Product Specification

Product name: Bluetooth and ANC module
Product model：F-3128 V1.0
Document Version：V1.0
Availability date：2020-3-24

Edit	Review	Approve

Revision History				
Version	**Change Information**	**Page**	**Date**	**Editor**
V1.0	初版		2020-3-24	沈红兵

Content

1. Product Overview:

F-3128 Bluetooth noise reduction module is an intelligent wireless audio data dual-mode transmission compatible with active noise reduction ANC products independently developed by the company. It is a high-efficiency stereo wireless transmission scheme. The module uses QCC3034/QCC5124 (QCC5124 supports APTX-HD) chip Provides high-quality sound quality and compatibility for the module, and the overall performance is more optimized. The F-3128 Bluetooth noise reduction module adopts a driver-free mode, which is simple to use and can quickly realize the wireless transmission of music and enjoy the fun of wireless music.

2. Application Area：

This module is mainly used for short-distance music transmission, and can be easily connected to Bluetooth devices of digital products such as laptops, mobile phones, PDAs, and other digital products to realize wireless transmission of music.

※ High-end Bluetooth Noise Cancelling Headphones
※ Bluetooth stereo headset
※ Hands-free phone
※ Bluetooth wireless audio transmission
※ Bluetooth data transmission application
※ Support mobile internet peripheral devices
※ Bluetooth wireless networking audio and other equipment

3. Features：

A ---- Part Bluetooth:

Bluetooth Profiles

※ Qualified to Bluetooth v5.0 specification including 2 Mbps Bluetooth low energy (Production parts)
※ Single ended antenna connection with on-chip balun and Tx/Rx switch
※ Bluetooth, Bluetooth low energy, and mixed topologies supported
※ Class 1 support

Audio subsystem

※ 32- bit Kalimba audio digital signal processor (DSP) core with flexible clocking from 2 MHz to 120 MHz to allow optimization and trade-off performance vs. powerconsumption
※ DSP runs from ROM
※ 80 KB program random access memory (RAM)
※ 256 KB data RAM
※ 5 Mb ROM

Application subsystem

※ Dual core application subsystem 32 MHz operation
※ 32- bit Firmware Processor:
  □ Reserved for system use
  □ Runs Bluetooth upper stack, profiles, house-keeping code
※ 32- bit Developer Processor:
  □ Runs developer applications
※ Both cores execute code from external flash memory using QSPI clocked at 32 MHz
※On-chip caches per core allow for optimized performance and power consumption

Li-ion battery charger

※ Integrated battery charger supporting internal mode (up to 200 mA) and external mode (up to 1.8 A)
※ Variable float (or termination) voltage adjustable in 50 mV steps from 3.65 V to 4.4 V

※ Thermal monitoring and management are implementable in application software

※ Pre-charge to fast charge transition configurable at 2.5 V, 2.9 V, 3.0 V, and 3.1 V **Power management**

※ Integrated power management unit (PMU) to minimize external components

※ QCC3021/3031 QFN runs directly from a Li-ion, USB, or external supply (2.8 V to 6.5 V)

※ Auto-switching between battery and USB (or other) charging source

※ Power islands employed to optimize power consumption for variety of use-cases

※ Dual switch-mode power supply (SMPS):

□ Automatic mode selection to minimize power consumption

□ 1.8 V SMPS generates power for both the device and off-chip circuits

Dedicated digital SMPS (output voltage changes automatically to minimize device power consumption)

Audio engine and digital audio interfaces

※ Sony/Philips digital interface (SPDIF): 2, configurable as input or output

※ Dual analog inputs configurable as single ended line inputs or, unbalanced or balanced analog microphone inputs:

□ SNR single-ended: 101 dBA typ.

□ THD+N single-ended: -85 dB typ.

※ 2 microphone bias (single bias shared by the two channels) for incomingcall:

※ Crosstalk attenuation between two inputs using recommended application circuit: 80 dB typ.

