Leader

PTP | GNSS | GENLOCK | B.B. | Tri-level | WC | AES-EBU
4K | IP TSG | 12G SDI | 3G SDI | HD SDI | SD SDI | TC

LT4670

SYNC AND TEST GENERATOR

Summary

The LT4670 is a 1U rack-sized synchronization and test signal generator that can be configured to output PTP, GNSS, (4K/HD) IP, 4K 12G, (3G/HD/SD) SDI, analog sync signals, AES/EBU, audio word clock and LTC synchronized to analog video sync signals. The LT4670 offers customers unmatched flexibility, reliability, and redundancy with a full range of options.

Six independent analog sync signal outputs, digital audio output, word clock output, LTC input/output, and L-SYNC are provided as standard. Options for GNSS sync, PTP, 4K IP, HD IP, 4K 12G-SDI, 4K Quad, 3G-SDI, HD-SDI, and SD-SDI allow customization to match the needs of any audio or video system. The LT4670 can operate as a PTP grandmaster and provide two independent leader and follower engines.

Features & Standards

LT4670 Base Configuration

Genlock
NTSC/PAL black burst and HD tri-level sync can be input to synchronize each output signal. NTSC/PAL black burst with field reference pulse and NTSC black burst signals with 10-field ID are also supported, as well as 10 MHz CW lock.

Stay-in-sink and slow lock
A “stay-in-sync” algorithm is used in case of abnormalities in the genlock input. This is paired with “slow lock,” which reduces the shock that occurs when external genlock returns, delivering an extremely stable synchronization system. The system supports BB, tri-level, 10 MHz CW, GNSS (SER01), and PTP (SER03).

Analog video sync signal output
Six analog video sync signal outputs are available. Each output has independently variable phase. NTSC/PAL black burst signals with field reference pulse and NTSC black burst signals with 10 field IDs are also supported.

Word clock signal output
A 48 kHz word clock signal synchronized with the video signal is standard.

AES/EBU signal output
One AES/EBU signal output (AES/EBU terminal) with a sampling frequency of 48 kHz synchronized with the video signal is provided. In addition, there is one AES/EBU signal output (SILENCE terminal) that is DARS compatible.

CW/1PPS output
A selectable CW/1PPS output is available.

Time code input/output
In addition to free-running based on internal time information, the timecode generator can output to three LTC systems based on time information from an NTP server, LTC, VITC, GNSS (SER01), and PTP (SER03), multiplex to VITC for analog video sync signal output, and multiplex to ATC (LTC/VITC) for SDI (SER02/SER04)

LTC input/output
LTC can output three independent systems for each input. The outputs can be set for frame rate and offset time relative to the reference time, respectively.

GPIO pin
Supports recall of presets and output of up to two alarms.

Synchronous control between devices (L-SYNC)
In a redundant system, time can be synchronized by using L-SYNC to connect the main and backup LT4670, synchronized by the same analog video sync signal. Synchronized time outputs are PTP (SER03), LTC, black signal (VITC), SDI signal ATC (VITC/LTC) (SER02/04), AES/EBU signal, and NTP.

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

Ethernet
The instrument can be controlled via HTTPS/HTTP and a REST-API as well as with SNMP. Can connect to an NTP server to set the internal clock time, or operate as an NTP server.

Preset memory
Up to 10 presets can be stored internally. Registered presets can be conveniently recalled for operation and always start up with the same settings.

External memory support
Logs can be saved and preset data can be written and saved using a USB memory stick from the front panel.

Logging
Operational status can be logged to internal or external memory.

Last memory recall
When the power is turned on, the system starts up with the panel settings from the previous power down.

Supported Standards

Analog video synchronous 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 signals	SMPTE ST 240, SMPTE ST 274, SMPTE ST 296
AES/EBU signals	ANSI S4.40, AES3-2009, AES11-2009, SMPTE ST 276
LTC signal	SMPTE 12M-1
Phase control	SMPTE ST 2059-1

Input-output terminal

Genlock input terminal	
Connector	BNC connector 2 terminals
Input signal	Analog composite sync signal
HD tri-level sync signal	Analog component sync signal
Format	Loop-through
Input impedance	47kΩ
Maximum input voltage	±5V (DC + peak AC)
Operating input level range	±6dB
External lock range	±5ppm
Jitter	1ns (at genlock)
10MHz CW input terminal	
Connector	BNC connector 1 terminal (Used with genlock input terminal)
Input impedance	47kΩ (Used with 50Ω termination to loop through)
Input signal level	0.5 - 1V rms (at 50Ω termination)
Input signal frequency	10MHz
Recessed frequency range	±5ppm
10MHz CW / 1PPS output terminal	
Connector	BNC connector 1 terminal (10MHz CWand 1PPS used together)
Output Amplitude Signal Level	
10MHz CW	2Vp-p±20% (1V rms) at square wave 50 ohm terminated
1PPS	4.8±0.5V (unterminated, high level) 2.4±0.25V (at 50Ω termination, high level)
Output impedance	50Ω unbalanced
Output signal frequency	10MHz / 1PPS

LTC input/output terminal	
Connector	D-SUB 26-pin
LTC	
Number of inputs	1
Input impedance	1kΩ (balanced), 500Ω (unbalanced)
Input signal level	0.5 - 4Vp-p
Number of outputs	3
Output impedance	24Ω balanced
Output signal level	2Vp-p±10
Analog video synchronous signal output terminal	
Connector	BNC connector 6 terminals 6 systems
Output signal	NTSC black burst signal, PAL black burst signal, HD tri-level synchronous signal
Output impedance	75Ω
Synchronization Level	
NTSC	40±1IRE
PAL	-300±6mV
HD	±300±6mV
Blanking	0±15mV
AES/EBU digital audio output terminal	
Connector	DIN 1.0 / 2.3 Connector1 terminal
Output amplitude	1Vp-p±0.1V
Output impedance	75Ω unbalanced
AES/EBU silence output terminal	
Connector	DIN 1.0 / 2.3 Connector1 Terminal
Output amplitude	1Vp-p±0.1V
Output impedance	75Ω unbalanced
Word clock output terminal	
Connector	DIN 1.0 / 2.3 Connector1 Terminal
Output frequency	48kHz
Output amplitude	4.8V or more (unterminated, high level) 2.4V or more (75Ω terminated, high level)

