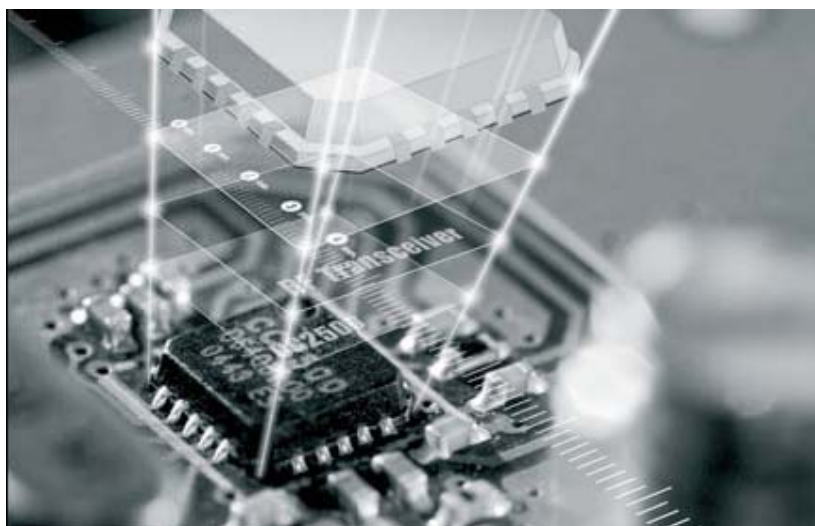

SPECIFICATION

2.4-GHz Wireless System-on-Module



Model : **BLE module**
Part No : Pixi
Version : V1.0
Date : 2016.02.21

■ Applications

- Home and Building Automation
 - Connected Appliances
 - Lighting
 - Locks
 - Gateways
 - Security Systems
 - Industrial
 - Logistics
 - Production and Manufacturing
 - Automation
 - Asset Tracking and Management
 - Remote Display
 - Cable Replacement
 - HMI
 - Access Control
 - Retail
 - Beacons
 - Advertising
 - ESL / Price Tags
 - Point of Sales / Payment Systems
 - Health and Medical
 - Thermometers
 - SpO2
 - Blood Glucose and Pressure Meters
 - Weight-scales
 - Vitals Monitoring
 - Hearing Aids
 - Sports and Fitness
 - Activity Monitors and Fitness Trackers
 - Heart Rate Monitors
 - Running Sensors
 - Biking Sensors
 - Sports Watches
 - Gym Equipment
 - Team Sports Equipment
 - HID
 - Remote Controls
 - Keyboards and Mice
 - Gaming
 - Accessories
 - Toys
 - Trackers
 - Luggage-tags
 - Wearables
-

■ Absolute Maximum Ratings

		MIN	MAX	UNIT
Supply voltage, VDD ⁽³⁾	VDDR supplied by internal DC/DC regulator or internal GLDO	−0.3	4.1	V
Supply voltage, VDD ⁽³⁾ and VDDR	External regulator mode (VDD and VDDR pins connected on PCB)	−0.3	2.25	V
Voltage on any digital pin ⁽⁴⁾		−0.3	VDD+0.3, max 4.1	V
Voltage on crystal oscillator pins, X32K_Q1, X32K_Q2, X24M_N and X24M_P		−0.3	VDDR+0.3, max 2.25	V
Voltage on ADC input (V _{in})	Internal fixed or relative reference, voltage scaling enabled	−0.3	VDD	V
	Internal fixed reference, voltage scaling disabled	−0.3	1.49	
	Internal relative reference, voltage scaling disabled	−0.3	VDD / 2.9	
	External reference, voltage scaling enabled	−0.3	min (V _{ref} × 2.9, VDD)	
	External reference, voltage scaling disabled	−0.3	V _{ref}	
Voltage on external ADC reference (V _{ref})		−0.3	1.6	V
Input RF level			+5	dBm
T _{stg}	Storage temperature	−40	150	°C

- (1) All voltage values are with respect to VDD, unless otherwise noted.
(2) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(3) VDD2 and VDD3 needs to be at the same potential as VDD.
(4) Including analog capable DIO.

