Kontron User's Guide

DIMM-PC® COMBO2/VGA2

Document Revision 1.11

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1 User Information

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Before contacting Kontron Embedded Modules GmbH technical support, please consult our Web site at http://www.kontron-emea.com/emd for the latest product documentation, utilities, and drivers. If the information does not help solve the problem, contact us by telephone or email.

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2 Introduction

2.1 DIMM-PC® Concept

DIMM-PC® modules are very small, embedded computer boards that fit directly on an application-specific baseboard, using industry-standard SO-DIMM sockets.

Kontron offers two types of DIMM-PC® modules:

- CPU modules, available with 80386, 80486, and 80586 processors, are fully PC/AT compatible and come with a substantial amount of onboard I/O.
- I/O modules extend the functionality of DIMM-PC® systems by allowing additional I/Os and peripherals.

Kontron offers a starter kit for all DIMM-PC® and DIMM-PC® I/O applications.

2.2 DIMM-PC®/COMBO2

The DIMM-PC®/COMBO2 is an add-on module for the Kontron DIMM-PC® series. It combines three single modules:

- DIMM-PC®/VGA2
- DIMM-PC®/ETN1
- DIMM-PC®/COM1

2.2.1 DIMM-PC®/VGA2

The VGA2 module comes with the a TOPRO TP6508 controller that can directly drive monochrome, passive color (STN) and thin film transistor (TFT) displays. The connected display is automatically recognized via cable configuration, and the timing is correspondingly adjusted. Resolutions on the CRT can go up to 1024x768. However, maximum LCD resolution is limited to 800x600.

High performance comes from features such as:

- Hardware cursor
- Color expansion
- 32-bit memory
- 16-bit I/O access

Features also include:

- 1MB-graphics memory
- 128KB PROM, which holds the VGA BIOS

2.2.2 DIMM-PC®/ETN1

The ETN1 module comes with the Crystal LAN® CS8900 ISA Ethernet controller from Cirrus Logic. The controller follows the IEEE802.3 standard and supports half- or full-duplex operation in ISA-bus

computers on 10-Mbps Ethernet networks. The controller's I/O addresses are configurable from a DOS setup program.

2.2.3 DIMM-PC®/COM1

The COM1 module comes with a Standard Microsystems Corporation (SMSC) 37C665GT I/O controller and adds two more serial ports to a DIMM-PC® system. The signals of the serial ports are available on the DIMM-I/O connector in transistor-to-transistor logic (TTL) levels. You can decide which interface (RS232, RS485, or TTL) to use by adding your own driver circuitry to a baseboard.

3 Features

3.1 Functional Specifications

VGA CRT and LCD controller TOPRO TP6508 with 1MB video RAM

VGA graphics for CRT and flat displays

LCD controller support for:

- Monochrome
- Color super twisted nematic (SNT)
- 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

1MB video memory

Kontron AG JIPA interface supports:

- LCD
- TFT
- STN flat panels

Color

Monochrome displays

Graphics accelerator function for:

- Hardware cursor
- Color expansion
- Simultaneous operation of display
- CRT monitor

Support for ¼ VGA displays (320 x 240) by character compression

Cirrus Logic Crystal LAN 10 Mbps Embedded Ethernet Controller **(CS8900)**

- Single-chip IEEE 802.3 Ethernet controller with direct ISA-bus interface
- 10Mbps
- Selectable I/O addresses (0300-030F)
- Comprehensive suite of software drivers
- Half- and full-duplex operation
- On-chip RAM buffers transmit and receive frames
- 10BASE-T port with analog filters

SMSC Super I/O Controller **(FDC37C665GT)**

- Two serial ports (COM3 and COM4)
- Two high-speed NS16C550-compatible UARTs with Send/Receive 16byte FIFOs
- 115K baud support

Kontron DIMM-PC® Interface

- DIMM-PC® form factor: 68mm x 40mm (1.57" x 2.68")
- DIMM-PC® I/O signals

ISA bus (DIMM-PC® specification 1.D)

Low-power CMOS technology

5V power supply

3.2 Mechanical Specifications

3.2.1 Dimensions

- Length x Width: 67.6 mm x 40.0 mm (2.68" x 1.57")
- Height: 6 mm (0.24")

3.3 Electrical Specifications

3.3.1 Supply Voltage

- 5V DC +/- 5%

3.3.2 Supply Voltage Ripple

- 100 mV peak to peak 0 - 20 MHz

3.3.3 Supply Current (Typical)

- ≈ 370mA

3.4 Environmental Specifications

3.4.1 Temperature

- Operating: 0 to +60 °C ((*) with appropriate airflow))
- Nonoperating: -40 to +85 ° C

Note: **The maximum operating temperature is the maximum measurable temperature on any spot on a modules´s surface. It is your responsibility to maintain this temperature within the above specification.*

3.4.2 Thermal Gradient

- Operating: -25 ° C per hour
- Nonoperating: 40 ° C per hour

3.4.3 Humidity

- Operating: 10 percent to 90 percent (noncondensing)
- Nonoperating: 5 percent to 95 percent (noncondensing)

3.4.4 Mechanical

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

3.4.5 Altitude

- Operating: 0 – 3000m
- Nonoperating: 0 – 5000m

4 Resource List and I/O Map

Typical resource allocations are listed in the table below.

4.1 IRQ Addresses for Ethernet and COM Ports

IRQ #	Used For	Available	Comment
5	Ethernet	No	Default IRQ for onboard Ethernet controller; available if Ethernet uses IRQ 10, 11, or 12. IRQ 5 and IRQ 11 are not available if you use a DIMM-PC®/486-I. Use the setup tool of the CS8900 controller to select another interrupt such as IRQ 10.
10	COM3	No	For systems using DIMM-PC®'s with PhoenixBIOS*1, the BIOS detects the external Super I/O chip on the Combo2. The IRQ# is adjustable in the BIOS setup. For all other DIMM-PC®'s, use DIO1I110.EXE*2 to activate COM3/4. Available if DIO1I110 is not called.
11	COM4	No	For systems using DIMM-PC®'s with PhoenixBIOS*1, the BIOS detects the external Super I/O chip on the Combo2. The IRQ# is adjustable from the BIOS setup. For all other DIMM-PC®'s, use DIO1I110.EXE*2 to activate COM3/4. Available if DIO1I110 is not called; IRQ 11 is not available if you use the DIMM-PC®/486-I.

