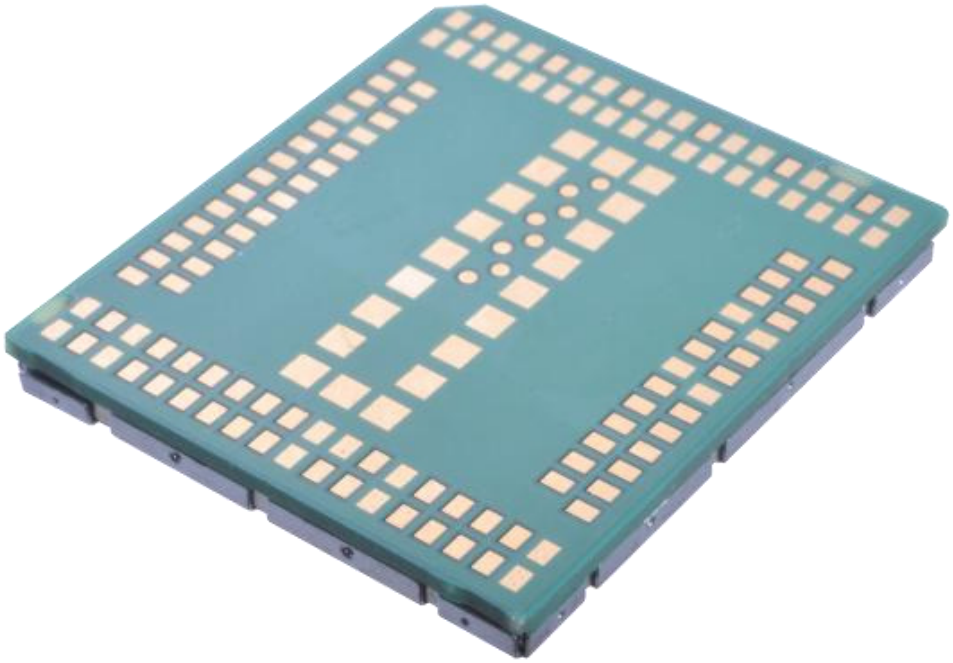

M14A2A User Manual

Project Name: M14A2A

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Revision: 1.0

Revision Date: 2016/04/06

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Federal Communication Commission Interference Statement

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.

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 and can radiate radio frequency energy and, if not installed and used in accordance with the 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 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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

This device is intended only for OEM integrators under the following conditions:

(1) The antenna must be installed such that 20 cm is maintained between the antenna and users,

(2) The transmitter module may not be co-located with any other transmitter or antenna.

(3) To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile exposure condition must not exceed:

Standalone Condition:

- 10.1 dBi in 700 MHz Band
- 6.5 dBi in 1700 MHz Band
- 9.5 dBi in 1900 MHz Band

Assuming collocated with a WLAN transmitter with maximum 34 dBm average EIRP power

- 7.0 dBi in 700 MHz Band
- 6.5 dBi in 1700 MHz Band
- 9.5 dBi in 1900 MHz Band

Remark: This assumption is not valid if the output power of the collocated WLAN transmitter is higher than 34 dBm.

Contents

1. Introduction

M14A2A is a Cat. 1 (10 Mbps/5 Mbps DL/UL respectively) LTE modem which incorporates an application CPU subsystem and a host of peripheral interfaces and functions uniquely designed to address the power/performance/cost requirements of IoT and M2M applications. The chip is based on SDR-v3.0 (Software Defined Radio) architecture which offers OFDMA-related software based signal processing capabilities that significantly exceed traditional communications DSP cores, yet consumes a fraction of the power.

The CPU subsystem features a high performance MIPS MicroAptiv™ processor running a Linux OS with a variety of host interfaces including USB 2.0, I2C, SPI, and UART. The module supports integrated VoLTE functionality with a variety of narrow and wide-band CODECs and full IMS signaling.

1.1. Features

- 3GPP category support: LTE CAT-1 with 10/5 Mbps for DL/UL
- Embedded 512Mbit LPDDR
- Embedded 256Mbit SPI NOR Flash
- Ultra-high performance enhanced SDR processor
- Embedded network processor with Linux OS
- Integrated support for VoLTE including HD voice
- Integrated PMU circuitry
- Integrated RTC support
- Interference Cancellation (INCA™) capability
- Optimized for the M2M and IoT markets
- Interfaces:
  - HS USB2.0 with integrated PHY
  - Dual UART interfaces (4 bit and 2 bit) for high-speed data transfer and diagnostic tools support
  - SPI master interface
  - Mobile LPDDR and PSRAM support
  - Serial NOR flash controller
  - USIM interface
  - I2S/PCM audio interface
  - GPIOs
  - One I2C interface

