EnzyTek Technology, Inc.
7F, No. 35, Hsueh Fu Rd., Hsinchu 300,
Taiwan , R.O.C.
TEL：886-3-573-6708　FAX： 886-3-573-8749

BTA-QC3034-3M

Preliminary Datasheet

(Version 01)

Issued date: September 9, 2020

This device is intended only for OEM integrators under the following conditions:
The use of the printed antenna with gain=-0.46dBi(2.4GHz)

IMPORTANT NOTE:
In the event that these conditions can't be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and FCC ID can't be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product(including the transmitter) and obtain a separate FCC authorization.

End Product Labeling
The final end product must be labeled in a visible area with the following:
"Contains FCC ID: 2AABGQ3034-3M".The grantee's FCC ID can be used only when all FCC compliance requirements are met.

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EnzyTek Bluetooth® Class II Module – BTA-QC3034-3M

Product Description

BTA-QC3034-3M is a highly integrated small form factor (24.5x13 mm^2) Bluetooth class II module which adopts Qualcomm QCC3034 as core chip for Bluetooth operation.

QCC3034 VFBGA is a system on-chip (SoC) with on-chip Bluetooth, audio and programmable application processor. It includes high-performance, analog, and digital audio codecs, Class-AB and Class-D headphone drivers, advanced power management, Li-ion battery charger, light-emitting diode (LED) drivers, and flexible interfaces including inter- integrated circuit sound (I²S), inter-integrated circuit interface (I²C), universal asynchronous receiver transmitter (UART), and programmable input/output (PIO).

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FEATURES

- Highly integrated BT 5.0 module
  QCC3034 (embedded Balun + Filter + Crystal + Flash + PCB Antenna)
- 120 MHz Qualcomm® Kalimba™ audio DSPs
- 32 MHz Developer Processor for applications
- Firmware Processor for system
- Flexible QSPI flash programmable platform
- Advanced audio algorithms
- High-performance 24‑bit stereo audio interface
- Digital and analog microphone interfaces
- Flexible PIO controller and LED pins with PWM support
- 1 or 2-mic Qualcomm® cVc™ headset noise reduction and echo cancellation technology
- aptX, aptX HD, aptX Low Latency, SBC, and AAC audio codecs support
- Serial interfaces: UART, Bit Serializer (I²C/SPI), USB 2.0
- Integrated PMU: Dual SMPS for system/digital circuits, Integrated Li-ion battery charger
- Frequency: 2402 ~ 2480 GHz
- TX Output Power : 9 dBm/(Max)
- RX Sensitivity : -90 dBm (typ)
- Dimension : 24.5 mm x 13 mm x 2.8/3.2 mm (L x W x H)
- Temperature :-10~+70 ˚C

Applications

- Wired/wireless stereo headsets/headphones
- Qualcomm TrueWireless™ stereo earbuds

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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. power consumption
- 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

Bluetooth subsystem

- 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 1/2 support

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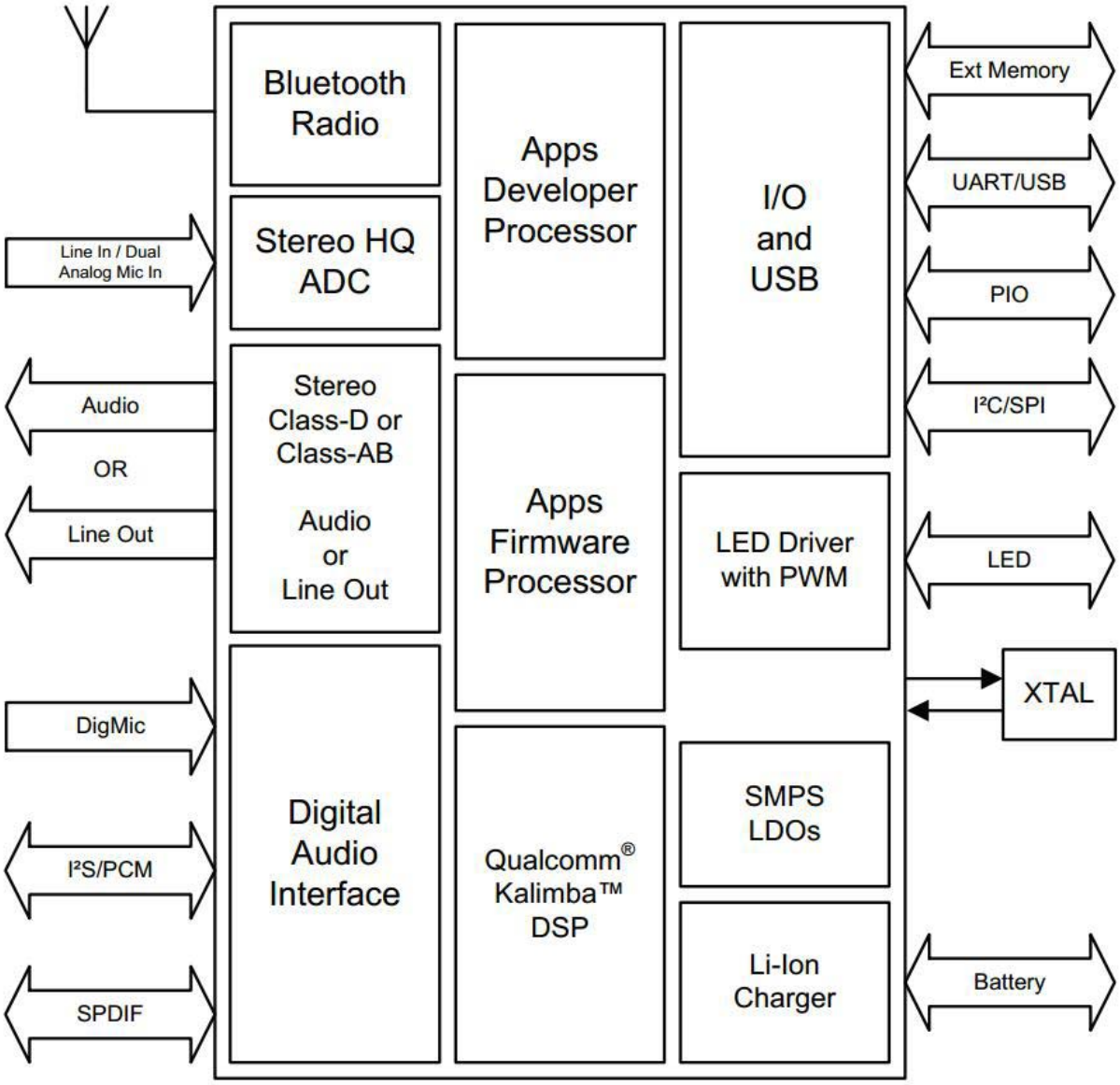
Block Diagram



