

**SENTECH**

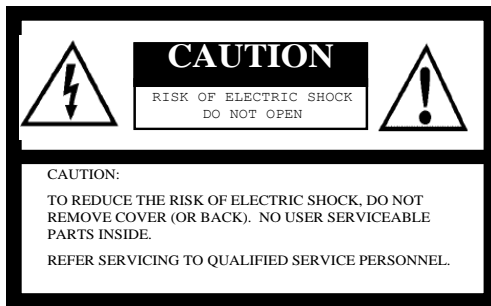
**STC-AF133A**  
(without close-up lens)

**STC-AF133B**  
(with 250mm close-up lens)

## **Product Specification**

**16:9 Format 1.3 MegaPixels**  
**18x Zoom Auto Focus 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

<b>I. Specifications</b> .....	<b>5-8</b>
A. Electronic Specifications / Mechanical Specifications / Environmental Specifications.....	5
B. Connector Specifications .....	5
1. Mechanical Drawings.....	6
2. Connector-A: Video Output .....	6
3. Connector-B (CN303): Power Input .....	7
4. Connector-C (CN304): UART Communication.....	7
5. Connector-D (CN305): External Switch Connection.....	7
C. Output timing.....	8
<b>II. Camera Operations</b> .....	<b>9-14</b>
A. ALC Operations .....	9
B. Shutter Settings.....	9
C. External Switch Assignable Functions .....	10
D. User Configurable Functions.....	11-14
<b>III. Dimensions</b> .....	<b>15-16</b>
A. STC-AF133A.....	15
B. STC-AF133B .....	16

## I. Specifications

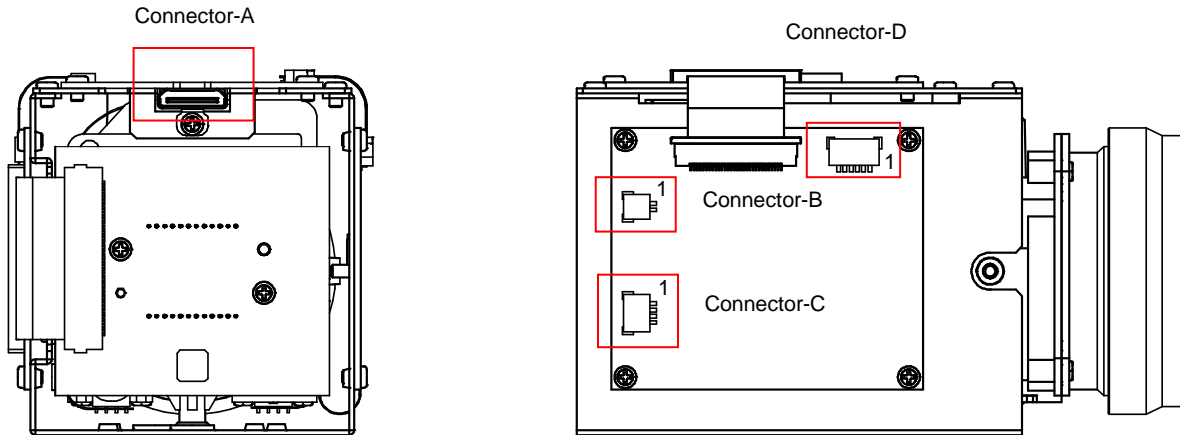
### A. Electronic Specifications / Mechanical Specifications / Environmental Specifications

