Dragon-C Manual

Project:Dragon-C Bluetooth 5 BLE module
Module name:Dragon-C
Designed:Suzhou Pairlink Network Technology Ltd.

Version	Note	Date
V1.0	Create	2020/02/21

Suzhou Pairlink Network Technology Ltd.

Contents

Suzhou Pairlink Network Technology Ltd.

1.Functional Characteristics

Dragon-C is SOC module developed based on the Bluetooth 5 standards. the internal integration architecture ARM® Cortex®-M3 processor.It has the advantage of small volume, low power consumption, long distance transmission, strong anti-jamming capability, low cost.Specifically applied to Bluetooth low power control area,and suitable for various occasions short distance wireless communication.

The Dragon-C is the optimal solution for voice, data, home automation, accessories and other applications that require a Bluetooth SIG standards-compliant interface. The Dragon-C supports a host command interface (HCI) through USB or UART and also supports PCM audio. The Dragon-C transceiver's enhanced radio performance meets the most stringent industrial temperature application requirements for compact integration into mobile handset and portable devices.

The module includes 20Mhz Crystal and 8Mb SPI flash. The module is also integrated with Ipex Connector. which can be used with the FPC antenna provided by Pairlink. Circuit block diagram of the module is shown in Figure 1.
.

Figure 1: Dragon-C Circuit Block Diagram

Suzhou Pairlink Network Technology Ltd.
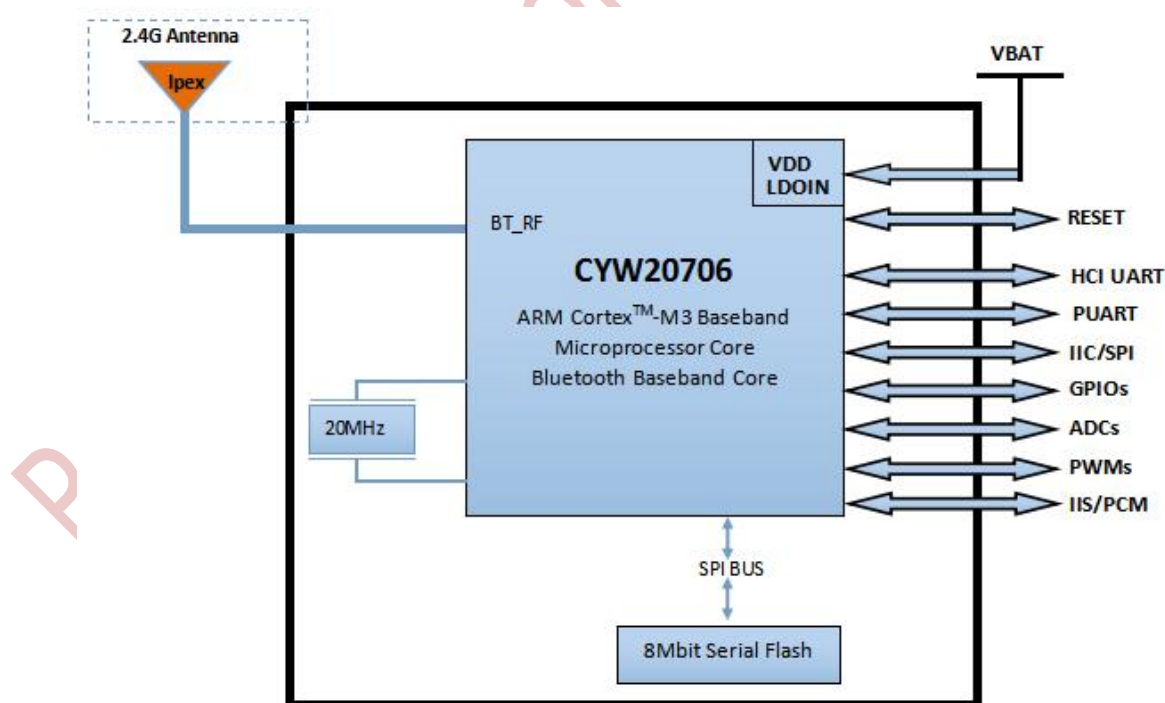
1.1.Product Feature

