



HY-40R201PC Bluetooth BLE 5.0 Module Specifications

(40 pin)

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Version : V1.0

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The *Bluetooth* trademark is owned by the Bluetooth SIG Inc., USA

1. Description

HY-40R201PC Bluetooth low energy single mode module is a single mode device targeted for low power sensors and accessories.

HY-40R201PC offers all Bluetooth low energy features: radio, stack, profiles and application space for customer applications. The module also provides flexible hardware interfaces to connect sensors.

HY-40R201PC can be powered directly with a standard 3V coin cell batteries or pair of AAA batteries. in lowest power shutdown mode it consumes only 0.15uA and will wake up in few microseconds.

HY-40R201PC transmission distance of 100 meter .(At face to face, free space, 1.2 Meter high from Ground for testing).

Bluetooth IC : TTC2640R2 6*6*0.9mm 48 pin IC,Used TI CC2640R2 chip

2. Application:

Heart rate sensors

Pedometers

Watches

Blood pressure and glucose meters

Weight scales

Key fobs

Households sensors and collector devices

Security tags

Wireless keys (keyless go)

Proximity sensors

HID keyboards and mice

Indoor GPS broadcasting devices

Smart home living device control & message transceiver.

Smart office device control & message transceiver.

Smart industrial device control and message transceiver.

3. Key Features:

Bluetooth v.4.2/v.5.0 single mode compliant

Supports master,slaveand master/slave modes

Integrated Bluetooth low energy stack

GAP, GATT, L2CAP, SMP Bluetooth low energy profiles

Pre-certified RF regurations for BQB BLE 5.0 (DID:D037649, QDID 102453) , CE ETSI RED (AGC01629170901E0), FCC (ID: 2ADXE-HY-40R201PC), IC(Canada)(ID: 23267-HY40R201PC) ; and can Compliance for other worldwide RF Regulations.

Transmit power :+5 dBm typical

Receiver sensitivity: -97dBm typical

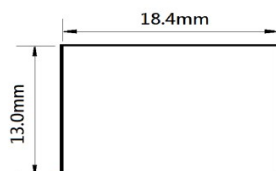
Ultra low current consumption :Shutdown. No clocks running, no retention: 150 nA(Typical)

Programmable ARM Cortex-M3 processor for embedding full applications

4. Product model Number: Hardware Model Description

	Product Mode Item	PCB NO.	Description
1	WMD40R201xx6PC	HY-40R201PC	PCB Antenna

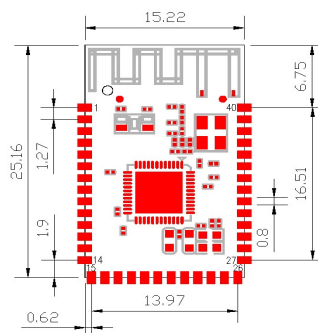
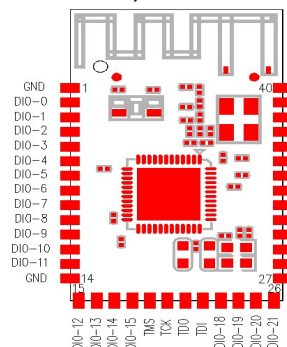
5. FCC ID & IC ID & CE & BQB print format on the shield case:



Shield Case Size:
13.0*18.4*1.5mm

Shield Case Size:
13.0*18.4*1.5mm

6. PCBA dimension size and picture HY-40R201PC / WMD40R201xx6PC(PCB F Antenna) (PCBA dimension size : 17.9*11.59*2.0mm).



7. Application Note:

7-1. Attention to the electrostatic protection, prevent the soldering iron and the equipment grounding bad; And the workbench, working environment, packaging materials and from the human body Touch with static electricity, etc., destroy IC and software to be flied; Manual welding module solder iron temperature, should pay attention to avoid the PCB copper stripping off; Soldering iron strictly Grounding requirements, eliminating solder iron leak voltage and **avoid supply power Vcc switch instant turn on/ turn off state**, generate high voltage, May be let the module to damaged;

7-2. Attention to avoid the overall motherboard power supply circuit of bad welding connected to short circuit or open circuit, causing the Bluetooth chip, abnormal voltage, The software will fly and problems of IC was damaged.

7-3. When programming firm ware, the VDDS supply voltage must in DC 2.4~3.3V, To avoid programming has not completely, and abnormal status occur.

7-4. Avoid supply voltage in (BOD Brown - Out Dectect) fall within the scope of electrical detection threshold (1.76 V ~ 1.78 V) occurred many times, (diagram below off electric Lock - up area) firmware may be locked.

