LTC Reader Owner's Manual
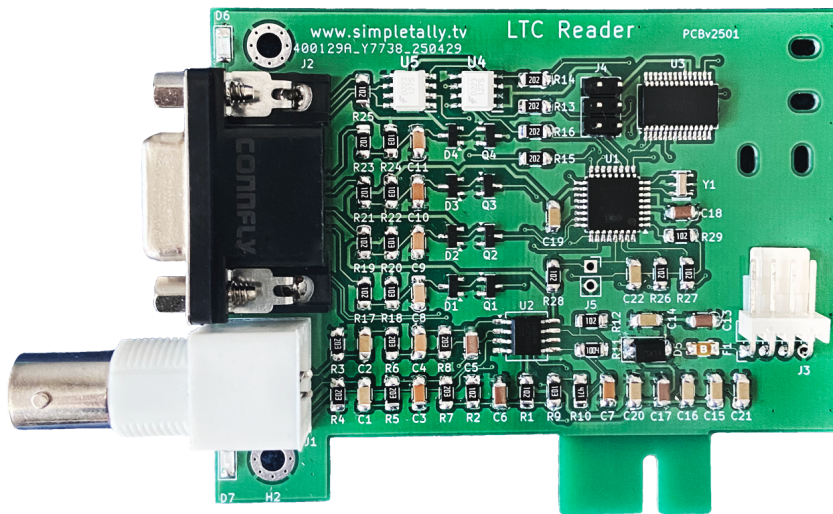
Contents

1   About

LTC Reader, hereinafter referred to as the Device, is used to:

- synchronize a computer or server from the LTC signal
- receive 4 GPI input signals
- send 4 GPI output signals

Supported OS:

- Windows
- Linux

2   LTC Reader Basics

2.1   Basic connection

The basic functional connection for Device consists of:

- 1 x Linear Time Code (LTC) input
- 1 x USB 2.0 communication port of a computer
- 4 x General Purpose Interface Input
- 4 x General Purpose Interface Output

2.2   Connection to computer or server

1. Place Device in PCI or PCIe x1-x16 slot.

2. Connect cable to connector J3 on Device and USB2.0 connector at computer.

   The slot serves only for the mechanical placement of the board. Data and power are transmitted via USB HU-4 cable through the J3 connector on the board.

   It is possible to connect Device to PLS-4 connector on motherboard using a special cable, which is purchased separately. Attention, it is important not to confuse the polarity when connecting. Improper connection can cause the device or motherboard fatal damage.

2.3   LTC Input

The input accepts a Linear Time Code (LTC) signal from either a balanced or unbalanced source. The shell of the BNC input connector is floating above ground. For an unbalanced source connect the input using a standard BNC-BNC or a BNC-Phono cable. For a balanced source leave the cable shield unconnected at the LTC Reader end and connect the balanced signal between the center pin and the shell of the BNC connector.

2.4   USB 2.0 connection

The LTC Reader is designed for direct connection to

- a PC computer's standard USB 2.0 port
- 4-Pin plug 2.54 mm (PLS-4 or DS-1021-1x4)

Power is derived from USB 2.0 port.

2.5   General Purpose Interface (GPI) Connector

A 15 pin high density D-Sub socket connector (DHR-15FB / DS1038-15F) on the side of the LTC Reader is used for both GPI inputs and outputs. A 15 pin high density D-Sub plug connector (DS1035-15M) is supplied with the unit for termination by the customer.

2.5.1 GPI Outputs

There are four opto-isolated outputs on the LTC Reader. Each output is a NPN transistor with the emitters connected to common pin. The operation of each of the GPI outputs is software programmable to operate under direct software control.

2.5.2 GPI Inputs

There are four GPI inputs. These inputs are protected by clamping diodes and current limiting series resistors. The inputs are pulled up internally to logic Vcc and may be operated by a pull down to logic ground. The common logic ground is connected to the frame ground of the communications port. Each of the GPI inputs may be programmed to transmit a serial report to the Computer's Virtual Com port. This may be displayed by the host software on the computer or may be used to initiate another action.