1. Dragon-C under Bluetooth 5 specification. including BR/EDR/BLE.
2. Supports A2DP, AVRCP, HSP, HFP, GATT, SPP, HIDD, HIDH, ANCS, AMS, IAP2, PBAP, OBEX, WeChat, HomeKit, Wide band speech (WBS)
3. Support Beacon function.
4. Support OTA Upgrade, UART Upgrade.
5. I2S/PCM for BT audio

1.2. Main Application Domain

1: Bluetooth Printer/Scanning device
2: Home automation/ Intelligent lighting / Intelligent access control system.
3: Industrial telemetry / Industrial data collection.
4: Bluetooth and RS232 (RS485) serial data transfer.

Suzhou Pairlink Network Technology Ltd.

2.Electrical Specifications

- Integration architecture ARM® Cortex®-M3 processor
- 352KB RAM,848KB ROM,8Mbit Flash
- Include 8Mbit SPI FLASH, Memory size is optional
- Supports Cypress proprietary data rate up to 2 Mbps

2.1.Absolute Ratings

Parameter	Specification			Unit
	Min.	Typical	Max.	
Power Supply	-0.3	3.3	+3.8	V
Current Consumption	-	-	40	mA
Storage temperature	-40	-	+150	℃
Working temperature	-30	-	+105	℃
ESD HBM	-2K	-	+2K	V
ESD CDM	-500	-	+500	V
Latch-up	TBD	TBD	TBD	mA

2.2.Recommended Operating Conditions

Parameter	Specification			Unit
	Min.	Typical	Max.	
Power Supply	3.0	3.3	3.6	V

Digital I/O Characteristic(VDDIO=3.3V)

Characteristics	Symbol	Specification			Unit
		Min.	Typical	Max.	
Input Low Voltage	VIL	-	-	0.8	V
Input High Voltage	VIH	2.0	-	-	V
Output Low Voltage	VOL	-	-	0.4	V
Output High Voltage	VOH	VBAT-0.4V	-	-	V

　　　　Suzhou Pairlink Network Technology Ltd.

2.3.Power Consumption

Current consumption measured with 3.30V power on in VBAT.

The following data is not accurate value, only for reference.

SPP(EDR+LE)

Operational Mode	Conditions	AVG Current	Unit
Shutdown		8	uA
MCU idle + nodiscoverable		1.1	mA
MCU idle + discoverable	Interval:500ms	1.2	mA
MCU active+discoverable	Interval:500ms	1.9	mA
Connected+ MCU idle	No data	1.85	mA
Connected+MCU active	No data	1.9	mA
Connected + transfer data		8.23	mA

Low Energy(EDR+LE)

Operational Mode	Conditions	AVG Current	Unit
Shutdown		8	uA
MCU idle + no Adv		1.1	mA
MCU idle + Adv	Interval:500ms	1.2	mA
MCU active+Adv	Interval:500ms	1.9	mA
Connected+ MCU idle	No data	1.85	mA
Connected+MCU active	No data	1.9	mA
Connected + transfer data		3.15	mA

Low Energy(only LE)

Operational Mode	Conditions	AVG Current	Unit
Shutdown		8	uA
MCU idle + no Adv		60	uA
MCU idle + Adv	Interval:500ms	120	uA
MCU active+Adv	Interval:500ms	1.1	mA
Connected+ MCU idle		220	uA
Connected+MCU active		320	uA
Connected + transfer data		3.15	mA

　　　　　　Suzhou Pairlink Network Technology Ltd.

