

FCC AND ISCED CERTIFICATION TEST REPORT

FOR

Applicant	:	Shenzhen Cnstar Electronic CO., LTD
Address	:	F2806, 28 / F, Xinghe World F building, No. 1 Yabao Road, Longgang District, Shenzhen
Equipment under Test	:	Wireless Transceiver Module
Model No.	:	HC03RFM
Trade Mark	:	N/A
FCC ID	:	2A718HC03RFM
IC	:	28699-HC03RFM
Manufacturer	:	Shenzhen Cnstar Electronic CO., LTD
Address	:	F2806, 28 / F, Xinghe World F Building, No. 1 Yabao Road, Longgang District, Shenzhen

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

Add: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan
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REPORT

Table of Contents

	Test report declares.....	3
1	Summary of test results	5
2	General test information.....	6
2.1.	Description of EUT	6
2.2.	Accessories of EUT.....	6
2.3.	Assistant equipment used for test.....	6
2.4.	Block diagram of EUT configuration for test	6
2.5.	Deviations of test standard.....	6
2.6.	Test environment conditions	7
2.7.	Test laboratory	7
2.8.	Measurement uncertainty.....	8
3	Equipment used during test	9
4.	20dB Bandwidth and 99% Bandwidth.....	12
4.1.	Block diagram of test setup.....	12
4.2.	Limits	12
4.3.	Test Procedure	12
4.4.	Test Result	12
4.5.	Original test data	12
5	Stop transmitting time test.....	14
5.1.	Block diagram of test setup.....	14
5.2.	Limits	14
5.3.	Test Procedure	14
5.4.	Test Result	14
5.5.	Original test data	14
6	Radiated emission.....	15
6.1.	Block diagram of test setup.....	15
6.2.	Limit.....	16
6.3.	Test Procedure	18
6.4.	Test result.....	19
7	Power Line Conducted Emission	25
7.1.	Block diagram of test setup.....	25
7.2.	Power Line Conducted Emission Limits	25
7.3.	Test Procedure	25
7.4.	Test Result	26
8	Antenna Requirements	27
9	Test setup photograph	28
10	Photos of the EUT	29

Test Report Declare

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Address	:	F2806, 28 / F, Xinghe World F building, No. 1 Yabao Road, Longgang District, Shenzhen

Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C, RSS-210 Issue 10 December 2019

Test procedure used:

ANSI C63.10:2013, RSS-Gen Issue 5, Apr. 2018, Amendment 2 (February 2021)

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 and ISSED standards.

Report No.:	DDT-R22052702-2E01		
Date of Receipt:	Jun. 17, 2022	Date of Test:	Jun. 06, 2022 ~ Jul. 15, 2022

Prepared By:

Ella Gong

Ella Gong/Engineer

Approved By:



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	Jul. 15, 2022	

1 Summary of test results

Description of Test Item	Standard	Results
20dB Bandwidth and 99% Bandwidth	FCC Part 15: 15.231(c) ANSI C63.10:2013 RSS-210 Issue 10 RSS-Gen Issue 5	PASS
Stop Transmitting Time Test	FCC Part 15C: 15.231(e) RSS-210 Issue 10	PASS
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.231(e) ANSI C63.10:2013 RSS-210 Issue 10 RSS-Gen Issue 5	PASS
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10:2013 RSS-210 Issue 10 RSS-Gen Issue 5	N/A
Antenna requirement	FCC Part 15: 15.203 RSS-210 Issue 10 RSS-Gen Issue 5	PASS

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

2 General test information

2.1. Description of EUT

EUT* Name	: Wireless Transceiver Module
Model Number	: HC03RFM
EUT function description	: Please reference user manual of this device
Power supply	: 1.8-3.6V
Operation frequency	: 433.92MHz
Modulation	: FSK
Antenna Type	: RP-SMA antenna, Peak Gain: 3 dBi.
Sample Number	: S22052702-05

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

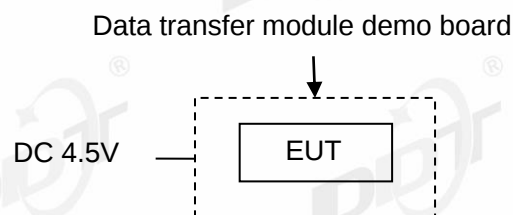
2.2. Accessories of EUT

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
Data transfer module demo board	HOPE RF ELECTRONIC	RFM300	N/A	N/A

2.4. Block diagram of EUT configuration for test



Tested mode, channel, information		
Mode	Channel	Frequency (MHz)
TX mode	/	433.92

Note : New battery is used during all test

2.5. Deviations of test standard

No Deviation.

