Report No.: DDT-R19082808-1E3

Issued Date: Jan. 15, 2020

FCC CERTIFICATION TEST REPORT

FOR

Applicant	**:**	EQUITATION HOLDING B.V.
Address	**:**	Van Heemstraweg 25, 6657 KD, Boven- Leeuwen, Netherlands
Equipment under Test	**:**	WHIS
Model No.	**:**	WHIS-02
Trade Mark	**:**	WHIS
FCC ID	**:**	2AUKHWHIS-02
Manufacturer	**:**	EQUITATION HOLDING B.V.
Address	**:**	Van Heemstraweg 25, 6657 KD, Boven- Leeuwen, Netherlands

DONG DIAN TESTING

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

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REPORT

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10. Photos of the EUT 37

TEST REPORT DECLARE

Applicant	:	EQUITATION HOLDING B.V.
Address	:	Van Heemstraweg 25, 6657 KD, Boven- Leeuwen, Netherlands
Equipment under Test	:	WHIS
Model No.	:	WHIS-02
Trade mark	:	WHIS
Manufacturer	:	EQUITATION HOLDING B.V.
Address	:	Van Heemstraweg 25, 6657 KD, Boven- Leeuwen, Netherlands

Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C.

Test procedure used:

ANSI C63.10:2013.

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd. and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC standards.

Report No:	DDT-R19082808-1E3		
Date of Receipt:	Sep. 03, 2019	**Date of Test:**	Sep. 03, 2019 ~ Jan. 15, 2020

Prepared By: ***Approved By:***

Sam Li

Sam Li/Engineer ***Damon Hu/EMC Manager***

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision history

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Jan. 15, 2020	

1. Summary of test results

The EUT have been tested according to the applicable standards as referenced below.		
Description of Test Item	**Standard**	**Results**
20dB Bandwidth	FCC Part 15: 15.215 ANSI C63.10:2013	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.249 ANSI C63.10:2013	PASS
Band Edge Compliance	FCC Part 15: 15.249 ANSI C63.10:2013	PASS
Power Line Conducted Emission	FCC Part 15: 15.207 ANSI C63.10:2013	PASS
Antenna requirement	FCC Part 15: 15.203	PASS

2. General test information

2.1. Description of EUT

EUT* Name	:	WHIS
Model Number	:	WHIS-02
EUT function description	:	Please reference user manual of this device
Power supply	:	DC 5V from external AC Adapter DC 3.7V built-in battery
Operation frequency	:	902.5MHz-927.25MHz
Modulation	:	FM
Antenna Type	:	Integral antenna, maximum PK gain: 1 dBi
Sample Type	:	Series production

Note: EUT is the ab. of equipment under test.

EUT channels and frequencies list:

Channel information							
CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
0	902.5	25	908.75	50	915	75	921.25
1	902.75	26	909	51	915.25	76	921.5
2	903	27	909.25	52	915.5	77	921.75
3	903.25	28	909.5	53	915.75	78	922
4	903.5	29	909.75	54	916	79	922.25
5	903.75	30	910	55	916.25	80	922.5
6	904	31	910.25	56	916.5	81	922.75
7	904.25	32	910.5	57	916.75	82	923
8	904.5	33	910.75	58	917	83	923.25
9	904.75	34	911	59	917.25	84	923.5
10	905	35	911.25	60	917.5	85	923.75
11	905.25	36	911.5	61	917.75	86	924
12	905.5	37	911.75	62	918	87	924.25
13	905.75	38	912	63	918.25	88	924.5
14	906	39	912.25	64	918.5	89	924.75
15	906.25	40	912.5	65	918.75	90	925
16	906.5	41	912.75	66	919	91	925.25
17	906.75	42	913	67	919.25	92	925.5
18	907	43	913.25	68	919.5	93	925.75
19	907.25	44	913.5	69	919.75	94	926
20	907.5	45	913.75	70	920	95	926.25
21	907.75	46	914	71	920.25	96	926.5
22	908	47	914.25	72	920.5	97	926.75
23	908.25	48	914.5	73	920.75	98	927
24	908.5	49	914.75	74	921	99	927.25

2.2. Accessories of EUT

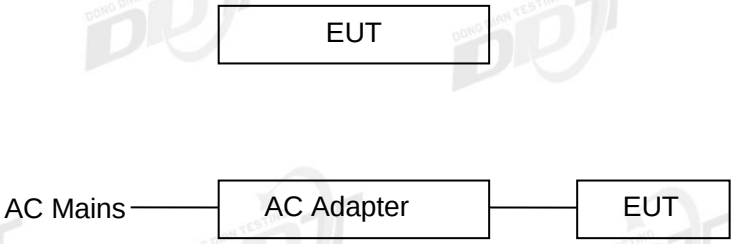
Description of Accessories	Manufacturer	Model number	Description	Remark
N/A	N/A	N/A	N/A	N/A

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
AC Adapter	N/A	NSA12UU-050230	N/A	N/A
Mobile phone	SAMSUNG	SM-G9600/DS	R28K331TTNF	N/A
Line in cable	N/A	N/A	N/A	Length: 1.5m

2.4. Block diagram of EUT configuration for test

Tx Mode:



The test software was used to control EUT work in Continuous Tx mode, and select test channel, wireless mode as below table.

Tested mode, channel, information			
Mode	Channel	Setting Tx Power	Frequency (MHz)
Tx mode	CH 0	/	902.5
	CH 50	/	915
	CH99	/	927.25

2.5. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25℃
Humidity range:	40-75%
Pressure range:	86-106kPa

2.6. Deviations of test standard

No Deviation.

2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel: +86-0769-38826678, http://www.dgddt.com, Email: ddt@dgddt.com

CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

Designation Number: CN1182; Test Firm Registration Number: 540522

Industry Canada site registration number: 10288A-1

2.8. Measurement uncertainty

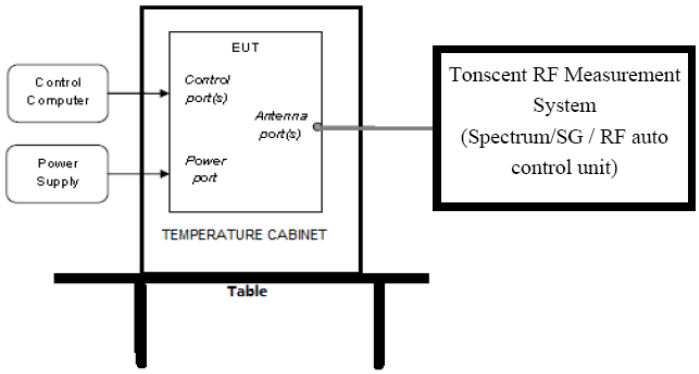
Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power (Conducted) (Spectrum analyzer)	0.86dB (10MHz ≤ f < 3.6GHz);
	1.38dB (3.6GHz≤ f < 8GHz)
Peak Output Power (Conducted) (Power Sensor)	0.74dB
Power Spectral Density	0.74dB (10MHz ≤ f < 3.6GHz);
	1.38dB (3.6GHz≤ f < 8GHz)
Conducted spurious emissions	0.86dB (10MHz ≤ f < 3.6GHz);
	1.40dB (3.6GHz≤ f < 8GHz)
	1.66dB (8GHz≤ f < 22GHz)
Uncertainty for radio frequency (RBW<20kHz)	3×10^{-8}
Temperature	0.4℃
Humidity	2%
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70dB (Antenna Polarize: V)
	4.84dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-18GHz)	4.10dB(1-6GHz)
	4.40dB (6GHz-18GHz)
Uncertainty for Power line conduction emission test	3.32dB (150kHz-30MHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

3. Equipment used during test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
RF Connected Test (Tonscend RF Measurement System)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 29, 2019	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jun. 25, 2019	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 29, 2019	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jun. 25, 2019	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Jun. 28, 2019	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Jun. 28, 2019	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Jun. 25, 2019	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 29, 2019	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Sep. 29, 2019	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
Radiation 1#chamber					
EMI Test Receiver	R&S	ESU8	100316	Sep. 29, 2019	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 25, 2019	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 15, 2019	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Sep. 29, 2019	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 15, 2019	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Sep. 29, 2019	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 29, 2019	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	101303	Sep. 29, 2019	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Sep. 29, 2019	1 Year
RF Cable	N/A	SMAJ-SMAJ-1M+ 11M	17070133+17070131	Sep. 29, 2019	1 Year
MI Cable	HUBSER	C10-01-01-1M	1091629	Sep. 29, 2019	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Power Line Conducted Emissions Test					
EMI Test Receiver	R&S	ESU8	100316	Sep. 29, 2019	1 Year
LISN 1	R&S	ENV216	101109	Sep. 29, 2019	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 29, 2019	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 29, 2019	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 29, 2019	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

