CMX-ZG03
Datasheet
(VER.0.0)

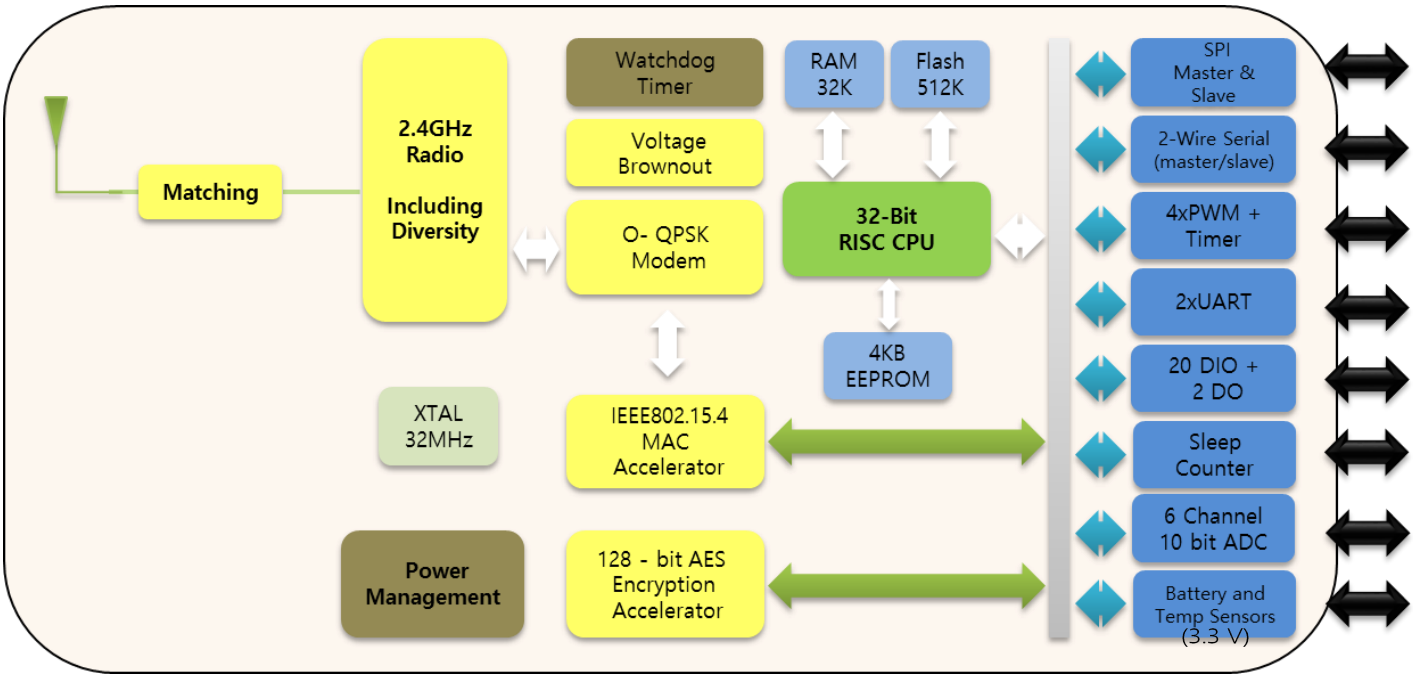
Data Sheet : CMX-ZG03

ZigBee 3.0 , ZigBee PRO and IEEE802.15.4 Module

Overview

CMX-ZG03은 using the IEEE802.15.4 standard in the 2.4 GHz - 2.5 GHz ISM frequency band, including ZigBee 3.0 and ZigBee PRO stack with Home Automation, Light Link and Smart Energy profiles. The modules integrate all of the RF components required, removing the need to perform expensive RF design and test. Products can be designed by simply connecting sensors and switches to the module IO pins. The modules use JN51xx single chip IEEE802.15.4 wireless microcontroller, allowing designers to make use of the extensive chip development support material. Hence, this range of modules allows designers to bring wireless applications to market in the minimum time with significantly reduced development effort and cost.

