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Bluetooth Module

Model: CTE_BT2

Version: V1.0

1.Introduction

CTE Tech Corp. introduces the pioneer of the Bluetooth5.3 modules ORS-M81 which is a high performance, low power and compact solution. The Bluetooth module provides a complete 2.4GHz Bluetooth system based on the QCC5181 WLCSP chipset which is a single chip radio and baseband IC for Bluetooth 2.4GH systems. This module is fully qualified single-chip dual mode Bluetooth@v5.4 system.

2. Key Features

Earbud and Headset Applications

- Bluetooth® v5.4 stack and profiles
- Qualcomm Bluetooth High Speed Link
- Qualcomm TrueWireless™ Mirroring
- Feedforward, Feedback, and Hybrid Qualcomm ANC
- Qualcomm aptX™ Adaptive audio, aptX Voice, and aptX Adaptive 96 kHz, and aptX Adaptive Lossless (R2.2), and Snapdragon Sound

Gaming Codec

- 1-Mic, 2-Mic, or 3-Mic Qualcomm® cVc™ Echo Cancelling and Noise Suppression (cVc). 3-Mic: Earbud Application only
- 3-Mic cVc with Machine Learning-based noise suppression
- Adaptive Transparency Wind Noise Reduction
- Machine Learning Framework
- Bluetooth Low Energy Audio Broadcast Receiver (BMR)
- Low Latency Gaming Mode for A2DP
- LE Audio Unicast Music Receiver with Gaming mode, Call Terminal, and Stereo Recording
- LE Audio Gaming mode with Voice Back Channel
- Multipoint (BR/EDR only) with Barge-In support and 3-way call holding
- Microsoft Swift Pair
- Google Better Together, including Fast Pair and Audio Switching
- Tones and AAC Voice Prompts
- Google Voice Assistant PTT
- AMA Voice Assistant WuW and TTT
- MFi support (iAP2)
- Device Firmware Upgrade support and DFU over HID (ES quality)
- iAP2 (including GAIA framework)
- Wireless Debug Capability
- Over the air DFU (background and foreground): Earbud Application

only

- Wireless device test service for manufacturing
- Over the air update for ST Micro-based Earbud RDP case
- In charger case pairing
- Charging Case Power Line Communications using the fast comms scheme

Source Application

- Bluetooth® v5.4 stack and profiles
- Qualcomm Bluetooth High Speed Link
- Bluetooth Low Energy Audio Unicast Voice with call control (CCP)
- Bluetooth Low Energy Audio Unicast Music with media control (MCP)
- LEA Broadcast source support (TMAP and PBP) (CS quality)
- LE Audio Gaming mode with Voice Back Channel
- 19 ms LEA Gaming latency
- Volume control using VCP
- DFU support
- aptX Adaptive Lossless (R2.1/R2.2)

Audio subsystem

- Dual 32-bit Kalimba audio digital signal processor (or processing) (DSP) cores with flexible clocking from 2 MHz to 240 MHz to enable optimization of performance vs. power consumption
- DSPs execute code from ROM and from program RAM
- OEM and third party developed features can execute from program RAM
- 384 KB program RAM
- 1408 KB data RAM Application subsystem
- Dual-core application subsystem 32/80 MHz operation
- 32-bit Firmware Processor (reserved for system use)

Executes:

- ☐ Bluetooth upper stack
- ☐ Profiles
- ☐ House-keeping code
- 32-bit Developer Processor executes:
- ☐ Developer applications
- Both cores execute code from external flash memory using QSPI clocked at 32 MHz or 80 MHz
- On-chip caches per core enable optimized performance

and power consumption

Bluetooth subsystem

- Qualified to Bluetooth v5.4 specification including 2 Mbps Bluetooth Low Energy and Bluetooth Low Energy Isochronous Channels
- Qualcomm® Bluetooth High Speed Link
- Single ended antenna connection with on-chip balun and Tx/Rx switch
- Bluetooth, Bluetooth Low Energy, and mixed topologies supported
- Class 1 support

3.Applications

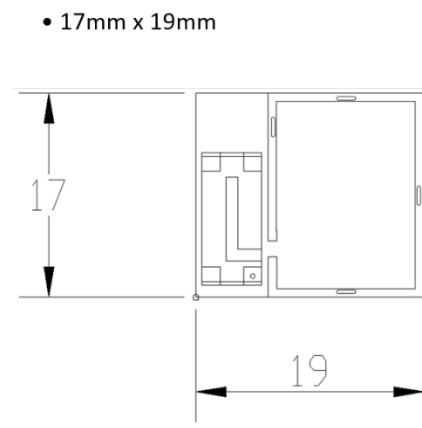
- Wired/wireless stereo headsets/headphones/Dongle
- Qualcomm True Wireless™ stereo earbuds

