



## LV5900A

### WAVEFORM MONITOR



9-inch full HD panel  
4U : 223 (W) × 172 (H) × 360 (D) mm

## General

The LV5900A waveform monitor supports SMPTE ST 2082-12, which is used to receive 7680(8192)x4320 / 59.94P YCBCR10bit 8K video via 12G-SDI QUAD LINK. As the LV5900A supports not only 8K but also a 4k input and four simultaneous HD inputs, you can use it as a high-end 8K monitor and switch between other formats as needed.

The waveform, vector, picture, and eye pattern displays enable easy measurement and quality control of video signals. The status display allows you to confirm system stability with comprehensive event logs and long-term charts.

## Features

### Unmatched ease of use

- Dedicated buttons and knobs for simple operation.
- Optional control with USB mouse
- 9-inch full HD panel with touch operation

### Wide range of 2K/4K/8K Formats

- 12G/6G/3G/HD-SDI single link
- 6G-SDI dual link
- 3G-SDI dual link and quad link
- HD-SDI quad link
- 12G-SDI dual link and quad link(8K)
- 8K Square Division ( 4 x 4K )

### Comprehensive Transmission Quality Monitoring

- External sync phase difference display
- Lip sync measurement
- SDI signal frequency deviation measurement
- Equivalent cable length meter
- Ancillary data analysis

### Video Monitoring

- Full suite of displays
  - waveform display
  - vector display
  - picture display
  - 5-bar display
  - CIE chromaticity, and more
- Quality control (QoE) functions
  - Freeze error
  - Black error
  - Gamut error

### Audio Monitoring

MADI audio and Embedded SDI Audio

- Level meter
- Lissajous
- Surround (8K is not supported.)
- Loudness
- Mute
- Clip error detection, etc.

### Eye Pattern

- HD-SDI to 12G-SDI support
- Eye pattern available for each of 4 SDI inputs
- Automatic eye measurement
- Jitter display
- Histogram

### Closed Caption Decode

- CEA-608
- CEA-708
- Japanese closed captions
- Teletext
- OP47 Subtitles

### Timing Characteristics vs External Sync

The phase difference and synchronization states of SDI video signals are shown graphically versus the external reference sync signal to identify any link timing issue.

### Customizable Layout

Waveforms, vector, picture, etc. can be laid out freely (in both size and location) of your choice to match the monitoring need.

### SDI Signal Generation Function

- HD-SDI to 12G-SDI support
- 8K video format support

### HDR

ITU-R BT.2100 (HLG, PQ), S-Log3, C-Log, Log-C

Precise level control is possible based on the estimated display brightness (Nits) using the OOTF.

### Focus Assist

The LV5900A offers a new focusing algorithm based on nonlinear super-resolution technology. This makes accurate focus evaluation possible, even for difficult low-contrast, high resolution frames.



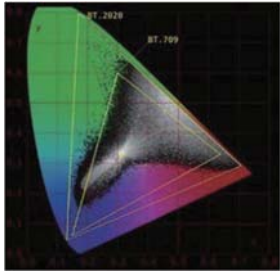
### Video Analysis

A comprehensive selection of displays are available for monitoring video signals including waveform, vector, picture, 5bar gamut, and CIE chromaticity diagram mapping. In addition, automated quality control (QoE) alerts include freeze error, black error, and gamut error detection functions. Detected errors can be recorded in event logs.

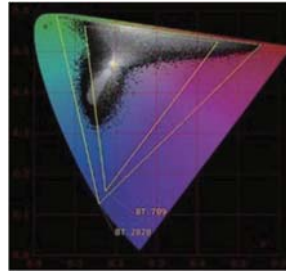
### CIE Chart

The LV5900A features a chromaticity display that supports ITU-R BT.709 and ITU-R BT.2020 colorimetry. The display mode conforms to CIE 1931 (xy diagram) and CIE1976 (u'v' diagram). Because the CIE chart display can display two color areas, it can be used to reduce the color within the BT.709 color area or confirm the contents exceeding the BT.709 color area by using equipment that conforms to BT.2020. For the color display, chromaticity points are displayed by using colors that are contained in video signals (or are available on the picture). Chromaticity points can be measured at each point with the cursor.

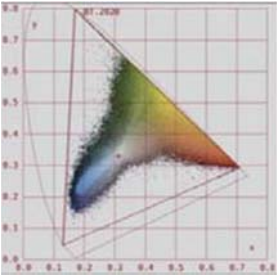
xy chromaticity coordinate display



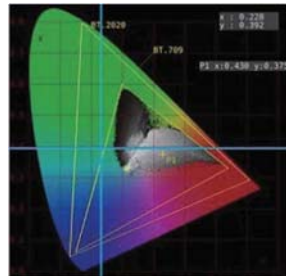
u'v' chromaticity coordinate display



xy coordinate color indication

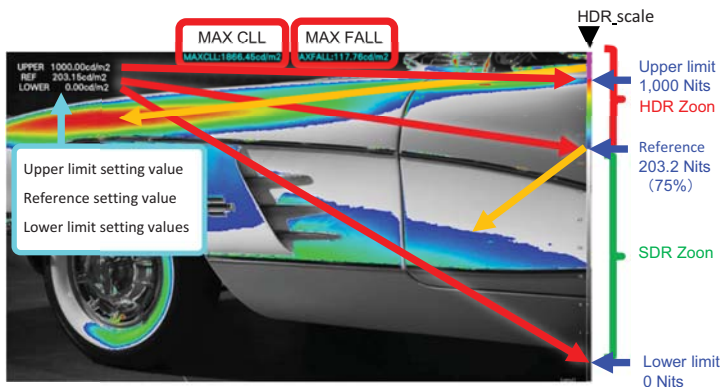


A light blue is a measurement function cursor



### HDR

Level monitoring of HDR signals includes support for S-Log3, HLG, and PQ as specified in ITU-R BT.2100, and level management at an assumed luminance (Nits) on the display with OOTF is possible. The HDR scale is added to the IRE scale and, for the CineZone display, the luminance distribution in HDR and SDR can be easily evaluated.

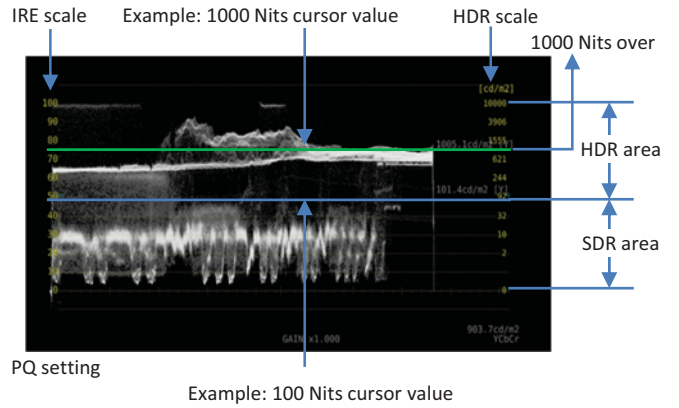


The SDR part is rendered monochrome, the HDR region is colored according to luminance.

Content above an upper limit value is colored magenta.

The upper limit value, the reference value, and the lower limit value can be varied.

### HDR waveform display



### HDR Pixel Measurement

A crosshair cursor can be used to evaluate up to three points in an image simultaneously.



PQ setting

P1(S: 884,L: 261)3243.6cd/m2

HLG setting SYSTEM GAMMA OFF

P1(S: 884,L: 261) 623.9%

HLG setting System Gamma On

P1(S: 884,L: 261) 456.1cd/m2

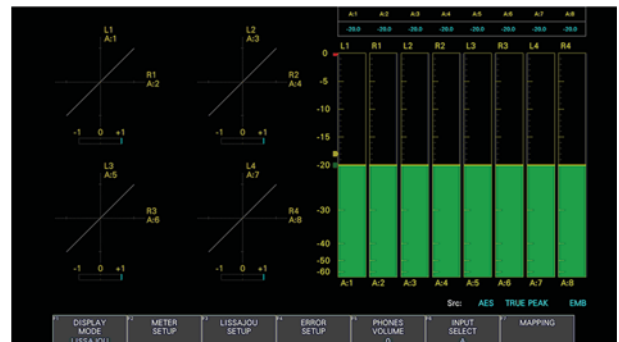
S-Log3 setting System Gamma Off

P1(S: 884,L: 261) 809.1%

### Audio Analysis Function

For audio embedded in SDI, or for discrete MAD1 input, level meter, Lissajous, surround display (8K not supported), loudness, mute, clip error detection, and other audio tools are available. Detected errors can be recorded in event logs.

Audio display



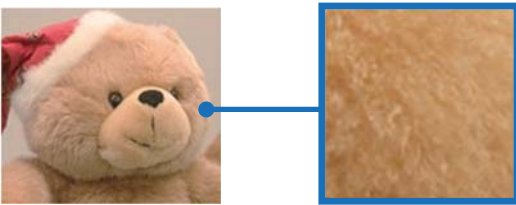
### Focus Assist

The LV5900A offers a unique tool to quickly identify focal issues in low-contrast, high-pixel count images. A proprietary algorithm provides visual cues to help achieve focus in these difficult conditions.

Focus assist display



After focus adjustment  
(The green part is the focus adjustment point )

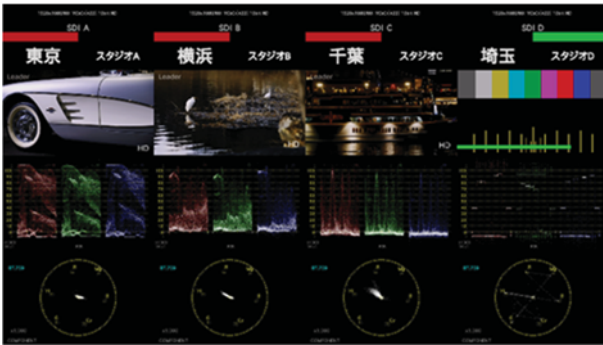


Enlarged view (After focus adjustment)

### ID / Iris / Tally Display

Display camera ID, and tally information received via Serial RS-422/485 ports. Remote connectivity is also supported.

