

# FPA2 Universal Adapter for EPI

*Short description of congatec's universal flat panel adapter*



***Short Description***

***Revision 1.0***

# Revision History

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Revision	Date (dd.mm.yy)	Author	Changes
1.0	23.12.10	GDA	Official release

# Preface

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This short description provides information about the features, connectors and schematics for the FPA2.

## Disclaimer

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## Intended Audience

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## Symbols

The following symbols are used in this user's guide:



### Warning

*Warnings indicate conditions that, if not observed, can cause personal injury.*



### Caution

*Cautions warn the user about how to prevent damage to hardware or loss of data.*



### Note

*Notes call attention to important information that should be observed.*



### Connector Type

*Describes the connector that must be used with the FPA2, not the connector found on the FPA2.*



### Link to connector layout diagram

*This link icon is located in the top right corner of each page. It provides a direct link to the connector layout on page 10 of this document.*

## Terminology

Term	Description
EPI	Embedded Panel Interface
EDID™	Extended Display Identification Data is a VESA standard data format that contains basic information about a display
FPA2	Flat panel Prototype Adapter 2
LVDS	Low Voltage Differential Signaling, a low noise, low power, low amplitude method for high-speed data transmission
TTL	Transistor-Transistor logic, a common type of digital circuit in which the output is derived from two transistors
I <sup>2</sup> C Bus	Inter-Integrated Circuit Bus: is a simple two-wire bus with a software-defined protocol that was developed to provide the communications link between integrated circuits in a system.

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# 1 Introduction

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FPA2 (Flat panel Prototype Adapter 2) is a universal adapter board that has been designed for use with congatec's Embedded Panel Interface (EPI). It can be used for either prototyping, demonstration purposes, or for debugging certain issues. It may also serve as a reference for the implementation of panel adaptations on customer specific carrier boards. This document is one of several that should be referred to while using or implementing FPA2 features and/or functions. The following congatec documents should be referenced:

- congatec Backlight Control Design Guide (DG\_BacklightControl\_1x.pdf)
- congatec System Utility (CGUTLm1x.pdf)
- The User's Guide for the congatec product that will be used with the FPA2.

Links to these documents can be found at [www.congatec.com](http://www.congatec.com). The following are industry standard documents that should be referred to as well. They include:

- *EPI Specification from the EPI consortium at [www.epi-standard.org](http://www.epi-standard.org)*
- *E-EDIDTM Implementation Guide Version 1.0 from VESA under the file name **EEDIDguideV1.pdf** at [www.vesa.org/public](http://www.vesa.org/public)*
- *Open LVDS Display Interface Specification v0.95 from National Semiconductor at <http://www.national.com/appinfo/fpd/0,2132,228,00.html>*
- *Digital Visual Interface DVI Revision 1.0 from the Digital Display Working Group found at [www.ddwg.org/downloads.asp](http://www.ddwg.org/downloads.asp)*
- *SPWG v3.5 Specification from the Standard Panel Working Group found at [www.spwg.org](http://www.spwg.org)*

The FPA2 is capable of several functions designed to assist you during the evaluation and implementation of flat panel support. They are as follows:

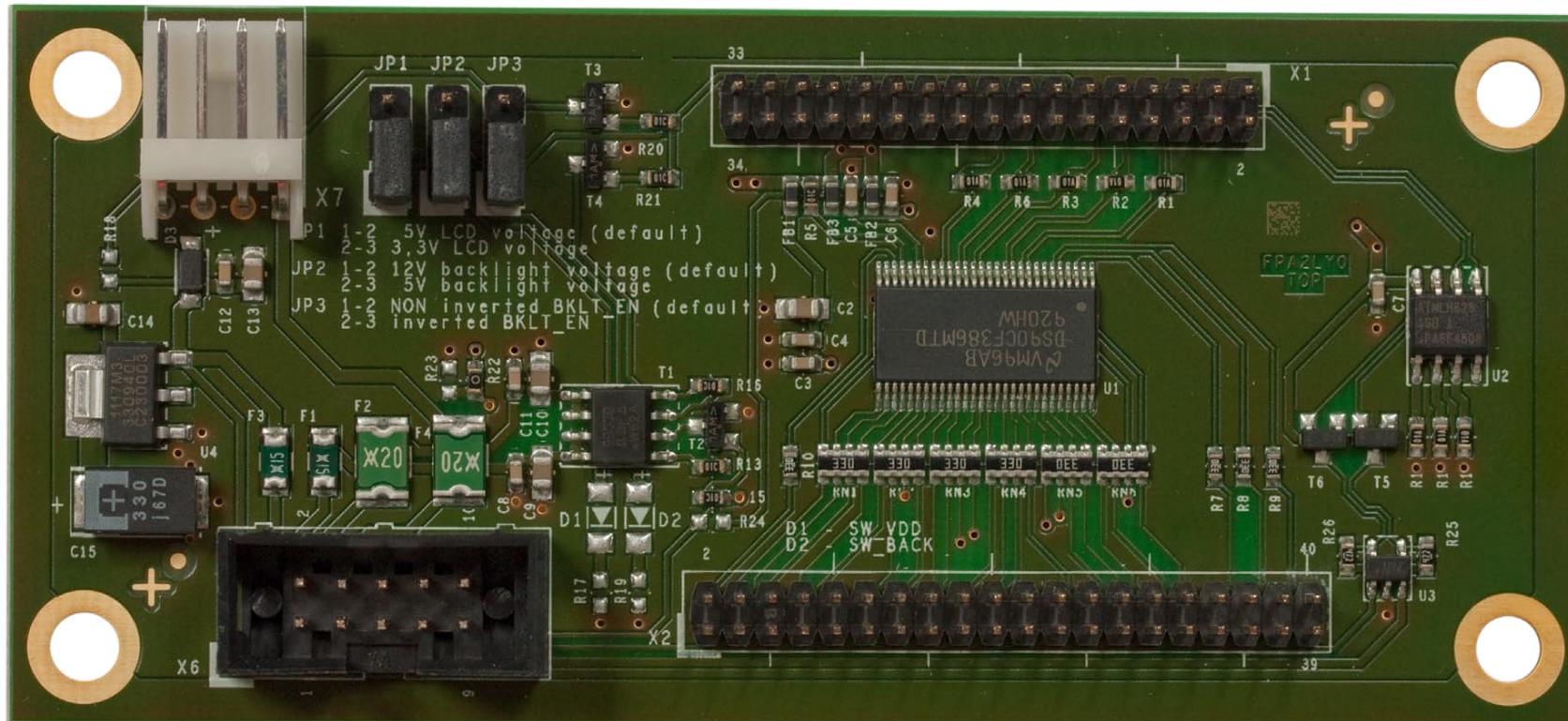
- Power sequencing for panel and backlight.
- Serial I<sup>2</sup>C EEPROM to store the EPI enhanced EDID™ file.
- D/A converter enabling backlight brightness control.
- 3.3V power supply for low-voltage panels.
- Panel and backlight supply voltage can be configured by jumpers.

## 2 Connector Layout

The connector layout picture below shows the silkscreen of the FPA2, which indicates pinout as well as name designators.

Select the Adobe 'Zoom-In-Tool' and zoom in on a given component to see the descriptive silkscreen text. Hover over the component and the 'Zoom-In-Tool' will change indicating there is a link. Click on the link to navigate to the area in the document where the component is described in detail.

Use the mouse icon in the top left hand corner of the destination page to return to the connector layout picture.





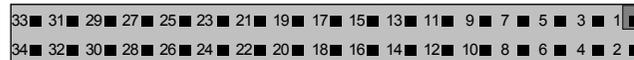
# 3 Connectors

The following section describes the connectors located on the FPA2. Each connector's pinout is listed as well a description of the mating connector that should be used to connect to the specific connector located on the FPA2.

## 3.1 X1 Connector EPI Input

For a detailed description of the signals listed in the pinout table below refer to the EPI Specification.

**EPI Input (X1)**



Pin	Signal Name	LVDS mode	TTL mode	Pin	Signal Name	LVDS mode	TTL mode
1	LCD_DDC_DAT	I <sup>2</sup> C EPI DATA		18	LCDD9	FL3P	GREEN3
2	LCD_DDC_CLK	I <sup>2</sup> C EPI Clock		19	LCDD8	FL3N	GREEN2
3	-	Currently unused		20	GND	GND	
4	-	Currently unused		21	LCDD10	SL0N	GREEN4
5	GND	GND		22	LCDD11	SL0P	GREEN5
6	LCDD0	FL0N	RED0	23	GND	GND	
7	LCDD1	FL0P	RED1	24	LCDD12	SL1N	BLUE0
8	LCD_VDD_EN	Enable Panel Power		25	LCDD13	SL1P	BLUE1
9	LCDD2	FL1N	RED2	26	GND	GND	
10	LCDD3	FL1P	RED3	27	LCDD14	SL2N	BLUE2
11	LCD_BKLT_EN	Enable Backlight Power		28	LCDD15	SL2P	BLUE3
12	LCDD5	FL2P	RED5	29	GND	GND	
13	LCDD4	FL2N	RED4	30	LCDD17	SLCP	BLUE5
14	LCD_VSYNC		VSYNC	31	LCDD16	SLCN	BLUE4
15	LCDD6	FLCN	GREEN0	32	Detect#	Currently unused	
16	LCDD7	FLCP	GREEN1	33	LCDD19	SL3P	DE
17	LCD_HSYNC		HSYNC	34	LCDD18	SL3N	DCLK

