CFR 47 FCC Part 15.231

Industry Canada RSS-210

TEST REPORT

Product： water sensor

Trade Name： N/A

Model Number： UM-WWS

FCC ID： ZJM-UMWWS

IC ID： 2225A-UMWWS

Prepared for

Condoplex Monitoring Systems Inc

7-75 Horner Ave Etobicoke ON Canada M8Z 4X5

Prepared by

Interocean EMC Technology Corp.
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Remark:

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The test result in the report is only subjected to the test sample.

Statement of Compliance

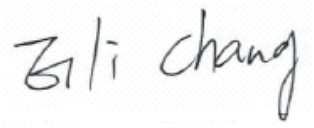
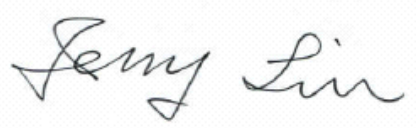
Applicant:	Condoplex Monitoring Systems Inc
Manufacturer:	Nutek Corporation
Product:	water sensor
Model No.:	UM-WWS
Tested Power Supply:	DC 9V
Date of Final Test:	Nov. 20, 2014
Revision of Report:	Rev. 01

Configuration of Measurements and Standards Used：

FCC Rules and Regulations Part 15 Subpart C
Industry Canada RSS-Gen Issue 3
Industry Canada RSS-210 Issue 8

1. The result of the testing report relate only to the item tested.
2. The testing report shall not be reproduced expect in full, without the written approval of IETC.

Report Issued: 2014/11/25

Project Engineer:  Approved: 

Elli Chang　　Jerry Liu

Table of Contents

1 Summary of Measurement

Report Clause	Test Parameter	Reference Document		Results
4	Timing Requirement	§FCC15.231(a)	RSS-210 A1.1.1	Pass
4	Radiated Emission	§FCC15.231(b), 15.209	RSS-210 A1.1.2	Pass
5	Emission Bandwidth	§FCC15.231(c)		Pass
6	99% Occupied Bandwidth		RSS-210 A1.1.3	Pass

2 General Information

2.1 Description of Equipment Under Test

Product	:	water sensor
Model Number	:	UM-WWS
Applicant	:	**Condoplex Monitoring Systems Inc** 7-75 Horner Ave Etobicoke ON Canada M8Z 4X5
Manufacturer	:	**Nutek Corporation** No.167, Lane 235, Bauchiau Rd., Shindian City, Taipei Country 23145, Taiwan
Power Supply	:	DC 9V
Operating Frequency	:	433.92MHz
Type of Modulation	:	ASK
Antenna Description	:	This device uses Helix antenna. The antenna is integral to the device, thereby meeting the requirement of FCC 15.203.
Date of Test	:	Nov. 07 ~ 20, 2014
Additional Description	:	1) The Model Number “**UM-WWS**” is representative selected in the test and included in this report. 2) For more detail specification about EUT, please refer to the user’s manual.

2.2 Details of Tested Peripheral Equipment

N/A

2.3 Test Facility

Site Description : ☒ OATS 1

Name of Firm : Interocean EMC Technology Corp.

Company web : http://www.ietc.com.tw

Location : No. 5-2, Lin 1, Tin-Fu, Lin-Kou Dist., New Taipei City, Taiwan 244, R.O.C.

Site Filing :
- Federal Communication Commissions – USA
  Registration No.: 96399 (OATS 1, 2, 3 & Chamber 3)
  Designation No.: TW1020
- Industry Canada (IC)
  OUR FILE: 46405-4437
  Registration No. (OATS 1): Site# 4437A-1
  Registration No. (OATS 3): Site# 4437A-3
  Registration No. (Chamber 3): Site# 4437A-5
  Registration No. (OATS 5): Site# 4437A-6
- Voluntary Control Council for Interference by Information Technology Equipment (VCCI) – Japan
  Member No.: 1349
  Registration No. (Conducted Room): C-1094
  Registration No. (Conducted Room): T-1562
  Registration No. (OATS 1): R-1040; G-274
  Registration No. (OATS 2): R-1041

Site Accreditation :
- Bureau of Standards and Metrology and Inspection (BSMI) – Taiwan, R.O.C.
  Accreditation No.:
  SL2-IN-E-0026 for CNS13438 / CISPR 22
  SL2-IN-E-0026 for CNS14757-2 / IEC 62040-2
  SL2-R1-E-0026 for CNS13439 / CISPR 13
  SL2-R2-E-0026 for CNS13439 / CISPR 13
  SL2-A1-E-0026 for CNS13783-1 / CISPR 14-1
  SL2-L1-E-0026 for CNS 14115 / CISPR 15
- Taiwan Accreditation Foundation (TAF)
  Accreditation No.: 1113
- Vehicle Safety Certification Center (VSCC)
  Approval No.: TW16-11-0
- TüV NORD
  Certificate No: TNTW0801R-04
- Nemko
  Authorisation No: AeLA 011
  Authorisation No: ELA 181

3 Test Specifications

3.1 Test Standard

The EUT was performed according to FCC Part 15 Subpart C Section 15.231 and Industry Canada RSS-210 procedure and setup followed by ANSI C63.4, 2003 requirements.

