

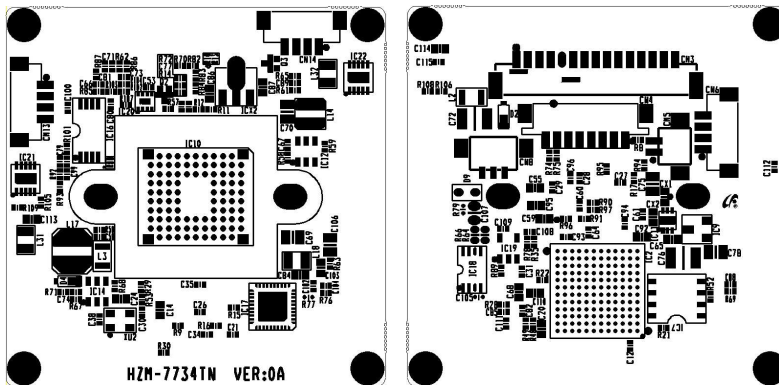


<b>CUSTOMER</b>	
<b>ATTENTION 1</b>	<b>2 Mega CMOS</b>
<b>ATTENTION 2</b>	<b>42x42mm</b>
<b>MODEL</b>	<b>HCM-7772TN</b>
<b>CODE NO</b>	<b>TVI</b>

TVI Color Camera Module

# SPECIFICATIONS

OCT. 01. 2015



P&A Corporation



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**- Revision History**

<b>Date</b>	<b>Version</b>	<b>Description</b>
OCT.01 2015	0A	Establishment



## 1. Features

### ■ 1/2.8" 2 MEGA SONY CMOS

High definition 12-bit digital image signals offering 2 mega pixels are obtained with high speed of 30 fps and with low power consumption.

### ■ High Resolution 1100(Color)/(BW) TV Lines

This camera has realized high resolution of **1100(Color)/(BW)** TV lines using the top-notch full digital image processing, **12 Bit A/D** serial signal processing and special algorithm technologies.

### ■ DNR (Digital Noise Reduction, 2D+3D)

The DNR technology eliminates noise thus generating a distinct and clear image.

This camera DNR function utilizes both an adaptive 2D filter reducing noise in the brightness of the image and an adaptive 3D filter reducing caused by movement.

### ■ DAY&NIGHT (Output the Filter changing signal)

This camera has the Day&Night function which outputs the filter changing signal with detecting the illumination condition. Day&Night operation feature an 'auto' mode which switches between day and night mode automatically based upon the level of illumination on the scene.

EXTERN mode changes between day and night operation upon triggering from an external source(Optional). And also, the COLOR mode operates in daytime conditions to provide optimum colors, and B/W mode operates in night-time conditions to enhance the definition of the image.

### ■ SMART IR & WDR

Brightness of IR and saturation phenomenon are automatically adjusted. Multiple exposure WDR(Wide Dynamic Frange)

### ■ OSD (On Screen Display)

This camera supports the OSD function which is used with multi language. And so, the camera can be controlled by selecting text displayed on the monitor screen.

### ■ Privacy Mask Function (16 points)

Privacy masking allows for the 'blanking' of specific areas of a scene, where the viewing or recording of images is prohibited or undesired.

The technology of this camera allows for the user defined setting of a four point polygonal mask, which is overlaid onto the video signal output.

### ■ TVI Analog HD video

HCM-770TN is a video D/A solution for converting HD digital video signal into the analog domain that is suitable for transmission over signal coax-cable over long reach.

The major application is the security surveillance applications require transmission of HD video.



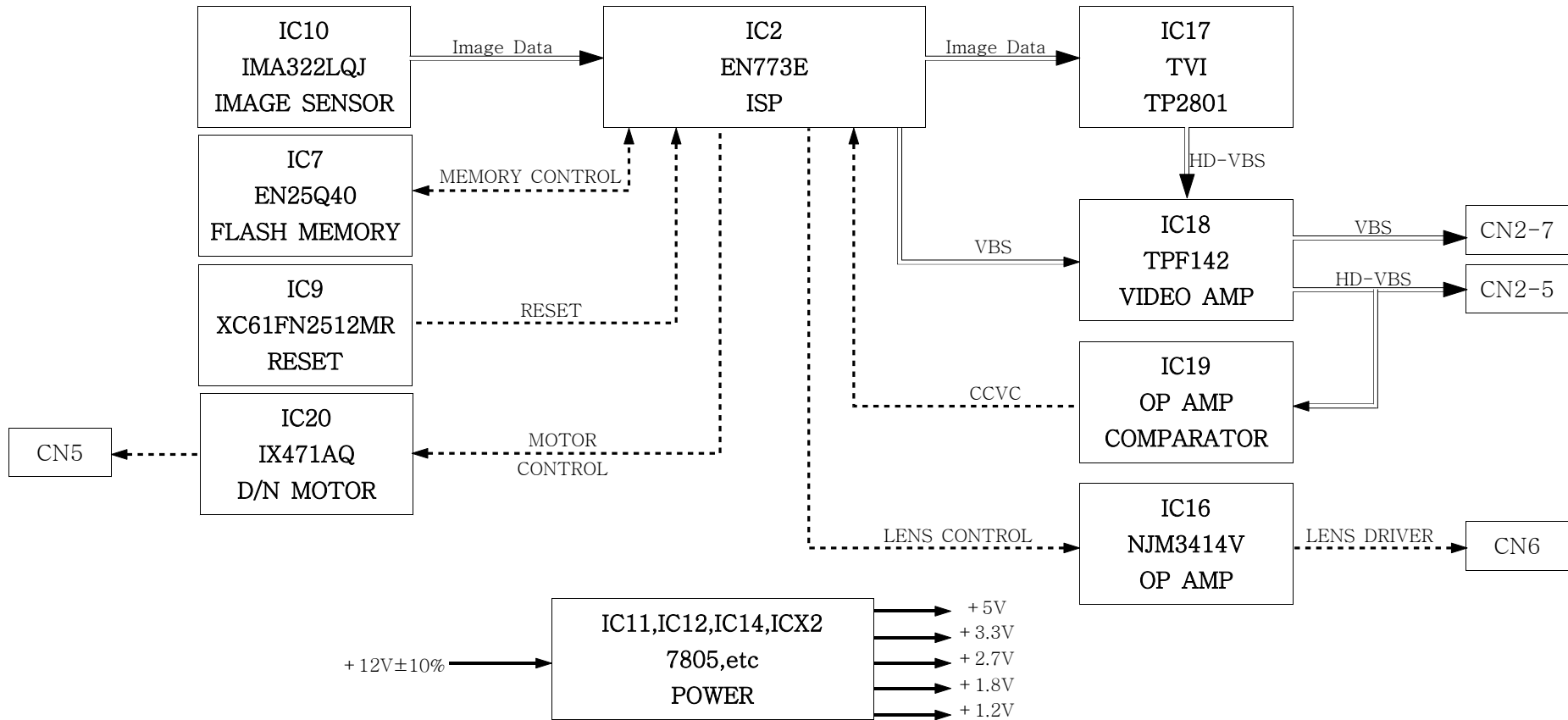
## 2. Applications & Information

### 2-1. General Specifications & Functions

Items	Sub-items	HCM-7772TN(P)
CMOS	Device	1/2.8" 2MEGA CMOS
	Total	2000(H) × 1121(V)
	Effective	1984(H) x 1105 (V)
Performance	Horizontal/Verical Resolution	1080p
	Minimum illumination(F1.2)	Color : 0.1 Lux(50IRE) / 0.02 Lux(15IRE) B/W : 0.08 Lux(50IRE) / 0.018 Lux(15IRE)
	S/N Ratio	More than 50dB (AGC off)
	Frame	30fps Full HD
Functions	OSD	English/Chinese/Chinese(S)/Japanese/Korea
	Day&Night	Auto/Color/B&W/EXTERN
	ATW	1800 ~ 10500K
	High Speed Shutter	1/30(1/25) ~ 1/30Ksec
	WDR	Off/ON
	D-WDR	Off/ON
	BLC	Off/ON (Size, Position)
	HLC	Level Setting(0~20), Color
	AGC	Level Setting(0~20) : Max 42dB
	D-Zoom	1.0x~8.0x
	Camera ID	Off/On (Letters A to Z, Numerals 0 to 9, Symbols)
	White Balance	AUTO / AUTOext / PUSH / MANUAL
	DNR	2D+3DNR, OFF/LOW/MIDDLE/HIGH
	Motion Detection	Off/ON
	Privacy Mask	16 Areas (On/Off, Color, Position)
	Sens-Up	x2,x4,x8,x16,x32
	De-Fog	AUTO/Manual
Etc. Function	Sharpness, Reverse(H,V)	0~10, Mirror, Flip
	Color Bar	Off/ON
	In/Output	Alarm Output, Ext IR Mode, IR LED Output
	Upstream data	VBI data extraction for 2way data communication
Power Consumption		DC 12V±10%, Less than 1.8Watts
Operating Temperature		Absolute : -10°C ~ +50°C
Operating Humidity		Less than 90%
Dimension		42mm x 42 mm x 1.0t



