

Prüfbericht-Nr.: <i>Test report No.:</i>	50098233 001	Auftrags-Nr.: <i>Order No.:</i>	164101463	Seite 1 von 24 <i>Page 1 of 24</i>	
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	N/A	Auftragsdatum: <i>Order date.:</i>	06.06.2017		
Auftraggeber: <i>Client:</i>	Binatone Electronics International Ltd. Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong				
Prüfgegenstand: <i>Test item:</i>	Wi-Fi® Home Video Camera				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	FOCUS68P, FOCUS68 (Trademark: motorola)				
Auftrags-Inhalt: <i>Order content:</i>	FCC and IC approval				
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 RSS-247 Issue 2 February 2017 CFR47 FCC Part 15: Subpart C Section 15.207 RSS-Gen Issue 4 November 2014 CFR47 FCC Part 15: Subpart C Section 15.209 ICES-003 Issue 6 January 2016 CFR47 FCC Part 15: Subpart B Section 15.107 RSS-102 Issue 5 March 2015 CFR47 FCC Part 15: Subpart B Section 15.109 CFR47 FCC Part 2: Section 2.1091				
Wareneingangsdatum: <i>Date of receipt:</i>	06.06.2017	Please refer to photo documents			
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000589684-001 to 003				
Prüfzeitraum: <i>Testing period:</i>	06.06.2017 - 10.07.2017				
Ort der Prüfung: <i>Place of testing:</i>	EMTEK(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:			
11.07.2017 Ryan Yang / Assistant Project Manager		11.07.2017 Owen Tian / 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>	Unterschrift <i>Signature</i>
Sonstiges / Other:					
FCC ID: VLJ-FOCUS68					
IC: 4522A-FOCUS68 HVIN: FOCUS68P, FOCUS68					
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) 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 specifications(s) F(ail) = failed a.m. test specifications(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.					
<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

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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 Conducted Testing

Appendix C: Test Results of Radiated Testing

2 Test Sites

2.1 Test Facilities

EMTEK(Shenzhen) Co., Ltd.

Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

FCC Registration No.: 406365

Test site Industry Canada No.: 4480A-2

The tests at the test sites have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

EMTEK(Shenzhen) Co., Ltd.

Radio Spectrum Testing				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESU	1302.6005.26	20.05.2018
Signal Analyzer	Agilent	N9010A	My53470879	20.05.2018
Power Analyzer	Agilent	PS-X10-200	N/A	20.05.2018
Test Accessories	Agilent	PS-X10-100	N/A	20.05.2018
Spurious Emission & Radiated Emission				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESU	1302.6005.26	20.05.2018
Pre-Amplifier	HP	8447D	2944A07999	20.05.2018
Bilog Antenna	Schwarzbeck	VULB9163	142	20.05.2018
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	20.05.2018
Horn Antenna	Schwarzbeck	BBHA 9120	D143	20.05.2018
Cable	Schwarzbeck	AK9513	ACRX1	20.05.2018
Cable	Rosenberger	N/A	FP2RX2	20.05.2018
Cable	Schwarzbeck	AK9513	CRPX1	20.05.2018
Cable	Schwarzbeck	AK9513	CRRX2	20.05.2018
Pre-Amplifier	LUNAR-EM	LNA30M3G-25	J10100000070	20.05.2018
Band reject Filter (50dB)	WI/DE	WRCGV2400 (2400-2485MHz)	2	20.05.2018
Conducted Emission on AC Mains				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
Test Receiver	R&S	ESCI	26115-010-0027	20.05.2018
L.I.S.N.	R&S	ENV216	101161	20.05.2018
50Ω Coaxial Switch	Anritsu	MP59B	6100175589	20.05.2018

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 (dB μ V/m) ± 6.0 dB
Radiated Emission (above 1000MHz)	Field strength (dB μ V/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 EMTEK(Shenzhen) Co., Ltd. Test facility located at Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, 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 Wi-Fi® Home Video Camera which supports Wi-Fi 802.11 b/g/n wireless technology.

