MT2511 Biosensor Daughterboard for LinkIt™ 2523 HDK User's Guide

Version: 1.0

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Document Revision History

Revision	Date	Description
1.0	17 June 2016	Initial version for the PCB version (MTK0067) of MT2511 Biosensor Daughterboard.

Table of contents

Lists of tables and figures

1. Introduction

MediaTek MT2511 biosensor daughterboard is designed for LinkIt 2523 hardware development kit (HDK). The daughterboard contains a receiver channel, two current sinks of up to 100mA to use for LEDs, two dry electrode channels and one right-leg drive (RLD). The MT2511 communicates with the MCU through the I2C or SPI interface and can be clocked with an external clock or external crystal.
The schematic layout of the daughterboard is shown in Figure 1, the top and bottom views of the actual board are in Figure 2 and Figure 3, respectively.

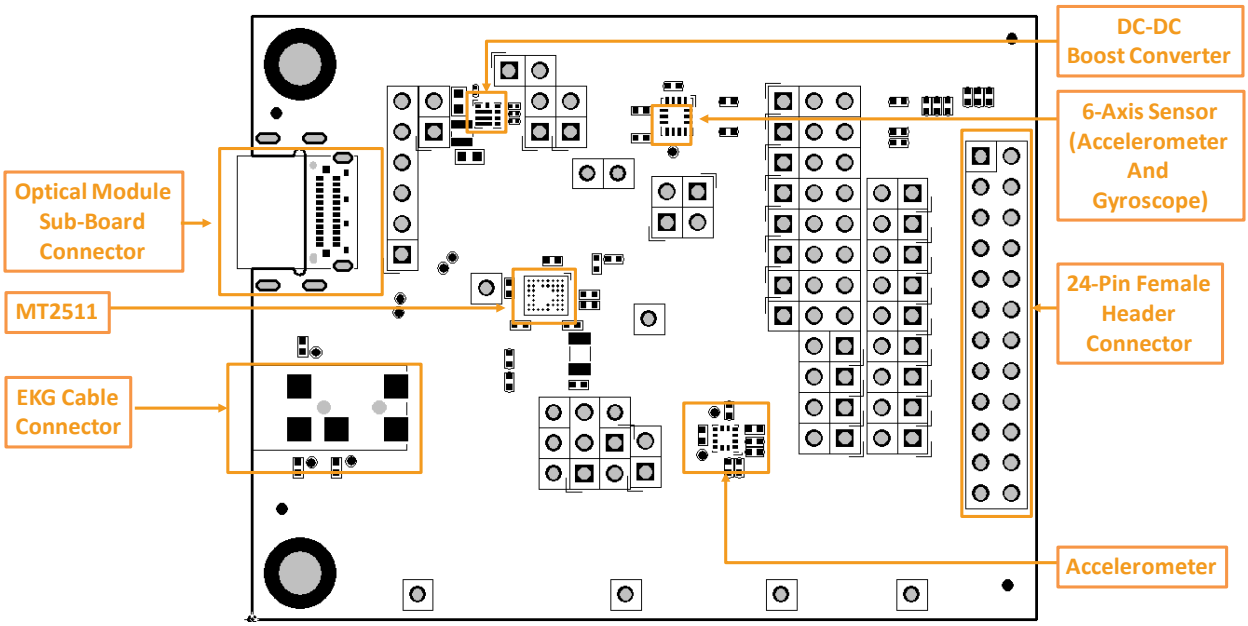


Figure 1. Schematic layout of the daughterboard

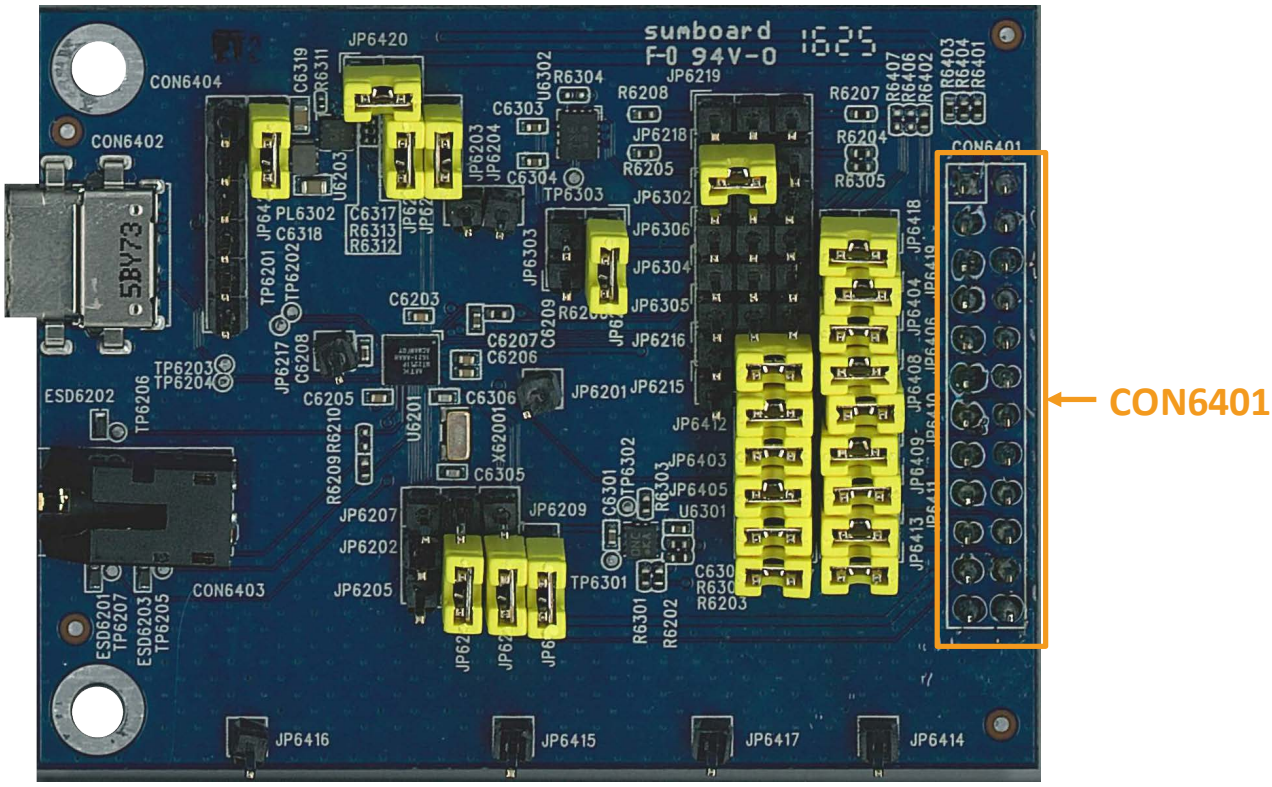


Figure 2. MT2511 biosensor daughterboard's top view

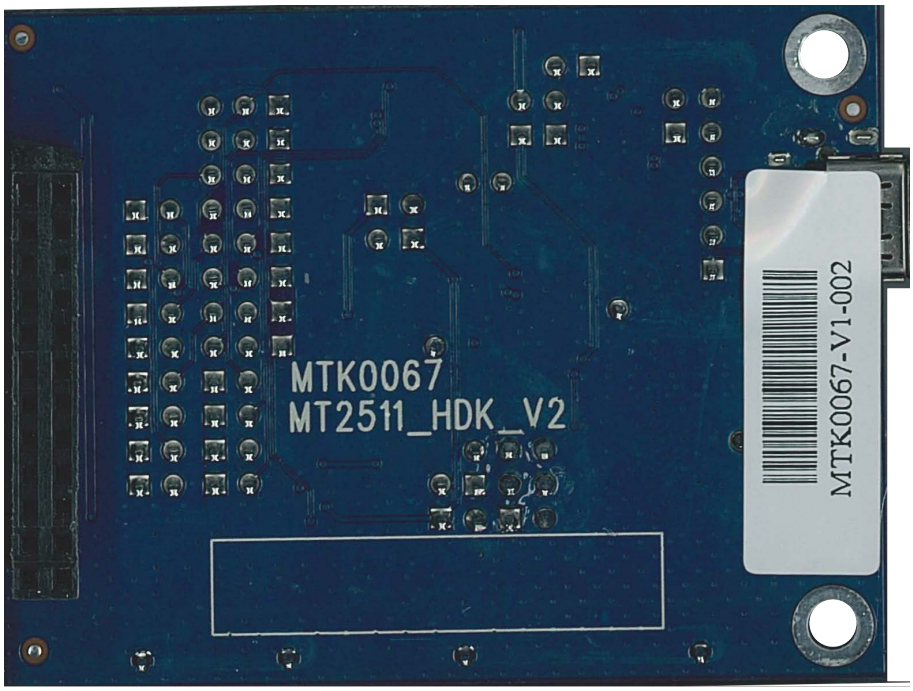


Figure 3. MT2511 biosensor daughterboard's bottom view

This document guides you through:

- Describing the hardware features of the MT2511 biosensor daughterboard.

- Configuring the daughterboard with specific pin and jumper assignments to achieve various functionalities.
- Providing the hardware schematics for more detailed configuration and reference design.
- Listing bill of materials (BOM) for the daughterboard.

2. Hardware Configuration

The LinkIt 2523 HDK supports sensor connectivity through I2C and SPI interfaces. The connector **Sensor** on the LinkIt 2523 HDK is reserved for the MT2511 biosensor daughterboard.

This section provides details on how to setup the daughterboard with LinkIt 2523 HDK.

2.1. Installing the MT2511 biosensor daughterboard on LinkIt 2523 HDK

Before connecting the daughterboard onto LinkIt 2523 HDK, set up the camera daughterboard jumpers as shown in Figure 4. More details on the camera daughterboard connector can be found in the LinkIt 2523 User's Guide under `<sdk_root>/doc/HDK`.

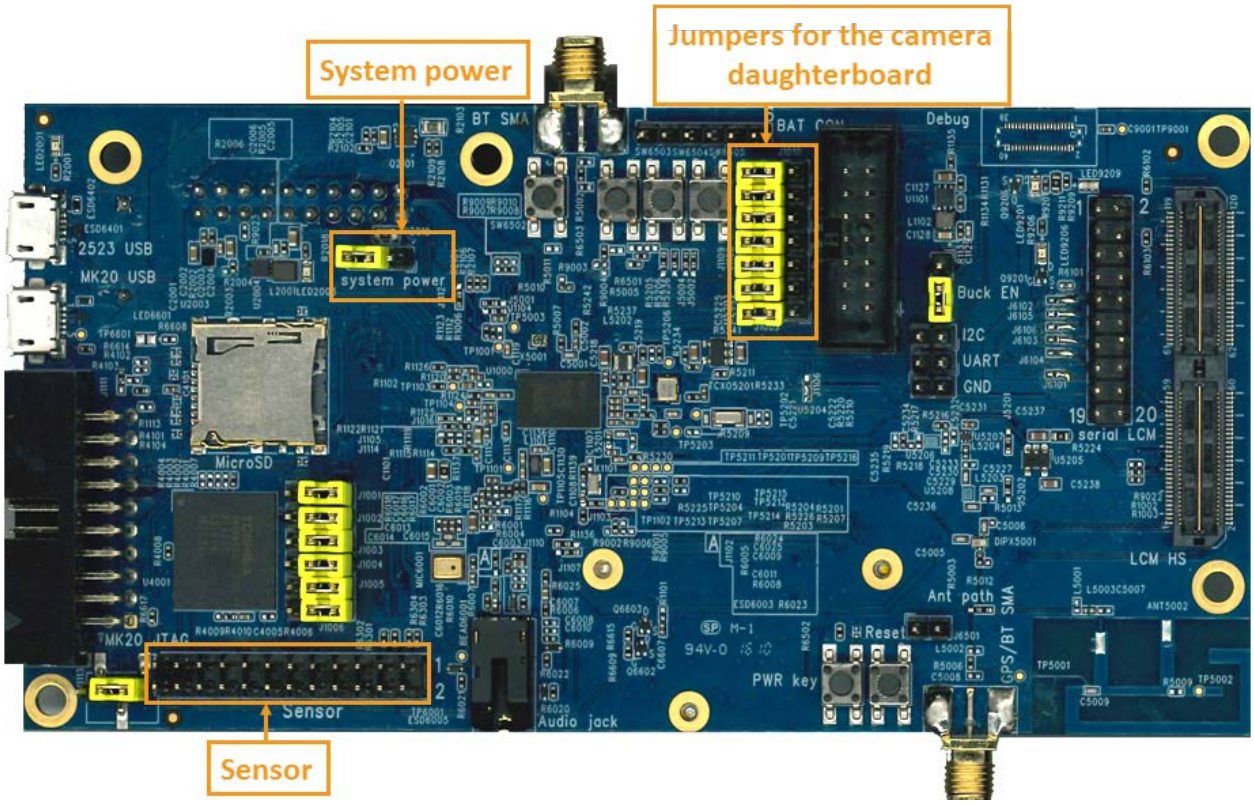


Figure 4. LinkIt 2523 HDK's top view

The daughterboard connected to the LinkIt 2523 HDK is shown in Figure 5.

