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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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HAT2070R

Silicon N Channel Power MOS FET Power Switching

RENESAS

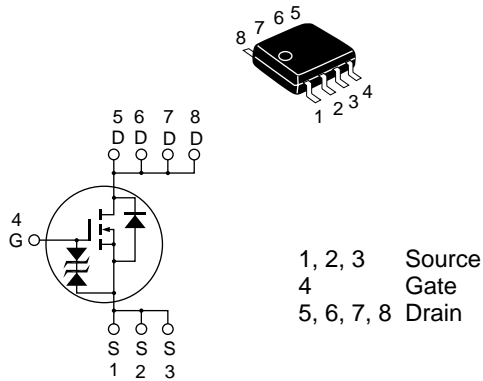
ADE-208-1226B (Z)
3rd. Edition
Jan. 2001

Features

- Capable of 4.5 V gate drive
- Low drive current
- High density mounting
- Low on-resistance
 $R_{DS(on)} = 11 \text{ m}\Omega \text{ typ}$ (at $V_{GS} = 10\text{V}$)

Outline

SOP-8



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	30	V
Gate to source voltage	V_{GSS}	± 20	V
Drain current	I_D	12	A
Drain peak current	$I_{D(pulse)}$ ^{Note1}	96	A
Body-drain diode reverse drain current	I_{DR}	12	A
Channel dissipation	Pch ^{Note2}	2.5	W
Channel to Ambient Thermal Impedance	θ_{ch-a} ^{Note2}	50	°C/W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	- 55 to + 150	°C

Note: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$

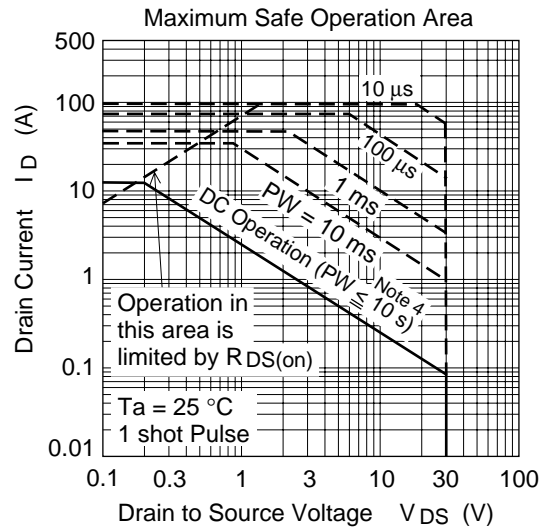
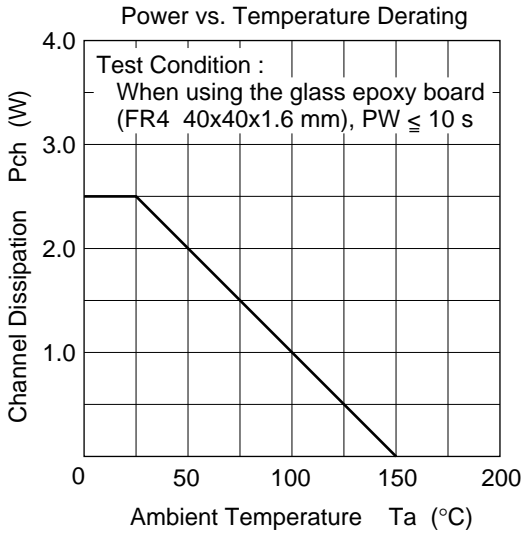
2. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), $PW \leq 10s$

Electrical Characteristics (Ta = 25°C)

