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TECHNOLOGY FOR A CHANGING WORLD

Data Sheet – JN5121-xxx-Myy
IEEE802.15.4/ZigBee Module Family

Overview

The JN5121-xxx-Myy is a family of surface mounted modules that enable users to implement IEEE802.15.4 or ZigBee compliant systems 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 Jennic's JN5121 wireless microcontroller to provide a comprehensive solution, including all RF components. 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, sensors, considerably simplifying product development.

Three basic hardware module variants are available: JN5121-xxx-M00 with an integrated antenna, JN5121-xxx-M01/M03 with an antenna connector and JN5121-xxx-M02/M04 with a power amplifier and LNA for extended range. Each of these can be provided pre-programmed with a ZigBee network stack (JN5121-Z01-Myy) or with customer-specific software.

Block Diagram
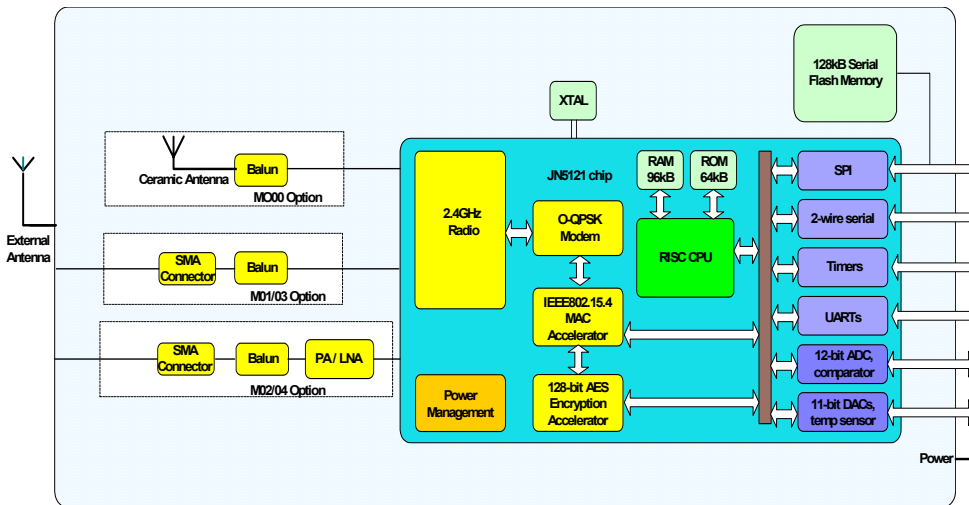
Benefits

- Microminiature module solutions
- Ready to use in products
- Minimises product development time
- No RF test required for systems
- Compliant with FCC part 15 rules, IC Canada, ETSI ETS 300-328 and Japan ARIB STD-T66
- Production volumes supplied pre-programmed with application software

Applications

- Robust and secure low power wireless applications
- Wireless sensor networks, particularly IEEE802.15.4 / ZigBee systems
- Home and commercial building automation
- Home networks
- Toys and gaming peripherals
- Industrial systems
- Telemetry and utilities (e.g. AMR)

Features: Module

- 2.4GHz IEEE802.15.4 compliant
- 2.7-3.6V operation
- Sleep current (with active sleep timer) < 14µA
- **JN5121-xxx-M00/01/03**
  Standard module, 0dBm power
  M00: on board antenna or
  M01: SMA connector,
  M03: RP-SMA connector
  up to 400m range
  - Receiver sensitivity -90dBm
  - TX current < 45mA
  - RX current < 50mA
  - 18x30mm
- **JN5121-xxx-M02/04**
  18.5dBm power with LNA and SMA connector, to 4km range
  Receiver sensitivity -93dBm
  - TX current 115mA
  - RX current 60mA
  - 18x41mm

Features: Microcontroller

- 16MHz 32-bit RISC CPU
- 96kB RAM, 64kB ROM
- 4-input 12-bit ADC, 2 11-bit DACs, comparator, temperature sensor
- 2 Application timer/counters, 3 system timers
- 2 UARTs (one for in-system debug)
- SPI port with 5 selects
- 2-wire serial interface
- 21 GPIO
- Evaluation kits available with full, unlimited, Software Development Kit

Temperature range
-20°C to +70°C

Lead-free and RoHS compliant

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Contents

1. Introduction

The JN5121-xxx-Myy module family provides designers with a ready made component which allows IEEE802.15.4 [1] wireless applications, including ZigBee, to be quickly and easily included in product designs. The modules integrate all of the RF components, 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 Jennic's 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.

Three basic modules are available: JN5121-xxx-M00 (standard module with on board ceramic antenna), JN5121-xxx-M01 (standard module with SMA connector for use with external antennae) and JN5121-xxx-M02 (high RF power, improved sensitivity module for extended range applications). Each of these modules can be supplied with a range of protocol stacks, including a simple IEEE802.15.4 protocol for point to point and star applications and a ZigBee mesh networking stack. The variants available are described below.

1.1. Variants

Variant	Description	FCCID	Industry Canada ID
JN5121-000-M00	IEEE802.15.4 stack, ceramic antenna	TYOJN5121M0	IC: 7438A-CYO5121M0
JN5121-Z01-M00	ZigBee stack, ceramic antenna	TYOJN5121M0	IC: 7438A-CYO5121M0
JN5121-000-M01	IEEE802.15.4 stack, SMA connector	N/A	IC: 7438A-CYO5121M6
JN5121-Z01-M01	ZigBee stack, SMA connector	N/A	IC: 7438A-CYO5121M6
JN5121-000-M02	High Power (18.5dBm), IEEE802.15.4 stack, SMA connector	N/A	IC: 7438A-CYO5121M4
JN5121-Z01-M02	High Power (18.5dBm), ZigBee stack, SMA connector	N/A	IC: 7438A-CYO5121M4
JN5121-000-M03	IEEE802.15.4 stack, RP-SMA connector	TYOJN5121M6	IC: 7438A-CYO5121M6
JN5121-Z01-M03	ZigBee stack, RP-SMA connector	TYOJN5121M6	IC: 7438A-CYO5121M6
JN5121-000-M04	(High Power (18.5dBm), IEEE802.15.4 stack, RP-SMA connector	TYOJN5121M4	IC: 7438A-CYO5121M4
JN5121-Z01-M04	High Power (18.5dBm), ZigBee stack, RP-SMA connector	TYOJN5121M4	IC: 7438A-CYO5121M4

1.1.1. Regulatory Approvals

All module types have been tested against the requirements of European standard ETS 300 328 and a certificate of compliance to this standard is available on request. The High Power modules with M02 suffix are approved for use in Europe with reduced output power. They must not be used with PHY_PIB_ATTR_TX_POWER set above 3 See [4].

