

Surface Mount

# Monolithic Amplifier

DC-4 GHz

## Product Features

- DC-4 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

## Typical Applications

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



**ERA-6SM+**

CASE STYLE: WW107

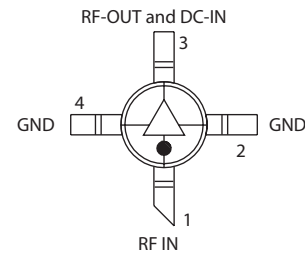
### +RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

## General Description

ERA-6SM+ (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-6SM+ uses Darlington configuration and is fabricated using InGaP HBT technology. Expected MTBF is 350 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.  |

### Notes

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**Electrical Specifications at 25°C and 70mA, unless noted**

| Parameter   |           | Min. | Typ.   | Max.  | Units | Cpk    |
|---|-----------|------|--------|-------|-------|--------|
| Frequency Range*  |           | DC   |        | 4     | GHz   |        |
| Gain  | f=0.1 GHz | 12   | 12.6   | 13.3  | dB    | ≥ 1.5  |
|   | f=1 GHz   | —    | 12.5   | —     | —     |        |
|   | f=2 GHz   | 11.1 | 11.7   | 12.3  | —     |        |
|   | f=3 GHz   | —    | 11.7   | —     | —     |        |
|   | f=4 GHz   | 9.8  | 10.3   | 10.8  | —     |        |
| Magnitude of Gain Variation versus Temperature<br>(values are negative) | f=0.1 GHz | —    | 0.0013 | .0025 | dB/°C |        |
|   | f=1 GHz   | —    | 0.0018 | .0035 |       |        |
|   | f=2 GHz   | —    | 0.0021 | .004  |       |        |
|   | f=3 GHz   | —    | 0.0025 | .005  |       |        |
|   | f=4 GHz   | —    | 0.0032 | .007  |       |        |
| Input Return Loss   | f=0.1 GHz |      | 25     |       | dB    |        |
|   | f=1 GHz   |      | 30     |       |       |        |
|   | f=2 GHz   |      | 35     |       |       |        |
|   | f=3 GHz   |      | 33     |       |       |        |
|   | f=4 GHz   |      | 28     |       |       |        |
| Output Return Loss  | f=0.1 GHz |      | 35     |       | dB    |        |
|   | f=1 GHz   |      | 24     |       |       |        |
|   | f=2 GHz   |      | 20     |       |       |        |
|   | f=3 GHz   |      | 20     |       |       |        |
|   | f=4 GHz   |      | 20     |       |       |        |
| Reverse Isolation   | f=2 GHz   | 16   | 19     | —     | dB    |        |
| Output Power @ 1 dB compression   | f=0.1 GHz | —    | 17.1   | —     | dBm   | ≥ 1.33 |
|   | f=1 GHz   | 16   | 17.2   | —     |       |        |
|   | f=2 GHz   | —    | 17.1   | —     |       |        |
|   | f=3 GHz   | —    | 16.2   | —     |       |        |
|   | f=4 GHz   | —    | 14.7   | —     |       |        |
| Saturated Output Power<br>(at 3dB compression)                          | f=0.1 GHz |      | 17.1   |       | dBm   |        |
|   | f=1 GHz   |      | 17.2   |       |       |        |
|   | f=2 GHz   |      | 17.7   |       |       |        |
|   | f=3 GHz   |      | 17.3   |       |       |        |
|   | f=4 GHz   |      | 15.9   |       |       |        |
| Output IP3  | f=0.1 GHz | 34   | 36.5   | —     | dBm   | ≥ 1.33 |
|   | f=1 GHz   | 33   | 35     | —     |       |        |
|   | f=2 GHz   | 31   | 33     | —     |       |        |
|   | f=3 GHz   | —    | 30     | —     |       |        |
|   | f=4 GHz   | —    | 28.5   | —     |       |        |
| Noise Figure  | f=0.1 GHz | —    | 4.4    | 5.2   | dB    |        |
|   | f=1 GHz   | —    | 4.4    | 5.5   |       |        |
|   | f=2 GHz   | —    | 4.5    | 5.5   |       |        |
|   | f=3 GHz   | —    | 4.5    | 6     |       |        |
|   | f=4 GHz   | —    | 4.7    | 6     |       |        |
| Group Delay   | f=2 GHz   |      | 80     |       | psec  |        |
| Recommended Device Operating Current                                    |           |      | 70     |       | mA    |        |
| Device Operating Voltage  |           | 4.7  | 5      | 5.3   | V     | ≥ 1.5  |
| Device Voltage Variation vs. Temperature at 70mA                        |           |      | -3.2   |       | mV/°C |        |
| Device Voltage Variation vs. Current at 25°C                            |           |      | 11.8   |       | mV/mA |        |
| Thermal Resistance, junction-to-case <sup>1</sup>                       |           |      | 143    |       | °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      | 85mA           |
| Power Dissipation      | 451mW          |
| Input Power            | 20dBm          |

