

Leader

Leader Electronics Corporation Technical Information

Leader ZEN Series – Ordering Guide

Leader
ZEN

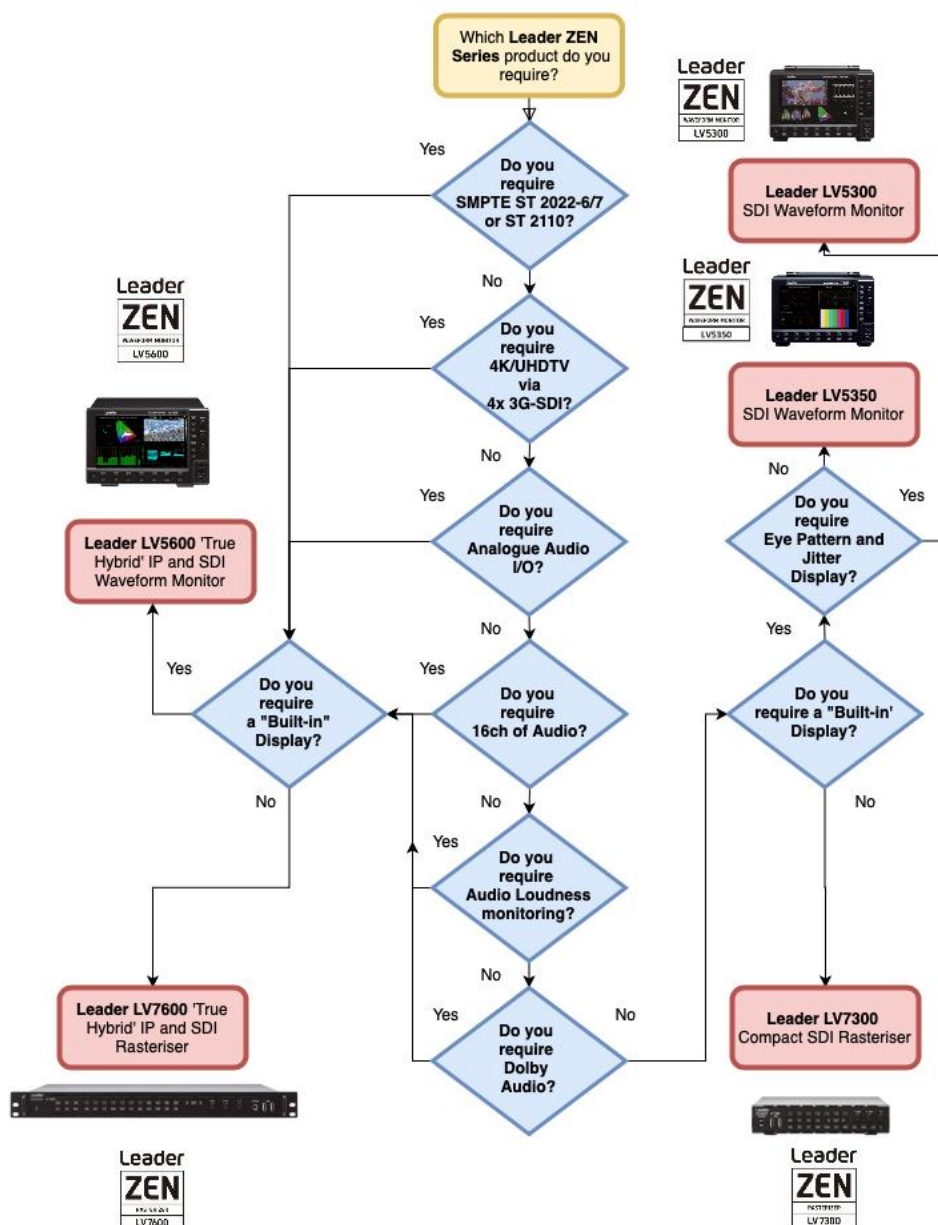


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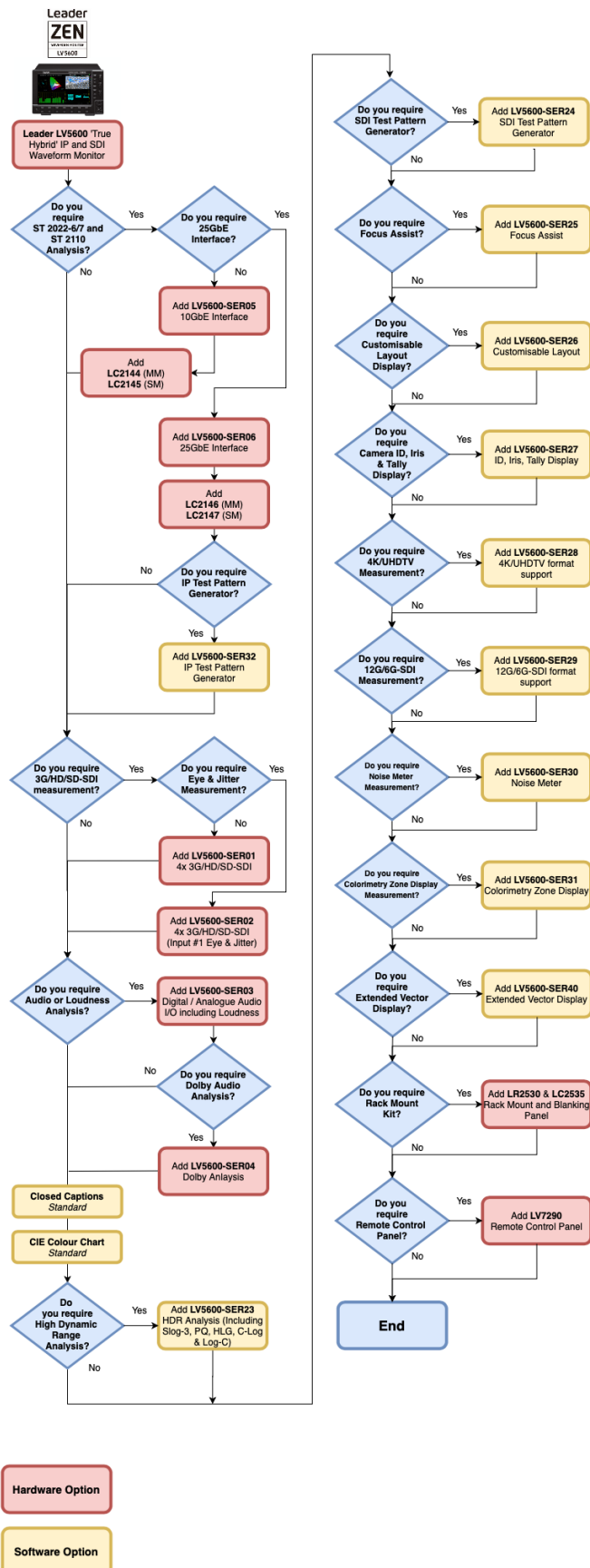
Leader ZEN Series Ordering Guide

