SONY

FCB-EX2700/P

Color Camera Module

Version 1.00 Jan, 2014

1 Cover Page and Summary of Specification

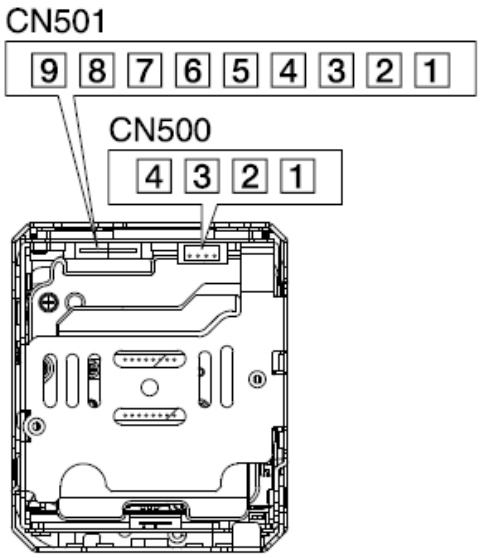
Image sensor	Diagonal 4.5mm (Type1/4) "Super HAD CCD Ⅱ" Progressive Scan CCD Area Image sensor		 Outline Image
	Number of total pixels (H) x(V)	FCB-EX2700 (NTSC) :1028 x 508, 520K [pixels] FCB-EX2700P(PAL) :1028 x 596, 610K [pixels]	
	Number of effective pixels (H) x(V)	FCB-EX2700 (NTSC) : 976 x 494, 480K [pixels] FCB-EX2700P(PAL) :976 x 582, 570K [pixels]	
Lens	Focal length	3.06 [mm] to 122.4 [mm]	
	Magnification	40 [times]	
	Horizontal angle of view	60.0[degree] (Wide) 1.6[degree] (Tele)	
	F value	F1.6 (Wide) to F4.6(Tele)	
Control mechanics	Zoom motor	Stepping motor	
	Focus motor	Stepping motor	
	Iris	Meter Galvano method	
	IRCF	Meter Galvano method	
Video systems	Signal systems	FCB-EX2700：NTSC FCB-EX2700P：PAL	
	Sync systems	Internal / External (V-lock)	
I/O pins	Image signal I/O	Analog VBS, Y/C Digital (CMOS [3.3])	
	Control signal I/O	VISCA protocol (CMOS 5 [V]) Key sw connector	
Power, others	Power supply	DC 6.0 [V] to DC 12.0 [V]	
	Power consumption	2.4W (Typ. DC IN 9V, Lens actuator not included, Wide Dynamic Range Off)	
	Storage temperature	-20 to +60 [degree] / 20 [%] to 95 [%] Absolute humidity: 36 [g/m3]	
	Operating temperature	-5 to +60 [degree] / 20 [%] to 80 [%] Absolute humidity: 36 [g/m3]	
	Package dimensions (W) x (L) x (H)	50 [mm] x 60 [mm] x 90.9 [mm]	
	Package mass	265 [g]	

2 Function

Exposure	Full Auto / Gain Limit Setting / Shutter Priority / Iris Priority / Manual / Bright
White Balance	Auto White Balance / ATW / Indoor / Outdoor / One Push WB / Manual WB / Outdoor Auto / Sodium Vapor Lamp Auto / Sodium Vapor Lamp / Sodium Vapor Lamp Outdoor Auto
Focus	Auto Focus / Manual Focus Mode / One Push Trigger Mode / / Near Limit Mode
Wide Dynamic Range	Yes
Visibility Enhancer	Yes
Noise Reduction	3D / 2D Noise Reduction
Progressive scan (CCD)	Yes
ICR (Day and Night)	Yes
Image Stabilizer	Yes
Slow AE	Yes
D-ZOOM	12x
Character Gen.	Yes
Defog	Yes
Color Enhancement	Yes
Picture Effect	Neg. Art / Black & White
Spherical Privacy Zone Masking	Yes
E-Flip	Yes
Motion Detection	Yes

