

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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# HAT2024R

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

# RENESAS

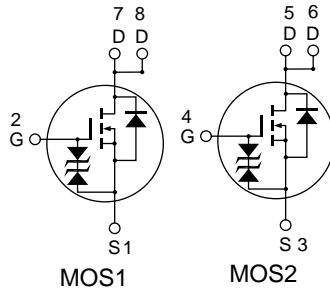
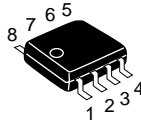
ADE-208-494C (Z)  
4th. Edition  
Aug. 1997

### Features

- Low on-resistance
- Capable of 4 V gate drive
- Low drive current
- High density mounting

### Outline

SOP-8



1, 3            S  
2, 4            G  
5, 6, 7, 8    Dra

## 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	$I_D$	5.5	A
Drain peak current	$I_{D(pulse)}^{*1}$	44	A
Body to drain diode reverse drain current	$I_{DR}$	5.5	A
Channel dissipation	$Pch^{*2}$	2	W
Channel dissipation	$Pch^{*3}$	3	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

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

2. 1 Drive operation : When using the glass epoxy board (FR4 40 x 40 x 1.6 mm),  $PW \leq 10s$

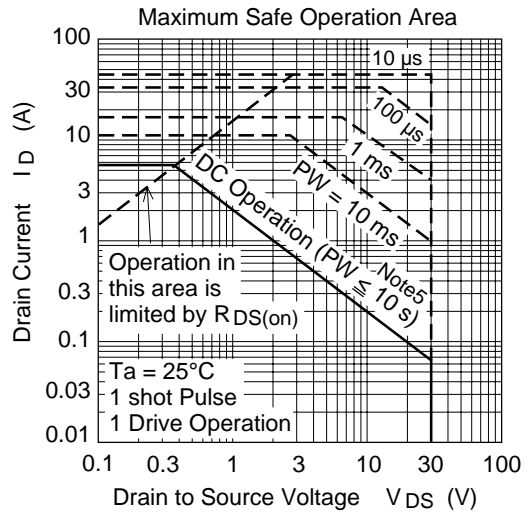
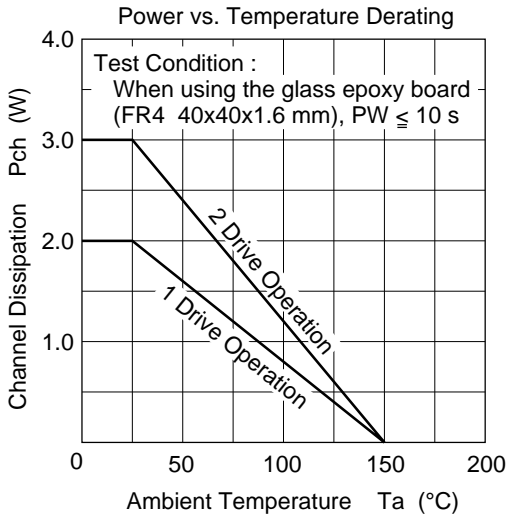
3. 2 Drive operation : When using the glass epoxy board (FR4 40 x 40 x 1.6 mm),  $PW \leq 10s$