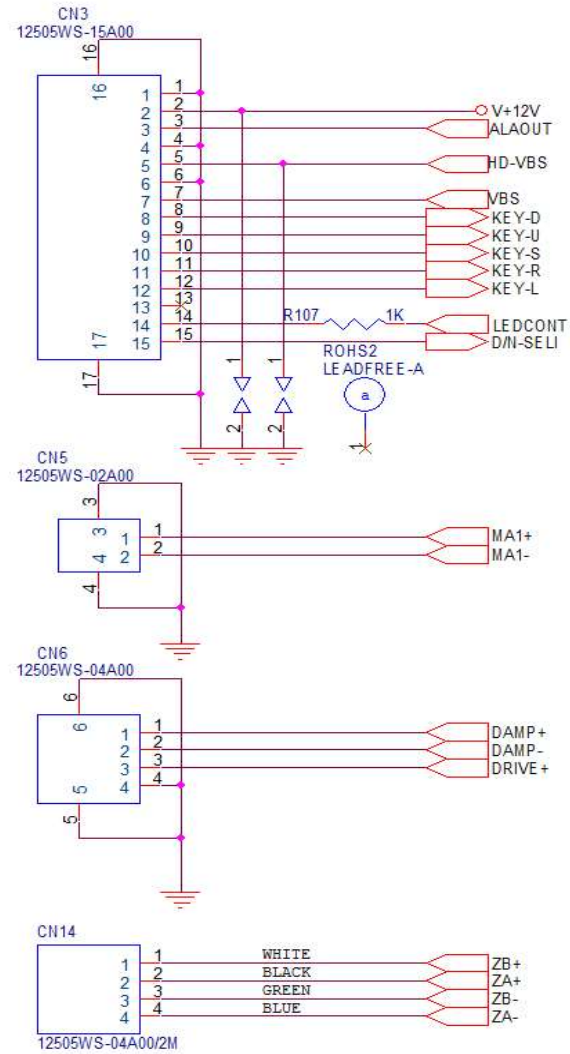
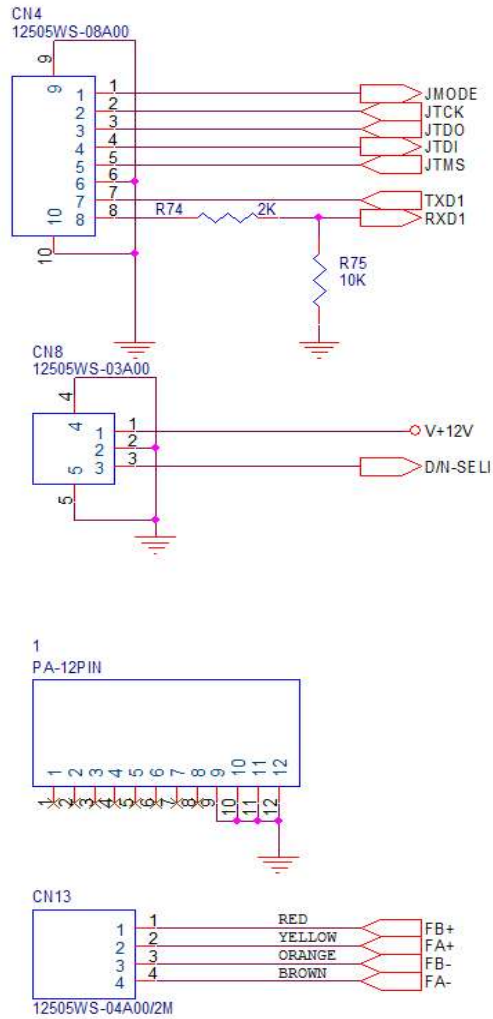
## 2-2. Block Diagram





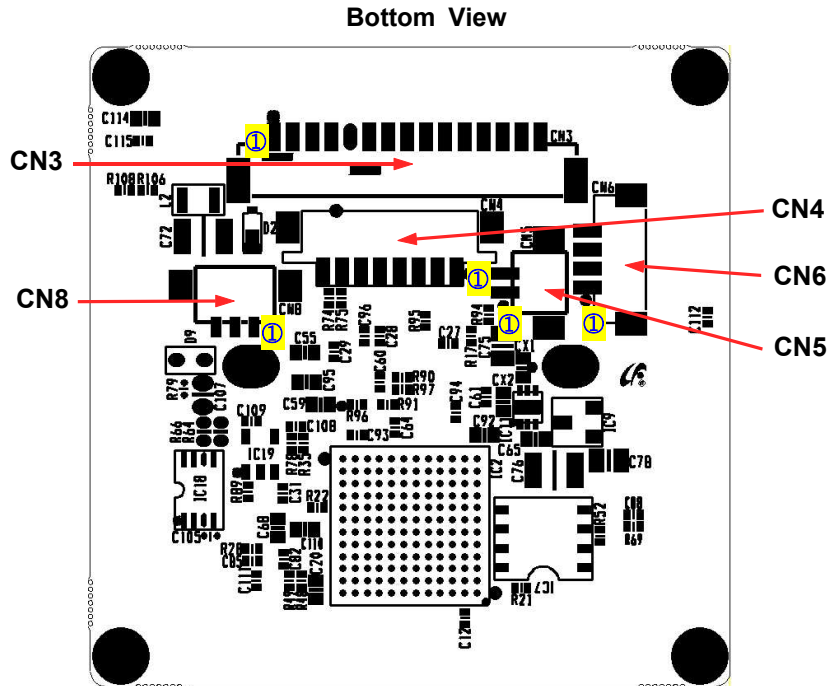
## 2-3. I/O Interface Specifications

### 2-3-1. I/O Circuit





## 2-3-2. I/O Specifications



① CN3 : I/O Connector -1

Pin NO	Pin Name	Description	Normal	Active	I/O
1	GND	Board Ground	-	-	-
2	V+12V	DC+12V Input	DC+12V	DC+12V	I
3	ALAOUT	Alarm Output	Open	0V	O
4	GND	Board Ground	-	-	-
5	HD-VBS	TVI HD Composite Video Output	1Vp-p	1Vp-p	O
6	GND	Board Ground	-	-	-
7	VBS	NTSC/PAL Composite Video Output	1Vp-p	1Vp-p	O
8	KEY-D	OSD Control DOWN	3.3V	0V	I
9	KEY-U	OSD Control Up	3.3V	0V	I
10	KEY-S	ADC KEY INPUT/OSD Control Enter	3.3V	ADC/0V	I
11	KEY-R	OSD Control RIGHT	3.3V	0V	I
12	KEY-L	OSD Control LEFT	3.3V	0V	I
13	NC	-			
14	LED CONT	Day & Night Control Output	0V	3.3V	O
15	D/N-SEL1	External Day & Night Select Input	Open(3.3V)	0V	I
Yeonho Electronics, 12505WS-15A00					





② CN4 : Connector for upgrading Camera Program

Pin NO	Pin Name	Description	Normal	Active	I/O
1	JMODE	JTAG MODE(0:Program Debug, 1:Normal)	Open	3.3V/0V	I
2	JTCK	JTAG CLOCK	Open	3.3V/0V	I
3	JTDO	JTAG DATA OUT	Open	3.3V/0V	I
4	JTDI	JTAG DATA IN	Open	3.3V/0V	I
5	JTMS	JTAG ENABLE	Open	3.3V/0V	I
6	GND	Board Ground	-	-	-
7	TXD1	UART Transmit OUTPUT1(RS232)	3.3V/0V	3.3V/0V	O
8	RXD1	UART Receive INPUT1(RS232)	0V	3.3V/0V	I
Yeonho Electronics, 12505WS-08A00					

③ CN5 : Day & Night Motor Control Connector

Pin NO	Pin Name	Description	Normal	Active	I/O
1	MA+	Day & Night Motor Drive - Output	Open	0V/5V	O
2	MA-	Day & Night Motor Drive + Output	Open	5V/0V	O
Yeonho Electronics, 12505WS-02A00					

