



English

**FULL HD**  
**Color MOS**  
**Assembly Unit**  
**VPC-HD22**

**Product Specification**  
**& Operational Manual**

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## 1. Scope of Application

This is to describe VPC-HD22, an assembly unit for camera modules. All specifications contained herein are subject to change without prior notice. Reproduction in whole or in part is prohibited.

## 2. Handling Precautions

The assembly unit must not be used for any nuclear equipments or aerospace equipments with which mechanical failure or malfunction could result in serious bodily injury or loss of human life. Our warranty does not apply to damages or defects caused by irregular and/or abnormal use of the product..

Please observe all warnings and cautions stated below.

Our warranty does not apply to damages or malfunctions caused by neglecting these precautions.

- Do not use or store the assembly unit in the dusty or humid places.
- Do not apply excessive force or static electricity that could damage the assembly unit.
- Do not shoot direct images that are extremely bright (e.g., light source, sun, etc).
- Follow the instructions in Chapter 7, "External Connector Pin Assignment" for connecting the camera module. Improper connection may cause damages not only to the camera module but also to the connected devices. t
- Confirm the mutual ground potential carefully and then connect the camera module to monitors or computers. AC leaks from the connected devices may cause damages or destroy the camera module.
- Do not apply excessive voltage. (Use only the specified voltage.) Unstable or improper power supply voltage may cause damages or malfunction of the camera assembly.
- VPC-HD22 is an assembly unit for camera modules. It is designed based on the premise of embedded in a camera. Therefore, the appropriate heat dissipation needs to be considered when embedding the board unit. Operating the assembly unit without appropriate heat dissipation considered may cause damages or malfunction.

### 3. Product Outline

VPC-HD22 is provided as an assembly unit that is a full HD color camera module VPC-HD20 utilizing a 1/3 type MOS image sensor.

1080 60p/59.94p/50p (3G-SDI), 1080 60i/59.94i/50i (HD-SDI), 720 60p/59.94p/50p (HD-SDI) is corresponded.

#### Key Features

- Features original ISP, state-of-the-art "Clairvu™" engine for superb imaging quality.
- Sensor board 25.4mm×25.4mm, Main board 25.4mm×38mm, Driver board 25.4mm×38mm.
- Cameras are controllable with RS-232C and USB communications.

\*This model uses  $\mu$  T-Kernel source code based on  $\mu$  T-License of T-Engine Forum ([www.t-engine.org](http://www.t-engine.org)).

### 4. Bundled Items

#### 4.1. Standard Bundled Items

- Sensor board (BI-VC01PA), Main board (MB-VC01), Driver board (PD-VC01)  
\*Boards are connected with FPC (51 pins) at the time of delivery.
- 10 pins connector (power, USB, I/F)
- 4 pins connector (DC IRIS)
- 3 pins connector (RS-232C)

#### 4.2. Packaging

- Individual carton
- Master carton (10pcs/carton)  
\*Master carton may change depends on the quantity to be shipped per delivery.