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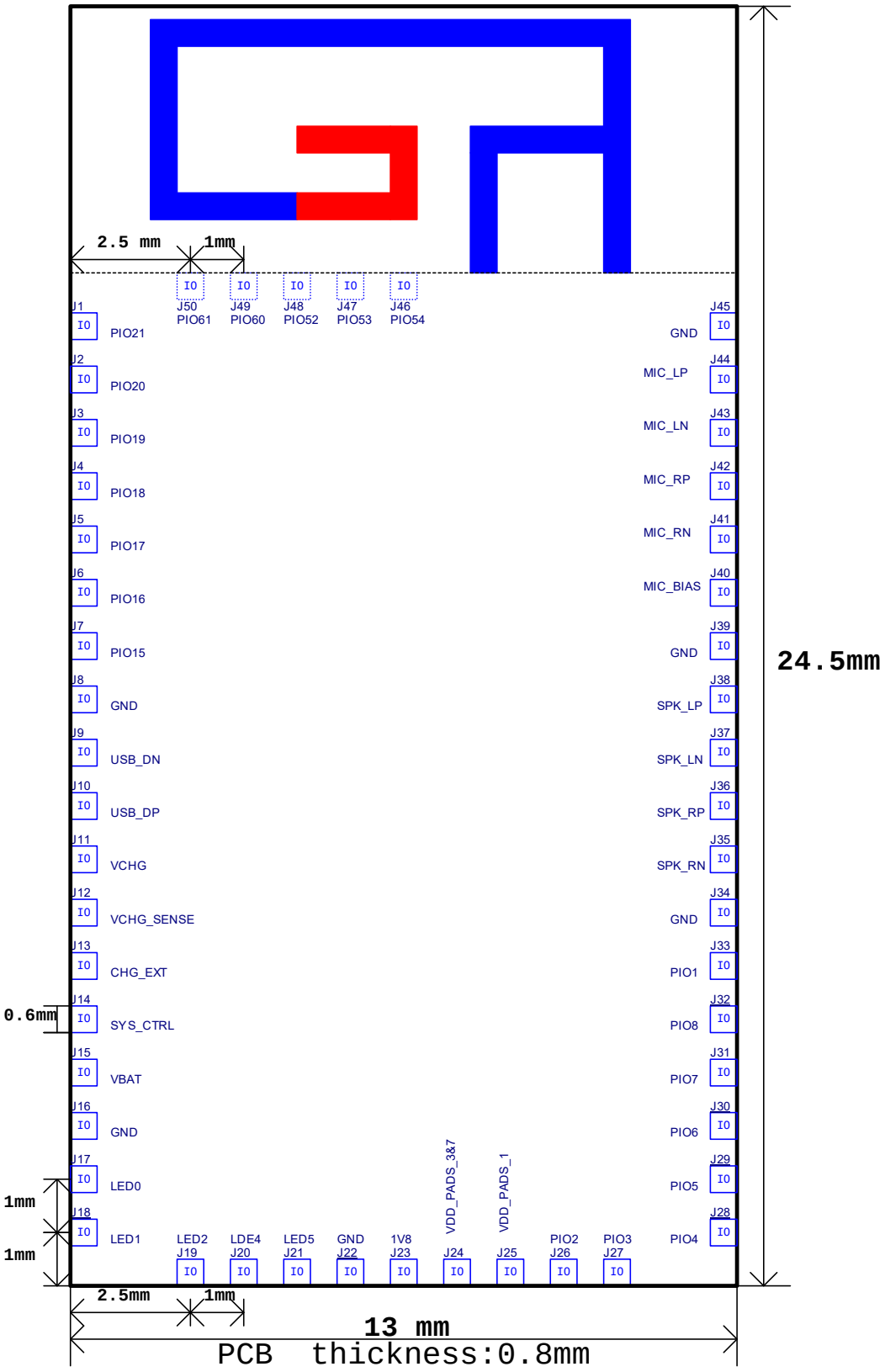
Pinout Diagram & Dimension

Unit : mm



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I/O PIN LISTING

Pin No.	Pin Name	Type	Description
1	PIO21	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 21. Alternative function : PCM_DOUT[2]
2	PIO20	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 20. Alternative function : PCM_DOUT[1]
3	PIO19	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 19. Alternative function : PCM_DIN[0]
4	PIO18	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 18. Alternative function : PCM_DOUT[0]
5	PIO17	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 17. Alternative function : PCM_SYNC
6	PIO16	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 16. Alternative function : PCM_CLK
7	PIO15	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 15. Alternative function : MCLK_OUT
8	GND	Power	Ground
9	USB_DN	Digital	USB Full Speed device D- I/O.
10	USB_DP	Digital	USB Full Speed device D+ I/O.
11	VCHG	Analog	VCHG voltage input.
12	VCHG_SENSE	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.
13	CHG_EXT	Analog	External charger transistor current control. Connect to base of external charger transistor as per application schematic.
14	SYS_CTRL	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. Additionally useable as a digital input in normal operation. No pull. Additional function: PIO[0] input only
15	VBAT	Power	Battery voltage input.

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16	GND	Power	Ground
17	LED0	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
18	LED1	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
19	LED2	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
20	LED4	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
21	LED5	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
22	GND	Power	Ground
23	1V8	Power	1.8V output
24	VDD_PADS_3&7	Power	1.8 V/3.3 V PIO supply
25	VDD_PADS_1	Power	1.8 V/3.3 V PIO supply
26	PIO2	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 2. Alternative function : TBR_MISO[3]
27	PIO3	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 3. Alternative function : TBR_MISO[2]
28	PIO4	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 4. Alternative function : TBR_MOSI[1]
29	PIO5	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 5. Alternative function : TBR_MISO[1]
30	PIO6	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 6. Alternative function : TBR_MOSI[0]
31	PIO7	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 7. Alternative function : TBR_MISO[0]
32	PIO8	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 8. Alternative function : TBR_CLK
33	PIO1	Digital: Bidirectional with programmable strength internal pull- up/pull-down	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
34	GND	Power	Ground

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35	SPK_RN	Analogue out	Headphone/speaker differential right output, negative. Alternative function : Differential right line output, negative
36	SPK_RP	Analogue out	Headphone/speaker differential right output, positive. Alternative function : Differential right line output, positive
37	SPK_LN	Analogue out	Headphone/speaker differential left output, negative. Alternative function : Differential left line output, negative
38	SPK_LP	Analogue out	Headphone/speaker differential left output, positive. Alternative function : Differential left line output, positive
39	GND	Power	Ground
40	MIC_BIAS	Analogue out	Mic bias output.
41	MIC_RN	Analogue in	Microphone differential 2 input, negative. Alternative function : Differential audio line input right, negative
42	MIC_RP	Analogue in	Microphone differential 2 input, positive. Alternative function : Differential audio line input right, positive
43	MIC_LN	Analogue in	Microphone differential 1 input, negative. Alternative function : Differential audio line input left, negative
44	MIC_LP	Analogue in	Microphone differential 1 input, positive. Alternative function : Differential audio line input left, positive
45	GND	Power	Ground
46	PIO54	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 54. Alternative function : SDIO_D[0]
47	PIO53	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 53. Alternative function : SDIO_CMD
48	PIO52	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 52. Alternative function : SDIO_CLK

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49	PIO60	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 60.
50	PIO61	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 61.