Product		STC-AF133A	STC-AF133B	Initial Settings	
Electronic Specifications	Imager	1/3" Interline SXGA CCD: ICX445AQA			
	Effective Picture Elements	1296 (H) x 966 (V)			
	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	13 Lux at F1.6 (at zoom out position) at 50% IRE, AGC ON and 1/60 second shutter speed with IR cut filter			
	Sync System	Internal			
	Video Output	DVI 1.0 Conformity RGB, 1280 (H) x 720 (V), 60 Hz / 50 Hz			
	Camera Functions	ALC	Can be configured via the UART communication With optical iris, auto electronic shutter and AGC		Fixed shutter, AGC OFF
		Shutter Speed	Adjustable shutter speed via the UART communication		1/100 seconds
			Extended	Available up to 0.5 seconds	
		Gain	Up to 1/100,000 seconds at 60 Hz or up to 1/83,333 seconds at 50Hz		Fixed gain, 0dB
			AGC	AGC or Fixed Gain selectable via the UART communication	
		Digital Gain	0 to 18.3 dB		0dB
			Fixed Gain	0 to 18.3 dB	
		Gamma	Up to 5.9866 dB		Manual gamma
		White Balance	1.0, 0.9, 0.8, 0.7, 0.6, 0.5, 0.45, 0.3 or manual gamma Selectable gamma via the UART communication		Manual white balance (4100K)
		Mirror Image	Auto white balance / manual white balance / push-to-set white balance White balance selectable via the UART communication		Horizontal mirror
		Picture Modes	Horizontal and vertical flip are selectable via UART communication		Picture mode
		Line Generator	3 picture modes: Picture, Bright and Pseudo Color (includes 30 pseudo colors) Picture mode selectable via the UART communication		No lines
Shadow Mask Generator		Both horizontal and vertical with all available colors Thickness adjustable via the UART communication		No shadow mask	
Motion Detection		Horizontal and vertical w/ shading level adjustment via the UART communication		On	
Digital Zoom	ON/OFF selectable via the UART communication				
Freeze Image	x1 to x 128 digital zoom Digital pan and tilt is available on still images		Live image		
Communication	Live or freeze image is selectable via UART communication Digital pan and tilt is available on still images				
Character Generator	UART communication via C304 (S4B-ZR-SM4A, JST) connector				
Lens Control Functions	Optical Zoom	Built-in character generation function via the UART communication			
	Focus	Manual zoom position control via UART communication		Auto focus	
	Iris	Auto focus / manual focus / push set focus Focus mode selectable via the UART communication		Auto iris	
Power	Input Voltage	Auto iris / manual iris / push-set iris Selectable iris control mode via the UART communication			
	Consumption	8Vdc to 15Vdc (Typically: 12Vdc) < 5.2W			
Mechanical Specifications	Dimensions	64 (W) x 60 (H) x 89.3 (D) mm	64 (W) x 60 (H) x 97.4 (D) mm		
	Auto Focus Lens	18x auto focus zoom lens (Tamron) Optical zoom range: from 4.7 mm to 84.6 mm Aperture: F1.6 at f = 4.7 mm to F2.8 at f = 84.6 mm			
	Close-up Lens	Does not include close-up lens	250mm close-up lens		
	Optical Filter	IR cut filter on IR cut filter ON/OFF selectable via the UART communication			
	Interface Connector	Video Output	Mini-HDMI connector		
		Power Input	CN303, S2B-ZR-SM4A (JST)		
		External Control	CN305, SM06B-SRSS (JST) 6-pin connector header for connectivity of up to nine external switches		
		Communication	CN304, S4B-ZR-SM4A (JST)		
Weight	Approximately 227 g	Approximately 251 g			
Environmental Specifications	Temperature	Operational	0 to 45°C		
		Storage	-30 to 65°C		
	RoHS	RoHS Compliant			

## B. Connector Specifications

### 1. Mechanical Drawings

The camera is equipped with the following four connectors (Connector-A through D).



### 2. Connector-A: Video Output

The connector type: Mini-HDMI Connector

Pin Assignment:

No.	Signal Type
1	TMDS Data2 Shield
2	TMDS Data2+
3	TMDS Data2-
4	TMDS Data1 Shield
5	TMDS Data1+
6	TMDS Data1-
7	TMDS Data0 Shield
8	TMDS Data0+
9	TMDS Data0-
10	TMDS CLK Shield
11	TMDS CLK+
12	TMDS CLK-
13	DDC/CEC Ground
14	CEC
15	SCL
16	SDA
17	Reserved
18	+5V Power
19	Hot Plug Detect

The cable requirements:

The camera connects to the HDMI port on the monitor:

1. Mini-HDMI – HDMI cable
2. HDMI cable with the Mini-HDMI to HDMI adaptor

The camera connects to the DVI port on the monitor:

1. Mini-HDMI – HDMI cable with a HDMI to DVI adaptor
2. HDMI cable with a Mini-HDMI to HDMI adaptor and a HDMI to DVI adaptor

### C. Connector-B (CN303): Power Input

The connector type: S2B-ZR-SM4A (Right angle connector, JST)

Note: Mating connector housing: ZHR-02 manufactured by JST

Pin Assignment:

No.	Signal Types
1	Power In
2	GND

### D. Connector-C (CN304): UART Communication

The connector type: S4B-ZR-SM4A (Right angle connector, JST)

Note: Mating connector housing: ZHR-04 manufactured by JST

Pin Assignment:

No.	Signal Types	Voltage
1	+3.3V Out	3.3V
2	TX	3.3V
3	GND	
4	RX	3.3V

### E. Connector-D (DN305): External Switch Connection

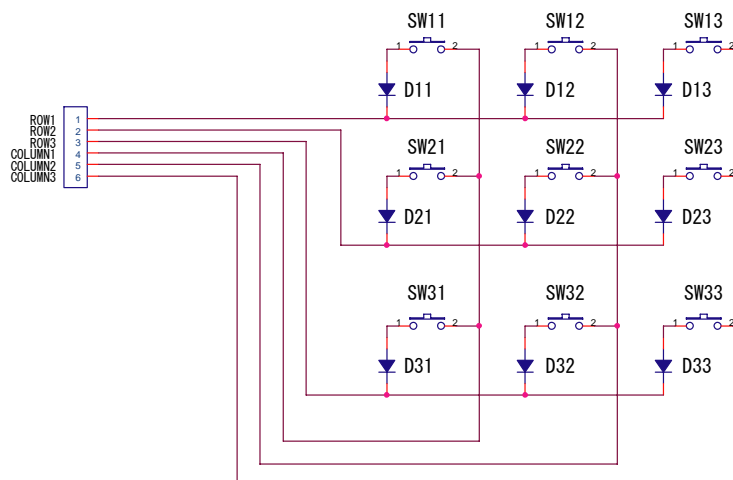
The connector type: SM06B-SRSS (Right angle connector, JST)

Note: Mating connector housing: SHR-06 manufactured by JST

Pin Assignment:

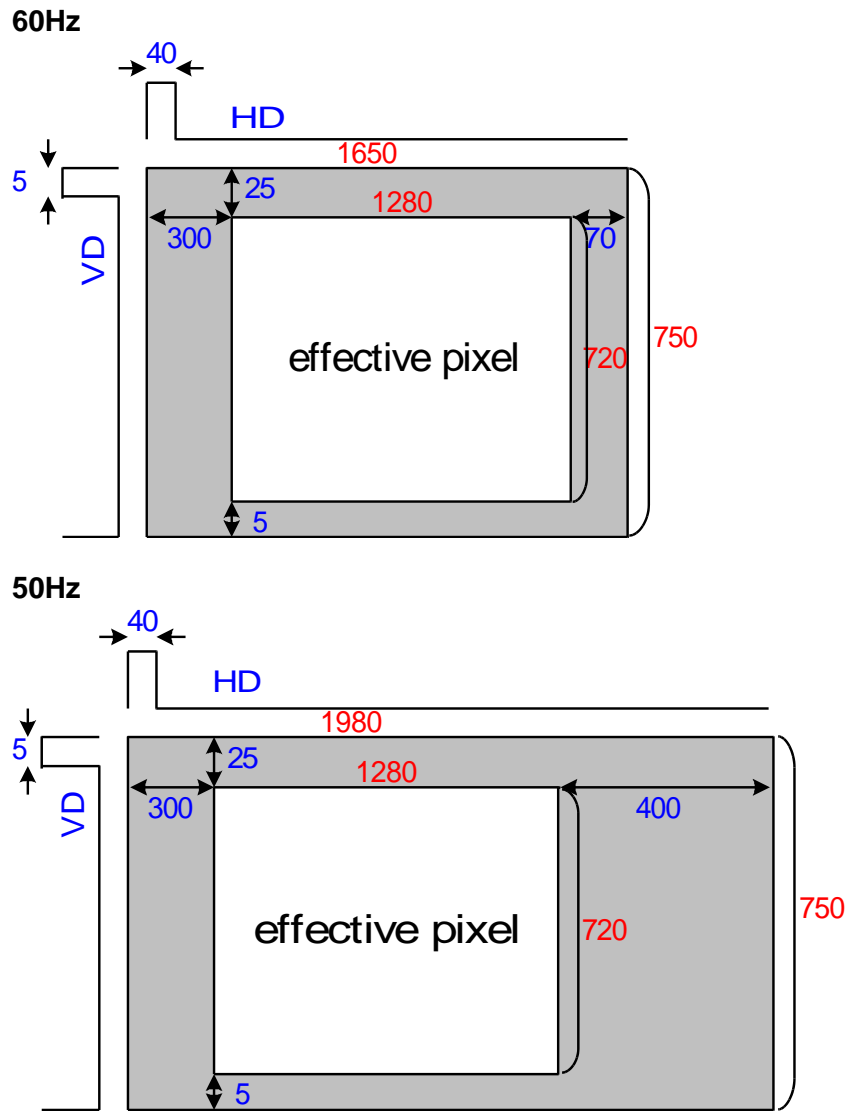
No.	Signal Type
1	ROW1
2	ROW2
3	ROW3
4	COLUMN1
5	COLUMN2
6	COLUMN3

According to the diagram below, a total of 9 switches can be connected to connector CN305. The switches are arranged as row/column matrix and this enables the user to connect 9 switches on 6 conductors.