## 5. Specification

### 5.1. General Specifications

(1)	Pick up device	Device Type	1/3 type MOS sensor (color)
		Effective Pixel Numbers	1944(H) × 1092(V)
		Unit Cell Size	2.75μm(H) × 2.75μm(V)
		Chip Size	5.346mm(H) × 3.003mm(V) (Effective Pixels)
(2)	Resolution	1080p,1080i :	1920(H) × 1080(V)
		720p :	1280(H) × 720(V)
(3)	Aspect Ratio	16 : 9	
(4)	Video Output Format	1920 x 1080p @60fps(Level A)	3G-SDI
		1920 x 1080p @60fps(Level B)	3G-SDI
		1920 x 1080p @59.94fps(Level A)	3G-SDI
		1920 x 1080p @59.94fps(Level B)	3G-SDI
		1920 x 1080p @50fps(Level A)	3G-SDI
		1920 x 1080p @50fps(Level B)	3G-SDI
		1920 x 1080i @60fps	HD-SDI
		1920 x 1080i @59.94fps	HD-SDI
		1920 x 1080i @50fps	HD-SDI
		1280 x 720p @60fps	HD-SDI
		1280 x 720p @59.94fps	HD-SDI
1280 x 720p @50fps	HD-SDI		
(5)	Sync. System	Internal Sync.	
(6)	Video Output Standard	3G-SDI/HD-SDI : Y/Pb/Pr(4:2:2 10bit) BNC 75Ωterminal	
(7)	Sensitivity	F5.6 2000lx	
(8)	Minimum illumination	F1.4 1.2lx	
		Conditions : VIDEO 50%, AGC 30dB, Electric Shutter OFF	
(9)	Dust or stains in optical systems	No dust or stain shall be detected on the testing screen with setting the camera aperture at F16.	
(10)	Power Requirements(*1)	DC+9~+15V	
(11)	Power Consumption(*1)	4.0W at DC+12V IN	
(12)	Dimensions	Refer to overall dimension drawing	
(13)	Weight	Approx. 12g (Sensor board, Main board)	
(14)	Lens Mount	OLPF and a filter on a sensor board at the time of delivery	
(15)	Gain Setting	AGC (Max. Gain : 0dB~30dB)	
		MANUAL : 0dB~30dB	
(16)	Shutter Speed Variable Range	OFF : 1/60(60fps, 59.94fps), 1/50(50fps)	
		MANUAL : 1/8k, 1/4k, 1/2k, 1/1k, 1/500, 1/250, 1/120, 1/100, 1/60, Open	
		AUTO : 1/8k s~Open (Upper limit and lower limit can be set.)	
(17)	White Balance Adjustment Range	AUTO, AUTO(Outdoor), Preset 7 different kinds, User Preset 1~5, One Push Preset:	
		Daylight(5500K), Cloudy(6500K), Shade(8000K), Tungsten(3200K), Fluorescent(White), Fluorescent(Neutral White), Fluorescent(Daylight) 6500K	
(18)	DC IRIS output(*1)	Auto/Open Selectable. Can be used with electric shutter (With priority to electric shutter).	
(19)	Auto Exposure Detection	Average/Center-Weight/Spot(1/256)/Backlight Compensation	
(20)	Flicker Cancelling	OFF/ON	
(21)	Edge Enhancement	OFF, 1, 2, 3, 4, 5 (typ.3)	

