
3SK296

Silicon N-Channel Dual Gate MOS FET

HITACHI

ADE-208-388
1st. Edition

Application

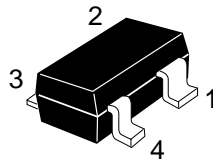
UHF RF amplifier

Features

- Low noise figure.
NF = 2.0 dB Typ. at f = 900 MHz
- Capable of low voltage operation

Outline

CMPAK-4



1. Source
2. Gate1
3. Gate2
4. Drain

Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	12	V
Gate 1 to source voltage	V_{G1S}	±8	V
Gate 2 to source voltage	V_{G2S}	±8	V
Drain current	I_D	25	mA
Channel power dissipation	Pch	100	mW
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

Attention: This device is very sensitive to electro static discharge.

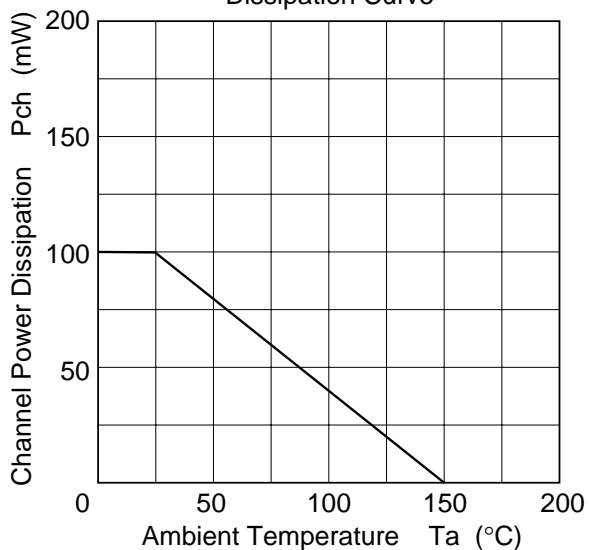
It is recommended to adopt appropriate cautions when handling this transistor.

Electrical Characteristics (Ta = 25°C)

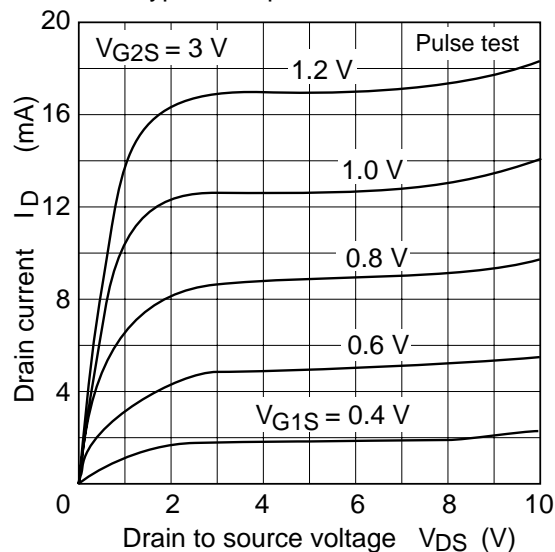
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSX}$	12	—	—	V	$I_D = 200 \mu A$, $V_{G1S} = -3 V$, $V_{G2S} = -3 V$
Gate 1 to source breakdown voltage	$V_{(BR)G1SS}$	±8	—	—	V	$I_{G1} = \pm 10 \mu A$, $V_{G2S} = V_{DS} = 0$
Gate 2 to source breakdown voltage	$V_{(BR)G2SS}$	±8	—	—	V	$I_{G2} = \pm 10 \mu A$, $V_{G1S} = V_{DS} = 0$
Gate 1 cutoff current	I_{G1SS}	—	—	±100	nA	$V_{G1S} = \pm 6 V$, $V_{G2S} = V_{DS} = 0$
Gate 2 cutoff current	I_{G2SS}	—	—	±100	nA	$V_{G2S} = \pm 6 V$, $V_{G1S} = V_{DS} = 0$
Drain current	$I_{DS(on)}$	0.5	—	10	mA	$V_{DS} = 6 V$, $V_{G1S} = 0.5 V$, $V_{G2S} = 3 V$
Gate 1 to source cutoff voltage	$V_{G1S(off)}$	-0.5	—	+0.5	V	$V_{DS} = 10 V$, $V_{G2S} = 3 V$, $I_D = 100 \mu A$
Gate 2 to source cutoff voltage	$V_{G2S(off)}$	0	—	+1.0	V	$V_{DS} = 10 V$, $V_{G1S} = 3 V$, $I_D = 100 \mu A$
Forward transfer admittance	$ y_{fs} $	16	20.8	—	mS	$V_{DS} = 6 V$, $V_{G2S} = 3 V$, $I_D = 10 mA$, $f = 1 kHz$
Input capacitance	Ciss	1.2	1.5	2.2	pF	$V_{DS} = 6 V$, $V_{G2S} = 3 V$, $I_D = 10 mA$, $f = 1 MHz$
Output capacitance	Coss	0.6	0.9	1.2	pF	
Reverse transfer capacitance	Crss	—	0.01	0.03	pF	
Power gain	PG	16	19.5	—	dB	$V_{DS} = 4 V$, $V_{G2S} = 3 V$, $I_D = 10 mA$, $f = 900 MHz$
Noise figure	NF	—	2.0	3	dB	