Leader's ZEN Series offers broadcasters unrivalled flexibility in selecting the idea product configuration for their immediate operational and production requirements, whilst also providing a simple and cost-effective upgrade path as their requirements change.

1st Identify the ZEN Series product that meets your requirements



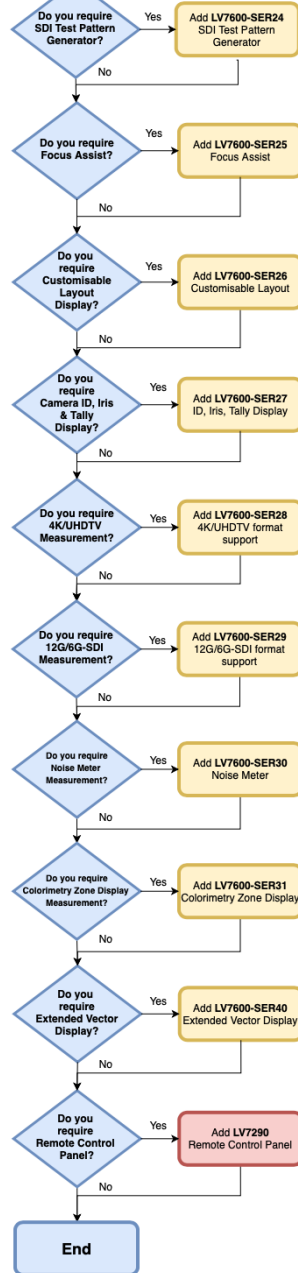
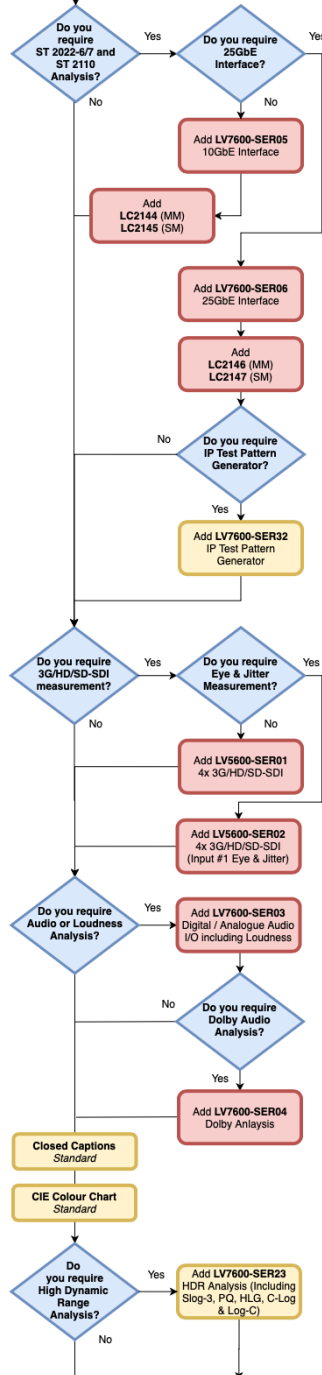
Waveform Monitor **LV5600**



