



TEST REPORT NUMBER: (8521)189-0441
TEST REPORT

Applicant:	NSI Products (HK) Limited	Fax:	--
		E-mail:	--
Address :	Flat A, 1/F, Block 4, Golden Dragon Industrial Centre 182-190 Tai Lin Pai Road, Kwai Chung, N.T., Hong Kong		
Test Date :	12 Jul. 2021 ~ 24 Jul. 2021		

Manufacturer or Supplier :	NSI Products (HK) Limited
Address :	Flat A, 1/F, Block 4, Golden Dragon Industrial Centre 182-190 Tai Lin Pai Road, Kwai Chung, N.T., Hong Kong
Sample Description:	SPYBOTS Roboear
Model number:	68403
Additional Model :	--
Rated Voltage:	TX: DC 4.5V ("AAA"size *3)
FCC ID :	2A2LDNSI2021-ROBO-1
The submitted sample of the above equipment has been tested according to following standard(s)	
FCC Rules and Regulations Part 15 Subpart C 15.249, ANSI C63.10:2013	
CONCLUSION: The submitted sample was found to COMPLY with the test requirement	

Assistant Manager

Name: Nick Lung
Date: JUL 26,2021



TEST REPORT NUMBER: (8521)189-0441

1. Summary of Test Results

The EUT have been tested according to the applicable standards as referenced below.		
Description of Test Item	Standard	Results
20 dB 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	N/A
Antenna Requirement	FCC Part 15: 15.203	Pass

Note: N/A is an abbreviation for Not Applicable.



TEST REPORT NUMBER: (8521)189-0441

2. General Test Information

2.1. Description of EUT

Power supply	: DC 4.5V ("AAA"size *3)
Operation frequency	: 2423 MHz - 2463 MHz
Modulation	: MSK
Antenna Type	: wire antenna, maximum PK gain: 1.9 dBi

2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Serial No.	Other
N/A	N/A	N/A	N/A	N/A

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	Serial No.	Other
N/A	N/A	N/A	N/A	N/A

2.4. Block diagram of EUT configuration for test

Tx Mode:



For Tx Mode, A special test firmware was installed in EUT and which can exercise the EUT work in continues RF test mode at specified test channel as below:

Note: New battery is used during all tests.

Tested mode, channel, information		
Mode	Channel	Frequency (MHz)
Tx mode	Low	2423
	Middle	2443
	High	2463



TEST REPORT NUMBER: (8521)189-0441

2.5. Test environment conditions

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

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

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 Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, G-20118

Result reviewed by Centre of Testing Service (Ningbo) Co, Ltd Guangzhou Branch - a Bureau Veritas Company

Address: Building A, No.65 Zhuji Highway, jishancun, Tianhe District, Guangzhou, China



TEST REPORT NUMBER: (8521)189-0441

2.8. Measurement uncertainty

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



TEST REPORT NUMBER: (8521)189-0441

3. Equipment Used During Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
<input type="checkbox"/> RF Connected Test (Tonscend RF Measurement System 1#)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 25, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jun. 01, 2021	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 24, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jun. 01, 2021	1 Year
RF Control Unit	Tonsend	JS0806-2	DDT-ZC0290	Jun. 01, 2021	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jun. 01, 2021	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
<input checked="" type="checkbox"/> RF Connected Test (Tonscend RF Measurement System 2#)					
Spectrum analyzer	R&S	FSU26	101472	Jun. 01, 2021	1 Year
Wideband Radio Communication tester	R&S	CMW500	120259	Jan. 19, 2021	1 Year
Vector Signal Generator	Agilent	N5182A	MY19060405	Jun. 01, 2021	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180912	Jun. 01, 2021	1 Year
RF Control Unit	Tonsend	JS0806-2	DDT-ZC01449	Jun. 01, 2021	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jun. 01, 2021	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
<input type="checkbox"/> Radiation 1#chamber					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 01, 2021	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 18, 2020	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 13, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	May 07, 2021	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 28, 2020	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Sep. 24, 2020	1 Year



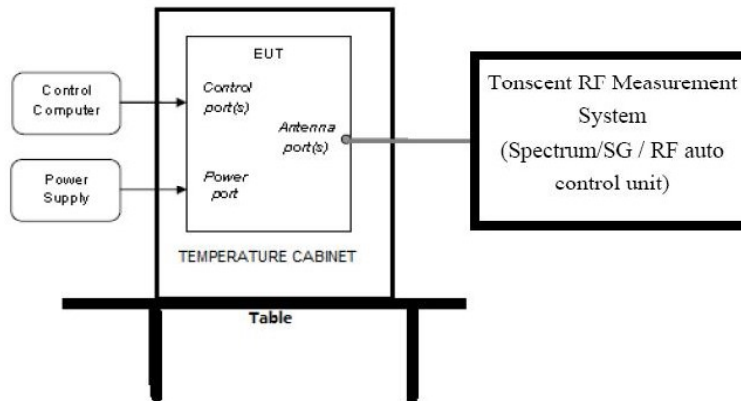
TEST REPORT NUMBER: (8521)189-0441

RF Cable	N/A	5m+6m+1m	06270619	Sep. 30, 2020	1 Year
MI Cable	HUBSER	C10-01-01-1 M	1091629	Sep. 30, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
<input checked="" type="checkbox"/> Radiation 2#chamber					
EMI Test Receiver	R&S	ESCI	101364	Sep. 28, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jun. 01, 2021	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	9163-994	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 18, 2020	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120	02108	Jul. 11, 2021	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	May 07, 2021	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	1013 03	Sep. 28, 2020	1 Year
RF Cable	N/A	14+1.5m	06270619	Sep. 28, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
<input type="checkbox"/> Power Line Conducted Emissions Test 1#					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101109	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	ESH3-Z2	101242	Sep. 24, 2020	1 Year
CE Cable 1	HUBSER	N/A	W10.01	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
<input type="checkbox"/> Power Line Conducted Emissions Test 2#					
Test Receiver	R&S	ESPI	101761	Sep. 24, 2020	1 Year
LISN 1	R&S	ENV216	101170	Sep. 28, 2020	1 Year
LISN 2	R&S	ESH2-Z5	100309	Sep. 28, 2020	1 Year
Pulse Limiter	R&S	KH43101	43101180156 8-12#	Jun. 01, 2021	1 Year
CE Cable 2	HUBSER	N/A	W11.02	Sep. 24, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

TEST REPORT NUMBER: (8521)189-0441

4 Duty Cycle

4.1. Block diagram of test setup



4.2. Limits

None: for reporting purposes only.

4.3. Test procedure

Set the Centre frequency of the spectrum analyzer to the transmitting frequency;

Set the span = 0, RBW = 10 MHz, VBW = 10 MHz, Sweep time = 100 ms;

Trace mode = Single hold.

