

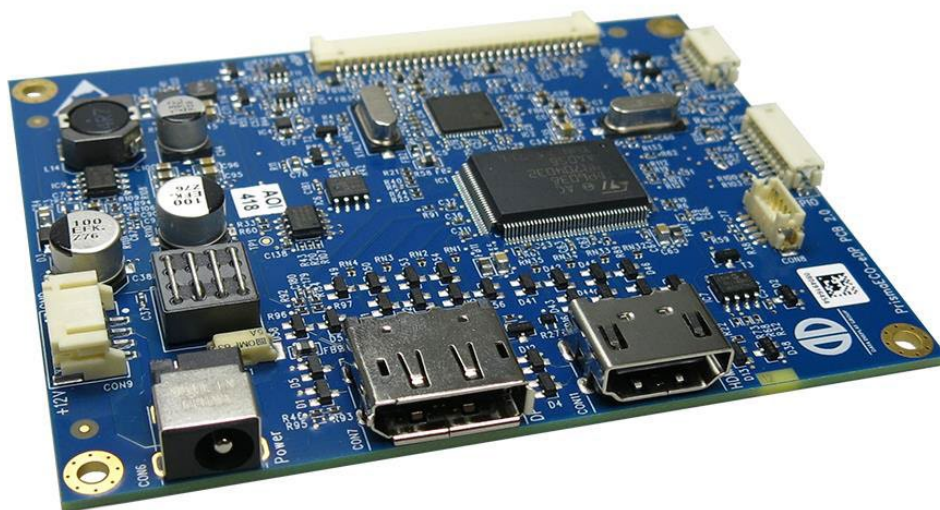
Datasheet

FORTEC Integrated

PrismaECO-eDP

LCD Panel Controller with eDP Output

PR-02-190_A2



Version 2.3
08.02.2018



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Table of Contents

1	Revision History	4
2	Overview	5
3	Warnings	5
4	Features	5
5	Hardware Features	6
6	Input / Output Interfaces.....	7
7	OSD Menu and User Controls	8
7.1	OSD Control through External Keypad.....	8
7.2	OSD control through Remote OSD (ROSD).....	9
8	On-Screen-Menu	9
8.1	Image Menu	9
8.1.1	Color Sub-Menu	10
8.2	System Menu	11
8.2.1	Input Sub-Menu	11
8.2.2	OSD Settings Sub-Menu	12
8.2.2.1	Timer:	12
8.2.2.2	Rotation:.....	13
8.2.2.3	Position:	13
8.2.2.4	Transparency:	14
8.2.2.5	Remote Control - IR:	14
8.2.2.6	Keypad:	15
8.2.3	Reset	15
8.2.4	Auto Brightness.....	16
9	Supported Input Modes	17
9.1	HDMI – Graphics	17
9.2	HDMI – Video.....	17
9.3	DisplayPort	18
10	Absolute Maximum Ratings	19
11	Electrical Characteristics	19
12	Mechanical Dimensions.....	20
13	Connector Overview.....	21
14	Input Connectors.....	21

15 Output Connector 24

16 I/O Connector 25

17 Supported Panels and Backlight Converter 25

18 Reference KIT 26

19 Hardware Information 26

1 Revision History

Date	Rev.No.	Description	Page
19.11.2014	1.0	Initial version	All
16.02.2015	1.1	Change 6 button Keypad is optional, mark some TBD red, add picture, date update, change revision no. to 1.1, change last Page	1, 8, 19
09.03.2015	1.2	Removed Preliminary State Removed 6 button OSD Filled in the power consumptions and removed TBDs	4, 8, 18
11.05.2015	1.3	Corrected eDP Connector pinning	23
15.06.2015	1.4	Corrected "Voltage controlled Backlight"	4
05.08.2015	1.5	Corrected CON23 pinning	20, 24
14.10.2015	1.6	Added maximum panel an backlight currents Added Note about HPD signal	18, 23
26.04.2016	1.7	Company logo updated HDMI version updated Storage Temperature Range updated Operating Temperature Range updated Reference KIT added	All 5, 6 19 19 26
27.06.2016	1.8	Corrected "Maximum Backlight Current"	19
06.07.2016	1.9	Add new Part Number PR 02-190_A1 Add Ordering Information	1 26
31.05.2017	2.0	Added DDC/CI support and RoHS Changed Input / Output Picture Changed 4-Button OSD Keypad Picture Removed Chapter 7.2 System Menü "VGA" Removed VGA at Input Sub-Menu <i>Changed Mechanical Dimensions Picture</i> Added Mechanical Dimension and weight Table <i>Added Chapter 17 Supported Panels and Backlights</i> Removed Chapter "News and Updates"	5 7 8 11 19 19 25 27
14.11.2017	2.1	Updated firmware revision	11
30.11.2017	2.2	Updated cover photo, part number, supply current, CON3 and CON23 pin-out; removed reset key;	1,8,18, 23-25
08.02.2018	2.3	Added DP HW requirements	18

