



Vector Modulator, 1.805 to 1.88 GHz (DCS) and 1.93 to 1.99 GHz (PCS)

V 1.00

MAMDCC0002

Features

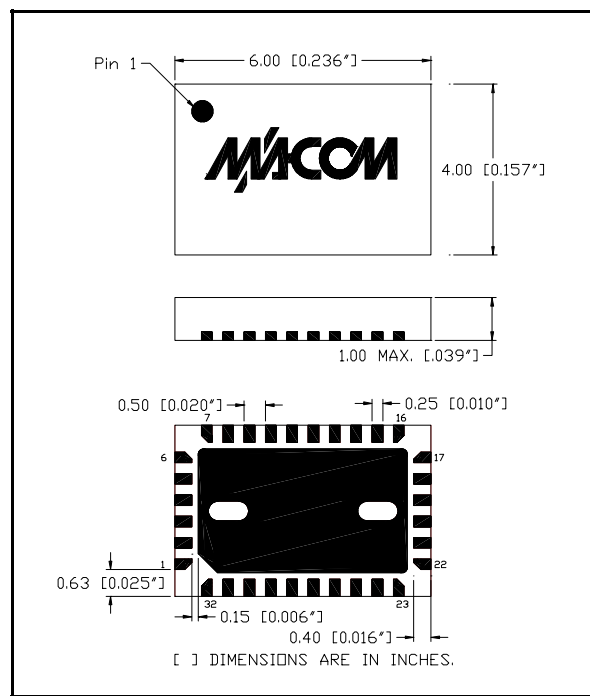
- Operates 1.805 to 1.88 GHz (DCS)
- Operates 1.93 to 1.99 GHz (PCS)
- Chip Scale Package.
- Low Amplitude Ripple
- Linear Phase
- 50 Ohm Nominal Impedance
- Continuously Variable Across a Full 360 degree range
- Test Boards Available

Description

M/A-COM's MAMDCC0002 is a Vector Modulator that significantly reduces the required board space compared to hybrid solutions. The monolithic passive elements will lead to greater repeatability lot-to-lot. Low amplitude ripple will provide superior performance. High intercept and compression points will contribute to more linear system performance. MAMDCC0002 is ideally suited for wireless infrastructure applications.

M/A-COM's MADRCC0002 Dual Linearizer is designed to simplify the control of Vector Modulators. See Figure 1 and App Note AN3001.

CSP-6



Electrical Specifications $T_A = +25^\circ\text{C}$

| Parameter | Test Conditions | Units | Min | Typical | Max |
|--------------------------------|--|-------|-------|------------|------------|
| Frequency | DCS Band | GHz | 1.805 | — | 1.88 |
| | PCS Band | GHz | 1.93 | — | 1.99 |
| Impedance | — | Ohms | — | 50 | — |
| Reference Loss | Z = 50 Ohms | dB | -12.5 | — | -10.0 |
| Attenuation Range | Z = 50 Ohms Above Reference Loss | dB | 10 | — | — |
| Phase Shift Range | Z = 50 Ohms, Over minimum Attenuation Range | deg | 0 | — | 360 |
| Amplitude Ripple | Z = 50 Ohms, Ref Loss | dB | — | ± 0.07 | ± 0.15 |
| | Z = 50 Ohms, 5 dB above Ref Loss | dB | — | ± 0.07 | ± 0.20 |
| | Z = 50 Ohms, 10 dB above Ref Loss | dB | — | ± 0.09 | ± 0.20 |
| Deviation from Linear Phase | Z = 50 Ohms, Ref Loss | deg | — | ± 0.15 | ± 0.5 |
| | Z = 50 Ohms, 5 dB above Ref Loss | deg | — | ± 0.25 | ± 0.5 |
| | Z = 50 Ohms, 10 dB above Ref Loss | deg | — | ± 0.15 | ± 0.5 |
| Return Loss - Input | Over 10 dB Attenuation Range | dB | 15 | — | — |
| Return Loss - Output | Over 10 dB Attenuation Range | dB | 14 | — | — |
| Input IP_3 | Over 10 dB Attenuation Range | dBm | — | +41 | — |
| Input P_{1dB} | Over 10 dB Attenuation Range | dBm | — | +29 | — |
| Noise Figure | Over 10 dB Attenuation Range | dB | — | — | Note 1 |
| Switching Speed | 50% Control to 10% / 90% RF | ns | — | 500 | — |
| I Supply | — | mA | — | — | 25 |

