FCC Test Report

APPLICANT	:	Blackiehead LLC
EQUIPMENT	:	Smart Soap dispenser
MODEL NAME	:	G4N5E7
FCC ID	:	2AZGB-7679
STANDARD	:	47 CFR Part 15 Subpart B
CLASSIFICATION	:	Certification

The product was completed on Apr. 17, 2021. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

Alex wang

Approved by: Alex Wang / Manager

ACCREDITED
Cert #5145.02

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

TABLE OF CONTENTS

REVISION HISTORY **3**

SUMMARY OF TEST RESULT **4**

1. GENERAL DESCRIPTION **5**

1.1. Applicant 5
1.2. Product Feature of Equipment Under Test 5
1.3. Product Specification of Equipment Under Test 5
1.4. Modification of EUT 5
1.5. Test Location 6
1.6. Test Software 6
1.7. Applicable Standards 6

2. TEST CONFIGURATION OF EQUIPMENT UNDER TEST **7**

2.1. Test Mode 7
2.2. Connection Diagram of Test System 8
2.3. Support Unit used in test configuration and system 8

3. TEST RESULT **9**

3.1. Test of AC Conducted Emission Measurement 9
3.2. Test of Radiated Emission Measurement 13

4. LIST OF MEASURING EQUIPMENT **18**

5. UNCERTAINTY OF EVALUATION **19**

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC130109	Rev. 01	Initial issue of report	Apr. 29, 2021
FC130109	Rev. 02	Revised test report according to TCB comment.	May. 18, 2021

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.107	AC Conducted Emission	< 15.107 limits	PASS	Under limit 6.29 dB at 0.167 MHz
3.2	15.109	Radiated Emission	< 15.109 limits	PASS	Under limit 4.94 dB at 201.221 MHz for Quasi-Peak

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1. General Description

1.1. Applicant

Blackiehead LLC
321 S. Boston, Suite 300 Tulsa, OK 74103

1.2. Product Feature of Equipment Under Test

Product Feature	
Equipment	Smart Soap dispenser
Model Name	G4N5E7
FCC ID	2AZGB-7679
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/HT40 Bluetooth LE

1.3. Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	802.11b/g/n: 2400 MHz ~ 2483.5 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Rx Frequency	802.11b/g/n: 2400 MHz ~ 2483.5 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz
Antenna Type	WLAN : Fixed internal Antenna Bluetooth : Fixed internal Antenna
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth LE : GFSK

1.4. Modification of EUT

No modifications are made to the EUT during all test items.

1.5. Test Location

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	CO01-KS 03CH02-KS	CN1257	314309

1.6. Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH02-KS	Rohde&Schwarz	EMC32	10.60.0.0
2.	CO01-KS	Rohde&Schwarz	EMC32	10.60.0.0

1.7. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart B
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Test Configuration of Equipment Under Test