2 Overview

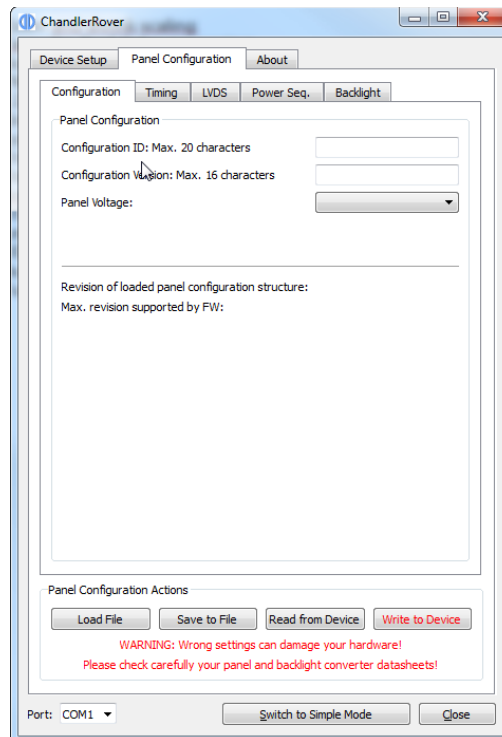
PrismaECO-eDP is a graphics processing board, providing high quality images for TFT-LCD panels with eDP interface. The board supports TFT panels up to WUXGA (1920 x 1200) resolution and can be used in a variety of systems. It is developed by Distec GmbH who is able to adapt almost every TFT panel.

3 Warnings

Although the PrismaECO-eDP is using protection circuits for most of its interfaces, it is strongly recommended to prevent the attached devices from drawing too much current from the PrismaECO-eDP.

4 Features

- HDMI Input - True High Definition 1080p on HDMI 1.4 input
- Display Port 1.1a input up to 2560x1600@60Hz
- eDP Output - 2 lanes for panels with up to 1920x1200@60Hz resolution
- Zoom and shrink scaling
- Faroudja Real Color processing
- 12V main power input
- 3.3 V panel supply
- 12V backlight supply
- PWM controlled backlight dimming
- Supports VESA DDC/CI and a subset of VESA DPMS standards
- DDC-Control on HDMI and Display Port
- Four-button external OSD - keypad interface
- Controls / OSD
 - External Keyboard
 - External RS-232 (debugging and RemoteOSD)
- Additional features
 - GPIO and I2C connector
- Software Support
 - RemoteOSD protocol
 - Fully Customizable through the configuration software ChandlerRover



5 Hardware Features

Ultra-Reliable HDMI 1.4 Receiver

- Single Link TMDS Rx for up to 12-bit 1080p
- Captures up to 225MHz
- Direct connect to all HDMI compliant TMDS transmitters
- HDCP 1.3 support

DisplayPort 1.1a Receiver

- 10.8Gbps total bandwidth over 4 lanes
- 2560x1600@60Hz input support at 12-bit
- HDCP 1.3 support

Embedded DisplayPort Output

- eDP output compliant with DisplayPort 1.1a
- Supports two lanes with HBR (2.7Gpbs) and RBR (1.62Gpbs)
- Output resolution up to 1920x1200@60Hz

