

Bluetooth Module Specification

Model: TL-BC8-70

Version: V5.0

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1. Description

TL-BC8-70 is the latest generation of Bluetooth Module. It provides highest level of integration With integrated 2.4GHz radio, DSP, Power management, battery Charger, stereo audio CODEC, and antenna and can be designed for mono and stereo audio applications.

TL-BC8-70 has also support the latest Bluetooth v5.0 BR/EDR and BLE Dual mode specification standard and support for secure Simple pairing.

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2. Features

2.1 Bluetooth Profiles

- ◆ Bluetooth v5.0 BR/EDR and BLE specification support
- ◆ BLE v5.0 (BLE Speed 1Mbps)
- ◆ HFP v1.7
- ◆ HSP v1.2
- ◆ A2DP v1.3.1
- ◆ AVRCP v1.6
- ◆ SPP v1.2
- ◆ HOGP v1.0
- ◆ HID v1.1
- ◆ QTIL's proximity pairing and QTIL's proximity connection
- ◆ Support for smartphone applications (apps)

2.2 Music Enhancements

- ◆ Audio tuning suite with audio enhancements and two 5-band EQs for music playback (rock, pop, classical, jazz, dance etc)
- ◆ SBC, MP3, AAC, Faststream decoder, aptX, aptX Low Latency and aptX-HD
- ◆ Qualcomm TrueWireless™ Stereo (TWS), which allows two devices to be configured as a stereo pair
- ◆ Qualcomm® meloD™ Expansion audio processing technology: 3D Stereo widening (S3D)
- ◆ Volume Boost
- ◆ Comander to compress or expand the dynamic range of audio
- ◆ Support for voice recognition
- ◆ Support for multi-language programmable audio prompts
- ◆ Multipoint support for HFP connection to 2 handsets for voice
- ◆ Multipoint support for A2DP connection to 2 A2DP sources for music playback

- ◆ Talk-time extension
- ◆ Stereo 16-bit ADC, up to 48kHz sampling frequency; Stereo 16-bit DAC, up to 96kHz sampling frequency(CSR8670). Stereo 24-bit ADC, up to 96kHz sampling frequency; Stereo 24-bit DAC, up to 192kHz sampling frequency(CSR8675)

2.3 Improved Audio Quality

- ◆ Qualcomm CSR's 2 microphone 8th Generation CVC hands-free and headset audio enhancements for narrowband and wideband speech
- ◆ 1-mic far-end audio enhancements
- ◆ Near-end audio enhancements (noise suppression and AEQ)
- ◆ Wind noise reduction
- ◆ Packet loss concealment
- ◆ Bit error concealment
- ◆ Automatic gain control and automatic volume control
- ◆ Frequency expansion for improved speech intelligibility
- ◆ mSBC codec support for wideband speech
- ◆ Qualcomm Ambient Noise Cancellation (ANC) feature for headsets(CSR8675)

2.4 Others

- ◆ Operating Frequency 2.4GHz-2.48GHz ISM band
- ◆ Modulation GFSK(Gaussian Frequency Shift Keying)
- ◆ Transmit Power ≤ 10 dBm, Class 2
- ◆ Receiver sensitivity ≤ -90 dBm at 0.1% BER
- ◆ Transfer distance ≥ 10 m
- ◆ Security features Authentication and encryption
- ◆ Power 2.8V ~ 4.3 Li-battery
- ◆ Charger 4.75V ~ 5.75V
- ◆ Operating Temperature -40 ~ +80 Centigrade

3. Electrical Characteristics

Recommended operating conditions

	Min	Typ	Max	Unit
Operating Temperature	-40	20	80	°C
VDD_BAT	2.8	3.7	4.3	V
VDD_CHG	4.75	5.0	5.75	V
VDD_IO	1.7/3.1	1.8/3.3	1.9/3.6	V
Charger Current	10	-	200	mA
Sco Current	-	-	18	mA
Stream Current	-	-	20	mA
Idle Current	-	-	1	mA
Off Current	-	-	50	uA

