

SENTECH

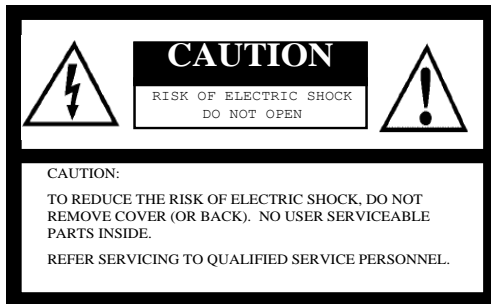
STC-GE330X / GEC330X
STC-GE830X / GEC830X
STC-GE1520X / GEC1520X
STC-GE2020X / GEC2020X
STC-GE5000X / GEC5000X

Product Specification

GigE Vision
Color / Monochrome CCD
Camera Series

With XILINX optional board model

Safety Precautions



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

For U.S.A.

Warning:

This equipment generates and uses radio frequency energy and if not installed and used properly, I.e., in strict accordance with the instruction manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

For Canada

Warning:

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

Product Precautions

- Handle the camera with care. Do not abuse the camera; avoid striking or shaking it. Improper handling or storage could damage the camera.
- Do not pull or damage the camera cable.
- During camera use, do not wrap the unit in any material. This will cause the internal temperature of the unit to increase.
- Do not expose the camera to moisture, or do not try to operate it in wet areas.
- Do not operate the camera beyond its temperature, humidity and power source ratings.
- While the camera is not being used, keep the lens or lens cap on the camera to prevent dust or contamination from getting in the CCD or filter area and scratching or damaging this area.
- Do **not** keep the camera under the following conditions:
 - In wet, moist, and high humidity areas
 - Under hot, direct sunlight
 - In high temperature areas
 - Near an object that releases a strong magnetic or electric field
 - Areas with strong vibrations
- Use a soft cloth to clean the camera. Use pressured air spray to clean the surface of the glass. DO not scratch the surface of the glass.

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Contents

I. Specifications	5-27
A. Electronic Specifications / Mechanical Specifications / Environmental Conditions.....	5-14
1. STC-GE330X / STC-GEC330X	5-7
2. STC-GE830X / STC-GEC830X	8-10
3. STC-GE1520X / STC-GEC1520X	11-13
4. STC-GE2020X / STC-GEC2020X	14-16
5. STC-GE5000X / STC-GEC5000X	17-19
B. Operational Temperature and Power Consumption	20
C. Connector Specifications	21-22
1. RJ45 Connector	21
2. Power / IO Connector	22-23
3. DC IRIS Lens Connector	23
D. IO Circuits.....	24-26
1. Input Circuit	24-25
2. Output Circuit.....	26
E. User Configurable FPGA (XILINX)	27-34
1. Block Diagram	27
2. Data Flow	28-30
3. Key Devices on the Optional Board	31
4. Examples of Possible Applications	31
5. Connection between the User Configurable FPGA and Sentech FPGA	32-34
II. Dimensions	35

I. Specifications

A. Electronic Specifications / Mechanical Specifications / Environmental Specifications

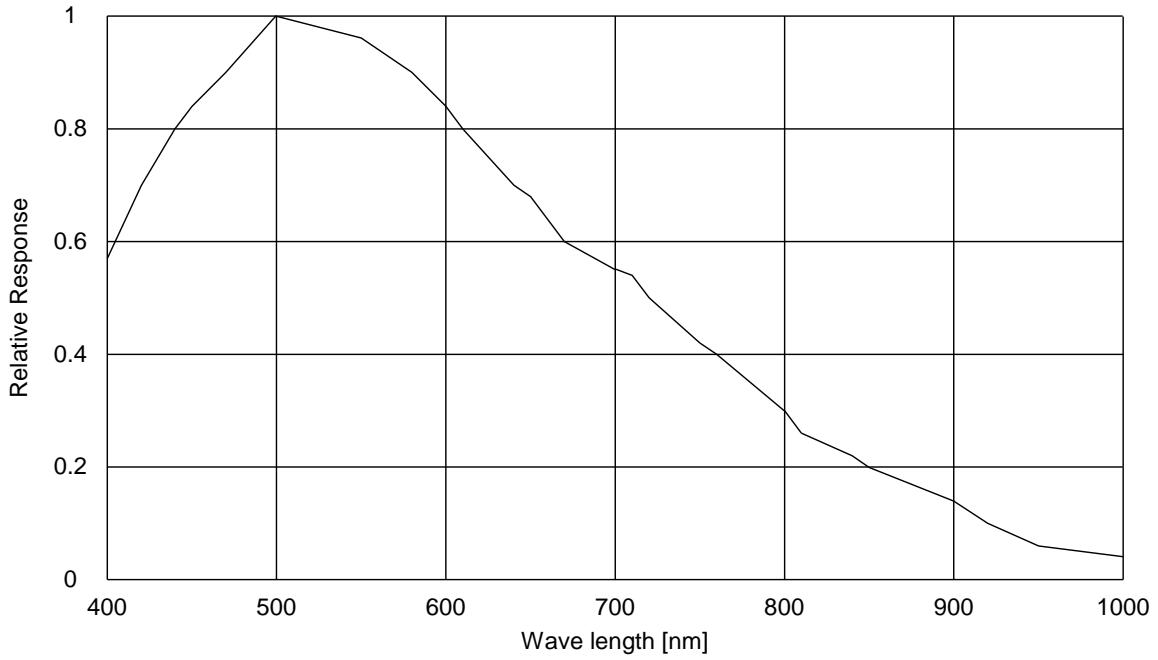
1. STC-GE330X / STC-GEC330X

Product		STC-GEC330X	STC-GE330X	
Electronic Specifications	Imager	1/3" Interline VGA color progressive CCD: ICX424AQ	1/3" Interline VGA monochrome progressive CCD: ICX424AL	
	Total Picture Elements	692 (H) x 504 (V)		
	Active Picture Elements	VGA: 648 (H) x 494 (V)		
	Chip Size	5.79 (H) x 4.89 (V) mm		
	Cell Size	7.4 (H) x 7.4 (V) μ m		
	Scanning System	Progressive		
	Vertical Frequency (Frame Rate)	89.91172 Hz at full resolution 0.72028 to 360.33325 Hz adjustable via the communication Maximum frame rate depends on the AOI setting Maximum frame rate of the camera (360.33325 Hz) is 104 vertical resolution AOI setting		
	Horizontal Frequency	47.2028 kHz		
	Pixel Frequency	36.818175 MHz		
	Noise Level	@ 8bit output	≤ 3 Digit (Gain 0 dB)	
		@ 10bit output	≤ 12 Digit (Gain 0 dB)	
		@ 12bit output	≤ 48 Digit (Gain 0 dB)	
	Minimum Scene Illumination	25.75 Lux at F1.2, 89.91172 Hz	0.58 Lux at F1.2, 89.91172 Hz	
	Sync. System	Internal		
	Video Output	Digital 8, 10 or 12 bit Raw Data or RGB 8 bit	Digital 8, 10 or 12 bit Raw Data	
	Interface	PoE : IEEE802.3af CLASS3 (1000BASE-T)		
	Protocol	GigE Vision [®] 1.2 and GenICam [™] 2.0		
	Exposure Time	Preset continuous mode: 10 useconds to 16,777,216 useconds Preset trigger mode: 10 useconds to 16,777,216 useconds Pulse width mode: 10 useconds to Unlimited		
	ALC	Auto iris lens, electronic iris and AGC (ON/OFF)		
	Gain	0 to 20.4 dB		
	Gamma	Gamma 1.0 (Factory default) or downloadable gamma table		
	AOI Function	Programmable AOI setting via the communication		
	Smear Reduction	Selectable ON/OFF via the communication		
	Color Interpolation	Available on RGB output	N/A	
	White Balance Function	Auto, manual and push-to-set white balance is available on both Raw data output and RGB output	N/A	
	I/Os	Three opto-isolated inputs and five opto-isolated outputs		
	Auto IRIS lens control	DC IRIS control input with video level target, peak/average and zone weight settings via the communication		
	Power	Input Voltage	+10.8 to +26.4 Vdc through power/IO connector or Power Over Ethernet (Auto detection with power/IO connector prioritized)	
		Consumption	< 6.5W (when user configurable FPGA is working) (Check "Operational temperature and power consumption")	
	Trigger Mode	Edge preset trigger, Pulse width trigger (unlimited long exposure)		
Communication	UART Communication through Ethernet port			
User Configurable Optional Board	FPGA	XILINX FPGA (XC3SD1800A, CSG484 package), 1800K gates		
	DDR2	W9725G6JB-25 (Winbond), 32MB		
	EEPROM	M95512-RMN6TP (ST Micro), 512Kbit		
	Config EEPROM	M25P80-VMP6G (Micron), 8Mbit		

