

# VIDEOLOGY

IMAGING SOLUTIONS INC.  
Original Equipment Manufacturer

## Application Note 20C11X/21C11X 20C11XUSB/21C11XUSB



20/21C11X



20/21C11XUSB

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## 1. Document History

Revision	Issue Date	Reason	CN#
Rev B	01-05-2015	Update on I2C and OSD options, clock diagram	15-0002
Rev A	11-17-2014	Initial release	14-0109

## 2. Product Features

### Provides analog (CVBS) and digital (BT.656) video output simultaneously

- Color Board Camera with 1/3" CMOS sensor (690TVL)
- Miniature rugged 22mm x 26mm single board
- Low 0.1 lux sensitivity
- Metal CS, M-12 and pinhole lens mounts
- Available as USB 2.0 camera via extension board
- Optional additional mini metal housings for available for e.g. ATMs and Kiosk applications

## 3. Introduction

This document is written to give technical background on this camera module, also all the connectors are being described in this application note.

The 2XC11X is a CMOS based camera family with an analog and digital output (CCIR656 based). The dimensions are 26\*22mm with 2 mounting holes.

Communication is possible via an OSD keyboard.

The digital output is described in chapter 6 of this document. Connections for the digital interface are available on a 30-pin board to board connector.

Examples of application PCB's are:

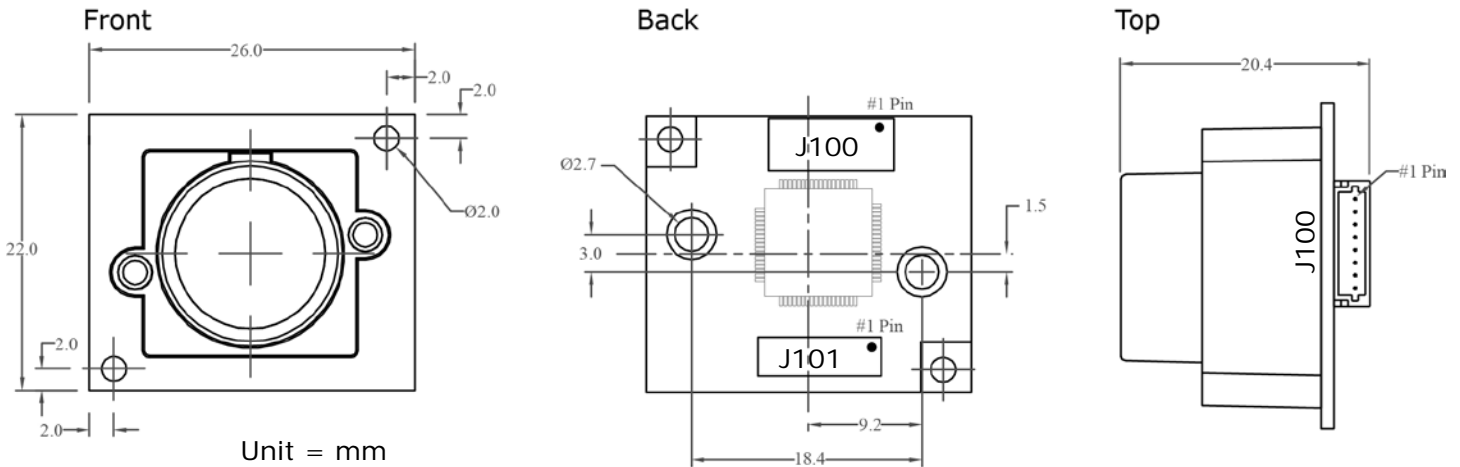
- USB 2.0 Board: Videology product that has the same small dimensions (22x26mm). When two boards are stacked together to complete the USB 2.0 camera.
- Interface to the 60SVMx, Videology's Ethernet server board.
- Customized application specific PCB.

