



VX881e

VX882e

*Professional Multichannel
Sound Cards*



User manual

**For technical support,
please contact your system supplier.**



Digigram S.A.

82/84 Allée Galilée, 38330 Montbonnot-Saint-Martin, FRANCE
Tel: +33 (0)4 76 52 47 47 • Fax: +33 (0) 4 76 52 18 44 • E-mail: info@digigram.com

Digigram Inc.

2000 North 14th Street - Suite 530, Arlington, VA 22201-USA
Tel: +1 703 875 9100 • Fax: +1 703 875 9161 • E-mail: input@digigram.com

Digigram Asia Pte Ltd.

60 Albert Street - #19-11 OG Albert Complex Singapore 189969, Singapore
Tel: +65 6291 2234 • Fax: +65 6291 3433 • E-mail: info_asia@digigram.com

Table of Contents

INFORMATION FOR THE USER	4
IMPORTANT NOTICE	4
CONTENTS OF THIS PACKAGE	5
FEATURES	5
VX881e main hardware features.....	6
VX882e main hardware features.....	6
Main software features.....	6
REQUIREMENTS	7
Minimum hardware requirements.....	7
Software requirements.....	7
Supported operating systems.....	7
HARDWARE INSTALLATION	7
Installing the card.....	7
Interrupt and memory address.....	7
SOFTWARE INSTALLATION	8
Standard installation under Windows XP, Windows Server 2003, Windows Vista, Windows Server 2008, and Windows 7.....	9
Parameterizing the ASIO and Wave drivers.....	10
Removing the driver under Windows XP, and Windows Server 2003.....	11
Removing the driver under Windows Vista, Windows Server 2008, and Windows 7.....	11
HOW TO CHECK THE INSTALLATION	11
THE 'DIGIGRAM HARDWARE SETTINGS' '(DHS') CONTROL PANEL	13
SPECIFICATIONS	14
Configuration.....	14
Inputs.....	14
Outputs.....	15
Connectors.....	15
Audio specifications.....	15
Audio Performance.....	16
Development environments.....	16
APPENDICES	17
VX881e Schematic Diagram.....	17
VX882e Schematic Diagram.....	17
Layout.....	18
VX881e cable diagram.....	19
VX881e wiring diagram.....	19
Adapter cable Sub-D 62 ↔ SCSI 68 MDR.....	20
Connection cable VX882e ↔ BoB8.....	20
Sub-D 62 ↔ SCSI 68 MDR wiring diagram.....	21
VX882e cable diagram.....	22
VX882e wiring diagram.....	23
VX882e cable pinout.....	24
VX882e cable pinout.....	24

Copyright 2007 - 2010 Digigram. All rights reserved.

No portion of this manual may be reproduced without prior written consent from Digigram. The copyright protection claimed here includes photocopying, translation and/or reformatting of the information contained in this manual.

While every effort has been made to ensure accuracy, Digigram is not responsible for errors and omissions, and reserves the right to make improvements or changes in the products and programs described without notice.

Digigram and the Digigram logo, VX882e, and VX881e are registered trademarks or trademarks of Digigram S.A. Other trademarks are property of their respective holders.

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

VX881e & VX882e

User Manual



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 card 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 card 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 card.



Due to the reduced length of the PCI EXPRESS™ bus connector and the resulting lack of mechanical stability, we strongly advise against transporting the card(s) installed in a computer, unless its chassis or case provides a dedicated support to keep the card securely in place in order to avoid physical damage.

CONTENTS OF THIS PACKAGE

Thank you for purchasing a Digigram VX sound card.

The package consists of the following components:

* a VX881e or VX882e sound card

The end user version additionally includes:

- breakout cable(s)
- a CD-Rom with drivers, installation notices, FAQs, etc...

For the OEM version, the cables are available optionally.

Also available:

2U 19-inch breakout box allowing straightforward and secure connection to all the cards' I/Os

FEATURES

VX882e and VX881e are audio cards for PCI EXPRESS™ (PCIe®) bus. They are in PCI EXPRESS™ x1 format and can thus be plugged into any PCIe® slot (x1, x2, x4, x8, x16, x32).

