



2017 PRODUCT CATALOG

**LEADER**

LEADER ELECTRONICS CORPORATION



Headquarters



LEADER INSTRUMENTS CORP.



JIALONG LEADER (BEIJING) TRADING CO.,LTD.

## Leader Electronics Corp.

Leader Electronics selects and focuses on the professional video area of digital TV, on specialized portions of the consumer electronics area, as well as on the optical disk area for DVD/CDs and on the flat panel display area for LCD in order to achieve effective management. The evolution of electronics is endless and it is the most important technology as there can be no industry without the use of electronics. With experience and history of 64 years, we are committed to being a leading company in the area of test instrumentation so that we can always develop new products that apply to new electronics applications.

Company name

### JAPAN HEADQUARTERS

#### LEADER ELECTRONICS CORP.

2-6-33 Tsunashima-Higashi,  
Kohoku-ku, Yokohama 223-8505, Japan  
Phone: +81-45-541-2123 Fax: +81-45-541-2823  
URL <http://www.leader.co.jp/english>  
E-mail [sales@leader.co.jp](mailto:sales@leader.co.jp)

### U.S.A.

#### LEADER INSTRUMENTS CORP.

80 Seaview Drive, Secaucus, NJ 07094  
PHONE: +1 551 232 3907  
URL <http://www.leaderamerica.com>  
E-mail [sales@leaderamerica.com](mailto:sales@leaderamerica.com)

### BEIJING

#### JIALONG LEADER (BEIJING) TRADING CO.,LTD.

Unit 08,20F Jialong International Tower,  
NO.19,Chaoyang Park road,  
Chaoyang District, Beijing 100125,  
P.R.China  
Zip Code 100125  
PHONE:+86-10-85118606, 85118607  
FAX:+86-10-85118608  
E-mail [beijing@leadercorp.com.cn](mailto:beijing@leadercorp.com.cn)

### SHANGHAI

#### JIALONG LEADER (BEIJING) TRADING CO.,LTD. SHANGHAI BRANCH

ROOM 601 JINHUI BUILDING,  
NO.8 WU ZHONG ROAD,SHANGHAI,  
200336 P.R.CHINA  
PHONE:+86-21-62756905, 62759629  
FAX:+86-21-62751486  
E-mail [shanghai@leadercorp.com.cn](mailto:shanghai@leadercorp.com.cn)

### KOREA

#### LEADER KOREA CO.,LTD.

STXW-TowerNo1005,90,GYEONIN-RO,53-GIL,GURO-SEOUL,  
152-865,Korea  
PHONE:+82-2-2068-2771  
E-mail [sales@leader.co.jp](mailto:sales@leader.co.jp)

### U.K.

#### LEADER ELECTRONICS CORP.

LEADER ELECTRONICS CORP.UK REPRESENTATIVE OFFICE  
6th floor, First Central 200, 2 Lakeside Drive Park Royal London NW10 7FQ, UK  
PHONE: +44-7286-178-752  
PHONE: +44-7552-236-162  
E-mail [sales@leadereurope.com](mailto:sales@leadereurope.com)

### SINGAPORE

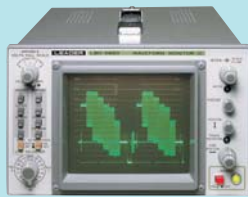
LEADER ELECTRONICS CORP. REPRESENTATIVE OFFICE  
(Singapore) 50 Bukit Batok Street 23, #05-20 Midview Building, Singapore 679578  
PHONE: +65-9429-0237  
E-mail [sales@leader.co.jp](mailto:sales@leader.co.jp)



## Company History



**LSG 100**  
Test Oscillator (1954)



**LBO 5860**  
Waveform Monitor (1981)



**LV 5100D**  
Digital Waveform Monitor (1995)



**LV 5490**  
4K Waveform Monitor (2013)

### May, 1954:

Established Ohmatsu Denki Co., Ltd. Meguro City, Tokyo.

### January, 1959:

Established Ohmatsu Seiko Co., Ltd. spin off from the machinery division of the company.

### August, 1960:

Purchased the land at the current place of Kohoku-ku, Yokohama City due to the business expansion by the development of new products and completed the first phase of construction and moved to this site.

### November, 1963:

Established Osaka Sales Office.

### May, 1966:

Unified the name to LEADER ELECTRONICS CORPORATION.

### August, 1969:

Completion of Osaka Sales Office Building.

### September, 1969:

Established LEADER INSTRUMENTS CORP. as an overseas affiliated company in New York.

### January, 1971:

Established Sendai Sales Office.

### June, 1972:

Established Fukuoka Sales Office.

### October, 1977:

Completion of Northern Kanto Sales Office Building.

### July, 1980:

Established LEADER INSTRUMENTS (H.K.) LTD. as an overseas affiliated company in Hong Kong.

### August, 1981:

Completion of Sendai Sales Office.

### December, 1983:

Completion of Tokai Sales Office.

### May, 1984:

Completion of Fukuoka Sales Office.

### March, 1986:

Built Tsunashima Factory anew.

### November, 1986:

Built Head Office Main Building anew and moved departments of technology and administration there.

### April, 1988:

Established a resident office in England.

### December, 1989:

Established LEADER INSTRUMENTS (EUROPE) LTD. as an overseas affiliated company in England.

### May, 1990:

Established Hokuriku Sales Office.

### November, 1990:

Established Singapore Resident Office in Singapore.

### November, 1991:

Started stock exchange as Japan Securities Dealers Association Quotation System.

### April, 1992:

Established Kanetsu Sales Office.

### April, 1992:

Established Koshin Sales Office.

### July, 1994:

Established LEADER INSTRUMENTS ASIA PTE., LTD. in Singapore.

### April, 1995:

Closed Tokai Sales Office.

### March, 1998:

Certified according to upgraded ISO9001 by International Standardization Organization.

### October, 1999:

Liquidated LEADER INSTRUMENTS (EUROPE) LTD. in Europe.

### March, 2002:

Liquidated LEADER INSTRUMENTS ASIA PTE., LTD. in Singapore.

### April, 2003:

Established Beijing Resident Office in Beijing in China.

### April, 2003:

Established Dong Guan Resident Office of LEADER INSTRUMENTS (HK) LTD., in Dong Guan in China.

### October, 2004:

Established Shanghai Resident Office in Shanghai, China.

### February, 2005

Renewed Head Office Building and merged Research Facility into the head office.

### June, 2006:

Established Service Center in Beijing, China.

### September, 2006:

Established Europe Resident Office in Netherland.

### July, 2014:

Established Singapore Representative office in Singapore

### April, 2015:

Established Leader Electronics Corp. UK Representative Office

### October, 2016:

Established Leader Korea Co.Ltd., in Korea.

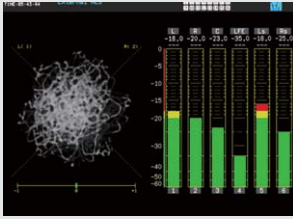


### Audit and Registration of ISO9001, the internal standard for Quality Management Systems

The electronic measuring instrument, the mother tool of electronics, consistently requires the highest technology and quality. The history of LEADER ELECTRONICS CORP. is indeed the history of the pursuit of higher technology and quality. In December 1994, we received an audit and successfully registered ISO9001, the international standard for quality management systems, and furthermore, as our basic policy of product development considering the environment. It gives us great satisfaction to offer products manufactured with outstanding technologies and quality, and moreover, to contribute to society through activities that take into consideration the environment.

# Display Examples

## Audio(Loudness, Lissajous, Level)



for:LV7770,LV5490,LV5480,  
LV7390, V5770A

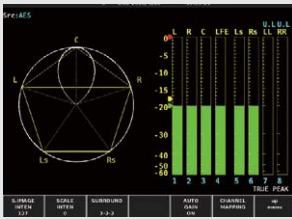


for:LV5838,LV7770,LV5490,  
LV5480,LV7390,LV5770A

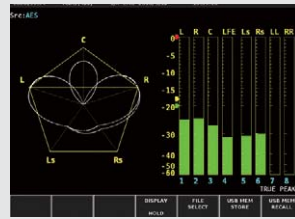


for:LV5490,LV5480,LV7770,  
LV7390,LV5770A

## 5 LEAF(Surround)

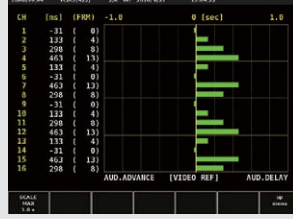


for:LV7770,LV5490,LV5480,  
LV7390,LV5770A



for:LV7770,LV5490,LV5480,  
LV7390,LV5770A

## Lip Sync



for:LV5770A,LV7770

## Cinelite



for:LV5770A,LV5381,LV5333,LV7770,LV7330,LV5490,LV5480,LV7390

## Cinezone



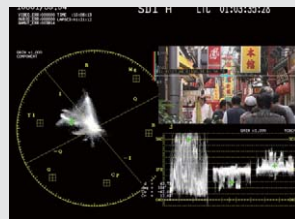
## Cineserch



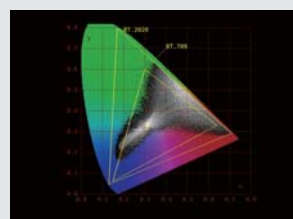
## Cinelite Advanced



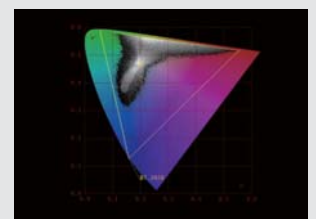
for:LV5381,LV7770,LV5490,LV5480,LV7390,LV5770A



## CIE Chart



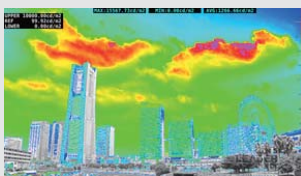
X-Y(CIE1931)



u'-v'(CIE1976)

for:LV5490,LV5480

## HDR



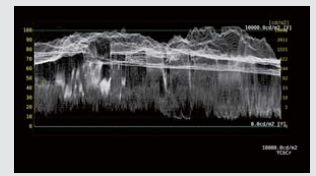
HDR ZONE DISPLAY  
for:LV5490,LV5480,  
LV5333,LV7390



HIGH KEY DISPLAY  
for:LV5490,LV5480

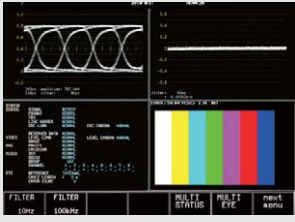


HDR CURSOR MEASUREMENT  
for:LV5490,LV5480

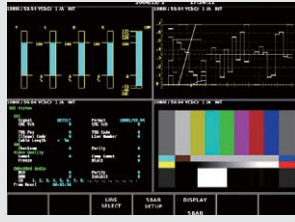


WFM with HDR SCALE  
for:LV5490,LV5480,  
LV5333,LV7390

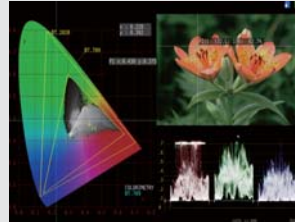
## Multi-Screen



for:LV5770A,LV7770,LV5490,  
LV5480,LV7390



for:LV5770A,LV7770,LV5490,  
LV5480,LV7390



for:LV5490,LV5480

## 4 inputs Picture



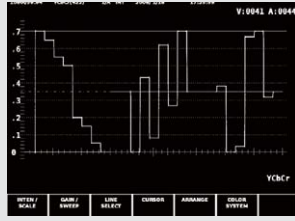
for:LV5381,LV5490,  
LV5480,LV7390

## Closed Caption

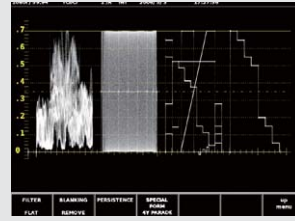


for:LV5770A,LV7770, LV7330,  
LV5490,LV5480

## Waveforms

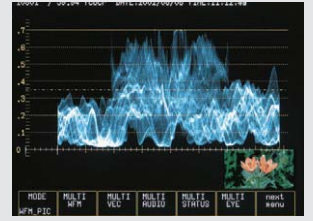


for:LV5770A,LV7770,LV7330,  
LV5381,LV5333,LV5490,  
LV5480,LV7390



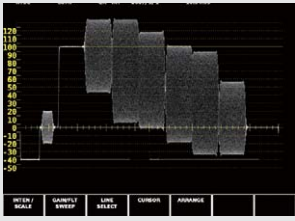
for:LV5381,LV5490,  
LV5480,LV7390

## Waveform/Picture



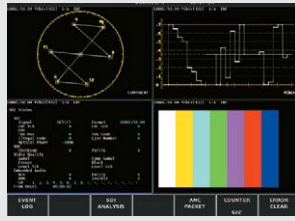
for:LV5770A,LV7770,  
LV5381,LV5333

## Pseudo Composite



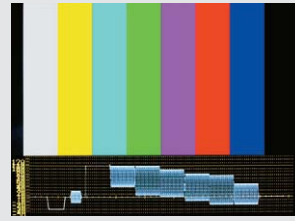
for:LV5770A,LV7770,LV7330,  
LV5381,LV5333,LV5490,  
LV5480,LV7390

## Vector



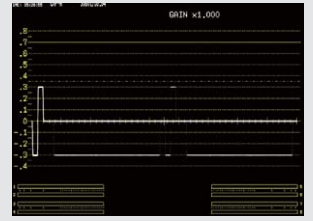
for:LV5770A,LV7770,LV7330,  
LV5381,LV5333,LV5490,  
LV5480,LV7390

## Picture/Waveform



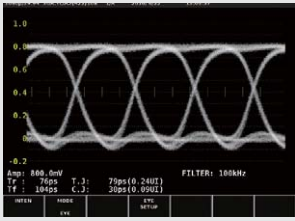
for:LV5770A,LV7770,LV7330,  
LV5381,LV5333,LV5490,  
LV5480,LV7390

## Tri Sync Display

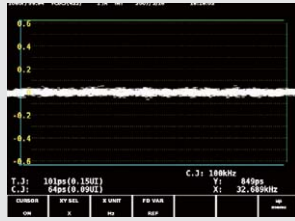


for:LV5770A,LV7770

## EyePattern/Jitter



for:LV5770A,LV7770,  
LV5490,LV5480



for:LV5770A,LV7770,  
LV5490,LV5480

## 5 Bar/Gamut



for:LV5770A,LV7770,LV7330,  
LV5381,LV5333

## AFD



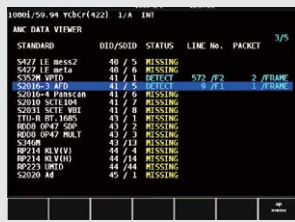
for:LV5770A,LV7770

## Phase



for:LV5770A,LV7770,LV7330,  
LV5381,LV5333,LV5490,  
LV7390

## Anc Data Viewer



for:LV5770A,LV7770,  
LV5490,LV5480,LV7390

## V-ANC



for:LV5770A,LV7770,LV5490,  
LV5480,LV7390

## Aperture



for:LV5381,LV5333,LV5490,  
LV5480,LV7390

### CINELITE

A feature that allows you to put the cross bars on any location of the picture display and view the luminance, RGB levels, and relative exposure at that point.

#### ■ F-Stop Display Mode (relative exposure)

You can easily and accurately measure exposure values directly from the camera signal. This feature is fundamentally different from conventional spot measurement. It is especially useful for making lighting arrangements when filming.

F-stop display based on the active measured position and the 18% reference set

Active Measured

Reference position

F-stop value display based on the reference position and the 18% reference set

F-stop value display based on the difference between the reference position and the active measured position

#### ■ RGB 255 Display

R: 219 G: 83 B: 89

#### ■ RGB % Display Mode

R: 86.2% G: 32.9% B: 35.3%

#### ■ LUMINANCE % Display Mode

44.4%

## CINEZONE

You can achieve a flawless picture when filming. This feature is especially useful for making lighting arrangements. You can easily and accurately confirm dark areas with approximately 5% luminance, areas with approximately 45% of the luminance of the film subject, and bright areas with luminances of 80% or more.

#### ■ CINEZONE Display

UPPER% 99.0 LOWER% 5.0

#### ■ Normal Display

# CINE Search

Displays a specified luminance level  $\pm 0.5\%$  using green on an otherwise monochrome picture display.

## Luminance Search Feature

Luminance at or above Upper% are red.

Luminance at Level% are green.

Luminance at or below Lower% are blue.

MODE LEVEL% UPPER% LOWER%  
SEARCH 42,0 97,5 0,0

Searching for luminance levels is incredibly easy.

### Luminance Search Feature (1)

You can adjust each of the three luminance levels.

109.4 %  
97.5 %  
Luminance at or above Upper% are red.  
Luminance at Level% are green.  
42 %  
Luminance at or below Lower% are blue.  
0 %  
-7.3 %

MODE LEVEL% UPPER% LOWER%  
SEARCH 42,0 97,5 0,0

### Luminance Search Feature (2)

You can adjust each of the three luminance levels.

109.4 %  
93.0 %  
Luminance at or above Upper% are red.  
70 %  
Luminance at Level% are green.  
20 %  
Luminance at or below Lower% are blue.  
-7.3 %

MODE LEVEL% UPPER% LOWER%  
SEARCH 70,0 93,0 20,0

## Adjusting the Luminance Level during Filming

### STEP 1

Step 1: Switch to CineSearch mode.

MODE LEVEL% UPPER% LOWER%  
SEARCH 0,0 100,0 0,0

### STEP 2

Green indicates the luminance specified for LEVEL%.

Step 2: Turn the F.D knob to set the CineSearch level to 42 %.

MODE LEVEL% UPPER% LOWER%  
SEARCH 42,0 100,0 0,0

### STEP 3

or

Step 3: Adjust the camera iris or lighting so that green appears on the face in the luminance search.

### STEP 4

Step 4: The luminance of the green portion is 42 %.

MODE LEVEL% UPPER% LOWER%  
SEARCH 42,0 100,0 0,0

### Change Search level

MODE LEVEL% MODE LEVEL% DE LEVEL% DE LEVEL%  
ARCH 8,3 ARCH 22,0 RCH 70,0 RCH 87,0

In this manner, you can use CineSearch to easily adjust the luminance. This would not be possible on a picture or waveform monitor.

## CINELITE Advanced

Synchronizes the markers on the vector display or waveform display to the measurement points of the CINELITE display's f Stop display or % display.

### Vector Marker

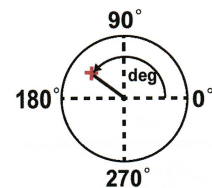


Displays crosshair marker on the vectorscope arbitrarily at any location. It indicates color position for matching multiple cameras in reference to each other. Also, the color phase and color difference signal levels of the marker position are displayed allowing for quick and easy color checks against specific client requirements.

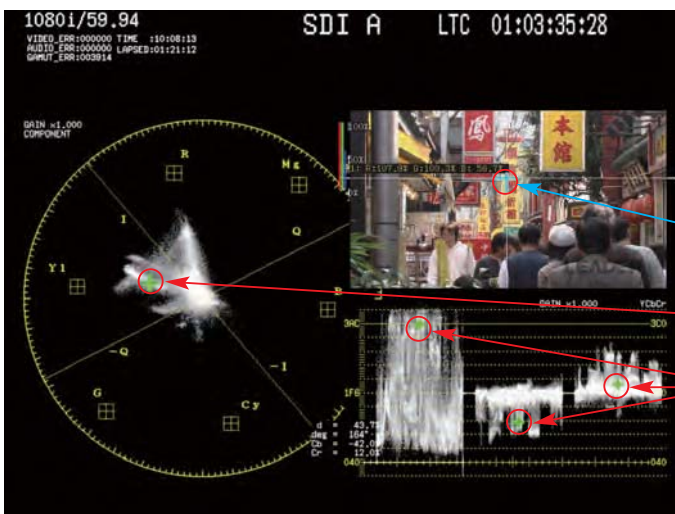
Sets crosshairs marker position



DIGITAL VALUE DISPLAY  
 d (distance)  
 deg (degree)  
 Cb (color difference)  
 Cr (color difference)



### Enhanced CINELITE



Select any point on the picture and see its position on the waveform and vectorscope! Get the measurement in any units you need - from mV to % to f stop and hexadecimal - and also see the equivalent position of the picture point on the waveform and vectorscope.

Sets crosshair marker position on picture



Marker on Vectorscope

Markers on WFM

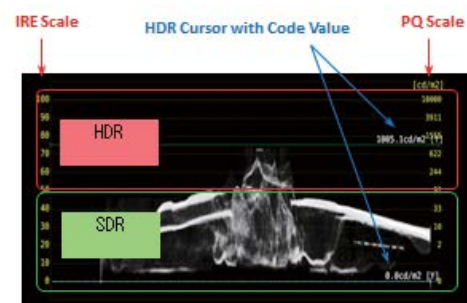
## HDR Measurement

Accepts PQ CURVE, NHK/BBC HLG and SONY SLOG3 with Picture & Waveform Display



HDR Zone Display

- HDR is displayed using Cinezone False Colors
- SDR is displayed in Monochrome
- Upper Level is displayed in Magenta
- Upper, Reference and Lower Levels are variable

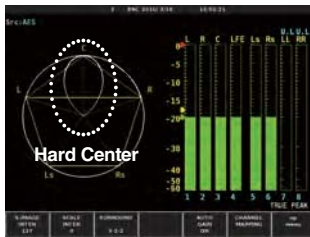


Waveform Display with HDR&SDR



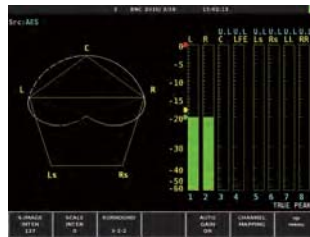
## Surround Display (5 LEAF)

### Hard Center Display

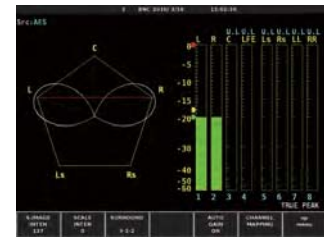


When the difference between the levels of the L and R channels is small and the channels are in phase, the LV 7800 computes and displays the hard center between the two channels.

