# Leader



8K 4K 12G-SDI PTP GPS BDS lock Time Code Duplex Power Supply

LT4610 Sync Generator LT4611 Sync Generator

# Leader

# LT4610

## SYNC GENERATOR

GENLOCK	ВВ	Tri-level	GPS	PTP	TC
8K	4K	12Gsdi	3Gsdi	HDsdi	SDsdi
WC	AES-EBU				



# General

The LT4610 is a 1U full rack size sync generator that can operate in synchronization with GPS, PTP, CW, and internal reference signals, as well as Genlock that supports external analog video synchronization signals.

It supports analog video sync signals, AES / EBU digital audio output, word clock, and time code, and also supports 3G / HD / SD-SDI output and 12G-SDI output compatible with 4K and 8K.

In addition, it supports the PTP grand master function and PTP slave function, and can manage the optimum synchronization system according to the system.

The genlock function is equipped with a STAY IN SYNC function that retains the phase when an abnormality occurs in the input analog video synchronization signal, and the power supply unit performs redundant operation, enabling highly reliable system construction.

# **Features**

#### **Genlock Function**

Various output signals can be synchronized by applying NTSC/PAL black burst signals, which are analog video sync 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.

#### **Stay-in-Sync and Slow Lock Functions**

A Stay-in-Sync function is available in case errors occur at the genlock input. In addition, a slow lock function is available to reduce the shock that occurs when genlock is performed again based on stay-in-sync. This makes it possible to construct an extremely reliable synchronization system.

## **Analog Video Sync Signal Output**

Six analog video sync signals can be output. The phase of each output can be adjusted independently.

NTSC/PAL black burst signal with field reference pulse and NTSC black burst signal with 10 field IDs are also supported.

## GPS/BDS Synchronization (LT4610SER01, LT4610SER04)

By connecting a GPS antenna, the LT4610SER01 can generate and output each signal by locking it to frequencies and times obtained from gps. The LT4610SER04 also supports BDS by connecting GNSS antennas.

#### **PTP** (LT4610SER03)

PTP synchronization corresponds to the grandmaster and slave functions.

You can choose reference signal from PTP, GPS, analog BB or internal.

#### Time Code I/O (LT4610SER01)

The ATC (LTC) can be embedded in LTC outputs from internal time, GPS, LTC, and VITC time information, and SDI signal outputs, or VITC in analog video synchronous signal outputs.

## **Triple-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 at output terminals. The pattern and phase can be set separately for each. (However, only a single output is available for 3G-SDI level B and HD dual link.)

## 12G-SDI Support (LT4610SER02)

Four output connectors can be added to support 12G-SDI, 3G-SDI (level A, level B) and HD-SDI (including dual links).

In addition, it corresponds to the 8K video signal by adding 8K software option.

## Lip Sync Patterns (Standard, LT4610SER02, LT4610SER24)

This option can output lip sync patterns in which the video and audio are synchronized. In combination with a waveform monitor that features a lip sync function, such as the Leader's LV5600, it is possible to measure the offset between the video and audio in SDI signal transmissions.

## **User Pattern Output**

User pattern can be output in addition to built-in patterns such as color bars

## Audio Embedding (Standard, LT4610SER02, LT4610SER24)

The LT4610 can embed 32 channels (stream 1, stream 2, 4 channels each  $\times$  4 groups) of audio signals for 3G-SDI level B and 16 channels (4 channels  $\times$  4 groups) of audio signals for 3G-SDI level A, HD-SDI, and SD-HDI. The frequency, level, and the click can be set for each channel.

## **AES/EBU Signal Output**

The LT 4610 can output a 48 kHz AES/EBU signal synchronized with video signals. It is also equipped with a muted AES/EBU signal output.

## **Word-Clock Signal Output**

The LT4610 can output a 48 kHz word-clock signal synchronized with video signals.

## **Real Time Clock**

The real time clock is backed up by a battery. There is no need to reset the clock even when the power is turned off and on.

## **Ethernet**

SNMP is supported. When an error is detected, a TRAP is issued. Further, the LT4610 can be controlled through HTTP.

#### **Preset Memory Function**

Up to 10 presets can be saved. Convenient registered presets can be recalled during operation. The LT4610 can be started with the same settings every time.

## **External Memory Support**

Logo data and preset data can be written and saved from the front panel using USB memory devices.

## **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 output as alarms using SNMP traps.



## List of options

	Model number	Model name	Main functions
Hardware options	LT4610SER01	GPS/TC	GPS synchronization, 10 MHz CW I/O, LTC I/O
	LT4610SER02	12G-SDI	12G-SDI (4K) pattern output. Natural picture support with 3G-SDI quad link.
	LT4610SER03	PTP	PTP grand master, slave function.
	LT4610SER04	GPS/BDS/TC	GPS/BDS synchronization, 10 MHz CW I/O, LTC I/O
Software option	LT4611SER24	8K	8K SDI pattern output *You need the LT4610SER02 to install the LT4610SER24 in the LT4610.

## LT4610SER01 GPS/TC

#### **GPS Synchronization**

A GPS antenna can be connected to generate and output signals by locking to the frequency and clock obtained from the GPS Satellite.

#### Time Code I/O

The time code generator can run in free run mode based on internal time information. It can also embed ATC (LTC) in SDI signal output or VITC in analog video sync signal output based on a GPS, LTC, or VITC time information.

It also features a holdover function, which retains the phase and frequency of the output signal when GPS signals or CW signals are lost. Further, when LT4610 is locked to GPS, it can also be used as an NTP server.

#### **CW I/O**

The CW I/O connector not only receives 10 MHz CW but also outputs 10 MHz CW or 1PPS, whichever is selected.

#### LTC I/O

The LTC I/O connector can receive 1 LTC input and 3 LTC outputs, and outputs two separate alarms

## LT4610SER02 12G-SDI

## 12G-SDI (4K) Support

Four output connectors supporting 12G-SDI, 3G-SDI (level A, level B), HD-SDI (including dual link), and SD-SDI are available to accommodate the 4K video format. The format is the same for all four outputs, but you can set different patterns and phases for each.

Only two outputs are available for 3G-SDI level B and HD dual link.

## **User Pattern Generation**

In addition to internal patterns such as the color bar, SD, HD (2K), and 4K user patterns can be output.

#### **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.

## **Safety Area Markers**

90% and 80% safety area markers can be overlaid on the display. For 12G-SDI, 3G-SDI and HD-SDI, a 4:3 aspect ratio marker can be overlaid.

## **Pattern Scrolling**

This option is equipped with a function for scrolling patterns in eight directions. The moving speed can be varied.

## **Moving Box**

A moving box can be overlaid on the display. Its color, size, and moving speed can be varied.

## **Audio Embedding**

This option can embed 32 channels (stream 1 (\*1), stream 2 (\*1), 4 channels each  $\times$  4 groups) of audio signals for 3G-SDI level B and 16 channels (4 channels  $\times$  4 groups) of audio signals for 3G-SDI level A, HD-SDI, and SD-SDI. The frequency, level, and the click can be set for each channel.

\*1 On the menu, stream 1 and stream 2 are displayed as LINK-A and LINK-B, respectively.

#### **Lip Sync Patterns**

This option can output lip sync patterns in which the video and audio are synchronized. In combination with a waveform monitor that features a lip sync function, such as the Leader's LV5600, it possible to measure the offset between the video and audio in SDI signal transmissions.

## LT4610SER03 PTP

#### **PTP Grand Master Function**

This option supports the Precision Time Protocol defined in IEEE 1588-2008 and operates as a PTP grand master. SMPTE ST 2059, AES67, and General profiles are supported. The PTP time source is obtained from the internal clock or GPS.

#### **PTP Slave Function**

When a host PTP grand master is present in the system, the LT4611 Sync Generator operates as a PTP slave and can operate as a master to even lower devices.

#### **10GbE Ready**

In addition to the RJ-45 port, a 10GbE SFP+ module, sold separately, can be used.

## LT4610SER04 GPS/BDS/TC

## **GPS/BDS Synchronization**

A GNSS antenna can be connected to generate and output signals by locking to the frequency and clock obtained from the GPS or BDS. \*Other features are the same as the LT4610SER01.

## LT4610SER24 8K

The LT4610SER24 is a software option for the LT4610 that adds the ability to output the 8K patterns from the 12G-SDI connectors, when the LT4610 is equipped with the hardware option LT4610SER02.

#### 12G-SDI 8I

QUAD LINK 12G-SDI 8K (7680 x 4320) can be output.

## **User Pattern Output**

User pattern can be output in addition to built-in patterns such as color bars.

#### **Audio Embedding**

The LT4610SER24 can embed 16 channels (4 channels  $\times$  4 groups) of audio signals for 12G-SDI. The frequency, level, and the click can be set for each channel.

#### **Lip Sync Patterns**

The LT4610SER24 can output lip sync patterns in which the video and audio are synchronized.



## The selectable patterns

#### **Fixed Pattern**

SDI output with standard configuration

		SDI format			
Pa	Pattern		720x487:SD	720x576:SD	
	100%	YES	YES	YES	
	75%	YES	YES	NO	
	MULTI 100%	YES	NO	NO	
COLOR BAR	MULTI 75%	YES	NO	NO	
COLOR BAR	MULTI (+I)	YES	NO	NO	
	SMPTE	NO	YES	NO	
	EBU	NO	NO	YES	
	BBC	NO	NO	YES	
FLAT FIELD 100% / FLAT FIELD 0% / RED FIELD 100% / GREEN FILED 100% / BLUE FIELD 100%		YES	YES	YES	
CHECK FIELD		YES	YES	YES	

## SDI output with optional LT4610SER02

		SDI format					
P	Pattern		720x487:SD	720x576:SD	3840x2160	4096x2160	
	100%	YES	YES	YES	YES	YES	
	75%	YES	YES	NO	YES	YES	
	MULTI 100%	YES	NO	NO	YES	YES	
	MULTI 75%	YES	NO	NO	YES	YES	
COLOR BAR	MULTI (+I)	YES	NO	NO	YES	YES	
	SMPTE	NO	YES	NO	NO	NO	
	EBU	NO	NO	YES	NO	NO	
	BBC	NO	NO	YES	NO	NO	
	ARIB STD-B66-2	NO	NO	NO	YES (*1)	S (*1、2)	
FLAT FIELD 100% / FLAT FIELD 0% / RED FIELD 100% / GREEN FILED 100% / BLUE FIELD 100%		YES	YES	YES	YES	YES	
CHECK FIELD		YES	YES	YES	NO	NO	

<sup>\*1</sup> In ARIB STD-B66-2, the color system is 422(YCbCr) 10 bit.

## SDI output with optional LT4610SER02 and LT4610SER24

Pattern -		SDI format				
		3840x2160 12G	4096x2160 12G	7680x4320 12G		
COLOR DAD	100%	YES	YES	YES		
COLOR BAR	75%	YES	YES	NO		
FLAT FIELD 100% / FLAT FIELD 0% / RED FIELD 100% / GREEN FILED 100% / BLUE FIELD 100%		YES	YES	YES		

## **User Pattern**

## SDI output with LT4610SER02

Pattern	SDI format				
Pattern	SD	HD(2K)	4K(SQD)	4K(2SI)	8K (*1)
User Pattern	YES	YES	YES	YES	YES
UHDColorBar	NO	NO	NO	YES	YES
HLGCB	NO	NO	YES	YES	NO
SLog3_LiveHDR_narrow_v11	NO	YES	NO	YES	YES

For User patterns, prepare 8K: 7680 x 4320, 4K: 3840 x 2160, 4096 x 2160, HD: 1280 x 720, 1920 x 1080, 2048 x 1080, SD: 720 x 487, 720 x 576 image files. \*1 8K requires LT4610SER24.

<sup>\*2</sup> Because ARIB STD-B66-2 is a fixed pattern that is 3840x2160 in size, 256 dots on the right side will display black if the pattern is displayed in the 4096x2160 size.

# / Patterns

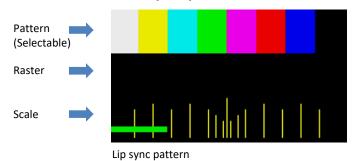
## Sample LT4610SER02 user patterns

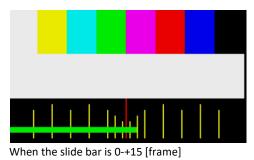


#### Lip sync patterns

The lip-sync pattern outputs audio synchronized with the video signal. Leader's lip-sync compatible waveform monitor can measure the difference in timing between the audio and video for each channel.

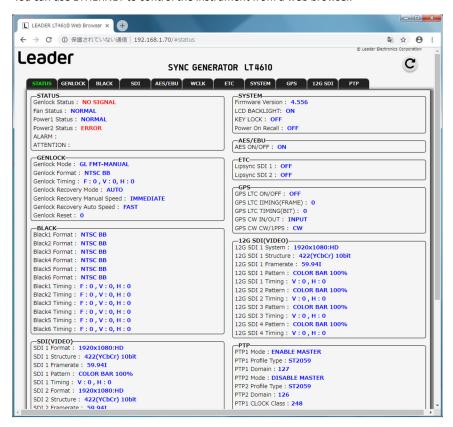
- Pattern: Displays the pattern selected in the SDI menu.
- Raster: Displays a white raster when the slide bar of the scale is 0-+15 [frame], and a black raster at other times.
- Scale: The green slide bar scrolls from left to right. (Approximately 6 seconds at 1080 / 59.94I)The center scale turns red when the slide bar is 0-+15 [frame].





# Web Browser

You can use ETHERNET to control the instrument from a web browser.





