

miroCRYSTAL 12SD/miroCRYSTAL 22SD

User's Guide
– Hardware –





miroCRYSTAL 12SD miroCRYSTAL 22SD miroCRYSTAL 22SD 1MB

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miroCRYSTAL 12SD/miroCRYSTAL 22SD/miroCRYSTAL 22SD1MB

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– Hardware –

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VDOK-CLSD-100

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About the manual

This manual explains how to install your miro graphics board in your computer.

The quick installation chart provides an overview for the hardware and software installation. To ensure the correct installation, read the detailed explanations in this manual.

In the margins are subheadings and ideograms to help you quickly find your way through this manual.



Important text passages are marked with the «hand» and this format.

Bullets mark step by step instructions:

- Insert the graphics board into the slot.

All keyboard commands appear in this font:

install <↵>

<↵> represents the enter key.

Menus, commands, options or buttons which the user can select are written in *italics*.

For your own safety

In the interest of your own safety and the flawless functioning of your new product and computer system please note the following:

- Before opening the computer make sure that the power plug is disconnected from the main socket.
- Computer components such as graphics boards are sensitive to static charge. Divert any electrostatic charge from your person before touching the components with your hands or any tools.
- Make sure that the components you want to add to the computer are in compliance with the computer's characteristics.
- Only use a shielded cable to connect the monitor to the computer.
- Do not use any cable that supplies the power through the computer.
- Make sure that your graphics board is **in compliance with the slot**.



For changes that have occurred after the manual has been printed, refer to the README file on the disks supplied with your system!

Quick installation chart

The following quick installation chart provides a hardware and software installation overview.

Hardware

Hardware

1. Check the system requirements, make copies of the supplied disks.
2. Open the computer.
3. Depending on its bus type install the graphics board into the VL or PCI slot.
4. Connect the monitor.

Software

Software

5. Install the miro drivers for your miroCRYSTAL graphics board. The order of the installation is not obligatory.



miro•win (Windows)

The miro•win disks are needed.

Insert *miro•win High speed drivers for WIndows, Install disk # 1.*

In the Windows Program Manager in the *File* menu select *Run...*

Depending on your disk drive enter **a:install** or **b:install**.

Follow the instructions given by the installation program.



miro•win (CAD drivers)

The miro•win disks are needed.

Insert *miro•win High speed drivers for CAD; Install disk # 1/1.*

Depending on your disk drive enter **a:install** or **b:install**.

Follow the instructions given by the installation program.

If necessary, configure installed drivers.



miro•cad (3D-CAD applications)

The miro•cad disk is needed.

Insert *miro•cad 3D-CAD Application for AutoCAD; Install disk # 1/1.*

Depending on your disk drive enter **a:install** or **b:install**.

Follow the instructions given by the installation program.



miro•plus (OS/2 drivers, Windows NT drivers)

The miro•plus disks are needed.

Insert *miro•plus High speed drivers for OS/2; Install disk # 1/1* or
miro•plus High speed drivers for Windows NT; Install disk # 1/1.

Install drivers and/or tools.

If necessary, configure installed drivers.

1. Overview

Features

With miroCRYSTAL 12SD/22SD miro offers graphics boards, which were designed especially for professional use under Windows and DOS: The graphics boards meet all requirements concerning page layout, illustration and color image editing.

q **Graphics acceleration**

The operating speed of a graphics system is essential especially for professional purposes. The operating speed depends on the graphics processor.

The miroCRYSTAL 12SD graphics board is equipped with the S3 TRIO32 graphics processor (32-bit system). miroCRYSTAL 22SD is equipped with the S3 TRIO64 (64-bit graphics processor). Both improve the performance of applications running under Windows and DOS.

q **Video memory**

miroCRYSTAL 12SD and miroCRYSTAL 22SD 1MB have 1 MB of High-Speed DRAM (upgradable to 2 MB). miroCRYSTAL 22SD has 2 MB of High-Speed DRAM.

q **Fast bus systems**

There is a **V**(esa) **L**(ocal) bus version and a **P**(eripheral) **C**(omponent) **I**(nterconnect) version of the boards.

q **Drivers**

miroCRYSTAL includes all of the necessary drivers to achieve the maximum performance from your system. In addition, the miro tools are provided.

q **Power Management**

miroCRYSTAL supports VESA DPMS Power Management for today's monitors with Power Management. Therefore, monitors can turn themselves off after a preset time interval to prolong their life and save energy.

q **Monitor plug & play support**

The graphics processor of the graphics boards supports the **VESA D**(isplay) **D**(ata) **C**(hannel). If the connected monitor and the used software support this data channel, the monitor can send its characteristics to the graphics board via this interface. Then the monitor will immediately start with a suitable resolution. Future Windows versions will support this feature.