3 Connection Specification

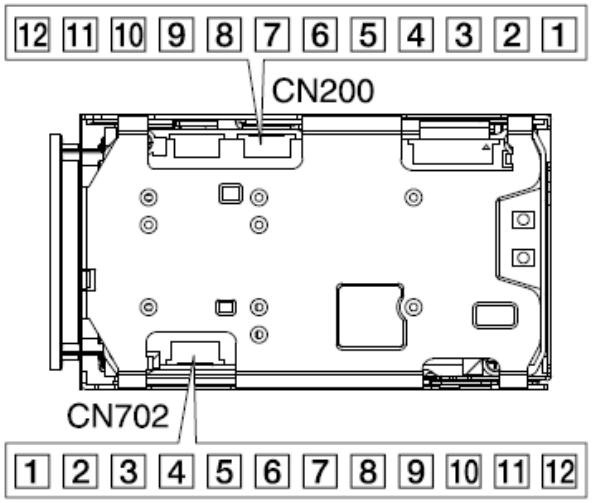
3.1 Connector and Pin Assignment



CN501

KYOCERA ELCO Co. 00 6200 509 130 000+

Pin No.	Name	Level
1	RxD	CMOS 5 V (low: max 0.8 V, high: min 2.0 V) Read Data
2	TxD	CMOS 5 V (low: max 0.1 V, high: min 4.4 V) Send Data
3	GND (for RxD&TxD)	
4	DC IN	9.0 V±3 V
5	GND (for DC IN)	
6	VBS OUT	1.0 V±0.2 V
7	GND (for VBS OUT)	
8	V LOCK PULSE	External VD-Lock Pulse (EX.FV: Negative, 3 Vp-p 50% duty)
9	GND (VL PULSE)	



CN500

J.S.T. Mfg Co. S4B-ZR-SM4A-TF(LF)

Pin No.	Name	Level
1	Y_Out	1.0 Vp-p (75 ohm), luminance signal
2	GND (for Y signal)	
3	C_Out	Chrominance signal
4	GND (for C signal)	

CN200

KYOCERA ELCO Co. 086222012101848+

Pin No.	Name	Level
1	GND	
2	Digital Out 0	0 - 3.3 Vp-p
3	Digital Out 1	0 - 3.3 Vp-p
4	Digital Out 2	0 - 3.3 Vp-p
5	Digital Out 3	0 - 3.3 Vp-p
6	Digital Out 4	0 - 3.3 Vp-p
7	Digital Out 5	0 - 3.3 Vp-p
8	Digital Out 6	0 - 3.3 Vp-p
9	Digital Out 7	0 - 3.3 Vp-p
10	GND	
11	CLOCK	0 - 3.3 Vp-p
12	GND	

