

2121A Complex Vector Attenuator (CVA)

Features

- Frequency range of 800 MHz to 1000 MHz
- Packaged in a compact JEDEC Standard, machine-placeable, surface-mount 84-pin PLCC

Description

The 2121A is a complex vector attenuator (CVA) packaged in a 84-pin PLCC package. At 800 MHz to 1000 MHz, it is functionally equivalent to the combination of an endless phase shifter and attenuator. It may be used anywhere it is necessary to control the phase and amplitude of a signal without introducing intermodulation distortion, dispersion, or variation in group delay.

Typical performance for the 2121A CVA includes a 40 dBm third-order input intercept, 9.5 dB minimum loss, 15 dB attenuation range, and input and output VSWR of 1.15:1. Amplitude and phase linearity are typically ± 0.1 dB and $\pm 0.5^\circ$ over common bands such as the 869 MHz to 894 MHz AMPS band. Designs for other bands centered from 500 MHz to 3000 MHz are available upon request.

While the 2121A is not architecturally similar to the combination of a phase shifter and attenuator, it serves the same purpose and has several other advantages. For example, there is no limitation on phase change. With no delay variation, phase can increase or decrease continuously without reaching an end point.

The CVA can also go directly from any attenuation and phase in its range to any other attenuation and phase: for example, minimum attenuation at 0° to minimum attenuation at 180° , without a continuous phase transition from 0° to 90° to 180° .

These qualities make the 2121A CVA particularly useful in signal cancellation systems where the phase and amplitude of one signal must be adjusted so that it can completely cancel another signal of arbitrary amplitude and phase. The minimum theoretical insertion loss of the CVA is 6 dB, while typical insertion loss is in the range of 9.5 dB to 10.5 dB. For applications requiring lower loss and high linearity, low-noise surface-mount amplifiers such as the 2121B, designed to be a companion to the 2121A, can be supplied.

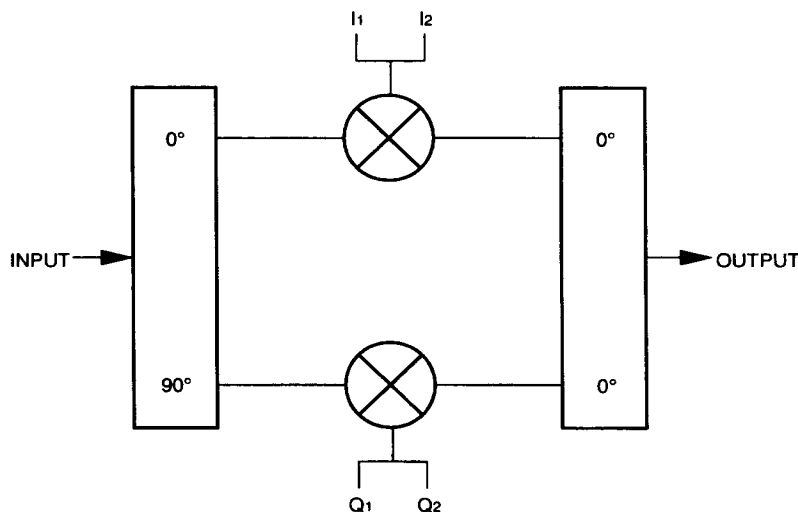


Figure 1. 2121A Block Diagram

Pin Information

Table 1. Pin Descriptions

Pin No.	Symbol	Name/Function
1	INPUT	RF Signal Input
43	OUTPUT	RF Signal Output
16, 28	I1, I2	In-phase Attenuator Control
58, 70	Q1, Q2	Quadrature Attenuator Control

Note: All remaining pins are to be connected to RF ground.

Absolute Maximum Ratings

Stresses in excess of the Absolute Maximum Ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to Absolute Maximum Ratings for extended periods can adversely affect the device reliability.

Parameter	Symbol	Value	Unit
Temperature Range	TA	−40 to +125	°C
Pin Soldering Temperature/Duration	TS	200/30 to 60	°C/s
RF Signal Input	INPUT	20	dBm
Attenuator Control	I1, I2, Q1, Q2	50	mA

Electrical Characteristics

Frequency: 800 MHz to 1000 MHz. Temperature at 25 °C.

