Level: Public Information

HY-264027 BlueTooth BLE 4.1 Module Specifications

(40 pin)

23 Oct. 2017

Version：V1.0

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Version History

Version	Revision Date	Reviser	Reviewer	Revised Contents
V1.0	23/10/2017	WF	LYC	1st issue

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1. Description

HY-264027 Bluetooth low energy single mode module is a single mode device targeted for low power sensors and accessories.
HY-264027 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-264027 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-264027 transmission distance of 100 meter or more. (At face to face, free space, 1.2 Meter high from Ground for testing).
Bluetooth IC：TI CC2640 7*7*0.9mm 48pin IC

1-1.APPLICATIONS:

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

1-2.KEY FEATURES:

- Bluetooth BLE v.4.1 single mode compliant
- Supports master,slaveand master/slave modes
- Integrated Bluetooth low energy stack
- GAP, GATT, L2CAP, SMP Bluetooth low energy profiles
- Compliance: BQB BLE4.1,FCC,IC(Canada),CE ETSI RED,etc.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

2. Product model Number: Hardware Model Description

2-1. (4 kinds Antenna type for choice) ,(Option: with shield case or no shield case)

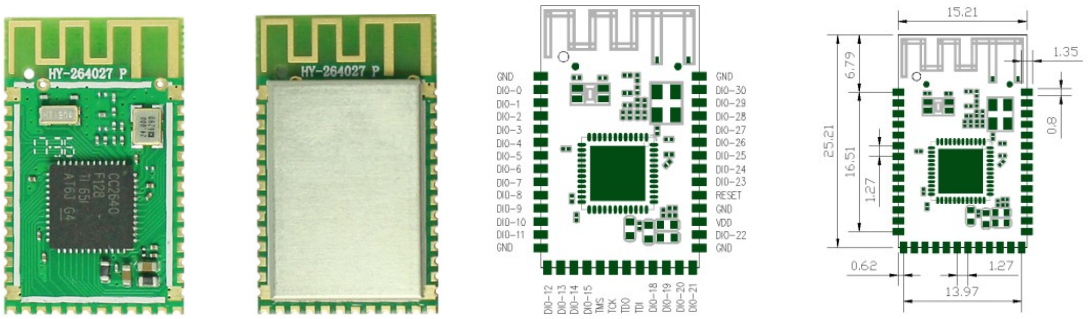
	Product Mode Item	PCB NO.	Description
1	WMD400027SR6P0	HY-264027P	PCB IFA Antenna
2	WMD400027SR6I0	HY-264027I	IPEX Connector for External Antenna
3	WMD400027SR6W0	HY-264027W	Metal Wire Antenna(λ/4 Half wave dipole)
4	WMD400027SR6C0	HY-264027C	Ceramic Antenna
6	WMD400027SR6PC	HY-264027PC	PCB He IFA Antenna with shield case
5	WMD400027SR6IC	HY-264027IC	IPEX Connector for External Antenna with shield case
7	WMD400027SR6WC	HY-264027WC	Metal Wire Antenna with shield case
8	WMD400027SR6CC	HY-264027CC	CeramicAntenna with shield case

3. PCBA dimension size and picture

3-1: HY-264027P / WMD400027SR6P0(PCB IFAAntenna)

& HY-264027PC / WMD400027SR6PC (PCB IFA Antenna, with shield case);

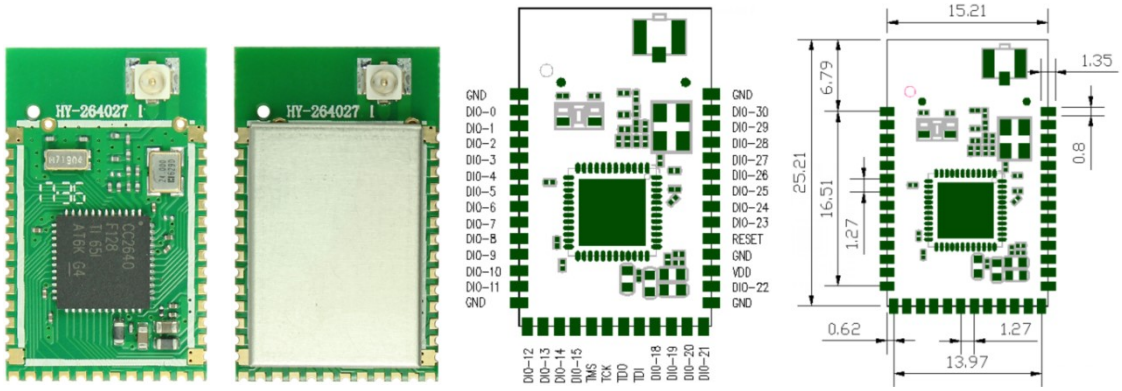
(PCBA dimension size : (25.21*15.21*2.0/2.6 mm).