Module Block Diagram



Benefits

- Microminiature module solutions
- Ready to use in products
- Minimises product development time
- No RF test required for systems

Applications

- Robust and secure low-power wireless applications
- ZigBee Smart Energy networks
- ZigBee Home Automation networks
- Toys and gaming peripherals
- Energy harvesting - for example, self-powered light switch

Features: Module

- 2.4GHz IEEE 802.15.4, , ZigBee 3.0 and ZigBee PRO stack with Home Automation, ZigBee Light Link, ZigBee Smart Energy

- **CMX-ZG03**
  CMX-ZG03 : integral antenna 16x28mm
  - 8.5dBm/10dBm TX Power
  - Receiver sensitivity -96dBm
  - TX current 27.2 mA at 10 dBm
  - TX current 23.6 mA at 8.5 dBm
  - RX current 17.8 mA at maximum input level 10 dBm
  - RX current 16.2 mA at maximum input level 0 dBm
  - 2.0-3.6V operation

Features: Microcontroller

- 32-bit RISC CPU; 1 MHz to 32 MHz clock speed
- Variable instruction width for high coding efficiency
- Multi-stage instruction pipeline
- 512 kB Flash
- 32 kB RAM
- 4 kB EEPROM
- Data EEPROM with guaranteed 100 k write operations
- 2-wire I^2C-bus compatible serial interface; can operate as either master or slave
- 5 × PWM (4 timers, 1 timer/counter)
- 2 low-power sleep counters
- 2 UARTs
- SPI-bus Master and Slave port, 3 selects
- Supply voltage monitor with 8 programmable thresholds
- 6-input 10-bit ADC, comparator
- Battery and temperature sensors
- Watchdog and Supply Voltage Monitor (SVM)
- Up to 20 Digital IO (DIO) pins

Industrial temp (-40°C to +85°C)
Lead-free and RoHS compliant

Contents

1. Introduction

CMX-ZG03 is a range of ultra-low power, high performance surface mount modules targeted at IEEE 802.15.4, ZigBee 3.0 and ZigBee Home Automation, Light Link and Smart Energy networking applications, enabling users to realize products with minimum time to market and at the lowest cost. They remove the need for expensive and lengthy development of custom RF board designs and test suites. The modules use JN51xx wireless microcontroller to provide a comprehensive solution with large memory, high CPU and radio performance and all RF components included. All that is required to develop and manufacture wireless control or sensing products is to connect a power supply and peripherals such as switches, actuators and sensors, considerably simplifying product development.

module variants are available.

1.1. Variants

Variant	Description
CMX-ZG03	integrated antenna

2. Specifications

VDD=3.0V @ +25°C

Typical DC Characteristics		Notes
	CMX-ZG03	
Deep sleep current	70nA	
Sleep current	0.73uA	In sleep mode; with I/O and RC oscillator timer wake-up;
Radio transmit current	25mA	10dBm @2.8V
Radio receive current	17.8mA	Maximu input level at 10dBm
Centre frequency accuracy	+/-25ppm	Additional +/-15ppm allowance for temperature and ageing
Typical RF Characteristics		**Notes**
Receive sensitivity	-96dBm	Nominal for 1% PER, as per 802.15.4 section 6.5.3.3 (Note 1)
Transmit power	10dBm	Nominal
Maximum input signal	10dBm	For 1% PER, measured as sensitivity
RSSI range	-95 to -10dBm	
RF Port impedance – uFL connector	50 ohm	2.4 - 2.5GHz
Rx Spurious Emissions	-70dBm	Measured conducted into 50ohms
Tx Spurious Emissions	-36dBm	Measured conducted into 50ohms
VSWR (max)	2:1	2.4 - 2.5GHz
Peripherals		**Notes**
Master SPI port	3 selects	250kHz - 16MHz
Slave SPI port	1	250kHz - 4MHz
Two UARTs	2	16550 compatible
Two-wire serial I/F (compatible with SMbus & I^2C)	1	Up to 400kHz
PWM	4 x timer, 1 x timer/counter	16MHz clock
Two programmable Sleep Timers	2	32kHz clock
Digital IO lines (multiplexed with UARTs, timers and SPI selects)	20	DIO2 & DIO3 not available on RZN-AEM00 and RZN-AEM01 modules
Analogue-to-Digital converter	6	10-bit, up to 100ks/s

