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DIGITAL-LOGIC

smart embedded computers

TECHNICAL USER'S MANUAL FOR:

MICROSPACE®

PC/104 PERIPHERAL BOARD

MSMV104+



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1 PREFACE

This manual is for integrators and programmers of systems based on the MICROSPACE card family. It contains information on hardware requirements, interconnections, and details of how to program the system. The specifications given in this manual were correct at the time of printing; advances mean that some may have changed in the meantime. If errors are found, please notify DIGITAL-LOGIC AG at the address shown on the title page of this document, and we will correct them as soon as possible.

1.1 How to use this Manual

This manual is written for the original equipment manufacturer (OEM) who plans to build computer systems based on the single board MICROSPACE-PC. It provides instructions for installing and configuring the MSM486SL or MSM386SN board, and describes the system and setup requirements.

1.2 Trademarks

Chips & Technologies	SuperState R
MICROSPACE, MicroModule	DIGITAL-LOGIC AG
DOS Vx.y, Windows	Microsoft Inc.
PC-AT, PC-XT	IBM
NetWare	Novell Corporation
Ethernet	Xerox Corporation
DR-DOS, PALMDOS	Digital Research Inc. / Novell Inc.
ROM-DOS	Datalight Inc.

1.3 Disclaimer

DIGITAL-LOGIC AG makes no representations or warranties with respect to the contents of this manual and specifically disclaims any implied warranty of merchantability or fitness for any particular purpose. DIGITAL-LOGIC AG shall under no circumstances be liable for incidental or consequential damages or related expenses resulting from the use of this product, even if it has been notified of the possibility of such damage. DIGITAL-LOGIC AG reserves the right to revise this publication from time to time without obligation to notify any person of such revisions. If errors are found, please contact DIGITAL-LOGIC AG at the address listed on the title page of this document.

1.4 Who should use this Product

- Electronic engineers with know-how in PC-technology.
- Without electronic know-how we expect you to have questions. This manual assumes, that you have a general knowledge of PC-electronics.
- Because of the complexity and the variability of PC-technology, we can't give any warranty that the product will work in any particular situation or combination. Our technical support will help you to may find a solution.
- Pay attention to the electrostatic discharges. Use a CMOS protected workplace.
- Power supply OFF when you are working on the board or connecting any cables or devices.

This is a high technology product.
You need know-how in electronics and PC-technology to install the system !

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1.5 Recycling Information

Hardware:

- Print: epoxy with glass fiber
wires are of tin-plated copper

- Components: ceramics and alloys of gold, silver
check your local electronic recycling

Software:

- no problems: re-use the diskette after formatting

1.6 Technical Support

1. Contact your local Digital-Logic Technical Support in your country.
2. Use Internet Support Request form on http://www.digitallogic.com -> support
3. Send a FAX or an E-mail to DIGITAL-LOGIC AG with a description of your problem.

DIGITAL-LOGIC AG
smartModule DesignIn Center
Nordstr. 11/F
CH-4542 Luterbach (SWITZERLAND)
Fax: ++41 32 681 58 01
E-Mail: support@digitallogic.com
Internet www.digitallogic.com

➔ Support requests will only be accepted with detailed informations about the product (BIOS-, Board-version) !

1.7 Limited Warranty

DIGITAL-LOGIC AG warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from DIGITAL-LOGIC AG, Switzerland. This warranty is limited to the original purchaser of product and is not transferable.

During the one year warranty period, DIGITAL-LOGIC AG will repair or replace, at its discretion, any defective product or part at no additional charge, provided that the product is returned, shipping prepaid, to DIGITAL-LOGIC AG. All replaced parts and products become property of DIGITAL-LOGIC AG.

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Except, as expressly set forth above, no other warranties are expressed or implied, including, but not limited to, any implied warranty of merchantability and fitness for a particular purpose, and DIGITAL-LOGIC AG expressly disclaims all warranties not stated herein. Under no circumstances will DIGITAL-LOGIC AG be liable to the purchaser or any user for any damage, including any incidental or consequential damage, expenses, lost profits, lost savings, or other damages arising out of the use or inability to use the product.

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2 OVERVIEW

2.1 Ordering Information

To get the actual status of the partnumbers, customers are advised to ask for them via our sales department or distributors.
The list below has to be treated as a momentary screenshot and is might not up to date anymore.

Ordering Information: (To be determined)	
MSMV104+l	Light version with dual LCD (no LVDS and DVI)

2.2 General Information

The product MSMV104+ can be described as follows:
- PC/104+ PCI bus 120 pin with selectable PCI slot
- SM721 (Lynx3DM) XGA controller with 4MB VRAM
- 200MHz 24bit RAMDAC for resolution up to 1600x1200
- 1.6GB/s bandwidth
- Combination of 128-bit 2D and 3D Engine (Microsoft DirectX capability)
- Different display outputs CRT, TV-Out, Dual LCD (option LVDS and DVI)
- ZV-Port Interface

BUS:	
Standard:	PC/104+
Size and Type:	PCI multiplexed 32 Bit Address/Data Bus

Controller:	
Type:	Lynx3DM from SiliconMotion (SM721)
Package:	BGA 316 pins

Video Memory:	
Size:	4MB VRAM

BIOS:	
Standard:	CRT only
Available:	CRT and TFT 800x600 18 bit

Power Supply:	
Power supply: V1.2	5V through PCI Bus 3.3V on board supply 2.5V on board supply
LCD Power supply	3.3 Logic Power 5V/ 3V Bias Power Power sequencing controlled by SM721

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Interfaces:	
DSUB15	VGA CRT
Molex..	DVI (up to 24bit resolution)
Molex…	LVDS (up to 18 bit resolution)
40x2 pin	Dual LCD (DSTN or TFT)
30 pin	ZV-Port
SMB Coax	TV-Out (PAL or NTSC)

Available Display:	
CRT only	
LCD and CRT	Simultaneous mode
LCD and CRT	Dual display mode (for example extended Windows desktop)
TV-Out only	

LVDS Interface:	
Controller	DSC90C363 (National)
Size:	18 bit

DVI Interface:	
Controller	SiL164 (SiliconImage)
Size:	24 bit

Physical Characteristics:	
Dimensions:	Length: 90mm
	Width: 96mm
	Height: 15mm

Operating Environment:			
Relative humidity:	5 - 90% non condensing		
Vibration:	5 to 2000 Hz		
Shock:	10g		
Temperature:	Operating:	Standard version:	-25°C to +70°C
		Industry version:	-25°C to +85°C (ask DIGITAL-LOGIC AG)
	Storage:	-55°C to +85°C	

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2.3 Multimedia features

The Lynx3DM motion compensation hardware allows full- frame playback of DVD content in software. Making use of its independent bus-master interface and its ability to alpha blend sub-picture data, the Lynx3DM offloads the CPU and eliminates the need for a dedicated decoder.

