ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No.	**: OT-203-RWD-069**
AGR No	**: A19DA-367R1**
Applicant	**: BROS&COMPANY INC.**
Address	**: A-402, InnoValley, 253, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea**
Manufacturer	**: BROS&COMPANY INC.**
Address	**: A-402, InnoValley, 253, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea**
Type of Equipment	**: EYES9**
FCC ID.	**: 2AQIS-POUT-02501**
Model Name	**: POUT-02501-01**
Multiple Model Name	**: POUT-02501-02**
Serial number	**: N/A**
Total page of Report	**: 32 pages (including this page)**
Date of Incoming	**: January 02, 2020**
Date of issue	**: March 25, 2020**

SUMMARY

The equipment complies with the regulation; **FCC CFR47 Part 15 Subpart C Section 15.207 and 15.209**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Reviewed by: Ha-Ram Lee / Manager, ONETECH Corp.

Approved by: Jae-Ho Lee / General Manager, ONETECH Corp.

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ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Issue Report No.	Issued Date	Revisions	Effect Section
OT-203-RWD-069	March 25, 2020	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: BROS&COMPANY INC.
ADDRESS	: A-402, InnoValley, 253, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
CONTACT PERSON	: KIYEOL PARK / CEO
TELEPHONE NO	: +82-31-286-8646
FCC ID	: 2AQIS-POUT-02501
MODEL NAME	: POUT-02501-01
BRAND NAME	: N/A
SERIAL NUMBER	: N/A
DATE	: March 25, 2020

EQUIPMENT CLASS	**DCD – Part 15 Low Power Transmitter Below 1 705 kHz**
KIND OF EQUIPMENT	EYES9
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC&IC RULES PART(S)	FCC CFR47 Part 15 Subpart C Section 15.207 and 15.209
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. The equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.209, 15.209(a)	Radiated emission, Spurious Emission and Field Strength of Fundamental	Met the Limit / PASS
2.1049	20 dB Bandwidth	Met the Limit / PASS
15.207	Transmitter AC Power Line Conducted Emission	Met the Limit / PASS

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC CFR47 Part 15 Subpart C Section 15.207 and 15.209, 2.1049.

2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.10: 2013 at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The ONETECH Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862 Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-4617/ G-666/ T-1842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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3. GENERAL INFORMATION

3.1 Product Description

The BROS&COMPANY INC., Model: POUT-02501-01 (referred to as the EUT in this report) is a EYES9. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Wireless Charger
OPERATING FREQUENCY	111 kHz ~ 205 kHz
RATED RF OUTPUT POWER	57.1 dBμV/m
ANTENNA TYPE	Coil Antenna
MODULATION	ASK
RATED SUPPLY VOLTAGE	DC 5.0 V, DC 9.0 V

3.2 Alternative type(s)/model(s); also covered by this test report.

-. The following lists consist of the added model and their differences.

Model Name	Differences	Tested
POUT-02501-01	Basic Model	☑
POUT-02501-02	This model is identical to the basic model except for the table length.	☐

Note: 1. Applicant consigns only basic model to test. Therefore this test report just guarantees the units, which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

4. EUT MODIFICATIONS

-. None

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5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	N/A	N/A	N/A

5.2 Peripheral equipment

Model	Manufacturer	Description	Connected to
N/A	N/A	DUMMY load	N/A

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing, the EUT was set at Max. load (115 kHz), Mid. load (128 kHz), and Min. load (133 kHz) for 5V.

The EUT was set at Max. load (116 kHz), Mid. load (125 kHz), and Min. load (135 kHz) for 9V.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XY” axis.

Mode	Charging current	Description
Charging Mode With load	1 000 mA	Using Max. load
	500 mA	Using Mid. load
	100 mA	Using Min. load

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5.4 Configuration of Test System

Line Conducted Test **:** The EUT was tested in a charging mode. The EUT was connected to USB and the power of USB was connected to Adapter. All supporting equipment were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2009 7.3.3 to determine the worse operating conditions.

Radiated Emission Test **:** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 m Semi Anechoic Chamber.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

5.5 Antenna Requirement

According to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The antenna of the EUT is a Coil Antenna on the main board in the EUT, so no consideration of replacement by the user.

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6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

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7. 20 dB BANDWIDTH

7.1 Operating environment

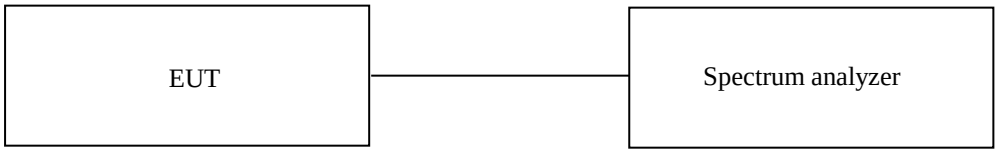
Temperature : 23 ℃

Relative humidity : 49 % R.H.

7.2 Test set-up

a. Span = approximately 2 to 3 times the 20 dB bandwidth, RBW = greater than 1 % of the 20 dB bandwidth, VBW = RBW, Sweep = auto, Detector = peak, Trace = max hold.

b. The marker-to-peak function to set the mark to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level.
The marker-delta reading at this point is 20 dB bandwidth of the emission.



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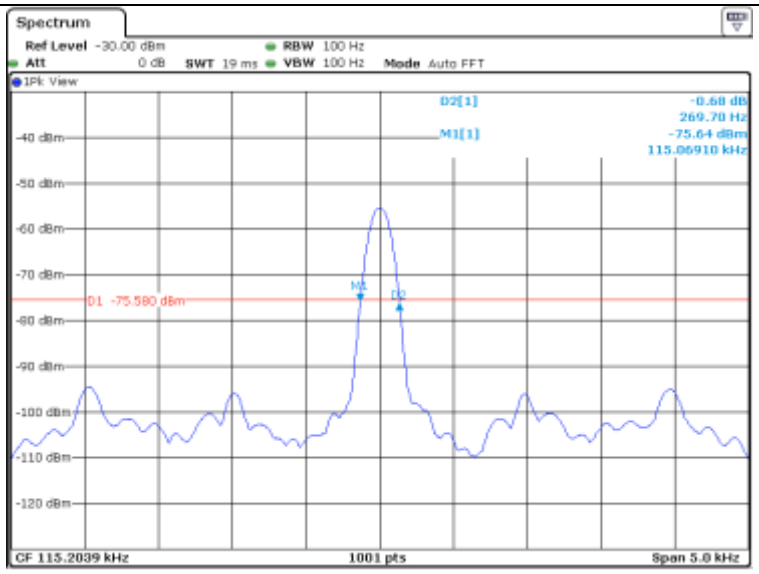
7.3 Test data for 5V