According to the declaration of the applicant, two models are identical with RF design except for minor differences in circuitry for the power supply design, the differences of the appliance do not affect the RF characteristic. See the following table for details:

Test EUT	FOCUS68P		FOCUS68		Supplier
	Supported	Tested	Supported	Tested	
Adapter #1 (S006AKU0500100 White, Black)	☒	☒	☒	☒	Ten Pao
Adapter #2 (BLJ06W050100P1-U White, Black)	☒	☒	☒	☒	BLJ
Battery #1 (5C)	☒	☒	☐	☐	Tianmao

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	Wi-Fi® Home Video Camera
Type Designation	FOCUS68P, FOCUS68
Trade Mark	motorola
FCC ID	VLJ-FOCUS68
IC	4522A-FOCUS68
HVIN	FOCUS68P, FOCUS68
Operating Voltage	DC 5.0V 1000mA input via AC/DC adapter DC 3.7V 1200mAh input via internal Li-ion battery
Testing Voltage	AC 120V, 60Hz
AC/DC Adapter #1	Model: S006AKU0500100 Input: AC 100-240V~50/60Hz, 200mA Output: DC 5.0V~1000mA
AC/DC Adapter #2	Model: BLJ06W050150P1-U Input: AC 100-240V~50/60Hz, 0.2A Output: DC 5.0V~1000mA
Battery #1	Model: 5C DC 3.7V 1200mAh Li-ion battery

Technical Specification of Wi-Fi 802.11 b/g/n	
Operating Frequency	2412 - 2462 MHz for 802.11b/g/n(HT20) 2422 - 2452 MHz for 802.11n(HT40)
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) 7 channels for 802.11n(HT40)
Channel Separation	5 MHz
Antenna Type	Integral Antenna
Gain	0 dBi

Table 3: RF Channel and Frequency of Wi-Fi 802.11 b/g/n

RF Channel	802.11 b/g/n(HT20)	802.11 n(HT40)
	Frequency (MHz)	Frequency (MHz)
01	2412	/
02	2417	/
03	2422	2422
04	2427	2427
05	2432	2432
06	2437	2437
07	2442	2442
08	2447	2447
09	2452	2452
10	2457	/
11	2462	/

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

Test frequencies are lowest channel: 2422 MHz, middle channel: 2437 MHz and highest channel: 2452 MHz for 802.11n(HT40)

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Wi-Fi 802.11 b/g/n wireless transmitting mode
 1. Low channel
 2. Middle channel
 3. High channel
- B. On, Charging mode
- C. On, Normal operation with wireless mode
- D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

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

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 and ANSI C63.4: 2014.

According to clause 3.1, all tests were performed on model FOCUS68P in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N	Rating
Notebook	HP	Compaq 6515b	SS05538914	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).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

