



User Manual



Revision 2.81



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1 Introduction

The Dotcard-Speedcolor is an ISA-Bus graphic board to be used with either active or passive displays. The Dotcard-Speedcolor is based upon the Western Digital graphic controller WD90C24. The Dotcard-Speedcolor is fully compatible to the VGA standard and can be used in every normal ISA-Bus PC system.

2 Start up

Safety hint!

The Dotcard-Speedcolor is equipped with electrostatic critical components. For this reason, the Dotcard-Speedcolor is only permitted to be handled by skilled personnel. Improper treatment can damage the Dotcard-Speedcolor and results in forfeit of guarantee.

2.1 Installation procedure

The following steps must be carried out in currentless state:

1. Take out the Dotcard-Speedcolor from the packing.
2. Carefully check the configuration of the jumpers (see section 5) and the DIP switch setting (see section 6) according to the specification of your display. If you have problems you can contact the Dotronic GmbH technical support.
3. If you want to drive a display which needs an external backplane voltage (e. g. monochrome and older colour STN displays) please check for jumper JP6 to be plugged. Adjust the nominal value of $\pm VEE$ with potentiometer R126 (see section 4.7).
4. Connect the necessary cables.
5. Plug the Dotcard-Speedcolor into an appropriate ISA slot of your system.
6. Secure the Dotcard-Speedcolor via the card plate against falling or off-centering.

Now you can switch on the system.

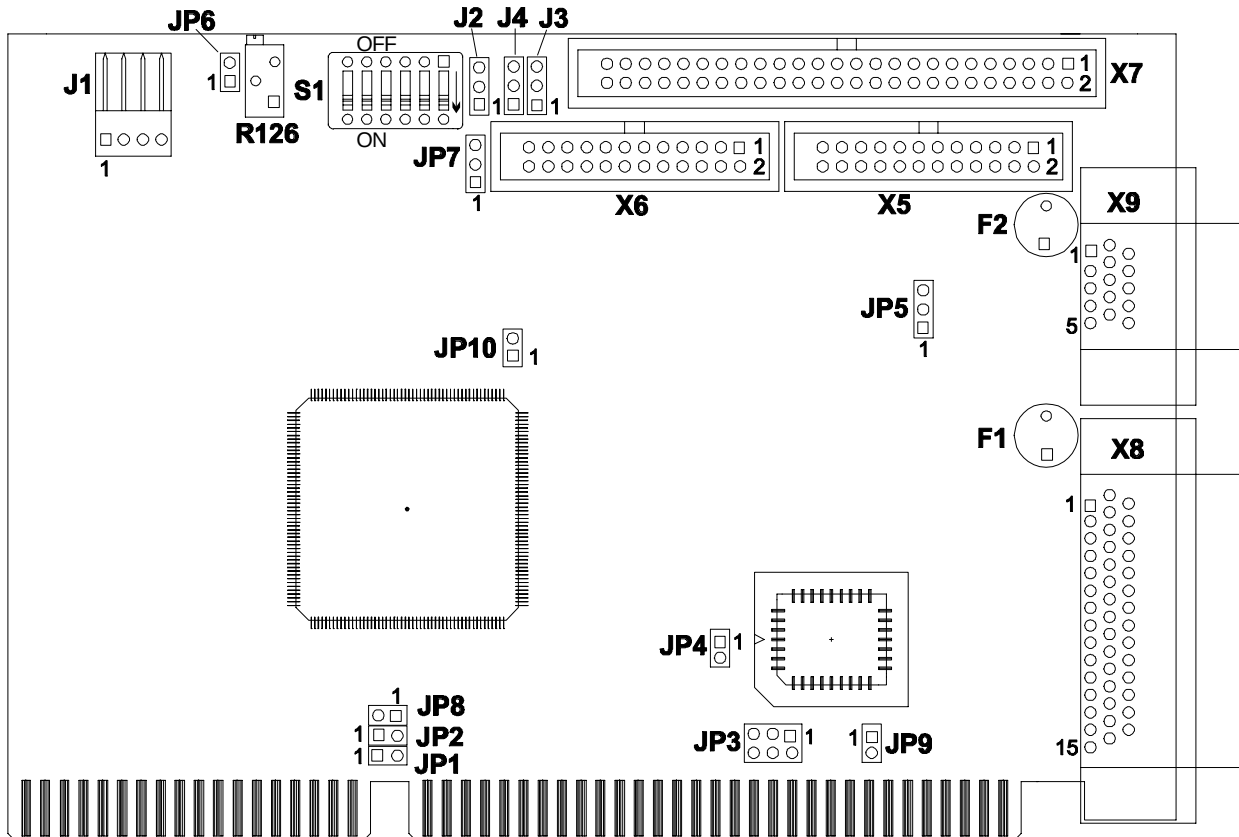
Normally you don't need any display drivers when using the Dotcard-Speedcolor. If you use the Dotcard-Speedcolor with a graphic operating system the hardware accelerator features are only available if you install specific drivers for the WD90C24.