Programmable analogue comparators	1	Ultra low power mode for sleep
Internal temperature sensor and battery monitor	1	

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 ZigBee PRO 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. JN51xx Single Chip Wireless Microcontroller

CMX-ZG03 is constructed around the JN51XX single chip wireless microcontroller, which includes the radio system, a 32-bit RISC CPU, Flash, RAM & EEPROM memory and a range of analogue and digital peripherals.

4. Pin Configurations

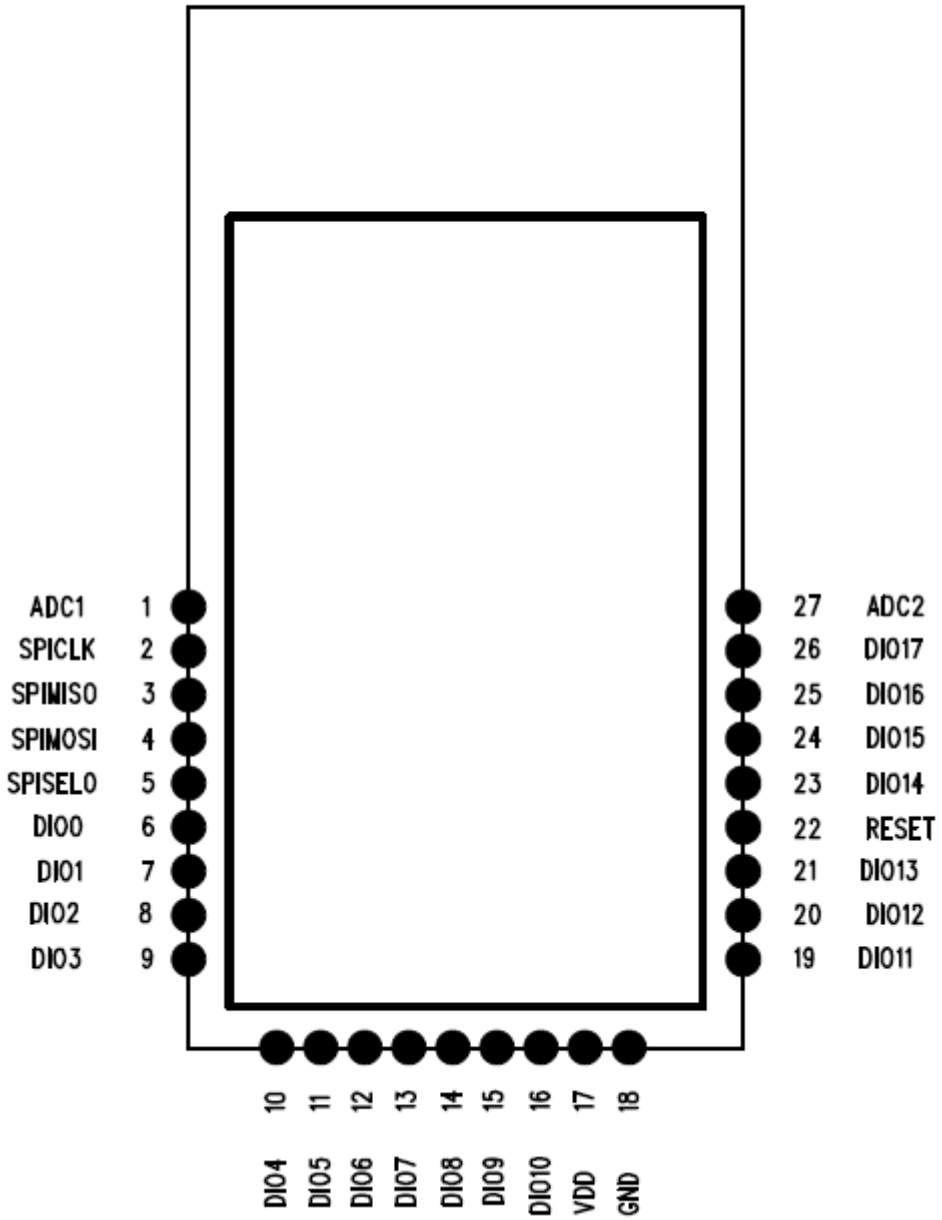


Figure 1: Pin Configuration (top view)

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

However, DIO2 (pin 8) and DIO3 (pin 9) are not available on the RZN-AEM00 and RZN-AEM05.

4.1. Pin Assignment

Symbol	Pin	Type[1]	Description
DO0/SPICLK/PWM2[2]	2	O	**DO0 —** DO0
			SPICLK — SPI-bus master clock output
			PWM2 — PWM2 output
DO1/SPIMISO/PWM3[3]	3	I/O	**DO1 —** DO1
			SPIMISO — SPI-bus Master In, Slave Out input
			PWM3 — PWM3 output
DIO18/SPIMOSI	4	I/O	**DIO18 —** DIO18
			SPIMOSI — SPI-bus Master Out Slave In output
DIO19/SPISEL0	5	I/O	**DIO19 —** DIO19
			SPISEL0 — SPI-bus Master Select Output 0
