

Next Generation CMOS Chip-on-Tip Endoscopy Interface— AntLinx™

White Paper

November 11, 2022

Introduction

Endoscopy using CMOS Chip-on-Tip is a rapidly growing and evolving market segment. There is a significant need within endoscopic imaging to incorporate a CMOS imager at the distal tip of the endoscope and for this imager to support an interface that has a high bandwidth, is low in pin count, needs a cost-effective cable and is immune to EMC/EMI and noise over a long transmission distance. All these challenges are satisfied by a new medical interface: AntLinx™, from OMNIVISION, a world leader in endoscopic imaging.

Data Transmission Challenges

Mobile Industry Processor Interface (MIPI) is the current methodology used in endoscopy to transmit the images from the camera at the distal tip to the back-end camera control unit (CCU). MIPI has wide bandwidth and can transmit high-resolution images at high frame rates. However, to do so requires a minimum of 12 pins. This directly impacts the size of the imager used in the endoscope. Additionally, MIPI requires a thicker cable that can transmit up to a maximum of 1.5 meters reliably. These limitations result in endoscopes with larger outer diameter, thus causing patient discomfort.

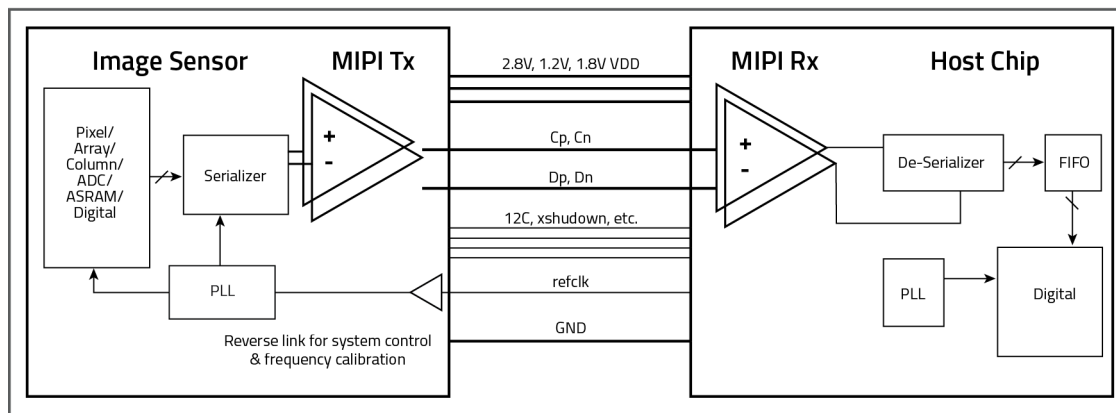


Figure 1: Showing 12 Pin Connection

To resolve the data transmission challenge over long cable lengths, current endoscopy systems convert the MIPI output from the imager to another format, such as low-voltage differential signaling (LVDS), fiber, or serial. The converted signal is then transmitted to the handle or CCU, where it is decoded to recover the MIPI data. This increases the complexity, size, heat generation and cost of the endoscopy system in a single-use imaging solution.

Thus, the camera and cable size, transmission length, signal integrity, and system complexity – as well as cost – need to be addressed to enable a solution that facilitates the implementation of cost-effective single-use endoscopes.

The Solution: AntLinx™ Interface

AntLinx™ is a proprietary imaging interface designed by OMNIVISION to overcome the challenges of the MIPI interface explained above.