4. 20dB Bandwidth

4.1. Block diagram of test setup



4.2. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.3. Test Procedure

(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) Set the spectrum analyzer as follows:

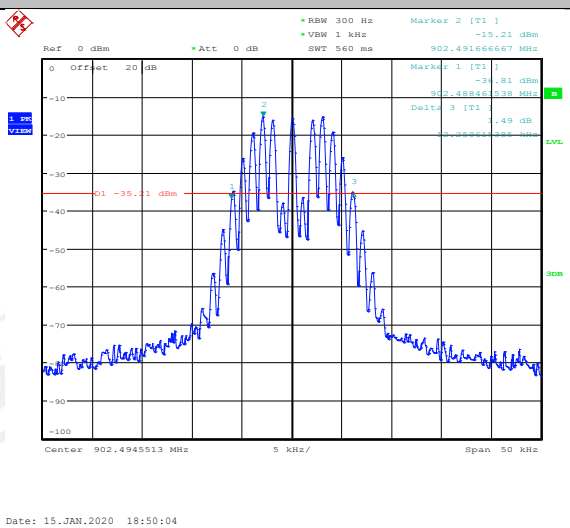
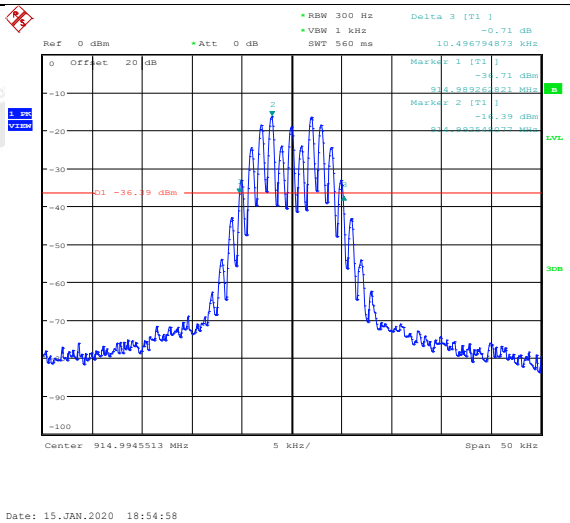
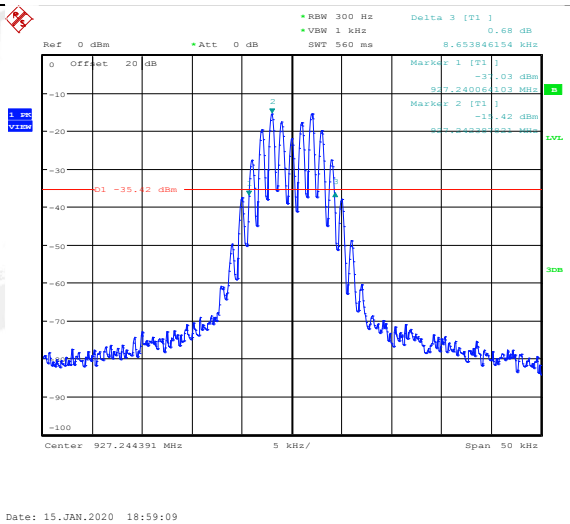
RBW:	300Hz
VBW:	1kHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold

(3) Allow the trace to stabilize, measure the 20dB bandwidth of signal.

4.4. Test Result

Test Mode	Freq. (MHz)	20dB bandwidth Result (kHz)	Conclusion
Tx mode	902.5	12.260	PASS
	915	10.497	PASS
	927.25	8.654	PASS

