EVBUM2636/D

X-Cube Imaging System X-Cube XGS 12000 Imager Board User's Manual

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EVAL BOARD USER'S MANUAL

X−CUBE XGS 12000 IMAGER BOARD OVERVIEW

The X−Cube Imaging System (X−Cube) is designed to demonstrate the features of ON Semiconductor's XGS family of image sensors in machine vision applications. The X−Cube is designed to conform to the machine vision industry standard 29 mm × 29 mm form factor.

This XGS 12000 Imager Board is designed to be compatible with the X−Cube Imaging System and fits in the 29 mm × 29 mm form factor C−Mount lens housing.

This imager board provides a good starting point for those about to initiate a small format camera design based on the XGS family of imager sensors.

For more information about the X−Cube, please refer to the X−Cube Imaging System Developer Guide. (AND9891/D)

FEATURES

- XGS 12000 Global Shutter Image Sensor
- 12 Lane HiSPi Packetized−SP Sensor Output Mode Implementation
- 1" Optical Format
- C−Mount Lens Housing (29 mm × 29 mm Form Factor)
- 26 mm × 26 mm PCB Sized to Fit the Industry Standard 29 mm × 29 mm Camera Case and Lens Mount
- Supports both Free−Running and Externally Triggered Operating Modes
- Supports Slave Mode Read Out Operation
- Operates off of a Single +3.3 V Power Supply Supplied by the Host
- A Host Controlled I^2C Interface is used to Configure and Operate the Imaging System

This X−Cube demonstration and evaluation platform includes an imager board housed in a machine vision industry standard form factor 29 mm × 29 mm C−mount lens housing. For the color X−Cube option an integrated IR−Cut filter is also provided and is installed in the lens housing prior to the installation of the imager board. The lens mount housing design includes the option to attach a mounting post to the lens housing that enables the attachment of the lens housing to any tripod with a 1/4 inch sized mounting screw.

All of the PCB design files (schematic and PCB layout files) as well as the lens housing mechanical files are available to customers (NDA is required) to enable and accelerate the design of a customized camera based on the XGS family of image sensors.

For information on how to obtain the design files please contact the ON Semiconductor technical support team in your region.

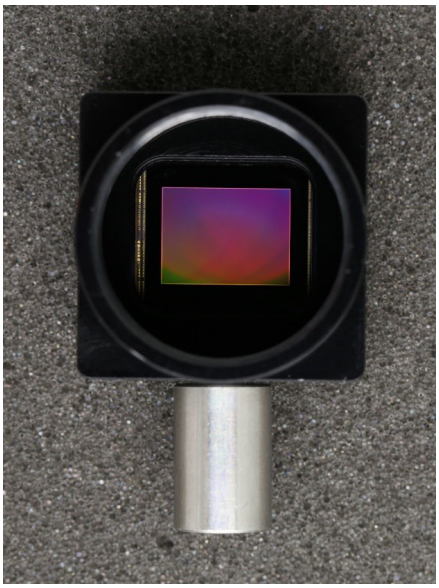

Figure 1. X−Cube XGS 12000 Imager Board Installed in the Lens Mount Housing

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Block Diagram

The board block diagram is shown in Figure 2.