## Electrical Characteristics (Ta = 25°C)

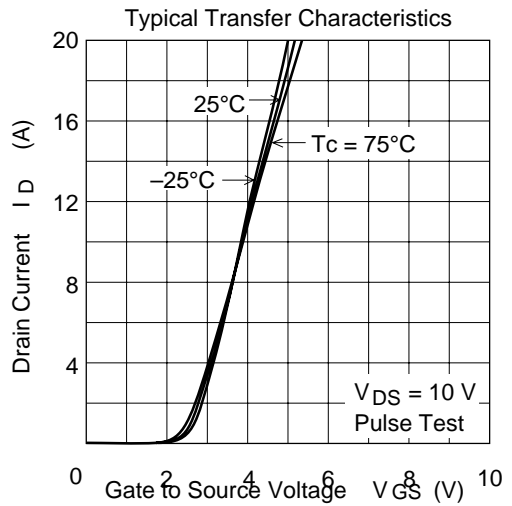
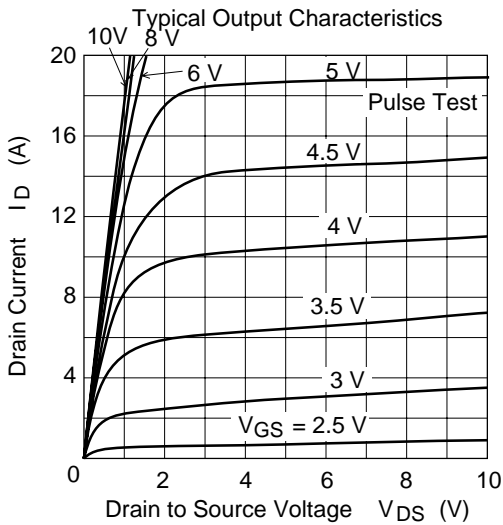
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	$I_D = 10\text{mA}$ , $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	$\pm 20$	—	—	V	$I_G = \pm 100\mu\text{A}$ , $V_{DS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 16\text{V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	10	$\mu\text{A}$	$V_{DS} = 30\text{V}$ , $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.0	V	$V_{DS} = 10\text{V}$ , $I_D = 1\text{mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.05	0.065	$\Omega$	$I_D = 3\text{A}$ , $V_{GS} = 10\text{V}^{*1}$
	$R_{DS(on)}$	—	0.078	0.11	$\Omega$	$I_D = 3\text{A}$ , $V_{GS} = 4\text{V}^{*1}$
Forward transfer admittance	$ y_{fs} $	3.5	5.5	—	S	$I_D = 3\text{A}$ , $V_{DS} = 10\text{V}^{*1}$
Input capacitance	$C_{iss}$	—	310	—	pF	$V_{DS} = 10\text{V}$
Output capacitance	$C_{oss}$	—	220	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	100	—	pF	$f = 1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	—	17	—	ns	$V_{GS} = 4\text{V}$ , $I_D = 3\text{A}$
Rise time	$t_r$	—	190	—	ns	$V_{DD} \cong 10\text{V}$
Turn-off delay time	$t_{d(off)}$	—	25	—	ns	
Fall time	$t_f$	—	60	—	ns	
Body to drain diode forward voltage	$V_{DF}$	—	0.9	1.4	V	$I_F = 5.5\text{A}$ , $V_{GS} = 0^{*1}$
Body to drain diode reverse recovery time	$t_{rr}$	—	50	—	ns	$I_F = 5.5\text{A}$ , $V_{GS} = 0$ $diF/dt = 20\text{A}/\mu\text{s}$

Note: 1. Pulse test

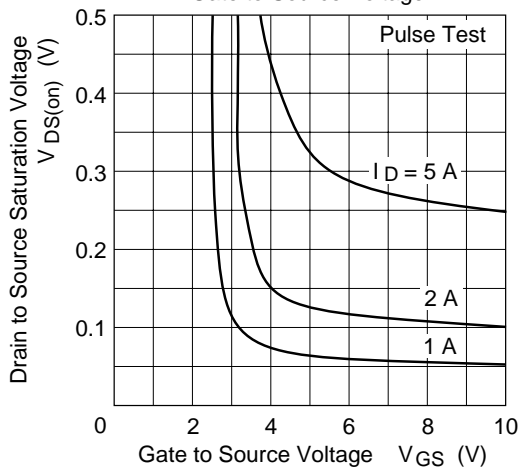
## Main Characteristics



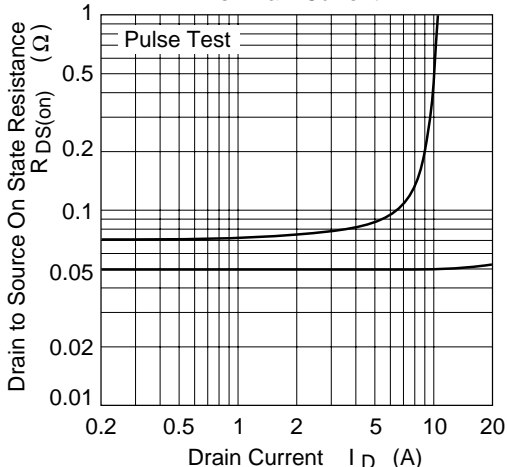
Note 5 :  
When using the glass epoxy board (FR4 40x40x1.6 mm)