Auto-Configuration / Auto-Detection

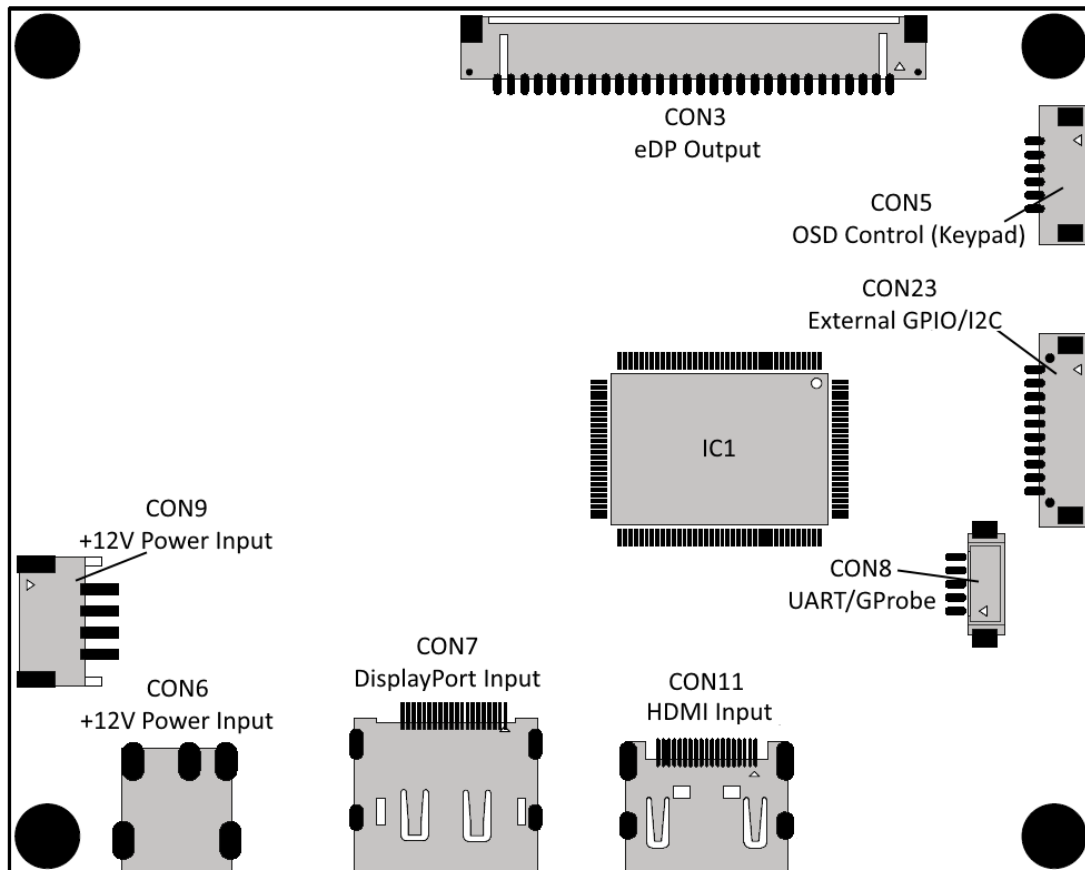
- Phase and image positioning
- Input format detection

On Screen Display

- Horizontal and vertical stretch of OSD images
- 16 levels of blending

6 Input / Output Interfaces

The following drawing shows the input and output interfaces of the PrismaECO-eDP. The design is implemented as a single printed circuit board.

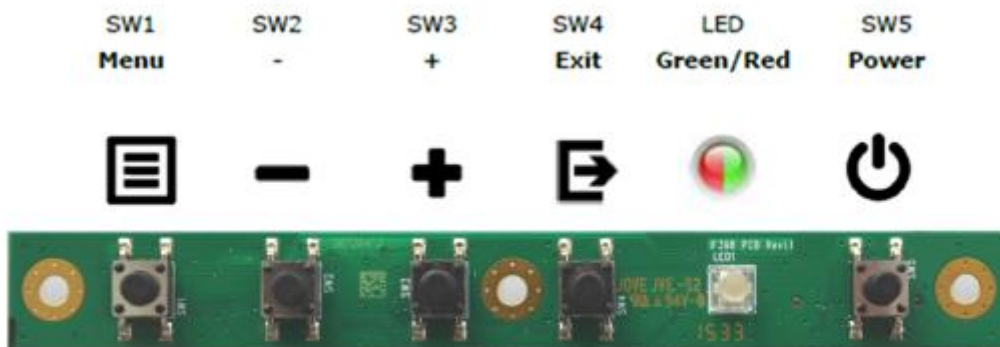


7 OSD Menu and User Controls

The 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 OSD Control through External Keypad

The 4-button OSD-Keypad **ZU-02-398** can be used to control the OSD:



The following table gives you an overview about the functionality:

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

LED Status:

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

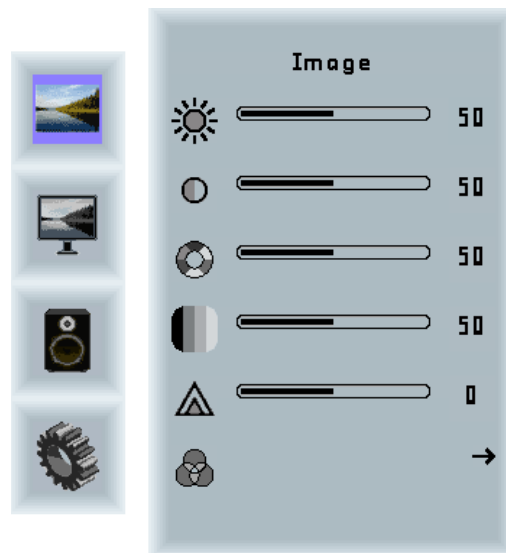
7.2 OSD control through Remote OSD (ROSD)

The PrismaECO-eDP can be controlled with the ROSD Protocol (Remote OSD) via the COM port of your PC. The ROSD Protocol is a proprietary Distec GmbH protocol. You may need an interface board IF370 (ZU-02-370) to convert the RS232 voltage levels of the COM port to the 3.3V UART levels of PrismaECO-eDP (CON8).

The ROSD protocol is explained in a separate document. Please contact sales for further information.

8 On-Screen-Menu

8.1 Image Menu



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.

Hue: Allows <Hue> adjustment in the UV domain. The modification affects all color channels and all input types. Available if color space of input is not RGB.

Saturation: Allows <Saturation> adjustment in the UV domain. The modification affects all color channels and all input types. Available if color space of input is not RGB.

Sharpness: Allows <Sharpness> adjustment on the image.

Color: Opens the color sub-menu.

8.1.1 Color Sub-Menu



Auto: ADC-Calibration. It performs auto-color adjustment.

Full color: Selects full received color space.

srgb: Selects srgb color space.

xyycc: Selects xyycc color space.

Color Temp: Allow selection of different color temperature schemes, predefined and custom. Available if color space of input is RGB.



8.2 System Menu

Contains the following sub-menus:

Inputs, OSD settings, factory reset, Auto Brightness and FW/OSD revision information.



If there is no Auto Brightness sensor is available, Auto Brightness icon is either not shown or non-selectable according to the firmware version.

Firmware Version	Sensor Available	Sensor Not Available
< 1.6.0	Auto brightness is not available	
>= 1.6.0	Icon Shown	Icon not shown

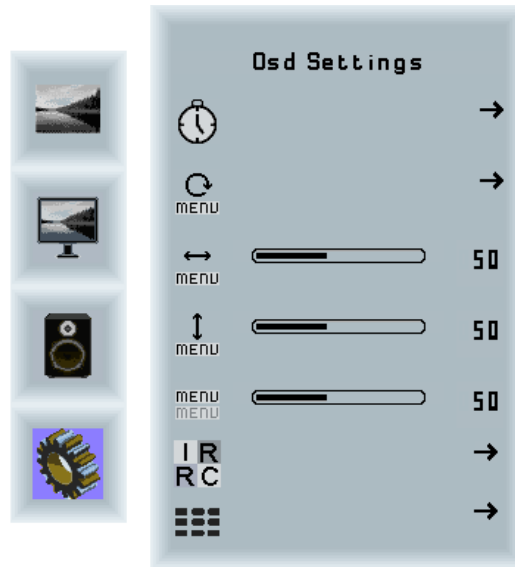
8.2.1 Input Sub-Menu

- Manual selection of input
- Enable/disable input auto-scan



8.2.2 OSD Settings Sub-Menu

Contains timer, rotation, position adjustment, transparency, IR enable and Keypad switch



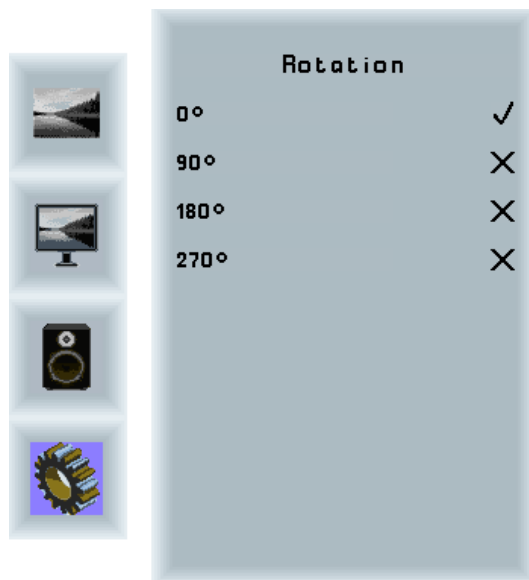
8.2.2.1 Timer:

Selects how many seconds the OSD will remain active after the last use



8.2.2.2 Rotation:

Rotates the OSD menu



8.2.2.3 Position:

Manual adjustment of OSD placement



8.2.2.4 Transparency:

Selects OSD blending with background



8.2.2.5 Remote Control - IR:

The remote control - IR function enables or disables the remote control interface. If current state is on, after selecting the off state, the OSD interface requests the user to press right, left, right, left keys in sequence. This is done to prevent accidental de-activation of the IR interface, as a user which has no external keypad and no serial port communication will have no means to turn IR back on.

