

Thiamis Embedded Platform.

Hardware Guide.

october 2016

1. Functional Description

Thiamis Embedded platform designed to simplify adding IoT to any customer board. Thiamis X&G is the 2 modules stack that give to customers possibilities to capture data using list of available interfaces and store that data to the environet cloud service.

1.1. Thiamis X Module.

Thiamis X can work standalone or like a master for Thiamis G module. Thiamis X can communicate with external equipment using USART, USB, I2C and more interfaces. Using Bluetooth, WIFI, Mesh network and (if connected Thiamis G module) gsm - Thiamis X can send captured data to the environet cloud service.

1.2. Thiamis G Module.

Thiamis G adding Cellular and GNNS features to the Thiamis X module. It can work only like a slave with Thiamis X module.

1.3. Thiamis X&G Development Board.

Thiamis X&G development board provide possibility to evaluate the Thiamis Embedded platform.

2. Modules Hardware Details.

2.1. Thiamis X Module.

Hardware feature	Details
Processor	32bit ARM Cortex-M4F, 120MHz
RAM	256KBytes Internal, 512KBytes External
Storage Memory	128MBytes Flash
WIFI	CC3100 802.11b/g/n 2.4GHz
Bluetooth	Dual-Mode Bluetooth® CC2564B
Mesh	CC2520 2.4 GHz ZigBee/IEEE 802.15.4 RF transceiver
2.4GHz Antenna	onboard chip antenna or u.FL type connectors for Mesh and WIFI (All WIFI, Bluetooth and Mesh are transmitting from onboard chip antenna for this version, and they can transmit at the same time, u.FL connectors will supply to special customers on other version.
Interfaces	USART, USB, I2C, SPI, GPIO
Supply Voltage	2.2V - 4.8V
Size	40.5x30mm.

2.2. Thiamis G Module.

Hardware feature	Details
Cellular	HE910-G multi-band module
GNNS	HE910-G multi-band module
GSM Antenna	u.FL type connector for external antenna
GNNS Antenna	u.FL type connector for external antenna
Supply Voltage	3.4V - 4.2V
Size	40.5x30mm.

2.3. Thiamis X&G Development Board.

Hardware feature	Details
Ports	RS232(PORTA, PORTB), SDI-12, RS485, USB, 4 RF
Supply Voltage	12V
Size	120x70mm.

3. Board to Board Interface Connector.

3.1. Interface Connector Part Number.

Manufacturer	Part Number	Description
AVX Corporation	9158028020061	Fine Pitch SMT Board to Board Connectors

3.2. Interface Connector Pin Out Description.

BOARD/ PIN		THIAMIS X	THIAMIS G	Description
POWER	1	VSYS(2.2 – 4.8)	VSYS(3.4 – 4.2)	Power for system
	3			
	2	3.3V	3.3V	I/O reference voltage only
	4	VBAT(RTC)	-	
	26	GND	GND	
	27			
	28			
USB	7	USB-DP	-	
	5	USB-DM	-	
GPIOs	6	GPIOs-6 USB-PFLT	-	
	8	GPIOs-7 USB-EPEN	-	
	10	GPIOs-0	-	
	12	GPIOs-1	-	
	13	GPIOs-2	-	
	15	GPIOs-3	-	
	18	GPIOs-4	ON/OFF, RST	Signal also reset PCAL6408A chip
	20	GPIOs-5	PCAL6408A IRQ	
	25	WAKEUP-IN	-	OD input, wake up MCU from hibernate
UART0	9	UART0-RX CAN-RX	-	
	11	UART0-TX CAN-TX	-	
I2C	14	I2C-SCL	3G-RING 3G-DCD HW_SHUTDOWN VAUX/PWRMON 3G-DSR 3G-DTR 3G-RTS 3G-CTS	THIAMIS G used PCAL6408A to control the pins in the list
	16	I2C-SDA		
UART1	17	UART1-RX	3G-TXD	
	19	UART1-TX	3G-RXD	

SPI	22	SPI-SCK	-	
	21	SPI-CS	-	
	23	SPI-MOSI	-	
	24	SPI-MISO	-	
JTAG		RST	-	1.27 pitch 5 pads placed above sim card holder near the board edge
		MCU_PC0	-	
		MCU_PC1	-	
		MCU_PC2	-	
		MCU_PC3	-	

NOTE: if Thiamis X board used in stack with Thiamis G, the pins in the ThiamisG pins column(except I2C pins) utilized by Thiamis X to control Thiamis G.

