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22-23
SEPTEMBER
2020

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Why an Integrated MIPI C-PHY/ D-PHY IP is Essential

MOBILE & BEYOND

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MIPI Camera and Display Market Trends

MIPI Camera & Display Standards

MIPI for Consumer & Automotive: Implementation Examples

Camera Innovations for Growing Vision Processing Needs

For Human Vision and Machine Vision

- 100+ mega-pixel image sensors
- AI-enabled image sensors
- Mobile More pixels, more and bigger image sensors
- Vision systems - the heart of automotive ADAS/IVI
  - HDR, SNR, NIR, resolution, size, power, ASIL x /Grade x
  - Multiple IS combined with other sensing technologies
- IoT, edge, MCUs with machine vision capabilities
  - Face recognition for home appliances

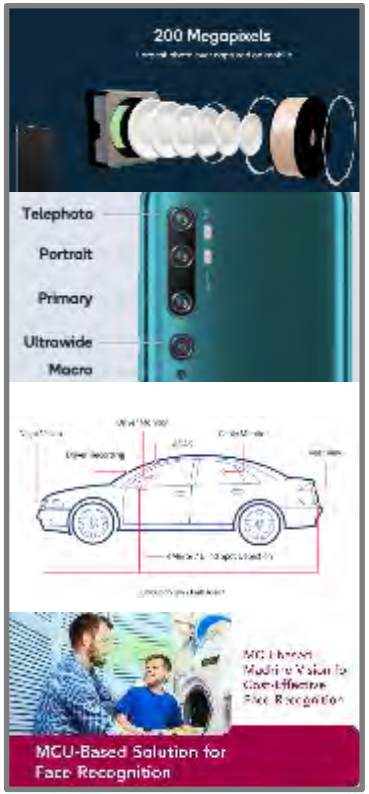


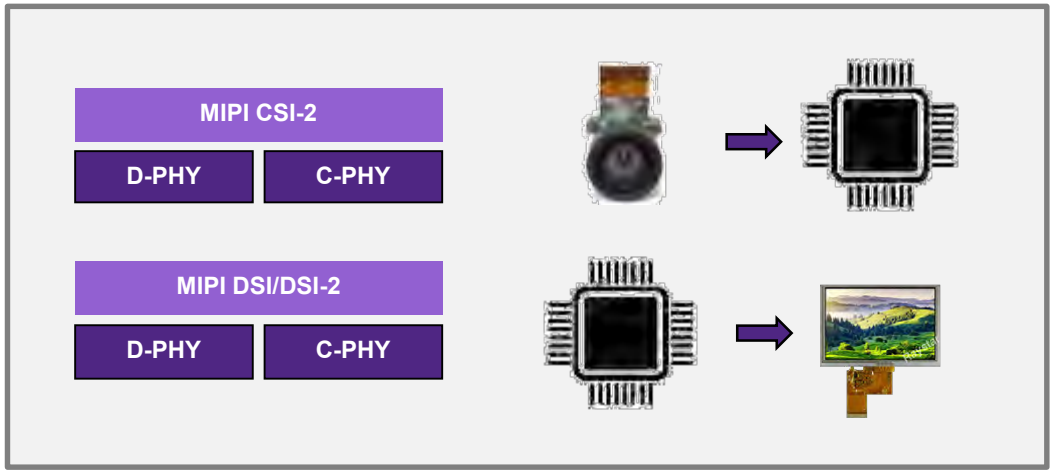
Image source: Qualcomm.com, Omnivision.com, NXP.com

Display Innovations Driven by Mobile and Automotive

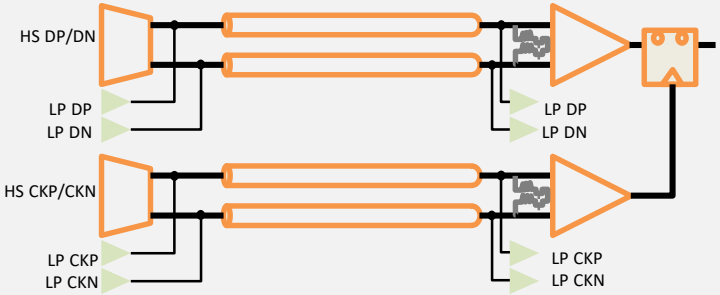
Dual Display, Foldable, 120Hz, Higher Resolutions