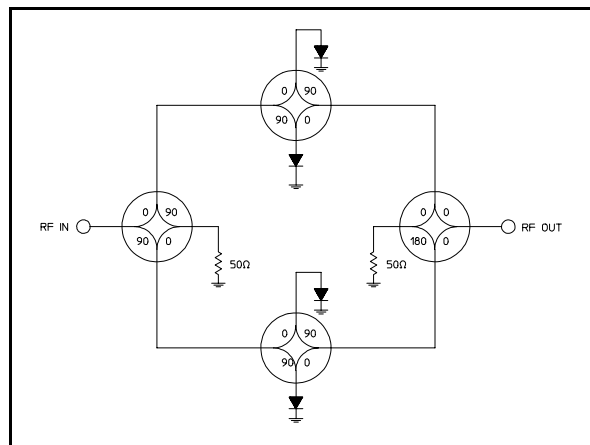
1. Noise figure is approximately equal to the absolute attenuation.

Absolute Maximum Ratings ²

| Parameter | Absolute Maximum |
|---|--------------------|
| Max. Input Power 1.7 to 2.1 GHz Other Frequencies | +30 dBm +24 dBm |
| DC Voltages ³ Vbias1 or Vbias2 | +1.0V |
| DC Current | 50 mA Max per Bias |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -65°C to +125°C |

- Operation of this device above any one of these parameters may cause permanent damage.
- Note that external dropping resistors are required to limit the current and voltage on the PIN diodes.

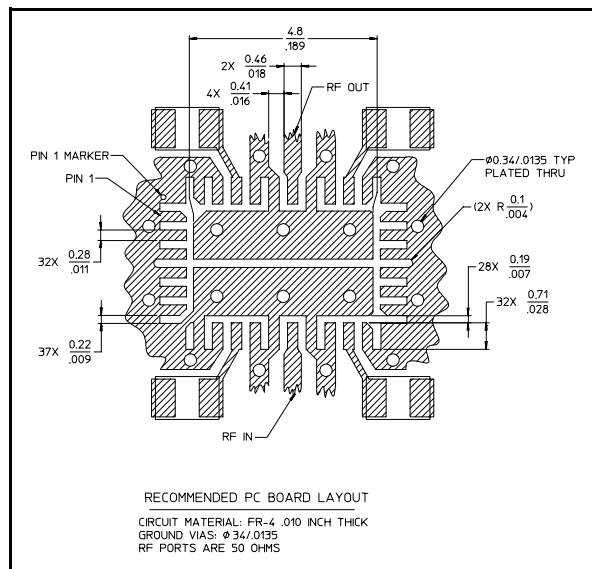
Schematic



Pad Configuration

| Pin # | Function | Pin # | Function |
|-------|----------|-------|----------|
| 1 | NC | 17 | NC |
| 2 | NC | 18 | NC |
| 3 | NC | 19 | NC |
| 4 | NC | 20 | NC |
| 5 | NC | 21 | NC |
| 6 | NC | 22 | NC |
| 7 | NC | 23 | NC |
| 8 | NC | 24 | Bias 2B |
| 9 | Bias 1A | 25 | NC |
| 10 | NC | 26 | GND |
| 11 | GND | 27 | RF OUT |
| 12 | RF IN | 28 | GND |
| 13 | GND | 29 | NC |
| 14 | NC | 30 | Bias 1B |
| 15 | Bias 2A | 31 | NC |
| 16 | NC | 32 | NC |

Recommended PCB Layout



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Figure 1A - Phase and Attenuation of MAMDCC0002, Vector Modulator Linearized with MADRCC0002 Dual Linearizer