Additionally, modules with M00, M03 and M04 suffixes have received FCC "Modular Approvals", in compliance with CFR 47 FCC part 15 regulations and in accordance to FCC Public notice DA00-1407. The modules are approved for use with the following half wave dipole antenna families: EAD BKR2400 series, Antenna Factor RCT and RCL series, Centurion WCR2400 & WRR2400, GigaAnt Titanis and Nearson Models 131, 141 & 145. See Appendix A.6 for details on the conditions applying to this modular approval. The modular approvals notice and test reports are available on request.

The high power module variant FCC ID TYOJN5121M4 is classified as 'mobile' device pursuant with FCC § 2.1091 and must not be used at a distance of < 20 cm (8") from any nearby people.

In addition, all modules have Industry Canada RSS 210 Issue 7 (June 2007) certification.

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2. Specifications

Most specification parameters for the modules are specified in JN-DS-JN5121 Datasheet for JN5121 single chip wireless microcontroller, [2]. Where there are differences, the parameters are defined here.

VDD=3.0V @ +25ºC

Typ. DC Characteristics			Notes
	JN5121-xxx-M00/01/03	JN5121-xxx-M02/04	
Deep sleep	<11uA	<11uA	
Sleep	<14uA	<14uA	With active sleep timer
Radio transmit	44mA	115mA	CPU in doze, radio transmitting
Radio receive	49mA	60mA	CPU in doze, radio receiving
Centre frequency accuracy	+/-25ppm	+/-25ppm	Additional +/-15ppm allowance for temperature and aging
Typ. RF Characteristics			**Notes**
Receive sensitivity	-90dBm	-93dBm	Nominal for 1% PER, as per 802.15.4 section 6.5.3.3
Max. Transmit power	0dBm	16dBm	Nominal
Transmit power at 3.6V		18.5dBm	With Vcc=3.6V
Maximum input signal	-10dBm	-15dBm	For 1% PER, measured as sensitivity
RSSI range	-95 to -10 dBm	-105 to -20 dBm	
RF Port impedance - SMA connector	50 ohm	50 ohm	2.4 - 2.5GHz
VSWR (max)	2:1	2:1	2.4 - 2.5GHz
Peripherals			**Notes**
Master SPI port with five select outputs			250kHz - 16MHz
Slave SPI port			250kHz - 16MHz
Two UARTs			16550 compatible
Two-wire serial I/F (compatible with SMbus & I^2C)			Up to 400kHz
Two programmable Timer/Counters with capture/compare facility, Tick timer			16MHz clock
Two programmable Sleep Timers			32kHz clock
Twenty-one digital IO lines (multiplexed with UARTs, timers and SPI selects)			
Four-channel, 12-bit, Analogue-to-Digital converter			Up to 100ks/s
Two 11-bit Digital-to-Analogue converters			Up to 100ks/s
Programmable analogue comparator			Ultra low power mode for sleep
Internal temperature sensor and battery monitor			

3. Product Development

Jennic supplies all the development tools and networking stacks needed to enable end product development to occur quickly and efficiently. These are all freely available from Jennic's support website: http://www.jennic.com/support/ . A range of evaluation/developer kits is also available, allowing products to be quickly breadboarded. 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 network stack, this package provides everything required to develop application code and to trial it with hardware representative of the final module.

The modules can be programmed by the user, for both development and production, using Jennic supplied software. They can also be supplied ready loaded with customer defined software if required. The JN-UG-3007 Flash Loader User Guide [5], describes how to put the module into programming mode, download software onto the module and to load individual MAC addresses. Access to the on-chip peripherals, MAC and ZigBee stack software is provided through specific APIs. These are described in the JN-RM-2001 Hardware Peripheral Library Reference Manual [3], JN-RM-2002 Stack Software Reference Manual [4] and JN-RM-2014 ZigBee Application Development API Reference Manual [6]. Additional information is available on the Jennic support website.

3.1. JN5121 Single Chip Wireless Microcontroller

The JN5121-xxx-Myy series is constructed around the JN5121 single chip wireless microcontroller, which includes the radio system, a 32-bit RISC CPU, ROM and RAM memory and a range of analogue and digital peripherals.

The chip is described fully in JN-DS-JN5121 Datasheet for JN5121 single chip wireless microcontroller [2].