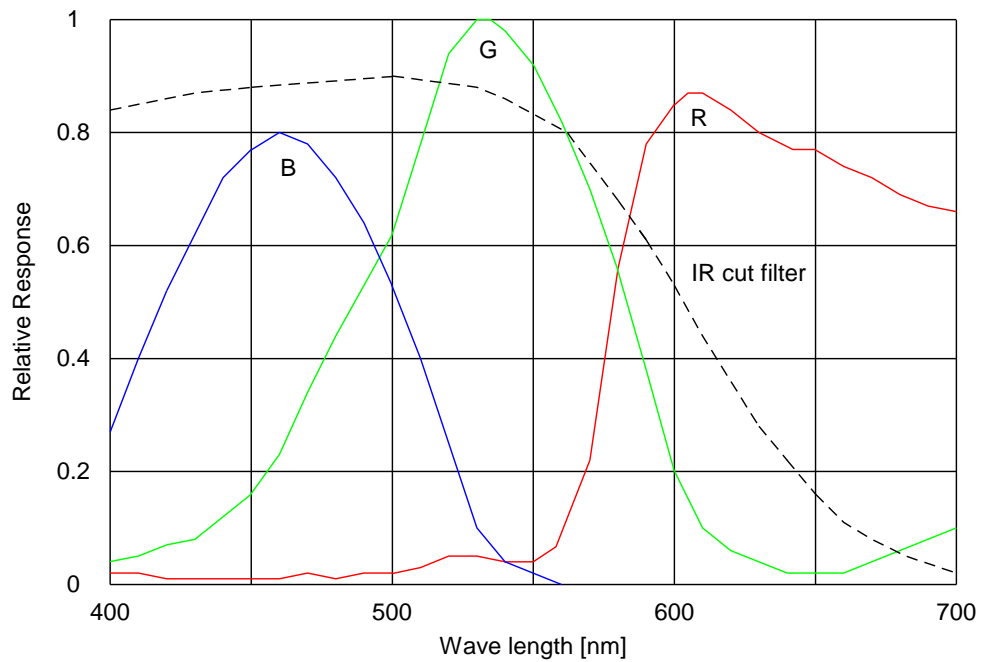
Product		STC-GEC330X	STC-GE330X
Mechanical Specifications	Dimensions	50 (W) x 50 (H) x 53.5 (D) mm excluding connectors	
	Optical Filter	IR cut filter on	No filter
	Optical Center Accuracy	Positional accuracy in H and V directions: +/- 0.3 mm Rotational accuracy of H and V: +/- 1.5 deg.	
	Material	Aluminum (AC)	
	Lens Mount	C mount	
	Connectors	RJ45 connector Power/IO connector: HR10A-10R-12PB (Hirose) or equivalent DC IRIS lens connector: M1951 (EMUDEN) or equivalent	
	Camera Mount Screws	Two 3/4" Tripod screw holes (one on each top and bottom plate) Sixteen M4 screw holes (Four on each top, bottom and both side plate)	
Weight	Approximately 170 g		
Environmental Specifications	Operational Temperature	Lower Limit	Environmental temperature -5°C
		Higher Limit	Camera housing temperature (Top plate): 70°C (See Operational temperature and Power Consumption)
	Storage Temperature	-30°C to 65°C	
	Vibration	20Hz to 200Hz to 20Hz (5min./cycle), acceleration 10G, 3 directions 30 min. each	
	Shock	Acceleration 38G, half amplitude 6ms, 3 directions 3 times each	
	Standard Compliancy	TBD	
	RoHS	RoHS Compliant	

Spectral Sensitivity Characteristics

STC-GE330X



STC-GEC330X



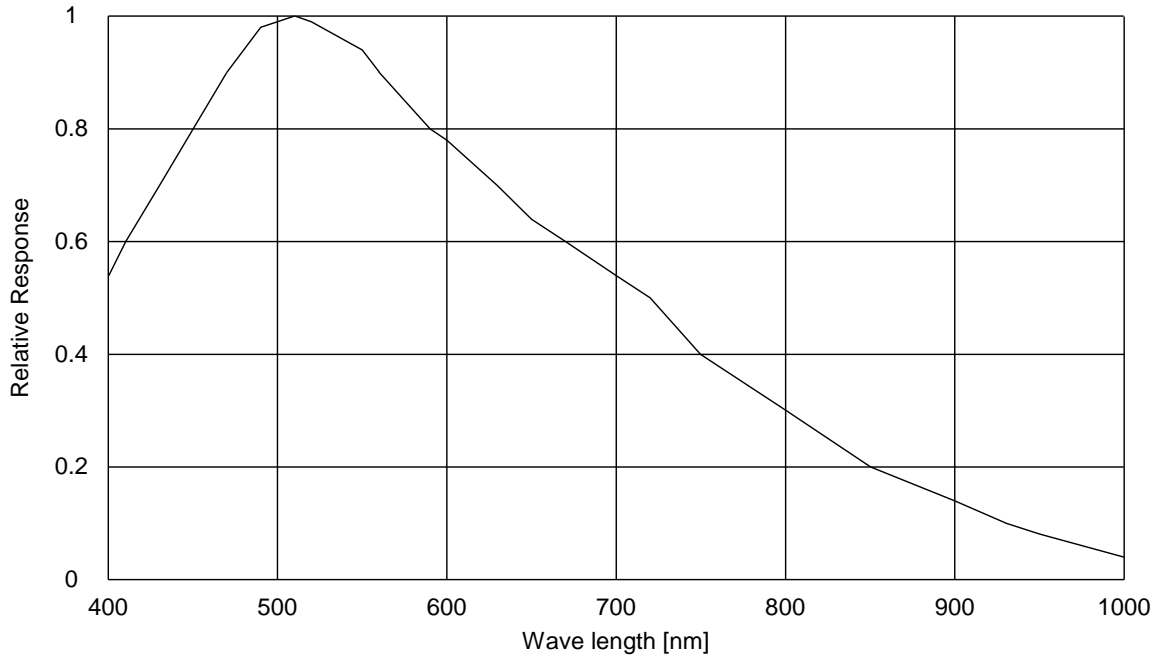
2. STC-GE830X / STC-GEC830X

Product		STC-GEC830X	STC-GE830X	
Electronic Specifications	Imager	1/3" Interline XGA color progressive CCD: ICX204AK	1/3" Interline XGA monochrome progressive CCD: ICX204AL	
	Total Picture Elements	1077 (H) x 788 (V)		
	Active Picture Elements	XGA: 1024 (H) x 768 (V)		
	Chip Size	5.5 (H) x 4.92 (V) mm		
	Cell Size	4.65 (H) x 4.65 (V) μ m		
	Scanning System	Progressive		
	Vertical Frequency (Frame Rate)	36.42113 Hz at full resolution 0.44238 to 147.16356 Hz adjustable via the communication Maximum frame rate depends on the AOI setting Maximum frame rate of the camera (147.16356 Hz) is 146 vertical resolution AOI setting		
	Horizontal Frequency	28.9907 kHz		
	Pixel Frequency	36.818175 MHz		
	Noise Level	@ 8bit output	\leq 3 Digit (Gain 0 dB)	
		@ 10bit output	\leq 12 Digit (Gain 0 dB)	
		@ 12bit output	\leq 48 Digit (Gain 0 dB)	
	Minimum Scene Illumination	24.70 Lux at F1.2, 36.42113 Hz	0.96 Lux at F1.2, 36.42113 Hz	
	Sync. System	Internal		
	Video Output	Digital 8, 10 or 12 bit Raw Data or RGB 8 bit	Digital 8, 10 or 12 bit Raw Data	
	Interface	PoE : IEEE802.3af CLASS3 (1000BASE-T)		
	Protocol	GigE Vision [®] 1.2 and GenICam [™] 2.0 Compliant		
	Exposure Time	Preset continuous mode: 10 useconds to 16,777,216 useconds Preset trigger mode: 10 useconds to 16,777,216 useconds Pulse width mode: 10 useconds to Unlimited		
	ALC	Auto iris lens, electronic iris and AGC (ON/OFF)		
	Gain	0 to 20.4 dB		
	Gamma	Gamma 1.0 (Factory default) or downloadable gamma table		
	AOI Function	Programmable AOI setting via the communication		
	Smear Reduction	Selectable ON/OFF via the communication		
	Color Interpolation	Available on RGB output	N/A	
	White Balance Function	Auto, manual and push-to-set white balance Is available on both Raw data output And RGB output	N/A	
	I/Os	Three opto-isolated inputs and five opto-isolated outputs		
	Auto IRIS lens control	DC IRIS control input with video level target, peak/average and zone weight settings via the communication		
Power	Input Voltage	+10.8 to +26.4 Vdc through Power/IO connector or Power Over Ethernet (Auto detection with Power/IO connector prioritized)		
	Consumption	< 6.0W (when user configurable FPGA is working) (Check "Operational temperature and power consumption")		
Trigger Mode	Edge preset trigger, Pulse width trigger (unlimited long exposure)			
Communication	UART Communication through Ethernet port			
User Configurable Optional Board	FPGA	XILINX FPGA (XC3SD1800A, CSG484 package), 1800K gates		
	DDR2	W9725G6JB-25 (Winbond), 32MB		
	EEPROM	M95512-RMN6TP (ST Micro), 512Kbit		
	Config EEPROM	M25P80-VMP6G (ST Micro), 8Mbit		

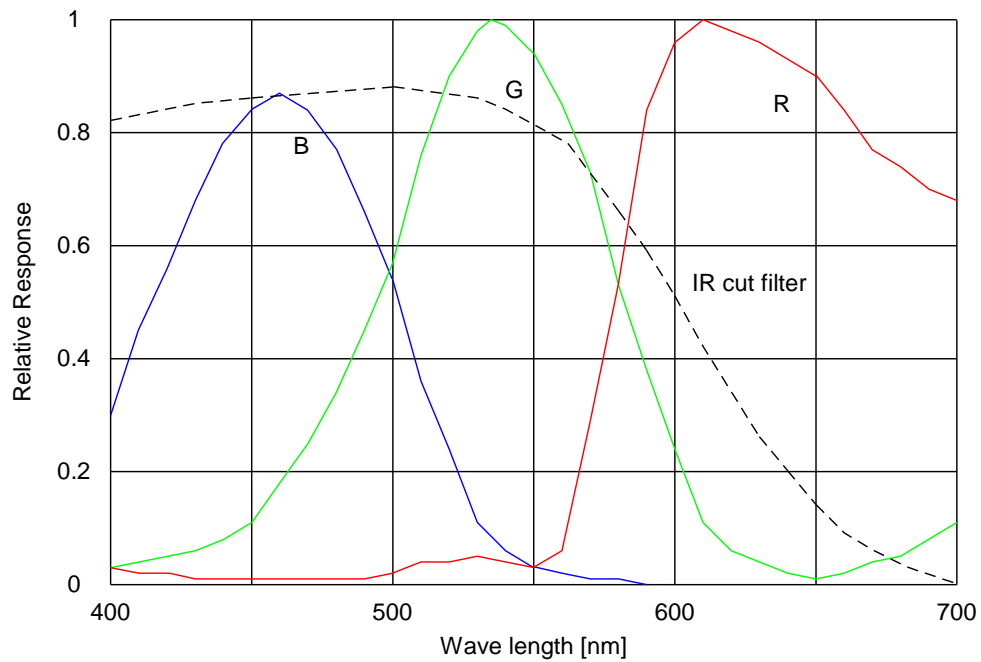
Product		STC-GEC830X	STC-GE830X
Mechanical Specifications	Dimensions	50 (W) x 50 (H) x 53.4 (D) mm excluding connectors	
	Optical Filter	IR cut filter on	No filter
	Optical Center Accuracy	Positional accuracy in H and V directions: +/- 0.3 mm Rotational accuracy of H and V: +/- 1.5 deg.	
	Material	Aluminum (AC)	
	Lens Mount	C mount	
	Connectors	RJ45 connector Power/IO connector: HR10A-10R-12PB (Hirose) or equivalent DC IRIS lens connector: M1951 (EMUDEN) or equivalent	
	Camera Mount Screws	Two 3/4" Tripod screw holes (one on each top and bottom plate) Sixteen M4 screw holes (Four on each top, bottom and both side plate)	
	Weight	Approximately 170 g	
Environmental Specifications	Operational Temperature	Lower limit	Environmental temperature -5°C
		Higher limit	Camera housing temperature (Top plate): 70°C (See Operational temperature and Power Consumption)
	Storage temperature	-30°C to 65°C	
	Vibration	20Hz to 200Hz to 20Hz (5min./cycle), acceleration 10G, 3 directions 30 min. each	
	Shock	Acceleration 38G, half amplitude 6ms, 3 directions 3 times each	
	Standard Compliancy	TBD	
	RoHS	RoHS Compliant	

