

# VIDEOLOGY®

IMAGING SOLUTIONS INC.

## Application Note

### 22 X ZOOM CCD Color Camera 20Z704/22X / 21Z704/22X

***Information may change without notice.***

This document provides technical information for the user. Videology reserves the right to modify the information in this document as necessary. The customer should make sure that they have the most recent manual version. Videology holds no responsibility for any errors that may appear in this document.

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# 1. Specifications

Signal System	NTSC (20Z704/22X)	PAL (21Z704 /22X)	REMARKS
Scanning System	2:1 Interface		
Scanning Frequency (H)	15.734 KHz	15.625 KHz	
Scanning Frequency (V)	59.94 Hz	50 Hz	
Image Sensor	¼ Inch Solid State Interline CCD Image Sensor		SONY
Total Pixels No.	811 (H) X 508 (V) 410K	795 9H) X 596 (V) 470K	
Effective Pixels No.	768 (H) X 494 (V) 380K	752 (H) X 582 (V) 440K	

**“ Bold: Default Mode ”**

## Lens

F1.6 ~ 3.7 (± 5 %), f = 3.9 ~ 85.8 mm (± 5 %)  
 x22 Zoom Video Auto Focus  
 High Durability Zoom Lens

## Zoom Durability

More than 500k at Room Temperature

## Focus Durability

More than 1,000k at Room Temperature

## Iris Durability

More than 500k at Room Temperature

## Focus Length

∞ ~ 1.0m (Tele)~0.01m (Wide)

## Signal Process

Digital Signal Process

## Sync System

Internal

## Camera Function

### Optical Zoom

TELE ~ **WIDE** (Zoom Speed: **6 sec**)

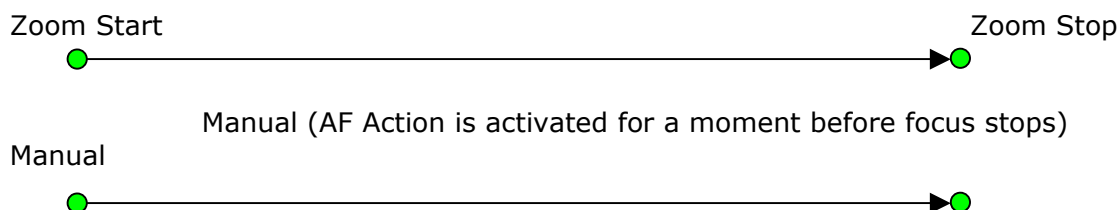
### Digital Zoom

**ON** / Off (X2, X4, X8, **X10** times)

### Video Focus

**Auto** / Manual (NEAR ~ FAR) / Push Auto

### Manual Mode



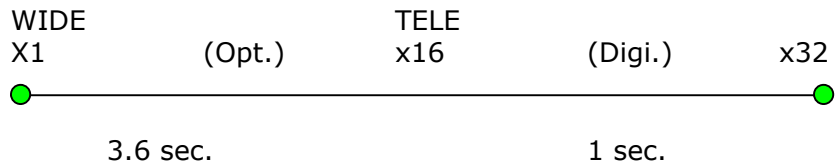
## White Balance

**Auto** / Indoor / Outdoor / Push Auto / Manual  
 (R&B Gain Level UP/Down)  
 Special (R or B Gain Level Control)

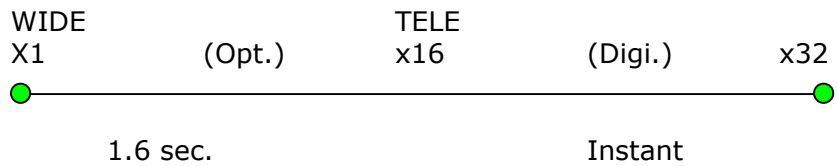
## Shutter Speed

**Auto** / Manual  
 (1/60 ~ 1/ 10000 (NTSC) / 1/50 ~ 1/10000 (PAL))

Iris Control	<b>Auto</b> / Manual (Manual Iris Level: UP ~ Down)
Gain Control	<b>Auto</b> / Manual (Auto Gain Control: UP ~ Down)
Sharpness	<b>Manual</b> (Sharpness UP ~ Down)
Brightness	<b>Manual</b> (Brightness UP ~ Down)
Negative	<b>Off</b> / On (Negative Level UP ~ DOWN)
OSD Function	<b>On</b> / Off (See an Annexed Document " <b>APPENDIX 1</b> ")
Flickerless	<b>Off</b> / On (1 / 100 sec Shutter Set (NTSC) / 1/120 sec Shutter Set (PAL))
Back Light	<b>Off</b> / On/ Auto
Mirror Mode	Is controlled via RS-232. See Communication Protocol: <a href="http://www.videologyinc.com/media/products/application_notes/APN-20Z704-22x-comm.pdf">http://www.videologyinc.com/media/products/application_notes/APN-20Z704-22x-comm.pdf</a>
Position Preset	64 Mode Set / Move (Store with Internal EEPROM) (a) Zoom Trace Preset Mode: MF Trace *In case of memory (EX. Memory Point: ●)



(b) Zoom Trace Preset Mode: MF NO-Trace  
\* In case of preset



### Video Output Level

NTSC	Video Level	0.714 ± 0.07V (100 ± 10 IRE)
	Sync Level	0.286 ± 0.035V (40 ± 10 IRE)
	Burst Level	0.286 ± 0.035V (40 ± 10 IRE)
PAL	Video Level	700 ± 70 mV
	Sync Level	300 ± 35 mV
	Burst Level	300 ± 35 mV

### Color Reproduction

	COLOR	RED	BLUE	YELLOW	BURST
NTSC	Amplitude (%)	200 ± 40%	130 ± 40%	115 ± 40%	100% (Base)
	Phase (°)	103 ± 20 <sub>0</sub>	345 ± 20 <sub>0</sub>	170 ± 20 <sub>0</sub>	180 <sub>0</sub> (Base)
PAL	Amplitude (%)	200 ± 40%	130 ± 40%	115 ± 40%	100% (Base)
	Phase (°)	103 ± 20 <sub>0</sub>	170 ± 20 <sub>0</sub>	170 ± 20 <sub>0</sub>	135 <sub>0</sub> (Base)

**Horizontal Resolution**

More than 480 Lines

**Luminance S/N**

More than 48dB

**Sensitivity**

Typ. 1Lux ---- At 30 IRE  
(LENS-F: F = 1.4 (WIDE) AGC Gain: Max)

**Supplied Voltage**

12VDC  $\pm$  5 % (Note: Always use a regulated 12V power supply.)

