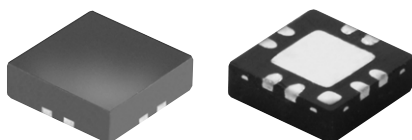


Surface Mount

# Monolithic Amplifiers

## MNA-SERIES

High Directivity, 50Ω, 0.5 to 5.9 GHz



CASE STYLE:DQ849

### Features

- 3V & 5V operation
- micro-miniature size .120"x.120"
- no external biasing circuit required
- high directivity, 20 dB typ.
- wide bandwidth, 0.5 to 5.9 GHz
- low noise figure, 2.9 dB typ. (MNA-6)
- output power, up to +19 dBm typ.
- excellent repeatability
- low cost

### Applications

- buffer amplifier
- cellular
- PCN

### Electrical Specifications at T<sub>AMB</sub>=25°C

| MODEL NO. | FREQ. (GHz)<br>f <sub>L</sub> - f <sub>U</sub> | DC VOLTS (V) | GAIN, dB Typical    |              |              |              |              |               | MAXIMUM POWER (dBm) |                     | DYNAMIC RANGE |                |              | VSWR* (:1) Typ. |            | DIRECTIVITY (dB) (Isolation-Gain) Typ. | DC OPERATING CURRENT @ Pin 3 (mA) |         | THERMAL RESISTANCE θ <sub>Jc</sub> Typ. °C/W | CASE STYLE | CONNECTION | PRICE \$ Qty. (30) |      |      |      |
|-----------|--|--------------|---------------------|--------------|--------------|--------------|--------------|---------------|---------------------|---------------------|---------------|----------------|--------------|-----------------|------------|--|-----------------------------------|---------|--|------------|------------|--------------------|------|------|------|
|           |  |              | over frequency, GHz |              |              |              |              |               | f <sub>L</sub> Typ. | f <sub>U</sub> Typ. | NF (dB) Typ.  | IP3 (dBm) Typ. | at1 GHz      | at1 GHz         | at2 GHz    |  | In                                | Out     |  |            |            |                    | Typ. | Typ. | Max. |
|           |  |              | 0.5                 | 1.0          | 1.5          | 2.0          | 2.5          | Min. at 2 GHz |                     |                     |               |                |              |                 |            |  |                                   |         |  |            |            |                    |      |      |      |
| MNA-2     | 0.5-2.5  | 5.0<br>2.8   | 10.6<br>2.8         | 12.8<br>11.5 | 12.8<br>11.2 | 12.3<br>10.7 | 11.9<br>10.2 | 10.3<br>—     | 17.7<br>12.9        | 14.9<br>12.4        | 5.4<br>5.4    | 26.5<br>23.2   | 28.0<br>24.2 | 1.5<br>1.5      | 1.6<br>1.6 | 20<br>20                               | 76<br>60                          | 95<br>— | 78   | DQ849      | nt         | 1.90               |      |      |      |
| MNA-3     | 0.5-2.5  | 5.0<br>2.8   | 14.6<br>14.2        | 16.2<br>15.2 | 16.1<br>15.0 | 15.0<br>14.0 | 11.8<br>11.0 | 13.0<br>—     | 11.4<br>9.7         | 9.5<br>8.0          | 4.9<br>4.8    | 19.6<br>18.0   | 21.3<br>19.9 | 1.9<br>1.9      | 1.5<br>1.5 | 17<br>17                               | 30<br>28                          | 40<br>— | 78   | DQ849      | nt         | 1.60               |      |      |      |
| MNA-4     | 0.5-2.5  | 5.0<br>2.8   | 15.6<br>14.3        | 16.6<br>14.6 | 16.4<br>14.5 | 15.8<br>14.1 | 13.3<br>11.7 | 14.0<br>—     | 19.0<br>13.4        | 17.0<br>13.7        | 4.8<br>4.8    | 28.4<br>23.9   | 29.0<br>24.9 | 1.5<br>1.5      | 1.7<br>1.7 | 20<br>20                               | 75<br>67                          | 90<br>— | 78   | DQ849      | nt         | 1.90               |      |      |      |
| MNA-5     | 0.5-2.5  | 5.0<br>2.8   | 18.5<br>18.0        | 22.8<br>21.4 | 21.9<br>20.5 | 20.6<br>19.4 | 18.0<br>17.4 | 17.0<br>—     | 12.2<br>10.1        | 8.0<br>6.5          | 3.5<br>3.5    | 19.4<br>18.0   | 21.0<br>20.0 | 1.6<br>1.6      | 1.9<br>1.9 | 17<br>17                               | 28<br>26                          | 40<br>— | 78   | DQ849      | nt         | 1.60               |      |      |      |
| MNA-6     | 0.5-2.5  | 5.0<br>2.8   | 19.4<br>18.6        | 23.5<br>21.5 | 23.6<br>21.2 | 23.0<br>21.0 | 20.2<br>19.0 | 21.5<br>—     | 18.0<br>14.1        | 15.8<br>13.2        | 2.9<br>2.9    | 27.1<br>23.4   | 28.0<br>25.0 | 1.5<br>1.5      | 1.6<br>1.9 | 17<br>17                               | 81<br>65                          | 95<br>— | 78   | DQ849      | nt         | 2.25               |      |      |      |
| MNA-7     | 1.5-5.9  | 5.0<br>2.8   | over frequency, GHz |              |              |              |              |               | 15.6<br>15.9        | 15.9<br>15.9        | at2 GHz       | at2 GHz        | at5.9 GHz    | 2.0<br>2.0      | 1.5<br>1.5 | 20<br>24                               | 73<br>65                          | 96<br>— | 78   | DQ849      | nt         | 2.25               |      |      |      |
|           |  |              | 1.5                 | 2.0          | 3.5          | 5.0          | 5.9          | 15.9          |                     |                     |               |                |              |                 |            |  |                                   |         |  |            |            |                    | 17.2 | 17.4 | 17.2 |

