

Specification of HMBT01 module

HMBT01 is a low-power embedded BT+BLE dual-protocol module. It consists of a highly integrated radio frequency chip AC6956C. And a few peripheral devices and built-in audio storage flash.

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1 product overview

HMBT01 includes V5.1+BR+EDR+BLE bluetooth chip AC6956C with 32-bit DSP supporting hardware floating-point unit, with the highest frequency of 240MHz. The chip has built-in audio processing, audio codec, SRAM, flash and abundant peripheral resources. The HMBT01 module contains a flash chip for storing audio.

HMBT01 is a dual Bluetooth module which integrates Bluetooth control and Bluetooth playback.

1.1 characteristics

Built-in 32-bit CPU with low power consumption can double as application processor.

Main frequency 240MHz

Peripheral:

- A full-speed USB 2.0 OTG controller
- 4 multifunction 16-bit timers, supporting capture and PWM modes
- Three 16-bit PWM motor drives
- Three full-duplex serial ports, UART, UART0 and UART1, all support DMA mode.
- Two SPI interfaces support master and slave modes.
- A hardware IIC interface supports master and slave modes.
- Built-in touch-sensitive key controller
- 10-bit ADC
- External wake-up/interrupt of all gpio
- DSP audio processing
 - SBC, AAC audio decoding
 - mSBC voice codec supporting Bluetooth phone
 - Support MP2, MP3, WMA, APE, FLAC, AAC, MP4, M4A, WAV, AIF and AIFC audio decoding
 - Packet Loss Hiding (PLC) for voice processing
 - Acoustic echo cancellation/suppression (AEC, AES)
 - Single/double microphone ambient noise cancellation (ENC)
 - Multi-band DRC limiter
 - 30-band EQ configuration for sound effects

max9888

- Dual-channel 16-bit DAC with SNR>=95dB
- Three-channel 16-bit ADC with SNR>=90dB
- Support the sampling rate of 8khz/11.025khz/16khz/22.05khz/24khz/32khz/44.1khz/48khz.
- An analog microphone amplifier with built-in microphone bias generator
- Support two PDM digital microphone inputs
- Three-channel stereo analog multiplexer
- Capacitance-free, single-ended and differential modes are supported on DAC paths.
- Supports 16 ohm and 32 ohm speaker loads.

- BLE

- Support low-power Bluetooth (V5.3)
- On-board PCB antenna with antenna gain of -0.58 dBi

1.2 application fields

Bluetooth stereo speaker
 Bluetooth mono speaker
 Sleep-aiding noise machine
 Wireless controller

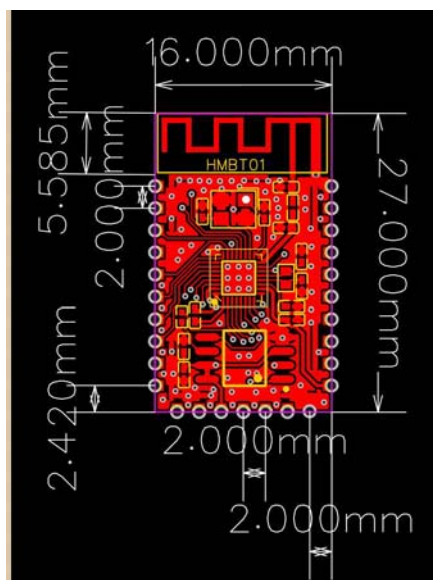
2 version update instructions

update date	Update content	Updated version
2022.7.18	new document	V1.0.0

3 module interface

3.1 size package

HMBT01 has 2 rows of pins with a pitch of 2mm. Size: 16mm (W) × 27mm (L) × 3.6mm (H).



3.2 Pin definition

pin	symbol	IO class ty	function
1	PC5	I/O	GPIO,SD1CLKA,,SPI1DOB,UART2RXD,IIC_SDA_B, ADC13,PWMCH5
2	PC4	I/O	GPIO,SD1CMDA,SPI1CLKB,UART2TXD,IIC_SCL_B, ADC10,PWMCH5H
3	PC3	I/O	GPIO,SD1DAT0A,SPI1DIB
4	/	/	/
5	USBDM	I/O	USBDM,UART1RXD,IIC_SDA_A
6	USBDP	I/O	USBDP,UART1TXD,IIC_SCL_A,ADC12
7	PA10	I/O	GPIO,SD0CLKA,ALNK0_LRCKB,ADC3,SPDIF_IN_B, TMR1,Touch9,UART2RXB,PWMCH4L
8	PA9	I/O	GPIO,SD0CMA,ALNK0_SCLKB,SPDIF_IN_A,Touch8, UART2TXB,PWMCH4H
9	PA1	I/O	GPIO,AMUX0R,Touch1,ADC0,UART1RXC,PWMCH0L
10	PA0	I/O	GPIO,AMUX0L,Touch0,CLKOUT0,UART1TXC,PWMCH0H
11	PC7	I/O	GPIO,MIC_BIAS
12	MIC	I	Microphone input channel
13	3V3IO	P	3.3V power input and output
14	AGND	P	Reference DAC
15	DACL	O	DAC left channel
16	DACR	O	DAC right channel
17	GND	P	Ground power supply
18	VBAT	P	Power supply
19	FMIP	I	FM input
20	PB11	I/O	GPIO,SDPG,SPDIF_OUT
21	/	/	/
22	/	/	/
23	PB8	I/O	GPIO,AMUX1R,SPI2_DIA,ADC8,CLKOUT1
24	PB5	I/O	GPIO,PWM3,CAP1,UART0TXC,UART0RXC
25	PB1	I/O	GPIO,SPI1DOA
26	PB0	I/O	GPIO,SPI1CLKA,UART1TXA,PWMCH1H
27	GND	P	GND