Control terminal

Ethernet terminal	
Standard	IEEE 802.3
Protocol	
SNMP v2c/v3	command operation, status acquisition Sending traps
REST-API	command operation, status acquisition
HTTP/HTTPS	Monitoring and operation via browser
NTP	Internal clock time alignment and time distribution
Connector	RJ-45 Type 10BASE-T/100BASE-TX/1000BASE-T (Automatic switching)
USB terminal	
Standard	USB2.0
Supported media	USB memory device
Supported formats	FAT32
Function	Presets, logos, ID characters, Loading user patterns and saving presets and logs Obtaining MIB files Obtaining an Authentication Key Firmware updates
Connector	USB Type A
GPIO terminal	
Terminal shape	26-pin D-sub (female)
Fixing screw for mounting	Inch screw (No.4-40UNC)
Number of terminals	1
Control signal	LV-TTL level (Preset LOW active) HC-CMOS level (alarm)
Input voltage range (preset call)	DC 0 - 5V All inputs pulled up to +3.3V (Controllable at +5V)
Output voltage range (alarm output)	DC 0 - 5V
Function	Preset recall Alarm output (Alarm output when various errors occur, various attentions occur, FAN error, power supply error, or internal temperature error)
Sync terminal between devices (L-SYNC)	
Terminal shape	D-sub 15-pin (female)
Number of terminals	1
Control signal	LV-CMOS 6 main-side outputs 6 backup-side inputs
Input voltage range	DC 0 - 3.3V
Function	Synchronizes the time between two units in redundancy

Liquid crystal display

Resolution	24 characters x 2 lines
Backlight	On / Off

Genlock function

Signal Format	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 1125/60P, 1125/59.94P, and 1125/50P, 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 variable	
Variable range	
FINE	±100STEP, variable unit is 0.5ns
Genlock mode	
INTERNAL	Operated by internal reference signal
EXTERNAL	Operated by external reference signal GL FMT-AUTO/GL FMT-MANUAL/10MHz CW GNSS(SER01)/PTP(SER03)
Recovery mode	
AUTO	Resynchronization operation according to auto-setting when external reference signal is restored
MANUNAL	Holds STAY IN SYNC state when external sync signal is restored
Auto setting	
IMMEDIATE	Reset operation when external reference signal is restored
FAST	Prompt resynchronization operation when external sync signal is restored
SLOW	Slow resynchronization operation when external sync signal is restored
Manual setting	
IMMEDIATE	Reset operation when external reference signal is restored
FAST	Prompt resynchronization operation when external sync signal is restored
SLOW	Slow resynchronization operation when external sync signal is restored

Genlock reset	Immediate resynchronization operation
Hold-over function	When an error occurs in the external reference signal, the frequency (video phase) immediately before the error is held. When 10MHz CW is input, holds the previous frequency when 10MHz CW is interrupted

Analog video sync signal output

Signal format	6 systems individually configurable 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 1125/60P, 1125/59.94P, and 1125/50P, 1125/60I, 1125/59.94I, 1125/50I, 1125/30P, 1125/29.97P, 1125/25P, 1125/24P, 1125/23.98P, 1125/24PsF, 1125/23.98 PsF, 750/60P, 750/59.94P, 750/50P, 750/30P, 750/29.97P, 750/25P, 750/24P, 750/23.98P
Variable timing	6 systems can be set individually
Variable range	
NTSC black burst signal	±5 frames
PAL black burst signal	±2 frames
HD tri-level sync signal	1 frame (full frame range)
Variable unit	
NTSC/PAL black burst signal	0.0185μs unit (54MHz clock unit)
HD tri-level sync signal	0.0135μs unit (74.25/1.001MHz clock unit or 74.25MHz clock unit)

Analog video sync signal output

Signal format	6 systems individually configurable 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 1125/60P, 1125/59.94P, and 1125/50P, 1125/60I, 1125/59.94I, 1125/50I, 1125/30P, 1125/29.97P, 1125/25P, 1125/24P, 1125/23.98P, 1125/24PsF, 1125/23.98 PsF, 750/60P, 750/59.94P, 750/50P, 750/30P, 750/29.97P, 750/25P, 750/24P, 750/23.98P
Variable timing	6 systems can be set individually
Variable range	
NTSC black burst signal	±5 frames
PAL black burst signal	±2 frames
HD tri-level sync signal	1 frame (full frame range)
Variable unit	
NTSC/PAL black burst signal	0.0185μs unit (54MHz clock unit)
HD tri-level sync signal	0.0135μs unit (74.25/1.001MHz clock unit or 74.25MHz clock unit)

AES/EBU digital audio output

Timing variable	
Variable range	±1AES/EBU frame (±511)
Variable unit	512fs (24.576MHz) unit
Sampling frequency	48 kHz samples (synchronized with video signal)
Resolution	20 bits / 24 bits
Pre-emphasis	OFF / 50/15 /CCITT (only CS bit is switched)
Frequency	SILENCE / 400Hz / 800Hz / 1kHz
Level	-60 - 0dBFS (1dBFS step)
Audio click OFF / 1 / 2 / 4sec	
Lip Sync	SDI-1 and sync
Sampling clock accuracy	Grade 2 (±10ppm)

*Frequency, level, and audio click can be set for each channel.

AES/EBU silence output

Timing variable	
Variable range	±1AES/EBU frame (±511)
Variable unit	512fs (24.576MHz) unit
Sampling frequency	48 kHz samples (synchronized with video signal)
Resolution	20 bits / 24 bits
Preemphasis	OFF
Frequency	SILENCE
Level	MUTE
Sampling clock accuracy	Grade 2 (±10ppm)

*Supports DARS

*When EQUAL TO AES/EBU is on, AES/EBU digital audio output and Output the same signal

Word clock output

Timing variable	
Variable range	±1AES/EBU frame (±511)
Variable unit	512fs (24.576MHz) unit

Time code function

Reference Time	Internal / NTP / LTC / VITC / GNSS(SER01) / PTP(SER03)
Frame rate	30 / 29.97 / 25 / 24 / 23.98(Hz)
Drop frame mode	On / Off
JAM SYNC	
Apply setting	Timer setting for applicable time
ATC setting	
LTC insertion setting	On / Off
VITC insertion setting	On / Off
LTC setting	
Output setting	On / Off
Leap second	
Apply setting	Timer setting for applicable date and time *PTP (SER03) does not support timer setting.
Daylight savings time	
Apply setting	Timer setting for applicable date and time

Preset function

Preset	Save preset panel settings*.
Number of presets	10
Recall Methods	Front panel, GPIO pins, SNMP, REST-API, (web) browser
Copy method	Copy from this unit to a USB memory device or from a USB memory device to this unit

*Logo data and device-specific information (IP address, time, etc.) cannot be saved.