Spectral Sensitivity Characteristics

STC-GE830X



STC-GEC830X (with IR cut filter)



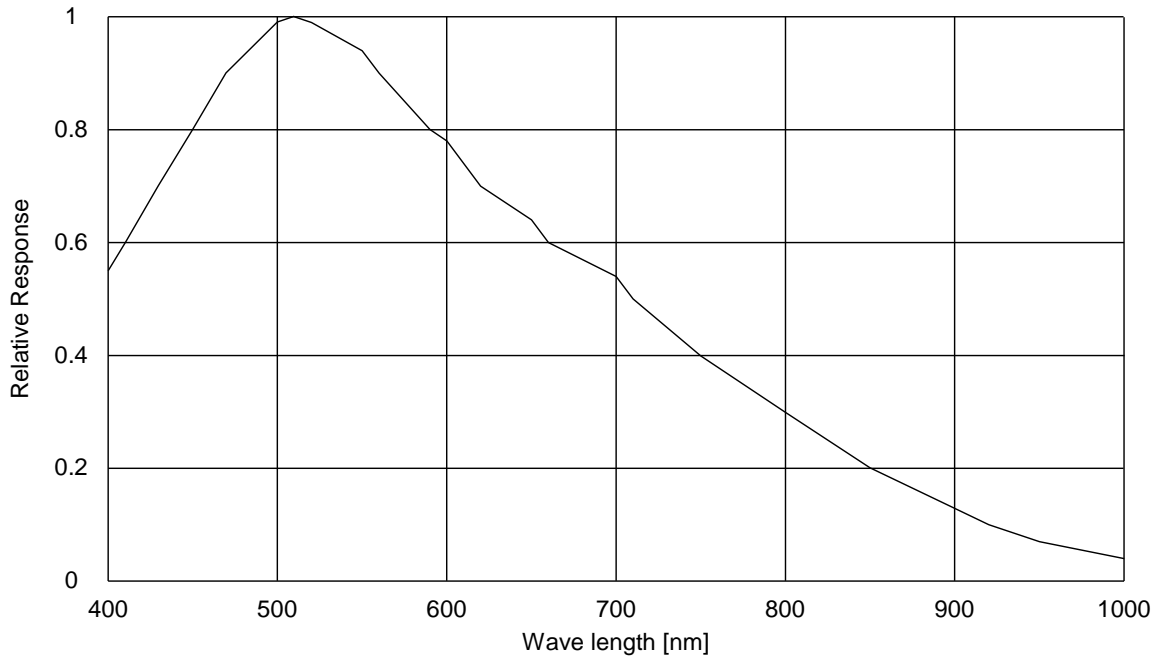
3. STC-GE1520X / STC-GEC1520X

Product		STC-GEC1520X	STC-GE1520X	
Electronic Specifications	Imager	1/2" Interline SXGA color progressive CCD: ICX205AK	1/2" Interline SXGA monochrome progressive CCD: ICX205AL	
	Total Picture Elements	1434 (H) x 1050 (V)		
	Active Picture Elements	SXGA: 1360 (H) x 1040 (V)		
	Chip Size	7.6 (H) x 6.2 (V) mm		
	Cell Size	4.65 (H) x 4.65 (V) μm		
	Scanning System	Progressive		
	Vertical Frequency (Frame Rate)	19.25954 Hz at full resolution 0.31387 to 71.66965 Hz adjustable via the communication Maximum frame rate depends on the AOI setting Maximum frame rate of the camera (71.66965 Hz) is 200 vertical resolution AOI setting		
	Horizontal Frequency	20.5688 kHz		
	Pixel Frequency	36.8181 MHz		
	Noise Level	@ 8bit output	≤ 3 Digit (Gain 0 dB)	
		@ 10bit output	≤ 12 Digit (Gain 0 dB)	
		@ 12bit output	≤ 48 Digit (Gain 0 dB)	
	Minimum Scene Illumination	15.49 Lux at F1.2, 19.25954 Hz	0.41 Lux at F1.2, 19.25954 Hz	
	Sync. System	Internal		
	Video Output	Digital 8, 10 or 12 bit Raw Data or RGB 8 bit	Digital 8, 10 or 12 bit Raw Data	
	Interface	PoE : IEEE802.3af CLASS3 (1000BASE-T)		
	Protocol	GigE Vision® 1.2 and GenICam™ 2.0 Compliant		
	Exposure time	Preset continuous mode: 10 useconds to 16,777,216 useconds Preset trigger mode: 10 useconds to 16,777,216 useconds Pulse width mode: 10 useconds to Unlimited		
	ALC	Auto iris lens, electronic iris and AGC (ON/OFF)		
	Gain	0 to 20.4 dB		
	Gamma	Gamma 1.0 (Factory default) or downloadable gamma table		
	AOI Function	Programmable AOI setting via the communication		
	Smear Reduction	Selectable ON/OFF via the communication		
	Color Interpolation	Available on RGB output	N/A	
	White Balance Function	Auto, manual and push-to-set white balance Is available on both Raw data output And RGB output	N/A	
	I/Os	Three opto-isolated inputs and five opto-isolated outputs		
	Auto IRIS lens control	DC IRIS control input with video level target, peak/average and zone weight settings via the communication		
	Power	Input Voltage	+10.8 to +26.4 Vdc through power/IO connector or Power Over Ethernet (Auto detection with power/IO connector prioritized)	
		Consumption	< 6.5W (when user configurable FPGA is working) (Check "Operational temperature and power consumption")	
	Trigger Mode	Edge preset trigger, Pulse width trigger (unlimited long exposure)		
Communication	UART Communication through Ethernet port			
User Configurable	FPGA	XILINX FPGA (XC3SD1800A, CSG484 package), 1800K gates		
Optional Board	DDR2	W9725G6JB-25 (Winbond), 32MB		
	EEPROM	M95512-RMN6TP (ST Micro), 512Kbit		
	Config EEPROM	M25P80-VMP6G (ST Micro), 8Mbit		

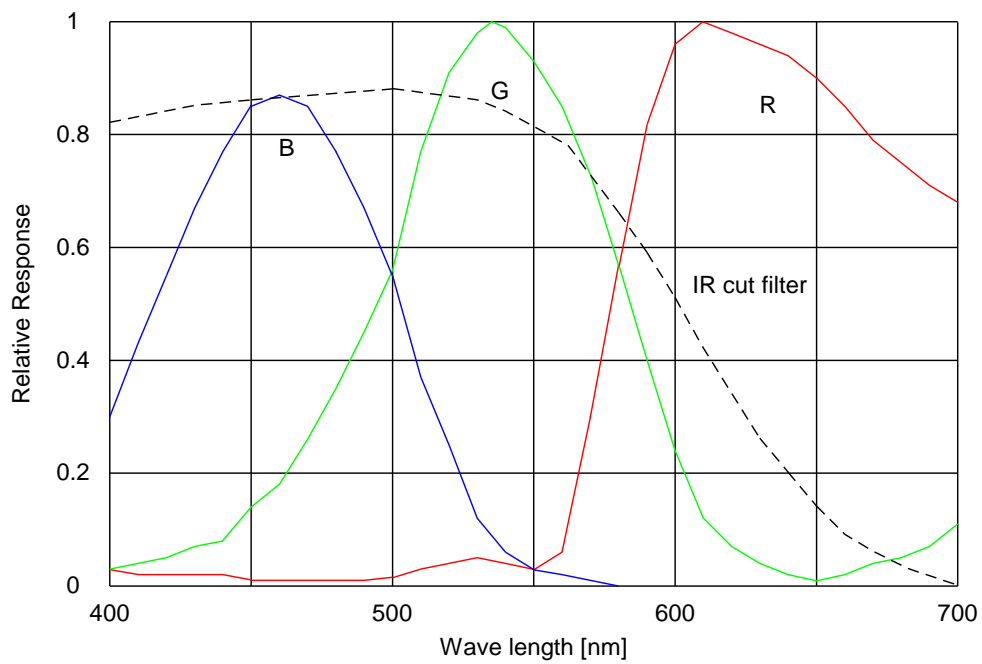
Product		STC-GEC1520X	STC-GE1520X
Mechanical Specifications	Dimensions	50 (W) x 50 (H) x 53.4 (D) mm excluding connectors	
	Optical Filter	IR cut filter	No filter
	Optical Center Accuracy	Positional accuracy in H and V directions: +/- 0.3 mm Rotational accuracy of H and V: +/- 1.5 deg.	
	Material	Aluminum (AC)	
	Lens Mount	C mount	
	Connectors	RJ45 connector Power/IO connector: HR10A-10R-12PB (Hirose) or equivalent DC IRIS lens connector: M1951 (EMUDEN) or equivalent	
	Camera Mount Screws	Two ¼" Tripod screw holes (one on each top and bottom plate) Sixteen M4 screw holes (Four on each top, bottom and both side plate)	
	Weight	Approximately 170 g	
Environmental Specifications	Operational Temperature	Lower limit	Environmental temperature -5°C
		Higher limit	Camera housing temperature (Top plate): 70°C (See Operational temperature and Power Consumption)
	Storage Temperature	-30°C to 65°C	
	Vibration	20Hz to 200Hz to 20Hz (5min./cycle), acceleration 10G, 3 directions 30 min. each	
	Shock	Acceleration 38G, half amplitude 6ms, 3 directions 3 times each	
	Standard Compliancy	TBD	
	RoHS	RoHS Compliant	

Spectral Sensitivity Characteristics

STC-GE1520X



STC-GEC1520X (with IR cut filter)