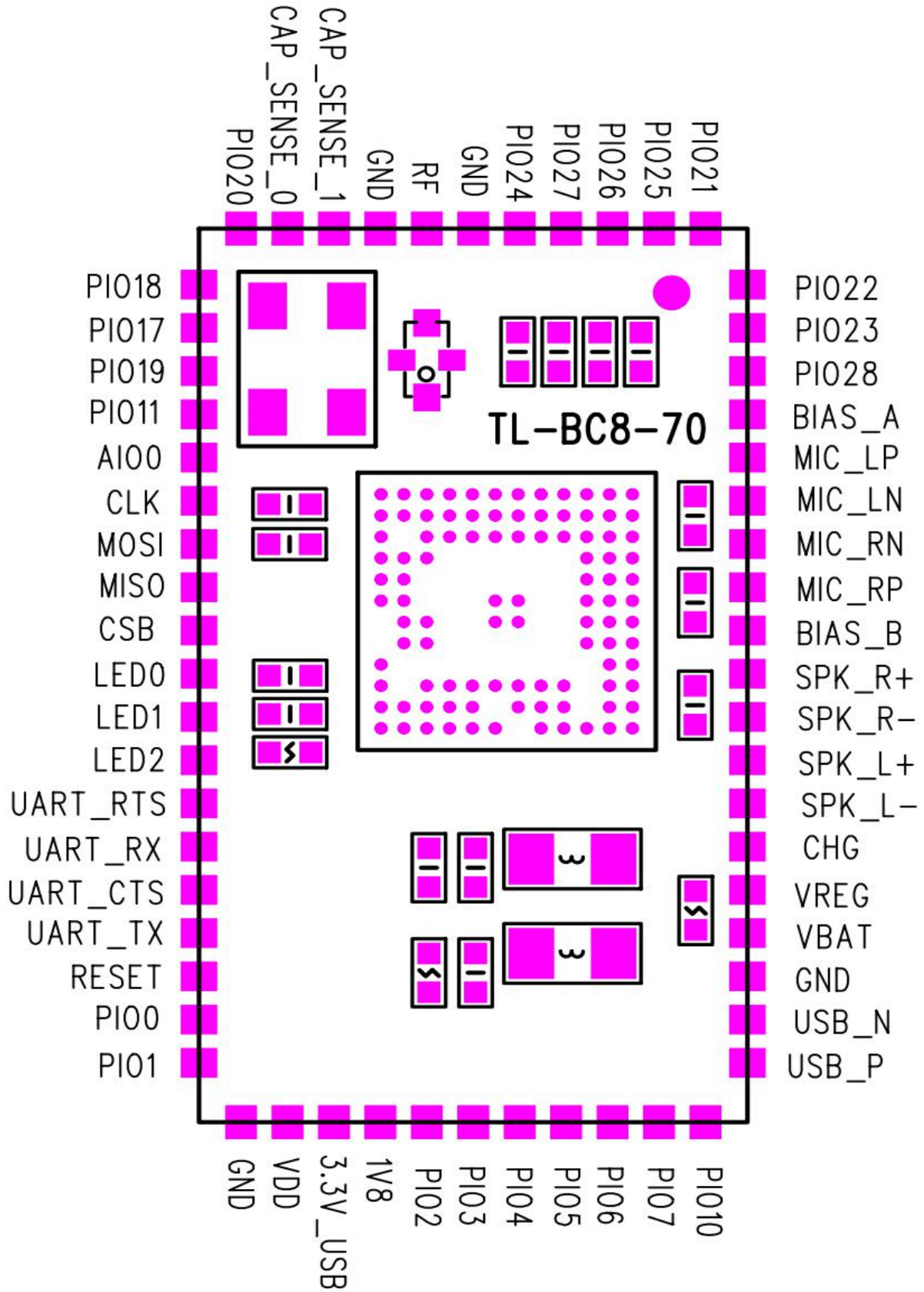
4. Features

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General		
Chips	CSR8670 or CSR8675	
Operating Voltage	Battery:2.8V ~ 4.3V, VDD:3.3V, Charger:5.0V	
Host Interface	PIO, LED, UART, USB	
Audio Interface	SPK&MIC, PCM, I2S, SPDIF, USB	
Flash Memory Size	16Mbits	
Dimension	21mm(L) x 12mm(W) x 1.8mm(H)	

