



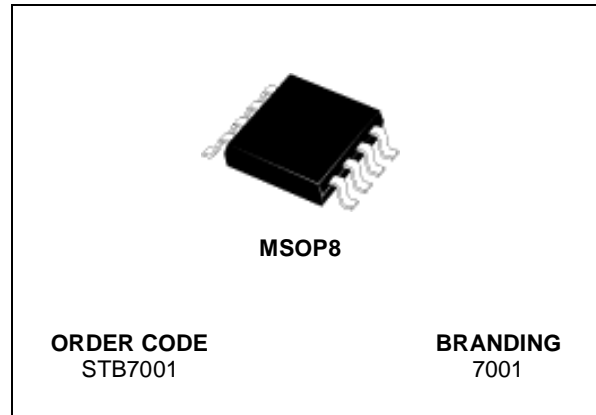
# STB7001

## 900 MHz THREE GAIN LEVEL LNA

- FULLY INTEGRATED 900 MHz LNA
- THREE GAIN LEVELS (0dB, 18dB, 26dB typ. @ 2.8V)
- LOW NOISE FIGURE
- TEMPERATURE COMPENSATED

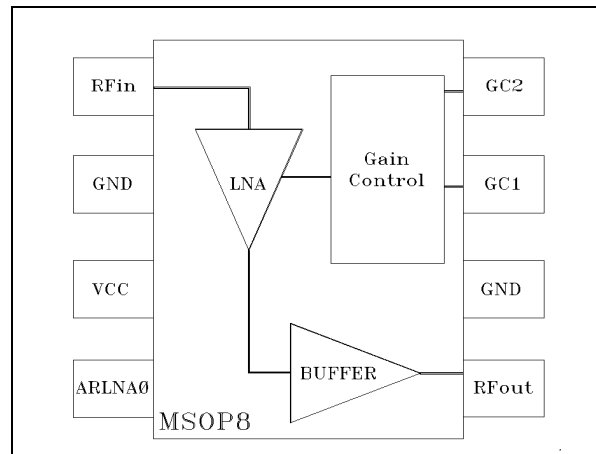
### APPLICATIONS

- GSM HANDSETS



### DESCRIPTION

The STB7001 is a Silicon monolithic amplifier, that offers low noise figure and three gain levels for 900-MHz applications. STB7001 is housed in a small industry-standard MSOP8 surface mount package, requiring very little board space (50% reduction vs SO8 Package). MSOP8 dimensions are 3mmx5mm with a 1.1mm thickness. The device is ESD protected and requires minimum external components in the application circuit, for the on-chip bias and gain control. Furthermore, temperature and supply voltage compensation assures high stability over a wide range of operating conditions.



### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter            | Value      | Unit |
|-----------|----------------------|------------|------|
| $V_{cc}$  | Supply voltage       | 5.5        | V    |
| $T_j$     | Junction Temperature | 150        | °C   |
| $T_{stg}$ | Storage temperature  | -40 to +85 | °C   |

### THERMAL DATA

| Symbol        | Parameter                            | Value | Unit |
|---------------|--------------------------------------|-------|------|
| $R_{th(j-a)}$ | Junction -ambient Thermal Resistance | 200   | °C/W |

**ELECTRICAL SPECIFICATION (T<sub>amb</sub> = 25°C, V<sub>cc</sub> = 2.8V)**

| Symbol                 | Parameters                  | Test Conditions  | Min.                 | Typ.                    | Max.                | Unit |
|------------------------|-----------------------------|--|----------------------|-------------------------|---------------------|------|
| V <sub>cc</sub>        | Supply voltage              |  | 2.7                  | 2.8                     | 2.9                 | V    |
| I <sub>bias</sub>      | Bias current                | for G <sub>p1</sub> <sup>(1)</sup><br>G <sub>p2</sub> <sup>(1)</sup><br>G <sub>p3</sub> <sup>(1)</sup> | 8<br>14<br>10        | 11.5<br>17.5<br>15.0    | 15.0<br>22.5<br>19  | mA   |
| I <sub>stby</sub>      | Standby current             |  |                      |                         | 20                  | μA   |
| f                      | Frequency range             |  | 925                  |                         | 960                 | MHz  |
| G <sub>p1,2,3</sub>    | Power gain                  | for G <sub>p1</sub><br>G <sub>p2</sub><br>G <sub>p3</sub>  | -3.0<br>16.0<br>24.0 | 0.0<br>18.0<br>26.0     | 3.0<br>20.0<br>28.0 | dB   |
| NF <sub>1,2,3</sub>    | Noise figure                | for G <sub>p1</sub><br>G <sub>p2</sub><br>G <sub>p3</sub>  |                      | 10<br>3.1<br>2.5        |                     | dB   |
| P1dB <sub>1,2,3</sub>  | Input 1 dB Compr.Power      | for G <sub>p1</sub><br>G <sub>p2</sub><br>G <sub>p3</sub>  |                      | -15.0<br>-19.0<br>-26.5 |                     | dBm  |
| IIP <sub>3,1,2,3</sub> | Input Third Order Intercept | for G <sub>p1</sub><br>G <sub>p2</sub><br>G <sub>p3</sub>  |                      | -6.0<br>-11.0<br>-20.0  |                     | dBm  |
| VSWR <sub>i</sub>      | Input VSWR                  |  |                      |                         | 1.5:1               |      |
| VSWR <sub>o</sub>      | Output VSWR                 |  |                      |                         | 1.5:1               |      |
| AZ <sub>out</sub>      | Z <sub>out</sub> LNA on/off |  |                      |                         | 15                  | %    |

