

Prüfbericht-Nr.: <i>Test report No.:</i>	50321756 001	Auftrags-Nr.: <i>Order No.:</i>	168138213	Seite 1 von 27 <i>Page 1 of 27</i>
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	N/A	Auftragsdatum: <i>Order date.:</i>	03.11.2019	
Auftraggeber: <i>Client:</i>	Clarion Co., Ltd. 6F, NO.40, Guanri Road, Software Park Stage II, Xiamen, China			
Prüfgegenstand: <i>Test item:</i>	Silver Box			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	PU-1723 (Trade Mark: clarion)			
Auftrags-Inhalt: <i>Order content:</i>	FCC approval			
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 2: Section 2.1091			
Wareneingangsdatum: <i>Date of receipt:</i>	04.11.2019	Please refer to photo documents		
Prüfmuster-Nr.: <i>Test sample No.:</i>	A001018511-001			
Prüfzeitraum: <i>Testing period:</i>	19.11.2019 - 03.12.2019			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
 16.12.2019 Alex Lan / Senior Project Engineer		 16.12.2019 Winnie Hou / Technical Certifier		
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>
Sonstiges / Other:				
FCC ID: WY2PU1723				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged:</i>		
* 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)		
Legend: 1 = very good 2 = good 3 = satisfactory		N/A = nicht anwendbar N/T = nicht getestet		
P(ass) = passed a.m. test specifications(s)		F(ail) = failed a.m. test specifications(s)		
		4 = sufficient 5 = poor		
		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. <i>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.</i>				

Test Summary

5.1.1 ANTENNA REQUIREMENT*RESULT: Pass***5.1.2 MAXIMUM CONDUCTED OUTPUT POWER***RESULT: Pass***5.1.3 CONDUCTED POWER SPECTRAL DENSITY***RESULT: Pass***5.1.4 6dB BANDWIDTH***RESULT: Pass***5.1.5 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 kHz BANDWIDTH***RESULT: Pass***5.1.6 RADIATED SPURIOUS EMISSION***RESULT: Pass***5.1.7 20dB BANDWIDTH***RESULT: Pass***5.1.8 CARRIER FREQUENCY SEPARATION***RESULT: Pass***5.1.9 NUMBER OF HOPPING FREQUENCY***RESULT: Pass***5.1.10 TIME OF OCCUPANCY***RESULT: Pass***6.1.1 ELECTROMAGNETIC FIELDS***RESULT: Pass*

Contents

1	GENERAL REMARKS	5
1.1	COMPLEMENTARY MATERIALS.....	5
2	TEST SITES.....	5
2.1	TEST FACILITIES	5
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS	6
2.3	TRACEABILITY	8
2.4	CALIBRATION.....	8
2.5	MEASUREMENT UNCERTAINTY	8
2.6	LOCATION OF ORIGINAL DATA	8
2.7	STATUS OF FACILITY USED FOR TESTING	8
3	GENERAL PRODUCT INFORMATION	9
3.1	PRODUCT FUNCTION AND INTENDED USE	9
3.2	RATINGS AND SYSTEM DETAILS.....	9
3.3	INDEPENDENT OPERATION MODES.....	11
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS	11
3.5	SUBMITTED DOCUMENTS.....	11
4	TEST SET-UP AND OPERATION MODES.....	12
4.1	PRINCIPLE OF CONFIGURATION SELECTION	12
4.2	TEST OPERATION AND TEST SOFTWARE	12
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	12
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	12
4.5	TEST SETUP DIAGRAM	13
5	TEST RESULTS	14
5.1	TRANSMITTER REQUIREMENT & TEST SUITES.....	14
5.1.1	Antenna Requirement.....	14
5.1.2	Maximum Conducted Output Power.....	15
5.1.3	Conducted Power Spectral Density.....	17
5.1.4	6dB Bandwidth	18
5.1.5	Conducted Spurious Emissions Measured in 100 kHz Bandwidth.....	19
5.1.6	Radiated Spurious Emission	20
5.1.7	20dB Bandwidth	21
5.1.8	Carrier Frequency Separation	22
5.1.9	Number of Hopping Frequency	23
5.1.10	Time of Occupancy	24
6	SAFETY HUMAN EXPOSURE	25
6.1	RADIO FREQUENCY EXPOSURE COMPLIANCE	25
6.1.1	Electromagnetic Fields	25
7	PHOTOGRAPHS OF THE TEST SET-UP	27

8	LIST OF TABLES.....	27
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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 Bluetooth

Appendix C: Test Results of 802.11 b/g/n

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

East of F/1, F/2 - F/4, Building 1, Cybio Technology Building, No. 6 Langshan No. 2 Road, North Hi-tech Industry Park, Nanshan District, Shenzhen, P.R. China

FCC Registration No.: 694916

IC Registration No.: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

TÜV Rheinland (Shenzhen) Co., Ltd.

