BTUC49-SP

BTUC49-TX

BT4.2 Wireless Module

Product Specification 1.0

Approved:	Approved:	Prepared by:
_____	_____	_____
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Revision History:

Date	Number	Approver	Comments
Nov 13 2018	1.0	Wayne Chang	Initial Draft
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CHAPTER 1. MODULE OVERVIEW

The Foxconn BTUC49-SP/ BTUC49-TX 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 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.The enhanced Kalimba DSP coprocessor with 80MIPS supports enhanced audio and DSP applications.

The BTUC49-SP/ BTUC49-TX Bluetooth module complies with Bluetooth specification ver 4.2(BT4.0 Compatible).

It supports HSP,HFP,A2DP,AVRCP, etc. Also integrates RF,baseband controller, etc. BTUC49-SP/ BTUC49-TX provides USB & SPI interface, probrammable I/O, stereo speaker output(Analog-differential, Digital-PCM&I2S), microphone input, etc.

1-1 Key Characteristic

- Small size 22*8*2.5mm(Max,Including shielding case)
- BT Class 2(Max 4dBm)
- Bluetooth specification v4.2(BT4.0 Compatible)
- Dual-mode Bluetooth low energy radio
- Radio includes integrated balun
- 80MHz RISC MCU and 80MIPS Kalimba DSP
- 16Mb internal flash memory ;optional support for 64Mb of external SPI flash
- Stereo codec with 2 channels of ADC and up to 6 microphone inputs
- Support for CSR’s latest CVC technology voice connections including wind noise reduction
- Audio interface : I2S, PCM and SPDIF
- Serial interface : USB2.0 (full-speed),SPI & I2C
- Integrated dual switch-mode regulators, linear regulators and battery charger

1-2 Hardware Characteristic

Form factor	22 mm x 8 mm LGA Stamp
Host Interface	SPI & USB
PCB	6-layers HDI design

CHAPTER 2. ELECTRICAL AND RF SPECIFICAITON

2-1 Recommended Operation Rating

Parameter	Condition	Min	Typ.	Max.	Unit
VCHG	5	4.75	5	5.75	V
SMPS_3V3	3.3	3.10	3.3	3.60	V
VDD_USB	3.3	3.10	3.3	3.60	V
RF Interface	Zo		50		Ohm

2-2 Power Consumption

Table Power Consumption

Description	Typical	Unit
IDLE	3.6	mA
2G/1T- 1DH5	13.8	mA
2G/1T- 2DH5	13.6	mA
2G/1T- 3DH5	13.5	mA
2G/1T- 1LE	22	mA
2G/1R- 1DH5	22.2	mA
2G/1R- 2DH5	22.3	mA
2G/1R- 3DH5	22.2	mA
2G/1R- 1LE	25	mA

2-3 Electrical Specifications

Model Number	BTUC49-SP,BTUC-TX
Product Type	Bluetooth Module
Main Chip(s)	Qualcomm CSR8670
Package	66-pin LGA Stamp Pins
Bluetooth Standard(s)	BT 4.2 (BT4.0 Compatible)
Bluetooth Operating Frequency	2402-2480MHz
BT Interface(s)	SPI、USB
Bluetooth Data Rates	Up to 3Mbps
Bluetooth Tx Power BR,EDR (Typical)	0dBm (Class 2)
Bluetooth GFSK Rx Sensitivity (Typical)	-82dBm at 2402MHz -84dBm at 2441MHz -84dBm at 2480MHz
Bluetooth DQPSK Rx Sensitivity (Typical)	-83dBm at 2402MHz -85dBm at 2441MHz -85dBm at 2480MHz
Bluetooth 8DPSK Rx Sensitivity (Typical)	-77dBm at 2402MHz -79dBm at 2441MHz -79dBm at 2480MHz
Bluetooth Low Energy Tx Power (Max)	6dBm(Max)
Bluetooth Low Energy Rx Sensitivity (Typical)	-85dBm at 2402MHz -87dBm at 2440MHz -87dBm at 2480MHz
Power Requirements	3.6mA@5V_VCHG **(IDLE)**