Log function

Saved items	Genlock status changes, equipment operation, Alarm information, Attention information
Number of records	Up to 1,000
Copy method	Copy from this unit to USB memory
Display	Panel, Browser

FAN Unit

Number of fans	2 (1 front, 1 rear)
Replacement method	FAN can be stopped from the panel and replaced without turning off the power of the main unit.
Alarm	FAN failure is indicated by LED and LCD, and notified by SNMP Trap

Power supply unit

Number of built-in units	1 (standard) 2 (max. with LT4670-SER11 option installed)
Redundant power supply	Need LT4670-SER11 option installed
Replacement method	When the LT4670-SER11 option is installed, replacement can be performed without turning off the power to the main unit.
Alarm	Power failure is indicated by LED and LCD, and notified by SNMP Trap

General Specifications

Environmental condition	
Operating temperature	0 - 40° C
Operating humidity	85%RH or less (non-condensing)
Guaranteed performance temperature range	10 - 35° C
Operating environment	Indoor
Operating altitude	up to 2,000 m
Overvoltage Category	Ⅱ
Pollution degree	2
Power supply conditions	
Voltage	AC 100 - 240V
Voltage fluctuation	±10
Power consumption	150W max (with full options)
Dimensions 482(W)×44(H)×400(D)mm	(Not including protruding parts)
Weight	4.15 kg (excluding options) 5.37kg (including options)
Accessories	Power cord, AC cord clamp

Optional goods

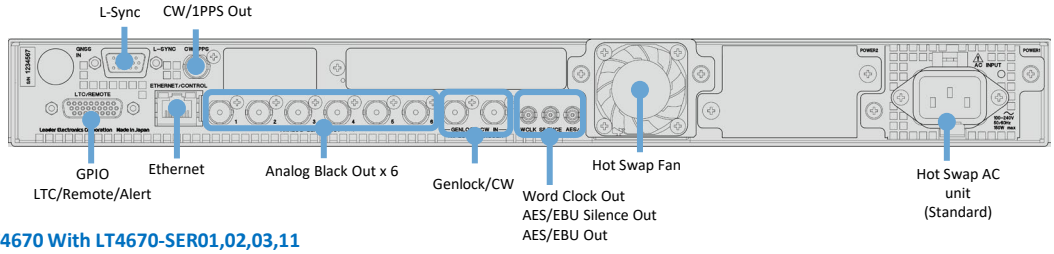
SFP Transceivers (LC 2141/LC 2148/LC 2149)
GNSS Antenna
FAN unit (LP 2184)
LTC cable (LC 2185)*for LT4448 connection
L-SYNC cable (LC 2186)

LT4670 Configuration Table

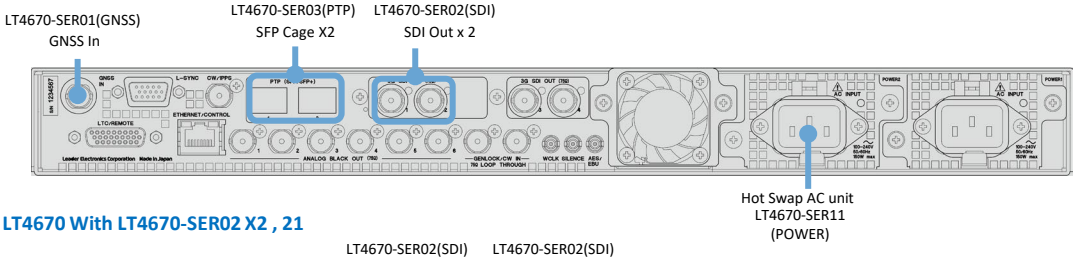
Model number	Description	Feature
LT4670	SYNC GENERATOR	genlock
		6 outputs Analog reference (BB/3 values) 1 to 6 systems
		1 output Word clock
		1 output AES/EBU audio output
		1 output AES/EBU silent audio output
		Time code output (LTC, VITC)
		L-SYNC *L-SYNC cable is required.
LT4670-SER01	GNSS	GPS, GLONASS, GALILEO, BDS compatible
LT4670-SER02	SDI	2 outputs 3G/HD/SD SDI pattern outputs *Up to 2 can be mounted
LT4670-SER03	PTP	PTP support (Leader, Follower)
LT4670-SER04	25G IP 12G TSG	4 outputs 12G/3G/HD/SD SDI, IP 25G/10G pattern output
LT4670-SER11	POWER	Power supply unit for redundancy (hot-swappable)
LT4670-SER21	4K 3G Quad Link	4K Quad output * Requires two LT4670-SER02.

Rear Panel

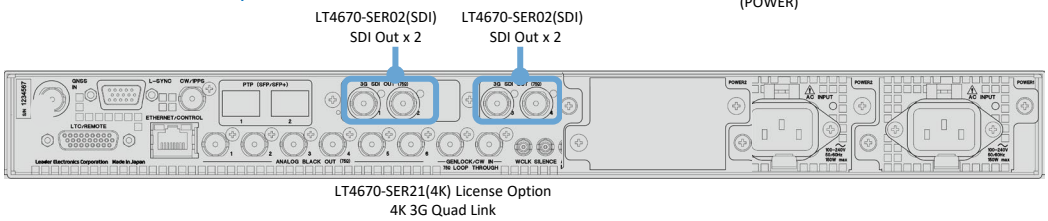
LT4670 Standard



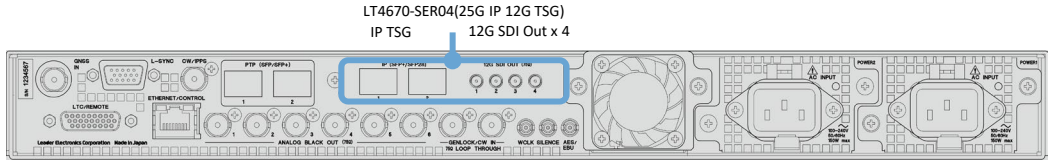
LT4670 With LT4670-SER01,02,03,11



LT4670 With LT4670-SER02 X2 , 21



LT4670 With LT4670-SER04



LT4670-SER01 (GNSS)

GNSS Synchronization

By connecting a GNSS antenna, each signal can be generated and output locked to the frequency and time obtained from GPS, GLONASS, GALILEO, and BDS.
A hold-over function is provided to hold the phase and frequency of the output signal upon loss of GNSS signals.

Standard

Input-output terminal

GNSS input terminal

Connector	BNC connector 1 terminal
Input impedance	50Ω
Antenna and preamplifier power supply	
Voltage	5V / 3.3V / OFF
Current	50mA max. (Built-in overcurrent protection circuit)

GNSS Lock

GNSS receiver

Reception frequency	GPS:1575.42 MHz (L1) GLONASS:1602 MHz + k × 562.5kHz(L1OF) *k = -7,...,5,6 GALILEO:1575.42MHz(E1-B/C) BDS:1561.098MHz(B1)
Status	NO SIGNAL, TRACKING, LOCKED, STAY IN SYNC
Hold-over function	When GPS, GLONASS, GALILEO, or BDS signals are interrupted, the previous frequency and phase are retained.