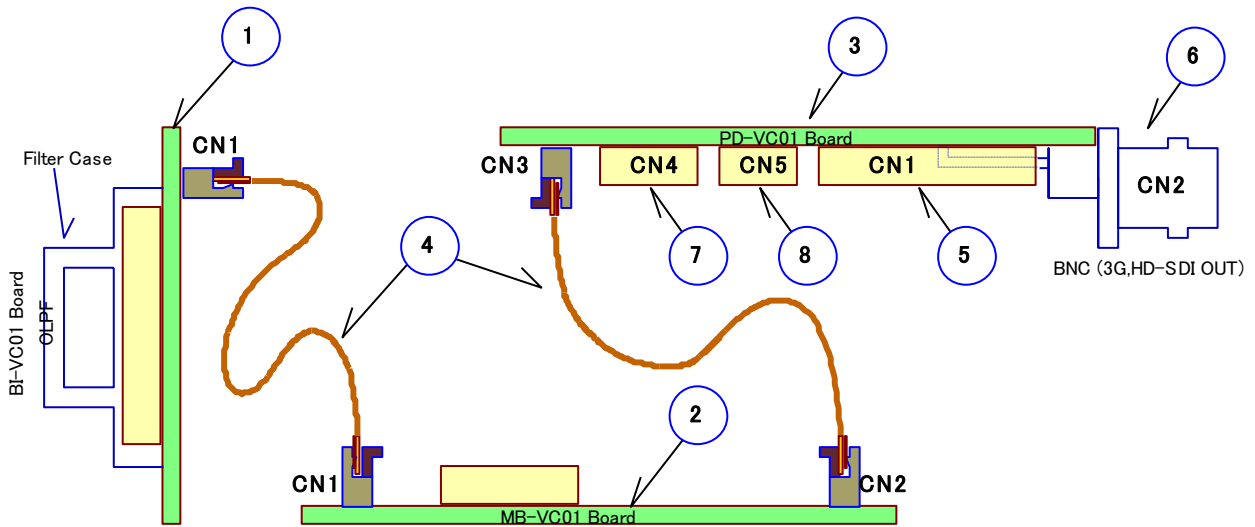
(22)	Color Saturation Adjustment	0%(B/W)~100%(typ.)~200%
(23)	Gamma Compensation	Auto Gamma Compensation OFF( $\gamma=0.45$ ), ON, ON[Strong]
(24)	Contrast Adjustment	-2, -1, 0, 1, 2 Selectable (typ.0)
(25)	Color Balance	Blue/Red : -100~0~100(typ.0), Green/Magenta : -100~0~100(typ.0)
(26)	Black Level Adjustment	Level:0~127(typ.0)
(27)	Pixel Defect (White spot) Correction	Corrected at factory setting.
(28)	Remote Control Operation	Cameras can be controlled via RS-232C communications or USB 2.0 Full Speed (12Mbps). Camera settings can be controlled by control software via PC.
(29)	Safety/Quality standards	UL: Conform to UL Standard including materials and others RoHS: Conform to RoHS CE and FCC are acquired as VPC-HD20 (chassis typed camera).
(30)	Durability (*1)	Vibration Acceleration : 98m/s <sup>2</sup> (10G) Frequency : 20~200 Hz Direction : X,Y, and Z, 3 directions Testing time : 120min for each direction
		Shock No malfunction shall be occurred with 980m/s <sup>2</sup> (100G) for $\pm X, \pm Y$ , and $\pm Z$ , 6 directions.
(31)	Operation environment (*1)	Performance guaranteed 0 ~ +40°C Humidity 20 ~ 80%RH with no condensation
		Operation guaranteed -5 ~ +45°C Humidity 20 ~ 80%RH with no condensation
		※Performance guaranteed: All the specifications specified in this manual is guaranteed under performance guaranteed temperature. ※Operation guaranteed : All the camera functions operate normally under operation guaranteed temperature.
(31)	Storage Environment (*1)	Storage Temperature: -25 ~ +60°C Humidity 20 ~ 80%RH with no condensation

(\*1) Applied when embedded in VPC-HD20, chassis typed camera.

#### <3G-SDI output Level A and Level B>

A difference between Level A and Level B is a way of mapping Y signal and Cb/Cr signal onto 3G-SDI standard signal. The difference does not affect the resolution of the video signal. Some 3G-SDI receivers correspond to either Level A or B, whereas other receivers correspond to both Levels, so please set the camera mode to match your 3G-SDI receiver.

6 Part Names and Functions



1. Sensor board (BI-VC01PA)  
 OLPF and filter case are attached to the sensor board.  
 Protect the OLPF from dusts.  
 Has the same serial number as the one on a main board
  
2. Main board (MB-VC01)  
 Mainly provided with on-board FPGA and CPU.  
 Has the same serial number as the one on a sensor board.
  
3. Driver board (PD-VC01)  
 Mainly provided with on-board 3G-SDI, HD-SDI drive, and power circuit.  
 Has the same serial number as the one on a sensor board.
  
4. FPC (51 pins)  
 FPCs which connect each board  
 Boards are connected at the time of delivery.  
 Sensor board and main board are paired up as the correction data of the sensor is saved in the main board.
  
5. Electric power supply, USB I/F connector (10 pins)  
 Power input (DC+12V) and USB I/F signal.  
 Connect to the power input and USB using the attached 10 pins cable.
  
6. 3G-SDI/HD-SDI output connector (BNC)  
 3G-SDI/HD-SDI video-out signal  
 Connect to the 3G-SDI/HD-SDI monitor using BNC cable.
  
7. DC IRIS LENS connector (4 pins)  
 Signal for the DC IRIS lens.LENS

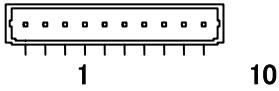
Connector for Power input and Connect to the DC IRIS LENS using the attached 4 pins cable.  
No connection is needed when DC IRIS is not in use.