#### **Compliant Standards**

SDI Embedded Audio

3G, HD, HD (DL) SMPTE ST 299 **SMPTE ST 272** SDI Payload ID **SMPTE ST 352** 

Analog Video Sync Signal

NTSC Black Burst Signal SMPTE ST 170, SMPTE ST 318,

**SMPTE RP 154** 

PAL Black Burst Signal ITU-R BT 1700, EBU N14 HD Tri-Level Sync Signal SMPTE ST 240, SMPTE ST 274,

**SMPTE ST 296** 

AES/EBU ANSI \$4.40, AE\$3-2009, AE\$11-2009,

**SMPTE ST 276** 

#### **SDI Formats and Standards**

## HD, SD Video Signal Formats and Standards

Color System	Quantization	Image	Frame (Field) Frequency /Scanning	Compliant Standards	
		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	
YC <sub>R</sub> C <sub>R</sub> 4:2:2	10bit	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 274	
YCBCR 4:2:2	10bit	1920 × 1080	24/23.98/PsF	SMPTE ST 292	
			24/23.96/PSF	SMPTE RP 211	
		720 × 487	59.94/I	CNADTE CT 250	
		720 × 576	50/I	SMPTE ST 259	

#### HD(DL) Video Signal Formats and Standards

Color System	Quantization	Image	Frame (Field) Frequency	Compliant
Color System	Quantization	iiiage	/Scanning	Standards
	10bit	1920 × 1080	60/59.94/50/P	SMPTE ST 274
VC C 4.2.2			60/59.94/50/I	SMPTE ST 372
YC <sub>B</sub> C <sub>R</sub> 4:2:2	12bit	1920 × 1080	30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	4.0h-i+	1920 × 1080	60/59.94/50/I	
YC <sub>B</sub> C <sub>R</sub> 4:4:4	10bit 12bit		30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	401.1		60/59.94/50/I	
RGB 4:4:4	10bit	1920 × 1080	30/29.97/25/24/23.98/P	
	12bit		30/29.97/25/24/23.98/PsF	

## 3G-A Video Signal Formats and Standards

			Frame (Field) Frequency	Compliant
Color System	Quantization	Image	/Scanning	Standards
	10bit	1920 × 1080	60/59.94/50/P	
VC C 4.2.2			60/59.94/50/I	SMPTE ST 274
YC <sub>B</sub> C <sub>R</sub> 4:2:2	12bit	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425
			30/29.97/25/24/23.98/PsF	
		1280 × 720	60/59.94/50/	SMPTE ST 296
		1280 ^ /20	30/29.97/25/24/23.98/P	SMPTE ST 425
	10bit	1920 × 1080	60/59.94/50/I	
YC <sub>B</sub> C <sub>R</sub> 4:4:4			30/29.97/25/24/23.98/P	CAARTE CT 274
			30/29.97/25/24/23.98/PsF	SMPTE ST 274
	12bit	1920 × 1080	60/59.94/50/I	SMPTE ST 425
			30/29.97/25/24/23.98/P	
		1280 × 720	60/59.94/50/	SMPTE ST 296
		1280 ^ /20	30/29.97/25/24/23.98/P	SMPTE ST 425-1
	10bit		60/59.94/50/I	
RGB 4:4:4		1920 × 1080	30/29.97/25/24/23.98/P	CAARTE CT 274
			30/29.97/25/24/23.98/PsF	SMPTE ST 274
	421.7	4020 1/4000	60/59.94/50/I	SMPTE ST 425-1
	12bit	1920 × 1080	30/29.97/25/24/23.98/P	]

## 3G-B Video Signal Formats and Standards

Color System	Quantization	Image	Frame (Field) Frequency /Scanning	Compliant Standards
	10bit	1920 × 1080	60/59.94/50/P	
VC C 4:2:2			60/59.94/50/I	
YC <sub>B</sub> C <sub>R</sub> 4:2:2	12bit	1920 × 1080	30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	10bit		60/59.94/50/I	
		1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425
YC <sub>B</sub> C <sub>R</sub> 4:4:4			30/29.97/25/24/23.98/PsF	
	12bit	1920 × 1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			60/59.94/50/I	
RGB 4:4:4	10bit	1920 × 1080	30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	1.2hi+	1920 x 1080 i	60/59.94/50/I	
	12bit		30/29.97/25/24/23.98/P	

#### I/O Connectors

**SDI Output Connector** 

2 BNC connectors Connector

3G-A, HD, SD 2 3G-B, HD(DL) 1 Output Impedance 75 Ω

Output Amplitude  $800 \, \text{mVp-p} \pm 10\%$ 

**Output Return Loss** 

5 MHz to 1.485 GHz 15 dB or more 1.485 to 2.97 GHz 10 dB or more Overshoot Less than 10%

Rise and Fall Times

≤ 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±0.5 V

**Genlock Input Connector** 

2 BNC connectors Connector

Input Signal Analog composite sync signal

Analog component sync signal

Format Loop-through

15 kΩ Input Impedance

Maximum Input Voltage  $\pm 5 \text{ V}$  (DC + peak AC) Operating Input Level Range ±6 dB

External Lock Range ±5 ppm

Jitter 1 ns (when genlock is in use)

Analog Video Sync Signal Output Connector

Connector 6 BNC connectors, 6 outputs **Output Signal** NTSC black burst signal PAL black burst signal

75 Ω

HD tri-level sync signal

**Output Impedance** 

Sync Level

NTSC 40±1 IRE PAL -300±6 mV HD  $\pm 300 \pm 6 \,\mathrm{mV}$ Blanking  $0\pm15\,\mathrm{mV}$ AES/EBU Digital Audio Output Connector

Connector 1 BNC connector **Output Amplitude**  $1 Vp-p\pm0.1 V$ Output Impedance 75 Ω unbalanced

**AES/EBU Silence Output Connector** 

Connector 1 BNC connector Output Amplitude  $1 Vp-p\pm0.1 V$ Output Impedance 75 Ω unbalanced

Word-Clock Output Connector

Connector 1 BNC connector

**Output Frequency** 48 kHz

**Output Amplitude** 3.5 V or more (high level not terminated with 75  $\Omega$ )

2.4 V or more (high level terminated with 75  $\Omega$ )

#### **Control Connectors**

**Ethernet Port** 

**Specifications IEEE 802.3** 

Protocol

SNMP v2c Command operation and trap transmission

Transmission of operation status (e.g., genlock synchronization status)

HTTP Remote monitoring and control froma Web

browser

Connector

Type 10BASE-T/100BASE-TX auto switching **USB Port** 

Specifications USB 2.0

Supported Media USB memory device

Saving and recalling presets, genlock log, Function

logo, and ID characters Updating firmware Retrieving MIB files

USB Type A Connector

LCD

**Number of Characters** 20 characters × 2 lines

Backlight On / Off

**SDI Video Output** 

SDI Signal

Bit Rate

2.970Gbps, 2.970/1.001Gbps 3G HD, HD(DL) 1.485Gbps, 1.485/1.001Gbps

270 Mbps SD

**Timing Adjustment** 

Adjustment Range Entire frame

Adjustment Unit

٧ Lines

Н Clocks (148.5 MHz, 148.5/1.001 MHz,

74.25 MHz, 74.25/1.001 MHz, 27 MHz)

**Test Patterns** 

100% color bar, 75% color bar, 3G, HD

multiformat 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

525/59.941 100% color bar, 75% color bar,

SMPTE color bar, check field.

flat field white 100%, black 0%, red 100%,

green 100%, blue 100%

625/501 100% 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 selectable

color bar patterns

Switch Time 1 to 255 sec

Pattern Scrolling

Direction Eight directions (up, down, left, right, and

their combinations)

Speed Range and Unit

In unit of fields Interlace

٧ 0 to 256 lines, in 1 line steps Н 0 to 256 dots, in 2 dot steps

In unit of frames Progressive

0 to 256 lines, in 1 line steps ٧ Н 0 to 256 dots, in 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]  $32 \times 32 / 64 \times 64 / 128 \times 128 / 256 \times 256$ Intensity 100%, 75% (black only for the background

color)

Anywhere on the display **Display Position** Adjustment Resolution **Display Position** 

1 line ٧ Н 1 dot Blinking Display (\*1) ON / OFF

**ON TIME** 1 to 9 sec, in 1 sec step **OFF TIME** 1 to 9 sec, in 1 sec step

Scrolling (\*1)

Function Scroll including the ID character background

Direction Two directions (left and right)

Speed Range and Unit

Interlace In unit of fields

0 to 256 dots, in 2 dot steps

Progressive In unit of frames

0 to 256 dots, 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 (dots) × 240 (lines) (QVGA size)

Number of Logo Marks That Can Be Saved in the LT4610

Up to 4

**Display Position** Anywhere on the display

Display Position Adjustment Resolution

٧ 1 line Н 1 dot

Any level from 0 to 3 **Display Level** 

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

Using the logo application **Conversion Method** 

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.

Component On/Off

**Function** Each of the Y/G, Cb/B, and Cr/R components

can be turned on and off independently.

\* 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.) ID characters, logo mark, safety area

markers, and test pattern can be displayed

simultaneously.

**Embedded Audio** 

Frequency

Level

Simultaneous Display

**Embedded Channels** Can be turned on and off at the group level

3G-A, HD, SD 16 channels

 $(4 \text{ channels} \times 4 \text{ groups})$ 

3G-B 32 channels (stream 1, stream 2, 4 channels

each  $\times$  4 groups)

Sampling Frequency 48 kHz sampling (synced with the video

signal)

20 bits, 24 bits Pre-emphasis OFF, 50/15, Resolution

> CCITT (only the CS bit is switched) SILENCE / 400Hz / 800Hz / 1kHz

-60 to 0 dBFS (1 dBFS steps)

**Audio Click** OFF, 1 / 2 / 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 (525/59.94I). • For 16 channel output, the resolution is set to 20 bits.

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

**Genlock Function** 

Signal Formats NTSC BB, NTSC BB+REF, NTSC BB+ID,

NTSC BB+REF+ID, PAL BB, PAL BB+REF, 525/59.94I, 525/59.94P, 625/50I, 625/50P, 1125/60I, 1125/59.94I, 1125/50I, 1125/30P,

1125/29.97P, 1125/25P, 1125/24P, 1125/23.98P, 1125/24PsF, 1125/23.98PsF, 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 ±5frames PAL Black Burst Signal ±2frames

HD Tri-Level Sync Signal 1 frame (entire frame)
FINE Covers 1 adjustment unit

(adjustment unit: 13.5 MHz, clock width: 74.1

nsec)

Genlock Mode

INTERNAL Operates using the internal reference signal EXTERNAL Operates using an external reference signal

GL FMT-AUTO / GL FMT-MANUAL / GPS(SER01) / GNSS(SER04) /

10MHz CW(SER01/SER04) / PTP(SER03)

Recovery Mode

AUTO Resynchronizes according to the auto setting

when the external reference signal recovers Retains the STAY IN SYNC state when the

external reference signal recovers

Auto Setting

MANUAL

IMMEDIATE Resets the lock when the external reference

signal recovers

FAST Quickly resynchronizes when the external

reference signal recovers

SLOW Slowly resynchronizes when the external

reference signal recovers

Manual Setting

IMMEDIATE Resets the lock when the external reference

signal recovers

FAST Quickly resynchronizes when the external

reference signal recovers

SLOW Slowly resynchronizes when the external

reference signal recovers

Genlock Reset Resynchronizes immediately.

**Analog Video Sync Signal Output** 

Signal Formats Each of the 6 outputs can be set separately.

NTSC BB, NTSC BB+REF, NTSC BB+ID, NTSC BB+REF+ID, NTSC BB+SETUP, NTSC BB+S+REF, NTSC BB+S+ID, NTSC BB+S+R+ID, PAL BB, PAL BB+REF, 525/59.94I, 525/59.94P, 625/50I, 625/50P, 1125/60I, 1125/59.94I, 1125/50I, 1125/30P, 1125/29.97P, 1125/25P, 1125/24P, 1125/23.98P, 1125/24PsF, 1125/23.98PsF, 750/60P, 750/59.94P, 750/50P, 750/30P,

750/29.97P, 750/25P, 750/24P, 750/23.98P Timing Adjustment Can be set separately for each of the 6

outputs

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  $\mu s$  (54 MHz clock unit)

HD Tri-Level Sync Signal

In units of 0.0135  $\mu$ s (74.25/1.001 MHz clock

unit or 74.25 MHz clock unit)

**AES/EBU Digital Audio Output** 

**Timing Adjustment** 

Adjustment Range ±1 AES/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 / 400Hz / 800Hz / 1kHz Level -60 to 0 dBFS (1 dBFS steps)

Audio Click

OFF, 1 / 2 / 4 sec

Lip Sync

Synchronization with SDI1

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)...

**AES/EBU Silence Output** 

Timing Adjustment

Adjustment Range ±1 AES/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
Frequency SILENCE
Level MUTE

Sampling Clock Accuracy Grade 2 (±10 ppm)

Word-Clock Output
Timing Adjustment

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

**Lip Sync Patterns** 

Setting SDI1+AES/EBU and SDI2 can be set

separately.

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

\* Safety area markers, ID characters, and logo mark cannot be overlaid.

\* The audio click setting of embedded audio is disabled, and audio synchronized to the lip sync pattern is output.

**Preset Settings** 

Preset Saves the panel settings (\*1)

Number of Presets 10

Recall Method Front panel

Copy Method Copy from the LT4610 to a USB memory

device or copy from the USB memory device

to the LT4610

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

**Logging Feature** 

Saved Items Genlock status change

Copy Method Copy from the LT4610 to a USB memory

device

**Internal Reference Generator** 

Reference Frequency 13.5MHz

**Internal Clock** 

Power Supply Primary lithium battery

Battery Operation Period Approx. 3 years (depending on the storage

and operating environments)

**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 II
Pollution Degree 2
Power Requirements

Voltage 90 to 250 VAC Power Consumption 80 W max.

Dimensions 482 (W)  $\times$  44 (H)  $\times$  400 (D) mm (excluding

protrusions)

Weight 3.6 kg (excluding SER01, SER02, SER03, and

SER04)

 $3.8\ kg$  (including SER01 or SER04, SER02, and

ER03)

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## LT4610SER01 GPS/TC

Compliant Phase Control Standard SMPTE ST 2059-1

**GPS Input Connector** 

1 BNC connector Connector

Input Impedance 50 O Antenna, Pre-amp Power Supply

5 V / 3.3 V / OFF Voltage

50 mA max. (built-in overcurrent protection Current

**GPS** Receiver

1575.42 MHz (L1) Receive Frequency

Receive Code C/A code

**Receive Sensitivity** -130 dBm or more (input level to the

antenna)

Status NO SIGNAL, TRACKING, LOCKED, STAY IN

SYNC

**Holdover Function** Retains the previous frequency and phase

when the GPS signal is interrupted

**CW I/O** 

CW I/O Connector

Connector 1 BNC connector (shared input and output)

Input Impedance Input Signal Level 0.5 to 2 Vp-p Input Signal Frequency 10 MHz Locking Frequency Range  $\pm 5 \, ppm$ **Output Signal Level** 3.3 V LVCMOS Output Signal Frequency 10 MHz / 1 PPS

**Holdover Function** Retains the previous frequency when the

10 MHz CW signal is interrupted

LTC I/O

I/O Connectors

Connector D-SUB 15 pin (shared input and output)

LTC

Number of Inputs

Input Impedance  $600 \Omega$  balanced Input Signal Level 0.5 to 4 Vp-p

**Number of Outputs** 3

**Output Impedance**  $600\,\Omega$  balanced **Output Signal Level** 2 Vp-p±10%

Alarm

**Number of Outputs** 

**Output Signal** Level 5 V CMOS

**Time Code** 

Reference Time Internal / GPS / LTC / VITC / PTP (when the

LT4610 is equipped with the hardware option

LT4610SER03)

Synchronizes to ANALOG BLACK 1 (LTC OUT) Frame Rate On / Off

**Dropped Frame Mode** 

**ATC Setting** 

LTC Insertion Setting On / Off

LTC Setting

**Output Setting** On / Off

**AES/EBU Time Code Insertion Setting** On / Off

Leap Second

**Application Setting** 

Set the application date/time with a timer

**Daylight Savings Time** 

**Application Setting** Set the application date/time with a timer

## LT4610SER02 12G-SDI

#### **Compliant Standards**

SDI Embedded Audio

12G, 3G, HD, HD (DL) SMPTE ST 299 SD SMPTE ST 272 SDI Payload ID SMPTE ST 352

## **SDI Formats and Standards**

The SDI format is the same for all four outputs.