## 4. Specifications

<b>Electrical</b>	<b>20C11X NTSC 21C11X PAL</b>	<b>20C11XUSB NTSC 21C11XUSB PAL</b>
Image sensor	1/3" CMOS	
Effective Pixels	756 x 504 (H x V)	
Pixel Size	6.35µm x 7µm	
Shutter Mode	Rolling	
Horizontal Resolution	690 TVL	
Aspect Ratio	4:3	
Sensitivity	<0.1 Lux color   <0.01 Lux B&W	
White Balance Range	2,000K - 11,000K	
Synchronization	Internal	
Iris	Manual	
Video Output	CVBS and BT.656	USB 2.0
Signal to Noise Ratio	50dB	
Supplied Voltage	5VDC – 12VDC	5VDC via USB bus
Power Consumption	<0.8W	<1.0W
<b>Controls</b>		
Scanning System	2:1 Interlace default	
Frame Rate	25/30fps	
White Balance Control	AWB (default)	
Day & Night	Auto (default)	
Image Flip	Default off	
Mirror Mode	Default off	
AGC Control	Auto (default)	
<b>Environmental</b>		
Operating Temp.	-10° ~ 50° Celsius (14°F ~ 122°F)	
Operating Humidity	30% ~ 90% RH	
Storage Temp.	-30° ~ 80° Celsius (-22°F ~ 176°F)	
Storage Humidity	< 85% RH	
<b>Mechanical</b>		
Dimensions WxHxD (w/ M-12 lens mount)	26mm x 22mm x 20.4mm	26mm x 22mm x 30.9mm
Weight	13.5g (w/ M-12 lens mount)	17g (w/ M-12 lens mount)
Lens mount	Replace "X" in model number with desired lens mount: 2: Metal pinhole lens mount 5: Metal M12 board lens mount 7: No lens mount 8: Metal CS lens mount	
<b>Accessories</b>		
Included Cable (2XC11X only)	60C1041	6.89in (175mm) 8-pin JST with flying leads
Optional USB Cables (2XC11XUSB only)	60C1147	10ft (3.048m) USB mini (B) to USB (A)
	60C1062	8ft (2.4384m) 6-pin JST to USB (A)
	Other cable length options are available. Please contact a Videology Sales Rep. for details	

## 5. Connectors / Interface

### 5.1. 20C11X / 21C11X



Connectors			
J100	70CN0061	JST-SM08B-SRSS-TB	CONN JST 8 PIN 1MM HOR SMD
J101	70CN0303	JST-30P4.0-JMCS-G-TF	CONN JST 30 PIN 4MM 0,5MM PITCH BTB SMD

Connector J100	
Pin #	Pin name
1	OSDC
2	GND
3	DO NOT USE
4	DO NOT USE
5	DO NOT USE
6	Video
7	GND
8	Vin

Connector J101					
Pin #	Pin name	Pin #	Pin name	Pin #	Pin name
1	GND	11	YUV4	21	IRIS OUT (analog)
2	GND	12		22	GND
3	YUV0	13	YUV5	23	HSYNC
4		14		24	VSYNC
5	YUV1	15	YUV6	25	
6		16		26	
7	YUV2	17	YUV7	27	DO NOT USE
8		18		28	DO NOT USE
9	YUV3	19	CLOCK	29	CVBS OUT (analog)
10		20		30	POWER IN

Connector J100 is the main connector for operating the analog camera. Via the optional cable (60C0510), the camera can be powered. Single sided CVBS video-out is available on this connector as well.

The OSD can be controlled by applying various pull-down resistor values to the OSDC pin. A keyboard, supplied with the 60C2-O cable kit, provides this function.

