

# Iron CoaXPress Small Form Factor, Ruggedized Camera

## **Innovative Approach**

The *Iron 2020E* is a high speed, low-cost, low-power global/rolling shutter CMOS camera with up to 12.5 Gbps CoaXPress 2.0 interface (Micro-BNC connector) which supports 4 MP high quality video at rates of up to 220fps.

#### Intelligent Design

The GSENSE2020e is a global/rolling shutter sensor with a 6.5µm pixel size. With a compact outline the camera can be fitted into tight spaces. Superior sensor performance allows very low light vision capabilities.

#### **Applications:**

- Perimeter vision
- Low light surveillance
- Special Effects
- Virtual Reality

#### **Key Features:**

- 4 Megapixel up to 220 fps
- Up to 4W power at full rate
- Full image processing feature set
- Optional Pan/Tilt alignment of the sensor
- Up to 12.5 Gbps CoaXPress interface
- C / CS / EF or DC Auto Iris mounts available
- Full EMVA1288 report
- Full built-in self-test (BIT)
- Full built-in voltage testing
- Customization as per user requirements

# Datasheet | Iron CoaXPress 2020E

# **Technical Data**

Pixel size	Feature Feature	Description
Resolution   2048 (H) x 2048 (V)   Sensor size   13.3 mm x 13.3 mm 1 1.2"   Sensor size   13.3 mm x 13.3 mm x 12.3 mm x 12.5 Clops (CXP3, CXP6, CXP12)   Sensor   Gpixed GSPNSE200e   Sensor   Gpixed GSPNSE200e   Sensor   Gpixed Connector   Micro-BNC   Global shutter   Global shutter   Global shutter   Shutter speed   Global shutter   Shutter speed shutter		•
Sensor size         13.3 mm x 13.3 mm   1.2"           Sensor         Spixed SSENSE2020e           Video output         CoaxPress 2.0 up to 12.5 Gbps (CXP3, CXP6, CXP12)           Interface connector         Micro-BNC           Digitization         10 bit, 12 bit           Electronic shutter         Rolling / Global shutter           Shutter speed         Global: 2.54 µs @12-bit resolution           Exposure control         Off / Internal / Auto           Image acquisition         Continuous / Trigger of           Trigger input 1°1         External, pulse generator, SW           Trigger mode         Free run, externally or internally triggered           Trigger options         Edge, de-bounce           Output resolution         15bts HDR in API or 24bit RAW (2x 10 or 12 bit ADC)           Frame rate         Global: 94 ½s in HDR           Rolling: 47 ½s in HDR         47 ½s in HDR           Subsampling         1 x 2 / 2 x 1 / 2 x 2 (user configurable)           Monochrome / color         Monochrome           Full well charge         Global HDR: 40 ke           Rolling HDR: 40 ke         82 liber           Rolling HDR: 40 ke         82 liber           Quantum efficiency (QE) X Ff         72% @556 m (according to sensor performance)           Temporal rolse		
Sansor         Spixel GSENSE2020e           Video duptul         CoaXPress 2.0 up to 12.5 Gbps (CXP3, CXP6, CXP12)           Interface connector         Micro-BNC           Digitization         10 bit, 12 bit           Electronic shutter         Rolling / Global shutter           Shuter spood         Global: 2.54 µs @12-bit resolution           Exposure control         Off / Internal / Auto           Image acquisition         Continuous / Trigger rod           Trigger mode         External, pulse generator, SW           Trigger options         Edge, de-bource           Output resolution         16bts HDR in API or 24bit RAW (2x 10 or 12 bit ADC)           Frame rate         Global: 94 fps in HDR           220 fps @10 bit         Rolling: 47 fps in HDR           Rolling: 47 fps in HDR         220 fps @10 bit           Rolling: 47 fps in HDR         220 fps @10 bit           Monochrome / color         Monochrome           Full well charge         Global HDR: 17.1 ker           Rolling HDR: 47 fps in HDR         20 fps @10 bit           Rolling HDR: 47 fps in HDR         20 fps @10 bit           Rolling HDR: 78 dB         17 fps in HDR           Dynamic range         Global HDR: 17 fps in HDR           Rolling HDR: 78 dB         20 fps		
Video output		·
Interface connector		•
Digitization   10 bit, 12 bit   Selection is whitter   Rolling / Global shitter   Rolling / Global shitter   Rolling / Global shitter   Rolling   18.4 µ se @12-bit resolution   Rolling   Rol	·	
Solution is shutter   Solution   Solution		
Shutter speed	-	
Rolling: 18.4 µs @ 12-bit resolution		
Exposure control   Off / Internal / Auto   Image acquisition   Continuous / Triggered   Free run, external pulse generator, SW     Trigger input	Shutter speed	
