Leader

# LT 4448

## CHANGEOVER

Specification

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# 1. GENERAL

The LT 4448 is a changeover unit that automatically switches the signal from the primary signal to the backup signal when problems are detected in the primary signal. Two systems of input signals (primary and backup) are connected to the LT 4448, and the LT 4448 detects errors in the amplitude of the primary input signal.

A single LT 4448 has 11 BNC channels and 3 LTC channels. These channels can receive SDI, NTSC/PAL black burst, HD tri-level sync, AES/EBU digital audio, word-clock signals, and LTC signals. SDI signals are switched with relays; all other signals can be switched with electronic switches. The power supplies are redundant. Alarms are generated when errors occur.

The LT 4448 is used in combination with the LT4670 (SYNC GENERATOR), LT 4610 (SYNC GENERATOR), or LT 4600A (MULTIFORMAT VIDEO GENERATOR) at close distance.

# 2. FEATURES

- I/O Connectors

  A single LT 4448 is equipped with 11 sets of BNC I/O connectors and 3 sets of LTC I/O connectors.
  A single set consists of a primary input connector, a backup input connector, and an output connector.

- Input Switching

  Relays are used to switch between the primary signals and backup signals of channels 1 and 2.
  High-speed electronic switches are used to switch between the primary signals and backup signals of channels 3 to 11 and LTC.

- Selecting the Input Signal

  On channels 1 and 2, you can select SDI signals (3G, HD, SD), NTSC/PAL black burst signals, or HD tri-level sync signals.
  On channels 3 to 8, you can select NTSC/PAL black burst signals or HD tri-level sync signals.
  Channels 9 and 10 are exclusively for AES/EBU digital audio signals.
  Channel 11 is exclusively for word-clock signals. It receives TTL signals.
  LTC channels are dedicated to LTC signals. They are 2 Vp-p differential inputs.

- LTC Channels

  LTC channels provide three systems of two inputs (primary and backup) and three systems of one output.
  It can also connect to an LT 4610 (SYNC GENERATOR) or LT4670 (SYNC GENERATOR) with a dedicated cable (sold separately).

- Fault Detection

  When an input signal level error is detected, the LT 4448 lights the panel fault LED as well as the panel LED that indicates the channel that is causing the problem. This feature allows quick investigation of the problem.
  Channels 3 to 11 are equipped with high-speed fault detection circuits. These enable the LT 4448 to switch to a backup signal with barely any disturbances shown on the screen when problems such as interruptions occur in the primary signal.

- Alarm Detection

  If an error is detected at an output connector of channels 3 to 11, or power supply, a panel LED indicating where the error occurred lights to alert the user.

- Power Supply Start Time

  A delay for starting the fault detection at power up can be set to none or approximately 1, 2, or 4 minutes depending on the rise time of the system signal source that the LT 4446/4447 is connected to.

- SNMP Ready

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

- WEB Browser

  The LT 4448 can be controlled with a Web browser.

- Combining with an LT4670, LT 4610, or LT 4600A

  The depth of the LT 4448 is the same as that of the LT4670 (SYNC GENERATOR), LT 4610 (SYNC GENERATOR), or LT 4600A (MULTIFORMAT VIDEO GENERATOR). This makes it easy to wire and operate the devices when you combine them.

- Redundant Power Supply

  Redundant power supply provides extra reliability. Alarms are generated when errors occur.

# 3. SPECIFICATIONS

## 3.1 Compliant Standards

| | |
|---|---|
| SDI Signal | |
| 3G-SDI | SMPTE ST 372, SMPTE ST 424, SMPTE ST 425 |
| HD-SDI (including HD dual link) | SMPTE ST 274, SMPTE ST 292, SMPTE ST 296 |
| SD-SDI | SMPTE ST 125, SMPTE ST 259 |
| 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 274, SMPTE ST 296 |
| AES/EBU Digital Audio Signal | AES3, SMPTE ST 276 |
| LTC Signal | SMPTE 12M-1 |

## 3.2 I/O Connectors

| | |
|---|---|
| Primary Input Connectors | |
| Ch1 to 10 | 10 input connectors (75 Ω BNC connectors) |
| Ch11 | 1 input connector (TTL, 75 Ω BNC connector) |
| Backup Input Connectors | |
| Ch1 to 10 | 10 input connectors (75 Ω BNC connectors) |
| Ch11 | 1 input connector (TTL, 75 Ω BNC connector) |
| Output Connectors | |
| Ch1 to 10 | 10 output connectors (75 Ω BNC connectors) |
| Ch11 | 1 output connector (+5 V CMOS, 75 Ω BNC connector) |
| LTC Connectors | |
| Connector | 25-pin D-sub (input and output shared) |
| Number of Inputs | 3 systems each 2 inputs (PRIMARY, BACKUP) |
| Number of Outputs | 3 systems 1 output (OUTPUT) |

