TB-FMCL-ADDA24
Hardware User Manual

Rev.1.00

Revision History

Version	Date	Description	Publisher
Rev.1.00	2012/09/27	Release version	Amano

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Introduction

Thank you for purchasing the **TB-FMCL-ADDA24** 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, and 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	
	**In the event of a failure, disconnect the power supply.** 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.
	**If an unpleasant smell or smoking occurs, disconnect the power supply.** 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.
	**Do not disassemble, repair or modify the product.** 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.
	**Do not touch a cooling fan.** 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.
	**Do not place the product on unstable locations.** Otherwise, it may drop or fall, resulting in injury to persons or failure.
	**If the product is dropped or damaged, do not use it as is.** Otherwise, a fire or electric shock may occur.
	**Do not touch the product with a metallic object.** Otherwise, a fire or electric shock may occur.
	**Do not place the product in dusty or humid locations or where water may splash.** Otherwise, a fire or electric shock may occur.
	**Do not get the product wet or touch it with a wet hand.** Otherwise, the product may break down or it may cause a fire, smoking or electric shock.
	**Do not touch a connector on the product (gold-plated portion).** 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.

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 • Staticky 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 an FPGA Mezzanine Card (hereafter referred to as “FMC”) type of **inrevium** evaluation board comprising of four audio signal inputs and four audio signal outputs. 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 Accessories

All documents relating to this board can be downloaded from our website Club-X.
[Accessory]
Board fixing spacer set

2. Overview

This board is an optional card equipped with an FMC Low-Pin Count (hereafter referred to as “LPC”) and can be used with the FMC inrevium evaluation board (hereafter referred to as “Platform Board”.
The board is designed to allow the user to easily evaluate audio application design features by using it in combination with the Platform Board.

The board provides a 4-ch analog input and output interface connected to the audio dedicated high performance Analog Digital Convertor “hereafter referred to as “ADC”) and the Digital Analog Convertor (hereafter referred to as “DAC”).

3. Features

ADC Device:	TI 192KHz/24bit PCM4204
DAC Device:	TI 192KHz/24bit PCM4104
Input/output Amplifier:	TI OPA1632
Audio Clock (24.576MHz VXCO):	Fox FVXO-HC73B-24.576
Audio Clock (22.5792MHz):	Kyocera KC7050B22.5792C3
TRS Phone Plug:	JALCO YKB21-5010
FMC Connector:	Samtec ASP-134604-01

	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	PRSNT_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
			LPC Connector	LPC Connector			LPC Connector	LPC Connector		

Figure3-1 FMC Connector Pin Layout

*The onboard FMC connector can be only used for the LPC Connector in the above pin layout. For information on real pins, refer to Section 4.6.

4. Board Overview

4.1. Block Diagram

Figure 4-1 shows the TB-FMCL-ADDA24 block diagram.

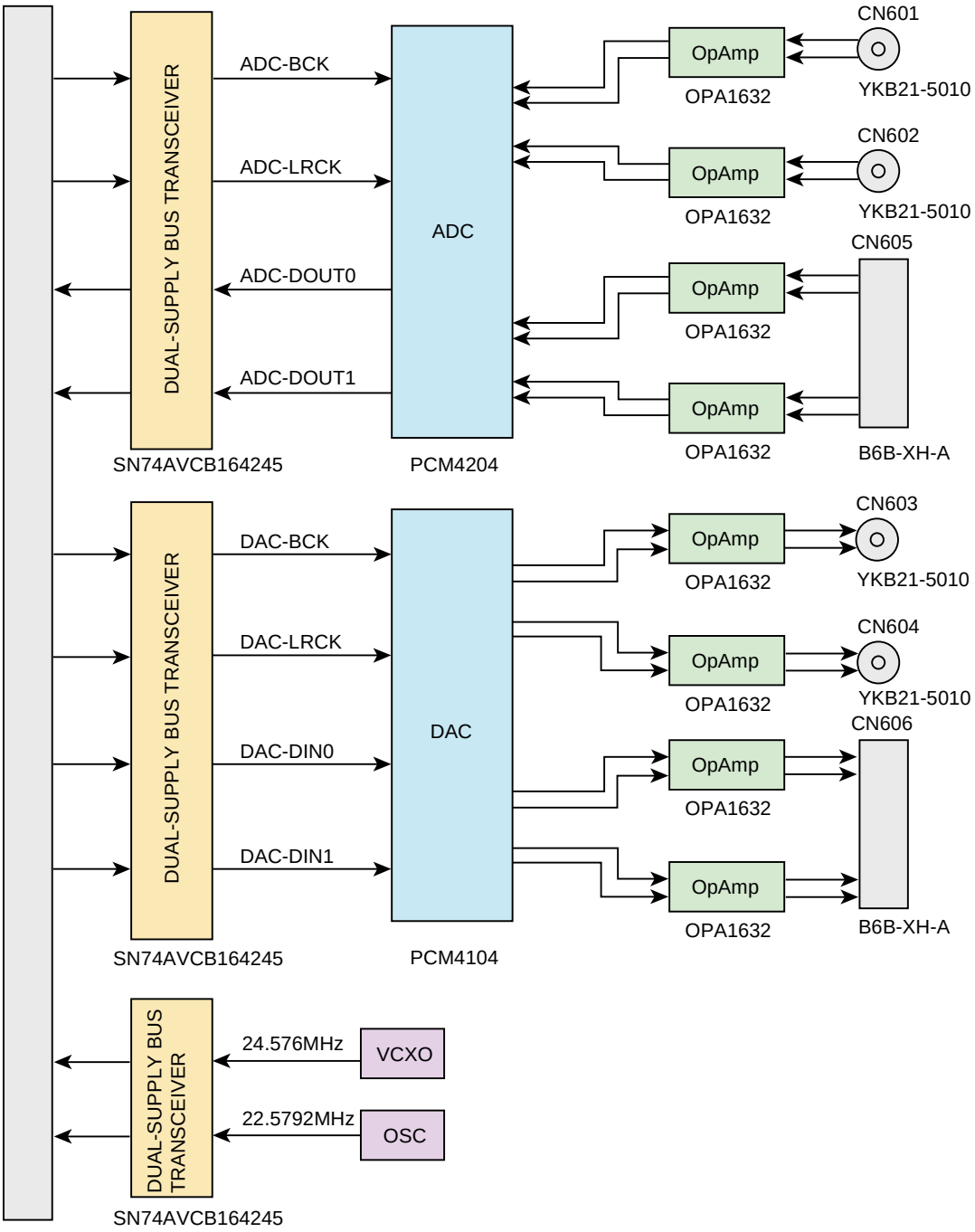

Figure4-1 TB-FMCL-ADDA24 Block Diagram

4.2. External View of Board

Figures 4-2 and 4-3 shows the external view of the TB-FMCL-ADDA24 board.

