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

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Keep safety first in your circuit designs!

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HTT1115S

Silicon NPN Epitaxial Twin Transistor

RENESAS

ADE-208-1440C(Z)

Rev.3
Aug. 2001

Features

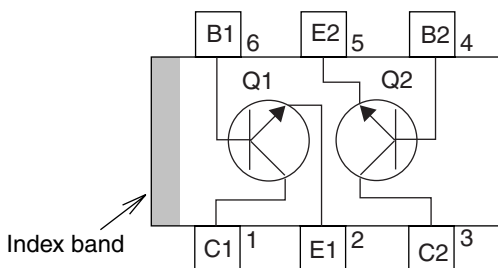
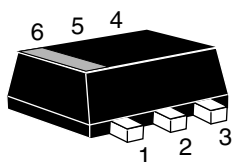
- Include 2 transistors in a small size SMD package: SMFPAK-6(6 Leads: 1.5 x 1.1 x 0.55 mm)

Q1: Equivalent Buffer transistor	Q2: Equivalent OSC transistor
2SC5700	2SC5757

Outline

SMFPAK-6

Pin Arrangement



- | | |
|-----------------|---------------|
| 1. Collector Q1 | 4. Base Q2 |
| 2. Emitter Q1 | 5. Emitter Q2 |
| 3. Collector Q2 | 6. Base Q1 |

Note: Marking is "EK1".

Absolute Maximum Ratings

(Ta = 25 °C)

Item	Symbol	Ratings		Unit
		Q1	Q2	
Collector to base voltage	V_{CBO}	15	10	V
Collector to emitter voltage	V_{CEO}	4	3.5	V
Emitter to base voltage	V_{EBO}	1.5	1.5	V
Collector current	I_C	50	80	mA
Collector power dissipation	P_C	Total 220*		mW
Junction temperature	T_j	150	150	°C
Storage temperature	T_{stg}	-55 to +150	-55 to +150	°C

*Value on PCB. (FR-4(13 x 13 x 0.635 mm))

Electrical Characteristics (Q1)

(Ta = 25°C)