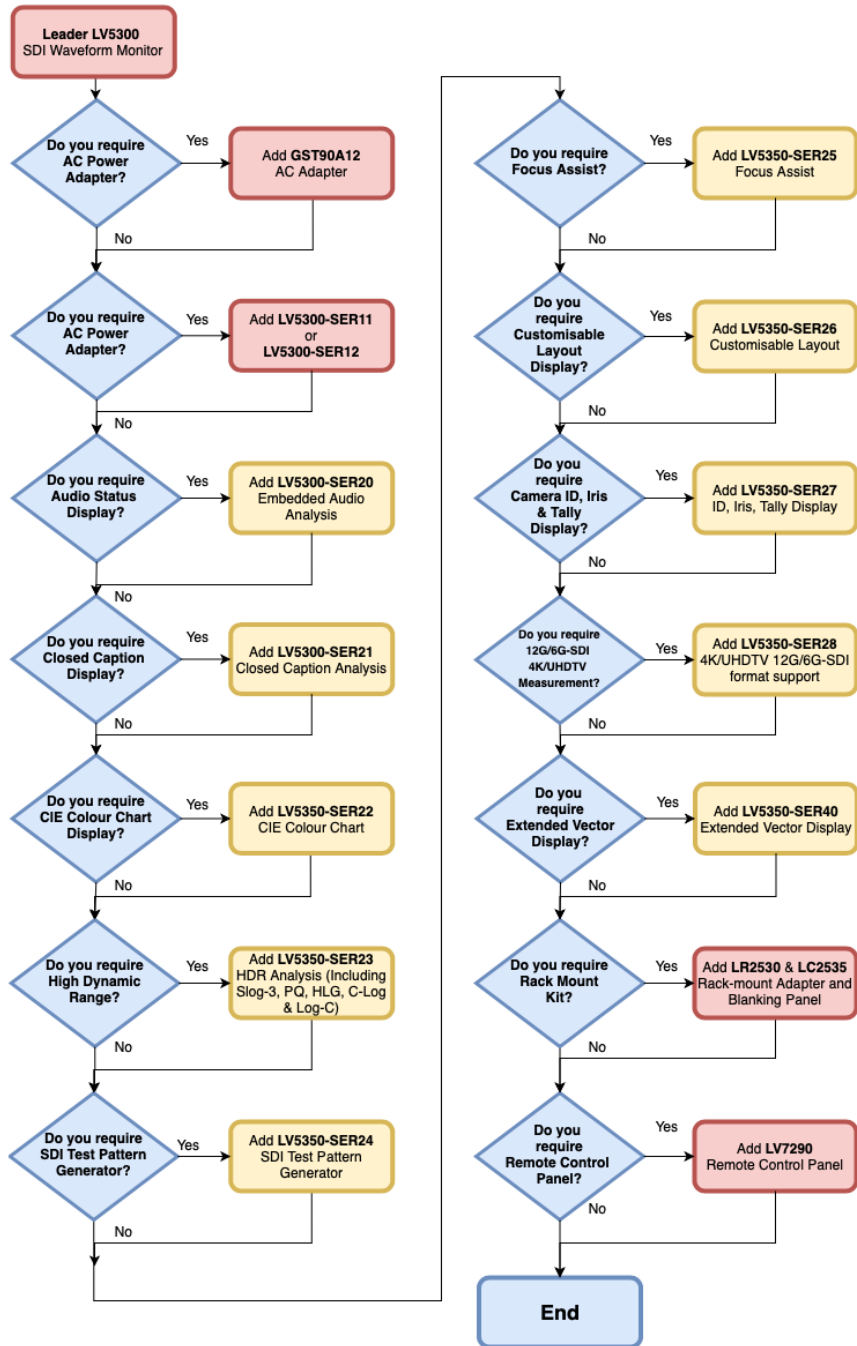
Rasterizer **LV7600**



Leader LV7600 True Hybrid IP and SDI Rasteriser



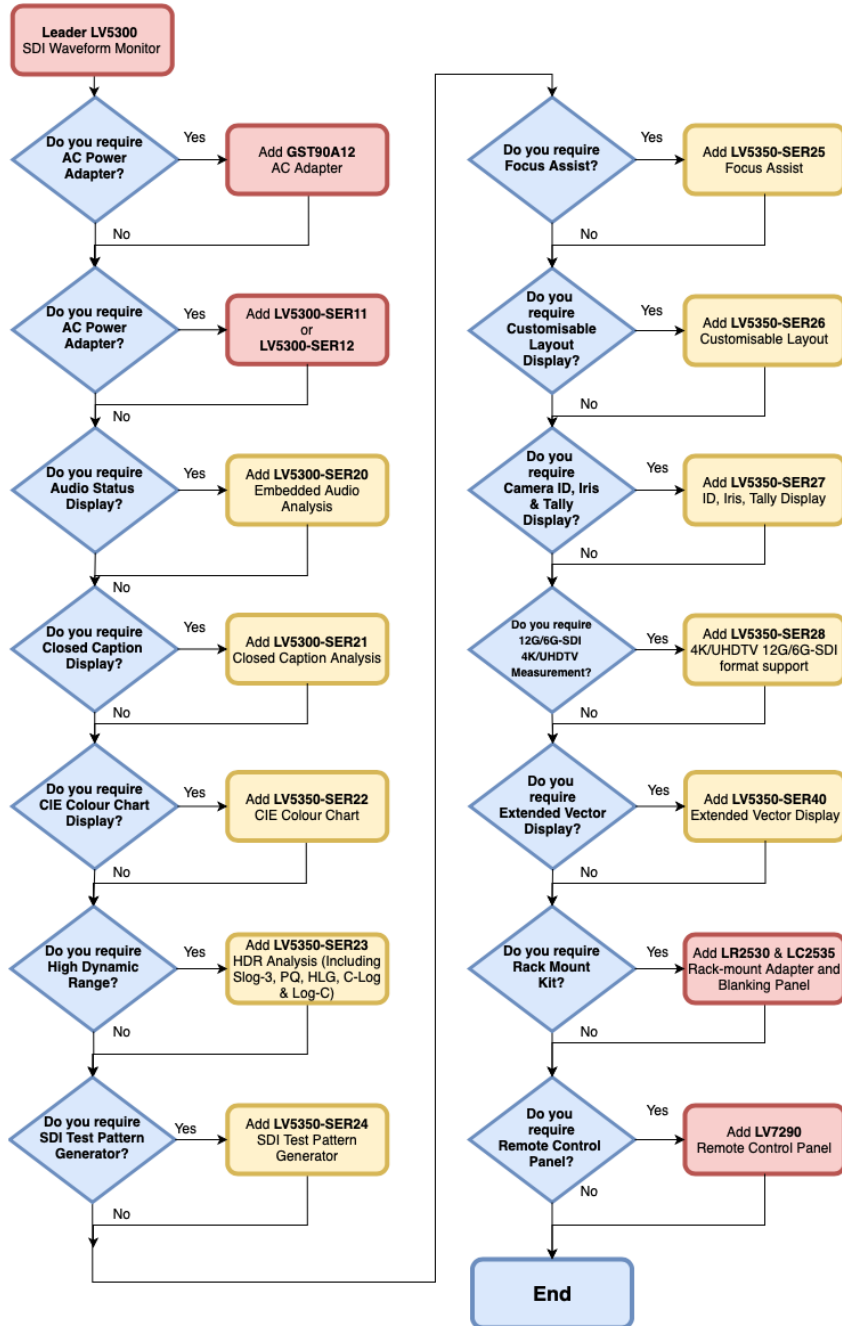
Waveform Monitor **LV5300**



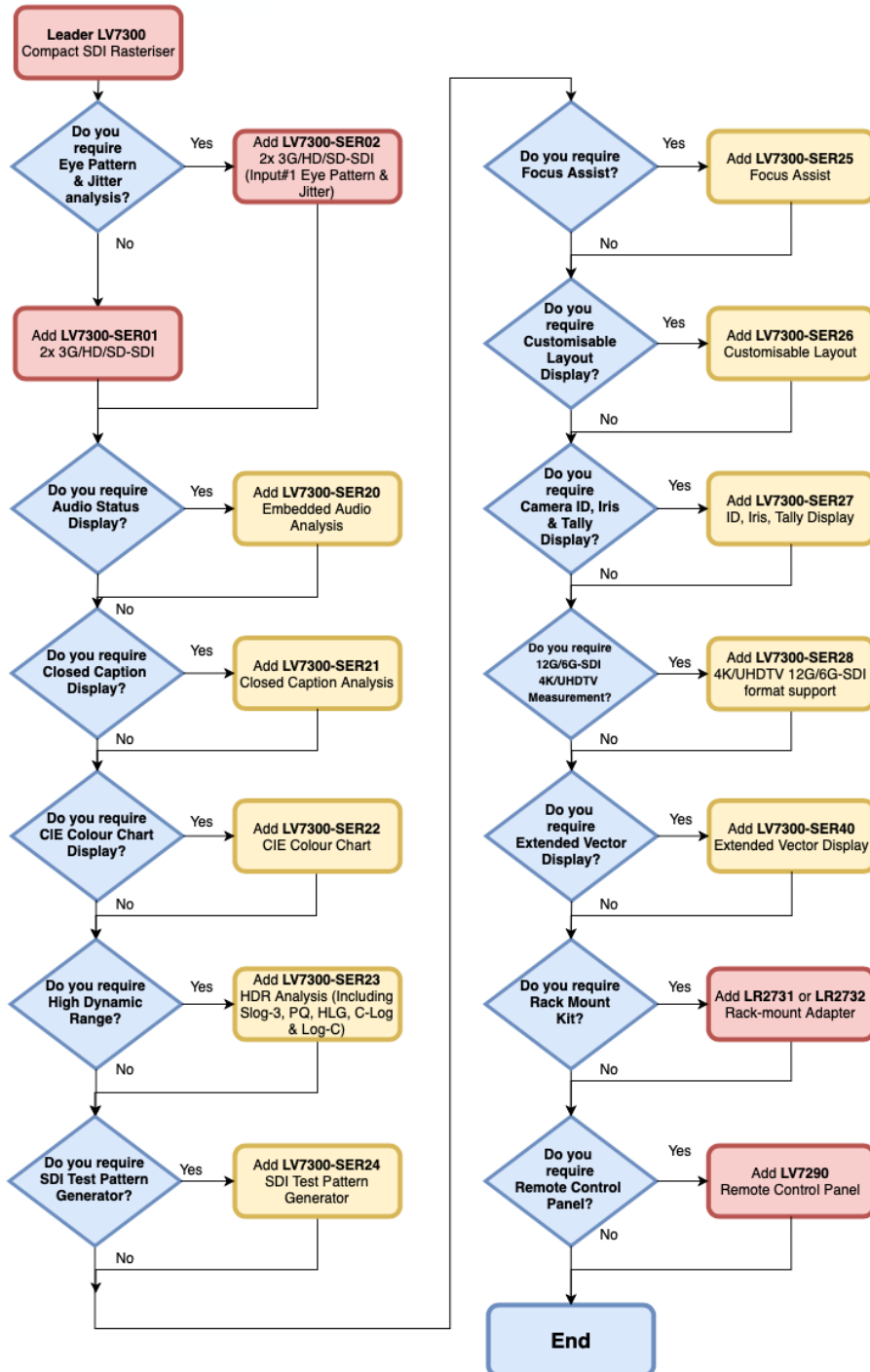
Hardware Option

Software Option

Waveform Monitor **LV5350**



Rasterizer **LV7300**



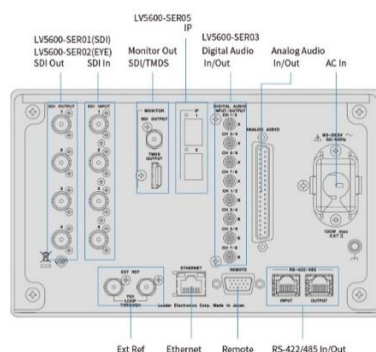
Waveform Monitor **LV5600**



Features

- **Supports various signal inputs**
The LV5600 supports SD-SDI, HD-SDI, 3G-SDI, 6-G-SDI, 12G-SDI single link, 3G-SDI dual link and quad link, HD-SDI quad link, 10GbE or 25GbE SMPTE ST 2022/6 & 7 and SMPTE ST 2110 (video over IP).
- **Excellent operability**
The LV5600 features a 7-inch full HD panel display with touch panel functionality. The LV5600 also features both a 3G-SDI and TDMS (HDMI) monitor display output, web-browser remote control and ethernet remote 1RU hardware control panel.
- **Eye pattern display**
LV5600-SER02 adds physical layer measurement of the SDI signal with eye pattern display and jitter display from SD-SDI to 12G-SDI.
- **Audio**
LV5600-SER03 adds Analogue / Digital audio measurement support and audio loudness. LV5600-SER04 adds support for AC-3 Dolby Digital & Dolby E.
- **Customizable layout**
LV5600-SER26 software license adds the ability to re-size and position multiple measure displays simultaneously in a user-defined customizable layout.