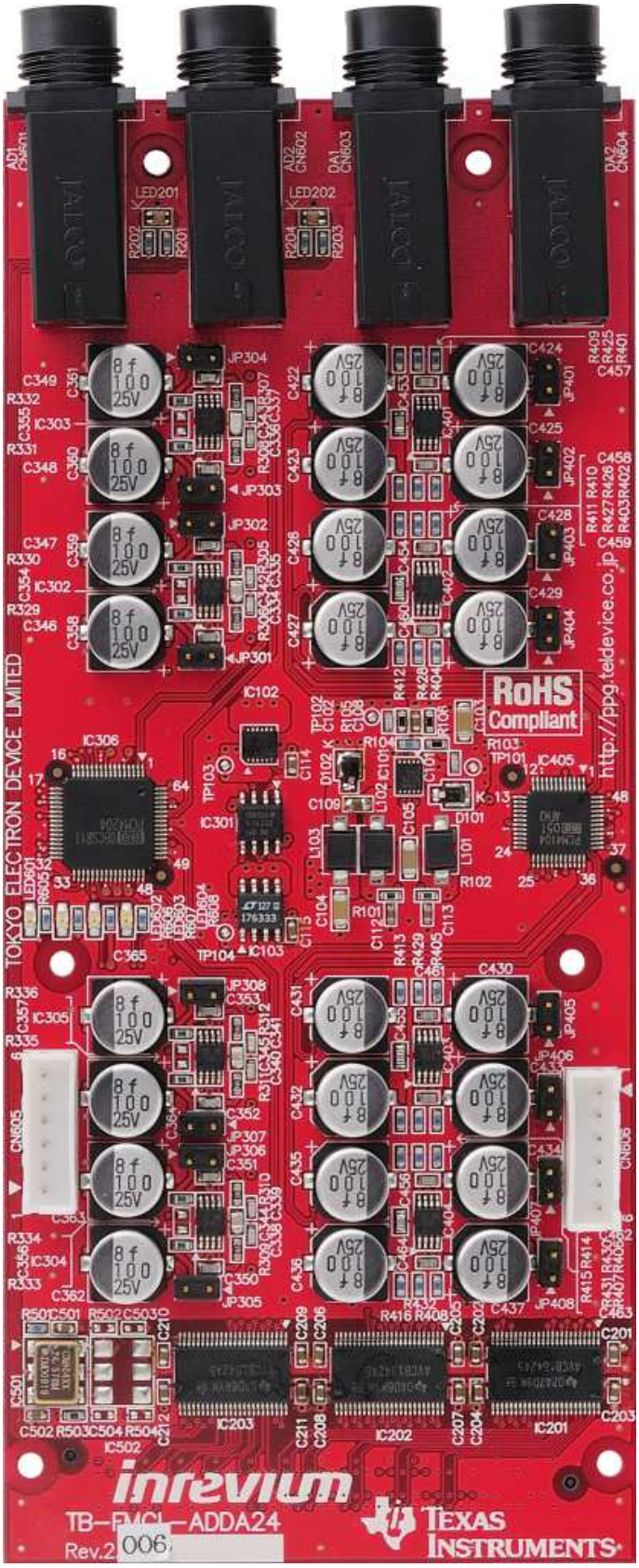

Figure4-2 External View of Board (Component Side)

