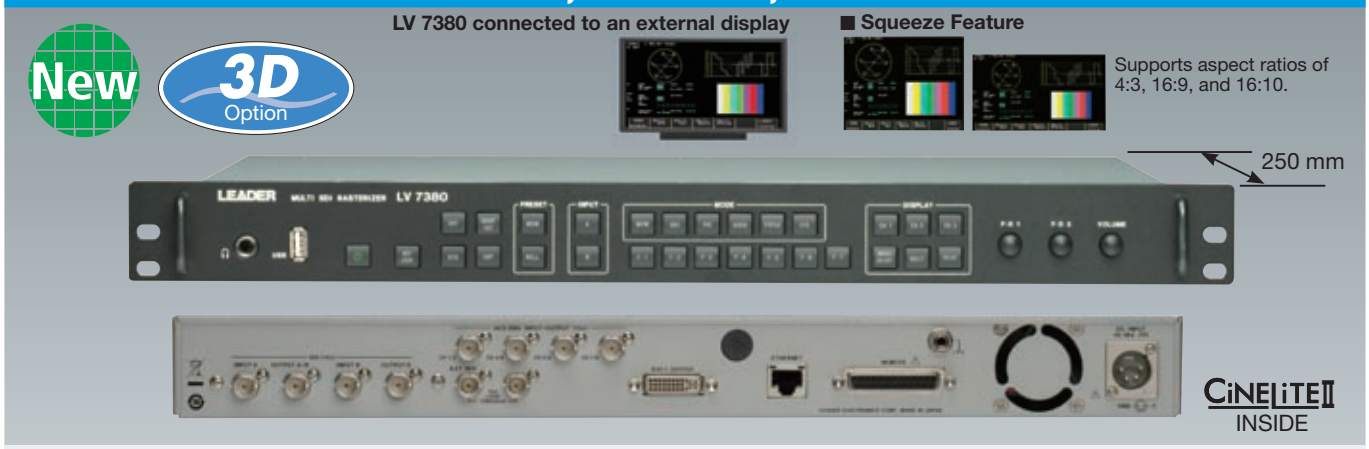
VIDEO MULTI SDI RASTERIZER

2-Channel Simultaneous Display of Waveforms, Pictures, and Vectors



LV 7380 MULTI SDI RASTERIZER

GENERAL

The LV 7380 is a 1U, full rack rasterizer that displays video signal waveforms, vectors, and pictures of HD-SDI and SD-SDI signals on an external LCD monitor. The LV 7380 also has a variety of other features. It has audio signal display features that include the Lissajous and level meter displays of embedded audio. It can display two SDI signals at the same time. It can save screen captures to USB memory. It can also display gamut errors over the picture. SDI signals that are received through channel A and B can be reclocked and transmitted from the OUTPUT A/B and OUTPUT B connectors with a press of one of the INPUT keys.
With a factory option, it can also display eye patterns of SDI signals. All these features are packed in a small unit that is only 250 mm deep.

FEATURES

■ **Two Serial Digital Inputs and Outputs**
The LV 7380 is equipped with two SDI inputs. This enables the LV 7380 to receive two different SDI signals and to receive a single signal in dual link mode. The LV 7380 can also generate a serial reclocked SDI signal for each SDI signal that it receives.
SDI signals that are received through channel A and B can be reclocked and transmitted from the OUTPUT A/B and OUTPUT B connectors with a press of one of the INPUT keys.

■ **DVI-I Output**
The screen image is displayed in XGA resolution (the effective resolution is 1024×768). The supported DVI-I output signals are single-link TMDS and analog RGB.

■ **Multi-Screen Display and 2-Channel Simultaneous Display**
The LV 7380 has a multi-screen display that can display a video signal waveform and a picture at the same time and a multi-screen display that can display vectors and an audio level meter in addition to the waveform and picture. It also has a multi-screen display that can display two SDI signals simultaneously. Different measurement modes can be assigned to the four different areas of the multi-screen display. (This feature is not available for the 2-channel simultaneous display.)

■ **CINELITE II (CINELITE feature and Leader's patented CINEZONE feature)*1**
The LV 7380 comes standard-equipped with CINELITE II (CINELITE and CINEZONE), which is a video signal luminance information analysis tool.