LT4670-SER02(SDI)

Triple-rate SDI support

3G-SDI (Level A, Level B), HD-SDI, and SD-SDI. 2 independent SDI signal output terminals are provided, and the pattern and phase can be set for each.
In addition, two SER02s can be installed to output up to four independent SDI signals. Furthermore, by adding the 4K option (SER21), 4K 3G-Quad Link is supported.

User pattern output

In addition to built-in patterns such as color bars, SD and HD (2K) user patterns can be output.

ID character superimposition

ID characters can be superimposed at any position on the screen. In addition, horizontal scrolling and blinking display can be used to confirm active status.

Logo superimposition

24-bit full-color bitmap data with a size of 640 (dots) × 480 (lines) (VGA size) can be superimposed as a logo mark at an arbitrary location on the screen.

Safety area marker

Safety area markers of 90% and 80% can be superimposed on the screen, as well as 4:3 aspect markers for 3G-SDI and HD-SDI.

Pattern scroll

Scrolls the pattern in 8 directions. The speed of movement can also be varied.

Moving box

Boxes that move on the screen can be superimposed. Color, size, and speed of movement can be varied.

Circle

90%, 80%, and 70% circles can be superimposed on the screen. Brightness can be switched and blinked.

Time code

Time code can be superimposed at any position on the screen. Font size and brightness can be changed.

Embedded Audio

16 channels (4 channels x 4 groups) of embedded audio can be added. Frequency, level, etc. can be set for each channel.

Lip-sync pattern

Outputs a lip-sync pattern with synchronized video and audio. By using a waveform monitor equipped with a lip-sync measurement function, such as our LV 5600, it is possible to measure the discrepancy between video and audio on SDI signal transmission.

Supported Standards

SDI Embedded Audio

3G, HD	SMPTE ST 299
SD	SMPTE ST 272
SDI Payload ID	SMPTE ST 352

SDI Formats and Standards

HD and SD video signal formats and standards

Color system	Quantization	Image Size	Frame (field) frequency/scanning	Supported Standards
YC C_{BR} 4:2:2	10bit	1280 × 720	60/59.94/50/30/29.97/25/24/23.98/P	SMPTE ST 292-1 SMPTE ST 296
		1920 × 1080	60/59.94/50/I	SMPTE ST 292-1
			30/29.97/25/24/23.98/P	SMPTE ST 274
			30/29.97/25/24/23.98/PsF	SMPTE ST 292-1 SMPTE RP 211
		720 x 487	59.94/I	SMPTE ST 259
		720 × 576	50/I	

3G-A Video Signal Formats and Standards

Color system	Quantization	Image Size	Frame (field) frequency/scanning	Supported Standards
YC C_{BR} 4:2:2	10bit	1920 × 1080	60/59.94/50/P	SMPTE ST 274 SMPTE ST 425-1
	12bit		60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
RGB 4:4:4	10bit	1280 × 720	60/59.94/50/30/29.97/25/24/23.98/P	SMPTE ST 296 SMPTE ST 425-1
		1920 × 1080	60/59.94/50/I	SMPTE ST 274 SMPTE ST 425-1
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	12bit	1920 × 1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	

3G-B Video Signal Formats and Standards

Color system	Quantization	Image Size	Frame (field) frequency/scanning	Supported Standards
YC C_{BR} 4:2:2	10bit	1920 × 1080	60/59.94/50/P	SMPTE ST 274
	12bit		60/59.94/50/I	SMPTE ST 372
			30/29.97/25/24/23.98/P	SMPTE ST 425-1
			30/29.97/25/24/23.98/PsF	
RGB 4:4:4	10bit	1920 × 1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	
	12bit	1920 × 1080	60/59.94/50/I	
			30/29.97/25/24/23.98/P	
			30/29.97/25/24/23.98/PsF	

Output terminal

SDI output terminal	2 terminals with BNC connector
Output impedance	75Ω
Output amplitude	800mVp-p±10
output return loss	
5MHz - 1.485GHz	15dB min.
1.485GHz - 2.97GHz	10dB min.
Overshoot	Less than 10
Rise and fall time	
3G	135ps or less (between 20 - 80%)
HD	270ps or less (between 20 - 80%)
SD	0.4ns or more, 1.5ns or less (between 20 - 80%)
DC offset	0±0.5V

SDI video output

SDI Signal	
Bit rate	
3G	2.970Gbps, 2.970/1.001Gbps
HD	1.485Gbps, 1.485/1.001Gbps
SD	270Mbps
Timing variable	
Variable range	Full frame range
Variable unit	
V	Line Unit
H	Clock unit (148.5MHz, 148.5/1.001MHz, 74.25MHz, 74.25/1.001MHz, 27MHz)
Selection of timing criteria	SD, HD only, 3G only SERIAL
SERIAL	Output at the timing defined in the SERAIL signal standard
LEGACY	Output with the same timing as our conventional signal generator
Test pattern	
3G, HD	100% color bar, 75% color bar, Multi-format color bar (ARIB STD-B28, Pattern 2 portion selectable from 100% white/75% white/+I), Check field, Flat field 100% white, 50% white, 0% black, 100% red, 100% green, 100% blue

SD

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

User pattern display	Select one from SD and HD each INT 1 - 4
File Format	24-bit full color bitmap format (.bmp)24/48-bit TIFF format (.tif)

*Data is transferred from the storage memory after the power is turned on.
Data transfer takes approximately 30 seconds per 2K user pattern.

Automatic switching function	Automatic switching of selectable color bar patterns
Switching time	1 - 255sec
Pattern scroll Direction	8 directions (up/down, left/right, and combinations thereof)
Speed range and units	
Interlaced	Field Unit
V	-256 - 256 lines, 1 line increments
H	-256 - 256 dots, 2 dot increments
Progressive	Frame-by-frame
V	-256 - 256 lines, 1 line increments
H	-256 - 256 dots, 2 dot increments

*Not valid when check field pattern is selected.

Safety area marker	
3G, HD	Action Safety Area (90%) Title safety area (80%) 4:3 aspect (Can be turned on/off individually)
SD	Action Safety Area (90%) Title safety area (80%) (can be turned on and off individually)

*Not valid when check field pattern is selected.

ID character	
Characters	Maximum 20 characters
Size [dot]	32x32 / 64x64 / 128x128 / 256x256
Brightness	100% / 75% (black background only)
Display position	Any position on the screen
Display position variable unit	
V	0-100% (1% step)
H	0-100% (1% step)
Flashing display (*1)	On / Off
ON time	1 - 9sec, in 1sec increments
Off time	1 - 9sec, in 1sec increments
Scroll function (*1)	
Function	Scroll including background of ID character
Direction	2 directions (left/right)
Speed and units	
Interlaced	Field Unit -256 - 256 dots, 2 dot increments
Progressive	Frame-by-frame -256 - 256 dots, 2 dot increments

*Not valid when check field pattern is selected.
1 Flashing and scrolling functions can be set at the same time .