ID/Iris/Tally Display



### SDI Signal Generator

The built-in SDI signal generator supports HD-SDI to 12G-SDI signals. Patterns include HD multi-format color bars, 4K multi-format color bars (simple pattern), and flat field patterns with selectable levels. Overlay of a moving graphic and embedded audio are also supported. To qualify the pull-in margin of receivers in 4K quad-link systems, the phase of each link can be controlled.

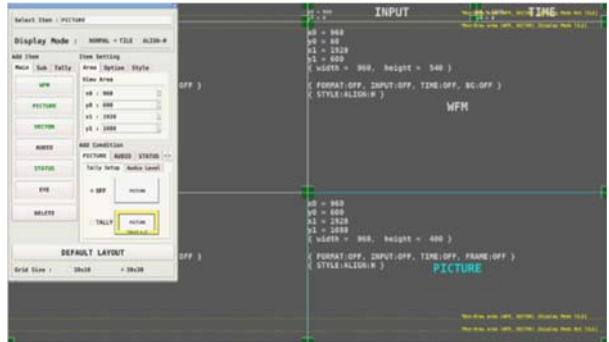
Sample patterns: 100% color bar, 75% color bar, HD multi-format color bar, 4K multi-format color bar, color luster, gamma, cross hatch, 10-step, limit lamp, check field, lip sync pattern, HDR color bar.

### Customizable Layout

Unique to Leader products, the user can fully customize the screen layout to match the monitoring situation. Waveform, vector, picture, etc. can be sized and arranged in nearly any position.

Multiple input signals up to four inputs can be displayed simultaneously, and one single input signal can be displayed in multiple windows.

Customized layout setting screen



Layout Set measurement screen



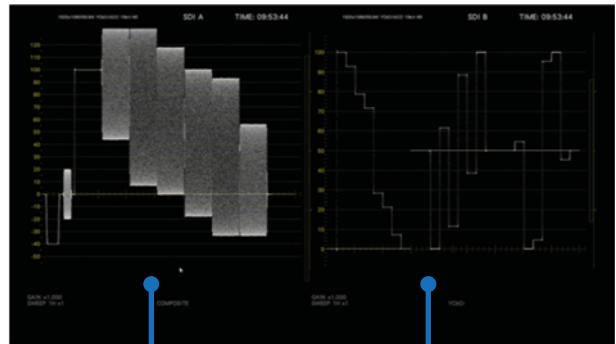
### Simultaneous Display

SDI input signals from the four rear inputs can be assigned to any of the A to D display channels. By allocating one SDI input signal to multiple display channels, it is possible to monitor video signals in multiple display formats. For example, SDI input 1 can be rendered as composite video on display channel A and as a component video waveform on display channel B.

\*Only HD, 3G-A, and 3G-B-DL are supported.

\*It is not possible to monitor errors in the background of input channels not assigned to display channels.

Display assignment display image



Composite

Component

# SPECIFICATIONS

## SDI Video Formats

Supported Standard	HD, 3G-A, 3G-B-DL, HD(DL), 3G-B-DS, 3G(DL)-2K, 3G(DL)-4K, HD(QL), 3G(QL), 6G, 12G, 12G(QL), 12G(DL)
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For more information on standards, see "SDI Input Format Standards" on page 15.

## SDI Audio Formats and Standards

Supported Standard	SMPTE ST 299
Sampling Frequency	48 kHz
Quantization	24 bit
Format	L-PCM
Clock Generation	Generated from the video clock
Synchronization	Synchronized to the video signal All video and audio streams must be synchronized during Simul Display.

SDI Audio Channel Separation	
2K, 4K	Separates up to 16 channels into groups G1 to G4 from the specified SDI input
8K(QL)	Separates up to 32 channels into groups G1 to G8 from LINK1 (SUB1), LINK2 (SUB5), LINK3 (SUB9), and LINK4 (SUB13) of the SDI input
8K(DL)	Separates up to 32 channels into groups G1 to G4 from LINK1 (SUB1, SUB2) and LINK2 (SUB9, SUB10) of the SDI input

## MADI Input Audio Formats and Standards

Supported Standard	AES-10
Sampling Frequency	48 kHz
Quantization	24 bit
Format	L-PCM
Clock Generation	Generated from the MADI input signal

MADI Audio Channel (*1)	
2K, 4K Fix to 8ch or fix to 16ch	
8K Fix to 16ch or fix to 32ch	

\*1 MADI does not have the concept of audio groups, but groups of four channels are divided into G1 to G8 to provide operability similar to that of SDI embedded audio.

## SDI Input Connector

Connector Type	BNC
Number of Input Connectors	4 (SDI INPUT 1, 2, 3, 4)
Input Impedance	75 Ω
Input Return Loss	
5 MHz to 1.485 GHz	-15 dB or more
1.485 to 2.970 GHz	-10 dB or more
2.970 to 5.940 GHz	-7 dB or more
5.940 to 11.880 GHz	-4 dB or more
Maximum Input Voltage	±1 V (DC + peak AC)
Eye Pattern Display	Select any of the input connectors from SDI INPUT 1 to 4 to show the eye pattern.

## SDI Output Connector

Connector Type	BNC
Number of Output Connectors	4 (SDI OUTPUT 1, 2, 3, 4)
Output Impedance	75 Ω
Output Return Loss	
5 MHz to 1.485 GHz	-15 dB or more
1.485 to 2.970 GHz	-10 dB or more
2.970 to 5.940 GHz	-7 dB or more
5.940 to 11.880 GHz	-4 dB or more
Output Voltage	800 mVp-p ± 10 % (into 75 Ω)
Output Signal	Reclocked signal of SDI input (*1), TSG output
Reclocked Signal	Reclocks the SDI signals of SDI INPUT 1 to 4 and outputs them through SDI OUTPUT 1 to 4

Select Reclocked Signal SDI OUTPUT 1 can reclock and output a signal from SDI INPUT 1 to 4 by switching. (\*2)

Signal Generation Function SDI OUTPUT 1 to 4 output SDI signals as a TSG

\*1 When SDI system setting is 2K HD/3G-B-DL/3G-A and input signal is 6G-SDI, reclock output is not possible.

\*2 Valid when the display assignment mode is set to off.

## External Reference Input

Connector Type	BNC
Number of Input Connectors	1 pair
Input Impedance	15 kΩ passive loop-through
Input Return Loss	≥ 30 dB for 50 kHz to 30 MHz into 75 Ω
Maximum Input Voltage	±5 V (DC + peak AC)
Input Signal	Tri-level sync or NTSC/PAL black burst signal 10 field IDs are supported.
Function	Video signal waveform display (*1) and phase difference (*2) display based on the phase of an external sync signal Waveform display of external sync signal (*3)

\* The display position of the video signal waveform display and the measured phase of the phase difference display based on the phase of the external sync signal may vary by ±1 clock depending on the timing when the external sync signal or SDI signal is connected or disconnected or when the device is restarted.

\*1 Video signal waveform display based on the phase of an external sync signal is not possible for the following formats.

- 3G's 720/30P, 720/29.97P, 720/25P, 720/24P, 720/23.98P
- HD(DL)'s 1080/60P, 1080/59.94P, 1080/50P
- 3G(DL), 3G(QL), HD(QL), 6G, 12G, 12G(QL), 12G(DL)
- Frame frequency 48P, 47.95P

\*2 Phase difference display based on the phase of an external sync signal is not possible for the following formats.

- 3G's 720/30P, 720/29.97P, 720/25P, 720/24P, 720/23.98P
- 12G(DL)

\*3 Waveform display using an external sync signal is not possible for the following formats.

- HD(DL), 3G(DL)-2K, 3G-B-DS, 12G(For 4K 2-screen display)

## MADI Input/Output Connectors

MADI Input Connector	
Connector Type	BNC
Number of Input Connectors	1
Input Impedance	75 Ω
Maximum Input Voltage	±1 V (DC + peak AC)

MADI Output Connector	
Connector Type	BNC
Number of Output Connectors	1
Output Impedance	75 Ω
Output Signal	Reclocks the MADI signals of MADI INPUT
Output Voltage	450 mVp-p ± 10 % (into 75 Ω)

## Monitor Output Connector

SDI Output Connector	
Function	Output the displayed screen to an SDI monitor
Output Connector	BNC
Number of Output Connectors	1
Output Impedance	75 Ω
Output Return Loss	
5 MHz to 1.485 GHz	15 dB or more
1.485 to 2.97 GHz	10 dB or more
Output Voltage	800 mVp-p ± 10 % (into 75 Ω)
Output Signal	Outputs the LCD screen in HD, 3G-A, or 3G-B-DL.

## Output Format

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			60/59.94/50 /P	

Synchronization Synchronized with the LCD refresh rate (free run or frequency synchronization with the external reference signal(\*1))

<b>TMDS Output Connector Function</b>	Output the displayed screen to an HDMI monitor (*2)
<b>Output Connector</b>	HDMI
<b>Number of Output Connectors</b>	1
<b>Signal Format</b>	Single Link T.M.D.S
<b>DDC</b>	Not supported
<b>HOT PLUG Detection</b>	Not supported
<b>Output Signal</b>	Outputs the LCD screen
<b>Image</b>	1920×1080
<b>Frame Frequency</b>	60P, 59.94P, 50P
<b>Synchronization</b>	Synchronized with the LCD refresh rate (free run or frequency synchronization with the external reference signal(*1))
<b>Touch Control</b>	Touch control possible by connecting the USB touch panel interface of a touch panel monitor to the LV5900A (*3)

\*1 Frame (field) frequencies 24 Hz and 23.98 Hz are not supported.

\*2 LEADER does not guarantee the operation on all HDMI monitors.

\*3 LEADER does not guarantee that all touch panel type monitors will work with the LV5900A.