4.General specifications

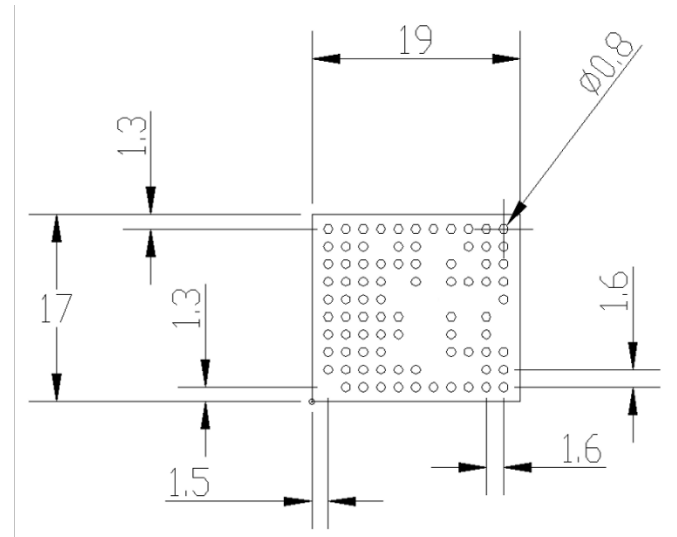
Model Name	CTE_BT2
Product Name	Bluetooth Module
Bluetooth Standard	Bluetooth 5.4
Chipset	QCC5181 WLCSP
Dimension	17mm x 19 mm x 1.7mm
Operating Conditions	
Voltage	3.0V~4.6V
Temperature	-40~+85℃
Storage Temperature	-40~+85℃
Electrical Specifications	
Frequency Range	2402~2480MHz
Maximum RF Transmit Power	13.5dBm
π /4 DQPSK Receive Sensitivity	-94.5dBm
8DPSK Receive Sensitivity	-88dBm

