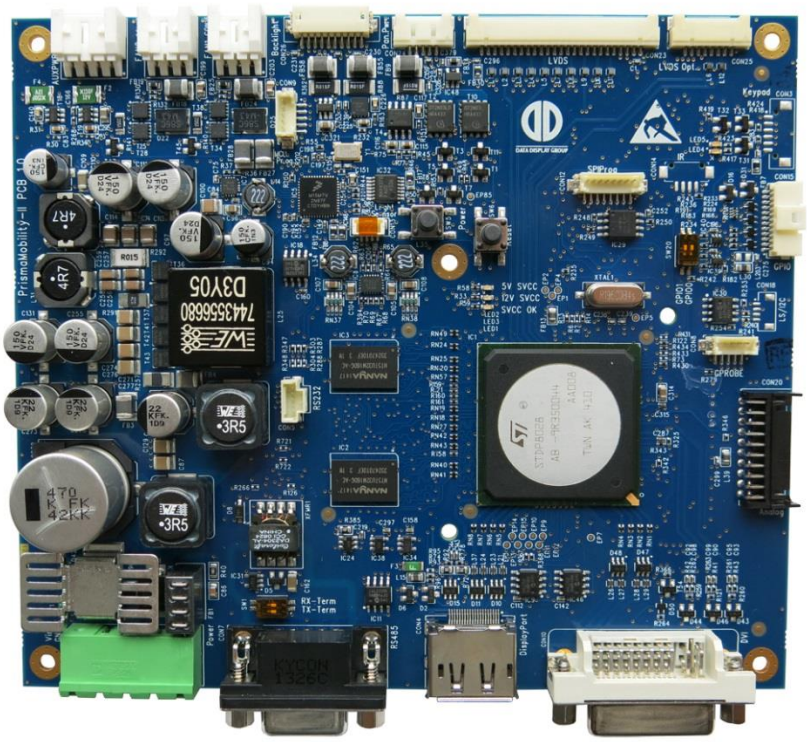
DATA DISPLAY GROUP

Datasheet

PrismaMOBILITY-II

DVI/DisplayPort/Analog Converter Board for Harsh Environments

For VGA – WUXGA Panels



Design EN55022 and EN61000-6-2 oriented

Version 1.1
15.07.2015

Table of Contents

Revision History

Date	Rev.No.	Description	Page
27.02.2015	1.0	Initial release	All
15.07.2015	1.1	Updated: hotkeys, electrical characteristics, PIP matrix, mode tables	6-8, 16, 24

1 Overview

PrismaMobility-II is a powerful graphics processing board, providing high-quality images for TFT panels. This converter supports 6/8/10-bit LVDS panels up to WUXGA (1920 x 1200) and can be used in a variety of systems. The board features a wide-range power supply input which can be directly powered from vehicle power systems.

2 General Features

- High-performance video scaler (called MARS, same as on Prisma-IIIa), including:
  - Frame rate conversion
  - Faroudja Truelife video enhancer
  - Faroudja RealColor color enhancing
- Input signal types:
  - DVI-I (EDID selectable for analog or digital operation)
  - DisplayPort
  - Analog (CVBS/S-Video/Component) inputs on internal pin header
- Software controlled panel and backlight configuration
- Wide-range input voltage (up to 36V)
- True High Definition 1080p on DVI (HDMI 1.3a) input
- Integrated supervision and control features (compatible to ARCB)
  - Fan control
  - Temperature sensing/control
  - Panel and backlight current measurement
  - Automatic backlight control with ambient light sensor
- RS485 remote control capability, RS232 as internal pin header
- RS232 instead of RS485 on external D-Sub connector as assembly option
- MCU controlled AUX Power output (+5V/+12V), incl. configurable GPIO

3 Hardware Features

Dedicated System Control MCU

- Protocol conversion (RS-232/RS-485)
- Temperature sensing and control with on-board temperature sensor
- Fan control, fans can be powered directly by input power or internally regulated +12V
- Current measurement
- Protocol compatible to DataDisplay's ARCB
- Operation and panel power on-time counter

LVDS Panel Interface

- Fully programmable LVDS mappings for compliance with all LVDS protocols

Output Format

- Single and double wide LVDS up to WUXGA@60Hz output
- Support for 10, 8 or 6-bit panels (with high-quality dithering)

Panel/Inverter Supply

- Panel supply selectable: 3.3V, 5V or 12V
- 4 configurable Option Pins: 3.3V logic level, one of them also capable of 5V logic level
- Backlight control configurable for PWM operation at 3.3V or 5V logic level or analog control with freely configurable DC levels from 0V to 5V
- All options are software-controlled, no HW modifications necessary for panel adaptation
- Power supply designed to deliver up to 35 W of panel power and flexible LVDS options to adapt a multitude of panels

Wide range input supply

- PrismaMobility-II can work within a voltage range of 8-36V, and can filter instantaneous peaks (10/1000us wave form) up to 58V.

Input signal types

- DisplayPort 1.1
- DVI-I: Either HDMI 1.3a TMDS digital signals or analog VGA signals; EDID selection for analog or digital input will be factory programmable
- Analog: CVBS, S-Video or Component

4 Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Note
Supply Voltage	V_{in}	0	58	VDC	1, 2
Storage Temperature	T_{St}	-35	+85	°C	
Operating Temperature	T_{Op}	-20	+75	°C	

1) Within operating temperature range.
2) Permanent damage to the device may occur if maximum values are exceeded.

5 Electrical Characteristics

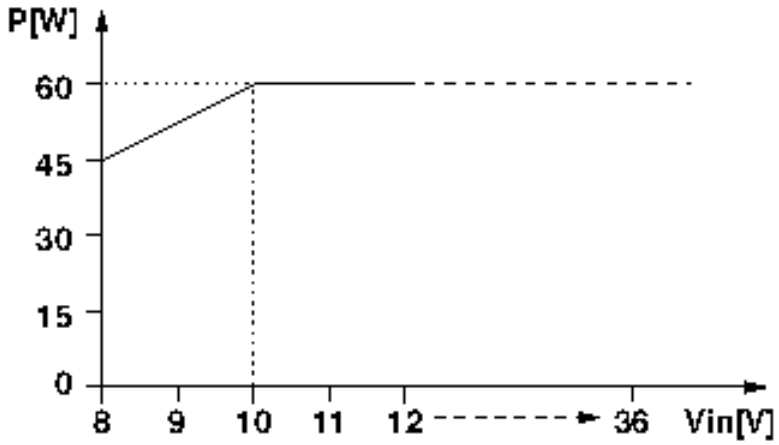
Item	Condition	MIN.	TYP.	MAX.	Unit	Note
Supply Voltage		8	28	36	VDC	1, 2, 6
Current Consumption (at 28V supply voltage)	Power-OFF (low power mode)		80		mA	3, 4
	Sleep mode		150		mA	3, 4
	Operating mode, board only		170		mA	3, 4, 5
	Operating mode, incl. panel LTM230HP01		1200		mA	3, 4

1) Supply voltage limits are for PrismaMobility-II supplying a 12V@2.6A or 5V@2A inverter. If a different voltage or higher current inverter is to be used, it will have to be powered externally.
2) Instantaneous peaks (10/1000us wave form) up to 58V will be filtered and will not cause damage.
3) All measurements done at 25°C ambient temperature.
4) Input voltage has been held constant at 28V for all measurements.
5) For the board-only measurement panel and inverter were disconnected.
6) Output power derating below 10V is applied as shown in the following section.

