# MONOLITHIC AMPLIFIERS 50Ω

## BROADBAND DC to 8 GHz


ERA


ERA-SM



**low power**, up to +13.5 dBm

**all specifications at 25°C**

| MODEL◆ NO. | ✪ FREQ. GHz $f_L$ - $f_U$ | GAIN, dB Typical over frequency, GHz 0.1 | 1 | 2 | 3 | 4 | 6 | 8 | Min.@ 2 GHz | MAXIMUM POWER (dBm) at 2 GHz* Output (1 dB Comp.) Typ. | Min. | Input (no dmg) | DYNAMIC RANGE at 2 GHz* NF (dB) Typ. | IP3 (dBm) Typ. | VSWR (:1) Typ. In DC-3 GHz | 3-$f_U$** GHz | Out DC-3 GHz | 3-$f_U$** GHz | ABSOLUTE MAX. RATING[3] I (mA) | P (mW) | DC OPERATING POWER[4] at Pin 3 Current (mA) | Device Volt. Typ | Min | Max | THERMAL RESISTANCE θjc Typ. °C/W | CASE STYLE Note B | CONNECTION | PRICE $ ea. Qty. (30) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ERA-1 | DC-8 | 12.3 | 12.1 | 11.8 | 10.9 | 9.7 | 7.9 | 8.2 | 9 | 12.0 | 10.0 | 15 | 4.3 | 26 | 1.5 | 1.8 | 1.5 | 1.9 | 75 | 330 | 40 | 3.4 | 3.0 | 4.1 | 178 | VV105 | cb | |
| ERA-2 | DC-6 | 16.2 | 15.8 | 15.2 | 14.4 | 13.1 | 11.2 | — | 13 | 13.0 | 11.0 | 15 | 4.0 | 26 | 1.3 | 1.4 | 1.2 | 1.6 | 75 | 330 | 40 | 3.4 | 3.0 | 4.1 | 155 | VV105 | cb | |
| ERA-3 | DC-3 | 22.1 | 21.0 | 18.7 | 16.8 | — | — | — | 16 | 12.5 | 9.0 | 13 | 3.5 | 25 | 1.5 | — | 1.4 | — | 75 | 330 | 35 | 3.2 | 3.0 | 4.1 | 154 | VV105 | cb | |
| ERA-1SM | DC-8 | 12.3 | 12.1 | 11.8 | 10.9 | 9.7 | 7.9 | 8.2 | 9 | 12.0 | 10.0 | 15 | 4.3 | 26 | 1.5 | 1.8 | 1.5 | 1.9 | 75 | 330 | 40 | 3.4 | 3.0 | 4.1 | 183 | WW107 | cb | |
| ERA-21SM | DC-8 | 14.2 | 13.9 | 13.2 | 12.2 | 10.8 | 8.7 | 8.9 | 11.2 | 12.6 | 10.6 | 15 | 4.7 | 26 | 1.1 | 1.4 | 1.3 | 1.9 | 75 | 330 | 40 | 3.5 | 3.0 | 4.1 | 194 | WW107 | cb | |
| ERA-2SM | DC-6 | 16.2 | 15.8 | 15.2 | 14.4 | 13.1 | 11.2 | — | 13 | 13.0 | 11.0 | 15 | 4.0 | 26 | 1.3 | 1.4 | 1.2 | 1.6 | 75 | 330 | 40 | 3.4 | 3.0 | 4.1 | 160 | WW107 | cb | |
| ERA-33SM | DC-3 | 19.3 | 18.7 | 17.4 | 15.9 | — | — | — | 15 | 13.5 | 11.5 | 13 | 3.9 | 28.5 | 1.6 | — | 1.25 | — | 75 | 330 | 40 | 4.3 | 3.8 | 4.8 | 140 | WW107 | cb | |
| ERA-3SM | DC-3 | 22.1 | 21.0 | 18.7 | 16.8 | — | — | — | 16 | 12.5 | 9.0 | 13 | 3.5 | 25 | 1.5 | — | 1.4 | — | 75 | 330 | 35 | 3.2 | 3.0 | 4.1 | 186 | WW107 | cb | |
| ERA-8SM | DC-2 | 31.5 | 25.0 | 19.0 | 15.0 | 12.0 | — | — | 17 | 12.5 | — | 13 | 3.1 | 25 | 1.4 | 1.8 | 1.8 | 2.2 | 65 | 250 | 36 | 3.7 | 3.2 | 4.2 | 140 | WW107 | cb | |