System requirements

To install the graphics board, your computer system has to meet the following requirements:

Computer

- for VL bus: a 386, 486, Pentium computer or compatible with a VL Local Bus slot
- for PCI bus: a 486 or Pentium computer or compatible with a PCI Local Bus slot.

Monitor

Standard monitor; to receive all the benefits from your miroCRYSTAL, you need a high-resolution multifrequency monitor. miro offers suitable monitors.

Delivery scope

Before beginning the installation of your miro graphics board, please make sure your miro package is complete:

- Graphics board*
- Installation disk(s)
- Documentation
- *optional*
Monitor, shielded monitor cable
upgrade kit**
(only for miroCRYSTAL 12SD and miroCRYSTAL 22SD 1MB)



Graphics boards are sensitive to static charge. To avoid damage that may occur by static charge, leave the graphics board in its antistatic packaging until installation. Keep the packaging for possible future transportation.

* For model and serial number of your miro graphics board, refer to the label on the graphics board.

** The upgrade kit for upgrading the miroCRYSTAL 12SD/22SD 1MB with 1 MB additional memory is **optional**; it is only part of the package contents if you purchased it together with the graphics board. You can purchase the upgrade kit and upgrade your graphics board any time.

2. Hardware Installation

VGA

The board's graphics chip has an integrated VGA component that cannot be turned off. Before the installation, however, any existing VGA board or motherboard VGA has to be removed from the computer or disabled.

Installing the miro graphics board

The only tool you need for the installation is a screwdriver. Proceed as follows:

- Turn off your computer and all peripheral devices. Disconnect the computer from the power supply and all other components.
- Loosen the screws of the computer's cover and remove it.
- Discharge yourself of static charge by touching the power unit casing.
- Depending on your graphics board select a free VL or PCI slot. Remove the slot's cover at the back of the computer. Save the screws of the cover.
- Depending on the bus type, carefully insert the graphics board into the VL or PCI slot by holding the board at the top and gently pushing both ends into the slot at the same time. Press onto the upper edge of the board to make sure it is firmly seated in the slot.



Don't force the board into the slot! You run the risk of bending the contacts. If the board does not fit easily, pull it back out, and try again.

- Fasten the board's bracket at the back of the computer using the screws you saved from the shield.
- Put the cover back on the computer and reconnect the peripheral devices.
- Connect the monitor with the 15-pin D-type socket. If you are in doubt about how to connect your monitor, please refer to the monitor documentation.
- Reconnect the computer and the monitor to the power supply.

How to go on?

After you have installed your graphics board, you can proceed with the software installation and with the installation and configuration of the application drivers.

For a detailed description of the miro drivers and miro tools, please refer to the corresponding Software Manuals.

Not all miro tools described in the miro•win Software Manual are available for the miroCRYSTAL graphics boards.