■ **Picture Display**
The LV 7380 uses fully digital waveform display processing to achieve high precision and versatility. The display has a number of adjustment features such as brightness adjustment, contrast adjustment, gain adjustment, bias adjustment, and aperture adjustment. It also has monochrome, chroma up, gamut error, and safety marker display features. The LV 7380 is also standard-equipped with CINELITE II, a convenient tool for adjusting the lighting during filming.

■ **Waveform Display**
The video signal waveform display has gain, sweep, and cursor measurement features, along with RGB and pseudo-composite display features. In addition to video signal waveforms, the LV 7380 can also display vectors and display the Lissajous curves of embedded audio.

■ **5 Bar Display**
The 5 bar display enables the simultaneous monitoring of component and composite gamut.

■ **Status Display**
The status display can display the SDI signal's error count and error log, a data dump, and the phase difference between an external sync signal (a tri-level sync signal or an NTSC or PAL black burst signal) and the SDI signal.

■ **Time Code Display**
LTC or VITC time codes can be displayed.

■ **Screen Capture**
The display can be captured and stored as image data. Not only can captured data be displayed by the LV 7380, but it can also be compared with an input signal or saved to USB memory as bitmap data. The saved bitmap data can then be viewed on a PC.

■ **Error Detection**
SDI signal errors, such as HD-SDI signal CRC errors and SD-SDI signal EDH errors, and various errors related to embedded audio signals and ancillary data can be detected.

■ **ANC Data Analysis**
Various ancillary data can be analyzed, and the results can be displayed.

■ **ID Display**
IDs can be assigned to input channels. IDs are entered from the LV 7380 panel.

■ **Equivalent Cable Length Measurement Feature**
The LV 7380 converts the SDI signal attenuation to a cable length and displays the result.

■ **Closed Caption Data Display**
The LV 7380 can display the closed caption data embedded in an SDI signal over the picture display. It can analyze and display status and control information.
1) CEA/EIA-608-B closed caption data in CDP packets that are defined by EIA-708-B
2) CEA/EIA-608-B closed caption data
3) VBI (CEA/EIA-608-B line 21) closed caption data

■ **Display Mode Switch Keys** ■ **Audio** ■ **Presets**
■ **Last Memory** ■ **External Remote Connector** ■ **Key Lock**
■ **Shortcut Keys** ■ **Ethernet Port**

*1 CINELITE is a registered trademark of LEADER ELECTRONICS CORP.

SPECIFICATIONS LV 7380

Video Signal Formats and Standards

Supported Formats of Dual Link System Video Signals and Corresponding Standards

Color System	Quantization	Scanning	Frame (Field) Rates	Corresponding Standard
GBR 4:4:4	10 bit	1080p	30/29.97/25/24/23.98	SMPTE 372M (1920 × 1080)
		1080PsF	30/29.97/25/24/23.98	
		1080i	60/59.94/50	
	12 bit	1080p	30/29.97/25/24/23.98	
		1080PsF	30/29.97/25/24/23.98	
		1080i	60/59.94/50	
Y, C_B, C_R 4:2:2	10 bit	1080p	60/59.94/50	
	12 bit	1080p	30/29.97/25/24/23.98	
		1080PsF	30/29.97/25/24/23.98	
		1080i	60/59.94/50	
GBR 4:4:4 (2K)	12 bit	1080p	24/23.98	(2048 × 1080)
		1080PsF	24/23.98	

* The picture display bit depth is 8 bits.
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.

Supported Formats of Single Link System Video Signals and Corresponding Standards

Color System	Quantization	Scanning	Frame (Field) Rates	Corresponding Standards
Y, C_B, C_R 4:2:2	10 bit	1080i	60/59.94/50	SMPTE 274M SMPTE 292M
		1080p	30/29.97/25/24/23.98	
		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	

Format Settings

Link Format Switching: Manually switched between single and dual link

Format Setting: Manual switching. Only frame and field rates can be set automatically.

