

GigaBaudics

8 GHz, 4 CHANNEL PROGRAMMABLE ATTENUATOR MODEL: QPA8

PRELIMINARY DATA SHEET



FEATURES

- DC to 6, 8 GHz bandwidth
- 10 Bit (1024 step) range
- Very low insertion loss
- 0.0625 dB step
- Constant phase
- Precise repeatability
- 50 ohm matched I/O
- High-speed TTL control
- Low noise
- High Linearity, ~50dBm IP3

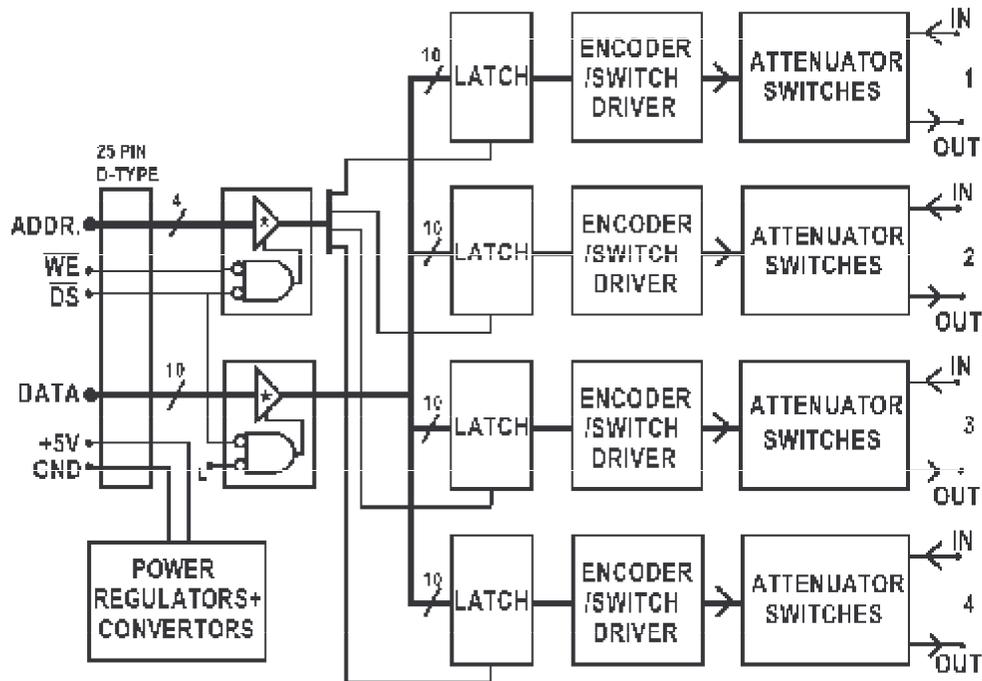
PRODUCT DESCRIPTION

The QPA8 is a 4 channel programmable attenuator designed for adjusting the amplitude of radio and microwave signals of bandwidths from DC to 8 GHz.

This device has low impedance mismatch, high bandwidth, wide dynamic range and is capable of rapid state change. The QPA8 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 0 to 63.9375dB. Non-standard custom step sizes are available.

The QPA8 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 +/- 5 ps.. The maximum phase shift between consecutive attenuation states is typically cooresponds to 2 to 3 picoseconds. This device is specially calibrated to maintain high accuracy at the major-carriers so that attenuation states do not overlap or have large errors at these points. The QPA8 employs all GaAs passive microwave switched-element techniques. Elements are switched in a series configuration so that each attenuation value occurs additively with any other switched-in attenuation. This also lends to an outstandingly low repeatability error of less than +/-0.02 dB. Active elements are thermally regulated to 50 °C. Inputs and outputs are connected by SMA jacks while data and control signals are connected by a standard 25 pin D-type connector plug. 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.

QPA8 FUNCTIONAL DIAGRAM



PROGRAMMING

The attenuation is equal to the 0.0625 dB step size times the 10 bit control word. Each of the 10 bits corresponds to a separate attenuator element. Each channel is addressed (selected) by a separate address line AO, A1, A2 and A3. This allows any combination of channels to be identically programmed simultaneously. The WE (write enable) line is activated (low) while data is valid. The DS (device select) line, active low, is useful for selecting a particular unit when more than one unit is used in conjunction. Data, address and DS should be valid for at least 4 ns, after WE goes low and should remain valid 3 ns. after WE goes high. Programming can be done without using the WE or DS line by tying them low, applying the desired control word, then selecting the channel. When the channel is de-selected the control word will be latched in that channel. The control word need not be latched if the user wishes to operate the latches transparently. Simply keep the address line high, DS and WE low and the attenuation state of the selected channel(s) will follow the applied data.