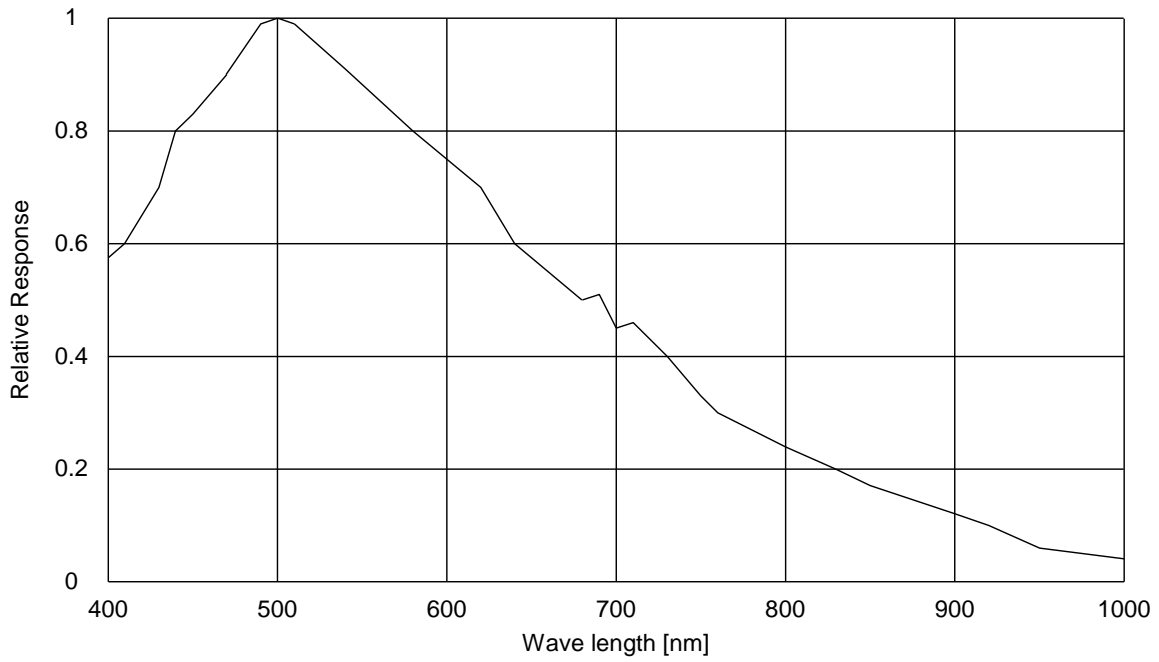
4. STC-GE2020X / STC-GEC2020X

Product		STC-GEC2020X	STC-GE2020X	
Electronic Specifications	Imager	1/1.8" Interline UXGA color progressive CCD: ICX274AQ	1/1.8" Interline UXGA monochrome progressive CCD: ICX274AL	
	Total Picture Elements	1688 (H) x 1246 (V)		
	Active Picture Elements	UXGA: 1624 (H) x 1236 (V)		
	Chip Size	8.5 (H) x 6.8 (V) mm		
	Cell Size	4.4 (H) x 4.4 (V) μm		
	Scanning System	Progressive		
	Vertical Frequency (Frame Rate)	15.31668 Hz at full resolution 0.29261 to 61.26674 Hz adjustable via the communication Maximum frame rate depends on the AOI setting Maximum frame rate of the camera (61.26674 Hz) is 230 vertical resolution AOI setting		
	Horizontal Frequency	19.176 kHz		
	Pixel Frequency	36.8181 MHz		
	Noise Level	@ 8bit output	≤ 3 Digit (Gain 0 dB)	
		@ 10bit output	≤ 12 Digit (Gain 0 dB)	
		@ 12bit output	≤ 48 Digit (Gain 0 dB)	
	Minimum Scene Illumination	7.27 Lux at F1.2, 15.31668 Hz	0.16 Lux at F1.2, 15.31668 Hz	
	Sync. System	Internal		
	Video Output	Digital 8, 10 or 12 bit Raw Data or RGB 8 bit	Digital 8, 10 or 12 bit Raw Data	
	Interface	PoE : IEEE802.3af CLASS3 (1000BASE-T)		
	Protocol	GigE Vision® 1.2 and GenICam™ 2.0 Compliant		
	Exposure Time	Preset continuous mode: 10 useconds to 16,777,216 useconds Preset trigger mode: 10 useconds to 16,777,216 useconds Pulse width mode: 10 useconds to Unlimited		
	ALC	Auto iris lens, electronic iris and AGC (ON/OFF)		
	Gain	0 to 20.4 dB		
	Gamma	Gamma 1.0 (Factory default) or downloadable gamma table		
	AOI Function	Programmable AOI setting via the communication		
	Smear Reduction	Selectable ON/OFF via the communication		
	Color Interpolation	Available on RGB output	N/A	
	White Balance Function	Auto, manual and push-to-set white balance Is available on both Raw data output And RGB output	N/A	
	I/Os	Three opto-isolated inputs and five opto-isolated outputs		
	Auto IRIS lens control	DC IRIS control input with video level target, peak/average and zone weight settings via the communication		
	Power	Input Voltage	+10.8 to +26.4 Vdc through Power/IO connector or Power Over Ethernet (Auto detection with Power/IO connector prioritized)	
		Consumption	< 6.8W (when user configurable FPGA is working) (Check "Operational temperature and power consumption")	
	Trigger Mode	Edge preset trigger, Pulse width trigger (unlimited long exposure)		
	Communication	UART Communication through Ethernet port		
	User Configurable	FPGA	XILINX FPGA (XC3SD1800A, CSG484 package), 1800K gates	
Optional Board	DDR2	W9725G6JB-25 (Winbond), 32MB		
	EEPROM	M95512-RMN6TP (ST Micro), 512Kbit		
	Config EEPROM	M25P80-VMP6G (Micro), 8Mbit		

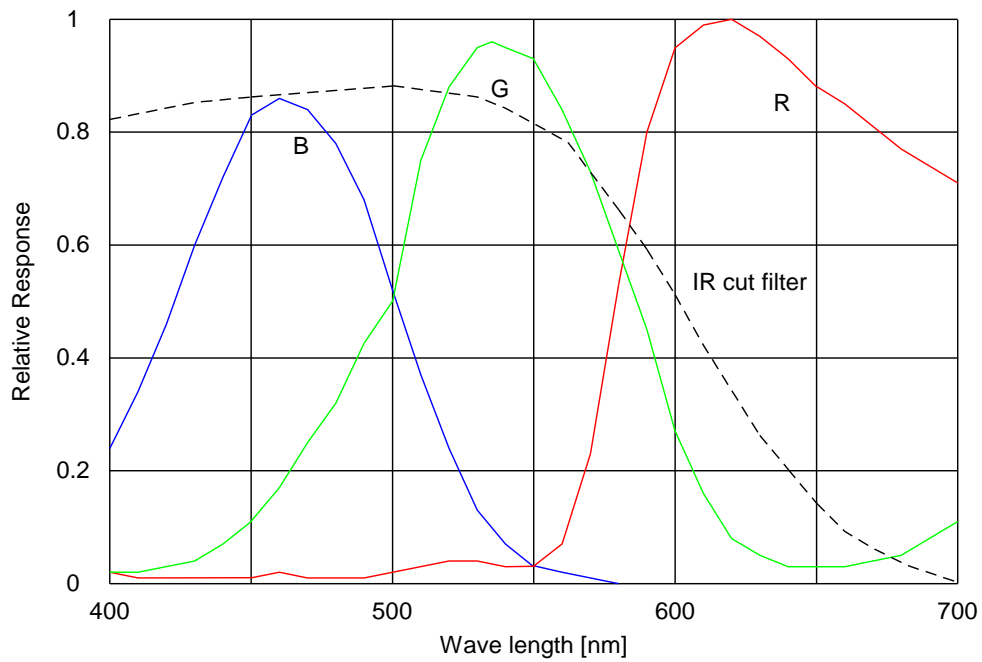
Product		STC-GEC2020X	STC-GE2020X
Mechanical Specifications	Dimensions	50 (W) x 50 (H) x 53.4 (D) mm excluding connectors	
	Optical Filter	IR cut filter on	No filter
	Optical Center Accuracy	Positional accuracy in H and V directions: +/- 0.3 mm Rotational accuracy of H and V: +/- 1.5 deg.	
	Material	Aluminum (AC)	
	Lens Mount	C mount	
	Connectors	RJ45 connector Power/IO connector: HR10A-10R-12PB (Hirose) or equivalent DC IRIS lens connector: M1951 (EMUDEN) or equivalent	
	Camera Mount Screws	Two ¼" Tripod screw holes (one on each top and bottom plate) Sixteen M4 screw holes (Four on each top, bottom and both side plate)	
	Weight	Approximately 170 g	
Environmental Specifications	Operational Temperature	Lower limit	Environmental temperature -5°C
		Higher limit	Camera housing temperature (Top plate): 70°C (See Operational temperature and Power Consumption)
	Storage Temperature	-30°C to 65°C	
	Vibration	20Hz to 200Hz to 20Hz (5min./cycle), acceleration 10G, 3 directions 30 min. each	
	Shock	Acceleration 38G, half amplitude 6ms, 3 directions 3 times each	
	Standard Compliancy	TBD	
	RoHS	RoHS Compliant	

Spectral Sensitivity Characteristics

STC-GE2020X



STC-GEC2020X (with IR cut filter)



D. Operational Temperature and Power Consumption

The temperature of the camera (camera case and inside) and the power consumption will change depending on the usage of the user-configurable FPGA.

Please use this camera under the following conditions:

Power Consumption: Less than 7.0 W when the power is supplied from the 12-pin connector
 Less than 7.4 W when using the PoE

Operational Temperature: Camera housing temperature (Top plate) is less than 70°C

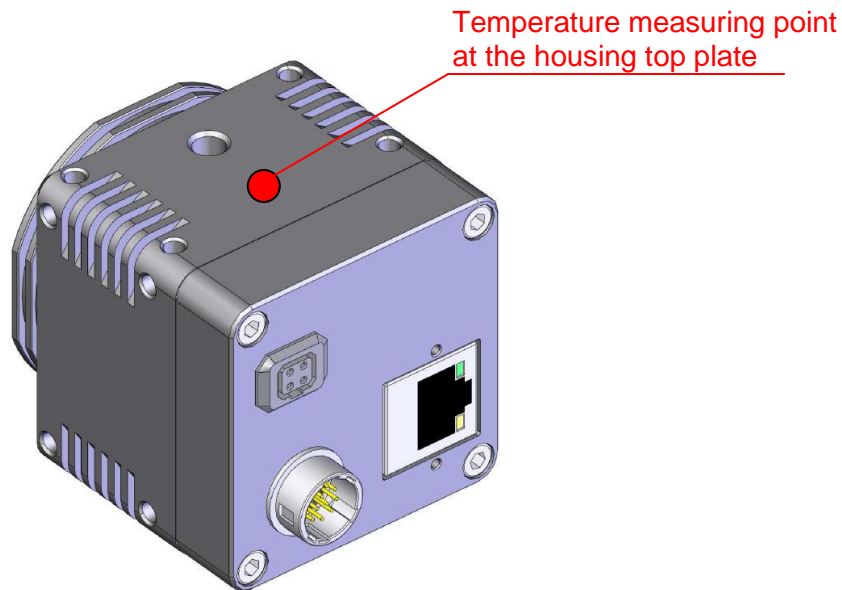
Calculating the Power Consumption for the PoE:

It is difficult to measure the actual power consumption when using the PoE.

