

D i g i g r a m

VX222HR

VX222HR-Mic

*Professional Stereo
Sound Cards*



User's manual

**For technical support,
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VX222HR & VX222HR-Mic

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Warning:



Electrostatic discharge (ESD) can damage several components on the board. To avoid such damage in handling the board, take the following precautions:

Bring the device and everything that contacts it to ground potential by providing a conductive surface and discharge paths. As a minimum, observe these precautions:

- Disconnect all power and signal sources.
- Place the device on a grounded conductive work surface.
- Ground yourself via a grounding wrist strap or by holding a grounded object.
- Ground any tool that will contact the device.



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INFORMATION FOR THE USER

This device complies with part 15 of FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a CLASS B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions contained in this data sheet, may cause harmful interference to radio and television communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- * reorient or relocate the receiving antenna
- * increase the separation between the equipment and the receiver
- * connect the equipment into an outlet on a circuit different from that of the receiver
- * consult the dealer or an experienced audio television technician.

Note: Connecting this device to peripheral devices that do not comply with CLASS B requirements or using an unshielded peripheral data cable could also result in harmful interference to radio or television reception. The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. To ensure that the use of this product does not contribute to interference, it is necessary to use shielded I/O cables.

IMPORTANT NOTICE

This card has been tested and found to comply with the following standards:

- International: CISPR22 Class B.
- Europe: EMC 89/336/CEE (1992) specifications.
- United States: FCC Rules-Part 15-Class B (digital device).

In order to guarantee compliance with the above standards in an installation, the following must be done:

- the provided cable must not be modified.
- additional cables used must have their respective shield connected to each extremity.

CONTENTS OF THIS PACKAGE

Thank you for purchasing a Digigram VX sound card.

The package consists of the following components:

- a VX222HR or VX222HR-Mic sound card
- the User's Manual at hand.

The end user version additionally includes:

- two breakout cables (analog and digital)
- a CD-Rom with drivers, installation notices, FAQs, etc...
- a registration form

For the OEM version, the cables are available optionally.

FEATURES

VX222HR and VX222HR-Mic are audio cards for PCI bus. They are 'Universal PCI 64-bit/66 MHz', which means they can be plugged in 32-bit/33 MHz 5 V keyed PCI slots as well as in 64-bit/66 MHz 3.3 V keyed PCI slots. The cards are also compatible with PCI-X interfaces.

VX222HR & VX222HR-Mic main hardware features

- 2 balanced* analog mono line inputs, with software adjustable gain and a maximum input level of +24 dBu
- 2 servo-balanced** analog mono line outputs, with software adjustable gain and a maximum output level of +24 dBu
- 1 digital AES/EBU*** stereo input
The selection of the digital input for recording excludes the selection of the analog inputs.
It is possible to use the signal on the digital input as reference clock.
- 1 digital AES/EBU*** stereo output
Always transmits the digital version of the analog outputs 1 and 2.
- 1 LTC (Linear Time Code) input
- 1 mini jack headphone stereo output
This output is in parallel of the analog outputs 1 and 2.
- 2 General Purpose inputs and 2 outputs (GPIOs)
- Inter-card synchronization connector

* can be used with unbalanced signals

** electronically servo-balanced outputs provide automatic level adjustment to accommodate either balanced or unbalanced lines

*** can be used as S/PDIF interface as well

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Additional hardware features VX222HR-Mic

- 1 analog microphone input with
 - high-quality preamplifier
 - switchable 48 V phantom power
 - analog expander/compressor/limiterThis input is mixed with the two line inputs before A/D conversion.
- 1 AES/EBU Sync input
- The AES/EBU input is AES42 compatible and features a hardware sample rate converter (*for details see chapter 'Specifications'*)
The two AES/EBU inputs on the VX222HR-Mic allow:
 - recording of a digital signal on the AES/EBU data input; this input is also used as source of synchronization with a digital clock
 - recording of a digital signal on the AES/EBU data input, synchronized on a digital clock connected to the AES/EBU synchronization input;
 - the synchronization of analog recording and playback on an AES/EBU clock connected to the AES/EBU Sync input.The selection of the digital input excludes the selection of the analog inputs.

Note: AES42 is an extension of the digital audio standard of interface AES3 providing for interfacing digital microphones.

