



CADEKA Solution in CAT5 VGA/Audio, Multimedia & KVM Extension



Ø **Design Goal:** To **economically** transmit and enable the reception of high bandwidth RGB video over a distance of 300m .

Ø **Solution:** This paper **provides** an economical solution to this goal through use of inexpensive CAT-5 in place of Coax cables.

Ø **Advantages:** The average cost of **100m of CAT-5** cable is \$20.
The cost of 100 m of coax would be over \$ 240.

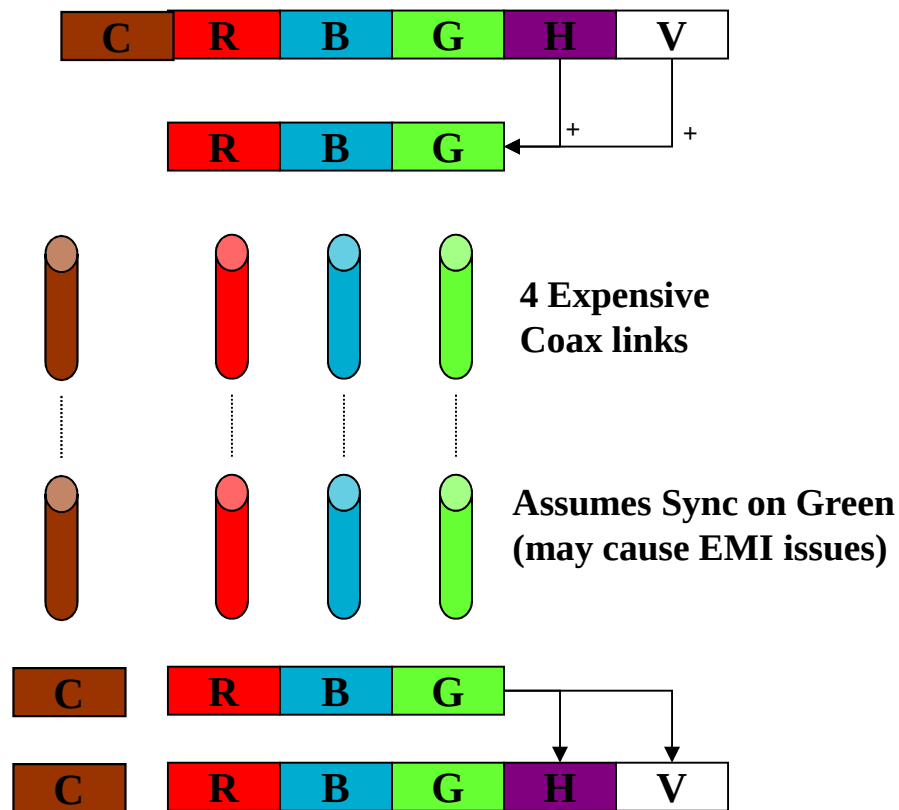
Wiring is reduced from 3 cables to 1 easily pulled cable.

Installed base of CAT-5 exists in commercial buildings.

The 4th pair in CAT-5 is free for use as a control channel.

CADEKA® Comparison of Coaxial solution vs. CAT-5 solution

Solution # 1 Coaxial cable



Advantage:
attenuation

Disadvantage:

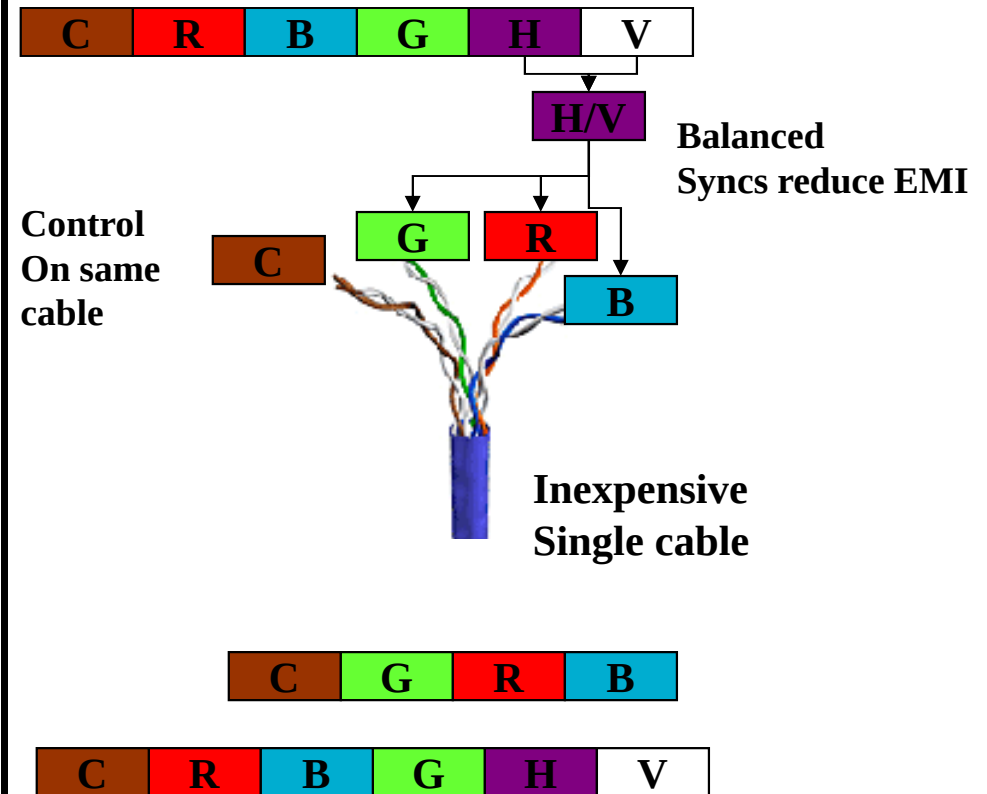
Long distance, low

Less Xtalk

Syns may cause EMI

Very expensive cabling

Solution # 2 CAT-5 cable



Advantage:

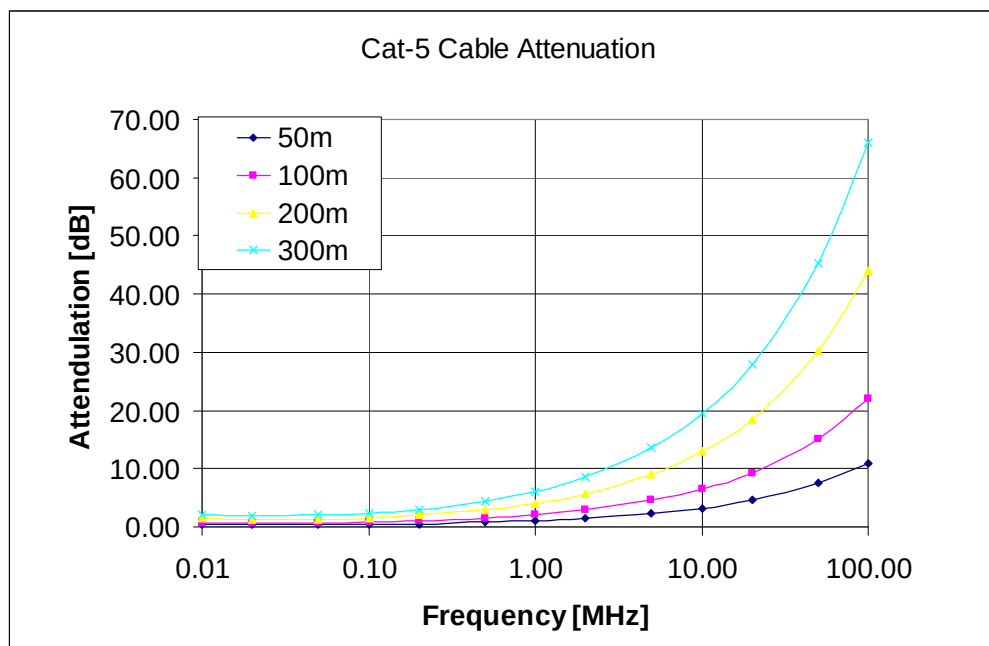
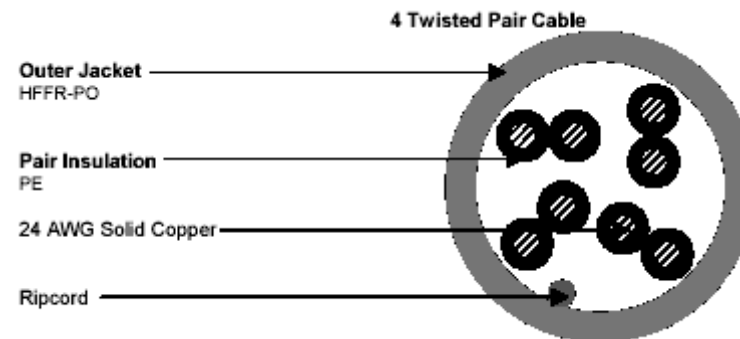
Disadvantage:
attenuation

