

TB-FMCH-DP Hardware User Manual

Rev.2.01

Revision History

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Introduction

Thank you for purchasing the **TB-FMCH-DP** board. Before using the product, be sure to carefully read this user manual and fully understand how to correctly use the product. First read through this manual, then always keep it handy.




SAFETY PRECAUTIONS

Be sure to observe these precautions




Observe the precautions listed below to prevent injuries to you or other personnel or damage to property.

- Before using the product, read these safety precautions carefully to assure correct use.
- These precautions contain serious safety instructions that must be observed.
- After reading through this manual, be sure to always keep it handy.

The following conventions are used to indicate the possibility of injury/damage and classify precautions if the product is handled incorrectly.

 Danger	Indicates the high possibility of serious injury or death if the product is handled incorrectly.
 Warning	Indicates the possibility of serious injury or death if the product is handled incorrectly.
 Caution	Indicates the possibility of injury or physical damage in connection with houses or household goods if the product is handled incorrectly.

The following graphical symbols are used to indicate and classify precautions in this manual.
(Examples)

	Turn off the power switch.
	Do not disassemble the product.
	Do not attempt this.

**Warning**

	<p>In the event of a failure, disconnect the power supply.</p> <p>If the product is used as is, a fire or electric shock may occur. Disconnect the power supply immediately and contact our sales personnel for repair.</p>
	<p>If an unpleasant smell or smoking occurs, disconnect the power supply.</p> <p>If the product is used as is, a fire or electric shock may occur. Disconnect the power supply immediately. After verifying that no smoking is observed, contact our sales personnel for repair.</p>
	<p>Do not disassemble, repair or modify the product.</p> <p>Otherwise, a fire or electric shock may occur due to a short circuit or heat generation. For inspection, modification or repair, contact our sales personnel.</p>
	<p>Do not touch a cooling fan.</p> <p>As a cooling fan rotates in high speed, do not put your hand close to it. Otherwise, it may cause injury to persons. Never touch a rotating cooling fan.</p>
	<p>Do not place the product on unstable locations.</p> <p>Otherwise, it may drop or fall, resulting in injury to persons or failure.</p>
	<p>If the product is dropped or damaged, do not use it as is.</p> <p>Otherwise, a fire or electric shock may occur.</p>
	<p>Do not touch the product with a metallic object.</p> <p>Otherwise, a fire or electric shock may occur.</p>
	<p>Do not place the product in dusty or humid locations or where water may splash.</p> <p>Otherwise, a fire or electric shock may occur.</p>
	<p>Do not get the product wet or touch it with a wet hand.</p> <p>Otherwise, the product may break down or it may cause a fire, smoking or electric shock.</p>
	<p>Do not touch a connector on the product (gold-plated portion).</p> <p>Otherwise, the surface of a connector may be contaminated with sweat or skin oil, resulting in contact failure of a connector or it may cause a malfunction, fire or electric shock due to static electricity.</p>

**Caution****Do not use or place the product in the following locations.**

- Humid and dusty locations
- Airless locations such as closet or bookshelf
- Locations which receive oily smoke or steam
- Locations exposed to direct sunlight
- Locations close to heating equipment
- Closed inside of a car where the temperature becomes high
- Sticky locations
- Locations close to water or chemicals

Otherwise, a fire, electric shock, accident or deformation may occur due to a short circuit or heat generation.

**Do not place heavy things on the product.**

Otherwise, the product may be damaged.

■ Disclaimer

This product is a board intended for conversion between the Samtec FMC connector and the JAE Display Port connector and interfacing by Display Port standard of the VESA. Tokyo Electron Device Limited assumes no responsibility for any damages resulting from the use of this product for purposes other than those stated.

Even if the product is used properly, Tokyo Electron Device Limited assumes no responsibility for any damages caused by:

- (1) Earthquake, thunder, natural disaster or fire resulting from the use beyond our responsibility, acts by a third party or other accidents, the customer's willful or accidental misuse or use under other abnormal conditions.
- (2) Secondary impact arising from use of this product or its unusable state (business interruption or others)
- (3) Use of this product against the instructions given in this manual.
- (4) Malfunctions due to connection to other devices.