**Supplied Current**

270 mA (Steady-state)  
420 mA (Max) ----- While zooming and focusing

**Power consumption**

3.4 W (Max)

**Dimensions**

**58.0 (W)  $\times$  59.8(H)  $\times$  101.2(D) mm** (Except Connector)

**Weight**

345 g (Approx.)

**Appearance / Dimensions**

See Attached page 11 (Appearance / Dimensions)

**Body Color**

Black

**Packing Method**

See Attached page 12 (Packing Method)

**Optional Accessories**

WIRE Remote controller (60ZRC006, 1M)  
WIRE Remote controller (60ZRC100, 30M)

**Optical Accessories**

Dioptic Lens  
(2 X Min Object Distance = 13 inches/320mm  
Maximum Object Distance = 20 inches / 500mm)

Dioptic Lens  
(3 X Minimum Object Distance = 10 inches /250mm)  
Maximum Object Distance = 13 inches / 330mm)

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## 2. Measurement Specifications

- Standard Measurement Condition and Measurement Procedure
- See an Annexed Document " **APPENDIX 2** "

## 3. Environment Condition and Test

### Operating Condition

Temperature -10°C ~ 50°C (Recommended: -5°C ~ 40°C)  
Humidity 10% .85%

### Storage Condition

Temperature -20°C ~ 60°C  
Humidity 0% .90%

### High Temperature storage Test

Leave the camera packed at a temperature of 60°C for 72 Hours. Then bring it to room temperature and leave it for 8 Hours. There should be no problem in performance.

### Low Temperature storage Test

Leave the camera packed at a temperature of -20°C for 72 Hours. Then bring it to room temperature for 8 Hours. There should be no problem in performance.

## 4. Layout Of Plug (Rear Panel)

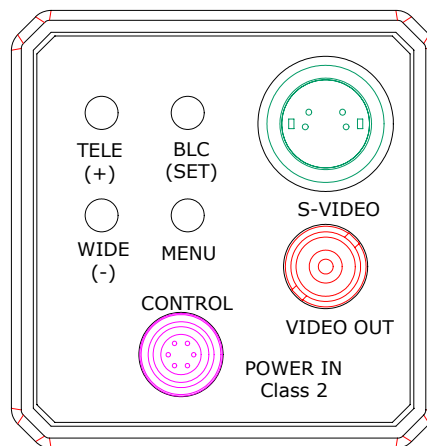


Figure 6. 20/21Z704-22X

## 5. Interface (RS-232C):

Figure 8. Diagram (6 Pin Circle Connector): Rear View

Mirror Mode is controlled via RS-232. For more information see Videology's Communication Protocol:

[http://www.videologyinc.com/media/products/application\\_notes/APN-20Z704-22x-comm.pdf](http://www.videologyinc.com/media/products/application_notes/APN-20Z704-22x-comm.pdf)

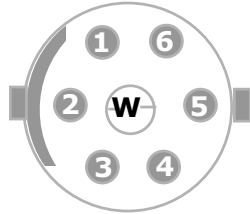


Figure 9. Pin Assignment (6 Pin Circle Connector)

PIN No.	NAME	I/O	Wire Color	Note
1	RD (For R S-232C)	Input	Green	
2	TD (For R S-232C)	Output	White	
3	Key	Input	Blue	
4	GND		Yellow	
5	GND		Black	
6	DC IN	Input	Red	12 ±0.5V