PS:The PIO definition can be customize for the application, please contact with EnzyTek for detail FW specification.

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Radio Characteristics

VCC = 3.3V and test under Non-EDR environment

		Min	Typ	Max	Bluetooth Spec.	Unit
Maximum RF transmit power		7	8	9	0 ~ +20	dBm
Sensitivity, 0.1% BER	2.402 GHz			-90	≦-70	dBm
	2.411 GHz			-90		dBm
	2.480 GHz			-90		dBm
RF Power control range			18		≧16	dB
RF Power control resolution		3.5		5.5	2dB≦ step ≦8dB	dBm
20dB bandwidth for modulated carrier			910		≦1000	kHz
△f1avg Max. modulation		155	165	170	140 < f1avg < 175	kHz
△f2max Min.. modulation		135		185	≧115	kHz
△f1avg /△f2avg		0.9	1.15	1.25	≧0.80	
Initial Center Frequency		-15		+15	≦±75	kHz
Frequency Drift Rate		-340		340	≦±400	kHz/us
Frequency Drift (single slot packet)		-20	-10	20	≦±25	kHz
Frequency Drift (five slot packet)		-20	-12	20	≦±40	kHz

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Battery input pin specification

VBAT	Min	Typ	Max	Unit
Operating voltage	2.8	3.7	4.6	V
Software power-off threshold	-	3	-	V
Under voltage lockout rising threshold	2.47	2.6	2.73	V
Under voltage lockout hysteresis	50	-	120	mV
USB dead/weak battery rising threshold	3.14	3.3	3.46	V
USB dead/weak battery hysteresis	50	-	120	mV

Charger input pin specification

VCHG	Min	Typ	Max	Unit
Operating voltage (full device specification)	4.75	5	6.5	V
Operating voltage (reduced charger specification)	4.0	5	6.5	V
VCHG_PRESENT rising threshold	3.4	3.6	4.0	V
VCHG_PRESENT hysteresis	70	-	150	mV
Full operating range	VCHG_ PRESENT	-	6.5	V
On chip pull-down (disabled when VCHG_PRESENT = 1)	10	20	30	kΩ

Microphone Bias

Parameter	Conditions	Min	Typ	Max	Unit
Output voltage (Tunable, step = 0.1 V)	-	1.5	-	2.1	V
Output current capability	-	0.07	-	3.0	mA
Output noise	B/W = 20 Hz → 20 kHz Unweighted	4.5	5.1	7.3	μVrms
Crosstalk Between Microphones	Using recommended application circuit	-	80	-	dB
Load capacitance [a]	From parasitic PCB routing and package	-	-	0.1	nF

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Stereo Codec: Analogue to Digital Converter :

High-quality (HQADC) differential audio input

Parameter	Conditions	Mi	Typ	Max	Uni
Output Sample Width	-	-	-	24	Bit
Output Sample Rate, F_{sample}	-	8	-	96	kHz
Input level	-	-	-	2.4	V pk-pk
Input impedance	0 dB to 24 dB analog gain	-	20	-	k
	27 dB to 39 dB analog gain	-	10	-	k
SNR	f_{in} = 1 kHz 48 kHz A-Weighted THD+N < 0.1%	-	100	-	dBA
THD+N	f_{in} = 1 kHz 48 kHz	-	-91	-	dB
Digital gain	Digital gain resolution = 1/32	-24.0	-	21.5	dB
Analog gain	3 dB steps	0	-	39	dB
Stereo separation (crosstalk)	-	80	-	-	dB

Stereo Codec: Digital to Analog Converter :

Class-D DAC audio output

Parameter	Conditions	Mi	Typ	Max	Uni
Input Sample Width	-	-	-	24	Bits
Input Sample Rate, F_{sample}	-	8	-	192	kHz
Output Power	0 dBFS, 32 Ω load -3 dBFS, 16 Ω load	-	-	30	mW
Load	-	1	32	30k	Ω
SNR	f_{in} = 1 kHz 48 kHz F_{sample} B/W = 20 Hz → 20 kHz A-Weighted	-	98.3	-	dBA

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THD+N	f_{in} = 1 kHz 48 kHz B/W = 20 Hz → 20 kHz -1 dBFS	-	-87.5	-	dB
Digital gain	Digital gain resolution = 1/32	-24.0	-	21.5	dB
Stereo separation (crosstalk)	-	80	-	-	dB
Max capacitive load	Per terminal to ground	-	-	100	pF

Class-AB DAC audio output

Parameter	**Conditions**	**Mi**	**Typ**	**Max**	**Uni**
Input Sample Width	-	-	-	24	Bit
Input Sample Rate, F_{sample}	-	8	-	192	kHz
Output Power	0 dBFS, 32 Ω load -3 dBFS, 16 Ω load	-	-	30	mW
Load	-	1	32	30k	Ω
SNR	f_{in} = 1 kHz 48 kHz F_{sample} B/W = 20 Hz → 20 kHz A-Weighted 0 dBFS 32 Ω load	-	98.3	-	dBA
THD+N	f_{in} = 1 kHz 48 kHz B/W = 20 Hz → 20 kHz -1 dBFS 32 Ω load	-	-87.5	-	dB
Digital gain	Digital gain resolution = 1/32	-24.0	-	21.5	dB
Stereo separation (crosstalk)	-	80	-	-	dB
Max capacitive load	Per terminal to ground	-	-	100	pF

