

UM10983

ZigBee PRO and IEEE802.15.4 JN5179-001-M00 module

Rev. 1.0 — 9 March 2016

User manual

Document information

Info	Content
Keywords	JN5179, ZigBee, module
Abstract	JN5179-001-M00 module user manual



Revision history

Rev	Date	Description
1.0	20160309	Initial version

Contact information

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1. General description

The JN5179-001-M00 module family provides designers with a ready-made component that provides a fully integrated solution for applications, using the IEEE802.15.4 standard in the 2.4 GHz - 2.5 GHz ISM frequency band, including ZigBee Smart Energy and Home Automation and can be quickly and easily included in product designs. The module integrates 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 module uses NXP's single chip IEEE802.15.4 wireless microcontroller, allowing designers to make use of the extensive chip development support material. Hence, this module allows designers to bring wireless applications to market in the minimum time with significantly reduced development effort and cost.

JN5179-001-M00 module has FCC and Industry Canada modular approval. It is also CE compliant and subject to a Notified Body Opinion.

1.1 FCC and Industry Canada identification

Table 1. FCC and Industry Canada identification

Module name	Description	FCCID	Industry Canada
JN5179-001-M00	Standard power, integrated antenna	XXMJN5179M0	8764A-JN5179M0

1.2 Regulatory approvals

The JN5179-001-M00 has been tested against the requirements of the following European standards.

- Radio EN 300 328 v 1.9.1
- EMC, EN 301 489-17 v 2.2.1, EN 62479 2010, EN 301 489-1 v 1.9.2
- Basic Safety Assessment (BSA) EN 60950-1:2006

A Notified Body statement of opinion for this standard is available on request.

Additionally, the module has received FCC "Modular Approval", in compliance with CFR 47 FCC part 15 regulations and in accordance to FCC public notice DA00-1407. The modular approval notice and test report are available on request.

The module is compliant to Industry Canada RSS210 (Issue8 Annex8) and has Industry Canada modular approval.

2. Features and benefits

2.1 Benefits

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

- FCC 47CFR Part 15C
- ETSI EN 300-328 V1.9.1
- EN 301-489-17 V2.2.1
- EN60950-1-2006
- Temperature range: –40 °C to +85 °C
- Lead-free and RoHS compliant

2.2 Features: module

- 2.4 GHz IEEE 802.15.4, ZigBee Smart Energy and Home Automation compatible
- Integral antenna
- 16 mm × 30 mm PCB size
- TX power 8.5 dBm/10 dBm
- Receiver sensitivity –96 dBm
- TX current 22.5 mA at 10 dBm
- TX current 19.6 mA at 8.5 dBm
- RX current 14.8 mA at maximum input level 10 dBm
- RX current 12.7 mA at maximum input level 0 dBm
- 2.0 V to 3.6 V battery operation
- 3.6 V to 10 V operation with internal switched mode power supply

2.3 Features: microcontroller

- ARM Cortex-M3 CPU with debug support
- JN5179: 512 kB/32 kB/4 kB (Flash/RAM/EEPROM)
- OTA firmware upgrade capability
- 32 MHz clock selectable down to 1 MHz for low-power operation
- Dual PAN ID support
- Fail-safe I²C-bus interface. operates as either master or slave
- 8 × Timers (6 × PWM and 2 timer/counters)
- 2 low-power sleep counters
- 2 × UART supporting DALI and DMX512, one with flow control
- SPI-bus master and slave port, 2 simultaneous selects
- Variable instruction width for high coding efficiency
- Multi-stage instruction pipeline
- Data EEPROM with guaranteed 100 k write operations
- ZigBee PRO stack with Smart Home, Smart Lighting and Smart Energy profiles
- Supply voltage monitor with 8 programmable thresholds
- Battery voltage and temperature sensors
- 6-input 10-bit ADC
- Analog comparator

- Digital monitor for ADC
- Watchdog timer and POR
- Standby power controller
- Up to 18 Digital IO (DIO) and 2 digital outputs pins

3. Applications

- Robust and secure low-power wireless applications
- Thread
- ZigBee 3.0
- Commercial Building and Home Automation
- ZigBee Smart Energy networks
- Smart Lighting and ZigBee Light Link networks
- Toys and gaming peripherals
- Energy harvesting, for example self-powered light switch
- Remote control

4. Overview

The JN5179-001-M00 is an ultra-low power, high performance surface mount module targeted at IEEE 802.15.4, ZigBee Smart Energy, ZigBee LightLink and Home Automation networking applications, enabling users to realize products with minimum time to market and at the lowest cost. It removes the need for expensive and lengthy development of custom RF board designs and test suites. The module uses NXP's JN5179 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.