1. Please measure the power consumption with +12V power supply from the 12-pin connector.
2. The power consumption for the PoE = “the power consumption with +12V power supply” / 0.94

In order to keep the camera housing’s top plate temperature below 70°C , properly set the camera up so that heat can radiate away.

The case’s heat management maintains the heat rating of the electronic components of the camera.



E. Connector Specifications

1. RJ45 Connector:

Caution: This product is a PoE type. Apply power (+10.8 to +26.4 Vdc) through the power/IO connector when PoE is not supported.

Note: It is recommended that a 0.18 N · m torque is used to screw lock the LAN cable to the camera.

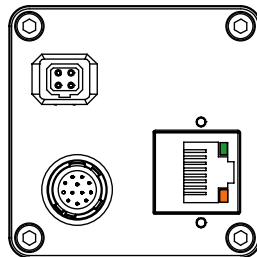
Pin Assignment:

Pin No.	Signal Name
1	TA+
2	TA-
3	TB+
4	TC+
5	TC-
6	TB-
7	TD+
8	TD-

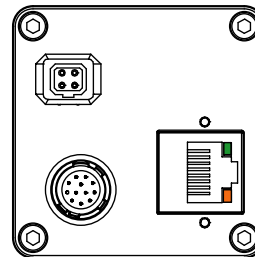
Note: Power supply connection comprises of PoE (IEEE802.3af).

LED Information:

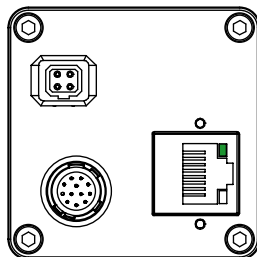
Yellow LED	Green LED	Status
Orange Light ON	Green Light ON	Power ON
Orange Light ON	Green Light Blinking	1 Gb transferring
Light OFF	Green Light Blinking	100 Mb transferring



The camera is powered-ON



Green light: Blinking
Yellow light: ON
1 Gb transferring



Green light: Blinking
Yellow light: OFF
100 Mb transferring

Please use a 1Gb supported NIC, HUB and LAN cable. Check that the NIC and HUB being used is “1Gb transferring”.

Damaging or mishandling the CAT5e cable may cause the transferring speed to change from 1Gb to 100Mb. If this happens, please replace the CAT5e cable.

2. Power/IO Connector: HR10A-10R-12PB (Hirose) or equivalent.

This connector is for DC power input and the input and output signals.

Pin Assignment:

Pin No.	Signal Name	IO direction	Spec.	IO Default setting
1	POWER IN GND	-	GND	-
2	POWER IN	-	+10.8 +26.4 Vdc	-
3	OUT0 AUX OP	OUT	Opt. isolated	FrameTriggerWait out
4	OUT1 AUX OP	OUT	Opt. isolated	ExposureActive out
5	OUT2 AUX OP	OUT	Opt. isolated	Open
6	OUT3 AUX OP	OUT	Opt. isolated	Open
7	OUT4 AUX OP	OUT	Opt. isolated	Open
8	IN0 AUX OP	IN	Opt. isolated	TRG IN
9	IN1 AUX OP	IN	Opt. isolated	Open
10	IN2 AUX OP	IN	Opt. isolated	Open
11	IO VCC IN	-	IO VCC +3 to +24.6 Vdc	-
12	IO GND	-	IO GND(Refer Fig. 3)	-

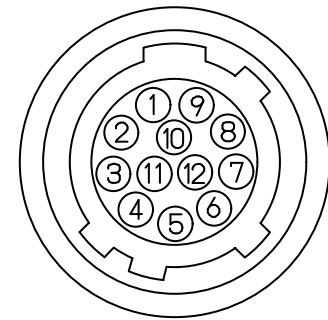


Fig. 1: 12pin Connector

Note: All IOs (Pin number 3~10) are user assignable.

Note: DO NOT connect or disconnect the power/IO connector while the power is being input through the PoE.

a. Input Signal

TRG IN: Input the trigger signal

High: Voltage of the "IO VCC IN"

Low: Smaller than 0.4V

b. Output Signals

Set the output signals from the power/IO connector.

The following six output signals are selectable with the software or communication.

1) FrameTriggerWait

The user can check the camera condition (if camera is ready to process the trigger signal) with the FrameTriggerWait signal.

a) High status (voltage of the "IO VCC IN"): No processing by the trigger signal. The camera accepts the trigger signal.

b) Low status (0V): The camera is expose and the image output processing by the trigger signal.

The camera default setting of the input trigger signal is INVALID while in the low status of this signal. When the exposure begins while the image is output by next trigger signal, change the camera setting (Device code: 00H, Command: 13H) to accept the trigger signal while the image is being output.

Noise appears on the image when the exposure starts while the image is output. In this case, please change the "H reset" for the exposure start mode (Device code: 00H, Command: 12H) to change the exposure start point to next HD timing.

2) UserOutput

The status of the UserOutput signal can be changed with the "UserOutputValue".

3) ExposureActive

The user can check the exposure time with the ExposureActive signal.

- a) High status (Voltage of the "IO VCC IN"): The camera is exposing
- b) Low status (0V): The camera is not exposed

4) TriggerAuxiliary

The TriggerAuxiliary signal is the input trigger signal.

5) TriggerInternal

The TriggerInternal signal is the input trigger signal with the trigger delay time.

6) SensorReadOut

SensorReadOut signal is the FVAL signal, this is the image output period of the time.

3. DC IRIS Lens Connector: M1951 (EMUDEN) or equivalent

Pin Assignment:

Pin No.	Signal Name
1	DAMP-
2	DAMP+
3	DRIVE+
4	DRIVE-

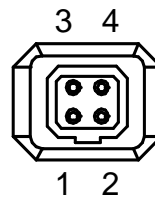


Fig. 2:
DC IRIS lens connector

C. IO Circuits

1. Input Circuit

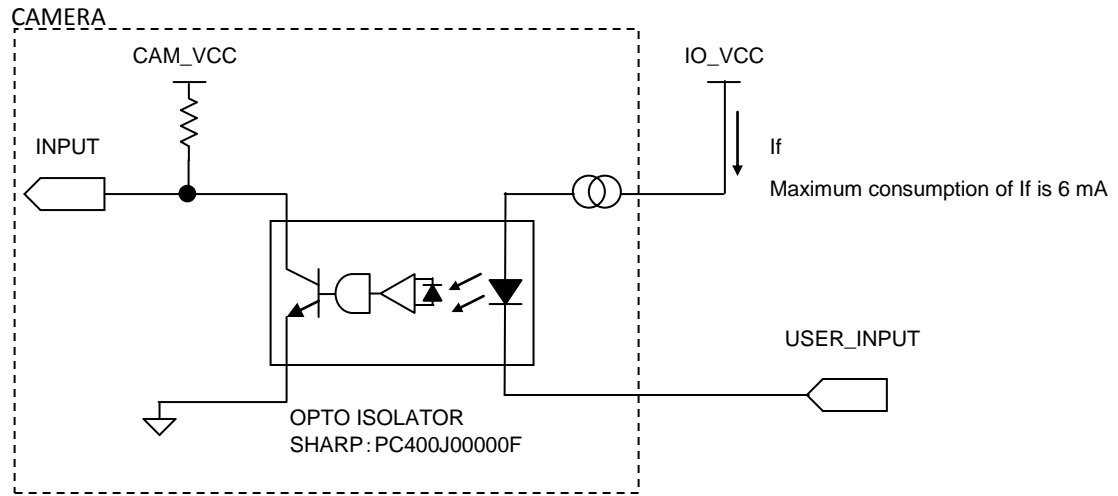
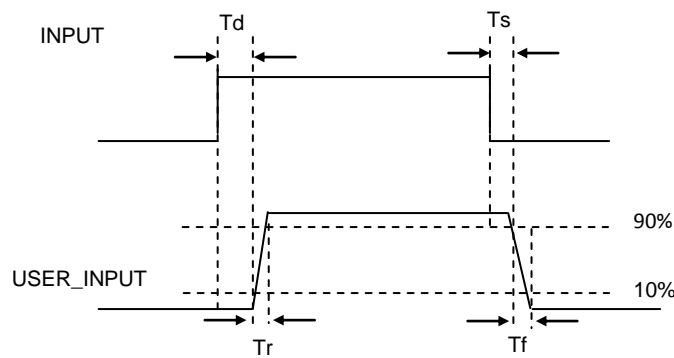