3-2:HY-264027I / WMD400027SR6I0(IPEX RF connector terminal)

& HY-264027IC / WMD400027SR6IC (IPEX RF connector with shield case)

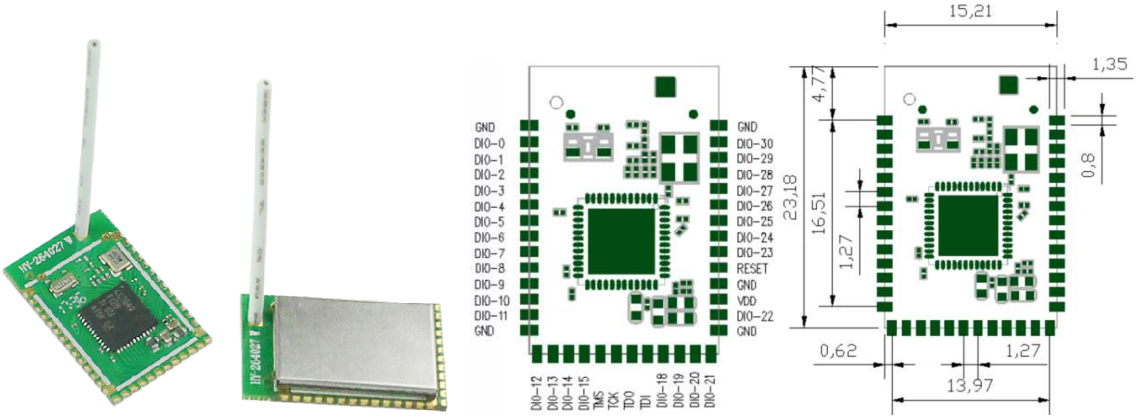
(PCBA dimension size : 25.21*15.21*2.6 mm).



3-3: HY-264027W / WMD400027SR6W0(Metal WireAntenna)(1/4λ half wave dipole)_

& HY-264027WC / WMD400027SR6WC (Metal Wire Antenna, with shield case) ;

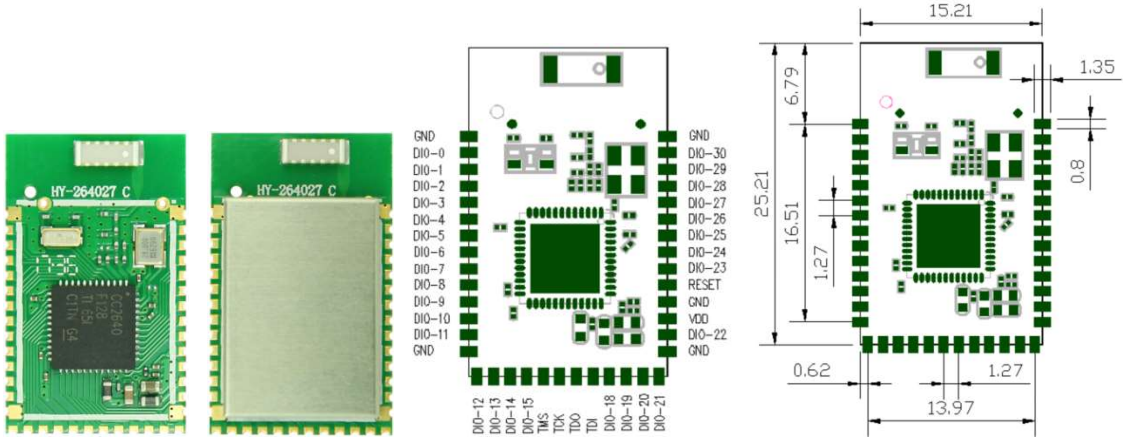
(PCBA dimension size : 23.18*15.21*2.0/2.6 mm).



3-4: HY-264027C / WMD400027SR6C0(CeramicAntenna)

& HY-264027CC / WMD400027SR6CC (Ceramic Antenna, with shield case) ;

(PCBA dimension size : 25.21 * 15.21 * 2.0/2.6 mm).