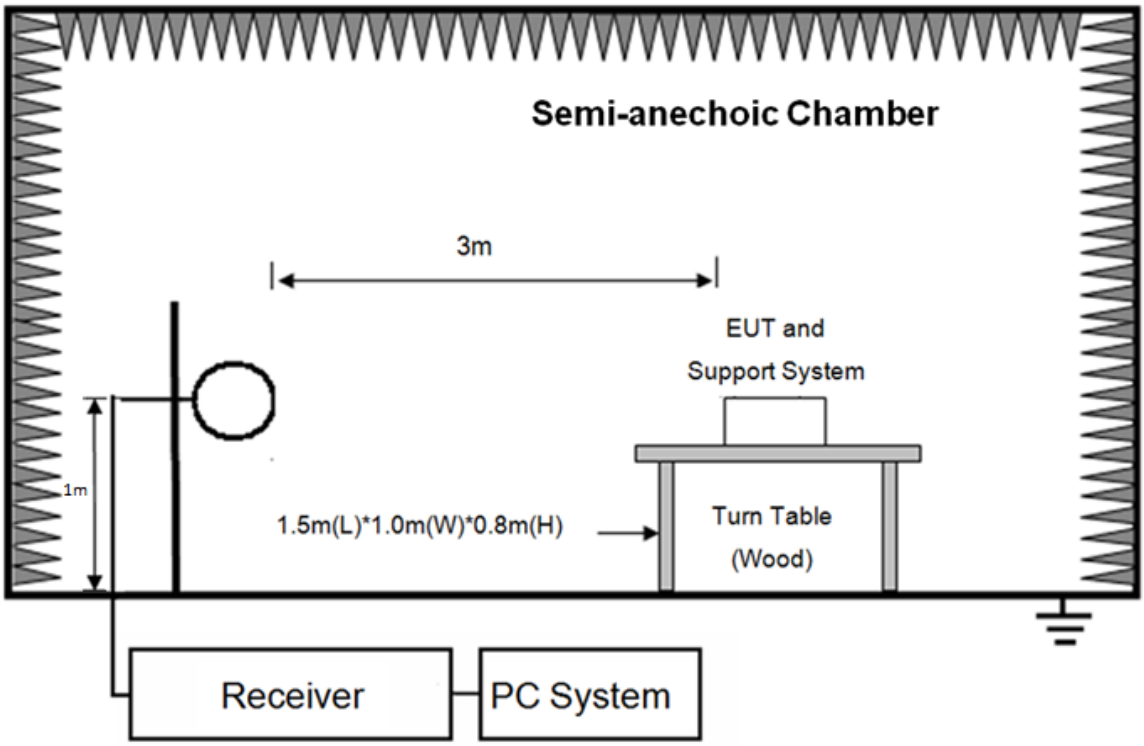
4.5. Original test data

20dB bandwidth	
CH 0 902.5MHz	
CH 50 915MHz	
CH 99 927.25MHz	

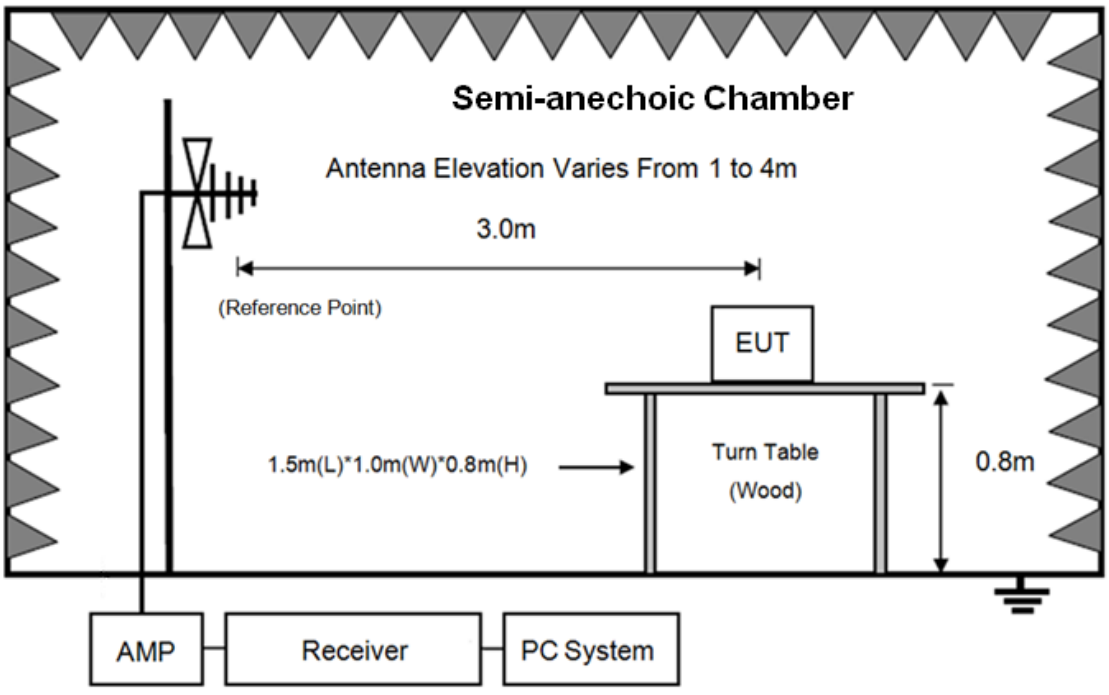
5. Radiated emission

5.1. Block diagram of test setup

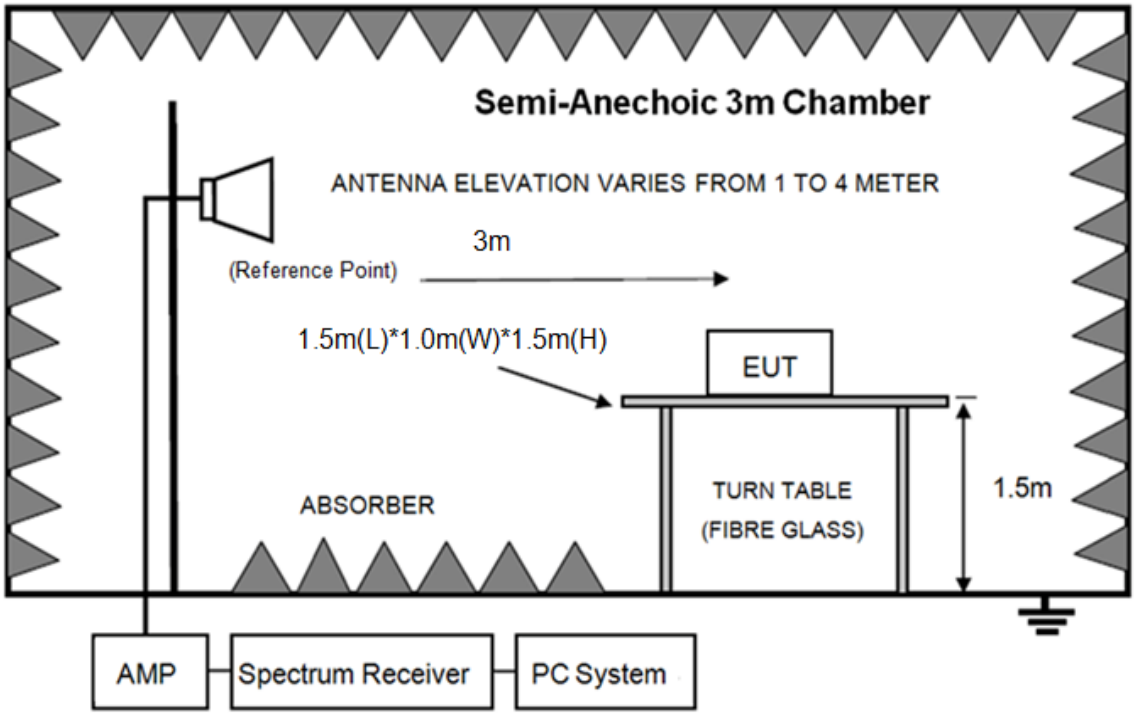
In 3m Anechoic Chamber Test Setup Diagram for 9kHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for 30MHz-1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test an appropriate high pass filter was inserted in the input port of AMP.

5.2. Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000MHz	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	
Field Strength of Fundamental emission for 902MHz~928MHz	3	94.0 dB(μV)/m (QP)	
Field Strength of Harmonics	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Remark:

(1) Emission level dBμV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

(4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000MHz, radiated emission limits in these three bands are based on measurements employing an average detector.

5.3. Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.

(2) Setup EUT and assistant system according clause 2.3

(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.

(a) Change work frequency or channel of device if practicable.

(b) Change modulation type of device if practicable.

(c) Change power supply range from 85% to 115% of the rated supply voltage

(d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions

(4) Spectrum frequency from 9kHz to 10GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9kHz to 30MHz, so below final test was performed with frequency range from 30MHz to 10GHz.

(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013 on Radiated Emission test.

(6) For emissions from 30MHz to 1GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 kHz.

(7) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure. Peak detector is used for both PK and AV test.

(8) X axis, Y axis, Z axis are tested, and worse setup X axis is reported.

5.4. Test result

PASS. (See below detailed test result)

All the emissions except fundamental emission from 9kHz to 10GHz comply with 15.209 limit. According exploratory test, the emission levels are 20 dB below the limit from 9kHz to 30MHz, so the final test was performed with frequency range from 30MHz to 10GHz and recorded in below.

Field Strength of the Fundamental Signal

Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Result Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector type	Polarization
902.5	61.53	21.72	6.93	90.18	94.00	-3.82	Peak	HORIZONTAL
902.5	60.07	21.72	6.93	88.72	94.00	-5.28	Peak	VERTICAL
915	58.22	21.87	6.99	87.08	94.00	-6.92	Peak	HORIZONTAL
915	57.32	21.87	6.99	86.18	94.00	-7.82	Peak	VERTICAL
927.25	61.13	22.02	7.05	90.20	94.00	-3.80	Peak	HORIZONTAL
927.25	59.65	22.02	7.05	88.72	94.00	-5.28	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

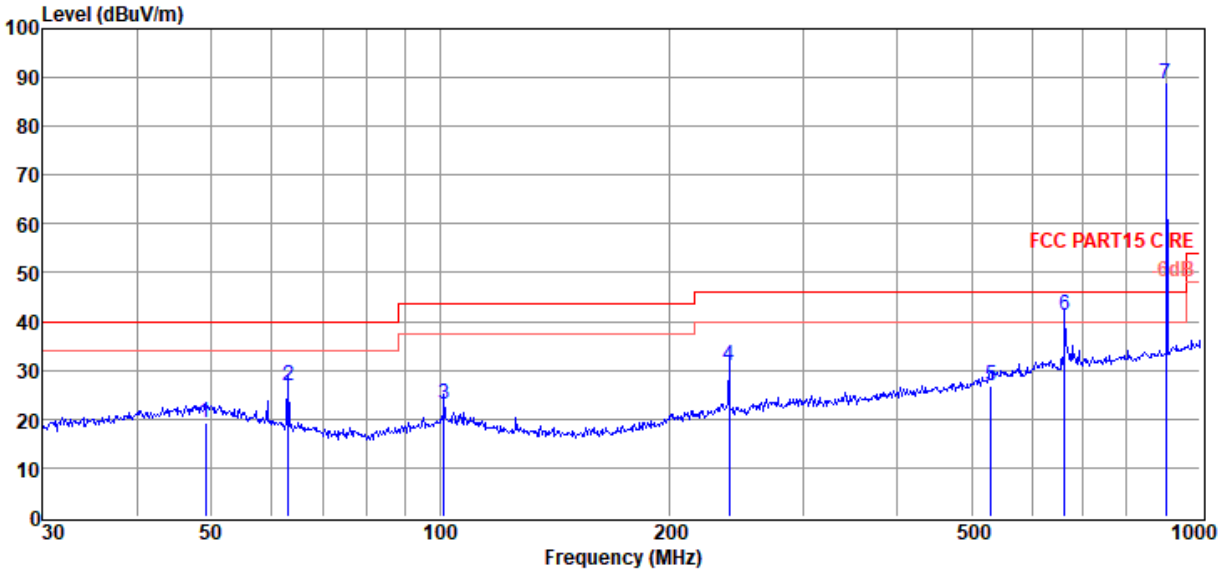
2: For Field Strength of the Fundamental Signal test. If peak results comply with QP limit, QP Result is deemed to comply with QP limit.

Radiated Emission test (below 1GHz)

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2019-09-18	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C, Humi:55%, Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/VERTICAL
Memo	: 902.5MHz		