The module includes an integrated antenna.

5. Marking



Fig 1. JN5179-001-M00 package marking (top view)

Table 2. Marking code

Line number	Marking code
Line 1	NXP Logo: B&W outline logo
Line 2	part ID: JN5179-001-M00
Line 3	FCC ID: XXMJN5179M0
Line 4	IC ID: 8764A-JN5179M0
Line 5	European notified body number

The JN5179-001-M00 module meets the requirements of Directive 2002/95/EC of the European Parliament and of the Council on the Restriction of Hazardous Substance (RoHS) and of the Chinese RoHS requirements SJ/T11363-2006 which came into force on 1st March 2007.

6. Block diagram

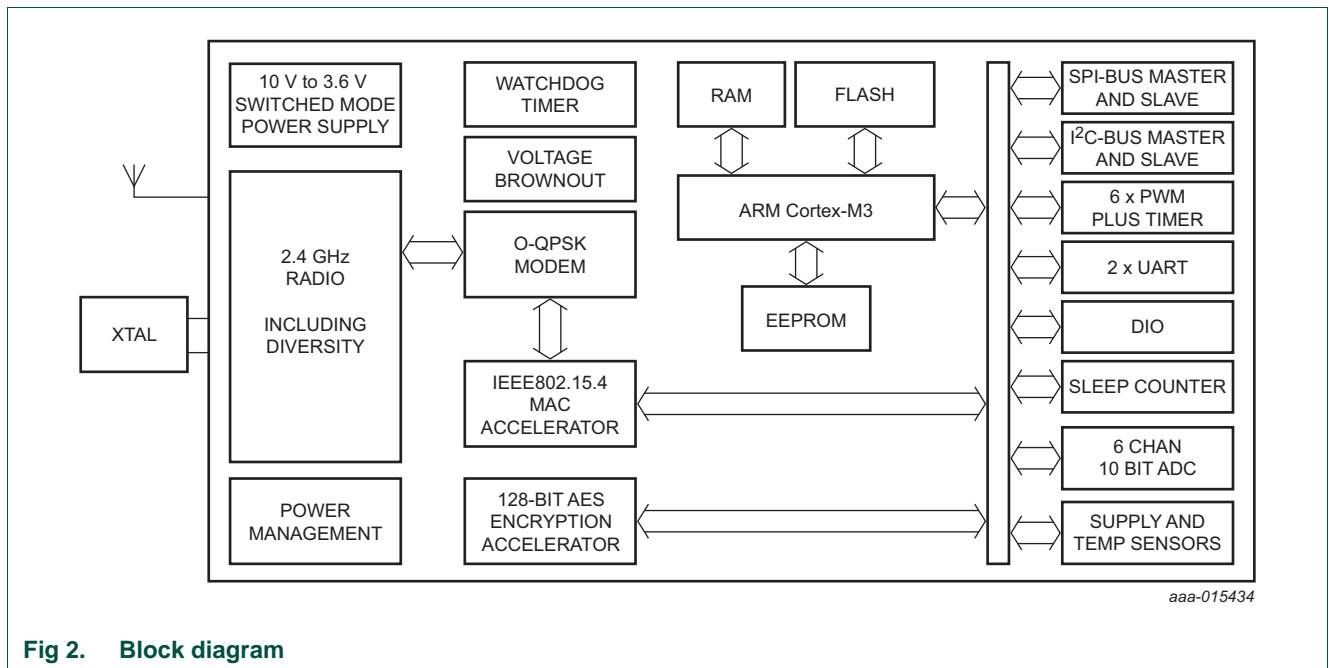
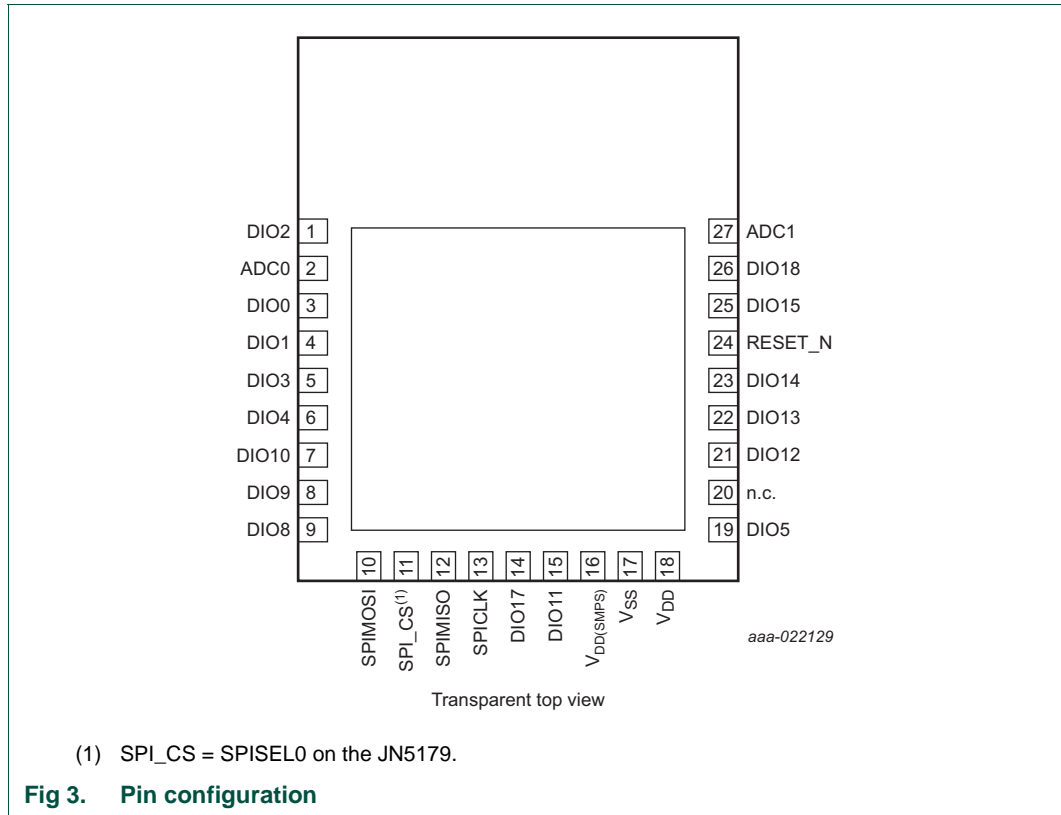