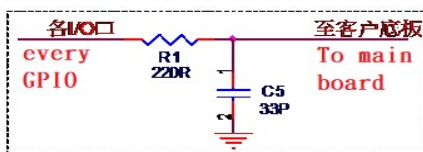
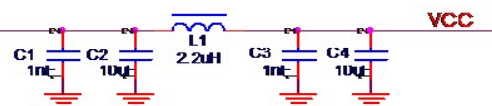
Cause the Boot Code startup Code suspended, unable to connect to the JTAG protocol; In case of this state is available use Reset pin action under 1.0 V, to remove this phenomenon; The rechargeable batteries at charge-discharge status; In the application at the same time, to ensure the voltage setting of the protection system; And pay attention to the supply of power caused by the internal resistance and line impedance voltage drop; And make sure that

The oscilloscope screenshot displays two waveforms: Supply Current (yellow) and Ramping Supply Voltage (green). The Supply Current trace shows a lock-up event at 2.25mA. The Ramping Supply Voltage trace shows a linear ramp from -10V to 0V. A vertical dashed line marks the lock-up point.

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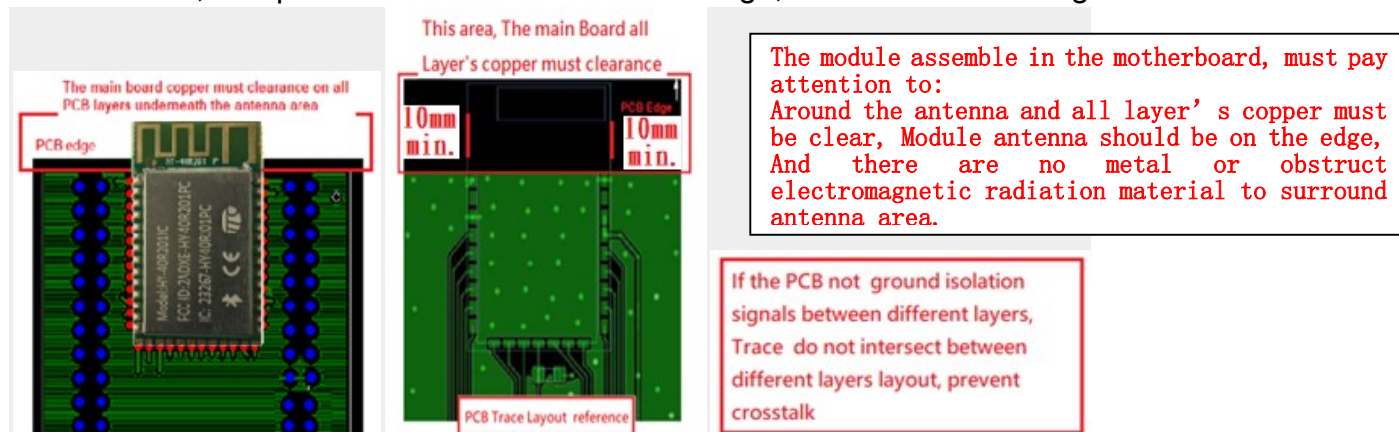
Pinout diagram of the HY 40R20M1 P component. The component is a square chip with pins on all four sides. The top pins are labeled DIO 0 through DIO 11. The right pins are labeled DIO 30 through DIO 22. The bottom pins are labeled DIO 21 through DIO 12. The left pins are labeled JTAG_TMS through JTAG_TCK. The component is labeled 'U1 HY 40R20M1 P'.



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The antenna can't be near around metal parts and prevent material existence of electromagnetic radiation , Can affect the manipulation of the distance.

7-9. Assembly recommendation (2): Signal trace and power supply trace, don't cross layout, as show in below Fig.To avoid crosstalk, affect the receiving sensitivity.Assembly recommendation 1:Underneath the module antenna and RF circuit on themain board PCB copper need to clearance, and place close to the main board edge, as show in below Fig.



8. Pinout and GPIO function Description

Pin No.	Name	Type	Function Description
1	GND	Power GND	Ground
2	DIO_0	Digital I/O	GPIO, Sensor Controller (I:4mA max)
3	DIO_1	Digital I/O	GPIO, Sensor Controller (I:4mA max)
4	DIO_2	Digital I/O	UART RX; GPIO, Sensor Controller (I:4mA max)
5	DIO_3	Digital I/O	UART TX; GPIO, Sensor Controller (I:4mA max)
6	DIO_4	Digital I/O	WAKE UP; Don't floating GPIO, Sensor Controller (I:4mA max)
7	DIO_5	Digital I/O	GPIO, Sensor Controller, high-drive capability (8mA max).
8	DIO_6	Digital I/O	GPIO, Sensor Controller, high-drive capability (8mA max).
9	DIO_7	Digital I/O	GPIO, Sensor Controller, high-drive capability (8mA max).
10	DIO_8	Digital I/O	GPIO (I: 4mA max)
11	DIO_9	Digital I/O	GPIO (I: 4mA max)
12	DIO_10	Digital I/O	GPIO (I: 4mA max)
13	DIO_11	Digital I/O	GPIO (I: 4mA max)
14	GND	Power GND	Ground

