

# DATASHEET

ERZ-LNA-0100-0310-30-2-NS

# ERZIA



## NEW SPACE Low Noise Amplifier

1 to 3.1 GHz

Noise Figure 1.6 dB, Gain 30 dB

**Description:**

The ERZ-LNA-0100-0310-30-2-NS is a microwave low noise amplifier based in GaAs, specially prepared for New Space applications. It is based on its commercial grade equivalent, maintaining electrical performance and including key features ideal for new space applications, including radiation tolerance, performance in vacuum and outgassing compatibility, among others. See table next page.

**Key Technical Features:**

- Frequency Range: 1 to 3.1 GHz.
- Typical values: Noise Figure 1.6 dB, Gain 30 dB
- RF connectors (I/O): SMA Female
- Micro-D Sub-9 for control and DC connection

**Electrical Performance**

| Parameter           | Value             |       |       | Units |
|---------------------|-------------------|-------|-------|-------|
|                     | Min               | Typ   | Max   |       |
| Frequency           | 1.0               | -     | 3.1   | GHz   |
| Output Power (P1dB) | 17                | 19    | 21    | dBm   |
| Small Signal Gain   | 29                | 30    | 32    | dB    |
| Gain Flatness       | -                 | ±0.5  | -     | dB    |
| Noise Figure        | 1.5               | 1.6   | 2.0   | dB    |
| VSWR input          | 1.7:1             | 1.8:1 | 2.0:1 | -     |
| VSWR output         | 1.3:1             | 1.4:1 | 1.8:1 | -     |
| DC Voltage          | 10                | 15    | 20    | V     |
| Power Consumption   | -                 | 3     | -     | W     |
| RF Connectors       | SMA Female IN/OUT |       |       | -     |
| Weight (±10%)       | -                 | 110   | -     | g     |

Specifications at case temperatura of 25°C.

### New Space (-NS) versions

| Feature                                                                                                                           | COTS | NEW Space (-NS) |
|-----------------------------------------------------------------------------------------------------------------------------------|------|-----------------|
| Operating Temperature range -45 to +85 °C<br>(MIL-STD-810F, method 520.2)                                                         | x    | x*              |
| Random Vibration 8g RMS<br>(MIL-STD-810F, method 514.5)                                                                           | x    | x*              |
| Mechanical Shock 20g, 11ms SawTooth<br>(MIL-STD-810F, method 516.5)                                                               | x    | x*              |
| Acceleration 15g<br>(MIL-STD-810F, method 513.5)                                                                                  | x    | x*              |
| Thermal cycling<br>(Based in MIL-HDBK-2164 Rev. A)                                                                                | x    | x               |
| Simplified power interface<br>Single DC supply line                                                                               | x    | x               |
| ATP at three temperatures<br>CoC & CoO supplied                                                                                   | x    | x               |
| RF section radiation tolerance (TID)<br>Technology intrinsically tolerant to 300 krad (TID)                                       | x    | x               |
| RF section radiation SEE tolerance:<br>SEE-aware RF design and filtering                                                          | -    | x               |
| DC section radiation tolerance (TID)<br>Radiation Tolerant to 30 krad (TID) plus housing shielding.                               | -    | x               |
| DC section radiation SEE tolerance:<br>Passive SEE mitigation plus rad-tolerant (43 MeV-cm <sup>2</sup> /mg) in<br>key components | -    | x               |
| Vacuum-optimized mechanics (venting, joints)<br>(ECSS-Q-ST-70-02)                                                                 | -    | x               |
| Low-outgassing materials<br>(ECSS-Q-ST-70 / NASA-ASTM-E595 compliant)                                                             | -    | x               |
| Pure-tin mitigation (whisker control / alternative finishes)<br>(GEIA-STD-0005-2 guidelines)                                      | -    | x               |
| Prepared for LEO (atomic-oxygen mitigation techniques)                                                                            | -    | x               |
| Screening /of RF active devices / Complete burn in                                                                                | -    | Optional        |
| Additional documentation & analyses (FMECA, Worst-Case, etc.)<br>— NDA required                                                   | -    | Optional        |
| Environmental testing on demand (TVAC, vibration, ...)                                                                            | -    | Optional        |

\* -NS extended specifications: see "Environmental Specifications (-NS)" section.

### Output Power

Figure 1 shows output power at 1dB compression measurement as a function of frequency at room temperature (25°C).

