

PC/104 VGALCD-6

Technical Manual

Rev. 1.2

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User Information

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In this document Kontron Hamburg will also be referred to by the short form "Kontron".

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General

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The information in the Technical Descriptions describes the type of the boards and shall not be considered as assured characteristics.

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Warranty

Each board is carefully and thoroughly tested before being shipped. If, however, problems should occur during the operation, please check your user specific settings of all boards included in your system. This is often the source of the fault. If a board is defective, it can be sent to your supplier for repair. Please take care of the following steps:

1. The board returned should correspond to the factory default settings since a test is only possible under these settings.
2. In order to repair your board as fast as possible, we require some additional information from you. Please fill out the attached Repair Form and include it with the defective board.
3. If possible, the board will be upgraded to the latest version without additional cost.
4. Upon receipt of the board, please be aware that your user specific settings were changes during the test.

Within the guarantee, the repair is free as long as the guarantee conditions were kept. If no fault has been found, you will be charged with the test cost due to the high test expenditure. Repairs outside of the guarantee will be charged.

This Kontron product is warranted against defects in material and workmanship for our guaranteed warranty period from the date of shipment. During the warranty period, Kontron will, at its option, either repair or replace products which prove to be defective.

For warranty service or repair, the product must be returned to a service facility designated by Kontron.

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance or handling by buyer, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper installation or maintenance.

Kontron will not be responsible for any defects or damages due to a faulty Kontron product other than the products supplied by Kontron.

Important Notes

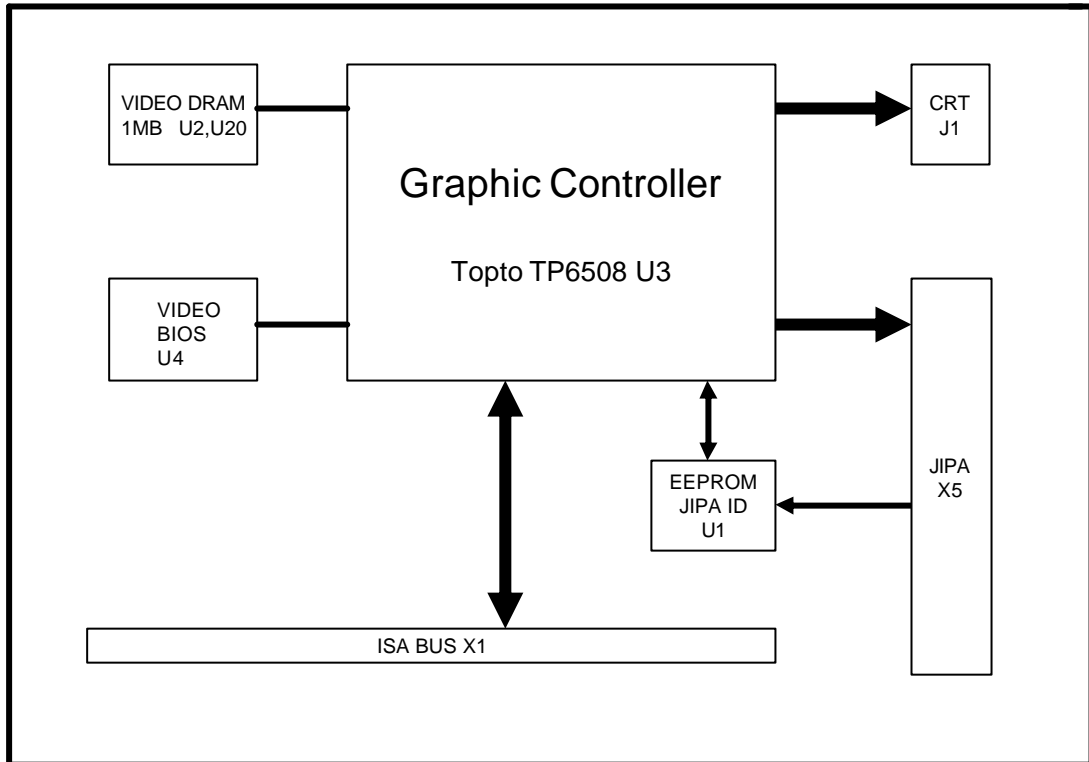
To protect the external power lines of peripheral devices the customer has to take care about:

that the wires have the right diameter to withstand the maximum available current and that the enclosure of the peripheral device fulfils the fire protecting requirements of IEC/EN 60950.

