Technical Description

The Equipment Under Test (EUT) is a Portable System with Bluetooth connection. It can accept both analog input sources (FM radio play and 3.5mm headphone-jack in), and wireless Bluetooth device. The Bluetooth module is operating in the frequency range from 2402MHz to 2480MHz (79 channels with 1MHz channel spacing). The EUT is powered by 120VAC.

2.4GHz Bluetooth Module:
Modulation Type: GFSK
Antenna Type: Integral, Internal (PCB Trace)
Frequency Range: 2402MHz - 2480MHz, 1MHz channel spacing, 79 channels

Nominal field strength is 93.8dBµV/m @ 3m
Production Tolerance of field strength is +/- 3dB
Antenna gain is 0dBi

The functions of main ICs are mentioned below.

1. BlueTooth module BM81SPK01 (U507):
1) U1 (IS1684S) acts as the 2.4GHz radio core of Bluetooth module (U2) (BM81SPK01NB2), which is integrating with audio CODEC.
2) 16MHz crystal (X1) provides clock for Bluetooth RF IC IS1681S (U1).
3) U2 (24C32) is serial EEPROM for parameter backup of U1 (IS1681S).

2. Power Supply portion:
1) Regulator for RF module: ICYT81117T3.3V

3. Control MCU:
1) IC1 SC9671B

4. Linear Integrated Circuit
1) IC505 TC9153

5. Dual Operational Amplifier
1) IC506. IC508 UTC4558

6. Power Amplifier
1) IC503 TDA7377

7. Multiplexer
1) IC509 TC4052P

8. Broadcast FM radio Tuner
1) U500 SI4831-B

Channel Frequency Table of Bluetooth Module

CH. NO.	FRE.	Hex Value		CH. NO.	FRE.	Hex Value		CH. NO	FRE.	Hex Value		CH. NO	FRE.	Hex Value
CH0	2402MHz	0		CH26	2428MHz	1A		CH52	2454MHz	34		CH78	2480MHz	4E
CH1	2403MHz	1		CH27	2429MHz	1B		CH53	2455MHz	35				
CH2	2404MHz	2		CH28	2430MHz	1C		CH54	2456MHz	36				
CH3	2405MHz	3		CH29	2431MHz	1D		CH55	2457MHz	37				
CH4	2406MHz	4		CH30	2432MHz	1E		CH56	2458MHz	38				
CH5	2407MHz	5		CH31	2433MHz	1F		CH57	2459MHz	39				
CH6	2408MHz	6		CH32	2434MHz	20		CH58	2460MHz	3A				
CH7	2409MHz	7		CH33	2435MHz	21		CH59	2461MHz	3B				
CH8	2410MHz	8		CH34	2436MHz	22		CH60	2462MHz	3C				
CH9	2411MHz	9		CH35	2437MHz	23		CH61	2463MHz	3D				
CH10	2412MHz	A		CH36	2438MHz	24		CH62	2464MHz	3E				
CH11	2413MHz	B		CH37	2439MHz	25		CH63	2465MHz	3F				
CH12	2414MHz	C		CH38	2440MHz	26		CH64	2466MHz	40				
CH13	2415MHz	D		CH39	2441MHz	27		CH65	2467MHz	41				
CH14	2416MHz	E		CH40	2442MHz	28		CH66	2468MHz	42				
CH15	2417MHz	F		CH41	2443MHz	29		CH67	2469MHz	43				
CH16	2418MHz	10		CH42	2444MHz	2A		CH68	2470MHz	44				
CH17	2419MHz	11		CH43	2445MHz	2B		CH69	2471MHz	45				
CH18	2420MHz	12		CH44	2446MHz	2C		CH70	2472MHz	46				
CH19	2421MHz	13		CH45	2447MHz	2D		CH71	2473MHz	47				
CH20	2422MHz	14		CH46	2448MHz	2E		CH72	2474MHz	48				
CH21	2423MHz	15		CH47	2449MHz	2F		CH73	2475MHz	49				
CH22	2424MHz	16		CH48	2450MHz	30		CH74	2476MHz	4A				
CH23	2425MHz	17		CH49	2451MHz	31		CH75	2477MHz	4B				
CH24	2426MHz	18		CH50	2452MHz	32		CH76	2478MHz	4C				
CH25	2427MHz	19		CH51	2453MHz	33		CH77	2479MHz	4D				

