

To our customers,

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## Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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### 9 GHz DIVIDE-BY-2 PRESCALER

#### DESCRIPTION

The  $\mu$ PG504B is a GaAs divide-by-2 prescaler capable of operating up to 9 GHz.

It is intended to be used in the frequency synthesizers of microwave application systems and measurement equipment.

The  $\mu$ PG504B is a dynamic frequency divider which uses the BFL (Buffered FET Logic) circuit as a basic circuit. It is housed in a hermetic 8 pin ceramic flat package that is easy to install and realize high reliability.

#### FEATURES

- Wide operating frequency range;  $f_{in} = 2.0$  to  $9.0$  GHz (@ $T_A = 25$  °C)
- Hermetically sealed package assures high reliability

#### ORDERING INFORMATION

| PART NUMBER  | PACKAGE             |
|--------------|---------------------|
| $\mu$ PG504B | K-12, 8 PIN CERAMIC |

#### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25$ °C)

|                                  |                         |                   |     |
|----------------------------------|-------------------------|-------------------|-----|
| Supply Voltage                   | $V_{DD} - V_{SS1}^{*1}$ | +5.0              | V   |
| Supply Voltage                   | $V_{SS} - V_{SS1}^{*1}$ | -5.0              | V   |
| Total Power Dissipation          | $P_{tot}$               | 1.5 <sup>*2</sup> | W   |
| Input Power                      | $P_{in}$                | +13               | dBm |
| Operating Case Temperature Range | $T_c$                   | -65 to +125       | °C  |
| Storage Temperature              | $T_{stg}$               | -65 to +175       | °C  |

\*1  $V_{SS1} = 0$  V

\*2  $T_c \leq 125$  °C

#### RECOMMENDED OPERATING CONDITIONS ( $T_A = 25$ °C)

|                     |         |   |
|---------------------|---------|---|
| $V_{DD} - V_{SS1}$  | 3.8±0.2 | V |
| $V_{SS1} - V_{SS2}$ | 2.2±0.1 | V |

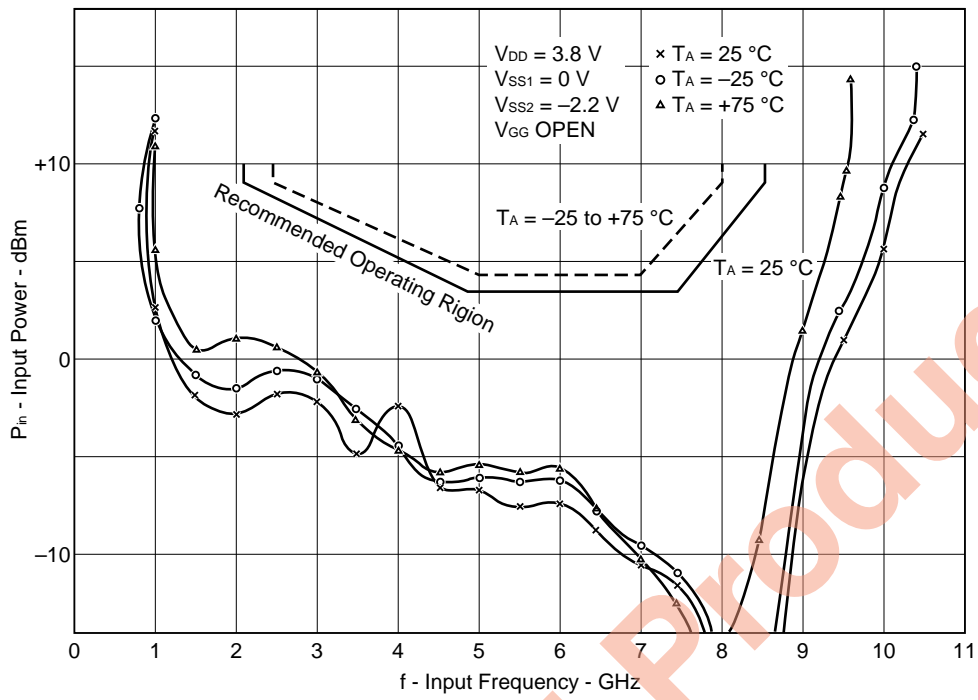
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C, V<sub>DD</sub> = 3.8 V, V<sub>SS1</sub> = 0 V, V<sub>SS2</sub> = -2.2 V)**