④ CN6 : Auto Iris Lens Control Connector

Pin NO	Pin Name	Description	Active	I/O
1	DAMP+	DC Iris Damping Motor +	DAMP+	O
2	DAMP-	DC Iris Damping Motor -	DAMP-	O
3	DRIVE+	DC Iris Motor Drive	DRIVE+	O
4	GND	Board GROUND	-	-
Yeonho Electronics, 12505WS-04A00				

⑤ CN8 : Extra DC+12V & Analog VBS Output

Pin NO	Pin Name	Description	Normal	Active	I/O
1	V+12V	Extra DC+12V Output(Use IR LED Board)	DC+12V	DC+12V	O
2	GND	Board GROUND	-	-	-
3	D/N-SELI	External Day & Night Select Input	Open(3.3V)	0V	I
Yeonho Electronics, 12505WS-03A00					

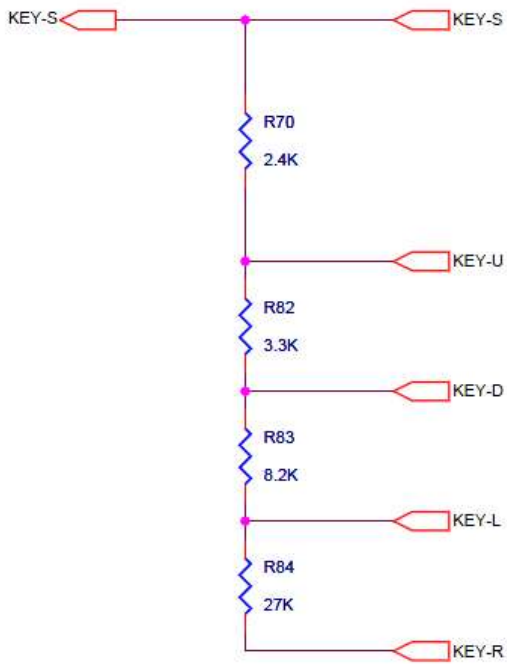


## 2-3-3. ADC KEY

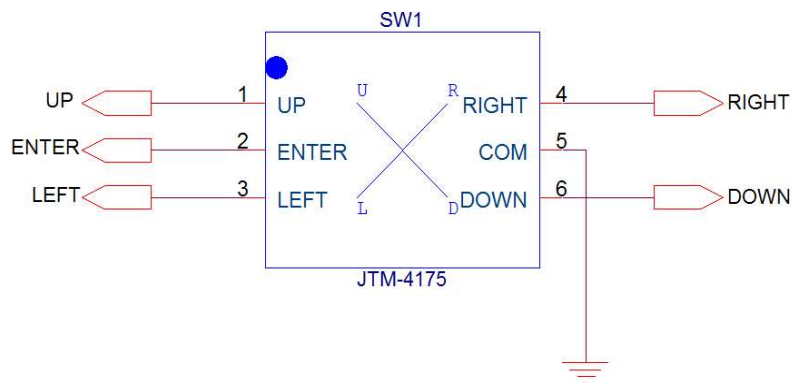
### ① KEY-VOLTAGE

net Name	Direction	Key Name	Voltage
KEY-S	⊙	SELECT(ENTER)	0.00V
KEY-U	▲	UP	0.66V
KEY-D	▼	DOWN	1.21V
KEY-L	◀	LEFT	1.92V
KEY-R	▶	RIGHT	2.65V

### ② Internal/External Circuit



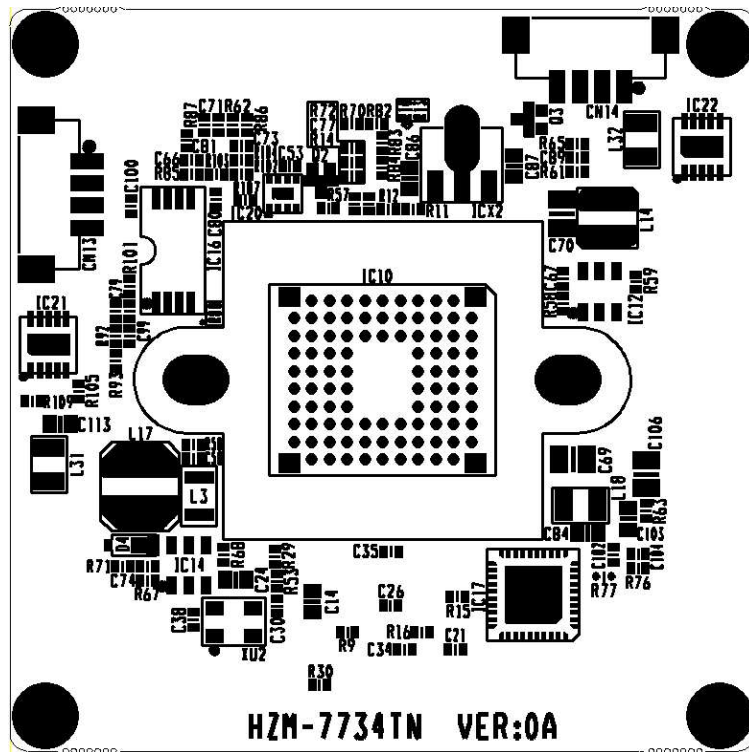
### ③ External Switch(Sample)



