DATA SHEET

NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC8215TU

SiGe LOW NOISE AMPLIFIER FOR GPS/MOBILE COMMUNICATIONS

DESCRIPTION

The μPC8215TU 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 Ω

APPLICATION

- Low noise amplifier for GPS and mobile communications

ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPC8215TU-E2	μPC8215TU-E2-A	8-pin lead-less minimold (Pb-Free) [Note]	8215	• 8 mm wide embossed taping • Pin 5, 6, 7, 8 indicates pull-out direction of tape • Qty 5 kpcs/reel

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: μPC8215TU

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

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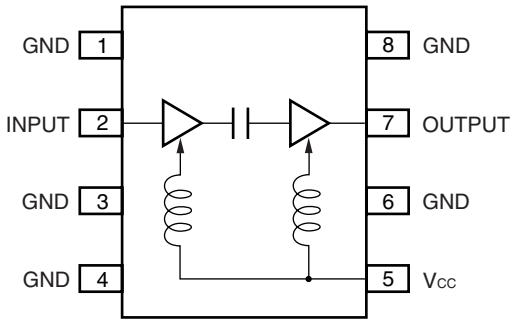
PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Test Conditions	Ratings	Unit
Supply Voltage	V_{CC}	T_A = +25°C	4.0	V
Power Dissipation of Package	P_D	T_A = +85°C **Note**	1.06	W
Operating Ambient Temperature	T_A		−40 to +85	°C
Storage Temperature	T_{stg}		−55 to +150	°C
Input Power	P_{in}		+10	dBm

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

RECOMMENDED OPERATING RANGE

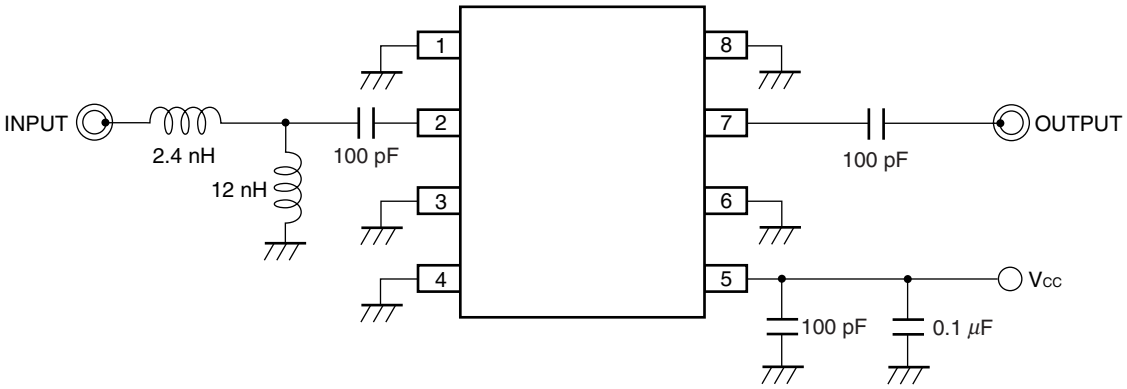
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V_{CC}	2.7	3.0	3.3	V
Operating Ambient Temperature	T_A	−25	+25	+85	°C
Operating Frequency Range	f_{in}	–	1 575	–	MHz

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, V_{CC} = 3.0 V, f_{in} = 1 575 MHz, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	I_{CC}	No Signal	–	10.0	13.0	mA
Power Gain	G_P		24.0	27.0	30.0	dB
Noise Figure	NF		–	1.3	1.5	dB
Output 3rd Order Distortion Intercept Point	OIP_3		–	+12.5	–	dBm
Input Return Loss	RL_{in}		6.0	7.0	–	dB
Output Return Loss	RL_{out}		10	14.0	–	dB
Isolation	ISL		30	40.0	–	dB
Gain 1 dB Compression Output Power	$P_{O\ (1\ dB)}$		–	+5.0	–	dBm

