DBA – Detector Broadband Amplifiers

DBA - Broadband Detector Amplifiers

The DBA Amplifiers are intended for use with fast detectors. With an input impedance of 50 Ohms, ability to work with FWHM pulse widths of less than 1 ns and corresponding pulse amplitudes of 100 microvolts to 1 volt, the DBA broadband detector amplifiers allow operation over more than 2 GHz bandwidth at detector DC bias voltages exceeding 2 kilovolts.

Available Amplifier Models

The amplifier types which are available are the DBA-IV and DBA-IV/R with high voltage capability.

DBA-IV

The DBA-IV is a compact broadband, non-inverting preamplifier. The gain is remotely controlled by a voltage between 0 and +5V DC. The available flat gain ranges from +10 dB to +50 dB. The input is protected against short circuit at the detector input for bias voltages within -600V to +100V. The power supply and remote gain control have a common 4pole LEMO connector. Its pin assignment is listed in table B2.
If multiple channels are used, a common external voltage may be supplied for Ugain.
The gain variation from unit to unit does not exceed +/- 2dB typically.

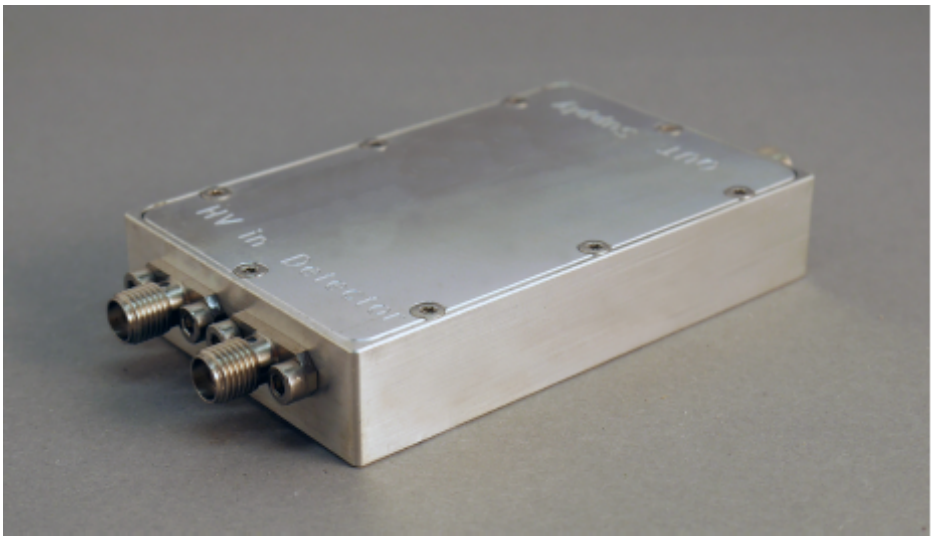

Fig. 1 - Image of the DBA-IV preamplifier

Type	DBA-IV
Description	GaAs 3-stage MMIC Non-Inverting Broadband Amplifier
Bandwidth (-3 dB)	0.003 - 2.0 GHz
Gain max.	+50 dB
Gain min.	+10 dB (Gain Remote Controlled 0-5V DC)
Input Impedance	50Ω, SWR <1.5
Output Impedance	50Ω, SWR <1.5
Noise Figure (Input terminated)	5 dB
Max. Input Voltage at min. Gain	1 V_{peak}
Max. Bias Voltage for the Detector	+/- 2000V, no damage at Detector Input Shorts for -600V/+100V Bias Range
Power Supply	+12 V, 150mA
Dimensions	74x47x14 mm (length x width x height)
Connectors	RF in/out, Bias: SMA; Power/Remote Gain: LEMO 4-pole

