2.2 GHz High-Speed Amplifier

**Features**
- Bandwidth 10 kHz … 2.2 GHz
- Rise time 160 ps
- Gain 40 dB (inverting)
- Input VSWR 1.25 : 1
- Integrated bias circuit

**Applications**
- Preamplifier for ultra-fast detectors (microchannel-plates, photomultipliers, avalanche-photodiodes and PIN-photodiodes)
- Oscilloscope and transient-recorder preamplifier
- Time-resolved pulse and transient measurements

**Specifications**

<table>
<thead>
<tr>
<th>Test conditions</th>
<th>( V_S = +15 \text{ V}, T_A = 25^\circ \text{C}, \text{system impedance} = 50 \Omega )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gain</strong></td>
<td>( \text{Gain} ) 40 dB (x100) (inverting) ( \text{Transimpedance gain} ) 5,000 V/A (40 dB x 50 ( \Omega )) ( \text{Gain accuracy} ) ±1 dB</td>
</tr>
<tr>
<td><strong>Frequency Response</strong></td>
<td>Lower cut-off frequency (~3 dB) ( \pm 20 % ) ( \text{Upper cut-off frequency (~3 dB)} ) 2.2 GHz ( \pm 15 % ) ( \text{Rise/fall time (10 % - 90 %)} ) 160 ps</td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td>( \text{DC input impedance} ) 50 ( \Omega ) ( \text{RF input impedance} ) 50 ( \Omega ) ( \text{50 ( \Omega ) noise figure} ) 2.8 dB ( \text{(@} \ f \ &lt; \ 1 \text{ GHz)} ) ( \text{Equivalent input voltage noise} ) 430 pV/( \sqrt{\text{Hz}} ) ( \text{(@} \ f \ &lt; \ 2.2 \text{ GHz)} ) ( \text{Input VSWR} ) 1.25 : 1 ( \text{(@} \ f \ &lt; \ 2.2 \text{ GHz)} ) ( \text{Input return loss} ) 19 dB ( \text{(@} \ f \ &lt; \ 2.2 \text{ GHz)} )</td>
</tr>
</tbody>
</table>

**Block Diagram**
## Specifications (continued)

### Output
- **Output impedance**: 50 Ω
- **Output VSWR**: 1.4 : 1 (at f < 2.5 GHz)
- **Output return loss**: 15.5 dB (at f < 2.5 GHz)
- **Output power $P_{1dB}$**: +12.5 dBm (at f < 1 GHz)
- **Output peak-to-peak voltage**: 2.0 $V_{pp}$ (at f < 500 MHz, for linear amplification)
- **Output noise**: typ. 3.0 m$V_{rms}$ or 20 m$V_{pp}$* (measurement BW: 4 GHz)

* The peak-to-peak output noise is derived from the RMS noise as follows: $V_{pp} = V_{rms} \times 6.6$

(99.9% of the time the output noise voltage will be within the specified peak-to-peak value.)

### Power Supply
- **Supply voltage**: +15 V
- **Supply current**: +145 mA

### Case
- **Weight**: 100 g (0.23 lb)
- **Material**: AlMg4.5Mn, nickel-plated

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

### Absolute Maximum Ratings
- **Power supply voltage**: +18.5 V
- **DC and LF input voltage**: ±3 V
- **RF input power**: +13 dBm

### Connectors
- **Input**: SMA, jack (female)
- **Output**: SMA, jack (female)
- **Power supply**: Lemo® series 1S, 3-pin fixed socket (mating plug type: FFA.1S.303.CLAC52)
  - Pin 1: +15 V
  - Pin 2: NC
  - Pin 3: GND

---

**Datasheet**

**HSA-X-1-2-40**

**2.2 GHz High-Speed Amplifier**

---

**SOPHISTICATED TOOLS FOR SIGNAL RECOVERY**

---

**Page 2**
2.2 GHz High-Speed Amplifier

Dimensions

IN OUT

43 mm

54 mm

22 mm

M4

UNC 8-32

DZ-HSA-X-I

Specifications are subject to change without notice. Information provided herein is believed to be accurate and reliable. However, no responsibility is assumed by FEMTO Messtechnik GmbH for its use, nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of FEMTO Messtechnik GmbH. Product names mentioned may also be trademarks used here for identification purposes only.

© by FEMTO Messtechnik GmbH · Printed in Germany