2. Electrical Specifications

2.1. Interface pin assignments

2.1.1. LGA Pad Diagram

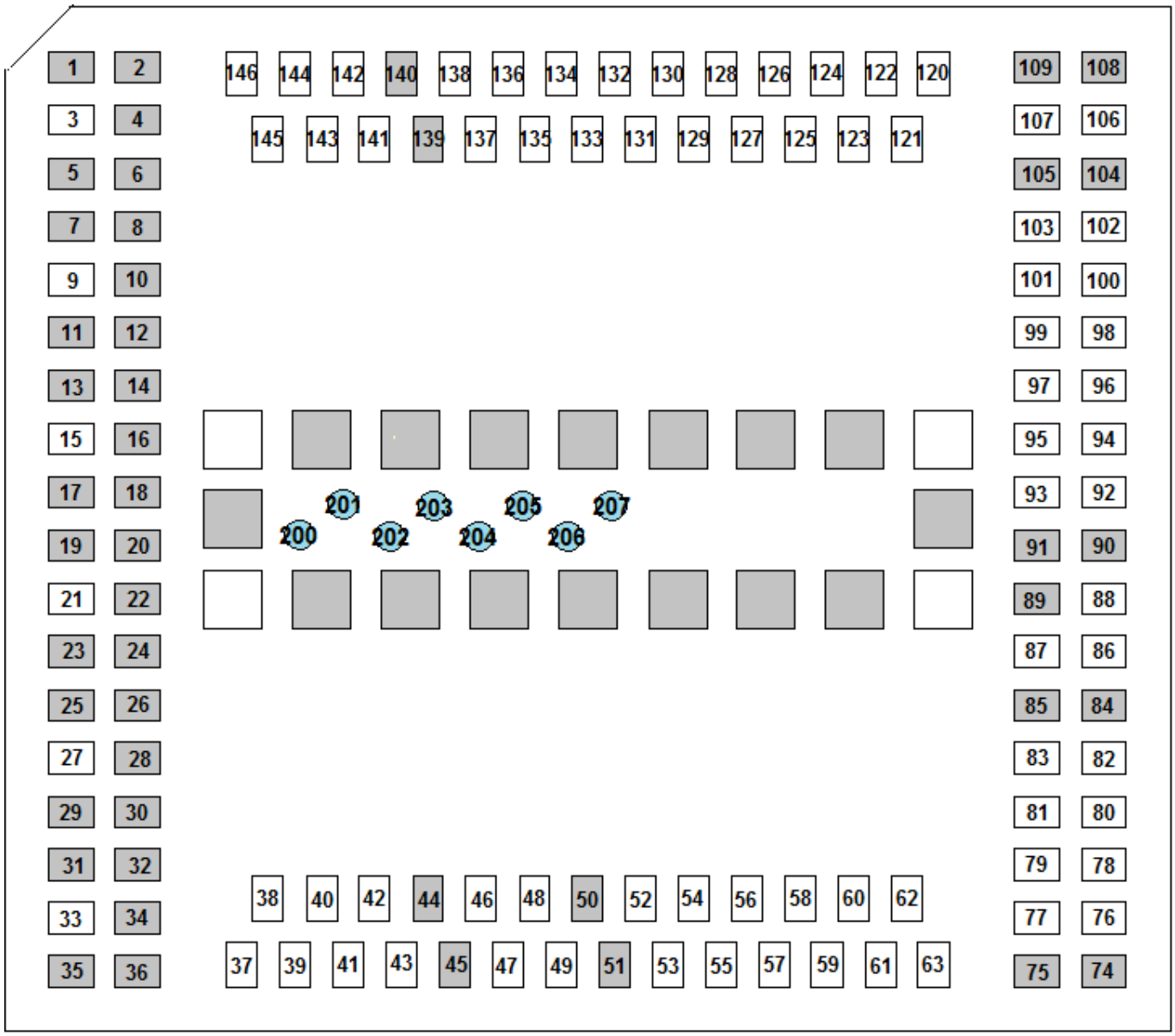

Figure 1. LGA pad diagram (top view)

2.1.2. Pin Assignments

I/O type description :

- AO : Analog Output
- AI : Analog Input
- DO : Digital Output
- DI : Digital Input

Table 1. Pin Interface Family

Interface Family		Signal Name	Description	I/O
RF Interfaces		RF_1	Main Antenna	AI/AO
		RF_2	Aux Antenna	AI
User Identity Module		UIM_VCC	UIM Power	DO
		UIM_DATA	UIM Data in/out	DI/DO
		UIM_CLK	UIM Clock	DO
		UIM_RESET	UIM Reset	DO
		UIM_DETECT	UIM Detect	DI/DO
Data Interfaces	USB2.0	USB_Dp	USB Data Positive	DI/DO
		USB_Dn	USB Data Negative	DI/DO
	UART1	UART1_CTS	Clear To Send for UART 1	DI
		UART1_RTS	Request To Send for UART 1	DO
		UART1_RX	Receive for UART 1	DI
		UART1_TX	Transmit for UART 1	DO
	UART2	UART2_RX	Receive for UART2	DI
		UART2_TX	Transmit for UART2	DO
	I2C	I2C_SDA	I2C Data	DI/DO
		I2C_SCL	I2C Clock	DI/DO
	SPI	SPIM_MOSI	SPI Master Out Slave In	DO
		SPIM_MISO	SPI Master In Slave Out	DI
		SPIM_EN	SPI master interface enable	DO
		SPIM_CLK	SPI master interface clock	DO
Module Control and State Interfaces		WWAN_STATE	Wireless WAN Radio State	DI
		POWER_ON	Power On the module	DO
		WAKEUP_OUT	Module wakes up host OR GPIO	DI
		WAKEUP_IN	Host wakes up module OR GPIO.	DI
		RESET	Reset the module	AI
Power and GND		VREF	Reference Logic Voltage	AI
		VCC	Main Power	AO
		GND	Ground	AI
General Purpose		GPIO	General Purpose I/O	DI/DO
		ADC	Analog to Digital Convertor	AI
Audio	PCM/I2S	PCM_SYNC	PCM_SYNC	DI /DO
		PCM_IN	PCM_IN	DI
		PCM_OUT	PCM_OUT	DO
		PCM_CLK	PCM_CLK	DO

2.2. Power supply

M14A2A includes an integrated Power Manager enabling single and direct voltage supply from the battery and reducing the overall bill of materials.

Table 2. Power supply specifications

Power	Signal Name	Pin No.	Description	Voltage Levels (V)		
				Min.	Typ.	Max.
VCC	VCC1 to VCC6	37–42	Main Power Supply	3.3	3.8	4.2

2.3. USB interface

M14A2A complies with USB 2.0 high-speed protocol. The USB input/output lines comply with USB 2.0 specifications.

Table 3. Signals of the USB interface

Name	Description	Input/Output (Direction to module)	Voltage Levels (V)		
			Min.	Typ.	Max.
D+	USB data positive (low-/full-speed)	Input High	2	3.3	3.6
		Input Low	0	–	0.8
		Output High	2.8	3.3	3.6
		Output Low	–	–	0.3
	USB data positive (high-speed)	Input High	0.3	–	0.44
		Input Low	0	–	0.01
		Output High	0.36	0.38	0.44
		Output Low	0	–	0.01
D–	USB data negative (low-/full-speed)	Input High	2	3.3	3.6
		Input Low	0	–	0.8
		Output High	2.8	3.3	3.6
		Output Low	–	–	0.3
	USB data negative (high-speed)	Input High	0.3	–	0.44
		Input Low	0	–	0.01
		Output High	0.36	0.38	0.44
		Output Low	0	–	0.01

Layout suggestion:

- Differential impedance: 90 Ω
- Space to other signals should be at least 20 mils
- Intra-pair length mismatch should be less than 150 mils

USB Length in M14A2A is tuned as below:

2.4. SIM interface

M14A2A includes an SC controller, interface pins, and a dedicated LDO (3.0 V or 1.8 V).

