User Manual for

LUXABT01

Revision	Description of changes	Note
1.0	Created	10 September. 2019

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1 Introduction

The LUXABT01 BT Platform module consumer audio platform for wired and wireless applications integrates an ultra-low-power DSP and application processor with embedded flash memory, a high-performance stereo codec, a power management subsystem, LED and LCD drivers and capacitive touch sensor inputs in a SOC IC. The dual-core architecture with flash memory enables manufacturers to easily differentiate their products with new features without extending development cycles.

2 Specifications

Quick overview of Specification.

Operating Frequency Band	2.4GHz ~ 2.48GHz unlicensed ISM band
Bluetooth Specification	V4.2
Output Power Class	Class 1
Max. Output Power	8dBm
Date Rate	3Mbps
Channel No.	79, 40
Modulation Type	GFSK π/4 DQPSK 8DPSK
Operating Voltage	3.3V
Host Interface	USB 2.0 or UART
Audio Interface	PCM, I2S, SPDIF
Flash Memory Size	16Mbits, optional support up to 64Mb of external SPI flash
Dimension	24.5mm (L) x 13.5 (W) mm x 2.2mm (H)

Technical Specification

Absolute Maximum Rating	**Min**	**Max**
Storage Temperature	-40°C	+105°C
Supply Voltage, (VREGENABLE)	-0.4V	+4.4V
Supply Voltage, (VDD)	-0.4V	+3.6V
Supply Voltage, (V_CHG)	-0.30V	+6.5V
Other terminal voltages	VSS - 0.4	VDD + 0.4

Recommended Operating Conditions	**Min**	**Max**
Operating Temperature Range	-20°C	+70°C
Supply Voltage, (VREGENABLE)	0.7 x VDD	+4.25V
Supply Voltage, (VDD)	+1.7V	+3.6V
Supply Voltage, (V_CHG)	4.5V	+5.75V

Power Consumption	**Units**	Average
SCO Connection HV3 (30ms interval sniff mode)	mA	
SCO Connection HV1	mA	
ACL Data Transfer 115.2Kbps UART no traffic (Master)	mA	
ACL Data Transfer 115.2Kbps UART no traffic (Slave)	mA	
CODEC		
Microphone inputs and ADC/channel	mA	
DAC and loudspeaker driver, no signal/channel	mA	
Digital audio processing subsystem	mA	