- **SDI signal generation function**
LV5600-SER24 software license adds SDI signal generation functionality from HD-SDI to 12G-SDI.
- **CIE Colour Chart & Closed Captions**
Come as standard on the LV5600
- **High Dynamic Range**
LV5600-SER23 software license adds HDR measurement for PQ, HLG, Slog-3, C-Log and Log-C, with waveform graticule display, Leader's CINEZONE HDR 'real-time' false colour display and 'real-time' MaxFALL & MaxCLL measurement.
- **Colorimetry Zone Display**
LV5600-SER31 allows operators to check chroma levels beyond BT.709 or DCI-P3 with 'real-time' false colour display.

Rear Panel



Rasterizer **LV7600**



Features

- **Supports various signal inputs**

The LV7600 supports SD-SDI, HD-SDI, 3G-SDI, 6-G-SDI, 12G-SDI single link, 3G-SDI dual link and quad link, HD-SDI quad link, 10GbE or 25GbE SMPTE ST 2022/6 & 7 and SMPTE ST 2110 (video over IP).

- **Excellent operability**

The LV7600 features both a 3G-SDI and TDMS (HDMI) monitor display output, web-browser remote control and ethernet remote 1RU hardware control panel.

- **Eye pattern display**

LV5600-SER02 adds physical layer measurement of the SDI signal with eye pattern display, jitter display from SD-SDI to 12G-SDI.

- **Audio**

LV7600-SER03 adds Analogue / Digital audio measurement support and audio loudness. LV7600-SER04 adds support for AC-3 Dolby Digital & Dolby E.

