

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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BIPOLAR ANALOG INTEGRATED CIRCUIT

**$\mu$ PC8215TU**

**SiGe LOW NOISE AMPLIFIER  
FOR GPS/MOBILE COMMUNICATIONS**

**DESCRIPTION**

The  $\mu$ PC8215TU is a silicon germanium (SiGe) monolithic integrated circuit designed as low noise amplifier for GPS and mobile communications.

The package is 8-pin lead-less minimold suitable for surface mount.

This IC is manufactured using our 50 GHz  $f_{max}$  UHS2 (Ultra High Speed Process) SiGe bipolar process.

**FEATURES**

- Low noise : NF = 1.3 dB TYP. @  $V_{CC} = 3.0$  V
- High gain :  $G_P = 27.0$  dB TYP. @  $V_{CC} = 3.0$  V
- Low distortion :  $OIP_3 = +12.5$  dBm TYP. @  $V_{CC} = 3.0$  V
- High-density surface mounting : 8-pin lead-less minimold package (2.0 × 2.2 × 0.5 mm)
- High performance with minimum external components
- Output matched to 50  $\Omega$

**APPLICATION**

- Low noise amplifier for GPS and mobile communications

**ORDERING INFORMATION**

Part Number	Order Number	Package	Marking	Supplying Form
$\mu$ PC8215TU-E2	$\mu$ PC8215TU-E2-A	8-pin lead-less minimold (Pb-Free) <sup>Note</sup>	8215	<ul style="list-style-type: none"> <li>• 8 mm wide embossed taping</li> <li>• Pin 5, 6, 7, 8 indicates pull-out direction of tape</li> <li>• Qty 5 kpcs/reel</li> </ul>

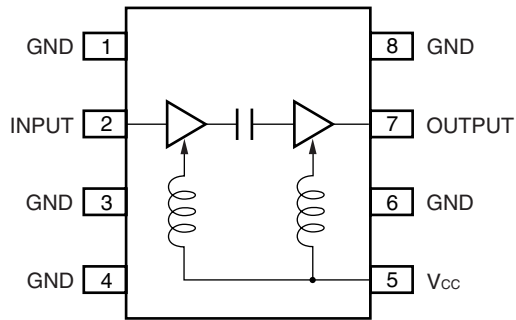
**Note** With regards to terminal solder (the solder contains lead) plated products (conventionally plated), contact your nearby sales office.

**Remark** To order evaluation samples, contact your nearby sales office.  
Part number for sample order:  $\mu$ PC8215TU

**Caution** Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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Not all devices/types available in every country. Please check with local NEC Compound Semiconductor Devices representative for availability and additional information.

**PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Test Conditions	Ratings	Unit
Supply Voltage	V <sub>CC</sub>	T <sub>A</sub> = +25°C	4.0	V
Power Dissipation of Package	P <sub>D</sub>	T <sub>A</sub> = +85°C <b>Note</b>	1.06	W
Operating Ambient Temperature	T <sub>A</sub>		-40 to +85	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C
Input Power	P <sub>in</sub>		+10	dBm

**Note** Mounted on double-side copper-clad 50 × 50 × 1.6 mm epoxy glass PWB

**RECOMMENDED OPERATING RANGE**

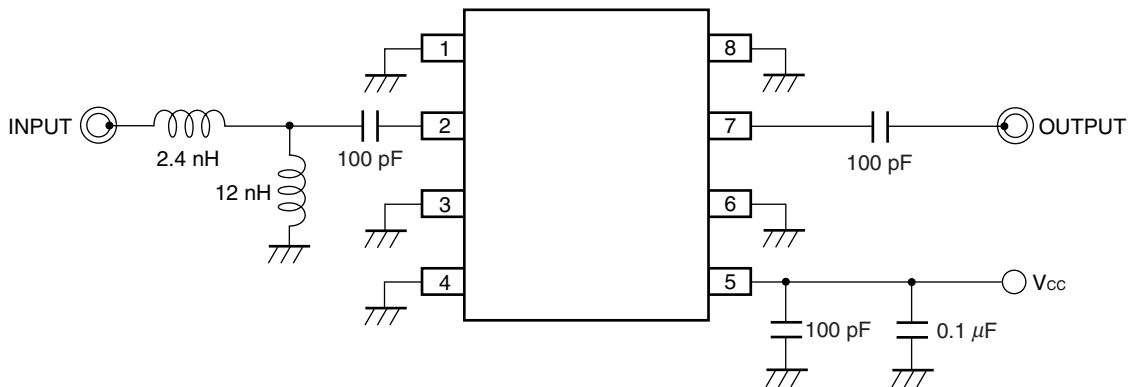
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V <sub>CC</sub>	2.7	3.0	3.3	V
Operating Ambient Temperature	T <sub>A</sub>	-25	+25	+85	°C
Operating Frequency Range	f <sub>in</sub>	-	1 575	-	MHz