3.2 Test Step of EUT

3.2.1 Setup the fixture to EUT for power supplying.

3.2.2 Turn on the power of all equipment.

3.2.3 Let the EUT continuous transmission. Executed the test.

3.3 Test Equipment

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSP40	100478	2015/06/02
Preamplifier	Agilent	8449B	3008A01434	2015/05/07
Preamplifier	Agilent	83050A	3950A00225	2015/09/08
Horn Antenna	Schwarzbeck	BBHA 9120	9120D-583	2015/05/13
Horn Antenna	Schwarzbeck	BBHA 9170	213	2015/07/24
Cable	HARBOUR	27478LL142	CBL22	2015/01/01
EMI Test Receiver	Rohde & Schwarz	ESVS10	826148/011	2015/10/29
Biconical Antenna	Schwarzbeck	BBA 9106	VHA 9103-2418	2015/01/18
Log Antenna	Schwarzbeck	UHALP 9108 A	0738	2015/01/18
Pre-Amplifier	Agilent	8447D	2944A09703	2015/04/29
RF Cable	EMCI	EMC8D-NM-NM-25000	140105	2015/02/16
RF Cable	Mini-Circuits	CBL-3FL-NMNM	CBL56	2015/08/29
RF Cable	Insulated Wire	CBL59	CBL59	2015/01/22

Note: The above equipments are within the valid calibration period.

4 Radiated Emission Test

4.1 Limits

According to FCC 15.231(b) and RSS-210 Annex 1 requirement:
In addition to the provisions of §15.205, the field strength of emissions from intentional radiator operated under this section shall not exceed the following:

Fundamental and harmonics emission limits

Frequency	Field Strength of Fundamental		Field Strength of Harmonics	
(MHz)	(μV/m@3m)	(dBμV/m@3m)	(μV/m@3m)	(dBμV/m@3m)
433.92	10996	80.8	1099.6	60.8

General Radiated Emission Limit

Spurious Emission tested through until 10th harmonic. Radiated emissions, which fall in the restricted bands, as defined in §15.205 (a), comply with the radiated emission limits specified in §15.209 (a) and defined in RSS-Gen Table 3, comply with the radiated emission limits specified in RSS-Gen 7.2.5.

.

Frequency	15.209 Limits	
(MHz)	(μV/m@3m)	(dBμV/m@3m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remark ：

1. The table above tighter limit applies at the band edges.
2. The measurement distance in meters, which that between form closest point of EUT to instrument antenna.

4.2 Calculation of Average Factor

The output field strengths of specification in accordance with the rules specify measurements with an average detector. During the test, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector. The duty cycle is measured in 100 ms or the repetition cycle period, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer to set zero span at 100kHz resolution bandwidth.

Averaging factor in dB =20 log (duty cycle)

The duration of one cycle = 105.84ms

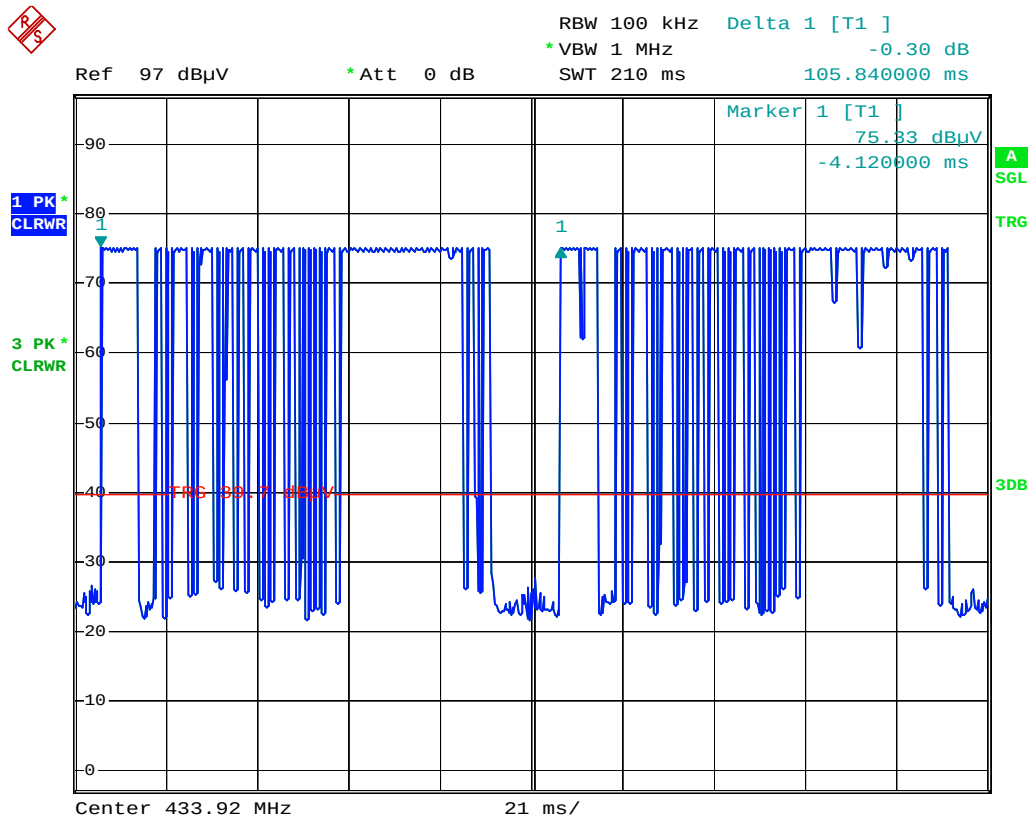
The duty cycle is simply the on-time divided by 100ms