DIO0/ADO/SPISEL1/ADC3	6	I/O	**DIO0 —** DIO0
			ADO — antenna diversity odd output
			SPISEL1 — SPI-bus master select output 1
			ADC3 — ADC input: ADC3
DIO1/ADE/SPISEL2/ADC4/PC0	7	I/O	**DIO1 —** DIO1
			ADE — antenna diversity even output
			SPISEL2 — SPI-bus master select output 2
			ADC4 — ADC input: ADC4
			PC0 — pulse counter 0 input
DIO2/RFRX/TIM0CK_GT/ADC5[4]	8	I/O	**DIO2 —** DIO2
			RFRX — radio receives control output
			TIM0CK_GT — timer0 clock/gate input
			ADC5 — ADC input: ADC5
DIO3/RFTX/TIM0CAP/ADC6[4]	9	I/O	**DIO3 —** DIO3
			RFTX — radio transmit control output
			TIM0CAP — timer0 capture input
			ADC6 — ADC input: ADC6
DIO4/CTS0/JTAG_TCK/TIM0OUT/PC0	10	I/O	**DIO4 —** DIO4
			CTS0 — UART 0 clear to send input
			JTAG_TCK — JTAG CLK input
			TIM0OUT — timer0 PWM output
			PC0 — pulse counter 0 input
DIO5/RTS0/JTAG_TMS/PWM1/PC1	11	I/O	**DIO5 —** DIO5
			RTS0 — UART 0 request to send output
			JTAG_TMS — JTAG mode select input
			PWM1 — PWM1 output
			PC1 — pulse counter 1 input
DIO6/TXD0/JTAG_TDO/PWM2	12	I/O	**DIO6 —** DIO6
			TXD0 — UART 0 transmit data output
			JTAG_TDO — JTAG data output
			PWM2 — PWM2 data output