**ELECTRICAL CHARACTERISTICS**

(T<sub>A</sub> = +25°C, V<sub>CC</sub> = 3.0 V, f<sub>in</sub> = 1 575 MHz, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	I <sub>CC</sub>	No Signal	-	10.0	13.0	mA
Power Gain	G <sub>P</sub>		24.0	27.0	30.0	dB
Noise Figure	NF		-	1.3	1.5	dB
Output 3rd Order Distortion Intercept Point	OIP <sub>3</sub>		-	+12.5	-	dBm
Input Return Loss	RL <sub>in</sub>		6.0	7.0	-	dB
Output Return Loss	RL <sub>out</sub>		10	14.0	-	dB
Isolation	ISL		30	40.0	-	dB
Gain 1 dB Compression Output Power	P <sub>O(1 dB)</sub>		-	+5.0	-	dBm

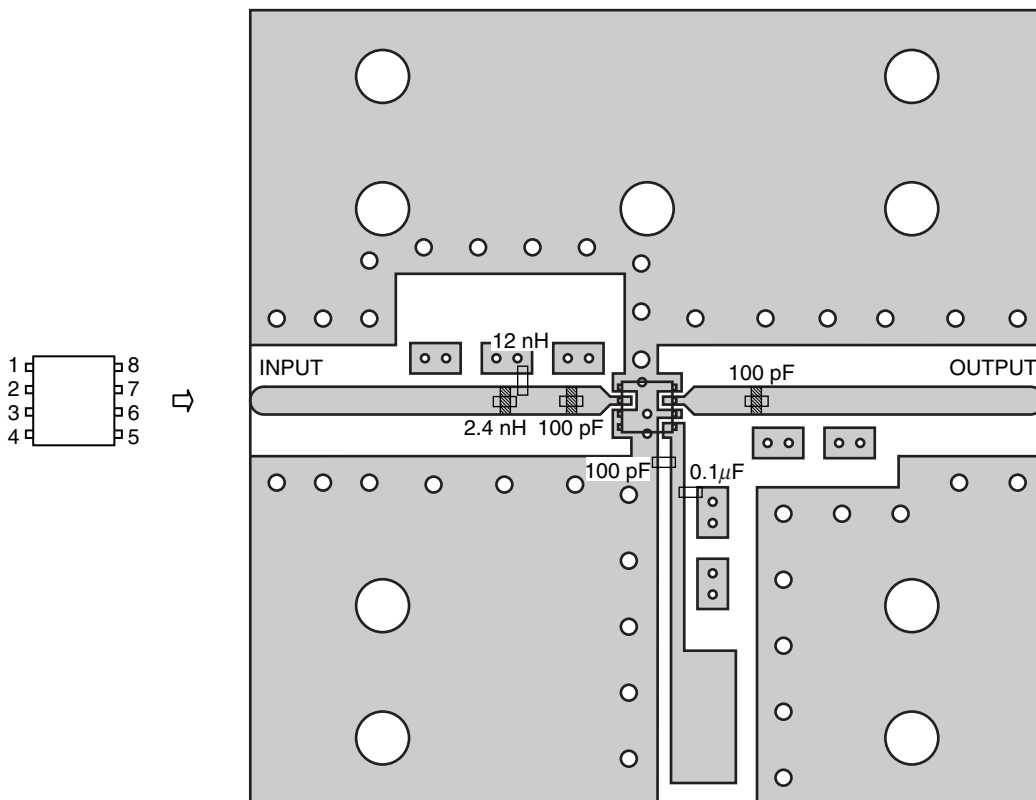
TEST CIRCUIT