### Headphone Output

<b>Output Connector</b>	One 3.5 mm mini jack (stereo)
<b>Output Signal</b>	2 channels from the audio signals that are being displayed on the screen (downmixed Lt and Rt are also possible)
<b>Sampling Frequency</b>	48 kHz
<b>Volume Adjustment</b>	Using the menu
<b>Power Output</b>	100 mW maximum (into 8 Ω load)

### Control Connectors

<b>USB Port</b>	
<b>Port Type</b>	Standard A
<b>Number of Ports</b>	2
<b>Specifications</b>	USB 2.0
<b>Compatible Devices</b>	USB memory, USB mouse, touch panel monitor
<b>USB Memory Feature</b>	Saves capture data, preset data, event log data, data dumps, and loudness log data
<b>USB Mouse Feature</b>	Used to control on the screen
<b>Touch panel monitor</b>	Touch control of the displayed screen (*1,*2)

### Ethernet Port

<b>Supported Standard</b>	IEEE802.3
<b>Supported Protocol</b>	
<b>TELNET (*3)</b>	Command control, status query
<b>FTP</b>	File transfer
<b>SNMP</b>	Command control, alarm query
<b>HTTP</b>	Remote monitoring and control from a Web browser
<b>SNTP</b>	Internal clock synchronization
<b>Connector Type</b>	RJ-45
<b>Type</b>	10Base-T, 100Base-TX, 1000Base-T
<b>Function</b>	Remote control from an external PC, file transfer, status information query

### Remote Connector

<b>Port Type</b>	15-pin D-sub (female) Locking Screws Inch screws (No.4-40UNC)
<b>Number of Ports</b>	1
<b>Control Signal</b>	LV-TTL level (low active)
<b>Input Voltage Range</b>	0 to 5 V DC All inputs are pulled up to +3.3 V (control is also possible using +5 V)
<b>Function</b>	Load preset settings, switch input signals, transmit alarm signals activate tally, and start, stop, and clear the loudness measurement
<b>Alarm Output</b>	Outputs alarms signals when a format alarm occurs, when various errors occur, when the fan malfunctions, or when the internal temperature is abnormal

### RS-422/485 Connector

<b>Supported Protocols</b>	
<b>Leader</b>	Receives tally, camera ID, and camera iris signals and displays them

<b>TSL UMD Protocol</b>	Tally (TALLY-1, TALLY-2), camera ID (LABEL-1) reception display
<b>Supported Versions</b>	UMD 3.1, UMD 4.0
<b>Port Type</b>	RJ-45
<b>Number of Ports</b>	2

\*1 Pinch out and swipe operations are not supported.

\*2 LEADER does not guarantee that all touch panel type monitors will work with the LV5900A.

\*3 You cannot use TELNET and the LV7290 at the same time.

### Front Panel

<b>Display</b>	
<b>LCD Type</b>	9-inch color TFT
<b>Resolution</b>	1920×1080P
<b>Refresh Rate</b>	60 Hz, 59.94 Hz, 50 Hz (free run or frequency synchronization with the external reference signal(*1))

<b>Key LEDs</b>	All the keys are dimly back-lit. The selected key is lit more brightly.
<b>Power Switch</b>	Electronic switch (which remembers whether the instrument is on or off)
<b>Last Memory</b>	Backs up the panel settings to memory
<b>Key Lock</b>	Lock by holding down the SYS key. Prevents unintentional operations on the instrument.

\*1 The LCD refresh rate changes automatically depending on the frame rate of the external reference signal.

Frame Rate of the External Reference Signal	LCD Refresh Rate
23.98Hz	Free run
24Hz	Free run
25Hz	50Hz
29.97Hz	59.94Hz
30Hz	60Hz

### Capturing

#### Screen Capture

<b>Function</b>	Captures the screen
<b>Display</b>	Displays only the captured image or overlays the captured image over the input signal
<b>Media</b>	Internal memory (RAM) and USB memory You can only save one screen capture to the internal memory.
<b>Data Output</b>	Saved to bitmap format to a USB memory device or to a file format that the instrument can load (BSG).
<b>Data Input</b>	Data saved to a USB memory device can be loaded and displayed on the instrument.
<b>Frame Capture (4K 2-screen display is not supported)</b>	
<b>Function</b>	Captures frame data
<b>Input Signal</b>	SDI signal
<b>Display</b>	Displays only the captured frame data or superimposes the captured frame data over the input signal
<b>Media</b>	Internal memory (RAM) and USB memory Stores 1 frame or 16 consecutive frames (4 frames for 8K, 32 frames for some formats) in the internal memory
<b>Data Output</b>	Saved to DPX or TIFF format to a USB memory device or to a file format that the instrument can load (FRM). (*1)
<b>Data Input</b>	Data saved to a USB memory device can be loaded and displayed on the instrument. (*2)
<b>Capture Timing</b>	Manual and automatic (error capture)
<b>Error Capturing</b>	Automatically captures frame data when an error occurs
<b>Error Location Search</b>	Can be searched on Frame Capture Viewer

\*1 Only FRM format is supported for 8K.

\*2 An input signal in the same format as the frame data is required.

### Presets

<b>Preset</b>	Saves panel settings (with a few exceptions)
<b>Number of Presets</b>	60
<b>Preset Loading Method</b>	Front panel or remote connector(*1)
<b>Copying</b>	All preset data can be copied from the instrument to a USB memory device or from a USB memory device to the instrument.

\*1 The number of presets loaded from the remote connector can be 8 or 60.

## Display

Number of simultaneously displayed SDI input signals	
HD, 3G-A, 3G-B-DL	4
HD(DL)	2
3G-B-DS	1
3G(DL)-2K	2
3G(DL)-4K	1
HD(QL)	1
3G(QL)	1
6G	1
12G	
4K 2-Screen Display On	2
4K 2-Screen Display Off	1
12G(QL)	1
12G(DL)	1
Display Mode	
Single display	Displays a single input signal
Simul Display	Displays two or more input signals simultaneously
4K 2-Screen Display	For 4K 12G, displays two channels of 4K input signals simultaneously (*1)
Display Assignment Mode (Only HD, 3G-A, and 3G-B-DL are supported)	Maps the input video signal of a channel to multiple areas (*2)
Alarm Indications	
System Alarm Indication	Displays an alarm when the fan malfunctions or when the internal temperature is abnormal
Error Indication	Displays an error when an receive signal error occurs
Display Layout	
Multi Display	Control the WFM/PIC and other display functions in multiple areas from a single screen
Customized Layout Function	Freely arrange the windows shown with the WFM, VECT, PIC, AUDIO, STATUS, and EYE keys (one of each), and a window consisting of six displays shown with MULTI
Display Format	Displays up to four single link input signals in tiled, mixed, V aligned, or H aligned mode.
Normal Mode	Each display area is divided evenly.
Tiled Display	The windows are divided into four quadrants.
Mixed Display	The windows are cascaded.
V Aligned Display	The windows are arranged top to bottom.
H Aligned Display	The windows are arranged side by side.
Tile Mode	The display contents arranged in the display are shown in four quadrants per screen.
V Aligned Mode	The display contents arranged in the display are shown in four vertical divided windows per screen.
H Aligned Mode	The display contents arranged in the display are shown in four horizontally divided windows per screen.
Enhanced Layout Function	When multiple channels of single link are displayed, the selected channel is automatically shown in a specific area. You can make the specific area larger than the other areas to show the selected channel enlarged.
3G-B-DS Display Format	
Aligned Display	The screen is divided into windows.
Time Display	
Displayed Contents	Current time, time code
Current Time Display	The time based on the internal clock
Time Code Display	LTC, VITC
Supported Standard	
LTC, VITC	SMPTE ST 12-2
Tally Display	
Remote Connector	Turn on and off the tally display by controlling through the remote connector
RS-485 Control	Shows tallies through RS-485 control

## Camera ID Display

Instrument Setting	Shows the camera ID set with the instrument's menu RS-485 Control Shows the camera ID through RS-485 control Iris Display
RS-485 Control	Shows the iris through RS-485 control
*1	The signals that can be displayed simultaneously are the 4K input signals of SDI INPUT 1 and 2 or the 4K input signals of SDI INPUT 3 and 4. Apply signals with the same format to both channels.
*2	Simultaneous display of HDR and normal picture or CINEZONE and normal picture is possible. However, there is a limit to the number of channels that can be displayed. This can be set only for HD/3G-A/3G-B-DL single link. It cannot be set for 4K signals or SDI system that transmits multiple lines.

## Video Signal Waveform Display

### Waveform Control

Display Mode	
Overlay	Overlays component signals
Parade	Displays component signals side by side
Blanking Interval	H and V blanking periods can be masked.
RGB Conversion	Converts a YCBCR signal into an RGB signal and displays the result
Channel Assignment	GBR or RGB order
Pseudo-Composite Display	Artificially converts component signals into composite signals and displays the result
Line Select	Displays the selected line
Sweep Modes	H, V
Color	7 colors to choose from
Vertical Axis	
Gain	×1, ×5, ×10
Variable Gain	
Gain	×1 ×0.2 to ×2.0
Gain ×5	×1.0 to ×10.0
Gain ×10	×2.0 to ×10.0
Amplitude Accuracy	±0.5% (single default display)
3G, HD(DL) (1080/60P, 1080/59.94P, 1080/50P)	
Y Signal	±0.5 % (1 to 60 MHz)
CbCr Signal	±0.5 % (0.5 to 30 MHz)
Low-Pass Attenuation	≥ 20 dB (at 40 MHz)
3G, HD, HD(DL) (1080/60P, 1080/59.94P, 1080/50P)	
Y Signal	±0.5 % (1 to 30 MHz)
CBCR Signal	±0.5 % (0.5 to 15 MHz)
Low-Pass Attenuation	≥ 20 dB (at 20 MHz)
Horizontal Axis	
Line Display	
Display Format	Overlay (1H, 2H) (*1) Parade (1H, 2H, 3H) 4Y parade (4H)
Magnification	×1 / ×10 / ×20 / ACTIVE / BLANK
Field Display	
Display Format	Overlay (1V, 2V) (*2) Parade (1V, 2V, 3V)
Magnification	×1, ×20, ×40
Time Accuracy	±0.5% (single default display)

### Cursor Measurement

Composition	
Horizontal Cursors	2 (REF and DELTA)
Vertical Cursors	2 (REF and DELTA)
Simultaneous Display	Displays the horizontal cursors and vertical cursors simultaneously
Amplitude Measurement	mV, %, R%, DEC, HEX
Time Measurement	Second display
Frequency Display	Computes and displays the frequency with the length of one period set to the time between two cursors
Cursor Value Display	Displays measured values at the cursors

Scale	
Type	%, V, decimal, hexadecimal
Display Colors	7 colors to choose from
HDR Scale	Adds an HDR scale to each scale for HDR
External Sync Signal Waveform Display	
Compatible SDI Systems	Can be displayed for HD, 3G-A, 3G-B-DL, 12G(1-screen display), 6G, 3G(QL), 3G(DL)-4K, HD(QL), 12G(DL), and 12G(QL)
Features	Waveform display of external sync signal
Vertical Axis	
Gain	×1
Variable Gain	CAL
Horizontal Axis	
Line Display	
Display Format	1H, 2H
Magnification	×1
Field Display	
Display Format	1V, 2V
Magnification	×1
Scale	
Type	%
Display Colors	7 colors to choose from

\*1 2H display is not possible when the input signal is 4K.