4.4. Test result

Test Channel [MHz]	Duty Cycle [%]	20log(Δ) Factor[dB]
2463	0.48	-46.38

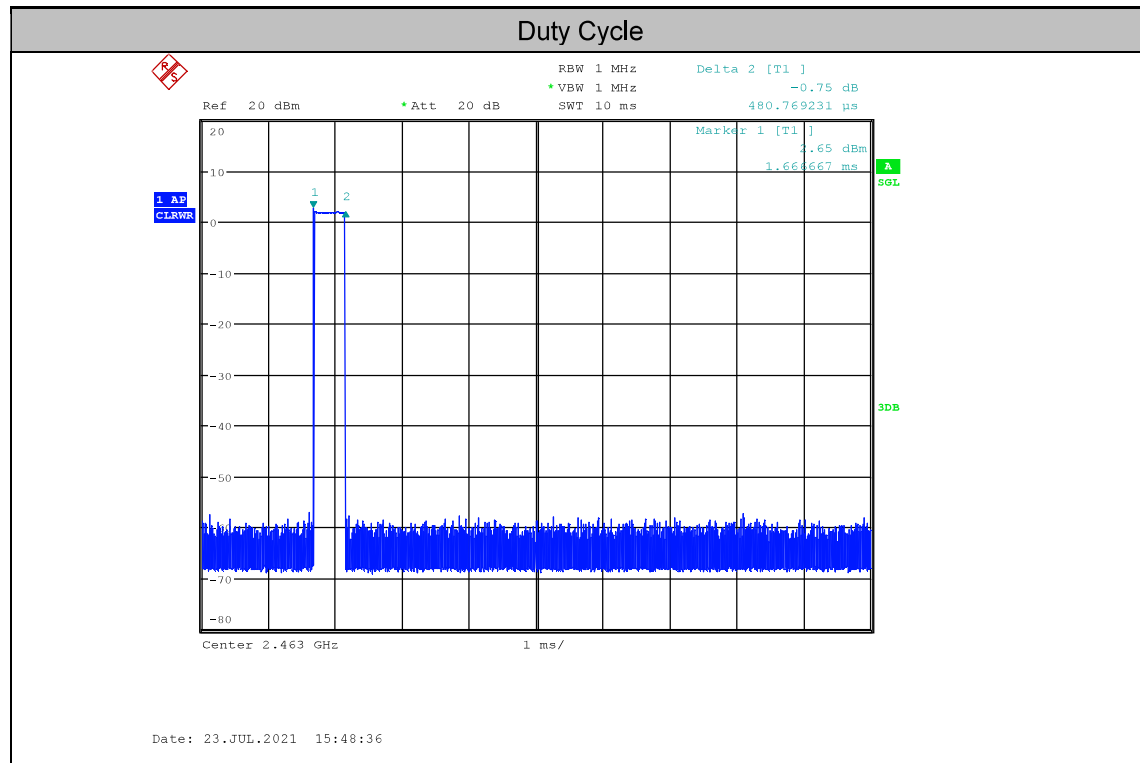
Average value:	
Calculate Formula:	Average value = Peak value + PDCF
	PDCF = 20 log(Duty cycle)
	Duty cycle = $T_{on\ time} / T_{period}$
Test data:	$T_{on\ time} = 0.48\ ms$
	$T_{period} = 100\ ms$
	PDCF = 20 log(Duty cycle) = 20 log(0.48/100) = -46.38 dB



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TEST REPORT NUMBER: (8521)189-0441

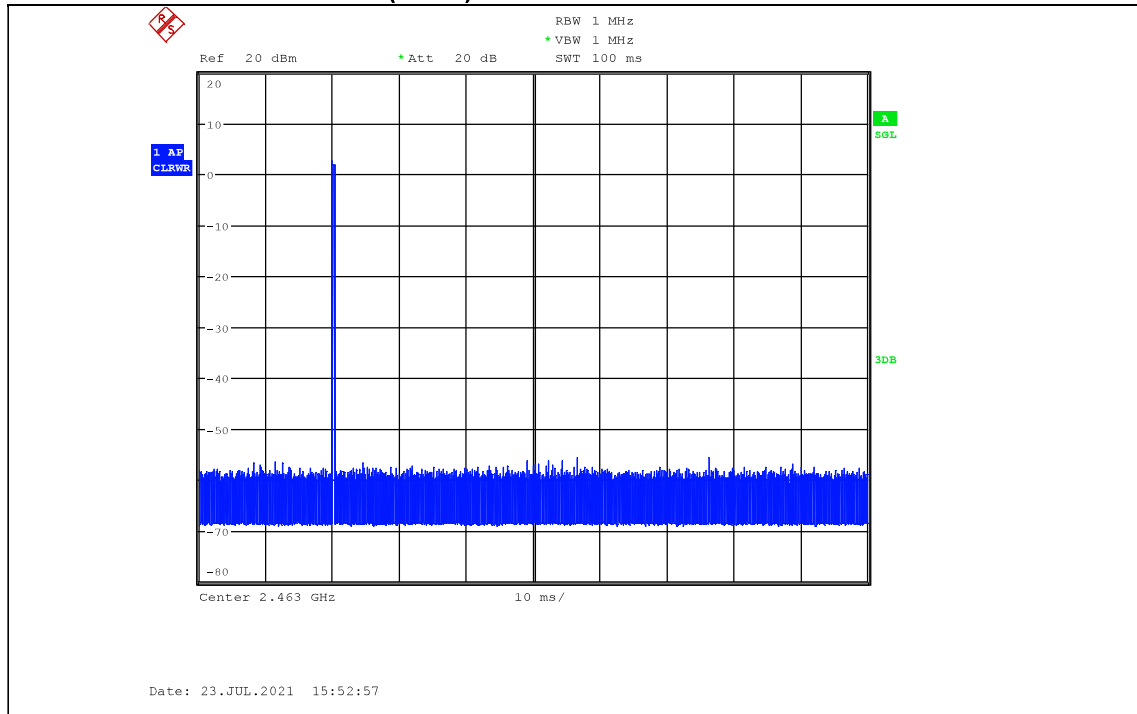
4.5. Original test data





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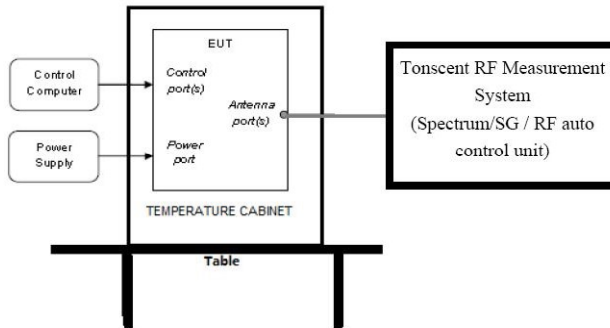
TEST REPORT NUMBER: (8521)189-0441



TEST REPORT NUMBER: (8521)189-0441

5. 20 dB Bandwidth

5.1. Block diagram of test setup



5.2. 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 20 dB 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.

5.3. Test procedure

- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) Set the spectrum analyzer as follows:

RBW:	30 kHz
VBW:	100 kHz
Detector Mode:	Peak
Sweep time:	auto
Trace mode	Max hold
- (3) Allow the trace to stabilize, measure the 20 dB bandwidth of signal.