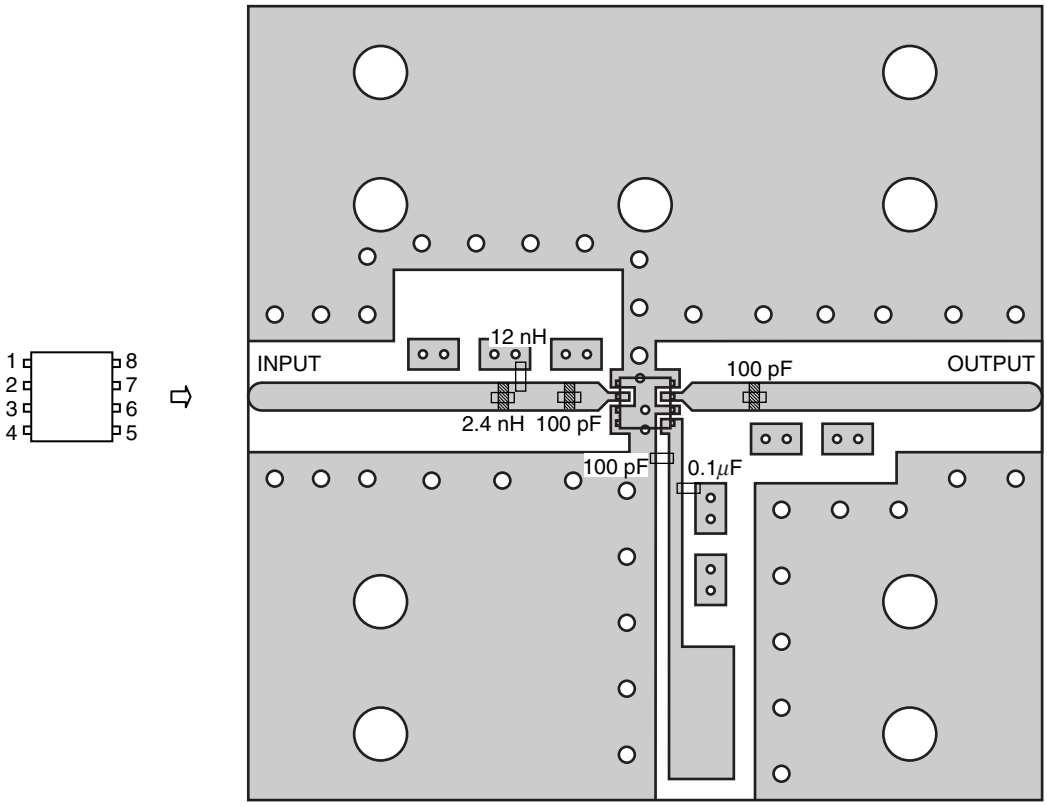
TEST CIRCUIT



Notes

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

ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD

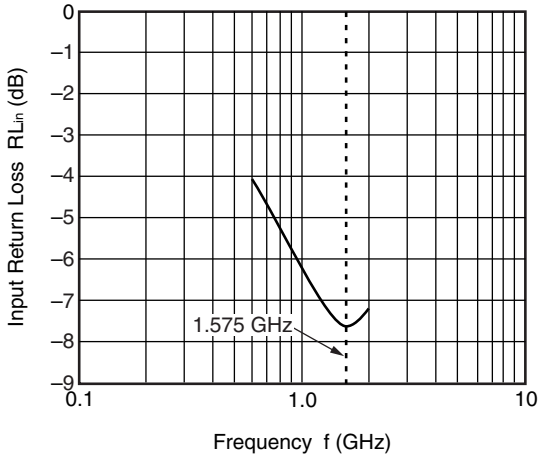


Notes

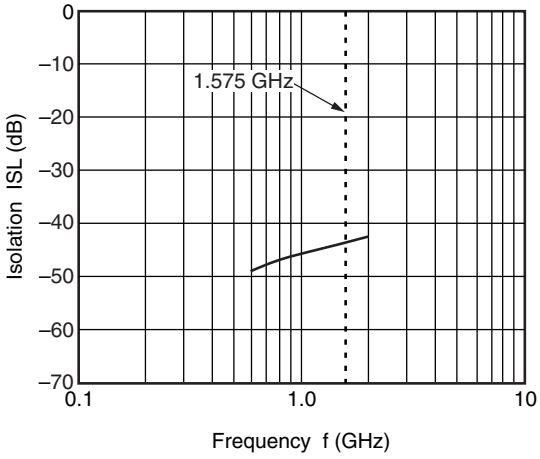
1. 30 × 30 × 0.51 mm double sided copper-clad hydrocarbon ceramic woven glass PWB (Rogers : R04003, εr = 3.38).
2. Au plated on pattern
3. 12 nH/2.4 nH : Murata LQP15M
4. 100 pF/0.1 μF : Murata GRM15
5. ▨ represents cutout
6. ○: Through holes

TYPICAL CHARACTERISTICS (T_A = +25°C, V_{CC} = 3.0 V, unless otherwise specified)

