

Prüfbericht-Nr.: Test report no.:	CN21QM01 001	Auftrags-Nr.: Order no.:	168332760	Seite 1 von 22 Page 1 of 22
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2021-08-26	
Auftraggeber: Client:	Beike Technology Co., Ltd. Room 708, Building A3, No.12, Nanhai Road, TEDA, Tianjin, China			
Prüfgegenstand: Test item:	Realsee Gimbal			
Bezeichnung / Typ-Nr.: Identification / Type no.:	RS5YT01 (Trademark: REALSEE)			
Auftrags-Inhalt: Order content:	Test Report			
Prüfgrundlage: Test specification:	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart B Section 15.207 CFR47 FCC Part 15: Subpart B Section 15.209 CFR47 FCC Part 15: Subpart B Section 15.107 CFR47 FCC Part 15: Subpart B Section 15.109 RSS-247 Issue 2 February 2017 RSS-Gen Issue 5 March 2019 ICES-003 Issue 7 October 2020			
Wareneingangsdatum: Date of sample receipt:	2021-09-02	Please refer to Photo Document		
Prüfmuster-Nr.: Test sample no.:	A003112335-005~010 A003112335-002,015			
Prüfzeitraum: Testing period:	2021-09-10 – 2021-10-28			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:			genehmigt von: authorized by:	
Datum: Date:	2021-11-14		Ausstellungsdatum: Issue date:	2021-11-18
Stellung / Position:	Signed by: Winnie Hou Department Manager		Stellung / Position:	Signed by: Andy Yan Technical Certifier
Sonstiges / Other:	FCC ID: 2A26V-RS5YT0101 IC: 27444-RS5YT0101 HVIN: RS5YT01			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet * Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested			
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.				

Prüfbericht - Nr.: CN21QM01 001
Test Report No.:

Seite 2 von 22
Page 2 of 22

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY

RESULT: Pass

5.1.4 6dB BANDWIDTH

RESULT: Pass

5.1.5 99% BANDWIDTH

RESULT: Pass

5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH

RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION

RESULT: Pass

5.1.8 CONDUCTED EMISSION ON AC MAINS

RESULT: Pass

5.1.9 RADIATED EMISSION

RESULT: Pass

Contents

1	GENERAL REMARKS.....	4
1.1	COMPLEMENTARY MATERIALS	4
2	TEST SITES	5
2.1	TEST FACILITIES	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS	5
2.3	TRACEABILITY	6
2.4	CALIBRATION.....	6
2.5	MEASUREMENT UNCERTAINTY	6
2.6	LOCATION OF ORIGINAL DATA	7
2.7	STATUS OF FACILITY USED FOR TESTING	7
3	GENERAL PRODUCT INFORMATION.....	8
3.1	PRODUCT FUNCTION AND INTENDED USE.....	8
3.2	RATINGS AND SYSTEM DETAILS	8
3.3	INDEPENDENT OPERATION MODES.....	9
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	9
3.5	SUBMITTED DOCUMENTS	9
4	TEST SET-UP AND OPERATION MODES.....	10
4.1	PRINCIPLE OF CONFIGURATION SELECTION.....	10
4.2	TEST OPERATION AND TEST SOFTWARE.....	10
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	10
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	10
4.5	TEST SETUP DIAGRAM	11
5	TEST RESULTS	13
5.1	TRANSMITTER REQUIREMENT & TEST SUITES	13
5.1.1	<i>Antenna Requirement.....</i>	<i>13</i>
5.1.2	<i>Maximum Peak Conducted Output Power</i>	<i>14</i>
5.1.3	<i>Conducted Power Spectral Density.....</i>	<i>15</i>
5.1.4	<i>6dB Bandwidth.....</i>	<i>16</i>
5.1.5	<i>99% Bandwidth.....</i>	<i>17</i>
5.1.6	<i>Conducted Spurious Emissions Measured in 100 kHz Bandwidth</i>	<i>18</i>
5.1.7	<i>Radiated Spurious Emission</i>	<i>19</i>
5.1.8	<i>Conducted Emission on AC Mains</i>	<i>20</i>
5.1.9	<i>Radiated Emission.....</i>	<i>21</i>
6	PHOTOGRAPHS OF THE TEST SET-UP	22
7	LIST OF TABLES	22

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of FCC Part 15C & RSS-247

Appendix C: Test Results of FCC Part 15B & ICES-003

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China.