Audio features	Min	Typ	Max	Unit
ADC Input amplitude	13	1600(0dB)	2260	mV _{pk-pk}
ADC Gain	-27	0	63.5	dB
ADC SNR	-	92	-	dB
ADC THD+N	-	0.004	-	%
DAC output amplitude	-	-	778	mV _{rms}
DAC Gain	-45	0	21.5	dB
DAC SNR	-	96	-	dB
DAC THD+N	-	0.004	-	%

5. Device Terminal Functions

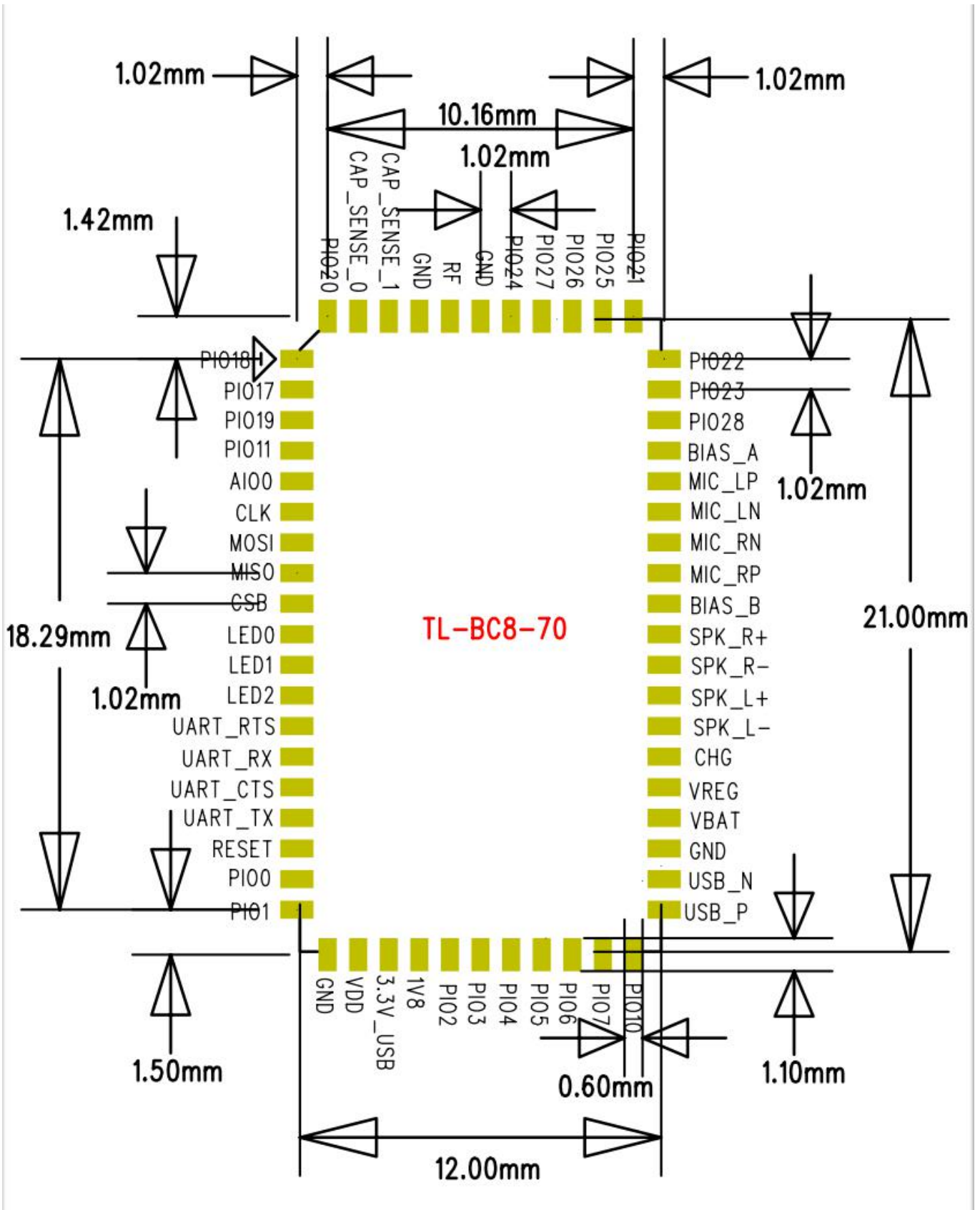


Pin NO.	Name	Level	Function and Description
1	PIO18	VDD	Synchronous data output. PCM_OUT, I2S_SD_OUT, SPDIF_OUT
2	PIO17	VDD	Synchronous data input. PCM_IN, I2S_SD_IN, SPDIF_IN
3	PIO19	VDD	Synchronous data sync. PCM_SYNC, I2S_WS(LRCK)
4	PIO11	VDD	Programmable input / output line
5	AIO0		Analogue programmable input / output line
6	SPI_CLK	VDD	Serial Peripheral Interface Clock, debug only
7	SPI_MOSI	VDD	Serial Peripheral Interface Data Output, debug only
8	SPI_MISO	VDD	Serial Peripheral Interface Data Input, debug only
9	SPI_CSB	VDD	Chip Select for Serial Peripheral Interface, active Low, debug only
10	LED0	VDD	LED driver
11	LED1	VDD	LED driver
12	LED2	VDD	LED driver
13	UART_RTS	VDD	UART request to send, active low
14	UART_RX	VDD	UART data input
15	UART_CTS	VDD	UART clear to send, active low
16	UART_TX	VDD	UART data output
17	RESET	VDD	Reset if low. Input debounced so must be low for >5ms to cause a reset
18	PIO0	VDD	Programmable input / output line
19	PIO1	VDD	Programmable input / output line
20	GND		Ground connection
21	VDD	1.8V/3.3V	Positive supply input for input/output ports
22	3.3V_USB	3.3V	3.3V bypass linear regulator output or positive supply input for USB ports
23	1.8V	1.8V	1.8V switch-mode power regulator sense output
24	PIO2	VDD	Programmable input / output line
25	PIO3	VDD	Programmable input / output line
26	PIO4	VDD	Programmable input / output line
27	PIO5	VDD	Programmable input / output line
28	PIO6	VDD	Programmable input / output line
29	PIO7	VDD	Programmable input / output line
30	PIO10	VDD	Programmable input / output line