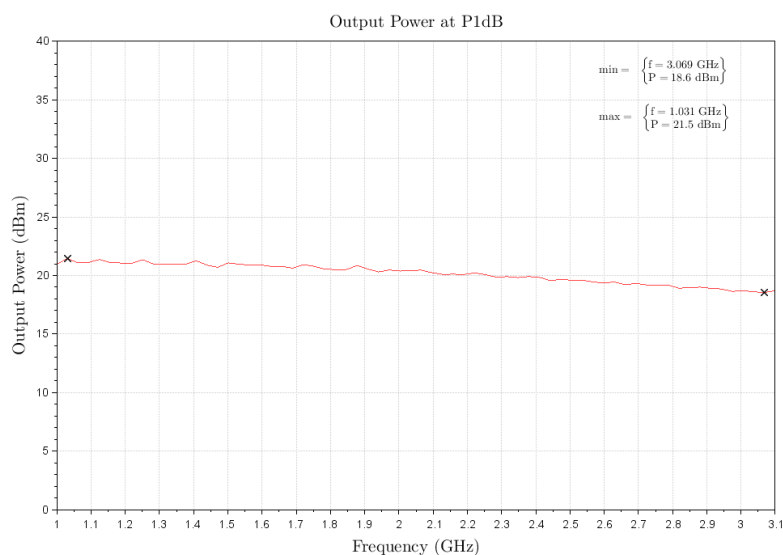


Figure 1: ERZ-LNA-0100-0310-30-2-NS P1dB

### Small Signal Gain

Figure 2 shows the small signal gain measurement as a function of frequency at different temperatures.

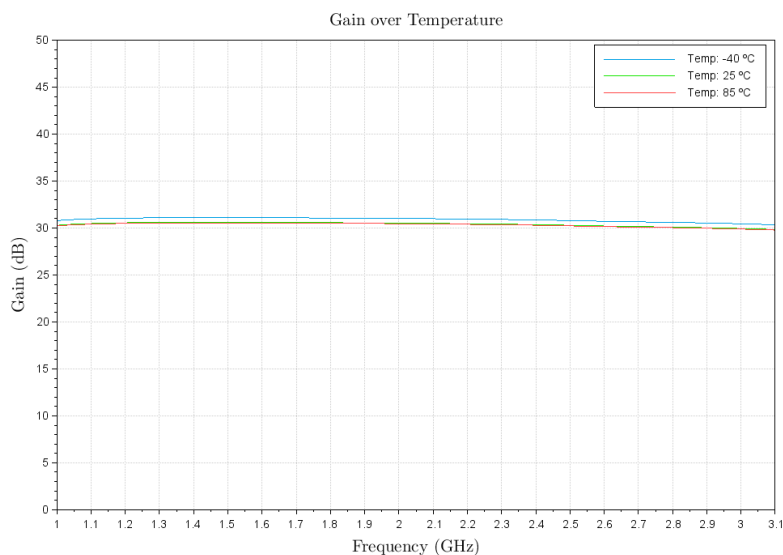


Figure 2: ERZ-LNA-0100-0310-30-2-NS Small Signal Gain

### Input and Output Matching

Figure 3 shows input (S11) and output (S22) VSWR as a function of frequency at room temperature (25°C).

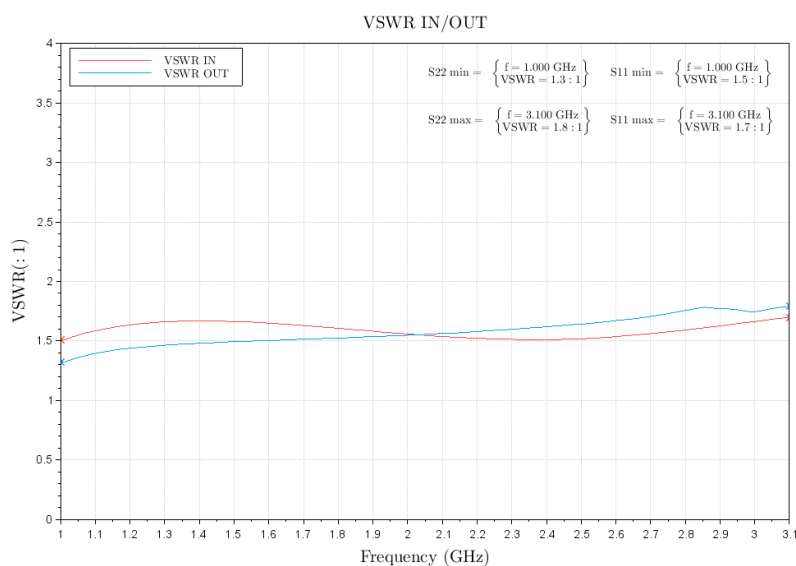


Figure 3: ERZ-LNA-0100-0310-30-2-NS Input&Output Matching

### Noise Figure

Figure 4 shows the noise figure measurement as a function of frequency at room temperature (25°C).

