MMIC SURFACE MOUNT

# Monolithic Amplifier

# ERA-3+

50Ω DC to 3 GHz

## FEATURES

- DC to 3 GHz
- Single Voltage Supply
- Internally Matched to 50 Ohms
- Unconditionally Stable
- Low Performance Variation Over Temperature
- Transient Protected
- Aqueous Washable
- Protected By US Patent 6,943,629



*Generic photo used for illustration purposes only*

CASE STYLE: VV105

**+RoHS Compliant**
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

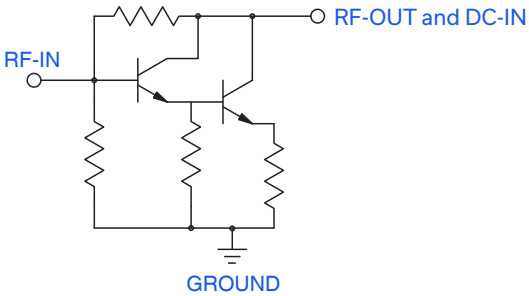
## APPLICATIONS

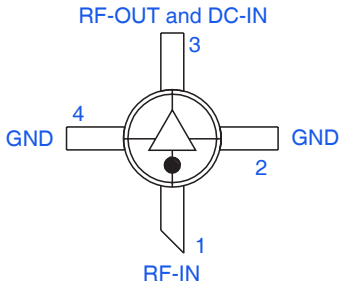
- Cellular/ PCS/ 3G Base Station
- CATV, Cable Modem & DBS
- Fixed Wireless & WLAN
- Microwave Radio & Test Equipment

## PRODUCT OVERVIEW

ERA-3+ (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-3+ uses Darlington configuration and is fabricated using InGaP HBT technology. Expected MTTF is 9100 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. |

REV. Q
ECO-024740
ERA-3+
MCL NY
250304

# Monolithic Amplifier

## ERA-3+

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### ELECTRICAL SPECIFICATIONS AT +25°C AND 35 mA UNLESS NOTED OTHERWISE

| Parameter | Conditions (GHz) | Min. | Typ. | Max. | Units | Cpk |
|---|---|---|---|---|---|---|
| Frequency Range[1] | | DC | | 3 | GHz | |
| Gain | 0.1 | 21 | 23.4 | 24.4 | dB | ≥ 1.5 |
| | 1.0 | | 21 | | | |
| | 2.0 | 17.6 | 18.7 | 20.7 | | |
| | 3.0 | 15.4 | 16.4 | 18.5 | | |
| Magnitude of Gain Variation versus Temperature (values are negative) | 0.1 | | 0.0045 | 0.009 | dB/°C | |
| | 1.0 | | 0.0051 | 0.010 | | |
| | 2.0 | | 0.0059 | 0.012 | | |
| | 3.0 | | 0.0064 | 0.013 | | |
| Input Return Loss | 0.1 | | 30 | | dB | |
| | 1.0 | | 19 | | | |
| | 2.0 | | 18 | | | |
| | 3.0 | | 18 | | | |
| Output Return Loss | 0.1 | | 21 | | dB | |
| | 1.0 | | 17 | | | |
| | 2.0 | | 17 | | | |
| | 3.0 | | 17 | | | |
| Reverse Isolation | 2.0 | 21 | 24 | | dB | |
| Output Power @ 1 dB Compression | 0.1 | | 12.5 | | dBm | ≥ 1.5 |
| | 1.0 | | 12.1 | | | |
| | 2.0 | 9 | 12.5 | | | |
| | 3.0 | | 10.5 | | | |
| Saturated Output Power (at 3 dB Compression) | 0.1 | | +13.6 | | dBm | |
| | 1.0 | | +13.3 | | | |
| | 2.0 | | +13.1 | | | |
| | 3.0 | | +12.1 | | | |
| Output IP3 | 0.1 | +24 | +27 | | dBm | ≥ 1.5 |
| | 1.0 | +24 | +27 | | | |
| | 2.0 | +23 | +26 | | | |
| | 3.0 | +21 | +24 | | | |
| Noise Figure | 0.1 | | 2.7 | | dB | ≥ 1.5 |
| | 1.0 | | 2.6 | | | |
| | 2.0 | | 2.8 | | | |
| | 3.0 | | 2.9 | | | |
| Group Delay | 2.0 | | 80 | | psec | |
| Recommended Device Operating Current | | | 35 | | mA | |
| Device Operating Voltage | | +3.0 | +3.2 | +3.4 | V | ≥ 1.5 |
| Device Voltage Variation vs. Temperature at 35 mA | | | -2.3 | | mV/°C | |
| Device Voltage Variation vs. Current at +25°C | | | 3.6 | | mV/mA | |
| Thermal Resistance, junction-to-case[2] | | | 186 | | °C/W | |

1. Guaranteed specification DC-8 GHz. Low frequency cut off determined by external coupling capacitors.
2. Case is defined as ground leads.