15	DIO_12	Digital I/O	GPIO (I: 4mA max)
16	DIO_13	Digital I/O	GPIO (I: 4mA max)
17	DIO_14	Digital I/O	GPIO (I: 4mA max)
18	DIO_15	Digital I/O	GPIO (I: 4mA max)
19	JTAG TMS	Digital I/O	JTAG TMS; high-drive capability
20	JTAG TCK	Digital I/O	JTAG TCK
21	DIO_16 TDO	Digital I/O	GPIO, JTAG_TDO; high-drive capability(8mA max).
22	DIO_17 TDI	Digital I/O	GPIO, JTAG_TDI; high-drive capability(8mA max).
23	DIO_18	Digital I/O	GPIO (I: 4mA max)
24	DIO_19	Digital I/O	GPIO (I: 4mA max)
25	DIO_20	Digital I/O	GPIO (I: 4mA max)
26	DIO_21	Digital I/O	GPIO (I: 4mA max)
27	GND	Power GND	Ground
28	DIO_22	Digital I/O	GPIO (I: 4mA max)
29	VDD	Power Supply	+1.8V to +3.8V (Recommended 2.7~3.3V)
30	GND	Power GND	Ground
31	RESET	Digital input	Reset, active-low. Module have pull up.
32	DIO_23	Digital I/O	GPIO, Sensor Controller, Analog(I: 4mA max)
33	DIO_24	Digital I/O	GPIO, Sensor Controller, Analog(I: 4mA max)
34	DIO_25	Digital I/O	GPIO, Sensor Controller, Analog(I: 4mA max)
35	DIO_26	Digital I/O	GPIO, Sensor Controller, Analog(I: 4mA max)
36	DIO_27	Digital I/O	GPIO, Sensor Controller, Analog(I: 4mA max)
37	DIO_28	Digital I/O	GPIO, Sensor Controller, Analog(I: 4mA max)
38	DIO_29	Digital I/O	GPIO, Sensor Controller, Analog(I: 4mA max)
39	DIO_30	Digital I/O	GPIO, Sensor Controller, Analog(I: 4mA max)
40	GND	Power GND	Ground

9. Electrical Characteristics

(Test condition: With Ta = 25 °C, VDD =3.0V with internal DC-DC converter,
standardmeasure:1Mbps GFSKmodulation ,FRF = 2440MHz Bluetooth Low energy mode.)

9-1.Radio performance & current consumption

(Test condition:With Ta = 25 °C, VDD =3.0V, with internal DC-DC converter,
standardmeasure:1Mbps GFSKmodulation ,FRF = 2440MHz Bluetooth Low energy mode.)

- Modulation Mode: GFSK

- Frequency range: 2402~2480MHZ (2.4GHz ISM band)
- Transmit power setting Range: -21 ~ +5 dBm typical (differential mode o/p point characteristics ; programmable by software)
- Receiver sensitivity: -97dBm typical(differential mode o/p point characteristics)
- Pre-certified RF regulations for BQB BLE 4.2/5.0, CE ETSI RED, FCC, IC (Canada), (FCC and IC only for PCB antenna with shield case model);
Another can Compliance for worldwide RF Regulations.
- Ultra low current consumption
 - Transmit : 6.1mA(typical) (O/P Power setting :0dBm)
 - Transmit : 9.1mA(typical) (O/P Power setting :5dBm)
 - Receive(high gain setting): 6.1 mA(typical)
 - Idle. Supply Systems and RAM powered:550uA(Typical)
 - Standby. With Cache, RTC, CPU, RAM and partial register retention. XOSC_LF: 3.0 uA(Typical)
 - Shutdown. No clocks running, no retention: 150 nA(Typical)

9-2. Absolute Maximum Ratings

Note: These are absolute maximum ratings beyond which the module can be permanently damaged, these are not Maximum operating conditions, the maximum recommended operating conditions are in the table 6.

Rating	Min	Max	Unit
VDD	-0.3	3.9	V
Other Terminal Voltages	VSS-0.3	VDD+0.3	V
Storage Temperature	-40	+85	°C

9-3. ESD Ratings

			Value	Unit
V _{ESD} Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDECJS001	All pins	±2500	V
		RF pins	±750	
	Charged device model (CDM), per JESD22-C101	Non-RFpins	±750	

9-4. Recommended Operating Conditions

Supply voltage noise should be less than 10mVpp. Excessive noise at the supply voltage will reduce the RF performance.