### Phantom Center Display



When the L and R channels are out of phase, line segment LR is red. Because the channels are out of phase, there is no phantom center.



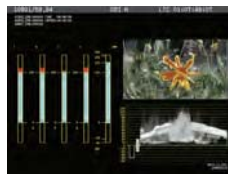
When input is received for the L, R, C, Ls, and Rs channels, an independent hard center is displayed.

## Overview of the 5 Bar Display

### 5 Bar Display Enables the Simultaneous Observation of Digital Broadcasts and Composite Levels

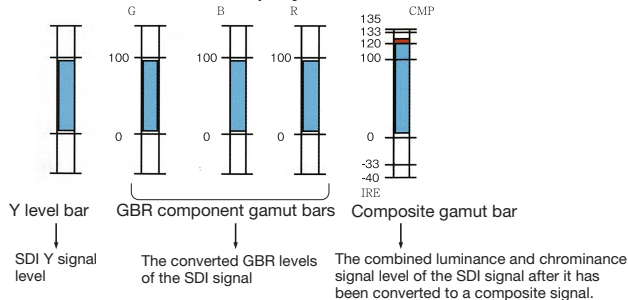
In the 5 bar display, video signal peak levels can be displayed instead of vectors. Five different bars are used to simultaneously display five different levels: luminance (Y), green (G), blue (B), red (R), and composite (COMP). The 5 bar display functions as a mode of the vector display. It is viewable as an alternate display under the vectorscope menu.

The G, B, R, and COMP bars are converted from the SDI Y, C<sub>B</sub>, and C<sub>R</sub> signals using matrix calculation.

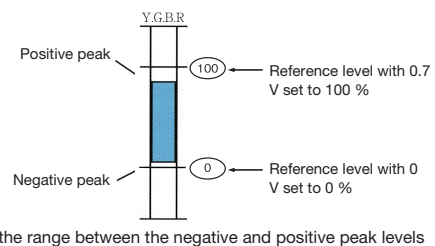


### Bar Display Details

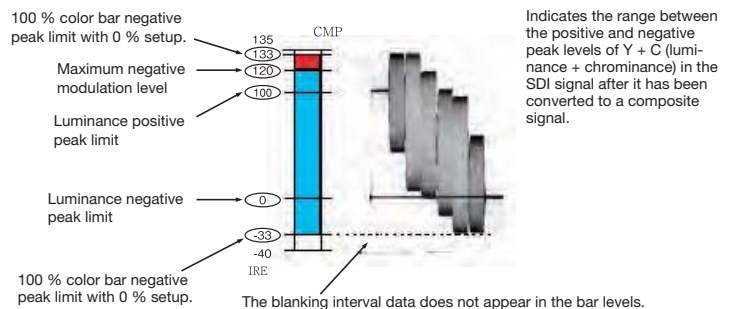
#### Contents of the 5 Bar Display



#### Contents of the Component Bar Display



#### Contents of the Composite Bar Display



## Overview of the SDI-EXT REF Phase Difference Display

### SDI-EXT REF Phase Difference Display

#### Overview

The SDI-EXT REF phase difference display shows the phase differences between an SDI signal and an external sync signal (EXT REF).

#### Features

Graphic and Numeric Displays of SDI and External Sync Signal (EXT REF) Phase Differences

Traditionally, the most common SDI phase adjustment method was to determine the phase difference by switching between an internal and external sync signal and observing the waveform shift. However,

you can view phase differences and adjust phases more easily by using the SDI-EXT REF phase difference display.

#### Relative SDI Signal Phase Differences Are Displayable

By setting a particular SDI-EXT REF phase difference to zero, you can display relative SDI signal phase differences.

#### Store Up to Eight Different Phase Differences

You can store up to eight different phase differences. This allows you to store up to eight different switcher SDI signal phases.

### SDI-EXT REF Phase Difference Display

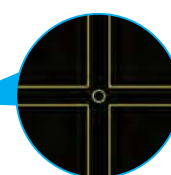
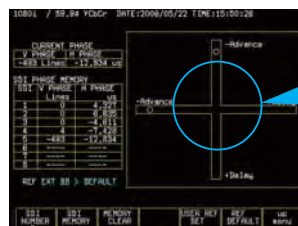
A feature that shows the phase differences between SDI and external sync (EXT REF) signals.

#### Numeric Display

The current phase differences between the applied SDI and EXT REF signals are indicated numerically under CURRENT PHASE.

#### Phase Difference Log

You can store up to eight sets of measured values. This is useful in cases such as when you use a device such as a switcher to change inputs and match phases.



#### Graphic Center

The V marker turns from white to green when it is in the center. The H marker turns from white to green when it is within  $\pm 3$  clocks of the center.

You can readily determine the phase difference between an SDI and external sync (EXT REF) signal through graphic and numeric phase difference representations. You can also determine the phase differences between different SDI signals by setting the difference for one signal to zero.

You can record up to eight phase differences. You can quickly determine the phase differences between multiple inputs.

## LV5490 / LV5480 12G/3G/HD/SD SDI WAVEFORM MONITOR LEADER's First 4K Waveform Monitor

CE  
Upon request



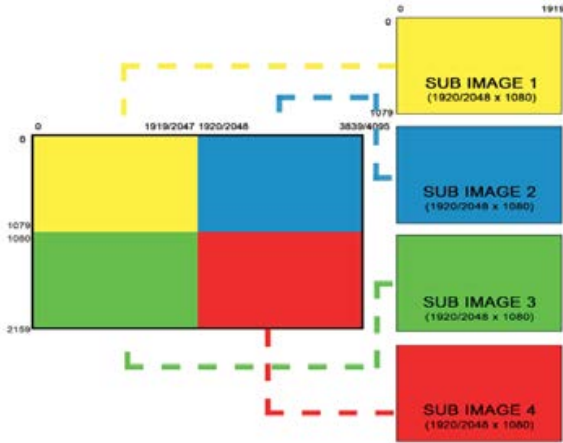
### MAIN FEATURES:

- **4K Video Format:** The LV5490 supports 4K video formats (4096 x 2160 and 3840 x 2160) based on 3G dual link and quad link and HD quad link. Up to four 3G dual link 4K video signals can be displayed by switching.
- **Full High Definition LCD:** The LV5490 is equipped with a 9-inch LCD with excellent viewing angle and color reproduction. It can also be used as a high-quality high definition picture monitor.
- **Customizable Display:** The LV5490 can display not only the video signal waveform, vector waveform, picture, and the like of an input SDI signal simultaneously, but it can also display multiple input signals simultaneously and overlay them for comparison.
- **Eight Inputs and Simultaneous Four Input Display:** The LV5490 has four SDI input connectors compatible with 3G, HD, and SD and can display up to four SDI input signals simultaneously. It also has four additional SDI I/O connectors.
- **CINELITE® II:** Allows to check the luminance levels and distribution on a picture.
- **Equivalent Cable Length Measurement:** The four SDI input connectors are equipped with an equivalent cable length measurement function.
- **Pattern Generator Function with Embedded Audio and Reclock Output:** By using the four SDI I/O connectors as outputs, you can use them as reclock outputs of the SDI signals received through the SDI input connectors. They can also be used as outputs for generating patterns such as color bars. In pattern output, the phase of each SDI output can be varied up to + - 0.5H.
- **External Monitor Output and SDI Routing:** The measurement screen can be output in HD-SDI or DVI-D from the monitor output connector. The output signal can be displayed on an external LCD in full high definition resolution.
- **USB Mouse Operation:** A USB mouse can be used to operate the panel. If the measurement screen is displayed on an external monitor in SDI or DVI-D, you can control the LV5490 by using a USB mouse while viewing the external monitor.
- **SDI Signal Analysis:** The status display also has a feature for detecting CRC and embedded audio errors.
- **Embedded Audio Display:** Embedded Audio can be separated from the SDI signal and shown in Lissajous, surround, and meter displays.
- **Screen Capture:** The LV5490 is equipped with a screen capture feature, which captures the entire display as still-image data. Not only can captured data be displayed by the LV5490, but it can also be compared with an input signal or saved to a USB memory device as bitmap data for viewing on a PC.
- **Frame Capture:** The LV5490 is equipped with a frame capture feature, which captures single frames in an SDI signal.
- **Time Code Display:** The LV5490 can display the LTC or VITC that is embedded in an SDI signal and the D-VITC of an SDI signal.
- **External Remote Connector:** The remote control connector can be used to load presets, switch the input signal, and transmit alarms.
- **Ethernet Port:** By connecting the Ethernet interface to a PC, you can control the LV5490 remotely over TELNET, transfer files over FTP, control the LV5490 remotely and detect errors over SNMP, and control the LV5490 over HTTP.

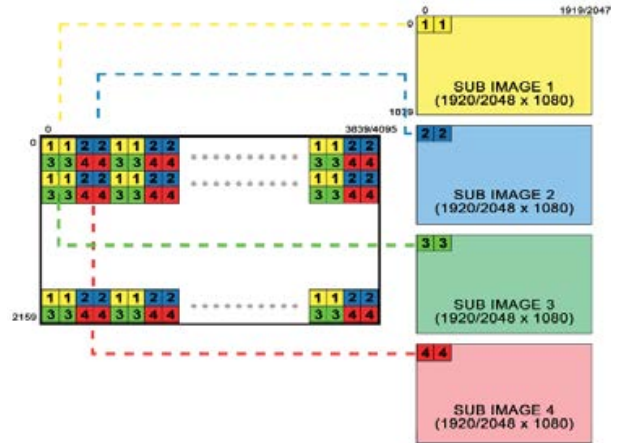
# LV5490 / LV5480 12G/3G/HD/SD SDI WAVEFORM MONITOR

## 4K IMAGE TRANSMISSION

**Square Division Method**  
Full image is divided into four quadrants

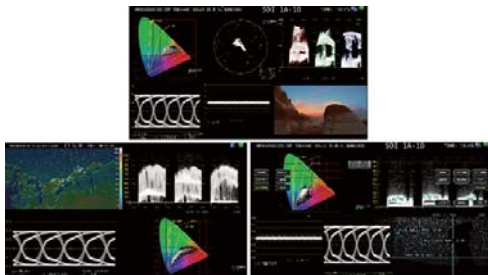


**Two-Sample Interleave Method**  
Two consecutive pixels are sent to one of the four sub-images at a time



## CUSTOMIZABLE FREE USER LAYOUT

User can customize the size of each of the displays within the screen



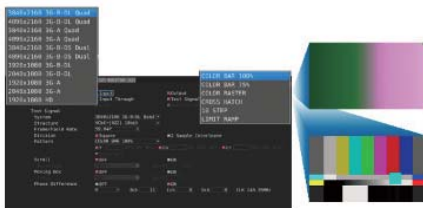
## FREQUENCY DEVIATION MEASUREMENT

Measures the frequency deviation and the field frequency of the input signals

STATUS				
	SIGNAL	SUB IMAGE FORMAT		Freq.
1A CH	DETECT	1920x1080/59.94P	3G-B-DL	-0.0ppm
1B CH	DETECT	1920x1080/59.94P	3G-B-DL	-0.0ppm
1C CH	DETECT	1920x1080/59.94P	3G-B-DL	-0.0ppm
1D CH	DETECT	1920x1080/59.94P	3G-B-DL	-0.0ppm
Cable Embedded Audio				
1A CH	< 10m	[Waveform]		
1B CH	< 10m	[Waveform]		
1C CH	< 10m	[Waveform]		
1D CH	< 10m	[Waveform]		

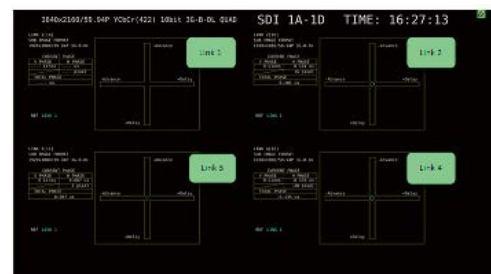
## 4K PATTERN GENERATOR with EMBEDDED AUDIO

Different several 4K and HD video patterns can be generated including embedded audio



## 4-INPUT PHASE DIFFERENCE MEASUREMENT

Allows to measure the phase difference of each 3G-SDI signal



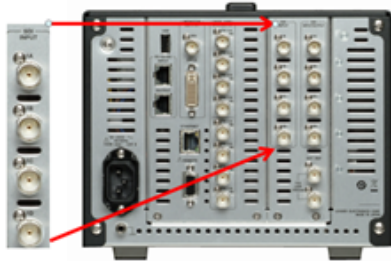
## LV5480 4INPUT 3G/HD/SDI MONITOR



# LV5490 / LV5480 OPTIONS

## SDI Input Option (LV5490SER01)

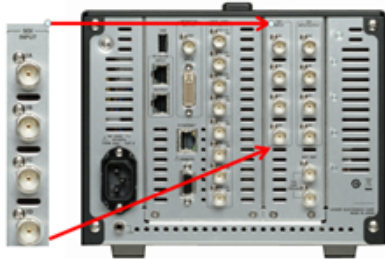
This option allows the monitor input for 4K 3G quad, 4K 3G dual, 4K HD quad, HDX4 and SDX4 of the SDI signal.



SDI Input

## Eye Pattern and Jitter Measurement Option (LV5490SER02)

This option allows the monitor to measure the eye pattern and jitter of the 3G, HD and SD-SDI signal.

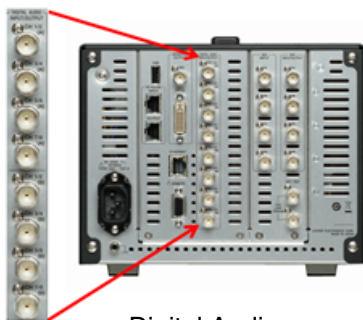


Eye and Jitter

## Digital Audio Option (LV5490SER03)

The Digital Audio option card allows to analyze the audio embedded in the SDI video signal as well as the external audio provided from the 16 audio input channels.

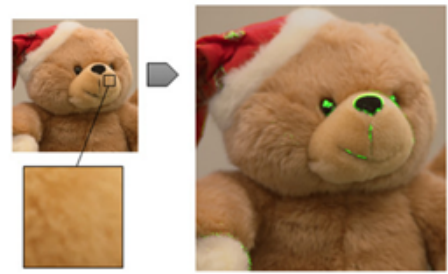
Lissajous curves, Surround Sound, Meter, and Status can be measured and displayed with this option. Event log and channel status are also available.



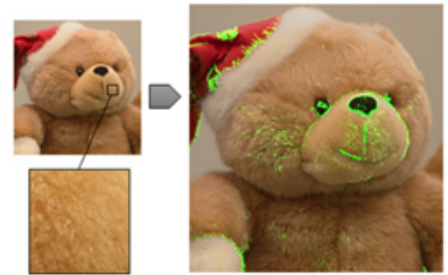
Digital Audio

## Focus Assist Option (LV5490SER04)

Focus Assist is an optional feature of the LV5490. It's best for scenes with low contrast details and facilitates the focusing of details even in small objects. It provides a visual pattern where the specific scene is focused the most.



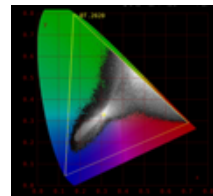
Before Adjustment



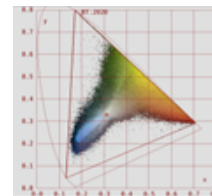
After Adjustment Focus Assist

## CIE 1931 Chromaticity Chart Option (LV5490SER05)

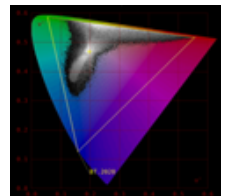
A scene can be represented on the CIE1931 chart, as established on the ITU BT.2020 standard for 4K and 8K signals. This color space is much richer and wider than the one established for HD signals (ITU BT.709). For more information.



xy CIE luminance Chart



xy CIE Color Chart



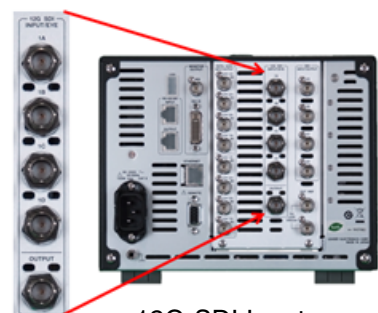
u'v' CIE luminance Chart

## 12G-SDI Input Option (LV5490SER06)

## 12G Eye Pattern and Jitter Measurement Option (LV5490SER09)

This option is an interface card equipped with four 12G-SDI inputs. The card supports 12G-SDI, 3G-SDI quad link, 3G-SDI dual-link and HD-SDI. The card also incorporates a reclocked 12G-SDI output.

12G-SDI eye pattern with jitter measurements will also be available as an option.



12G-SDI Input  
12G Eye and Jitter



# LV5490 / LV5480 SPECIFICATIONS

## ● SDI Format and Standards

### SD video signal formats and standards

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standard
YCbCr 4:2:2	10 bits	720×487 720×576	59.94/I 50/I	SMPTE ST 259

### HD video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Compliant Standard
YCbCr 4:2:2	10 bits	1280×720	60/59.94/50/30/29.97/25/24/23.98/P 60/59.94/50/I	SMPTE ST 292-1 SMPTE ST 274
		1920×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 292-1 SMPTE ST 292-1

### 3G-A video signal formats and standards

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Compliant Standard
YCbCr 4:2:2	10 bits	1920×1080	60/59.94/50/P 48/47.95/P	SMPTE ST 274 SMPTE ST 425-1
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 425-1 SMPTE ST 2048-2
	12 bits	1920×1080	60/59.94/50/I 30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 274 SMPTE ST 425-1 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-1 SMPTE ST 2048-2
YCbCr 4:4:4	10 bits	1280×720	60/59.94/50/30/29.97/25/24/23.98/P 60/59.94/50/I	SMPTE ST 296 SMPTE ST 425-1 SMPTE ST 274
		1920×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-1 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-1 SMPTE ST 2048-2
	12 bits	1920×1080	60/59.94/50/I 30/29.97/25/24/23.98/P	SMPTE ST 274 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-1 SMPTE ST 2048-2

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Compliant Standard
RGB 4:4:4	10 bits	1280×720	60/59.94/50/30/29.97/25/24/23.98/P 60/59.94/50/I	SMPTE ST 296 SMPTE ST 425-1 SMPTE ST 274
		1920×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-1 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-1 SMPTE ST 2048-2
	12 bits	1920×1080	60/59.94/50/I 30/29.97/25/24/23.98/P	SMPTE ST 274 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-1 SMPTE ST 2048-2
		XYZ 4:4:4	12 bits	2048×1080

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

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Compliant Standard
YCbCr 4:2:2	10 bits	1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425-1
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 372 SMPTE ST 425-1 SMPTE ST 2048-2
	12 bits	1920×1080	60/59.94/50/I 30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-1 SMPTE ST 2048-2
YCbCr 4:4:4	10 bits	1920×1080	60/59.94/50/I 30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 372 SMPTE ST 425-1 SMPTE ST 2048-2
		1920×1080	60/59.94/50/I 30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425-1
	12 bits	1920×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 372 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-1 SMPTE ST 2048-2

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Compliant Standard
RGB 4:4:4	10 bits	1920×1080	60/59.94/50/I 30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 372 SMPTE ST 425-1 SMPTE ST 2048-2
	12 bits	1920×1080	60/59.94/50/I 30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 372 SMPTE ST 425-1 SMPTE ST 2048-2
XYZ 4:4:4	12 bits	2048×1080	30/25/24/P 30/25/24/PsF	SMPTE ST 372 SMPTE ST 425-1 SMPTE ST 428

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

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

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Compliant Standard
YCbCr 4:2:2	10 bits	1920×1080	60/59.94/50/I 30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 274 SMPTE ST 425-1 SMPTE ST 425-1
		1280×720	60/59.94/50/30/29.97/25/24/23.98/P	SMPTE ST 296 SMPTE ST 425-1

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

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Compliant Standard
YCbCr 4:2:2	12 bits	1920×1080	60/59.94/50/P 48/47.95/P	SMPTE ST 274 SMPTE ST 425-3
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3
YCbCr 4:4:4	10 bits	1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-3
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3
	12 bits	1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-3
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3

Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Compliant Standard
RGB 4:4:4	10 bits	1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-3
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3
	12 bits	1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-3
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3

\*When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 us) between links are automatically corrected.  
\*3G-A and 3G-B-DL links are supported.

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

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Compliant Standard
Square	YCbCr 4:2:2	10 bits	3840×2160	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-3 SMPTE ST 2036-1
			4096×2160	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425-3 SMPTE ST 2048-1
2 sample interleave	YCbCr 4:2:2	10 bits	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 425-3 SMPTE ST 2036-1
			4096×2160	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 us) between links are automatically corrected.  
\*3G-B-DS links are supported.