Audio Playback

Compliant Standards: SMPTE-299M (HD-SDI) and SMPTE-272M (SD-SDI)

Quantization: 24 bit

Clock Generation: Generated from the video clock

Synchronization: All audio channels must be synchronized to the video clock.

Channel Separation: 2 groups (from the same SDI input signal) of 8 channels are selectable.

Input/Output Connectors

SDI Input

Input Connectors: Two BNC connectors
2 inputs in single link mode (channels A and B)
1 input (link A and B) in dual link mode

Input Impedance: 75 Ω

Input Return Loss: ≥ 15 dB for 5 MHz to the serial clock frequency

Maximum Input Voltage: ±2 V (DC + peak AC)

SDI Output

Output Connectors: Two BNC connectors
Reclocks and transmits the input signal
1 output (switchable between channels A and B) in single link mode
1 output fixed to channel B
1 output (link A and B) in dual link mode

Output Impedance: 75 Ω

Output Voltage: 800 mVp-p ± 10 %

External Reference Input

Input Signal: Tri-level sync or NTSC/PAL black burst signal

Input Connectors: 1 pair of BNC connectors

Maximum Input Voltage: ±5 V (DC + peak AC)

* If the video signal waveform is displayed using an external sync signal as a reference, the waveform phase one clock before or after an SDI signal is inserted or the power is turned on is indefinite.

* External synchronization cannot be used for 1080p/60, 59.94, 50.

Audio Input/Output Connectors

Input/Output: 4 BNC connectors (8 channels)

Supported Format: AES/EBU

Sampling Frequency: Only 48 kHz is supported.

Input/Output Switching: Use the menu to select whether the connectors are used as AES/EBU input connectors or as AES/EBU output connectors that are separated from the SDI signal.

Headphone Output

Output Signal: Separate any two channels of audio signals that are embedded in the SDI signal and output them (in sync with the video signal) or output the audio that is being received through the audio input connector.

Output Connector: One stereo jack

Volume Adjustment: VOLUME knob

DVI-I Connector

Signal Format: Single-link TMDS, analog RGB

Display Format: XGA. The effective resolution is 1024 × 768.

DDC: Not supported

HOT PLUG Detection: Not supported

Output Connector: One DVI-I connector

Control Connectors

USB Port

Specification: USB 2.0

Media: Only USB memory devices are supported.

Function: Used to save screen captures, event logs, preset data, and data dumps

Ethernet Port

Compliant Standard: IEEE802.3

Supported Protocols: TELNET, FTP, SNMP

Input/Output: RJ-45

Function: Used to control the LV 7380 from a PC and monitor errors and other events

Type: 10Base-T/100Base-TX

Remote-Control Connector

Function: Used to recall preset settings, display tally indications, switch input channels (A or B), and transmit the alarm signal.

Control Signal: LV-TTL level (low active)

Input Voltage Range: DC to 5 V

Control Connector: 25-pin D-sub (female)

Screen Capture

Function: Captures the screen

Display: Displays the captured image or superimposes the captured image over the input signal

Media: Internal memory (RAM) and USB memory
Only one screen capture can be stored in the internal memory.

Data Output: Screen captures can be saved as bitmap files to USB memory, or they can be saved in a file format that the LV 7380 can load.

Data Input: Data saved to USB memory can be loaded and displayed on the LV 7380.

Preset Settings

Number of Presets: 30

Display mode presets: Five for each display mode

Recall Method: Front panel, remote connector, or Ethernet command

* The number of presets recalled from the remote connector can be switched between 8 and 30 (all presets are recalled at once).

Copying: Preset configurations can be copied as a group to or from USB memory.

Display Format

Display Format: XGA. The effective resolution is 1024 × 768.
In 16:9 and 16:10 modes, the LV 7380 can be displayed on 16:9 and 16:10 LCD panels (respectively).

* The LCD panel must have a resolution conversion feature.

1 Screen Display: Waveform, vector, picture, audio, and status displays

Multi Screen Display: Waveform and picture; waveform, picture, and vector; and waveform, picture, vector, and audio displays

4 Screen Display: Waveform, picture, vector, audio, status, and eye pattern (optional) modes can be selected for each of the four areas of the display

2-Channel Simultaneous Display: Waveform and picture display and waveform and vector display

Thumbnail Display: Picture, audio level meter, and waveform displays
Displays can be turned ON and OFF.