Note: Marking is "ZQ—"

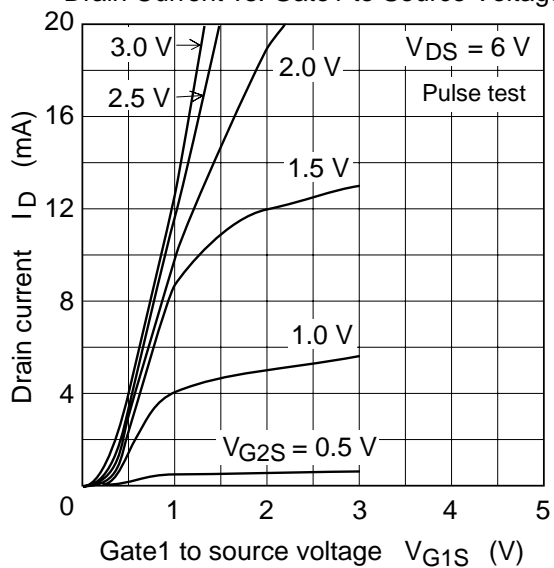
Maximum Channel Power Dissipation Curve



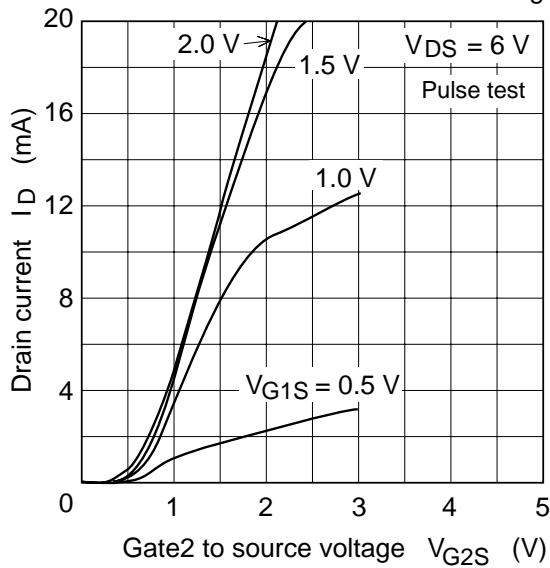
Typical Output Characteristics