2.6. 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:	86-106kPa

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

2.8. Measurement uncertainty

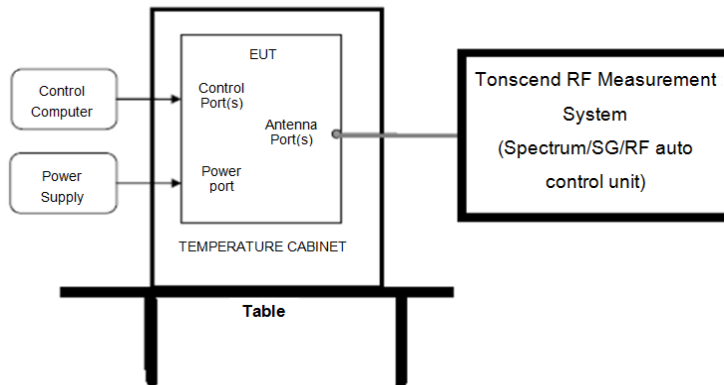
Test Item	Uncertainty
Bandwidth	1.1%
Peak Output Power(Conducted)(Spectrum analyzer)	0.86dB (10 MHz ≤ f < 3.6GHz); 1.38dB (3.6GHz ≤ f < 8GHz)
Peak Output Power(Conducted)(Power Sensor)	0.74dB
Power Spectral Density	0.74dB (10 MHz ≤ f < 3.6GHz); 1.38dB (3.6GHz ≤ f < 8GHz)
Frequencies Stability	6.7 × 10 ⁻⁸ (Antenna couple method) 5.5 × 10 ⁻⁸ (Conducted method)
Conducted spurious emissions	0.86dB (10 MHz ≤ 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 (9 kHz-30 MHz)	3.44 dB
Uncertainty for Radiation Emission test (30MHz-1GHz)	4.70 dB (Antenna Polarize: V) 4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1GHz-40GHz)	4.10dB (1-6GHz) 4.40dB (6GHz-18GHz) 3.54dB (18GHz-26GHz) 4.30dB (26GHz-40GHz)
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 3#)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 02, 2021	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	May 18, 2022	1 Year
Vector Signal Generator	Agilent	N5182A	MY19060405	May 18, 2022	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180912	May 18, 2022	1 Year
RF Control Unit	Tonsend	JS0806-2	DDT-ZC01449	May 18, 2022	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	May 26, 2022	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.6.77.0518	N/A	N/A
☑Radiation 3#chamber					
EMI Test Receiver	R&S	ESU	100472	May 18, 2022	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	May 18, 2022	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Sep. 19, 2021	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	01429	Aug. 07, 2021	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120	02468	Nov. 17, 2021	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	May 06, 2022	1 Year
Pre-amplifier	COM-POWER	PAM-118A	18040084	Sep. 02, 2021	1 Year
Pre-amplifier	COM-POWER	PAM-840A	461369	Apr. 11, 2022	1 Year
Test software	Audix	E3	V 6.1.1.1	N/A	N/A

4. On Time and 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=0MHz, RBW=10MHz, VBW=10MHz, Sweep time=5s;

Trace mode = Single hold.

4.4. Test Result

Test Channel	Duty Cycle[%]	20 log(duty cycle)
433.92	100	0

Note 1: The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by below Equation:

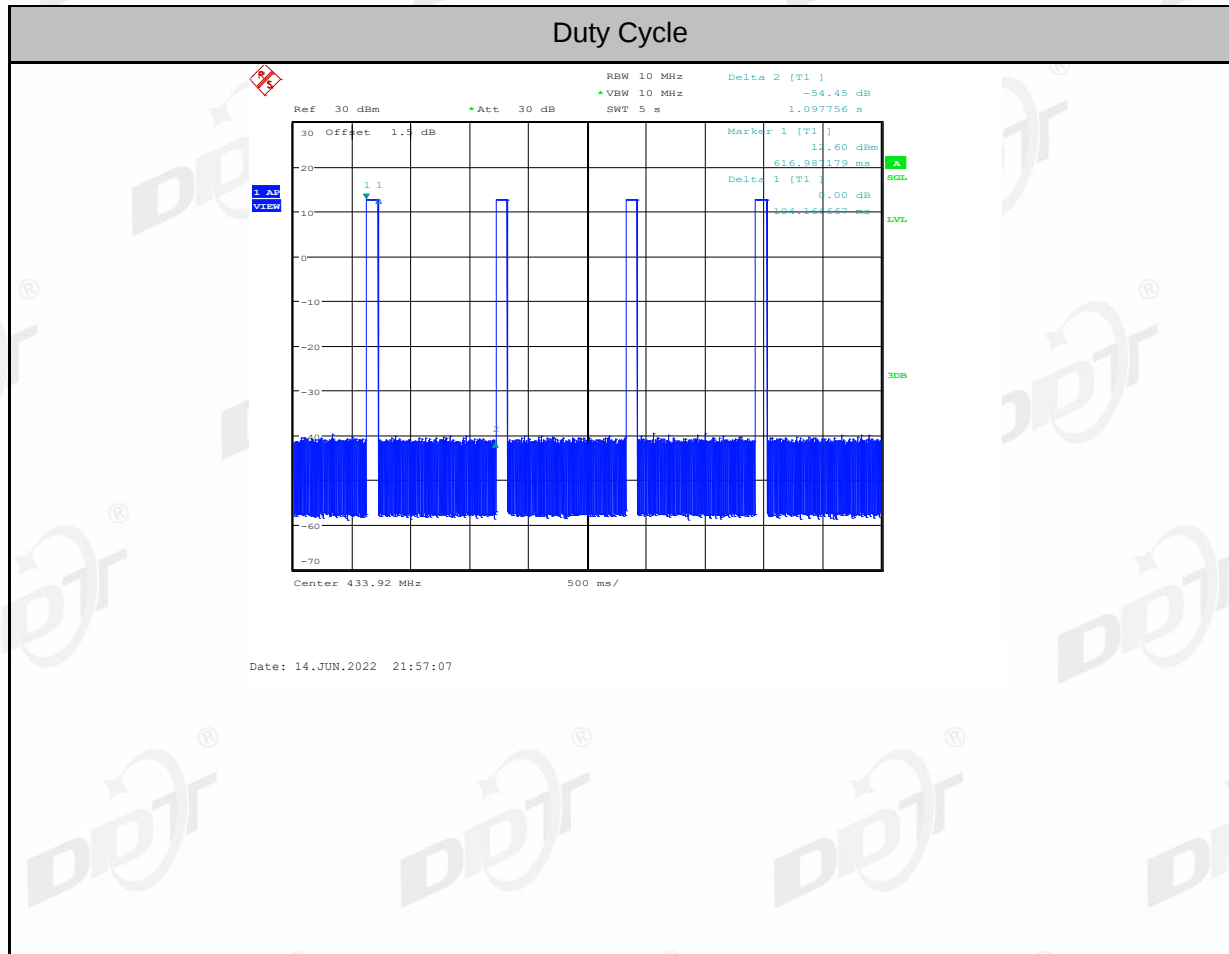
$$\delta(\text{dB}) = 20\log(\Delta) = 20\log(100/100) = 0 \text{ dB}$$

δ is the duty cycle correction factor (dB)

Δ is the duty cycle (dimensionless)

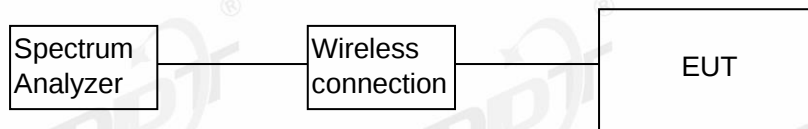
Note 2: In cases where the pulse train exceeds 0.1 s, the measured field strength shall be determined during a 0.1 s interval

4.5. Original test data



5. 20dB Bandwidth and 99% Bandwidth

5.1. Block diagram of test setup



5.2. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency of devices operation above 70MHz and below 900MHz.