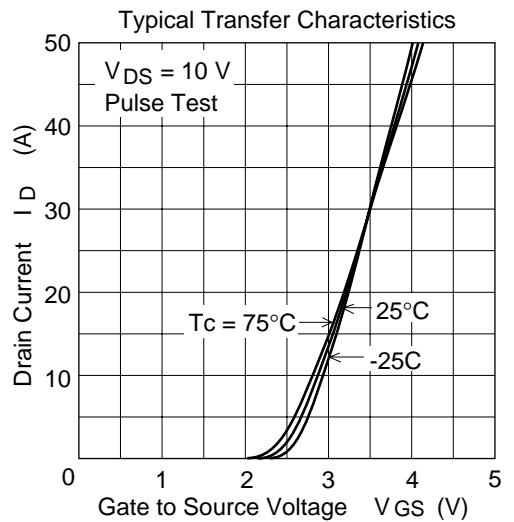
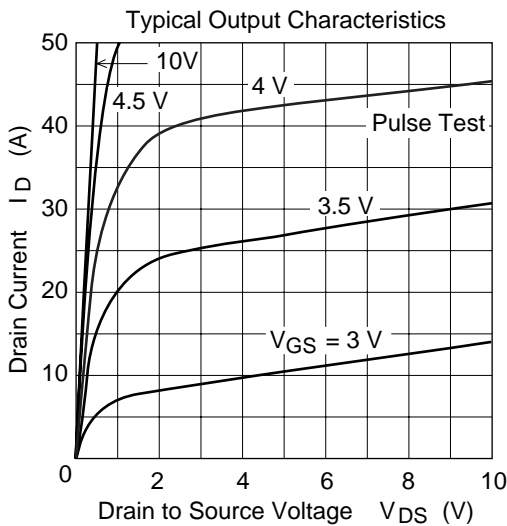
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	$I_D = 10 \text{ mA}, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}, V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 30 \text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	11	14	$\text{m}\Omega$	$I_D = 6 \text{ A}, V_{GS} = 10 \text{ V}$ ^{Note3}
	$R_{DS(on)}$	—	15	22	$\text{m}\Omega$	$I_D = 6 \text{ A}, V_{GS} = 4.5 \text{ V}$ ^{Note3}
Forward transfer admittance	$ y_{fs} $	12	20	—	S	$I_D = 6 \text{ A}, V_{DS} = 10 \text{ V}$ ^{Note3}
Input capacitance	Ciss	—	1400	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	Coss	—	340	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	Crss	—	190	—	pF	$f = 1 \text{ MHz}$
Total gate charge	Qg	—	23	—	nc	$V_{DD} = 10 \text{ V}$
Gate to source charge	Qgs	—	4	—	nc	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Qgd	—	4	—	nc	$I_D = 12 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	$V_{GS} = 10 \text{ V}, I_D = 6 \text{ A}$
Rise time	t_r	—	18	—	ns	$V_{DD} \cong 10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	50	—	ns	$R_L = 1.67 \text{ }\Omega$
Fall time	t_f	—	9	—	ns	$R_g = 4.7 \text{ }\Omega$
Body-drain diode forward voltage	V_{DF}	—	0.85	1.10	V	$I_F = 12 \text{ A}, V_{GS} = 0$ ^{Note3}
Body-drain diode reverse recovery time	t_{rr}	—	50	—	ns	$I_F = 12 \text{ A}, V_{GS} = 0$ $diF/dt = 50 \text{ A}/\mu\text{s}$

Note: 3. Pulse test

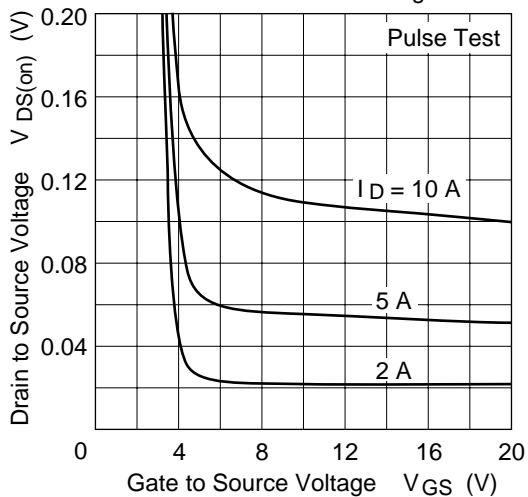
Main Characteristics



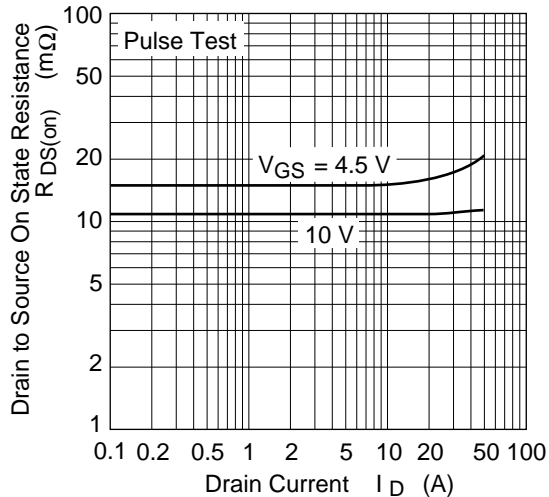
Note 4 :
When using the glass epoxy board
(FR4 40x40x1.6 mm)