MIPI Camera and Display Specifications

Evolving to Address Growing Imaging Needs

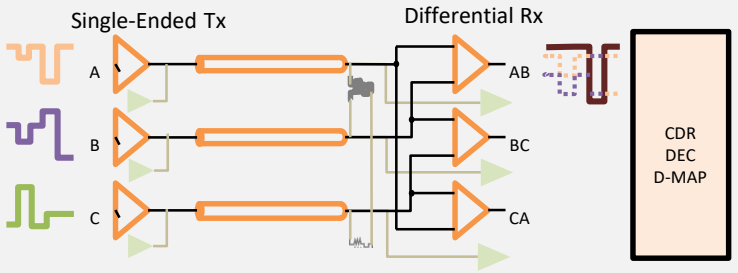


MIPI Physical Layers



MIPI D-PHY

- Source synchronous architecture
- High-speed and low-power modes for efficiency
- Proven, mature and widely adopted



MIPI C-PHY

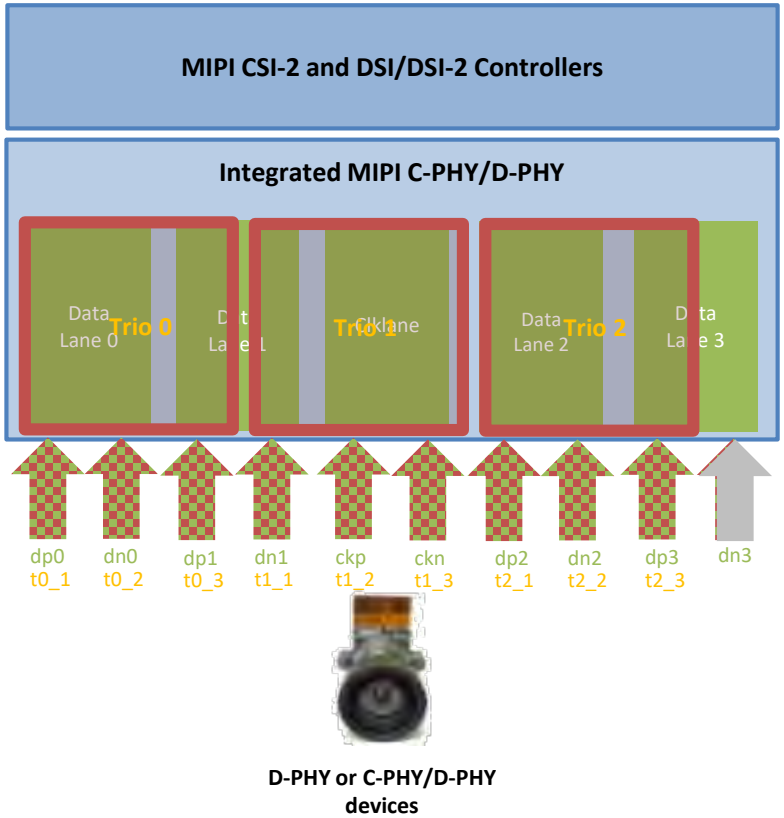
- Higher bandwidth transmission on restricted channels – CoG, CoF, CoP
- Key concepts: trios and 3-phase encoding
- Bitrate ~2.28x the signaling rate
- Single ended drivers; differential receivers

Integrated MIPI C-PHY/D-PHY Solution

The Best of Both Worlds

- Electrical specs are similar
- Low-power modes are identical
- Most of the of the circuits are re-used
  - Aside from line drivers/receivers,
- C-PHY and D-PHY pins can co-exist in 10 pins
  - 4 lanes and 3 trios

- Satisfies most important KPI
  - Maturity
  - Backwards compatibility
  - Flexibility
  - Performance
  - Power efficiency
  - EMI



D-PHY or C-PHY/D-PHY devices

MIPI CSI-2 Going From Mobile to a Vision Platform

Evolving to Address Growing Vision Processing Needs

MIPI CSI-2 V1.x	MIPI CSI-2 V2.x	MIPI CSI-2 V3.x	MIPI CSI-2 V4.x
RES	VCx	USL	AOSC
FPS	PSD	SROI	FSAF
BPP	LRTE	RAW24	A-PHY
CCI	DPCM		ISEC
	RAW16/20		