Tokyo Electron Device Limited assumes no responsibility or liability for:

- (1) Erasure or corruption of data arising from use of this product.
- (2) Any consequences or other abnormalities arising from use of this product, or
- (3) Damage of this product not due to our responsibility or failure due to modification

This product has been developed by assuming its use for research, testing or evaluation. It is not authorized for use in any system or application that requires high reliability.

Repair of this product is carried out by replacing it on a chargeable basis, not repairing the faulty devices. However, non-chargeable replacement is offered for initial failure if such notification is received within two weeks after delivery of the product.

The specification of this product is subject to change without prior notice.

The product is subject to discontinuation without prior notice.

1. Related Documents and Board Accessories

Related documents:

All documents relating to this board can be downloaded from our website. Please refer to attached paper of the products.

Board accessories:

- FMC spacer set
 - M2.6 X 10 spacer (Duracon): 2
 - Screws with Duracon washer: 4

2. Overview

This board is intended to be used for conversion between Samtec FMC (High-Pin Count) and JAE DisplayPort connectors. The board can achieve DisplayPort standard signal transfer speeds. The board has been designed for connection with high-pin-count platform boards.

3. Features

FMC Connector: Samtec FMC Connector (High-Pin Count)
 LVDS Connector: JAE DP1 Series

	K	J	H	G	F	E	D	C	B	A
1	VREF_B M2C	GND	VREF_A M2C	GND	PG M2C	GND	PG C2M	GND	RES1	GND
2	GND	CLK3 M2C P	PRSN1 M2C L	CLK1 M2C P	GND	HA01 P CC	GND	DP0 C2M P	GND	DP1 M2C P
3	GND	CLK3 M2C N	GND	CLK1 M2C N	GND	HA01 N CC	GND	DP0 C2M N	GND	DP1 M2C N
4	CLK2 M2C P	GND	CLK0 M2C P	GND	HA00 P CC	GND	GBTCLK0 M2C P	GND	DP9 M2C P	GND
5	CLK2 M2C N	GND	CLK0 M2C N	GND	HA00 N CC	GND	GBTCLK0 M2C N	GND	DP9 M2C N	GND
6	GND	HA03 P	GND	LA00 P CC	GND	HA05 P	GND	DP0 M2C P	GND	DP2 M2C P
7	HA02 P	HA03 N	LA02 P	LA00 N CC	HA04 P	HA05 N	GND	DP0 M2C N	GND	DP2 M2C N
8	HA02 N	GND	LA02 N	GND	HA04 N	GND	LA01 P CC	GND	DP8 M2C P	GND
9	GND	HA07 P	GND	LA03 P	GND	HA09 P	LA01 N CC	GND	DP8 M2C N	GND