LT4670-SER03(PTP)

PTP Leader

Precision Time Protocol as specified in IEEE 1588-2008 and operates as a PTP grandmaster. Profiles supported are SMPTE2059, AES67, and General; the PTP time source is obtained from the built-in clock, NTP server, GNSS, VITC, or LTC.

PTP Follower

If there is a higher PTP grandmaster on the system, it can act as a PTP follower and also act as a PTP leader to lower devices.

Two independent PTP ports

Two PTP engines are installed, each of which can be used as an independent grand master to build a PTP system.
Two systems can also be used in a follower configuration. The leader can be selected by the user or automatically. Additionally, can be configured with one follower and the other as leader.

10GbE support

Compatible with 10GbE SFP+ modules (sold separately).

Local PTP

With the genlock function genlocked to an analog video sync signal or HDTV tri-level sync signal, time information can be acquired from an external time source such as GNSS or NTP server, adjusted to match the phase information of the genlocked sync signal, and the PTP time can be redistributed.

Supported Standards

Internet Protocol Version	IPv4
PTP Standard	IEEE 1588 - 2008
Supported profiles	SMPTE ST 2059 / AES67 / General

input-output terminal

SFP / SPF+ pin	
Number of terminals	2
Terminal Shape	SFP Gauge
Supported standards	MSA compliant
Supported modules and types	
SFP Transceiver RJ-45	1000Base-T
SFP + transceiver optical	10GBase-SR and 10GBase-SW

*SFP / SFP+ modules are sold separately.

Leader Functions

Number of controllable leaders	2
Communication mode	Multicast / Unicast / MIXED SMPTE / MIXED SMPTE without negotiation
Domain number	0 - 127 (SMPTE ST 2059) 0 - 255 (AES67 / General)
Announcement 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
Sink 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 0.00625 Hz

*The message rate setting range differs depending on the profile.

Priority 1	0 - 255
Priority 2	0 - 255
Number of connectable	Follower 1000

*Theoretical value when sync message is 8Hz

Follower function

Number of controllable followers	2
Communication mode	Multicast / Unicast / MIXED SMPTE / MIXED SMPTE without negotiation
Domain number	0 - 127 (SMPTE ST 2059) 0 - 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 0.00625 Hz
Announcement timeout count	2 - 10

LT4670-SER11(POWER)

Redundant power supply

For added security of operation, the LT4670 supports dual power supplies by adding LT4670-SER11(POWER).
In the event of a power unit failure, an alarm is displayed on the panel of the main unit, and an alarm can also be output via SNMP.

Details

Redundant power supply	Available
Replacement method	Replacement possible without turning off the power of the main unit.
Alarm	Power failure is indicated by LED and LCD, and notified by SNMP Trap.

LT4670-SER21(4K 3G-Quad Link)

4K 3G-Quad Link support

Two LT4670-SER02 (SDI) options are required to output 4K 3G-Quad Link when this option is enabled.

4K built-in pattern output

The following patterns can be output in addition to the built-in patterns of LT4670-SER02.
- UHD Color Bar ARIB STD-B66
- HLG CB ITU-R BT.2111 HLG narrow range.
- S-LOG3(Live HDR) Ver1.11 narrow range scale

User pattern output

In addition to built-in patterns such as color bars, 4K user patterns can be output.

ID character insertion

ID characters can be superimposed at any position on the screen. In addition, horizontal scrolling and blinking display can be used to confirm motion.

Logo insertion

24-bit full-color bitmap data with a size of 640 (dots) × 480 (lines) (VGA size) can be superimposed as a logo mark at an arbitrary location on the screen.

Safe area marker

Safe area markers of 90% and 80% can be superimposed on the screen, as well as 4:3 aspect markers for 3G-SDI and HD-SDI.

Pattern scroll

It has the ability to scroll the pattern in 8 directions. The speed of movement can also be varied.

Moving box

Boxes that move on the screen can be superimposed. Color, size, and speed of movement can be varied.

Circle

90%, 80%, and 70% circles can be superimposed on the screen. Brightness can be switched and blinked.

Time code

Time code can be superimposed at any position on the screen. Font size and brightness can be changed.

Superimposed Embedded Audio

16 channels (4 channels x 4 groups) of embedded audio can be superimposed. Frequency, level, etc. can be set for each channel.

Lip-sync pattern

Outputs a lip-sync pattern with synchronized video and audio. By using a waveform monitor equipped with a lip-sync measurement function, such as our LV 5600, it is possible to measure the discrepancy between video and audio on SDI signal transmission.

Supported Standards

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

SDI Formats and Standards

3G Quad Link video signal format and standard (4K 2-sample interlib only supported)

Division transmission method	color system	quantization accuracy	impression	Frame frequency/ scanning	Supported Standards
2 sample interleave	YCbCr 4:2:2	10bit	3840 × 2160	60/59.94/50/P	SMPTE ST 425-5 SMPTE ST 2036-1
			4096 × 2160	60/59.94/50/48/47.95/P	SMPTE ST 425-5 SMPTE ST 2048-1
		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
	RGB 4:4:4	10bit	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
		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

SDI video output

SDI Signal	
Bit rate	
3G(QL)	2.970Gbps, 2.970/1.001Gbps
Timing variable	
Variable range	Full frame range
Variable unit	
V	Line Unit
H	clock unit (148.5 MHz, 148.5/1.001 MHz)
Test Pattern	100% color bar, 75% color bar, Multi-format color bar (ARIB STD-B28, Pattern 2 part selectable from 100% white/75% white/+I), Check field, Flat field 100% white, 50% white, 0% black, 100% red, 100% green, 100% blue
4K additional test pattern	
UHDColorBar	ARIB STD-B66 UHDTV MULTIFORMAT COLOR BAR
HLGColorBar	ARIB STD-B72 Color Bar Test Pattern for HLG HDR-TV System Recommendation ITU-R BT.2111 HLG
Slog3_LiveHDR_narrow_V11	S-Log3(Live HDR) Ver.1.11 narrow range scale
User pattern display	4K(2SI) Select one from INT 1 - 4
File Format	24-bit full color bitmap format (.bmp)24/48-bit TIFF format (.tif)

*Data is transferred from the storage memory after the power is turned on.
Data transfer takes approximately 2 minutes per 4K user pattern.

Automatic switching function	Automatic switching of selectable color bar patterns
Switching time	1 - 255sec
Pattern scroll	
Direction	8 directions (up, down, left, right, and combinations thereof)
Speed range and units	
Progressive	Frame-by-frame
V	-256 - 256 lines, 2 line steps
H	-256 - 256 dots, 4 dot steps

*Not valid when check field pattern is selected.