VX881e main hardware features

- 4 digital AES/EBU* stereo inputs, with hardware sample rate converters (up to 192 kHz)
- 4 digital AES/EBU* stereo outputs (up to 192 kHz)
- 1 digital AES/EBU* stereo sync input (up to 192 kHz in play and record)
- 1 standard Word Clock input (up to 96 kHz)
- 1 standard Word Clock output (up to 96 kHz)
- 1 video sync input
- 1 SMPTE/LTC (Linear Time Code) sync input

VX882e main hardware features

All features of the VX881e, plus:

- 8 balanced** analog mono line inputs, with software programmable analog and digital gain
- 8 servo-balanced*** analog mono line outputs, with software programmable analog and digital gain
- 192 kHz / 24-bit converters
- Maximum level on analog inputs and outputs: +24 dBu

Note: *The digital outputs always play the digital version of the corresponding analog outputs. The selection of the AES/EBU input excludes the selection of the corresponding analog inputs. Nevertheless, it is possible to simultaneously record AES and analog inputs, as long as the channels are different.*

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 mixing of several PCM audio streams, direct monitoring, level adjustment, panning, cross-fades, punch-in/punch-out, scrubbing
- Low latency DirectSound, Wave****, and ASIO drivers

Note: *the HR Runtime package for Windows Vista does not include a Wave driver. In case your audio application explicitly requires a Wave interface, a Wave driver is available on request. In this case, please contact [Digigram](#).*

* can be used as S/PDIF interface as well

** can be used with unbalanced signals

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

**** Windows XP and Server 2003 only

REQUIREMENTS

Minimum hardware requirements

PC with one free PCI EXPRESS™ (PCIe®) slot (x1, x2, x4, x8, x16 or x32). CPU power and memory required depend on the operating system and on the audio application used.

Software requirements

To use your VX881e or VX882e, install the driver from the HR Runtime package version 1.60 or higher. This package includes:

- a Digigram np driver enabling OEM applications to best capitalize on the boards
- a WDM DirectSound driver. Microsoft DirectX 9 or higher must be installed on your computer
- a Wave driver* (32 bits, installation optional)
- an ASIO driver (32 bits, installation optional)

Supported operating systems

VX1221e and VX1222e cards run under Windows XP, Windows Server 2003, Windows Server 2008, Windows Vista, and Windows 7.

HARDWARE INSTALLATION

Due to the reduced length of the PCI EXPRESS™ bus connector and the resulting lack of mechanical stability, we strongly advise against transporting the card(s) installed in a computer, unless its chassis or case provides a dedicated support to keep the card securely in place in order to avoid physical damage.

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.

* Windows XP and Server 2003 only

SOFTWARE INSTALLATION

Note: *the installation of the software requires administrator rights on your computer*

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, this application might require the use of a specific driver version. In this case, make sure that the updated driver has been approved by your supplier.

Important note: *this default procedure installs the 'Digigram Hardware Settings' control panel. This application allows the configuration of the hardware resources of Digigram cards for all audio applications. The DHS allows for instance to define the clock of the card, the input source, input and output analog and digital gain, Sample Rate Converters, digital output format, etc...*

Please note that, with the DHS installed, controls available through the DirectSound control panel are limited to:

- *Volume control for input and output*
- *Wave control*

Under Windows XP and Server 2003 you may also install the driver without installing the DHS control panel, and in this case more controls are available through the DirectSound control panel:

- *Volume control for input*
- *Wave control*
- *Monitoring control*
- *Analog input level*
- *Digital input level*
- *Clock selection: AES Sync, AES1, Word Clock*
- *Digital output format: professional, consumer*

*To do so, install the driver with the command line: "**setup x_topology**" (not available under Windows Vista). For detailed information, please refer to the dedicated document on our web site.*

Standard installation under Windows XP, Windows Server 2003, and Windows Vista

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 **HR Runtime vxx.msi/HR Runtime vxx.msi for Vista** 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 "**I accept the terms in the license agreement**" to approve it.
- Do the same in the next window for Virtual PCX and PC Codec Legal Notice.
- In the "**Custom Setup**" window, the "**Drivers for the HR boards**" are displayed; by default, both WDM DirectSound and ASIO HR are installed.

To install the Wave driver*, select '**Wave**'.

To be able to use your VX card through np, select the '**Digigram np**' component option *(or make sure that the np application explicitly sets the 'VX_FLAG' with PCXInitialize()).*
Next.