10	HA06 P	HA07 N	LA04 P	LA03 N	HA08 P	HA09 N	GND	LA06 P	GND	DP3 M2C P
11	HA06 N	GND	LA04 N	GND	HA08 N	GND	LA05 P	LA06 N	GND	DP3 M2C N
12	GND	HA11 P	GND	LA08 P	GND	HA13 P	LA05 N	GND	DP7 M2C P	GND
13	HA10 P	HA11 N	LA07 P	LA08 N	HA12 P	HA13 N	GND	GND	DP7 M2C N	GND
14	HA10 N	GND	LA07 N	GND	HA12 N	GND	LA09 P	LA10 P	GND	DP4 M2C P
15	GND	HA14 P	GND	LA12 P	GND	HA16 P	LA09 N	LA10 N	GND	DP4 M2C N
16	HA17 P CC	HA14 N	LA11 P	LA12 N	HA15 P	HA16 N	GND	GND	DP6 M2C P	GND
17	HA17 N CC	GND	LA11 N	GND	HA15 N	GND	LA13 P	GND	DP6 M2C N	GND
18	GND	HA18 P	GND	LA16 P	GND	HA20 P	LA13 N	LA14 P	GND	DP5 M2C P
19	HA21 P	HA18 N	LA15 P	LA16 N	HA19 P	HA20 N	GND	LA14 N	GND	DP5 M2C N
20	HA21 N	GND	LA15 N	GND	HA19 N	GND	LA17 P CC	GND	GBTCLK1 M2C P	GND
21	GND	HA22 P	GND	LA20 P	GND	HB03 P	LA17 N CC	GND	GBTCLK1 M2C N	GND
22	HA23 P	HA22 N	LA19 P	LA20 N	HB02 P	HB03 N	GND	LA18 P CC	GND	DP1 C2M P
23	HA23 N	GND	LA19 N	GND	HB02 N	GND	LA23 P	LA18 N CC	GND	DP1 C2M N
24	GND	HB01 P	GND	LA22 P	GND	HB05 P	LA23 N	GND	DP9 C2M P	GND
25	HB00 P CC	HB01 N	LA21 P	LA22 N	HB04 P	HB05 N	GND	GND	DP9 C2M N	GND
26	HB00 N CC	GND	LA21 N	GND	HB04 N	GND	LA26 P	LA27 P	GND	DP2 C2M P
27	GND	HB07 P	GND	LA25 P	GND	HB09 P	LA26 N	LA27 N	GND	DP2 C2M N
28	HB06 P CC	HB07 N	LA24 P	LA25 N	HB08 P	HB09 N	GND	GND	DP8 C2M P	GND
29	HB06 N CC	GND	LA24 N	GND	HB08 N	GND	TCK	GND	DP8 C2M N	GND
30	GND	HB11 P	GND	LA29 P	GND	HB13 P	TDI	SCL	GND	DP3 C2M P
31	HB10 P	HB11 N	LA28 P	LA29 N	HB12 P	HB13 N	TDO	SDA	GND	DP3 C2M N
32	HB10 N	GND	LA28 N	GND	HB12 N	GND	3P3VAUX	GND	DP7 C2M P	GND
33	GND	HB15 P	GND	LA31 P	GND	HB19 P	TMS	GND	DP7 C2M N	GND
34	HB14 P	HB15 N	LA30 P	LA31 N	HB16 P	HB19 N	TRST_L	GA0	GND	DP4 C2M P
35	HB14 N	GND	LA30 N	GND	HB16 N	GND	GA1	12P0V	GND	DP4 C2M N
36	GND	HB18 P	GND	LA33 P	GND	HB21 P	3P3V	GND	DP6 C2M P	GND
37	HB17 P CC	HB18 N	LA32 P	LA33 N	HB20 P	HB21 N	GND	12P0V	DP6 C2M N	GND
38	HB17 N CC	GND	LA32 N	GND	HB20 N	GND	3P3V	GND	GND	DP5 C2M P
39	GND	VIO_B M2C	GND	VADJ	GND	VADJ	GND	3P3V	GND	DP5 C2M N
40	VIO_B M2C	GND	VADJ	GND	VADJ	GND	3P3V	GND	RES0	GND

Figure 3-1 FMC Connector Pin Layouts

4. Block Diagram

Figure 4-1 shows a block diagram of the TB-FMCH-DP board.
The FMC connector is mounted on the solder side of the board.

