
Product Specification

Product name: Bluetooth module

Product model: F-6990 V1.0

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Edit	Review	Approve

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Revision History				
Version	Change Information	Page	Date	Editor
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1. Product Overview:

F-6990 is an intelligent wireless audio data transmission dual-mode Bluetooth module independently developed by the company. It is a cost-effective stereo wireless transmission solution. The module uses the BK32881 chip. The F-6990 Bluetooth module adopts a driver-free mode. Customers only need to connect the module to the application product to quickly realize the wireless transmission of music, enjoy the fun of wireless music, and support data transmission. Support intelligent voice prompt and number reporting function; integrated TF card playback function; infrared remote control; support internal LINE-IN; support ENC call noise reduction.

2. Application Area:

- High-end Bluetooth speaker
- Bluetooth smart speaker
- Bluetooth stereo headset
- Hands-free phone
- Bluetooth wireless audio transmission
- Bluetooth data transmission application
- Support mobile internet peripheral devices

3. Features:

- Bluetooth 5.1 classic and low energy
- Active noise cancellation
- Touch and force sensor
- Voice-activated assistant
- Bond conduction
- 24 bits audio quality
- 8 kHz to 384 kHz audio sample rate
- Array microphone noise reduction
- Acoustic echo cancellation
- Code encryption and system security

4. Performance Parameter:

4.1 Absolute maximum ratings

Parameter	Description	MIN	TYP	MAX	Unit
VCC4BAT	Battery regulator supply voltage	2.8		4.35	V
VCC5USB	USB power supply voltage	4.75		5.5	V
P _{RX}	RX input power	-	10	-	dBm
T _{STR}	Storage temperature range	-40	-	150	°C

4.2 Recommended working conditions

Parameter	Description	MIN	TYP	MAX	Unit
VCC4BAT	Battery regulator supply voltage	2.8	3.6	4.2	V
VCC5USB	USB power supply voltage	4.75	5	5.5	V
T _{OPR}	Operation temperature range	-40	-	85	°C

4.3 Internal charging

Parameter	Description	MIN	TYP	MAX	Unit
VCC5USB	Charger input voltage	4.75	5	5.5	V
I _{trickle}	Charge Current at trickle mode as percent of fast charge mode		10		%
I _{fast}	Charge current at fast charge mode	5		220	mA
V _{end} (Need Calibrated)	VBAT voltage when Charge End		4.2		V