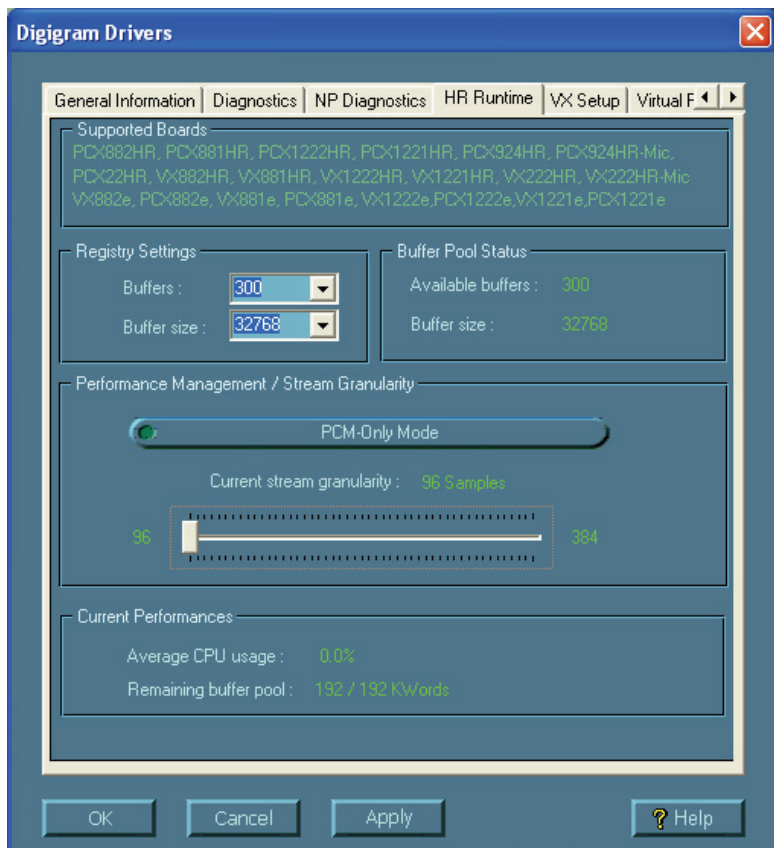
- In the "Ready to Install the Program Window", click on Install to start copying the files.
 - **Note:** *In case you use an unsigned driver version, the "Digital Signature Not Found" message may appear because a non-Microsoft software is about to be installed. Click on **Continue** in the "**Hardware installation**" window (Windows XP, Server 2003).*
- *Under Windows Vista:*
Click **Allow** in the "**User Account Control**" window.
Click **Install** in the "**Windows Security**" window.
- In the "**Digigram drivers**" window, select the number and the size of buffers required by your applications. Click on **Ok**.
- Click **Finish** to complete the driver installation.

* Windows XP and Server 2003 only

Parameterizing the ASIO and Wave drivers

Note: for most current ASIO/Wave applications (e.g. Cubase, Nuendo, Winamp etc...) you have the choice between a 32-bit version and a 64-bit version when installing them under Windows \geq Vista. For operation with your sound card, make sure to use the 32-bit version!

For all sound cards of the VX range, “PCM only” is the only operating mode, therefore this button is not functional in the Digigram control panel (CPL). (To access this control panel, go to <Start>, <Programs>, <Digigram>, <Digigram Control Center>). For detailed information on how to use the Digigram control panel, please refer to its online help (“? Help” button).



Removing the driver under Windows 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 np Runtime window.
- Follow the instructions to finish to remove the driver.

Removing the driver under Windows Vista, Windows Server 2008, and Windows 7

- Open the **Windows Control Panel** and double-click on the **Programs and Features** icon.
- Select “**Digigram HR Runtime for Vista...**”, and **Change/Remove**.
- Select **Remove** in the HR Runtime window.
- Follow the instructions to finish removing the driver.

How to check the installation

Once the cards and the driver have been 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.

Available WDM recording and playback devices are:

- VX881e (VX882e) 1+2 (WDM) (*record and playback*)
 - VX881e (VX882e) 3+4 (WDM) (*record and playback*)
 - VX881e (VX882e) 5+6 (WDM) (*record and playback*)
 - VX881e (VX882e) 7+8 (WDM) (*record and playback*)
 - VX881e (VX882e) 5.1 (WDM) (*record and playback*)
 - VX881e (VX882e) 7.1 (WDM) (*record and playback*)
- 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**.
- 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 the HR Runtime package as described in this manual, and re-install it.
- If the Wave driver has been installed*:
 - Go to 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 Wave application.

Available Wave recording and playback devices are:

 - VX881e (VX882e) 1+2 (Wave) (*record and playback*)
 - VX881e (VX882e) 3+4 (Wave) (*record and playback*)
 - VX881e (VX882e) 5+6 (Wave) (*record and playback*)
 - VX881e (VX882e) 7+8 (Wave) (*record and playback*)
 - VX881e (VX882e) 5.1 (Wave) (*record and playback*)
 - VX881e (VX882e) 7.1 (Wave) (*record and playback*)
 - VX881e (VX882e) 5.1+2 (Wave) (*record and playback*)
- If the ASIO driver has been installed:
 - The card is visible from any ASIO application.