### 5.1.1. PC Interface

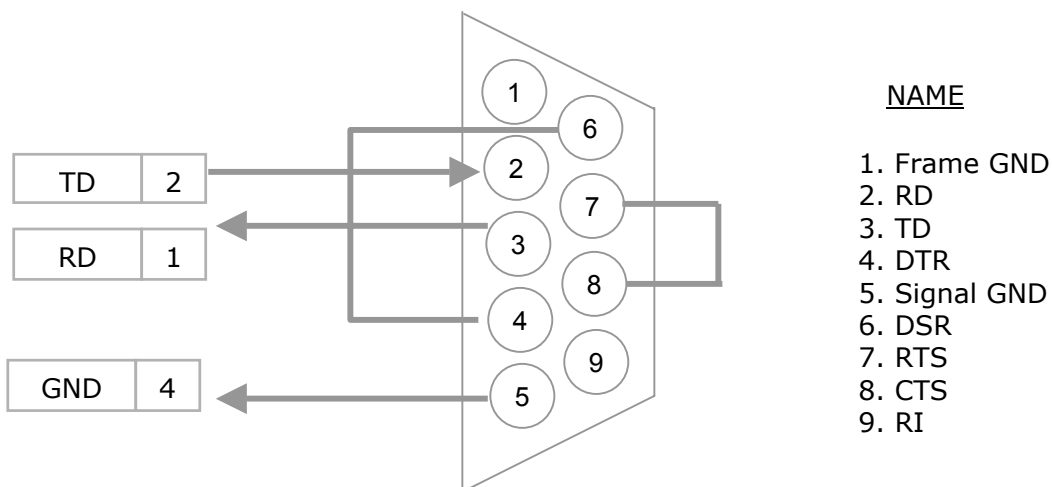
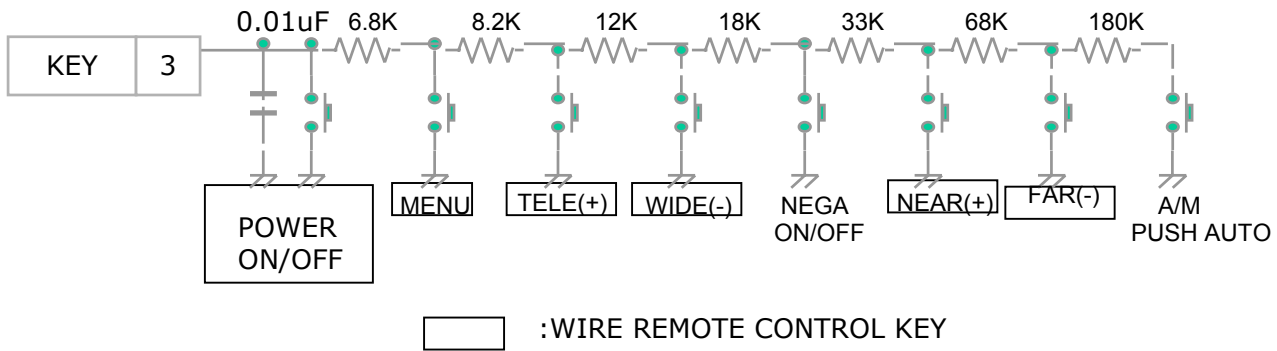


