

2SC5849

Silicon NPN Epitaxial
VHF/UHF wide band amplifier

HITACHI

ADE-208-1469 (Z)

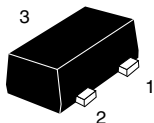
Rev. 0
Nov. 2001

Features

- Super compact package: MFPAK (1.4 x 0.8 x 0.59 mm)

Outline

MFPAK



1. Emitter
2. Base
3. Collector

Note: Marking is "WY-".

Absolute Maximum Ratings

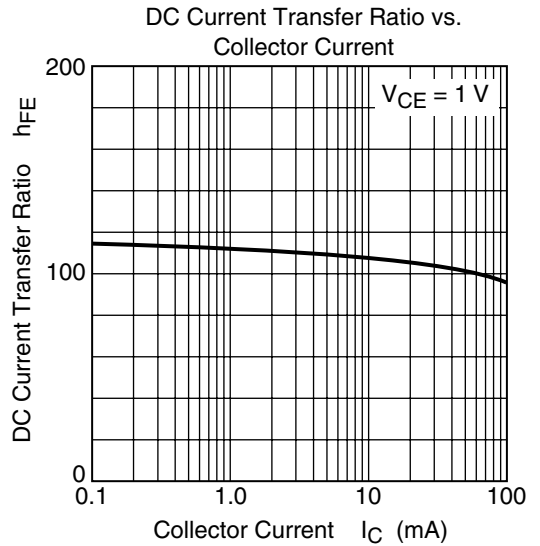
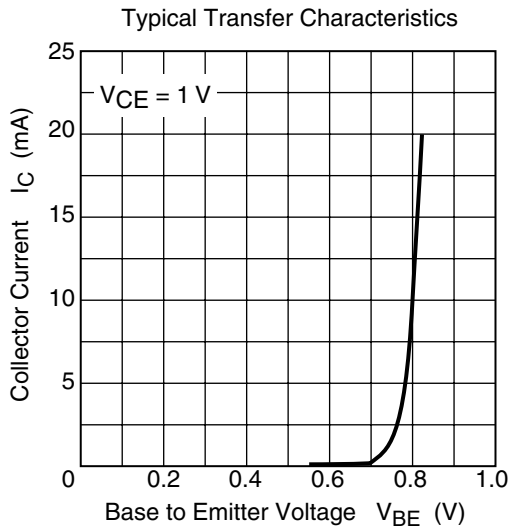
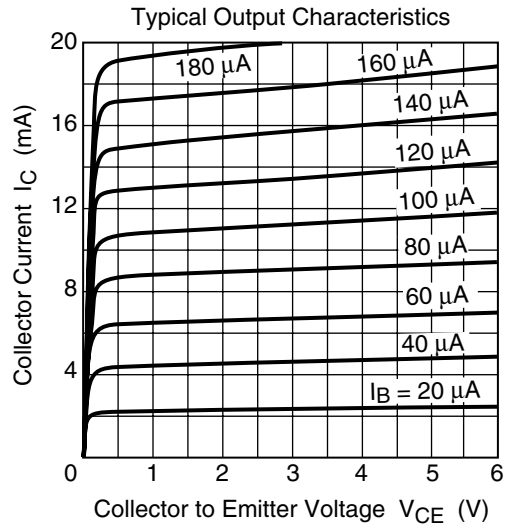
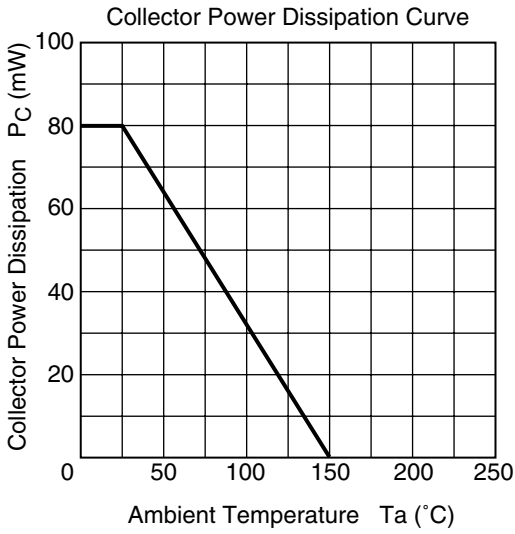
(Ta = 25°C)