- **Customizable layout**

LV7600-SER26 software license adds the ability to re-size and position multiple measure displays simultaneously in a user-defined customizable layout.

- **SDI signal generation function**

LV7600-SER24 software license adds SDI signal generation functionality from HD-SDI to 12G-SDI.

- **CIE Colour Chart & Closed Captions**

Come as standard on the LV7600

- **High Dynamic Range**

LV7600-SER23 software license adds HDR measurement for PQ, HLG, Slog-3, C-Log and Log-C, with waveform graticule display, Leader's CINEZONE HDR 'real-time' false colour display and 'real-time' MaxFALL & MaxCLL measurement.

- **Colorimetry Zone Display**

LV5600-SER31 allows operators to check chroma levels beyond BT.709 or DCI-P3 with 'real-time' false colour display.

Rear Panel



Waveform Monitor **LV5300**



Features

- **Supports various signal inputs**
The LV5300 supports SD-SDI, HD-SDI, 3G-SDI, LV5300-SER28 adds support for 4K/UHTV and 6G-SDI and 12G-SDI single link operation.
- **Excellent operability**
The LV5300 features a 7-inch full HD panel display with touch panel functionality. The LV5350 also features also features 3G-SDI monitor display output.
- **Eye pattern display**
The LV5300 physical layer measurement of the SDI signal with eye pattern display and jitter display from SD-SDI to 12G-SDI.
- **Audio**
LV5300-SER20 software license adds Embedded Audio Analysis.
- **Customizable layout**
LV5300-SER26 software license adds the ability to re-size and position multiple measure displays simultaneously in a user-defined customizable layout.
- **SDI signal generation function**
LV5300-SER24 software license adds SDI signal generation functionality from HD-SDI to 12G-SDI.
- **Closed Captions**
LV5300-SER21 software license adds Closed Captions analysis.
- **CIE Colour Chart**
LV5300-SER22 software license adds CIE Colour Chart Display.
- **High Dynamic Range**
LV5300-SER23 software license adds HDR measurement for PQ, HLG, Slog-3, C-Log and Log-C, with waveform graticule display, Leader's CINEZONE HDR 'real-time' false colour display and 'real-time' MaxFALL & MaxCLL measurement.
- **Focus Assist**
LV5300-SER25 software license adds new focus detection algorithm based on nonlinear super-resolution technology; accordingly, the focus with high sensitivity can be detected even with low-contrast images, which were conventionally difficult to detect.

Waveform Monitor **LV5350**



Features

- **Supports various signal inputs**
The LV5350 supports SD-SDI, HD-SDI, 3G-SDI, LV5350-SER28 adds support for 4K/UHTV and 6G-SDI and 12G-SDI single link operation.
- **Excellent operability**
The LV5350 features a 7-inch full HD panel display with touch panel functionality. The LV5350 also features also features 3G-SDI monitor display output.
- **Eye pattern display**
The LV5300 physical layer measurement of the SDI signal with eye pattern display and jitter display from SD-SDI to 12G-SDI.
- **Audio**
LV5350-SER20 software license adds Embedded Audio Analysis.
- **Customizable layout**
LV5350-SER26 software license adds the ability to re-size and position multiple measure displays simultaneously in a user-defined customizable layout.
- **SDI signal generation function**
LV5350-SER24 software license adds SDI signal generation functionality from HD-SDI to 12G-SDI.
- **Closed Captions**
LV5350-SER21 software license adds Closed Captions analysis.
- **CIE Colour Chart**
LV5350-SER22 software license adds CIE Colour Chart Display.
- **High Dynamic Range**
LV5350-SER23 software license adds HDR measurement for PQ, HLG, Slog-3, C-Log and Log-C, with waveform graticule display, Leader's CINEZONE HDR 'real-time' false colour display and 'real-time' MaxFALL & MaxCLL measurement.
- **Focus Assist**
LV5350-SER25 software license adds new focus detection algorithm based on nonlinear super-resolution technology; accordingly, the focus with high sensitivity can be detected even with low-contrast images, which were conventionally difficult to detect.

