



Bluetooth Module Datasheet

Version: V2.0

Part Number: BB2707-25

Hardware version: Ver1.3

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1.Overview

The BB2707-25 module is using the Broadcom® BCM20707 solution. Bluetooth 4.2-compliant, stand-alone baseband processor with an integrated 2.4 GHz transceiver. Manufactured using the industry's most advanced 40nm CMOS low-power process, the BCM20707 employs the highest level of integration to eliminate all critical external components, thereby minimizing the device's footprint and the costs associated with implementing Bluetooth solutions.

The module includes Flash, crystal, and PCB antenna(When SMT,RS1 is NC,and LC5、LC6、LC7 is welding on PCB) or optional external antenna connection(When SMT,RS1 is welding on PCB,and LC5、LC6、LC7 is NC),the PCB antenna is default.

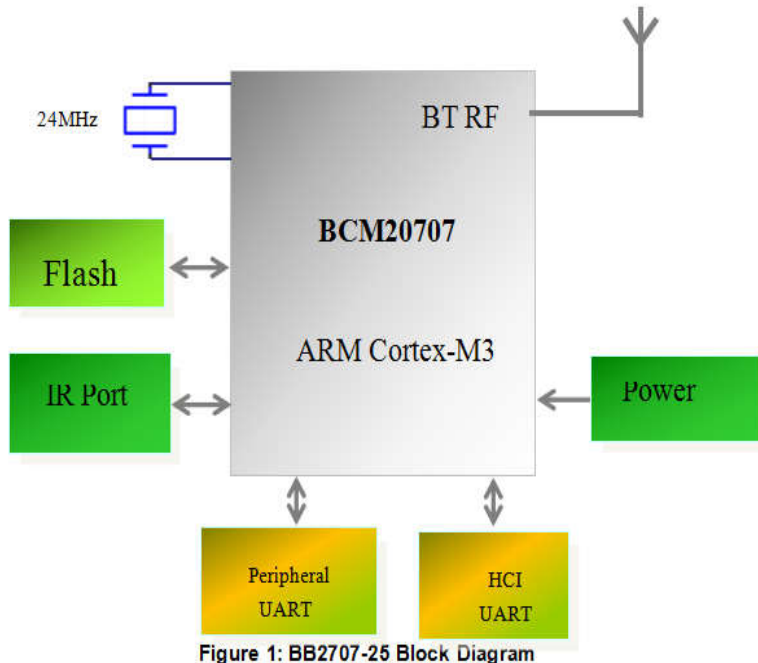
1.1 Applications

- Home automation
- Point-of-sale input devices
- Blood pressure monitors
- “Find me” devices
- Heart rate monitors
- Proximity sensors
- Thermometers
- Wearables

1.2 Features

- Complies with Bluetooth Core Specification version 4.2 including BR/EDR/BLE
- Broadcom proprietary LE data rate up to 2 Mbps
- BLE HID profile version 1.00 compliant
- Bluetooth Device ID profile version 1.3 compliant
- Supports Generic Access Profile (GAP)
- Supports Adaptive Frequency Hopping (AFH)
- Excellent receiver sensitivity
- Programmable output power control
- Integrated ARM Cortex-M3 microprocessor core
- On-chip power-on reset (POR)
- Support for EEPROM and serial flash interfaces
- Integrated low dropout regulators (LDO)
- On-chip software controlled PMU
- PCM/I2 S Interface
- Infrared modulator
- IR learning
- On-chip support for SPI (master/slave modes)
- Broadcom Serial Communications interface (compatible with NXP I2C slaves)

1.3 Functional Block Diagram



1.4 Physical Description

The BB2707-25 is a 12.5mm×20mm TG170 PCB with 25 pads located around the perimeter.

