

## エンベデッドビジョンとマルチカメラ セットアップ - xiX

### OEM タイプの製品 - 特別な仕様条件に適用

最大 **64 GBit** の高帯域幅を備えた高速インターフェイスで、**センサーの潜在能力を最大限**に活用します。

Osram CMOSIS センサー:

**CMV2000, CMV4000, CMV12000, CMV20000, CMV50000**

Sony Pregius™ センサー:

**IMX174, IMX252, IMX250, IMX255, IMX253, IMX530, IMX531, IMX532**

Gpixel センサー:

**GMAX0505, GMAX3265**

解像度は 2 Mpix から 65 Mpix まで

複数のカメラ ストリームを集約するための理想的なプラットフォーム

**NVIDIA Jetson GPU** モジュールで使用を対象にした設計

インテグレートCanon EF マウント制御は、ダイナミック絞りとフォーカス制御可能

リモートで使用可能なセンサーボード - 組込み エムベデッドビジョンシステム向けのロングリーチ対応

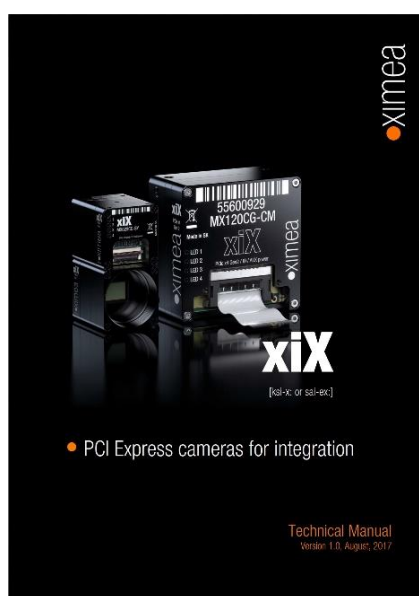
DMA (ダイレクトメモリアクセス) により、マルチカメラセットアップの遅延がほとんど発生なし

コンパクトで低消費電力

ポータビリティとモジュール性

ハードウェアとソフトウェアの低オーバーヘッド

低ゲインと高ゲインを備えた HDR デュアル ADC 機能



Multi-camera line



xiX Manual



Multi-camera Systems And Embedded Vision Applications - AlloverIP 2018

Embedded Vision Summit 2018 Presentation on the subject  
Embedded Vision Summit 2017 Presentation on the subject  
VR starts from reality - Inspect Application Forum 2016

**xiC / xiX (small)**  
The xiC is an extremely diversified and highly modular camera family designed for the Sony ImageMaster™ sensor series. It offers a wide choice of camera sizes and models. Each design is a headstack by system integrators. It has all the benefits of a single board design and is accordingly small.  
The small xiC cameras are based on the same board-level concept and obtain images to the host computer via 2 lanes on a PCI Express Gen2 bus. Together with minimal busmaster and CPU load, the cameras are a perfect fit for embedded vision and machine applications. Thanks to flat face casing, the board-level and zero-loss camera size integration is tight spaces and close proximity between cameras.

**CONNECTORS / BOARD-LEVEL CAMERAS**

**xiC**  
**Standard Type-C**  
Board level version of standard housed camera with Type-C connector, perpendicular to board surface.  
**Standard Micro-B**  
Board level version of standard housed camera with Micro-B connector, perpendicular to board surface.  
**Flex-Line boards**  
Connectors for flat flex cables (FPC) mounting USB 3.1 Gen1 signals and 5V/1.8V. Flex cable connector parallel to board or perpendicular to board.

**xiX**  
**PCIe Gen2 x2, C/CS-mount**  
Connector for flat flex cables (FPC) mounting USB 3.1 Gen1 signals and 5V/1.8V. Flex cable connector parallel to board or perpendicular to board.

**ADDITIONAL CONNECTION**  
 \* Threaded fit interface for direct behind-panel access with up to 20 SBU's.  
 - Dual powered bus powered or AIO powered.

**ACCESSORIES**  
 USB cable, passive length: 1.4, 5 m  
 USB cable, passive, angled (micro-B connector) length: 5 m  
 USB cable, active length: 10, 15, 40 m  
 Sync cable, digital I/O length: 5 m  
 Universal robot mounting bracket  
 PC camera scanner 2x USB ports 4x USB slots  
 Inboard for USB3.0

**HIGHLIGHTS**

- USB 3.1 Gen1
- Lowest power consumption. All models are fan powered
- Smallest footprint in class
- Very light
- USB3.0/3.1 compliant

