

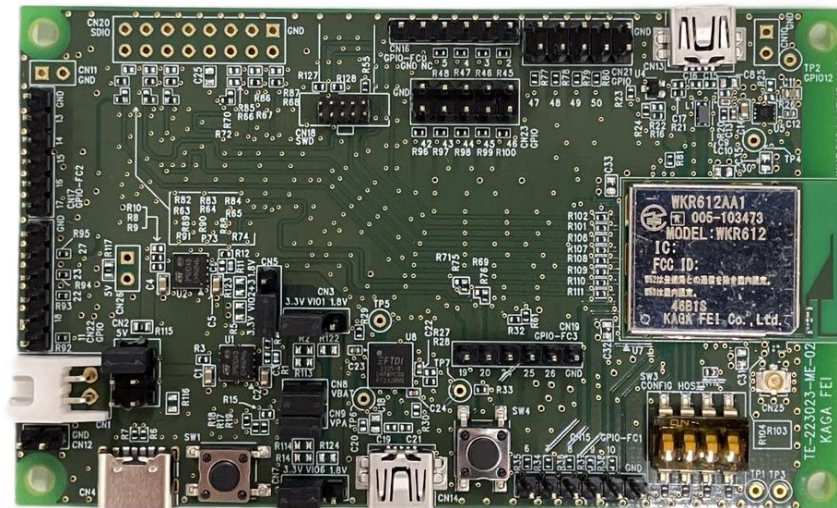
EVALUATION BOARD MANUAL

WKR612AA1-EVB

EVALUATION KIT MANUAL

WKR612AA1-EVK

For WKR612AA1 Wireless LAN Module



To operate this evaluation board, you need to sign a Software License Agreement with NXP Semiconductors and obtain the SDK (Software Development Kit).

This evaluation board is intended for experimental operation and does not guarantee quality. Additionally, the schematics, components, and software used in the evaluation board may not be the latest versions.

ATTENTION: Software related to this module may be under Japan export control. Depending on the customer's country and application (e.g. weapons), KAGA FEI may not be able to provide the software to all customers. Please contact your local KAGA FEI sales office for additional information.

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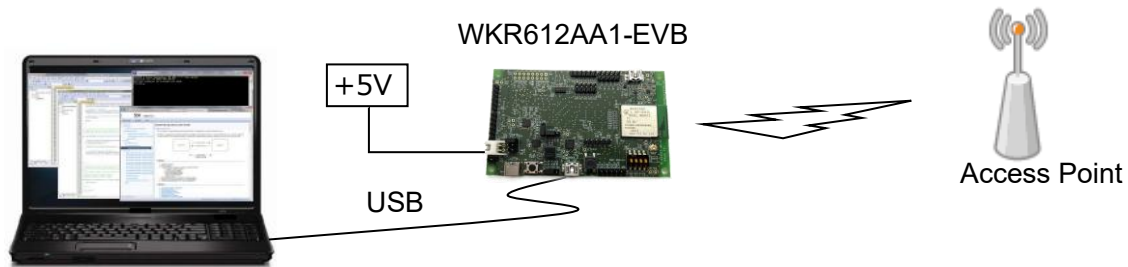
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Rev. History

- 21-Apr.-2023> Rev.1.0 Initial Release
- 29-Nov.-2023> Rev.1.1 This revision improved the datasheet layout for better readability.
- 30-May-2025> Rev.1.3 Minor notational inconsistencies corrected.
- 13-Jun-2025> Rev.1.4 Added accessory photos.
- 01-Dec-2025> Rev.1.5 Added accessories.

1. Introduction

The evaluation board is designed for customers to easily work with “WKR612AA1”, **MCU embedded Wireless LAN** module, for functional evaluation purposes. This document describes the hardware configuration and the usage.



A USB cable enables serial UART interface communication. This board also has the SWD connector terminal for software development.

2. Target Module

WKR612AA1

3. Accessories

1	Evaluation Board + USB cable (WKR612AA1-EVB)	1 set
2	J-Link Lite + USB cable for Evaluation Board (WKR612AA1-EVK Only)	1 set
3	Power Supply Cable (WKR612AA1-EVB , WKR612AA1-EVK)	1 piece

1. WKR612AA1-EVB



2. WKR612AA1-EVK



3. Power Supply Cable



The J-Link Lite is only delivered and supported as part of an evaluation kit, which includes an evaluation board. It may only be used with the evaluation board it came with, and is not to be used for commercial product development.