 **Connector Type**

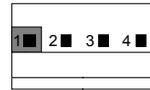
*34 pin, 2 row 2mm grid female*



## 3.2 X7 Power Input

The power to the FPA2 is supplied via a 3.5" floppy connector. A quadratic pad on the bottom side indicates pin one. The pinout and connector are described below.

### 3.5" Floppy Connector



Pin	Signal Name
1	12V
2	GND
3	GND
4	5V

### Connector Type

*Standard 4 pin 3.5" floppy power connector female*



### 3.3 X2 TTL Output-Single/First Pixel Mode Data

The X2 connector is used for LVDS/TTL mode. It is responsible for delivering the 18/24 bit single pixel mode data. The pinout and connector are described below.



#### Connector Type

40 pin, 2 row 2mm grid female

#### TTL Output Single/First Pixel (X2)



Pin	Signal	Pin	Signal
1	GND	21	GREEN5
2	DCLK	22	GND
3	GND	23	GREEN6
4	RED0	24	GREEN7
5	RED1	25	BLUE0
6	RED2	26	GND
7	GND	27	BLUE1
8	RED3	28	BLUE2
9	RED4	29	BLUE3
10	RED5	30	GND
11	GND	31	BLUE4
12	RED6	32	BLUE5
13	RED7	33	BLUE6
14	GREEN0	34	GND
15	GND	35	BLUE7
16	GREEN1	36	HSYNC
17	GREEN2	37	VSYNC
18	GREEN3	38	GND
19	GND	39	DE
20	GREEN4	40	GND



## 3.4 X6 Panel Power Connector

The power connector provides power and display orientation control for the flat panel. See section 5 of this document for jumper configuration settings. The pinout and connector are described below.

### Panel Power (X6)



#### Connector Type

*10 pin, 2 row 2.54mm grid female*

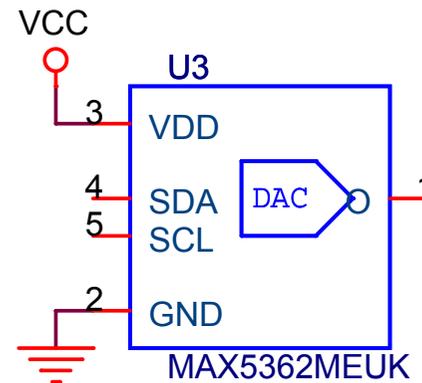
Pin	Function
1	Switched VDD
2	Switched VBKL
3	+5V
4	+12V
5	Enable Display (active high)

Pin	Function
6	Backlight On (active high)
7	Backlight Dimmer 0-4.7V
8	Backlight On
9	GND
10	GND



## 4 Brightness Control

The backlight control is implemented using a MAXIM MAX5362MEUK voltage-output, 6-bit DAC that offers full 6-bit performance with less than 1LSB integral nonlinearity (INL) error and less than 1LSB differential nonlinearity (DNL) error ensuring monotonic performance. The device uses a simple two-wire, fastmode I2C-compatible serial interface. It includes an internal reference, an output buffer, and low-current shutdown mode, making it ideal for low-power, highly integrated applications. It is supported by the congatec embedded BIOS allowing for backlight brightness control. For additional information refer to the manufacturer's datasheet.



### Note

For more information about this subject refer to the EPI Specification and the user's guide for the congatec System Utility as well as the congatec Backlight Control Design Guide.



# 5 Configuration

## 5.1 Timing

The panel timing is configured by an EPI/EDID™ configuration file, which is either stored on the congatec module or inside the FPA2 onboard EEPROM. It can be accessed through the I<sup>2</sup>C bus via the congatec System Utility.



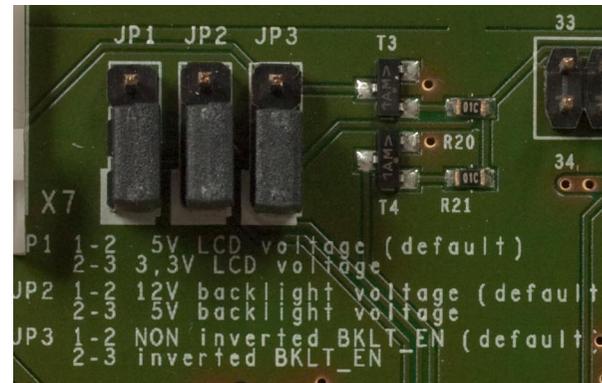
**Note**  
For more information about this subject refer to the EPI Specification and the user's guide for the congatec System Utility.