Table 1 shows the pinout diagram of the module.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	ANT2	2	GND	3	OTP_Sel	4	Up_RTS_N
5	Up_CTS_N	6	Up_TXD	7	Up_RXD	8	LED1
9	LED2	10	GND	11	RST_N	12	MFI_RST
13	SELASH_SI	14	SELASH_SCK	15	SWITCH	16	SCL
17	SDA	18	LED_STATUS	19	TXD	20	RXD
21	GPIO_1	22	GPIO_2	23	GPIO_3	24	VCC
25	GND						

Table 1 Pin Location

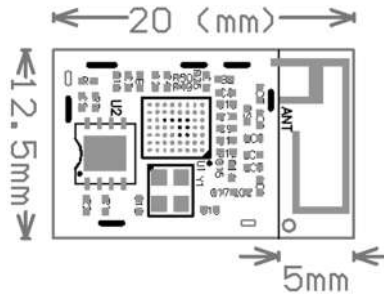


Figure 2: Module PCB Top View

Table 2 Pin Function Descriptions

Pin No.	Pin name	I/O	Power domain	Descriptions
1	ANT2	I/O	VDD_RF	RF I/O antenna port, Note:It is active by select RS1 ,and LC5,LC6,LC7 is NC when SMT
2	GND		N/A	Ground
3	OTP_Sel	I	VDDO	<ul style="list-style-type: none"> • If OTP is used, pull this pin high. • If OTP is not used, pull this pin low.
4	Up_RTS_N	O	VDDO	UART request to send output
5	Up_CTS_N	I	VDDO	UART clear to send input
6	Up_TXD	O	VDDO	UART transmit data
7	Up_RXD	I	VDDO	UART receive data
8	LED1	O	VDDO	BT_GPIO_1/BT_HOST_WAKE A signal from the BCM20707 device to the host indicating that the Bluetooth device requires attention.
		I/O	VDDO	GPIO: P25 SPI_1: MISO (master and slave) Peripheral UART: puart_rx
		I/O	VDDO	GPIO: P32 A/D converter input 7 Quadrature: QDX0 SPI_1: SPI_CS (slave only) Auxiliary clock output: ACLK0 Peripheral UART: puart_tx
9	LED2	I	VDDO	BT_GPIO_0/BT_DEV_WAKE A signal from the host to the BCM20707 that the host requires attention.
		I/O	VDDO	GPIO: P36 A/D converter input 3 Quadrature: QDZ0

				SPI_1: SPI_CLK (master and slave) Auxiliary Clock Output: ACLK0 External T/R switch control: ~tx_pd
		I/O	VDDO	GPIO: P38 A/D converter input 1 SPI_1: MOSI (master and slave) IR_TX
10	GND		N/A	Ground
11	RST_N	I	VDDO	Active-low reset input
12	MFI_RST	O	VDDO	Used for shared-clock application.
		I/O	VDDO	GPIO:P4 Quadrature: QDY0 Peripheral UART: puart_rx SPI_1: MOSI (master and slave) IR_TX
		I/O	VDDO	GPIO: P24 SPI_1: SPI_CLK (master and slave) Peripheral UART: puart_tx
13	SELASH_SI	I/O	VDDO	SPI2_MOSI_I2C_SDA
14	SELASH_SCK	I/O	VDDO	SPI2_CLK
15	SWITCH	I/O	VDDO	PCM sync/I2S word select
		I/O	VDDO	GPIO: P0 A/D converter input 29 Peripheral UART: puart_tx SPI_1: MOSI (master and slave) IR_RX 60Hz_main Note: Not available during TM1 = 1.
		I/O	VDDO	GPIO: P34 A/D converter input 5 Quadrature: QDY0 Peripheral UART: puart_rx External T/R switch control: tx_pd
16	SCL	I/O	VDDO	PCM/I2S data output. I2C_SCL
		I/O	VDDO	GPIO: P3 Quadrature: QDX1 Peripheral UART: puart_cts SPI_1: SPI_CLK (master and slave)
		I/O	VDDO	GPIO: P29 Optical control output: QOC3 A/D converter input 10 LED2 Current: 16 mA sink

