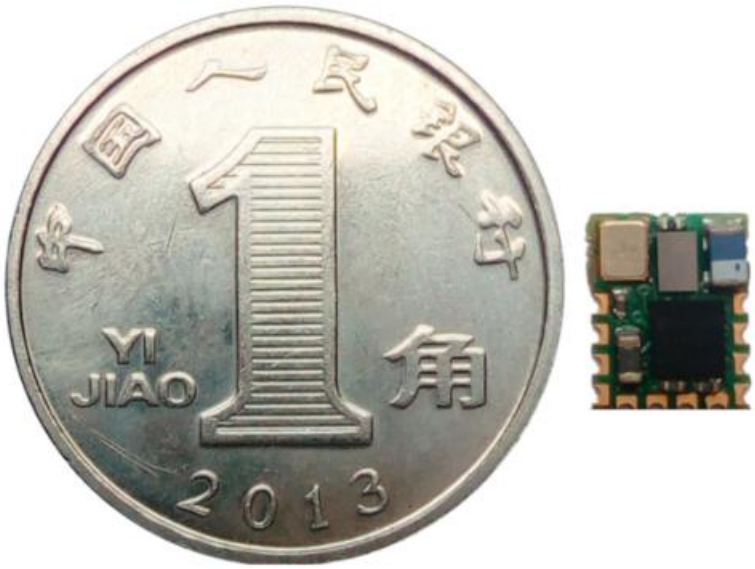
Bluetooth Ultra Low Energy Module DataSheet V2.2

Based on DA14580 SOC from Dialog Semiconductor

P/N：HJ-580XP



Release History

NO.	Data	Description
1	2014-10-7	Initial Release
2	2014-12-1	Update DC Characteristics
3	2015-5-1	Add Reflow soldering requirements
4	2016-8-7	Add Warning content: Ultrasonic soldering requirements
5	2018-3-2	Update Datasheet structure

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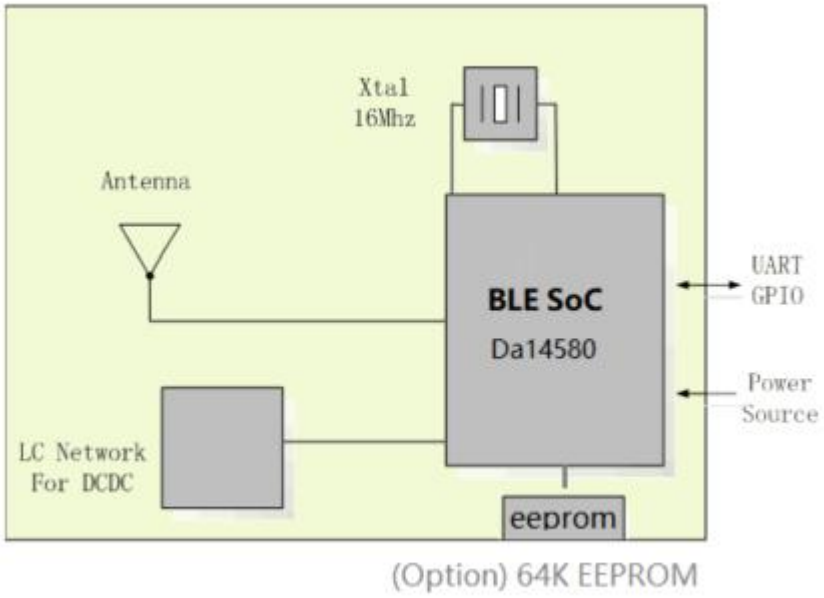
1、Module Features

- Operating Frequency :2.4GHZ，Support ISM free Band
- Embedded Bluetooth low energy stack and GATT profile
- Transmit Power :0dBm
- High sensitivity: -93 dBm
- Onboard PCB Antenna
- **optional Inside 64K EEPROM,can download firmware and user data (SDA=P02;SCL=P03)**
- Power supply : 2.5V to 3.7V
- BLE master and slave role supported
- Ultra-low power consumption:
  - ✓ Sleep current < 2uA,
  - ✓ 11.5uA with 1-sec advertising interval
  - ✓ 6.3uA with 2-sec advertising interval.
- GPIO: Up to 8 GPIOs available
- Communication range: around 20 to 40 meters
- Small footprint： 5.3mm * 6.6mm （Include Antenna）,Weight: 0.116g， ROHS compliance
- Package: 1.0mm Pad spacing，Stamp hole(half hole) package.
- Industrial temperature range: -40 to 85°C (Maximum up to 105°C)
- Supports Wechat、Xiaomi MiSDK， Modules without built-in firmware for custom profile is also available

