
CMX-ZG07

Manual

CMX-ZG07

Overview

The CMX-ZG07 modules are small, cost-effective evaluation and development board or application prototyping.

The JN51xx is an ultra-low-power, highly integrated single-chip device that enables Standard IEEE 802.15.4 RF connectivity for portable, extremely low-power embedded systems.

The CMX-ZG07 modules integrates a radio transceiver operating in the 2.4 GHz ISM band supporting O-QPSK modulation, an ARM Cortex-M4 processor, up to 640 kB flash, 152 kB SRAM and 128 kB ROM, 802.15.4 processor hardware and peripherals optimized to meet the requirements of the target applications.

Benefits

- Single chip device to run stack and application
- System BOM is low in component count and cost
- Flexible sensor interfacing

Applications

- Zigbee 3.0, Thread networks
- Robust and secure Low-power wireless application
- Smart lighting, thermostats and home automation
- Home security and access
- Wireless sensor networks

Features: Module

- 2.4GHz IEEE 802.15.4,
- Zigbee 3.0, Thread networks

- **CMX-ZG07**

CMX-ZG07 : PCB Printed Antenna 16x28mm

- TX current 178mA
- RX current 11mA
- 1.9-3.6V operation

Features: Microcontroller

- Arm Cortex-M4 processor, running at a frequency of up to 48 MHz
- Memory Protection Unit (MPU)
- Serial Wire Debug (SWD) with 8 breakpoints and 4 watchpoints
- On-Chip memory
 - 640 KB flash
 - 152 KB SRAM
- 2 x I2C-bus interface, operate as either master or slave
- 10 x PWM
- 2 x Low-power timers
- 2 UART, one with flow control
- SPI Master & Slave port with 3 selects
- 2 x SPI-bus, master or slave
- Battery and Temperature Sensor
- Watchdog timer and POR
- Up to 22 DIO

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1. Introduction

The standard in the ISM band of 2.4 to 2.5 GHz, including CMX-ZG07 module is ZigBee3.0, uses IEEE 802.15.4 to provide developers with a fully integrated solution for application development, making product design and development quick and easy. These modules do not require expensive RF design and testing and contain all RF devices. It is possible to simply connect the sensor and the switches using the IO pins in the module. These modules use IEEE 802.15.4 wireless microcontrollers for developers using a wide range of chip development materials. Therefore, these modules contribute to developers commercializing wireless applications by reducing significant development costs and development time.

The available modules are specified below.

1.1. Variants

Variant	Description
CMX-ZG07	PCB Printed Antenna

2. Specifications

VDD=3.0V @ +25°C

Typical DC Characteristics		Notes
	CMX-ZG07	
Deep sleep current	1,350nA	
Sleep current	1,800nA	With active sleep timer
Radio transmit current	178mA	IEEE 802.15.4 output power +20 dBm
Radio receive current	11mA	IEEE 802.15.4
Centre frequency accuracy	+/-40ppm	
Typical RF Characteristics		Notes
Receive sensitivity	-99dBm	1 % PER, as per IEEE 802.15.4 Maximum receiver input Power : 10Bm
Transmit power	20 dBm	MAX
Maximum input signal	15dBm	For 1% PER, measured as sensitivity
RSSI range	-100 dBm to 8 dBm	+/- 2 dB IEEE 802.15.4
RF Port impedance – uFL connector	50 ohm	2.4 - 2.5GHz

3. Product Development

A range of evaluation/developer kits is also available, allowing products to be quickly bread boarded. Efficient development of software applications is enabled by the provision of a complete, unlimited, software developer kit. Together with the available libraries for the IEEE802.15.4 MAC and the ZigBee3.0 network stacks, this package provides everything required to develop application code and to trial it with hardware representative of the final module. The modules can be user programmed both in development. Access to the on-chip peripherals, MAC and network stack software is provided through specific APIs.