**MODULARITY / VARIANTS**

- Various connector technologies available: xC, Type-C, Micro-B, Flat ribbon, xX, PCIe Gen2 x2 flat mount, Addressable Thunderbolt Gen 1 (BT series)
- All variants are available as housed camera and board level camera
- A flexible board level design makes it ideal for system integration in small machine applications and robotics
- The board stack is incredibly small with all the benefits of a single board design
- Board level cameras are responsible for remote operation
- Designed to go with embedded system platforms
- More than 20 popular machine vision lenses supported, e.g. M42, M48, M54, M63, M72, M82, M90, M108, M125, M150, M180, M205, M225, M255, M280, M300, M350, M400, M450, M500, M550, M600, M650, M700, M750, M800, M850, M900, M950, M1000, M1050, M1100, M1150, M1200, M1250, M1300, M1350, M1400, M1450, M1500, M1550, M1600, M1650, M1700, M1750, M1800, M1850, M1900, M1950, M2000, M2050, M2100, M2150, M2200, M2250, M2300, M2350, M2400, M2450, M2500, M2550, M2600, M2650, M2700, M2750, M2800, M2850, M2900, M2950, M3000, M3050, M3100, M3150, M3200, M3250, M3300, M3350, M3400, M3450, M3500, M3550, M3600, M3650, M3700, M3750, M3800, M3850, M3900, M3950, M4000, M4050, M4100, M4150, M4200, M4250, M4300, M4350, M4400, M4450, M4500, M4550, M4600, M4650, M4700, M4750, M4800, M4850, M4900, M4950, M5000, M5050, M5100, M5150, M5200, M5250, M5300, M5350, M5400, M5450, M5500, M5550, M5600, M5650, M5700, M5750, M5800, M5850, M5900, M5950, M6000, M6050, M6100, M6150, M6200, M6250, M6300, M6350, M6400, M6450, 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M81900, M81950, M82000, M82050, M82100, M82150, M82200,

### xSWITCH

Utilizing PCIe as a camera interface offers unique camera application options, is extremely high bandwidth, enables camera use on either the connector and fiber (passive) over ethernet based fiber and copper or fiber optic cable connector for a host computer, utilizing ready to memory DMA of 64 GB/s. Full fiber cables between the camera and the xSWITCH allow the most compact integration in tight spaces.

**XITECH**  
As a xTECH category device, XIMEA offers a PCB design called xSWITCH camera quality, high location and resolution of PCB components can be varied to optimize the layout of multi camera systems. Multiple reference instances of the PCB already exist based on the concept, which enables solution search for replication, custom and unique customer applications.

### PCI EXPRESS TOPOLOGY

#### CAMERAS

Supported camera models refer to document xSWITCH compatible camera

#### HIGHLIGHTS

- Maximum compactness: smallest form factor camera and compact connectors allow closed sensor to sensor proximity
- Aggregate the **high bandwidth upstream** (up to 64GB/s)
- Full utilization of PCIe architecture supports **hot-plug connection and direct memory access**
- Use of standard components allow simple assembly for the creation of a **custom platform**
- Reserved for external or additional expansion backbones
- Support for **Windows, Linux and MacOS**
- Multiple **reference instances** of the xSWITCH already available
- Board shape can be tailored** precisely to application requirements
- Benefit from XIMEA's **unique experience** and expertise in the field of PCIe

#### CONNECTION TO CAMERA

Fit the address connector or service interface < 100 cm

Optical cable > 100 m

Copper cable < 7 m

#### CONNECTION TO HOST

Optical cable > 100 m

Copper cable < 7 m

#### PCIe HOST ADAPTER

single

2x4

4x4

7, 4 and 8 lanes is supported

#### PERFORMANCE

Examples	Cameras	Resolution	Speed (FPS)	Camera Model	Sensor	PCIe Interface
Setup 1	16	2.5	185	MUS0460-SR3202	IMX174	Gen2, 2 Lanes
Setup 2	8	12.4	77	IMX17466-SR3202	IMX535	Gen2, 2 Lanes
Setup 3	4	3.1	218	MUS140-SR4202	IMX520	Gen2, 2 Lanes
Setup 4	4	5.0	185	MUS140-SR4202	IMX534	Gen2, 2 Lanes
Setup 5	3	12.0	100	MUS2066-SR4202	CMV20000	Gen3, 4 Lanes
Setup 6	10	20.0	30	MUS2066-SR4202	CMV20000	Gen2, 4 Lanes
Setup 8	6	8.9	95	MUS0460-SR3202	IMX520	Gen2, 2 Lanes
Setup 9	2	20.0	30	MUS2066-SR4202	CMV20000	Gen2, 4 Lanes

## OPTIMIZED INTEGRATION

## 組み込みビジョン システムの xSwitch インフォグラフィック

このドキュメントでは、組み込みビジョン システムの XIMEA コンセプトについて説明します。トポロジ、ケーブル (フラットフレックス リボンなど)、スイッチ、ボード、アダプタなど、さまざまなアクセサリが多数用意されており、特定のアプリケーションに最適なシステムを組み立てることができます。