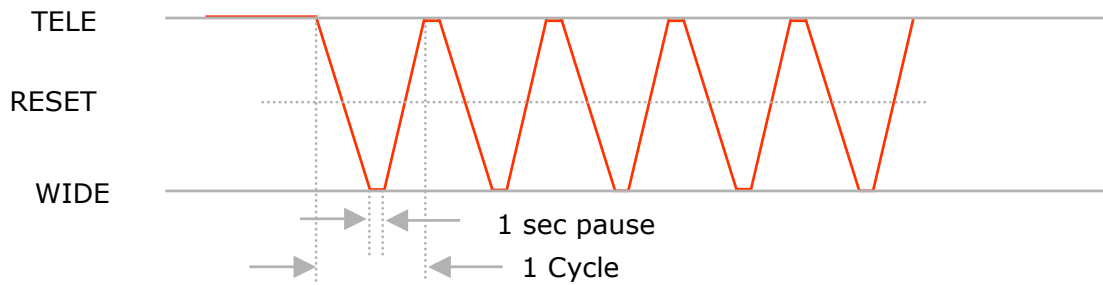
Figure 10. RS-232C D-Sub Connector

## 5.2. KEY Function

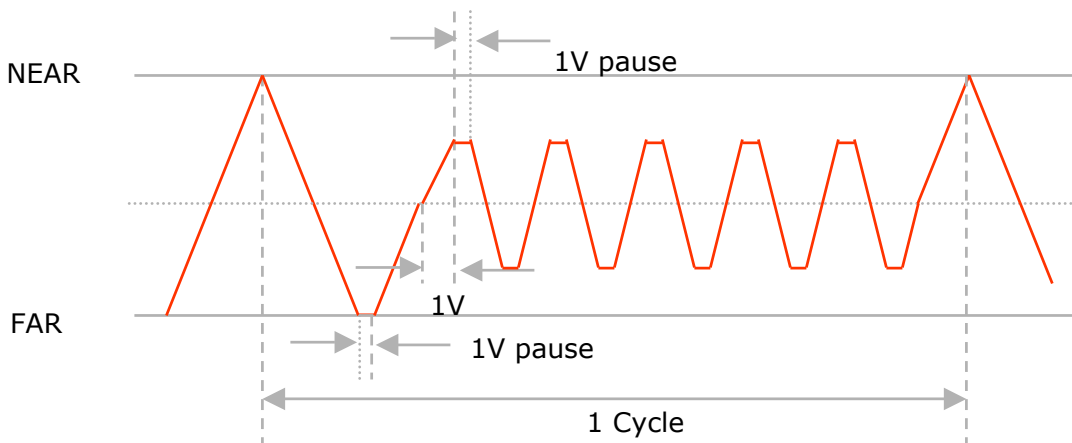


## 6. Lens Test Condition

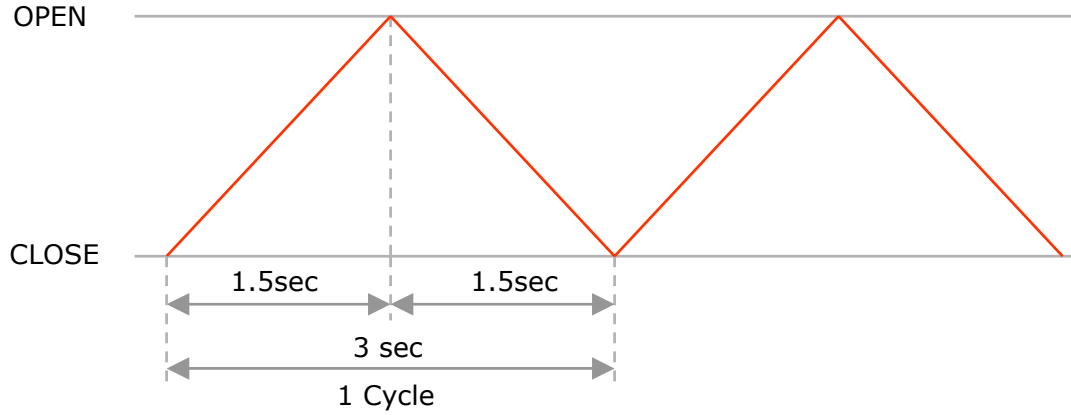
### 6.1. Zoom



### 6.2. Focus

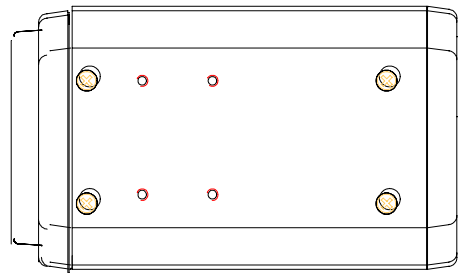


### 6.3. Auto Iris

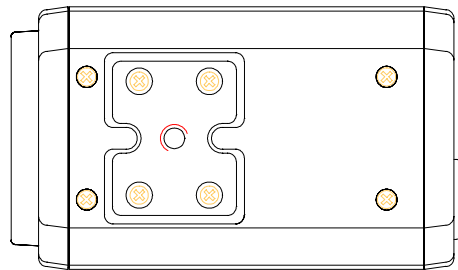
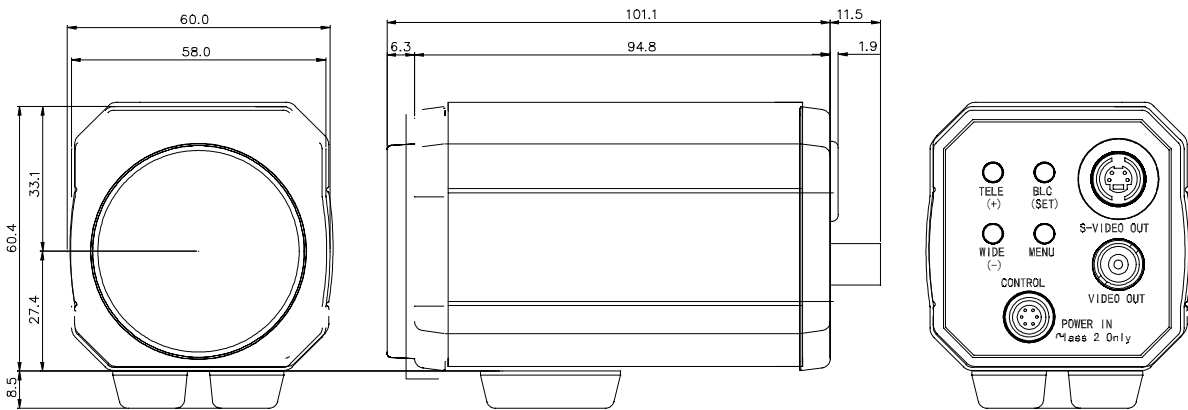


