OPERATIONAL DESCRIPTION

1.1. LX6464ES description

64/64 I/O channel EtherSound PCI sound card

LX6464ES

The LX6464ES is a versatile PCI sound card that provides a convenient and effective way to bridge a wide range of computer audio applications to all channels of a 100Mb/s EtherSound network.

With up to 64 inputs/outputs, the LX6464ES combines the widely used EtherSound technology for distributing real-time audio over Ethernet with Digigram's sound card expertise. Professional audio software applications now have a gateway to EtherSound networks.

Applications

- broadcast
- live
- installed sound
- recording

Key features

- 64 bi-directional PCM linear channels over EtherSound using DirectSound or ASIO drivers.
- Word Clock synchronization
- I/O routing remotely controllable via EScontrol or other applications using the EtherSound SDK
- EtherSound ES100 firmware making it compatible with the EtherSound redundant ring topology

Digigram LX6464ES EtherSound PCI sound card comes with DirectSound and ASIO drivers. It can transmit and receive up to 64 EtherSound channels, thus connecting professional audio software to any EtherSound network for a wide range of applications.
In a live environment using EtherSound as the ultra-low latency audio distribution system the ability to receive up to 64 channels from an EtherSound-ready mixing console and record them straight onto a computer's hard disk for mix down at a later date, offers a highly cost-effective solution for multichannel recording and a solution for musician replacement during sound checks.

With its ability to record many channels from different locations, the LX6464ES is also a perfect solution for logging applications and surveillance monitoring. For hotels, conference centers and other multiroom venues, the LX6464ES offers the ability to play back up to 32 stereo music programs from just one PC, or 64 in mono mode.

In broadcast installations, LX6464ES teaming up with Digigram analog and digital EtherSound interfaces offers a compelling solution for multichannel audio delivery and distribution in and between studios via standard Ethernet.

LX6464ES

Configuration	
Bus/Format	32-bit/66 Mhz Universal PCI, PCI and PCI-X compatible, master mode
Size	175 mm x 99 mm x 20 mm
Power requirements (+3.3V/+5V /+12V /–12V)	1 A / 0.2 A / 0 A / 0 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	
EtherSound inputs (mono)	64 at 48 / 44.1 kHz ; 32 at 96 / 88.2 kHz(1) ; 16 at 192 / 176 kHz(1)
Word Clock input	Yes
EtherSound outputs (mono)	64 at 48 kHz ; 32 at 96 / 88.2 kHz(1) ; 16 at 192 / 176 kHz(1)
Connectors	2 female RJ45 for EtherSound In/Out 1 BNC for Word Clock In
EtherSound	
EtherSound technology	ES-100
Clock sources	Network (44.1 or 48khz), internal (48khz) or Word Clock (44.1 or 48Khz).
Sampling frequencies	44.1, 48, *88.2, 96, 176.4, 192 kHz(1)*
Supported topologies	Star Bidirectional daisy-chain Redundant ring
Environments	
Management	Low-latency WDM DirectSound, ASIO, and Wave(1) (all PCM only) ES control, EtherSound SDK
Supported audio formats	PCM 16 and 24 bit
Supported operating systems	Windows XP(2) and Windows 2003(2) Server

(1) Please consult Digigram for availibility
(2) 32-bit version

About EtherSound ES100
ethernetworking professional audio

EtherSound is an elegant, simple, and open digital audio network standard with extremely low latency that is fully compliant with the IEEE's 802.3x Ethernet specification.

