

PRODUCT – LL304W

Four Channel 4 Wire Audio E & M
 Extender On Fibre System

USER MANUAL

12 November 2004

Product: LL304W		Model:			
Serial Number:		Job No:			
TEST		CRITERIA		RESULT	
Power Supply Output Voltages		+5V, +12V, -12V			
Master Oscillator Frequency		16,384MHz ± 12ppm (±200Hz)		Hz	
PLL VCXO Centre Frequency		16,384MHz ± 25ppm (±400Hz)		Hz	
Fit Microprocessor and FPGA Devices. Download software. Check Power Up & Programming Sequence.					
PLL Control Voltage		2.5Vdc @ 16,384MHz		Vdc	
LED Indicators		Functional			
M Detection	Ch 1 - 4	Functional			
E Switching	Ch 1 - 4	Functional			
Audio Level	Ch 1 - 4	0dBm (2.2Vp-p @ 600E)			
Optical Transmit Level		- dBm		- dBm	
Optical Receive Sensitivity		- dBm		- dBm	
Optical Power Budget		dB			

Tested By :

Date :

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1 PRODUCT DESCRIPTION

1.1 General

The LL304W is a 4-channel 4-wire audio, with E & M switching, extender on fibre system. A link consists of a Master unit and a Slave unit.

1.2 Basic System Description

The LL304W Master unit generates the system clock, and the LL304W Slave unit locks onto the Master unit. Each audio channel accepts audio signals at line level, or 0dBm (2.2Vp-p into 600 Ohm). The E & M switching can be set for positive switching (between a positive voltage and Earth), or negative switching (between Earth and a negative voltage). Each unit digitises the four analogue audio lines and multiplexes them, together with the E & M switching information, into a single high-speed data stream; which is then converted into an optical signal for transmission across optical fibre. Each unit then converts the optical signal received from the fibre into a high-speed data stream, which is then demultiplexed and converted into the four separate analogue audio lines with the relevant E & M switching information.

These units can also be configured for 2-wire audio (bi-directional audio on two wires), and needs to be specified when the units are ordered. Special software has also been developed for use between Motorola GM340 RF Radio Repeaters. This allows surface RF communication to be extended to underground mine shafts via fibre cable.

The LL304W units are available in two options. The first is a standalone desktop unit in a small metal enclosure that is compact enough so that two units can fit side by side in a 19" rack, with a height of 2U. The second is a rack mount card that can plug directly into an OS800 3U 19" sub rack assembly.

The units are modular in design and can thus be upgraded easily with different power supplies or optic options. See the Stock Codes for all the options available for the LL304W.

Features

- Sends four analogue audio lines with E & M switching across a single fibre pair
- Noise and EMI immunity as compared to long copper cable runs
- Modular design allows quick & easy changing of power supplies and optic options

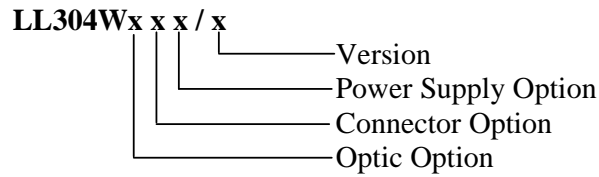
Indications

The unit has 10 Led's which indicate the following:

Power	Indicates that the unit is powered
LinkOK	Indicates that the unit is locked to the remote unit.
Loop1	Channel 1 M Input Activated
Ring1	Channel 1 E Output Switched
Loop2	Channel 2 M Input Activated
Ring2	Channel 2 E Output Switched
Loop3	Channel 3 M Input Activated
Ring3	Channel 3 E Output Switched
Loop4	Channel 4 M Input Activated
Ring4	Channel 4 E Output Switched

2 STOCK CODES

The stock code is made up as follows:



Optic Option	Fibre Type	Wavelength	TX Level	RX Sens	Optic Budget	Range*
A	Multimode	850 nm	-18dBm	-30dBm	10dB	3.5km
B	Multimode	1300 nm	-20dBm	-32dBm	10dB	12 km
C	Singlemode	1310 nm	-12dBm	-32dBm	20dB	40 km
E	Singlemode	1310 nm	-6dBm	-32dBm	26dB	52km
F	Singlemode	1310 nm	0dBm	-32dBm	32dB	63km
H	Singlemode	1550nm	-12dBm	-32dBm	20dB	80km

Connector Option	Type
A	SMA
B	ST
C	FC/PC

Power Supply Option.	Type
A	220Vac
B	110Vac
C	48Vdc
D	24Vdc
E	220 / 110Vac
F	110Vdc
G	24Vac
H	220Vdc
I	12Vdc
U	Universal 100 - 250Vac 140 - 300Vdc

***N.B.** The distance given is approximate, and assumes a good fibre without any bad splices.

3 PREPARATION FOR USE

3.1 Unpacking

Each unit is shipped factory tested, and carefully packed in a protective packaging. Carefully unpack the units and visually inspect them for any damage that may have occurred during transport. The manufacturer will not be held liable for any damage during transport.

3.2 Configuration & Installation

Check that the supply voltage matches that of the equipment before the installation commences. Also ensure that the total link loss across the fibre falls within the optical power budget of the equipment. See the Stock Codes for the different options and specifications.

Begin by connecting the power cables to the unit. The units have no power switch and will be ON the moment the power is connected. The connector will be a 3-pin power socket for AC units, or a 2-pin screw terminal for DC units. Take note that the power indication on the front panel is lit. Proceed to connect the fibre cables, taking note that TX on the local side must be connected to RX on the remote side; and vice versa. Be careful not to contaminate the fibre ends, or to bend the fibre beyond its tolerances. Once both directions are linked, the LINKOK led's should light up on both sides.