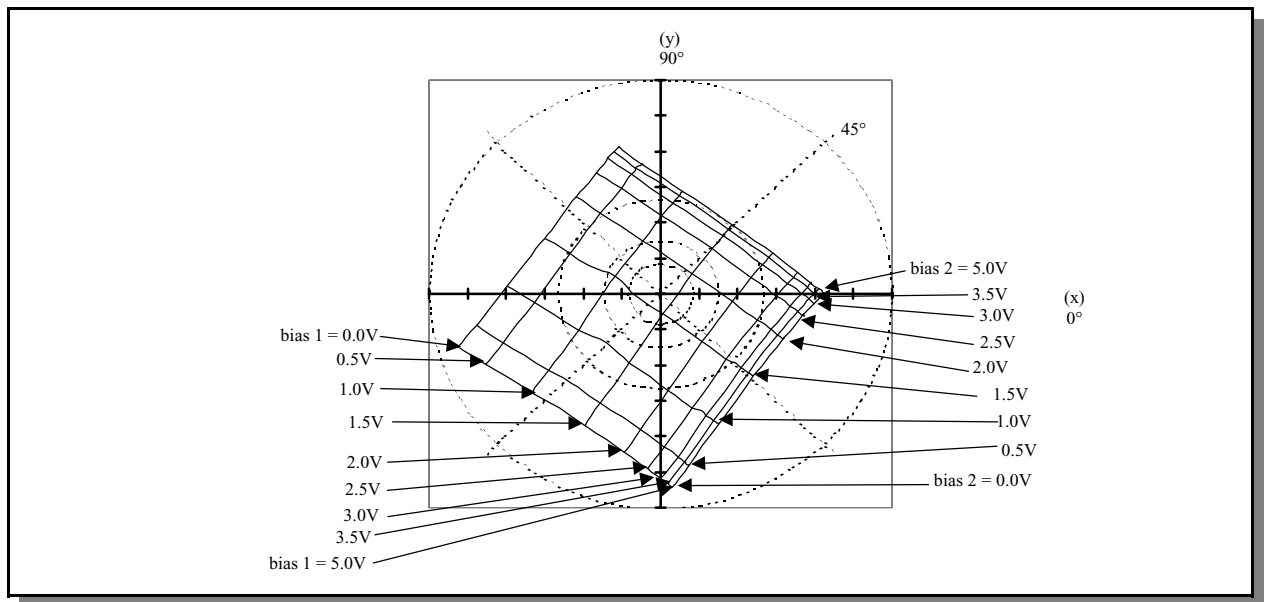
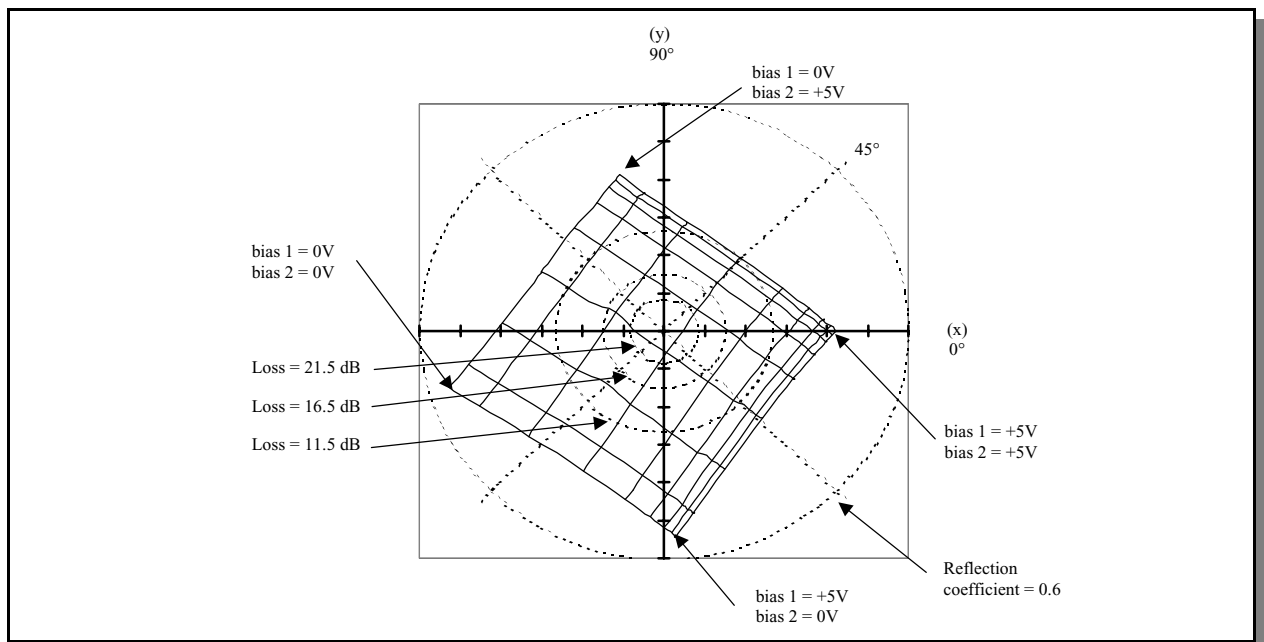