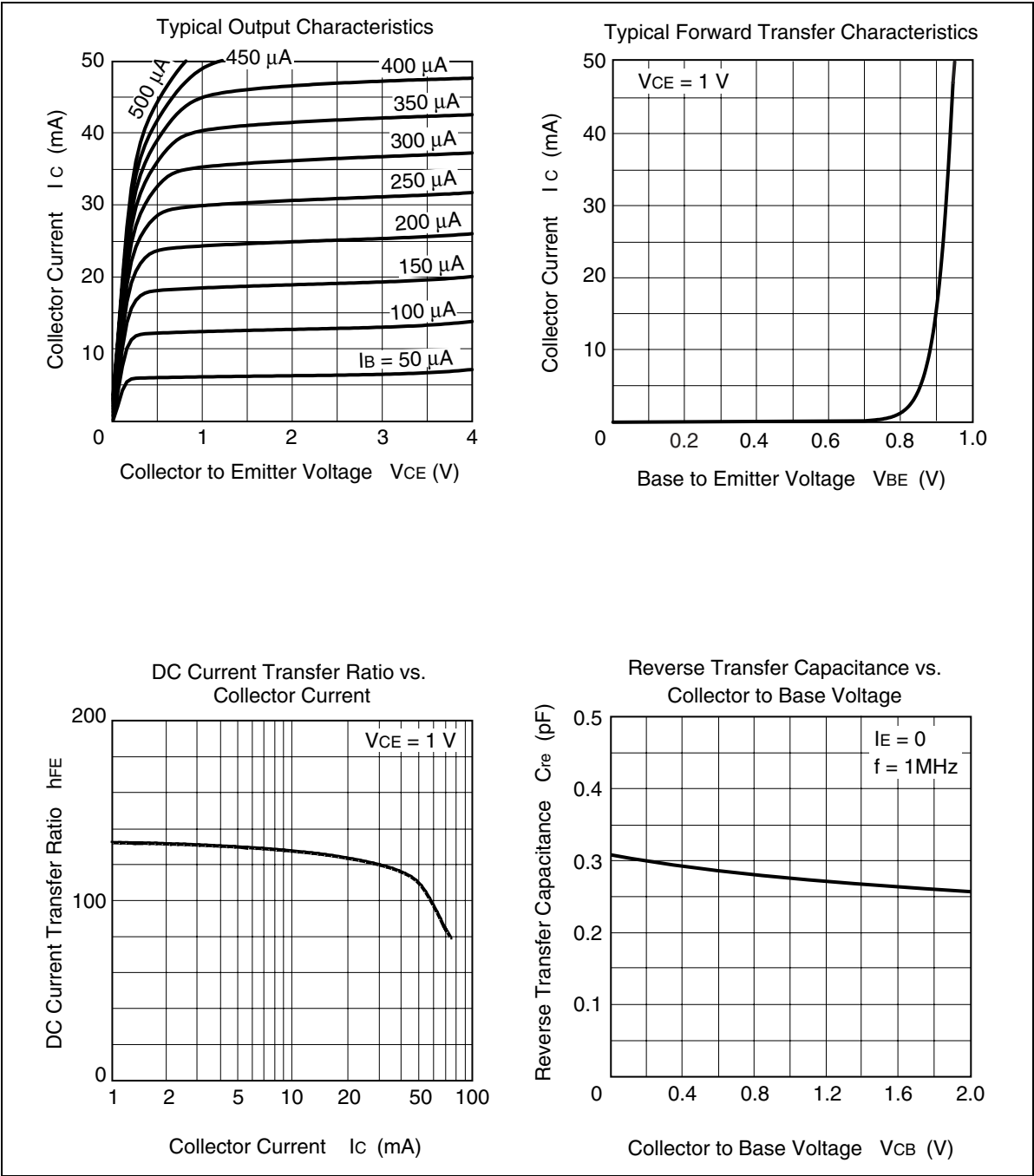
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Collector to base breakdown voltage	$V_{(BR)CBO}$	15	—	—	V	$I_C = 10 \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	0.1	μA	$V_{CB} = 15 V, I_E = 0$
Collector cutoff current	I_{CEO}	—	—	1	μA	$V_{CE} = 4 V, R_{BE} = \text{infinite}$
Emitter cutoff current	I_{EBO}	—	—	0.2	μA	$V_{EB} = 0.8 V, I_C = 0$
DC current transfer ratio	h_{FE}	100	130	170	—	$V_{CE} = 1 V, I_C = 5 mA$
Reverse transfer capacitance	C_{re}	—	—	0.45	pF	$V_{CB} = 1 V, f = 1 MHz, \text{Emitter ground}$
Gain bandwidth product	f_T	10	13	—	GHz	$V_{CE} = 1 V, I_C = 5 mA, f = 1 GHz$
Forward transfer coefficient	$ S_{21} ^2$	13	16	—	dB	$V_{CE} = 1 V, I_C = 5 mA, f = 900 MHz$
Noise figure	NF	—	1.0	2.0	dB	$V_{CE} = 1 V, I_C = 5 mA, f = 900 MHz, \Gamma_S = \Gamma_L = 50 \Omega$

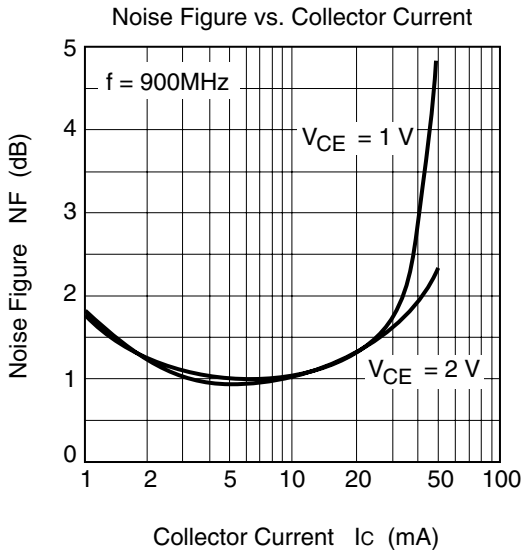
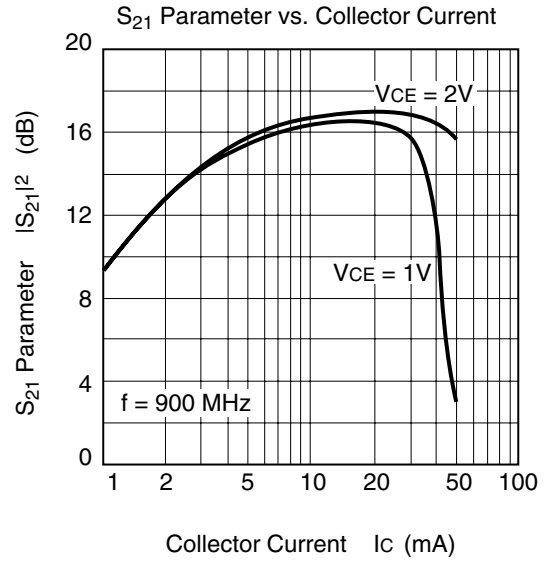
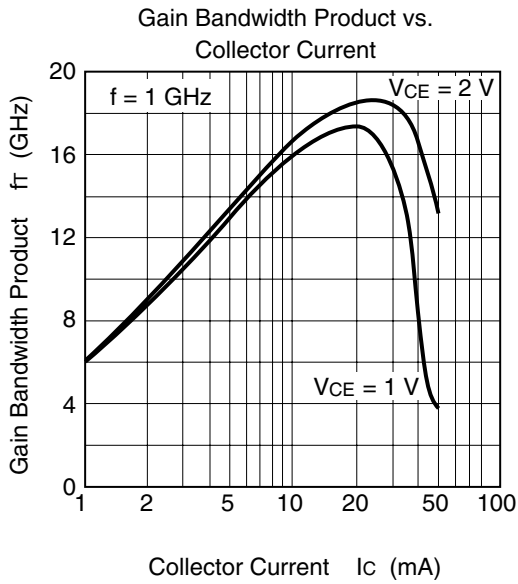
Electrical Characteristics (Q2)