Rating	Min	Max	Unit
VDD (when BlueTooth Active)	1.9	3.8	V
VDD(when flash programming)	2.4	3.3	V
Operating Temperature Range	-40	+85	°C

Note: (1).VDD power supply recommended voltage : 2.7~3.3V

(2).When programming firm ware , the VDD supply voltage must in DC 2.4~3.3V,

To avoid programming has not completely, or abnormal status occur..

(3).For smaller coin cell batteries, with high worst-case end-of-life equivalent source resistance, a 22-μF VDD input capacitor must be used to ensure compliance with this slew rate(6-6 timing req.).

9-5.GPIODC Characteristics

Parameter	Test Condition	Typical	Unit
GPIO VOH at 8-mA load	IOCURR = 2, high-drive GPIOs only	2.68	V
GPIO VOL at 8-mA load	IOCURR = 2, high-drive GPIOs only	0.33	V
GPIO VOH at 4-mA load	IOCURR = 1	2.72	V
GPIO VOL at 4-mA load	IOCURR = 1	0.28	V

9-6. Timing Requirements

Description		MIN	NO M	MA X	UNIT
Rising supply-voltage slew rate		0		100	mV/uS
Falling supply-voltage slew rate		0		20	mV/uS
Falling supply-voltage slew rate, with low-power flash settings(1)				3	mV/uS
Positive temperature gradient in standby(2)	No limitation for negative temperature gradient, or outside standby mode			5	°C/s
CONTROL INPUT AC CHARACTERISTICS(3)					
RESET_N low duration		1			uS

(1) For smaller coin cell batteries, with high worst-case end-of-life equivalent source resistance, a 22-μF VDD5 input capacitor must be used to ensure compliance with this slew rate.

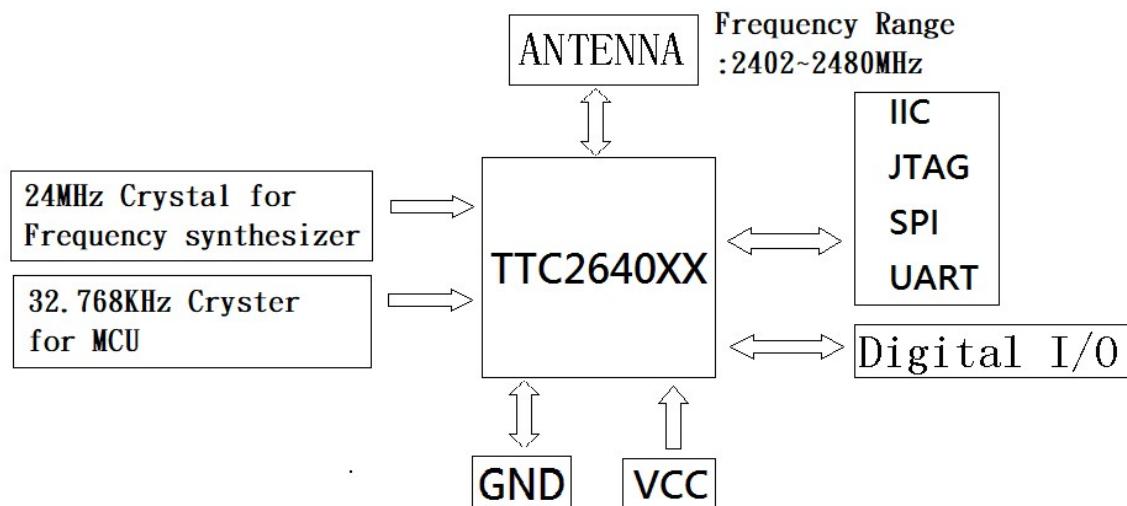
(2) Applications using RCOSC_LF as sleep timer must also consider the drift in frequency caused by a change in temperature .