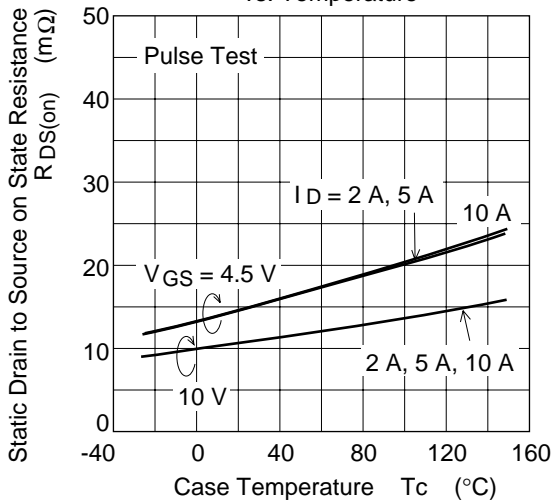
Drain to Source Saturation Voltage vs. Gate to Source Voltage



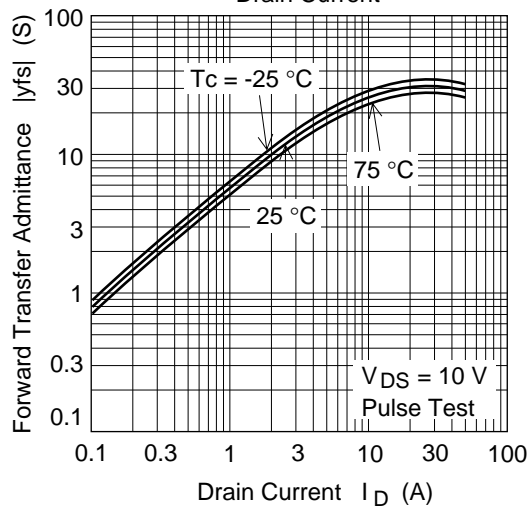
Static Drain to Source on State Resistance vs. Drain Current



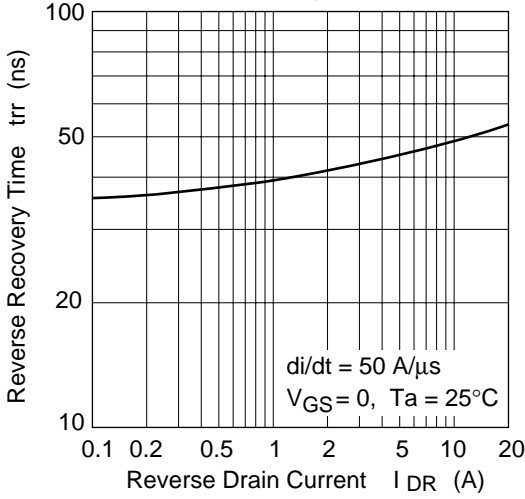
Static Drain to Source on State Resistance vs. Temperature



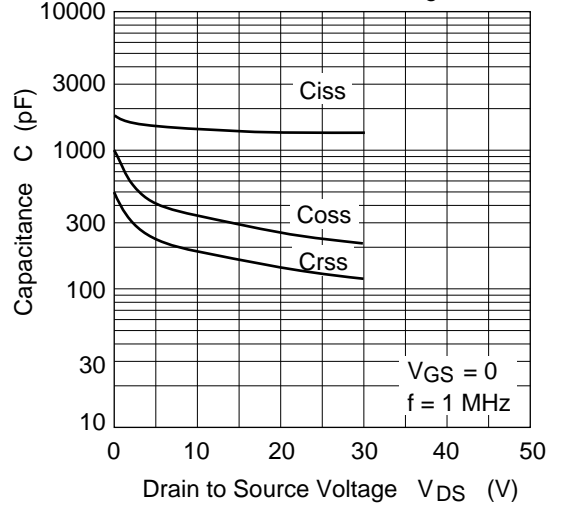
Forward Transfer Admittance vs. Drain Current