Trigger input   10	Exposure control	
Trigger input (**)  Trigger mode  Free run, externally or internally triggered  Trigger options  Edge, de-bounce  Output resolution  16bits HDR in API or 24bit RAW (2x 10 or 12 bit ADC)  Frame rate    Globai   94 ps in HDR		
Triger mode		
Trigger options		
Output resolution         16bits HDR in API or 24bit RAW (2x 10 or 12 bit ADC)           Frame rate         Global: 94 fps in HDR 220 fps @ 10 bit RAW (2x 10 or 12 bit ADC)           Rolling: 47 fps in HDR 94 fps @ 12 bit           Subsampling         1 x 2 / 2 x 1 / 2 x 2 (user configurable)           Monochrome / color         Monochrome           Full well charge         Global HDR: 40 ker           Plumantic range         Global HDR: 50 dB           Rolling HDR: 78 dB           Dynamic range         Global HDR: 63 dB           Rolling HDR: 72 e @ 25 C           Quantum efficiency (QE) X FF         72 % @ 595 mm (according to sensor performance)           Temporal noise         Global HDR: 7.2 e @ 25C           Rediling HDR: 2.6 e @ 25C         Rolling HDR: 2.6 e @ 25C           Latency         1 100 µs (on top of exposure time)           Communication latency         Gen-ki>Cam - 5 ms           Direct camera access0.5 ms           Regulation         FCC Part 15 Class A, CE, RoHs2 (official certification optional)           On camera processing         • Defect pixel correction • LUT           • Digital binning (2 x 2)         • Gain (Analog / Digital) – manual / auto           • Digital binning (2 x 2)         • Gain (Analog / Digital) – manual / auto           • Auto Exposure/Gain           Pulse gener		
Parame rate	30 .	
Rolling:		
Rolling	Frame rate	- 1, pe
Subsampling         1 x 2 / 2 x 1 / 2 x 2 (user configurable)           Monochrome / color         Monochrome           Full well charge         Global HDR: 17.1 ke Rolling HDR: 40 ke           Dynamic range         Global HDR: 63dB Rolling HDR: 78dB           Dark current         17 e px//sec ≥ 1 °C           Quantum efficiency (QE) x FF         < 72% @ 595 m (according to sensor performance)		
Subsampling         1 x 2 / 2 x 1 / 2 x 2 (user configurable)           Monochrome / color         Monochrome           Full well charge         Global HDR: do ker           Pulse generator         Global HDR: do ker           Pulse generator         Global HDR: do ker           Pulse generator         Auto (Normanus)           Pulse generator         Yes, Program ble at 8 ns increments           Autoling HDR: do ker         2 x 2 y c c c c c c c c c c c c c c c c c c		
Monochrome / color         Monochrome           Full well charge         Global HDR: 17.1 ke¹ Rolling HDR: 40 ke²           Dynamic range         Global HDR: 63dB Rolling HDR: 78dB           Dark current         17 e² pxl/sec ② 21 °C           Quantum efficiency (QE) X FF         <72% @595 rm (according to sensor performance)		
Full well charge		
Rolling HDR:   40 ke		Monochrome
Dynamic range   Global HDR:   63dB   Rolling HDR:   76dB	Full well charge	
Rolling HDR: 78dB  Dark current 17 e pxl/sec @ 21 °C  Quantum efficiency (QE) X FF < 72% @ 595 nm (according to sensor performance)  Temporal noise   Global HDR: 7.2 e @ 25C   Rolling HDR: 2.6 e @ 25C  Latency < 100 µs (on top of exposure time)  Communication latency   Gen <i>Scam - ~5 ms   Direct camera access - ~0.5 ms  Regulation   FCC Part 15 Class A, CE, RoHs2 (official certification optional)  On camera processing   Defect pixel correction   LUT   Gain (Analog / Digital) - manual / auto   Auto Exposure/Gain  Pulse generator   Yes, Programmable at 8 ns increments  Additional features   Over/under voltage protection   Reverse voltage polarity protection   Frame-by-frame shutter speed change   Per frame ROI change   Global reset   Global reset   Per-pixel FPN (optional)   Multi ROI Support (vertical only. Horizontal at full resolution)</i>		
Dark current  17 er pxl/sec @ 21 °C  Quantum efficiency (QE) X FF  72% @595 nm (according to sensor performance)  Global HDR: 7.2 er @25C  Rolling HDR: 2.6 er @25C  Latency  < 100 µs (on top of exposure time)  Communication latency  Gen <i>Cam5 ms  Direct camera access0.5 ms  Regulation  FCC Part 15 Class A, CE, RoHs2 (official certification optional)  On camera processing  Pulse generator  Pulse generator  Yes, Programmable at 8 ns increments  Additional features  Per frame ROI change Multi ROI Support (vertical only. Horizontal at full resolution)  Multi ROI Support (vertical only. Horizontal at full resolution)</i>	Dynamic range	