Main software features

- Real-time, simultaneous PCM record and playback (8, 16 and 24 bits), Float IEEE754 (with 24-bit fixed-point dynamic range)
- When using the np SDK, real-time on-board mixing of several PCM audio streams, direct monitoring, level adjustment, panning, cross-fades, punch-in/punch-out, scrubbing
- Possibility to control the parameters of the inputs and outputs (gains, mutes, 48 V switch, analog compressor-limiter-expander parameters), from the provided '**Digigram Hardware Settings**' application, or from any application that addresses these controls
- 24-bit DSP effects in playback and recording: 3-band parametric equalizer plus Maximizer
- Low latency DirectSound, Wave, and ASIO drivers

HARDWARE REQUIREMENTS

Minimum requirements

- Pentium III 700 MHz (or equivalent) minimum
- One free PCI (3.3 V or 5 V keyed) or PCI-X slot

Software requirements

To use your VX222HR or VX222HR-Mic, install the driver from the HR Runtime package version 1.40 or higher. This package includes a *WDM DirectSound* driver. Microsoft DirectX 9 or a later version must also be installed. The card can also be used with applications based on Digigram's np SDK

Supported operating systems

VX222HR and VX222HR-Mic cards run under Windows 2000, Windows XP¹, and Windows Server 2003¹ and are compatible with the np SDK, and come along with low-latency DirectSound, Wave, and ASIO drivers.

HARDWARE INSTALLATION

The card has to be installed in the computer prior to installing its driver.

Installing the card

Gently plug the card in a free PCI slot and press it down to position it firmly. Tighten the screw.

Interrupt and memory address

Hardware interrupt and addresses are automatically set up at start-up by the PCI PnP BIOS.

SOFTWARE INSTALLATION

Please visit the Digigram web site at www.digigram.com for the most recent driver.

In case you run a specific application developed or installed by a Digigram partner, it might require the use of a specific driver version. In this case, make sure that the updated driver has been approved by your supplier.

¹ 32-bit version

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Installation under Windows 2000, XP, and Windows Server 2003

If the driver has been downloaded from our web site, it has to be expanded prior to the driver's installation as follows: double-click on the downloaded file (self-expanding). You can use the default destination location (Windows temporary folder) or select another directory.

- Shut down your computer and insert your VX card.
- Restart your computer.
- Click on **Cancel** if the “**Found New Hardware**” Wizard appears.
- Double-click on the **setup.exe** icon to launch the driver installation.
- A welcome message is displayed, click **Next** to continue.
- The “**License Agreement**” window appears: read it, and click on **Yes** to approve it. Do the same for the “**Read Me First**” window.
- Choose the destination folder where *Setup* will install the application files (..*pcxnp* by default). Note that the driver files are installed in ..\windows\system32\Drivers\Digigram\PCXHR **Next**.
- In the “**Select components**” window make sure that the “**Driver for the HR boards**” has been selected.
- Select the program folder where the program icons will be added (default: DIGIGRAM). **Next**.
- Click on **Next** to start copying the files.
- Click on **Continue anyway** in the “**Hardware installation**” window (Windows XP).
- In the “**Digigram drivers**” window, select the number and the size of buffers required by your applications. Click on **Ok**.
- Click on the **Finish** button to complete the driver installation.

Removing the driver under Windows 2000, XP, and Windows Server 2003

- Open the Windows Control Panel and double-click on the Add/Remove Software icon.
- Select "Digigram HR Runtime ...", and Change/Remove.
- Select **Remove** in the “**HR Runtime**” window.
- Follow the instructions to finish the driver removal.

How to check the installation

Once the driver and the cards are installed according to the procedure described in this manual, you can verify that the card is properly installed and works fine as follows:

- Menu **<Start> <Settings> <Control panel>, <Sound and Multimedia>**, tab **“Audio”**, **Default device** (Playback device, Recording device). The card's channels can be selected. The card can be used with any *DirectSound* application (see pages hereafter).
- The card is also visible via the np interface: Go to **<Start> <Programs> <Digigram>** and select **<Digigram Control Center>**.
- In the **“Digigram drivers”** window, select the **‘General Information’** tab.
In the **“Modules Information”** window, you can see the **HR Runtime** modules that have been installed, and their versions.
- In the **“Digigram drivers”** window, select the **‘Diagnostics’** tab. You should see here the icons of the cards you have installed.