Notes

1. High performance with minimum external components.
2. Output matched to 50 Ω.

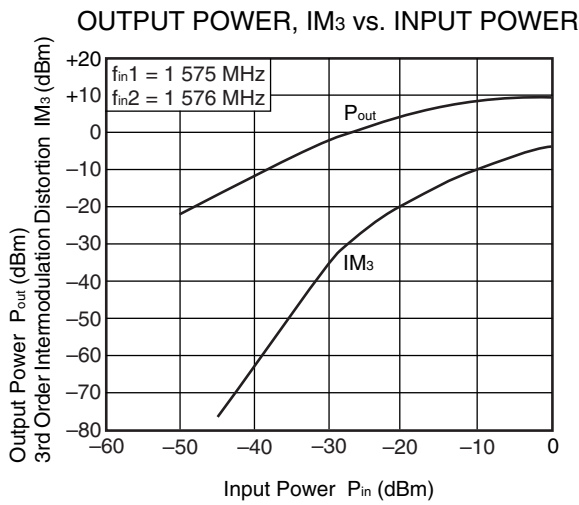
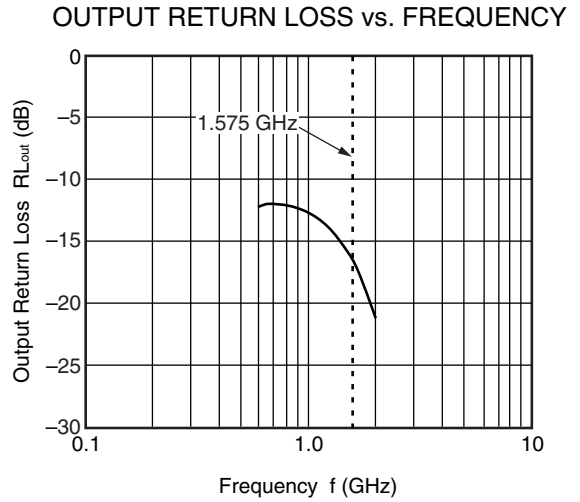
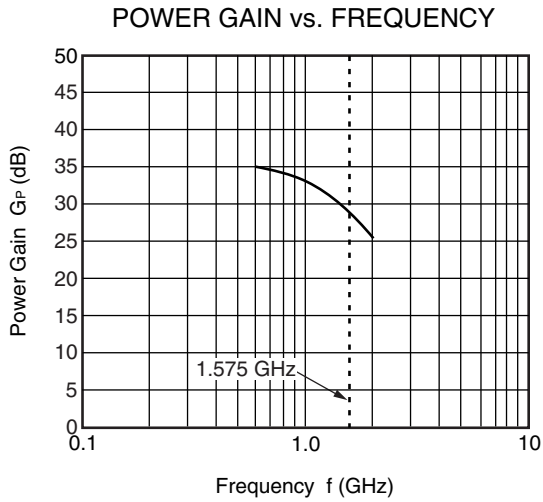
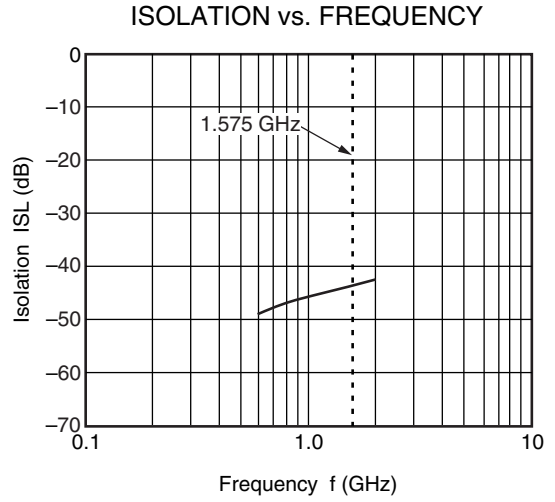
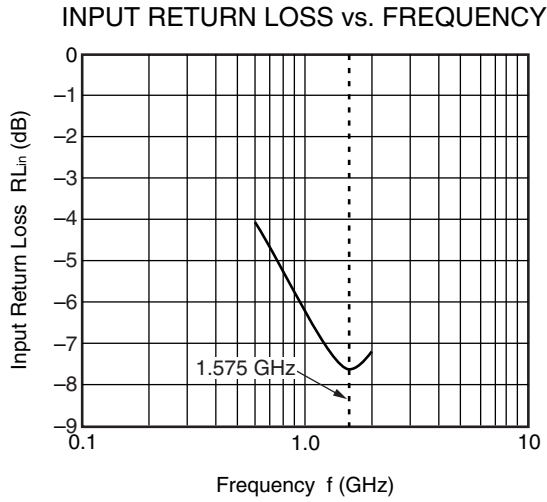
ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD



Notes

1. 30 × 30 × 0.51 mm double sided copper-clad hydrocarbon ceramic woven glass PWB (Rogers : R04003, εr = 3.38).
2. Au plated on pattern
3. 12 nH/2.4 nH : Murata LQP15M
4. 100 pF/0.1 μF : Murata GRM15
5.  represents cutout
6. ○: Through holes