Quantum efficiency (QE) X FF  72% @595 nm (according to sensor performance)  Global HDR: 7.2 e @25C Rolling HDR: 2.6 e @25C  Latency  < 100 µs (on top of exposure time)  Communication latency  Gen <i>Cam - ~5 ms Direct camera access - ~0.5 ms  Regulation  FCC Part 15 Class A, CE, RoHs2 (official certification optional)  On camera processing  • Defect pixel correction • LUT • Digital binning (2 x 2) • ROI [2] • Auto Exposure/Gain  Pulse generator  Yes, Programmable at 8 ns increments  Additional features  • Over/under voltage protection • Three points of temperature sensing • Per frame ROI change • Per-pixel FPN (optional) • Multi ROI Support (vertical only. Horizontal at full resolution)</i>		
Temporal noise       Global HDR: 7.2 e @ 25C         Rolling HDR: 2.6 e @25C         Latency       < 100 μs (on top of exposure time)	Dark current	17 e <sup>-</sup> pxl/sec @ 21 °C
Rolling HDR: 2.6 e @25C  Latency < 100 µs (on top of exposure time)  Communication latency	Quantum efficiency (QE) X FF	<72% @595 nm (according to sensor performance)
Latency  Communication latency Gen <i>Cam - ~5 ms Direct camera access - ~0.5 ms Regulation FCC Part 15 Class A, CE, RoHs2 (official certification optional) On camera processing • Defect pixel correction • Digital binning (2 x 2) • ROI [2] • Auto/Manual black level • Auto/Manual black level • Auto/Manual black level • Auto/Increments Additional features • Over/under voltage protection • Reverse voltage polarity protection • Three points of temperature sensing • Frame-by-frame shutter speed change • Per frame ROI change • Global reset • Per-pixel FPN (optional) • Multi ROI Support (vertical only. Horizontal at full resolution)</i>	Temporal noise	Global HDR: 7.2 e <sup>-</sup> @25C
Communication latency  Gen <i>Cam - ~5 ms  Direct camera access - ~0.5 ms  FCC Part 15 Class A, CE, RoHs2 (official certification optional)  On camera processing  Defect pixel correction Digital binning (2 x 2) ROI [2] Auto/Manual black level Auto Exposure/Gain  Pulse generator  Yes, Programmable at 8 ns increments  Additional features  Over/under voltage protection Reverse voltage polarity protection Frame-by-frame shutter speed change Fer frame ROI change Per-pixel FPN (optional) Multi ROI Support (vertical only. Horizontal at full resolution)</i>		Rolling HDR: 2.6 e <sup>-</sup> @25C
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<ul> <li>Digital binning (2 x 2)</li> <li>ROI <sup>[2]</sup></li> <li>Auto Exposure/Gain</li> <li>Pulse generator</li> <li>Additional features</li> <li>Over/under voltage protection</li> <li>Three points of temperature sensing</li> <li>Per frame ROI change</li> <li>Per-pixel FPN (optional)</li> <li>Multi ROI Support (vertical only. Horizontal at full resolution)</li> <li>Gain (Analog / Digital) – manual / auto</li> <li>Auto/Manual black level</li> <li>Reverse voltage polarity protection</li> <li>Frame-by-frame shutter speed change</li> <li>Global reset</li> </ul>	Regulation	FCC Part 15 Class A, CE, RoHs2 (official certification optional)
ROI <sup>[2]</sup> Auto Exposure/Gain  Pulse generator  Yes, Programmable at 8 ns increments  Additional features  Over/under voltage protection Three points of temperature sensing Per frame ROI change Per frame ROI change Per-pixel FPN (optional) Multi ROI Support (vertical only. Horizontal at full resolution)  Auto/Manual black level  Reverse voltage polarity protection Frame-by-frame shutter speed change Global reset  Houlti ROI Support (vertical only. Horizontal at full resolution)	On camera processing	
Pulse generator  Yes, Programmable at 8 ns increments  Additional features  Over/under voltage protection Three points of temperature sensing Per frame ROI change Per-pixel FPN (optional) Multi ROI Support (vertical only. Horizontal at full resolution)		
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<ul> <li>Three points of temperature sensing</li> <li>Per frame ROI change</li> <li>Global reset</li> <li>Per-pixel FPN (optional)</li> <li>Multi ROI Support (vertical only. Horizontal at full resolution)</li> </ul>	-	-
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<ul> <li>Per-pixel FPN (optional)</li> <li>Multi ROI Support (vertical only. Horizontal at full resolution)</li> </ul>		
Multi ROI Support (vertical only. Horizontal at full resolution)		•
	GPIO connection	