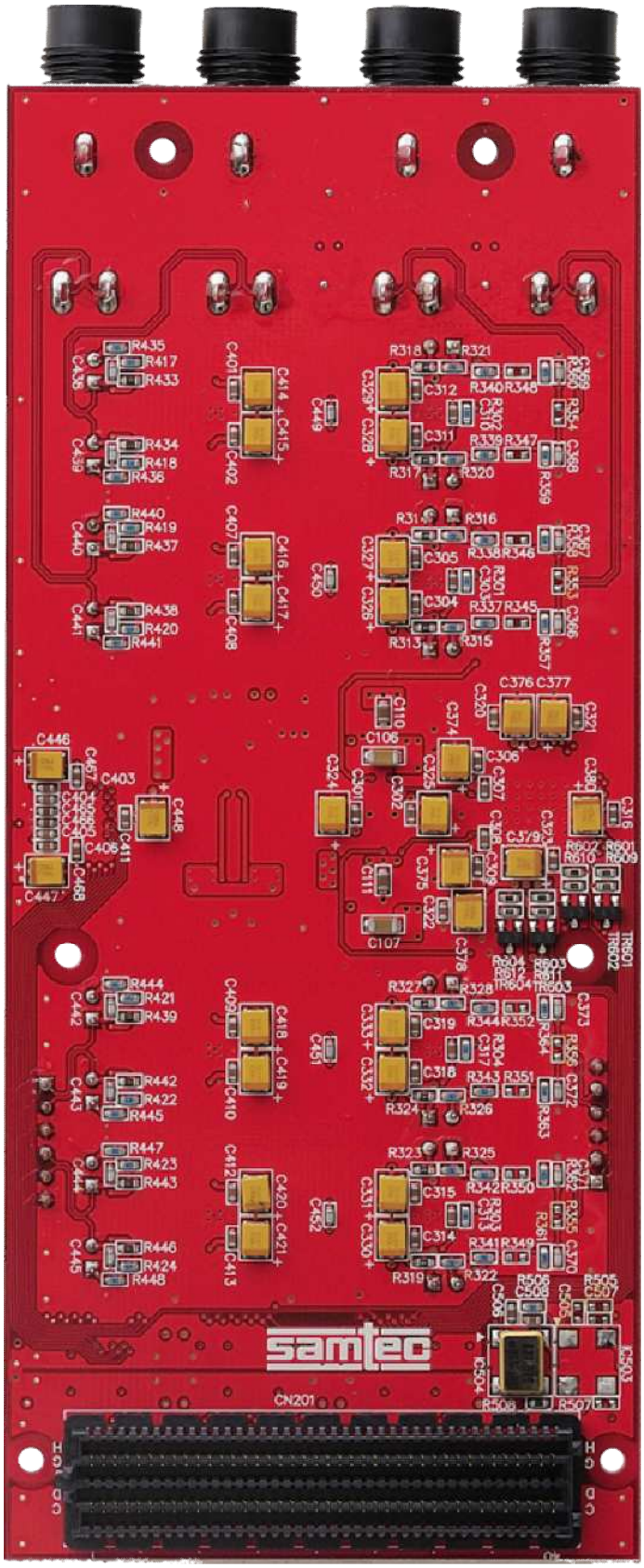

Figure4-3 External View of Board (Solder Side)

4.3. Board Specification

Figure 4-4 shows the TB-FMCL-ADDA24 board specification.

External Dimensions: W:160mm x H:69mm (not including projections)
Layer Structure: 6-Layer
Board Thickness: 1.6mm
Material: FR-4

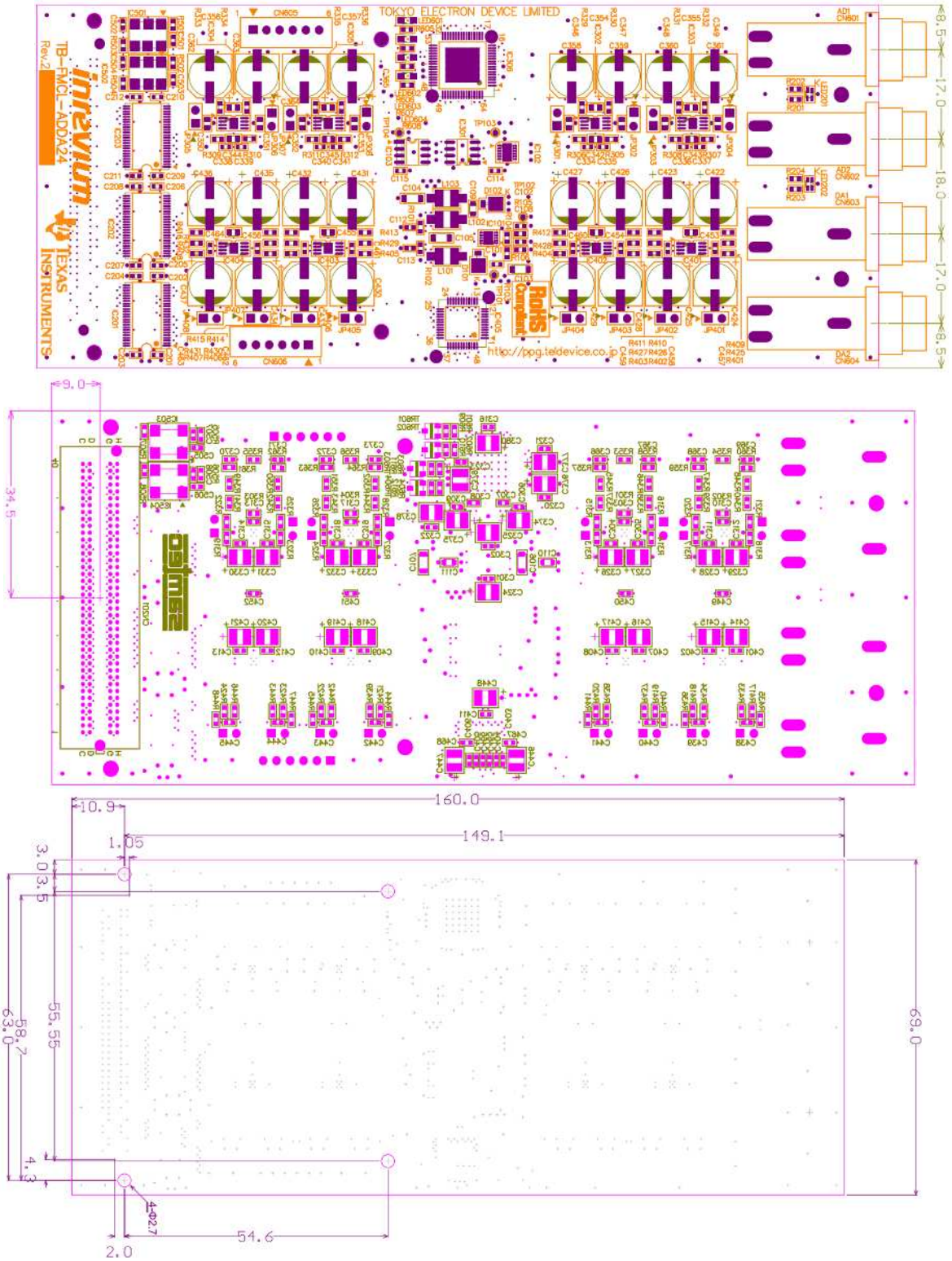

Figure4-4 TB-FMCL-ADDA24 Board Dimensions

5. Power Supply Structure

Figure 5-1 illustrates the power supply circuit of the TB-FMCL-ADDA24 board. The board generates the following voltages from a +12V external power supply source via the FMC connector:
+13.0V/-13.0V from an LT power supply IC “LT3471”
+5.0V from an LT power supply IC “LT1763"
+3.3V from an LT power supply IC "LT1763"
The board is equipped with a voltage level conversion buffer “TI SN74AVCB164245“ for ADC/DAC control. So, the bank voltage (VCCO) of an FPGA on the platform board (connected to the FMC connector on the TB-FMCL-ADDA24) can be configured to support either +2.5V or +3.3V