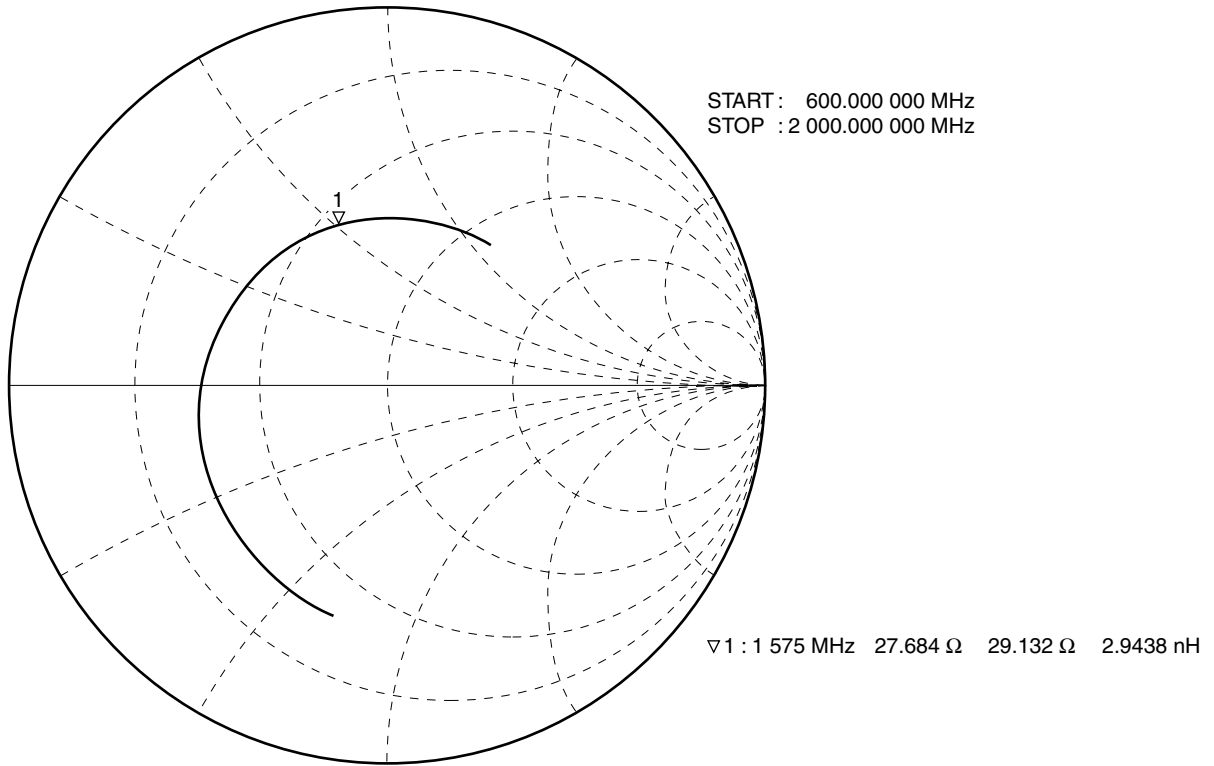
**TYPICAL CHARACTERISTICS (T<sub>A</sub> = +25°C, V<sub>CC</sub> = 3.0 V, unless otherwise specified)**



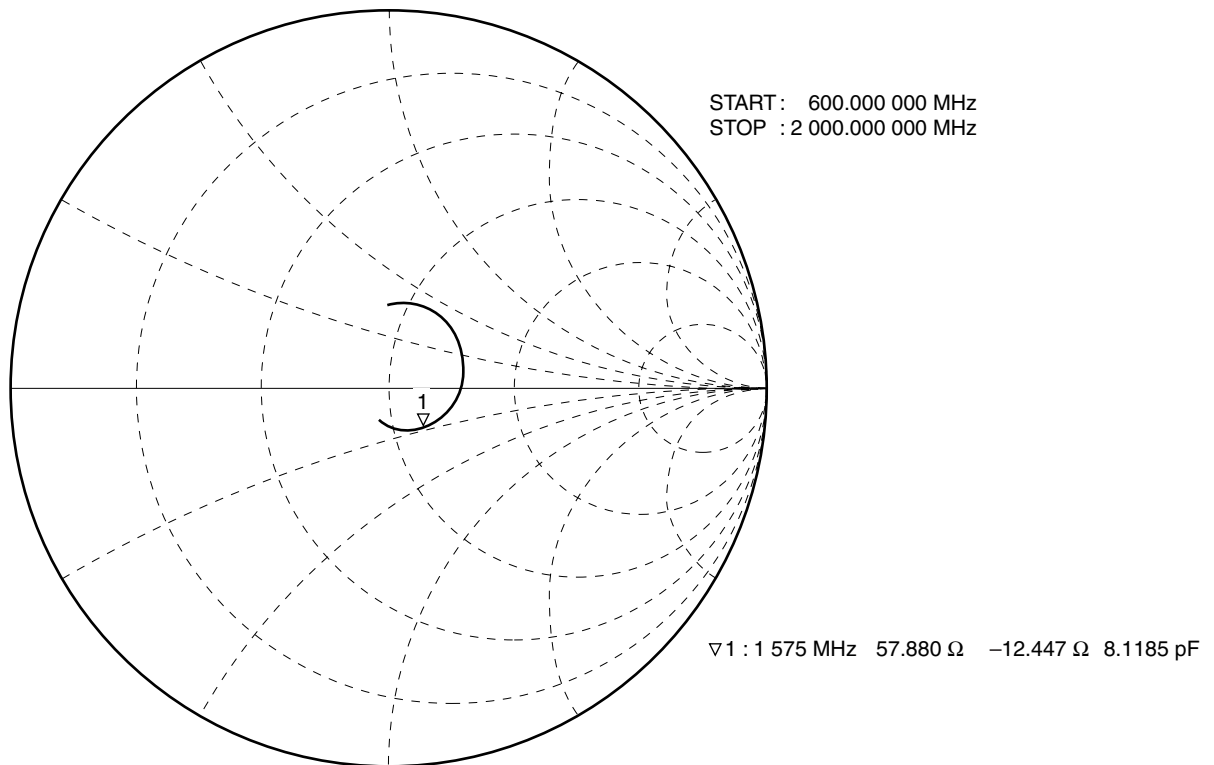
**Remark** The graphs indicate nominal characteristics.