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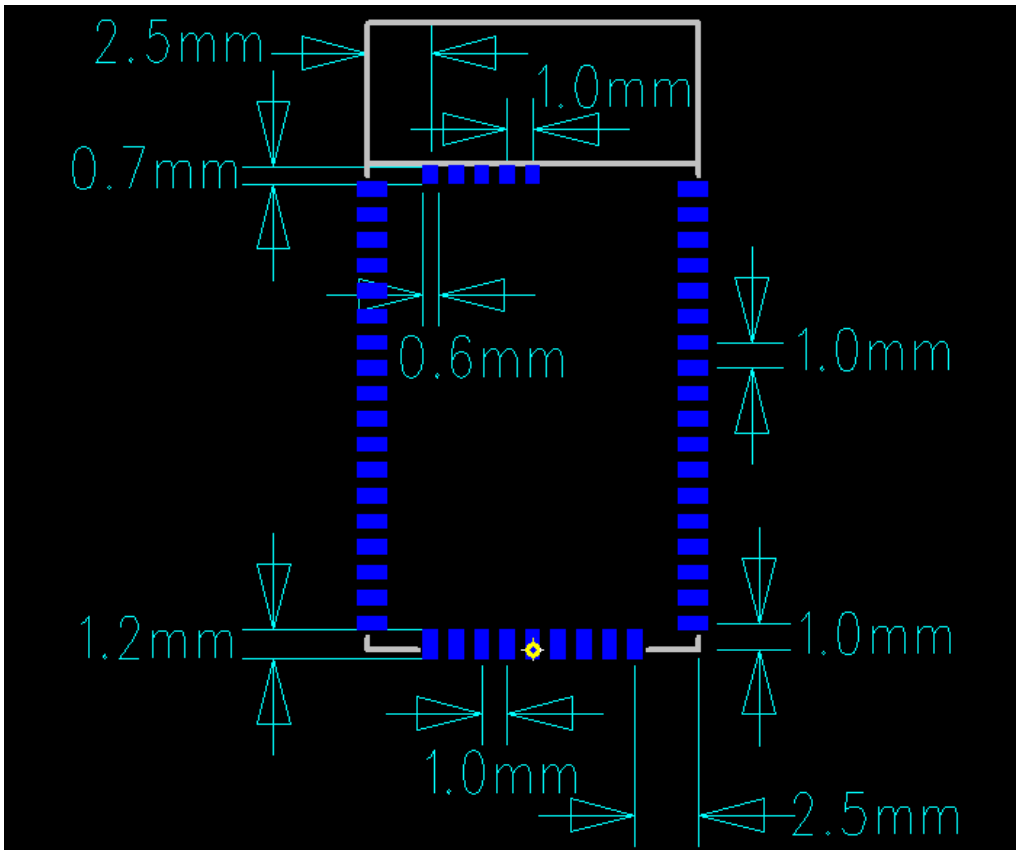
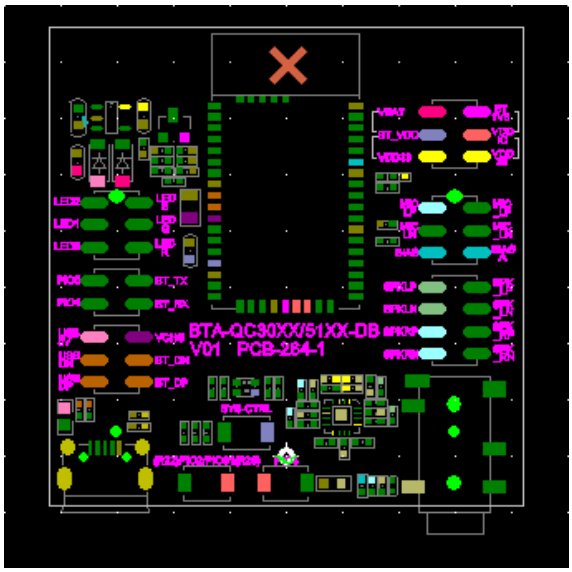
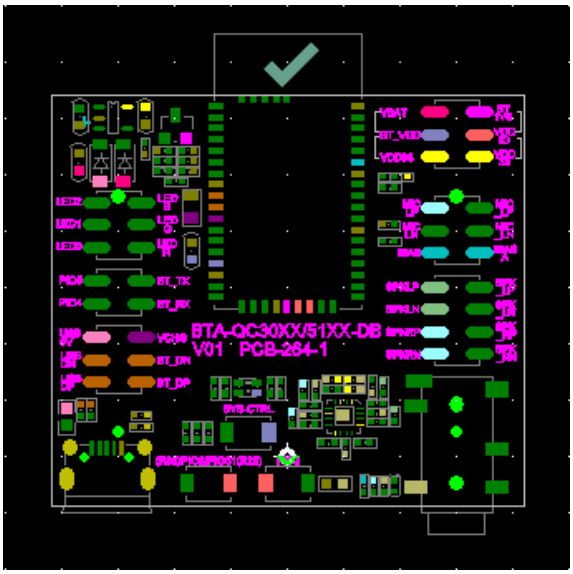
PCB Layout Guide