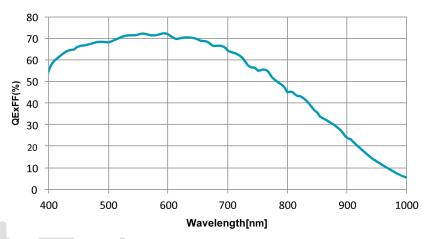
#### **Mechanical & Electrical**

Description
44 mm x 44 mm x 51.8 mm (Height x Width x Depth)
C-mount, CS-mount, EF-mount or DC Auto Iris lenses
<100g
170mA @ 24V
<4W @ 24V DC
Front mount
Front heat dissipation
≤ 0.15°
-40°C to 80°C, 10-90% humidity (non-condensing)
-40°C to 90°C, 10-90% humidity (non-condensing)
MIL 810F

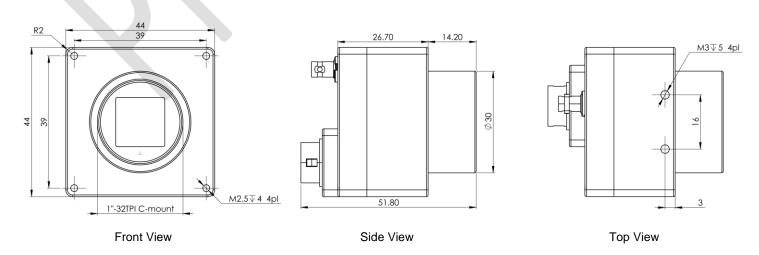
<sup>1.</sup> The output is synchronized to the trigger on a frame by frame basis

## **Absolute Quantum Efficiency**

# **GSENSE2020e Spectral Response**



# **Mechanical Drawings**



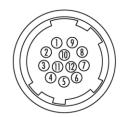
<sup>2.</sup> ROI position can change on a frame by frame basis

<sup>\*</sup> Performance is measured at full resolution, maximum bitness and the maximum frame rate for that bitness

<sup>\*\*</sup> KAYA Instruments reserves the right to update the data sheet from time to time without prior notice.

### **General Purpose Input Output**

GPIO Pinout - 12 Pin Hirose Connector



- 1. DC Power return
- 2. DC Power
- 3. RS232 RX
- 4. RS232 TX
- 5. OUT2 Return (OPTO)
- 6. RS232 Return
- 7. OUT1 (TTL)
- 8. IN1 (TTL)
- 9. IN2 (LVTTL)
- 10. IN1/OUT1 Return
- 11. IN2 Return (LVTTL)
- 12. OUT2 (OPTO)

## Compatibility

**KAYA Instruments** creates and maintains compatibility and interfaces for the most common and advanced vision image processing libraries and applications.

Major support is available for MVTec Halcon, National Instruments' LabVIEW and MathWorks' MATLAB.

Supported vision standards:



Supported vision libraries:











Supported operating systems:





Please check our website for an up-to-date list of other supported libraries and software package

## Contact Us

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