Remote control through infrared function is shared with DisplayPort powered source detection. Enabling infrared will convert DisplayPort cable-detect from powered up source detection to simple cable ground plug detection. The former method is preferred due to elimination of cable plug wake ups when source is not powered on, but since the board will go back to sleep mode, it is not critical.



8.2.2.6 Keypad:

Switch the OSD-Keypad from 6 to 4 button mode. Note that PrismaECO-eDP only supports the 4-Button keypad.



8.2.3 Reset

Reset: Performs a factory reset and returns all settings to default values.



8.2.4 Auto Brightness

Auto Brightness: Toggles the Auto Brightness regulation of the Ambient Light Sensor on or off



9 Supported Input Modes

The PrismaECO-eDP can support the following input modes.

9.1 HDMI – Graphics

The PrismaECO-eDP is equipped with the HDMI connector, CON11.

The factory preset supported input modes include:

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

9.2 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

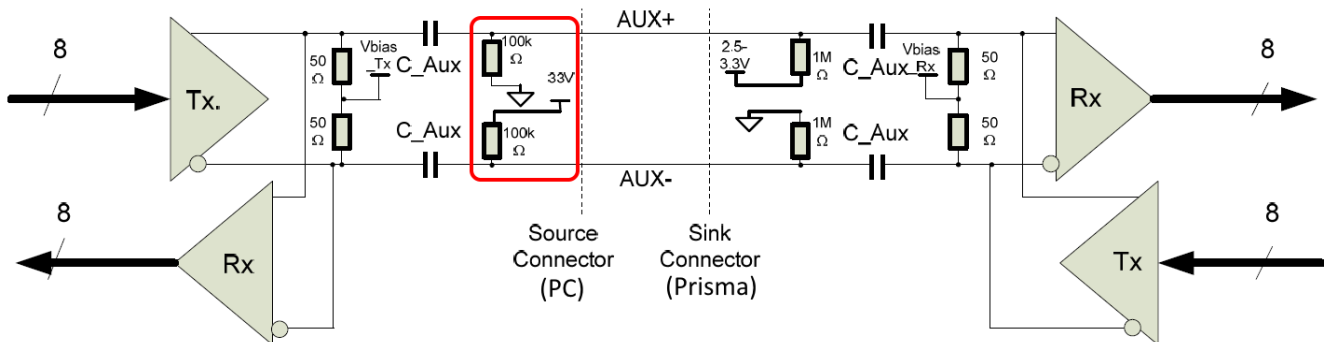
9.3 DisplayPort

The PrismaECO-eDP is equipped with one DP connector, CON7.

The factory preset supported input modes include:

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

Note that PrismaECO-eDP is performing Source Detection according to DisplayPort 1.1a specification. If your source is not detected by PrismaECO-eDP, please check if the pull-up and pull-down requirements for the AUX-channel are fulfilled:



The DisplayPort Source Device must weakly pull down the AUX+ line and weakly pull up the AUX- line with 100kΩ (+/-5%) resistors between the AC-coupling capacitor and the Source Connector to assist detection of DisplayPort Source and Powered DisplayPort Source by the Sink Device. (VESA DisplayPort Standard, Version 1, Revision 1a, January 11, 2008, chapter 3.4)

10 Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Note
Supply Voltage	$V_{in (+12V)}$	0	15	VDC	1, 2, 3
Storage Temperature	T_{St}	-35	+85	°C	
Operating Temperature	T_{Op}	-20	+80	°C	

Note (1) Within operating temperature range.

Note (2) Supply voltage limits are for the PrismaECO-eDP, panel and backlight converter supply limits must be met as well, if the panel voltage is 12V and the converter is to be powered through the PrismaECO-eDP board.

Note (3) Permanent damage to the device may occur if maximum values are exceeded.

11 Electrical Characteristics

All measurements done at 25°C ambient temperature.