CN702

KYOCERA ELCO Co. 086222012101848+

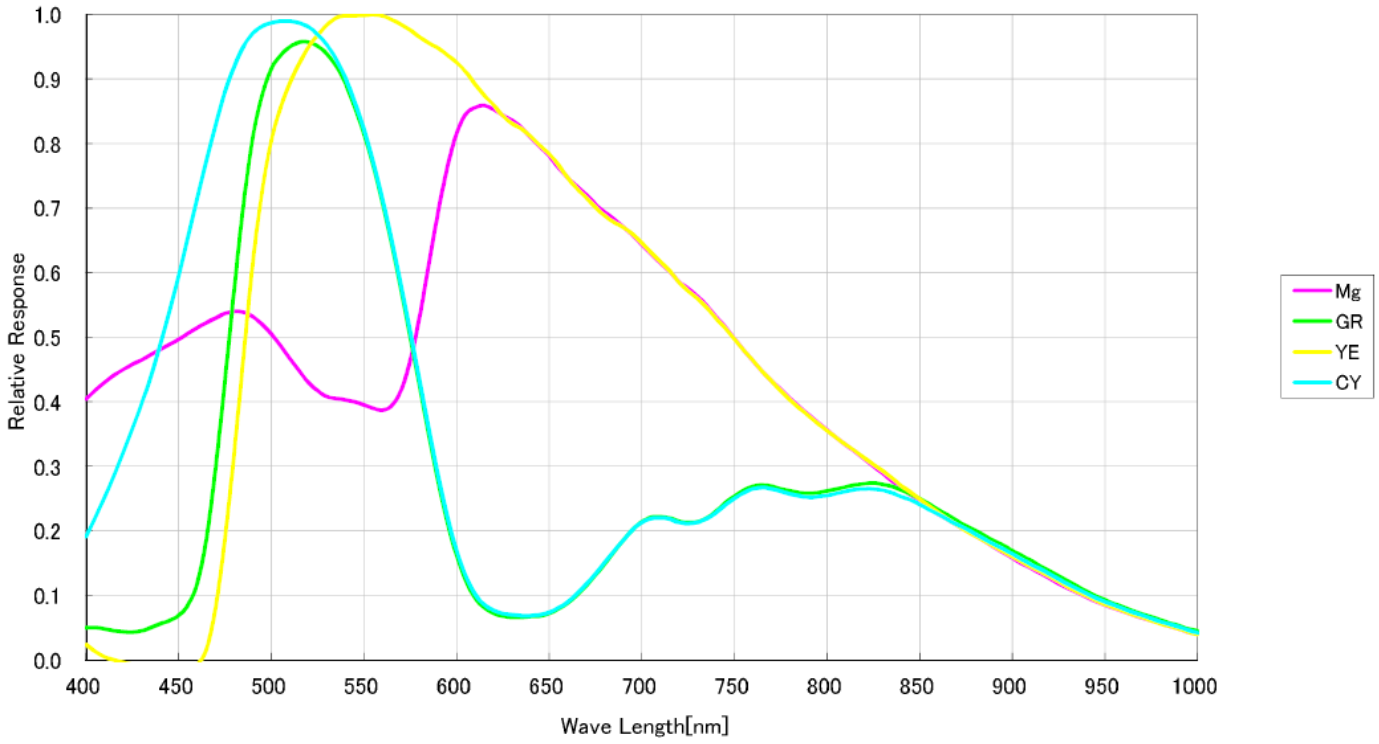
Pin No.	Name	Level
1	GND	
2	GND	
3	KEY AD0	
4	KEY AD1	
5	KEY AD2	
6	KEY AD3	
7	KEY AD4	
8	KEY AD5	
9	KEY AD6	
10	KEY AD7	
11	NC	
12	Strobe	

4 Detailed Specifications

4.1 Sensor Specifications

Image sensor	Diagonal 4.5mm (Type1/4) “Super HAD CCD Ⅱ“ Progressive Scan CCD Area Image sensor	
	Number of total pixels (H) x(V)	NTSC:1028 x 508, 520K [pixels] PAL : 1028 x 596, 610K [pixels]
	Number of effective pixels (H) x(V)	NTSC: 976 x 494, 480K [pixels] PAL : 976 x 582, 570K [pixels]

Spectral Sensitivity Characteristic



4.2 Lens Specifications (*Design Specifications)

Configuration		11 groups, 14 elements
Angle of view	Horizontal	61.4 [degrees] (Wide) 1.6 [degrees](Tele)
	Vertical	54 [degrees] (Wide) 1.2 [degrees] (Tele)
F number		1.6 (Wide) to 4.6 (Tele)
Focal length		3.06 [mm] to 122.4 [mm]
Focal range		10 [mm] to infinity (Wide) 1,500 [mm] to infinity (Tele)

Note) [*1] The above values of field of view are calculated based on the maximum recording pixel area of image sensor. They differ from the ones on 2D outline drawing, which are calculated based on the effective pixel area of image sensor and include the margin for the assembly tolerance.