9-7. Switching Characteristics

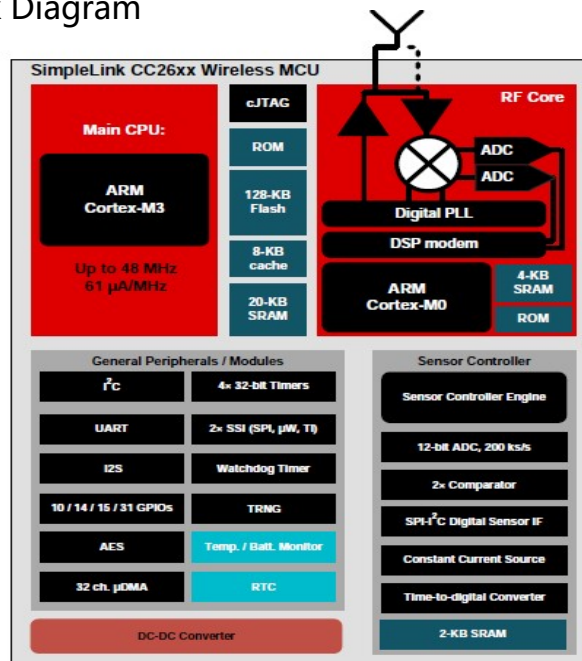
Measured with Tc = 25°C, VDD5 = 3.0 V, unless otherwise noted.

Parameter	Test Condition	Min	Typical	Max	Unit
Wakeup and Timing					
Idle →Active			14		μs
Standby →Active			151		μs
Shutdown →Active			1015		μs