***see suggested PCB layout PL-075 for ERA models***

## features

- low thermal resistance
- miniature microwave amplifier
- frequency range, DC to 8 GHz, usable to 10 GHz
- up to 18.4 dBm typ. (16.5 dBm min) output power

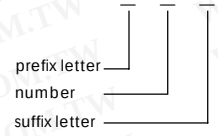
## absolute maximum ratings

operating temperature: -45°C to 85°C
storage temperature: -65° to 150°C

## model identification

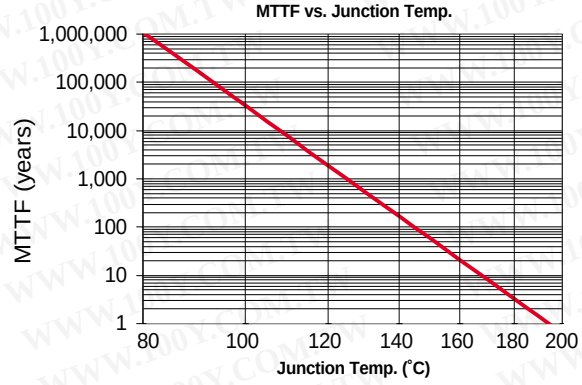
| Model | marking (see note below) | demo board |
|---|---|---|
| ERA-1, ERA-1SM | 1 | ERA-01TB |
| ERA-2, ERA-2SM | 2 | ERA-02TB |
| ERA-21SM | 21 | ERA-21TB |
| ERA-3, ERA-3SM | 3 | ERA-03TB |
| ERA-33SM | 33 | ERA-33TB |
| ERA-4,-4SM | 4 | ERA-04TB |
| ERA-4XSM | 4X | ERA-04TB |
| ERA-5, ERA-5SM | E5 | ERA-05TB |
| ERA-50SM | 50 | ERA-50TB |
| ERA-51SM | 51 | ERA-51TB |
| ERA-5XSM | 5X | ERA-05TB |
| ERA-6, ERA-6SM | 6 | ERA-06TB |
| ERA-8SM | E8 | ERA-08TB |

Note: Prefix letter (optional) designates assembly location. Suffix letters (optional) are for wafer identification.




NOTES:

◆ Aqueous washable
* at 1 GHz for ERA-4,5,6, 4SM,4XSM ,5SM,5XSM, 50SM, 51SM, 6SM, 8SM.
** $f_u$ is the upper frequency limit for each model as shown in the table; for ERA-8SM VSWR (In & Out) is specified at DC-1GHz & 1-4 GHz.
*** Gain and VSWR are specified at 1.5 GHz.
✪ Low frequency cutoff determined by external coupling capacitors.
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
1. Model number designated by alphanumeric code marking.
2. ERA-SM models available on tape and reel.
3. Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.
4. Supply voltage must be connected to pin 3 through a bias resistor in order to prevent damage. See "Biasing MMIC Amplifiers" in minicircuits.com/application.html. Reliability predictions are applicable at specified current & normal operating conditions.





