XGS 16000 Global Shutter CMOS Image Sensor

XGS Family

ORDERING INFORMATION

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

Public Data Sheet

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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 μm	
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^- (1x), 1.9 e^- (4x)	
SNR_{MAX}	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)	

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_J = 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^2C) 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

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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.
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.

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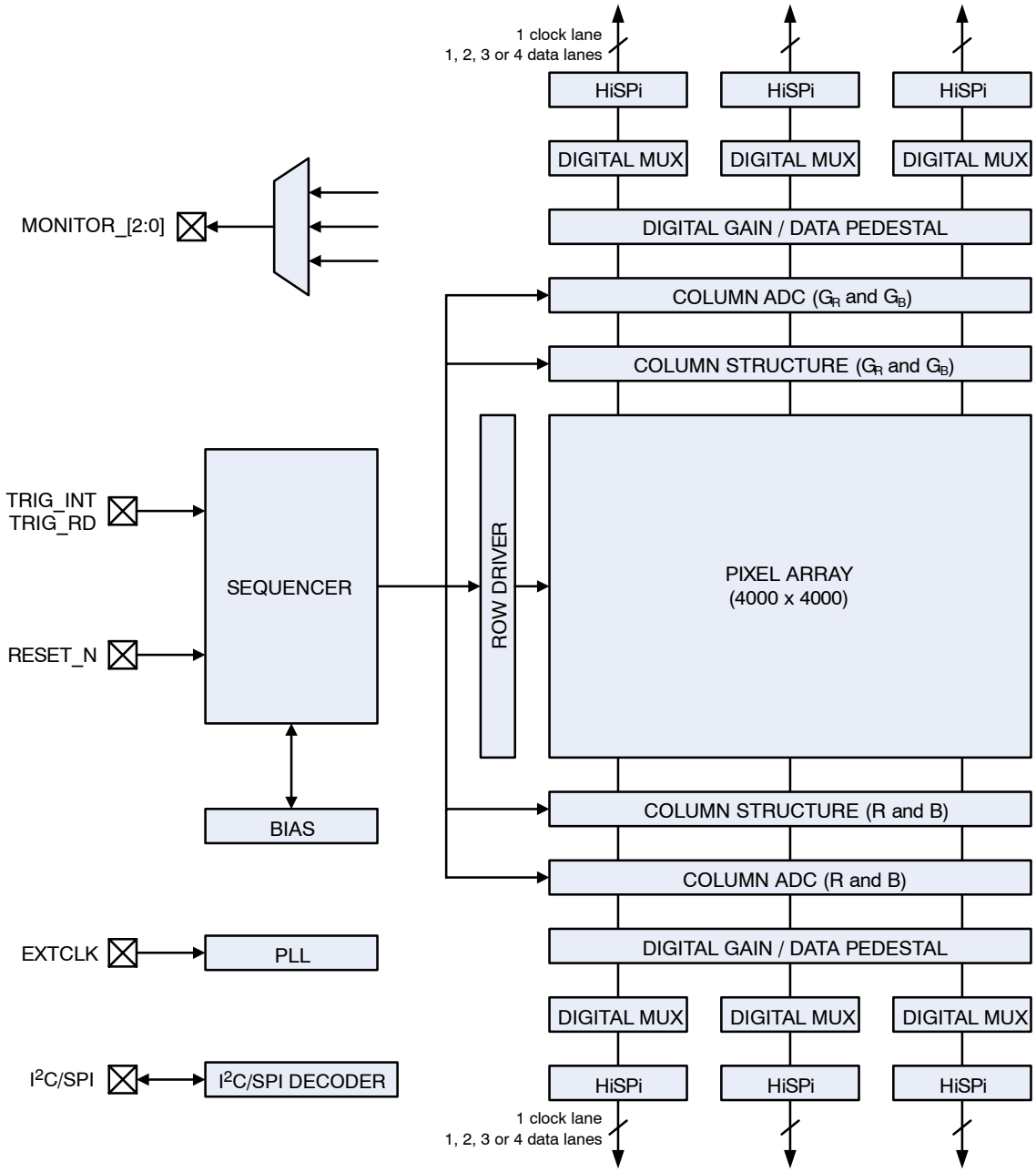