Data: 5



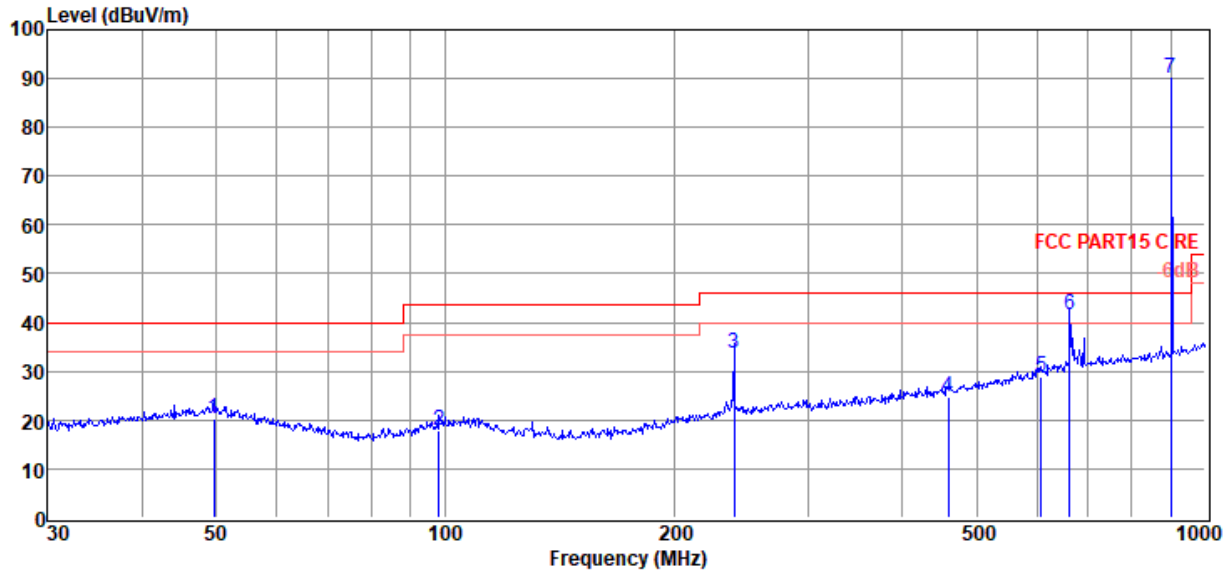
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	49.19	0.84	14.51	3.86	19.21	40.00	-20.79	QP	VERTICAL
2	63.09	12.01	10.78	3.97	26.76	40.00	-13.24	QP	VERTICAL
3	101.29	7.16	11.71	4.21	23.08	43.50	-20.42	QP	VERTICAL
4	239.99	13.51	12.57	4.96	31.04	46.00	-14.96	QP	VERTICAL
5	530.10	3.21	17.55	5.91	26.67	46.00	-19.33	QP	VERTICAL
6	663.47	15.58	19.54	6.27	41.39	46.00	-4.61	QP	VERTICAL
7	902.50	60.07	21.72	6.93	88.72	/	/	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2019-09-18	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/HORIZONTAL
Memo	: 902.5MHz		

Data: 6



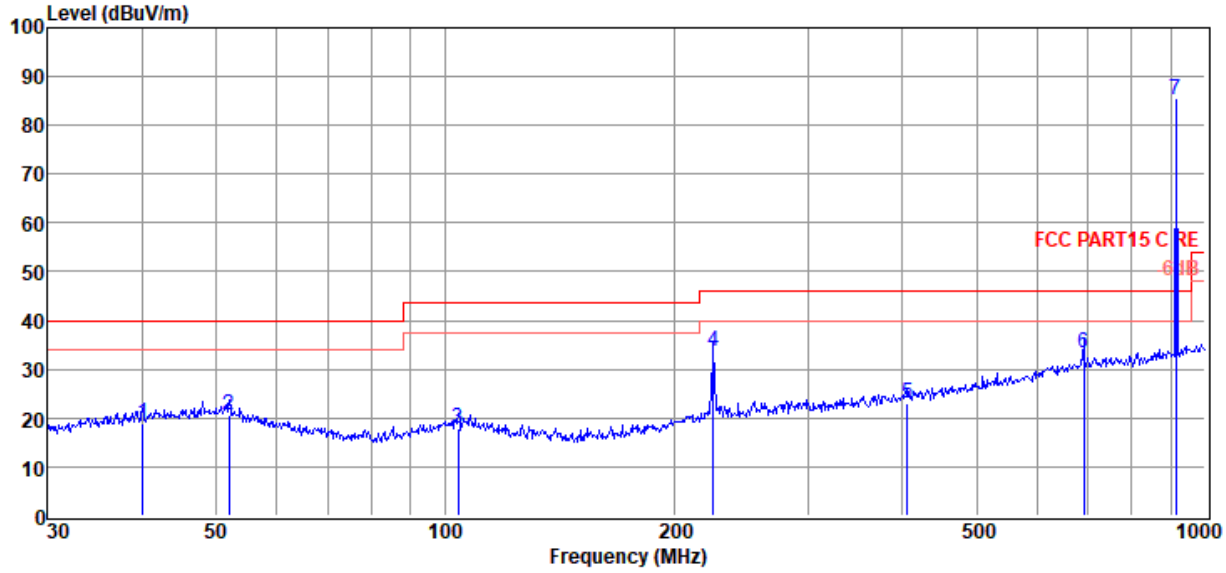
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	49.71	1.69	14.57	3.87	20.13	40.00	-19.87	QP	HORIZONTAL
2	98.14	2.22	11.40	4.19	17.81	43.50	-25.69	QP	HORIZONTAL
3	239.99	16.20	12.57	4.96	33.73	46.00	-12.27	QP	HORIZONTAL
4	459.11	2.39	16.53	5.70	24.62	46.00	-21.38	QP	HORIZONTAL
5	607.79	4.07	18.63	6.11	28.81	46.00	-17.19	QP	HORIZONTAL
6	663.47	15.66	19.54	6.27	41.47	46.00	-4.53	QP	HORIZONTAL
7	902.50	61.53	21.72	6.93	90.18	/	/	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2019-11-28	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/HORIZONTAL
Memo	: 915MHz		

Data: 7



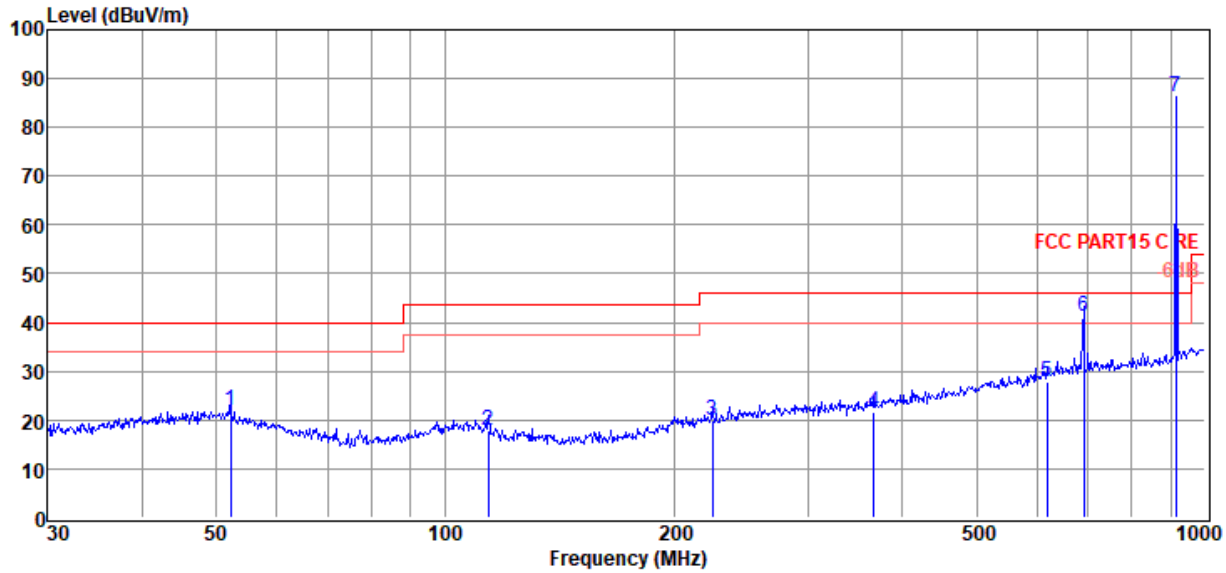
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	39.99	1.68	13.40	3.77	18.85	40.00	-21.15	QP	HORIZONTAL
2	52.03	2.79	13.90	3.89	20.58	40.00	-19.42	QP	HORIZONTAL
3	104.17	1.99	11.74	4.23	17.96	43.50	-25.54	QP	HORIZONTAL
4	225.31	16.45	12.16	4.90	33.51	46.00	-12.49	QP	HORIZONTAL
5	406.09	1.82	15.70	5.53	23.05	46.00	-22.95	QP	HORIZONTAL
6	691.99	7.01	19.98	6.35	33.34	46.00	-12.66	QP	HORIZONTAL
7	915.00	58.22	21.87	6.99	87.08	/	/	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2019-11-28	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/VERTICAL
Memo	: 915MHz		