(Ta = 25°C)

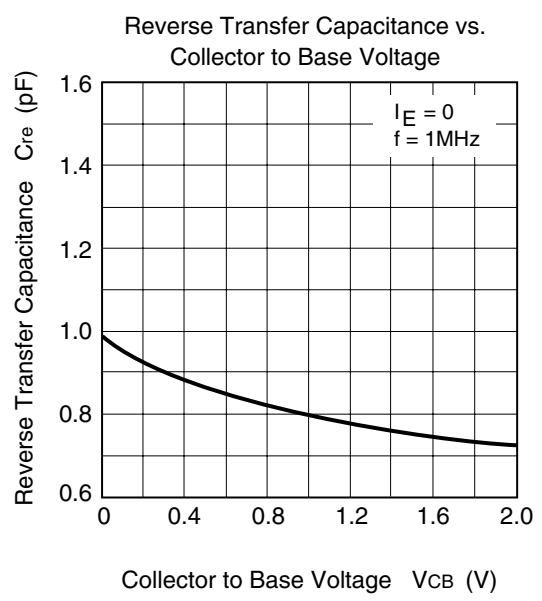
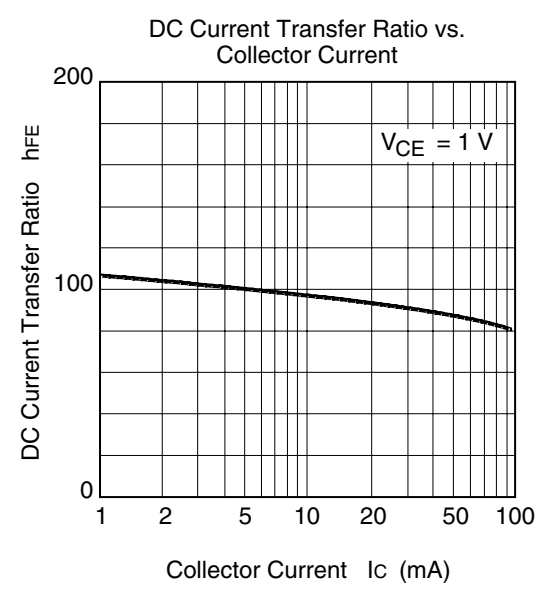
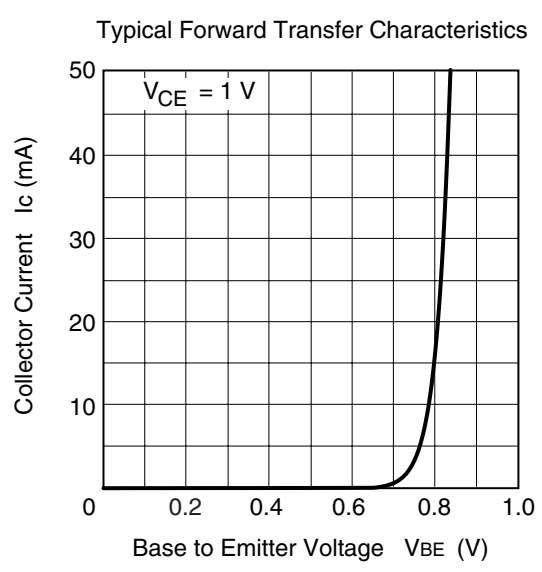
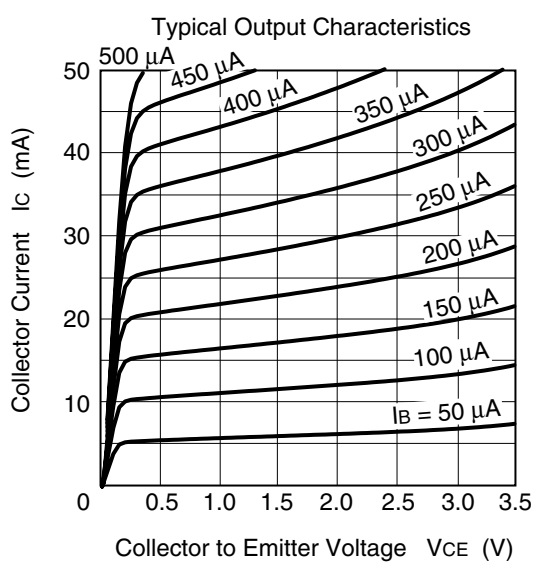
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Collector to base breakdown voltage	$V_{(BR)CBO}$	10	—	—	V	$I_C = 10\ \mu A, I_E = 0$
Collector cutoff current	I_{CBO}	—	—	1	μA	$V_{CB} = 10\ V, I_E = 0$
Collector cutoff current	I_{CEO}	—	—	1	μA	$V_{CE} = 3.5\ V, R_{BE} = \text{infinite}$
Emitter cutoff current	I_{EBO}	—	—	1.0	μA	$V_{EB} = 1.5\ V, I_C = 0$
DC current transfer ratio	h_{FE}	80	100	130	—	$V_{CE} = 1\ V, I_C = 5\ mA$
Reverse transfer capacitance	C_{re}	—	0.8	1.1	pF	$V_{CB} = 1\ V, f = 1\ MHz, \text{Emitter ground}$
Gain bandwidth product	f_T	4	6	—	GHz	$V_{CE} = 1\ V, I_C = 5\ mA, f = 1\ GHz$
Forward transfer coefficient	PG	7	12	—	dB	$V_{CE} = 1\ V, I_C = 5\ mA, f = 900\ MHz$
Noise figure	NF	—	1.5	2.3	dB	$V_{CE} = 1\ V, I_C = 5\ mA, f = 900\ MHz, \Gamma_S = \Gamma_L = 50\ \Omega$