| Item | Symbol | Ratings | Unit |
|------------------------------|-----------|------------|------|
| Collector to base voltage | V_{CBO} | 15 | V |
| Collector to emitter voltage | V_{CEO} | 6.0 | V |
| Emitter to base voltage | V_{EBO} | 1.5 | V |
| Collector current | I_C | 80 | mA |
| Collector power dissipation | P_C | 80 | mW |
| Junction temperature | Tj | 150 | °C |
| Storage temperature | Tstg | -55 to 150 | °C |

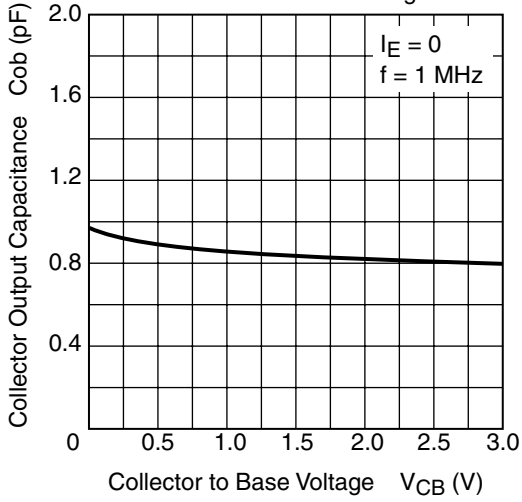
Electrical Characteristics

(Ta = 25°C)

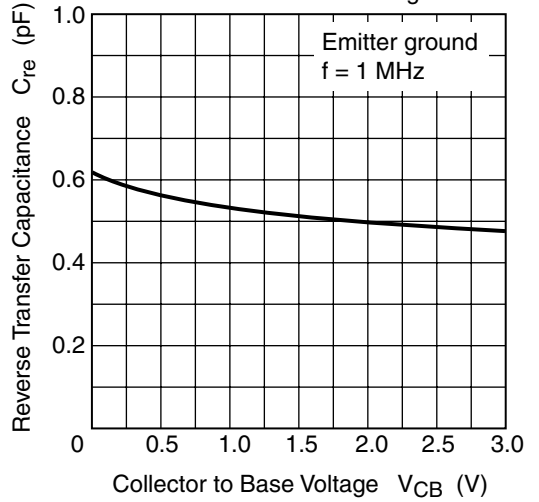
| Item | Symbol | Min | Typ | Max | Unit | Test conditions |
|-------------------------------------|---------------|-----|------|------|---------|---|
| Collector to base breakdown voltage | $V_{(BR)CBO}$ | 15 | — | — | V | $I_C = 10 \mu A, I_E = 0$ |
| Collector cutoff current | I_{CBO} | — | — | 0.1 | μA | $V_{CB} = 15 V, I_E = 0$ |
| Collector cutoff current | I_{CEO} | — | — | 0.1 | μA | $V_{CE} = 6.0 V, R_{BE} = \text{Infinite}$ |
| Emitter cutoff current | I_{EBO} | — | — | 0.1 | μA | $V_{EB} = 1.5 V, I_C = 0$ |
| DC current transfer ratio | h_{FE} | 90 | 110 | 140 | — | $V_{CE} = 1 V, I_C = 5 mA$ |
| Reverse transfer capacitance | C_{re} | — | 0.5 | — | pF | $V_{CE} = 1 V, \text{Emitter ground, } f = 1 \text{ MHz}$ |
| Collector output capacitance | C_{ob} | — | 0.85 | 1.15 | pF | $V_{CB} = 1 V, I_E = 0, f = 1 \text{ MHz}$ |
| Gain bandwidth product | $f_t(1)$ | 1.0 | 4.0 | — | GHz | $V_{CE} = 1 V, I_C = 5 mA$ |
| Gain bandwidth product | $f_t(2)$ | — | 9.0 | — | GHz | $V_{CE} = 1 V, I_C = 30 mA$ |
| Power gain | PG | 10 | 13 | — | dB | $V_{CE} = 1 V, I_C = 5 mA, f = 900 \text{ MHz}$ |
| Noise figure | NF | — | 1.1 | 1.8 | dB | $V_{CE} = 1 V, I_C = 5 mA, f = 900 \text{ MHz}$ |