Data: 8



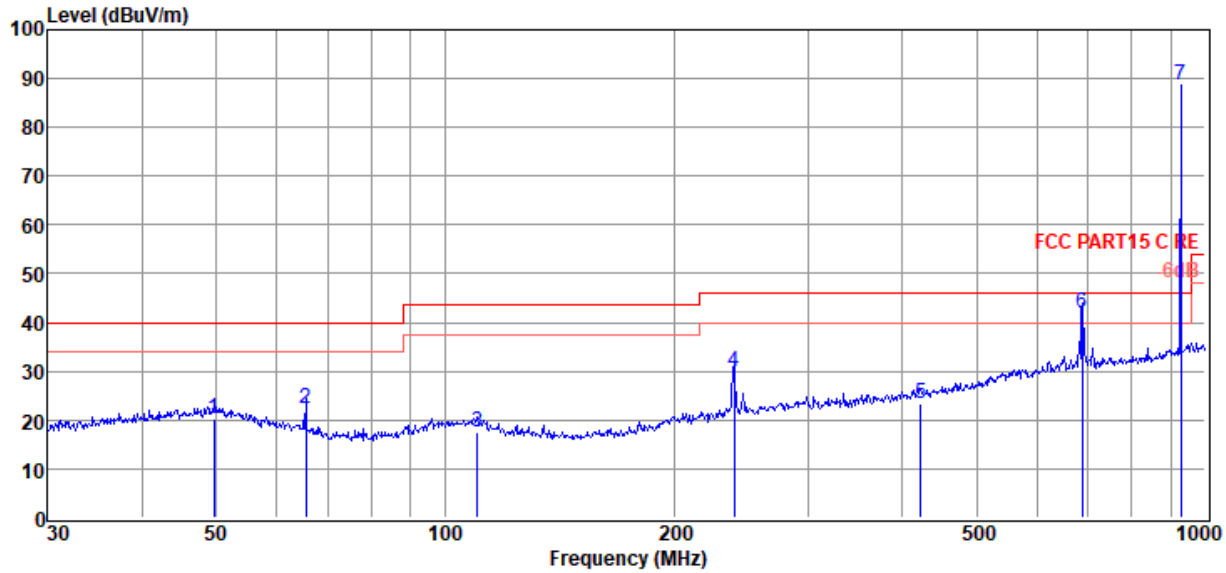
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	52.21	4.29	13.84	3.89	22.02	40.00	-17.98	QP	VERTICAL
2	114.11	2.61	10.91	4.28	17.80	43.50	-25.70	QP	VERTICAL
3	224.52	2.73	12.14	4.90	19.77	46.00	-26.23	QP	VERTICAL
4	366.82	1.28	15.12	5.40	21.80	46.00	-24.20	QP	VERTICAL
5	618.54	2.94	18.82	6.15	27.91	46.00	-18.09	QP	VERTICAL
6	691.99	14.89	19.98	6.35	41.22	46.00	-4.78	QP	VERTICAL
7	915.00	57.32	21.87	6.99	86.18	/	/	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2019-09-18	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/VERTICAL
Memo	: 927.25MHz		

Data: 9



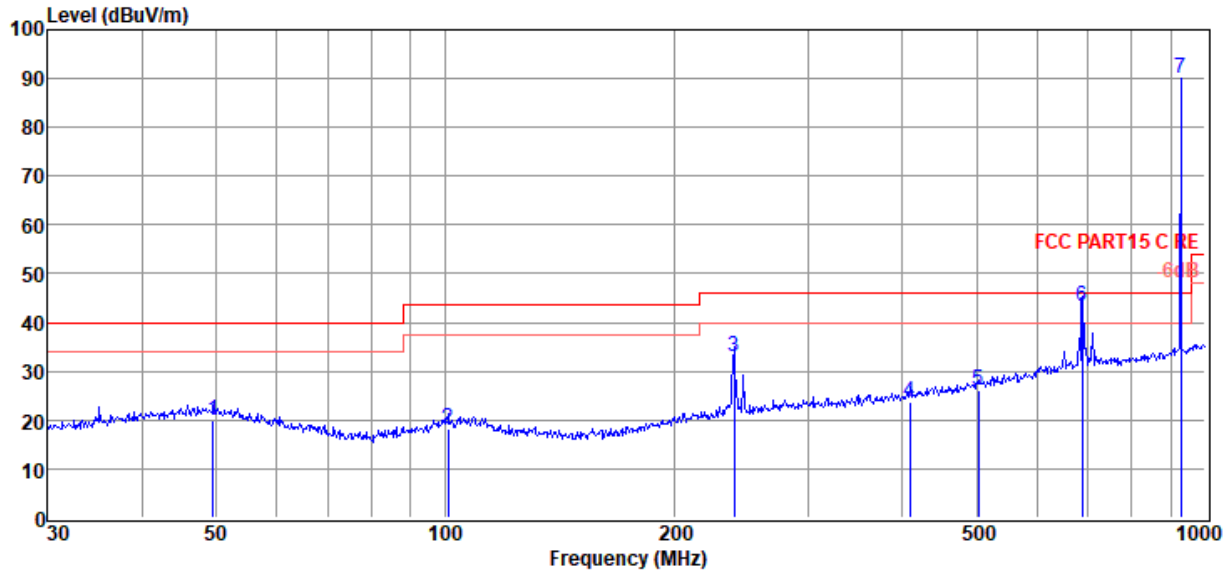
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	49.71	1.73	14.57	3.87	20.17	40.00	-19.83	QP	VERTICAL
2	65.57	8.16	10.31	3.99	22.46	40.00	-17.54	QP	VERTICAL
3	110.18	1.52	11.76	4.26	17.54	43.50	-25.96	QP	VERTICAL
4	239.99	12.54	12.57	4.96	30.07	46.00	-15.93	QP	VERTICAL
5	422.06	1.92	15.96	5.58	23.46	46.00	-22.54	QP	VERTICAL
6	689.57	15.67	19.94	6.35	41.96	46.00	-4.04	QP	VERTICAL
7	927.25	59.65	22.02	7.05	88.72	/	/	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2019-09-18	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2018 VULB 9163 1#/3m/HORIZONTAL
Memo	: 927.25MHz		

Data: 10



Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	49.53	1.58	14.55	3.86	19.99	40.00	-20.01	QP	HORIZONTAL
2	100.93	2.36	11.71	4.21	18.28	43.50	-25.22	QP	HORIZONTAL
3	239.99	15.46	12.57	4.96	32.99	46.00	-13.01	QP	HORIZONTAL
4	408.95	2.46	15.75	5.54	23.75	46.00	-22.25	QP	HORIZONTAL
5	502.94	3.17	17.15	5.83	26.15	46.00	-19.85	QP	HORIZONTAL
6	689.57	17.07	19.94	6.35	43.36	46.00	-2.64	QP	HORIZONTAL
7	927.25	61.13	22.02	7.05	90.20	/	/	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

Radiated Emission test (above 1GHz)