Main Characteristics (Q1)

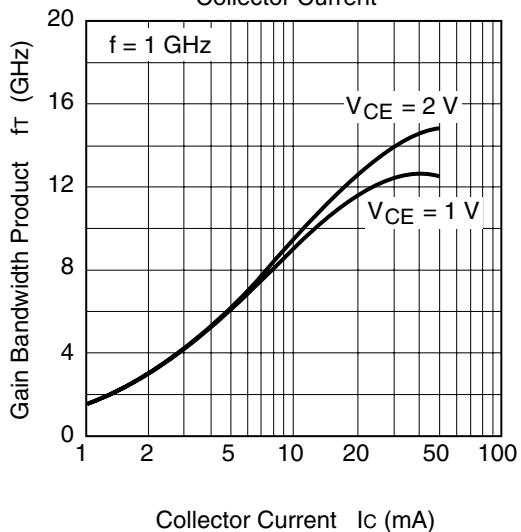




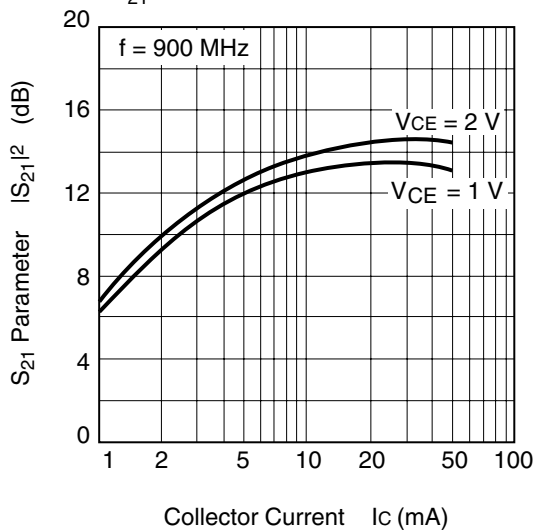
Main Characteristics (Q2)