Note:

5.1 plays on outputs 1, 2, 3, 4, 5, 6

7.1 plays on outputs 1, 2, 3, 4, 5, 6, 7, 8

5.1+2 plays on outputs 1, 2, 3, 4, 5, 6, 7, 8

* Windows XP and Server 2003 only

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 card 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

	VX881e	VX882e
Bus/Format	PCI EXPRESS™ (PCIe®) x1 (x2, x4, x8, x16, x32 compatible)	
Digital Signal Processor	Motorola 56321 at 240 MHz	
RAM	512 kWords	
Size	168 mm x 111 mm x 20 mm	
Power requirements (+3.3V / +12V)	1.3 A / 0.5 A	2.5 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

	VX881e	VX882e
Analog line inputs (mono)	-	8 balanced*
Maximum input level/ impedance	-	+24 dBu/ >10 kΩ
Digital inputs (stereo)	4 AES/EBU** with hw Sample Rate Converters, 7.5:1 to 1:8, up to 192 kHz	
Programmable input gain	digital: from -110 dB to +18 dB	analog: from -94.5dB à +15.5 dB⊗ digital: from -110 dB à +18 dB
Other inputs	AES/EBU Sync (up to 192 kHz), Word clock (up to 96 kHz), LTC, Video	
AES11 synchronization	Yes	

* can be used with unbalanced signals

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

⊗ maximum sensitivity: 0 dBFs for -15.5 dBu input

VX881e & VX882e

User Manual

Outputs

	VX881e	VX882e
Analog line outputs (mono)	-	8 servo-balanced ^{***}
Maximum output level / impedance	-	+24 dBu / <100 Ω
Digital outputs (stereo)	4 AES/EBU ^{**} , up to 192 kHz	
Programmable output gain	digital: from -110 dB to +18 dB	analog: from -86 dB to +24 dB digital: from -110 dB to +18 dB
Other outputs	Word clock (up to 96 kHz)	

Connectors

	VX881e	VX882e
Internal connectors	Inter-board Sync	
External connector	68-pin SCSI MDR	
Digigram accessories available	Breakout cable or 2U 19" Breakout Box	

Audio specifications

	VX881e	VX882e
Sampling frequencies available	Programmable from 22.05 to 192 kHz	Programmable from 8 to 192 kHz
A/D and D/A converter resolution	-	24 bits
Supported audio formats	PCM (8, 16, 24 bits), Float IEEE754	

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

Audio Performance

measured at $F_s=48$ kHz

	VX881e	VX882e
Frequency response (record + play)	-	20 Hz–20 kHz: ± 0.2 dB
Channel phase difference: 20/20kHz	-	$< 0.2^\circ/2^\circ$
Dynamic range (A-weighted)	-	Analog In: > 104 dB Analog Out: > 104 dB
THD + noise 1 kHz at -1 dBfs	-	Analog In: < -97 dB Analog Out: < -94 dB
Crosstalk (Analog in or out)	-	1 kHz at 24 dBu: < -100 dB 15 kHz at 24 dBu: < -85 dB

Development environments

	VX881e	VX882e
Digigram management	np SDK (HR Runtime, PCM only)	
Other management	Wave*, ASIO, DirectSound (all PCM only)	
OS supported	Windows XP, Windows Server 2003, Windows Server 2008, Windows Vista, and Windows 7	
Main on-board processing features (with np SDK)	PCM play, rec, Float IEEE754, direct monitoring, real-time mixing, level adjustment, panning, cross-fade, punch-in/punch-out, scrubbing	

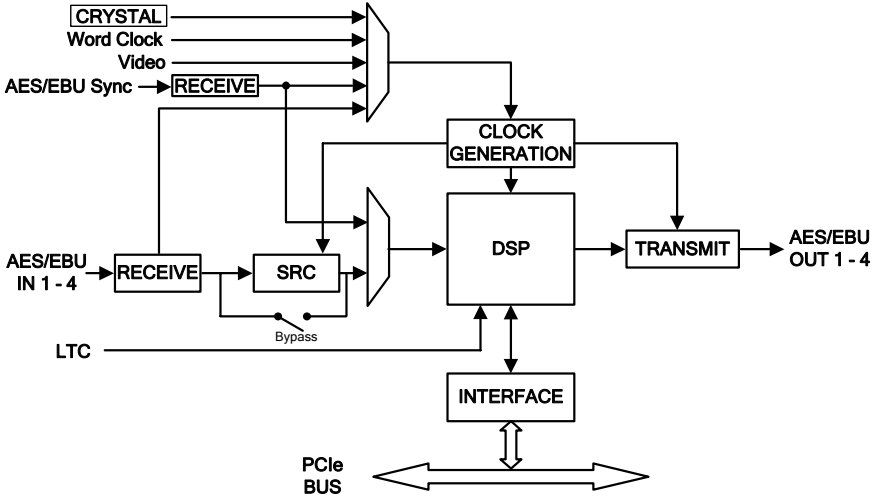
* Windows XP and Server 2003 only; for Windows Vista, a Wave driver is available on request.