- Channel count (at 44.1/48kHz)
  - Per 100 Mbps cable: up to 64 channels in each direction
  - Per system: Total channel count may exceed 128 by "overwriting" existing channels in parts of the network.
  - All channels are independent from one another.
  - In bi-directional daisy-chains all channels are available to all nodes. In star architectures or uni-directional daisy-chains, all channels are available to all nodes "downstream" of the input.
- Sampling frequency: 44.1 kHz or 48 kHz or multipliers/divisors (88.2, 96, 24 kHz, etc.)
- Audio format: 24-bit PCM
- Audio clock: All devices are synchronized from the clock reference of a master device on the network. Phase can be recovered using a distributed Word Clock source.
- Bandwidth requirements: dedicated 100 Mbps Ethernet network. Operational in VLANs on Gigabit networks.
- Latency:
  - Network latency (SSI in to SSI out): 104 micro-seconds (five samples at 48 kHz)
  - Independent from the number of channels
  - Additional latency per device in a daisy-chain: 1.4 microseconds
  - Additional latency per switch: 5 – 20 microseconds
  - Overall latency, including A/D and D/A conversion: 1.5-2 milliseconds
  - EtherSound is deterministic with stable latency: delay and phase between any two nodes can be calculated.
- Ethernet standard compliance
  - Fully IEEE 802.3x compliant.
  - Operational with standard Ethernet network layer 1 & 2 components (cables, fiber optics, switches, media converters, etc.)
- Control and monitoring data over the same cable
  - Network remote control through embedded control data
  - Standard control software with multi vendor support: EScontrol
  - Control application generator with multi vendor support via strategic partnership with Stardraw.com
  - ES command port for microcontroller based control system
- Network architectures:
  - Daisy-chain / Redundant ring
  - Star through Ethernet switches
  - Combination of daisy-chain and star
- Inter-operability
  - EtherSound enabled products are available from a number of leading audio equipment manufacturers for installed sound and pro audio applications.
  - Regardless of the product's manufacturer, all products can operate as a unified system on the same network, exchanging audio and control signals.

Digigram SA
(Serving Europe, Africa, Middle East, Latin America)
Parc de Pré Milliet
38330 Montbonnot-FRANCE
Tel: +33 (0)4 76 52 55 01
Fax: +33 (0)4 76 52 53 07
E-mail: sales@digigram.com

Digigram Inc.
(Serving North America)
2101 Wilson Boulevard, Suite 1004,
Arlington, VA 22201-USA
Tel: +1 703 875 9100
Fax: +1 703 875 9161
E-mail: input@digigram.com

Digigram Asia Pte Ltd.
(Serving Asia and Australia/Oceania)
350 Orchard Road
#19-07 Shaw House Singapore
238868-SINGAPORE
Tel: +65 6291 2234 - Fax: +65 6291 3433
E-mail: info_asia@digigram.com

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

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

1.3. Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

Trade Mark – Model Number (Serial number)	FCC ID	Description	Cable description
LX6464ES * (sn : Proto 2)	IGTPCXES	EtherSound PCI card	Ethernet cables IN & OUT shielded Work Clock In cable shielded
DELL, Model: SMM01 (sn: CNBX11J)	DoC	Personal computer	Power cord unshielded. All other cable shielded.
Hewlett Packard pn:D2846 (sn: JP74001000)	DoC	Monitor	Power cord unshielded. Video cable shielded with ferrites
Hewlett Packard pn:C3751B (sn: LZA62831217)	DZL211029	Mouse	PS2 cable (1.5m)
Hewlett Packard pn: C4734/60201 (sn: MR80605455)	GYUR38K	Keyboard	PS2 cable (1.2m)
Hewlett Packard DESKJET 895cxi (sn: HU9C51T11C)	none	Parallel printer	Power cord unshielded. All other cable shielded.
Hewlett Packard HP48GX (sn: ID83802369)	none	Serial calculator	Serial cable shielded
DIGIGRAM - Audio Load Box (sn: none)	none	Load box	Earth wire (1.5m)
DIGIGRAM ES8 (ES8 OUT XLR) (sn: 1500000134)	none	EtherSound bridge	Power cord unshielded. Ethernet shielded
DIGIGRAM ES881 (sn: None)	none	EtherSound bridge	Power cord unshielded. Ethernet shielded

***: Equipment under test.**

1.4. 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 meters. During testing, all equipment's and cables were moved relative to each other in order to identify the worst case set-up.

1.5. Test facility

Tests have been performed on September 4th and 5th, 2006.

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 July 14, 2005 (registration number 94821).
This test facility has also been accredited by COFRAC (French accreditation authority for European Union test lab accreditation organization) according to NF EN ISO/IEC 17025, accreditation number 1-1633 as compliant with test site criteria and competence in 47 CFR Part 15/ANSI C63.4 and EN55022/CISPR22 norms for 89/336/EEC European EMC Directive application. All pertinent data for this test facility remains unchanged.