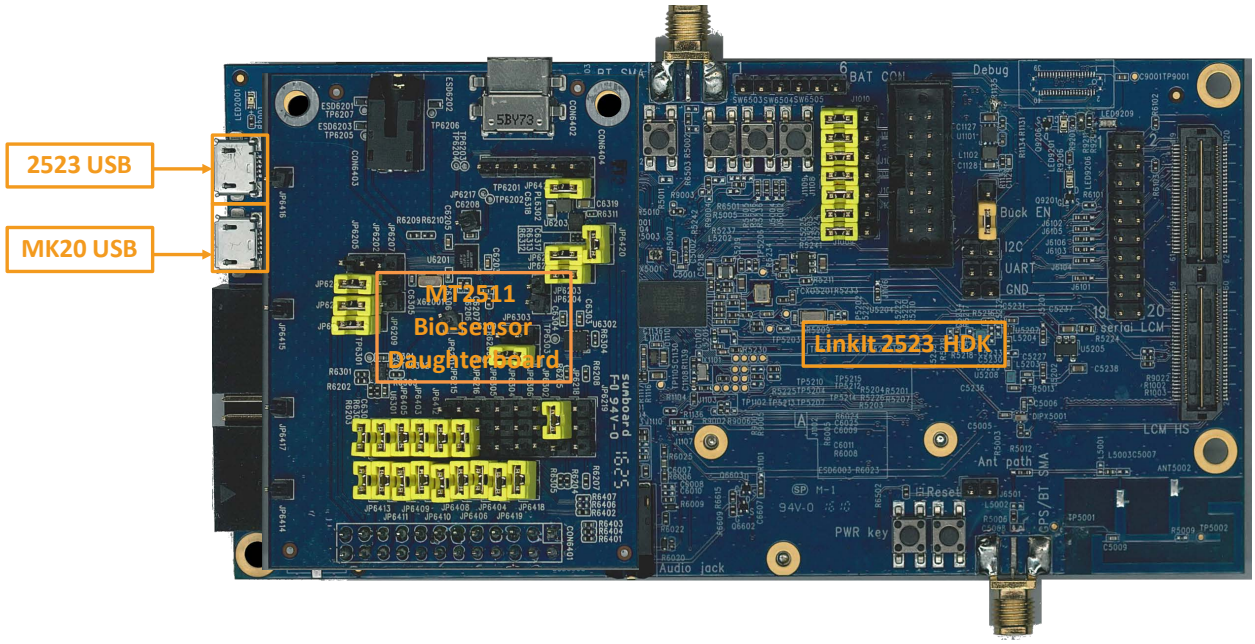


Figure 5. Connection between the daughterboard and LinkIt 2523 HDK

2.2. Build the hardware for measurement and analysis

The MT2511 biosensor daughterboard is designed especially for LinkIt 2523 HDK and cannot operate separately. The full set of required accessories in the MT2511 biosensor daughterboard kit includes an EKG cable, optical module sub-board, optical module sub-board connector cable, optical module sub-board Velcro strap, as shown in Figure 6.

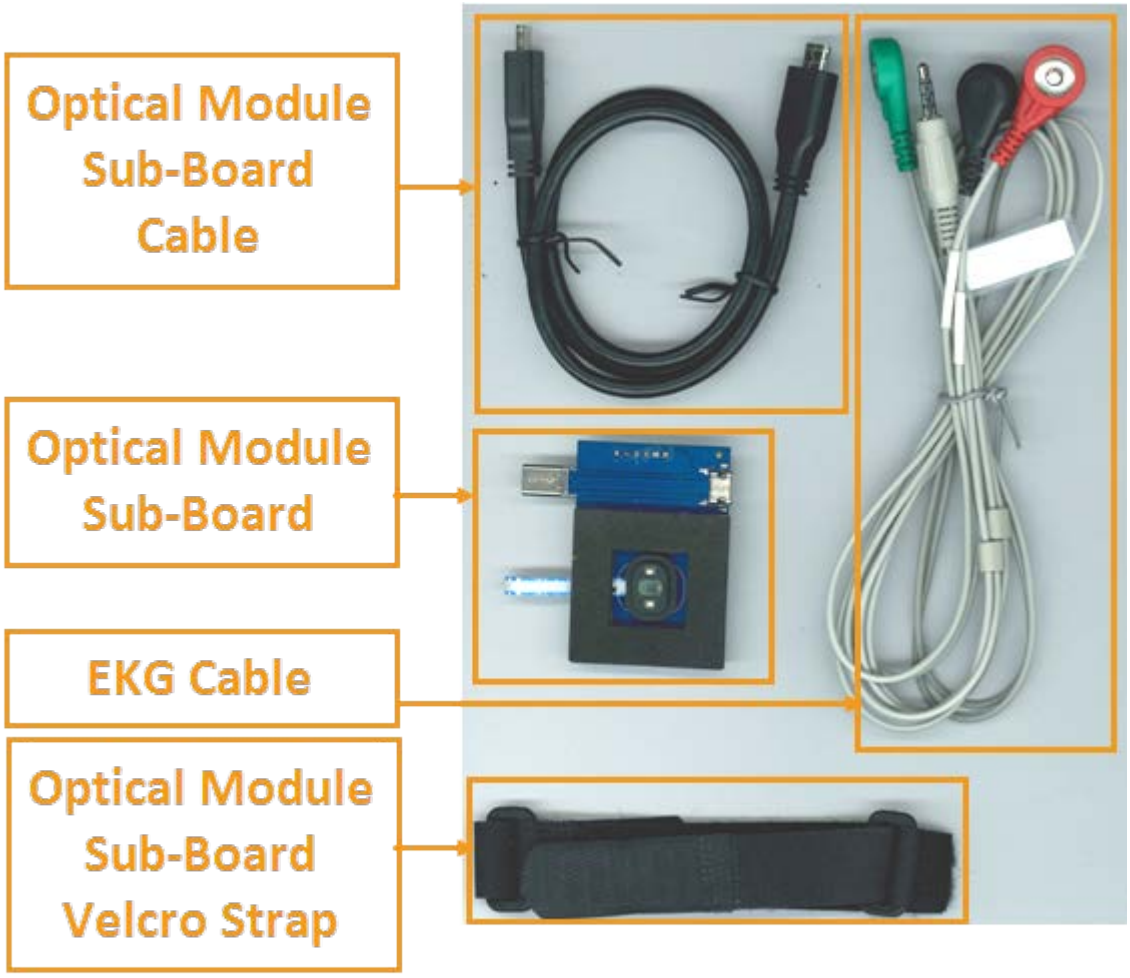


Figure 6. The required set of accessories included in the MT2511 biosensor daughterboard kit

2.2.1. Measuring the vital signals

The daughterboard has two connectors; one is to connect the EKG cable for measuring the EKG signal and the other one is to connect optical module sub-board for measuring the PPG signal.

2.2.1.1. PPG signal

Place the sensor side of optical sub-board module on the wrist and tie it snugly with Velcro strap, as shown in Figure 7.

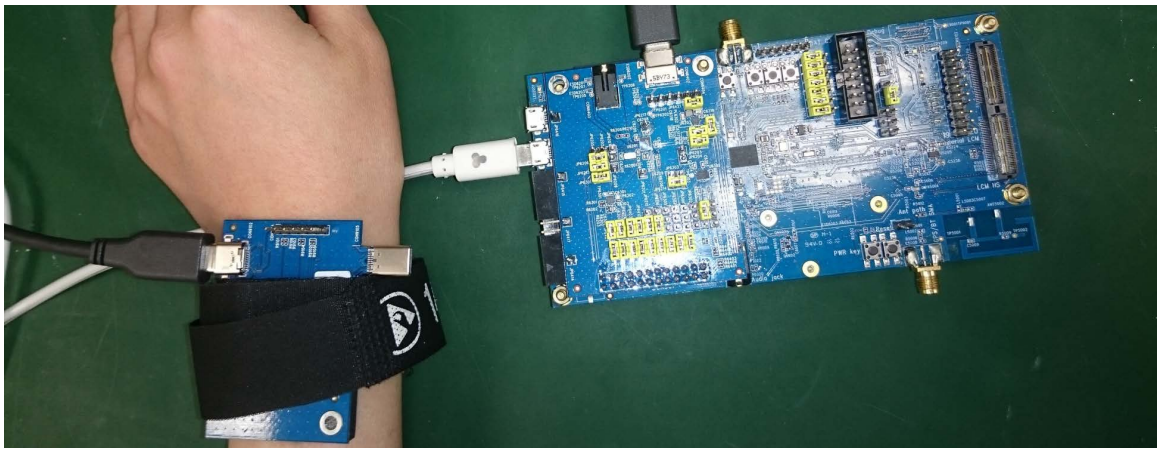


Figure 7. Measuring PPG signal from the wrist hardware setup

2.2.1.2. EKG signal

Attach EKG patches to the EKG cable's sensor heads, and paste VIP_EKG on the left arm, VIN_EKG on the right arm, and VRLD on either one of the arms.

You've now successfully connected the biosensor daughterboard for vital signal measurement (see Figure 8).

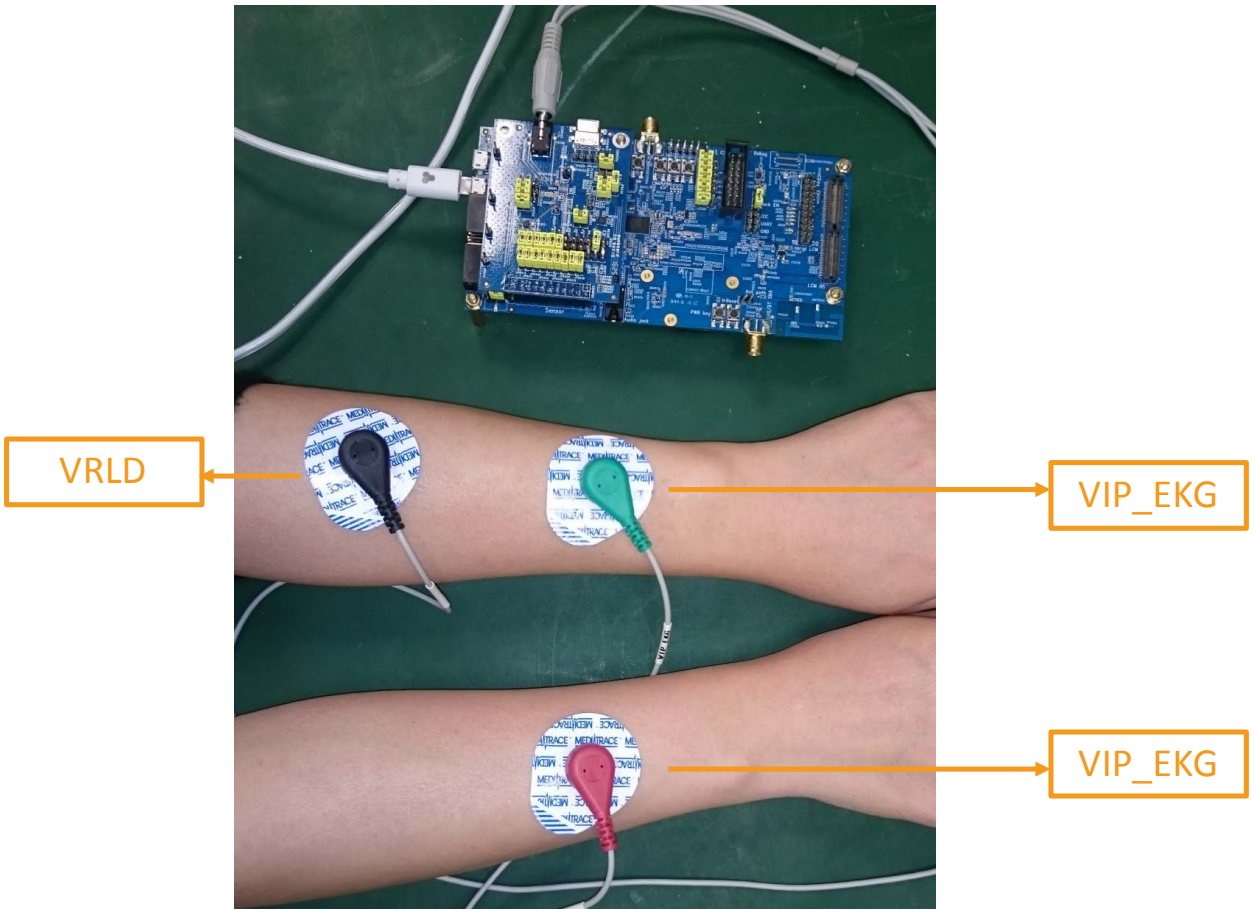


Figure 8. Measuring the EKG signal hardware setup

3. Hardware Description

The MT2511 is a 2-in-1 biosensing AFE (analog front-end) to facilitate biosignal acquisition. The AFE contains low noise voltage and current sensing channels and is capable of sensing EKG and PPG signals simultaneously.

The daughterboard has an accelerometer, a 6-axis sensor with accelerometer and a gyroscope, DC-DC boost converter which provides 5V voltage and the MT2511. The daughterboard connects to the LinkIt 2523 HDK through an MCU connector, an optical module sub-board connector connects the optical module and an EKG connector is used for the EKG cable.

The daughterboard block diagram is shown in Figure 9.