Fig 2. Block diagram

7. Pinning information

7.1 Pinning



7.2 Pin description

Table 3. Pin description

Symbol	Pin	Type ^[1]	Default at reset/ during boot	Default internal pull-up/pull-down	Description
DIO2	1	IO	DIO2 (I)	pull-up	DIO2 — digital input/output 2 ADC5 — ADC input 5 SDA — I ² C-bus master/slave SDA input/output (push-pull output) RXD1 — UART 1 receive data input TIM0CAP — Timer0 capture input RFRX — radios receiver control output VAUX_SENSE — auxiliary voltage sense input
ADC0	2	[2]			ADC0 — ADC input 0

Table 3. Pin description ...continued

Symbol	Pin	Type ^[1]	Default at reset/ during boot	Default internal pull-up/pull-down	Description
DIO0	3	IO	DIO0 (I)	pull-up	DIO0 — digital input/output 0
					ADC4 — ADC input 4
					SPISEL0 — SPI-bus master select output 0
					RFRX — radio receiver control output
					FLICK_CTRL — flicker control output
					ADO — antenna diversity odd output
DIO1	4	IO	DIO1 (I)	pull-up	DIO1 — digital input/output 1
					ADC3 — ADC input 3
					RFTX — radio transmitter control input
					PC0 — pulse counter 0 input
					ADE — antenna diversity even output
DIO3	5	IO	DIO3 (I)	pull-down	DIO3 — digital input/output 3
					ADC2 — ADC input 2
					PWM4 — PWM4 output
					SCL — I ² C-bus master/slave SCL input/output (push-pull output)
					TXD1 — UART 1 transmit data output
					TIM0OUT — Timer0 output
					RFTX — radio transmit control input
					FLICK_CTRL — flicker control output
DIO4	6	IO (open-drain)	DIO4 (I)	pull-up	DIO4 — digital input/output 4
					SCL — I ² C-bus master/slave SCL input/output (open-drain)
					RXD0 — UART 0 receive data input
					TIM0CK_GT — Timer0 clock/gate input
					ADO — antenna diversity odd output
DIO10	7	IO	JTAG_TDI (I)/ RXD0 (I)	pull-up	DIO10 — digital input/output 10
					JTAG_TDI — JTAG TDI data input
					RXD0 — UART 0 receive data input
DIO9	8	IO	JTAG_TDO (O)/ TXD0 (O)	pull-up	DIO9 — digital input/output 9
					JTAG_TDO — JTAG TDO data output
					TXD0 — UART 0 transmit data output
					TRACESWV — ARM trace serial wire viewer output
DIO8	9	IO	DIO8 (I)	pull-down	DIO8 — digital input/output 8
					PWM5 — PWM5 output
					TIM0OUT — Timer0 output
					TRACECLK — trace clock output
					32KXTALIN — 32 kHz clock input