Balanced syns – low EMI

Control on same cable

Shorter distance, high

Parameter	Value
Input Impedance	100 ohm +/- 15 ohm
DC Resistance	10 ohm /100 m
Capacitance	4.6 nF / 100 m



Frequency dependent characteristics

$$\text{Atten}(F, L) := L \cdot \left(1.967 \sqrt{F} + 0.023F + \frac{0.05}{\sqrt{F}} \right)$$

L is distance in 100 meter



CLC2005 & CLC2000 Sender/Transmitter Reference Design

for PC/VGA source UTP CAT5 Cable Extension

Cadeca Confidential

- ü CLC2005, 260MHz Bandwidth
- ü Dual Channel Rail to Rail Amplifier
- ü $\pm 55\text{mA}$ Current Output Op Amp
- ü Work at +5V Single Power Supply
- ü Up to 85dB Common Mode Rejection Ratio
- ü ESD Protection: 2.5kV (HBM)
- ü Industrial Temperature Range (-40°C to $+85^{\circ}\text{C}$)
- ü Standard SOIC-8 Package



Comlinear[®] CLC2005

Dual, Low Cost, +2.7V to 5.5V, 260MHz
Rail-to-Rail Amplifier

- ü CLC2000, 450MHz Bandwidth, G=+1
- ü Dual Channel High Speed Amplifier
- ü $\pm 200\text{mA}$ Large Current Output Op Amp
- ü Work at +5V to +12V Single Power Supply
- ü Up to 80dB Common Mode Rejection Ratio
- ü ESD Protection: 2.5kV (HBM)
- ü Industrial Temperature Range (-40°C to $+85^{\circ}\text{C}$)
- ü Standard SOIC-8 Package