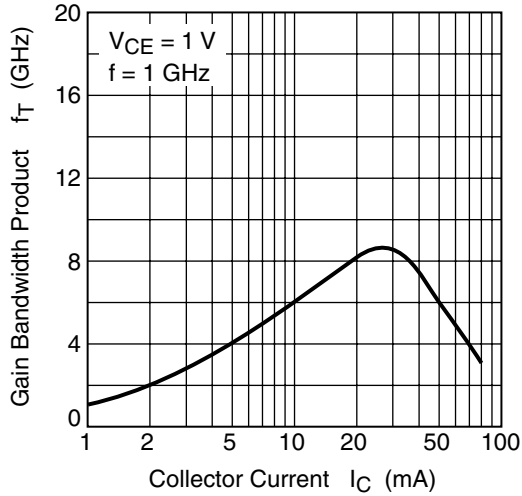
Collector Output Capacitance vs. Collector to Base Voltage



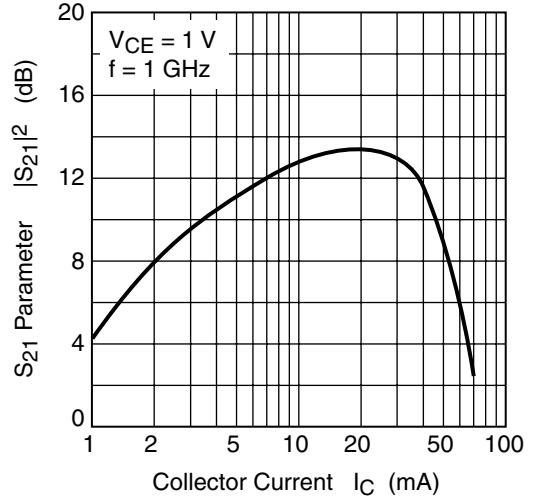
Reverse Transfer Capacitance vs. Collector to Base Voltage

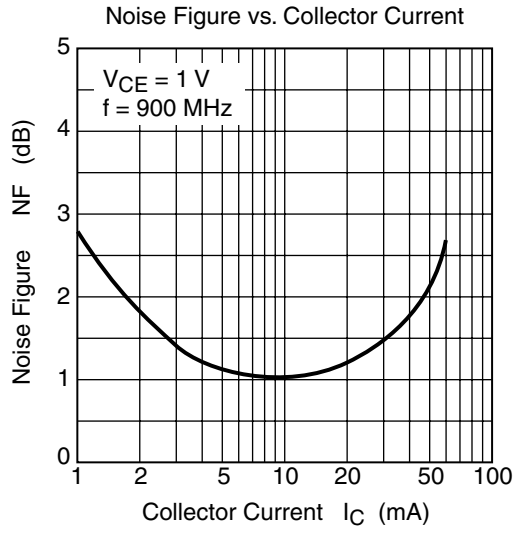
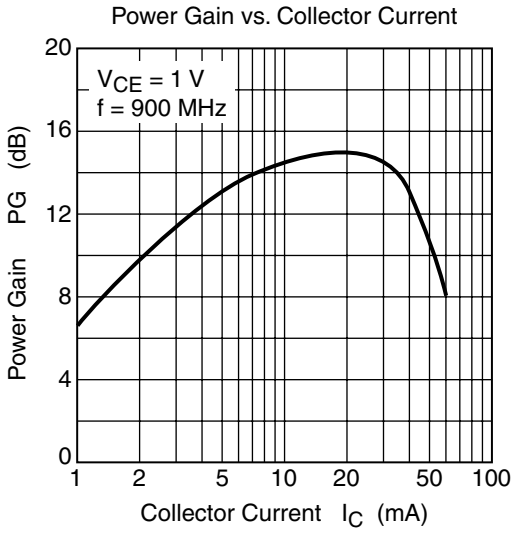