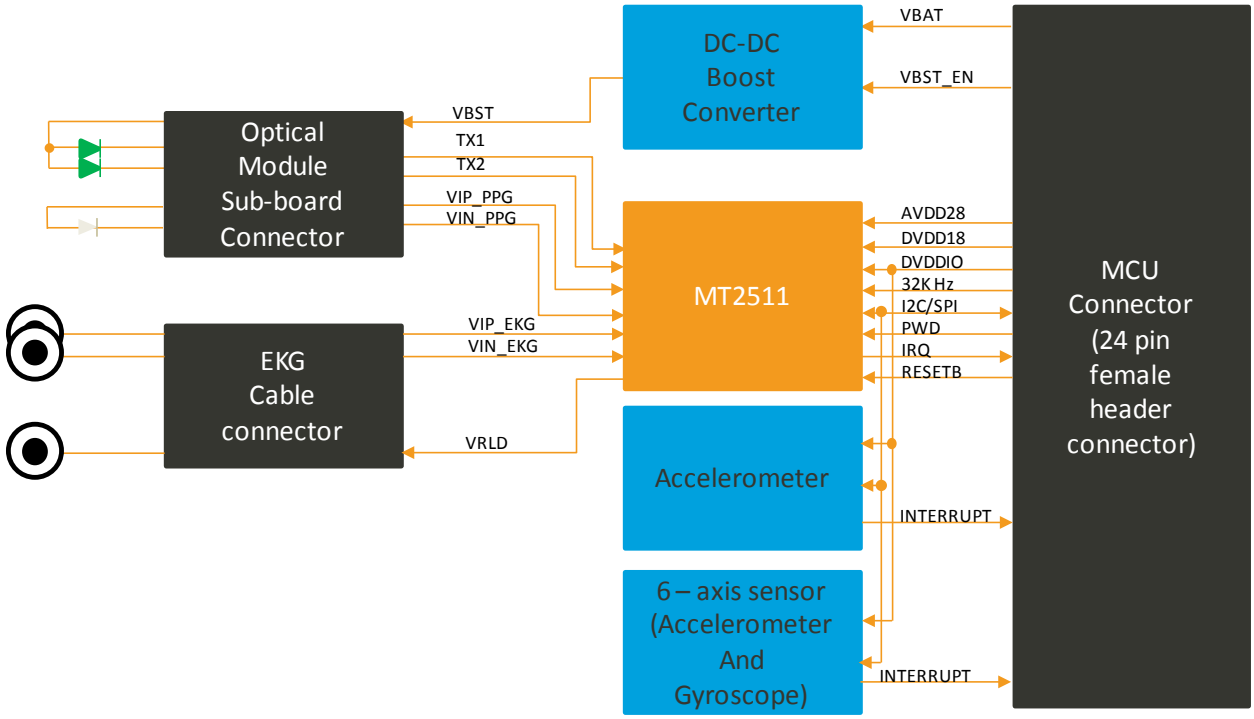


Figure 9. The block diagram of MT2511 biosensor daughterboard

For more details on the daughterboard schematics, see section 8, “Schematics”.

4. Hardware Feature Configuration

4.1. Power supply

The MT2511 can operate from 1.62V to 3.3V IO digital voltage input (DVDDIO), 1.62V to 1.98V digital voltage input (DVDD18), 2.66V to 2.94V analog voltage input (AVDD28), and 2.66V to 4.5V analog voltage input (AVDD45).
The power source of the daughterboard is from the LinkIt 2523 HDK through the MCU connector (24-pin female connector) (CON6401, see Figure 2).

The jumper settings and details on the power supply are provided in Table 1 and Figure 10.

Table 1. MT2511 power supply pins and jumpers

Symbol or pin name	Jumper	Description	Minimum	Typical.	Maximum	Unit
DVDDIO	**JP6214**	Digital voltage input	1.62	2.8	3.3	V
DVDD18	**JP6213**	Digital voltage input	1.62	1.8	1.98	V
AVDD28	**JP6212**	Analog voltage input	2.66	2.8	2.94	V
AVDD45	**JP6208**	Analog voltage input	2.66	2.8	4.5	V

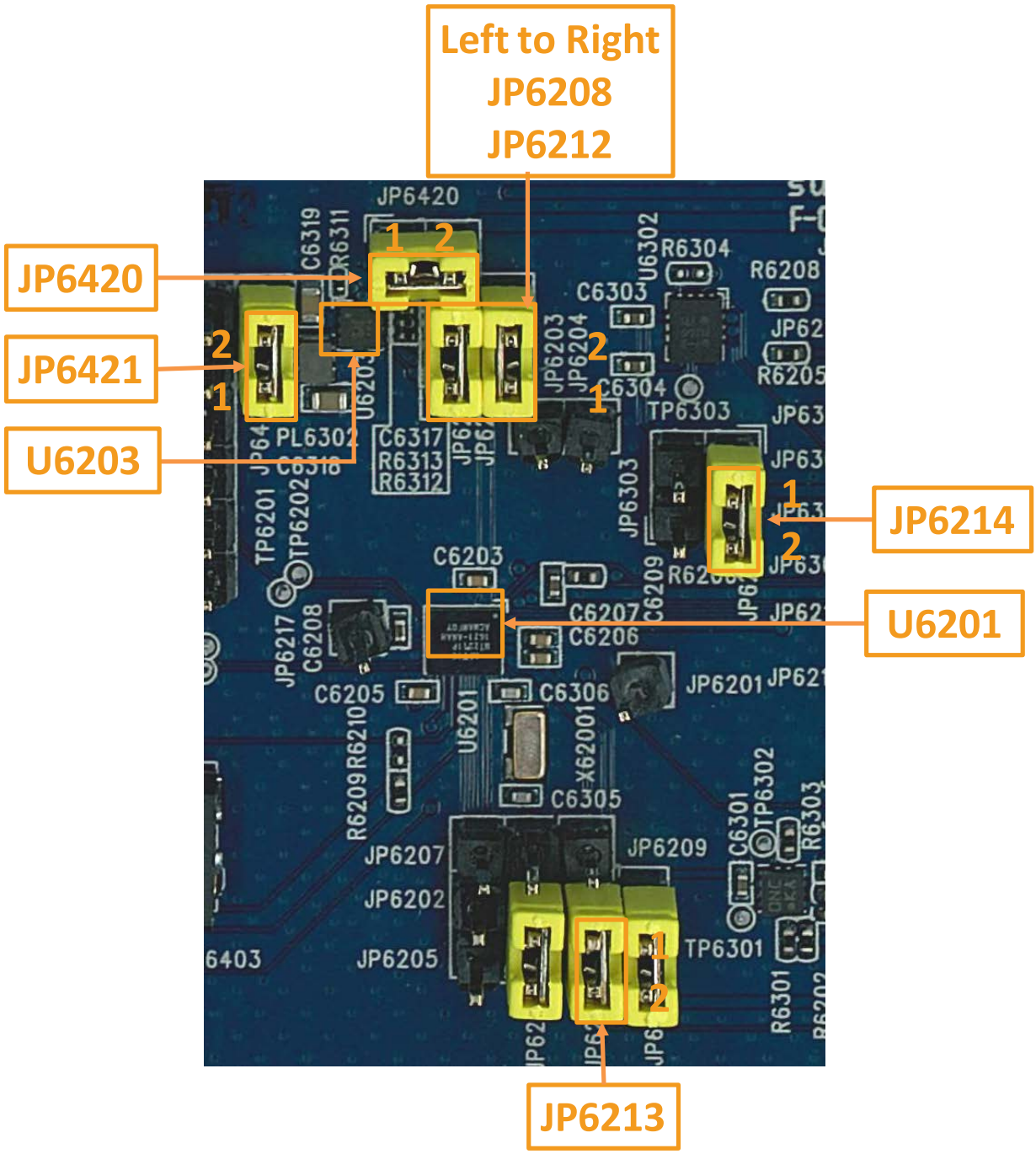


Figure 10. The jumper positions for power setup

4.2. Jumpers and test points

The daughterboard offers flexible jumper settings and test points for customization and monitoring. Table 2 summarizes the functions associated with different jumpers.

Table 2. The jumper index on MT2511

Jumpers	Purpose	Features	Type
JP6208 JP6212	The measuring points of the MT2511 power	• MT2511 power source	Power supply, section 4.1, “Power supply”

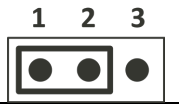
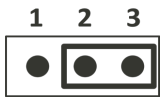
Jumpers	Purpose	Features	Type
JP6213 JP6214	consumption		
JP6420 JP6421	DC-DC boost converter	• JP6420 for DC-DC boost input source • JP6421 for DC-DC boost output source	DC-DC Boost converter
JP6206	External clock or external crystal select	• External clock for cost reduction. • External crystal for system performance	Clock, section 4.3, “Clock”
JP6215 JP6216 JP6218	MT2511 interface selection	• MT2511 SPI or I2C selection	Digital interfaces, section 4.4, “Digital interfaces”
JP6219	I2C address selection	• DVDDIO for I2C address: 0x27 and 0x37 • GND for I2C address: 0x23 and 0x33	Digital interfaces, section 4.4, “Digital interfaces”
JP6403 JP6404 JP6405 JP6406 JP6407 JP6408 JP6409 JP6410 JP6411 JP6412 JP6413	The daughterboard digital signals to MCU	• The daughterboard digital signals to MCU	Digital interfaces, section 4.4, “Digital interfaces”
JP6301	The measuring points of the accelerometer (BMA255) power consumption	• Accelerometer power source	Peripherals, section 4.6, “Peripherals”
JP6303	The measuring points of the 6-axis sensor (BMI160) power consumption	• 6-axis sensor power source	Peripherals, section 4.6, “Peripherals”
JP6302 JP6304 JP6305 JP6306	6-axis sensor protocol selection	• 6-axis sensor SPI or I2C selection	Peripherals, section 4.6, “Peripherals”
TP6201 TP6202	Current sink	• TP6201 for TXP • TP6202 for TXN	PPG current sink. Connected to optical module sub-board’s LED.
TP6203 TP6204	PPG receiver input	• TP6203 for VIP (connect to photodiode’s anode) • TP6204 for VIN (connect to photodiode’s cathode)	PPG receiver input. Connected to optical module sub-board’s photodiode.
TP6205	VRLD output	• TP6205 for VRLD	VRLD output.

Jumpers	Purpose	Features	Type
			Connected to an electrode.
TP6206 TP6206	EKG input	• TP6207 for the EKG Instrumentation Amplifier's (IA) positive input • TP6206 for EKG IA negative input	EKG input. Connected to an electrode.
JP6201 JP6202 JP6203 JP6204 JP6205 JP6207 JP6209 JP6217 JP6414 JP6415 JP6416 JP6417	Reserved pin	• Reserved pin	Reserved pin

4.3. Clock

MT2511 has an option to use an external clock or external crystal oscillator. By default, the daughterboard uses the external clock from the LinkIt 2523 HDK. Details to configure the jumper settings are shown in Table 3 and Figure 11.

Table 3. MT2511 external clock selection

External clock or external crystal selection	Set the jumper JP6206 to connect XTALI (B7) to AFE_32K, to use the external clock from MCU, as shown below. 
	Set the jumper JP6206 to connect XTALI (B7) to X62001 (crystal) pin 2, to use the external crystal, as shown below. 

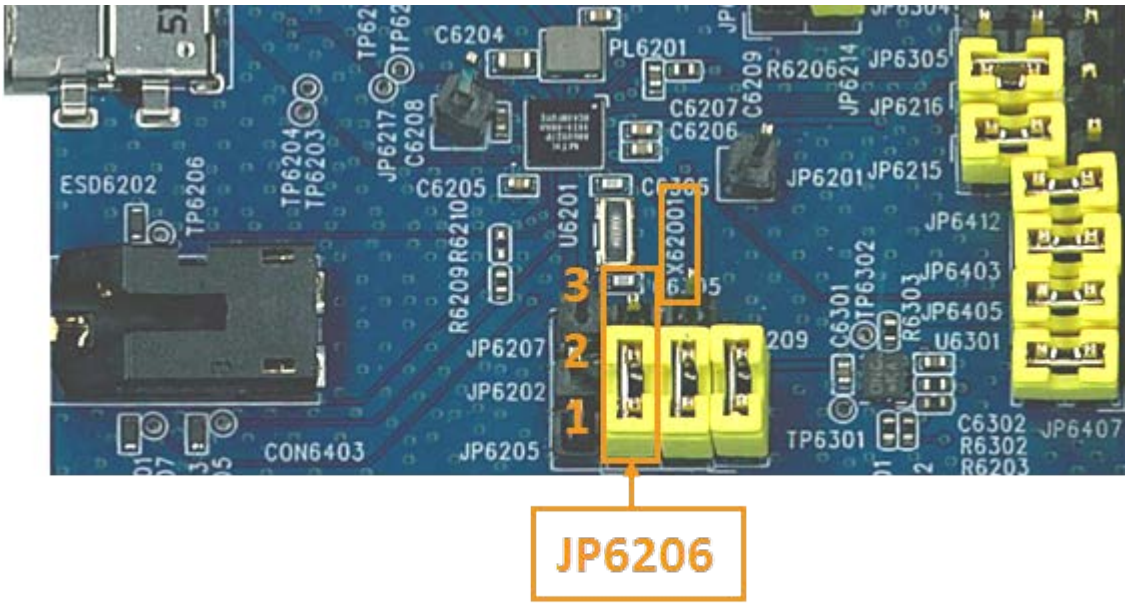


Figure 11. The jumper positions for the external clock selection

4.4. Digital interfaces

4.4.1. Serial interfaces

The MT2511 supports SPI/I2C dual interface, and the maximum SPI/I2C clock is designed to operate at a frequency of 1.6M/200K Hz.