Rasterizer **LV7300**



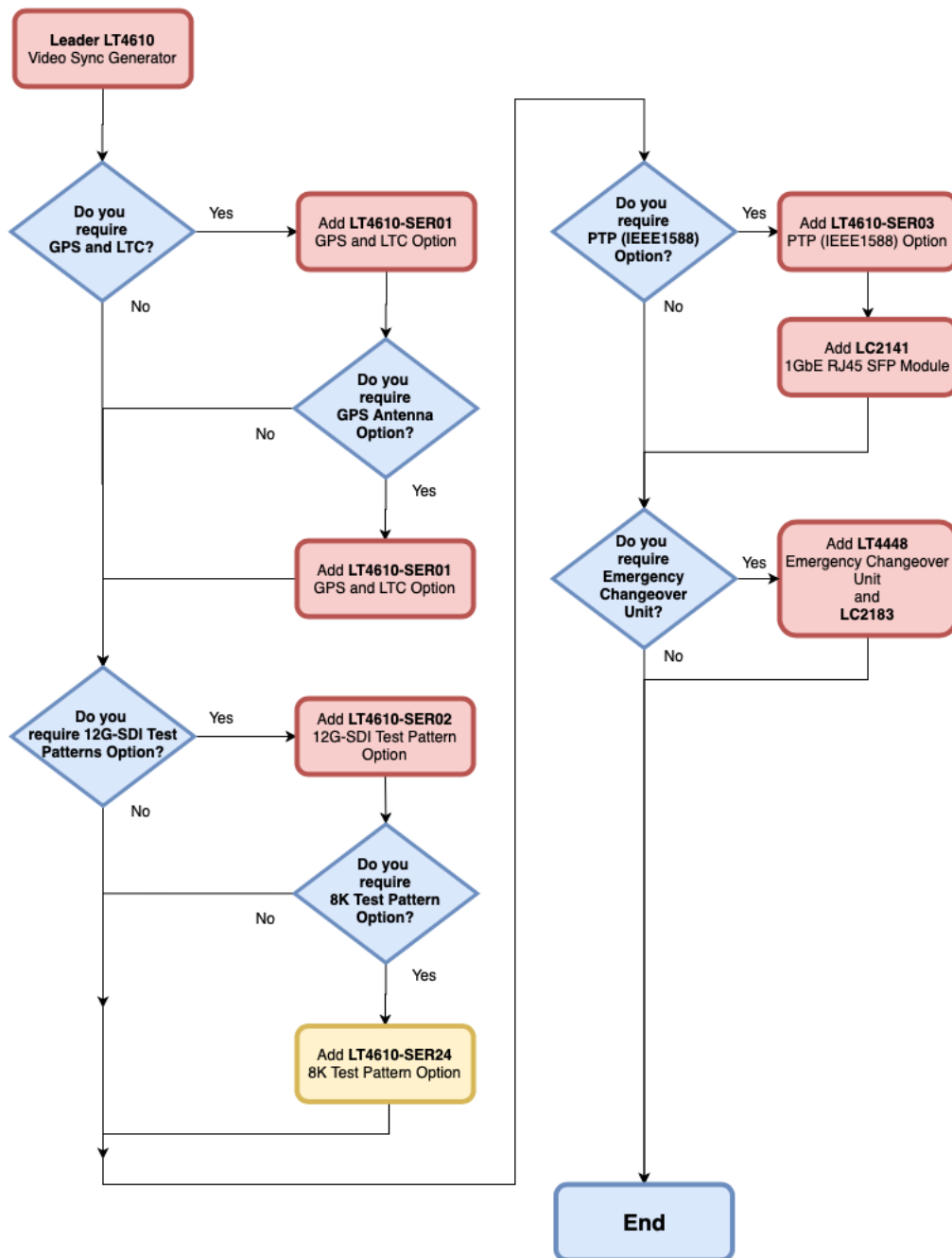
Features

- **Supports various signal inputs**
The LV7300 supports SD-SDI, HD-SDI, 3G-SDI, LV7300-SER28 adds support for 4K/UHTV and 6G-SDI and 12G-SDI single link operation.
- **Excellent operability**
The LV7300 features both a 3G-SDI and TDMS (HDMI) monitor display output, web-browser remote control and ethernet remote 1RU hardware control panel.
- **Eye pattern display**
The LV7300 physical layer measurement of the SDI signal with eye pattern display and jitter display from SD-SDI to 12G-SDI.
- **Audio**
LV7300-SER20 software license adds Embedded Audio Analysis.
- **Customizable layout**
LV7300-SER26 software license adds the ability to re-size and position multiple measure displays simultaneously in a user-defined customizable layout.
- **SDI signal generation function**
LV7300-SER24 software license adds SDI signal generation functionality from HD-SDI to 12G-SDI.
- **Closed Captions**
LV7300-SER21 software license adds Closed Captions analysis.
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LV7300-SER23 software license adds HDR measurement for PQ, HLG, Slog-3, C-Log and Log-C, with waveform graticule display, Leader's CINEZONE HDR 'real-time' false colour display and 'real-time' MaxFALL & MaxCLL measurement.
- **Focus Assist**
LV7300-SER25 software license adds new focus detection algorithm based on nonlinear super-resolution technology; accordingly, the focus with high sensitivity can be detected even with low-contrast images, which were conventionally difficult to detect.

Sync Generator **LT4610**



8K	4K	12GSDI	3GSDI	HDSDI
SDSDI	BB	LTC	PTP	GPS



Sync Generator **LT4610**



The LT4610 is a 1RU full-rack size sync generator that can output triple-rate SDI (3G-SD/HD-SDI/SD-SDI) signals. It employs two power supply units for redundant operation to accommodate power supply failures. The genlock function for external sync signals enables SDI signals, six sets of analogue black sync signals and audio word-clock signals to be output synchronously. The genlock function is equipped with a STAY IN SYNC function that maintains the phase when errors occur in the input signal, making it possible to construct stable systems.

In addition to test pattern output including colour bars and SDI check fields, the LT4610 can embed ID characters, QVGA logo marks, safety area markers and embedded audio in SDI signal output.

Features

- ☐ **Tripe-rate SDI Ready**
SDI signal output supports 3G-SDI (Level A and Level B), HD-SDI (including dual link) and SD-SDI. There are two independent outputs of SDI signal output terminals. The pattern and phase can be separately for each. (However, only a single output is available for 3G-SDI Level B and HD dual link)
- ☐ **ID Character Overlay**
ID Characters can be overlaid at any position on the display. In addition, ID characters can be scrolled horizontally or displayed in a blinking state for checking whether the display has frozen
- ☐ **Logo Mark Overlay**
A logo mark converted from bitmap can be overlaid at any position on the display at a standard 320 (dot) x 240 (line) size (QVGA size)
- ☐ **Safety Area Markers**
90% and 80% safety area markers can be overlaid on the display. For 3G-SDI and HD-SDI, a 4-3 aspect marker can be overlaid.
- ☐ **Pattern Scrolling**
Equipped with a function for scrolling patterns in eight directions. The speed can also be adjusted.
- ☐ **Audio Embedding**
The LT4610 can embed 32 channels (link A, link B, 4 channels each x 4 groups) of audio signals for 3G-SDI level B and 16 channels (4 channels x 4 groups) of audio signals for 3G-SDI level A, HD-SDI and SD-SDI. The frequency, level and the like can be set for each channel.

- ☐ **Lip Sync Pattern (3G-SDI level A, HD-SDI, SD-SDI only)**

The LT4610 can output lip sync patterns in which the video and audio are synchronised. In combination with a waveform monitor that features a lip sync function, such as the Leader Zen Series, it is possible to accurately measure the offset between the video and audio in SDI signal transmissions.
- ☐ **Genlock Function**

The LT4610 can synchronise with NTSC/PAL black burst signals and HDTV 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. A **STAY IN SYNC** function is available in case errors occur at the genlock input. The LT4610 also has a slow lock function to reduce the shock that occurs when genlock is performed again on **STAY IN SYNC**
- ☐ **Analog Black Sync Signal Output**

The LT4610 is equipped with six independent analogue black sync signal and HDTV tri-level signal outputs, which makes it possible to vary the timing. NTSC/PAL black burst signal with 10 field IDs are also supported.
- ☐ **Word-Clock Signal Output**

The LT4610 can output a 48kHz word-clock signal synchronised with video signals.
- ☐ **AES/EBU Signal Output**

The LT4610 can output a 48 kHz AES/EBU signal synchronised with video signals. It is also equipped with a muted AES/EBU signal output.
- ☐ **Real Time Clock**

The LT4610 can output a 48kHz word-clock signal synchronised with video signals.
- ☐ **Ethernet**

SNMP is supported as standard. When an error is detected, a TRAP is issued.
- ☐ **Pre-set memory Function**

Up to 10 pre-set memories can be saved. Convenient registered pre-sets can be recalled during operation. The LT4610 can be started with the same settings every time.
- ☐ **External memory Support**

Logo data and pre-set data can be written and saved from the front panel using a USB memory device.
- ☐ **Redundant Power Supply**

Two power supplies are built in to provide redundancy. When errors occur in power supply units, alarms are indicated on the LT4610 front panel. Errors can also be outputted as alarms using SNMP.