2.5.3 GPI pinout

Pin number	Signal
01	GPI-1
02	GPI-2
03	GPI-3
04	GPI-4
05	NC
06	GND
07	GND
08	GND
09	GND
10	GND
11	GPO-1
12	GPO-2
13	GPO-3
14	GPO-4
15	NC

2.6 Status LED

There are two LEDs:

#	Color	Position	Value
1	Red	Near D-Sub connector	Power on
2	Green	Near BNC connector	LTC input valid

3 Serial communications protocol

3.1 Serial Communications Protocol

Control of the LTC Reader is by a simple string of ISO characters. Control strings and User Group hexadecimal digits are case sensitive and **must** be entered as upper case characters. Commands, except control character commands, are terminated with a carriage return character (0D hex). LTC Reader responds to valid commands that require a data response with a data report. All other commands are acknowledged by:

Acknowledge	Value
OK	for valid commands
NA	for commands which are temporarily disabled by another function
NV	for not valid commands

All responses are terminated with a carriage return character. The serial port operates at:

- 19200 baud

- 8 data bits

- no parity

- 1 stop bit.

For continuous reporting of a maximum length report at 30 frames per second there is about 12% idle time left between reports.

3.2 Data Report Format for Time Address, User Groups & Status.

The output preset data report format may consist of up to three blocks of data:

- The Time Address

- User Groups

- Status blocks

Any data block may be individually enabled or disabled. The blocks are separated by single space characters. The Time Address and User Groups may also be formatted without separator characters for faster transmission or with separator characters for legibility when sent directly to a screen or printer.

Command	Value
RF>1	PRINT format. **HH:MM:SS;FF hh.hh.hh.hh sfftt**
RF>0	Unformatted. **HHMMSSFF hhhhhhhh sfftt**
RT>0	Exclude Time Address from report
RT>1	Include Time Address with report
RU>0	Exclude User Groups from report
RU>1	Include User Groups with report
RS>0	Exclude Status data from report
RS>1	Include Status data with report

3.3 Time Address

HH:MM:SS:FF or **HHMMSSFF**. Eight decimal ISO characters with or without colon separators. For 30fps Drop Frame Time Code the last colon separator is changed to a semicolon.

Legend	Description	BCD Values
HH	Hours	00-23
MM	Minutes	00-59
SS	Seconds	00-59
FF	Frames	00-23, 24, 29

3.4 User Groups

hh.hh.hh.hh or **hhhhhhhh**. Eight hexadecimal ISO characters (0-9,A-F) with or without period separators.

3.5 Status String 'sfftt'.

Special string consisting of 5 characters as follows:

Time Code reading status 's' is indicated by the 1st character.

Code	Time Code Reading Status
+	Valid read, monotonic ascending Time Address
X	No read or no input
H	Valid code, Held Time Address count

Time Code flag bits 'ff' are displayed in the 2nd & 3rd characters. Each Time Code flag bit is represented by a binary bit in the two hexadecimal characters (00 - 3F).

Code	Flag Bit	24, 30 fps	25 fps
01	Frame 40's bit	Drop Frame flag	not set
02	Frame 80's bit	Color Field flag	Color Field flag
04	Second 80's bit	Phase bit	User Group Usage 1
08	Minute 80's bit	User Group Usage 1	User Group Usage 2
10	Hour 40's bit	User Group Usage 2	User Group Usage 3
20	Hour 80's bit	User Group Usage 3	Phase bit

Trigger Source codes 'tt' for the report are displayed in the 4th & 5th characters. The Trigger source is represented by a binary bit in the two hexadecimal characters (00 - FF). If there is no trigger source as in a continuous report or a direct request then these two characters will be zeros. More than one GPI can be represented simultaneously. (e.g. The code 25 represents GPI Input 2 and GPI Outputs 1 and 3 occurring simultaneously).

Code	Source
01	GPI Output 1
02	GPI Output 2
04	GPI Output 3
08	GPI Output 4
10	GPI Input 1
20	GPI Input 2
40	GPI Input 3
80	GPI Input 4

Set Reporting Mode and Flow control.

Command	Value
RM>1	Report for each Time Code frame
RM>0	Terminate continuous reporting
Ctrl+Q	X-ON initiates continuous report
Ctrl+S	X-OFF terminates reporting
Ctrl+R	Report Time Address, User Groups and Status as selected
Ctrl+F	Report Status only
Ctrl+T	Report Time Address only
Ctrl+U	Report User Groups only

GPI Outputs

* = 1 to 4 or ? for all.

There are four GPI Outputs that may be controlled directly

Command	Value
O*>0	Set GPI Output-* Off
O*>1	Set GPI Output-* On
O*>P	Pulse GPI Output-* (duration 1 frame)

GPI Inputs

* = 1 to 4 or ? for all.