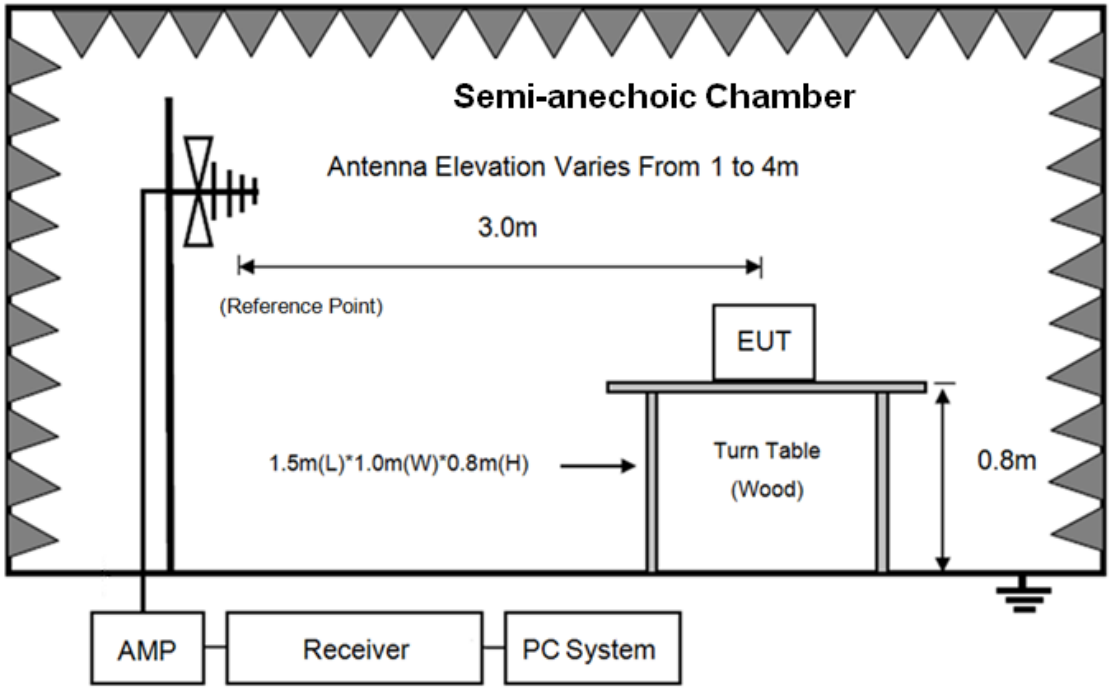
Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor(dB)	Cable Loss (dB)	ResultLevel(dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector type	Polarization
Tx mode 902.5MHz									
2998.00	45.11	31.19	43.80	4.27	36.77	74.00	-37.23	Peak	HORIZONTAL
4393.00	44.73	33.46	44.04	5.40	39.55	74.00	-34.45	Peak	HORIZONTAL
5617.00	44.69	34.40	43.17	6.22	42.14	74.00	-31.86	Peak	HORIZONTAL
6418.00	45.44	35.20	43.05	6.42	44.01	74.00	-29.99	Peak	HORIZONTAL
7822.00	44.50	36.16	43.23	7.13	44.56	74.00	-29.44	Peak	HORIZONTAL
8830.00	43.88	36.80	42.18	7.82	46.32	74.00	-27.68	Peak	HORIZONTAL
3133.00	44.98	31.45	43.94	4.40	36.89	74.00	-37.11	Peak	VERTICAL
3988.00	47.38	32.88	44.26	5.27	41.27	74.00	-32.73	Peak	VERTICAL
5995.00	44.96	34.70	43.16	6.60	43.10	74.00	-30.90	Peak	VERTICAL
7948.00	45.15	36.26	43.18	7.28	45.51	74.00	-28.49	Peak	VERTICAL
8830.00	44.26	36.80	42.18	7.82	46.70	74.00	-27.30	Peak	VERTICAL
9775.00	45.00	37.27	43.15	8.56	47.68	74.00	-26.32	Peak	VERTICAL
Tx mode 915MHz									
3322.00	45.78	31.80	44.10	4.60	38.08	74.00	-35.92	Peak	HORIZONTAL
5248.00	44.69	34.10	43.43	5.84	41.20	74.00	-32.80	Peak	HORIZONTAL
6400.00	45.56	35.18	43.06	6.43	44.11	74.00	-29.89	Peak	HORIZONTAL
7903.00	44.32	36.22	43.20	7.23	44.57	74.00	-29.43	Peak	HORIZONTAL
8830.00	44.57	36.80	42.18	7.82	47.01	74.00	-26.99	Peak	HORIZONTAL
9415.00	44.34	37.06	42.88	8.26	46.78	74.00	-27.22	Peak	HORIZONTAL
3745.00	44.82	32.51	44.27	5.02	38.08	74.00	-35.92	Peak	VERTICAL
5860.00	45.10	34.59	43.14	6.47	43.02	74.00	-30.98	Peak	VERTICAL
8002.00	45.03	36.30	43.16	7.34	45.51	74.00	-28.49	Peak	VERTICAL
8695.00	43.26	36.80	42.17	7.74	45.63	74.00	-28.37	Peak	VERTICAL
9343.00	43.67	37.01	42.76	8.20	46.12	74.00	-27.88	Peak	VERTICAL
9955.00	43.59	37.37	43.23	8.70	46.43	74.00	-27.57	Peak	VERTICAL
Tx mode 927.25MHz									
3223.00	44.78	31.62	44.03	4.50	36.87	74.00	-37.13	Peak	HORIZONTAL
4735.00	45.16	33.74	43.89	5.50	40.51	74.00	-33.49	Peak	HORIZONTAL
6328.00	44.45	35.10	43.07	6.46	42.94	74.00	-31.06	Peak	HORIZONTAL
7183.00	47.18	35.71	43.22	6.38	46.05	74.00	-27.95	Peak	HORIZONTAL
8470.00	42.93	36.77	42.22	7.61	45.09	74.00	-28.91	Peak	HORIZONTAL
9100.00	44.15	36.86	42.36	8.00	46.65	74.00	-27.35	Peak	HORIZONTAL
3628.00	46.07	32.32	44.24	4.90	39.05	74.00	-34.95	Peak	VERTICAL
5185.00	44.55	34.05	43.49	5.77	40.88	74.00	-33.12	Peak	VERTICAL
6958.00	45.74	35.58	43.13	6.18	44.37	74.00	-29.63	Peak	VERTICAL
8650.00	43.47	36.80	42.17	7.72	45.82	74.00	-28.18	Peak	VERTICAL
9352.00	44.15	37.02	42.77	8.21	46.61	74.00	-27.39	Peak	VERTICAL
9775.00	44.03	37.27	43.15	8.56	46.71	74.00	-27.29	Peak	VERTICAL
Result: Pass									

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

6. Band Edge Compliance

6.1. Block diagram of test setup



6.2. Limit

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

6.3. Test Procedure

Same with clause 5.3 except change investigated frequency range from 880MHz to 950MHz.

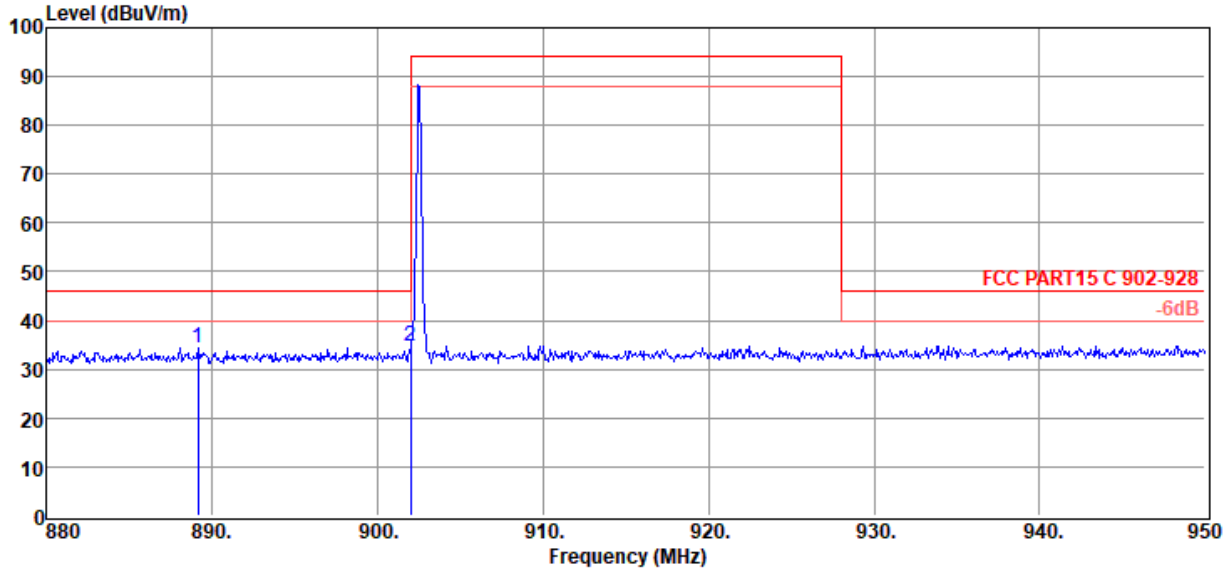
6.4. Test result

PASS. (See below detailed test result)

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2020-01-15	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 902.5MHz		

Data: 13



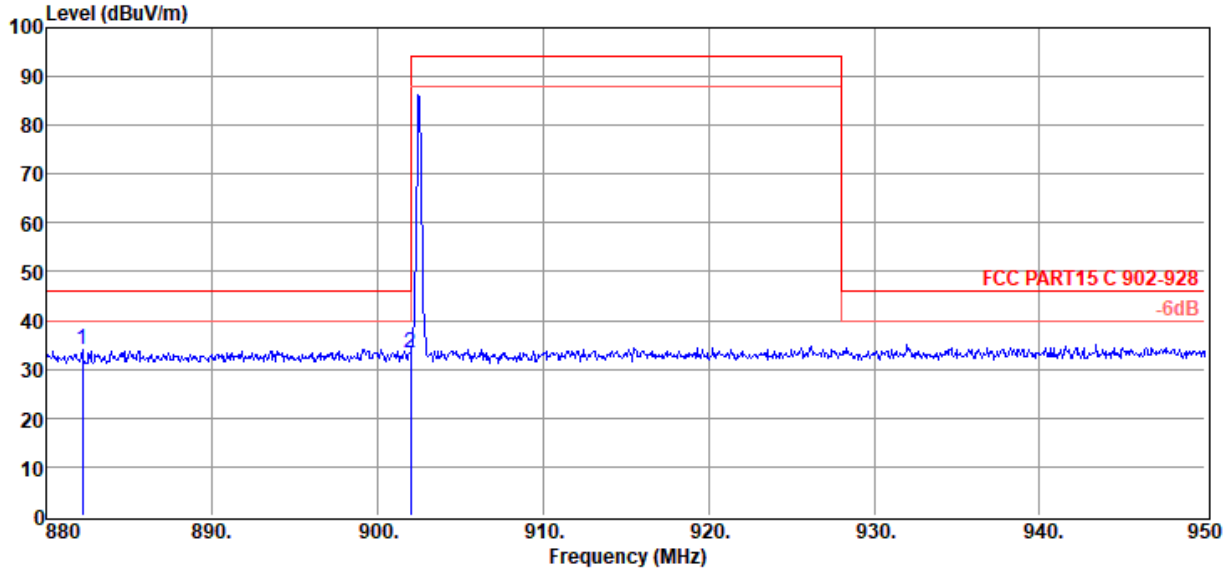
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	889.17	5.00	21.69	7.65	34.34	46.00	-11.66	Peak	VERTICAL
2	902.00	5.31	21.82	7.69	34.82	46.00	-11.18	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2020-01-15	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 902.5MHz		