Output Power

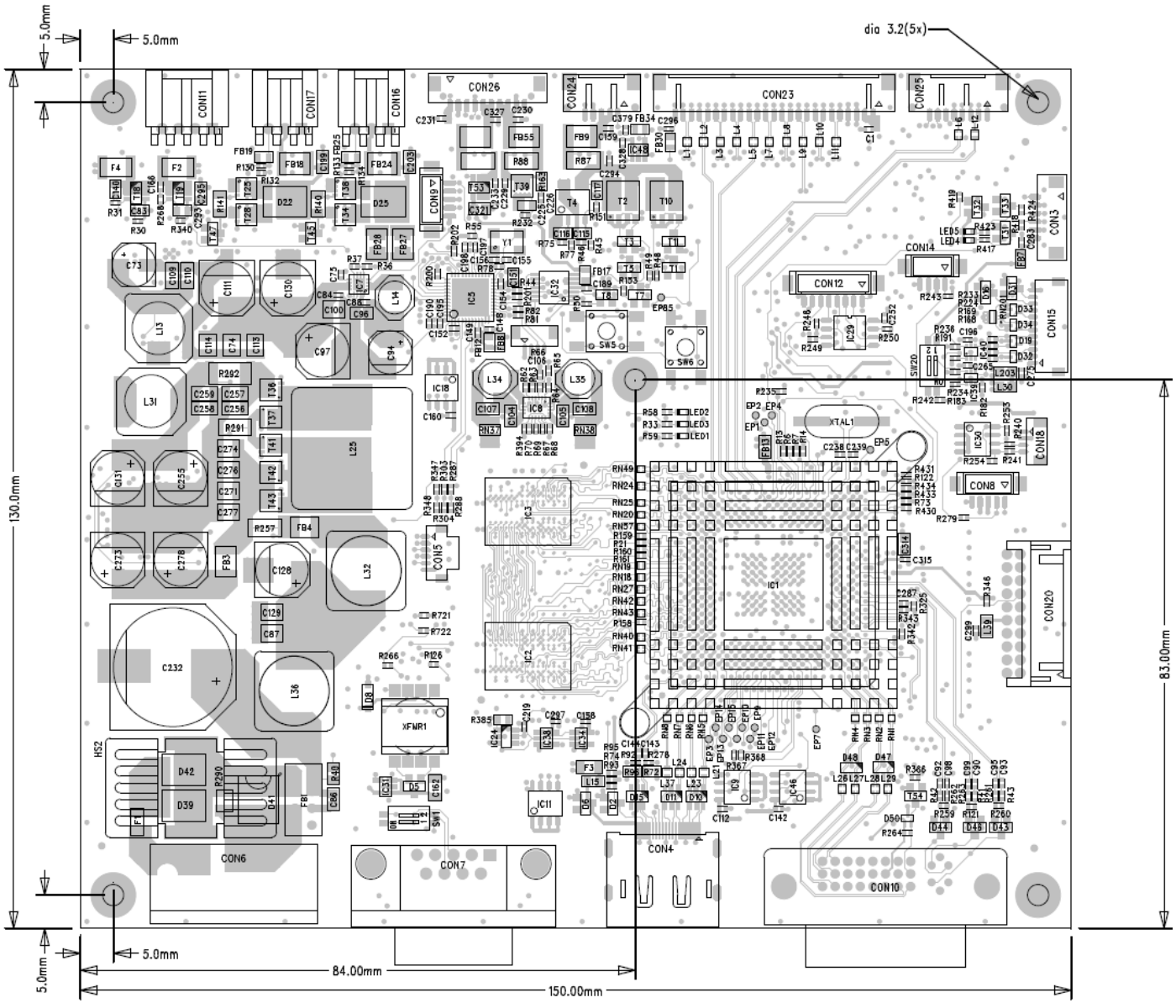
Item	Condition	MIN.	TYP.	MAX.	Unit	Note
Backlight supply current	12V			3.0	A	1
Backlight supply current	5V			2.0	A	1, 4
Panel supply current	12V			2.6	A	1, 2
Panel supply current	5V			2.6	A	1, 2, 4
Panel supply current	3.3V			1.5	A	1, 2
Aux. 12V	12V		500	800	mA	1, 3
Aux. 5V	5V		800	1000	mA	1, 3, 4

1) Total power output including panel, backlight and AUX power limited to 60 W, with derating applied below 10V input supply (see below diagram).
2) Panel Power is switched electronically; only one of the possible output power voltages is selected.
3) AUX Power controlled independent of panel power state, only controlled by temperature lockout; AUX power outputs are short-circuit protected by means of polyfuse elements.
4) Total current drawn from 5V backlight, 5V panel supply and 5V Aux. must not exceed 5.0A.



6 Mechanical Dimensions

The following drawing shows the mechanical dimensions and mounting-hole positions of PrismaMobility-II.



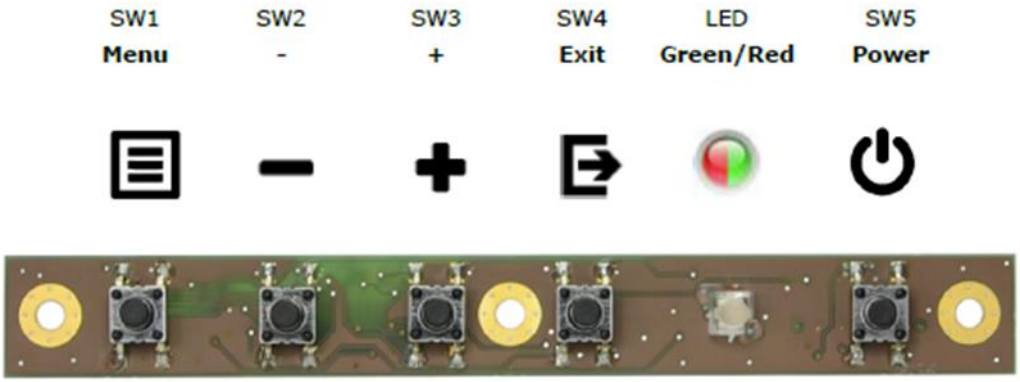
7 User Controls

The On-Screen-Display (OSD) allows selection of input source and fine tuning of various functional parameters like brightness, contrast etc. These parameters can be adjusted via an external interface.

7.1 External Keypad

An external keypad can be used to control the OSD.

4-Button OSD Keypad ZU-02-398:



The following tables give you an overview about the functionality.

	Menu	-	+	Exit	LED	Power
General					See below	Power ON/OFF
OSD closed	Open OSD	PIP Input Select*	Hotkey Brightness	Input Select		
OSD open	Select	Down/Left/-	Up/Right/+	Exit/Back		

* Only available if PIP is enabled, see sec. 8.3.

LED Status:

- Green: Signal Found
- Green flashing: Searching Signal
- Red: Power Safe
- Red flashing: Blank or corrupted panel config data. Please contact Data Display support.
- LEDs OFF: Power OFF

7.2 IR Remote Control

As an alternative to the external keypad, PrismaMobility-II can also be controlled through an IR remote control device. For this the IR-receiver **ZU-02-406** has to be attached to connector CON14. PrismaMobility-II can then be controlled with the IR Remote Control **RC-10-004** (see picture below).