#### SD Video Signal Formats and Standards

	Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
	YC <sub>B</sub> C <sub>R</sub> 4:2:2	4·2·2 I 10hit -	720 × 487	59.94/I	CMDTE CT 3E0
			720 × 576	50/I	SMPTE ST 259

#### **HD Video Signal Formats and Standards**

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
	10bit	1 178N X 77N	,,,,	SMPTE ST 292-1
			23.98/P	SMPTE ST 296
YC <sub>B</sub> C <sub>R</sub> 4:2:2		1920 × 1080	60/59.94/50/I	
I OBOK IIZIZ			30/29.97/25/24/23.98/P	SMPTE ST 274 SMPTE ST 292-1
			30/29.97/25/24/23.98/PsF	SIVIF   L 31 292-1

#### 3G-A Video Signal Formats and Standards

3G-A VIUEU				
Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
				SMPTE ST 274
		1920 × 1080	60/59.94/50/P	SMPTE ST 425-1
	10bit			SMPTE ST 425-1
		2048 × 1080	60/59.94/50/48/47.95/P	
			50/50 04/50/	SMPTE ST 2048-2
$YC_BC_R$ 4:2:2			60/59.94/50/I	SMPTE ST 274
		1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425-1
	12bit		30/29.97/25/24/23.98/PsF	
		2048 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425-1
		204011000	30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
		1280 × 720	60/59.94/50/	SMPTE ST 296
		1230 × 720	30/29.97/25/24/23.98/P	SMPTE ST 425
				SMPTE ST 274
	10bit	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425-1
			30/29.97/25/24/23.98/PsF	7
YC <sub>B</sub> C <sub>R</sub> 4:4:4			30/29.97/25/24/23.98/P	SMPTE ST 425-1
		2048 × 1080	30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
			60/59.94/50/I	SMPTE ST 274
	401	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425-1
	12bit		30/29.97/25/24/23.98/P	SMPTE ST 425-1
		2048 × 1080	30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
			60/59.94/50/	SMPTE ST 296
		1280 × 720	30/29.97/25/24/23.98/P	SMPTE ST 425-1
			60/59.94/50/I	SMPTE ST 274
	10bit	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425
	100.0	1520 1 1000	30/29.97/25/24/23.98/PsF	
RGB 4:4:4			30/29.97/25/24/23.98/P	SMPTE ST 425-1
NGB 4.4.4		2048 × 1080	30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
			60/59.94/50/I	SMPTE ST 2048-2
		1920 × 1080	30/29.97/25/24/23.98/P	<b>⊣</b> ` `
	12bit			SMPTE ST 425
		2048 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425-1
	l		30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2

## 3G-B-DL, HD (DL) Video Signal Formats and Standards

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
		1920 × 1080		SMPTE ST 274
		1920 ^ 1060	60/59.94/50/P	SMPTE ST 372
			100/59.94/50/P	SMPTE ST 425-1
	10bit	2048 × 1080		SMPTE ST 372
		2048 × 1080	CO/FO OA/FO/AO/AZ OF/D	
			60/59.94/50/48/47.95/P	SMPTE ST 425-1
				SMPTE ST 2048-2
$YC_BC_R$ 4:2:2		1920 × 1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	SMPTE ST 372
	421.7		30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
	12bit	20101000		SMPTE ST 372
		2048 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425-1
			30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
		1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	SMPTE ST 372
	10bit		30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
		2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 372
			30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
VC C 4 4 4				SMPTE ST 2048-2
$YC_BC_R 4:4:4$		1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	SMPTE ST 372
	12bit		30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
	12010	2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 372
			20/20 07/25/24/22 00/5	SMPTE ST 425-1
			30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
		1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	SMPTE ST 372
	10bit		30/29.97/25/24/23.98/PsF	SMPTE ST 425
	TODIT	2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 372
			20/20 07/25/24/22 00/0-5	SMPTE ST 425-1
RGB 4:4:4			30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
		1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	SMPTE ST 372
	12bit		30/29.97/25/24/23.98/PsF	SMPTE ST 425
	12DIL	2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 372
			30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
			30/23.31/23/24/23.36/PSF	SMPTE ST 2048-2

<sup>\*</sup> For 3G-B-DL, SDI1 settings apply to SDI1 and SDI2, and SDI3 settings apply to SDI3 and SDI4

## 3G-B-DS Video Signal Formats and Standards

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
YC <sub>B</sub> C <sub>R</sub> 4:2:2			60/59.94/50/I	CLARTE CT 274
			30/29.97/25/24/23.98/P	SMPTE ST 274 SMPTE ST 425-1
	10bit		30/29.97/25/24/23.98/PsF	SWII 12 31 423 1
		1280×720	60/59.94/50/30/29.97/P	SMPTE ST 296
		1200:1720	00/33.54/30/30/23.37/1	SMPTE ST 425-1

st Only SDI1 and SDI3 are supported.

## 3G(DL)-2K Video Signal Formats and Standards

Color System	Quantization	Image	Field Frequency/Scanning	Compliant
color system	Quartization	mage	Treid Frequency/ Scarining	Standards
		1920×1080	60/59.94/50/P	SMPTE ST 274
YC <sub>R</sub> C <sub>R</sub> 4:2:2	12bit	1020112000	00/33.3-1/30/1	SMPTE ST 425-3
TCBCR 4.2.2	12010	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2
		2040712000	00/33.34/30/40/47.33/1	SMPTE ST 425-3
		1920×1080	60/59.94/50/P	SMPTE ST 274
	10bit	1320×1000	00/39.94/30/F	SMPTE ST 425-3
	10010	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2
YC <sub>B</sub> C <sub>R</sub> 4:4:4		2040 × 1000	00/39.94/30/48/47.93/F	SMPTE ST 425-3
1CBCR 4.4.4		1920×1080	60/59.94/50/P	SMPTE ST 274
	12bit	1920 × 1080	00/39.94/30/P	SMPTE ST 425-3
	12011	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2
		2046 ^ 1060	00/59.94/50/48/47.95/P	SMPTE ST 425-3
		1920×1080	60/59.94/50/P	SMPTE ST 274
	10bit			SMPTE ST 425-3
	TODIC	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2
RGB 4:4:4				SMPTE ST 425-3
KGB 4.4.4		1920×1080	60/59.94/50/P	SMPTE ST 274
	12bit			SMPTE ST 425-3
	12011	2048×1080		SMPTE ST 2048-2
		2046 ^ 1060	60/59.94/50/48/47.95/P	SMPTE ST 425-3
		1920×1080	60/59.94/50/P	SMPTE ST 274
VC C 4:2:2	12bit	1920 ^ 1060	00/59.94/50/P	SMPTE ST 425-3
YC <sub>B</sub> C <sub>R</sub> 4:2:2	12011	2048×1080	CO/FO 04/FO/48/47 OF /D	SMPTE ST 2048-2
		2046 ^ 1060	60/59.94/50/48/47.95/P	SMPTE ST 425-3
		1920×1080	CO/FO 04/FO/D	SMPTE ST 274
VC C 4.4.4	10bit	1920 × 1080	60/59.94/50/P	SMPTE ST 425-3
	TODIT	2040 × 4000	50/50 04/50/40/47 05/5	SMPTE ST 2048-2
		2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 425-3
YC <sub>B</sub> C <sub>R</sub> 4:4:4		1020×1000	CO /50 04 /50 /D	SMPTE ST 274
	421.7	1920×1080	60/59.94/50/P	SMPTE ST 425-3
	12bit	2048×1080	50/50 04/50/40/47 05/5	SMPTE ST 2048-2
			60/59.94/50/48/47.95/P	SMPTE ST 425-3

## 3G(DL)-4K Video Signal Formats and Standards (Square)

١	Calar Sustan	Ougntination	Imaga	mage Field Frequency/Scanning	Compliant
	Color System	Quantization	image		Standards
1			2040 × 2460	Standards  Standards  SMPTE ST 425- SMPTE ST 2036  SMPTE ST 2036  SMPTE ST 225- SMPTE ST 225- SMPTE ST 425-	SMPTE ST 425-3
	VC C 4.2.2	10bit	3840 ^ 2160		SMPTE ST 2036-1
	YC <sub>B</sub> C <sub>R</sub> 4:2:2		4006 × 2160	20/20 07/25/24/22 08/0	SMPTE ST 425-3
			4096 ^ 2160	30/29.97/25/24/25.96/P	SMPTE ST 2048-1

## 3G(DL)-4K Video Signal Formats and Standards (2 sample Interleave)

Color System	Ougatiantian	tization Image Field Frequency/Scanning	Field Fraguency/Coopping	Compliant
Color System	Quantization		Field Frequency/Scanning	Standards
		2040 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-3
YC <sub>R</sub> C <sub>R</sub> 4:2:2	10bit	3840 X 2100	30/29.97/25/24/23.96/P	SMPTE ST 2036-1
1 CBCR 4:2:2		4006 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-3
		4096 ^ 2160	30/29.97/25/24/25.96/P	SMPTE ST 2048-1

## HD (QL) Video Signal Formats and Standards (Square)

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
YC <sub>B</sub> C <sub>R</sub> 4:2:2			30/29.97/25/24/23.98/P	-
			30/29.97/25/24/23.98/PsF	-
	10bit	4096 × 2160	30/29.97/25/24/23.98/P	-
		4096 × 2160	30/29 97/25/24/23 98/PcF	_

## 3G (QL) Video Signal Formats and Standards (Square)

l	Color System	Quantization	Image	Field Frequency/Scanning	Compliant
ļ		~~~			Standards
			3840 × 2160	60/59.94/50/P	SMPTE ST 425-5
		10bit	3040 × 2100	00/33:34/30/1	SMPTE ST 2036-1
		10010	4006 × 2160	60/59.94/50/48/47.95/P	SMPTE ST 425-5
	YC <sub>B</sub> C <sub>R</sub> 4:2:2		4030 × 2100	00/33:34/30/48/47:33/F	SMPTE ST 2048-1
	1 CBCR 4.2.2		2040 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
		126:4	3640 ^ 2100	30/29.97/23/24/23.96/P	SMPTE ST 2036-1
		12bit	400C × 24C0	20/20 07/25/24/22 00/5	SMPTE ST 425-5
			4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2048-1
1			2040 × 2460	20/20 07/25/24/22 00/5	SMPTE ST 425-5
		401.11	3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
		10bit	4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
					SMPTE ST 2048-1
	$YC_BC_R$ 4:4:4				SMPTE ST 425-5
		401	3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
		12bit	4096 × 2160 30/29.97/25/24/23.98/P	SMPTE ST 425-5	
				30/29.97/25/24/23.98/P	SMPTE ST 2048-1
1				22 /22 27 /27 /24 /22 22 /2	SMPTE ST 425-5
			3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
	1 1	10bit			SMPTE ST 425-5
			4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2048-1
	RGB 4:4:4				SMPTE ST 425-5
			3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
		12bit			SMPTE ST 425-5
			4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2048-1
ı					31411 12 31 2040 1

## 3G (QL) Video Signal Formats and Standards (2 sample interleave)

	,				
	Color System	Quantization	Image	Field Frequency/Scanning	Compliant
ļ		-,	- 0-	3	Standards
١			3840 × 2160	60/59.94/50/P	SMPTE ST 425-5
١		10bit	3040 × 2100	00/33.34/30/1	SMPTE ST 2036-1
١		10010	4006 × 2160	60/59.94/50/48/47.95/P	SMPTE ST 425-5
١	VC C 4.2.2		4096 ^ 2160	00/59.94/50/48/47.95/P	SMPTE ST 2048-1
١	YC <sub>B</sub> C <sub>R</sub> 4:2:2		2040 × 2160	20/20 07/25/24/22 08/0	SMPTE ST 425-5
١		12bit	3840 × 2100	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
١		12010	4006 × 2460	20/20 07/25/24/22 00/5	SMPTE ST 425-5
١			4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2048-1
1			2040 × 2460	20/20 07/25/24/22 00/5	SMPTE ST 425-5
١		106:4	3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
١		10bit	4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
١	VC C 4.4.4				SMPTE ST 2048-1
١	$YC_BC_R$ 4:4:4		2040 × 2460		SMPTE ST 425-5
١		4254	3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
١		12bit	4006 24 24 60	20/20 07/25/24/22 00/5	SMPTE ST 425-5
١			4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2048-1
ı			2040 × 2460	20/20 07/25/24/22 00/5	SMPTE ST 425-5
١		106:4	3840 × 2100	$840 \times 2160   30/29.97/25/24/23.98/P   S$	SMPTE ST 2036-1
١		10bit	400C × 24C0	20/20 07/25/24/22 00/5	SMPTE ST 425-5
١	DCD 4:4:4		4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2048-1
١	RGB 4:4:4		2040 × 2460	20/20 07/25/24/22 00/5	SMPTE ST 425-5
١		125:4	3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
١		12bit	4096 × 2160	20/20 07/25/24/22 00/5	SMPTE ST 425-5
				30/29.97/25/24/23.98/P	SMPTE ST 2048-1

## 12G Video Signal Formats and Standards (2 sample Interleave)

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
	10bit	3840 × 2160	60/59.94/50/P	
VC C 4.2.2	1001	4096 × 2160	60/59.94/50/48/47.95/P	
YC <sub>B</sub> C <sub>R</sub> 4:2:2	12bit	3840 × 2160	30/29.97/25/24/23.98/P	
	12011	4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2036-1
	10bit	3840 × 2160	30/29.97/25/24/23.98/P	
VC C 4.4.4		4096 × 2160	30/29.97/25/24/23.98/P	
YC <sub>B</sub> C <sub>R</sub> 4:4:4	421.1	3840 × 2160	30/29.97/25/24/23.98/P	
	12bit	4096 × 2160	30/29.97/25/24/23.98/P	
	10bit	3840 × 2160	30/29.97/25/24/23.98/P	
RGB 4:4:4	1001	4096 × 2160	30/29.97/25/24/23.98/P	
	12hi+	3840 × 2160	30/29.97/25/24/23.98/P	
	12bit	4096 × 2160	30/29.97/25/24/23.98/P	

#### **SDI Output Connector**

Connector 4 BNC connectors

12G, 3G-A, HD, SD 4 outputs 3G-B, HD (DL) 2 outputs **Output Impedance 75 Ω** 

**Output Amplitude**  $800 \text{ mVp-p} \pm 10\%$ 

**Output Return Loss** 

5 MHz to 1.485 GHz 15 dB or more 1.485 to 2.97 GHz 10 dB or more 2.97 to 6 GHz 7 dB or more 6 to 12 GHz 4 dB or more

Rise and Fall Times

≤ 45 ps (20 to 80%) 12G 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%)

0±0.5 V DC Offset

#### **SDI Pattern Generation**

The SDI pattern generation settings can be set separately for each output. But the fixed pattern and user pattern cannot be generated simultaneously.

\*You cannot format them separately.

**SDI Signal** Bit Rate

> 12G 11.880 Gbps, 11.880/1.001 Gbps 2.970 Gbps, 2.970/1.001 Gbps 3G HD, HD (DL) 1.485Gbps, 1.485/1.001Gbps

SD 270Mbps

**Timing Adjustment** 

Adjustment Range Entire frame

Adjustment Unit

Lines

Clocks (148.5 MHz, 148.5/1.001 MHz, Н 74.25 MHz, 74.25/1.001 MHz, 27 MHz)

**Test Patterns** 

12G, 3G, HD 100% color bar, 75% color bar,

multiformat color bar (ARIB STD-B28, pattern 2 area can be set to 100% white, 75% white, or +I), ARIB STD-B66-2 color bar (3G(QL) 2 sample interleave, and 12G 422 (YCbCr) 10bit only), check field (3G, HD), flat field white 100%, black 0%, red 100%, green

100%, blue 100%

SD

525/59.941 100% color bar, 75% color bar,

SMPTE color bar, check field,

flat field white 100%, black 0%, red 100%,

green 100%, blue 100%

625/501 100% 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 selectable

color bar patterns

Switch Time 1 to 255 sec

\* The selectable patterns depend on the SDI format.

