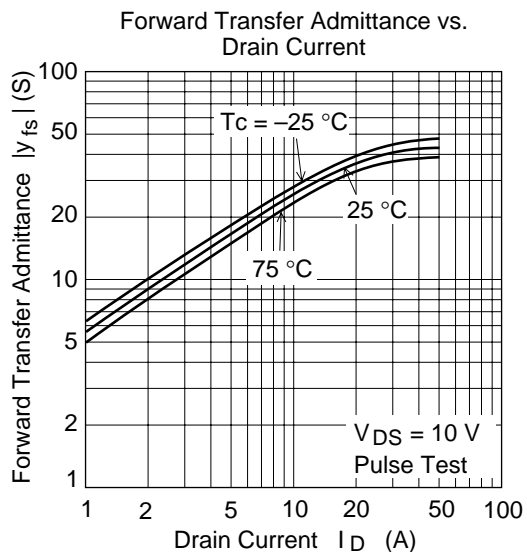
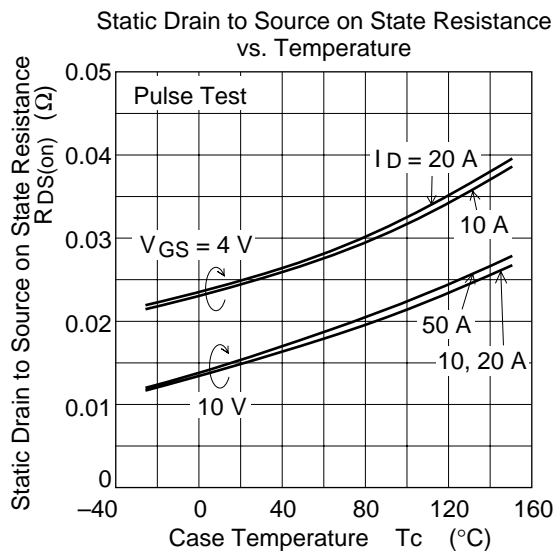
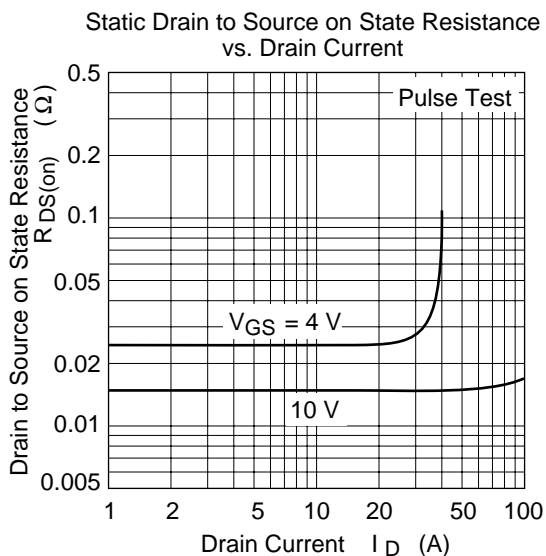
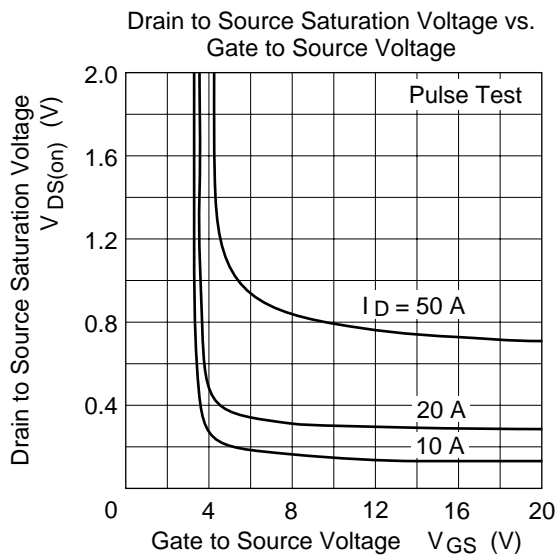
Electrical Characteristics (Ta = 25°C)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|--|---------------|----------|------|----------|------------------|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 60 | — | — | V | $I_D = 10\text{mA}$, $V_{GS} = 0$ |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ± 20 | — | — | V | $I_G = \pm 100\mu\text{A}$, $V_{DS} = 0$ |
| Gate to source leak current | I_{GSS} | — | — | ± 10 | μA | $V_{GS} = \pm 16\text{V}$, $V_{DS} = 0$ |
| Zero gate voltage drain current | I_{DSS} | — | — | 10 | μA | $V_{DS} = 60\text{V}$, $V_{GS} = 0$ |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 1.5 | — | 2.5 | V | $I_D = 1\text{mA}$, $V_{DS} = 10\text{V}$ |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 15 | 20 | $\text{m}\Omega$ | $I_D = 20\text{A}$, $V_{GS} = 10\text{V}^{*1}$ |
| | $R_{DS(on)}$ | — | 25 | 40 | $\text{m}\Omega$ | $I_D = 20\text{A}$, $V_{GS} = 4\text{V}^{*1}$ |
| Forward transfer admittance | $ y_{fs} $ | 20 | 35 | — | S | $I_D = 20\text{A}$, $V_{DS} = 10\text{V}^{*1}$ |
| Input capacitance | C_{iss} | — | 1500 | — | pF | $V_{DS} = 10\text{V}$ |
| Output capacitance | C_{oss} | — | 720 | — | pF | $V_{GS} = 0$ |
| Reverse transfer capacitance | C_{rss} | — | 200 | — | pF | $f = 1\text{MHz}$ |
| Turn-on delay time | $t_{d(on)}$ | — | 20 | — | ns | $I_D = 20\text{A}$, $V_{GS} = 10\text{V}$ |
| Rise time | t_r | — | 180 | — | ns | $R_L = 1.5\Omega$ |
| Turn-off delay time | $t_{d(off)}$ | — | 200 | — | ns | |
| Fall time | t_f | — | 200 | — | ns | |
| Body to drain diode forward voltage | VDF | — | 0.95 | — | V | $I_F = 40\text{A}$, $V_{GS} = 0$ $di_F/dt = 50\text{A}/\mu\text{s}$ |
| Body to drain diode reverse recovery time | t_{rr} | — | 70 | — | V | $I_F = 40\text{A}$, $V_{GS} = 0$ $di_r/dt = 50\text{A}/\mu\text{s}$ |