- The MSMV104+ graphic controller integrates a TV encoder with NTSC/PAL support and provide graphic/video display on TV without the need of any external logic
- The MSMV104+ GPU has a built-in MPEG2 hardware motion compensation decoder so as to enable easy DVD playback and to offload the main CPU.
- One primary and up to two secondary displays are supported, included dual digital display capability under Win95, Win98, WinMe, WinNT, WinCE, Win2000 and Linux.
- The MSMV104+ is also fitted with a Zoom Video Port to support input from camera or TV-tuner and allow easy monitoring, processing and recording of data.

3 SOFTWARE

The software can be found in the MICROSPACE Application CD

CD:\drivers\vga\lynx-3dm_smi721\	Drivers for
dos	DOS
lynx3DM-nt4-4.zip	Windows NT4.0
lynx3DM-win98-4.zip	Windows 95
lynx3DM-winme-4.zip	Windows Me
lynx3DM-win2k-4.zip	Windows 2000

CD:\products\msm\peripheral pc104+\msmv104\manual	Manual
Msmv104plus.pdf	This file

CD:\ products\msm\peripheral pc104+\msmv104\tools\	Control panel
CP42a.zip	Control panel for SMI721

CD:\ products\msm\peripheral pc104+\msmv104\tools\	Control panel
CP42a.zip	Control panel for SMI721

CD:\ lcd\ vgabios\ lynx-3dm_smi721\ SMI721-crt.zip	Bios
SMI721-crt.zip	“CRT Bios” for SMI721

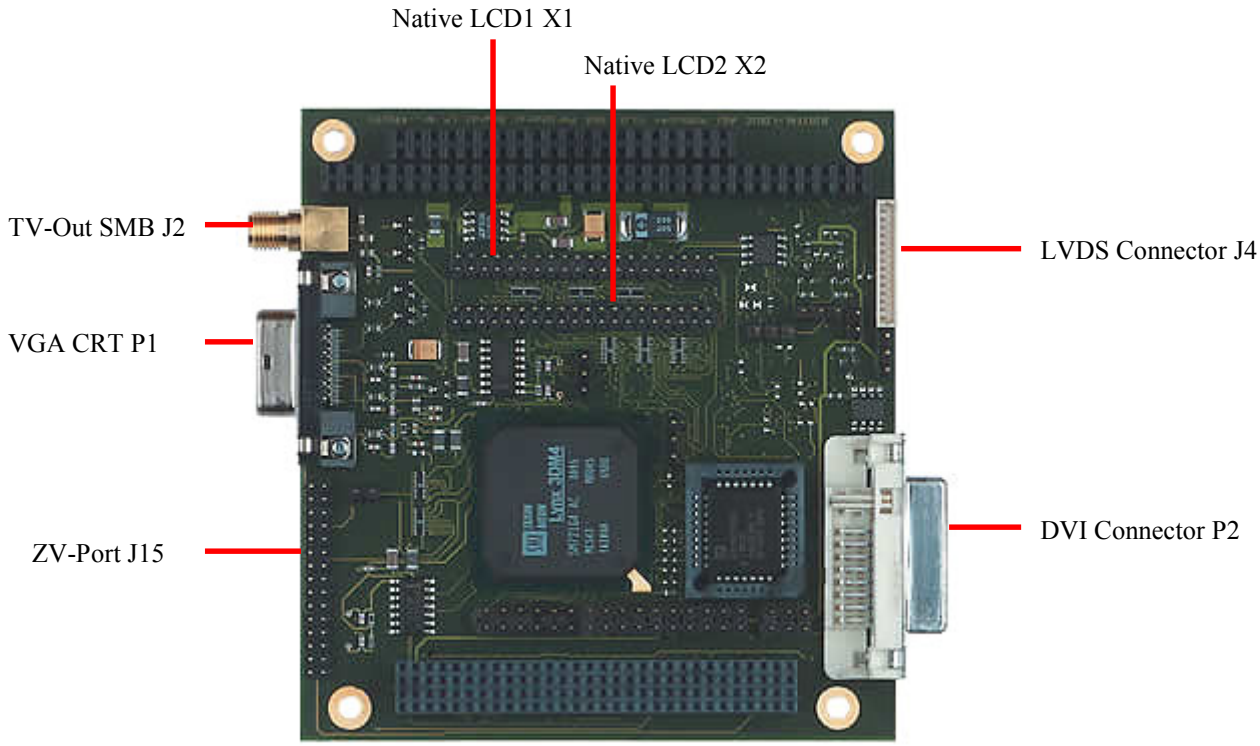
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4 CONNECTOR AND JUMPER DESCRIPTION

4.1 Product view

The following picture shows a front view from MSMV104+ Version 1.0. The connectors references and position are the same on revision 1.2.
The connector references are further explained in section 4.2

Figure 5.1a: Interface connectors on MSMV104+



4.2 Connector references and types

Please refer to figure XXX for detailed position of the referenced connectors.

VGA CRT	
Type	DSUB-15 f
Reference	P1

LCD Dual	
Type	Header 40 (pin to pin compatible with other 40 pin DLAG LCD product)
Reference	X1 and X2

LVDS	
Type	Molex xxxxxx
Reference	J4

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DVI	
Type	Molex MicroCross Digital/Analogue
Reference	P2

TV-Out (CVBS)	
Type	SMB Coax (75Ω f)
Reference	J2

TV-Out (S-Video)	
Type	Header 2
Reference	J29

ZV-Port	
Type	Header 30
Reference	J15

4.3 Dual LCD connector signals

The following table provides the pin to pin connection to the the LCD connector X1

X1 Pin	Signal	X1 Pin	Signal
1	M / DE	2	FLM
3	P18	4	Line Pulse LP
5	VCC	6	GND
7	VDDSAVE (5V/1A)	8	Shift Clock
9	VBACKSAVE (12V/1A)	10	P3
11	P2	12	P17
13	P1	14	P16
15	P0	16	P7
17	Enable VEE (TTL)	18	P6
19	VCC Panel (5V/3,3V)	20	P5
21	P4	22	P19
23	P8	24	P9
25	P10	26	P11
27	P12	28	P13
29	P14	30	P15
31	GND	32	NC
33	P20	34	NC
35	P21	36	NC
37	P22	38	NC
39	No connection	40	P23

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The following table provides the pin to pin connection to the LCD connector X2

X2 Pin	Signal	X2 Pin	Signal
1	P15	2	P23
3	P42	4	P22
5	VCC	6	GND
7	VDDSAVE (5V/1A)	8	Shift Clock
9	VBACKSAVE (12V/1A)	10	P27
11	P26	12	P41
13	P25	14	P40
15	P24	16	P31
17	Enable VEE (TTL)	18	P30
19	VCC Panel (5V/3,3V)	20	P29
21	P28	22	P43
23	P32	24	P33
25	P34	26	P35
27	P36	28	P37
29	P38	30	P39
31	GND	32	NC
33	P44	34	NC
35	P45	36	NC
37	P46	38	NC
39	No connection	40	P47