### 7. Appearance / Dimensions

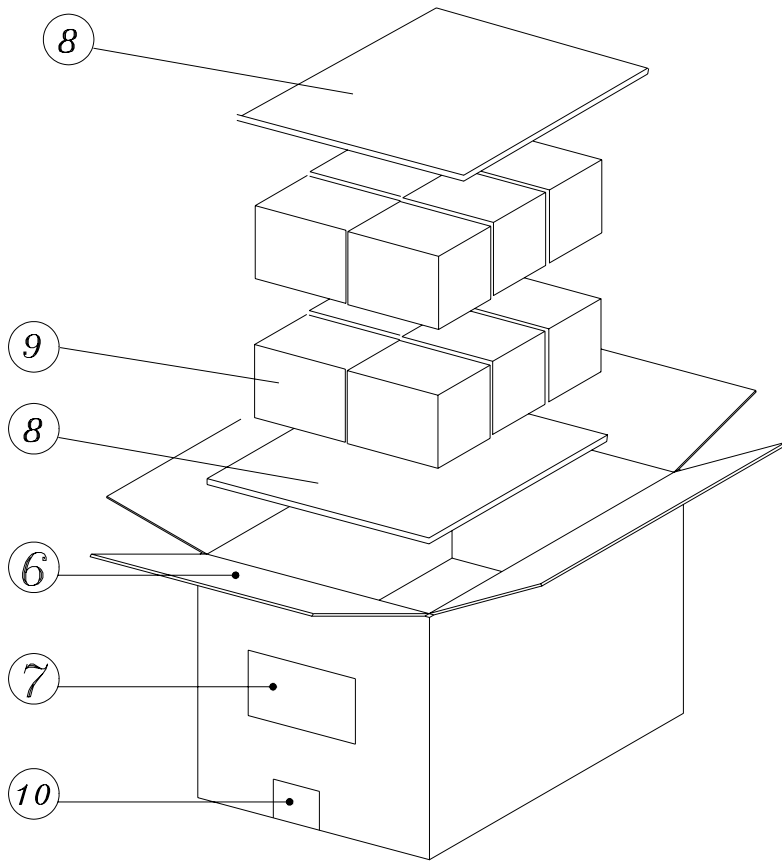
Note: Dimensions are in millimeters



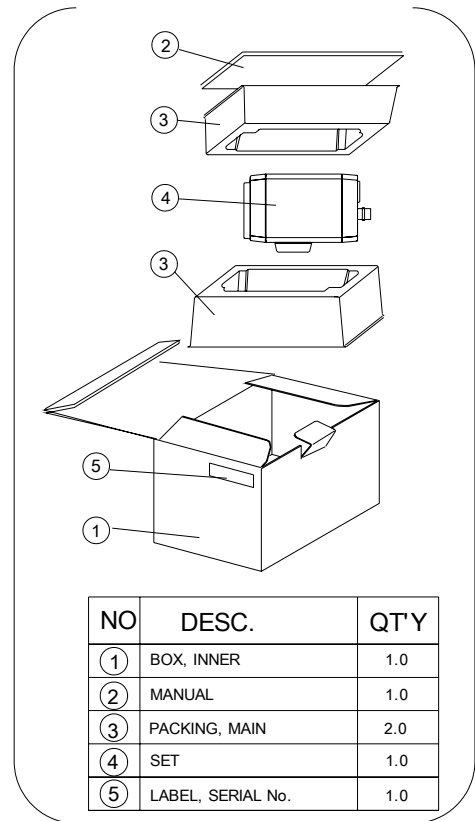
WEIGHT: 345g/SET



## 8. Packing Method



### BOX INNER ASSEMBLY



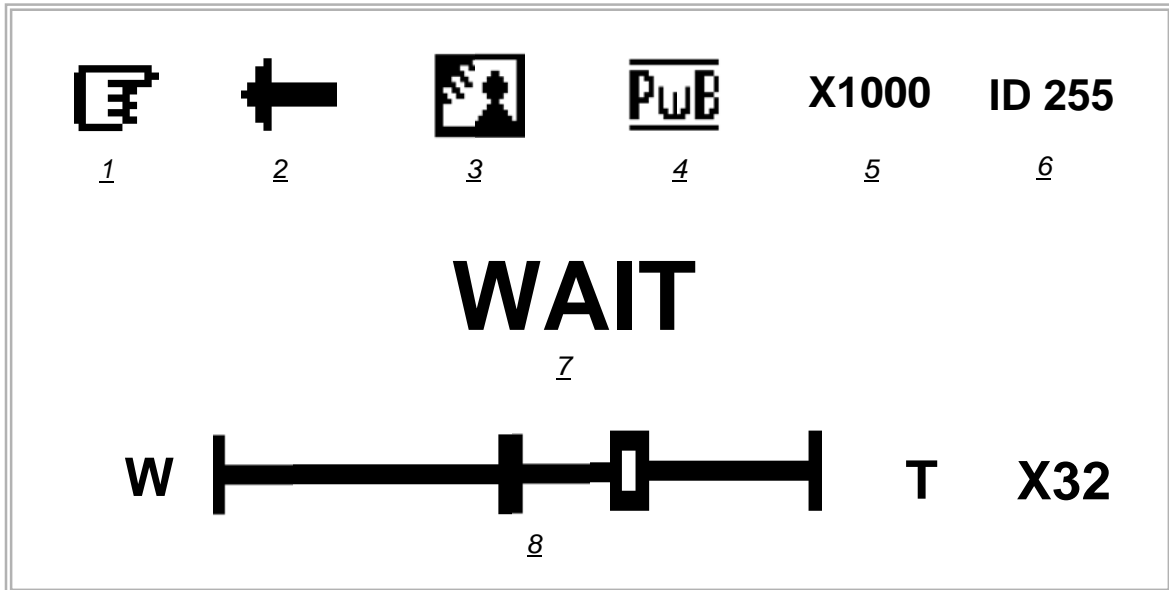
NO	DESC.	QT'Y
①	BOX, INNER	1.0
②	MANUAL	1.0
③	PACKING, MAIN	2.0
④	SET	1.0
⑤	LABEL, SERIAL No.	1.0






NO	DESC.	QT'Y
⑥	BOX, MASTER CARTON	1/12
⑦	LABEL SHIPPING	1/12
⑧	PAD	2/12
⑨	BOX INNER ASSEMBLY	1.0
⑩	TAPE	0.005






## 9. APPENDIX 1

### 9.1. OSD (On Screen Display) Format

Figure 11. OSD DISPLAY POSITION



	FUNCTION	OSD FORMAT	DESCRIPTION
1	Focus Mode	Non Display	Focus Auto Mode
			Focus Manual Mode
2	Mirror Mode	Non Display	Mirror Mode Off
			Mirror Mode On
3	Back Light	Non Display	Back Light Off
			Back Light On
		A 	Auto Back Light On
4	WBC Mode	Non Display	White Balance AUTO
			<p>Push Auto White Balance:                      In this mode "Push Key" pressed, the white balance tracks automatically (PWB Auto Mode).                      "Push Key" released, the white balance is preserved with the current settings (PWB Manual Mode).</p>

	FUNCTION	OSD FORMAT	DESCRIPTION	
5	Shutter Speed	Non Display	Normal Shutter (NTSC:1/60) (PAL:1/50)	
		1/125 . . . 1/10000	28 variable steps. (Can be set to 8 steps by programming Option)	
6	Camera ID	After inputing the Identification Number to each camera, Multi-point control is available (PC Control) (000 . 255).		
7	Wait Mode	WAIT	Indicates the camera stand-by mode until the camera power turns ON.	
8	Zoom Display	<p>W  T X10 ; In case of 16X Zoom; Optical Zoom only mode ; (Current Zoom : 10X)</p> <p>W  T X20 ; In case of 128X Zoom; Digital Zoom 2X mode ;(Current Zoom: 20X)</p> <p>W  T X100 ; In case of 128X Zoom ; Digital Zoom 8X mode ; (Current Zoom: 100X)</p>		
		Sharpness Adjustment Mode DISPLAY		
		Brightness Adjustment Mode DISPLAY		

\* The OSDs of **1,2,3,4,5,7,8** disappear after 5 sec. But **6** can be displayed continuously by ID On/Off Key (controlled by **PC command** Key).