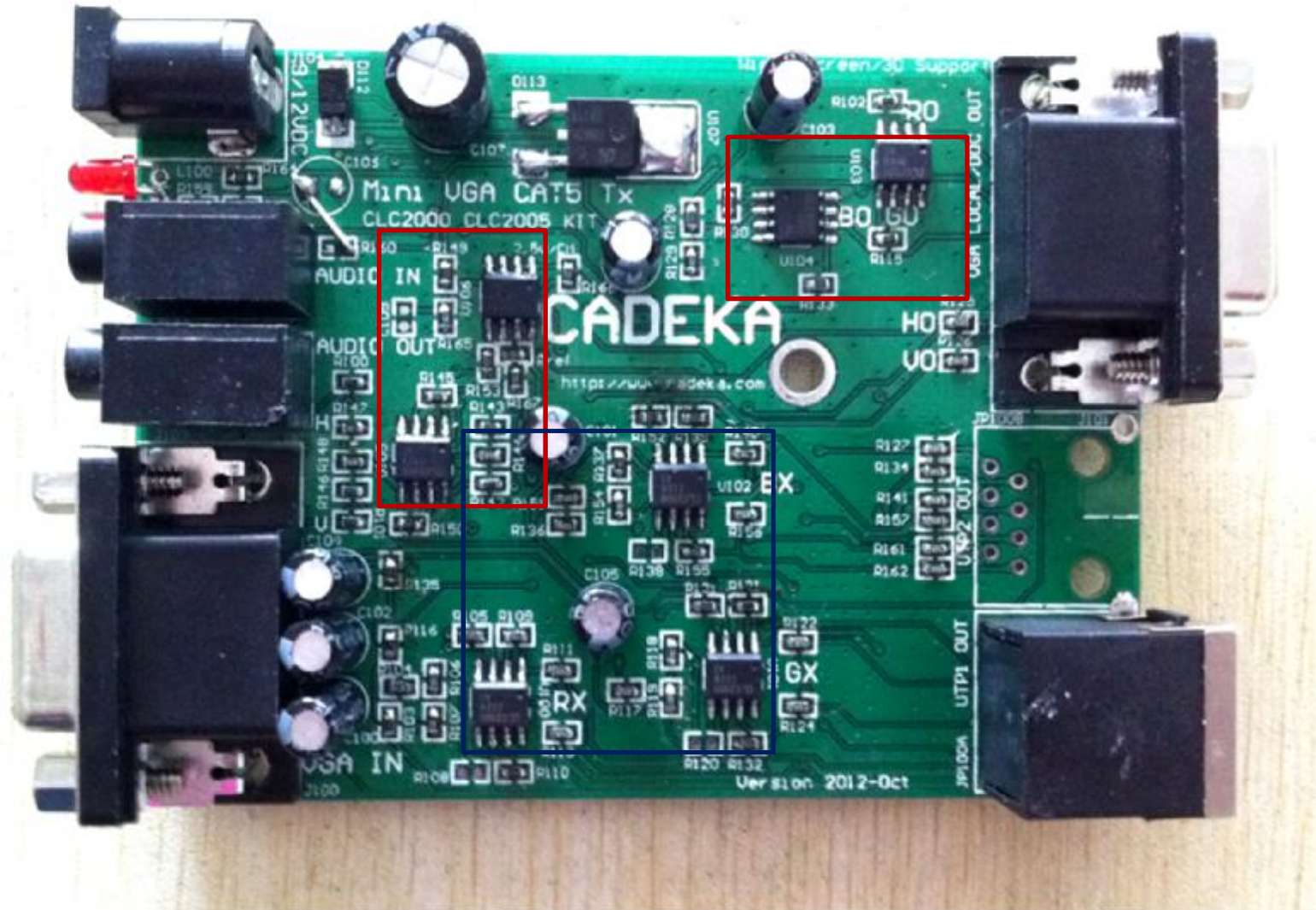
COMLINEAR[®] CLC2000

High Output Current Dual Amplifier

§ Outstanding function and specs (against competition)

- ü a. Large output current (3pcs CLC2000, up to 200mA) lighting and surge absorb more robust than Intersil/ADI limited current spec.
- ü b. Separated RGB chips has less pins damage/failure maintenances cost than competitions' all chip pin damage solution
- ü c. RGB inputs have better compatible performance with DC component VGA/RGB signal than competitions solution.
- ü d. RGB inputs have better compatible performance with AC coupled VGA/RGB signal than competitions solution.
- ü e. Down to 1.2V LLVTTL H and V sync support, more compatible improvement.
- ü f. Gain=1 solution, and also can be configured as Gain=2/4 with same layout for longer distance. More Flexibility
- ü g. Single Tx, and can be functional as 1-2port and 1-4port Tx as optional solution.