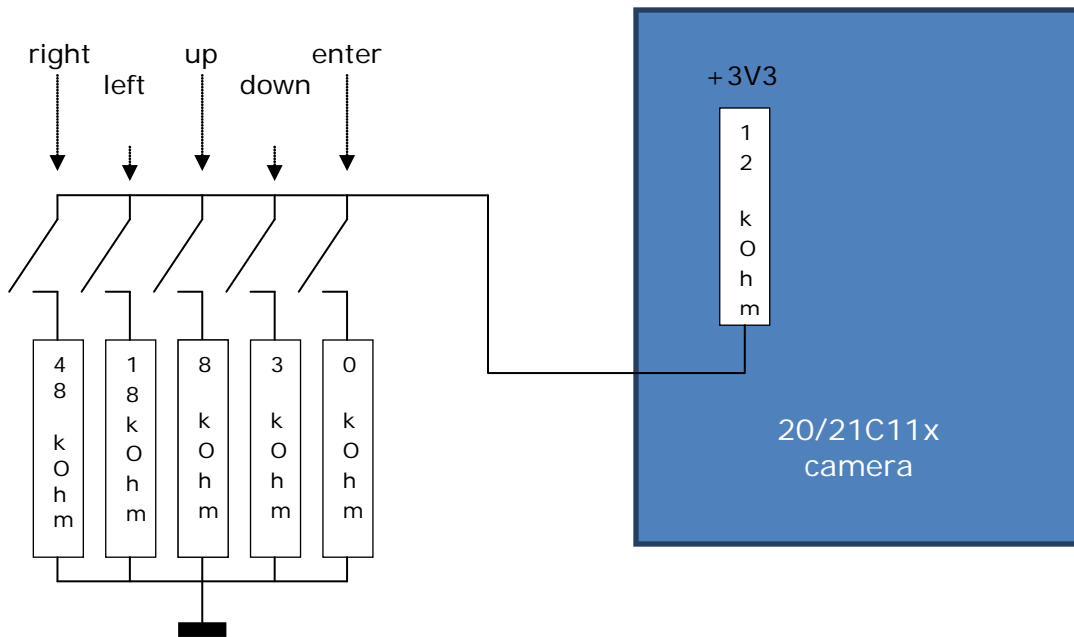
Instead of using the Videology keyboard, the function can be easily embedded in the application, since the OSDC pin is a single wire input.

Inside the camera board, this connection has a pull up resistor of 12kOhm to the +3V3. By means of externally connecting the OSDC pin via resistors of different values to ground, the following button functions are created:

- Resistor of 0 kOhm: enter/return button
- Resistor of 3 kOhm: down button
- Resistor of 8 kOhm: up button
- Resistor of 18 kOhm: left button
- Resistor of 48 kOhm: right button

To enter the OSD menu press the enter/return button till the OSD menu appears on the screen.

