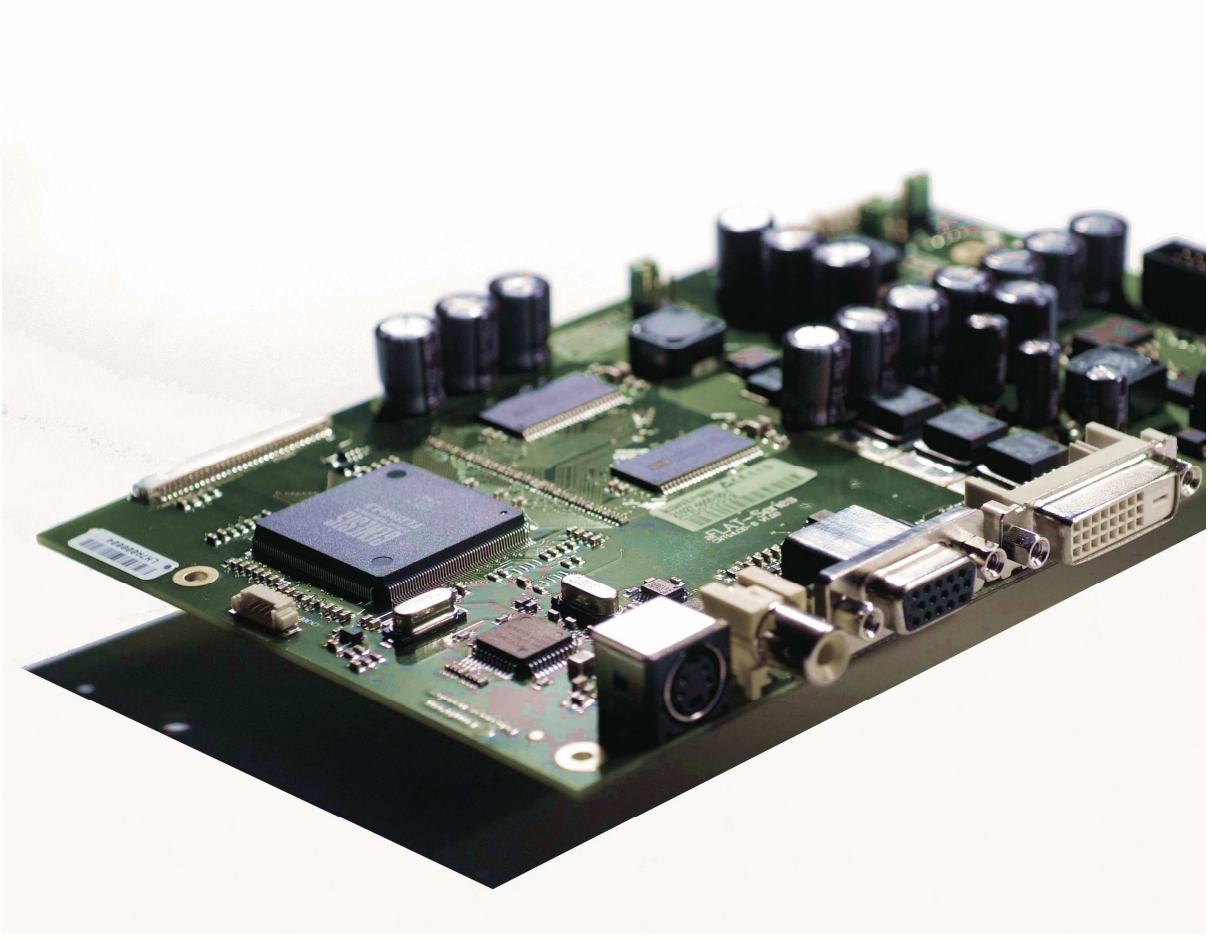
aFLAT-series

Flat Panel Controller

CRT*to*LCD-8
Preliminary



kontron

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1. User Information

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1.5 Warranty

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1.6 Technical Support

Technicians and engineers from Kontron Embedded Modules GmbH and/or its subsidiaries are available for technical support. We are committed to making our product easy to use and will help you use our products in your systems.

Please consult our Web site at http://www.kontron.com/support for the latest product documentation, utilities, drivers and support contacts. In any case you can always contact your board supplier for technical support.

2. Introduction

The CRTtoLCD-8 is a highly integrated TFT panel interface controller, which allows an easy adaptation of standard video input sources like S-video, composite video, DVI or analog RGB to a LVDS TFT panel. The CRTtoLCD-8 only needs one single wide range 12V – 24V power supply and incorporates all needed functionality to build up a full featured TFT monitor. The card generates the necessary power sequencing for the flat screen. The highly flexible architecture of the CRTtoLCD-8 panel interface allows adapting nearly any available TFT panel. Therefore a variety of panel adapters and programming are available on request.