Duty Cycle = (0.8ms*40+0.4*38) = 47.2 ms / 100ms

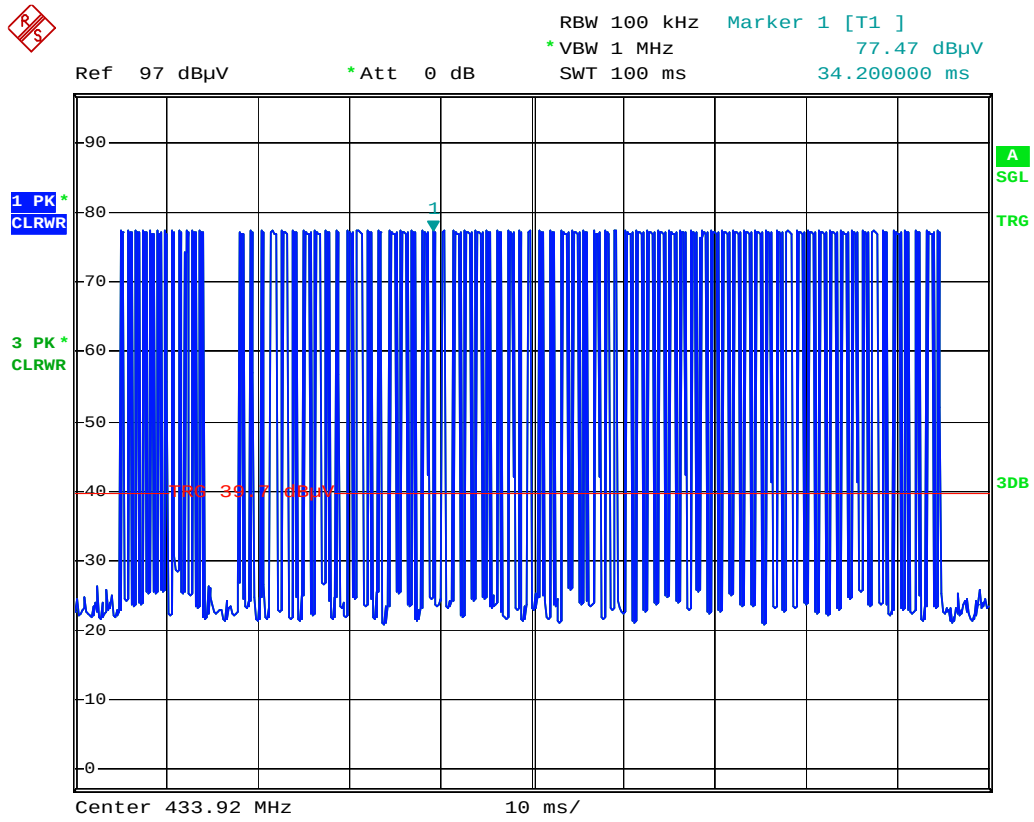
Therefore, the averaging factor is found by 20 log 0.472 = - 6.52dB

Please see the diagrams below.