Symbol	Pin	Type[1]	Description
DIO7/RXD0/JTAG_TDI/PWM3	13	I/O	**DIO7 —** DIO7
			RXD0 — UART 0 receive data input
			JTAG_TDI — JTAG data input
			PWM3 — PWM 3 data output
DIO8/TIM0CK_GT/PC1/PWM4	14	I/O	**DIO8 —** DIO8
			TIM0CK_GT — timer0 clock/gate input
			PC1 — pulse counter1 input
			PWM4 — PWM 4 output
DIO9/TIM0CAP/32KXTALIN/RXD1/32KIN	15	I/O	**DIO9 —** DIO9
			TIM0CAP — Timer0 Capture input
			32KXTALIN — 32 kHz External Crystal input
			RXD1 — UART1 Receive Data input
			32KIN — 32 kHz External clock input
DIO10/TIM0OUT/32KXTALOUT	16	I/O	**DIO10 —** DIO10
			TIM0OUT — Timer0 PWM Output
			32KXTALOUT — 32 kHz External Crystal output
V_{DD}	17	P	**V_{DD} —** supply voltage
V_{SS}	18	GND	ground
DIO11/PWM1/TXD1	19	I/O	**DIO11 —** DIO11
			PWM1 — PWM1 output
			TXD1 — UART1 Transmit Data output
DIO12[5]	20	I/O	**DIO12 —** DIO12
			PWM2 — PWM2 output
			CTS0 — UART0 clear to send input
			JTAG_TCK — JTAG CLK input
			ADO — antenna diversity odd output
			SPISMOSI — SPI-bus slave Master Out, Slave In input
DIO13[6]	21	I/O	**DIO13 —** DIO13
			PWM3 — PWM3 output
			RTS0 — UART0 request to send output
			JTAG_TMS — JTAG mode select input
			ADE — antenna diversity even output
			SPISMISO — SPI-bus slave master in slave out output
RESET_N	22	I	**RESET_N —** reset input
DIO14[7]	23	I/O	**DIO14 —** DIO14
			SIF_CLK — serial interface clock
			TXD0 — UART 0 transmit data output
			TXD1 — UART 1 transmit data output
			JTAG_TDO — JTAG data output
			SPISEL1 — SPI-bus master select output 1
			SPISSEL — SPI-bus slave select input

Symbol	Pin	Type[1]	Description
DIO15[8]	24	I/O	**DIO15 —** DIO15
			SIF_D — serial interface data
			RXD0 — UART 0 receive data input
			RXD1 — UART 1 receive data input
			JTAG_TDI — JTAG data input
			SPISEL2 — SPI-bus master select output 2
			SPISCLK — SPI-bus slave clock input
DIO16/SPISMOSI/SIF_CLK/COMP1P	25	I/O	**DIO16 —** DIO16
			COMP1P — comparator positive input
			SIF_CLK — Serial Interface clock
			SPISMOSI — SPI-bus Slave Master Out Slave In input
DIO17/SPISMISO/SIF_D/COMP1M	26	I/O	**DIO17 —** DIO17
			COMP1M — COMP1M; comparator negative input
			SIF_D — Serial Interface Data
			SPISMISO — SPI-bus Slave Master In Slave Out output
			PWM4 — PWM 4 output
VREF/ADC2	27	P	**VREF —** analog peripheral reference voltage
		I	**ADC2 —** ADC input 2

[1] P = power supply; G = ground; I = input, O = output; I/O = input/output.

[2] JTAG programming mode: must be left floating high during reset to avoid entering JTAG programming mode.

[3] UART programming mode: leave pin floating high during reset to avoid entering UART programming mode or hold it low to program

[4] Not available on the JN5169-001-M06-2 since they are used to control the front-end module.

[5] Multi-function: DIO12/PWM2/CTS0/JTAG_TCK/ADO/SPISMOSI.

[6] Multi-function: DIO13/PWM3/RTS0/JTAG_TMS/ADE/SPISMISO.

[7] Multi-function: DIO14/SIF_CLK/TXD0/TXD1/JTAG_TDO/SPISEL1/SPISSEL.

[8] Multi-function: DIO15/SIF_D/RXD0/RXD1/JTAG_TDI/SPISEL2/SPISCLK.