Footprint dimensions



Antenna location





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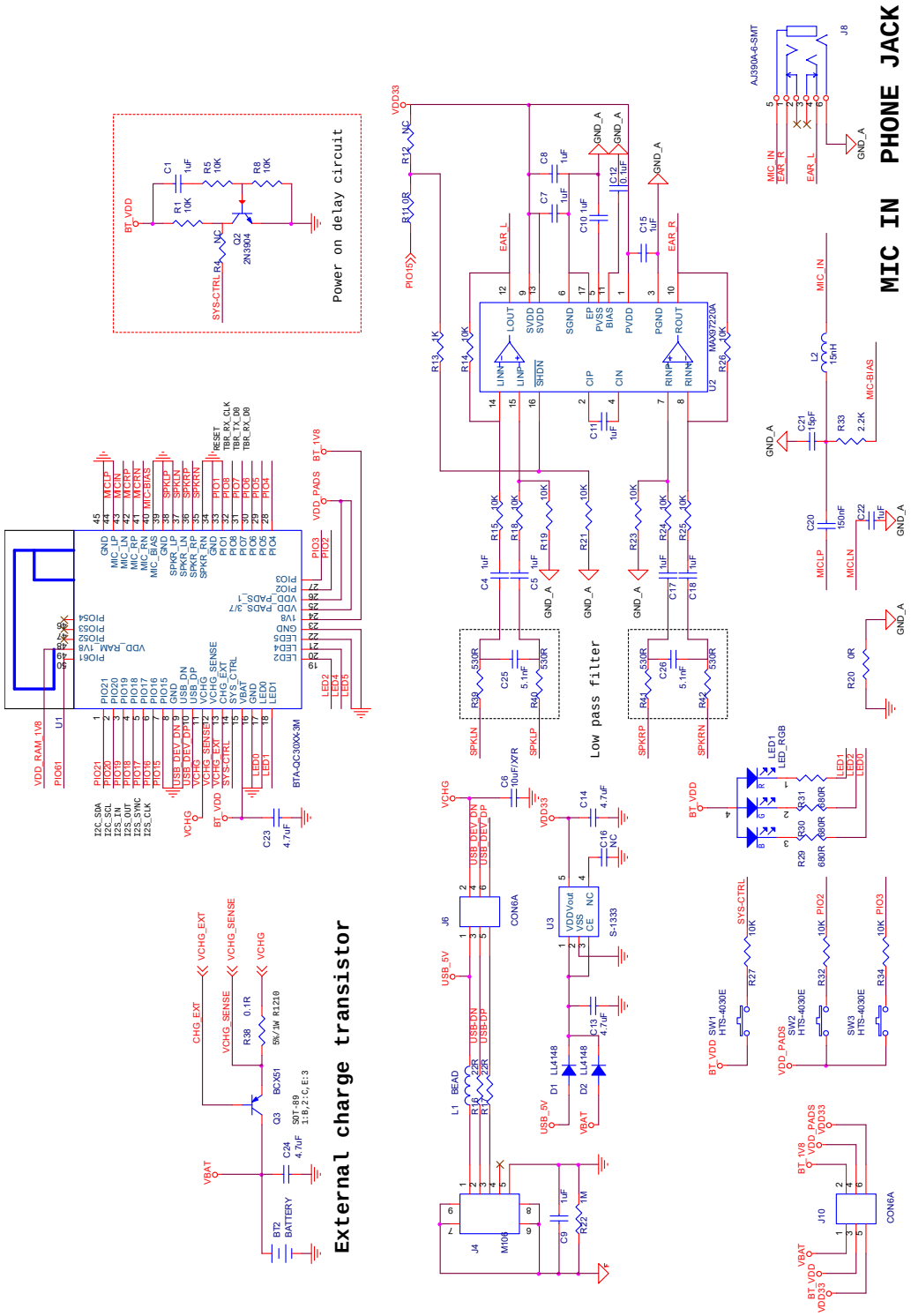
BT Stereo Headset Application Circuit



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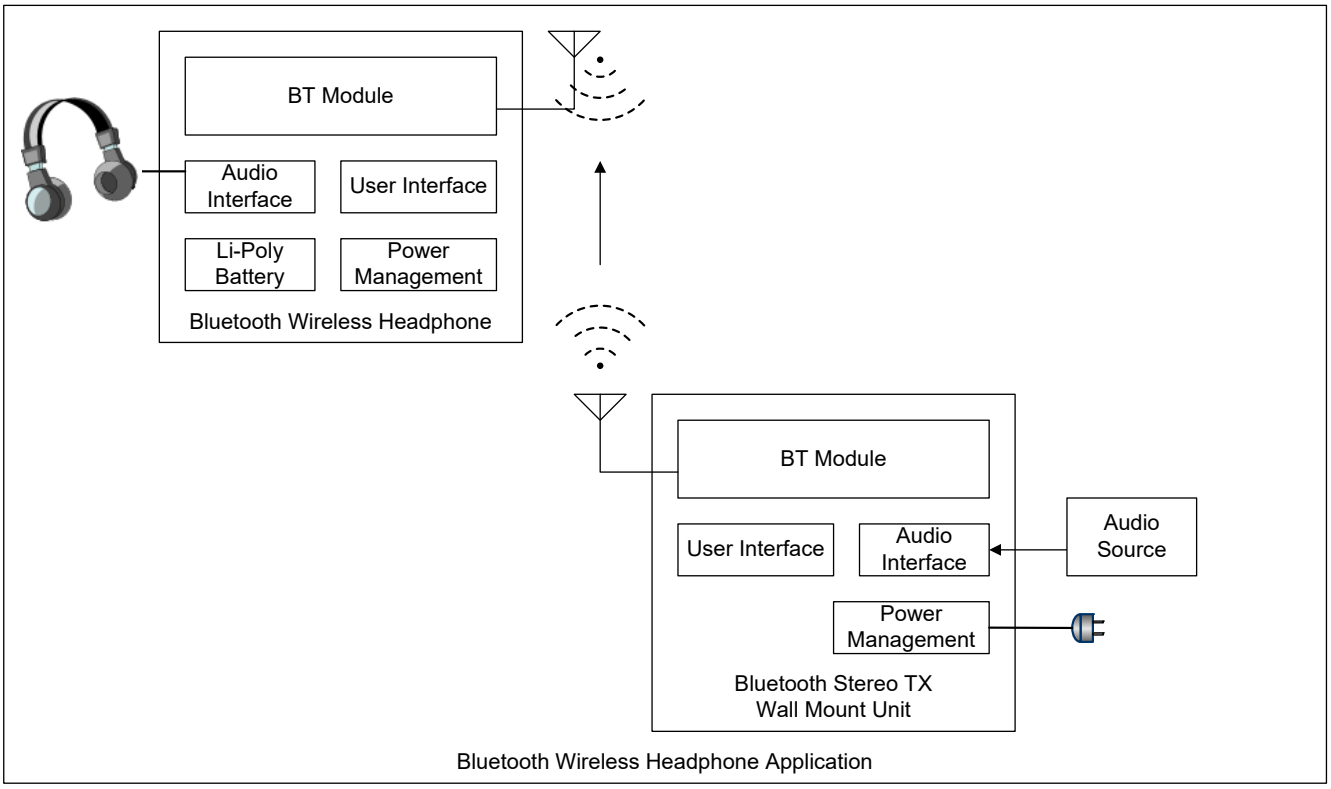
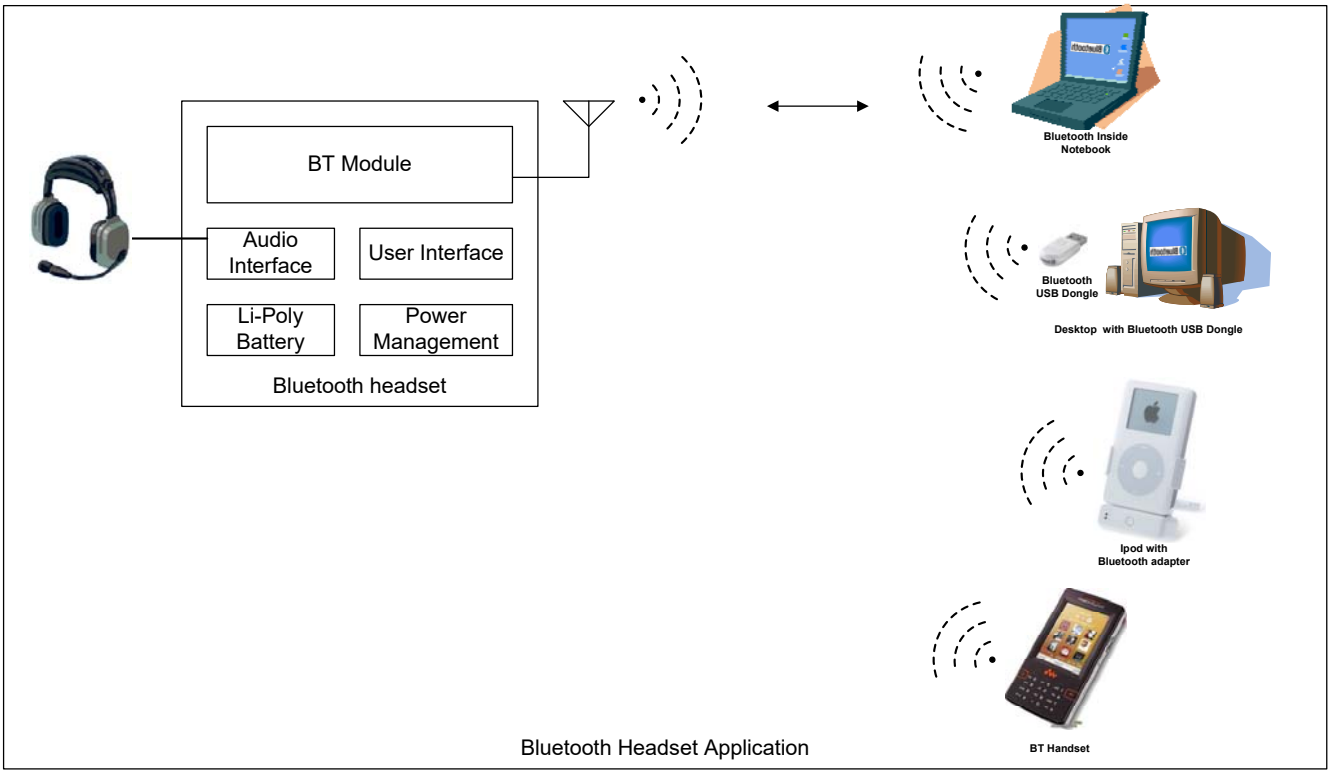
Application Block Diagram