Note(1) : G<sub>p1</sub> min gain, G<sub>p2</sub> mid gain and G<sub>p3</sub> max gain.

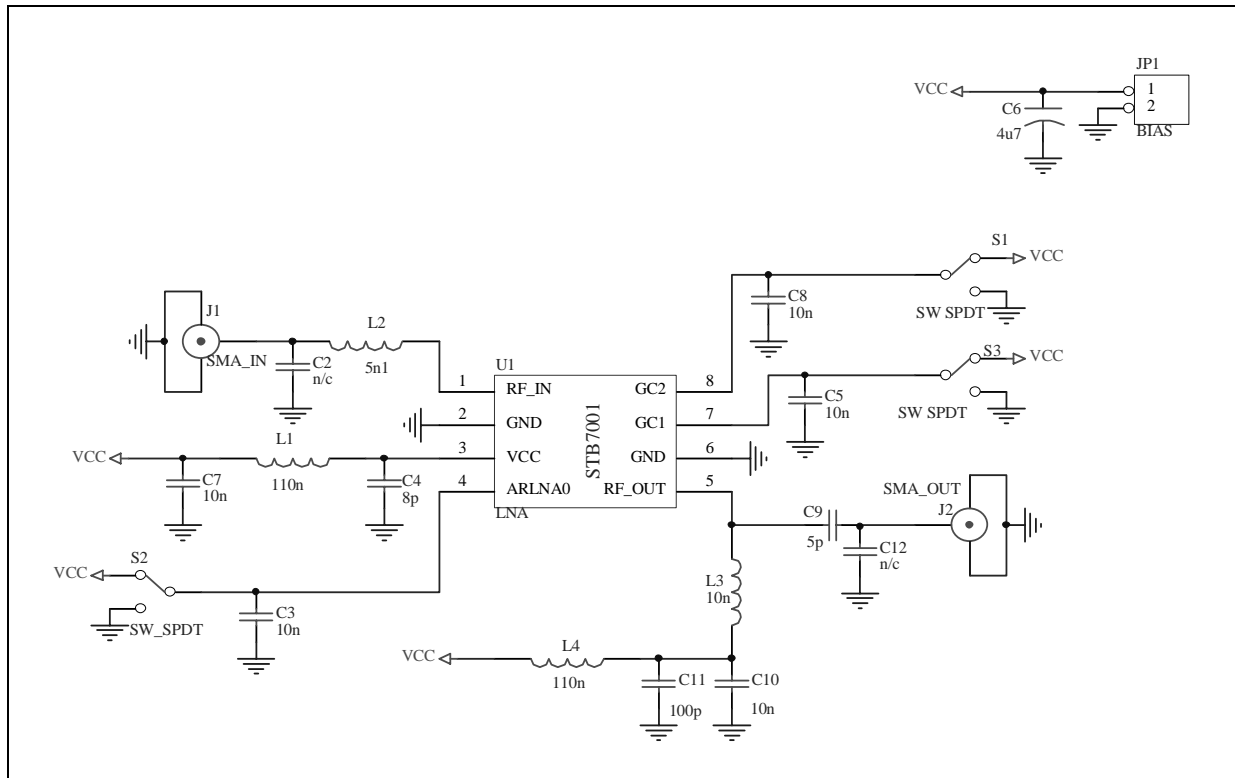
**PINOUT**

| Pin Number | Symbol | Description           | Evaluation circuit components                            |
|------------|--------|-----------------------|--|
| 1          | RFin   | RF input              | L2 = 5.1nH, C2 = n/c                                     |
| 2          | Gnd    | Ground                |  |
| 3          | Vcc    | Voltage supply        | C4 = 8pF, L1 = 110nH, C7 = 10nF, C6 = 4.7uF              |
| 4          | ARLNA0 | Enable for power down | C3 = 10nF  |
| 5          | RFout  | RF output             | C9 = 5pf, L3 = 10nH, C10 = 10nF, C11 = 100pF, L4 = 110nH |
| 6          | Gnd    | Ground                |  |
| 7          | GC1    | Gain selection        | C5 = 10nF  |
| 8          | GC2    | Gain selection        | C8 = 10nF  |