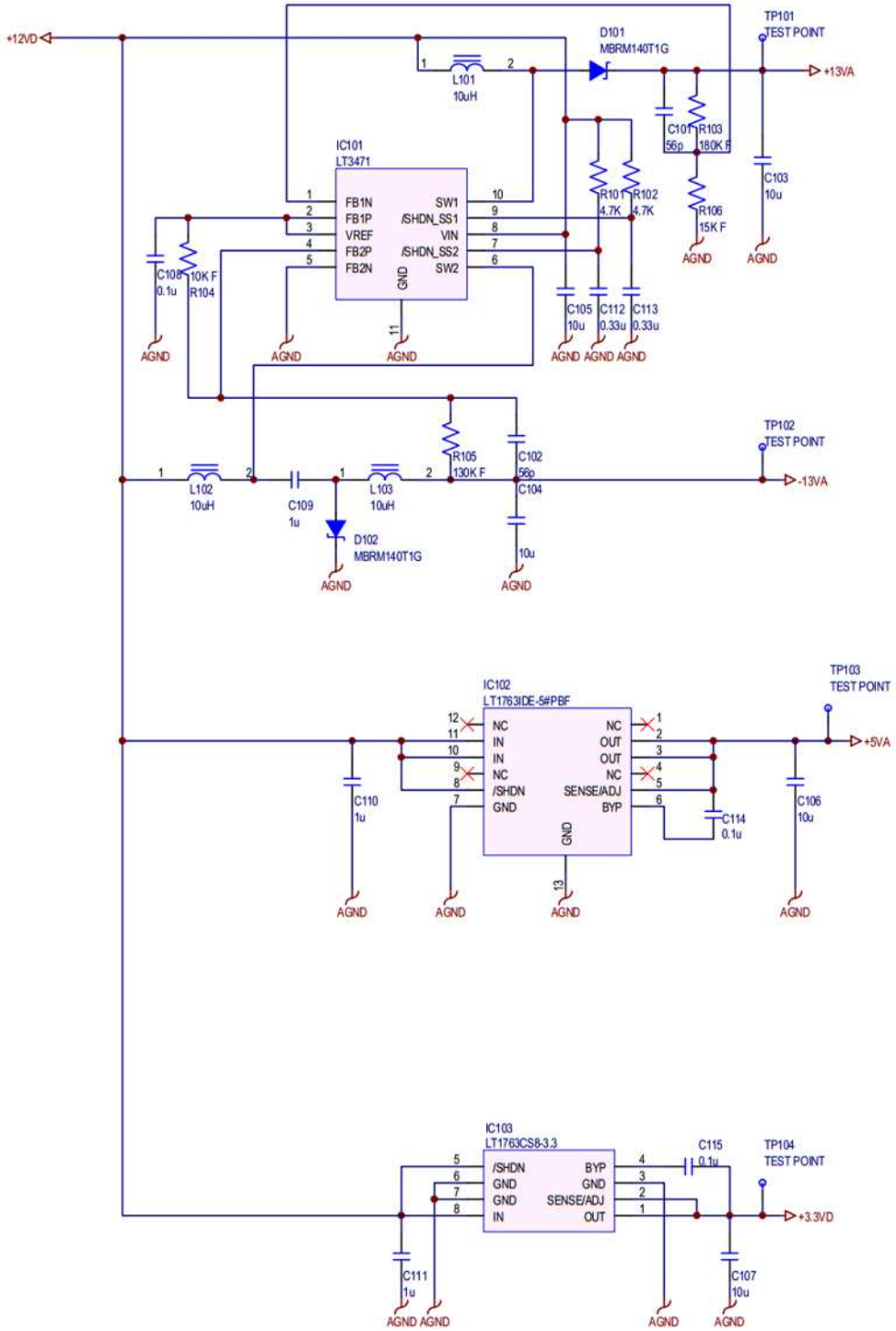

Figure5-1 Power Supply Circuit

6. Connectors and ICs

6.1. FMC Connector for Platform Board Connection (CN201)

The subsequent pages present the FMC connector pin assignment for Platform Board connection.
The **Direction** field in the table shows a signal direction:
Direction = I Platform Board to TB-FMCL-ADDA24 (Input)
Direction = O TB-FMCL-ADDA24 to Platform Board (Output)

Table 6-1 FMC Connector Pin Assignment for Platform Board Connection

C-Row (FMC Connector for Platform Board Connection)				
Pin#	FMC Standard	I/O	Signal Name	Description
1	GND	-	-	-
2	DP0_C2M_P	-	N/C	-
3	DP0_C2M_N	-	N/C	-
4	GND	-	-	-
5	GND	-	-	-
6	DP0_M2C_P	-	N/C	-
7	DP0_M2C_N	-	N/C	-
8	GND	-	-	-
9	GND	-	-	-
10	LA06_P	I	DAC_0_MODE	DAC Mode Setup Input
11	LA06_N	I	DAC_0_RST	DAC Reset Input
12	GND	-	-	-
13	GND	-	-	-
14	LA10_P	I	DAC_0_MUTE	DAC Mute Setup Input
15	LA10_N		DAC_0_SCKI	DAC System Clock Input
16	GND	-	-	-
17	GND	-	-	-
18	LA14_P	I	DAC_0_BCK	DAC Audio Bit Clock Input
19	LA14_N	I	DAC_0_LRCK	DAC Audio L/R Input
20	GND	-	-	-
21	GND	-	-	-
22	LA18_P_CC	I	DAC_0_DIN0	DAC Audio Data (ch1/ch2) Input
23	LA18_N_CC	I	DAC_0_DIN1	DAC Audio Data (ch3/ch4) Input
24	GND	-	-	-
25	GND	-	-	-
26	LA27_P	I	DAC_0_FMT0	DAC Audio Data Format Setup Input
27	LA27_N	I	DAC_0_FMT1	DAC Audio Data Format Setup Input
28	GND	-	-	-
29	GND	-	-	-
30	SCL	-	N/C	-
31	SDA	-	N/C	-
32	GND	-	-	-
33	GND	-	-	-
34	GA0	-	N/C	-
35	12P0V	-	+12V	+12V Power Supply
36	GND	-	-	-
37	12P0V	-	+12V	+12V Power Supply
38	GND	-	-	-
39	3P3V	-	N/C	-
40	GND	-	-	-