Table 3. Pin description ...continued

Symbol	Pin	Type ^[1]	Default at reset/ during boot	Default internal pull-up/pull-down	Description
SPIMOSI ^[5]	10	IO	SPIMOSI (O)	pull-down	DIO7 — digital input/output 7
					SPIMOSI — SPI-bus master data output
					JTAG_TDI — JTAG TDI data input
					SPISEL2 — SPI-bus master select output 2
					SPISSEL — SPI-bus slave select input
					CMP_OUT — comparator output
					32KIN — 32 kHz External clock input
					32KXTALOUT — 32 kHz clock output
SPI_CS ^[4]	11	IO	SPISEL0 (O)	pull-up	DIO6 — digital input/output 6
					SPISEL0 — SPI-bus master select output 0
					CTS0 — UART 0 clear to send input
					RXD1 — UART 1 receive data input
					JTAG_TCK — JTAG TCK input
					SWCK — Serial Wire Debugger Clock input
					SPISCLK — SPI-bus slave clock input
					TIM1CAP — Timer1 capture input
SPIMISO ^[3]	12	IO	SPIMISO (I)	pull-up	DO1 — digital output 1
					SPIMISO — SPI-bus master data input
					SPISMISO — SPI-bus slave data output
					ADO — antenna diversity odd output
SPICLK ^[2]	13	O	SPICLK (O)	pull-up	DO0 — digital output 0
					SPICLK — SPI-bus master clock output
					ADE — antenna diversity even output
DIO17	14	IO	at reset: DIO17 (I); during boot: SWCK (I)	pull-up	DIO17 — digital input/output 17
					JTAG_TCK — JTAG TCK input
					SWCK — Serial Wire Debugger Clock input
					SPISEL0 — SPI-bus master select output 0
					TIM1CAP — Timer1 capture input
					COMP1P — comparator plus input
SPISMISO — SPI-bus slave data output					

Table 3. Pin description ...continued

Symbol	Pin	Type ^[1]	Default at reset/ during boot	Default internal pull-up/pull-down	Description
DIO11	15	IO	SWD (I)	pull-up	DIO11 — digital input/output 11
					JTAG_TMS — JTAG TMS input
					SWD — serial wire debugger input
					RTS0 — UART 0 request to send output
					TXD1 — UART 1 transmit data output
					SPICLK — SPI-bus master clock output
					SPISMOSI — SPI-bus slave data input
					TIM1OUT — Timer1 output
					TRACED0 — ARM trace data0 output
V _{DD(SMPS)}	16	P; 3.6 V to 10 V			V _{DD(SMPS)} — SMPS input supply voltage
V _{SS}	17	G			V _{SS} — ground
V _{DD}	18	P			V _{DD} — supply voltage
DIO5	19	IO (open-drain)	DIO5 (I)	pull-up	DIO5 — digital input/output 5
					SDA — I ² C-bus master/slave SDA input/output (open-drain)
					TXD0 — UART 0 transmit data output
					PC1 — pulse counter 1 input
					TIM0CAP — Timer0 capture input
					ADE — antenna diversity even output
n.c.	20	-	-	-	not connected
DIO12	21	IO	DIO12 (I)	pull-down	DIO12 — digital input/output 12
					PWM1 — PWM1 output
					TXD0 — UART 0 transmit data output
					TRACED3 — ARM trace data3 output
					VAUX_OUT — auxiliary voltage control output
DIO13	22	IO	DIO13 (I)	pull-down	DIO13 — digital input/output 13
					PWM2 — PWM2 output
					RXD0 — UART 0 receive data input
					PC0 — pulse counter 0 input
					TRACED2 — ARM trace data2 output
DIO14	23	IO	DIO14 (I)	pull-down	DIO14 — digital input/output 14
					PWM3 — PWM3 output
					PC1 — pulse counter 1 input
					CMP_OUT — comparator output
					TRACED1 — ARM trace data1 output
					SPISMOSI — SPI-bus slave data input
RESET_N	24	I		pull-up	RESET_N — reset input

