ROSTEC Engineering
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# ROSTEC LDIS8
# Linear Distribution Amplifier for GPU Frame

### *Features*

- True analog bipolar architecture
- 8 individually buffered single ended outputs
- Balanced/unbalanced input circuit
- Analog bandwidth DC - 30 MHz
- Individual gain adjust for each output
- High frequency input equalizer
- Low noise
- Low distortion
- GPU stackable, up to 4 units in a frame.

### *General description*

The ROSTEC LDIS8 is a general purpose linear distribution amplifier intended for use in the studio and broadcast environment. It is able to multiply all kinds of odd analog and digital signals that do not fit into existing categories or established formats.
The amplifier architecture is bipolar throughout, which means it can handle signals with both positive and negative voltage swing.
It is especially well suited to distribute such signals as PAL/NTSC video, T1/E1 G704/703 signals, SPDIF digital audio or various impulse and DC control signals.
Although not intended for high quality audio, it actually handles analog audio signals up to +12 dB pretty well, with reasonable low noise and low distortion.

### *Input circuit*

The input circuit can receive signal from an external source via the SUB-D connector on the back panel of the GPU frame, or from another card in the GPU frame via the internal GPU bus.
When external source is selected, Channel 8 on the SUB-D connector is used as input, thus only seven outputs are available.
When the input circuit uses the GPU bus as the source, all eight outputs are available.

The input circuit is unterminated and electronically balanced but can be configured to unbalanced configuration by means of a jumper. The gain can be set to 1x for unterminated signals and 2x for terminated signals (termination halves the amplitude)
*OBS: When GPU bus source is selected, the gain must be 1 and Ch 8 must be set to output and unbalanced configuration. (see jumper settings).*

The circuit also features an adjustable shelving equalizer enabling it to compensate for high frequency loss in cables. The attack frequency of the equalizer is factory default set to 4.43 MHz (the color carrier of PAL video), but can be adjusted from 1 MHz to 10 MHz.
Two jumpers select a low cut filter at 3 Hz for AC operation

The signal from the input circuit is fed to the eight output buffers. It is also fed to the GPU bus buffer to be routed to the other cards in the frame.

### *Output circuit*

The output circuit consists of eight identical buffers. Each buffer has an adjustable gain of +/- 6 dB.
The output impedance is 75 ohms. The maximum voltage swing is 14 volts PP with no load, 7 Volts PP into 75 ohms.

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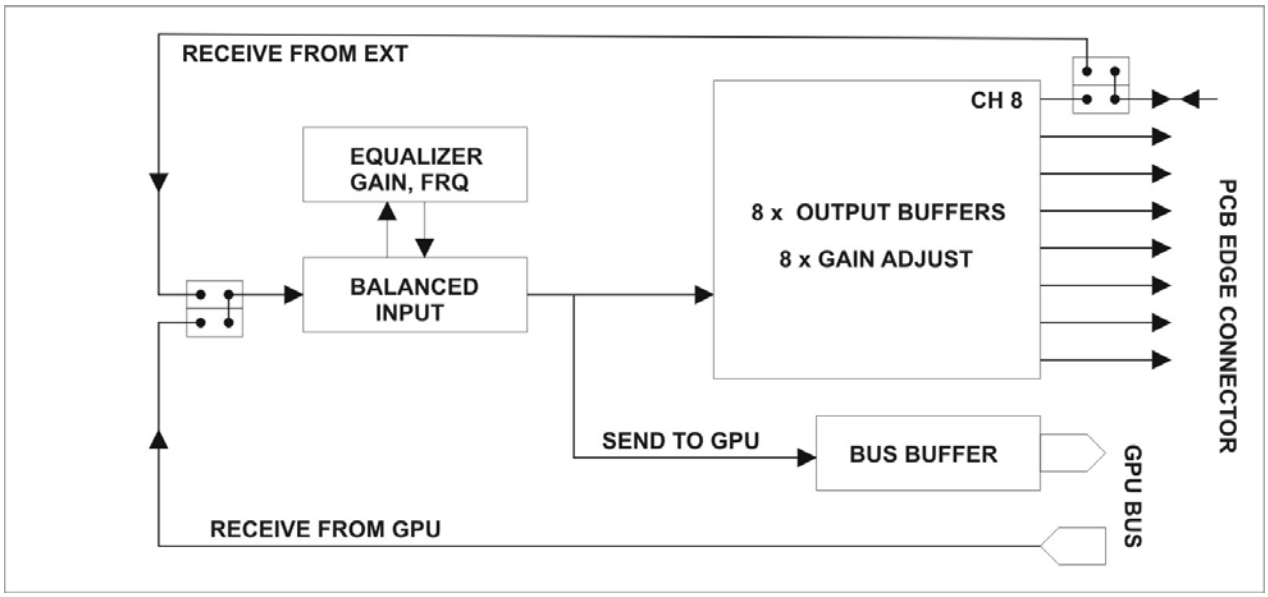
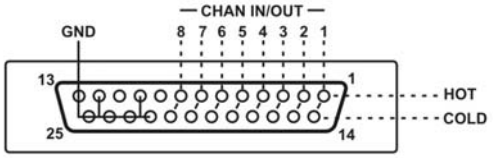
***Block schematic***