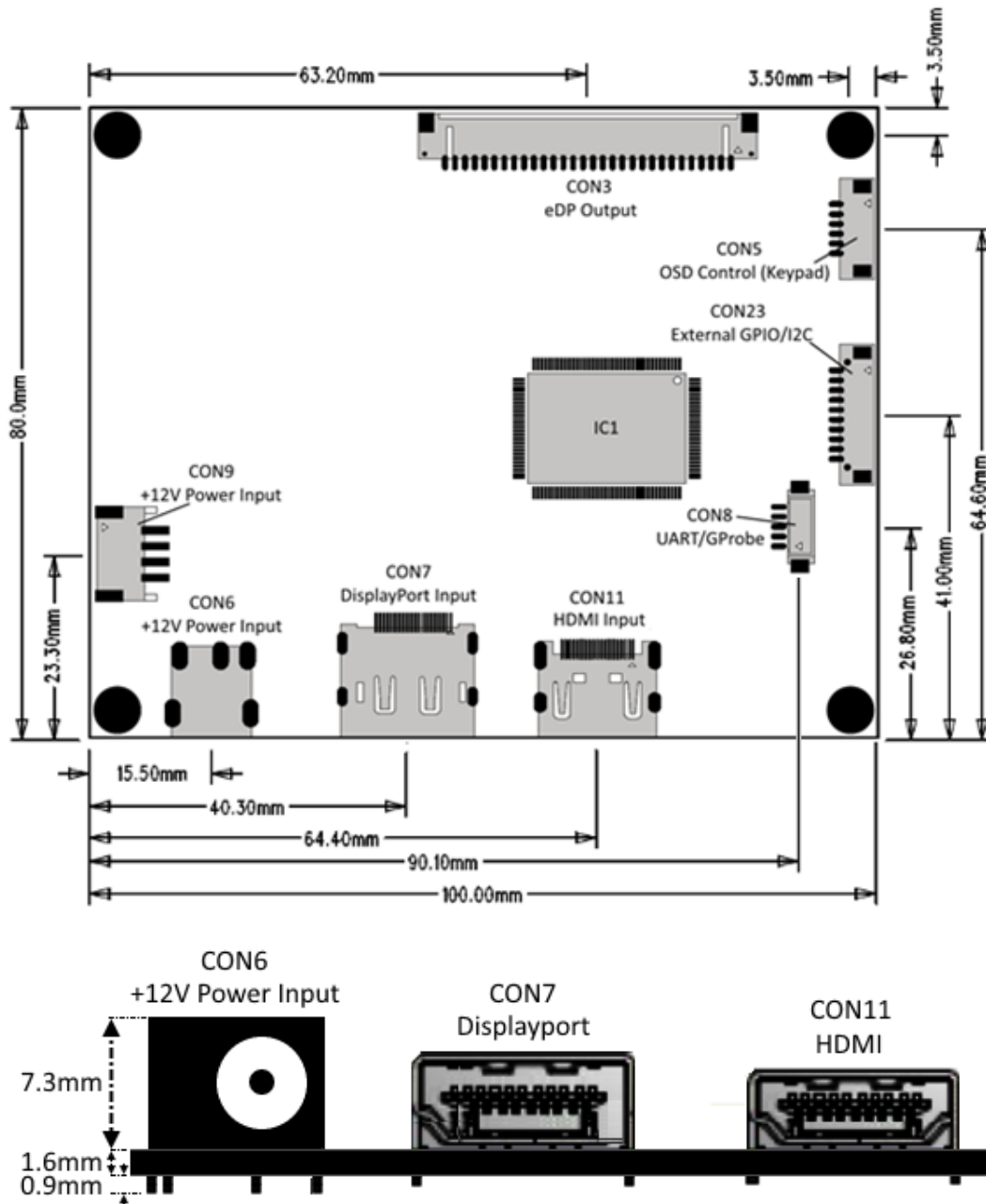
Item	Condition	MIN.	TYP.	MAX.	Unit	Note
Supply Voltage		11	12.0	15	VDC	1
Current Consumption with Panel LP156WF6-SPB1	Moire, 100% BRT, Full-HD input on HDMI	-	660	-	mA	2
Current Consumption Board only	Full-HD input on HDMI	-	250	-	mA	2
	Sleep mode (no sync)	-	26	-		
	Power off mode	-	23	-		
Maximum Panel Current	3.3V	-	-	1.5	A	
Maximum Backlight Current	12V	-	-	1.5	A	3

Note (1) Supply voltage limits are for the PrismaECO-eDP, backlight converter supply limits must be met as well if the converter is to be powered through the PrismaECO-eDP board.