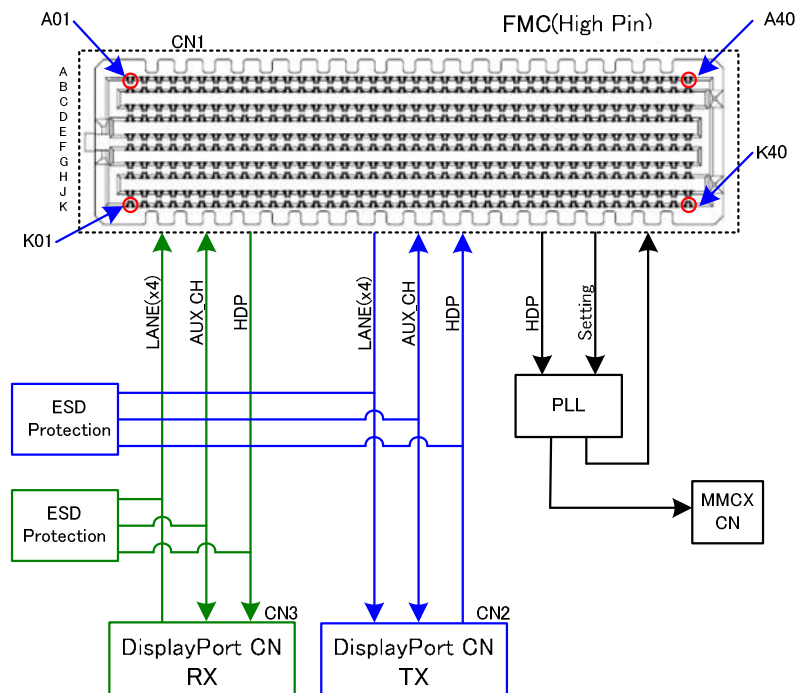


Figure 4-1 Block Diagram

Main Functions:

1. Signal connections between FMC and DisplayPort connector(CN2 ,CN3)
2. Clock signal generation and distribute.

5. External View of the Board

Figures 5-1 and 5-2 show external views of the board.

