

FCC Test Report

Application No.: HKEM1901000011AT
Applicant: ECOLAB INC.
Address: 650 Lone Oak Drive, Ecolab Schuman Center, Eagan Minnesota 55121
FCC ID: Z9O-92053070
Product Description: NEXA HHCM 915 Touch Free Dispenser Beacon
Model No.: 92053070
Country of Origin China
Country of Destination: United States of America
Requirement: CFR 47 FCC PART 15 SUBPART C, 2018
- Intentional Radiators (Section 15.249)
Date of Receipt: 2019-03-01
Date of Test: 2019-03-19
Date of Issue: 2019-03-19

Test Result :	PASS*
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In the configuration tested, the EUT complied with the requirements for the relevant clauses of Federal Communications Commission Rules as specified above.

Authorized Signature:



Ivan Toa
EMC Manager

The manufacturer should ensure that all products in series production are in conformity with the products sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Test Summary

Test	Test Requirement	Test Method	Result
Radiated Emission (9kHz to 1GHz)	FCC PART 15 C section 15.249 (a) section 15.249 (d)	ANSI C63.10: Clause 6.4, 6.5	PASS
Radiated Emission above 1 GHz	FCC PART 15 C section 15.249 (d)	ANSI C63.10: Clause 6.6	PASS
Restricted-band band-edge measurements (Radiated Emission)	FCC PART 15 C section 15.249 (d)	ANSI C63.10: Clause 6.4, 6.5	PASS
20dB bandwidth	FCC PART 15 C section 15.215(c)	ANSI C63.10: Clause 6.9.1	PASS

Remark: ANSI C63.10 version is ANSI C63.10:2013

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4 General Information

4.1 General Description of EUT

Product Description: HHCM 915 Nexa TF Beacon
Model No.: 92053070

4.2 Details of EUT

Power Supply: DC 3V ("AA" size battery x 2 pcs)
Operating Frequency 917 MHz
Antenna Type Integral antenna
Antenna gain: -1.96dBi
Modulation Type: ASK
Channel configuration method:
Insert batteries to enter test mode.

4.3 Conditions of EUT

Good condition

4.4 Description of Support Units

All field strength measures in this test report were done by the sample which set the frequency fixed with continuous transmission

4.5 Standards Applicable for Testing

CFR 47, FCC Part 15, 2018
ANSI C63.10:2013

4.6 Test Location

All tests were performed at:
SGS IECC Limited (Member of the SGS Group (SGS SA))
16-B, Yip Wo Street, On Lok Cheun, Fanling, Hong Kong.
Tel: +852 2305 2570 Fax: +852 2756 4480
No tests were sub-contracted

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4.7 Test Facility

The test facility is recognized or accredited by the following organizations:

- **HOKLAS (Lab Code: 125)**

SGS IECC Limited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2005 and it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **FCC Recognized Accredited Test Firm (CAB Registration No.: 446297)**

SGS IECC Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0010, Test Firm Registration Number: 446297.

- **Industry Canada (Site Registration No.: 5193A; CAB Identifier No.: HK0001)**

SGS IECC Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0001, Site Registration Number: 5193A.

4.8 Deviation from Standards

None.

4.9 Abnormalities from Standard Conditions

None.

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4.10 Declaration of Family Grouping

None.

4.11 Abbreviations

N/A: Not Applicable

EUT: Equipment Under Test

4.12 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radiated disturbance 9 kHz - 30MHz	±4.09
2	Radiated disturbance 30MHz – 1GHz	±5.26
3	Radiated disturbance 1GHz – 18GHz	±5.11

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5 Equipments Used during Test