* Waveform thumbnails can only be displayed in picture mode.

Waveform Display

Waveform Operations

Display Modes

Overlay: Overlays component signals

Parade: Displays component signals side by side

Blanking Period: H and V blanking periods can be masked.

RGB Conversion: Converts a Y,C_B,C_R signal into an RGB signal and displays the result

Pseudo-Composite Display: Artificially converts component signals into composite signals and displays the result

Channel Assignment: In RGB conversion display, the order can be set to GBR order or RGB order.

Line Select: Displays the selected line

Sweep Modes: H and V

Vertical Axis

Gain: ×1 or ×5

Variable Gain: ×0.2 to ×2.0

Amplitude Accuracy: ≤ ±0.5 %

HDTV Frequency Characteristics

Y Signal: ≤ ±0.5 % for 1 to 30 MHz

CBCR Signal: ≤ ±0.5 % for 0.5 to 15 MHz

Low-Pass Attenuation: ≥ 20 dB (at 20 MHz)

SDTV Frequency Characteristics

Y Signal: ≤ ±0.5 % for 1 to 5.75 MHz

CBCR Signal: ≤ ±0.5 % for 0.5 to 2.75 MHz

Low-Pass Attenuation: ≥ 20 dB (at 3.8 MHz)

Horizontal Axis

Line Display: ×1, ×10, ×20, ACTIVE, or BLANK

Field Display: ×1, ×20, or ×40

Cursor Measurement

Composition: Horizontal Cursors: 2 (REF and DELTA)
Vertical Cursors: 2 (REF and DELTA)

Amplitude Measurement: %, V, or R%

Time Measurement: Displayed in usec or msec

Frequency Display: Computes and displays the frequency with the length of one period set to the time between two cursors.

Scale

Type: % or V scale or digital values (when displaying GBR or RGB)

Display Colors: 7 colors to choose from

Thumbnail Display: Can display thumbnails of picture displays and audio level meters. The V sweep display during the 2-channel simultaneous display cannot be displayed as a thumbnail.

Vector Display

Gain: ×1, ×5, or IQ-MAG

Variable Gain: ×0.2 to ×2.0

Amplitude Accuracy: ≤ ±0.5 %

Blanking Period: Masked*

Scale

Type: 75 % or 100 % (color bar)

IQ Axis: Show or hide

Display Colors: 7 colors to choose from

Line Select: Displays the selected line

Pseudo-Composite Display: Artificially converts component signals into composite signals and displays the result

Thumbnail Display: Can display thumbnails of picture displays and audio level meters.

* In the multi-screen display, the blanking period depends on the video signal waveform display blanking display settings.

5 Bar Display

Function: Displays the peak levels of the Y, R, G, B, and composite signals

Error Level: Based on gamut error level and composite gamut error level settings.

Line Select: Displays the selected line

Filter: 1 MHz for HD and SD
Removes transient errors

Picture Display

Image Quality Adjustment: Brightness, contrast, gain, bias, and aperture

Display Sizes: Fit, full frame, real, and 4:3 full screen

Color Selection: R, G, and B can be turned off separately. Chroma gain and monochrome displays are available.

Frame Rate: The frame rate is converted and displayed using the internal sync signal.

Marker Displays

Aspect Marker Display: 4:3, 13:9, 14:9, 16:9, or 2.39:1

Aspect Marker Format: Line, shadow (99 levels), or black

Safety Marker Size: ARIB TR-B4, SMPTE RP-218, or user-defined

Line Select: Marks the selected line

AFD Display: Displays abbreviations for SMPTE 2016-1-2007 standard AFD codes

Gamut Error Display: Displays gamut error locations over the picture

Thumbnail Display: Can display thumbnails of audio level meters and video signal waveforms.

Superimpose: Displays closed captions over the picture.

Compliant Standards: SMPTE 334M and CIA/EIA-608-B

CINELITE II

Function: CINELITE and CINEZONE displays

Embedded Audio and External Audio Displays

Monitored Source: The audio signal applied to an AES/EBU input on the rear panel or the embedded audio in an SDI signal.