Table 3. Pin description ...continued

Symbol	Pin	Type ^[1]	Default at reset/ during boot	Default internal pull-up/pull-down	Description
DIO15	25	IO	DIO15 (I)	pull-down	DIO15 — digital input/output 15
					PWM6 — PWM6 output
					JTAG_TDO — JTAG TDO data output
					SPIMOSI — SPI-bus master data output
					SPISEL1 — SPI-bus master select output 1
					TIM0CK_GT — Timer0 - clock gate input
					TRACESWV — ARM trace Serial Wire Viewer output
					SPISEL — SPI-bus slave select input
VAUX_SENSE — auxiliary voltage sense					
DIO18	26	IO	DIO18 (I)	pull-up	DIO18 — digital input/output 18
					JTAG_TMS — JTAG TMS input
					SWD — Serial Wire Debugger input
					SPIMISO — SPI-bus master data input
					TIM1OUT — Timer1 output
					COMP1M — comparator minus input
					SPISCLK — SPI-bus slave clock input
ADC1	27	I ^[2]			VREF — analog peripheral reference voltage
					ADC1 — ADC input 1

[1] P = power supply; G = ground; I = input, O = output; IO = 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] Specific precautions have to be followed for UART flow control: CTS0 is not usable in the same time with SPISEL0.

[5] Specific precautions have to be followed if external 32 kHz crystal is used. See [Ref. 3](#).

8. Functional description

8.1 JN5179 single chip wireless microcontroller

The JN5179-001-M00 is constructed around the JN5179-001 single chip wireless microcontroller, which includes the radio system, a ARM Cortex-M3 CPU, Flash, RAM and EEPROM memory and a range of analogue and digital peripherals.

The chip is described fully in JN5179 Wireless Microcontroller Datasheet (see [Ref. 2](#)).

8.2 Peripherals

Table 4. Peripherals

Peripherals	JN5179-001-M00	Notes
Master SPI-bus port	1	250 kHz - 16 MHz
Slave SPI-bus port	1	250 kHz - 8 MHz
UART	2	16550 compatible
Two-wire serial I/F (compatible with SMBus and I ² C-bus)	1	Up to 400kHz
PWM		16 MHz clock
timer	6	
timer/counter	2	
Programmable Sleep Timers	2	32 kHz clock
Digital IO lines (multiplexed with UARTs, timers and SPI-bus selects)	18	DIO0 and DIO1 are not available on JN5179-001-M06 modules
Analog-to-Digital converter	6	10-bit
Programmable analogue comparator	1	ultra low power mode for sleep
Internal temperature sensor	1	
Internal battery sensor	1	

The performance of all peripherals is defined in the JN5179 Wireless Microcontroller Datasheet (see [Ref. 2](#)).

NXP 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 the NXP Wireless Connectivity (see [Ref. 3](#)). 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 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 module can be user programmed both in development and in production using software supplied by NXP. Access to the on-chip peripherals, MAC and network stack software is provided through specific APIs. This information is available on the NXP support website, together with many example applications, user guides, reference manuals and application notes.

9. Limiting values

Table 5. Limiting values

Symbol	Parameter	Conditions	Min	Max	Unit
V _{DD}	supply voltage		-0.3	+3.6	V
V _{DD(SMPS)}	SMPS supply voltage		0	10	V
V _{ADCX}	voltage on pin ADCX		-0.3	V _{DD} + 0.3	V
V _{IO(dig)}	digital input/output voltage	on pins DIOx	-0.3	V _{DD} + 0.3	V

Table 5. Limiting values ...continued

Symbol	Parameter	Conditions	Min	Max	Unit
T _{stg}	storage temperature		-40	+150	°C
V _{ESD}	electrostatic discharge voltage	HBM [3]	-	2000	V
		CDM [4]	-	1000	V

- [1] With x = 0, 1.
- [2] With x = 0, 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 17 or 18.
- [3] Testing for HBM discharge is performed as specified in JEDEC Standard JS-001.
- [4] Testing for CDM discharge is performed as specified in JEDEC Standard JESD22-C101.

10. Recommended operating conditions

Table 6. Operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
V _{DD}	supply voltage	[1][2]	2	3.6	V
V _{DD(SMPS)}	SMPS supply voltage		3.6	10	V
T _{amb}	ambient temperature	standard range	-40	+85	°C

- [1] To reach the maximum TX power, 2.8 V is the minimum.
- [2] Supplied with DC-to-DC at 2.8 V if the SMPS is used.

11. Characteristics

11.1 DC current

Table 7. Active processing

V_{DD} = 2 V to 3.6 V; T_{amb} = 25 °C; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{DD}	supply current	M00				
		with radio in receive mode; maximum input level at 10 dBm	-	14.8	-	mA
		with radio in receive mode; maximum input level at 0 dBm	-	12.7	-	mA
		with radio in transmit mode 10 dBm	[1]	22.5	-	mA
		with radio in transmit mode 8.5 dBm	[1]	19.6	-	mA

- [1] To reach the maximum TX power, 2.8 V is the minimum.