■ Recommended Operation Condition

		MIN	MAX	UNIT
Ambient temperature range		−40	85	°C
Operating supply voltage (VDD and VDDR), external regulator mode	For operation in 1.8 V systems (VDD and VDDR pins connected on PCB, internal DC/DC cannot be used)	1.7	1.95	V
Operating supply voltage (VDD)	For operation in battery-powered and 3.3 V systems (internal DC/DC can be used to minimize power consumption)	1.8	3.8	V

■ Electrical Specifications

● Current Consumption

TA = 25°C and VDD = 3.3 V

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
I _{core}	Core current consumption	Reset. RESET_N pin asserted		100		nA
		Shutdown. No clocks running, no retention		150		
		Standby. With RTC, CPU, RAM and (partial) register retention. RCOSC_LF		1		μA
		Standby. With RTC, CPU, RAM and (partial) register retention. XOSC_LF		1.2		
		Standby. With Cache, RTC, CPU, RAM and (partial) register retention. RCOSC_LF		2.5		
		Standby. With Cache, RTC, CPU, RAM and (partial) register retention. XOSC_LF		2.7		
		Idle. Supply Systems and RAM powered.		550		
		Active. Core running CoreMark		1.45 mA + 31 μA/MHz		
		Radio RX ⁽¹⁾		5.9		mA
		Radio RX ⁽²⁾		6.1		
		Radio TX, 0 dBm output power ⁽¹⁾		6.1		
		Radio TX, 5 dBm output power ⁽²⁾		9.1		
I _{peri}	Peripheral Current Consumption (Adds to core current I _{core} for each peripheral unit activated) ⁽³⁾					
	Peripheral power domain	Delta current with domain enabled		20		μA
	Serial power domain	Delta current with domain enabled		13		μA
	RF Core	Delta current with power domain enabled, clock enabled, RF Core Idle		237		μA
	μDMA	Delta current with clock enabled, module idle		130		μA
	Timers	Delta current with clock enabled, module idle		113		μA
	I ² C	Delta current with clock enabled, module idle		12		μA
	I2S	Delta current with clock enabled, module idle		36		μA
	SSI	Delta current with clock enabled, module idle		93		μA
	UART	Delta current with clock enabled, module idle		164		μA

■ General Characteristics

TA = 25°C and VDD = 3.3 V, unless otherwise noted.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Wake-up and Timing					
Idle -> Active			14		μs
Standby -> Active			151		μs
Shutdown -> Active			1015		μs
Flash Memory					
Supported flash erase cycles before failure		100			k Cycles
Flash page/sector erase current	Average delta current		12.6		mA
Flash page/sector erase time ⁽¹⁾			8		ms
Flash page/sector size			4		KB
Flash write current	Average delta current, 4 bytes at a time		8.15		mA
Flash write time ⁽¹⁾	4 bytes at a time		8		μs

■ RF Characteristics

RX Sensitivity

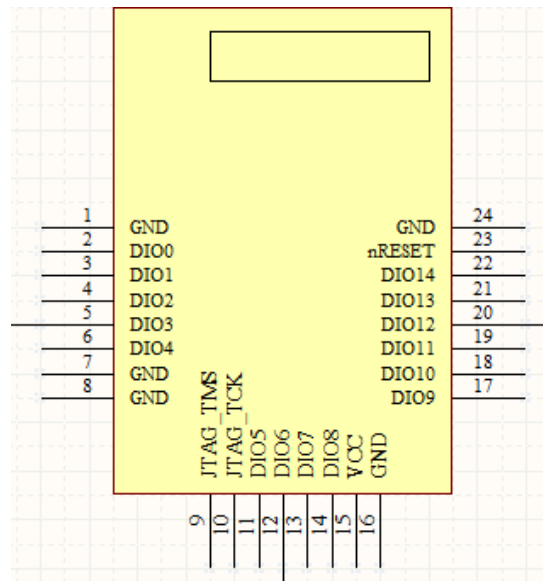
1Mbps, GFSK, 250-KHz deviation, Bluetooth low energy mode and 1%BER

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Receiver sensitivity	Differential mode. Measured at the SMA		-97		dBm