5.3. Test Procedure

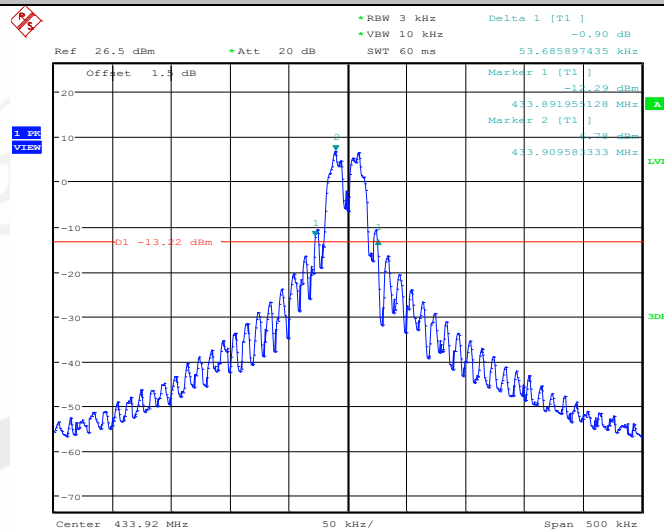
- (1) Connect EUT's antenna output to spectrum analyzer by RF cable.
- (2) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1kHz RBW and 3kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

5.4. Test Result

Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (MHz): No wider than 0.25% of the center frequency	Conclusion
FSK	53.686	49.679	$433.92 \times 0.25\% = 1.0848\text{MHz}$	PASS

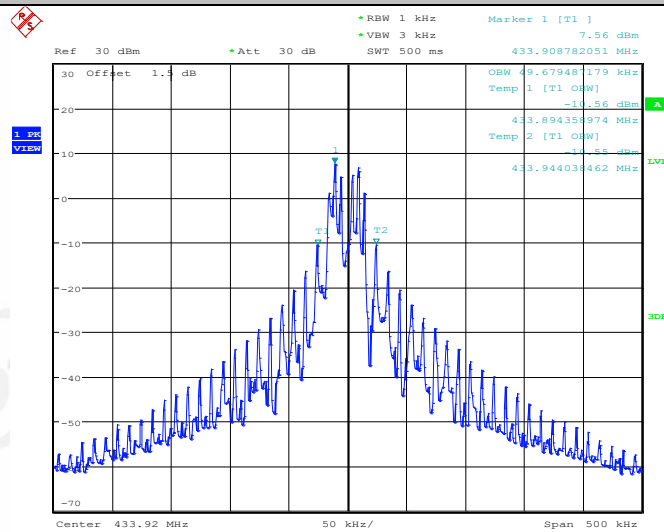
5.5. Original test data

20 dB Bandwidth



Date: 14.JUN.2022 23:11:07

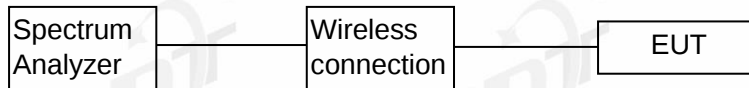
99% Bandwidth



Date: 14.JUN.2022 20:07:00

6 Stop transmitting time test

6.1. Block diagram of test setup



6.2. Limits

15.231(e), periodic transmissions: each transmission is not greater than 1 sec and silent period between transmissions is at least 30 times the duration of the transmission but in no case less than 10 sec.

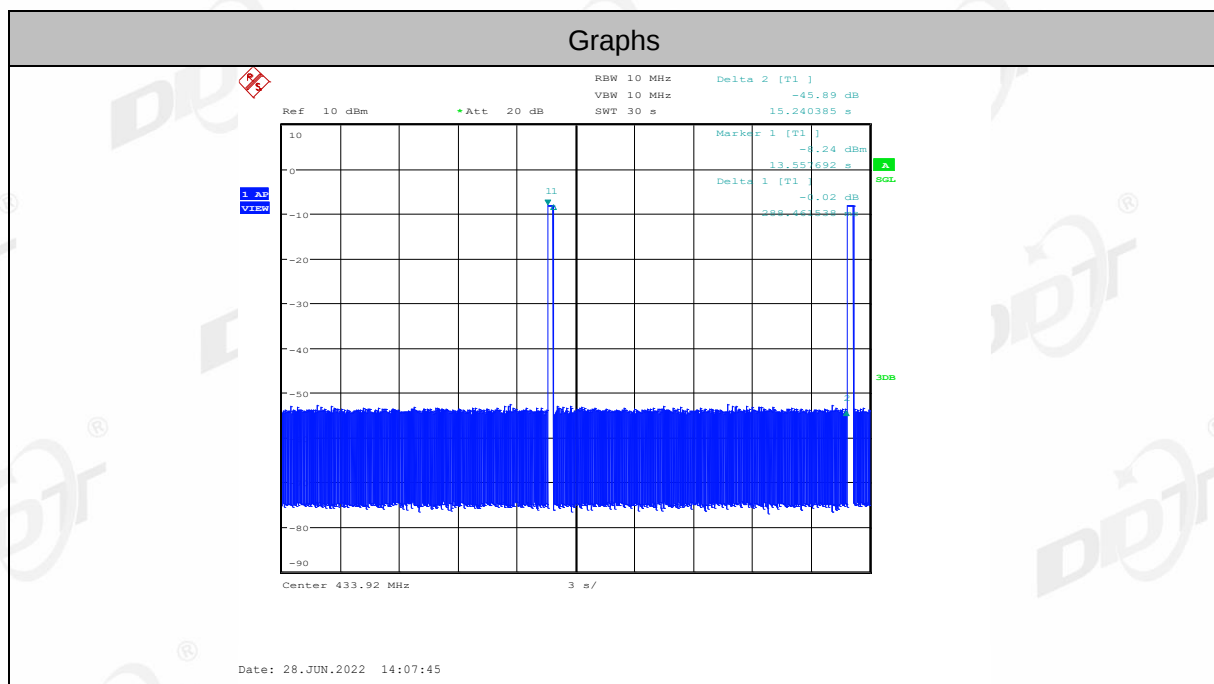
6.3. Test Procedure

- (1) The EUT's RF signal was coupled to spectrum analyzer by antenna connected to spectrum analyzer.
- (2) Set the spectrum to zero span mode, and centered of EUT frequency.
- (3) Measure the stop transmitting time after release EUT button.