4.4 LVDS connector signals

The following table shows the signals that are present on the LVDS connector J4

J4 Pin	Signal	J4 Pin	Signal
1	LVO0-	2	LVO0+
3	LVO1-	4	LVO1+
5	LVO2-	6	LVO2+
7	LVCK- (Clock-)	8	LVCK+ (Clock+)
9	VDDSAVE (5V/1A)	10	VDDSAVE (5V/1A)
11	GND	12	VBACKSAVE (12V/1A)
13	VBACKSAVE (12V/1A)	14	GND

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4.5 ZV-Port connector signals

The following table shows the signals, that are present on the ZV-Port connector J15

J15 Pin	Signal	J15 Pin	Signal
1	Z0	2	Z1
3	Z2	4	Z3
5	Z4	6	Z5
7	Z6	8	Z7
9	Z8	10	Z9
11	Z10	12	Z11
13	Z12	14	Z13
15	Z14	16	Z15
17	NC	18	Clock
19	Href	20	Vref
21	Blank	22	DDC SDA
23	DDC SCL	24	NC
25	No connection	26	NC
27	VCC	28	NC
29	No connection	30	GND

4.6 CRT Connector signals

P1 Pin	Signal	P1 Pin	Signal
1	RED	2	GREEN
3	BLUE	4	NC
5	AGND	6	AGND
7	AGND	8	AGND
9	NC	10	AGND
11	NC	12	DDC_SDA
13	HSYNC	14	VSYNC
15	DDC_SCL		

4.7 S-Video connector signals

J29 Pin	Signal	J29 Pin	Signal
1	Y	2	C

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4.8 DVI connector signals

For a mechanical front view of the connector, just consult next section.

P2 Pin	Signal	P2 Pin	Signal
1	TX2-	2	TX2+
3	SHIELD_GND	4	NC
5	NC	6	DDC_SCL
7	DDC_SDA	8	VSYNC
9	TX1-	10	TX1+
11	SHIELD_GND	12	NC
13	NC	14	VCC
15	GND	16	MSEN
17	TX0-	18	TX0+
19	SHIELD_GND	20	NC
21	NC	22	SHIELD_GND
23	TXCLK+	24	TXCLK-
C1	RED (analog)	C2	GREEN (analog)
C3	BLUE (analog)	C4	SYNC
C5	AGND		

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5 JUMPER DESCRIPTIONS

This chapter provides description for all the jumper present on MSMV104+. The sections which are red highlighted present jumper descriptions, which are only available for DVI/LVDS version of the product MSMV104+.

5.1 J7: LCD Bias power select. (2-jumper)

J7 Pin	Open	J7 Pin	Closed
1-2	VCCLCD: 5V	1-2	VCCLCD: 3.3V

Note: The LCD logic power is fixed 3.3V without buffer.

5.2 J6: LCD backlight select (3-jumper)

J6 Pin	1-2	J6 Pin	2-3
1-2	VBCKL: 12V	2-3	VCCLCD: 5V

5.3 J18: DVI I2C or Deskewing select (2-jumper)

J18 Pin	Open	J18 Pin	Closed
1-2	I2C select	2-3	Deskewing select

5.4 J19: DVI Deskewing increment select or I2C address

Depending on the state of the jumpers J18, J19, these are thought for selecting I2C address or deskewing increment for DVI interface

J19 Pin	Open	J19 Pin	Closed
1-2	A1/DK1=0	1-2	A1/DK1=1
3-4	A2/DK2=0	3-4	A2/DK2=1
5-6	A3/DK3=0	5-6	A3/DK3=1

5.5 J23: ZV-Port enable/disable jumper (2-jumper)

J23 Pin	Open	J23 Pin	Closed
1-2	Disabled	1-2	Enabled

5.6 J24: graphic controller VDD select (3-jumper)

J24 Pin	1-2	J24 Pin	2-3
1-2	VDD=2.5V	2-3	VDD=3.3V

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5.7 J25: graphic controller MEVDD select (3-jumper)

J25 Pin	1-2	J25 Pin	2-3
1-2	MEVDD=2.5V	2-3	MEVDD=3.3V

5.8 J26: graphic controller MIVDD select (3-jumper)

J26 Pin	1-2	J26 Pin	2-3
1-2	MIVDD=2.5V	2-3	MIVDD=3.3V

5.9 J27: graphic controller VCCA select (3-jumper)

J27 Pin	1-2	J27 Pin	2-3
1-2	VCCA=2.5V	2-3	VCCA=3.3V

5.10 J28: graphic controller RVDD select (3-jumper)

J28 Pin	1-2	J28 Pin	2-3
1-2	RVDD=2.5V	2-3	RVDD=3.3V

5.11 J30: DVI I2C ISEL or RESET select (3-jumper)

J30 Pin	1-2	J30 Pin	2-3
1-2	ISEL/RST=0V	2-3	ISEL/RST=3.3V

5.12 J22: Display configuration jumper

The Lynx3DM graphic controller contains of sixteen register sets, which are free to configure a special display. It is possible either to choose the correct panel using HW setting or doing selection directly using the BIOS.
This jumper is thought for hardware adaptation of the display interfaces. The actual BIOS version from Lynx3DM do not permit this function. To adapt MSMV104+ to your display configuration, the BIOS itself should enable the display to be adapted.

5.13 Default settings

Some of the jumper settings are fixed to enable normal function of the MSMV104+ product. The following state of the critical jumpers should be recovered in case something was changed and MSMV104+ does not enable correct function anymore.

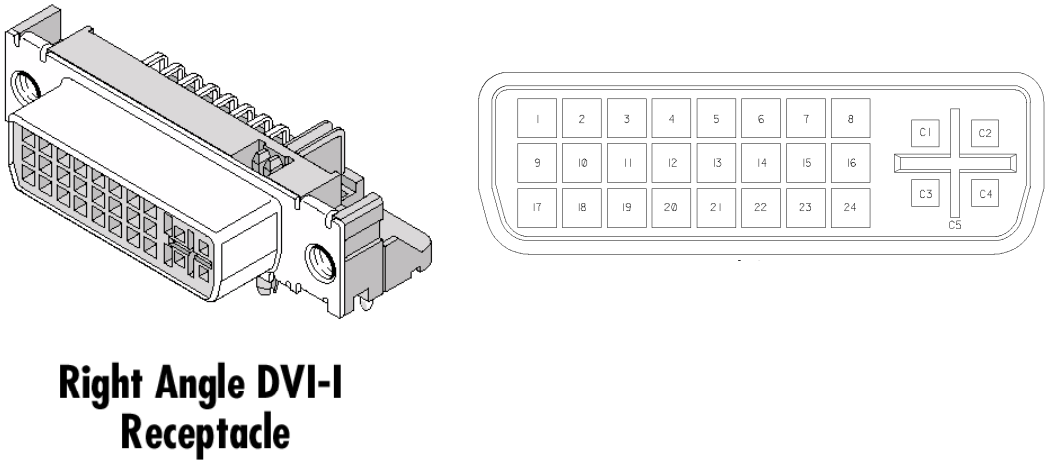
Every setting concerning power supply of the chip should be put to 2.5V.
That is to say: VDD, MEVDD, MIVDD, VCCA; RVDD should all be 2.5V

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5.14 DVI connector pin description

The right part of the following figure shows the front view of the connector together with the pin description. The pin c5, which can be found in the previous section table is not represented and refers to the metal cross separating c1, c2 c3 and c4.