By default, the daughterboard operates in SPI mode. To change the configuration, follow the settings in Table 4. The MT2511 also supports SPI interface with four-wire configuration, as shown in Table 4.

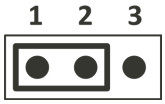
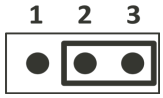
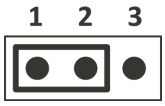
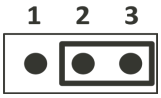
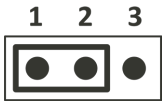
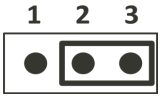
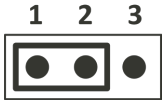
Table 4. Mapping of MT2511 interface configuration

PIN#	Name	I/O Type	Description	Configuration	
				I2C	SPI
B1	IRQ	Digital I/O	Interrupt pin (IRQ). It can be connected to an external MCU.	–	–
B6	AFE_PWD	Digital I/O	Power down pin (AFE_PWD). It can be connected to an external MCU.	–	–
B4	I2C_SEL	Digital I/O	Interface selection. The default selection on the daughterboard is SPI interface.	Set to DVDDIO	Set to GND
A1	RESETB	Digital I/O	Reset pin. It can be connected to an external MCU.	–	–
A3	SPI_CLK	Digital I/O	SPI_SCK for SPI serial clock, or SCL for I2C serial clock.	SCL	SPI_SCK
A2	SPI_CSN	Digital I/O	SPI_CSN for SPI chip select, or SDA for I2C serial data I/O.	SDA	SPI_CSN
B3	SPI_MISO	Digital I/O	Master Input, Slave Output pin for SPI	Floating	SPI_MISO

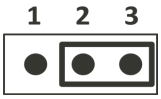
PIN#	Name	I/O Type	Description	Configuration		
E2	SPI_MOSI	Digital I/O	Master Output, Slave Input pin for SPI, or Address Selection of I2C mode.	Set to	Address:	SPI_MOSI
				DVDDIO	0x37 and 0x27	
				GND	Address: 0x33 and 0x23	

The details of the daughterboard interface configuration are shown in Table 5 and Figure 12.

Table 5. The jumper selection for the interface configuration

I2C or SPI selection. (U6201.B4 : I2C_SEL)	Set the jumper JP6218 to connect U6201.A3 (AFE_I2C_SEL) to GND, to enable the SPI mode, as shown below. 
	Set the jumper JP6218 to connect U6201.A3 (AFE_I2C_SEL) to DVDDIO, to enable I2C mode, as shown below. 
SCL or SPI_SCK selection (U6201.A3 : SPI_CLK)	Set the jumper JP6215 to connect U6201.A3 (SPI_CLK) to SCL, as shown below. 
	Set the jumper JP6215 to connect U6201.A3 (SPI_CLK) to SPI_CLK, as shown below. 
SDA or SPI_CSN_S0 selection (U6201.A2 : SPI_CSN)	Set the jumper JP6216 to connect U6201.A2 (SPI_CSN) to SDA, as shown below. 
	Set the jumper JP6216 to connect U6201.A2 (SPI_CSN) to SPI_CSN_S0, as shown below. 
I2C address setting. The default addresses are set to 0x23 and 0x33. (U6201.E2 : SPI_MOSI)	In I2C mode, set the jumper JP6219 to connect SPI_MISO to GND, to set I2C addresses to 0x23 and 0x33, as shown below. 

In I2C mode, set the jumper JP6219 to connect SPI_MISO to DVDDIO, to set I2C addresses to 0x27 and 0x37, as shown below.



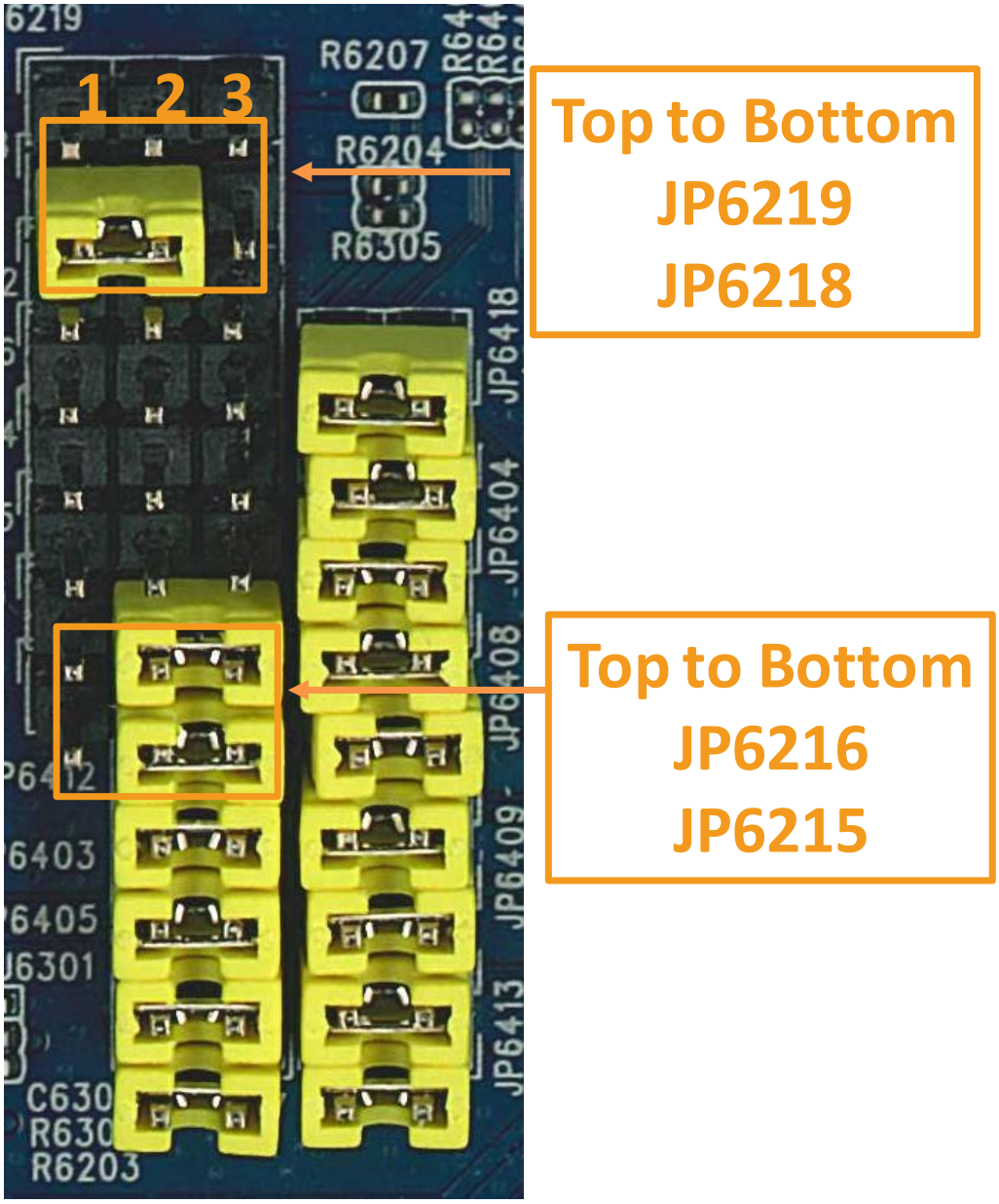


Figure 12. The jumper settings for the interface configuration

4.4.2. Signals

The digital signals on the daughterboard can be accessed through a series of jumpers. The JPxxxx.n in the table below represents the pin position n-th of jumper JPxxxx. The details are shown in Table 6 and Figure 13.

Table 6. MT2511 digital signals

Jumpers	Net name	Description
JP6403.2	AFE_IRQ	Interrupt pin for AFE. It can be connected to an external MCU.
JP6413.2	AFE_PWD	Power down control pin for AFE
JP6411.2	AFE_RESETB	Reset pin for AFE. It can be connected to an external MCU.
JP6419.2	SCL	Clock pin for I2C
JP6418.2	SDA	Data pin for I2C
JP6408.2	SPI_SCK	Serial Clock for SPI
JP6410.2	SPI_CSN_S0	Slave Select0 (active low) for SPI
JP6404.2	SPI_MISO	Master Input, Slave Output pin for SPI
JP6406.2	SPI_MOSI	Master Output, Slave Input pin for SPI

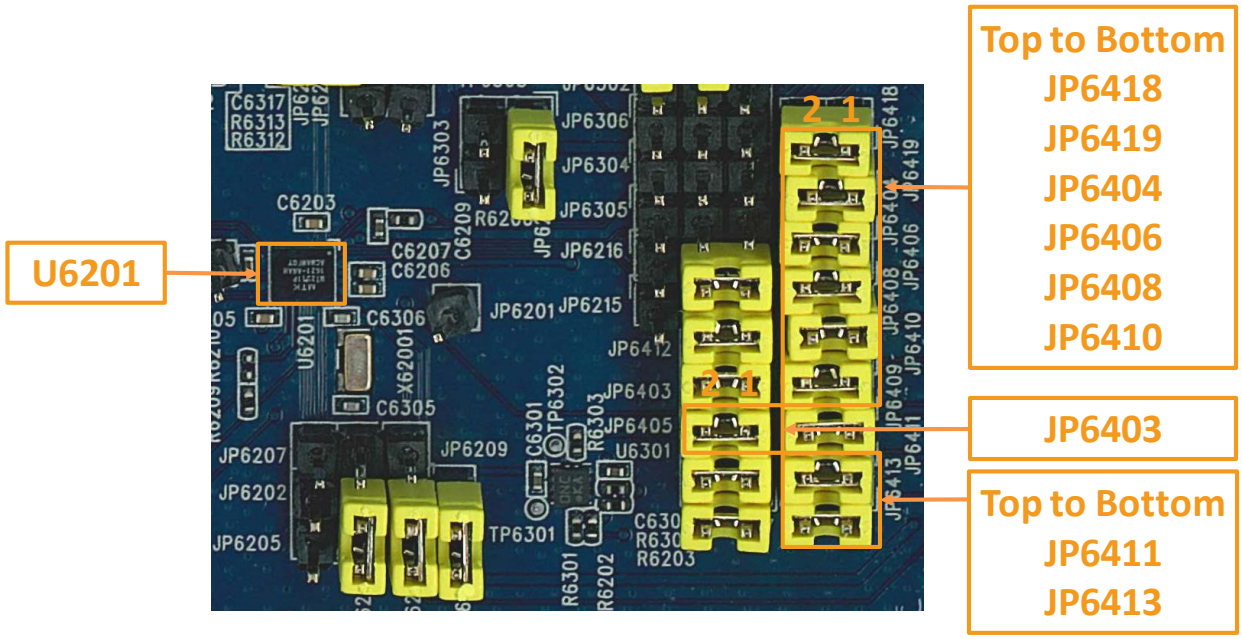


Figure 13. The jumper positions for the digital signals

4.5. Connectors

The following connectors are used on the daughterboard.

- CON6401 (see Figure 2).
- EKG cable connector.
- Optical module sub-board connector.

4.5.1. CON6401

CON6401 (the 24 pin female header connector) pin definition is shown in Figure 14. The description of the pins is provided in Table 7.

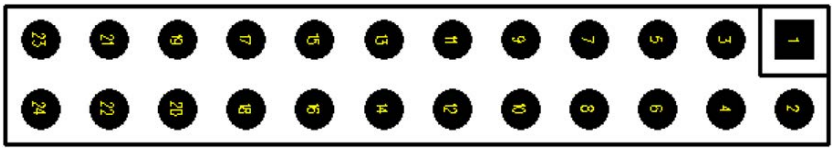


Figure 14. CON6401 connector

Table 7. CON6401 connector description

Pin number	Pin Name	Description
1	VBAT	Power source for Boost
2	AVDD28	Analog power source for AFE (2.8V)
3	DVDDIO	Digital power source for AFE(2.8V)
4	DVDD18	Digital power source for AFE(1.8V)
5	GND	Ground
6	GND	Ground
7	I2C_SDA0	Data pin for the I2C
8	MA_SPI3_MISO	Master Input, Slave Output pin for the SPI
9	I2C_SCL0	Clock pin for the I2C
10	MA_SPI3_MOSI	Master Output, Slave Input pin for the SPI
11	GND	Ground
12	MA_SPI3_SCK	Serial Clock for the SPI
13	MA_SPI3_CS1	Slave Select1 (active low) for the SPI
14	MA_SPI3_CS0	Slave Select0 (active low) for the SPI
15	EINT3	Interrupt pin for AFE
16	GND	Ground
17	EINT4	Interrupt pin for Accelerometer (BMA255)
18	GPIO7	Boost switch enable pin
19	EINT5	Interrupt pin for 6-axis sensor (BMI160)
20	GPIO29	Reset control pin for AFE (active low)
21	AFE_32K	Clock pin for AFE
22	GPIO24	Power down control pin for AFE
23	GND	Ground
24	GND	Ground

4.5.2. EKG cable connector

The EKG cable connector pin definition is shown in Figure 15. The description of the pins is provided in Table 8.