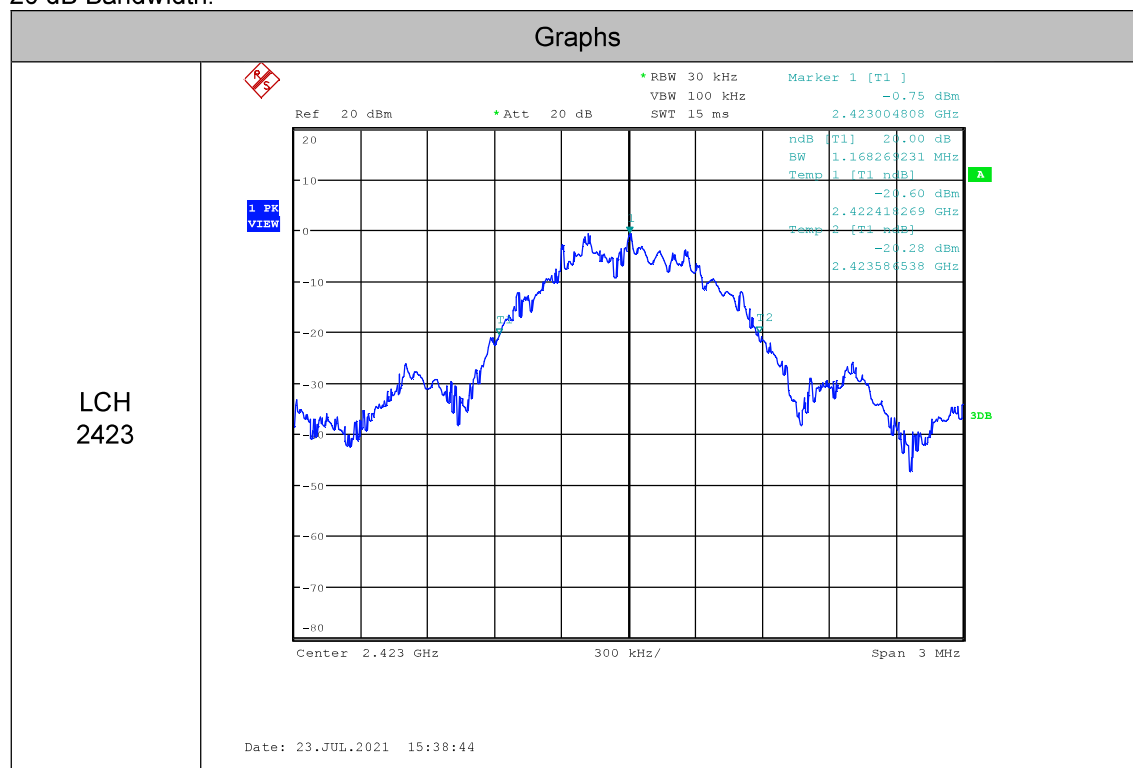
TEST REPORT NUMBER: (8521)189-0441

5.4. Test result

Mode	Freq (MHz)	20 dB bandwidth Result (MHz)	Conclusion
GFSK	2423	1.168	Pass
	2443	1.178	Pass
	2463	1.163	Pass

5.5. Original test data

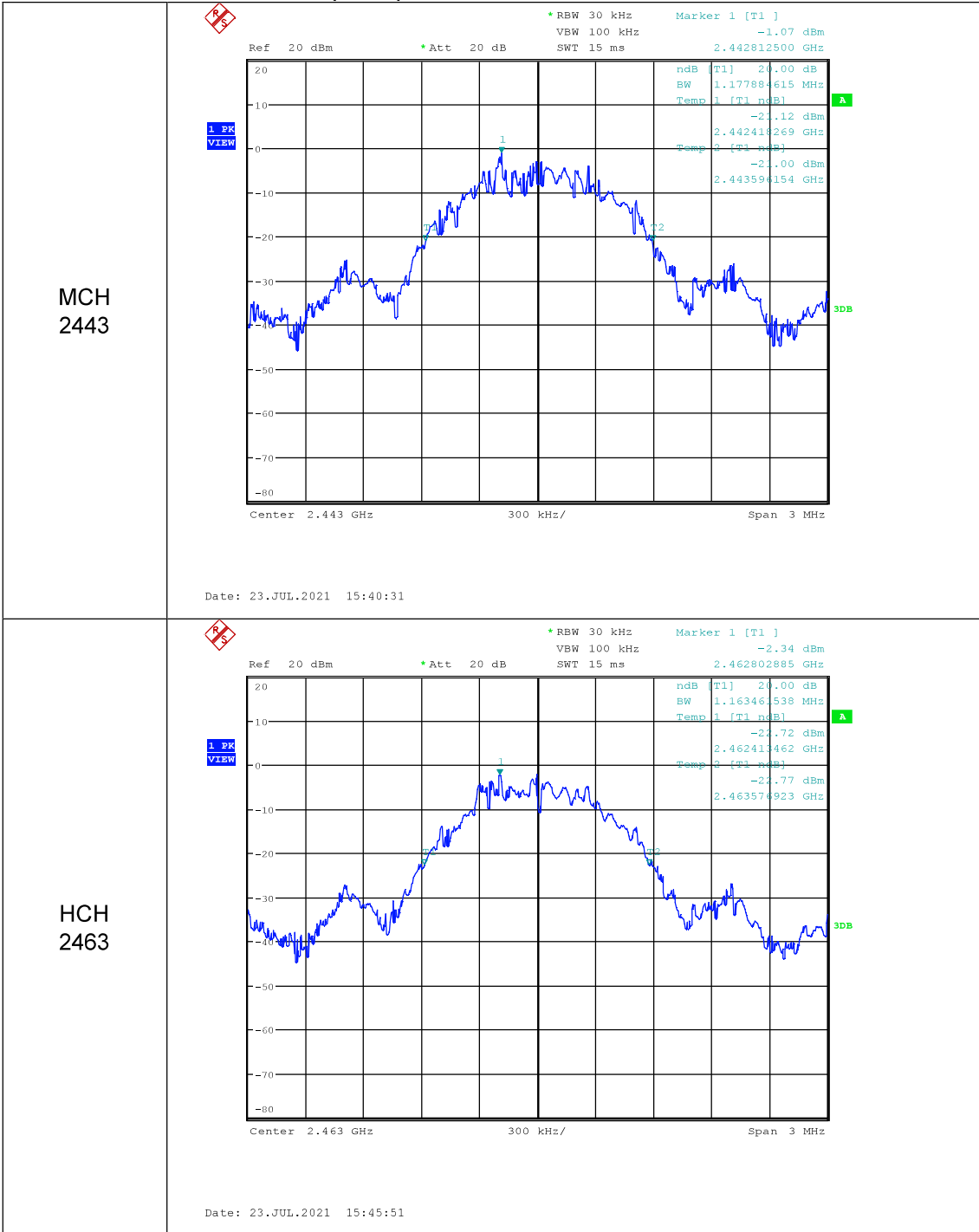
20 dB Bandwidth:





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TEST REPORT NUMBER: (8521)189-0441