Equipment	Manufacturer	Model / Serial No.	Cal. Due Date
EMI Test Receiver 9kHz to 3.6GHz	Rohde & Schwarz	ESR3 / 102326	2019/08/12
Antenna	Schaffner	CBL6111C / 2791	2019/10/26
Loop Antenna	Rohde & Schwarz	HFH2-Z2 / 871336/48	2020/12/03
Antenna	Schwarzbeck	BBA9106 / TE039A	2020/01/29
Antenna	Schwarzbeck	UHALP9107 / TE039B	2020/01/29
Millivoltmeter	Rohde & Schwarz	URV5 / 846254/013	2019/09/24
100V insertion Unit	Rohde & Schwarz	URV5-Z4 / 100138	2019/09/24
Amplifier	TESEQ	CBAIG-070 / T43859	--
Antenna Mast System	Schwarzbeck	AM9104 / -	--
Turntable with Controller	Drehtisch	DT312 / -	--
Spectrum Analyzer	Rohde & Schwarz	FSP30 / 101474	2019/05/22
Horn Antenna	Schwarzbeck	BBHA9120D / 9120D-1070	2020/01/29
Horn Antenna	Schwarzbeck	BBHA9170 / 9170-492	2019/10/16
Preamplifier	Schwarzbeck	BBV9718 / 9718-223	2019/01/28
Preamplifier	Schwarzbeck	BBV9719 / 9719-019	2019/12/20
Highpass Filter	Wainwright	WHNX3.5/26.5G-6SS / nil	2019/12/18
Band Reject Filter	Wainwright	WRCJV 2400/2500-2100/2800-40/3SS / nil	2019/12/18
RF cable	HUBER+SUHNER	SF104-26.5/2	2019/12/26

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6 Test Results

6.1 Radiated Emissions, 9kHz to 1GHz

Test Requirement: FCC Part15 Subpart C Section 15.209 and 15.249(d)
Test Method: ANSI C63.10
Test Date: 2019-03-19
Frequency Range: The lowest frequency generated by EUT, 12MHz to 1GHz
Measurement Distance: 3m
Detector: Peak for pre-scan
(200Hz resolution bandwidth and 1kHz video bandwidth for measurement between 9kHz – 150kHz)
(9kHz resolution bandwidth and 100kHz video bandwidth for measurement between 150kHz – 30MHz)
120kHz resolution bandwidth and 1MHz video bandwidth for measurement between 30MHz to 1GHz)
Quasi-Peak if maximised peak within 6dB of limit

Limit :

Frequency range MHz	Quasi-peak limits dB (µV/m)
0.009 – 0.490	-72.4 – 20logF(MHz)
0.490 – 1.705	-12.4 – 20logF(MHz)
1.705 – 30.0	-10.5
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960	54

Note: 1) At transitional frequencies the lower limit applies.
2) F is the frequency of the spurious emission measured in MHz.
3) Limit from 0.009 – 30 MHz is converted from measuring distance 300m or 30m to 3m with the formula provided in FCC Part 15, section 15.31(f)(2)

6.2.1 EUT Operation

Operating Environment:

Temperature: 24 °C Humidity: 57 %

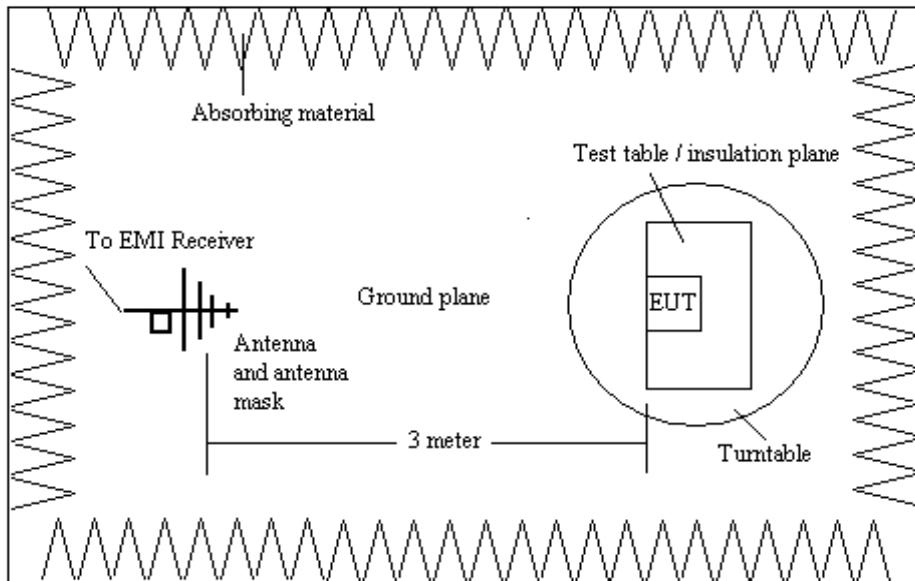
EUT Operation: Pre-test with Peak detector with the following mode(s):
1: Transmission in continuous transmitting mode

Final test with Quasi-Peak detector with the following mode(s):
1: Transmission in continuous transmitting mode

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6.2.2 Test Setup and Procedure



1. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. Test the EUT in the lowest channel, the middle channel, the Highest channel
8. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the Y axis positioning which it is worse case.
9. Repeat above procedures until all frequencies measured was complete.