D-Row (FMC Connector for Platform Board Connection)				
Pin#	FMC Standard	I/O	Signal Name	Description
1	PG_C2M	-	N/C	-
2	GND	-	-	-
3	GND	-	-	-
4	GBTCLK0_M2C_P	-	N/C	-
5	GBTCLK0_M2C_N	-	N/C	-
6	GND	-	-	-
7	GND	-	-	-
8	LA01_P_CC	I	DAC_0_FMT2	DAC Audio Data Format Setup Input
9	LA01_N_CC	I	DAC_0_FS0	DAC Sampling Mode Setup Input
10	GND	-	-	-
11	LA05_P	I	DAC_0_FS1	DAC Sampling Mode Setup Input
12	LA05_N	I	DAC_0_CS	DACSPI Chip Select Input
13	GND	-	-	-
14	LA09_P	I	DAC_0_CCLK	DACSPI Data Clock Input
15	LA09_N	I	DAC_0_CDTI	DACSPI Data Input
16	GND	-	-	-
17	LA13_P	I	ADC_0_RST	ADC Reset Input
18	LA13_N	I	ADC_0_FS0	ADC Sampling Mode Setup Input
19	GND	-	-	-
20	LA17_P_CC	I	ADC_0_FS1	ADC Sampling Mode Setup Input
21	LA17_N_CC	I	ADC_0_FS2	ADC Sampling Mode Setup Input
22	GND	-	-	-
23	LA23_P	I	ADC_0_SDKI	ADC System Clock Input
24	LA23_N	I	ADC_0_SM	ADC Master/Slave Setup Input
25	GND	-	-	-
26	LA26_P	-	N/C	-
27	LA26_N	-	N/C	-
28	GND	-	-	-
29	TCK	-	N/C	-
30	TDI	-	N/C	-
31	TDO	-	N/C	-
32	3P3VAUX	-	N/C	-
33	TMS	-	N/C	-
34	TRST_L	-	N/C	-
35	GA1	-	N/C	-
36	3P3V	-	N/C	-
37	GND	-	-	-
38	3P3V	-	N/C	-
39	GND	-	-	-
40	3P3V	-	N/C	-

G-Row (FMC Connector for Platform Board Connection)				
Pin#	FMC Standard	I/O	Signal Name	Description
1	GND	-	-	-
2	CLK0_M2C_P	O	CLK_24P576	24.576MHz Clock Output (Single End)
3	CLK0_M2C_N	O	CLK_22P5792	22.5792MHz Clock Output (Single End)
4	GND	-	-	-
5	GND	-	-	-
6	LA00_P_CC	-	N/C	-
7	LA00_N_CC	-	N/C	-
8	GND	-	-	-
9	LA03_P	-	N/C	-
10	LA03_N	I	ADC_0_FMT0	ADC Audio Data Format Setup Input
11	GND	-	-	-
12	LA08_P	I	ADC_0_FMT1	ADC Audio Data Format Setup Input
13	LA08_N	I	ADC_0_FMT2	ADC Audio Data Format Setup Input
14	GND	-	-	-
15	LA12_P	I	ADC_0_BCK	ADC Audio Bit Clock Input
16	LA12_N	I	ADC_0_LRCK	ADC Audio L/R Clock Input
17	GND	-	-	-
18	LA16_P	I	ADC_0_HPFD	ADC High Pass Filter Setup Input
19	LA16_N	-	N/C	-
20	GND	-	-	-
21	LA20_P	-	N/C	-
22	LA20_N	I	VCXO_CTRL0	24.576MHz Clock VCXO Control Input
23	GND	-	-	-
24	LA22_P	I	VCXO_CTRL1	22.5792MHz Clock Control Input (High: Enable)
25	LA22_N	O	DAC_0_CDT0	DACSPI Data Output
26	GND	-	-	-
27	LA25_P	O	ADC_0_DOUT0	ADC Audio Data (ch1/ch2) Output
28	LA25_N	O	ADC_0_DOUT1	ADC Audio Data (ch3/ch4) Output
29	GND	-	-	-
30	LA29_P	O	ADC_0_CLIP1	ADC Audio Data (ch1) Clip Flag Output
31	LA29_N	O	ADC_0_CLIP2	ADC Audio Data (ch2) Clip Flag Output
32	GND	-	-	-
33	LA31_P	O	ADC_0_CLIP3	ADC Audio Data (ch3) Clip Flag Output
34	LA31_N	O	ADC_0_CLIP4	ADC Audio Data (ch4) Clip Flag Output
35	GND	-	-	-
36	LA33_P	-	N/C	-
37	LA33_N	-	N/C	-
38	GND	-	-	-
39	VADJ	-	VADJ	FMC Reference Power Supply (+2.5V/+3.3V)
40	GND	-	-	-

H-Row (FMC Connector for Platform Board Connection)				
Pin#	FMC Standard	I/O	Signal Name	Description
1	VREF_A_M2C	-	N/C	-
2	PRSNT_M2C_L	-	N/C	-
3	GND	-	-	-
4	CLK0_M2C_P	-	N/C	-
5	CLK0_M2C_N	-	N/C	-
6	GND	-	-	-
7	LA02_P	-	N/C	-
8	LA02_N	O	LED201_4	Reference (LED201) Green Control Output
9	GND	-	-	
10	LA04_P	O	LED201_2	Reference (LED201) Red Control Output
11	LA04_N	O	LED202_2	Reference (LED202) Green Control Output
12	GND	-	-	
13	LA07_P	O	LED202_4	Reference (LED202) Red Control Output
14	LA07_N	-	N/C	-
15	GND	-	-	
16	LA11_P	-	N/C	-
17	LA11_N	-	N/C	-
18	GND	-	-	-
19	LA15_P	-	N/C	-
20	LA15_N	-	N/C	-
21	GND	-	-	-
22	LA19_P	-	N/C	-
23	LA19_N	-	N/C	-
24	GND	-	-	-
25	LA21_P	-	N/C	-
26	LA21_N	-	N/C	-
27	GND	-	-	-
28	LA24_P	-	N/C	-
29	LA24_N	-	N/C	-
30	GND	-	-	-
31	LA28_P	-	N/C	-
32	LA28_N	-	N/C	-
33	GND	-	-	-
34	LA30_P	-	N/C	-
35	LA30_N	-	N/C	-
36	GND	-	-	-
37	LA32_P	-	N/C	-
38	LA32_N	-	N/C	-
39	GND	-	-	-
40	VADJ	-	VADJ	FMC Reference Power Supply (+2.5V/+3.3V)

7. Audio Input / Output

7.1. TRS Phone Plug Audio AD Connectors (CN601/602)

The board supports 2-channel analog audio inputs (CH1/2).
JALCO YKB21-5010 connectors are used for these signal connections.