2、Part Number

Type	Model Code	Description
Uart Version(serial port service)	HJ-580XP_SPPv2	Include UART port transparent transmission firmware, the firmware module is a bridge between the Bluetooth device or the mobile phone and the MCU. The Customer does not need to understand the BLE protocol stack, and control the UART port command operation and the UART port data, and the operation is simple,short Development cycle to speed up product launch.
Custom Version	HJ-580XP_CUSv2	This version supports custom firmware, the customer proposes functions according to the product requirements, and we will customize the module with the special version firmware to supply the customer.
MI profile Version	HJ-580XP_MICv2	This version of the firmware is similar to the "Custom Version", but the include Xiaomi MISDK certification protocol, other functional requirements are also customized according to customer requirements.
Uart & Wechat Version	HJ-580XP_WSPPv2	This version of the firmware adds the WeChat serial port transparent transmission function based on the "Uart Version(serial port service)" version. The external GPIO can select the WeChat data transmission and reception method.
Custom development Version	HJ-580XP_EMP	This version is no program firmware module, customer can develop their own firmware according to the Dialog official chip datasheet and support documents, and only need to provide firmware for us to burn.

3、Block Diagram



4、Electrical Characteristics

4.1、Absolute Maximum Ratings

Parameter	Min	Max	Unit
Power Supply voltage	2.5	3.7	V
IO supply voltage	0	VCC	V
Vpp(OTP programming Voltage)	6.6	6.8	V
Operating Temperature	-40	+105	℃
Storage Temperature	-55	+85	℃

4.2、Recommend Operating Conditions

Parameter	Min	Typ	Max	Uint
Power Supply Voltage	2.6	3.3	3.7	V
Vpp(OTP programming Voltage)	6.6	6.7	6.8	V
IO supply voltage	0	3.3	3.4	V
Sleep Current		<2.0		uA
Output current for Each I/O pin		4.8		mA
Operating Temperature	-40	+25	+85	℃

4.3、IO DC Characteristics

IO pin	Drive current	Min	Max	Uint
V_{IO}		0	0.4	V
V_{IH}		0.7	VCC	V
V_{OL}	4.8mA	0	0.6	V
V_{OH}	4.8mA	3.3	VCC	V

4.4、RF Features

Modulation	GFSK	
Center frequency	2.402 - 2.480Ghz	Channel Spacing : 2 Mhz
Number of RF channel	40	
Data rate	1Mbps	
RF Port Impedance	50 Ohm	
Output power	MAX . +0dbm	
TX Current consumption	Typ: 4.8mA	
RX Current consumption	Typ: 5mA	
Receiver Sensitivity	TYP.-91dbm, Max.-93dbm	
Antenna type	Onboard Antenna	