**User Pattern Display** Select one from INT-1 to 8.

Storage Memory SD, HD (2K), 4K, up to 25 patterns each **Display Memory** Transfer the SD, HD (2K), 4K (2SI), 4K (SQD) (INT\_1 to 8)

pattern data (up to 8 patterns each) from the storage memory to the display memory

24-bit full color bitmap format (.bmp)

TIFF format (.tif), IMG format (.img)

Archiver Pattern IMG format (.img)

**UHDColorBar** ARIB STD-B66 UHDTV MULTIFORMAT COLOR BAR

(3G(QL) 2 sample interleave, and 12G 422 (YCbCr)

10bit only)

**HLGCB** ARIB STD-B72 Colour Bar Test Pattern for HLG

**HDR-TV System** 

Recommendation ITU-R BT.2111 HLG (3G(QL)

and 12G 422 (YCbCr) 10bit only)

SLog3\_LiveHDR\_narrow\_V11

S-Log3(Live HDR) Ver1.11 narrow range scale (HD and 3G(QL) 2 sample interleave, and 12G

422 (YCbCr) 10bit only)

\* After turning on the power, transfer the data from the storage memory to the display memory. It takes about 5 minutes to transfer the data of a 4K user pattern. If the power is cut off after a memory transfer, the data in the display memory will be cleared. The data in the storage memory will be retained even when the power is turned off, so after turning on the power, perform a memory transfer operation again. You can also set the power on load function that automatically transfers data after the power is turned on.

Component On/Off

File Format

Function Each of the Y/G, Cb/B, and Cr/R components

can be turned on and off independently.

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

Safety Area Markers

12G, 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)

Moving Box

**Box Color** Select from white, yellow, cyan, green, blue,

red, magenta, black

Speed Setting V/H LOW / MIDDLE / HIGH

Size Setting V/H SIZE 1 to 5 \* Not available when the check field pattern is selected.

Pattern Scrolling

Eight directions (up, down, left, right, and Direction

their combinations)

Speed Range and Unit

Interlace In unit of fields

V 0 to 256 lines, in 1 line steps Н 0 to 256 dots, in 2 dot steps

Progressive In unit of frames

0 to 256 lines, in 1 line steps V Н 0 to 256 dots, in 2 dot steps

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

**ID Characters** 

**Number of Characters** Up to 20 characters

32 × 32 / 64 × 64 / 128 × 128 / 256 × 256 Size [Dots] Intensity 100%, 75% (black only for the background

**Display Position** Anywhere on the display Adjustment Resolution **Display Position** 

٧ 1 line Н 1 dot Blinking Display (\*1) ON / OFF

ON TIME 1 to 9 sec, in 1 sec step OFF TIME 1 to 9 sec, in 1 sec step

<sup>\*</sup> In ARIB STD-B66-2 color bar display, the color system is 422(YCbCr) 10 bit.

<sup>\*</sup> If the power is cut off while data is being accessed, the data may become corrupted. Do not turn off the power while data is being accessed.

<sup>\*</sup> In the user pattern display, the color system is 422(YCbCr) 10 bit.

<sup>\*</sup> Not available when the check field pattern or user pattern is selected.

Scrolling (\*1)

Function Scroll including the ID character background

Direction Two directions (left and right)

Speed Range and Unit

Interlace In unit of fields

0 to 256 dots, in 2 dot steps

Progressive In unit of frames

0 to 256 dots, 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 (dots) × 240 (lines) (QVGA size) Number of Logo Marks That Can Be Saved in the LT4610

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.

**Image Overlay** 

Display Precedence ID characters > safety area markers > logo

mark > test pattern

(The display order cannot be changed.)

Simultaneous Display ID characters, 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 (4 channels × 4 groups)

3G-B 32 channels (stream 1, stream 2, 4 channels

each × 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 / 400Hz / 800Hz / 1kHz Level -60 to 0 dBFS (1 dBFS steps)

Audio Click OFF, 1 / 2 / 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 (525/59.94I).
   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 SDI1, SDI2, SDI3, and SDI4 can be set

separately.

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

\* The audio click setting of embedded audio is disabled, and audio synchronized to the lip sync pattern is output.

## **User Payload ID**

Setting ON / OFF

\* You can edit the user payload ID only in a web browser.

## LT4610SER03 (PTP)

#### **Compliant Standards**

Internet Protocol Version IPv4

PTP Standard IEEE 1588-2008

Supported Profile SMPTE ST 2059 / AES67 / General

**RJ-45 Port** 

Number of Ports 1
Port Type RJ-45
Compliant Standards IEEE 802.3

Type 10Base-T / 100Base-TX / 1000Base-T

SFP / SFP+ Port

Number of Ports 1
Port Type SFP cage
Compliant Standards MSA
Supported Modules and Types

SFP transceiver RJ-45 1000BASE-T

SFP+ optical transceiver 10GBASE-SR and 10GBASE-SW

\* The SFP/SFP+ module is optional.

#### **Master Function**

Number of Controllable Master Devices 2

Communication Mode Multicast / Unicast / MIXED SMPTE /

MIXED SMPTE without negotiation

Domain Number 0 to 127 (SMPTE ST 2059)

0 to 255 (AES67 / General)

Announce Message Rate 0.125s 8Hz / 0.25s 4Hz / 0.5s 2Hz / 1s 1Hz /

2s 0.5Hz / 4s 0.25Hz / 8s 0.125Hz /

16s 0.0625Hz

Sync Message Rate 0.0078s 128Hz / 0.015s 64Hz /

0.0312s 32Hz / 0.625s 16Hz / 0.125s 8Hz / 0.25s 4Hz / 0.5s 2Hz / 1s 1Hz / 2s 0.5Hz 4s 0.25Hz / 8s 0.125Hz /

16s 0.0625Hz

\* The message rate setting range varies depending on the profile.

Priority 1 0 to 255
Priority 2 0 to 255
Number of Connectable Slaves 1000
\* When the sync message rate is 8Hz in theoretical value.

**Slave Function** 

Communication Mode Multicast / Unicast / MIXED SMPTE /

MIXED SMPTE without negotiation

Domain Number 0 to 127 (SMPTE ST 2059)

0 to 255 (AES67 / General)

Delay Message Rate 0.0078s 128Hz / 0.015s 64Hz /

0.0312s 32Hz / 0.0625s 16Hz / 0.125s 8Hz / 0.25s 4Hz / 0.5s 2Hz / 1s 1Hz / 2s 0.5Hz /

4s 0.25Hz / 8s 0.125Hz / 16s 0.0625Hz

Announce Timeout Count 2 to 10

## LT4610SER04 GPS/BDS

#### **GNSS Lock**

Compliant Phase Control Standard SMPTE ST 2059-1

**GNSS Input Connector** 

 $\begin{array}{lll} \mbox{Connector} & \mbox{1 BNC connector} \\ \mbox{Input Impedance} & \mbox{50} \ \Omega \\ \mbox{Antenna, Pre-amp Power Supply} \\ \mbox{Voltage} & \mbox{5 V / 3.3 V / OFF} \\ \end{array}$ 

Current 50 mA max. (built-in overcurrent protection circuit)

GNSS Receiver
Receive Frequency

GPS 1575.42MHz (L1) BDS 1561.098MHz (B1)

Receive Sensitivity GPS:-130dBm or more (input level to the antenna)

BDS:-120dBm or more (input level to the antenna)
NO SIGNAL. TRACKING. LOCKED. STAY IN SYNC

Status NO SIGNAL, TRACKING, LOCKED, STAY IN SYNC
Holdover Function Retains the previous frequency and phase when
the GPS signal or GPS signal is interrupted

CW I/O

CW I/O Connector

Connector 1 BNC connector (shared input and output)

Input Impedance50  $\Omega$ Input Signal Level0.5 to 2 Vp-pInput Signal Frequency10 MHzLocking Frequency Range ± 5 ppmOutput Signal Level3.3 V LVCMOSOutput Signal Frequency10 MHz / 1 PPS

Holdover Function Retains the previous frequency when the 10

MHz CW signal is interrupted.

LTC I/O

I/O Connectors

Connector D-SUB 15 pin (shared input and output)

LTC

Number of Inputs 1

 $\begin{array}{ll} \text{Input Impedance} & 600 \ \Omega \ \text{balanced} \\ \text{Input Signal Level} & 0.5 \ \text{to 4 Vp-p} \end{array}$ 

Number of Outputs 3

Output Impedance  $600 \Omega$  balanced Output Signal Level  $2 \text{ Vp-p} \pm 10\%$ 

Alarm

Number of Outputs 2

Output Signal Level 5 V CMOS

Time Code

Reference Time Internal / GNSS / LTC / VITC / PTP(when the

LT4610 is equipped with the hardware

option LT4610SER03)

Frame Rate Synchronizes to ANALOG BLACK 1 (LTC OUT)

On / Off

Dropped Frame Mode

ATC Setting

LTC Insertion Setting On / Off

LTC Setting

Output Setting On / Off

AES/EBU Time Code Insertion SettingOn / Off

Leap Second

Application Setting Set the application date/time with a timer

**Daylight Savings Time** 

Application Setting Set the application date/time with a timer

LT4610SER24 8K

**Compliant Standard** 

SDI Embedded Audio SMPTE ST 299 SDI Payload ID SMPTE ST 352

## **SDI Formats and Standards**

12G(QL) 8K Video Signal Formats and Standards (2 sampleInterleave)

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
	10bit	7680×4320	60/59.94/50/48/47.95/P	SMPTE ST 2082-12 SMPTE ST 2036-1
YC <sub>B</sub> C <sub>R</sub> 4:2:2	12bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1
	10bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1
YC <sub>B</sub> C <sub>R</sub> 4:4:4	12bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1
DCD 4:4:4	10bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1
RGB 4:4:4	12bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1

#### **8K SDI Pattern Generation**

SDI Signal 11.880 Gbps, 11.880/1.001 Gbps
Test Patterns 100% color bar, 75% color bar,

flat field white 100%, black 0%, red 100%,

green 100%, blue 100%

Automatic Switching Automatically switches between selectable

color bar patterns

Switch Time 1 to 255 sec

User Pattern Display Select one from INT-1 to 8.

Storage Memory Up to 25 patterns

Display Memory (INT\_1 to 8)

Transfer the pattern data (up to 8 patterns) from the storage memory to the display

memory

File Format 24-bit full color bitmap format (.bmp)

TIFF format (.tif), IMG format (.img)

 $\mbox{*}$  In the user pattern display, the color system is 422(YCbCr) 10 bit.

\* When user pattern display is selected, simultaneous display other than user pattern display is not possible.

Component On/Off

Function Each of the Y/G, Cb/B, and Cr/R components

can be turned on and off independently.

Safety Area Markers Action safe area (90%)

Title safe area (80%) 4:3 aspect ratio

(can be turned on and off separately)

Moving Box

Box Color Select from white, yellow, cyan, green, blue,

red, magenta, black

Speed Setting V/H LOW / MIDDLE / HIGH

Size Setting V/H SIZE 1 to 5
Not available when the user pattern is selected.

Pattern Scrolling

Direction Eight directions (up, down, left, right, and

their combinations)

Speed Range and Unit

Progressive In unit of fields

V 0 to 256 lines, in 4 line steps H 0 to 256 dots, in 8 dot steps

**Embedded Audio** 

Embedded Channels Can be turned on and off at the group level

16 channels (4 channels × 4 groups)

Sampling Frequency 48 kHz sampling (synced with the video signal)

Signal

Resolution 20 bits, 24 bits

Pre-emphasis OFF, 50/15, CCITT (only the CS bit is

switched)

Frequency SILENCE / 400Hz / 800Hz / 1kHz Level -60 to 0 dBFS (1 dBFS steps)

Audio Click OFF, 1 / 2 / 4 sec

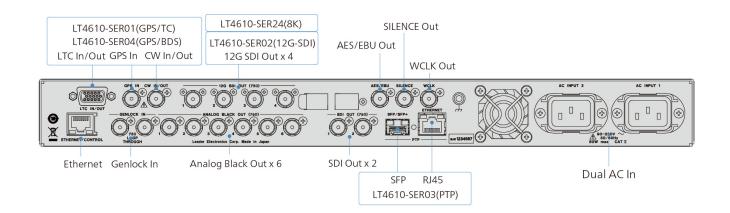
\* The frequency, level, and audio click can be set for each channel.

**Lip Sync Patterns** 

Setting Set by SDI1

**User Payload ID** 

Setting ON / OFF



# Related accessories

LC2141 (SFP RJ-45)

Speed: 1000Mbps Connector: RJ-45 LC2148 (SFP+ MULTI-MODE)

Transmission Distance: 300m

Wave ength: 850nm

Supported standards: 10GBASE-SR/SW

Connector: LC

LC2145 (SFP+ SINGLE-MODE)

Transmission Distance : Max 10,000m

Wave ength: 1310nm

Supported standards: 10GBASE-LR/LW







# LT4610 / LT4611 Comparison table

	LT4610	LT4611
Genlock	Standard	Standard
SYNC 3 Outputs (BB/tri-level) 1~3	Standard	Standard
SYNC 3 Outputs (BB/tri-level) 4~6	Standard	LT4611SER21
SDI 2 Outputs 3G/HD/SD SDI	Standard	LT4611SER22
Word-Clock Signal Output	Standard	Standard
AES/EBU Signal Output AES/EBU Silence Output	Standard	LT4611SER23
GPS/TC	LT4610SER01	LT4610SER01
GPS/BDS/TC	LT4610SER04	LT4610SER04
12G-SDI 4K Outputs	LT4610SER02	LT4610SER02
PTP	LT4610SER03	LT4610SER03
12G-SDI 8K Output	LT4610SER24	LT4611SER24

<sup>\*</sup>If you add the LT4611SER21, LT4611SER22, and LT4611SER23 to the LT4611 to make them equivalent to the LT4610, the LT4611 will be more expensive than the LT4610.

# Leader

# LT4611 SYNC GENERATOR

GENLOCK	BB	Tri-level	GPS	PTP	TC
8K	4K	12Gsdi	3Gsdi	HDsdi	SDsdi
WC	AES-EBU				



# General

The LT4611 is a 1U full rack size sync generator that can operate in synchronization with GPS, PTP, CW, and internal reference signals, as well as Genlock that supports external analog video synchronization signals.

It supports analog video sync signals, AES / EBU digital audio output, word clock, and time code, and also supports 3G / HD / SD-SDI output and 12G-SDI output compatible with 4K and 8K.

In addition, it supports the PTP grand master function and PTP slave function, and can manage the optimum synchronization system according to the system.

The genlock function is equipped with a STAY IN SYNC function that retains the phase when an abnormality occurs in the input analog video synchronization signal, and the power supply unit performs redundant operation, enabling highly reliable system construction. LT4611 has slimmed down the standard functions from the standard specifications of the LT4610, the SDI output function, audio output function, and three of the six analog sync signal output systems to be prepared as optional product. Functions can be added as needed, allowing you to configure the system with specifications that meet your objectives.

# **Features**

#### **Genlock Function**

Various output signals can be synchronized by applying NTSC/PAL black burst signals, which are analog video sync 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.

## **Stay-in-Sync and Slow Lock Functions**

A Stay-in-Sync function is available in case errors occur at the genlock input. In addition, a slow lock function is available to reduce the shock that occurs when genlock is performed again based on stay-in-sync. This makes it possible to construct an extremely reliable synchronization system.

## **Analog Video Sync Signal Output**

Six analog video sync signals can be output. The phase of each output can be adjusted independently.