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6.2.3 Measurement Data

Test results:**(1) Operation Frequency : 917 MHz**

Frequency (MHz)	Antenna Polarization	Correction Factor (dB/m)	Receiver QP Reading (dB μ V)	Emission Level (dB μ V/m)	Limit (dB μ V/m)	Over Limit (dB)
40.650	V	14.4	7.8	22.2	40	-17.8
70.880	H	11.3	6.5	17.8	40	-22.2
166.490	H	14.3	7.0	21.3	43.5	-22.2
243.620	H	12.7	7.8	20.5	46	-25.5
343.230	H	15.9	5.9	21.8	46	-24.2
528.430	H	20.0	6.4	26.4	46	-19.6

Note:

- 1) All readings are Quasi-Peak values.
- 2) Correction Factor = Antenna Factor + Cable Loss.
- 3) The above results were the worst case results with the EUT positioned in all 3 axis during the test. The EUT was positioned vertically and horizontally on the table for vertical and horizontal measurement respectively.
- 4) Other emissions more than 20dB below the limit are not shown on the above table and only worst six emissions below 1GHz are listed.

6.3 Radiated Emissions above 1 GHz

Test Requirement: FCC Part15 Subpart C Section 15.209 & 15.249(a) & (d)
Test Method: ANSI C63.10
Test Date: 2019-03-19
Frequency Range: 1GHz – 26GHz
Measurement Distance: 3m
Detector: Peak for pre-scan (1MHz resolution bandwidth, 1MHz video bandwidth)
Average and Peak detector for final test

Limit :

Fundamental Frequency :

Frequency range MHz	Limits (Peak) dB (μ V/m)	Limits (Average) dB (μ V/m)
917	114	94

Spurious Emission :

Frequency range MHz	Limits (Peak) dB (μ V/m)	Limits (Average) dB (μ V/m)
Over 1000	74	54

6.3.1 EUT Operation

Operating Environment:

Temperature: 24 °C Humidity: 57 %

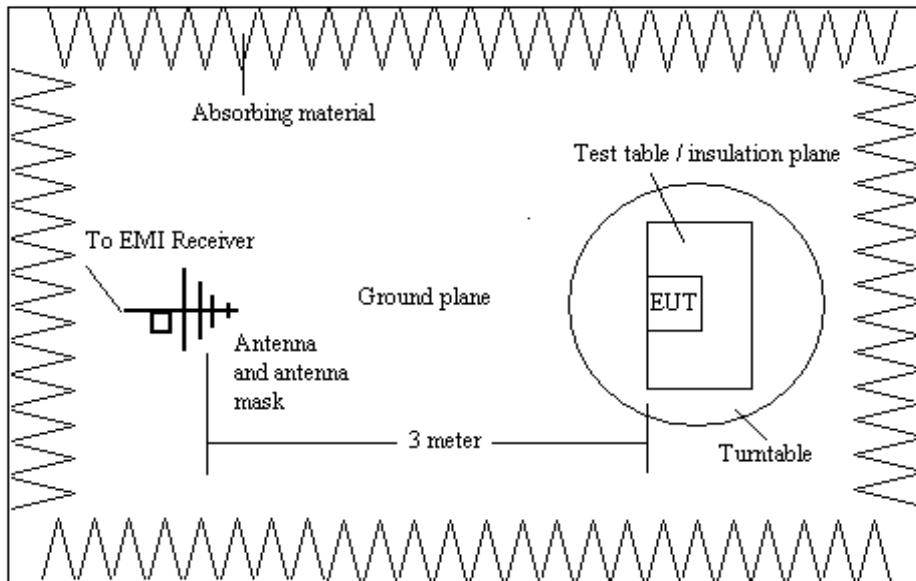
EUT Operation: Pre-test with Peak detector with the following mode(s):
1: Transmission in continuous transmitting mode

Final test with Peak and Average detector with the following mode(s):
1: Transmission in continuous transmitting mode

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6.3.2 Test Setup and Procedure



1. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. Test the EUT in the lowest channel, the middle channel, the Highest channel
8. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the Y axis positioning which it is worse case.
9. Repeat above procedures until all frequencies measured was complete.

