

Wireless Camera System

Technical Specifications

**Specifications subject to change without notice.
For the latest version go to the Link Research web site.**

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1 Introduction

The Link Wireless Camera System is built from the following products:

Transmit side - standard models

- A camera mounted encoder/transmitter of four models with frequency coverage as shown:
 - L1101 covering 1.95GHz to 2.2GHz
 - L1102 covering 2.1GHz to 2.3GHz
 - L1104 covering 2.3GHz to 2.5GHz
 - L1106 covering 2.5GHz to 2.7GHz
- Additional frequency ranges can be provided for orders of 10 or more units. Contact Link Research for further details.

Receive side

- An S band to UHF down-converter model L3010 feeding a UHF signal to one of the following 4 products
- An ultra low delay diversity integrated receiver decoder model L2102
- A Diversity demodulator models:
 - L2002 two channel
 - L2004 four channel

2 System Parameters

2.1 End-to-end Delay

- 40mS or 1 frame (as measured by the BBC)

2.2 Cable types

- Transmitter to transmit antenna RG8 50 foam polyethylene dielectric (if required)
- Receive antenna to down-convertor RG8 50 foam polyethylene dielectric
- Down-convertor to receiver/decoder RG11 or RG59 75 foam polyethylene dielectric

NB - cable lengths have not been specified as this will be dependent on the signal attenuation of the cable and/or the gain setting of the downconvertor.

3 L110x Encoder/transmitter

3..1 Physical

- 234 x 84 x 44mm without antenna fitted
- 1.05kg weight
- Black stove enamelled finish
- Housing - splash proof machined aluminium casing

3..2 Mounting

The front and back faces of the transmitter body have six 3mm threaded mounting holes on which can be mounted a variety of standard battery mountings.

3..3 Environmental

- Operational -10 C to +70 C

3..4 Power

- 10.5V DC to 14V DC supplied from standard camera battery.

3..5 Power Consumption

18 Watts (typically depending on power setting)

3..6 Top Panel Controls and Indicators

A small control panel having two push buttons is mounted on the top of the transmitter having the following functions:

- Profile - pressing this button allows selection of one of 6 preset configurations
- RF - pressing this button toggles between RF on and RF off

Three indicators have the following functions:

- Alarm - a red LED that shows fault status when lit
- RF - a green LED that shows RF is being radiated when lit
- Profile - 6 yellow LEDs that when lit, indicates the active profile selected. The profiles are also numbered from 1 - 6.
- Flashing LED indicates low battery voltage

3..7 Lower Panel Connectors

Seven connectors provide the following interfaces:

- RS232 Control - 6 pin Lemo connector
- Audio 1 - 5 pin Lemo connector
- Audio 2 - 5 pin Lemo connector
- DC input - 4 pin Lemo connector
- V video component input- 75 BNC connector
- U video component input- 75 BNC connector

- Y, composite video, SDI input - 75 BNC connector

3..8 Video Inputs

- SDI Video Input,
 - Serial Digital with embedded audio.
 - ITU-R BT.656 Part 3, bit serial interface 4:2:2 YC_BC_R. (UK/EC) ANSI/SMPTE 259M level C - 270Mb/s.
- Component video input
 - 525/625 component (USA).
- Composite video input
 - 1 Vpp - NTSC with and without pedestal or PAL I.
 - Return Loss >30dB at 6MHz

3..9 Audio Inputs

- Audio 1 and Audio 2
 - >20k input impedance
 - One stereo pair or two mono channels
 - Pin 1 L+, pin 2 L-, pin 3 ground, pin 4 R+, pin 5 R-
 - Frequency response 50Hz to 15kHz

3..10 RS232 Input

- Input at baud rates of 9600 baud or 11520 baud
- Protocol - standard Link 1000 ASCII protocol
- Data input Pin 1 TX, pin 2 RX, pin 3 ground
- Control input pin 4 TX, pin 5 RX, pin 3 ground

3..11 DC Input

- Pin 1 -ve, pin 4 +ve
- Pins 2 and 3 not connected

3..12 Transmitter Output Power

- Between 10mW and 100mW into 50

3..13 Modulation Method

- Coded Orthogonal Frequency Division Multiplex (COFDM)
 - 64QAM, 16QAM, QPSK
 - FEC $\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{6}$, $\frac{3}{4}$, $\frac{7}{8}$
 - Guard interval $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$
 - 2000 carriers (1705 active carriers)
 - 6MHz, 7MHz or 8MHz bandwidth selectable