5. Module Package Information

5.1 Dimension Postage stamp hole

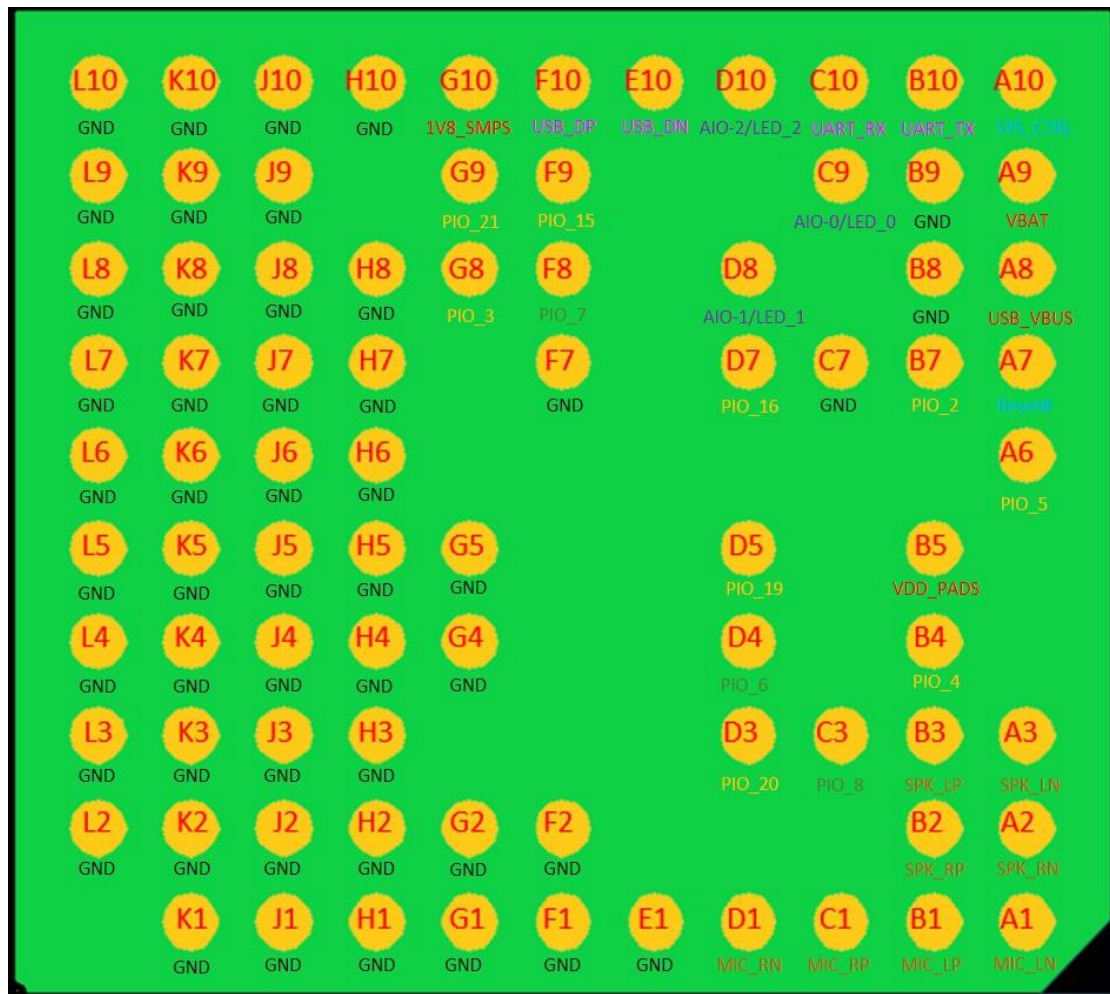


Top Layer



Bottom Layer (Top View)

5.2 Module Pin descriptions



(BGA 82 PIN)

5.3 Device Terminal Functions

Pin No	Name	Description	Pin No	Name	Description	Pin No	Name	Description
A1	MIC_LN	Microphone Left differential IN (-)	D10	A10-2/LED_2	Analog or digital input/open drain LED output	J4	GND	Ground PIN
A2	SPK_RN	Speaker Right differential Output(-)	E1	GND	Ground PIN	J5	GND	Ground PIN
A3	SPK_LN	Speaker Left differential Output(-)	E10	USB_DN	USB Data(-)	J6	GND	Ground PIN
A6	P10_5	Programmable I/O	F1	GND	Ground PIN	J7	GND	Ground PIN
A7	Reset#	Reset (active low), 120us	F2	GND	Ground PIN	J8	GND	Ground PIN
A8	USB_VBUS	USB 5V IN	F7	GND	Ground PIN	J9	GND	Ground PIN
A9	VBAT	Battery voltage input (DC 3V-4.6V)	F8	P10_7	TBR_TX_D0/Programmable I/O	J10	GND	Ground PIN
A10	SYS_CTRL	Connected to an ON/OFF push button Boot	F9	P10_15	Programmable I/O	K1	GND	Ground PIN
B1	MIC_LP	Microphone Left differential IN (+)	F10	USB_DP	USB Data(+)	K2	GND	Ground PIN
B2	SPK_RP	Speaker Right differential Output(+)	G1	GND	Ground PIN	K3	GND	Ground PIN
B3	SPK_LP	Speaker Left differential Output(+)	G2	GND	Ground PIN	K4	GND	Ground PIN
B4	P10_4	Programmable I/O	G4	GND	Ground PIN	K5	GND	Ground PIN
B5	VDD_PADS	1.8 V/3.3 V PIO supply input	G5	GND	Ground PIN	K6	GND	Ground PIN
B7	P10_2	Programmable I/O	G8	P10_3	Programmable I/O	K7	GND	Ground PIN
B8	GND	Ground PIN	G9	P10_21	Programmable I/O	K8	GND	Ground PIN
B9	GND	Ground PIN	G10	1V8_SMPS	DC 1.8V Output	K9	GND	Ground PIN
B10	UART_TX	UART data output	H1	GND	Ground PIN	K10	GND	Ground PIN
C1	MIC_RP	Microphone Right differential IN (+)	H2	GND	Ground PIN	L2	GND	Ground PIN
C3	P10_8	TBR_RX_CLK/Programmable I/O	H3	GND	Ground PIN	L3	GND	Ground PIN
C7	GND	Ground PIN	H4	GND	Ground PIN	L4	GND	Ground PIN
C9	A10-0/LED_0	Analog or digital input/open drain LED output	H5	GND	Ground PIN	L5	GND	Ground PIN
C10	UART_RX	UART data input	H6	GND	Ground PIN	L6	GND	Ground PIN
D1	MIC_RN	Microphone Right differential IN (-)	H7	GND	Ground PIN	L7	GND	Ground PIN
D3	P10_20	Programmable I/O	H8	GND	Ground PIN	L8	GND	Ground PIN
D4	P10_6	TBR_RX_D0/Programmable I/O	H10	GND	Ground PIN	L9	GND	Ground PIN
D5	P10_19	Programmable I/O	J1	GND	Ground PIN	L10	GND	Ground PIN
D7	P10_16	Programmable I/O	J2	GND	Ground PIN			
D8	A10-1/LED_1	Analog or digital input/open drain LED output	J3	GND	Ground PIN			