Since M14A2A is not equipped with a SIM socket, it must place a SIM socket on the user interface board.

M14A2A provides a UIM_DETECT input pin to detect if the SIM card is present. If the USIM card is present, UIM_DETECT should be high. (The voltage level should be 1.8 V) If the USIM card is absent, UIM_DETECT should be low. (The module is internally pulled down.) It was recommended to choose a SIM socket with the Card Detect pin. If the SIM card is preset, the pin will not contact the ground and pull up to 1.8 V through a 2 kΩ resistor. If the SIM card is absent, the pin will normally contact the ground. Other types of SIM sockets which can achieve this feature are also acceptable.

A 100 nF capacitor and a 1 µF capacitor are placed between the UIM_VCC and Ground pins in a parallel manner. (If the UIM_VCC circuit is too long, a larger capacitor such as a 4.7 µF capacitor can be employed if necessary.) Four 33 pF capacitors (0402 package is recommended.) are placed between the UIM_VCC and Ground pins, the UIM_CLK and Ground pins, the UIM_DATA and Ground pins, and the UIM_RESET and Ground pins in parallel to filter out interference from RF signals. (An R/C circuit on pin UIM_CLK is optional. If there is an EMI issue on this clock signal, try to adjust these R/C values.)

We recommend taking protective measures against electrostatic discharge (ESD) near the SIM socket. The TVS diode with a V_{RWM} of 5 V and junction capacitance of less than 10 pF must be placed as close as possible to the SIM socket, and the Ground pin of the ESD protection component must be well connected to the power Ground pin that supplies power to M14A2A.

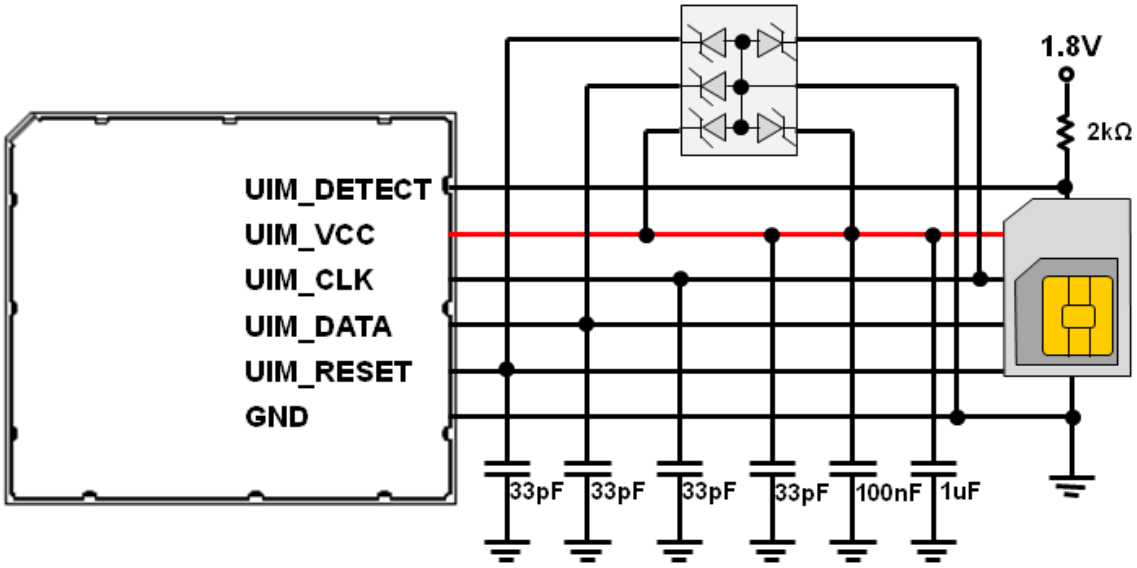

Figure 2. SIM card interface circuit

2.5. Control interface (signals)

This section describes the host-to-modem wake-up interface and power-on signal to enable or disable the control module.

2.5.1. Power-on Signal

The POWER_ON pad is an input signal used to control whether the module is in the Module Enabled or Module Disabled state. Do not toggle the PERST# pin during power-on. This signal has the highest priority over the wakeup, the alarms signals, and the digital control pins.

The POWER_ON signal is Active Low (VIL for VREF), its voltage level is 1.8V if going to High for Module Disabled:

- POWER_ON is High: Module is OFF
- POWER_ON is Low: Module is ON

There are three possible states of the module:

- Module Off - VCC is not present.
- Module Enabled - VCC is supplied, and the module is enabled.
- Module Disabled - VCC is supplied, and the module is disabled.

The state transitions are defined as follows:

- When voltage is applied to VCC, the module shall enter the Module Disabled state.
- An input to the POWER_ON pad shall trigger the transition from the Module Disabled to the Module Enabled state.
- An input to the POWER_ON pad shall trigger the transition from the Module Enabled to the Module Disabled state.

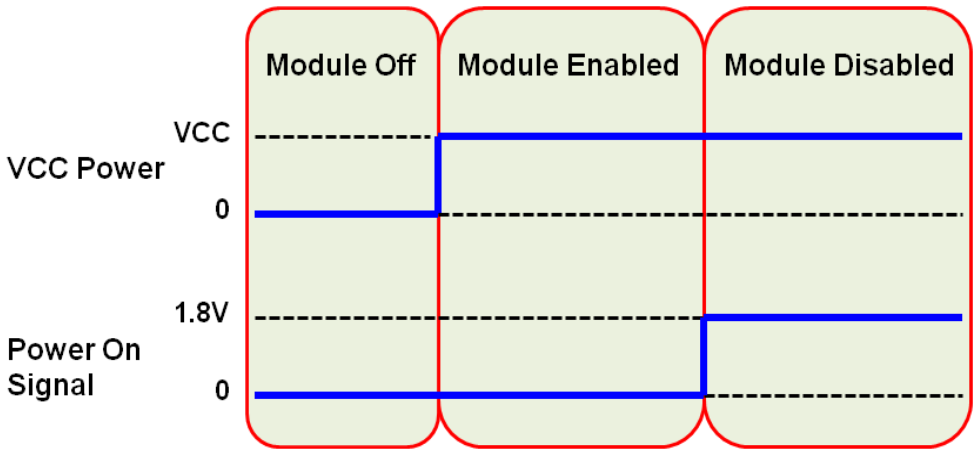

Figure 3. Power ON/OFF timming

In order to prevent the POWER_ON signal in a floating state, it was recommended to pull LOW for Module Enabled, or pull HIGH to VREF for Module Disabled.

