GigaBaudics

13 GHz PROGRAMMABLE ATTENUATOR MODEL PA13

FEATURES

- **DC to 13 GHz bandwidth**
- **1O Bit (1024 step) range**
- **Low profile**
- **0625 dB steps**
- **Constant phase**
- **Precise repeatability**
- **50 ohm matched I/O**
- **High-speed TTL control**

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PRODUCT DESCRIPTION

The PA13 is a single channel programmable attenuator designed for adjusting the amplitude of radio and microwave signals of bandwidths from DC to 13 GHz.

This device has low impedance mismatch, high bandwidth, wide dynamic range and is capable of rapid state change. The PA13 can be an attractive alternative to either the manually operated microwave attenuator switches, which are expensive and are switched very slowly, or the relay attenuators which are expensive and wear out quickly.

Attenuation is controlled in standard steps of 0.0625 dB. The 10 bit programmable range results in the full $2^{10}=1024$ steps yielding a dynamic range of O to 63.9375dB. Non-standard custom step sizes are available.

The PA13 is specifically designed to minimize any phase shift between attenuator states. The maximum phase deviation between any attenuation states is determined by the maximum delay shift of +/- 10 ps.. The maximum phase shift between consecutive attenuation states is typically 2 to 3 picoseconds. This device is specially calibrated to maintain high accuracy at the control word major-carries so that attenuation states do not overlap or have large errors at these points.
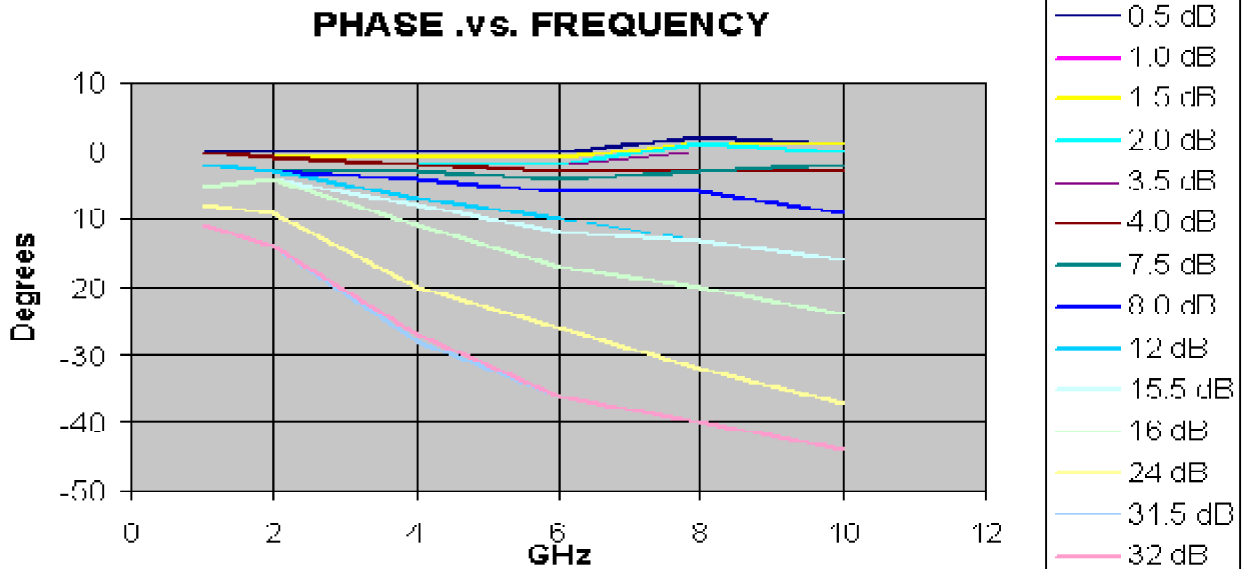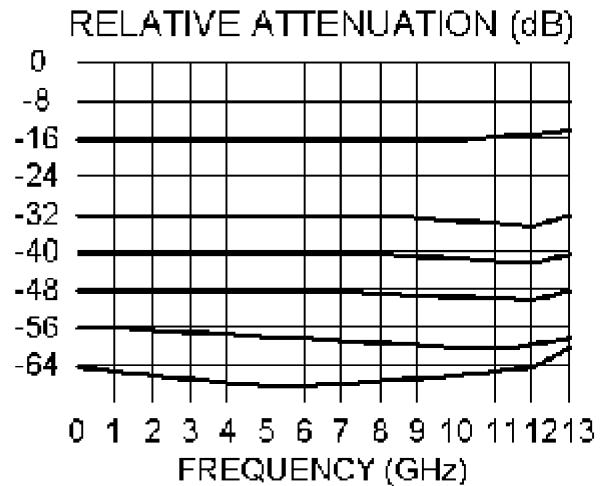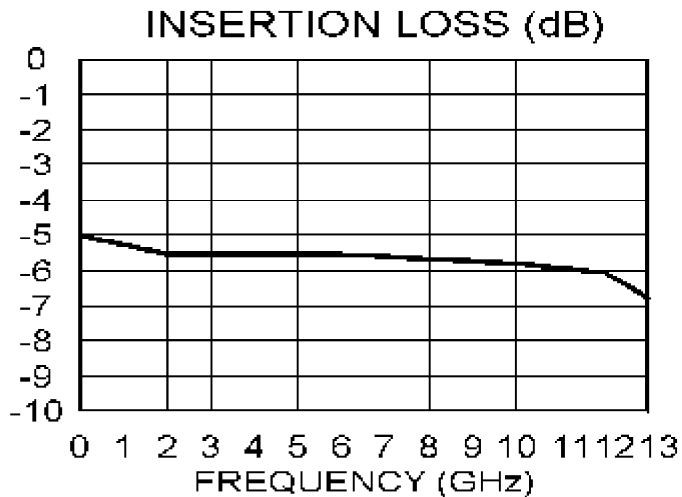
The PA13 employs all GaAs passive microwave switched-element and voltage-variable techniques. Lines are switched in a series configuration so that each attenuation value occurs additively with any other switched-in attenuation. Active elements are thermally

regulated to 50 ^{0}C. This also lends to an outstandingly low repeatability error of less than +/-0.02 dB.