Gain Bandwidth Product vs. Collector Current

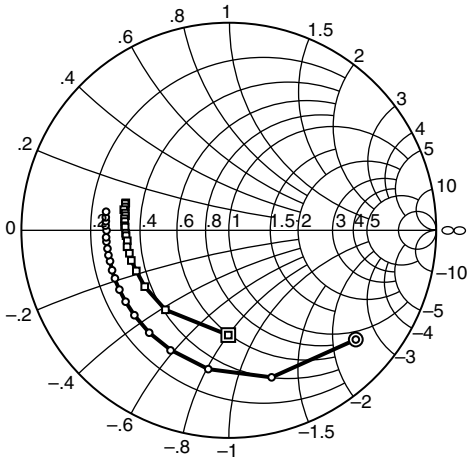


S_{21} Parameter vs. Collector Current



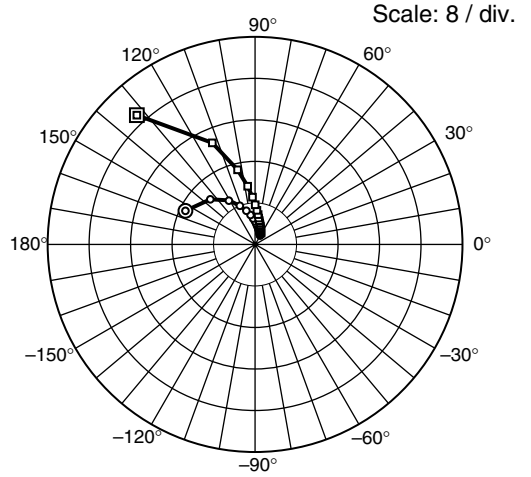


S₁₁ Parameter vs. Frequency



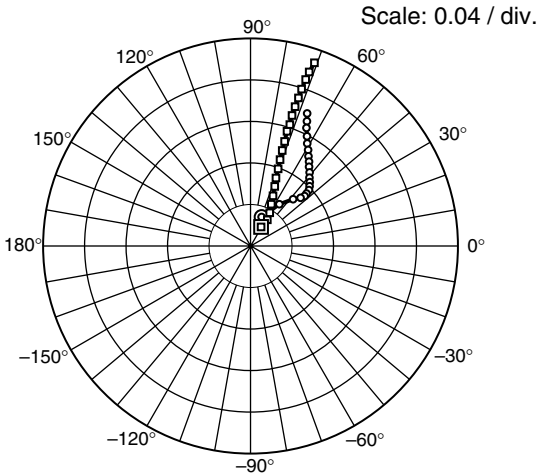
Test conditions: $V_{CE} = 1\text{ V}$, $Z_O = 50\ \Omega$
 100 to 2000 MHz (100 MHz step)
 ○—○ ($I_C = 5\text{ mA}$)
 □—□ ($I_C = 20\text{ mA}$)

S₂₁ Parameter vs. Frequency



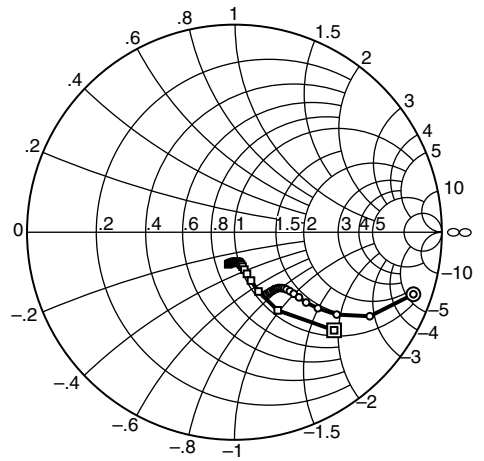
Test conditions: $V_{CE} = 1\text{ V}$, $Z_O = 50\ \Omega$
 100 to 2000 MHz (100 MHz step)
 ○—○ ($I_C = 5\text{ mA}$)
 □—□ ($I_C = 20\text{ mA}$)