6.4. Test Result

Frequency (MHz)	Burst Duration (ms)	Limit	Silent Period	Limit
433.92	288.462	≤1s	14.952s	>10s & >30* Burst Duration

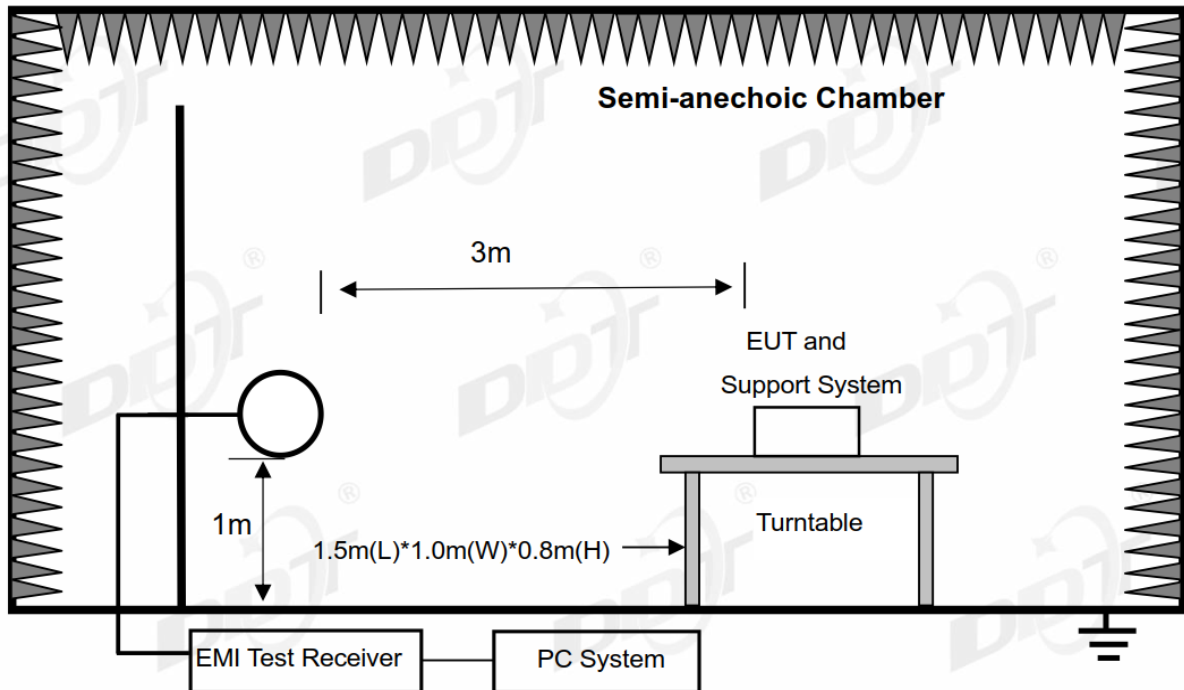
6.5. Original test data



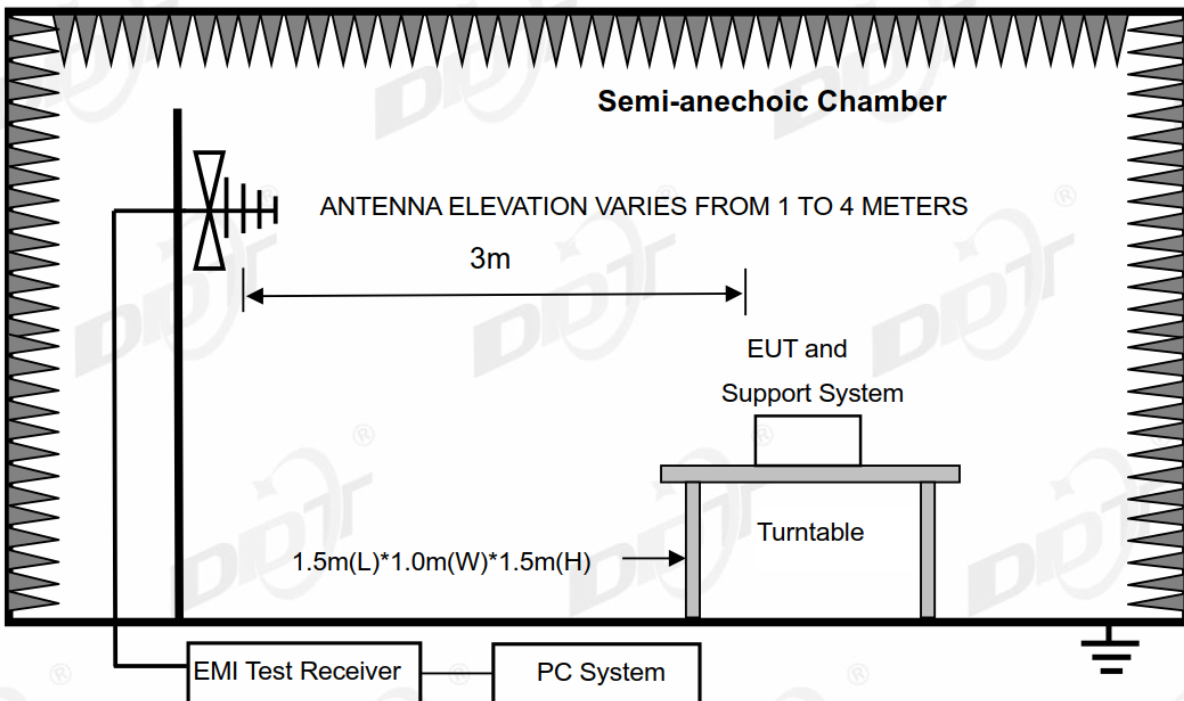
7 Radiated emission

7.1. Block diagram of test setup

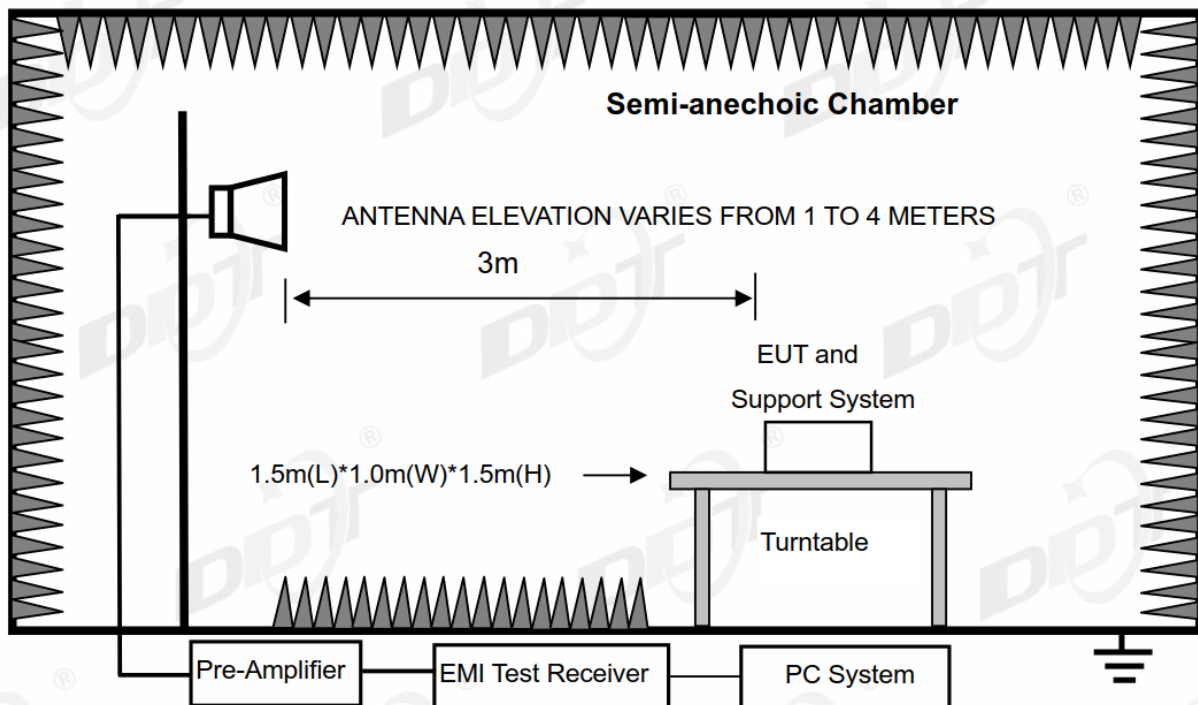
In 3m Anechoic Chamber Test Setup Diagram for 9kHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



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



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

7.2. Limit

(1) FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.1772&4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.2072&4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.G
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

RSS-Gen section 8.10 Restricted frequency bands*

MHz	MHz	MHz	GHz
0.090-0.110	12.51975-12.52025	240-285	3.5-4.4
0.495-0.505	12.57675-12.57725	322-335.4	4.5-5.15
2.1735-2.1905	13.36-13.41	399.9-410	5.35-5.46
3.020-3.026	16.42-16.423	608-614	7.25-7.75
4.125-4.128	16.69475-16.69525	960-1427	8.025-8.5
4.1772&4.17775	16.80425-16.80475	1435-1626.5	9.0-9.2
4.2072&4.20775	25.5-25.67	1645.5-1646.5	9.3-9.5
5.677-5.683	37.5-38.25	1660-1710	10.6-12.7
6.215-6.218	73-74.6	1718.8-1722.2	13.25-13.4
6.26775-6.26825	74.8-75.2	2200-2300	14.47-14.5
6.31175-6.31225	108-138	2310-2390	15.35-16.2
8.291-8.294	149.9-150.05	2483.5-2500	17.7-21.4
8.362-8.366	156.52475-156.52525	2655-2900	22.01-23.12
8.37625-8.38675	156.7-156.9	3260-3267	23.6-24.0