RF inputs and output are connected by SMA jacks while data and control signals are connected by a standard 15 pin D-type connector plug. Power is connected through the D-sub connector. This device is provided in a low profile rugged aluminum housing and requires a single, low power, 5V supply making this instrument very easy to use.

jFast, ACT control logic is used to support applications requiring rapid attenuation state change. This allows programming rates in excess of 20 MHz. If higher programming speeds are required, or if 110 ohm input terminations to TTL threshold are desired, contact the manufacturer.
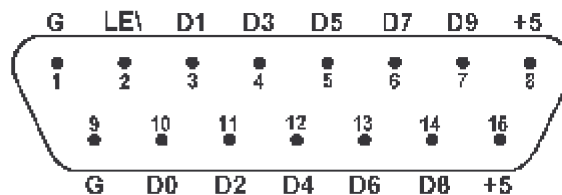
TRANSFER CHARACTERISTICS

The phase change increases monotonically beyond 32 dB.

PROGRAMMING

The attenuation is equal to the 0.0625 dB step size times the 10 bit control word number. Each of the 10 bits corresponds to a separate attenuator element. These 10 elements are connected in a series configuration to give 1024 combinations 0 to 63.9375dB. The latch enable line (LE) is active (low) to latch the control word. The control word need not be latched if the user wishes to operate the latch transparently. Simply keep the latch line high and the attenuation state will follow the applied data.

PIN CONNECTIONS

Pin #_____Function

- 1_____Ground
- 2_____Latch enable active low
- 3_____1/8 dB
- 4_____1/2 dB
- 5_____2 dB
- 6_____8 dB
- 7_____32 dB
- 8_____+5.0V Power

- 9_____Ground
- 10_____1/16 dB
- 11_____1/4 dB
- 12_____1 dB
- 13_____4 dB
- 14_____16 dB
- 15_____+5.0V Power

15 pin, male, D-type subminiature connector

Option: -9-32VV. This option is for a 9 bit (D9 inactive) version of this product with 31.9375 dB range. This option offers the advantage of reduced price, about 1/3 the insertion loss of the standard product, better 50 ohm impedance matching and flatter frequency response. It is recommended for low noise, small signal applications. PA13-9-32VV unit price: $1500.

Option: -AC. This option provides AC coupling for use in applications above 2.5 MHz. This is recommended for applications that may have DC offsets on the input or output. Option price: $100.

SPECIFICATIONS

- Nominal Attenuation:_____0.0625 dB steps to 63.9575 dB
- Attenuation Accuracy:_____0 to 8 GHz_____8 to 13 GHz
- 0-8 dB _____1/8 dB_____1/4 dB
- 8-48 dB_____1/4 dB_____1 dB
- 48-64 dB_____3 dB_____8 dB
- Reference insertion loss:_____<5.5 dB_____ < 7 dB
- VSWR:_____1.25:1 max_____ 1.35:1 max
- Phase deviation (in time +/-ps):___+/-8 max , 0 to 32 dB, 16 ps total
- Phase deviation consecutive step: _+/-2 ps max.
- Impedance: _____50 Ohms nominal
- Insertion delay: _____0.4 to 0.6 ns
- Dispersion (1-? GHz): _____
- Control data latch setup time:_____3.5 ns
- Control data latch hold time:_____1.5 ns
- Control propagation delay max.: __<9 ns
- Attenuation switch time (10/90%): <35 ns
- Input power: _____to 20 dBm port B, 18 dBm port A
- Supply requirement: _____+5 (<20 mV noise), current: < 0.2 Amps
- Physical dimensions:_____2.72 x 1.75 x 0.6 inches (Excluding connectors)
- Outline drawing:_____PA13ol.jpg

POWER REQUIREMENTS

The PA13 uses a single 5V supply. The current requirement is 200 mA but it is typically below 100 mA at low programming rates. Internal supply voltages are regulated to eliminate supply noise coupling to the signal path. The input buffer uses the 5V supply directly all other internal voltages are generated from the 5V supply in order to simplify power-up.

ABSOLUTE MAXIMUM RATINGS
(beyond which damage may occur)

- Power into RF I/O Port A (top)_____18 dBm
- Power into RF I/O Port B (bottom):_____ 25 dBm
- DC voltage at RF I/O Port A (top):_____ +/- 1.8
- DC voltage at RF I/O Port B (bottom):____ +/-4.0 (+/-3.1V during power-down)
- Voltage at TTL inputs:_____ -0.5 to 7.0
- Supply voltage:_____-0.5 to 7.0
- Inputs and outputs are static sensitive. No warranty will be extended to damaged inputs or output drivers.

Price: **$1700._____** Price and specifications subject to change without notice.

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