4. Recommended Operating Environment

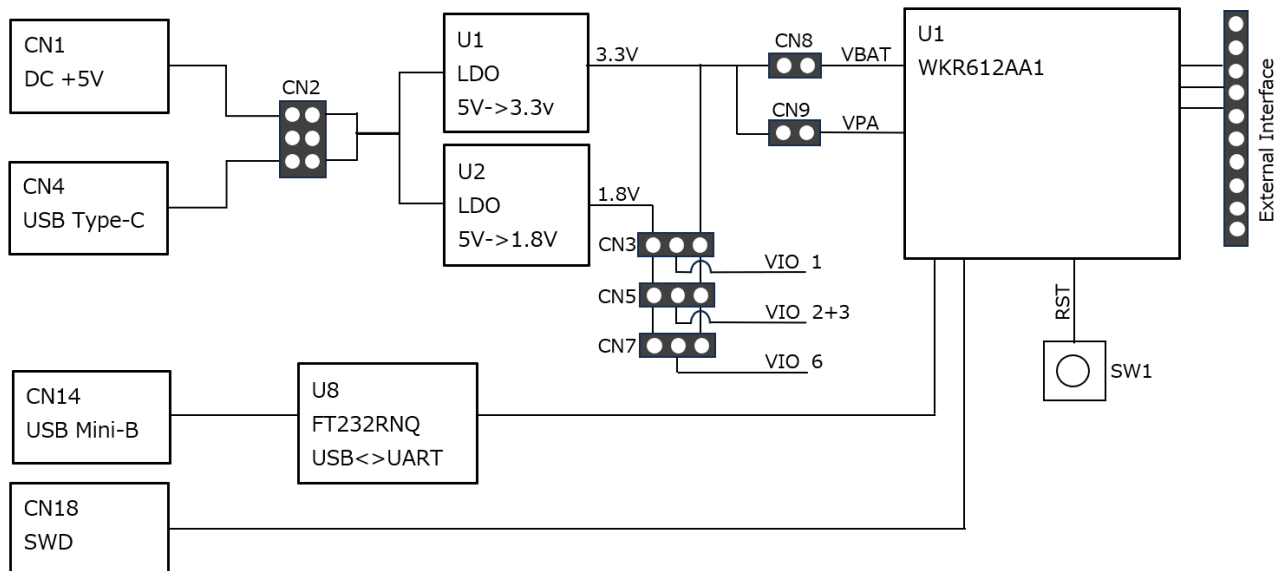
HOST PC:

- CPU: 1000MHz or higher
- Interface: USB

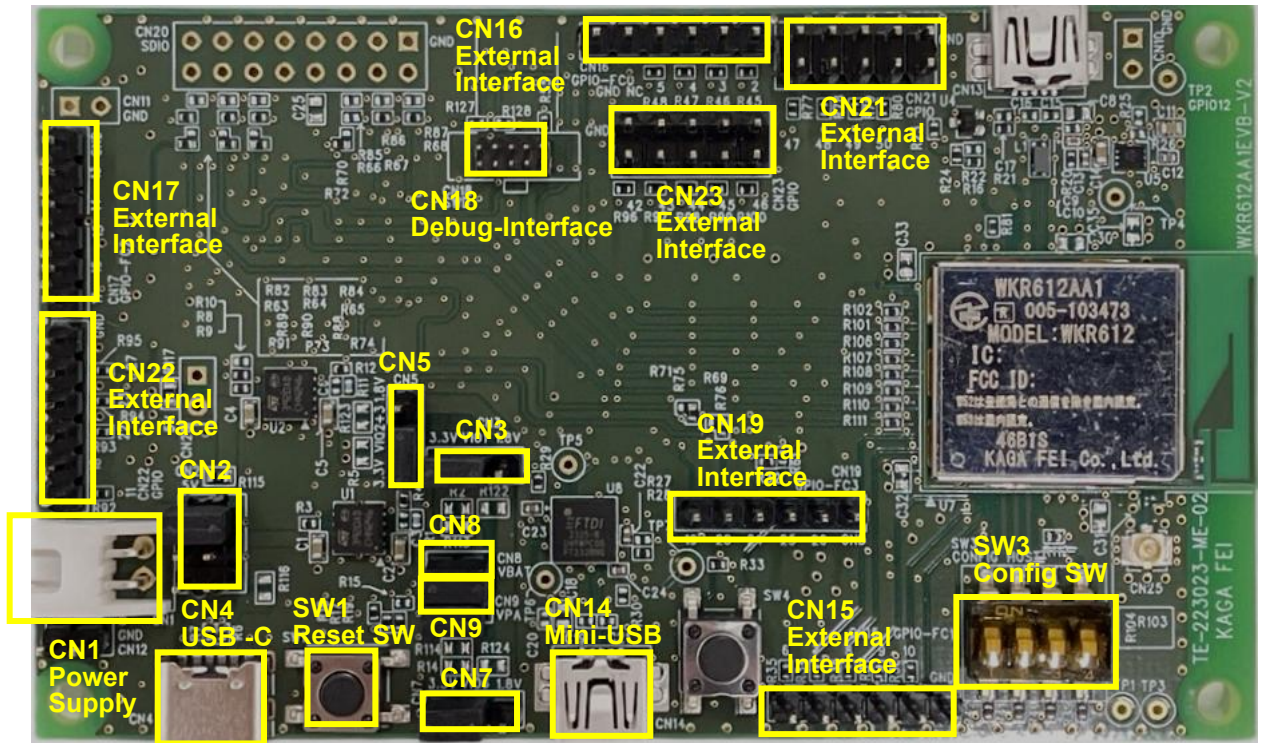
DC Power Supply: Please connect to an external power supply of 5V (1A or more).

5. Block Diagram

WKR612AA1-EVB has several connectors. CN14 (USB mini-B connector) is used for USB signals that is converted from UART by FT232RNQ. The embedded application running on WKR612AA1 uses UART as a host interface usually.



6. Evaluation Board Layout



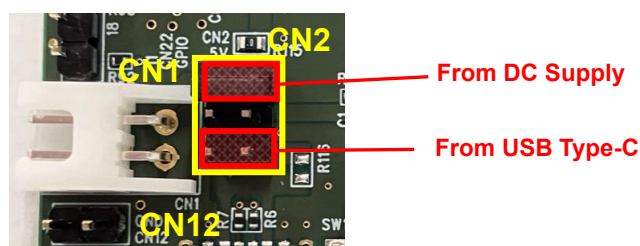
7. Power Supply Configuration.