***Input/output connections***

IN/OUT CONNECTIONS LDIS8

25 POLE SUB-D FEMALE CONNECTOR
AT THE GPU BACK PANEL




CH1 output : Hot pin1, Gnd pin14
CH2 output : Hot pin2, Gnd pin15
CH3 output : Hot pin3, Gnd pin16
CH4 output : Hot pin4, Gnd pin17
CH5 output : Hot pin5, Gnd pin18
CH6 output : Hot pin6, Gnd pin19
CH7 output : Hot pin7, Gnd pin20
CH8 output : Hot pin8, Gnd pin21
CH8 input : Hot pin8, Cold pin21, Gnd pin 22

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***Electrical specifications:***

| | |
|---|---|
| **Inputs** | : Balanced/unbalanced input via SUB-D |
| | : GPU bus 1, GPU bus 2 |
| | : Impedance 4 kohms balanced. |
| | : Gain 1x or 2x |
| | : Max common mode signal level +/- 3.5 Volts |
| | : Max input level +/- 7 Volts |
| **Outputs** | : 8 x single ended 75 ohms |
| | : 7 x single ended 75 ohms (ext. input mode) |
| | : Gain adjustment range +/- 6 dB |
| **Frequency range** | : DC - 30 MHz, -3 dB, slope 18 dB/octave |
| **Low cut filter** | : 3 Hz, - 3dB, slope 6 dB/octave |
| **Hi freq. equalizer** | : +/- 6 dB shelving type, 6 dB/octave, attack frequency 1 MHz - 10 MHz |

**Audio performance:**

| | |
|---|---|
| **Noise** | : -104 dB (A), ref + 10dBu |
| **THD + Noise** | : 0.01%, 20 - 20 kHz, measurement bandwidth 10 Hz - 80 kHz. |

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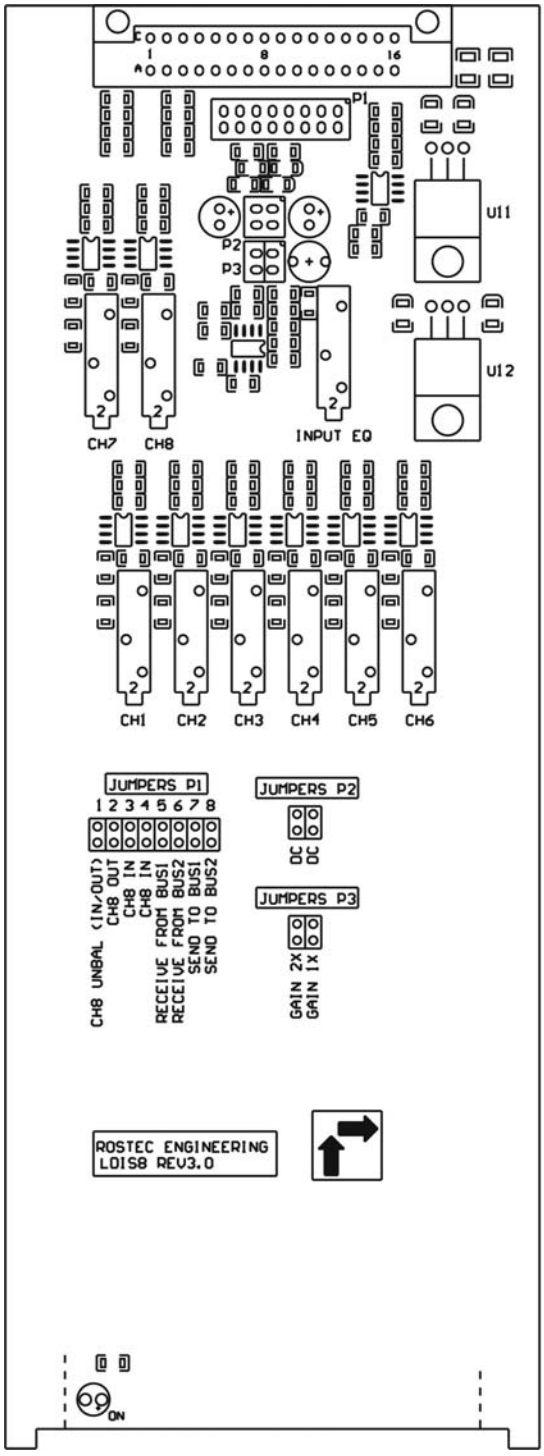
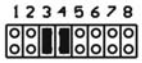
***Jumpers on the PCB***