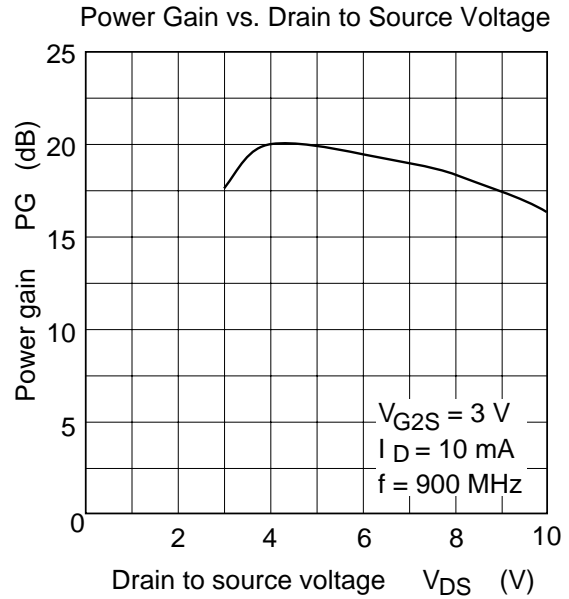
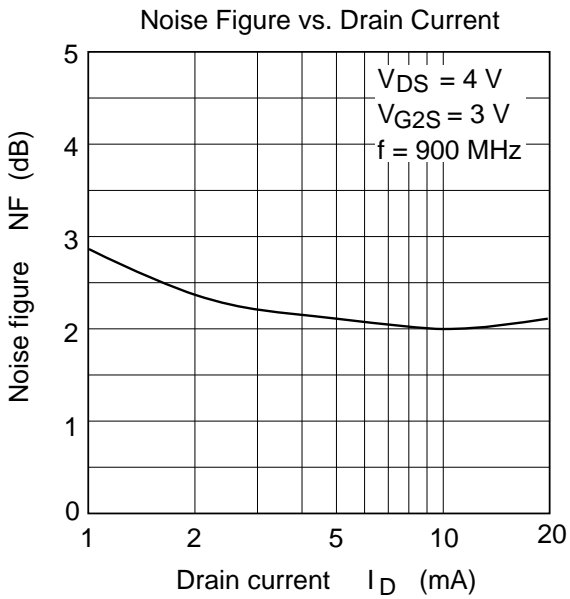
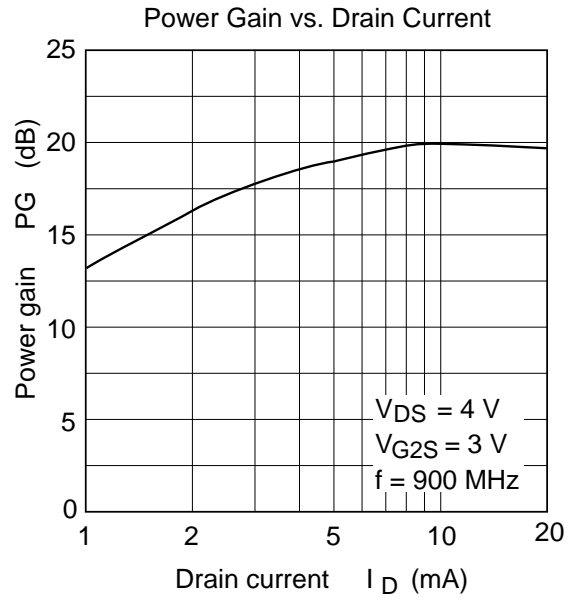
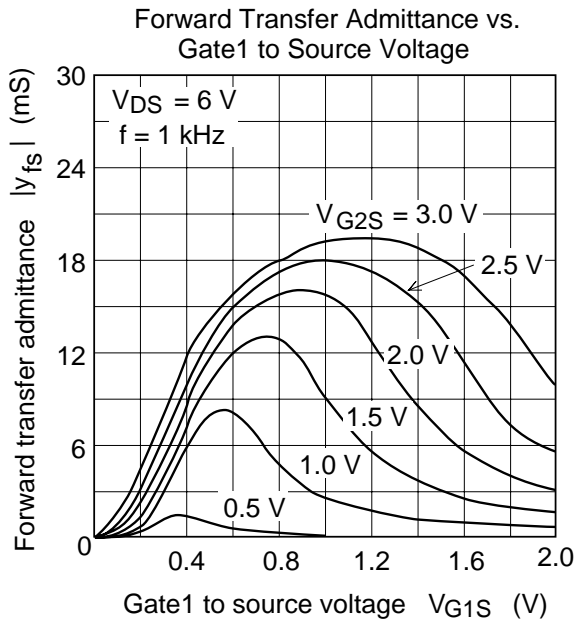