2.1 Technical Information Summary

Features
- Scaling (all resolutions from VGA to SXGA)
- Frame rate conversion
- Integrated 8-bit triple-channel ADC / PLL
- Integrated Ultra-Reliable DVI™ receiver
- On-chip versatile OSD engine
- Programmable gamma correction (CLUT)

Analog RGB Input Port
- Supports up to 165MHz (up to UXGA 60Hz reduced blanking)
- Support for Sync-on-Green (SOG)

Ultra-Reliable DVI™ Receiver
- Single link on-chip TMDS Rx up to 160 MHz operation
- Direct connect to all DVI compliant TMDS transmitters

NTSC,PAL or SECAM input
- video decoder with s-video and composite video input capabilities

Output Format
- Support for 8 or 6-bit panels (with high quality dithering)
- Singel / Dual Channel LVDS Output

Auto-Configuration / Auto-Detection
- Phase and image positioning
- Input format detection
- Compatibility with all graphic cards and standard VESA modes

Frame Store Interface
- 4 MB SDRAM Frame buffer

On-chip OSD Controller
- Bit-mapped OSD capability
- Horizontal and vertical stretch of OSD images

Operating Modes
- Frame rate conversion and scaling of images
- Bypass mode with no filtering and/or frame buffering
- 1:1 centering
- De-interlaced zoom
- Frame Sync and Free Run display synchronization modes

High-Quality Advanced Scaling
- Fully programmable zoom/shrink ratios
- Variable sharpness control
- Moire cancellation
- Adjustable scaling algorithms

Genesis FLI5961 Digital Video Format Converter
- High quality conversion of digital video formats
- Motion Adaptive Noise Reduction
- **DCDi™** two dimensional vector interpolation to improve quality of interlaced video formats

Display Interface Features :
- Control signal generation for backlight inverter
- backlight dimming support (PWM and voltage controlled)
- Voltage generation and power sequence control for panel
- Flat screens can be used with either 3.3V, 5V, 12V or power input.
- JILI30 (LVDS) panel interface (up to 2x24 Bit)

Operating Features:
- 5 button user interface (OSD Keypad)
- On Screen Display (OSD) control for all features
- Full multi sync capable
- VESA DPMS and DDC2B support
- Single wide range voltage supply (+12V to +24V /DC)
- Dynamic Power Management for minimal power consumption via DPMS
- No software drivers needed!

3. Specifications

3.1 Mechanical Specifications

3.1.1 Module Dimensions

- 179,07 x 114,28 mm (PCB)
- 179,07 x 124 mm (Module)
- Height 16,5 mm
- **Note:** The dimension of the module may vary depending on P/N or change if cable, Adapter or Keypad plugged in!

3.1.2 Weight

- 200 g

3.2 Electrical Specifications

3.2.1 Supply Voltage

- 12 - 24V DC ±3%

3.2.2 Supply Voltage

- 100 mV peak to peak 0 – 20 MHz

3.2.3 Supply Current at 25°C

- CRTtoLCD-8 with OSD-Keypad, 12V input, SXGA input signal: ⋆ 400 mA
- CRTtoLCD-8 with OSD-Keypad, 24V input, SXGA input signal: ⋆ 200 mA
- CRTtoLCD-8 with OSD-Keypad, 12V input, power down: ⋆ 350 mA
- CRTtoLCD-8 with OSD-Keypad, 24V input, power down: ⋆ 180 mA

3.2.4 Panel Current at 25°C

- Maximum current: 3A by 3.3V Panel VCC
- Maximum current: 3A by 5V Panel VCC
- Maximum current: 2A by 12V[x1] Panel VCC
- Maximum current: 2A by Input[x2] Panel VCC
- Maximum current: 4A by 12V[x1] Backlight VCC

[x1] By ≤12V input VCC, Panel VCC or Backlight VCC = input VCC – max. 300mV.

[x2] Panel VCC = input VCC – max. 300mV, max. 24V output.

3.2.5 Safety instruction

To protect the external powerlines to peripheral the customer has to take care about the following things:

The wires to the external device need to have the right diameter to withstand the max. available current.

The housing of external device must fulfill the protecting requirements of IEC/EN 60950.

4. Environmental Specifications

4.1 Temperature

- Operating (with appropriate airflow):
  - Maximum operating temperature: 0 to +60 °C (*)
- Non operating: -10 to +85 °C

Note:	(*) The maximum operating temperature is the maximum measurable temperature on any spot on a mo- dule's surface. You must maintain the temperature according to the above specification.

4.2 Humidity

- Operating: 10% to 90% (non condensing)
- Non operating: 5% to 95% (non condensing)

5. Connector

5.1 DC Power Supply (CN400)

4 contact connector, single row, right angle, 2.5 mm pitch, (Tyco, 171826-4 or equivalent).

Mating connector Tyco, 171822-4 or equivalent.

