Valens

VA7044/7042 Product Brief

The Leading MIPI® A-PHY Compliant CSI-2 Deserializers Supporting Long-Reach, Ultra High-Speed Automotive Connectivity

Overview

Valens VA7044/7042 automotive chipsets are MIPI A-PHY compliant deserializers offering multi-gig asymmetric sensor connectivity.

The VA7044/7042 integrated circuit (IC) deserializers support connectivity of multiple CSI-2-based cameras, RADARs, LIDARs, and other sensors, or act as local zonal sensor hubs, featuring four/two independent receiver links, with speeds of up to 8Gbps each. The IC can connect to any serializer devices that implement standard long-reach MIPI A-PHY interfaces.

The VA7044 is a quad-receiving hub, and the VA7042 is a dual receiving hub.

The ICs operate over standard, cost-effective, in-vehicle wires for up to 15 meters (50 feet) over Coax cables and up to 10 meters (33 feet) over Shielded Differential Pair cables, with 4 inline connectors. The ICs include a special mode enabling connectivity over unshielded twisted pair cables at speeds of up to 4Gbps to support the upcoming MIPI A-PHY v1.1 spec.

Featuring two CSI-2 output ports, the VA7044/7042 can be connected to one or two SoCs, multiplexing and/or duplicating the incoming sensor data.

An additional CSI-2 input port enables local sensor connectivity or cascading of additional deserializer devices.

The VA7044/7042 IC also provides I²C and SPI bus tunneling, GPIO pins tunneling, and advanced timing services, such as the distribution of a remote central clock and provisioning of a precise frame sync signal to multiple sensors.

Optimized for Automotive

AEC-Q100 Qualified – Device temperature grade 2: -40°C to +105°C ambient operating temperature.

MIPI Spec Compliant - Designed to meet the MIPI Alliance specifications for A-PHY version 1.0, D-PHY version 2.1, and C-PHY version 1.2, as well as draft PAL (Protocol Adaptation Layer) specifications for CSI-2, I²C, SPI, and GPIO I/Fs.

Functional Safety
Meets functional safety requirements:
- ASIL-B compliant, according to ISO 26262.
- MIPI Alliance draft specification for Camera Service Extensions (CSE℠).

With advanced data protection, diagnostics, and real-time monitoring.

Power Consumption – Low power consumption, typically less than 2.3W (VA7044) and 1.6W (VA7042).

Power Over Coax/SDP/UTP – Supporting power delivery over different types of cables, further reducing system cost.

Performance – Designed to handle harsh automotive EMC and environmental interferences as well as cable degradation resulting from aging, temperature changes, and physical impact.

Real-Time Applications – Near-zero latency to support time-sensitive, high throughput traffic for advanced computer processing.

Low Cost System Design – Dedicated modes for support of non-shielded cables and connectors with link speeds of up to 4Gbps.

Applications

Advanced Driver Assistance Systems (ADAS) and In-Vehicle Infotainment (IVI) Systems

- High resolution front cameras
- Rear view cameras
- Surround view cameras
- Mirror replacement cameras
- Monitoring and other in-cabin cameras
- RADARs
- LIDARs
- SoC-to-SoC video multi-streaming (DSI to CSI connectivity)

Non-Automotive Applications

Smart street infrastructure sensors

Surveillance and security sensors

Machine vision

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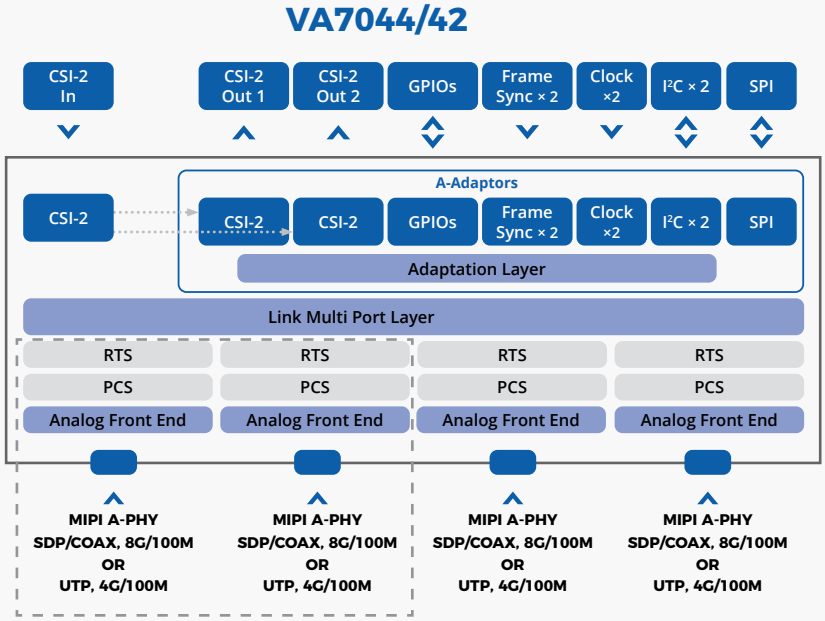
Functional Block Diagram

True to size



Above parts available for VA7044

Key Technical Highlights

Link	MIPI® A-PHY (V1.0) compliant › VA7044: 4x 2-8Gbps main Rx channel, 4x 100Mbps return channel › VA7042: 2x 2-8Gbps main Rx channel, 2x 100Mbps return channel
Configurable PHY	› Each main Rx channel: 2Gbps, 4Gbps, 8Gbps › Each return channel: 100Mbps
Infrastructure	› Operating over MIPI® A-PHY channel • Coax cable - Transmission distance of up to 15 meters/50 feet, with up to four inline connectors • Shielded differential pair (SDP) - Transmission distance of up to 10 meters/33 feet, with up to four inline connectors › Special mode for working over UTP channel at speeds of up to 4Gbps
MIPI CSI-2	› 2 output CSI-2 ports (each can be configured as a C-PHY or D-PHY I/F) • C-PHY I/F with 3 data lanes (each lane is a C-PHY trio), up to 5.7Gbps on each lane • D-PHY I/F with 4 data lanes, up to 2.5Gbps per lane › 1 input CSI-2 port (D-PHY I/F) with 4 data lanes, up to 2.5Gbps per lane › Each CSI-2 output port supports up to 16 virtual channels; each incoming video stream can be dynamically routed or duplicated to any of the CSI-2 output ports
I²C	› An I²C I/F for local and remote device management › 2nd I²C I/F for optional connection to a second SOC › Operating frequency of 100KHz-1MHz
SPI	› SPI interface for remote device management › Operating frequency of up to 40Mhz
Clock	2 precision clock inputs, remotely reconstructed at the sensors' side
Frame Sync	2 frame sync inputs for synchronization of different remote sensors
GPIOs	› Up to 13 general purpose output pins › Up to 12 general purpose I/O pins
Functional Safety	› ISO-26262, ASIL-B compliant › MIPI® Alliance draft specification for Camera Service Extensions (CSE℠)
Power Consumption	Typical 2.3W (VA7044), 1.6W (VA7042)
Package	15mm x 15mm FC-CSP
Temperature	Automotive Grade 2
Power Supply Rails	1.8V, 0.8V

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