Installing upgrade kit

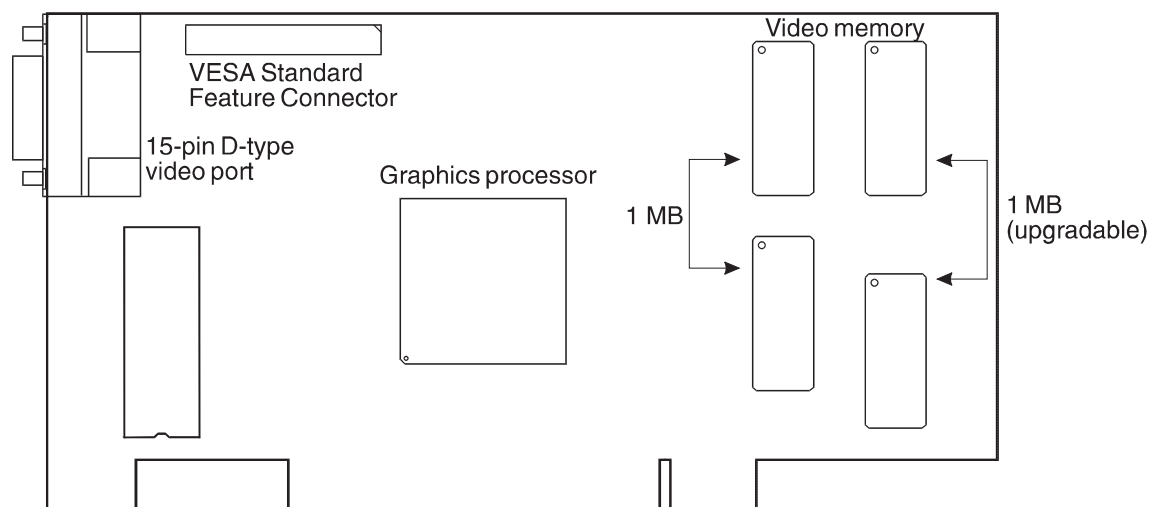
The optional upgrade kit allows you to easily upgrade the miroCRYSTAL 12SD and miroCRYSTAL 22SD 1MB from 1MB to 2 MB.

The upgrade kit consists of of two DRAMs with 512 KB each (with **70 ns**), which are inserted in the free sockets.

Board layouts of miroCRYSTAL 12SD

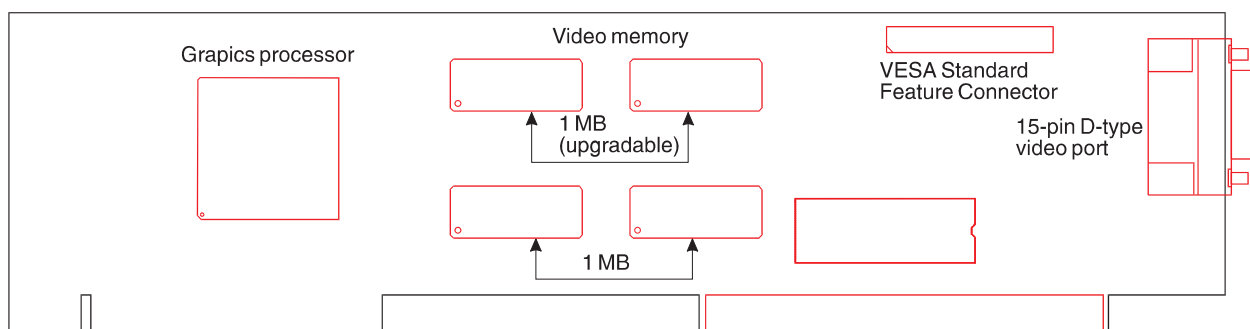
For the location of the video memory on your miroCRYSTAL 12SD, please refer to the following board layouts.