4.Application Note:

4-1.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 bodyTouch with static electricity etc., destroy IC and software be fly; Manual welding module solder iron temperature, should pay attention to avoid the PCB copper stripping off; Soldering iron strictlyGrounding requirements, eliminating iron power failure module;

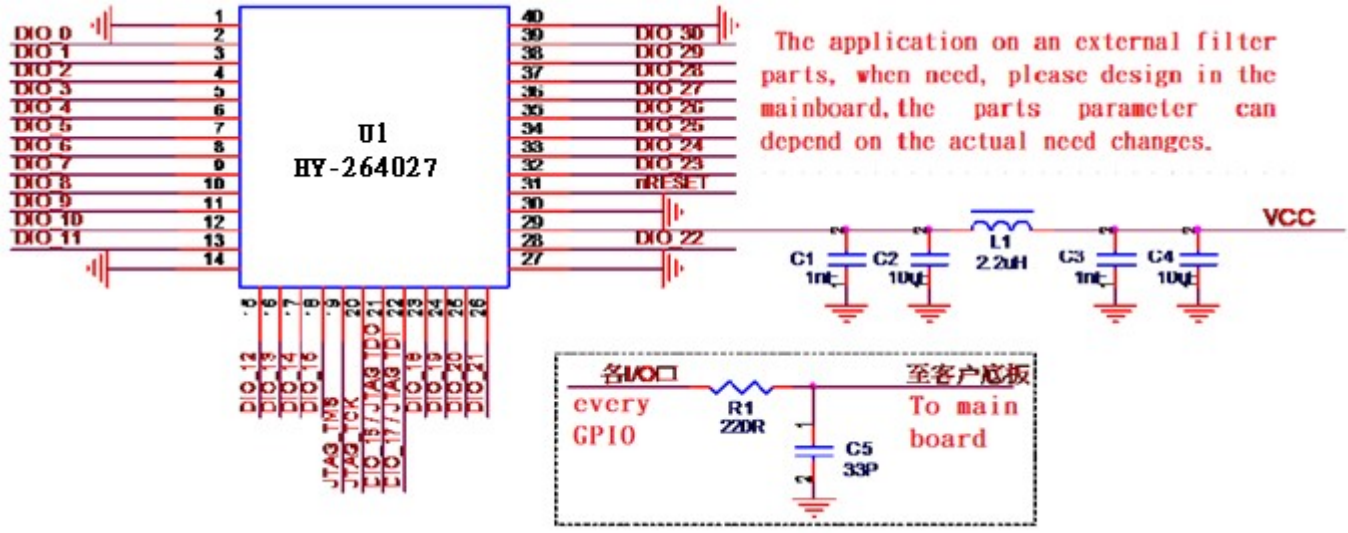
4-2.Attention to avoid the overall motherboard power supply circuit of bad welding connected to short circuit or open circuit, causing the Bluetooth chip, abnormal voltage,Thesoftwarewill fly and problems of IC was damaged.

4-3.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..

4-4. Use the module in the production and the transport process, please insure module'scomponent protection, prevent the precision parts on the moduleDamaged (welding furnace exit and assembly, testing, delivery process,suggest using collision buffer material, not collide with each other)

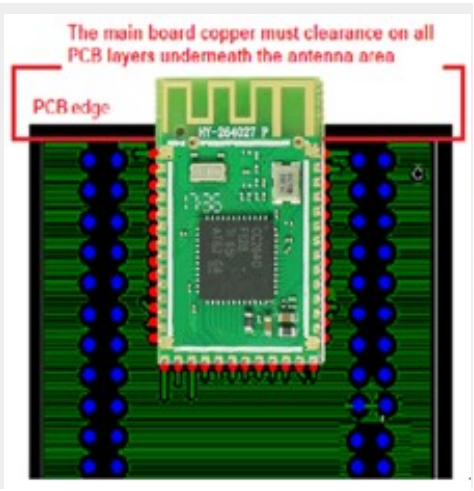
4-5. The module for the humidity sensitive components, if used in SMT reflow soldering operations, please strictly follow the IPC/JEDECJ - STD – 020 regulation, completes the drying dehumidifying , and for this module has second processing work after placed in the functional test environment, the humidity of the chip is no guarantee that in a certain ratio, the honored guest please understand;(The attention note show in below Fig.)