Input gains can be controlled by setting onboard jumper pins.
For details, refer to Section 8. Jumper Pins.

Figure7-1 TRS Phone Plug Audio AD Connector

Table 7-1 shows the connector pin assignment.

Table 7-1 TRS Phone Plug Audio AD Connector Pin Assignment

Pin #	Name	Pin #	Name
CN601:1:S	AGND	CN602:1:S	AGND
CN601:2:T	ADC_0_VIN1+	CN602:2:T	ADC_0_VIN2+
CN601:3:R	ADC_0_VIN1-	CN602:3:R	ADC_0_VIN2-

7.2. Pin Header Audio AD Connector (CN605)

The board supports 2-channel analog audio inputs (CH3/4).
JST B6B-XH-A connectors are used for these signal connections.

Input gains can be controlled by setting onboard jumper pins.
For details, refer to Section 7.4.

Figure7-2 Pin Header Audio AD Connector

Table 7-2 shows the connector pin assignment.

Table 7-2 Pin Header Audio AD Connector Pin Assignment

Pin #	Name
1	ADC_0_VIN3+
2	ADC_0_VIN3-
3	AGND
4	ADC_0_VIN4+
5	ADC_0_VIN4-
6	AGND

7.3. Audio AD Input Decoupling

The following four audio input capacitors are inserted in series.

7.4. Audio AD Input Gain Setting (JP301, 302, 303, 304, 305, 306, 307 & 308)

A desired audio input gain is selectable using these jumper pins.

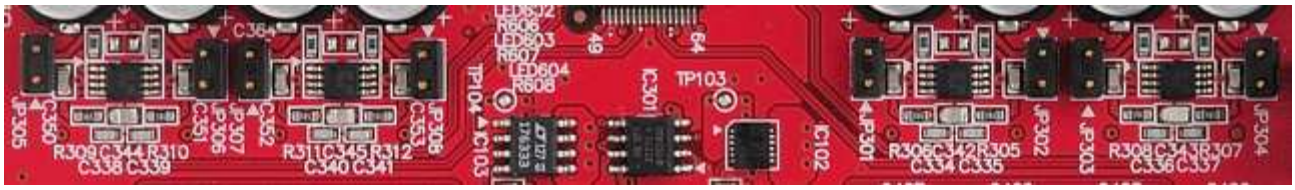

Figure7-3 Audio AD Input Gain Jumper Pins

Rated Input + 4dBu, Max Input + 18dBu (balanced inputs):

ADC_0_VIN1:	JP301 and JP302 = SHORT.
ADC_0_VIN2:	JP303 and JP304 = SHORT.
ADC_0_VIN3:	JP305 and JP306 = SHORT.
ADC_0_VIN4:	JP307 and JP308 = SHORT.

Rated Input - 10dBV, Max Input + 4dBV (unbalanced inputs):

ADC_0_VIN1:	JP301 and JP302 = OPEN.
ADC_0_VIN2:	JP303 and JP304 = OPEN.
ADC_0_VIN3:	JP305 and JP306 = OPEN.
ADC_0_VIN4:	JP307 and JP308 = OPEN.

7.5. Audio ADC (IC306)

The board is equipped with a TI PCN4204 device that supports 24bit/192kHz ADC.
4ch analog audio inputs are supported. These audio inputs are connected to the onboard CN601/602/605 connectors via a TI OPA1632.

Caution: DSDCLK (24), DSD1 (25), DSD2 (26), DSD3 (27) and DSD4 (28) are NC and SUB (39) is connected to GND.

Figure7-4 ADC

7.6. Audio AD Clip Display LEDs (LED601, 602, 603 & 604)

The following four audio AD clip display LEDs are provided that can be controlled from the ADC state display pin.

Figure7-5 Audio AD Clip Display LEDs

LED601: State of a clip in Channel 1 Clip = ON
LED602: State of a clip in Channel 2 Clip = ON
LED603: State of a clip in Channel 3 Clip = ON
LED604: State of a clip in Channel 4 Clip = ON

7.7. TRS Phone Plug Audio DA Connectors (CN603/604)

The board supports 2-channel analog audio outputs (CH1/ 2).
JALCO YKB21-5010 connectors are used for these signal connections.

Output gains can be controlled by setting onboard jumper pins.
For details, refer to Section 7.9.

Figure7-6 TRS Phone Plug Audio DA Connector

Table 7-3 shows the connector pin assignment.

Table 7-3 TRS Phone Plug Audio DA Connector Pin Assignment

Pin #	Name	Pin #	Name
CN603:1:S	AGND	CN604:1:S	AGND
CN603:2:T	DAC_0_VOUT1+	CN604:2:T	DAC_0_VOUT2+
CN603:3:R	DAC_0_VOUT1-	CN604:3:R	DAC_0_VOUT2-

7.8. Pin Header Audio DA Connector (CN606)

The board supports 2-channel analog audio outputs (CH3/ 4).
JST B6B-XH-A connectors are used for these signal connections.

Output gains can be controlled by setting onboard jumper pins.
For details, refer to Section 7.9

Figure7-7 Pin Header Audio DA Connector

Table 7-4 shows the connector pin assignment.

Table 7-4 Pin Header Audio DA Connector Pin Assignment

Pin #	Name
1	DAC_0_VOUT3+
2	DAC_0_VOUT3-
3	AGND
4	DAC_0_VOUT4+
5	DAC_0_VOUT4-
6	AGND

7.9. Audio DA Output Gain Setting (JP401, 402, 403, 404, 405, 406, 407 & 408)

A desired audio output gain is selectable using these jumpers.