Notes: **1 DIMM-PC®'s with PhoenixBIOS: DIMM-PC®520-I; DIMM-PC®/586-IE.*
**2 See Appendix E: Assembler Program for more information.*

4.2 I/O Addresses for VGA/LCD, Ethernet and COM Ports

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

I/O Address	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
0300 – 030F	Ethernet	No	Selectable I/O address
02E8 – 02EF	COM4	No	I/O addresses for COM4
03E8 – 03EF	COM3	No	I/O addresses for COM3

4.3 Memory Addresses for VGA/LCD

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

Memory Address	Used For	Available	Comment
A0000-BFFFF	VGA/LCD	No	Video memory
C0000-CFFFF	VGA/LCD	No	Video BIOS

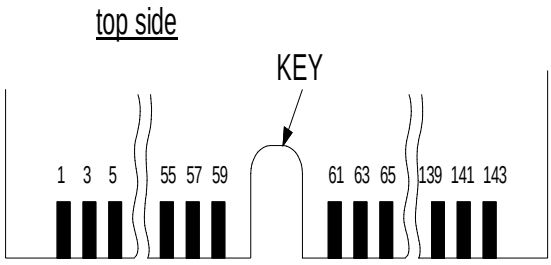
5 Connector Description

5.1 Connector Pinouts

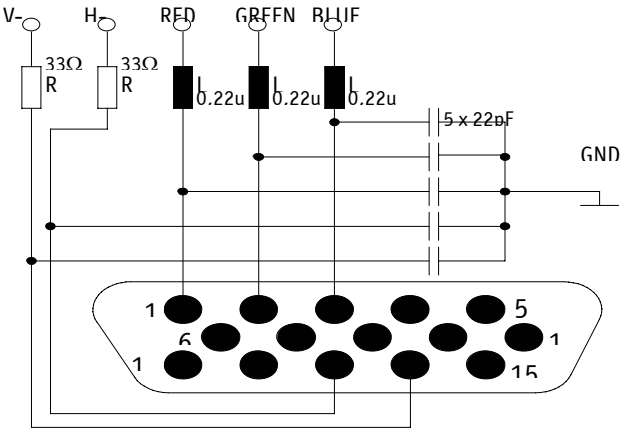
The following tables provide information about the DIMM-PC® I/O connector for the DIMM-PC®/Combo2.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	SA0	2	GND	73	SA13	74	VCC
3	OSC	4	N.C.	75	I2CLK	76	VSYNC
5	SA1	6	VCC	77	SA14	78	GND
7	SA2	8	RI4#	79	N.C.	80	HSYNC
9	N.C.	10	DCD4#	81	SA15	82	FPBACK
11	SA3	12	DTR4#	83	N.C.	84	P20
13	BALE	14	DSR4#	85	N.C.	86	SA16
15	SD15	16	RTS4#	87	IOR#	88	GND
17	SA4	18	CTS4#	89	SA17	90	FPVDD
19	N.C.	20	TXD4 / DO	91	N.C.	92	/BLANK
21	SD14	22	RXD4 / DI	93	IOW#	94	P15
23	SA5	24	RI3#	95	SA18	96	P14
25	N.C.	26	DCD3#	97	IRQ12	98	P13
27	SD13	28	DTR3#	99	SMEMr#	100	P12
29	SA6	30	DSR3#	101	SA19	102	P7
31	IRQ3	32	RTS3#	103	IRQ11	104	P6
33	DRQ7	34	CTS3#	105	SMEMW#	106	P5
35	DACk#7	36	TXD3	107	AEN	108	P4
37	N.C.	38	RXD3	109	IRQ10	110	P19
39	SA7	40	P23	111	IOCHRDY	112	P18
41	SD12	42	P22	113	SBHE#	114	P11
43	IRQ5	44	TXD+	115	SD0	116	P10
45	SA8	46	TXD-	117	IOCS16#	118	GND
47	SD11	48	RXD+	119	ZWS#	120	P3
49	N.C.	50	RXD-	121	SD1	122	P2
51	SA9	52	LNLED	123	MEMCS16#	124	P1
53	SD10	54	LKLED	125	SD2	126	P0
55	N.C.	56	GND	127	SD3	128	P9
57	SA10	58	MAD15	129	N.C.	130	P8
59	SD9	60	MAD14	131	SD4	132	VPANEL
61	N.C.	62	MAD13	133	SD5	134	FPVEE
63	SA11	64	MAD12	135	N.C.	136	VDCLK
65	SD8	66	P21	137	SD6	138	LLCLK
67	REF#	68	BLUE	139	SD7	140	VCC
69	SA12	70	GREEN	141	RSTDRV#	142	LFS
71	I2DAT	72	RED	143	N.C.	144	GND

5.1.1 Top-side View of DIMM-PC® I/O Connector



5.2 CRT Connector Pin Description



5.2.1 CRT Connector Pin Table

DIMM-PC®/Combo2	VGA Connector	Description
72	1	RED
70	2	GREEN
68	3	BLUE
	4	NC
78	5	GND
78	6	GND
78	7	GND
78	8	GND
	9	NC
78	10	GND
	11	NC
	12	NC
80	13	H-SYNC
76	14	V-SYNC
	15	NC

Note: *Pins marked as NC are not connected.*

5.3 JIPA Interface Pin Description

You can connect various flat-display panels to the 72-pin JIPA display connector X29 on ADA7. The pinout is shown in the following table.

5.3.1 JIPA Interface Pinout table

Name	JIPA	DIMM-PC®/Combo2	DIMM-PC®/Combo2	JIPA	Name
LFS, FLM/VS	1	142	138	2	LP/HS, LLCLK
GND	3	144, 118, 88, 78, 56, 2	144, 118, 88, 78, 56, 2	4	GND
SCLKY	5		144,118, 88,78,56,2	6	GND
GND	7	144, 118, 88, 78, 56, 2	92	8	BLANK (DE)#
N.C.	9			10	N.C.
SUD3* P8	11	130	128	12	P9 SUD2*
UD3** SUD7* P0	13	126	124	14	P1 SUD6* UD2**
UD1** SUD5* B2*** P2	15	122	120	16	P3 B3*** SUD4* UD0**
SUD1* G2*** P10	17	116	114	18	P11 G3*** SUD0*
R2*** P18	19	112	110	20	P19 R3***
LD3** SLD7* B4*** P4	21	108	106	22	P5 B5*** SLD6* LD2**
LD1** SLD5* B6*** P6	23	104	102	24	P7 B7*** SLD4* LD0**
SLD3* G4*** P12	25	100	98	26	P13 G5*** SLD2*
SLD1* G6*** P14	27	96	94	28	P15 G7*** SLD0*
R4*** P20	29	84	66	30	P21 R5***
R6*** P22	31	42	40	32	P23 R7***
GND	33	144, 118, 88, 78, 56, 2		34	N.C.
N.C.	35			36	N.C.
MADD12	37	64	62	38	MADD13
MADD14	39	60	58	40	MADD15
N.C.	41		144, 118, 88, 78, 56, 2	42	GND
I2DAT	43	71	75	44	I2CLK
N.C.	45			46	N.C.
N.C.	47			48	N.C.
N.C.	49		144, 118, 88, 78, 56, 2	50	GND
VCC	51	140, 74, 6		52	DA_00
N.C.	53			54	N.C.
VDCLK	55	136	76	56	VSYNC
HSYNC	57	80	68	58	BLUE
GREEN	59	70	72	60	RED
SW_BACK	61			62	VDD_SRC
BACK_SRC	63			64	N.C.
+12 V	65			66	+ 12 V
VCC	67	140, 74, 6		68	N.C.
N.C.	69			70	N.C.
FPVEE	71		132	72	VPANEL

Notes: ** Signals in red mean signaling for STN color displays.*
*** Signals in blue mean signaling for B/W STN displays.*
****Signals in green mean signaling for TFT 18-bit displays.*

5.4 LCD Signal Explanation

Some pins generate up to four signals, depending on the display connected.