コンパイルや交換が簡単で、リモート操作に適しています。



## 組み込みカメラ システムのアプリケーション - 例:

360 度パノラマ、拡張現実または仮想現実 (AR、VR)、セルフドライブ車両、街路/都市マッピング、ディープラーニング タスク、ステレオ カメラ システム、ポータブル医療機器、3D スキャン、エンターテインメント、写真測量、FACS スキャン、顔認識、モーション キャプチャ、UAV/UAS (ドローン)、映画撮影、ビデオ測量、LoLa (低遅延オーディオ ビジュアル ストリーミング)



## NVIDIA Jetson TX1/TX2

高解像度、高データ帯域幅、モジュラー アーキテクチャを備えたポータブルでコンパクトなエンベデッドビジョン システムを設計している Jetson プラットフォームのお客様とマシンビジョン インテグレーター向けです。

**xiX カメラとキャリア ボード**は、多くの既存市場および新興市場における自律型小型アプリケーションに最適な高帯域幅マルチカメラ ソリューションです。

カスタマイズや極端なサイズ制限に最適化されていない他の汎用製品オプションとは異なり、xiX カメラとキャリア ボードは、最小のフォーム ファクターと最速のデータ転送速度を提供しながら、消費電力を最小限に抑え、徹底したカスタマー サポートによる最速の市場投入までの時間を実現します。

## カメラとアクセサリ

NVIDIA Jetsonとカメラ用キャリア アボード	マルチカメラ接続用スイッチ	アダプタ、ケーブル、アクセサリ
		
<p>組み込み / マルチカメラ用ボード スタック</p> <p>コンパクトなスタンドアロンGPUパッケージ</p> <p>カメラと周辺機器用の複数のポート</p> <p>完全同期とトリガー</p>	<p>さまざまなインターフェース スロット用の複数の入力</p> <p>4~12 台のカメラに対応するコンパクトなマルチプレクサ</p> <p>単一の高速 64 Gbits 出力ケーブル</p> <p>完全同期とトリガー</p>	<p>さまざまなシステムとの相互接続</p> <p>Mini PCIe、M.2、PCIe x4、x8、iPass、USB</p> <p>フラットフレックスリボンケーブルまたは iPassケーブル</p> <p>アダプタボード、ホスト、スイッチ、GPIO</p>