2.5.2. Host-to-modem wake-up interface

In applications where the device power consumption is a major target of optimization such as battery-operated sensors that are based on IOT/M2M modem solution and in addition, include a third-party host, it is necessary to define a simple interface that will allow both the modem and the host to be able to enter low power states whenever possible while allowing the other side to wake it up when required.

For example, if the host has no data to transmit or any other tasks, it may wish to enter some low power state according to its own capabilities and configurations. If during the time the host is in a low power state and the modem suddenly receives data, it must wake-up the host.

A similar requirement exists from the other side. If, for example, the modem is in a low power state and suddenly the host must transmit data, it must to be able to wake-up the modem.

Each side has notification functionality when they are up and ready to follow a wake-up request.

The idea behind the suggested method is to have a very simple interface that will also be pin-limited (requires only two pins) to fit into such limited-pin-count applications and packages.

The interface consists of two lines: one is driven by the host and received by the modem, and the other is driven by the modem and received by the host.

Each side can wake the other side by toggling it high and allowing the other side to go to sleep when not needed by toggling it low.

Toggling the signal high does not necessary mean the other side will enter the low power state; the toggling function is only intended to notify the other side that its functions will not be required in the near term and that it is allowed to enter a low power state if he can (according to its own tasks, configurations, and capabilities).

The following diagram depicts how this simple interface works. In addition to the two hardware signals, additional higher-level messages may be defined to pass further information or details between the host and the modem if required.

If the Power states of "Deep Sleep" and "Light Hibernation" feature are required, it was recommended to connect WAKEUP_IN and WAKEUP_OUT signal to Host. This design can make sure M14A2A can be waked up by Host.

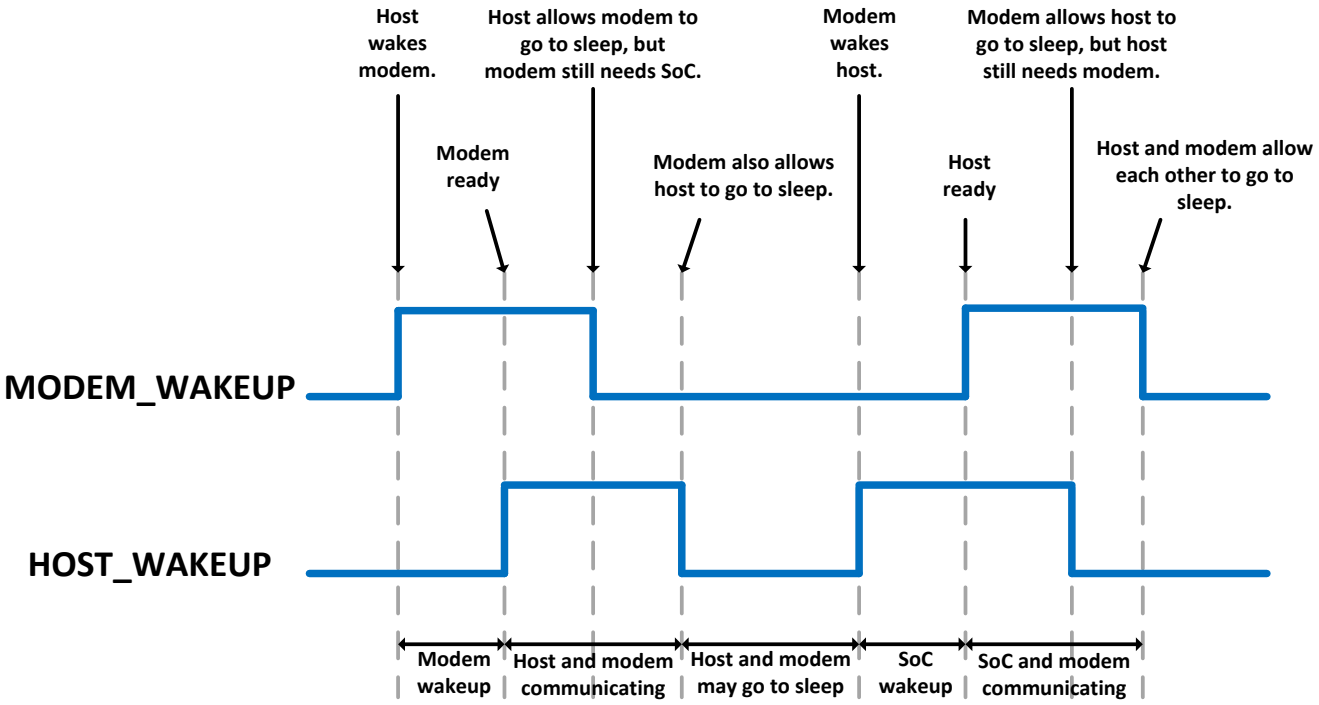

Figure 4. Host-modem mutual wake-up interface

- "MODEM_WAKEUP" (Host: Output, Modem: Input):
  LOW: SoC does not need the MODEM (allowing it to sleep).
  HIGH: SoC needs the MODEM or acknowledges it is ready following a wakeup request from the MODEM.
- "HOST_WAKEUP" (Host: Input, Modem: Output):
  LOW: MODEM does not need the Host (allowing it to sleep).
  HIGH: MODEM needs the Host or acknowledges it is ready following a wakeup request from the SoC.

2.5.3. Reset Signal

The Reset Signal is a hardware reset signal to control the system reset directly. You can connect it to a key or a control signal. It was recommended to reserve a pull up resistor and a capacitor to ground. Default is not installed.

