



## 650- 800 MHz LOW NOISE POWER AMPLIFIER WLA08-2030A<sup>1</sup>

WLA08-2030A LNA is a low noise figure, wideband, and high linearity power amplifiers. The amplifier offers typical 0.50 noise figure, 21 dB gain, and output 34.0 dBm IP<sub>3</sub> at the frequency range from 650 MHz to 800 MHz.

WLA08-2030A is most suitable for cellular base stations, wireless data communications, tower top amplifiers, cellular micro-cells, last-mile wireless communication systems, and wireless measurement applications.



### Key Features:

|                          |                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Impedance:               | 50 Ohm                                                                                                                    |
| MTBF <sup>2</sup> :      | >300,000 hrs (34 Years)                                                                                                   |
| Low Noise:               | 0.50 dB                                                                                                                   |
| Output IP <sub>3</sub> : | 34.0 dBm typical                                                                                                          |
| Gain:                    | 21 dB                                                                                                                     |
| Input VSWR:              | 1.35:1                                                                                                                    |
| Output VSWR:             | 1.35:1                                                                                                                    |
| P <sub>1dB</sub> :       | 18.0 dBm typical                                                                                                          |
| Single Power Supply:     | 65 mA, @ +7V ~ +15V                                                                                                       |
| Frequency Range:         | 650 ~ 800 MHz                                                                                                             |
| Operating Temperature:   | -40 ~ +85 °C                                                                                                              |
| Built-In Functions:      | DC blocks at input and output, DC-DC converter, sequencing biases, temperature compensation circuits, and auto DC biases. |

### Absolute Maximum Ratings<sup>3</sup>:

| Symbol              | Parameters                    | Units | Absolute Maximum |
|---------------------|-------------------------------|-------|------------------|
| V <sub>dd</sub>     | DC Power Supply Voltage       | V     | 25.0             |
| I <sub>dd</sub>     | Drain Current                 | mA    | 70               |
| P <sub>diss</sub>   | Total Power Dissipation       | W     | 1.75             |
| P <sub>in,Max</sub> | RF Input Power                | dBm   | 10               |
| T <sub>ch</sub>     | Channel Temperature           | °C    | 150              |
| T <sub>STG</sub>    | Storage Temperature           | °C    | -55 ~ 125        |
| T <sub>O,MAX</sub>  | Maximum Operating Temperature | °C    | -40 ~ 85         |
| R <sub>th,c</sub>   | Thermal Resistance            | °C/W  | 40               |

<sup>1</sup> Specifications are subject to change without notice.

<sup>2</sup> MTBF: Mean Time Between Failure, Per TR-NWT-000332, ISSUE 3, SEPTEMBER, 1990, T=40°C

<sup>3</sup> Operation of this device above any one of these parameters may cause permanent damage.



## Specifications:

### a) Table 1 Summary of the electrical specifications of WLA08-2030A at room temperature

| Index | Testing Item                          | Symbol       | Test Constraints                                  | Nom (RT) | Min | Max   | Unit |
|-------|---------------------------------------|--------------|---------------------------------------------------|----------|-----|-------|------|
| 1     | Gain                                  | $S_{21}$     | 650 - 800 MHz                                     | 21       | 20  | 23    | dB   |
| 2     | Gain Variation                        | $\Delta G$   | 650 - 800 MHz                                     | +/- 0.3  |     | +/- 1 | dB   |
| 3     | Input Return Loss                     | $S_{11}$     | 650 - 800 MHz                                     | 16       | 15  |       | dB   |
| 4     | Output Return Loss                    | $S_{22}$     | 650 - 800 MHz                                     | 16       | 15  |       | dB   |
| 5     | Reverse Isolation                     | $S_{12}$     | 650 - 800 MHz                                     |          | 25  |       | dB   |
| 6     | Noise figure                          | NF           | 650 - 800 MHz                                     | 0.50     |     | 0.60  | dB   |
| 7     | Output $P_{1dB}$ compression          | $P_{1dB}$    | 650 - 800 MHz                                     | 18       | 16  |       | dBm  |
| 8     | Output-Third-Order Interception point | $TOIP_3$     | Two-Tone, $P_{out}$ +0 dBm each, 1 MHz separation | 34       | 31  |       | dBm  |
| 9     | Maximum RF Input Power                | $P_{IN,MAX}$ | 650 - 800 MHz                                     |          |     | 10    | dBm  |
| 10    | Current Consumption                   | $I_{dd}$     | $V_{dd} = +7 \sim +15$ V                          | 65       |     |       | mA   |
| 11    | Power Supply Voltage                  | $V_{dd}$     |                                                   |          | +7  | +15   | V    |
| 12    | Operating Temperature                 | $T_o$        |                                                   |          | -40 | +85   | °C   |