NTSC/PAL black burst signal with field reference pulse and NTSC black burst signal with 10 field IDs are also supported.

## GPS/BDS Synchronization (LT4610SER01, LT4610SER04)

By connecting a GPS antenna, the LT4610SER01 can generate and output each signal by locking it to frequencies and times obtained from gps. The LT4610SER04 also supports BDS by connecting GNSS antennas.

## **PTP** (LT4610SER03)

PTP synchronization corresponds to the grandmaster and slave functions.

You can choose reference signal from PTP, GPS, analog BB or internal.

## Time Code I/O (LT4610SER01)

The ATC (LTC) can be embedded in LTC outputs from internal time, GPS, LTC, and VITC time information, and SDI signal outputs, or VITC in analog video synchronous signal outputs.

## **Triple-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 at output terminals. The pattern and phase can be set separately for each. (However, only a single output is available for 3G-SDI level B and HD dual link.)

#### 12G-SDI Support (LT4610SER02)

Four output connectors can be added to support 12G-SDI, 3G-SDI (level A, level B) and HD-SDI (including dual links).

In addition, it corresponds to the 8K video signal by adding 8K software option.

## Lip Sync Patterns (LT4610SER02, LT4611SER22, LT4611SER24)

This option can output lip sync patterns in which the video and audio are synchronized. In combination with a waveform monitor that features a lip sync function, such as the Leader's LV5600, it is possible to measure the offset between the video and audio in SDI signal transmissions.

## **User Pattern Output**

User pattern can be output in addition to built-in patterns such as color bars

## Audio Embedding (LT4610SER02, LT4611SER22, LT4611SER24)

The LT4611 can embed 32 channels (stream 1, stream 2, 4 channels each  $\times$  4 groups) of audio signals for 3G-SDI level B and 16 channels (4 channels  $\times$  4 groups) of audio signals for 3G-SDI level A, HD-SDI, and SD-HDI. The frequency, level, and the click can be set for each channel.

## **AES/EBU Signal Output**

The LT4611 can output a 48 kHz AES/EBU signal synchronized with video signals. It is also equipped with a muted AES/EBU signal output.

## **Word-Clock Signal Output**

The LT4611 can output a 48 kHz word-clock signal synchronized with video signals.

## **Real Time Clock**

The real time clock is backed up by a battery. There is no need to reset the clock even when the power is turned off and on.

#### Ethernet

SNMP is supported. When an error is detected, a TRAP is issued. Further, the LT4611 can be controlled through HTTP.

## **Preset Memory Function**

Up to 10 presets can be saved. Convenient registered presets can be recalled during operation. The LT4611 can be started with the same settings every time.

#### **External Memory Support**

Logo data and preset data can be written and saved from the front panel using USB memory devices.

#### **Redundant Power Supply**

Two power supplies are built in to provide redundancy. When errors occur in power supply units, alarms are indicated on the LT4611 front panel. Errors can also be output as alarms using SNMP traps.

# / Options

## List of options

	Model number	Model name	Main functions
Hardware options	LT4610SER01	GPS/TC	GPS synchronization, 10 MHz CW I/O, LTC I/O
	LT4610SER02	12G-SDI	12G-SDI (4K) pattern output.  Natural picture support with 3G-SDI quad link.
	LT4610SER03	PTP	PTP grand master, slave function.
	LT4610SER04	GPS/BDS/TC	GPS/BDS synchronization, 10 MHz CW I/O, LTC I/O
Software option	LT4611SER21	SYNC 3 OUT ADD	3 additional analog sync signal output connectors with independent phase adjustment function
	LT4611SER22	SDI OUTPUT	2 SD-SDI, HD-SDI, 3G-SDI output connectors
	LT4611SER23	AUDIO OUTPUT	2 AES/EBU output connectors
	LT4611SER24	8К	8K SDI pattern output *You need the LT4610SER02 to install the LT4611SER24 in the LT4611.

## LT4610SER01 GPS/TC

#### **GPS Synchronization**

A GPS antenna can be connected to generate and output signals by locking to the frequency and clock obtained from the GPS.

#### Time Code I/O

The time code generator can run in free run mode based on internal time information. It can also embed ATC (LTC) in SDI signal output or VITC in analog video sync signal output based on a GPS, LTC, or VITC time information.

It also features a holdover function, which retains the phase and frequency of the output signal when GPS signals or CW signals are lost. Further, when GPS lock is in effect, the LT4611 can also be used as an NTP server.

#### **CW I/O**

The CW I/O connector not only receives 10 MHz CW but also outputs 10 MHz CW or 1PPS, whichever is selected.

#### LTC I/O

The LTC I/O connector receives LTC1, outputs LTC3, and outputs two separate alarms.

#### LT4610SER02 12G-SDI

## 12G-SDI (4K) Support

Four output connectors supporting 12G-SDI, 3G-SDI (level A, level B), HD-SDI (including dual link), and SD-SDI are available to accommodate the 4K video format. The format is the same for all four outputs, but you can set different patterns and phases for each.

Only two outputs are available for 3G-SDI level B and HD dual link.

## **User Pattern Generation**

In addition to internal patterns such as the color bar, SD, HD (2K), and 4K user patterns can be output.

## **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.

#### **Safety Area Markers**

90% and 80% safety area markers can be overlaid on the display. For 12G-SDI, 3G-SDI and HD-SDI, a 4:3 aspect marker can be overlaid.

## **Pattern Scrolling**

This option is equipped with a function for scrolling patterns in eight directions. The moving speed can be varied.

## **Moving Box**

A moving box can be overlaid on the display. Its color, size, and moving speed can be varied.

#### **Audio Embedding**

This option can embed 32 channels (stream 1 (\*1), stream 2 (\*1), 4 channels each  $\times$  4 groups) of audio signals for 3G-SDI level B and 16 channels (4 channels  $\times$  4 groups) of audio signals for 3G-SDI level A, HD-SDI, and SD-HDI. The frequency, level, and the like can be set for each channel.

\*1 On the menu, stream 1 and stream 2 are displayed as LINK-A and LINK-B, respectively.

#### **Lip Sync Patterns**

This option can output lip sync patterns in which the video and audio are synchronized. In combination with a waveform monitor that features a lip sync function, such as the Leader's LV 5770A, it possible to measure the offset between the video and audio in SDI signal transmissions.

## LT4610SER03 PTP

#### **PTP Grand Master Function**

This option supports the Precision Time Protocol defined in IEEE1588-2008 and operates as a PTP grand master. SMPTE ST 2059, AES67, and General profiles are supported. The PTP time source is obtained from the internal clock or GPS.

#### **PTP Slave Function**

When a host PTP grand master is present in the system, this option operates as a PTP slave and can operate as a master to even lower devices.

### 10GbE Ready

In addition to the RJ-45 port, a 10GbE SFP+ module, sold separately, can be used.

## LT4610SER04 GPS/BDS/TC

## **GPS Synchronization**

A GNSS antenna can be connected to generate and output signals by locking to the frequency and clock obtained from the GPS or BDS. \*Other features are the same as the LT4610SER01.

## LT4611SER21 (SYNC 3 OUT ADD)

Software option for the LT 4611 only. It is a standard feature on the LT4610.

## **Three Additional Analog Sync Signal Outputs**

In addition to the three outputs on the standard LT 4611, three analog video sync signal outputs can be added. NTSC/PAL black burst signal with field reference pulse and NTSC black burst signal with 10 field IDs are also supported.

#### **Independent Phase Adjustment**

The phases of all analog video sync signal outputs can be adjusted.

## LT4611SER22 (SDI OUTPUT)

Software option for the LT4611 only. It is a standard feature on the LT4610.

### **Triple-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 set 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 and displayed in a blinking state for checking whether the display has frozen.

## **Logo Mark Overlay**

A logo mark that is 320 (dot)  $\times$  240 (line) in size (QVGA size) can be overlaid at any position on the display. Logo marks are 4-level monochrome data converted from bitmap data.

## **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**

This option is equipped with a function for scrolling patterns in eight directions. The moving speed can be varied.

#### **Audio Embedding**

This option can embed 32 channels (stream 1 (\*1), stream 2 (\*1), 4 channels each  $\times$  4 groups) of audio signals for 3G-SDI level B and 16 channels (4 channels  $\times$  4 groups) of audio signals for 3G-SDI level A, HD-SDI, and SD-HDI. The frequency, level, and the like can be set for each channel.

\*1 On the menu, stream 1 and stream 2 are displayed as LINK-A and LINK-B, respectively.

#### **Lip Sync Patterns**

This option can output lip sync patterns in which the video and audio are synchronized. In combination with a waveform monitor that features a lip sync function, such as the Leader's LV5770A, it possible to measure the offset between the video and audio in SDI signal transmissions.

## LT4611SER23 (AUDIO OUTPUT)

Software option for the LT 4611 only. It is a standard feature on the LT4610.

## **AES/EBU Signal Output**

This option can output a 48 kHz AES/EBU signal synchronized with video signals. It is also equipped with a muted AES/EBU signal output.

#### LT4611SER24 8K

The LT4611SER24 is a software option for the LT4611 that adds the ability to output the 8K patterns from the 12G-SDI connectors, when the LT4611 is equipped with the hardware option LT4610SER02.

#### 12G-SDI 8K

QUAD LINK 12G-SDI 8K (7680 x 4320) can be output.

#### **User Pattern Output**

User pattern can be output in addition to built-in patterns such as color bars

## **Audio Embedding**

The LT4611SER24 can embed 16 channels (4 channels  $\times$  4 groups) of audio signals for 12G-SDI. The frequency, level, and the like can be set for each channel.

## **Lip Sync Patterns**

The LT4611SER24 can output lip sync patterns in which the video and audio are synchronized.



## The selectable patterns

## **Fixed pattern**

SDI output with standard configuration

	_		SDI format			
Pattern		Other than those on the right	720x487:SD	720x576:SD		
	100%	YES	YES	YES		
	75%	YES	YES	NO		
	MULTI 100%	YES	NO	NO		
COLOR BAR	MULTI 75%	YES	NO	NO		
COLOR BAR	MULTI (+I)	YES	NO	NO		
	SMPTE	NO	YES	NO		
	EBU	NO	NO	YES		
	BBC	NO	NO	YES		
FLAT FIELD 100% / FLAT FIELD 0% / RED FIELD 100% / GREEN FILED 100% / BLUE FIELD 100%		YES	YES	YES		
CHECK FIELD		YES	YES	YES		

## SDI output with optional LT4610SER02

		SDI format				
P	Pattern		720x487:SD	720x576:SD	3840x2160	4096x2160
	100%	YES	YES	YES	YES	YES
	75%	YES	YES	NO	YES	YES
	MULTI 100%	YES	NO	NO	YES	YES
	MULTI 75%	YES	NO	NO	YES	YES
COLOR BAR	MULTI (+I)	YES	NO	NO	YES	YES
	SMPTE	NO	YES	NO	NO	NO
	EBU	NO	NO	YES	NO	NO
	BBC	NO	NO	YES	NO	NO
	ARIB STD-B66-2	NO	NO	NO	YES (*1)	S (*1、2)
FLAT FIELD 100% / FLAT FIELD 0% / RED FIELD 100% / GREEN FILED 100% / BLUE FIELD 100%		YES	YES	YES	YES	YES
CHECK FIELD		YES	YES	YES	NO	NO

<sup>\*1</sup> In ARIB STD-B66-2, the color system is 422(YCbCr) 10 bit.

## SDI output with optional LT4610SER02, LT4611SER24.

Pattern		SDI format				
		3840x2160 12G	4096x2160 12G	7680x4320 12G		
COLOR BAR	100%	YES	YES	YES		
COLOR BAR	75%	YES	YES	NO		
FLAT FIELD 100% / FLAT FIELD 0% / RED FIELD 100% / GREEN FILED 100% / BLUE FIELD 100%		YES	YES	YES		

## **User Pattern**

## SDI output of LT4610SER02

Pattern	SDI format				
	SD	HD(2K)	4K(SQD)	4K(2SI)	8K (*1)
User pattern	YES	YES	YES	YES	YES
UHDColorBar	NO	NO	NO	YES	YES
HLGCB	NO	NO	YES	YES	NO
SLog3_LiveHDR_narrow_v11	NO	YES	NO	YES	YES

For User patterns, prepare 8K: 7680 x 4320, 4K: 3840 x 2160, 4096 x 2160, HD: 1280 x 720, 1920 x 1080, 2048 x 1080, SD: 720 x 487, 720 x 576 image files. \*1 8K requires LT4610SER24.

<sup>\*2</sup> Because ARIB STD-B66-2 is a fixed pattern that is 3840x2160 in size, 256 dots on the right side will display black if the pattern is displayed in the 4096x2160 size.

# / Patterns

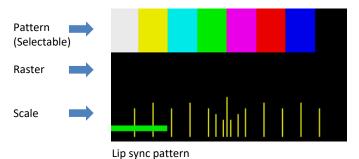
## Sample LT4610SER02 user patterns



#### Lip sync patterns

The lip-sync pattern outputs audio synchronized with the video signal. Leader's lip-sync compatible waveform monitor can measure the difference in timing between the audio and video for each channel.

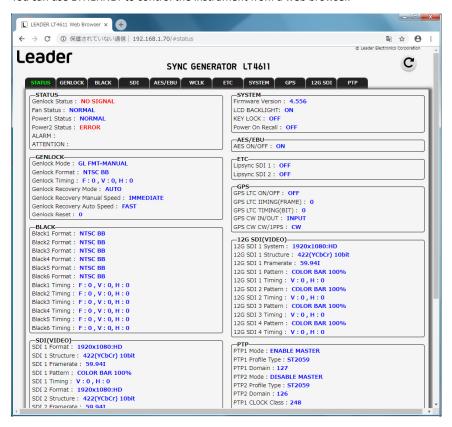
- Pattern: Displays the pattern selected in the SDI menu.
- Raster: Displays a white raster when the slide bar of the scale is 0-+15 [frame], and a black raster at other times.
- Scale: The green slide bar scrolls from left to right. (Approximately 6 seconds at 1080 / 59.94I)The center scale turns red when the slide bar is 0-+15 [frame].



When the slide bar is 0-+15 [frame]

# Web Browser

You can use ETHERNET to control the instrument from a web browser.