2-4 Bluetooth RF Specification

Parameter	Condition	Min.	Typ.	Max.	Unit
Basic Data Rate – Transmit Performance					
RF Transmit Power (TRM01)		-6	0	4	dBm
Power Density (TRM02)	Per 100kHz		≤20		dBm
Power Control (TRM03)			2≤ step size ≤ 8		dB
TX Output Spectrum – Freq. Range (TRM04)	F(low)- CH0		> 2400		MHz
	F(high)-CH78		< 2483.5		
TX Output Spectrum – 20dB BW (TRM05)			$\lvert f_H-f_L \rvert$ < 1000		MHz
TX Output Spectrum – Adjacent Channel Power (TRM06)	$\lvert f-f_0 \rvert$ = 2MHz		≤ -20		dBm
	$\lvert f-f_0 \rvert$ ≥ 3MHz		≤ -40		
TX Output Spectrum – Out of Band Spurious Emission	30MHz – 1GHz		≤ -36		dBm
	1GHz -12.75GHz		≤ -30		
	5.15GHz -5.35GHz		≤ -47		
	5.725GHz-5.825GHz		≤ -47		
Modulation Characteristic (TRM07)	Delta f1 avg		140 ≤ $\Delta f1_{avg}$ ≤ 175		kHz
	Delta f2 max		≥ 115 at 99.9%		
	Delta f2 avg/Delta f1 avg		≥ 0.8		
Initial Carrier Frequency Tolerance (TRM08)			≤± 75		kHz
Carrier Frequency Drift (TRM09)	DH1		≤± 25		kHz
	DH3		≤± 40		
	DH5		≤± 40		
Maximum Drift Rate (TRM09)			20 kHz/50 us		
Enhanced Data Rate – Transmit Performance					
RF Transmit Power	π/4 DQPSK	-7	-4	-1	dBm
	8DPSK	-7	-4	-1	
Relative Transmit Power (TRM10)	All pairs		(P_{GFSK}-4 dB)<P_{DPSK}<(P_{GFSK}+1 dB)		
Carrier Frequency Stability (TRM11)	All packets		-75 ≤ w_i ≤ 75		kHz
	All blocks		-75 ≤ (w_0+w_i) ≤ 75		
	All blocks		-10 ≤ w_0 ≤ 10		
Modulation Accuracy – RMS DEVM (TRM11)	π/4 DQPSK		≤ 20		%
	8DPSK		≤ 13		
Modulation Accuracy – Peak DEVM (TRM11)	π/4 DQPSK		≤ 35		
	8DPSK		≤ 25		
Modulation Accuracy – 99% DEVM (TRM11)	π/4 DQPSK		≤ 30		
	8DPSK		≤ 20		
EDR Differential Phase Emissions (TRM12)			≥ 99		%
In-band Spurious Emission (TRM13)	$\lvert f-f_0 \rvert$ = 1MHz		≤ -26		dB
	$\lvert f-f_0 \rvert$ = 2MHz		≤ -20		dBm
	$\lvert f-f_0 \rvert$ ≥ 3MHz		≤ -40		
TX Output Spectrum – Out of Band Spurious Emission	30MHz – 1GHz		≤ -36		dBm
	1GHz -12.75GHz		≤ -30		
	5.15GHz -5.35GHz		≤ -47		

	5.725GHz-5.825GHz	≤ -47	
Enhanced power control (TRM14)	Step Size	2 ≤ Step Size ≤ 8	dB
	Difference. Btw. GFSK, π/4 DQPSK,&8DPSK	≤ 10	
Basic Data Rate – Receiver Performance			
Sensitivity at 0.1% BER (RCV01-02)		≤ -70	dBm
C/I Co-Channel interference (RCV03)		≤ 11	dB
C/I Adjacent CH interference (RCV03)	$\lvert f-f_0 \rvert$ = 1MHz	≤ 0	
	$\lvert f-f_0 \rvert$ = 2MHz	≤ -30	
	$\lvert f-f_0 \rvert$ ≥ 3MHz	≤ -40	
C/I Image CH interference (RCV03)	C/I_{image}	≤ -9	
	$C/I_{image\pm1MHz}$	≤ -20	
Out of band Blocking (RCV04)	30MHz – 2000 MHz	-10	dBm
	2003MHz – 2399MHz	-27	
	2484MHz – 2997MHz	-27	
	3000MHz – 12750MHz	-10	
Intermodulation Performance at ≤ 0.1% BER (RCV05)		-64	dBm
Maximum input power level		≥ -20	dBm
Spurious Emission	30MHz – 12.75GHz	≤ -57	dBm
Enhanced Data Rate – Receiver Performance			
Sensitivity at 0.007% BER (RCV07)	π/4 DQPSK	≤ -70	dBm
	8DPSK	≤ -70	
EDR BER Floor Performance at ≤ 0.0007% BER (RCV08)		≤-60	dBm
C/I Co-Channel interference (RCV09)	π/4 DQPSK 8DPSK	≤ +13 ≤ +21	dB
C/I Adjacent Channel C/I $\lvert f-f_0 \rvert$ = 1MHz (RCV09)	π/4 DQPSK	≤ 0	
	8DPSK	≤ +5	
C/I Adjacent Channel C/I $\lvert f-f_0 \rvert$ = 2MHz (RCV09)	π/4 DQPSK	≤ -30	
	8DPSK	≤ -25	
C/I Adjacent Channel C/I $\lvert f-f_0 \rvert$ ≥3MHz (RCV09)	π/4 DQPSK	≤ -40	
	8DPSK	≤ -33	
C/I Image Channel C/I_{image} (RCV09)	π/4 DQPSK	≤ -7	
	8DPSK	≤ 0	
C/I Image Channel $C/I_{image\pm1MHz}$ (RCV09)	π/4 DQPSK	≤ -20	
	8DPSK	≤ -13	
Maximum input power level (RCV10)		≥ -20	dBm
Spurious Emission	30MHz – 12.75GHz	≤ -57	Pass