It is required that the Reset Signal is kept LOW for at least 100 ms after a command to reset the module has been issued to ensure that there is time for the module reset properly.

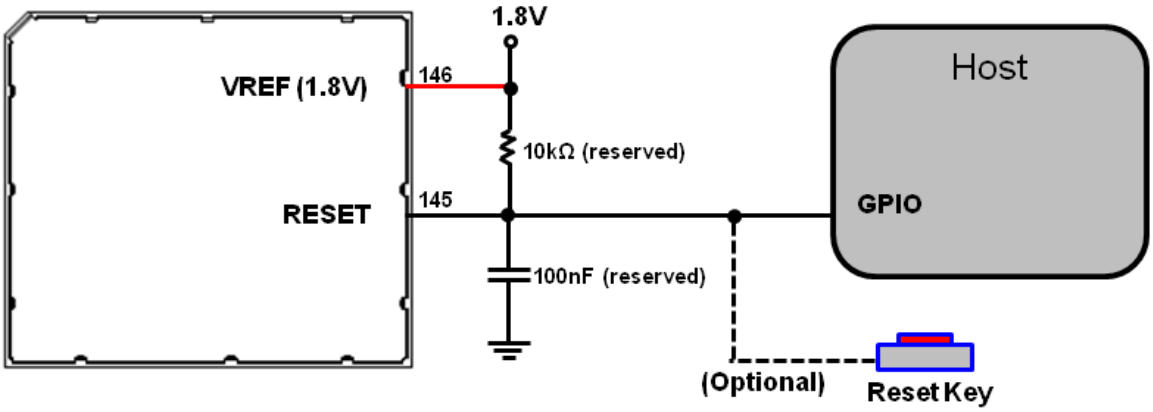

Figure 5. Reset Signals circuit

2.6. Digital interface

This section provides the required AC timing information relating to Module Digital Interfaces.

2.6.1. PCM Interface

M14A2A provides one PCM digital audio interface.
The PCM interface enables communication with an external codec to support a linear format.

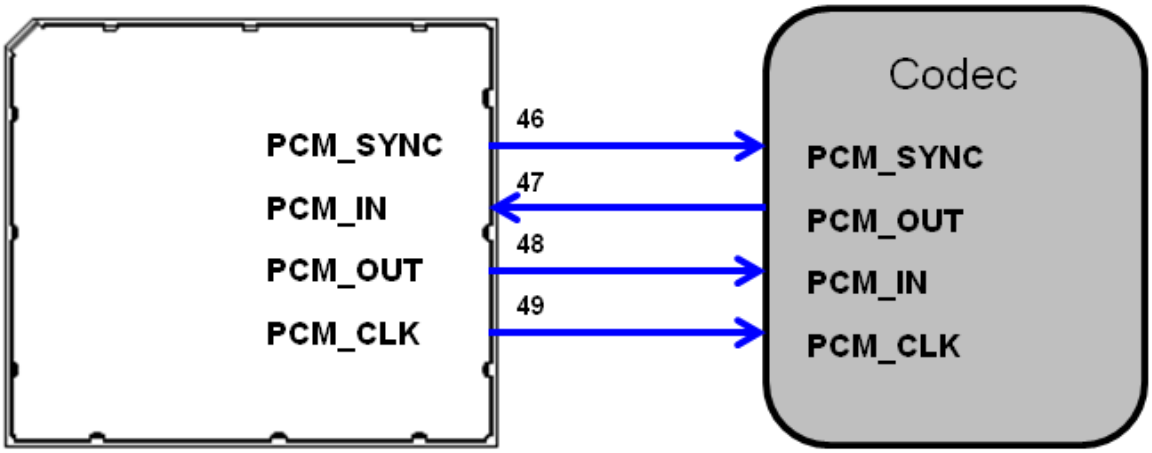

Figure 6. Recommended circuit for the PCM interface

Use a TVS on the related interface to prevent electrostatic discharge and protect integrated-circuit (IC) components.

2.6.2. I2S Interface

PCM and I2S share the same pins on M14A2A, the PCM signal pins can be configured as an I2S interface.

Pad	Config1	Config2
46	PCM_SYNC	I2S_LRCK
47	PCM_DIN	I2S_DATA_IN

48	PCM_DOUT	I2S_DATA_OUT
49	PCM_CLK	I2S_BCK

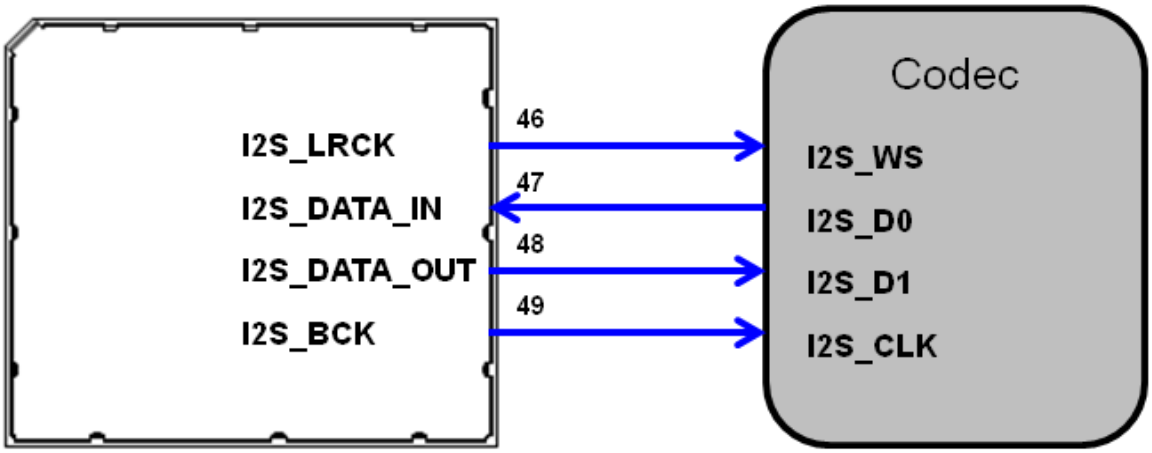

Figure 7. Recommended circuit for the I2S interface

2.6.3. I2C Interface

There is one I2C interface in M14A2A. It was recommended to add pull high to 1.8 V through resistors with values of 2.2 kΩ to 4.7 kΩ. ICs and sensors can use the same I2C interface. M14A2A can recognize them by different addresses.