## C. Output Signal Timing

		720P	720P
		60Hz	50Hz
Parameter	Unit		
H-Resolution	Pixels	1280	1280
V-Resolution	Lines	720	720
H Frequency	kHz	45.00	37.50
V Frequency	Hz	60.00	50.00
Scan Type	-	NI	NI
Pixel Frequency	MHz	74.25	74.25
Pixel Time	nsec	13.5	13.5
Line time	usec	22.2	26.7
Frame Time	msec	16.7	20.0
H Addressable	Pixels	1280	1280
H Front Porch	Pixels	70	400
H Sync	Pixels	40	40
H Back Porch	Pixels	260	260
H Total	Pixels	1650	1980
V Addressable	Lines	720	720
V Front Porch	Lines	5	5
V Sync	Lines	5	5
V Back Porch	Lines	20	20
V Total	Lines	750	750
H Addressable	usec	17.239	17.239
H Front Porch	usec	0.943	5.387
H Sync	usec	0.539	0.539
H Back Porch	usec	3.502	3.502
V Addressable	msec	16.000	19.200
V Front Porch	msec	0.111	0.133
V Sync	msec	0.111	0.133
V Back Porch	msec	0.444	0.533



Note: These timings are the output signal timing before converting to the DVI signal.

## II. Camera Operations

### A. ALC Operations

ALC (Automatic Light Compensation) is configured by the user by enabling or disabling the optical iris, auto electronic shutter and/or the AGC (Automatic Gain Control). The camera provides flexible priority settings as described below. The setting parameters in the table are defined in the protocol document and the Sentech control software.

Scene Illumination	Electronic Shutter Parameters	Optical Iris Parameters	AGC Parameters
Bright	AEE minimum exposure time	Auto minimum open ratio	AGC Minimum Gain
	-	-	
	AEE middle exposure time (minimum side)	-	-
	Change	Auto maximum open ratio	-
	AEE middle exposure time (maximum side)		AGC Middle Gain
	Change	-	
AEE maximum exposure time	-	AGC Maximum Gain	
Dark			

### B. Shutter Settings

The camera offers both high-speed shutter and extended shutter settings as described below:

#### 720P – 60Hz Operations:

Value	High Speed Shutter		Value	Extended Shutter	
0	20.0 ms	1/50 s	-64	40.0 ms	1/30 s
64	10.0 ms	1/100 s	-128	80.0 ms	1/15 s
128	5.00 ms	1/200 s	-192	160.0 ms	2/15 s
192	2.50 ms	1/400 s	-256	320.0 ms	4/15 s
256	1.25 ms	1/800 s	-320	640.0 ms	8/15 s
320	625.0 us	1/1,600 s	-384	1.28 s	16/15 s
384	312.5 us	1/3,200 s	-448	2.56 s	32/15 s
448	156.25 us	1/6,400 s	-512	5.12 s	64/15 s
512	78.13 us	1/12,800 s	-576	10.2 s	128/15 s
576	39.06 us	1/25,600 s	-640	20.5 s	256/15 s
640	19.53 us	1/51,200 s	-740	41.0 s	512/15 s
690	12.0 us	1/83,333 s	-768	81.9 s	1,024/15 s

The extended shutter can be set up to 68.3 seconds. Therefore, when it is set to be more than 0.5 seconds, noise will appear on the image. Please check the image when the extended shutter is set greater than 0.5 seconds.

#### 720P – 50Hz Operations:

Value	High Speed Shutter		Value	Extended Shutter	
0	16.7 ms	1/60 s	-64	33.3 ms	1/30 s
64	8.33 ms	1/120 s	-128	66.7 ms	1/15 s
128	4.17 ms	1/240 s	-192	133.3 ms	2/15 s
192	2.08 ms	1/480 s	-256	266.7 ms	4/15 s
256	1.04 ms	1/960 s	-320	533.3 ms	8/15 s
320	520.8 us	1/1,920 s	-384	1.07 s	16/15 s
384	260.4 us	1/3,840 s	-448	2.13 s	32/15 s
448	130.2 us	1/7,680 s	-512	4.27 s	64/15 s
512	65.1 us	1/15,360 s	-576	8.53 s	128/15 s
576	32.6 us	1/30,720 s	-640	17.1 s	256/15 s
640	16.3 us	1/61,440 s	-740	34.1 s	512/15 s
690	10.0 us	1/100,00 s	-768	68.3 s	1,024/15 s

The extended shutter can be set up to 81.9 seconds. Therefore, when it is set to be more than 0.5 seconds, noise will appear on the image. Please check the image when the extended shutter is set greater than 0.5 seconds.

## C. External Switch Assignable Functions

The external control switches (up to nine switches) can be connected on the CN305 connectors. The functions below can be assigned on each switch independently and this enables the external switch controls without UART communication.

