XGS 45000, XGS 32000, XGS 30000 and XGS 20000 Global Shutter CMOS Image Sensors

XGS Family

Description

The XGS family was designed for industrial and ITS applications but is also used in applications that benefit from compact, global shutter sensing. The higher resolution variants, featuring a larger optical format, are specifically targeted at applications where larger fields of view in combination with an excellent optical resolution are required such as flat panel display inspection, aerial surveillance and printed circuit board inspection. XGS is a truly hardware scalable solution with a universal data, control and optical interface where parts only differ in resolution and frame rate. The family has been specified for compatibility with popular machine vision cameras and is ready to take maximum advantage from upcoming camera interface standards like USB 3.2, Thunderbolt™ (rev. 3) and 10 GigE and 4x CoaXPress6. For ITS, it brings a next step in low light imaging and an interesting range of resolutions.

Within the XGS family the image is read out through a column ADC architecture and then transferred over a HiSPi digital interface. The sensors can be configured to use from 48 to 12 data channels. The on−chip digital logic, programmable via the serial interface, generates all internal timing for integration control and supports all read out modes.

Advanced trigger functions enable synchronization to external events (Master and Slave Triggered) but also allow the camera to synchronize the image read out with the host (receiver) on a frame or line basis (Slave Frame Read and Slave Line Read).

The image can be read out by up to 64 independent ROIs; a unique identifier will enable the host to detect the active ROI configuration during the transfer over the HiSPi interface.

Up to three different register configurations sets (contexts) can be programmed and also sequentially enabled (frame by Frame) with a single command over the control interface.

Various operating modes enable a flexible sensor operation to meet application specific requirements such as reduced read out data rate, implemented by HiSPi channel multiplexing (48, 36, 24, & 12 channels), reduced power consumption by going to an idle mode while waiting for an external trigger.

The XGS 45000 sensor adds to the XGS family and has the same pin functionality, optical performance, and sequencer as the rest of the XGS family of sensors.

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 52 fps (48−lane) at Full Resolution
- Companding & 10−Bit Mode at 37 fps (24−lane) and 19 fps (12−lane)
- Dual Gain Mode with 74.5 dB Dynamic Range (T_J = 40°C) at Half Frame Rate
- Data Interface: 48−lane HiSPi (Scalable Low−Voltage Signaling)
- Configurable Number of HiSPi Lanes: 48, 36, 24 or 12
- 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 (8192 by 4320 @60 fps)
- Medical
- Scientific

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Table 1. KEY PERFORMANCE PARAMETERS

Parameter	Typical Value	
Optical Format	XGS 45000	Super 35 mm
	XGS 32000	APS−C
	XGS 30000	APS−C
	XGS 20000	1.3 Inch
Active Pixels	XGS 45000	8192 (H) x 5460 (V)
	XGS 32000	6580 (H) x 4940 (V)
	XGS 30000	5460 (H) x 5460 (V)
	XGS 20000	4500 (H) x 4500 (V)
Pixel Size	3.2 μm	
Color Filter Array	Monochrome, Bayer	
Shutter Type	Global Shutter	
Input Clock	32.4 MHz	
Output Interface	HiSPi (48 Lanes − 777.6 Mbps/lane)	
Frame Rate (12−bit)	48 Lanes (−X0)	
	XGS 45000	48 fps (60 fps @ 8192 by 4320 8k ROI)
	XGS 32000	52 fps
	XGS 30000	48 fps
	XGS 20000	58 fps
	24 Lanes (−X1)	
	XGS 45000	31 fps
	XGS 32000	35 fps
	XGS 30000	31 fps
	XGS 20000	38 fps
	12 Lanes (−X2)	
	XGS 45000	16 fps
Read Noise	4.5 e^- (1x), 2.0 e^- (4x)	
SNR_{MAX}	39.6 dB	
Dynamic Range	67.5 dB	
Supply Voltages	1.2V, 2.8 V, 3 V (0.4 V, 1.8 V optional)	
Power Consumption	2.3 W (Full Speed, Full Resolution)T	
Operating Temp.	−40°C to 85°C (Ambient)	
Package	251−pin Ceramic μPGA	