- B/W-LCD displays use signals UDx and LDx (LDx for dual-scan displays only).
- STN color displays use SUDx and SLDx.
- Thin film transistor (TFT) displays use Rx, Gx and Bx.

5.4.1 LCD Signal Pin table

Pin Name	Pin Description
LFS	LCD Frame Start: This output provides a pulse to start a new frame on flat panels.
LLCLK	LCD Line Clock: This output drives the LCD panel-line clock. Some panel manufacturers also designate this signal as LP or CP1.
FPVDD	Switched VDD: Part of panel-power sequencing. Connect to VCC or VDD on most panels. This pin is a switch output. Output voltage must be supplied at Pin 37 (VDD_SRC).
GND	Ground.
UD0-UD3	Upper Data: The upper data bits are typically used with monochrome dual-scan STN flat panels to provide 4-bit parallel data for the upper portion of the panel.
LD0-LD3	Lower Data: The lower data bits are typically used with monochrome dual-scan STN flat panels to provide 4-bit parallel data for the lower portion of the panel.
SLD0-SLD7	STN Lower Data: The lower-data bits are for use with color STN LCD 16-bit panels.
SUD0-SUD7	STN Upper Data: The upper data bits are for use with color STN LCD 16-bit panels.
R2- R7	Red Bits: These bits contain red-color data for TFT color 18-bit flat panels.
G2 G7	Green Bits: These bits contain green-color data for TFT color 18-bit flat panels.
B2- B7	Blue Bits: These bits contain blue color data for TFT color 18-bit flat panels.
BLANK#	DE: Display Enable: For those flat panels that require an external display enable, this pin provides a data enable.
FPVDD	Flat Panel VDD enable: This output is part of panel-power sequencing. Normally, this signal is only used internally. Use Pin 62 (VDD-SRC) instead.
FPBACK	Flat Panel Backlight enable: This output is part of the panel-power sequencing. Connect to the panel's backlight enable or use Pin 61 (SW_BACK) to supply the backlight converter. Do not use this signal as supply voltage for the backlight converter.
MAD12-MAD15	Panel Sense: Inputs for panel-type selection.
I2DAT	I2C-bus data line.
I2CLK	I2C-bus clock line.
DA_00	Analog voltage output from 8-bit DAC for the flat panel's contrast voltage.
VDCLK	Flat Panel Video Clock: This signal drives the shift clock of the flat panel, which is designated as CP2 by some panel manufacturers. On ADA7, it's possible to buffer this signal.
HSYNC	Horizontal Sync: This output supplies the horizontal-synchronization pulse to the monitor. It is usually not needed for flat panels.
VSYNC	Vertical Sync: This output supplies the vertical-synchronization pulse to the monitor. It is usually not needed for flat panels.
BLUE	This analog output is generated by TP6508's built-in DAC. It supplies current corresponding to the BLUE value of the displayed pixel.
GREEN	This analog output is generated by TP6508's built-in DAC. It supplies current corresponding to the GREEN value of the displayed pixel.
RED	This analog output is generated by TP6508's built-in DAC. It supplies current corresponding to the RED value of the displayed pixel.
SW_BACK	Switched Backlight Supply: Use this as supply for backlight converters. Outputs the voltage supplied at Pin 63 (BACK_SRC).

VDD_SRC	VDD Source: Connect this pin to the source of VDD. For most panels, this will be +5V. This input leads to a switch controlled by FPVDD. The switched voltage is output at Pin 62.
BACK_SRC	Backlight Source: Connect this pin to the supply voltage for your backlight if necessary. This input leads to a switch controlled by FPBACK. The switched voltage is output at Pin 61 (SW_BACK).
+12V	+12V output. May be used as input for Pin 63 (BACK_SRC) if your backlight converter needs +12V power supply and is connected to Pin 61 (SW_BACK).
+5V (VCC)	+5V output. May be used as input for Pin 63 (BACK_SRC) if your backlight converter needs +5V power supply and is connected to Pin 61 (SW_BACK). May also be used as input for Pin 62 (VDD_SRC) if your display needs 5V supply voltage.
FPVEE	Flat Panel VEE enable: This output is part of the panel-power sequencing. Normally, this signal is only used internally.
VPANEL	Supply voltage for flat-panel logic.

5.5 Panel Detection

The VGA BIOS from the TOPRO TP6508 supports up to 16 panel types, which are selected by a 4-bit value. This value is read back during system reset on all Kontron Embedded Modules boards. On all Kontron Embedded Modules JIPA interfaces, there are four configuration switches, which are built using RW (MAD15), RX (MAD14), RY (MAD13), and RZ (MAD12), which determine this value.

If a OR resistor is set or shorted, its value is 0. If not, set its value to 1. The table below shows actual configurations.

Not all panel types defined by TOPRO are supported on Kontron boards; some types are unusual. Common settings can drive others. An example: When driving color STN SS 8-bit panels (for instance QVGA [320x240] STN color panels), you can use the upper half of the data of color STN DD 16-bit panels.

New panel types are added to Kontron Embedded Modules BIOSses. Check the Kontron Web site under the product's name for the latest supported panels.

Panel ID	Rw...Rz MAD15 ...MAD12 MSB...LSB	Panel Type	Clock Rate (MHz)	Resolution (Pixel)
0	0000	Reserved		
1	0001	Reserved		
2	0010	Color STN DD 16 Bit	10	640x480
3	0011	Color STN DD 16 Bit	20	800x600
4	0100	Color TFT 18/24 Bit	25	640x480
5	0101	Color TFT 18/24 Bit	25	640x480
6	0110	Reserved		
7	0111	Color TFT 18/24 Bit	38	800x600
8	1000	Color TFT 18/24 Bit	38	800x600
9	1001	Reserved		
10	1010	Reserved		
11	1011	Mono STN DD 8 Bit	6	640x480
12	1100	Reserved		
13	1101	Reserved		
14	1110	Reserved		
15	1111	Reserved		

5.6 Ethernet Controller Pin Description

Pin	Signal Name	Function	In / Out	Notes
1	TXD+	10BASE-T Transmit	Differential Output	1
2	TXD-	10BASE-T Transmit	Differential Output	1
3	RXD+	10BASE-T Receive	Differential Input	2
4	NC	Unused Pin		
5	NC	Unused Pin		
6	RXD-	10BASE-T Receive	Differential Input	2
7	NC	Unused Pin		
8	NC	Unused Pin		

Notes: *[1] TXD+, TXD-*
Differential output pair drives 10 Mb/s Manchester-encoded data to the 10BASE-T transmit lines.
[2] RXD+, RXD-
Differential input pair receives 10 Mb/s Manchester-encoded data from the 10BASE-T receive lines.