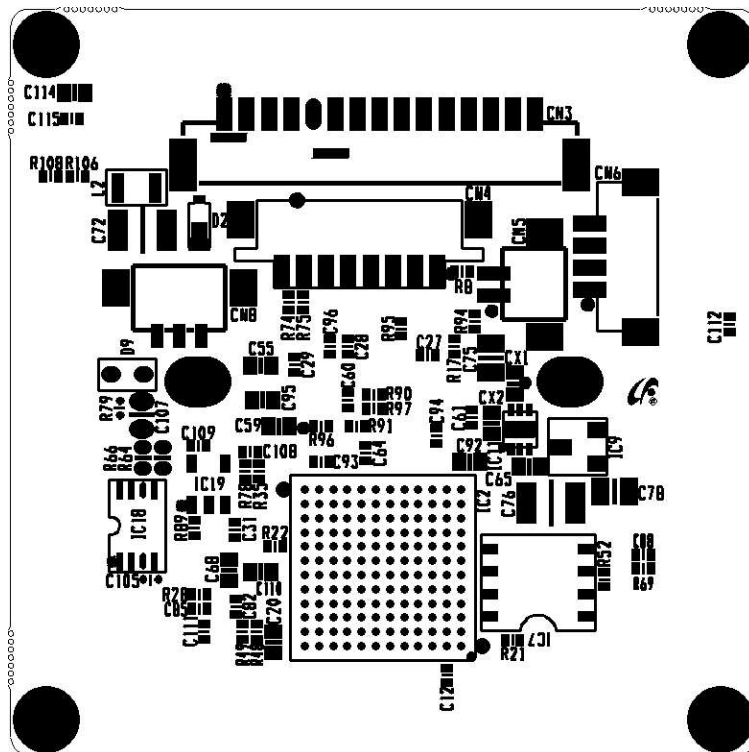


## 2-3-4. PCB Layout

<TOP VIEW>

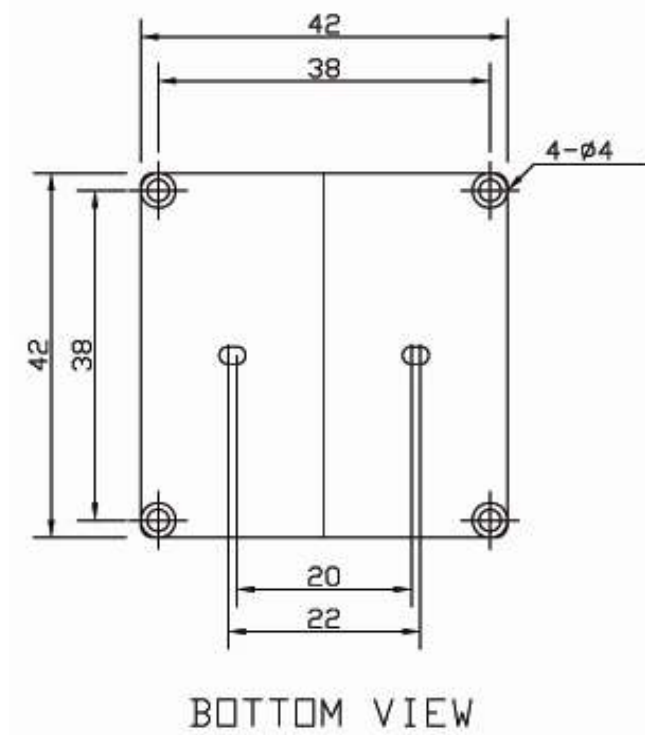
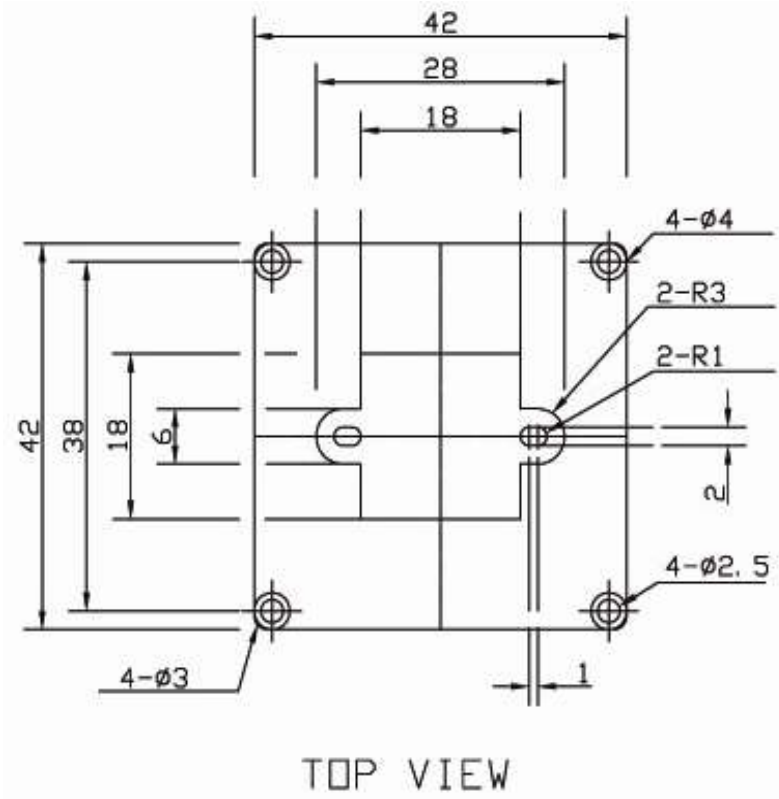


<BOTTOM VIEW>





## 2-4. PCB Outline Dimensions





## 2-5. OSD Menu tree

Main Menu	Sub Menu	Descriptions
LENS	MODE	DC,MANUAL
EXPOSURE	BRIGHTNESS	0~20
	SHUTTER	AUTO,MANUAL,FLICKER
	TCS	OFF/MODE1~20
	SENS-UP	OFF,X2~X32
	AGC	0~20
	RETURN	
BACKLIGHT	MODE	OFF,HLC,BLC,WDR
	HLC	LEVEL:0~20, MODE: ALLDAY/NIGHT ONLY
	BLC	H-POS,V-POS,H-SIZE,V-SIZE
	WDR	WEIGHT: LOW,MIDDLE,HIGH
	RETURN	
DAY/NIGHT	MODE	AUTO,COLOR,B&W,EXTERN
	AUTO	THRESHOLD, MARGIN, DELAY,SMART IR
	COLOR	-
	B&W	SMART IR
	EXTERN	EXTERN SW, DELAY, SMART IR
	RETURN	
WHITE BAL	MODE	AUTO,AUTOext,PRESET,MANUAL
	AUTO	-
	AUTOext	-
	PRESET	PRESET, PUSHING
	MANUAL	KELVIN,R-GAIN,B-GAIN
	RETURN	
DNR	MODE	OFF,LOW,MIDDLE,HIGH
IMAGE	SHARPNESS	0~10
	GAMMA	0.45,0.5,0.55,0.6,0.65
	COLOR GAIN	0~20



Main Menu	Sub Menu	Descriptions
IMAGE	MIRROR	OFF,ON
	FLIP	OFF,ON
	D-ZOOM	1.0X~8.0X
	ACE	OFF,LOW,MIDDLE,HIGH
	DEFOG	OFF,ON
	SHADING	OFF,ON
	PRIVACY	OFF,ON
	RETURN	
MOTION	SENSITIVITY	0~20
	WINDOW TONE	0~6
	WINDOW USE	0~3
	WINDOW ZONE	OFF,ON
	DET H-POS	0~60
	DET V-POS	0~40
	DET H-SIZE	0~60
	DET V-SIZE	0~40
	RETURN	
OPTION	IMAGE RANGE	Full,Comp,User
	OUTPUT MODE	1080P
	FRAME RATE	30FPS,25FPS
	COLOR BAR	OFF,ON
	CVBS	NTSC,PAL
	CVBS	OFF,ON
	LANGUAGE	English,Chinese,Chinese(S) Japanese,Korea
	TITLE	OFF,ON
	VERSION	777XI E5B
	RETURN	
EXIT	EXIT	SAVE, Reset



## 2-6 OSD Menu Functions

### ◆ Main Menu



#### ■ LENS

Select the Lens operation type.

#### ■ EXPOSURE

Adjust camera exposure.

#### ■ BACKLIGHT

The function is used to set the Back Light Compensation(BLC) and High Light Compensation(HLC) and Wide Dynamic Range(WDR).

#### ■ DAY/NIGHT

The function is used to set the Day/Night function which switches day/Night mode automatically based on the level of illumination.

#### ■ WHITE BAL

This function is used to set the White Balance operation which adjusts the color scheme.

#### ■ DNR

The function is used to reduce the noise using the Digital Noise Reduction (DNR).

#### ■ IMAGE

The function is used to adjust the camera picture(Sharpness, Gamma,Color Gain, etc).

#### ■ MOTION

The function is used to configure the Motion Detection operation and Alarm function which sense the movement of the scene.

#### ■ OPTION

Set up CVBS on/off, Language, etc.

#### ■ EXIT

SAVE: The function is used to save the various settings of the internal OSD menu.

RESET: The function initializes all the internal OSD menu settings.

#### KEY FUNCTIONS

- ▲: Up
- ▼: Down
- ◀: Left
- ▶: Right
- Ⓢ: Enter(Setup)



## ◆ LENS

▶ LENS "◀" "▶" "Ⓜ"



FUNCTION	OPTION	DESCRIPTION
LENS	DC	DC (Automatic IRIS Control)
	MANUAL	MANUAL (Electronic Shutter Control)

## ◆ EXPOSURE

▶ EXPOSURE "Ⓜ"



Automatic exposure automatically controls exposure by recognizing the brightness of the object.

■ EXPOSURE "▲" "▼" "◀" "▶" "Ⓜ"



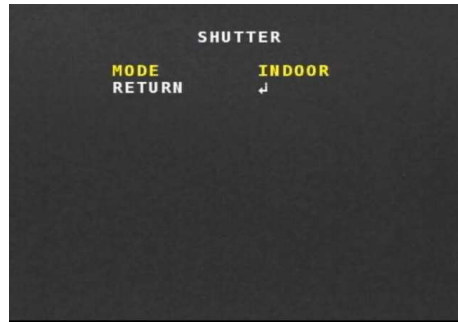
FUNCTION	OPTION	DESCRIPTION
BRIGHTNESS	0~20	Sets the screen brightness
SHUTTER	AUTO "Ⓜ"	Execute the Shutter speed automatically
	MANUAL "Ⓜ"	Execute the user setting Shutter speed
	FLICKER	Execute the Flickerless Shutter speed.
TCS	OFF, MODE1~MODE20 "Ⓜ"	Selects the TCS MODE





SENS-UP	OFF,X2,X4,X8,X16,X32	Adjusts the SENS-UP
AGC	0~20	Adjusts the AGC

■ SHUTTER (AUTO) "▲" "▼" "◀" "▶" "Ⓢ"



FUNCTION	OPTION	DESCRIPTION
MODE (DC)	INDOOR	IRIS
	OUTDOOR	IRIS+SHUTTER
	DEBLUR	SHUTTER:1/240+AGC
(MANUAL)	NORMAL	SHUTTER
	DEBLUR	SHUTTER:1/240+AGC

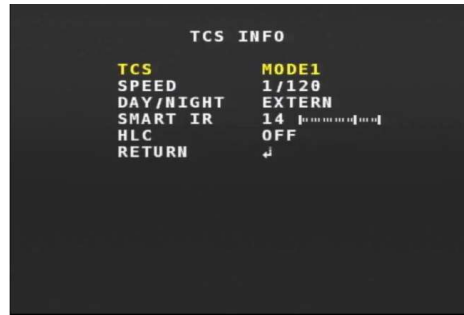
■ SHUTTER(MANUAL) "▲" "▼" "◀" "▶" "Ⓢ"



