RM-2350W-HD

HD/SD-SDI 3-Screen Audio/Video Monitor

User Guide

Part Number 821193, Revision C

Wohler CONFIDENCE.

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This document is intended to be printed on a duplex printer, such that the copy appears on both sides of each page. This ensures that all new chapters start on a right-facing page.

This document looks best when printed on a color printer since some images may be indistinct when printed on a black and white printer.

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RM-2350W-HD User Guide

Introduction

Overview

The 2U rack-mounted RM-2350W-HD sets a new standard in LCD monitors for broadcast and professional video applications. It provides 800 x 480 resolution, TFT screens, and supports full digital signal processing: HD/SD-SDI and analog composite video standards. All video formats are scaled to fit on screen in the highest quality using precision scaling and gamma correction to produce the best images available.

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Safety Instructions

1. Read, keep, and follow all of these instructions; heed all warnings.
2. Do not use this equipment near water.
3. Use only a dry cloth to clean the equipment.
4. Do not block any ventilation openings. Install only in accordance with the instructions in the section entitled, "Installation Recommendations" on page 3.
5. Do not install near any heat source such as a radiator, heat register, amplifier, or stove.
6. Do not expose the equipment to rain or moisture.
7. Do not attempt to plug the unit into a two-blade outlet (with only two prongs of equal width).

IMPORTANT: By design, these monitors will only plug into a three-prong outlet for your safety. If the plug does not fit into your outlet, contact an electrician to replace the obsolete outlet.

8. Protect the power cord from being walked on or pinched, particularly at plug's source on the equipment and at the socket.
9. Use only the attachments/accessories specified by the manufacturer.
10. Unplug the equipment during lightning storms or when unused for long periods of time.
11. Refer all servicing to qualified service personnel. Servicing will be required under all of the following conditions:
    - The equipment has been damaged in any way, such as when the power-supply cord or plug is damaged.
    - Liquid had been spilled or objects have fallen onto the equipment.
    - The equipment has been exposed to rain or moisture.
    - The equipment does not operate normally.
    - The equipment has been dropped.

Installation Recommendations

Mounting

The unit is designed to install into a standard 19″ rack. The unit should be mounted at approximately ear level for optimum frequency response and at eye level for optimum visual observation. The rack ears allow tilting for best viewing from higher or lower positions.

Heat Dissipation

No special physical mounting considerations are necessary regarding heat dissipation except under adverse conditions, provided the ambient temperature inside the mounting enclosure does not exceed 40°C (104°F). Adjacent devices can be rack mounted (or stacked) in proximity to the unit. If the temperature is above 40°C, allow a 1RU (1.75”/44.45mm) space above and below the unit for air circulation.

Power

Connect the power adapter output plug (12VDC) to the DC IN jack. Secure it to the cable retention bracket with a twist tie for support.

Connect the IEC320-C13 AC inlet of power adapter to your AC mains receptacle using an approved grounded cord.

The power buttons for each screen on the front panel light continuously when ready. The buttons flash when saving power in stand-by mode.

Compliance

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial

environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

ICES-003

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Features

The RM-2350W-HD audio/video monitor is designed for confidence monitoring of HD/SD-SDI and composite video broadcast signal (CVBS) video sources. Input signals are automatically detected and accommodated. Up to eight of the sixteen audio channels embedded in an HD/SD-SDI bit stream or external analog audio may be selected for visual monitoring on eight on-screen bar graph style level meters. Left and right speakers and headphone jack allow audible stereo monitoring of the left/right channels.

Each of the three high-resolution LCD screens display high definition at 16:9 aspect ratio or standard definition video at either 4:3 or 16:9 aspect ratio. Parameters are selected and adjusted using an On Screen Display (OSD) MENU. One function button may be programmed as a hot key for quick parameter settings. A DB9 connector serves as the interface to the three tally lights on the front panel.

Additional overlays can be added by the operator for Safe Area and Safe title markers, center mark, time code, and display name (for 16:9 aspect only). Time code is derived from embedded HD/SD-SDI source.

The slim and light weight design provides three screens in a very compact rack-size (2RU) while the chassis only has 2.25 inches of depth.