3.1. JN5XXX Single Chip Wireless Microcontroller

CMX-ZG07 is constructed around the JN51XX single chip wireless microcontroller, which includes the radio system, a 32-bit Arm cortex-M4 CPU, Flash, RAM & EEPROM memory and a range of analogue and digital peripherals

4. Pin Configurations

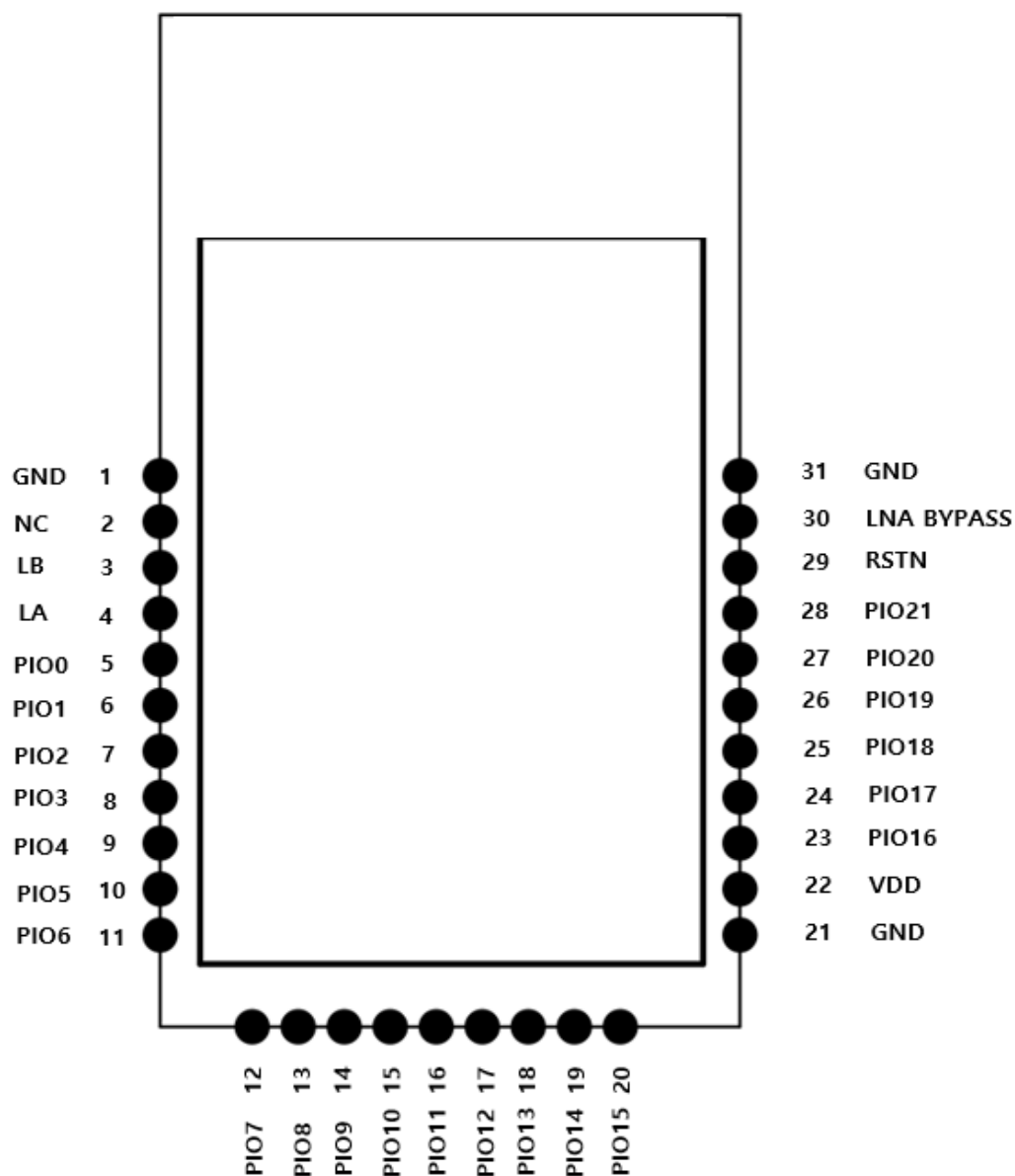


Figure 1: Pin Configuration (top view)

Note : that the same basic pin configuration applies for all module designs.