4. Powering Details.

4.1. Power Supply Requirements.

The external power supply must be connected to VSYS pins and must fulfill the following requirements:

Power Supply	
Nominal Supply Voltage	3.8V
Nominal Operational Voltage Range	3.4V ~ 4.2V
Extended Operating Voltage Range	3.3V ~ 4.5V

The average consumption depends on features used at each module. Thiamis X if used standalone consume much less power than if it used in stack with Thiamis G module.

Current Load	
Thiamis X	<100mA
Thiamis G	>500mA

NOTE: In case Thiamis X&G stack used, the electrical design for the Power supply must be made ensuring that it will be capable of a peak current output of at least 2A.

4.2. Electrical Design Examples.

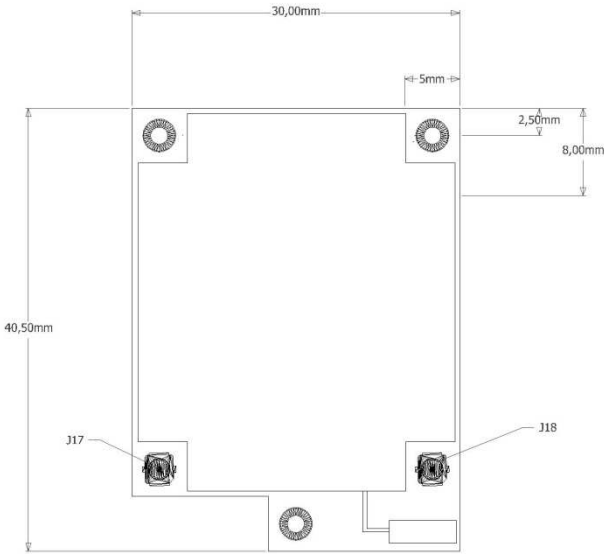
Electrical design of the power supply mainly depends on the power source used to supply the modules. There are some examples below:

Power Supply	Design Example
+5V input	Usually linear regulator used because of small difference between the input source and the desired output
+12V input	A switching power supply will be preferable because of its better efficiency especially with the 2A peak current load represented by Thiamis G module.
3.7V lithium-ion cell battery	ideal to supply power to the modules

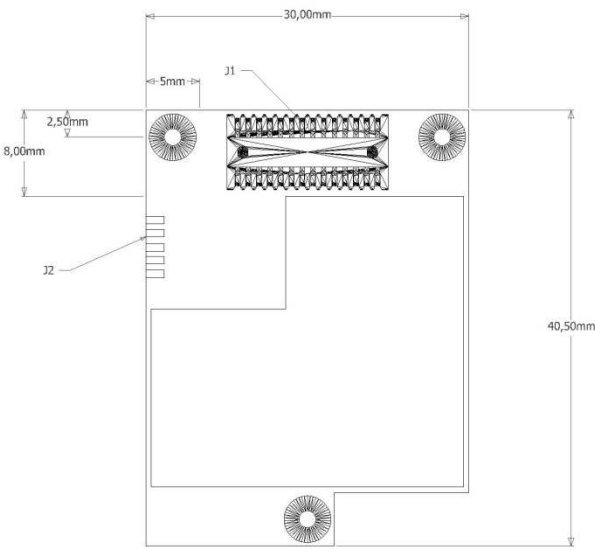
5. Mechanical Details.