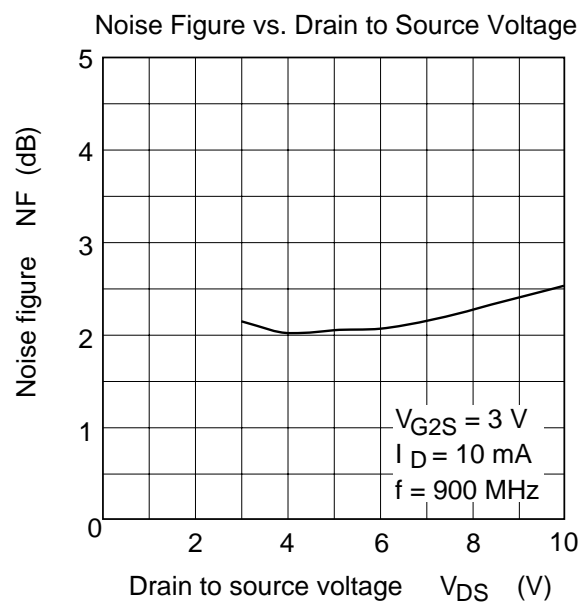
Drain Current vs. Gate1 to Source Voltage



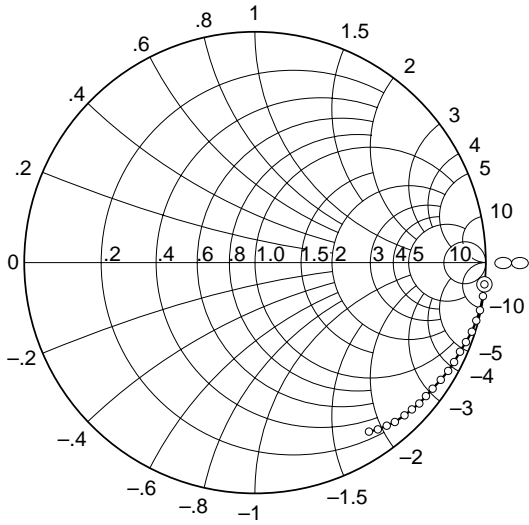
Drain Current vs. Gate2 to Source Voltage







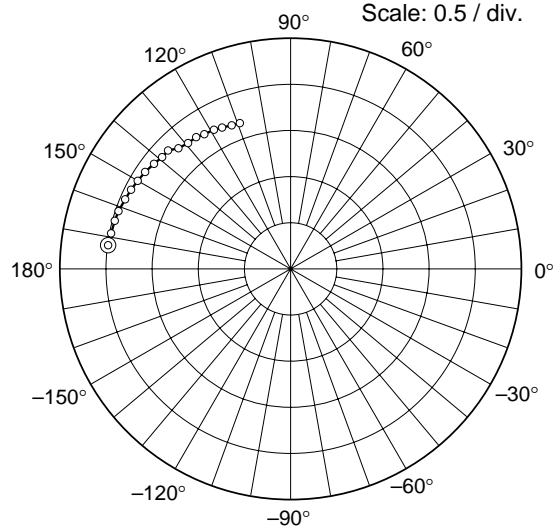
S11 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{GS} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz step)