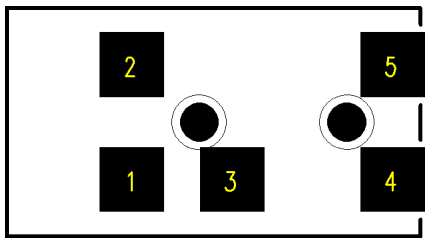


Figure 15. The EKG cable connector

Table 8. The EKG cable connector description

Pin number	Pin Name	Description
1	VIP_EKG_CON	EKG IA positive input to electrode cable
2	VIN_EKG_CON	EKG IA negative input to electrode cable
3	VRLD_CON	RLD output to electrode cable
4	GND	Ground
5	NC	Non-connected

4.5.3. Optical module sub-board connector

The Optical module sub-board pin definition is shown in Figure 16. The description of the pins is provided in Table 9.

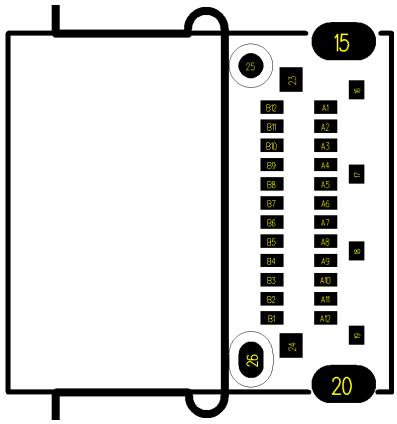


Figure 16. Optical module sub-board connector

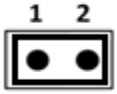
Table 9. Optical module sub-board connector descriptions

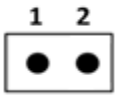
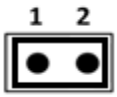
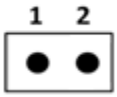
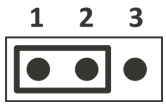
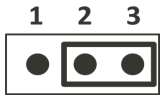
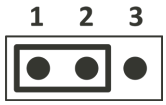
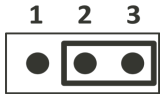
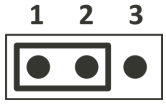
Pin number		Pin Name	Description
A1	B1	GND	Ground
A2	B2	TXP_PPG	Anode of LEDs
A3	B3	TXN_PPG	Cathode of LEDs
A4	B4	AFE_VBST	Power supply for LEDs
A5	B5	NC	Not-connected
A6	B6	NC	Not-connected
A7	B7	NC	Not-connected
A8	B8	NC	Not-connected
A9	B9	AFE_VBST	Power supply for LEDs
A10	B10	VIP_PPG	Photodiode cathode
A11	B11	VIN_PPG	Photodiode anode
A12	B12	GND	Ground

4.6. Peripherals

The algorithms on MT2511 take advantage over accelerometer to assist the calculation of heart rate. The daughterboard supports two peripheral options. One is accelerometer (BMA255: I2C address = `0b0011000 (0x18)`) and the other is 6-axis sensor (BMI160: I2C address = `0b1101000 (0x68)`). Both of them are installed by default. The detailed setup information is provided in Table 10 and Figure 17.

Table 10. Peripheral sensor setup

Accelerometer (BMA255)'s power source	Set the jumper JP6301 to connect the power source to U6301 (BMA255) VDD/VDDIO, as shown below. 
	Set the jumper JP6301 to disconnect the power source from U6301 (BMA255) VDD/VDDIO, as shown below.

	
6-axis sensor (BMI160)'s power source	Set the jumper JP6303 to connect the power source to U6302 (BMI160) VDD/VDDIO, as shown below. 
	Set the jumper JP6303 to disconnect the power source from U6302 (BMI160) VDD/VDDIO, as shown below. 
6-axis sensor (BMI160)'s SPI or I2C interface selection. (U6302.1 : SDO)	Set the jumper JP6302 to connect U6302.1 (SDO) to GND, to select I2C mode, as shown below. 
	Set the jumper JP6302 to connect U6302.1 (SDO) to SPI_MISO, to select SPI mode, as shown below. 
6-axis sensor (BMI160)'s SPI or I2C interface selection. (U6302.14 : SDx)	Set the jumper JP6304 to connect U6302.14 (SDx) to SDA, to select I2C mode, as shown below. 
	Set the jumper JP6304 to connect U6302.14 (SDx) to SPI_MOSI, to select SPI mode, as shown below. 
6-axis sensor (BMI160)'s SPI or I2C interface selection. (U6302.13 : SCx)	Set the jumper JP6305 to connect U6302.13 (SCx) to SCL, to select I2C mode, as shown below. 
	Set the jumper JP6305 to connect U6302.13 (SCx) to SPI_SCK, to select SPI mode, as shown below.

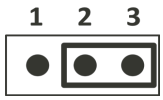
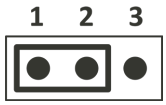
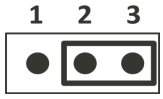
	
6-axis sensor (BMI160)'s SPI or I2C inteface selection. **(U6302.12 : CSB)**	Set the jumper JP6306 to connect U6302.12 (CSB) to DVDDIO, to select I2C mode, as shown below. 
	Set the jumper JP6306 to connect U6302.1 (SDO) to SPI_CSN_S1, to select SPI mode, as shown below. 