CADEKA CLC2005 + CLC2000 VGA Audio Tx PCBA



CLC2000 (blue) + CLC2005 (red) Kit TX Board

- ü CLC4000, 450MHz Bandwidth, G=+1
- ü Quad Channel High Speed Amplifier
- ü $\pm 200\text{mA}$ Large Current Output Op Amp
- ü Robust version for engineering application
- ü Work at +/-5V Split Power Supply
- ü Up to 80dB Common Mode Rejection Ratio
- ü ESD Protection: 2.5kV (HBM)
- ü Industrial Temperature Range (-40° C to +85° C)
- ü Standard SOIC-14 Package
- ü Sampling Now



- ü CLC4601, 550MHz Bandwidth, CFA
- ü Current Feedback Amplifier for Equalization
- ü Up to 1500V/uS Slew Rate
- ü Dual Channel High Speed Amplifier
- ü 52mA Current Output Op Amp
- ü Work at +/-5V Split Power Supply
- ü Up to 55dB Common Mode Rejection Ratio
- ü ESD Protection: 2.5kV (HBM)
- ü Industrial Temperature Range (-40° C to +85° C)
- ü Standard SOIC-14 Package



COMLINEAR® CLC2601, CLC3601, CLC4601
Dual, Triple, and Quad 550MHz Amplifiers

§ Outstanding function and specs (against competition)

- ü a. Better Tx to Rx grounding voltage difference limitation.
- ü b. More robust lightning and surge absorb limitation
- ü c. Higher common mode noise input dynamic range
- ü e. RGB chroma and hue independent potentiometer control
(picture COOL or WARM color selection optional)
- ü f. H & V sync regenerated outputs for voltage swing sensitive receiver
- ü g. H & V screw correction to eliminate image on/off flicker
- ü h. Grounding noise isolated, Hum bucker for audio channel
- ü i. Less power dissipation against competition
- ü j. Cost effective solution against competition



CLC4000/4601 + CLC2005 + CLC2059 kit

RX Board



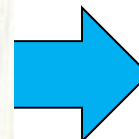
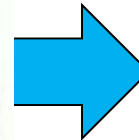
Sender/Transmitter

