*Surface Mount*

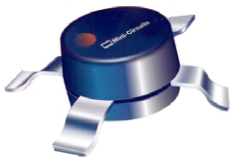
# Monolithic Amplifier DC-4 GHz

## Product Features

- DC-4 GHz
- Single Voltage Supply
- Internally Matched to 50 Ohm
- Unconditionally Stable
- Low Performance Variation Over Temperature
- Transient Protected
- Aqueous washable
- Protected By US Patent 6,943,629

## Typical Applications

- Cellular/ PCS/ 3G Base Station
- CATV, Cable Modem & DBS
- Fixed Wireless & WLAN
- Microwave Radio & Test Equipment



## ERA-4XSM+

CASE STYLE: WW107
PRICE: $1.69 ea. QTY. (30)

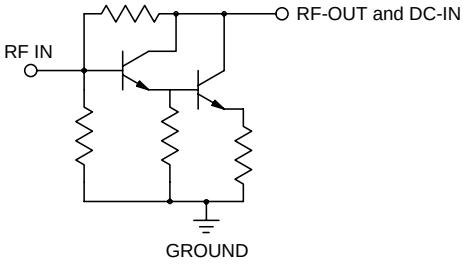
*+ RoHS compliant in accordance with EU Directive (2002/95/EC)*

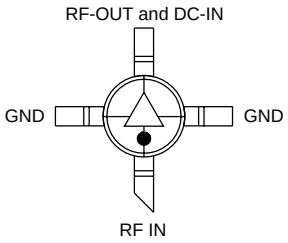
*The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.*

## General Description

ERA-4XSM+ (RoHS compliant) is a wideband amplifier offering high dynamic range. It has repeatable performance from lot to lot. It is enclosed in a Micro-X package. ERA-4XSM+ uses Darlington configuration and is fabricated using InGaP HBT technology. Expected MTBF is 150 years at 85°C case temperature.

### *simplified schematic and pin description*




| Function | Pin Number | Description |
|---|---|---|
| RF IN | 1 | RF input pin. This pin requires the use of an external DC blocking capacitor chosen for the frequency of operation. |
| RF-OUT and DC-IN | 3 | RF output and bias pin. DC voltage is present on this pin; therefore a DC blocking capacitor is necessary for proper operation. An RF choke is needed to feed DC bias without loss of RF signal due to the bias connection, as shown in "Recommended Application Circuit". |
| GND | 2,4 | Connections to ground. Use via holes as shown in "Suggested Layout for PCB Design" to reduce ground path inductance for best performance. |

## Electrical Specifications at 25°C and 65mA, unless noted

| Parameter | | Min. | Typ. | Max. | Units | Cpk |
|---|---|---|---|---|---|---|
| Frequency Range* | | DC | | 4 | GHz | |
| Gain | f=0.1 GHz | 13.7 | 14.4 | 15 | dB | ≥ 1.5 |
| | f=1 GHz | | 14.2 | | | |
| | f=2 GHz | 12.5 | 13 | 13.6 | | |
| | f=3 GHz | | 12 | | | |
| | f=4 GHz | 10.8 | 11.3 | 11.7 | | |
| Magnitude of Gain Variation versus Temperature (values are negative) | f=0.1 GHz | | .003 | .006 | dB/°C | |
| | f=1 GHz | | .0025 | .006 | | |
| | f=2 GHz | | .0031 | .006 | | |
| | f=3 GHz | | .0042 | .008 | | |
| | f=4 GHz | | .0051 | .01 | | |
| Input Return Loss | f=0.1 GHz | | 35 | | dB | |
| | f=2 GHz | | 30 | | | |
| | f=3 GHz | | 21 | | | |
| | f=4 GHz | | 21 | | | |
| Output Return Loss | f=0.1 GHz | | 35 | | dB | |
| | f=2 GHz | | 21 | | | |
| | f=3 GHz | | 21 | | | |
| | f=4 GHz | | 16 | | | |
| Reverse Isolation | f=2 GHz | 18 | 23 | | dB | |
| Output Power @ 1 dB compression | f=0.1 GHz | | 17.5 | | dBm | ≥ 1.5 |
| | f=1 GHz | 15 | 17.3 | | | |
| | f=2 GHz | | 16.1 | | | |
| | f=3 GHz | | 14 | | | |
| | f=4 GHz | | 11.7 | | | |
| Saturated Output Power (at 3dB compression) | f=0.1 GHz | | 17.8 | | dBm | |
| | f=2 GHz | | 16.5 | | | |
| Output IP3 | f=0.1 GHz | 32 | 36.1 | | dBm | ≥ 1.5 |
| | f=1 GHz | 31 | 35 | | | |
| | f=2 GHz | 27 | 30.4 | | | |
| | f=4 GHz | | 25 | | | |
| Noise Figure | f=0.1 GHz | | 4 | 5 | dB | ≥ 1.5 |
| | f=1 GHz | | 4.2 | 5.2 | | |
| | f=2 GHz | | 4.2 | 5.2 | | |
| | f=4 GHz | | 4.5 | 5.5 | | |
| Group Delay | f=2 GHz | | 80 | | psec | |
| Recommended Device Operating Current | | | 65 | | mA | |
| Device Operating Voltage | | 4.3 | 4.6 | 4.9 | V | ≥ 1.5 |
| Device Voltage Variation vs. Temperature at 65mA | | | -2.9 | | mV/°C | |
| Device Voltage Variation vs. Current at 25°C | | | 10.4 | | mV/mA | |
| Thermal Resistance, junction-to-case[1] | | | 196 | | °C/W | |