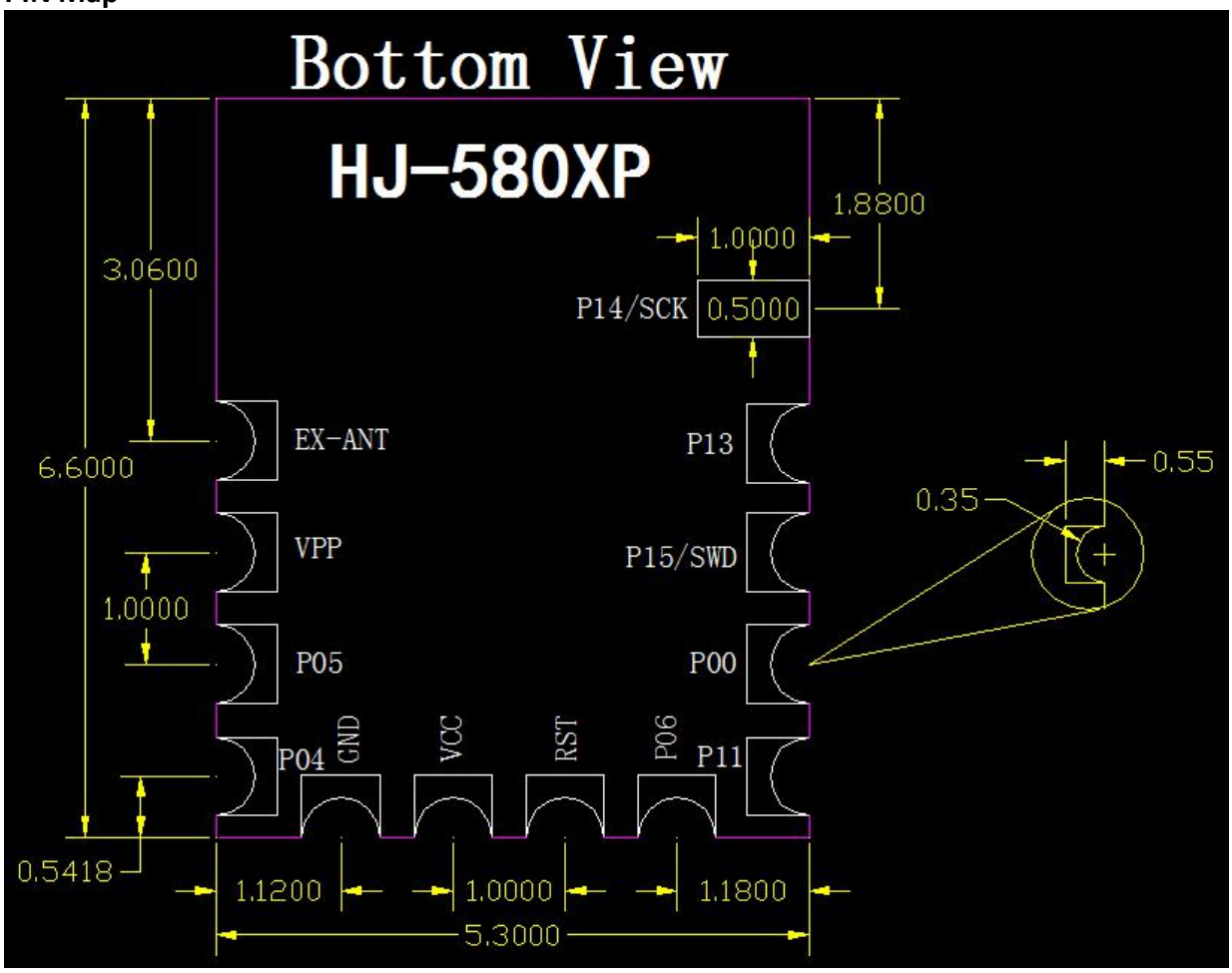
4.5、Current consumption

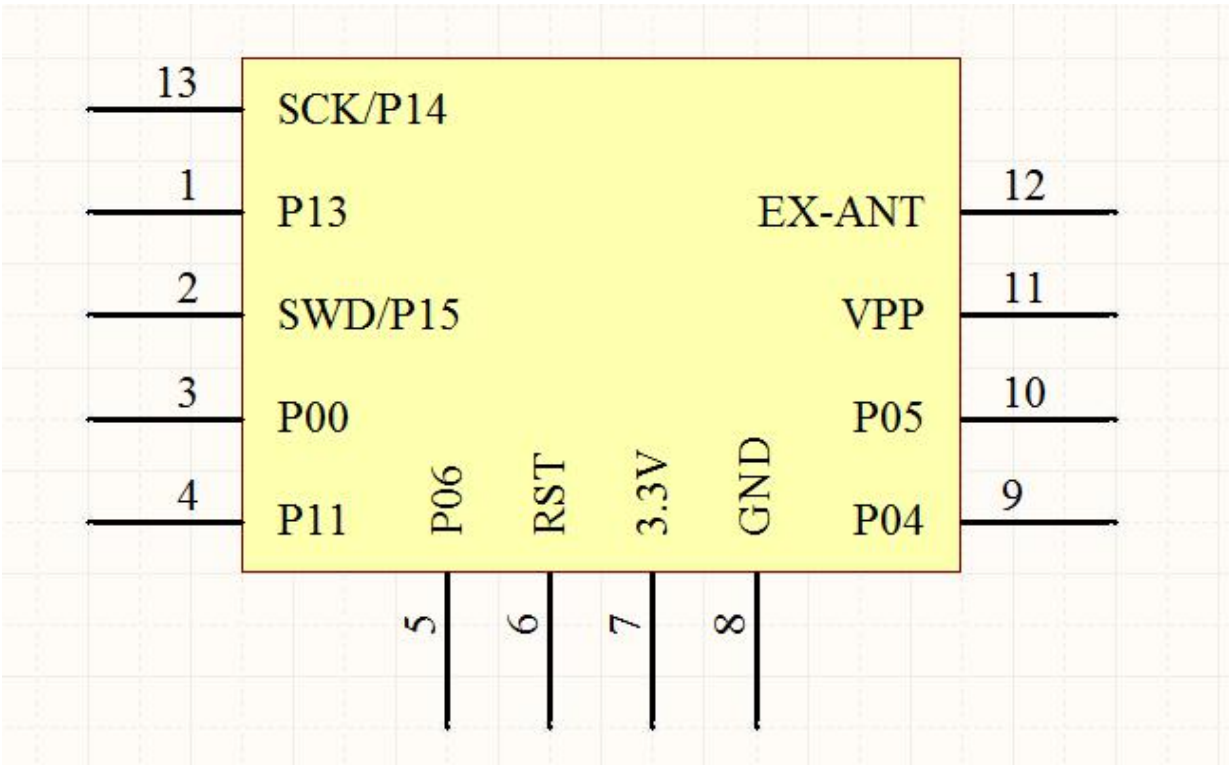
Test conditions	Typ.	Uint
Sleep mode	1.5	uA
20-msec adverting interval	51.5	uA
1-sec adverting interval	11.5	uA
20-msec connection Interval (Slaver mode)	170	uA
Center mode for Scanning	3.05	mA
20-msec connect Interval (Center mode)	175	uA

5、PIN Description

Connection type	Half hole pad	
Spacing	1mm	

PIN Map





Pin	Name	Typ.	Description	Remarks
1	Connect flag (P13)	Connect status	Connected=Low(0),Disconnected=High(1)	Can be customized for other functions
2	Center Slaver Selet （P15）	INPUT	Select the pin for the master slave during power-on: the external input is low for the master and the high is for the slave;	Can be customized for other functions
3	Config mode Select （P00）	INPUT	After 100ms power-on delay, the pin function to configuration mode: the external input is low to the configuration mode, and the high is the Uart transparent transmission mode (it must be valid when the Uart RX enable (P22) is input low.)	Can be customized for other functions
4	APP data ready send flag （P11）	OUTPUT	After receiving APP data by mobile phone, the module will first pull the pin=low(0), for about 20ms delay, the data will be output from the serial port TX pin,When send completed, the pin will automatically output high(1).	Can be customized for other functions