\*2 2V display is not possible when the input signal is progressive.

### Vector Display

Display Colors	7 colors to choose from
Blanking Interval	H and V blanking periods can be masked (according to the video signal waveform display settings).
Pseudo-Composite Display	Artificially converts component signals into composite signals and displays the result
Line Select	Displays the selected line
Gain	×1, ×5, IQ-MAG
Variable Gain	
Gain	×1 ×0.2 to ×2.0
Gain	×5 ×1.0 to ×10.0
Gain	IQ-MAG
Component display	0.620 to 6.240
Pseudo-composite display	0.570 to 5.700
Amplitude Accuracy	±0.5 %
Scale	
Type	AUTO, ITU-R BT.709, DCI, ITU-R BT.2020
Color Bar Saturation	75%, 100%
IQ Axis	Show or hide
Display Colors	7 colors to choose from
Variable Scale	ON, OFF
ARIB Check Marker	OFF, STD-B66, STD-B72
Vector Marker Display	Displays a marker and numeric value at the specified location on the vector display
Number of Markers	1
Numeric Display	Displays the marker position numerically
Cb	Displays the CB position as a percentage
Cr	Displays the CR position as a percentage
deg	Displays the hue in degrees.
d	Displays the distance from the center as a percentage
Variable Marker	Marker and frame resizing
Histogram Display(4K 2-screen display is not supported)	Displays the Y, R, G, and B histograms
5-Bar Display (4K 2-screen display is not supported)	
Function	Converts an SDI signal into Y, R, G, B, and composite values, and then displays the five peak levels.
Channel Assignment	RGB, GBR
Scale	%, mV, HEX, DEC
Error Level	Based on the gamut error, composite gamut error, and luminance error thresholds
Line Select (8K is not supported.)	Displays the selected line
Low-Pass Filter	The same as for gamut errors

### Picture Screen

Quantization	8 bit (internal signal processing is performed with signed 12 bit or higher)
Level Mapping	Maps the black level to 0 (8bit), SDI code value 1024 to 255 (8bit)
Display Sizes	Reduced, 1/4 8K (8K only), actual size (4K 2-screen display or 8K is not supported), ×2 (4K and 8K are not supported.), full frame (4K and 8K are not supported.)
Quality Adjustment and Color Selection	Brightness, contrast, RGB gain, RGB bias, chroma gain, monochrome display (RGB gain, RGB bias, chroma gain not valid)
Frame Rate	Converts the frame rate based on the LCD frame rate (60P, 59.94P, 50P)
Aspect Marker Display	
17:9 aspect ratio	16:9, 14:9, 13:9, 4:3, 2.39:1
16:9 aspect ratio	17:9, 14:9, 13:9, 4:3, 2.39:1, AFD (*1)
Aspect Marker Format	Line, shadow (99 levels), or black
Safety Marker	Size ARIB TR-B4, SMPTE RP-218, or user-defined
AFD Display (*1)	Displays abbreviations for SMPTE ST 2016-1-2007 standard AFD codes
Line Select	Marks the selected line
Error Indication (*2)	Displays markers in the gamut error and level error areas

\*1 AFD Supports only HD-SDI.

\*2 Errors are not displayed for the 4K 2-screen display.

\* 8K signals are down converted internally to 4K and then displayed.

\* For the 4K 2-screen display, signals are down converted internally to 2K and then displayed

### Superimpose Display (4K 2-screen display or 8K is not supported)

Displays English closed captions, European closed captions, and Japanese closed captions over the picture	
English Closed Caption	
Supported Standards (Mapping Standards)	
EIA-708	SMPTE ST 334
EIA/CEA-608-B (EIA-708-B)	SMPTE ST 334
EIA/CEA-608-B (EIA/CEA-608-B)	SMPTE ST 334
Supported Video Formats	HD, 3G-A, 3G-B-DL, HD(DL) (close caption decoding only for link A), 3G(DL)-2K (3G-B not supported, close caption decoding only for link 1), 3G(DL)-4K (close caption decoding only for link 1), HD(QL) (close caption decoding only for link 1), 3G(QL) (close caption decoding only for link 1), 6G (close caption decoding only for sub 1) 12G (close caption decoding only for sub 1)
European Closed Caption	
Supported Standards	
Teletext	OP47
Simple Japanese Closed Caption Display	Displays a simple Japanese closed caption on the picture display. (Select HD, SD, analog, or portable closed caption to display. Select language 1 or 2.)
Supported Standard	ARIB STD-B37 short form data
Supported Video Formats	HD, 3G-A, HD(DL) (close caption decoding only for link A), HD(QL) (close caption decoding only for link 1), 3G(QL) (3G-B not supported, close caption decoding only for link 1), 6G (close caption decoding only for sub 1) 12G (close caption decoding only for sub 1)

Display	Display position control is supported only for HD and SD closed captions.	S-Log3	Converts the reflectance to IRE with SDI code value 95 assumed to be 0% and 589 assumed to be 100% and displays it as a percentage
Characters	Only Kanji, roman numerals, katakana, hiragana, additional characters (ARIB STD-B24), additional kanji (ARIB STD-B24), and 1-byte DRCS are displayed.	C-Log	Displays the percentage with the SDI code value 128 assumed to 0% and 614 assumed to be 100%
Character Sizes	Supports only standard, medium, small, and specified size codes	Log-C	
Logging		EI200	Displays the percentage with the SDI code value 95 assumed to 0.39% and 853 assumed to be 83%
Logged Events	Clear screen command, text closed caption display event, time code, TV commercial material check result	EI400	Displays the percentage with the SDI code value 95 assumed to 0.39% and 917 assumed to be 90%
Data Format	Text	EI800	Displays the percentage with the SDI code value 95 assumed to 0.39% and 976 assumed to be 95%
TV Commercial Material Checking		EI1600	Displays the percentage with the SDI code value 95 assumed to 0.39% and 1022 assumed to be 94%
Function	Checks whether closed caption displays are present during the closed caption prohibited time	Measured Points	3
Check Period	The material start time and end time can be specified using timecodes.	Measurement Sizes	1 × 1 pixel, 3 × 3 pixels, and 9 × 9 pixels
Log Display Color		<b>CINELITE Advanced Display</b>	(4K 2-screen display is not supported)
Closed Caption during Prohibited Time	Red	Function	Synchronizes the markers on the waveform display, vector display, and chromaticity diagram display to the points selected with CINELITE
Closed Caption Not during Prohibited Time	Green	Waveform Display Link Markers	Synchronizes the markers on the waveform display to the points selected with CINELITE
Check Result Display	Displays OK or NG when measurements are complete	Number of Link Markers	Up to 16 (for YRGB, YGBR display) (including the 4 reference points)
Loudness Synchronization	Simultaneous measurement with loudness measurement	Vector Link Markers	Synchronizes the markers on the vector display to the points selected with CINELITE
<b>CINELITE Display</b> (4K 2-screen display is not supported)		Number of Link Markers	Up to 4 (including the 1 reference point)
Function	Video levels are displayed numerically.	Vector Numeric Display	Displays numerically the active marker position
f Stop Display	Displays f Stop values relative to a reference point Set in reference to an object with an 18% reflectance f Stop gamma correction (not supported on the HDR)	Cb	Displays the CB position as a percentage
Fundamental Gamma	ITU-R BT.709, hybrid log gamma (HLG), PQ, S-Log3	Cr	Displays the CR position as a percentage
User Correction	Table 3 types (data acquired with a real device)	deg	Displays the hue as an angle (°).
% Display (SDR)	Displays the luminance level or RGB level as a percentage with the SDI code value 64 assumed to be 0% and the SDI code value 940 assumed to be 100%	d	Displays the distance from the center as a percentage
Gradation Display	Displays the luminance or RGB value with the SDI code value 64 assumed to be 0 and the SDI code value 940 assumed to be 255	CIE Chromaticity Diagram Display Link Markers	Synchronizes the markers on the CIE chromaticity diagram display to the points selected with CINELITE
CV Display	Decimal, hexadecimal Displays the SDI signal code value as YCbCr or RGB according to the input signal (only for measurement size 1×1)	Number of Link Markers	Up to 4 (including the 1 reference point)
HDR Display		<b>CINEZONE Display</b> (4K 2-screen display is not supported)	
HLG		CINEZONE Display (SDR)	
System Gamma OFF		Function	Adds colors to the display in accordance with luminance levels
Narrow Range	Displays the relative HLG luminance with the SDI code value 64 assumed to 0% and 940 assumed to be 1200% or 100%	Display Colors	Linear (1024 colors), step (12 colors)
Full Range	Displays the relative HLG luminance with the SDI code value 0 assumed to 0% and 1023 assumed to be 1200% or 100%	Upper Limit	-6.3 to 109.4 % (values equal to or greater than the upper limit are displayed in white)
System Gamma ON		Lower Limit	-7.3 to 108.4 % (values less than the lower limit are displayed in black)
Narrow Range	Displays the relative HLG luminance with the SDI code value 64 assumed to 0Nits and 940 assumed to be 1000Nits	CINEZONE display (HDR)	
Full Range	Displays the relative HLG luminance with the SDI code value 0 assumed to 0Nits and 1023 assumed to be 1000Nits	Function	Adds colors to the display in accordance with luminance levels
PQ	Converts the luminance level to the display's Nits and displays the result	HDR Area Setting	Displays color according to the brightness
Narrow Range	SDI code value 64 to 940 are assumed to be 0Nits to 10000Nits	SDR Area Setting	Monochrome display
Full Range	SDI code value 0 to 1023 are assumed to be 0Nits to 10000Nits	Upper Limit	Displays magenta for values exceeding the limit
		Lower Limit	Ref.LEVEL to 100% (code values 64 to 940 or 0 to 1023 assumed to be 100%)
			Displays black for values less than the limit 0% to Ref.LEVEL% (code values 64 to 940 or 0 to 1023 assumed to be 100%)

\* 8K signals are down converted internally to 4K and then displayed.