## 9.2. MENU

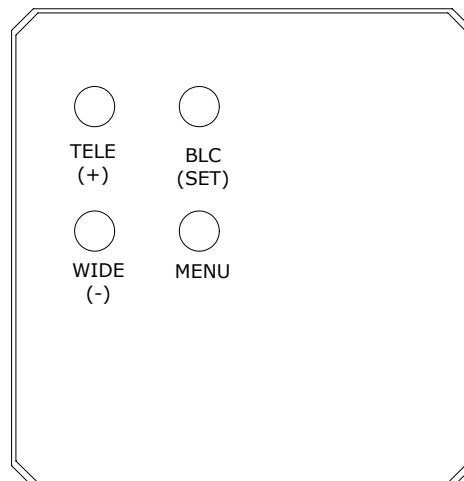
### 9.2.1. Menu Format

Figure 12. Menu Format

<b>MENU</b>			
<b>1</b>	<b>BACKLIGHT</b>	<b>OFF</b>	<b>(ON)</b>
<b>2</b>	<b>NEG / POS</b>	<b>POS</b>	<b>(NEG)</b>
<b>3</b>	<b>COLOR</b>	<b>ON</b>	<b>(OFF)</b>
<b>4</b>	<b>WB CONTROL</b>	<b>AUTO</b>	<b>(PUSH AUTO)</b>
<b>5</b>	<b>SHUTTER</b>	<b>1/10000</b>	
<b>6</b>	<b>CAMERA ID</b>	<b>123</b>	

<b>MENU</b>			
<b>7</b>	<b>ZOOM START</b>	<b>X1</b>	
<b>8</b>	<b>ZOOM STOP</b>	<b>X128</b>	
<b>9</b>	<b>BRIGHTNESS</b>	<b>24</b>	
<b>10</b>	<b>SHARPNESS</b>	<b>10</b>	
<b>11</b>	<b>FOCUS</b>	<b>AUTO</b>	<b>(PUSH AUTO)</b>
<b>12</b>	<b>INIT SET</b>	<b>OFF</b>	<b>(ON)</b>
		<b>END</b>	

Figure 13. Rear Panel



## 9.2.2.Using The MENU

### **Menu Mode**

In order to display the MENU on the screen, Press the MENU key. If you hold the MENU button over 2 seconds, the OSD will be switched off.

Menu mode will again be displayed when the Menu button is pressed.

### **Menu Item selection Mode**

Position Hand Mark to each ITEM you want to change by using Wide and Tele Keys.

Press the BLC (SET) button.

### **Menu Data Change Mode**

Press the TELE and WIDE key. Then the right side of selected ITEM will blink. Using Tele and Wide keys can change the values.

Press the BLC (SET) button.

Press the BLC (SET) key again to return to Mode (2).

### **To escape from Menu Mode:**

Press Menu key again in Mode (2).

Remarks: BLC (SET) Key Switches Menu Item selection Mode(2) and Menu Data change Mode(3).

### 9.2.3.MENU Description

#### **BACKLIGHT**

Use to change the BLC on/off

#### **NEG/POS**

Use to change NEGATIVE and POSITIVE mode.

ON: Negative Mode, OFF: Positive Mode.

#### **COLOR**

ON: Color Mode.

OFF: B/W (Monochrome Mode).

#### **WB CONTROL**

Use to change White Balance Mode.

- AUTO: WB Range 2800 °K ~ 8000 °K.

- PUSH AUTO: In this Mode you can adjust White balance by using PUSH AUTO Key.

#### **SHUTTER**

Use to change the Shutter Speed.

In default, AE mode acts automatically (28/8 steps control is available).

#### **CAMERA ID**

An Identification number can be assigned to each camera. And ID NOs can be displayed on Monitor to confirm each camera.

(000 ~ 255: total numbers of ID are 256) .

#### **ZOOM START**

Wide Zoom Area Start point allocation (1 ~128).

#### **ZOOM STOP**

Tele Zoom Area End point allocation (1 ~128).

#### **BRIGHTNESS**

Use to change the brightness level of scene (0 ~ 48).

#### **SHARPNESS**

Use to change the contour of scene (0 ~ 15)

#### **FOCUS**

Use to change Focus Mode.

- AUTO: Automatic focus

- MANUAL: Focusing is controlled by Far and Near Keys.

- PUSH AUTO: Automatic focus is activated while the button is depressed and stops when released.

#### **INIT SET**

Turn the initial mode ON, the changed data are renewed to manufacturer (default) settings. The data are initialized to its shipping condition)

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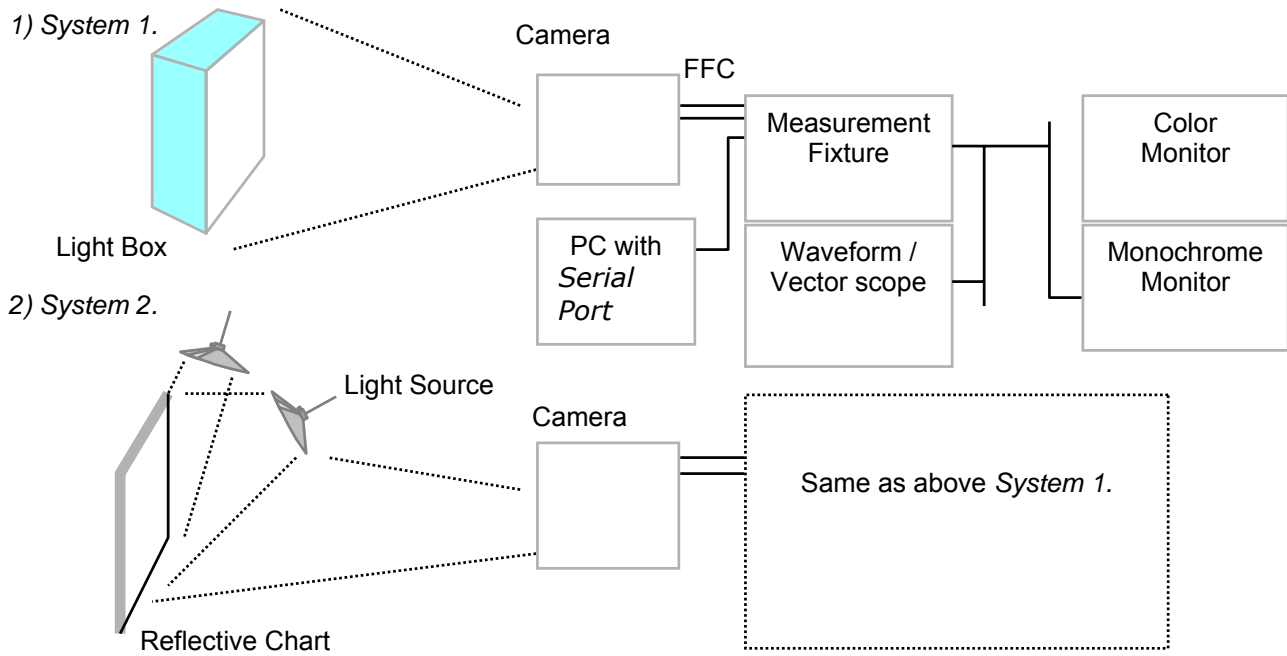
## 10. APPENDIX 2