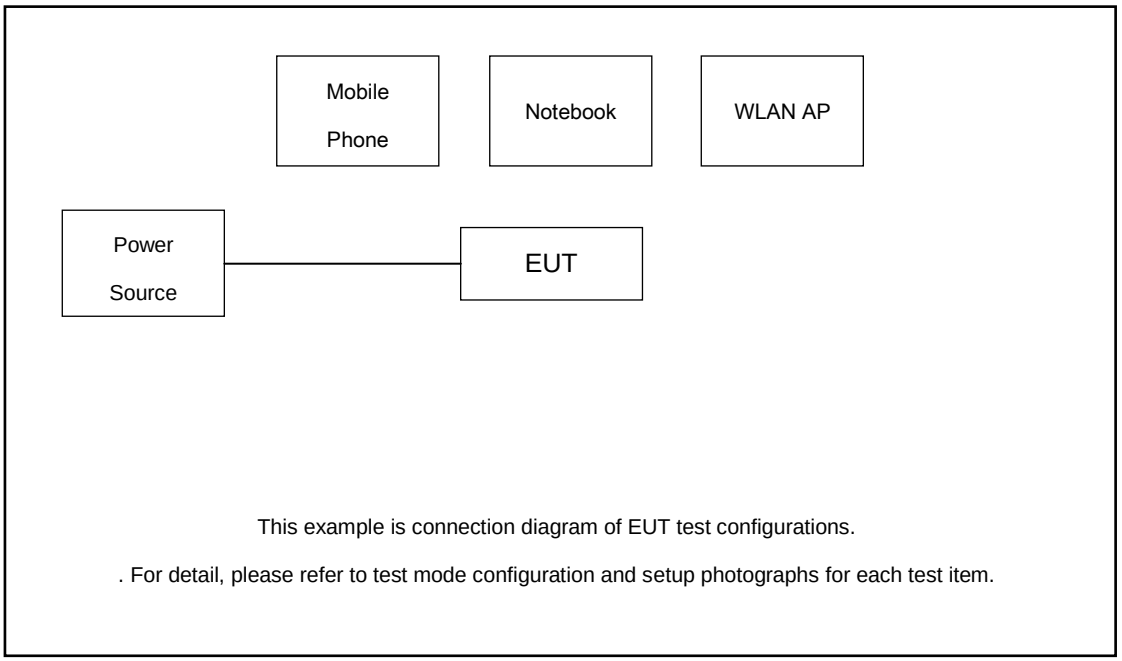
2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
AC Conducted Emission	Mode 1: Bluetooth Idle + USB Cable(charging from Adapter) + Battery 1 Mode 2: WLAN (2.4G) Idle + USB Cable(charging from Adapter) + Battery 1 Mode 3: Bluetooth Idle + USB Cable(charging from Adapter) + Battery 2
Radiated Emissions	Mode 1: Bluetooth Idle + USB Cable(charging from Adapter) + Battery 1 Mode 2: WLAN (2.4G) Idle + USB Cable(charging from Adapter) + Battery 1 Mode 3: Bluetooth Idle + USB Cable(charging from Adapter) + Battery 2
Remark: **1.** The worst case of AC is mode 3; only the test data of this mode is reported. **2.** The worst case of RE is mode 1; only the test data of this mode is reported.	

2.2. Connection Diagram of Test System



The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application

2.3. Support Unit used in test configuration and system

Item	Equipment	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
2.	Notebook	G480	QDS-BRCM1050I	N/A	AC I/P: Unshielded, 1.8 m DC O/P: Shielded, 1.8 m
3.	Phone	N/A	N/A	N/A	N/A
4.	Adapter	N/A	N/A	N/A	N/A

3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

<Class B Limit>

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

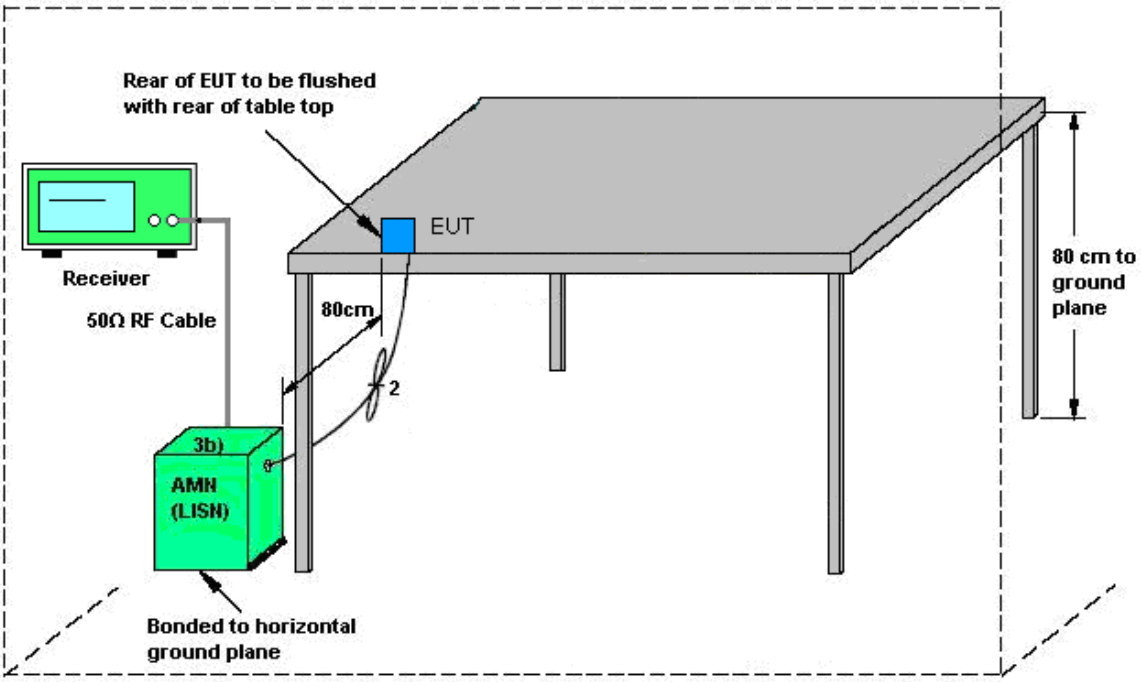
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