However, DIO4 (pin 9) and DIO5 (pin 10) are not available on the CMX-ZG07

4.1. Pin Assignment

Symbol	Pin	Type	Description
GND	1	GND	ground
NC	2	-	NC
LB	3	-	NC
LA	4	-	NC
PIO0	5	I/O	GPIO0 — General Purpose digital Input/Output 0
			USART0_SCK — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - synchronous clock
			USART1_TXD — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - transmit data output
			PWM0 — Pulse Width Modulator output 0
			SPI1_SCK — Serial Peripheral Interface-bus 1 clock input/output
			PDM0_DATA — Pulse Density Modulation Data input from digital microphone (channel 0)
PIO1	6	I/O	GPIO1 — General Purpose digital Input/Output 1
			USART1_RXD — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - receive data input
			PWM1 — Pulse Width Modulator output 1
			SPI1_MISO — Serial Peripheral Interface-bus 1 master data input
			PDM0_CLK — Pulse Density Modulation Clock output to digital microphone (channel 0)
PIO2	7	I/O	GPIO2 — General Purpose digital Input/Output 2
			SPI0_SCK — Serial Peripheral Interface-bus 0 clock input/output
			PWM2 — Pulse Width Modulator output 2
			SPI1_MOSI — Serial Peripheral Interface-bus 1 master output slave input
			USART0_RXD — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - receive data input
			ISO7816_RST — RST signal, output, for ISO7816 interface
			MCLK — External clock, can be provided to DMIC IP

Symbol	Pin	Type	Description
PIO3	8	I/O	GPIO3 — General Purpose digital Input/Output 3
			SPI0_MISO — Serial Peripheral Interface-bus 0 master input
			PWM3 — Pulse Width Modulator output 3
			SPI1_SSELN0 — Serial Peripheral Interface-bus 1 slave select not 0
			USART0_TXD — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - transmit data output
			ISO7816_CLK — Clock output for ISO7816 interface
PIO4	9	I/O	GPIO4 — General Purpose digital Input/Output 4
			SPI0_MOSI — Serial Peripheral Interface-bus 0 master output slave input
			PWM4 — Pulse Width Modulator output 4
			SPI1_SSELN1 — Serial Peripheral Interface-bus 1 slave select not 1
			USART0_CTS — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - Clear To Send input
			ISO7816_IO — IO of ISO7816 interface
			RFTX — Radio Transmit Control Output
			ISP_SEL — In-System Programming Mode Selection
PIO5/ISP_ENTRY	10	I/O	GPIO5/ISP_ENTRY — General Purpose digital Input/Output 5; In-System Programming Entry
			SPI0_SSELN — Serial Peripheral Interface-bus 0 slave select no
			SPI1_MISO — Serial Peripheral Interface-bus 1 master data input
			SPI1_SSELN2 — Serial Peripheral Interface-bus 1 slave select not 2
			USART0_RTS — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - Request To Send output
			RFRX — Radio Receiver Control Output
PIO6	11	I/O	GPIO6 — General Purpose digital Input/Output 6
			USART0_RTS — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - Request to Send output
			CT32B1_MAT0 — 32-bit CT32B1 match output 0
			PWM6 — Pulse Width Modulator output 6
			I2C1_SCL — I2C-bus 1 master/slave SCL input/output
			USART1_TXD — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - transmit data output
			ADE — Antenna Diversity Even output
			SPI0_SCK — Serial Peripheral Interface 0- synchronous clock

Symbol	Pin	Type	Description
PIO7	12	I/O	GPIO7 — General Purpose digital Input/Output 7
			USART0_CTS — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - Clear to Send input
			CT32B1_MAT1 — 32-bit CT32B1 match output 1
			PWM7 — Pulse Width Modulator output 7
			I2C1_SDA — I2C-bus 1 master/slave SDA input/output
			USART1_RXD — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - receive data input
			ADO — Antenna Diversity Odd Output
			SPI0_MISO — Serial Peripheral Interface-bus 0 master input
PIO8	13	I/O	GPIO8 — General Purpose digital Input/Output 8
			USART0_TXD — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - transmit data output
			CT32B0_MAT0 — 32-bit CT32B0 match output 0
			PWM8 — Pulse Width Modulator output 8
			ANA_COMP_OUT — Analog Comparator digital output
			PDM1_DATA — Pulse Density Modulation Data input from digital microphone (channel 1)
			SPI0_MOSI — Serial Peripheral Interface-bus 0 master output slave input
			RFTX — Radio Transmit Control Output
PIO9	14	I/O	GPIO9 — General Purpose digital Input/Output 9
			USART0_RXD — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - receive data input
			CT32B1_CAP1 — 32-bit CT32B1 capture input 1
			PWM9 — Pulse Width Modulator output 9
			USART1_SCK — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - synchronous clock
			PDM1_CLK — Pulse Density Modulation Clock output to digital microphone (channel 1)
			SPI0_SSELN — Serial Peripheral Interface-bus 0 slave select no
			ADO — Antenna Diversity Odd Output