Pin	Function
1	Not connected
2	Power Ground
3	Power Ground
4	Input DC Power

5.2 DC Power Supply (CN401)

2 contact connector, DC POWER JACK, 2mm pin diameter

Pin	Function
1 (center)	Input DC Power
2 (outside)	Power Ground

5.3 VGA / RGB analog input (CN700)

High Density SUB-D Connector, 15 contacts, right angle

Pin	Function
1	Analog Input Red
2	Analog Input Green
3	Analog Input Blue
4	Not connected
5	Analog Ground
6	Analog Ground Red
7	Analog Ground Green
8	Analog Ground Blue
9	+5V DC from Video Card
10	Analog Ground
11	Not connected
12	DDC Serial Data
13	Horizontal Sync Input
14	Vertical Sync Input
15	DDC Serial Clock

5.4 DVI input (CN100)

DVI-D Connector, 24+1 contacts, right angle

Pin	Function
1	TMDS Data 2-
2	TMDS Data 2+
3	Power Ground
4	Not connected
5	Not connected
6	DDC Serial Clock
7	DDC Serial Data
8	Not connected
9	TMDS Data 1-
10	TMDS Data 1+
11	Power Ground
12	Not connected
13	Not connected
14	+5V DC from Video Card
15	Power Ground
16	Hot Plug Detect
17	TMDS Data 0 -
18	TMDS Data 0+
19	Power Ground
20	Not connected
21	Not connected
22	Power Ground
23	TMDS Clock+
24	TMDS Clock-
C5	Not connected

5.5 Compostie video input (CN500)

Cinch connector, right angle

Pin	Function
1 (outside)	Power Ground
2 (center)	CVBS Video Signal

5.6 SVHS video input (CN501)

Mini-DIN (4 contacts) connector, right angle

Pin	Function
1	Power Ground
2	Power Ground
3	Intensity (Luminace)
4	Color (Chrominance)

5.7 JILI30 Connector (CN200)

Connector single row, 1.00mm pitch, 30 contacts (JAE, FI-X30S-HF or equivalent).

Mating connector JAE, FI-X30H or equivalent.

Pin	Function
1	First Transmitter Signal 0-
2	First Transmitter Signal 0+
3	First Transmitter Signal 1-
4	First Transmitter Signal 1+
5	First Transmitter Signal 2-
6	First Transmitter Signal 2+
7	Power Ground
8	First Transmitter Clock-
9	First Transmitter Clock+
10	First Transmitter Signal 3-
11	First Transmitter Signal 3+
12	Second Transmitter Signal 0-
13	Second Transmitter Signal 0+
14	Power Ground
15	Second Transmitter Signal 1-
16	Second Transmitter Signal 1+
17	Power Ground
18	Second Transmitter Signal 2-
19	Second Transmitter Signal 2+
20	Second Transmitter Clock-
21	Second Transmitter Clock+
22	Second Transmitter Signal 3-
23	Second Transmitter Signal 3+
24	Power Ground
25	I2C Data
26	Panel Power Enable
27	I2C Clock
28	Panel VCC *
29	Panel VCC *
30	Panel VCC *

* Configuration see 6.2

5.8 Backlight Connector (CN900)

Connector single row, 1.25mm pitch, 10 contacts (Molex, 53261-1071 or equivalent).

Mating connector Molex, 51021-1000 or equivalent.

Pin	Function
1	Backlight Power Enable *
2	Power Ground
3	Power Ground
4	Backlight Power
5	Backlight Power
6	Backlight Power
7	Backlight Power
8	Power Ground
9	Power Ground
10	Brightness *

* Configuration see 6.3, 6.4, 6.5

5.9 LED Backlight Connector (CN901)

Connector single row, 1.25mm pitch, 12 contacts (Molex, 53261-1271 or equivalent).

Mating connector Molex, 51021-1200 or equivalent.

Pin	Function
1	Backlight Power Enable *
2	Power Ground
3	Power Ground
4	Backlight Power
5	Backlight Power
6	Backlight Power
7	Backlight Power
8	Power Ground
9	Power Ground
10	Brightness *
11	I2C Data
12	I2C Clock

* Configuration see 6.3, 6.4, 6.5

5.10 OSD Keypad Connector (CN800)

14 contacts boxed IDC connector, double row, straight, 2.54mm pitch.

Pin	Function
1	+5V DC Power (max. 50 mA)
2	LED Enable
3	KEY (Confirm)
4	KEY (OSD)
5	KEY (Down)
6	KEY (Up)
7	Serial Transmit
8	Serial Receive
9	Switch LED
10	KEY (ON/OFF)
11	Not connected
12	+12V DC Power (max. 50mA)
13	Power Ground
14	Power Ground

5.11 Analog Input Connector (CN300)

Connector single row, 1.25mm pitch, 5 contacts (Molex, 53261-0571 or equivalent).

Mating connector Molex, 51021-0500 or equivalent.

Pin	Function
1	Power Ground
2	Analog Input 1
3	+3V DC Power (max. 50mA)
4	Analog Input 2
5	Power Ground

Note: Input range is 0 – 3V.

5.12 Serial OSD Connector (CN301)

Connector single row, 1.25mm pitch, 4 contacts (Molex, 53261-0471 or equivalent).

Mating connector Molex, 51021-0400 or equivalent.

Pin	Function
1	+5V DC Power (max. 50 mA)
2	Serial Receive
3	Serial Transmit
4	Power Ground

Caution! The transmit and receive signals have TTL level.

6. Configuration

6.1 Panel Configuration

Coming soon....

6.2 Panel Power Configuration (JP200)

Caution! Only one configuration for flatpanel is allowed, otherwise the board is permanently damaged.

Pin	Function
Open	Panel +3.3V
1 – 2	Panel +5V
3 - 4	Panel +12V
5 - 6	Panel Input VCC (max. 24V)

6.3 Backlight Power Enable Configuration (JP901)

Caution! Only one configuration for backlight is allowed, otherwise the board is permanently damaged.