The feature-rich RM-2350W-HD provides all of the following:

- Three LCDs, 5.0" diagonal each
- Selectable 16:9 or 4:3 screen aspects for on screen video
- Rack mount mechanical design with vertical tilt
- Three multi-rate inputs (one per screen) accepting composite (CVBS) or HD/SD-SDI video with re-clocked outputs of the HD/SD-SDI input on BNC connectors
- Audio demux and display for up to eight channels from the sixteen embedded in the HD/SDI-SDI source
- Monitoring of embedded audio through stereo front panel speakers or stereo headphones
- Visually monitor audio levels on meters assignable to any channel
- Level meters can display VU, PPM (PK) or both with assignable -20db to -18db reference level
- Two RS-485 I/O on RJ-45 connectors
- Local control (via menu operation) for all functions including:
  - Blue gun as mono
  - Safe area
  - Safe title
  - Center markers
  - H/V delay
  - Monochrome display mode
  - Over/underscan
  - Display of input format
  - Display of input time code and up to 10 characters of user-defined text
  - Time code and text position in top or bottom of screen
  - Red/green/yellow/white text color
  - Built in color bars 75% full field

- User defined configuration
- Auto sets at power up
- Waveform monitor/vectorscope monitor

- User defined hot key functionality provides any of the following:
  - H/V delay toggle through functions
  - Underscan toggle on/off
  - On Screen Display (OSD) on/off
  - Color bar on/off
  - Audio monitor display on/off
  - Area marker toggle

Specifications

The specifications of the RM-2350W-HD are listed below.

Table 1–1 RM-2350W-HD Specifications

Specification	Domain Range
Number of Screens	3
Display	5.0″ diagonal
Aspect Ratios	4:3 or 16:9
Viewing Angles	170°H x 170°V
Screen Colors	16.7M
Resolution (Dots, H x V)	800 x 480
Dot Pitch (H x V, mm)	0.135 x 0.135
Contrast Ratio	600:1
Pixel Response (ms)	<25ms typical
Dimensions (W x H x D)	19″ x 3.5″ x 2.7″ (482 x 88 x 69 mm)
Power Consumption	12VDC/10 watts (3.8 Amps max) CE & UL power supply
Operating Temperature	0°C (32°F) to 40°C (104°F)
Video Format	NTSC/PAL auto recognition

Table 1–1 RM-2350W-HD Specifications

Specification	Domain Range
Inputs	• HD/SD-SDI, Analog Composite (1 BNC per LCD Screen) • Analog Audio (2 RCA per LCD screen) • 1 RS-485 on RJ-45
Outputs	• HD/SD-SDI Re-clocked output (1 BNC per LCD Screen) • Analog Audio (2 RCA per LCD screen) • 1 RS-485 on RJ-45
Space Required	2 rack units of an EIA-19 standard equipment rack
Supplied Accessories	AC power adapter

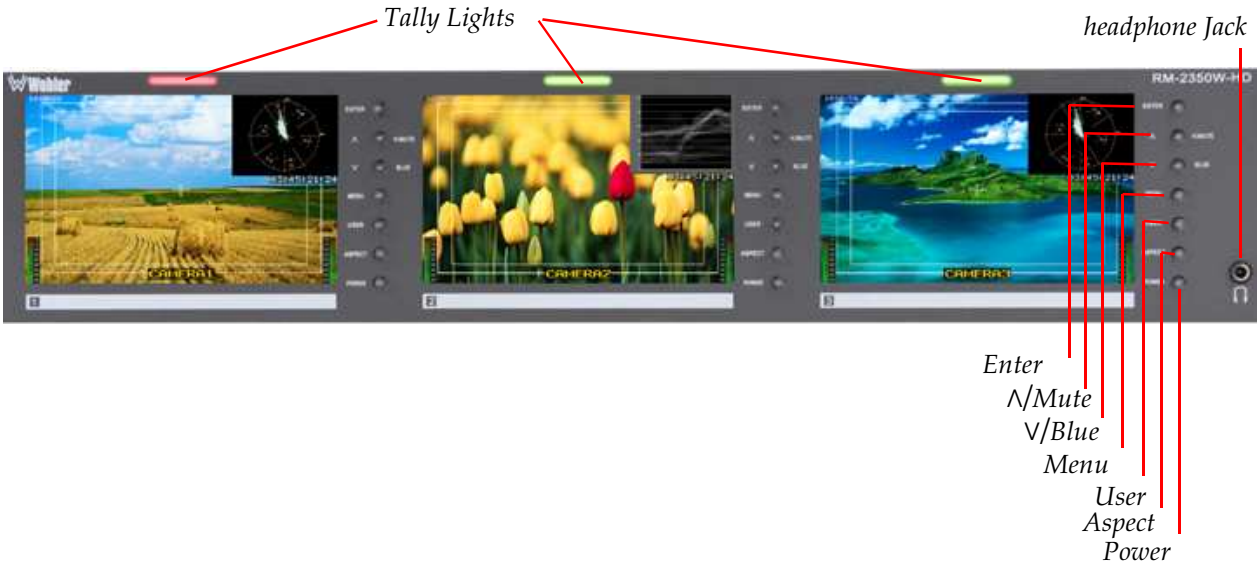
Note: All of the specifications listed above are subject to change without notice.