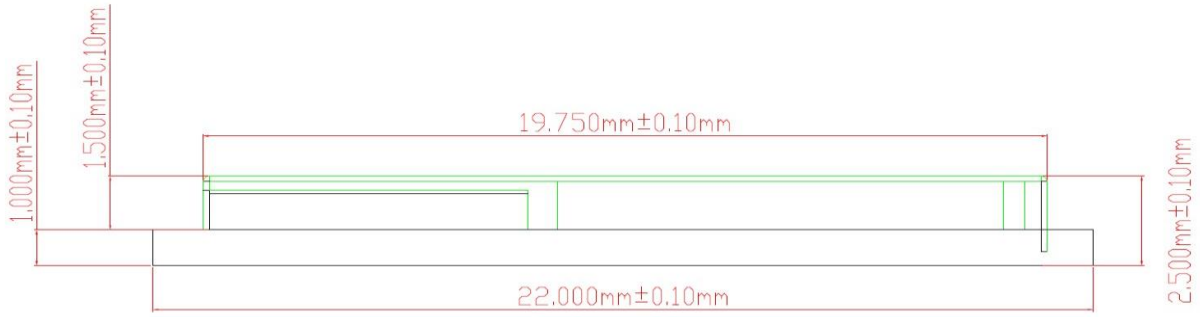
2-5 Bluetooth Low Energy RF Specification

Parameter	Condition	Min.	Typ.	Max.	Unit
Transmit Performance					
RF Transmit Power (TRM-LE01,02)		0	3	6	dBm
In-Band Emission (TRM-LE03,04)	$\lvert f-f_0\rvert$ = 2MHz		≤ -20		dBm
	$\lvert f-f_0\rvert \geq$ 3MHz		≤ -30		
TX Output Spectrum – Out of Band Spurious Emission	30MHz – 1GHz		≤ -36		dBm
	1GHz -12.75GHz		≤ -30		
	5.15GHz -5.35GHz		≤ -47		
	5.725GHz-5.825GHz		≤ -47		
Modulation Characteristic (TRM-LE05)	Delta f1 avg		225 ≤ $\Delta f1_{avg}$≤ 275		kHz
	Delta f2 max		≥ 185 at 99.9%		
	Delta f2 avg/Delta f1 avg		≥ 0.8		
Carrier Frequency Drift (TRM-LE06,07)	Center frequency		≤± 150		kHz
	During any packet		≤± 50		
Maximum Drift Rate (TRM-LE06,07)			20 Hz/50 us		
Receiver Performance					
Sensitivity at 30.8% PER (RCV-LE01,02)			≤ -70		dBm
C/I Co-Channel interference (RCV-LE03)	Co-channel		≤ 21		dB
C/I Adjacent CH interference (RCV-LE03)	$\lvert f-f_0\rvert$ = 1MHz		≤ 15		
	$\lvert f-f_0\rvert$ = 2MHz		≤ -17		
	$\lvert f-f_0\rvert \geq$ 3MHz		≤ -27		
C/I Image CH interference (RCV-LE03)	C/I_{image}		≤ -9		
	$C/I_{image\pm1MHz}$		≤ -15		
Out of band Blocking (RCV-LE04)	30MHz – 2000 MHz		-30		dBm
	2003MHz – 2399MHz		-35		
	2484MHz – 2997MHz		-35		
	3000MHz – 12750MHz		-30		
Intermodulation Performance at ≤30.8% (≤ 0.1% BER) (RCV-LE05)			-64		dBm
Maximum input power level (RCV-LE06)			≥ -10		dBm
PER Report Integrity 50% ≤ PER ≤ 65.4% (RCV-LE07)			-30		dBm
Spurious Emission	30MHz – 12.75GHz		≤ -57		dBm