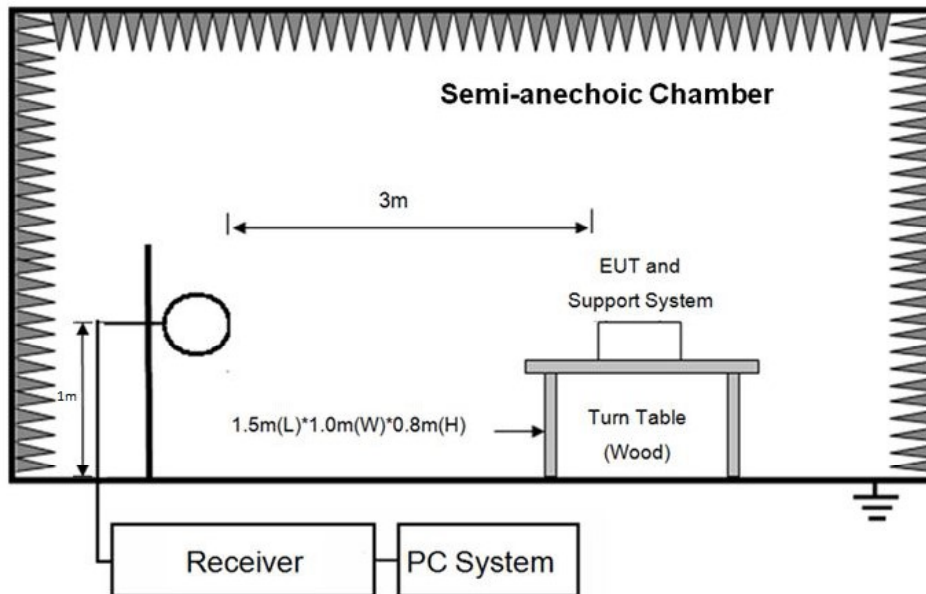


TEST REPORT NUMBER: (8521)189-0441

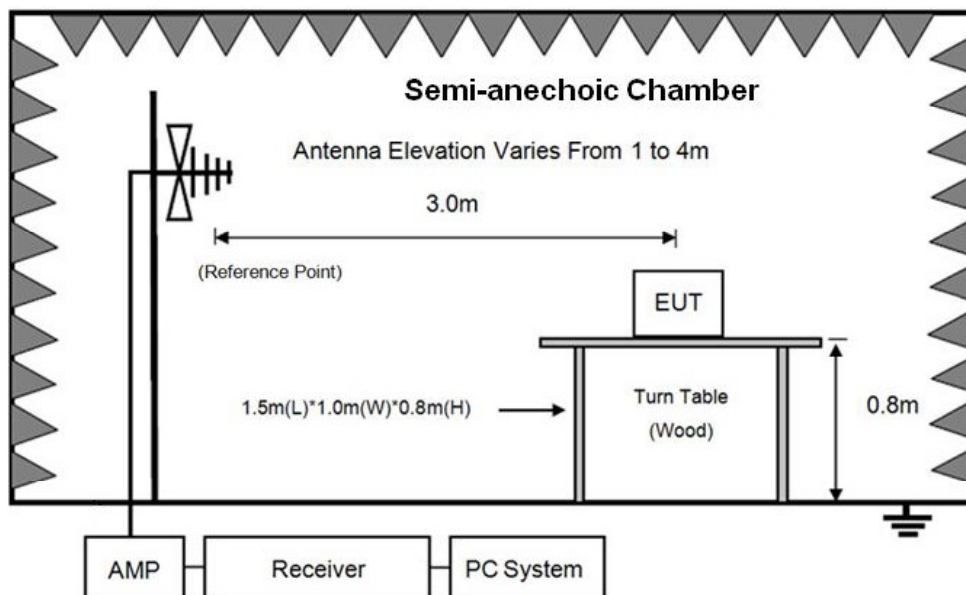
6. Radiated Emission

6.1. Block diagram of test setup

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

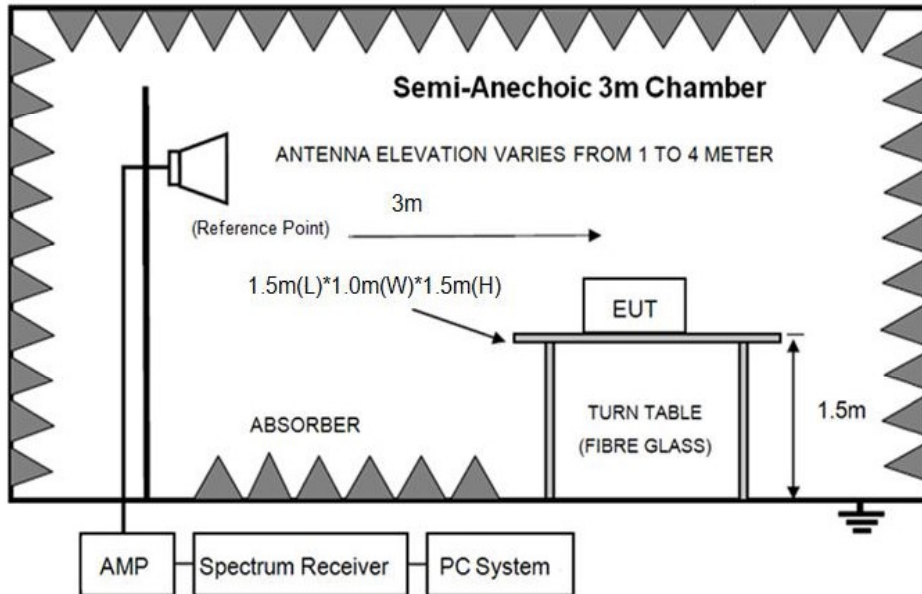


In 3 m Anechoic Chamber Test Setup Diagram for 30 MHz - 1 GHz



TEST REPORT NUMBER: (8521)189-0441

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



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

6.2. Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
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 1000 MHz	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	
Field Strength of Fundamental emission for 2.4 GHz - 2.4835 GHz	3	94.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average) 114.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak)	
Field Strength of Harmonics	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

Remark:

- (1) Emission level $\text{dB}\mu\text{V} = 20 \log$ Emission level $\mu\text{V}/\text{m}$
- (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.



TEST REPORT NUMBER: (8521)189-0441

(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 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6.3. 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 and 4.2
- (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 9 kHz to 25 GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 9 kHz to 30 MHz and 18 GHz to 25 GHz, so below final test was performed with frequency range from 30 MHz to 18 GHz.
- (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 30 MHz to 1 GHz, Quasi-Peak values were measured with EMI Receiver and the bandwidth of Receiver is 120 kHz.
- (7) For emissions above 1 GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1 MHz, VBW is set at 3 MHz for Peak measure; according ANSI C63.10:2013 for average measure.
- (8) For fundamental frequency test, set spectrum analyzer's RBW = 3 MHz, VBW = 10 MHz. peak detector for PK, RMS detector for AV, Read the Level in spectrum analyzer and record.
- (9) X axis, Y axis, Z axis are tested, and worse setup X axis is reported.



TEST REPORT NUMBER: (8521)189-0441

6.4. Test result

Pass. (See below detailed test result)

All the emissions except fundamental emission from 9 kHz to 25 GHz were comply with 15.209 limit.

Note1: According exploratory test, the emission levels are 20 dB below the limit detected from 9 kHz to 30 MHz and 18 GHz to 25 GHz, so the final test was performed with frequency range from 30 MHz to 18 GHz and recorded in below.

Note2: For emissions below 1 GHz, according exploratory explorer test, when change Tx mode and channel, have no distinct influence on emissions level, so for emissions below 1 GHz, the final test was only performed with EUT working in Tx 2423 MHz mode.

Note3: For emissions above 1 GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.