### b) Passband Frequency Response

As shown in **Figure 1**, the typical gain of the WLA08-2030A is 21.0 dB across 0.65 to 0.80 GHz. The typical input and output return losses are 16 dB across the frequency of 0.65 to 0.80 GHz.

**Figure 2** shows the measured  $P_{1dB}$  and  $IP_3$  of the WLA08-2030A. The typical  $P_{1dB}$  and  $IP_3$  are 18.0 dBm and 34.0 dBm in the frequency range of 0.65 to 0.80 GHz, respectively.

**Figure 3** illustrates the measured noise figure performance at full temperature. The noise figure is 0.50 across the frequency range of 0.65 to 0.80 GHz at room temperature. At 85 °C, WLA08-2030A only has 0.25 dB noise increases. At -40 °C, WLA08-2030A offers approximately 0.15 dB less noise figure than that at room temperature.

**Figure 4** demonstrates the stability factor  $k$  of the amplifier. It is less than 1.0 in some frequency band and the amplifier is conditional stable.

**Figure 5** is the frequency response of WLA08-2030A in the extended frequencies. The amplifier works from 0.5 to 1.0 GHz.

**Figure 6** shows the mechanical outline and recommended motherboard layout of WLA08-2030A. It is a standard WP-5 connectorized housing.

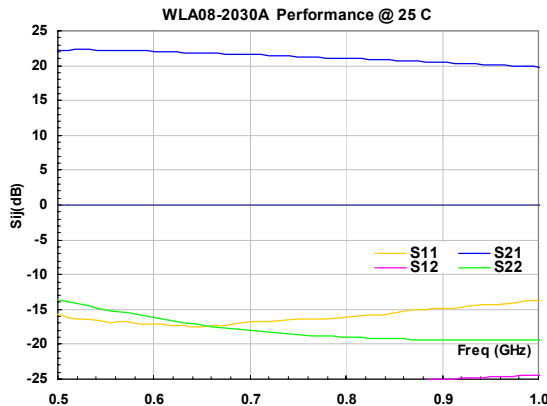


FIG. 1 Typical small signal performance.

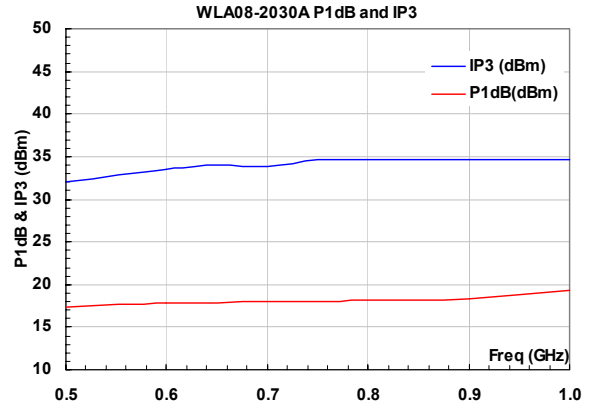


FIG. 2 Typical  $P_{1dB}$  and  $IP_3$  at room temperature.