FCC Registration No.: 694916

ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing (TS8997)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
Signal Analyzer	R&S	FSV 40	101441	2022-08-09
OSP	R&S	OSP 150	101017	2021-12-10
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A
Power Meter	R&S	NRP2	107105	2021-12-10
Wideband Power Sensor	R&S	NRP-Z81	105677	2022-08-09
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2024-06-22
Unwanted Emission Testing (TS9975)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
EMI Test Receiver	R&S	ESR 7	102021	2022-08-10
Signal Analyzer	R&S	FSV 40	101439	2022-08-09
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2022-08-09
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2022-08-09
Amplifier	R&S	SCU-18F	180070	2022-08-09
Amplifier	R&S	SCU40A	100475	2022-08-09
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-08
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-08
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-08
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-09-13
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2024-06-22

Conducted Emission				
Equipment	Manufacturer	Model	Serial No.	Cal. until
EMI Test Receiver	R&S	ESR3	102680	2022-04-25
Artificial Mains Network	R&S	ENV216	101445	2022-04-25
Artificial Mains Network	R&S	ENV432	101546	2022-04-25
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A
Radiated Emission (3m chamber)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
3m SAC	ETS-Lindgren	SAC3	CT001632-Q1362	2024-04-26
EMI Test Receiver	R&S	ESR7	102111	2021-12-16
Horn Antenna	R&S	HF907	102706	2022-08-07
Preamplifier (1-18GHz)	FIT	SCU-18F	180077	2022-08-13
Trilog-Broadband antenna	SCHWARZBECK	VULB9168	0945	2022-12-12
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF Power (conducted)	± 2.5 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	± 6 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	± 6 dB
Radiated Emission (3m SAC), 30MHz to 1000MHz	± 5.34 dB
Radiated Emission (3m SAC), above 1000MHz	± 4.56 dB
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	± 3.70 dB / ± 3.30 dB
Temperature	± 1 °C
Humidity	± 5 %
Voltage (DC)	± 1 %
Voltage (AC, <10kHz)	± 2 %

Prüfbericht - Nr.: CN21QM01 001
Test Report No.:

Seite 7 von 22
Page 7 of 22

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a Realsee Gimbal, which supports Bluetooth low energy function.
The product has two alternative MCU.

ARM® Cortex™- M3 32-bit MCU	
Manufacturer	Model
ST life. augmented	STM32F103CBT6
GigaDevice Semiconductor Inc.	GD32F103CBT6

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	Realsee Gimbal
Type Designation:	RS5YT01
Trademark:	REALSEE
FCC ID:	2A26V-RS5YT0101
IC:	27444-RS5YT0101
HVIN:	RS5YT01
Operating Voltage:	Internal battery operated (DC3.7V, 3000mAh) Charge by USB port (DC5V, 1.5A)
Testing Voltage:	DC 3.7V by battery DC 5V by USB port
Technical Specification of Bluetooth low energy	
Frequency Range:	2402 MHz to 2480 MHz
Type of Modulation:	GFSK
Channel Number:	40 channels
Data Rate:	1 Mbps
Channel Separation:	2 MHz
Antenna Type:	PCB Antenna
Antenna Gain:	2.0 dBi

Table 3: RF Channel and Frequency of Bluetooth (BLE)

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth Low Energy transmitting mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- B. On, Bluetooth communication mode
- C. On, Charging mode
- D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Rating Label
- User Manual
- PCB Layout
- Schematics

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013 & ANSI C63.4: 2014.

According to clause 3.1, all EMC tests were performed on both alternative MCU.

4.3 Special Accessories and Auxiliary Equipment

Table 4: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N	Rating
Laptop	Lenovo	T480	PF-16A6N8	N/A
Mobile Phone	Xiaomi	Redmi Note 9	N/A	N/A
AC Adapter	N/A	ADP-65SD B	N/A	Input: 100-240V, 50/60Hz, 1.5A Output: 5.0Vdc, 3A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