※ Digital microphone inputs with capability to interface up to 6 digitalmicrophones

※ Both analog-to-digital converter (ADC)s and digital-to analog converter (DAC)s support sample rates of 8, 16, 32, 44.1, 48, 96 kHz. DACs also support 192 kHz.

Peripherals and physical interfaces

※ A UART interfacee

※ 2 x Bit Serializers (programmable serial peripheral interface (SPI) and I²C hardware accelerator)

※ 1 x USB interface:

□ A full speed USB (USB-FS) Device (12 Mbps) – USB interface includes ESD protectionto IEC-61000-4-2 (device level)

※ QSPI NOR flash interface

□ QSPI encryption to protect developer code and data

□ Encryption programmable with a 128- bit security key of original equipment manufacturer (OEM) choice stored in on-chip one-time programmable (OTP) memory

※ Up to 17 PIO and 4 open drain/digital input LED pads with pulse width modulation (PWM)

B ---- Part ANC:

※ Power supplies

Analog AVDD at 1.8 V typical

Digital I/O IOVDD at 1.1 V to 1.98 V

※ Programmable Fast DSP audio processing

engine Up to 768 kHz sample rate

Biquad filters, limiters, volume controls, mixing

※ 28-bit Sigma DSP audio processing core

Visually programmable using Sigma

Studio Up to 50 MIPS performance

※ Low latency, 24-bit ADCs and DACs

96 dB SNR (signal through PGA and ADC with A-weighted filter)

105 dB combined SNR (signal through DAC and headphone with A-weighted filter)

※ Serial port f SYNC frequency from 8 kHz to 192 kHz

※ 5 µs group delay (f S = 768 kHz) analog in to analog out with Fast DSP bypass

※ 4 single-ended analog inputs, configurable as microphone or line inputs

※ 8 digital microphone inputs

※ 2 analog differential audio outputs, configurable as either line output or headphone driver

※ PLL supporting any input clock rate from 30 kHz to 27 MHz

※ Full-duplex, 4-channel ASRCs

※ 2, 16-channel serial audio ports supporting I 2 S, left justified, or up to TDM16

※ 8 interpolators and 8 decimators with flexible routing

※ Low power (11.027 mW for typical stereo noise cancellingsolution)

※ Interface I 2 C and SPI control interfaces, self boot from I 2 C EEPROM

4. **Performance Parameter：**

A --- Part Bluetooth

Part NO.	F-3128
Bluetooth version	Bluetooth V5.0
Modulation	GFSK, π/4 DQPSK, 8DPSK
Supply voltage：	BT:3.3-4.2V
Support Bluetooth protocol	HFPV1.6, HSPV1.2, A2DPV1.2, AVRCPV1.0, PBAP, SPP, OPP, GOEP, FTP, HID etc.
Work current	≤30mA
Standby current	<10uA
Storage temperature range	-40ºC to +80ºC
Transmission range	＞ 10 meters
TX power	Support CLASS1/ CLASS2/ CLASS3 Maximum adjustable 8dBm
Sensitivity	-82dBm<0.1%BER
Frequency Range	2.402GHz-2.480GHz
Interface	PIO, SPI, AIO, UART, USB, PCM, I2S, SPDIF, SPK(L/R)
System	Android, IOS, Windows
Audio performance	AAC, MP3, SBC, AAC+ Faststream, APTX,（QCC5124 support APTX-HD）
SNR	≥90dB
Distortion	≤0.1%
Dimension	23.2*13.5*2.5MM

A --- Part ANC

ANALOG-TO-DIGITAL CONVERTERS (ADCs):

ADC Resolution All ADCs 24 Bits

Digital Gain Step 0.375 dB Digital Gain

Range −71 +24 dB

INPUT RESISTANCE:

Single-Ended Line Input 14.3 kΩ

Programmable Gain Amplifier (PGA)