4. Pin Configurations
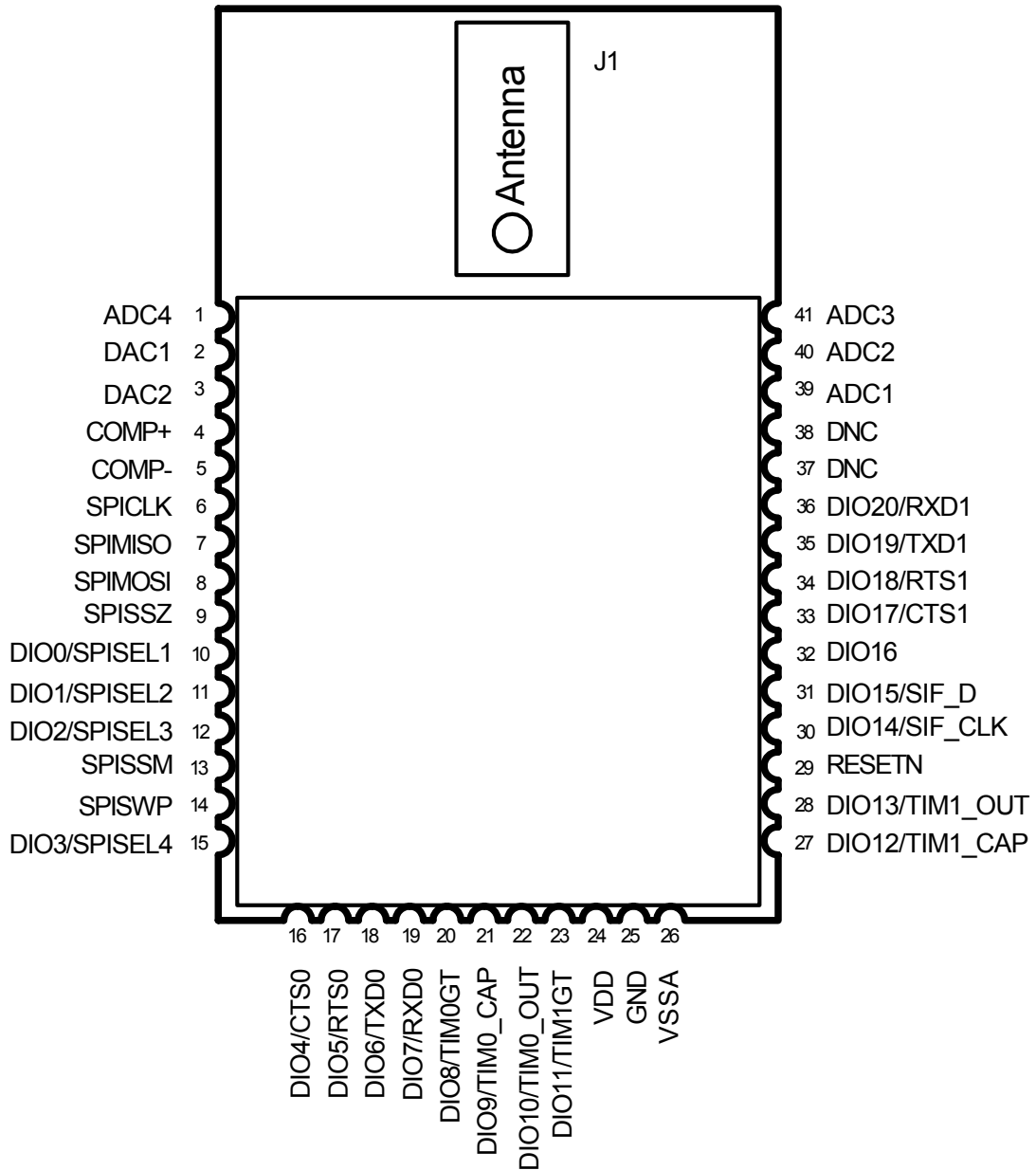
Figure 1: Pin Configuration (top view)

Note that the same basic pin configuration applies for all module designs. However, DIO3/SPISEL4 and DIO2/SPISEL3 are not available with high power modules.

JN-DS-JN5121MO-1v3.doc

4.1. Pin Assignment

Module Pin	Signal	Function	Alternative Function
1	ADC4	Analogue to Digital input	
2	DAC1	Digital to Analogue output	
3	DAC2	Digital to Analogue output	
4	COMP+	Comparator inputs	
5	COMP-		
6	SPICLK	SPI master clock out/slave clock in	
7	SPIMISO	SPI Master In/Slave Out	
8	SPIMOSI	SPI Master Out/Slave In	
9	SPISSZ	SPI select from module - SS0 (output)	
10	SPISEL1	SPI Slave Select1 (output)	General Purpose Digital I/O DIO0
11	SPISEL2	SPI Slave Select2 (output)	General Purpose Digital I/O DIO1
12	SPISEL3*	SPI Slave Select3 (output)	General Purpose Digital I/O DIO2 *
13	SPISSM	SPI select to FLASH (input)	
14	SPISWP	FLASH write protect (input)	
15	SPISEL4*	SPI Slave Select4 (output)	General Purpose Digital I/O DIO3*
16	CTS0	UART0 Clear To Send (input)	General Purpose Digital I/O DIO4
17	RTS0	UART0 Request To Send (output)	General Purpose Digital I/O DIO5
18	TXD0	UART0 Transmit Data (output)	General Purpose Digital I/O DIO6
19	RXD0	UART0 Receive Data (input)	General Purpose Digital I/O DIO7
20	TIM0GT	Timer0 clock/gate (input)	General Purpose Digital I/O DIO8
21	TIM0_CAP	Timer0 capture (input)	General Purpose Digital I/O DIO9
22	TIM0_OUT	Timer0 PWM (output)	General Purpose Digital I/O DIO10
23	TIM1GT	Timer1 clock/gate (input)	General Purpose Digital I/O DIO11
24	VDD	3V power	
25	GND	Digital ground	
26	VSSA	Analogue ground	
27	TIM1_CAP	Timer1 capture (input)	General Purpose Digital I/O DIO12
28	TIM1_OUT	Timer1 PWM (output)	General Purpose Digital I/O DIO13
29	RESETN	Active low reset	
30	SIF_CLK	Serial Interface clock / Intelligent peripheral clock	General Purpose Digital I/O DIO14

Module Pin	Signal	Function	Alternative Function
31	SIF_D	Serial Interface data / Intelligent peripheral data	General Purpose Digital I/O DIO15
32	DIO 16	Intelligent peripheral device select	General Purpose Digital I/O
33	CTS1	UART1 Clear To Send (input)	General Purpose Digital I/O DIO17
34	RTS1	UART1 Request To Send (output)	General Purpose Digital I/O DIO18
35	TXD1	UART1 Transmit Data (output)	General Purpose Digital I/O DIO19
36	RXD1	UART1 Receive Data (input)	General Purpose Digital I/O DIO20
37	DNC	Do Not Connect	
38	DNC		
39	ADC1	Analogue to Digital input	
40	ADC2	Analogue to Digital input	
41	ADC3	Analogue to Digital input	

*: These two pins are not connected for High power modules

4.2. Pin Descriptions

All pins behave as described in the JN5121 datasheet [2], with the exception of the following:

4.2.1. Power Supplies

A single power supply pin, VDD is provided. Separate analogue (VSSA) and digital (GND) grounds are provided. These should be connected together at the module pins.

4.2.2. SPI Memory Connections

SPISWP is a write protect pin for the serial flash memory. This should be held low to inhibit writes to the flash device.

SPISSZ is connected to SPI Slave Select 0 on the JN5121.

SPISSM is connected to the Slave Select pin on the memory.

This configuration allows the flash memory device to be programmed using an external programmer if required. The JN5121 should be held in reset by taking RESETN low. The memory can then be programmed over the UART by using the programming mode described in JN-UG-3007 Flash Loader User Guide [5]. Alternatively, the memory can be programmed by connecting a SPI programmer to SPISSM, SPICLK, and SPIMISO and directly loading the code into the memory.

For normal operation of the module, SPISSZ should be connected to SPISSM.

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
Voltage on analogue pins: ADC1-4, DAC1-2, COMP1-, COMP1+, COMP2-, COMP2+, DIO9, DIO10, SPISSM, SPISWP, SPICLK, SPIMOSI, SPIMISO,	-0.3V	VDD + 0.3V
Voltage on 5v tolerant digital pins: SPISSZ, DIO0-DIO8, DIO11-DIO20, RESETN	-0.3V	Lower of (VDD2 + 2V) and 5.5V
Storage temperature	-40ºC	150ºC
Reflow soldering temperature according to IPC/JEDEC J-STD-020C		260ºC