Figure 5.8.1a: 3D modeling and front side view of the MicroCross DVI-I P2 connector



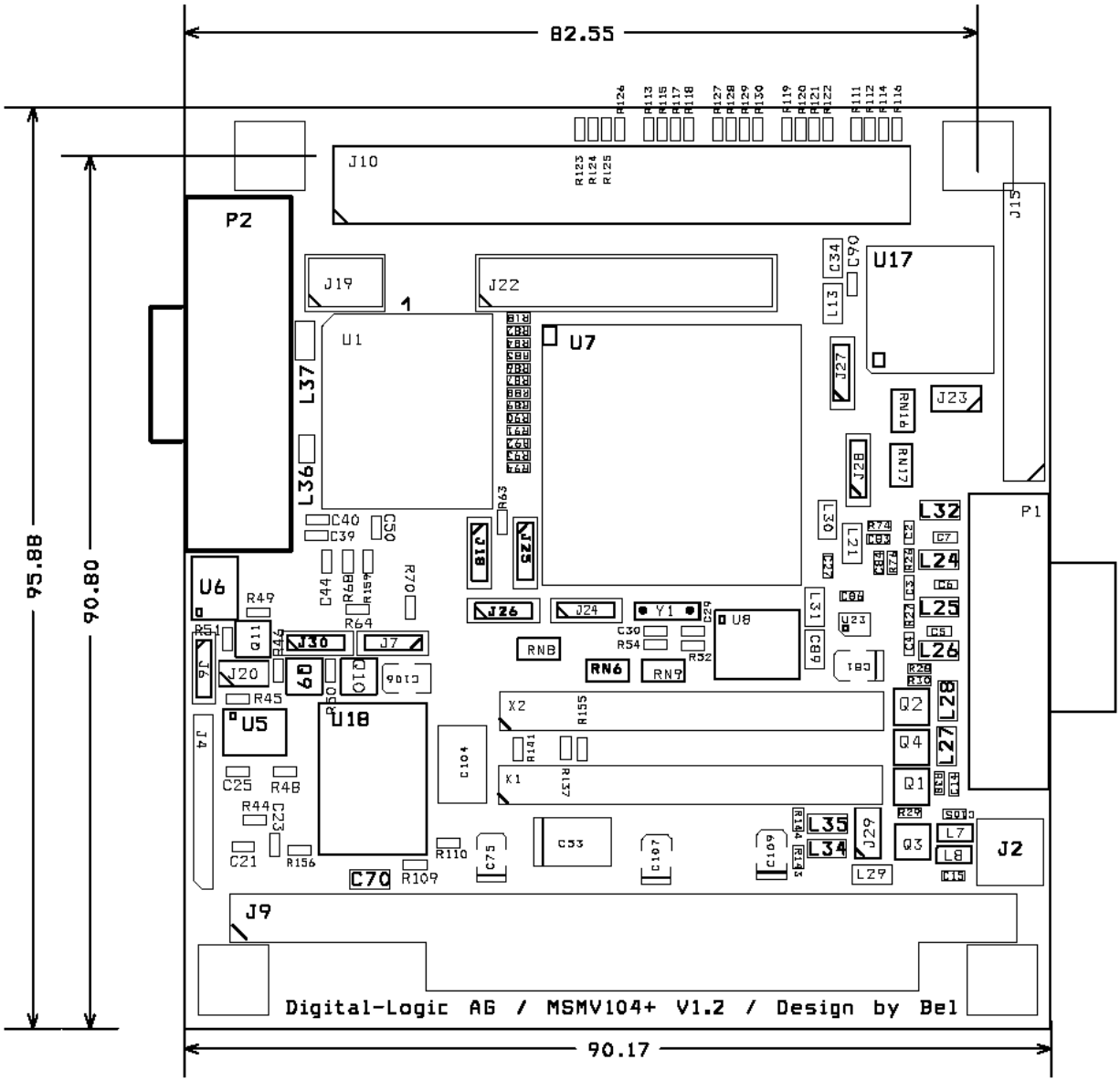
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6 DIMENSIONS, CONNECTOR AND JUMPER LOCATIONS

The following two figures show the dimension of the MSMV104+ V1.2, standard PC/104+ product. For the connector references please consult the dedicated chapter 5.