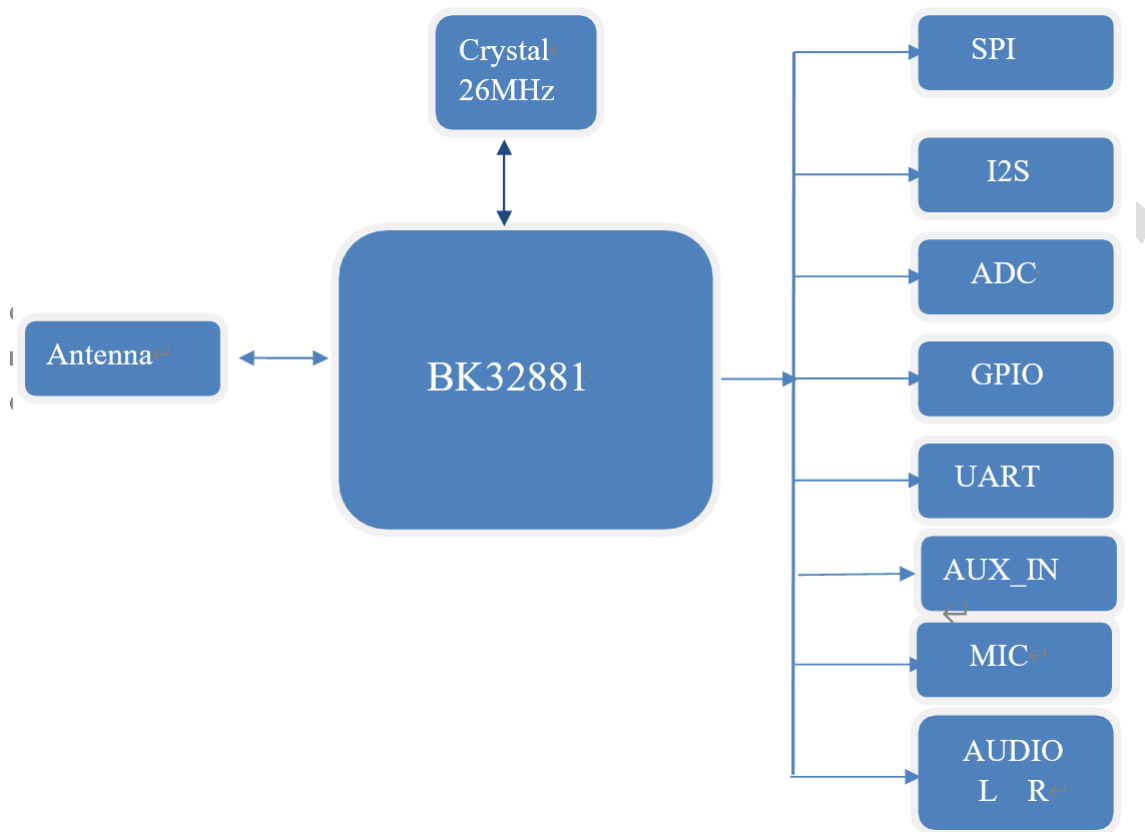
4.4 Typical power consumption

State	Description	MIN	TYP	MAX	Unit
Shut Down	Software sets device into shut down mode, wake up from GPIO		0.9		uA
Standby	Software sets device into standby mode, wake up from GPIO and RTC timer		20		uA
Idle-Sniff	Idle state at Sniff mode		0.2		mA
Active (A2DP)	2DH5		5		mA
Active (HFP)	HV1		6		mA
BLE RX			12		mA
BLE TX	0 dBm		15		mA
BLE TX	4 dBm		19		mA
BLE TX	10 dBm		28		mA

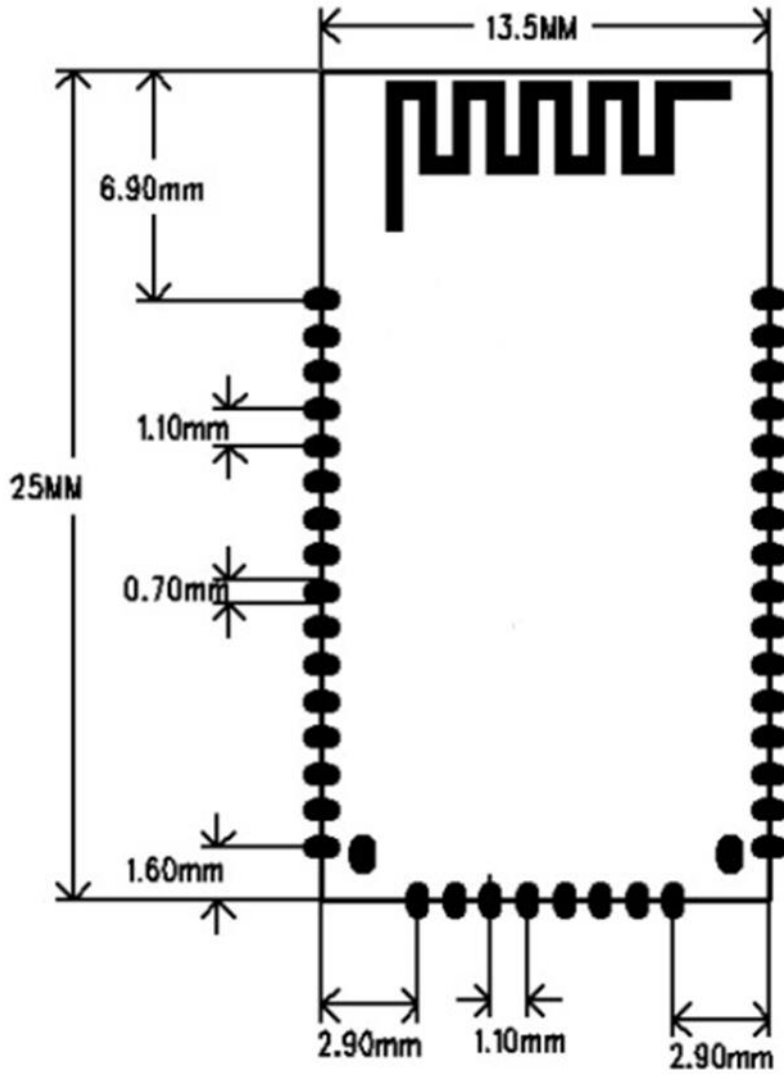
4.5 Audio characteristics

Parameter	Condition	MIN	TYP	MAX	Unit
DAC output SNR	1 kHz sine wave		104		dB
DAC Sample Rate		8		384	kHz
Audio Output Gain		-34		6	dB
Audio Output Gain Step			1		dB
Audio Output Channel Separation	Full Differential		90		dB
Microphone Gain		0		36	dB
Microphone Gain Step			2		dB
Microphone Reference	MICREF	1.8		2.4	V
Audio Input Channel Separation			80		dB
ADC Sample Rate		8		384	kHz
ADC SNR	1 kHz sine wave		96		dB