Table 8. Sleep mode

V_{DD} = 2 V to 3.6 V; T_{amb} = 25 °C; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{DD(IO)}	input/output supply current	in sleep mode; with I/O and RC oscillator timer wake-up; T _{amb} = 25 °C	-	0.60	-	µA

- [1] Waiting on I/O event.

Table 9. Deep sleep mode

$V_{DD} = 2\text{ V to }3.6\text{ V}$; $T_{amb} = 25\text{ °C}$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{DD}	supply current	deep sleep mode; measured at 25 °C [1]	-	100	-	nA

[1] Waiting on chip RESET or I/O event.

11.2 AC characteristics

11.2.1 Radio transceiver

This module meets all the requirements of the IEEE802.15.4 standard over 2.0 V to 3.6 V and offers the improved RF characteristics shown in [Table 10](#). All RF characteristics are measured single ended.

Table 10. Antenna port characteristics

Single-ended; Impedance = 50 Ω [\[1\]](#); $V_{DD} = 2\text{ V to }3.6\text{ V}$; $T_{amb} = -40\text{ °C to }+125\text{ °C}$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
f_{range}	frequency range		2.4	-	2.485	GHz
V_{ESD}	electrostatic discharge voltage		-	-	-	
		HBM	-	2	-	kV
		CDM	-	500	-	V

[1] With external matching inductors and assuming PCB layout.

Table 11. Radio transceiver characteristics: +25 °C

$V_{DD} = 2\text{ V to }3.6\text{ V}$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Receiver						
S_{RX}	receiver sensitivity	nominal for 1 % PER, as per 802.15.4	-	-96	-93.5	dBm
$P_{i(RX)(max)}$	maximum receiver input power	1 % PER, measured as sensitivity; supply current at 14.8 mA; high-performance mode	-	10	-	dBm
		1 % PER, measured as sensitivity; supply current at 12.7 mA; low-power mode	-	-2	-	dBm
α_{ch}	channel rejection	1 % PER, with wanted signal 3 dB, above sensitivity as per 802.15.4				
		modulated interferer [1][2]				
		-1 channel	-	19	-	dBc
		+1 channel	-	34	-	dBc
		-2 channel	-	40	-	dBc
		+2 channel	-	44	-	dBc
		co-channel	-	-7	-	dBc
		CW interferer [1][2]				
		-1 channel	-	25	-	dBc
		+1 channel	-	50	-	dBc
		-2 channel	-	57	-	dBc
+2 channel	-	60	-	dBc		

Table 11. Radio transceiver characteristics: +25 °C ...continued

$V_{DD} = 2\text{ V to }3.6\text{ V}$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
α_{ib}	in-band rejection	1 % PER with wanted signal 3 dB above sensitivity; 2.4 GHz to 2.4835 GHz; modulated interferers at 3 channel separation	[1]	-	43	-	dBc
α_{oob}	out-of-band rejection	1 % PER with wanted signal 3 dB above sensitivity	[1]	-	-	-	-
		all frequencies except wanted/2 which is 8 dB lower	-	45	-	dBc	
		3G frequency at 2.1 GHz	-	-5	-	dBm	
		LTE frequency at 2.5 GHz	-	-18	-	dBm	
$P_{sp(RX)}$	receiver spurious power	measured conducted into 50 Ω	-	-	-	-	
		30 MHz to 1 GHz	-	-	-70	dBm	
		1 GHz to 12 GHz	-	-	-70	dBm	
$P_{L(lo)}$	local oscillator leakage power		-	-	-57	dBm	
IMP	intermodulation protection	1 % PER at with wanted signal 3 dB above sensitivity; modulated interferers at 3 and 6 channel separation	[1]	-	46	-	dB
$\Delta\alpha_{RSSI}$	RSSI variation	-95 dBm to -10 dBm; available through UM10983 Integrated Peripherals API	-4	-	+4	dB	
Transmitter							
P_o	output power	PA = 5 and Att. 2.5 dB OFF	[3]	-	10	-	dBm
$P_{o(cr)}$	control range output power	in 6 major steps and then 4 fine steps	[4]	-	-42	-	dB
$P_{sp(TX)}$	transmitter spurious power	measured conducted into 50 Ω	-	-	-	-	
		30 MHz to 1 GHz	-	-	-65	dBm	
		1 GHz to 12.5 GHz (harmonic H2)	-	-	-36	dBm	
		exceptions	-	-	-	-	
		1.8 GHz to 1.9 GHz	-	-	-65	dBm	
		5.15 GHz to 5.3 GHz	-	-	-65	dBm	
EVM	error vector magnitude	at maximum output power	-	8	-	%	
EVM_{offset}	error vector magnitude offset	at maximum output power	-	3	4.5	%	
PSD	power spectral density	at greater than 3.5 MHz offset	[5]	-	-38	-20	dBc

[1] Blocker rejection is defined as the value, when 1 % PER is seen with the wanted signal 3 dB above sensitivity, as per IEEE802.15.4.