3.Physical Parameters

Parameter	Performance	Note
Distance	50M	Data Transfer (BLE) Environment: Sunny and open Dragon-C with cable Antenna Airspeed: 1Mbps
	10M	AUDIO(BR/EDR) Environment: Sunny and open Dragon-C with cable Antenna
Dimensions	16.8mm*11mm*2.6mm	L*W*H
RF Interface	Dragon-C:Ipex Connector	50ohm impedance matching

3.1.Peripheral Interface

● 1 x I2S/PCM interface
● 1 x PUART interface with CTS/RTS
● 1 x HCI UART interface with CTS/RTS
● 1 x SPI interface with master/slave configurable
● 1 x I2C interface with master/slave configurable
● 12 x GPIO
● 1 x ADC input
● 4 x PWM interface

Suzhou Pairlink Network Technology Ltd.

4. Hardware design and use manual

4.1. Pin assignment and Pin description[a][b]

Dragon-C Pin definition can refer to Figure 2.

Table 1:Module Pin Description

Pin Number	Pin Name	I/O	POR State	Alternate Function Description
10	VBAT	ADI	/	Power Supply
1,2,3,9,17,18,26	GND	GND	/	Connect to Ground
11	RESET	DI		INPUT. Reset signal (active Low). Floating if not used
7	RECOVERY	I		SPI2 Master In Slave Out. For Test.
3	UART_RTS	I,PU		RTS for HCI UART interface. NC if unused.
4	UART_CTS	I,PU		CTS for HCI UART interface: NC if unused.
5	UART_RXD	I		Serial data input for the HCI UART interface.
6	UART_TXD	O,PU		Serial data input for the HCI UART interface.
8	P15/ADC_IN	DIO	Floating	GPIO:P15/ADC_IN
13	P30	DIO	Floating	GPIO:P30
14	P25	DIO	Floating	GPIO:P25/P32
15	P4/PUART_RX	DIO	Floating	GPIO:P4/P24 PUART_TX
16	P36	DIO	Floating	GPIO:P36/P38
19	P31/PUART_TX	DIO	Floating	GPIO:P31 PUART_RX
20	P34/I2S_WS	DIO	Floating	GPIO:P34 I2S_WS /PCM_SYNC
21	P12	DIO	Floating	GPIO:P12 I2S_DI/PCM_IN/I2C_SDA
22	P29/I2S_DATA	DIO	Floating	GPIO:P29 I2S_DO/PCM_OUT/I2C_SCL/PWM3
23	P28/I2S_SCLK	DIO	Floating	GPIO:P28 I2S_SCLK/PCM_CLK/PWM2
24	P26	DIO	Floating	GPIO:P26/P11 PWM0

　　　　　　　　Suzhou Pairlink Network Technology Ltd.

25	P27/I2S_MCLK	DIO	Floating	GPIO:P27/P33 I2S_MCLK/PWM1

a. For more GPIO function configuration questions, contact to Pairlink.

b. During power-on reset, all inputs are disabled.

4.2.Reference Design

The latest schematic and design examples, bill of material, and layout file are available from original developer . Contact us for details.