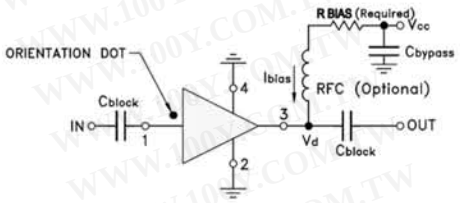
**medium power**, up to +18.4 dBm output

**all specifications at 25°C**

| MODEL◆ NO. | ✪ FREQ. GHz $f_L$ - $f_U$ | GAIN, dB Typical over frequency, GHz 0.1 | 1 | 2 | 3 | 4 | Min.@ 2 GHz | MAXIMUM POWER (dBm) at 2 GHz* Output (1 dB Comp.) Typ. | Min. | Input (no dmg) | DYNAMIC RANGE at 2 GHz* NF (dB) Typ. | IP3 (dBm) Typ. | VSWR (:1) Typ. In DC-3 GHz | 3-$f_U$** GHz | Out DC-3 GHz | 3-$f_U$** GHz | ABSOLUTE MAX. RATING[3] I (mA) | P (mW) | DC OPERATING POWER[4] at Pin 3 Current (mA) | Device Volt. Typ | Min | Max | THERMAL RESISTANCE θjc Typ. °C/W | CASE STYLE Note B | CONNECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ERA-6 | DC-4 | 12.6 | 12.5 | 12.2 | 11.7 | 11.3 | 10.5 | 17.9 | 16 | 20 | 4.5 | 36 | 1.3 | 1.2 | 1.6 | 1.8 | 120 | 650 | 70 | 5.0 | 4.6 | 5.6 | 170 | VV105 | cb |
| ERA-4 | DC-4 | 14.3 | 14.0 | 13.4 | 12.7 | 11.8 | 11 | 17.3 | 15 | 20 | 4.2 | 34 | 1.2 | 1.2 | 1.3 | 1.8 | 120 | 650 | 65 | 4.5 | 4.2 | 5.5 | 163 | VV105 | cb |
| ERA-5 | DC-4 | 20.2 | 19.5 | 18.5 | 16.7 | 14.3 | 16 | 18.4 | 16.5 | 13 | 4.3 | 32.5 | 1.3 | 1.3 | 1.2 | 1.3 | 120 | 650 | 65 | 4.9 | 4.2 | 5.5 | 133 | VV105 | cb |
| ERA-6SM | DC-4 | 12.6 | 12.5 | 12.2 | 11.7 | 11.3 | 10.5 | 17.9 | 16 | 20 | 4.5 | 36 | 1.3 | 1.2 | 1.6 | 1.8 | 120 | 650 | 70 | 5.0 | 4.6 | 5.6 | 143 | WW107 | cb |
| ERA-4SM | DC-4 | 14.3 | 14.0 | 13.4 | 12.7 | 11.8 | 11 | 17.3 | 15 | 20 | 4.2 | 34 | 1.2 | 1.2 | 1.3 | 1.8 | 120 | 650 | 65 | 4.5 | 4.2 | 5.5 | 196 | WW107 | cb |
| NEW ERA-4XSM | DC-4 | 14.7 | 14.2 | 13.5 | 12.0 | 11.8 | 12 | 17.0 | 15.0 | 20 | 4.2 | 35 | 1.2 | 1.2 | 1.2 | 1.4 | 100 | 650 | 65 | 4.5 | 4.2 | 5.5 | 196 | WW107 | cb |
| NEW ERA-5XSM | DC-4 | 20.5 | 19.5 | 17.6 | 15.5 | 13.7 | 16 | 17.8 | 16.5 | 13 | 3.5 | 33 | 1.2 | 1.3 | 1.2 | 1.4 | 120 | 650 | 65 | 4.9 | 4.2 | 5.5 | 133 | WW107 | cb |
| ERA-51SM | DC-4 | 18.0 | 17.4 | 16.1 | 14.8 | 12.5 | 14 | 18.1 | 16.5 | 13 | 4.1 | 33 | 1.1 | 1.2 | 1.2 | 1.9 | 120 | 650 | 65 | 4.5 | 4.2 | 5.5 | 154 | WW107 | cb |
| ERA-5SM | DC-4 | 20.2 | 19.5 | 17.6 | 15.6 | 14.0 | 16 | 18.4 | 16.5 | 13 | 4.3 | 32.5 | 1.3 | 1.3 | 1.2 | 1.3 | 120 | 650 | 65 | 4.9 | 4.2 | 5.5 | 133 | WW107 | cb |
| ERA-50SM*** | DC-1.5 | 20.7 | 19.4 | 18.3 | — | — | 16 | 17.2 | 16.0 | 13 | 3.5 | 32.5 | 1.3 | — | 1.2 | — | 120 | 650 | 60 | 4.4 | 4.0 | 4.9 | 177 | WW107 | cb |