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

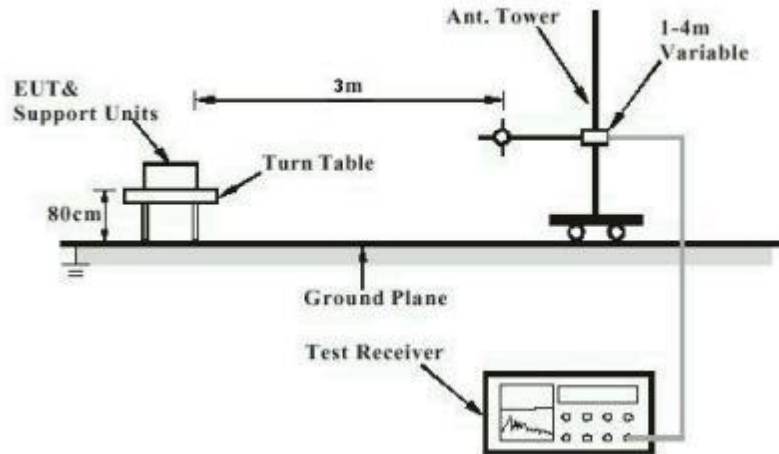


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

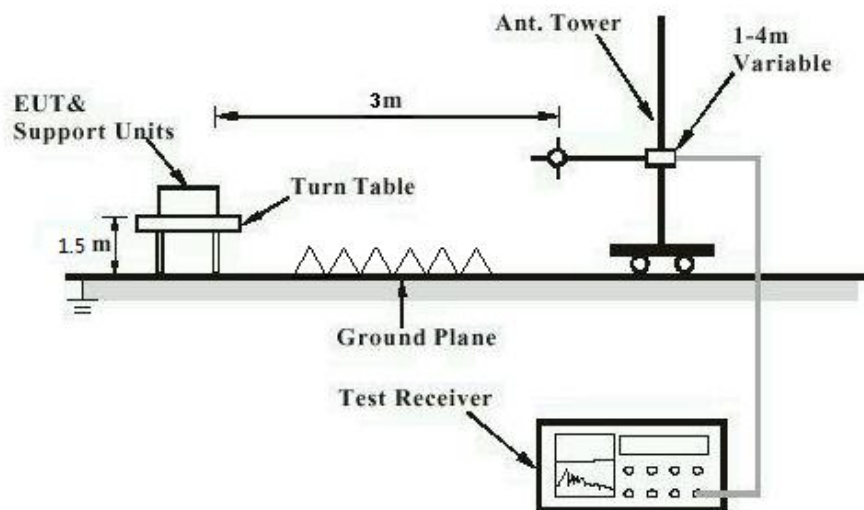


Diagram of Measurement Configuration for Mains Conduction Measurement

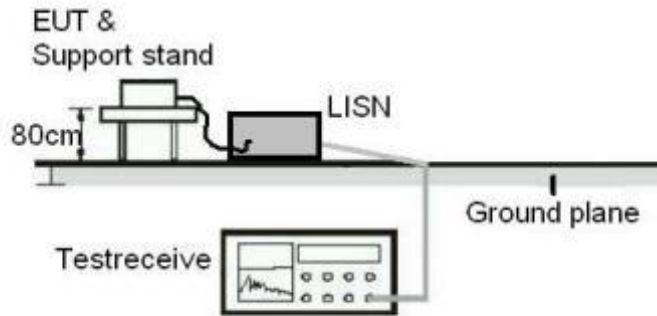
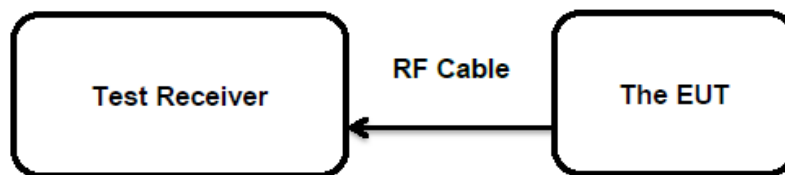


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 0 dBi, 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.

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

Refer to EUT Photo for further details.

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(4)
 Basic standard : ANSI C63.10: 2013
 Limits : < 1.0 Watts
 Kind of test site : Shielded Room

Test Setup

Date of testing : 10.07.2017
 Input voltage : AC 120V, 60Hz
 Operation mode : A
 Test channel : Low / Middle / High
 Ambient temperature : 25 °C
 Relative humidity : 56 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 5: Test Result of Maximum Peak Conducted Output Power

Test Mode	Data Rate	Frequency (MHz)	Measured Power		Limit (W)
			dBm	W	
802.11b	1 Mbps	2412	20.85	0.12162	< 1.0
		2437	22.11	0.16255	
		2462	21.40	0.13804	
802.11g	6 Mbps	2412	20.88	0.12246	
		2437	21.96	0.15704	
		2462	21.37	0.13709	
802.11n (HT20)	MCS0	2412	20.95	0.12445	
		2437	21.79	0.15101	
		2462	21.32	0.13552	
802.11n (HT40)	MCS0	2422	20.97	0.12503	
		2437	21.46	0.13996	
		2452	21.12	0.12942	
Maximum Measured Value			22.11	0.16255	

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)
 : RSS-247 Clause 5.2(2)
 Basic standard : ANSI C63.10: 2013
 Limits : < 8 dBm / 3kHz
 Kind of test site : Shielded Room

Test Setup

Date of testing : 10.07.2017
 Input voltage : AC 120V, 60Hz
 Operation mode : A
 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 Power Spectral Density

Test Mode	Data Rate	Frequency (MHz)	Measured Peak Power Spectral Density (dBm/3KHz)	Limit (dBm)
802.11b	1 Mbps	2412	-11.82	8 dBm / 3kHz
		2437	-10.64	
		2462	-11.38	
802.11g	6 Mbps	2412	-15.45	
		2437	-14.61	
		2462	-14.65	
802.11n (HT20)	MCS0	2412	-15.27	
		2437	-13.51	
		2462	-13.98	
802.11n (HT40)	MCS0	2422	-15.60	
		2437	-16.24	
		2452	-17.62	
Maximum Measured Value			-10.64	

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

For the measurement records, refer to the appendix B.