Data: 14



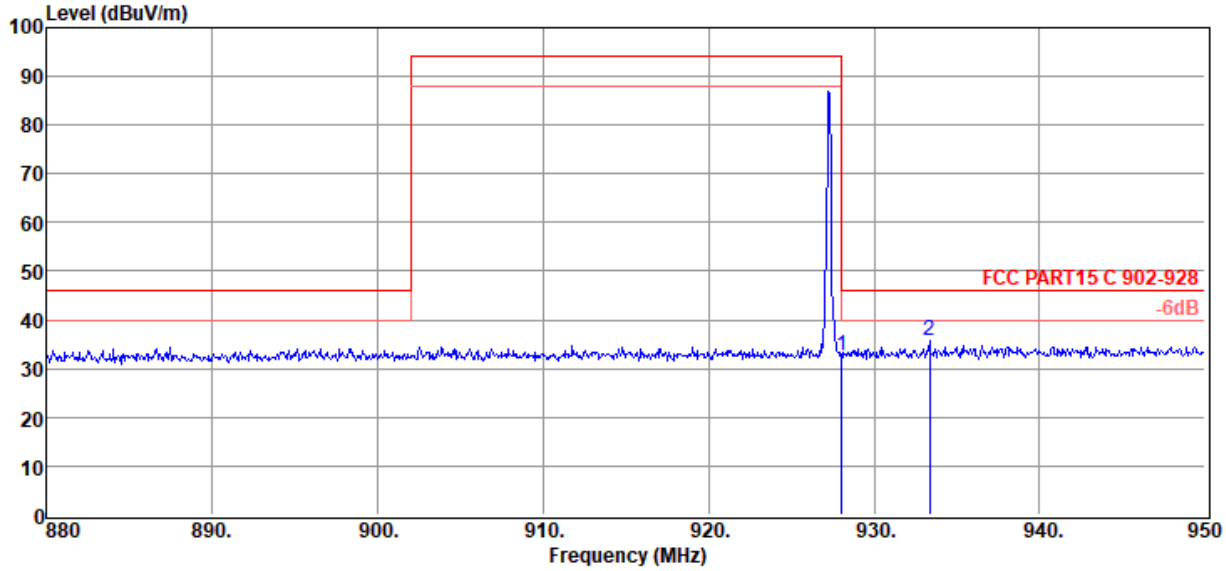
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	882.17	4.87	21.61	7.63	34.11	46.00	-11.89	Peak	HORIZONTAL
2	902.00	3.69	21.82	7.69	33.20	46.00	-12.80	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2020-01-15	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/HORIZONTAL
Memo	: 927.25MHz		

Data: 11



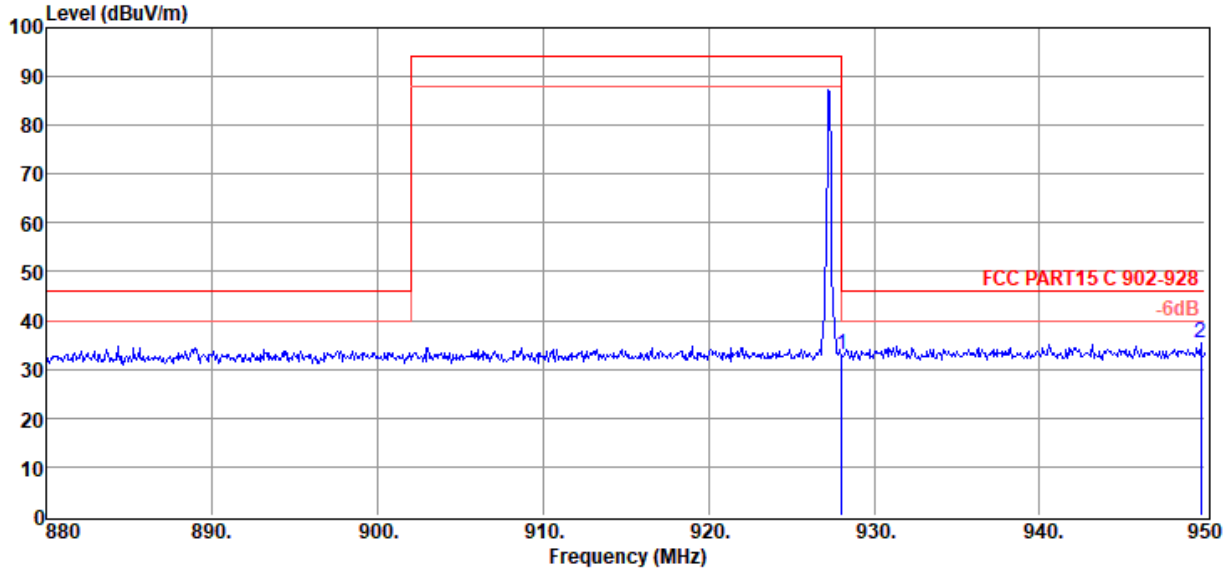
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	928.00	2.78	22.09	7.77	32.64	46.00	-13.36	Peak	HORIZONTAL
2	933.34	5.81	22.15	7.78	35.74	46.00	-10.26	Peak	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 1#	D:\2019 RE1# Report Data\Q19082808-1E WHIS-02\FCC BELOW 1G.EM6	
Test Date	: 2020-01-15	**Tested By**	: Jacky
EUT	: WHIS	**Model Number**	: WHIS-02
Power Supply	: Battery	**Test Mode**	: TX mode
Condition	: Temp:24.5'C,Humi:55%,Press:100.1kPa	**Antenna/Distance**	: 2019 VULB 9163 1#/3m/VERTICAL
Memo	: 927.25MHz		

Data: 12

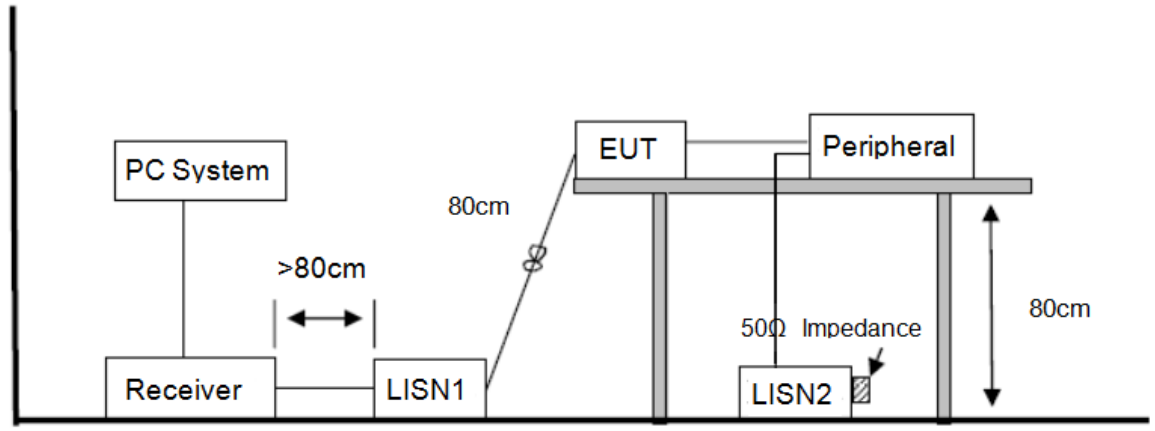


Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	928.00	3.23	22.09	7.77	33.09	46.00	-12.91	Peak	VERTICAL
2	949.72	5.31	22.31	7.83	35.45	46.00	-10.55	Peak	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