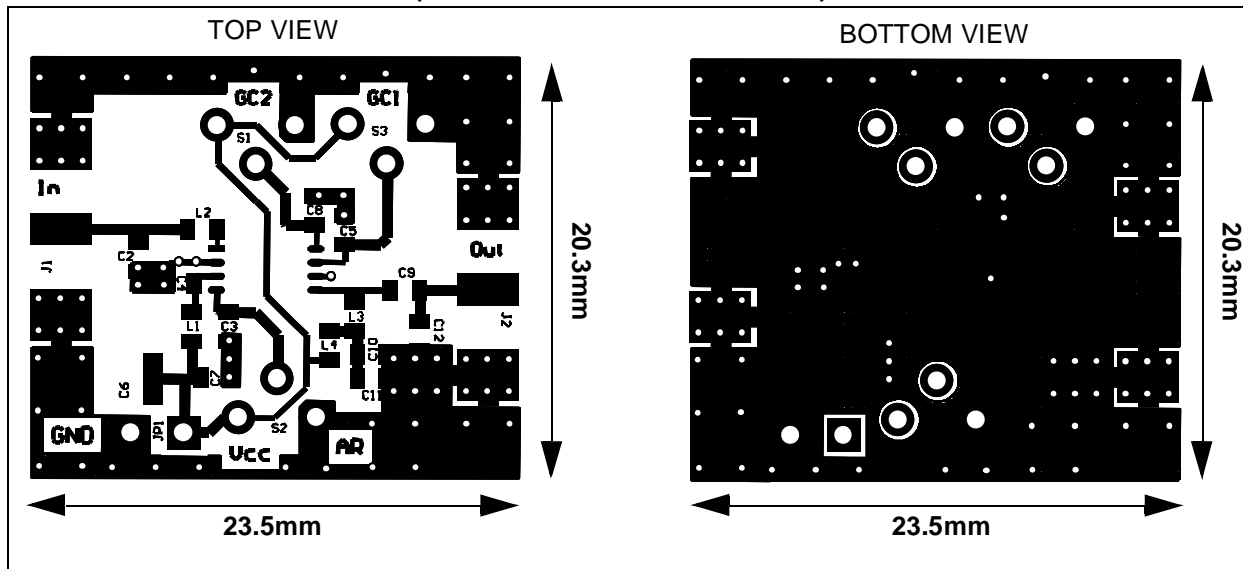
**GAIN SELECTION**

|     | G <sub>p1</sub> | G <sub>p2</sub> | G <sub>p3</sub> |
|-----|-----------------|-----------------|-----------------|
| GC1 | 0               | 0               | 1               |
| GC2 | 0               | 1               | 1               |

TEST CIRCUIT SCHEMATIC



TEST CIRCUIT PHOTOMASTER (board dimensions 23.5x20.3mm)



## INPUT/OUTPUT VSWR, ISOLATION AND GAIN PARAMETERS (MEASURED DATA)

## MAX GAIN

| Freq. | VSWRi | VSWRo | Isolation | Gain  |
|-------|-------|-------|-----------|-------|
| 905   | 1.16  | 1.15  | -43.61    | 25.09 |
| 912.5 | 1.15  | 1.17  | -45.69    | 25.04 |
| 913.5 | 1.15  | 1.17  | -42.84    | 24.98 |
| 927.5 | 1.15  | 1.17  | -43.36    | 24.92 |
| 935   | 1.14  | 1.18  | -42.42    | 24.85 |
| 942.5 | 1.14  | 1.19  | -48.58    | 24.79 |
| 950   | 1.14  | 1.20  | -47.86    | 24.72 |
| 957.5 | 1.13  | 1.18  | -41.52    | 24.68 |
| 965   | 1.13  | 1.19  | -45.53    | 24.61 |
| 972.5 | 1.14  | 1.22  | -49.18    | 24.57 |
| 980   | 1.13  | 1.20  | -44.99    | 24.48 |
| 987.5 | 1.14  | 1.21  | -47.83    | 24.41 |
| 995   | 1.14  | 1.21  | -45.33    | 24.35 |