**Focus Assist** (4K 2-screen display is not supported)  
 Detection Sensitivity LOW / MIDDLE / HIGH  
 Highlight Display Color WHITE / GREEN / BLUE / RED  
 Picture Luminance Level OFF / EMBOSS / 25% / 50% / 75% / 100%  
 \* 8K signals are down converted internally to 4K and then displayed.

**CIE Chromaticity Diagram Display** (4K 2-screen display is not supported)  
 Display Standard CIE1931 (xy display), CIE1976 (u'v' display)  
 Display Type Chromaticity diagram display, color temperature display

Display Mode  
 Chromaticity Diagram Display  
 Luminance display, color display  
 Color Temperature Display Luminance display  
 Colorimetry BT.709, DCI, ITU-R BT.2020  
 Clipping  
 ON Clips negative values of the input signal to zero  
 OFF Displays negative values of the input signal according to ITU-R BT.1361  
 Smoothing Displays by averaging data every two pixels  
 Accuracy ±0.005 (relative to the measurement coordinate value)  
 Chromaticity Diagram Display Scale  
 Triangle Select two from ITU-R BT.709, DCI, and ITU-R BT.2020  
 User-defined Triangle Set a single user-defined triangle  
 Background Color sample, white background, black background  
 Sub scale Color temperature curve, grid (0.1 steps), white point (D65), triangle name (each can be turned on or off)  
 Cursor Displays the cursor position in coordinates  
 Gamma ITU-R BT.709, user (1.5 to 3.0), HLG, PQ, S-Log3, C-Log, Log-C  
 Line Select Displays the selected line

### HDR Display

Supported Standard ITU-R BT.2100 (HLG: Hybrid Log Gamma, Full range / Narrow range), ITU-R BT.2100 (PQ: Perceptual Quantization, Full range / Narrow range), S-Log3, C-Log, Log-C  
 Supported Formats All formats  
 Function  
 Video Waveform Display Scale, cursor  
 Vector Display (4K 2-screen display is not supported) Histogram  
 Picture Screen (4K 2-screen display is not supported)  
 HDR CINEZONE (\*1)  
 HDR CINELITE  
 MAX CLL, MAX FALL (CEA861 compliant)  
 START MAX CLL, MAX FALL computation start  
 STOP MAX CLL, MAX FALL computation stop

\* 8K signals are down converted internally to 4K and then displayed.

### Audio Display

Input Signal SDI embedded audio, MADI  
 Format L-PCM  
 Sampling Frequency 48 kHz  
 Quantization 24 bit  
 SDI Embedded Audio  
 Supported Standard 3G, HD, HD(DL) SMPTE ST 299  
 Clock Generation Generated from the video clock  
 Synchronization Must be synchronized to the video clock. All SDI signals must be synchronized.  
 Channel Separation  
 2K, 4K Separates up to 16 channels into groups G1 to G4 from the specified SDI input  
 8K(QL) Separates up to 32 channels into groups G1 to G8 from LINK1(SUB1), LINK2 (SUB5), LINK3 (SUB9), and LINK4 (SUB13) of the SDI input  
 8K(DL) Separates up to 32 channels into groups G1 to G4 from LINK1(SUB1, SUB2) and LINK2 (SUB9, SUB10) of the SDI input

### MADI

Supported Standard AES-10  
 Sampling Frequency 48 kHz  
 Quantization 24 bit  
 Format L-PCM  
 Clock Generation Generated from the MADI input signal  
 MADI Audio Channel  
 2K, 4K Fix to 8ch or fix to 16ch  
 8K Fix to 16ch or fix to 32ch

### Number of Display Channels

SDI embedded audio signal  
 2K, 4K 16 channels max.  
 8K 32 channels max.  
 MADI Signal  
 2K, 4K Fix to 8ch or fix to 16ch  
 8K Fix to 16ch or fix to 32ch  
 \* MADI does not have the concept of audio groups, but groups of four channels are divided into G1 to G8 to provide operability similar to that of SDI embedded audio

Display Types Level meter, Lissajous, correlation meter, surround (8K is not supported.), status, loudness

### Level meter

Displayed Channels  
 2K, 4K 8ch, 16ch  
 8K 16ch, 32ch  
 Dynamic Range  
 SDI Embedded Audio -60 dBFS, -90 dBFS, reference level±3 dB  
 MADI -60 dBFS, -90 dBFS, reference level±3 dB  
 Meter Response Model TRUE PEAK, PPM type I, PPM type II, VU  
 Peak Hold Time 0.0 to 5.0 s (in 0.5 s steps), HOLD  
 Level Setting -40.0 to 0.0 dBFS (standard level, warning level, over level)  
 Level Numeric Display Displays the levels numerically  
 Numeric display in red when level-over is detected  
 Displays a blue "M" when mute is detected (ON/OFF selectable).  
 The displays changes to a blue ■ when the layout size is small.)  
 Displays "U.L." when audio is not detected

### Lissajous Display

Displayed Channels  
 2K, 4K 2ch×1  
 2ch×4  
 2ch×8  
 8K 2ch×8  
 2ch×16  
 Display Mode X-Y, MATRIX  
 Correlation Meter Displays the correlation between two channels as a value from -1 to 1

### Channel Assignment

SINGLE LISSAJOU L, R  
 MULTI LISSAJOU L1, R1 to L4, R4 to L8, R8

### Surround Display (8K is not supported.)

Function Displays a graphical representation of a sound field  
 Surround Format 5.1ch  
 Channel Mapping L, R, C, LFE, Ls, Rs, Lt, Rt  
 Center Channel Format NORMAL, PHANTOM CENTER  
 Gain ×1, AUTO

\* Only CH Mode 8ch is supported.

### Status Display

Level Audio levels are displayed using numbers (dBFS).  
 Error Detection Counts the number of errors that occur for each channel  
 Level Over Counts the number of times that the level of the input signal exceeds the set value  
 Detection Setting -40.0 to 0.0 dBFS

Clipping	Counts the number of times that a received signal exceeds the maximum signal value for the specified number of consecutive samples	Momentary, Short-term Loudness	Displayed in red when the target level is exceeded
Detection Setting	1 to 100 sample	Log	Time Up to 24 hours
Mute	Counts the number of times that the length of a received mute signal exceeds the specified period	File	
Detection Setting	1 to 5000 ms	Log	Saves gating block loudness in CSV format
Parity Error (*1)	Counts the number of times that the input signal's parity bit and the parity bit recalculated by the instrument differ	Summary	Saves settings and measurement results in text format
Validity Error (*1)	Counts the number of times that the input signal's validity bit is 1	Level Meter Display	
CRC Error (*1)	Counts the number of times that the CRC of the channel status bits and the calculated CRC are different	2K, 4K	Displays level meters for eight channels
Code Violation (*1)	Counts the number of times that the state of the input signal's biphasic modulation is abnormal	8K	Displays level meters for 32 channels
Elapsed Time	Displays the amount of time that has elapsed since the instrument was reset	Peak Value Display	Displays peak values of a measurement channel numerically
Channel Status	Bits Dump display, text display		
User Data Bits	Dump Display		
*1 This feature is not supported during MADI input.			
Loudness Display (4K 2-screen display is not supported)			
Function	Loudness chart display, numeric display, log, level meter display, peak value display		
Supported Standard	ITU-R BS.1770, ARIB TR-B32, EBU R128, ATSC A/85		
Measurement Channel	Simultaneous measurement of two audio sources		
2K, 4K			
Mode (Main)	Monaural, stereo, 5.1, user specified channel		
Mode (Sub) Channel	Off, monaural, stereo		
LFE Gain	0 to 10 times		
8K			
Mode (Main)	22.2, 5.1, stereo		
Mode (Sub) Channel	Off, 5.1, stereo		
LFE Gain	0 to 10 times		
Measurement Trigger	Manual (panel), remote, timecode, mute		
Measurement Mode	BS1770, ARIB, EBU, ATSC, CUSTOM		
Target Level			
BS1770	-24.0 LKFS		
ARIB	-24.0 LKFS (±1 LK)		
EBU	-23.0 LUFS (±1 LU)		
ATSC	-24.0 LKFS (±2 LK)		
CUSTOM	-25.0 to -23.0 LKFS		
Average Time			
Momentary Loudness	200 to 10000 ms		
Short-term Loudness	200 to 10000 ms		
Chart Display			
1 During Audio Measurement	Graph display of integrated loudness and momentary or short-term loudness		
2 During Audio Measurement	Graph display of integrated, momentary, or short-term loudness		
Measurement Time	2min, 10min, 30min, 1hour, 2hour, 6hour, 12hour, 24hour		
MAG	Zoomed display of the target level from -18 to +9 (LK/LU)		
Numeric Display	Absolute value and relative value displays of integrated loudness and momentary or short-term loudness		
Integrated Loudness	Displayed in red when the target level range is exceeded		
		Signal Detection	Detects the presence of an SDI signal
		Format Display	Displays the video signal format
		Frequency Deviation Display	
		Function	Displays the sampling frequency deviation
		Measurement Range	Displays an error if ±10 ppm is exceeded
		Precision	±100 ppm
		Equivalent Cable Length Display	
		Function	Displays SDI signal attenuation in terms of cable length
		Supported Cables	Displays an error if the specified cable length is exceeded
		12G, 6G	L-5.5CUHD
		3G, HD	LS-5CFB, 1694A
		Display Range	
		12G, 6G	< 10 m, 10 to 80 m, > 80 m
		3G	< 10 m, 10 to 100 m, > 100 m
		HD	< 10 m, 10 to 130 m, > 130 m
		Precision	
		12G, 6G, 3G, HD	±20 m
		Resolution	10 m
		Error Count Display	Up to 999999 errors for each error type
		Count Period	1 second, 1 field (frame)
		Embedded Audio Channel Display	
			Displays the embedded audio channel numbers
		* If the input signal is 3G-B-DL, only stream 1 is supported	
		SDI Signal Error Detection	
		CRC Error	Detects 3G and HD signal transmission errors
		TRS Position Error	Detects TRS embedding position errors
		TRS Code Error	Detects TRS protection bit errors
		Line Number Error	Detects errors with the line numbers embedded in 3G and HD signals
		Illegal Code Error	Detects data within the range of 000 to 003h and 3FC to 3FFh in locations other than TRS and ADF
		Ancillary Data Packet Error Detection	
		Checksum error	Detects ancillary data transmission errors
		Parity Error	Detects ancillary data header parity errors
		Embedded Audio Packet Error Detection (*1)	
		BCH Error	Detects audio packet transmission errors
		DBN Error	Detects audio packet continuity errors
		Parity Error	Detects audio packet parity errors
		Embedded Position Error	
			Detects the presence of audio in lines where it should not be embedded
		Sample Counter Error	Detects asynchronous audio by measuring the number of audio Samples
		*1 If the input signal is 3G-B-DL, only stream 1 is supported.	

