

# MONOLITHIC AMPLIFIERS 50 $\Omega$

## BROADBAND DC to 3 GHz



up to +17.5 dBm output

| MODEL<br>NO. | FREQ. $\Phi$<br>(MHz) | GAIN (dB)<br>Typical at MHz |      |      |                | MAXIMUM<br>POWER (dBm)            |                                 | DYNAMIC<br>RANGE   |                      | VSWR<br>(:1)<br>Typ. |     | ABSOLUTE<br>MAXIMUM<br>RATING <sup>7</sup><br>(25°C) |           | DC<br>OPERATING<br>POWER <sup>8</sup><br>at Pin 3 |               | THERMAL<br>RESIS-<br>TANCE <sup>5</sup><br>$\theta_{jc}$<br>°C/W | CASE<br>STYLE<br>Note B1 | CON-<br>NEC-<br>TION |
|--------------|-----------------------|-----------------------------|------|------|----------------|-----------------------------------|---------------------------------|--------------------|----------------------|----------------------|-----|------------------------------------------------------|-----------|---------------------------------------------------|---------------|------------------------------------------------------------------|--------------------------|----------------------|
|              |                       | 100                         | 1000 | 2000 | Note 1<br>Min. | Output<br>(1 dB<br>Comp.)<br>Typ. | Input<br>(no<br>damage)<br>Typ. | NF<br>(dB)<br>Typ. | IP3<br>(dBm)<br>Typ. | In                   | Out | I<br>(mA)                                            | P<br>(mW) | Current<br>(mA)                                   | Volt.<br>Typ. |                                                                  |                          |                      |
| MAR-1SM      | DC-1000               | 18.5                        | 15.5 | —    | 13.0           | +1.5                              | +13                             | 5.5                | +14.0                | 1.3                  | 1.2 | 40                                                   | 200       | 17                                                | 5.00          | 115                                                              | WW107                    | cb                   |
| MAR-2SM      | DC-2000               | 12.5                        | 12.0 | 11.0 | 8.5            | +4.5                              | +13                             | 6.5                | +17.0                | 1.5                  | 1.4 | 60                                                   | 325       | 25                                                | 5.00          | 105                                                              | WW107                    | cb                   |
| MAR-3SM      | DC-2000               | 12.5                        | 12.0 | 10.5 | 8.0            | +10.0                             | +13                             | 6.0                | +23.0                | 1.5                  | 1.7 | 70                                                   | 400       | 35                                                | 5.00          | 115                                                              | WW107                    | cb                   |
| MAR-4SM      | DC-1000               | 8.3                         | 8.0  | —    | 7.0            | +12.5                             | +13                             | 7.0                | +25.5                | 1.5                  | 1.9 | 85                                                   | 500       | 50                                                | 5.25          | 100                                                              | WW107                    | cb                   |
| MAR-6SM      | DC-2000               | 20.0                        | 16.0 | 11.0 | 9.0            | +2.0                              | +13                             | 3.0                | +14.5                | 1.7                  | 1.7 | 50                                                   | 200       | 16                                                | 3.50          | 120                                                              | WW107                    | cb                   |
| MAR-7SM      | DC-2000               | 13.5                        | 12.5 | 11.0 | 8.5            | +5.5                              | +13                             | 5.0                | +19.0                | 1.7                  | 1.7 | 60                                                   | 275       | 22                                                | 4.00          | 120                                                              | WW107                    | cb                   |
| MAR-8SM      | DC-1000               | 32.5                        | 22.5 | —    | 19.0           | +12.5                             | +13                             | 3.3                | +27.0                | #                    | #   | 65                                                   | 500       | 36                                                | 7.80          | 140                                                              | WW107                    | cb                   |
| MAV-11SM     | 50-1000               | 12.7                        | 10.5 | —    | 9.0            | +17.5                             | +13                             | 3.6                | +30.0                | 1.5                  | 1.7 | 80                                                   | 550       | 60                                                | 5.50          | 125                                                              | RRR137                   | cb                   |

### NOTES:

- ◆ Aqueous washable
- ☆ Increases below 1500 MHz.
- \* RAM models are hermetically sealed.
- ★ Max. Voltage 7V at pin 1 (DC power). Max. voltage 10V at pins 3,6, DC or transient.
- ❖ Price of RAM models is for 1-9 quantity.
- # Dash-8 models input and output impedances are not 50 ohms, see S-parameter data. Conditionally stable, source and load VSWR<3:1 required. Dash-6 models conditionally stable, source and load VSWR<5:1 required.
- ⊕ Low frequency cutoff determined by external coupling capacitors.
- † Specification at 500 MHz.
- ‡ Specification at 2500 MHz.
- A. Environmental specifications and re-flow soldering information available in General Information Section.
- B1. Units are non-hermetic unless otherwise noted. Details on case dimensions & finishes in "Case Styles & Outline Drawings". Case styles VV105 or BBB123 available, consult factory.
- C. Prices and Specifications subject to change without notice.
- 1. Minimum gain at highest frequency, except VAM-93 at 2 GHz. Full temperature range, except room temperature for Dash-4 models.
- 2. Model number designated by color dot or alphanumeric code marking.
- 3. Frequency at which output power, NF and IP3 are specified: 500 MHz for MAR-1SM, MAR-6SM, RAM-1, RAM-6, MAV-11SM, VAM-6, 2 GHz for VAM-93, 1000 MHz for all other models.
- 4. Dash-6 models potentially unstable with very high VSWR terminations.
- 5. Thermal resistance  $\theta_{jc}$  is from hottest junction in device to mounting surface of leads.
- 6. Permanent damage may occur if any of these limits are exceeded. These ratings are not intended for continuous normal operation.
- 7. 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](http://minicircuits.com/application.html). Reliability predictions are applicable at specified current & normal operating conditions.