**CMOSIS CMV2000 PCIe  
mono industrial camera**



2.2 MPix  
2/3" CMOS, Global Shutter  
AMS CMOSIS CMV2000 B/W

**340 fps**

**CMOSIS CMV2000 PCIe  
color industrial camera**



2.2 MPix  
2/3" CMOS, Global Shutter  
AMS CMOSIS CMV2000 Color

**340 fps**

**CMOSIS CMV2000 PCIe  
NIR industrial camera**



2.2 MPix  
2/3" CMOS, Global Shutter  
AMS CMOSIS CMV2000 Near  
Infrared (NIR)

**340 fps**

**Sony IMX174 fast mono  
industrial camera**



2.3 Mpix with PCIe speed  
1/1.2" CMOS, Global Shutter  
**Sony IMX174** Pregius™ B/W  
166 fps

**Sony IMX174 fast color  
industrial camera**



2.3 Mpix with PCIe speed  
1/1.2" CMOS, Global Shutter  
**Sony IMX174** Pregius™ Color  
166 fps

**Sony IMX252 fast mono  
industrial camera**



3.1 Mpix  
1/1.8" CMOS, Global Shutter  
**Sony IMX252** B/W  
218 fps

**Sony IMX252 fast color  
industrial camera**



3.1 Mpix  
1/1.8" CMOS, Global Shutter  
**Sony IMX252** Color  
218 fps

**CMOSIS CMV4000 PCIe  
mono industrial camera**



4.2 MPix  
1" CMOS, Global Shutter  
AMS CMOSIS CMV4000 B/W  
**180 fps**

**CMOSIS CMV4000 PCIe  
Color industrial camera**



4.2 MPix  
1" CMOS, Global Shutter  
AMS CMOSIS CMV4000 Color  
**180 fps**

**CMOSIS CMV4000 PCIe  
NIR industrial camera**



4.2 MPix  
1" CMOS, Global Shutter  
AMS CMOSIS CMV4000 Near  
Infrared (NIR)  
**180 fps**

**Sony IMX250 fast mono  
industrial camera**



5 Mpix  
2/3" CMOS, Global Shutter  
**Sony IMX250 B/W**  
165 fps

**Sony IMX250 fast color  
industrial camera**



5 Mpix  
2/3" CMOS, Global Shutter  
**Sony IMX250 Color**  
165 fps

**Sony IMX255 fast mono  
industrial camera**



8.9 Mpix  
16.1mm CMOS, Global Shutter  
**Sony IMX255 B/W**  
95 fps

**Sony IMX255 fast color  
industrial camera**



8.9 Mpix  
16.1mm CMOS, Global Shutter  
**Sony IMX255 Color**  
95 fps

**Sony IMX253 fast mono  
industrial camera**



12.4 Mpix  
17.6mm CMOS, Global Shutter  
**Sony IMX253 B/W**  
69 fps

**Sony IMX253 fast color  
industrial camera**



12.4 Mpix  
17.6mm CMOS, Global Shutter  
**Sony IMX253 Color**  
69 fps

**Sony IMX542 fast mono  
industrial camera**



16.1 Mpix  
1.1" Sony CMOS Pregius S™,  
4th Gen  
**Sony IMX542 B/W**  
45 fps

**Sony IMX542 fast color  
industrial camera**



16.1 Mpix  
1.1" Sony CMOS Pregius S™,  
4th Gen  
**Sony IMX542 Color**  
45 fps

**Sony IMX532 HDR mono industrial camera**



16.1 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX532** B/W  
45 fps

**Sony IMX532 HDR color industrial camera**



16.1 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX532** Color  
45 fps

**Sony IMX541 fast mono industrial camera**



20.3 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX541** B/W  
35 fps

**Sony IMX541 fast color industrial camera**



20.3 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX541** Color  
35 fps

**Sony IMX531 HDR mono industrial camera**



20.3 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX531** B/W  
35 fps

**Sony IMX531 HDR color industrial camera**



20.3 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX531** Color  
35 fps

**Sony IMX540 fast mono industrial camera**



24.5 Mpix  
1.2" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX540** B/W  
30 fps

**Sony IMX540 fast color industrial camera**



24.5 Mpix  
1.2" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX540** Color  
30 fps

**Sony IMX530 HDR mono industrial camera**



24.5 Mpix  
1.2" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX530** HDR B/W  
30 fps

**Sony IMX530 HDR color industrial camera**



24.5 Mpix  
1.2" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX530** Color  
30 fps

**CMOSIS CMV12000 mono 4K embedded camera**



12 Mpix at 133 Fps  
AMS CMOSIS CMV12000  
28 mm B/W CMOS  
PCIe flat ribbon cable camera

**CMOSIS CMV12000 color 4K embedded camera**



12 Mpix at 133 Fps  
AMS CMOSIS CMV12000  
28 mm Color CMOS  
PCIe flat ribbon cable camera

**CMOSIS CMV20000 mono 5K embedded camera**



20 Mpix at 33 Fps  
AMS CMOSIS CMV20000  
35 mm B/W CMOS  
PCIe flat ribbon cable camera

**CMOSIS CMV20000 color 5K embedded camera**



20 Mpix at 33 Fps  
AMS CMOSIS CMV20000  
35 mm Color CMOS  
PCIe flat ribbon cable camera

**CMOSIS CMV50000 mono 8K embedded camera**



48 Mpix at 30 Fps  
AMS CMOSIS CMV50000  
35 mm B/W CMOS  
PCIe flat ribbon cable camera



**CMOSIS CMV50000 color  
8K embedded camera**



48 Mpix at 30 Fps  
AMS CMOSIS CMV50000

35 mm Full frame Color CMOS  
PCIe flat ribbon cable camera

**Gpixel GMAX0505 mono  
5K embedded camera**



26 Mpix  
CMOS sensor - Gpixel  
**GMAX0505**

1.1" Global shutter B/W  
150 Fps @ 10 bit

**Gpixel GMAX0505 color 5K  
embedded camera**



26 Mpix  
CMOS sensor - Gpixel  
**GMAX0505**

1.1" Global shutter Color  
150 Fps @ 10 bit

**Gpixel GMAX0505 mono  
NIR 5K embedded camera**



26 Mpix  
CMOS - Gpixel **GMAX0505RF**  
**Red Fox**

1.1" Global shutter B/W NIR  
150 Fps @ 10 bit

**Gpixel GMAX3265 mono  
8K embedded camera**



65 Mpix  
CMOS sensor - **Gpixel**  
**GMAX3265**

2.3" Global shutter B/W  
71 Fps @ 10 bit

**Gpixel GMAX3265 color 8K  
embedded camera**



65 Mpix  
CMOS sensor - **Gpixel**  
**GMAX3265**

2.3" Global shutter Color  
71 Fps @ 10 bit

## Embedded vision and multi-camera setup - xiX

### OEM type of product

### - special conditions may apply

Fast speed interface with high bandwidth of up to **64 GBit** to utilize the full potential of the sensors

Osram CMOSIS sensors:

**CMV2000, CMV4000, CMV12000, CMV20000, CMV50000**

Sony Pregius™ sensors:

**IMX174, IMX252, IMX250, IMX255, IMX253, IMX530, IMX531, IMX533**

Gpixel sensors:

**GMAX0505, GMAX3265**

Resolutions range from 2 Mpix to 65 Mpix

Ideal platform for aggregation of Multiple camera streams

Designed for use with **NVIDIA Jetson** GPU modules

Integrated Canon EF-mount control with dynamic aperture and focus control

Remotely usable sensor boards - long distance reach for Embedded vision systems

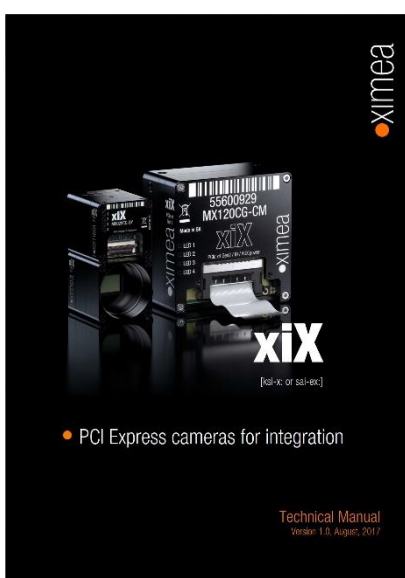
DMA (Direct memory access) ensures an almost non-existent latency of multi-camera setup

Compactness and Low power consumption

Portability and modularity

Low HW and SW overhead

HDR Dual ADC capability features with Low and High gain



Multi-camera line



xiX Manual



# Camera family page Support page

## Multi-camera Systems And Embedded Vision Applications - AlloverIP 2018

## Embedded Vision Summit 2018 Presentation on the subject Embedded Vision Summit 2017 Presentation on the subject VR starts from reality - Inspect Application Forum 2016

**xiC / xiX (small)**  
The xiC is an extremely diversified and highly modular camera family designed for the Sony Imx200 sensor series. It offers multiple versions of complete cameras and modules. Even though it is a board-level, for system integrators it has all the benefits of a single-board design and is incredibly small.  
The small xiC cameras are based on the same board-level concept and stream images to the host computer via 2 lanes on a PCI Express Gen2 bus. Together with image processing and CPU logic, the camera acts as a perfect fit for embedded vision and multi-camera applications. Thanks to fast face casing, the board-level and turn-key use, various image integration in tight spaces and close proximity between cameras.

**CONNECTORS / BOARD-LEVEL CAMERAS**

- xiC**
  - Standard Type-C**  
Board level version of standard board camera with Type-C connector, perpendicular to board surface.
  - Standard Micro-B**  
Board level version of standard board camera with Micro-B connector, perpendicular to board surface.
  - Flex-line boards**  
Collector for flat flex cables (FFC) including USB 3.1 Gen1 signals and CPUs. Flexline connector parallel to board or perpendicular to board.
- xiX**
  - PCIe Gen2 x2, CUS-mount**  
Collector for flat flex cables (FFC) with data lines, A/D converter and optics (Up to 2 CPUs sensor for up to 11 CPUs in total).

**ADDITIONAL CONNECTION**

- Thunderbolt 1 interface for direct and optical access, up to 10/GB/s
- Data powered bus powered or A/D powered

**ACCESSORIES**

- USB cable, passive length 1.5-5m
- USB cable, passive, optoelectronic connector length 3-5m
- USB cable, active length 10, 15, 20-30m
- Synco cable, digital I/O length 5-5m
- Universal board mounting bracket
- PCI express adapter for USB ports and USB ports
- Resistor for USB ports

**HIGHLIGHTS**

- USB 3.1 Gen1
- Lowest power consumption. All models are hot powered
- Smallest footprint in class
- Hot plug
- USB3 vision compliant

**MODULARITY / VARIANTS**

- Various connector technologies available: xiC, Type-C, Micro-B, flat flexion, etc. PCIe Gen2 x2 flat flexion. Additional: Thunderbolt Gen1 (not series)
- All variants are available as board camera and board level camera
- A modular board level design makes it ideal for system integration in small mobile applications and robotics
- This board-level is incredibly small, with all the benefits of a single board design
- Board level camera are operable for sensor operation
- Designed to run with embedded system platforms
- More than 30 years of machine vision hardware support, e.g. Intel, AB, Labview, Matlab, OpenCV, ...
- Compatible with all cameras: xiC, xiX, xiX2S
- Complies to various Standards: USB3 Vision, GenCam / GenTL