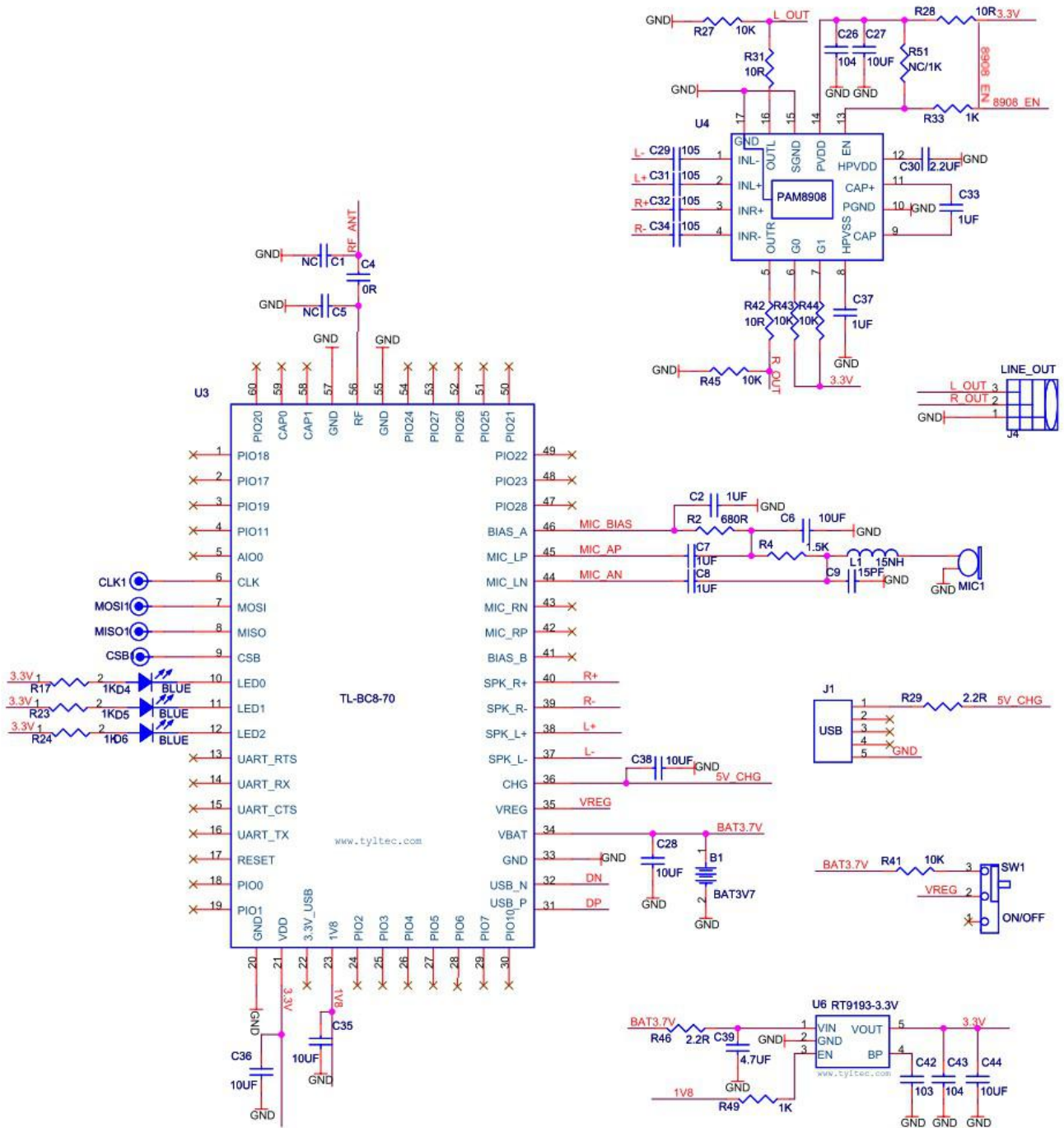
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31	USB_P	3.3V_USB	USB data plus	
32	USB_N	3.3V_USB	USB data minus	
33	GND		Ground connection	
34	VBAT	3.0V~4.3V	Battery positive terminal	
35	VREG		Take high to enable switch-mode regulator	
36	CHG	4.75V~5.75V	Battery charger input	
37	SPK_L-		Speaker output negative, left	
38	SPK_L+		Speaker output positive, left	
39	SPK_R-		Speaker output negative, right	
40	SPK_R+		Speaker output positive, right	
41	BIAS_B		Microphone bias output B	
42	MIC_RP		Microphone input positive, right	
43	MIC_RN		Microphone input negative, right	
44	MIC_LN		Microphone input negative, left	
45	MIC_LP		Microphone input positive, left	
46	BIAS_A		Microphone bias output A	
47	PIO28	VDD	Programmable input / output line	
48	PIO23	VDD	Programmable input / output line	
49	PIO22	VDD	Programmable input / output line	
50	PIO21	VDD	Programmable input / output line	
51	PIO25	VDD	Programmable input / output line	
52	PIO26	VDD	Programmable input / output line	
53	PIO27	VDD	Programmable input / output line	
54	PIO24	VDD	Programmable input / output line	
55	GND		Ground connection	
56	RF		Bluetooth 50Ω transmitter output / receiver input	
57	GND		Ground connection	
58	CAP1		Capacitive touch sensor input	
59	CAP0		Capacitive touch sensor input	
60	PIO20	VDD	Synchronous Data Clock. PCM_CLK, I2S_SCK(BCLK)	