BOARD/Dimensions	Size(mm)	Height(mm)	Mounting Hole Diameter(mm)
Thiamis X	30x40.5	4.5	2.2
Thiamis G	30x40.5	5.0	2.2
Thiamis X&G stacked	30x40.5	7.5	2.2

5.1. Thiamis X.

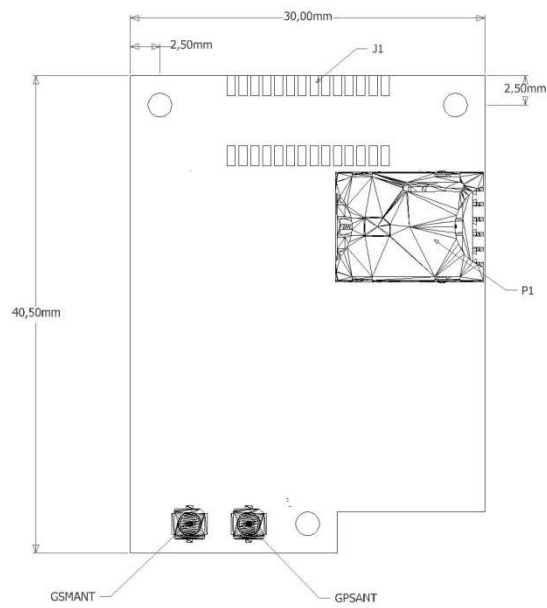


TOP VIEW

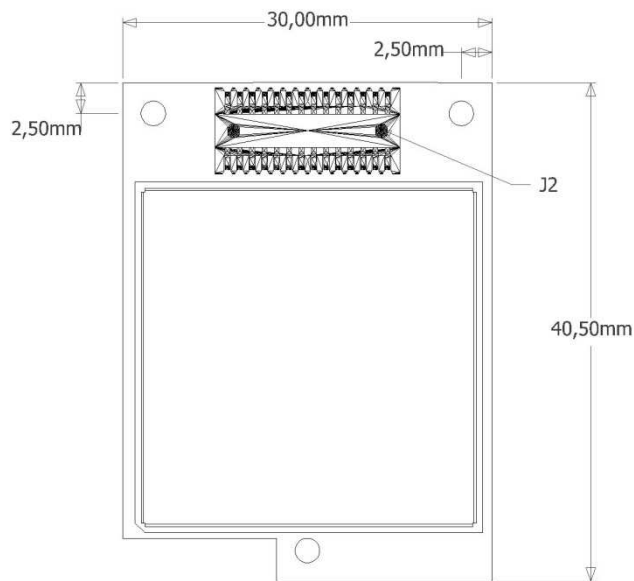


BOTTOM VIEW

5.2. Thiamis G.

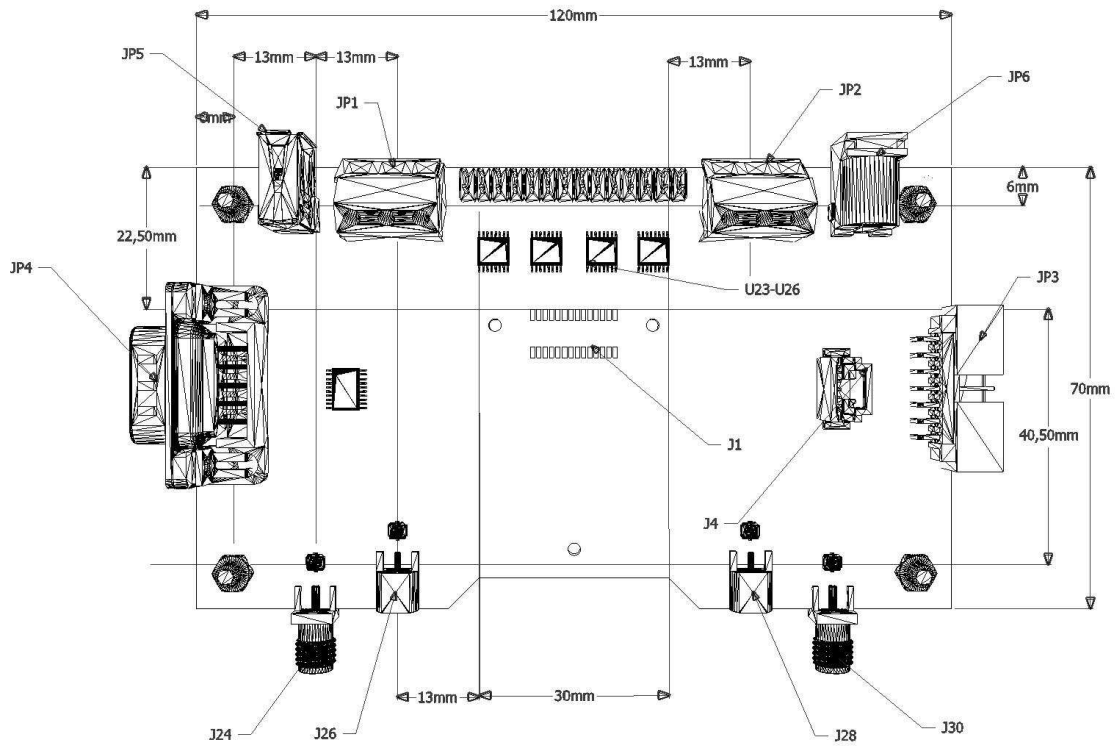


TOP VIEW

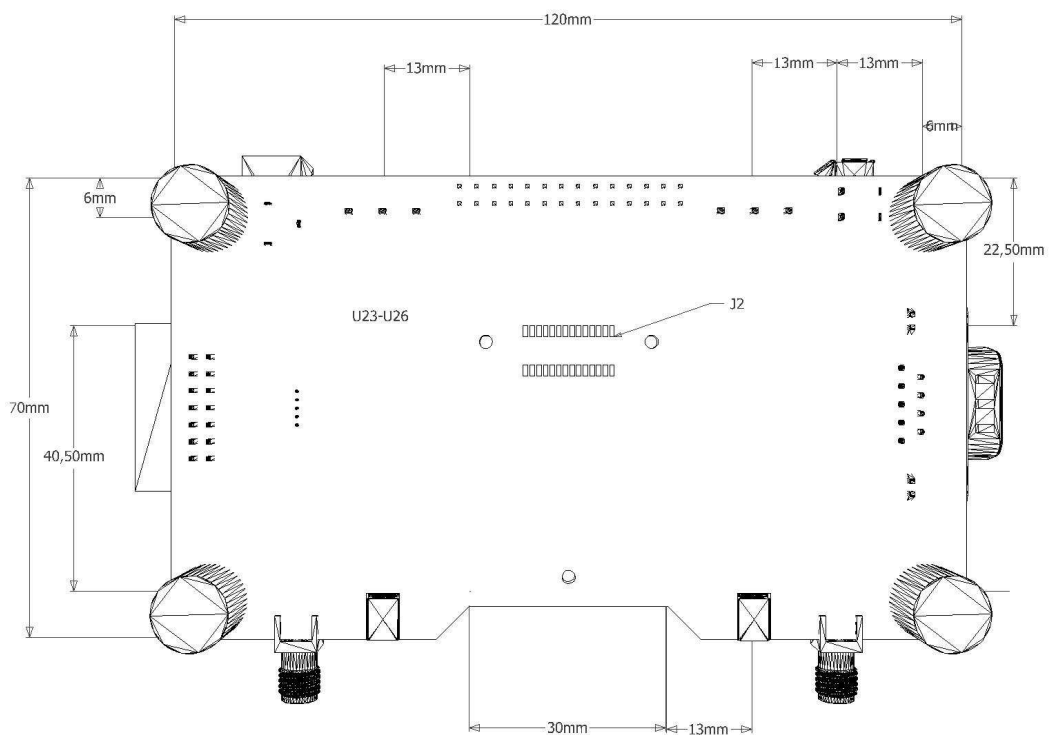


BOTTOM VIEW

5.3. Thiamis X&G Development Board .



TOP VIEW



BOTTOM VIEW

Based on reference design of the test board a customer can implement own pcb design for nested Thiamis X&G modules.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.
- when the equipment is normally used, please keep away from it at least 20cm.

IMPORTANT NOTE:

Integration is strictly limited to mobile/fixed categorized end-products where a separation distance of at least 20 cm between the radiating part and any human body can be assured during normal operating conditions.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

IMPORTANT NOTE:

This module is intended for OEM integrator only and the OEM integrators are instructed to ensure that the end user has no manual instructions to remove or install the device. The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following “Contains TX FCC ID: 2AN9Q-THIAMISX”. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.