S₁₂ Parameter vs. Frequency



Test conditions: $V_{CE} = 1\text{ V}$, $Z_O = 50\ \Omega$
 100 to 2000 MHz (100 MHz step)
 ○—○ ($I_C = 5\text{ mA}$)
 □—□ ($I_C = 20\text{ mA}$)

S₂₂ Parameter vs. Frequency



Test conditions: $V_{CE} = 1\text{ V}$, $Z_O = 50\ \Omega$
 100 to 2000 MHz (100 MHz step)
 ○—○ ($I_C = 5\text{ mA}$)
 □—□ ($I_C = 20\text{ mA}$)

S Parameter $(V_{CE} = 1 \text{ V}, I_C = 5 \text{ mA}, Z_o = 50 \Omega)$

| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|---------|-------|--------|-------|-------|-------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100 | 0.807 | -40.6 | 14.95 | 154.2 | 0.030 | 69.3 | 0.913 | -19.1 |
| 200 | 0.737 | -73.7 | 12.30 | 135.0 | 0.049 | 55.5 | 0.768 | -31.8 |
| 300 | 0.675 | -98.4 | 9.86 | 121.2 | 0.061 | 47.8 | 0.633 | -38.8 |
| 400 | 0.642 | -115.9 | 8.03 | 111.9 | 0.067 | 44.0 | 0.544 | -42.3 |
| 500 | 0.624 | -127.9 | 6.72 | 105.0 | 0.071 | 42.8 | 0.484 | -44.4 |
| 600 | 0.611 | -138.1 | 5.75 | 99.4 | 0.074 | 43.2 | 0.442 | -45.2 |
| 700 | 0.604 | -145.4 | 5.02 | 95.0 | 0.078 | 43.8 | 0.412 | -46.0 |
| 800 | 0.599 | -151.6 | 4.45 | 90.9 | 0.081 | 45.4 | 0.390 | -46.7 |
| 900 | 0.595 | -157.2 | 3.98 | 87.6 | 0.084 | 47.2 | 0.373 | -47.6 |
| 1000 | 0.594 | -161.2 | 3.62 | 84.5 | 0.087 | 49.3 | 0.362 | -48.4 |
| 1100 | 0.591 | -165.5 | 3.33 | 81.8 | 0.091 | 51.3 | 0.354 | -49.5 |
| 1200 | 0.592 | -168.4 | 3.06 | 79.0 | 0.095 | 53.6 | 0.347 | -50.7 |
| 1300 | 0.591 | -171.5 | 2.86 | 76.4 | 0.099 | 55.3 | 0.341 | -52.0 |
| 1400 | 0.592 | -174.8 | 2.66 | 74.1 | 0.103 | 57.2 | 0.340 | -53.5 |
| 1500 | 0.592 | -176.8 | 2.51 | 72.0 | 0.108 | 59.1 | 0.335 | -54.8 |
| 1600 | 0.589 | -180.0 | 2.35 | 69.7 | 0.113 | 61.1 | 0.337 | -56.3 |
| 1700 | 0.594 | 177.7 | 2.23 | 67.8 | 0.119 | 62.8 | 0.334 | -58.3 |
| 1800 | 0.594 | 175.7 | 2.13 | 65.7 | 0.126 | 64.7 | 0.335 | -60.0 |
| 1900 | 0.596 | 173.9 | 2.03 | 63.7 | 0.132 | 65.7 | 0.335 | -62.0 |
| 2000 | 0.598 | 171.3 | 1.94 | 61.9 | 0.139 | 66.9 | 0.335 | -64.0 |