Front Panel Controls

The front panel feature descriptions refer to the image below.

- **Tally Lights**: These tri-color (red/green/amber) lights are controlled through a DB9 connector on the rear of the panel. For more information about the DB9 connector, refer to "Rear Panel Connectors" on page 10.
- **LCD Screen:** The LCD screens display the video image, overlays and menus.
- **Speakers:** Eight of 16 channels of de-embedded audio or one pair of analog inputs per screen may be selected for monitoring through the right speaker or stereo headphones.
- **Headphone Jack:** Monitor the assigned left/right stereo audio channels with stereo headphones from this mini-stereo connector. The speaker will mute when the headphones are plugged in.

Figure 1–1 RM-2350W-HD Front Panel



- **Enter:** When the OSD MENU is displayed, pressing this button enters items and accepts selections in the OSD MENU. Otherwise, it acts as a quick menu for VOLUME and screen adjustments in conjunction with the ∧ and ∨ buttons.

- **Mute or** ∧: When the OSD MENU is not active, this button is used to select the audio source for monitoring through the headphones. Press this button on whichever LCD section you wish to audibly monitor, and the green LED will light to indicate your selection. Pressing it a second time will mute the audio. Subsequent presses will toggle the mute off and on. The green LED flickers to indicate the mute is on. When the OSD MENU is active, this button serves as the up (∧) navigation button in the menu.

- **Blue or** ∨**:** When the OSD MENU is not active, pressing this button toggles between three settings: blue monochromatic, grey scale monochromatic, and full color. When the OSD MENU is active, this button serves as the down (∨) navigation button in the menu.

- **Menu:** Pressing the **Menu** button displays the OSD (On-Screen Display) MENU. Refer to "Using the OSD Menu" on page 11 for more information.

- **User:** The **User** button is programmable as a hot key for parameter adjustments. Refer to "Programming the Hot Key Buttons" on page 17 for more information.

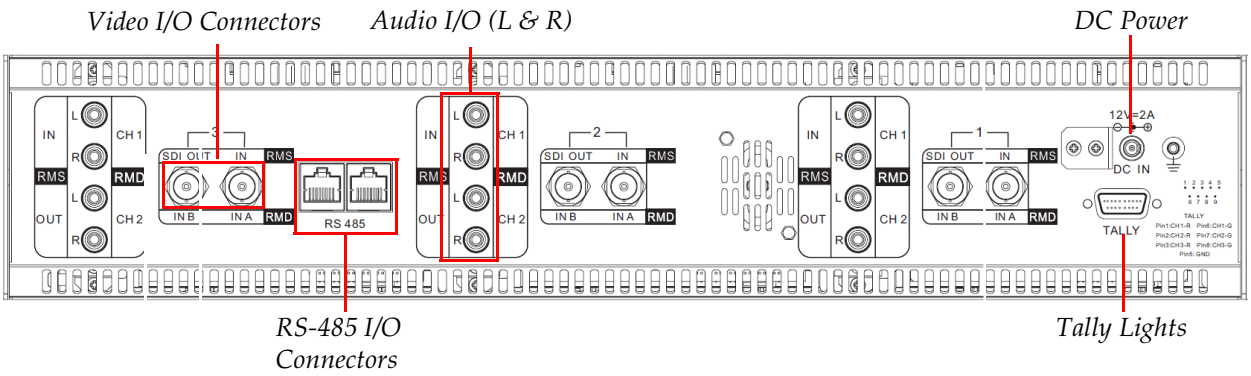
- **Aspect:** The **Aspect** button toggles the aspect ratio between 4:3 and 16:9 for the associated LCD screen when the input signal is SD-SDI. HD-SDI images are always 16:9 and are not be affected by the Aspect switch.