Camera Specifications

- **S/N**

  42 [dB] (White 50 [%], AE mode “Auto”)
  52[dB] (Black, Gain 0 [step])

- **Minimum Illumination**

  50 [IRE] (IRIS OPEN, AGC MAX 28 [step])

	FCB-EX2700	FCB-EX2700P
ICR OFF	0.6 [lx] typical (shutter 1/60sec)	0.6 [lx] typical (shutter 1/50sec)
ICR ON	0.01 [lx] typical (shutter 1/4sec)	0.01 [lx] typical (shutter 1/3sec)

- **White Balance**

  AWB (Auto White Balance) mode 3000[k] – 7500[k]
  ATW (Auto Tracing White Balance) mode 2000[k] – 10000[k]

- **Camera Horizontal Level**

  When setting up the camera and object horizontally, screen should be ±3 [˚] of the horizontal line of the monitor.

- **Optical Axis Gap**

  When zooming from Tele end to Wide end, the gap of screen center object on Tele end is in radius circle of 8% or less of short side of monitor screen.

- **Camera Horizontal Level**

  When setting up the camera and object horizontally, screen should be ±3 [˚] of the horizontal line of the monitor.

- **Optical Axis Gap**

  When zooming from Tele end to Wide end, the gap of screen center object on Tele end is in radius circle of 8% or less of short side of monitor screen.

- **Image Vibration**

  2 [mm] or less on 21[inch] monitor

- **Dirt and Scratch Specifications**

  No denser than density sample
  [Conditions]
  1. Zoom: Wide end, Focus: ∞
  2. Aperture: F4 fixed
  3. Light viewer (500 to 1000 [cd/m^2])

  Image on full screen
  1. Density sample: LEE FILTERS 130 CLEAR

- **Resolution**

  (WIDE)
  Center 670 [TV lines] or more

- **TV Distortion (Distortion Correct ON)**

  ±2[%]

- **Vibration Correction Frequency**

  3 to 13 [Hz]

4.3 Absolute Maximum supply voltage

Item	Signal	Min.	Typ.	Max.	Unit
Supply voltage	DC IN*	-0.5	-	13.2	[V]

*FCB input terminal part

4.4 Operating Conditions

Item	Signal	Min.	Typ.	Max.	Unit
Supply voltage	DC IN*	6.0	9.0	12.0	[V]

＊FCB input terminal part

4.5 Power Consumption

(Measured conditions: Room temperature, typical voltage, high speed frame rate mode as stable operation)

Item	Signal	Min	Ave	Max	Unit
Power Supply	DC IN 9.0 [V]	-	2.4	4.8	[W]
	DC IN 12.0 [V]	-	2.6	5.0	

4.6 Lens Durability

(At Room temperature)

ZOOM 1,000,000 [Wide-Tele cycles]
FOCUS 2,000,000 [Near-∞ cycles]
Iris 500,000 [Open-Close cycles]
IR motor 200,000 [On-Off cycles]

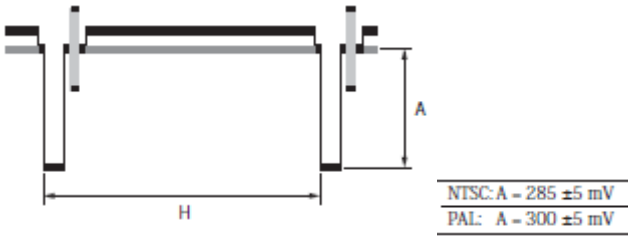
5 Electrical Characteristics

5.1 VISCA (CMOS (5V))

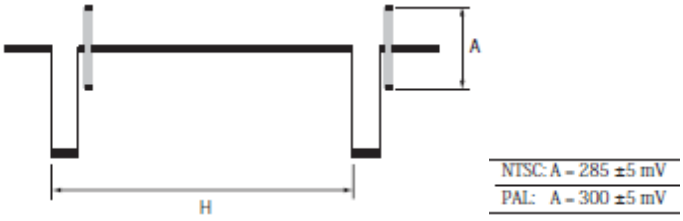
RxD	High : 2.0 [V] or more	Low: 0.8 [V] or less
TxD	High : 4.4 [V] or more	Low: 0.1 [V] or less

5.2 Analog Video

Y signal output level.