Radio Spectrum Testing				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Wireless Connectivity Tester	Rohde & Schwarz	CMW270	101375	20.08.2020
Signal Analyzer	Rohde & Schwarz	FSV 40	101441	20.08.2020
Vector Signal Generator	Rohde & Schwarz	SMBV100A	263301	21.08.2020
Signal Generator	Rohde & Schwarz	SMB100A	115186	21.08.2020
OSP	Rohde & Schwarz	OSP 150	101017	20.12.2019
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	Rohde & Schwarz	WMS32 (V10.40.10)	N/A	N/A
Power Meter	Rohde & Schwarz	NRP2	107105	20.12.2019
Wideband Power Sensor	Rohde & Schwarz	NRP-Z81	105350	20.12.2019
Humid & Temp Programmable Tester	BOST	NTH090-60	19040801	16.04.2020
Shielding Room 8#	Albatross	SR8	APC17151-SR8	23.07.2020
Unwanted Emission Testing				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	Rohde & Schwarz	ESR 7	102021	19.08.2020
Signal Analyzer	Rohde & Schwarz	FSV 40	101439	21.08.2020
System Controller Interface	Rohde & Schwarz	SCI-100	S10010038	N/A
Filterbank	Rohde & Schwarz	Wlan	100759	21.08.2020
OSP	Rohde & Schwarz	OSP 120	102040	N/A
Pre-amplifier	Rohde & Schwarz	SCU08F1	08320031	20.08.2020
Amplifier	Rohde & Schwarz	SCU-18F	180070	20.08.2020
Amplifier	Rohde & Schwarz	SCU40A	100475	20.08.2020
Trilog Broadband Antenna (30 MHz - 1 GHz)	Schwarzbeck	VULB9162	193	02.09.2020
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	02.09.2020
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	02.09.2020
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	01.09.2020
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18313	02.09.2020
Test software	Rohde & Schwarz	V10.40.10-EMC32	N/A	N/A

Prüfbericht - Nr.: 50321756 001
Test Report No.Seite 7 von 27
Page 7 of 27

Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	07.06.2020

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.

Item		Extended Uncertainty
Conducted Emission		± 3.0 dB
Radiated Emission (30-1000MHz)	Field strength (dBµV/m)	± 6.0 dB
Radiated Emission (above 1000MHz)	Field strength (dBµV/m)	± 6.0 dB
Radio Spectrum		± 1.5 dB

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) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at East of F/1, F/2 - F/4, Building 1, Cybio Technology Building, No. 6 Langshan No. 2 Road, North Hi-tech Industry Park, Nanshan District, 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 Silver Box, which supports Bluetooth and 802.11 b/g/n (HT-20) wireless technologies, it Bluetooth and 802.11 b/g/n (HT20) can't simultaneously transmitting.

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	Silver Box
Type Designation	PU-1723
Trade Mark	clarion
FCC ID	WY2PU1723
Operating Voltage	DC 12V, 5A Max
Testing Voltage	DC 12V + 10%deviation
Technical Specification of Bluetooth	
Operating Frequency band	2402 – 2480 MHz
Bluetooth Core Version	5.0, single mode
Channel Number	79 channels
Channel separation	1MHz
Modulation	GFSK, 8DPSK, $\pi/4$ DQPSK
Antenna Type	Internal Antenna
Antenna Gain	0dBi
Technical Specification of Wi-Fi 802.11 b/g/n	
Operating Frequency	2412 - 2462 MHz for 802.11b/g/n(HT20)
Type of Modulation	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n
Channel Number	11 channels for 802.11b/g/n(HT20)
Channel Separation	5 MHz
Antenna Type	Integral Antenna
Gain	1 dBi

Table 3: RF Channel and Frequency of Bluetooth (BDR & EDR mode)