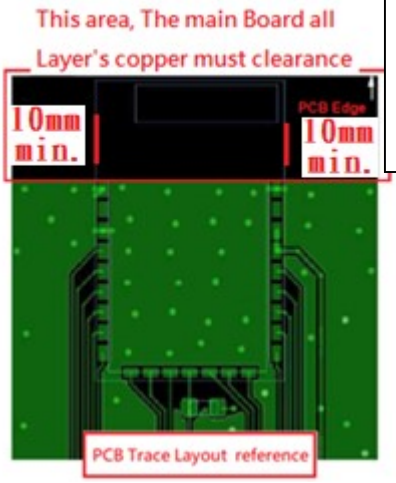
4-6. The diagram (show in below Fig.) of the module application on external filter parts, whenneed, please design in the mainboard, the parts parameter can depend on the actual need to changes.



4-7.Assembly recommendation 1: Underneath the module antenna and RF circuit on themain boardPCB copper need to clearance, and place close to the main board edge, as show in below Fig. The antenna can't be near aroundmetal parts and prevent material existence of electromagnetic radiation , Can affect the manipulation of the distance.

4-8. 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.





The module assemble in the motherboard, must pay attention to:
Around the antenna and all layer's copper must be clear, Module antenna should be on the edge, And there are no metal or obstruct electromagnetic radiation material to surround antenna area.

If the PCB not ground isolation signals between different layers, Trace do not intersect between different layers layout, prevent crosstalk
若 PCB不同層間沒有接地面隔離信號, 不同層間的線路不要交叉布局,防止串擾.

5. Pinout and GPIO function Description

Pin	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	UART RX; GPIO, Sensor Controller (I:4mA max)
4	DIO_2	Digital I/O	UART TX; GPIO, Sensor Controller (I:4mA max)
5	DIO_3	Digital I/O	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 TMSC	Digital I/O	JTAG TMSC; high-drive capability
20	JTAG TCKC	Digital I/O	JTAG TCKC
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

6. Electrical Characteristics

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

6-1.Radio performance & current consumption

(Test condition:With Ta = 25 ℃, 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)
- Compliance:FCC,IC(Canada),CE ETSI RED,BQB,… etc. 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)

6-2. 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
VDDS	-0.3	4.1	V
Other Terminal Voltages	VSS-0.3	VDDS+0.3	V
Storage Temperature	-40	+85	°C

6-3. ESD Ratings

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

6-4. 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)	1.8	3.8	V
VDD(whenflash 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 VDDS input capacitor must be used to ensure compliance with this slew rate(6-6 timing req.).

6-5.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

6-6. Timing Requirements

Description		MIN	NOM	MAX	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

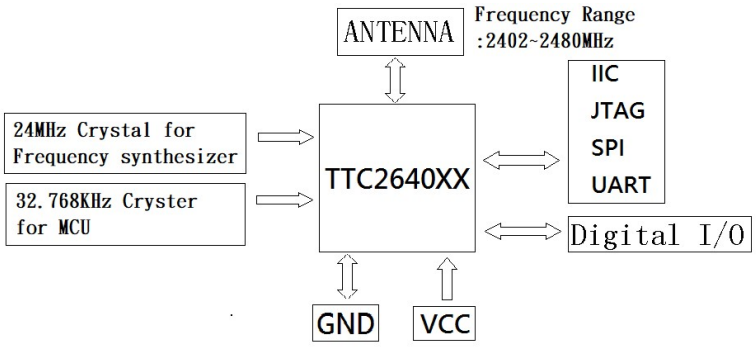
(1) For smaller coin cell batteries, with high worst-case end-of-life equivalent source resistance, a 22-µF VDDS input capacitor must be used to ensure compliance with this slew rate.
(2) Applications using RCOSC_LF as sleep timer must also consider the drift in frequency caused by a change in temperature .

6-7. Switching Characteristics

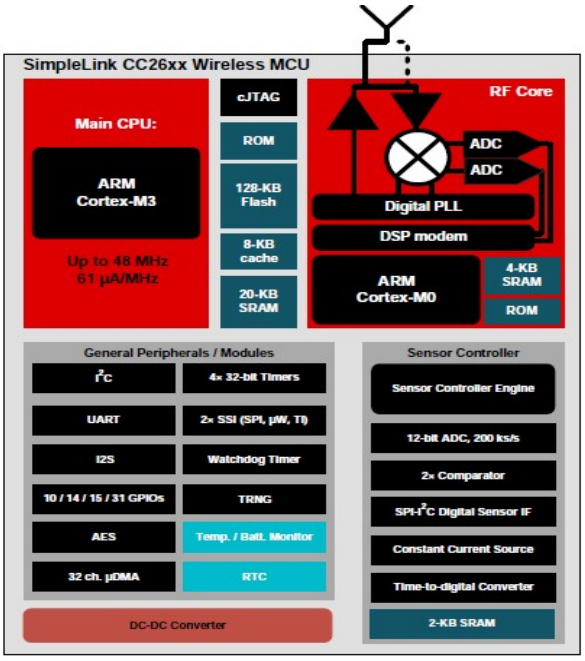
Measured with Tc = 25°C, VDDS = 3.0 V, unless otherwise noted.