2.2 Simultaneous drive of CRT monitor and flatpanel

The Dotcard-Speedcolor only supports a simultaneous mode in conjunction with B/W- and TFT-displays. When driving a colour STN display the simultaneous mode is not available. This means, if you connect a CRT in parallel to a colour STN display, the CRT is chosen as the primary device during boot up and the flatpanel is switched off.



3 Jumper and connector placement



4 Connector description

4.1 X7: Internal display connector

This 50 pin male header with a pitch of 2.54 mm can be used with all display technologies supported by the Dotcard-Speedcolor. The pin out for the used display types is described in Table 2.

4.2 X8: External display connector

This 44 pin high density D-SUB female connector can be used to connect a display externally. The pin out is described in Table 1.

4.3 X9: Analog CRT connector

This is a standard 15 pin high density D-SUB female VGA connector for CRT monitors. The pin out is described in Table 1.

4.4 X5: Compatibility connector for B/W displays

This 24 pin male header with a pitch of 2.54 mm is designed for the connection of B/W-LCD. The pin out is compatible to older Dotcards and described in Table 1.

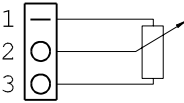
4.5 X6: Compatibility connector for TFT displays

This 24 pin male header with a pitch of 2.54 mm is designed for the connection of 9 BIT-TFT-Displays. The pin out is compatible to older Dotcards and described in Table 1

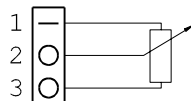
4.6 J1: Backlight supply

This 4 pin support strip is used to connect a voltage supply cable for the backlight inverter. The grouping of this plug is compatible to the voltage supply plug for 3.5" floppy disk drives. The pin out is described in Table 1.

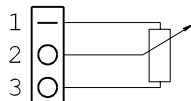
4.7 J2: Adjustment of the backplane voltage $\pm V_{EE}$ via external potentiometer

Pin grouping	Function	Wiring proposal
1  VCC (5V) 2  U _{st} 3  GND	At this end a potentiometer (allowable values between 470 Ω and 10 k Ω) can be connected to generate the control voltage(0 to 5 V) for changing the backplane voltage $\pm V_{EE}$. Use only if JP7 is plugged into Position 2-3!	

4.8 J3: Adjustment of the +V₀ voltage

Pin grouping	Function	Wiring proposal
1  GND 2  V ₀ 3  +VEESTN	At this end a potentiometer (allowable values between 10 k Ω and 20 k Ω) can be connected to adjust the voltage +V ₀ (0 to +V _{EE}). Some displays need this voltage in addition to V _{EE} . If the potentiometer is not connected, the voltage V ₀ is not available at the display plugs X7 and X8.	

4.9 J4: Adjustment of the voltage -V₀

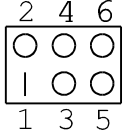
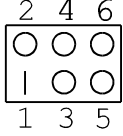
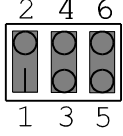
Pin grouping	Function	Wiring proposal
1  VCC (+5V) 2  V ₀ 3  -VEESTN	At this end a potentiometer (allowable values between 10 k Ω and 20 k Ω) can be connected to adjust the voltage -V ₀ (VCC to -V _{EE}). Some displays need this voltage in addition to V _{EE} . If the potentiometer is not connected, the voltage V ₀ is not available at the display plugs X7 and X8.	



5 Jumper Settings

In the following tables for the jumper positions the graphics  means that the jumper is plugged. The graphics  means that the jumper is not plugged. The line of a jumper field  characterises the pin 1.