## 3.3 I/O Characteristics

Ch1 and 2 (typical)

| | |
|---|---|
| Return Loss | 30 dB (0 to 10 MHz) |
| | 15 dB (10 MHz to 1.5 GHz) |
| | 10 dB (1.5 to 3 GHz) |
| Insertion Loss | 0.2 dB (0 to 10 MHz) |
| | 0.5 dB (10 to 500 MHz) |
| | 2.0 dB (1.5 to 3 GHz) |
| Crosstalk | -60 dB (0 to 10 MHz) |
| | -48 dB (10 MHz to 1.5 GHz) |
| | -40 dB (1.5 to 3 GHz) |
| Impedance | External termination |
| Maximum Input Voltage | ±5V |

Ch3 to 10

| | |
|---|---|
| Return Loss | 30 dB (0 to 10 MHz, internally terminated) |
| Insertion Loss | 0.3 dB (0 to 10 MHz) |
| Crosstalk | -55 dB (0 to 10 MHz) |
| | -45 dB (10 to 30 MHz) |
| Input Impedance | 75Ω |
| Output Impedance | 75Ω |
| Maximum Input Voltage | ±1.5V |

Ch11

| | |
|---|---|
| Input Impedance | Approx. 4 kΩ |
| Output Impedance | Approx. 60 Ω |
| Maximum Input Voltage | 0V/+5V (TTL) |

LTC

| | |
|---|---|
| Input Impedance | 600 Ω balanced |
| Input Signal Level | 0.5 to 4Vp-p |
| Output Impedance | 600 Ω balanced |
| Output Signal Level | 2Vp-p±10% |
| Number of input channels | LTC1, LTC2, LTC3 (3 channel inputs) |
| Number of output channels | LTC1, LTC2, LTC3 (3 channel outputs) |

GPI (LTC connector shared)

LT4670 and LT 4610 alarm outputs

| | |
|---|---|
| Number of Inputs | PRIMARY, BACKUP, 1 each |
| Number of Outputs | PRIMARY, BACKUP, 1 each |
| Output method | Through |
| Output Signal Level | 5V CMOS |

## 3.4 Input Signals

| | |
|---|---|
| Setting Method | Select the input signal type for each channel with DIP switches or external control. |
| Ch1 and 2 | NTSC black burst signal<br>PAL black burst signal<br>HD tri-level sync signal<br>SD-SDI signal (270 Mb/s)<br>HD-SDI signal (1.485 Gb/s)<br>3G-SDI signal (2.97 Gb/s) |
| Ch3 to 8 | NTSC black burst signal<br>PAL black burst signal<br>HD tri-level sync signal |
| Ch9 and 10 | AES/EBU Digital Audio Signal |
| Ch11 | Word-clock Signal (TTL) |
| LTC | LTC Signal |

## 3.5 Signal Switching

| | |
|---|---|
| Switching Method | |
| Ch1 and 2 | Relays |
| Ch3 to 11, LTC | Electrical switches |
| Switch Time of the Relay (*1) | |
| Ch1 and 2 | 2 ms or less |
| High-speed Switch Time | |
| Ch3 to 11, LTC | 100 ns or less |
| Switch Time due to Fault Detection | |
| Ch1, 2 and LTC | 70 ms or less |
| Ch3 to 8 | |
| High-Speed Detection | 1.5 H or less |
| Low-Speed Detection | 60 ms or less |
| Ch9 and 10 | |
| High-Speed Detection | 6 us or less |
| Low-Speed Detection | 60 ms or less |
| Ch11 | |
| High-Speed Detection | 60 us or less |
| Low-Speed Detection | 60 ms or less |

*1 This is the time it takes for the signal to stabilize after the relay is switched.

## 3.6 Fault Detection

| | |
|---|---|
| Fault Indication | Indicates with LEDs the problematic signal system (PRIMARY or BACKUP) if a fault is detected |
| Fault Channel Indication | Indicates with LEDs the problematic channels when a fault is detected |
| DC Offset | ±30 mV (sync signal only) |
| High-Speed Detection | Detects a fault when a signal drops out |
| Low-Speed Detection | Detects a fault when a signal level falls below the detection level |
| Detection Level | 2 to 5 dB below the specified level |
| Detection Reference | |
| Ch1 to 11 | Select LOW, HIGH, or user-defined level with DIP switches for each input signal type. |
| Low level (*1) | |
| NTSC Black Burst Signal | -180 to -227 mV (-286 mV) |
| PAL Black Burst Signal | -190 to -238 mV (-300 mV) |
| HD Tri-Level Sync Signal | 337 to 476 mV (600 mV) |
| SD-SDI signal (270 Mb/s) | 450 to 635 mV (800 mV) |
| HD-SDI signal (1.485 Gb/s) | 450 to 635 mV (800 mV) |
| 3G-SDI signal (2.97 Gb/s) | 450 to 635 mV (800 mV) |
| AES/EBU Digital Audio Signal | 631 to 794 mV (1000 mV) |
| Word-clock signal | 1515 to 1907 mV (2400 mV) |
| High level (*1) | |
| NTSC Black Burst Signal | -210 to -264 mV (-286 mV) |
| PAL Black Burst Signal | -220 to -277 mV (-300 mV) |
| HD Tri-Level Sync Signal | 379 to 535 mV (600 mV) |
| SD-SDI signal (270 Mb/s) | 505 to 713 mV (800 mV) |
| HD-SDI signal (1.485 Gb/s) | 505 to 713 mV (800 mV) |
| 3G-SDI signal (2.97 Gb/s) | 505 to 713 mV (800 mV) |
| AES/EBU Digital Audio Signal | 734 to 924 mV (1000 mV) |
| Word-clock signal | 1759 to 2215 mV (2400 mV) |
| User-defined level (*2) | |
| Ch1 to 8 | -100 to -700 mV(when a signal that is equivalent to a horizontal sync signal is applied) |
| Ch9 and 10 | 100 to 1400 mV (p-p value of input signal) |
| Ch11 | 500 to 3000 mV (high level of input signal) |
| LTC | Signal amplitude 300 mVp-p or less (*3) |
| Time from When the LT 4448 Turns On to When Error Detection Starts (*4) | Approx. 10 s (no delay) / Approx. 1 min. (60 to 80 s) / Approx. 2 min. (120 to 140 s) / approx. 4 min. (240 to 320 s) |