5.7 COM3 and COM4 Pin Descriptions

Pin	Name	Description	Pin	Name	Description
38	RXD3	Receiver serial data input for COM3.	22	RXD4	Receiver serial data input for COM4.
36	TXD3	Transmit serial data output for COM3.	20	TXD4	Transmit serial data output for COM4.
34	CTS3#	Active low clear to send input for COM3.	18	CTS4#	Active low clear to send input for COM4.
32	RTS3#	Active low request to send output for COM3.	16	RTS4#	Active low request to send output for COM4.
30	DSR3#	Active low data set ready input for COM3.	14	DSR4#	Active low data set ready input for COM4.
28	DTR3#	Active low Data Terminal Ready output for COM3.	12	DTR4#	Active low Data Terminal Ready output for COM4.
26	DCD3#	Active low data carrier detect input for COM3.	10	DCD4#	Active low data carrier detect input for COM4.
24	RI3#	Active low ring indicator input for COM3.	8	RI4#	Active low ring indicator input for COM4.

6 VGA Controller

The DIMM-PC®/Combo2 adds the functions and features of the latest video standards to your DIMM-PC® board. The VGA BIOS, created by Kontron Embedded Modules, is included in a 64KB-Flash EEPROM (48KB VGA BIOS).

The EEPROM is situated on the DIMM-PC®/Combo2 module. The BIOS address range is C000:0000h up to C000:FFFFh. The DIMM-PC®/Combo2 module can control LCD displays of technologies 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. LCD displays have no interface standards.

Display resolutions smaller than 640 * 480 are generally supported but can require additional software drivers to be PC-compatible.

6.1 Supported Display Types

The DIMM-PC®/Combo2 can support panels configured by a dedicated cable (JIPA interface) for each panel. There is no jumper setting or software setup required. Because nearly all LCDs have different connectors, pinout, and LCD voltages, this is the easiest and safest way to configure different panels.

Name	Panel Support				
	Mono STN	Color TFT	Color STN	DC/DC	SW Control
DIMM-PC®/COMBO2	Yes	Yes	Yes	---	---

6.1.1 SW Control

The panel software control allows you to change contrast settings and other panel features via Jump*tec* Intelligent Device Architecture (JIDA) calls or the keyboard. For more information on the JIDA standard, see the Appendix D: JIDA Standard chapter.

6.1.2 DC/DC

You need an external DC/DC converter if you use a panel that uses contrast voltages such as monochrome or color STN panels.

6.2 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 DIMM-PC®/Combo2. A detection circuit determines monitor type at power up.

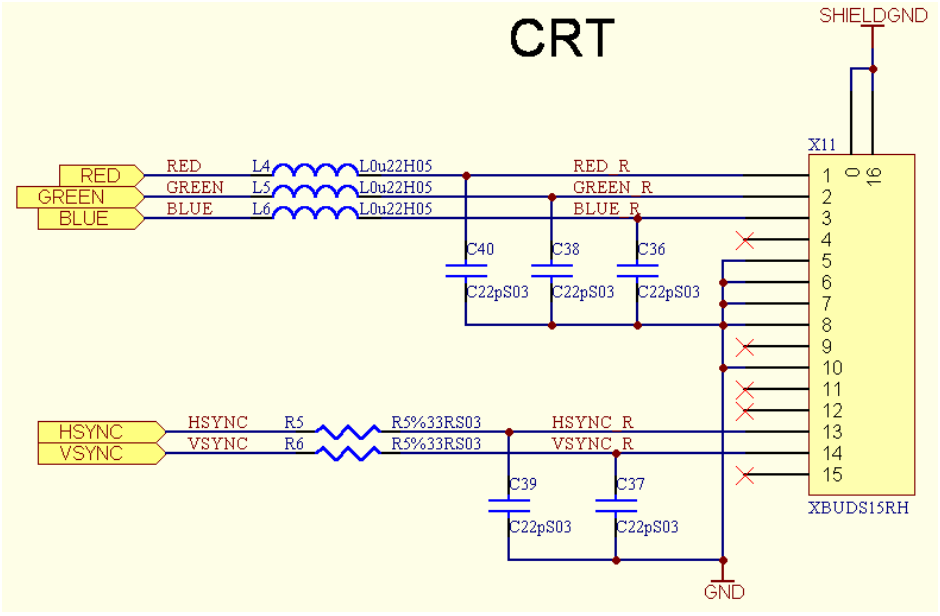
6.3 Reserved Memory Addresses

For Interrupt Return Vectors for the matrix controller, a memory area of 12 bytes is reserved in the memory area 0:2B4h to 2BFh. Unused interrupt vectors include INT ADh to INT AFh.

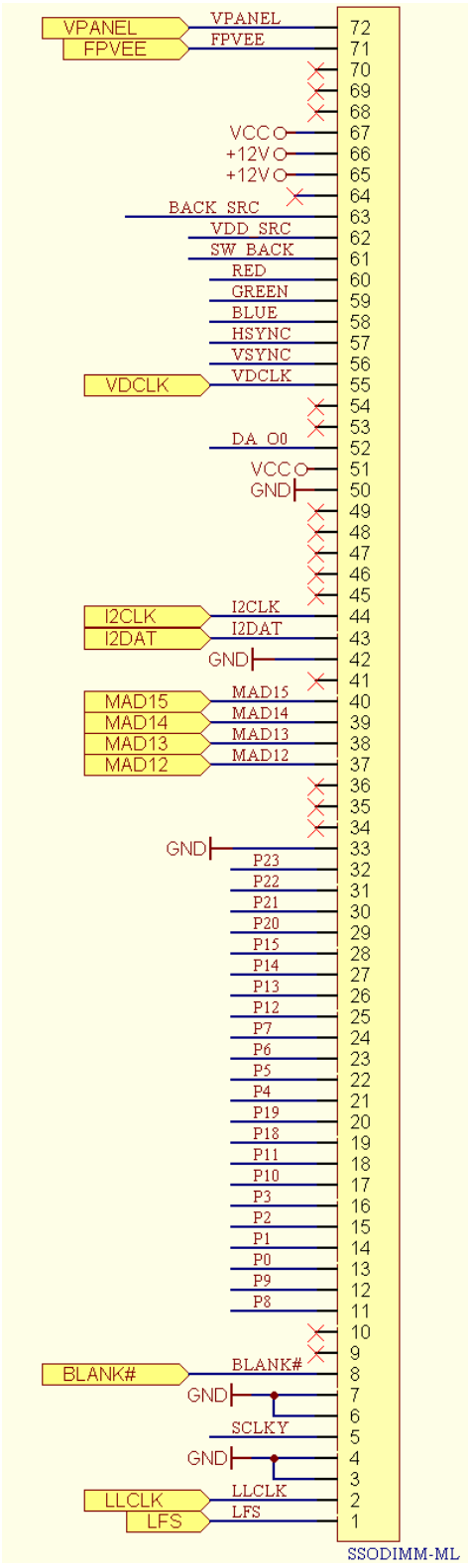
6.4 Configuring Cables

Check the Kontron Embedded Modules home page for a panel list, which is regularly updated following testing.