**SENSORS & MODELS**

Sensor	Color	Resolution	Camera series	Pixel size (µm)	A/D (bits)	DPF (dB)	Optical size	Sensor size (diagonal) (mm)	FPS*
Sony IMX174	M, C	1336 x 1016 2.1 Mpx	xiC, xiX, xiT	5.66	10, 12	72	1.1-2"	11.3 x 7.1 13.1	165
Sony IMX222	M, C	2048 x 1544 3.1 Mpx	xiC, xiX	3.45	8, 10, 12	71	1.0-8"	11 x 8.3 8.8	122
Sony IMX250	M, C	2464 x 2048 5.0 Mpx	xiC, xiX	3.45	8, 10, 12	71	1"	8.5 x 7.1 11.1	76
Sony IMX255	M, C	4112 x 2016 8.4 Mpx	xiC, xiX	3.45	8, 10, 12	71	1"	14.2 x 7.5 16.3	45
Sony IMX255	M, C	4112 x 3008 12.4 Mpx	xiC, xiX	3.45	8, 10, 12	72	1.1"	14.2 x 10.4 17.2	31
OM3558-DP92200	M, C, NR	2592 x 2025 5.2 Mpx	xiX	5.5	8, 10	60*	2"	11.5 x 8.0 12.8	340
OM3558-DP94000	M, C, NR	2592 x 2025 5.2 Mpx	xiX	5.5	8, 10	60*	1"	11.5 x 11.3 13.0	180

Note 1: M: monochrome, C: color, NR: non-removable lens attached. \*Frame 2 at 1000x1000, 2.0s. Note 2: FPS: max. available

**BIG IN MODULARITY**

## xiX and xiC - Embedded vision cameras Infographics

Overview of various versions and options possible through modularity of the camera architecture.

Clear benefits for classic system integrators or start-ups with new ideas that are offered through the diversity of multiple setups.

All with a small footprint and detachable parts or switchable sets of components.

### xSWITCH

Utilizing PCIe as a camera interface offers unique camera aggregation options, is extremely high bandwidth, enables cameras to be effectively reconfigured and their massive data streams handled into a single copper or fiber optic cable connection to a host computer, enabling boards to "reconfigure" at 67.5MB/s. Flat flex cables reduce the camera and the xSWITCH from a board to compact integration in tight spaces.

### xTECH

As a xTECH camera board, XIMEA offers a PCIe camera called xSWITCH. In one quality, size, location or orientation, PCIe cameras can be varied to optimize the building of multi-camera systems. Multiple reference instances of the PCIe already exist based on this concept, which means you have access for rapid customizations and enables customer applications.

### PCI EXPRESS TOPOLOGY

### CAMERAS

Flat flex

Board level

Support camera models refer to document: xSwitch compatible cameras

### HIGHLIGHTS

- **Maximum compactness:** installed form factor camera and one-pair connectors allow board-level sensor to sensor proximity.
- Aggregation into one **high bandwidth upstream** link to 67.5Gbit/s.
- Full utilization of PCIe architecture with point-to-point connection and **direct memory access**.
- Used as standard components allow simple assembly for the creation of a **custom platform**.
- No need for external or additional processor backbones.
- Support for **Windows, Linux and MacOS**.
- Multiple **reference instances** of the xSWITCH already available.
- **Board shape can be tailored** precisely to application requirements.
- Benefit from XIMEA's **unique experience** and expertise in the field of PCIe.

### MIX AND MATCH

- Connect **multiple cameras** to a single PC.
- Select from wide range of sensor **resolutions and frame rates**.
- Control **board-level camera types**.
- Choice of **different number of PCIe lanes** and **PCIe standards** (v. 4, 3, Gen3 or Gen2).
- Choice of **various connectors**: flat flex cables, board-to-board or IFFs.
- Choice between flat flex connectors with **vertical or horizontal orientation**.
- High level of **integration** of >100 mm by selecting copper cable or optical flat-cable.

### CONNECTION TO CAMERA

Flat flex cables: horizontal or vertical connector < 60 mm

Optical cable > 100 m

Copper cable < 7 m

### CONNECTION TO HOST

Optical cable > 100 m

Copper cable < 7 m

### PCIe HOST-ADAPTER

single

2x4

2x8

7, 4 and 0 lanes supported

### PERFORMANCE

Examples	Cameras	Resolution (Mpx)	Speed (FPS)	Camera Model	Connector	PCIe Interface
Step 1	16	2.2	180	MVC100-20-002	16x174	Gen2, 2 Lanes
Step 2	8	17.4	75	MVC140-20-002	8x203	Gen2, 2 Lanes
Step 3	4	3.1	218	MVC100-20-002	8x203	Gen2, 2 Lanes
	4	3.0	185	MVC140-20-002	8x203	Gen2, 2 Lanes
Step 4	3	12.0	130	MVC200-20-006	12x200	Gen2, 4 Lanes
Step 5	3	20.0	35	MVC100-20-006	12x200	Gen2, 4 Lanes
Step 6	6	8.8	35	MVC100-20-002	8x203	Gen2, 2 Lanes
	2	20.0	35	MVC200-20-006	12x200	Gen2, 4 Lanes

## xSwitch Infographics of Embedded vision systems

This document explains XIMEA concept for Embedded vision systems. Topology, cables (e.g. flat-flex ribbon), switches, boards, adapters - the plethora of various elements allowing to assemble a system with a perfect fit for your particular application. Easy to compile, easy to exchange and suitable for remote operation.



