



RF Exposure Evaluation

For

Focalcrest Limited

Mixtile 2-in-1 Zigbee & Z-Wave mPCIe Interface Module

Test Model: ACC-ZZM01-US

Prepared for : Focalcrest Limited
Address : Haisong Building Tower B Suite 1101, Tairan 9th Road, Futian District, Shenzhen China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : June 10, 2025
Number of tested samples : 2
Sample No. : A250603005-1, A250603005-2
Serial number : Prototype
Date of Test : June 10, 2025 ~ July 14, 2025
Date of Report : July 15, 2025



Shenzhen LCS Compliance Testing Laboratory Ltd.

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Scan code to check authenticity



RF Exposure Evaluation	
Report Reference No.	LCSA06105079EC
Date of Issue	July 15, 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	Focalcrest Limited
Address	Haisong Building Tower B Suite 1101, Tairan 9th Road, Futian District, Shenzhen China
Test Specification	
Standard	FCC KDB publication 447498 D01 General RF Exposure Guidance v06 FCC CFR 47 part1 1.1310 FCC CFR 47 part2 2.1091
Test Report Form No.	TRF-4-E-215 A/0
TRF Originator	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	Dated 2011-03
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Test Item Description	Mixtile 2-in-1 Zigbee & Z-Wave mPCIe Interface Module
Trade Mark	MIXTILE
Test Model	ACC-ZZM01-US
Ratings	Input: DC 3.3V, 1705mA
Result	PASS

Compiled by:

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Supervised by:

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Approved by:

Gavin Liang/ Manager



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RF Exposure Evaluation

Test Report No. : LCSA06105079EC	<u>July 15, 2025</u> Date of issue
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EUT.....	: Mixtile 2-in-1 Zigbee & Z-Wave mPCIe Interface Module
Test Model.....	: ACC-ZZM01-US
Applicant.....	: Focalcrest Limited
Address.....	: Haisong Building Tower B Suite 1101, Tairan 9th Road, Futian District, Shenzhen China
Telephone.....	: /
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Manufacturer.....	: Mixtile Limited
Address.....	: Room1101, Tower B, Haisong Building, Tairan 9th Road, Futian District, Shenzhen, Guangdong, China
Telephone.....	: /
Fax.....	: /
Factory.....	: Mixtile Limited
Address.....	: Room1101, Tower B, Haisong Building, Tairan 9th Road, Futian District, Shenzhen, Guangdong, China
Telephone.....	: /
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 15, 2025	Initial Issue	---





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**1. Product Information**

EUT	:	Mixtile 2-in-1 Zigbee & Z-Wave mPCIe Interface Module
Test Model	:	ACC-ZZM01-US
Ratings	:	Input: DC 3.3V, 1705mA
Hardware Version	:	V1.0.0
Software Version	:	V1.0.0
Zigbee	:	
Frequency Range	:	2405MHz-2480MHz
Channel Spacing	:	5MHz
Channel Number	:	16 Channels
Modulation Type	:	O-QPSK
Antenna Description	:	External Antenna, 2.72dBi(Max.)
Z-Wave	:	
Frequency Range	:	908.4MHz, 916MHz
Channel Number	:	2 Channels
Modulation Type	:	FSK
Antenna Description	:	External Antenna, 3.30dBi(Max)
Exposure category	:	General population/uncontrolled environment
EUT Type	:	Production Unit
Device Type	:	Mobile Device
Note: For a more detailed antenna description, please refer to the antenna specifications or the antenna report provided by the customer.		





2. Evaluation Method

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. Limit

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





4. MPE Calculation Method

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

$$S = \frac{PG}{4\pi R^2}$$

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	Notes
External	External Antenna	2405MHz-2480MHz	2.72dBi	Zigbee Antenna
External	External Antenna	908.4MHz, 916MHz	3.30dBi	Z-Wave Antenna





6. Conducted Power

[Zigbee]

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
Zigbee	0	2405	8.48
	7	2440	8.77
	15	2480	8.37

7. Manufacturing Tolerance

[Zigbee]

O-QPSK (Peak)			
Channel	Channel 0	Channel 07	Channel 15
Target (dBm)	8.0	8.0	8.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

Test Procedure

TX frequency range: 916MHz

Device category: Portable device (Distance: 20cm)

Max. Field Strength: 85.71dBuV/m @3m

EIRP=E-104.8+20logD=85.71-104.8+20log3=-9.55dBm

Maximum Conducted Output Power: -9.55dBm

Turn-up: -9 $\pm$ 1

8. Measurement Results

8.1 Standalone MPE Evaluation

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.

[Zigbee]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE Ratio
	dBm	mW					
O-QPSK	9.0	7.9433	2.72	1.8707	0.0030	1.0000	0.0030

[Z-Wave]

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)	MPE Ratio
	dBm	mW					
FSK	-8.0	0.1585	3.30	2.1380	0.0001	0.6107	0.0002

Remark:

1. Output power including tune-up tolerance;
2. Output power was adjusted to duty cycle at 100% if measured duty cycle less than 98%;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer.





8.2 Simultaneous Transmission MPE Evaluation

The EUT equipped with one ZigBee antenna and one Z-Wave antenna. So, need consider simultaneous transmission;
According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;
 $\Sigma \Sigma$ of MPE ratios ≤ 1.0

Simultaneous Transmission				
ZigBee Antenna Max MPE ratios	Z-Wave Antenna Max MPE ratios	Σ MPE ratios	Limit	Results
0.0030	0.0002	0.0032	1.0	Pass

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

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-----