**Compliant Standards** 

Analog Video Sync Signal

NTSC Black Burst Signal SMPTE ST 170, SMPTE ST 318, SMPTE RP 154

PAL Black Burst Signal ITU-R BT 1700, EBU N14

HD Tri-Level Sync Signal SMPTE ST 240, SMPTE ST 274, SMPTE ST 296

**I/O Connectors** 

**Genlock Input Connector** 

Connector 2 BNC connectors

Input Signal Analog composite sync signal

Analog component sync signal

**Format** Loop-through

15 kΩ Input Impedance

Maximum Input Voltage ±5 V (DC + peak AC) Operating Input Level Range  $\pm 6 dB$ 

**External Lock Range**  $\pm 5$  ppm

litter 1 ns (when genlock is in use)

Analog Video Sync Signal Output Connector

3 BNC connectors, 3 outputs Connector **Output Signal** NTSC black burst signal PAL black burst signal HD tri-level sync signal

**Output Impedance** 75 O

Sync Level

NTSC 40 + 1 IRF-300±6 mV ΡΔΙ HD  $\pm 300 \pm 6 \, \text{mV}$ Blanking  $0 \pm 15 \,\text{mV}$ 

Word-Clock Output Connector

Connector 1 BNC connector

48 kHz **Output Frequency** 

**Output Amplitude** 3.5 V or more (high level not terminated with 75  $\Omega$ )

2.4 V or more (high level terminated with 75  $\Omega$ )

**Control Connectors** 

**Ethernet Port** 

Specifications **IEEE 802.3** 

Protocol

HTTP

Command operation and trap transmission SNMP v2c

Transmission of operation status (e.g., genlocksynchronization status) Remote monitoring and control from

a Web browser

Connector **RJ-45** 

Type 10BASE-T/100BASE-TX auto switching

**USB Port** 

Specifications USB 2.0

Supported Media USB memory device

Saving and recalling presets, genlock log, **Function** 

> logo, and ID characters Updating firmware Retrieving MIB files

20 characters × 2 lines

Connector USB Type A

LCD

**Number of Characters** 

On / Off Backlight

**Genlock Function** 

Signal Formats

NTSC BB, NTSC BB+REF, NTSC BB+ID,

NTSC BB+REF+ID, PAL BB, PAL BB+REF, 525/59.94I, 525/59.94P, 625/50I, 625/50P, 1125/60I, 1125/59.94I, 1125/50I, 1125/30P,

1125/29.97P, 1125/25P, 1125/24P, 1125/23.98P, 1125/24PsF, 1125/23.98PsF, 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 ±5 frames

PAL Black Burst Signal ±2frames

HD Tri-Level Sync Signal 1 frame (entire frame) FINE Covers 1 adjustment unit

(adjustment unit: 13.5 MHz, clock width:

74.1nsec)

Genlock Mode

INTERNAL Operates using the internal reference signal FXTFRNAI Operates using an external reference signal

GL FMT-AUTO / GL FMT-MANUAL /

GPS(SER01) / GNSS(SER04) /

10MHz CW(SER01/SER04) / PTP(SER03)

Recovery Mode

AUTO Resynchronizes according to the auto setting

> when the external reference signal recovers Retains the STAY IN SYNC state when the

external reference signal recovers

**Auto Setting** 

MANUAL

**IMMEDIATE** Resets the lock when the external reference

signal recovers

Quickly resynchronizes when the external **FAST** 

reference signal recovers

**SLOW** Slowly resynchronizes when the external

reference signal recovers

**Manual Setting** 

IMMEDIATE Resets the lock when the external reference

signal recovers

FAST Quickly resynchronizes when the external

reference signal recovers

**SLOW** Slowly resynchronizes when the external

reference signal recovers

Genlock Reset Resynchronizes immediately.

**Analog Video Sync Signal Output** 

Signal Formats Each of the 3 outputs can be set separately.

NTSC BB, NTSC BB+REF, NTSC BB+ID, NTSC BB+REF+ID, NTSC BB+SETUP, NTSC BB+S+REF, NTSC BB+S+ID, NTSC BB+S+R+ID, PAL BB, PAL BB+REF, 525/59.94I, 525/59.94P, 625/50I, 625/50P, 1125/60I, 1125/59.94I, 1125/50I, 1125/30P, 1125/29.97P, 1125/25P, 1125/24P,

1125/23.98P, 1125/24PsF, 1125/23.98PsF, 750/60P, 750/59.94P, 750/50P, 750/30P, 750/29.97P, 750/25P, 750/24P, 750/23.98P

**Timing Adjustment** Can be set separately for each of the

3 outputs

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 (54 MHz clock unit)

HD Tri-Level Sync Signal

In units of 0.0135 µs (74.25/1.001 MHz clock unit or 74.25 MHz clock unit)

**Word-Clock Output** 

Timing Adjustment

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

**Preset Settings** 

Saves the panel settings (\*1) Preset

**Number of Presets** 10

Recall Method Front panel

Copy Method Copy from the LT 4611 to a USB memory

device or copy from the USB memory device

to the LT 4611

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

**Logging Feature** 

Saved Items Genlock status change

Copy Method Copy from the LT 4611 to a USB memory

device

**Internal Reference Generator** 

Reference Frequency

13.5 MHz

**Internal Clock** 

**Power Supply** Primary lithium battery

**Battery Operation Period** Approx. 3 years (depending on the storage

and operating environments)

**General Specifications** 

**Environmental Conditions** 

Operating Temperature 0 to 40 °C

Operating Humidity Range 85 %RH or less (no condensation)

Optimal Temperature 10 to 35 ℃ Operating Environment Indoors Up to 2,000 m Elevation

Overvoltage Category Π 2 Pollution Degree

**Power Requirements** 

90 to 250 VAC Voltage **Power Consumption** 80 W max.

**Dimensions**  $482 (W) \times 44 (H) \times 400 (D) mm$  (excluding

protrusions)

3.6 kg (excluding SER01, SER02, SER03, and Weight

SER04)

3.8 kg (including SER01 or SER04, SER02, and

SER03)

Accessories Power cord ...... 2

Cover/Inlet stopper ...... 2 CD-ROM (Logo App, instruction manual)... 1 LT4610SER01 GPS/TC

Compliant Phase Control Standard SMPTE ST 2059-1

**GPS Input Connector** 

1 BNC connector Connector

Input Impedance 50 O Antenna, Pre-amp Power Supply

5 V / 3.3 V / OFF Voltage

Current 50 mA max. (built-in overcurrent protection

circuit)

**GPS** Receiver

Receive Frequency 1575.42 MHz (L1)

Receive Code C/A code

-130 dBm or more (input level to the **Receive Sensitivity** 

antenna)

Status NO SIGNAL, TRACKING, LOCKED, STAY IN

**Holdover Function** Retains the previous frequency and phase

when the GPS signal is interrupted

**CW I/O** 

CW I/O Connector

Connector 1 BNC connector (shared input and output)

Input Impedance 50 Ω Input Signal Level 0.5 to 2 Vp-p Input Signal Frequency 10 MHz Locking Frequency Range ±5 ppm **Output Signal Level** 3.3 V LVCMOS Output Signal Frequency 10 MHz / 1 PPS

**Holdover Function** Retains the previous frequency when the

10 MHz CW signal is interrupted

LTC I/O

I/O Connectors

Connector D-SUB 15 pin (shared input and output)

LTC

Number of Inputs

Input Impedance  $600 \Omega$  balanced Input Signal Level 0.5 to 4 Vp-p

**Number of Outputs** 3

Output Impedance  $600 \Omega$  balanced Output Signal Level  $2 \text{ Vp-p} \pm 10\%$ 

Alarm

**Number of Outputs** 

**Output Signal** Level 5 V CMOS

**Time Code** 

Reference Time Internal / GPS / LTC / VITC / PTP(when the

LT4611 is equipped with the hardware option

LT4610SER03)

Frame Rate Synchronizes to ANALOG BLACK 1 (LTC OUT)

**Dropped Frame Mode** On / Off

**ATC Setting** 

LTC Insertion Setting On / Off

LTC Setting

**Output Setting** On / Off

**AES/EBU Time Code Insertion Setting** On / Off

Leap Second

Application Setting

Set the application date/time with a timer

**Daylight Savings Time** 

Set the application date/time with a timer **Application Setting** 

## LT4610SER02 12G-SDI

## **Compliant Standards**

SDI Embedded Audio

12G, 3G, HD, HD (DL) SMPTE ST 299
SD SMPTE ST 272
SDI Payload ID SMPTE ST 352

## **SDI Formats and Standards**

The SDI format is the same for all four outputs.

## SD Video Signal Formats and Standards

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
YC <sub>B</sub> C <sub>R</sub> 4:2:2	4:2:2 10bit	720 × 487	59.94/I	SMPTE ST 259
		720 × 576	50/I	3IVIPTE 31 239

## HD Video Signal Formats and Standards

	Color System	Ouantization	Image	Field Frequency/Scanning	Compliant
		Quantization		Field Frequency/Scallining	Standards
		10bit	I 17X0 X /70	60/59.94/50/30/29.97/25/24/	SMPTE ST 292-1
				23.98/P	SMPTE ST 296
	YC <sub>R</sub> C <sub>R</sub> 4:2:2		1920 × 1080	60/59.94/50/I	
	1 353 1 111			30/29.97/25/24/23.98/P	SMPTE ST 274 SMPTE ST 292-1
				30/29.97/25/24/23.98/PsF	31VIF 1L 31 232-1

## 3G-A Video Signal Formats and Standards

Color System	Quantization	Image	Field Frequency/Scanning	Compliant
Color System	Quantization	iiiage	Field Frequency/scanning	Standards
		1020 × 1000	60/59.94/50/P	SMPTE ST 274
	10bit	1920 ^ 1080	00/39.94/30/P	SMPTE ST 425-1
	10010	2040 × 1000	60/59.94/50/48/47.95/P	SMPTE ST 425-1
		2046 ^ 1060	00/39.94/30/48/47.93/F	SMPTE ST 2048-2
YC <sub>B</sub> C <sub>R</sub> 4:2:2			60/59.94/50/I	SMPTE ST 274
		$1920 \times 1080$	30/29.97/25/24/23.98/P	SMPTE ST 425-1
	12bit		30/29.97/25/24/23.98/PsF	SIVIPTE 31 425-1
		2048 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425-1
		2048 × 1080	30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
		1280 × 720	60/59.94/50/	SMPTE ST 296
		1280 × 720	30/29.97/25/24/23.98/P	SMPTE ST 425
			60/59.94/50/I	SMPTE ST 274
	10bit	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 274 SMPTE ST 425-1
			30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
YC <sub>B</sub> C <sub>R</sub> 4:4:4		2048 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425-1
			30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
		1920 × 1080	60/59.94/50/I	SMPTE ST 274
	425:4		30/29.97/25/24/23.98/P	SMPTE ST 425-1
	12bit	2040 × 1000	30/29.97/25/24/23.98/P	SMPTE ST 425-1
		2048 × 1080	30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
		1200 × 720	60/59.94/50/	SMPTE ST 296
		1280 × 720	30/29.97/25/24/23.98/P	SMPTE ST 425-1
			60/59.94/50/I	CAARTE CT 274
	10bit	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 274
			30/29.97/25/24/23.98/PsF	SMPTE ST 425
RGB 4:4:4		2040 1/4000	30/29.97/25/24/23.98/P	SMPTE ST 425-1
		2048 × 1080	30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2
		4020 1/ 4000	60/59.94/50/I	SMPTE ST 274
	1254	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425
	12bit	2040 × 1000	30/29.97/25/24/23.98/P	SMPTE ST 425-1
		2048 × 1080	30/29.97/25/24/23.98/PsF	SMPTE ST 2048-2

## 3G-B-DL, HD (DL) Video Signal Formats and Standards (1/2)

Quantization	Image	Field Frequency/Scanning	Compliant Standards
10bit	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
	1920 × 1080	60/59.94/50/I	SMPTE ST 274
		30/29.97/25/24/23.98/P	SMPTE ST 372
12bit		30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
	2048 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 372
			30/29.97/25/24/23.98/PsF
	10bit	1920 × 1080  10bit 2048 × 1080  1920 × 1080	1920 × 1080

## 3G-B-DL, HD (DL) Video Signal Formats and Standards (2/2)

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
		1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	SMPTE ST 372
	10bit		30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
	1001	2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 372
			30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
YC <sub>R</sub> C <sub>R</sub> 4:4:4			30/29.97/23/24/23.98/PSF	SMPTE ST 2048-2
1CBCR 4.4.4		1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	SMPTE ST 372
	12bit		30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
	12011	2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 372
			30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
			30/29.97/25/24/23.98/PSF	SMPTE ST 2048-2
		1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	SMPTE ST 372
	10bit		30/29.97/25/24/23.98/PsF	SMPTE ST 425
	1001	2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 372
			30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
RGB 4:4:4			30/23.37/23/24/23.38/F3	SMPTE ST 2048-2
NGB 4.4.4		1920×1080	60/59.94/50/I	SMPTE ST 274
			30/29.97/25/24/23.98/P	SMPTE ST 372
	12bit		30/29.97/25/24/23.98/PsF	SMPTE ST 425
	12011	2048×1080	30/29.97/25/24/23.98/P	SMPTE ST 372
			30/29.97/25/24/23.98/PsF	SMPTE ST 425-1
			30/23.31/23/24/23.30/PSF	SMPTE ST 2048-2

## 3G-B-DS Video Signal Formats and Standards

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
YC <sub>B</sub> C <sub>R</sub> 4:2:2 10bit		60/59.94/50/I	CAADTE CT 274	
	10bit	1920×1080	30/29.97/25/24/23.98/P	SMPTE ST 274 SMPTE ST 425-1
			30/29.97/25/24/23.98/PsF	31411 12 31 423 1
		1280×720	CO /FO O A /FO /20 /20 O 7 /P	SMPTE ST 296
			60/59.94/50/30/29.97/P	SMPTE ST 425-1

<sup>\*</sup> Only SDI1 and SDI3 are supported.

## 3G(DL)-2K Video Signal Formats and Standards

3G(DL)-2K Video Signal Formats and Standards					
Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards	
V2.0.4.0.0	401.0	1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-3	
YC <sub>B</sub> C <sub>R</sub> 4:2:2	12bit	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3	
		1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-3	
	10bit	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3	
YC <sub>B</sub> C <sub>R</sub> 4:4:4		1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-3	
	12bit	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3	
	10bit	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	
RGB 4:4:4	12bit	1920×1080	60/59.94/50/P	SMPTE ST 425 3 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	
		1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-3	
YC <sub>B</sub> C <sub>R</sub> 4:2:2	12bit	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3	
		1920×1080	60/59.94/50/P	SMPTE ST 425 3 SMPTE ST 274 SMPTE ST 425-3	
	10bit	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 425 3 SMPTE ST 2048-2 SMPTE ST 425-3	
YC <sub>B</sub> C <sub>R</sub> 4:4:4		1920×1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-3	
	12bit	2048×1080	60/59.94/50/48/47.95/P	SMPTE ST 2048-2 SMPTE ST 425-3	

## 3G(DL)-4K Video Signal Formats and Standards (Square)

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
YC <sub>B</sub> C <sub>R</sub> 4:2:2 10bit	10hit	3840 × 2160	130/29 97/25/24/23 98/P	SMPTE ST 425-3 SMPTE ST 2036-1
	4096 × 2160	130/29 97/25/24/23 98/P	SMPTE ST 425-3 SMPTE ST 2048-1	

#### 3G(DL)-4K Video Signal Formats and Standards (2 sample Interleave)

Color System Qu	Ougntination	Imaga	Field Frequency/Scanning	Compliant
Color System	Quantization	Image	Field Frequency/Scanning	Standards
YC <sub>B</sub> C <sub>R</sub> 4:2:2 10bit		2040 × 2460	20/20 07/25/24/22 00/5	SMPTE ST 425-3
	10bit	3840 X 2100	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
	10010	4006 × 2160	20/20 07/25/24/22 08/0	SMPTE ST 425-3
		4096 ^ 2160	30/29.97/25/24/23.98/P SMPTE SMPTE 30/29.97/25/24/23.98/P SMPTE	SMPTE ST 2048-1

## HD (QL) Video Signal Formats and Standards (Square)

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
			30/29.97/25/24/23.98/P	-
YC <sub>B</sub> C <sub>R</sub> 4:2:2	10bit	3840 × 2160	30/29.97/25/24/23.98/PsF	-
	10010	4096 × 2160	30/29.97/25/24/23.98/P	-
		4090 × 2100	30/29.97/25/24/23.98/PsF	-