WKR612AA1 modules are supplied with 3.3V and selectable VIO/VIO_SD voltages at 3.3V and 1.8V. The following power supply options are available on the EVB:

- External sources: 5V power is supplied from external power sources through connector CN1. To use the external DC power supply, set the jumper CN2 to the "From DC Supply" position.
- USB interface: Power is supplied from the USB Type-C (CN4) socket. To use the USB Type-C power supply, set the jumper CN2 to the "From USB Type-C" position.

All internal voltages are generated by DC-DC converters on the EVB.

Additionally, CN12 is connected to ground and can be used as a reference ground terminal if needed.



8.VIO Configuration

The VIO_1, VIO_6, and VIO_2+3 (SD voltage) of the WKR612AA1 module can be selected between 1.8V or 3.3V using jumpers. The default configuration supplies all with 3.3V.

CN3 : VIO_1

CN5 : VIO_2+3

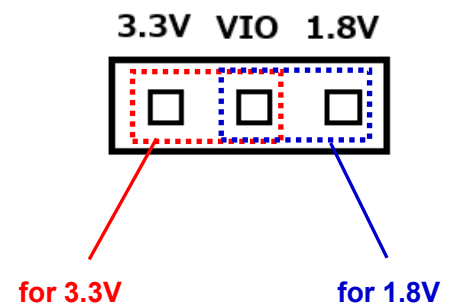
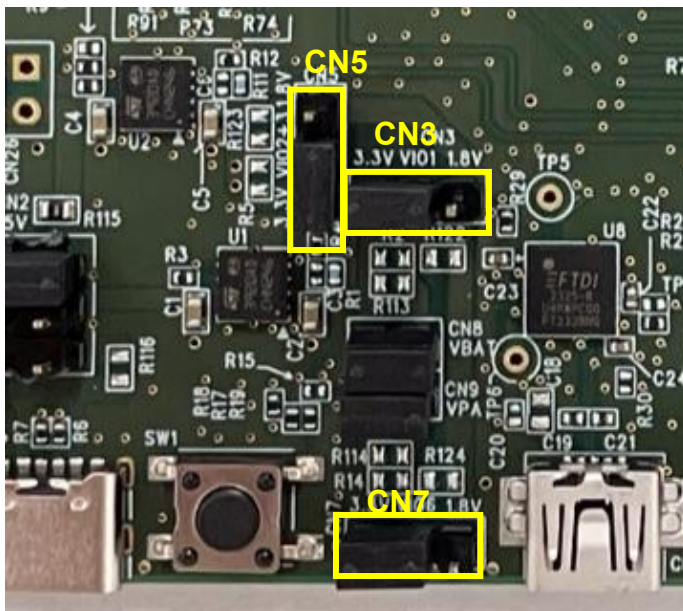
CN7 : VIO_6

Place the jumpers in the following positions to select the desired voltage:

For 3.3V: Place the jumper in the position marked in red in the diagram.

For 1.8V: Place the jumper in the position marked in blue in the diagram.

Set each jumper to the required voltage based on your application. After setting the jumpers, ensure the correct voltage is being supplied.



9.Current measurement

It is possible to measure the current consumption of the WKR612AA1 module individually on each supply rail. The jumpers correspond to the power rails as follows:

- CN8: VBAT
- CN9: VPA
- CN3: VIO_1
- CN5: VIO_2+3
- CN7: VIO_6

10. Pin Description of Evaluation Board

The interfaces and external terminals of the WKR612AA1 are connected via connectors CN15 to CN23.

Each pin's signal is indicated by silkscreen printing.

CN15 External Interface

Silk	Name	Direction	Description
6	GPIO[6]	Input/Output	GPIO/JTAG_TCK
7	GPIO[7]	Input/Output	GPIO/JTAG_TMS
8	GPIO[8]	Input/Output	GPIO/JTAG_TDI
9	GPIO[9]	Input/Output	GPIO/JTAG_TDO
10	GPIO[10]	Input/Output	GPIO/JTAG_TRSTN
GND	Ground	-	Ground

CN16 External Interface

Silk	Name	Direction	Description
GND	Ground	-	Ground
NC	-	-	
5	GPIO[5]	Input/Output	GPIO//MCLK
4	GPIO[4]	Input/Output	GPIO/CLKIN_FRM_PD
3	GPIO[3]	Input/Output	GPIO
2	GPIO[2]	Input/Output	GPIO

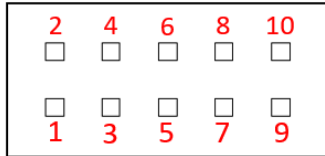
CN17 External Interface

Silk	Name	Direction	Description
17	GPIO[17]	Input/Output	GPIO/SDIO_CMD
16	GPIO[16]	Input/Output	GPIO/SDIO_DATA3
15	GPIO[15]	Input/Output	GPIO/SD_CLK
14	GPIO[14]	Input/Output	GPIO/SWD_IO
13	GPIO[13]	Input/Output	GPIO/SWD_CLK
GND	Ground	-	Ground

CN18 Debug Interface (not used by KAGA FEI Co., Ltd. standard application)

There is no silkscreen labeling for each signal on CN18.

The pin assignments are based on the orientation of the connector's silkscreen and are arranged as shown in the diagram below.