The cables can now be connected between the audio / switching equipment, and the fibre units. The connections on the RJ11 6 pin connector are as follows (as seen when looking at the connector on the rear, pin 1 being on the left):

1 - E Output	6 - M Input
2 - Audio In Leg A	5 - Audio In Leg B
3 - Audio Out Leg A	4 - Audio Out Leg B

Finally, connect the Protection Earth tag on the back of the unit to a known good Earth point (such as an Earth Bus Bar). This is essential for the protection circuits inside the unit, and for proper operation of the E & M Switching circuits. **Remember to reference the switching equipment System Ground to Earth as well.**

Basic Circuit Operation

The audio signals are continuously transmitted between the two units. The E switching outputs are only activated when the relevant M Inputs are activated on the remote unit.

4 OPERATOR'S INSTRUCTIONS

The unit needs no operator intervention to function correctly. If a fault arises, it is necessary to observe the indicators on the front panel and to perform such procedures as outlined in the maintenance instructions.

5 MAINTENACE INSTRUCTIONS

No routine maintenance is required on this equipment.

5.1 First Line Maintenance

5.1.1 Instruments & Tools Required

Multimeter
Optic Power Meter
Audio Test Set (or Signal Generator and Oscilloscope)

5.1.2 First Line Maintenance

When arriving at a suspect link, it is always necessary to observe the indications and to ensure that all the copper connections have been done correctly. Many faults are sometimes traced to broken or shorted wires, especially in industrial environments.

First observe the POWER indicator. If it is OFF, use the multimeter to check the supply voltage. Next, the fuses must be checked. The AC unit has a fuse inside the power socket at the back of the unit. The DC unit has a fuse inside on the power supply board itself. Replace any blown fuses only with those of the same value. If the fuse blows again, then the power supply is faulty and the unit will have to be sent for repair.

Observe the LINK OK indicator. If it is OFF then it means the unit is unable to lock onto a signal from the fibre. Use the Optic Power Meter to measure the strength of the incoming signal on the RX fibre. The unit will fail to lock if this level falls outside of the specification. If there is no reading, then either the fibre is faulty or the remote unit is not transmitting, and will have to be checked.

Use the Optic Power Meter to measure the Optic Transmit Level, and ensure that it is within the specification. If this level is very low, then the remote unit might not lock onto it.

If all the POWER and LINK OK indications are ON, then all the audio lines can be tested for functionality. This can be done by using a Signal Generator to input a 0dBm (2.2Vp-p) audio signal @ 820Hz at one end; and then checking the audio signal output at the remote end with the Oscilloscope. Remember to use a 600Ohm termination load in order to obtain the correct audio output level. Alternatively, an Audio Test Set can be used to check for functionality.

The M Detect Inputs can be activated by simply shorting the M input wire to Earth (such as the Earth Tag on the rear of the unit). Once activated, the LOOP led for that channel should light up on the front panel, and the corresponding RING led should light up for the E Output on the remote unit.

If all these tests have been done, and the units are still not operational, then the supplier should be contacted, and the units possibly sent in for repair.

6 SPECIFICATIONS

6.1 Electrical

Power Consumption:	~ 30mA @ 220Vac	6.6W
	~100mA @ 48Vdc	4.8W
	~ 55mA @ 110Vdc	6.1W

Audio:

Line Impedance	600 Ohm
Frequency Response	300Hz to 3400Hz
Audio Level	0dBm (2.2Vp-p into 600Ohm) nominally +3dBm (3.1Vp-p into 600Ohm) maximum

Switching:

M Input Detection	
Positive:	Usually between +12V (or +5V), and Earth
Negative:	Usually between Earth and -12V or -48V
E Output Switching	Same as above.

6.2 Physical

6.2.1 Desktop Unit

Length	202mm
Width	180mm
Height	42mm (1U)
Weight	1.5kg

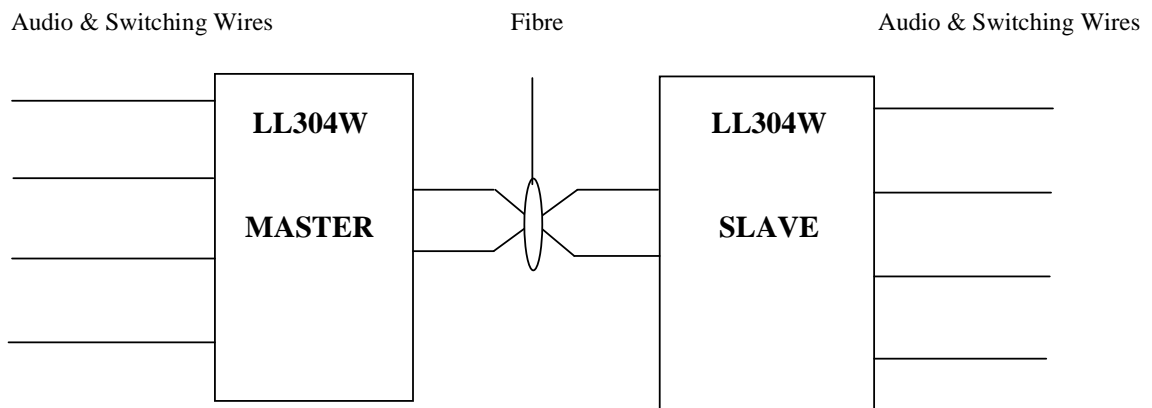
6.2.2 Rack-Mount Unit

Euro-sized card for mounting in 3U high 19" Rack.

6.3 Environmental

Temperature	-5°C to +55°C
Humidity	0 - 95% non-condensating

7 WIRING BLOCK DIAGRAM.



8 CONTACT DETAILS

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