Lissajous Display

Displayed Channels: Two (single) or eight (multi)

Display Mode: X-Y or MATRIX

Sound Image Display

Channel Mapping: L, R, C, LFE, Ls (S), Rs, LL, or RR

Surround Formats: NORMAL / PHANTOM C

Level Meter Display

Displayed Channels: Two or eight

Meter Response Model I: TRUE PEAK, PPM type I, PPM type II, VU, LOUDNESS

Peak Hold Response Model: TRUE PEAK, PPM type I, PPM type II

Peak Hold Time: 0.5 to 5.0 s (in 0.5 s steps), HOLD

Level Setting: Standard level, warning level, over level (-40.0 to 0.0 dBFS for each level)

Correlation Meter: Displays the correlation between two channels as a value from -1 to 1

Status Display

Channel Status Bit Display: Dump display, text display

User Data Bit Display: Dump display

Error Detection: Counts the number of errors that occur for each channel

* Error detection is performed on the AES/EBU data.
Level-over, clipping, mute, parity error, validity error, CRC error, and code violation detection

Channel

Group Selection: Any two groups (from the same SDI input signal) from groups 1, 2, 3, and 4 can be selected.

Sampling Frequency: 48 kHz (embedded audio must be synchronized to the video)

* Peak hold is only displayed when the meter response model is set to VU.

Status Display

Signal Detection: Detects the presence of an SDI signal

Format: Detected from the supported video signal formats (In a dual link signal, only the frame rate is detected.)

Embedded Audio Channel: Displays the embedded audio channel number (In a dual link signal, only link A is supported)

Event Log

Recording Capacity: Up to 1000 events

Operation: Records all events from start to finish

Recorded Events: Errors, changes in input type, time stamps, etc.

Data Output: Data can be saved as text files to USB memory or to a PC over an Ethernet

Data Dump Display

Display Format: Displays data separated by serial data sequence or by channel

Line Select: Displays the selected line; displays markers on pictures

Sample Select: Displays from the selected sample

Jump Feature: Jumps to an EAV or SAV

Data Output: Data can be saved as text files to USB memory or to a PC over an Ethernet

Phase Difference Display

Display: Displays the phase difference between an SDI signal and the external sync signal both numerically and graphically
In a dual link signal, the phase difference between links A and B can also be measured.

Display Range

Vertical: Approx. ±1/2 frame

Horizontal: ±1 line

Equivalent Cable Length Measurement:
Converts the SDI signal attenuation to a cable length and displays the result

Supported Cables: HD-SDI: L-7CHD, LS-5CFB, 1694A
SD-SDI: LS-5C2V, 8281, 1505A

Accuracy:	±20 m
Resolution:	5 m (10 m for the L-7CHD)

Error Detection

Error Count:	Up to 999,999 errors for each error type
Count Period:	All errors that occur in one field are counted as one error.
Video Errors	
CRC Error:	Detects HD-SDI signal transmission errors
EDH Error:	Detects SD-SDI signal transmission errors
TRS Error:	Detects TRS location and protection bit errors
Line Number Error:	Detects HD-SDI signal line number errors
Illegal Code Error:	Detects data within the range of 000h to 003h and 3FC to 3FF in locations other than the TRS and ADF headers
Embedded Position Error:	Detects the presence of audio in lines where it should not be embedded (In a dual link signal, only link A is supported)
Cable Length Measurement Error:	Detects the attenuation of the signal to detect cable length measurement errors
HD-SDI:	Detection range: 5 to 200 m in 5 m steps
SD-SDI:	Detection range: 50 to 300 m in 5 m steps
Gamut Error	
Gamut Error:	Detects gamut errors Detection Range Upper Limit: 90.8 to 109.4 % Lower Limit: -7.2 to +6.1 % in 0.1 % steps Filter : 1 MHz for HD and SD Removes transient errors
Composite Gamut Error:	Detects level errors that occur when component signals are converted to composite signals Detection Range Upper Limit: 90.0 to 135.0 % Lower Limit: -40 to 20 % in 0.1 % steps Filter : 1 MHz for HD and SD Removes transient errors
Audio Errors	
BCH Error:	Detects transmission errors in the audio packets that are embedded in HD-SDI signals
DBN Error:	Detects audio packet continuity errors
Parity Error:	Detects parity errors in the audio packets that are embedded in HD-SDI signals
Ancillary Data Error Detection	
Checksum Error:	Detects ancillary data transmission errors
Parity Error:	Detects ancillary data header parity errors