3..14 Spurious Emissions

- -60dB or better

3..15 In-band Tones

- -40dB or better with respect to OFDM level

3..16 Shoulder Height

- -45dB or better with respect to OFDM level

3..17 Frequency Stability

- 2.5ppm or better

3..18 Tuning Step Size

- 125kHz

3..19 Phase Noise

- Better than -80dBc/Hz at 10kHz

3..20 Encoder performance

- Modes
 - MP@ML (4:2:0)
 - 422P@ML (4:2:2)
- Bit rate
 - MP@ML 1.5mbits/s to 15mbits/s dictated by channel and setting
 - 422P@ML 3.0mbits/s to 50mbits/s dictated by channel and setting
- Horizontal resolution 720 or 704
- Vertical resolution
 - 480 lines in 525 line (NTSC)
 - 576 lines in 625 (PAL)
- Frame rates
 - NTSC 29.97
 - PAL 25
- Delay mode and GOP length
 - Low delay mode GOP length = 1
 - Standard delay mode GOP = 12 (PAL) 15 NTSC
- Audio
 - Two analogue input channels
 - Each channel can be configured as a stereo pair or dual mono
 - Input impedance 20k
 - Sampling rate 48kHz
 - Coding method MPEG layer 1 (ISO/IEC 13818-3, ISO/MPEG 11172.3) and MPEG layer 2 (MUSICAM)
 - Minimum audio bit rate of 128kbits per channel, 384kbits stereo
 - Video and audio synchronisation better than +10ms to -30ms. Typically <5ms

4 L3010 Down-converter

4..1 Physical

- 130 x 170 x 40mm without antenna fitted
- 0.83kg weight
- White stove enamelled finish
- Housing - water resistant 2-piece diecast aluminium casing

4..2 Mounting

Four holes for direct mounting to a flat surface or flat adaptor plate for universal pole mounting brackets.

NB To ensure the unit is fully waterproof it must be mounted with the input and output connectors facing down.

4..3 Environmental

- -30°C to +55°C

4..4 Power

- Input range 10VDC to 30VDC supplied via coaxial cable from receiver/decoder
- Power consumption approximately 3.5W excluding cable loss

4..5 Lower Panel Connectors

- N-type 50 input for connection to antenna either directly or by short drop lead
- F-type 75 output for connection to receiver/decoder

4..6 Input

- 1.95GHz to 2.70GHz frequency range
- <3.5dB noise figure

4..7 Output

- 470MHz to 860MHz frequency range
- Switchable in two bands
 - High band from 2.31GHz to 2.70GHz
 - Low band from 1.95GHz to 2.34GHz
 - Offset from centre frequency ± 16 MHz in two steps of 8MHz

4..8 Input Signal Level

- Minimum level -80dBm

4..9 Output Level

- Up to +17dBm at P1dB dependent on setting

4..10 Spurious Outputs

- Better than -30dBm (1 W) with no input signal
- Output must be correctly terminated in 75

4..11 Inband Tones

- -40dB or better with respect to peak OFDM signal level

4..12 Frequency Stability

- Better than 10ppm

4..13 Phase Noise

- Better than -80dBc/Hz at 10kHz offset from carrier

4..14 Down Conversion Factor

- High band 1.84GHz
- Low band 1.48GHz

4..15 Down Conversion Gain

- +45dB switchable in 3 steps of +15dB
 - Manual switching inside unit
 - Remote switching using 22kHz tone from receiver/decoder
 - Powers up in last good setting

5 L2102 Ultra Low Delay Integrated Receiver/Decoder

5..1 Physical

- 210 x 227 x 44mm
- Small form 1RU ½ 19" rack width
- 1.7kg weight
- Black spray painted steel enclosure

5..2 Mounting

- Free standing
- Two units rack mounted side by side with optional bridging kit
- Single unit rack mounted with 10.5" 1RU mount option

5..3 Environmental

- Operational -10°C to +70°C

5..4 Power

- AC input option 100VAC to 240VAC 50Hz to 60Hz
- DC input option 11VDC to 32VDC (-ve chassis earth)

5..5 Power Consumption

- 12 watts plus downconverter requirements

5..6 Front Panel Controls and Indicators

- 6 Push buttons with the following menu control functions
 - 4 buttons to the right of the unit with functions of move left, right, up and down in the menu structure
 - 2 buttons to the right of the display screen, upper button cancels/moves up a menu level; lower button opens and executes a selection
- 55mm x 20mm liquid crystal display (LCD) showing menu items, status and alarms
- 3 light emitting diodes (LED) showing status
 - Power - green - when lit power is applied
 - Alarm - red - when lit an alarm raised (details on the LCD)
 - Status - yellow - when lit a valid input signal is present