Jumpers P1

1 card in the frame

CH 8 balanced in
CH 1-7 out




CH 8 unbalanced in
CH 1-7 out

2-4 cards in the frame

CH 8 balanced in
CH 1-7 out
Send to BUS 1

Card 1

CH 8 unbalanced in
CH 1-7 out
Send to BUS 1

Receive from BUS 1
CH 1 -8 out

Card 2

Receive from BUS 1
CH 1 -8 out

Card 3

Receive from BUS 1
CH 1 -8 out

Card 4

Jumpers P2

Input DC Coupled

Input AC Coupled

Jumpers P3

Input Gain 1x

Input Gain 2x

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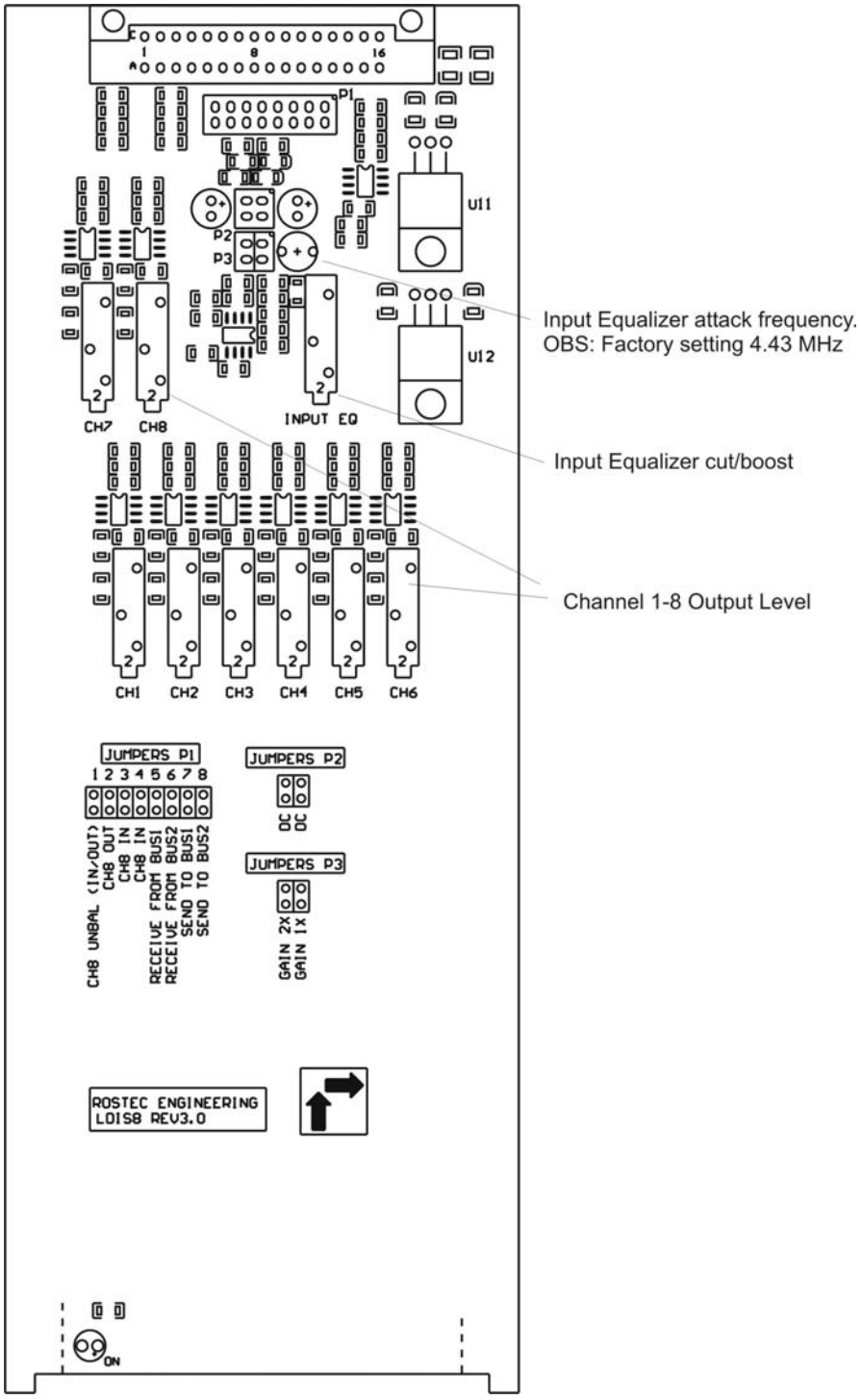
***Adjustments on the PCB***