Remoter/Receiver



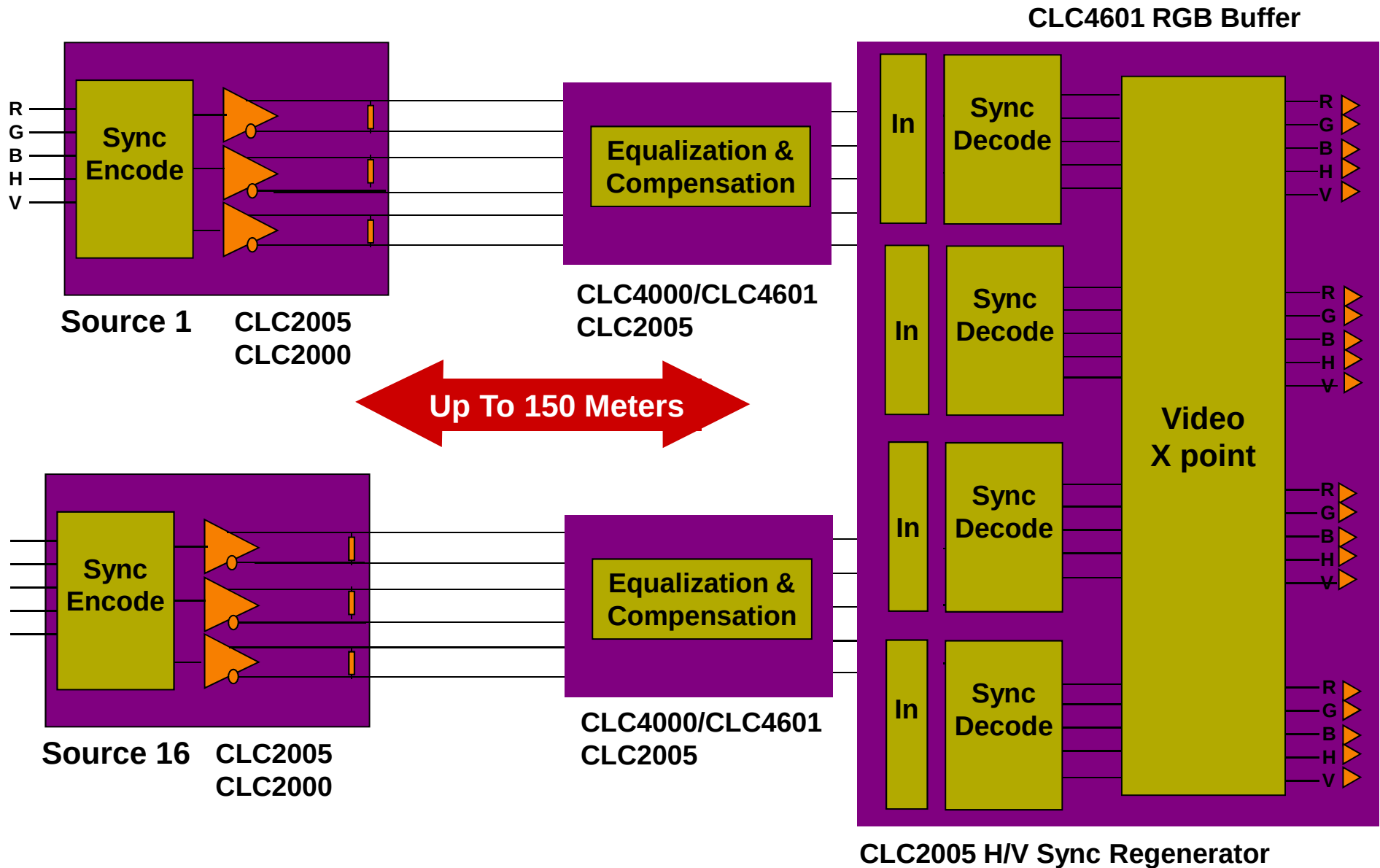
TX/RX PCBA

REAL MP PRODUCT



Sender/Transmitter

Remoter/Receiver





CADEKA Solution in HD VGA/RGB Splitter



CLC4601+CLC2005
1-4/8/16/32/96Port VGA Splitter Reference Design

- § 1to4 HD VGA (RGB+HV) Splitter
- 1to8 HD VGA (RGB+HV) Splitter
- 1to16 HD VGA (RGB+HV) Splitter

- ü 350MHz, support 1080P, DDC/DDC2 and wide screen

- ü CLC4601, CFA, 550MHz Bandwidth, Quad CH

- RGB Channel, Gain=2
- +/-5V split power supply
- DC coupled, double terminated load

- ü CLC2005, Rail to Rail, 260MHz, Dual CH

- Up to 145V/us slew rate
- H/V sync, lower to 1.8Vp-p, LLVTTL compatible
- +5V single power supply

CADEKA Solution in HD VGA Switch/Splitter



CLCUSB30+CLC2058+CLC4601+CLC2005
2:1VGA Switch and 1-4Port VGA Splitter/Matrix Reference Design

§ 2:1 VGA Switch – CLCUSB30

- ü CLCUSB30, DPDT, 720MHz Bandwidth, lower to 4ohm Ron
- ü Up to +/-8KV ESD protection
- ü For RGB , HV, DDC switch

§ On/Off Switch Selection Trigger

- ü CLC2058, Dual Channel Op-amp

§ 1to4 VGA (RGB+HV) Splitter

- ü CLC4601, CFA, 550MHz Bandwidth, Quad CH, for RGB
- ü CLC2005, Rail to Rail, 260MHz, Dual CH for H/V sync