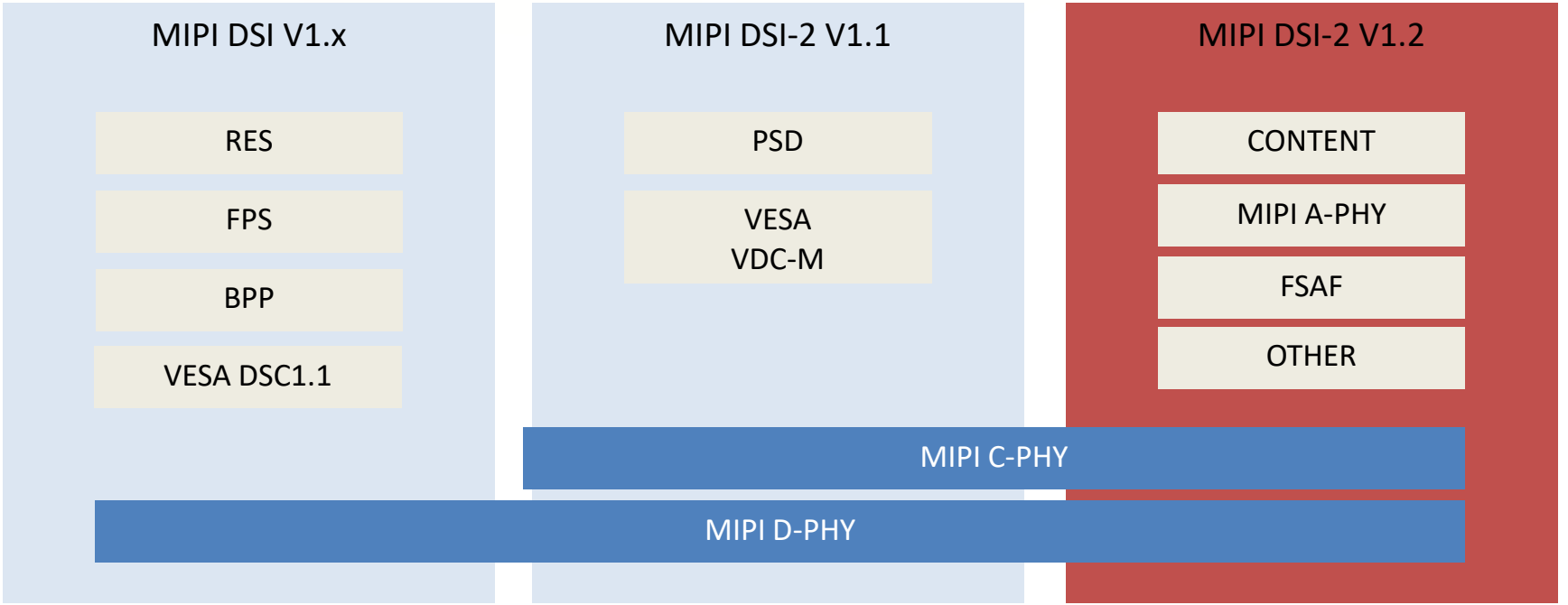
MIPI C-PHY

MIPI D-PHY

Mobile

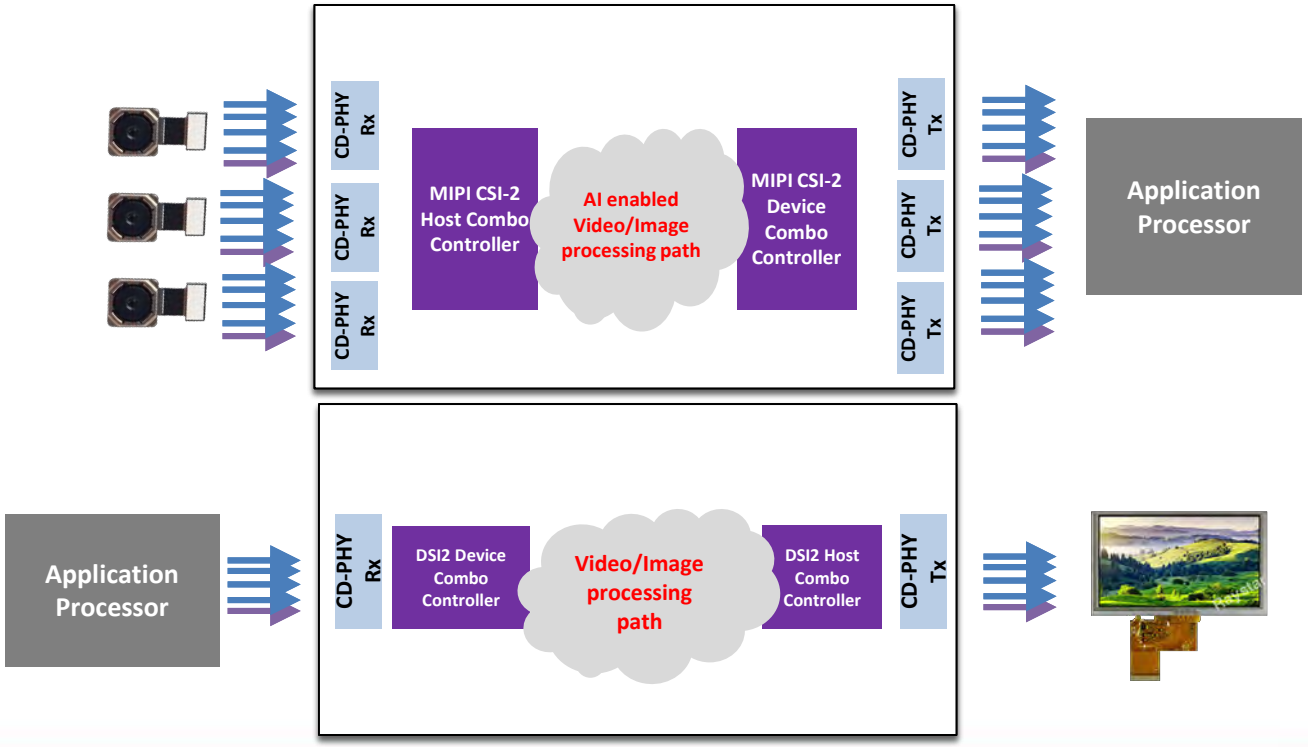
Vision Platform

MIPI DSI/DSI-2: Defacto Interface for Embedded Displays



Use Case with DesignWare MIPI C-PHY/D-PHY IP Solution

Case Studies: Enabling Camera ISP and Enhanced Mobile Display Quality

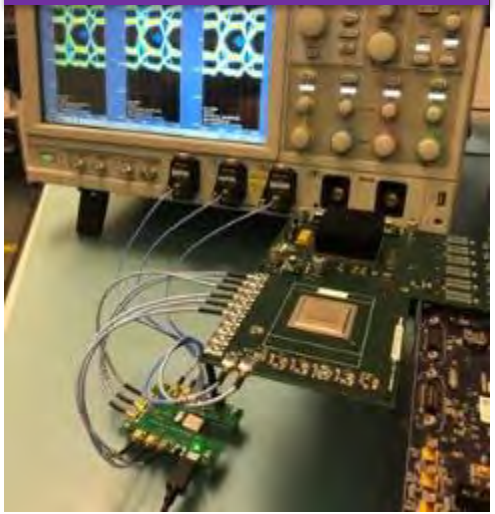


DJI use case with DesignWare C-PHY/ D-PHY IP Solution

Interop With State-Of-The-Art Image Sensor & DJI SoC Platform

- To satisfy challenging camera interface bandwidth requirements for the next generation camera drone products
- DJI's SoC platform successfully interoperating with advanced 64 mega-pixel sensor up to 3.5 Gsps