Video Error Detection (4K 2-screen display is not supported)  
 8K signals are down converted internally to 4K and then detected.

Freeze Error  
 Detects freezing of video within the specified time range

Detection Method Video interval checksum  
 Time Specification 2 to 300 frames

Black Error Detects video blackouts  
 Black Level Specification 0 to 100%  
 Area Specification 1 to 100%  
 Time Specification 1 to 300 frames

Level Error  
 Detects luminance level errors and chrominance level errors

Luminance Level Detection Range  
 Upper limit -51 to 766 mV  
 Lower Limit -51 to 766 mV

Chrominance Level Detection Range  
 Upper limit -400 to 399 mV  
 Lower Limit -400 to 399 mV

Black Line Error  
 Detects consecutive black-level lines as error lines and displays the start line number and end line number of the consecutive error lines

Black Level Specification 0 to 100 %

Gamut Error  
 Detects gamut errors

Detection Range  
 Upper limit 90.8 to 109.4%  
 Lower Limit -7.2 to 6.1%

Low-Pass Filter

Format	Low-Pass Filter	
	HD:1MHz	HD:2.8MHz
HD 1280×720	Approx.1MHz	Approx.2.8MHz
HD 1920×1080 (frame rate ≤ 30Hz)	Approx.1MHz (IEEE STD 205)	Approx.2.8MHz
HD 1920×1080 (frame rate > 30Hz)	Approx.2MHz	Approx.5.5MHz
HD 2048×1080 (frame rate ≤ 30Hz)	Approx.1MHz (IEEE STD 205)	Approx.2.8MHz
HD 2048×1080 (frame rate > 30Hz)	Approx.2MHz	Approx.5.5MHz
4K 3840×2160 (frame rate ≤ 30Hz)	Approx.4MHz	Approx.11MHz
4K 3840×2160 (frame rate > 30Hz)	Approx.8MHz	Approx.22MHz
4K 4096×2160 (frame rate ≤ 30Hz)	Approx.4MHz	Approx.11MHz
4K 4096×2160 (frame rate > 30Hz)	Approx.8MHz	Approx.22MHz

Area Specification 0.0 to 5.0%  
 Time Specification 1 to 60 frames

Composite Gamut Error Detects level errors that occur when component signals are converted to composite signals

Detection Range  
 Upper limit 90.0 to 135.0%  
 Lower Limit -40.0 to 20.0%

Low-Pass Filter The same as the gamut error  
 Area Specification 0.0 to 5.0%  
 Time Specification 1 to 60 frames

SDI Analysis Features  
 Event Log Display  
 Function Records detected errors, events—such as the instrument switching between input signals, and timestamps.

Log Capacity Up to 1000 events  
 Operation Logs all events from start to finish  
 Data Output Overwrite mode, Stop after 1,000 events

Data Dump Display  
 Display Format  
 HD, 3G-A, 3G-B-DS  
 3G-B-DL  
 HD(DL)  
 3G(DL)-2K  
 3G(DL)-4K  
 3G(QL), HD(QL)  
 6G, 12G  
 12G(QL), 12G(DL)

Display Format Details  
 PICTURE Links or streams 1 and 2 are combined and displayed in a picture structure.  
 Stream 1/2 Displays each stream in a transmission structure.

Link A, B, 1, 2, 3, 4  
 Sub 1 to 16 Displays the selected link  
 Displays the HD sub image in a transmission structure.

Line Select Displays the selected line  
 Sample Select Displays from the selected sample  
 Jump Feature Jumps to an EAV or SAV  
 Data Output Text output to USB memory

Phase Difference Display  
 Function Displays the phase difference between a reference signal and an SDI signal numerically and graphically

Reference Signal  
 HD, 3G-A, 3G-B-DL External sync signal, Ach  
 3G-B-DS External sync signal  
 HD(DL) External sync signal, Ach, Cch  
 3G(DL)-2K External sync signal, Ach, Cch  
 3G(DL)-4K External sync signal, Ach, Cch  
 HD(QL), 3G(QL) External sync signal, Ach  
 6G, 12G External sync signal  
 12(DL) Ach, Cch  
 12(QL) External sync signal, Ach

Display Range  
 Vertical 1 frame  
 For 3G-B-DL 47.95P to 60P, ±1 frame measurement possible

Horizontal ±1 line

\* If the reference signal is set to an external sync signal, the measured phase may vary by ±1 clock depending on the timing when the external sync signal or SDI signal is connected or disconnected or when the power is turned on and off.

SDI Ancillary Data List Display  
 List Display Details Presence or absence of each ancillary data type, embedded line number, and number of packets per frame

Dump Display The selected ancillary data is displayed in hexadecimal or binary.

Payload ID Display  
 Supported Standard SMPTE ST 352  
 Displayed Contents Analyzes and displays payload information  
 Display Format Text and binary

Displaying Audio Control Packets  
 Supported Standard SMPTE ST 299-1, SMPTE ST 272  
 Displayed Contents Displays audio control packet analysis  
 Display Format Text, hexadecimal, binary  
 Display Format 1 to 8

Japanese Closed Caption Display (\*1)  
 Supported Standard ARIB STD-B37  
 Displayed Contents Analysis display of closed caption signals  
 Display Format Text, hexadecimal, binary

English Closed Caption Display (4K 2-screen display or 8K is not supported)  
 Supported Video Formats HD, 3G-A, 3G-B-DL,  
 HD(DL) (close caption decoding only for link A),  
 3G(DL)-2K (3G-B not supported, close caption decoding only for link 1),  
 3G(DL)-4K (close caption decoding only for link 1),  
 HD(QL) (close caption decoding only for link 1),  
 3G(QL) (close caption decoding only for link 1),  
 6G (close caption decoding only for sub 1),  
 12G (close caption decoding only for sub 1)

## CDP Packet Display Details

CDP packet header information	
	Presence or absence of timecode packet, Presence or absence of closed caption packet and validity of this packet, Presence or absence of closed caption service packet and validity of this packet, Presence or absence of the FUTURE data packet
Time Code	When time code packets are present
Closed Caption Data	When valid closed caption packets are present
	Presence or absence of CC1 to 4, TEXT1 to 4, XDS packets
XDS Packet Display Details	Contents adviser information Copy management information
Display content of Program Description packet	
	Stuffing Descriptor
	AC3 Audio Descriptor
	Caption Service Descriptor
	Content Advisory Descriptor
	Extended Channel Name Descriptor
	Service Location Descriptor
	Time-Shifted Service Descriptor
	Component Name Descriptor
	DCC Arriving Request Descriptor
	DCC Arriving Request Descriptor
	Redistribution Control Descriptor
Inter-Stationary Control Signal (NET-Q) Display (*1)	
	ARIB STD-B39
	Analysis display of inter-stationary control signals
	Text, hexadecimal, binary
	Q signal logging
	Analysis display of the format ID
	Outputs Q signal logs in CSV format through a USB memory device
Data Broadcast Trigger Signal Display (*1)	
	ARIB STD-B35
	Text, hexadecimal, binary
V-ANC User Data Display (*1)	
	ARIB TR-B23
	Hexadecimal, binary
AFD Packet Display	
	SMPTE ST 2016-3
	Text, hexadecimal, binary
User-Defined ANC Packet Display	
	DID, SDID
	Y, C
	Hexadecimal, binary

\*1 Supported video formats are as follows:

HD, 3G-A, HD(DL) (close caption decoding only for link A), HD(QL) (close caption decoding only for link 1), 3G(QL) (3G-B not supported, close caption decoding only for link 1), 6G (close caption decoding only for sub 1), 12G (close caption decoding only for sub 1), 12G(QL) (close caption decoding only for sub 1), 12G(DL) (close caption decoding only for sub 1)

## Lip Sync Display (4K 2-screen display is not supported)

Displays the phase difference between the video and audio

### Lip Sync Measurement

Function	Measures the time difference between the SDI signal and digital audio signal and displays the results numerically and graphically
Reference Signal	A Leader TSG that supports lip syncing (*1)
Measurement Method	Measures the time difference when the luminance level of the video signal exceeds the specified value and when the audio level signal exceeds the specified value
Luminance Level Setting	25 to 100%
Audio Signal Level Setting	-30 to 0 dBFS
Supported Audio Signals	Embedded audio signal, MADI signal
Measurement Range (Bar Display)	±50 ms, ±100 ms, ±500 ms, ±1.0 s, ±2.5 s
Measurement Range (Numeric Display)	±3999 ms
Measurement Resolution	1 ms

\*1 TSG patterns not made by Leader may be supportable by specifying the video signal setting and audio signal setting

## Eye Pattern

SDI Input Connector	SDI INPUT 1 to 4 (select an input terminal to display)
Display	Displays the input SDI waveform before equalizing
Number of Displays	
1-Screen Display	Displays the eye pattern of the selected filter in a single screen
2-Screen Display	Displays the timing filter and eye pattern of the selected filter in two screens
Waveform Display Color	7 colors to choose from
Scale Display Color	7 colors to choose from
Method	Equivalent time sampling
Amplitude Accuracy	800 mV ± 5 % (for 800 mV input)
Time Axis	
2 UI Display	12.5ps/div
	12G
	25ps/div
	6G
	50ps/div
	3G
	100ps/div
	HD
4 UI Display	25ps/div
	12G
	50ps/div
	6G
	100ps/div
	3G
	200ps/div
	HD
16 UI Display	100ps/div
	12G
	200ps/div
	6G
	400ps/div
	3G
	800ps/div
	HD
Time Axis Accuracy	±3%
Jitter Filte	
	10Hz
	HPF 10Hz
	100Hz
	HPF 100Hz
	1kHz
	HPF 1kHz
	100kHz
	HPF 100kHz
	TIMING
	HPF 10Hz
	ALIGNMENT
	12G、6G
	HPF 100kHz
	3G、HD
	HPF 100kHz
Cursor Measurement	Amplitude measurement using Y cursors Time measurement using X cursors Rise time and fall time measurement using the TrTf cursor