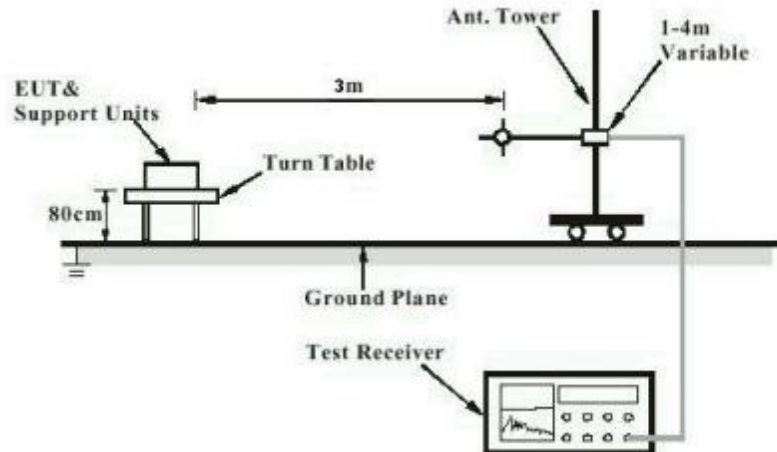


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

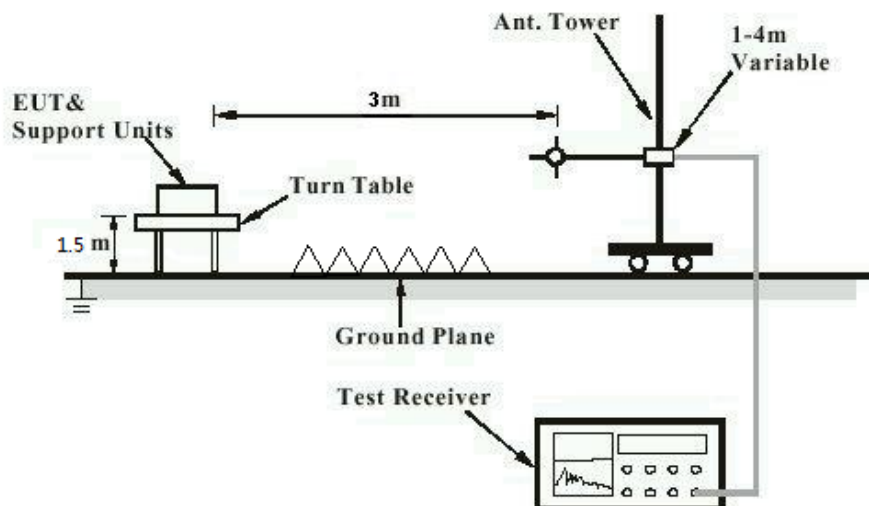


Diagram of Measurement Configuration for Mains Conduction Measurement

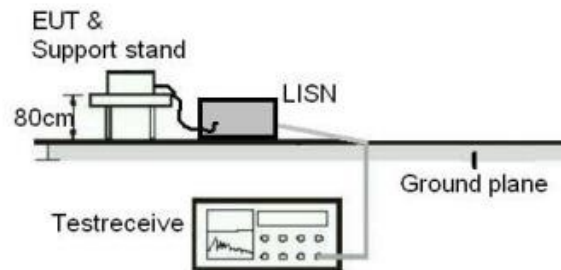
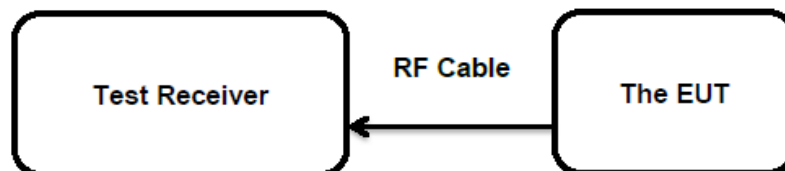


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(b)(4) and Part 15.203
RSS-Gen Clause 6.8

According to the manufacturer declared, the EUT has a PCB antenna, the directional gain of antenna is 2.0 dBi, permanent attachment and no consideration of replacement.

Therefore, the EUT is considered sufficient to comply with the provision.

