

OPERATIONAL DESCRIPTION

1.1. Equipment description

LX-IP RAVENA

CONFIGURATION

Bus/Format	PCI Express® x1 (compatible x1, x4, x8, x16 slots)
Size	111.15 mm x 167.65 mm x 20 mm
Power requirements (+3.3V/+12V)	0.4 A / 0.12 A
Operating: temp / humidity (non-condensing)	0°C / +50°C • 5% / 90%
Storage: temp / humidity (non-condensing)	-5°C / +70°C • 0% / 95%

INPUTS AND OUTPUTS

Connectors	2 Gigabit Ethernet RJ45 ports for RAVENNA In/Out (dual port or Primary/Back up mode) 1 optical connector for MADI In/Out (Factory option) 1 BNC for Word Clock In
RAVENNA input and output channels	Up to 128/128 Input/Output (Mono) channels at 44.1 kHz or 48 kHz (64 / 64 I/O on each Gigabit Ethernet interface)
RAVENNA packet size	From 128 down to 1 (ultra-low latency profile) audio samples per RAVENNA packet
AES 67 compliance	Full compliance in all respects with AES 67 (excepted SIP)
Supported audio payload formats	PCM16 / PCM24 / PCM32 / AM824 (PCM24+AES3 channel status)
PC Record / Play channels	64/64 simultaneous Record / Play (Mono) channels to/from PC
MADI (Multichannels Audio Digital Interface) inputs and outputs	Optical I/O connector, 64/64 Inputs/Outputs (Mono) at 48 kHz sampling frequency and 32/32 Inputs/Outputs (Mono) at 96 kHz (Factory option)
Word Clock input	TTL input, impedance selectable by jumper (75 Ohms / HighZ)
Clock sources	PTPv2 (IEEE1588-2008) from network or internal clock or Word Clock or MADI input Local clock eligible as GrandMaster PTP Local clock precision: better than 10 ppm
Sampling frequencies	From local clock: 44.1 kHz, 48 kHz and 96 kHz (MADI) From network or Word Clock: 44.1 kHz, 48 kHz and 96 kHz (MADI) From MADI: 44.1 kHz, 48 kHz, 96 kHz

CONTROL AND ROUTING

Routing	Zero latency on-board routing matrix between RAVENNA, PC Rec/Play and optional MADI channels
Control	HTTP (web pages from embedded server) EMBER+

ENVIRONMENT

Latency	Roud trip time down to 1.8 ms (excluding IP network)
Supported operating systems	Windows 8 and 7 32/64bits, Windows server 2003/2008, Linux
Supported drivers	ASIO, WASAPI / low latency WDM DirectSound, Digigram np, ALSA

LX-MADI**CONFIGURATION**

Bus/Format	PCI Express® x1 (compatible x1, x4, x8, x16 slots)
Size	111.15 mm x 167.65 mm x 20 mm
Power requirements (+3.3V/+12V)	0.4 A / 0.12 A
Operating: temp / humidity (non-condensing)	0°C / +50°C • 5% / 90%
Storage: temp / humidity (non-condensing)	-5°C / +70°C • 0% / 95%

INPUTS AND OUTPUTS

Connectors	1 optical connector for MADI In/Out 1 BNC for Word Clock In
MADI (Multichannels Audio Digital Interface) inputs and outputs	64/64 Inputs/Outputs (mono) or 56/56 Inputs/Outputs at 48 kHz sampling frequency and 32/32 Inputs/Outputs at 96 kHz sampling frequency
Word Clock input	TTL input, impedance selectable by jumper (75 Ohms / HighZ)
Clock sources	Internal or Word Clock or MADI input Local clock precision : better than 10 ppm
Sampling frequencies	From local clock: 44.1 kHz, 48 kHz, 96 kHz From Word Clock: 44.1 kHz, 48 kHz, 96 kHz From MADI: 44.1 kHz, 48 kHz, 96 kHz

ENVIRONMENT

Latency and PC interface	Roud trip time down to 1.8 ms
Supported operating systems	Windows 8 and 7 32/64 bits, Windows server 2003/2008, Linux
Supported drivers	ASIO, WASAPI / low latency WDM DirectSound, Digigram np, ALSA

➤ **LX 1616ESe & LX 6464ESe**

FEATURES

LX1616ESe and LX6464ESe are audio cards for PCI EXPRESS™ x1 (PCIe®) bus, and can be inserted in PCIe® (x1, x4, x8 ou x16) slots.

LX1616ESe main hardware features

- 16 EtherSound ES-100 mono inputs at 44.1 kHz or 48 kHz
- 16 EtherSound ES-100 mono outputs at 44.1 kHz or 48 kHz
- 1 standard Word Clock input with selectable input impedance

On the LX1616ESe, EtherSound I/Os can be added by up to three bundles of 16/16 channels through a software key. For this option, please contact your system supplier.