CN18

Pin #	Name	Direction	Description
1	VIO_2+3	Input	1.8 V/3.3 V digital I/O power supply
2	GPIO[14]	Input/Output	GPIO/SWD_IO
3	GND	-	Ground
4	GPIO[13]	Input/Output	GPIO/SWD_CLK
5	GND	-	Ground
6	NC	-	
7	NC	-	
8	NC	-	
9	GND	-	Ground
10	SWD	Input	NRESET

CN19 External Interface

Silk	Name	Direction	Description
19	GPIO[19]	Input/Output	GPIO/SDIO_DATA0
20	GPIO[20]	Input/Output	GPIO//SDIO_DATA1
24	GPIO[24]	Input/Output	GPIO
25	GPIO[25]	Input/Output	GPIO
26	GPIO[26]	Input/Output	GPIO
GND	GND	-	Ground

CN20 Not Use

CN21 External Interface

Silk	Name		Description
47	GPIO[47]	Input/Output	GPIO/ADC0_5
-	GND	-	Ground
48	GPIO[48]	Input/Output	GPIO/ADC0_6/ ADC1_6
-	GND	-	Ground
49	GPIO[49]	Input/Output	GPIO/ADC0_7/ ADC1_7
-	GND	-	Ground
50	GPIO[50]	Input/Output	GPIO/ADC_DAC_TRIGGER0
-	GND	-	Ground
-	NC	-	-
-	NC	-	-

CN22 External Interface

Silk	Name		Description
11	GPIO[11]	Input/Output	GPIO
18	GPIO[18]	Input/Output	GPIO/SDIO_DATA2
22	GPIO[22]	Input/Output	GPIO/AON_XTAL32K_IN/SLP_CLK_32K
23	GPIO[23]	Input/Output	GPIO/AON_XTAL32K_OUT
27	GPIO[27]	Input/Output	GPIO/AON_OUT
GND	GND	-	Ground

CN23 External Interface

Silk	Name		Description
42	GPIO[42]	Input/Output	GPIO/ADC0_0
-	GND	-	Ground
43	GPIO[43]	Input/Output	GPIO/ADC0_1
-	GND	-	Ground
44	GPIO[44]	Input/Output	GPIO/ADC0_2
-	GND	-	Ground
45	GPIO[45]	Input/Output	GPIO/ADC0_3
-	GND	-	Ground
46	GPIO[46]	Input/Output	GPIO/ADC0_4
-	GND	-	Ground

12. Switches

The WKR612AA1-EVB features two switches:

SW1 (Reset Switch): Resets the module.

SW3 (Boot Config): When using the internal FLASH, all switches SW3-1 to SW3-4 must be set to the OFF position.

13. Software

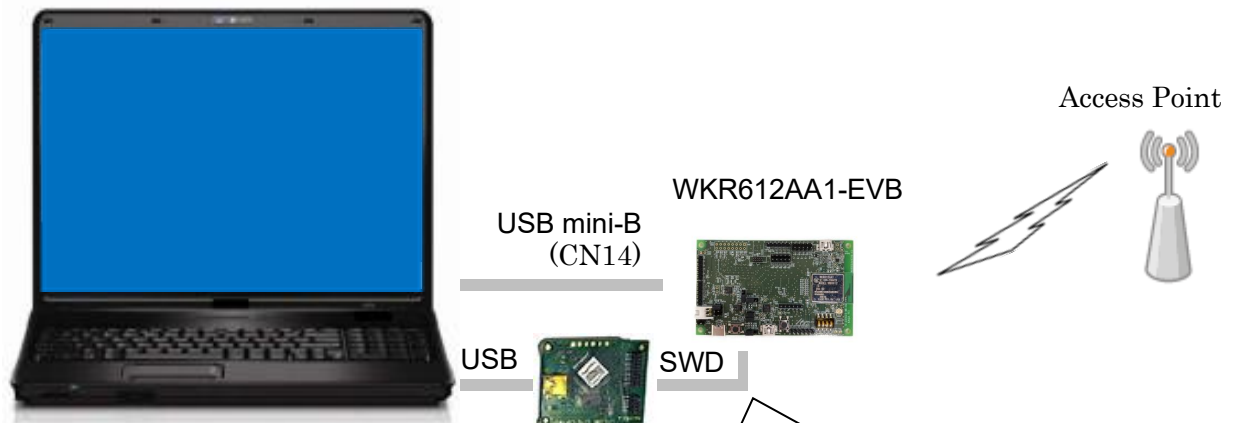
Device Drivers for FT232RNQ:

FT232RNQ USB-UART converter is built into this board. FT232RNQ is made by Future Technology Devices International Limited. Download the USB driver from following URL.

<http://www.ftdichip.com/>

13. Example of Connection for Evaluation

- Supply 5V from an external power source. (Use CN1 or CN4)
- Connect a USB cable between PC and WKR612AA1-EVB. (Connect to CN14)
- Run serial terminal software. The default baud rate of the module is 115.2kbps.
Please configure baud rate of serial terminal software.

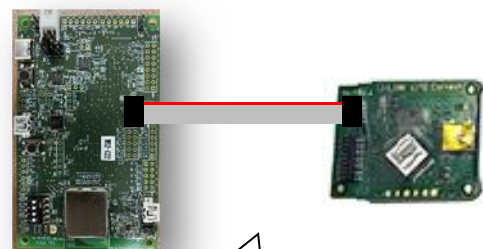


J-Link LITE(*) CortexM33 JTAG/SWD Emulator that attached with WKR612AA1-EVK is used for debugging.