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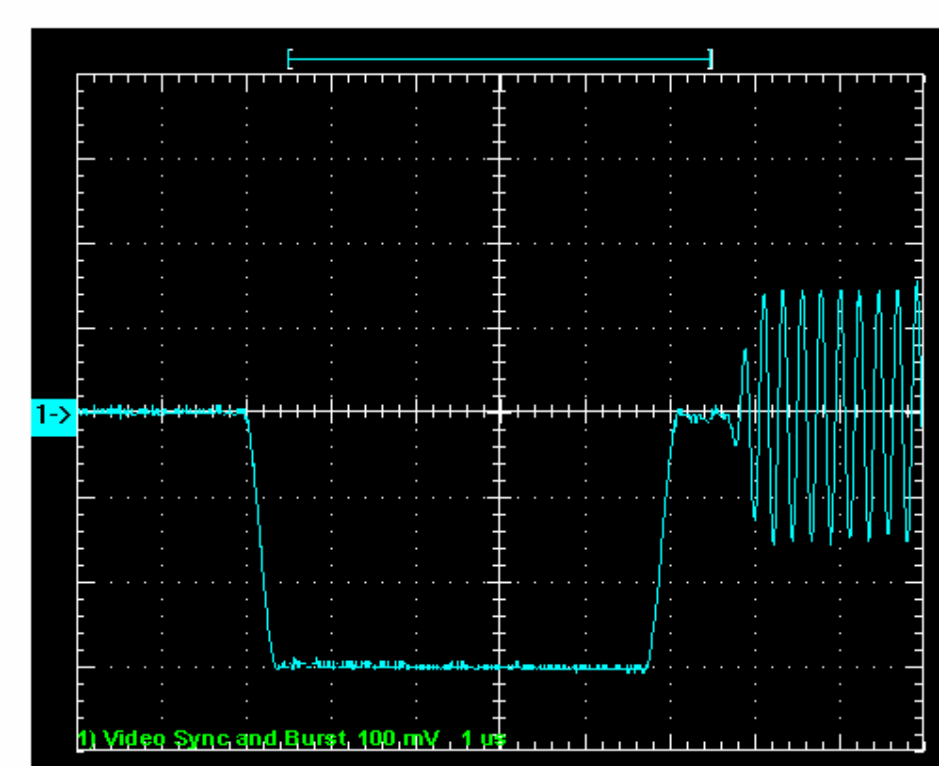
***Various measurements:***

The LDIS8 is extremely well behaved when it comes to handling pulse of various sorts. Ringing and overshoot is almost non existent and linearity is excellent.




**PAL video. Negative going line sync and bipolar color burst (4.43 MHz) into 75 ohms**

The variations in the 4.43 MHz amplitude are due to sampling errors of the scope because the frequencies of the line sync pulses and the subcarrier are not synchronized. In fact this is intentionally chosen to be so by the EBU when they established the PAL standard.