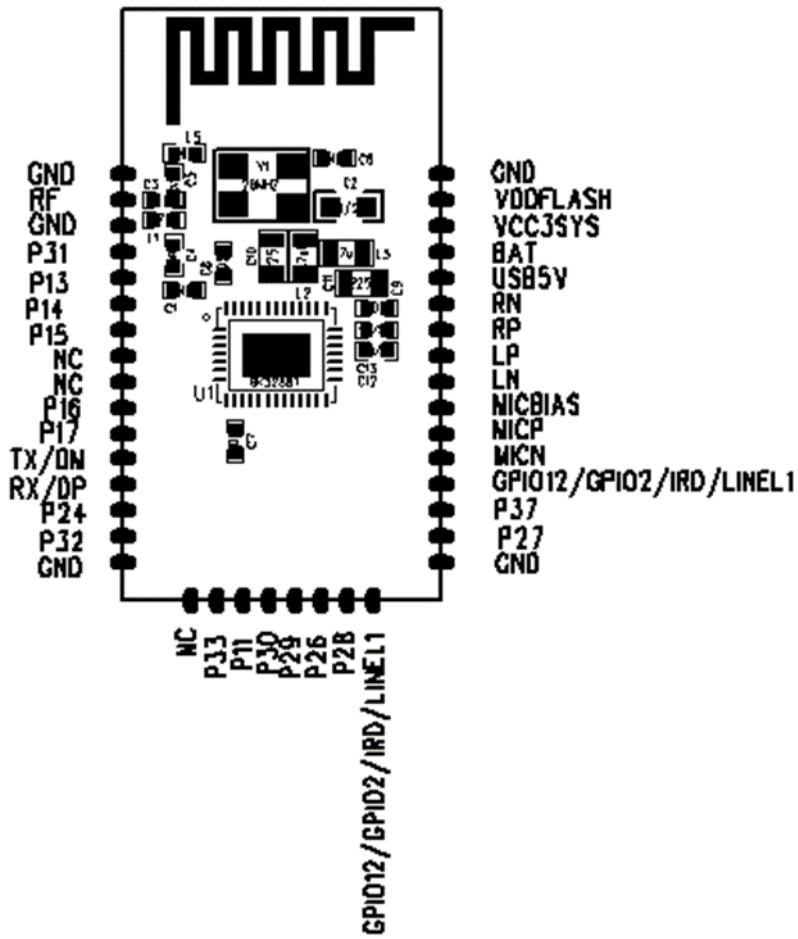
5. Module Block Diagram



6. The Size Of The Module Graph :



7. Device Pin Out Diagram



8. Pin Definition

Pin	Symb	I/O	Description
1	GND	GND	RF_GND
2	RF	RF	RF_OUT / NC
3	GND	GND	RF_GND
4	GPI031	Digital I/O	ADC7, Touch8, I2S3_SCLK, PWM7, QSPI_IO3, SPI3_CSN
5	GPI013	Digital I/O	HDMI_CEC
6	GPI014	Digital I/O	SPDIF3
7	GPI015	Digital I/O	Power on/off key
8	NC	NC	NC
9	NC	NC	NC
10	GPI016/GPI09	Digital I/O	GPIO16:I2C2_SCL, UART2_TXD or GPIO9:TXEN
11	GPI017	Digital I/O	I2C2_SDA, UART2_RXD
12	GPI00	Digital I/O	Flash Download TX, UART1_TXD, I2C1_SCL and USB_DN;
13	GPI01	Digital I/O	Flash Download RX, UART1_RXD, I2C1_SDA and USB_DP
14	GPI024	Digital I/O	I2S_MCLK
15	GPI032	Digital I/O	ADC8, Touch7, I2S3_DIN, PWM8, QSPI_FLASH_CLK, SPI3_MISO
16	GND	GND	Ground connect battery negative
17	NC	NC	NC