Table 2. ORDERABLE PART NUMBERS (Note 1)

Part Number	Product Description			Speed Grade	Resolution (H x V)
NOIX0SN045KB−GTI	44.7 MP	Mono	10°CRA	48 Lanes	8192 x 5460
NOIX0SE045KB−GTI	44.7 MP	Color	10°CRA		
NOIX1SN045KB−GTI	44.7 MP	Mono	10°CRA	24 Lanes	
NOIX1SE045KB−GTI	44.7 MP	Color	10°CRA		
NOIX2SN045KB−GTI	44.7 MP	Mono	10°CRA	12 Lanes	
NOIX2SE045KB−GTI	44.7 MP	Color	10°CRA		

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Table 2. ORDERABLE PART NUMBERS (Note 1)

Part Number	Product Description			Speed Grade	Resolution (H x V)
NOIX0SN032KB−GTI	32.4 MP	Mono	10°CRA	48 Lanes	6580 x 4940
NOIX0SE032KB−GTI	32.4 MP	Color	10°CRA		
NOIX1SN032KB−GTI	32.4 MP	Mono	10°CRA	24 Lanes	
NOIX1SE032KB−GTI	32.4 MP	Color	10°CRA		
NOIX0SN030KB−GTI	29.8 MP	Mono	10°CRA	48 Lanes	5460 x 5460
NOIX0SE030KB−GTI	29.8 MP	Color	10°CRA		
NOIX1SN030KB−GTI	29.8 MP	Mono	10°CRA	24 Lanes	
NOIX1SE030KB−GTI	29.8 MP	Color	10°CRA		
NOIX0SN020KB−GTI	20.3 MP	Mono	10°CRA	48 Lanes	4500 x 4500
NOIX0SE020KB−GTI	20.3 MP	Color	10°CRA		
NOIX1SN020KB−GTI	20.3 MP	Mono	10°CRA	24 Lanes	
NOIX1SE020KB−GTI	20.3 MP	Color	10°CRA		

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.

Table 3. ORDERING INFORMATION EVALUATION KITS

Part Number	Product Description	Additional Information
NOIX0SN045KBGFB−GEVB	Sensor Headboard (45 MP, Mono, 48−Lane)	Demo Kit Headboard (incl. NOIX0SN045KB−LTI) (Note 2)
NOIX0SE045KBGFB−GEVB	Sensor Headboard (45 MP, Color, 48−Lane)	Demo Kit Headboard (incl. NOIX0SE045KB−LTI) (Note 2)
AGBAN6CS−GEVK	Frame Buffer Demo Board	AP21088 including Power Adapter
AGB1N0CS−GEVK	Demo 3 Board	FPGA Base Board including USB Cable and Tripod