	Function		Function
1	Display Menu	34	Horizontal line marker size (+)
2	Zoom (TELE)	35	Horizontal line marker size (-)
3	Zoom (WIDE)	36	Horizontal line marker position (+)
4	Focus (NEAR)	37	Horizontal line marker position (-)
5	Focus (FAR)	38	Vertical line marker color (+)
6	Push to set focus	39	Vertical line marker color (-)
7	Auto Focus OFF	40	Vertical line marker size (+)
8	Auto Focus ON	41	Vertical line marker size (-)
9	Push to set Iris	42	Vertical line marker position (+)
10	Auto Iris OFF	43	Vertical line marker position (-)
11	Auto Iris ON	44	Mirror OFF
12	Iris (Open)	45	Horizontal mirror
13	Iris (Close)	46	Upside down
14	Picture Mode (+)	47	Rotation 180 degrees
15	Picture Mode (-)	48	Still Image OFF
16	Contrast (+)	49	Still Image ON
17	Contrast (-)	50	IRC Filter ON
18	Shadow mask shading level (+)	51	IRC Filter OFF
19	Shadow mask shading level (-)	52	Manual White Balance
20	Shadow mask top (+)	53	Auto White Balance
21	Shadow mask top (-)	54	Push to set white balance
22	Shadow mask bottom (+)	55	Auto focus OFF/ON
23	Shadow mask bottom (-)	56	Auto Iris OFF/ON
24	Shadow mask top / bottom (+)	57	Mirror OFF / Horizontal Mirror
25	Shadow mask top / bottom (-)	58	Mirror OFF / Upside down
26	Shadow mask left (+)	59	Mirror OFF / Rotation 180 degrees
27	Shadow mask left (-)	60	Horizontal mirror / Upside down
28	Shadow mask right (+)	61	Degree
29	Shadow mask right (-)	62	Upside down / Rotation 180 degree
30	Shadow mask left / right (+)	63	Still Image OFF / ON
31	Shadow mask left / right (-)	64	IRC Filter ON / OFF
32	Horizontal line marker color (+)	65	Balance
33	Horizontal line marker color (-)		

## D. User Configurable Functions

The functions in the table below are available through the UART communication for users. The communication is done through the CN304 connector.

	Function		Function	
Zoom	Master zoom control	Color mode	Picture mode	
	Optical zoom out limiter		Pseudo00 back color	
	Optical zoom in limiter		Pseudo00 front color	
	Digital zoom link		Pseudo01 back color	
	Fixed digital zoom		Pseudo01 front color	
	Digital zoom tilt		Pseudo02 back color	
	Digital zoom pan		Pseudo02 front color	
	Digital zoom start position		Pseudo03 back color	
	Digital zoom end position		Pseudo03 front color	
	Minimum digital zoom		Pseudo04 back color	
	Maximum digital zoom		Pseudo04 front color	
	Digital zoom speed		Pseudo05 back color	
	Focus		Focus mode	Pseudo05 front color
			Push to set focus	Pseudo06 back color
Focus distance			Pseudo06 front color	
Motion detection			Pseudo07 back color	
Iris	Iris mode		Pseudo07 front color	
	Push to set iris		Pseudo08 back color	
	Iris open ratio		Pseudo08 front color	
	Auto iris Min. open ratio		Pseudo09 back color	
	Auto iris Max. open ratio		Pseudo09 front color	
	Auto iris tolerance		Pseudo10 back color	
	Auto iris threshold		Pseudo10 front color	
	Auto iris step (MUL)		Pseudo11 back color	
	Auto iris step (DIV)		Pseudo11 front color	
	Auto iris max. step		Pseudo12 back color	
	Push button		Push button	Pseudo12 front color
Push button initial function SW11			Pseudo13 back color	
Push button initial function SW12			Pseudo13 front color	
Push button initial function SW13		Pseudo14 back color		
Push button initial function SW21		Pseudo14 front color		
Push button initial function SW22		Pseudo15 back color		
Push button initial function SW23		Pseudo15 front color		
Push button initial function SW31		Pseudo16 back color		
Push button initial function SW32		Pseudo16 front color		
Push button initial function SW33		Pseudo17 back color		
Push button polarity SW11		Pseudo17 front color		
Push button polarity SW12		Pseudo18 back color		
Push button polarity SW13		Pseudo18 front color		
Push button polarity SW21		Pseudo19 back color		
Push button polarity SW22		Pseudo19 front color		
Push button polarity SW23		Pseudo20 back color		
Push button polarity SW31		Pseudo20 front color		
Push button polarity SW32		Pseudo21 back color		
Push button polarity SW33		Pseudo21 front color		
Min number of color modes		Pseudo22 back color		
Max number of color modes		Pseudo22 front color		
Contrast Min. limiter		Pseudo23 back color		
Contrast Max. limiter		Pseudo23 front color		
Shadow mask Min. shading level		Pseudo24 back color		
Shadow mask Max. shading level		Pseudo24 front color		
Marker horizontal Min. position		Pseudo25 back color		
Marker horizontal Max. position		Pseudo25 front color		
Marker horizontal Min. size		Pseudo26 back color		
Marker horizontal Max. size		Pseudo26 front color		
Marker vertical Min. position		Pseudo27 back color		
Marker vertical Max. position		Pseudo27 front color		
Marker vertical Min. size		Pseudo28 back color		
Marker vertical Max. size		Pseudo28 front color		
		Pseudo29 back color		
		Pseudo29 front color		
		Pesudo color threshold		
		Pesudo color slope		