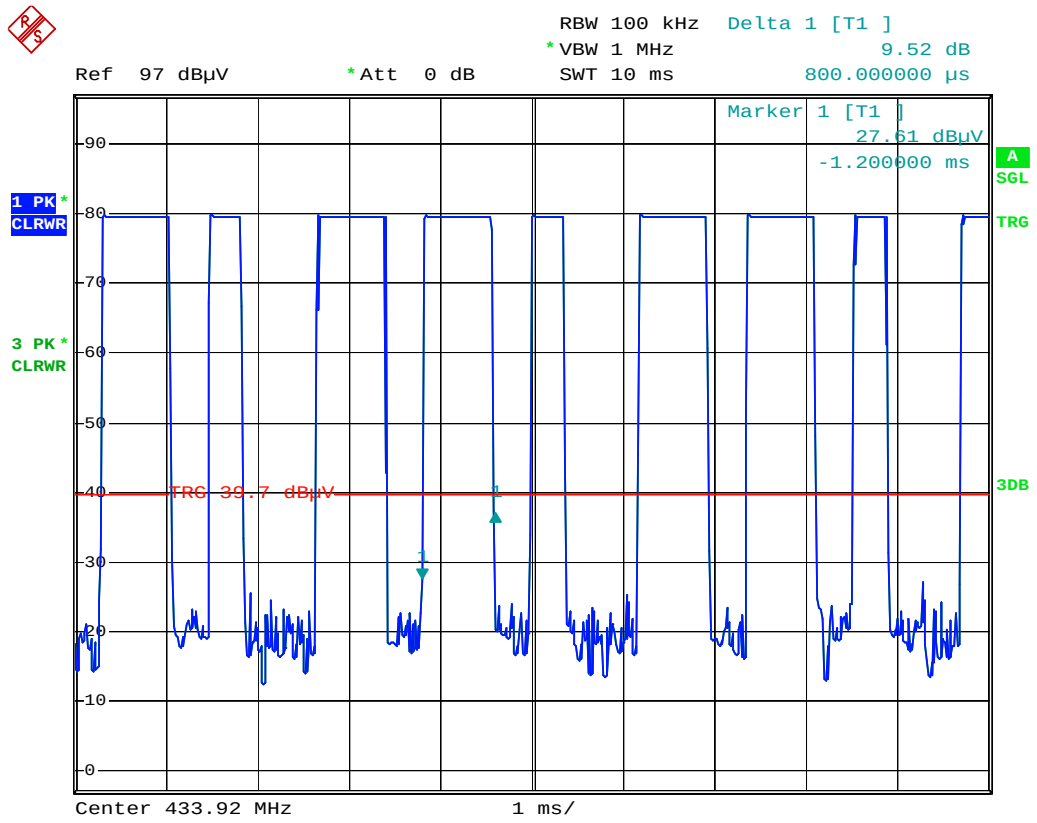
Duty Cycle


RBW 100 kHz
Delta 1 [T1]
*VBW 1 MHz
-0.30 dB
Ref 97 dBµV
*Att 0 dB
SWT 210 ms
105.840000 ms
Marker 1 [T1]
75.83 dBµV
-4.120000 ms
A
SGL
TRG
3DB
1 PK*
CLRWR
3 PK*
CLRWR
90
80
70
60
50
40
30
20
10
0
TRG 30.7 dBµV
Center 433.92 MHz
21 ms/