		I/O	VDDO	GPIO: P35 A/D converter input 4 Quadrature: QDY1 Peripheral UART: puart_cts BSC: SDA
17	SDA	I/O	VDDO	PCM/I2S data input. I2C_SDA
		I/O	VDDO	GPIO: P12 A/D converter input 23
18	LED_STATUS	I/O	VDDO	PCM/I2S clock Fp1
		I/O	VDDO	GPIO: P2 Quadrature: QDX0 Peripheral UART: puart_rx SPI_1: SPI_CS (slave only) SPI_1: MOSI (master only)
		I/O	VDDO	GPIO: P28 Optical control output: QOC2 A/D converter input 11 LED1 Current: 16 mA sink
		I/O	VDDO	GPIO: P37 A/D converter input 2 Quadrature: QDZ1 SPI_1: MISO (slave only) Auxiliary clock output: ACLK1 BSC: SCL
19	TXD	I/O	VDDO	General-purpose I/O4: can also be configured as a GCI pin.
		I/O	VDDO	GPIO: P6 Quadrature: QDZ0 Peripheral UART: puart_rts SPI_1: SPI_CS (slave only) 60Hz_main
		I	N/A	External LPO input
		I/O	VDDO	GPIO: P31 A/D converter input 8 Peripheral UART: puart_tx
20	RXD	I/O	VDDO	General-purpose I/O3
		I/O	VDDO	GPIO: P27 SPI_1: MOSI (master and slave) Optical control output: QOC1 Triac control 2 Current: 16 mA sink
		I/O	VDDO	GPIO: P33

				A/D converter input 6 Quadrature: QDX1 SPI_1: MOSI (slave only) Auxiliary clock output: ACLK1 Peripheral UART: puart_rx
21	GPIO_1	I/O	VDDO	General-purpose I/O7: can also be configured as a GCI pin.
		I/O	VDDO	GPIO: P30 A/D converter input 9 Peripheral UART: puart_rts
22	GPIO_2	I/O	VDDO	General-purpose I/O6: can also be configured as a GCI pin.
		I/O	VDDO	GPIO: P11 Keyboard scan output (column): KSO3 A/D converter input 24
		I/O	VDDO	GPIO: P26 SPI_1: SPI_CS (slave only) Optical control output: QOC0 Triac control 1 Current: 16 mA sink
23	GPIO_3	I/O	VDDO	General-purpose I/O5: can also be configured as a GCI pin. Debug UART
		I/O	VDDO	GPIO: P15 A/D converter input 20 IR_RX 60Hz_main
24	VCC	I	N/A	VCC
25	GND		N/A	Ground

2.Supporting Document

2.1 Reference Schematic

The most recent schematic , bill of material ,and layout file are available from the ITON Technology Limit. Contact your ITON representative for details.

2.2 Layout Considerations

The BB2707-25 module is placed at the location where the antenna is away from the power supply(i.e.,BT1 Battery contacts)and any digital signal traces.. The antenna keep-out area which is 5mm around the parameter of the module region is shown in the red dotted box. PCB material and signal traces should not be placed within the antenna keep-out area to assure optimum antenna performance.

2.3 Electrical Characteristics

Table 3: Maximum Electrical Rating

<i>Parameter</i>	<i>Specification</i>			<i>Units</i>
	<i>Minimum</i>	<i>Nominal</i>	<i>Maximum</i>	
Ambient temperature of operation	-30	25	85	°C
Storage temperature	-40	-	150	°C
ESD tolerance HBM	-2000	-	2000	V
ESD tolerance MM	-100	-	100	V
ESD tolerance CDM	-500	-	500	V
Latch-up	-200	-	200	mA
VDDC	-0.5	-	1.38	V
VDDO	-0.5	-	3.795	V
VDD_RF (excluding PA)	-0.5	-	1.38	V
VDDPA	-0.5	-	3.565	V
VBAT	-0.5	-	3.795	V
BT_OTP_VDD3P3V	-0.5	-	3.795	V
VDD2P5_IN	-0.5	-	3.795	V

Table 4: Power Supply Specification

<i>Parameter</i>	<i>Conditions</i>	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>	<i>Units</i>
VDD Core	-	1.14	1.2	1.26	V
VDDO ^a	-	1.62	3.3	3.6	V
VDDRF	Excluding class 1 PA	1.14	1.2	1.26	V
VDDPA	Class 1 operation	2.25	2.5 to 2.8	2.94	V
VBAT ^a	-	1.62	3.3	3.6	V
BT_OTP_VDD3 P3V	-	3.0	3.3	3.6	V
VDD2P5_IN	-	3.0	3.3	3.6	V

a. VDDO must be \geq VBAT.