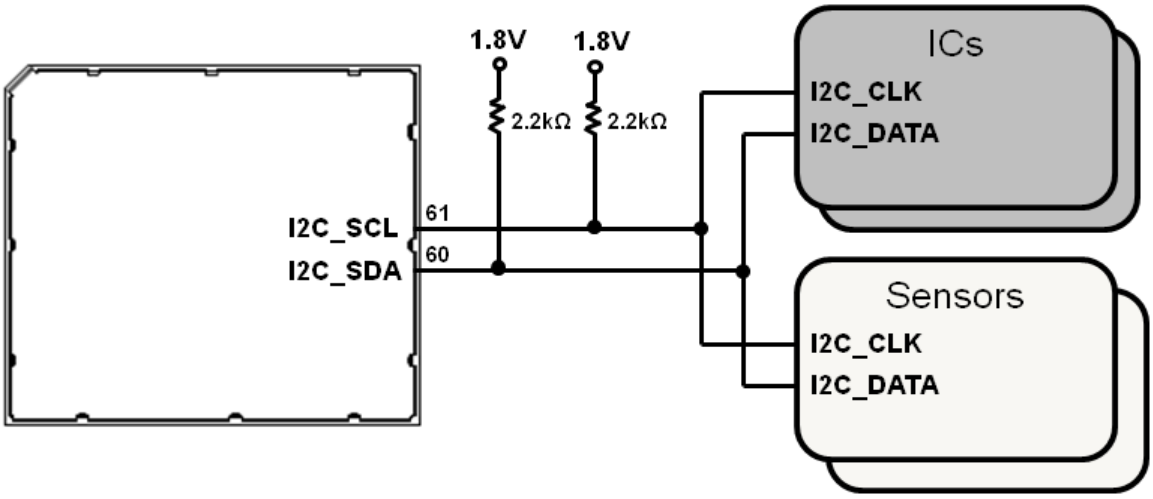

Figure 8. Recommended circuit for the I2C interface

2.6.4. UART Interface

There are dual UART interfaces. One is 4 bit for high-speed data transfer, and the other is 2 bit for diagnostic tools and debugging.

2.7. ADC interface

One Analog to Digital Converter (ADC) input is provided by M14A2A. The converter is of a 10 bit resolution, ranging from 0 V to 1.95 V with a sampling rate of 2 MHz. They can be used for customer applications.

Table 4. ADC interface

Signal Name	Pads	Type	Description
ADC	122	Analog	Analog to digital conversion input

2.8. GPIO

M14A2A includes general purpose I/O signals that are summarized in the following table. These GPIOs are available for customer-defined purposes such as control, signaling, and monitoring. Some GPIO signals also can be configured as PCM signals for audio applications.

Table 5. GPIOs

Signal Name	Pads	Description	Alt. Function
GPIO01	52	Configurable general purpose I/O	
GPIO02	53	Configurable general purpose I/O	
GPIO03	54	Configurable general purpose I/O	
GPIO04	55	Configurable general purpose I/O	
GPIO05	129	Configurable general purpose I/O	
GPIO06	130	Configurable general purpose I/O	
GPIO07	131	Configurable general purpose I/O	
GPIO08	132	Configurable general purpose I/O	
GPIO46	46	Configurable general purpose I/O	PCM_SYNC
GPIO47	47	Configurable general purpose I/O	PCM_IN
GPIO48	48	Configurable general purpose I/O	PCM_OUT
GPIO49	49	Configurable general purpose I/O	PCM_CLK
GPIO87	87	Configurable general purpose I/O	
GPIO93	93	Configurable general purpose I/O	
GPIO94	94	Configurable general purpose I/O	
GPIO95	95	Configurable general purpose I/O	
GPIO96	96	Configurable general purpose I/O	
GPIO97	97	Configurable general purpose I/O	

3. RF Specifications

3.1. RF connections

M14A2A provides two RF pads; developers can connect them via 50 Ω traces to the main board.

TRX pads – RX/TX path
DRX pads – Diversity path

It is recommended to have keep-out under the two RF pads.

3.2. Interference and sensitivity

This section is to help developers to identify the interference that may affect M14A2A when adopting it in systems.

Interference from other wireless devices

Harmonics or inter-modulated signals generated from wireless devices that fall in RX ranges of M14A2A may result in degraded RX performance.

It is highly recommended to check the RX performance of the entire systems in the shielding environment.

Interference from the host interface

High-speed switching signal elements in the system can easily couple noise to the module (Ex.: DDR memory, LCD modules, DC-DC converter).

Methods to avoid sources of interference

Antenna location is important; it is recommended that the antenna away from high-speed switching signals. Tracing from the module to the antenna is recommended to be as short as possible and must be shielded by complete grounding.

However, M14A2A is well-shielded. The high-speed elements in the system are recommend to be reserved for shielding during an early stage of a project's development.

3.3. Radiated sensitivity measurement

Over-the-air testing can demonstrate the TRX ability of the whole system. Keys elements that affect the measurement are:

Module ability (refer Specification)
Antenna Gain
System noise source

The OTA performance should be performed in an OTA chamber.

3.4. Supported frequencies

Table 6. M14A2A supported frequencies

Band	Uplink (MHz)	Downlink (MHz)
LTE Band 2	1,850–1,910	1,930–1,990
LTE Band 4	1,710–1,755	2,110–2,155
LTE Band 12	699–716	729–746

Table 7.

Band	Bandwidth					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
LTE Band 2			V	V	V	V
LTE Band 4			V	V	V	V
LTE Band 12			V	V		

Table 8. Conducted Tx power

Band	Items	Parameter	Unit	Min.	Typ.	Max.
LTE Band 2	Max TX Power	10 MHz 12RBs/QPSK	dBm	21.5	22.5	23.5
LTE Band 4	Max TX Power	10 MHz 12RBs/QPSK	dBm	21.5	22.5	23.5
LTE Band 12	Max TX Power	10 MHz 12RBs/QPSK	dBm	21.5	22.5	23.5

Table 9. Conducted Rx sensitivity

Band	Items	Parameter	Unit	Min.	Typ.	Max.
LTE Band 2	Receive Sensitivity	10 MHz with 50 RBs	dBm		–96.3	–94.3
LTE Band 4	Receive Sensitivity	10 MHz with 50 RBs	dBm		–98.3	–96.3
LTE Band 12	Receive Sensitivity	10 MHz with 50 RBs	dBm		–95.3	–93.3

4. Power

4.1. Module power states

In the operational modes, the system can be configured to use the different power states.