Figure 2: Module Reference Design
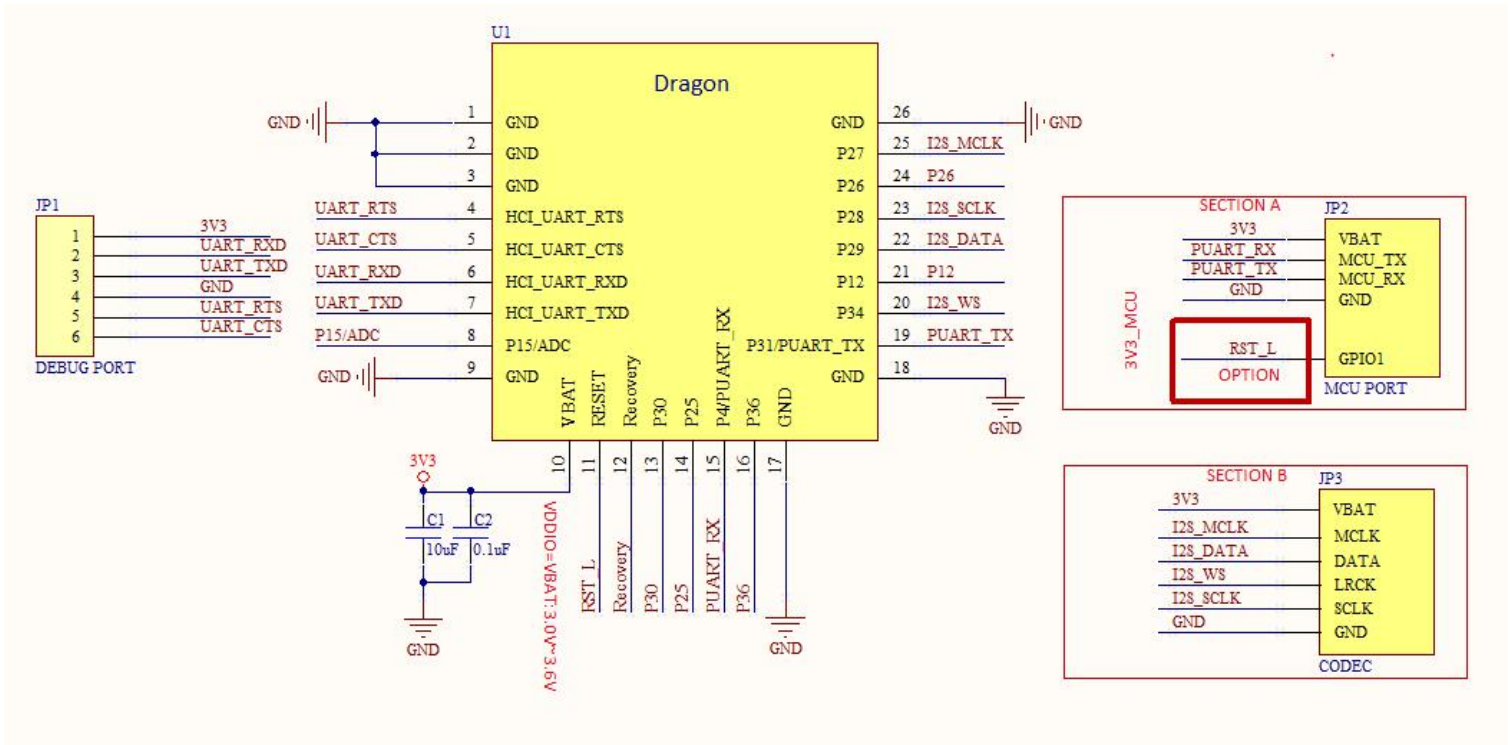
Circuit Description

1:VBAT supply voltage value is 3.0V-3.60V.

2:PIN12(Recovery) reserved for testing.

3:PIN11(RST_L) is Module Reset_Control (active Low) ,Keep floating if the user not use.

4:Reserve JP1 burning interface if the PCB board has enough space.

5:Dragon-C support GPIOs supermux,for more GPIO function configuration questions,
   please contact the Pairlink.

6:Only PIN8(P15) support ADC function.

Suzhou Pairlink Network Technology Ltd.

4.3.Interface Signal Function Selection

Dragon-C not support GPIOs Supermux. IIC\IIS\PWM\SPI\ADC can't be configured at the same time. If the customer wants to use all functions, it can be assigned by Pairlink.