6.5 CRT Connector

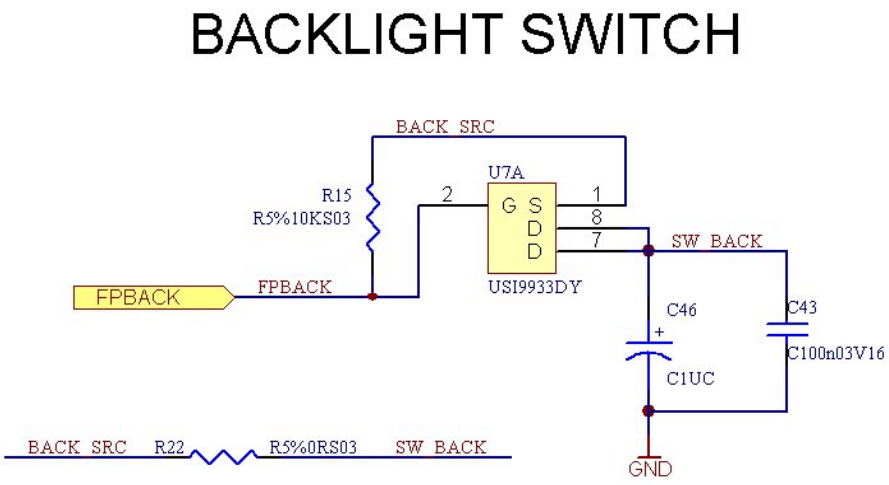


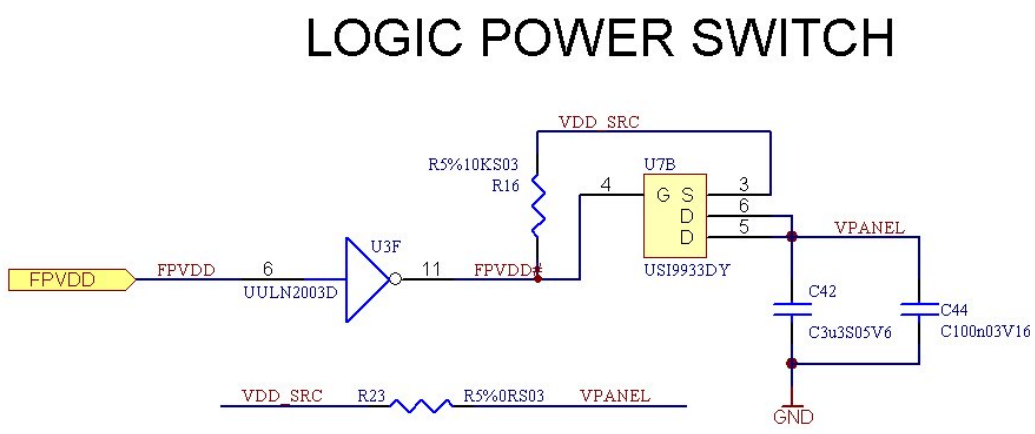
6.6 JIPA Display Connector



6.7 Connecting Backlight and Logic-Power Switches

Using the following circuits, you can switch the backlight on or off (backlight switch) and switch the display on or off (logic-power switch) via the keyboard. If you do not need the features, you can connect BACK_SRC with SW_BACK and VDD_SRC with VPANEL.





6.8 Ethernet Controller

The CrystalLAN™ CS8900 Ethernet Controller from Cirrus Logic follows the IEEE 802.3 standard and supports half- or full-duplex operation in 16-bit ISA bus computers on 10-Mbps Ethernet networks.

This feature is unavailable on the DIMM-PC®/VGA2 I/O board.

Note: *Crystal CS8900 Ethernet magnetics are not included and are assumed to be on the baseboard.*

6.9 Software Installation

To install and configure your CS8900 Ethernet controller:

- ➤ Connect your network cable.
- ➤ Configure the controller.

➤ Install the device driver and support files.

➤ Perform diagnostic tests as needed.

6.10 CS8900 Configuration

Connect the network cable before loading the driver. CS8900-based controllers have the following default settings.

To change the configuration of the controller after it has been installed, run the CS8900 DOS setup.exe utility, which you can find in the driver archive. You can find the driver archive in the Ethernet.exe utility files.

If you use a DIMM-PC®/486-I module, IRQ5 and IRQ11 are unavailable. The CS8900 controller should use either IRQ 10 or IRQ 12.

Parameter	Default Setting
Operation mode	Memory mode
IRQ	10
Base I/O Address	300
Memory Base Address	D0000
Optimization	DOS Client
Transmission Mode	Half-duplex
BootProm	None
Media Type	Autodetect (3 media cards) -or- 10BASET (10BASE-T only adapter)

6.11 Software and Driver Setup

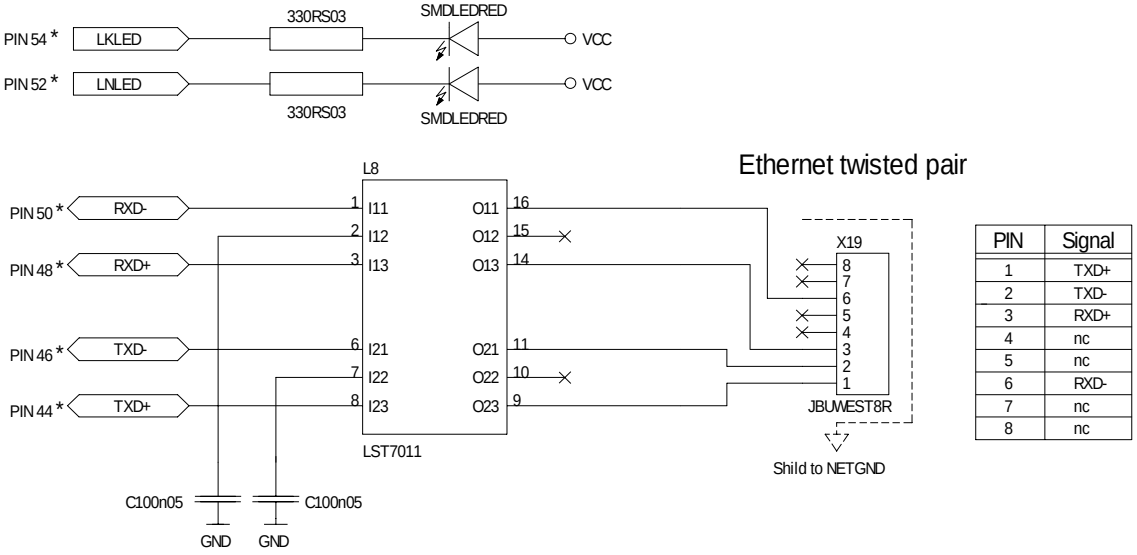
Please refer to the corresponding readme and setup/install files found in the Ethernet.exe utility that you can download from the Kontron Web site.