Table B1. Electrical properties of the DBA-IV Amplifier

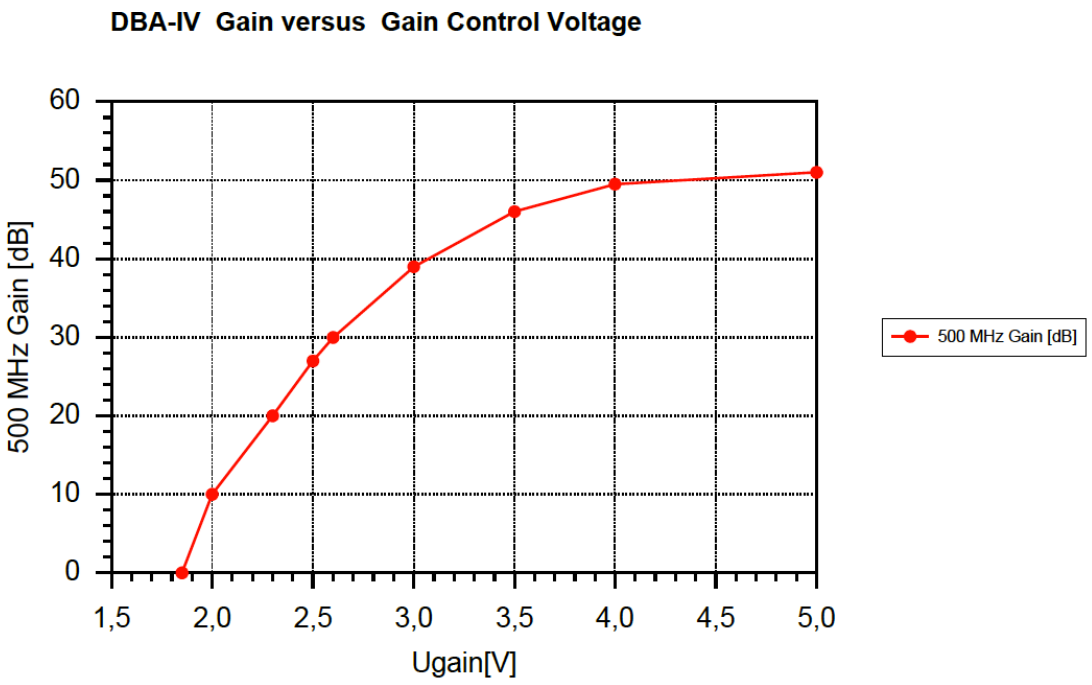

Figure 2. DBA-IV Gain at 500 MHz versus Gain Control Voltage

Pin 1	**+12V Power Supply** (Red)
Pin 2	**Remote gain control, U_{gain} (0...+5V, internal pull-up resistor, gain is +46dB if left open)** (Green)
Pin 3	**Ground** (Black)
Pin 4	**Ground**

Table B2. LEMO connector assignment

DBA-IV/R

The DBA-IV/R is a modified version of the DBA-IV broadband amplifier. The input attenuator is omitted which reduces the input noise factor considerably, but thus the input has no protection. The gain is remotely controlled by a voltage between 0 and +5V DC. The available flat gain ranges from +23 dB to +53 dB. The power supply and remote gain control have a common 4-pole LEMO connector, its pin assignment is listed in table B3.
If multiple channels are used, a common external voltage may be supplied for Ugain. The gain variation from unit to unit does not exceed +/- 2dB typically.