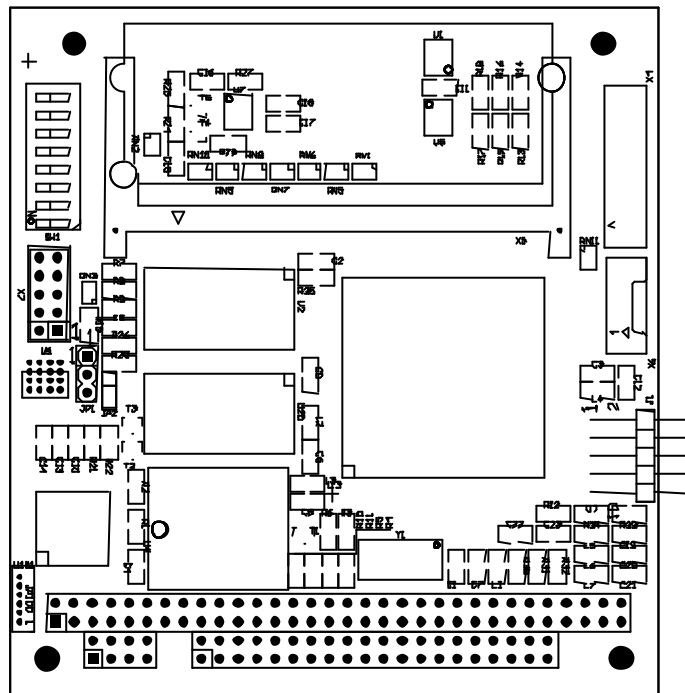
Features of the PC/104 VGALCD-6

- VGA-CRT and LCD Controller with 1 MB video RAM.
- LCD Controller supports almost any type of LCD.
- Low power CMOS technology.
- BIOS calls for efficient use of extensions
- Board size : 90,17 x 95,87 mm
- LCD controller support for:
Monochrome
Colour super twisted nematic (STN)
Thin film transistor (TFT) flat panels
- LCD resolutions
320 x 240 @ 24 bits
640 x 480 @ 24 bits
800 x 600 @ 16 bits
- CRT resolutions
320 x 240 @ 24 bits
640 x 480 @ 24 bits
800 x 600 @ 16 bits
1024 x 768 @ 8 bits
- Kontron's JIPA interface supports:
TFT
STN flat panels (Colour & monochrome)
- Graphics accelerator function for:
Hardware cursor
Colour expansion
Simultaneous operation of display
CRT monitor
- Support for ¼ VGA displays (320 x 240) by character compression

Block Diagram PC/104-VGALCD-6



Layout of the Connectors



Connector Tables

Connector Table for the PC/104-VGALCD-6

X1A PC/104 – Bus X1B					Power X1C		JIPA-Connector	VGA-CRT
Pin	A	B	C	D	E	F	X5	J1
0			GND	GND				
1	/IOCHCK	GND	/SBHE	/MEMCS16	VCC	GND	FLM	RED
2	SD7	RSTDRV	LA23	/IOCS16	+12V	NC	LP	GND
3	SD6	VCC	LA22	NC	NC	NC	GND	GREEN
4	SD5	NC	LA21	NC	VCC	GND	GND	GND
5	SD4	NC	LA20	NC			SCLK	BLUE
6	SD3	NC	LA19	NC			GND	GND
7	SD2	NC	LA18	NC			GND	V-SYNC
8	SD1	/OWS	LA17	NC			DE	GND
9	SD0	+12V	NC	NC			P16	H-SYNC
10	IOCHRDY	GND	NC	NC			P17	GND
11	AEN	/SMEMW	SD8	NC			P8	
12	SA19	/SMEMR	SD9	NC			P9	
13	SA18	/IOW	SC10	NC			P0	
14	SA17	/IOR	SD11	NC			P1	
15	SA16	NC	SD12	NC			P2	
16	SA15	NC	SD13	VCC			P3	
17	SA14	NC	SD14	NC			P10	
18	SA13	NC	SD15	GND			P11	
19	SA12	/REFRSH	GND	GND			P18	
20	SA11	NC					P19	
21	SA10	NC					P4	
22	SA9	NC					P5	
23	SA8	NC					P6	
24	SA7	NC					P7	
25	SA6	NC					P12	
26	SA5	NC					P13	
27	SA4	NC					P14	

Connector Table for the PC/104-VGALCD-6

28	SA3	BALE				P15	
29	SA2	VCC				P20	
30	SA1	OSC				P21	
31	SA0	GND				P22	
32	GND	GND				P23	
33						GND	
34						NC	
35						NC	
36						NC	
37						PID0	
38						PID1	
39						PID2	
40						PID3	
41						NC	
42						GND	
43						I2DAT	
44						I2CLK	
45						NC	
46						NC	
47						NC	
48						NC	
49						NC	
50						GND	
51						VCC5	
52						NC	
53						NC	
54						NC	
55						NC	
56						NC	
57						NC	
58						NC	
59						NC	

Connector Table for the PC/104-VGALCD-6

60						NC	
61						FPBACK	
62						VDD_SRC	
63						BACK_SRC	
64						VCC3	
65						+12V	
66						+12V	
67						VCC5	
68						NC	
69						NC	
70						NC	
71						FPVEE	
72						FPVCC	

Pin Discription

JIPA Interface Pin Description

You can connect various flat-display panels to the 72-pin JIPA display connector X5. The pinout is shown in the following table.