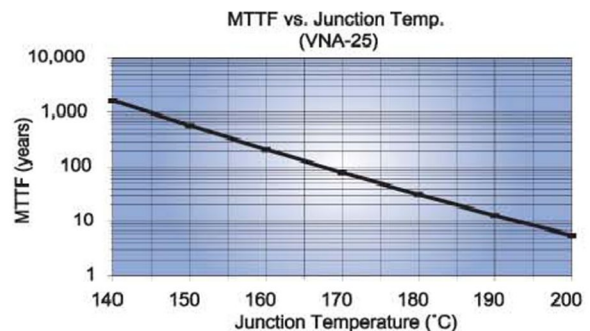
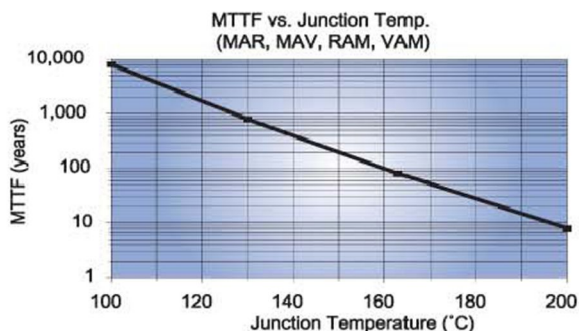
### model identification

Model marking (see note below)

|                          |         |
|--------------------------|---------|
| MAR-1SM (see note below) | 01      |
| MAR-2SM                  | 02      |
| MAR-3SM                  | 03      |
| MAR-4SM                  | 04      |
| MAR-6SM                  | 06      |
| MAR-7SM                  | 07      |
| MAR-8SM                  | 08      |
| RAM-1                    | 1 or 01 |
| RAM-2                    | 2 or 02 |
| RAM-3                    | 3 or 03 |
| RAM-4                    | 4 or 04 |
| RAM-6                    | 6 or 06 |
| RAM-7                    | 7 or 07 |
| RAM-8                    | 8 or 08 |
| MAV-11SM                 | A       |
| VAM-3                    | 03      |
| VAM-6                    | 06      |
| VAM-7                    | 07      |
| VAM-93                   | 93      |
| VNA-25                   | -25     |

### Notes:

- Prefix letter (optional) designates assembly location.
- MAR-1SM: limited availability; consult factory.