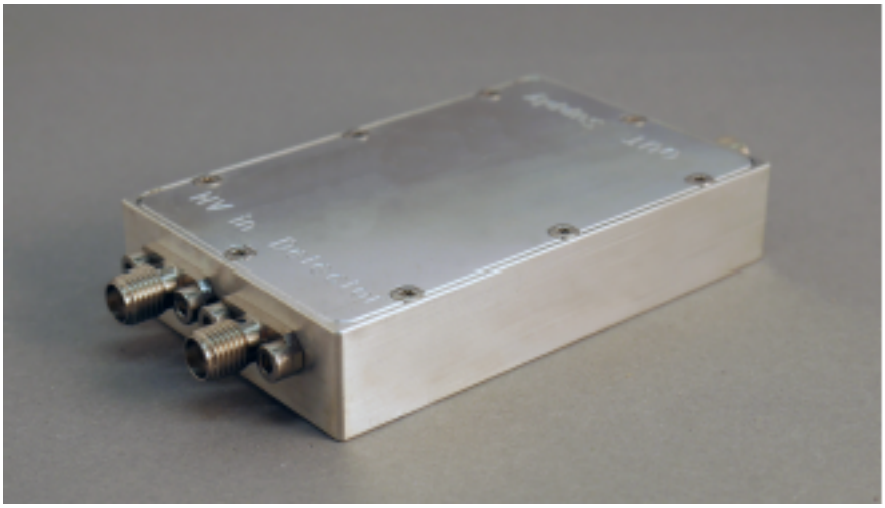

Fig. 3 - Image of the DBA-IV/R amplifiers

Type	DBA-IV/R
Description	GaAs 3-stage MMIC Non-Inverting Broadband Amplifier
Bandwidth (-3 dB)	0.003 - 2.0 GHz
Gain max.	+53 dB
Gain min.	+23 dB (Gain Remote Controlled 0-5V DC)
Input Impedance	50Ω, SWR <1.5
Output Impedance	50Ω, SWR <1.5
Noise Figure (Input terminated)	3 dB
Max. Input Voltage	1 V_{peak}
Max. Bias Voltage for the Detector	+/- 2000V, no input protection, the biased input must not be shorted to ground or disconnected !
Power Supply	+12 V, 150mA
Dimensions	74x47x14 mm (length x width x height)
Connectors	RF in/out, Bias: SMA; Power/Remote Gain: LEMO 4-pole