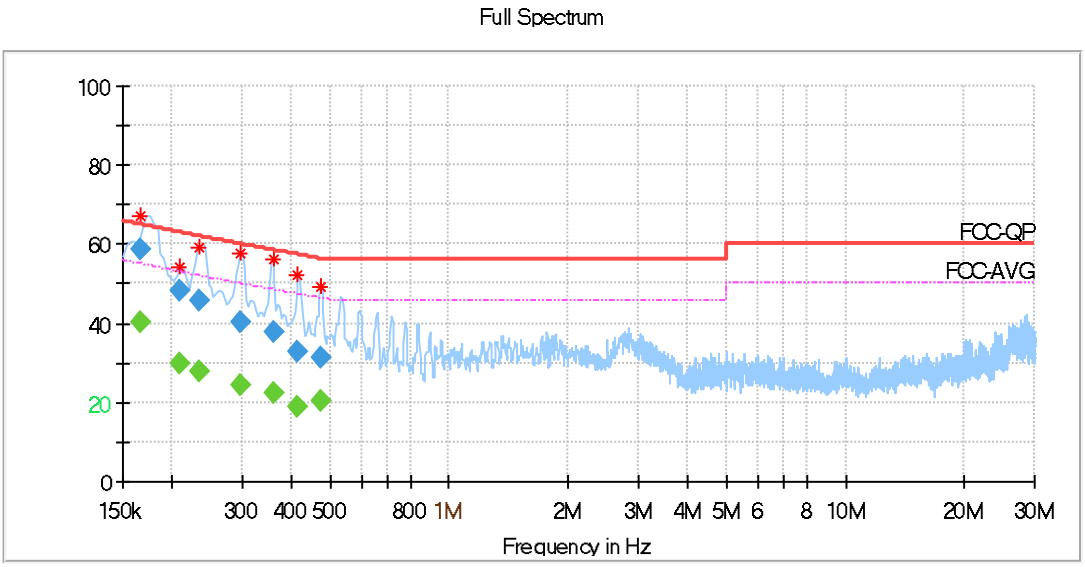
3.1.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.1.5 Test Result of AC Conducted Emission

Test Engineer :	Eko Guan	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

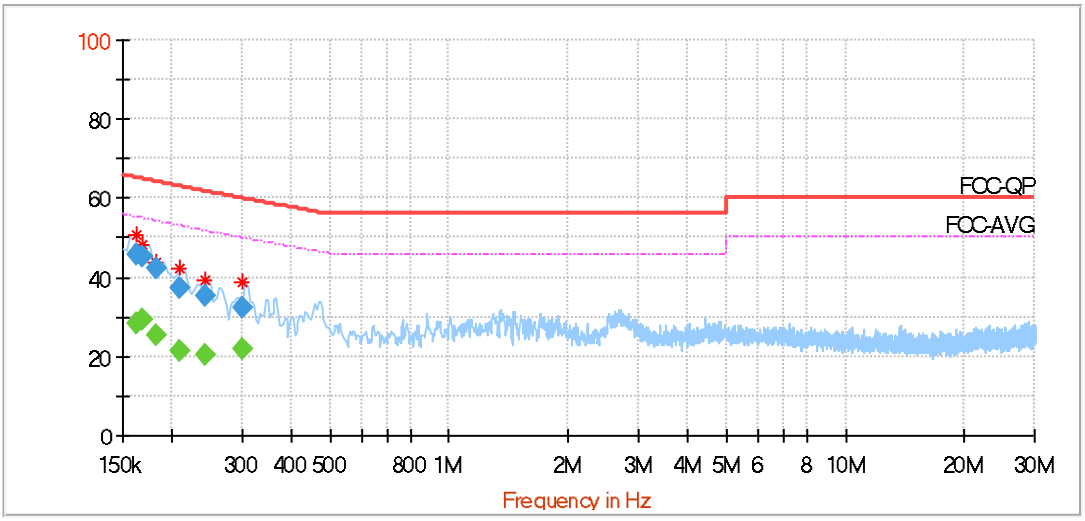


Final Result:

Frequency (MHz)	Quasi Peak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.167119	58.74	---	65.03	6.29	L1	OFF	20.0
0.167119	---	40.10	55.02	14.92	L1	OFF	20.0
0.208931	48.35	---	63.08	14.73	L1	OFF	20.0
0.208931	---	29.99	53.05	23.06	L1	OFF	20.0
0.234281	45.66	---	62.10	16.45	L1	OFF	19.9
0.234281	---	27.96	52.07	24.11	L1	OFF	19.9
0.297000	40.54	---	60.13	19.59	L1	OFF	19.9
0.297000	---	24.28	50.09	25.81	L1	OFF	19.9
0.358950	37.62	---	58.59	20.97	L1	OFF	19.9
0.358950	---	22.50	48.56	26.06	L1	OFF	19.9
0.414150	32.98	---	57.46	24.48	L1	OFF	19.9
0.414150	---	18.87	47.44	28.57	L1	OFF	19.9
0.472369	31.14	---	56.44	25.30	L1	OFF	19.8
0.472369	---	20.37	46.43	26.06	L1	OFF	19.8

Test Engineer :	Eko Guan	**Temperature :**	25.3~26.2℃
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

Full Spectrum



Final Result

Frequency (MHz)	Quasi Peak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.161962	45.68	---	65.31	19.63	N	OFF	20.2
0.161962	---	28.57	55.30	26.73	N	OFF	20.2
0.167888	45.42	---	64.99	19.58	N	OFF	20.2
0.167888	---	29.21	54.98	25.77	N	OFF	20.2
0.182812	42.08	---	64.24	22.16	N	OFF	20.2
0.182812	---	25.42	54.22	28.80	N	OFF	20.2
0.208931	37.10	---	63.08	25.99	N	OFF	20.2
0.208931	---	21.58	53.05	31.46	N	OFF	20.2
0.242512	35.31	---	61.81	26.50	N	OFF	20.1
0.242512	---	20.56	51.77	31.22	N	OFF	20.1
0.302212	32.15	---	59.98	27.84	N	OFF	20.0
0.302212	---	21.77	49.94	28.17	N	OFF	20.0

3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B Limit>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

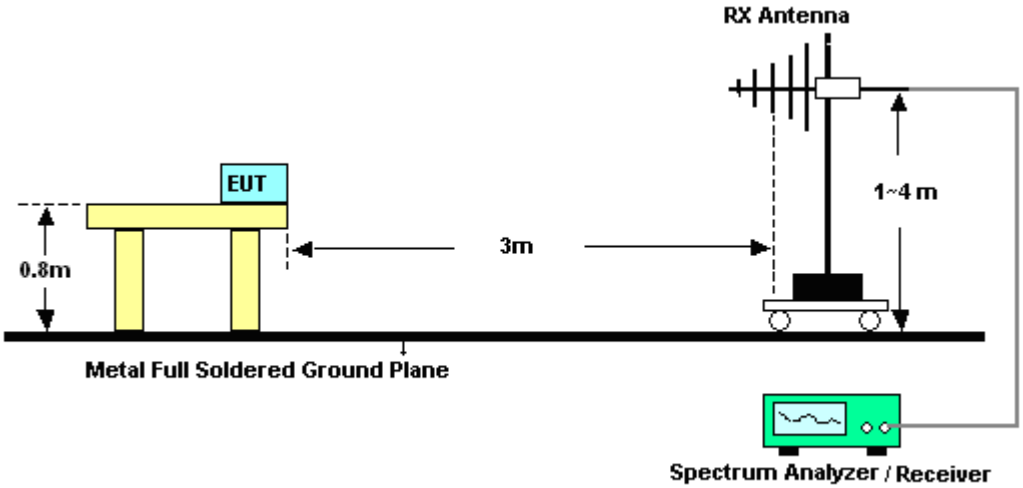
The measuring equipment is listed in the section 4 of this test report.