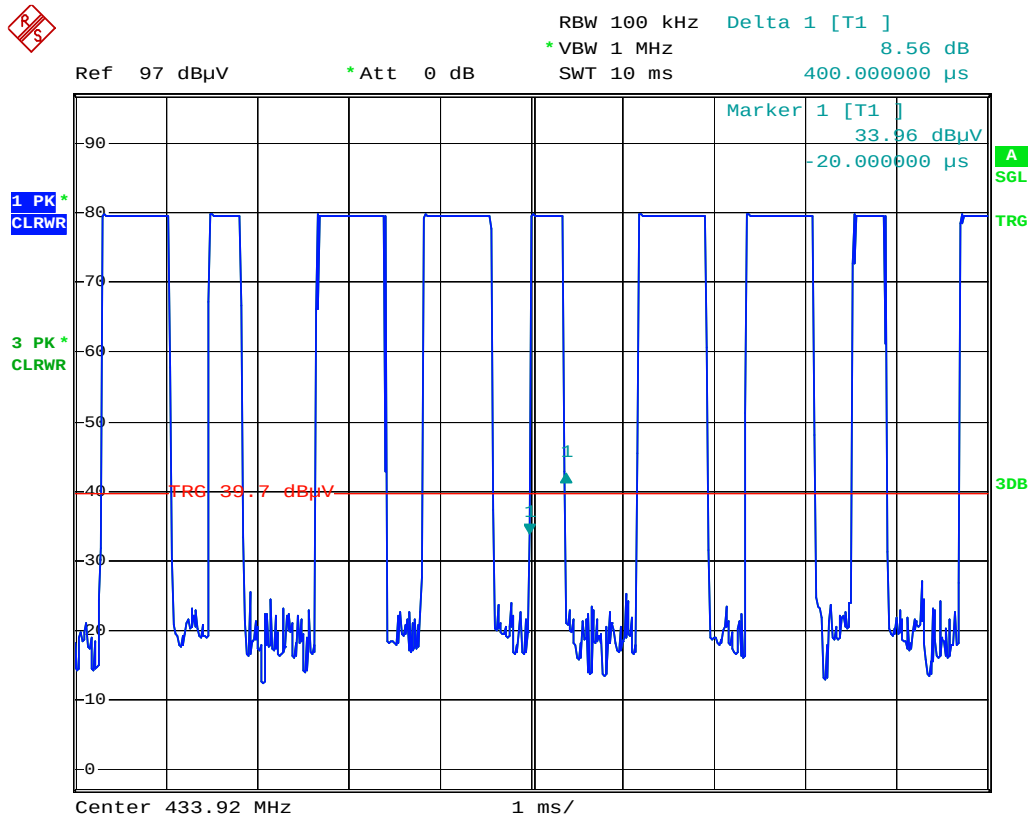
Time Slot



Time Slot 1

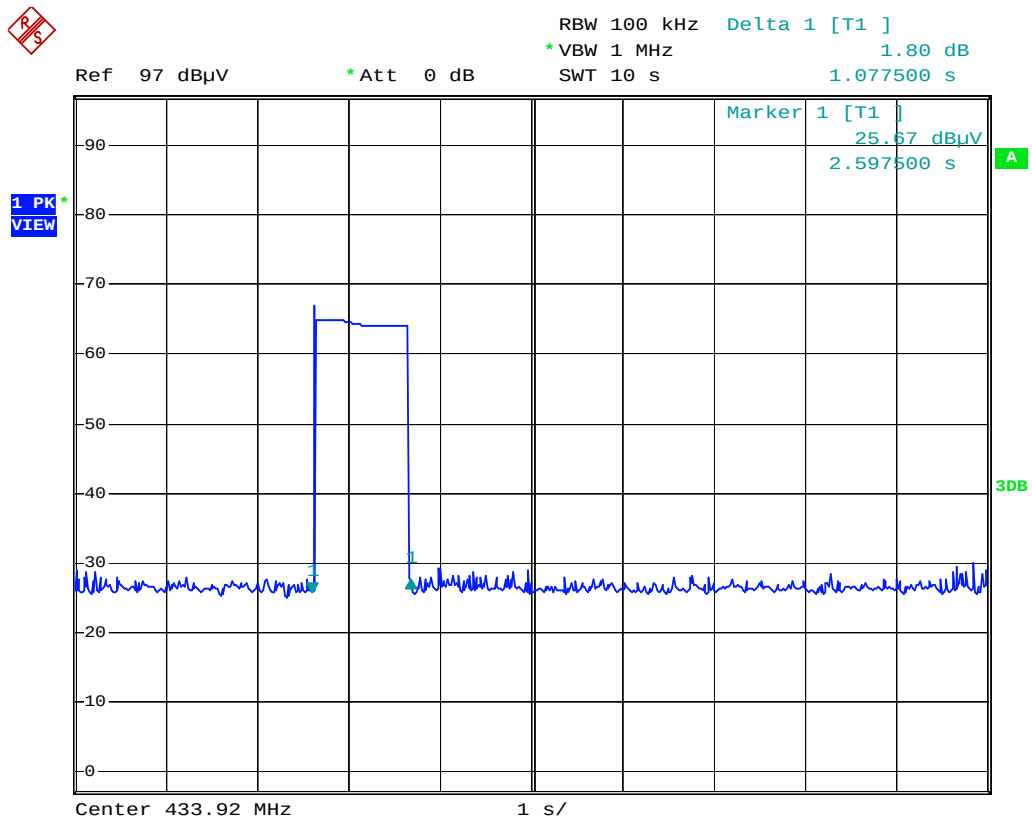

RBW 100 kHz
Delta 1 [T1]
*VBW 1 MHz
9.52 dB
Ref 97 dBµV
*Att 0 dB
SWT 10 ms
800.000000 µs
Marker 1 [T1]
27.61 dBµV
-1.200000 ms
A
SGL
TRG
1 PK *
CLRWR
3 PK *
CLRWR
3DB
TRG 39.7 dBµV
90
80
70
60
50
40
30
20
10
0
Center 433.92 MHz
1 ms/

Time Slot 2


RBW 100 kHz
Delta 1 [T1]
*VBW 1 MHz
8.56 dB
Ref 97 dBµV
*Att 0 dB
SWT 10 ms
400.000000 µs
Marker 1 [T1]
33.96 dBµV
-20.000000 µs
A
SGL
1 PK *
CLRWR
TRG
3 PK *
CLRWR
90
80
70
60
50
40
30
20
10
0
TRG 39.7 dBµV
3DB
Center 433.92 MHz
1 ms/