8. RS-232C I/F connector (3 pins)  
Signal for RS-232C  
Connect to the RS-232C using the attached 3 pins cable.  
No connection is needed when RS-232C is not in use.



7. External Connector

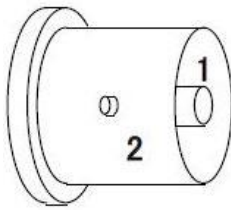
7.1 PD-VC01 CN1 (10 pins)



Model Name BM10B-SRSS-TB (JST)

Pin No.	
1	Power IN DC+12V
2	GND
3	N.C.
4	N.C.
5	N.C.
6	N.C.
7	USB_VBUS
8	USB_D-
9	USB_D+
10	GND

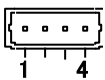
7.2 PD-VC01 CN2 (BNC)



Model Name BCJ-BPLHA (CANARE)

Pin No.	
1	3G-SDI/HD-SDI output
2	GND

7.3 PD-VC01 CN4 (4 pins)



Model Name BM4B-SRSS-TB (JST)

Pin No.	
1	IRIS_DUMP+
2	IRIS_DUMP-
3	IRIS_DRIVE-
4	IRIS_DRIVE+

7.4 PD-VC01 CN5 (3 pins)



Model Name BM3B-SRSS-TB (JST)

Pin No.	
1	RS-232C-TXD
2	RS-232C-RXD
3	GND

8. Guideline for Thermal design

This camera is designed for embedding into a chassis, therefore, operating the board itself without heat release will exceed the tolerance of the operation temperature. The operation temperature will reach 130°C when operating FPGA without casing. Do not leave it on without casing as it may cause burns and damages to the camera. Please refer to the guideline below for designing heat dissipation.

8.1. Operating temperature of main parts

	Board(ref)	Data sheet value	Upper limit temperature of IC package surface
Image sensor	BI-VC01PA(IC1)	ta=75°C	85°C
FPGA	MB-VC01(IC1)	ta=85°C	80°C
CPU	MB-VC01(IC4)	ta=85°C	95°C
SDI IC	PD-VC01(IC3)	ta=85°C	95°C

Upper limit temperature of the package is  $t_a + 10^\circ\text{C}$  for parts defined "ta" on a data sheet. As the data sheet value of FPGA says "tj," upper limit temperature of FPGA shall be 80°C based on the thermal conductivity of the package and power consumption.

Please release heat so that surface temperature of the IC package on a board in a chassis does not exceed the upper limit temperature. Please measure the temperature in the usage environment. Give first priority to the heat dissipation of the FPGA because it is the main heat source.

8.2. Temperature measurement of the surface of the device.

Measure temperature by fixing a thermocouple to the device surface with tape, making a slit in the heat conduction sheet, and adhering a heat-sink tightly onto it.

(E.g. : Temperature measurement of the surface of FPGA)



8.3. Reference> surface temperature of each device in a Pacific chassis(29mm×29mm×77mm)

Ambient Temperature	25°C	40°C	45°C
Image sensor	58	73	78
FPGA	55.7	70.7	75.7
CPU	51.7	66.7	71.7
SDI IC	55.1	70.1	75.1