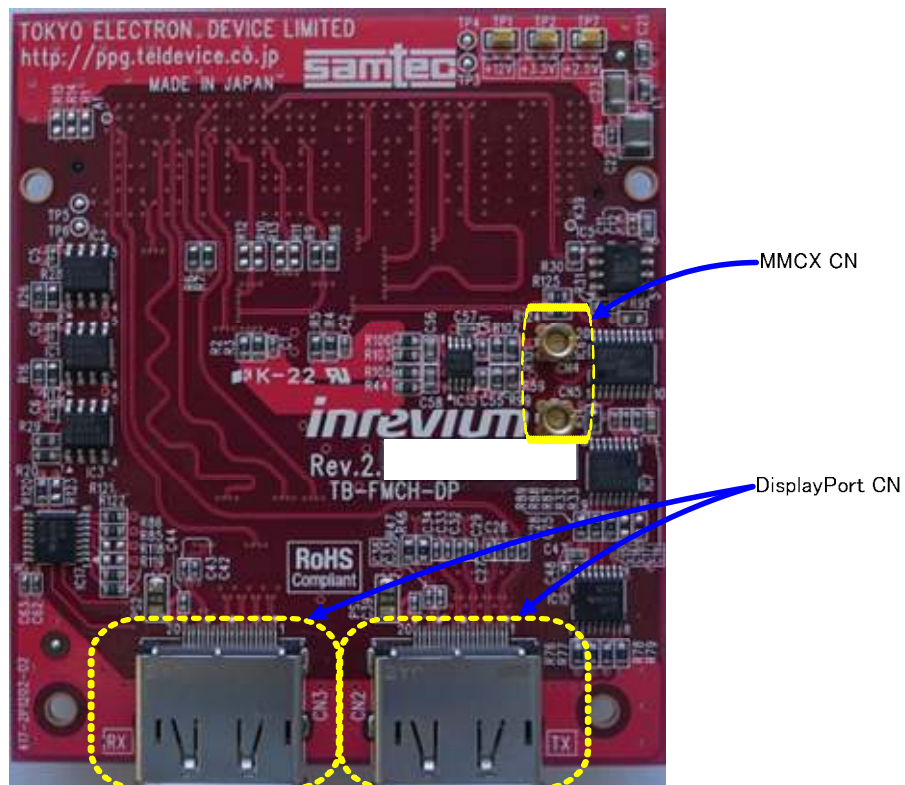


Figure 5-1 Component Side

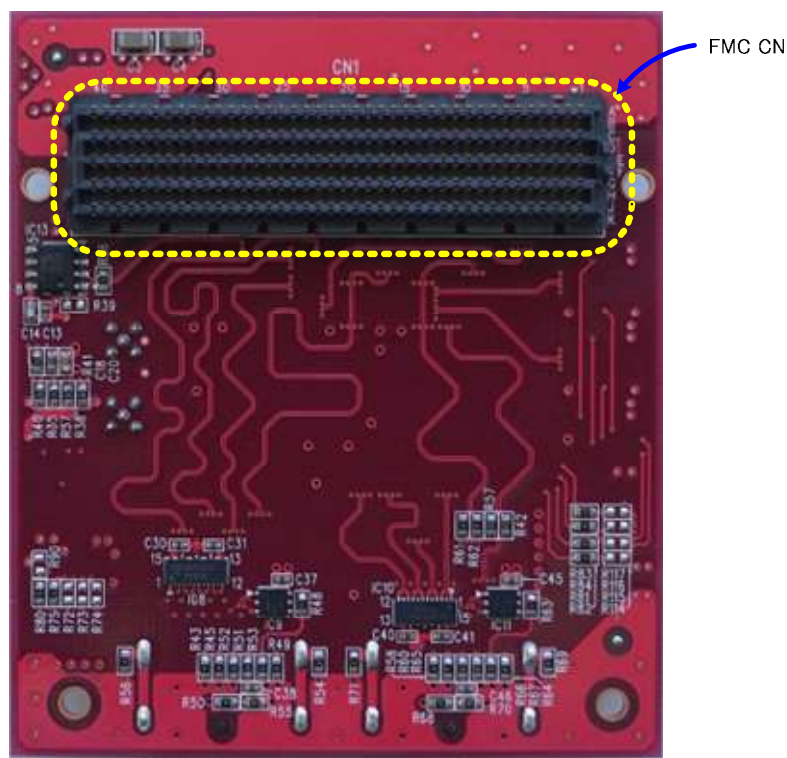


Figure 5-2 Solder Side

6. Board Specification

External Dimensions:	69 mm (W) x 78.8 mm (H)
Layer Structure:	8-Layer
Board Thickness:	1.6 mm
Material:	FR-4
FMC Connector:	Samtec ASP-134488-01
SerDes Connector:	JAE DP1RD20JQ1