TEST REPORT NUMBER: (8521)189-0441
Field Strength of the Fundamental Signal

Frequency (MHz)	PK Level (dBuV/m)	PK Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2423	94.71	114.00	-19.29	Horizontal
2423	94.07	114.00	-19.93	Vertical
2443	94.03	114.00	-19.97	Horizontal
2443	94.03	114.00	-19.97	Vertical
2463	92.82	114.00	-21.18	Horizontal
2463	92.82	114.00	-21.18	Vertical

Frequency (MHz)	AV Level (dBuV/m)	AV Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2423	48.33	94.00	-45.67	Horizontal
2423	47.69	94.00	-46.31	Horizontal
2443	47.65	94.00	-46.35	Horizontal
2443	47.65	94.00	-46.35	Vertical
2463	46.44	94.00	-47.56	Vertical
2463	46.44	94.00	-47.56	Vertical

Note: AV Level = PK Level + PDCF



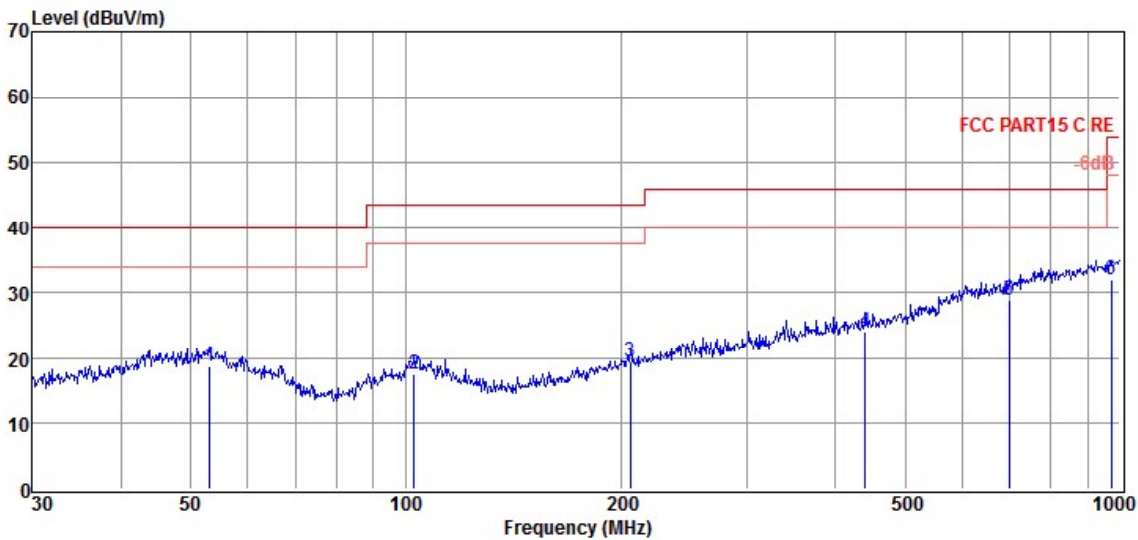
TEST REPORT NUMBER: (8521)189-0441

Radiated Emission test (below 1 GHz)

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#	D:\2021 RE2# Report Data\85211890441\FCC BELOW 1G.EM6
Test Date : 2021-07-15	Tested By : Zora
EUT : SPYBOTS Roboear	Model Number : 68403
Power Supply : Battery	Test Mode : Tx mode
Condition : Temp:24.5°C,Humi:55%,Press:101.4kPa	Antenna/Distance : 2020 VULB 9163 2#/3m/VERTICAL
Memo :	

Data:
1



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	53.13	1.10	13.73	3.89	18.72	40.00	-21.28	QP	VERTICAL
2	102.72	1.09	11.98	4.42	17.49	43.50	-26.01	QP	VERTICAL
3	206.40	3.56	10.80	5.07	19.43	43.50	-24.07	QP	VERTICAL
4	440.20	1.77	16.11	6.07	23.95	46.00	-22.05	QP	VERTICAL
5	699.31	2.20	19.69	7.06	28.95	46.00	-17.05	QP	VERTICAL
6	972.34	1.87	22.18	7.94	31.99	54.00	-22.01	QP	VERTICAL



TEST REPORT NUMBER: (8521)189-0441

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.

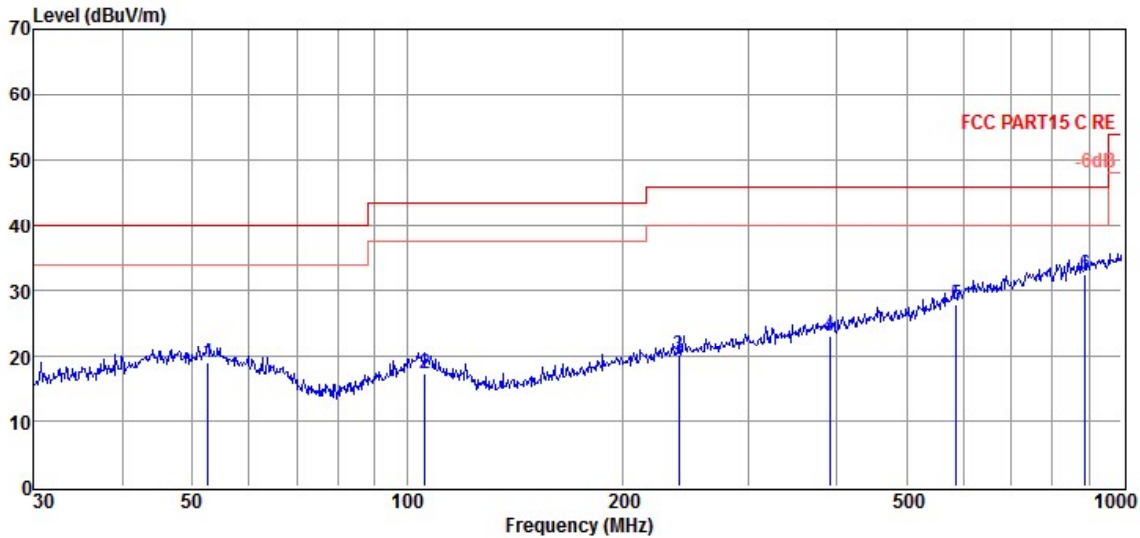
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



TEST REPORT NUMBER: (8521)189-0441

TR-4-E-009 Radiated Emission Test Result

: DDT 3m Chamber 2#
 D:\2021 RE2# Report Data\85211890441\FCC BELOW
 1G.EM6
Test Date : 2021-07-15 **Tested By** : Zora
EUT : SPYBOTS Roboear **Model Number** : 68403
Power Supply : Battery **Test Mode** : Tx mode
Condition : Temp:24.5°C,Humi:55%,Press:101.4kPa **Antenna/Distance** : 2020 VULB 9163 2#/3m/HORIZONTAL
Memo :
 Data:
 2



Item (Mark)	Freq. (MHz)	Read Level (dB μ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
1	52.58	1.47	13.59	3.88	18.94	40.00	-21.06	QP	HORIZONTAL
2	106.01	1.50	11.44	4.45	17.39	43.50	-26.11	QP	HORIZONTAL
3	239.99	2.56	12.30	5.23	20.09	46.00	-25.91	QP	HORIZONTAL
4	390.72	1.93	15.33	5.88	23.14	46.00	-22.86	QP	HORIZONTAL
5	586.84	2.39	18.82	6.66	27.87	46.00	-18.13	QP	HORIZONTAL
6	890.73	2.96	21.79	7.67	32.42	46.00	-13.58	QP	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.