The system state is selected according to the permissions, required activity, and the available expected time until the next power state.

This method allows the power management to be very dynamic and flexible and to be tuned according to the needs of each product/application and according to specific conditions.

The following table shows several main system operational modes and the different system power states used in each mode.

If the Power states of "Deep Sleep" and "Light Hibernation" feature are required, it was recommended to connect WAKEUP_IN and WAKEUP_OUT signal to Host. This design can make sure M14A2A can be waked up by Host.

Table 10. System operational modes

System Operational Mode	System Power State	Description
Idle Registered (short paging interval)	Active	Wake up
	Active	The modem is currently listening to the channel, decoding paging message etc
	Deep sleep	The modem is in deep sleep; modem state info is fully retained on the baseband side.
Idle Registered (short paging interval)	Active	Wake up
	Active	The modem is listening for paging.
	Light Hibernation	The modem state is retained in the DDR and reconstructed when returning to active.
Idle Registered (long paging cycle) or PSM	Active	Wake up
	Active	The modem is currently listening to the channel, decoding paging message etc.
	Off	The modem stores its state info on the host, flash memory, or other non-volatile memory. The modem internal memory and DDR data are not stored and are completely shut down.
Connected	Active	All different active modes
Connected long-DRX	Deep sleep	
Connected short-DRX	Light sleep	
Detached	Active	The modem performs scanning for networks.
Shutdown	Off	The modem is shut down.

Table 11. Power Consumption result(TBD)

LTE Working Mode	Conditions	Result
Airplane mode	Only Module, no other device	977.099uA
LTE standby (1.28 sec)	Band2 –LTE Standby mode, DRX = 1.28 sec	2.182mA
	Band4 –LTE Standby mode, DRX = 1.28 sec	1.945mA
	Band12 –LTE Standby mode, DRX = 1.28 sec	2.147mA
Band2 Working mode	Band2 – Bandwidth 10MHz, TM3 –DLRB 100 – ULRB 100 – IPV4-TCP , TX Power=23dbm Cat. 1, Downlink throughput is 10Mbps via USB interface by Iperf tool	763mA (22.5dBm/9.44Mbps)
Band4 Working mode	Band4 – Bandwidth 10MHz, TM3 –DLRB 100 – ULRB 100 – IPV4-TCP , TX Power=23dbm Cat. 1, Downlink throughput is 10Mbps via USB interface by Iperf tool	796mA (22.3dBm/9.44Mbps)
Band12 Working mode	Band12 – Bandwidth 10MHz, TM3 –DLRB 100 – ULRB 100 – IPV4-TCP , TX Power=23dbm Cat. 1, Downlink throughput is 10Mbps via USB interface by Iperf tool	747mA (21.6dBm/9.44Mbps)
Powering on	Conditions	Result
Peak power consumption	Power consumption peak when the module is powering up	375mA

Note : The power consumption is still under optimized and the result will update in the future.

5. Software Interface

M14A2A can be configured with several types of configurations for different external host processors which require data communication to the Internet. The basic concept is that the module provides proper interfaces for its control and for the data traffic, which supports as many external host processors as possible with different capabilities for network connection.

Please refer to the “WNC M18Q2 M14A2A SW Developer Guide” for further detail.

6. Mechanical and Environmental Specifications

6.1. PCBA form factor

Dimensions and recommended PCB Layout footprint for M14A2A.