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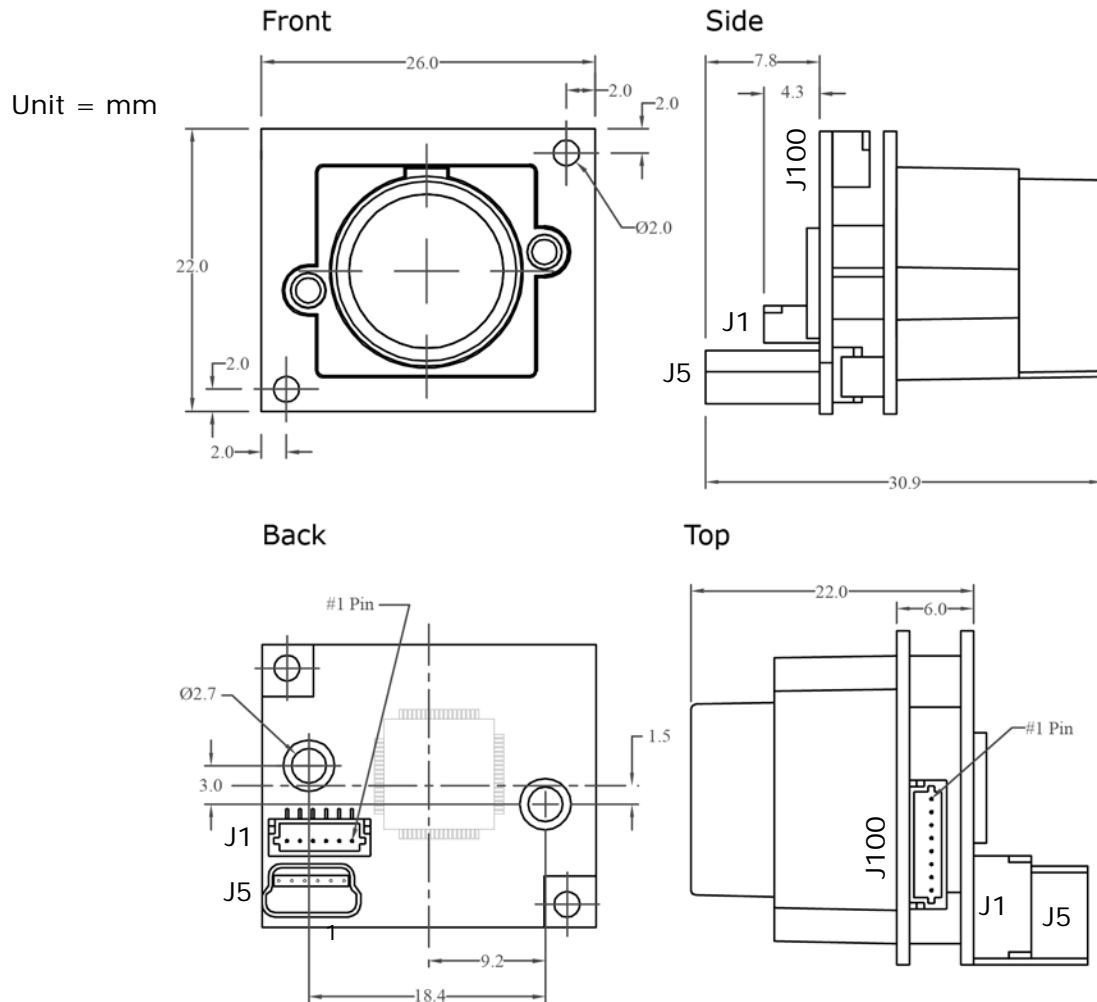
The selectable menu items are described in chapter 7.

Connector J101 is the digital output connector. In the 20C11xUSB and 21C11xUSB camera, this connector is used to connect the optional Videology USB board, see chapter 5.2. 20C11XUSB / 20C11XUSB.

## 5.2. 20C11XUSB / 20C11XUSB

When the camera is extended with the USB interface, the analog connector J100 is still available.

The camera is operational via the USB connector J1 or J5. The pinning of those connectors is shown below (M12 mount 20C115USB / 20C115USB versions):



Connector J100	
Pin #	Pin name
1	OSDC
2	GND
3	DO NOT USE
4	DO NOT USE
5	DO NOT USE
6	Video
7	GND
8	Vin