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402.00	20	2422.00	40	2442.00	60	2462.00
1	2403.00	21	2423.00	41	2443.00	61	2463.00
2	2404.00	22	2424.00	42	2444.00	62	2464.00
3	2405.00	23	2425.00	43	2445.00	63	2465.00
4	2406.00	24	2426.00	44	2446.00	64	2466.00
5	2407.00	25	2427.00	45	2447.00	65	2467.00
6	2408.00	26	2428.00	46	2448.00	66	2468.00
7	2409.00	27	2429.00	47	2449.00	67	2469.00
8	2410.00	28	2430.00	48	2450.00	68	2470.00
9	2411.00	29	2431.00	49	2451.00	69	2471.00
10	2412.00	30	2432.00	50	2452.00	70	2472.00
11	2413.00	31	2433.00	51	2453.00	71	2473.00
12	2414.00	32	2434.00	52	2454.00	72	2474.00
13	2415.00	33	2435.00	53	2455.00	73	2475.00
14	2416.00	34	2436.00	54	2456.00	74	2476.00
15	2417.00	35	2437.00	55	2457.00	75	2477.00
16	2418.00	36	2438.00	56	2458.00	76	2478.00
17	2419.00	37	2439.00	57	2459.00	77	2479.00
18	2420.00	38	2440.00	58	2460.00	78	2480.00
19	2421.00	39	2441.00	59	2461.00		

Table 4: RF Channel and Frequency of Wi-Fi 802.11 b/g/n

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
01	2412	05	2432	09	2452
02	2417	06	2437	10	2457
03	2422	07	2442	11	2462
04	2427	08	2447		

Test frequencies are lowest channel: 2412 MHz, middle channel: 2437 MHz and highest channel: 2462 MHz for 802.11b/g/n(HT20)

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth Transmitting mode (BDR & EDR)
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel
- B. On, Wi-Fi 802.11 b/g/n wireless transmitting
 - 1. Low channel
 - 2. Middle channel
 - 3. High channel
- C. Bluetooth Hopping mode
- D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- | | |
|----------------------------------|------------------|
| - Application Form | - Photo Document |
| - Block Diagram | - Schematics |
| - FCC/IC Label and Location Info | - User Manual |
| - Operation Description | |

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 testing were performed according to the procedures in ANSI C63.10: 2013.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Notebook PC	Lenovo	4290-RT8	4290-RT8	N/A

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).

Additional countermeasures to the submitted test sample(s) for Radiated Emission were employed to achieve compliance.