Pin	Function
1-2	Backlight Power Enable (high active)
2 -3	Backlight Power Enable (low active)

6.4 Backlight Brightness Configuration (JP902)

Caution! Only one configuration for backlight is allowed, otherwise the board is permanently damaged.

Pin	Function
1-2	0V – 5V Level
2-3	0V – 12V Level

6.5 Panel Brightness Mode Configuration (JP900)

Caution! Only one configuration for backlight is allowed, otherwise the board is permanently damaged.

Pin	Function
1-2	Analog / Linear
2-3	Pulse Width Modulation

7. On Screen Display

With the OSD (On Screen Display) you can modify the settings and control the special features of the CRTtoLCD-8. The OSD uses a number of menus for making changes and turning the special features on or off. The configuration can be done via the OSD-keypad (OSD-Panel-Kit).

To start the OSD press the “OSD” button on the keypad, after switching the power supply on. If a valid flat panel configuration is installed, the OSD Main Menu will be displayed.

To select a menu point, simply use the “UP” or “DOWN” buttons to move the cursor to the menu point you want to select and presses the button “OSD”. To get back to the previous menu point or to exit the current function you have to push the “Confirm“-button.

7.1 Image Menu



7.1.1 Brightness

Changes the brightness of the displayed Image.

7.1.2 Contrast

Changes the contrast of the displayed Image.

7.1.3 Hue

Changes the hue of the displayed Image (Only for NTSC/PAl inputs).

7.1.4 Saturation

Changes the saturation of the displayed Image (Only for NTSC/PAl inputs).

7.1.5 Sharpness

Changes the sharpness of the displayed Image.

7.1.6 Backlight

Changes the backlight dimming setting.

7.1.7 Color

Open sub menu for color adjustment

7.1.8 Exit

Return to the main menu level.

7.2 Color Menu



7.2.1 Auto Color

Execute an automatic color adjustment (Only for VGA inputs).

7.2.2 Color Temperature

Select predefined color temperatures.

7.2.3 Red

Changes the intensity of red in the displayed Image (This setting only has an effect when Color Temperature /"USER" is selected).

7.2.4 Green

Changes the intensity of red in the displayed Image (This setting only has an effect when Color Temperature /"USER" is selected).

7.2.5 Blue

Changes the intensity of red in the displayed Image (This setting only has an effect when Color Temperature /"USER" is selected).

7.2.6 Exit

Return to Image menu level.

7.3 Display Menu



7.3.1 Auto Configuration

Execute an automatic configuration of the VGA input including postion an phase (Only for VGA inputs).

7.3.2 Display Image

Adjusts the image scaling of the input signal.
"Auto" expands the input image to full screen.
"1:1" displays the input image with the original resolution.
"Aspect" expands the input image as far as possible, while keeping the aspect ratio of original image.

7.3.3 Phase

Adjusts the sampling phase of the displayed image. The phase can only be adjusted for VGA inputs.

7.3.4 Clock

Adjusts the sampling clock of the displayed image. The clock can only be adjusted for VGA inputs.

7.3.5 Horizontal Postion

Shifts the horizontal position of the displayed image. Dependent on the displayed input signal, the range may be limited.

7.3.6 Vertical Position

Shifts the vertical position of the displayed image. Dependent on the displayed input signal, the range may be limited.

7.3.7 Exit

Return to main menu.

7.4 Video Processing Menu



7.4.1 Deinterlacing

Controls the type of Deinterlacing used for video signals. “None” displays each input frame in consecutive order.” Static” interleaves two input frames to form an output frame. “Madi” (Motion Adaptive De-interlacing) uses a combination of both (none, static) depending on the amount of motion in the input signal (Only for NTSC/PAl inputs).

7.4.2 Film Mode

Controls the Deinterlacing method upon detecting film material (Only for NTSC/PAl inputs).

7.4.3 DCDi

Controls the “Directional Correlation DeInterlacing” (Only for NTSC/PAl inputs).

7.4.4 TNR

Turns Temporal Noise reduction on (Only for NTSC/PAl inputs).

7.4.5 CCR

Turns Cross Color Reduction on (Only for NTSC/PAl inputs).

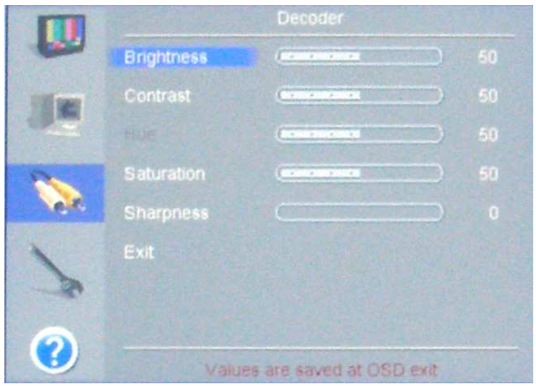
7.4.6 Decoder Settings

Changes into the decoder menu (Only for NTSC/PAl inputs).

7.4.7 Exit

Return to main menu.

7.5 Decoder Menu



7.5.1 Brightness

Changes the brightness of the displayed Image in the video decoder (Only for NTSC/PAl inputs).