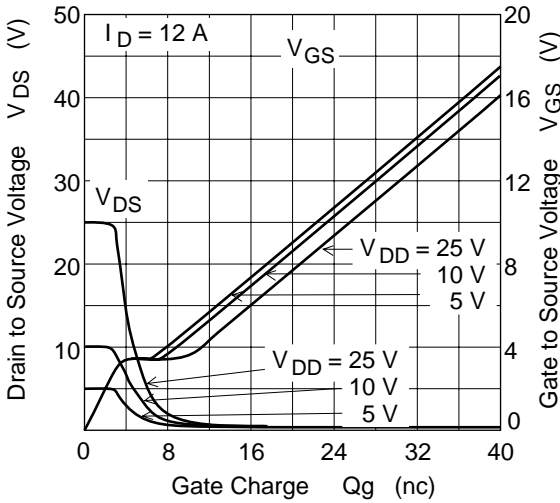
Body—Drain Diode Reverse Recovery Time



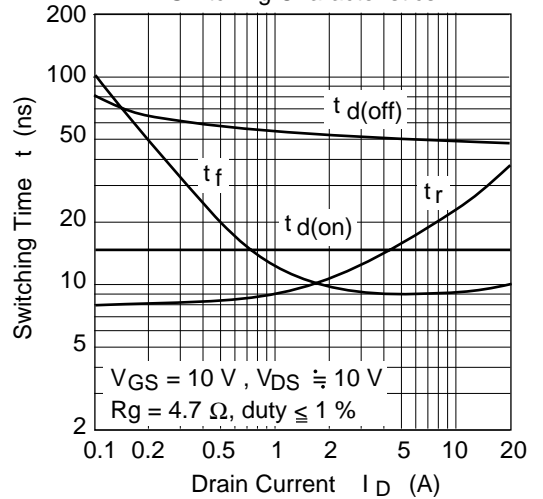
Typical Capacitance vs. Drain to Source Voltage

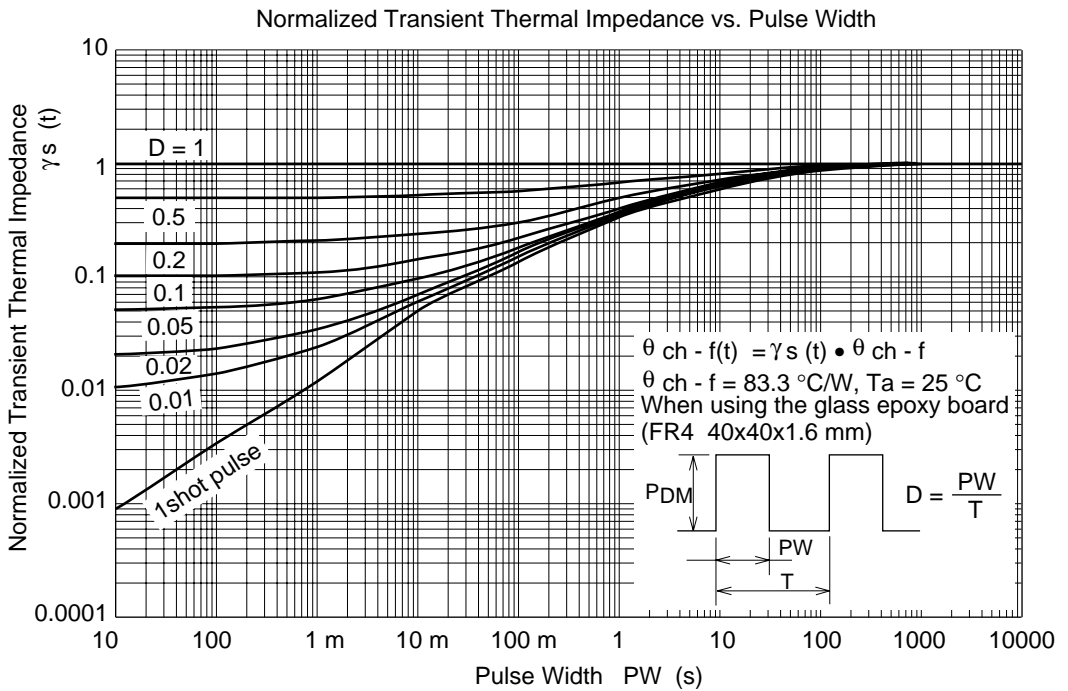
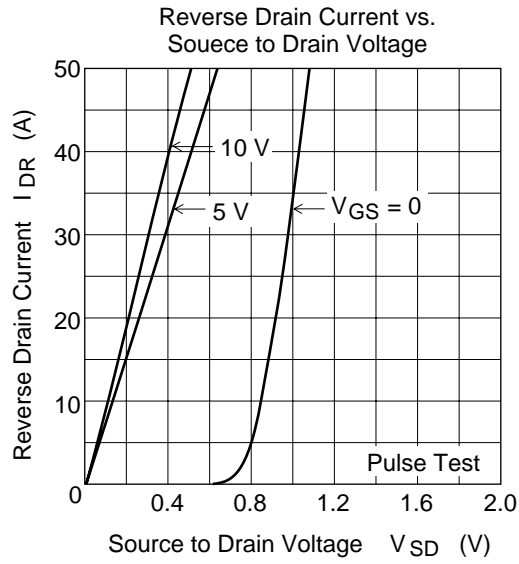