VBAT = 4.2V; f = 2.441GHz; T=20°C

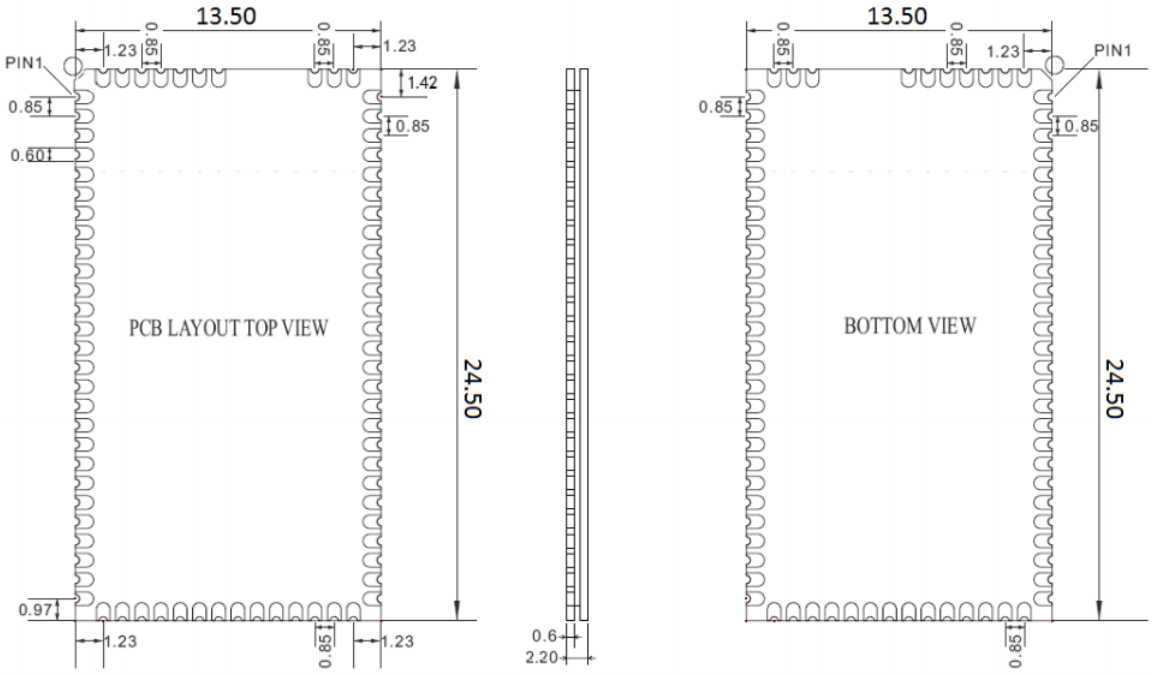
3 Mechanical overview

Mechanical Dimension

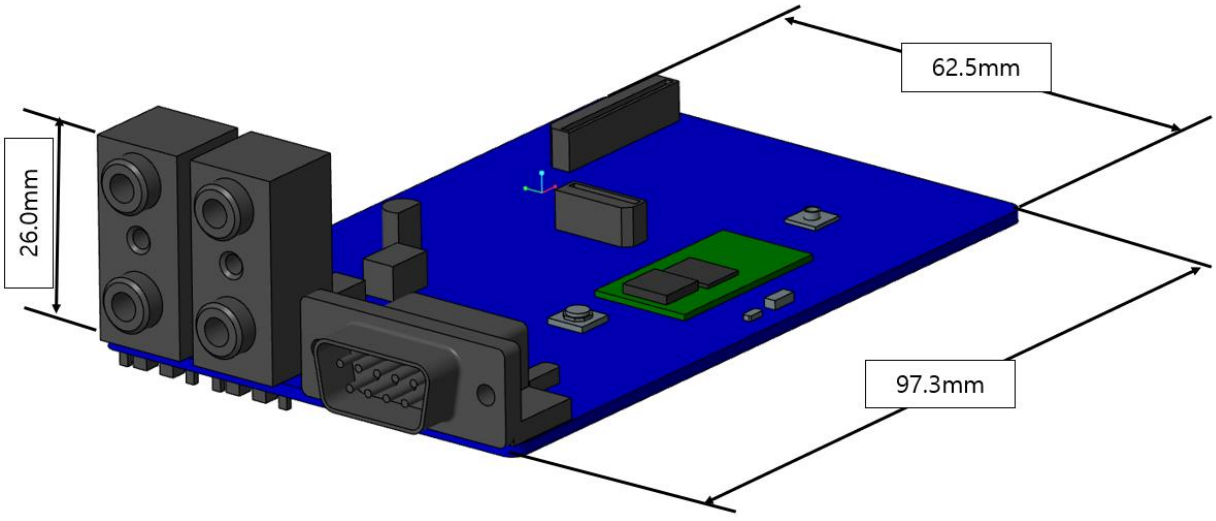
The maximum mechanical form factor of the module is shown below.

Physical Dimension Unit in mm

BT Chip



BT Module(with BT Chip)