2. Sensors are not soldered to the headboard but instead mounted in a socket.

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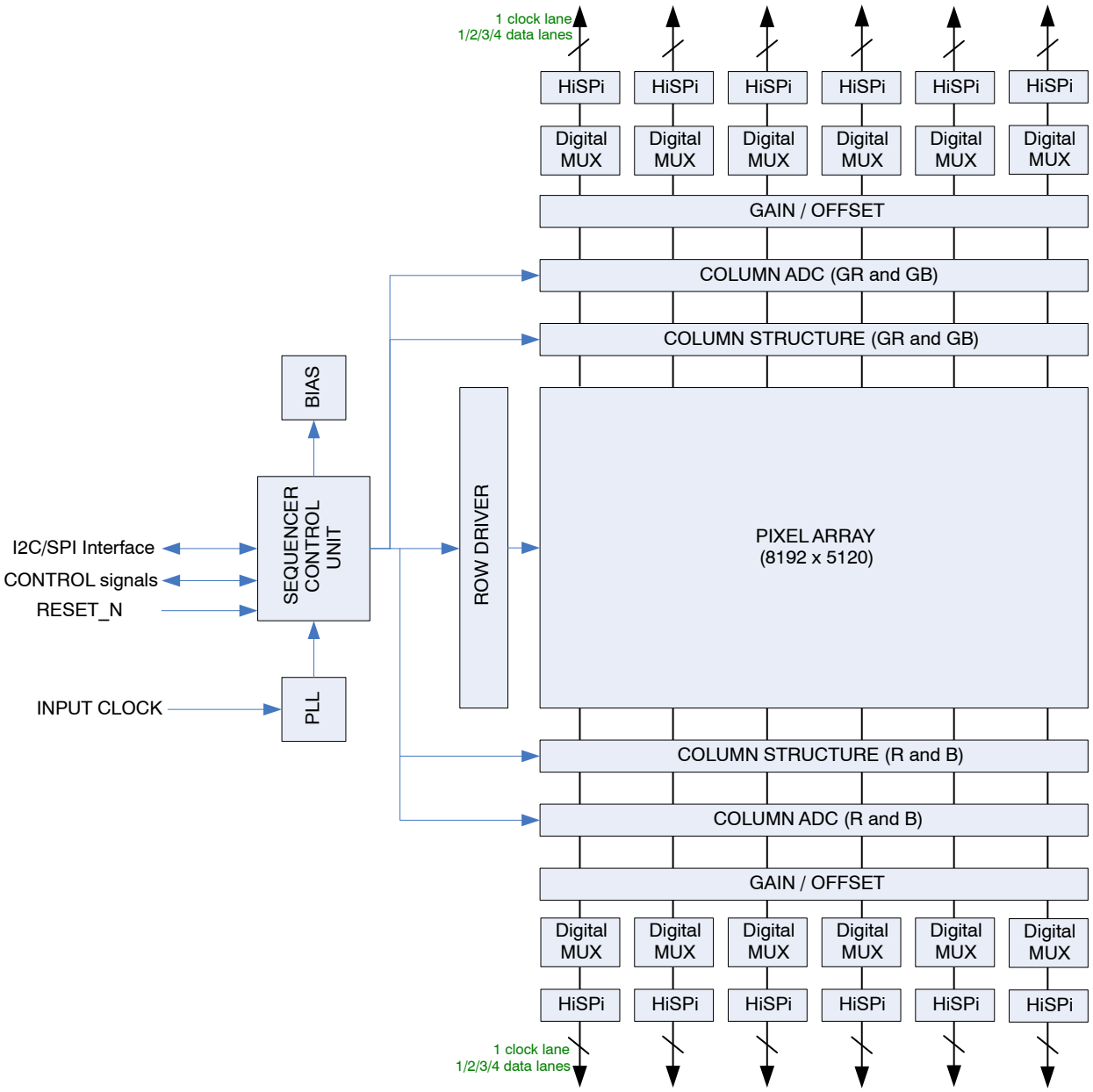

Figure 1. Functional Block Diagram (XGS 45000)

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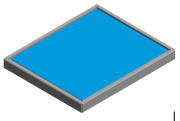

CPGA251 44.40x37.25
CASE 107FN
ISSUE A

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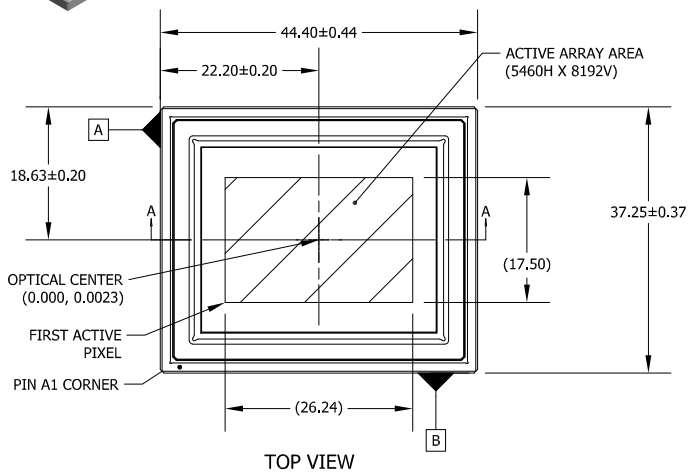
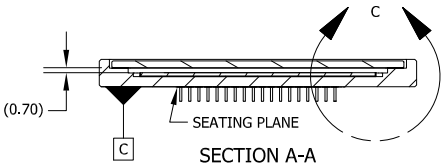
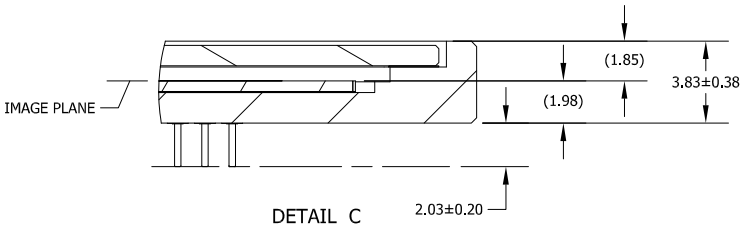