Inputs

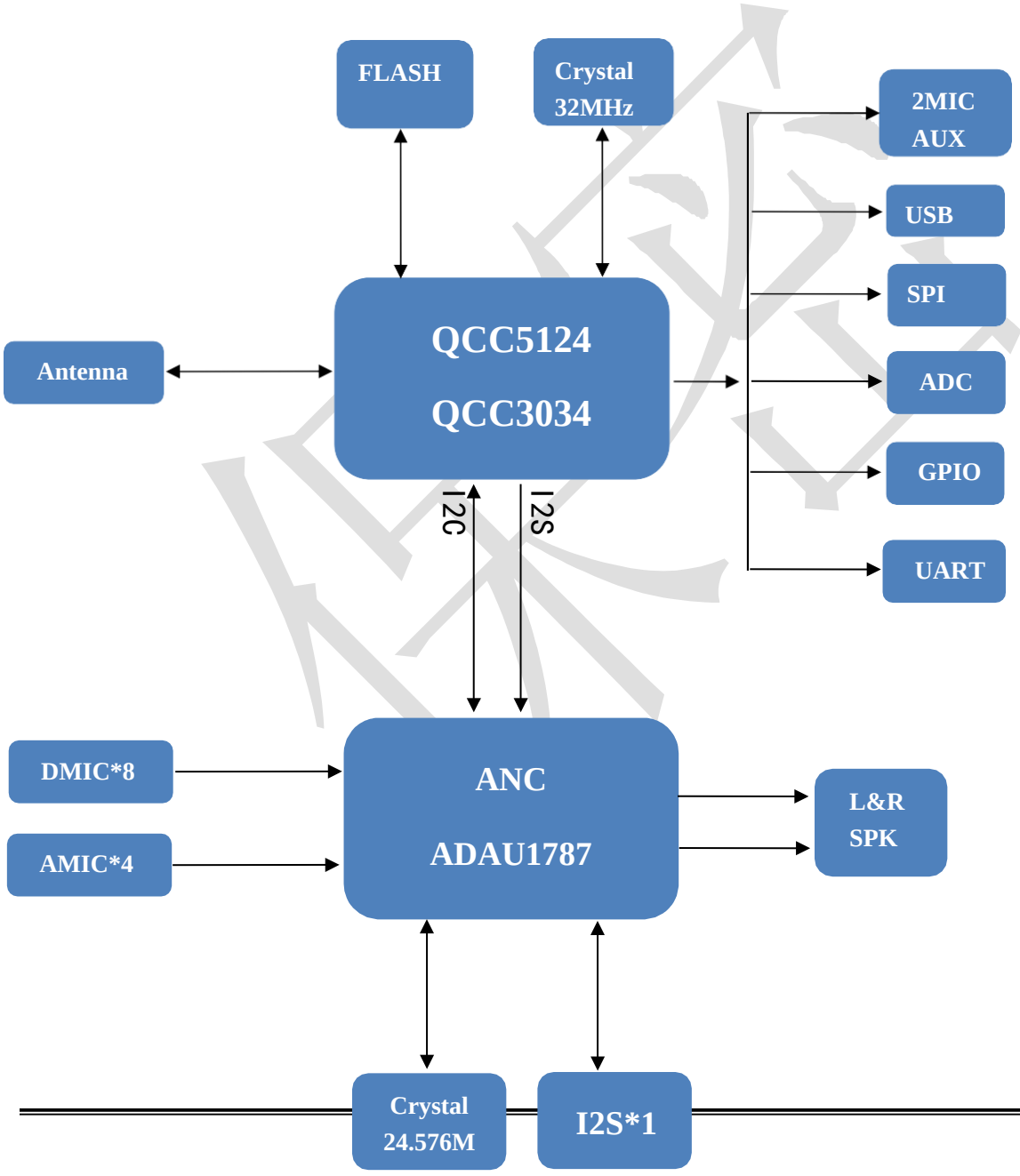
0 dB gain 20.26 kΩ

32 dB gain 0.97 kΩ

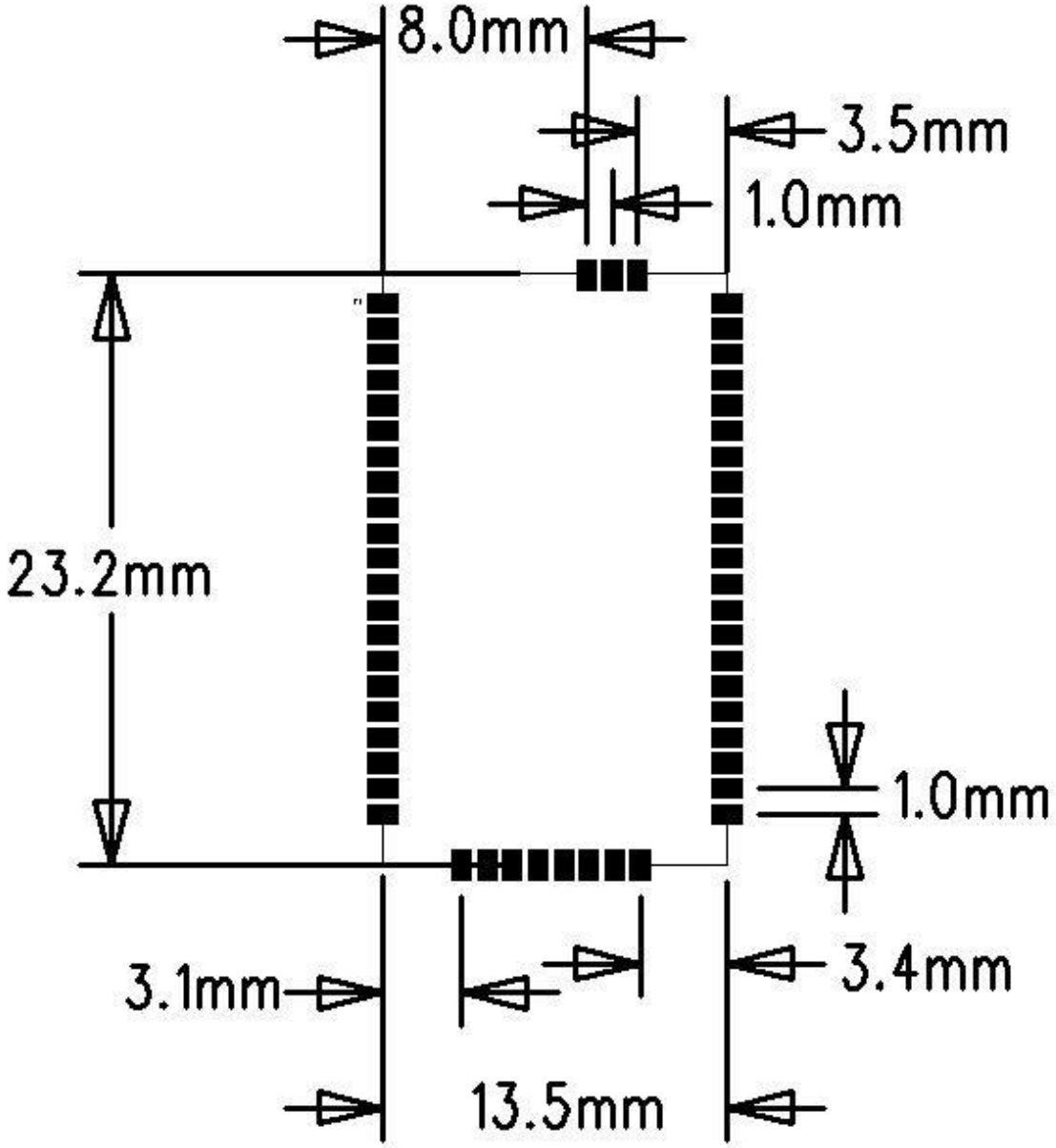
DAC DIFFERENTIAL OUTPUT:	**Differential operation** Full-	
Scale Output Voltage	0 dBFS to DAC 1.0 V rms	
Dynamic Range 1	Line output mode, 20 Hz to 20 kHz, −60 dB input	
With A-Weighted Filter (RMS)		105 dB
With Flat 20 Hz to 20 kHz Filter		102 dB
SNR 2	Line output mode, 20 Hz to 20 kHz	
With A-Weighted Filter (RMS)		105 dB
With Flat 20 Hz to 20 kHz Filter		102 dB
Interchannel Gain Mismatch	Line output mode	20 mdB
THD + N Level	Line output mode, 20 Hz to 20 kHz, −1 dBFS	−93
dBV Gain Error	Line output mode	%
Dynamic Range 1	Headphone mode, 20 Hz to 20 kHz, −60 dB input	
With A-Weighted Filter (RMS)		105 dB
With Flat 20 Hz to 20 kHz Filter		101 dB
SNR 2	Headphone mode, 20 Hz to 20 kHz	
With A-Weighted Filter (RMS)		105 dB
With Flat 20 Hz to 20 kHz Filter		101 dB
Inter channel Gain Mismatch	Headphone mode	75
	mdB THD + N Level	
	Headphone mode	
32 Ω Load	−1 dBFS, output power (POUT) = 27 mW	−75 dBV