## Surface Mount



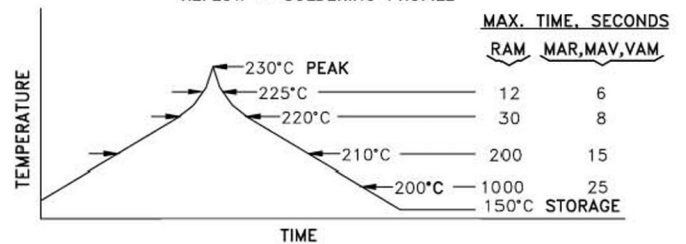
up to +18.2 dBm output

| MODEL NO.  | FREQ. (MHz) | GAIN (dB)<br>Typical at MHz |      |        |      |             | MAXIMUM POWER (dBm)      |                   | DYNAMIC RANGE |                | VSWR (:1)<br>Typ. |     | ABSOLUTE MAXIMUM RATING <sup>7</sup><br>(25°C) |        | DC OPERATING POWER <sup>8</sup><br>at Pin 3 |           | THERMAL RESISTANCE <sup>5</sup><br>$\theta_{jc}$ °C/W | CASE STYLE<br>Note B | CONNECTION |
|------------|-------------|-----------------------------|------|--------|------|-------------|--------------------------|-------------------|---------------|----------------|-------------------|-----|------------------------------------------------|--------|---------------------------------------------|-----------|-------------------------------------------------------|----------------------|------------|
|            |             | 100                         | 1000 | 2000   | 3000 | Note 1 Min. | Output (1 dB Comp.) Typ. | Input (no damage) | NF (dB) Typ.  | IP3 (dBm) Typ. | In                | Out | I (mA)                                         | P (mW) | Current (mA)                                | Volt Typ. |                                                       |                      |            |
| * RAM-1    | DC-1000     | 19.0                        | 15.5 | —      | —    | 13.0        | +1.5                     | +13               | 5.5           | +14.0          | 1.3               | 1.3 | 40                                             | 200    | 17                                          | 5.00      | 150                                                   | AF190                | cb         |
| * RAM-2    | DC-2000     | 12.5                        | 11.8 | 11.0   | —    | 8.5         | +4.5                     | +13               | 6.5           | +17.0          | 1.2               | 1.4 | 60                                             | 325    | 25                                          | 5.00      | 145                                                   | AF190                | cb         |
| * RAM-3    | DC-2000     | 12.5                        | 12.0 | 10.5   | —    | 8.0         | +10.0                    | +13               | 6.0           | +23.0          | 1.6               | 1.7 | 80                                             | 425    | 35                                          | 5.00      | 150                                                   | AF190                | cb         |
| * RAM-4    | DC-1000     | 8.5                         | 8.0  | —      | —    | 7.0         | +12.5                    | +13               | 6.5           | +25.5          | 1.4               | 1.9 | 100                                            | 540    | 50                                          | 5.25      | 140                                                   | AF190                | cb         |
| * RAM-6    | DC-2000     | 20.0                        | 16.0 | 11.0   | —    | 9.0         | +2.0                     | +13               | 2.8           | +14.5          | 1.4               | 1.3 | 50                                             | 200    | 16                                          | 3.50      | 155                                                   | AF190                | cb         |
| * RAM-7    | DC-2000     | 13.5                        | 12.5 | 11.0   | —    | 8.5         | +5.5                     | +13               | 4.5           | +19.0          | 2.0               | 1.8 | 60                                             | 275    | 22                                          | 4.00      | 155                                                   | AF190                | cb         |
| * RAM-8    | DC-1000     | 32.5                        | 23.0 | —      | —    | 19.0        | +12.5                    | +13               | 3.0           | +27.0          | #                 | #   | 65                                             | 420    | 36                                          | 7.80      | 175                                                   | AF190                | cb         |
| VAM-3      | DC-2000     | 11.5                        | 11.0 | 9.5    | —    | 7.5         | +9.0                     | +13               | 6.0           | +22.0          | 1.5               | 1.7 | 60                                             | 240    | 35                                          | 4.70      | 500                                                   | MMM168               | cb         |
| VAM-6      | DC-2000     | 19.5                        | 15.0 | 10.0   | —    | 8.0         | +2.0                     | +13               | 3.0           | +14.0          | 1.6               | 1.5 | 40                                             | 125    | 16                                          | 3.30      | 505                                                   | MMM168               | cb         |
| VAM-7      | DC-2000     | 13.0                        | 12.0 | 9.8    | —    | 7.8         | +5.5                     | +13               | 5.0           | +18.0          | 1.5               | 1.5 | 50                                             | 175    | 22                                          | 3.80      | 505                                                   | MMM168               | cb         |
| NEW VAM-93 | DC-3000     | 22.3                        | 21.2 | 19.1   | 17.1 | 17.0        | +12.7                    | +13               | 3.7           | +27.0          | 1.5               | 1.1 | 75                                             | 330    | 35                                          | 3.2       | 159                                                   | MMM168               | cb         |
| VNA-25     | 500-2500    | 14.0†                       | 18.0 | 16.0†† | —    | 11.5        | +18.2                    | +10               | 5.5           | +27.0          | 1.5★              | 1.6 | 105                                            | 1000   | 85                                          | 5.0★      | 125                                                   | XX211                | hj         |

### features

- cascadable
- excellent repeatability
- wide bandwidth, DC to 2500 MHz
- unconditionally stable, most models
- low cost
- hermetically sealed, RAM models
- low noise figure, 2.8 dB typ
- high output power, up to +18 dBm typ

### REFLOW - SOLDERING PROFILE



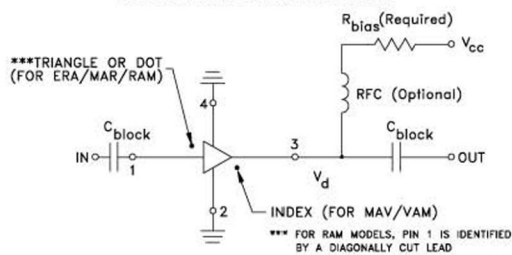
### pin connections

| PORT     | cb  | hj        |
|----------|-----|-----------|
| RF IN    | 1   | 3         |
| RF OUT   | 3   | 6         |
| DC       | 3   | 1         |
| GND EXT  | 2,4 | 2,4,5,7,8 |
| NOT USED | —   | —         |

### NSN GUIDE

| MCL NO. | NSN              |
|---------|------------------|
| MAR-1SM | 5962-01-414-8635 |
| MAR-3SM | 5962-01-423-1569 |
| MAR-6SM | 5962-01-460-6063 |
| RAM-6   | 5996-01-450-5504 |

### typical biasing configuration ERA/MAR/MAV/RAM/VAM



### biasing configuration VNA

