

Voltage Variable Phase Shifter, 1.85 - 1.99 GHz

**MACMCC0003
V2**

Features

- 120° Phase Shift Minimum
- High IP3
- Very Low Insertion Loss
- Surface Mount CSP Package
- Low Cost/High Performance
- 50 Ohm Nominal Impedance

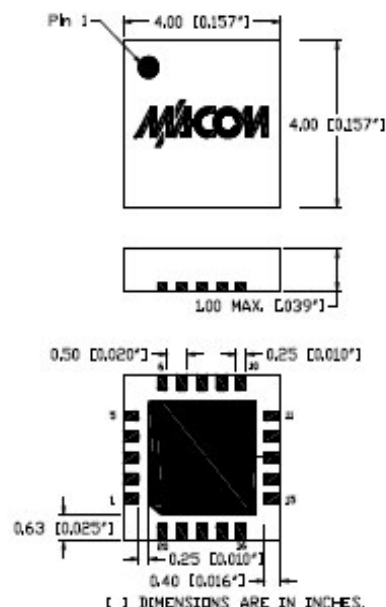
CSP-7

Description

M/A-COM's MACMCC0003 is an integrated assembly containing varactor diodes and a GaAs MMIC. This device is packaged in a 20 lead surface mount CSP package. Using the suggested bias configuration, 120° of phase shift is achieved from +5V to 0V. The MACMCC0003 is ideally suited for UMTS communication applications requiring variable phase in the 1.85 to 1.99 GHz

Ordering Information

Part Number	Package
MACMCC0003	Bulk Packaging
MACMCC0003TR	Tape and Reel (1K Reel)
MACMCC0003-TB	Units Mounted on Test Board



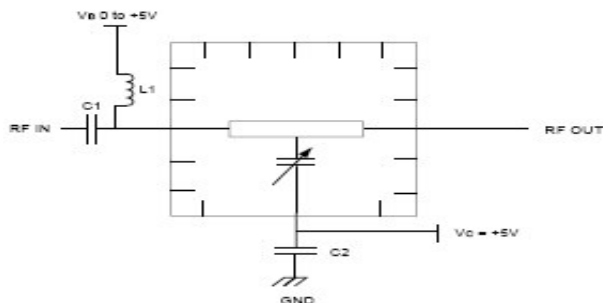
Electrical Specifications¹: T_A = 25°C, Z₀ = 50Ω

Parameter	Test Conditions	Frequency	Units	Min	Typ	Max
Insertion Loss	Less Coupling	V _B = 0V	dB	—	2.2	3.0
		V _B = 1V	dB	—	2.2	3.0
		V _B = 2V	dB	—	2.2	3.0
		V _B = 3V	dB	—	2.2	3.0
		V _B = 4V	dB	—	2.8	3.5
		V _B = 5V	dB	—	4.0	5.5
VSWR	—		Ratio	—	1.4	1.9
Phase Linearity vs. Frequency	—	0 - 45°	deg	—	±2	—
		0 - 90°	deg	—	±4	—
		0 - 120°	deg	—	±6	—
Input IP3	—	Two Tones 2.15 GHz, 2.155 GHz, +5 dBm V _{BIAS} = 0V	dBm	—	25	—
Phase	—	V _B = 0V	deg	120	130	—

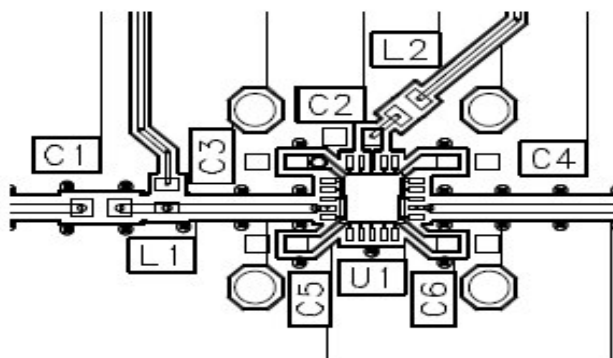
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Functional Diagram and Bias Circuitry (Top View)



Recommended PCB Configuration



1. Circuit Material = FR-4, TETRA II, .010 ± .001 thick.
2. Line Width = 0.018 inches, Line Spacing = 0.016 inches for 50 ohm line.