\* VSWR above .75 GHz

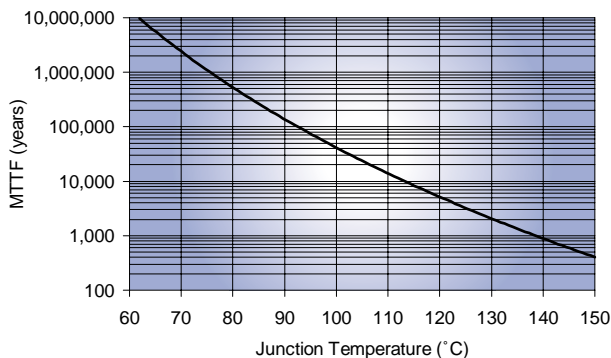
### Maximum Ratings

|  |   |
|--|---|
| Operating Temperature                          | -40°C to 85°C                               |
| Storage Temperature                            | -55°C to 100°C                              |
| DC Voltage                                     | 7V at pin 7 <sup>†</sup><br>10V at pins 2&5 |
| Power  | 500mW                                       |
| Input Power (no damage)                        | 10 dBm                                      |
| <sup>†</sup> Refer to pin configuration for DC |   |

### Pin Configuration

|            |   |
|------------|---|
| PORT       | (nt)  |
| RF IN      | 2   |
| RF OUT     | 5   |
| DC         | 7, with 1000 pF bypass to ground; connect pin 8 via 33 ohms to pin 7 externally |
| GNDEXT.    | 3,4 and paddle in center of bottom  |
| OPTIONAL   | 1,6 No internal connection; recommended use: per PCB Layout (see next sheet)    |
| DEMO BOARD | TB-186  |

MTTF vs. Junction Temp. (MNA)



designers kit available

| KIT No. | No. of Units in KIT | Description                           | Price \$ per KIT |
|---------|---------------------|---------------------------------------|------------------|
| K1-MNA  | 40                  | 10 of each: MNA-2, -3, -5, -6         | 69.95            |
| K2-MNA  | 60                  | 10 of each: MNA-2, -3, -4, -5, -6, -7 | 99.95            |



Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

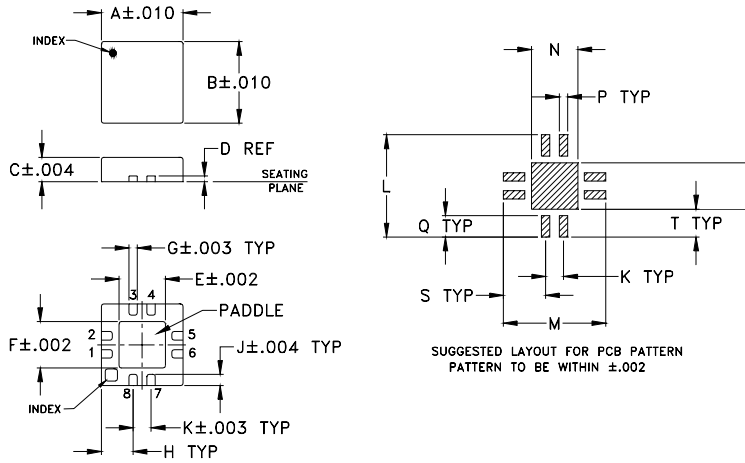
Mini-Circuits ISO 9001 & ISO 14001 Certified

INTERNET <http://www.minicircuits.com>

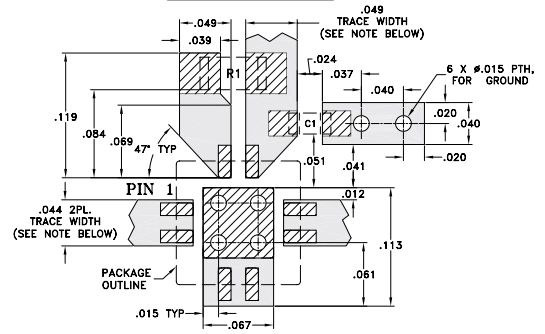
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

REV. G  
M92482  
ED-9640A/2  
MNA-SERIES  
FL/TD/CP  
041028  
page 1 of 8

## Outline Drawing



## Suggested PCB Layout (PL-078)



RESISTOR R1: 33.2 Ohm, 0603 SIZE  
CAPACITOR C1: 1000 pF ± 10%, X7R, 0402 SIZE

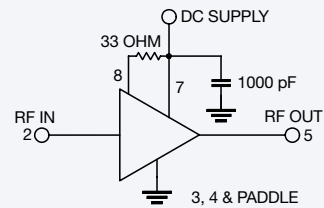
NOTE: TRACE WIDTH IS SHOWN FOR ROGERS RO4350 WITH DIELECTRIC THICKNESS 0.020" ± 0.0015", COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

- DENOTES PCB COPPER LAYOUT
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