	Function
Shadow mask	Shadow mask shading level
	Horizontal shadow mask top position
	Horizontal shadow mask bottom position
	Vertical shadow mask left position
	Vertical shadow mask right position
Line marker	Horizontal line marker color
	Horizontal line marker position
	Horizontal line marker thickness
	Vertical line marker color
	Vertical line marker position
	Vertical line marker thickness
User color	User defined color 0 R
	User defined color 0 G
	User defined color 0 B
	User defined color 1 R
	User defined color 1 G
	User defined color 1 B
	User defined color 2 R
	User defined color 2 G
	User defined color 2 B
	User defined color 3 R
	User defined color 3 G
	User defined color 3 B
	User defined color 4 R
	User defined color 4 G
	User defined color 4 B
	User defined color 5 R
	User defined color 5 G
	User defined color 5 B
	User defined color 6 R
	User defined color 6 G
	User defined color 6 B
User defined color 7 R	
User defined color 7 G	
User defined color 7 B	
UART	UART baud rate
	UART short reply for write
	UART check sum

	Function
Blemish pixel	Blemish pixel correction
	Display blemish pixel correction
	White blemish pixel threshold
	Black blemish pixel threshold
	Blemish pixel 00 horizontal position
	Blemish pixel 00 vertical position
	Blemish pixel 01 horizontal position
	Blemish pixel 01 vertical position
	Blemish pixel 02 horizontal position
	Blemish pixel 02 vertical position
	Blemish pixel 03 horizontal position
	Blemish pixel 03 vertical position
	Blemish pixel 04 horizontal position
	Blemish pixel 04 vertical position
	Blemish pixel 05 horizontal position
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Blemish pixel 30 horizontal position	
Blemish pixel 30 vertical position	

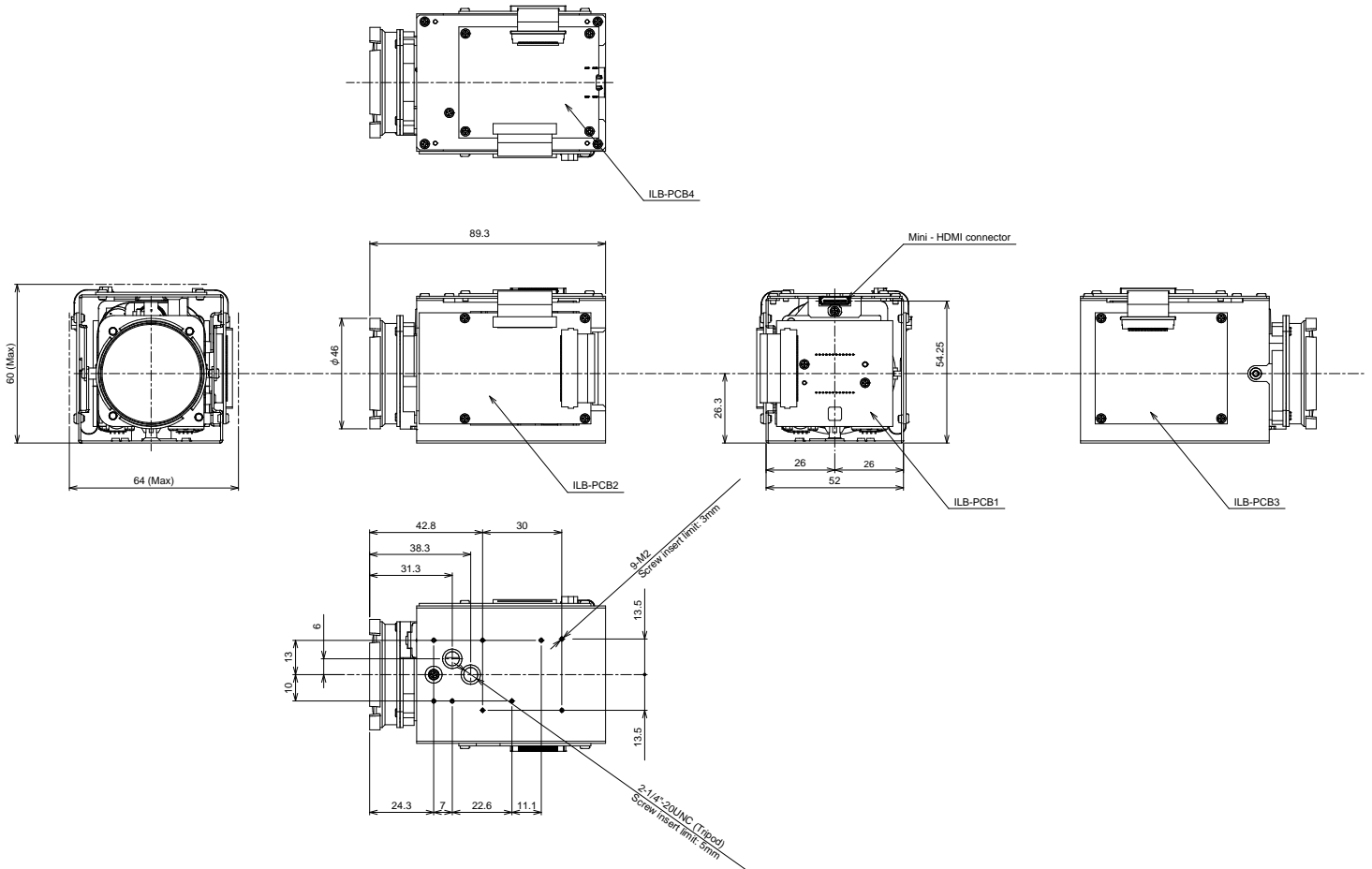
	Function
Blemish pixel	Blemish pixel 31 horizontal position
	Blemish pixel 31 vertical position
	Blemish pixel 32 horizontal position
	Blemish pixel 32 vertical position
	Blemish pixel 33 horizontal position
	Blemish pixel 33 vertical position
	Blemish pixel 34 horizontal position
	Blemish pixel 34 vertical position
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	Blemish pixel 60 horizontal position
	Blemish pixel 60 vertical position
	Blemish pixel 61 horizontal position
	Blemish pixel 61 vertical position
	Blemish pixel 62 horizontal position
Blemish pixel 62 vertical position	
Blemish pixel 63 horizontal position	
Blemish pixel 63 vertical position	