| CHARACTERISTIC                 | SYMBOL             | MIN. | TYP. | MAX.  | UNIT | CONDITIONS                       |
|--------------------------------|--------------------|------|------|-------|------|----------------------------------|
| Supply Current                 | I <sub>DD</sub>    | 38   | 55   | 78    | mA   |                                  |
| Supply Current                 | I <sub>SS1</sub>   | 18   | 20   | 24    | mA   |                                  |
| Supply Current                 | I <sub>SS2</sub>   | 20   | 35   | 54    | mA   |                                  |
| Upper Limit Of Input Frequency | f <sub>in(u)</sub> | 8.6  | 9.0  |       | GHz  | P <sub>in</sub> = +9 to +10 dBm  |
| Lower Limit Of Input Frequency | f <sub>in(l)</sub> |      | 2.0  | 2.2   | GHz  | P <sub>in</sub> = +9 to +10 dBm  |
| Input Power                    | P <sub>in</sub>    | +9.0 |      | +10.0 | dBm  | f <sub>in</sub> = 2.2 to 8.6 GHz |
|                                |                    | +3.0 |      | +10.0 |      | f <sub>in</sub> = 5.0 to 7.4 GHz |
| Output Power                   | P <sub>out</sub>   | -3.0 | 0    |       | dBm  | f <sub>in</sub> = 8.0 GHz        |
|                                |                    | 0    | +2.0 |       |      | f <sub>in</sub> = 2.2 GHz        |

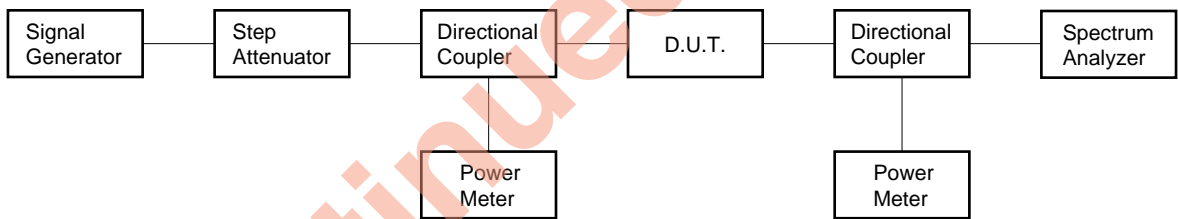
**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = -25 °C to +75 °C, V<sub>DD</sub> = 3.8 V, V<sub>SS1</sub> = 0 V, V<sub>SS2</sub> = -2.2 V)**

| CHARACTERISTIC                 | SYMBOL             | MIN. | TYP. | MAX.  | UNIT | CONDITIONS                       |
|--------------------------------|--------------------|------|------|-------|------|----------------------------------|
| Supply Current                 | I <sub>DD</sub>    |      | 55   |       | mA   |                                  |
| Supply Current                 | I <sub>SS1</sub>   |      | 20   |       | mA   |                                  |
| Supply Current                 | I <sub>SS2</sub>   |      | 35   |       | mA   |                                  |
| Upper Limit Of Input Frequency | f <sub>in(u)</sub> | 8.0  | 8.4  |       | GHz  | P <sub>in</sub> = +9 to +10 dBm  |
| Lower Limit Of Input Frequency | f <sub>in(l)</sub> |      | 2.3  | 2.5   | GHz  | P <sub>in</sub> = +9 to +10 dBm  |
| Input Power                    | P <sub>in</sub>    | +9.0 |      | +10.0 | dBm  | f <sub>in</sub> = 2.5 to 8.0 GHz |
|                                |                    | +4.0 |      | +10.0 |      | f <sub>in</sub> = 5.0 to 7.0 GHz |
| Output Power                   | P <sub>out</sub>   | -4.0 | -1.0 |       | dBm  | f <sub>in</sub> = 8.0 GHz        |
|                                |                    | -1.0 | +1.0 |       |      | f <sub>in</sub> = 2.5 GHz        |