6. Package Dimensions

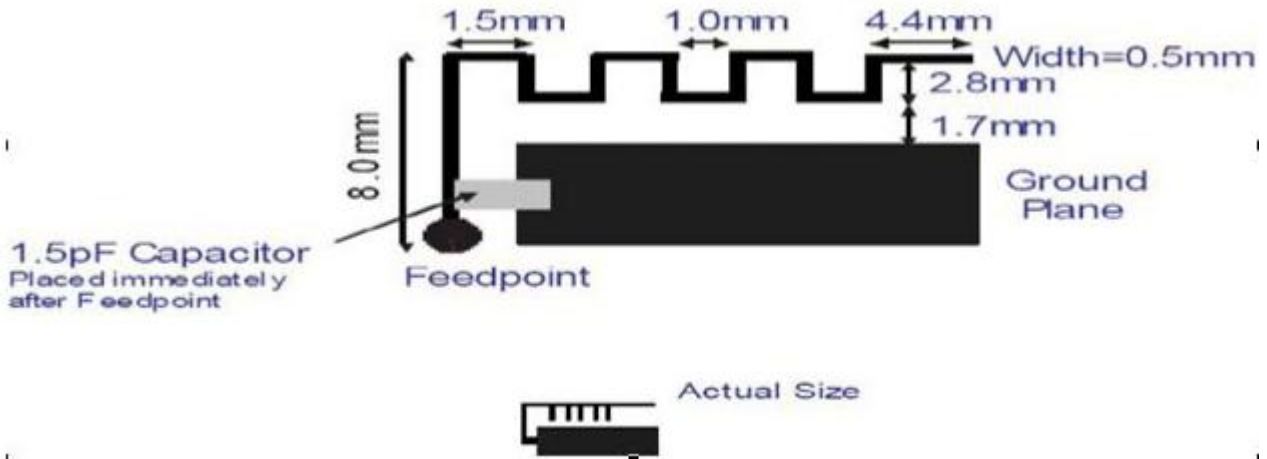


7. Example Application Schematic

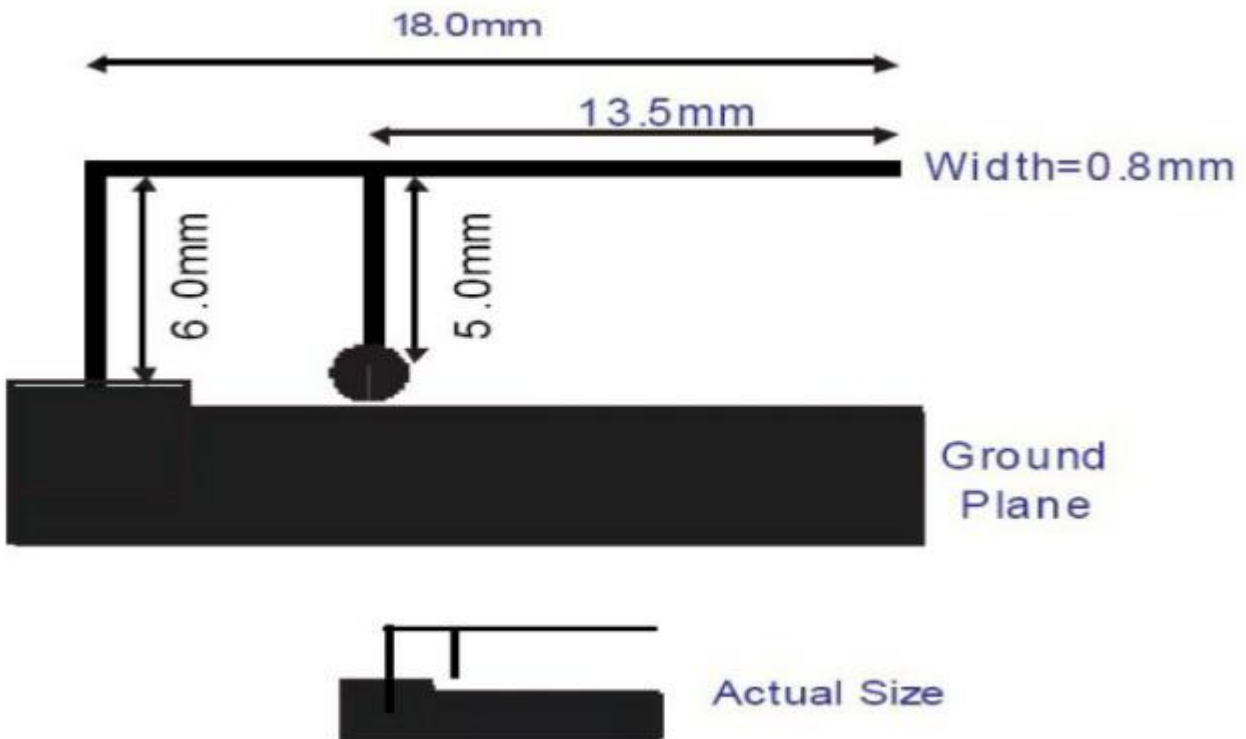


8. PCB Antenna Example

8.1 Meander Antenna



8.2 Inverted-F-Antenna



9. Layout Guidelines

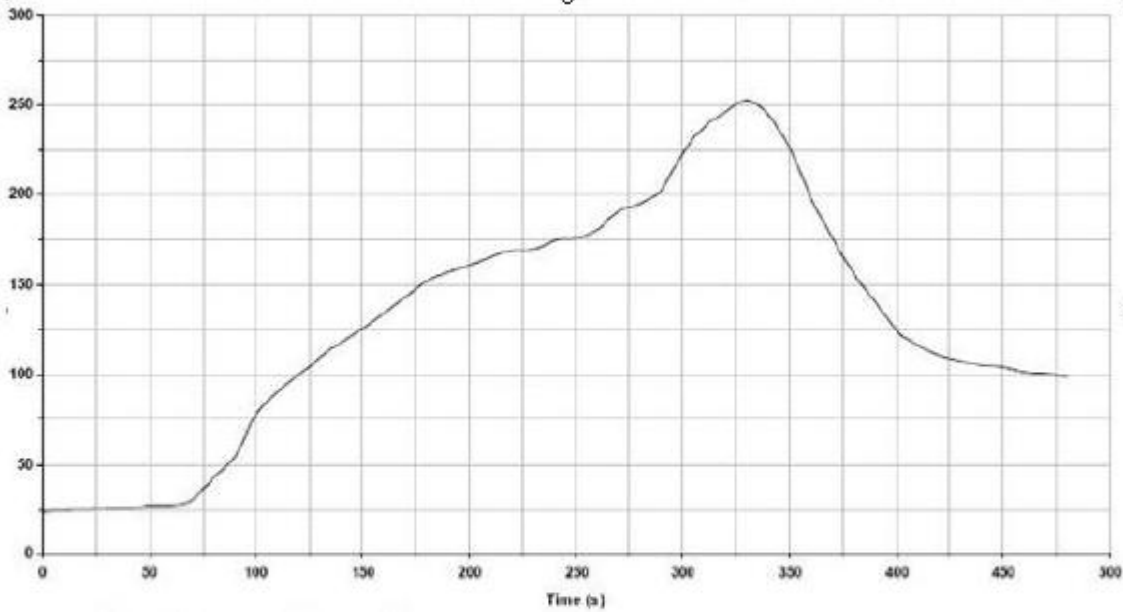
9.1 Audio Layout

Route audio lines as differential pairs. The positive and negative signals should run parallel and close to each other until they are converted to single-ended signals. Use dedicated audio ground plane for entire audio section.

9.2 Antenna Design

Do not place GND plane or any metal directly under the antenna of TL-BC8-70. To avoid any excess parasitic capacitance in the antenna feed line caused by the RF test pin on the bottom side of the module, the area underneath the RF test pin should also be left free from copper. Any metal in close proximity of the antenna will have an effect on the antenna performance. Thus any metal should be placed as far from the antenna as possible. The module should be placed to an edge of the PCB.

10. Recommended Reflow Soldering Temperature



Key features of the profile:

- 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

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