TEST REPORT NUMBER: (8521)189-0441

Radiated Emission test (above 1 GHz)

Freq. (MHz)	Read level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dB μV/m)	Limit (dBμV/m)	Margin (dB)	Detector type	Polarization
GFSK Tx mode 2423 MHz									
4961.00	48.59	34.43	43.23	6.99	46.78	74.00	-27.22	Peak	HORIZONTAL
7494.00	46.95	36.20	42.64	8.83	49.34	74.00	-24.66	Peak	HORIZONTAL
10061.00	45.59	38.78	42.24	10.29	52.42	74.00	-21.58	Peak	HORIZONTAL
12271.00	45.65	38.00	41.85	11.63	53.43	74.00	-20.57	Peak	HORIZONTAL
15110.00	42.56	40.59	41.77	12.93	54.31	74.00	-19.69	Peak	HORIZONTAL
15110.00	54.31-46.38=7.93					54.00	-46.07	Average	HORIZONTAL
17915.00	43.05	44.22	42.48	14.43	59.22	74.00	-14.78	Peak	HORIZONTAL
17915.00	59.22-46.38=12.84					54.00	-41.16	Average	HORIZONTAL
4846.00	50.27	34.20	43.31	6.85	48.01	74.00	-25.99	Peak	VERTICAL
7426.00	46.57	36.16	42.69	8.71	48.75	74.00	-25.25	Peak	VERTICAL
10231.00	46.18	38.43	42.37	10.32	52.56	74.00	-21.44	Peak	VERTICAL
12900.00	44.94	38.48	42.85	11.35	51.92	74.00	-22.08	Peak	VERTICAL
14430.00	43.25	40.04	42.15	12.07	53.21	74.00	-20.79	Peak	VERTICAL
17201.00	43.32	42.88	42.26	13.71	57.65	74.00	-16.35	Peak	VERTICAL
17201.00	57.63-46.38=11.25					54.00	-42.75	Average	VERTICAL
GFSK Tx mode 2443 MHz									
5029.00	48.48	34.51	43.21	7.04	46.82	74.00	-27.18	Peak	HORIZONTAL
7579.00	47.01	36.23	42.58	8.81	49.47	74.00	-24.53	Peak	HORIZONTAL
9959.00	44.77	38.84	42.18	10.23	51.66	74.00	-22.34	Peak	HORIZONTAL
12441.00	45.58	38.00	42.12	11.98	53.44	74.00	-20.56	Peak	HORIZONTAL
14209.00	43.20	39.87	42.33	12.18	52.92	74.00	-21.08	Peak	HORIZONTAL
17915.00	42.79	44.22	42.48	14.43	58.96	74.00	-15.04	Peak	HORIZONTAL
17915.00	58.96-46.38=12.58					54.00	-41.42	Average	HORIZONTAL
4886.00	49.03	34.28	43.28	6.90	46.93	74.00	-27.07	Peak	VERTICAL
7494.00	46.90	36.20	42.64	8.83	49.29	74.00	-24.71	Peak	VERTICAL
9959.00	45.33	38.84	42.18	10.23	52.22	74.00	-21.78	Peak	VERTICAL
13648.00	44.00	39.14	42.67	11.79	52.26	74.00	-21.74	Peak	VERTICAL
15858.00	43.10	41.33	42.22	12.57	54.78	74.00	-19.22	Peak	VERTICAL
15858.00	54.78-46.38=8.40					54.00	-45.60	Average	VERTICAL
17184.00	43.62	42.86	42.26	13.73	57.95	74.00	-16.05	Peak	VERTICAL
17184.00	57.95-46.38=11.57					54.00	-42.43	Average	VERTICAL
GFSK Tx mode 2463 MHz									
5420.00	48.42	34.67	43.33	7.11	46.87	74.00	-27.13	Peak	HORIZONTAL
7579.00	46.83	36.23	42.58	8.81	49.29	74.00	-24.71	Peak	HORIZONTAL
10061.00	45.49	38.78	42.24	10.29	52.32	74.00	-21.68	Peak	HORIZONTAL



TEST REPORT NUMBER: (8521)189-0441

12866.00	45.19	38.44	42.79	11.41	52.25	74.00	-21.75	Peak	HORIZONTAL
14634.00	42.58	40.21	41.99	12.32	53.12	74.00	-20.88	Peak	HORIZONTAL
17881.00	42.57	44.14	42.47	14.35	58.59	74.00	-15.41	Peak	HORIZONTAL
17881.00	58.59-46.38=12.21					54.00	-41.79	Average	HORIZONTAL
4926.00	49.18	34.36	43.25	6.95	47.24	74.00	-26.76	Peak	VERTICAL
8021.00	47.07	36.42	42.29	8.64	49.84	74.00	-24.16	Peak	VERTICAL
10044.00	46.18	38.81	42.23	10.29	53.05	74.00	-20.95	Peak	VERTICAL
12611.00	45.93	38.14	42.39	11.89	53.57	74.00	-20.43	Peak	VERTICAL
15705.00	43.40	41.15	42.13	12.49	54.91	74.00	-19.09	Peak	VERTICAL
15705.00	54.91-46.38=8.53					54.00	-45.47	Average	VERTICAL
17932.00	42.00	44.25	42.48	14.47	58.24	74.00	-15.76	Peak	VERTICAL
17932.00	58.24-46.38=11.86					54.00	-42.14	Average	VERTICAL
Result: Pass									

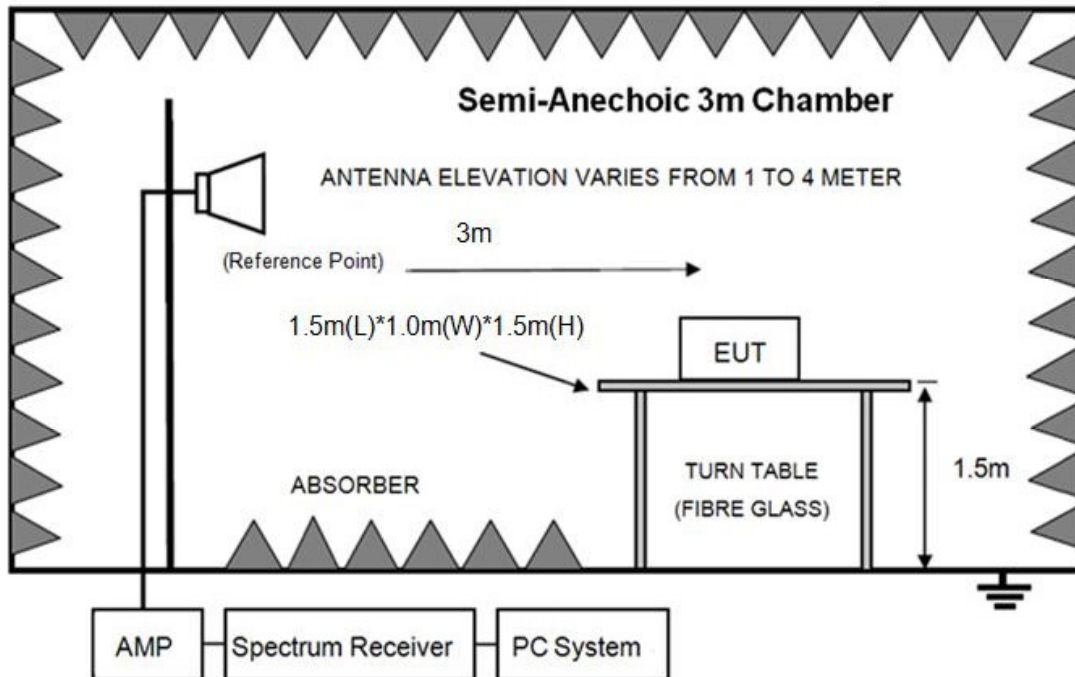
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.