6.1 Top view

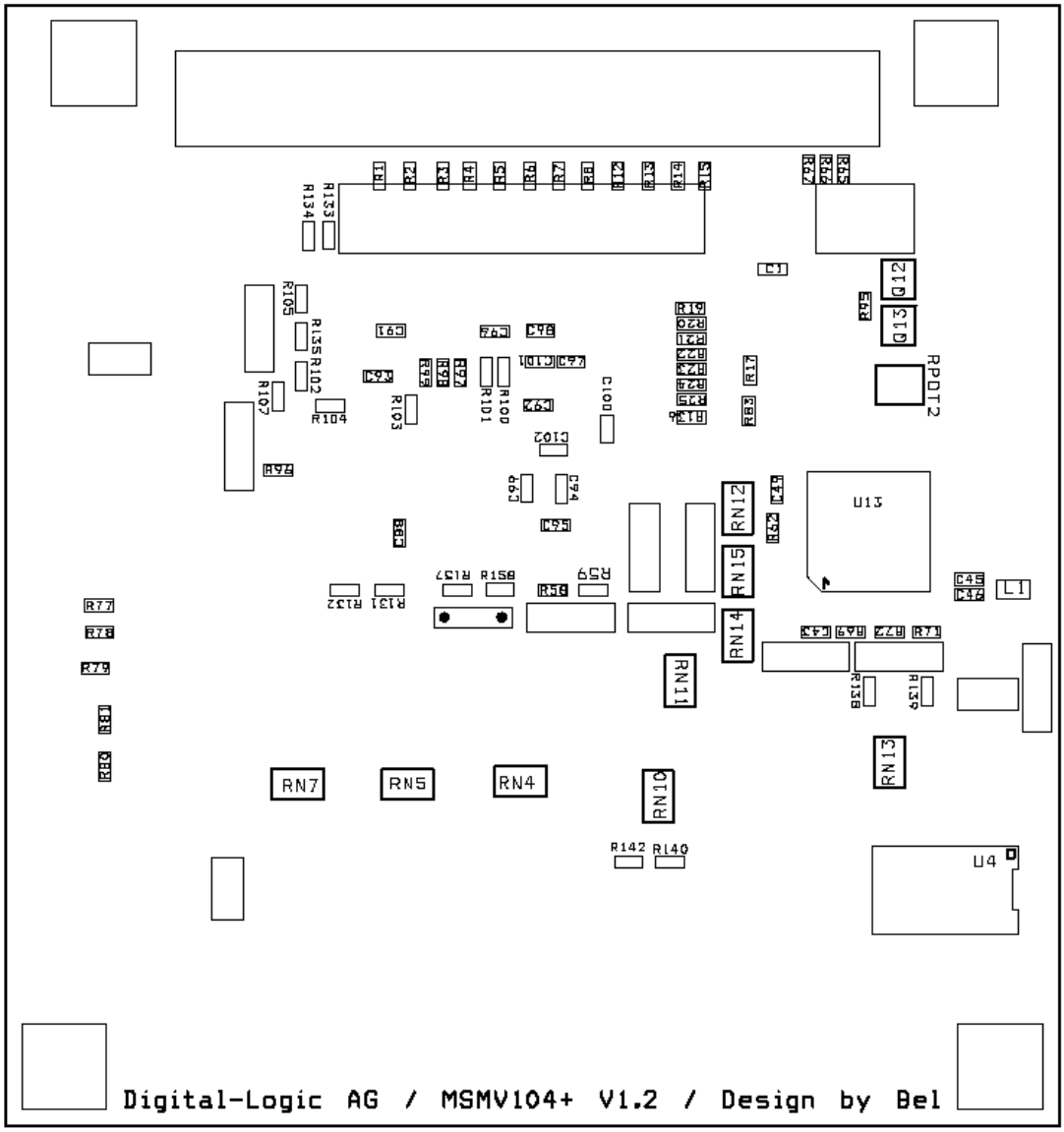
Figure 6.1a: Top view with connector references and dimensions of the board



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6.2 Bottom view

Figure 6.1a: Bottom view with connector references



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7 GETTING STARTED

This chapter is intended to show both the functionalities of the SMI chip and the way to access them under a windows operating system.

7.1 Driver installation

The first time that your new configuration will be started (both your CPU application board together with MSMV104+), you will be asked to install the correct driver for the SMI721 chip.
Please choose the driver from the MICROSPACE application CD, the location of which is to be found in chapter 3.

Using both LCD and VGA CRT, check if the LCD BIOS is available and download the latest driver from our webpage: http://www.digitallogic.com

7.2 Installing control panel under windows

After the right driver be installed, the chip control panel to be able to change the display properties has to be installed.
The location of the files (MICROSPACE Application CD) needed to install the control panel can also be found in the table from chapter 3.

Figure 8.2a: SMI Control panel installation

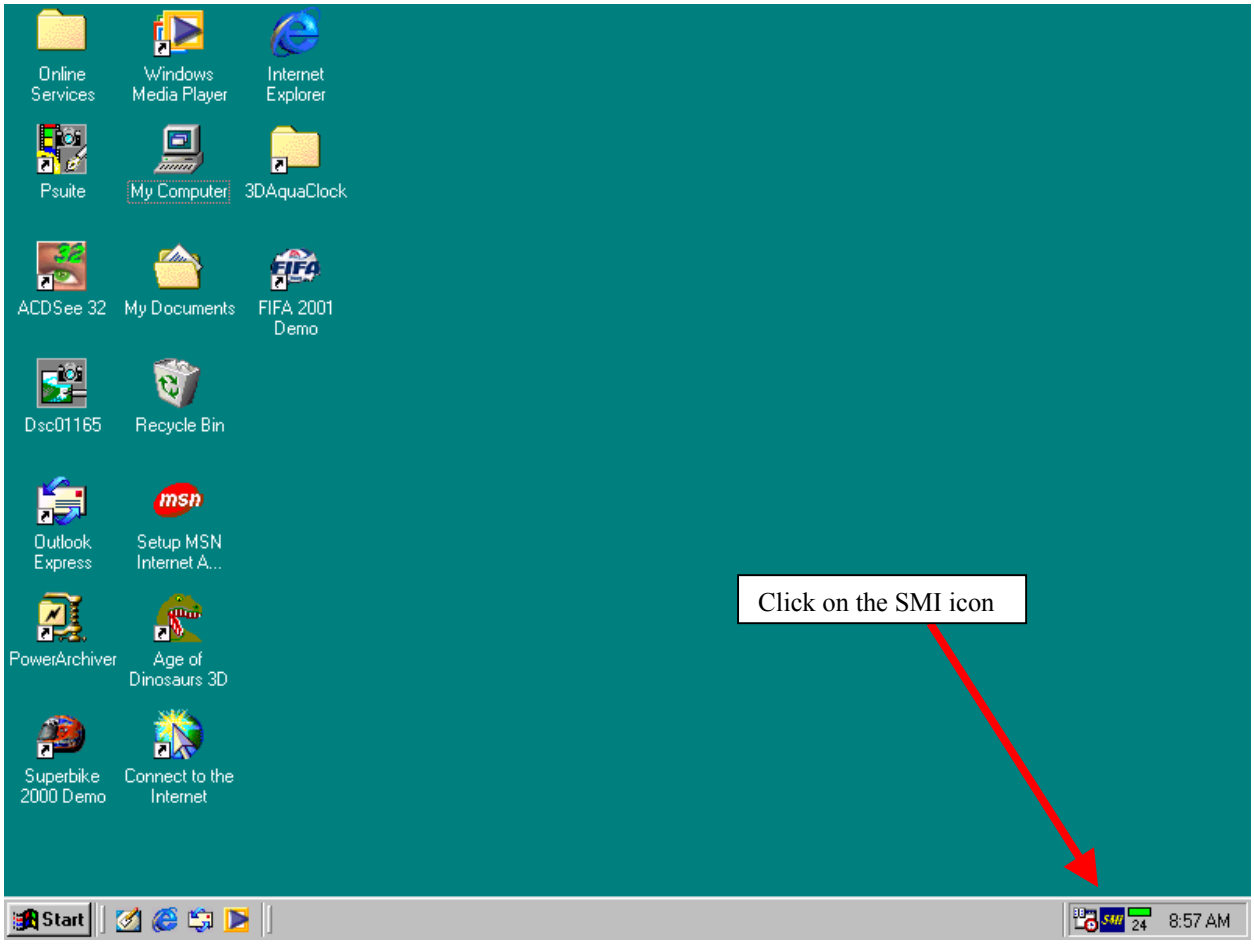


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7.3 Accessing chip functionality under Windows

After the control panel be installed, you can access the extended display properties by clicking on the SMI icon to be found at the right bottom of your diplay

Figure 8.3a: Location of the SMI icon for direct access to the extended display properties



7.4 Control panel functionalities

The control panel enables different standard features, such as to change the display resolution, color depth… But it also fit with some additional nice features, which make possible to choose the display output, the display rotation or to enter stretch mode, which can enable for LCD for example a 640x480 resolution to be extended to a full 800x600 display.