### 10.1. Measurement Conditions

#### Standard Measurement Conditions

Supplied Voltage	DC 12V $\pm$ 0.5 V
Ambient Temperature	23°C
Humidity	60 % RH
Measurement Fixture	Video output, DC input, RS-232C level Convert ( 5Vpp -> 12Vpp)
Power Supply	12V $\pm$ 0.5 V
Color Monitor	CMM20 - 11, Shibasoku or Equivalent
Monochrome Monitor Waveform Monitor /	More than 800 TV Lines Horizontal Resolution
Vector Scope	1720A, Tektronix (NTSC / EIA) or Equivalent 1730A, Tektronix (PAL / CCIR) or Equivalent
S / N (Signal to Noise) Meter	VN31AX, Shibasoku (NTSC/PAL/EIA/CCIR) or Equivalent
Illumination Meter / Color Temperature Meter	XY-1 / CL-100, Minolta Camera or Equivalent
Light Box	Dai Nippon Printing Co. - Color Temperature 3200. K $\pm$ 100 . K - Illumination More than 2000 Lux
Test Charts	(Transparent Chart) Color Bar Chart, Dai Nippon Printing Co. Gray Scale Chart, Dai Nippon Printing Co. (Gamma 0.45) Resolution Chart, Dai Nippon Printing Co. (Reflective Chart) Gray Scale Chart, Murakami Color Research Lab
Light Source	Halogen Lamp (with Dimmer Switch) - Color Temperature 3200 ° K $\pm$ 100 ° K - Illumination Variable with Dimmer
Color Temperature Filter	LB 140, Hoya or Kenko or Equivalent (Color Temperature Conversion Filter)
Adjustment PC	With Serial Port 1 or 2
RS-232C Cable	Each Terminal Connector (D-Sub 9 Pin)

Figure 14. Measuring System

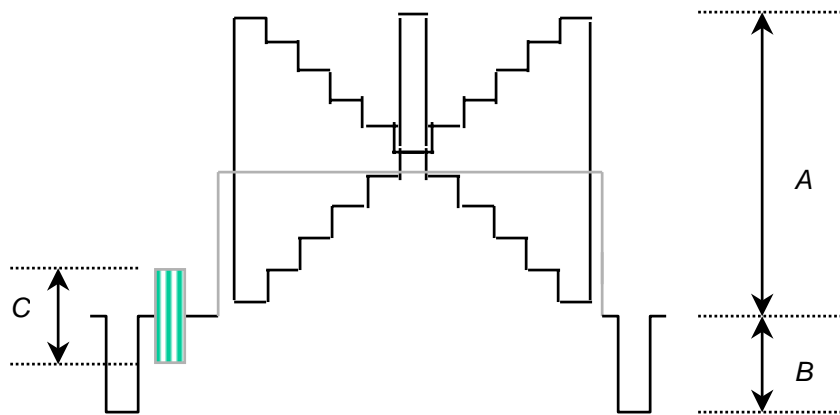


## 10.2. Measurement Procedure

### 10.2.1. Video Output Level

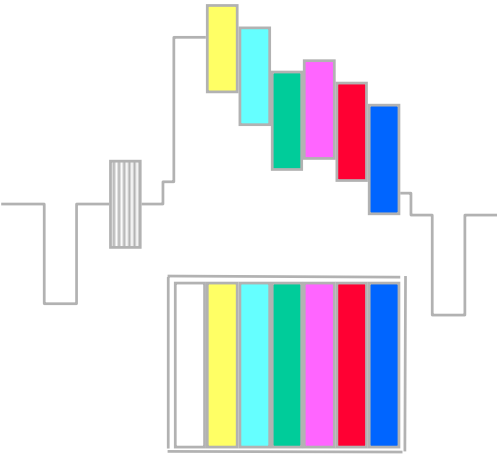
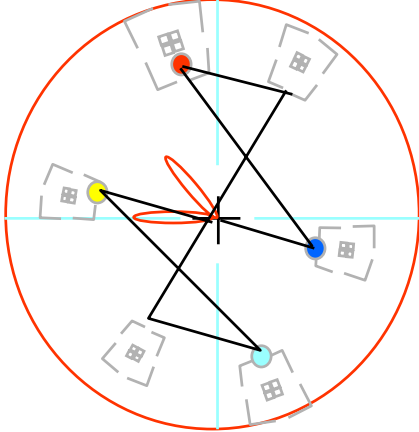
TEST CONDITIONS	Refer to " MEASUREMENT CONDITIONS"
MEASURING SYSEM	System 1.
PROCEDURE:	
1. Image the gray scale chart, and Zoom WIDE or TELE to completely fill the monitor with the target.	
2. Measure the video output level on the waveform monitor. Measure the SYNC and BURST level.)	