5	Uart RX enable (P06)	INPUT	When the external serial data needs to be sent to the BLE module, you must first drive the pin=low(0) and ensure the serial port receiving enable, and then send the data to the serial port after pulling down for at least 5ms. (If you do not consider power consumption, you can pull this pin=low(0) or connect to GND.) After the transmission is completed, pull the pin high to save power.	Can be customized for other functions
6	RST	INPUT	The DA14580 RESET Pin,if the pin is drive by high(1),will reset the DA14580; High is active.	If this pin not used,please connect the pin to GND or keep it float.
7	VCC	Power In	POWER INPUT PIN	Range = 2.5V - 3.7V
8	GND	Power Ground	GND	
9	BLE TX (P04)	UART TX	BLE Uart TX pin	Can be customized for other functions
10	BLE RX (P05)	UART RX	BLE Uart RX pin	Can be customized for other functions
11	VPP	OTP Program Power	Please keep it float	
12	EX-ANT	RF out	DA14580 RF OUTPUT pin	

6、Optional self-contained 64K EEPROM memory

HJ-580XP can load up to 64Kbit EEPROM memory on board, users can download firmware directly into the EEPROM, and can also do OTA air upgrade, store user data, etc. Please contact us.

7、Hardware Design Considerations

6.1、The module should not be placed in a metal-based enclosure. If a metal enclosure is required, the antenna must be taken out.