4.5 Test Setup Diagram

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

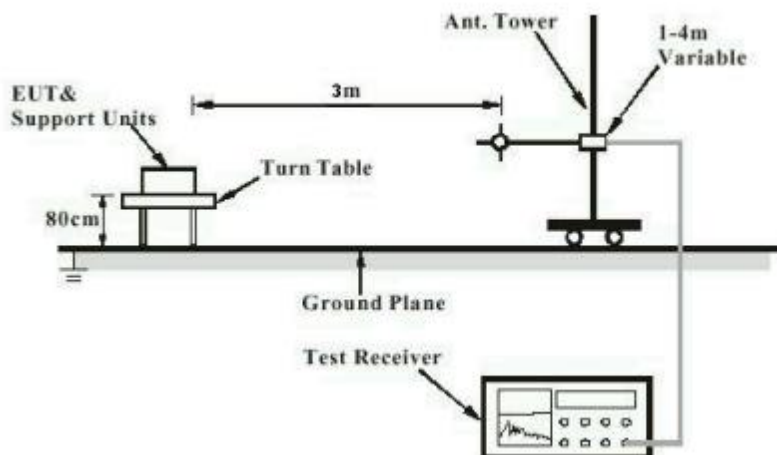


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

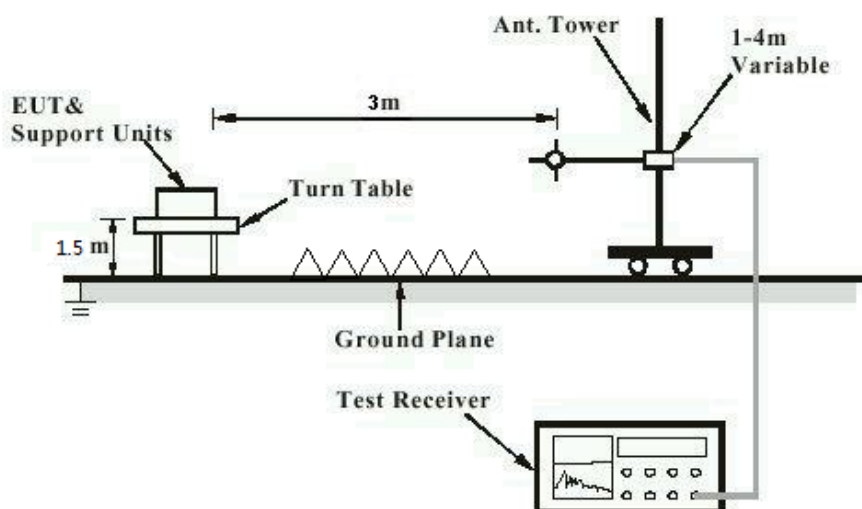
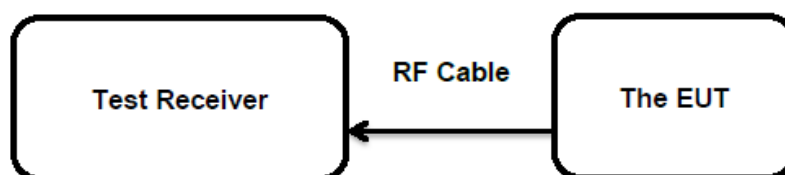


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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
Limit	: the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 0dBi for Bluetooth and 1dBi for 802.11 b/g/n, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Conducted Output Power

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

Test standard	: FCC Part 15.247(b)(1)&(3)
Basic standard	: ANSI C63.10: 2013
Limits	: FHSS < 0.125 Watts, DSSS < 1.0 Watts
Kind of test site	: Shielded Room

Test Setup

Date of testing	: Refer to test result
Input voltage	: DC 12V + 10%deviation
Operation mode	: A, B
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

For details refer to following test result.

Table 6: Test Result of Maximum Conducted Output Power, Bluetooth

Mode	Bluetooth(8QPSK)		
Data Rate	3DH5		
Channel	0	39	78
Frequency (MHz)	2402	2441	2480
Peak. Power (dBm)	0.99	1.57	1.54
Avg.Power (dBm)	-0.56	0.06	-0.08
Mode	Bluetooth(GFSK)		
Data Rate	DH5		
Channel	0	39	78
Frequency (MHz)	2402	2441	2480
Peak.Power (dBm)	-1.63	-1.01	-1.12
Avg.Power (dBm)	-5.54	-4.87	-4.94

Table 7: Test Result of Maximum Conducted Output Power, Wi-Fi 802.11 b/g/n

Mode	802.11b			802.11g		
Data Rate	1Mbps			6Mbps		
Channel	1	7	13	1	7	13
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Peak. Power (dBm)	19.69	19.96	20.45	22.35	22.61	22.94
Avg.Power (dBm)	16.28	16.62	17.01	13.59	13.81	14.20
Power Setting	18.00	18.00	18.00	15.00	15.00	15.00
Max. (dBm)	17.01			14.20		
Mode	802.11n HT20					
Data Rate	MCS0 6.5Mbps					
Channel	1	7	13			
Frequency (MHz)	2412	2437	2462			
Peak. Power (dBm)	23.01	23.14	23.53			
Avg.Power (dBm)	13.43	13.61	13.98			
Power Setting	15.00	15.00	15.00			
Max. (dBm)	13.98					

Note: The cable loss is taken into account in results.

5.1.3 Conducted Power Spectral Density

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.247(e)
 Basic standard : ANSI C63.10: 2013
 Limits : 8 dBm / 3kHz
 Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result
 Input voltage : DC 12V + 10%deviation
 Operation mode : B
 Test channel : Low / Middle / High
 Ambient temperature : 25 °C
 Relative humidity : 56 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 8: Test Result of Power Spectral Density, Wi-Fi 802.11 b/g/n

Test Mode	Data Rate	Frequency (MHz)	Measured Peak Power Spectral Density (dBm/3KHz)
802.11b	1 Mbps	2412	-2.79
		2437	-2.56
		2462	-2.17
802.11g	6 Mbps	2412	-5.36
		2437	-5.07
		2462	-4.74
802.11n (HT20)	MCS0	2412	-5.04
		2437	-4.65
		2462	-4.76
Maximum Measured Value			-2.17

Note: The cable loss is taken into account in results.