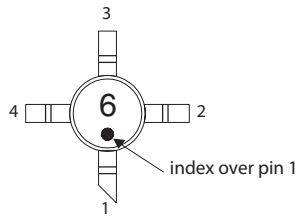
Note: Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.  
<sup>1</sup>Case is defined as ground leads.  
 \*Based on typical case temperature rise 5°C above ambient.

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Product Marking



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

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 over nickel

Tape & Reel: F4

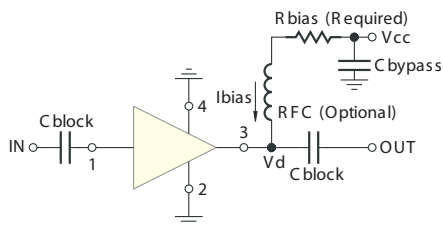
7" Reels with 20, 50, 100, 200, 500, 1K devices

Suggested Layout for PCB Design: PL-075

Evaluation Board: TB-408-6+

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      | 30.1  |
| 8      | 43.2  |
| 9      | 56.2  |
| 10     | 69.8  |
| 11     | 84.5  |
| 12     | 100   |
| 13     | 113   |
| 14     | 127   |
| 15     | 140   |
| 16     | 154   |
| 17     | 169   |
| 18     | 182   |
| 19     | 196   |
| 20     | 210   |

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**ESD Rating**

Human Body Model (HBM): Class 1B (500 v to < 1,000 v) in accordance with ANSI/ESD STM 5.1 - 2001

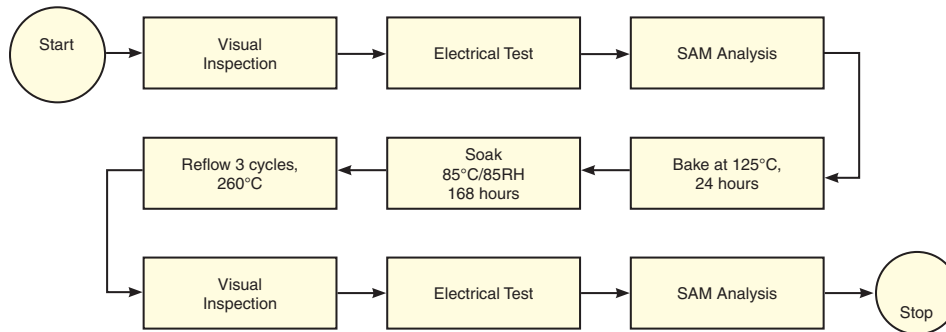
Machine Model (MM): Class M1 (< 100 v) in accordance with ANSI/ESD STM 5.2 - 1999

**MSL Rating**

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

| No. | Test Required                | Condition   | Standard                    | Quantity |
|-----|------------------------------|---|-----------------------------|----------|
| 1   | Visual Inspection            | Low Power Microscope Magnification 40x  | MIP-IN-0003 (MCT spec)      | 45 units |
| 2   | Electrical Test              | Room Temperature  | SCD (MCL spec)              | 45 units |
| 3   | SAM Analysis                 | Less than 10% growth in term of delamination  | J-Std-020C (Jedec Standard) | 45 units |
| 4   | Moisture Sensitivity 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 (Jedec Standard) | 45 units |

**MSL Test Flow Chart**



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