Table 5:Power Supply Current(Class1)

<i>Mode</i>	<i>Remarks</i>	<i>Typ.</i>	<i>Unit</i>
3DH5/3DH5	–	37.10	mA
BLE			
• BLE	Connected 600 ms interval	211	µA
• BLE ADV	Unconnectable 1.00 sec	176	µA
• BLE Scan	No devices present. A 1.28-sec interval with 11.25 ms scan window.	355	µA
DMx/DHx			
• DM1/DH1	–	32.15	mA
• DM3/DH3	–	38.14	mA
• DM5/DH5	–	38.46	mA
HIDOFF	Deep sleep	2.69	µA
Page scan	Periodic scan rate is 1.28 sec	0.486	mA
Receive			
• 1 Mbps	Peak current level during reception of a basic-rate packet.	26.373	mA
• EDR	Peak current level during the reception of a 2 or 3 Mbps rate packet.	26.373	mA
Sniff Slave			
• 11.25 ms	–	4.95	mA
• 22.5 ms	–	2.6	mA
• 495.00 ms	Based on one attempt and no timeout.	254	µA
Transmit			
• 1 Mbps	Peak current level during the transmission of a basic-rate packet: GFSK output power = 10 dBm.	60.289	mA
• EDR	Peak current level during the transmission of a 2 or 3 Mbps rate packet. EDR output power = 8 dBm.	52.485	mA

Table 6:Power Supply Current(Class2)

<i>Mode</i>	<i>Remarks</i>	<i>Typ.</i>	<i>Unit</i>
3DH5/3DH5	–	31.57	mA
BLE			
• BLE ADV	Unconnectable 1.00 sec	174	µA
• BLE Scan	No devices present. A 1.28-sec interval with 11.25 ms scan window.	368	µA
DMx/DHx			
• DM1/DH1	–	27.5	mA
• DM3/DH3	–	31.34	mA
• DM5/DH5	–	32.36	mA