HD (QL) video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Compliant Standard
Square	YCbCr 4:2:2	10 bits	3840×2160	30/29.97/25/24/23.98/P	-
				30/29.97/25/24/23.98/P sF	-
			4096×2160	30/29.97/25/24/23.98/P	-
				30/29.97/25/24/23.98/P sF	-

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

3G (QL) video signal formats and standards

Division Transmission System	Color System	Quantization	Image	Frame Frequency/Scanning	Compliant Standard		
Square	YCbCr 4:2:2	10 bits	3840×2160	60/59.94/50/P	SMPTE ST 425-5 SMPTE ST 2036-1		
				48/47.95/P	-		
			4096×2160	60/59.94/50/48/47.95/P	SMPTE ST 425-5 SMPTE ST 2048-1		
				30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1		
			12 bits	3840×2160	30/29.97/25/24/23.98/P sF	-	
					30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1	
		4096×2160	30/29.97/25/24/23.98/P sF	-			
			30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1			
			YCbCr 4:4:4	10 bits	3840×2160	30/29.97/25/24/23.98/P sF	SMPTE ST 425-5 SMPTE ST 2036-1
						30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
					4096×2160	30/29.97/25/24/23.98/P sF	-
						30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
	12 bits	3840×2160			30/29.97/25/24/23.98/P sF	-	
					30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1	
		4096×2160		30/29.97/25/24/23.98/P sF	-		
				30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1		
		RGB 4:4:4		10 bits	3840×2160	30/29.97/25/24/23.98/P sF	SMPTE ST 425-5 SMPTE ST 2036-1
						30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
	4096×2160				30/29.97/25/24/23.98/P sF	-	
	12 bits			3840×2160	30/29.97/25/24/23.98/P sF	SMPTE ST 425-5 SMPTE ST 2048-1	
			30/29.97/25/24/23.98/P		-		
			4096×2160	30/29.97/25/24/23.98/P sF	-		
	XYZ 4:4:4	12 bits	4096×2160	30/25/24/P	SMPTE ST 425-5 SMPTE ST 428		
				30/25/24/P sF	-		

\*When these signals are displayed, phase differences of up to 100 clocks (approx. 0.67 us) between links are automatically corrected.  
\*3G-A and 3G-B-DL links are supported.

12G Video Signal Formats and Standards

Division Transmission System	Color System	Quantization	Image	Frame (Field) Frequency/Scanning	Compliance Standard		
2 Sample Interleave	YCbCr 4:2:2	10bit	3840×2160	60/59.94/50/P	SMPTE ST 2082-10 SMPTE ST 2036-1		
				48/47.95/P	-		
			4096×2160	60/59.94/50/48/47.95/P	SMPTE ST 2082-10 SMPTE ST 2048-1		
				30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2036-1		
			12bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2036-1	
					4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2048-1
		4096×2160		30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2048-1		
				30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2048-1		
		RGB 4:4:4		10bit	3840×2160	30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2036-1
						4096×2160	30/29.97/25/24/23.98/P
			4096×2160		30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2048-1	
					30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2048-1	
	12bit		3840×2160		30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2036-1	
					4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2048-1
			4096×2160	30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2048-1		
				30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2048-1		

\*Supports TYPE1, TYPE2  
\*These specifications are subject to change without notice.

General Specifications

Environmental Conditions	0 to 40 °C
Operating Temperature	85 %RH or less (no condensation)
Operating Humidity Range	10 to 30 °C
Optimal Temperature	Indoors
Operating Environment	Up to 2,000 m
Elevation	II
Overvoltage Category	2
Pollution Degree	
Power Requirements	
Voltage	90 to 250 VAC
Frequency	50/60 Hz
Power Consumption	150 W max.
Dimensions	223 (W) × 172 (H) × 360 (D) mm (excluding protrusions)
Weight	5.6 kg max. (including options, excluding accessories)
Accessories	Power cord.....1 Cover/Inlet stopper.....1 15-pin D-sub connector.....1 15-pin D-sub connector cover.....1 Instruction manual.....1

Mount Example

LR2490 shown with an LV5490 & LC2190 Rackmounted.



LV5490-01 Remote controller



# LV5770A 3G/HD/SD SDI WAVEFORM MONITOR

The New Standard in HD Test



Please use exclusive cabinet for Model LV 5770A (photo-graph shows LR 2427B) The cabinet is sold separately.



- 3G-SDI  
*option*
- HD-SDI  
*option*
- SD-SDI  
*option*
- 3D  
*option*
- 3U size  
*(half Rack)*
- CINE LITE II  
*option*

## Multi Monitor

The LV 5770A is a multi monitor that can be customized with a variety of units to meet your needs. The LV 5770A is highly cost effective because it supports 3G-SDI, HD dual link, HD-SDI, and SD-SDI signals. The LV 5770A has a variety of features including simultaneous monitoring of two SDI signals, SDI signal frame capture, lipsync measurement, Pic Moni Output, Equipped with loudness measurement and a wide variety of other features.

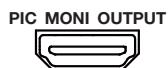
### FEATURES

• **XGA Display and DVI-D Output**

The LCD display is a 6.3-inch XGA screen (the effective resolution is 1024x768). In addition, the screen images are transmitted from a DVI-D connector that supports single link TMDS, so the screen image can be displayed larger than is possible on the LV 5770A through the use of an external LCD monitor display.

• **Pic Moni Output**

The input SDI signal can be generated as a Pic Moni Output signal. (This requires the LV 5770SER08 option or the LV 5770SER09A option.) However, analog composite input (LV 5770SER03A) can-not be generated as a Pic Moni Output signal.



• **Frame Capture and Screen Capture Features**

The LV 5770A is equipped with a frame capture feature, which captures single frames in an SDI signal. Frames can be captured manually or automatically when errors occur. This feature is suitable for performing data analysis when errors occur. The LV 5770A is also equipped with a screen capture feature, which captures the entire display as still-image data.

• **External Control Connectors**

The LV 5770A has two external control connectors: an Ethernet port and a remote control connector. The Ethernet interface can be used to control the LV 5770A remotely over TELNET, HTTP, perform file transfers over FTP, control the LV 5770A remotely and detect errors over SNMP, as well as perform other operations all from the connected PC. The remote control connector can be used to load presets, switch the input signal, and transmit errors.

• **Headphone Output (6.3 mm)**

The headphone jack can be used to monitor audio. (This requires the LV 5770SER41/43 optional unit.)

LV 5770SER08 SDI INPUT
The 3G, HD dual link, HD, and SD-SDI formats are supported. Two inputs can be displayed overlaid or side by side. Two input SDI signals can be generated from two outputs. Also, input A or B, whichever is selected, can be generated as a Pic Moni Output signal.
LV 5770SER09A SDI INPUT/EYE
In addition to the LV 5770SER08 features, eye patterns can also be displayed. (The eye pattern display can be used on one of the two input SDI signals that you select.)
LV 5770SER41 DIGITAL AUDIO (Loudness)
Embedded audio and external digital audio are supported. Loudness Measurement for One Signal (The eight I/O connectors—16 channels—are switched between input and output in groups of four connectors—8 channels.)
LV 5770SER42 ANALOG AUDIO
Up to 8 channels of analog audio are supported. (The LV 5770A must be combined with the LV 5770SER41/43)
LV 5770SER43 DIGITAL AUDIO (Loudness with 8ch LevelMeter)
16 channel Digital Audio input Loudness Measurement for Two Signals
LV 5770SER03A TRI SYNC COMPOSITE
TRI SYNC and composite signals are supported.


• **Field Frequency Deviation Display (Factory Option)**

The LV 5770SER08 and LV 5770SER09A cannot be installed in the LV 5770A at the same time.

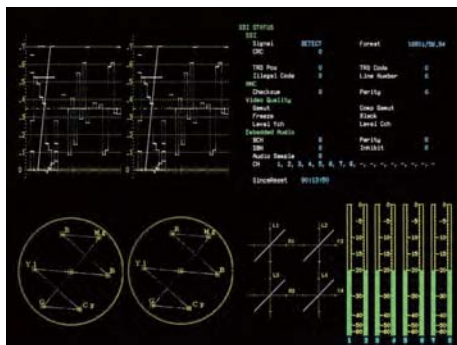


# LV 5770A SPECIFICATIONS

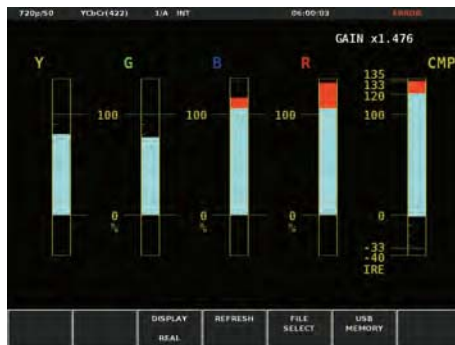
<b>Video Output Connectors</b> <b>DVI-D Output Connector</b> <b>Output Connector</b> <b>Output Signal</b> <b>Resolution</b> <b>Signal Format</b> <b>Pic Moni Output Connector</b> <b>Output Connector</b> <b>Output Signal</b> <b>Audio</b>	One DVI-D connector Digital signal of the LCD display XGA (1024x768) Single link TMDS Selected SDI input (channel A or B) generated as Pic Moni output SDI embedded audio channels 1 to 8 embedded in HDMI signals (LPCM only) * Analog composite input (LV 5770SER03A) cannot be generated as a Pic Moni Output signal. * 720p/24, 1080PsF/30, 1080PsF/29.97, 1080PsF/25, 1080PsF/24, 1080PsF/23.98, 1080p (2048 1080)/24, 1080p (2048 1080)/23.98, 1080PsF (2048 1080)/24, and 1080PsF (2048 1080)/23.98 are not supported.
<b>Control Connectors</b> <b>USB Port</b> <b>Specification</b> <b>Supported Media</b> <b>Ethernet Port (Future)</b> <b>Compliant Standard</b> <b>Supported Protocols</b> <b>I/O Connector</b> <b>Types</b> <b>Remote Control Connector</b> <b>Control Connector</b>	USB 2.0 Only USB memory devices are supported. IEEE802.3 TELNET, FTP, SNMP, HTTP, SNTp RJ-45 10Base-T, 100Base-TX 15-pin D-sub (female)
<b>LCD</b> <b>LCD Type</b> <b>Display Format</b> <b>Backlight Brightness Switch</b> <b>Auto Shutoff</b>	6.3-inch color TFT XGA. The effective resolution is 1024x768. High and low LCD can be automatically turned off after a set period of time.
<b>Screen Capture</b> <b>Function</b> <b>Display</b> <b>Media</b> <b>Data Output</b> <b>Format</b> <b>Data Input</b>	Captures the display Displays only the captured image or overlays the captured image over the input signal Internal memory (RAM) and USB memory Only one screen capture can be stored in the internal memory. Screen captures can be saved as bitmap files to USB memory, or they can be saved in a file format that the LV 5770A can load. TIF, DPX Data saved to USB memory can be loaded and displayed on the LV 5770A.

<b>Presets</b> <b>Presets</b> <b>Number of Presets</b> <b>Copying</b>	All panel operations can be stored in memory(*1) 60 Preset configurations can be copied as a group to or from USB memory. *1 The power on/off status
<b>Alarm Output</b> <b>Display</b> <b>Remote Control Connector</b>	The fan alarm indication is displayed when the fan stops rotating. When an error occurs or the fan stops rotating, a signal is transmitted from the remote control connector to indicate this.
<b>Front Panel</b> <b>Key LEDs</b> <b>Power Switch</b> <b>Last Memory</b>	All keys are constantly dimly lit. The selected key lights more brightly. Electronic switch (which remembers whether the instrument is on or off) Backs up the panel settings to memory
<b>Environmental Conditions</b> <b>Operating Temperature</b> <b>Operating Humidity</b> <b>Operating Environment</b> <b>Operating Altitude</b> <b>Overvoltage Category</b> <b>Pollution Degree</b>	0 to 40 °C 85 %RH or less (no condensation) Indoors Up to 2,000 m II 2
<b>Power Requirements</b> <b>Voltage</b> <b>Power Consumption</b>	90 to 250 VAC, 50 Hz/60 Hz 120 Wmax.
<b>Dimensions and Weight</b>	215 (W) x 133 (H) x 435 (D) mm (excluding protruding parts) 8 1/2(W) x 5 1/4(H) x 17 1/8(D) inch Approx. 4 kg (8.8 lbs.; excluding options and accessories)
<b>Accessories</b>	Instruction manual . . . . . 1 Power cord . . . . . 1 Cover/inlet stopper . . . . . 1 Rack-mount, ANSI screw . . . . . 2 15-pin D-sub connector . . . . . 1 15-pin D-sub connector cover . . . . . 1
<b>Option Sold Separately</b> <b>Cabinet</b> <b>Rack mount adapter</b> <b>Remote Controller</b>	LR 2427B (with handle) LR 2404A (without handle) LR 2770A LV 7770-01 

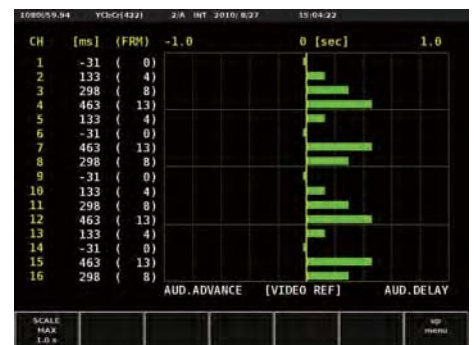
## Display Examples



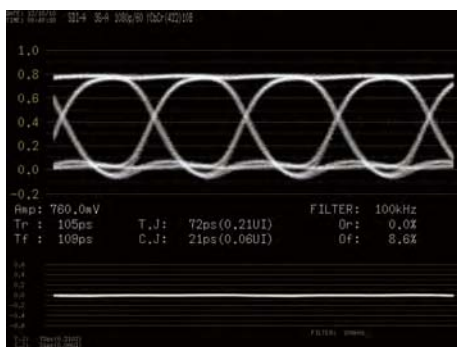
2-channel simultaneous display (with the LV 5770SER08, LV 5770SER09A, and LV 5770SER41/43 installed)



5 bar display (with the LV 5770SER08 and LV 5770SER09A installed)



Lip sync display (when the LV 5770SER41 and LT 4600 are installed)



Eye pattern display (with the LV 5770SER09A installed)

## REAR PANEL



Example of an LV 5770A with an LV 5770SER03A, LV 5770SER09A, LV 5770SER41, and LV 5770SER42 installed. (Connect Pic Moni Output to a monitor that supports HDMI input.)

## FEATURES

### • Two-Channel Simultaneous Display

The LV 5770A is equipped with a pair of SDI input connectors that support 3G-SDI, HD dual link, HD-SDI, and SD-SDI signals. The two input signals can be displayed simultaneously. Even when one of the input signals is not being displayed, the LV 5770A still monitors the undisplayed signal for errors. In addition, the LV 5770A is equipped with SDI output connectors that can generate serial reclocked SDI signals from the input SDI signals. The A/B output connector generates the reclocked signal of the SDI signal applied to channel A or channel B. The output that is generated from this connector is switched between the two channels whenever an input key (A or B) is pressed.

### • Rich Assortment of Display Features

Not only does the LV 5770A have essential displays for video signal quality monitoring, such as a video signal waveform display and a vectorscope display, it also has a rich assortment of other display features such as a picture display, 5-bar display, and status display.

### • Wide Variety of Display Formats

In the video signal waveform display, vectorscope display, and picture display, the LV 5770A can display up to two input SDI signals on top of each other or side by side. This makes it suitable for adjusting the gain and black balance values of two video signals. In the video signal waveform and vectorscope displays, the LV 5770A can make different input channels easier to see by displaying them using different colors.

**• Extremely Flexible Display Layouts (When optional units are installed)** The 1-screen display feature can be used to show each of the different displays on a single screen, or the 4-screen multi display feature can be used to divide the screen into four areas with a different display shown in each area. The video signal waveform display picture display audio level meter display, and histogram display can be shown on the 1-screen display.

### • Frame Capture and Screen Capture Features

The LV 5770A is equipped with a frame capture feature, which captures single frames of an SDI signal. Captured frame data can be displayed as still-image data on the video signal waveform, vectorscope, and picture displays. In addition, this data can be saved to a USB memory device. The LV 5770A is also equipped with a screen capture feature, which captures the entire display as still-image data.

### • Picture Monitor Output

The input SDI signal can be generated as an 8-bit signal. Regardless of the SDI input signal, the output format can be set to YCbCr4:2:2, YCbCr4:4:4, or RGB4:4:4. The signal can also be generated in 8 bits, 10 bits, or 12 bits.

### • SDI Signal Data Analysis Feature

On the status display, SDI signal transmission errors and various errors related to the embedded audio signal and ancillary data can be detected. The LV 5770A has event log, data dump, and external sync signal and SDI signal phase difference display features for analyzing SDI signals. Ancillary data can be displayed along with the embedded line numbers and numbers of the corresponding standards in a list. A variety of detailed ancillary data analyses can be displayed.

### • Timecode Display

The LV 5770A can display the LTC or VITC timecode that is embedded in an SDI signal and the D-VITC timecode of an SD-SDI signal. The timecode can also be used as the time stamp in the event log.

### • Superimposing Closed Caption Data

The closed caption data (EIA-608, EIA-708, VBI) that is embedded in an SDI signal can be superimposed on the picture display.

### • Standard-Equipped CINELITE II

The CINELITE feature makes it easy to manage the levels of specific points on the picture display. This is useful for adjusting the gain of multiple cameras through the use of the same reference-point. The CINEZONE feature makes it possible to check the luminance distribution of the whole picture display at a glance.



CINELITE Display



CINEZONE Display

### • 3D Assist Option

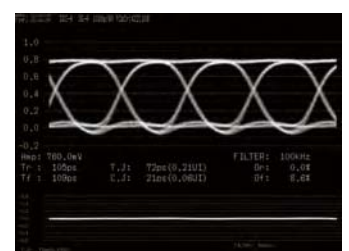
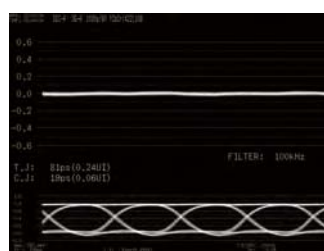
3D video signals can be evaluated by applying the video signal for the left eye to channel A and the video signal for the right eye to channel B. The available picture display formats are anaglyph, con-vergence, overlay, and wipe.

## LV 5770SER09A

### • Eye Pattern and Jitter Measurement Display

The LV 5770A can display the eye pattern and jitter waveforms of 3G-SDI, HD dual link, HD-SDI, and SD-SDI signals.

An eye pattern's amplitude, rise time, fall time, timing jitter, current jitter, overshoot of the rising edge, and overshoot of the falling edge can be measured automatically.



Eye Pattern and Jitter Display (LV 5770SER09A installed)

# SPECIFICATIONS

SDI Video Signal Formats and Standards				
SD-SDI Video Signal Formats and Standards				
Color System	Quantization	Scanning	Frame (Field) Rates	Standard Supported
Y, C <sub>B</sub> , C <sub>R</sub> 4:2:2	10 bit	525i	59.94	SMPTE ST 259
		625i	50	
HD-SDI Video Signal Formats and Standard				
Color System	Quantization	Scanning	Frame (Field) Rates	Standard Supported
Y, C <sub>B</sub> , C <sub>R</sub> 4:2:2	10bit	1080i	60/59.94/50	SMPTE ST 274 SMPTE ST 292
		1080p	30/29.97/25/24/23.98	
		1080PsF	30/29.97/25/24/23.98	SMPTE ST 296 SMPTE ST 292
		720p	60/59.94/50 30/29.97/25/24/23.98	
HD Dual Link Video Signal Formats and Standards				
Color System	Quantization	Scanning	Frame (Field) Rates	Standard Supported
Y, C <sub>B</sub> , C <sub>R</sub> 4:2:2	10 bit	1080p	60/59.94/50	SMPTE ST 372 (1920 X 1080)
		1080p	30/29.97/25/24/23.98	
	12 bit	1080PsF	60/59.94/50	
Y, C <sub>B</sub> , C <sub>R</sub> 4:4:4	10 bit	1080p	30/29.97/25/24/23.98	
		1080PsF	30/29.97/25/24/23.98	
	12 bit	1080i	60/59.94/50	
RGB 4:4:4	10 bit	1080p	30/29.97/25/24/23.98	
		1080PsF	60/59.94/50	
		1080i	60/59.94/50	
	12 bit	1080p	30/29.97/25/24/23.98	
		1080psF	60/59.94/50	
		1080p	24/23.98	
		1080psF		(2048 x 1080)

\* When these signals are displayed, phase differences of up to 100 clocks (approx. 1.4 μs) between links A and B are automatically corrected. If links A and B are not synchronized, the various error detection features that are shown on the status display do not operate correctly.