VX881e & VX882e

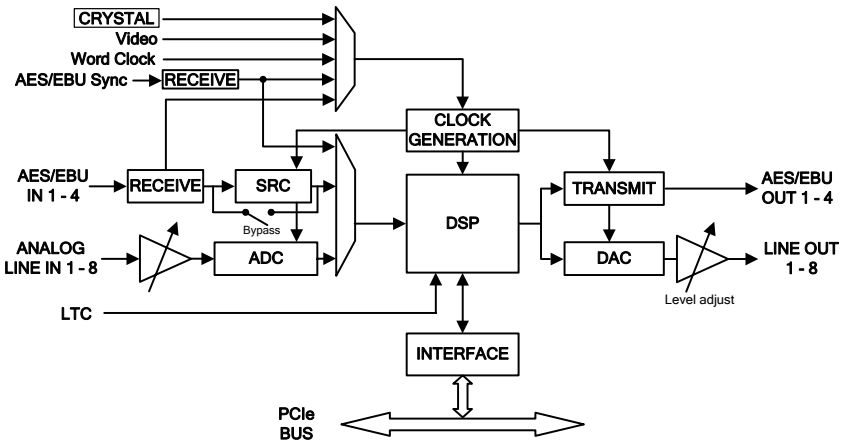
User Manual

APPENDICES

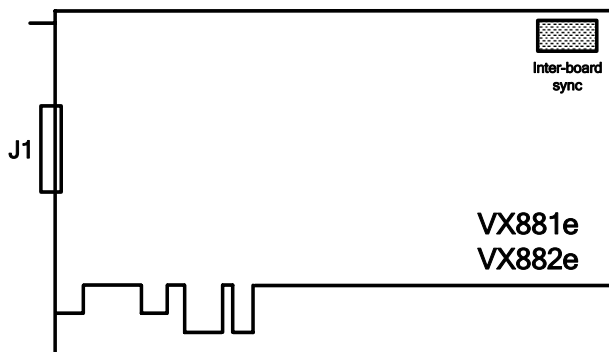
VX881e Schematic Diagram



VX882e Schematic Diagram



LAYOUT



J1:

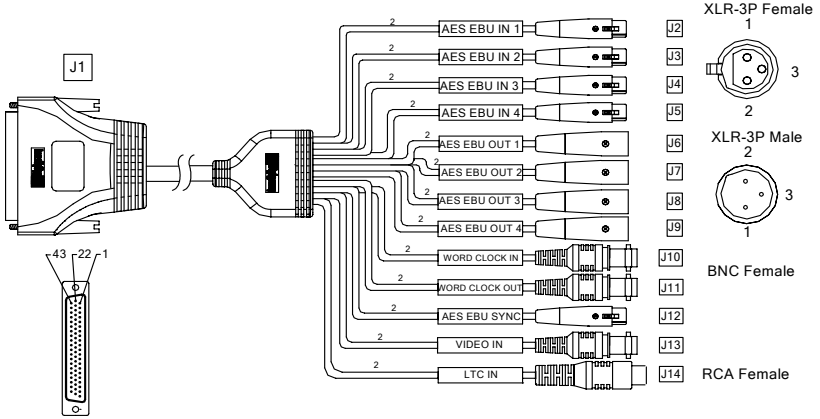
- Digital cable (VX881e)
- Analog/digital cable (VX882e)

VX881e & VX882e

User Manual

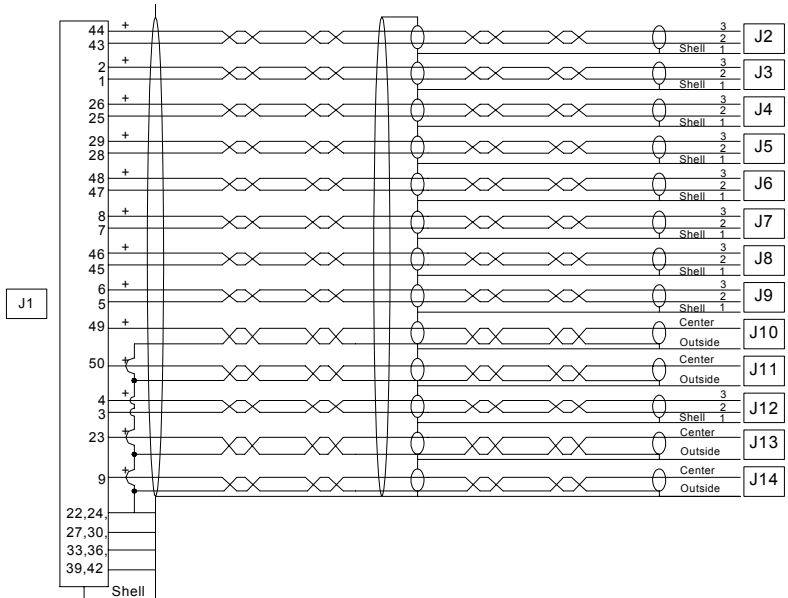
VX881e cable diagram

Schematic diagram of the cable delivered by Digigram*:

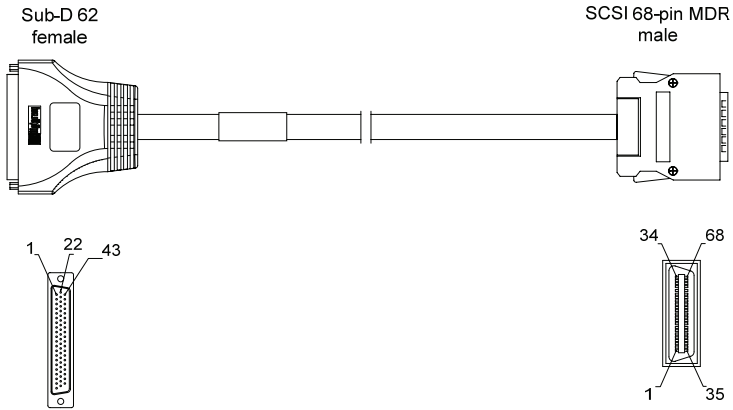


* Your cable may look different if it is not a Digigram cable.

VX881e wiring diagram

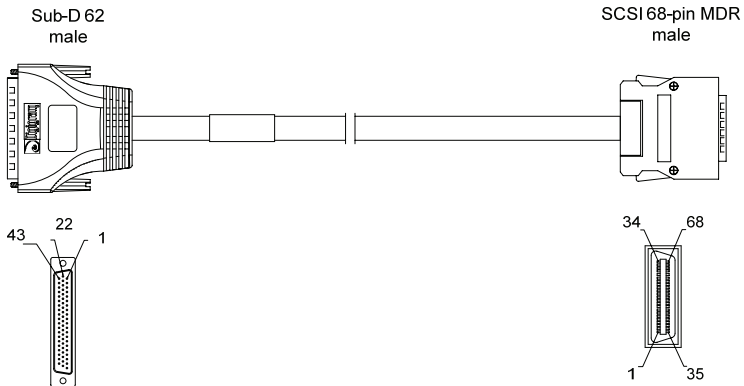


Adapter cable Sub-D 62 ↔ SCSI 68 MDR



Use this adapter cable to connect the VX881e cable with the card.
 If you dispose of a VX881HR or VX882HR cable, this adapter allows its use with the VX PCI EXPRESS™ multichannel boards.