[2] Channels 11, 17, 24 low/high values reversed.

[3] To reach the maximum TX power, 2.8 V is the minimum on V_{DDA} .

[4] Up to an extra 2.5 dB of attenuation is available if required.

[5] See IEEE802.15.4.

12. Federal Communication Commission 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 see [Ref. 4](#). 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
- OEM integrators instructions
 - The OEM integrators are responsible for ensuring that the end-user has no manual instructions to remove or install module
 - The module is limited to installation in mobile or fixed applications, according to CFR 47 Part 2.1091(b)
 - Separate approval is required for all other operating configurations, including portable configurations with respect to CFR 47 Part 2.1093 and different antenna configurations
- User guide mandatory statements
 - User's instructions of the host device must contain the following statements in addition to operation instructions:
 - * "This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
 - (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation"
 - * "Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment"
- FCC RF Exposure requirements
 - User's instructions of the host device must contain the following instructions in addition to operation instructions:

Avoid direct contact to the antenna, or keep it to a 20 cm minimum distance while using this equipment. This device must not be collocated or operating in conjunction with another antenna or transmitter.

This module has been designed to operate with antennas having a maximum gain of 0.86 dBi. Antennas having a gain greater than 0.86 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

12.1 FCC end product labelling

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

"Contains TX FCC ID: XXMJN5179M0".

13. Industry Canada statement

<p>This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.</p> <p>This device complies with Industry Canada RF radiation exposure limits set forth for general population (uncontrolled exposure). This device must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.</p>	<p>Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) il ne doit pas produire de brouillage, et (2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.</p> <p>Le présent appareil est conforme aux niveaux limites d'exigences d'exposition RF aux personnes définies par Industrie Canada. Cet appareil doit être installé afin d'offrir une distance de séparation d'au moins 20 cm avec l'utilisateur, et ne doit pas être installé à proximité ou être utilisé en conjonction avec une autre antenne ou un autre émetteur.</p>
---	---

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

This module has been designed to operate with antennas having a maximum gain of 0.86 dBi. Antennas having a gain greater than 0.86 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

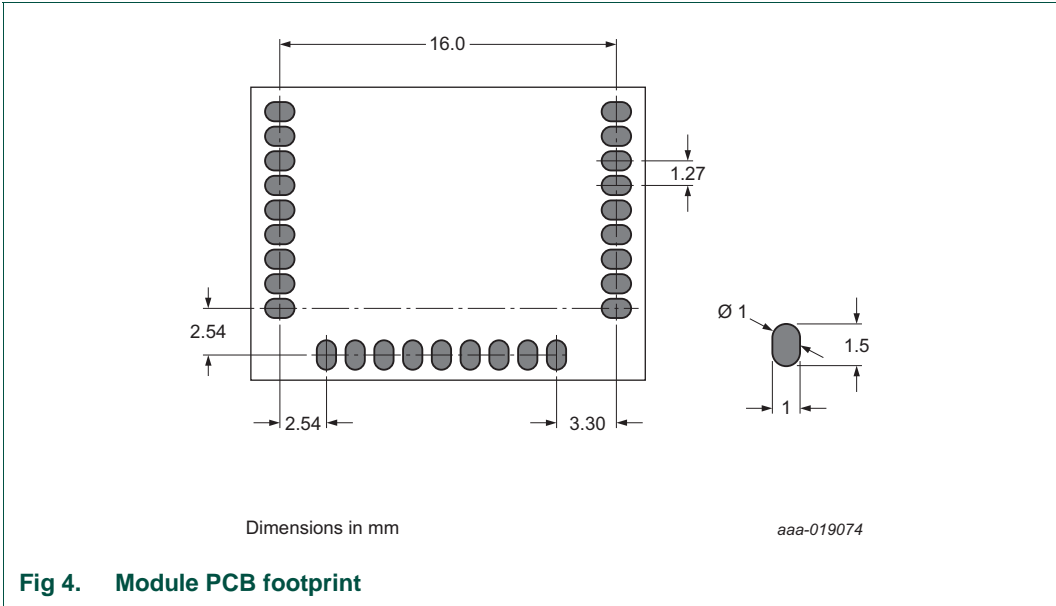
As long as the above condition is met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral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

13.1 Industry Canada end product labelling

For Industry Canada purposes the following should be used:

"Contains Industry Canada ID IC: 8764A-JN5179M0"