3.2.3. Test Procedures

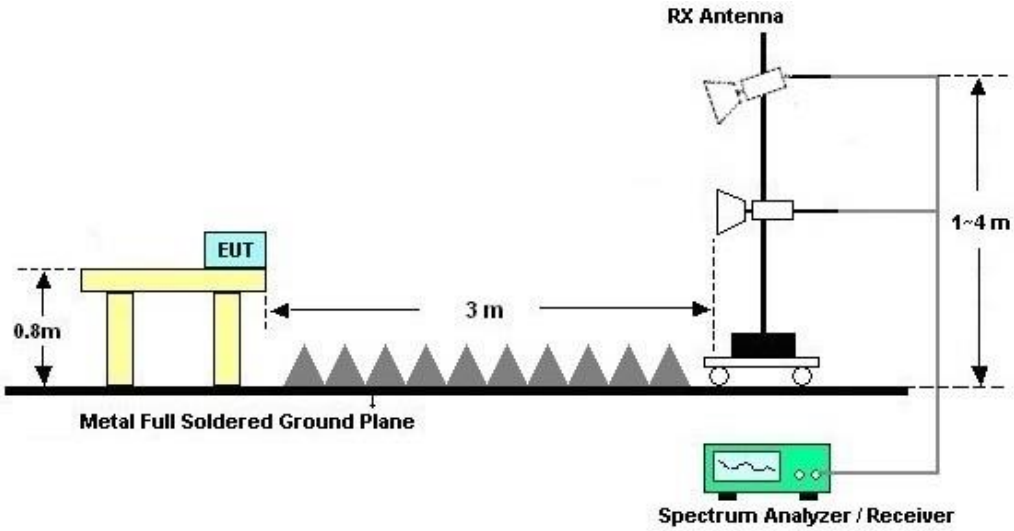
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss - Preamp Factor

3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



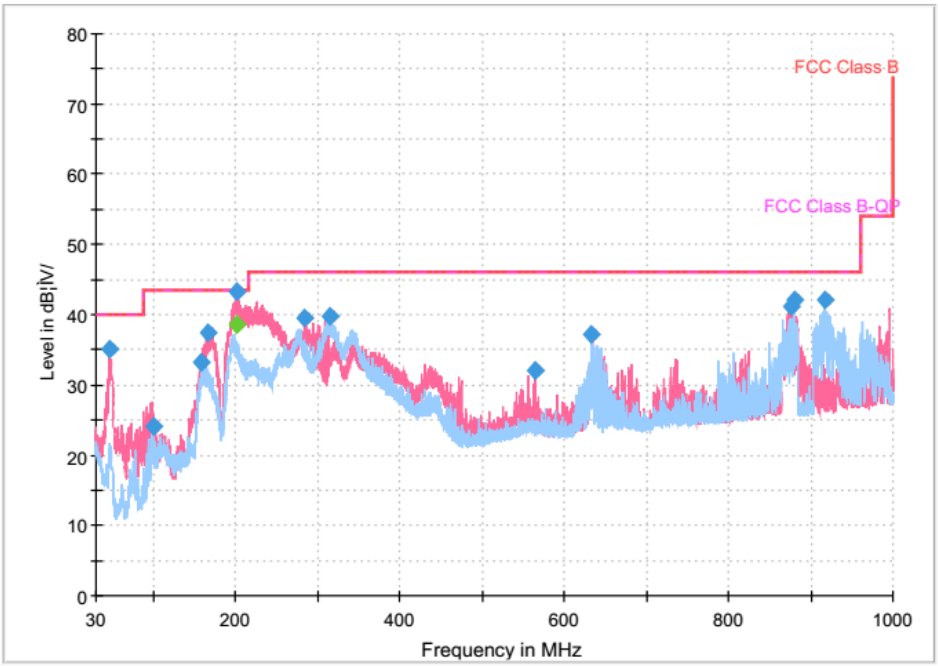
For radiated emissions above 1GHz



3.2.5. Test Result of Radiated Emission

Test Engineer :	Cable Li	**Temperature :**	21~22°C
		Relative Humidity :	41~42%
Test Distance :	3m	**Frequency :**	30 MHz ~ 1000 MHz