5.1.4 6dB Bandwidth

RESULT:
Pass
Test Specification

Test standard : FCC Part 15.247(a)(2)
 : RSS-247 Clause 5.2(1)
 Basic standard : ANSI C63.10: 2013
 Limits : > 500 KHz
 Kind of test site : Shielded Room

Test Setup

Date of testing : 10.07.2017
 Input voltage : AC 120V, 60Hz
 Operation mode : A
 Test channel : Low / Middle / High
 Ambient temperature : 25 °C
 Relative humidity : 56 %
 Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 7: Test Result of 6dB Bandwidth

Test Mode	Data Rate	Frequency (MHz)	-6dB Bandwidth (MHz)	Limit (kHz)
802.11b	1 Mbps	2412	10.10	> 500
		2437	10.10	
		2462	10.10	
802.11g	6 Mbps	2412	16.60	
		2437	16.61	
		2462	16.61	
802.11n (HT20)	MCS0	2412	17.82	
		2437	17.81	
		2462	17.82	
802.11n (HT40)	MCS0	2422	36.43	
		2437	36.42	
		2452	36.45	
Minimum Measured Value			10.10	

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

For the measurement records, refer to the appendix B.

5.1.5 99% Bandwidth

RESULT:
Pass
Test Specification

Test standard : RSS-Gen Clause 6.6
 Basic standard : ANSI C63.10: 2013
 Kind of test site : Shielded Room

Test Setup

Date of testing : 10.07.2017
 Input voltage : AC 120V, 60Hz
 Operation mode : A
 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 99% Bandwidth

Test Mode	Data Rate	Frequency (MHz)	99% Bandwidth (MHz)	Limit (kHz)
802.11b	1 Mbps	2412	15.03	/
		2437	15.01	
		2462	15.01	
802.11g	6 Mbps	2412	16.82	
		2437	16.80	
		2462	16.81	
802.11n (HT20)	MCS0	2412	17.87	
		2437	17.86	
		2462	17.86	
802.11n (HT40)	MCS0	2422	36.35	
		2437	36.29	
		2452	36.27	
Maximum Measured Value			36.35	

For the measurement records, refer to the appendix B.

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 : 10.07.2017

Input voltage : AC 120V, 60Hz

Operation mode : A

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.

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 Issue 4 Table 4
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: Refer to test result
Input voltage	: AC 120V, 60Hz
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 22 °C
Relative humidity	: 53 %
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 C.

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 Clause 8.8 & ICES-003
Basic standard	: ANSI C63.10: 2013 & ANSI C63.4: 2014
Frequency range	: 0.15 – 30MHz
Limits	: FCC Part 15.207(a) & FCC Part 15.107(a) RSS-Gen Table 3 & ICES-003 Table 2
Kind of test site	: Shielded Room

Test Setup

Date of testing	: Refer to test result
Input voltage	: AC 120V, 60Hz
Operation mode	: B, C
Earthing	: Not connected
Ambient temperature	: 24 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix C.

5.1.9 Radiated Emission

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

Test standard	: FCC Part 15.109(a) ICES-003
Basic standard	: ANSI C63.4: 2014
Frequency range	: 30 - 6000MHz
Classification	: Class B
Limits	: FCC Part 15.109(a) ICES-003 Table 5 & Table 7
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: Refer to test result
Input voltage	: AC 120V, 60Hz
Operation mode	: B
Earthing	: Not connected
Ambient temperature	: 24 °C
Relative humidity	: 48 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix C.

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)
RSS-102 Issue 5 March 2015

➤ 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 65Power 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:

802.11b/g/n: 23.00 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 802.11b/g/n), the RF power density can be calculated as below:

For 802.11b/g/n: $S_{(mW/cm^2)} = PG/4\pi R^2 = 0.040$ mW/cm²**Limits for Maximum Permissible Exposure (MPE) according to FCC Part 1.1310:**1.0 mW/cm²

➤ **IC requirements:** The EUT shall comply with the requirement of RSS-102 section 2.5.2.

Exemption from Routine Evaluation Limits – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

- RF exposure evaluation exempted power for 802.11b/g/n: 2.684 W

The nominal maximum conducted output power specified:

802.11b/g/n: 23.00 dBm

Antenna Gain: 0.0 dBi for 802.11b/g/n

The Max. e.i.r.p. for 802.11b/g/n: 23.00 dBm = 0.200 W

Both e.i.r.p. for 802.11b/g/n are less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.

“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.

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