This device is sensitive to ESD and should only be handled using ESD precautions.
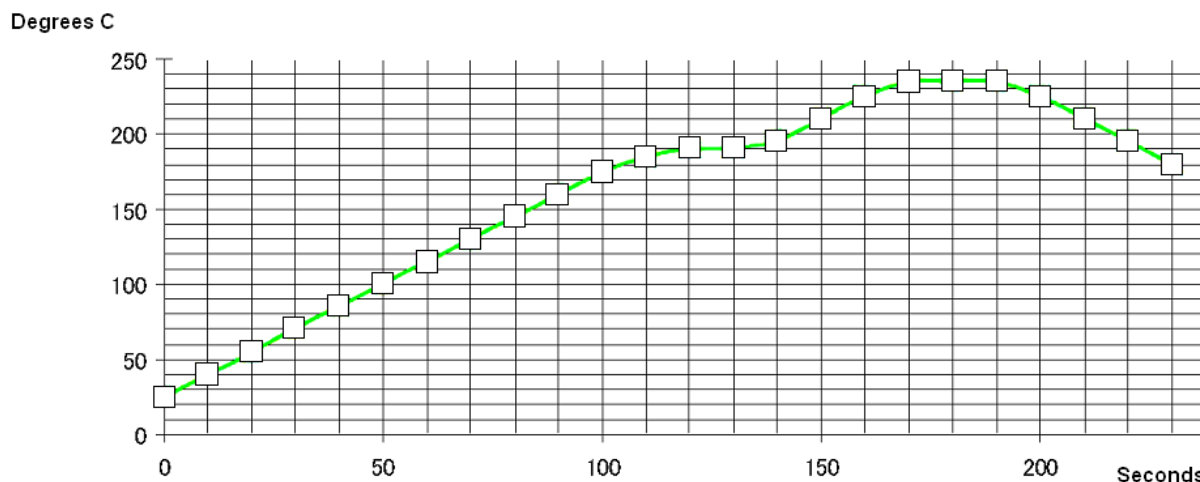
Temperature	25~160 ºC	160~190 ºC	> 220º C	230~Pk.	Pk. Temp (235ºC)
Target Time (s)	90~130	30~60	20~50	10~15	160~270

