

# XGS 16000 Global Shutter CMOS Image Sensor

## XGS Family

### Description

The XGS CMOS image sensor family provides high resolution, high performance global shutter image capture. This is a 16 MP 1.1 inch resolution variant that is hardware compatible to the XGS 12000 and lower XGS resolutions. The 21.5 mm x 19.5 mm package makes this sensor particularly suited for integration in 29 mm x 29 mm camera formats. The high speed, 12-bit output maximally leverages interfaces such as USB 3.2, Thunderbolt™ 2 and 10 GigE.

Image data is read out through a column ADC architecture and then transferred over a HiSPi interface. On-chip logic, programmable via the serial interface, generates internal timing for integration and readout control. Up to three register configurations can be programmed and sequentially enabled (frame by frame) using a single command over the control interface.

**Table 1. KEY PERFORMANCE PARAMETERS**

Parameter	Typical Value	
Optical Format	XGS 16000	1.1 inch (18.1 mm Diagonal)
Active Pixels	XGS 16000	4000 (H) x 4000 (V)
Pixel Size	3.2 $\mu$ m	
Color Filter Array	Monochrome, Bayer	
Shutter Type	Global Shutter	
Input Clock	32.4 MHz	
Output Interface	HiSPi (24 Lanes – 777.6 Mbps/lane)	
Frame Rate (12-bit)	24 Lanes (–X1)	
	XGS 16000	69 fps
	12 Lanes (–X2)	
	XGS 16000	43 fps
	6 Lanes (–X3)	
	XGS 16000	21 fps
Read Noise	4 e <sup>-</sup> (1x), 1.9 e <sup>-</sup> (4x)	
SNR <sub>MAX</sub>	40 dB	
Dynamic Range	68 dB	
Supply Voltages	1.2 V, 2.8 V, 3 V (0.4 V, 1.8 V Optional)	
Power Consumption	1 W (Full Speed, Full Resolution)	
Operating Temp.	–40°C to 85°C (Junction)	
Package	163-pin iLGA (Inspectable Land Grid Array)	

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

## Non-NDA Data Sheet

**Interested in what you see?** If you would like more detailed information, please request the full version of our data sheet.

[Request Full Data Sheet](#)

### Features

- On-chip 12-bit Column ADCs
- 10-bit Mode with Increased Frame Rate of 76 fps (24-lane) at Full Resolution
- Companding and 10-Bit Mode at 52 fps (12-lane) and 26 fps (6-lane)
- Dual Gain Mode with 74.5 dB Dynamic Range (T<sub>J</sub> = 40°C) at Half Frame Rate
- Data Interface: 24-lane HiSPi (Scalable Low-Voltage Signaling)
- Configurable Number of HiSPi Lanes: 24, 18, 12 or 6 Lanes
- Two-Wire (I<sup>2</sup>C) and Four-Wire (SPI) Serial Interface
- Triggered Integration and Readout Control
- Programmable Control for up to 64 Regions of Interest (ROI)
- Context Switching
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Machine Vision
- Security
- Intelligent Transportation Systems (ITS)
- Broadcasting
- Medical
- Scientific

# XGS Family

## ORDERING INFORMATION

**Table 2. ORDERABLE PART NUMBERS** (Notes 1, 2)

Part Number	Product Description			Speed Grade	Resolution (H x V)
NOIX1SE016KB-LTI	16 MP	Color	Production Device	24 lanes	4000 x 4000
NOIX1SN016KB-LTI	16 MP	Mono	Production Device		
NOIX2SE016KB-LTI	16 MP	Color	Production Device	12 lanes	
NOIX2SN016KB-LTI	16 MP	Mono	Production Device		
NOIX3SE016KB-LTI	16 MP	Color	Production Device	6 lanes	
NOIX3SN016KB-LTI	16 MP	Mono	Production Device		

1. See the **onsemi** Device Nomenclature document (TND310/D) for a full description of the naming convention used for image sensors. For reference documentation, including information on evaluation kits, please visit our web site at [www.onsemi.com](http://www.onsemi.com).
2. All devices listed in Table 2 are equipped with microlenses and optimized for a 0° Chief Ray Angle (zero-shift placement).