Figure 17.The jumper positions of peripheral sensor setup

5. Layouts

5.1. Layer 1 to Layer 4 of the MT2511 biosensor daughterboard (PCB version: MTK0067)

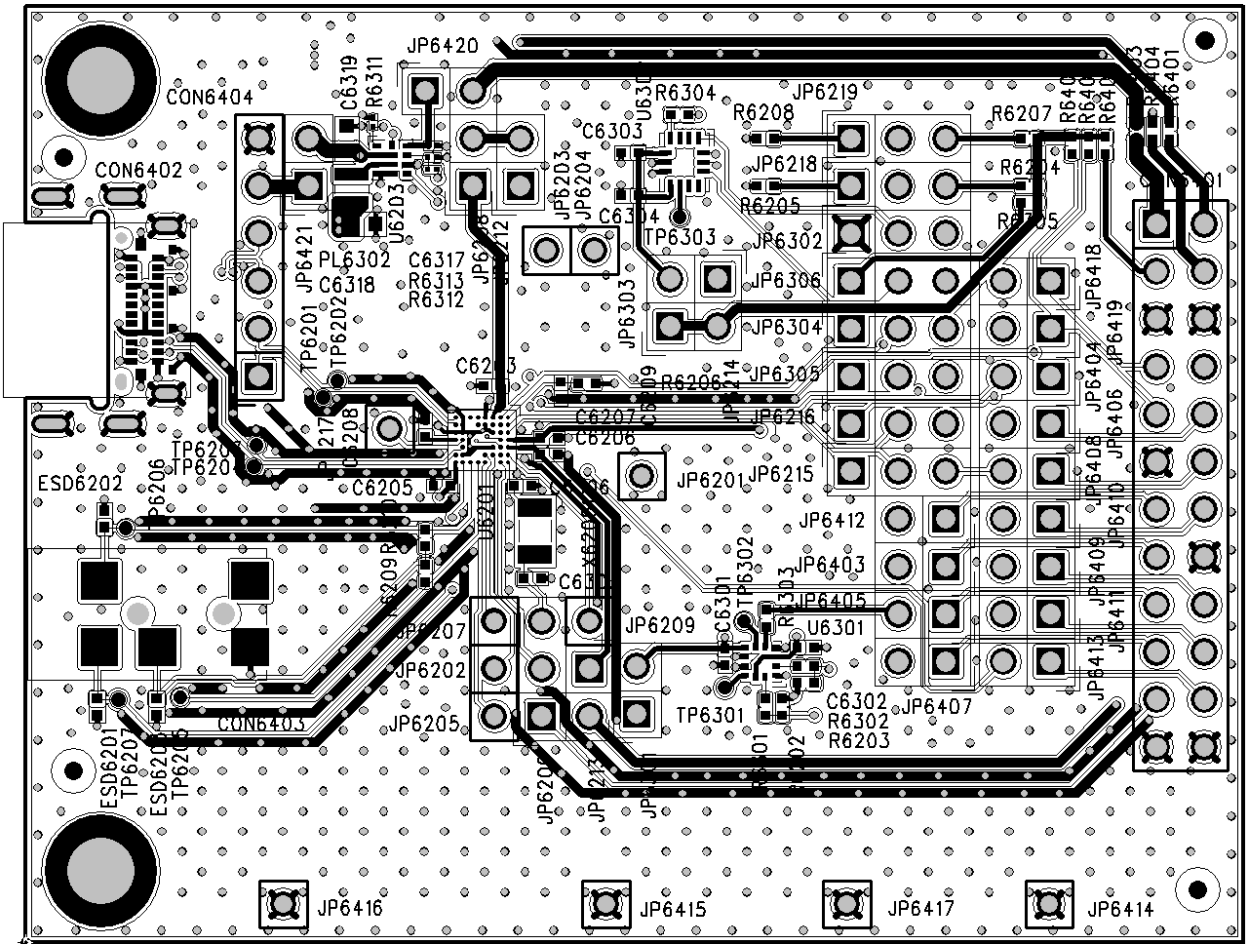


Figure 18. Layer 1 of the MT2511 biosensor daughterboard

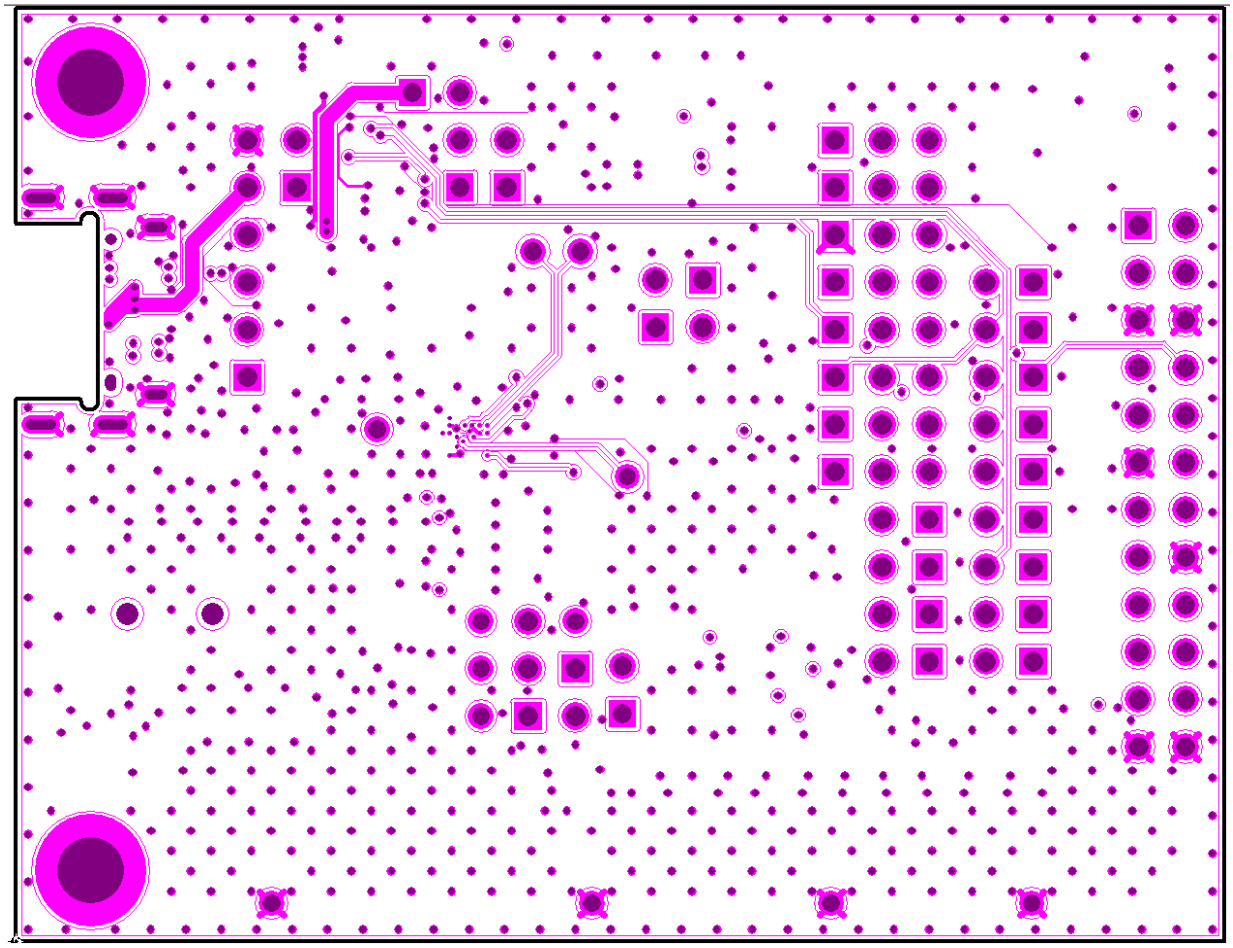


Figure 19. Layer 2 of the MT2511 biosensor daughterboard

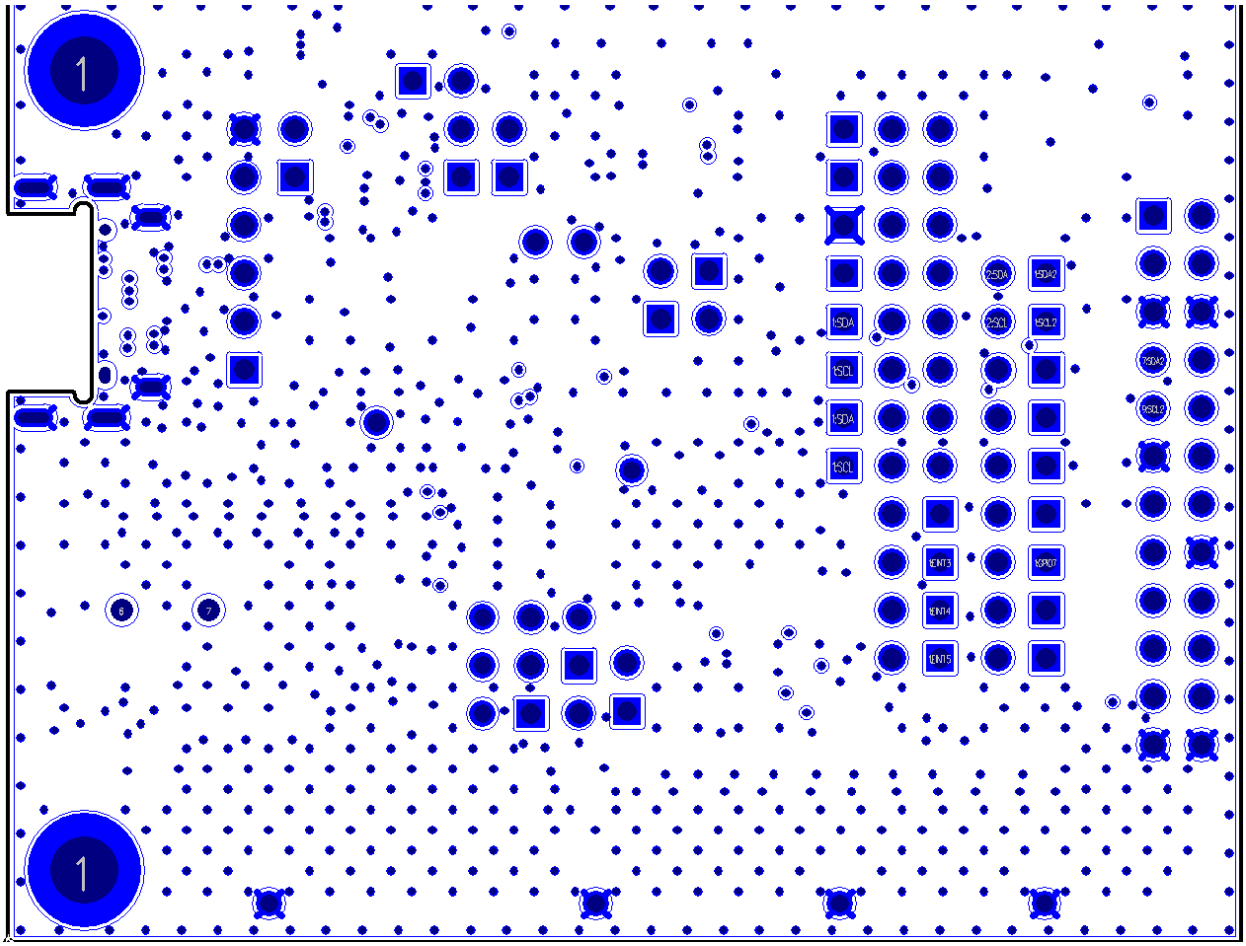


Figure 20. Layer 3 of the MT2511 biosensor daughterboard

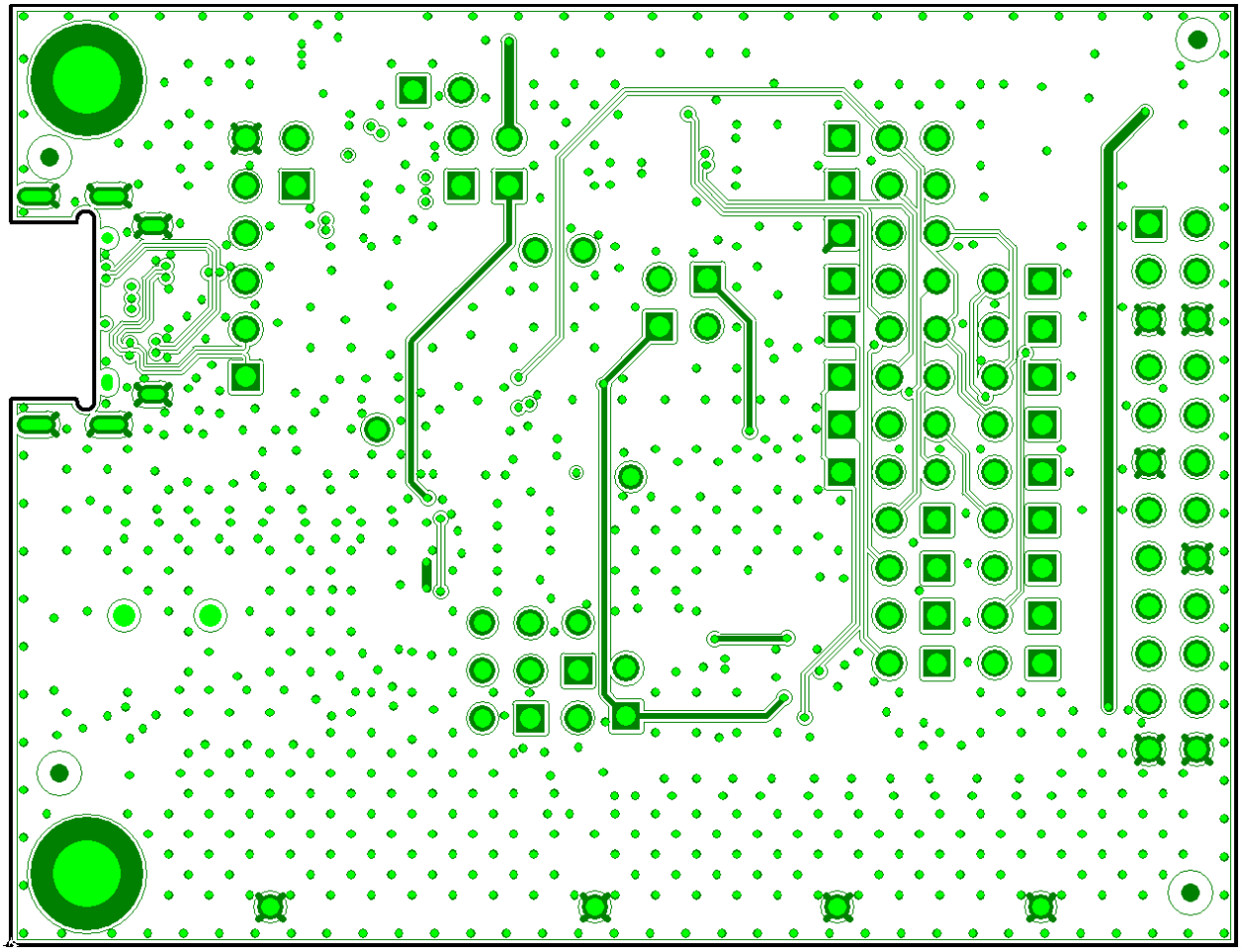


Figure 21. Layer 4 of the MT2511 biosensor daughterboard

5.2. Layout of the optical module sub-board(PCB version: WS3499-2)

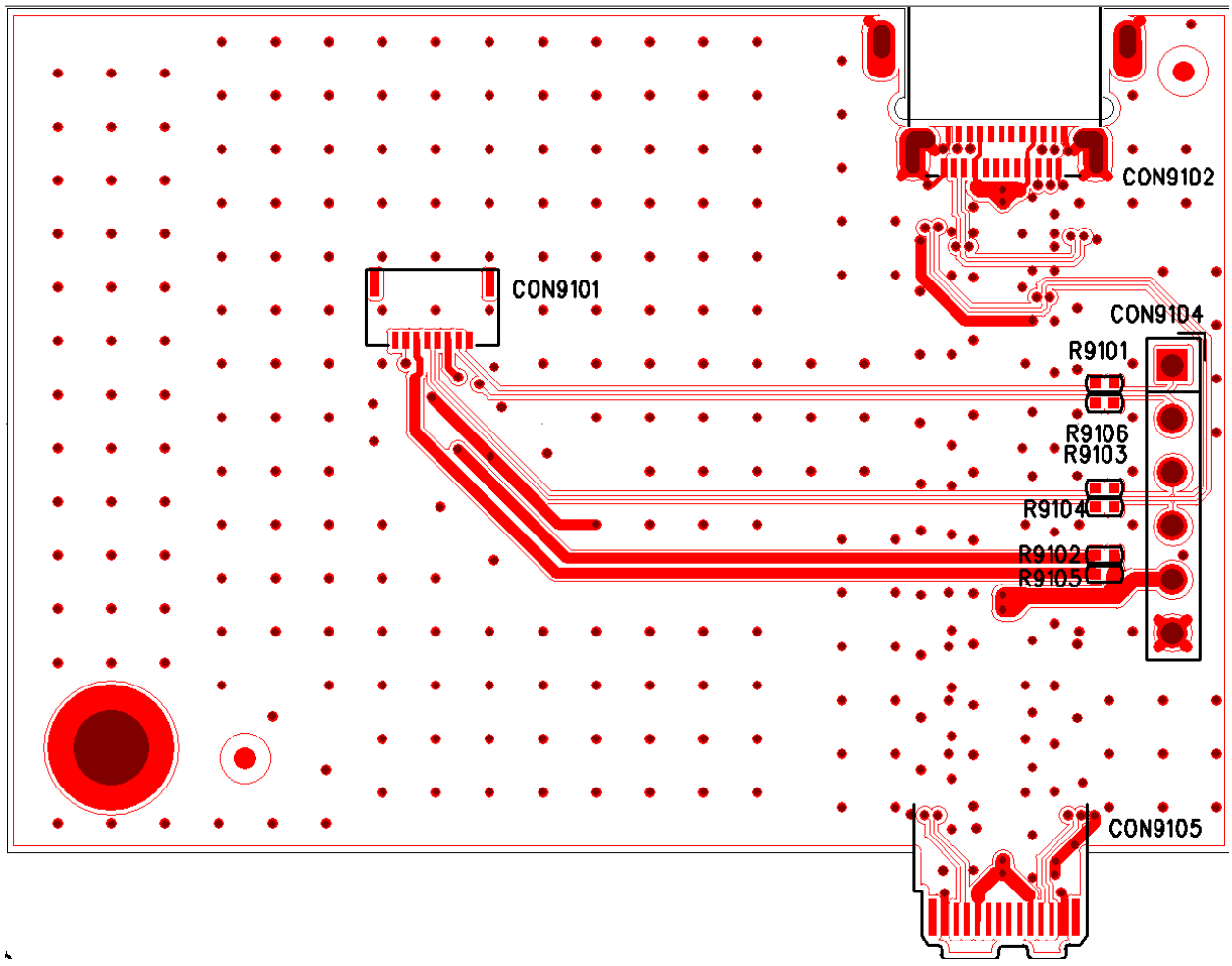


Figure 22. Layer 1 of the optical module sub-board

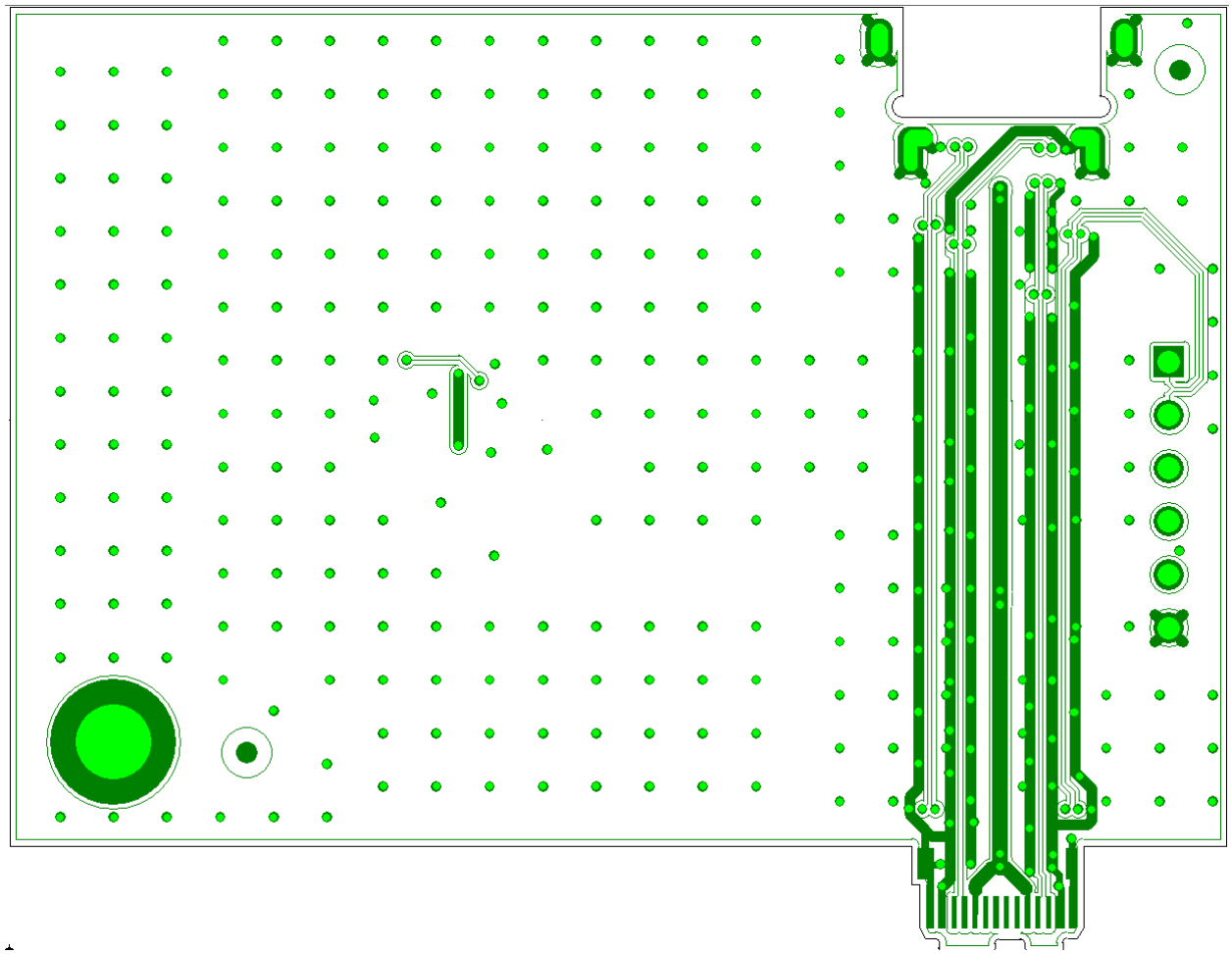


Figure 23. Layer 2 of the optical module sub-board

6. Bill of Materials

6.1. MT2511 biosensor daughterboard's bill of materials (PCB version: MTK0067)

Table 11 shows the BOM details of the biosensor daughterboard. Apply this table to develop custom applications with MT2511.

Table 11. MT2511 HDK's bill of materials

Item	Quantity	Reference	Part	Footprint
1	1	CON6401	CON / 24 / 2.54 / DIP / F	DIP12X2/P2.54
2	1	CON6402	CON / 24 / UT12123-1A501-7H	USB/24P/SMD/UT12123-1A501-7H
3	1	CON6403	JACK_CON/5P/EJ-3699M-GP	AUDIOJACK/5P/SMD/EJ-3699M-GP
4	1	CON6404	HEAD_6P	DIP6/P2.54
5	4	C6203,C6205,C6206,C6207	C / 2.2 / uF / 0402 / X5R	C0402
6	1	C6208	C / 1 / uF / 0402 / X5R	C0402
7	5	C6209,C6301,C6302,C6303,C6304	C / 100 / nF / 0402	C0402
8	2	C6305,C6306	C / 22 / pF / 0402	C0402
9	1	C6317	C / 1 / uF / 0201	C0201
10	2	C6318,C6319	C / 22 / uF / 0603 / 6.3V	C0603
11	3	ESD6201,ESD6202,ESD6203	ESD / AZ5325-01F	VR0402
12	2	H6401,H6402	STAND	HOLE/PTH/R6D3.5
13	12	JP6201,JP6202,JP6203,JP6204,JP6205,JP6207,JP6209,JP6217,JP6414,JP6415,JP6416,JP6417	JP / 1 / 2.54 / DIP	TP/W/H/DIP
14	4	JP6206,JP6215,JP6216,JP6219	JP / 3 / 2.54 / DIP3P(1-2)	DIP3/P2.54
15	20	JP6208,JP6212,JP6213,JP6214,JP6301,JP6403,JP6404,JP6405,JP6406,JP6407,JP6408,JP6409,JP6410,JP6411,JP6412,JP6413,JP6418,JP6419,JP6420,JP6421	JP / 2 / 2.54 / DIP / SH	DIP2/P2.54