Safety area marker	Action safety area (90%) Title safety area (80%) 4:3 aspect (Can be turned on/off individually)

*Not valid when check field pattern is selected.

ID character	
Characters Maximum	20 characters
Size [dot]	32x32 / 64x64 / 128x128 / 256x256
Brightness	100% / 75% (black background only)
Display position	Any position on the screen
display position	variable unit
V	0-100% (1% step)
H	0-100% (1% step)
Flashing display (*1)	On / Off
ON time	1 - 9sec, in 1sec increments
Off time	1 - 9sec, in 1sec increments
Scroll function (*1)	

Function	Scroll including background of ID character
Direction	2 directions (left/right)
Speed and units	
Progressive	Frame-by-frame -256 - 256 dots, 4 dot increments

*Not valid when check field pattern is selected.
1 Flashing and scrolling functions can be set at the same time logo

Logo mark data	24-bit full color data
Maximum size	640(dot)x480(line)(VGA size)

Number of logos that can be stored in the main unit Up to 4 types

Display position	Any position on the screen
display position variable unit	
V	0-100% (1% step)
H	0-100% (1% step)
File Format	24-bit full color bitmap format (.bmp)
Logo data transfer	Transfer data from USB memory device to the main unit

*Not valid when check field pattern is selected.

Component on/off (Y/G,Cb/B,Cr/R)

Function	On/off for Y/G, Cb/B, and Cr/R components independently for each component

*Not valid when check field 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 setting V/H	SIZE 1 - 5

*Not valid when check field pattern is selected.

Circle

Display position	90% / 80% / 70% of resolution
Brightness	100% / 75
Flashing display	On / Off
ON time	1 - 9sec, in 1sec increments
Off time	1 - 9sec, in 1sec increments

*Not valid when check field pattern is selected.

Time code

Display position	Any position on the screen
Size [dot]	32x32 / 64x64 / 128x128 / 256x256
Brightness	100% / 75% (black background only)
Display position variable unit	
V	0-100% (1% step)
H	0-100% (1% step)

*Not valid when check field pattern is selected.

Superimposed images

Display priority	Test pattern < Circle < Moving box < Safety area marker < Logo mark < ID character < Time code (The order of display cannot be changed.)
Simultaneous display	ID character, logo mark, safety area marker, moving box, circle, time code, and test pattern can be displayed simultaneously.

Embedded audio

Superimposed channel	On/off by group 16ch (4ch x 4 groups)
Sampling frequency	48 kHz samples (synchronized with video signal)
Resolution	20 bits / 24 bits
Preemphasis	OFF / 50/15 / CCITT (Only CS bit is switched.)
Frequency	SILENCE / 400Hz / 800Hz / 1kHz
Level	-60 - 0dbFS (1dBFS step)
Audio click	OFF / 1 / 2 / 4sec

*When a check field pattern is selected, audio (including packets) cannot be superimposed.
*Frequency, level, and audio click can be set for each channel.
*Audio clicks are asynchronous to digital audio.
*Not valid when lip-sync is on.

Lip-sync pattern

Setting	On/Off

*Synchronizes with AES/EBU.
*Not valid when check field pattern is selected.
*Safety area markers, ID characters, logos, moving Boxes, circles, and time codes cannot be superimposed.
*Audio clicks for embedded audio are disabled, Audio is output in sync with the lip-sync pattern.

User payload ID

Setting	On/Off

*The contents of the user payload ID can be edited only with a web browser.

LT4670-SER04 (25G IP 12G TSG) [Future Support]

25G IP signal generation

Test pattern signal generation function for IP, supporting SMPTE ST 2110-20/30/31/40 for IP transmission standards, and capable of generating 2K and 4K (3840x2160) test patterns for video signals.

12G-SDI (4K) support

Supports 12G-SDI, 3G-SDI (Level A, Level B), HD-SDI, and SD-SDI. 4 independent SDI signal output terminals are provided, each with its own pattern and phase settings.

User pattern output

In addition to built-in patterns such as color bars, arbitrary patterns can be output.

Supported Standards

25G IP TSG

IP output terminal

Output terminal	SFP+ / SFP28
Supported	SFP SFP+ / SFP28
Number of terminals	2 (*1)
Supported standards	10GBASE-SR / 10GBASE-LR / 25GBASE-SR / 25GBASE-LR
Fiber type	Multimode / Singlemode

*1 The two input/output terminals must match the standard.

Supported IP Standards	
IP format	SMPTE ST 2022-6, SMPTE ST 2110-20/30/31/40
Synchronization method	PTP (SMPTE ST 2059)
Supported protocols	IPv4 (Internet Protocol version 4) IGMPv2/v3 (Internet Group Management Protocol) NMOS (IS-04/05)

12G TSG

Supported Standards

SDI Embedded Audio	
12G, 3G, HD	SMPTE ST 299
SD	SMPTE ST 272
SDI Payload ID	SMPTE ST 352

SDI output terminal

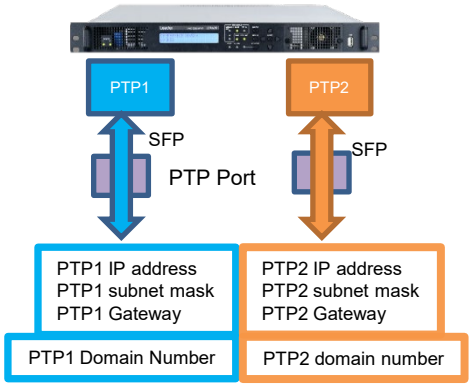
Connector	HD-BNC connector 4 terminals
12G, 3G, HD, SD	4 systems
Output impedance	75Ω

SDI Signal

Bit rate	
12G	11.880Gbps, 11.880/1.001Gbps
3G	2.970Gbps, 2.970/1.001Gbps
HD	1.485Gbps, 1.485/1.001Gbps
SD	270Mbps

*HD-BNC is a trademark of Amphenol Corporation.