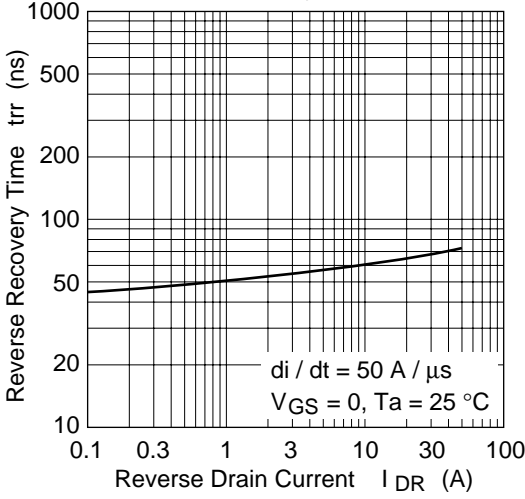
Note: 1. Pulse test

Main Characteristics

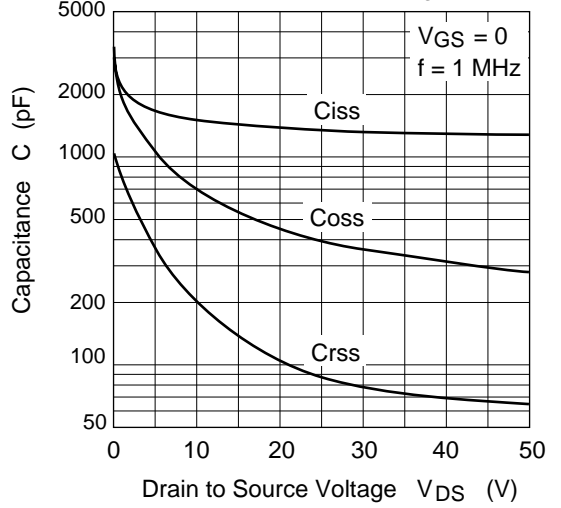




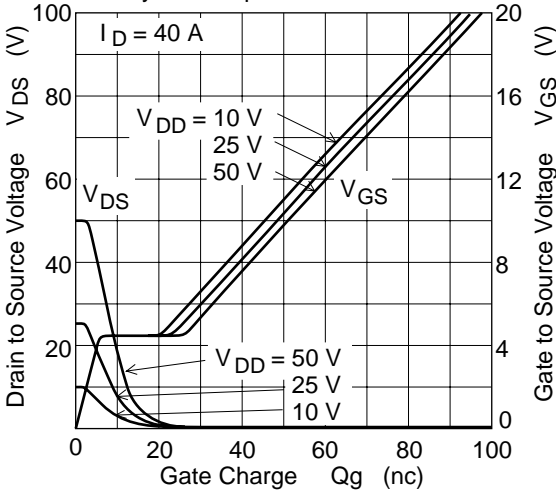
Body to Drain Diode Reverse Recovery Time