Test Date : January 02, 2020

Frequency : 115.20 KHz

20 dB Bandwidth : 269.70 Hz



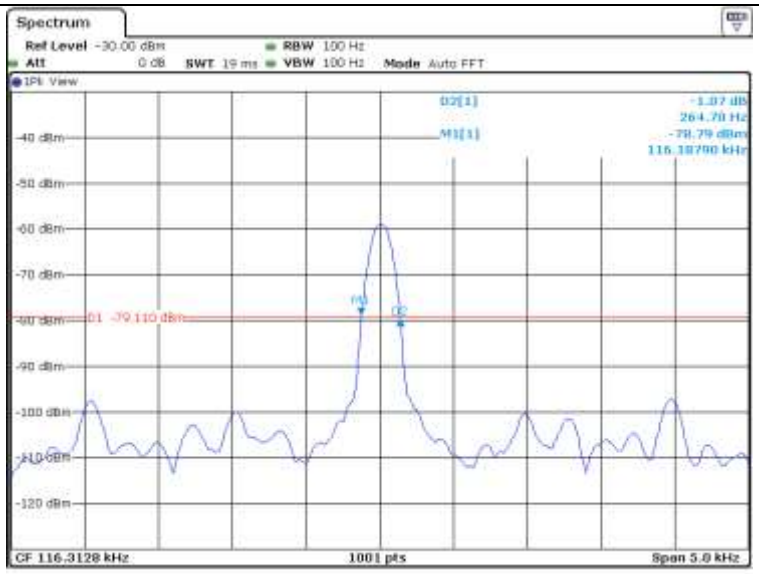
Tested by: Sieon Lee / Assistant Manager

7.4 Test data for 9V

-. Test Date : January 02, 2020

Frequency : 116.31 KHz

20 dB Bandwidth : 264.70 Hz



Tested by: Sieon Lee / Assistant Manager

8. Spurious Emission Test

8.1 Regulation

According to §15.209(a), for an intentional device, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency [MHz]	Field strength [μ V/m]	Field strength [dBμ V/m]	Measurement distance [m]
0.009 ~ 0.490	2 400 / F (kHz)	48.52 ~ 13.80	300
0.490 ~ 1.705	24 000 / F (kHz)	33.8 ~ 22.97	30
1.705 ~ 30	30	29.50	30
30 ~ 88	*100	40.00	3
88 ~ 216	*150	43.52	3
216 ~ 960	*200	46.02	3
Above 960	500	53.98	3

*Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54 ~ 72 MHz, 76 ~ 88 MHz, 174 ~ 216 MHz or 470 ~ 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

8.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 kHz to 1 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 ms in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

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8.3 Test data for Using Max load (1 000 mA) (5V)

8.3.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 49 % R.H. Temperature: 23 ℃

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency Range : 9 kHz ~ 30 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin (dB)
0.048	QP	H	34.8	19.4	0.0	54.2	-25.8	34.0	59.8
*0.115	QP	H	56.0	19.4	0.0	75.4	-4.6	26.4	31.0
0.210	QP	H	25.6	19.4	0.0	45.0	-35.0	21.2	56.2
0.329	QP	H	32.8	19.4	0.0	52.2	-27.8	17.3	45.1

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin (dB)
0.568	QP	H	23.6	19.3	0.0	42.9	2.9	32.5	29.6
0.777	QP	H	22.0	19.3	0.0	41.3	1.3	29.8	28.5

-. Remark: “H” Horizontal, “V” Vertical

-. “*” Means Fundamental frequency

-. Emission Level at 3m [dB μ V/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]

-. Margin [dB] = Emission Level at 300m [dBμV/m] – Limit at 300m [dBμV/m]

= Emission Level at 300m [dBμV/m] – Limit at 30m [dBμV/m]

-. Emission Level at 300m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (300/3), 80 dB for up to 0.49 MHz

-. Emission Level at 30m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (30/3), 40 dB for above 0.49 MHz, Below 30 MHz

Tested by: Sieon Lee / Assistant Manager

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8.3.2 Spurious Radiated Emission below 1 GHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 49 % R.H. Temperature: 23 ℃

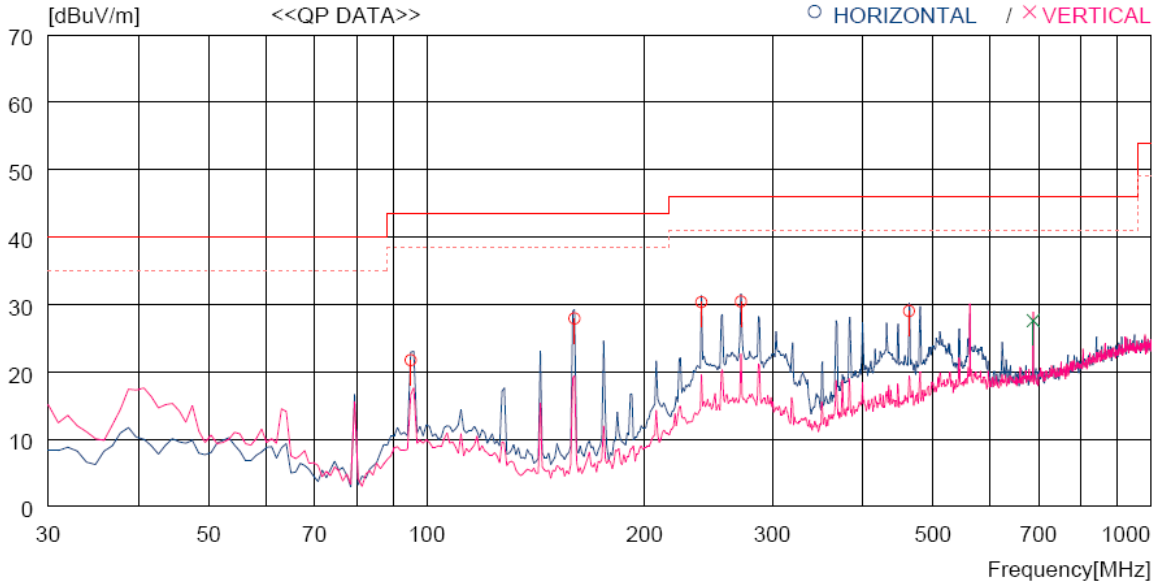
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency range : 30 MHz ~ 1 000 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode



No.	FREQ	READING QP	ANT FACTOR	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal ------										
1	94.990	41.2	12.0	1.2	32.7	21.7	43.5	21.8	200	324
2	159.980	50.0	8.9	1.6	32.6	27.9	43.5	15.6	200	359
3	239.520	48.6	12.4	1.9	32.6	30.3	46.0	15.7	200	14
4	271.530	47.9	13.2	2.0	32.7	30.4	46.0	15.6	200	137
5	463.591	42.5	16.7	2.6	32.8	29.0	46.0	17.0	100	279
----- Vertical ------										
6	687.655	36.4	20.7	3.4	32.9	27.6	46.0	18.4	200	79