Options

☐ **LT4610-SER01 GPS Option**

This option adds

1. a GPS lock function, which locks to the frequency and time that can be obtained from GPS.
2. 10 Mhz CW lock function.
3. Time-code generator function.

☐ **LT4610 ANTENNA**

GPS Antenna

- Connector: TNC-J
- Gain: 30dB
- Impedance: 50W
- Applicable model: LT4610, LT4611

☐ **LT4610-SER02 12G-SDI Option**

This option adds support for 12G-SDI. SDI signal output supports 4K 12G-SDI, 4K 3G-SDI quad, 4K HD-SDI quad, 4K 3G dual, 3G-SDI (level A and level B), HD-SDI (including dual link) and SD-SDI. Four SDI signal output connectors are available. The format is the same for all four outputs, but you can set different patterns and phases for each. (However, only two outputs are available for 3G-SDI level B and HD dual link).

☐ **LT4610-SER03 PTP (IEEE 15888)**

Unlike other Video Sync Generators that have had PTP capabilities added at a later date, the Leader LT4610 was designed with 'true hybrid' IP & SDI operation in mind from the outset, so the PTP option complements the traditional black burst timing systems.

This option adds support for PTP (IEEE 1588-2008) and supports SMPTE ST-2059 / AES67 / General profiles. This option equips the LT4610 with an RJ-45 Port supporting 10BASE-T / 100BASE-TX / 1000BASE-T as well as an SFP cage that supports SFP transceiver RJ-45 – 100BASE-T and SFP+ transceiver optical that supports 10GBASE-SR and 10GBASE-SW. This option supports Best Master Clock Algorithm and allows the LT4610 to operate as both a Master or Slave in Multicast / Unicast / MIXED SMPTE / MIXED SMPTE without negotiation communication Mode.

☐ **LT4610-SER24 8K test Pattern Generator Option**

LT4610-SER24 is a software license option that adds 12G-SDI 8K output to the LT4610-SER02

Emergency Changeover Unit **LT4448**



The LT4448 is a changeover unit that automatically switches the signal from the primary signal to backup signal when problems are detected in the primary signal. Two systems of input signals (primary and backup) are connected to the LT4448 and the LT4448 detects errors in the amplitude of the primary input signal.

A single LT4448 provides 11 pairs of BNC and LTC channels. These channels can receive SDI, NTSC/PAL black burst, HD tri-level sync, AES/EBU digital audio, word-clock and LTC signals.

It can be used in combination with the LT4610

Options

☐ **LC2183, LTC Cable**

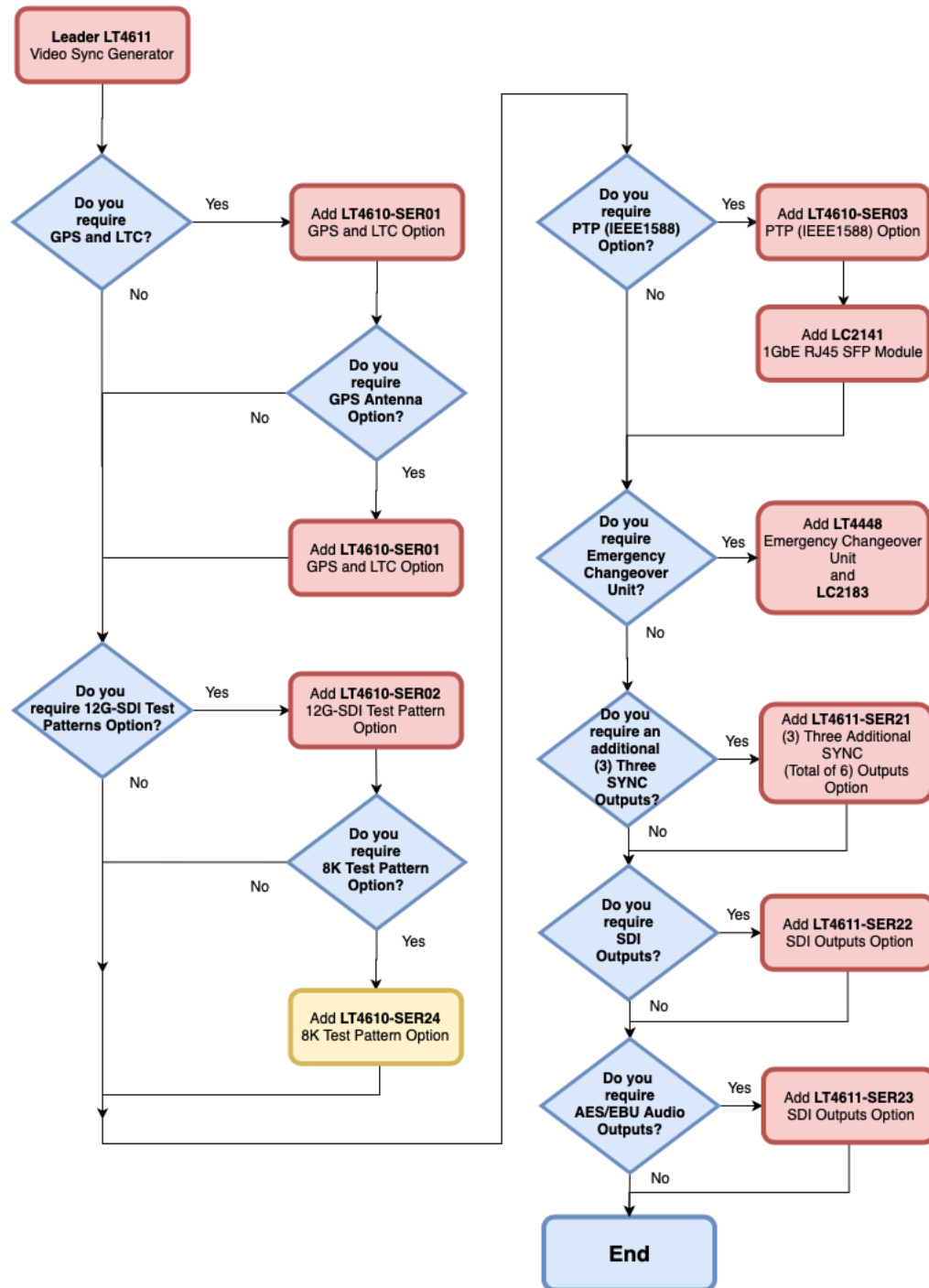
The LC2183 is a conversion cable used when combining an LT4448 changeover unit and LT4610 sync generator.