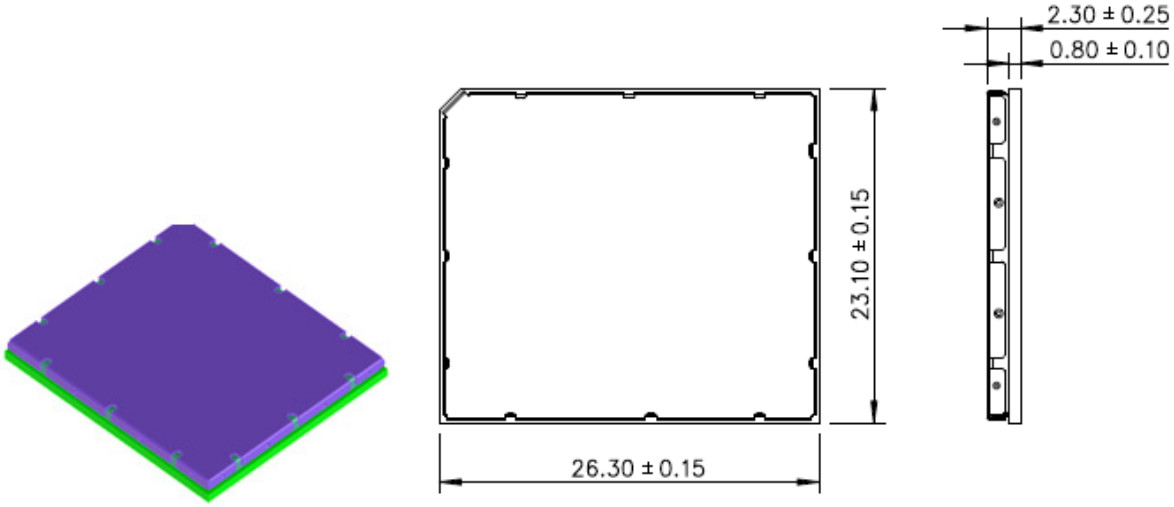

Figure 9. PCBA dimensions

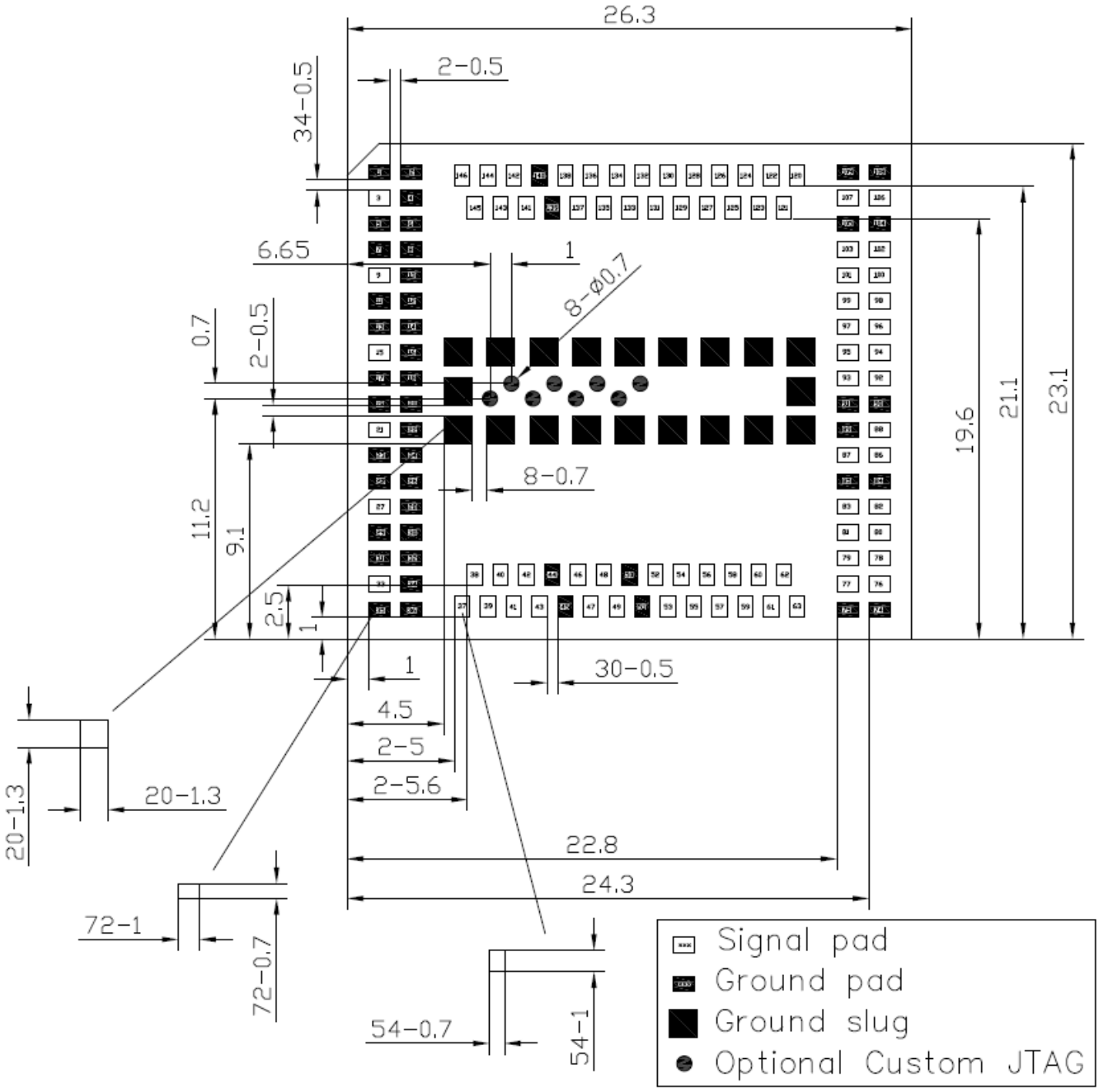

Figure 10. Recommended PCB layout footprint (top view)

6.2. Labeling

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains FCC ID:NKRM14A2A"

The grantee's FCC ID can be used only when all FCC compliance requirements are met

6.3. Thermal considerations

Ambient operating temperature: –30 °C to +75 °C
Ambient storage temperature: –40 °C to +85 °C

The case temperature of module shielding cover must be < 85 °C when integrated to prevent damage.

Design points used to improve the thermal performance:

- It is better to add a naked copper area onto M14A2A's back side of the PCB. If the thermal performance becomes a issue in the customer's product, add thermal solutions for improvement such as thermal padding or a heat sink.
- It's recommended to have a thermal pad or a heat sink on shielding cover to help transfer heat.

7. Regulatory and Industry Approvals

7.1. Certification testing

PTCRB, FCC and AT&T TA

7.2. Safety and hazards

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and must be avoided in the following areas:

- Where it can interfere with other electronic devices in environments such as hospitals, airports, and aircraft
- Where there is a risk of explosion such as gasoline stations and oil refineries

It is the responsibility of the user to comply with his or her country's regulations and the specific environmental regulations.

Do not disassemble the product; any mark of tampering will compromise the warranty's validity.

We recommend following the instructions of the hardware user guides for a correct wiring of the product. The product must be supplied with a stabilized voltage source, and the wiring must conform to the security and fire-prevention regulations.

This product must be handled with care; avoid any contact with the pins because electrostatic discharge may damage the product. Same caution must be taken regarding the SIM card; carefully check the instructions for its use. Do not insert or remove the SIM when the product is in power-saving mode.

The system integrator is responsible of the functioning of the final product; therefore, care must be taken for the external components of the module as well as for project or installation issues—there may be a risk of disturbing the GSM network or external devices or of having an impact on device security. If you have any doubts, please refer to the technical documentation and the relevant regulations in force.

Every module must be equipped with a proper antenna with specific characteristics. The antenna must be installed with care in order to avoid any interference with other electronic devices.

8. References

8.1. Web site support

To be updated

8.2. WNC documents

To be updated

sss

9. Safety Recommendation

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and must be avoided in the following areas:

- Where it can interfere with other electronic devices in environments such as hospitals, airports, and aircraft
- Where there is a risk of explosion such as gasoline stations and oil refineries

It is the responsibility of the user to comply with the his or her country's regulations and the specific environmental regulations.

Do not disassemble the product; any mark of tampering will compromise the warranty's validity.

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Every module must be equipped with a proper antenna with specific characteristics. The antenna must be installed with care in order to avoid any interference with other electronic devices.