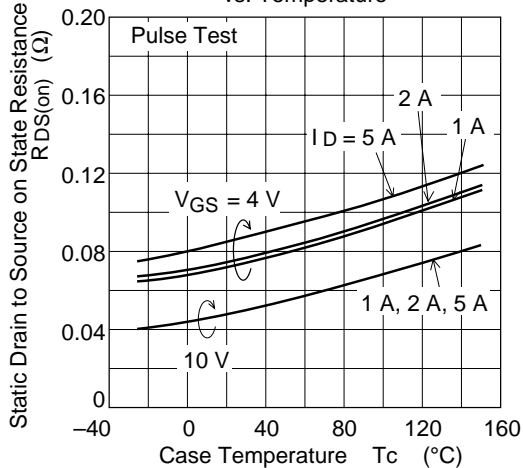
Drain to Source Saturation Voltage vs. Gate to Source Voltage



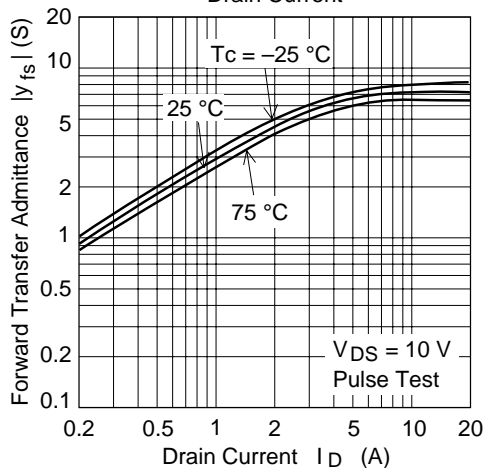
Static Drain to Source on State Resistance vs. Drain Current



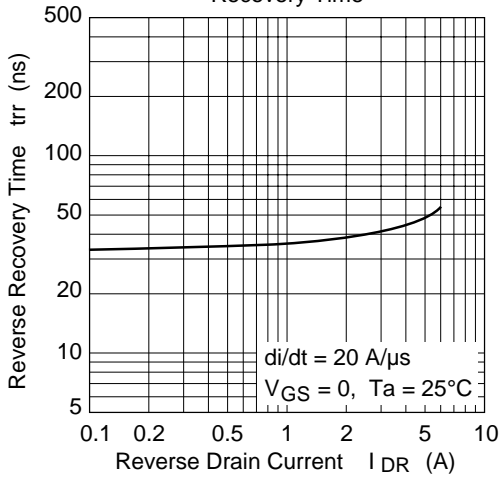
Static Drain to Source on State Resistance vs. Temperature



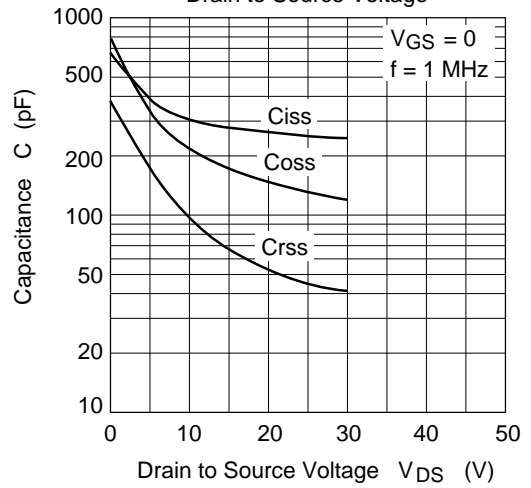
Forward Transfer Admittance vs. Drain Current



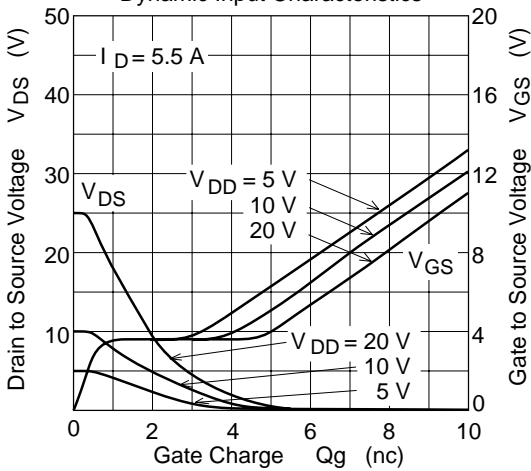
Body-Drain Diode Reverse Recovery Time



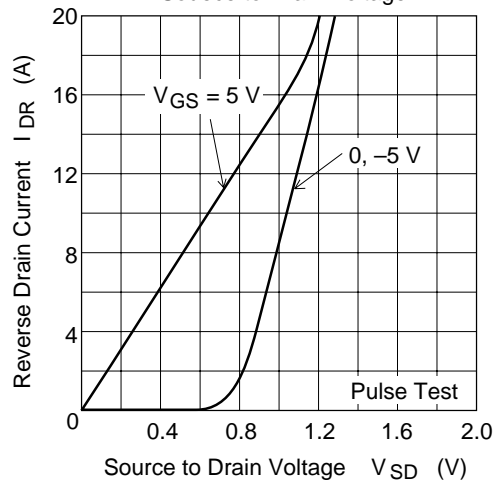
Typical Capacitance vs. Drain to Source Voltage