Figure 1B



4. Tic marks on x,y axes refer to reflection coefficient in increments of 0.1V. Reflection coefficients vary from -0.6 to +0.6 on both the x and y axes.
5. Data is for vector modulators driven by linearizers. See Application Note AN3001.
6. Inputs to the linearizers vary from 0 to 5V.
7. The phase with the inputs to both linearizers set to +5V is arbitrarily called zero degrees.

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**Figure 2A - Phase and Attenuation of MAMDCC0002,
Vector Modulator with Current Drive**

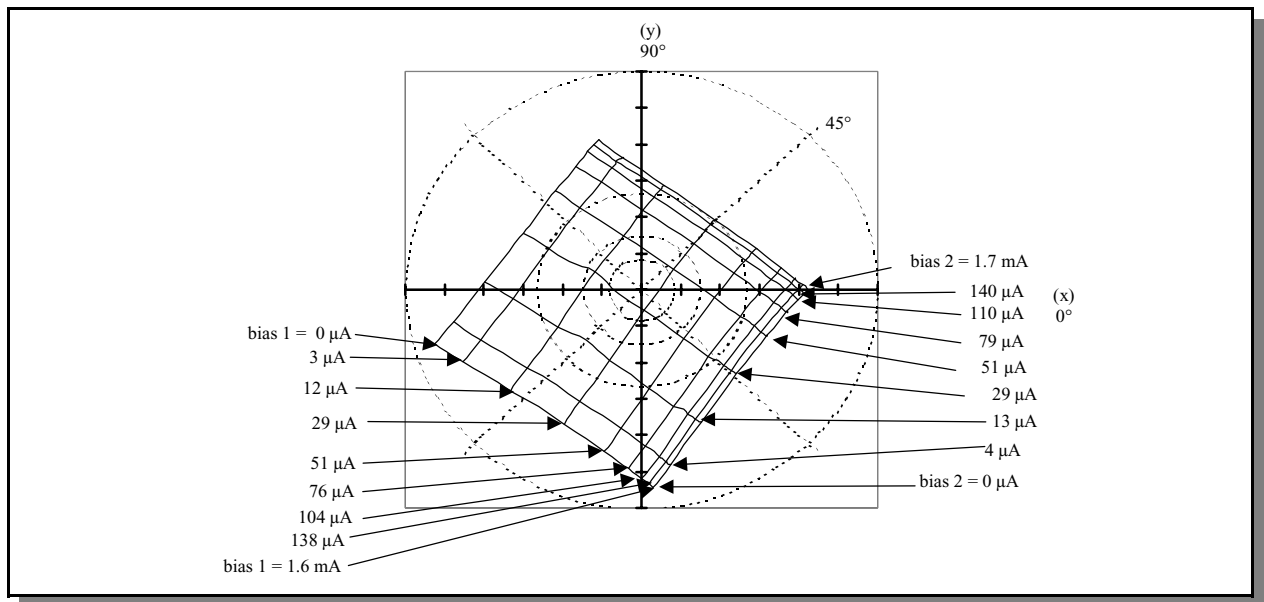
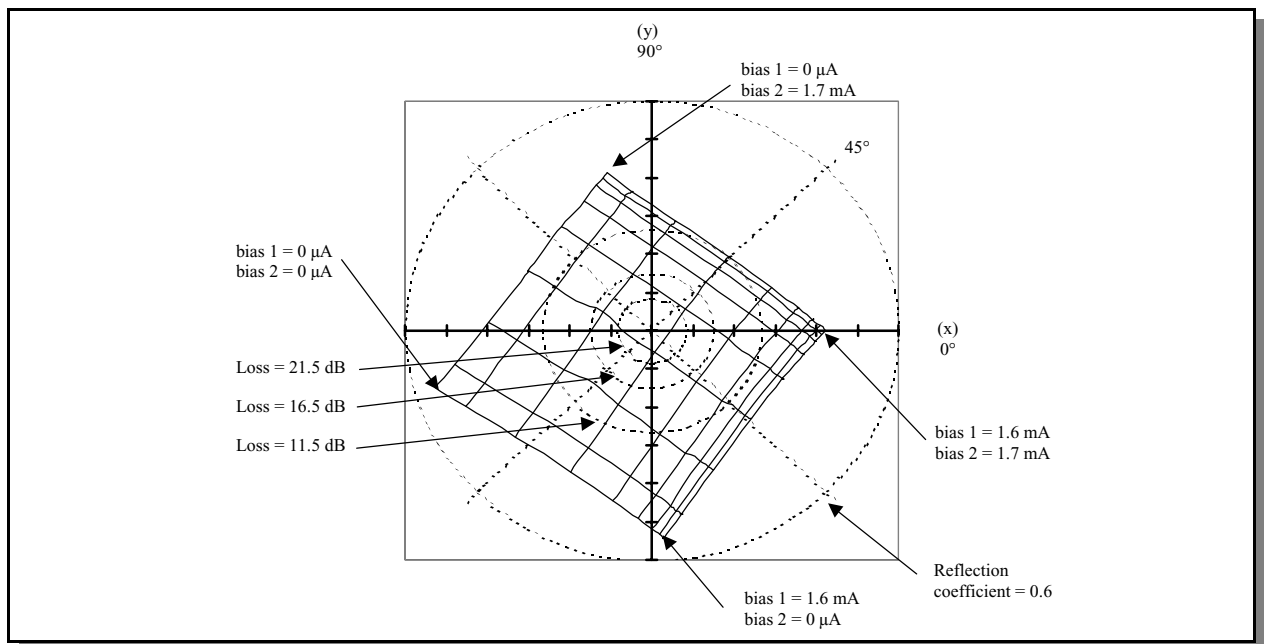