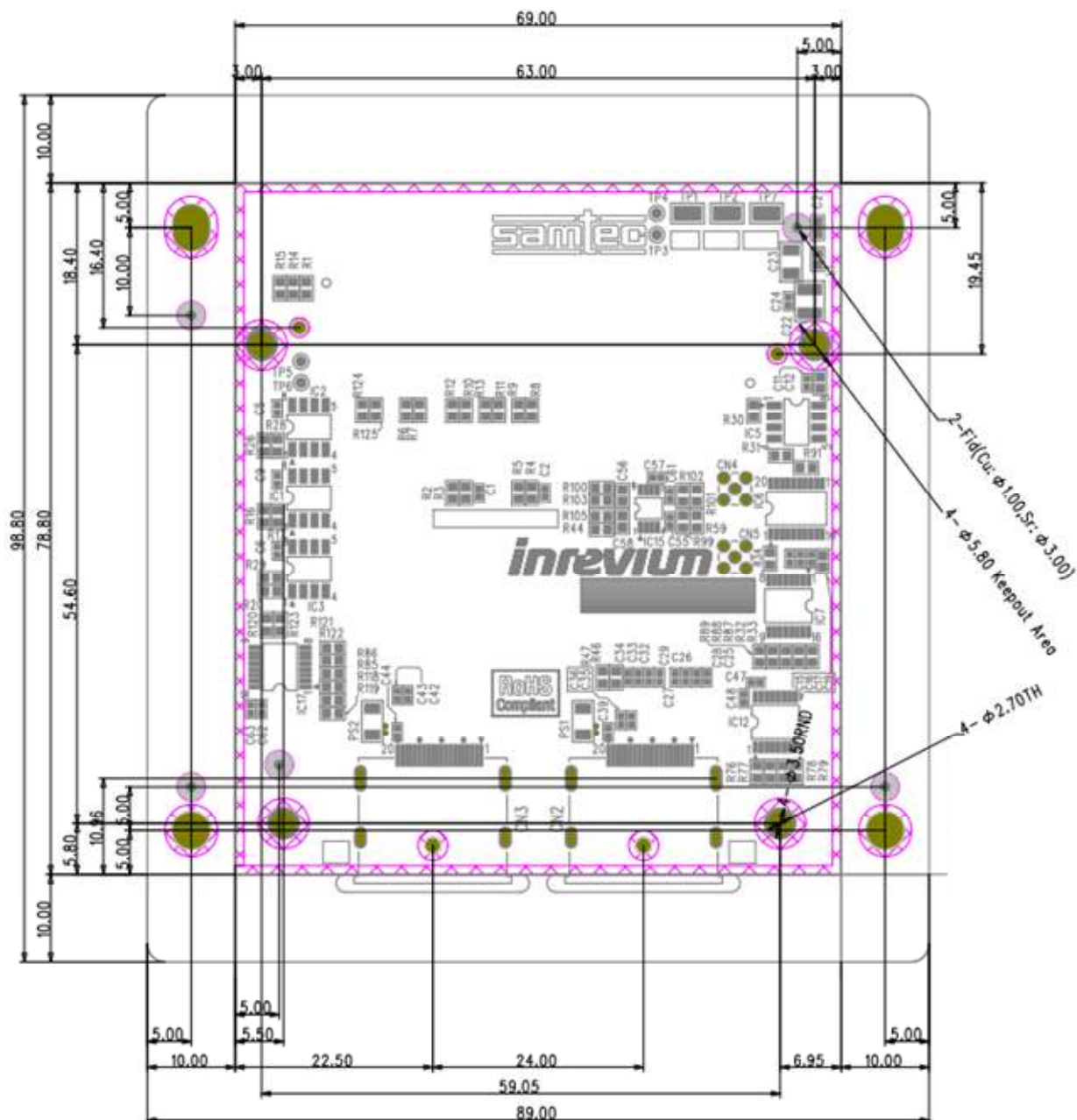


Figure 6-1 Board Dimensions (inclusive of a wasteable portion)

7. Description of Each Component

7.1. Signal connection between receiver side of DisplayPort and FMC connector

Figure 7-1 shows the signal connection of DisplayPort receiver side.

3 AUX signals are connected. And it has signal level shifters circuit between FMC and DisplayPort.

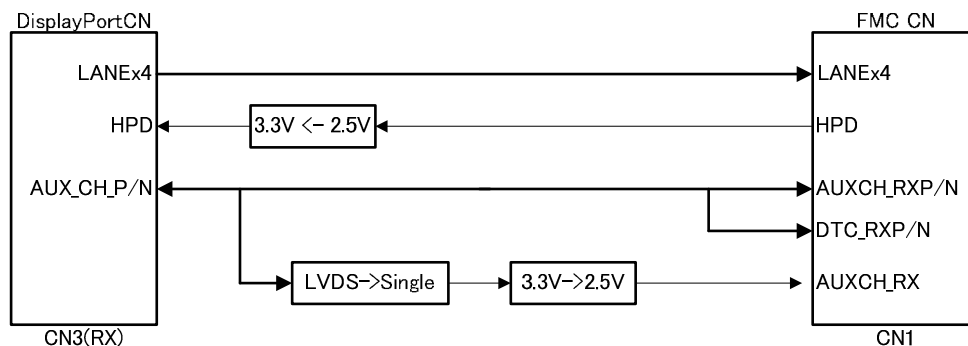


Figure 7-1 Block diagram of receiver side

Table 1 shows signal connections between FMC connector and DisplayPort connector.