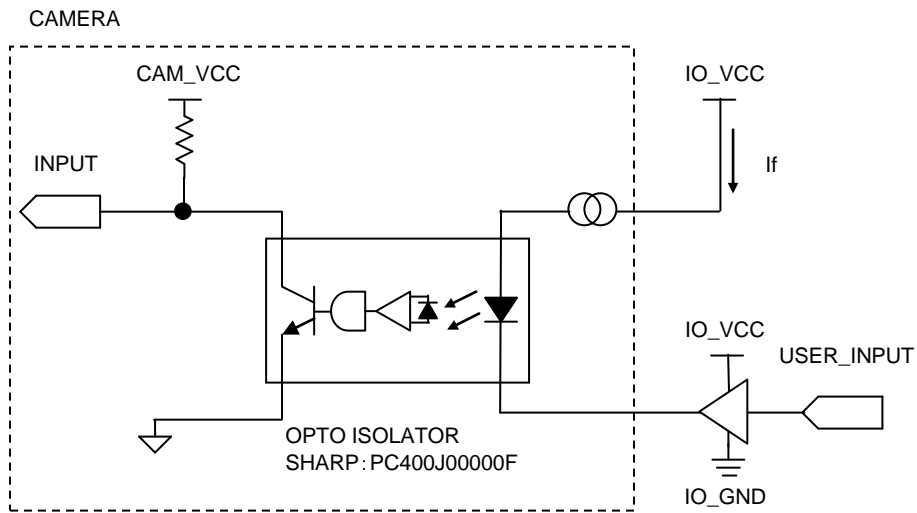
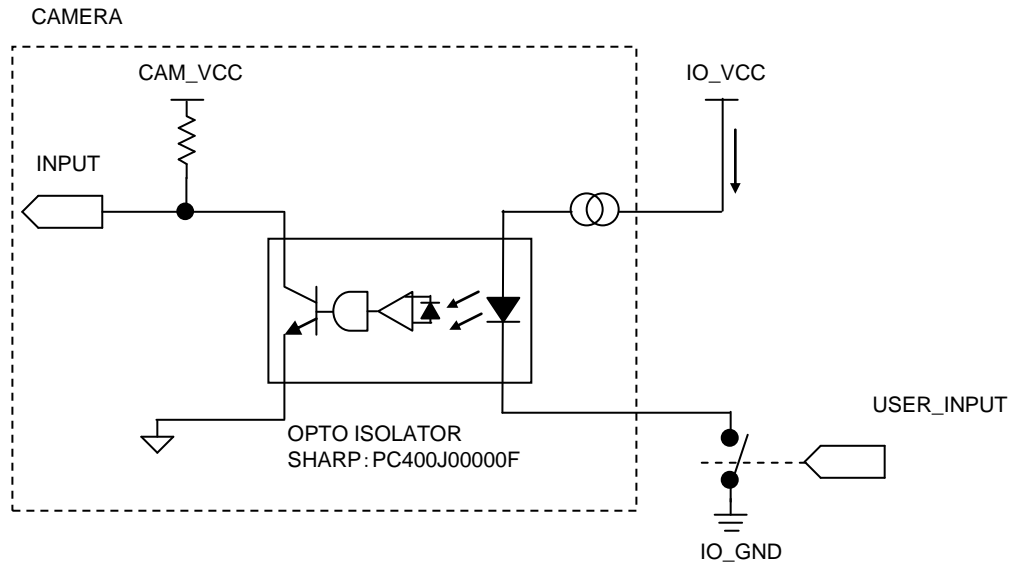
Fig. 3: Input Circuits

Response Timing



	IO_VCC			
	3.3[V]	5.0[V]	12[V]	24[V]
Td	2.5[us]	2.8[us]	3.0[us]	3.0[us]
Tr	100[ns]	100[ns]	100[ns]	100[ns]
Ts	689[ns]	584[ns]	545[ns]	520[ns]
Tf	11[ns]	11[ns]	11[ns]	11[ns]

Example circuit for the input signal



2. Output Circuit

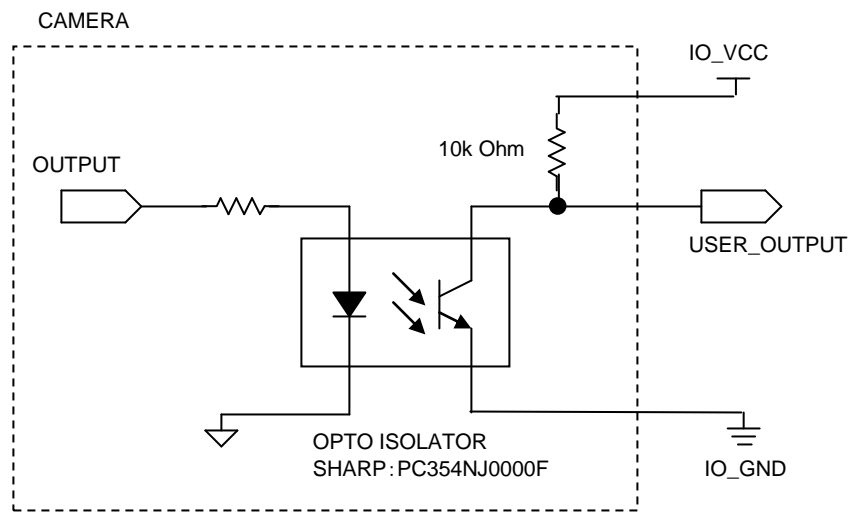
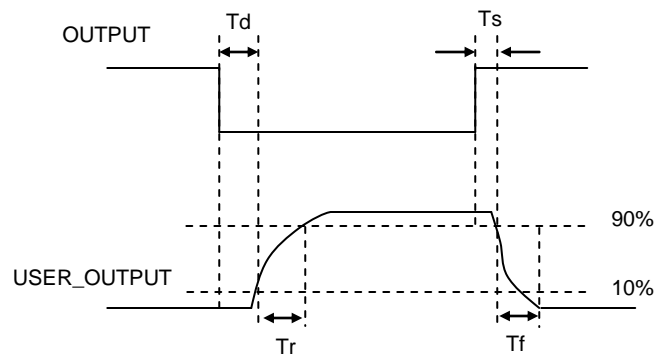


Fig. 4: Output Circuits

Response Time



	IO_VCC			
	3.3[V]	5.0[V]	12[V]	24[V]
Td	29.6[us]	30.4[us]	35.2[us]	28.4[us]
Tr	67.5[us]	60.2[us]	42.3[us]	31.0[us]
Ts	2.2[us]	2.2[us]	2.8[us]	2.8[us]
Tf	3.1[us]	3.8[us]	6.9[us]	10.9[us]

D. User Configurable FPGA (XILINX)

With this product, the customer would program the provided FPGA (XILINX) with its own proprietary code and the customer would also have complete control over the “Memory” utilization.

Sentech checks the camera for proper operation by “Disabling” around the customer’s code and memory control.

1. Block Diagram

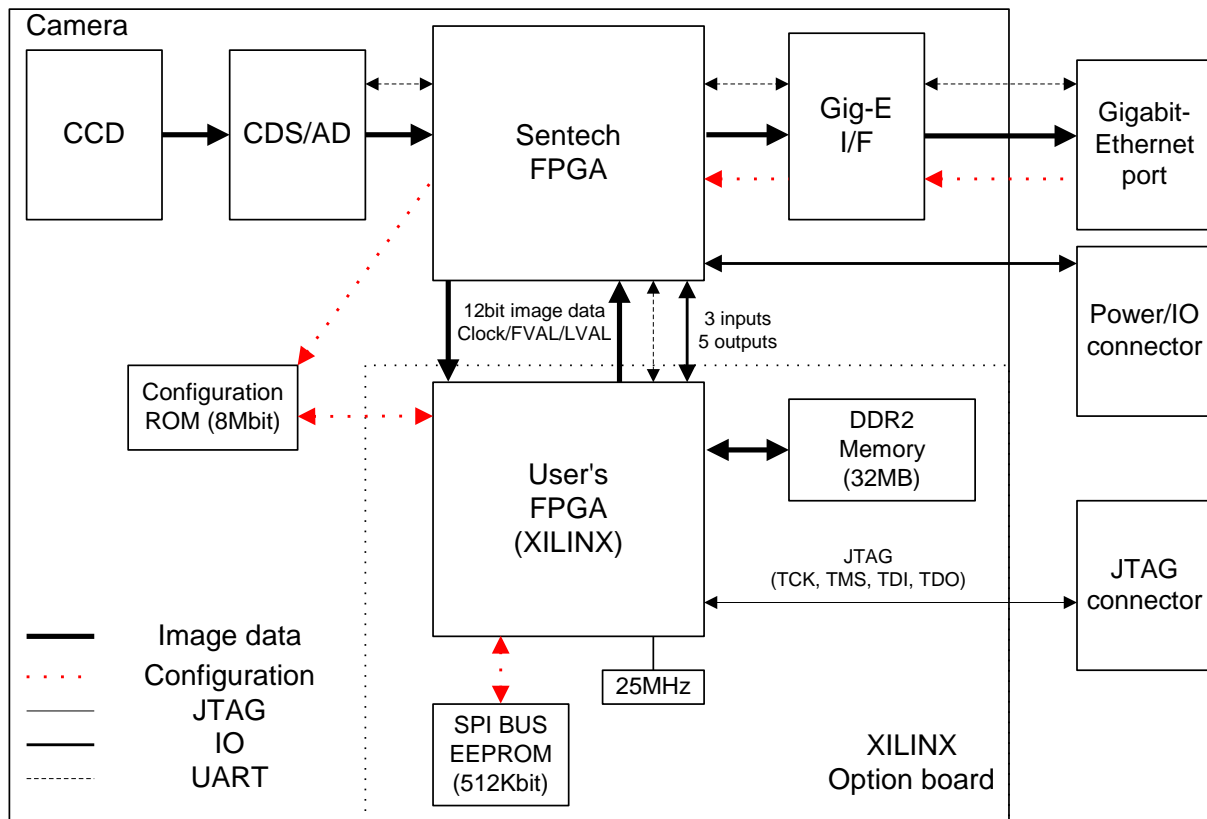


Fig. 5: Block diagram

2. Data Flow

a. Image Data

- 1) The 12 bit image data is transferred from "Sentech FPGA" to "User Configurable FPGA". Then it is returned to "Sentech FPGA".
- 2) The diagram below (Fig. 5) shows the basic image data diagram.