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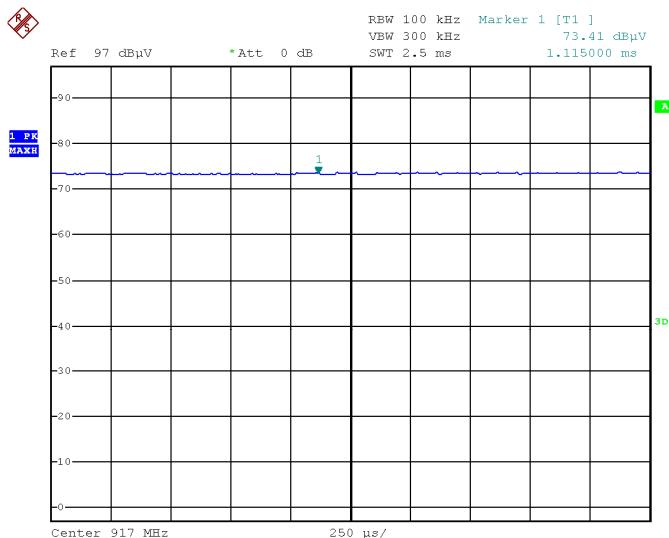
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6.3.3 Measurement Data

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. The EUT was measured with 3 orthogonal polarities and frequencies of average emissions from the EUT were measured as follows:

Emission at the fundamental frequency for the pulse modulated device was measured with the peak detector function of the test receiver and was properly adjusted for the duty cycle correction factor as pulse desensitization to calculate the average emission value.

Time Domain Plots (Fundamental frequency of Transmitter) :



Date: 1.MAR.2019 10:19:40

According to above plot , the duty cycle of the this device is 100%, plused operation according to C63.10 clause 7.5 is not employed and the average correction calculation is not applied on this report.

Hence, the average measurement is used below setting:

Dectector = peak

RBW = $\geq 1\text{MHz}$

VBW = $\geq 1\text{Hz}$

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Test results :**(1) Fundamental Frequency**

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
917	H	84.6	82.1	114	94	Pass
917	V	77.7	74.9	114	94	Pass

(2) Spurious Emission**Operation Frequency : 917 MHz**

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
1568	V	32.78	18.67	74	54	Pass
3668	H	42.06	34.25	74	54	Pass
5247	H	42.97	28.36	74	54	Pass
6171	H	43.67	28.99	74	54	Pass
7041	H	47.79	32.31	74	54	Pass
8103	H	49.93	34.93	74	54	Pass

Note:

- 1) The above results were the worst case results with the EUT positioned in all 3 axis during the test. The EUT was positioned vertically and horizontally on the table for vertical and horizontal measurement respectively.
- 2) Other emissions more than 20dB below the limit are not shown on the above table and only worst six emissions below 1GHz are listed.
- 3) There is not any other emission which falls in restricted bands which set out in Section 15.205 Restricted bands can be detected and reported.

6.4 Restricted-band band-edge measurements (Radiated Emission)

Test Requirement: FCC Part15 Subpart C Section 15.215, 15.249(d)
Test Method: ANSI C63.10
Measurement Distance: 3m
Detector: (1MHz resolution bandwidth, 3MHz video bandwidth)
Average and Peak detector
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 field strength limits listed in RSS-Gen, whichever is less stringent.