Figure7-8 Audio DA Output Gain Jumper Pins

Rated Output + 4dBu, Max Output + 18dBu (balanced outputs):

DAC_0_VOUT1: JP401 and JP402 = OPEN
DAC_0_VOUT2: JP403 and JP404 = OPEN
DAC_0_VOUT3: JP405 and JP406 = OPEN
DAC_0_VOUT4: JP407 and JP408 = OPEN

Rated Output - 10dBV, Max Output + 4dBV (unbalanced Outputs):

DAC_0_VOUT1: JP401 and JP402 = SHORT
DAC_0_VOUT2: JP403 and JP404 = SHORT
DAC_0_VOUT3: JP405 and JP406 = SHORT
DAC_0_VOUT4: JP407 and JP408 = SHORT

7.10. Audio DAC (IC405)

The board is equipped with a TI PCN4104 device that supports 24bit/192kHz DAC.
4ch analog audio outputs are supported. These audio outputs are connected to the onboard CN603/604/606 connectors via a TI OPA1632.

Figure7-9 DAC

8. Clock

8.1. Onboard Clock (IC501, 504)

The board provides the following two onboard clock sources:

24.576MHz (VCXO)
22.5792MHz (FIX)

The VCXO enables self-oscillation and synchronization with external clock sources (48-kHz only).

Figure8-1 24.576MHz Clock

Figure8-2 22.5792MHz Clock

8.2. Control 24.576 VCXO

24.576 VCXO(IC501) has a Low Path Filer(LPF) circuit to the frequency control pin(VC). The frequency is adjustable by PWM control method from a FPGA to signal “VCXO_CTRL0”.

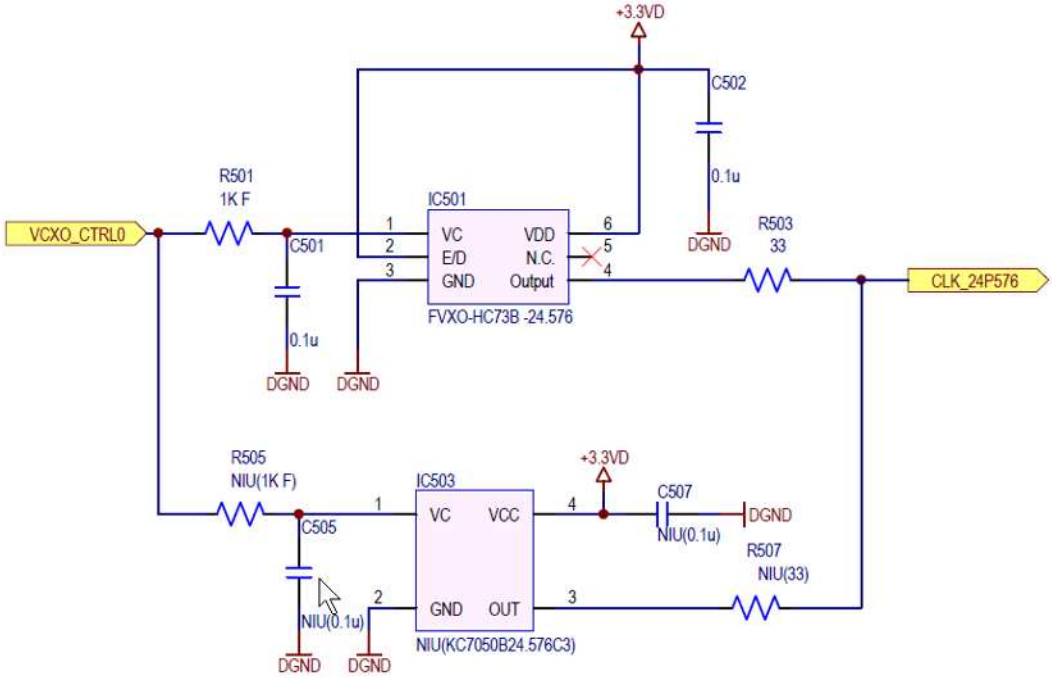

Figure8-3 VCXO Circuit

The frequency is control -150PPM to +150PPM area by 0 to 3.3V voltage. (VC= 1.65: 24.576MHZ)
Please refer to the reference design for PWM control method.
Also, refer to the datasheet of VCXO(FVXO-HC73B-24.576)
http://www.foxonline.com/pdfs/FVXO_HC73.pdf

About 24.576 OSC
This board can use OSC instead of VCXO.
Please contact us if using OSC.

8.3. Control 22.5792MHz OSC

OSC(IC504) is controlled by signal “VCXO_CTRL1” form FPGA.
VCXO_CTRL1: High- Enable, Low- Disable.

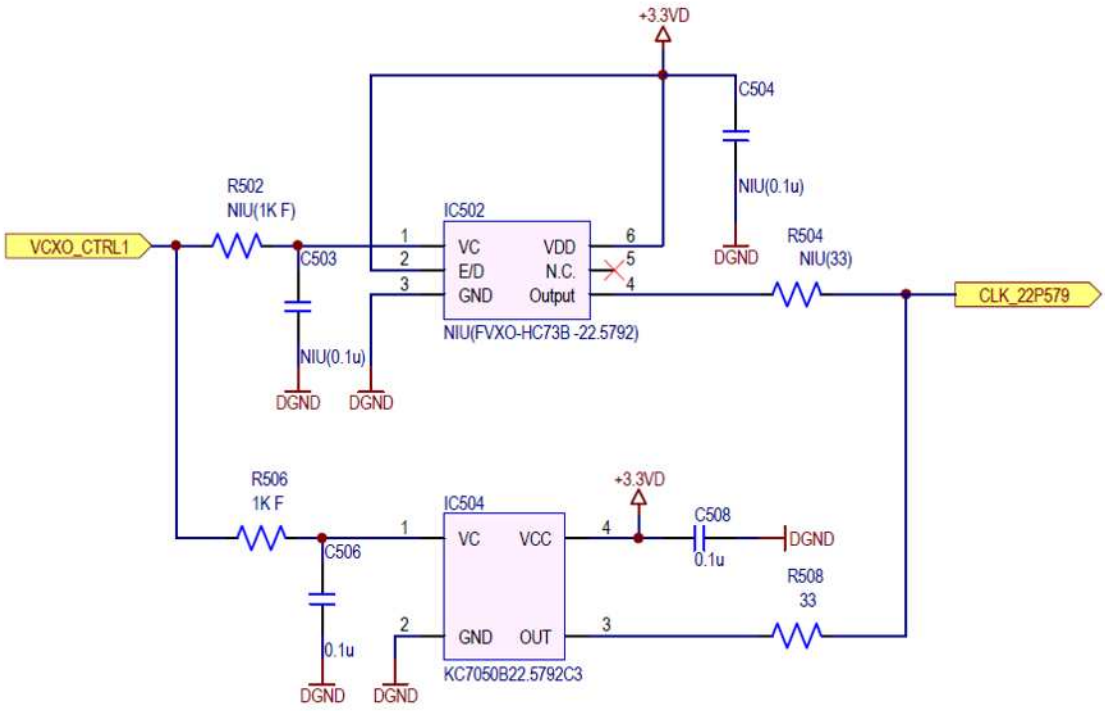

Figure8-4 OSC circuit

About 24.576 VCXO
This board can use VCXO instead of OSC.
Please contact us if using VCXO.

