Variable-Gain
Ultra-Wideband Voltage Amplifier

Features
- Variable gain 30 to 70 dB (approx. ×30 to ×3000), switchable in 10 dB steps
- Bandwidth 1 kHz ... 1.1 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

SOPHISTICATED TOOLS FOR SIGNAL RECOVERY
### Datasheet

**DUPVA-1-70**

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| Related Models | DUPVA-1-60 | Gain values 20, 30, 40, 50, 60 dB  
Upper cut-off frequency 1.2 GHz |
|----------------|------------|---------------------------------------------------|
| Available Accessories | CA-SMA-BNC | SMA to BNC adapter  
PS-15 | power supply  
input: 100 - 240 VAC  
output: ±15 VDC, ±400/±250 mA  
LUCI-10 | compact digital I/O interface for USB remote control, supports opto-isolation of amplifier signal path from PC  
USB port, 16 digital outputs, 3 opto-isolated digital inputs, bus-powered operation |
| Specifications | Test conditions | $V_s = \pm 15\, V$, $T_a = 25\, ^\circ C$, system impedance = 50 $\Omega$ |
| Gain | Gain values | 30, 40, 50, 60, 70 dB  
Gain accuracy | $\pm 0.1\, \text{dB}$ (between settings)  
$\pm 1\, \text{dB}$ (overall)  
Gain flatness | $\pm 0.15\, \text{dB}$ |
| Frequency Response | Lower cut-off frequency | 1 kHz  
Upper cut-off frequency | 1.1 GHz  
Upper cut-off frequency rolloff | 40 dB/oct. |
| Time Response | Rise/fall time (10 % - 90 %) | 390 ps  
Group delay | 2.2 ns |
| Input | Input impedance AC | 50 $\Omega$  
Input impedance DC | 100 k$\Omega$  
Input VSWR (@ 30 dB gain) | $1.1 : 1$ (f < 1 GHz)  
$1.2 : 1$ (f < 2 GHz)  
Input VSWR (@ 40 - 70 dB gain) | $1.7 : 1$ (f < 1 GHz)  
$1.7 : 1$ (f < 2 GHz)  
50 $\Omega$ noise figure | 1.9 dB ( @ 70 dB gain)  
2.5 dB ( @ 40 - 60 dB gain)  
Equivalent input voltage noise | 330 pV/$\sqrt{\text{Hz}}$ ( @ 70 dB gain)  
400 pV/$\sqrt{\text{Hz}}$ ( @ 40 - 60 dB gain)  
1/f-noise corner | 20 kHz |
## Specifications (continued)

### Output
- **Output impedance**: 50 Ω
- **Output power $P_{1dB}$**:
  - @ 100 MHz: 12 dBm
  - @ 500 MHz: 11 dBm
- **Output peak-to-peak voltage** for linear amplification:
  - @ 100 MHz: 2 V
  - @ 500 MHz: 1.7 V
- **Output VSWR**: 1.5 : 1 ($f < 1 \text{ GHz}$)
  - 1.7 : 1 ($f < 2 \text{ GHz}$)
- **Reverse isolation**: 20 dBm
- **Dynamic range (without average)**: 62 dB ($P_{1dB} - \text{min. detectable signal}$)

### Monitor Output
- **Monitor output gain**: 1 (@ $\geq 100$ kΩ load)
- **Monitor output impedance**: 50 Ω (designed for $\geq 100$ 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
- **Supply current**: +250 / –100 mA
  (without current consumption from Sub-D-connector)
- **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**:
  - +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: +15V
  - Pin 2: –15V
  - Pin 3: GND

Control port

- Sub-D 25-pin, female, qual. class 2
  - Pin 1: +12V (stabilized power supply output)
  - Pin 2: –12V (stabilized power supply output)
  - Pin 3: AGND (analog ground)
  - Pin 4: +5V (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</th>
<th>Pin 14</th>
<th>Pin 15</th>
<th>Pin 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 dB</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>40 dB</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>50 dB</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>60 dB</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>70 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, $S_{11}$

Input return loss, $S_{11}$ (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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