Symbol	Pin	Type	Description
PIO10	15	I/O	GPIO10 — General Purpose digital Input/Output 10
			CT32B0_CAP0 — 32-bit CT32B0 capture input 0
			USART1_TXD — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - transmit data output
			RFTX — Radio Transmit Control Output
			I2C0_SCL — I2C-bus 0 master/slave SCL input/output (open drain)
			SPI0_SCK — Serial Peripheral Interface-bus 0 clock input/output
			PDM0_DATA — Pulse Density Modulation Data input from digital microphone (channel 0)
PIO11	16	I/O	GPIO11 — General Purpose digital Input/Output 1
			CT32B1_CAP0 — 32-bit CT32B1 capture input 0
			USART1_RXD — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - receive data input
			RFRX — Radio Receiver Control Output
			I2C0_SDA — I2C-bus 0 master/slave SDA input/output (open drain)
			SPI0_MISO — Serial Peripheral Interface-bus 0 master input slave output
			PDM0_CLK — Pulse Density Modulation Clock output to digital microphone (channel 0)
PIO12/SWCLK	17	I/O	GPIO12 — General Purpose digital Input/Output 12
			SWCLK — Serial Wire Debug Clock
			PWM0 — Pulse Width Modulator output 0
			I2C1_SCL — I2C-bus 1 master/slave SCL input/output (open drain)
			SPI0_MOSI — Serial Peripheral Interface-bus 0 master output slave input
			ANA_COMP_OUT — Analog Comparator digital output
			IR_BLASTER — Infra-Red Modulator output
PIO13/ SWDIO	18	I/O	GPIO13 — General Purpose digital Input/Output 13
			SPI1_SSELN2 — Serial Peripheral Interface-bus 1, slave select not 2
			SWDIO — Serial Wire Debug Input/Output
			PWM2 — Pulse Width Modulator output 2
			I2C1_SDA — I2C-bus 1 master/slave SDA input/output (open drain)
			SPI0_SSELN — Serial Peripheral Interface-bus 0, slave select not

Symbol	Pin	Type	Description
PIO14/ADC0	19	I/O	ADC0 — ADC input 0
			GPIO14 — General Purpose digital Input/Output 14
			SPI1_SSELN1 — Serial Peripheral Interface-bus 1, slave select not 1
			CT32B0_CAP1 — 32-bit CT32B0 capture input 1
			PWM1 — Pulse Width Modulator output 1
			SWO — Serial Wire Output
			USART0_SCK — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - synchronous clock
			MCLK — External clock, can be provided to DMIC IP
			RFTX — Radio Transmit Control Output
PIO15/ADC1	20	I/O	ADC1 — ADC input 1
			GPIO15 — General Purpose digital Input/Output 15
			SPI1_SCK — Serial Peripheral Interface-bus 1, clock input/output
			ANA_COMP_OUT — Analog Comparator digital output
			PWM3 — Pulse Width Modulator output 3
			PDM1_DATA — Pulse Density Modulation Data input from digital microphone (channel 1)
			I2C0_SCL — I2C-bus 0 master/slave SCL input/output (open drain)
			RFRX — Radio Receiver Control Output
GND	21	GND	ground
VDD	22	P	VDD
PIO16/ADC2	23	I/O	ADC2 — ADC input 2
			GPIO16 — General Purpose digital Input/Output 16
			SPI1_SSELN0 — Serial Peripheral Interface-bus 1, slave select not 0
			PWM5 — Pulse Width Modulator output 5
			PDM1_CLK — Pulse Density Modulation Clock output to digital microphone (channel 1)
			SPIFI_CSN — Quad-SPI Chip Select Not, output
			ISO7816_RST — RST signal, output, for ISO7816 interface
			I2C0_SDA — I2C-bus 0 master/slave SDA input/output (open drain)