The key features of AntLinx™ are:

- Uses only 4 pins for < 2-megapixel (MP) imagers
- Scalable architecture to use up to 8 pins for up to 10MP images
- Can transmit up to 4 meter cable length
- Uses cost-effective micro-coaxial cable
- Has a robust EMC/EMI profile
- Offers high noise immunity
- Provides analog and digital signal transmission

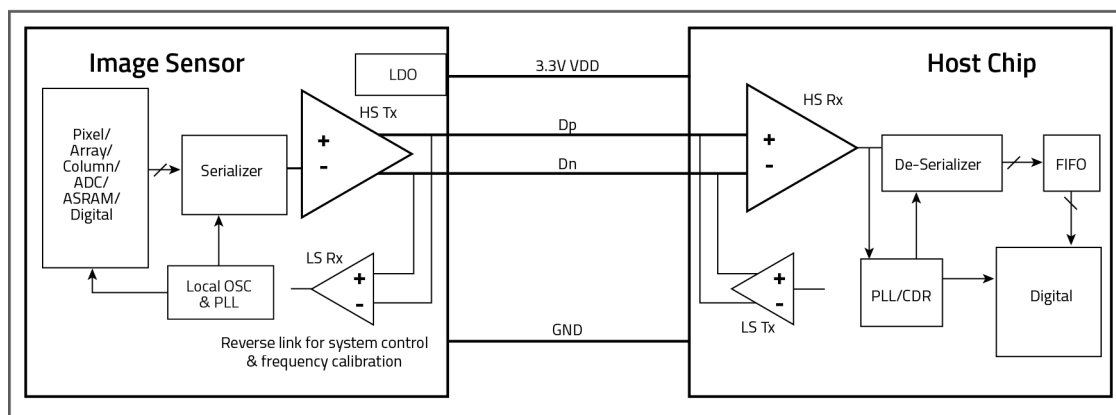


Figure 2: AntLinx™ Digital 4 Pin Medical digital interface

The implementation of an interface that uses only 4 pins for a less than 2MP image sensor, and 8 pins for up to 10MP image sensors, reduces the size and complexity at the distal tip of the endoscope as well as the cable attached to it. The compact interface enables a slim, cost-effective cable.

AntLinx™ includes both 4-wire analog and digital interfaces, depending on the data throughput. The robust EMC/EMI profile and high noise immunity ensure high-quality image delivery to the CCU.

The output from the imager in AntLinx™ format is then decoded by a bridge chip from OMNIVISION that resides in the back end of the endoscopic system. This bridge chip handles all the electrical and logical protocol with the imager and produces DVP or MIPI output to connect to back-end processor.

Summary

The AntLinx™ interface provides endoscope OEMs an optimized interface supported by OMNIVISION medical imagers. Longer transmission length, reduced system complexity, high bandwidth, and higher data reliability makes it a key enabler in the transition to cost-effective, single-use imaging procedures. Implementing the OMNIVISION AntLinx™ interface-based solutions help ensure more confident diagnosis, and ultimately, better patient outcomes.

References

1 FDA: <https://www.fda.gov/medical-devices/safety-communications/use-duodenoscopes-innovative-designs-enhance-safety-fda-safety-communication>

About OMNIVISION

OMNIVISION is a global fabless semiconductor organization that develops advanced digital imaging, analog, and touch & display solutions for multiple applications and industries, including mobile phones; security and surveillance; automotive; computing; medical; and emerging applications. Its award-winning innovative technologies enable a smoother human/machine interface in many of today's commercial devices.

For more information, visit:

<https://www.ovt.com/medical-imaging/overview>

or contact OMNIVISION at:

medical.marketing@ovt.com

Content and Liability Disclaimer

OmniVision Technologies, Inc. ("OMNIVISION") believes the information in this document is accurate as of its publication date. Any and all specifications and designs are subject to change without notice. OMNIVISION is not liable for errors or omissions in this document. OMNIVISION undertakes no obligation to update the information presented in this document. This information is not intended to provide medical advice. It is intended for informational purposes only. It is not a substitute for professional medical advice, diagnosis or treatment. Please consult with your OMNIVISION sales representatives regarding official product documentation, data sheets and specifications.

OMNIVISION™, the OMNIVISION logo, and AntLinx™ are trademarks or registered trademarks of OMNIVISION. All other trademarks are the property of their respective owners.