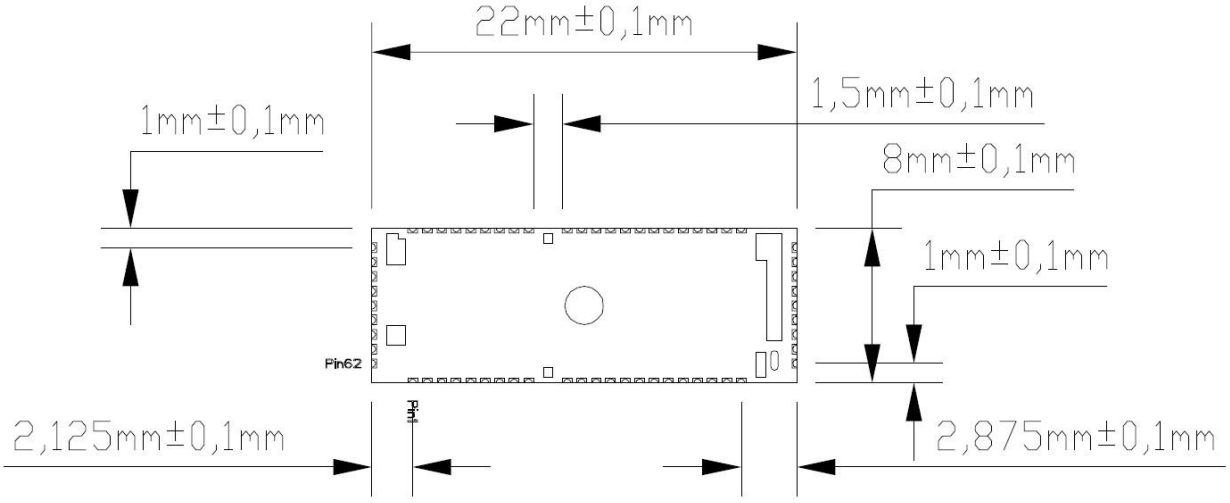
CHAPTER 3. MECHANICAL SPECIFICAITON

3-1 Module Assembly Dimension:

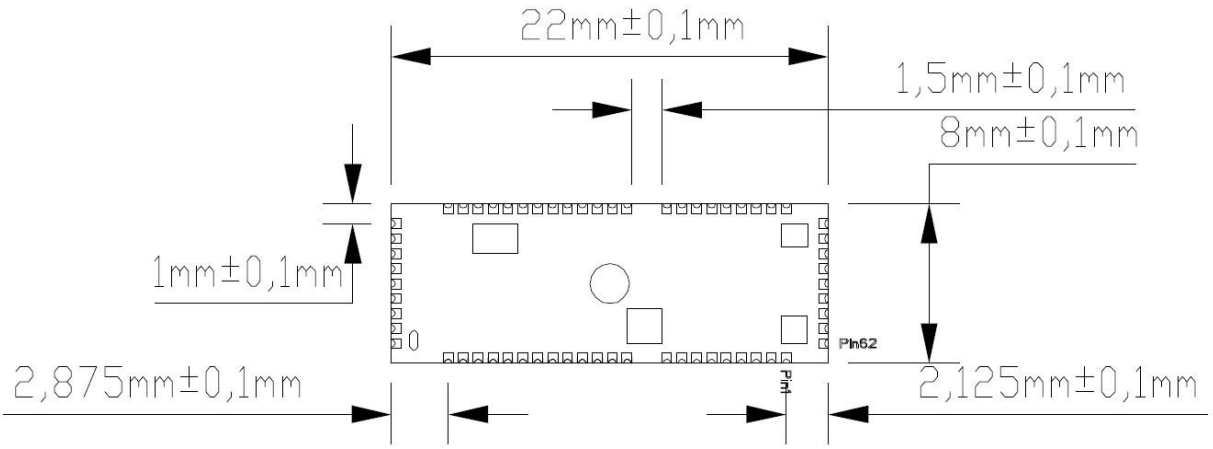
Dimension (W x L x H): 22.0 x 8.0 x 2.5 (Max) unit:mm