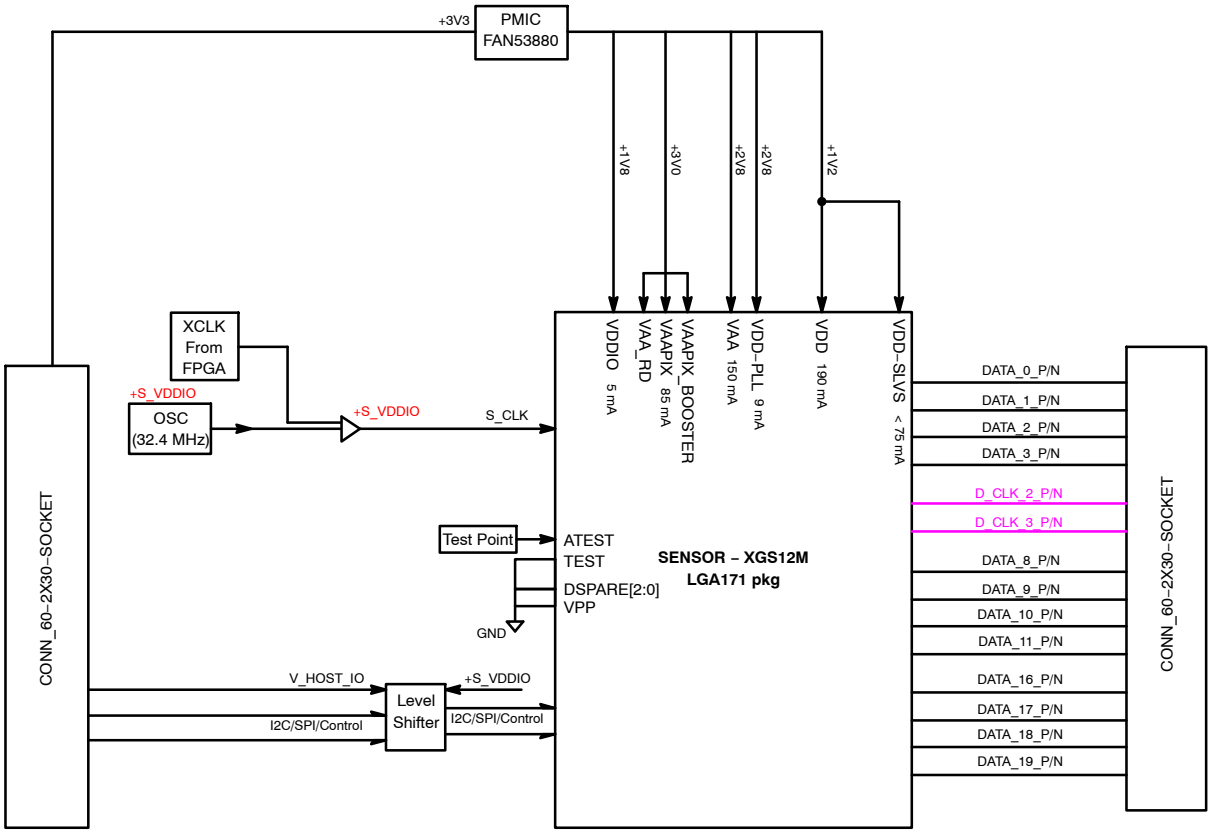

Figure 2. X−Cube−XGS 12000−GEVB Block Diagram

C−mount Lens Housing

The C−Mount Lens Housing is shown in Figure 3. The lens housing is designed to hold the imager board. The external dimensions of the lens housing are 29 mm × 29 mm.

For X−Cubes with color imagers, an IR−Cut filter is installed in the lens housing prior to the installation of the imager board. To secure the IR−Cut filter and avoid damage to the image sensor, the filter is glued into a cavity provided in the Lens Mount Housing that was designed to accommodate the filter. The lens housing is designed to accommodate filters with a form factor of 20 mm × 20 mm and a thickness less than 3 mm.

The spectroscopic characteristics of the IR−Cut filter are shown in Table 1.

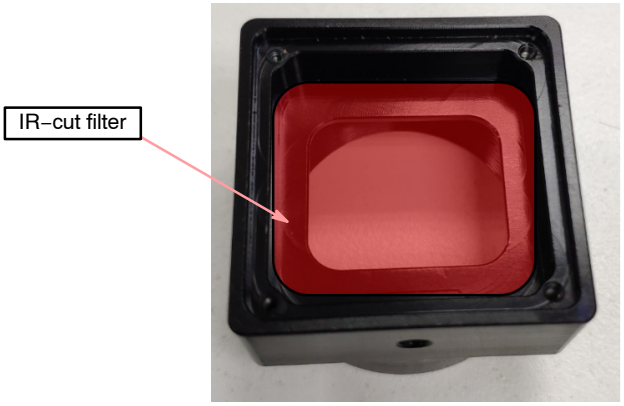

Figure 3. C−Mount Lens Housing Shown with an IR−Cut Filter Installed

Table 1. IR−CUT FILTER SPECTROSCOPIC CHARACTERISTICS

Wavelength (nm)	Transmission (T%)
420 − 620 nm	Tavg > 85%
650 ± 10 nm	T = 50%
720 − 1100 nm	Tmax < 2%

The Lens Mount Housing for the X−Cube is shown in Figure 4. The CAD design files (.DXF, .STP file formats) for the Lens Mount Housing are available to customers upon request (NDA is required).