TYPICAL CHARACTERISTICS

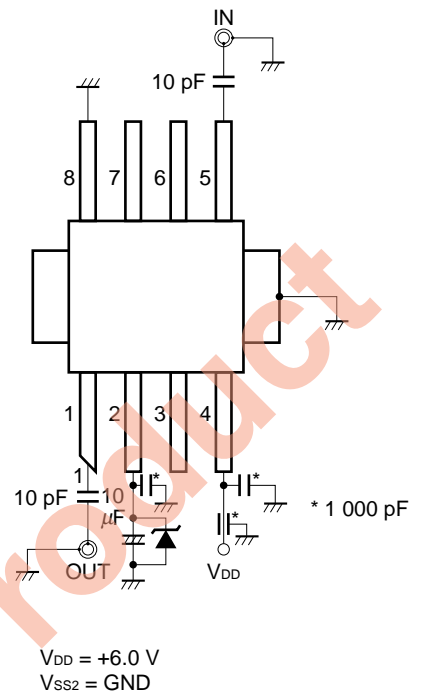
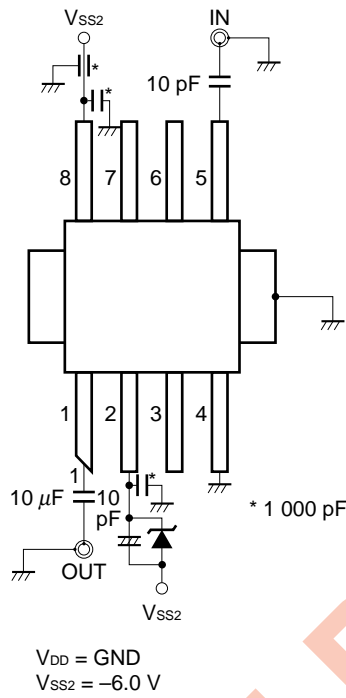
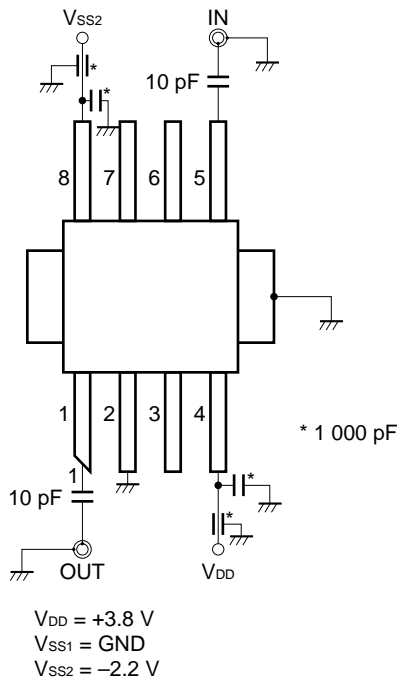