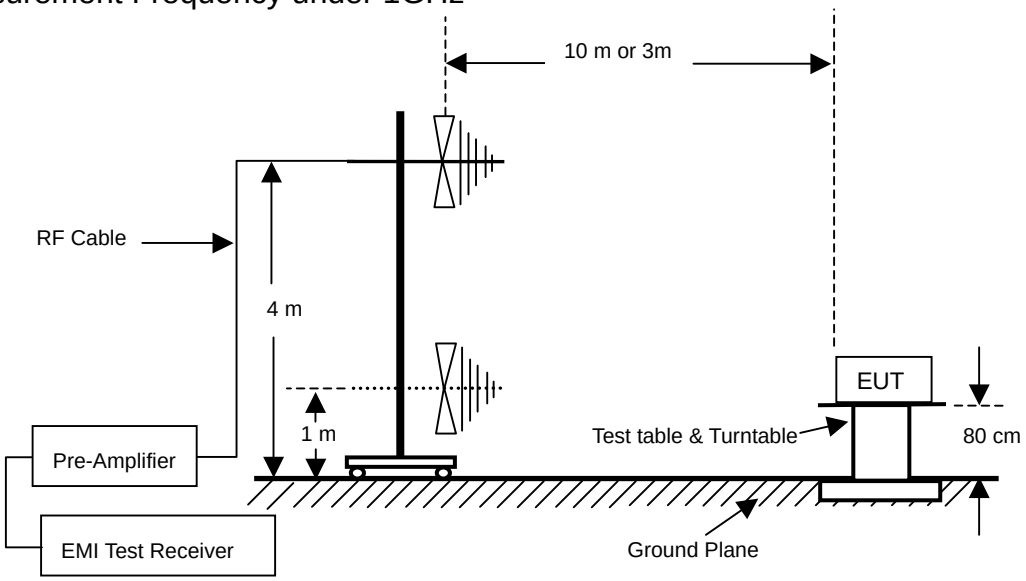
Time Slot 3

The EUT was complied with the requirement of FCC 15.231 (a)(1) and RSS-210 Annex 1, which employed a switch that will automatically deactivate the transmitter within less than 5 seconds of being released.

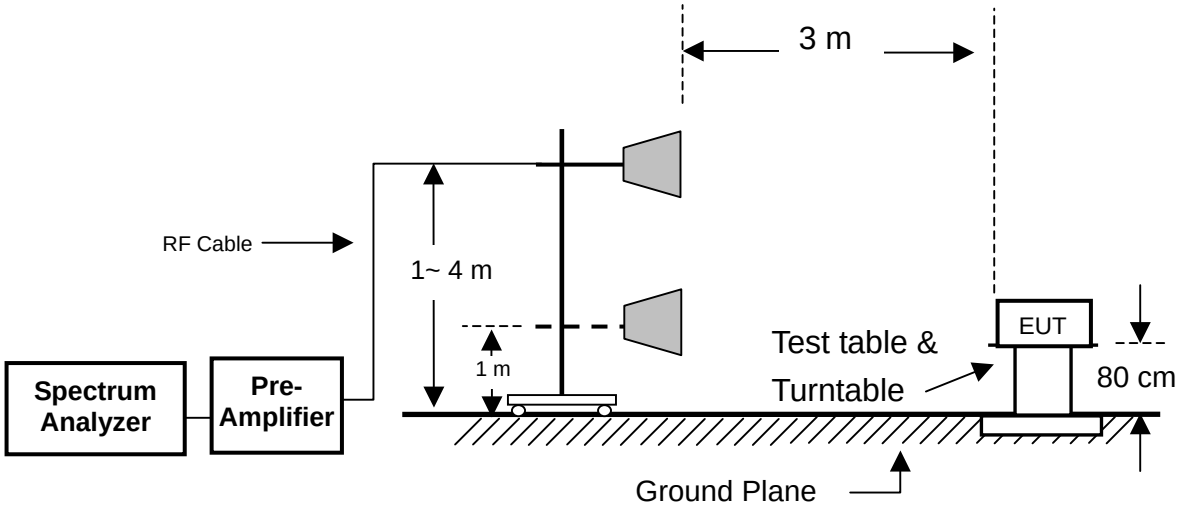


4.3 Configuration of Measurement

Measurement Frequency under 1GHz



Measurement Frequency above 1GHz



4.4 Test Procedure

Radiated emission measurements frequency range were performed from 30MHz to 5GHz. Spectrum Analyzer Resolution Bandwidth set to 100kHz or greater for frequencies from 30MHz to 1GHz, and set 1MHz Resolution Bandwidth for frequencies above 1GHz.
The EUT is place on non-conductive turntable for the test. If peripheral devices apply to the EUT, the peripheral devices will be connected to EUT and whole system. During the emission test, the signal is maximized through rotation and all cables were present worst-case emissions. The height of antenna and polarization is constantly changed for exploring maximum signal reading. The height of antenna can be up form reference ground to 4 meter and down to 1 meter.