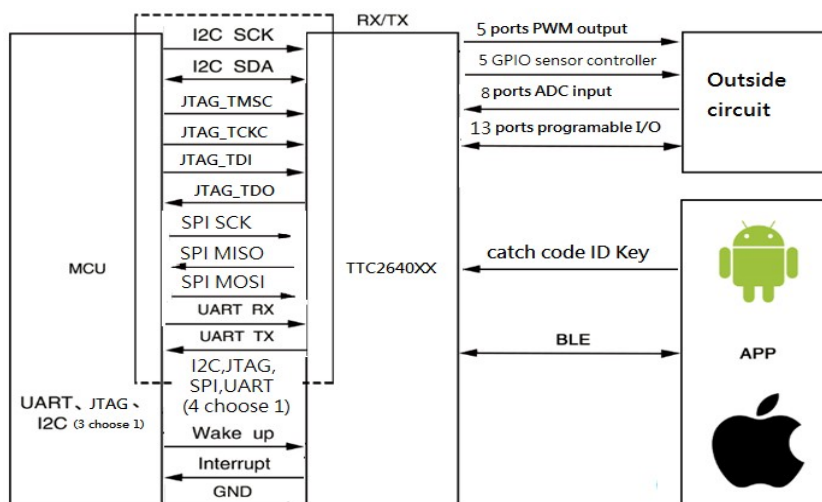
10. Block Diagram



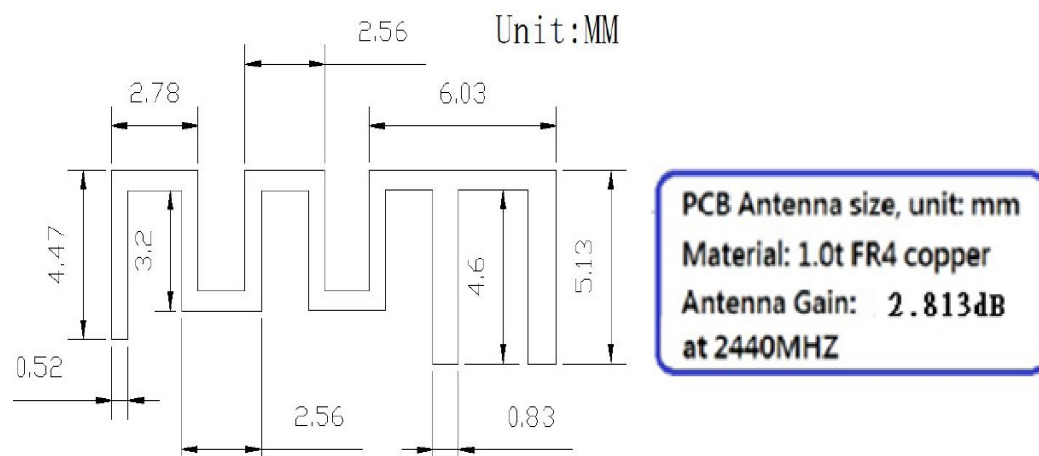
11. Functional Block Diagram

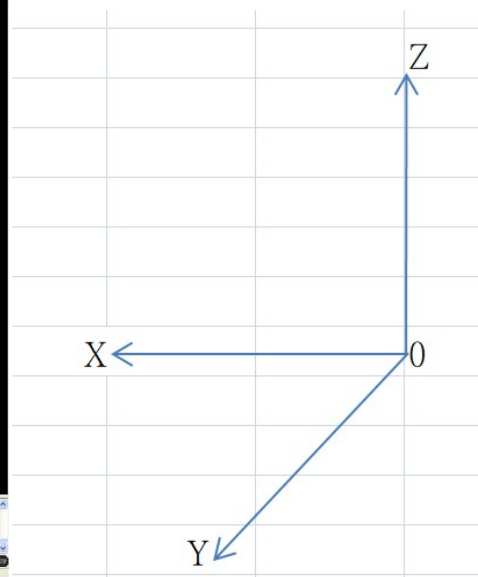