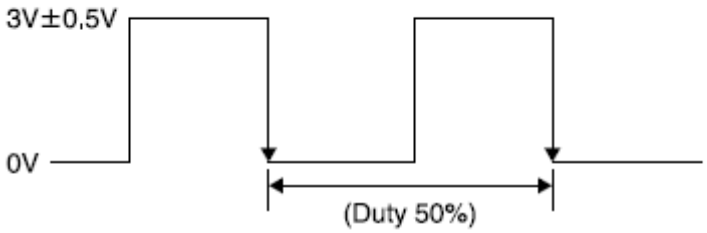
chroma signal output level.



5.3 External VD-LOCK PULSE

Frequency: 60 Hz ±1 Hz (NTSC)
50 Hz ±1 Hz (PAL)
Amplitude: 3 V ±0.5 V square wave (50% duty)
CMOS level
V Phase Adjustment Range: 0° to 360° from V SYNC falling edge

Recommended Input Waveform



5.4 MTBF

Approx. 5.6 [years]

5.5 Environmental Test (Under the Condition of 10 Cartons)

Drop test : Sony Technical Manual (STM-1059 level3)

5.6 Power Supply Condition

8 [msec] or less

6 Handling Precautions

6.1 Operating Temperature

Make sure that the temperature inside the equipment does not exceed the recommended operating temperature

6.2 Durability of the Image Sensor

The on-chip color filter of the sensor may be decolorized if a large amount of light enters into the sensor. Such conditions of use should be avoided as no product warranty is given for de-colorization. Be sure to take protective measurements against continuous exposure to intense light.

6.3 ESD Protection

Anti-ESD measures should be taken for this camera module in the same manner as semiconductor devices.

(1) Either handle bare handed or use non-chargeable gloves, cloth or material. Also use conductive shoes.
(2) When handling directly use a wrist strap.
(3) Install grounded conductive mats on the floor and working table to prevent the generation of static electricity.
(4) Discharge using ionized air or other means is recommended when handling this camera module.

6.4 Storage and Operating Environment

Avoid storage or use under high temperature, high humidity and dusty conditions.

6.5 Mechanical Strength

This camera module is a precision optical part, so care should be taken not to apply excessive mechanical shock or force.

6.6 Remodeling

Any remodeling or process at customers should be avoided. No product warranty will be granted if the product is once remodeled or processed.

6.7 EEPROM

The data in the EEPROM should not be modified or overwritten. Once they are modified or overwritten, no product warranty may be able to be given.

6.8 White Pixels

The image-sensing device is vulnerable to natural radiation such as cosmic radiation that may cause incidental defect resulting in white pixel. Although these white pixels are corrected during the final inspection and adjustment process of the camera module production, a minor number of the product might be affected during the storage and shipment, and “white pixel” may appear on incoming stage at customer production site. As the occurrence of white pixels is due to natural behavior, it’s beyond supplier’s control.

6.9 Vertical line noise in low light condition

Rarely a vertical line noise may happen in the case when a gain sets up in the low light condition.
It's not a malfunction but the characteristic of CMOS Image Sensor
0

6.10 Safety Standards

This product is manufactured as an unfinished product and no particular safety standard is applicable to this product alone. Users should ensure that finished products using this camera module conform to applicable safety standards.

6.11 Location of Use and Storage

Do not shoot extremely bright objects (lights or sun) for long hours. In addition, please refrain from using or storing at the following locations.