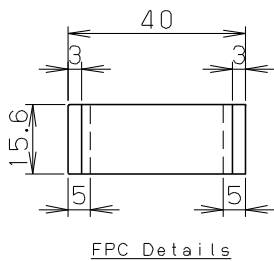
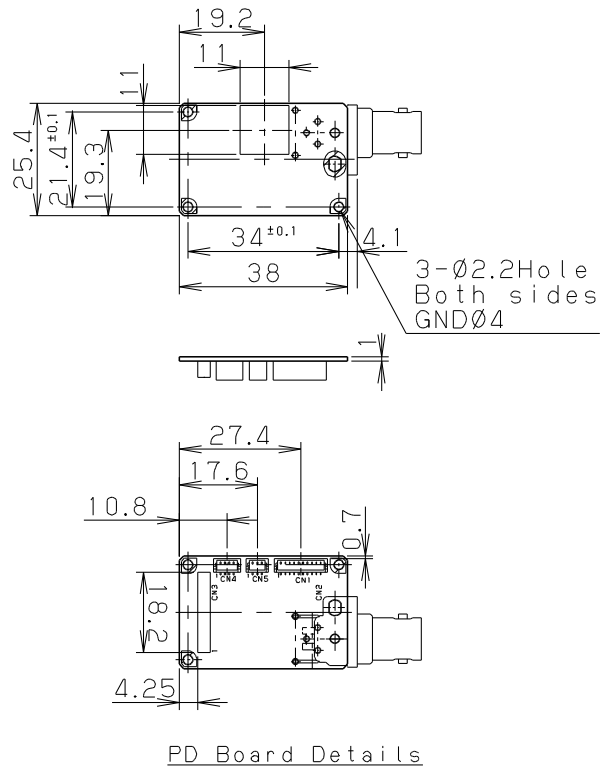
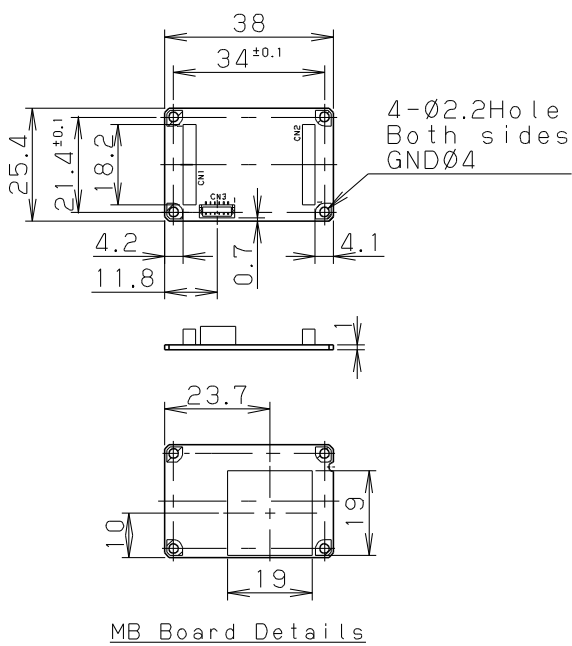
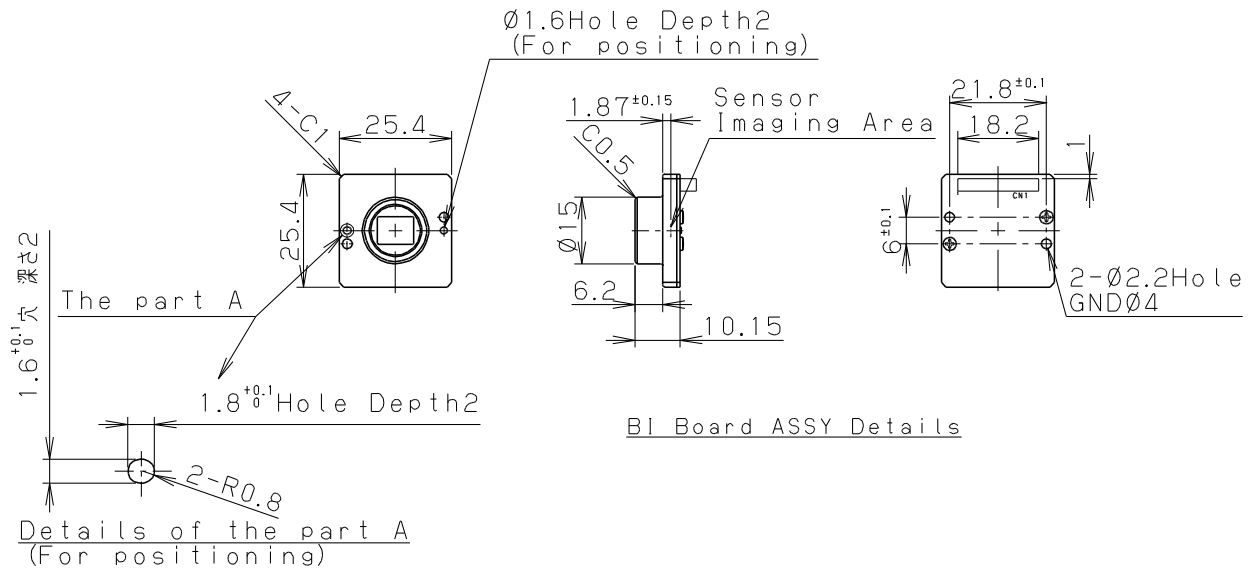
## 9. Factory Setting