5.1.2 Maximum Peak Conducted Output Power

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(b)(3)
RSS-247 Clause 5.4(d)
Basic standard : ANSI C63.10: 2013
Limits : 1.0 Watts
Kind of test site : Shielded Room

Test Setup

Date of testing : 2021-09-10
Input voltage : Fully charged battery
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 26.5 °C
Relative humidity : 58 %
Atmospheric pressure : 101 kPa

Table 5: Test Result of Maximum Peak Conducted Output Power, BLE

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
GFSK (BLE)	2402	2.50	0.0018	< 1.0
	2440	2.00	0.0016	
	2480	1.70	0.0015	
Maximum Measured Value		2.50	0.0018	

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): 2.0 dBi,
e.i.r.p.= $P_{(\text{Peak power})} + G$, which is far below the 4 W

Prüfbericht - Nr.: **CN21QM01 001**
Test Report No.:Seite 15 von 22
Page 15 of 22

5.1.3 Conducted Power Spectral Density

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(e)
RSS-247 Clause 5.2(b)
Basic standard : ANSI C63.10: 2013
Limits : < 8 dBm / 3kHz
Kind of test site : Shielded Room

Test Setup

Date of testing : 2021-09-10
Input voltage : Fully charged battery
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 26.5 °C
Relative humidity : 58 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: **CN21QM01 001**
Test Report No.:Seite 16 von 22
Page 16 of 22

5.1.4 6dB Bandwidth

RESULT:

Pass**Test Specification**

Test standard	: FCC Part 15.247(a)(2) RSS-247 Clause 5.2(a)
Basic standard	: ANSI C63.10: 2013
Limits	: > 500 KHz
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2021-09-10
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 26.5 °C
Relative humidity	: 58 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: **CN21QM01 001**
Test Report No.:Seite 17 von 22
Page 17 of 22**5.1.5 99% Bandwidth****RESULT:****Pass****Test Specification**

Test standard	: RSS-Gen Clause 6.7
Basic standard	: ANSI C63.10: 2013
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2021-09-10
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 26.5 °C
Relative humidity	: 58 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: **CN21QM01 001**
Test Report No.:Seite 18 von 22
Page 18 of 22**5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth****RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	: ANSI C63.10: 2013
Limits	: 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2021-09-10
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 26.5 °C
Relative humidity	: 58 %
Atmospheric pressure	: 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: **CN21QM01 001**
Test Report No.:Seite 19 von 22
Page 19 of 22

5.1.7 Radiated Spurious Emission

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(d) & FCC Part 15.205
RSS-247 Clause 3.3

Basic standard : ANSI C63.10: 2013

Limits : Refer to 15.209(a) of FCC part 15.247(d)
RSS-Gen Section 8.9 & 8.10

Kind of test site : 3m Semi-anechoic Chamber

Test Setup

Date of testing : 2021-09-13 to 2021-09-15

Input voltage : Fully charged battery

Operation mode : A

Test channel : Low / Middle / High

Ambient temperature : Refer to test result

Relative humidity : Refer to test result

Atmospheric pressure : 101 kPa

Remark:

Testing carried out within frequency range 9kHz to the tenth harmonics. Only the worst-case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix B.

Prüfbericht - Nr.: **CN21QM01 001**
Test Report No.:Seite 20 von 22
Page 20 of 22

5.1.8 Conducted Emission on AC Mains

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.207(a) & FCC Part 15.107(a) RSS-Gen & ICES-003
Basic standard	: ANSI C63.10: 2013 & ANSI C63.4:2014
Frequency range	: 0.15 – 30MHz
Classification	: Class B
Limits	: FCC Part 15.207(a) & FCC Part 15.107(a) RSS-Gen Table 4 & ICES-003 Table 1
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2021-09-13 to 2021-10-26
Input voltage	: DC 5V by USB port
Operation mode	: C
Earthing	: Not connected
Ambient temperature	: 24.1 °C
Relative humidity	: 49 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B & C.

Prüfbericht - Nr.: **CN21QM01 001**
Test Report No.:Seite 21 von 22
Page 21 of 22

5.1.9 Radiated Emission

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.209(a) & FCC Part 15.109(a) ICES-003
Basic standard	: ANSI C63.4:2014
Frequency range	: Refer to FCC Part 15.33
Classification	: Class B
Limits	: FCC Part 15.209(a) & FCC Part 15.109(a) ICES-003 Table 2 & 4
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 2021-09-13 to 2021-10-26
Input voltage	: DC 5V by USB port DC 3.7V by battery
Operation mode	: B, C
Earthing	: Not connected
Ambient temperature	: 23 °C
Relative humidity	: 50 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix C.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

7 List of Tables

Table 1: List of Test and Measurement Equipment	5
Table 2: Technical Specification of EUT	8
Table 3: RF Channel and Frequency of Bluetooth (BLE).....	9
Table 4: Auxiliary Equipment Used during Test.....	10
Table 5: Test Result of Maximum Peak Conducted Output Power, BLE	14