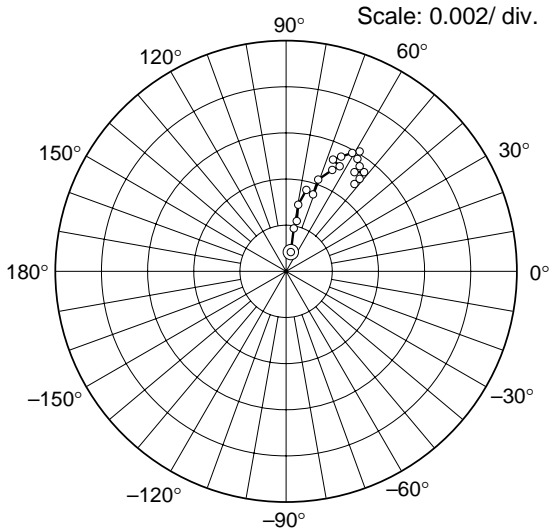
S21 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{GS} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz step)



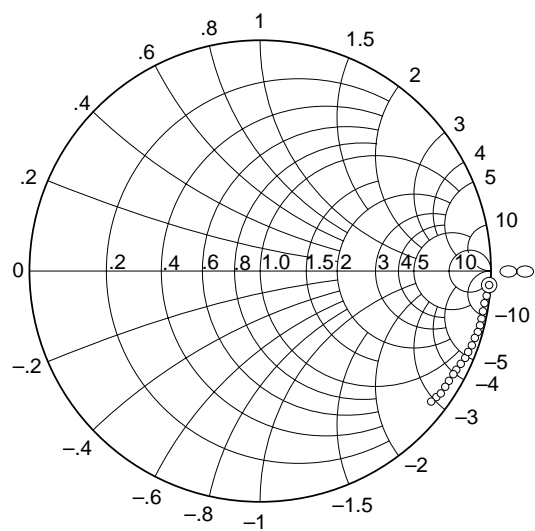
S12 Parameter vs. Frequency



Condition: $V_{DS} = 4\text{ V}$, $V_{GS} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz step)



S22 Parameter vs. Frequency



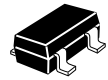
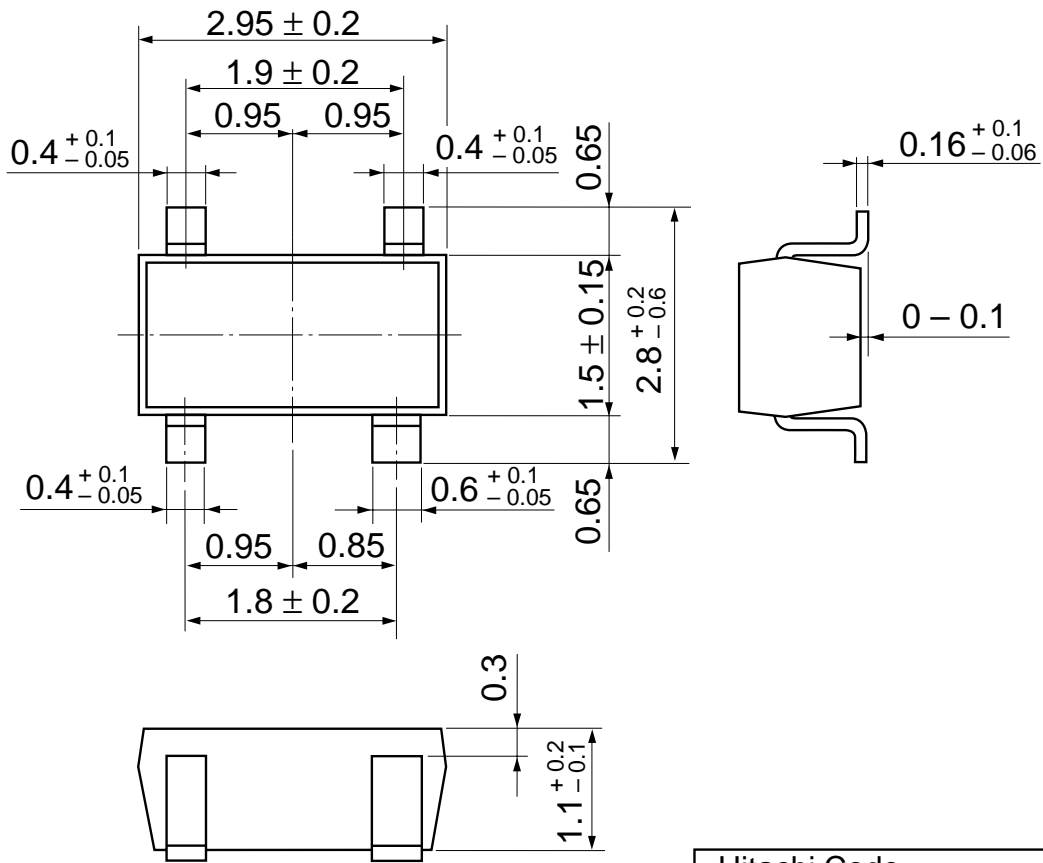
Condition: $V_{DS} = 4\text{ V}$, $V_{GS} = 3\text{ V}$
 $I_D = 10\text{ mA}$, $Z_o = 50\ \Omega$
 100 to 1000 MHz (50 MHz step)