Pin Configuration

Pin No.	Function	Pin No.	Function
1	GND ⁴	11	GND
2	GND	12	RF OUT
3	GND	13	GND
4	RF IN, V _B	14	GND
5	GND	15	GND
6	GND	16	GND
7	GND	17	GND
8	GND	18	GND, V _C ³
9	GND	19	GND
10	GND	20	GND

3. GND is floated through C2. Therefore, the phase shifter bias voltage, V_B, is positive (0 to +5V).

4. All GND pins are connected to ground through C2.

Absolute Maximum Ratings⁵

Parameter	Absolute Maximum
Operating Voltage ^{6,7}	Breakdown Voltage
Operating Temperature	-65°C to +125°C
Storage Temperature	-65°C to +200°C

5. Operation of this device above any one of these parameters may cause permanent damage.

6. Breakdown Voltage = 22 volts minimum, measured at 10 microamps.

7. To operate this device above the recommended V_B = +5V; increase V_C to 22 volts maximum.

External Circuitry Parts⁸

Part	Value	Purpose
C1	20pF	DC Block
C2	20 pF	DC Block
L1	33 nH	RF Choke

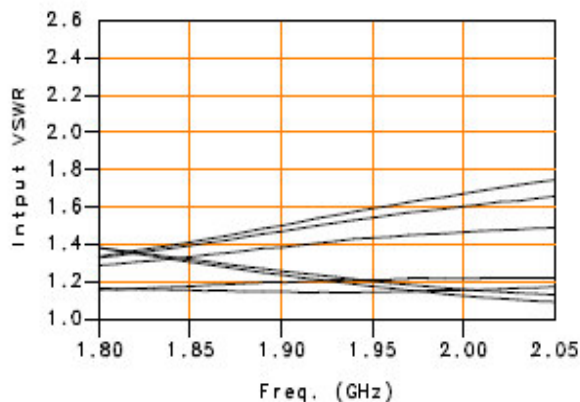
8. All external circuitry parts are readily available, low cost surface mount components (.060 in. x .030 in or .080 in x .050 in.).

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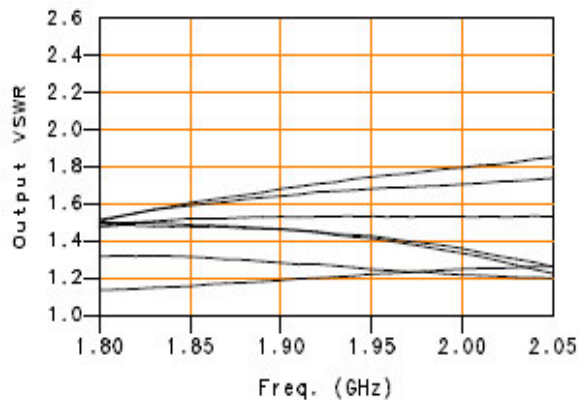
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Typical Performance Curves

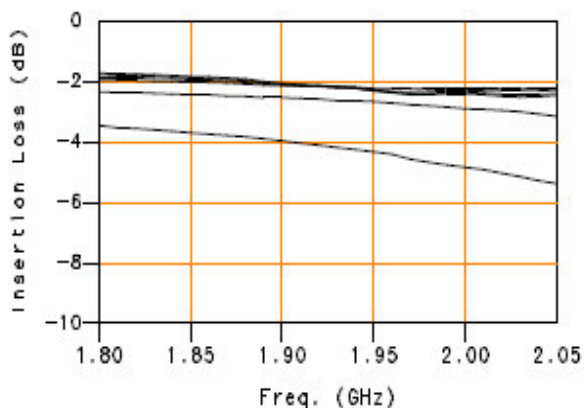
Input VSWR



Output VSWR



Insertion Loss



Phase