Bluetooth Wireless Headphone Application



Bluetooth Wireless Headphone Application

Bluetooth Wireless Headset Application



Bluetooth Headset Application

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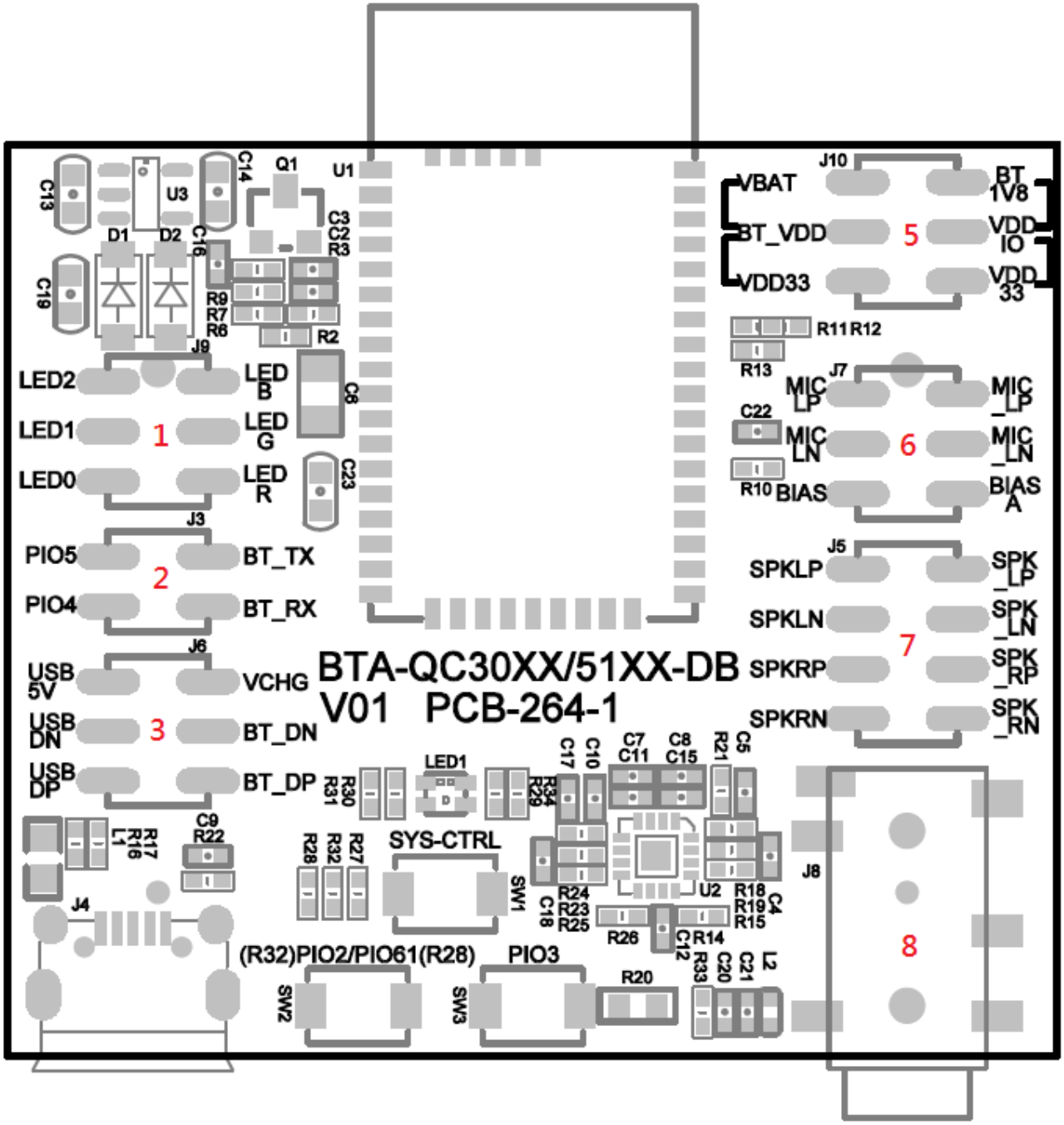
Evaluation board definition