PIN CONNECTIONS

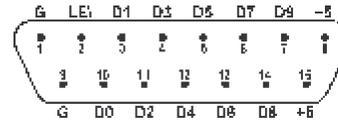
- **Pin#** _____ **Function (QPA8)**
- 14-17 _____ +5.0V Power
- 1-10 _____ DO - D9 respectively, active high
- 22 _____ DS = Device Select, active low
- 23 _____ WE = Write Enable, active low
- 18-21 _____ Ground
- 25 _____ A0 "1" Channel select, active high
- 12 _____ A1 "2" ""
- 24 _____ A2 "3" ""
- 11 _____ A3 "4" ""
- 13 _____ no connection



25 pin, male, D-type subminiature connector

- **Pin #** _____ **Function (PA8)**
- 1 _____ Ground
- 9 _____ 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
- 10 _____ 1/16 dB
- 11 _____ 1/4 dB
- 12 _____ 1 dB
- 13 _____ 4 dB
- 14 _____ 16 dB
- 15 _____ +5.0V Power

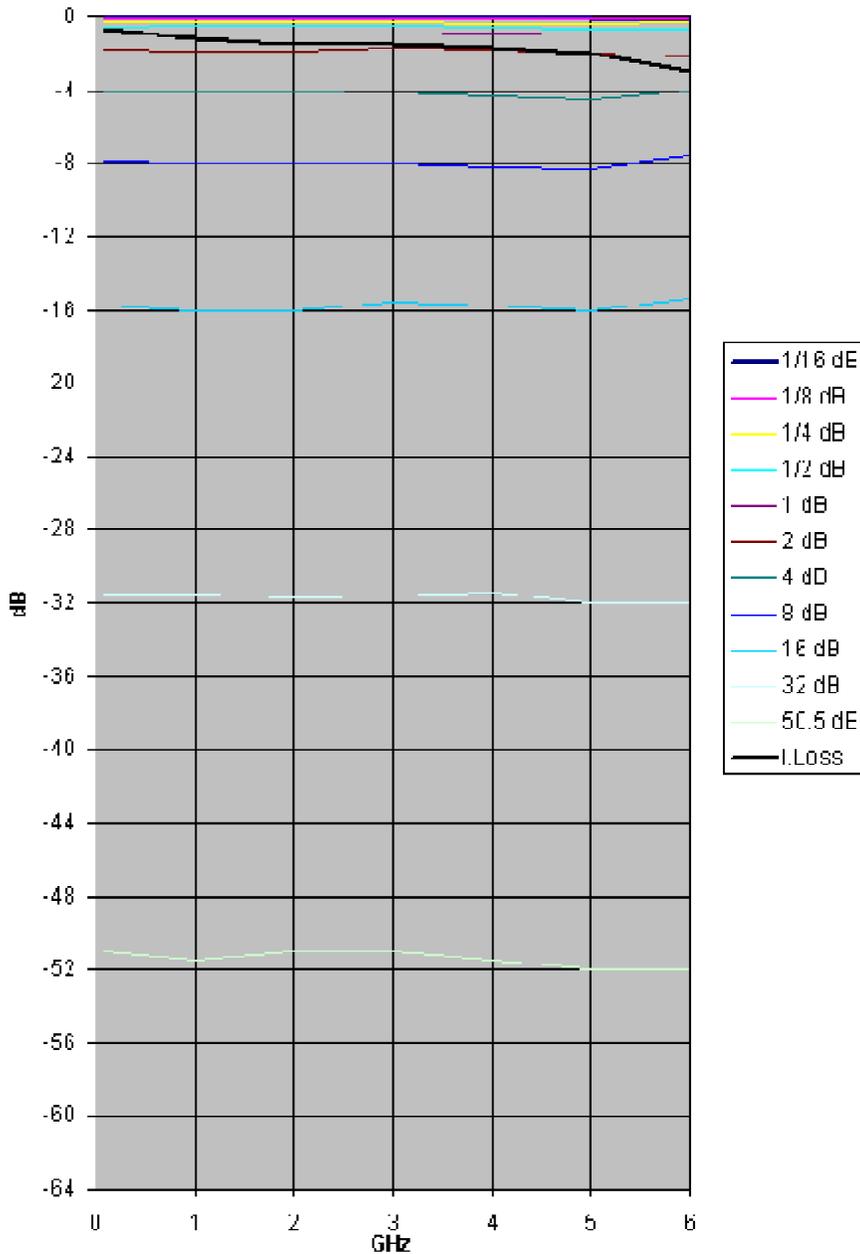


15 pin, male, D-type subminiature connector

SPECIFICATIONS

- Nominal Attenuation: _____ 0.0625 dB steps to 63.9575 dB
- Reference insertion loss: _____ ~0.8 dB at 100MHz, 1.1 dB at 1 GHz, 1.3 dB at 2 GHz, 1.5 dB at 3 GHz, 1.8 dB at 4 GHz, 2 dB at 5 GHz, 3 dB at 6 GHz
- VSWR: _____ 1.25:1 max _____ 1.35:1 max
- Phase deviation consecutive step: _____ +/-5 picoseconds max.
- Repeatability error (dB): _____ +/- 0.02 dB max.
- Impedance: _____ 50 Ohms nominal
- Input power: _____ to 27 dBm
- Supply voltage requirement: _____ +5.0 +/- 0.2 V
- Supply current: _____ < 1.0 Amps
- Physical dimensions: _____ 3.8 x 2.75 x 0.6 inches (excluding connectors)
- Warm-up time : _____ ~1 min.
- Outline drawing: _____ Same as QPA13 and PA13. [QPA13ol.jpg](#), [PA13ol.jpg](#)

ATTENUATION .vs. FREQUENCY



POWER REQUIREMENTS

The QPA8 uses a single 5V supply. The current requirement is 600 mA but it is typically below 400 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 (upper):_____ 27 dBm
- Power into RF I/O Port B (lower):_____ 27 dBm
- 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 \$ 4800: _____ Price and specifications subject to change without notice. [QPA8.pdf](#)

Please use e-mail for any correspondences, either technical or administrative, at address postman@gigabaudics.com

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