If the card you have installed is listed:

- Right click on the icon of the card.
- Select **‘Diagnostics’**, and **Play Sine**. This plays in loop a sine signal on the outputs of the card. You can also select **Play file** to play in loop a file of your choice (PCM only).
If the playback is correct, the card is correctly installed and works.
- To stop the playback, right click on the card icon, and select **Stop Activities**.

The card is also visible via the DHS control panel (cf. dedicated chapter next page).

If the card is not displayed:

- Make sure that during the HR runtime installation the **“Driver for the HR boards”** has been selected in the **“Select components”** window.
- make sure that the card is correctly inserted in the PCI slot, and screwed on the PC chassis.
- if necessary, uninstall HR runtime package as described in this manual, and re-install it.

The ‘Digigram Hardware Settings’ ('DHS') control panel

Digigram hardware settings (DHS) is an application allowing to configure the hardware resources of Digigram cards for all audio applications using them. A resource being managed by the DHS application can not be modified by any other applications. To enable an audio application to modify a Digigram card resource, this resource must not be managed by the DHS.

***Note:** As soon as a resource of a card is managed by the DHS, the clock selection of this chart **MUST** be defined in the DHS.*

The DHS allows to:

- Select the clock the card uses
- Select the input source
- Set analog and digital gains of an input
- Enable Sample Rate Converters of an input
- Select the input monitored on an output
- Set the monitoring gains
- Set the analog and digital gains of an output
- Define the digital output format

For help on how to use this control panel, please refer to its on-line help.

SPECIFICATIONS

Configuration

	VX222HR	VX222HR-Mic
Bus/Format	PCI 2.2, "Universal PCI 32-bit/66 MHz" master mode, "short-length" PCI format compatible, PCI-X compatible	
Digital Signal Processor	Motorola 56303 at 100 MHz	
RAM	128 kWords	512 kWords
Size	175 mm x 99 mm x 20 mm	
Power requirements (+3.3V/+5V / +12V / -12V)	0,35 A / 0,2 A / 0,2 A / 0,08 A	0,4 A / 0,3 A* / 0,22 A / 0,1 A
Operating: temp / humidity (non-condensing)	0°C / +50°C • 5% / 90%	
Storage: temp / humidity (non-condensing)	-5°C / +70°C • 0% / 95%	

Inputs

	VX222HR	VX222HR-Mic
Analog line inputs (mono)	2 balanced**	2 balanced**
Maximum input level/impedance	+24 dBu / <10 kΩ	+24 dBu / <10 kΩ
Digital inputs (stereo)	1 AES/EBU***	cf. separate table
Programmable input gain	analog: from -94 dB to +16 dB⊗ digital: from -110 dB to +18 dB	
Other inputs	2 GPI (dry contact), LTC	
AES11 synchronization	Yes	

* enabling phantom power (48 V) may increase this value by 50%
 using the 10 V AES42 power to feed the microphone may increase this value by 150%

** can be used with unbalanced signals

*** can be used as S/PDIF interface as well

⊗ maximum sensitivity: 0 dBFS for -16 dBu input

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Additional inputs VX222HR-Mic

Microphone input	1 professional mono with - high-quality preamplifier - switchable 48 V phantom power - analog expander/compressor/limiter <i>This input is mixed with the two line inputs before A/D conversion.</i>
Digital input (stereo)	1 AES/EBU, AES42 compatible - with hardware sample rate converter (SRC) - supplying 10 V to feed a digital microphone - allowing remote microphone control
Other inputs	AES/EBU Sync (up to 200 kHz)

Outputs

	VX222HR	VX222HR-Mic
Analog line outputs (mono)	2 servo-balanced**	
Maximum output level / impedance	+24 dBu / < 100 Ω	
Digital outputs (stereo)	1 AES/EBU, up to 200 kHz	
Programmable output gain	analog: from -24 dB to +24 dB digital: from -110 dB to +18 dB	
Other outputs	1 stereo headphone output (600 Ω) 2 GPO (relay, 0.5 A, 48 VCC)	

** electronically servo-balanced outputs provide automatic level adjustment to accommodate either balanced or unbalanced lines

Connectors

	VX222HR	VX222HR-Mic
Internal connector	Inter board synchronization	
External connectors	15-pin Sub-D for analog I/Os 15-pin HD Sub-D for digital I/Os, Sync., and GPIO - Mini jack headphone stereo output (3,5 mm TRS female jack)	