※SWD : Serial Wire Debug

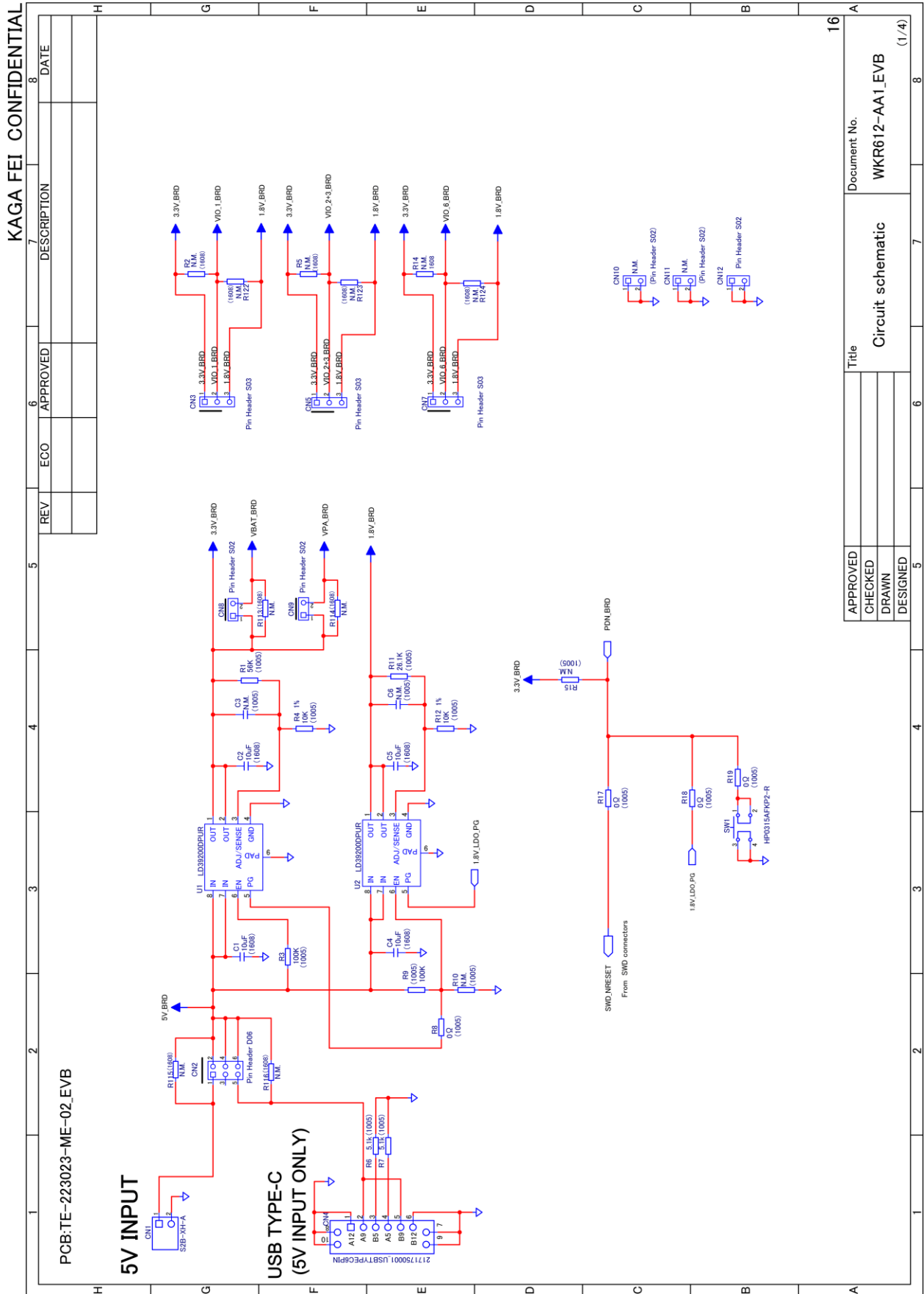
CN18 supports the connection of the 10-pin 1.27 mm flat cable.