S Parameter ($V_{DS} = 4 \text{ V}$, $V_{G2S} = 3 \text{ V}$, $I_D = 10 \text{ mA}$, $Z_0 = 50 \text{ } \Omega$)

Freq. (MHz)	S11		S21		S12		S22	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100	0.999	-6.1	1.98	172.2	0.00094	79.2	0.989	-4.2
150	0.998	-9.1	1.97	168.4	0.00189	80.4	0.987	-6.1
200	0.992	-11.9	1.96	165.0	0.00230	79.5	0.986	-7.9
250	0.988	-14.8	1.96	161.0	0.00286	79.9	0.984	-9.8
300	0.985	-17.9	1.94	157.1	0.00364	75.2	0.981	-11.5
350	0.976	-20.6	1.92	153.7	0.00353	71.8	0.978	-13.4
400	0.971	-23.2	1.91	149.9	0.00419	70.7	0.975	-15.2
450	0.964	-26.3	1.88	146.8	0.00495	65.5	0.972	-17.2
500	0.961	-29.1	1.87	142.8	0.00509	62.7	0.968	-19.1
550	0.951	-32.2	1.86	139.4	0.00530	66.6	0.963	-20.8
600	0.949	-35.0	1.86	136.1	0.00550	63.8	0.960	-22.8
650	0.935	-37.6	1.81	132.9	0.00601	58.2	0.956	-24.5
700	0.933	-40.5	1.78	129.4	0.00582	60.6	0.950	-26.3
750	0.923	-42.9	1.77	125.7	0.00572	58.5	0.945	-28.0
800	0.916	-45.8	1.75	122.6	0.00553	56.3	0.941	-29.9
850	0.908	-49.0	1.72	119.1	0.00514	56.3	0.936	-31.7
900	0.900	-51.2	1.70	115.8	0.00543	52.9	0.930	-33.4
950	0.890	-54.0	1.67	112.6	0.00506	52.4	0.924	-35.2
1000	0.876	-56.4	1.65	109.3	0.00469	51.9	0.919	-37.0

Unit: mm



Hitachi Code	MPAK-4
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.013 g

Cautions

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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 : <http://semiconductor.hitachi.com/>
 Europe : <http://www.hitachi-eu.com/hel/ecg>
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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 StraÙe 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) 778322

Hitachi Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia Ltd.
Taipei Branch Office
3F, Hung Kuo Building, No.167,
Tun-Hwa North Road, Taipei (105)
Tel: <886> (2) 2718-3666
Fax: <886> (2) 2718-8180

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
Telex: 40815 HITEC HX

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