For information on how to obtain the design files please contact the ON Semiconductor technical support team in your region.

Figure 4. X−Cube Lens Mount Housing Only: Top and Bottom View

Imager Board

The XGS 12000 Imager Board for the X−Cube system is shown in Figure 5. The PCB design files (schematic and PCB layout files) for the imager board are available to customers upon request (NDA is required).

For information on how to obtain the design files please contact the ON Semiconductor technical support team in your region.

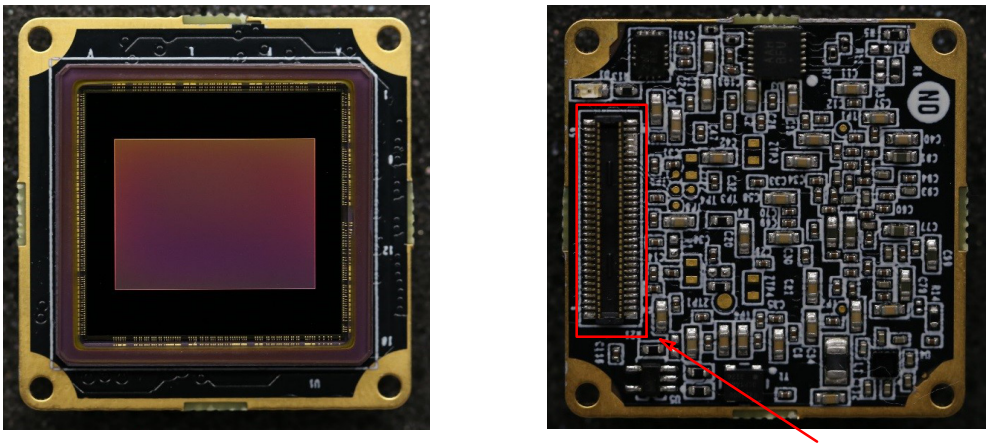

Figure 5. X−Cube XGS 12000 Imager Board Only: Top and Bottom View

Specification

The X−Cube XGS 12000 Imager Board is designed to operate the XGS image sensor in HiSPi Packetized−SP mode format with a 12 lane output implementation.

The Imager Board requires only a single +3.3 V power supply input that is provided by the Host. The Imager Board utilizes an on−board power management IC (PMIC) designed by ON Semiconductor to generate all of the power supplies voltages required by the image sensor from the +3.3 V power supply input. Digital logic voltage level shifters are also included on the imager board to translate the 1.8 V I/O signal level required by the image sensor to the I/O signal level voltage required by the Host. Please refer to the Imager Board schematic for detailed information on these circuits.

The configuration and control of both the image sensor and the PMIC is accomplished by way of an I2C interface that is controlled by the Host. Note that at power up, the PMIC is disabled. Therefore, at start up the first step is to enable the PMIC and then program the PMIC to provide the voltages required by the image sensor. After the PMIC output voltages have been programmed and stabilized, the image sensor is ready for register programming. Please refer to the Imager Board schematic and to the PMIC device datasheet for more information.

Table 2. IMAGER BOARD SPECIFICATIONS

Item	Definition	Min	Typ	Max	Unit
Lens mount	Lens Mount Housing accepts a C−Mount Type Lens				
IR−cut filter	For color modules only: An IR−Cut filter is installed in the Lens Mount Housing between the lens and the image sensor.				
Image sensor	Either XGS 12000 color or XGS 12000 monochrome				
Max frame rate	Frame rate at full resolution (12 Mpix)			57	fps
HiSPi Output Mode Implemented	Packetized−SP mode with 12 data lanes and 2 clock lanes (Top/Bottom)	6	12	12	lanes
HiSPi bitrate	Data rate per lane		777.6		Mbps
Image Sensor input clock	User Configurable: Can either use the 32.4 MHz oscillator on the Imager Board or supply this clock externally from the Host		32.4		MHz
VDD	Single power supply input to the Imager Board		3.3		V
IDD	Total current load of the Imager Board at max frame rate operation		500		mA
POWER	Power dissipation at max frame rate operation		1.65		W
External Trigger Modes	In addition to Free−Running Mode, Master Triggered mode and Slave Triggered mode of operation are also supported				

REFERENCES

[1] AND9891/D (n.d.) X−Cube Imaging System X−Cube Machine Vision Reference Module Developer Guide.

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