Side View with shielding case



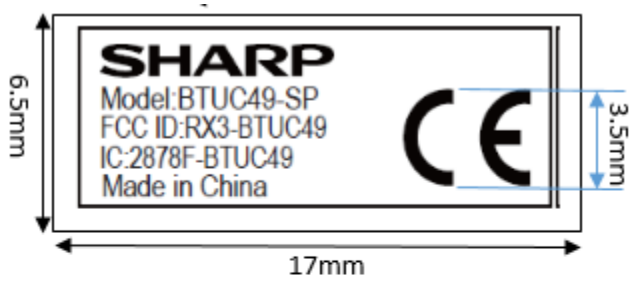
Top View

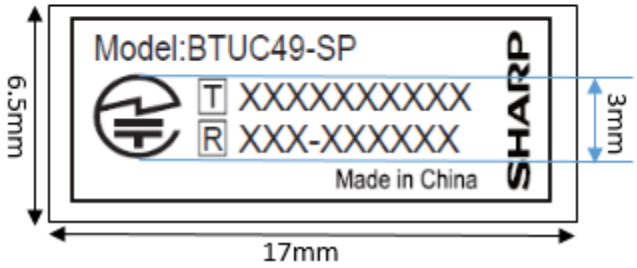

22mm±0,1mm
1,5mm±0,1mm
8mm±0,1mm
1mm±0,1mm
Pin62
Pin1
2,875mm±0,1mm
2,125mm±0,1mm