**Table 3. ORDERING INFORMATION EVALUATION KITS**

Part Number	Product Description	Additional Information
NOIX1SN016KBLFB-GEVB	Sensor Headboard (16 MP, Mono, 24-Lane)	Demo Kit Headboard (incl. NOIX1SN016KB-LTI) (Note 3)
NOIX1SE016KBLFB-GEVB	Sensor Headboard (16 MP, Color, 24-Lane)	Demo Kit Headboard (incl. NOIX1SE016KB-LTI) (Note 3)
AGBAN6CS-GEVK	Frame Buffer Demo Board	AP21088 including Power Adapter
AGB1N0CS-GEVK	Demo 3 Board	FPGA Base Board including USB Cable and Tripod

3. Sensors are soldered to the headboard.

## XGS Family

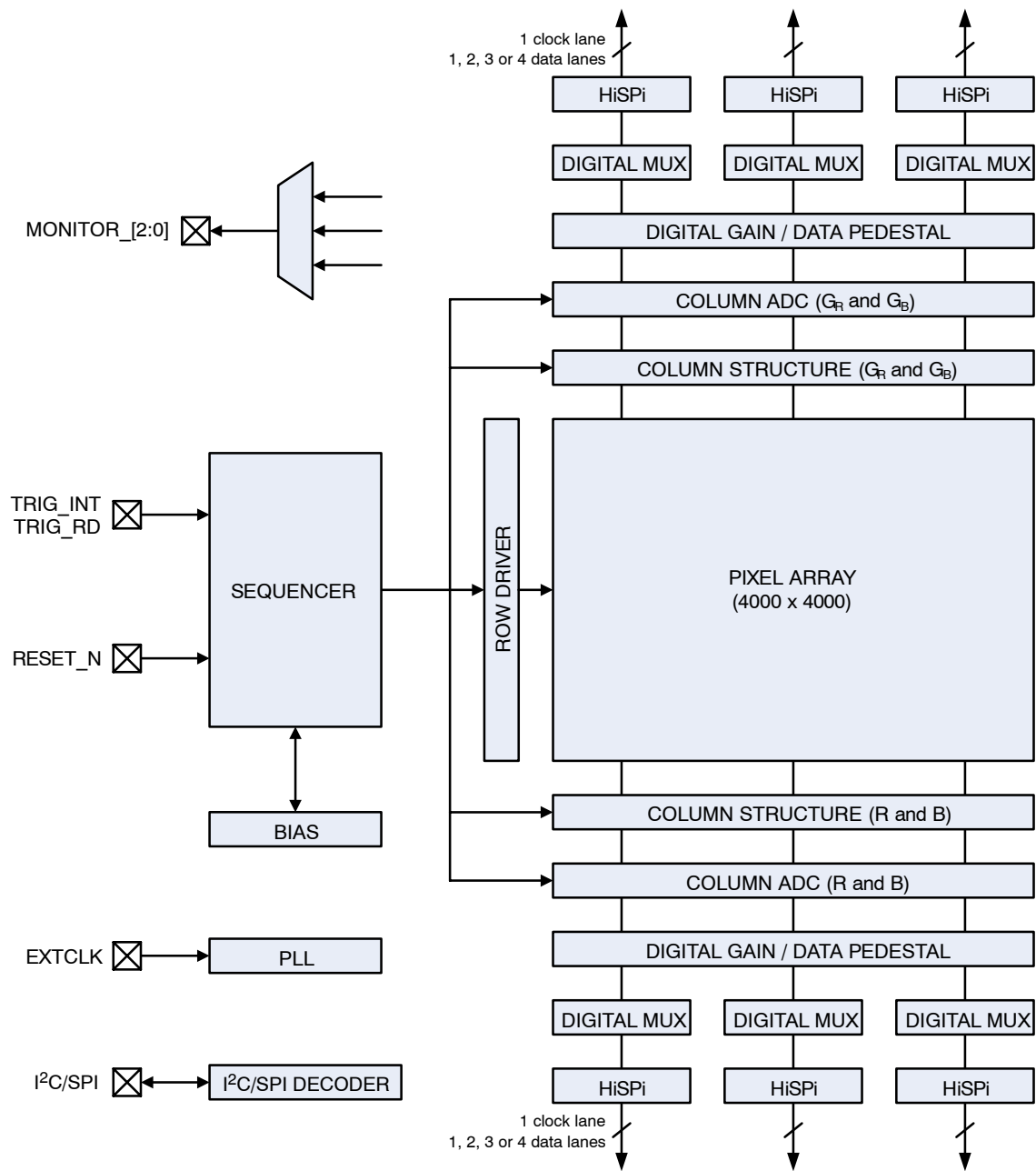
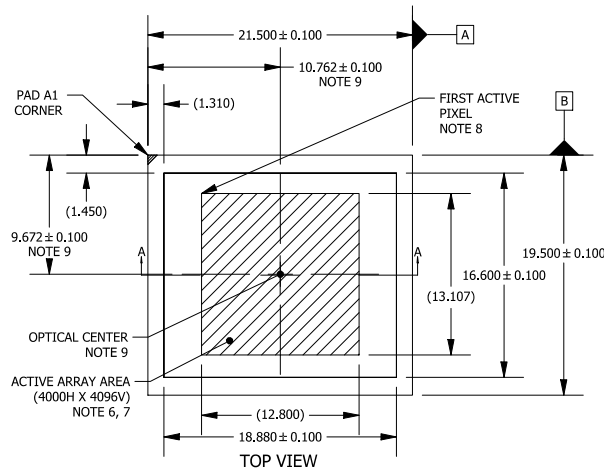