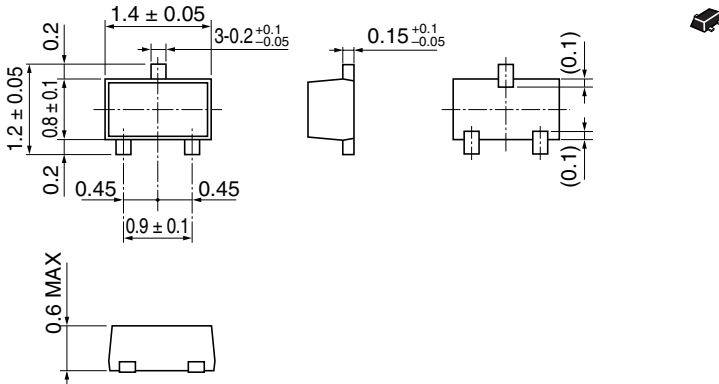
2SC5849

($V_{CE} = 1 \text{ V}$, $I_C = 20 \text{ mA}$, $Z_o = 50 \Omega$)

| f (MHz) | S11 | | S21 | | S12 | | S22 | |
|---------|-------|--------|-------|-------|-------|------|-------|--------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100 | 0.504 | -90.3 | 33.79 | 132.5 | 0.021 | 61.4 | 0.674 | -44.5 |
| 200 | 0.490 | -128.6 | 21.25 | 112.9 | 0.030 | 57.6 | 0.431 | -61.0 |
| 300 | 0.488 | -146.2 | 14.78 | 103.3 | 0.037 | 60.2 | 0.309 | -67.9 |
| 400 | 0.487 | -156.3 | 11.31 | 97.4 | 0.045 | 63.7 | 0.247 | -71.1 |
| 500 | 0.492 | -162.8 | 9.13 | 93.3 | 0.053 | 66.0 | 0.210 | -73.2 |
| 600 | 0.492 | -167.0 | 7.65 | 90.0 | 0.062 | 68.0 | 0.187 | -75.1 |
| 700 | 0.497 | -170.8 | 6.58 | 87.2 | 0.070 | 69.6 | 0.171 | -76.7 |
| 800 | 0.492 | -174.1 | 5.78 | 84.4 | 0.079 | 70.4 | 0.160 | -78.2 |
| 900 | 0.496 | -177.0 | 5.13 | 82.6 | 0.088 | 71.2 | 0.152 | -79.9 |
| 1000 | 0.498 | -178.4 | 4.65 | 80.2 | 0.097 | 71.7 | 0.147 | -81.4 |
| 1100 | 0.500 | 178.2 | 4.24 | 78.3 | 0.106 | 72.0 | 0.145 | -83.2 |
| 1200 | 0.503 | 177.5 | 3.90 | 76.1 | 0.116 | 72.4 | 0.143 | -85.1 |
| 1300 | 0.503 | 175.2 | 3.63 | 74.3 | 0.123 | 72.1 | 0.143 | -87.2 |
| 1400 | 0.506 | 173.7 | 3.38 | 72.6 | 0.132 | 72.4 | 0.144 | -88.8 |
| 1500 | 0.503 | 172.0 | 3.17 | 70.9 | 0.141 | 72.3 | 0.144 | -91.2 |
| 1600 | 0.507 | 170.6 | 2.99 | 69.4 | 0.150 | 72.1 | 0.146 | -92.8 |
| 1700 | 0.516 | 168.9 | 2.82 | 67.7 | 0.159 | 72.0 | 0.148 | -95.0 |
| 1800 | 0.511 | 167.3 | 2.68 | 66.0 | 0.169 | 71.7 | 0.151 | -97.0 |
| 1900 | 0.515 | 165.6 | 2.56 | 64.6 | 0.177 | 71.4 | 0.154 | -99.0 |
| 2000 | 0.514 | 165.1 | 2.45 | 63.0 | 0.187 | 70.8 | 0.158 | -100.8 |

Package Dimensions

As of July, 2001
Unit: mm



| | |
|------------------------|----------|
| Hitachi Code | MFPAK |
| JEDEC | — |
| JEITA | — |
| Mass (reference value) | 0.0016 g |

Disclaimer

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

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 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 (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 |
|---|--|

| | |
|---|---|
| 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. (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 |
|---|---|

Copyright © Hitachi, Ltd., 2001. All rights reserved. Printed in Japan.
 Colophon 5.0