Figure 2: Recommended solder reflow profile

5.2. Operating Conditions

Supply	Min	Max
VDD	2.7V	3.6V
Ambient temperature range	-20ºC	70ºC

Appendix A Additional Information

A.1 Outline Drawing
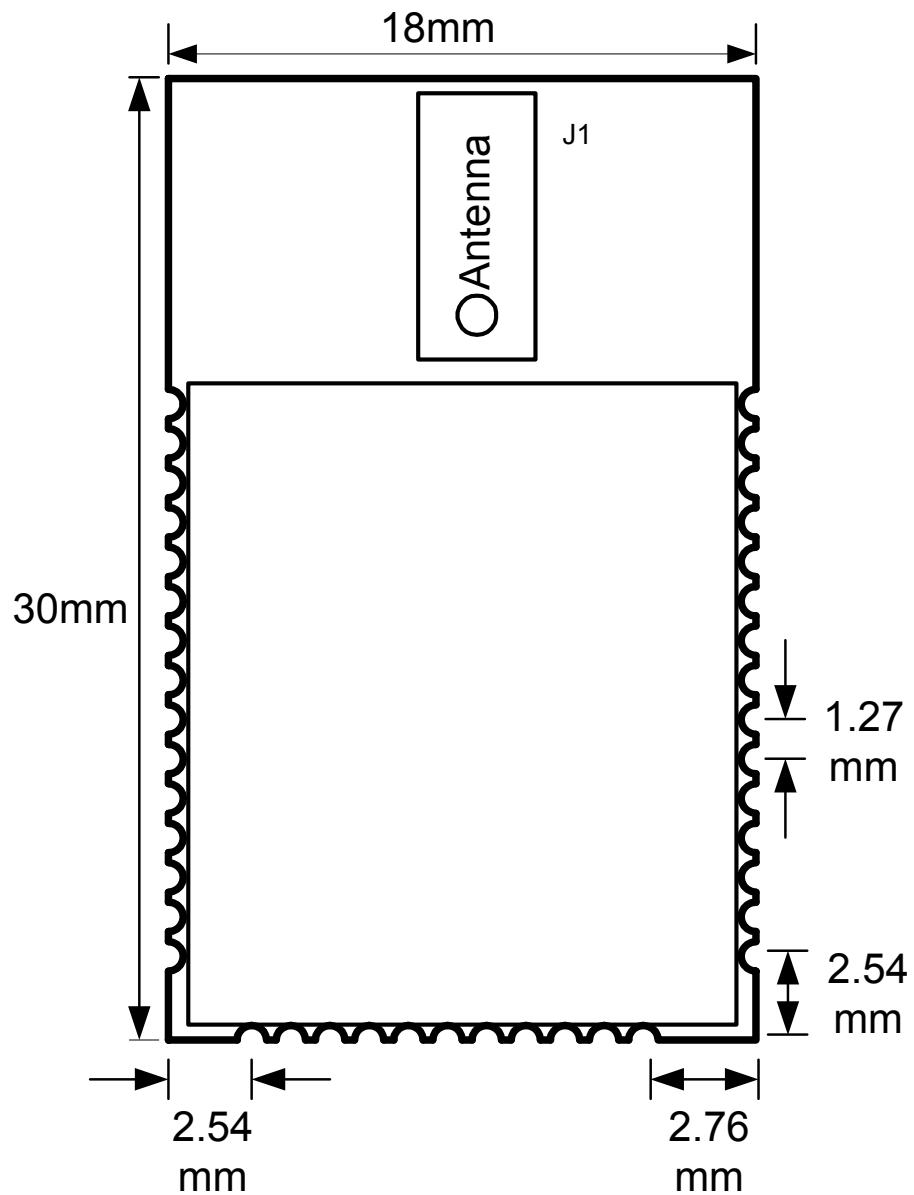
Thickness: 3.5mm

JN5121-xxx-M00 Outline Drawing

18mm

9.74mm

4.59 mm

30mm

1.27 mm

2.54 mm

2.54 mm

2.76 mm
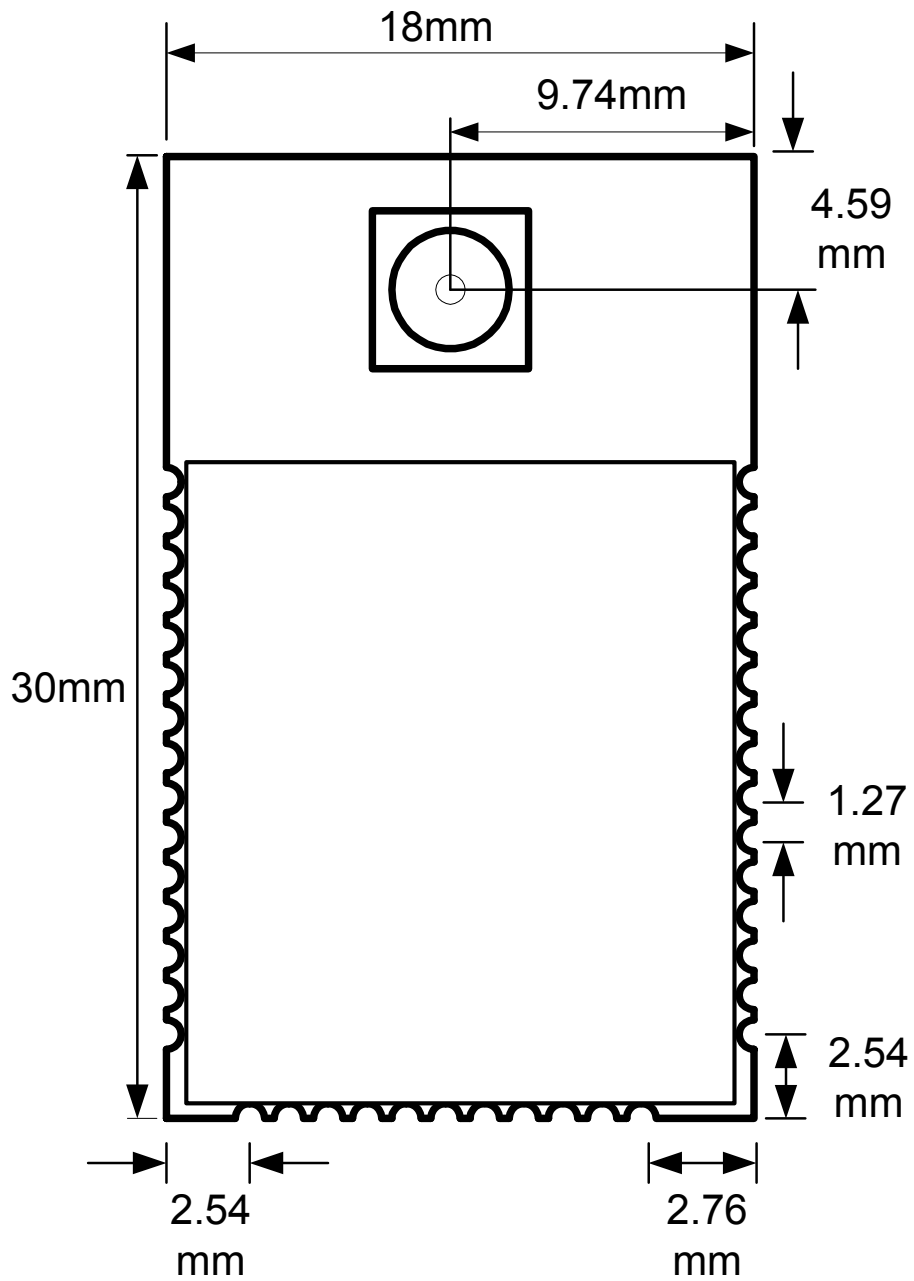
Thickness: 3.6mm over can, 10.8mm at SMA connector

JN5121-xxx-M01/M03 Outline Drawing

18mm

7.2mm

4.32mm

41mm

1.27 mm

2.54 mm

2.54 mm

2.76 mm
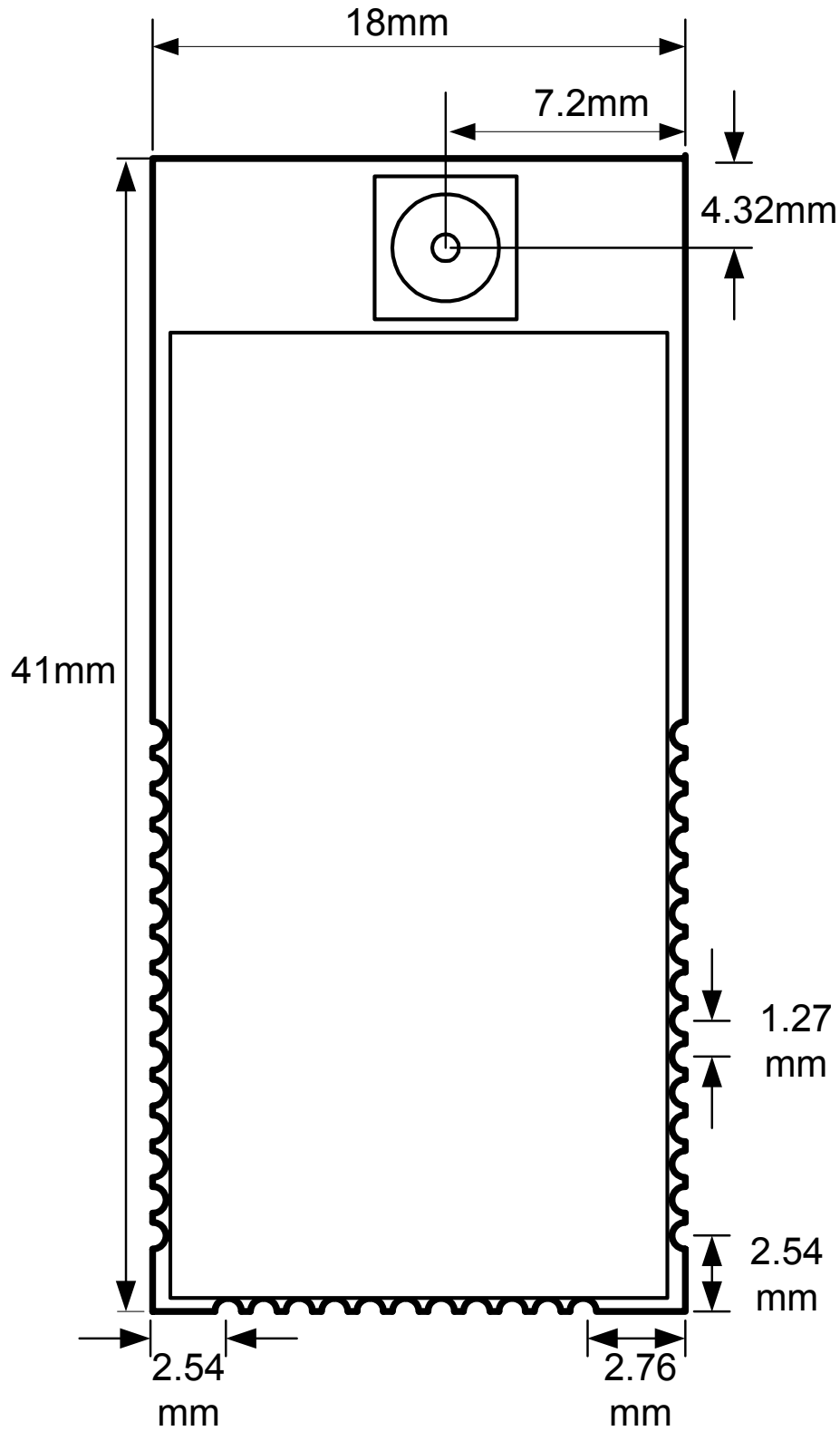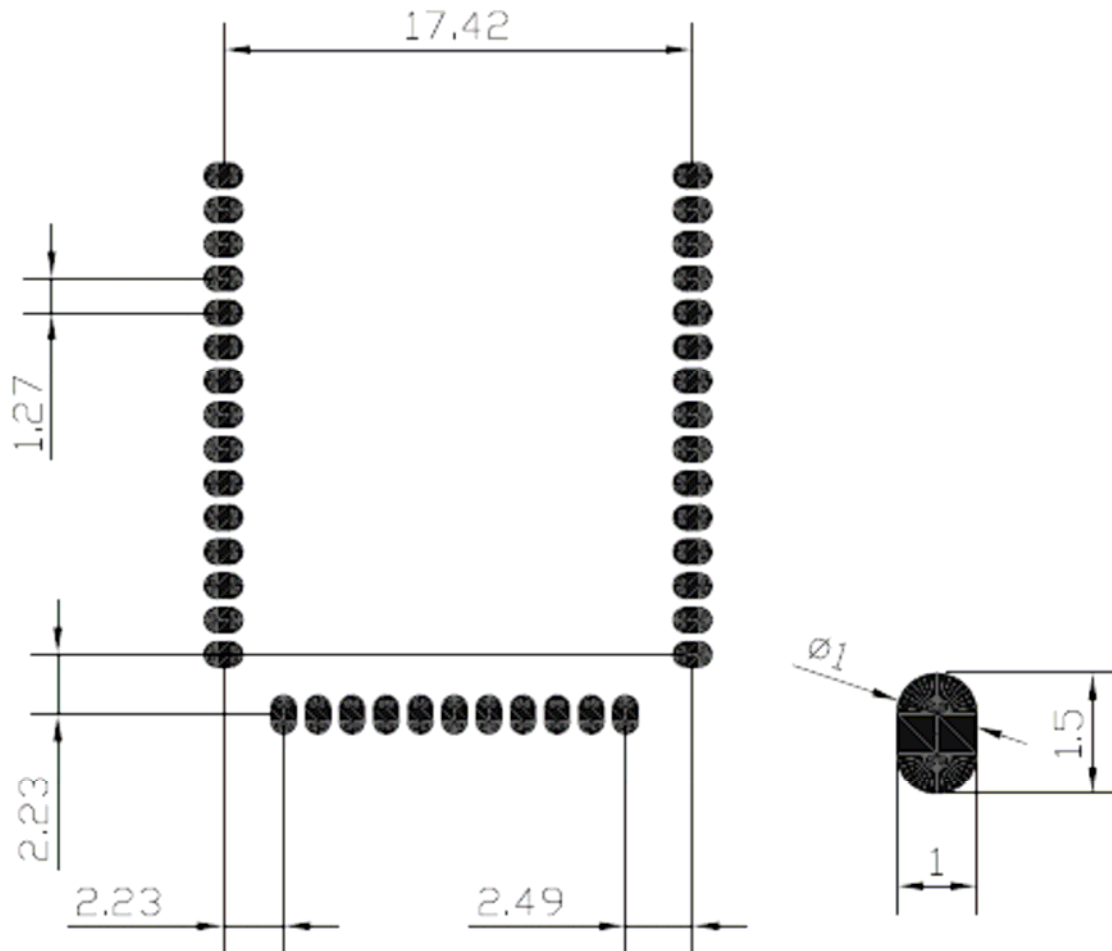
Thickness: 3.6mm over can, 10.8mm at SMA connector.