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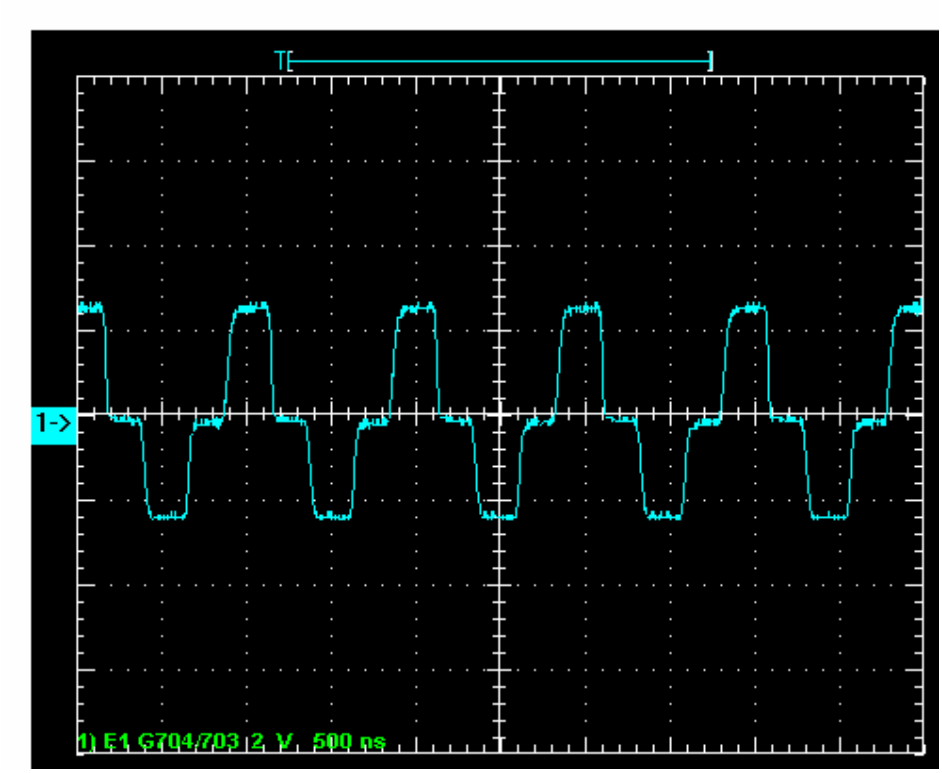


**E1 G704 2 Mbit signal into 75 ohms**

The bipolar signal is only integrated slightly, with an excellent well controlled exponentially rounding of the edges.
The noise is due to the low bit resolution of the scope A/D converter

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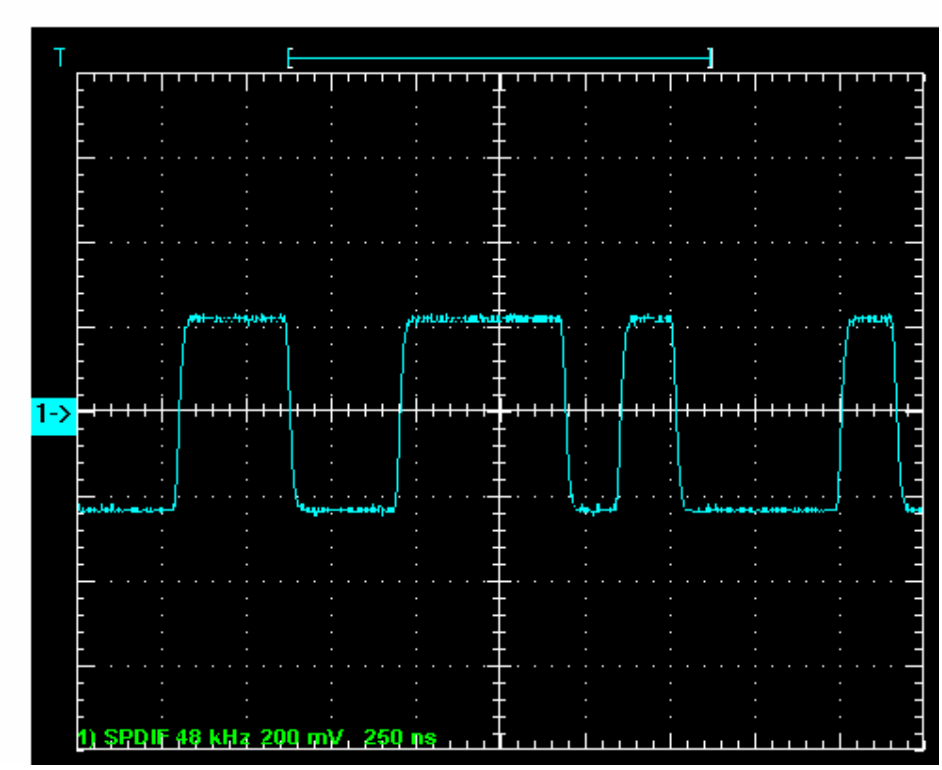


**SPDIF Digital Audio Signal into 75 ohms, sampling frequency 48 kHz**

No ringing and overshoot. Good clean edges.