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

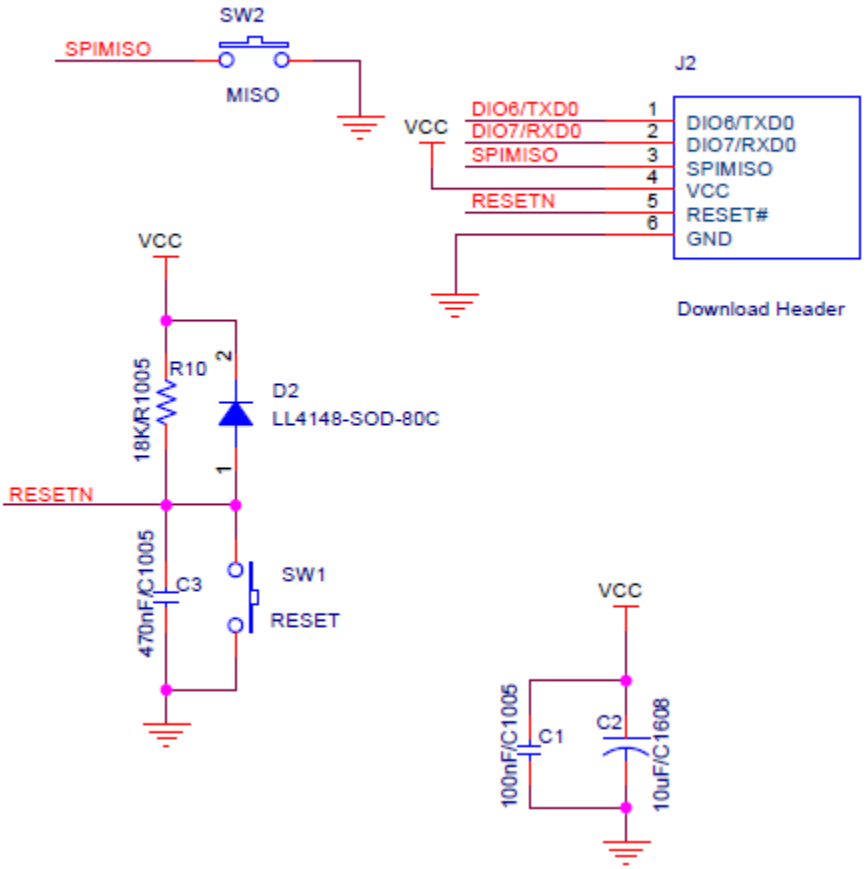
Exceeding these conditions will result in damage to the device.

Parameter	Min	Max
Device supply voltage VDD	-0.3V	3.6V
All Pins	-0.3V	VDD + 0.3V
Storage temperature	-40ºC	150ºC