S-PARAMETERS (T<sub>A</sub> = +25°C, V<sub>CC</sub> = 3.0 V, monitored at connector on board)

S<sub>11</sub>-FREQUENCY

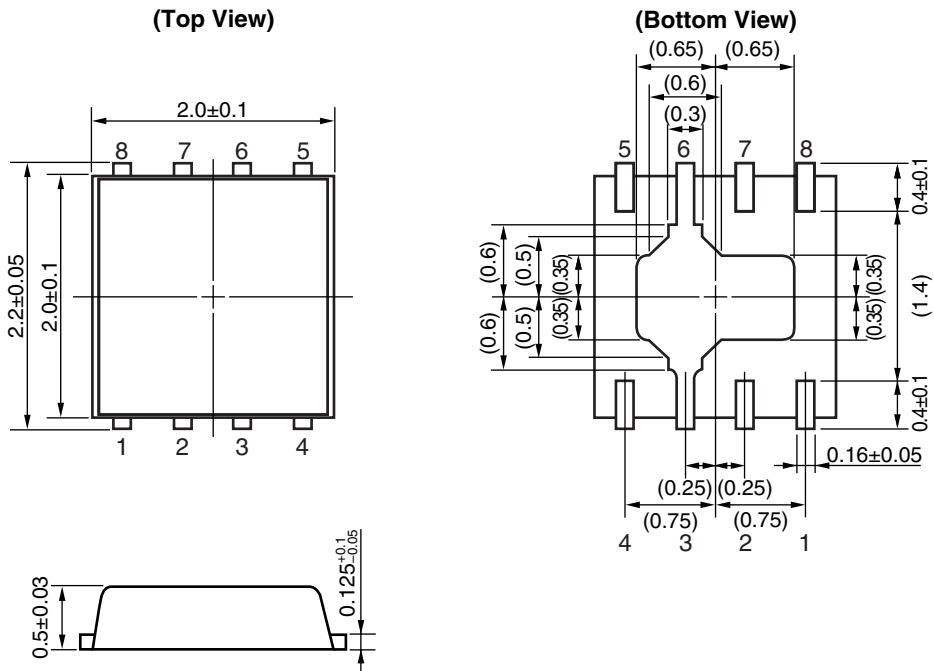


S<sub>22</sub>-FREQUENCY



PACKAGE DIMENSIONS

8-PIN LEAD-LESS MINIMOLD (UNIT: mm)



Remark ( ): Reference value



**NOTES ON CORRECT USE**

- (1) Observe precautions for handling because of electro-static sensitive devices.
- (2) Form a ground pattern as widely as possible to minimize ground impedance (to prevent undesired oscillation).  
All the ground terminals must be connected together with wide ground pattern to decrease impedance difference.
- (3) The bypass capacitor should be attached to Vcc line.

**RECOMMENDED SOLDERING CONDITIONS**

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

Soldering Method	Soldering Conditions	Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	IR260
Wave Soldering	Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	WS260
Partial Heating	Peak temperature (terminal temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below	HS350

**Caution Do not use different soldering methods together (except for partial heating).**

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