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

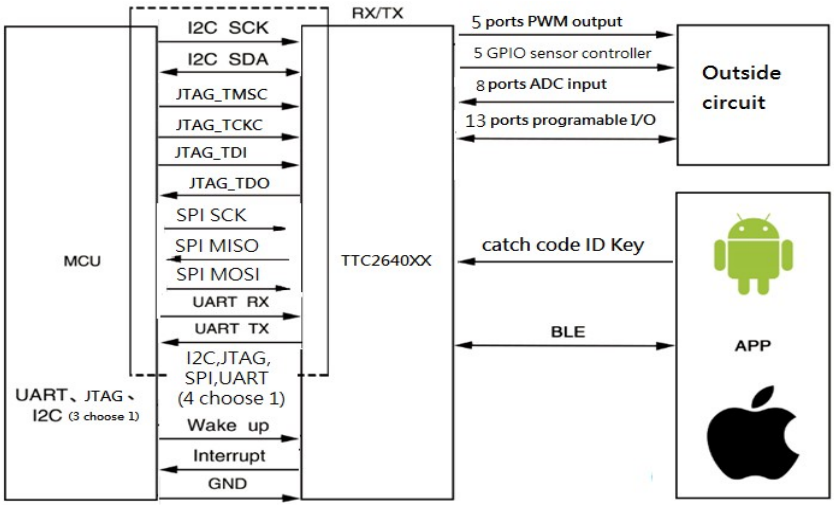
7. Block Diagram



8. Functional Block Diagram



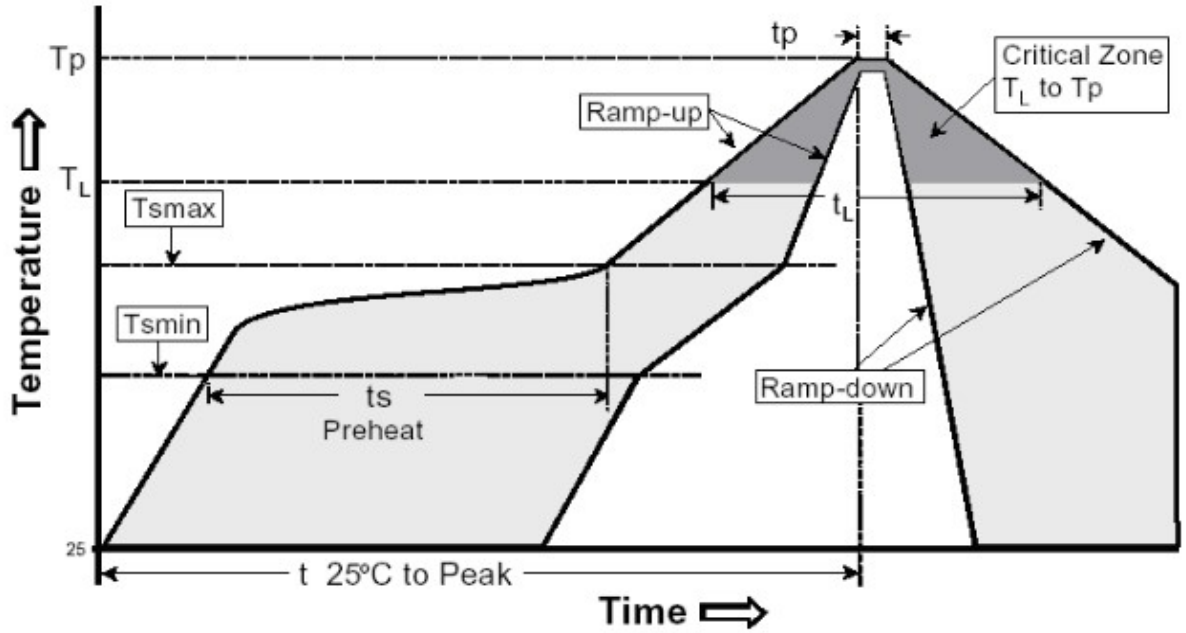
9. Working mode schematic



10. 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 (Ts_{min}) -Temperature Max (Ts_{max}) -Time (min to max)(ts)	150°C 200°C 60-180 seconds	
$Ts_{max}$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



11.Contact Us

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