Symbol	Pin	Type	Description
PIO17/ADC3	24	I/O	ADC3 — ADC input 3
			GPIO17 — General Purpose digital Input/Output 17
			SPI1_MOSI — Serial Peripheral Interface-bus 1, master output slave input
			SWO — Serial Wire Output
			PWM6 — Pulse Width Modulator output 6
			SPIFI_IO3 — Quad-SPI Input/Output 3
			ISO7816_CLK — Clock output for ISO7816 interface
			CLK_OUT — Clock out
PIO18/ADC4	25	I/O	ADC4 — ADC input 4
			GPIO18 — General Purpose digital Input/Output 18
			SPI1_MISO — Serial Peripheral Interface-bus 1, master data input
			CT32B0_MAT1 — 32-bit CT32B0 match output 1
			PWM7 — Pulse Width Modulator output 7
			SPIFI_CLK — Quad-SPI Clock output
			ISO7816_IO — IO of ISO7816 interface)
			USART0_TXD — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - transmit data output
PIO19/ADC5	26	I/O	ADC5 — ADC input 5
			GPIO19 — General Purpose digital Input/Output 19
			ADO — Antenna Diversity Odd Output
			PWM4 — Pulse Width Modulator output 4
			SPIFI_IO0 — Quad-SPI Input/Output 0
			USART1_RXD — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - receive data input
			CLK_IN — External clock
			USART0_RXD — Universal Synchronous/Asynchronous Receiver/Transmitter 0 - receive data input

Symbol	Pin	Type	Description
PIO20/ACP	27	I/O	ACP — Analog Comparator Positive input
			GPIO20 — General Purpose digital Input/Output 20
			IR_BLASTER — Infra-Red Modulator output
			PWM8 — Pulse Width Modulator output 8
			RFTX — Radio Transmit Control Output
			SPIFI_IO2 — Quad-SPI Input/Output 2
			USART1_TXD — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - transmit data output
PIO21/ACM	28	I/O	ACM — Analog Comparator Negative input
			GPIO21 — General Purpose digital Input/Output 21
			IR_BLASTER — Infra-Red Modulator output
			PWM9 — Pulse Width Modulator output 9
			RFRX — Radio Receiver Control Output
			SWO — Serial Wire Output
			SPIFI_IO1 — Quad-SPI Input/Output 1
			USART1_SCK — Universal Synchronous/Asynchronous Receiver/Transmitter 1 - synchronous clock
RSTN	29	I	RSTN — Reset Not input
LNA BYPASS	30	I	Connect to GPIO signal to control Front End Module State
GND	31	GND	ground

4.2. Pin Descriptions

4.2.1. Power Supplies

A single power supply pin, VDD is provided.

5. Electrical Characteristics

In most cases, the Electrical Characteristics are the same for both module and chip. They are described in detail in the chip datasheet. Where there are differences, they are detailed below.

5.1. Maximum Ratings

Exceeding these conditions will result in damage to the device.