5.2. Operating Conditions

Supply	Min	Max
VDD	2.0V	3.6V
Ambient temperature range	-40ºC	85ºC

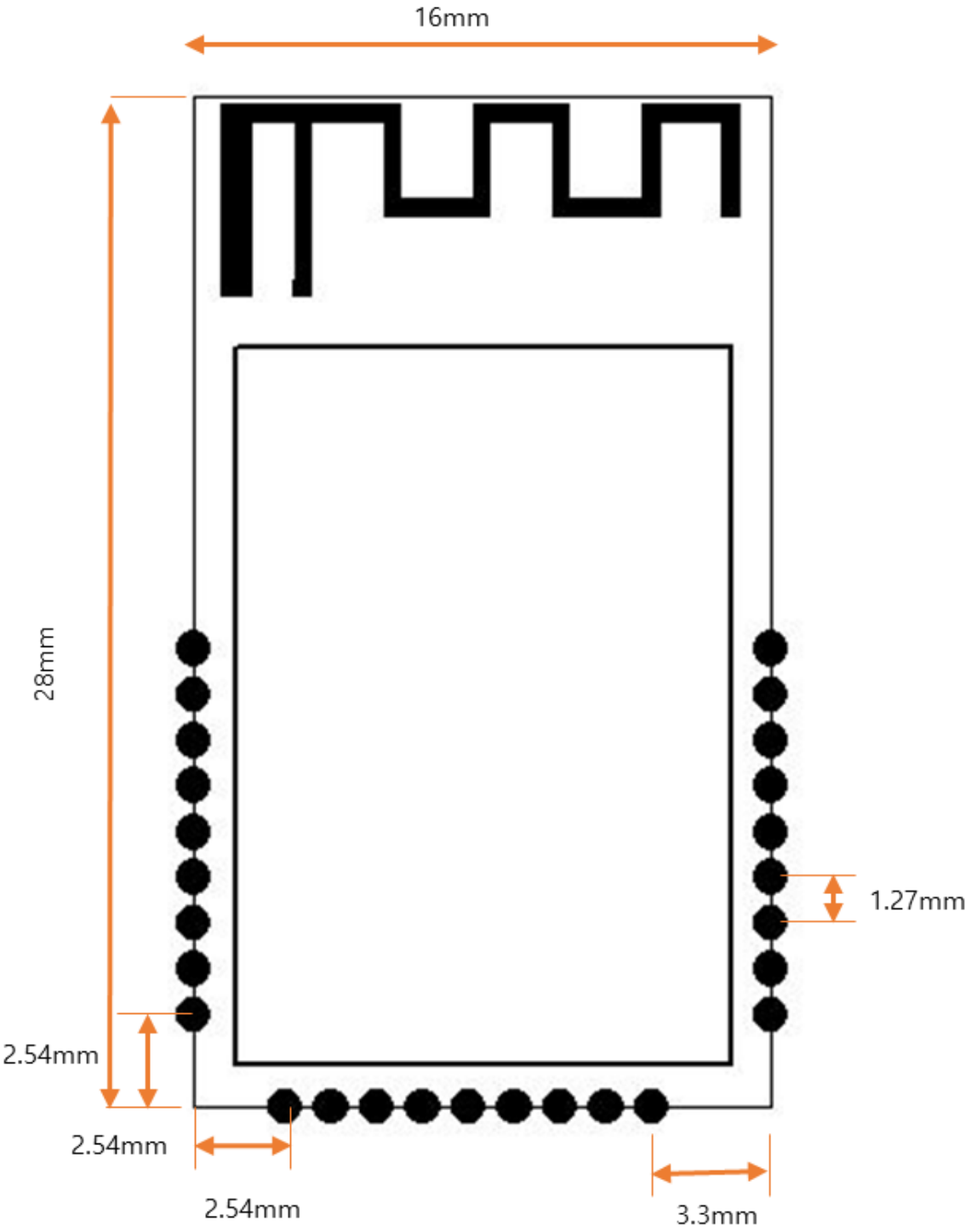
6. Module External Circuit for Programming