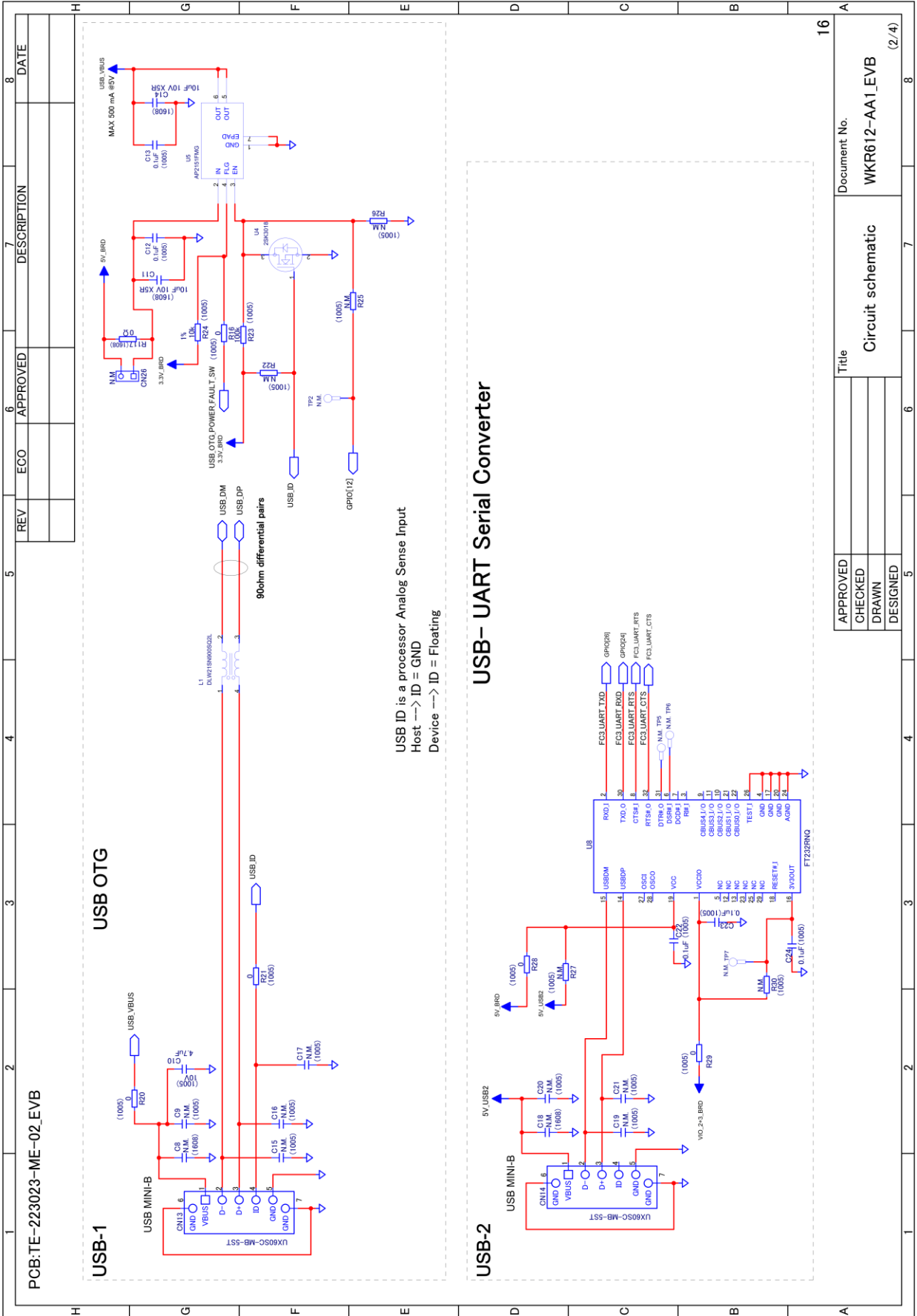


Please be careful about the directions.

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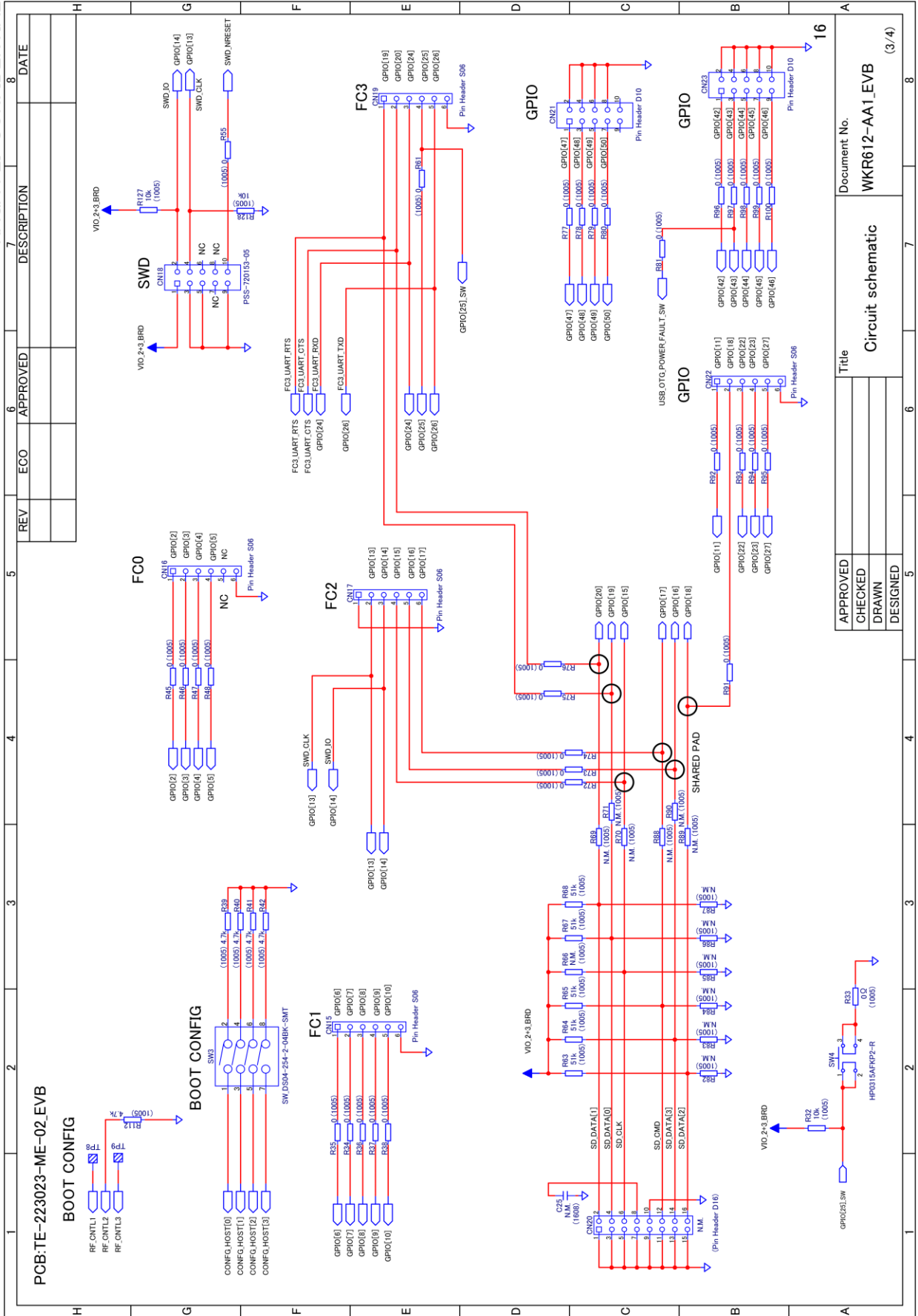
14. Schematic of Evaluation Board