Four GPI Inputs can trigger a report to the serial port. The format of the report from each input may be independently selected

Command	Value
I*>0	Disable GPI Input-*
I*>R	Enable GPI Input-* to trigger report as formatted
I*>S	Enable GPI Input-* to trigger Status only report
I*>T	Enable GPI Input-* to trigger Time Address only report
I*>U	Enable GPI Input-* to trigger User Groups only report

Enabling any Input GPI to trigger a report terminates continuous transmission of data reporting.
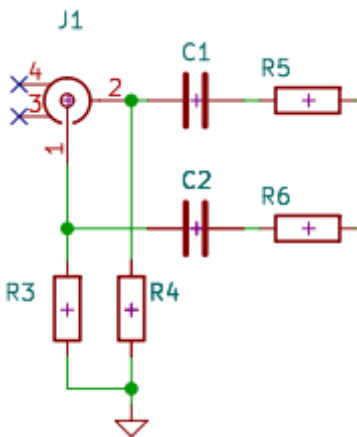
Miscellaneous

Command	Value
SP>	Save settings to memory
RP>	Restore settings (executed automatically at power on)
GS>	Get Product ID Number

4 Interface circuit information

4.1 LTC input circuit

LTC input circuit:

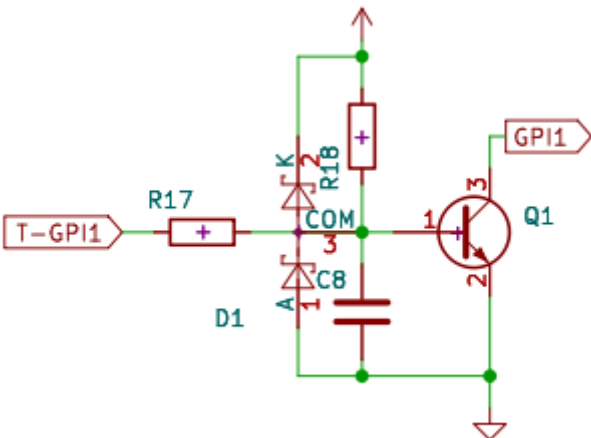

4.2 GPI input circuit

GPI input circuit:

Figure 1: GPI Input Circuit
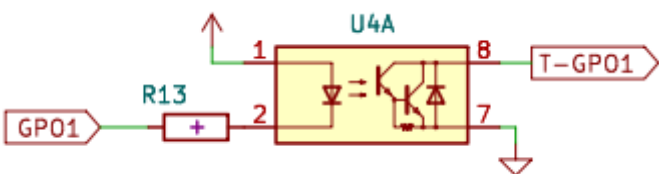
4.3 GPO output circuit

GPO output circuit:

Figure 2: GPI Output Circuit

4.4 USB 2.0 pinout

Connector 1 - J3 at Device.

Connector 1	Pin1	Pin2	Connector2
DS1070-4 F	1	GND	USB-A 2.0
DS1070-4 F	2	D+	USB-A 2.0
DS1070-4 F	3	D-	USB-A 2.0
DS1070-4 F	4	+5V	USB-A 2.0

5   Specifications

5.1   USB 2.0

- Connector: USB-A 2.0 (via cable with HU-04 connector)
- 19200 baud, no parity, 8 data bits, 1 stop bit.

5.2   LTC input

- Balanced or unbalanced.
- Impedance: 10 kOhms.
- Level: 100mV p-p to 10V p-p.
- Speed: Nominal play @ 24, 25 30 frames per second.

5.3   Power

- From USB 2.0.
- Load: Max 100 mA @ 5V.

5.4   GPI Output

- Quantity 4.
- Drive: 10mA.
- Max. Reverse Voltage: 30V.
- True = transistor conducting.

5.5   GPI Input

- Quantity 4.
- Internal pull up to logic Vcc.
- True = pull down to ground.

5.6   Size/Weight

- 83x67x20 mm .
- 100 grams.
- Shipping weight 0.5 Kg.

6   What's in the box

- 1 x LTC Reader with PCIe Low Profile IO Bracket

- 1 x Cable HU-4 USB2.0 0.5m

7   Revision Notes

8   Operational Hints

LTC Reader will be restored to its stored settings if there is a power failure or momentary power drop out. It is advised that the desired settings be saved (see save settings command 'SP>') to ensure that LTC Reader is in the desired mode, even after a power failure.

9   Ordering Information

Code	Description
LTC Reader	LTC Reader (1 x LTC input, 4 x GPI inputs, 4 x GPI outputs, USB 2.0), HU04-50 (Cable HU-4 to USB 2.0 50 cm long)
PLS04-50	Cable HU-4 to PLS-4 50 cm long
HU04-50	Cable HU-4 to USB 2.0 50 cm long (in box by default)

10   How to contact us

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