## Automatic Measurement Items

	Eye pattern's amplitude
	Rise time (the time for the signal to rise from 20 to 80 % of its amplitude)
	Fall time (the time for the signal to fall from 80 to 20 % of its amplitude)
	Timing jitter
	Jitter
	Rising edge overshoot
	Falling edge overshoot
Histogram Display	Displays the frequency distribution of the eye pattern waveform amplitudes

## Jitter Display

SDI Input Connector	SDI INPUT 1 to 4 (select an input terminal to display)
Display	Displays the jitter component of an SDI signal
Number of Displays	
1-Screen Display	Displays the jitter waveform of the selected filter in a single screen
2-Screen Display	Displays the timing jitter and the jitter waveform of the selected filter in two screens
Waveform Display Color	7 colors to choose from
Scale Display Color	7 colors to choose from
Method	Phase detection method
Gain	×16, ×8, ×4, ×2, ×1



## HD video signal formats and standards

Color System	Quantization	Image	Field Frequency / Scanning	Supported Standard
YCbCr <sub>4:2:2</sub>	10bit	1280×720	60/59.94/50/30/29.97/25/24/23.98 /P	SMPTE ST 292-1 SMPTE ST 296
			60/59.94/50 /I	SMPTE ST 274
	1920×1080	30/29.97/25/24/23.98 /P	SMPTE ST 292-1	
		30/29.97/25/24/23.98 /PsF		

## 3G-A video signal formats and standards

Color System	Quantization	Image	Field Frequency / Scanning	Supported Standard
YCbCr <sub>4:2:2</sub>	10bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-1
			48/47.95 /P	-
	2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 425-1 SMPTE ST 2048-2	
		60/59.94/50 /I	SMPTE ST 274	
	12bit	1920×1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2
2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2		
YCbCr <sub>4:4:4</sub>	10bit	1280×720	60/59.94/50/30/29.97/25/24/23.98 /P	SMPTE ST 296 SMPTE ST 425-1
			60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
	1920×1080	30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1	
		30/29.97/25/24/23.98 /P	SMPTE ST 2048-2	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2	
2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2		
YCbCr <sub>4:4:4</sub>	10bit	1280×720	60/59.94/50/30/29.97/25/24/23.98 /P	SMPTE ST 296 SMPTE ST 425-1
			60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
	1920×1080	30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1	
		30/29.97/25/24/23.98 /P	SMPTE ST 2048-2	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2	
2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2		
RGB 4:4:4	10bit	1280×720	60/59.94/50/30/29.97/25/24/23.98 /P	SMPTE ST 296 SMPTE ST 425-1
			60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
	1920×1080	30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1	
		30/29.97/25/24/23.98 /P	SMPTE ST 2048-2	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2	
2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2		
XYZ 4:4:4	10bit	1280×720	60/59.94/50/30/29.97/25/24/23.98 /P	SMPTE ST 296 SMPTE ST 425-1
			60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
	1920×1080	30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1	
		30/29.97/25/24/23.98 /P	SMPTE ST 2048-2	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2	
2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2		
12bit	2048×1080	30/25/24 /P	SMPTE ST 425-1	
		30/25/24 /PsF	SMPTE ST 428	

## 3G-B-DL, HD(DL) video signal formats and standards

Color System	Quantization	Image	Field Frequency / Scanning	Supported Standard
YCbCr <sub>4:2:2</sub>	10bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425-1
			48/47.95 /P	-
	2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 372 SMPTE ST 425-1 SMPTE ST 2048-2	
		60/59.94/50 /I	SMPTE ST 274	
	12bit	1920×1080	30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1
2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 372		
	30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1 SMPTE ST 2048-2		
YCbCr <sub>4:4:4</sub>	10bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1
	2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 372	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2	
RGB 4:4:4	10bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1
	2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 372	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2	
XYZ 4:4:4	10bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 372
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1
	2048×1080	30/29.97/25/24/23.98 /P	SMPTE ST 372	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 425-1	
		30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2	
12bit	2048×1080	30/25/24 /P	SMPTE ST 372	
		30/25/24 /PsF	SMPTE ST 428	

\* When these signals are displayed, phase differences of up to 100 clocks (approx. 1.34 μs) between HD(DL) links are automatically corrected.

## 3G-B-DS video signal formats and standards

Color System	Quantization	Image	Field Frequency / Scanning	Supported Standard
YCbCr <sub>4:2:2</sub>	10bit	1920×1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
	1280×720	30/29.97/25/24/23.98 /PsF	SMPTE ST 296	
		60/59.94/50/30/29.97/25/24/23.98 /P	SMPTE ST 425-1	

## 3G(DL)-2K video signal formats and standards

Color System	Quantization	Image	Field Frequency / Scanning	Supported Standard
YCbCr <sub>4:2:2</sub>	12bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-3
			48/47.95 /P	-
2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3		
	60/59.94/50 /I	SMPTE ST 274		
YCbCr <sub>4:4:4</sub>	10bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-3
			30/29.97/25/24/23.98 /P	SMPTE ST 2048-2 SMPTE ST 425-3
	2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3	
		60/59.94/50 /I	SMPTE ST 274	
12bit	1920×1080	60/59.94/50 /P	SMPTE ST 2048-2 SMPTE ST 425-3	
		60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3	
RGB 4:4:4	10bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-3
			60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3
	2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3	
		60/59.94/50 /I	SMPTE ST 274	
12bit	1920×1080	60/59.94/50 /P	SMPTE ST 274 SMPTE ST 425-3	
		60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3	
2048×1080	60/59.94/50/48/47.95 /P	SMPTE ST 2048-2 SMPTE ST 425-3		
	60/59.94/50 /I	SMPTE ST 274		

\* When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 μs) between links are automatically corrected.

\* 3G-A and 3G-B-DL links are supported.

## 3G(DL)-4K video signal formats and standards

Color System	Quantization	Image	Frame Frequency / Scanning	Supported Standard
Square YCbCr <sub>4:2:2</sub>	10bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /PsF	-
	4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2048-1	
		30/29.97/25/24/23.98 /PsF	-	
2 sample interleave YCbCr <sub>4:2:2</sub>	10bit	3840×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2048-1
4096×2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2048-1		
	30/29.97/25/24/23.98 /P	SMPTE ST 425-3 SMPTE ST 2048-1		

\* When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 μs) between links are automatically corrected.

\* 3G-B-DS links are supported.

## HD(QL) video signal formats and standards(Square)

Color System	Quantization	Image	Frame Frequency / Scanning	Supported Standard
YCbCr <sub>4:2:2</sub>	10bit	3840×2160	30/29.97/25/24/23.98 /P	-
			30/29.97/25/24/23.98 /PsF	-
	4096×2160	30/29.97/25/24/23.98 /P	-	
		30/29.97/25/24/23.98 /PsF	-	

When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 μs) between links are automatically corrected.

**3G(QL) video signal formats and standards(Square)**

Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10bit	3840x2160	60/59.94/50 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			48/47.95 /P	-
	12bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /PsF	-
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
			30/29.97/25/24/23.98 /PsF	-
YCbCr 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /PsF	-
	12bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /PsF	-
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
			30/29.97/25/24/23.98 /PsF	-
RGB 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /PsF	-
	12bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /PsF	-
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
			30/29.97/25/24/23.98 /PsF	-
XYZ 4:4:4	12bit	4096x2160	30/25/24 /P	SMPTE ST 425-5 SMPTE ST 428
			30/25/24 /PsF	-

**3G(QL) video signal formats and standards(2 sample interleave)**

Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10bit	3840x2160	60/59.94/50 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			48/47.95 /P	-
	12bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
YCbCr 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
	12bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
RGB 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
	12bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
			30/29.97/25/24/23.98 /P	SMPTE ST 425-5 SMPTE ST 2048-1
XYZ 4:4:4	12bit	4096x2160	30/25/24 /P	SMPTE ST 425-5 SMPTE ST 428
			30/25/24 /P	-

\* When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 μs) between links are automatically corrected.

\* 3G-A and 3G-B-DL links are supported.

**6G video signal formats and standards (2 sample interleave)**

Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2081-10
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2081-10

**12G video signal formats and standards (2 sample interleave)**

Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10bit	3840x2160	60/59.94/50 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
			48/47.95/P	-
	12bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10
			30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10
			30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10
YCbCr 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
			30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10
	12bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
			30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
			30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10
RGB 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
			30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10
	12bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
			30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1 SMPTE ST 2082-10
			30/29.97/25/24/23.98 /P	SMPTE ST 2048-1 SMPTE ST 2082-10

\* For 4K 2-Screen Display Off, if you input 12G-SDI signal without the Sync Bit Insertion, the instrument displays "NO SIGNAL" and cannot receive the signal.

**12G(QL) video signal formats and standards(Square)**

Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10bit	7680x4320	60/59.94/50/48/47.95/P	-
		8192x4320	60/59.94/50/48/47.95 /P	-
YCbCr 4:4:4	10bit	7680x4320	30/29.97/25/24/23.98 /P	-
		8192x4320	30/29.97/25/24/23.98 /P	-
RGB 4:4:4	10bit	7680x4320	30/29.97/25/24/23.98 /P	-
		8192x4320	30/29.97/25/24/23.98 /P	-
	12bit	7680x4320	30/29.97/25/24/23.98 /P	-
		8192x4320	30/29.97/25/24/23.98 /P	-

\* 8K video is divided into four parts of 4K size, up, down, left and right, and the 4K size is divided by 2 sample interleave system.

Upper left: LINK1, upper right: LINK2, lower left: LINK3, lower right: LINK4.