***see suggested PCB layout PL-075 for ERA models***

## typical biasing configuration




**R BIAS**

**"1%" Resistor Values (ohms) for Optimum Biasing of ERA Models**

| Vcc | ERA-1 ERA-1SM | ERA-2 ERA-2SM | ERA-21SM | ERA-3 ERA-3SM | ERA-33SM | ERA-4, 4SM,4XSM | ERA-5, 5SM,5XSM | ERA-50SM, -51SM | ERA-6, ERA-6SM | ERA-8SM |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 90.9 | 88.7 | 88.7 | 107 | 69.8 | 38.3 | 33.2 | 40.2 | 30.1 | 88.7 |
| 8 | 113 | 113 | 113 | 133 | 93.1 | 52.3 | 48.7 | 53.6 | 43.2 | 118 |
| 9 | 137 | 137 | 137 | 162 | 115 | 66.5 | 63.4 | 68.1 | 56.2 | 143 |
| 10 | 162 | 162 | 162 | 191 | 140 | 80.6 | 78.7 | 82.5 | 69.8 | 174 |
| 11 | 187 | 187 | 187 | 221 | 165 | 95.3 | 95.3 | 97.6 | 84.5 | 200 |
| 12 | 215 | 215 | 215 | 249 | 191 | 110 | 110 | 113 | 97.6 | 226 |
| 13 | 237 | 237 | 237 | 280 | 215 | 127 | 124 | 127 | 113 | 255 |
| 14 | 261 | 261 | 261 | 309 | 243 | 143 | 140 | 143 | 127 | 280 |
| 15 | 287 | 287 | 287 | 340 | 267 | 158 | 158 | 158 | 140 | 309 |
| 16 | 309 | 309 | 316 | 365 | 287 | 174 | 174 | 174 | 154 | 340 |
| 17 | 332 | 332 | 340 | 392 | 316 | 187 | 187 | 191 | 169 | 365 |
| 18 | 357 | 365 | 365 | 422 | 340 | 205 | 205 | 205 | 182 | 392 |
| 19 | 383 | 392 | 392 | 453 | 365 | 221 | 221 | 221 | 196 | 422 |
| 20 | 412 | 412 | 412 | 475 | 392 | 237 | 232 | 237 | 210 | 453 |

## designers kits available

| KIT NO. | Model Type | No. of Units in Kit | Description |
|---|---|---|---|
| K1-ERA | ERA | 30 | 10 of each 1,2,3 |
| K2-ERA | ERA | 20 | 10 of each 4,5 |
| K1-ERASM | ERA-SM | 30 | 10 of each 1SM, 2SM,3SM |
| K2-ERASM | ERA-SM | 20 | 10 of each 4SM, 5SM |
| K3-ERASM | ERA-SM | 30 | 10 of each 4SM, 5SM, 6SM |

## pin connections

| PORT | cb |
|---|---|
| RF IN | 1 |
| RF OUT | 3 |
| DC | 3 |
| CASE GND | 2,4 |
| NOT USED | — |

**NSN GUIDE**

| MCL NO. | NSN |
|---|---|
| ERA-1SM | 5962-01-459-9075 |
| ERA-3SM | 5996-01-516-5438 |
| ERA-4SM | 5962-01-459-7410 |
| ERA-5SM | 5962-01-459-9314 |



051018

Available Tape & Reel