Note (2) Measured with 12V input voltage

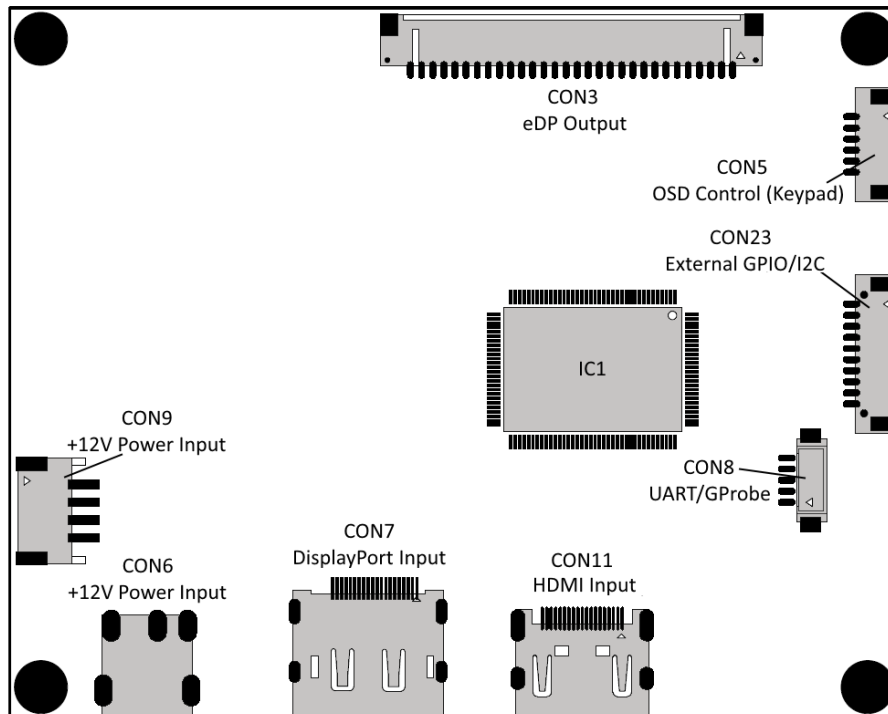
Note (3) 12V is not regulated on PrismaECO-eDP

12 Mechanical Dimensions



ITEM	DESCRIPTION	REMARKS
Length	100.0mm	± 0.2mm
Width	80.0mm	± 0.5mm
Height (top side)	7.3mm	± 0.2mm
Height (PCB)	1.6 mm	± 0.2 mm
Height (bottom side)	0.9 mm	± 0.1mm
Weight	51g	

13 Connector Overview



CON	DESCRIPTION	TYPE	MANUFACTURER
CON3	eDP Output	DF14-30P-1.25H	Hirose
CON5	OSD Control (Keypad)	DF13-6P-1.25H	Hirose
CON6	DC Power Jack (5A)	PJ-051AH	CUI Incorporated
CON7	DisplayPort Input	3660HF1R	Nexus
CON8	UART/GProbe	DF13-5P-1.25V	Hirose
CON9	DC Power Connector	S4B-PH-SM3-TB	JST
CON11	HDMI Input	3600HFR	Nexus
CON23	External GPIO/I2C	DF13-10P-1.25H	Hirose

14 Input Connectors

OSD Control - CON5		
Pin	Signal	Description
1	KEYPAD_IN	Keypad Input Signal (Analog)
2	GND	Ground
3	LED_RED	Status LED – Red (Sleep Mode)
4	LED_GREEN	Status LED – Green (Signal good or searching for signal)
5	GND	Ground
6	+3.3V	+3.3V power

Power Supply - CON6		
Pin	Signal	Description
Center	+12V	12V Power supply (up to 5A)
Bottom	GND	Ground

DisplayPort Input – CON7		
Pin	Signal	Description
1	DP3-_IN	Pair-3 negative
2	GND	Ground
3	DP3+_IN	Pair-3 positive
4	DP2-_IN	Pair-2 negative
5	GND	Ground
6	DP2+_IN	Pair-2 positive
7	DP1-_IN	Pair-1 negative
8	GND	Ground
9	DP1+_IN	Pair-1 positive
10	DP0-_IN	Pair-0 negative
11	GND	Ground
12	DP0+_IN	Pair-0 positive
13	GND	Ground
14	GND	Ground
15	DPA+_IN	Aux channel positive
16	GND	Ground
17	DPA-_IN	Aux channel negative
18	HPD	Hot Plug Detect
19	Power Return	Return for +3.3V
20	+3.3V_DP	DisplayPort +3.3V