**12G(QL) video signal formats and standards(2 sample interleave)**

Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10bit	7680x4320	60/59.94/50/48/47.95/P	SMPTE ST 2082-12
		8192x4320	60/59.94/50/48/47.95 /P	-
YCbCr 4:4:4	10bit	7680x4320	30/29.97/25/24/23.98 /P	SMPTE ST 2082-12
		8192x4320	30/29.97/25/24/23.98 /P	-
RGB 4:4:4	10bit	7680x4320	30/29.97/25/24/23.98 /P	SMPTE ST 2082-12
		8192x4320	30/29.97/25/24/23.98 /P	-
	12bit	7680x4320	30/29.97/25/24/23.98 /P	SMPTE ST 2082-12
		8192x4320	30/29.97/25/24/23.98 /P	-

**12G(DL) video signal formats and standards(2 sample interleave)**

Color System	Quantization	Image	Frame Frequency/Scanning	Supported Standard
YCbCr 4:2:2	10bit	7680x4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-11
		8192x4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-11

## HD video signal formats and standards

Color System	Quantization	Image	Field Frequency /Scanning	Supported Standard
YCbCr 4:2:2	10bit	1280x720	60/59.94/50 /P	SMPTE ST 292-1
			30/29.97/25/24/23.98 /P	SMPTE ST 296
		1920x1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 292-1
		30/29.97/25/24/23.98 /PsF		

## 3G-A, 3G-B-DL video signal formats and standards

Color System	Quantization	Image	Field Frequency /Scanning	Supported Standard
YCbCr 4:2:2	10bit	1920x1080	60/59.94/50/48/47.95 /P	SMPTE ST 274
			48/47.95 /P	SMPTE ST 425-1
		2048x1080	60/59.94/50/48/47.95 /P	SMPTE ST 425-1
				SMPTE ST 2048-2
YCbCr 4:4:4	10bit	1920x1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
			30/29.97/25/24/23.98 /PsF	
		2048x1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2
RGB 4:4:4	10bit	1920x1080	60/59.94/50 /I	SMPTE ST 274
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
			30/29.97/25/24/23.98 /PsF	
			30/29.97/25/24/23.98 /P	SMPTE ST 425-1
		2048x1080	30/29.97/25/24/23.98 /P	SMPTE ST 425-1
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-2

## 3G(DL)-4K video signal formats and standards

Color System	Quantization	Image	Field Frequency /Scanning	Supported Standard
Square YCbCr 4:2:2	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2036-1
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-1
				-
2 sample interleave YCbCr 4:2:2	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3
			30/29.97/25/24/23.98 /P	SMPTE ST 2036-1
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-3
				SMPTE ST 2048-1

## 3G(QL) video signal formats and standards(Square)

Color System	Quantization	Image	Field Frequency /Scanning	Supported Standard
YCbCr 4:2:2	10bit	3840x2160	60/59.94/50 /P	SMPTE ST 425-5
			48/47.95 /P	SMPTE ST 2036-1
		4096x2160	60/59.94/50/48/47.95 /P	SMPTE ST 425-5
				SMPTE ST 2048-1
YCbCr 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	-
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-1
			30/29.97/25/24/23.98 /PsF	-
RGB 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2036-1
		4096x2160	30/29.97/25/24/23.98 /P	-
			30/29.97/25/24/23.98 /PsF	SMPTE ST 425-5
			30/29.97/25/24/23.98 /PsF	SMPTE ST 2048-1
			30/29.97/25/24/23.98 /PsF	-

\*3G-A and 3G-B-DL links are supported.

## 3G(QL) video signal formats and standards(2 sample interleave)

Color System	Quantization	Image	Field Frequency /Scanning	Supported Standard
YCbCr 4:2:2	10bit	3840x2160	60/59.94/50 /P	SMPTE ST 425-5
			48/47.95 /P	SMPTE ST 2036-1
		4096x2160	60/59.94/50/48/47.95 /P	-
				SMPTE ST 425-5
				SMPTE ST 2048-1
YCbCr 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5
			30/29.97/25/24/23.98 /P	SMPTE ST 2036-1
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5
				SMPTE ST 2048-1
RGB 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5
			30/29.97/25/24/23.98 /P	SMPTE ST 2036-1
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 425-5
				SMPTE ST 2048-1

\* 3G-A and 3G-B-DL links are supported.

## 6G video signal formats and standards(2 sample interleave)

Color System	Quantization	Image	Field Frequency /Scanning	Supported Standard
YCbCr 4:2:2	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	SMPTE ST 2081-10
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1
				SMPTE ST 2081-10

## 12G video signal formats and standards(2 sample interleave)

Color System	Quantization	Image	Field Frequency /Scanning	Supported Standard
YCbCr 4:2:2	10bit	3840x2160	60/59.94/50 /P	SMPTE ST 2036-1
			48/47.95 /P	SMPTE ST 2082-10
		4096x2160	60/59.94/50/48/47.95 /P	-
				SMPTE ST 2048-1
				SMPTE ST 2082-10
YCbCr 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	SMPTE ST 2082-10
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1
				SMPTE ST 2082-10
RGB 4:4:4	10bit	3840x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2036-1
			30/29.97/25/24/23.98 /P	SMPTE ST 2082-10
		4096x2160	30/29.97/25/24/23.98 /P	SMPTE ST 2048-1
				SMPTE ST 2082-10

## 12G(QL) video signal formats and standards(2 sample interleave)

Color System	Quantization	Image	Field Frequency /Scanning	Supported Standard
YCbCr 4:2:2	10bit	7680x4320	60/59.94/50/48/47.95/P	SMPTE ST 2082-12
			8192x4320	-
		8192x4320	60/59.94/50/48/47.95 /P	-
YCbCr 4:4:4	10bit	7680x4320	30/29.97/25/24/23.98 /P	SMPTE ST 2082-12
			30/29.97/25/24/23.98 /P	-
		8192x4320	30/29.97/25/24/23.98 /P	-
RGB 4:4:4	10bit	7680x4320	30/29.97/25/24/23.98 /P	SMPTE ST 2082-12
			30/29.97/25/24/23.98 /P	-
		8192x4320	30/29.97/25/24/23.98 /P	-

## 12G(DL) video signal formats and standards(2 sample interleave)

Color System	Quantization	Image	Field Frequency /Scanning	Supported Standard
YCbCr 4:2:2	10bit	7680x4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-11
			8192x4320	-

## Related accessories

### LR2490 Rack Mount Adapter

The LR2490 is a dual rack mount adapter used to install LV5900A waveform monitors into a 19-inch EIA standard rack. It allows two LV5900As to be installed side by side. Applicable model: LV5900A



### LC2190 Blank Panel

The LC2190 is a blank panel for the LR2490 rack mount adapter. It can be used when installing a single LV5900A waveform monitor into the LR2490. Applicable model: LV5900A



### LV7290 REMOTE CONTROLLER

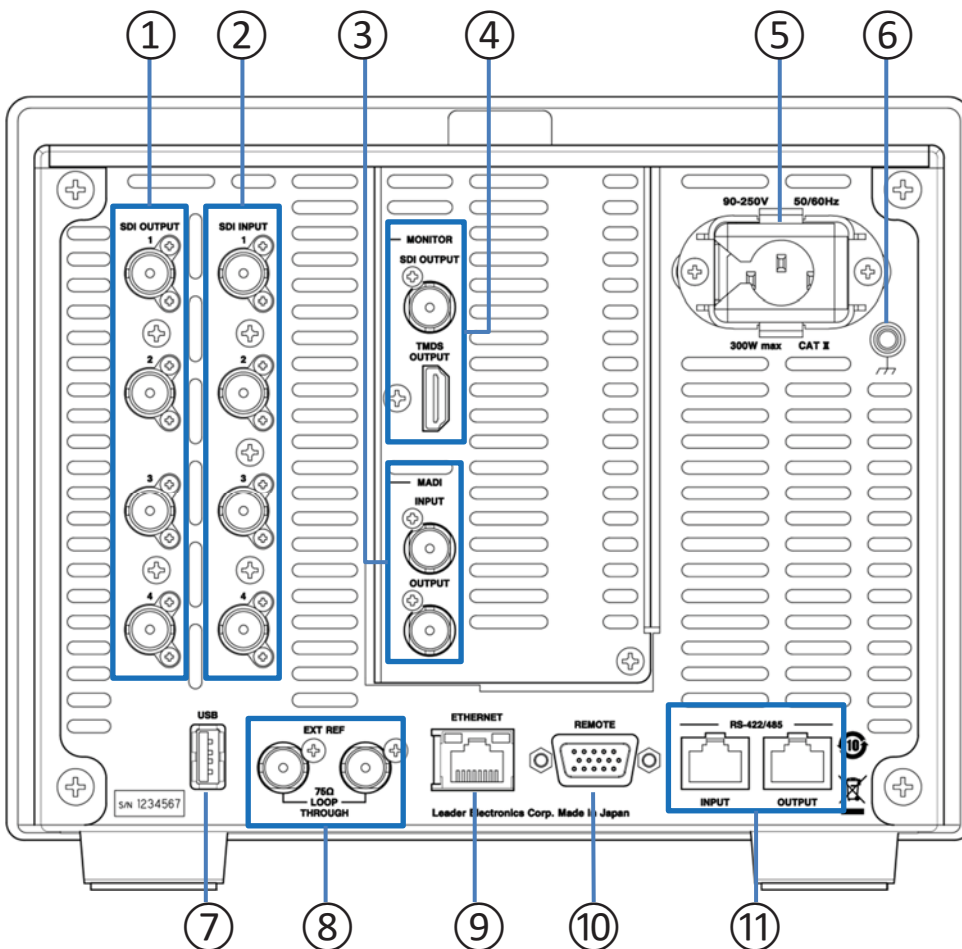
The remote controller LV7290 is used to remotely control either waveform monitors or rasterizers (LV5900A/LV5600/LV5350/LV5300A/LV7600/LV7300/LV7390) via Ethernet. Connection is via ETHERNET on the rear of the product.

One remote controller can be connected to up to 8 waveform monitors or rasterizers. (Note, multiple LV7290s cannot be used with a single monitor or rasterizer.)

Dimensions and weight: 482(W) X44(H) X110(D) mm (excluding protrusions)  
Weight : 1.2 kg



## Rear panel



- 1 SDI OUTPUT
- 2 SDI INPUT
- 3 MADI
- 4 MONITOR
- 5 AC inlet
- 6 Ground terminal
- 7 USB
- 8 EXT REF
- 9 ETHERNET
- 10 REMOTE
- 11 RS-422/485

# Leader

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