FUNCTION	OPTION	DESCRIPTION
SPEED	<60HZ(50HZ)> 1/30(25),1/60(50), 1/120(100),1/240, 1/500,1/1000, 1/2000,1/4000, 1/8000,1/16000, 1/30000	Sets the screen shutter



■ TCS INFO "▲" "▼" "◀" "▶" "Ⓢ"



FUNCTION	OPTION	DESCRIPTION
TCS	OFF	NOT USED
	MODE1	Shutter 1/120 + DN EXT + Smart IR 14
	MODE2	Shutter 1/250 + DN EXT + Smart IR 14
	MODE3	Shutter 1/700 + DN EXT + Smart IR 14
	MODE4	Shutter 1/1000 + DN EXT + Smart IR 14
	MODE5	Shutter 1/1600 + DN EXT + Smart IR 14
	MODE6	Shutter 1/120 + User DN + User Smart IR
	MODE7	Shutter 1/250 + User DN + User Smart IR
	MODE8	Shutter 1/700 + User DN + User Smart IR
	MODE9	Shutter 1/1000 + User DN + User Smart IR
	MODE10	Shutter 1/1600 + User DN + User Smart IR
	MODE11	Shutter 1/120 + DN EXT + Smart IR 14 + HLC
	MODE12	Shutter 1/250 + DN EXT + Smart IR 14 + HLC
	MODE13	Shutter 1/700 + DN EXT + Smart IR 14 + HLC
	MODE14	Shutter 1/1000 + DN EXT + Smart IR 14 + HLC
	MODE15	Shutter 1/1600 + DN EXT + Smart IR 14 + HLC
	MODE16	Shutter 1/120 + User DN + User Smart IR+ HLC
	MODE17	Shutter 1/250 + User DN + User Smart IR+ HLC
	MODE18	Shutter 1/700 + User DN + User Smart IR+ HLC
	MODE19	Shutter 1/1000 + User DN + User Smart IR+ HLC
	MODE20	Shutter 1/1600 + User DN + User Smart IR+ HLC
SPEED	1/120 ~ 1/1600	Show the Shutter speed value
DAY/NIGHT	AUTO~EXTERN	Show the DAY/NIGHT mode
SMART IR	0~20	Show the SMART IR level value
HLC	OFF,ON	Show the HLC on,off state



## ◆ BACKLIGHT

\*Not CVBS output when WDR mode.

▶ BACKLIGHT "◀" "▶" "Ⓜ"



FUNCTION	OPTION	DESCRIPTION
BACKLIGHT	OFF	-
	HLC"Ⓜ"	HLC(High Light Compensation) ON
	BLC"Ⓜ"	BLC(Back light Compensation) ON.
	WDR"Ⓜ"	WDR(Wide Dynamic Range) ON.

■ HLC "▲" "▼" "◀" "▶" "Ⓜ"



FUNCTION	OPTION	DESCRIPTION
LEVEL	0~20	Adjusts the HLC Mask Level
MODE	ALL DAY, NIGHT ONLY	Select the HLC Mask excution condition

■ BLC "▲" "▼" "◀" "▶" "Ⓜ"



FUNCTION	OPTION	DESCRIPTION
H-POS	0~20	Can be adjusted BLC area



V-POS	0~20	
H-SIZE	5~20	
V-SIZE	7~20	

■ WDR ▲ "▼" "◀" "▶" "Ⓢ"



FUNCTION	OPTION	DESCRIPTION
WEIGHT	LOW,MIDDLE,HIGH	Selects the WDR weight

◆ DAY/NIGHT

▶ DAY/NIGHT ◀ "▶" "◀" "Ⓢ"



FUNCTION	OPTION	DESCRIPTION
DAY/NIGHT	AUTO "Ⓢ"	switches between day and night mode automatically based upon the level of illumination on the scene
	COLOR	fixed day
	B&W "Ⓢ"	fixed night
	EXTERN "Ⓢ"	changes between day and night operation upon triggering from an external source

■ AUTO ▲ "▼" "◀" "▶" "Ⓢ"





FUNCTION	OPTION	DESCRIPTION
THRESHOLD	0~20	Sets the threshold for identifying the Night status from the Day status.
MARGIN	0~20	Sets the margin for identifying the Night status from the Day status.
DELAY	0~20	Sets the Night/Day identification transfer time.
Smart IR	0~20	Brightness of IR and saturation phenomenon are automatically adjusted.

■ B&W "▲" "▼" "◀" "▶" "Ⓢ"



FUNCTION	OPTION	DESCRIPTION
Smart IR	0~20	Brightness of IR and saturation phenomenon are automatically adjusted.

■ EXTERN "▲" "▼" "◀" "▶" "Ⓢ"



FUNCTION	OPTION	DESCRIPTION
EXTERN SW	LOW,HIGH	Selects the active level.
DELAY	0~20	Sets the Night/Day identification transfer time.
Smart IR	0~20	Brightness of IR and saturation phenomenon are automatically adjusted.



## ◆ WHITE BALANCE

▶ WHITE BAL "◀" "▶" "Ⓢ"



FUNCTION	OPTION	DESCRIPTION
AWB	AUTO AUTOext PUSH	Auto trace white balance. TDN lens Auto trace white balance. Can be changed in AWC mode only. When the set color temperature doesn't meet with user's environment, press the menu button long to adjust the color temperature to desired setting.
	MANUAL "Ⓢ"	Manual white balance.

■ MANUAL "▲" "▼" "◀" "▶" "Ⓢ"

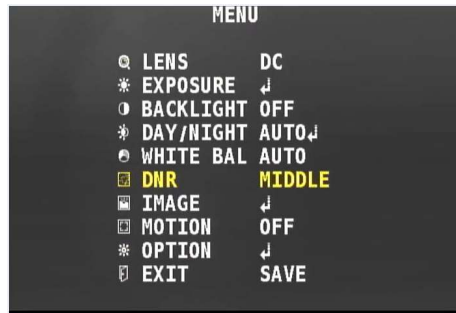


FUNCTION	OPTION	DESCRIPTION
KELVIN	LOW,MIDDLE,HIGH	Selects Color Temperature
R-GAIN	0~20	Adjusts R-GAIN
B-GAIN	0~20	Adjusts B-GAIN



## ◆ DNR

▶ DNR "e"



FUNCTION	OPTION	DESCRIPTION
DNR	OFF, LOW, MIDDLE, HIGH	Set up 3D-DNR(Digital Noise Reduction) LEVEL.

## ◆ IMAGE

▶ IMAGE "e"



The function is used to adjust the camera picture(Sharpness, Gamma, Color gain, Mirror, Flip, D-zoom, etc).

■ IMAGE "▲" "▼" "◀" "▶" "e"



FUNCTION	OPTION	DESCRIPTION
SHARPNESS	0~10	Select the resolution of the camera.
GAMMA	0.45,0.55,0.65,0.75	Select the GAMMA



COLOR GAIN	0~20	Adjusts COLOR GAIN
MIRROR	OFF,ON	Set up the screen mirror
FLIP	OFF,ON	Set up the screen flip
D-ZOOM	1.0X~8.0X	Enlarge the screen with DIGITAL ZOOM
ACE	OFF,LOW,MIDDLE. HIGH	Select Digital ACE(Advanced Enhance) level
DEFOG	OFF,ON"Ⓜ"	Defog on,off
SHADING	OFF,ON"Ⓜ"	Sets the Lens Shading
PRIVACY	"Ⓜ"	Sets the Privacy function

■ **DEFOG** "▲" "▼" "◀" "▶" "Ⓜ"



FUNCTION	OPTION	DESCRIPTION
MODE	AUTO, MANUAL	Changes the Defog level automatically Executes the Defog function within fixed Defog level
LEVEL	LOW,MIDDLE,HIGH	Selects the Defog function weight

■ **SHADING** "▲" "▼" "◀" "▶" "Ⓜ"

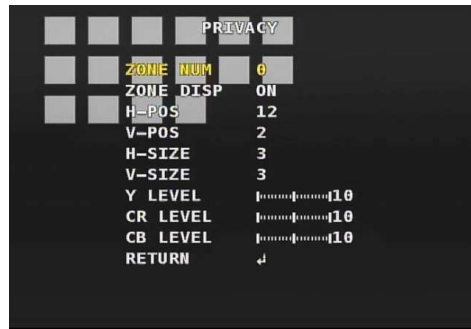


FUNCTION	OPTION	DESCRIPTION
WEIGHT	0~100%	Selects the Lens shading weight





■ PRIVACY "▲" "▼" "◀" "▶" "Ⓜ"