Bottom View

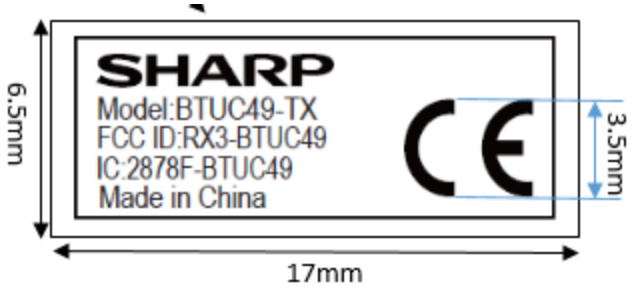
3-3 Labels Specification

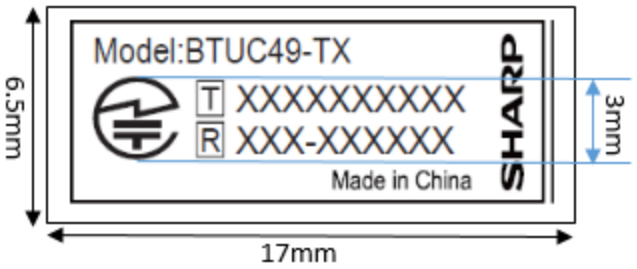
BTUC49-SP





BTUC49-TX

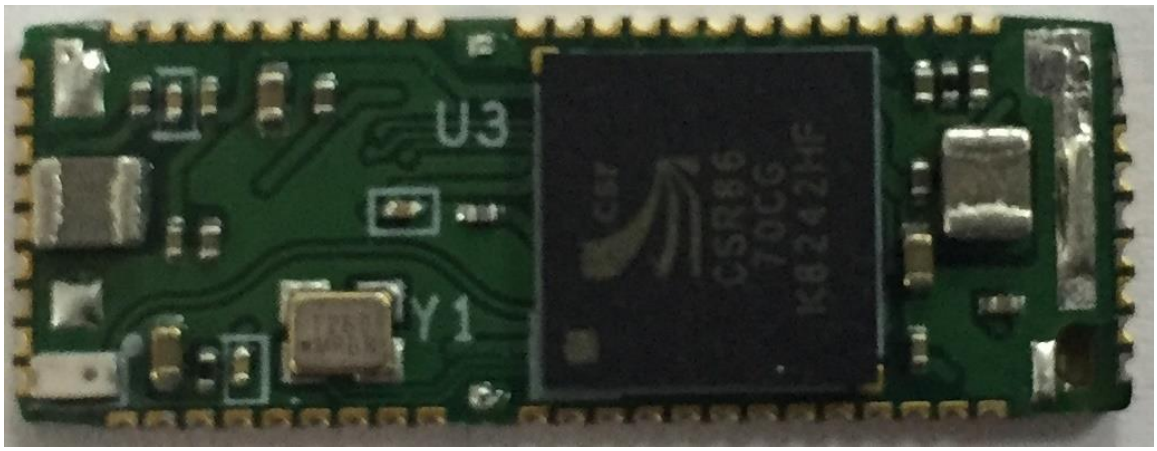




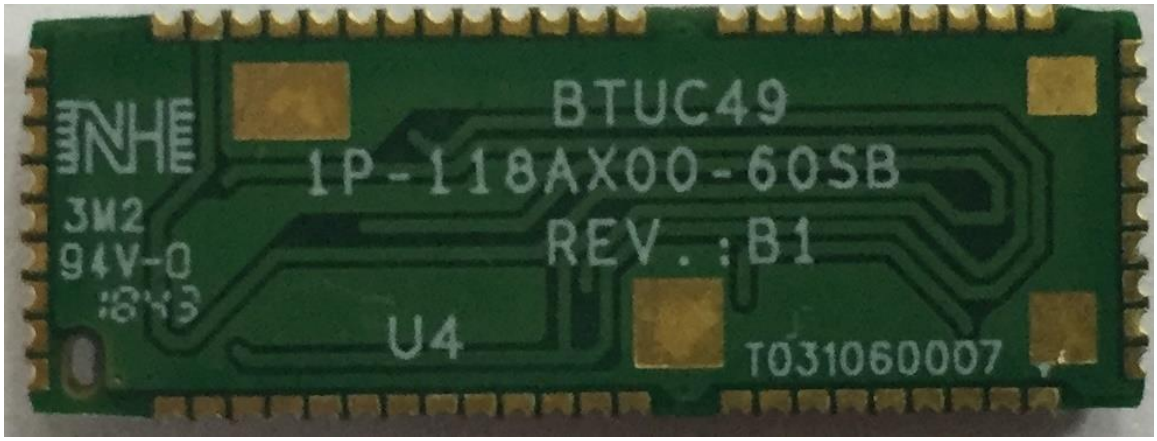
CHAPTER 4. ADDITIONAL IMFORMATION

4-1 Module Photo

Top Side Photo



Bottom Side Photo



4-2 Environment Specifications

Operating Conditions

Operation Temperature : -20℃ ～ 65℃

Relevant Humidity: 10 ~ 90% (non-condensing)

Storage Conditions

Non-Operation Temperature : -20 ~ 85℃ (Typ. 25℃)

Relevant Humidity: 10 ~ 90% (non-condensing)

Federal Communication Commission Interference 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 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 transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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 20cm between the radiator & your body.

This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

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

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: RX3-BTUC49”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

Canada, Industry Canada (IC) Statement

This Class B digital apparatus complies with Canadian ICES-003.

This device complies with Industry Canada licence-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.

RF Radiation Exposure Statement:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

Required end product labeling:

Any device incorporating this module must include an external, visible, permanent marking or label which states: “Contains IC: 2878F-BTUC49”

This radio transmitter (identify the device by certification number or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain 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.

Antenna Type: PIFA Peak Gain: 2,49 dBi

Canada, Industrie Canada (IC) Déclaration

Cet appareil numérique de classe B est conforme à la norme NMB-003.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables auxappareils 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 adioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Déclaration d'exposition aux radiations:

Cet appareil est conforme aux limites d'exposition aux rayonnements définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimale de 20 centimètres entre le radiateur et votre corps.

Obligation d'étiquetage du produit final:

Tout dispositif intégrant ce module doit comporter un externe, visible, marquage permanent ou une étiquette qui dit: "Contient IC : 2878F-BTUC49".

Cet émetteur radio (identifier le dispositif par numéro de certification ou le numéro de modèle , si la catégorie II) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous avec le gain maximal admissible indiqué . types d'antennes non inclus dans cette liste , ayant un gain supérieur au gain maximum indiqué pour ce type , sont strictement interdits pour une utilisation avec cet appareil.

Type d'antenne: PIFA Pic Gain: 2,49 dBi

National Communications Commission

根據 NCC 低功率電波輻射性電機管理辦法規定：

第十二條 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

End Product Labeling

此模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示「本產品內含射頻模組： CCXXxxLPyyyZzW 」字樣。