Figure 1. Functional Block Diagram (XGS 16000)

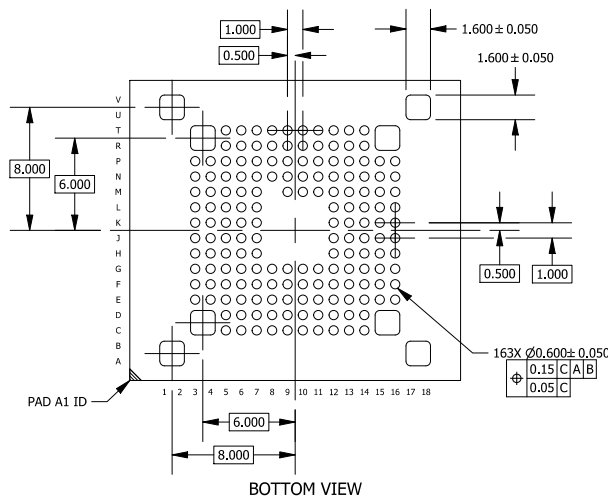
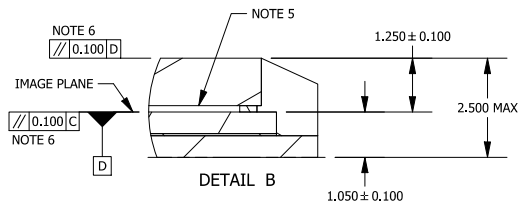
ILGA163 21.5x19.5, 1P  
CASE 710AA  
ISSUE C

DATE 08 JUL 2020

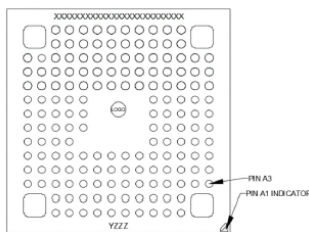


## NOTES

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS [mm].
3. COPLANARITY APPLIES TO THE PLATED LAND PADS.
4. GLASS: 1.100 THICKNESS; REFRACTIVE INDEX = 1.52.
5. AIR GAP BETWEEN GLASS AND PIXEL ARRAY: 0.150 THICKNESS.
6. PARALLELISM APPLIES ONLY TO THE ACTIVE ARRAY.
7. MAXIMUM ROTATION OF ACTIVE ARRAY RELATIVE TO DATUMS A AND B IS  $\pm 1^\circ$ .
8. REFER TO THE DEVICE DATA SHEET FOR TOTAL PIXEL ARRAY DEFINITIONS.
9. OPTICAL CENTER RELATIVE TO PACKAGE CENTER (X, Y) = (0.012, 0.078).
10. PACKAGE CENTER X Y = 0.000 0.000 .

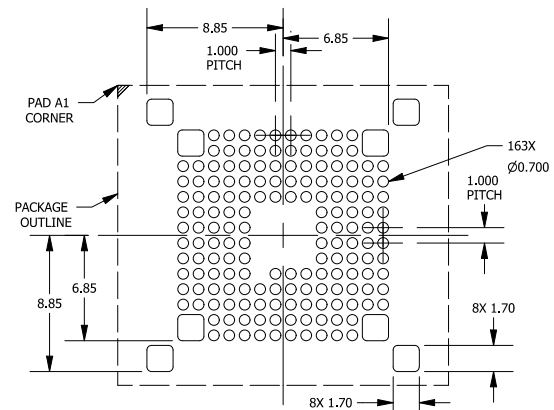


### GENERIC MARKING DIAGRAM\*



XXXX = Specific Device Code  
Y = Year  
ZZZ = Assembly Lot Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.



RECOMMENDED MOUNTING FOOTPRINT\*

\*FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

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