8.41425-8.41475	162.0125-167.17	3332-3339	31.2-31.8
12.29-12.293	167.72-173.2	3345.8-3358	36.43-36.5
			Above 38.6

* Certain frequency bands listed in table and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

(2) FCC 15.209 Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
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	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

(3) FCC 15.231 section (e) limit

Fundamental Frequency (MHz)	Field Strength of Fundamental
433.92	AV:72.87dBuV/m @3m PK:92.87dBuV/m @3m

Note:

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

(2) At frequencies below 30MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$$\text{Limit}_{3m}(\text{dBuV/m}) = \text{Limit}_{300m}(\text{dBuV/m}) + 40\log(300m/3m) = \text{Limit}_{300m}(\text{dBuV/m}) + 80$$

$$\text{Limit}_{3m}(\text{dBuV/m}) = \text{Limit}_{30m}(\text{dBuV/m}) + 40\log(30m/3m) = \text{Limit}_{30m}(\text{dBuV/m}) + 40$$

(3) Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions include fundamental emission shall not exceed FCC 15.231 section (e) limit of comply with FCC 15.209 limit which permit higher emission level.

RSS-210 Issue 10 Annex D

(b) exceed 11,000 $\mu\text{V/m}$ measured at 3 m with an average detector. The peak level of any emission within this specified frequency band shall not exceed 55,000 $\mu\text{V/m}$ measured at 3 m; and

(c) The field strength of emissions on any frequencies outside this specified band shall not exceed the general field strength limits specified in RSS-Gen.

