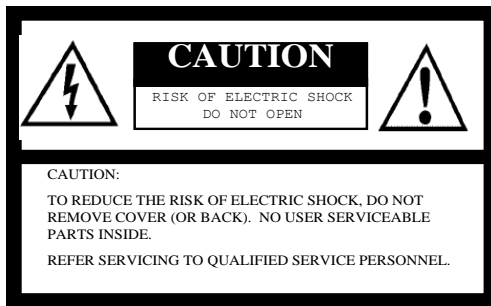


**SENTECH**

**STC-HD133SDI**  
**Product Specification**

**16:9 Format, 720p**  
**Color HD-SDI Camera**

## Safety Precautions



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.



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.

**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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## Content

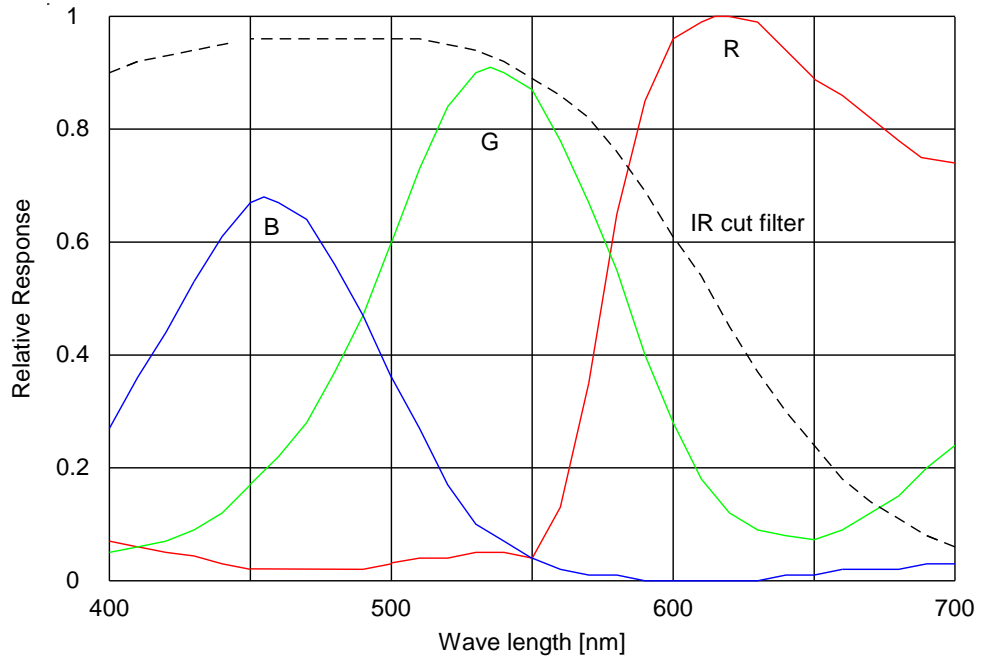
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## I. Specifications