It converts a 25-pin D-sub LTC connector to two 15-pin D-sub LTC connectors. It can be used to connect to the PRIMARY and BACKUP connectors of the LT4610. It can also be used to convert to three XLR connectors for LTC output. The cable length is 1.5 m.

Sync Generator **LT4611**



8K	4K	12GSDI	3GSDI	HDSDI
SDSDI	BB	LTC	PTP	GPS



Sync Generator **LT4611**



Designed for use in both SDI and IP infrastructure and ideally suited for OB production, the LT4611 is a 1U full-rack-width generator producing analogue video sync, audio word-clock signals and SMPTE ST 2059-2 profile.

With the increasing adoption of SMPTE ST 2110 standards, broadcasters are facing new challenges when integrating their IP and legacy SDI infrastructures, not least in the area of video timing. SMPTE ST 2110 makes the distribution process asynchronous by removing timing information from the underlying hardware layer. With current broadcast formats, the video must be frame-synchronous at the camera sensor and the viewers' display device. The intermediate IP distribution network is asynchronous but the variance in packet jitter directly affects latency, leading to potentially longer video and audio delays than is normal in SDI infrastructures. Although uncompressed video such as that provided by SMPTE ST 2110 does map to the active video parts of SDI, two major changes have occurred: First, the precision timing protocol and black and burst / tri-level sync SDI references need to be derived from the same sync generator. Second, the sync generator needs to be designed to respect the timing requirements of SDI whilst supporting PTP requirements.

The new LT4611 sync generator builds on Leader's 67-year experience in the video and audio domain while providing an ideal and cost-effective entry point for broadcaster IP deployment deployments. Based on the established and proven LT4610, it has a lower entry price point giving broadcasters the freedom to select the features they need as the industry progresses from SDI to an increasingly IP-dominated world.

As well as providing both a 10 GbE and 1GbE PTP interface, the LT4611 comes as standard with three independent synchronized analogue black and burst outputs. This overcomes the challenges of requiring both IP and SDI timing references. The LT4611 also supports a stay-in-sync function which maintains the phase when GPS reference is lost, plus a slow-lock function to reduce the shock that occurs when genlock is restored.

All LT4611 functions can be managed locally from the front panel or remotely via Ethernet. SNMP is supported. When an error is detected, a trap notification is issued. The LT 4611 can also be controlled via a standard HTTP browser link. Up to 10 pre-sets can be saved within the generator for later recall. The LT4611 can be started with the same settings each time. Logo data and pre-set data can be written to and recalled from plug-in memory devices via a front-panel USB port.

Dual power supplies are built in to maximize operational security. If an error occurs in one of the power supplies, its status light on the LT4611 front panel changes from green to red. A power supply alert can also be output via SNMP. The LT4611 incorporates a real time clock which backed up by a battery so there is no need to reset the clock even when the power is turned off and on.

The new instrument is supported by three LT4610-compatible hardware options and four LT4611-specific hardware options which can be selected for system configurations matching present-day standards. Additional options can be purchased as or when required.

Entry level LT4611 features

- GENLOCK
 - Synchronised NTSC/PAL BB, HDTV tri-level sync
 - A STAY IN SYNC function is available in case error occurs at the GENLOCK input.
- SYNC output
 - (3) three independent analogue black sync outputs
- WCLK output
 - 48 kHz word-clock signal synchronisation with video signals
- Ethernet
 - SNMP is supported
- Redundant Power Supply

Options

- **LT4610-SER01 – GPS/TC (Hardware)**
 - GPS IN
 - Synchronise to GPS Signal
 - CW IN/OUT
 - Synchronised to 10 MHz CW signal
 - LTC IN/OUT
 - LTC: 4 output (D-sub connector)
- **LT4610-SER02 – 12G-SDI (Hardware)**
 - SDI output
 - SD-SDI, HD-SDI, 3G-SDI, 12G-SDI) 4 output (4K 12G-SDI, 4K HD Quad Link, 4K 3G Quad Link)
 - USER Test Patterns
- **LT4610-SER03 – PTP (IEEE 1588) (Hardware)**
 - PTP Grandmaster
 - PTP Master / Slave Operation
- **LT4611-SER21 – Sync (Software)**
 - Sync Output
 - Adds (3) three independent analogue black sync signals (Total (6) six outputs)
- **LT4611-SER22 – SDI (Software)**
 - SDI output
 - SD-SDI, HD-SDI, 3G-SDI: (2) two outputs
- **LT4611-SER23 – Audio (Software)**
 - AES/EBU output
 - SILENCE
- **LT4611-SER24 – 8K Test Pattern Generator**
 - Quad 12G-SDI 8K Test pattern (*requires LT4610-SER02*)

Kevin Salvidge, European Regional Development Manager, Leader Europe Limited, has over 20 years of broadcast industry experience. He joined Marconi Instruments in 1982 as an apprentice, later becoming a field service engineer. In 1994 he progressed to Sony Transcom as a field service representative before moving into sales roles with Tektronix, Grass Valley, Thomson Multimedia, Sony and Omneon.



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