2. For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit. Other emission levels are attenuated 20 dB below the limit, so it does not record in the report.

TEST REPORT NUMBER: (8521)189-0441

7. Band Edge Compliance

7.1. Block diagram of test setup



7.2. Limit

All the lower and upper band-edges emissions appearing within 2310 MHz to 2390 MHz and 2483.5 MHz to 2500 MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400 MHz to 2483.5 MHz and 5725 MHz to 5850 MHz shall be at least 20 dB below the fundamental emissions, or comply with 15.209 limits.

7.3. Test procedure

Same with clause 6.3 except change investigated frequency range from 2310 MHz to 2430 MHz and 2460 MHz to 2500 MHz.

Remark: All restriction band have been tested, and only the worst case is shown in report.



TEST REPORT NUMBER: (8521)189-0441

7.4. Test result

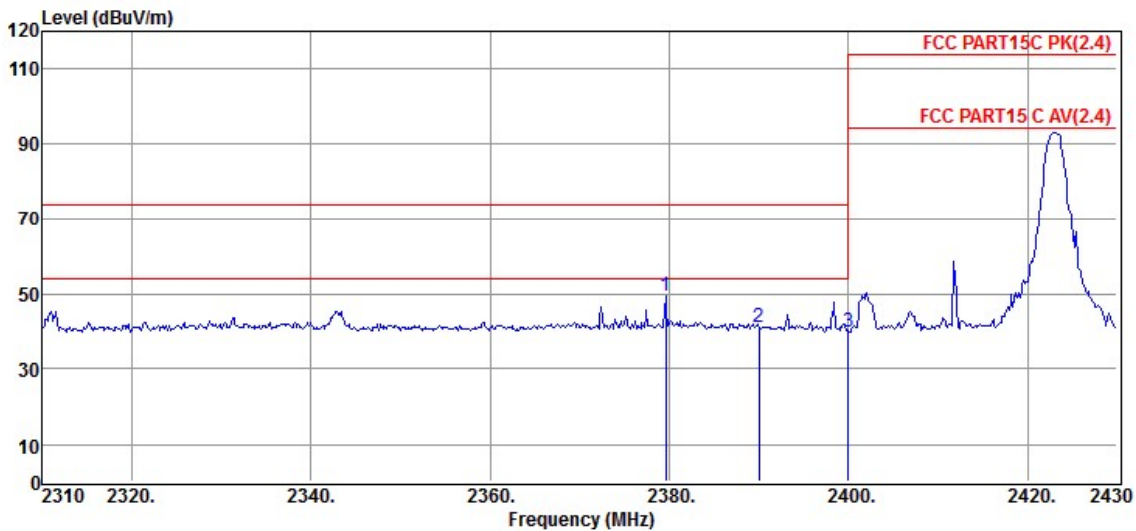
Pass. (See below detailed test result)



TEST REPORT NUMBER: (8521)189-0441
TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2# **D:\2021 RE2# Report Data\85211890441\FCC ABOVE 1G - 2.EM6**
Test Date : 2021-07-21 **Tested By** : Zora
EUT : SPYBOTS Roboear **Model Number** : 68403
Power Supply : Battery **Test Mode** : Tx mode
Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa **Antenna/Distance** : 2020 HF907/3m/HORIZONTAL
Memo : 2423

Data: 3



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2379.60	58.76	28.96	43.13	4.79	49.38	74.00	-24.62	Peak	HORIZONTAL
2	2390.00	50.57	28.98	43.14	4.80	41.21	74.00	-32.79	Peak	HORIZONTAL
3	2400.00	49.34	29.00	43.15	4.81	40.00	74.00	-34.00	Peak	HORIZONTAL

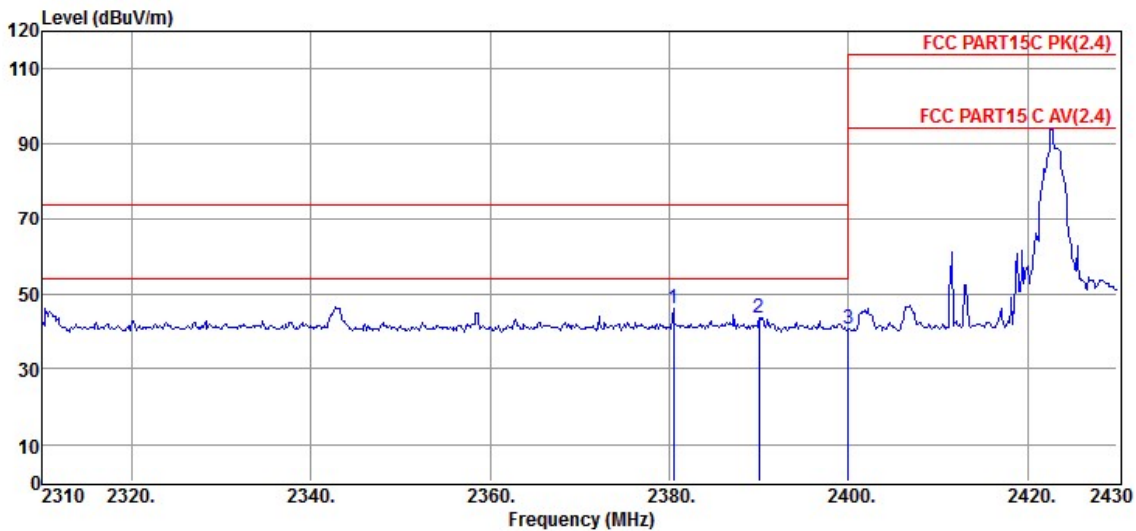
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
 2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.



TEST REPORT NUMBER: (8521)189-0441
TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2# **D:\2021 RE2# Report Data\85211890441\FCC ABOVE 1G - 2.EM6**
Test Date : 2021-07-21 **Tested By** : Zora
EUT : SPYBOTS Roboear **Model Number** : 68403
Power Supply : Battery **Test Mode** : Tx mode
Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa **Antenna/Distance** : 2020 HF907/3m/VERTICAL
Memo : 2423

Data: 4



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2380.44	55.67	28.96	43.13	4.79	46.29	74.00	-27.71	Peak	VERTICAL
2	2390.00	52.95	28.98	43.14	4.80	43.59	74.00	-30.41	Peak	VERTICAL
3	2400.00	50.12	29.00	43.15	4.81	40.78	74.00	-33.22	Peak	VERTICAL