Connector J1	
Pin #	Pin name
1	+5VDC
2	DATA -
3	DATA +
4	GND
5	GND
6	GND

Connector J5	
Pin name	Pin #
1	+5VDC
2	DATA -
3	DATA +
4	GND
5	GND
6	GND

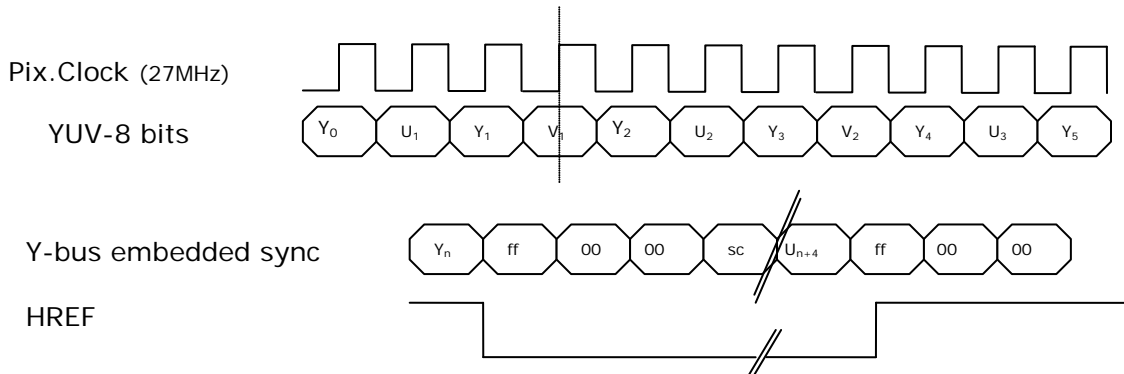


## 6. Digital Interface

The camera is meant to be used as a digital output camera. Besides the digital output, the camera also provides a CVBS output (NTSC in 60Hz and PAL in 50 Hz mode). This analog output is only to be used as quick review since it will have aspect ratio distortion (the 16:9 format is cropped into 4:3).

### 6.1. BT.656

The BT.656 standard has one bus of 8 bits.



The digital Y-bus uses the values of 0xff and 0x00 to indicate the start of the embedded sync code. At the moment the value 0xff is detected followed by two times 0x00 the system knows that the next data is the sync code.

The sync code data is build up as:

1	Field	Vblank	Hblank	P3	P2	P1	P0
---	-------	--------	--------	----	----	----	----

VBlank is 1 during the vertical blanking and HBlank is 1 during the horizontal blanking. So more or less reversed with HREF and VREF.

Data should be clocked in on the positive edge of the pixel clock.

Timing data clock				
item	min	nominal	max	Unit
Freq pixel clock	26.997	27.000	27.003	MHz
Clock period	37.033	37.037	37.041	nS
Clock Duty cycle	40	50	60	%
Min Data hold after rising clock edge	3			nS
Data change time			3	nS

## 7. Videology USB 2.0 Viewer

The 20C11XUSB / 20C11XUSB camera can be viewed via the Videology USB viewer. This viewer can be downloaded from [videologyinc.com](http://videologyinc.com) (under Products -> Viewer Drivers & Updates). The viewer function for this camera is embedded in the SFT-07019 viewer software.

For instructions on how to use the software, refer to the software manual ([INS-07019.pdf](#)) which is downloadable from the same webpage.

## 8. On Screen Display (O.S.D.)

### 8.1. OSD menu

By means of the push buttons on the OSD board, the following menu appears on the screen:

#### SETUP

```
→ EXPO.
  → WDR                OFF - L - M - H
  → LENS              FIX - IRIS
  → AGC               [ZOOM 1, 2, 3, 4][OFF, X4, X8, X16, X32, X64, X96, X128]
  → RETURN
→ WB
  → MODE              [AUTO, 2000K, 3000K, 4000K, 5000K, 6000K, 7000K, 8000K,
                      9000K, 10000K]
  → RETURN
→ D&N
  → MODE              [SMART, COLOR, B&W, AUTO]
  → D → N LEVEL      [1, 2, 3, 4, 5]
  → N → D LEVEL      [1, 2, 3, 4, 5]
  → RETURN
→ FUNC.
  → BRIGHTNESS        .....
  → CONTRAST          .....
  → SHARPNESS         .....
  → COLOR GAIN        .....
  → NR                LEVEL [1, 2, 3]
  → MIRROR             [NONE, H, V, HV]
  → LANGUAGE           [ENGLISH]
  → ENGINEER SETUP    [SET]
                      → SYNC                [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
                      → BURST               [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
                      → PEDESTAL            [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
                      → WHITE              [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
                      → OSD COLOR          [WHITE, YELLOW, RED]
                      → OSD BG             [ON, OFF]
                      → RETURN
                      → EXIT
  → RETURN
→ RESET
  → FACTORY MODE      [YES, NO]
→ EXIT
  → SAVE & EXIT
```

## 8.2. OSD Hardware Kit

To control the OSD, a dedicated board is available with 5 push buttons, which can be connected to the cable as shown below. This board and the cable are part of the OSD Kit 60C2-O.