BM81SPK01

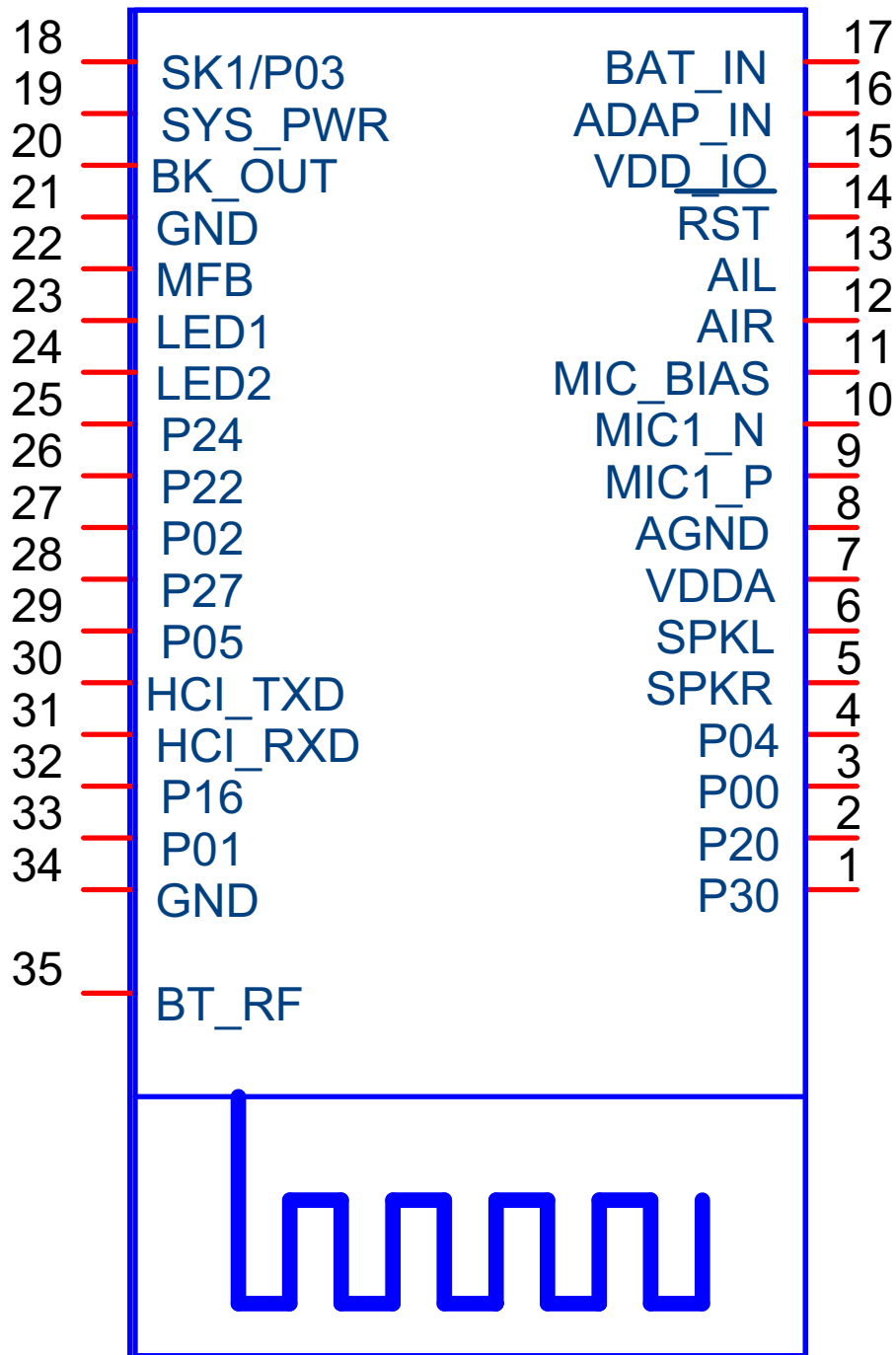# Bluetooth 3.0+EDR Wireless Speaker Module

Product Description

The ISSC BM81SPK01 is a highly integrated Bluetooth 3.0+EDR stereo module, designed for high data rate, short-range wireless communication in the 2.4 GHz ISM band. With ISSC Bluetooth stack and profile, the ISSC BM81SPK01 provides a low power and ultra-low cost Bluetooth 3.0+EDR solution for wireless voice/audio applications.