2.4 RF Specification

Table 7 : Receiver RF Specifications

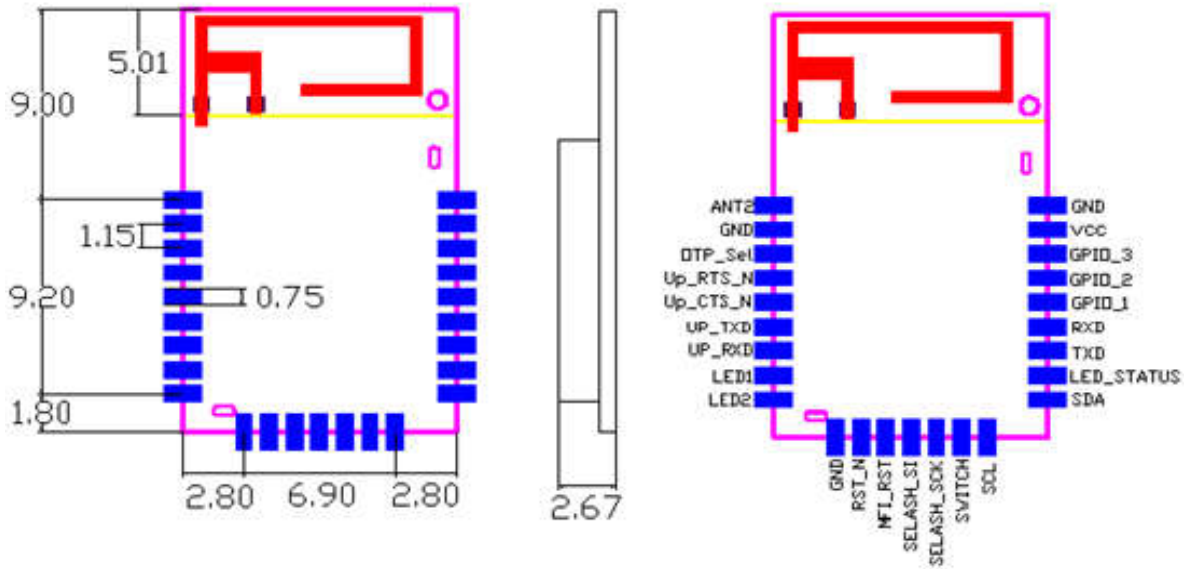
<i>Parameter</i>	<i>Conditions</i>	<i>Minimum</i>	<i>Typical^a</i>	<i>Maximum</i>	<i>Unit</i>
General					
Frequency range	–	2402	–	2480	MHz
RX sensitivity ^b	GFSK, 0.1% BER, 1 Mbps	–	–93.5	–	dBm
	LE GFSK, 0.1% BER, 1 Mbps	–	–96.5	–	dBm
	$\pi/4$ -DQPSK, 0.01% BER, 2 Mbps	–	–95.5	–	dBm
	8-DPSK, 0.01% BER, 3 Mbps	–	–89.5	–	dBm
Maximum input	GFSK, 1 Mbps	–	–	–20	dBm
Maximum input	$\pi/4$ -DQPSK, 8-DPSK, 2/3 Mbps	–	–	–20	dBm
Interference Performance					
C/I cochannel	GFSK, 0.1% BER	–	9.5	11	dB
C/I 1 MHz adjacent channel	GFSK, 0.1% BER	–	–5	0	dB
C/I 2 MHz adjacent channel	GFSK, 0.1% BER	–	–40	–30.0	dB
C/I \geq 3 MHz adjacent channel	GFSK, 0.1% BER	–	–49	–40.0	dB
C/I image channel	GFSK, 0.1% BER	–	–27	–9.0	dB
C/I 1 MHz adjacent to image channel	GFSK, 0.1% BER	–	–37	–20.0	dB
C/I cochannel	$\pi/4$ -DQPSK, 0.1% BER	–	11	13	dB
C/I 1 MHz adjacent channel	$\pi/4$ -DQPSK, 0.1% BER	–	–8	0	dB
C/I 2 MHz adjacent channel	$\pi/4$ -DQPSK, 0.1% BER	–	–40	–30.0	dB
C/I \geq 3 MHz adjacent channel	8-DPSK, 0.1% BER	–	–50	–40.0	dB
C/I image channel	$\pi/4$ -DQPSK, 0.1% BER	–	–27	–7.0	dB
C/I 1 MHz adjacent to image channel	$\pi/4$ -DQPSK, 0.1% BER	–	–40	–20.0	dB
C/I cochannel	8-DPSK, 0.1% BER	–	17	21	dB
C/I 1 MHz adjacent channel	8-DPSK, 0.1% BER	–	–5	5	dB
C/I 2 MHz adjacent channel	8-DPSK, 0.1% BER	–	–40	–25.0	dB
C/I \geq 3 MHz adjacent channel	8-DPSK, 0.1% BER	–	–47	–33.0	dB
C/I Image channel	8-DPSK, 0.1% BER	–	–20	0	dB
C/I 1 MHz adjacent to image channel	8-DPSK, 0.1% BER	–	–35	–13.0	dB

Table7: Transmitter RF Specifications

<i>Parameter</i>	<i>Conditions</i>	<i>Minimum</i>	<i>Typical</i>	<i>Maximum</i>	<i>Unit</i>
General					
Frequency range	–	2402	–	2480	MHz
Class1: GFSK Tx power ^a	–	–	12	–	dBm
Class1: EDR Tx power ^b	–	–	9	–	dBm
Class 2: GFSK Tx power	–	–	2	–	dBm
Power control step	–	2	4	8	dB
Modulation Accuracy					
$\pi/4$ -DQPSK Frequency Stability	–	–10	–	10	kHz
$\pi/4$ -DQPSK RMS DEVM	–	–	–	20	%
$\pi/4$ -QPSK Peak DEVM	–	–	–	35	%
$\pi/4$ -DQPSK 99% DEVM	–	–	–	30	%
8-DPSK frequency stability	–	–10	–	10	kHz
8-DPSK RMS DEVM	–	–	–	13	%
8-DPSK Peak DEVM	–	–	–	25	%
8-DPSK 99% DEVM	–	–	–	20	%
In-Band Spurious Emissions					
$1.0 \text{ MHz} < M - N < 1.5 \text{ MHz}$	–	–	–	–26	dBc
$1.5 \text{ MHz} < M - N < 2.5 \text{ MHz}$	–	–	–	–20	dBm
$ M - N \geq 2.5 \text{ MHz}$	–	–	–	–40	dBm
Out-of-Band Spurious Emissions					
30 MHz to 1 GHz	–	–	–	–36.0 ^c	dBm
1 GHz to 12.75 GHz	–	–	–	–30.0 ^{c, d}	dBm
1.8 GHz to 1.9 GHz	–	–	–	–47.0	dBm
5.15 GHz to 5.3 GHz	–	–	–	–47.0	dBm