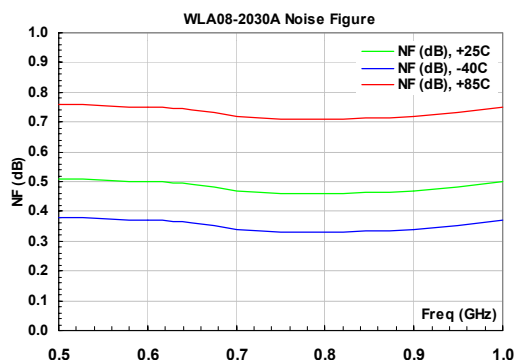


FIG. 3 Noise figure performance at full temperature

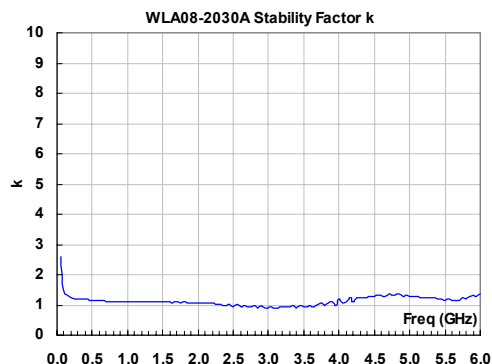


FIG. 4 Stability factor k

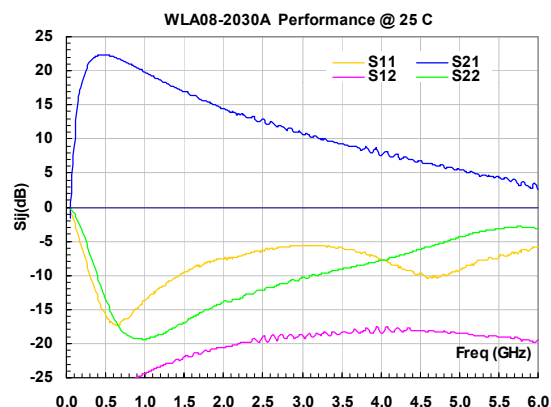


FIG. 5 Frequency response in the extended frequencies

## WLA08-2030A Mechanical Outline: WP-5

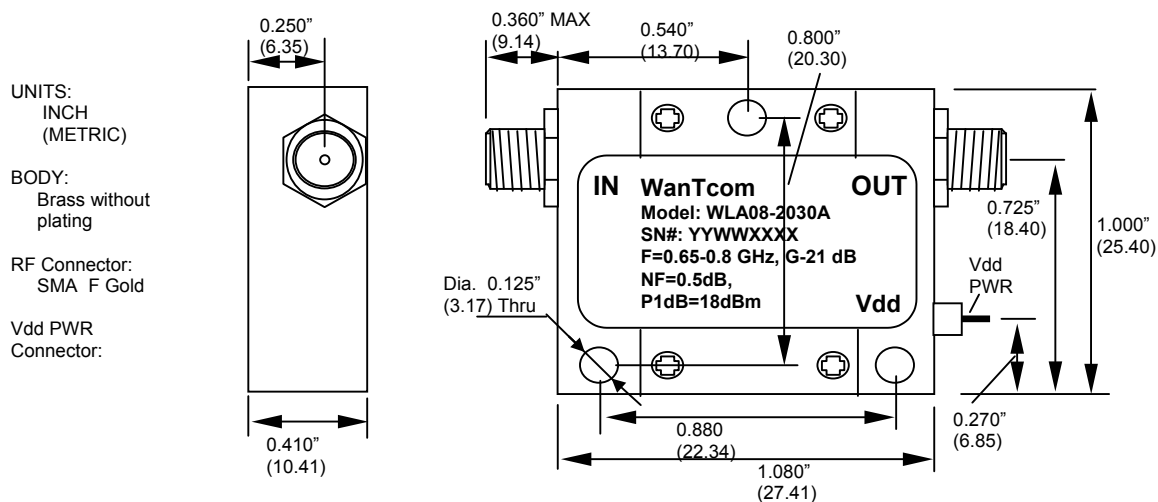


FIG. 4 WP-5 Outline



## Ordering Information

|               |             |
|---------------|-------------|
| Model Number: | WLA08-2030A |
|---------------|-------------|

## Small Signal S-Parameters:

!WLA08-2030A

!s-parameters at Vdd=+7 ~ +15V, Idd=65mA. Last updated 12/17/04.