Audio specifications

	VX222HR	VX222HR-Mic
Sampling frequencies available	Programmable from 8 to 192 kHz	
A/D and D/A converter resolution	24 bits	24 bits
Supported audio formats	PCM (8, 16, 24 bits), Float IEEE754	

Analog audio performance

Measurements done at $F_s=48$ kHz unless stated otherwise, with filter on the 22 Hz- 22 kHz range

	VX222HR	VX222HR-Mic
Frequency response (record + play)	at 48 kHz: 20 Hz - 20 kHz: +0 /-0.3 dB at 96 kHz: 20 Hz - 40 kHz: +0 /-0.4 dB at 192 kHz: 20 Hz - 80 kHz: +0 /-1.1 dB	
Channel phase difference: 20/20kHz	<0.2°/2°	
Dynamic range (A-weighted)	Analog In: >104 dB Analog Out: > 106 dB	
THD + noise 1 kHz at -2 dBfs	Analog In: <-97 dB Analog Out: <-95 dB	
Crosstalk (Analog in or out)	1 kHz at 24 dBu: <-115 dB 15 kHz at 24 dBu: <-100 dB	

Sample rate converter performance

	VX222HR-Mic
Maximum frequency	192 kHz
Frequency ratio	from 1:8 to 7,5:1
THD + noise 1 kHz at -2 dBfs	<-130 dB

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Analog mono microphone input features

VX222HR-Mic

Power supply	switchable 48 V phantom power
Programmable mic gain	0 to 66 dB in 0.5 dB steps
Maximum input level/impedance	+10 dBu / >10 k Ω
Equivalent Input Noise, A/D-D/A at 48kHz, G=60 dB	<-125 dBu
Programmable noise-gate threshold	-52 dB, -42 dB, -32 dB
Programmable compressor/limiter threshold	from -26 dB to 0 dB
Programmable compressor ratio	1, 1.2, 1.5, 1.8, 2, 2.5, 3, 3.5, 4, 4.5
Programmable compressor/limiter gain	from 0 to 16 dB
Limiter ratio	15:1
Compressor/limiter release time	150 ms
Management of line and mic inputs	Mixed together before A/D, with independent level and mute controls
Programmable DSP effects on the output	3-band parametric equalizer plus Maximizer

AES42 microphone input features - VX222HR-Mic

Power supply	10 V min / 250 mA max
Remote control	Yes
Supported synchronization	Operational mode 1 (the microphone generates its own clock)

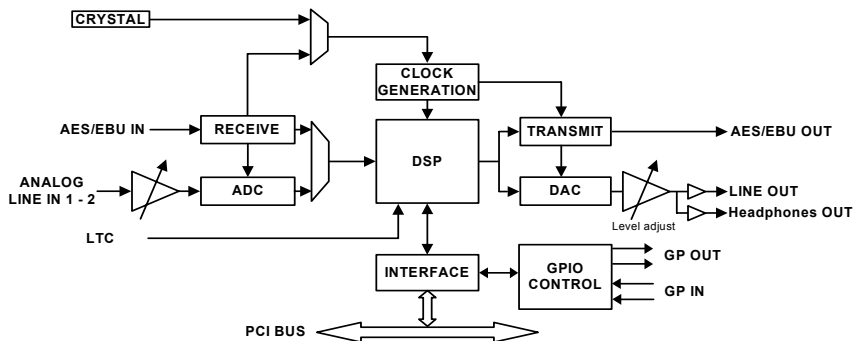
Development environments

	VX222HR	VX222HR-Mic
Digigram management	np SDK (HR runtime, PCM only)	
Other management	Wave, ASIO, DirectSound (all PCM only)	
Supported operating systems	Windows 2000, XP ¹ , and Windows 2003 ¹ Server	
Main on-board processing features (with np SDK)	PCM play, rec, Float IEEE754, direct monitoring, real-time mixing, level adjustment, <i>panning</i> , cross-fade, <i>punch-in/punch-out</i> , <i>scrubbing</i>	