7.5.2 Contrast

Changes the contrast of the displayed Image in the video decoder (Only for NTSC/PAl inputs).

7.5.3 Hue

Changes the hue of the displayed Image in the video decoder (Only for NTSC/PAl inputs).

7.5.4 Saturation

Changes the saturation of the displayed Image in the video decoder (Only for NTSC/PAl inputs).

7.5.5 Sharpness

Adds an amount of image sharpness to the input signal (Only for NTSC/PAl inputs).

7.5.6 Exit

Return to video processing menu.

7.6 System Menu



7.6.1 Input Select

Change to the input source.

7.6.2 Osd Settings

Change to the OSD Settings Menu.

7.6.3 Test pattern

Displays a sequence of test patterns on the LCD. To return to normal operation mode, press Confirm key.

7.6.4 Factory Reset

Perform a factory reset. All user values are cleared and factory default values loaded.

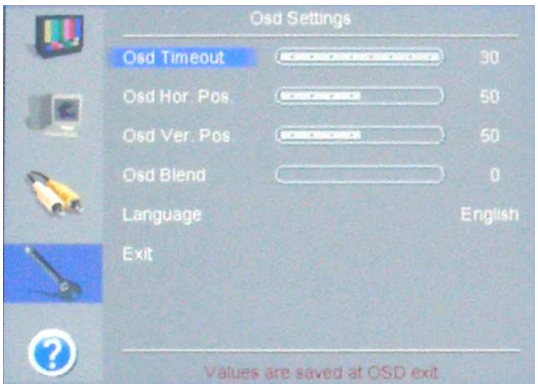
7.6.5 Logo Settings

Change to the Logo Settings Menu.

7.6.6 Exit

Return to main menu.

7.7 Osd Settings Menu



7.7.1 OSD Timeout

Controls the timeout of the menu.

7.7.2 Osd Hor. Pos.

Controls the horizontal position of the OSD menu.

7.7.3 Osd Ver. Pos.

Controls the vertical position of the OSD menu.

7.7.4 Osd Blend

Controls the translucency of the OSD menu.
Note: See Appendix C: “Known Restrictions”

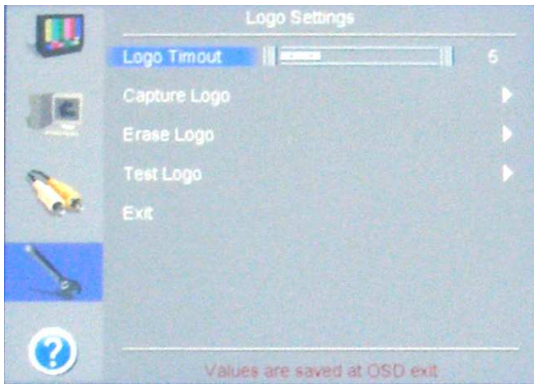
7.7.5 Language

Controls the OSD menu language.

7.7.6 Exit

Return to system menu.

7.8 Logo Settings Menu



Note: Logo is only shown directly after PSU has been switched on.

7.8.1 Logo Timeout

Controls the time the power on Logo is displayed, before any connected signal is displayed.

7.8.2 Capture Logo

Capture the logo from the displayed image. The area of the image that is captured will be highlighted.

7.8.3 Erase Logo

Erasing the logo.

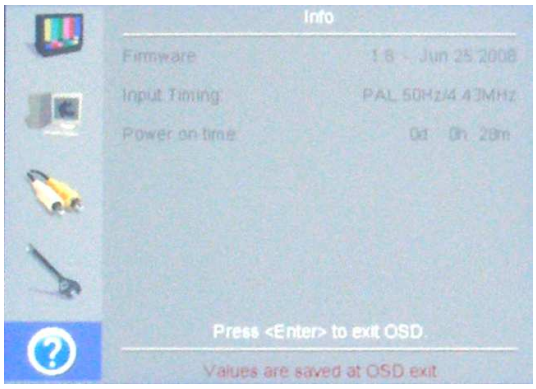
7.8.4 Test Logo

Display the currently saved logo.

7.8.5 Exit

Return to system menu.

7.9 Info Menu



7.9.1 Firmware

Displays the currently active firmware version.

7.9.2 Input Timing

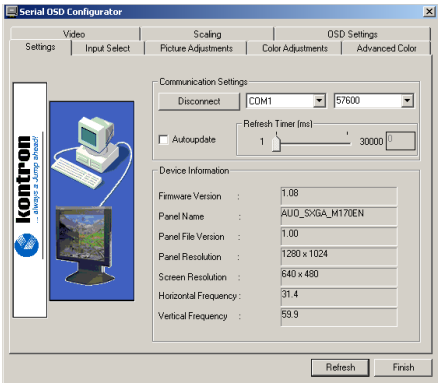
Displays the currently active input signal.

7.9.3 Power on time

Displays the amount of time the unit was operated.