	Function
OSD	OSD character size
	OSD H position
	OSD V position
Still image	Still image
60 / 50 fps	60/50FPS
Test pattern	Test pattern (Gray scale)
ALC	ALC target level
	Edge ALC weight
	Center ALC weight
	ALC peak
	ALC average integration frames
	ALC single-frame quantity
Shutter	Exposure control
	Exposure time
	AEE minimum exposure time
	AEE middle exposure time (minimum side)
	AEE middle exposure time (maximum side)
	AEE maximum exposure time
	AEE tolerance
	AEE threshold
	AEE speed
Gain	Gain control
	Gain
	AGC minimum gain
	AGC middle gain
	AGC maximum gain
	AGC tolerance
	AGC threshold
	AGC speed
	Gain value for disabling motion detection
	Digital gain
IRC	IRC
White balance	White balance mode
	Push to set white balance
	White balance R gain
	White balance G gain
	White balance B gain
	Auto white balance tolerance
	Auto white balance threshold
	Auto white balance average integration frames
	Auto white balance singl-frame process quantity
	Auto white balance R change limit
Auto white balance B change limit	
Gamma	Gamma mode
	Preset gamma
	Manual gamma control point 0
	Manual gamma control point 1
	Manual gamma control point 2
	Manual gamma control point 3
	Manual gamma control point 4
	Manual gamma control point 5
	Manual gamma control point 6
	Manual gamma control point 7
Manual gamma control point 8	
Manual gamma control point 9	
Color	Color correction matrix RR
	Color correction matrix RG
	Color correction matrix RB
	Color correction matrix GR
	Color correction matrix GG
	Color correction matrix GB
	Color correction matrix BR
	Color correction matrix BG
Color correction matrix BB	

	Function
YUV	B-Y gain
	B-Y hue
	R-Y gain
	R-Y hue
High luminance chrome suppress	High luminance chrome suppress threshold
	High luminance chrome suppress slope
Aperture	Front aperture control horizontal gain
	Front aperture control vertical gain
	Front aperture control coring
	Back aperture control horizontal gain
	Back aperture control vertical gain
Other	Back aperture control coring
	Horizontal flip
	Vertical flip
	Contrast
OSD command	RGB offset
Field table	