5..7 Rear Panel Connectors

- RF1 and RF2 inputs
 - 75 F connector
 - Diversity input, antenna 1 to RF 1 and antenna 2 to RF2
 - UHF input 470MHz to 860MHz

- +24VDC output to power upconverter limited to 400mA per connector
- Short circuit protected
- Frame lock input
 - 75 BNC connector
- ASI out
 - 75 BNC connector
- SDI out
 - 75 BNC connector
 - Serial digital video with embedded audio
- Video out
 - 75 BNC connector
 - Composite video out 1V pp
 - PAL or NTSC
- Data
 - 9 way D-sub connector
 - RS232 data output
 - Baud rates of 9K6, 19K2, 38K4
 - Firmware download port
- Remote/Alarm
 - 9 way D-sub connector
 - Alarm output
 - Remote control port

5..8 Audio

- Proprietary connector block with screw clamp and strain relief bracket
 - Pin 1 Audio 1 L+
 - Pin 2 Audio 1 L-
 - Pin 3 Audio 1 L ground
 - Pin 4 Audio 1 R+
 - Pin 5 Audio 1 R-
 - Pin 6 Audio 1 R ground
 - Pin 7 Audio 2 L+
 - Pin 8 Audio 2 L-
 - Pin 9 Audio 2 L ground
 - Pin 10 Audio 2 R+
 - Pin 11 Audio 2 R-
 - Pin 12 Audio 2 R ground

5..9 Video Outputs

- Serial Digital Interface (SDI)
 - SDI with two stereo channels of embedded audio
 - SMPTE 259M, Rec ITU-R BT.656.3
- Composite Video
 - NTSC (with and without pedestal) or PAL I
 - REC. ITU-R BT.470-4

- Signal to noise ratio >56dB
- ASI out
 - DVB ASI Burst and Byte mode

5..10 Video Inputs

- Frame Lock
 - Composite Black and Burst input for timing reference
 - Frame store added
 - Delay increased by 0 - 40mS

5..11 Analogue Audio Output

- Two stereo pairs or 4 mono channels
 - MPEG layer 1 and layer 2
 - Bit rates 32 to 448kbits/sec
 - 32kHz and 48kHz sampling
 - Clip level 18dBm
 - THD < 0.1%
 - 20Hz to 18kHz ± 0.25 dB
 - Crosstalk >60dB minimum
 - Signal to noise ratio >66dB RMS

5..12 Input Signal Level

- Receiver sense limit -80dBm
- Receiver overload limit -20dBm

6 L2002 & L2004 Diversity Demodulator

6..1 Physical

- 210 x 227 x 44mm
- Small form 1RU ½ 19" rack width
- 1.7kg weight

6..2 Mounting

- Free standing
- Two units rack mounted side by side with optional bridging kit
- Single unit rack mounted with 10.5" 1RU mount option

6..3 Environmental

- Operational 0°C to +70°C
- Ambient 0°C to +40°C

6..4 Power

- AC input option 100VAC to 240VAC 50Hz to 60Hz
- DC input option 10VDC to 32VDC (-ve chassis earth)

6..5 Power Consumption

- 12 watts plus downconverter requirements

6..6 Front Panel Controls and Indicators

- 6 Push buttons with the following menu control functions
 - 4 buttons to the right of the unit with functions of move left, right, up and down in the menu structure
 - 2 buttons to the right of the display screen, upper button cancels/moves up a menu level; lower button opens and executes a selection
- 55mm x 20mm liquid crystal display (LCD) showing menu items, status and alarms
- 3 light emitting diodes (LED) showing status
 - Power - green - when lit power is applied
 - Alarm - red - when lit an alarm raised (details on the LCD)
 - Status - yellow - when lit a valid input signal is present

6..7 Rear Panel Connectors

- RF1, RF2, RF3 and RF4 (RF3 and RF4 not fitted to L2002)
 - 75 Ω F connector
 - Diversity input, antenna 1 to RF 1 and antenna 2 to RF2 (L2002)

- Diversity input antenna 3 to RF 3 and antenna 4 to RF4 (L2004 only)
- UHF input 470MHz to 860MHz
- +24VDC output to power upconverter limited to 400mA per connector
- Short circuit protected
- ASI1 and ASI2 out
 - 75 BNC connector
 - Two independent outputs
- Data
 - 9 way D-sub connector
 - RS232 data output
 - Baud rates of 9K6, 19K2, 38K4
 - Firmware download port
- Remote/Alarm
 - 9 way D-sub connector
 - Alarm output
 - Remote control port

6..8 Video Outputs/Inputs

- DVB ASI Burst and Byte mode

6..9 Input Signal Level

- Receiver sense limit -80dBm
- Receiver overload limit -20dBm