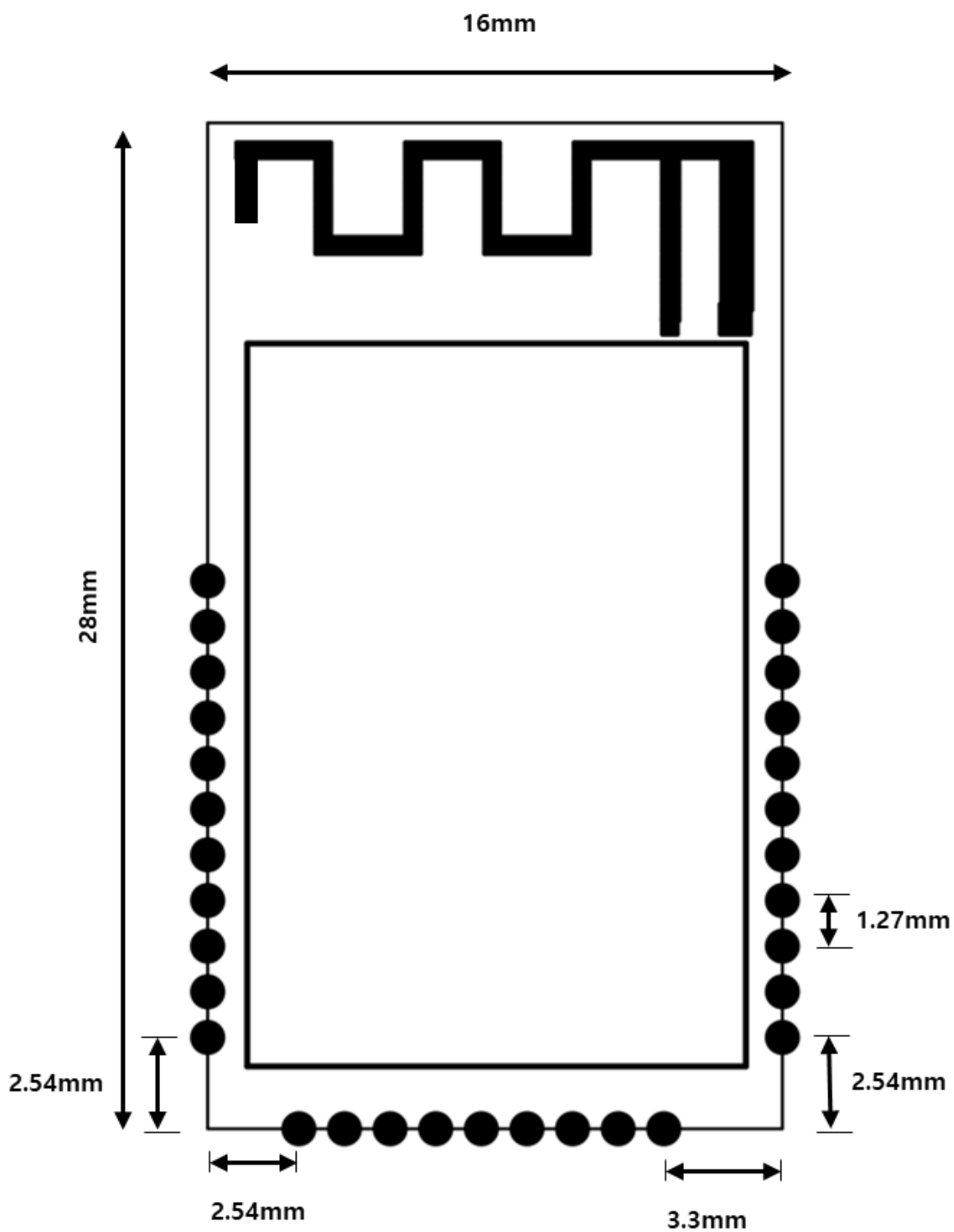
Parameter	Min	Max
Device supply voltage VDD	-0.3V	3.6V
All Pins	-0.3V	VDD + 0.3V
Storage temperature	-40°C	85°C

5.2. Operating Conditions

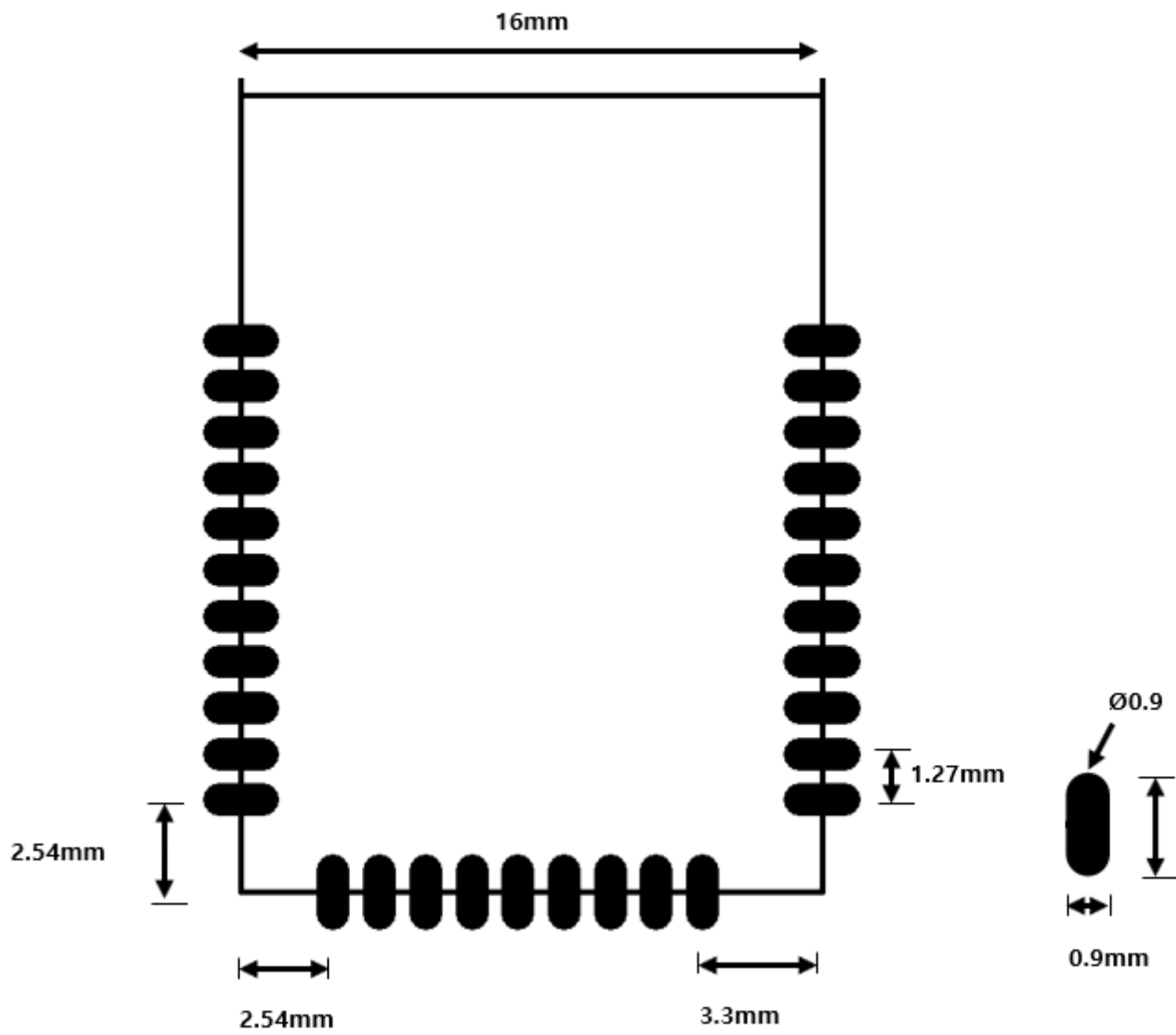
Supply	Min	Max
VDD	1.9V	3.6V
Ambient temperature range	-20°C	70°C