## III. Dimensions

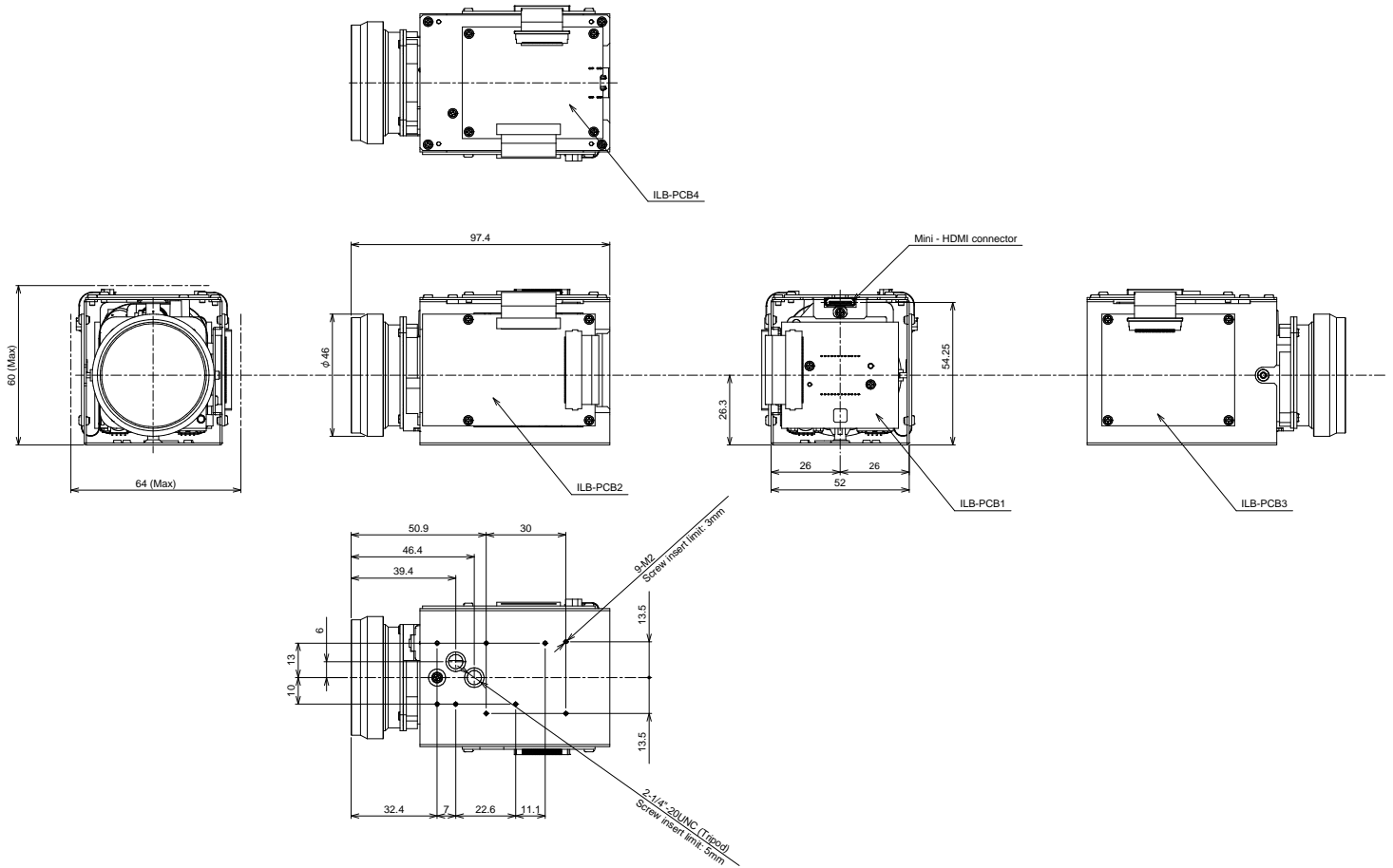
### A. STC-AF133A



Unit: mm

**Important Note:** Do NOT use a screw that exceeds 5mm in length in the tripod screw hole.  
Failing to do this will cause the camera to work improperly.

## B. STC-AF133B



Unit: mm

**Important Note:** In the tripod screw hole, do NOT use a screw that exceeds 5mm in length. Failing to do this will cause the camera to work improperly.

## Revisions

Rev	Date	Changes	Note
1.0	2009/08/04	New document	
1.1	2010/08/05	Update Change the scanning rate from 30fps to 60fps	
1.2	2010/08/18	Update Revise the dimensions	
1.3	2010/09/03	Update Add the manual gamma function for the electronic specifications Add the initial settings for the electronic specifications Change the range of the input voltage for the electronic specifications (Change from "DC 7 to 15V" to "DC 8 to 15 V") Delete the humidity from the environmental specifications	
1.4	2010/09/14	Update Edit English	
1.5	2010/10/14	Update Change the drawing in the connector specifications Change the drawing in the dimensions	
1.6	2010/10/18	Update Added the screw hole size note for the base plate	
1.7	2010/12/16	Update Extended Shutter Speed - Spec	
1.8	2010/12/20	Update Add the note for the extended shutter	
1.9	2011/8/15	Update Revise the dimension drawings	

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