3G-SDI Level B Dual-Link Video Signal Formats and Standards				
Color System	Quantization	Scanning	Frame (Field) Rates	Standard Supported
Y, C <sub>B</sub> , C <sub>R</sub> 4:2:2	10 bit	1080p	60/59.94/50	SMPTE ST 424 SMPTE ST 425
		1080p	30/29.97/25/24/23.98	
	12 bit	1080PsF	60/59.94/50	
Y, C <sub>B</sub> , C <sub>R</sub> 4:4:4	10 bit	1080p	30/29.97/25/24/23.98	
		1080PsF	60/59.94/50	
	12 bit	1080p	30/29.97/25/24/23.98	
RGB 4:4:4	10 bit	1080p	30/29.97/25/24/23.98	
		1080PsF	60/59.94/50	
		1080i	60/59.94/50	
	12 bit	1080p	30/29.97/25/24/23.98	
		1080psF	60/59.94/50	
		1080p	24/23.98	
		1080psF		(2048 x 1080)

3G-SDI Level B Dual Stream and Standards				
Color System	Quantization	Scanning	Frame (Field) Rates	Standard Supported
Y, C <sub>B</sub> , C <sub>R</sub> 4:2:2	10bit	1080i	60/59.94/50	SMPTE ST 424 SMPTE ST 425
		1080p	30/29.97/25/24/23.98	
		1080PsF	60/59.94/50	
		720p	30/29.97/25/24/23.98	

<b>Ancillary Data Standard Format Setting Automatic</b> <b>3G-SDI and HD Dual Link</b>	SMPTE ST 291 Automatic and manual
	The LV 5770A detects the format information within the payload ID (SMPTE ST 352) and automatically sets the format.
<b>HD-SDI and SD-SDI</b>	The LV 5770A determines the format from the input signal's synchronization information and automatically sets the format.
	The video signal format is set manually.
<b>Manual:</b>	

<b>Embedded Audio Playback Method (When an LV 5770 SER41 is installed)</b> <b>Standard Supported</b>	SMPTE ST 299 (HD-SDI, HD dual link, 3G-SDI) SMPTE ST 272 (SD-SDI)
<b>Format</b>	LPCM, Dolby-E (factory option), Dolby-Digital (factory option)
<b>Quantization</b>	24 bits
<b>Clock Generation</b>	Generated from the video clock
<b>Synchronization</b>	All audio channels must be synchronized to the video clock. In simul mode, channels A and B must be synchronized.
<b>Channel Separation</b>	2 groups—8 channels—can be selected (channels A and B can be mixed)

<b>Input/Output Connectors</b> <b>SDI Input</b> <b>Input Connectors</b>	BNC connector 2 connectors 2 inputs (channels A and B) in HD-SDI, SD-SDI, and 3G-SDI modes 1 input (link A or B) in HD dual link mode
<b>Input Impedance</b> <b>Input Return Loss</b>	75 Ω ≥ 15 dB (5 MHz to 1.485 GHz) ≥ 10 dB (1.485 to 2.97 GHz)
<b>Maximum Input Voltage</b> <b>SDI Output</b> <b>Output Connectors</b> <b>Output Signal</b>	±2 V (DC + peak AC) BNC connector 2 connectors Serial reclocked input SDI signal 1 output (switchable between channels A and B) in HD-SDI, SD-SDI, and 3G-SDI modes 1 output fixed to channel B 1 output (link A or B) in HD dual link mode
<b>Output Impedance</b> <b>Output Voltage</b> <b>Output Return Loss</b>	75 Ω 800 mVp-p ± 10 % (into 75 Ω) ≥ 15 dB (5 MHz to 1.485 GHz) ≥ 10 dB (1.485 to 2.97 GHz)

<b>External Sync Signal Input Connectors</b> <b>Input Connectors</b> <b>Input Signal</b> <b>Input Impedance</b> <b>Maximum Input Voltage</b>	1 pair of BNC connectors Tri-level sync or NTSC/PAL black burst signal 15 kΩ passive loop-through ±5 V (DC + peak AC) * If the video signal waveform is displayed using an external sync signal as the reference, inserting or removing an SDI signal or restarting the
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	device may cause the waveform phase to be off by one clock.
<b>Main Display Features</b>	
<b>Input</b>	SDI input
<b>Input Mode</b>	Single input mode and simul mode (Only single input mode is available for HD dual link signals or when the composite option is installed.)
<b>Single Input Mode</b>	Displays a single input signal
<b>Simul Mode</b>	Displays up to two input SDI signals simultaneously
<b>3G-SDI 2 Mapping Mode</b>	Splits a 3G-SDI signal into two HD-SDI signals and displays them simultaneously
<b>Simul Mode Display Format</b>	Mixed, tiled, aligned (differs depending on the displayed contents)
<b>3G-SDI 2 Mapping Mode Display Format</b>	The same as the simul mode display format
<b>Mixed Display</b>	Two input signals are displayed on top of each other.
<b>Tiled Display</b>	Two input signals are displayed in separate areas.
<b>Aligned Display</b>	Two input signals are displayed side by side.
<b>Display Size</b>	1-screen display, 2-screen display, 4-screen display
<b>1-Screen Display</b>	Displays a single, large screen (the thumbnail display can be turned on and off)
<b>2-Screen Display</b>	Splits the display into two screens (left and right)
<b>4-Screen Display</b>	Splits the display into four screens
<b>Waveform Display</b>	
<b>Simul Mode Display Format</b>	Mixed, aligned
<b>Waveform Operations</b>	
<b>Display Mode</b>	
<b>Overlay</b>	Displays component signals overlaid
<b>Parade</b>	Displays component signals side by side
<b>Blanking Interval</b>	H and V blanking periods can be masked.
<b>RGB Conversion</b>	Converts a Y,CB,CR signal into an RGB signal and displays the result
<b>Pseudo-Composite Display</b>	Digitally converts component signals into composite signals and displays the result
<b>Channel Mapping</b>	On the RGB conversion display, the order can be set to GBR order or RGB order.
<b>Line Select</b>	Displays the selected line
<b>Display Colors</b>	Seven colors to choose from; a different color for each input channel
<b>Vertical Axis</b>	
<b>Gain</b>	x1 or x5
<b>Variable Gain</b>	x0.2 to x2.0
<b>Amplitude Accuracy</b>	±0.5 %
<b>HD-SDI</b>	
<b>Y Signal</b>	±0.5 % for 1 to 30 MHz
<b>C<sub>b</sub>C<sub>r</sub> Signal</b>	±0.5 % for 0.5 to 15 MHz
<b>Low-Pass Attenuation</b>	≥ 20 dB (at 20 MHz)
<b>SD-SDI</b>	
<b>Y Signal</b>	±0.5 % for 1 to 5.75 MHz
<b>C<sub>b</sub>C<sub>r</sub> Signal</b>	±0.5 % for 0.5 to 2.75 MHz
<b>Low-Pass Attenuation</b>	≥ 20 dB (at 3.8 MHz)
<b>Horizontal Axis</b>	
<b>Line Display</b>	x1, x10, x20, ACTIVE, or BLANK
<b>Field Display</b>	x1, x20, or x40
<b>Cursor Measurement</b>	
<b>Composition</b>	Horizontal Cursors: 2 (REF and DELTA) Vertical Cursors: 2 (REF and DELTA)
<b>Amplitude Measurement</b>	mV, %, R%, DEC, HEX
<b>Time Measurement</b>	Second display
<b>Frequency Display</b>	Computes and displays the frequency with the length of one period set to the time between two cursors
<b>Scale</b>	
<b>Types</b>	% scale, V scale, decimal scale, hexadecimal scale
<b>Display Colors</b>	Seven colors to choose from
<b>Thumbnail Display</b>	Picture, audio level meter (when an LV 5770SER41/43 is installed)
<b>Vectorscope Display</b>	
<b>Simul Mode Display Format</b>	Mixed, tiled
<b>Display Colors</b>	Seven colors to choose from; a different color for each input channel
<b>Blanking Interval</b>	Masked(*)
<b>Pseudo-Composite Display</b>	Artificially converts component signals into composite signals and displays the result
<b>Line Select</b>	Displays the selected line
<b>Gain</b>	x1, x5, IQ-MAG
<b>Variable Gain</b>	x0.2 to x2.0
<b>Amplitude Accuracy</b>	±0.5 %
<b>Scale</b>	

<b>Types</b>	ITU-R BT.601, ITU-R BT.709, AUTO
<b>Color Bar Saturation</b>	75 %, 100 %
<b>IQ Axis</b>	Show or hide
<b>Display Colors</b>	Seven colors to choose from
<b>Thumbnail Display</b>	Picture, audio level meter (when an LV 5770SER41 is installed), histogram * On the multi-screen display, the blanking period depends on the video signal waveform display's blanking display settings.
<b>5-Bar Display</b>	
<b>Simul Mode Display Format</b>	Tiled only
<b>Function</b>	Converts an SDI signal into Y, R, G, B, and composite values and then displays the five peak levels
<b>Scale</b>	mV, %
<b>Error Level</b>	Based on the gamut error, composite gamut error, and luminance error thresholds
<b>Line Select</b>	Displays the selected line
<b>Thumbnail Display</b>	Picture, audio level meter (when an LV 5770SER41/43 is installed)
<b>Picture Display</b>	
<b>Simul Mode Display Format</b>	Mixed, tiled
<b>Quantization</b>	8 bits
<b>Display Size</b>	Fit, full frame, real, x2
<b>Frame Rate</b>	The frame rate is converted and displayed using the internal sync signal.
<b>Aspect Marker Display</b>	
<b>HD-SDI</b>	4:3, 13:9, 14:9, 2.39:1
<b>SD-SDI</b>	13:9, 14:9, 16:9
<b>Aspect Marker Format</b>	Line, shadow (99 levels), black
<b>Safety Marker Size</b>	ARIB TR-B4, SMPTE ST RP-218, user-defined
<b>Line Select</b>	Marks the selected line
<b>AFD Display</b>	Displays abbreviations for SMPTE ST 2016 standard AFD codes
<b>Gamut Error Display</b>	Displays gamut error locations over the picture
<b>Superimpose</b>	Displays closed captions over the picture *1
<b>Standard Supported</b>	EIA-708, EIA/CEA-608-B (EIA-708-B) SMPTE ST 334, EIA/CEA-608-B (EIA/CEA-608-B) SMPTE ST 334, VBI (EIA/CEA-608-B Line 21) CIA/EIA-608-B
<b>CINELITE II Display</b>	Displays the luminance information on the picture display
<b>Thumbnail Display</b>	Video signal waveform, audio level meter (when an LV 5770SER41/43 is installed) *1 The closed caption display is not supported when the input signal is 3G-SDI or HD dual link.
<b>Status Display</b>	
<b>Signal Detection</b>	Detects the presence of an SDI signal
<b>Format Display</b>	Displays the video signal format
<b>Embedded Audio Channel</b>	Displays the embedded audio channel numbers *2
<b>SDI Signal Error Detection</b>	
<b>CRC Error</b>	Detects transmission errors of 3G-SDI, HD-SDI, and HD dual link signals
<b>EDH Error</b>	Detects transmission errors of SD-SDI signals
<b>TRS Position Error</b>	Detects errors in the TRS position
<b>TRS Code Error</b>	Detects errors in the TRS protection bits
<b>Line Number Error</b>	Detects errors with the line numbers embedded in 3G-SDI, HD-SDI, and HD dual link signals
<b>Illegal Code Error</b>	Detects data in the range of 000h to 003h and 3FCh to 3FFh outside the TRS and ADF header
<b>Dual Link Phase Difference Error</b>	Detects errors when the phase difference between links A and B is 100 clocks or more
<b>Ancillary Data Packet Error Detection</b>	
<b>Checksum Error</b>	Detects transmission errors in the ancillary data
<b>Parity Error</b>	Detects parity errors in the ancillary data header
<b>Embedded Audio Packet Error Detection *2</b>	
<b>BCH Error</b>	Detects transmission errors of audio packets
<b>DBN Error</b>	Detects sequential errors in audio packets
<b>Parity Error</b>	Detects parity errors in audio packets
<b>Image Quality Error Detection</b>	
<b>Gamut Error</b>	Detects gamut errors
<b>Detection Range</b>	Upper Limit 90.8 to 109.4 % Lower Limit: -7.2 to 6.1 % in 0.1 % steps
<b>Composite Gamut Error</b>	Detects level errors that occur when component signals are converted to composite signals
<b>Detection Range</b>	Upper Limit 90.0 to 135.0 % Lower Limit: -40 to 20 % in 0.1 % steps
<b>Freeze Error(*2)</b>	Detects freezing of video within the specified time range
<b>Detection Method</b>	Video interval checksum
<b>Time Specification</b>	2 to 300 frames
<b>Black Error</b>	Detects video blackouts *3

<b>Black Level Specification</b> <b>Area Specification</b> <b>Time Specification</b> <b>Level Error</b>	0 to 100 % 1 to 100 % 1 to 300 frames Detects YCaCa level errors *3 *2 If the input signal is 3G-SDI level B, only stream 1 is supported. If the input signal is HD dual link, only link A is supported. *3 This is not supported when the input signal is 3G-SDI or HD dual link.
<b>Event Log Function</b>  <b>Recording Capacity Operation</b> <b>Data Output</b>	Records detected errors, events—such as the LV 5770 switching between input signals, and time stamps. Up to 1000 events Records all events from start to finish Can be saved in text format to a USB memory device
<b>SDI Analysis Features</b> <b>Data Dump Display</b> <b>HD, SD-SDI Display Format</b>  <b>3G-SDI Display Format</b>  <b>HD Dual Link Display Format</b> <b>Line Select</b> <b>Sample Select</b> <b>Jump Function</b> <b>Data Output</b> <b>Phase Difference Display Function</b>  <b>Reference Signal</b> <b>3G, HD, SD-SDI</b> <b>HD Dual Link</b> <b>Display Range</b> <b>Vertical</b> <b>Horizontal</b> <b>Audio Control Packet *4</b> <b>Display Content</b> <b>Group Selection</b> <b>EDH Display (Only for SD)</b> <b>Standard Supported</b> <b>Display Content</b>  <b>Payload ID Display</b> <b>Closed Caption Analysis Display*5</b> <b>Standard Supported</b> <b>Display Content</b> <b>Inter-Stationary Control Signal (NET-Q) Display *5</b> <b>Standard Supported</b> <b>Display Content</b> <b>Logging Feature</b> <b>Data Broadcast Trigger Signal *5</b> <b>Standard Supported</b> <b>V-ANC User Data Display *5</b> <b>Standard Supported</b> <b>Arbitrary ANC Packet Display (Only for link A when the link format is set to dual)</b> <b>Method of specifying ANC</b> <b>AFD Packet Display *5</b> <b>Standard Supported</b>	Displays data separated by serial data sequence or by channel Stream 1, stream 2, stream 1 and stream 2 simultaneously Link A, link B, link A and B simultaneously Displays the selected line Displays the selected sample Moves to an EAV or SAV Save data in text format to a USB memory device  Displays the phase difference between a reference signal and an SDI video signal numerically and graphically  External sync signal, channel A of the SDI signal External sync signal, link A  1 frame ±1 line  Displays audio control packet analysis Select one group from four groups.  SMPTE ST RP-165 Analyzes and displays EDH packets and displays received CRC errors Analyzes and displays payload information  ARIB STD-B37, EIA-708-B, EIA/CEA-608-B Analyzes and displays the closed caption signal  ARIB STD-B39 Analyzes and displays inter-stationary control signals Q-signal logging  ARIB STD-B35  ARIB TR-B23  (Only for link A when the link format is set to dual) DID, SDID  SMPTE ST 2016-1-2007 *4 If the input signal is 3G-SDI level B, only stream 1 is supported. If the input signal is HD dual link, only link A is supported. *5 This is not supported when the input signal is 3G-SDI or HD dual link.
<b>Ancillary Data List Display</b> <b>List Display Content</b>	Presence or absence of each ancillary data type, embedded line number, and number of packets per frame *6 *6 This is not supported when the input signal is 3G-SDI or HD dual link.
<b>Lip Sync Measurement (When an LV 5770SER41/LV 5770SER43 is installed)</b> <b>Function</b>  <b>Reference Signal</b>  <b>Compliant Audio</b> <b>Measurement Range</b> <b>Measurement Resolution</b>  <b>Frame Capture Feature</b> <b>Function</b>	Measures the phase difference between an SDI video signal and digital audio Generated by a LEADER TSG that can create the signal necessary for lip sync measurements SDI embedded audio, digital audio 50 ms, 100 ms, 200 ms, 1 s, 2 s, 5 s 1 ms  SDI Captures frame data

Closed Caption Packet Display Standard Support				
Feature	Standard Supported	DID	SDID	
EIA-708 CC decode feature	SMPTE ST 334	161h	101h	
EIA/CEA-608-B CC decode feature (EIA-708-B)	SMPTE ST 334	161h	101h	
EIA/CEA-608-B CC decode feature (EIA/CEA-608-B)	SMPTE ST 334	161h	101h	
VBI (EIA/CEA-608-B line 21) CC decode feature	CIA/EIA-608-B			
<b>CDP Packet Display Content</b>	CDP packet header information Frame rate, 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, timecode (when the timecode packet is present), closed caption data (when the closed caption packet is present and valid), presence or absence of the CC1 to CC4 packets, the TEXT1 to TEXT4 packets, and the XDS packet			
<b>XDS Packet Display Content</b>	Contents adviser information Copy management information			
<b>Program Description Packet Display Content</b>	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 Departing Request Descriptor, DCC Arriving Request Descriptor, Redistribution Control Descriptor			
<b>Time Display Feature</b> <b>Time Display</b> <b>Current Time Display</b> <b>Timecode</b> <b>Standard Supported</b> <b>LTC, VITC</b> <b>D-VITC</b>	Current time, timecode The time based on the internal clock LTC, VITC, D-VITC (SD-SDI only)  SMPTE ST 12-2 SMPTE ST 266			

### LV 5770SER09A only

<b>Eye Pattern Display Display</b> <b>3G-SDI, HD-SDI, SD-SDI</b> <b>HD Dual Link</b> <b>Method</b> <b>Cursor Measurement</b>	Displays the input SDI waveform before equalizing Displays channel A or B, whichever is selected Displays link A or B, whichever is selected Equivalent time sampling Amplitude measurement using Y cursors Time measurement using X cursors Rise time and fall time measurement using the TrTf cursor
<b>Automatic Measurement Items</b>	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
<b>Jitter Display</b> <b>Display</b> <b>3G-SDI, HD-SDI, SD-SDI</b> <b>HD Dual Link</b> <b>Method</b> <b>Cursor Measurement</b> <b>Automatic Measurement Display Feature</b>	Displays the jitter component of an SDI signal Displays channel A or B, whichever is selected Displays link A or B, whichever is selected Phase detection method Jitter value measurement through the use of cursors Displays the jitter value in seconds (sec) and unit intervals (UI)
<b>Eye Pattern and Jitter Detection</b> <b>Error Detection</b> <b>Error Threshold Settings</b>  <b>Event Log</b> <b>Threshold Values</b>	On or off per item Can be set individually for 3G-SDI, HD-SDI, and SD-SDI signals Stores eye patterns and jitter errors 100 % of the values in the SMPTE standard

## LV 5770SER41/LV 5770SER43 DIGITAL AUDIO

### FEATURES

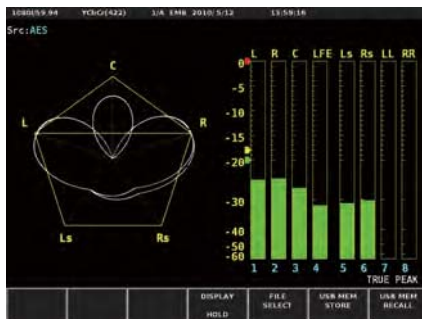
#### • Digital Audio I/O

The addition of the digital audio option (LV 5770SER41/LV 5770SER43) enables the LV 5770A to display not only embedded audio (when an LV 5770SER08 or LV 5770SER09A is installed) but also external digital audio. The eight I/O connectors—16 channels—can be switched between input and output in groups of four connectors—8 channels. Therefore, the LV 5770A can also be used to extract and transmit the embedded audio's digital audio. 16 Channel Loudness measurement with Level meter, Lissajous display and Level meter (LV 5770SER43 only)\*2

#### • Dolby Decode (Factory Option)\*1

The addition of the Dolby decode feature enables the LV 5770A to decode and display the Dolby-E or Dolby digital signal that is compressed in the embedded audio (which requires the LV 5770SER08 or LV 5770SER09) or digital audio input signal.