TX output Power

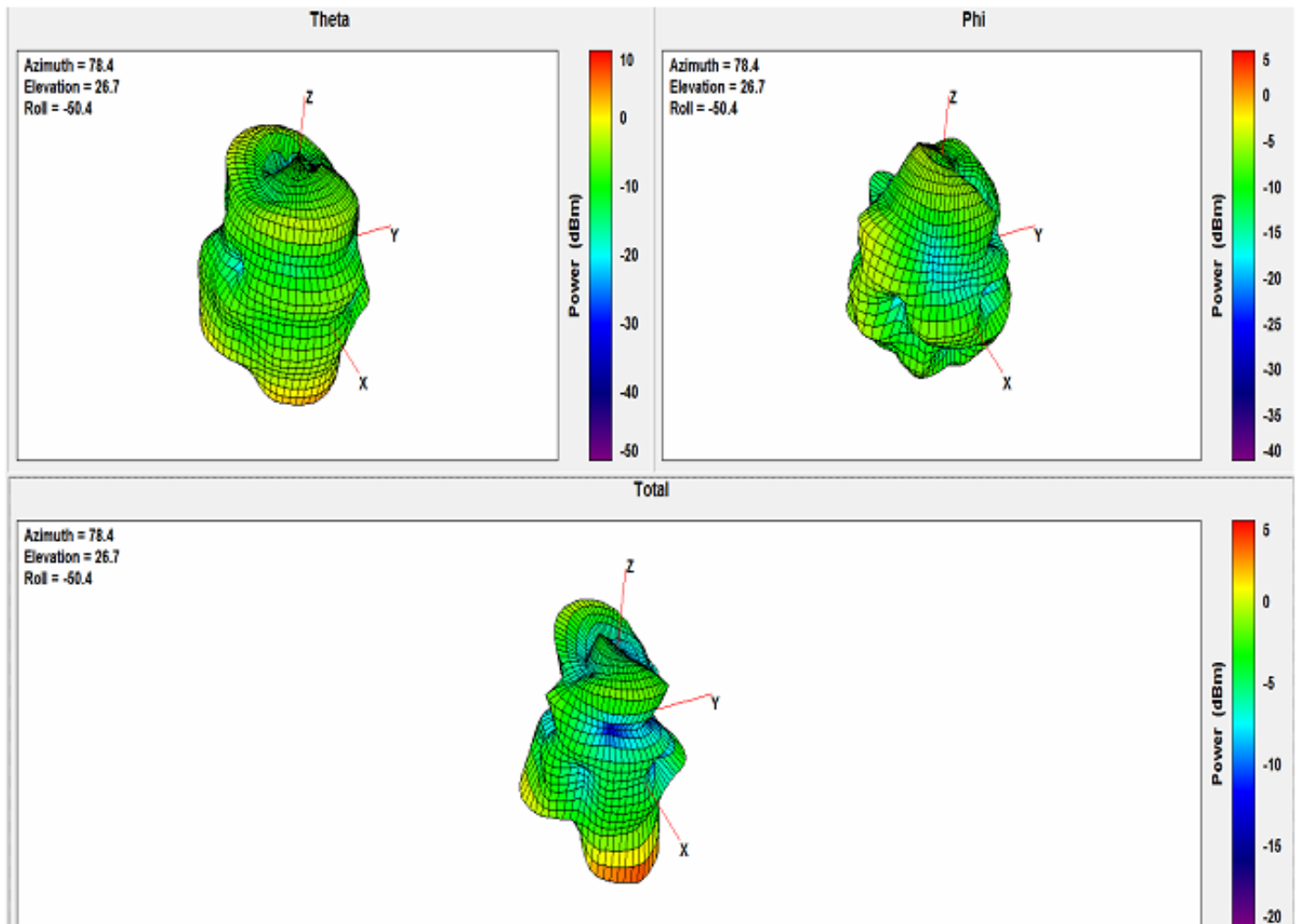
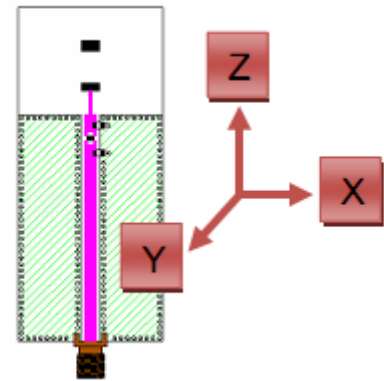
Output power, highest setting	Measured on 50-Ω load, delivered to a single-ended		+2		dBm
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RF Module Pin Configuration