- a. 12 dBm output for GFSK measured with PAVDD = 2.5V.
- b. 9 dBm output for EDR measured with PAVDD = 2.5V.
- c. Maximum value is the value required for Bluetooth qualification.
- d. Meets this spec using a front-end band pass filter.

3.Mechanical Specification



Weight : 0.85g Uint : mm

Figure 7: BB2707-25 Module PCB size

4.Packing Information

TBD

**Please be noticed following information and instructions should
be placed in the end-user' s operating manual**

1. Separate approval is required for all other operating configurations, including portable configurations with respect to 2.1093 and different antenna configurations.
2. The MODEL BB2707-25 and its antenna must not be co-located or operating in conjunction with any other transmitter or antenna within a host device. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.
3. A label must be affixed to the outside of the end product into which the MODEL BB2707-25 module is incorporated, with a statement similar to the following: For MODEL BB2707-25: This device contains FCC ID: ZKJ-BLEB001.
4. The module shall be in non-detachable construction protection into the finished products, so that the end-user has to destroy the module while remove or install it.
5. This module is to be installed only in fixed applications. According to FCC part 2.1093(b) definition of portable devices is:.

Portable device:

For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

6. Separate approval is required for all other operating configurations, including portable configurations with respect to FCC Part 2.1093 and different antenna configurations.
7. A certified modular has the option to use a permanently affixed label, or an electronic label. For a permanently affixed label, the module must be labelled with an FCC ID: ZKJ-BLEB001. The OEM manual must provide clear instructions explaining to the OEM the labelling requirements, options and OEM user manual instructions that are required

For a host using a this FCC certified modular with a standard fixed label, if (1) the module's FCC ID is not visible when installed in the host, or (2) if the host is marketed so that end users do not have straightforward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module: "Contains Transmitter Module FCC ID: ZKJ-BLEB001" or "Contains FCC ID: ZKJ-BLEB001" must be used. The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID.

8. Host product is required to comply with all applicable FCC equipment authorizations regulations, requirements and equipment functions not associated with the transmitter module portion. compliance must be demonstrated to regulations for other transmitter components within the host product; to requirements for unintentional radiators (Part 15B). To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. If a host was previously authorized as an unintentional radiator under the Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, we suggest the host device to recertify part 15B to ensure complete compliance with FCC requirement: Part 2 Subpart J Equipment Authorization Procedures , KDB784748 D01 v07, and KDB 997198 about importation of radio frequency devices into the United States.

FCC Certification Requirement:

The end product with an embedded - MODEL BB2707-25 may also need to pass the FCC Part 15 unintentional emission testing requirements and be properly authorized per FCC Part 15.

Note: If this module is intended for use in a portable device, you are responsible for separate approval to satisfy the SAR requirements of FCC Part 2.1093.

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 made to this equipment not expressly approved by Haier US Appliance Solutions, Inc. may void the FCC authorization to operate this equipment.

5.Revision History

Change NO.	Date	Subject And Reason	Version	Responder
1	12-NOV-2016	Initial Version	V1.0	LZX
2	28-NOV-2016	Exchange the Pin16 and Pin17	V1.1	LZX
3	2-June-2017	Add the information about the Hardware version,customer Software	Ver2.0	LZX