Figure 2B



8. Tic marks on x,y axes refer to reflection coefficient in increments of 0.1. Reflection coefficients vary from -0.6 to +0.6 on both the x and y axes.
9. The phase with the inputs to both linearizers set to +15 mA is arbitrarily called zero degrees.

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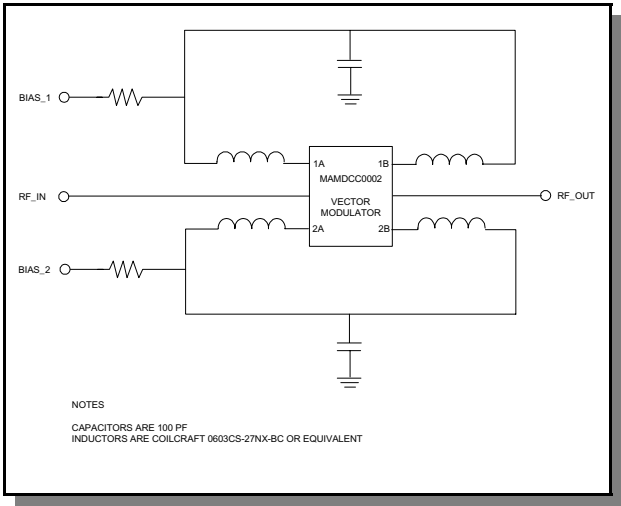
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Functional Block Diagram



Ordering Information

| Part Number | Package |
|------------------|---|
| MAMDCC0002 | Bulk Packaging |
| MAMDCC0002TR | Tape and Reel |
| MAMDCC0002-DC000 | Units Mounted on Test Board with Driver |

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