## Applications for embedded camera systems - examples:

361 panorama, Augmented or Virtual Reality (AR, VR), Autonomous self-driving vehicles, Street/city mapping, Deep learning tasks, Stereo camera systems, portable medical devices, 4D scanning, Entertainment, Photogrammetry, FACS scanning, Face recognition, Motion capture, UAV / UAS (drones), Cinematography, Videogrammetry, LoLa (Low Latency **audio visual streaming**)



## NVIDIA Jetson TX1/TX2

For Jetson platform customers and machine vision integrators who are designing portable, compact Embedded vision systems with high resolution, high data bandwidth and modular architecture.

**xiX cameras and carrier boards** are the ideal high bandwidth multi-camera solutions for autonomous, miniature applications in many established and Startup markets.

Unlike other generic product options which are not optimized for customization and extreme size restrictions, xiX cameras and carrier boards offer the smallest form factor and highest speed of data transmission while consuming the least amount of power and including the fastest Time to market path with exhaustive customer support.

## Cameras and Accessories

### Carrier board for NVIDIA Jetson and cameras



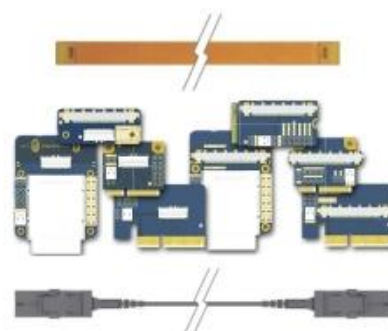
Board stack for embedded / multi cameras  
Compact standalone GPU package  
Multiple ports for cameras and peripherals  
Simultaneous synchronization and triggering

### Switches for Multi camera connections



Multiple inputs for various interface slots  
Compact multiplexor for 4 - 12 cameras  
Single high speed 64 Gbits output cable  
Simultaneous synchronization and triggering

### Adapters, Cables and Accessories



Interconnects with miscellaneous systems  
Mini PCIe, M.2, PCIe x4, x8, iPass, USB  
Flat flex ribbon cables or iPass cables  
Adapter boards, Hosts, Switches, GPIO