# GHZ s MA R 50

| !F(GHz) | MAG S11 | ANG S11 | MAG S21 | ANG S21 | MAG S12 | ANG S12 | MAG S22 | ANG S22 |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0.05    | 0.924   | 179.4   | 0.828   | -17.1   | 0.0015  | 173.2   | 0.971   | -22.1   |
| 0.1     | 0.786   | 128.9   | 3.048   | -55.4   | 0.0057  | 144.1   | 0.895   | -43.3   |
| 0.2     | 0.499   | 65.1    | 8.241   | -111.5  | 0.0170  | 105.8   | 0.670   | -80.6   |
| 0.3     | 0.318   | 19.3    | 11.609  | -152.5  | 0.0260  | 80.4    | 0.456   | -109.3  |
| 0.4     | 0.218   | -21.8   | 12.906  | 175.9   | 0.0330  | 63.0    | 0.306   | -130.0  |
| 0.5     | 0.164   | -63.1   | 13.019  | 150.4   | 0.0380  | 50.0    | 0.210   | -144.2  |
| 0.6     | 0.140   | -106.1  | 12.698  | 128.9   | 0.0430  | 40.1    | 0.154   | -153.7  |
| 0.7     | 0.143   | -146.3  | 12.079  | 110.7   | 0.0480  | 31.1    | 0.125   | -160.7  |
| 0.8     | 0.158   | -178.8  | 11.271  | 94.5    | 0.0520  | 23.3    | 0.113   | -169.0  |
| 0.9     | 0.179   | 155.2   | 10.474  | 79.6    | 0.0560  | 15.4    | 0.108   | 179.0   |
| 1       | 0.206   | 133.1   | 9.778   | 65.4    | 0.0600  | 7.6     | 0.107   | 165.2   |
| 1.1     | 0.232   | 115.4   | 9.105   | 53.0    | 0.0640  | 0.7     | 0.111   | 150.2   |
| 1.2     | 0.257   | 98.9    | 8.493   | 40.8    | 0.0670  | -6.3    | 0.117   | 132.5   |
| 1.3     | 0.284   | 84.1    | 7.959   | 29.2    | 0.0710  | -14.2   | 0.125   | 113.6   |
| 1.4     | 0.307   | 71.0    | 7.518   | 18.8    | 0.0770  | -20.7   | 0.133   | 96.0    |
| 1.5     | 0.333   | 57.7    | 7.061   | 8.7     | 0.0800  | -26.2   | 0.143   | 78.6    |
| 1.6     | 0.351   | 45.2    | 6.563   | -1.6    | 0.0810  | -33.0   | 0.153   | 61.7    |
| 1.7     | 0.375   | 34.7    | 6.192   | -12.3   | 0.0840  | -41.6   | 0.167   | 45.8    |
| 1.8     | 0.396   | 23.2    | 5.897   | -22.2   | 0.0880  | -48.8   | 0.179   | 30.7    |
| 1.9     | 0.409   | 11.9    | 5.600   | -31.2   | 0.0910  | -55.1   | 0.191   | 14.8    |
| 2       | 0.421   | 1.7     | 5.281   | -40.5   | 0.0940  | -62.4   | 0.203   | -0.4    |
| 2.1     | 0.420   | -6.7    | 4.999   | -48.8   | 0.0960  | -68.6   | 0.205   | -14.1   |
| 2.2     | 0.437   | -15.5   | 4.792   | -57.5   | 0.0990  | -74.6   | 0.214   | -26.9   |
| 2.3     | 0.457   | -23.5   | 4.579   | -67.8   | 0.1010  | -83.0   | 0.230   | -40.0   |