miroCRYSTAL 12SD/PCI



miroCRYSTAL 12SD: PCI version

miroCRYSTAL 12SD/VL

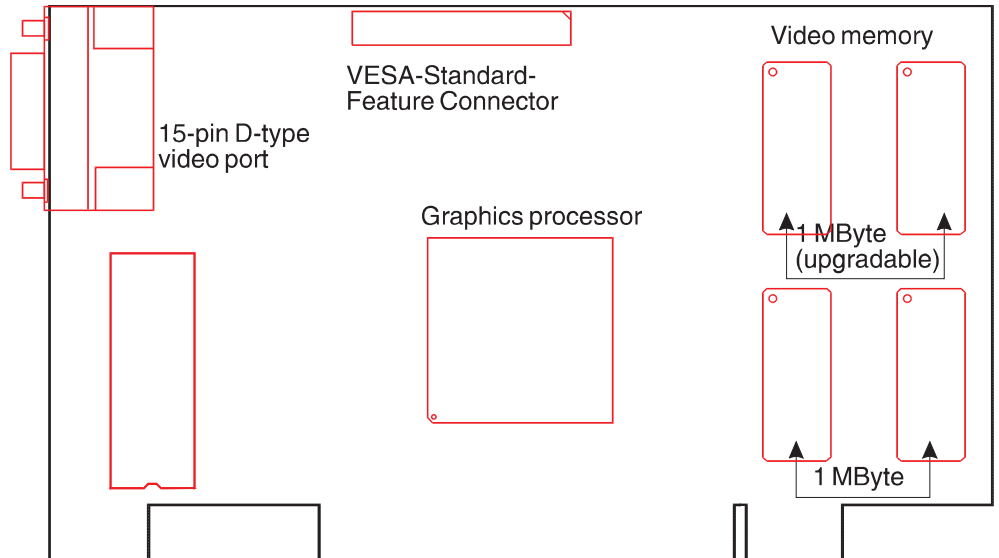


miroCRYSTAL 12SD: VL version

Board layouts of miroCRYSTAL 22SD 1MB

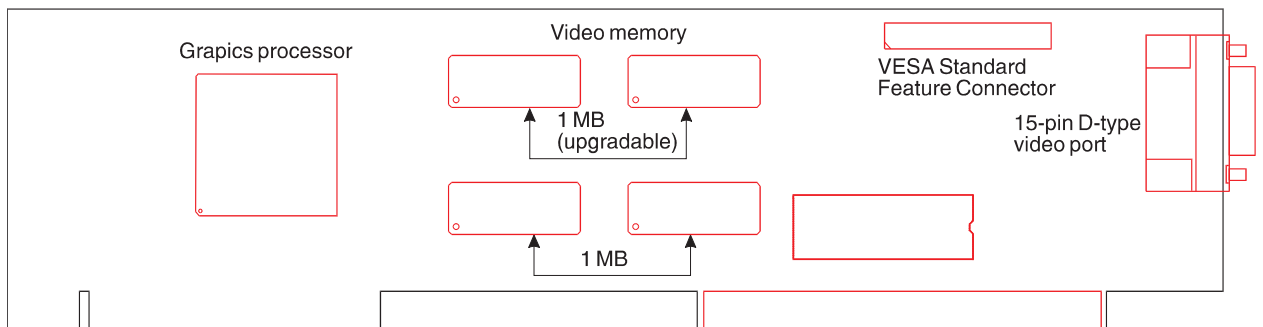
For the location of the video memory on your miroCRYSTAL 22SD 1MB, please refer to the following board layouts.

miroCRYSTAL 22SD 1MB/PCI



miroCRYSTAL 22SD 1MB: PCI version

miroCRYSTAL 22SD 1MB/VL



miroCRYSTAL 22SD 1MB: VL version

Removing the miro graphics board

- If you have already installed the miroCRYSTAL in your computer, you have to remove it for upgrading the graphics board.
- Power off your computer and all peripheral devices.
- Disconnect the computer from the power supply and also disconnect all other cables.
- Loosen the screws of the computer's cover and remove it.
- Discharge yourself of static charge by touching the power unit casing.
- Remove the cover of the graphics board at the back of the computer. Save the screws.
- Remove the graphics board **carefully** from the slot!

Upgrading and installing the graphics board

- Remove the DRAMs from the packaging.



Make sure to align the upgrade components in a line with the memory components already installed. For this purpose, memory components have a small crescent-shaped gap, a round depression or a bevelled edge.

- Align the memory components on the board in a line with the components already installed and insert the memory components carefully into the free sockets.



Make sure that you don't bend the pins of the memory components. The memory components must be firmly seated in their sockets!

- Reinstall the graphics board as described in the chapter «Installing the miro graphics board».
- Install and reconfigure the application drivers.

3. Technical Data

Bus system

- miroCRYSTAL 12SD/22SD/22SD 1MB for VESA Local Bus:
VESA Local Bus
- miroCRYSTAL 12SD/22SD/22SD 1MB for PCI Local Bus:
PCI Local Bus

Compatibility

- VGA register-compatible
- CGA register-compatible
- HGC register-compatible
- MDA register-compatible

Graphics processor

miroCRYSTAL 12SD:

- S3 TRIO32 for VESA Local Bus up to 50 MHz clock frequency
- S3 TRIO32 für PCI Local Bus up to 33 MHz clock frequency

miroCRYSTAL 22SD/miroCRYSTAL 22SD 1MB:

- S3 TRIO64 for VESA Local Bus up to 50 MHz clock frequency
- S3 TRIO64 für PCI Local Bus up to 33 MHz clock frequency

Video memory

miroCRYSTAL 12SD/miroCRYSTAL 22SD 1MB:

- 1 MB DRAM

miroCRYSTAL 22SD:

- 2 MB DRAM

Power supply

- +5 V, max. 1 A
- +12 V, max. 0.01 A

Video timings

- Horizontal scan frequency:
31 kHz to 80 kHz, depending on operating mode
- Vertical scan frequency:
50 Hz to 100 Hz, non interlaced, depending on operating mode
- Pixel frequency:
25 MHz to 135 MHz, depending on operating mode

Video modes

miroCRYSTAL 12SD (with 1 MB DRAM):

		100 kHz Mf	miroC2105	miroC2005	miroC1702	02 kHz Mf	70 kHz Mf	71 kHz Mf	MAGMX 17S	64 kHz Mf	50 kHz Mf	40 kHz Mf	35 kHz Mf	31 kHz VGA	TV
Bits per pixel	Resolution														
4 (16 colors)	1280 x 1024	70	70	70	70	70	70	65	60	60	-	-	-	-	-
8 (256 colors)	1152 x 864	80	75	75	75	75	75	75	70	70	64	-	-	-	-
	1024 x 768	80	75	75	75	75	75	75	75	75	70	60	-	-	-
	800 x 600	100	100	100	100	75	75	75	100	75	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	75	75	75	100	75	75	75	60	60	50
16 (65,536)	800 x 600	75	75	75	75	75	75	75	75	75	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	75	75	75	100	75	75	75	60	60	50
24 (16.7 mill.)	640 x 480	60	60	60	60	60	60	60	60	60	60	60	60	60	-

Mf=Multifrequency monitor

Maximum vertical refresh rate (Hz)

miroCRYSTAL 12SD (with 2 MB DRAM):

		100 kHz Mf	miroC2105	miroC2005	miroC1702	02 kHz Mf	70 kHz Mf	71 kHz Mf	MAGMX 17S	64 kHz Mf	50 kHz Mf	40 kHz Mf	35 kHz Mf	31 kHz VGA	TV
Bits per pixel	Resolution														
8 (256 colors)	1280 x 1024	60	60	60	60	60	60	60	60	60	-	-	-	-	-
	1152 x 864	80	75	75	75	75	75	75	70	70	64	-	-	-	-
	1024 x 768	100	75	75	75	75	75	75	75	75	70	60	-	-	-
	800 x 600	100	100	100	100	75	75	75	100	75	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	75	75	75	100	75	75	75	60	60	50
16 (65,536)	800 x 600	75	75	75	75	75	75	75	75	75	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	75	75	100	100	75	75	75	60	60	50
32 (16.7 mill.)	640 x 480	60	60	60	60	60	60	60	60	60	60	60	60	60	50

Mf=Multifrequency monitor

Maximum vertical refresh rate

miroCRYSTAL 22SD 1MB:

		100 kHz-Mf	miroC2105	miroC2005	miroC1702	02 kHz-Mf	70 kHz-Mf	71 kHz-Mf	MAGMX17S	64 kHz-Mf	50 kHz-Mf	40 kHz-Mf	05 kHz-Mf	01 kHz-VGA	TV
Bits per pixel	Resolution														
4 (16 colors)	1280 x 1024	70	70	70	70	70	70	65	60	60	-	-	-	-	-
8 (256 colors)	1152 x 864	80	80	80	80	75	75	75	70	70	64	-	-	-	-
	1024 x 768	80	80	80	80	75	75	75	80	75	70	60	-	-	-
	800 x 600	100	100	100	100	75	75	75	100	75	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	75	75	75	100	75	75	75	60	60	50
16 (65,536)	800 x 600	75	75	75	75	75	75	75	75	75	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	75	75	75	100	75	75	75	60	60	50

Mf=Multifrequency monitor

Maximum vertical refresh rate (Hz)

miroCRYSTAL 22SD:

		100 kHz-Mf	miroC2105	miroC2005	miroC1702	02 kHz-Mf	70 kHz-Mf	71 kHz-Mf	MAGMX17S	64 kHz-Mf	50 kHz-Mf	40 kHz-Mf	05 kHz-Mf	01 kHz-VGA	TV
Bits per pixel	Resolution														
8 (256 colors)	1408 x 1024	70	70	70	70	70	70	66	-	-	-	-	-	-	-
	1280 x 1024	75	75	75	75	75	70	66	60	60	-	-	-	-	-
	1152 x 864	80	80	80	80	75	75	75	70	70	64	-	-	-	-
	1024 x 768	100	100	100	100	75	75	75	75	80	70	60	-	-	-
	800 x 600	100	100	100	100	75	75	75	75	100	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	75	75	75	100	75	75	75	60	60	50
16 (65,536)	1152 x 864	75	75	75	75	75	75	75	70	70	64	-	-	-	-
	1024 x 768	75	75	75	75	75	75	75	75	70	60	-	-	-	-
	800 x 600	100	100	100	100	75	75	75	100	75	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	75	75	75	100	75	80	75	60	60	50
32 (16.7 mill.)	800 x 600	70	70	70	70	70	70	70	70	70	70	56	-	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	75	75	75	100	75	75	75	60	60	50

Mf=Multifrequency monitor

Maximum vertical refresh rate (Hz)

Options

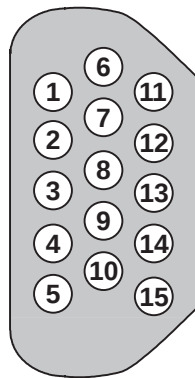
- Monitor, shielded monitor cable
- upgrade kit

Appendix

15-pin D-type video port

The miroCRYSTAL graphics board are equipped with a 15-pin D-type connector to which the video cable attaches. The other end of the video cable connects to the monitor.

The following illustration and the table show the video output and the corresponding pin allocation:



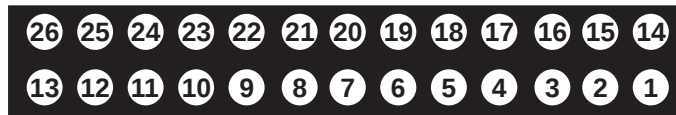
15-pin D-type connector

Pin No.	Pin Allocation
1	Red
2	Green
3	Blue
4	Free
5	Ground (analog)
6	Ground (red)
7	Ground (green)
8	Ground (blue)
9	Free
10	Ground (sync.)
11	Free
12	DDC data
13	HSync
14	VSynC
15	DDC clock

VESA standard feature connector

Your miro graphics board can be used together with a video overlay board. For this purpose you need the VESA standard feature connector.

The following table provides a pin allocation overview.



VESA standard feature connector

Pin No.	Pin Allocation
1	Pixel data P0
2	Pixel data P1
3	Pixel data P2
4	Pixel data P3
5	Pixel data P4
6	Pixel data P5
7	Pixel data P6
8	Pixel data P7
9	Clock
10	Reserved
11	HSync
12	VSynC
13	Ground
14	Ground
15	Ground
16	Ground
17	Enabling signal
18	Enabling signal
19	Enabling signal
20	Free
21	Ground
22	Ground
23	Ground
24	Ground
25	Free
26	Free



The pin allocation of the VESA standard feature connector has been adjusted for all miroCRYSTAL *PCI boards*, so that these boards can be connected 1:1 to another graphics board via a flat ribbon cable.

miroCRYSTAL address range

For the miroCRYSTAL graphics board to run without problems you have to avoid address conflicts. Make sure that the addresses used by miroCRYSTAL are not also assigned to other components of your computer system.

– I/O address range

miroCRYSTAL occupies the address range of standard VGA **03B0h-03DFh** and parts of the 8514/A I/O address range.

These address ranges are normally not used by standard system hardware and therefore address conflicts are unlikely to happen.

The following table shows the I/O address areas that can be selected and used by miroCRYSTAL.

0E2E8h	
042E8h	04AE8h
082E8h	08AE8h
092E8h	09AE8h
0A2E8h	0AAE8h
0B2E8h	0BAE8h
046E8h	04EE8h
086E8h	08EE8h
096E8h	09EE8h
0A6E8h	0AEE8h
0B6E8h	0BEE8h

– Additional VGA addresses

In addition the following addresses are used:

VGA video memory	VGA BIOS
0A0000h - 0BFFFFh	0C0000h - 0C7FFFh

Glossary

This glossary contains the most important concepts from the field of computer hardware and software. Cross-references are marked by this symbol .