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8.4 Test data for Using Max load (1 000 mA) (9V)

8.4.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 49 % R.H. Temperature: 23 ℃

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency Range : 9 kHz ~ 30 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin (dB)
0.048	QP	H	35.6	19.4	0.0	55.0	-25.0	34.0	59.0
*0.116	QP	H	57.1	19.4	0.0	76.5	-3.5	26.3	29.8
0.210	QP	H	26.1	19.4	0.0	45.5	-34.5	21.2	55.7
0.329	QP	H	34.1	19.4	0.0	53.5	-26.5	17.3	43.8

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin (dB)
0.568	QP	H	24.4	19.3	0.0	43.7	3.7	32.5	28.8
0.807	QP	H	22.1	19.3	0.0	41.4	1.4	29.5	28.1

-. Remark: “H” Horizontal, “V” Vertical

-. “*” Means Fundamental frequency

-. Emission Level at 3m [dB μ V/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]

-. Margin [dB] = Emission Level at 300m [dBμV/m] – Limit at 300m [dBμV/m]

= Emission Level at 300m [dBμV/m] – Limit at 30m [dBμV/m]

-. Emission Level at 300m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (300/3), 80 dB for up to 0.49 MHz

-. Emission Level at 30m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (30/3), 40 dB for above 0.49 MHz, Below 30 MHz

Tested by: Sieon Lee / Assistant Manager

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8.4.2 Spurious Radiated Emission below 1 GHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 49 % R.H. Temperature: 23 ℃

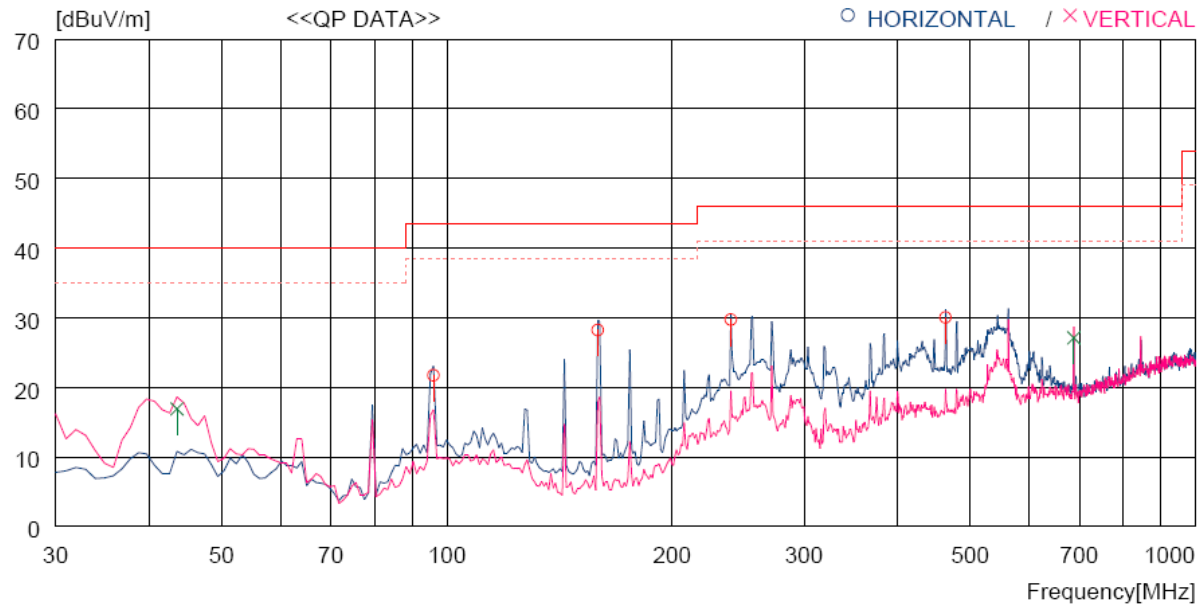
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency range : 30 MHz ~ 1 000 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode



No.	FREQ	READING QP	ANT FACTOR	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal ------										
1	95.960	41.1	12.1	1.2	32.7	21.7	43.5	21.8	300	308
2	159.010	50.3	8.9	1.6	32.6	28.2	43.5	15.3	200	304
3	239.520	48.0	12.4	1.9	32.6	29.7	46.0	16.3	200	10
4	463.591	43.5	16.7	2.6	32.8	30.0	46.0	16.0	100	261
----- Vertical ------										
5	43.580	33.9	14.8	0.9	32.7	16.9	40.0	23.1	100	188
6	687.655	35.9	20.7	3.4	32.9	27.1	46.0	18.9	200	0

Tested by: Sieon Lee / Assistant Manager

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8.5 Test data for Using Mid. load (500 mA) (5V)

8.5.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 49 % R.H. Temperature: 23 ℃

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency Range : 9 kHz ~ 30 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin (dB)
0.048	QP	H	34.0	19.4	0.0	53.4	-26.6	34.0	60.6
*0.128	QP	H	52.6	19.4	0.0	72.0	-8.0	25.5	33.5
0.359	QP	H	32.5	19.4	0.0	51.9	-28.1	16.5	44.6

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin (dB)
0.628	QP	H	23.4	19.4	0.0	42.8	2.8	31.6	28.8
0.866	QP	H	19.3	19.3	0.0	38.6	-1.4	28.9	30.3
1.135	QP	H	16.0	19.3	0.1	35.4	-4.6	26.5	31.1

-. Remark: “H” Horizontal, “V” Vertical

-. “*” Means Fundamental frequency

-. Emission Level at 3m [dB μ V/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]

-. Margin [dB] = Emission Level at 300m [dBμV/m] – Limit at 300m [dBμV/m]

= Emission Level at 300m [dBμV/m] – Limit at 30m [dBμV/m]

-. Emission Level at 300m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (300/3), 80 dB for up to 0.49 MHz

-. Emission Level at 30m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (30/3), 40 dB for above 0.49 MHz, Below 30 MHz

Tested by: Sieon Lee / Assistant Manager

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8.5.2 Spurious Radiated Emission below 1 GHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 49 % R.H. Temperature: 23 ℃