Peripheral_UART			
P_UART_TX		P_UART_RX	
PIN Number	PIN Name	PIN Number	PIN Name
19	P31	15	P4

IIC			
IIC_SDA		IIC_SCL	
PIN Number	PIN Name	PIN Number	PIN Name
21	P12	22	P29

SPI							
SPI_CS (SLAVE)		SPI_CLK (Mater and Salve)		SPI_MOSI (Mater and Salve)		SPI_MISO (Mater and Salve)	
PIN Number	PIN Name	PIN Number	PIN Name	PIN Number	PIN Name	PIN Number	PIN Name
24	P26	16	P36	25	P27	14	P25

IIS							
I2S_WS		I2S_DATA		I2S_SCLK		I2S_MCLK	
PIN Number	PIN Name	PIN Number	PIN Name	PIN Number	PIN Name	PIN Number	PIN Name
20	P34	22	P29	23	P28	25	P27

PWM							
PWM0		PWM1		PWM2		PWM3	
PIN Number	PIN Name	PIN Number	PIN Name	PIN Number	PIN Name	PIN Number	PIN Name
24	P26	25	P27	23	P28	22	P29

HCI_UART							
HCI_UART_TXD		HCI_UART_RXD		HCI_UART_CTS		HCI_UART_RTS	
PIN Number	PIN Name	PIN Number	PIN Name	PIN Number	PIN Name	PIN Number	PIN Name
7	HCI_UART_TXD	6	HCI_UART_RXD	5	HCI_UART_CTS	4	HCI_UART_RTS

　Suzhou Pairlink Network Technology Ltd.

4.4.Appearance and Dimensions

Figure 3 shows the size of the module.The components and prominent structure are not allowed put in this size range(16.8mm*11.0mm*2.60mm).

The following land pattern size is recommended for user board design. However, user can modify it according PCB soldering conditions. Sufficient examination is necessary if use the modified land pattern.

Figure 3: Mechanical Information

Suzhou Pairlink Network Technology Ltd.
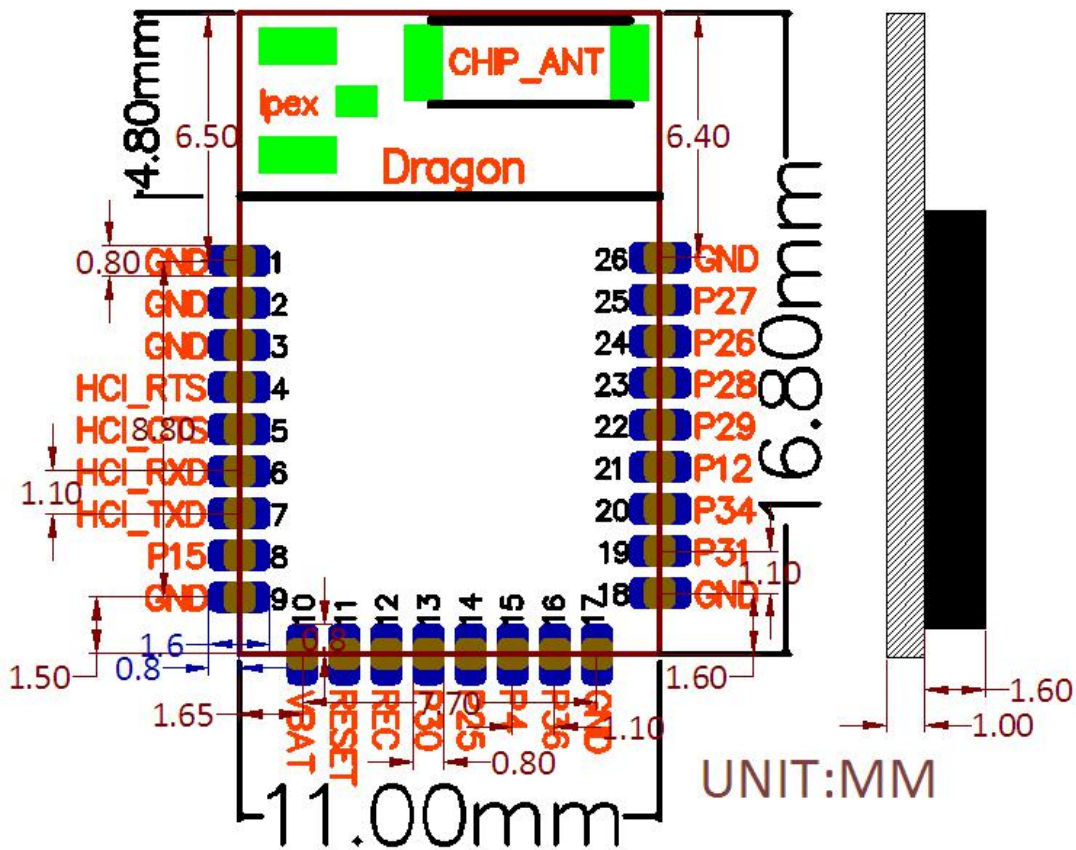
5.Regulatory Module Integration Instructions