Features

- Main Chip: ISSC IS1684S
- Bluetooth 3.0+EDR compliant
- Typical +2dBm Class 2 output power
- Receiver Sensitivity: GFSK typical -91dBm, π/4 PSK typical -92dBm, 8DPSK typical -84dBm
- Piconet and Scatter net support
- HCI UART interface
- CVSD, A-law, μ-law CODEC algorithms for voice applications
- SBC decode for Bluetooth audio streaming
- Build-in High performance stereo audio codec
- Cap-less/single end headphone driver
- Audio DAC: 94dB SNR
- Build in Max. 350mAH Li-ion battery charger
- HSP, HFP, A2DP, AVRCP profile support
- 3V operating voltage
- ROM version: 32Kb EEPROM
- 34 pins for DIP module, 35pins for SMT module (with additional 35th pin antenna port for external antenna option)
- Size: 15mm x29mm
- Build-in PCB Antenna
- RoHS compliant

Device Pinout Diagram

Pin	Left Signal		Right Signal	Pin
18	SK1/P03		BAT_IN	17
19	SYS_PWR		ADAP_IN	16
20	BK_OUT		VDD_IO	15
21	GND		RST	14
22	MFB		AIL	13
23	LED1		AIR	12
24	LED2		MIC_BIAS	11
25	P24		MIC1_N	10
26	P22		MIC1_P	9
27	P02		AGND	8
28	P27		VDDA	7
29	P05		SPKL	6
30	HCI_TXD		SPKR	5
31	HCI_RXD		P04	4
32	P16		P00	3
33	P01		P20	2
34	GND		P30	1
35	BT_RF			

Pin Definition

Pin No.	I/O	Name	Description
1	P	P30	GPIO, default pull-high input Line-in detection, 1: no line-in detected; 0: line-in detected
2	I/O	P20	GPIO, default pull-high input System Configuration, H: Application L: Baseband(IBDK Mode)
3	I/O	P00	GPIO, default pull-low input. Slide Switch Detector
4	I/O	P04	GPIO, default pull-high input Audio AMP Enable
5	AO	SPKR	R-channel analog headphone output, single-ended application only
6	AO	SPKL	L-channel analog headphone output, single-ended application only
7	AP	VDDA	Reserve for external cap to fine tune audio frequency response
8	AP	AGND	Audio ground
9	AI	MIC1_P	Mic 1 mono differential analog positive input
10	AI	MIC1_N	Mic 1 mono differential analog negative input
11	AP	MIC_BIAS	Microphone biasing voltage
12	AI	AIR	Stereo analog line in, R-channel
13	AI	AIL	Stereo analog line in, L-channel
14	I/O	RST_N	System Reset Pin
15	P	VDDIO	VDDIO pin, for calibration only Do not add external power to this pin
16	P	ADAP_IN	Power adaptor input
17	P	BAT_IN	Battery input
18	I/O	SK1/P03	Default SAR input for battery detection This pin can be re-defined as GPIO P03
19	P	SYS_PW	System Power Output
20	P	BK_OUT	Buck feedback sense pin
21	P	GND	Digital ground

22	P	MFB	Multi-Function Push Button key Combined Play/Pause key when A2DP enabled.
23	P	LED1	LED Driver 1
24	P	LED2	LED Driver 2
25	I/O	P24	GPIO, default pull-high input System Configuration, H: Boot Mode
26	I/O	P22	GPIO, default pull-low input. External LDO enable
27	I/O	P02	GPIO, default pull-high input PLAY/PAUSE button
28	I/O	P27	GPIO, default pull-high input Foward button
29	I/O	P05	GPIO, default pull-high input REW button
30	O	HCI_TXD	HCI TX data
31	I	HXI_RXD	HCI RX data
32	I/O	P16	GPIO, default pull-high input Volumn down button
33	I/O	P01	GPIO, default pull-high input Volumn up button
34	P	GND	Digital ground
35	AIO	BT_RF	NC for on board PCB antenna Antenna matching if an external antenna is used

Outline Dimension (Module Foot print)

(0,0)

ANT AREA

5.5mm

2.5066mm

1

8.5mm

35

4.1mm

29mm

23.5mm

1.27mm

17

18

11.7450mm

12.8664mm

15mm

RF TP AREA
KEEP OUT

Pad Size

L:2.1336/ W:0.6096

Unit:mm

Hole Size

Pad:0.6092 drill:0.4572

Connect Hole Size

PAD :1.016X0.762

drill:0.6604

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Main circuit schematic diagram for BM81 Stereo Speaker module, including sections: POWER TREE, 5V Adapter In, Li Battery, SPEAKER OUTPUT PATH (R Channel, L Channel), LINE INPUT, MIC INPUT, STEREO AMP CIRCUIT, EXTERNAL CHARGER, OPTIONAL CIRCUIT, PUSH BUTTON (PLAY, MFB/Power, VOL-, VOL+, REV, FWD), CONDITIONAL RESET, RED LED SHARED CIRCUIT WITH CHARGER STATUS, BM81 MODULE, TEST POINT, GPIO vs. APPLICATION FUNCTION.

*Charge Current Formula:
Ichg=Kset x Vset/Rset
Kset=100; Vset=1V;
Rset=3.3KΩ> Ichg=300mA