Remote controller functionality:

Rubber key marking	Chase marking	hex code	Functions
	**Power**	**0x01**	**Power on/off board**
	**PAP**	**0x0B**	**Picture-At-Picture Mode on/off**
	**Brightness**	**0x30**	**Increases brightness while OSD is closed**
		0x31	**Decreases brightness while OSD is closed**
		**0x0D**	**Moves up through possible selections, Switch main input port while OSD is closed**
		**0x11**	**Moves down through possible selections, Switch pip input port while OSD is closed**
		**0x0E**	**Exits current sub-menu / function (goes to upper menu), Moves left through possible selections or slider, Decrease brightness while OSD is closed**
		**0x10**	**Enters current sub-menu / function, Moves right through possible selections or slider, Increase brightness while OSD is closed**
		**0x0F**	**Enters chosen function**
M	**Source**	**0x23**	**Selects source for Main channel**

P	Source	0x24	Selects source for PIP/PAP channel
blank	Menu	0x27	Opens OSD
blank	Exit	0x13	Closes OSD
blank	Freeze	0x1A	Freeze image
blank	Auto	0x21	Auto-configuration for VGA input
blank	Aspect Main	0x17	Changes aspect ratio in Main View
blank	Aspect PIP	0x0A	Changes aspect ratio in PIP View
blank	PIP Select	0x14	Switches Picture-In-Picture mode on/off
blank	PIP Swap	0x02	Swaps input of main and PIP, when PIP is open
blank	PIP Size	0x15	Switches PIP size (small, large)
blank	PIP Position	0x16	Switches between 4 PIP position (left-top, left-bottom, right-top, right-bottom)

Table 1: Infrared remote controller functionality

8 On-Screen-Menu (OSM)

8.1 Sub-Menu “Image Settings“

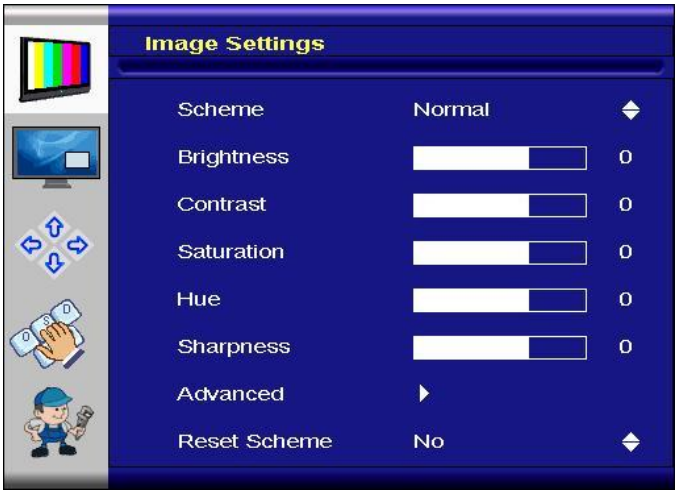


Figure 8.1.a “Image Settings” menu for S-Video, CVBS, YPbPr, RGB+CS and video mode of DVI/HDMI.

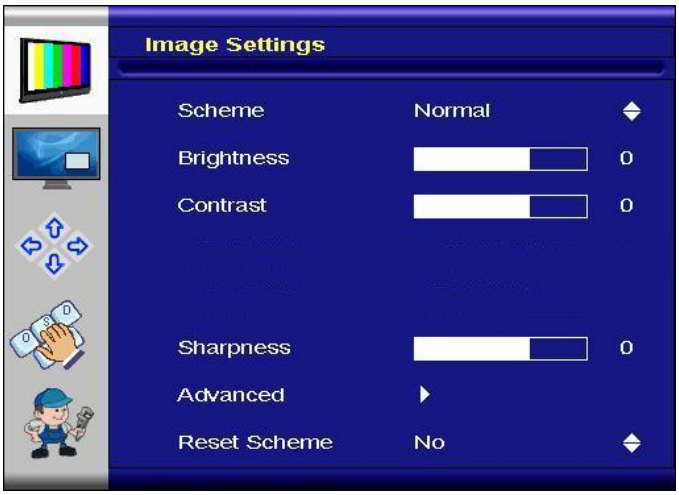


Figure 8.1.b “Image Settings” Menu for VGA and graphics mode of DVI/HDMI.

Scheme: Switches between normal/sport/game/cinema/vivid preset values. Each scheme has particular brightness, contrast, etc. values.

Brightness: Brightness of the image can be controlled using this function, with left and right buttons after the brightness slider is selected. This function modifies RGB data to change the brightness.

Contrast: Allows <Contrast> adjustment in the Y domain. The modification affects all color channels and all input types and is a direct multiplication of the Y data after YUV black level adjustment.

Saturation: Allows <Saturation> adjustment in the UV domain. The modification affects all color channels and all input types.

Hue: Allows <Hue> adjustment in the UV domain. The modification affects all color channels and all input types.

Sharpness: Allows <Sharpness> adjustment on the image.

Advanced: See following section.

Reset Scheme: Can be used to reset scheme (normal/sport/game/cinema/vivid) settings to factory value.

8.2 Sub-Menu “Advanced” of “Image Settings“

The advanced menu opens in two different ways, according to the input type:

Figure 8.2.a “Advanced” menu for S-Video, CVBS, YPbPr, RGB+CS, and video mode of DVI/HDMI.

Figure 8.2.b “Advanced” menu for VGA and graphics mode of DVI/HDMI.

Color

Figure 8.2.e “Color” menu for DVI/HDMI

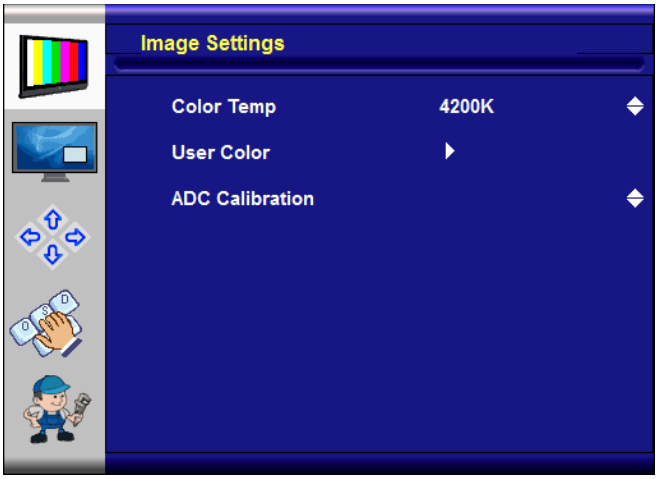
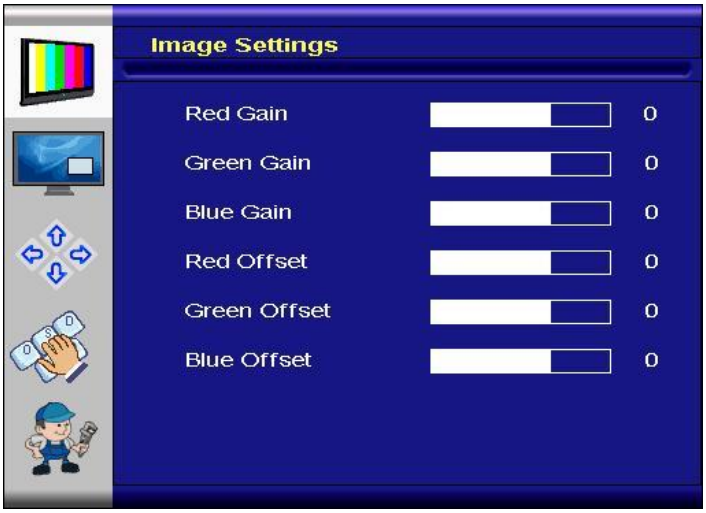


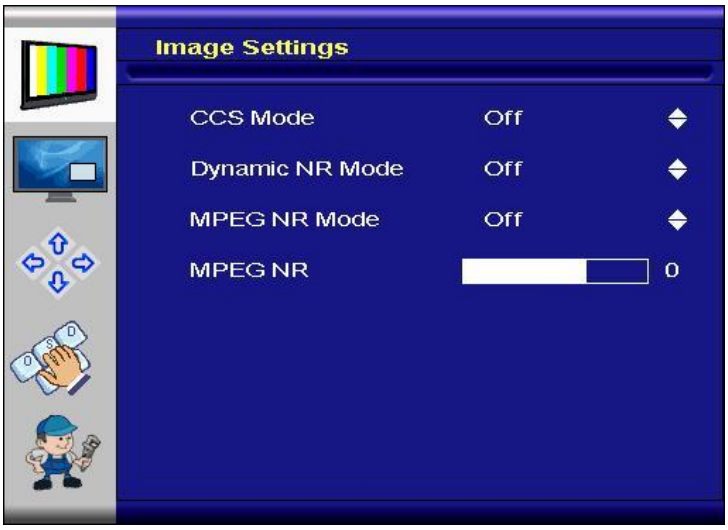
Figure 8.2.f “Color” menu for S-Video, CVBS, YPbPr, RGB+CS and VGA

- **Color Temp:** Allow selection of different color temperature schemes. Selections are user, sRGB, 4200K, 5000K, 5400K, 6500K, 7200K, 9300K.
- **User Color:** If the user has a preference other than the pre-set color temperatures, the menu below can be used to create a new color scheme.
- **ADC Calibration:** Performs an auto fine tuning on the ADC. Does not apply to digital inputs.