FUNCTION	OPTION	DESCRIPTION
ZONE NUM	0~15	Select the Privacy zone number
ZONE DISP	OFF,ON	Show up PRIVACY AREA function on the screen
H-POS V-POS H-SIZE V-SIZE	0~60 0~40 0~40 0~40	Can be adjusted Privacy area
Y LEVEL	0~20	Adjusts the Y LEVEL of the Privacy zone area
CB LEVEL	0~20	Adjusts the B GAIN of the Privacy zone area
CR LEVEL	0~20	Adjusts the R GAIN of the Privacy zone area

◆ MOTION "▲" "▼" "◀" "▶" "Ⓜ"

▶ MOTION "◀" "▶" "Ⓜ"



The function is used to configure the Motion Detection operation and Alarm function which sense the movement of the scene

■ MOTION "▲" "▼" "◀" "▶" "Ⓜ"

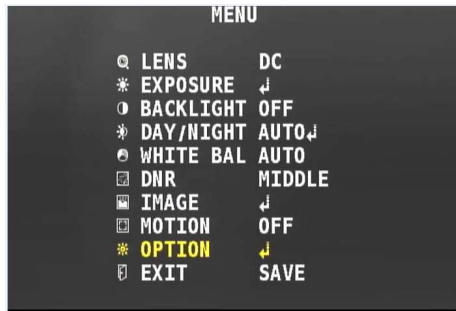




FUNCTION	OPTION	DESCRIPTION
SENSITIVITY	0~20	Sets the motion detection sensitivity
WINDOW TONE	0~6	Adjusts the transparency of the motion detection zone area
WINDOW USE	0~3	Select the Motion set number
WINDOW ZONE	OFF,ON	Active the Motion set number
DET H-POS	0~60	Adjust the size of the detection area
DET V-POS	0~34	
DET H-SIZE	0~60	
DET V-SIZE	0~34	

◆ **OPTION** "▲" "▼" "◀" "▶"

▶ **OPTION** "ⓔ"



Set up CVBS on/off, Language, etc

■ **OPTION** "▲" "▼" "◀" "▶" "ⓔ"



FUNCTION	OPTION	DESCRIPTION
IMAGE RANGE	Full,Comp,User"ⓔ"	Digital output data scale
OUTPUT MODE	1080P	Sets the output format
FRAME RATE	30FPS,25FPS	Sets the frame rate
COLOR BAR	OFF,ON	Display Color bar pattern
CVBS	NTSC,PAL	Cvbs Output format
CVBS	OFF,ON	Cvbs on,off
LANGUAGE	English,Chinese,Chinese(S) Japanese,Korea	Selects the language in which to display the internal OSD menu
TITLE	OFF,ON"ⓔ"	Sets Camera TITLE
VERSION	777XI E5B	Camera VERSION display

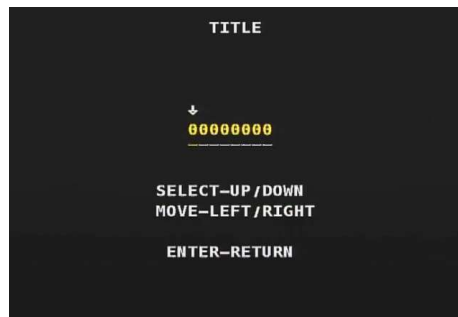


■ **IMAGE RANGE** "▲" "▼" "◀" "▶" "ⓔ"



FUNCTION	OPTION	DESCRIPTION
IMAGE RANGE	0~20	Digital output data scale

■ **TITLE** "▲" "▼" "◀" "▶" "ⓔ"



This function can set up Title, Version, Communication, etc  
Use the "▲" "▼" "◀" "▶" "ⓔ" switch to select a menu item

◆ **Exit** "◀" "▶"

FUNCTION	OPTION	DESCRIPTION
EXIT	SAVE	All the settings of the internal OSD menu are saved.
	RESET	All the internal OSD menu settings are reset.