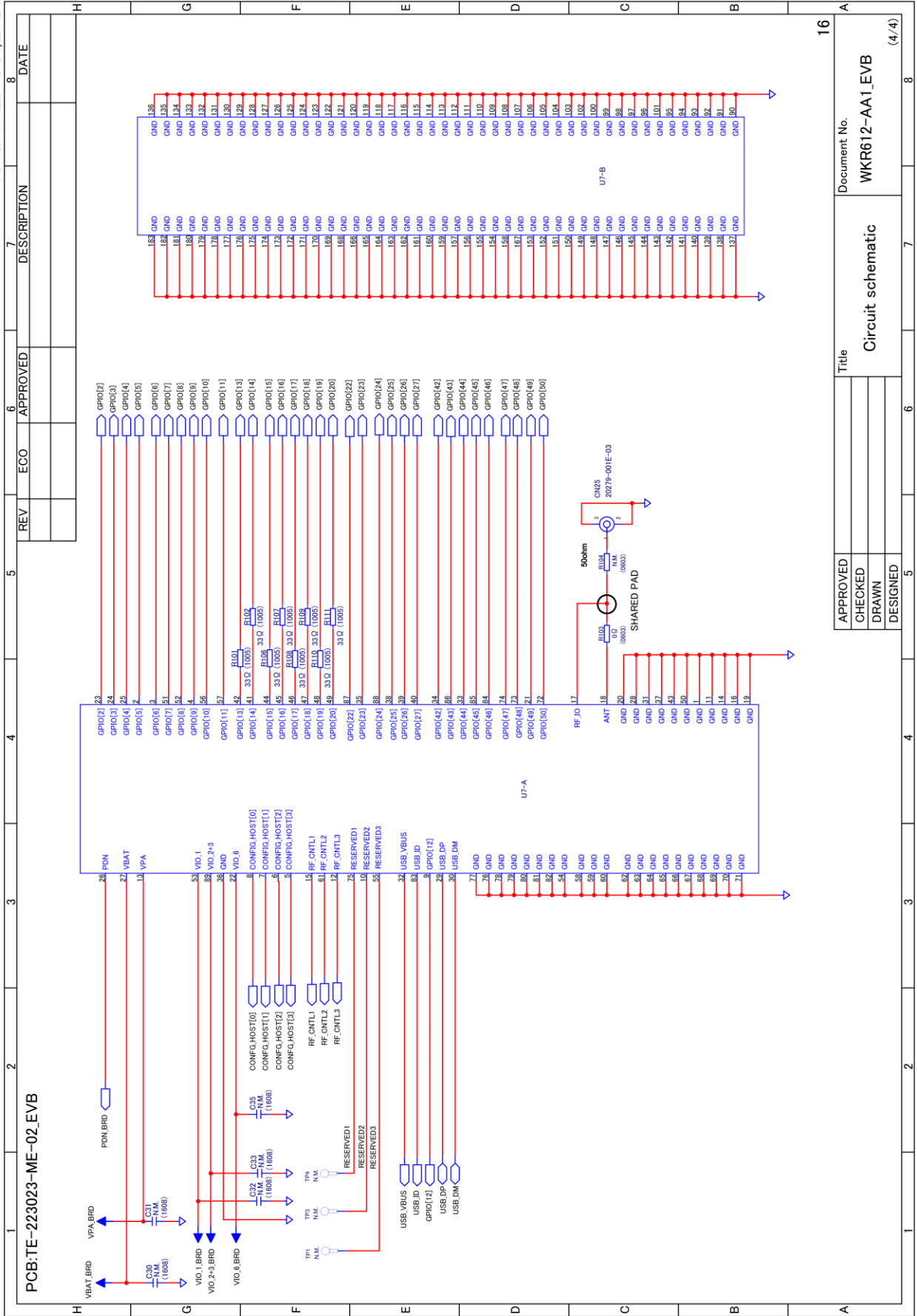


APPROVED		Title		Document No.		16
CHECKED		Circuit schematic		WKR612-AA1_EVB		8
DRAWN						(2/4)
DESIGNED						

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REV	ECO	APPROVED	DESCRIPTION	DATE

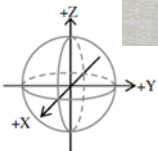
APPROVED	TITLE	DOCUMENT NO.
	Circuit schematic	WKR612-AA1_EVB
CHECKED		
DRAWN		
DESIGNED		