#### 3G (QL) Video Signal Formats and Standards (Square)

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
	401.7	3840 × 2160	60/59.94/50/P	SMPTE ST 425-5 SMPTE ST 2036-1
	10bit	4096 × 2160	60/59.94/50/48/47.95/P	SMPTE ST 425-5 SMPTE ST 2048-1
YC <sub>B</sub> C <sub>R</sub> 4:2:2		3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
	12bit	4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
		3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
	10bit	4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
YC <sub>B</sub> C <sub>R</sub> 4:4:4	12bit	3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
		4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
		3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
RGB 4:4:4	10bit	4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1
		3840 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2036-1
	12bit	4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5 SMPTE ST 2048-1

#### 3G (QL) Video Signal Formats and Standards (2 sample interleave)

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
		2040 × 2460	CO /50 04 /50 /D	SMPTE ST 425-5
	406:4	3840 × 2160	60/59.94/50/P	SMPTE ST 2036-1
	10bit	4000 × 2400	60/59.94/50/48/47.95/P	SMPTE ST 425-5
VC C 4.2.2		4096 × 2160	00/59.94/50/48/47.95/P	SMPTE ST 2048-1
YC <sub>B</sub> C <sub>R</sub> 4:2:2		2040 × 2160	20/20 07/25/24/22 08/5	SMPTE ST 425-5
	12bit	3840 × 2100	30/29.97/25/24/23.98/P	SMPTE ST 2036-1
	12010	4006 × 3160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
		4096 ^ 2160	30/29.97/25/24/23.98/P	SMPTE ST 2048-1
		2040 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
	10bit	3840 ^ 2160	30/29.97/25/24/25.98/P	SMPTE ST 2036-1
		4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
YC <sub>B</sub> C <sub>R</sub> 4:4:4				SMPTE ST 2048-1
1 CBCR 4.4.4		28/0 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
	12bit	3640 × 2100	30/29.97/23/24/23.98/P	SMPTE ST 2036-1
	12010	4006 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
		4096 × 2160	30/29.97/23/24/23.98/P	SMPTE ST 2048-1
		2840 ¥ 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
	10bit	3840 × 2100	30/29.97/23/24/23.98/F	SMPTE ST 2036-1
	10010	4006 ¥ 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
RGB 4:4:4		4090 ^ 2100	30/29.97/23/24/23.98/P	SMPTE ST 2048-1
		2840 ¥ 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
	12bit	3640 ^ 2100	30/29.97/23/24/23.98/P	SMPTE ST 2036-1
	12010	4006 ¥ 2160	30/29.97/25/24/23.98/P	SMPTE ST 425-5
		4030 × 2100	30/23.31/23/24/23.38/P	SMPTE ST 2048-1

## 12G Video Signal Formats and Standards (2 sample Interleave)

Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
	10bit	3840 × 2160	60/59.94/50/P	
VC C 4:3:3	10010	4096 × 2160	60/59.94/50/48/47.95/P	
YC <sub>B</sub> C <sub>R</sub> 4:2:2	1264	3840 × 2160	30/29.97/25/24/23.98/P	
	12bit	4096 × 2160	30/29.97/25/24/23.98/P	SMPTE ST 2082-10 SMPTE ST 2036-1
	10bit	3840 × 2160	30/29.97/25/24/23.98/P	
VC C 4.4.4		4096 × 2160	30/29.97/25/24/23.98/P	
YC <sub>B</sub> C <sub>R</sub> 4:4:4	12bit	3840 × 2160	30/29.97/25/24/23.98/P	
		4096 × 2160	30/29.97/25/24/23.98/P	
	10bit	3840 × 2160 30/29.97/25/24/23.98/P		
RGB 4:4:4	10010	4096 × 2160	30/29.97/25/24/23.98/P	
	12bi+	3840 × 2160	30/29.97/25/24/23.98/P	
	12bit	4096 × 2160	30/29.97/25/24/23.98/P	

#### **SDI Output Connector**

Connector 4 BNC connectors

12G, 3G-A, HD, SD 4 outputs 3G-B, HD (DL) 2 outputs Output Impedance  $75 \Omega$ 

Output Amplitude 800 mVp-p  $\pm$  10%

**Output Return Loss** 

5 MHz to 1.485 GHz 15 dB or more 1.485 to 2.97 GHz 10 dB or more 2.97 to 6 GHz 7 dB or more 6 to 12 GHz 4 dB or more

Rise and Fall Times

 $\begin{array}{ll} 12G & \leq 45 \text{ ps } (20 \text{ to } 80\%) \\ 3G & \leq 135 \text{ ps } (20 \text{ to } 80\%) \\ \text{HD, HD (DL)} & \leq 270 \text{ ps } (20 \text{ to } 80\%) \\ \text{SD} & 0.4 \text{ ns to } 1.5 \text{ ns } (20 \text{ to } 80\%) \end{array}$ 

DC Offset 0±0.5 V

#### **SDI Pattern Generation**

The SDI pattern generation settings can be set separately for each output. But the fixed pattern and user pattern cannot be generated simultaneously.

\*You cannot format them separately.

SDI Signal Bit Rate

 12G
 11.880 Gbps, 11.880/1.001 Gbps

 3G
 2.970 Gbps, 2.970/1.001 Gbps

 HD, HD (DL)
 1.485Gbps, 1.485/1.001Gbps

SD 270Mbps

**Timing Adjustment** 

Adjustment Range Entire frame

Adjustment Unit

V Lines

H Clocks (148.5 MHz, 148.5/1.001 MHz, 74.25 MHz, 74.25/1.001 MHz, 27 MHz)

**Test Patterns** 

12G, 3G, HD 100% color bar, 75% color bar,

multiformat color bar (ARIB STD-B28, pattern 2 area can be set to 100% white, 75% white, or +I), ARIB STD-B66-2 color bar (3G(QL) 2 sample interleave, and 12G 422 (YCbCr) 10bit only), check field (3G, HD), flat field white 100%, black 0%, red 100%, green

100%, blue 100%

SD

525/59.94I 100% color bar, 75% color bar,

SMPTE color bar, check field,

flat field white 100%, black 0%, red 100%,

green 100%, blue 100%

625/50I 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 selectable

color bar patterns

Switch Time 1 to 255 sec

\* The selectable patterns depend on the SDI format.

\* In ARIB STD-B66-2 color bar display, the color system is 422(YCbCr) 10 bit.

**User Pattern Display** Select one from INT-1 to 8.

Storage Memory SD, HD (2K), 4K, up to 25 patterns each Display Memory Transfer the SD, HD (2K), 4K (2SI), 4K (SQD) pattern data (up to 8 patterns each) from the (INT\_1 to 8)

storage memory to the display memory

24-bit full color bitmap format (.bmp)

TIFF format (.tif), IMG format (.img)

Archiver Pattern IMG format (.img)

UHDColorBar ARIB STD-B66 UHDTV MULTIFORMAT COLOR BAR

(3G(QL) 2 sample interleave, and 12G 422 (YCbCr)

10bit only)

**HLGCB** ARIB STD-B72 Colour Bar Test Pattern for HLG

**HDR-TV System** 

Recommendation ITU-R BT.2111 HLG (3G(QL)

and 12G 422 (YCbCr) 10bit only)

SLog3\_LiveHDR\_narrow\_V11

S-Log3(Live HDR) Ver1.11 narrow range scale (HD and 3G(QL) 2 sample interleave, and 12G

422 (YCbCr) 10bit only)

Component On/Off

File Format

Function Each of the Y/G, Cb/B, and Cr/R components

can be turned on and off independently.

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

Safety Area Markers

12G, 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 or user pattern is selected.

Moving Box

**Box Color** Select from white, yellow, cyan, green, blue,

red, magenta, black

Speed Setting V/H LOW / MIDDLE / HIGH

SIZE 1 to 5 Size Setting V/H \* Not available when the check field pattern is selected.

Pattern Scrolling

Direction Eight directions (up, down, left, right, and

their combinations)

Speed Range and Unit

Interlace In unit of fields

٧ 0 to 256 lines, in 1 line steps Н 0 to 256 dots, in 2 dot steps

Progressive In unit of frames

٧ 0 to 256 lines, in 1 line steps Н 0 to 256 dots, in 2 dot steps

\* 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 × 256 100%, 75% (black only for the background Intensity

color)

**Display Position** Anywhere on the display **Display Position Adjustment Resolution** 

٧ 1 line 1 dot Blinking Display (\*1) ON / OFF

**ON TIME** 1 to 9 sec, in 1 sec step **OFF TIME** 1 to 9 sec, in 1 sec step Scrolling (\*1)

Function Scroll including the ID character background

Two directions (left and right) Direction

Speed Range and Unit

Interlace In unit of fields

0 to 256 dots, in 2 dot steps

In unit of frames Progressive

0 to 256 dots, in 2 dot steps

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

#### Logo Mark

Logo Mark Data 4-level monochrome data from level 0 to 3 320 (dots) × 240 (lines) (QVGA size) Maximum Size Number of Logo Marks That Can Be Saved in the LT4611

Up to 4

1 dot

**Display Position** Anywhere on the display

Display Position Adjustment Resolution 1 line

Н Any level from 0 to 3 **Display Level** 

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 LT4611.

**Image Overlay** 

Display Precedence ID characters > safety area markers > logo

mark > test pattern

(The display order cannot be changed.)

Simultaneous Display ID characters, 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 16 channels (4 channels × 4 groups) 3G-A, HD, SD 3G-B 32 channels (stream 1, stream 2, 4 channels

each × 4 groups)

Sampling Frequency 48 kHz sampling (synced with the video

signal)

20 bits, 24 bits Resolution

OFF, 50/15, CCITT (only the CS bit is switched) Pre-emphasis

SILENCE / 400Hz / 800Hz / 1kHz Frequency -60 to 0 dBFS (1 dBFS steps) Level

OFF, 1 / 2 / 4 sec Audio Click

## **Lip Sync Patterns**

SDI1, SDI2, SDI3, and SDI4 can be set Setting

separately.

## **User Payload ID**

Setting ON / OFF

\* You can edit the user payload ID only in a web browser.

 $<sup>{}^{\</sup>star}$  After turning on the power, transfer the data from the storage memory to the display memory. It takes about 5 minutes to transfer the data of a 4K user pattern. If the power is cut off after a memory transfer, the data in the display memory will be cleared. The data in the storage memory will be retained even when the power is turned off, so after turning on the power, perform a memory transfer operation again. You can also set the power on load function that automatically transfers data after the power is turned on.

<sup>\*</sup> In the user pattern display, the color system is 422(YCbCr) 10 bit.

<sup>\*1</sup> The blinking display and scrolling can be used simultaneously

<sup>\*</sup> Not available when the check field pattern is selected.

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

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

<sup>\*</sup> The following limitations apply for SD (525/59.94I).

<sup>•</sup> For 16 channel output, the resolution is set to 20 bits.

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

<sup>\*</sup> Not available when the check field pattern is selected.

 $<sup>^{\</sup>star}$  The audio click setting of embedded audio is disabled, and audio synchronized to the lip sync pattern is output.

## LT4610SER03

#### **Compliant Standards**

Internet Protocol Version IPv4

PTP Standard IEEE 1588-2008

Supported Profile SMPTE ST 2059 / AES67 / General

**RJ-45 Port** 

**Number of Ports** Port Type **RJ-45 Compliant Standards IEEE 802.3** 

10Base-T / 100Base-TX / 1000Base-T Type

SFP / SFP+ Port

**Number of Ports** Port Type SFP cage **Compliant Standards** MSA **Supported Modules and Types** SFP transceiver RJ-45 1000BASE-T

SFP+ optical transceiver 10GBASE-SR and 10GBASE-SW

\* The SFP/SFP+ module is optional.

#### **Master Function**

**Number of Controllable Master Devices** 2

Multicast / Unicast / MIXED SMPTE / Communication Mode

MIXED SMPTE without negotiation

Domain Number 0 to 127 (SMPTE ST 2059) 0 to 255 (AES67 / General)

0.125s 8Hz / 0.25s 4Hz / 0.5s 2Hz / 1s 1Hz / Announce Message Rate

2s 0.5Hz / 4s 0.25Hz / 8s 0.125Hz /

16s 0.0625Hz

0.0078s 128Hz / 0.015s 64Hz / Sync Message Rate

0.0312s 32Hz / 0.625s 16Hz / 0.125s 8Hz / 0.25s 4Hz / 0.5s 2Hz / 1s 1Hz / 2s 0.5Hz 4s 0.25Hz / 8s 0.125Hz /

16s 0.0625Hz

\* The message rate setting range varies depending on the profile.

Priority 1 0 to 255 Priority 2 0 to 255 **Number of Connectable Slaves** 1000 \* When the sync message rate is 8Hz in theoretical value.

**Slave Function** 

Communication Mode Multicast / Unicast / MIXED SMPTE /

MIXED SMPTE without negotiation

Domain Number 0 to 127 (SMPTE ST 2059)

0 to 255 (AES67 / General) 0.0078s 128Hz / 0.015s 64Hz /

Delay Message Rate 0.0312s 32Hz / 0.0625s 16Hz /

0.125s 8Hz / 0.25s 4Hz / 0.5s 2Hz / 1s 1Hz / 2s 0.5Hz /

4s 0.25Hz / 8s 0.125Hz / 16s 0.0625Hz

Announce Timeout Count 2 to 10

## LT4610SER04 GPS/BDS

#### **GNSS Lock**

Compliant Phase Control Standard **SMPTE ST 2059-1** 

**GNSS Input Connector** 

Connector 1 BNC connector Input Impedance 50 Ω Antenna, Pre-amp Power Supply Voltage 5 V / 3.3 V / OFF

Current 50 mA max. (built-in overcurrent protection circuit)

**GNSS Receiver** Receive Frequency

> **GPS** 1575.42MHz (L1) BDS 1561.098MHz (B1)

Receive Sensitivity GPS:-130dBm or more (input level to the antenna)

BDS:-120dBm or more (input level to the antenna)

Status NO SIGNAL, TRACKING, LOCKED, STAY IN SYNC **Holdover Function** Retains the previous frequency and phase when

the GPS signal or GPS signal is interrupted

#### **CW I/O**

CW I/O Connector

Connector 1 BNC connector (shared input and output)

Input Impedance 50 Ω Input Signal Level 0.5 to 2 Vp-p Input Signal Frequency 10 MHz Locking Frequency Range ± 5 ppm Output Signal Level 3.3 V LVCMOS Output Signal Frequency 10 MHz / 1 PPS

**Holdover Function** Retains the previous frequency when the 10

MHz CW signal is interrupted.