*1 Depending on the instrument that you are using, there will be deviations in the detection level within the ranges shown.
The parenthetical values are levels during normal operation.

*2 Depending on the shape of the waveform, the detection level that you have set may not be reached.

*3 FAULT (LTC) on the front panel lights up with an error of any of the three systems LTC1 to LTC3, so input signals to all three systems.

*4 The recommended setting when the power is started simultaneously with the LT4670 is approx. 4 min., and for the LT 4610 the recommended setting is approx. 2 min.

## 3.7 Alarm Detection

| | |
|---|---|
| Alarm Indications | Indicates with LEDs when errors are detected in output signals (channels 3 to 11), or power supply. |
| Detection Setting | ON / OFF (*1) |

*1 If set to OFF, the alarm detection is disabled only for the output connector.

## 3.8 Key Lock

| | |
|---|---|
| Lock and Unlock | Hold down the KEY LOCK key. |
| Auto Key Lock | Automatically locks the keys after 60 seconds of inactivity (no key operations) |

## 3.9 External Control Connectors

Remote Connector

| | |
|---|---|
| Use | Remote control |
| Input | SYNC SOURCE, AUTO SWITCHING, RESET |
| Output | SYNC SOURCE, FAULT |
| Connector | 9-pin D-sub (female) |
| Locking Screws | #4-40 inch screws |

Ethernet Port

| | |
|---|---|
| Use | Remote control and error monitoring from an external PC |
| Compliant Standards | 10BASE-T/100BASE-TX auto switching |
| Protocol | |
| SNMP (SNMPv2c) | Remote monitoring, alarm occurrence |
| HTTP | Control through a browser |
| Supported browsers | FireFox (latest)<br>Google Chrome (latest)<br>Microsoft Edge (latest)<br>IE9 or later (IE9, IE10, IE11) |
| Connector | RJ-45 |
| SNMP Read Community (*1) | LDRUser (factory default) |
| SNMP Write Community (*1) | LDRAdm (factory default) |
| SNMP Trap Community (*1) | LDRUser (factory default) |
| SNMP negotiation | AUTO |

*1 The SNMP Community name can be changed with the SNMP configuration software or the HTTP server feature.

USB Port

| | |
|---|---|
| Use | IP address configuration |
| Compliant Standards | USB 2.0 |
| Connector | Type B |

## 3.10 General Specifications

| | |
|---|---|
| Environmental Conditions | |
| Operating Temperature | 0 to 40 °C |
| Operating Humidity Range | 90 %RH or less (no condensation) |
| Optimal Temperature | 5 to 35 °C |
| Optimal Humidity | 85 %RH or less (no condensation) |
| Operating Environment | Indoors |
| Elevation | Up to 2,000 m |
| Overvoltage Category | II |
| Pollution Degree | 2 |
| Power Requirements | |
| Redundancy | Supported |
| Voltage | 90 to 250 VAC |
| Frequency | 50/60 Hz |
| Power Consumption | 40W max. |
| Dimensions | 426 (W) × 44 (H) × 400 (D) mm (excluding protrusions) |
| Weight | 4.0 kg (excluding rack support) |
| Accessories | Power cord ..... 2<br>Rack supports ..... 2<br>Rack support mounting screws ..... 4 |
| Sold Separately | |
| LC 2183 (LTC Connection Cables) | Conversion cables (1.5 m) for the 25-pin D-sub LTC connector of the LT 4448, the two 15-pin D-sub LTC connectors for PRIMARY and BACKUP connected to the LT 4610, and the three XLR connectors for LTC output |
| LC2185 (LTC Connection Cables) | Conversion cables (1.5 m) for the 25-pin D-sub LTC connector of the LT 4448, the two 26-pin D-sub LTC connectors for PRIMARY and BACKUP connected to the LT4670, and the three XLR connectors for LTC output |