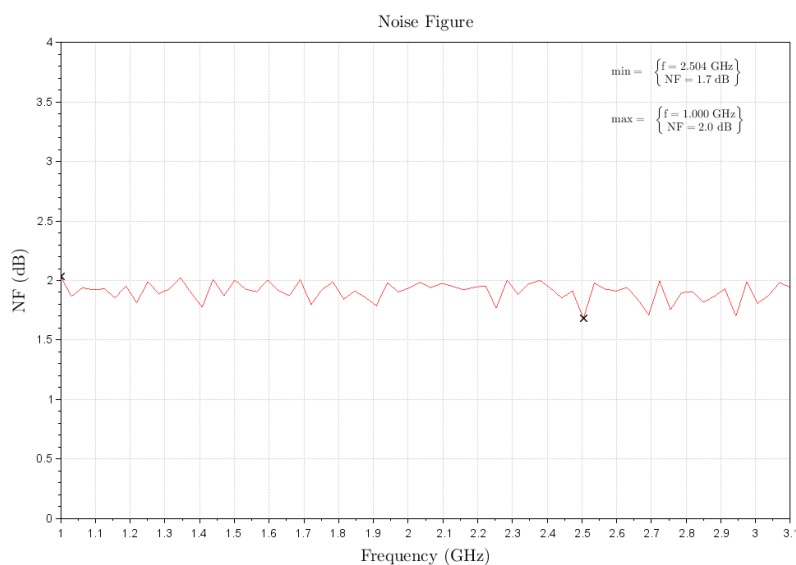


Figure 4: ERZ-LNA-0100-0310-30-2-NS Noise Figure

## Absolute Maximum Ratings

| Condition                       | Value         |
|---------------------------------|---------------|
| DC Voltage                      | 15 VDC        |
| Maximum Input Power (CW)        | 10 dBm        |
| Operation temperature (at case) | -45 to 85 °C  |
| Storage temperature             | -55 to 125 °C |

- Stress above these ratings may cause permanent damage to the device.
- It is final user responsibility to maintain the amplifier within the specified ranges.

## Measurements Conditions

All measurements provided in this report were performed at the following conditions:

| Condition                                                   | Value         |
|-------------------------------------------------------------|---------------|
| Temperature (DUT ON)                                        | 25 °C ± 1°C   |
| Humidity                                                    | 44% ± 10%     |
| DUT Warm up time                                            | 30 min        |
| DUT minimum operation time                                  | 24 hours      |
| Test equipment warm up time                                 | 2 hours       |
| Additional temperature cycles in climatic chamber (DUT OFF) | -40°C to 85°C |

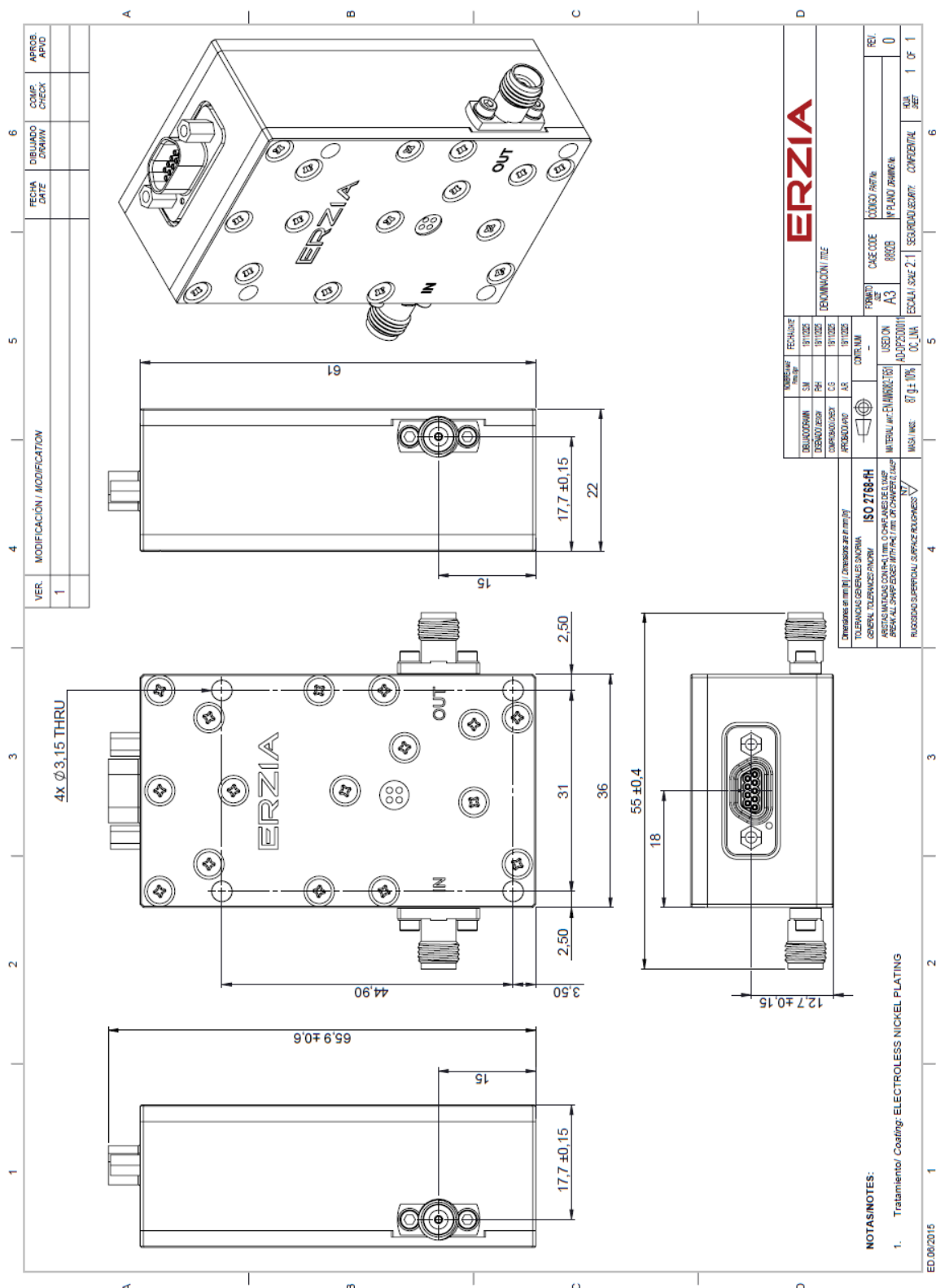
### Environmental Specifications (-NS)