JN5121-xxx-M02/M04 Outline Drawing
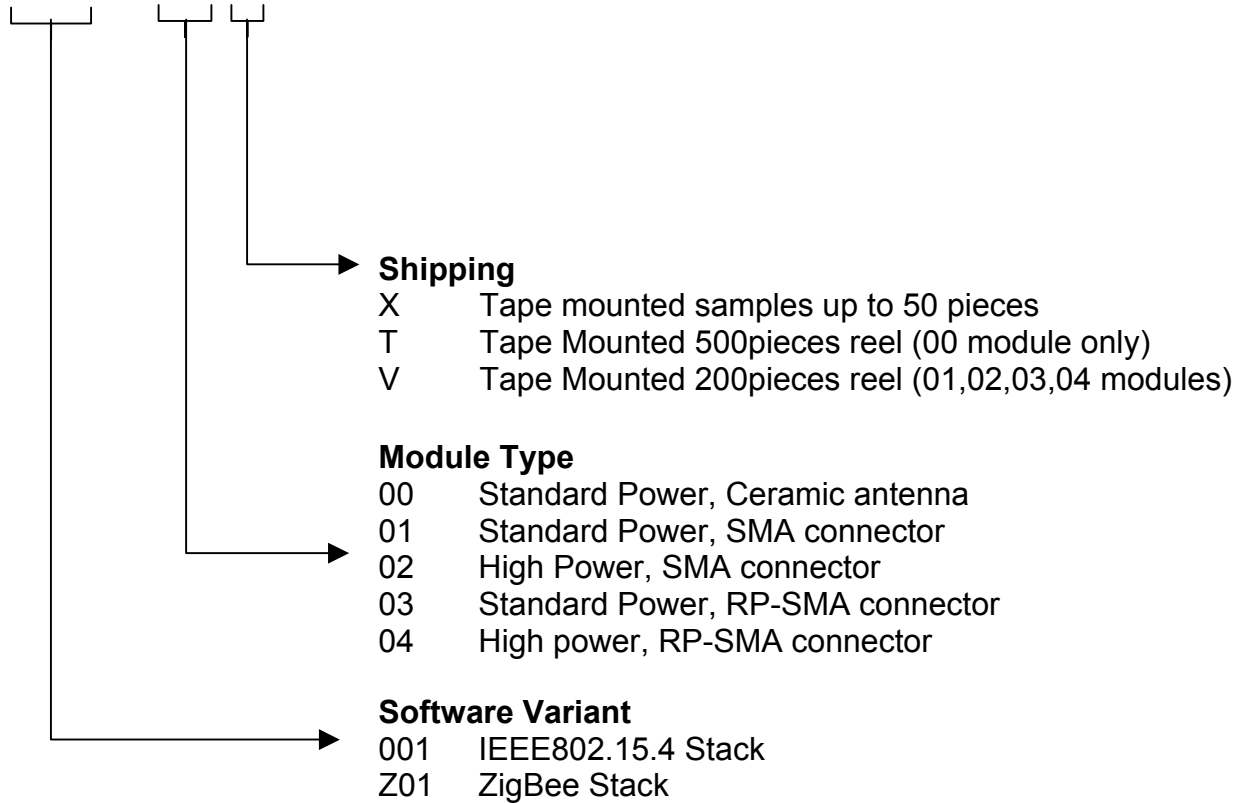
A.2 Module PCB Footprint

Note: All modules have the same footprint.

RF note for –M00 modules with ceramic antenna: No components, ground plane or tracks on any layer of the mother board should be placed within 20mm of the 3 free sides of the antenna. Tracks etc may be placed adjacent to the can, but should not extend past the can towards the antenna end of the module for 20mm from the antenna.