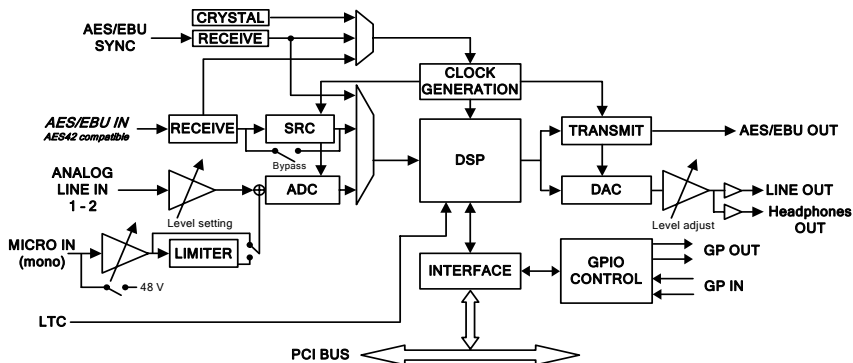
¹ 32-bit version

APPENDICES

VX222HR Schematic Diagram



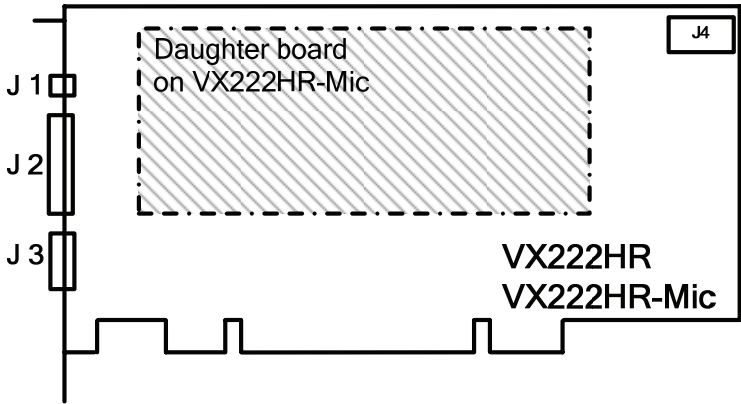
VX222HR-Mic Schematic Diagram



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Layout



J1 : Headphone connector:
(3.5 mm TRS female jack)

Contact	Signal
Sleeve	Ground
Tip	Left channel
Ring	Right channel

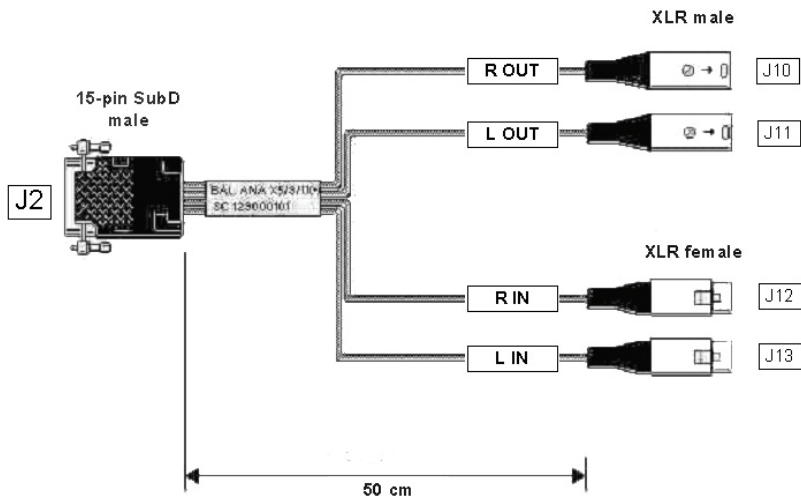
J2 : Analog cable

J3 : Digital cable

J4 : Inter-card synchronization connector

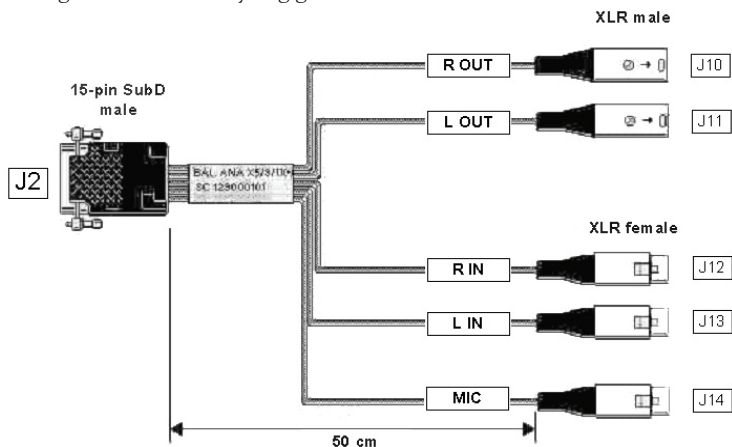
VX222HR analog cable diagram:

Analog cable delivered by Digigram:



VX222HR-Mic analog cable diagram:

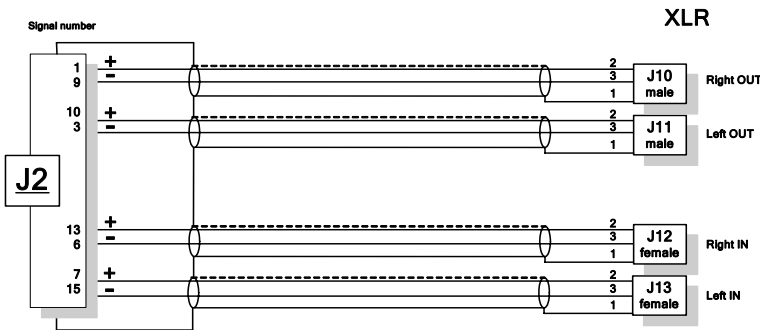
Analog cable delivered by Digigram:



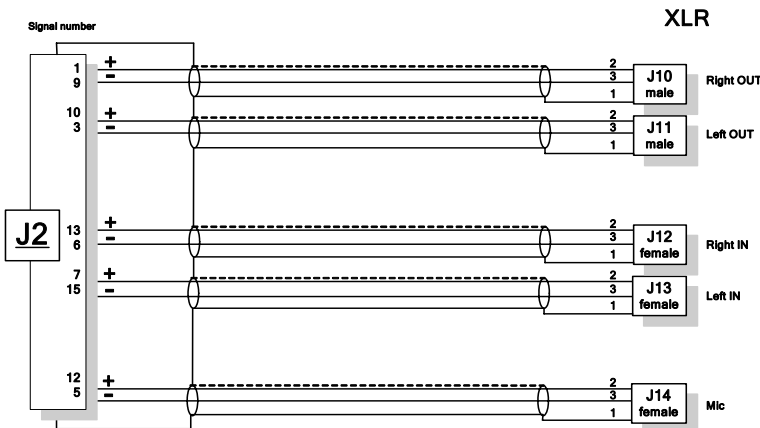
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Wiring Diagram – Analog Cable VX222HR

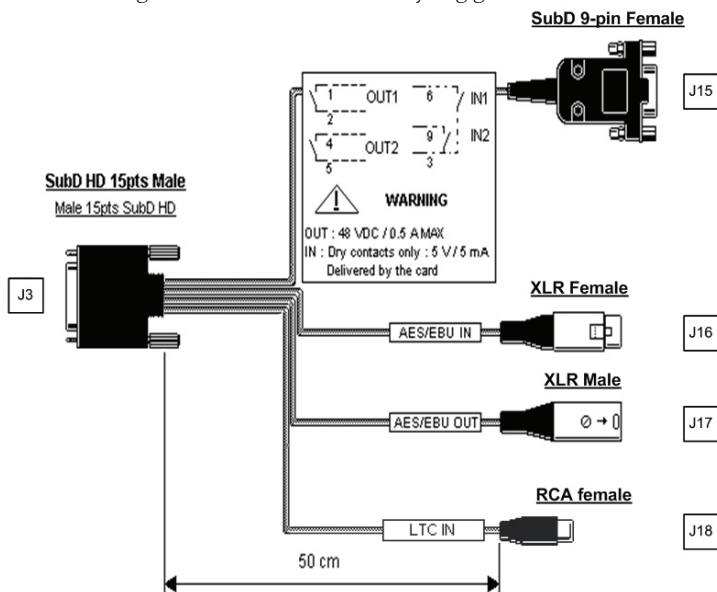


Wiring Diagram – Analog Cable VX222HR



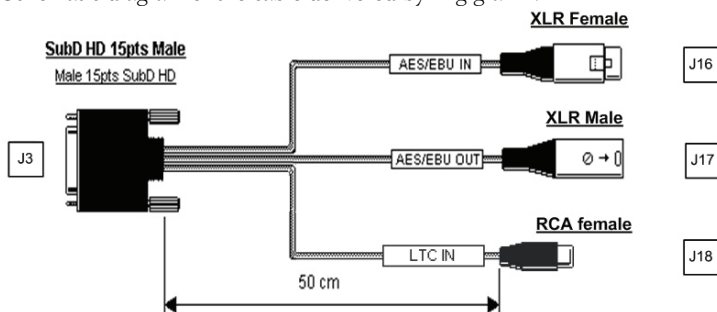
VX222HR digital cable with GPIOs

Schematic diagram of the cable delivered by Digigram*:



VX222HR digital cable without GPIOs

Schematic diagram of the cable delivered by Digigram*:

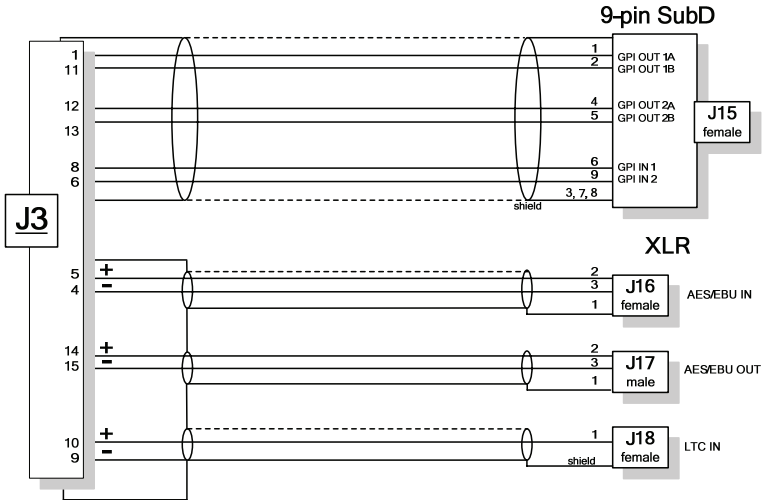


* Your cable may look different if it is not a Digigram cable.

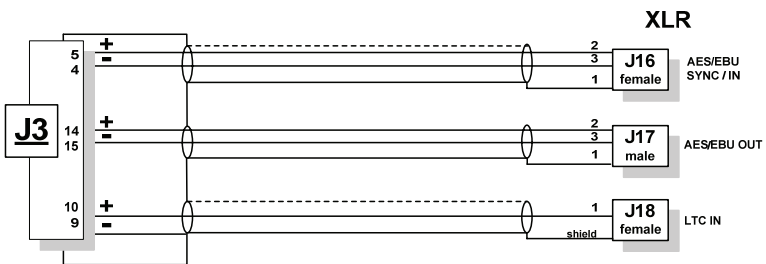
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Wiring Diagram – Digital Cable with GPIOs (VX222HR)

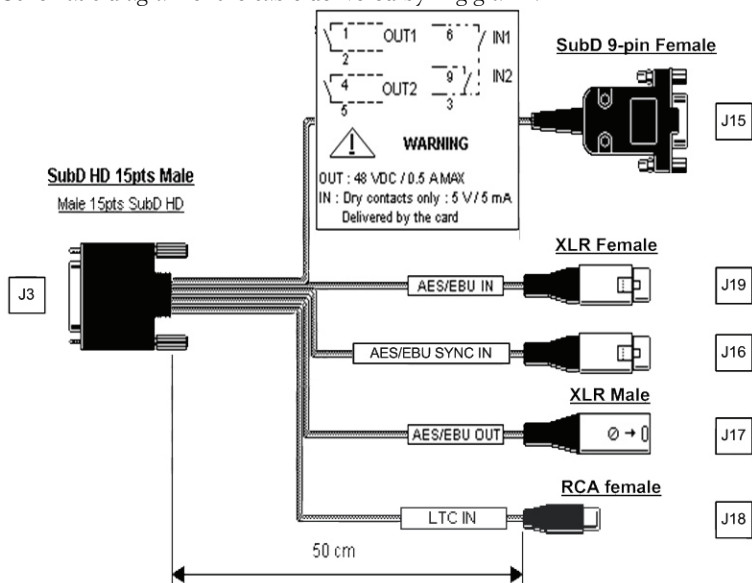


Wiring Diagram – digital cable without GPIOs (VX222HR)