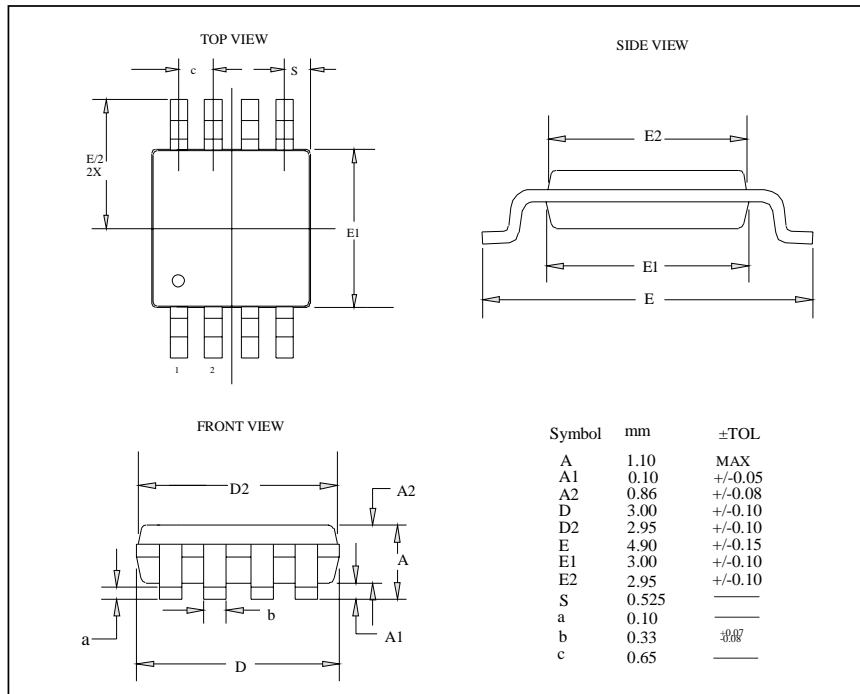
## MID GAIN

| Freq. | VSWRi | VSWRo | Isolation | Gain  |
|-------|-------|-------|-----------|-------|
| 905   | 1.18  | 1.10  | -44.66    | 17.41 |
| 912.5 | 1.18  | 1.11  | -43.96    | 17.36 |
| 913.5 | 1.18  | 1.11  | -46.54    | 17.32 |
| 927.5 | 1.18  | 1.12  | -46.48    | 17.28 |
| 935   | 1.18  | 1.12  | -46.39    | 17.25 |
| 942.5 | 1.18  | 1.13  | -48.29    | 17.19 |
| 950   | 1.18  | 1.13  | -47.05    | 17.16 |
| 957.5 | 1.19  | 1.13  | -48.72    | 17.11 |
| 965   | 1.20  | 1.14  | -50.07    | 17.07 |
| 972.5 | 1.20  | 1.14  | -50.48    | 17.02 |
| 980   | 1.21  | 1.15  | -55.86    | 16.96 |
| 987.5 | 1.22  | 1.15  | -52.12    | 16.92 |
| 995   | 1.23  | 1.15  | -56.92    | 16.86 |

## MIN GAIN

| Freq. | VSWR <sub>i</sub> | VSWR <sub>o</sub> | Isolation | Gain  |
|-------|-------------------|-------------------|-----------|-------|
| 905   | 1.54              | 1.11              | -43.83    | 0.07  |
| 912.5 | 1.54              | 1.11              | -43.63    | 0.03  |
| 913.5 | 1.54              | 1.12              | -45.88    | -0.04 |
| 927.5 | 1.54              | 1.13              | -45.76    | -0.10 |
| 935   | 1.55              | 1.13              | -45.69    | -0.13 |
| 942.5 | 1.56              | 1.14              | -46.75    | -0.21 |
| 950   | 1.56              | 1.14              | -45.29    | -0.27 |
| 957.5 | 1.57              | 1.14              | -45.20    | -0.34 |
| 965   | 1.59              | 1.15              | -45.38    | -0.41 |
| 972.5 | 1.60              | 1.15              | -45.79    | -0.48 |
| 980   | 1.61              | 1.16              | -45.15    | -0.59 |
| 987.5 | 1.61              | 1.17              | -42.79    | -0.67 |
| 995   | 1.60              | 1.17              | -43.49    | -0.77 |

MSOP8 MECHANICAL DATA



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