6.12 Technical Support

Kontron Embedded Modules provides you with the latest tested drivers at the time of product shipment. You can resolve some problems by downloading the most recent **CS8900 Ethernet Controller drivers** from the Cirrus Logic Web site.

For further help, contact Kontron http://emea.kontron.com/.

6.13 Ethernet Design Example



PIN	Signal
1	TXD+
2	TXD-
3	RXD+
4	nc
5	nc
6	RXD-
7	nc
8	nc

* PIN-Number of the DIMM-PC/ETH1

6.14 Parts Description

The following table describes the parts used in the above schematic.

Designator	Used	Description	Manufacturer	Order Number
LST7011	1	SMD 10Base-T transformer without choke	VALOR YCL	ST7011 16PT-41S
SMDLEDRED	2	SMD LED red, SOT-23 shape	SIEMENS TELEFUNKEN	LS S26-DO TLMR2200
JBUWEST8R	1	Western socket, 8 positions, right-angled	AMP BERG	5-555178-3 87180-088

7 Serial Ports

The information in this section explains the hardware and software used by the two serial ports on the DIMM-PC®/Combo2 module.

7.1 Software Installation

Before using the serial ports, initialize the registers on the SMSC I/O controller on the DIMM-PC®/Combo2 module. Kontron Embedded Modules provides a utility called DIO1I111.exe to assist you. You can find the utility at Kontron Embeded Modules Web site. The utility initializes the serial ports of the DIMM-PC®/Combo2 module to use I/O addresses 3E8 and 2E8, and IRQs 10 and 11 respectively.

This feature is unavailable on the DIMM-PC®/VGA2 I/O board.

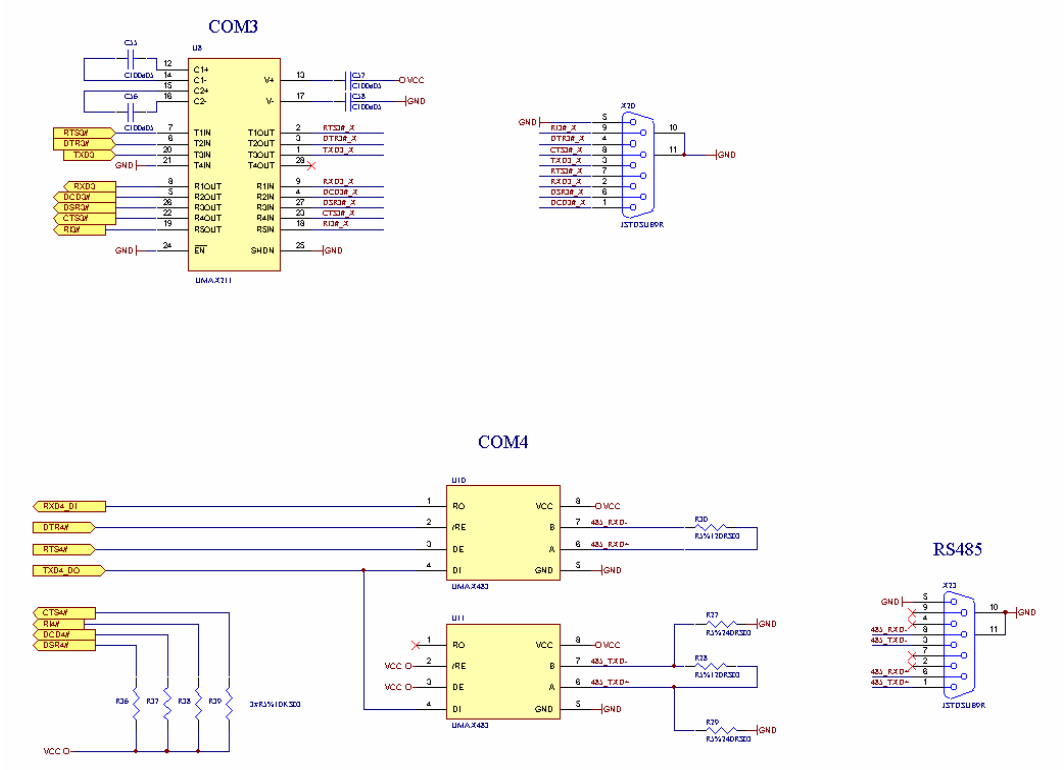
To initialize the SMCS controller, add the DIO1I111.exe utility to the autoexec.bat file in your system before running a program that needs to access the serial ports of the DIMM-PC®/Combo2.

For non-DOS operating systems, the source code for DIO1I111.exe is provided in Appendix D. You can use the code to generate a suitable configuration utility for the specific OS in use.

For other operating systems please initialize the same registers.

7.2 Serial Port Design Example

In the application is the Serial Port 3 (COM3) performed as a RS232 interface and the Serial Port 4 (COM4) as a RS485 interface.