- **Power:** Each of the three **Power** buttons turn the associated LCD screen on and off; the LED glows green to indicate on. When the indicator above the power switch is green then the unit is receiving power. When the indicator is flashing, the unit is in stand-by mode.

Rear Panel Connectors

The rear panel feature descriptions refer to the following image.

Figure 1–2 RM-2350W-HD Rear Panel (Ignore all *RMD* Markings)



- **Video Input Connector**: This auto-detecting, input connector accepts HD/SD-SDI or analog CVBS video signals. The inputs comply with SMPTE259M, SMPTE292M/ITU-R BT601. Composite video inputs comply with SMPTE-170M.

- **HD/SD-SDI Output Connector:** The system re-shapes and re-clocks an HD/SD-SDI signal before outputting it to this female BNC connector.

- **RS-485 I/O (on RJ-45)**: These two ports are used for system software upgrades and dynamic UMD controls.

Figure 1–3 RS-485 I/O Pin Out

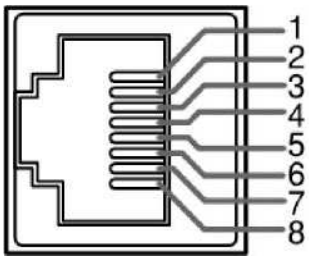


Table 1–2 RS-485 Pin Out

Pin	RS485 In terminal	RS485 Out Terminal
1, 2	GND	GND
3	Tx-	Tx-
4	Rx+	Rx+
5	Rx-	Rx-
6	Tx+	Tx+
7, 8	NC	NC

- **Analog Audio Input:** Input terminal for the analog audio signal. **L:** left audio channel; **R:** right audio channel.
- **Analog Audio Output:** Input terminal for the analog audio signal. **L:** left audio channel; **R:** right audio channel.
- **Tally Interface Connector:** This DB9 connector controls the tally lights on the front panel. Refer to Figure 1–4 below for the pin out.

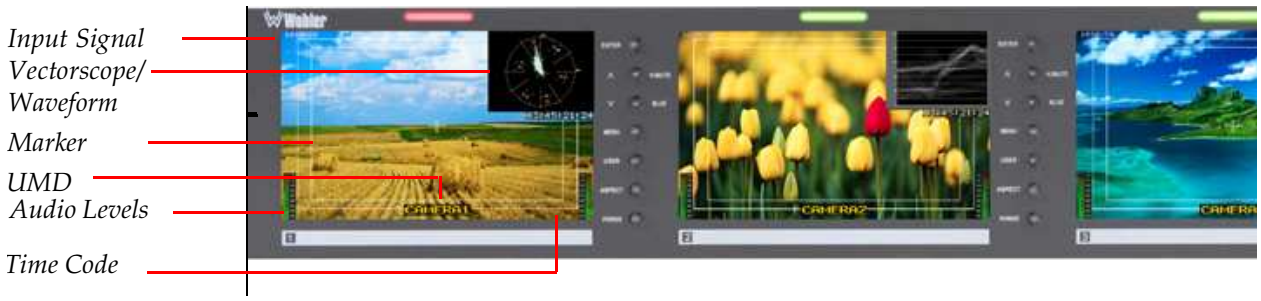
Figure 1–4 Rear Panel DB9 Connector Pin Out

- **Power Connector:** To provide power to the unit, attach the supplied 12VDC power supply to this connector.

On-Screen Display Features

Some of the buttons and OSD Menu control the display of features on the screen as shown in Figure 1–5 below.