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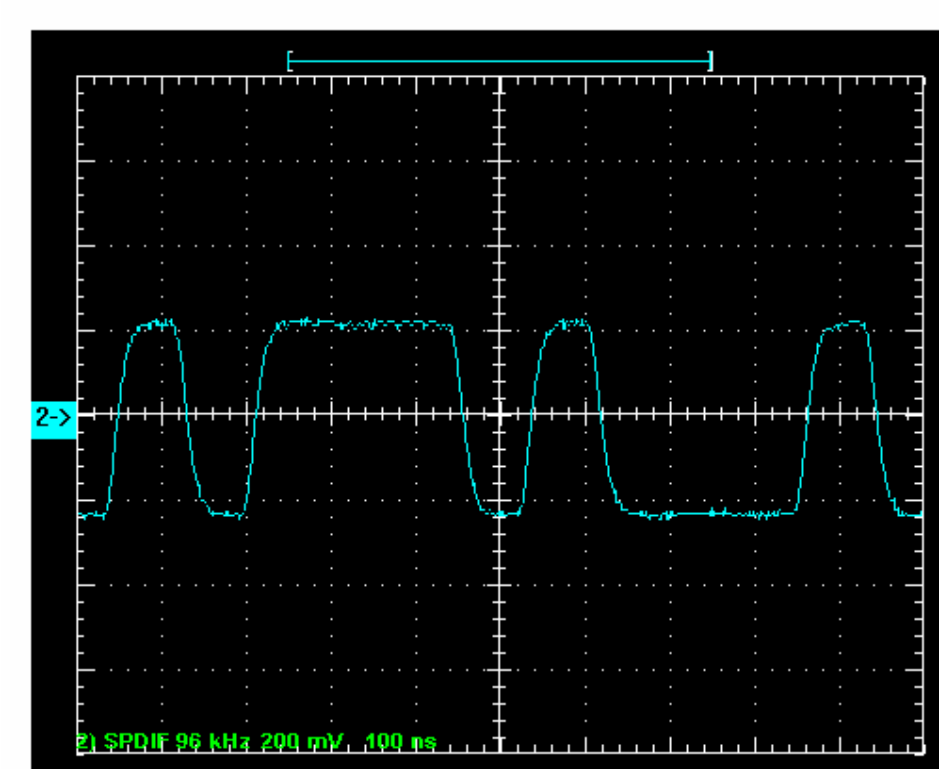


**SPDIF Digital Audio Signal into 75 ohms, sampling frequency 96 kHz**

No ringing and overshoot. Good clean edges. The 30 MHz upper frequency limitation of the LDIS8 can be seen on the smooth integration of the pulses.

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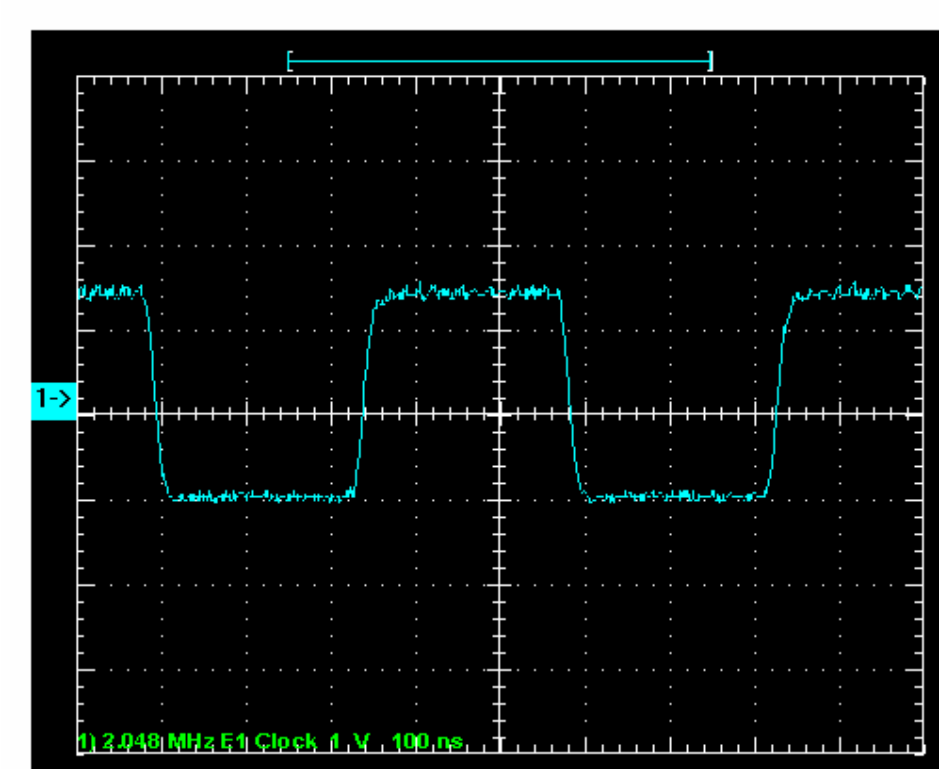


**A 2.048 MHz clock (from E1 G704 2 Mbit) into 75 ohms**

Good regular behaviour.