Figure 15. Video Output



SPECIFICATION:		
NTSC	Video Level A	100 ± 10 IRE
	Sync Level B	40 ± 5 IRE
	Burst Level C	40 ± 5 IRE
PAL	Video Level A	700 ± 70 mV
	Sync Level B	300 ± 35 mV
	Burst Level C	300 ± 35 mV

### 10.2.2. Color Reproduction

TEST CONDITIONS	Refer to "10.1. MEASUREMENT CONDITIONS"
MEASURING SYSTEM	System 1.
PROCEDURE:	
<p>1. Image the color bar chart, and Zoom WIDE or TELE completely fill the monitor with the target.</p> <p>2. Measure the color amplitude and color phase on the vector scope of Red, Blue, Yellow. (Before the above measurement, Adjust the burst amplitude and phase on the vectorscope so that the burst level becomes 100% and its phase becomes 180 ° (NTSC) (135 ° PAL)</p>	
 	
Figure 16. Video Output Waveform	Figure 17. Video Output Color Vector

SPECIFICATION:					
	COLOR	RED	BLUE	YELLOW	BURST
NTSC	Amplitude (%)	200 ± 40%	130 ± 40%	115 ± 40%	100%
	Phase (°)	103 ± 20 <sub>0</sub>	345 ± 20 <sub>0</sub>	170 ± 20 <sub>0</sub>	180 <sub>0</sub>
PAL	Amplitude (%)	200 ± 40%	130 ± 40%	115 ± 40%	100%
	Phase (°)	103 ± 20 <sub>0</sub>	345 ± 20 <sub>0</sub>	170 ± 20 <sub>0</sub>	135 <sub>0</sub>

### 10.3. Luminance S/N

TEST CONDITIONS	Refer to "10.1. MEASUREMENT CONDITIONS																		
MEASURING SYSTEM	System 1.																		
PROCEDURE:																			
<ol style="list-style-type: none"> <li>1. Image the light box, and zoom WIDE or TELE completely fill the monitor with the target.</li> <li>2. The noise meter settings are: <table style="margin-left: 40px; border: none;"> <tr> <td>Input level</td> <td>:</td> <td>Preset</td> </tr> <tr> <td>High Pass Filter</td> <td>:</td> <td>100KHz</td> </tr> <tr> <td>Low Pass Filter</td> <td>:</td> <td>4.2 MHz</td> </tr> <tr> <td>Sub-carrier Trap</td> <td>:</td> <td>On</td> </tr> <tr> <td>Weighting</td> <td>:</td> <td>On</td> </tr> <tr> <td>Sag &amp; Hue Comp.</td> <td>:</td> <td>Optimum</td> </tr> </table> </li> <li>3. Measure the maximum S/N on the noise meter.</li> </ol>		Input level	:	Preset	High Pass Filter	:	100KHz	Low Pass Filter	:	4.2 MHz	Sub-carrier Trap	:	On	Weighting	:	On	Sag & Hue Comp.	:	Optimum
Input level	:	Preset																	
High Pass Filter	:	100KHz																	
Low Pass Filter	:	4.2 MHz																	
Sub-carrier Trap	:	On																	
Weighting	:	On																	
Sag & Hue Comp.	:	Optimum																	
SPECIFICATION:																			
NTSC	: More than 48 dB																		
PAL	: More than 48 dB																		

### 10.4. Horizontal Resolution

TEST CONDITIONS	Refer to "10.1. MEASUREMENT CONDITIONS
MEASURING SYSTEM	System 1.
PROCEDURE:	
<ol style="list-style-type: none"> <li>1. Image the resolution chart, and Zoom WIDE or TELE completely fill the monitor with the target.</li> <li>2. Adjust the brightness and contrast of the B/W monitor so that each step of the gray scale target can be observed.</li> <li>3. Change the scan size of monitor to underscan.</li> <li>4. The reference arrows on the resolution chart are positioned at the edge of the underscanned picture.</li> <li>5. Change the scan size of monitor from underscan to overscan.</li> <li>6. Measure the maximum horizontal resolution on the picture.</li> </ol>	
SPECIFICATION:	
More than 480 TV Lines (High Resolution)	
More than 380 TV Lines (Normal Resolution)	

### 10.5. Low Luminance Sensitiity

TEST CONDITIONS	Refer to "10.1. MEASUREMENT CONDITIONS
MEASURING SYSTEM	System 1.
PROCEDURE:	
<ol style="list-style-type: none"> <li>1. Image the gray scale chart (reflective), and zoom to full WIDE view.</li> <li>2. Adjust the brightness of the light source using the dimmer switch of the light box so that the white peak level of the chart becomes 30 IRE (NTSC) (210mV, PAL) on the waveform monitor.</li> <li>3. Measure the level of illumination using the illumination meter.</li> </ol>	
SPECIFICATION:	
NTSC (HI)	: 1 Lux (30 IRE)
PAL (HI)	: 1 Lux (210 mV)
NTSC (Normal)	: 0.5 Lux (30 IRE)
PAL (Normal)	: 0.5 Lux (210 mV)

## 11. Contact

To contact Videology Imaging Solutions:

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Please also visit our WEB-site at:

<http://www.videologyinc.com/>

***Please note that data in this application note is subject to change without notification!***

*Videology Imaging Solutions Inc. is an ISO 9001 registered video camera developer and manufacturer serving security, industrial and machine vision, biometric and specialty OEM markets. The main facility is based in Greenville, Rhode Island, USA and Videology Imaging Solutions BV is located in Uden The Netherlands. The company designs, develops, manufactures and distributes video, image acquisition and display products.*

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