Figure 1–5 Display Features



- **Input Signal:** STD DISP in the **OSD Menu** determines when the video signal type is displayed. AUTO displays briefly after changes occur.
- **Audio Levels:** Levels for the selected eight of 16 audio channels de-embedded from an HD/SD or analog pair source are displayed on eight meters (four pair). Four meters on the left side and four on the right.
- **UMD:** The OSD Menu provides settings to customize the UMD (User-Modifiable Data) text area to show a line of characters, numbers, and some symbols.
- **Time Code:** The de-embedded time code from the HD/SD-SDI source displays in the bottom right corner.

Using the OSD Menu

A description of how to use the OSD MENU follows. Also refer to Table 1–3 on page 13 below for typical values and domain ranges.

1. Press the **Menu** button to display the menu.

   Note: If you do not press another button for approximately 60 seconds, the menu will disappear from the screen.

2. Us the **Up** and **Down** buttons to navigate through the seven sub-menu icons. The sub-menus are:

   A. STATUS (No configurable options)

   A. VIDEO

   B. AUDIO

   C. MARKER

   D. OSD

   E. USER CONTROL

   F. USER CONFIG

3. Press the **Enter** button to enter the parameter selections in the chosen sub-menu.

4. Use the **Up** or **Down** buttons to cycle through the sub-menu selections.

5. When the desired option is highlighted, press the **Enter** button to select it.

6. Use the **Up** or **Down** buttons to adjust the parameter value up or down, make a selection, or turn a function on or off.

7. Press the **Menu** button to back out of a parameter or sub-menu. Press the **Menu** button again to remove the menu from the screen.

Table 1–3 OSD Menu Structure

Menu	Parameters	Default Value	Domain Range
STATUS	FORMAT	N/A	Not configurable, signal dependent
	COLOR TEMP	D65	
	MON SOURCE	N/A	
	SCAN	UNDER SCAN	
	SD ASPECT	4:3	
	MODEL	RM-2350W-HD	
VIDEO	BRIGHTNESS	000	-116 to 139
	CONTRAST		-128 TO 127
	SATURATION		-128 TO 127
	SHARPNESS		0 TO 15
	HUE		-32 TO 31
	RESET	YES	Loads system defaults
	COLOR TEMP	D65	D65, D56, OR D93
	R GAIN	128	0 to 255
	G GAIN		
	B GAIN		
	R OFFSET		
	G OFFSET		
	B OFFSET		
	RESET	YES	Loads system defaults
AUDIO	AUDIO MON	OFF	ON or OFF; toggles audio enable between the two monitors, (i.e., enabling the ON selection on one turns the other OFF).
	MON SOURCE	MET 1	Metered pair for speakers/ headphones • MET 1, • MET 2, • MET 3, OR • MET 4
	VOLUME	-30db	-30 db to 0 db

Table 1–3 OSD Menu Structure (Continued)

Menu	Parameters	Default Value	Domain Range
AUDIO (Continued)	METER SIZE	SMALL	Not configurable, signal dependent
	METER H POS L	000	000 to 255, number of pixels in from the edge
	METER H POS R		
	TEST LEV	-20 DB	-20DB or -18DB
	IN A:MET 1	VU+PK	• VU, • PK, • VU+PK, OR • NONE
	IN A:MET 2		
	IN A:MET 3		
	IN A:MET 4		
	IN A:MET 1-L	CH 1	• EDB1 through EDB16, • EXT1L, • EXT1R through EXT4L, • EXT4R
	IN A:MET 1-R	CH 2	
	IN A:MET 2-L	CH 3	
	IN A:MET 2-R	CH 4	
	IN A:MET 3-L	CH 5	
	IN A:MET 3-R	CH 6	
	IN A:MET 4-L	CH 7	
	IN A:MET 4-R	CH 8	
MARKER	SAFE MARKER	OFF	ON or OFF; If SAFE MARKER is set to OFF, none of the other options on this menu are configurable.
	CENTER		ON or OFF
	90%		
	80%		
	AREA		• 2.35:1, • 1.85:1, • 15:9, • 14:9, • 13:9, • 4:3, or • OFF
OSD	STD DISP	OFF	• AUTO OFF, • ON, or • OFF

Table 1–3 OSD Menu Structure (Continued)