UART - CONS		
Pin	Signal	Description
1	TX	Serial Output
2	RX	Serial Input
3	+3.3V	3.3V Power supply
4	NC	Not Connected
5	GND	Ground

Power Supply - CON9		
Pin	Signal	Description
1	GND	Ground
2	GND	Ground
3	+12V	12V Power Supply
4	+12V	12V Power Supply

HDMI - CON11		
Pin	Signal	Description
1	TMDS2+	Differential TMDS Data 2+
2	GND	Ground
3	TMDS2-	Differential TMDS Data 2-
4	TMDS1+	Differential TMDS Data 1+
5	GND	Ground
6	TMDS1-	Differential TMDS Data 1-
7	TMDS0+	Differential TMDS Data 0+
8	GND	Ground
9	TMDS0-	Differential TMDS Data 0-
10	TMDSCLK+	Differential TMDS Clock+
11	GND	Ground
12	TMDSCLK-	Differential TMDS Clock-
13	CEC	Consumer Electronic Control
14	Reserved	
15	HDMI_SCL	DDC Clock
16	HDMI_SDA	DDC Data
17	GND	Ground
18	HDMI_VCC	+5V
19	Hot Plug	Hot Plug Detection

15 Output Connector

eDP Output - CON3		
Pin	Signal	Description
1	NC	Not Connected
2	GND	Ground
3	DPAUX+	eDP Aux Channel +
4	DPAUX-	eDP Aux Channel -
5	GND	Ground
6	DP0-	eDP Channel 0 -
7	DP0+	eDP Channel 0 +
8	GND	Ground
9	DP1-	eDP Channel 1 -
10	DP1+	eDP Channel 1 +
11	GND	Ground
12	SVCC	+3.3V Panel Power Supply Output, max. 1.5A
13		
14	NC	Not Connected
15	GND	Ground
16		
17	HPD	Hot Plug Detection - Input
18	GND	Ground
19		
20		
21		
22	BKLT_EN	Backlight Enable - Output
23	BRT_ADJ	Backlight Dimming - PWM Output
24	NC	Not Connected
25	NC	Not Connected
26	+12V_BKLT	+12V Backlight Power Supply Output, max. 1.5A
27		
28		
29		
30	NC	Not Connected

16I/O Connector

There are four GPIOs and one GPO with 4.75kOhm pull-ups connected to CON23. Note that these pins are used as boot-straps for the scaler chip, therefore make sure not to pull-down these pins during power up of PrismaECO-eDP.

CON23 also provides an I2C interface to control external I2C devices.

External GPIO / I2C - CON23		
Pin	Signal	Description
1	+3.3V	3.3V power supply
2	EXT_GPO_4	External GPO 4 (output only)
3	EXT_GPIO_0	External GPIO 0
4	EXT_GPIO_1	External GPIO 1
5	EXT_GPIO_2	External GPIO 2
6	EXT_GPIO_3	External GPIO 3
7	NC	No Connection
8	SCL	I2C Clock
9	SDA	I2C Data
10	GND	Ground

17 Supported Panels and Backlight Converter

PrismaECO-eDP supports single and dual lane eDP panels up to a resolution of 1920x1200@60Hz.

Panel and Backlight Options	Hardware Options
Panel Voltage (CON3, SVCC)	3.3V
Pixel Per Clock	1
	2
Backlight Voltage (CON3, +12V_BKLT)	12V
Backlight Control Type	PWM
Voltage Level of PWM Signal (CON3, BRT_ADJ)	3.3V
Voltage Level of Backlight Enable Signal (CON3, BKLT_EN)	3.3V

18 Reference KIT

Ordering Code	Description	Comment
HD-10-101	Panel LP156WF6-SPB1 (15.6",3.3V) inc. LED Converter	
PA-32-003R1.1	PrismaECO-eDP configured for LP156WF6-SPB1	
PR-02-190_A2	PrismaECO-eDP without FW	
KA-30-541	Cable LVDS2eDP/LP156WF6-SPB1 100mm	
KA-30-613	Cable OSD IF398/PrismaECO-eDP 45cm	
ZU-02-398	IF398-00-OSD-Board-Universal 4+1Button	
ZU-02-370	IF370 programming adaptor	optional
KA-30-101	Programming cable 80cm	optional
ZV-90-026	Software ChandlerRover Windows	optional

19 Hardware Information

Part Number	Status
PR-02-190	Obsolete
PR-02-190_A1	Obsolete
PR-02-190_A2	Active

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