**CMOSIS CMV2000 PCIe  
mono industrial camera**



2.2 MPix  
2/3" CMOS, Global Shutter  
AMS CMOSIS CMV2000 B/W

**340 fps**

**CMOSIS CMV2000 PCIe  
color industrial camera**



2.2 MPix  
2/3" CMOS, Global Shutter  
AMS CMOSIS CMV2000 Color

**340 fps**

**CMOSIS CMV2000 PCIe  
NIR industrial camera**



2.2 MPix  
2/3" CMOS, Global Shutter  
AMS CMOSIS CMV2000 Near  
Infrared (NIR)

**340 fps**

**Sony IMX174 fast mono  
industrial camera**



2.3 Mpix with PCIe speed  
1/1.2" CMOS, Global Shutter  
**Sony IMX174** Pregius™ B/W  
166 fps

**Sony IMX174 fast color  
industrial camera**



2.3 Mpix with PCIe speed  
1/1.2" CMOS, Global Shutter  
**Sony IMX174** Pregius™ Color  
166 fps

**Sony IMX252 fast mono  
industrial camera**



3.1 Mpix  
1/1.8" CMOS, Global Shutter  
**Sony IMX252** B/W  
218 fps

**Sony IMX252 fast color  
industrial camera**



3.1 Mpix  
1/1.8" CMOS, Global Shutter  
**Sony IMX252** Color  
218 fps

**CMOSIS CMV4000 PCIe  
mono industrial camera**



4.2 MPix  
1" CMOS, Global Shutter  
AMS CMOSIS CMV4000 B/W  
**180 fps**

**CMOSIS CMV4000 PCIe  
Color industrial camera**



4.2 MPix  
1" CMOS, Global Shutter  
AMS CMOSIS CMV4000 Color  
**180 fps**

**CMOSIS CMV4000 PCIe  
NIR industrial camera**



4.2 MPix  
1" CMOS, Global Shutter  
AMS CMOSIS CMV4000 Near  
Infrared (NIR)  
**180 fps**

**Sony IMX250 fast mono  
industrial camera**



5 Mpix  
2/3" CMOS, Global Shutter  
**Sony IMX250 B/W**  
165 fps

**Sony IMX250 fast color  
industrial camera**



5 Mpix  
2/3" CMOS, Global Shutter  
**Sony IMX250 Color**  
165 fps

**Sony IMX255 fast mono  
industrial camera**



8.9 Mpix  
16.1mm CMOS, Global Shutter  
**Sony IMX255 B/W**  
95 fps

**Sony IMX255 fast color  
industrial camera**



8.9 Mpix  
16.1mm CMOS, Global Shutter  
**Sony IMX255 Color**  
95 fps

**Sony IMX253 fast mono  
industrial camera**



12.4 Mpix  
17.6mm CMOS, Global Shutter  
**Sony IMX253 B/W**  
69 fps

**Sony IMX253 fast color  
industrial camera**



12.4 Mpix  
17.6mm CMOS, Global Shutter  
**Sony IMX253 Color**  
69 fps

**Sony IMX542 fast mono  
industrial camera**



16.1 Mpix  
1.1" Sony CMOS Pregius S™,  
4th Gen  
**Sony IMX542 B/W**  
45 fps

**Sony IMX542 fast color  
industrial camera**



16.1 Mpix  
1.1" Sony CMOS Pregius S™,  
4th Gen  
**Sony IMX542 Color**  
45 fps

**Sony IMX532 HDR mono industrial camera**



16.1 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX532** B/W  
45 fps

**Sony IMX532 HDR color industrial camera**



16.1 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX532** Color  
45 fps

**Sony IMX541 fast mono industrial camera**



20.3 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX541** B/W  
35 fps

**Sony IMX541 fast color industrial camera**



20.3 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX541** Color  
35 fps

**Sony IMX531 HDR mono industrial camera**



20.3 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX531** B/W  
35 fps

**Sony IMX531 HDR color industrial camera**



20.3 Mpix  
1.1" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX531** Color  
35 fps

**Sony IMX540 fast mono industrial camera**



24.5 Mpix  
1.2" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX540** B/W  
30 fps

**Sony IMX540 fast color industrial camera**



24.5 Mpix  
1.2" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX540** Color  
30 fps

**Sony IMX530 HDR mono industrial camera**



24.5 Mpix  
1.2" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX530** HDR B/W  
30 fps



**Sony IMX530 HDR color industrial camera**



24.5 Mpix  
1.2" Sony CMOS Pregius S™, 4th Gen  
**Sony IMX530** Color  
30 fps

**CMOSIS CMV12000 mono 4K embedded camera**



12 Mpix at 133 Fps  
AMS CMOSIS CMV12000  
28 mm B/W CMOS  
PCIe flat ribbon cable camera

**CMOSIS CMV12000 color 4K embedded camera**



12 Mpix at 133 Fps  
AMS CMOSIS CMV12000  
28 mm Color CMOS  
PCIe flat ribbon cable camera

**CMOSIS CMV20000 mono 5K embedded camera**



20 Mpix at 33 Fps  
AMS CMOSIS CMV20000  
35 mm B/W CMOS  
PCIe flat ribbon cable camera

**CMOSIS CMV20000 color 5K embedded camera**



20 Mpix at 33 Fps  
AMS CMOSIS CMV20000  
35 mm Color CMOS  
PCIe flat ribbon cable camera

**CMOSIS CMV50000 mono 8K embedded camera**



48 Mpix at 30 Fps  
AMS CMOSIS CMV50000  
35 mm B/W CMOS  
PCIe flat ribbon cable camera

**CMOSIS CMV50000 color  
8K embedded camera**



48 Mpix at 30 Fps  
AMS CMOSIS CMV50000

35 mm Full frame Color CMOS  
PCIe flat ribbon cable camera

**Gpixel GMAX0505 mono  
5K embedded camera**



26 Mpix  
CMOS sensor - Gpixel  
**GMAX0505**

1.1" Global shutter B/W  
150 Fps @ 10 bit

**Gpixel GMAX0505 color 5K  
embedded camera**



26 Mpix  
CMOS sensor - Gpixel  
**GMAX0505**

1.1" Global shutter Color  
150 Fps @ 10 bit

**Gpixel GMAX0505 mono  
NIR 5K embedded camera**



26 Mpix  
CMOS - Gpixel **GMAX0505RF**  
**Red Fox**

1.1" Global shutter B/W NIR  
150 Fps @ 10 bit

**Gpixel GMAX3265 mono  
8K embedded camera**



65 Mpix  
CMOS sensor - **Gpixel**  
**GMAX3265**

2.3" Global shutter B/W  
71 Fps @ 10 bit

**Gpixel GMAX3265 color 8K  
embedded camera**



65 Mpix  
CMOS sensor - **Gpixel**  
**GMAX3265**

2.3" Global shutter Color  
71 Fps @ 10 bit