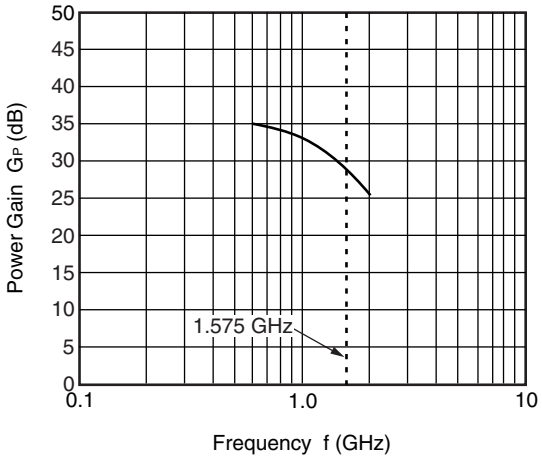
INPUT RETURN LOSS vs. FREQUENCY



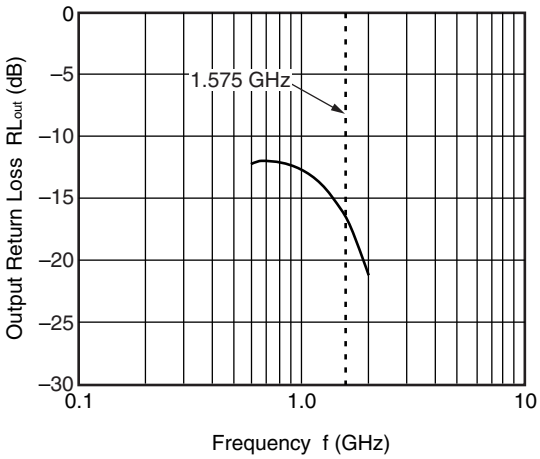
ISOLATION vs. FREQUENCY



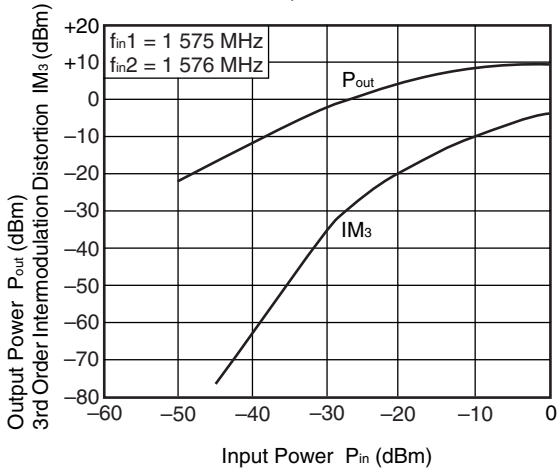
POWER GAIN vs. FREQUENCY



OUTPUT RETURN LOSS vs. FREQUENCY



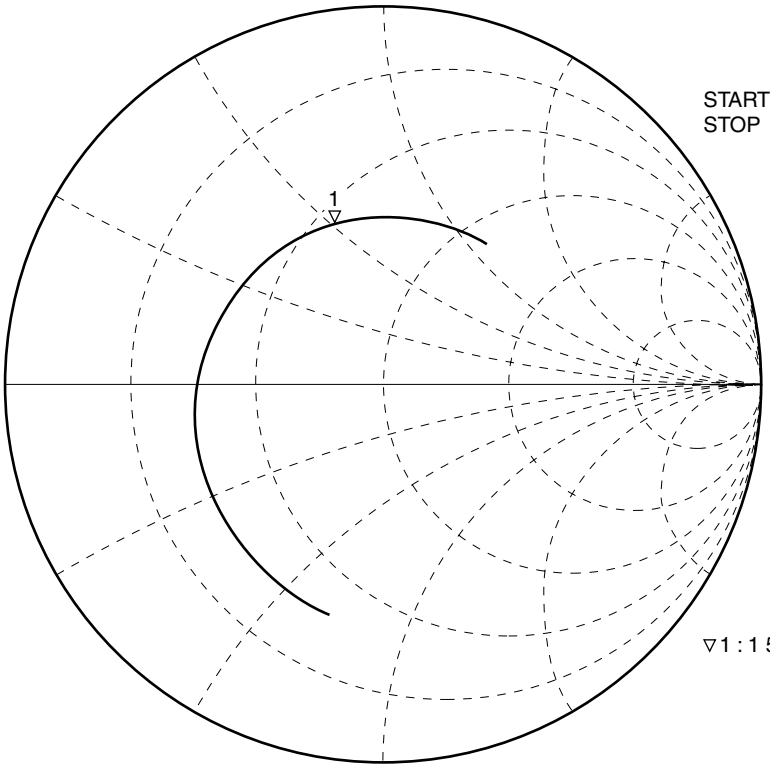
OUTPUT POWER, IM3 vs. INPUT POWER



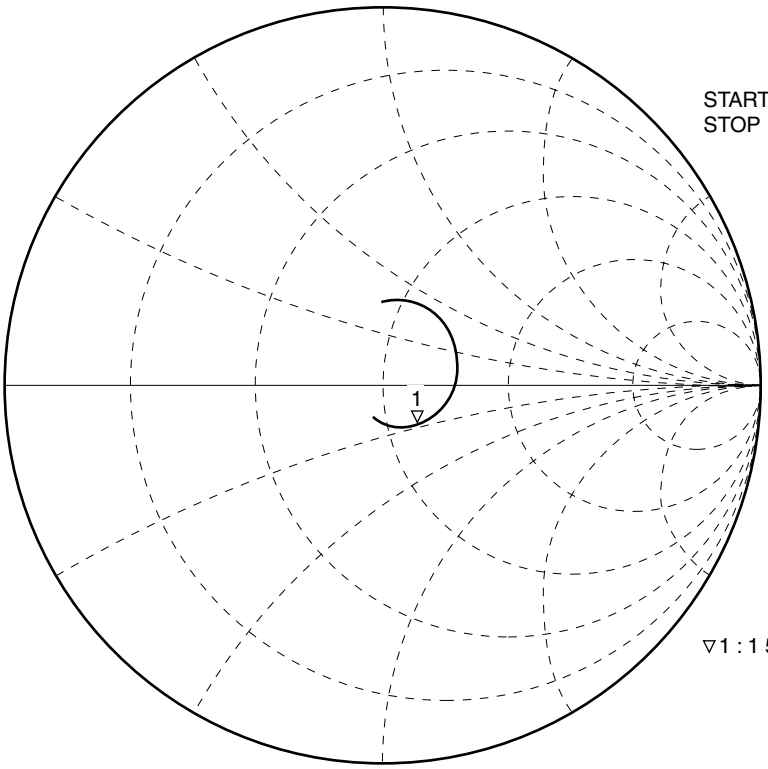
Remark The graphs indicate nominal characteristics.

S-PARAMETERS (T_A = +25°C, V_{CC} = 3.0 V, monitored at connector on board)

S_{11}–FREQUENCY



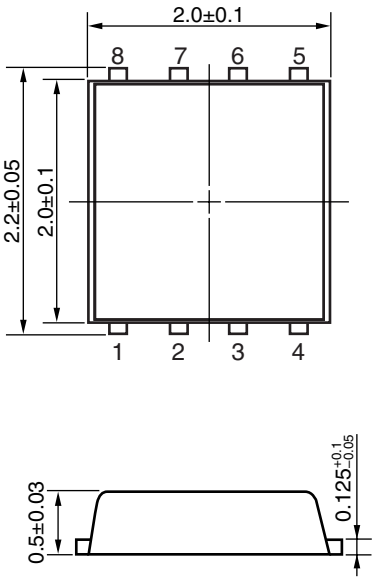
S_{22}–FREQUENCY



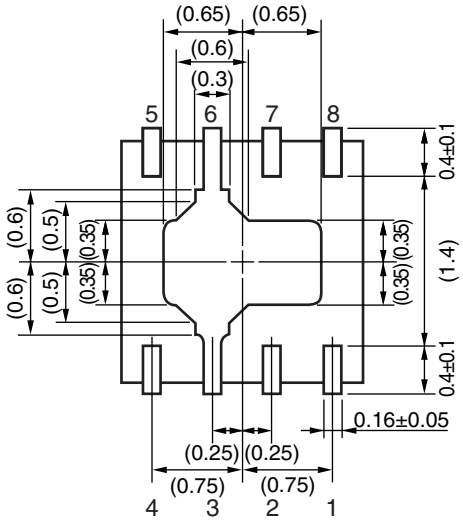
PACKAGE DIMENSIONS

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

(Top View)



(Bottom View)



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 V_{CC} 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	IR260
	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	
Wave Soldering	Peak temperature (molten solder temperature)	: 260°C or below	WS260
	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	
Partial Heating	Peak temperature (terminal temperature)	: 350°C or below	HS350
	Soldering time (per side of device)	: 3 seconds or less	
	Maximum chlorine content of rosin flux (% mass)	: 0.2%(Wt.) or below	

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

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