Variable-Gain
Ultra-Wideband Voltage Amplifier

Features
- Variable gain 20 to 60 dB (×10 to ×1000), switchable in 10 dB steps
- Bandwidth 1 kHz … 1.2 GHz
- Bandwidth, frequency response and pulse response independent of gain setting
- Local and remote control
- DC monitor output

Applications
- Oscilloscope and transient-recorder preamplifier
- Photomultiplier and microchannel-plate amplifier
- Signal-booster for optical receivers and current amplifiers
- Time-resolved pulse and transient measurements
- Automated measurement systems

Block Diagram
# Variable-Gain Ultra-Wideband Voltage Amplifier

## Related Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUPVA-1-70</td>
<td>Gain values 30, 40, 50, 60, 70 dB</td>
</tr>
<tr>
<td></td>
<td>Upper cut-off frequency 1.1 GHz</td>
</tr>
</tbody>
</table>

## Available Accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA-SMA-BNC</td>
<td>SMA to BNC adapter</td>
</tr>
<tr>
<td>PS-15</td>
<td>Power supply&lt;br&gt;input: 100 - 240 VAC&lt;br&gt;output: ±15 VDC, +400/-250 mA</td>
</tr>
<tr>
<td>LUCI-10</td>
<td>Compact digital I/O interface for USB remote control, supports opto-isolation of amplifier signal path from PC&lt;br&gt;USB port, 16 digital outputs, 3 opto-isolated digital inputs, bus-powered operation</td>
</tr>
</tbody>
</table>

## Specifications

<table>
<thead>
<tr>
<th>Test conditions</th>
<th>$V_s = \pm 15 \text{ V}, T_i = 25 \text{ °C}, \text{ system impedance } = 50 \text{ Ω} $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain</td>
<td>Gain values 20, 30, 40, 50, 60 dB&lt;br&gt;Gain accuracy ±0.1 dB (between settings)&lt;br&gt;±1 dB (overall)&lt;br&gt;Gain flatness ±0.15 dB</td>
</tr>
<tr>
<td>Frequency Response</td>
<td>Lower cut-off frequency 1kHz&lt;br&gt;Upper cut-off frequency 1.2 GHz&lt;br&gt;Upper cut-off frequency rolloff 40 dB/Oct.</td>
</tr>
<tr>
<td>Time Response</td>
<td>Rise/fall time (10 % - 90 %) 380 ps&lt;br&gt;Group delay 2.2 ns</td>
</tr>
<tr>
<td>Input</td>
<td>Input impedance AC 50 Ω&lt;br&gt;Input impedance DC 100 kΩ&lt;br&gt;Input VSWR (@ 20 dB gain) 1.12 : 1 (f &lt; 1 GHz)&lt;br&gt;1.7 : 1 (f &lt; 2 GHz)&lt;br&gt;Input VSWR (@ 30 - 60 dB gain) 1.2 : 1 (f &lt; 1 GHz)&lt;br&gt;1.75 : 1 (f &lt; 2 GHz)&lt;br&gt;50 Ω noise figure 3.0 dB (@ 60 dB gain)&lt;br&gt;3.5 dB (@ 30 - 50 dB gain)&lt;br&gt;Equivalent input voltage noise 450 pV/√Hz (@ 60 dB gain)&lt;br&gt;500 pV/√Hz (@ 30 - 50 dB gain)&lt;br&gt;1/f-noise corner 40 kHz</td>
</tr>
</tbody>
</table>
### Specifications (continued)

#### Output
- **Output impedance**: 50 Ω
- **Output power $P_{1dB}$**: 13 dBm (@ 100 MHz), 10 dBm (@ 500 MHz)
- **Output peak-peak voltage for linear Amplification**: 2 V (@ 100 MHz), 1.7 V (@ 500 MHz)
- **Output VSWR**: 1.77 : 1 (f < 1 GHz), 2.0 : 1 (f < 2 GHz)
- **Third order intercept point $I_{IP3}$**: 21 dBm
- **Reverse isolation**: 80 dB
- **Dynamic range (without average)**: 70 dB ($P_{1dB} –$ min. detectable signal)

#### Monitor Output
- **Monitor output gain**: 1 (@ ≥100 kΩ load)
- **Monitor output impedance**: 50 Ω (designed for ≥100 kΩ load)
- **Monitor output voltage range**: ±10 V
- **Monitor output current**: ±25 mA
- **Monitor output bandwidth**: DC ... 100 kHz

#### Digital Control
- **Control input voltage range**: Low: −0.8 ... +0.8 V, High: +1.8 ... +12 V

#### Power Supply
- **Supply voltage**: ±15 V (without current consumption from Sub-D-connector)
- **Supply current**: +350 / −100 mA
- **Stabilized power supply output**: ±12 V / max. 50 mA, +5 V / max. 50 mA (Auxiliary voltage outputs Pin 1-4 Sub-D-connector)

#### Case
- **Weight**: 510 g (1.1 lb)
- **Material**: AlMg4.5Mn, nickel-plated

#### Temperature Range
- **Storage temperature**: −40 ... +100 °C
- **Operating temperature**: 0 ... +60 °C

#### Absolute Maximum Ratings
- **Signal input power**: +13 dBm (f > 500 Hz)
- **Signal input DC voltage**: ±16 V (slope max. ±1 V/ms)
- **Signal output reverse power**: +13 dBm
- **Signal output reverse DC voltage**: +16 V / −12 V (slope max. ±1 V/ms)
- **Control input voltage**: +16 V / −5 V
- **Power supply voltage**: ±17 V
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Connectors
- Input: SMA female
- Output: SMA female
- Power supply: Lemo® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)
  - Pin 1: +15 V
  - Pin 2: −15 V
  - Pin 3: GND

Control port
- Sub-D 25-pin, female, qual. class 2
- Pin 1: +12 V (stabilized power supply output)
- Pin 2: −12 V (stabilized power supply output)
- Pin 3: AGND (analog ground)
- Pin 4: +5 V (stabilized power supply output)
- Pin 5: Monitor output
- Pin 6 - 8: NC
- Pin 9: DGND (ground f. digital control pin 10 - 25)
- Pin 10 - 13: NC
- Pin 14: Digital control input: gain, LSB
- Pin 15: Digital control input: gain
- Pin 16: Digital control input: gain, MSB
- Pin 17 - 25: NC

Remote Control Operation
General
- Remote control input bits are opto-isolated and connected by logical OR to local switch setting. For remote control of the gain setting, set the local switch to "Ext." and select the wanted gain setting via a 3-bit-code at the corresponding digital inputs:

<table>
<thead>
<tr>
<th>Gain setting - corresponding inputs</th>
<th>Pin 14</th>
<th>Pin 15</th>
<th>Pin 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 dB</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>30 dB</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>40 dB</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>50 dB</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>60 dB</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>
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Typical Performance Characteristics

Frequency response (logarithmic)

Frequency response (linear)
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Typical Performance Characteristics

Input reflection, S11

Input return loss, S11 (linear magnitude)
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Typical Performance Characteristics

Output reflection, S22

Output return loss, S22 (linear magnitude)

Group delay
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Dimensions

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