Independent PTP Network



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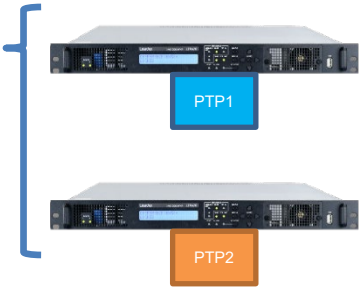
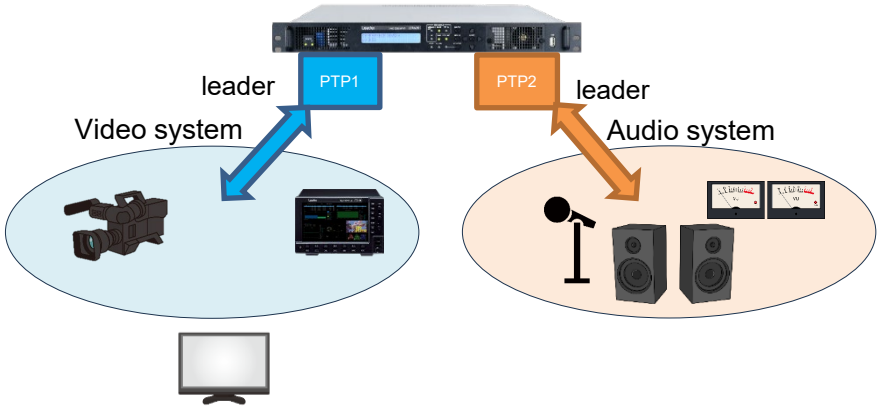
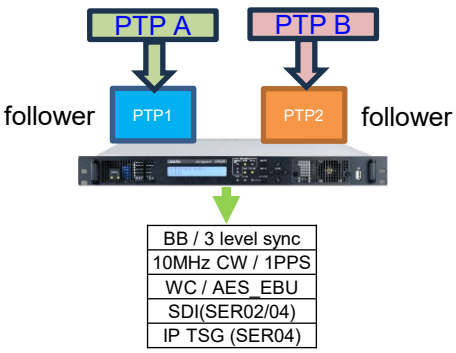


PTPs are independent of each other, therefore operation is equivalent to two separate PTP sources.
Note, however, complete redundancy cannot be built with a single unit since there is only one standard for GNSS, etc.

Independent PTP network use case

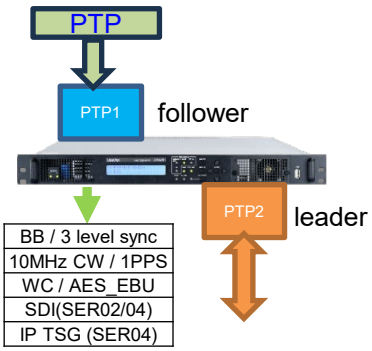


Set 2 systems as followers



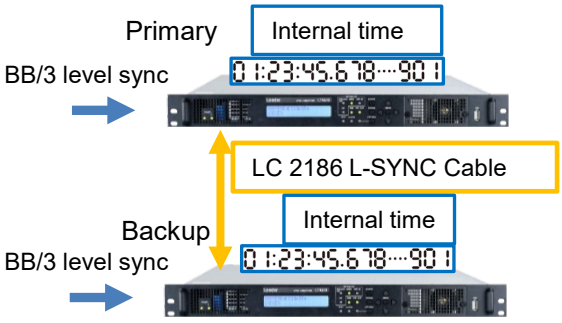
Followers will be automatically selected.

Leader and follower settings



PTP and other outputs synchronized to followers.

Synchronous control between devices (L-SYNC)

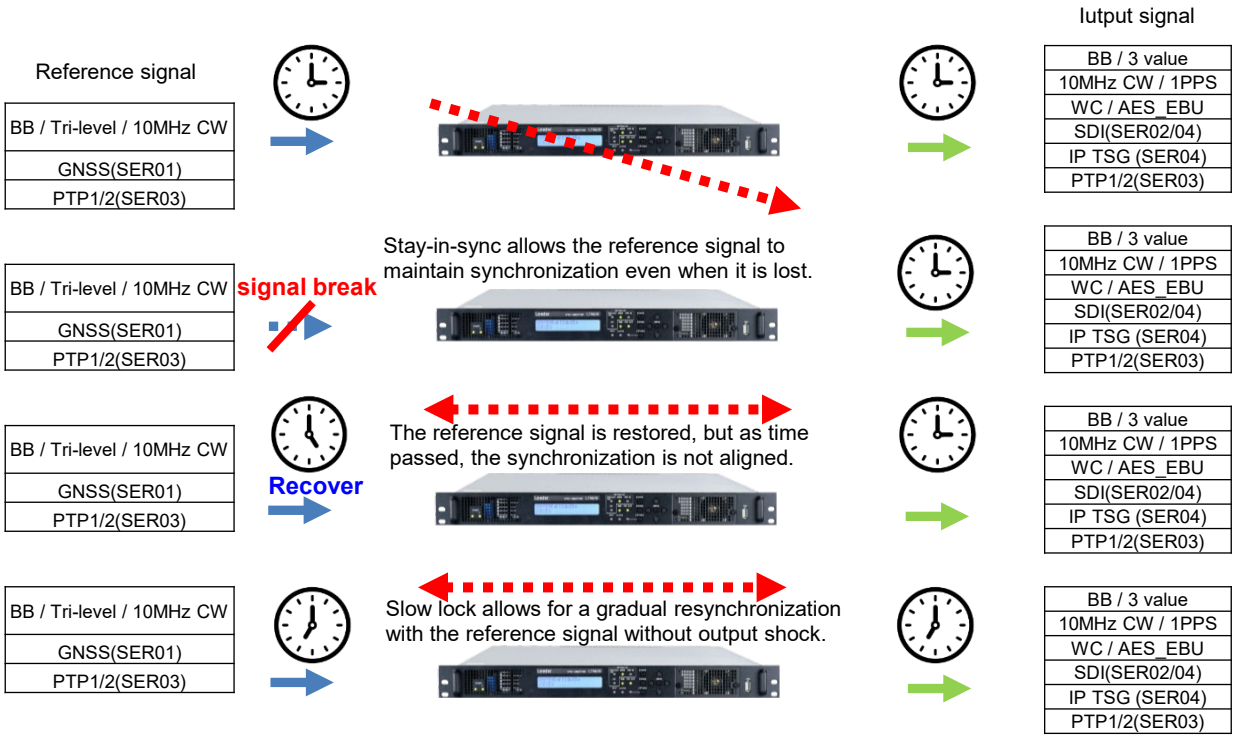


The same time is output from Primary and Backup

PTP1(SER03)
PTP2(SER03)
LTC
Black Signal (VITC)
SDI Signal ATC (VITC/LTC) (SER02/04)
AES/EBU Signal
NTP

L-SYNC synchronizes the time of the two units.

Stay-in-sink and slow lock



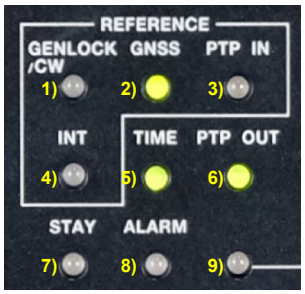
*The PTP/GNSS time information clock is shown as an example.
Synchronization is maintained when the signal is cut off, and is synchronized without shock when the signal is restored.
*One of the reference signal inputs is selected.