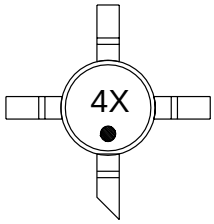
*Guaranteed specification DC-4 GHz. Low frequency cut off determined by external coupling capacitors.

## Absolute Maximum Ratings

| Parameter | Ratings |
|---|---|
| Operating Temperature* | -45°C to 85°C |
| Storage Temperature | -65°C to 150°C |
| Operating Current | 100mA |
| Power Dissipation | 650mW |
| Input Power | 20 dBm |

Note: Permanent damage may occur if any of these limits are exceeded.
These ratings are not intended for continuous normal operation.
[1]Case is defined as ground leads.
*Based on typical case temperature rise 5°C above ambient.

## Product Marking




## Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

**Performance data, graphs, s-parameter data set (.zip file)**

**Case Style: WW107**

Plastic micro-x, .085 body diameter, lead finish: tin/silver/nickel

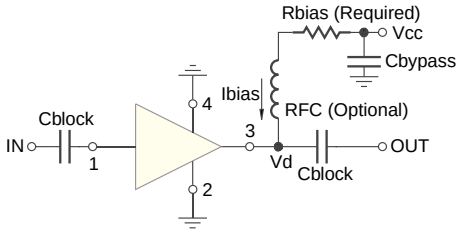
**Tape & Reel: F4**

**Suggested Layout for PCB Design: PL-075**

**Evaluation Board: TB-408-4+**

**Environmental Ratings: ENV08T2**

## Recommended Application Circuit




Test Board includes case, connectors, and components (in bold) soldered to PCB

| R BIAS | |
|---|---|
| **Vcc** | **"1%" Res. Values (ohms) for Optimum Biasing** |
| 7 | 38.3 |
| 8 | 52.3 |
| 9 | 66.5 |
| 10 | 80.6 |
| 11 | 95.3 |
| 12 | 115 |
| 13 | 127 |
| 14 | 143 |
| 15 | 158 |
| 16 | 174 |
| 17 | 187 |
| 18 | 205 |
| 19 | 221 |
| 20 | 237 |

# MMIC Amplifier ERA-4XSM+

## *Typical Performance Data*

**NOTE: Use PDF Bookmarks to view DATA at required conditions or to view GRAPHS.**

**Definitions:**
Input Return Loss = -S11 (dB)
Gain(Power Gain) = S21 (dB)
Reverse Isolation = -S12 (dB)
Output Return Loss = -S22 (dB)

TEST CONDITIONS: INPUT POWER = -15dBm, Icc = 65mA, Vd = 4.93V @Temperature = +25degC