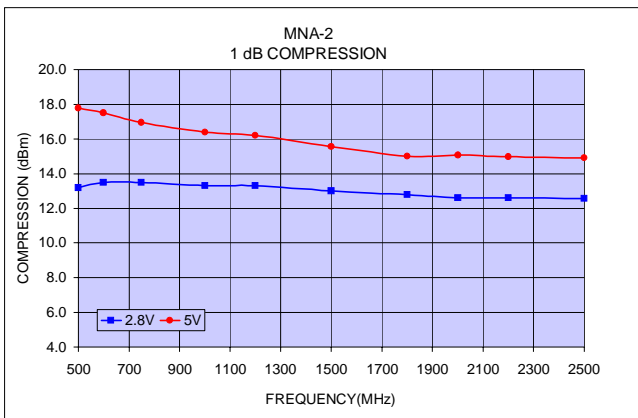
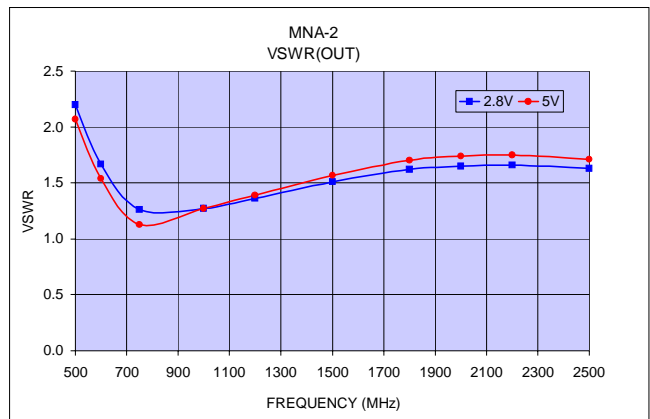
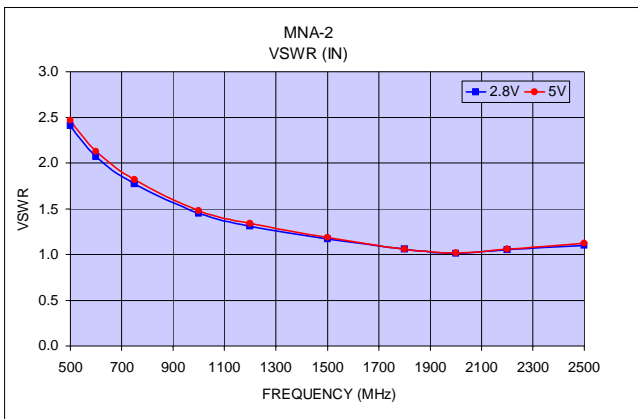
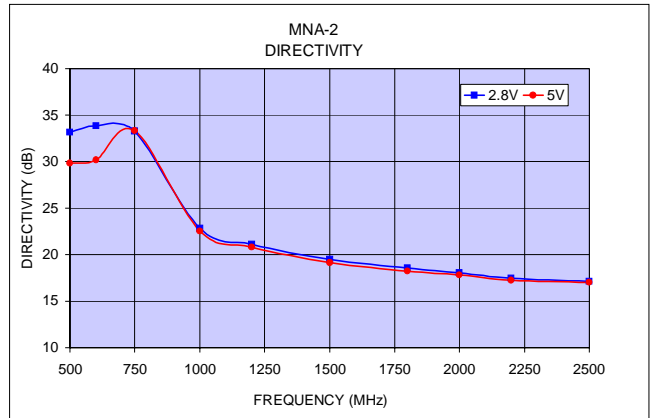
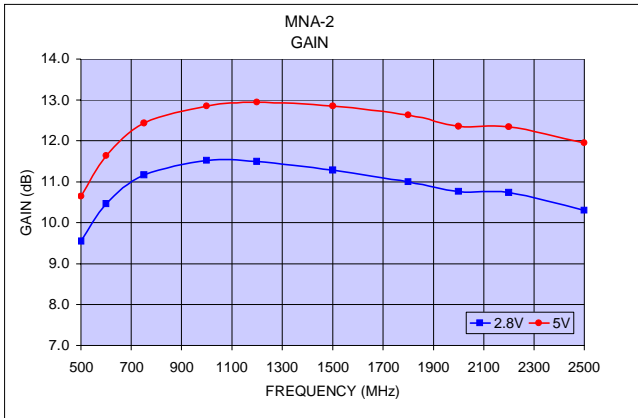
## Outline Dimensions (inch mm)

| A    | B    | C    | D    | E    | F    | G    | H    | J    |       |
|------|------|------|------|------|------|------|------|------|-------|
| .118 | .118 | .035 | .008 | .067 | .067 | .012 | .046 | .016 |       |
| 3.00 | 3.00 | 0.89 | 0.20 | 1.70 | 1.70 | 0.30 | 1.17 | 0.41 |       |
| K    | L    | M    | N    | P    | Q    | R    | S    | T    | wt.   |
| .026 | .148 | .148 | .067 | .012 | .031 | .067 | .061 | .041 | grams |
| 0.66 | 3.76 | 3.76 | 1.70 | 0.30 | 0.79 | 1.70 | 1.55 | 1.04 | .02   |