The image data from Sentech FPGA to user configurable FPGA

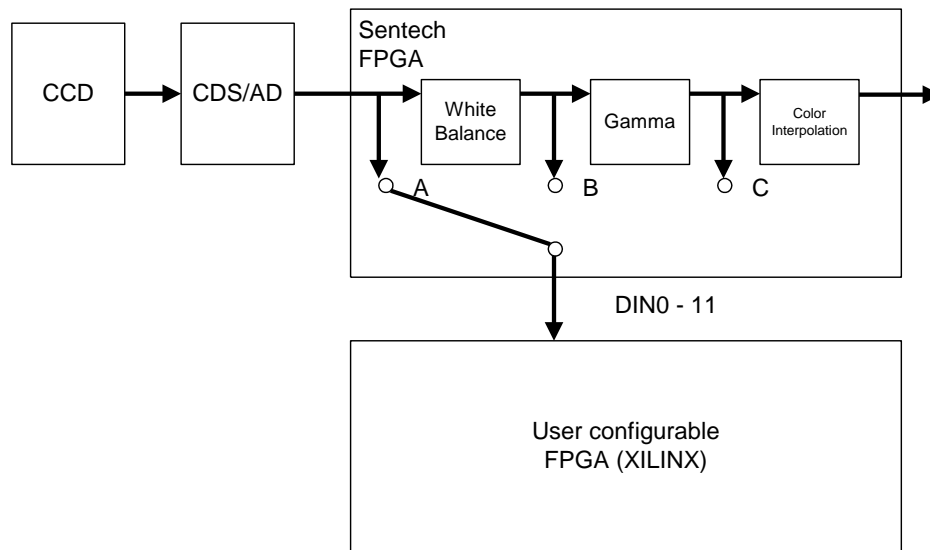
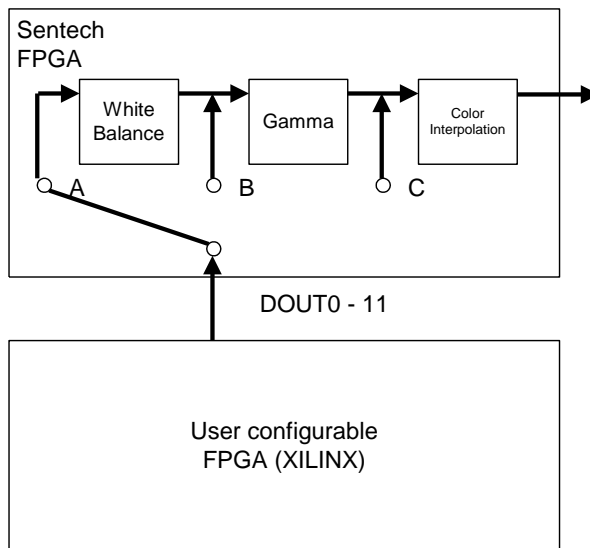


Fig. 6: Image Data Processing

The image data from user configurable FPGA to Sentech FPGA



b. Configuration Data

- 1) User configuration data from the “User Configurable FPGA” can be downloaded through Ethernet connector to the “Configuration ROM”.
- 2) Sentech provides the uploading software “StGigEOpFPGAUpload”.

c. JTAG

- 1) Users can access the “User Configurable FPGA RAM” through the JTAG interface for debugging purposes.
- 2) The Standard XILINX tools can be used for this purpose.

d. User IOs

- 1) There are a total of 8 user configurable I/O’s (3 inputs and 5 outputs). Please refer below.
- 2) The functions of all of the I/Os are defined by the user program provided in the “User’s FPGA”.

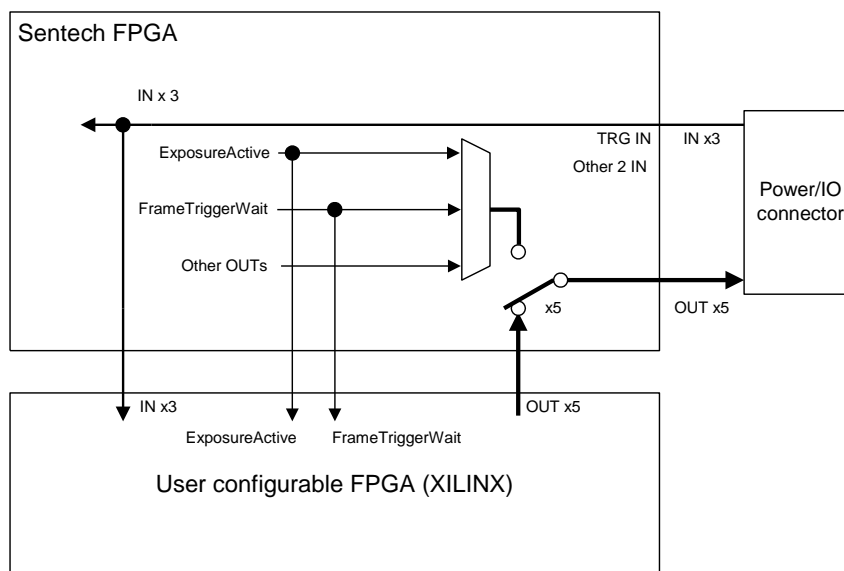


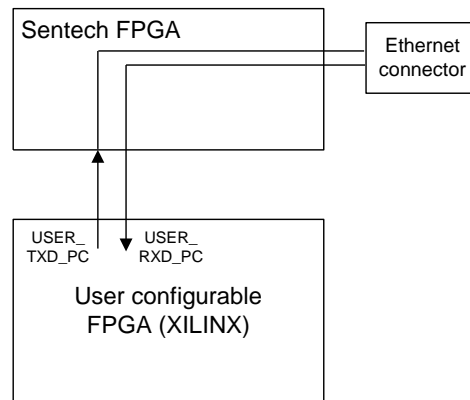
Fig. 7: Image data processing diagram

e. UART through Ethernet Connector

1) This enables the external PC to communicate with the “User’s FPGA” through Ethernet connector.

2) Please setup the UART port as follows:

Baud Rate: 115200 bps
Data Bit: 8 bit
Parity: None
Stop Bit: 1 bit
Flow Control: None



3. Key Devices on the Optional Board

Device	Part Number	Size	Manufacturer
FPGA	XC3SD1800A (Package: CSG484)	1800k gate	XILINX
DDR2	W9725G6JB-25	32MB	Winbond
EEPROM	M95512-RMN6TP	512kbit	ST Micro
Configuration ROM	M25P80-VMP6G	8Mbit	Micron

4. Examples of Possible Applications

Image Processing and Conversion
Image Storage
Image Analysis
Pattern Comparison and Others

5. Connection Information between the Devices

a. Connection between user configurable FPGA (XILINX) and Sentech FPGA

No	Signal Name	Direction	Discription	Pin No. of User FPGA
1	DIN0	input	Image Data bit0	B6
2	DIN1	input	Image Data bit1	A6
3	DIN2	input	Image Data bit2	A7
4	DIN3	input	Image Data bit3	A5
5	DIN4	input	Image Data bit4	B3
6	DIN5	input	Image Data bit5	B4
7	DIN6	input	Image Data bit6	A3
8	DIN7	input	Image Data bit7	A4
9	DIN8	input	Image Data bit8	A8
10	DIN9	input	Image Data bit9	B11
11	DIN10	input	Image Data bit10	B8
12	DIN11	input	Image Data bit11	A11
13	FVALIN	input	FVAL	C13
14	LVALIN	input	LVAL	C15
15	DOUT0	output	Image Data bit0	B13
16	DOUT1	output	Image Data bit1	B15
17	DOUT2	output	Image Data bit2	A16
18	DOUT3	output	Image Data bit3	A9
19	DOUT4	output	Image Data bit4	A17
20	DOUT5	output	Image Data bit5	B9
21	DOUT6	output	Image Data bit6	C4
22	DOUT7	output	Image Data bit7	C6
23	DOUT8	output	Image Data bit8	C7
24	DOUT9	output	Image Data bit9	C8
25	DOUT10	output	Image Data bit10	C9
26	DOUT11	output	Image Data bit11	C12
27	FVALOUT	output	FVAL	A13
28	LVALOUT	output	LVAL	A14
29	CLKIN	input	CLK	F11
30	SYS_RST_N	input	SYSTEM_RESET	AA12
31	USER_TXD_PC	input	UART_TX	E22
32	USER_RXD_PC	output	UART_RX	G22
34	USER_OUT_AUX0	output	USER_I/O	P22
35	USER_OUT_AUX1	output	USER_I/O	R22
36	USER_OUT_AUX2	output	USER_I/O	R20
37	USER_OUT_AUX3	output	USER_I/O	U22
38	USER_OUT_AUX4	output	USER_I/O	V20
39	USER_IN_AUX0	input	USER_I/O	W22
40	USER_IN_AUX1	input	USER_I/O	Y22
41	USER_IN_AUX2	input	USER_I/O	W19
42	ExposureActive	input	EXP_OUT	N17
43	FrameTriggerWait	input	TRG_RDY	N18
44	USER_TRG	output	TRG_OUT	D22

Direction is for the user configurable FPGA (XILINX).

12 bit image data operates between the Sentech FPGA and the user configurable FPGA.
bit11 is MSB of the image data, bit0 is LSB of the image data.

DIN0-11: The image data is sent from the Sentech FPGA to the user configurable FPGA.

DOUT0-11: The image data is sent back from the user configurable FPGA to the Sentech FPGA.

b. Connection between the user configurable FPGA (XILINX) and the DDR2

No	Signal Name	Direction	Discription	Pin No. of User FPGA
1	DDR_A0	output	Address0	G1
2	DDR_A1	output	Address1	K5
3	DDR_A2	output	Address2	K4
4	DDR_A3	output	Address3	L5
5	DDR_A4	output	Address4	K6
6	DDR_A5	output	Address5	K3
7	DDR_A6	output	Address6	K2
8	DDR_A7	output	Address7	M5
9	DDR_A8	output	Address8	L6
10	DDR_A9	output	Address9	V3
11	DDR_A10	output	Address10	V4
12	DDR_A11	output	Address11	W2
13	DDR_A12	output	Address12	W3
14	DDR_A13	-	Not use	F1
15	DDR_A14	-	Not use	F5
16	DDR_A15	-	Not use	F4
17	DDR_BA0	output	Bank address0	H5
18	DDR_BA1	output	Bank address1	H1
19	DDR_BA2	-	Not use	H2
20	DDR_D0	I/O	Data0	Y1
21	DDR_D1	I/O	Data1	W1
22	DDR_D2	I/O	Data2	R3
23	DDR_D3	I/O	Data3	T4
24	DDR_D4	I/O	Data4	T1
25	DDR_D5	I/O	Data5	R5
26	DDR_D6	I/O	Data6	T6
27	DDR_D7	I/O	Data7	T5
28	DDR_D8	I/O	Data8	P6
29	DDR_D9	I/O	Data9	P2
30	DDR_D10	I/O	Data10	P1
31	DDR_D11	I/O	Data11	N5
32	DDR_D12	I/O	Data12	L3
33	DDR_D13	I/O	Data13	M2
34	DDR_D14	I/O	Data14	K1
35	DDR_D15	I/O	Data15	L1
36	DDR_RAS#	output	Command inputs	F4
37	DDR_CAS#	output	Command inputs	G5
38	DDR_WE#	input	Command inputs	G6
39	DDR_CKE	output	Clock enable	H6
40	DDR_CK	output	Clock	U4
41	DDR_CK#	output	Clock	U5
42	DDR_LDQS	I/O	Data strobe for lower byte	U2
43	DDR_LDQS#	I/O	Data strobe for lower byte	V1
44	DDR_UDQS	I/O	Data strobe for upper byte	M6
45	DDR_UDQS#	I/O	Data strobe for upper byte	N7
46	DDR_ODT	output	On-die termination	F2
47	DDR_LDM	output	Input data mask for lower byte	U1
48	DDR_UDM	output	Input data mask for upper byte	R6