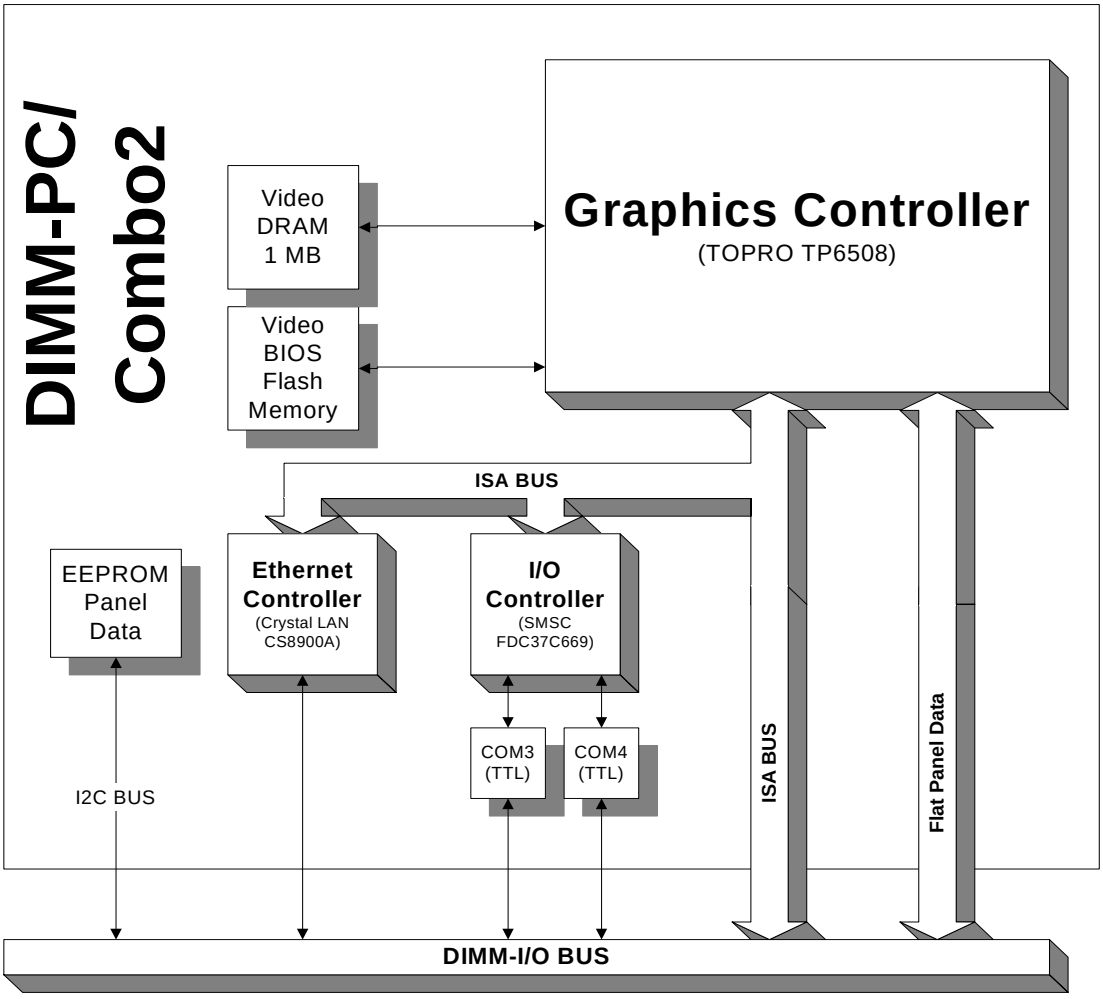


7.2.1 Parts Description

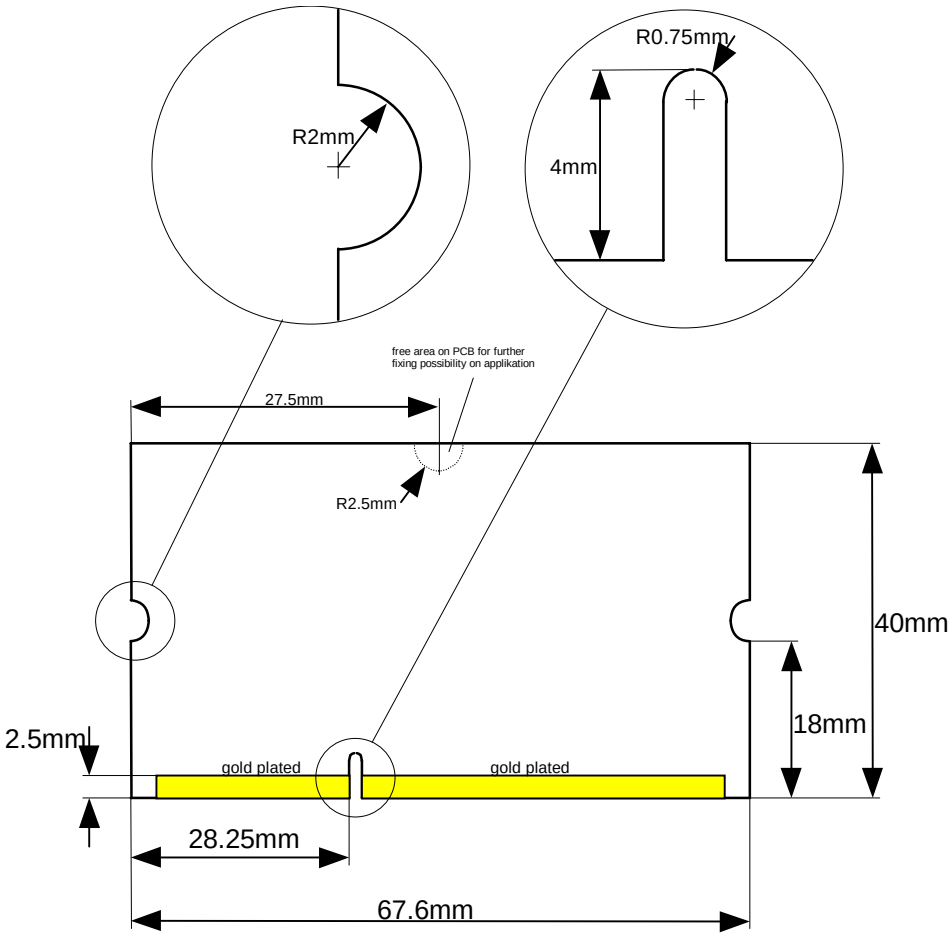
The following table provides the parts used in the above schematic.

Designator	Used	Description	Manufacturer	Order Number
UMAX211	1	CMOS RS 232 driver and receiver	SIPEX	SP211(B)CA
UMAX483	2	RS-485 transceiver	SIPEX	SP483CN
JSTDSUB9R	2	DSUB-connector 9pos	Riebensahm	DRA09P11

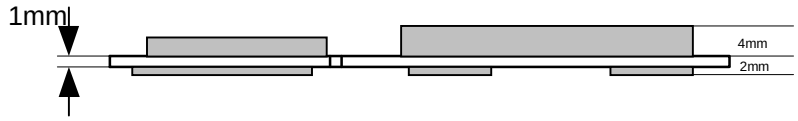
8 Appendix A: Block Diagram



9 Appendix B: Mechanical Dimensions



front view



side view

10 Appendix C: Literature and Specifications

Below is a list of information sources to help you to further understand PC architecture.

10.1 Buses

10.1.1 ISA, Standard PS/2 - Connectors

- AT Bus Design: Eight and Sixteen-Bit ISA, E-ISA and EISA Design, Edward Solari, Annabooks, 1990, ISBN 0-929392-08-6
- AT IBM Technical Reference Vol 1&2, 1985
- ISA & EISA Theory and Operation, Edward Solari, Annabooks, 1992, ISBN 0929392159
- ISA Bus Specifications and Application Notes, Jan. 30, 1990, Intel
- ISA System Architecture, Third Edition, Tom Shanley and Don Anderson, Addison-Wesley Publishing Company, 1995, ISBN 0-201-40996-8
- Personal Computer Bus Standard P996, Draft D2.00, Jan. 18, 1990, IEEE Inc
- Technical Reference Guide, Extended Industry Standard Architecture Expansion Bus, Compaq 1989

10.1.2 PCI/104

- **Embedded PC 104 Consortium**
  This Web site will provide information about PC/104 and PC/104-Plus technology.
- **PCI SIG**
  The PCI-SIG provides a forum for its ~900 member companies, who develop PCI products based on the specifications that are created by the PCI-SIG.
- *PCI & PCI-X Hardware and Software Architecture & Design*, Fifth Edition, Edward Solari and George Willse, Annabooks, 2001, ISBN 0-929392-63-9.
- *PCI System Architecture,* Tom Shanley and Don Anderson, Addison-Wesley, 2000, ISBN 0-201-30974-2.