Table B3. Electrical properties of the DBA-IV/R Amplifier

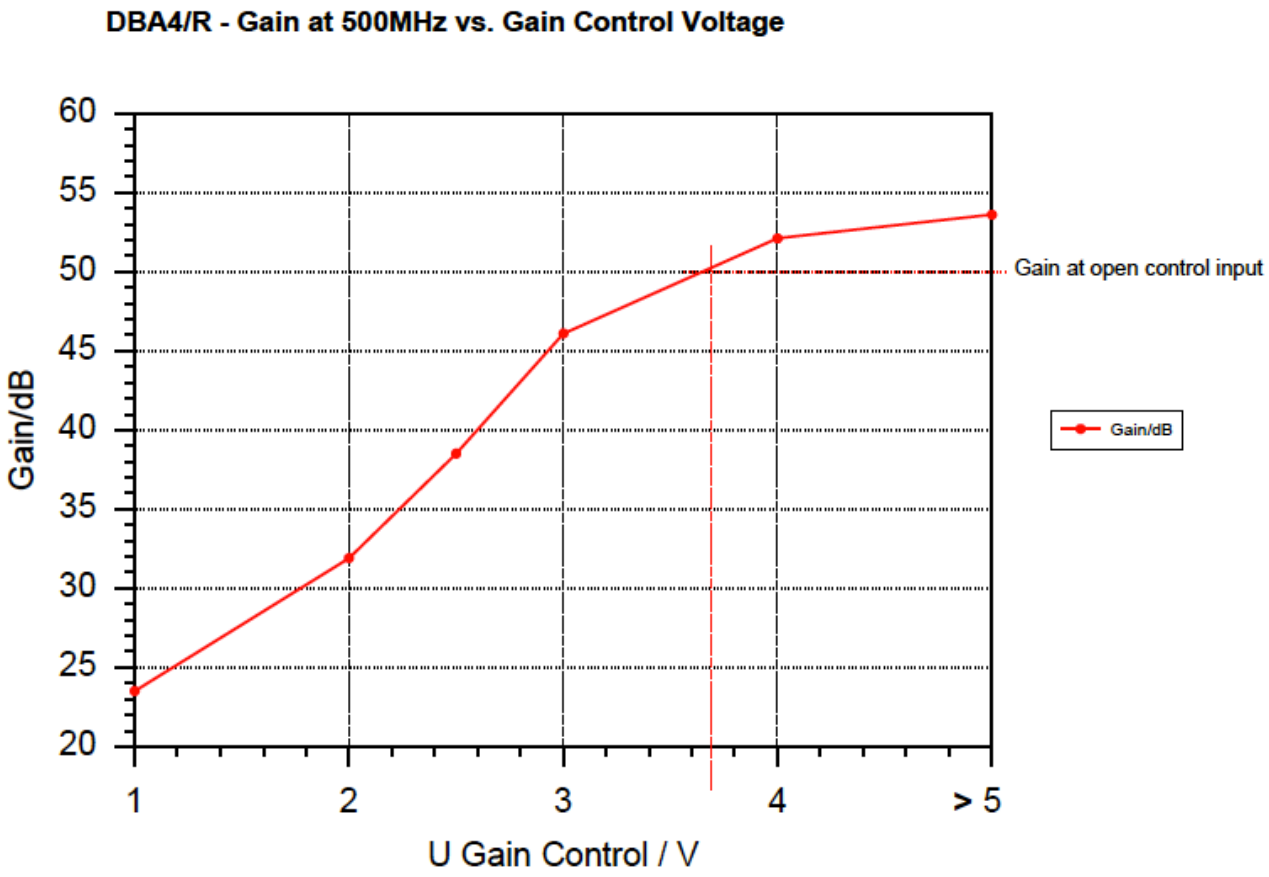

Fig. 4 - DBA-IV Gain at 500 MHz versus Gain Control Voltage

Pin 1	**+12V Power Supply** (Red)
Pin 2	**Ugain (0...+5V, internal pull-up resistor, gain is +50dB if left open)**(Green)
Pin 3	**Ground** (Black)
Pin 4	**Ground**

Table B4 - DBA-IV/R Lemo connector pin assignment

AC/DC Splitter

The AC/DC Splitter is a passive device that splits the AC and the DC parts of the detector signal provided at the input. This can be used to measure the current at the DC output while counting single particles at the AC output.

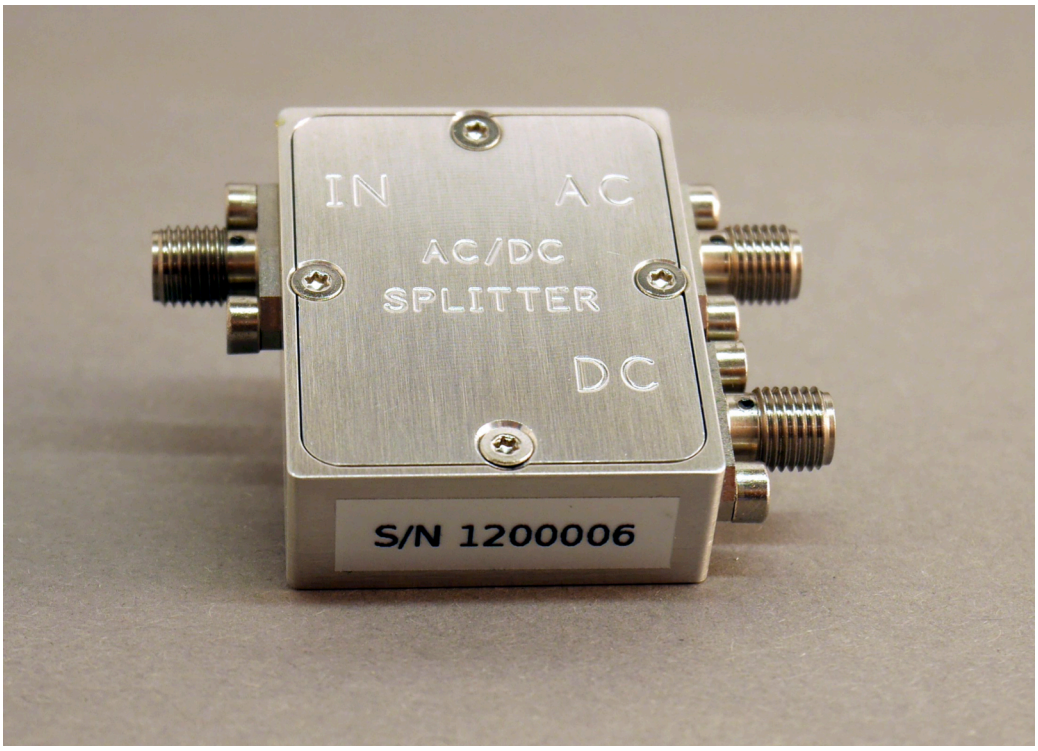

Fig 5: Picture of the AC/DC Splitter

Type	AC/DC Splitter
Bandwidth (-3 dB) IN→AC	0.001-4.0 GHz
Bandwidth (-3 dB) IN→DC	0-10 Hz
Attenuation IN→DC	<-50 dB @ 1GHz, <-45 dB @ 2GHz, <-40 dB @ 3GHz, <-35 dB @ 4GHz
Output impedance AC port	50Ω
Output impedance DC port	100kΩ
Dimensions	30x38x13 mm (length x width x height)
Connectors	RF IN, AC/DC out: SMA

Table B5. Electrical properties of the AC/DC splitter