- Extremely hot or cold place (Operating temperature: -5˚C to +60˚C(23˚F to 140˚F))
- Near TV/radio station which produces intense radio emission
- The place where is affected by reflects of fluorescent light or light from windows
- Under unstable illumination (Flickers will be generated)
- Place with intense vibration
- Where it is subject to radiation from laser beams

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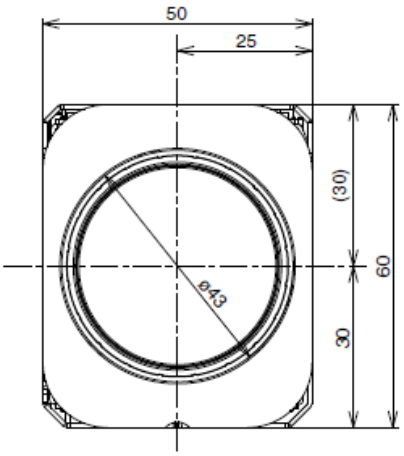
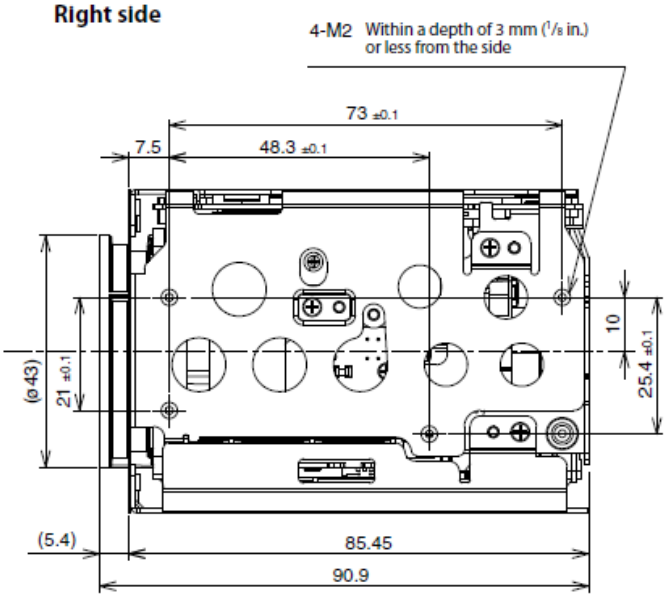
7 Package Outline