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

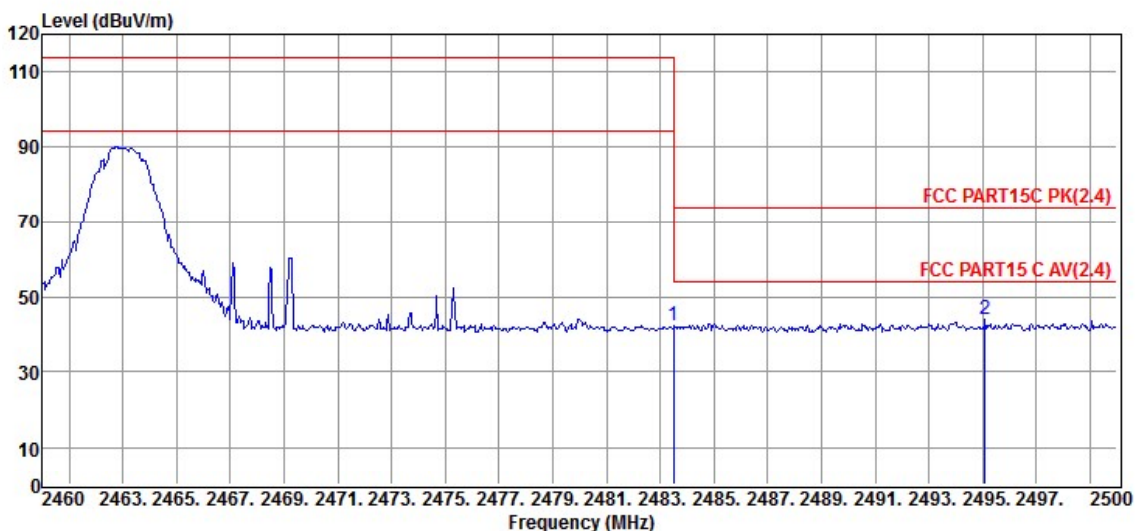


TEST REPORT NUMBER: (8521)189-0441

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#	D:\2021 RE2# Report Data\85211890441\FCC ABOVE 1G - 2.EM6
Test Date : 2021-07-21	Tested By : Zora
EUT : SPYBOTS Roboear	Model Number : 68403
Power Supply : Battery	Test Mode : Tx mode
Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa	Antenna/Distance : 2020 HF907/3m/VERTICAL
Memo : 2463	

Data: 7



Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	51.49	29.17	43.23	4.90	42.33	74.00	-31.67	Peak	VERTICAL
2	2495.08	53.45	29.19	43.25	4.91	44.30	74.00	-29.70	Peak	VERTICAL

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

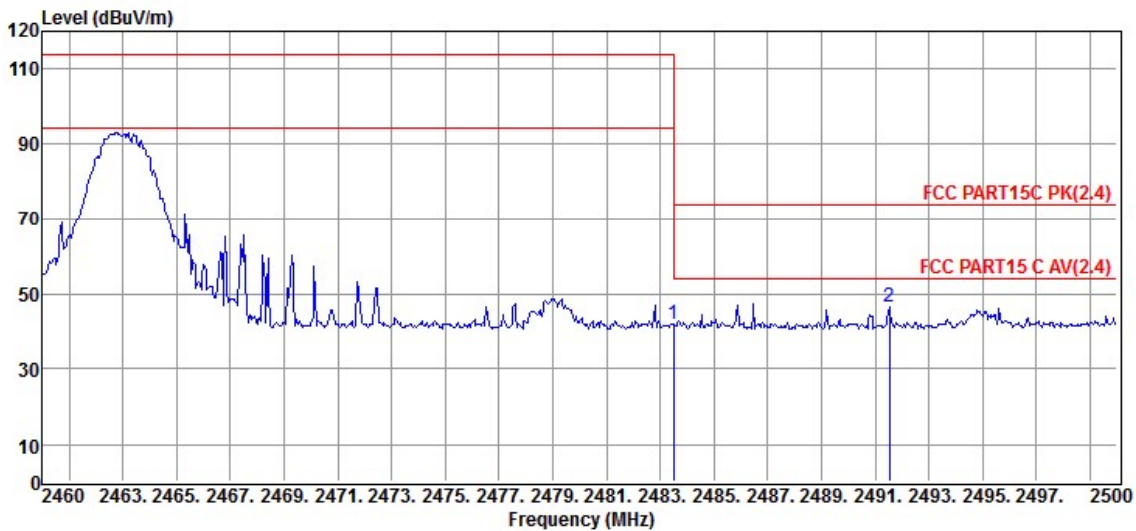


TEST REPORT NUMBER: (8521)189-0441

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 2#	D:\2021 RE2# Report Data\85211890441\FCC ABOVE 1G - 2.EM6
Test Date : 2021-07-21	Tested By : Zora
EUT : SPYBOTS Roboear	Model Number : 68403
Power Supply : Battery	Test Mode : Tx mode
Condition : Temp:24.5°C,Humi:55%,Press:100.1kPa	Antenna/Distance : 2020 HF907/3m/HORIZONTAL
Memo : 2463	

Data: 8



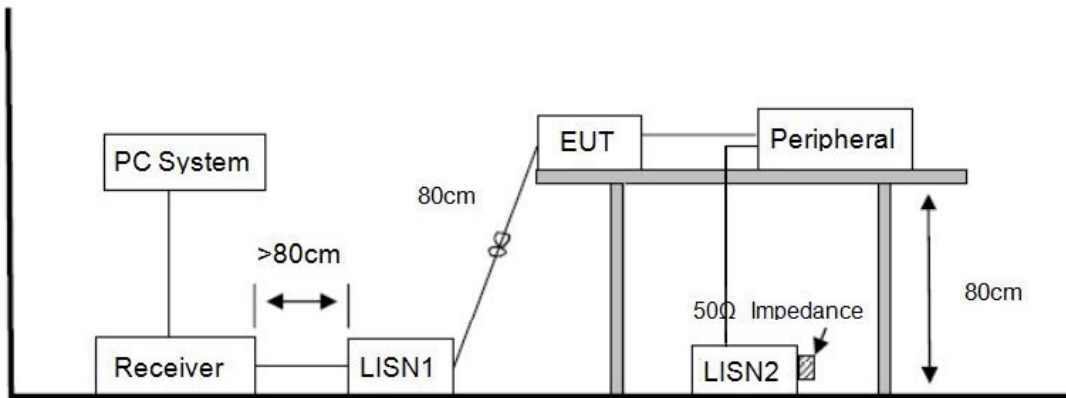
Item (Mark)	Freq. (MHz)	Read Level (dBμV)	Antenna Factor (dB/m)	PRM Factor (dB)	Cable Loss (dB)	Result Level (dBμV/m)	Limit Line (dBμV/m)	Over Limit (dB)	Detector	Polarization
1	2483.50	51.26	29.17	43.23	4.90	42.10	74.00	-31.90	Peak	HORIZONTAL
2	2491.52	55.79	29.18	43.24	4.91	46.64	74.00	-27.36	Peak	HORIZONTAL

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

TEST REPORT NUMBER: (8521)189-0441

8. Power Line Conducted Emission

8.1. Block diagram of test setup



8.2. Power line conducted emission limits

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

Note 1: * Decreasing linearly with logarithm of frequency.

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

8.3. 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 30 MHz for emissions in each of the test modes.



TEST REPORT NUMBER: (8521)189-0441

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.

8.4. Test result

Not Applicable, since the EUT is only battery-operated device.

9. Antenna Requirements

9.1. 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.

9.2. Result

The antenna used for this product is wire 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 1.9 dBi.

END OF REPORT