



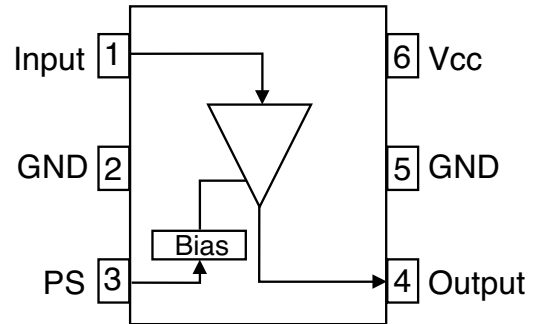
# NEC's SiGe LOW NOISE AMPLIFIER FOR GPS/MOBILE COMMUNICATIONS

## UPC8211TK

### FEATURES

- **LOW NOISE:**  
NF = 1.3 dB TYP.
- **HIGH GAIN:**  
GP = 18.5 dB TYP.
- **LOW CURRENT CONSUMPTION:**  
I<sub>CC</sub> = 3.5 mA TYP. at V<sub>CC</sub> = 3.0 V
- **BUILT-IN POWER SAVE FUNCTION:**
- **HIGH-DENSITY SURFACE MOUNTING:**  
6-pin lead less minimold package ( 1.5 x 1.3 x 0.55 mm)

### INTERNAL BLOCK DIAGRAM



### APPLICATION

- Low Noise amplifier for GPS and mobile communications
- General purpose low noise amplifier

### DESCRIPTION

NEC's UPC8211TK is a silicon germanium (SiGe) monolithic integrated circuit designed as low noise amplifier for GPS and as a general low noise amplifier for mobile communications.

The package is 6-pin lead-less minimold (1.5 x 1.3 x 0.55 mm) suitable for surface mount and optimized for very densely populated compact designs.

This IC is manufactured using NEC's 60 GHz f<sub>T</sub>UHS2 (Ultra High Speed Process) silicon bipolar process. This process can realize excellent low noise performance and low power consumption simultaneously.

NEC's stringent quality assurance and test procedures ensure the highest reliability and performance.

### ELECTRICAL CHARACTERISTICS,

(Unless otherwise specified, T<sub>A</sub> = +25°C, V<sub>CC</sub> = 3.0 V, f<sub>in</sub> = 1575 MHz, V<sub>PS</sub> = 3.0 V)

| PART NUMBER<br>PACKAGE OUTLINE |   |       | UPC8211TK<br>S06 |       |      |
|--------------------------------|---|-------|------------------|-------|------|
| SYMBOLS                        | PARAMETERS AND CONDITIONS                                   | UNITS | MIN              | TYP   | MAX  |
| I <sub>CC</sub>                | Circuit Current (no input signal)                           | mA    | -                | 3.5   | 4.5  |
|                                | At power save mode (V <sub>PS</sub> < 0.8V)                 | μA    | -                | -     | 1    |
| GP                             | Power Gain  | dB    | 15.5             | 18.5  | 21.5 |
| NF                             | Noise Figure  | dB    | -                | 1.3   | 1.5  |
| IIP <sub>3</sub>               | 3rd Order Distortion Input Intercept Point (Gain = 18.5 dB) | dBm   | -                | -12   | -    |
| RL <sub>IN</sub>               | Input Return Loss   | dB    | -                | -7.5  | -6   |
| RL <sub>OUT</sub>              | Output Return Loss  | dB    | -                | -14.5 | -10  |
| ISO                            | Isolation   | dB    | -                | -32.5 | -    |
| V <sub>PS ON</sub>             | Rising Voltage from Power-Saving Mode                       | V     | 2.2              | -     | -    |
| V <sub>PS OFF</sub>            | Falling Voltage from Power-Saving Mode                      | V     | -                | -     | 0.8  |
| Flat                           | Gain Flatness (f <sub>in</sub> ±2.5 MHz)                    | dB    | -                | -     | Δ0.5 |
| P <sub>O(1 dB)</sub>           | Gain1 dB Compression Output Power                           | dBm   | -                | -4    | -    |
| P <sub>O</sub>                 | Output Power  | dBm   | -1.5             | +2.0  | -    |

## ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

| SYMBOLS          | PARAMETERS                    | UNITS | RATINGS     |
|------------------|-------------------------------|-------|-------------|
| V <sub>CC</sub>  | Supply Voltage                | V     | 4.0         |
| P <sub>D</sub>   | Power Dissipation             | mW    | 232         |
| T <sub>A</sub>   | Operating Ambient Temperature | °C    | -40 to +85  |
| T <sub>STG</sub> | Storage Temperature           | °C    | -55 to +150 |
| P <sub>IN</sub>  | Input Power                   | dBm   | +10         |

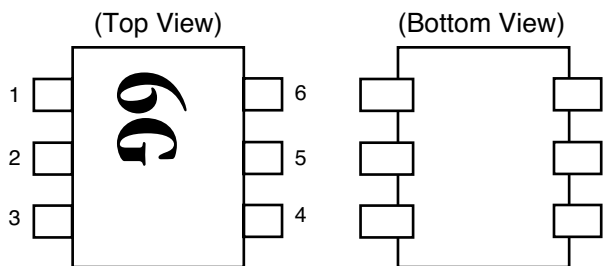
Notes:

1. Mounted on a double-sided copper-clad 50 x 50 x 1.6 mm epoxy glass PWB

## RECOMMENDED OPERATING CONDITIONS

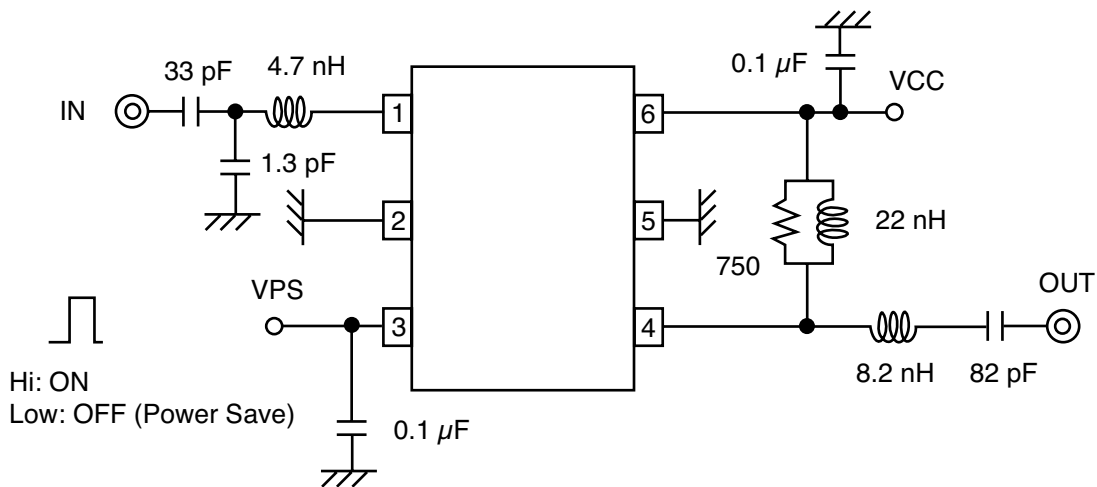
| SYMBOLS         | PARAMETERS                    | UNITS | MIN | TYP  | MAX |
|-----------------|-------------------------------|-------|-----|------|-----|
| V <sub>CC</sub> | Supply Voltage                | V     | 2.7 | 3.0  | 3.3 |
| T <sub>A</sub>  | Operating Ambient Temperature | °C    | -25 | +25  | +85 |
| f <sub>in</sub> | Operating Frequency Range     | MHz   | -   | 1575 | -   |

## PIN CONNECTIONS



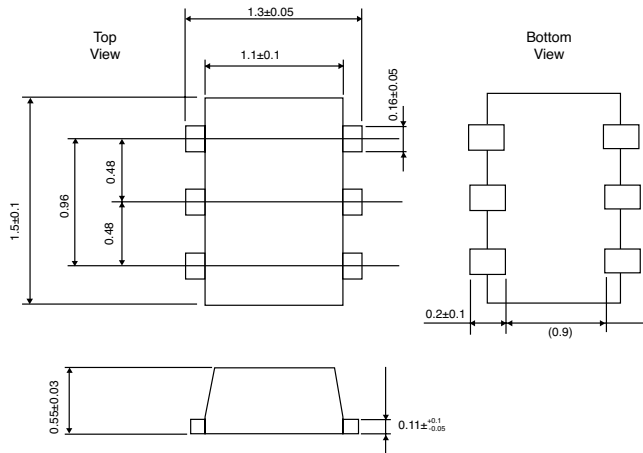
| PIN NO. | PIN NAME        |
|---------|-----------------|
| 1       | INPUT           |
| 2       | GND             |
| 3       | PS              |
| 4       | OUTPUT          |
| 5       | GND             |
| 6       | V <sub>CC</sub> |

## TEST CIRCUITS



## OUTLINE DIMENSIONS (Units in mm)

### PACKAGE OUTLINE S06



## ORDERING INFORMATION

| PART NUMBER    | QTY     |
|----------------|---------|
| UPC8211TK-E2-A | 5K/Reel |

### Note:

Embossed tape, 8 mm wide. Pins 4, 5, 6 are in tape pull-out direction.

### Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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01/27/2005

Subject: Compliance with EU Directives

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CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (\*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL’s understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance per RoHS | Concentration Limit per RoHS (values are not yet fixed) | Concentration contained in CEL devices |     |
|-------------------------------|---|--|-----|
|                               |   | -A                                     | -AZ |
| Lead (Pb)                     | < 1000 PPM  | Not Detected                           | (*) |
| Mercury                       | < 1000 PPM  | Not Detected                           |     |
| Cadmium                       | < 100 PPM   | Not Detected                           |     |
| Hexavalent Chromium           | < 1000 PPM  | Not Detected                           |     |
| PBB                           | < 1000 PPM  | Not Detected                           |     |
| PBDE                          | < 1000 PPM  | Not Detected                           |     |

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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