8. Serial OSD

8.1 Settings



8.1.1 Connect / Disconnect

Let you establish or relieve connection to the CRTtoLCD-8

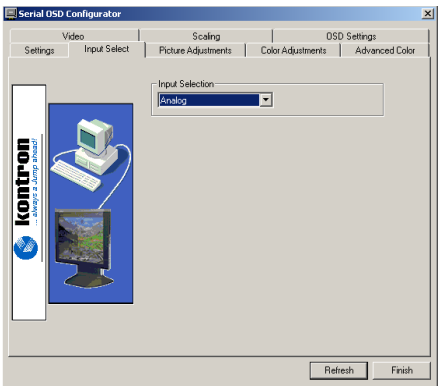
8.1.2 Auto update

Automatically refreshes OSD settings

8.1.3 Device Information

Shows information about the current Firmware, the Panelfile, physically resolution of the panel and lets you see information about the detected input format.

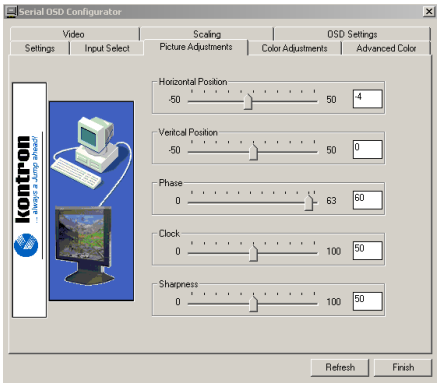
8.2 Input Select



8.2.1 Input Selection

Select source for input.

8.3 Picture Adjustments



8.3.1 Horizontal / Vertical Position

Adjust horizontal and vertical position of VGA image

8.3.2 Phase

Adjust phase of VGA signal.

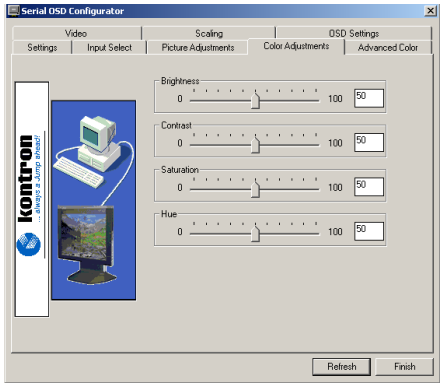
8.3.3 Horizontal / Vertical Position

Adjust between min. and max. Clock cycle

8.3.4 Sharpness

Adjust sharpness of the displayed Image.

8.4 Color Adjustments



8.4.1 Brightness

Adjust brightness of the displayed Image.

8.4.2 Contrast

Adjust contrast of the displayed Image.

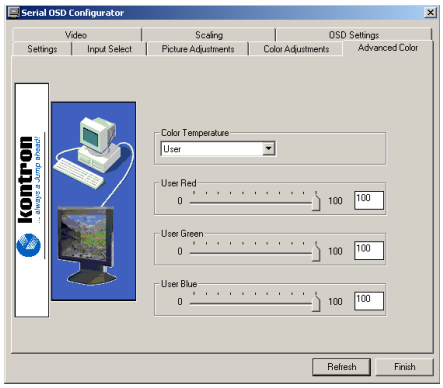
8.4.3 Saturation

Adjust saturation of the displayed Image.

8.4.4 Hue

Adjust hue of the displayed Image.

8.5 Advanced Color



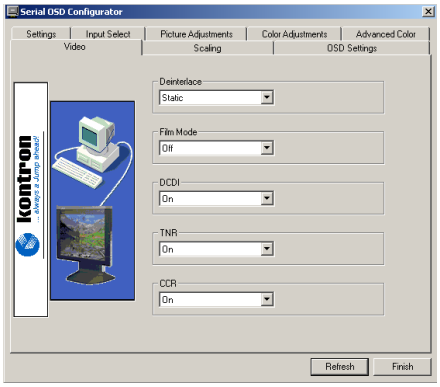
8.5.1 Color Temperature

Select predefined predefined user defined color temperature settings.

8.5.2 User Red/Green/Blue

Adjust user color temperature of each color component.

8.6 Video



8.6.1 Deinterlace

Select Deinterlace mode.

“None” displays each input frame in consecutive order. Static interleaves two input frames to frorm a output frame.

“Madi” (Motion Adaptive De-interlacing) uses a combination of both (none, static) depending on the amout of motion in the input signal.

8.6.2 Flim mode

Switch film mode (On / Off).

8.6.3 DCDI

Switch “Directional Correlation De-Interlacing” (On / Off).

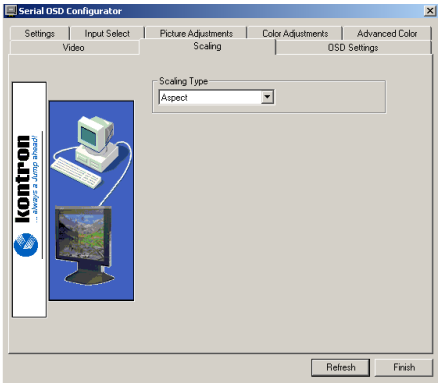
8.6.4 TNR

Swich “Turns Temporal Reduction” (On / Off).

8.6.5 CCR

Switch “Cross Color Reduction” (On / Off).