Table 7-1 RX Signal Connections to FMC(CN1)

FMC Pin No.	CN Signal Name	Signal
C6	DP0_M2C_P	RX_ML_LANE0_P
C7	DP0_M2C_N	RX_ML_LANE0_N
A2	DP1_M2C_P	RX_ML_LANE1_P
A3	DP1_M2C_N	RX_ML_LANE1_N
A6	DP2_M2C_P	RX_ML_LANE2_P
A7	DP2_M2C_N	RX_ML_LANE2_N
A10	DP3_M2C_P	RX_ML_LANE3_P
A11	DP3_M2C_N	RX_ML_LANE3_N
D8	LA01_P_CC	RX_AUX_CH_P
D9	LA01_N_CC	RX_AUX_CH_N
C10	LA06_P	RX_AUX_CH_P
C11	LA06_N	RX_AUX_CH_N
C15	LA10_N	DP_AUXCH_RX
C19	LA14_N	RX_HPD

7.2. Signal connection between Transfer side of DisplayPort and FMC connector

Figure 7-2 shows the signal connection of DisplayPort transfer side.

2 AUX signals are connected. And it has signal level sifter circuits between FMC and DisplayPort.

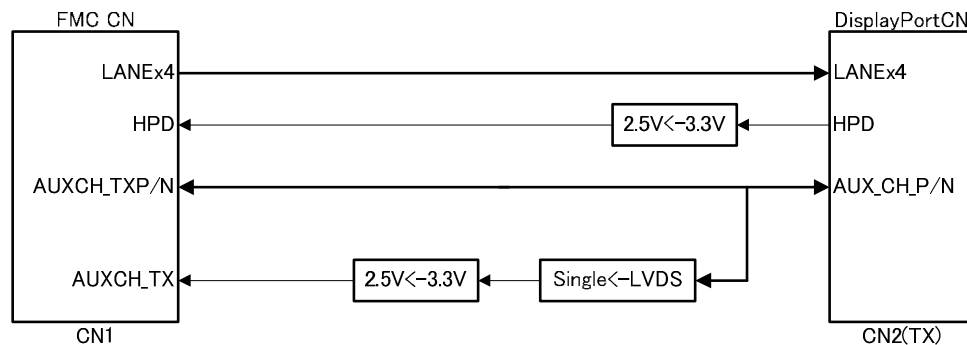


Figure 7-2 Block diagram of transfer side

Table 2 shows signal connections between FMC connector and DisplayPort connector.

Table 7-2 TX Signal Connections to FMC(CN1)

FMC Pin No.	CN Signal Name	Signal
C2	DP0_C2M_P	TX_ML_LANE0_P
C3	DP0_C2M_N	TX_ML_LANE0_N
A22	DP1_C2M_P	TX_ML_LANE1_P
A23	DP1_C2M_N	TX_ML_LANE1_N
A26	DP2_C2M_P	TX_ML_LANE2_P
A27	DP2_C2M_N	TX_ML_LANE2_N
A30	DP3_C2M_P	TX_ML_LANE3_P
A31	DP3_C2M_N	TX_ML_LANE3_N
D17	LA13_P	TX_AUX_CH_P
D18	LA13_N	TX_AUX_CH_N
C14	LA10_P	DP_AUXCH_TX
C18	LA14_P	TX_HPD

7.3. Clock signal generate by PLL and distribution circuit

PLL circuit receive clock signal source from FMC connector. Generated clock is distributed by LVDS buffer to MMCX connectors and FMC connector.

PLL circuit have serial control interface to setting generating signal frequency.

Signal level of FMC connector side is 2.5V interface.

