

To all our customers

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

## Cautions

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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# 2SK3209

## Silicon N Channel MOS FET High Speed Power Switching

# RENESAS

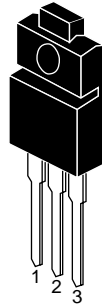
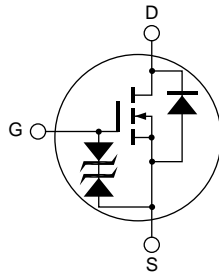
ADE-208-759A (Z)  
Target Specification 2nd. Edition  
Mar. 2001

### Features

- Low on-resistance  
 $R_{DS} = 40\text{m}\Omega$  typ.
- High speed switching
- 4V gate drive device can be driven from 5V source

### Outline

TO-220FM



1. Gate
2. Drain
3. Source

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

<b>Item</b>	<b>Symbol</b>	<b>Ratings</b>	<b>Unit</b>
Drain to source voltage	V <sub>DSS</sub>	150	V
Gate to source voltage	V <sub>GSS</sub>	±20	V
Drain current	I <sub>D</sub>	25	A
Drain peak current	I <sub>D(pulse)</sub> <sup>*1</sup>	100	A
Body-drain diode reverse drain current	I <sub>DR</sub>	25	A
Avalanche current	I <sub>AP</sub> <sup>*3</sup>	25	A
Avalanche energy	E <sub>AR</sub> <sup>*3</sup>	46	mJ
Channel dissipation	Pch <sup>*2</sup>	35	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

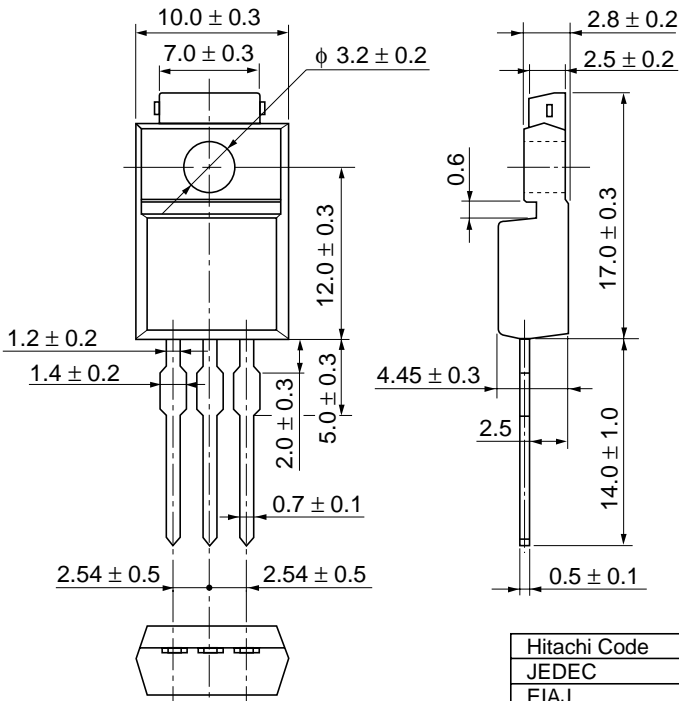
Note: 1. PW ≤ 10μs, duty cycle ≤ 1 %  
2. Value at Tc = 25°C  
3. Value at Tch = 25°C, Rg ≥ 50Ω

## Electrical Characteristics (Ta = 25°C)

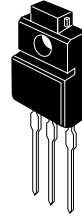
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	150	—	—	V	$I_D = 10\text{mA}, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	$\pm 20$	—	—	V	$I_G = \pm 100\mu\text{A}, V_{DS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 16\text{V}, V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	10	$\mu\text{A}$	$V_{DS} = 150\text{V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	$I_D = 1\text{mA}, V_{DS} = 10\text{V}$
Static drain to source on state resistance	$R_{DS(on)}$	—	40	45	$\text{m}\Omega$	$I_D = 15\text{A}, V_{GS} = 10\text{V}^{*4}$
	$R_{DS(on)}$	—	45	63	$\text{m}\Omega$	$I_D = 15\text{A}, V_{GS} = 4\text{V}^{*4}$
Forward transfer admittance	$ y_{fs} $	18	30	—	S	$I_D = 15\text{A}, V_{DS} = 10\text{V}^{*4}$
Input capacitance	$C_{iss}$	—	2600	—	pF	$V_{DS} = 10\text{V}$
Output capacitance	$C_{oss}$	—	820	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	350	—	pF	$f = 1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	—	25	—	ns	$I_D = 15\text{A}, V_{GS} = 10\text{V}$
Rise time	$t_r$	—	180	—	ns	$R_L = 2\Omega$
Turn-off delay time	$t_{d(off)}$	—	600	—	ns	
Fall time	$t_f$	—	280	—	ns	
Body-drain diode forward voltage	$V_{DF}$	—	0.90	—	V	$I_F = 25\text{A}, V_{GS} = 0$
Body-drain diode reverse recovery time	$t_{rr}$	—	100	—	ns	$I_F = 25\text{A}, V_{GS} = 0$ $diF/dt = 50\text{A}/\mu\text{s}$

Note: 4. Pulse test

Package Dimensions



As of January, 2001  
Unit: mm



Hitachi Code	TO-220FM
JEDEC	—
EIAJ	Conforms
Mass (reference value)	1.8 g

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# HITACHI

## Hitachi, Ltd.

Semiconductor & Integrated Circuits.

Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL	NorthAmerica	: <a href="http://semiconductor.hitachi.com/">http://semiconductor.hitachi.com/</a>
	Europe	: <a href="http://www.hitachi-eu.com/hel/ecg">http://www.hitachi-eu.com/hel/ecg</a>
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### For further information write to:

Hitachi Semiconductor  
(America) Inc.  
179 East Tasman Drive,  
San Jose, CA 95134  
Tel: <1> (408) 433-1990  
Fax: <1> (408) 433-0223

Hitachi Europe GmbH  
Electronic Components Group  
Dornacher Straße 3  
D-85622 Feldkirchen, Munich  
Germany  
Tel: <49> (89) 9 9180-0  
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.  
Electronic Components Group.  
Whitebrook Park  
Lower Cookham Road  
Maidenhead  
Berkshire SL6 8YA, United Kingdom  
Tel: <44> (1628) 585000  
Fax: <44> (1628) 585160

Hitachi Asia Ltd.  
Hitachi Tower  
16 Collyer Quay #20-00,  
Singapore 049318  
Tel : <65>-538-6533/538-8577  
Fax : <65>-538-6933/538-3877  
URL : <http://www.hitachi.com.sg>

Hitachi Asia Ltd.  
(Taipei Branch Office)  
4/F, No. 167, Tun Hwa North Road,  
Hung-Kuo Building,  
Taipei (105), Taiwan  
Tel : <886>-(2)-2718-3666  
Fax : <886>-(2)-2718-8180  
Telex : 23222 HAS-TP  
URL : <http://www.hitachi.com.tw>

Hitachi Asia (Hong Kong) Ltd.  
Group III (Electronic Components)  
7/F., North Tower,  
World Finance Centre,  
Harbour City, Canton Road  
Tsim Sha Tsui, Kowloon,  
Hong Kong  
Tel : <852>-(2)-735-9218  
Fax : <852>-(2)-730-0281  
URL : <http://www.hitachi.com.hk>