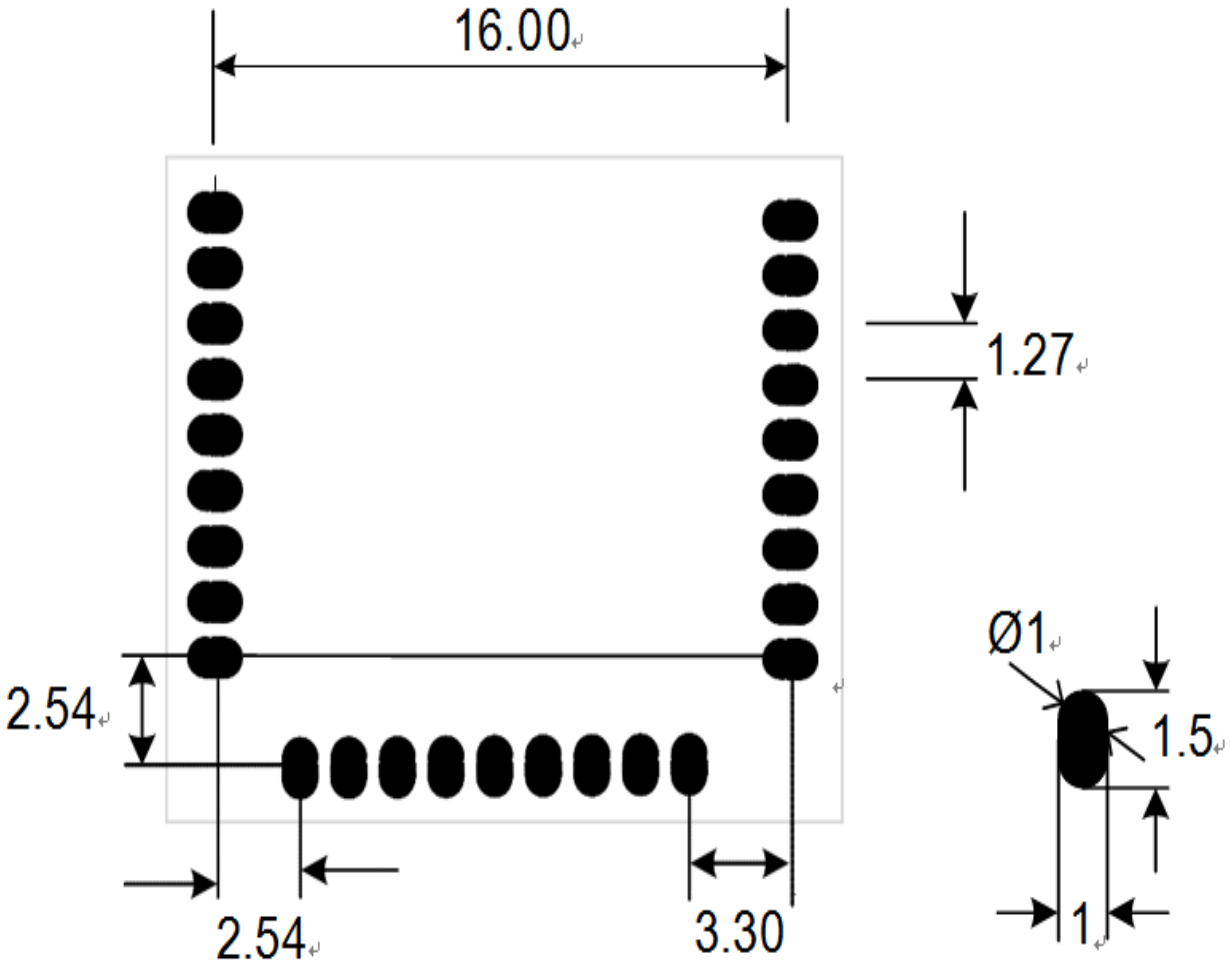
< Module External Circuit for Programming >

Appendix A Additional Information

A.1. Outline Drawing : CMX-ZG03



A.2. Module PCB Footprint



Note: All modules have the same footprint

FCC Information to User

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.

Caution

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

FCC Compliance Information : 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

Including interference that may cause undesired operation. Modifications not expressly approved by the manufacturer could void the user's authority To operated the equipment under FCC rules. To satisfy FCC exterior labeling requirements, the following text must be placed on the exterior of the end product.

Contains Transmitter Module FCC ID: CCECMX-ZG03 ID : 22254-CMXZG03

The host of this equipment is limited to Commax Co., Ltd.
There are two models in which this module is installed.

FCC ID: CCECIP-700SW IC Number: 22254-CIP700SW Model Name: CIP-700SW
FCC ID: CCECIS-PM01 IC Number: 22254-CIS-PM01 Model Name: CIS-PM01

CAUTION : This device and its antenna(s) must not be co-located or operated in conjunction with any other antenna or transmitter. End sers cannot modify this transmitter device. Any una thorized modification could void the user's authority to operate this device.

This module is limited to installation in fixed appl ications, and only installed Door Lock System
This module can not be attached to other device without Door Lock System device.

IMPOR TANT NOTTE:

FCC RF Radiation Exposure Statement:

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter

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

1)The transmitter module may not be co-located with any other transmitter or antenna,

2)OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

The OEM integrator is responsible for ensuring the end-user has no manual instruction to remove or install module.

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.

Manual Information To the End User The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.