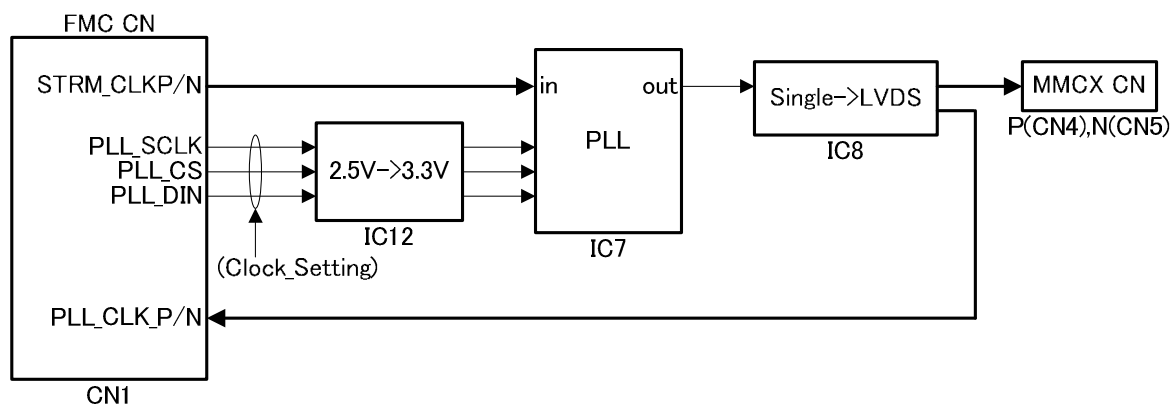


Figure 7-3 Block diagram of PLL circuit

Table 3 shows signal connections between FMC connector and PLL circuit.

Table 7-3 PLL circuit signal connections

FMC Pin No.	CN Signal Name	Signal
A14	DP4_M2C_P	STRM_CLK1P
A15	DP4_M2C_N	STRM_CLK1N
G15	LA12_P	PLL_SCLK
G12	LA08_P	PLL_CS
G9	LA03_P	PLL_DIN
H4	CLK0_M2C_P	PLL_CLK_P
H5	CLK0_M2C_N	PLL_CLK_N

7.4. Power supply

This board needs to get power from FMC connector

Table 4 shows power supply connection on FMC connector.

Table 7-4 Power supply connections

FMC Pin No.	CN Signal Name	Signal
C35,C37	12P0V	12V
C39,D32,D36,D38,D40	3P3V,3P3VAUX	3.3V
E39,F40,G39,H40	VADJ	2.5V

7.5. Other signals on FMC connector

7.5.1. Test point (TP)

This board has 4 test points to connect FMC connector. These test point can use for signal test purpose.

Table 7-5 Test point connections

FMC Pin No.		Test PAD
Pin No.	Pin Name	
C34	GA0	TP3
D35	GA1	TP4
H1	VREF_A_M2C	TP5
K1	VREF_B_M2C	TP6

7.5.2. Connect to ground.

The following signal ground structures can be implemented for the FMC connector pins. The resistors are not mounted at shipment.

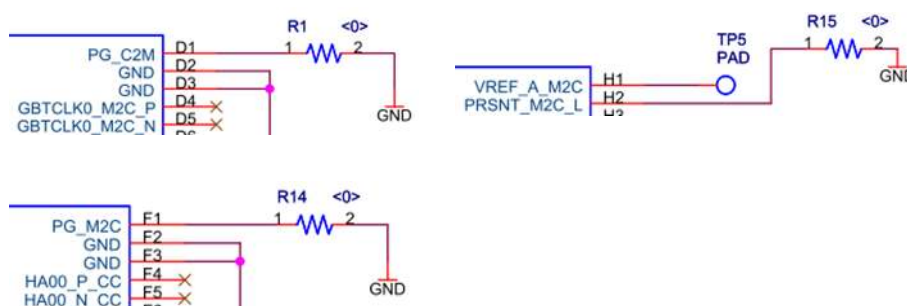


Figure 7-4 Ground connective signals

Table 7-6 Ground connective signals

FMC Pin No.		resistor
Pin No.	Pin Name	
D1	PG_C2M	R1
F1	PG_M2C	R14
H2	PRSNT_M2C_L	R15

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