5.1 JP1, JP2, JP3 & JP8: Bus plug point and access

Jumper position	Function
JP3  JP1  1 JP2  1 JP8  2	Operation of the Dotcard-Speedcolor in a 16-bit ISA slot with 16-bit access. Default setting for delivery!
JP3  JP1  1 JP2  1 JP8  2	Operation of the Dotcard-Speedcolor in a 16-bit ISA slot with 8-bit access.
JP3  JP1  1 JP2  1 JP8  2	Operation of the Dotcard-Speedcolor in a 8-bit ISA slot with 8-bit access.

5.2 JP9: Zero Waitstates

Jumper position	Function
1  2 	The Speedcolor is accessed with zero waitstates. Default setting for delivery!
1  2 	The Speedcolor is not accessed with zero waitstates. Hint: If you have problems to run the card in your PC system, just try this setting.

5.3 JP4: BIOS

Caution: Don't do any changes to the default setting!

Jumper position	Function
1  2 	The card is equipped with a large BIOS of 40 KB. Default setting for delivery!
1  2 	This setting is not supported!



5.4 JP5: Invert pixel clock XSCLK

Jumper position	Function
1  2  3 	The pixel clock XSCLK is not inverted. Default setting for delivery!
1  2  3 	The pixel clock XSCLK is inverted. Set after consultation with the manufacturer only!

5.5 JP6: VEE converter enable/disable

This jumper must be plugged when using a display which requires a backplane voltage.

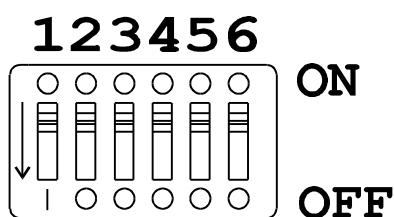
Jumper position	Function
1  2 	The VEE converter is enabled. The voltages $\pm V_{EE}$ are available on plugs X7 and X8. Default setting for delivery!
1  2 	The VEE converter is disabled. The voltages $\pm V_{EE}$ are not available on plugs X7 and X8. When you use the Dotcard-Speedcolor with a display which doesn't require a VEE backplane voltage (e. g. TFTs) you can choose this setting to reduce power consumption.

The desired basic value for the backplane voltage $\pm V_{EE}$ is adjusted by potentiometer R126. Measure +VEE at X7 between pin 43 und pin 1 (GND). Measure -VEE at X7 between pin 41 and pin 1 (GND). For the correct value observe your display specification!

5.6 JP7: Adjustment of the backplane voltage $\pm V_{EE}$ by soft- or hardware

Jumper position	Function
1  2  3 	The adjustment voltage (0 to 5 V) is controlled by an internal D/A-converter (7-bit) via software. By the memory-resident program "LCD_WD24.EXE" the backplane voltages $\pm V_{EE}$ can be changed via keyboard combinations. When switched on the adjustment voltage indicates half of the final value (2.5 V). Default setting for delivery!
1  2  3 	The adjustment voltage for changing the backplane voltages $\pm V_{EE}$ is generated by means of an external potentiometer to be connected to J2.

6 Configuration of DIP-Switch S1



6.1 TFT-Colour LC-Displays

	S1.1	S1.2	S1.3	S1.4	S1.5	S1.6
9 BIT LQ10DH11 LQ10DO11 LQ10DO21 LQ9DO11 LTM10CO15K LTM09CO15	OFF	ON	ON	OFF	ON	OFF
12 BIT LQ10D131 NL6448AC33	ON	ON	OFF	OFF	OFF	OFF
18 BIT LQ14D311* LQ10D321 LQ10D341 LQ10D345 LT104V3-X0S LTM10CO25	ON	ON	OFF	ON	OFF	OFF
12 BIT TX26D51VC1AAA	OFF	OFF	OFF	ON	OFF	OFF
24 BIT FPD LDH102T BIOS 5.01 or higher	ON	OFF	ON	ON	ON	OFF
18 BIT 800x600 LQ10DS01 LQ11DS01 BIOS 6.03 or higher	OFF	ON	ON	ON	OFF	OFF

* If TFT-Display LQ14D311 is used, it should be observed that switch number 6 at DIP-switch SW-3 on the LQ14D311 is in Position "ON".



