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# Multistandard Video Capture Devices

Models 2464/3364

Hardware Manual

Ver. 1.1.0 | November 2019

SENSORAY | embedded electronics |



Designed and manufactured in the U.S.A

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## Limited warranty

Sensoray Company, Incorporated (Sensoray) warrants the hardware to be free from defects in material and workmanship and perform to applicable published Sensoray specifications for two years from the date of shipment to purchaser. Sensoray will, at its option, repair or replace equipment that proves to be defective during the warranty period. This warranty includes parts and labor.

The warranty provided herein does not cover equipment subjected to abuse, misuse, accident, alteration, neglect, or unauthorized repair or installation. Sensoray shall have the right of final determination as to the existence and cause of defect.

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# Introduction

Models 2464/3364 capture video from an SDI, DVI, VGA or component source. Model 2464 has Ethernet interface, whereas model 3364 has a USB 3.0 interface. Model 3364 captures uncompressed HD/SD video and will overlay and compress resolutions up to 1080p30. It can simultaneously send both compressed and uncompressed video to the host computer. Model 2464 captures compressed video and sends it over the Ethernet in several different formats.

Analog audio can be captured from a microphone or line source using an optional 3364TA accessory board. Audio may be sent uncompressed, or it may be compressed and multiplexed into a transport stream along with compressed video, or both simultaneously.

The 3364 is a UVC (USB Video Class) device, which means it does not require a device-specific driver and can be easily controlled using popular video APIs such as DirectShow and Video4Linux. Sensoray provides Software Development Kits (SDKs) for several operating systems to accelerate application development. Our fully functional demo program illustrates model 3364's capabilities and serves as an excellent starting point for custom designs.

The video processor implements efficient H.264 video compression, producing output data formatted as either MPEG transport stream (MPEG-TS) or in MP4 or AVI file formats. Audio compression is performed using AAC-LC. The stream multiplexer employs high precision hardware timestamps to ensure perfect audio-video sync on players. Snapshot capture is also supported, with MJPEG compression available for both snapshots and AVI streams.

For video resolutions up to 1080p30, the 3364 can pass through unaltered or downsized video while adding Unicode text and graphical overlays (which may be uploaded in real time via USB). Audio pass-through is available with an optional, attached 3364TA board. Embedded audio can also be extracted from SDI signal.

The units have one input and one output video connector. Depending on the model number, both connectors are either DVI or SDI. DVI models can capture video from a DVI, VGA or component video source (with appropriate adaptors), and output DVI. SDI models accept SDI signals per SMPTE 259M(C), SMPTE 292M, and SMPTE 424M.

Models 2464 and 3364 are available as bare boards or in a robust metal enclosure.

# System Requirements

For model 3364 a computer with native USB 3.0 port is recommended. PCIe USB 3.0 extension cards may not provide bandwidth sufficient for 1080p30 video.

Supported operating systems:

Windows 7, 8, 10;

Linux 2.6, 3.x, 4.x.

Model 2464 requires a 100Base-TX Ethernet connection. Power-over-Ethernet (POE) is supported, as well as an external 5V power supply. The default Ethernet address is 192.168.24.64, net mask 255.255.0.0.