	P OUT = 1 mW	−82 dBV
24 Ω Load	−2 dBFS, P OUT = 28 mW	−75 dBV
16 Ω Load	−3 dBFS, P OUT = 33 mW	−75 dBV
Headphone Output Power		
32 Ω Load	AVDD = 1.8 V, <0.1% THD + N	30 mW
24 Ω Load	AVDD = 1.8 V, <0.1% THD + N	40 mW
16 Ω Load	AVDD = 1.8 V, <0.1% THD + N	50 mW

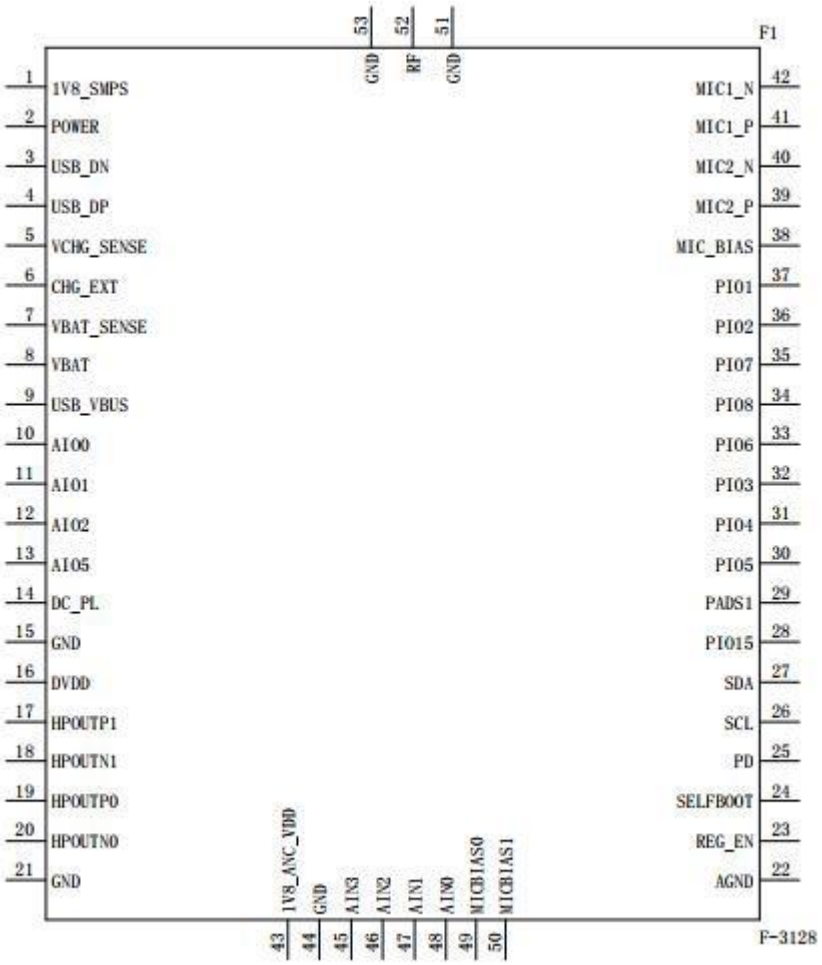
5. Module Block Diagram



6. The Size Of The Module Graph：



7. Device Pin Out Diagram



8. Pin Definition

Pin	Symb	I/O	Description
15 21 51 53	GND	GND	Gound
	1V8_OUT	Supply	SMPS output 1.8V
2	MFB	Digital input	Typically connected to an ON/OFF push button. Boots device in response to a button press when power is still present from battery and/or charger but software has placed the device in the OFF or DORMANT state. Add itionally useable as a digital input in normal B operation. No pull. Additional function: ■ PIO [0] input only
5	VCHG_SEN SE	Analog	Charger input sense pin after external mode sense-resistor. High impedance. NOTE If using internal charger or no charger, Connect VCHG_SENSE direct to VCHG
6	CHG_EXT	Analog	External charger transistor current control. Connect to base of external charger transistor as per application schematic.
7	VBAT_SEN SE	Analog	Battery voltage sense input.
8	VBAT	Supply	Battery voltage input.
9	USB_VBUS	Supply	Supply to SMPS power switch from charger input.
3	USB_DN	Digital	USB Full Speed device D- I/O. IEC-61000-4-2 (device level) ESD Protection
4	USB_DP	Digital	USB Full Speed device D+ I/O. IEC-61000-4-2 (device level) ESD Protection
10	AIO0	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
11	AIO1	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