The following sections show the different features together with a small summary of the different display modes which can be set.

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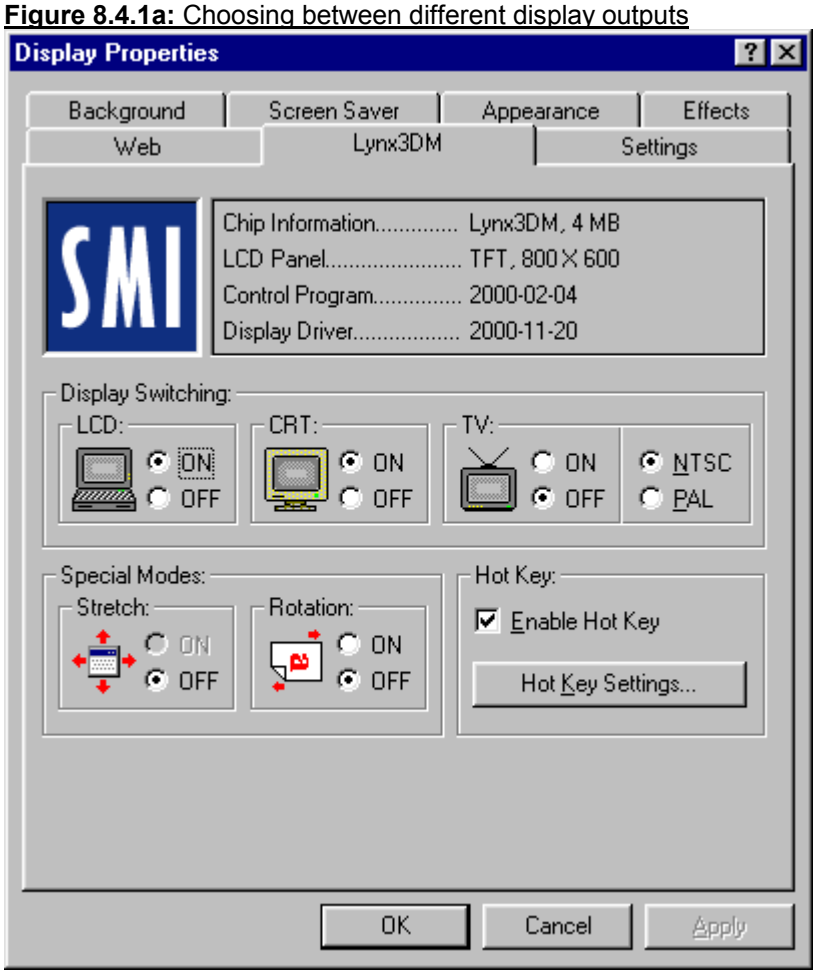
7.4.1 Choosing the display output

The different available modes are listed below:

- CRT only mode
- LCD only mode
- Simultaneous mode (LCD+CRT)
- Dual display mode under windows with extension of the windows desktop on the second monitor
- TV-Output (PAL or NTSC)

Note: It is also possible to use a second LCD instead of a CRT in simultaneous mode and dual display mode. The panel type must be configured in the bios.

Figure 8.4.1a: Choosing between different display outputs

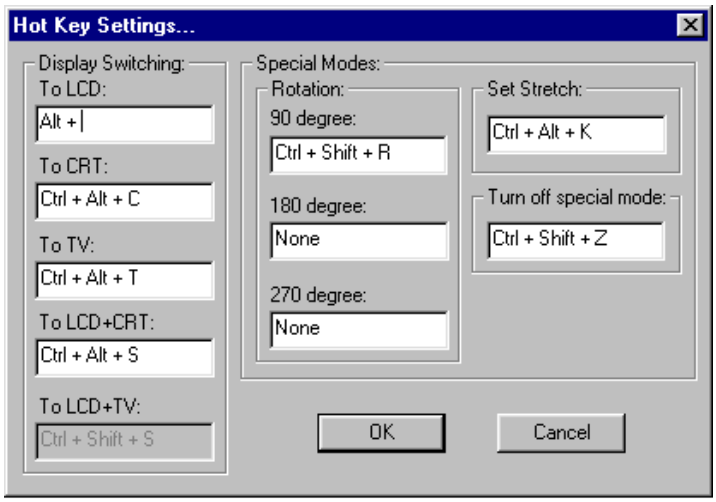


7.4.2 Setting hotkeys for special display modes

The control panel also enables some shortcut to switch between the different display modes, including rotation and stretching.

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Figure 8.4.2a: Setting hotkeys for the special display modes

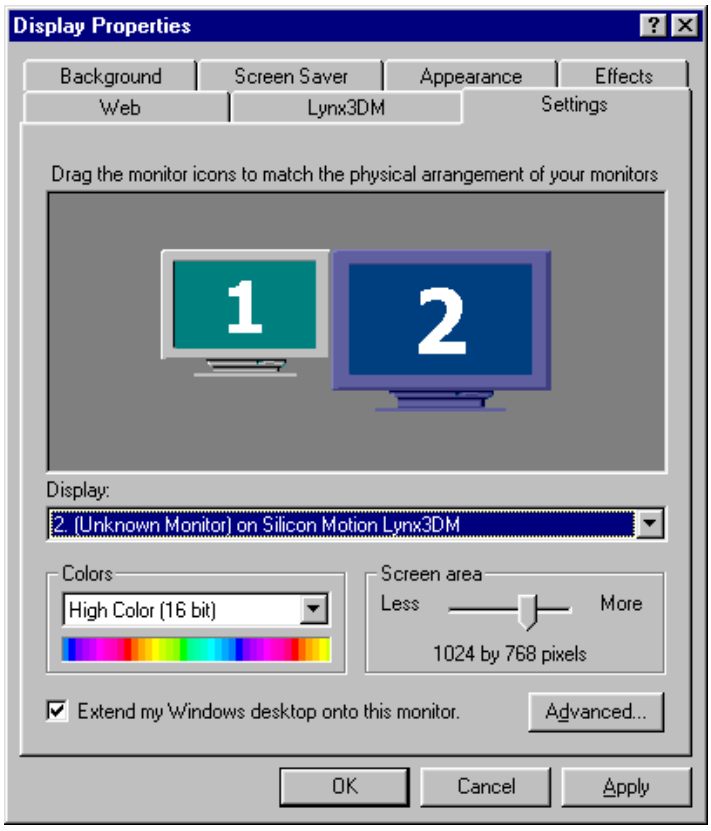


7.4.3 Entering dual-display mode

If two panel are configured, it is possible to use the dual display mode with the windows desktop extension. Right clicking on the second monitor icon and choosing to enable it will cause the whole windows desktop to be extended on two monitors.