5.1.List of applicable FCC rules

This device complies with part 15.247 of the FCC Rules.

5.2.Summarize the specific operational use conditions

This module can be used in household electrical appliances as well as lighting equipments.
The input voltage to the module should be nominally 3.0~3.6V$_{DC}$, Typical value 3.3V$_{DC}$ and the ambient temperature of the module should not exceed 105℃.
The module with a I-pex connector, which can be used with the FPC antenna provided by Pairlink
Dragon-C antenna type: 2.4GHz Dipole antenna
The antenna is not field replaceable. If the antenna needs to be changed, the certification should be re-applied.

5.3.Limited module procedure

This module is not subject to 'Limited module' use restrictions.
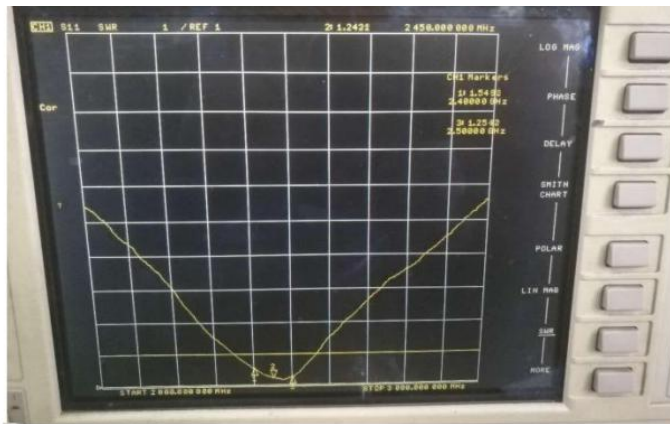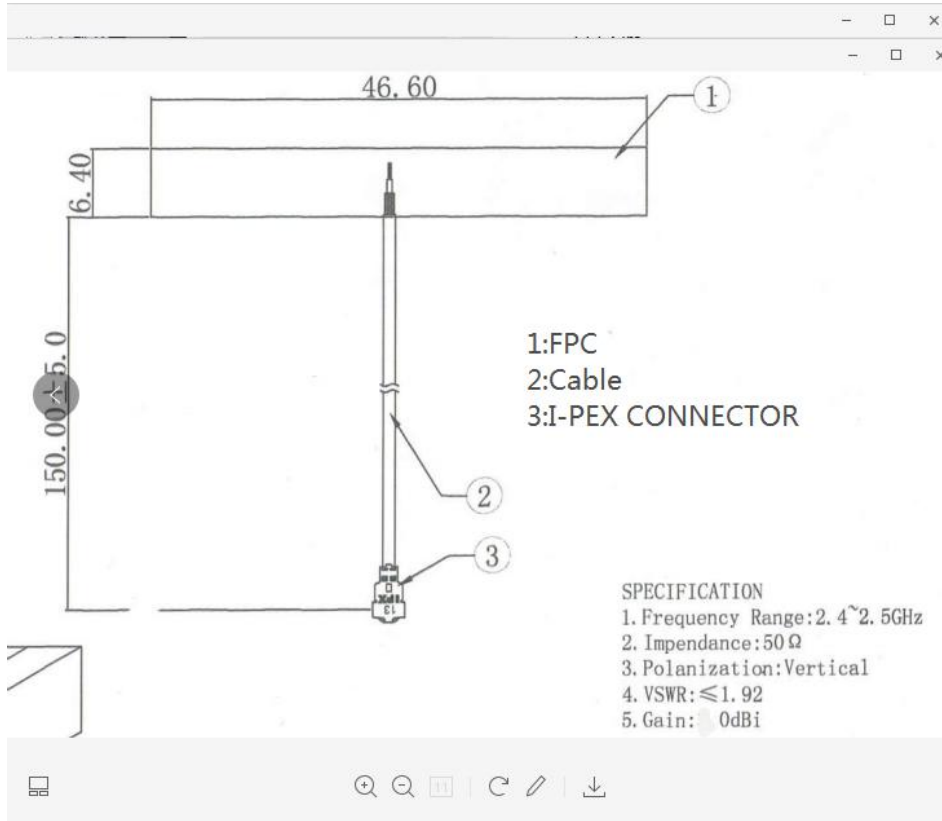
5.4.Trace antenna designs