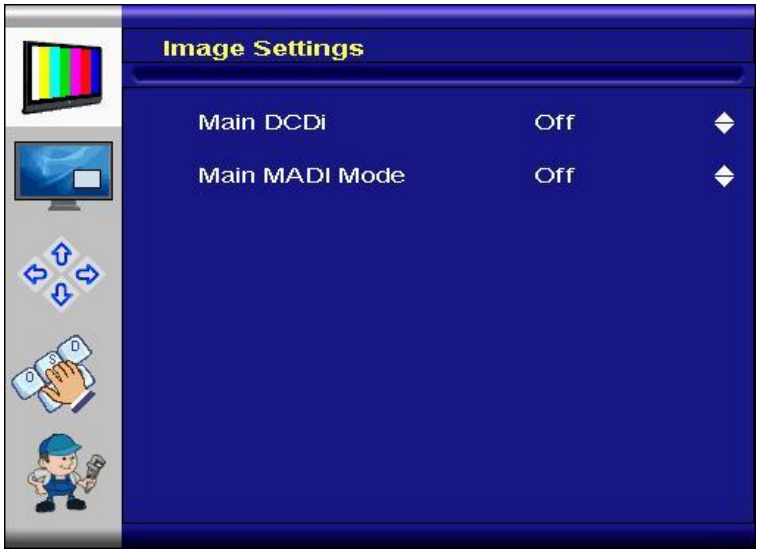
- **Red Gain:** Boost adjustment on red.
- **Green Gain:** Boost adjustment on green.
- **Blue Gain:** Boost adjustment on blue.
- **Red Offset:** Base level increase on red.
- **Green Offset:** Base level increase on green.
- **Blue Offset:** Base level increase on blue.

Noise Reduction



- **CCS Mode:** Changes Cross-Color Suppression between off/adaptive/normal. Adjust for best image.
- **Dynamic NR Mode:** Changes Dynamic Noise Reduction between low/medium/high/off/adaptive. High setting may cause loss of detail, adjust for best image.
- **MPEG NR Mode:** Enables/disables the MPEG NR Mode.
- **MPEG NR:** Allows the user to manually set the level of MPEG noise reduction.

Video Processing



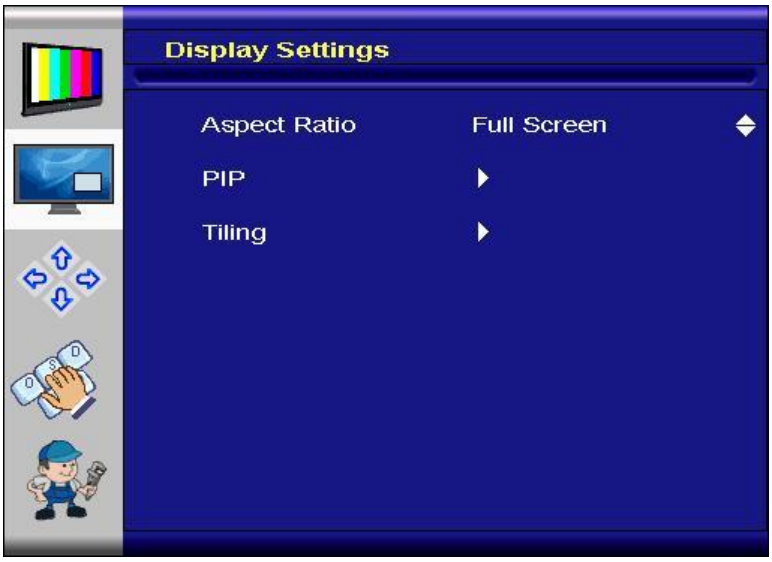
- **Main DCDi:** Turns DCDi on/off on main channel.
- **Main MADI Mode:** Changes Motion Adaptive De-Interlacing between normal/off/adaptive modes.

Film Mode & Scaling

This feature can be used to adjust image when viewing 2:2/3:2 pulled-down video camera films.

- **Film Mode Detection:** Selection of Video-3:2/Video-2:2/Video-3:2-2:2/off.
- **Film Display Mode:** Selection of Normal 3:2 or other future modes.

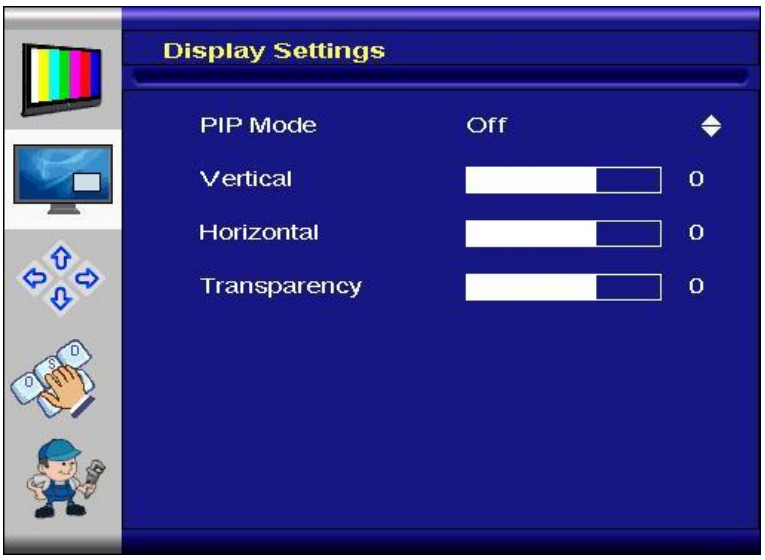
8.3 Sub-Menu “Display Settings“



Aspect Ratio: Used to adjust display between full screen, panoramic, Letter Box Expand, Pillar Box and 1:1.

Panoramic is a technique that captures images with elongated fields of view.
When a film or video that was not originally designed for widescreen is shown on a widescreen display, black bars are placed on the sides of the image. This is called *pillar boxing*.
Letterboxing is the practice of transferring a film shot in a widescreen aspect ratio to standard-width video formats while preserving the film's original aspect ratio, by placing black bars above and below the image.
1:1 is a technique that captures images without changing resolution. The input resolution can not be bigger than the panel resolution in horizontal or vertical.

PIP: Picture-In-Picture can be used to display HDMI/DVI and another input at the same time.



PIP mode can be toggled between Off, PAP-Tall, Side-by-Side, Small PIP and Large PIP.
PIP position can be adjusted using the slider bars.

The following matrix shows the possible combinations of Main- and PIP Channels:
Note that not all listed ports are available on all variants of PrismaMobility-II.