4 I/O specification

Pin Configurations

PIN NO.	NAME	TYPE	FUNCTION	RE-MARK
1	AIO0	Bi-directional	Programmable input/output line	
2	AIO1	Bi-directional	Programmable input/output line	
3	GND	GND	Ground	
4	I2S1_BCLK	CMOS Output	Synchronous Data Clock	
5	I2S1_LRCLK	Bi-directional	Synchronous Data Sync	
6	I2S1_ DATA OUT	Bi-directional	Synchronous Data Output	
7	I2S1_DATA IN	CMOS Input	Synchronous Data Input	
8	GND	GND	Ground	
9	SPI_CLK	CMOS Input	Serial Peripheral Interface Clock	
10	SPI_MISO	CMOS Output	Serial Peripheral Interface Data Output	
11	SPI_CSB	CMOS Input	Chip Select For Synchronous Serial Interface (Active Low)	
12	SPI_MOSI	CMOS Input	Serial Peripheral Interface Data Input	
13	GND	GND	Ground	
14	RESET	CMOS input with weak internal pull-up	Reset if low. Input debounced so must be low for >5ms to cause a reset	
15	UART_RTS	Bidirectional with weak pull-up	UART request to send, active low.	
16	UART_CTS	Bidirectional with weak pull-down	UART clear to send, active low.	
17	UART_RX	Bidirectional with weak pull-up	UART data input.	
18	UART_TX	Bidirectional with weak pull-up	UART data output.	
19	LED0	Open drain output	LED Driver	
20	LED1	Open drain output	LED Driver	
21	LED2	Open drain output	LED Driver	
22	GPIO8	Bi-directional	Programmable Input/Output Line	
23	I2C SDA	Bi-directional	Programmable Input/Output Line(Serial Address/Data I/O), Alternative function GPIO9	
24	I2C SCL	Bi-directional	Programmable Input/Output Line(Serial Clock), Alternative function GPIO10	
25	GPIO11	Bi-directional	Programmable Input/Output Line	
26	I2S2_DATA IN	CMOS Input	Synchronous Data Input	
27	I2S2_DATA OUT	Bi-directional	Synchronous Data Output	
28	GPIO14	Bi-directional	Programmable Input/Output Line	
29	GPIO15	Bi-directional	Programmable Input/Output Line	
30	GPIO16	Bi-directional	Programmable Input/Output Line	
31	GPIO17	Bi-directional	Programmable Input/Output Line	
32	GPIO18	Bi-directional	Programmable Input/Output Line	
33	GPIO19	Bi-directional	Programmable Input/Output Line	
34	GPIO20	Bi-directional	Programmable Input/Output Line	
35	GPIO21	Bi-directional	Programmable Input/Output Line	
36	GND	GND	Ground	
37	GPIO22	Bi-directional	Programmable Input/Output Line	
38	GPIO23	Bi-directional	Programmable Input/Output Line	
39	GPIO24	Bi-directional	Programmable Input/Output Line	
40	GPIO25	Bi-directional	Programmable Input/Output Line	
41	GPIO26	Bi-directional	Programmable Input/Output Line	
42	GPIO27	Bi-directional	Programmable Input/Output Line	
43	I2S2_LRCLK	Bi-directional	Synchronous Data Sync	
44	I2S2_BCLK	CMOS Output	Synchronous Data Clock	
45	GND	GND	Ground	
46	USB_D+	Bi-directional	USB Data Plus	
47	USB_D-	Bi-directional	USB Data Minus	
48	GND	GND	Ground	
49	VDD_PADS	Power(in)	1.7V to 3.6V positive supply input for input/output ports: ■RST# ■UART ■PCM ■ SPI ■ PIO[15:0]	