## LTC I/O

I/O Connectors

Connector D-SUB 15 pin (shared input and output)

ITC

**Number of Inputs** 

 $600 \Omega$  balanced Input Impedance Input Signal Level 0.5 to 4 Vp-p **Number of Outputs** 

**Output Impedance** 

600 Ω balanced **Output Signal Level** 2 Vp-p±10%

Alarm

**Number of Outputs** 

**Output Signal Level** 5 V CMOS

**Time Code** 

Internal / GNSS / LTC / VITC / PTP(when the Reference Time

LT4611 is equipped with the hardware

option LT4610SER03)

Frame Rate Synchronizes to ANALOG BLACK 1 (LTC OUT)

**Dropped Frame Mode** On / Off

ATC Setting

LTC Insertion Setting On / Off

LTC Setting

On / Off **Output Setting** 

AES/EBU Time Code Insertion SettingOn / Off

Leap Second

Application Setting Set the application date/time with a timer

**Daylight Sayings Time** 

**Application Setting** Set the application date/time with a timer

## LT4611SER21 SYNC 3 OUT ADD

## **Compliant Standard**

Analog Video Sync Signal

NTSC Black Burst Signal SMPTE ST 170, SMPTE ST 318, SMPTE RP 154

PAL Black Burst Signal ITU-R BT 1700, EBU N14

HD Tri-Level Sync Signal SMPTE ST 240, SMPTE ST 274, SMPTE ST 296

**Output Connectors** 

Analog Video Sync Signal Output Connector

Connector 3 BNC connectors, 3 outputs

Output Signal NTSC black burst signal, PAL black burst

signal, HD tri-level sync signal

Output Impedance 75Ω

Sync Level

NTSC 40±1 IRE
PAL -300±6mV
HD ±300±6mV
Blanking 0±15mV

**Analog Video Sync Signal Output** 

Signal Formats Each of the 3 outputs can be set separately.

NTSC BB, NTSC BB+REF, NTSC BB+ID, NTSC BB+REF+ID, NTSC BB+SETUP, NTSC BB+S+REF, NTSC BB+S+ID, NTSC BB+S+R+ID, PAL BB, PAL BB+REF, 525/59.94I, 525/59.94P, 625/50I, 625/50P, 1125/60I, 1125/59.94I, 1125/50I, 1125/30P,

1125/29.97P, 1125/25P, 1125/24P, 1125/23.98P, 1125/24PsF, 1125/23.98PsF,

750/60P, 750/59.94P, 750/50P, 750/30P, 750/29.97P, 750/25P, 750/24P, 750/23.98P

Timing Adjustment Can be set separately for each of the

3 outputs

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  $\mu s$  (54 MHz clock unit)

HD Tri-Level Sync Signal  $\;$  In units of 0.0135  $\mu s$  (74.25/1.001 MHz

clock unit or 74.25 MHz clock unit)

## LT4611SER22 SDI OUTPUT

#### **Compliant Standards**

SDI Embedded Audio

3G、HD、HD (DL) SMPTE ST 299
SD SMPTE ST 272
SDI Payload ID SMPTE ST 352

**SDI Formats and Standards** 

HD, SD Video Signal Formats and Standards

Color System	Quantization	Image	Frame (Field) Frequency /Scanning	Compliant Standards
		1280 × 720	60/59.94/50/ 30/29.97/25/24/23.98/P	SMPTE ST 292 SMPTE ST 296
		60/59.9	60/59.94/50/I	SMPTE ST 292
VC C 4.2.2	10bit	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 274
YC <sub>B</sub> C <sub>R</sub> 4:2:2	TOBIC	1920 ^ 1080	24/23.98/PsF	SMPTE ST 292 SMPTE RP 211
		720 × 487	59.94/I	SMPTE ST 259
		720 × 576	50/I	SMPTE ST 125

HD(DL) Video Signal Formats and Standards

Color System	Quantization	Image	Frame (Field) Frequency	Compliant
			/Scanning	Standards
	10bit	1920 × 1080	60/59.94/50/P	SMPTE ST 274
YC <sub>B</sub> C <sub>R</sub> 4:2:2			60/59.94/50/I	SMPTE ST 372
1 CBCR 4:2:2	12bit	1920 × 1080	30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	10b:t	1920 × 1080	60/59.94/50/I	
YC <sub>B</sub> C <sub>R</sub> 4:4:4	10bit 12bit		30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
RGB 4:4:4	401.0		60/59.94/50/I	
	10bit 12bit	1920 × 1080	30/29.97/25/24/23.98/P	
	12011		30/29.97/25/24/23.98/PsF	

3G-A Video Signal Formats and Standards

Color System	Quantization	Image	Frame (Field) Frequency /Scanning	Compliant Standards
	10bit	1920 × 1080	60/59.94/50/P	
YC <sub>B</sub> C <sub>R</sub> 4:2:2			60/59.94/50/I	SMPTE ST 274
1 CBCR 4:2:2	12bit	1920 × 1080	30/29.97/25/24/23.98/P	SMPTE ST 425
			30/29.97/25/24/23.98/PsF	
		1280 × 720	60/59.94/50/	SMPTE ST 296
		1280 × 720	30/29.97/25/24/23.98/P	SMPTE ST 425
	10bit		60/59.94/50/I	
YC <sub>B</sub> C <sub>R</sub> 4:4:4		1920 × 1080	30/29.97/25/24/23.98/P	CNADTE CT 274
			30/29.97/25/24/23.98/PsF	SMPTE ST 274 SMPTE ST 425
	12bit	1920 × 1080	60/59.94/50/I	3IVIF1E 31 423
			30/29.97/25/24/23.98/P	
		1280 × 720	60/59.94/50/	SMPTE ST 296
		1280 × 720	30/29.97/25/24/23.98/P	SMPTE ST 425
	10bit		60/59.94/50/I	
RGB 4:4:4		1920 × 1080	30/29.97/25/24/23.98/P	CLADTE CT 274
			30/29.97/25/24/23.98/PsF	SMPTE ST 274 SMPTE ST 425
	12bit	1020 × 1090	60/59.94/50/I	31VIF 1E 31 423
	12bit	1920 × 1080	30/29.97/25/24/23.98/P	

3G-B Video Signal Formats and Standards

Calar Custom	0		Frame (Field) Frequency	Compliant
Color System	Quantization	Image	/Scanning	Standards
	10bit	1920 × 1080	60/59.94/50/P	
VC C 4.2.2			60/59.94/50/I	
$YC_BC_R$ 4:2:2	12bit	1920 × 1080	30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	10bit	1920 × 1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	SMPTE ST 274 SMPTE ST 372 SMPTE ST 425
YC <sub>B</sub> C <sub>R</sub> 4:4:4			30/29.97/25/24/23.98/PsF	
	12bit	1920 × 1080	60/59.94/50/I	
	12011 1		30/29.97/25/24/23.98/P	
			60/59.94/50/I	
RGB 4:4:4	10bit	1920 × 1080	30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	12bit	1920 × 1080	60/59.94/50/I	
	12011	1320 \ 1000	30/29.97/25/24/23.98/P	

Output Connectors
SDI Output Connector
Connector
3G-A, HD, SD
3G-B, HD(DL)
Output Impedance
Output Amplitude

2 BNC connectors

2 BNC conne 2 1

75 Ω

Output Amplitude 800 mVp-p±10%

**Output Return Loss** 

5 MHz to 1.485 GHz 15 dB or more 1.485 to 2.97 GHz 10 dB or more 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±0.5 V

**SDI Video Output** 

SDI Signal Bit Rate

> 3G 2.970Gbps, 2.970/1.001Gbps HD, HD(DL) 1.485Gbps, 1.485/1.001Gbps

SD 270 Mbps

**Timing Adjustment** 

Adjustment Range Entire frame

Adjustment Unit

V Lines

H Clocks (148.5 MHz, 148.5/1.001 MHz, 74.25 MHz, 74.25/1.001 MHz, 27 MHz)

**Test Patterns** 

3G, HD 100% color bar, 75% color bar,

multiformat 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

525/59.94I 100% color bar, 75% color bar,

SMPTE color bar, check field,

flat field white 100%, black 0%, red 100%,

green 100%, blue 100%

625/50I 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 selectable

color bar patterns

Switch Time 1 to 255 sec

Pattern Scrolling

Direction Eight directions (up, down, left, right, and

their combinations)

Speed Range and Unit

Interlace In unit of fields

V 0 to 256 lines, in 1 line steps H 0 to 256 dots, in 2 dot steps

Progressive In unit of frames

V 0 to 256 lines, in 1 line steps
H 0 to 256 dots, in 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]  $32 \times 32 / 64 \times 64 / 128 \times 128 / 256 \times 256$ 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) ON / OFF

ON TIME 1 to 9 sec, in 1 sec step
OFF TIME 1 to 9 sec, in 1 sec step

Scrolling (\*1)

Direction

Function Scroll including the ID character background

Two directions (left and right)

Speed Range and Unit

Interlace In unit of fields

0 to 256 dots, in 2 dot steps

Progressive In unit of frames

0 to 256 dots, 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 (dots) × 240 (lines) (QVGA size)
Number of Logo Marks That Can Be Saved in the LT4611

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 LT4611.

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

Component On/Off

Function Each of the Y/G, Cb/B, and Cr/R components

can be turned on and off independently.

\* 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.)
ID characters, logo mark, safety area

Simultaneous Display ID characters, 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

(4 channels × 4 groups)

3G-B 32 channels (stream 1, stream 2, 4 channels

each × 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) SILENCE / 400Hz / 800Hz / 1kHz -60 to 0 dBFS (1 dBFS steps)

Audio Click OFF, 1 / 2 / 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 (525/59.94I).
• 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** 

Frequency

Level

Setting SDI1+AES/EBU and SDI2 can be set

separately.

## LT4611SER23 AUDIO OUT

#### **Compliant Standards**

AES/EBU ANSI S4.40、AES3-2009、

AES11-2009, SMPTE ST276

#### **Output Connectors**

AES/EBU Digital Audio Output Connector Connector 1 BNC connector Output Amplitude 1 Vp-p $\pm$ 0.1 V Output Impedance 75  $\Omega$  unbalanced

AES/EBU Silence Output Connector

Connector 1 BNC connector Output Amplitude 1  $Vp-p\pm0.1 V$  Output Impedance 75  $\Omega$  unbalanced

## **AES/EBU Digital Audio Output**

**Timing Adjustment** 

Adjustment Range ±1 AES/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 / 400Hz / 800Hz / 1kHz

Level -60 to 0 dBFS (1 dBFS steps)

Audio Click OFF, 1 / 2 / 4 sec Lip Sync Synchronization with SDI1

Sampling Clock Accuracy Grade 2 (±10 ppm)

## **AES/EBU Silence Output**

**Timing Adjustment** 

Adjustment Range ±1 AES/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 Frequency SILENCE Level MUTE

Sampling Clock Accuracy Grade 2 ( $\pm 10$  ppm)

## LT4611SER24 8K

**Compliant Standard** 

SDI Embedded Audio SMPTE ST 299 SDI Payload ID SMPTE ST 352

**SDI Formats and Standards** 

12G(QL) 8K Video Signal Formats and Standards(2 sample Interleave)				
Color System	Quantization	Image	Field Frequency/Scanning	Compliant Standards
VC C 4:2:2	10bit	7680×4320	60/59.94/50/48/47.95/P	SMPTE ST 2082-12 SMPTE ST 2036-1
YC <sub>B</sub> C <sub>R</sub> 4:2:2	12bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1
VC C 4.4.4	10bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1
YC <sub>B</sub> C <sub>R</sub> 4:4:4	12bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1
RGB 4:4:4	10bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1
	12bit	7680×4320	30/29.97/25/24/23.98/P	SMPTE ST 2082-12 SMPTE ST 2036-1

#### **8K SDI Pattern Generation**

SDI Signal 11.880 Gbps, 11.880/1.001 Gbps Test Patterns 100% color bar, 75% color bar,

flat field white 100%, black 0%, red 100%,

green 100%, blue 100%

Automatic Switching Automatically switches between selectable

color bar patterns

Switch Time 1 to 255 sec

User Pattern Display Select one from INT-1 to 8.

Storage Memory Up to 25 patterns

Display Memory (INT\_1 to 8)

Transfer the pattern data (up to 8 patterns) from the storage memory to the display

memory

File Format 24-bit full color bitmap format (.bmp)

TIFF format (.tif), IMG format (.img)

\* After turning on the power, transfer the data from the storage memory to the display memory. It takes about 2 minutes to transfer the data of an 8K user pattern. If the power is cut off after a memory transfer, the data in the display memory will be cleared. The data in the storage memory will be retained even when the power is turned off, so after turning on the power, perform a memory transfer operation again.

\* If the power is cut off while data is being accessed, the data may become corrupted. Do not turn off the power while data is being accessed.

\* In the user pattern display, the color system is 422(YCbCr) 10 bit.

Component On/Off

Function Each of the Y/G, Cb/B, and Cr/R components

can be turned on and off independently.

Safety Area Markers Action safe area (90%)

Title safe area (80%) 4:3 aspect ratio

(can be turned on and off separately)

Moving Box

Box Color Select from white, yellow, cyan, green, blue,

red, magenta, black LOW / MIDDLE / HIGH

Speed Setting V/H LOW / MIDDLE /
Size Setting V/H SIZE 1 to 5

SIZE Setting V/H SIZE 1 to
Not available when the user pattern is selected.

Pattern Scrolling

Direction Eight directions (up, down, left, right, and

their combinations)

Speed Range and Unit

Progressive In unit of fields

V 0 to 256 lines, in 4 line steps H 0 to 256 dots, in 8 dot steps

Embedded Audio

Embedded Channels Can be turned on and off at the group level

16 channels (4 channels × 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 / 400Hz / 800Hz / 1kHz Level -60 to 0 dBFS (1 dBFS steps)

Audio Click OFF, 1 / 2 / 4 sec

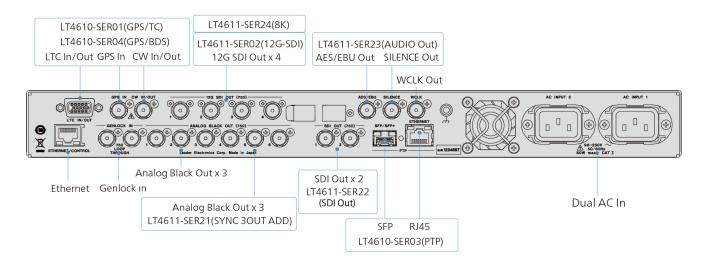
\* The frequency, level, and audio click can be set for each channel.

**Lip Sync Patterns** 

Setting Set by SDI1

**User Payload ID** 

Setting ON / OFF
\* You can edit the user payload ID only in a web browser.



## Related accessories

LC2141 (SFP RJ-45) Speed:1000Mbps

Speed: 1000Mbps Connector: RJ-45 LC2148 (SFP+ MULTI-MODE)

Transmission Distance: 300m

Wave ength: 850nm

Supported standards: 10GBASE-SR/SW

Connector: LC



LC2145 (SFP+ SINGLE-MODE)

Transmission Distance: Max 10,000m

Wave ength: 1310nm

Supported standards: 10GBASE-LR/LW





# LT4610 / LT4611 Comparison table

	LT4610	LT4611
Genlock	Standard	Standard
SYNC 3 Outputs (BB/tri-level) 1~3	Standard	Standard
SYNC 3 Outputs (BB/tri-level) 4~6	Standard	LT4611SER21
SDI 2 Outputs 3G/HD/SD SDI	Standard	LT4611SER22
Word-Clock Signal Output	Standard	Standard
AES/EBU Signal Output AES/EBU Silence Output	Standard	LT4611SER23
GPS/TC	LT4610SER01	LT4610SER01
GPS/BDS/TC	LT4610SER04	LT4610SER04
12G-SDI 4K Outputs	LT4610SER02	LT4610SER02
PTP	LT4610SER03	LT4610SER03
12G-SDI 8K Output	LT4610SER24	LT4611SER24

<sup>\*</sup>If you add the LT4611SER21, LT4611SER22, and LT4611SER23 to the LT4611 to make them equivalent to the LT4610, the LT4611 will be more expensive than the LT4610.

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Specified product specifications are subject to change without notice.

In order to use the product correctly and safely, carefully read the instruction manual prior to first use