



RF Exposure Evaluation

For

Guangzhou BDE Technology Inc.

BDE 2.4GHz Multi-Protocol Wireless Module with PA

Test Model: BDE-MP2674P10A32

Additional Model No.: Please Refer to Page 6

Prepared for : Guangzhou BDE Technology Inc.
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Guangzhou 510663, China

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Date of receipt of test sample : May 20, 2024
Number of tested samples : 2
Sample No. : A240514023-1, A240514023-2
Serial number : Prototype
Date of Test : May 20, 2024 ~ July 28, 2025
Date of Report : July 29, 2025



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**RF Exposure Evaluation****Report Reference No.** : **LCSA05144093EC****Date of Issue**..... : July 29, 2025**Testing Laboratory Name**..... : **Shenzhen LCS Compliance Testing Laboratory Ltd.****Address**..... : 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China**Testing Location/ Procedure**..... : Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing method ☐**Applicant's Name**..... : **Guangzhou BDE Technology Inc.****Address**..... : B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District, Guangzhou 510663, China**Test Specification****Standard**..... : FCC KDB publication 447498 D01 General 1 RF Exposure
Guidance v06
FCC CFR 47 part1 1.1310
FCC CFR 47 part2 2.1091**Test Report Form No**..... : TRF-4-E-214 A/0**TRF Originator**..... : Shenzhen LCS Compliance Testing Laboratory Ltd.**Master TRF**..... : Dated 2011-03**Shenzhen LCS Compliance Testing Laboratory Ltd. All rights reserved.**

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EUT Description..... : **BDE 2.4GHz Multi-Protocol Wireless Module with PA****Trade Mark**..... : BDE**Test Model**..... : BDE-MP2674P10A32**Ratings**..... : Input: DC 3.3V**Result** : **PASS****Compiled by:**

Joker Hu/ Administrator

Supervised by:

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Approved by:

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RF Exposure Evaluation

Test Report No. :	LCSA05144093EC	July 29, 2025 Date of issue
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Test Model.....	: BDE-MP2674P10A32
EUT.....	: BDE 2.4GHz Multi-Protocol Wireless Module with PA
Applicant.....	: Guangzhou BDE Technology Inc.
Address.....	: B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District, Guangzhou 510663, China
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Factory.....	: Guangzhou BDE Technology Inc.
Address.....	: B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District, Guangzhou 510663, China
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Fax.....	: /

Test Result	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.





Revision History

Report Version	Issue Date	Revision Content	Revised By
000	July 29, 2025	Initial Issue	---





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1. Product Information

Product name	BDE 2.4GHz Multi-Protocol Wireless Module with PA
Test Model	BDE-MP2674P10A32
Additional Model No.	See model list
Ratings	Input: DC 3.3V
Hardware version	V1
Software version	7.40.00
Bluetooth	
Frequency Range	2402MHz~2480MHz
Channel Number	40 channels for Bluetooth V5.3 (DTS)
Channel Spacing	2MHz for Bluetooth V5.3 (DTS)
Modulation Type	GFSK for Bluetooth V5.3 (DTS)
Bluetooth Version	V5.3
Antenna Description	For PCB Trace Antenna: Integrated PCB trace antenna, 0.8dBi(Max.) For ANT Pin or U.FL connector: Dipole whip antenna, 3.0dBi(Max.)
Zigbee	
Frequency Range	2405MHz-2480MHz
Channel Spacing	5MHz
Channel Number	16 Channels
Modulation Type	O-QPSK
Antenna Description	For PCB Trace Antenna: Integrated PCB trace antenna, 0.8dBi(Max.) For ANT Pin or U.FL connector: Dipole whip antenna, 3.0dBi(Max.)
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Devices

Note: For a more detailed antenna description, please refer to the antenna specifications or the antenna report provided by the customer.





Model list:

Model Number	Orderable Part Number	Chipset	Flash (KB)	SRAM (KB)	Antenna on 2.4G	On-Board SPI Flash Support	Operating Temperature(°C)
BDE-MP26P	BDE-MP2674P10A32	CC2674P10	1024	296	PCB Trace Antenna	32Mbit	-40 ~ +85
	BDE-MP2674P10U32				U.FL Connector		
	BDE-MP2674P10N32				ANT Pin		
	BDE-MP2674P10A0				PCB Trace Antenna	Not Included	
	BDE-MP2674P10U0				U.FL Connector		
	BDE-MP2674P10N0				ANT Pin		
	BDE-MP2674P10A32-IN				PCB Trace Antenna	32Mbit	
	BDE-MP2674P10U32-IN				U.FL Connector		
	BDE-MP2674P10N32-IN				ANT Pin		
	BDE-MP2674P10A0-IN				PCB Trace Antenna	Not Included	
	BDE-MP2674P10U0-IN				U.FL Connector		
	BDE-MP2674P10N0-IN				ANT Pin		
	BDE-MP2652P7A32	CC2652P7	704	152	PCB Trace Antenna	32Mbit	-40 ~ +85
	BDE-MP2652P7U32				U.FL Connector		
	BDE-MP2652P7N32				ANT Pin		
	BDE-MP2652P7A0				PCB Trace Antenna	Not Included	
	BDE-MP2652P7U0				U.FL Connector		
	BDE-MP2652P7N0				ANT Pin		
	BDE-MP2652P7A32-IN				PCB Trace Antenna	32Mbit	-40 ~ +105
	BDE-MP2652P7U32-IN				U.FL Connector		
	BDE-MP2652P7N32-IN				ANT Pin		
	BDE-MP2652P7A0-IN				PCB Trace Antenna	Not Included	
	BDE-MP2652P7U0-IN				U.FL Connector		
	BDE-MP2652P7N0-IN				ANT Pin		
	BDE-MP2651P3A32				PCB Trace Antenna	32Mbit	