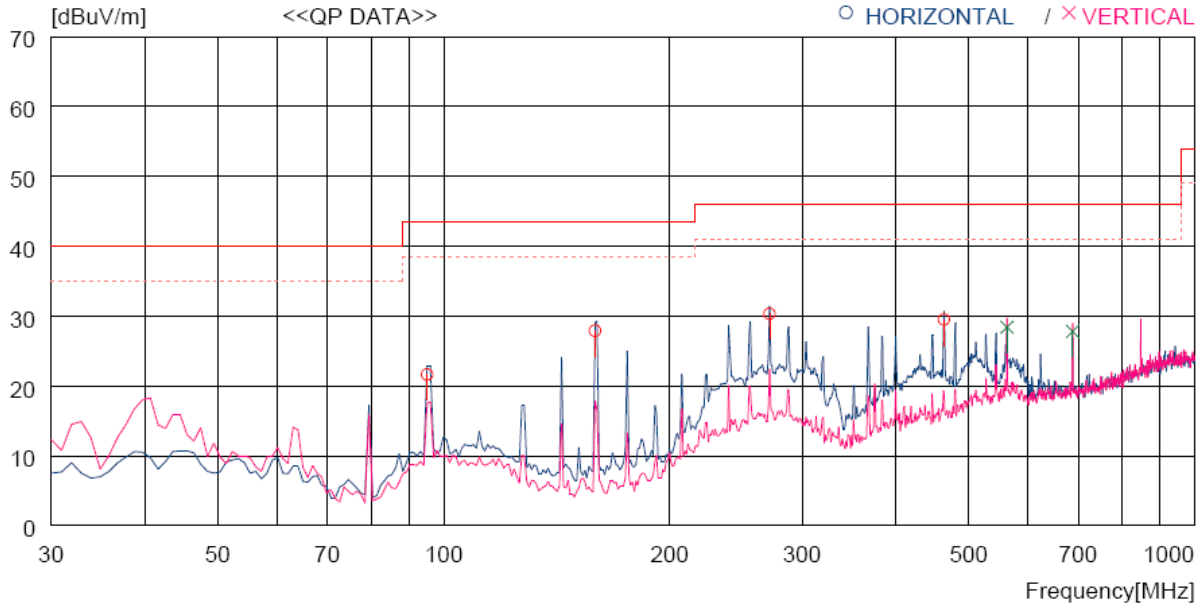
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency range : 30 MHz ~ 1 000 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode



No.	FREQ	READING QP	ANT FACTOR	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal ------										
1	94.990	41.1	12.0	1.2	32.7	21.6	43.5	21.9	300	0
2	159.010	50.0	8.9	1.6	32.6	27.9	43.5	15.6	200	306
3	271.530	47.8	13.2	2.0	32.7	30.3	46.0	15.7	200	359
4	463.591	43.0	16.7	2.6	32.8	29.5	46.0	16.5	100	0
----- Vertical ------										
5	562.529	38.9	19.6	2.9	33.0	28.4	46.0	17.6	100	107
6	687.655	36.6	20.7	3.4	32.9	27.8	46.0	18.2	100	359

Tested by: Sieon Lee / Assistant Manager

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8.6 Test data for Using Mid. load (500 mA) (9V)

8.6.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 49 % R.H. Temperature: 23 ℃

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency Range : 9 kHz ~ 30 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin (dB)
0.048	QP	H	35.9	19.4	0.0	55.3	-24.7	34.0	58.7
*0.125	QP	H	56.5	19.4	0.0	75.9	-4.1	25.7	29.8
0.240	QP	H	26.0	19.4	0.0	45.4	-34.6	20.0	54.6
0.359	QP	H	35.2	19.4	0.0	54.6	-25.4	16.5	41.9

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin (dB)
0.598	QP	H	26.0	19.3	0.0	45.3	5.3	32.1	26.8
0.866	QP	H	22.1	19.3	0.0	41.4	1.4	28.9	27.5

-. Remark: “H” Horizontal, “V” Vertical

-. “*” Means Fundamental frequency

-. Emission Level at 3m [dB μ V/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]

-. Margin [dB] = Emission Level at 300m [dBμV/m] – Limit at 300m [dBμV/m]

= Emission Level at 300m [dBμV/m] – Limit at 30m [dBμV/m]

-. Emission Level at 300m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (300/3), 80 dB for up to 0.49 MHz

-. Emission Level at 30m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (30/3), 40 dB for above 0.49 MHz, Below 30 MHz

Tested by: Sieon Lee / Assistant Manager

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8.6.2 Spurious Radiated Emission below 1 GHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 49 % R.H. Temperature: 23 ℃

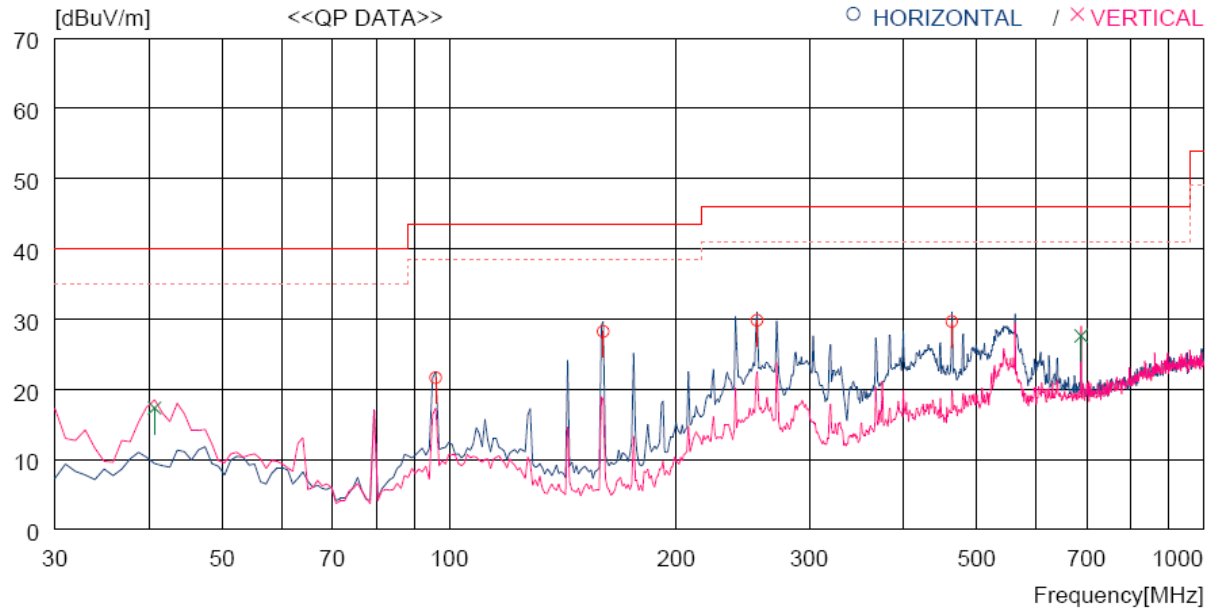
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency range : 30 MHz ~ 1 000 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode



No.	FREQ	READING QP	ANT FACTOR	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal ------										
1	95.960	41.0	12.1	1.2	32.7	21.6	43.5	21.9	300	0
2	159.980	50.3	8.9	1.6	32.6	28.2	43.5	15.3	200	359
3	256.010	47.5	13.0	2.0	32.7	29.8	46.0	16.2	100	1
4	463.591	43.1	16.7	2.6	32.8	29.6	46.0	16.4	100	280
----- Vertical ------										
5	40.670	34.4	14.7	0.9	32.7	17.3	40.0	22.7	100	154
6	687.655	36.4	20.7	3.4	32.9	27.6	46.0	18.4	200	0

Tested by: Sieon Lee / Assistant Manager

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8.7 Test data for Using Min. load (100 mA) (5V)

8.7.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 49 % R.H. Temperature: 23 ℃

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency Range : 9 kHz ~ 30 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin (dB)
0.048	QP	H	33.4	19.4	0.0	52.8	-27.2	34.0	61.2
*0.133	QP	H	51.0	19.4	0.0	70.4	-9.6	25.1	34.7
0.389	QP	H	29.0	19.4	0.0	48.4	-31.6	15.8	47.4

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin (dB)
0.657	QP	H	21.4	19.3	0.0	40.7	0.7	31.3	30.6
0.926	QP	H	17.9	19.3	0.0	37.2	-2.8	28.3	31.1
1.195	QP	H	14.0	19.3	0.1	33.4	-6.6	26.1	32.7

-. Remark: “H” Horizontal, “V” Vertical

-. “*” Means Fundamental frequency

-. Emission Level at 3m [dB μ V/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]

-. Margin [dB] = Emission Level at 300m [dBμV/m] – Limit at 300m [dBμV/m]

= Emission Level at 300m [dBμV/m] – Limit at 30m [dBμV/m]

-. Emission Level at 300m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (300/3), 80 dB for up to 0.49 MHz

-. Emission Level at 30m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (30/3), 40 dB for above 0.49 MHz, Below 30 MHz

Tested by: Sieon Lee / Assistant Manager

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8.7.2 Spurious Radiated Emission below 1 GHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 49 % R.H. Temperature: 23 ℃

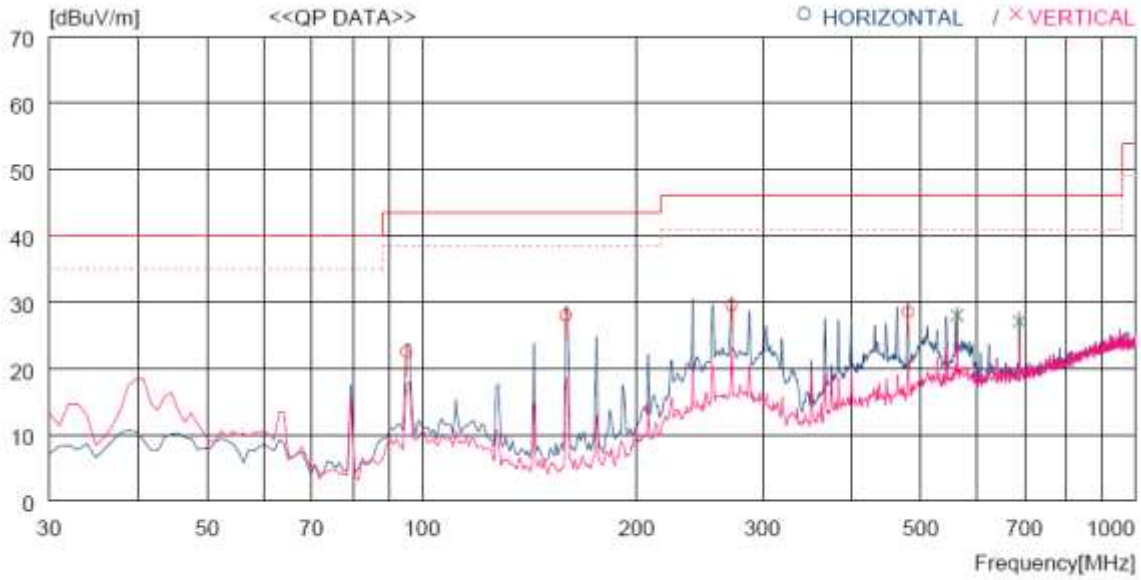
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency range : 30 MHz ~ 1 000 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode



No.	FREQ	READING QP	ANT FACTOR	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal ------										
1	94.990	42.0	12.0	1.2	32.7	22.5	43.5	21.0	300	303
2	159.010	50.1	8.9	1.6	32.6	28.0	43.5	15.5	200	359
3	271.530	47.0	13.2	2.0	32.7	29.5	46.0	16.5	100	0
4	480.081	41.3	17.5	2.6	32.9	28.5	46.0	17.5	100	0
----- Vertical ------										
5	562.529	38.5	19.6	2.9	33.0	28.0	46.0	18.0	100	359
6	687.655	35.9	20.7	3.4	32.9	27.1	46.0	18.9	200	174

Tested by: Sieon Lee / Assistant Manager

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8.8 Test data for Using Min. load (100 mA) (9V)

8.8.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 49 % R.H. Temperature: 23 ℃

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency Range : 9 kHz ~ 30 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin (dB)
0.048	QP	H	35.4	19.4	0.0	54.8	-25.2	34.0	59.2
*0.135	QP	H	52.0	19.4	0.0	71.4	-8.6	25.0	33.6
0.389	QP	H	32.1	19.4	0.0	51.5	-28.5	15.8	44.3

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin (dB)
0.657	QP	H	23.0	19.3	0.0	42.3	2.3	31.3	29.0
0.926	QP	H	18.5	19.3	0.0	37.8	-2.2	28.3	30.5
1.195	QP	H	15.0	19.3	0.1	34.4	-5.6	26.1	31.7

-. Remark: “H” Horizontal, “V” Vertical

-. “*” Means Fundamental frequency

-. Emission Level at 3m [dB μ V/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]

-. Margin [dB] = Emission Level at 300m [dBμV/m] – Limit at 300m [dBμV/m]

= Emission Level at 300m [dBμV/m] – Limit at 30m [dBμV/m]

-. Emission Level at 300m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (300/3), 80 dB for up to 0.49 MHz

-. Emission Level at 30m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (30/3), 40 dB for above 0.49 MHz, Below 30 MHz

Tested by: Sieon Lee / Assistant Manager

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8.8.2 Spurious Radiated Emission Below 1 GHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 49 % R.H. Temperature: 23 ℃