6.2、Among the products that need to install this wireless module, some metal materials such as screws, inductors, etc. should be kept away from the RF antenna part of the wireless module.

6.3、On the wireless module antenna, try not to place other components to place the occlusion to affect the wireless performance.

6.4、The wireless module should be placed on the four sides of the motherboard as much as possible. The antenna part is close to the side or corner of the motherboard. The motherboard PCB under the module antenna should be hollowed out with the keepout layer. If the request cannot be hollowed out, no copper or trace is allowed under the antenna. Otherwise it will affect RF performance.

6.5、Please pay attention to the pin diagram for all pins. Please pay attention to the IO mode and status of the IO connected to it.

6.6、GND must be well grounded.

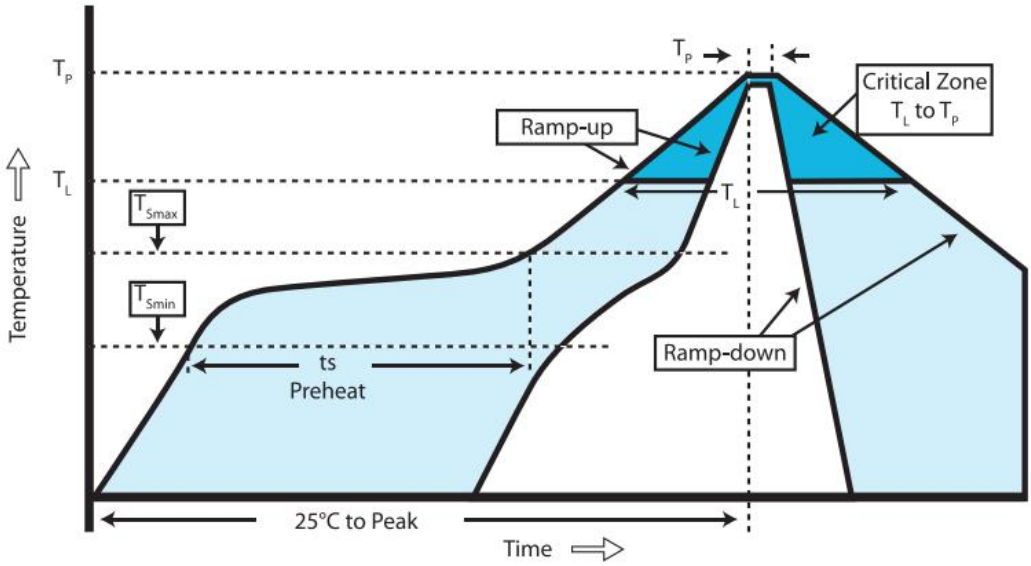
6.7、Input power is recommended for bead or inductive filtering.

8、Soldering Conditions

HJ-580XP module use high temperature resistant PCB, all of is PB-free. The highest test temperature is 265 ℃. 10 continuous reflow has no effect on performance and strength, as follows:

Profile feature	**PB-free assembly**
Average ramp up rate (TSMAX to Tp)	3℃/sec max

Preheat Temperature min (TS mn) Temperature max (TS max) Time (tS min to tS max) (tS)	150℃ 200℃ 80-100ses
Peak temperature (TP)	250+-5℃
Ramp down rate	6℃/sec max
Time from 25℃ to peak temperature	8 minutes max



9、Taping Diagrams

8.1、Sealed with chip-level anti-static aluminum foil bag and taped, desiccant in each bag, industrial grade vacuum machine to ensure airtight, moisture-proof, waterproof and dustproof (IP65).

8.2、All packages will be marked with the cargo information, including ROHS and anti-static signs. The production batch information in the item number is 15 IDs.

Tangshan HongJia Electronic Technology Co., Ltd.

HJ-580XP_SPPv2

Pb Free Reflow(260℃)

DATE CODE:P16aI15bS17c001

QTY:500PCS SEAL DATE:20170504

Example: P16a I15b S17c001 represents PCB production in January 2016, IC production in February 2015, and SMT patch in the first time in March 2017.

10、Warning

Please consider the ultrasonic soldering method carefully. If you must use the ultrasonic soldering method, please use the 40KHZ high frequency ultrasonic soldering technology. Keep the module away from the ultrasonic soldering line and the fixing column during the design method to prevent damage to the module!

For specific ultrasonic soldering, please contact us.