# Block Diagrams

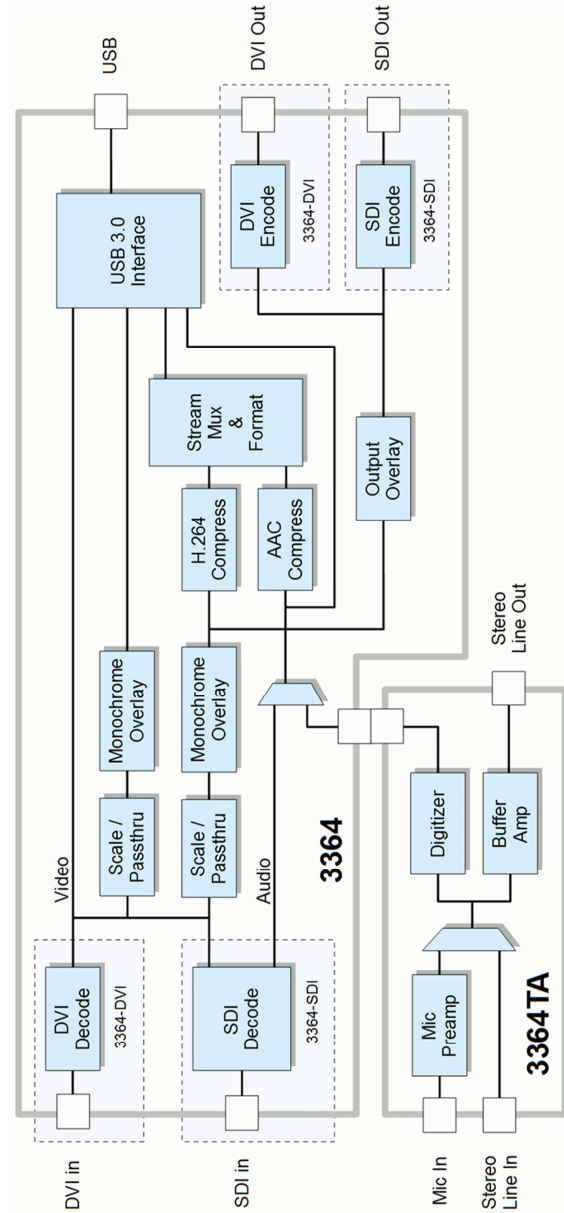


Fig.1. Model 3364 block diagram.

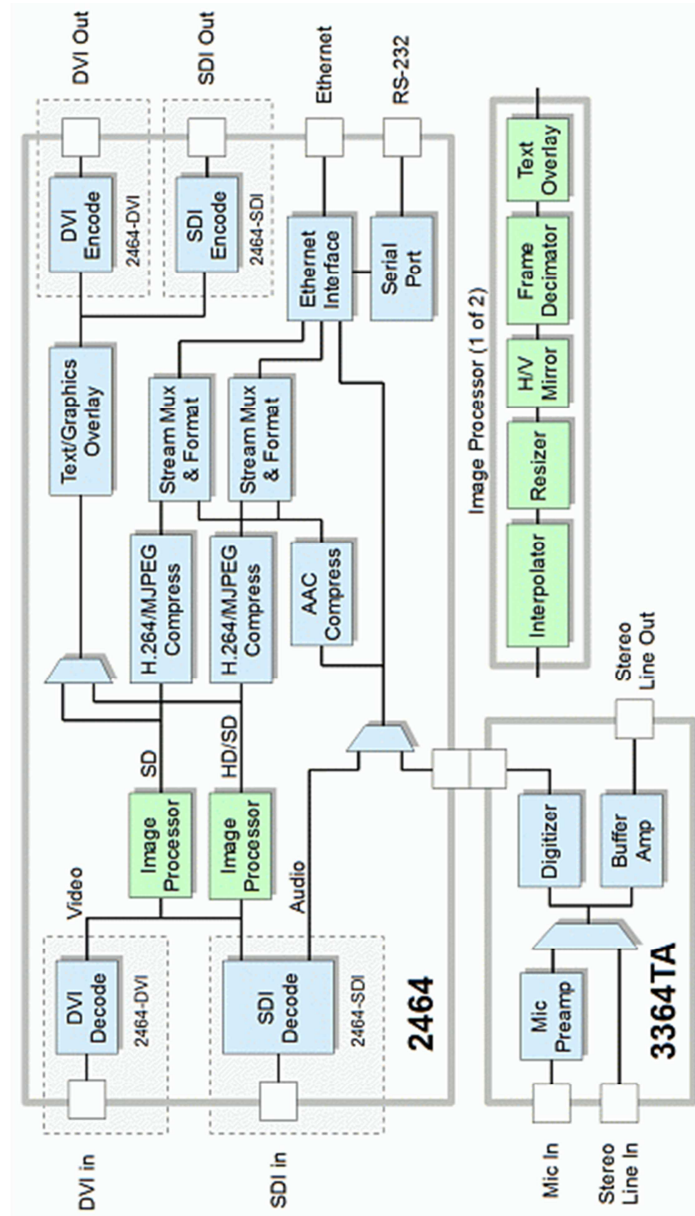
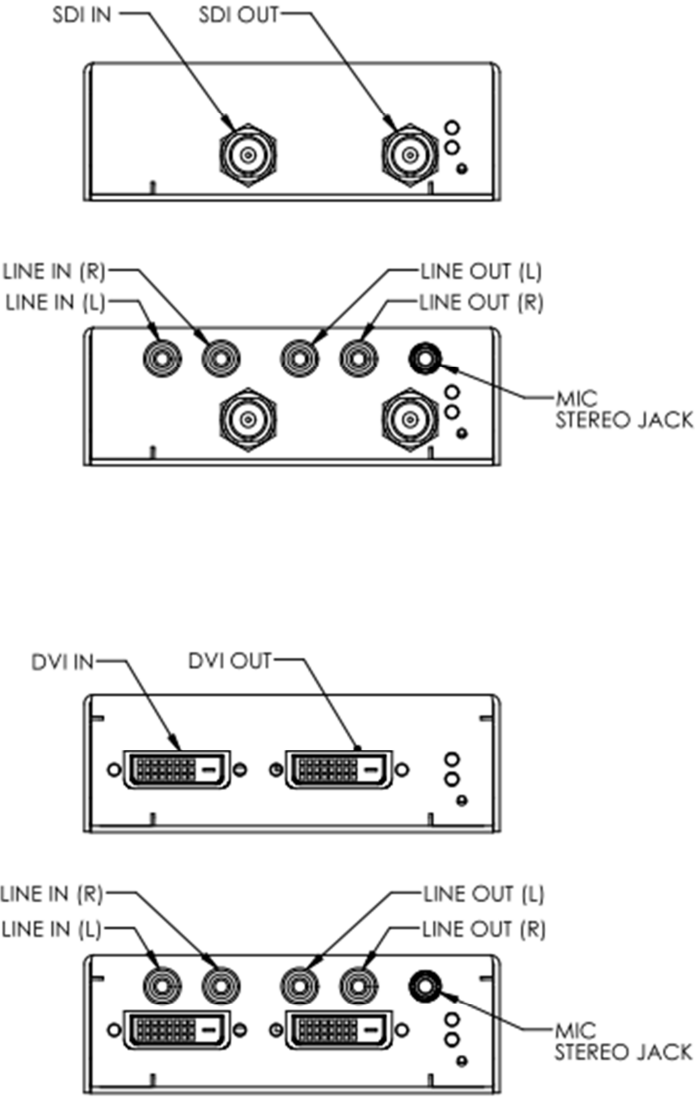