		Main Channel							
		VGA	YPbPr [1]	RGB CS [2]	CVBS1	CVBS2	S-Video	DVI	DP
PIP	VGA	*	✓	✓	✓	✓	✓	✓	✓
	YPbPr [1]	✓	*	×	✓	✓	✓	✓	✓
	RGB CS [2]	✓	×	*	×	×	×	✓	✓
	CVBS1	✓	✓	×	*	×	×	✓	✓
	CVBS2	✓	✓	×	×	*	×	✓	✓
	S-Video	✓	✓	×	×	×	*	✓	✓
	DVI	✓	✓	✓	✓	✓	✓	*	✓
	DP	✓	✓	✓	✓	✓	✓	✓	*

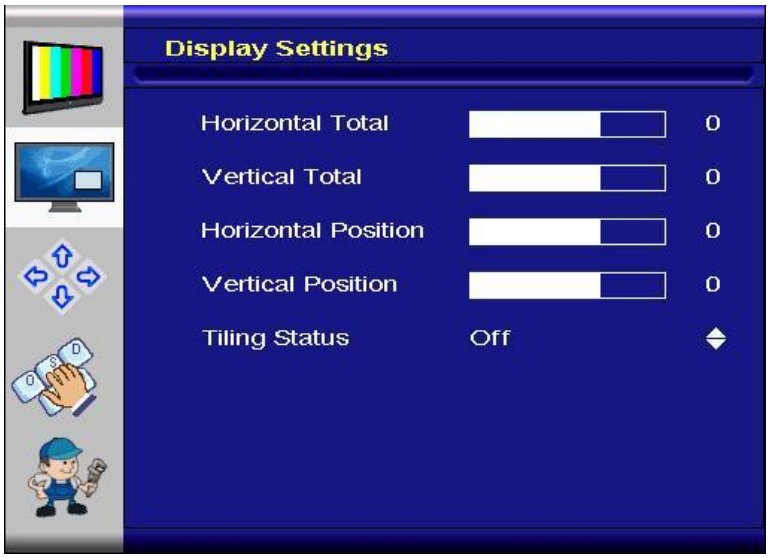
* One input port can be displayed simultaneously on Main and PIP channel.

1) Component

2) RGB with Composite Sync

Tiling:

The tiling function (for video wall applications) can be used with all input types.



Horizontal Total: Defines the total horizontal number of displays.

Vertical Total: Defines the total vertical number of displays.

Horizontal Position: Defines the horizontal position of the actual display unit.

Vertical Position: Defines the vertical position of the actual display unit

Tiling Status: Enables/disables the tiling function. If the PIP-Mode is PAP-Tall or side-by-side, the tiling status will be off and disabled.

Example: 3 by 3 video wall: Definition of Horizontal/Vertical display position:

Horizontal / Vertical	**1**	**2**	**3**
1	1/1	2/1	3/1
2	1/2	2/2	3/2
3	1/3	2/3	3/3

Limitations:

- Tiling property cannot be used while PAP-Tall or Side-by-Side modes are active.
- If PIP is turned on, the PIP image would be displayed on every panel of the video wall.
- Image and position menus are disabled while tiling is on.

Note:

- For best results, the Horizontal Total and Vertical Total value should to be set to a value which is an integer divider of the input width or height, respectively. For example, if input is 1280x768, horizontal total has to be set to one of 2, 4, 5, 8 and vertical total has to be set to one of 2, 3, 4, 6, 8.

8.4 Sub-Menu “Position Settings“

Position Settings for Video

Figure 8.4.a: “Position Settings” menu for video mode of HDMI, S-Video, composite and component inputs.

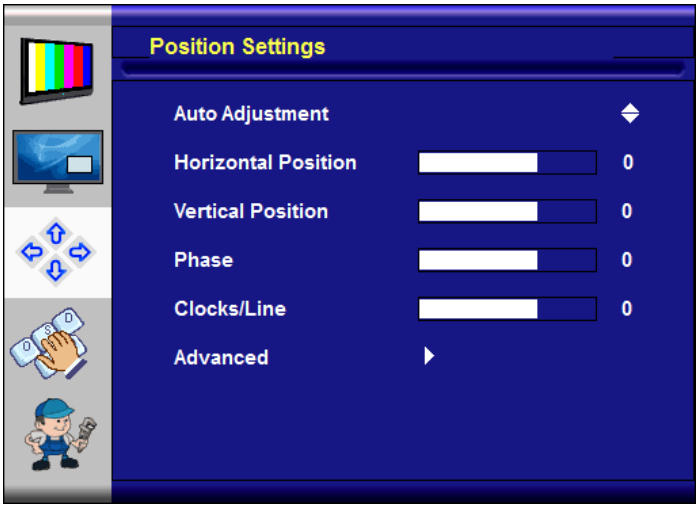
Width: Adjusts total width of the image by stretching or shrinking.

Height: Adjusts total height of the image by stretching or shrinking.

Horizontal Start: Changes the starting point of the image horizontally, without altering height.

Vertical Start: Changes the starting point of the image vertically, without altering width.

Position Settings for VGA



8.4.b: "Position Settings" menu for VGA.

Auto Adjustment: Performs auto-adjust function on the image.

Image Position: Used to alter placement of the image.

Phase: This function is a slider to adjust the sampling phase of the analog interface. For optimum image quality, input pixels should be sampled at the ideal sampling points.

Clocks/Line: This function is a slider to adjust the sample clock of the analog interface. This is helpful for improving the image quality for non-standard display modes.

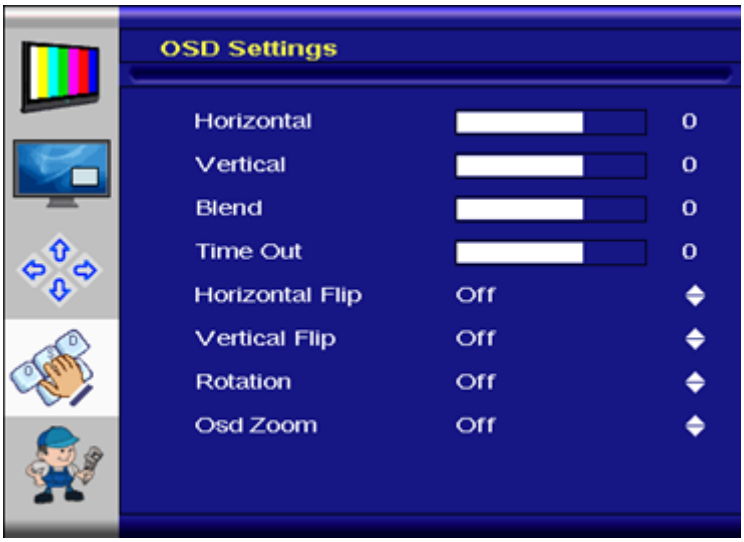
Advanced:

This function can be used to manually force some of the widely used difficult-to-detect modes which can be misinterpreted by the controller.

Position Settings for graphics mode of HDMI

8.4.c: “Position Settings” menu for graphics mode of HDMI.

8.5 Sub-Menu “OSD Settings“



Horizontal: This function can be used to move the OSD window on a horizontal line.

Vertical: This function can be used to move the OSD window on a horizontal line.

Blend: This function can be used to change the transparency of the OSD window.

Time Out: This function determines after how many seconds the OSD will close itself.

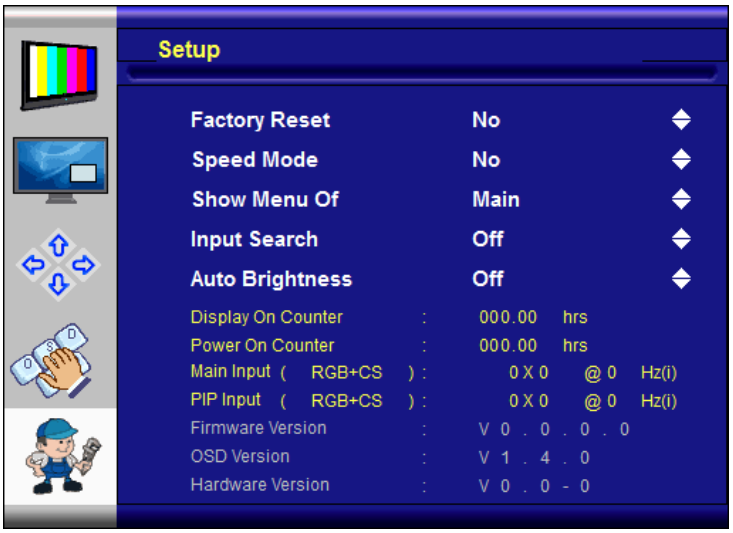
Horizontal Flip: Flips the OSD horizontal.