14. Footprint information for reflow soldering



15. Package outline

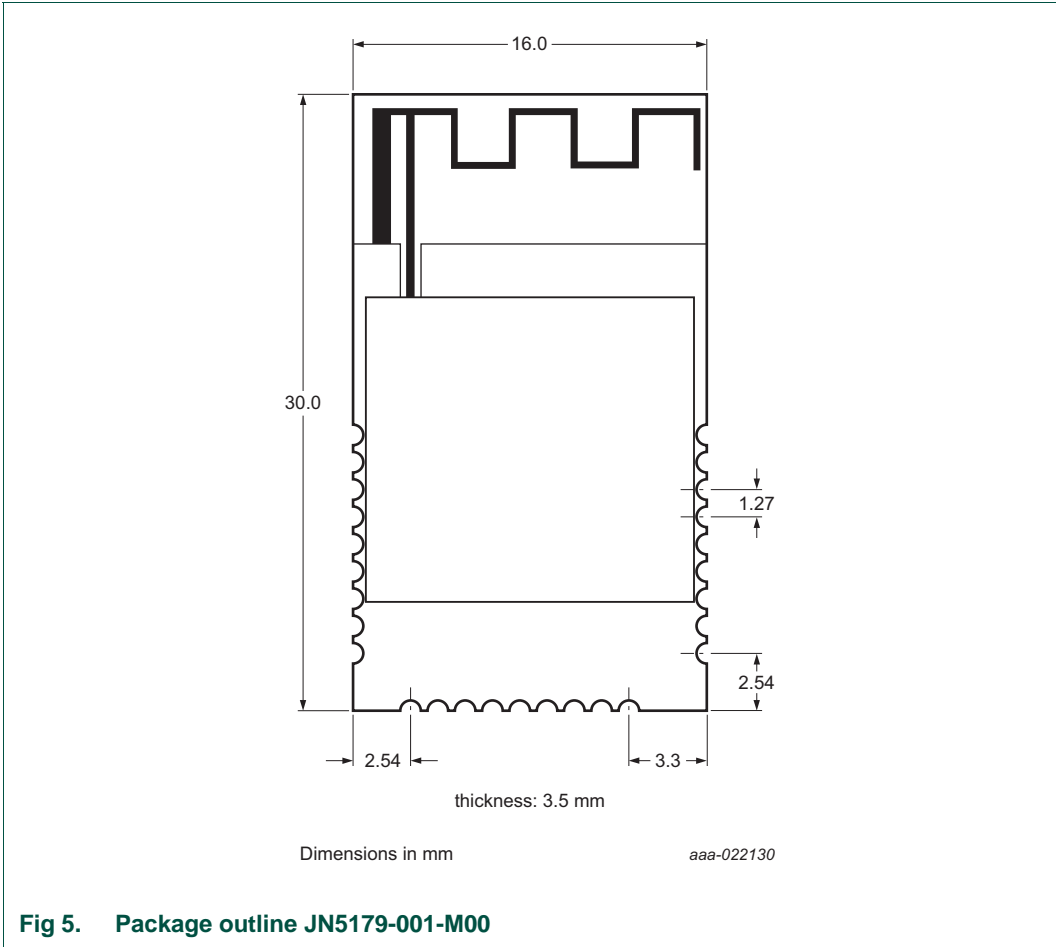


Fig 5. Package outline JN5179-001-M00

16. Abbreviations

Table 12. Abbreviations

Acronym	Description
API	Application Program Interface
ADC	Analog to Digital Converter
ARM	Advanced RISC Machine
FCC	Federal Communication Commission
IO	Input Output
OEM	Original Equipment Manufacturer
PCB	Printed Circuit Board
PER	Packet Error Rate
PWM	Pulse Width Modulation
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
RISC	Reduce Instruction Set Computing
RSSI	Receive Signal Strength Indicator
RTS	Request-To-Send
SPI	Serial Peripheral Interface
SVM	Supply Voltage Monitor
SYNTH	SYNTHesizer
UART	Universal Asynchronous Receiver/Transmitter

17. References

- [1] **IEEE Std 802.15.4-2011** — IEEE Std 802.15.4-2011 IEEE Standard for Information Technology.
- [2] **JN517x** — JN517x wireless microcontroller datasheet.
- [3] **Wireless Connectivity** — <http://www.nxp.com/products/interface-and-connectivity/wireless-connectivity:WIRELESS-CONNECTIVITY>
- [4] **Part 15 of the FCC Rules** — <http://www.ecfr.gov/cgi-bin/text-idx?SID=d01e00935bfc0d53b914e7c8e63f383&node=47:1.0.1.1.16&rgn=div5>

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