Full Spectrum

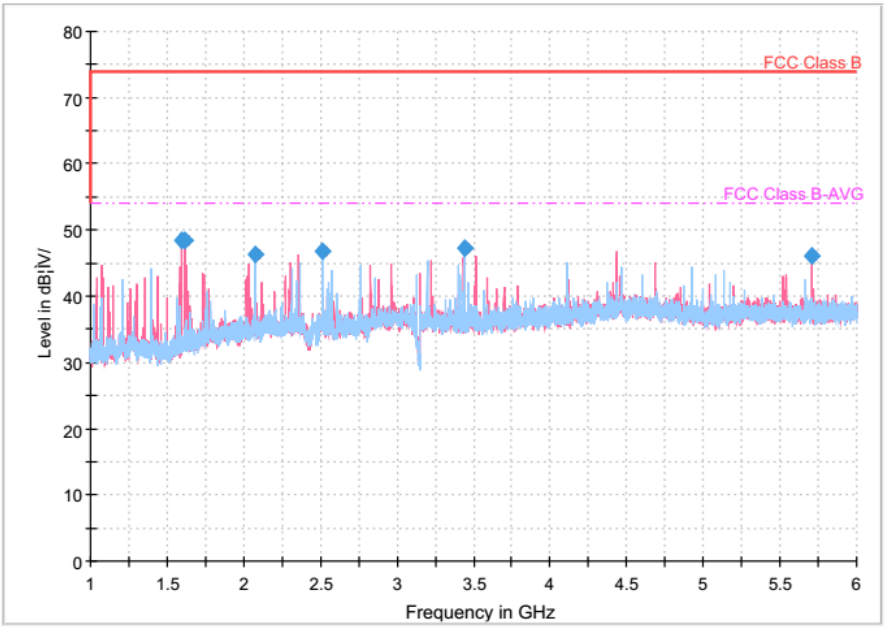


Frequency	Peak	Quasi Peak	Limit	Margin	Height	Pol	Azimuth	Corr.
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm		deg	dB/m
100.109444	24.04	---	43.50	19.46	200.0	H	4.0	-14.1
158.632778	33.23	---	43.50	10.27	300.0	H	69.0	-14.6
314.802778	39.67	---	46.00	6.33	100.0	H	76.0	-10.5
633.555556	37.23	---	46.00	8.77	100.0	H	92.0	-4.0
881.175000	42.01	---	46.00	3.99	100.0	H	230.0	-1.0
916.957222	42.14	---	46.00	3.86	100.0	H	230.0	-0.3
46.651667	35.06	---	40.00	4.94	100.0	V	17.0	-16.5
166.931667	37.45	---	43.50	6.05	100.0	V	231.0	-14.7
201.220556	---	38.56	43.50	4.94	100.0	V	7.0	-15.0
283.708889	39.47	---	46.00	6.53	300.0	V	223.0	-11.2
564.470000	31.98	---	46.00	14.02	100.0	V	290.0	-4.4
876.055556	41.22	---	46.00	4.78	100.0	V	331.0	-1.0

Note: Blue trace is Horizontal polarity and Red trace is Vertical polarity.

Test Engineer :	Cable Li	**Temperature :**	21~22°C
		Relative Humidity :	41~42%
Test Distance :	3m	**Frequency :**	1000 MHz ~ 6000 MHz