Ancillary Data Analysis

Audio Control Packet (In a dual link signal, only link A is supported)	
Display Details:	Displays audio control packet analysis
Group Selection:	Select one group from four available groups
EDH Display (Only for SD)	
Compliant Standard:	SMPTE RP-165
Display Details:	Analyzes and displays EDH packets and displays received CRC errors
Format ID Display	
Compliant Standards:	SMPTE 352M and ARIB STD-B39 (In a dual link signal, only SMPTE 352M is supported)
Display Details:	Analyzes and displays the format ID
Closed Caption Analysis Display (Not supported for dual link signals)	
Compliant Standards:	ARIB STD-B37, EIA-708-B, and EIA/CEA-608-B
Display Details:	Analyzes and displays the closed caption signal
Inter-Stationary Control Signal (NET-Q) Display (Not supported for dual link signals)	
Compliant Standard:	ARIB STD-B39
Display Details:	Analyzes and displays inter-stationary control signals
Logging:	Q-signal logging
Data Broadcast Trigger Signals (Not supported for dual link signals)	
Compliant Standard:	ARIB STD-B35
V-ANC User Data Display (Not supported for dual link signals)	
Compliant Standard:	ARIB TR-B23
ANC Packet Display (In a dual link signal, only link A is supported)	
ANC Specification Method:	DID/SDID
Display Format:	Hexadecimal or binary
AFD Packet Display (Not supported for dual link signals)	
Compliant Standard:	SMPTE 2016-1-2007

Ancillary Data List Display (Not supported for dual link signals)

List Display Details:	Presence or absence of each ancillary data type, embedded line number, and number of packets per frame
Dump Display:	The selected ancillary data is displayed in hexadecimal or binary.

Time Display

Current Time Display:	The time based on the internal clock
Elapsed Time:	The elapsed time since the error count was cleared
Time Code:	LTC or VITC (compliant standard: SMPTE 12M-2)

Alarm Output

Display Indication:	If the fan stops working, the fan alarm is displayed (on the external display).
Remote Connector Output:	When a video or audio error or a fan alarm occurs, a signal is transmitted from the remote connector to notify the user.

Other Display Features

ID Display:	An ID can be assigned to each input channel.
Tally Indication:	Part of the remote connector can be assigned to tally indication in order to display tallies on the screen.

Environmental Conditions

Operating Temperature:	0 to 40 °C
Operating Humidity:	85 %RH or less (no condensation)

Power Requirements

Voltage:	10 to 18 VDC
Power Consumption:	50 W max.

Dimensions

482 (W) × 44 (H) × 250 (D) mm (excluding protruding parts)

Weight

Approx. 2.6 kg (excluding options and accessories)

Accessories

Instruction manual 1
AC adapter 1
25-pin D-sub connector 1
25-pin D-sub connector cover 1

Precautions

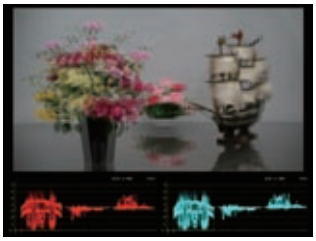
- Video signal waveform and vector displays have a maximum delay of one frame in reference to the picture display.
- When using the 2-channel simultaneous display, the V sweep cannot be displayed on the video signal waveform display.
- If the video signal waveform or the phase difference is displayed using an external sync signal as a reference, the waveform phase one clock before or after an SDI signal is inserted or the power is turned on is indefinite.

■ Factory Option

LV 58SER02 Eye Pattern Unit

Can be used to observe eye pattern waveforms of SDI signals.(Jitter output cannot be used.)

LV 7380SER01 3D Assist



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.

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