For the measurement records, refer to the appendix C.

5.1.4 6dB Bandwidth

RESULT:
Pass
Test Specification

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

Test Setup

Date of testing : Refer to test result
 Input voltage : DC 12V + 10% deviation
 Operation mode : B
 Test channel : Low / Middle / High
 Ambient temperature : 25 °C
 Relative humidity : 56 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 9: Test Result of 6dB Bandwidth, Wi-Fi 802.11 b/g/n

Test Mode	Data Rate	Frequency (MHz)	-6dB Bandwidth (MHz)	Limit (kHz)
802.11b	1 Mbps	2412	7.20	> 500
		2437	7.20	
		2462	7.20	
802.11g	6 Mbps	2412	16.40	
		2437	16.40	
		2462	16.15	
802.11n (HT20)	MCS0	2412	17.40	
		2437	17.35	
		2462	17.20	
Minimum Measured Value			7.20	

For the measurement records, refer to the appendix C.

5.1.5 Conducted Spurious Emissions Measured in 100 kHz Bandwidth**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(d)
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	: Refer to test result
Input voltage	: DC 12V + 10%deviation
Operation mode	: A, B, C
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
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&C.

5.1.6 Radiated Spurious Emission

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

Test standard	: FCC Part 15.247(d) & FCC Part 15.205
Basic standard	: ANSI C63.10: 2013
Limits	: Refer to 15.209(a) of FCC part 15.247(d)
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: Refer to test result
Input voltage	: DC 12V + 10%deviation
Operation mode	: A, B, C
Test channel	: Low / Middle / High
Ambient temperature	: 23°C
Relative humidity	: 48%
Atmospheric pressure	: 101 kPa

Remark:

Testing was 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&C.

5.1.7 20dB Bandwidth

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

Test standard : FCC Part 15.247(a)(1)
Basic standard : ANSI C63.10: 2013
Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result
Input voltage : DC 12V + 10% deviation
Operation mode : A, C
Test channel : Low / Middle / High
Ambient temperature : 25 °C
Relative humidity : 56 %
Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 10: Test Result of 20dB Bandwidth, Bluetooth

Test Mode	Channel Frequency (MHz)	20dB Bandwidth (kHz)	2/3 of 20dB Bandwidth (kHz)	Limit (MHz)
BDR	2402	955	636.667	/
	2441	955	636.667	
	2480	955	636.667	
EDR	2402	1320	880.000	/
	2441	1320	880.000	
	2480	1325	883.333	

For the measurement records, refer to the appendix B.

5.1.8 Carrier Frequency Separation

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.247(a)(1)
 Basic standard : ANSI C63.10: 2013
 Limits : $\geq 25\text{kHz}$ or $2/3$ of 20dB bandwidth, whichever is greater
 Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result
 Input voltage : DC 12V + 10% deviation
 Operation mode : C
 Test channel : Low / Middle / High
 Ambient temperature : 25 °C
 Relative humidity : 56 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 11: Test Result of Carrier Frequency Separation, Bluetooth

Test Mode	Channel	Channel Frequency (MHz)	Measured Channel Separation (MHz)	Limit (kHz)	Result
BDR	Low Channel	2401.995050	0.980198	≥ 25kHz or 2/3 of 20dB bandwidth	Pass
	Adjacency Channel	2402.975248			
	Middle Channel	2440.995050	1.009900		Pass
	Adjacency Channel	2442.004950			
	High Channel	2478.995050	1.009900		Pass
	Adjacency Channel	2480.004950			
EDR	Low Channel	2402.024752	0.980198	≥ 25kHz or 2/3 of 20dB bandwidth	Pass
	Adjacency Channel	2403.004950			
	Middle Channel	2441.024752	0.980198		Pass
	Adjacency Channel	2442.004950			
	High Channel	2479.024752	1.009901		Pass
	Adjacency Channel	2480.034653			

Note: The limit is maximum $2/3$ of the 20 dB bandwidth: **Error! Reference source not found.** KHz for BDR and 880 for EDR.