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test Date: 2019-03-19
EUT Operation: Transmission in continuous transmitting mode
Result: Pass

Test results :

Operation frequency : 917 MHz

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
902.0	V	44.1	31.1	74	54	Pass

Operation frequency : 917 MHz

Frequency (MHz)	Antenna Polarization	Emission Level (dB μ V/m)		Limit (dB μ V/m)		Remark
		Peak	Average	Peak	Average	
928.0	H	45.4	32.0	74	54	Pass

According to above bandedge measurement, emissions radiated outside of the specified frequency bands, (902-928)MHz except for harmonics, are below general field strength limits under 15.209 It is deemed to comply with section 15.215 and 15.249(d)

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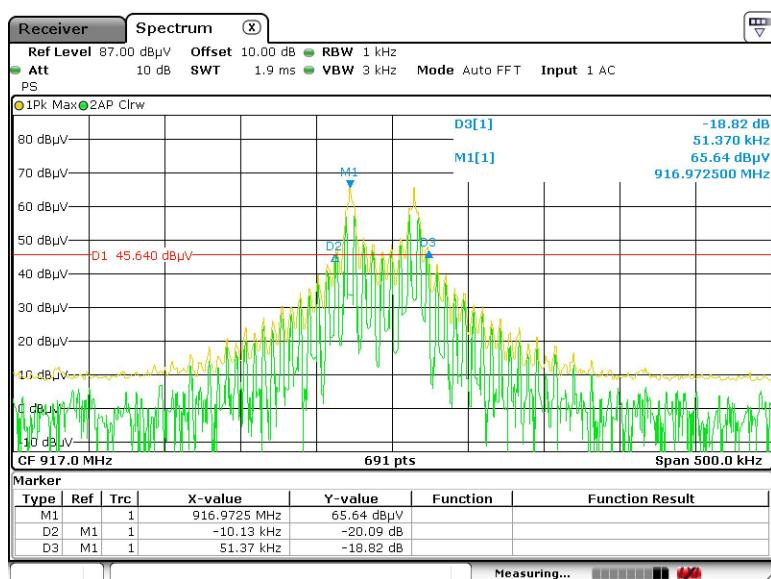
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

6.5 20 dB Bandwidth

Test Requirement: FCC Part15 Subpart C Section 15.215
 Test Method: ANSI C63.10:2013
 Test Date: 2019-03-19
 EUT Operation: 1: Transmission in continous transmitting mode
 Result: Pass

Test Plot : (Worst case:

Operation frequency : 917 MHz

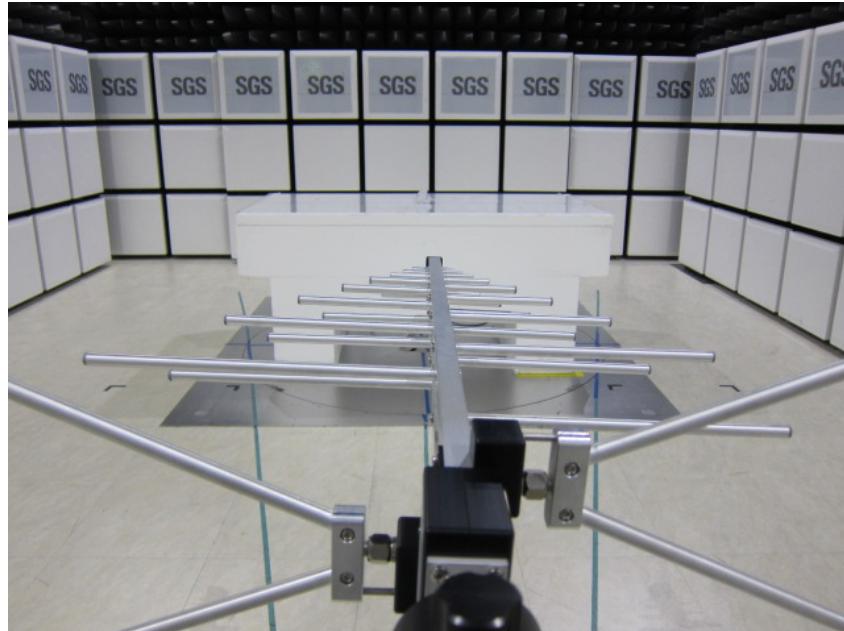


Remark 20dB Bandwidth: $D_3 - D_2 = 61.50$ kHz.

According to above plot, 20dB bandwidth falls in assigned band (902-928)MHz. It is deemed to comply with section 15.215

7 Photographs

7.1 Radiated Spurious Emission Test Setup



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8 EUT Constructional Details



--End of Report--

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