12	AIO2	Analog or digital input/	General-purpose analog/digital

		open drain output.	input or open drain LED output.
13	AIO5	Analogordigitalinput/ open drain output.	General-purpose analog/digital input or open drain LED output.
16	DC-PL	Analog	**Analog power pad. Either battery or charger inputs are switched into this decoupling pad.**
48	AIN0	Analog in	ADC0 input
47	AIN1	Analog in	ADC1 input
46	AIN2	Analog in	ADC2 input
45	AIN3	Analog in	ADC3 input
50	MICBIAS1	Analog	Bias Voltage for Electret Microphone 1
49	MICBIAS0	Analog	Bias Voltage for Electret Microphone 0
24	SLEFBOOT	Digital in	Self Boot. Connect this pin to IOVDD at power-up to enable the self boot mode. Otherwise, set this pin to DGND at startup. Multipurpose I/O 11 (MP11).
26	SCL	Digital in	I 2 C Clock (SCL). This pin is always an open-collector input when the device is in I 2 C control mode. When the device is in self-boot mode, this pin is an open-collector output (I 2 C master). The line connected to this pin must have a 2.0 kΩ pull-up resistor. SPI Clock (SCLK). This pin can either run continuously or be gated off between SPI transactions.
27	SDA	Digital io	I 2 C Data (SDA). This pin is a bidirectional open-collector input. The line connected to this pin must have a 2.0 kΩ pull-up resistor. SPI Data Output (MISO). This SPI data output is used for reading back registers and memory locations. This pin is tristated when an SPI read is not active. SPI Clock (SCLK). This pin can either run continuously or can begated off between SPI transactions.
43	1V8_IN	Supply	ANC supply input
29	PADS1	Supply	1.8V/3.3V pio supply