6.2 Colour STN Displays

	S1.1	S1.2	S1.3	S1.4	S1.5	S1.6
16 BIT LM64C08P LM64C142 LM64C35P LM64C21P LM64C152 Optrex 50414NCU	ON	ON	OFF	ON	ON	OFF
16 BIT Epson	ON	OFF	OFF	OFF	ON	OFF
16 BIT Sanyo	OFF	ON	OFF	OFF	OFF	OFF

6.3 B/W- / Plasma-Displays / Mono TFT

	S1.1	S1.2	S1.3	S1.4	S1.5	S1.6
B/W-LCDs 320x240	ON	ON	ON	OFF	ON	OFF
B/W-LCDs 640x400	ON	OFF	OFF	ON	ON	OFF
B/W-LCDs 640x480	OFF	OFF	OFF	OFF	OFF	OFF
Plasma Fujitsu FPF8060HRUS	ON	OFF	ON	OFF	ON	OFF
Mono TFT	ON	ON	OFF	OFF	ON	OFF

6.4 EL-Displays

	S1.1	S1.2	S1.3	S1.4	S1.5	S1.6
Sharp EL LJ64OU32	ON	OFF	ON	OFF	OFF	OFF
Sharp EL LJ64OU21	OFF	OFF	OFF	ON	ON	OFF
Planar EL EL-320.256	ON	OFF	OFF	ON	OFF	OFF
Planar EL EL-640.400	ON	ON	ON	OFF	OFF	OFF
Planar EL EL-640.400CB	OFF	ON	OFF	ON	ON	OFF
Sharp EL LJ64HO34	OFF	OFF	ON	ON	ON	OFF
Sharp EL LJ64HO52	ON	OFF	ON	ON	ON	OFF



7 Fuses

Fuse	Voltage	Type
F1	12V DISP	2 A, slow, 250 V, package TR5
F2	5V DISP	2 A, slow, 250 V, package TR5

8 Technical Data

Power supply voltage:	+5 V $\pm$ 5 % and +12 V $\pm$ 5 %
Supply current*:	600 mA @ 5 V; 10 mA @ 12 V
Operating temperature**:	0 °C to 60 °C
Storage temperature**:	-10 °C to 85 °C
Humidity (operation):	10 % to 90 % (not condensed)
Humidity (storage):	5 % to 95 % (not condensed)
PCB size:	155 mm x 107 mm
Assembly height:	18 mm
Ressources:	I/O-Range: 3B0h -3BBh and 3C0h - 3DFh Memory: A0000h - BFFFFh BIOS: C0000h - C9FFFh

*: The values are measured without external peripheral devices (LCD or backlight inverter).

**: The details concerning the temperature refer to the direct environment of the components and the PCB.

9 Accessories

- Disk with VGA drivers for Windows® 3.1X and Windows® 95
- Disk with VGA drivers for DOS user programs and utility programs
- Other display drivers on demand



10 Pin out of connector X5, X6, X9 and J1

Pin #	X5	X6	X9	J1
1	N.C.	B0	Red	Vcc (+5V)
2	/DISPON	/DISPON	Green	GND
3	N.C.	CLK	Blue	GND
4	CLK	N.C.	GND	12V DISP
5	N.C.	ENAB	GND	
6	HSYNC	HSYNC	Red return	
7	VSYN	VSYN	Green return	
8	ENAB	N.C.	Blue return	
9	5V DISP	5V DISP	N.C.	
10	5V DISP	5V DISP	GND	
11	GND	GND	GND	
12	GND	GND	N.C.	
13	12V DISP	12V DISP	HSYN	
14	12V DISP	12V DISP	VSYN	
15	LD0	G1	N.C.	
16	LD1	G0		
17	LD2	B2		
18	LD3	B1		
19	UD0	R2		
20	UD1	R1		
21	UD2	R0		
22	UD3	G2		
23	GND	GND		
24	N.C.	N.C.		