15. The antenna characteristics example has been updated.

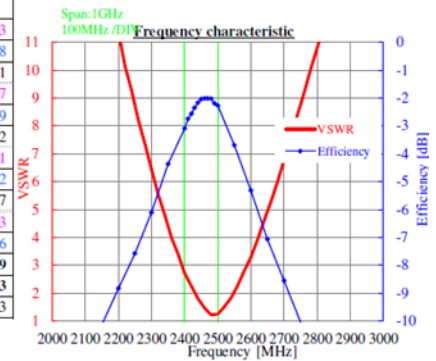
2.4GHz Band

Measurement data of antenna

Appearance and coordinates definition

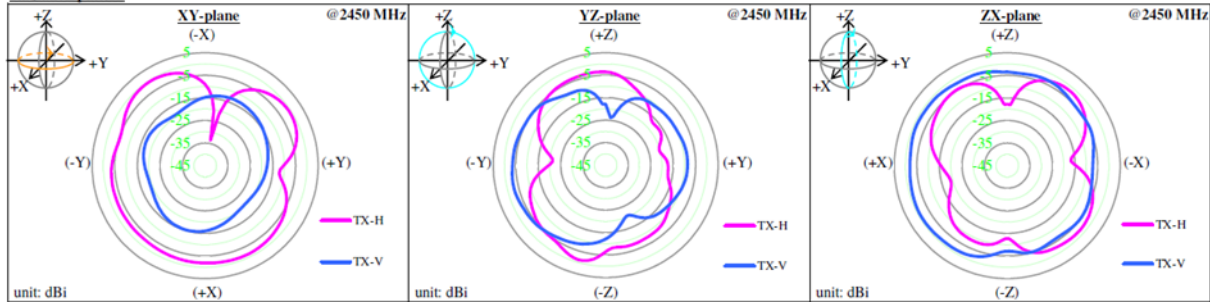


Frequency [MHz]	@2400	@2450	@2500
Peak gain	[dBi]		
3-plane			
TX-H	-1.7	-0.4	-0.7
TX-V	-2.1	-0.8	-0.9
	-1.7	-0.4	-0.7
Average gain	[dBi]		
XY-plane			
TX-H	-4.5	-3.1	-3.3
TX-V	-17.3	-16.5	-16.8
Plus(H,V)	-4.3	-2.9	-3.1
YZ-plane			
TX-H	-7.9	-6.9	-6.7
TX-V	-8.5	-7.3	-7.9
Plus(H,V)	-5.2	-4.1	-4.2
XZ-plane			
TX-H	-6.9	-6.3	-7.1
TX-V	-4.6	-3.2	-3.2
Plus(H,V)	-2.6	-1.5	-1.7
3plane			
TX-H	-6.2	-5.1	-5.3
TX-V	-7.7	-6.4	-6.6
	-3.9	-2.7	-2.9
Efficiency [dB]	-3.1	-2.0	-2.3
VSWR [:1]	2.7	1.6	1.3



*Note: The value is average value in 1 round of each inclination direction angle.

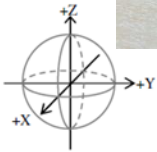
Radiation pattern



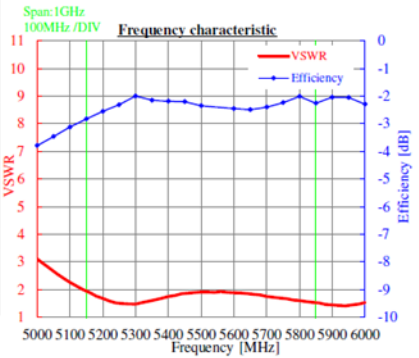
5GHz Band

Measurement data of antenna

Appearance and coordinates definition

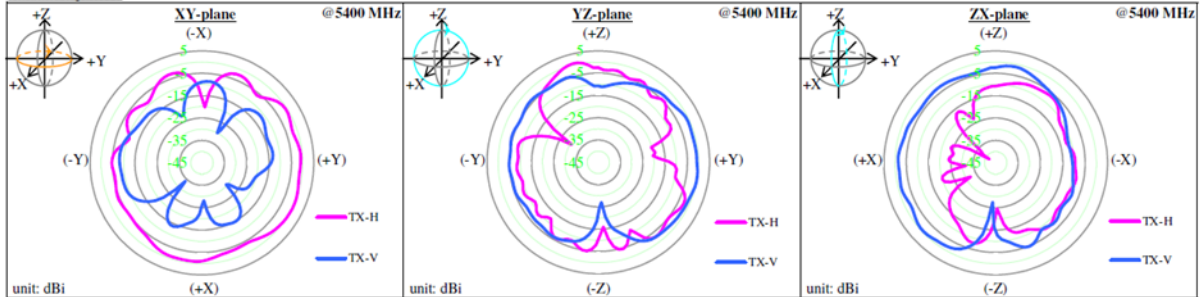


Frequency [MHz]	@5150	@5400	@5850	
Peak gain [dBi]				
3-plane	TX-H	-0.7	0.8	3.0
	TX-V	-0.7	-0.1	3.2
		-0.7	0.8	3.2
Average gain [dBi]				
XY-plane	TX-H	-4.1	-3.1	-2.9
	TX-V	-15.3	-13.1	-14.9
	Plus(H,V)	-3.8	-2.6	-2.6
YZ-plane	TX-H	-5.6	-5.1	-6.1
	TX-V	-4.0	-3.5	-6.8
	Plus(H,V)	-1.7	-1.2	-3.4
XZ-plane	TX-H	-11.3	-11.4	-12.0
	TX-V	-7.3	-4.2	-0.9
	Plus(H,V)	-5.8	-3.4	-0.6
3plane	TX-H	-6.1	-5.3	-5.6
	TX-V	-6.9	-5.3	-4.6
		-3.5	-2.3	-2.0
Efficiency [dB]	-2.8	-2.2	-2.3	
VSWR [:1]	2.0	1.8	1.5	



*Note: The value is average value in 1 round of each inclination direction angle.

Radiation pattern



16. Antenna Configuration

The WKR612AA1-EVB is initially connected to the internal antenna. However, it can be switched to the U.FL connector by adjusting jumper R104.