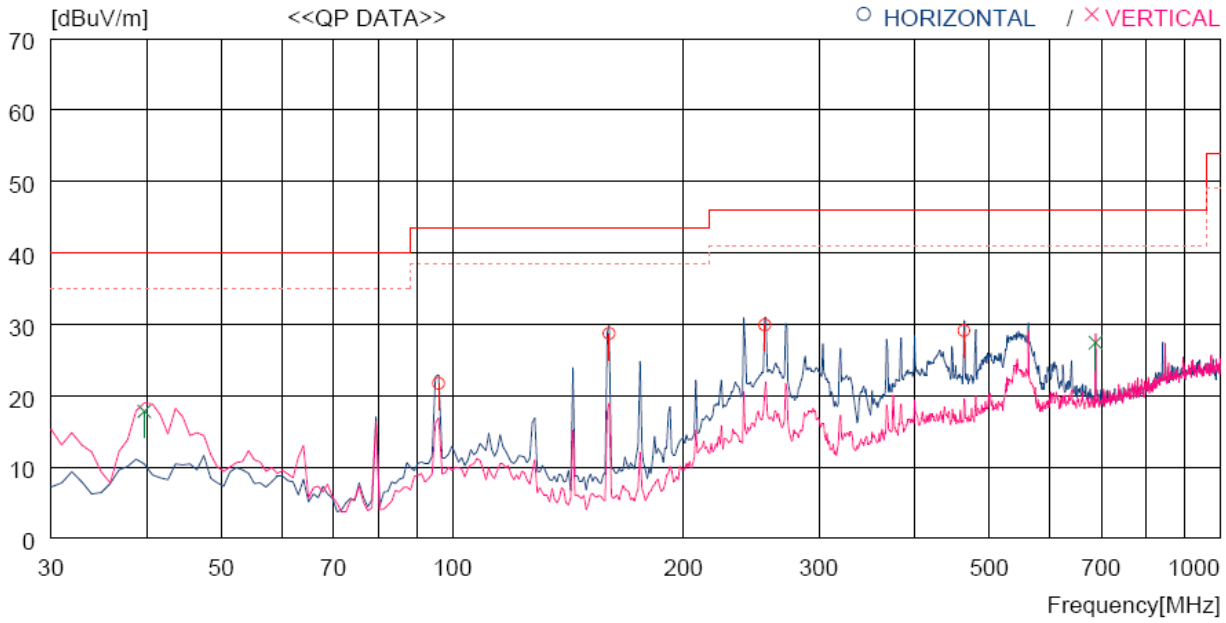
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency range : 30 MHz ~ 1 000 MHz

Result : PASSED

EUT : EYES9 Date: January 02, 2020

Operating Condition : Transmitting Mode



No.	FREQ	READING QP	ANT FACTOR	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal ------										
1	95.960	41.1	12.1	1.2	32.7	21.7	43.5	21.8	300	0
2	159.980	50.8	8.9	1.6	32.6	28.7	43.5	14.8	200	359
3	255.040	47.7	12.9	2.0	32.7	29.9	46.0	16.1	200	359
4	463.591	42.6	16.7	2.6	32.8	29.1	46.0	16.9	100	0
----- Vertical ------										
5	39.700	35.0	14.6	0.9	32.7	17.8	40.0	22.2	100	359
6	687.655	36.2	20.7	3.4	32.9	27.4	46.0	18.6	200	168

Tested by: Sieon Lee / Assistant Manager

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9. CONDUCTED EMISSION TEST

9.1 Operating environment

Temperature : 23 ℃

Relative humidity : 49 % R.H

9.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50 Ω / 50 μH + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

9.3 Test equipment used

All test equipment used is calibrated on a regular basis.

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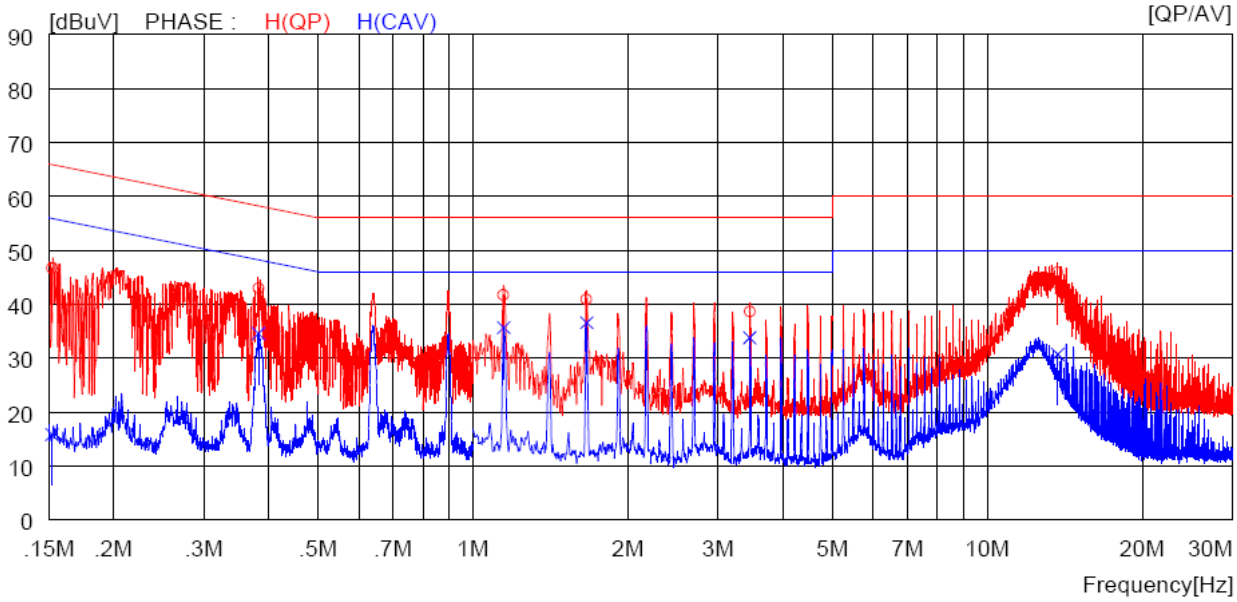
9.4 Test data for 5V