BTA-QC30XX/51XX-DB



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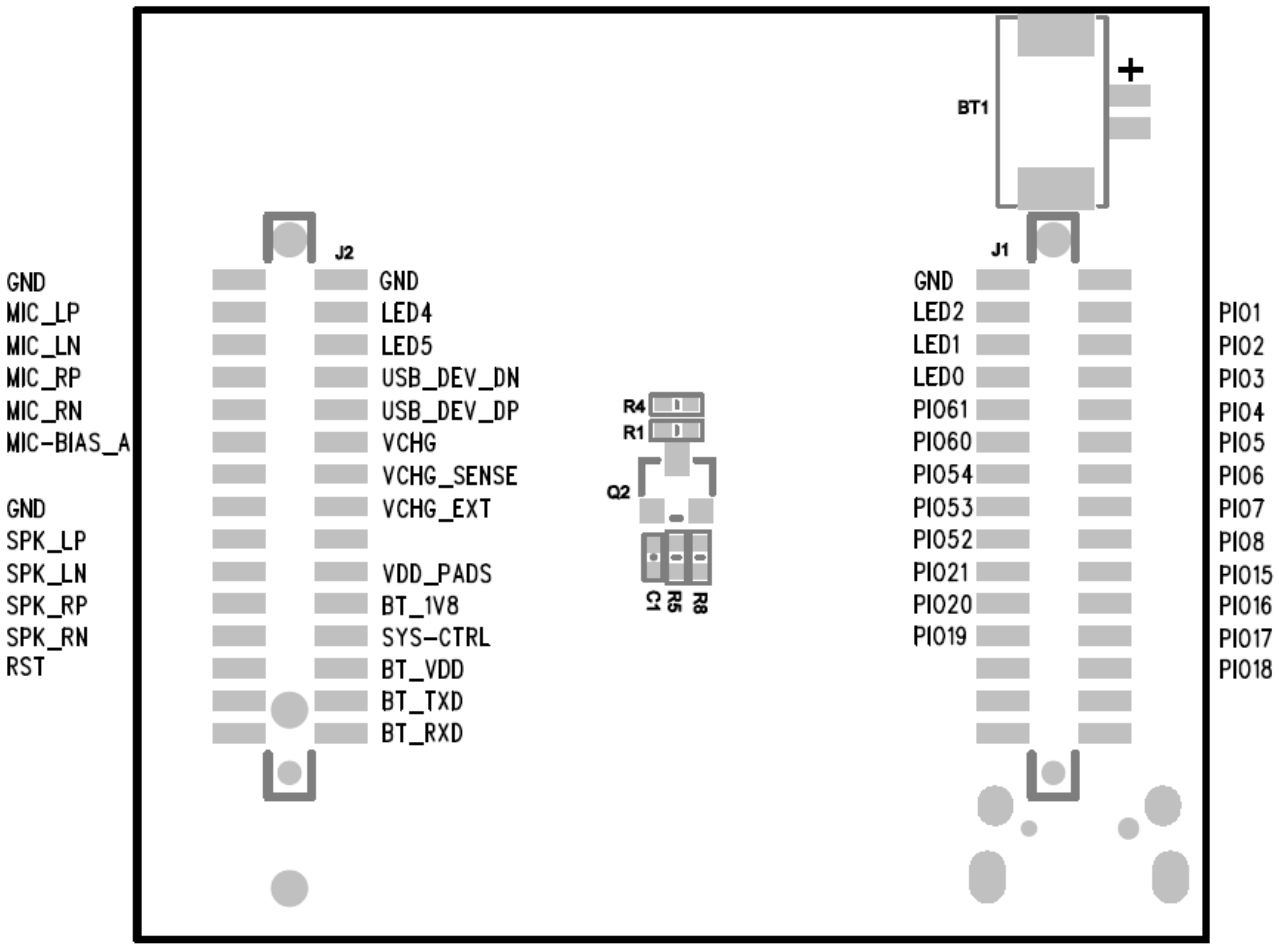

1. LED
   LED_R=LED0, LED_G=LED1, LED_G=LED2
2. UART
   The jumper is only used when it combined with the MB.
3. USB
   Use or bypass the USB signal
4. Button
   SYS_CTRL=PIO1, SW3=PIO2, SW4=PIO3

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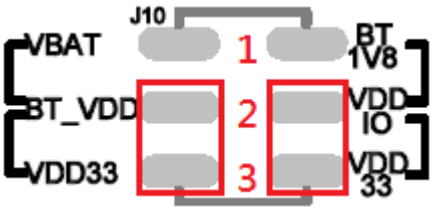
5. Power source