4.5 Test Result

PASS.

The final test emission data is shown as following tables.

Radiated Emission Below 1GHz

Frequency	Antenna	Reading	Preamp	Correction Factor	Corrected Level	Limits	Margin	Det
(MHz)	Polarization	(dBuV)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Mode
112.400	H	41.54	29.84	13.33	25.03	43.52	-18.49	PK
160.560	H	40.67	30.21	17.38	27.84	43.52	-15.68	PK
204.780	H	35.78	29.94	19.80	25.64	43.52	-17.88	PK
288.420	H	35.60	29.47	23.32	29.45	46.02	-16.57	PK
340.130	H	39.53	29.40	18.49	28.62	46.02	-17.40	PK
450.790	H	37.77	30.61	21.74	28.90	46.02	-17.12	PK
71.200	V	45.26	30.71	7.64	22.19	40.00	-17.81	PK
114.600	V	43.19	29.92	14.50	27.77	43.52	-15.75	PK
211.800	V	36.10	29.77	20.00	26.33	43.52	-17.19	PK
289.630	V	36.73	29.46	22.36	29.63	46.02	-16.39	PK
324.000	V	40.09	29.38	17.90	28.61	46.02	-17.41	PK
410.200	V	38.65	29.87	20.79	29.57	46.02	-16.45	PK

Remark ： Corrected Level = Reading + Correction Factor – Preamp
Correction Factor = Antenna Factor + Cable Loss

Fundamental and Harmonics Emissions

Freq.	Antenna	Reading	Preamp	Correction Factor	Average Factor	Corrected Level	Limits	Margin	Det
(MHz)	Polarization	(dBuV)	(dB)	(dB/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	Mode
433.92	H	59.86	0.00	21.30	--	81.16	100.8	-19.64	PK
433.92	H	59.86	0.00	21.30	-6.52	74.64	80.8	-6.16	AV
867.84	H	46.95	30.10	29.36	--	46.21	80.8	-34.59	PK
867.84	H	46.95	30.10	29.36	-6.52	39.69	60.8	-21.11	AV
1301.76	H	52.88	27.36	28.11	--	53.63	74.0	-20.37	PK
1301.76	H	52.88	27.36	28.11	-6.52	47.11	54.0	-6.89	AV
1735.68	H	49.90	27.67	29.31	--	51.54	80.8	-29.26	PK
1735.68	H	49.90	27.67	29.31	-6.52	45.02	60.8	-15.78	AV
2169.60	H	40.40	27.80	30.57	--	43.17	80.8	-37.63	PK
2169.60	H	40.40	27.80	30.57	-6.52	36.65	60.8	-24.15	AV
2603.52	H	41.90	27.83	32.14	--	46.21	80.8	-34.59	PK
2603.52	H	41.90	27.83	32.14	-6.52	39.69	60.8	-21.11	AV
3037.44	H	47.00	27.97	33.36	--	52.39	80.8	-28.41	PK
3037.44	H	47.00	27.97	33.36	-6.52	45.87	60.8	-14.93	AV
3471.36	H	46.57	27.79	33.68	--	52.46	80.8	-28.34	PK
3471.36	H	46.57	27.79	33.68	-6.52	45.94	60.8	-14.86	AV
3905.28	H	36.36	27.86	35.88	--	44.38	74.0	-29.62	PK
3905.28	H	36.36	27.86	35.88	-6.52	37.86	54.0	-16.14	AV
4339.20	H	35.40	27.61	36.53	--	44.32	74.0	-29.68	PK
4339.20	H	35.40	27.61	36.53	-6.52	37.80	54.0	-16.20	AV
433.92	V	50.21	0.00	21.06	--	71.27	100.8	-29.53	PK
433.92	V	50.21	0.00	21.06	-6.52	64.75	80.8	-16.05	AV
867.84	V	40.72	30.10	28.94	--	39.56	80.8	-41.24	PK
867.84	V	40.72	30.10	28.94	-6.52	33.04	60.8	-27.76	AV
1301.76	V	45.54	27.36	28.11	--	46.29	74.0	-27.71	PK
1301.76	V	45.54	27.36	28.11	-6.52	39.77	54.0	-14.23	AV
1735.68	V	49.02	27.67	29.31	--	50.66	80.8	-30.14	PK
1735.68	V	49.02	27.67	29.31	-6.52	44.14	60.8	-16.66	AV
2169.60	V	37.88	27.80	30.57	--	40.65	80.8	-40.15	PK
2169.60	V	37.88	27.80	30.57	-6.52	34.13	60.8	-26.67	AV
2603.52	V	42.26	27.83	32.14	--	46.57	80.8	-34.23	PK
2603.52	V	42.26	27.83	32.14	-6.52	40.05	60.8	-20.75	AV