TOP VIEW

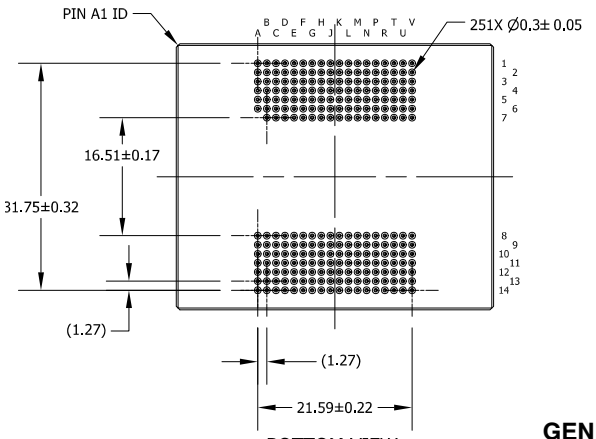
NOTES:
1. CONTROLLING DIMENSION: MILLIMETERS [mm].
2. DIMENSIONS IN ( ) ARE FOR REFERENCE ONLY.
3. SUBSTRATE MATERIAL: CERAMIC 1.425 THICKNESS.
4. GLASS MATERIAL: 0.95 THICKNESS.
5. IMAGE SENSOR DIE: 0.5 THICKNESS.
6. POGO PIN MATERIAL: Fe-Ni-Co ALLOY
7. MAXIMUM ROTATION OF ACTIVE ARRAY RELATIVE TO DATUMS A AND B IS ±0.5°.
8. MAXIMUM TILT OF ACTIVE ARRAY RELATIVE TO DATUM C: 200 MICRONS.
9. REFER TO THE DEVICE DATA SHEET FOR TOTAL PIXEL ARRAY DEFINITIONS.
10. PACKAGE CENTER (X, Y) = (0.00, 0.00).
11. DIE CENTER (X, Y) = (0.00, 0.00).
12. OPTICAL CENTER (X, Y) = (0.0000, 0.0023).



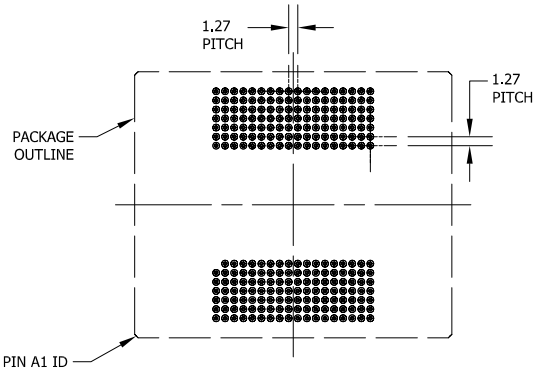
SECTION A-A



DETAIL C

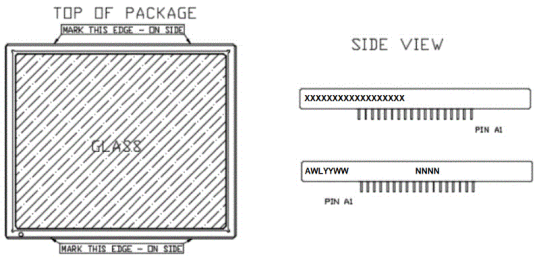


BOTTOM VIEW



RECOMMENDED MOUNTING FOOTPRINT*
*FOR ADDITIONAL INFORMATION PLEASE DOWNLOAD THE ONSEMI IMAGE SENSOR HANDLING AND BEST PRACTICES APPLICATION NOTE AN52561/D.

GENERIC MARKING DIAGRAM



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