### A. Electronic Specifications / Mechanical Specifications / Environmental Specifications

Product		STC-HD133SDI	
Electronic Specifications	Imager	1/3" Interline SXVGA CCD: ICX445AQA	
	HD Active Picture Elements	1280 (H) x 720 (V)	
	Chip Size	6.26 (H) x 5.01 (V) mm	
	Cell Size	3.75 (H) x 3.75 (V) $\mu$ m	
	Minimum Scene Illumination	5 Lux at F1.2 at 50% IRE, AGC ON and 1/60 second shutter speed with IR cut filter	
	Resolution	600 TV Lines	
	Sync System	Internal	
	Video Output	HD-SDI (SMPTE292M) YPbPr, 1280 (H) x 720 (V), 60Hz / 59.94Hz / 50Hz	
	Camera Functions	ALC	Configurable via the UART communication with auto electronic shutter and AGC
		Shutter Speed	Shutter speed adjustable via the UART communication Up to 1/100,000 seconds at 60Hz / 59.94 Hz or up to 1/83,947 seconds at 50Hz
		Gain	AGC or Fixed gain, selectable via the UART communication Gain range: 0 to 18.3 dB
		Digital Gain	Up to 5.9866 dB
		Gamma	1.0, 0.9, 0.8, 0.7, 0.6, 0.5, 0.45, 0.3 or manual gamma Gamma selectable via the UART communication
		White Balance	Auto white balance / manual white balance / push-to-set white balance White balance selectable via the UART communication
		Mirror Image	Normal Image and Horizontal Flip are selectable via UART communication
		DSP Presets	28 DSP presets; Selectable picture mode via the UART communication
		Line Generator	Both horizontal and vertical with all available colors Thickness adjustable via the UART communication
		Shadow Mask Generator	Horizontal and vertical w/ shading level adjustment via the UART communication
		Communication	+3.3V UART communication via 3.5 $\phi$ stereo jack
		Character Generator	Built-in character generation function via the UART communication
Pixel Blemish Collection	Up to 64 pixel blemish static collection		
Power	Input Voltage	+9Vdc to +15Vdc (Typically: 12Vdc)	
	Consumption	< 3.0 W	
Mechanical Specifications	Dimensions	40 (W) x 40 (H) x 45.8 (D) mm	
	Optical Filter	Includes IR cut filter	
	Lens Mount	C mount	
	Interface Connector	Video Output	BNC connector
		Power Input	12V power jack
		External Control	3.5 $\phi$ stereo jack with SW board
		Communication	3.5 $\phi$ stereo jack
	Button	Primary SW Initial press button function: push-to-set white balance Initial hold button function: Auto white balance (Function is selectable via the UART communication)	
Weight	Approximately 120 g		
Environmental Specifications	Temperature	Operational	0°C to 40°C
		Storage	-30° to 65°C
	Vibration	20Hz to 200Hz to 20Hz (5min./cycle), Acceleration: 10G, 30min., XYZ each direction	
	Shock	Acceleration: 38G, half amplitude 6ms, 3 times, XYZ each direction	
	Standard Compliance	EMS: EN61000-6-2, EMI: 55011	
	RoHS	RoHS Compliant	

## Spectral Sensitivity Characteristics



## II. Camera Operations

### A. Shutter Settings

#### 1. Formula for the moment of exposure

Setting value is 0 to 63:

$$\text{Exposure time (seconds)} = \left( \text{Vline} \times \text{Hclk} - \frac{\text{Vline} \times \text{Hclk} \times \text{Setting value}}{128} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 64 to 127:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{2} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 64)}{256} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 128 to 191:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{4} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 128)}{512} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 192 to 255:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{8} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 192)}{1,024} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 256 to 319:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{16} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 256)}{2,048} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 320 to 383:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{32} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 320)}{4,096} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 384 to 447:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{64} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 384)}{8,192} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 448 to 511:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{128} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 448)}{16,384} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 512 to 575:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{256} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 512)}{32,768} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 576 to 639:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{512} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 576)}{65,536} \right) \times \frac{1}{\text{Fclk}}$$

Setting value is 640 to 699:

$$\text{Exposure time (seconds)} = \left( \frac{\text{Vline} \times \text{Hclk}}{1,024} - \frac{\text{Vline} \times \text{Hclk} \times (\text{Setting value} - 640)}{131,072} \right) \times \frac{1}{\text{Fclk}}$$

Vline: Number of lines for 1V = 750

Fclk: Clock frequency = 74.25 MHz = 74,250,000

Hclk: Number of clocks for 1H = 1,650 (60 or 59.94 Hz) or 1,980 (50 Hz)

## 2. Examples of Exposure Time

### a. 720p – 60Hz, 720P-59.94Hz Operations

Value	High Speed Shutter	
0	16.7 ms	1/60 s
64	8.33 ms	1/120 s
128	4.17 ms	1/240 s
192	2.08 ms	1/480 s
256	1.04 ms	1/960 s
320	520.8 us	1/1,920 s
384	260.4 us	1/3,840 s
448	130.2 us	1/7,680 s
512	65.1 us	1/15,360 s
576	32.6 us	1/30,720 s
640	16.3 us	1/61,440 s
690	10.0 us	1/100,000 s