### ■ Display Examples



Surround display  
(5 LEAF Display)



16 Channel Level\*2  
(LV 5770SER43)



Simultaneous Loudness Measurement on Two Signals

Loudness display LV 5770SER43 (Loudness with 8ch Level Meter)



Loudness Measurement for One Signal

Loudness display LV 5770SER41

### SPECIFICATIONS

<b>I/O Connectors</b> I/O Connectors	BNC connector Group A—4 connectors, 8 channels Group B—4 connectors, 8 channels
<b>I/O Switching</b>	Switching between the connections (4 connectors, 8 channels) Also supports 16 channel digital audio input*
<b>Supported Formats</b>	AES, EBU, Dolby-E (factory option), Dolby-Digital (factory option)
<b>Sampling Frequency</b> <b>Output Signal</b>	48 kHz Channels 1 to 8 of the SDI embedded audio, channels 9 to 16 of the SDI embedded audio, the 8 channels that are displayed on the screen (the Dolby feature is used to decode and generate the signals) * The LV 5770SER08 or LV 5770SER09 is required to generate embedded audio signals.
<b>Headphone Output</b> <b>Output Connector</b>	One 6.3 mm stereo jack
<b>Digital Audio Display</b> <b>Simul Mode Display Format</b> <b>Input Signal</b>	Tiled only SDI embedded input (this requires an LV 5770SER08 or LV 5770SER09), digital audio input Up to 8 channels
<b>Displayed Channels</b> <b>Channel Selection</b> <b>SDI Embedded</b> <b>Digital Audio Input</b> <b>Display Type</b>	Any two groups from groups 1, 2, 3, and 4 Switchable between A and B (set to the inputs) Level meter, Lissajous, surround, status
<b>Meter Display</b> <b>Level Meter Display</b> <b>Displayed Channels</b> <b>Dynamic Range</b> <b>Meter Response Mode</b> <b>Peak Hold Response Mode</b> <b>Peak Hold Time</b> <b>Level Setting</b>	Two or eight -60 dBFS, -90 dBFS TRUE PEAK, PPM type I, PPM type II, VU TRUE PEAK, PPM type I, PPM type II 0 to 5.0 s (in 0.5 s steps), HOLD Reference level, warning level, over level (-40.0 to 0.0 dBFS for each level)
<b>Waveform Display</b> <b>Lissajous Display</b> <b>Displayed Channels</b> <b>Display Mode</b> <b>Surround Display</b> <b>Function</b> <b>Surround Format</b> <b>Channel Mapping</b> <b>Center Channel Format</b> <b>Gain</b> <b>Correlation Display</b>	Two (single) or eight (multi) X-Y or MATRIX  Displays a graphical representation of a sound field 5.1 L, R, C, LFE, Ls (S), Rs, LL, RR NORMAL, PHANTOM CENTER x1, AUTO Detects the case of the channel being 180 ° out of phase with its adjacent channels
<b>Loudness Display</b> <b>Function</b>	Displays a loudness chart plotted over a long period and the loudness values
<b>Compliant Standard</b> <b>Measurement Channel</b> <b>Mode</b> <b>Channel Selection</b> <b>LFE Gain</b>	ITU-R BS.1770, ARIB TR-B32, EBU R125, ATSC A/85  Monaural, stereo, 5.1 User-defined assignment of eight channels 0 to 10 times
<b>Measurement Trigger</b> <b>Measurement Mode</b> <b>Target Level</b> <b>BS1770-2</b> <b>ARIB</b> <b>EBU</b> <b>ATSC</b>	Manual (panel), timecode / Mute BS1770-2, ARIB, EBU, ATSC  -24.0 LKFS -24.0 LKFS (±1 LK) -23.0 LUFS (±1 LU) -24.0 LKFS (±2 LK)
<b>Average Time</b> <b>Momentary Loudness</b> <b>ShortTerm Loudness</b>	200 to 10000 ms 200 to 10000 ms
<b>Chart Display</b>	Graph display of LongTerm loudness and Momentary or ShortTerm loudness
<b>Measurement Time</b> <b>MAG</b> <b>Numeric Display</b>	2min, 10min, 30min, 1hour, 2hour Zoomed display of the target level from -18 to +9 (LK/LLU) Absolute value and relative value displays of LongTerm loudness and Momentary or ShortTerm loudness
<b>LongTerm Loudness</b> <b>Momentary, ShortTerm Loudness</b>	Displayed in red when the target level is exceeded Displayed in red when the target level is exceeded
<b>Status Display</b> <b>Level</b> <b>Error Detection</b>	Audio levels are displayed using numbers (dBFS). Level Over, Clipping, Mute, Parity Error, Validity Error, CRC Error, Code Violation
<b>Elapsed Time</b>	Displays the amount of time that has elapsed since the instrument was reset
<b>Channel Status Bits</b> <b>User Data Bits</b> <b>Dolby E Meter Data</b> <b>Dolby Digital Meter Data</b>	Dump display, text display Dump display Text display (factory option) Text display (factory option)

\*1 Dolby is a trademark of Dolby Laboratories.

\*2 16 channel Lissajous and Level are future supported

\* To be supported in the future.

## LV 5770SER42 ANALOG AUDIO

### FEATURES

#### • Digital Audio I/O

The addition of the analog audio option enables the LV 5770A to display analog audio. The LV 5770SER42 is equipped with an output connector, and this option can also be used to generate the analog audio that corresponds to the audio signal displayed on the screen. (This option requires the LV 5770SER41/43.)

### SPECIFICATIONS

<b>Audio Input/Output I/O Connectors</b>	37-pin D-sub (female)
<b>Input Signal Format</b>	DC-coupled balanced input
<b>Number of Input Channels</b>	8 (4 stereo pairs)
<b>Input Impedance</b>	≥ 20 kΩ
<b>Output Signal Format</b>	DC-coupled balanced output
<b>Number of Output Channels</b>	8
<b>Output Impedance</b>	50 Ω (nominal)
<b>Output Signal</b>	8-channel audio signal that is displayed on the screen (Dolby*—available as a special order—signals are decoded and generated as analog signals.)
<b>Maximum Output Level</b>	100 kΩ load 24 dBu 600 Ω load 4 dBu

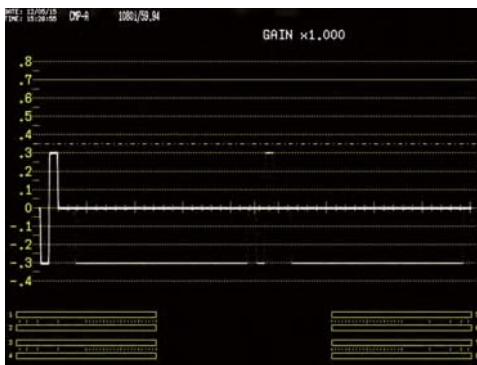
<b>Headphone Output Jack (LV 5770SER41 option)</b>	One stereo jack
<b>Analog Audio Display</b>	
<b>Input Signal</b>	Analog audio input
<b>Displayed Channels</b>	Up to 8 channels (4 stereo pairs)
<b>Display Type</b>	Level meter, Lissajous, surround, Status, Loudness
<b>Level Meter Display</b>	
<b>Displayed Channels</b>	Two or eight
<b>Dynamic Range</b>	-60 dBFS / -90 dBFS
<b>Meter Response Mode</b>	TRUE PEAK, PPM type I, PPM type II, VU
<b>Peak Hold Response Mode</b>	TRUE PEAK, PPM type I, PPM type II
<b>Peak Hold Time</b>	0.5 to 5.0 s (in 0.5 s steps), HOLD
<b>Level Setting</b>	Reference level, warning level, over level (-40.0 to 0.0 dBFS for each level)
<b>Lissajous Display</b>	The same as digital audio
<b>Lissajous Display</b>	The same as digital audio
<b>Surround Display</b>	The same as digital audio
<b>Loudness Display</b>	The same as digital audio
	*The LV 5770SER41 is required for the LV 5770SER42 to operate.
<b>Accessories</b>	37-pin D-sub connector .....1 37-pin D-sub connector cover.....1 Cable .....2

## LV 5770SER03A TRI SYNC / COMPOSITE

### FEATURES

The addition of the analog composite input option enables the LV 5770A to display the video signal waveforms of NTSC, PAL, and HD tri-level sync signals, display vectors (NTSC and PAL only), measure SCH (NTSC and PAL only), and measure phase differences against external signals.  
(For phase difference measurement, an external sync signal that is synchronized and of the same format as the input signal is necessary.)

#### ■ Display Example



Tri sync display

### SPECIFICATIONS

<b>Formats and Standards</b>	
<b>Input Signal</b>	NTSC or PAL composite video signal
<b>Standard Supported:</b>	SMPTE ST 170, ITU-R BT.470, SMPTE ST 274
<b>I/O Connectors</b>	
<b>Input Connectors</b>	2 BNC connectors (channels A and B are selectable)
<b>Output Connector</b>	1 BNC connector
<b>Output Signal</b>	Channel A or B—which ever is selected—of the composite option, the active signal
<b>External Sync Signal Input Connectors</b>	
<b>Input Connector</b>	1 pair of BNC connectors
<b>Input Signal</b>	Tri-level sync or NTSC/PAL black burst signal
<b>Input Impedance</b>	15 kΩ passive loop-through * If the video signal waveform is displayed using an external sync signal as the reference, inserting or removing a composite signal or restarting the device may cause the waveform phase to be off by two clock.

<b>Waveform Display</b>	
<b>Waveform Operations</b>	
<b>Line Select</b>	Displays the selected line
<b>Sweep Modes</b>	H and V
<b>Vertical Axis</b>	
<b>IRE Scale (NTSC)</b>	-40 to 100 IRE
<b>V Scale (PAL)</b>	-0.3 to 0.7 V
<b>Horizontal Axis</b>	
<b>Operation Mode</b>	1-waveform display
<b>Display Format</b>	
<b>Line Display</b>	1H, 2H
<b>Cursor Measurement</b>	
<b>Horizontal Cursors</b>	2 (REF and DELTA)
<b>Time Measurement</b>	Second display
<b>Vertical Cursors</b>	2 (REF and DELTA)
<b>Amplitude Measurement</b>	V or % display
<b>Vectorscope Display</b>	
<b>Scale</b>	
<b>Color Bar Saturation</b>	75 %, 100 % (color bar)
<b>IQ Axis</b>	Show, hide
<b>Display Colors</b>	Seven colors to choose from
<b>Setup (NTSC)</b>	0 %, 7.5 %
<b>NTSC Display (PAL)</b>	NTSC display, PAL display
<b>SCH Display</b>	The SCH value is displayed as a digital value.
<b>Picture Display</b>	
<b>Quantization</b>	8 bits
<b>Display Size</b>	Fit, full frame, real
<b>Frame Rate</b>	The frame rate is converted and displayed using the internal sync signal.
<b>Aspect Marker Display</b>	16:9, 14:9, 13:9
<b>Aspect Marker Format</b>	Line, shadow (99 levels), black
<b>Safety Marker Size</b>	SMPTE ST RP-218, user-defined
<b>Analog Composite Signal Status Display Phase Difference Display</b>	
<b>Function</b>	Displays the phase difference between a reference signal and an input signal both numerically and graphically
<b>Reference Signal</b>	NTSC/PAL black burst signal HD tri-level sync signal (The same format as the input signal)

\* When an LV5770SER41/43 is installed

# LV5333 MULTI SDI WAVEFORM MONITOR

## Compact, Portable, and now for 3G-SDI!



Upon request

The NEW LV5333 Waveform Monitor is a powerful, versatile production tool this is compact and portable. Like its predecessor, the LV5333 boasts a 6.5" high-fidelity TFT LCD screen for high quality picture images. Waveform, Vectorscope, Audio, 5-bar Display, and Status analysis are all possible in this instrument. Just like the previous waveform monitors from LEADER, various multi-display combinations allow for complete and easy monitoring while full-screen presentations provide a wealth of information and enable detailed review of the material. LV5333 also offers an embedded audio signal display allowing level-meter measurements.

Plus new features like Cable Length, External Phase Difference, and Field Frequency Deviation measurements are added to the list of standard functions. CINELITE® II and other software functions also come included with the LV5333, making it not only an attractive technical instrument but also a creative one at the same time.

### MAIN FEATURES:

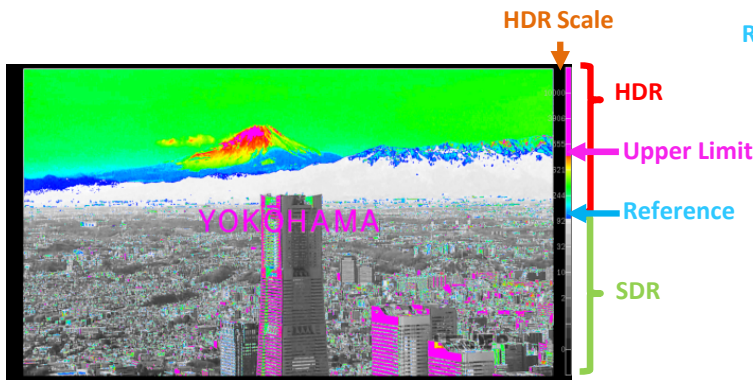
- Multi SDI Waveform Monitor supports 3G-SDI, HD-SDI and SD-SDI.
- Built-in 6.5" TFT LCD XGA Display (1,024 x 768) for superb, crisp waveforms and picture representations.
- CINELITE® II (Cinelite® and Cinezone®) and CINELITE® ADVANCED come standard with this waveform monitor.
- Histogram, User Gamma Display, Gamut and Level Error functions come now standard with the LV5333.
- Line Selector allows to choose any line of the video signal to be displayed and provides waveform, vector, and 5-bar representations of that specific line.
- Cable Length, EXT Phase, and Field Frequency Deviation Measurements.
- Up to 8 channels of embedded audio signals can be displayed using audio bar level meters.
- Supports Closed-Captions EIA608.
- Extracts embedded audio signals and sends two user-selectable audio channels to the headphone jack.
- Audio shortcut button located on the front panel.
- Includes "Screen Capture" to capture the displayed image and save it to the internal memory (RAM) or in to an USB memory device.
- The internal memory holds up to 30 presets allowing quick access to favorite instrument setups.
- Instrument can be remote controlled from a PC over an Ethernet network.
- Can be mounted on a tripod for on-camera fitting.
- Universal AC Power Supply allows for worldwide use.
- Battery Adapters for IV Mount and QR Gold Mount are available.

### AVAILABLE OPTIONS:

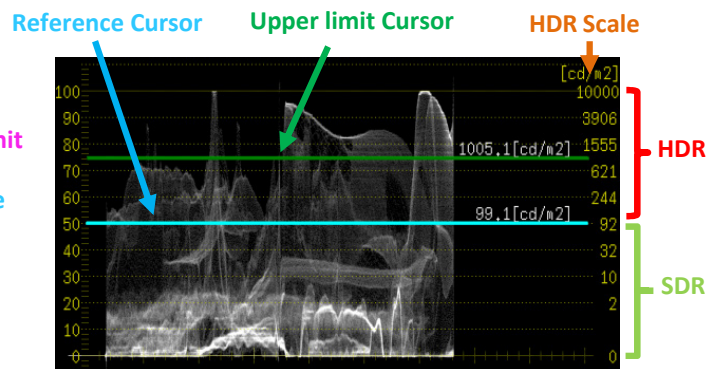
- **SLOG2 & CUSTOM FALSE COLORS DISPLAY - LV5333SER01:** This option adds an enhancement to the Exposure Evaluation and Gamma Correction for cameras with S-LOG2 (High Key / Low Key function), Zoom-in and Aperture function, and Custom False Colors function.
- **Battery Mount factory option - OP70 or OP71:** The addition of the battery mount option enables the LV 5333 to use V MOUNT (OP70) or QR Gold Mount (OP71) batteries.



# LV 5333SER02 HDR Option For Multi SDI Monitor LV5333



HDR CINEZONE Display



HDR Waveform Display

LV 5333SER02 is a function to evaluate HDR video signal by picture display and waveform display.

In the picture display, it can be checked easily the luminance distribution by coloring according to the luminance of the HDR area.

In the waveform display, level management including the HDR area can be performed by the HDR scale. Although it is for 3G / HD-SDI, it can also support 4K HDR display by using 4K 2 sample interleaved 1 signal or HD monitor output from 4K camera.

## MAIN FEATURES

### Compatible with various standards

It supports HLG (Hybrid Log Gamma) conforming to ITU-R BT.2100, ARIB STD-B 67, SMPTE ST 2084 and PQ (Perceptual Quantization). In addition, it supports S-Log 3, C-Log (Future), Log-C (Future).

### Enhanced CINEZONE

Enables the user to check the brightness levels of HDR content easily by identifying the SDR range in monochrome and the HDR range in color.

### HDR Scale

By matching the WFM scale to the HDR standard, you can easily check the brightness level.

### License Option

Because it is a license option, you can install it even after purchasing LV 5333.

## SPECIFICATIONS

### Compliant standard (HDR)

ITU-R BT.2100  
SMPTE ST 2084  
ARIB STD B-67  
Format 3G/HD(1920x1080,2048x1080) format  
Color System YCbCr, RGB  
Color Space ITU-R BT.709, BT.2020(Future)

### Waveform Display

Scale IRE and HDR scale Corresponding to the HDR signal.  
Scale Unit [cd/m2]:PQ, [%]:HLG, S-Log3, C-Log(Future), Log-C(Future)  
Range Full range / Limited(Narrow)range  
Cursor It is possible to measure the cursor according to the scale unit.

### Picture Display

#### HDR CINEZONE Display

Color The HDR part is colored according to the luminance, the SDR part is monochrome, below the lower limit value is black, and above the upper limit value is displayed in magenta.  
Setting Value From minimum luminance to maximum luminance in the standard.

# LV5381 HD/SD SDI WAVEFORM MONITOR

## Up to 4 Input Signals in a Small Monitor

HD-SDI

SD-SDI

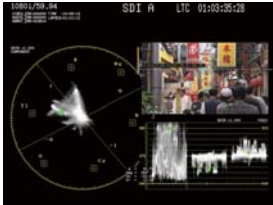
3D  
Anaglyph

4U size  
(half Rack)

CINELITE II  
INSIDE



**CINELITE**  
Advanced Display



(4 Inputs Display)

## Multi SDI Monitor (4 Inputs)

The LV 5381 is a waveform monitor that can monitor up to four SDI signals simultaneously. It is optimized for the level adjustment of the outputs of multiple installed cameras. In the video signal waveform display, vector display, and picture display, multiple input signals can be displayed on top of each other or lined up next to each other. It is also full of useful features such as a level meter display for embedded audio, an error display that indicates transmission errors, and a 5-bar display that shows video signal peak levels using five bars. Furthermore, the LV 5381 can show different combinations of these displays in its multi-screen display.

### FEATURES

- Simultaneous Monitoring of Four Inputs**  
 The LV 5381 is a waveform monitor with a built-in 8.4-inch TFT-LCD. It can display up to four SDI input signals of the same format simultaneously. The LCD is an XGA display (1024 x 768 pixels) that boasts high color reproducibility. This makes the LV 5381 useful for picture monitoring as well.
- Wide Variety of Display Formats**  
 In the video signal waveform display, vector display, and picture display, the LV 5381 can display up to four input SDI signals on top of each other or side by side. This makes it suitable for adjusting the gain and black balance values of multiple cameras. In the video signal waveform and vector displays, the LV 5381 can make different waveforms easier to see by using a different waveform color for each input channel.
- Extremely Flexible Display Layouts**  
 Each of the different displays can be shown on a single screen, or the multiscreen display feature can be used to divide the screen into four areas with a different display shown in each area. The video signal waveform display, picture display, and audio level meter display can be shown as a thumbnail display on the one-screen display.
- Video Signal Waveform Display**  
 The input Y C<sub>B</sub> C<sub>R</sub> signal can be converted to an RGB or pseudocomposite signal and shown on the video signal waveform display. The video signal waveform display has a rich assortment of features such as waveform magnification and line selection.
- Picture Display**  
 The picture display has a wide variety of picture monitoring features, such as color temperature specification; brightness, contrast, and aperture adjustment; and the display of gamut error locations.
- CINELITE II / CINELITE Advanced**  
 The LV 5381 comes standard-equipped with CINELITE II (CINELITE and CINEZONE), which is a video signal luminance information analysis tool. With CINELITE, you can use the cursor to select any 3 points and display their f-Stop numbers, percentage values, and level values. You can choose to analyze a single pixel or a small area by setting the size of the

measured area to 1 pixel or to the average value for 9 or 81 pixels. With CINEZONE, you can display the luminance levels in the picture using different colors. This allows you to quickly determine the overall luminance distribution in the picture, and it makes it easy to spot overexposure, underexposure, and different luminance levels in dark areas.

- Screen Capture Feature**  
 The display can be captured and stored as image data. The captured data can be displayed on the LV 5381. Additionally, it can be saved as bitmap files to USB memory, which makes it possible to view the data on a PC.
- External Sync Signal Input**  
 The LV 5381 can receive a tri-level sync signal or an NTSC or PAL black burst signal as its external sync signal and then display video signal waveforms with this sync signal as its reference.
- Presets**  
 Stores up to 30 front panel presets.
- Last Memory**
- ID Display**  
 IDs can be assigned to input channels. IDs are entered from the LV 5381 panel.
- Stereo Headphone Output (1 stereo miniature jack)**
- Dimensions and Weight**  
 425 (W) x 352 (H) x 95.0 (D) mm, 5.2 kg  
 16 3/4(w) x 13 7/8(H) x 3 3/4(D) inch. (excluding projections), 11.46 lbs

#### Remote and Tally Option (OP70, factory option)

The addition of the external remote option enables the LV 5381 to load presets and display tallies according to the signals that it receives through the rear-panel remote control connector. This makes it possible to link the LV 5381 to a switcher or other device.

#### Dual Link Option (LV 5381SER01)

The addition of the dual link option enables the LV 5381 to monitor a pair of dual link signals simultaneously.

#### Audio Lissajous Option (LV 5381SER02)

The addition of the audio lissajous option enables the LV 5381 to display the lissajous curves and the numeric values of levels of the audio that is embedded in an SDI signal.

#### Status Option (LV 5381SER03)

The addition of the status option enables the LV 5381 to show analysis displays such as the data dump, phase difference, and event log displays.

#### 3D Assist Option (LV 5381SER04)

3D video signals can be evaluated by applying the video signal for the left eye to channel A and the video signal for the right eye to channel B. The available picture display formats are anaglyph, convergence, overlay, and wipe.