LX6464ESe main hardware features

- 64 EtherSound ES-100 mono inputs at 44.1 kHz or 48 kHz
- 64 EtherSound ES-100 mono outputs at 44.1 kHz or 48 kHz
- 1 standard Word Clock input with selectable input impedance

Main software features

- Real-time, simultaneous record and playback in PCM (16 and 24 bits)
- Low latency WDM DirectSound and ASIO drivers.
- Card can be used through the following programming interfaces (APIs): DirectSound kernel streaming, DirectSound, WASAPI, ASIO.

Configuration

	LX1616ESe & LX6464ESe
Bus/Format	PCI EXPRESS™ (PCIe®) x1 (x2, x4, x8, x16, x32 compatible)
Size	169 mm x 99 mm x 20 mm
Power requirements (+3.3 V / +12 V)	0.4 A / 0.12 A
Operating: temp / humidity (non-condensing)	0°C / +50°C • 5% / 90%
Storage: temp / humidity (non-condensing)	-5°C / +70°C • 0% / 95%

Inputs/Outputs

	LX1616ESe	LX6464ESe
Audio inputs	- 16 EtherSound channels at 44.1 or 48 kHz	- 64 EtherSound channels at 44.1 or 48 kHz
Audio outputs	- 16 EtherSound channels at 44.1 or 48 kHz	- 64 EtherSound channels at 44.1 or 48 kHz
Other inputs	Word clock, 44.1 or 48 kHz, with selectable input impedance (High Z / 75 ohms) (can be used if card delivers the master clock for the EtherSound network).	

Connectors

	LX1616ESe & LX6464ESe
EtherSound IN	RJ45 female
EtherSound OUT	RJ45 female
Word Clock IN	BNC female
Word Clock input impedance	Jumper: High Z / 75 ohms

EtherSound

	LX1616ESe & LX6464ESe
Technology	ES-100
Functions	Compatible with Ring Redundancy mode Can generate the audio network clock in all modes
Network clock frequencies supported	Can generate a 48 KHz audio clock for the EtherSound network Can synchronize on an EtherSound network at either 44.1 or 48 kHz
Other inputs	Word clock LX card can generate a 44.1 or 48 kHz audio clock synchronized on the Word Clock In
EtherSound virtual control port	Virtual Ethernet interface, enabling a software application such as EScontrol, installed on the same PC as the LX card, to control and monitor the EtherSound network through the LX card.

Audio specifications

	LX1616ESe & LX6464ESe
Audio sampling frequencies supported	48 kHz, 44.1 kHz
Supported audio formats	PCM 16, 24, 24 bits <i>"packed"</i> (packets of 32 bits)

Development environments

	LX1616ESe & LX6464ESe
Management	DirectSound, WASAPI, ASIO
Supported operating systems	Windows XP, Windows 7 / Windows 8 / Windows 2008 Server (32-bit and 64-bit versions)

1.2. Related Submittal(s) / Grant(s)

All host equipment used in the test configuration are FCC granted, when relevant.

Trade Mark – Model Number (Serial number)	FCC ID	Description	Cable description
LX-IP RAVENNA * (sn : 14022 28191)	IGTLXIP	PCI Express sound card	I/O cables shielded
DELL VOSTRO 220 Model: DCSCMF (sn: 6L2374J)	DoC	Personal computer	Power cord unshielded. All other cable shielded.
PHILIPS 19S video monitor (Model: 190S6FS/00) (sn: BZ000551116501)	DoC	Monitor	Power cord unshielded. Video cable shielded with ferrites
DELL Model: SK-8115	DoC	Keyboard	USB cable (1.2m)
DELL Model: ODJ301	DoC	Mouse	USB cable (1.2m)
DirectOut Technologies (Model: D.O.TEC PRODUCER.COM) (Sn: 23567849)	DoC	MADI Embedder / De-Embedder	Power cord unshielded. All other cable shielded.
EtherSound AQONDA 16 (DIGIGRAM product) Sn: 2444.00020009 & N.C	Doc	Controllable Ethersound audio bridges	Power cord unshielded. Optic cable is unshielded All other cable shielded.

*: Equipment under test.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-2003, FCC Part 15 Subpart B.

Radiated testing was performed at an antenna to EUT distance of 10 or 3 meters. During testing, all equipment's and cables were moved relative to each other in order to identify the worst case set-up.

1.4. Test facility

Tests have been performed on March 19th and 20th, 2014.

This test facility has been fully described in a report and accepted by FCC as compliant with the radiated and AC line conducted test site criteria in ANSI C63.4-2003 in a letter dated May 6th, 2014 (registration number 171131). All pertinent data for this test facility remains unchanged.