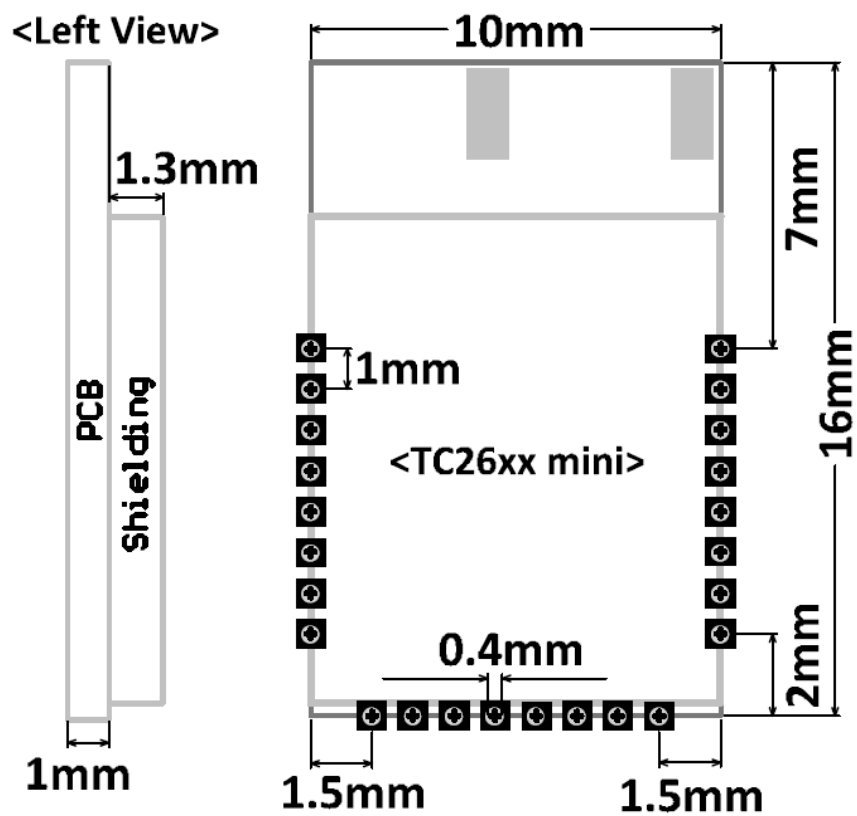


Pin#	Pin Define	Pin Type	Description
1	GND	GND	Ground
2	DIO_0	Digital I/O	
3	DIO_1	Digital I/O	
4	DIO_2	Digital I/O	
5	DIO_3	Digital I/O	
6	DIO_4	Digital I/O	
7	GND	Digital I/O	
8	GND	Digital I/O	
9	TMS	Digital I/O	JTAG TMSC
10	TCK	Digital I/O	JTAG TCKC
11	DIO_5	Digital I/O	
12	DIO_6	Digital I/O	
13	DIO_7	Digital/Analog I/O	
14	DIO_8	Digital/Analog I/O	
15	VDD	POWER	2~3.6V power supply
16	GND	GND	Ground
17	DIO_9	Digital/Analog I/O	
18	DIO_10	Digital/Analog I/O	
19	DIO_11	Digital/Analog I/O	
20	DIO_12	Digital/Analog I/O	
21	DIO_13	Digital/Analog I/O	
22	DIO_14	Digital/Analog I/O	
23	NRESET	RESET	RESET
24	GND	GND	Ground

■ Antenna Radiation Pattern



■ RF Module Dimension



Important FCC notice:

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.

FCC Caution: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Label Instructions

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2ADRLNNDPIXI1605

" or "Contains FCC ID: 2ADRLNNDPIXI1605

." Any similar wording that expresses the same meaning may be used.

Additionally, there must be the following sentence on the device, unless it is too small to carry it:

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 Certification only covers the shielded version of the module.

Important NCC notice:

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

■ Document History

Revision	Date	Description/Changes
1.0	2015.07.08	First release
2.0	2016.04.08	Update drawing: PCB Size & layout guide