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# ERA-3+

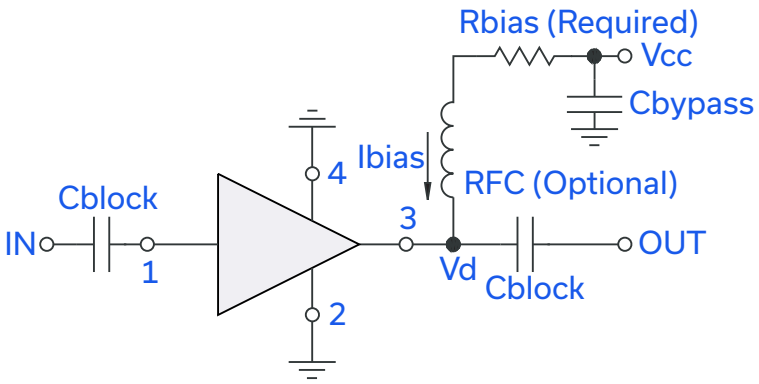
50Ω DC to 3 GHz

## ABSOLUTE MAXIMUM RATINGS

| Parameter | Ratings |
|---|---|
| Operating Temperature[3] | -45°C to +85°C |
| Storage Temperature | -65°C to +150°C |
| Operating Current | 75 mA |
| Power Dissipation | 330 mW |
| Input Power | +13 dBm |

3. Based on typical case temperature rise 5°C above ambient.
Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.

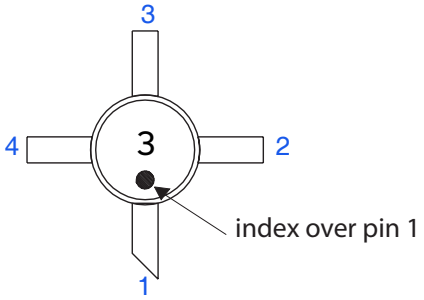
## RECOMMENDED APPLICATION CIRCUIT




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

| R BIAS | |
|---|---|
| Vcc | "1%" Res. Values (ohms) for Optimum Biasing |
| 7 | 107 |
| 8 | 133 |
| 9 | 162 |
| 10 | 191 |
| 11 | 221 |
| 12 | 251 |
| 13 | 280 |
| 14 | 309 |
| 15 | 340 |
| 16 | 365 |
| 17 | 392 |
| 18 | 422 |
| 19 | 453 |
| 20 | 475 |

## PRODUCT MARKING




Markings in addition to model number designation may appear for internal quality control purposes.

# Monolithic Amplifier

## ERA-3+

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**ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD.** CLICK HERE

| | |
|---|---|
| **Performance Data & Graphs** | Data Table<br>Swept Graphs<br>S-Parameter (S2P Files) Data Set (.zip file) |
| **Case Style** | VV105 Plastic micro-x package, lead finish: Matte-tin |
| **Tape & Reel**<br>**Standard quantities available on reel** | F4<br>7" reels with 20, 50, 100, 200, 500 or 1K devices |
| **Suggested Layout for PCB Design** | PL261 |
| **Evaluation Board** | TB-431-3+ |
| **Environmental Ratings** | ENV08T2 |

## ESD RATING

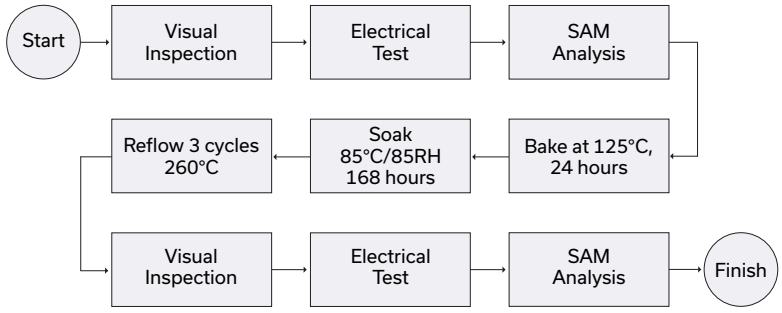
Human Body Model (HBM): Class 1A (250 V to < 500 V) in accordance with ANSI/ESD STM 5.1 - 2001
Machine Model (MM): Class M1 (< 100 V) in accordance with ANSI/ESD STM 5.2 - 1999

## MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDECJ-STD-020C

| No. | Test Required | Condition | Standard | Quantity |
|---|---|---|---|---|
| 1 | Visual Inspection | Low Power Microscope<br>Magnification 40x | MIP-IN-0003<br>(MCT spec) | 45 units |
| 2 | Electrical Test | Room Temperature | SCD<br>(MCL spec) | 45 units |
| 3 | SAM Analysis | Less than 10% growth in term of delamination | J-Std-020C<br>(Jedec Standard) | 45 units |
| 4 | Moisture Sensitivity<br>Level 1 | Bake at 125°C for 24 hours<br>Soak at 85°C/85%RH for 168 hours<br>Reflow 3 cycles at 260°C peak | J-Std-020C<br>(Jedec Standard) | 45 units |

## MSL TEST FLOW CHART




NOTES

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.
C. The parts covered by this specification document are subject to Mini-Circuits' standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html