-. Test Date : January 03, 2020

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : HOT LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.15200	36.7	----	10.0	46.7	----	65.9	----	19.2	----	H(QP)
2	0.38300	33.0	----	10.0	43.0	----	58.2	----	15.2	----	H(QP)
3	1.14800	31.6	----	10.1	41.7	----	56.0	----	14.3	----	H(QP)
4	1.66400	30.8	----	10.1	40.9	----	56.0	----	15.1	----	H(QP)
5	3.45600	28.6	----	10.1	38.7	----	56.0	----	17.3	----	H(QP)
6	13.70000	35.4	----	10.5	45.9	----	60.0	----	14.1	----	H(QP)
7	0.15200	----	5.9	10.0	----	15.9	----	55.9	----	40.0	H(CAV)
8	0.38300	----	24.6	10.0	----	34.6	----	48.2	----	13.6	H(CAV)
9	1.14800	----	25.6	10.1	----	35.7	----	46.0	----	10.3	H(CAV)
10	1.66400	----	26.5	10.1	----	36.6	----	46.0	----	9.4	H(CAV)
11	3.45600	----	23.7	10.1	----	33.8	----	46.0	----	12.2	H(CAV)
12	13.70000	----	20.3	10.5	----	30.8	----	50.0	----	19.2	H(CAV)

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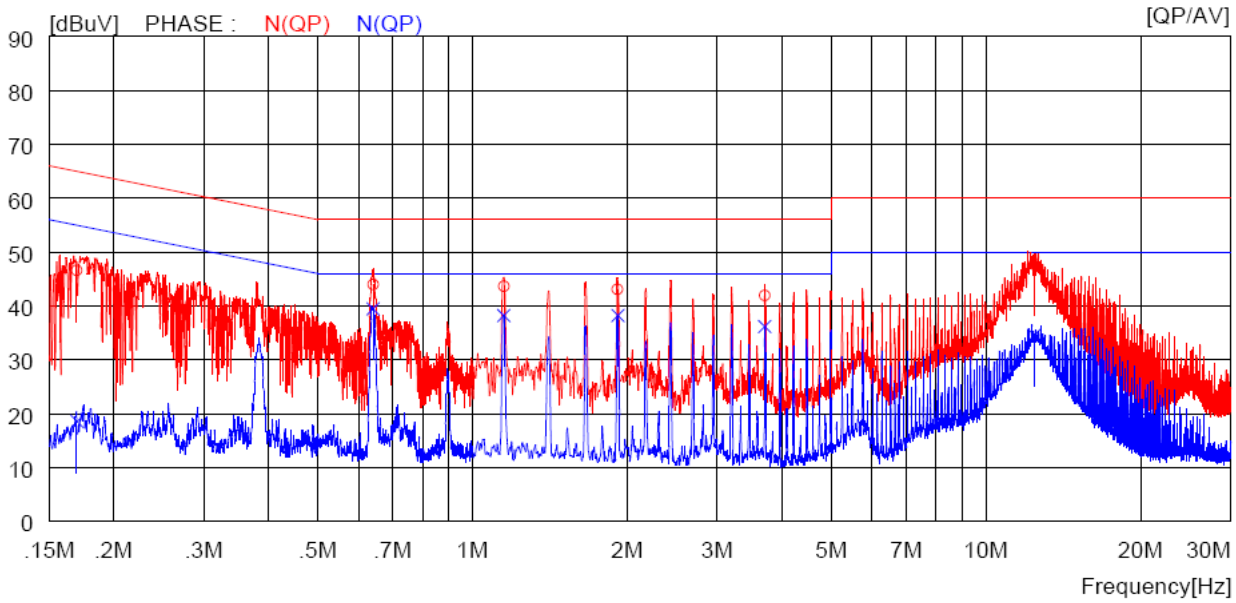
-. Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.17000	36.6	----	10.0	46.6	----	65.0	----	18.4	----	N(QP)
2	0.64100	34.0	----	10.0	44.0	----	56.0	----	12.0	----	N(QP)
3	1.15200	33.5	----	10.1	43.6	----	56.0	----	12.4	----	N(QP)
4	1.92000	33.0	----	10.1	43.1	----	56.0	----	12.9	----	N(QP)
5	3.71200	31.9	----	10.1	42.0	----	56.0	----	14.0	----	N(QP)
6	12.42000	37.3	----	10.5	47.8	----	60.0	----	12.2	----	N(QP)
7	0.17000	----	8.6	10.0	----	18.6	----	55.0	----	36.4	N(CAV)
8	0.64100	----	29.5	10.0	----	39.5	----	46.0	----	6.5	N(CAV)
9	1.15200	----	28.1	10.1	----	38.2	----	46.0	----	7.8	N(CAV)
10	1.92000	----	28.1	10.1	----	38.2	----	46.0	----	7.8	N(CAV)
11	3.71200	----	26.1	10.1	----	36.2	----	46.0	----	9.8	N(CAV)
12	12.42000	----	24.1	10.5	----	34.6	----	50.0	----	15.4	N(CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

Tested by: Sieon Lee / Assistant Manager

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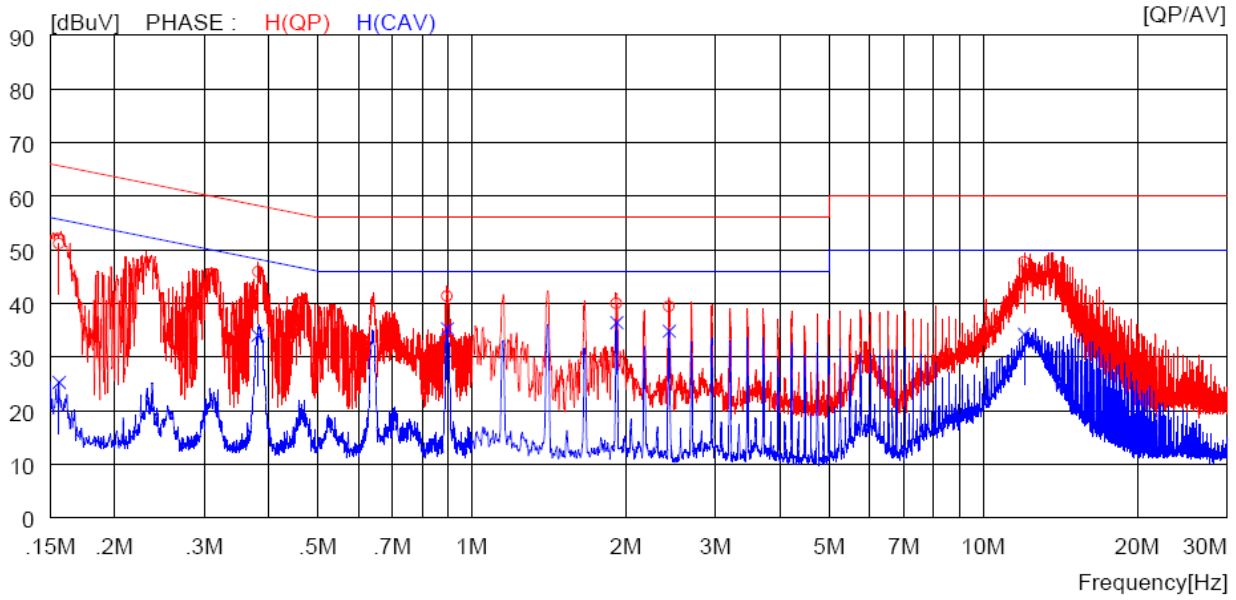
9.5 Test data for 9V