Parameter	Min	Typ	Max	Unit
Minimum Insertion Loss*	—	9.5	10.5	dB
Attenuation Flatness†	—	±0.005	±0.015	dB/MHz
Total Available Loss	20	40	—	dB
Phase Flatness†	—	±0.02	±0.06	°/MHz
Input/Output VSWR	—	1.15:1	1.35:1	—
Input Third-Order Intercept	34	40	—	dBm

* Measured with 25 mA into I1 and I2 (50 mA total) or 25 mA into Q1 and Q2 (50 mA total).

† Specified up to maximum total loss of 20 dB.

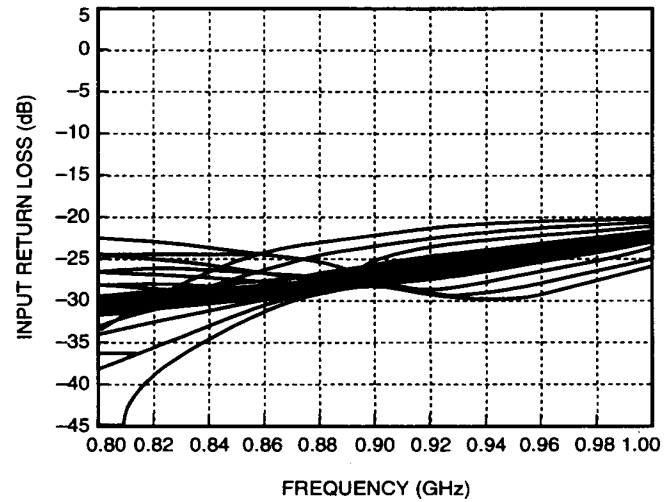
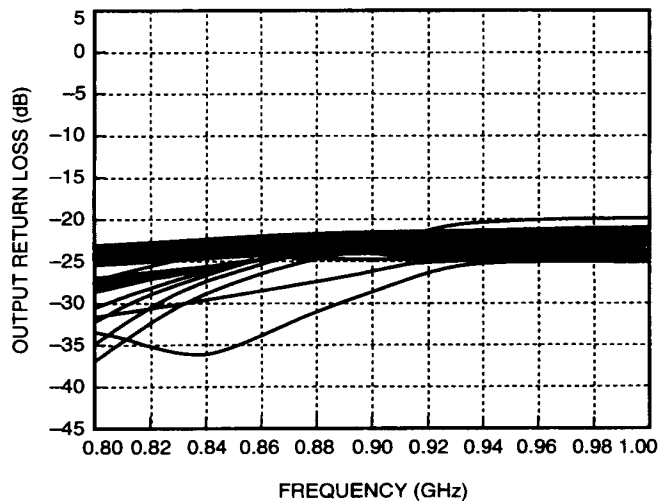
Electrical Characteristics (continued)

Figure 2. Output Return Loss (typical RF performance) **Figure 3. Input Return Loss** (typical RF performance)