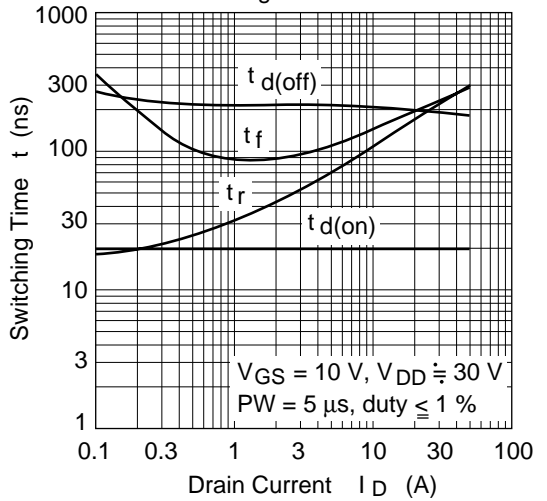
Typical Capacitance vs. Drain to Source Voltage



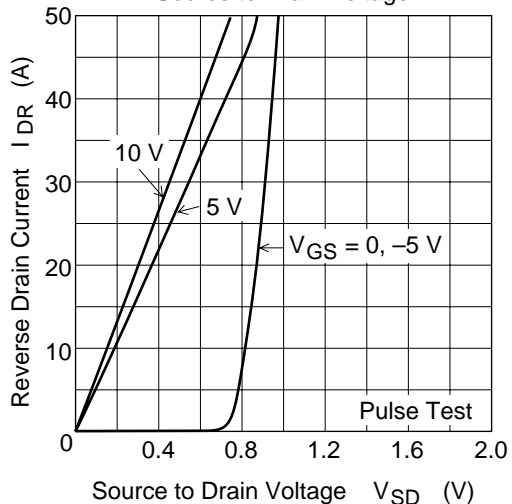
Dynamic Input Characteristics



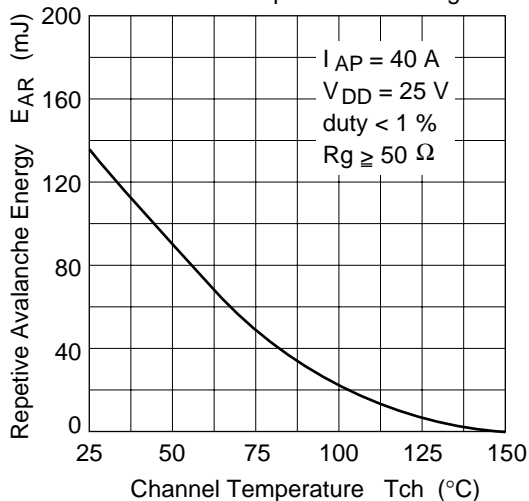
Switching Characteristics



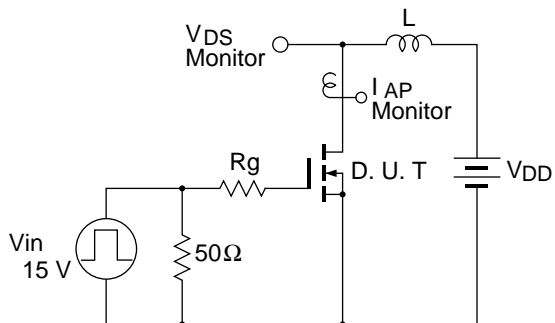
Reverse Drain Current vs. Source to Drain Voltage



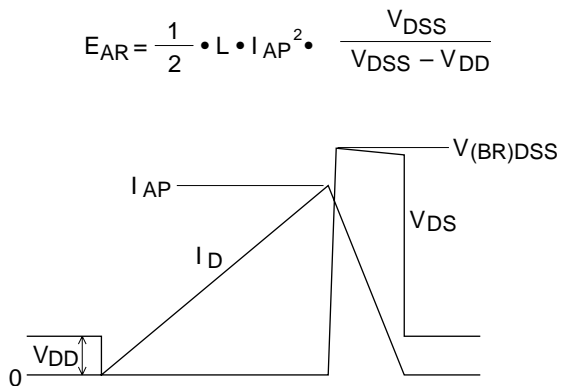
Maximum Avalanche Energy vs. Channel Temperature Derating