Time output based on reference signal and time source

REFERENCE SOURCE	TIME SOURCE	Time Output						
		LTC	Black Signal (VITC)	SDI Signal ATC(VITC/LTC) (SER02/04)	AES/EBU Signal	NTP	PTP1 (SER03)	PTP2 (SER03)
Internal / 10MHz CW	Internal	✓	✓	✓	✓	✓	✓	✓
	LTC	✓	✓	✓	✓	✓	✓	✓
	LTC ST309	✓	✓	✓	✓	✓	✓	✓
	NTP	✓	✓	✓	✓	✓	✓	✓
	GNSS(SER01)	✓	✓	✓	✓	✓	✓	✓
	PTP1(SER03)	✓	✓	✓	✓	✓		✓
	PTP2(SER03)	✓	✓	✓	✓	✓	✓	
BB / Tri-level	Internal	✓	✓	✓	✓	✓	✓	✓
	LTC	✓	✓	✓	✓	✓	✓	✓
	VITC	✓	✓	✓	✓	✓	✓	✓
	LTC ST309	✓	✓	✓	✓	✓	✓	✓
	VITC ST309	✓	✓	✓	✓	✓	✓	✓
	NTP	✓	✓	✓	✓	✓	✓	✓
	GNSS(SER01)	✓	✓	✓	✓	✓	✓	✓
	PTP1(SER03)	✓	✓	✓	✓	✓		✓
	PTP2(SER03)	✓	✓	✓	✓	✓	✓	
GNSS(SER01)	GNSS(SER01)	✓	✓	✓	✓	✓	✓	✓
PTP1(SER03)	PTP1(SER03)	✓	✓	✓	✓	✓		✓
PTP2(SER03)	PTP2(SER03)	✓	✓	✓	✓	✓	✓	

When the TIME SOURCE is PTP1/PTP2, the corresponding port becomes a follower operation.
It is used as a follower and not a leader

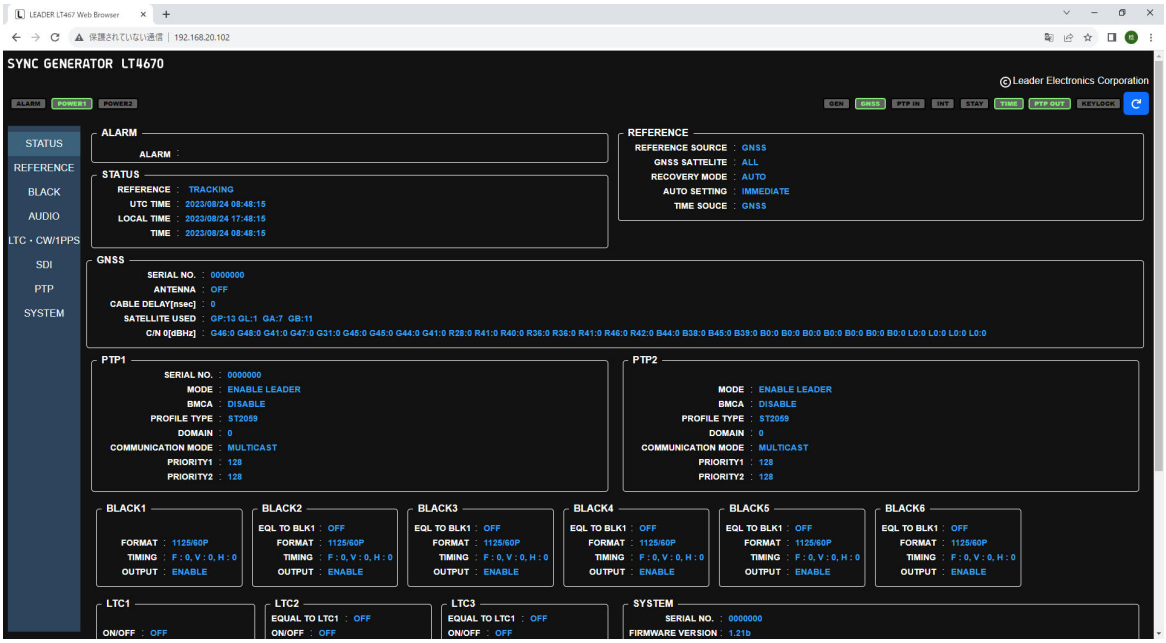
LED display function



1) GENLOCK/CW Lights green when the reference signal is locked at GENLOCK or CW. Flashes orange until locked, and lights orange during stay-in-sync.
2) GNSS (SER01) Lights up green when the reference signal is locked by GNSS. Flashes orange until it locks, and lights orange during stay-in-sync.
3) PTP IN (SER03) Lights green when the reference signal is locked at PTP. Flashes orange until locked and lights orange during stay-in-sync.
4) INT Lights up green when the reference signal is INTERNAL.
5) TIME Lights up green when the time is successfully obtained from the selected TIME SOURCE. When the time is not obtained or when the TIME SOURCE is changed, the light turns orange.
6) PTP OUT Lights up green when PTP output is working properly.
7) STAY Lights up orange during stay-in-sync.
8) ALARM Lights up red when an alarm is present.
9) KEYLOCK Lights up green when the key is locked.

Web Browser

By connecting the LT4670 to a PC, settings and monitoring can be made via a web browser.



Optional Items

LT4448 Changeover

L-SYNC Cable

Model number: LC 2186
Function: LT4670 for time synchronization of two units

LTC Cable

Model number: LC 2185
Function: Connects to LT4448 and 3 LTCs distribution

GPS ANTENA

Model number: LTGPSA1
Function: Connect to LT4670 with LT4670-SER01

SFP RJ-45

Model Number :LC2141
Transmission Speed:1000Mbps
Connector :RJ-45
Supported Models :LT4670-SER03

SFP+ MULTI-MODE

Model Number :LC2148
For short range use:300m max.
Function :850nm
Supported Standards :10GBASE-SR/SW
Connector :LC
Supported Models:LT4670-SER03

SFP+ SINGLE-MODE

Model Number:LC2149
For long distance use:Up to 10,000m
Function:1310nm
Supported Standards:10GBASE-LR/LW
Connector :LC
Supported Models :LT4670-SER03

SFP28 MULTI-MODE

Model Number :LC2151
For short range use:70m max.(OM3) /100m(OM4)
Function :850nm
Supported Standards :25GBASE-SR/SW
Connector :LC
Supported Models:LT4670-SER04

SFP28 SINGLE-MODE

Model Number:LC2152
For long distance use:Up to 10,000m
Function:1310nm
Supported Standards:25GBASE-LR/LW
Connector :LC
Supported Models :LT4670-SER04

For further information, please visit

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⚠ Safety Precautions

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

Jan. 2024