Address	All memory positions in a computer have numbers (addresses). Through these addresses each memory position can be addressed directly. Some addresses are reserved for certain  hardware components and must not be used. If two hardware components use the same address, there is an address conflict.
ANSI	American National Standards Institute. ANSI character set ( Font): used by Microsoft Windows and Windows applications. The character assignment only differs slightly from the assignment of the  ASCII character set.
ASCII	American Standards Committee of Information Interchange. ASCII character set ( Font): standard character set used by IBM and compatible computers. The ASCII character set consists of 256 characters, the first 128 of which are standardized.
AUTO-EXEC.BAT	A special DOS  batch file which is processed automatically after the computer has been started. The file contains among other things commands which load the country-specific keyboard driver ( Driver), set the time or load programs automatically.
Batch file	A  DOS file where a sequence of commands is processed one after the other.
BIOS	Basic Input Output System. Number of basic input and output commands stored in a  ROM, PROM or EPROM. The  operating system uses these commands. The basic task of the BIOS is to control the data input and output. After starting the system the ROM BIOS performs some tests (checking the  interfaces, the disk drives, etc.).
Bit	Binary Digit. Smallest information unit in a computer. One bit can take on two states: «0» and «1», two bits can take on $2^2=4$ states and three bits $2^3=8$, etc. In a computer those states are realized by «0 V» (no current = 0) and «5 V» (current = 1). To display a character (letter, number etc.), 8 bits = 1  byte are required.
Bus	In a computer, busses provide for the communication between the  processor and the installed hardware (hard disk, graphics board, etc.). Depending on the bus width, the bus transfers a different amount of information. An 8-bit bus can transfer 8  bits (=  byte = one character) at a time.
Byte	One byte consists of eight  bits. One byte represents exactly one character (letter, number etc.). The characters are binary-coded with «zero» (0) and «one» (1). The character «E» has the  ASCII code «01000101» or «45h» (hexadecimal).

CGA	Color Graphics Adapter (IBM). Graphics board which displays four colors in the graphics mode.
Clock frequency	Rate at which individual commands are processed in a processor. The higher the  clock frequency, the quicker the commands are processed.
CLUT	Color Look Up Table. Color table which contains all indexed color values.
Color depth	Number of  bits used to represent the color information for each  pixel. At a black and white display 1 bit color depth displays $2^1=2$ colors. At a color depth of 8 bits $2^8=256$ colors are available and at 24 bits $2^{24}=16,277,216$ ( TrueColor) colors are available.
CONFIG.SYS	A  DOS configuration file which is processed automatically when the system starts. The CONFIG.SYS file includes  drivers which control the output to the monitor and the keyboard and the mouse.
DIP switch	Dual Inline Package switch. A row of small switches designed to make certain hardware presettings.
DOS	Disk Operating System. The most common  operating system for PCs (Personal Computer). MS DOS is the Microsoft version of DOS.
Driver	Programs which integrate the hardware (e.g. driver for a CD-ROM drive) in the computer and which adapt the software to the hardware (e.g. driver for a graphical user interface, such as Microsoft Windows). The software then uses the features of the graphics board.
EGA	Enhanced Graphics Adapter (IBM), graphics board which displays 16 colors in the graphics mode.
EISA bus	Extended Industry Standard Architecture. 32-bit bus: The EISA bus can transfer an amount of data of 33  MB per second at a  clock frequency of 8.33 MHz.
Fixed-frequency monitor	Monitor operating at a very small frequency range ( multifrequency monitor).
Font	Character set in a certain type, size and style, e.g. Times New Roman 11, normal; Times New Roman 11, italics; Times New Roman 11, bold; Times New Roman 11, bold, italics.
Graphics board	Graphics boards are the «link» between the computer and the monitor. Without a graphics board no image appears on the screen. Graphics boards operate in two modes: the text mode and the graphics mode. In the text mode only  ASCII characters are displayed. The ASCII character set includes some simple «graphical» characters to display simple graphics. The graphics mode uses individual  pixels. The more pixels are available (the higher the  resolution) the more detailed characters and graphics can be displayed.
Hardware	The hardware includes all computer components which are «hard», such as the monitor, the hard disk, the keyboard, the mouse and the printer.
HGC	Hercules Graphics Card, monochrome (black and white) graphics board.
Horizontal scan rate	Number of horizontal scans of the electron beam per second required to create a new line. The higher the  resolution the higher the required horizontal scan rate.