Video Signal Formats and Standards Single Link System Video				
Format	Quantization	Scanning	Frame (Field) Rates	Compliant Standard
Y, C <sub>b</sub> , C <sub>r</sub> 4:2:2	10 bit	1080i	60/59.94/50	SMPTE 274M
		1080p	30/29.97/25/24/23.98	SMPTE 292M
		1080PsF	30/29.97/25/24/23.98	SMPTE RP 211 SMPTE 292M
		720p	60/59.94/50/ 30/29.97/25/24/23.98	SMPTE 296M SMPTE 292M
		525i	59.94	SMPTE 259M
		625i	50	
<b>Audio Playback Compliant Standards</b>		SMPTE-299M (HD-SDI) SMPTE-272M (SD-SDI)		
<b>Quantization Clock Generation Synchronization</b>		24 bits Generated from the video clock All audio channels must be synchronized to the video clock.		
<b>Input/Output Connectors SDI Input Input Connectors SDI Output Output Connectors Output Signal</b>		4 BNC connectors (channels A, B, C, and D)		
<b>Output Impedance Output Voltage Output Return Loss External Sync Input(*1) Input Signal Input Connectors Input Impedance Input Return Loss Maximum Input Voltage Headphone Output Output Signal</b>		2 BNC connectors SDI signal selected from channel A or B is relocked and generated SDI signal selected from channel C or D is relocked and generated 75 Ω 800 mVp-p ± 10 % ≥ 15 dB for 5 MHz to the serial clock frequency Tri-level sync or NTSC/PAL black burst signal 2 BNC connectors 15 kΩ passive loop-through ≥ 30 dB for 50 kHz to 30 MHz into 75 Ω ±5 V (DC + peak AC)		
<b>Output Channel Sampling Frequency Output Connector Volume Adjustment Power Output</b>		Extracts and transmits the audio signal embedded in an SDI signal. Specified AES/EBU pair Only 48 kHz is supported. 1 stereo miniature jack Configured from the menu 50 mW max. (with 16 Ω load resistance) *1 If the video signal waveform is displayed using an external sync signal as the reference, inserting or removing an SDI signal or restarting the device may cause the waveform phase to be off by one clock. This feature does not function when the video format is 1080p/60, 59.94, or 50.		
<b>Control Connectors USB Port Specification Media</b>		USB 2.0 Only supports USB memory devices.		
<b>LCD LCD Type Display Format Backlight Brightness Auto Shutoff</b>		8.4-inch color TFT XGA. The effective resolution is 1024 x 768. 32 levels Time to turn off the LCD can be set.		
<b>Screen Capture Screen Capture</b>		Captures the screen to an image file (only one screen capture is stored in internal memory)		
<b>Media Data Output</b>		Internal memory (RAM) and USB memory Screen captures can be saved as bitmap files to USB memory.		
<b>Data Input</b>		Data saved to USB memory can be loaded and displayed on the LV 5381.		
<b>Preset Settings Preset Mode</b>		Comprehensive preset, display mode preset		
<b>Waveform Display Simultaneous Input Mode Display Format Waveform Operation Display Mode Overlay Parade Blanking Period RGB Conversion</b>		Mixed, tiled, aligned Overlay, parade Overlays component signals Displays component signals side by side H and V blanking periods can be displayed or hidden. Converts a Y, C <sub>b</sub> , C <sub>r</sub> signal into an RGB signal and displays the result		
<b>Pseudo-Composite Display Channel Assignment</b>		Artificially converts a component signal into a composite signal Displayed in GBR or RGB order (selectable when RGB conversion is enabled)		
<b>Line Select Gain Variable Gain Filter</b>		Displays the selected line x1, x5 x0.2 to x2.0 Flat, low pass		
<b>Waveform Display Accuracy Amplitude Accuracy</b>		±0.5 %		

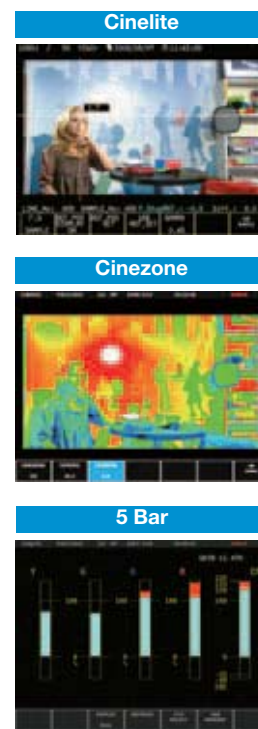
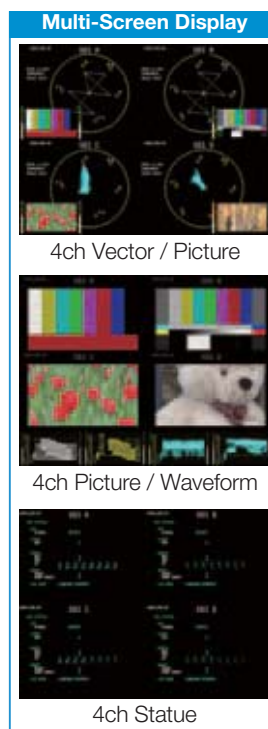
<b>HD-SDI Y Signal C<sub>b</sub>C<sub>r</sub> Signal Low-Pass Attenuation</b>	±0.5 % for 1 to 30 MHz ±0.5 % for 0.5 to 15 MHz ≥ 20 dB (at 20 MHz)
<b>SD-SDI Y Signal C<sub>b</sub>C<sub>r</sub> Signal Low-Pass Attenuation</b>	±0.5 % for 1 to 5.75 MHz ±0.5 % for 0.5 to 2.75 MHz ≥ 20 dB (at 3.8 MHz)
<b>Scale Type Display Color</b>	% scale, V scale, decimal scale, hexadecimal scale 7 colors
<b>Thumbnail Display</b>	Picture, audio level meter
<b>Vectorscope Display Simultaneous Input Mode Display Format Blanking Interval Pseudo-Composite Display</b>	Mixed, tiled Masked Artificially converts a component signal into a composite signal
<b>Line Select Gain Variable Gain Amplitude Accuracy Scale Type Setting the Color Bar Saturation IQ Axis Display Color Thumbnail Display</b>	Displays the selected line x1, x5, IQ-MAG x0.2 to x2.0 ±0.5 % ITU-R BT.601, ITU-R BT.709, AUTO 75 %, 100 % Show, hide 7 colors Picture, audio level meter
<b>5 Bar Display Simultaneous Input Mode Display Format Bar Display Channel Assignment Scale Error Level</b>	Tiled only Displays the peak levels of Y, R, G, B and composite RGB, GBR mV, % Based on the gamut error, composite gamut error, and luminance error thresholds
<b>Picture Display Simultaneous Input Mode Display Format Quantization Color Temperature Image Quality Adjustment</b>	Mixed, tiled 8 bits 6500 K, 9300 K Brightness, contrast, chroma gain, RGB gain, RGB bias, aperture
<b>Display Sizes Color Frame Rate</b>	Fit, full frame, real, 4:3 full screen R, G, B can be turned off separately. Chroma off The frame rate is converted and displayed using the internal sync signal.
<b>Aspect Display Marker HD-SDI SD-SDI Line Select Gamut Error Display Thumbnail Display</b>	4:3, 13:9, 14:9, 2.39:1 13:9, 14:9, 16:9 Marks the selected line Displays gamut error locations over the picture Video signal waveform, audio level meter
<b>Error Count Display Function Video Error Display Audio Error Display</b>	Used to count the video, audio, and gamut errors Counts CRC (HD-SDI) and EDH (SD-SDI) errors Counts embedded audio BCH (HD-SDI) and channel status bit CRC errors
<b>Gamut Error Display Upper Limit Lower Limit Composite Gamut Error Upper Limit Lower Limit Error Count</b>	Counts gamut, composite gamut, and luminance errors 90.8 to 109.4 % -7.2 to 6.1 % 90.0 to 135.0 % -40.0 to 20.0 % Up to 999,999 errors can be counted separately for video, audio, and gamut.
<b>Count Period Current Time Display Elapsed Time Display</b>	One count per field The time based on the internal clock The elapsed time since the error count was cleared
<b>Other Display Settings Input Information Display Time Code Format Display</b>	Input channel, ID, OFF LTC, VITC, OFF The format can be displayed when an SDI signal is detected.
<b>Front Panel Key LEDs</b>	All the keys are dimly back-lit, and the selected key is lit more brightly
<b>Environmental Conditions Operating Temperature Range Operating Humidity Range</b>	0 to 40 °C ≤ 85 %RH (without condensation)
<b>Power Requirements</b>	10 to 18 VDC, 46 W max.
<b>Dimensions</b>	215 (W) x 176 (H) x 111 (D) mm (excluding projections) 8 1/2(w) x 6 7/8(H) x 3 3/8(D) inch
<b>Weight</b>	2.2 kg 4.85 lbs
<b>Accessories</b>	AC adapter (SPU63-105).....1 Instruction manual .....1
<b>Optional Accessories</b>	Rack mount adapter, Handle

**■Rear Panel**



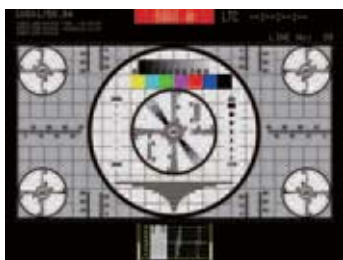
Shown with OP70

**■Display Examples**



**■Option**

● Remote and Tally Option (OP70, factory option)



The addition of the external remote option enables the LV 5381 to load presets and display tallies according to the signals that it receives through the rear-panel remote control connector. This makes it possible to link the LV 5381 to a switcher or other device.

● Dual Link Option (LV 5381SER01)

The addition of the dual link option enables the LV 5381 to monitor a pair of dual link signals simultaneously.

● Audio Lissajous Option (LV 5381SER02)

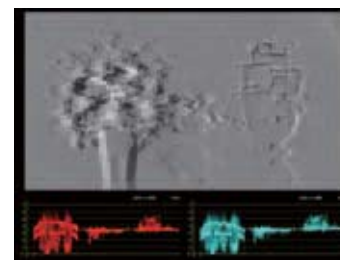


The addition of the audio lissajous option enables the LV 5381 to display the lissajous curves and the numeric values of levels of the audio that is embedded in an SDI signal.

● 3D Assist (LV 5381SER04)



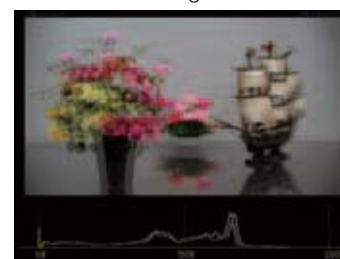
Anaglyph



Convergence



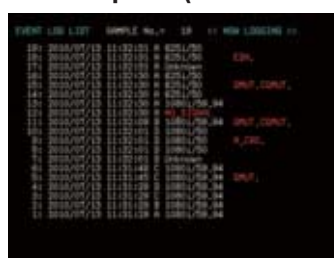
Wipe



Overlay & Histogram

3D video signals can be evaluated by applying the video signal for the left eye to channel A and the video signal for the right eye to channel B. The available picture display formats are anaglyph, convergence, overlay, and wipe.

● Status Option (LV 5381SER03)



The addition of the status option enables the LV 5381 to show analysis displays such as the data dump, phase difference, and event log displays.

# LV 7390 4K 3G/HD/SD SDI RASTERIZER

## Four SDI Inputs – 4K Capable!



Upon request

LEADER's new LV 7390 is a versatile and powerful rasterizer capable of monitoring up to four 3G/HD/SD SDI signals simultaneously and can display Waveform, Vector, Picture, CINELITE® CINEZONE®, Audio and Status information on

an external monitor in full high definition resolution via its 3G/HD SDI or DVI-I rasterized outputs. Video and Digital Audio measurements can be displayed full screen or individually in user defined configurations.

The LV 7390 can also display information from camera feeds including the camera menus through a separate set of input connectors. This feature helps operators know immediately what settings are being used on the camera from the operation room or OB van.

### STANDARD FEATURES:

- Accepts four 3G/HD/SD SDI sources and provides Waveform, Vector, Picture, CINELITE® II (Cinelite® and Cinezone®), and SDI Status information. -LV 7390SER01
- CINELITE® allows the user to measure the luminance levels at different points in a scene (up to 3 points).
- CINEZONE® uses false colors to indicate luminance levels in a scene and is great for green screen work.
- Status Display provides information on a variety of error monitoring functions, such as CRC, TRS position, Illegal Code, and Line Number SDI errors, Checksum and Parity Ancillary Data errors, BCH, Parity, DBN, Inhibit, and Audio Sample Embedded Audio errors.
- Error Logs and Alarms
- Format and Timecode Display
- SDI Analysis: Data Dump with hexadecimal values for YCbCr. EAV and SAV search.
- User Customizable Display, which can be configured with a USB mouse and saved.
- 3G/HD SDI and DVI-I Rasterized Outputs can display the information on a separate monitor in full HD resolution (1920 x 1080).
- Equivalent Cable Length Measurement for each of the SDI inputs.
- Video Engineer (VE) menus. These menus are ideal for camera shading operations and, when activated, they can be easily be accessed with the press of a button.
- Capture function allows the user to perform a screen capture of the display as a BMP file, which can be saved on to a USB device. This feature can be used for matching cameras and/or documenting a shot (continuity, trouble-shooting).

- Ethernet connectivity allows for remote control over the web. LV 7390 supports TELNET, FTP, HTTP, and SNMP protocols.
- 60 user definable presets are available, that can be labeled and displayed on screen.

### OPTIONAL FEATURES:

- **DIGITAL AUDIO I/O – 16 channels** - LV 7390SER03
- **4K CAPABLE:** It will allow the LV 7390 to process 4K signals for digital cinema (4096 x 2160) or broadcast (3840 x 2160) -LV 7390SER20
- **VIEWFINDER SDI INPUT:** Four separate input connectors, which can display the input signals from the camera including the menu configuration. Ideal for camera operators to monitor the camera settings. -LV 7390SER01
- **Dolby Option:** The addition of the Dolby option enables the LV 7390 to decode and display the Dolby E, Dolby Digital or Dolby Digital Plus signals that are compressed in embedded audio or digital audio signals. (Dolby is a trademark of Dolby Laboratories)

### LV7290 Remote Controller



Upon request

# LV 7390 4K 3G/HD/SD SDI RASTERIZER

## Versatile and Affordable Rasterizer with 4K Capabilities UP TO 4K OPERATION

### User-customizable Layout



**ZOOM-IN:  
PIC in Full HD**

**MATRIX ROUTER**  
(located anywhere)

via HD-SDI

- 4 SDI Inputs
  - HD-SDI Output
  - 4 SDI Outputs
  - DVI Output
- Display is advanced layout



### Ideal for Camera Shading



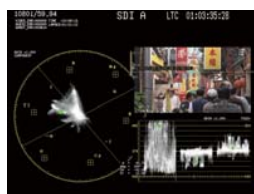
### 4 Independent PIC-MON Outputs



## LV7770 / LV7770-01 3G/HD/SD RASTERIZER

### Configurable & Affordable

#### ■ CINELITE Advanced Display



Synchronizes the markers on the vector display or waveform display to the measurement points of the CINELITE display's f Stop display or % display

External display



HD-SDI

SD-SDI

1U size

CINELITE II INSIDE



Upon request



■ LV 7770 MULTI RASTERIZER



■ LV 7770-01 REMOTE CONTROLLER

## Multi Rasterizer

The LV 7770 is a rasterizer that supports 3G-SDI, HD dual link, HD-SDI, and SD-SDI signals.

It has a variety of features, including simultaneous monitoring of two SDI input signals, frame capturing, lip sync measurement, and ANC data analysis.

### FEATURES

#### • 3G-SDI Compatible 2-Channel Simultaneous Display (LV 5770SER08 and LV 5770SER09A)

The LV 7770 is equipped with a pair of SDI input connectors that support 3G-SDI, HD dual link, HD-SDI, and SD-SDI signals. The two input signals can be displayed simultaneously. Even when one of the input signals is not being displayed, the LV 7770 still monitors the undisplayed signal for errors. In addition, the LV 7770 is equipped with SDI output connectors that can generate serial reclocked SDI signals from the input SDI signals. The A/B output connector generates the reclocked signal of the SDI signal applied to channel A or channel B. The output that is generated from this connector is switched between the two channels whenever an input key (A or B) is pressed.

#### • Wide Variety of Display Formats (LV 5770SER08 and LV 5770SER09A)

In the video signal waveform display, vector display, and picture display, the LV 7770 can display up to two input SDI signals on top of each other or side by side. This makes it suitable for adjusting the gain and black balance values of two video signals. In the video signal waveform and vector displays, the LV 7770 can make different input channels easier to see by displaying them using different colors.

#### • Capture Feature

A screen capture feature that captures the screen as still images, a frame capture feature that captures single frames of SDI signals, and an error capture feature that automatically detects and captures error frames are available. Not only can captured data be displayed by the LV 7770, but it can also be compared with an input signal or saved to a USB memory device. It is easy to view the saved data on a PC.

#### • XGA Resolution DVI-I Output

The measurement display has XGA resolution (an effective resolution of 1024 x768) and can be output from the DVI-I connector, which supports single-link TMDS. The aspect ratio can be switched between 4:3, 16:9, and 16:10. (The display must have a resolution conversion feature.)

#### • Picture Monitor Output (LV 5770SER08 and LV 5770SER09A)

The input SDI signal can be generated as an 8-bit signal. Regardless of the SDI input signal, the output format can be set to YCbCr 4:2:2, YCbCr 4:4:4, or RGB 4:4:4.

#### • 3D Assist Display (LV 5770SER08 and LV 5770SER09A)

3D video signals can be evaluated by applying the video signal for the left eye to channel A and the video signal for the right eye to channel B. The available picture display formats are anaglyph, convergence, overlay, wipe, checker, and flicker.

#### • Digital Audio I/O

An external digital audio signal can be displayed in addition to the embedded audio. The eight I/O channels of the four connectors can be switched between input and output. Therefore, the LV 7770 can also be used to extract and transmit the embedded audio's digital audio. Also, when the 16-channel digital audio I/O option (LV 7770 OP70) is installed in the LV 7770, the number of I/O connectors can be expanded to 8 connectors with 16 channels. (To measure embedded audio, the LV 7770 must have the LV 5770SER08 or LV 5770SER09 installed.)

#### • With Loudness Measurement Function (for 2 Signals)

#### • Standard-Equipped CINELITE II / CINELITE Advanced

The CINELITE feature makes it easy to manage the levels of specific points on the picture display. This is useful for adjusting the gain of multiple cameras through the use of a single reference point. The CINEZONE feature makes it possible to check the luminance distribution of the whole picture display at a glance.

#### • SDI Signal Data Analysis Feature (LV 5770SER08 and LV 5770SER09A)

On the status display, SDI signal transmission errors and various errors related to the embedded audio signal and ancillary data can be detected. In addition, the LV 7770 has event log, data dump, and external sync signal and SDI signal phase difference display features for analyzing SDI signals. Ancillary data is displayed along with the embedded line numbers and numbers of the corresponding standards in a list. This makes it possible to display detailed analyses.

#### • Timecode Display (LV 5770SER08 and LV 5770SER09A)

The LTC and VITC that are embedded in an SDI signal and the D-VITC that is embedded in an SD-SDI signal can be displayed. The timecode can also be used for time stamps in the event log.

#### • Superimposing of English Closed Captions (LV 5770SER08 and LV 5770SER09A)

The English closed captions (EIA-608, EIA-708, or VBI) that are embedded in an SDI signal can be superimposed over the image on the picture screen.

#### • External Control Connectors

The LV 7770 has two external control connectors: an Ethernet port and a remote control connector.

By connecting the Ethernet interface to a PC, you can control the LV 7770 remotely over TELNET, transfer files over FTP, control the LV 7770 remotely and detect errors over SNMP, and control the LV 7770 over HTTP. You can also connect to the separately-sold LV 7770-01 (REMOTE CONTROLLER). (You cannot use TELNET and the LV 7770-01 at the same time.)

The remote control connector can be used to load presets, switch the input signal, and transmit errors.

#### LV 5770SER08 SDI INPUT (Option)

SDI input(The LV 5770SER08 and LV 5770SER09 cannot be installed in the instrument at the same time.)

#### LV 5770SER09A SDI INPUT / EYE (Option)

In addition to the LV 5770SER08 features, eye patterns can also be displayed.(The eye pattern display can be used on one of the two input SDI signals that you select.)

#### LV 5770SER03A TRI SYNC / COMPOSITE NTSC/PAL (Option)

Tri-level sync and composite input.

#### LV 5770SER42 ANALOG AUDIO (Option)

Up to 8 channels of analog audio are supported.

#### LV 7770 OP70 16CH DIGITAL AUDIO ADAPTER (Option)

Up to 16 channels of digital audio are supported.

#### ■ Dolby Option

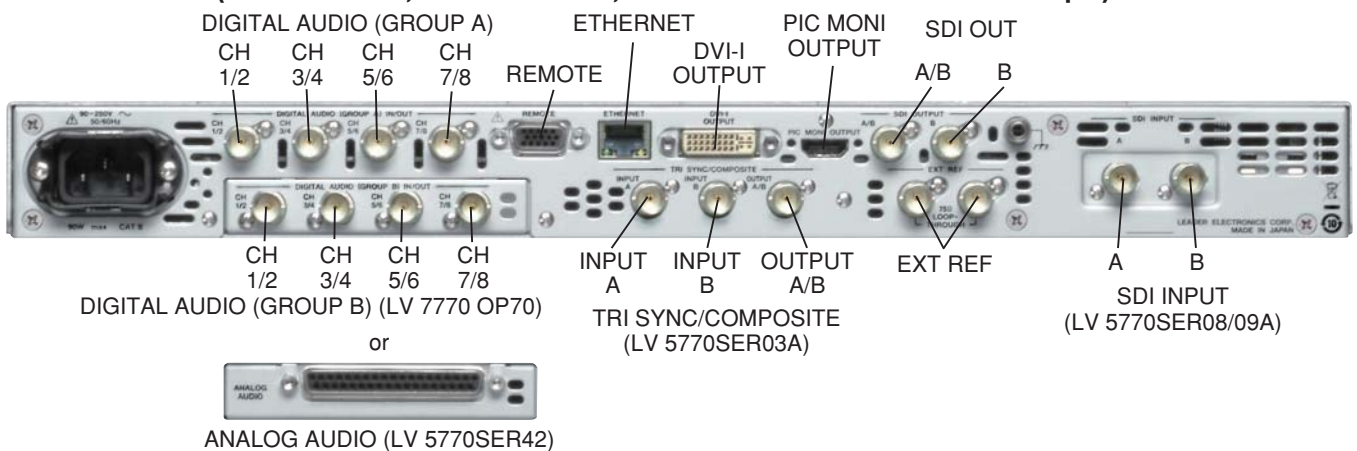
The addition of the Dolby option enables the LV 7770 to decode and display the Dolby E or Dolby Digital signals that are compressed in embedded audio or digital audio signals.