A.3 Ordering Information

JN5121 - XXX - MY$_1$Y$_2$ Y$_3$

Shipping

X   Tape mounted samples up to 50 pieces

T   Tape Mounted 500pieces reel (00 module only)

V   Tape Mounted 200pieces reel (01,02,03,04 modules)

Module Type

00   Standard Power, Ceramic antenna

01   Standard Power, SMA connector

02   High Power, SMA connector

03   Standard Power, RP-SMA connector

04   High power, RP-SMA connector

Software Variant

001   IEEE802.15.4 Stack

Z01   ZigBee Stack

Label line 1: **IC ID Number**
Label line 2: **FCC ID Number**
Label line 3: **Part Name**
Label line 4: **Barcode Label**
Label line 5: **YYWWTNNNNN (see below)**

Identifier	Description	Format
YY	Year	06(example)
WW	Week	45(example)
T	Module type	
NNNNN	Serial Number	

IC: 7438A-CYO5121M0
FCC ID: TYOJN5121M0

JN51XX-XXX-XXX JENNIC

YYWWTNNNNN
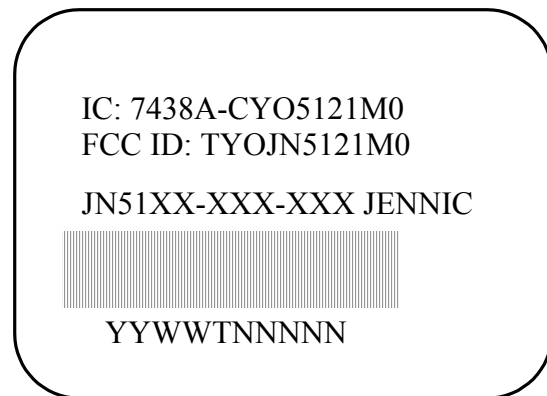
Figure 3: Module labelling

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A.4 Tape and Reel Information:

A.4.1 Tape Orientation and dimensions
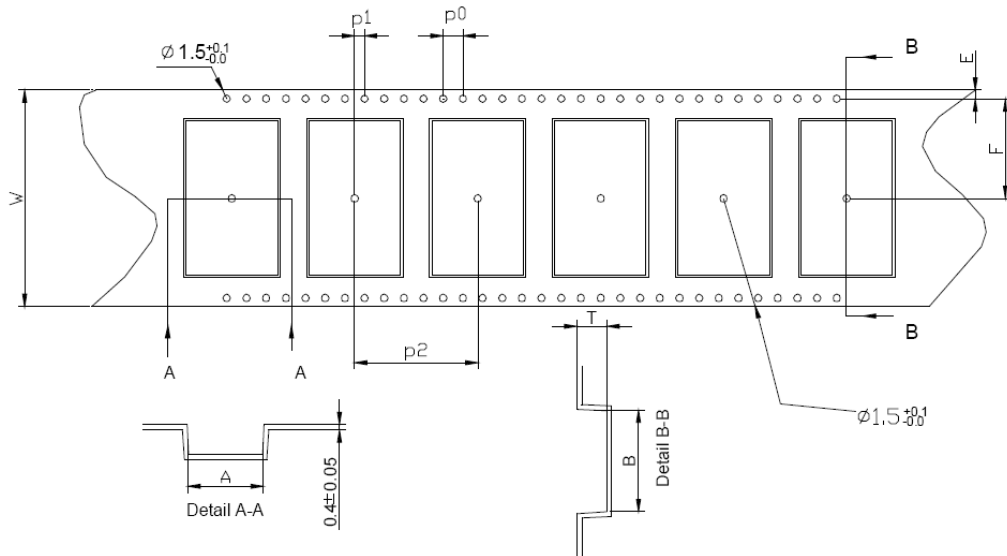
Module type:	A	B	W	F	E	P0	P1	P2	T	Cover Tape width (W)
JN5121-xxx-M00	18.4	30.4	44	20.2	1.75	4.0	2.0	24.0	3.4	37.5
JN5121-xxx-M01/3	18.4	30.4	56	26.2	1.75	4.0	2.0	24.0	11.2	49.5
JN5121-xxx-M02/4	18.4	40.5	56	26.2	1.75	4.0	2.0	24.0	11.1	49.5
Tolerance	±0.1	±0.1	±0.3	±0.1	+0.1	±0.1	±0.1	±0.1	±0.1	

A.4.2 Cover tape details

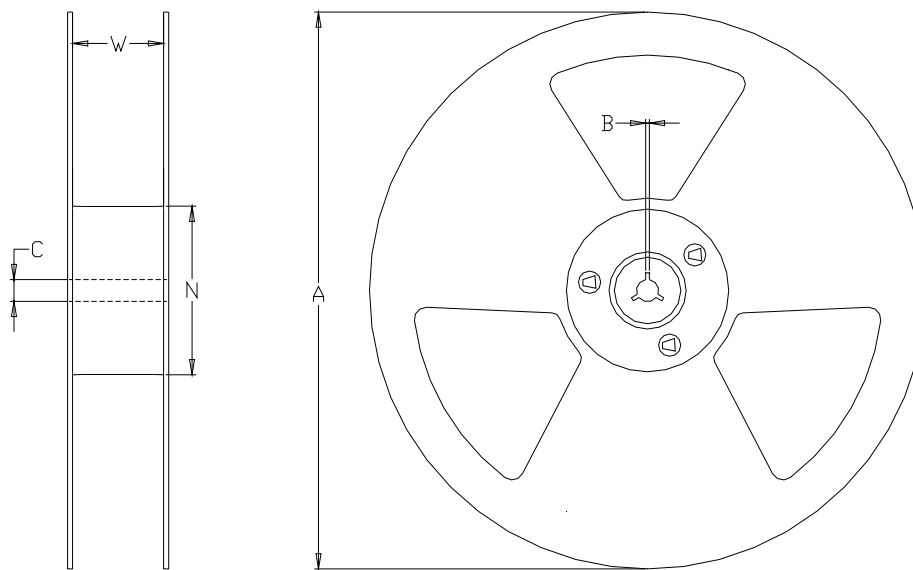| Thickness (T)	0.061mm
Surface resistivity (component side)	10^4 to 10^7 Ohms/sq
Surface resistivity (component side)	Non-conductive
Backing type:	Polyester
Adhesive type:	PSA
Sealing:	Room ambient