16	DVDD	Power	Digital Core Supply. The digital supply can be generated from an on-board regulator or supplied directlyfromanexternalsupply.In each case,
17	HPOUTP1	Analog audio output	Headphone Output Noninverted Channel 1 (HPOUTP1). Line Output Noninverted Channel 1 (LOUTP1)
18	HPOUTN1	Analog audio output	Headphone Output Inverted Channel 1 (HPOUTN1). Line Output Inverted Channel 1 (LOUTN1).
19	HPOUTP0	Audio output	Headphone Output Noninverted Channel 0 (HPOUTP0). Line Output Noninverted Channel 0(LOUTP0).
20	HPOUTN0	Audio output	Headphone Output Noninverted Channel 0 (HPOUTP0). Line Output Noninverted Channel 0(LOUTP0).
22	AGND	Audio GND	Audio gound
23	REG_EN	Analog in	Regulator Enable. Tie this pin to AVDD to enable the regulator, and tie this pin to ground to disable the regulator.
25	PD	Digital io	ActiveLowPower-Down.Alldigitalandanalog circuits are powered down. There is an internal pull-down resistor on this pin. Therefore,theADAU1787 isheldinpower-down mode if the input signal is floating while power is applied to the supply pins.
29	PADS1	Supply	Input 1.8V/3.3V PIO supply
33	PIO6	PIO6/PADS1	Programmable I/O line 6. Alternative function: ■ TBR_MOSI [0]
35	PIO7	PIO7/PADS1	Programmable I/O line 7. Alternative function: ■ TBR_MISO [0]
37	PIO1	PIO1/PADS1	Automatically defaults to RESET# mode when the device is unpowered, or in off modes. Reconfigurable as a PIO after boot. Alternative function: ■ Programmable I/O line 1
36	PIO2	PIO2/PADS1	Programmable I/O line 2.

			Alternative function: ■ TBR_MISO [3
30	PIO5	PIO5/PADS1	Programmable I/O line 5. Alternative function: ■ TBR_MISO [1]
34	PIO8	PIO8/PADS1	Programmable I/O line 8. Alternative function: ■ TBR_CLK
28	PIO15	PIO15	Programmable I/O line 15. Alternative function: ■ MCLK_OUT
38	BT_MICBIAS	Analog	Mic bias output.
42	BT_MIC1_ N	AUDIO_MIC1_N LINE_IN_L_N	Microphone differential 1 input, negative. Alternative function: ■ Differential audio line input left, negative
41	BT_MIC1_ P	AUDIO_MIC1_P LINE_IN_L_P	Microphone differential 1 input, positive. Alternative function: ■ Differential audio line input left, positive
39	BT_MIC2_ P	AUDIO_MIC2_P LINE_IN_R_P	Microphone differential 2 input, positive. Alternative function: ■ Differential audio line input right, positive
40	BT_MIC2_ N	AUDIO_MIC2_N LINE_IN_R_N	Microphone differential 2 input, negative. Alternative function: ■ Differential audio line input right, negative
52	BT_RF	RF	Bluetooth transmit/receive.

9. Design Notes:

In order to better SNR, please pay attention to the hardware design of PA, DC booster, DC/ DC circuit and the module power circuit to avoid influencing module.

10. Note:

a. The signal strength is depending on the environment of Bluetooth application, such as wood and metal will block the transmission signal to get the shorter transmission distance.
b. Because of metal will block the signal transmission, it is recommend not to using the metal housing.
c. PCB layout guideline: no any copper existed in the antenna area of the module is the PCB antenna, the metal will weaken the function of the antenna when the antenna module to the module board, following prohibited paving and walk the line.
d. If the module antenna next to the battery 、 metal, liquid crystal screen, loudspeaker, at least keep them away from antenna distance 15mm

e. When layout the power supply line recommended star line, and to ensure thatthe BluetoothmodulePowersupplylinesis better,andBTshouldbewiththeamplifier, power amplifier, MCU, separately, and the underside of the BT has no other interference.
f. suggeststhemoduleantennapartfloatingonthefloor,donotgoaroundtheantenna control line, power line, audio line, MIC interference lines;
g. If the module antenna near the row seats, Because of metal will block the signal transmission, it is recommended to use professional high-gain antenna.

11.Recommended Reflow Temperature