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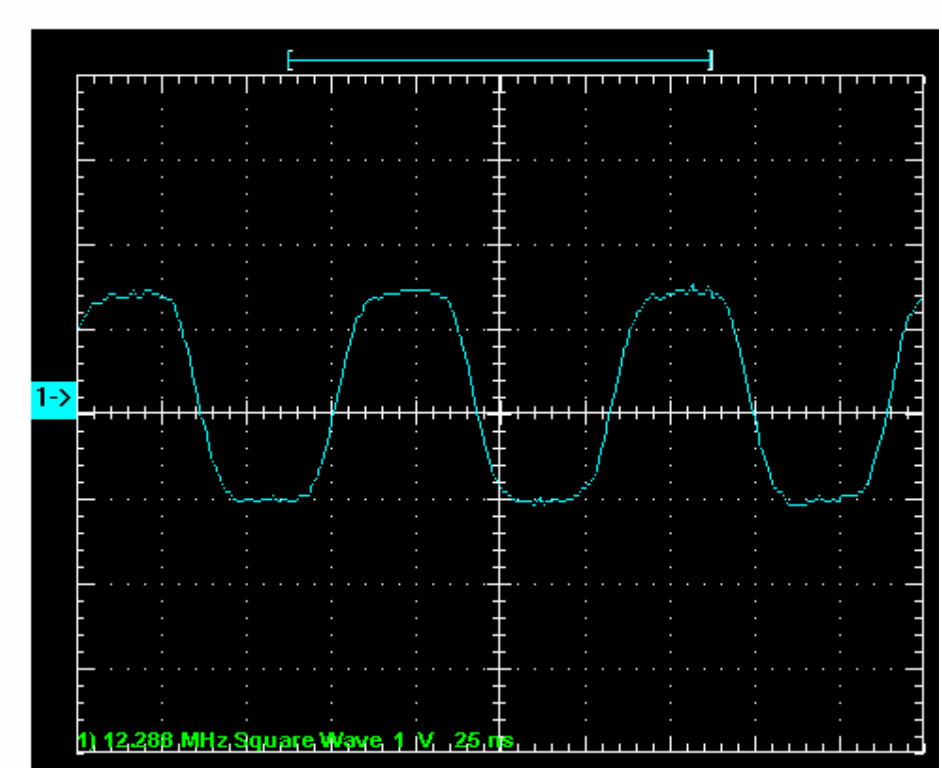


**A 12.288 MHz master clock from digital audio (AES 11) into 75 ohms**

Here the 30 MHz limitation is visible. Edges are clean. No ringing or overshoot. Nice integration.

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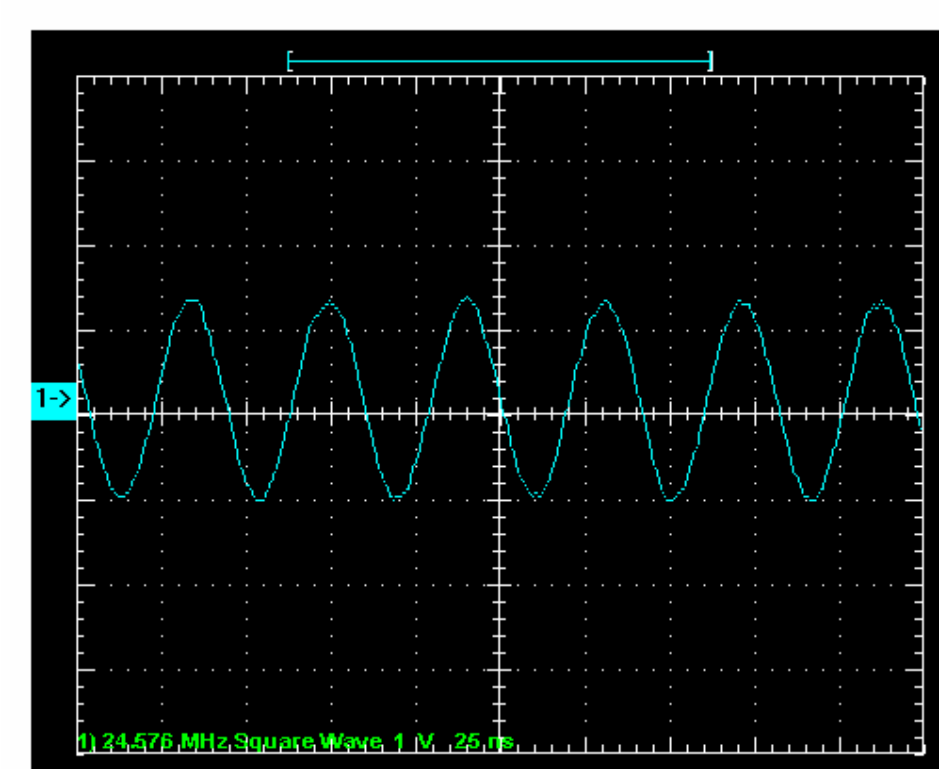


**A 24.576 MHz master clock from digital audio (AES 11) into 75 ohms**

Here the 30 MHz limitation is clearly visible. In fact the integration has turned the squarewave into a sinus. There are no apparent artifacts, and the amplitude is still correct. A good example of when theory and practice coincide.