3037.44	V	49.04	27.97	33.36	--	54.43	80.8	-26.37	PK
3037.44	V	49.04	27.97	33.36	-6.52	47.91	60.8	-12.89	AV
3471.36	V	50.00	27.79	33.68	--	55.89	80.8	-24.91	PK
3471.36	V	50.00	27.79	33.68	-6.52	49.37	60.8	-11.43	AV
3905.28	V	38.15	27.86	35.88	--	46.17	74.0	-27.83	PK
3905.28	V	38.15	27.86	35.88	-6.52	39.65	54.0	-14.35	AV
4339.20	V	35.80	27.61	36.53	--	44.72	74.0	-29.28	PK
4339.20	V	35.80	27.61	36.53	-6.52	38.20	54.0	-15.80	AV

Remark ： 1. Corrected Level = Reading + Correction Factor – Preamp
2. Correction Factor = Antenna Factor + Cable Loss
3. “ * ” Mark indicated Background Noise Level
4. The signal bandwidth was measured and less then 100KHz RBW so PDCF factor is not required to correct the fundamental signal peak result.

5 Emission Bandwidth

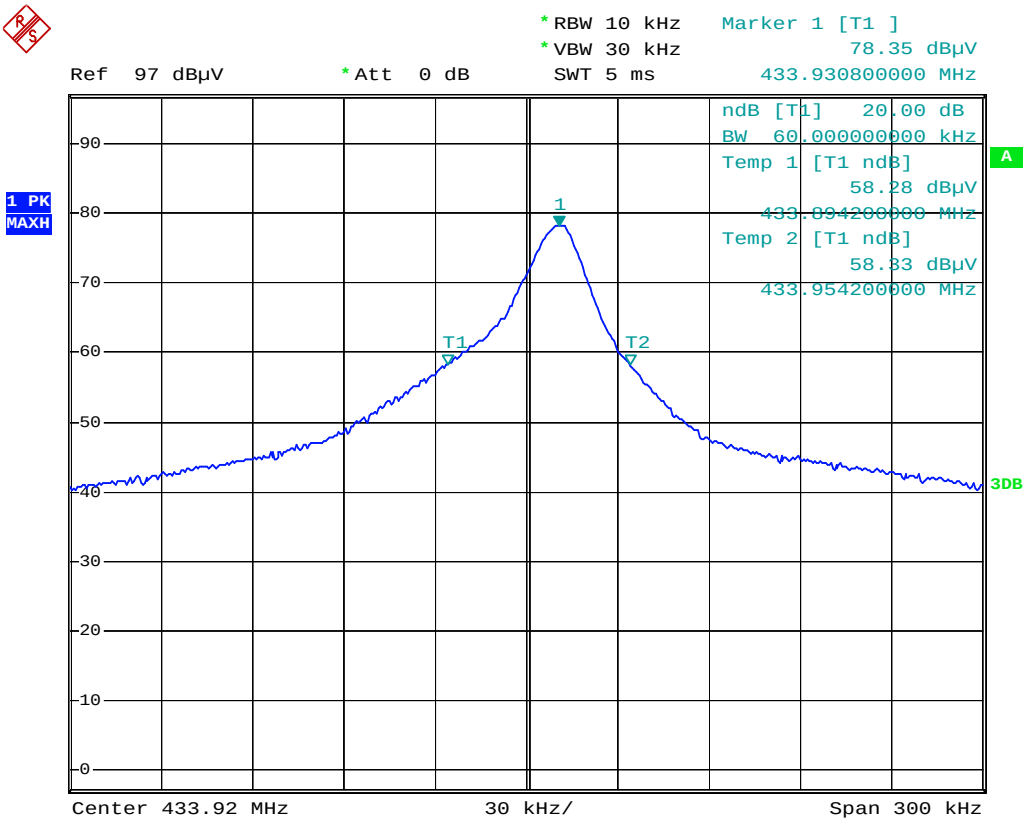
5.1 Limits

According to FCC 15.231(c) requirement:
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 MHz to 900 MHz. Those devices operating above 900 MHz, the emission spurious shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
B.W (20dBc) Limit = 0.25% * f(MHz) = 0.25% * 433.92MHz = 1084.8kHz

5.2 Test Result

PASS.
The final test data is shown as following.

Channel Frequency (MHz)	Measured 20dB Bandwidth (kHz)	Limit (kHz)	Result
433.92	60	1084.8	PASS



6 99% Occupied Bandwidth

6.1 Limits

According to RSS-210 Annex 1 requirement:
The 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the centre frequency.
99% OBW Limit = 0.25% * f(MHz) = 0.25% * 433.92MHz = 1084.8kHz

6.2 Test Result

PASS.
The final test data is shown as following.

Channel Frequency (MHz)	Measured 99% Bandwidth (kHz)	Limit (kHz)	Result
433.92	84	1084.8	PASS