7.3. Test Procedure

- (1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber for below 1GHz and 150 cm above the ground plane inside a semi-anechoic chamber for above 1GHz.
- (2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
9kHz-30MHz	Active Loop antenna	3m
30MHz-1GHz	Trilog Broadband Antenna	3m
1GHz-18GHz	Double Ridged Horn Antenna(1GHz-18GHz)	3m
18GHz-40GHz	Horn Antenna(18GHz-40GHz)	1m

According ANSI C63.10:2013 clause 6.4.6 and 6.5.3, for measurements below 30 MHz, Antenna was located 3 m from EUT, the loop antenna was positioned in three antenna orientations (parallel, perpendicular, and round-parallel), for each measurement antenna alignment, the EUT shall be rotated through 0° to 360° on a turntable, and the lowest height of the magnetic antenna shall be 1 m above the ground. For measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

- (3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum

radiated emissions from 9kHz to 5GHz (tenth harmonic of fundamental frequency):

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)

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

(c) Change modulation type of device if practicable.

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

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

(4) For final emissions measurements at each frequency of interest, the EUT was 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.

(5) The emissions from 9kHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90kHz, 110-490kHz, for emissions from 9kHz-90kHz,110kHz-490kHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9kHz to 1GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
9kHz-150kHz	200Hz
150kHz-30MHz	9kHz
30MHz-1GHz	120kHz

(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; RMS detector RBW 1MHz VBW 3MHz for Average measure(according ANSI C63.10:2013 clause 4.2.3.2.3 procedure for average measure).

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

7.4. Test result

PASS. (See below detailed test result)

Note1: According exploratory test no any obvious emission were detected from 9kHz to 30MHz.

Note2: For emissions above 1GHz. If peak results comply with AV limit, AV Result is deemed to comply with AV limit.

Radiated Emission test (below 1GHz)

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 3#

D:\E3 6.111\2022 Report Data\Q22052702-2E
HC03REM\New\FCC BELOW 1G.EM6

Test Date : 2022-07-15

Tested By : James Gan

EUT : Wireless Transceiver Module

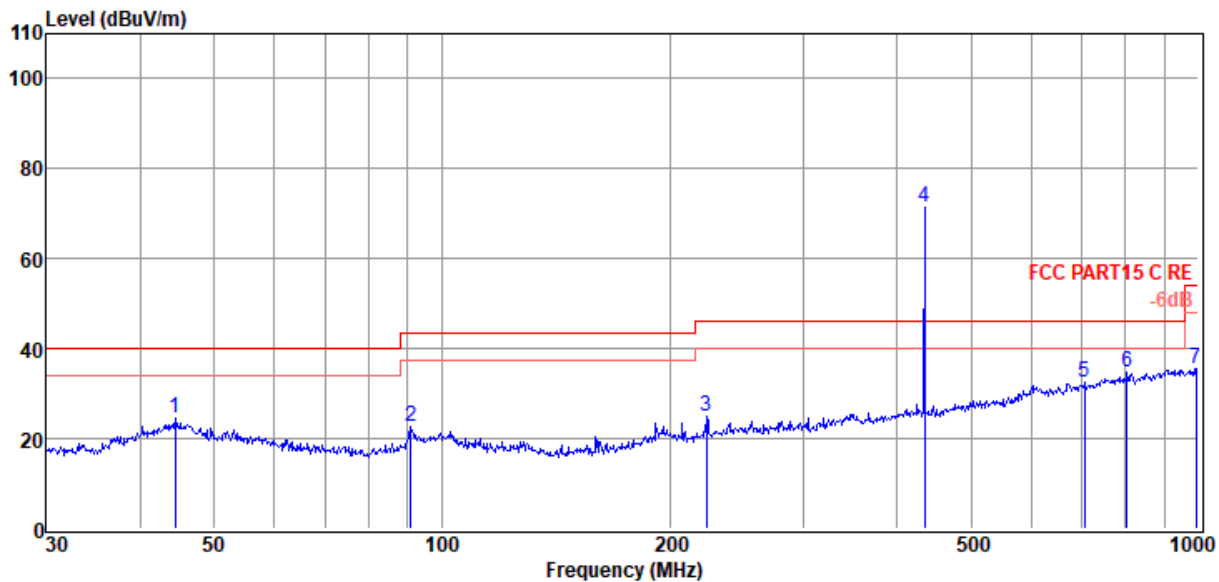
Model Number : HC03RFM

Power Supply : Battery

Test Mode : Tx Mode

Condition : Temp:23.2°C,Humi:58.8%,Press:100.3kPa Antenna/Distance : 2021 VLUB 9163 #3/3m/VERTICAL

Memo : 433.92MHz

Data:
15

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	44.43	5.83	15.04	3.64	24.51	40.00	-15.49	Peak	VERTICAL
2	90.86	8.49	10.14	3.94	22.57	43.50	-20.93	Peak	VERTICAL
3	223.73	8.86	11.70	4.55	25.11	46.00	-20.89	Peak	VERTICAL
4	433.92	49.88	16.18	5.27	71.33	/	/	Peak	VERTICAL
5	706.70	7.09	19.57	6.01	32.67	46.00	-13.33	Peak	VERTICAL
6	804.60	7.59	20.79	6.23	34.61	46.00	-11.39	Peak	VERTICAL
7	993.01	6.49	22.40	6.80	35.69	54.00	-18.31	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 3#