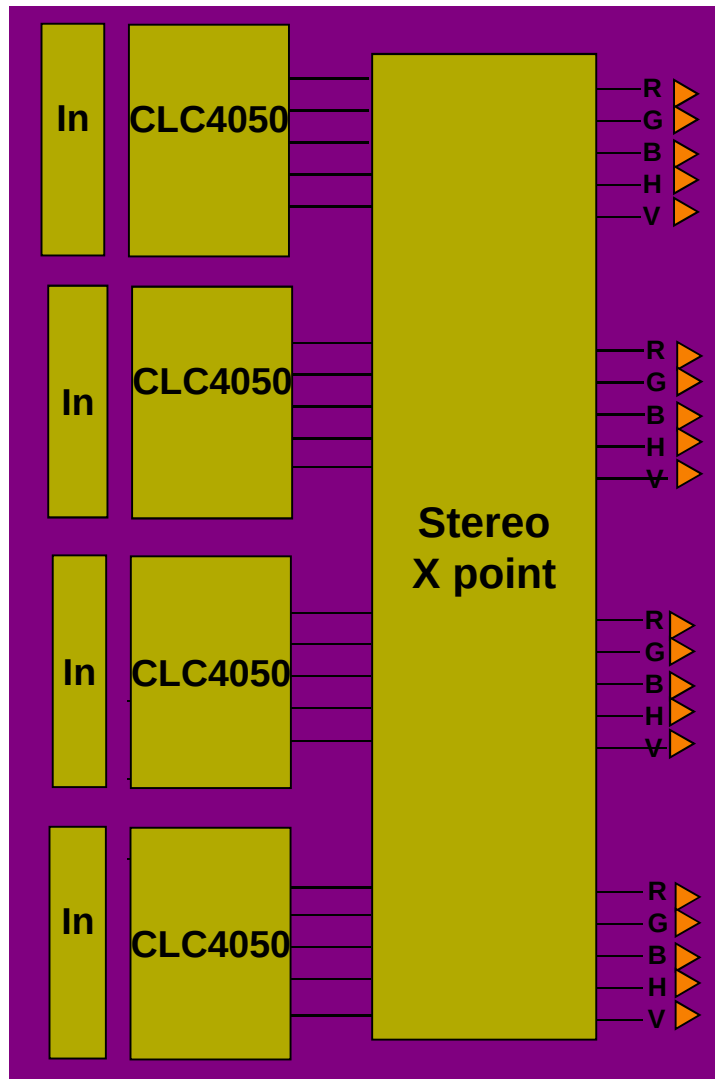


CADEKA Solution in Stereo Audio Matrix



CLC4050
Stereo Audio Reference Design

CLC4050 Audio Buffer

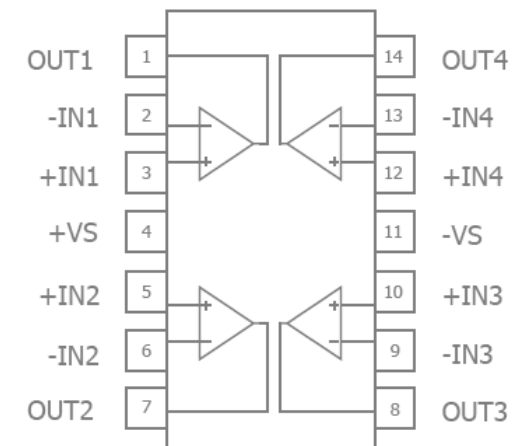


COMLINEAR[®] CLC1050, CLC2050, CLC4050

Low Power, 3V to 36V, Single/Dual/Quad Amplifiers



CLC4050 Pin Configuration

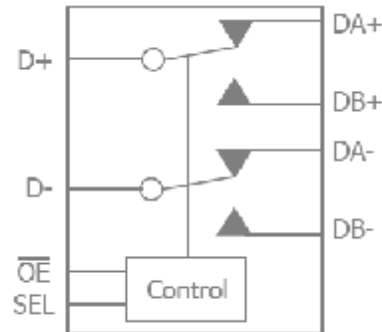


FEATURES

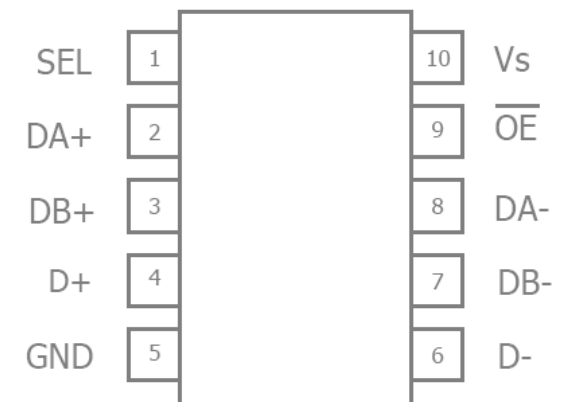
- Unity gain stable
- 100dB voltage gain
- 550kHz unity gain bandwidth
- 0.5mA supply current
- 20nA input bias current
- 2mV input offset voltage
- 3V to 36V single supply voltage range
- $\pm 1.5V$ to $\pm 18V$ dual supply voltage range
- Input common mode voltage range includes ground
- 0V to $V_S - 1.5V$ output voltage swing
- CLC2050: improved replacement for industry standard LM358
- CLC4050: Improved replacement for industry standard LM324
- CLC1050: Pb-free SOT23-5
- CLC2050: Pb-free SOIC-8
- CLC4050: Pb-free SOIC-14

FEATURES

- $\pm 8\text{kV}$ ESD protection on all pins
- 7pF on capacitance
- 4.0Ω on resistance
- 720MHz -3dB bandwidth
- $<1\mu\text{A}$ supply current in standby mode
- $<6\mu\text{A}$ over a wide control voltage range
- -45dB crosstalk
- Power-off protection when $V_S = 0\text{V}$;
D+ and D- tolerate up to 5.25V
- Power-on protection when $V_S \neq 0\text{V}$;