TEST CIRCUIT BLOCK DIAGRAM



TEST CIRCUIT

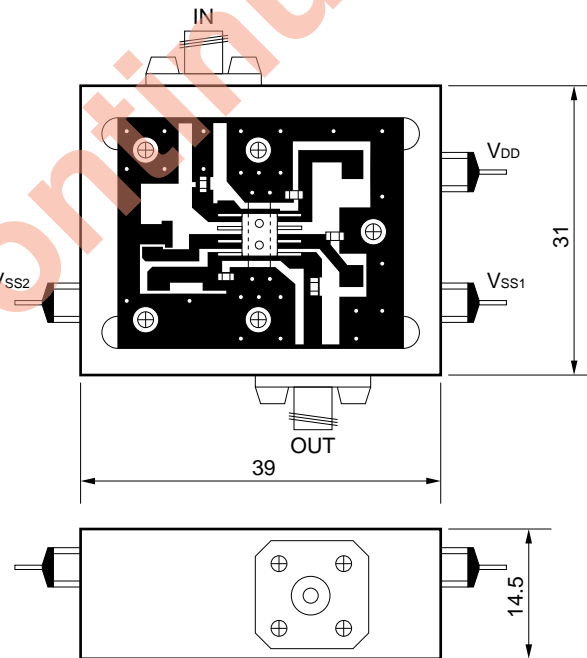
SINGLE BIAS SUPPLY



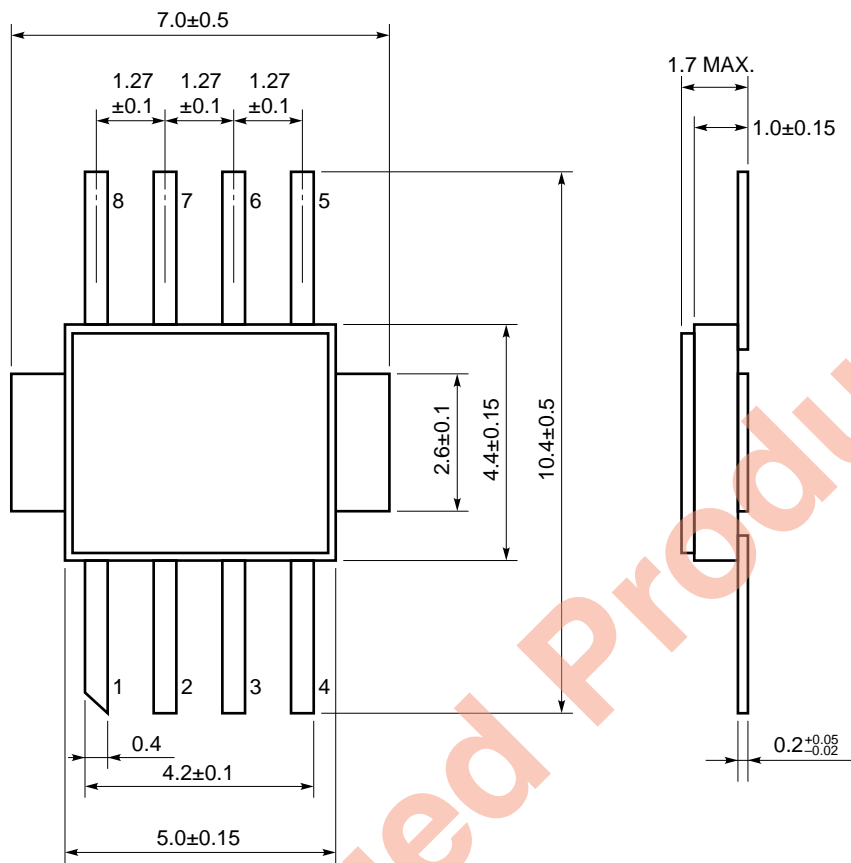
For  $V_{SS1}$ , the bias voltage of  $-6.0\text{ V}$  should be applied through  $2.2\text{ V}$  zener diode.

$V_{SS1}$  should be connected to GND through  $2.2\text{ V}$  zener diode.

TEST JIG DRAWING (Unit: mm)



PACKAGE DIMENSIONS (Unit: mm)



**PIN CONNECTIONS**

- 1: OUTPUT
- 2:  $V_{SS1}$
- 3: NC\*\*
- 4:  $V_{DD}$
- 5: IN
- 6: NC
- 7:  $V_{GG}$  (Normally open)
- 8:  $V_{SS2}$
- FLANGE: GND

\*\* Non Connection

Discontinued Product

**RECOMMENDED SOLDERING CONDITIONS**

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

**TYPES OF SURFACE MOUNT DEVICE**

For more details, refer to our document "SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (C10535E).

| Soldering process      | Soldering conditions   | Symbol |
|------------------------|--|--------|
| Partial heating method | Terminal temperature: 260 °C or below,<br>Flow time: 10 seconds or below,<br>Exposure limit*: None |        |

\* Exposure limit before soldering after dry-pack package is opened.  
Storage conditions: 25 °C and relative humidity at 65 % or less.

**Note** Do not apply more than a single process at once, except for "Partial heating method".

**PRECAUTION** This IC must be handled with great care to prevent static discharge because its circuitry is composed of GaAs MES FET.

**Caution**

**The Great Care must be taken in dealing with the devices in this guide.  
The reason is that the material of the devices is GaAs (Galium Arsenide), which is designated as harmful substance according to the law concerned.  
Keep the law concerned and so on, especially in case of removal.**

[MEMO]

Discontinued Product

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Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.