## 5.2 Jumper Configurations



### Connector Type

JP1-3, 2,54mm grid jumpers



### JP1: Panel voltage selector

Jumper JP1	Configuration
1 - 2	+5V (default)
2 - 3	+3.3V

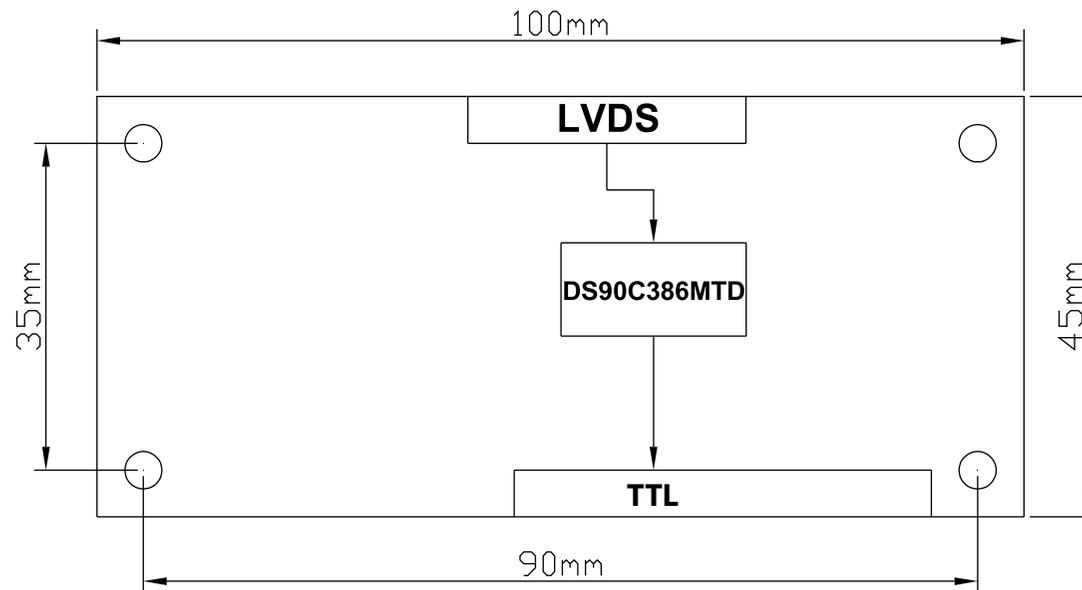
### JP2: Backlight inverter voltage

Jumper JP2	Configuration
1 - 2	+12V (default)
2 - 3	+5V

### JP3: Backlight Polarity Config

Jumper JP3	Configuration
1 - 2	Backlight enable HIGH active (default)
2 - 3	Backlight enable LOW active

## 6 Mechanical Dimensions



# 7 Maximum Ratings

## 7.1 Power Ratings

### Input Voltage:

Signal	Min. V	Max. V
5V	4.6V	5.2V
12V	4.5V	12.5V

### Output Current:

Signal	@ Voltage	Max. Current
Switched VDD	3.3V	0.6A
	5V	2A
	12V	2A
Switched VBKL	5V / 12V	2A

## 7.2 Environmental Specifications

Temperature                      Operation: 0° to 60°C                      Storage: -20° to +80°C

Humidity                            Operation: 10% to 90%                      Storage: 5% to 95%



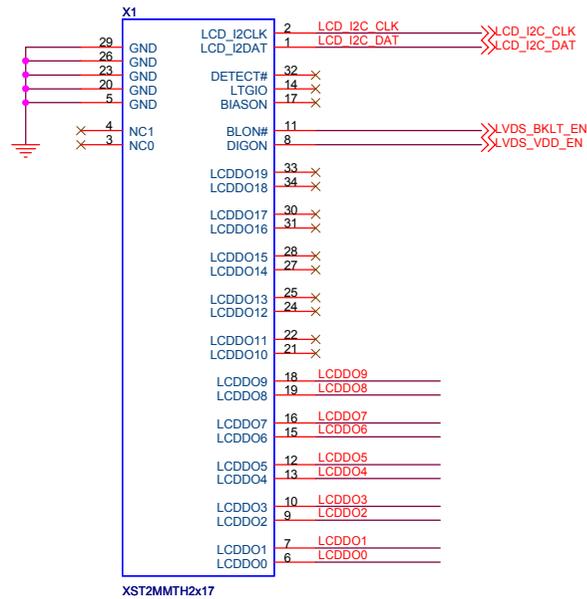
### Caution

*The above operating temperatures must be strictly adhered to at all times. The maximum operating temperature refers to any measurable spot on the modules surface.*