18	GPIO33	Digital I/O	Clock Output, Touch6, I2S3_DOUT, PWM9, QSPI_FLASH_CSN, SPI3_MOSI,
19	GPIO11	Digital I/O	SPDIF1, ADC0
20	GPIO30	Digital I/O	Touch9, I2S3_BCLK, PWM6, QSPI_IO2, SPI3_SCK
21	GPIO29	Digital I/O	Touch10, I2S2_DOUT, PWM9, QSPI_IO1
22	GPIO26	Digital I/O	PWM6, I2S2_BCLK, QSPI_RAM_CLK
23	GPIO28	Digital I/O	Touch11, I2S2_DIN, PWM8, QSPI_IO0
24	GPIO2/GPIO12	Digital I/O	GPIO12: SPDIF2 or GPIO2: LINEIN1_L, IrDA
25	GND	GND	GND
26	GPIO27	Digital I/O	I2S2_SCLK, PWM7, QSPI_RAM_CSN
27	GPIO37	AUX_INPUT	ADC11, Touch2, SPI3_SCK
28	GPIO2/GPIO12	AUX_INPUT	GPIO12: SPDIF2 or GPIO2: LINEIN1_L, IrDA
29	MICN		Microphone negative
30	MICP		Microphone positive
31	MICB1AS	VMIC	Microphone reference voltage
32	AUDIO1LN	Audio output	Audio left channel negative
33	AUDIO1LP	Audio output	Audio left channel positive
34	AUDIO1RP	Audio output	Audio right channel positive
35	AUDIO1RN	Audio output	Audio right channel negative
36	VUSB	Power	USB 5 V input
37	VBAT	Power supply	Power supply
38	VCC3YS	Power	System 3 V, LDO output

39	VDDFLASH	VDD	3V voltage output, could be shut down in idle state
40	GND	GND	GND



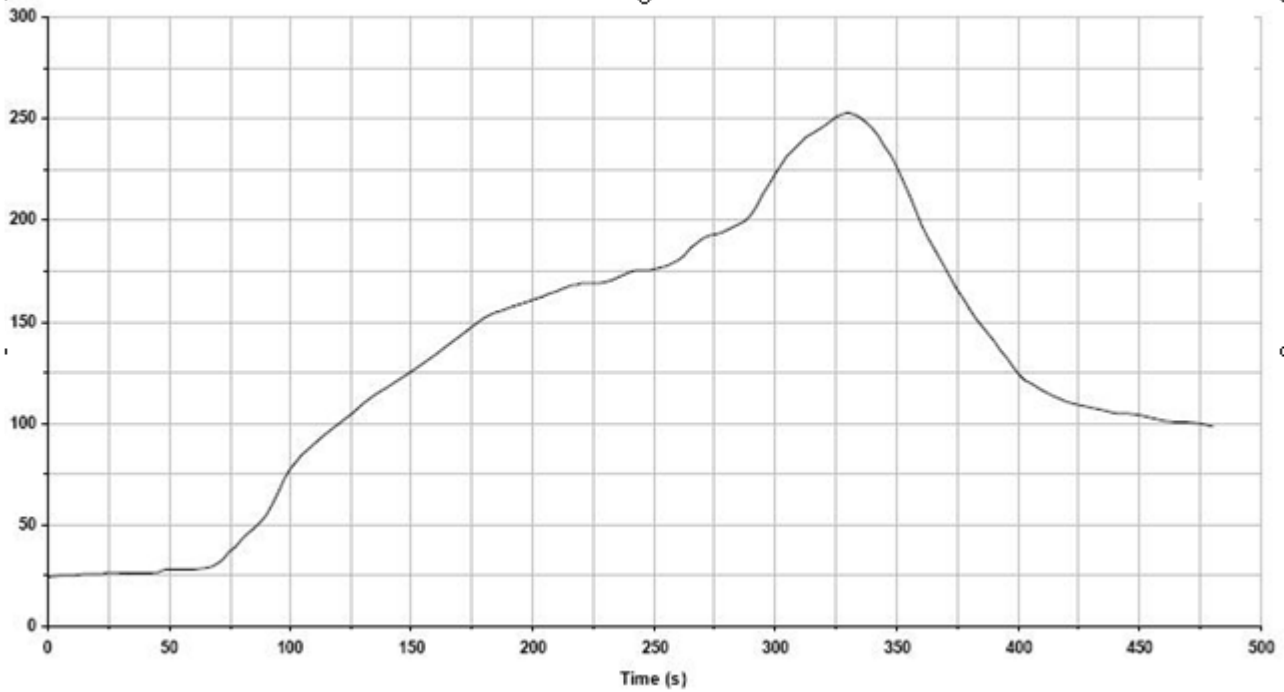
9. Design Notes:

1. GPIO 00/01/11/13 will jitter when starting up. When designing the schematic diagram, if there are requirements for the power-on sequence (such as LED lights, power amplifier MUTE, etc.), these IO ports are not recommended;
2. GPIO15 is a special pin. A low for 10S will reset the chip, so GPIO15 cannot be used for 10S low.

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. suggests the module antenna part floating on the floor, do not go around the antenna 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



- Initial Ramp=1-2.5°C/sec to 175°C equilibrium
- Equilibrium time=60 to 80 seconds
- Ramp to Maximum temperature (250°C)=3°C/sec Max
- Time above liquidus temperature(217°C): 45 - 90 seconds
- Device absolute maximum reflow temperature: 250°C