(Dolby is a trademark of Dolby Laboratories)

<b>Video Output Connectors</b> <b>DVI-I Output Connector</b> <b>Output Connector</b> <b>Output Signal</b>	One DVI-I connector The measurement display is output as a digital signal
<b>Resolution</b> <b>Aspect Ratio *1</b> <b>Signal Format</b> <b>DDC</b> <b>HOT PLUG Detection</b>	XGA (1024 x 768) 4:3, 16:9, 16:10 Single link TMDS, analog RGB Not supported Not supported
<b>Picture Monitor Output Connector (LV 5770SER08 and LV 5770SER09A) *2</b> <b>Output Connector</b> <b>Output Signal</b>	1 Monitor output of the selected SDI input signal (channel A or B)
<b>Signal Format</b> <b>Color Space Conversion</b>	Single link TMDS YCbCr 4:2:2, YCbCr 4:4:4, RGB 4:4:4 (convertible between color spaces)
<b>Quantization Conversion</b> <b>Audio *3</b>	8 bits, 10 bits, 12 bits SDI embedded audio channels 1 to 8 embedded in the output signal (LPCM only) *1 The display must have a resolution conversion feature. *2 The following signals are not supported. 720p/24, 23.98, 1080PsF/30, 29.97, 25, 24, 23.98, 1080p/24, 23.98 (2048x1080), 1080PsF /24, 23.98 (2048x1080) *3 The audio channel mapping is fixed.
<b>Output</b> <b>DVI-I Output</b> <b>Output</b> <b>Signal Format</b> <b>DDC</b> <b>HOT PLUG</b>	Connector 1 Single link T.M.D.S Analog RGB Not supported Not supported
<b>Pic Mon Output Connector (LV 5770SER08 and LV 5770SER09A)</b> <b>Output Connector</b> <b>Output Signal</b>	1 Monitor output of the selected SDI input signal (channel A or B)
<b>Signal Format</b> <b>Color Space Conversion</b>	Single link TMDS YCbCr 4:2:2, YCbCr 4:4:4, RGB 4:4:4 (convertible between color spaces)
<b>Quantization Conversion</b> <b>Audio</b>	8 bits, 10 bits, 12 bits SDI embedded audio channels 1 to 8 embedded in the output signal (LPCM only)
<b>Control Connectors</b> <b>USB Port</b> <b>Specification</b> <b>Supported Media</b> <b>Function</b>	USB 2.0 USB memory device Used to save captured data, event logs, preset data, data dumps, and loudness logs.
<b>Ethernet Port</b> <b>Compliant Standard</b> <b>Supported Protocol</b>	IEEE802.3 TELNET, FTP, SNMP, HTTP, SNTp

<b>I/O Connectors</b> <b>Function</b>	RJ-45 Remote control from an external PC or the LV 7770-01
<b>Type</b>	10Base-T, 100Base-TX
<b>Remote Control Connector</b> <b>Function</b>	Used to load preset settings, switch input channels, transmit the alarm signal, and start, stop, and clear the loudness measurement.
<b>Control Signal</b> <b>Input Voltage Range</b> <b>Control Connector</b>	LV-TTL level (low active) 0 to 5 VDC 15-pin D-sub (female)
<b>Screen Capture</b> <b>Function</b> <b>Display</b>	Captures the display Displays only the captured image or overlays the captured image over the input signal
<b>Media</b> <b>Data Output</b>	Internal memory (RAM) and USB memory Screen captures can be saved as bitmap files to USB memory, or they can be saved in a file format that the LV 7770 can load.
<b>Format</b> <b>Data Input</b>	TIF, DPX Data saved to USB memory can be loaded and displayed on the LV 7770.
<b>Presets</b> <b>Presets *1</b> <b>Number of Presets</b> <b>Preset Loading Method</b>	Saves the panel settings 60 Front panel, remote control connector *2, or ethernet
<b>Copying</b>	All preset data can be copied from the LV 7770 to a USB memory device or from a USB memory device to the LV 7770. *1 Settings related to whether the instrument is on or off, the ethernet connector, the remote control connector, the date, and the time are not saved. *2 The number of presets loaded from the remote control connector can be 8 (6 when loudness measurement is being controlled) or 60.
<b>Environmental Conditions</b> <b>Operating Temperature</b> <b>Operating Humidity</b> <b>Operating Environment</b> <b>Operating Altitude</b> <b>Overvoltage Category</b>	0 to 40 °C 85 %RH or less (no condensation) Indoor Up to 2,000 m II 90 to 250 VAC , 50/60 Hz, 90 W max.
<b>Dimensions and Weight</b>	426 (W) x 44 (H) x 460 (D) mm Approx. 5 kg 19 (W) x 1 3/4 (H) x 17 3/4 (D) inch, 11lbs.
<b>Accessories</b>	Power cord . . . . . 1 Cover/inlet stopper. . . . . 1 15-pin D-sub connector . . . . . 1 15-pin D-sub connector cover . . . . . 1 Instruction manual . . . . . 1

REAR PANEL (LV 5770SER08, LV5770SER03A, LV 7770 OP70 for installation example)

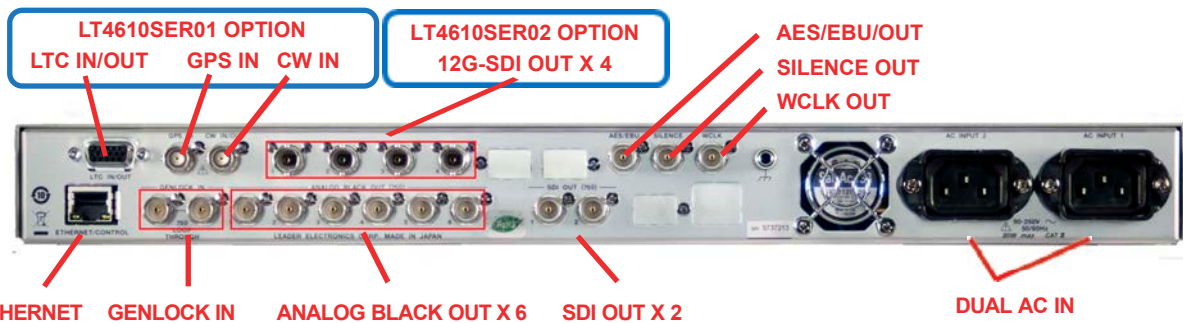


Combinations of Supported Units

Option Name Number	Product Name	Combination Conditions										
		1	2	3	4	5	6	7	8	9	10	11
LV 5770SER03A	TRI SYNC/COMPOSITE						○	○	○	○	○	○
LV 5770SER08 / LV 5770SER09A	SDI/EYE			○	○	○				○	○	○
LV 5770SER42	ANALOG AUDIO		○			○			○			○
LV 7770 OP70	16CH DIGITAL AUDIO ADAPTER	○			○				○			○



## LT4610 SYNC GENERATOR Powerful SYNC GENERATOR with GPS & Time-code Capabilities



The LT 4610 is a 1RU rack size Sync Generator that supports the triple-rate SDI (3G/HD/SD) format. LT4610 is equipped with a redundant power supply, which is very valuable if power is lost to the main supply. In addition to test pattern output including color bars and SDI check fields, the LT 4610 is equipped with numerous features such as ID characters, QVGA logo marks, safety area markers, audio word-clock, lip-sync, genlock function for external reference signals, and six analog black signals.

### MAIN FEATURES

- Accepts 3G-SDI, Dual Link, HD-SDI and SD-SDI systems.
  - The ID characters can be superimposed at any arbitrary position on the screen.
  - A logo mark, up to 320 (pixels) by 240 (lines) in QVGA size can be superimposed at any arbitrary position on the screen. Logo is converted from bitmap to four-grade monochrome data.
  - A 90% and 80% safety-area markers can be superimposed on the screen.
  - Simple motion picture mode is provided to scroll the pattern.
  - The 32 channels of embedded audio signals (link A and link B – each 4ch x 4 groups) for 3G-SDI (level B), and the 16 channels of embedded audio signals (4ch x 4 groups) can be superimposed. The frequency and level can be respectively set for each channel.
  - LT 4610 can output lip sync patterns in which the video and audio are synchronized. By using Leader's LV 5770(A), you can accurately measure the lip sync of the video and audio on SDI signals. (3G-SDI Level A/HD-SDI/SD-SDI only)
  - The LT 4610 can synchronize with NTSC/PAL black burst signals and HD tri-level sync signals. NTSC/PAL black burst signal with field reference pulse and NTSC black burst signal with 10 field IDs are also supported. Furthermore, a Stay-in-Sync function is available in case errors occur at the genlock input.
  - Six independent analog black signal outputs are provided. The black burst signal with the same format as the SDI output, or HDTV tri-level sync signal with the same format of clock frequency can be selected for variable timing.
  - A 48KHz word clock output and a 48KHz AES/EBU output are provided to synchronize the audio signal.
  - The LT4610 is equipped Real-time clock with a battery to keep real-time inside a unit regardless on/off power. Also, keeping real-time if GPS signal is not received when the LT4610 is equipped GPS option.
  - Standard support for SNMP via Ethernet makes it easy to integrate the LT 4610 in a network environment.
  - Up to 10 presets can be saved. You can recall a preset to start the LT 4610 with the same settings every time.
  - USB slot is available on the front panel to save and update user data settings.
  - Redundant power supply provides extra reliability. Alarms are generated with SNMP and displayed on front panel when errors occur.
- OPTIONS**
- LT4610 SER01 GPS OPTION
  - LT4610 SER02 12G-SDI OPTION
  - LT4610 SER03 PTP OPTION (FUTURE)

# LT 4610 SPECIFICATIONS

## Compliant Standards

Embedded Audio		
3G、HD、HD(DL)		SMPTE ST 299
SD		SMPTE ST 272
Payload ID		SMPTE ST 352
Analog Black Output		
NTSC Black Burst Signal		SMPTE ST 170、SMPTE ST 318、SMPTE RP 154
PAL Black Burst Signal		ITU-R BT1700、EBU N14
HD Tri-Level Sync Signal		SMPTE ST 240、SMPTE ST 274、SMPTE ST 296
AES/EBU Digital Audio Output		
		ANSI S4.40、AES3-2009、AES11-2009、SMPTE ST276

## SDI Format and Standards

### 3G-A format and standard

Color system	Quantization	Image	Frame (field) Frequency / Scanning	Compatible standard
YCbCr 4:2:2	10bit	1920×1080	60/59.94/50/P	SMPTE ST 274
			60/59.94/50/I	SMPTE ST 425
	12bit	1920×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	
YCbCr 4:4:4	10bit	1280×720	60/59.94/50/30/29.97/25/24/23.98/P	SMPTE ST 296 SMPTE ST 425
			60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425
	12bit	1920×1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
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
			60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425
	12bit	1920×1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	

### 3G-B format and standard

Color system	Quantization	Image	Frame (field) Frequency / Scanning	Compatible standard
YCbCr 4:2:2	10bit	1920×1080	60/59.94/50/P	SMPTE ST 274
			60/59.94/50/I	SMPTE ST 372
	12bit	1920×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	SMPTE ST 425
YCbCr 4:4:4	10bit	1920×1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	12bit	1920×1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
RGB 4:4:4	10bit	1920×1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	12bit	1920×1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	

### HD(DL) format and standard

Color system	Quantization	Image	Frame (field) Frequency / Scanning	Compatible standard
YCbCr 4:2:2	10bit	1920×1080	60/59.94/50/P	SMPTE ST 274
			60/59.94/50/I	SMPTE ST 372
	12bit	1920×1080	30/29.97/25/24/23.98/P 30/29.97/25/24/23.98/PsF	
YCbCr 4:4:4	10bit	1920×1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
RGB 4:4:4	10bit	1920×1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	

### HD、SD format and standard

Color system	Quantization	Image	Frame (field) Frequency / Scanning	Compatible standard
YCbCr 4:2:2	10bit	1280×720	60/59.94/50/30/29.97/25/24/23.98/P	SMPTE ST 292 SMPTE ST 296
			60/59.94/50/I	SMPTE ST 292
			30/29.97/25/24/23.98/P 24/23.98/PsF	SMPTE ST 274 SMPTE RP 211
		720×487 720×576	59.94/I	SMPTE ST 259
			50/I	SMPTE ST 125

## Input / Output

SDI Outputs		
Output Connectors		2 x BNCs
3G-A、HD、SD		2 outputs
3G-B、HD(DL)		1 output
Output Impedance		75 Ω
Output Amplitude		800mVp-p±10%
Return Loss		≥ 15 dB (5 MHz to 1.485 GHz) ≥ 10 dB (1.485 to 2.970GHz)
Overshoot		Less than 10%
Rise and Fall Times		
3G		≤ 135 ps (20 to 80%)
HD、HD(DL)		≤ 270 ps (20 to 80%)
SD		0.4 ns to 1.5 ns (20 to 80%)
DC Offset		0±0.5V

Genlock Input		
Input Connectors		2 x BNCs
Input Signals		Analog composite sync signal Analog component sync signal
Input Configuration		BNC 75 Ω loop-through
Input Impedance		75 Ω
Max. Input Voltage		±5V (DC + Peak AC)
Operating Input Level Range		±6dB
External Lock Range		±5ppm

Analog Black Output		
Output Connectors		6 x BNCs
Output Signals		Analog composite sync signal Analog component sync signal

Output Impedance		
Sync Level		75 Ω
NTSC		40±1 IRE
PAL		-300±6mV
HD		±300±6mV
Blanking		0±15mV

AES/EBU Digital Audio Output		
Output Connector		1 x BNC
Output Amplitude		1Vp-p±0.1V
Output Impedance		75 Ω unbalanced

AES/EBU Silence Output		
Output Connectors		1 x BNC
Output Amplitude		1Vp-p±0.1V
Output Impedance		75 Ω unbalanced

Word-Clock Output		
Output Connector		1 x BNC
Output Frequency		48kHz
Output Amplitude		≥ 3.5V (when 75 Ω terminated and high-level)

## External Interface

Ethernet		
Specifications		IEEE 802.3
Protocol		SNMP v2c
Input Connector		RJ-45
Function		Transmission of trap (when detects error) Transmission of operation status (e.g., genlock synchronization status)
Type		10BASE-T / 100BASE-TX (auto switching)

USB		
Specifications		USB 2.0
Supported Media		USB memory device
Functions		Saving and loading of preset data, Saving and loading of logo data, Firmware update MIB file acquisition
Connector		USB Type A

LCD		
Number of Characters		20 characters×2 lines
Backlight		On / Off

# LT 4610 SPECIFICATIONS

## ●SDI Video Output

### ●SDI Electrical Characteristics

#### Bit Rate

3G	2.970Gbps、2.970/1.001Gbps
HD、HD(DL)	1.485Gbps、1.485/1.001Gbps
SD	270Mbps

### ●Timing Adjustment

Adjustment Range Entire frame

#### Adjustment Unit

V	Lines
H	Clocks

#### Dual link

Link B  $\pm 10 \mu$ s range

### ●Test Patterns

#### 3G、HD

100% color bar, 75% color bar, multi-format color bar (ARIB STD-B28, pattern 2 area can be set to 100% white, 75% white or +I), check field, flat field white 100%, black 0%, red 100%, green 100%, blue 100%

#### SD

525i/59.94	100% color bar, 75% color bar, SMPTE color bar, check field, flat field white 100%, black 0%, red 100%, green 100%, blue 100%
625i/50	100% color bar, EBU color bar, BBC color bar, check field, Flat field white 100%, black 0%, red 100%, green 100%, blue 100%

#### Automatic Switching

Automatically switches between available patterns (except for check field)

#### Switching Time

1~255sec

### ●Pattern Scrolling

#### Direction

Eight directions (up, down, left, right and their combinations)

#### Speed Range and Unit

##### Interlace

V	In unit of fields
	0 to 256 lines, 1 lines steps
H	0 to 256 dots, in 2 dot steps

##### Progressive

V	In unit of frames
	0 to 256 lines, 1 line steps
H	0 to 256 dots, 2 dot steps

\* Not available when the check field pattern is selected.

### ●Safety Area Markers

#### 3G、HD

Action safe area (90%)  
Title safe area (80%)  
4:3 aspect ratio  
(can be turned on and off separately)

#### SD

Action safe area (90%)  
Title safe area (80%)  
(can be turned on and off separately)

\* Not available when the check field pattern is selected.

### ●ID Characters

#### Number of Characters

Up to 20 characters

#### Size [Dots]

32×32 / 64×64 / 128×128 / 256×256

#### Intensity

100%, 75% (black only for the background color)

#### Display Position

Anywhere on the display

#### Display Position Adjustment Resolution

V	1 line
H	1 dot

#### Blinking Display (\*1)

OFF, 1 to 9 sec

#### Scrolling (\*1)

Function	Scroll including the ID character background
Direction	Two directions (left and right)
Speed Range and Unit	
Interlace	In unknit of fields
	0 to 256 dots, in 2 dot steps
Progressive	In unit of frames
	0 to 256 dot, in 2 dot steps

\* Not available when the check field pattern is selected

\*1 The blinking display and scrolling can be used simultaneously.

### ●Logo Mark

#### Logo Mark Data

4-level monochrome data from level 0 to 3

#### Maximum Size

320 (dot)×240 (line) (QVGA size)

#### Number of Logo Marks

Up to 4

#### Display Position

Anywhere on the display

#### Display Position Adjustment Resolution

V	1 line
H	1 dot

#### Display Level

Any level from 0 to 3

#### File Format

Before Conversion	24-bit full color bitmap format (.bmp)
After Conversion	Original format (.lg)

#### Conversion Color Matrix

$Y = (0.212 \times R) + (0.701 \times G) + (0.087 \times B)$   
Converts 256-level monochrome data (Y) to 4 levels (levels 0 to 3) using specified thresholds.

#### Conversion Method

Using the logo application

#### Logo Mark Data Transfer

Save the data to a USB memory device and transfer to the LT4610

\* Not available when the check field pattern is selected.

### ●Channel On / Off

#### Function

Each of the Y/G, Cb/B, Cr/R components can be turned on and off for each channel independently. Outputs the specified Y/G, Cb/B or Cr/R signal

#### On

Y/G	040h/040h
Cb/B	200h/040h
Cr/R	200h/040h

#### Off

\* Not available when the check field pattern is selected

### ●Image Overlay

#### Display Precedence

ID characters > logo mark > safety area markers > test pattern  
(The display order cannot be changed.)

#### Simultaneous Display

ID character, logo mark, safety area markers, and test pattern can be displayed simultaneously.

### ●Embedded Audio

#### Embedded Channels

Can be turned on and off at the group level

#### 3G-A、HD、SD

16 channels (4ch x 4 groups)

#### 3G-B

32 channels (link A, link B, 4ch each x 4 groups)

#### Sampling Frequency

48 kHz sampling (synced with the video signal)

#### Resolution

20 bits, 24 bits

#### Pre-emphasis

OFF / 50/15 / CCITT (only the CS bit is switched)

#### Frequency

SILENCE, 400 Hz, 800 Hz, 1 kHz

#### Level

-60 to 0dBFS (1dBFS steps)

#### Audio Click

OFF, 1 to 4 sec

\* Audio (including packets) cannot be embedded when the check field pattern is selected..

\* The frequency, level, and audio click can be set for each channel.

\* The following limitations apply for SD (525i/59.94).

• For 16 channel output, the resolution is set to 20 bits.

• Up to three groups (12 channels) can be output at 24-bit resolution.

### ●Lip Sync Patterns

#### Setting SDI 1 output is synchronized to AES/EBU output

\* Not available when the check field pattern is selected

\* Safety marker, ID character and logo mark cannot be embedded.

\* When lip sync is enabled, the audio click setting is disabled, and audio synchronized to the lip sync pattern is output.