Menu	Parameters	Default Value	Domain Range
OSD (Continued)	WFM/VT DISP		• VECTOR, • WFM, or • OFF
	TC DISP		ON or OFF
	UMD DISP		
	OSD TLY DISP	On	
	OSD TLY MODE	RGY	• RG, • GR, or • RGY
	LED TLY DISP	On	ON or OFF
	UMD FIXED SET UP		
	—	N/A	A user-definable input string of up to 16 alphanumeric characters (also includes some symbols)
	COLOR	WHITE	• RED, • GREEN, • YELLOW, or • WHITE
	ALIGN	CENTER	LEFT, CENTER, or RIGHT
	UMD PROTOCOL		
	—		• LOCAL, • IMAGE VIDEO, • TSL V4.0, or • TSL V3.1,
	UMD ID	000	000 through 255 (TSL uses 128 to 255)
	UMD NAME (S/N)		
	—	N/A	A user-definable input string of up to 16 alphanumeric characters (also includes some symbols)
	UMD TLY MODE	T1T2	• T2, • T1, • T2T1-, or • T1T2-

Table 1–3 OSD Menu Structure (Continued)

Menu	Parameters	Default Value	Domain Range
OSD (Continued)	**UMD BAUD RATE**		
	—	N/A	• 2400, • 4800, • 9600, • 19200, • 38400, • 57600, or • 115200
	TALLY SOURCE		
	—	N/A	• STANDARD, • TSL, • STANDARD+IV422, • IMAGE VIDEO 422, or • IMAGE VIDEO HW
USER CONTROL	SCAN	NORMAL	NORMAL or UNDER SCAN
	SD ASPECT	4:3	4:3 or 16:9
	H/V DELAY	OFF	• OFF, • H, • V, or • H/V
	COLOR BAR	DISABLE	DISABLE or “ON”
USER CONFIG	VECTOR REF	75% CB	75% CB or 100% CB
	OSD CONTROL	ON	ON or OFF
	WFM/VT MODE	SOLID	• SOLID, • 75%, • 50%, or • 25%

Table 1–3 OSD Menu Structure (Continued)

Menu	Parameters	Default Value	Domain Range
USER CONFIG (Continued)	USER	SCAN	• SCAN, • HD ZOOM • MON SOURCE, • OSD CONTROL, • AREA MARKER, • SAFE MARKER, • WFM DISPLAY, or • H/V DELAY

Programming the Hot Key Buttons

The Enter Button

When the **OSD Menu** is not displayed, you can press the **Enter** button to quickly adjust the following parameters:

1. VOLUME: This option regulates the volume from -30db to 0db.
2. BRIGHTNESS: This option regulates the video brightness from -116 to 139, where 0 is the typical value.
3. CONTRAST: This option regulates the image contrast from -128 to 127, where 0 is the typical value.
4. SATURATION: This option regulates the color saturation of the image from -128 to 127, where 0 is the typical value.
5. SHARPNESS: This option regulates the sharpness of the image from 0 to 15, where 0 is the typical value.
6. HUE: This option regulates the hue of the image from -32 to 31, where 0 is the typical value.

Note: By selecting the DEFAULT option in the CONFIG sub-menu, you can reset the parameters of the BRIGHTNESS, CONTRAST, SATURATION, SHARPNESS, and HUE options to zero (0).

The User Button

You can use the **User** as a hot key. Assigning a parameter to this button allows that parameter to be displayed and adjusted on-screen at the press of the button without displaying and navigating through the OSD MENU. To program the hot key:

1. Press the **Menu** button.
2. Use the **Up** and **Down** buttons to find the USER CONFIG sub-menu and press the **Enter** button to select it.
3. Use the **Up** and **Down** buttons to cycle to the USER selection and press the **Enter** button to select it.
4. Use the **Up** and **Down** buttons to select the following eight parameters. Press the **Menu** button to exit the sub-menu. (Refer to Table 1–3 starting on page 13 for the domain range for each of these parameters.)
   - SCAN
   - HD ZOOM
   - AUDIO SOURCE
   - OSD CONTROL
   - AREA MARKER
   - SAFE MARKER
   - WFM DISPLAY/VECT DISPLAY
   - H/V DELAY

Technical Functional Overview

Figure 1–6 on page 19 illustrates the overall functionality of the RM-2350W-HD.

Figure 1–6 Block Diagram