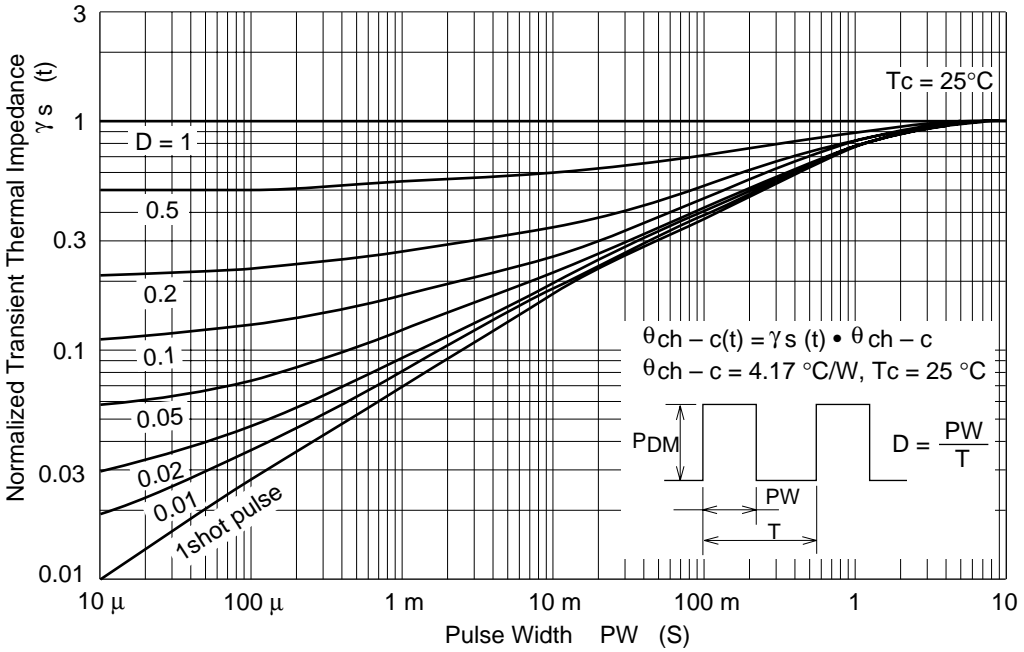
Avalanche Test Circuit



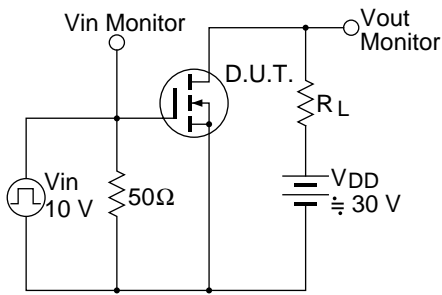
Avalanche Waveform



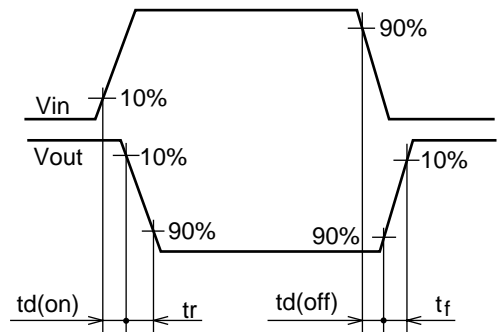
Normalized Transient Thermal Impedance vs. Pulse Width



Switching Time Test Circuit



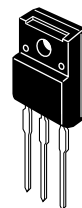
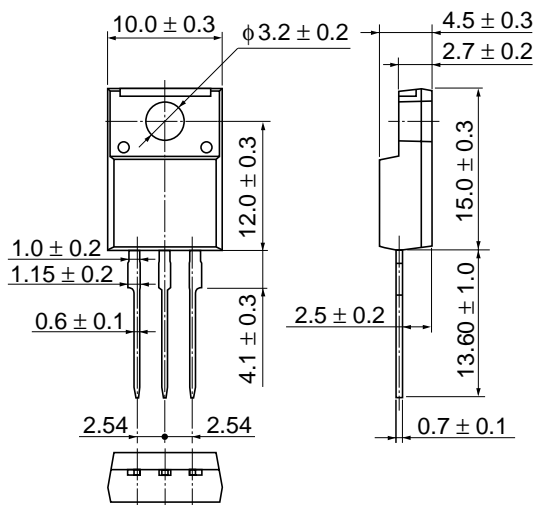
Switching Time Waveforms



Package Dimensions

As of January, 2001

Unit: mm



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

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Colophon 2.0



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