D:\E3 6.111\2022 Report Data\Q22052702-2E
HC03REM\New\FCC BELOW 1G.EM6

Test Date : 2022-07-15

Tested By : James Gan

EUT : Wireless Transceiver Module

Model Number : HC03RFM

Power Supply : Battery

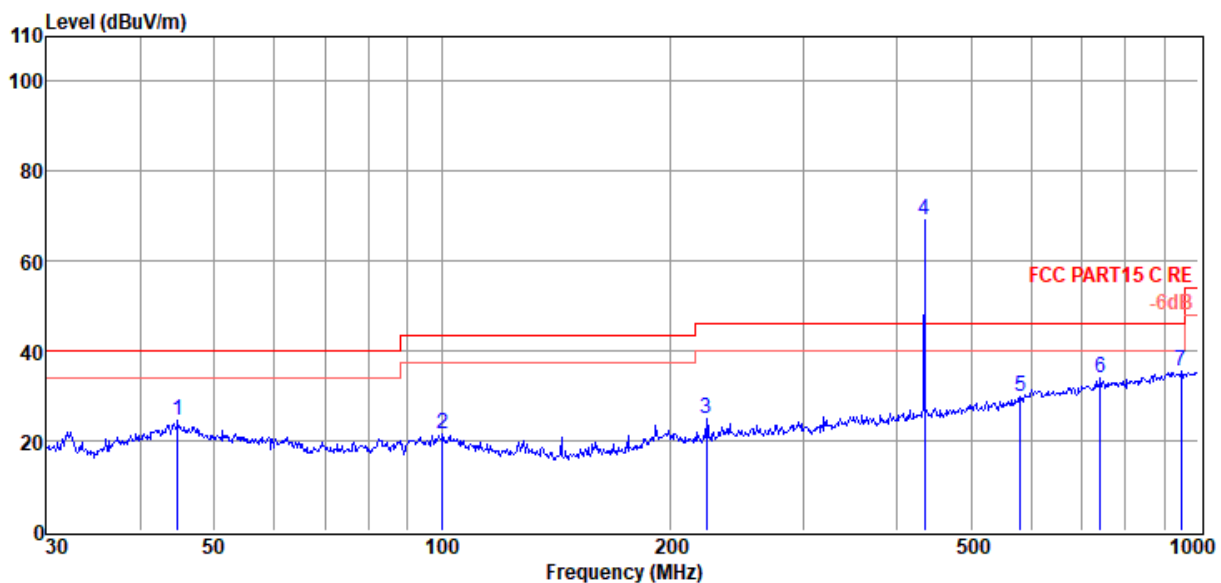
Test Mode : Tx Mode

Condition : Temp:23.2°C,Humi:58.8%,Press:100.3kPa

Antenna/Distance : 2021 VLUB 9163 #3/3m/HORIZONTAL

Memo : 433.92MHz

Data:
16



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	44.74	5.85	15.07	3.64	24.56	40.00	-15.44	Peak	HORIZONTAL
2	100.23	6.16	11.52	3.98	21.66	43.50	-21.84	Peak	HORIZONTAL
3	223.73	8.58	11.70	4.55	24.83	46.00	-21.17	Peak	HORIZONTAL
4	433.92	47.61	16.18	5.27	69.06	/	/	Peak	HORIZONTAL
5	580.70	6.05	18.24	5.68	29.97	46.00	-16.03	Peak	HORIZONTAL
6	742.26	7.47	20.45	6.08	34.00	46.00	-12.00	Peak	HORIZONTAL
7	948.76	6.82	22.20	6.57	35.59	46.00	-10.41	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.

Field Strength Of The Fundamental Signal

Frequency (MHz)	PK Level (dBuV/m)	PK Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	69.06	92.87	-23.81	Horizontal
433.92	71.33	92.87	-21.54	Vertical

Frequency (MHz)	AV Level (dBuV/m)	AV Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	69.06	72.87	-3.81	Horizontal
433.92	71.33	72.87	-1.54	Vertical

Note: AV Level= PK Level+ Duty factor

Radiated Emission test (above 1GHz)

TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 3#

D:\E3 6.111\2022 Report Data\Q22052702-2E
HC03REM\New\FCC ABOVE 1G .EM6

Test Date : 2022-06-11

Tested By : James Gan

EUT : Wireless Transceiver Module

Model Number : HC03RFM

Power Supply : Battery

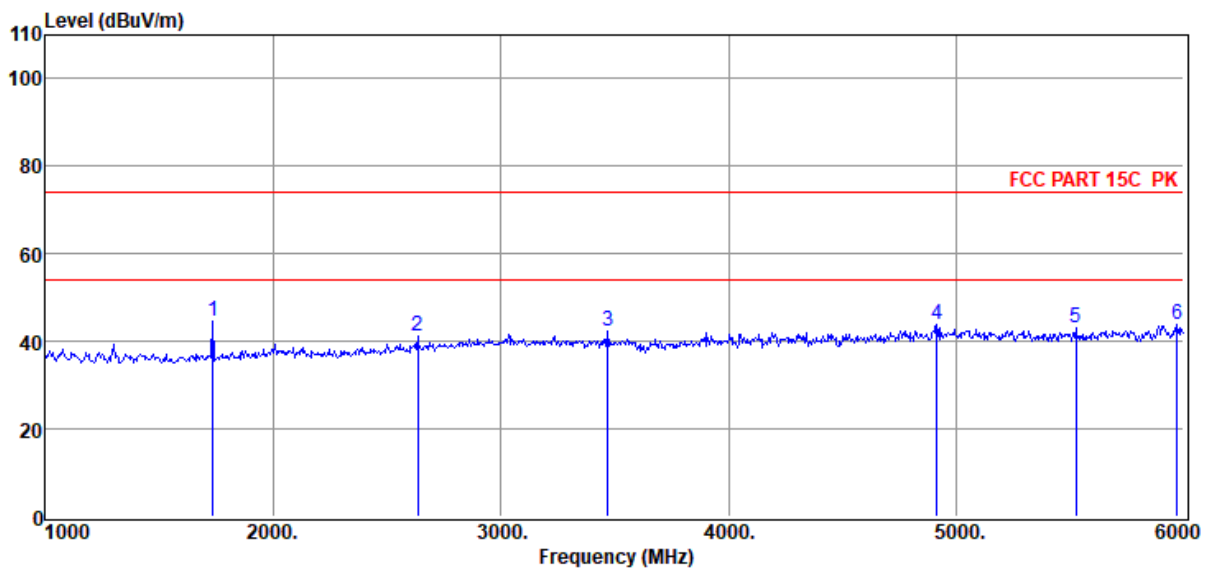
Test Mode : Tx Mode

Condition : Temp:23.2°C,Humi:58.8%,Press:100.3kPa

Antenna/Distance : 2021 BBHA 9120D
3#/3m/HORIZONTAL

Memo : 433.92MHz

Data: 3



Item (Mark)	Freq. (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	PRM Factor dB	Cable Loss dB	Filter Factor dB	Result Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	Polarization
1	1735.00	55.47	26.01	39.00	1.48	0.63	44.59	74.00	-29.41	Peak	HORIZONTAL
2	2635.00	50.16	28.11	39.72	1.78	0.75	41.08	74.00	-32.92	Peak	HORIZONTAL
3	3470.00	50.37	29.41	40.04	1.70	0.82	42.26	74.00	-31.74	Peak	HORIZONTAL
4	4915.00	48.01	32.83	40.38	2.51	0.91	43.88	74.00	-30.12	Peak	HORIZONTAL
5	5525.00	47.04	32.86	40.45	2.59	1.03	43.07	74.00	-30.93	Peak	HORIZONTAL
6	5970.00	46.16	33.93	40.50	3.00	1.13	43.72	74.00	-30.28	Peak	HORIZONTAL