60C2-O Kit

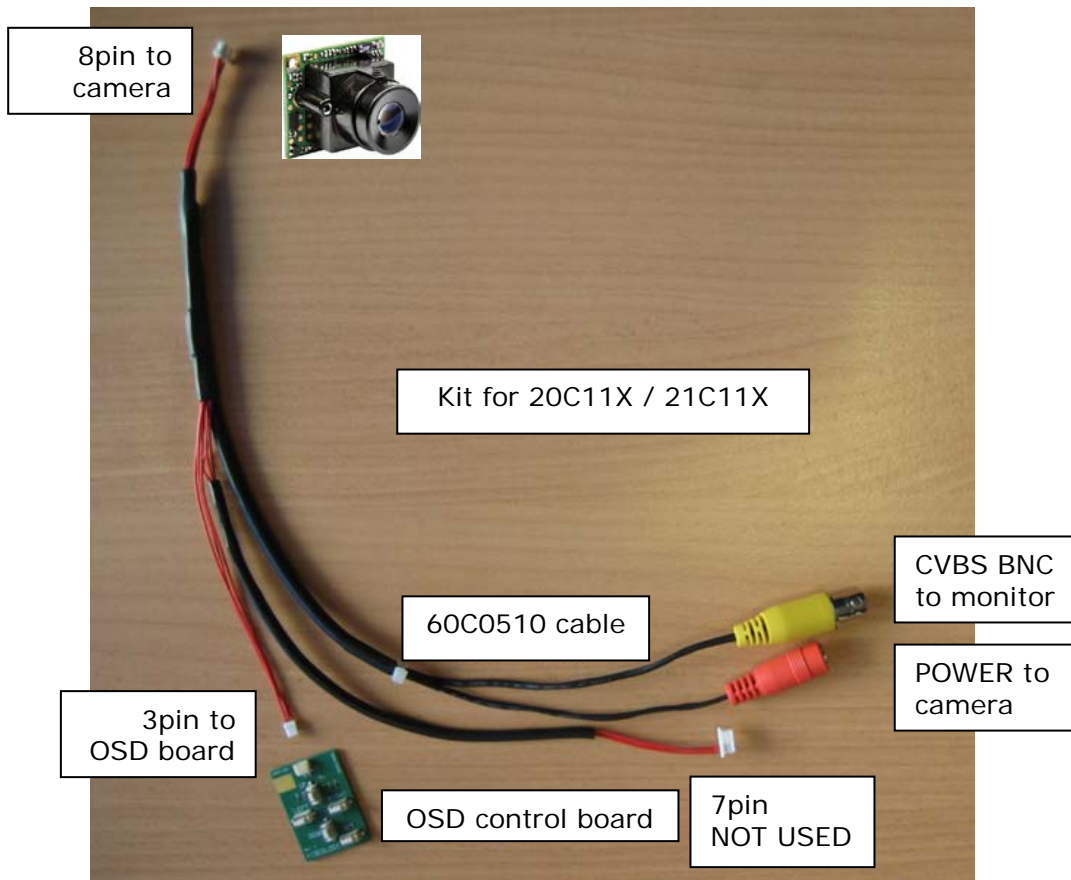


72V0281 OSD control board



60C0510 OSD Cable

3pin to OSD Board  
 7pin not used  
 8pin to camera  
 CVBS video (yellow) BNC to monitor  
 5V-12VDC (red) power to camera



## 9. Contact Information

For technical assistance with this product, please contact the supplier from whom the product was purchased.

For OEM inquiries, contact Videology® Imaging Solutions:

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