Vertical Flip: Flips the OSD vertical.

Rotation: Rotates the OSD

OSD Zoom: Changes OSD size,

8.6 Sub-Menu “Setup“



Factory Reset: This function can be used to load back factory-loaded values.

Speed Mode: In graphics mode, fast image transfer is supported.

Show Menu Of: Changes the menu between main image and PIP if the PIP mode is on.

Input Search: Toggles input search on/off.

Auto Brightness: (Optional) Toggles automatic brightness control through external light sensor on/off.

Display On Counter: (Optional) This counter shows how many hours the display has been switched on. If for example no valid input signal is found, the display is switched off automatically - during this time this timer is not increased.

Power On Counter: (Optional) This counter shows how many hours the board has been switched on. This counter increases as long as the board is powered and not switched to full power off mode by pressing the power key on the IR remote control or on the OSD keypad. This counter also increases when no valid input signal is found and the board is in sleep mode.

Main Input: Shows the detected input mode (resolution and frame rate) of the main input channel.

PIP Input: Shows the detected input mode (resolution and frame rate) of the PIP input channel.

9 Supported Input Modes

PrismaMobility-II can support the following input modes. Other modes can be implemented on request. Please ask your sales contact for more details.

9.1 S-Video, CVBS, RGB+CS

PrismaMobility-II provides S-Video and CVBS inputs through the side video connector CON20 as well as “RGB + Composite Sync”. The RGB+CS input shares pins with the YPbPr input, so they cannot be used at the same time. The following table shows the basic characteristics of the supported standard video formats.

Resolution
720 x 480 @ 30(i) (NTSC)
720 x 576 @ 25(i) (PAL)

Table 2: Standard video formats supported via S-Video, CVBS and RGB+CS

9.2 Component

PrismaMobility-II accepts Component Video Input (YPbPr) through the side video connector CON20. The YPbPr input shares pins with the RGB+CS input so they cannot be used at the same time.

Resolution	Resolution
720 x 240 @ 30(i)	1920 x 540 @ 25(i)
720 x 480 @ 60	1920 x 540 @ 30(i)
720 x 288 @ 25(i)	1920 x 1080 @ 25
720 x 576 @ 50	1920 x 1080 @ 30
1280 x 720 @ 50	1920 x 1080 @ 50
1280 x 720 @ 60	1920 x 1080 @ 60

Table 3: Standard video formats supported via Component input

9.3 VGA

The factory preset supported input modes include:

Resolution	Resolution
640 x 480 @ 60 Hz (VESA)	1360 x 768 @ 60 Hz
800 x 600 @ 60 Hz (VESA)	1366 x 768 @ 60 Hz
1024 x 768 @ 60 Hz (VESA)	1368 x 768 @ 60 Hz
1280 x 768 @ 60 Hz	1600 x 1200 @ 60 Hz (VESA)
1280 x 1024 @ 60 Hz (VESA)	1920 x 1200 @ 60 Hz
1280 x 800 @ 60Hz	1920 x 1080 @ 60 Hz

Table 4: Factory preset modes for VGA input

9.4 DisplayPort

PrismaMobility-II is equipped with one DisplayPort connector.
The factory preset supported input modes include:

Resolution	Resolution
640 x 480 @ 60 Hz (VESA)	1360 x 768 @ 60 Hz
800 x 600 @ 60 Hz (VESA)	1366 x 768 @ 60 Hz
1024 x 768 @ 60 Hz (VESA)	1368 x 768 @ 60 Hz
1280 x 768 @ 60 Hz	1600 x 1200 @ 60 Hz (VESA)
1280 x 1024 @ 60 Hz (VESA)	1920 x 1200 @ 60 Hz
1280 x 800 @ 60Hz	1920 x 1080 @ 60 Hz

Table 5: Factory preset modes for DP input

9.5 HDMI – Graphics

The integrated HDMI 1.3a receiver is backward compatible with DVI 1.0 specifications, therefore both DVI and HDMI signals can be supplied through the DVI connector CON10.

The factory preset supported input modes include:

Resolution	Resolution
640 x 480 @ 60 Hz (VESA)	1360 x 768 @ 60 Hz
800 x 600 @ 60 Hz (VESA)	1366 x 768 @ 60 Hz
1024 x 768 @ 60 Hz (VESA)	1368 x 768 @ 60 Hz
1280 x 768 @ 60 Hz	1600 x 1200 @ 60 Hz (VESA)
1280 x 1024 @ 60 Hz (VESA)	1920 x 1200 @ 60 Hz
1280 x 800 @ 60 Hz	1920 x 1080 @ 60 Hz

Table 6: Factory preset modes for HDMI input (graphics)

9.6 HDMI – Video

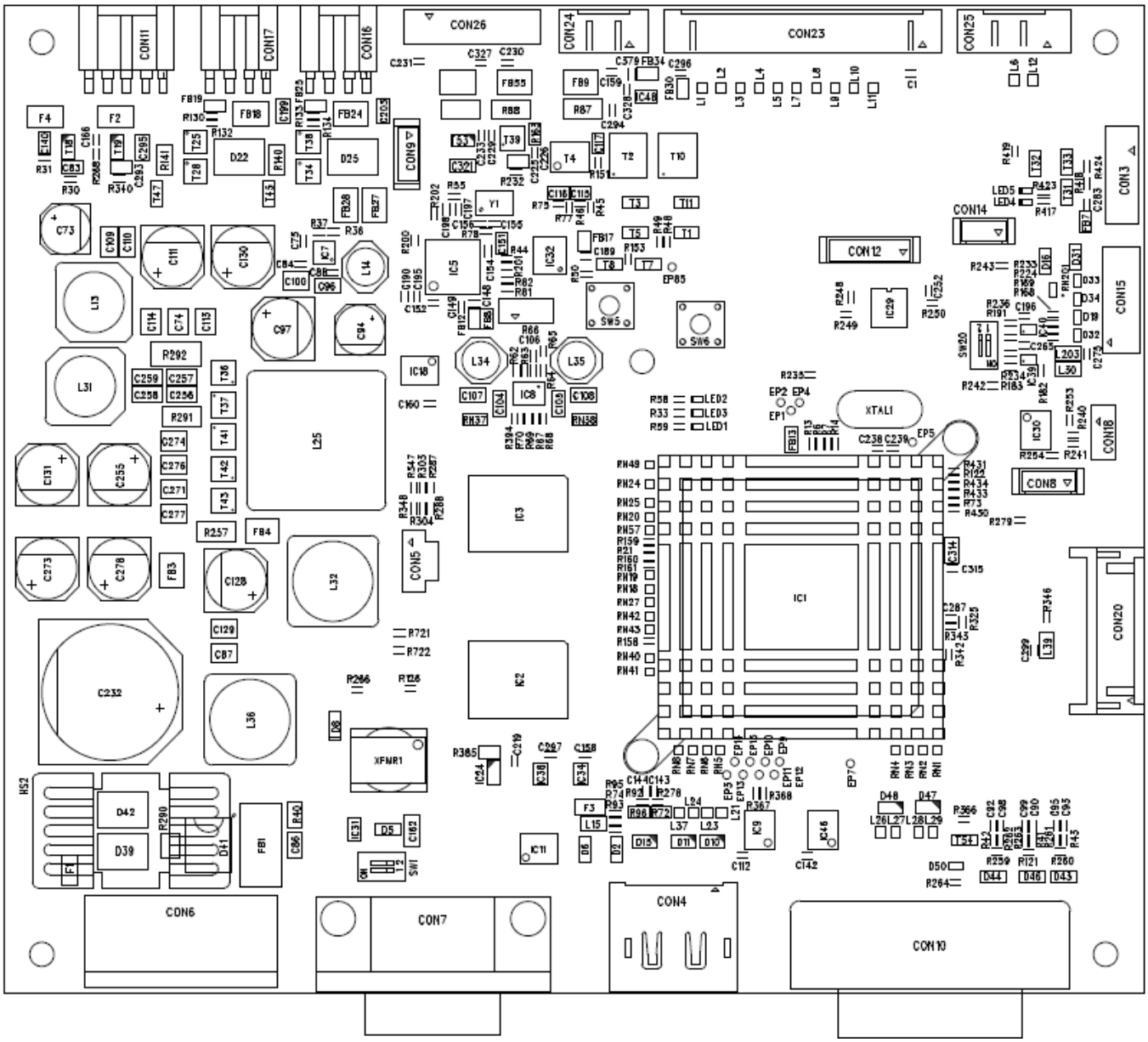
The factory preset supported input modes include:

Resolution	Resolution
720 x 480 @ 60	1280 x 720 @ 60
720 x 576 @ 50	1920 x 1080 @ 50
1280 x 720 @ 50	1920 x 1080 @ 60

Table 7: Factory preset modes for HDMI input (video)

10 Switches and Connectors

10.1 Overview



CON	DESCRIPTION	TYPE	MATCHING PART	MANUFACTURER	Note
CON10	DVI input	DVI-I female	Standard DVI-I	ASE	3
CON3	Keypad	DF13-6P-1.25H	DF13-6S-1.25H	Hirose	1
CON4	DisplayPort Input	47272-0001	Standard DisplayPort	Molex	2
CON5	RS232 Remote Control (via ARCB)	501331-0607	501330-0400	Molex	1
CON6	Power Supply Input	MSTB 2,5/ 3-GF-5,08 (1776511)	MVSTBW 2,5/ 3-STF-5,08 (1834916)	Phoenix Contact	
CON7	RS-422/RS-485 Remote Control (via ARCB)	9-pin D subminiature plug	9-pin D subminiature plug	various	
CON12	MARS Programming	DF13-8P-1.25V	DF13-8S-1.25V	Hirose	
CON9	MCU Programming	DF13-5P-1.25V	DF13-5S-1.25V	Hirose	
CON8	Debugging (Gprobe)	DF13-5P-1.25V	DF13-5S-1.25H	Hirose	
CON23	Dual LVDS	DF14-25P-1.25H	DF14-25S-1.25H	Hirose	1
CON24	Additional LVDS power	DF14-5P-1.25H	DF14-5S-1.25H	Hirose	1
CON11	AUX power output	53426-0410	51163-0400	Molex	
CON25	Extra LVDS pair for 10-bit	DF14-8P-1.25H	DF14-8S-1.25H	Hirose	1
CON13	Ambient Light Sensor	501568-0407	501330-0400	Molex	1
CON14	Infrared Sensor	DF13-4P-1.25V	DF13-4S-1.25H	Hirose	1
CON15	GPIOs	501568-1207	501330-1200	Molex	1
CON16	Fan Output 1	53426-0310	51163-0300	Molex	
CON17	Fan Output 2	53426-0310	51163-0300	Molex	
CON18	MARS I2C	501331-0407	501330-0400	Molex	1
CON26	Backlight Power Supply	DF13-10P-1.25H	DF13-10S-1.25H	Hirose	1
CON20	Analog Video Input	DF11-20DP-2DS	DF11-20DS-2C	Hirose	1

1) Connectors will be additionally fixed to the PCB with glue
2) Standard pinout according to DisplayPort specification
3) Standard pinout according to DVI specification

10.2 Switches

DIP Switch	DESCRIPTION	Index	Position	Setting	Note
SW1	RS485 Termination	1 (next to CON7)	Off (default)	RS485 TX not terminated	
			On	RS485 TX terminated	
		2 (next to transformer)	Off (default)	RS485 RX not terminated	
			On	RS485 RX terminated	
SW20	GPIO Configuration for CON15	1 (next to CON15)	Off (default)	MARS LPM GPIO 4	1
			On	MARS External GPIO 0	2
		2 (next to CON12)	Off (default)	MARS External GPIO 1	2
			On	MARS LBADC Input	3

1) Video scaler GPIO available in low power mode
2) Video scaler GPIO
3) Video scaler Low Bandwidth ADC

Push Button	DESCRIPTION	Function	Note
SW5	Power	Switch board ON and OFF (toggle function between normal operation and low power mode)	
SW6	Reset	Reset video scaler	

10.3 Connector Pinouts

DVI Connector CON10

Pin	Signal	Description
1	TMDS2-	Differential TMDS Data 2-
2	TMDS2+	Differential TMDS Data 2+
3	GND	TMDS Shield
4	NC	Not connected
5	NC	Not connected
6	DVI_SCL	DDC EDID data clock
7	DVI_SDA	DDC EDID data
8	VSync	Analog VSync
9	TMDS1-	Differential TMDS Data 1-
10	TMDS1+	Differential TMDS Data 1+
11	GND	TMDS Shield
12	NC	Not connected
13	NC	Not connected
14	DVI_5V	5V / 100mA Power Supply
15	GND	Ground

Pin	Signal	Description
16	DISPDET	Hot Plug Detection
17	TMDS0-	Differential TMDS Data 0-
18	TMDS0+	Differential TMDS Data 0+
19	GND	TMDS Shield
20	NC	Not connected
21	NC	Not connected
22	GND	TMDS Clock Shield
23	TMDSCL+	Differential TMDS Clock +
24	TMDSCL-	Differential TMDS Clock -
C1	Red	Analog Red
C2	Green	Analog Green
C3	Blue	Analog Blue
C4	HSync	Analog HSync
C5	GND	Analog Ground

Keypad Connector CON3

Pin	Signal	Description
1	LBADC1_IN	Keypad sense
2	GND	Ground
3	LED_RED	Red LED Anode

Pin	Signal	Description
4	LED_GREEN	Green LED Anode
5	GND	Ground
6	+3,3V	Keypad reference voltage

DisplayPort Input Connector CON4

Pin	Signal	Description
1	DP3-	Differential TMDS Data 3-
2	GND	Ground
3	DP3+	Differential TMDS Data 3+
4	DP2-	Differential TMDS Data 2-
5	GND	Ground
6	DP2+	Differential TMDS Data 2+
7	DP1-	Differential TMDS Data 1-
8	GND	Ground
9	DP1+	Differential TMDS Data 1+
10	DP0-	Differential TMDS Data 0-

Pin	Signal	Description
11	GND	Ground
12	DP0+	Differential TMDS Data 0+
13	CONFIG1	Ground
14	CONFIG2	Ground
15	DA+	AUX+
16	GND	Ground
17	DA-	AUX -
18	HPD	Hot Plug Detect
19	Return	Ground
20	+3.3V	3.3V Power Output

RS232 Serial Communication Connector CON5

Pin	Signal	Description
1	RX_IN/ RXD	RS232, serial input to Prisma
2	TX_OUT/ TXD (1)	RS232, serial output from Prisma
3	SYSCTR_GPIO0	MCU GPIO 0

Pin	Signal	Description
4	SYSCTR_GPIO1	MCU GPIO 1
5	SYSCTR_GPIO2	MCU GPIO 2
6	GND	Ground

Notes:
RS232 Rx/Tx signals: +/-12V typical, +/-5V minimum, +/-15V absolute maximum rating.
GPIOs of System Control MCU: 10kOhm pull-ups to +3.3V (default), can be changed to pull-downs upon customer request.