Interface	Link between two parts of a system or between two systems where information, pulses and signals are adapted in a way that the receiving part can understand the sending part. For example, signals which the computer sends to the printer have to be adapted by an interface so that the printer «understands» what it has to print.
Interlaced	Image refreshing technique: the screen is subdivided into lines. When refreshing the image first all even lines and then all odd lines are refreshed.
ISA bus	I nternational S tandard A rchitecture. 16-bit bus which transfers 8 MB of data per second at a clock frequency of 8 MHz.
Jumper	Jumpers can set up or interrupt electrical leads. To establish electrical leads with a jumper, the jumper has to be mounted, to interrupt the lead the jumper has to be removed.
KB	1 KB (Kilobyte) is equal to 1024 bytes. Here «K» (kilo) is always equal to «1024».
MB	1 MB (Megabyte) equals 1024 KB.
MDA	M onochrome D isplay A dapter. Monochrome (black and white) graphics board.
Multifrequency monitor	A multifrequency monitor adapts itself automatically to different frequencies supplied by the graphics board (fixed-frequency monitor) and can display different resolutions.
Operating system	The operating system provides for the communication between hardware, software and the user. The tasks of the operating system are among others the file and the program management.
Parallel interface	The parallel or Centronics interface transfers data through an 8-bit data line. This means that 8 bits (1 byte) can be transferred at a time. The transfer through the parallel interface is considerably faster than the transfer through the serial interface, over long distances the parallel data transfer is, however, more susceptible to interference. Parallel interfaces are designated by LPT and a number (e.g. LPT1).
PCI Local Bus	P eripheral C omponent I nterconnect. Local Bus concept by IBM: 32-bit bus, a PCI bus can transfer 132 MB per second at a clock frequency of 33 MHz.
Pixel	Picture element. Pixels are the smallest elements of a monitor image (resolution).
RAM	R andom A ccess M emory. An RAM is a read-write memory component from which data can be read and to which data can be written any time. The computer memory is equipped with RAM components. The memory is a so-called «volatile» memory meaning that the memory contents are removed as soon as the computer is switched off.
Refresh rate	Also vertical scan rate. Number of image refreshes per second measured in Hertz (Hz). The higher the vertical scan rate the less flicker.
Resolution	Number of horizontal and vertical pixels. 1408 x 1024 means that 1408 horizontal pixels and 1024 vertical pixels are displayed on the monitor. The higher the resolution the more details the monitor can display.

ROM	Read Only Memory. A ROM is a memory component which can only be read but which cannot be modified. The ROM's contents remain in the component also after the computer has been switched off. All functions which have to be available immediately after switching the computer on, e.g. the data for the system test, the character output on the screen, etc. are stored in ROM components. There are also PROMs (P rogrammable ROM) EPROMs (E rasable PROM) and EEPROMs (E lectric EPROM).
Serial interface	Also RS232. The serial interface transfers data through a data line bit by bit (all 8 bits of a byte one after the other). The serial data transfer is considerably slower than the transfer through the 8 parallel interface but it is less susceptible to interference. Serial interfaces are designated by COM and a number (e.g. COM1).
Software	General term for all programs a computer can run (system programs, application programs, drivers etc.) and files.
TrueColor	16.7 million colors can be displayed at a time (24 color depth).
VESA	V ideo E lectronic S tandards A ssociation. Committee founded in 1988 in the USA which establishes common standards for the computer technology.
VESA Local Bus	Bus concept defined by the VESA committee: 32-bit bus operating at a clock frequency of up to 50 MHz. At a clock frequency of 33 MHz the VL bus transfers up to 132 MB per second.
VGA	V ideo G raphics A rray (IBM), graphics board which displays 256 colors in the graphics mode.

FCC compliance statement

FCC warning statement

NOTE: 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, may cause harmful interference to radio 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 receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Label warning

This device complies with Part 15 of the 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.

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