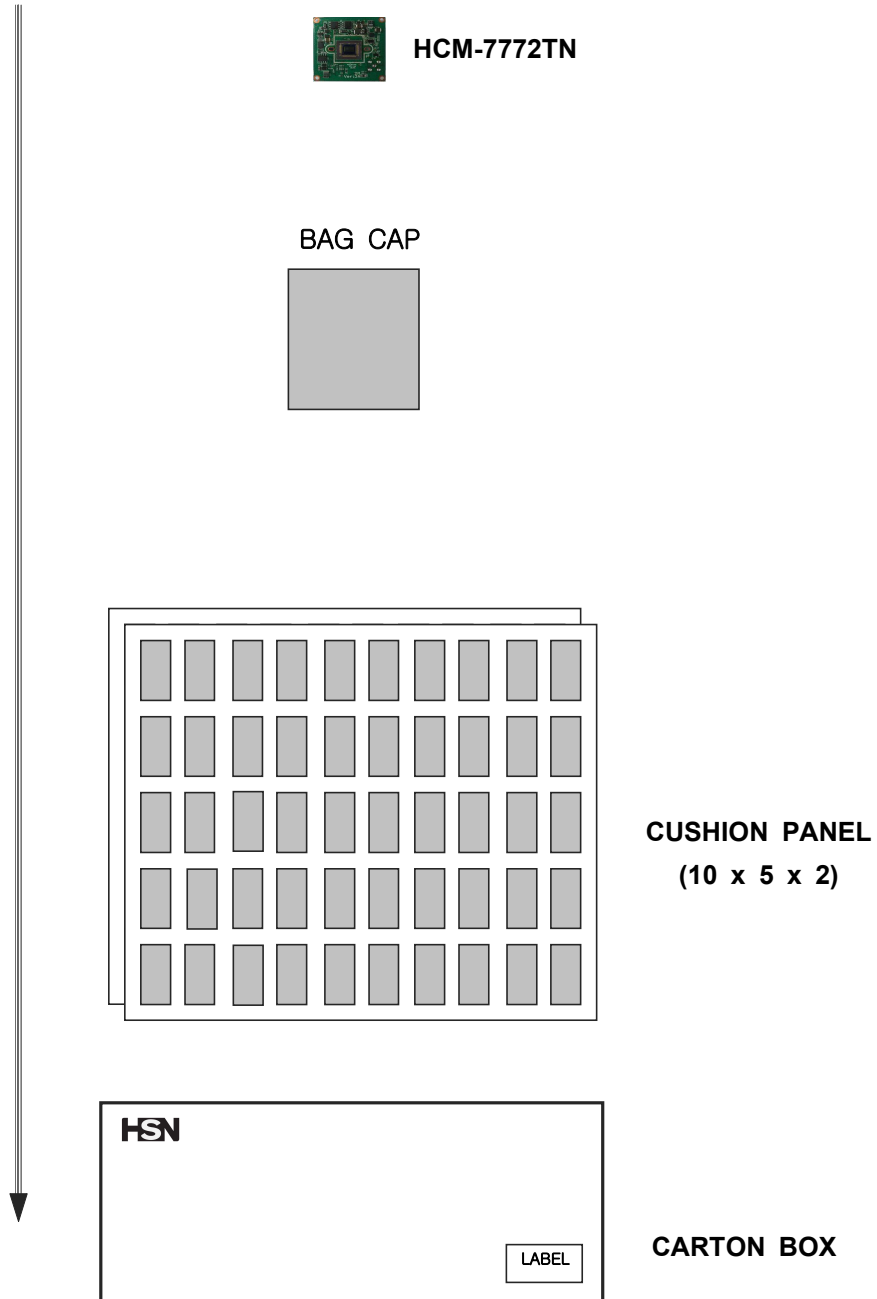


### **3. UART Protocol**

**Not support**



## 4. Packing Information

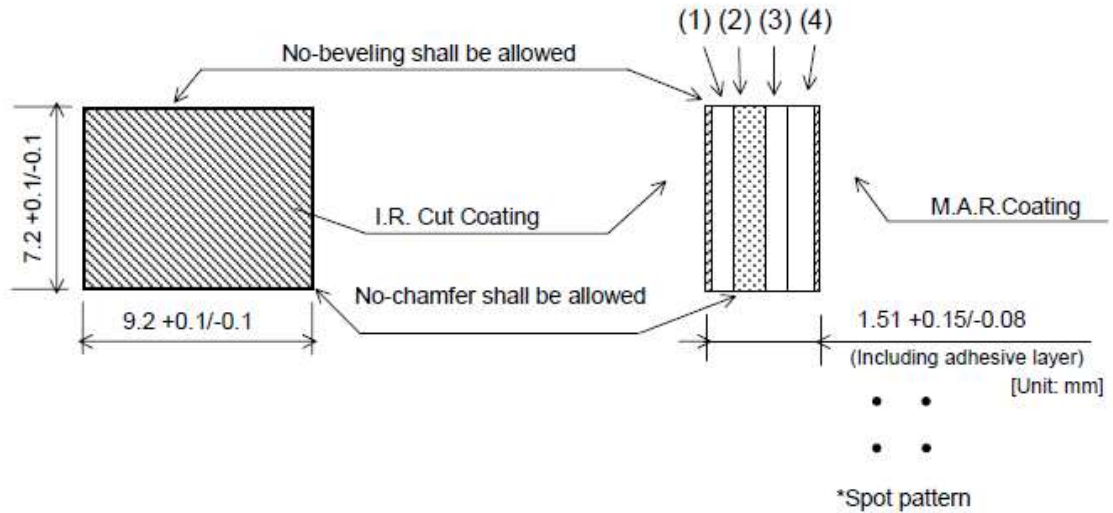




## 5. Reference Data Sheet

### 5-1. OLPF( Optical Low Pass Filter ) Specifications

#### 5-1-1. OLPF for general lens-1(OLPF Manufacturer : KDS)



No.	Item	Thickness (mm)	Orientation (degree)	Rotating Angle (degree)	Note
(1)	Double Refraction Plate	0.31 +0.02/-0.01	45 +1/-1	0 +1/-1	
(2)	Infrared Absorbing Glass	0.54 +0.03/-0.03	-	-	C5000(HOYA) or NF50(AGC)
(3)	Wave Plate	0.35 +0.03/-0.03	0 +1/-1	45 +1/-1	
(4)	Double Refraction Plate	0.31 +0.02/-0.01	45 +1/-1	90 +1/-1	

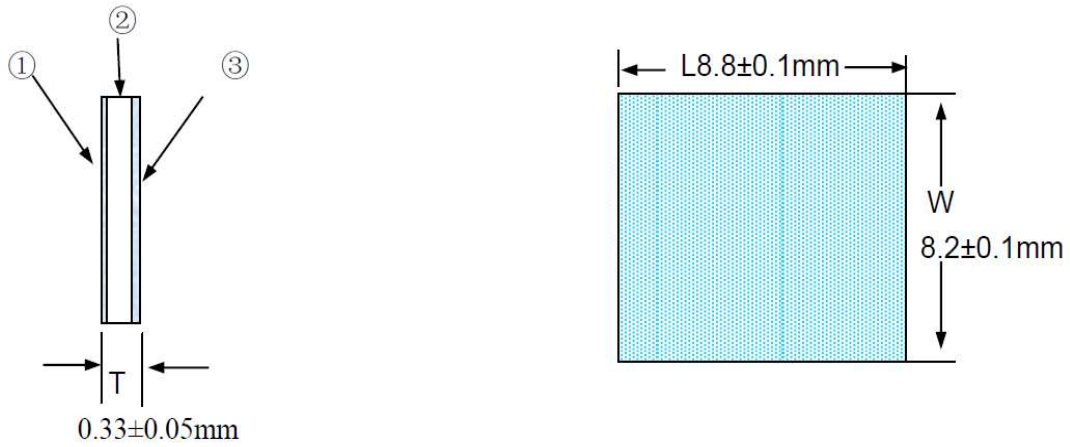
\*Rotating angle of parts No. (3) is possible event by -45 +1/-1 degree.

Wavelength (nm)	400-450	450-500	500-550	655+15/-15	720-750	750-1050	1050-1100
Transmission Rate (%)	83min.(Avg.)	87min.(Avg.)	84min.(Avg.)	50	3max.	1max.(Avg.)	5max.
Ripple (%)	73min.	82min.	79min.	-	-	2max.	-

(Spectral characteristics of Optical Low Pass Filter )



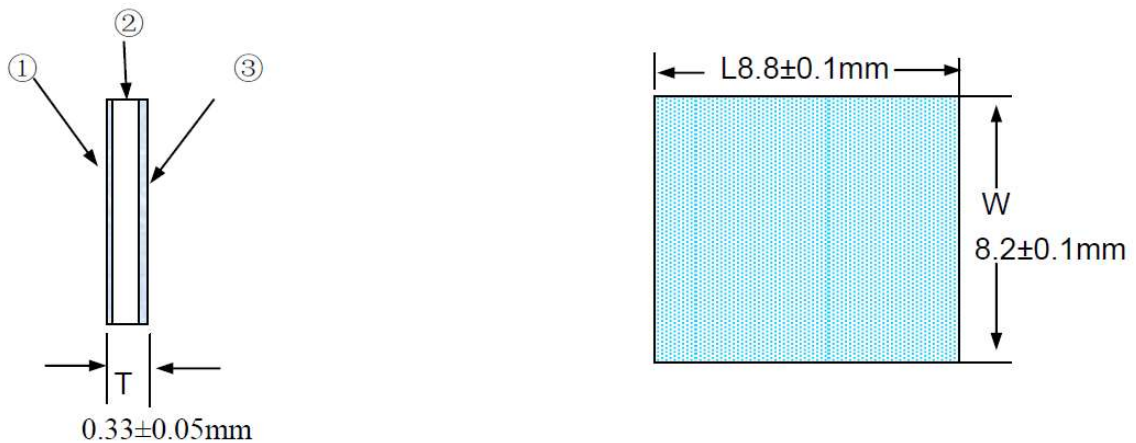
### 5-1-2. OLPF for general lens-2(OLPF Manufacturer : Max Gain)



Part No	Part Name	Dimension(mm)			Orientation Angle	Rotation Angle	Flatness	Para.
		L	W	T				
①	IR Coating							
②	Double refractive	8.8±0.	8.2±0.	0.33±0.0	45	0	3N	2'
③	AR Coating							

Wave Length(nm)	Transmission (%)
400nm	>75%
450~600nm	>80%
645 ± 10nm	=50%
700nm	<5%
1100nm	<15%

### 5-1-3. OLPF for TDN lens(OLPF Manufacturer : Max Gain)

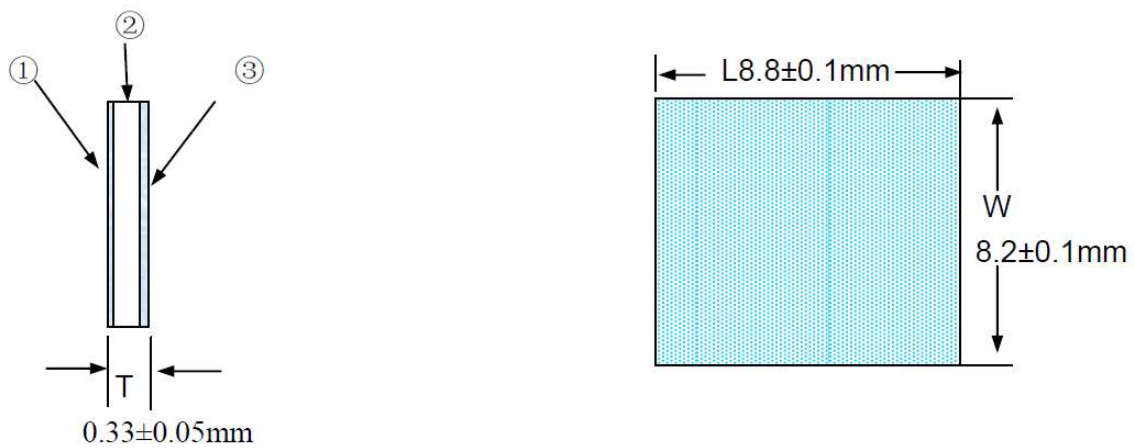




Part No	Part Name	Dimension(mm)			Orientation Angle	Rotation Angle	Flatness	Para
		L	W	T				
①	AR Coating							
②	Double refractive	8.8±0.	8.2±0.	0.33±0.0	45	0	3N	2'
③	AR Coating							

Wave Length(nm)	Transmission (%)
420~1100nm	>96%

#### 5-1-4. OLPF for Night Vision(OLPF Manufacturer : Max Gain)



Part No	Part Name	Dimension(mm)			Orientation Angle	Rotation Angle	Flatness	Para
		L	W	T				
①	Night vision Coating							
②	Double refractive	8.8±0.	8.2±0.	0.33±0.0	45	0	3N	2'
③	AR Coating							