Power Supply Connector CON6

Pin	Signal	Description
1	V_IN	Main power input
2	GND	Ground

Pin	Signal	Description
3	GND	Ground

RS-422/RS-485 Communication Connector CON7

Connector: 9-pin D-sub female on device

Pin	Signal	Description
1	Ch. GND	Frame (Chassis) Ground
2	TXA (-)	Transmit data from Prisma, negative
3	RXB (+)	Receive data to Prisma, positive
4	RX GND	Signal Ground (connected to pin 6)
5	nc	No connection

Pin	Signal	Description
6	TX GND	Signal ground (connected to pin 4)
7	TXB (+)	Transmit data from Prisma, positive
8	RXA (-)	Receive data to Prisma, negative
9	Ch. GND	Frame (Chassis) Ground
Shell	Ch. GND	Frame (Chassis) Ground

Assembly Option: RS-232 (DCE pinout, use 1:1 cable for regular PC serial port connection)

Pin	Signal	Description
1	nc	No connection
2	TXD	Transmit data from Prisma
3	RXD	Receive data to Prisma
4	nc	No connection
5	GND	Chassis + Signal Ground

Pin	Signal	Description
6	nc	No connection
7	nc	No connection
8	nc	No connection
9	nc	No connection
Shell	Ch. GND	Frame (Chassis) Ground

Debug and Programming Connector CON8 (GProbe)

Pin	Signal	Description
1	TX	Serial Output
2	RX	Serial Input
3	+3.3V	3.3V Power supply

Pin	Signal	Description
4	+5V	5V Power supply
5	GND	Ground

Note**:**
CON8 carries serial port signals with TTL (3,3V) level

LVDS Connector CON23

Pin	Signal	Description
1	SVCC	Switched panel power supply +3,3V/+5V/ +12V
2		
3	GND	Ground
4		
5	TXB3+	LVDS data 1st pixel
6	TXB3-	LVDS data 1st pixel
7	TXBCL+	LVDS clock 1st pixel
8	TXBCL-	LVDS clock 1st pixel
9	TXB2+	LVDS data 1st pixel
10	TXB2-	LVDS data 1st pixel
11	TXB1+	LVDS data 1st pixel
12	TXB1-	LVDS data 1st pixel
13	TXB0+	LVDS data 1st pixel

Pin	Signal	Description
14	TXB0-	LVDS data 1st pixel
15	TXA3+	LVDS data 2nd pixel
16	TXA3-	LVDS data 2nd pixel
17	TXACL+	LVDS clock 2nd pixel
18	TXACL-	LVDS clock 2nd pixel
19	TXA2+	LVDS data 2nd pixel
20	TXA2-	LVDS data 2nd pixel
21	TXA1+	LVDS data 2nd pixel
22	TXA1-	LVDS data 2nd pixel
23	TXA0+	LVDS data 2nd pixel
24	TXA0-	LVDS data 2nd pixel
25	EBKL	Enable backlight signal

Note:
LVDS channels A and B can be swapped upon request from customer.

Extra Panel Power Connector CON24

Pin	Signal	Description
1	LVDS_OPT_0	Selectable option: +3.3V or GND
2	SVCC	Switched panel power supply +3,3V/+5V/+12V
3	SVCC	Switched panel power supply +3,3V/+5V/+12V
4	GND	Ground
5	GND	Ground

LVDS 10-Bit Connector CON25

Pin	Signal	Description
1	GND	Ground
2	TXB4+	LVDS data 1st pixel
3	TXB4-	LVDS data 1st pixel
4	TXA4+	LVDS data 2nd pixel

Pin	Signal	Description
5	TXA4-	LVDS data 2nd pixel
6	LVDS_OPT_1	Selectable option: +3.3V or GND
7	LVDS_OPT_2	Selectable option: +3.3V or GND
8	LVDS_OPT_3	Selectable option: +5V, +3.3V or GND

Note:
LVDS_OPT pins are sequenced (switched on/off) together with SVCC panel power.

AUX Power Connector CON11

Pin	Signal	Description
1	+5V AUX	5V AUX power supply
2	EXT_GPIO	External GPIO

Pin	Signal	Description
3	GND	Ground
4	+12V AUX	12V AUX power supply

Notes:
+5V and +12V AUX power are short-circuit protected by polyfuse elements.
GPIO is connected to System Control MCU; customer specific configuration upon request.

Ambient Light Sensor Connector CON13

Pin	Signal	Description
1	+3.3V	3.3V Power Supply
2	GND	Ground

Pin	Signal	Description
3	SCL	I2C Clock
4	SDA	I2C Data

Notes:
CON13 carries I2C signals of the System Control MCU and can also be used for other sensors. However, only ALS support is currently implemented. Other sensors can be implemented upon request.

MARS GPIO Connector CON15

Pin	Signal	Description
1	+3.3V	3.3V power supply
2	EXT_GPIO_0	External GPIO 0 or LPM GPIO 4
3	EXT_GPIO_1	External GPIO 1 or LBADC Input
4	EXT_GPIO_2	External GPIO 2
5	EXT_GPIO_3	External GPIO 3
6	EXT_GPIO_4	External GPIO 4

Pin	Signal	Description
7	EXT_GPIO_5	External GPIO 5
8	EXT_GPIO_6	External GPIO 6
9	EXT_GPIO_7	External GPIO 7
10	SCL	MARS I2C Clock
11	SDA	MARS I2C Data
12	GND	Ground

Notes:
- GPIO 0 and GPIO 1 are pulled up to +3.3V by 10kOhm resistors on board.
- GPIO 2 to GPIO 7 are pulled up to +3.3V by 4.7kOhm resistors on board.
- GPIO 0 can be configured as LPM GPIO 4 by SW20, this LPM GPIO is available in low power mode.
- GPIO 1 can be configured as Low Bandwidth ADC input by SW20, this ADC is available in low power mode.
- GPIO 0 to GPIO 7 can be configured as either input or output, open-drain or CMOS.
- The I2C line is connected to the MARS video scaler, it can be used to control external devices.

MARS I^2C Connector CON18

Pin	Signal	Description
1	+3.3V	3.3V Power supply
2	GND	Ground

Pin	Signal	Description
3	SCL	MARS I2C Clock
4	SDA	MARS I2C Data

Notes:
CON18 can be used for connecting an ambient light sensor in case of configurations without System Control MCU (ARCB). +3.3V on pin 1 is not available in low power mode.

Fan Connectors CON16, CON17

Pin	Signal	Description
1	GND	Ground
2	Fan Power	Fan Power Supply

Pin	Signal	Description
3	Tacho	Fan Speed

Notes:
Fan Power can be derived directly from input power rail or from internally regulated +12V.
Fan speed of both fans can be monitored independently. Please see Programming/Protocol manual for the corresponding settings.

Backlight Supply Connector CON26

Pin	Signal	Description
1	V_{BKL} 12V	Switched 12V backlight power supply
2	GND	Ground
3	BKLT_EN	Enable backlight signal
4	BRT_ADJ	Brightness control signal
5	+5V	Switched 5V backlight power supply

Pin	Signal	Description
6	+5V	Switched 5V backlight power supply
7	V_{BKL} 12V	Switched 12V backlight power supply
8	V_{BKL} 12V	
9	GND	Ground
10	GND	Ground

Analog/Component Video Input Connector CON20

Pin	Signal	Description
1	Analog 1	B / Pb (1)
2	GND	Ground
3	Analog 2	G / Y (1)
4	GND	Ground
5	Analog 3	R / Pr (1)
6	GND	Ground
7	Analog 4	CS / none (1)
8	GND	Ground
9	+3.3V	+3.3V supply
10	SCL	I2C clock

Pin	Signal	Description
11	SDA	I2C data
12	+5V	+5V supply
13	GND	Ground
14	CON20_GPIO	MARS GPIO
15	Analog 5	S-Video 1 Luma
16	GND	Ground
17	Analog 6	S-Video 1 Chroma
18	GND	Ground
19	Analog 7	CVBS1
20	GND	Ground

Notes:
Pins 1-8 can be used as RGB+CS or Component input.
CON20 has the same pin-out as Prisma-IIIa CON14, the only difference is the default assignment for Analog5 to Analog7 signals.

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