16	1	JP6218	JP / 3 / 2.54 / DIP3P(2-3)	DIP3/P2.54
17	4	JP6302,JP6304,JP6305,JP6306	JP / 3 / 2.54 / DIP3P	DIP3/P2.54
18	1	JP6303	JP / 2 / 2.54 / DIP	DIP2/P2.54

Item	Quantity	Reference	Part	Footprint
19	1	PL6302	PL / MAKK2016H2R2M	L/IND/SMD/MAKK2016
20	2	R6202,R6203	R / 4.7 / K / 0402	R0402
21	6	R6204,R6205,R6206,R6207,R6208,R6209	R / 100 / K / 0402	R0402
22	1	R6210	R / 100 / K / 0402 / NC	R0402
23	8	R6301,R6302,R6303,R6305,R6401,R6402,R6403,R6404	R / 0 / ohm / 0402	R0402
24	1	R6304	R / 0 / ohm / 0402 / NC	R0402
25	1	R6311	R / 1000 / K / 0201	R0201
26	1	R6312	R / 820 / K / 0201	R0201
27	1	R6313	R / 102 / K / 0201	R0201
28	2	R6406,R6407	R / 4.7 / K / 0402 / NC	R0402
29	10	TP6201,TP6202,TP6203,TP6204,TP6205,TP6206,TP6207,TP6301,TP6302,TP6303	TP / 30 / mil	TP30MIL

6.2. Optical module sub-board's bill of materials (PCB version: WS3499-2)

Table 12 shows the BOM details of the optical module sub-board to develop custom applications with the daughterboard

Table 12. Optical module sub-board's bill of materials

Item	Quantity	Reference	Part	Footprint
1	1	CON9101	H8/SMD/P0.5/106A08-001000-A2-R	H8/SMD/P0.5/106A08-001000-A2-R
2	1	CON9102	CON / 24 / DX07B024JJ1	USB3.1/24P/SMD/DX07B024JJ1/JAE
3	1	CON9104	HEAD_6P	DIP6/P2.54
4	1	CON9105	CON / 24 / DX07P024AJ1	USB3.1/24P/SMD/DX07P024AJ1
5	1	H9101	STAND	HOLE/PTH/R6D3.5
6	6	R9101,R9102,R9103,R9104,R9105,R9106	R / 0 / ohm / 0402	R0402

7. Appendix A: Acronyms and Abbreviations

The acronyms and abbreviations used in this guide are listed in Table 13.

Table 13. Acronyms and abbreviations

Acronym	Description	Acronym	Description
AFE	Analog front-end	HDK	Hardware development kit
EKG or ECG	Electrocardiography	PPG	Photoplethysmography
I2C	Inter-integrated circuit	SPI	Serial peripheral interface
RLD	Right leg drive to improve ommon-Mode rejection	IA	Instrumentation amplifier
PCB	Printed circuit board		

8. Schematics

8.1. The daughterboard schematic (PCB version: MTK0067)

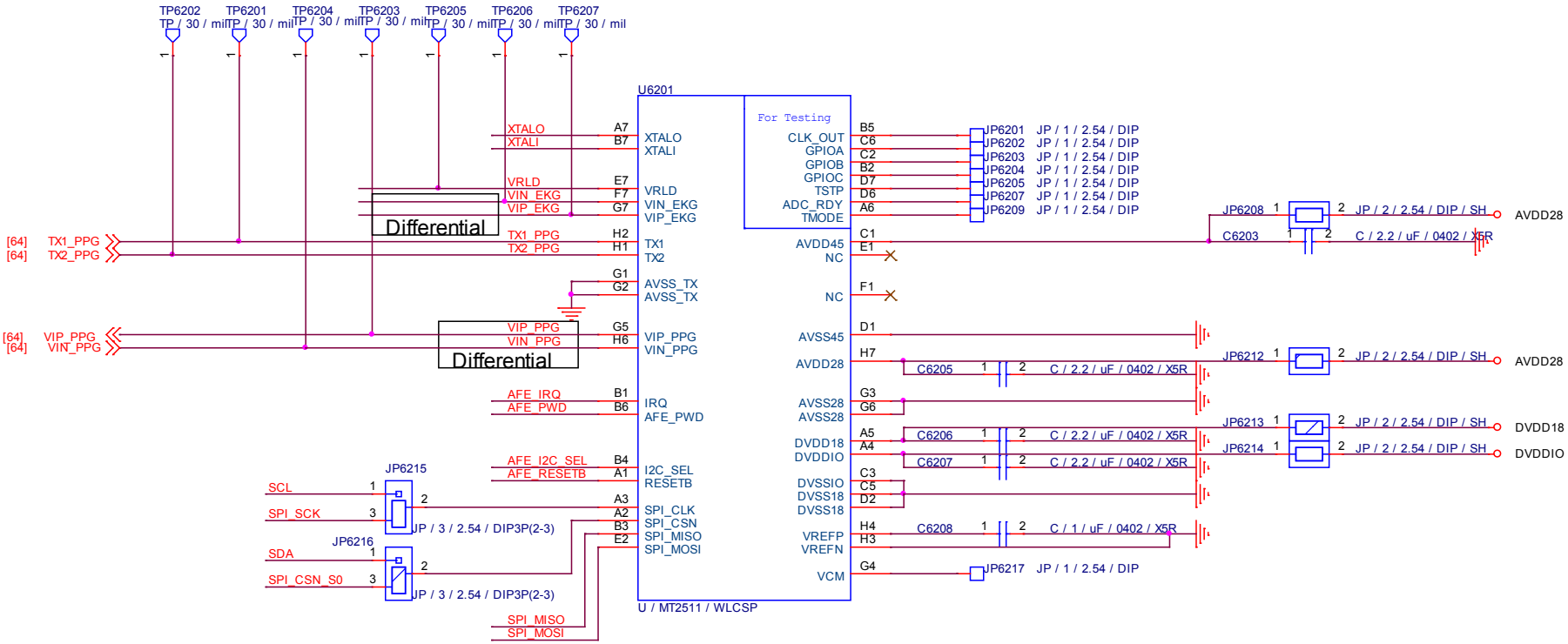
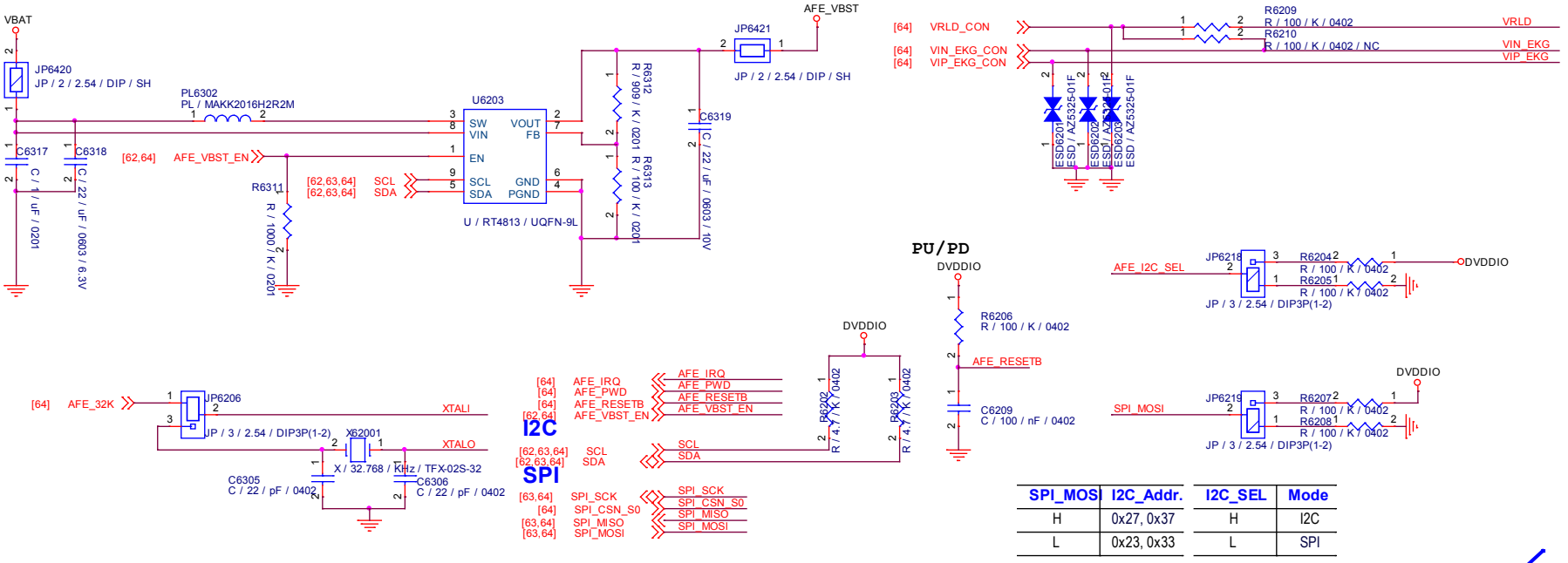
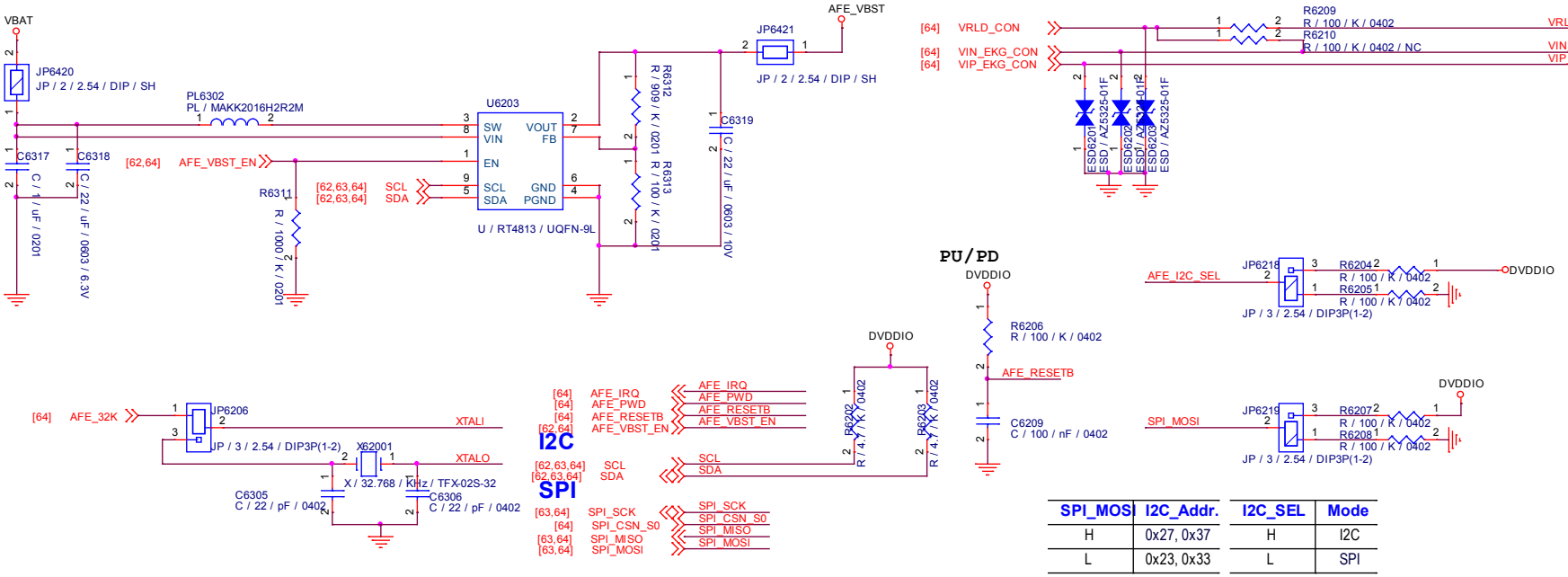