Note: The dual display mode can only be set using 16 bit color depth.

Figure 8.4.3a: Using dual-display mode



The position of the two screens can be adjust so as to fit the physical configuration of your two monitors.

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Figure 8.4.3b: Physical arrangement example one, second display on the left side

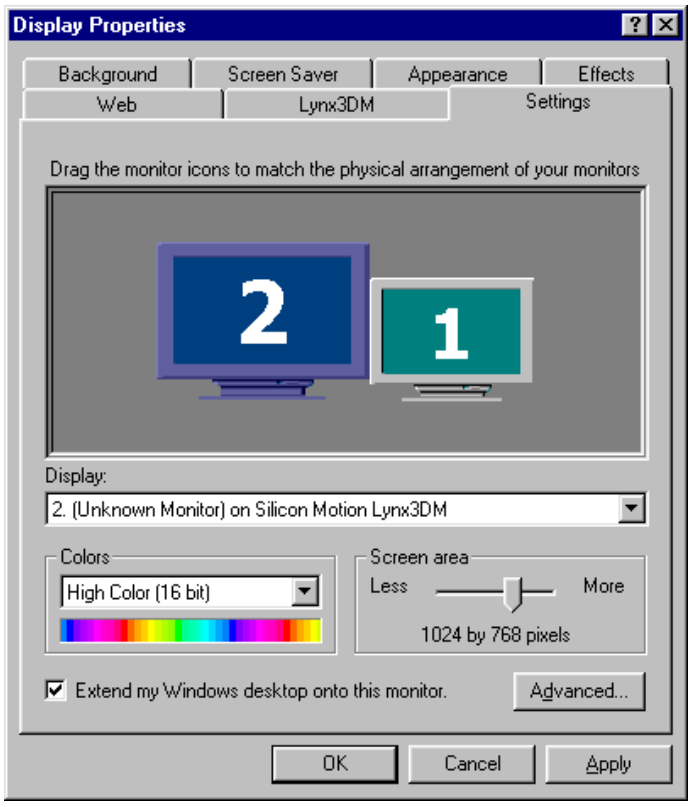
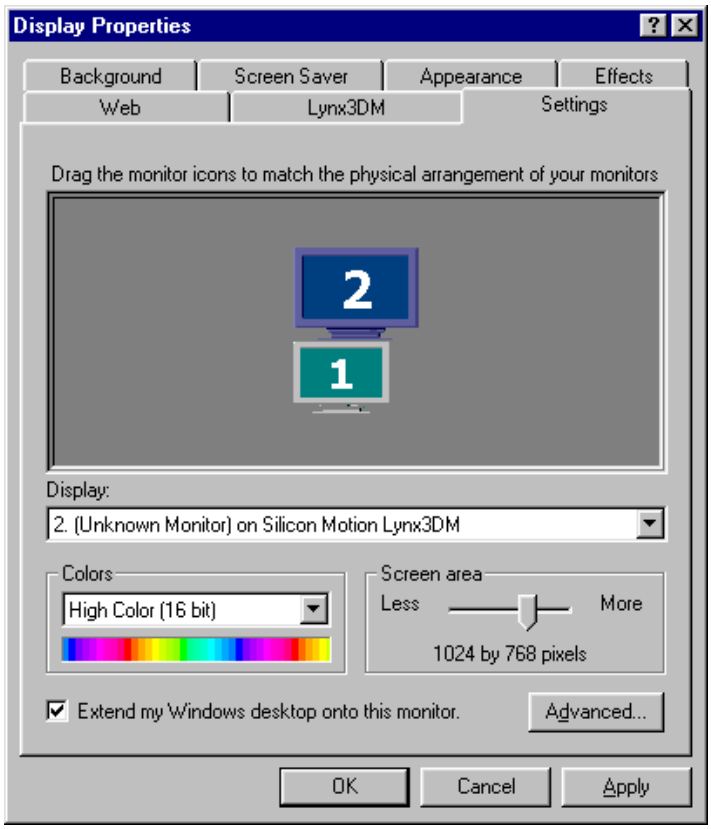


Figure 8.4.3c Physical arrangement example two, second display over first display



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8 GRAPHIC MODES

8.1 Standard IBM compatible VGA modes

Standard IBM Compatible VGA Modes

Mode # (Hex)	Type	Colors	Alpha	Resolution	Font	Clock (MHz)	Hsync (KHz)	Vsync (Hz)	Memory (Min.)	Buffer Start	Page
0,1	Txt	16	40x25	320x200	8x8	25.175	31.55	70.3	256K	B8000	8
0,1*	TXT	16	40x25	320x350	8x14	25.175	31.55	70.3	256K	B8000	8
0,1+	TXT	16	40x25	360x400	9x16	28.322	31.34	69.8	256K	B8000	8
2,3	TXT	16	80x25	640x200	8x8	25.175	31.55	70.3	256K	B8000	8
2,3*	TXT	16	80x25	640x350	8x14	25.175	31.55	70.3	256K	B8000	8
2,3+	TXT	16	80x25	720x400	9x16	28.322	31.34	69.8	256K	B8000	8
4,5	Gr	4	40x25	320x200	8x8	25.175	31.55	70.3	256K	B8000	1
6	Gr	2	80x25	640x200	8x8	25.175	31.55	70.3	256K	B8000	1
7	TXT	Mono	80x25	720x350	9x14	28.322	31.34	69.8	256K	B8000	8
7+	TXT	Mono	80x25	720x400	9x16	28.322	31.34	69.8	256K	B8000	8
D	Gr	16	40x25	320x200	8x8	25.175	31.55	70.3	256K	A0000	8
E	Gr	16	80x25	640x200	8x8	25.175	31.55	70.3	256K	A0000	4
F	Gr	Mono	80x25	640x350	8x14	25.175	31.55	70.3	256K	A0000	2
10	Gr	16	80x25	640x350	8x14	25.175	31.55	70.3	256K	A0000	2
11	Gr	2	80x30	640x480	8x16	25.175	31.55	60.1	256K	A0000	1
12	Gr	16	80x30	640x480	8x16	25.175	31.55	60.1	256K	A0000	1
13	Gr	256	40x25	320x200	8x8	25.175	31.55	70.3	256K	A0000	1

NOTE: For Modes 3 and 7, 8-dot Fonts are used on the LCD.