9. Other Interfaces

9.1. Debug LEDs (LED201, 202)

These are multi-purpose LEDs connected directly to the Platform Board.
A 2-color Rohm SML-522MUW light emitting diode is used.

Figure9-1 Debug LEDs

Table 9-1 LED201 Control

Pin #	FMC	DIR	Signal Name	Description
8	LA02_N	O	LED201_4	Green: Low Active
10	LA04_P	O	LED201_2	Red: Low Active

Table 9-2 LED202 Control

Pin #	FMC	DIR	Signal Name	Description
11	LA04_N	O	LED202_4	Green: Low Active
13	LA07_P	O	LED202_2	Red: Low Active

10. Factory Default Board Settings

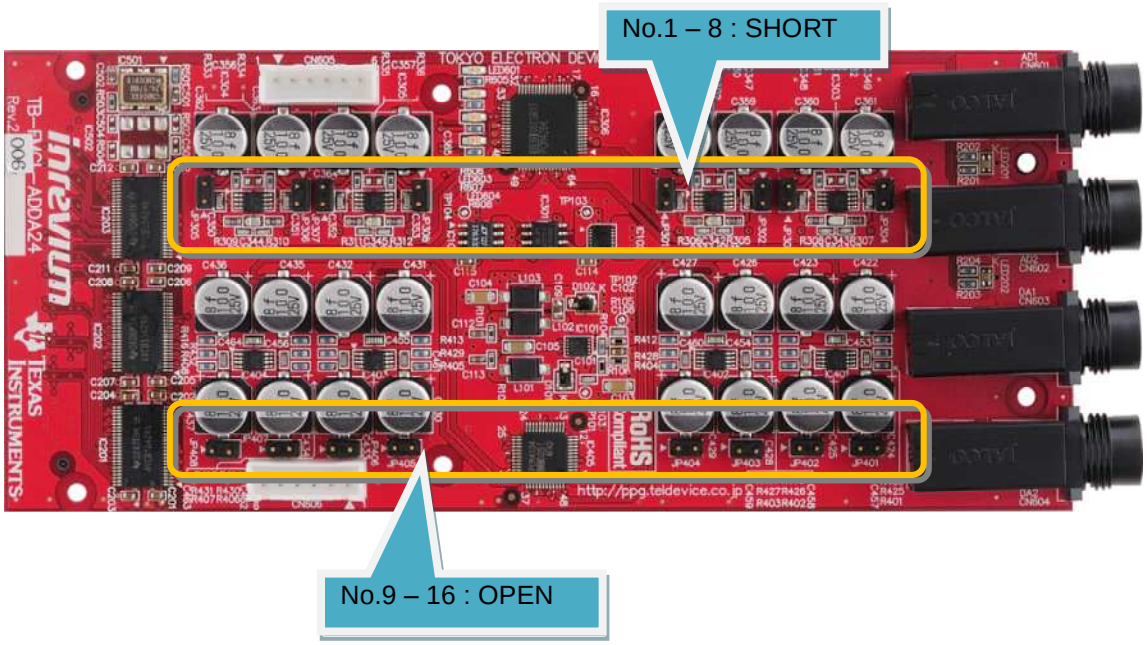

Figure10-1 Factory Default Board Settings

Table 10-1 Factory Default Settings

No.	Silk No.	Initial Setting	Function
1	JP301	SHORT	Rated Input + 4dBu, Max Input + 18dBu (balanced inputs)
2	JP302	SHORT	Rated Input + 4dBu, Max Input + 18dBu (balanced inputs)
3	JP303	SHORT	Rated Input + 4dBu, Max Input + 18dBu (balanced inputs)
4	JP304	SHORT	Rated Input + 4dBu, Max Input + 18dBu (balanced inputs)
5	JP305	SHORT	Rated Input + 4dBu, Max Input + 18dBu (balanced inputs)
6	JP306	SHORT	Rated Input + 4dBu, Max Input + 18dBu (balanced inputs)
7	JP307	SHORT	Rated Input + 4dBu, Max Input + 18dBu (balanced inputs)
8	JP308	SHORT	Rated Input + 4dBu, Max Input + 18dBu (balanced inputs)
9	JP401	OPEN	Rated Output + 4dBu, Max Output + 18dBu (balanced outputs)
10	JP402	OPEN	Rated Output + 4dBu, Max Output + 18dBu (balanced outputs)
11	JP403	OPEN	Rated Output + 4dBu, Max Output + 18dBu (balanced outputs)
12	JP404	OPEN	Rated Output + 4dBu, Max Output + 18dBu (balanced outputs)
13	JP405	OPEN	Rated Output + 4dBu, Max Output + 18dBu (balanced outputs)
14	JP406	OPEN	Rated Output + 4dBu, Max Output + 18dBu (balanced outputs)
15	JP407	OPEN	Rated Output + 4dBu, Max Output + 18dBu (balanced outputs)
16	JP408	OPEN	Rated Output + 4dBu, Max Output + 18dBu (balanced outputs)

TOKYO ELECTRON DEVICE

PLD Solution Dept. PLD Division
URL: **http://solutions.inrevium.com/**
E-mail: psd-support@teldevice.co.jp

HEAD Quarter: Yokohama East Square, 1-4 Kinko-cho, Kanagawa-ku, Yokohama City,
Kanagawa, Japan 221-0056
TEL: +81-45-443-4016 FAX: +81-45-443-4058