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

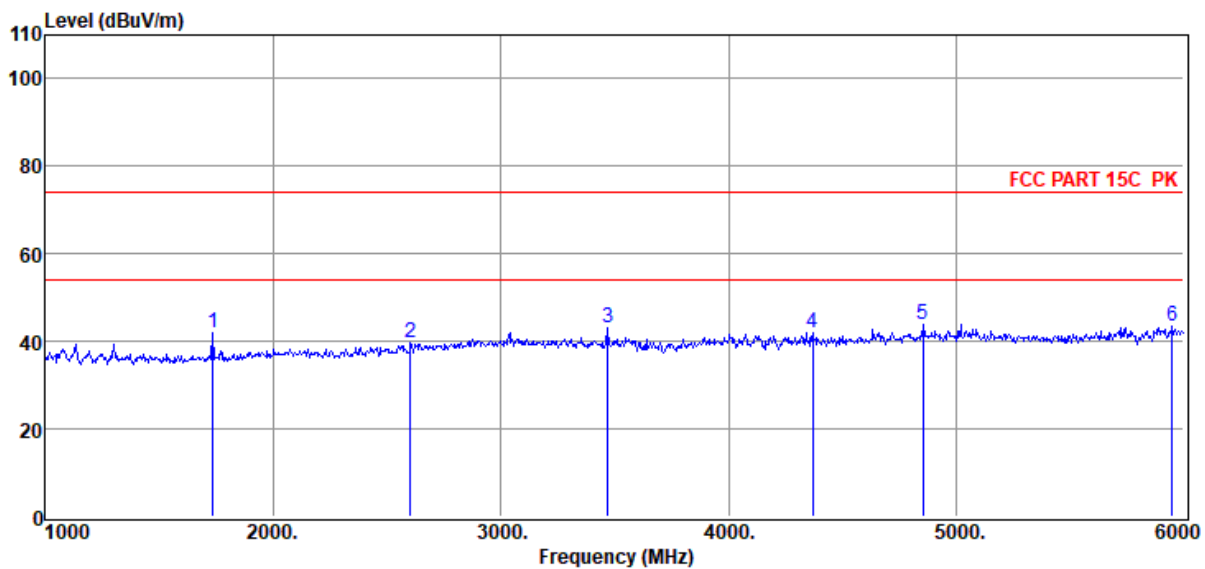
TR-4-E-009 Radiated Emission Test Result

Test Site : DDT 3m Chamber 3#
Test Date : 2022-06-11
EUT : Wireless Transceiver Module
Power Supply : Battery
Condition : Temp:23.2°C,Humi:58.8%,Press:100.3kPa
Memo : 433.92MHz

Tested By : James Gan
Model Number : HC03RFM
Test Mode : Tx Mode
Antenna/Distance : 2021 BBHA 9120D 3#/3m/VERTICAL

D:\E3 6.111\2022 Report Data\Q22052702-2E
HC03REM\New\FCC ABOVE 1G .EM6

Data: 4



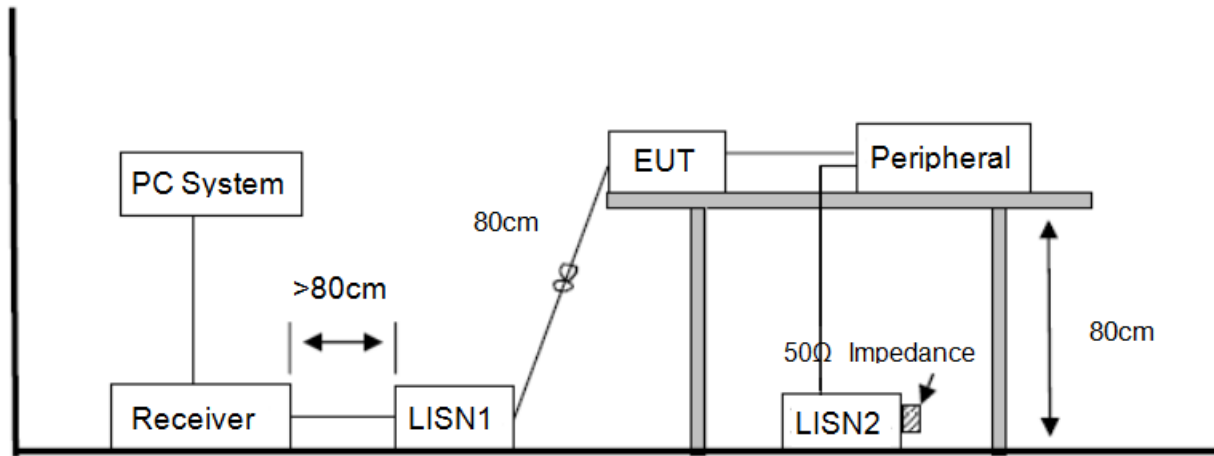
Note: 1. Result Level = Read Level + Antenna Factor + Cable loss + Filter Factor - PRM Factor.

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.

8 Power Line Conducted Emission

8.1. Block diagram of test setup



8.2. 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.

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 8.2 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.

8.4. Test Result

Not Applicable

Measurements to demonstrate compliance with the conducted limits are not required for devices which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines according to 15.207(C).

9 Antenna Requirements

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

For intentional device, according to RSS-Gen issue 5 section 6.8.

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

9.1. Result

The product is PR-SMA antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain is 3 dBi