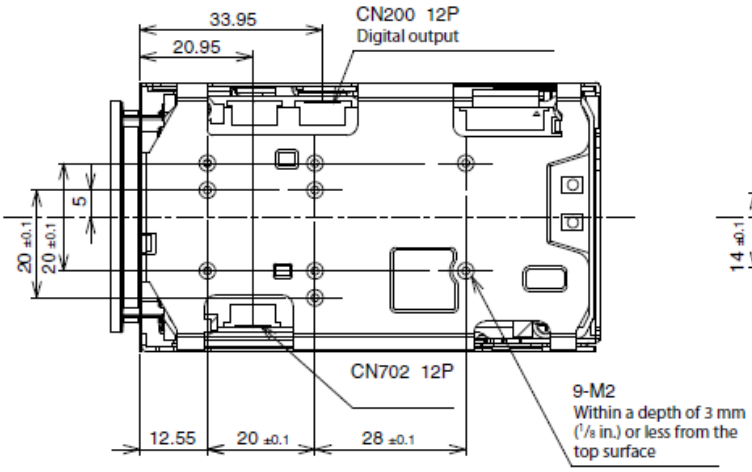
Front



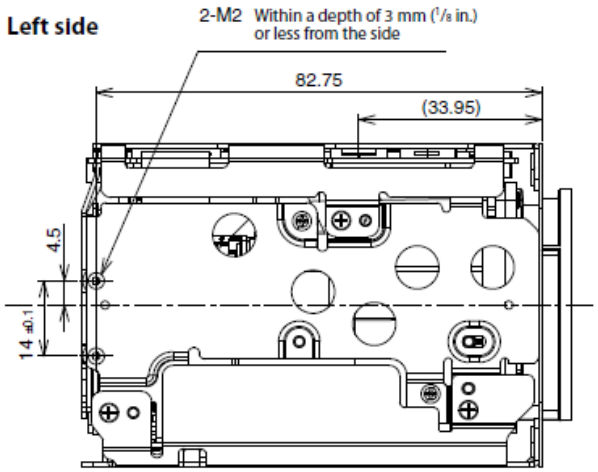
Right side



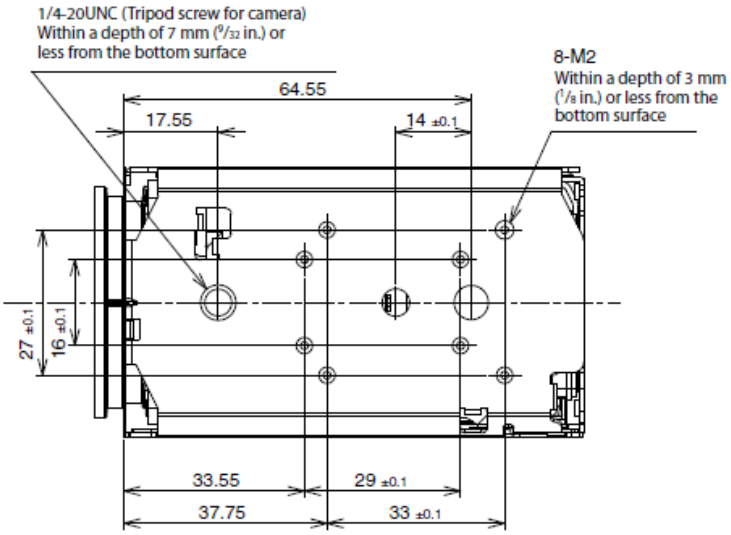
Top



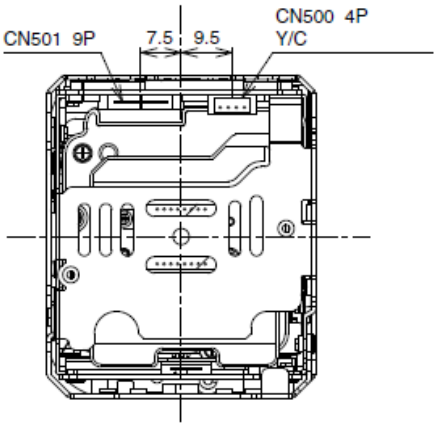
Left side



Bottom



Back

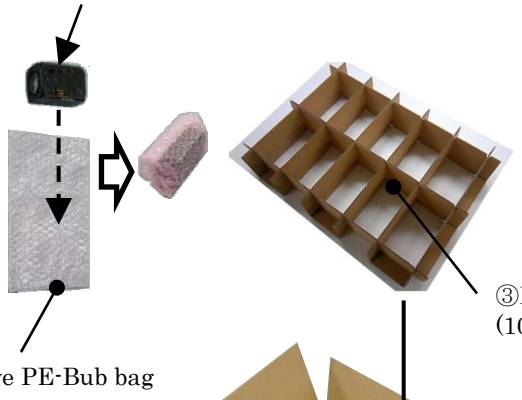


Unit: mm (inches) S

8 Package Specification

(Unit: mm)

level3

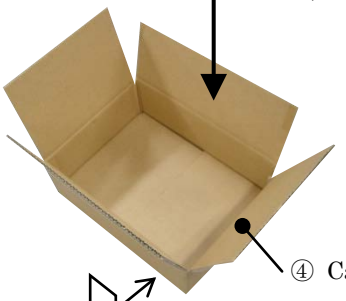


②Conductive PE-Bub bag

Material:
Polyethylene

③Partition
(10division)

Material:
Corrugated fiberboard)



④ Carton

Material:
Corrugated fiberboard

Barcode label

Outside dimensions (L) x (W) x (H):
405 x 300 x 109

Revision History

Version	Date	Page	Description
1.00	Feb/14/2014	-	1st release