Pin Name	Pin Description
FLM	LCD Frame Start: This output provides a pulse to start a new frame on flat panels.
LP	LCD Line Clock: This output drives the LCD panel-line clock. Some panel manufacturers also designate this signal as LP or CP1.
FPVCC	Part of panel-power sequencing. This pin is a switch output pin and used to drive the PanelVCC Switch on the Jipa Adapter.
FPBACK	Part of panel-power sequencing. This pin is a switch output pin and used to drive the Backlight VCCSwitch on the Jipa Adapter.
FPVEE	Part of panel-power sequencing. This pin is a switch output pin and used to drive the Contrast VEESwitch on the Jipa Adapter.
PD0-PD23	Panel Data Signals
SCLK	Flat Panel Video Clock: This signal drives the shift clock of the flat panel, which is designated as CP2 by some panel manufacturers.
DE	DE: Display Enable: For those flat panels that require an external display enable, this pin provides a data enable.
PID0-PID3	Panel Sense: Inputs for panel-type selection.
I2DAT	I2C-bus data line.
I2CLK	I2C-bus clock line.
VDD_SRC	Internal not used
BACK_SRC	Internal not used
GND	Ground.

General Description

The PC/104 VGALCD-6 cards add the functions and features of the latest video standards to your PC computer system. The VGA-BIOS is included in a 64kB FLASHEPROM (48kB VGA-BIOS, 16KB unused). The FLASHEPROM is suited on the board. The BIOS address range is C000:0000H up to C000:FFFFH. The PC/104 VGALCD-6 is designed to control LCD displays of any technology up to 800 * 600 resolution. The CRT resolution goes up to 1024 * 768, however LCD displays with more than 800 * 600 resolution are not supported. There is no interface standard for LCD displays, therefore, some unusual LCDs may require some external hardware to connect to the PC/104 VGALCD-6.

Displays with resolution smaller than 640*480 are generally supported, but may require additional software drivers to be PC compatible.

Supported Display Types

The PC/104 VGALCD-6 can support a vast variety of panels all configured by a dedicated cable for each panel. There is no Jumper setting or software setup required. Since practically all LCDs have different connectors, pinout or LCD voltages, this is the easiest and safest way to configure for different panels.

We plan to update the display type list in the manual, but ask for currently supported panel types, since new panels will be added frequently.

Systembus (PC/104-bus)

The **PC/104** bus is defined by the AMPRO company. The PC/104 bus is electrically identical to the standard AT-Bus (ISA-Bus) and functionally full compatible to the AT. The drive strength is 12mA instead of 24mA on the ISA bus.

Power Supply

The PC/104 VGALCD-6 board only needs a +5V power supply to work probably, but most Backlightinverter need +12V so the +5 and +12 volt must be supplied through the system bus connectors. The typ. power consumption of the PC/104 VGALCD-6 is about 350 mA.

VGA Monochrome Monitor

Monochrome type monitors use Green Video for all video input and ignore Red Video and Blue Video. Monitor ID Bits are not used by the PC/104 VGALCD-6. Monitor type is determined on power up by an automatic monitor detection circuit.

I/O-Addresses

Following addresses are occupied from the PC/104 VGALCD-6 I/O hardware:

Besides the standard PC I/O ports this board uses the following I/O addresses:

I/O addr.	used for	available	Comment
03C0 – 03CF	VGA/LCD	No	I/O-Addresses for VGA/LCD-Controller
03D4 – 03D5	VGA/LCD	No	I/O-Addresses for VGA/LCD-Controller

Reserved Memory Addresses

Besides the standard PC memory window this board uses the following addresses:

Memory addr.	used for	available	Comment
A0000-BFFFF	VGA/LCD	No	Video-memory
C0000-CFFFF	VGA/LCD	No	Video-BIOS

Working with the PC/104 VGALCD-6

Overview

The PC/104 VGALCD-6 offers some useful extensions compared with other peripheral modules, which will be described in the following:

Support for LC-Displays

Monochrome and Colour STN, TFT or EL Display panels may be connected to the PC/104 VGALCD-6. The complete display mode selection and configuration is supported by the video BIOS. Additionally, display mode selection (CRT only, panel only, or SimulScan) and the display features "contrast enhancement" and "reverse video" can be controlled by the user via software utilities supplied by Kontron and is available on the website www.kontron-hh.de.