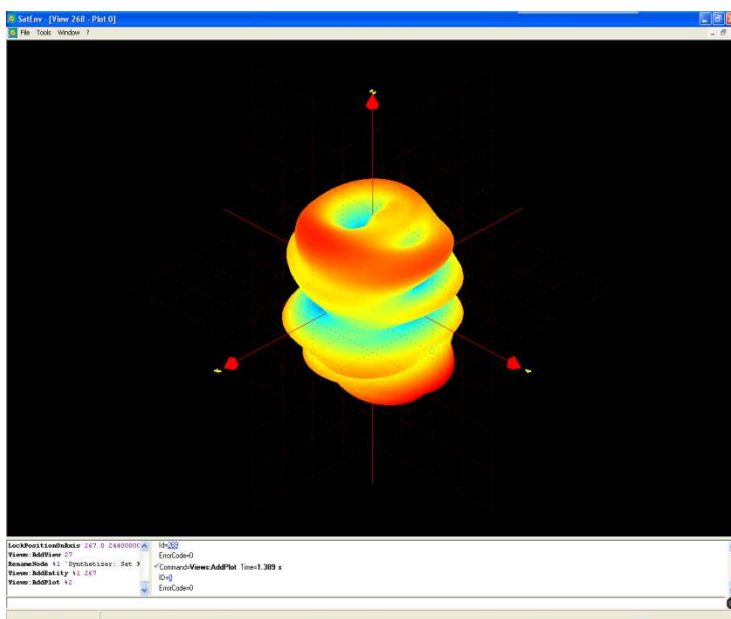
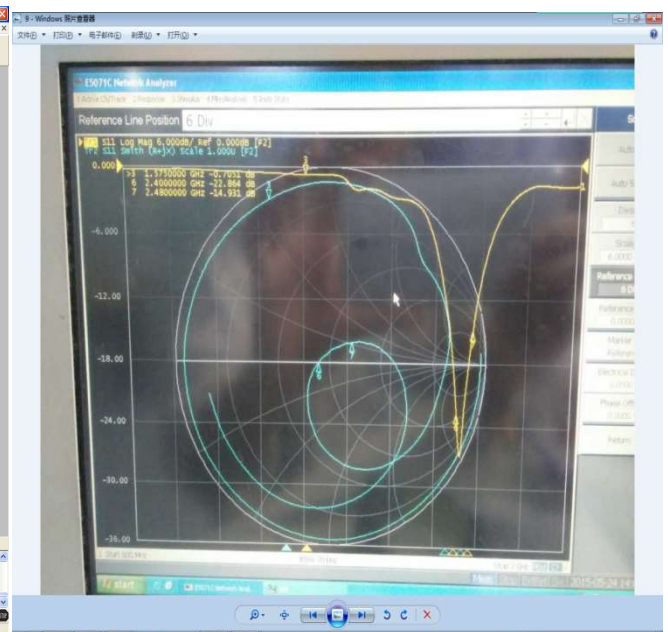
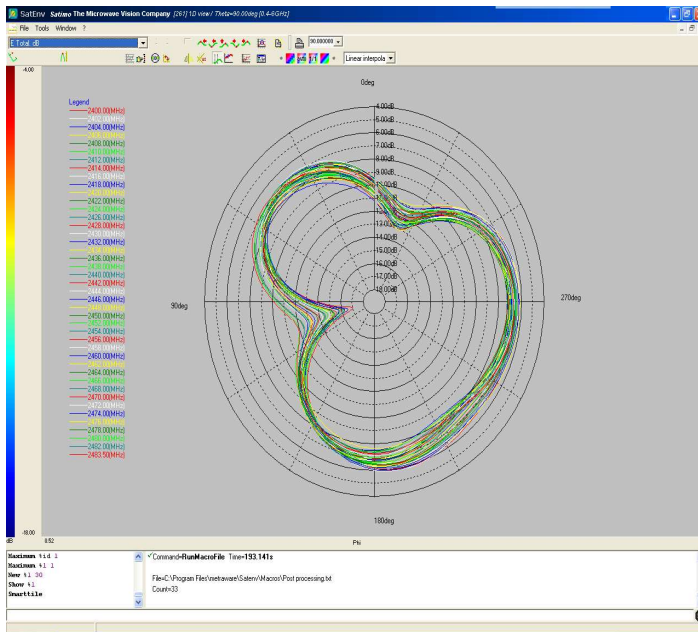
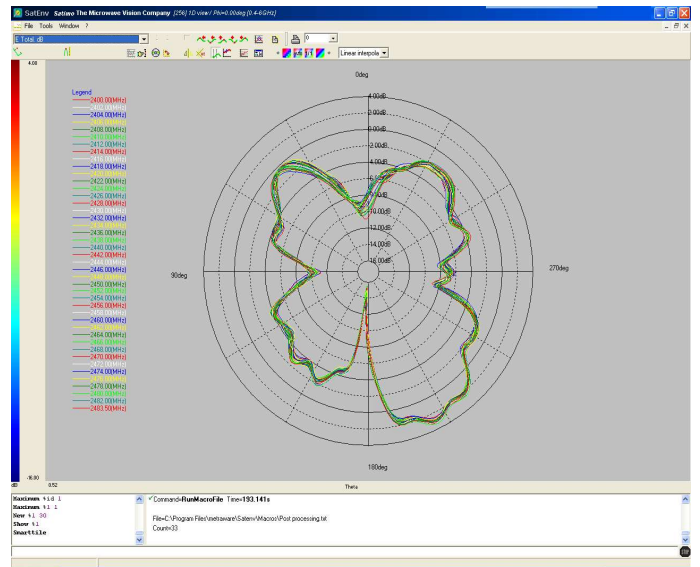
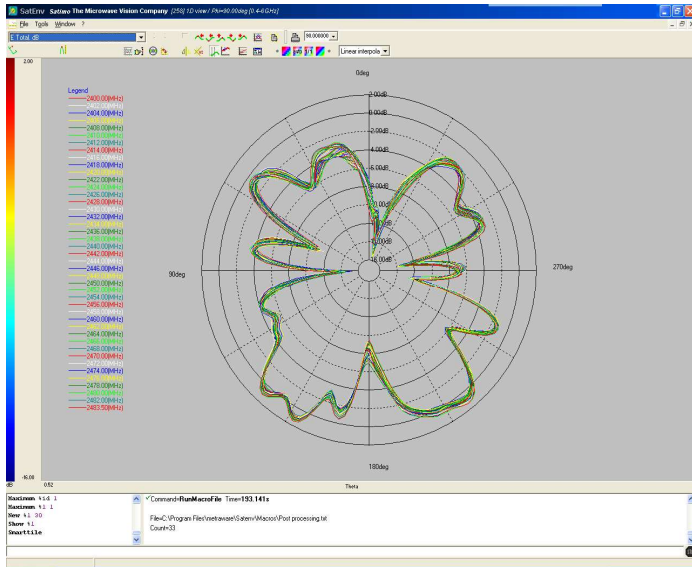