7. Power Line Conducted Emission

7.1. Block diagram of test setup



7.2. Power Line Conducted Emission Limits

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

7.3. Test Procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.
The EUT configuration and worse cable configuration of the above highest emission levels were

recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

7.4. Test Result

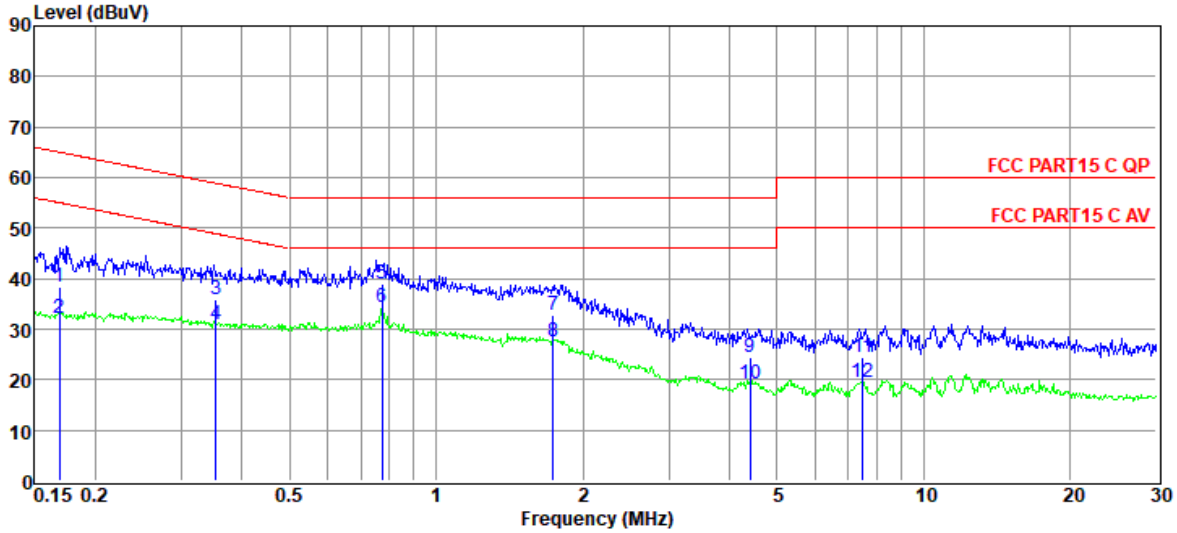
PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.
Note2: "-----" means Peak detection; "-----" means Average detection.
Note3: Pre-test AC conducted emission at both voltage AC 120V/60Hz and AC 240V/60Hz, recorded worst case.

TR-4-E-010 Conducted Emission Test Result

Test Site	:	DDT 5# Shield Room	D:\2019 report data\Q1982808-1E\CE.EM6		
Test Date	:	2019-09-04	**Tested By**	:	Hai
EUT	:	WHIS	**Model Number**	:	WHIS-02
Power Supply	:	AC 120V/60Hz	**Test Mode**	:	Tx mode
Condition	:	Temp:24.5'C, Humi:55.5%, Press:100.1kPa	**LISN**	:	2018 ENV216 2#/LINE
Memo	:				

Data: 10



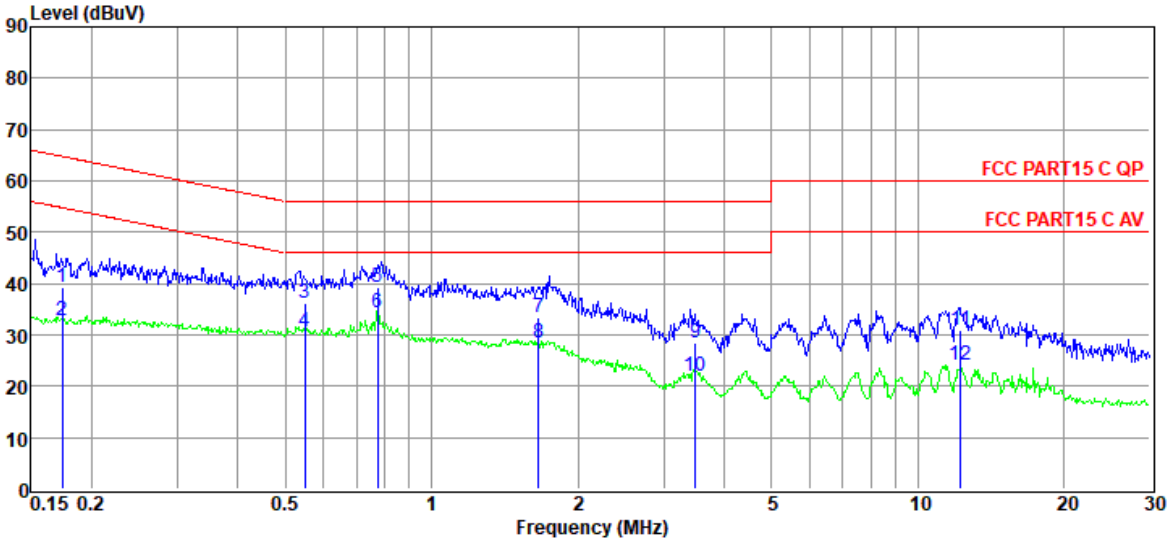
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBµV)	Limit Line (dBµV)	Over Limit (dB)	Detector	Phase
1	0.17	18.70	9.66	0.17	9.78	38.31	65.03	-26.72	QP	LINE
2	0.17	12.66	9.66	0.17	9.78	32.27	55.03	-22.76	Average	LINE
3	0.35	16.38	9.65	0.19	9.78	36.00	58.87	-22.87	QP	LINE
4	0.35	11.21	9.65	0.19	9.78	30.83	48.87	-18.04	Average	LINE
5	0.78	19.46	9.64	0.21	9.78	39.09	56.00	-16.91	QP	LINE
6	0.78	14.63	9.64	0.21	9.78	34.26	46.00	-11.74	Average	LINE
7	1.73	13.21	9.64	0.30	9.78	32.93	56.00	-23.07	QP	LINE
8	1.73	7.89	9.64	0.30	9.78	27.61	46.00	-18.39	Average	LINE
9	4.41	5.12	9.63	0.37	9.41	24.53	56.00	-31.47	QP	LINE
10	4.41	-0.28	9.63	0.37	9.41	19.13	46.00	-26.87	Average	LINE
11	7.49	5.06	9.69	0.38	9.35	24.48	60.00	-35.52	QP	LINE
12	7.49	0.16	9.69	0.38	9.35	19.58	50.00	-30.42	Average	LINE

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

TR-4-E-010 Conducted Emission Test Result

Test Site	:	DDT 5# Shield Room	D:\2019 report data\Q1982808-1E\CE.EM6		
Test Date	:	2019-09-04	**Tested By**	:	Hai
EUT	:	WHIS	**Model Number**	:	WHIS-02
Power Supply	:	AC 120V/60Hz	**Test Mode**	:	Tx mode
Condition	:	Temp:24.5'C, Humi:55.5%, Press:100.1kPa	**LISN**	:	2018 ENV216 2#/NEUTRAL
Memo	:				

Data: 12



Item (Mark)	Freq. (MHz)	Read Level (dBµV)	LISN Factor (dB)	Cable Loss (dB)	Pulse Limiter Factor (dB)	Result Level (dBµV)	Limit Line (dBµV)	Over Limit (dB)	Detector	Phase
1	0.17	19.62	9.66	0.17	9.78	39.23	64.77	-25.54	QP	NEUTRAL
2	0.17	13.03	9.66	0.17	9.78	32.64	54.77	-22.13	Average	NEUTRAL
3	0.55	16.66	9.64	0.20	9.78	36.28	56.00	-19.72	QP	NEUTRAL
4	0.55	10.99	9.64	0.20	9.78	30.61	46.00	-15.39	Average	NEUTRAL
5	0.78	19.50	9.64	0.21	9.78	39.13	56.00	-16.87	QP	NEUTRAL
6	0.78	14.65	9.64	0.21	9.78	34.28	46.00	-11.72	Average	NEUTRAL
7	1.66	13.61	9.64	0.29	9.78	33.32	56.00	-22.68	QP	NEUTRAL
8	1.66	8.62	9.64	0.29	9.78	28.33	46.00	-17.67	Average	NEUTRAL
9	3.49	8.80	9.63	0.36	9.52	28.31	56.00	-27.69	QP	NEUTRAL
10	3.49	2.50	9.63	0.36	9.52	22.01	46.00	-23.99	Average	NEUTRAL
11	12.25	11.36	9.72	0.40	9.35	30.83	60.00	-29.17	QP	NEUTRAL
12	12.25	4.64	9.72	0.40	9.35	24.11	50.00	-25.89	Average	NEUTRAL

Note: 1. Result Level = Read Level +LISN Factor + Pulse Limiter Factor + Cable loss.
2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
3. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).
4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

8. Antenna Requirements

8.1. Limit

For intentional device, according to FCC 47 CFR 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.

8.2. Result

The antenna used for this product is integral antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 1dBi.