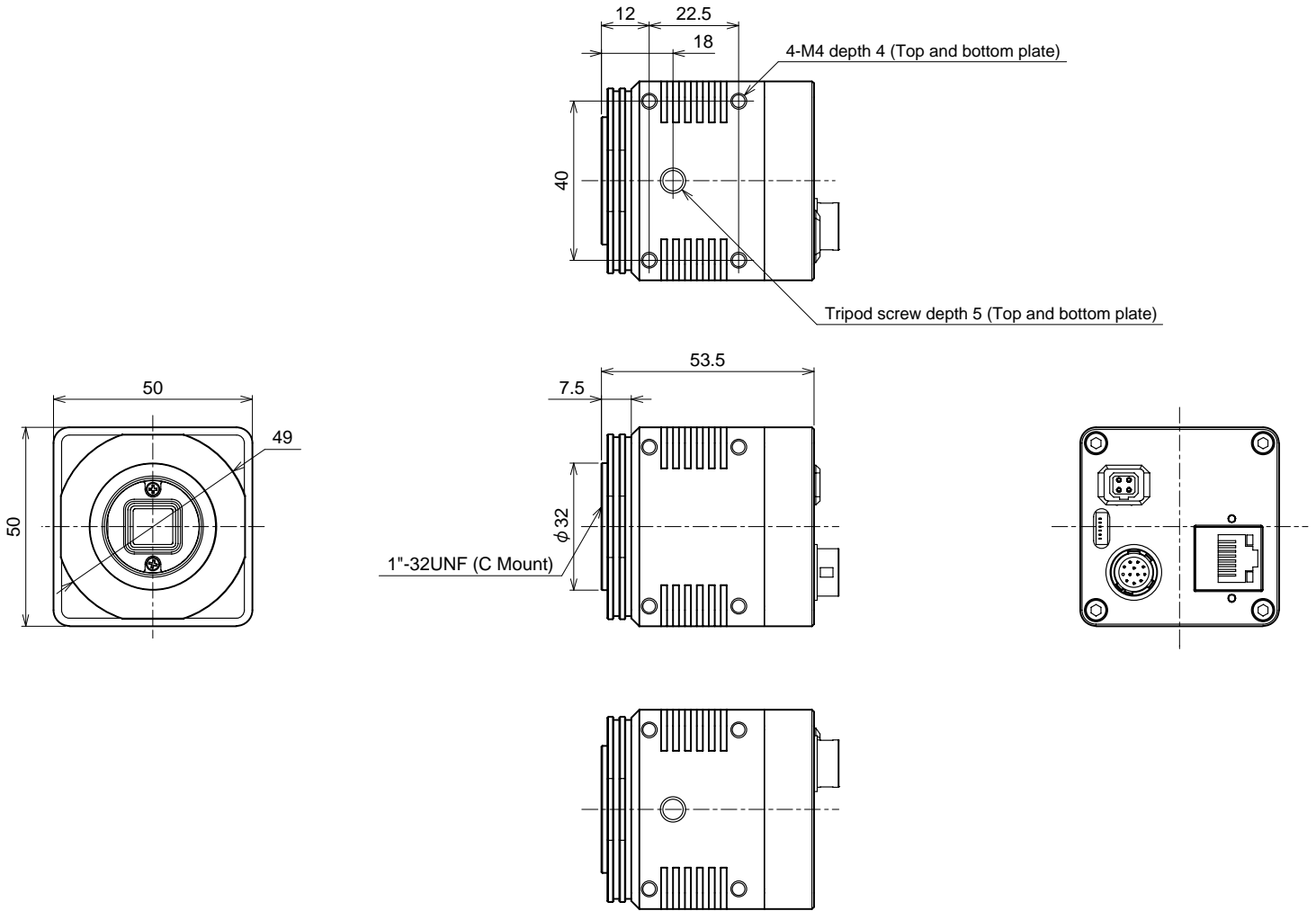
Direction is for the user configurable FPGA (XILINX)

c. Connection between user configurable FPGA (XILINX) and the EEPROM

No	Signal Name	Direction	Discription	Pin No. of User FPGA
1	ROM_512KBIT_CLK	output	Serial Clock for ROM	U20
2	ROM_512KBIT_nS	output	Chip Select for ROM	T17
3	ROM_512KBIT_DATA	output	Serial Data input for ROM	T20
4	ROM_512KBIT_Q	input	Serial Data output for ROM	T18
5	ROM_512KBIT_nW	output	Write Protect for ROM	R19

Direction is for the user configurable FPGA (XILINX)

II. Dimensions



Unit: mm

Revision

Rev.	Date	Change	Notes
1.0	Aug. 8, 2009	New Document	
1.1	Aug. 18, 2009	Update 1) Electronic Specifications (Change S/N ratio (standard deviation))	
1.2	Sept. 3, 2009	Update 1) Dimensions (Change drawing) 2) Mechanical Specifications (Change dimensions) 3) Mechanical specifications (Change descriptions of optical filter) 4) Electronic specifications (Add CCD out method for STC-GE/GEC500OX) 5) Electronic specifications (Change description of pulse width trigger)	
1.3	Sept. 8, 2009	Update 1) GE/GEC830X → XGA 2) GE/GEC500OX pixel frequency: 64 MHz 3) Video Output: Digital 8, 10, or 12 bit Raw Data GigE Vision 4) Power Supply → Power 5) Gamma: "Programmable gamma setting via the communication" 6) ROI function 7) Communication: Communication through Ethernet Connector 8) pg 11: Description of interface connector updated 9) pg 11: DC Iris Lens connector info updated 10) pg 13: Pin assignment was updated	
1.4	Dec.8, 2009	Update 1) Change power/IO connector, IO configurations and related specifications	
1.5	Dec. 18, 2009	Update 1) Change the explanation for the capacity of the DDR2 memory	
1.6	May 6, 2010	Update 1) Delete GE133/GEC133 2) Electronic Spec: Delete RGB 10/12 bit from video out 3) Electronic Spec: Change auto iris lens type from DC iris to Video iris 4) Electronic Spec: Change input power range from "9 to 28" to "10.8 to 26.4 Vdc" 5) Mech Spec: Change auto iris lens type 6) Connector Spec: Change input power range and auto iris lens type.	
1.7	May 17, 2010	Update 1) Electronic Spec: Change S/N Ratio to Noise Level 2) Electronic Spec: Change PoE IEEE802.3af Class2 to Class3	
1.8	May 21, 2010	Update 1) Dimension (Change drawing) 4) Electronic specifications (Change video output) 5) Electronic specifications (Change smear reduction) 6) Electronic specifications (Change ALC) 7) Electronic specifications (Add color interpolation, white balance and I/O's) 8) Mechanical specifications (Change dimensions) 9) Mechanical specifications (Change optical filter) 10) Mechanical specifications (Change camera mount screws)	These did not change: 2) Electronic specifications (Change minimum scene illumination) 3) Electronic specifications (Change power consumption)
1.9	Aug 2, 2010	Update 1) Change the camera name 2) Dimension (Change drawing) 3) Mechanical specifications (Change dimensions) 4) Mechanical specifications (Change auto iris lens type) 5) Mechanical specifications (Change optical filter)	
2.0	Sept 17, 2010	Update 1) Connector specifications (Add the explanation of the TRG READY OUT and EXP OUT signal)	
2.2 (2.1~ 2.2)	Dec. 3, 2010	Update 1) Electronic specifications (Change the frame rate) 2) Electronic specifications (Change the maximum gain) 3) Electronic specifications (Change from the shutter speed to the exposure time) 4) Electronic specifications (Change from the ROI to the AOI) 5) Electronic specifications (Delete the scanning method) 6) Electronic specifications (Change the protocol) 7) Environmental specifications (Change the operational and storage temperature) 8) Connector specifications (Add the description for the input and output signals) 9) Connection information between the devices (Change the information)	

Rev.	Date	Change	Notes
2.3	Dec. 21, 2010	Update Electronic spec 1) Power Consumption 2) Horizontal and pixel frequency for GE/GEC83A 3) Frame rate 4) Minimum Scene Illumination Mechanical Spec 1) Dimensions Connector Spec 1) Added description for the output signal 2) Added the LED information for the RJ45 connector Changed the DDR2 and the configuration devices.	
2.4	Jan 12, 2010	Update Mechanical spec 1) Change dimensions Dimensions 1) Change the drawing I/O circuits Mechanical spec 1) Revise response time for the input circuit	
2.5	Jan 14, 2010	Update Electronic spec 1) Revise the active picture elements for the STC-GE/GEC2020X) Connector Spec 1) Change the initial signal for the Power/IO connector	
2.6	March 1, 2011	Update Electronic spec 1) Revised the FPGA information 2) Revised the horizontal frequency 3) Revised the power consumption Added spectral sensitivity characteristics	
2.7	March 15, 2011	Update 1) Mechanical Spec (Added optical center accuracy) 2) Electronic Spec (Changed the frame rate for the GE/GEC500OX) 3) Environmental Spec (revised the shock, vibration and standard conformity)	
2.8	April 1, 2011	Update 1) Connector specifications (Changed the LED information for the RJ45 connector)	
2.9	May 18, 2011	Update 1) Separate STC-GE500OX/GEC500OX 2) Operational temperature and the power consumption (Revised the condition)	
3.0	June 13, 2011	Update 1) Add the note about the screw lock LAN cable	
3.1	July 27, 2011	Update 1) Revise the imager part number for STC-GEC83OX	
3.2	Aug 17, 2011	Update 1) Output signals (Change the output signal name from FrameActive to SensorReadOut)	

Sensor Technologies America, Inc.

1345 Valwood Pkwy, Suite 320
Carrollton, Texas 75006-6891
TEL (972) 481-9223 FAX (972) 481-9209
URL <http://www.sentechamerica.com/>

Sensor Technology Co., Ltd.

7F, Harada Center Building
9-17, Naka cho 4chrome
Atsugi-city, Kanagawa
243-0018 Japan
TEL +81-46-295-7061 FAX +81-46-295-7066
URL <http://www.sentech.co.jp/>

Taiwan Sensor Technology, Inc.

3F-6, No. 9, Aiguo W, Rd., Jhong Jheng District
Taipei City 100, Taiwan, R.O.C.
TEL 886-2-2383-2331 FAX 886-2-2370-8775
EMAIL: sentech0501@yahoo.com.tw