D+ and D- tolerate up to 5.25V
- Input voltage range extends 0.3V
beyond V_S
- Operates from 3V to 4.3V supplies
- Pb-free MSOP-10 package



Pin Configuration



COMLINEAR® CLCUSB30

Low Power, High-Speed (480MSPS) USB 2.0
Analog Switch

CADEKA Solution in MIC/Audio Amplifying

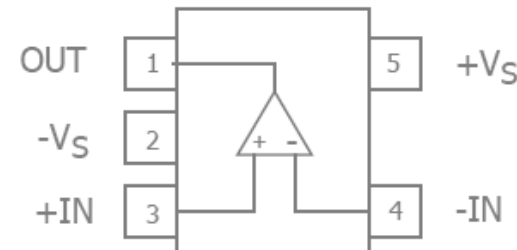


CLC1003 & CLC2003
Microphone Amplifying Reference Design

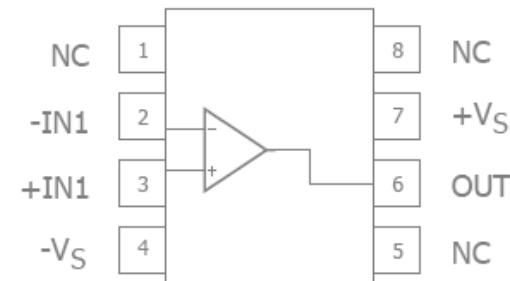
FEATURES

- 1mV max input offset voltage
- 0.00005% THD at 1kHz
- 5.3nV/√Hz input voltage noise >10kHz
- -90dB/-85dB HD2/HD3 at 100kHz, $R_L=100\Omega$
- <-100dB HD2 and HD3 at 10kHz, $R_L=1k\Omega$
- Rail-to-Rail input and output
- 55MHz unity gain bandwidth
- 12V/μs slew rate
- +80mA, -55mA output current
- -40°C to +125°C operating temperature range
- Fully specified at 3V and ±5V supplies
- CLC1003: Pb-free SOT23-5, SOIC-8
- Future option CLC2003: Dual
- Future option CLC4003: Quad

CLC1003 SOT Pin Configuration



CLC1003 SOIC Pin Configuration



Comlinear® CLC1003

Low Distortion, Low Offset, RRIO Amplifier

CADEKA Solution in Hi-Fi Stereo Audio Splitter



CLC2059 1-4Port Stereo Audio Splitter Reference Design

THANK YOU TRUST CADEKA!

- Web Site: <http://www.cadeka.com>
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