10.2 General PC Architecture

- *Embedded PCs*, Markt&Technik GmbH, ISBN 3-8272-5314-4 (German)
- *Hardware Bible*, Winn L. Rosch, SAMS, 1997, ISBN 0-672-30954-8
- *Interfacing to the IBM Personal Computer*, Second Edition, Lewis C. Eggebrecht, SAMS, 1990, ISBN 0-672-22722-3
- *The Indispensable PC Hardware Book*, Hans-Peter Messmer, Addison-Wesley, 1994, ISBN 0-201-62424-9
- *The PC Handbook: For Engineers, Programmers, and Other Serious PC Users, Sixth Edition*, John P. Choisser and John O. Foster, Annabooks, 1997, ISBN 0-929392-36-1

10.3 Ports

10.3.1 RS-232 Serial

- EIA-232-E Interface
  The EIA-232-E standard specifies the interface between (for example) a modem and a computer so that they can exchange data. The computer can then send data to the modem, which then sends the data over a telephone line. The data that the modem receives from the telephone line can then be sent to the computer.
- RS-232 Made Easy: Connecting Computers, Printers, Terminals, and Modems, Martin D. Seyer, Prentice Hall, 1991, ISBN 0-13-749854-3
- **National Semiconductor**
  Interface Data Book includes application notes. Type “232” as a search criteria to obtain a list of application notes.

10.3.2 Serial ATA

- **Serial AT Attachment (ATA) Working Group**
  This X3T10 standard defines an integrated bus interface between disk drives and host processors. It provides a common point of attachment for systems manufacturers and the system.

10.3.3 USB

- **USB Specification**
  USB Implementers Forum, Inc. is a non-profit corporation founded by the group of companies that developed the Universal Serial Bus specification. The USB-IF was formed to provide a support organization and forum for the advancement and adoption of Universal Serial Bus technology.

10.4 Programming

- *C Programmer’s Guide to Serial Communications*, Second Edition, Joe Campbell, SAMS, 1987, ISBN 0-672-22584-0
- *Programmer's Guide to the EGA, VGA, and Super VGA Cards*, Third Edition, Richard Ferraro, Addison-Wesley, 1990, ISBN 0-201-57025-4
- *The Programmer’s PC Sourcebook,* Second Edition, Thom Hogan, Microsoft Press, 1991, ISBN 1-55615-321-X
- *Undocumented PC, A Programmer’s Guide to I/O, CPUs, and Fixed Memory Areas*, Frank van Gilluwe, Second Edition, Addison-Wesley, 1997, ISBN 0-201-47950-8

11 Appendix D: JIDA Standard

Every board with an on-board BIOS extension supports the following function calls, which supply information about the board. JUMP*tec* Intelligent Device Architecture (JIDA) functions are called via Interrupt 15h. Functions include:

- AH=Eah
- AL=function number
- DX=4648h (security word)
- CL=board number (starting with 1)

The interrupt returns a CL≠0 if a board with the number specified in CL does not exist. CL will equal 0 if the board number exists. In this case, the content of DX determines if the operation was successful. DX=6B6Fh indicates success; other values indicate an error.

11.1 Obtaining Information about Boards that Use the JIDA Standard

To obtain information about the installed boards that follow the JIDA standard, use the following procedure.

- Call Get BIOS ID with CL=1.
  The name of the first device installed will be returned.
  If you see the result **Board exists** (CL=0), increment CL, and call **Get BIOS ID** again.
- Repeat until you see **Board not present** (CL≠0).
  You now know the names of all boards within your system that follow the JIDA standard.
- You can find out more information about a specific board by calling the appropriate inquiry function with the board's number in CL.

Note: *Association between board and board number may change because of configuration changes. Do not rely on any association between board and board number. Always use the procedure described above to determine the association between board and board number.*

Refer to the JIDA manual in the **jidai110.zip** folder for further information on implementing and using JIDA calls with C sample code.

12 Appendix E: Assembler Program

The following assembly language program serves as the source code for the DIO1I111.EXE utility. You can use the program to activate additional serial ports COM3 and COM4 on DIMM-I/O modules COMBO2, COM1, and ETH+COM.

```
;*************************************************************************
;*****************;
;*                        DIO1I110.ASM
            *;
;*-----------------------------------------------------------------
            *;
;*    This program activates additional serial ports
*;
;*    COM3 and COM4 on DIMM-I/O modules.                          *;
;*
*;
;*-----------------------------------------------------------------
            *;
;*    Author             : F. Krauss
      *;
;*    Creation date       : 30.03.1999
            *;
;*    Last update        : 30.03.1999
            *;
;*-----------------------------------------------------------------
            *;
;************************************************************************
;*************

;== Stack=================================================

stackseg  segment para STACK 'STACK'           ;definition of the Stack-
Segment

          dw 256 dup (?)                       ;the stack covers 256 Words

stackseg  ends                                 ;end of the Stack-Segment

;== Code ==================================================

code        segment para 'CODE'           ;definition of the CODE-Segment
assume      cs:code                       ;CS refers to the Code-Segment



prog        proc far                      ;this procedure is the real
                                          ;main program and it was executed
                                          ;after starting the program

;--- enter configuration mode ---

mov   dx, 370H
mov   ax, 055H
```

```
cli
out   dx, al
out   dx, al
sti

;--- configure registers ---

mov   dx, 370h                    ;initialize COM3 at the adress 3E8
mov   al, 24h
out   dx, al
mov   dx, 371h
mov   al, 0fah
out   dx, al

mov   dx, 370h                    ; initialize COM4 at the adress 2E8
mov   al, 25h
out   dx, al
mov   dx, 371h
mov   al, 0bah
out   dx, al

mov   dx, 370h                    ;assign INT10 to COM3
mov   al, 28h                     ;and INT11 to COM4
out   dx, al
mov   dx, 371h
mov   al, 43h
out   dx, al

;--- exit configuration mode ---

mov   dx, 370h
mov   ax, 0aah
out   dx, al


;--- load addresses and interrupts into the DOS configuration space ---

      mov   ax, 040h
      mov   ds, ax

      mov   di, 4                 ;enter the addresses of COM3 and COM4 to
the
      mov   [di], 3E8h            ;DOS configuration space
      mov   di, 6
      mov   [di], 2E8h

      mov   di, 10h               ;enter the new number of the serial
ports to the
      mov   ax, [di]              ; DOS configuration space
      mov   bx, ax
      and   bx, 0F1FFh
      and   ax, NOT 0F1FFh
      shr   ax, 9
      add   al, 2
      shl   ax ,9
```

```
      or    ax, bx
      mov   [di], ax

;--- finish the program with the DOS function 4Ch ---------

            mov   ax, 4C00h          ;loading function number, error code 0
            int   21h                ;call up DOS


prog      endp                      ;end of the PROG-Procedur


;== end=============================================================

code      ends                      ;end of  the CODE-Segment
end  prog
```

13 Appendix F: Document Revision History

Version	Date	Edited by	Changes
1.10	08.07.2002	JL and GUL	Initial release
1.11	16.05.2007	GUL	Updated to new Kontron Style Checked and updated Links