For the measurement records, refer to the appendix B

5.1.9 Number of Hopping Frequency

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

Test standard : FCC part 15.247(a)(1)(iii)
RSS-247 Clause 5.1(4)

Basic standard : ANSI C63.10: 2013

Limits : ≥ 15 non-overlapping channels

Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result

Input voltage : DC 12V + 10% deviation

Operation mode : C

Ambient temperature : 25 °C

Relative humidity : 56 %

Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 12: Test Result of Number of Hopping Frequency, Bluetooth

Frequency Range	Measured Quantity of Hopping Channel	Limit	Result
2402 to 2480 MHz	79	≥ 15	Pass

For the measurement records, refer to the appendix B.

5.1.10 Time of Occupancy

RESULT:
Pass
Test Specification

Test standard : FCC part 15.247(a)(1)(iii)
RSS-247 Clause 5.1(4)

Basic standard : ANSI C63.10: 2013

Limits : < 0.4s

Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result

Input voltage : DC 12V + 10%deviation

Operation mode : C

Test channel : Low / Middle / High

Ambient temperature : 25 °C

Relative humidity : 56 %

Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 13: Test Result of Time of Occupancy, Bluetooth

Test Mode	Channel	Data Packet	Pulse width (ms)	Measured Dwell time(s)	Limit (s)
BDR	2441	DH1	0.271	0.087	< 0.4s
		DH3	1.458	0.233	
		DH5	2.667	0.284	
EDR	2441	2DH1	0.393	0.126	< 0.4s
		2DH3	1.688	0.270	
		2DH5	2.884	0.308	

Note:

Dwell time = Pulse width x Number of channels in Period

Period = 0.4 (seconds/ channel) x 20 (channel) = 8 seconds

For the measurement records, refer to the appendix B.

6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT:

Pass

Test Specification

Test standard : CFR47 FCC Part 2: Section 2.1091
CFR47 FCC Part 1: Section 1.1310
FCC KDB Publication 447498 v06
FCC KDB Publication 865664 D02 v01r02
OET Bulletin 65 (Edition 97-01)

➤ FCC requirements

FCC requirement: Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20cm normally can be maintained between the user and the device.

MPE Calculation Method according to OET Bulletin 65

Power Density: $S_{(mW/cm^2)} = PG/4\pi R^2$ or $EIRP/4\pi R^2$

Where:

S = power density (mW/cm²)

P = power input to the antenna (mW)

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 (cm)

The nominal maximum conducted output power specified:

Bluetooth: 1.57 dBm

802.11b/g/n: 18.00 dBm

From the peak RF output power, the minimum mobile separation distance, d=20 cm, as well as the antenna gain (Max. 0.0 dBi for Bluetooth and 1.0 dBi 802.11b/g/n), the RF power density can be calculated as below:

For Bluetooth: $S_{(mW/cm^2)} = PG/4\pi R^2 = 0.0003$ mW/cm²

For 802.11b/g/n: $S_{(mW/cm^2)} = PG/4\pi R^2 = 0.016$ mW/cm²

Prüfbericht - Nr.: 50321756 001
Test Report No.

Seite 26 von 27
Page 26 of 27

Limits for Maximum Permissible Exposure (MPE) according to FCC Part 1.1310:

1.0 mW/cm²

“RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”

7 Photographs of the Test Set-Up

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

8 List of Tables

Table 1: List of Test and Measurement Equipment.....	6
Table 2: Technical Specification of EUT.....	9
Table 3: RF Channel and Frequency of Bluetooth (BDR & EDR mode)	10
Table 4: RF Channel and Frequency of Wi-Fi 802.11 b/g/n.....	10
Table 5: List of Accessories and Auxiliary Equipment.....	12
Table 6: Test Result of Maximum Conducted Output Power, Bluetooth	16
Table 7: Test Result of Maximum Conducted Output Power, Wi-Fi 802.11 b/g/n.....	16
Table 8: Test Result of Power Spectral Density, Wi-Fi 802.11 b/g/n.....	17
Table 9: Test Result of 6dB Bandwidth, Wi-Fi 802.11 b/g/n.....	18
Table 10: Test Result of 20dB Bandwidth, Bluetooth	21
Table 11: Test Result of Carrier Frequency Separation, Bluetooth	22
Table 12: Test Result of Number of Hopping Frequency, Bluetooth	23
Table 13: Test Result of Time of Occupancy, Bluetooth	24