-. Test Date : January 03, 2020

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : HOT LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.15600	41.2	----	10.0	51.2	----	65.7	----	14.5	----	H(QP)
2	0.38200	35.9	----	10.0	45.9	----	58.2	----	12.3	----	H(QP)
3	0.89600	31.4	----	10.0	41.4	----	56.0	----	14.6	----	H(QP)
4	1.92000	29.9	----	10.1	40.0	----	56.0	----	16.0	----	H(QP)
5	2.43200	29.3	----	10.1	39.4	----	56.0	----	16.6	----	H(QP)
6	12.03000	37.3	----	10.5	47.8	----	60.0	----	12.2	----	H(QP)
7	0.15600	----	15.3	10.0	----	25.3	----	55.7	----	30.4	H(CAV)
8	0.38200	----	24.0	10.0	----	34.0	----	48.2	----	14.2	H(CAV)
9	0.89600	----	25.3	10.0	----	35.3	----	46.0	----	10.7	H(CAV)
10	1.92000	----	26.3	10.1	----	36.4	----	46.0	----	9.6	H(CAV)
11	2.43200	----	24.7	10.1	----	34.8	----	46.0	----	11.2	H(CAV)
12	12.03000	----	23.8	10.5	----	34.3	----	50.0	----	15.7	H(CAV)

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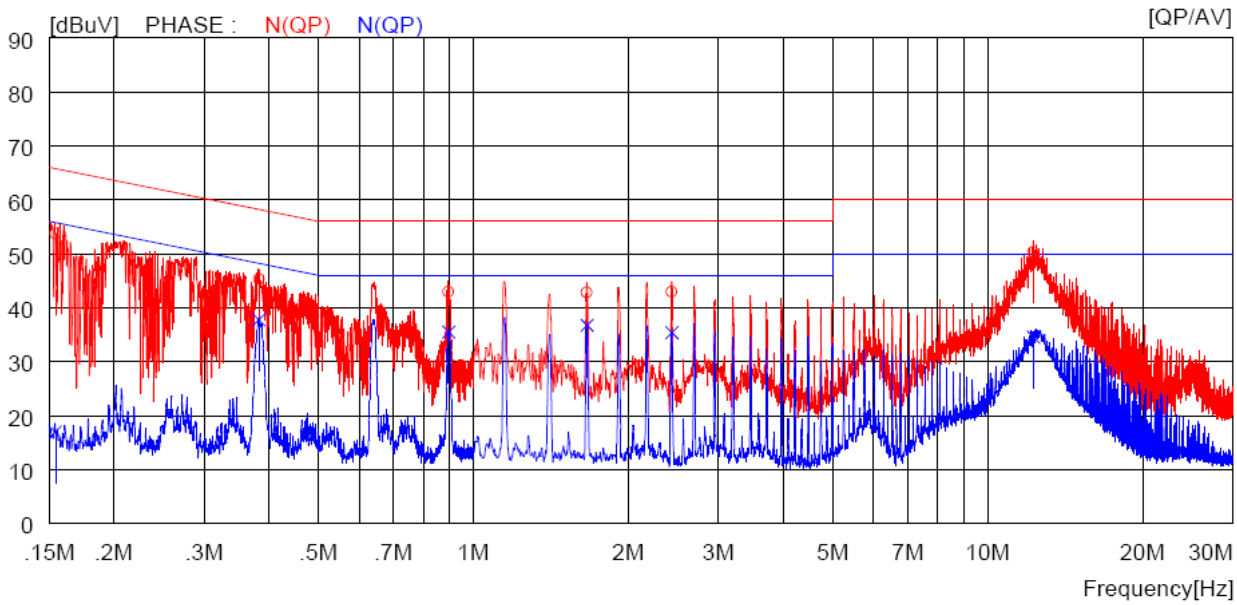
-. Tested Line : NEUTRAL LINE



NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15400	43.8	----	10.0	53.8	----	65.8	----	12.0	----	N(QP)
2	0.38300	35.3	----	10.0	45.3	----	58.2	----	12.9	----	N(QP)
3	0.89600	33.0	----	10.0	43.0	----	56.0	----	13.0	----	N(QP)
4	1.66400	32.8	----	10.1	42.9	----	56.0	----	13.1	----	N(QP)
5	2.43200	32.9	----	10.1	43.0	----	56.0	----	13.0	----	N(QP)
6	12.28000	39.9	----	10.5	50.4	----	60.0	----	9.6	----	N(QP)
7	0.15400	----	7.0	10.0	----	17.0	----	55.8	----	38.8	N(CAV)
8	0.38300	----	27.8	10.0	----	37.8	----	48.2	----	10.4	N(CAV)
9	0.89600	----	25.5	10.0	----	35.5	----	46.0	----	10.5	N(CAV)
10	1.66400	----	26.7	10.1	----	36.8	----	46.0	----	9.2	N(CAV)
11	2.43200	----	25.3	10.1	----	35.4	----	46.0	----	10.6	N(CAV)
12	12.28000	----	24.1	10.5	----	34.6	----	50.0	----	15.4	N(CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

Tested by: Sieon Lee / Assistant Manager

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10. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1	Spectrum analyzer	R/S	FSV30	101199	Mar. 11, 2019	One Year	■
2	Test receiver	R/S	ESCI	101420	Mar. 28, 2019	One Year	■
3	Amplifier	Sonoma Instrument	310N	392756	Oct. 16, 2019	One Year	■
4	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-225	Sep. 17, 2018	Two Year	■
5	Controller	Innco Systems GmbH	CO3000	1026/40960617/P	N/A	N/A	■
6	Turn Table	Innco Systems GmbH	DT2000-2t	930611	N/A	N/A	■
7	LISN	Schwarzbeck	NSLK8126	8126-404	Mar. 19, 2019	One Year	■
		Schwarzbeck	NSLK8128	8128-216	Mar. 20, 2019	One Year	■
8	AMN	EMCO	3825/2	9109-1867	Mar. 27, 2019	One Year	■
9	Antenna Master	Innco Systems GmbH	MA-4640-XPET	MA4640/652/43100318/P	N/A	N/A	■
10	Loop Antenna	Schwarzbeck	FMZB 1513	1513-235	May. 13, 2018	Two Years	■
11	Environmental Test Chamber	ESPEC	PSL-2KP	14009407	Feb. 22, 2019	One Year	■
12	DC Power Supply	LG Precision Co.,Ltd	GP-4303D	5071069	Jan. 10, 2019	One Year	■

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