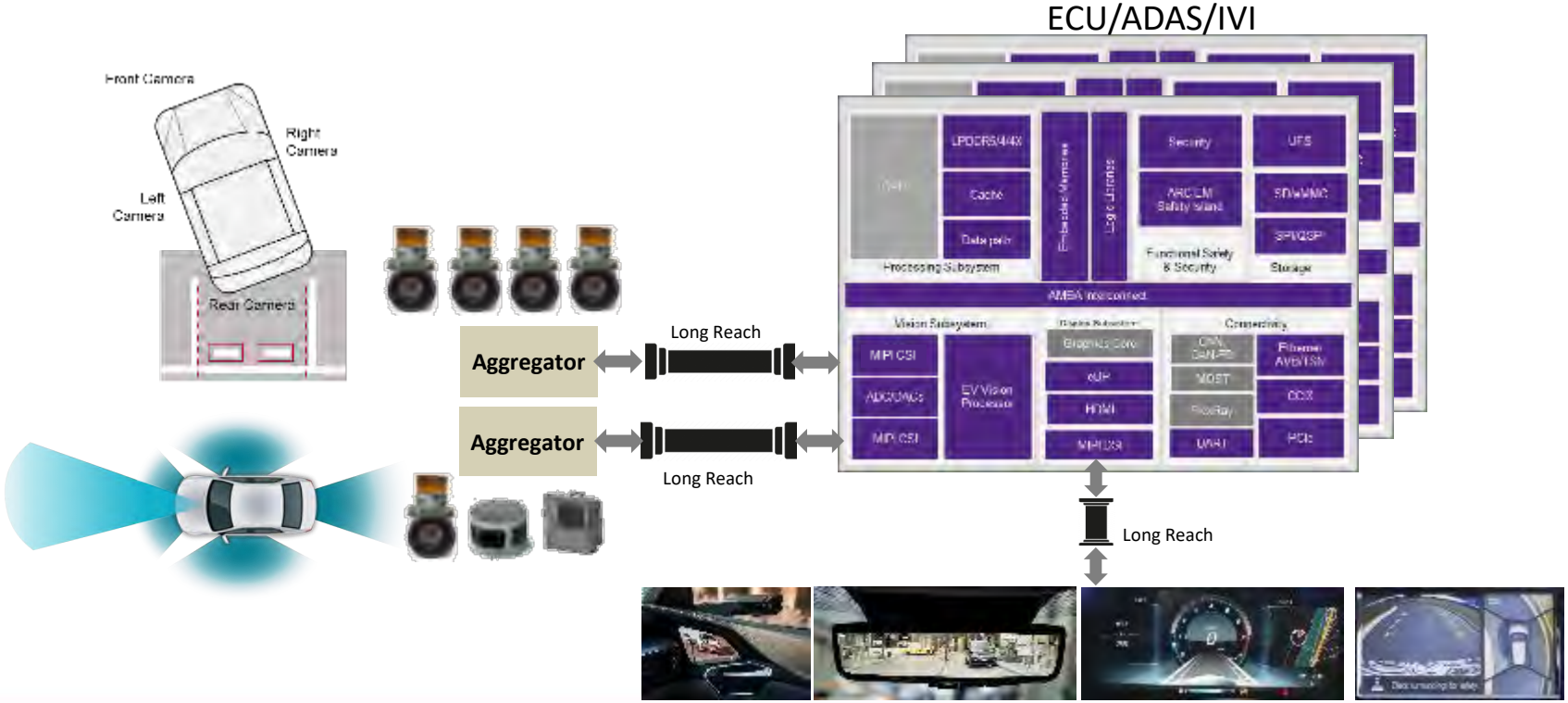
Synopsys DesignWare C-PHY/D-PHY IP in 12nm + 64MP image sensor