6 Electrical Characteristics

6.1 Absolute Maximum Ratings

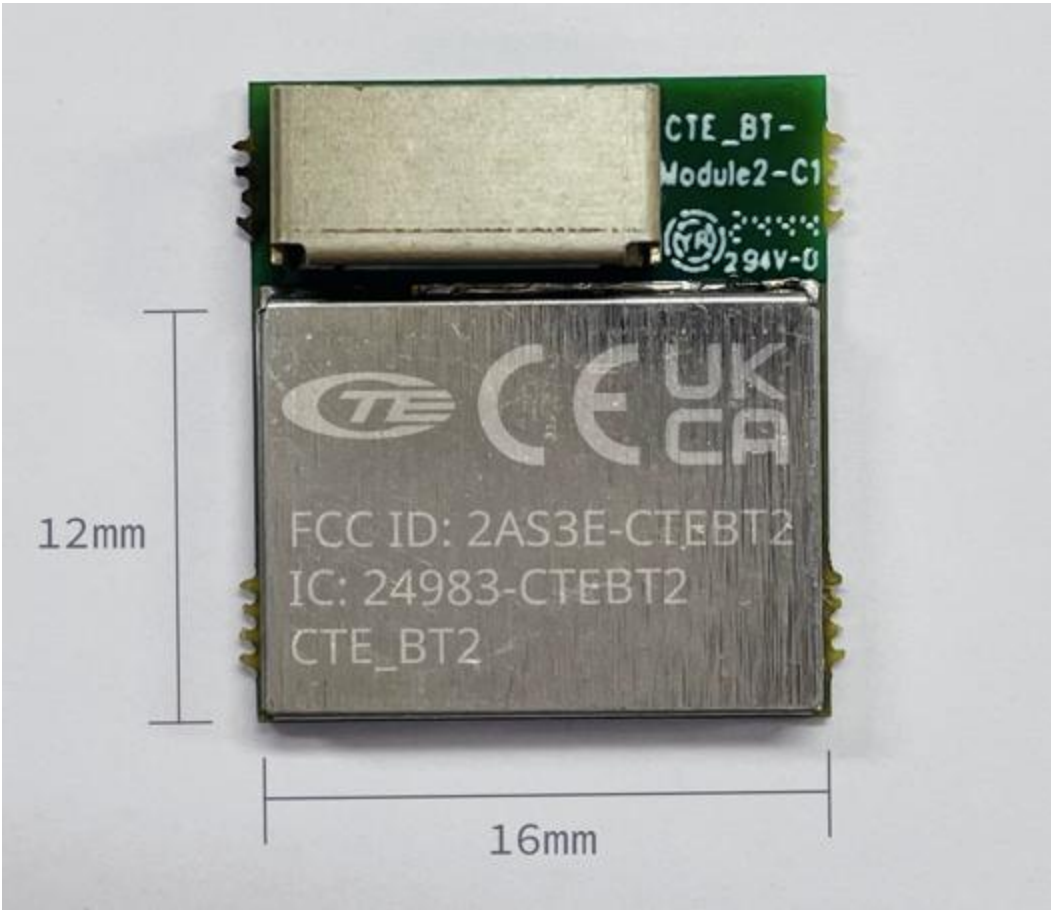
Rating	Minimum	Maximum
Storage temperature	-40°C	+85°C

6.2 Recommended Operating Conditions

Operating Condition	Minimum	Maximum
Operating temperature range	-40°C	+85°C
Supply voltage: VBAT	+3.0V	+4.6V

7 Label

Laser engraving printing label



8 Wireless Certifications

Country	Mark
U.S	FCC ID: 2AS3E-CTEBT2
Canada	IC: 24983-CTEBT2
Europe	
Taiwan	
Japan	
Korea	
U. K	

9 Warning

FCC Statement:

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. 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 or more 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.