| 2.4     | 0.471   | -32.2   | 4.463   | -77.6   | 0.1090  | -90.7   | 0.238   | -53.5   |
| 2.5     | 0.481   | -42.9   | 4.403   | -85.7   | 0.1130  | -95.6   | 0.246   | -66.8   |
| 2.6     | 0.494   | -50.5   | 4.200   | -92.5   | 0.1120  | -100.5  | 0.259   | -79.8   |
| 2.7     | 0.501   | -60.2   | 3.910   | -101.2  | 0.1080  | -107.5  | 0.269   | -92.9   |
| 2.8     | 0.510   | -69.1   | 3.669   | -111.0  | 0.1090  | -116.8  | 0.276   | -104.7  |
| 2.9     | 0.517   | -77.7   | 3.527   | -120.6  | 0.1110  | -125.3  | 0.291   | -116.4  |
| 3       | 0.523   | -86.7   | 3.433   | -129.7  | 0.1150  | -133.1  | 0.302   | -129.0  |
| 3.1     | 0.526   | -94.7   | 3.328   | -138.2  | 0.1190  | -139.1  | 0.308   | -140.6  |
| 3.2     | 0.519   | -104.1  | 3.226   | -146.0  | 0.1180  | -144.3  | 0.317   | -151.3  |
| 3.3     | 0.518   | -112.2  | 3.120   | -153.8  | 0.1190  | -152.2  | 0.329   | -162.1  |
| 3.4     | 0.513   | -120.3  | 3.020   | -161.7  | 0.1230  | -158.2  | 0.338   | -172.7  |
| 3.5     | 0.498   | -129.2  | 2.908   | -169.2  | 0.1200  | -163.0  | 0.350   | 177.3   |
| 3.6     | 0.492   | -137.5  | 2.792   | -178.4  | 0.1180  | -171.2  | 0.360   | 167.6   |
| 3.7     | 0.468   | -145.1  | 2.754   | 173.0   | 0.1230  | -179.6  | 0.369   | 158.2   |
| 3.8     | 0.463   | -152.5  | 2.731   | 166.9   | 0.1250  | 176.4   | 0.379   | 149.4   |
| 3.9     | 0.439   | -160.1  | 2.537   | 159.1   | 0.1190  | 169.4   | 0.391   | 140.8   |
| 4       | 0.413   | -166.0  | 2.405   | 148.0   | 0.1200  | 158.0   | 0.408   | 132.2   |
| 4.1     | 0.397   | -171.6  | 2.456   | 137.8   | 0.1290  | 150.8   | 0.416   | 123.8   |
| 4.2     | 0.374   | -178.0  | 2.461   | 130.7   | 0.1290  | 147.0   | 0.431   | 115.6   |
| 4.3     | 0.349   | 179.1   | 2.327   | 124.4   | 0.1220  | 139.2   | 0.449   | 107.6   |
| 4.4     | 0.341   | 176.8   | 2.246   | 114.6   | 0.1240  | 130.0   | 0.466   | 99.7    |
| 4.5     | 0.324   | 173.2   | 2.183   | 106.2   | 0.1250  | 123.4   | 0.485   | 92.3    |
| 5       | 0.343   | 166.2   | 1.895   | 64.3    | 0.1190  | 85.4    | 0.600   | 51.5    |
| 5.5     | 0.432   | 140.0   | 1.679   | 20.8    | 0.1120  | 47.2    | 0.698   | 6.6     |
| 6       | 0.510   | 112.5   | 1.369   | -29.2   | 0.1070  | 2.9     | 0.701   | -44.7   |

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