Not applicable

5.5.RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body. If the device built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by §2.1093.

Suzhou Pairlink Network Technology Ltd.

5.6.Antenna

The module with a I-pex connector, which can be used with the FPC antenna provided by Pairlink
Dragon-C antenna type: 2.4GHz Dipole antenna
The characteristics of the FPC antenna is shown in the following figure.

1:FPC
2:Cable
3:I-PEX CONNECTOR

SPECIFICATION
1. Frequency Range:2.4~2.5GHz
2. Impendance:50Ω
3. Polanization:Vertical
4. VSWR:≤1.92
5. Gain: 0dBi

Frequency MHZ	Efficiency	Gain
2400	25%	0.30DBI
2450	23%	0.15DBI
2500	26%	0.21DBI

　　　　　　　　　　Suzhou Pairlink Network Technology Ltd.

5.7.Label and compliance information

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:"FCC ID:2AQV6DRAGON",
Any similar wording that expresses the same meaning may be used.

5.8.Information on test modes and additional testing requirements

The Dragon-C module is based on CYW20706UA2KFFB4GT chip.Support standard Bluetooth HCI UART commands. For the testing module on your product, user can refer to specification of the Bluetooth system on how to configure and evaluate the module.
This specification can also be found on the official Bluetooth web site: https://www.bluetooth.org/en-us/specification/adopted-specifications.

6.FCC Statement

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

7.ISED Compliance Information

This device complies with Industry Canada's applicable licence-exempt RSSs. 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.
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) l'appareil ne doit pas produire de brouillage; 2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

8:OEM/Integrators Installation Manual

This module has been granted modular approval for mobile applications. OEM integrators for host products may use the module in their final products without additional FCC / IC (Industry Canada) certification if they meet the following conditions. Otherwise, additional FCC / IC approvals must be obtained.
● The host product with the module installed must be evaluated for simultaneous transmission requirements.
● The users manual for the host product must clearly indicate the operating requirements and conditions that must be observed to ensure compliance with current FCC / IC RF exposure guidelines.

Suzhou Pairlink Network Technology Ltd.

- To comply with FCC / IC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed, it includes one chip antenna with Max antenna gain 0 dBi
- A label must be affixed to the outside of the host product with the following statements:

This device contains FCC ID:2AQV6DRAGON
This equipment contains equipment certified under IC:24210-DRAGON

The final host / module combination may also 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.
If the final host / module combination is intended for use as a portable device (see classifications below) the host manufacturer is responsible for separate approvals for the SAR requirements from FCC Part 2.1093 and RSS-102.

Suzhou Pairlink Network Technology Ltd.