8.2 VESA Super VGA modes

VESA Super VGA Modes

VESA Mode # (Hex)	Extended Mode	Type	Colors	Alpha	Resolution	Font	Memory (Min.)	Buffer Start
101	50	Gr	256	80x30	640x480	8x16	512K	A0000
102	6A	Gr	16	100x75	800x600	8x8	256K	A0000
103	55	Gr	256	100x75	800x600	8x8	512K	A0000
104	6B	Gr	16	128x48	1024x768	8x16	512K	A0000
105	60	Gr	256	128x48	1024x768	8x16	1M	A0000
107	65	Gr	256	160x64	1280x1024	8x16	2M	A0000
111	52	Gr	64K	80x30	640x480	8x16	1M	A0000
112	53	Gr	16M	80x30	640x480	8x16	1M	A0000
114	57	Gr	64K	100x75	800x600	8x8	1M	A0000
115	58	Gr	16M	100x75	800x600	8x8	2M	A0000
117	62	Gr	64K	128x100	1024x768	8x8	2M	A0000
118	63	Gr	16M	128x100	1024x768	8x8	4M	A0000
11A	67	Gr	64K	160x128	1280x1024	8x8	4M	A0000
11B	68	Gr	16M	160x128	1280x1024	8x8	4M	A0000

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8.3 Low resolution modes

Low Resolution Modes						
Mode # (Hex)	**Type**	**Colors**	**Resolutions**	**Vsync (Hz)**	**Video Memory**	**Buffer Start**
40	Gr	256	320x200	70	1MB	A0000
41	Gr	64K	320x200	70	1MB	A0000
42	Gr	256	320x240	75, 60	1MB	A0000
43	Gr	64K	320x240	75, 60	1MB	A0000
44	Gr	256	400x300	75, 60	1MB	A0000
45	Gr	64K	400x300	75, 60	1MB	A0000
46	Gr	256	512x384	75	1MB	A0000
47	Gr	64K	512x384	75	1MB	A0000
48	Gr	256	640x400	70	1MB	A0000
49	Gr	64K	640x400	70	1MB	A0000

8.4 Extended modes

640x480 Extended Modes										
Mode # (Hex)	**VESA Mode # (Hex)**	**Type**	**Colors**	**Alpha Format**	**Font**	**VCLK (MHz)**	**Hsync +/- (KHz)**	**Vsync +/- (Hz)**	**Video Memory**	**Buffer Start**
50	101	Gr	256	80x30	8x16	25.0	31.5	60	512 KB	A0000
						31.5	37.5	75		
						36.0	43.3	85		
52	111	Gr	64K (16-bit)	80x30	8x16	25.0	31.5	60	1MB	A0000
						31.5	37.5	75		
						36.0	43.3	85		
53	112	Gr	16M (24-bit)	80x30	8x16	25.0	31.5	60	1MB	A0000
						31.5	37.5	75		
						36.0	43.3	85		
54		Gr	16M (32-bit)	80x30	8x16	25.0	31.5	60	2MB	A0000
						31.5	37.5	75		
						36.0	43.3	85		

800x600 Extended Modes										
Mode # (Hex)	**VESA Mode # (Hex)**	**Type**	**Colors**	**Alpha Format**	**Font**	**VCLK (MHz)**	**Hsync +/- (KHz)**	**Vsync +/- (Hz)**	**Video Memory**	**Buffer Start**
6A	6A	Gr	16	100x75	8x8	40.0	37.9	60	256KB	A0000
55	103	Gr	256	100x75	8x8	40.0	37.9	60	512KB	A0000
						49.5	46.9	75		
						56.25	53.7	85		
57	114	Gr	64K (16-bit)	100X75	8X8	40.0	37.9	60	1MB	A0000
						49.5	46.9	75		
						56.25	53.7	85		
58	115	Gr	16M (16-bit)	100X75	8X8	40.0	37.9	60	2MB	A0000
						49.5	46.9	75		
						56.25	53.7	85		
59		Gr	16M (24-bit)	100X75	8X8	40.0	37.9	60	2MB	A0000
						49.5	46.9	75		
						56.25	53.7	85		

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1024x768 Extended Modes

Mode # (Hex)	VESA Mode # (Hex)	Type	Colors	Alpha Format	Font	VCLK (MHz)	Hsync +/- (KHz)	Vsync +/- (Hz)	Video Memory	Buffer Start
6B	104	Gr	16	128x48	8x16	65.0	48.4	60	512KB	A0000
60	105	Gr	256	128x48	8x16	65.0	48.4	60	1MB	A0000
						78.75	60.0	75		
						94.5	68.7	85		
62	117	Gr	64K (16-bit)	128x48	8x16	65.0	48.4	60	2MB	A0000
						78.75	60.0	75		
						94.5	68.7	85		
63	118	Gr	16M (24-bit)	128x48	8x16	65.0	48.4	60	4MB	A0000
						78.75	60.0	75		
						94.5	68.7	85		
64		Gr	16M (32-bit)	128x48	8x16	65.0	48.4	60	4MB	A0000
						78.75	60.0	75		
						94.5	68.7	85		

1280x1024 Extended Modes for CRT only

Mode # (Hex)	VESA Mode # (Hex)	Type	Colors	Alpha Format	Font	VCLK (MHz)	Hsync +/- (KHz)	Vsync +/- (Hz)	Video Memory	Buffer Start
65	107	Gr	256	160x64	8x16	78.75	47	43(I)	2 MB	A0000
67	11A	Gr	64K	160x64	8x16	78.75	47	43(I)	4 MB	A0000
68	11B	Gr	16M (24-bit)	160x64	8x16	78.75	47	43(I)	4 MB	A0000

1280x1024 Extended Modes for LCD only

Mode # (Hex)	VESA Mode # (Hex)	Type	Colors	Alpha Format	Font	VCLK (MHz)	Hsync +/- (KHz)	Vsync +/- (Hz)	Video Memory	Buffer Start
65	107	Gr	256	160x64	8x16	85	50.3	47	2 MB	A0000
67	11A	Gr	64K	160x64	8x16	85	50.3	47	4 MB	A0000
68	11B	Gr	16M (24-bit)	160x64	8x16	85	50.3	47	4 MB	A0000

1280x1024 Extended Modes support for Lynx3DM only

Mode # (Hex)	VESA Mode # (Hex)	Type	Colors	Alpha Format	Font	VCLK (MHz)	Hsync +/- (KHz)	Vsync +/- (Hz)	Video Memory	Buffer Start
65	107	Gr	256	160x64	8x16	78.75	47	43(I)	2 MB	A0000
						108	64	60		
						135	79.98	75		
67	11A	Gr	64K (16-bit)	160x64	8x16	78.75	47	43(I)	4 MB	A0000
						108	64	60		
						135	79.98	75		
68	11B	Gr	16M (24-bit)	160x64	8x16	78.75	47	43(I)	4 MB	A0000
						108	64	60		
						135	79.98	75		

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