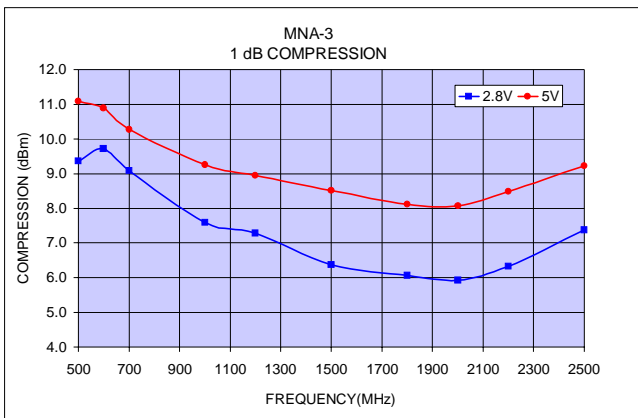
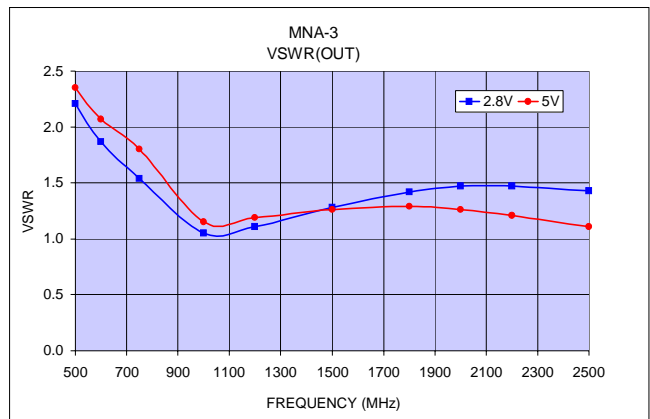
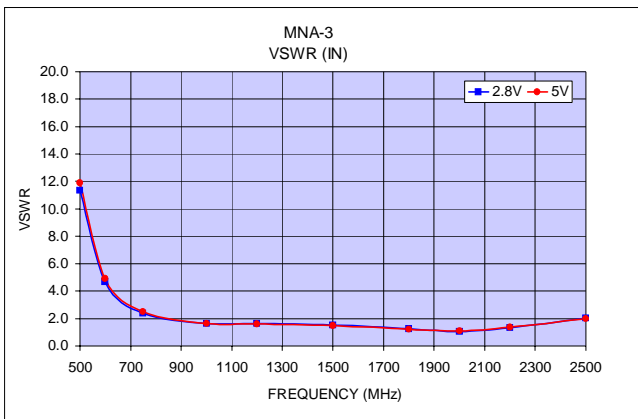
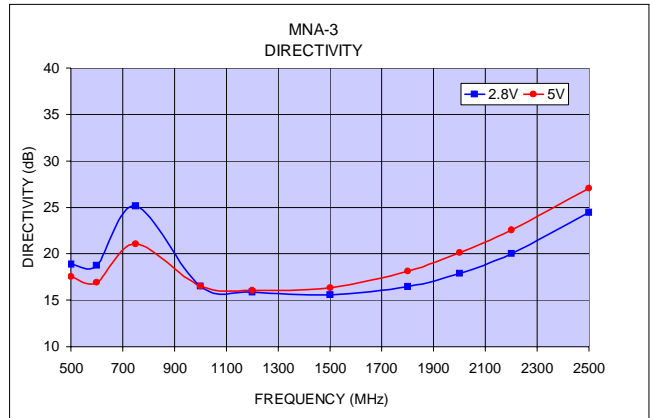
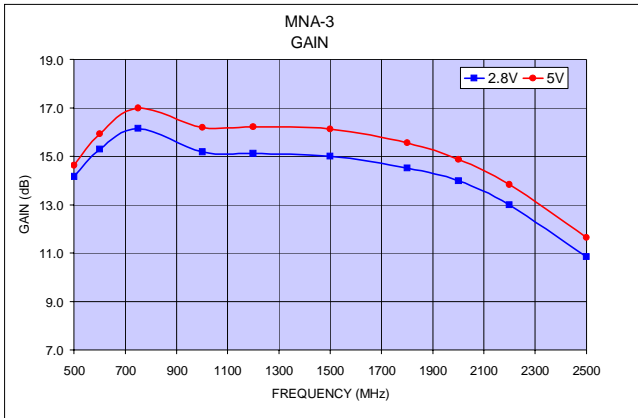
## Biasing configuration