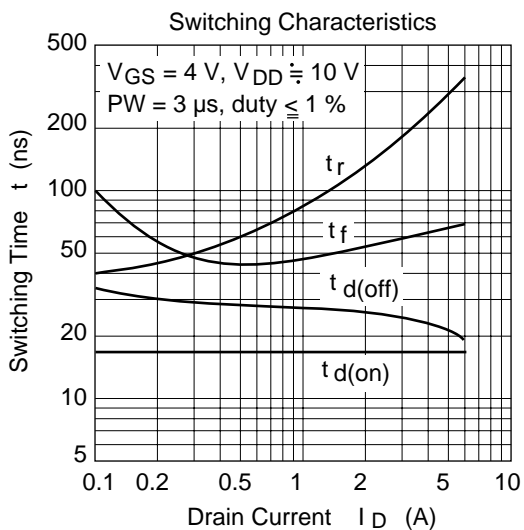
Dynamic Input Characteristics



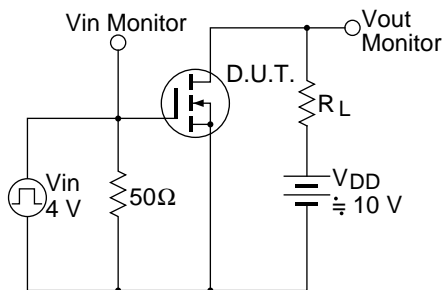
Reverse Drain Current vs. Source to Drain Voltage