8.7 Scaling



8.7.1 Scaling Type

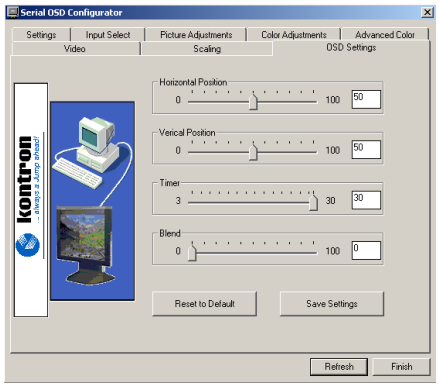
Adjusts the image scaling of the input signal.

“Auto” expands the input image to full screen.

“1:1” displays to input image with the original resolution.

“Aspect” expands the input image as far as possible, while keeping the aspect ratio of original image.

8.8 OSD Settings



8.8.1 Horizontal / Vertical Position

Set the position of the OSD menu.

8.8.2 Timer

Adjust time for the OSD timeout.

8.8.3 Blend

Adjust transparency of the OSD menu.
Note: See Appendix C: “Known Restrictions”

8.8.4 Reset to Default

Do a factory reset.

8.8.5 Save Settings

Save all settings as default OSD values to the non volatile memory.

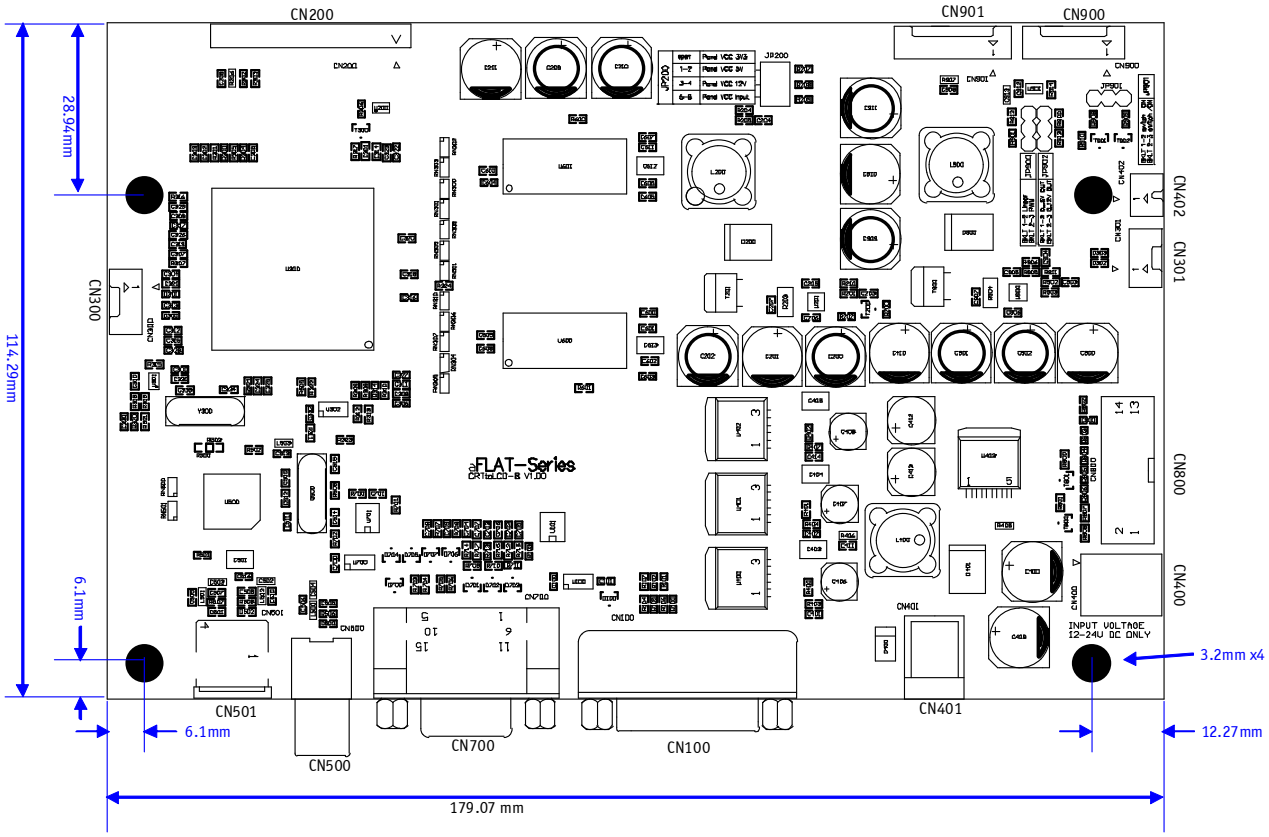
9. Supported Video Modes

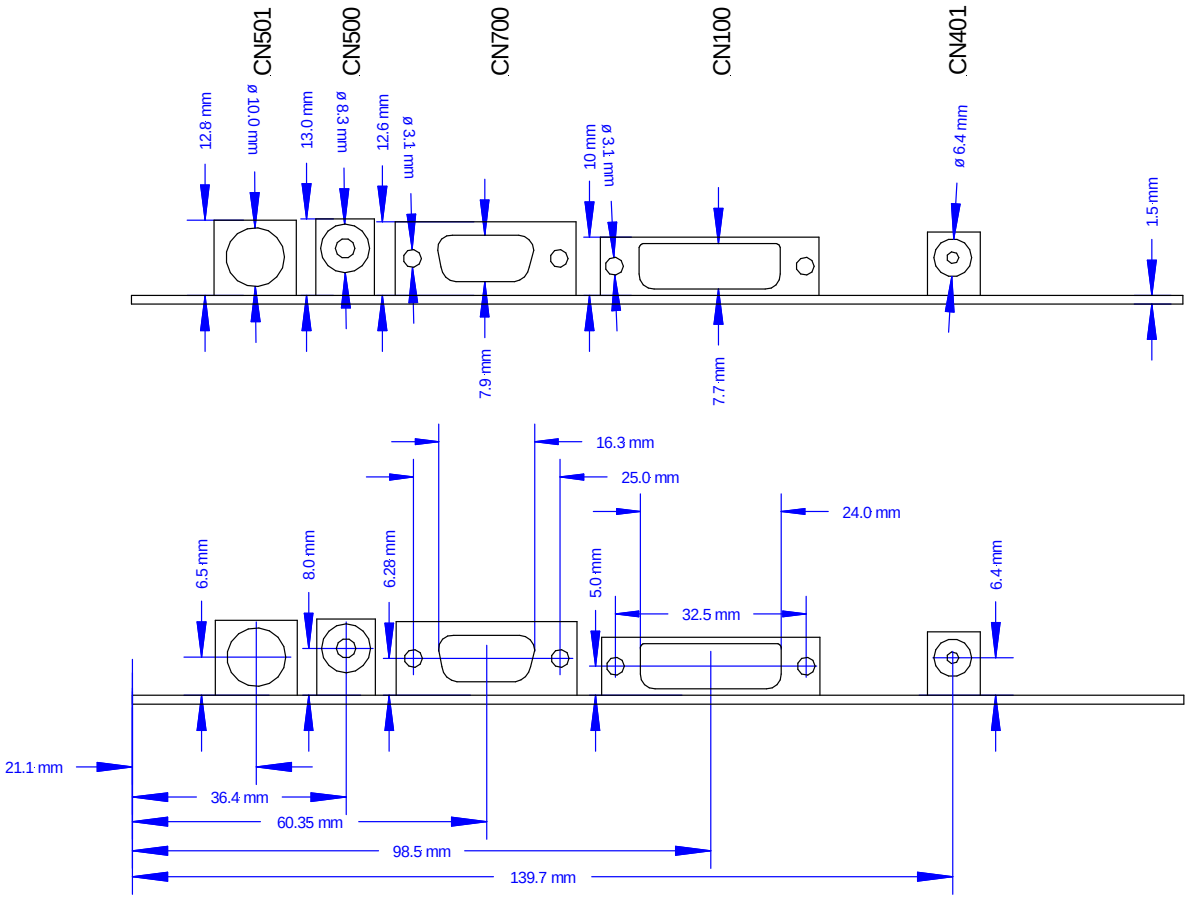
Generally all VESA compatible video modes are supported. If modes are not supported the controller displays "Invalid Mode" on the flat panel. In this case use the Kontron Configuration Workbench (KCWB), available on request, to add this special mode to the supported mode table.
Note: Supported Video Modes is contingent on Panel-files and Panel.

Following modes are tested:

Video Mode Input	Vertical refresh rate	Mode standard
720 x 400	70 Hz	DOS
640 x 350	70 Hz	DOS
640 x 400	70 Hz	DOS
640 x 480	59.9 Hz	VGA
640 x 480	60 Hz	VGA
640 x 480	72 Hz	VGA
640 x 480	72,8 Hz	VGA
640 x 480	75 Hz	VGA
640 x 480	85 Hz	VGA
800 x 600	56.25 Hz	SVGA
800 x 600	60 Hz	SVGA
800 x 600	70 Hz	SVGA
800 x 600	72 Hz	SVGA
800 x 600	75 Hz	SVGA
800 x 600	85 Hz	SVGA
1024 x 768	60 Hz	XGA
1024 x 768	70 Hz	XGA
1024 x 768	72 Hz	XGA
1024 x 768	75 Hz	XGA
1024 x 768	85 Hz	XGA
1280 x 1024	60 Hz	SXGA
1280 x 1024	70 Hz	SXGA
1280 x 1024	75 Hz	SXGA
1280 x 1024	85 Hz	SXGA

APPENDIX A: Layout





APPENDIX B: Accessories

Part.-No	Description
22010	OSD-Panel-Set
61029	Adapter to connect TTL Flatpannels to JILI30 Interface
61021	RS232 Adapter for CRTtoLCD-8
XXXX	Flat Panel cable, see www.kontron.com/FPC
XXXX	Backlight cable, on request.

APPENDIX C: Known Restrictions

No.	Description
1.00	Firmware 1.8 or 1.9. OSD Blend function not supported

APPENDIX D: REVISION HISTORY

Revision	Date	Edited by	Changes
1.0	12.02.2008	S.Leuchtenberger	First revision
1.1	18.09.2008	S.Leuchtenberger	Update spec, add OSD
1.2	05.10.2008	S.Leuchtenberger	Add Appendix C (Known Restrictions)