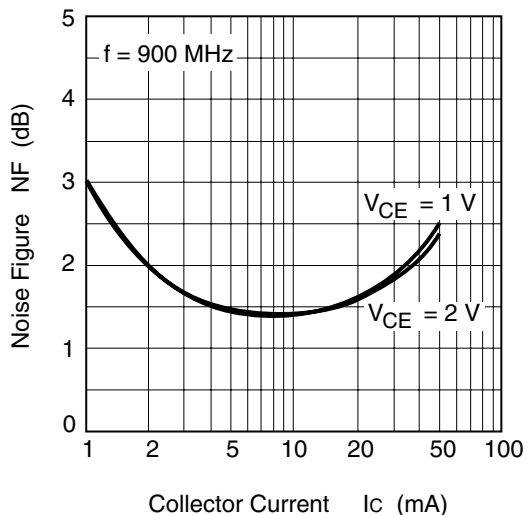
Gain Bandwidth Product vs.
Collector Current

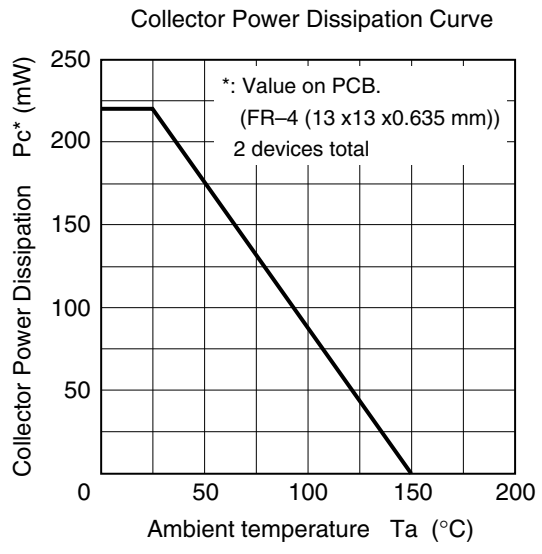


S_{21} Parameter vs. Collector Current



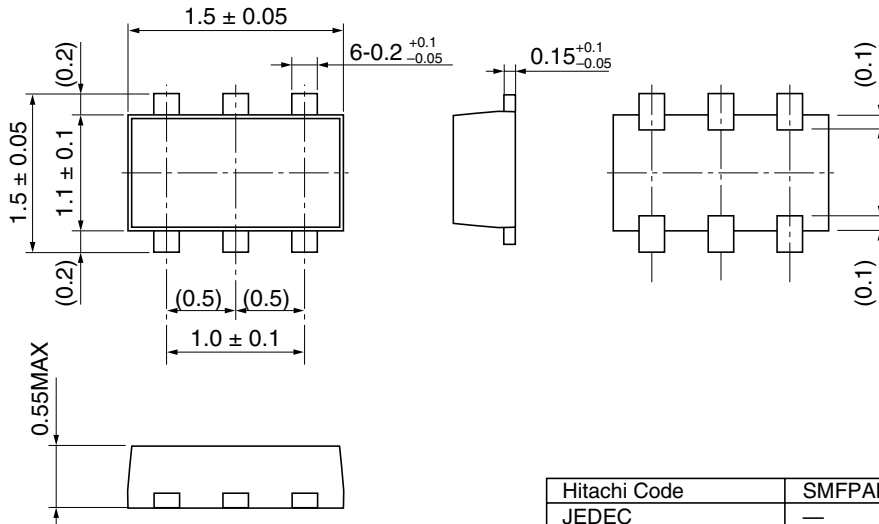
Noise Figure vs. Collector Current





Package Dimensions

As of July, 2001
Unit: mm



Hitachi Code	SMFPAK-6
JEDEC	—
JEITA	Conforms
Mass (reference value)	0.0025 g

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Sales Offices

HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: (03) 3270-2111 Fax: (03) 3270-5109

URL <http://www.hitachisemiconductor.com/>

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 Ltd.
Electronic Components Group
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 585200

Hitachi Europe GmbH
Electronic Components Group
Dornacher Straße 3
D-85622 Feldkirchen
Postfach 201, D-85619 Feldkirchen
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

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://semiconductor.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://semiconductor.hitachi.com.hk>

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