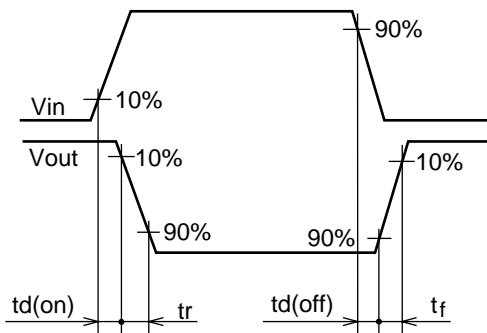


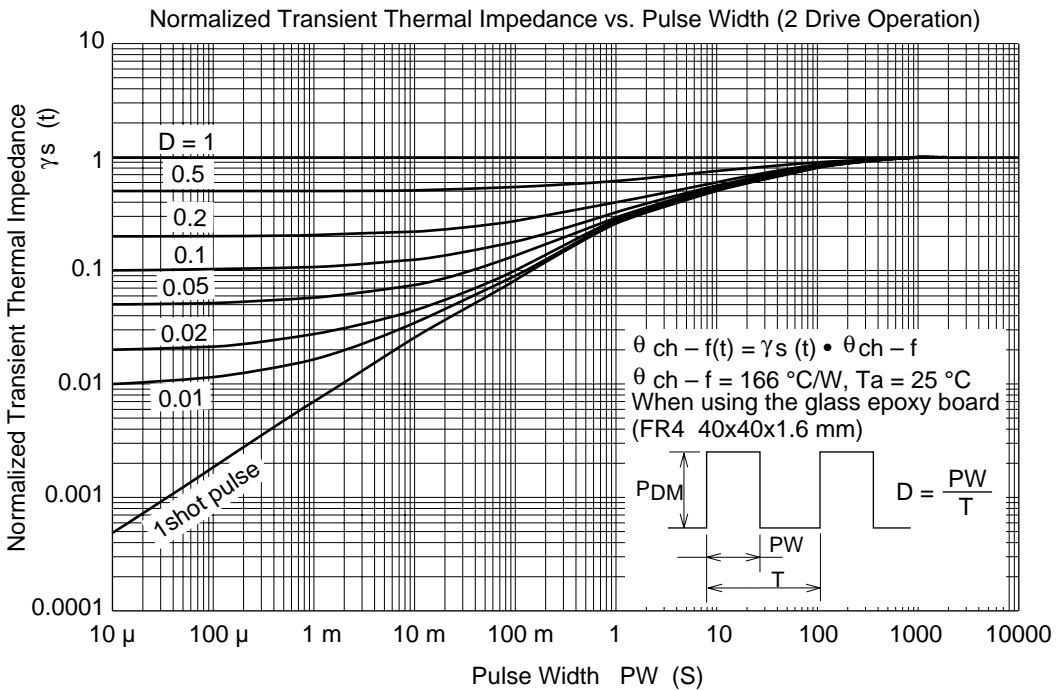
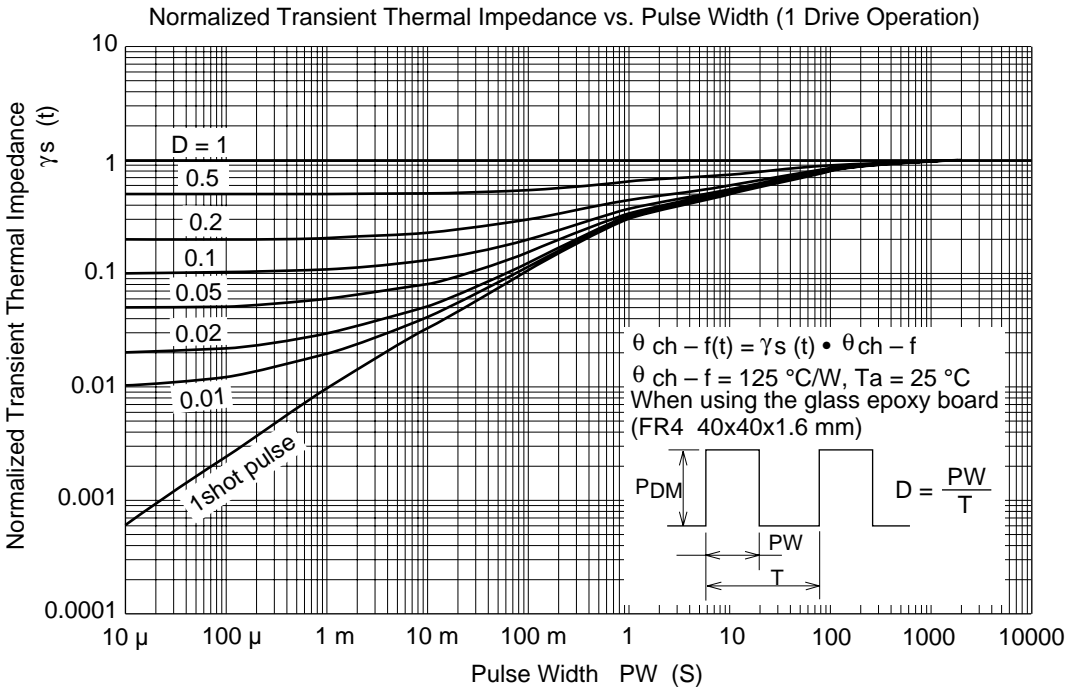


Switching Time Test Circuit



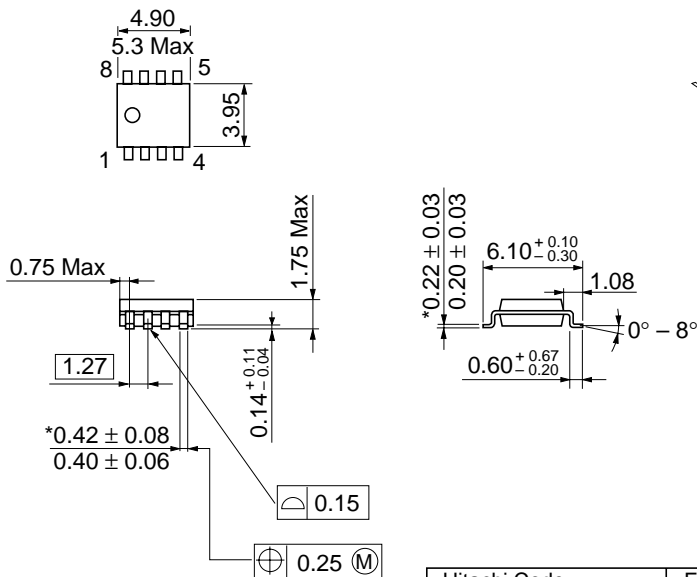
Switching Time Waveform





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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