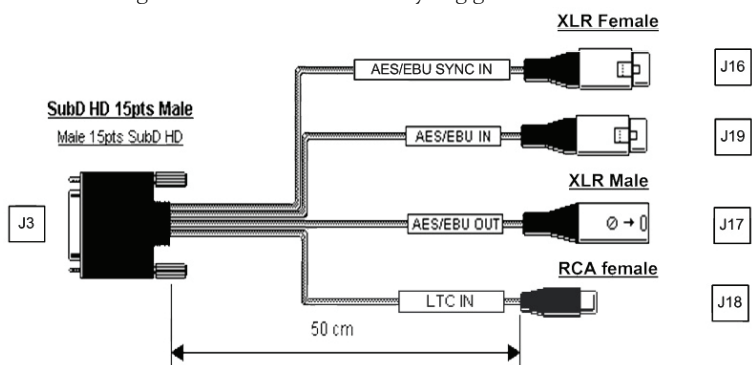
VX222HR-Mic digital cable with GPIOs

Schematic diagram of the cable delivered by Digigram*:



VX222HR-Mic digital cable without GPIOs

Schematic diagram of the cable delivered by Digigram*:

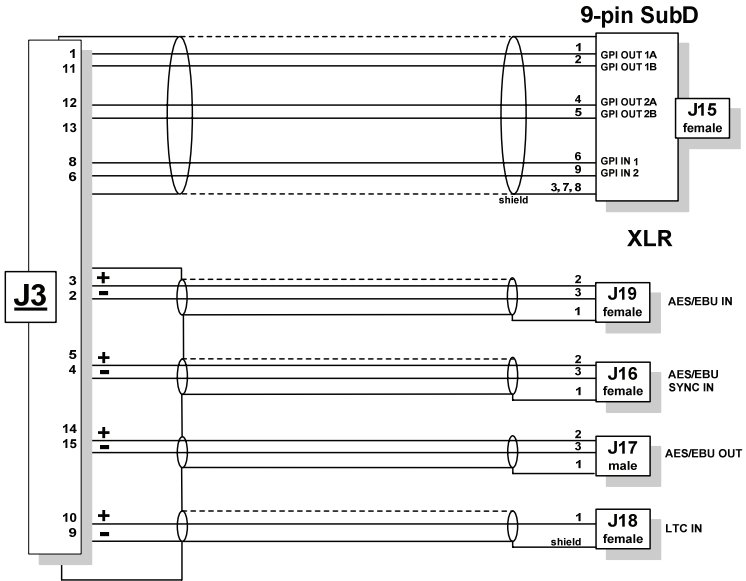


* Your cable may look different if it is not a Digigram cable.

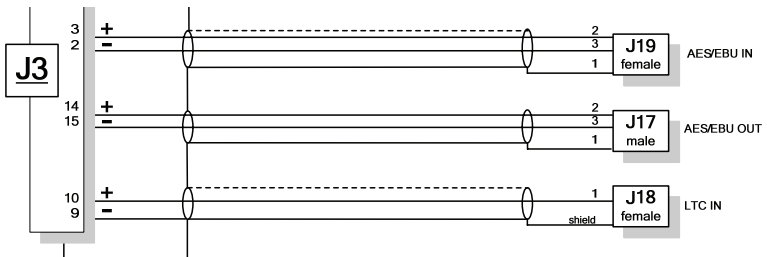
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Wiring Diagram – Digital Cable with GPIOs (VX222HR)



Wiring Diagram – digital cable without GPIOs (VX222HR-Mic)



VX222HR cable pinout

Pin #	ANALOG	DIGITAL
1	R OUT +	GPO OUT 1A
2	GND	NC
3	L OUT -	NC
4	GND	AES/EBU IN -
5	NC	AES/EBU IN +
6	R IN -	GPI INPUT 2
7	L IN +	GND/GPO COMMON INPUT
8	GND	GPI INPUT 1
9	R OUT -	GND
10	L OUT +	LTC IN
11	GND	GPO OUT 1B
12	NC	GPO OUT 2A
13	R IN +	GPO OUT 2B
14	GND	AES/EBU OUT +
15	L IN -	AES/EBU OUT -

VX222HR-Mic cable pinout

Pin #	ANALOG	DIGITAL
1	R OUT +	GPO OUT 1A
2	GND	AES/EBU IN -
3	L OUT -	AES/EBU IN +
4	GND	AES/EBU SYNC IN -
5	MIC IN	AES/EBU SYNC IN +
6	R IN -	GPI INPUT 2
7	L IN +	GND/GPI INPUT COMMON
8	GND	GPI INPUT 1
9	R OUT -	GND
10	L OUT +	LTC IN
11	GND	GPI OUT 1B
12	MIC IN +	GPI OUT 2A
13	R IN +	GPI OUT 2B
14	GND	AES/EBU OUT +
15	L IN -	AES/EBU OUT -