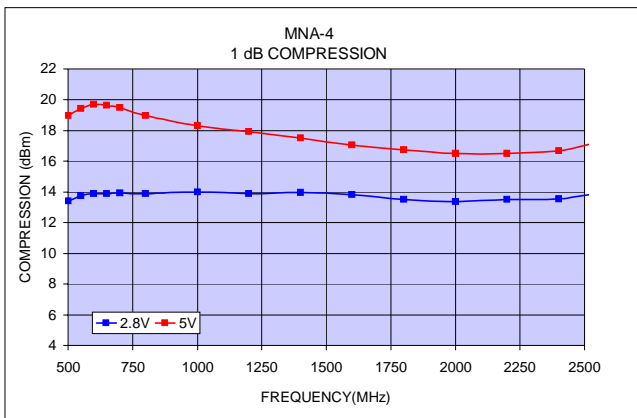
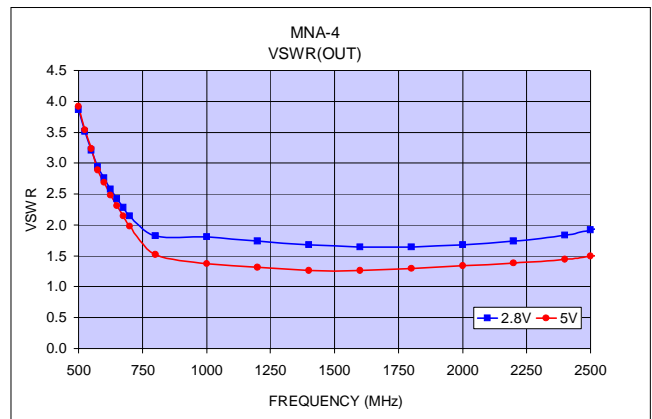
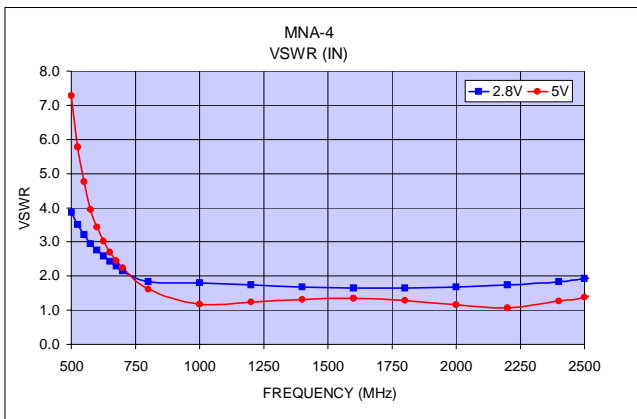
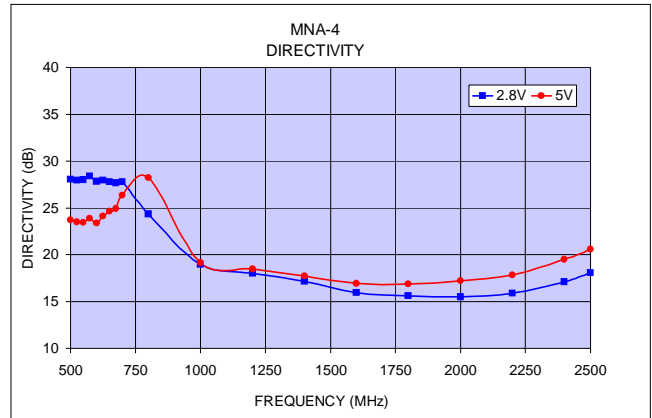
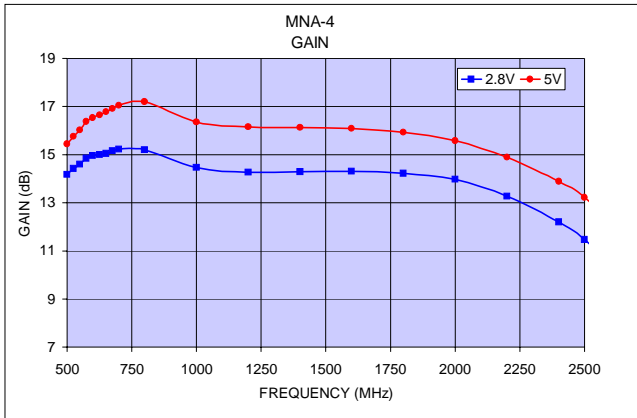
# MNA-2 Performance Curves