## ●Genlock Function

### Genlock Formats

NTSC-BB, NTSC-BB+Ref, NTSC-BB+ID, NTSC-BB+Ref+ID, NTSC-BB+S, NTSC-BB+S+Ref, NTSC-BB+S+ID, NTSC-BB+S+Ref+ID, PAL-BB, PAL-BB+Ref, 525/59.94I, 525/59.94P, 625/50I, 625/50P, 1125/60I, 1125/59.94I, 1125/50I, 1125/24I, 1125/23.98I, 1125/30P, 1125/29.97P, 1125/25P, 1125/24P, 1125/23.98P, 750/60P, 750/59.94P, 750/50P, 750/30P, 750/29.97P, 750/25P, 750/24P, 750/23.98P

### ●Timing Adjustment

#### Adjustment Range

NTSC Black Burst Signal	$\pm 5$ frames
PAL Black Burst Signal	$\pm 2$ frames
HD Tri-Level Sync Signal	1 frame (entire frame)
FINE	1 clock step

## ●Analog Black Output

### Analog Black Formats (Six independent analog black signal)

NTSC-BB, NTSC-BB+Ref, NTSC-BB+ID, NTSC-BB+Ref+ID, NTSC-BB+S, NTSC-BB+S+Ref, NTSC-BB+S+ID, NTSC-BB+S+Ref+ID, PAL-BB, PAL-BB+Ref, 525/59.94I, 525/59.94P, 625/50I, 625/50P, 1125/60I, 1125/59.94I, 1125/50I, 1125/24I, 1125/23.98I, 1125/30P, 1125/29.97P, 1125/25P, 1125/24P, 1125/23.98P, 750/60P, 750/59.94P, 750/50P, 750/30P, 750/29.97P, 750/25P, 750/24P, 750/23.98P

# LT 4610 SPECIFICATIONS

## ●Timing Adjustment

Setting	
Adjustment Range	
NTSC Black Burst Signal	±5 frames
PAL Black Burst Signal	±2 frames
HD Tri-Level Sync Signal	1 frame (entire frame)
Adjustment Unit	
NTSC/PAL Black Burst Signal	In units of 0.0185 μs
HD 3 値同期信号	In units of 0.0135 μs

## ●Word-Clock Output

Timing Adjustment	
Adjustment Range	±1AES/EBU frame
Adjustment Unit	512 fs (24.576 MHz)

## ●AES/EBU Digital Audio Output

Timing Adjustment	
Adjustment Range	±1AES/EBU frame
Adjustment Unit	512 fs (24.576 MHz)
Sampling Frequency	48 kHz sampling (synced with the video signal)
Resolution	20 bits, 24 bits
Pre-emphasis	OFF, 50/15, CCITT (only the CS bit is switched)
Frequency	SILENCE, 400 Hz, 800 Hz, 1 kHz
Level	-60 to 0 dBFS (1 dBFS step)
Audio Click	OFF, 1 to 4 sec
Sampling Clock Accuracy	Grade 2 (±10 ppm)

## ●AES/EBU Silence Output

Timing Adjustment	
Adjustment Range	±1AES/EBU frame
Adjustment Unit	512 fs
Sampling Frequency	48 kHz sampling (synced with the video signal)
Resolution	20 bits
Pre-emphasis	OFF
Frequency	SILENCE
Level	MUTE
Lip Sync	Synced with SDI1 output
Sampling Clock Accuracy	Grade 2 (±10 ppm)

\* The frequency, level, and audio click can be set for each channel.

\* Turn off all channels to output a digital audio reference signal (DARS)

## ●Lip Sync Pattern

Setting	Selectable between SDI1+AES/EBU and SDI2
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## ●Presets

Presets	Saves the panel settings (*1)
Number of Presets	10
Recall Method	Front panel
Copy Method	Copy all presets from the LT 4610 to a USB memory device or copy all presets from the USB memory device to the LT 4610.

\* Last memory is not supported. By setting POWER ON RECALL, you can start the LT 4610 with preset settings.

\*1 Logo data and device-specific information (e.g., IP address, time) cannot be saved.

## ●Internal Clock

Clock Frequency	13.5MHz
Frequency Accuracy	±0.1ppm (25±5°C)

## ●General Specifications

Environmental Conditions	
Operating Temperature	0 to 40 °C
Operating Humidity Range	85 %RH or less (no condensation)
Optimal Temperature	10 to 35 °C
Operating Environment	Indoors
Elevation	Up to 2,000 m
Overvoltage Category	I
Pollution Degree	2
Power Requirements	
Voltage	AC 90~250V
Power Consumption	80W max.

Dimensions	482 (W) × 44 (H) × 400 (D) mm (excluding protrusions)
Weight	3.6 kg (LT 4610 only) 3.8kg (LT 4610 with LT 4610SER01)
Accessories	Power codes.....2 Cover / inlet stoppers.....2 CD-ROM (Logo App, instruction manual).....1

## ●LT 4610SER01 GPS OPTION

This option adds GPS Sync Input, 10 MHz CW Sync Input and LTC Input / Output functions. Time-code generator function is synced to Internal Time Information, GPS, LTC, VITC Time Information, and available to generate ATC (LTC, LTC and AES/EBU Embedded Time-code on time information of GPS. Also, this option is equipped Holdover Function that GPS signal and the CW signal to hold the phase and frequency of the output signal when it becomes no signal. Also, when locking the GPS, this unit can be used as an NTP server.

### Standards

#### ●GPS Sync

Compliance Standards SMPTE ST 2059

#### GPS Input

Input Connector	1 x BNC
Input Impedance	50 Ω
Antenna, Pre-amplifier Power Supply	
Voltage	5V, 3.3V, OFF
Electric Current	50 mA max. (built-in overcurrent protection circuit)

#### GPS Receiving

Reception Frequency	1575.42MHz (L1)
Reception Code	C/A code
Receiving Sensitivity	Up to -130 dBm (input level into antenna)

Hold Over Function When the GPS signal is interrupted, holding the previous frequency and phase.

#### ●10MHz CW Sync

#### CW Input

Input Connector	1 x BNC
Input Impedance	50 Ω
Input Signal Level	0.5 to 2Vp-p
Input Signal Frequency	10MHz / 1pps < OUTPUT LEVEL 3.3Vcmos
Frequency Tolerance Range	±5ppm
Hold Over Function	When 10MHz CW signal is interrupted, holding the previous frequency.

#### ●LTC Input / Output

Compliance Standards SMPTE 12M-1

#### Input and Output

In/Output Connector	D-SUB 15 pin (Input and output shared)
Number of Input	1
Input Impedance	10k Ω balanced
Input Signal Level	0.5 to 4 Vp-p
Number of Output	3
Output Impedance	600 Ω balanced
Output Signal Level	2 Vp-p ±10%

#### ●Time-Code

Reference Time	Internal / GPS / LTC / VITC
Frame Rate	Synced with ANALOG BLACK 1
Drop Frame Mode	On, Off
ATC Setting	
LTC Insert Setting	On, Off
LTC Setting	
Output Setting	On, Off
Timing Adjustment Range	±42ms (Increase and decrease depending on frame rate)
Timing Adjustment Unit	0.01ms
AES/EBU Time-code Insert Setting	On, Off

Leap Second	
Apply Setting	Timer setting the application date and time.
Summer Time	
Apply Setting	Timer setting the application date and time.

# LT 4610 SPECIFICATIONS

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## ●LT4610SER02 12G-SDI OPTION

By adding LT 4610 SER 02 to the LT 4610, 12 G-SDI, 3 G-SDI, HD-SDI, SD-SDI correspondence is possible. SDI signal output can handle superimposition of natural image output, pattern scroll, moving box, ID character, embedded audio · logo mark in addition to test pattern output such as 4 output, color bar .

### ■ Features

#### ● 12G-SDI compatible (4K)

The SDI signal output can be used for 4K 12G-SDI, 4K 3G-SDI quad, 4K HD SDI quad, 4K 3G dual, 3G-SDI (level A, level B), HD-SDI (including dual link) and SD- It is compatible and has 4 SDI signal output terminals. The format is common to 4 outputs, but you can set patterns and phases, respectively. (However, only 2 lines of 3G-SDI level B and HD dual link are available)

#### ● Pattern scrolling

It has a function to scroll the pattern in 8 directions. You can also change the speed.

## ●LT4610SER03 PTP OPTION (Future)

#### ● Moving BOX

You can superimpose a BOX of any size that moves on the screen.

#### ● Superimposition of ID characters

An ID character can be superimposed on an arbitrary position on the screen. You can also display sideways scrolling or blinking as a confirmation of the freeze state.

#### ● Natural image output

Up to 8 4K natural images can be stored on the unit.

#### ● Embedding audio overlay

In the 3G-SDI level B, there are 16 ch (4 ch × 4 groups) embeddings for 32 ch (link A, link B: 4 ch × 4 groups each), 12 G-SDI, 3 G-SDI level A, HD-SDI, SD- Audio can be superimposed. Frequency, level, etc. can be set for each channel.

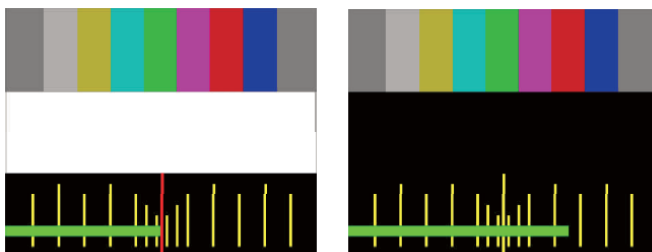
## LT4600A MULTI FORMAT VIDEO GENERATOR Compact Sync Generator with 3G Capabilities



The compact, 1U half-rack sized, LT 4600A Multiformat Video Generator is applicable to 3G-SDI, HD-SDI and SDDSI systems. Various output capabilities, such as color bar, SDI check field test pattern, ID characters, logo mark in QVGA size, safety area marker, embedded audio, genlock model for external reference synchronization, and three independent analog black signal systems. Lip Sync is one of the key features included in this product. Lip Sync is a feature included in this product

### MAIN FEATURES:

- Accepts 3G-SDI, Dual Link, HD-SDI and SD-SDI systems.
- SDI Outputs can be used independently from each other.
- The ID characters can be superimposed at any arbitrary position on the screen.
- A logo mark, up to 320 (pixels) by 240 (lines) in QVGA size can be superimposed at any arbitrary position on the screen. Logo is converted from bitmap to four-grade monochrome data.
- A 90% and 80% safety-area markers can be superimposed on the screen.
- A 4:3 aspect ratio marker can also be superimposed in 3G-SDI or HD-SDI formats.
- Simple motion picture mode is provided to scroll the pattern.
- The 32 channels of embedded audio signals (link A and link B - each 4ch x 4 groups) for 3G-SDI (level B), and the 16 channels of embedded audio signals (4 ch x 4 groups) can be superimposed. The frequency and level can be respectively set for each channel.
- The instrument can be locked to NTSC/PAL black burst or HDTV tri-level sync signal.
- In case of genlock input errors, a Stay-In function is available.
- Three independent analog black signal outputs are provided. The black burst signal with the same format as the SDI output, or HDTV tri-level sync signal with the same format of clock frequency can be selected for variable timing.
- A 48 KHz word clock output and two 48 KHz AES/EBU outputs are provided to synchronize the audio signal.
- It supports SNMP protocol to easily construct a network system.
- USB slot available on the front panel to save and update user data settings.
- Lip Sync Test Pattern included as standard
- DIMENSIONS (W x H x D) :  
8.39" x 1.73" x 15.75" (213mm x 44mm x 400mm)
- Power Requirements  
Voltage AC 90~250V  
Power Consumption 25W max.



Lip Sync : Black and White Blinking



LT4448 changeover on top of two LT4600A side by side.

# LT4448 AUTO CHANGEOVER

## Auto Changeover for the LT4610 and LT4600A



CE  
Upon request

### 3G/LTC/DUAL AC POWER/SNMP/WEB BROWSER

The LT 4448 is a changeover unit that automatically switches the signal from the primary signal to the backup signal when problems are detected in the primary signal.

A single LT4448 provides 11 channels. These channels can receive LTC, SDI, NTSC/PAL black burst, HD tri-level sync, AES/EBU digital audio, and word-clock signals. SDI signals are switched with relays; all other signals can be switched with electronic switches.

The power supplies are redundant. Alarms are generated when errors occur. The LT 4448 can be used in combination with LT4610(SYNC GENERATOR).

#### FEATURES

##### Input / Output

Provides 11 channels (a single channel consists of a primary input, a backup input, and an output) on a single LT4448.

##### Switching input signal

Relays are used to switch channels 1 to 2. Electronic switches are used to switch channels 3 to 11. In addition to the electronic switches, channels 4 to 11 are also equipped with high-speed, error detection circuits. Provides 3 channels (a single channel consists of a primary input, a backup input and an output) for the LTC.

##### Select a input signal

The channel 1 and 2 inputs are dedicated input for SDI signal (3G/HD/SD), NTSC/PAL Black burst and Tri-Level Sync signal. The channel 3 to 8 inputs are dedicated input for NTSC/PAL Black burst and Tri-Level Sync signals. The channel 9 and 10 inputs are dedicated input for AES/EBU digital audio signals. The channel 11 input is dedicated input for word-clock signal(TTL). For LTC signal, LTC dedicated input / output (2Vp-p,differential input) is used.

##### LTC Channel

There are 3 LTC channels. Each has 2 inputs (primary, backup) and 1 output. In addition, it can be connected with LT4610 (SYNC GENERATOR) with a dedicated cable (optional).

##### Fault detection

When an input signal level error is detected, the LT4448 lights the panel fault LED as well as the panel LED that indicates the channel that is causing the problem. This feature allows quick investigation of the problem. Channels 3 to 11 are equipped with high-speed fault detection circuits. These enable the LT4448 to switch to a backup signal with barely any disturbances shown on the screen when problems, such as interruptions, occur in the primary signal.

##### Power Supply Start Time

Depending on the rise time of the system signal source to be connected, you can choose from about 1 minute / about 4 minutes from the time the power is turned on until the fault detection is started.

##### SNMP Ready

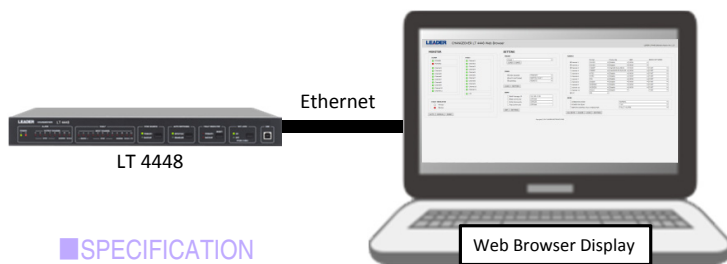
Error monitoring over an Ethernet network is possible. Traps are issued for error detection, panel control, and remote control. In addition, the error details and DIP switch settings (except for the user defined fault detection level) can be read as status information. IP address configuration software is included. (Windows 7 32bit/64bit, Windows 8, Windows 10)

##### Redundant Power Supply

Redundant power supply provides extra reliability. Alarms are generated when an error occurs.

##### Web Browser

It can be controlled by the web browser.



#### SPECIFICATION

##### Input Signals

Setting Method	Select the input signal type with DIP switches or Web (Browser) for each channel.
Ch1 and2	NTSC black burst signal PAL black burst signal HD tri-level signal SD-SDI signal (270Mb/s) HD-SDI signal (1.485Gb/s) 3G-SDI signal (2.97Gb/s)
Ch3 to 8	NTSC black burst signal PAL black burst signal HD tri-level sync signal
CH9 and10	AES/EBU digital audio signal
CH11	Word-clock signal (TTL)
LTC	LTC Signal

##### General Specifications

Power Supply Unit	(Dual)
Voltage/Power Consumption	AC 90 to 250VAC (50/60Hz) /25Wmax
Dimensions (WHD)	426×44×400mm (excluding protrusions)
Weight	4.0kg



Combination of LT4610 and LT4448

**Rackmount adapter**

LR 2478 (1U size)

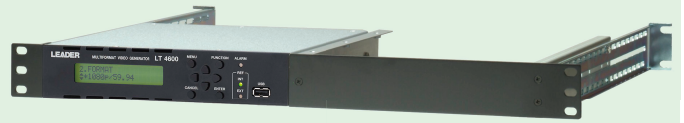


mount example

For  
LV 7330, LT4600A

**Rackmount adapter**

LR 2481 (1U size)



mount example

For  
LV 7330, LT4600A

**Rackmount adapter**

LR 2751 I (4U size)



For  
LV 5381

**Blank Panel**

LC 2129



For  
LR 2751 I

**Rackmount adapter**

LR 2752 (3U size)



For  
LV5333

**Blank Panel**

LC 2130



For  
LR 2752

**Handle**

LH 2140



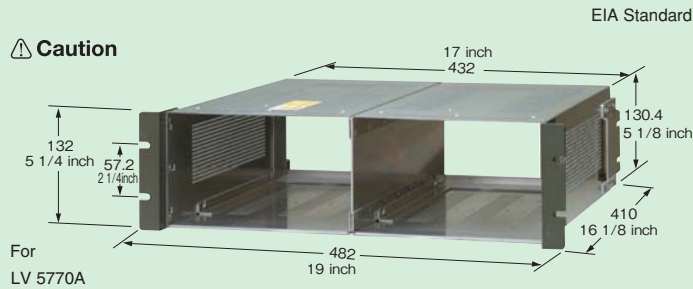
mount example

For  
LV 5381

**Rackmount adapter**

LR 2770A

**Caution**



**Blank Panel**

LC 2170

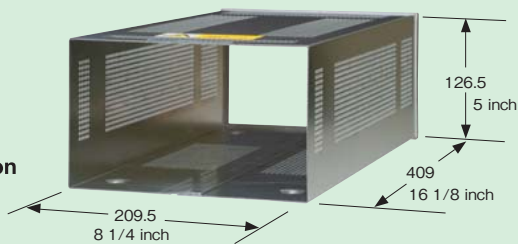


For  
LR 2770A

**Cabinet**

LR 2404A

**Caution**



**Cabinet**

LR 2427B

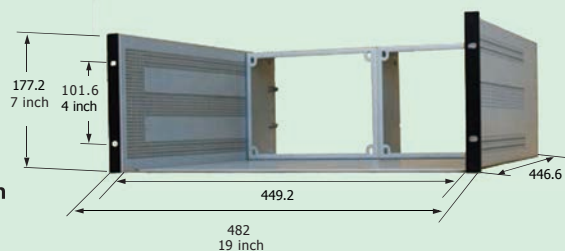
**Caution**



**Rackmount adapter**

LR 2490

**Caution**



**Blank Panel**

LC 2190

For  
LR 2490

**AC Adapter**

SPU40-105/SPU63-105



For  
LV 7330,  
LT 4600A, LV5333

For  
LV 5381



Product Name	Model	Applicable Model	Notes
Rackmount adapter	LR 2770A	LV 5770A	Two applicable can be mounted in a 3U space on a 19-inch EIA rack
Rackmount adapter	LR 2490	LV 5490, LV 5480	Two applicable models can be mounted in a 3U space on a 19-inch EIA rack.
Rackmount adapter	LR 2751 I	LV 5381	Two applicable models can be mounted in a 4U space on a 19-inch EIA rack. The adapter is equipped with a vertical tilt mechanism.
Rackmount adapter	LR 2752	LV 5333	
Rackmount adapter	LR 2478	LV 7330, LT 4600A	Two LV 7330s or an LV 7330 and an LT 4600A can be mounted in a 1U space on a 19-inch EIA rack. It doesn't matter which side you install the different units on.
Rackmount adapter	LR 2481	LV 7330, LT 4600A	One applicable model can be mounted in a 1U space on a 19-inch EIA rack. It doesn't matter which side you install the different units on.
Cabinet	LR 2404A	LV 5770A	Comes with a carrying handle and tilt stand.
Cabinet	LR 2427B		
Blank Panel	LC 2170	LR 2770A	Blank panel for LR 2770A
Blank Panel	LC 2129	LR 2751 I	Blank panel for LR 2751 I
Blank Panel	LC 2130	LR 2752	Blank panel for LR 2752
Blank Panel	LC 2190	LR 2490	Blank panel for LR 2490
Handle	LH 2140	LV 5381	
AC adapter	SPU40-105	LT 4600A, LV 7330, LV 5333	
AC adapter	SPU63-105	LV 5381	

**Caution** : Use a cabinet with the specified model number. If you use a cabinet that has not been specified, ventilation will not take place properly, and damage to the instrument, smoke emission, or fire may result.

### SPECIFICATION CHANGES:

LEADER ELECTRONICS CORP. reserves the right to discontinue the sale of instruments and/or change the specifications of instruments at any time without responsibility for the incorporation of new features in the instruments already sold.

### ENVIRONMENTAL CONDITIONS:

Our products can be used under the following conditions unless stated otherwise.

<Operating range>

1. Temperature: 0 to 40 °C

2. Humidity: 85 % RH (without condensation)



The EU WEEE Directive applies to this product and its accessories. When disposing of this product or its accessories, follow the regulations in your country or region.

EU WEEE Directive

(WEEE Directive: Waste Electrical and Electronic Equipment)

### JAPAN HEADQUARTERS

#### LEADER ELECTRONICS CORP.

2-6-33 Tsunashima-Higashi, Kohoku-ku, Yokohama 223-8505, Japan

PHONE: +81-45-541-2123 FAX: +81-45-541-2823

E-mail: sales@leader.co.jp

U.S.A.

#### LEADER INSTRUMENTS CORP.

80 Seaview Drive, Secaucus, NJ 07094

PHONE: +1-551-232-3907 E-mail: sales@leaderamerica.com

KOREA

#### LEADER KOREA CO.,LTD.

STX W-Tower No1005,90,GYEOGIN-RO,53-GIL,GURO-SEOUL,152-865,Korea

PHONE: +82-2-2068-2771 E-mail:sales@leader.co.jp

BEIJING

#### JIALONG LEADER(BEIJING) TRADING CO.,LTD.

PHONE: +86-10-85118606, 85118607 FAX: +86-10-85118608 E-mail: beijing@leadercorp.com.cn

SHANGHAI

#### JIALONG LEADER(BEIJING) TRADING CO.,LTD. SHANGHAI BRANCH

PHONE: +86-21-62756905, 62759629 FAX: +86-21-62751486 E-mail: shanghai@leadercorp.com.cn

U.K.

#### LEADER ELECTRONICS CORP. U.K.REPRESENTATIVE OFFICE

<http://www.leadereurope.com>

6th floor, First Central 200, 2 Lakeside Drive Park Royal London NW10 7FQ, UK

PHONE: +44-7286-178-752, +44-7552-236-162 E-mail: sales@leadereurope.com

SINGAPORE

#### LEADER ELECTRONICS CORP. REPRESENTATIVE OFFICE(Singapore)

PHONE: +65-9429-0237 E-mail: sales@leader.co.jp

<http://www.leader.co.jp/english/>

<http://www.leaderamerica.com>

<http://www.leaderkorea.kr/>

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