Synopsys HW setup

Example of MIPI In An Automotive Application

MIPI CSI-2 Sensors & DSI Displays



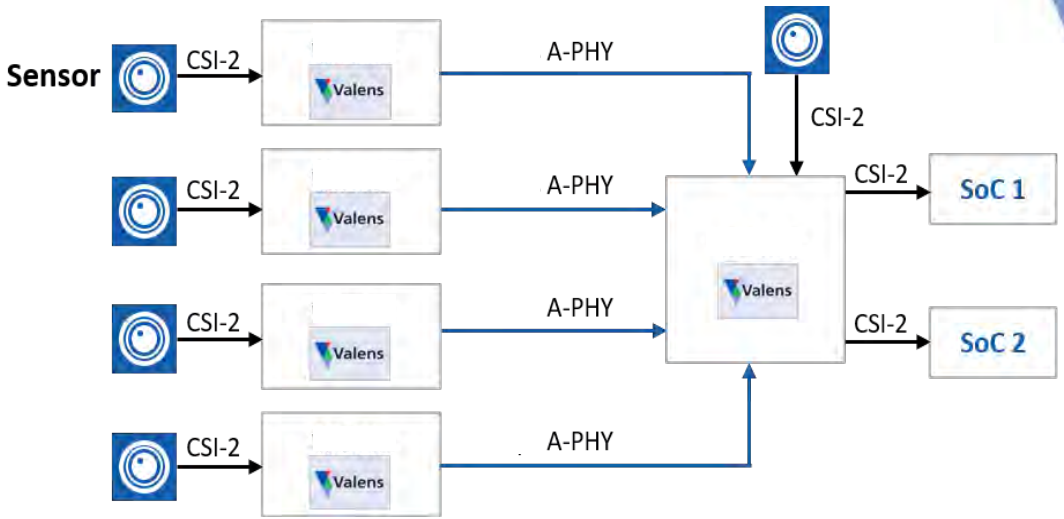
Automotive Grade IP Essentials

Reduce Risk and Accelerate Qualification for Automotive SoCs

Functional Safety	Accelerate ISO 26262 functional safety assessments to help ensure designers reach target ASIL levels
Reliability	Reduce risk & development time for AEC-Q100 qualification of SoCs
Quality	Meet quality levels required for automotive applications

Valens use case with DesignWare C-PHY/D-PHY IP Solution

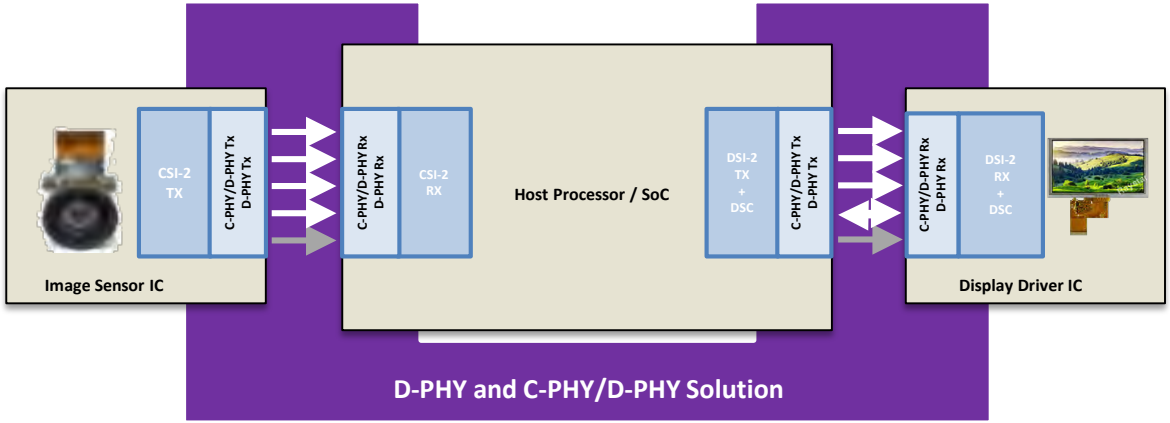
For Next-Generation Long-Reach CSI-2 Connectivity



Valens automotive technology enables in-vehicle high-speed links for cameras and sensors with long-reach CSI-2

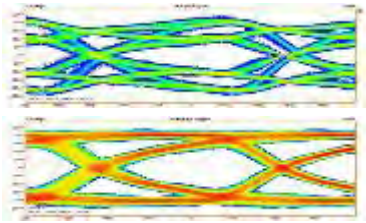
Summary

DesignWare MIPI IP Solution for Camera & Display



FUJITSU SK hynix Movidius LEADCORE OpenSilicon GUC INUITIVE light Rockchip ORBBEC

- D-PHY v1.2
- Integrated C-PHY v1.2 / D-PHY v2.1
- Controllers supporting key features of the latest specifications
- 2.5 Gbps & 4.5 Gbps / 3.5 Gsps
- Available in 40-nm - 5-nm
- ASIL B Ready ISO 26262 certified IP
- 500+ licenses; 30+ test chips
- Adopted by tier1s
- Mobile/drone/DSC/ surveillance/IoT
- interoperability with wide range of devices



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THANK YOU

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