



EtherSound PCI sound cards

## LX1616ES & LX6464ES

Digigram LX1616ES and LX6464ES are versatile PCI sound cards that provide convenient and effective ways to bridge a wide range of computer audio applications to 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.

The LX1616ES is the right choice when direct-to-disk applications need to play and/or record selected ES-100 audio channels without jeopardizing flexibility. Should your application be highly price sensitive or require more channels in the future, the LX1616ES comes with a channel count of 16/16 that can be upgraded on the fly to 32/32, 48/48 or 64/64 through simple firmware updates.

### Applications

- broadcast - live - installed sound - recording

### Key features

- From 16 to 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 ES-100 firmware making it compatible with the EtherSound redundant ring topology

Digigram LX1616ES & LX6464ES EtherSound PCI sound cards come with DirectSound and ASIO drivers. They can transmit and receive up to 64 EtherSound channels, thus connecting professional audio software to any 100 Mb/s EtherSound network for a wide range of applications.

In a live environment using 100 Mb/s 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 their ability to record many channels from different locations, the LX1616ES & LX6464ES are also perfect solutions for logging applications and surveillance monitoring. For hotels, conference centers and other multiroom venues, the LX1616ES & LX6464ES offer the ability to play back up to 32 stereo music programs from just one PC, or 64 in mono mode.

In broadcast installations, LX1616ES & LX6464ES teaming up with Digigram analog and digital EtherSound interfaces offer a compelling solution for multichannel audio delivery and distribution in and between studios via standard Ethernet.

# LX1616ES & LX6464ES

## LX1616ES & LX6464ES

<b>Configuration</b>	
<b>Bus/Format</b>	32-bit/66 Mhz Universal PCI, PCI and PCI-X compatible, master mode
<b>Size</b>	175 mm x 99 mm x 20 mm
<b>Power requirements (+3.3V/+5V /+12V /-12V)</b>	1 A / 0.2 A / 0 A / 0 A
<b>Operating: temp / humidity (non-condensing)</b>	0°C / +50°C • 5% / 90%
<b>Storage: temp / humidity (non-condensing)</b>	-5°C / +70°C • 0% / 95%
<b>Inputs and outputs</b>	
<b>EtherSound inputs (mono)</b>	
<b>LX1616ES</b>	16* at 48 / 44.1 kHz ; 8 at 96 / 88.2 kHz <sup>(1)</sup> ; 4 at 192 / 176 kHz <sup>(1)</sup>
<b>LX6464ES</b>	64 at 48 / 44.1 kHz ; 32 at 96 / 88.2 kHz <sup>(1)</sup> ; 16 at 192 / 176 kHz <sup>(1)</sup>
<b>Word Clock input</b>	Yes
<b>EtherSound outputs (mono)</b>	
<b>LX1616ES</b>	16* at 48 kHz ; 8 at 96 / 88.2 kHz <sup>(1)</sup> ; 4 at 192 / 176 kHz <sup>(1)</sup>
<b>LX6464ES</b>	64 at 48 kHz ; 32 at 96 / 88.2 kHz <sup>(1)</sup> ; 16 at 192 / 176 kHz <sup>(1)</sup>
<b>Connectors</b>	2 female RJ45 for EtherSound In/Out 1 BNC for Word Clock In
<b>EtherSound</b>	
<b>EtherSound technology</b>	ES-100
<b>Clock sources</b>	Network (44.1 or 48khz), internal (48khz) or Word Clock (44.1 or 48Khz).
<b>Sampling frequencies</b>	44.1, 48, 88.2, 96, 176.4, 192 kHz <sup>(1)</sup>
<b>Supported topologies</b>	Star, Bidirectional daisy-chain, Redundant ring
<b>Environments</b>	
<b>Management</b>	Low-latency WDM DirectSound, ASIO, and Wave <sup>(1)</sup> (all PCM only) ES control, EtherSound SDK
<b>Supported audio formats</b>	PCM 16 and 24 bit
<b>Supported operating systems</b>	Windows Vista, Windows XP <sup>(2)</sup> and Windows 2003 <sup>(2)</sup> Server

\* LX1616ES may receive up to three packs of 16/16 additional ES-100 channels (at 44.1 or 48 kHz).

<sup>(1)</sup> Please consult Digigram for availability. <sup>(2)</sup> 32-bit version

## About EtherSound ES-100



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.

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