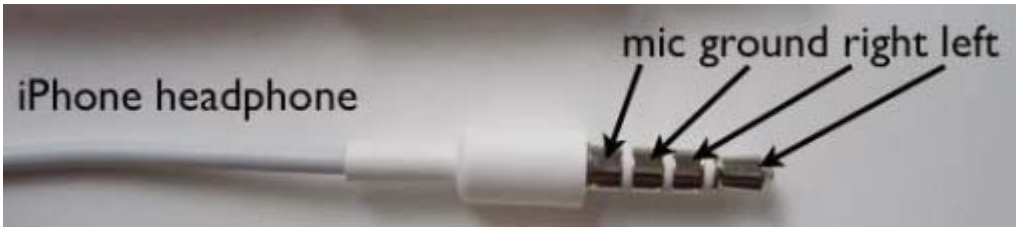


BT_VDD
1-2 short : VBAT
2-3 short : VDD33
VDD_IO
1-2 short : 1V8
2-3 short : 3V3

6. MIC IN
Use or bypass the MIC IN signal

7. SPK OUT
With the low-pass filter.

8. Phone Jack



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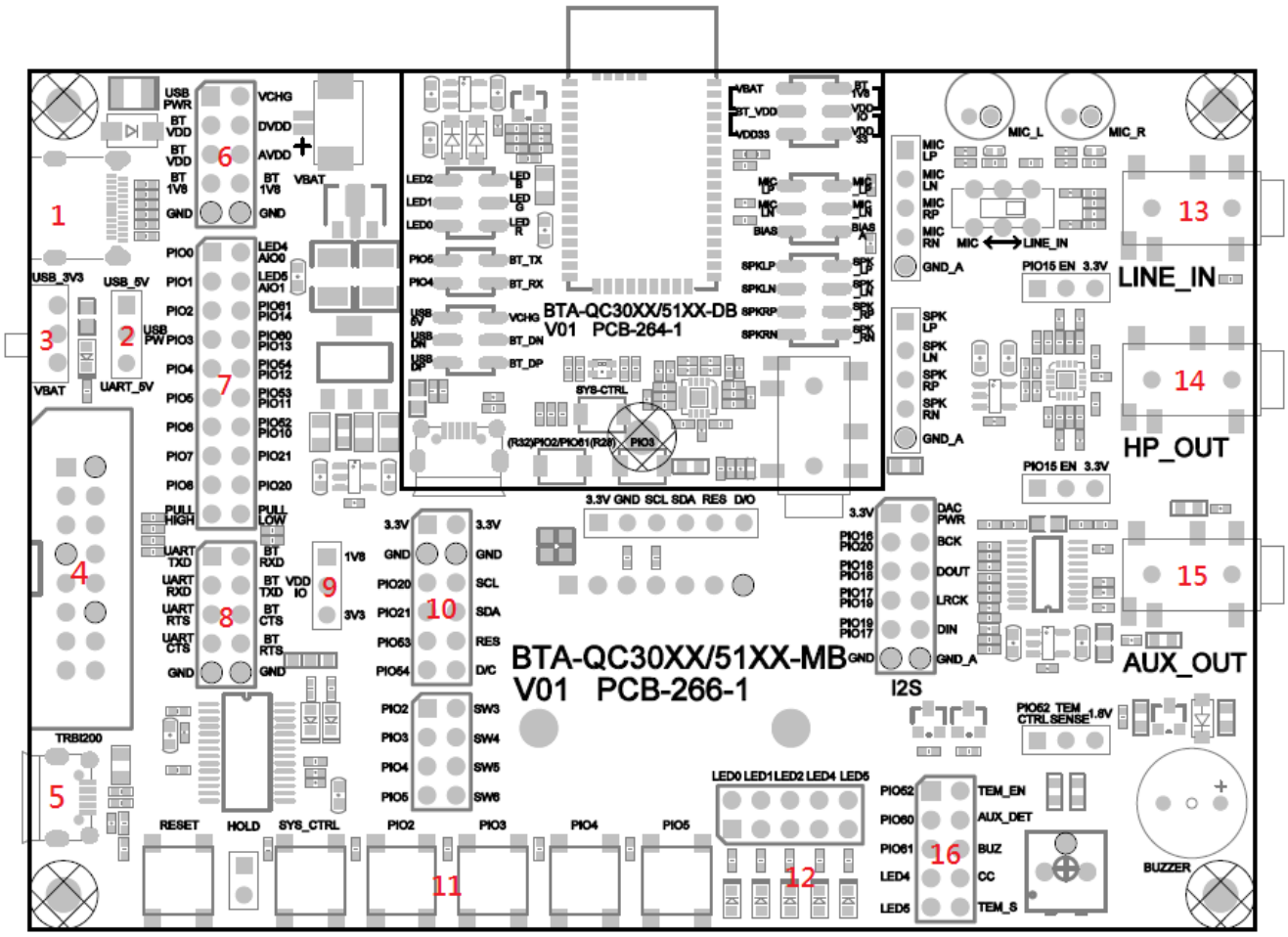
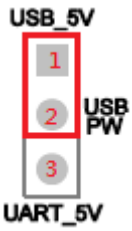
BTA-QC30XX/51XX-MB



1. USB-TYPE C
   Main USB port
2. USB Power source
   1-2 short : USB Type C
   2-3 short : Micro-USB



3. Power Switch
   UP: VDD_33 on or VBAT off.
   Down: VBAT on or power VDD_33 off.

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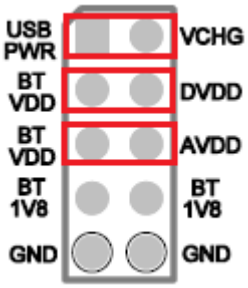
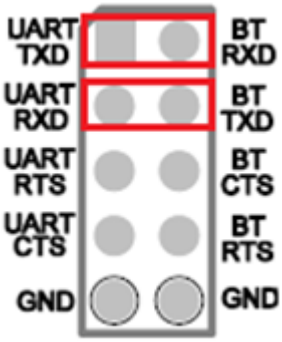
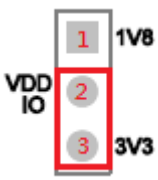
4. TRBI
   Interface for TRBI2000 Tool kit
5. USB-Micro USB
   It must be connected to this port as you use the UART function.
6. GPIO
   Full PIO/AIO test pin.
7. Power source selector
   Header default setting



8. UART
   Header default setting
   BT_TX=PIO5, BT_RX=PIO4
   MB DB



9. VDD_IO
   1-2 short: 1V8
   2-3 short: 3V3



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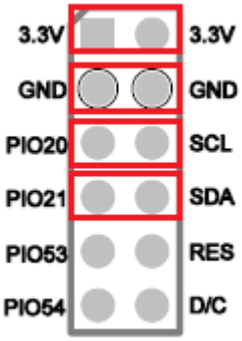
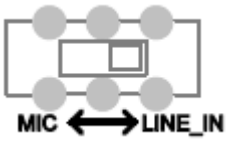
10. I2C(Display)
    Header default setting
    SCL=PIO20, SDA=PIO21



11. Button
    Header default setting:
    Reset=PIO0, SYS_CTRL=PIO1, SW3=PIO2, SW4=PIO3, SW5=PIO4, SW6=PIO5
12. LED
    Header default setting
    LED_G=LED0, LED_B=LED1, LED_R=LED2, LED_O=LED4, LED_W=LED5
13. MIC/LINE IN
    Switch setting
    Left: MIC In
    Right: Line in



14. HP OUT
    1-2 short: PIO15 enable
    2-3 short: 3.3V enable

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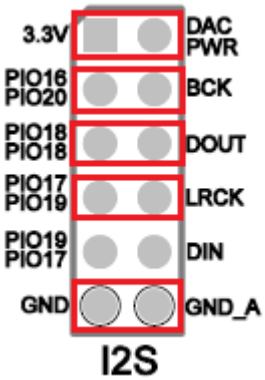
15. AUX OUT
    1-2 short: PIO15 enable
    2-3 short: 3.3V enable

Header default setting
BCLK=PIO16, DOUT=PIO, DIN=PIO19, LRCK=PIO17



16. TEM EN/Buzzer/AUX_DET/CC/TEM_S
    Header default setting
    TEM EN=PIO52, LINE IN_DET=PIO60, Buzzer=PIO61, CC_Type C=LED4,
    TEM S=LED5

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FCC (U. S. Federal Communications Commission)

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.
2. This device must accept any interference received, including interference that may cause undesired operation.

FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT

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. The 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 of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between 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 grantee of this device could void the user's authority to operate the equipment

The changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

RF exposure warning

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.