		Factory Settings
Video Format Settings	1920 x 1080p @60fps(Level A)	1920 x 1080i @60fps
	1920 x 1080p @60fps(Level B)	
	1920 x 1080p @59.94fps(Level A)	
	1920 x 1080p @59.94fps(Level B)	
	1920 x 1080p @50fps(Level A)	
	1920 x 1080p @50fps(Level B)	
	1920 x 1080i @60fps	
	1920 x 1080i @59.94fps	
	1920 x 1080i @50fps	
	1280 x 720p @60fps	
	1280 x 720p @59.94fps	
	1280 x 720p @50fps	
Gain Mode	Auto, Manual	Auto
Manual Gain	0dB~30dB	0dB
Max Gain	0dB~30dB	30dB
Shutter Mode	Auto, Manual	Auto
Shutter Limit Max	Open ~ < Shutter Limit Min	Open
Shutter Limit Min	Shutter Limit Max < ~ 1/8000	1/8000
Manual Shutter	Open~1/8000	Open
Iris	Open, Auto	Open
Flicker Cancel	OFF/ON	OFF
AE Mode	Average	Center-Weight
	Center-Weight	
	Spot	
	Backlight Compensation	
Spot Block	X=0~15 , Y=0~15	X=8, Y=8
AE Level	0(%)~100(%)	50(%)
AE Speed	0 ~ 100	2
White Balance Settings	Auto	Auto
	Auto(Outdoor)	
	Daylight(5500K)	
	Cloudy(6500K)	
	Shade(8000K)	
	Tungsten(3200K)	
	Fluorescent(White)	
	Fluorescent(Neutral White)	
	Fluorescent(Daylight)	
	OnePush	
	Manual	
	Preset 1~5	
Manual R Gain	0(%)~800(%)	100(%)
Manual B Gain	0(%)~800(%)	100(%)
Noise Reduction	OFF, ON	OFF
Edge Enhancement	OFF, 1, 2, 3, 4, 5	3
Color Saturation	0(%)~200(%)	100(%)

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Color Balance Blue/Red	-100~100	0
Color Balance Green/Magenta	-100~100	0
Pedestal	OFF/ON	OFF
Pedestal Level	0~127	44
Contrast	-2, -1, 0, 1, 2	0
Auto Gamma	OFF, ON, ON[Strong]	OFF

10. Dimensions



999-567-00-00  
(Unit:mm)

## 11. Case for Indemnity (Limited Warranty)

We shall be exempted from taking responsibility and held harmless for damage or losses incurred by the user in the following cases.

- In case damage or losses are caused by fire, earthquake, or other acts of God, acts by third party, deliberate or accidental misuse by the user, or use under extreme operating conditions.
- In case indirect, additional, consequential damages (loss of business interests, suspension of business activities) are incurred as result of malfunction or non-function of the equipment, we shall be exempted from responsibility for such damages.
- In case damage or losses are caused by failure to observe the information contained in the instructions in this product specification & operation manual.
- In case damage or losses are caused by use contrary to the instructions in this product specification & operation manual.
- In case damage or losses are caused by malfunction or other problems resulting from use of equipment or software that is not specified.
- In case damage or losses are caused by repair or modification conducted by the customer or any unauthorized third party (such as an unauthorized service representative).
- Expenses we bear on this product shall be limited to the individual price of the product.

## 12. MOS Pixel Defect

MOS pixel defects might be noted with time of usage of the products.

The cause of the MOS pixel defects is the characteristic phenomenon of MOS itself and Pacific Corp is exempted from taking any responsibilities for them.

## 13. Product Support

When defects or malfunction of our products occur, and if you would like us to investigate on the cause and repair, please contact your distributors you purchased from to consult and coordinate.