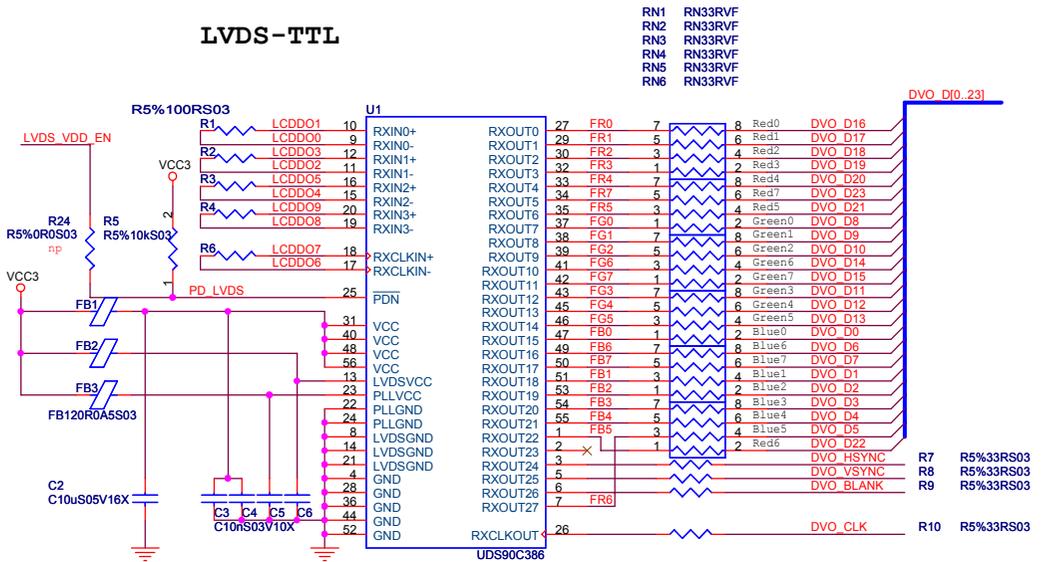
*Humidity specifications are for non-condensing conditions.*

# 8 FPA2 Schematics

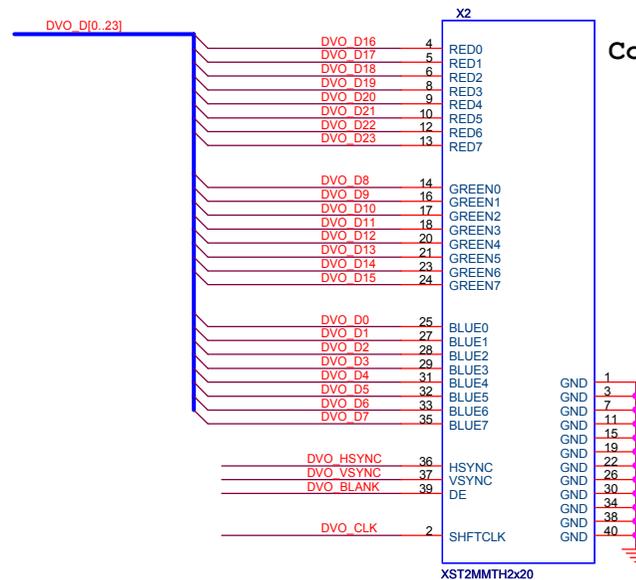
## Connector LVDS-IN



## LVDS-TTL

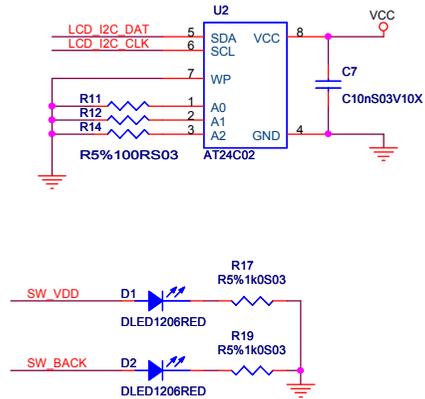


## Connector TTL-OUT



# FPA2 Schematics Continued

## EPI-EEPROM



set jumper 1-2 for 5V LCD voltage (default)  
set jumper 2-3 for 3.3V LCD voltage