Fig.2. Model 2464 block diagram.

# Connectors



Input/output connectors for SDI and DVI versions, with and without optional audio board (3364TA).



# Specifications

## ***SDI option***

Video Input/Output	
Data rates	270 Mbps, 1.483 Gbps, 1.485 Gbps, 2.97 Gbps
Standards	SMPTE 259M(C), SMPTE 292M, SMPTE 424M
Maximum resolution/frame rate	1920x1080p30 (uncompressed, 3364 only) 1920x1080p30 (compressed)
Connectors	BNC, 75 Ohm
Output video streams	
H.264	High Profile @ Level 3 (MP4, AVI, transport stream)
JPEG	Single snapshots, AVI
Raw (uncompressed)	UYVY (3364 only, full resolution at full frame rate available with USB 3.0-capable hosts only)
Electrical, mechanical and environmental	
Dimensions	71x100 mm (PCB outline, does not include connectors)
Mass	40 g (without an enclosure)
Operating temperature	0° to 70° C
Non-operating temperature	-40° to 85° C
Humidity	5 to 95% RH, non-condensing
Interface	
3364	USB 3.0, USB 3.0 micro B connector
2464	100 Base-TX Ethernet, RJ-45
Power	
3364	USB bus powered
2464	5 V power supply or POE

## **DVI option**

<b>Video Input/Output</b>	
Input resolutions/frame rates (DVI, VGA, component, composite)	720x480i60 720x576i50 1280x720 at p30, p25, p60, p50 1920x1080 at i60, i50, p30, p25, p24 1920x1200p30 1680x1050p30 1600x1200p30, 1600x900p30
Output resolutions/frame rates (DVI)	720x480p59.94 720x576p50 1280x720p30, p50, p60 1920x1080i50, i60 1920x1080p24, p25, p30
Maximum resolution/frame rate	1920x1080p30 (uncompressed, 3364 only) 1920x1080p30 (compressed)
Connectors	BNC, 75 Ohm
<b>Output video streams</b>	
H.264	High Profile @ Level 3 (MP4, AVI, transport stream)
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Power	
3364	USB bus powered
2464	5 V power supply or POE

## Recommended adaptors

DVI to VGA: Dynex DX-D1114, or similar. The following pins of the DVI connector carry VGA signals:

Pin	Signal
25	Red
26	Green
27	Blue
28	Hsync
8	Vsync
3,11,15,19, 22,29,30,32	Ground

DVI to component: Monoprice DVI-I-3-RCA adaptor/cable, or similar. The following pins of the DVI connector carry component signals:

Pin	Signal
25	Red
26	Green
27	Blue
3,11,15,19, 22,29,30,32	Ground

DVI to composite: composite input is taken from the RED channel signal (pin 25 of the DVI connector; ground is pins 29, 30).

## **Analog Audio Accessory Board**

Analog audio can be captured and played back (along with the video) with the help of an accessory board, model 3364TA. It is available separately, or as part of an enclosed version, DVI or SDI.

Audio embedded in the SDI signal can be extracted as well.

# Software

Software (Windows and Linux)	
Driver	UVC video
SDK	Library wrappers around the DirectShow (Windows) or V4L2 (Linux) APIs

# Firmware updates

Both models 2464 and 3364 feature flash memory that contains the firmware used to operate the hardware on the device. This firmware can be updated in the field to fix problems or add new features.