Easy configuration

Configuration and timing data for the different types of flat panels described above can easily be changed by using the program DIO4EDT.EXE. Other settings may also be made by your own software via well documented BIOS calls. The software is available on the website www.kontron-hh.de.

The LC-Display Interface

Connecting a Display by a JIPA- Cable

Many different display cables for a wide spread variety of displays are available through Kontron. If you use one of those standard cables supplied by Kontron, configuration is very easy:

1. Check, whether you have the correct cable for the panel you plan to use. Inspect the cable for damages.
2. Disconnect power from your System.
3. Connect the JIPA-cable for your display to the display connector (X5) on the PC/104 VGALCD-6. JIPA-cables are adjusted automatically.
4. Connect the other end of the cable to your display.
5. Supply power to your system.

Backlight converter

Most LCD displays need an extra AC or DC Voltage for their Backlight, which is generated by an external converter. This converter usually generates between 60 and 1000 Volts AC and has to be as close as possible to the Backlight to avoid capacitive losses on long cables. The JIPA-Cable has a connector to switch Backlight on or off via software control and can be configured to switch 5V or 12 V to the Backlight converter.

Available Video Modes

Mode #	Vesa #	Display Mode	Characters/Pixels	# of Colours
00h/01h	-	Text	40 * 25	16 out of 256
02h/03h	-	Text	80 * 25	16 out of 256
04h/05h	-	Graphics	320 * 200	4 out of 256
06h	-	Graphics	640 * 200	2 out of 256
07h	-	Text	80 * 25	mono
0Dh	-	Graphics	320 * 200	16 out of 256
0Eh	-	Graphics	640 * 200	16 out of 256
0Fh	-	Graphics	640 * 350 / * 400	mono
10h	-	Graphics	640 * 350	16 out of 256
11h	-	Graphics	640 * 480	2 out of 256
12h	-	Graphics	640 * 480	16 out of 256
13h	-	Graphics	320 * 200	256 out of 256
14h	-	Text	132 * 25	16 out of 256k
54h	10Ah	Text	132 * 43	16 out of 256k
55h	109h	Text	132 * 25	16 out of 256k
58h/6Ah	102h	Graphics	800 * 600	16 out of 256k
5Ch	103h	Graphics	800 * 600	256 out of 256k
5Dh	104h	Graphics	1024 * 768	16 out of 256k

Hardware Controller Descriptions

Video Controller Type Topro 6508

Features

- Integrated RAMDAC
- Integrated programmable frequency synthesizer
- Integrates Colour STN panel support
- Simultaneous CRT and LCD (SimulScan TM) operation
- 64 -shade greyscale at 640 * 480 resolution on monochrome STN LCD
- Resolution up to 1024 * 768 with 16 colours on CRTs
- 800 * 600 with 256 colours on Panels
- 132-column text modes on CRTs
- Low-power CMOS technology in a 160 pin-QFP package

Specifications

Mechanical Specifications

Dimensions: Length x Width: 90,17 x 95,87 mm

Topside Height: 12mm inclusive PC/104 Bus connector

Electrical Specifications

Supply voltage:	5V DC +/- 5%
Supply voltage ripple:	100 mV peak to peak 0 - 20 MHz
Supply current, typical:	400 mA at 25 °C
VGA connector signals:	
sync output current low:	20 mA at 0.5 V
sync output current high:	-12 mA at 2.4 V
RGB output voltage:	0 - 0.7 V with 75 Ohm external termination
RGB output current:	0 - 14 mA

Environmental Specifications

Temperature

operating	5 °C - 55 °C see note (*1)
non-operating	-40 °C - 85 °C

Thermal gradient

operating	25 °C per hour
non-operating	40 °C per hour

Relative Humidity

operating	10 % - 90 % RH non-condensing
non-operating	5 % - 95 % RH non-condensing

Mechanical

Shock	50G/20ms square wave maximum
Vibration	1G/0-600Hz, dwell not to exceed

Altitude

operating	0 - 3000 m
non-operating	0 - 5000 m

(*1) The maximum operating temperature is the maximum measurable temperature on any spot on the modules surface. It is the users responsibility to keep this temperature within the above specification.

Revision History

File-name	last alteration	author	alteration to previous version
PC104 VGALCD-6-M10.DOC	11.10.2001	DF	Initial release
PC104 VGALCD-6-M10.DOC	05.02.2002	DF	Update specs
PC104 VGALCD-6-M11.DOC	18.09.2003	LT	Update specs
PC104 VGALCD-6-M12.DOC	26.09.2003	DF	Update specs