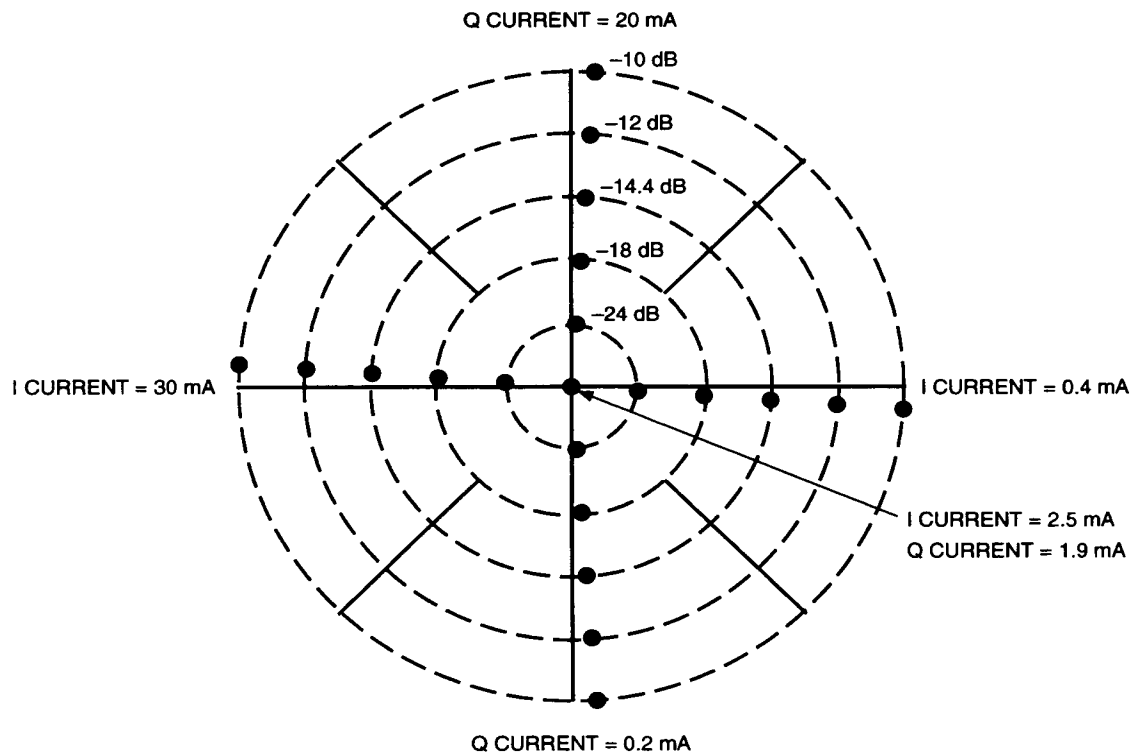


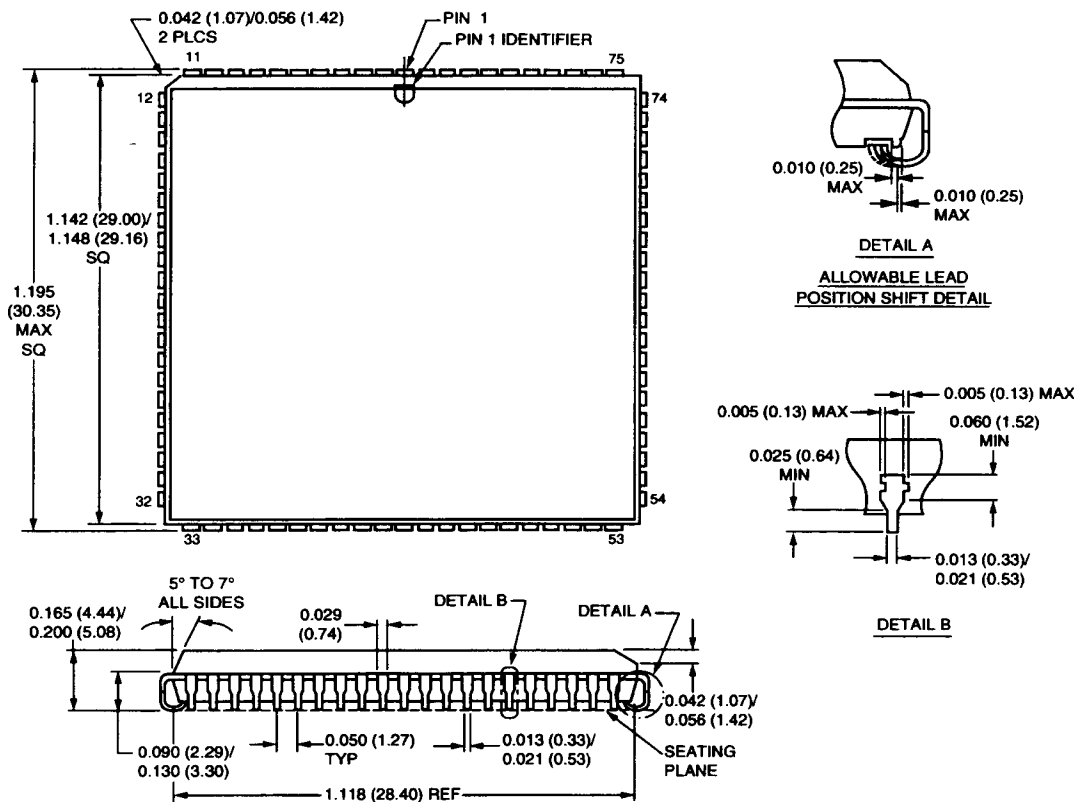
Figure 4. Transmission Loss and Phase vs. I and Q Current (fixed delay and phase removed)

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Outline Diagram

84-Pin PLCC Package

Dimensions are in inches and (millimeters).



Ordering Information

Code	Frequency Range*	Part Number
2121A	800 MHz to 1000 MHz	C107089062

* Designs for other bands ranging from 500 MHz to 3000 MHz are available upon request.

For additional information, contact your AT&T Account Manager or the following:

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