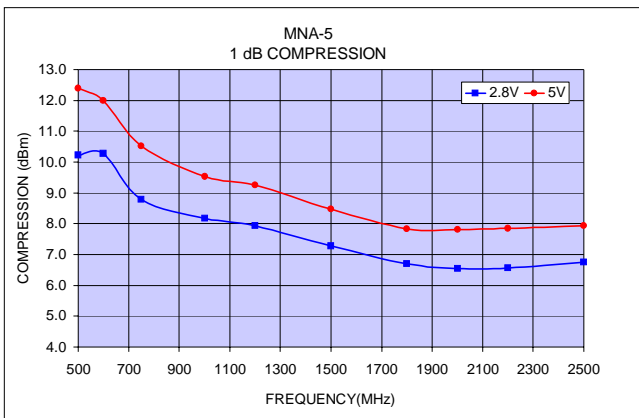
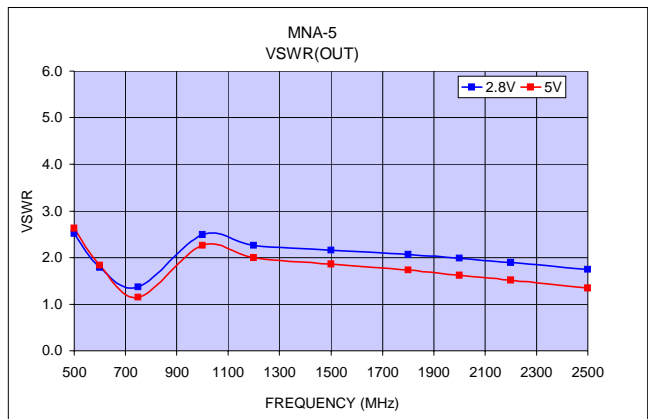
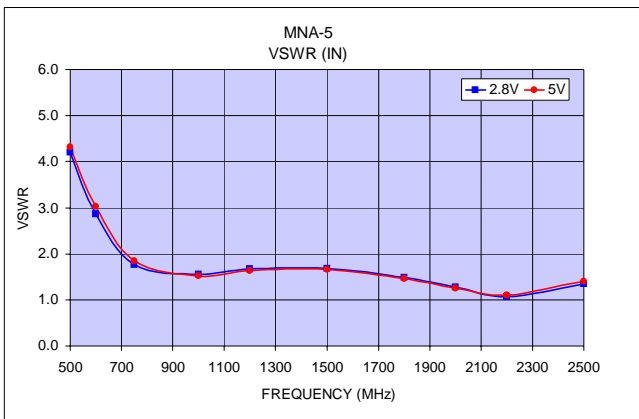
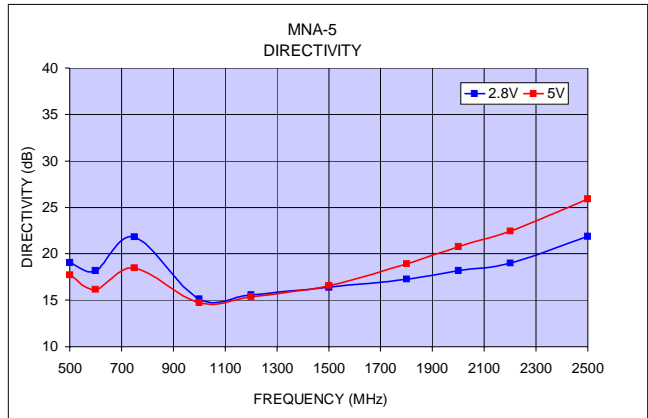
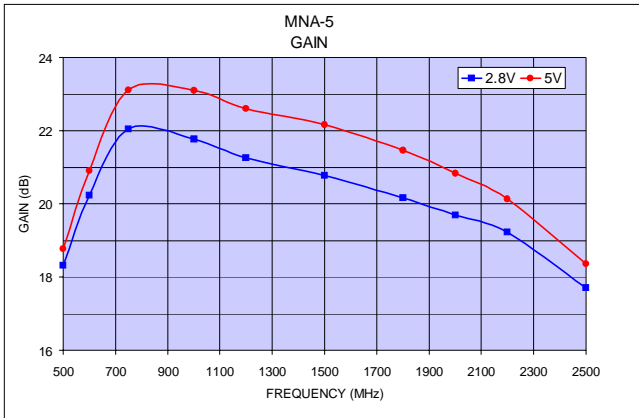
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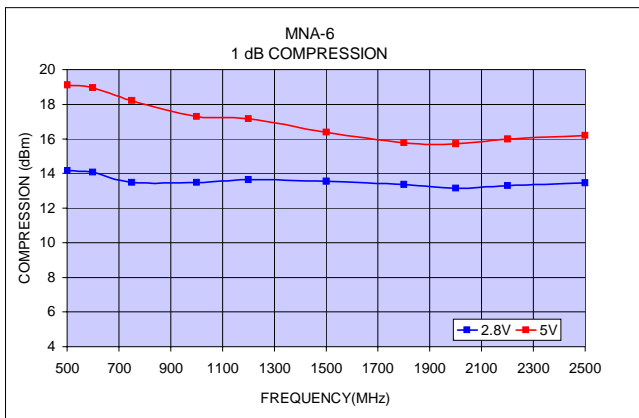