| FREQ | Gain | Isolation | Input Return Loss | Output Return Loss | Stability | | IP-3 Output | 1dB Comp. Output | Noise Figure |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dB) | (dB) | (dB) | (dB) | K | Delta | (dBm) | (dBm) | (dB) |
| 50 | 13.99 | 18.46 | 10.98 | 14.76 | 1.09 | 0.65 | 33.14 | 16.86 | 4.38 |
| 100 | 13.99 | 18.43 | 11.01 | 14.78 | 1.09 | 0.65 | 33.13 | 17.18 | 4.82 |
| 200 | 13.96 | 18.47 | 10.97 | 14.73 | 1.10 | 0.65 | 33.38 | 16.88 | 4.74 |
| 300 | 13.94 | 18.46 | 10.99 | 14.72 | 1.10 | 0.65 | 33.03 | 16.75 | 4.39 |
| 400 | 13.93 | 18.47 | 11.01 | 14.70 | 1.10 | 0.64 | 32.96 | 16.99 | 4.96 |
| 500 | 13.91 | 18.47 | 11.00 | 14.63 | 1.10 | 0.64 | 32.75 | 17.08 | 4.59 |
| 600 | 13.90 | 18.48 | 11.00 | 14.54 | 1.10 | 0.64 | 32.87 | 16.92 | 4.50 |
| 700 | 13.88 | 18.48 | 10.99 | 14.44 | 1.10 | 0.64 | 32.85 | 17.13 | 4.91 |
| 800 | 13.86 | 18.49 | 10.96 | 14.36 | 1.10 | 0.64 | 33.19 | 17.26 | 4.59 |
| 900 | 13.85 | 18.49 | 10.96 | 14.27 | 1.10 | 0.64 | 32.78 | 17.29 | 4.59 |
| 1000 | 13.83 | 18.48 | 10.97 | 14.17 | 1.10 | 0.64 | 32.79 | 17.25 | 4.91 |
| 1100 | 13.81 | 18.49 | 10.97 | 14.05 | 1.10 | 0.64 | 32.73 | 16.99 | 4.43 |
| 1200 | 13.80 | 18.49 | 10.96 | 13.94 | 1.10 | 0.64 | 32.99 | 16.63 | 4.71 |
| 1300 | 13.78 | 18.49 | 10.97 | 13.82 | 1.10 | 0.64 | 32.73 | 16.84 | 4.92 |
| 1400 | 13.77 | 18.49 | 11.02 | 13.71 | 1.10 | 0.64 | 32.32 | 16.90 | 4.51 |
| 1500 | 13.75 | 18.49 | 11.05 | 13.59 | 1.11 | 0.63 | 32.03 | 16.87 | 4.97 |
| 1600 | 13.73 | 18.49 | 11.10 | 13.51 | 1.11 | 0.63 | 32.17 | 16.94 | 4.83 |
| 1700 | 13.71 | 18.47 | 11.19 | 13.43 | 1.11 | 0.63 | 32.52 | 16.92 | 4.40 |
| 1800 | 13.69 | 18.47 | 11.28 | 13.32 | 1.11 | 0.63 | 32.20 | 16.82 | 4.82 |
| 1900 | 13.68 | 18.46 | 11.41 | 13.26 | 1.11 | 0.63 | 31.88 | 16.86 | 4.71 |
| 2000 | 13.66 | 18.45 | 11.53 | 13.20 | 1.11 | 0.63 | 31.71 | 16.73 | 4.65 |
| 2100 | 13.64 | 18.44 | 11.70 | 13.18 | 1.11 | 0.63 | 31.38 | 16.55 | 4.89 |
| 2200 | 13.62 | 18.42 | 11.87 | 13.13 | 1.11 | 0.63 | 30.93 | 16.51 | 4.66 |
| 2300 | 13.59 | 18.42 | 12.05 | 13.07 | 1.12 | 0.63 | 30.44 | 16.48 | 4.66 |
| 2400 | 13.57 | 18.42 | 12.26 | 13.04 | 1.12 | 0.62 | 29.66 | 16.30 | 4.97 |
| 2500 | 13.53 | 18.42 | 12.57 | 13.09 | 1.12 | 0.62 | 29.51 | 16.19 | 4.72 |
| 2600 | 13.50 | 18.37 | 12.88 | 13.10 | 1.12 | 0.62 | 29.27 | 15.99 | 4.82 |
| 2700 | 13.47 | 18.35 | 13.21 | 13.03 | 1.12 | 0.62 | 29.14 | 15.80 | 5.01 |
| 2800 | 13.44 | 18.33 | 13.49 | 13.01 | 1.13 | 0.62 | 28.92 | 15.63 | 4.76 |
| 2900 | 13.41 | 18.32 | 13.84 | 12.97 | 1.13 | 0.61 | 28.57 | 15.38 | 4.92 |
| 3000 | 13.35 | 18.33 | 14.11 | 12.88 | 1.13 | 0.61 | 28.10 | 15.16 | 4.98 |
| 3100 | 13.27 | 18.36 | 14.56 | 13.07 | 1.14 | 0.60 | 27.59 | 14.81 | 4.82 |
| 3200 | 13.25 | 18.30 | 15.05 | 13.05 | 1.14 | 0.60 | 27.29 | 14.63 | 5.00 |
| 3300 | 13.20 | 18.28 | 15.36 | 12.89 | 1.14 | 0.60 | 27.06 | 14.44 | 5.20 |
| 3400 | 13.14 | 18.28 | 16.04 | 13.04 | 1.15 | 0.59 | 26.85 | 14.21 | 5.02 |
| 3500 | 13.07 | 18.26 | 16.38 | 12.96 | 1.15 | 0.58 | 26.43 | 14.10 | 5.09 |
| 3600 | 13.02 | 18.23 | 16.81 | 12.90 | 1.15 | 0.58 | 26.03 | 13.78 | 5.16 |
| 3700 | 12.93 | 18.22 | 16.99 | 12.74 | 1.16 | 0.58 | 25.78 | 13.58 | 5.04 |
| 3800 | 12.82 | 18.27 | 17.39 | 12.81 | 1.17 | 0.56 | 25.60 | 13.34 | 5.12 |
| 4000 | 12.67 | 18.21 | 17.98 | 12.63 | 1.17 | 0.56 | 25.22 | 12.90 | 5.26 |