50	VDD_MEM	Power(in)	1.8V or 3.3V positive supply input for input/output ports: ■ Serial quad I/O flash port	
51	1V8_OUT	Power(out)	1.8V switch-mode power regulator output	
52	VBAT	Power	Battery positive terminal	
53	VBAT_SENSE		Battery charger sense input. Connect directly to the battery positive pin.	
54	CHG_EXT		External battery charger control. External battery charger transistor base control when using external charger boost. Otherwise leave unconnected.	
55	V5.0	Power	Battery charger input	
56	GPIO30	Bi-directional	Programmable Input (Vreg_EN)	
57	GPIO31	Bi-directional	Programmable Input/Output Line	
58	GPIO32	Bi-directional	Programmable Input/Output Line	
59	GND	GND	Ground	
60	MIC_RN	Analogue	Microphone input negative, right	
61	MIC_RP	Analogue	Microphone input positive, right	
62	MIC_LN	Analogue	Microphone input negative, left	
63	MIC_LP	Analogue	Microphone input positive, left	
64	MIC_BIAS_B	Analogue out	Microphone bias B	
65	MIC_BIAS_A	Analogue out	Microphone bias A	
66	GND	GND	Ground	
67	SPK_LN	Analogue	Speaker output negative, left	
68	SPK_LP	Analogue	Speaker output positive, left	
69	SPK_RN	Analogue	Speaker output negative, right	
70	SPK_RP	Analogue	Speaker output positive, right	
71	GND	GND	Ground	
72	GND	GND	Ground	
73	RF-IN	RF	Bluetooth 50Ω transmitter output /receiver input	
74	GND	GND	Ground	
75	GPIO33	Bi-directional	Programmable input line (SW_V1), Connect to GPIO21 via a 1K resistor	
76	GPIO34	Bi-directional	Programmable input line (SW_V2), Connect to GPIO8 via a 1K resistor	
77	VDD_3V3	Power(in)	3.3V Positive supply input	
78	GND	GND	Ground	

5 Bluetooth RF Specification

Receiver	**Units**	Min	Typ	Max	Bluetooth Spec
Sensitivity at 0.1% BER	dBm	-90	-	-	≤-70
Maximum Receiver Signal	dBm	-20	-10	-	≥ -20
C/I Co-Channel	dB	-	6	11	≤11
Adjacent Channel Selectivity C/I -1MHz	dB	-	-6	0	≤0
2nd Adjacent Channel Selectivity C/I -2MHz	dB	-	-38	-30	≤-30
3rd Adjacent Channel Selectivity C/I -3MHz	dB	-	-45	-40	≤-40
Image Rejection C/I	dB	-	-16	-9	≤-9

VBAT = 4.2V; f = 2.4441GHz; T=20°C

Transmitter	**Units**	Min	Typ	Max	Bluetooth Spec
RF Output Power	dBm	3	6	-	0 to +20
RF Power Control Range	dB	16	24	-	> 16
RF Power Range Control Resolution	dB	-	0.5	-	-
20dB Bandwidth for Modulated Carrier	KHz	-	940	1000	<1000
2nd Adjacent Channel Power (+/- 2MHz)	dBm	-	-36	-20	≤-20
3rd Adjacent Channel Power (+/- 3MHz)	dBm	-	-45	-40	≤-40

VBAT = 4.2V; f = 2.4441GHz; T=20°C
All specifications including pinouts and electrical specifications may be changed without prior notice

6 FCC & IC Statement

FCC ID : APILUXABT01

FCC Statement:

The modular transmitter complies with FCC Part 15C 15.247

Federal Communication 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. 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 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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 device and it's antennas(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

USERS MANUAL OF THE END PRODUCT:

The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the device is small or for such use that it is not practicable to place the statement on the product, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of 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.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains FCC ID : APILUXABT01 ". If the device is small or for such use that it is not practicable to place the statement on the product, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of 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.

IC Statement:

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

For product available in the USA/Canada market

This device and it's antennas(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with IC multi-transmitter product procedures.
Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

For indoor use only.
Pour une utilisation en intérieur uniquement.

IMPORTANT NOTE:
IC Radiation Exposure Statement:
This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.
Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

This radio transmitter(IC No:6132A-LUXABT01) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.
Le présent émetteur radio(IC No: 6132A-LUXABT01) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

USERS MANUAL OF THE END PRODUCT:
In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the IC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the device is small or for such use that it is not practicable to place the statement on the product, then following IC statement is required to be available in the users manual:

IC statement is required to be available in the users manual: This device complies with Industry Canada license-exempt RSS standard(s). This Class B digital apparatus complies with Canadian ICES-003. 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.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following

" Contains IC : 6132A-LUXABT01 "

7 Antenna List

No	Antenna P/N	Manufacturer	Peak Gain(dBi)	
			2.4GHz	5.0GHz
1	CSA3A020Z	SUNG NAM Electronics Co., Ltd.	1.83dBi	2.79dBi

Appendix - Module Functional Block Diagram