Dynamic Input Characteristics

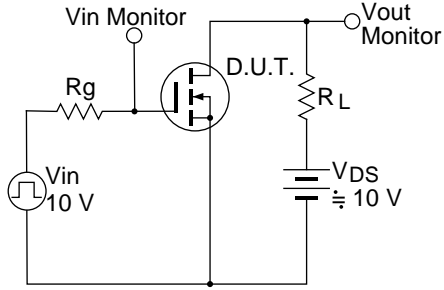


Switching Characteristics

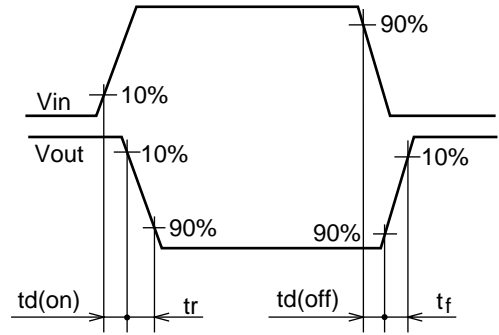




Switching Time Test Circuit



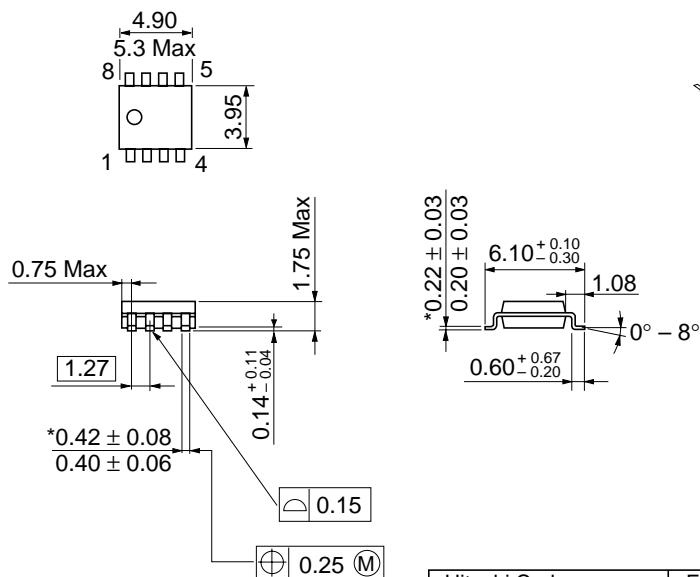
Switching Time Waveform



Package Dimensions

As of January, 2001

Unit: mm



*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-8DA
JEDEC	Conforms
EIAJ	—
Mass (reference value)	0.085 g

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