Note: P represents power supply pin, I/O represents input and output pin, and I represents input pin.

4 Electrical parameters

4.1 Absolute electrical parameters

parameter	describe	minimum	Max	v
T _{stg}	Storage temperature	-65	+150	°C
VBAT	Power supply voltage	2.2	5.5	V
V _{3.3IO}	3.3V Output voltage	-0.3	V _{3.3IO} +0.3	V

4.2 working conditions

parameter	describe	minimum	typical value	Max	test condition
T _{amb}	Working temperature	-20	-	+70	°C
VBAT	Power supply voltage	2.2	3.7	5.5	V
V _{3.3IO}	3.3V output voltage	-	3.3	V _{3.3IO} +0.3	V
V _{DACVDD}	Voltage DAC	-	2.7	-	V
I _{L3.3}	load current	-	-	150	mA
V _{IL}	Low level input voltage	-0.3	-	0.3* V _{3.3IO}	V
V _{IH}	High level input	0.7*V _{3.3IO}	-	V _{3.3IO} +0.3	V
V _{OL}	Low level output	-	-	0.33	V
V _{OH}	High level output	2.7	-	-	V

4.3 Internal resistance

Port		Universal output	High speed drive	Internal pull-up electric	Inner pull-down electric	explain
PA0、PA1 PA9、PA10 PB1、PB3 PB8~PB10 PC2~PC5		8mA	24mA	10K	10K	1、PB1 default pull-up 2、USBDM 和 USBDP Default drop-down 3、PB0、PB2、PB5 can Uplift resistance 5V voltage 4、inside Up/down Resistance Accuracy ±20%
PB11	Output 0	8mA	24mA	10K	10K	
PC7	Output 1	8mA	64mA			
PB0、PB2 PB5		8mA		10K	10K	
USBDP		4mA	-	1.5K	15K	
USBDM		4mA	-	180K	15K	

4.4 DAC

parameter	minimum	typical	Max	unit	test condition
frequency	20	-	20K	Hz	1KHz/0dB 10K load
THD+N	-	-75	-	dB	
S/N	-	95	-	dB	
Crosstalk	-	-90	-	dB	
Output Swing	-	1	-	Vrms	
Dynamic Range	-	90	-	dB	1KHz/-60dB 10K load
DAC Output Power	11	-	-	mW	32 Ohm load

5 Radio frequency parameter

5.1 Launch performance

parameter		minimum	typical	Max	unit	test condition
Radio frequency transmission power			4	6	dBm	25°C,VBAT=5V 2441MH
Radio frequency power control range			20		dB	
20dB bandwidth			950		KHz	
Relative power			-1		dB	
Adjacent channel Transmit power	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
	+3MHz		-44		dBm	
	-3MHz		-35		dBm	
$\pi/4$ -DQPSK Modulation accuracy	DEVM RMS		6		%	
	DEVM 99%		10		%	
	DEVM Peak		15		%	

5.2 receptivity

parameter		minimum	typical	Max	unit	test condition
sensitivity			-90		dBm	
Co-channel interference			-13		dB	
	+1MHz		+5		dB	

Adjacent channel Transmit power	-1MHz		+2		dB	25℃,VBAT=5V 2441MH
	+2MHz		+37		dB	
	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

manufacturer:AllInOne Smart IOT TECHNOLOGY CO.,LTD
 Address:D215, Building D, Hongwan Business Centre, Gushu Community,
 Xixiang Street,Baoan District, Shen Zhen

FCC Statement:

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.

This equipment has been tested and found to comply with the limits for a Class B digital device,

pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the

user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications not expressly approved by the party responsible

for compliance could void the user's authority to operate the equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 5mm between the radiator & your body.

2.7 Antennas

This radio transmitter E70-915T30S has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna No.	Operate frequency band	Antenna Type	Maximum antenna gain
Antenna 1	2402MHz~2480MHz	PCB Antenna	-0.58dBi

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains FCC ID: 2A9FZ-HMBT01".

2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.