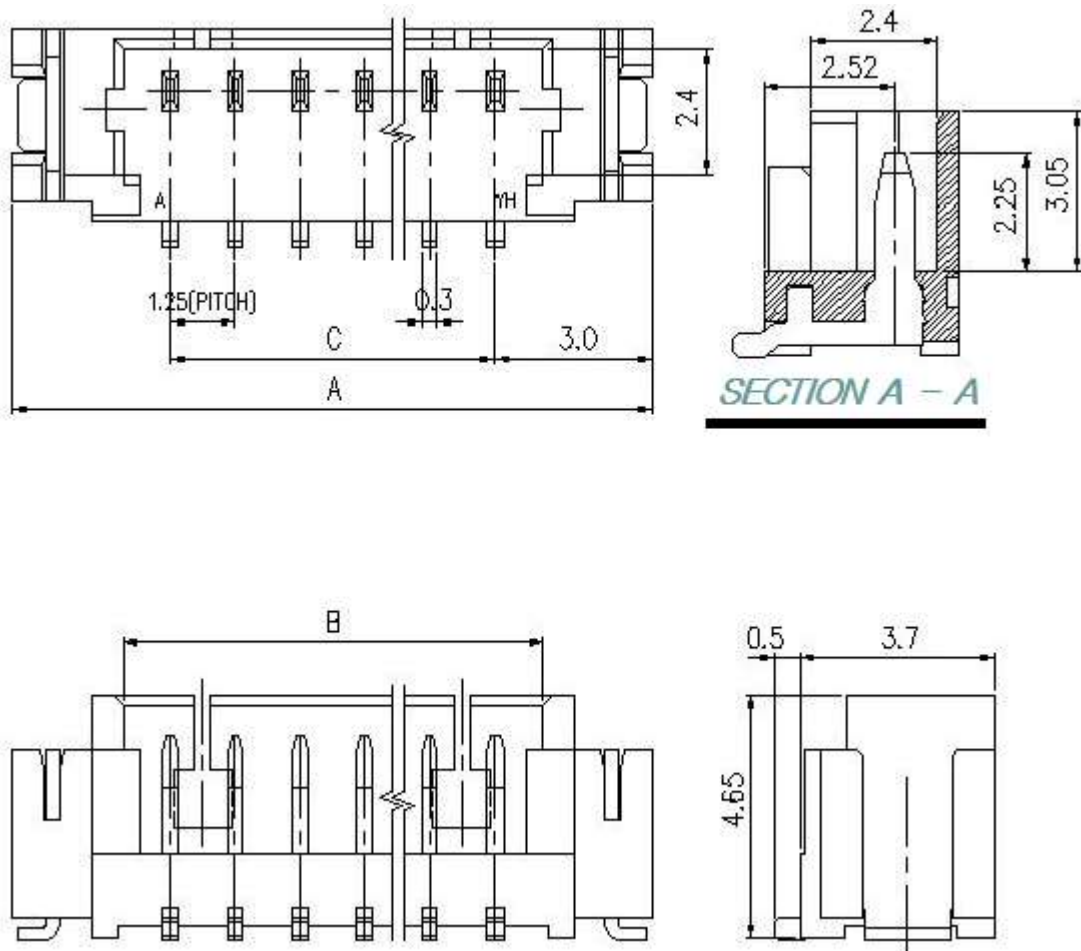
Wave Length(nm)	Transmission (%)
400-420	>75%
421-620	>85%
645±10	50%
700-750	<3%
815±15	50%
850	>80%
900-1100	<20%





## 5-2. I/O Connector Specifications

### 5-2-1. 12505WS-XXA00 Series



#### Available Pin

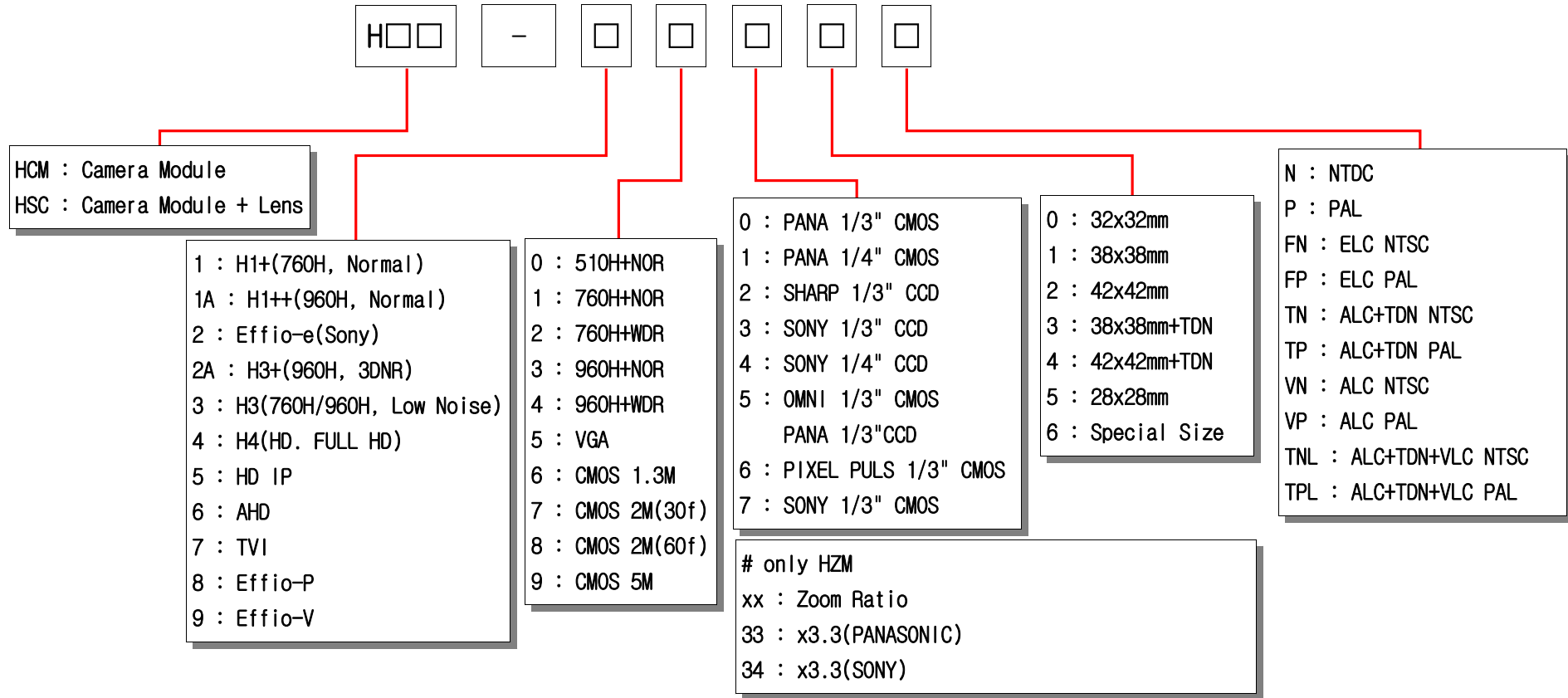
PARTS NO.	A	B	C
12505WS-02	7.25	3.05	-
12505WS-03	8.50	4.30	2.50
12505WS-04	9.75	5.55	3.75
12505WS-05	11.00	6.80	5.00
12505WS-06	12.25	8.05	6.25
12505WS-07	13.50	9.30	7.50
12505WS-08	14.75	10.55	8.75
12505WS-09	16.00	11.80	10.00
12505WS-10	17.25	13.05	11.25
12505WS-11	18.50	14.30	12.50
12505WS-12	19.75	15.55	13.75
12505WS-13	21.00	16.80	15.00
12505WS-14	22.25	18.05	16.25
12505WS-15	23.50	19.30	17.50

#### Specification

ITEM	SPEC
Voltage Rating	AC/DC 125V
Current Rating	AC/DC 1A
Operating Temperature	-25°C ~ +85°C
Contact Resistance	30mΩ MAX
Withstanding Voltage	AC250V/1min
Insulation Resistance	100MΩ MIN
Applicable Wire	-
Applicable P.C.B	0.8 ~ 1.6mm
Applicable FPC/FFC	-
Solder Height	0.15mm
Crimp Tensile Strength	-
UL FILE NO	E108706



## 6. Ordering Information(Model Configuration)



ex) HCM-7770TN : Camera Module / TVI / CMOS 2M / SONY 1/3" CMOS / 42x42mm / ALC TDN NTSC(30fps)  
 HCM-9432TP : Camera Module / effio-V / 960H+WDR / SONY 1/3" CCD / 42x42mm / ALC TDN PAL(25fps)  
 HCM-2A330FN : Camera Module / H3+ / 960H+NOR / SONY 1/3" CCD / 32x32mm / ELC NTSC(30fps)  
 HSC-9432TN : Camera Module + OLPF + Veri Focal Lens(TDN) / effio-V / 960H+WDR / SONY 1/3" CCD / 42x42mm / ALC TDN NTSC(30fps)