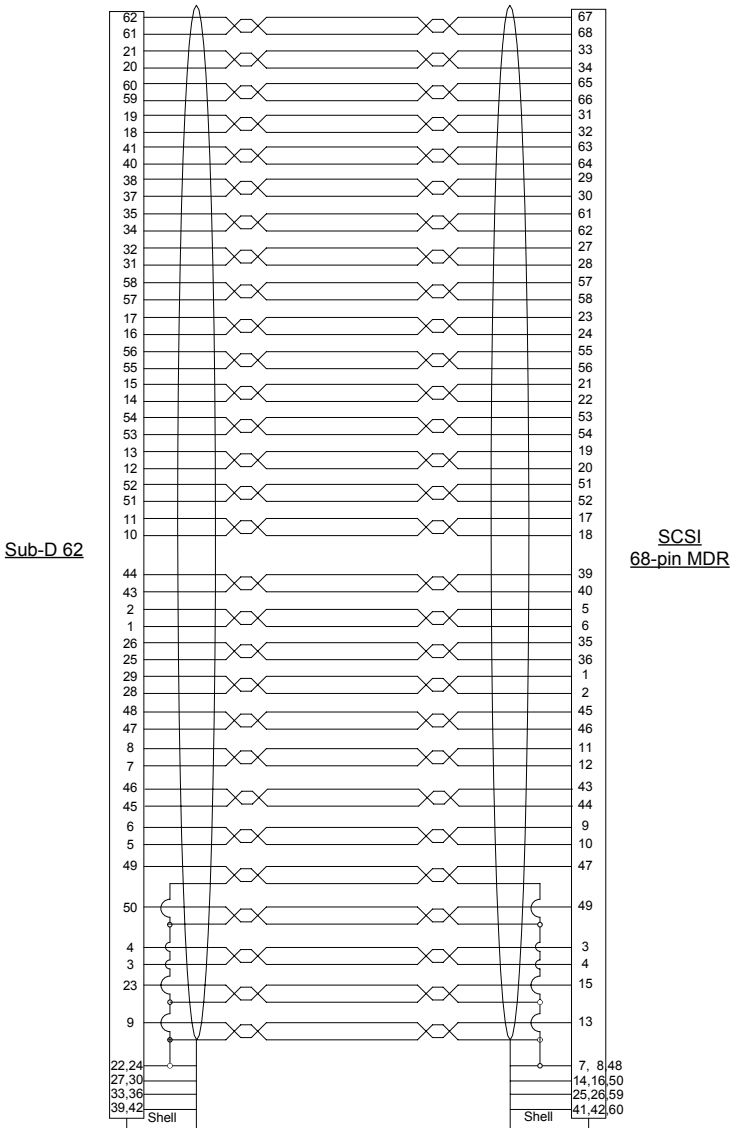
Connection cable VX882e ↔ BoB8



VX881e & VX882e

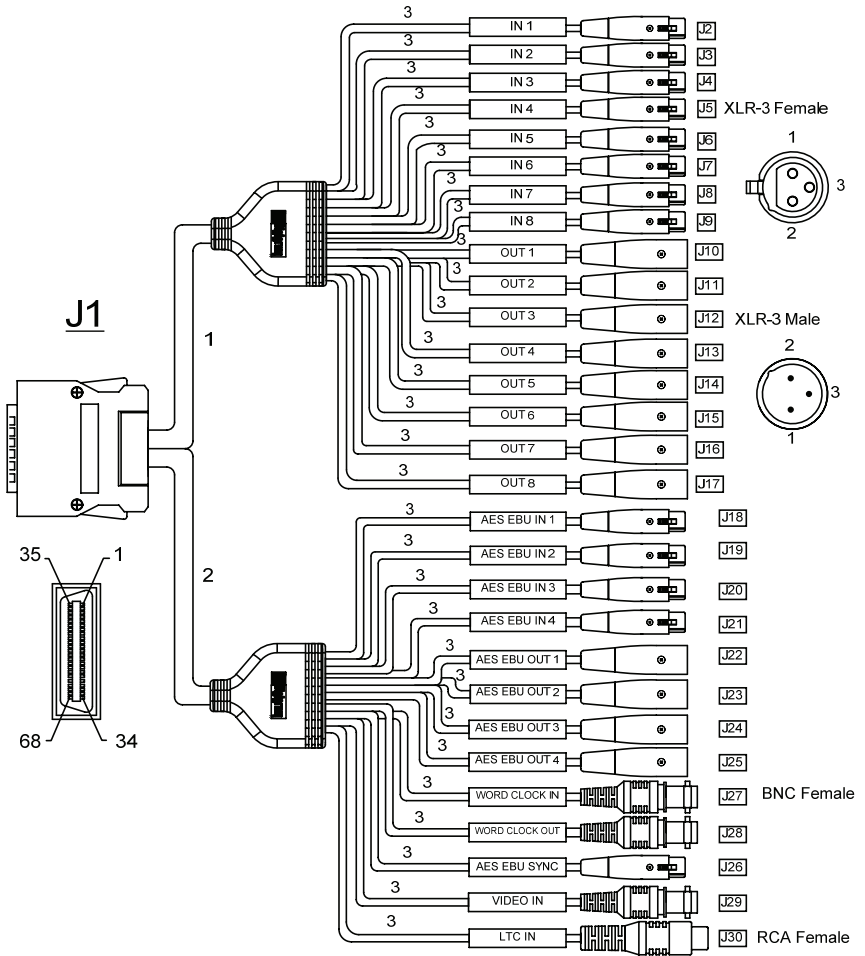
User Manual

Sub-D 62 ↔ SCSI 68 MDR wiring diagram



VX882e cable diagram

Schematic diagram of the cable delivered by Digigram*:

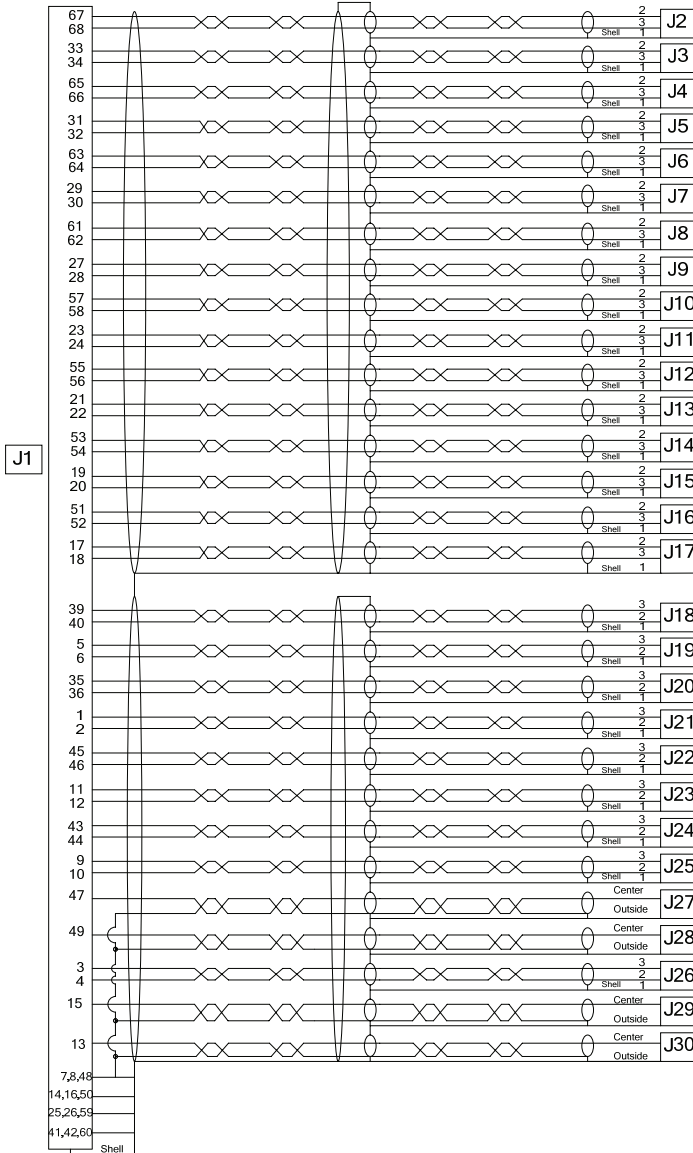


* Your cable may look different if it is not a Digigram cable.

VX881e & VX882e

User Manual

VX882e wiring diagram



VX881e cable pinout

Digital	Pin	Signal	Pin	Signal	Pin	Signal
	1	AES/EBU IN 4 +	11	AES/EBU OUT 2 +	41	GND
	2	AES/EBU IN 4 -	12	AES/EBU OUT 2 -	42	GND
	3	AES/EBU SYNC +	15	Video IN	43	AES/EBU OUT 3 +
	4	AES/EBU SYNC -	16	GND	44	AES/EBU OUT 3 -
	5	AES/EBU IN 2 +	35	AES/EBU IN 3 +	45	AES/EBU OUT 1 +
	6	AES/EBU IN 2 -	36	AES/EBU IN 3 -	46	AES/EBU OUT 1 -
	7	GND	37	Reserved	47	Word Clock IN
	8	GND	38	Reserved	48	GND
	9	AES/EBU OUT 4 +	39	AES/EBU IN 1 +	49	Word Clock OUT
10	AES/EBU OUT 4 -	40	AES/EBU IN 1 -	50	GND	

VX882e cable pinout

Digital	Pin	Signal	Pin	Signal	Pin	Signal
	1	AES/EBU IN 4 +	11	AES/EBU OUT 2 +	41	GND
	2	AES/EBU IN 4 -	12	AES/EBU OUT 2 -	42	GND
	3	AES/EBU SYNC +	15	Video IN	43	AES/EBU OUT 3 +
	4	AES/EBU SYNC -	16	GND	44	AES/EBU OUT 3 -
	5	AES/EBU IN 2 +	35	AES/EBU IN 3 +	45	AES/EBU OUT 1 +
	6	AES/EBU IN 2 -	36	AES/EBU IN 3 -	46	AES/EBU OUT 1 -
	7	GND	37	Reserved	47	Word Clock IN
	8	GND	38	Reserved	48	GND
	9	AES/EBU OUT 4 +	39	AES/EBU IN 1 +	49	Word Clock OUT
10	AES/EBU OUT 4 -	40	AES/EBU IN 1 -	50	GND	

Analog	Pin	Signal	Pin	Signal	Pin	Signal
	13	LTC IN	28	IN 8 -	57	OUT 1 +
	14	GND	29	IN 6 +	58	OUT 1 -
	17	OUT 8 +	30	IN 6 -	59	GND
	18	OUT 8 -	31	IN 4 +	60	GND
	19	OUT 6 +	32	IN 4 -	61	IN 7 +
	20	OUT 6 -	33	IN 2 +	62	IN 7 -
	21	OUT 4 +	34	IN 2 -	63	IN 5 +
	22	OUT 4 -	51	OUT 7 +	64	IN 5 -
	23	OUT 2 +	52	OUT 7 -	65	IN 3 +
	24	OUT 2 -	53	OUT 5 +	66	IN 3 -
	25	GND	54	OUT 5 -	67	IN 1 +
	26	GND	55	OUT 3 +	68	IN 1 -
27	IN 8 +	56	OUT 3 -			