| Environment                                                   | Level (1)                                                                                                                                   |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Operating temperature                                         | -40 to +85 °C                                                                                                                               |
| Thermal vacuum cycling<br>ECSS-E-ST-10-03C                    | 10 cycles, -40 / +85 °C, dwell $\geq 2$ h, $< 1 \times 10^{-5}$ mbar, unit operating, functional tests at plateaus                          |
| Thermal cycling, ambient pressure (2)<br>MIL-HDBK-2164A (ESS) | 4 cycles, -40 / +85 °C, 30 min dwell, non-operating + ATP at three temperatures (-40 / +25 / +85 °C)                                        |
| Non-operating / storage temperature                           | -55 to +125 °C                                                                                                                              |
| Random vibration, 3 axes<br>ECSS-E-ST-10-03C / GSFC-STD-7000B | 23.5 g RMS, 3 min/axis<br>20 Hz 0.32 · 50–400 Hz 0.80 · 2000 Hz 0.032 g <sup>2</sup> /Hz                                                    |
| Sine vibration, 3 axes<br>ECSS-E-ST-10-03C                    | 5–15 Hz $\pm 10$ mm · 25–100 Hz 25 g, 2 oct/min                                                                                             |
| Quasi-static acceleration                                     | 25 g                                                                                                                                        |
| Shock (SRS, Q = 10), 3 axes<br>ECSS-E-ST-10-03C               | 100 Hz 56.6 g $\rightarrow$ 1–10 kHz 1414 g                                                                                                 |
| Operating pressure                                            | Sea level to $1 \times 10^{-5}$ mbar (thermal vacuum)                                                                                       |
| Radiation, TID – DC section<br>ECSS-Q-ST-60-15C               | 30 krad(Si) behind housing                                                                                                                  |
| Radiation, TID – RF section<br>ECSS-Q-ST-60-15C               | $> 300$ krad(Si)                                                                                                                            |
| Radiation, SEE<br>ECSS-Q-ST-60-15C                            | SEL-immune or SEL-protected<br>LET $\geq 43$ MeV·cm <sup>2</sup> /mg in key components<br>LET $\geq 37$ MeV·cm <sup>2</sup> /mg in the rest |

(1) Levels shown here are qualification levels demonstrated by test or dedicated data for the whole -NS family.

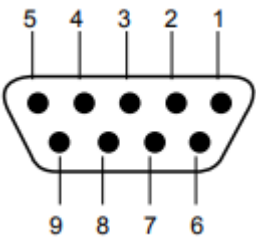
(2) Acceptance test performed by default to every unit is thermal cycling. Additional tests can be done on request.

## Mechanics and Housing



DC and Control Connector

Micro-D Sub-9 female connector (M83513/02-AN or similar)



| Pin No | Function           | Description   |
|--------|--------------------|---------------|
| 1      | +12 V Power Source | +(9...15) VDC |
| 2      | +12 V Power Source | +(9...15) VDC |
| 3      | NA                 | -             |
| 4      | NA                 | -             |
| 5      | NA                 | -             |
| 6      | Power Ground       | GND           |
| 7      | Power Ground       | GND           |
| 8      | NA                 | -             |
| 9      | NA                 | -             |

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