Figure 24. The daughterboard schematics (1 of 5)



SPI_MOSI	I2C_Addr.	I2C_SEL	Mode
H	0x27, 0x37	H	I2C
L	0x23, 0x33	L	SPI

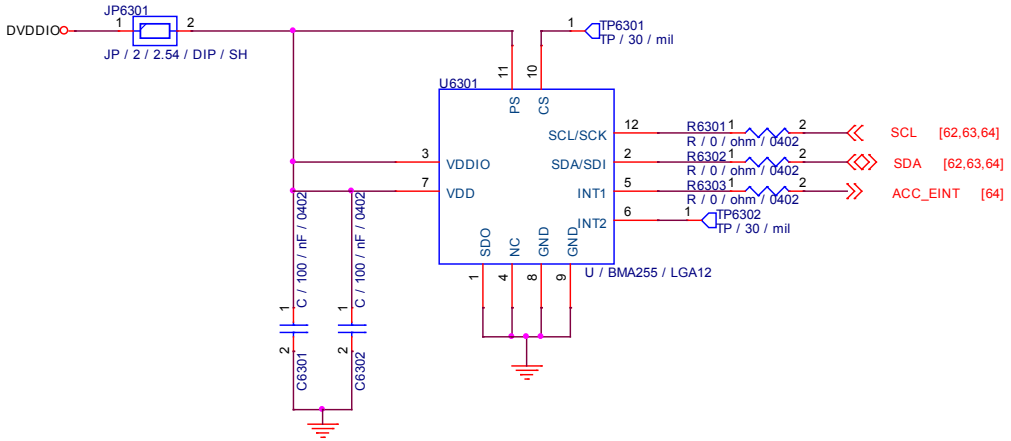


SPI_MOSI	I2C_Addr.	I2C_SEL	Mode
H	0x27, 0x37	H	I2C
L	0x23, 0x33	L	SPI

Figure 25. The daughterboard schematics (2 of 5)

Accelerometer_BMA255

BMA255 I2C address: 0X18 (Write:0x48, Read:0x49)



Six-axis sensor(Accelerometer and Gyroscope)_BMI160

BMI160 I2C Address is 0x68; written 0xD0, reading address 0xD1

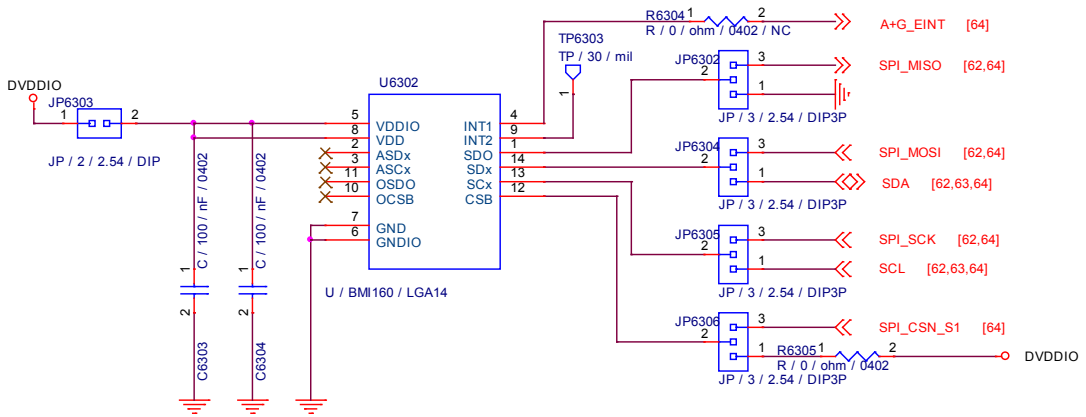


Figure 26. The daughterboard schematics (3 of 5)

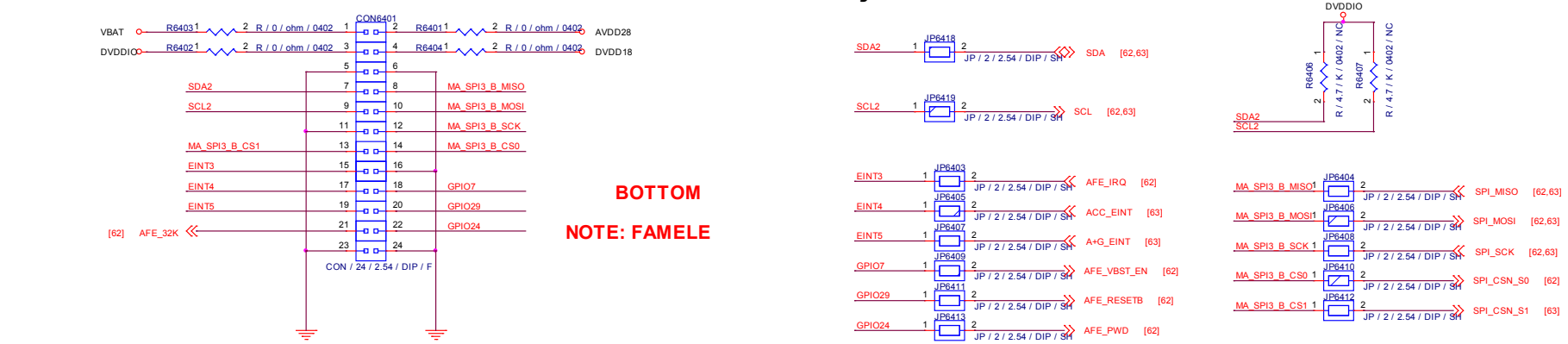


Figure 27. The daughterboard schematics (4 of 5)

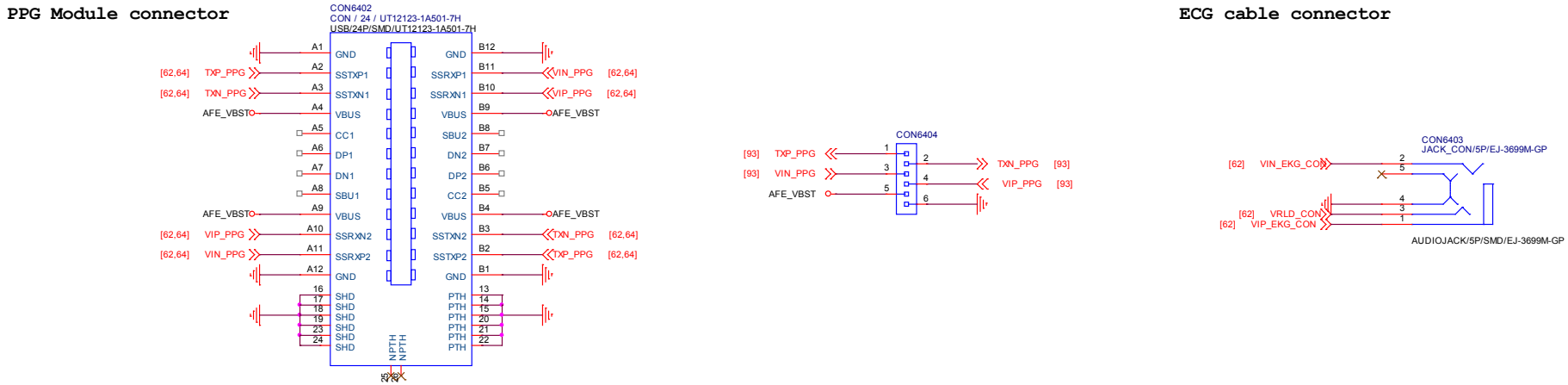


Figure 28. The daughterboard schematics (5 of 5)

8.2. Optical module sub-board schematic (PCB version: WS3499-2)

Soltmean PPG module

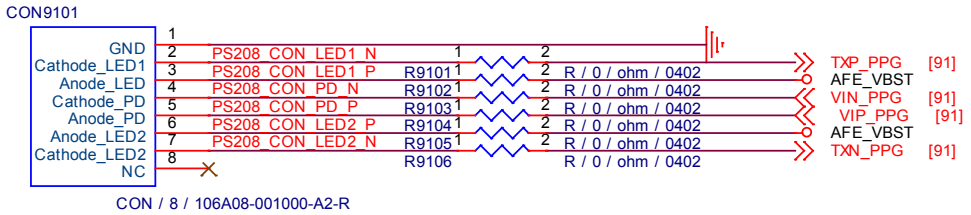


Figure 29. Optical module sub-board schematic (1 of 2)

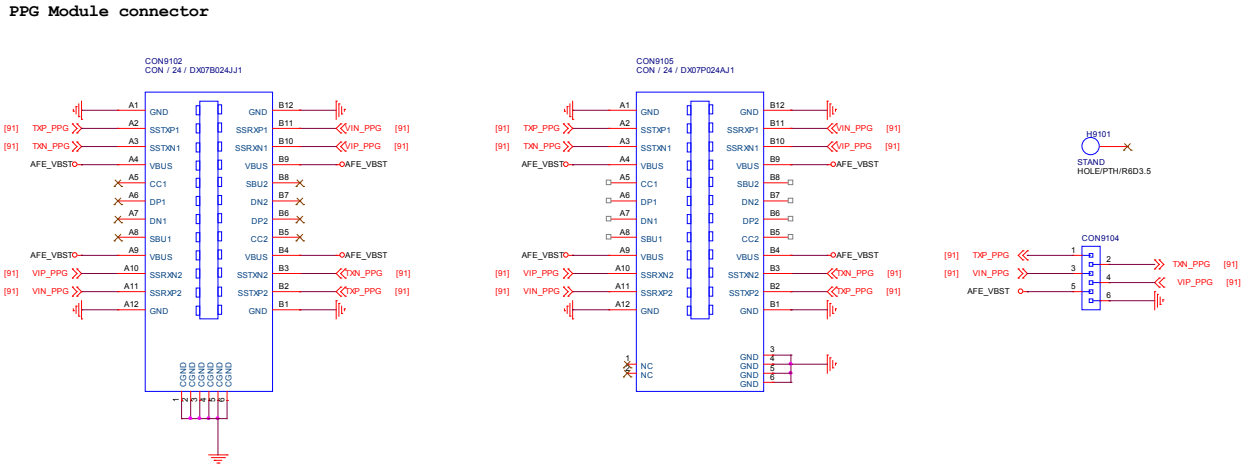


Figure 30. Optical module sub-board schematic (2 of 2)