Figure 1. Functional Block Diagram (XGS 16000)

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

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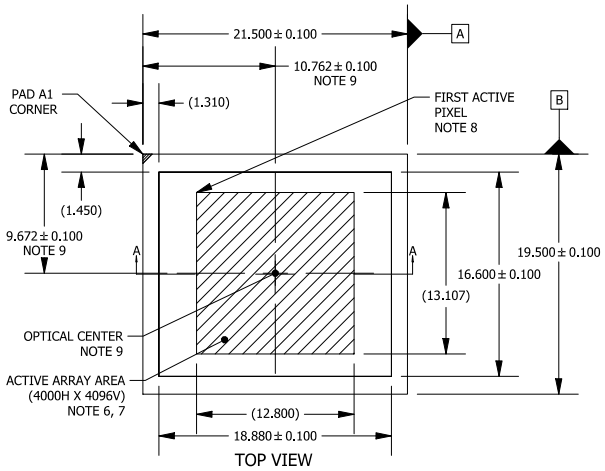
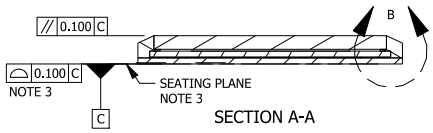
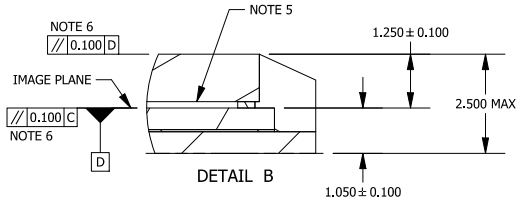


TOP VIEW



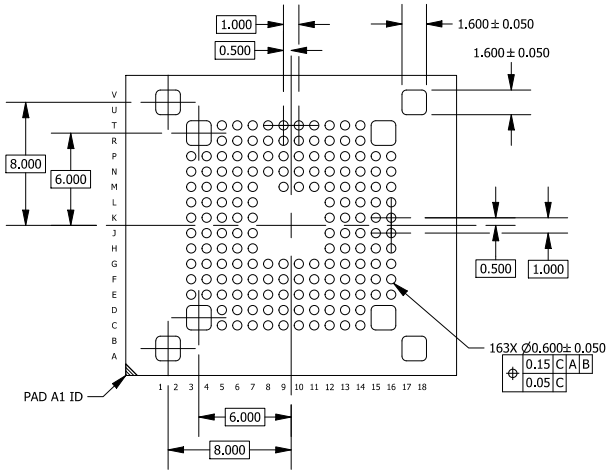
SECTION A-A



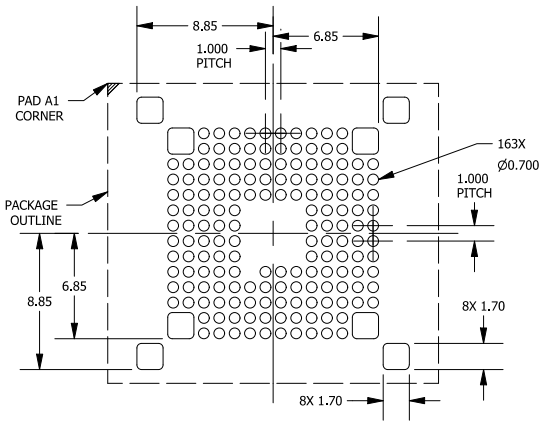
DETAIL B

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 ± 1°.
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 .



BOTTOM VIEW



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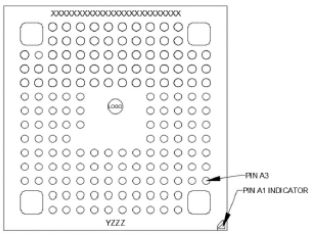
GENERIC MARKING DIAGRAM*



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.

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