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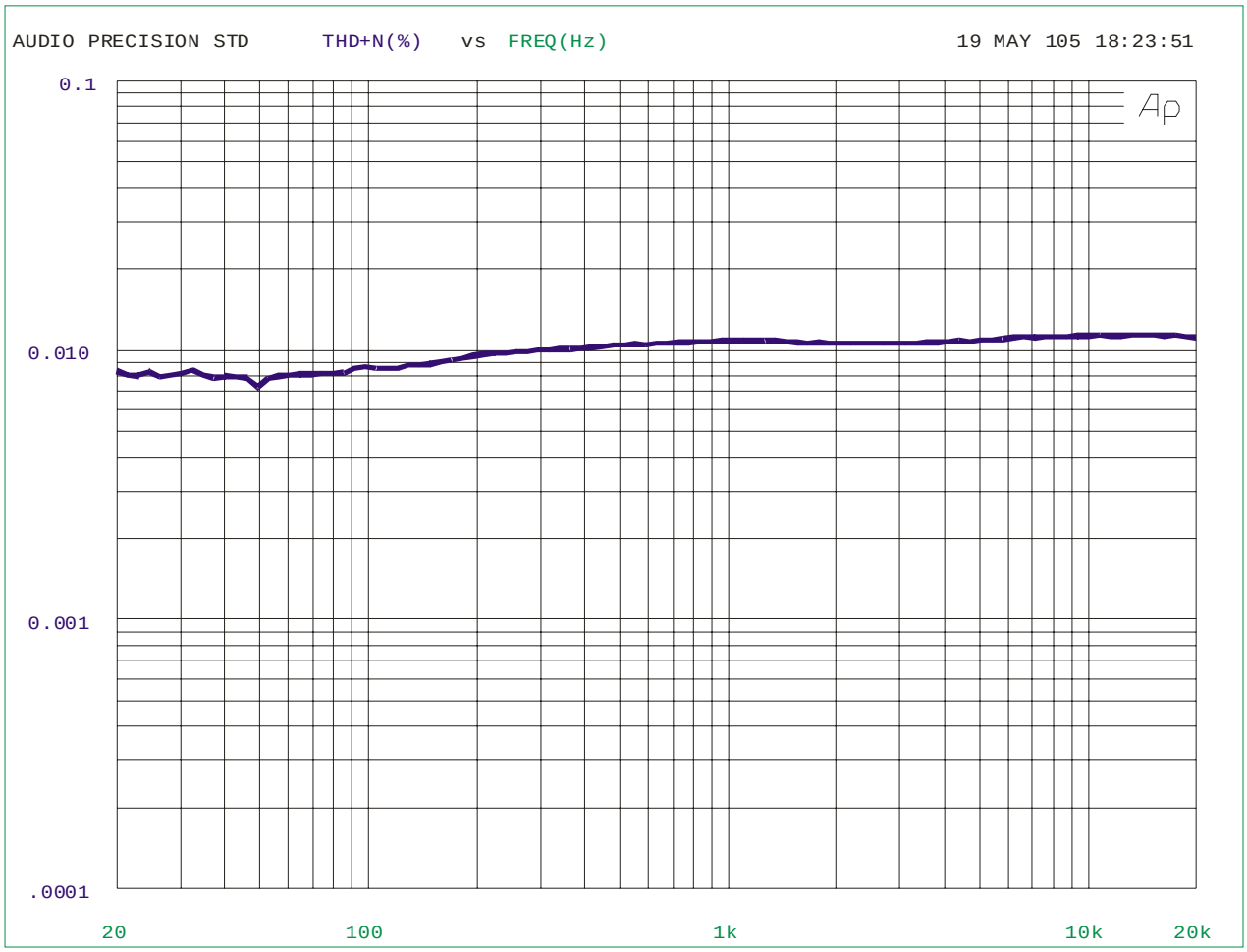


**Distortion analysis in the audio band**

Although not intended for audio use, LDIS8 has no problems whatsoever handling this. The level is 10 dBu,