Table 1



11 Pin out of connector X7 and X8

X7 Pin #	X8 Pin #	Display Typ	Mono DD	TFT	TFT	TFT	Color STN	STN DD
		Display Farben	8 Bit	9 Bit	12 Bit	18 Bit	8 Bit	16 Bit
		Pixel per Shift Clock	8	1	1	1	2-2/3	5-1/3
14	13			B0	B0	B0		UD4
16	15			B1	B1	B1		UD5
18	17			B2	B2	B2		UD6
20	19				B3	B3		UD7
12	11					B4		
8	7					B5	SHFCLKU	CLK
22	21	LD3	G0	G0	G0	G0	STN7	LD0
24	23	LD2	G1	G1	G1	G1	STN6	LD1
26	25	LD1	G2	G2	G2	G2	STN5	LD2
28	27	LD0		G3	G3	G3	STN4	LD3
30	29					G4		UD2
32	31					G5		UD3
34	33	UD3	R0	R0	R0	R0	STN3	LD4
36	35	UD2	R1	R1	R1	R1	STN2	LD5
38	37	UD1	R2	R2	R2	R2	STN1	LD6
40	39	UD0		R3	R3	R3	STN0	LD7
42	41					R4		UD0
44	43					R5		UD1
6	5	CLK	CLK	CLK	CLK	CLK	SHFCLKL	
4	3	HSYNC	HSYNC	HSYNC	HSYNC	HSYNC	HSYNC	HSYNC
2	1	VSNC	VSNC	VSNC	VSNC	VSNC	VSNC	VSNC
10	9	ENAB	ENAB	ENAB	ENAB	ENAB	ENAB	ENAB
46	28	/DISPON	/DISPON	/DISPON	/DISPON	/DISPON	/DISPON	/DISPON
45; 47	40; 42	5VDISP	5VDISP	5VDISP	5VDISP	5VDISP	5VDISP	5VDISP
49	44	12VDISP	12VDISP	12VDISP	12VDISP	12VDISP	12VDISP	12VDISP
1; 3; 5; 7; 9; 11; 13; 15; 17; 19; 21; 23; 25; 27; 29; 31; 33; 35; 37	2; 4; 6; 8; 10; 12; 14; 16; 18; 20; 22; 24; 26	GND	GND	GND	GND	GND	GND	GND
43	38	+VEE	+VEE	+VEE	+VEE	+VEE	+VEE	+VEE
41	36	-VEE	-VEE	-VEE	-VEE	-VEE	-VEE	-VEE
39	34	V0	V0	V0	V0	V0	V0	V0

Table 2



12 Fax back for problems with Dotcard-Speedcolor

to:

Dotronic Mikroelektronik GmbH

Telefon: +49 (0)231 75443 0

Telefax: +49 (0)231 75443 199

from:

Company: _____

Adress: _____

Phone: _____

Fax: _____

Sender: _____

Information about your system configuration

Used LCD-Type: _____

VGA-BIOS-Revision: _____

Number of colours: _____

Processor- / Bus-Clock: _____

BIOS-Manufacturer / -Revision: _____

Operating system: _____

Memory (RAM): _____

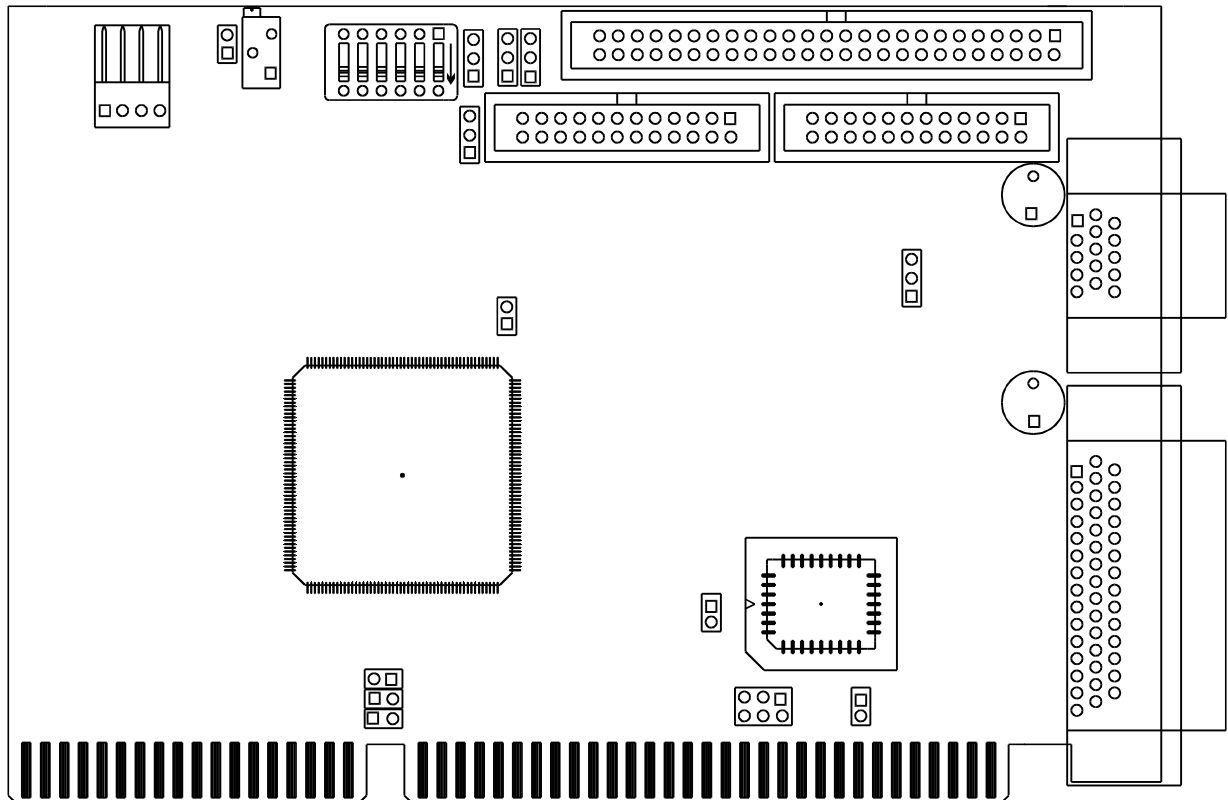
I/O Add on: _____

Other devices (Mouse/Printer): _____

Error description: _____



Flatpanel / CRT graphic board



Dotcard-Speedcolor

- ☐ 16 Bit ISA-Bus
- ☐ fully compatible with VGA standard
- ☐ internal and external connector for Flatpanels
- ☐ short dimensions
- ☐ Hardware GUI Accelerator
- ☐ Support for 5 V Displays
- ☐ Backplane voltage supply for passive displays on board



Technical Specifications

Supported types of displays
Monochrome active and passive
DSTN Colour
TFT
EL

CRT can be used simultaneously with TFT and monochrome displays

Graphic controller
Philips WD90C24

BIOS
Standard 40 KB; Support for 22 different display types

Ressources
IRQ none
I/O-Adress space 3B0h to 3DCh
Memory A0000h – BFFFFh
C0000h – C9FFFh (BIOS)

Video memory
1 MB FPM DRAM; 70 ns; 32 Bit Data path

Video modes
All standard VGA modes are supported

extended modes for:
640x480 with a maximum of 64 K colours
800x600 with a maximum of 256 colours

VESA modes included in BIOS

Pixel frequency
65 Mhz maximum

Voltage supply
Input voltage +5 V and +12 V (ISA Bus)
Input current 600 mA @ 5 V (without display)
10 mA @ 12 V (without display)

Operating conditions
Ambient temperature 0 to +60 °C
Storage temperature -25 °C to +80 °C
Humidity 95 % max. (no condensation)

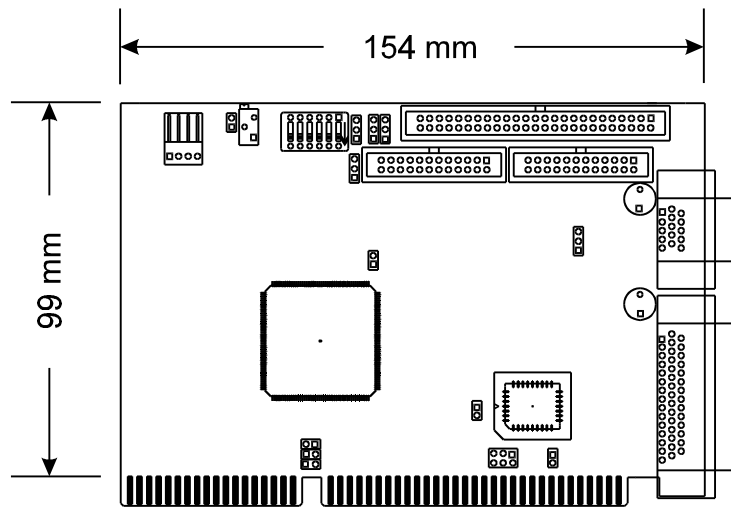
Connectors
15 pin HD D-SUB female (CRT)
50 pin male header (Display)
44 pin HD D-SUB female (Display)
4 pin male plug for supply of backlight inverter

Driver
Windows 3.1x
Windows 95
Windows NT 3.51
Windows NT4.0 (inc. on Windows NT 4.0 CD)
OS/2

Extras
– Panel Power Sequencing
– Contrast adjustment with trimpot (internal/external) and Software
– optional contrast adjustment with NTC or LDR



Dimensions



Order numbers

Board
9SG90089AA

Kits incl. cables and accessories
An actual list can be obtained from
Dotronic GmbH or their distribution.

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