BDE-MP2651P3U32	CC2651P 3	352	40	U.FL Connector	Not Included	-40 ~ +85
BDE-MP2651P3N32				ANT Pin		
BDE-MP2651P3A0				PCB Trace Antenna		
BDE-MP2651P3U0				U.FL Connector		
BDE-MP2651P3N0				ANT Pin		
BDE-MP2651P3A32-IN				PCB Trace Antenna	32Mbit	-40 ~ +105
BDE-MP2651P3U32-IN				U.FL Connector		
BDE-MP2651P3N32-IN				ANT Pin		
BDE-MP2651P3A0-IN				PCB Trace Antenna	Not Included	
BDE-MP2651P3U0-IN				U.FL Connector		
BDE-MP2651P3N0-IN				ANT Pin		
BDE-MP2652PA32	CC2652P	352	88	PCB Trace Antenna	32Mbit	-40 ~ +85
BDE-MP2652PU32				U.FL Connector		
BDE-MP2652PN32				ANT Pin		
BDE-MP2652PA0				PCB Trace Antenna	Not Included	
BDE-MP2652PU0				U.FL Connector		
BDE-MP2652PN0				ANT Pin		
BDE-MP2652PA32-IN				PCB Trace Antenna	32Mbit	-40 ~ +105
BDE-MP2652PU32-IN				U.FL Connector		
BDE-MP2652PN32-IN				ANT Pin		
BDE-MP2652PA0-IN				PCB Trace Antenna	Not Included	
BDE-MP2652PU0-IN				U.FL Connector		
BDE-MP2652PN0-IN				ANT Pin		

The differences between series models mainly lie in the size of Flash and SRAM, antenna interface method, whether an external 32Mbit SPI Flash is configured, and differences in operating temperature.





2. Evaluation Method and Limit

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Refer Evaluation Method

3. 1 Refer Evaluation Method

[ANSI C95.1-2019](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices.

3. 2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Uncontrolled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density



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4. MPE Calculation Method

Predication of MPE limit at a given distance
Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

5. Antenna Information

EUT can only use antennas certificated as follows provided by manufacturer;

Internal/External Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Internal	PCB trace antenna	2400MHz ~ 2500MHz	0.8dBi
External	Whip antenna	2400MHz ~ 2500MHz	3.0dBi

6. Conducted Power

[BT LE]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
BLE 1M	0	2402	18.01
	19	2440	17.74
	39	2480	17.17
BLE 2M	0	2402	17.98
	19	2440	17.69
	39	2480	7.83
BLE 125Kbps	0	2402	18.03
	19	2440	18.05
	39	2480	17.48
BLE 500Kbps	0	2402	18.04
	19	2440	18.03
	39	2480	17.47

[Zigbee]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
O-QPSK	0	2405	17.97
	7	2440	17.72
	15	2480	-1.96

7. Manufacturing Tolerance

BLE 1M (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	18.0	17.0	17.0
Tolerance ± (dB)	1.0	1.0	1.0





BLE 2M (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	17.0	17.0	7.0
Tolerance \pm (dB)	1.0	1.0	1.0

BLE 125Kbps(Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	18.0	18.0	17.0
Tolerance \pm (dB)	1.0	1.0	1.0

BLE 500Kbps (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	18.0	18.0	17.0
Tolerance \pm (dB)	1.0	1.0	1.0

[Zigbee]

O-QPSK (Peak)			
Channel	Channel 0	Channel 7	Channel 15
Target (dBm)	17.0	17.0	-1.0
Tolerance \pm (dB)	1.0	1.0	1.0

8. Measurement Results

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r=20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

[BT LE]

Modulation Type	Output power		Max. Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
BLE 1M	19.0	79.4328	3.0	1.9953	0.0315	1.0000
BLE 2M	18.0	63.0957	3.0	1.9953	0.0251	1.0000
BLE 125Kbps	19.0	79.4328	3.0	1.9953	0.0315	1.0000
BLE 500Kbps	19.0	79.4328	3.0	1.9953	0.0315	1.0000

[Zigbee]

Modulation Type	Output power		Max. Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW				
O-QPSK	18.0	63.0957	3.0	1.9953	0.0251	1.0000

8.2 Simultaneous Transmission MPE

The EUT has one 2.4G band. So no need consider simultaneous transmission. According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations; $\sum \sum$ of MPE ratios ≤ 1.0





Simultaneous Transmission				
BT LE band antenna Max. MPE ratios	Zigbee band antenna Max. MPE ratios	Σ MPE ratios	Limit	Results
0.0315	0.0251	0.0566	1.0	Pass

Remark:

1. Output power including tune-up tolerance;
2. MPE evaluate is assessed based on the maximum antenna gain value(worst case)
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.

9. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

10. Description of Test Facility

NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.
Test Firm Registration Number: 254912.

11. Measurement Uncertainty

BLE/Zigbee:

Test Item		Frequency Range	Uncertainty	Note
Output power	:	1GHz-40GHz	$\pm 0.57\text{dB}$	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

-----THE END OF REPORT-----