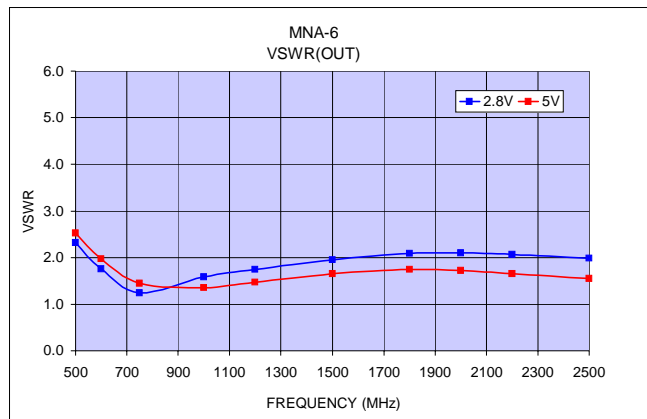
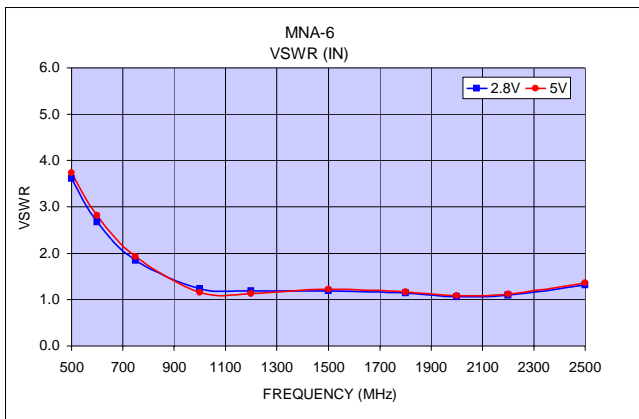
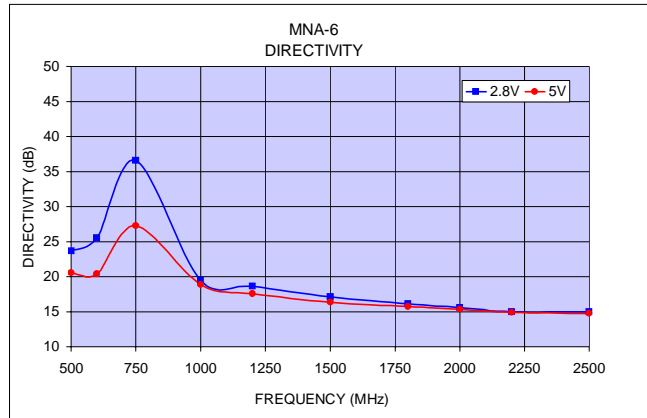
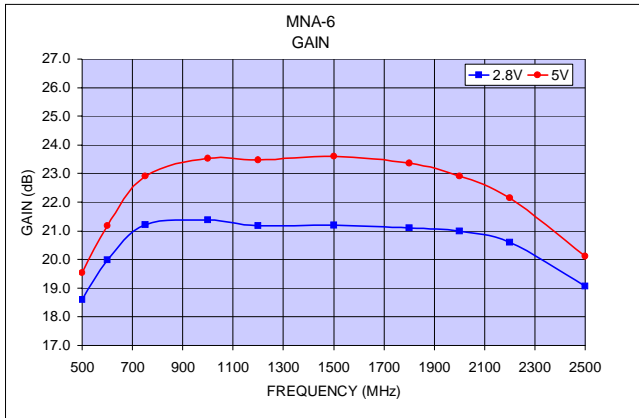
# MNA-4 Performance Curves



# MNA-5 Performance Curves



# MNA-6 Performance Curves



# MNA-7 Performance Curves