### b. 720p – 50Hz Operations

Value	High Speed Shutter	
0	20.0 ms	1/50 s
64	10.0 ms	1/100 s
128	5.00 ms	1/200 s
192	2.50 ms	1/400 s
256	1.25 ms	1/800 s
320	625.0 us	1/1,600 s
384	312.5 us	1/3,200 s
448	156.25 us	1/6,400 s
512	78.13 us	1/12,800 s
576	39.06 us	1/25,600 s
640	19.53 us	1/51,200 s
690	12.0 us	1/83,947 s



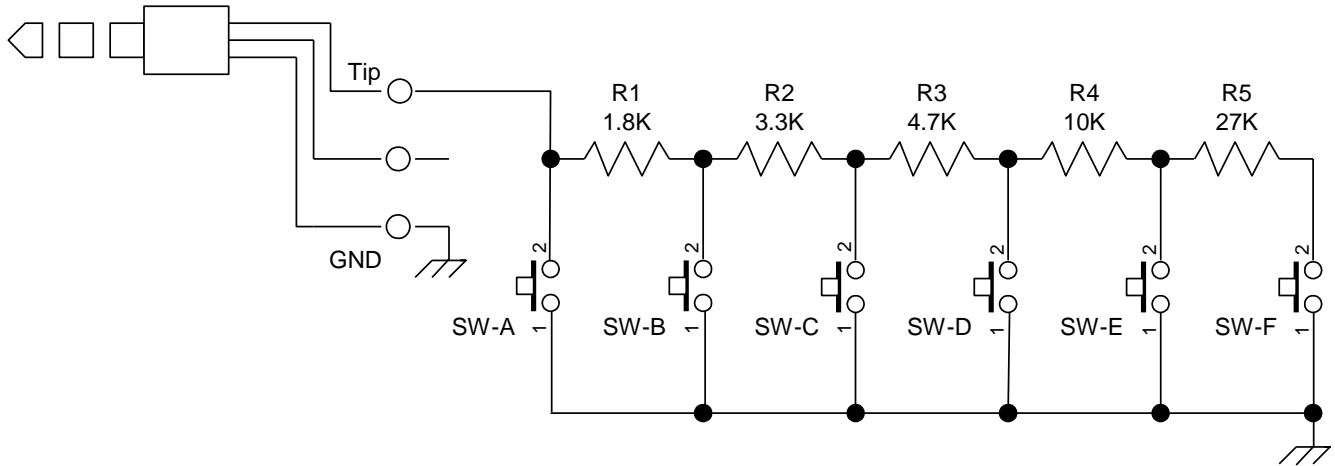
## B. The Camera Control Functions

	Functin
1	Display Menu
2	DSP preset (+)
3	DSP preset (-)
4	Contrast (+)
5	Contrast (-)
6	Shadow mask shading level (+)
7	Shadow mask shading level (-)
8	Shadow mask top (+)
9	Shadow mask top (-)
10	Shadow mask bottom (+)
11	Shadow mask bottom (-)
12	Shadow mask top / bottom (+)
13	Shadow mask top / bottom (-)
14	Shadow mask left (+)
15	Shadow mask left (-)
16	Shadow mask right (+)
17	Shadow mask right (-)
18	Shadow mask left / right (+)
19	Shadow mask left / right (-)
20	Horizontal line maker color (+)
21	Horizontal line maker color (-)
22	Horizontal line maker size (+)
23	Horizontal line maker size (-)
24	Horizontal line maker position (+)
25	Horizontal line maker position (-)
26	Vertical line maker color (+)
27	Vertical line maker color (-)
28	Vertical line maker size (+)
29	Vertical line maker size (-)
30	Vertical line maker position (+)
31	Vertical line maker position (-)
32	Horizontal mirror OFF
33	Horizontal mirror ON
34	Horizontal mirror ON/OFF change
35	Manual white balance
36	Auto white balance
37	Push to set white balance
38	Auto/manual white balance change
39	ALC OFF
40	ALC ON
41	ALC ON/OFF change
42	Fixed shutter
43	Auto shutter
44	Auto/fixed shutter change
45	Fixed gain
46	AGC ON
47	Fixed gain/AGC change