## ***Model 3364 firmware update***

Firmware can be updated by selecting an Update option in the demo application or by calling the corresponding SDK function. Upon those actions the device reconnects as a USB mass storage device with the name Update2263. (If the AutoPlay menu appears, choose the “Open folder to view files option”). In this mode, a new firmware file (s2363.fw provided by Sensoray) may be copied to the Update2263 folder. While the file is being written to the flash memory, the red LED blinks. Do not unplug the device while the red LED is blinking. After the update is complete, the Update2263 folder is closed, and the 3364 reconnects as a UVC device. To cancel the update mode without updating firmware, right click the Update2263 removable device in Computer and click Eject. In the unlikely event that a firmware update was interrupted in a way that prevents the device from operating, an original firmware mode (Safe Boot mode) is available. To enter Safe Boot mode, press and hold the button through the hole below the indicator LEDs while connecting the USB cable. The red LED will illuminate, indicating the original firmware has entered firmware update mode and a new firmware image may be applied. After the procedure is complete, in order to switch to the newly updated firmware, the power needs to be cycled by disconnecting and reconnecting the USB cable.

## ***Model 2464 firmware update***

The firmware update is initiated using web interface. That requires a computer, located on the same network as the 2464. Using any browser connect to the 2464, and select Firmware Update, which will bring up the window that displays the versions of the device's firmware components and the serial number. To update the firmware, choose the file (s2464.fw provided by Sensoray) and press Submit. The firmware update should take about 30 seconds to complete. Do not unplug the device while the firmware update is in process. If a firmware update is interrupted, the device will attempt to load from a backup firmware image. During the update the red LED flashes and update status is displayed in the Firmware Status field of the web page. If the update has completed successfully a message “Firmware result: ok” is displayed in a pop-up window. All

device settings are preserved across the firmware update. To reset the all parameters on the device, click the Reset Parameters button. That will reset the network settings as well, but the change to those will take effect only after the power is cycled. This allows setting an IP address different from the default (192.168.24.64) even after parameters reset, if necessary.

# Setting (resetting) IP address

Depending on the network restrictions one or two steps may be necessary to set a new IP address. If the network used to configure the unit can not access 192.168.x.x IP address range, start with Step 1, otherwise go directly to Step 2. Same procedures can be used to set an IP address in case the current one is not available.

## **Step 1 - Setting up a temporary IP address**

This step is only necessary if the network used to configure the unit can not access the default IP address (192.168.24.64). In this case the unit must be switched into the Configuration Mode which allows setting up a *temporary* IP address accessible from the current network. The temporary IP address should be selected such that it is:

1. accessible on the network;
2. is not already used by any other device on the same network.

First, run ARP on the computer that is connected to the same network with the following command line:

```
arp -s <temporary_address> 08-00-56-ff-ff-ff
```

Please use colons (:) instead of dashes (-) in MAC address on Linux systems.

For example,

```
arp -s 10.135.1.61 08-00-56-ff-ff-ff
```

In Windows either navigate to Start/Run and type the command line in the "Open" box, or start a Command Prompt window and type the command line followed by Enter.

In Linux type the command line in the terminal window at the shell prompt followed by Enter. Please use colons (:) instead of dashes (-) in MAC address.

Note: it is recommended to use a temporary IP address that is different from the target permanent address to be assigned to the unit.

Now switch the 2464 into the Configuration Mode by pressing the configuration button. The red LED starts blinking.



Note: you need to wait 15 seconds after the 2464 is powered up before the board is able to switch to Configuration Mode.

Once the 2464 receives a network packet addressed to it, the temporary IP address will be in effect. To send a packet either ping the board or connect to it with a browser. Using an IP address from the example, either run

```
ping 10.135.1.61
```

or type `http://10.135.1.61` into the address bar of your browser

on the computer connected to the same network as the 2464. Once the temporary address is enabled the red LED will blink fast several times and go off.

Once the unit is accessible using a temporary IP address, the standard Web page procedure (Step 2) can be used to set up the desired permanent IP address and other settings.

## ***Step 2 – Setting up a permanent IP address***

Connect to the unit with a Web browser by typing the unit's temporary IP address in the address field.

Example:

```
http://10.135.1.61
```

Once the Main Menu page is displayed, select Admin/Network.

Type in the desired permanent IP address and subnet mask values into corresponding fields. Please note that there are 2 static configurations available. Make sure that the one that you need is selected in the "Network mode" list-box before clicking on Submit. Now the unit's new IP address is set. The browser redirects to the new address automatically.

## Revision history

Version	Notes
1.1.0, November 2019	Added section on 2464 IP address setting/resetting.
1.0.3, October 2019	Added relative humidity spec.
1.0.2, October 2019	Added non-operating temperature spec.
1.0.1, April 2019	Maximum uncompressed capture frame rate edited.
1.0.0, July 2017	Initial release.