12. Working mode schematic :



13. Antenna size, gain and test data information : (Antenna gain: 2.813dBi at 2440MHz)

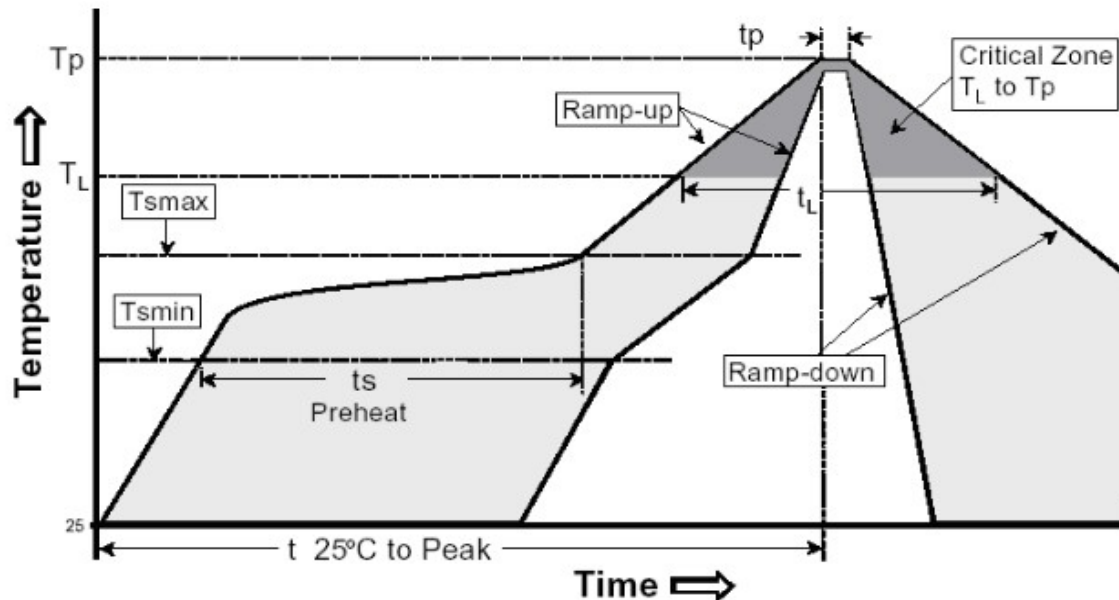




14. Recommend Reflow Profile(Leadless solder cream: Sn 96.5%, Ag 3%, Cu 0.5%)

Profile Feature	Pb-Free Assembly	
	Large Body	Small Body
Average ramp-up rate(T_L to T_P)	3°C/second max	
Preheat-Temperature Min (T_{smin}) -Temperature Max (T_{smax}) -Time (min to max)(t_s)	150°C 200°C 60-180 seconds	
T_{smax} to T_L -Ramp-up Rate	3°C/second max	
Time maintained above-Temperature (T_L) -Time (t_L)	217°C 60-150 seconds	
Peak Temperature (T_P)	245 +0/-5°C	250 +0/-5°C
Time within 5°C of actualPeakTemperature (t_p)	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second max	
Time 25°C to PeakTemperature	8 minutes max	

Reflow Curve Classification



15. HY-40R201PC/WMD40R201SR6PC Module FCC / Industry Canada Statement

(to be placed on End Products)Federal Communications Commission (FCC) Statement
FCC Statements

(OEM) Integrator has to assure compliance of the entire end-product incl. the integrated RF Module. For 15 B (§15.107 and if applicable §15.109) compliance, the host manufacturer is required to show compliance with 15 while the module is installed and operating.

Furthermore the module should be transmitting and the evaluation should confirm that the module's intentional emissions (15C) are compliant (fundamental / out-of-band). Finally the integrator has to apply the appropriate equipment authorization (e.g. Verification) for the new host device per definition in §15.101.

Integrator is reminded to assure that these installation instructions will not be made available to the end-user of the final host device.

The final host device, into which this RF Module is integrated" has to be labeled with an auxiliary label stating the FCC ID of the RF Module, such as "Contains FCC ID:

2ADXEHY-40R201PC

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

the Integrator will be responsible to satisfy SAR/ RF Exposure requirements, when the module integrated into the host device.

Module statement

The single-modular transmitter is a self-contained, physically delineated, component for which compliance can be demonstrated independent of the host operating conditions, and which complies with all eight requirements of § 15.212(a)(1) as summarized below.

- 1) The radio elements have the radio frequency circuitry shielded.
- 2) The module has buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.
- 3) The module contains power supply regulation on the module.
- 4) The module contains a permanently attached antenna.
- 5) The module demonstrates compliance in a stand-alone configuration.
- 6) The module is labeled with its permanently affixed FCC ID label.
- 7) The module complies with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.
- 8) The module complies with RF exposure requirements.

NOTE: 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 or more 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

Industry Canada (IC) Statement

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.

Canada, avis d'Industry Canada (IC)

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, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

16. Contact Us:

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Address: Room 602, B Block of Longjing Jingu Hi-tech Pioneer Park, Longzhu 4th Road, Xili Town, Nanshan District, Shenzhen, Guangdong, China..



Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

FCC Part 15.247

2.3 Specific operational use conditions

This transmitter/module and its antenna(s) must not be co-located or operating in conjunction with any transmitter. This information also extends to the host manufacturer's instruction manual.

2.4 Limited module procedures

not applicable

2.5 Trace antenna designs

It is "not applicable" as trace antenna which is not used on the module.

2.6 RF exposure considerations

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This compliance to FCC radiation exposure limits for an uncontrolled environment, and minimum of 50mm separation between antenna and body.

The host product manufacturer would provide the above information to end users in their end-product manuals.

2.7 Antennas

Integral Antenna; 3.42dBi; 2.402 GHz~2.480GHz

2.8 Label and compliance information

The end product must carry a physical label or shall use e-labeling followed KDB784748D01 and KDB 784748 stating "Contains Transmitter Module FCC ID: 2ADXEHY-40R201PC".

2.9 Information on test modes and additional testing requirements.

Information on test modes:

The host manufacturer can use software for access to the test modes. Connected to the device through the serial port of the host product and control the module. If it does not work, then the host product manufacturer should coordinate with the module manufacturer for access to test mode software.

The following provides guidance to host product when installing this module on how they may verify the end product:

- A. If the modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes, it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the

host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits(e.g., where a different antenna may be causing additional emissions).

- B. The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.
- C. If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15.247) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed when contains digital circuitry.