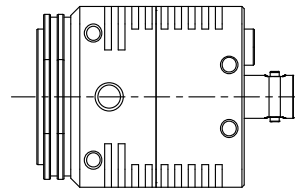
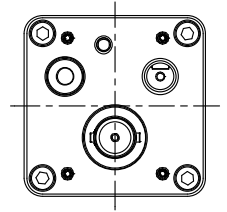
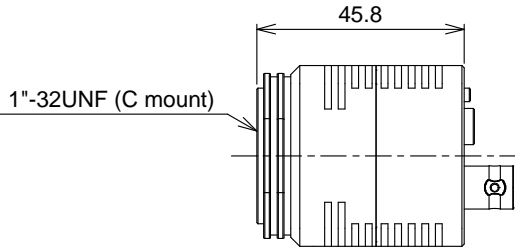
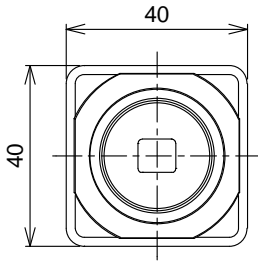
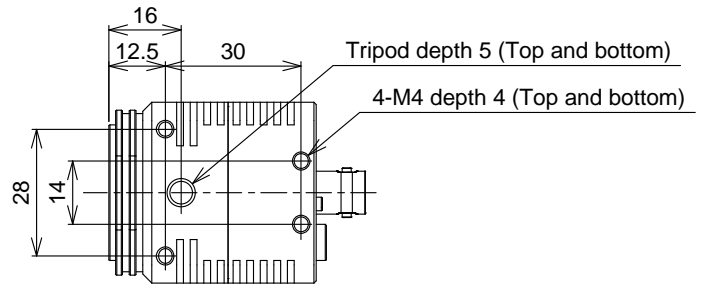
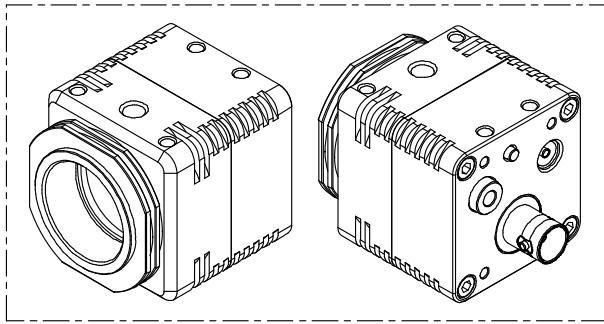
	Function
48	Undisplay maker (line maker and shadow mask)
49	Display maker (line maker and shadow mask)
50	Display/Undisplay maker (line maker and shadow mask)
51	Undisplay line maker
52	Display line maker
53	Display/Undisplay line maker
54	Undisplay shadow mask
55	Display shadow mask
56	Display/Undisplay shadow mask
57	Save to EEPROM (Horizontal mirror OFF)
58	Save to EEPROM (Horizontal mirror ON)
59	Save to EEPROM (Horizontal mirror ON/OFF change)
60	Save to EEPROM (Manual white balance)
61	Save to EEPROM (Auto white balance)
62	Save to EEPROM (Push to set white balance)
63	Save to EEPROM (Auto/manual white balance change)
64	Save to EEPROM (Undisplay maker (line maker and shadow mask))
65	Save to EEPROM (Display maker (line maker and shadow mask))
66	Save to EEPROM (Display/Undisplay maker (line maker and shadow mask))
67	Save to EEPROM (Undisplay line maker)
68	Save to EEPROM (Display line maker)
69	Save to EEPROM (Display/Undisplay line maker)
70	Save to EEPROM (Undisplay shadow mask)
71	Save to EEPROM (Display shadow mask)
72	Save to EEPROM (Display/Undisplay shadow mask)
73	Horizontal mirror ON/OFF change (Select: ON, unselect: OFF)
74	Auto/manual white balance change (Select: Auto, unselect: manual)
75	Display/Undisplay maker (line maker and shadow mask) (Select: Display, unselect: undisplay)
76	Display/Undisplay line maker (Select: Display, unselect: undisplay)
77	Display/Undisplay shadow mask (Select: Display, unselect: undisplay)

## C. External Control Board Circuits

SW board circuits for 3.5  $\Phi$  stereo jack (External SW)



### III. Dimensions



Unit: mm

## Revisions

Rev	Date	Changes	Note
1.0	Feb 1, 2012	New document	

**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