A.4.3 Leader and Trailer

VACANT

QUANTITY/200PCS

VACANT

300 MM   300 MM
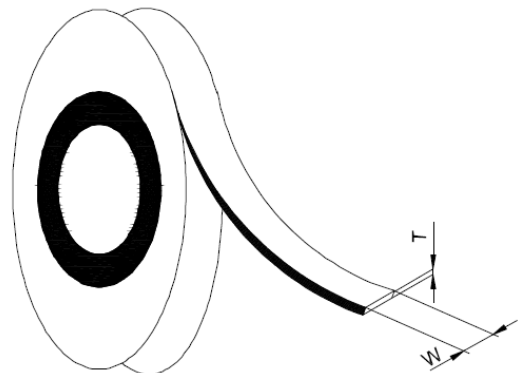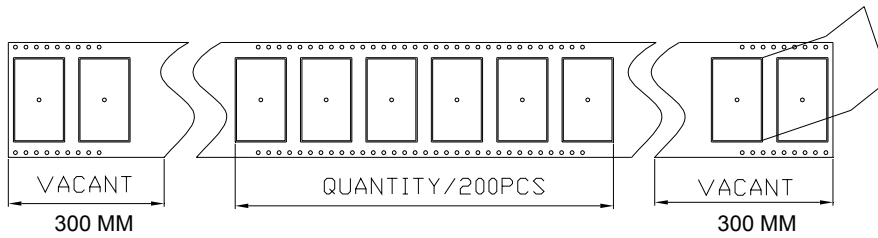
A.4.4 Reel Dimensions:

Module type:	A	B	C	N	W (min)
JN5121-xxx-M00	330 ±1.0	2.2±0.5	13 ±0.2	100 +0.1	44.5 ±0.3
JN5121-xxx-M01/02/03/04	330 ±1.0	2.2±0.5	13 ±0.2	100 +0.1	56.5 ±0.3

A.5 Related Documents

[1] IEEE Std 802.15.4-2003 IEEE Standard for Information Technology – Part 15.4 Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (LR-WPANs)

[2] JN-DS-JN5121 Datasheet for JN5121 single chip wireless microcontroller

[3] JN-RM-2001 Hardware Peripheral Library Reference Manual

[4] JN-RM-2002 Stack Software Reference Manual

[5] JN-UG-3007 Flash Loader User Guide

[6] JN-RM-2014 ZigBee Application Development API Reference Manual

A.6 Federal Communication Commission Interference Statement

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.

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.

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

WARNING!
FCC Radiation Exposure Statement:
This portable equipment with its antenna complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment. To maintain compliance follow the instructions below;

1. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. Avoid direct contact to the antenna, or keep it to a minimum while using this equipment.

This transmitter module is authorized to be used in other devices only by OEM integrators under the following condition:

The transmitter module must not be co-located with any other antenna or transmitter.

A.6.1 Antennas approved by FCC for use with JN5121 modules

Brand	Model Number	Type	Gain	Connector Type
Antenna Factor	ANT-2.4-CW-RCL	Knuckle Antenna	2.90dBi	RP-SMA
Antenna Factor	ANT-2.4-CW-RCT-RP	Knuckle Antenna	2.20dBi	RP-SMA
Centurion	WCR2400-SMRP	Knuckle Antenna	1.0dBi	RP-SMA
Centurion	WRR2400-SMRP	Knuckle Antenna	1.3dBi	RP-SMA
Embedded Antenna Design Ltd	BKR2400	Knuckle Antenna	2.0dBi	SMA
GigaAnt	2010B6090-01	Swivel	4.4dBi	RT-SMA
Nearson	S131CL-L	Knuckle Antenna	2.0dBi	Flying lead
Nearson	S141AH-2450	Knuckle Antenna	2.0dBi	RP-SMA
Nearson	T145AH-2.4/4.9/5.X-S	Knuckle Antenna	2.0dBi	RP-SMA

These antennae or versions with alternative connectors may be used to meet European regulations. This device has been designed to operate with the antennas listed below, and having a maximum gain of 4.4 dBi. Antennas not included in this list or having a gain greater than 4.4 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

A.6.2 High Power Module usage limitation

The high power module variant FCC ID TYOJN5121M4 is classified as 'mobile' device pursuant with FCC § 2.1091 and **must not** be used at a distance of < 20 cm (8") from any nearby people.

IMPORTANT NOTE: In the event that these conditions cannot be met (for certain configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot 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.

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 manual of the end product.

The user manual for the end product must include the following information in a prominent location;

"To comply with FCC's RF radiation exposure requirements, the antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter."

A.6.3 End Product Labelling

The final 'end product' should be labelled in a visible area with the following:

"Contains TX FCC ID: TYOJN5121M0, TYOJN5121M4 or TYOJN5121M6 " to reflect the version of the module being used inside the product.

For Industry Canada purposes the following should be used.
"Contains Industry Canada ID IC: 7438A-CYO5121M0, IC: 7438A-CYO5121M4 or IC: 7438A-CYO5121M6" to reflect the version of the module being used inside the product.

A.7 Industry Canada Statement

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

As long as the above condition is met, further transmitter testing 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.).

A.8 RoHS Compliance

JN5121-xxx-Myy devices meet the requirements of Directive 2002/95/EC of the European Parliament and of the Council on the Restriction of Hazardous Substance (RoHS).

Full data on this and Chinese RoHS requirements can be found on the Jennic website at
http://www.jennic.com/support/view_section.php?sectionID=0000000019

A.9 Status Information

The status of this Data Sheet is **Production**.

Jennic products progress according to the following format:

Advance

The Data Sheet shows the specification of a product in planning or in development.

The functionality and electrical performance specifications are target values and may be used as a guide to the final specification.

Jennic reserves the right to make changes to the product specification at anytime without notice.

Preliminary

The Data Sheet shows the specification of a product that is in production, but is not yet fully qualified.

The functionality of the product is final. The electrical performance specifications are target values and may used as a guide to the final specification. Modules are identified with an R suffix, for example JN5121-Z01-M00R.

Jennic reserves the right to make changes to the product specification at anytime without notice.

Production

This is the final Data Sheet for the product.

All functional and electrical performance specifications, including minimum and maximum values are final.

This Data Sheet supersedes all previous document versions.

Jennic reserves the right to make changes to the product specification at anytime to improve its performance.

A.10 Disclaimers

The contents of this document are subject to change without notice. Jennic reserves the right to make changes, without notice, in the products, including circuits and/or software, described or contained herein in order to improve design and/or performance. Information contained in this document regarding device applications and the like is intended through suggestion only and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications.

Jennic warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with Jennic's standard warranty. Testing and other quality control techniques are used to the extent Jennic deems necessary to support this warranty. Except where mandatory by government requirements, testing of all parameters of each product is not necessarily performed.

Jennic assumes no responsibility or liability for the use of any of these products, conveys no license or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work infringement, unless otherwise specified.

Jennic products are not intended for use in life support systems, appliances or systems where malfunction of these products can reasonably be expected to result in personal injury, death or severe property or environmental damage. Jennic customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Jennic for any damages resulting from such use.

All trademarks are the property of their respective owners.

A.11 Version Control

Version	Notes
0.9	1st Issue of Preliminary Datasheet
1.0	Update performance parameters & Ordering / Tape & Reel information
1.2	Regulatory compliance statements added. Pins 37 & 38 DNC. Dimensions updated including high power module change to 41mm length, status upgraded to Production, revised pcb footprint
1.3	Updated to include Industry Canada compliance statement and part ordering codes revised 06/02/08

A.12 Contact Details

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