CAUTION:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the 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.

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.

Information for OEMs and host integrators

The OEM or integrator is obligated to adhere to these requirements and restrictions as a condition for using the module's certification.

The OEM or integrator is responsible to perform the required additional host regulatory testing and/or obtaining the required host approvals for compliance.

2.2 List of applicable FCC rules

This module has been tested for compliance to FCC Part 15 Subpart C (15.247).

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) will need a separate reassessment through a class II permissive change application or new certification.

2.4 Limited module procedures

Not applicable, this device is a single modular approval and meets FCC 47 CFR 15.212 requirement.

2.5 Trace antenna designs

Not applicable. This module has its own antenna, and does not need a host's printed board micro strip trace antenna, etc.

2.6 RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. A separate SAR/Power Density evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

2.7 Antennas

This module has been approved to operate with the antenna types listed below, with the maximum permissible

gain indicated.

No.	Manufacturer	Part No.	Antenna Type	Peak Gain (dBi)	Freq. Range (GHz)	Connector Type
1	OpenRoad Solutions, Inc	66-040011	PIFA	3.3dBi	2.4GHz~2.5GHz	None

IMPORTANT: The final host product must have an integral antenna which is not removable by the end-user.

2.8 Label and compliance information

Label of the end product:

The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2AS3E-CTEBT2". The grantee's FCC ID can be used only when all FCC compliance requirements are met

2.9 Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) class II permissive change re-evaluation or new certification.

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if

applicable. As long as all 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 cannot 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 cannot 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 obtaining a separate FCC authorization.

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.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

IC Statement:

Innovation, Science and Economic Development Canada(ISED) Compliance Statement

This device complies with ISED's licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement:

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

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à plus de 20 cm entre le radiateur et votre corps.

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

- 1) The antenna must be installed and operated with greater than 20cm 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.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

- 1) L'antenne doit être installée et exploitée avec plus de 20 cm entre l'antenne et les utilisateurs, et
- 2) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne. Tant que les 2 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires.

Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

IMPORTANT NOTE: In the event that these conditions cannot be met (for example certain laptop configurations or colocation with another transmitter), then the Canada authorization is no longer considered valid and the IC ID cannot 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 obtaining a separate Canada authorization.

IMPORTANTENOTE

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considérée comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC: IC: 24983-CTEBT2".

Étiquetage du produit final

Ce module émetteur est uniquement autorisé à être utilisé dans un appareil où l'antenne peut être installée de manière à ce que 20 cm puissent être maintenus entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans une zone visible avec les informations suivantes: "Contient le module d'émission IC: 24983-CTEBT2".

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.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir à l'utilisateur final des informations concernant la procédure d'installation ou de suppression de ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations / avertissements réglementaires requis, comme indiqué dans ce manuel.

This radio transmitter [IC: 24983-CTEBT2] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

This radio transmitter [IC: 24983-CTEBT2] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio [IC: 24983-CTEBT2] a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur

No.	Manufacturer	Part No.	Antenna Type	Peak Gain (dBi)	Freq. Range (GHz)	Connector Type
1	OpenRoad Solutions, Inc	66-040011	PIFA	3.3dBi	2.4GHz~2.5GHz	None

IMPORTANT: The final host product must have an integral antenna which is not removable by the end-user.

CE RED / UK RER Compliance Statement

EU Declaration of Conformity

Hereby, CTE Tech Corp. declares that the radio equipment type CTE_BT2 is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address:

<https://www.ctetechcorp.com/product/meter>

RF Exposure warning

This device meets the EU requirements (2014/53/EU) on the limitation of exposure of the general public to electromagnetic fields by way of health protection.

The device complies with RF specifications when the device used at 20 cm from your body.



AT	BE	BG	CH	CY	CZ	DK	DE
EE	EL	ES	FI	FR	HR	HU	IE
IS	IT	LT	LU	LV	MT	NL	PL
PT	RO	SI	SE	SK	NI		

All operational modes:

Technologies	Frequency range (MHz)	Max. Transmit Power
Bluetooth EDR	2402-2480 MHz	
Bluetooth LE	2402-2480 MHz	

NCC 警語：

取得審驗證明之低功率射頻器材，非經核准，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。低功率射頻器材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。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材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。

本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，並要求最終產品平台

廠商(OEM Integrator)於最終產品平台(End Product)上標示:

本產品內含射頻模組，其 NCC 型式認證號碼為:  CCXXxxYYyyyZzW