Appendix A Additional Information

A.1. Outline Drawing : CMX-ZG07



A.2. Module PCB Footprint



Compliance Information

FCC

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

This device should be installed and operated with minimum 20Cm between the radiator and your body.

ISED

This device contains license-exempt transmitter(s)/receiver that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:(1) This device may not cause interference. (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada. Son fonctionnement est soumis aux deux conditions suivantes:(1) Cet appareil ne doit pas provoquer d'interférences.(2) Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent provoquer un fonctionnement indésirable de l'appareil.

This equipment should be installed and operated with minimum 20 cm between the radiator and your body.

Cet appareil doit être installé et utilisé avec un minimum de 20 cm entre le radiateur et votre corps.

INTEGRATION INSTRUCTIONS

List of applicable FCC/ISED rules

This module complies with Part 15.247 of the FCC rule.

This module complies with RSS-247 of ISED rule.

Summarize the specific operational use conditions

This device should be installed and operated with minimum 20Cm between the radiator and user body.

Limited module procedures

Not applicable

Trace antenna designs

Not applicable

RF exposure considerations

This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

This device should be installed and operated with minimum 20Cm between the radiator and user body.

The host manual shall include the RF exposure statements.

If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Antennas

The module itself has antenna. (Printed Antenna)

Label and compliance information

The module is labeled with its own FCC/IC. If the FCC ID/IC is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following;

For FCC: "Contains FCC ID: CCECMX-ZG07"

For ISSED: "Contains IC: 22254-CMXZG07"

The host manual shall include the following regulatory statement:

For FCC:

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.

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

This device should be installed and operated with minimum 20Cm between the radiator and your body.

For ISSED:

This device contains license-exempt transmitter(s)/receiver that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:(1) This device may not cause interference. (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada. Son fonctionnement est soumis aux deux conditions suivantes:(1) Cet appareil ne doit pas provoquer d'interférences.(2) Cet appareil doit accepter toute interférence, y compris les interférences qui peuvent provoquer un fonctionnement indésirable de l'appareil.

This equipment should be installed and operated with minimum 20 cm between the radiator and your body.

Cet appareil doit être installé et utilisé avec un minimum de 20 cm entre le radiateur et votre corps.

Information on test modes and additional testing requirements

Testing of the host product with all the transmitters installed - referred to as the composite investigation test- is recommended, to verify that the host product meets all the applicable FCC rules. The host manufacturer can use the software to control the RF signal during test.

For more information, please contact us.

Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.

The host product may need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

Note EMI Considerations

Not applicable