Full Spectrum

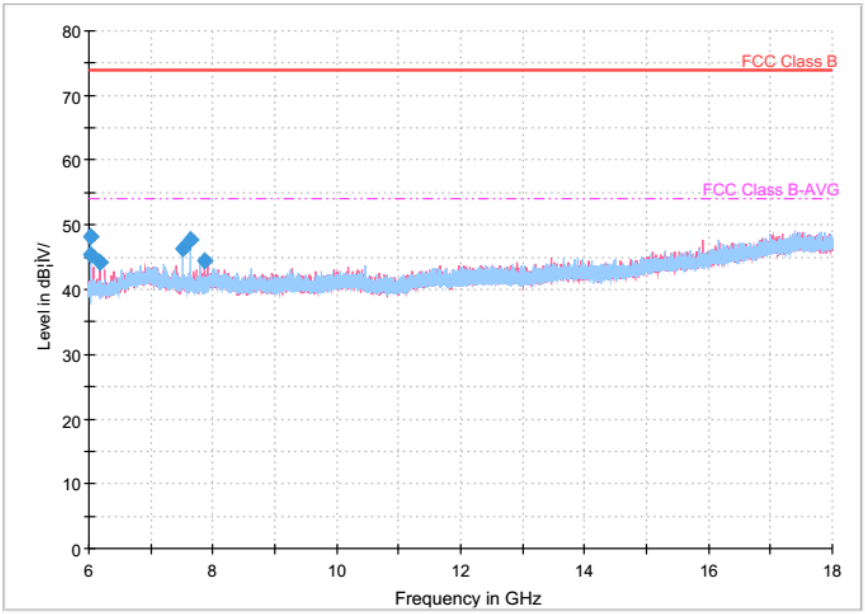


Frequency	Peak	Average	Limit	Margin	Height	Pol	Azimuth	Corr.
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm		deg	dB/m
2078.000000	46.31	---	74.00	27.69	100.0	H	114.0	-23.8
2513.000000	46.79	---	74.00	27.21	100.0	H	272.0	-22.3
3442.500000	47.29	---	74.00	26.71	200.0	H	277.0	-20.1
1599.000000	48.37	---	74.00	25.63	100.0	V	349.0	-27.7
1617.000000	48.43	---	74.00	25.57	100.0	V	346.0	-27.4
5712.000000	45.99	---	74.00	28.01	100.0	V	346.0	-15.5

Note: Blue trace is Horizontal polarity and Red trace is Vertical polarity.

Test Engineer :	Cable Li	**Temperature :**	21~22°C
		Relative Humidity :	41~42%
Test Distance :	3m	**Frequency :**	6000 MHz ~ 18000 MHz

Full Spectrum



Frequency	Peak	Average	Limit	Margin	Height	Pol	Azimuth	Corr.
MHz	dBµV/m	dBµV/m	dBµV/m	dB	cm		deg	dB/m
6034.200000	48.08	---	74.00	25.92	100.0	H	210.0	-14.7
7510.800000	46.32	---	74.00	27.68	100.0	H	205.0	-12.5
7630.200000	47.67	---	74.00	26.33	100.0	H	210.0	-12.5
6022.200000	45.27	---	74.00	28.73	200.0	V	59.0	-14.7
6178.800000	44.20	---	74.00	29.80	100.0	V	322.0	-14.3
7864.800000	44.33	---	74.00	29.67	200.0	V	278.0	-12.4

Note: Blue trace is Horizontal polarity and Red trace is Vertical polarity.

4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Oct. 17, 2020	Apr. 17, 2021	Oct. 16, 2021	Radiation (03CH02-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55370528	10Hz-44G,MAX 30dB	Oct. 17, 2020	Apr. 17, 2021	Oct. 16, 2021	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Jan. 26, 2021	Apr. 17, 2021	Jan. 25, 2022	Radiation (03CH02-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Nov. 01, 2020	Apr. 17, 2021	Oct. 31, 2021	Radiation (03CH02-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 06, 2020	Apr. 17, 2021	Nov. 05, 2021	Radiation (03CH02-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 06, 2021	Apr. 17, 2021	Jan. 05, 2022	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 06, 2021	Apr. 17, 2021	Jan. 05, 2022	Radiation (03CH02-KS)
Amplifier	Keysight	83017A	MY53270316	500MHz~26.5GHz	Oct. 17, 2020	Apr. 17, 2021	Oct. 16, 2021	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Apr. 17, 2021	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Apr. 17, 2021	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Apr. 17, 2021	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 14, 2020	Apr. 02, 2021	Apr. 13, 2021	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 17, 2020	Apr. 02, 2021	Oct. 16, 2021	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Oct. 17, 2020	Apr. 02, 2021	Oct. 16, 2021	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000081	AC 0V~300V, 45Hz~1000Hz	Oct. 17, 2020	Apr. 02, 2021	Oct. 16, 2021	Conduction (CO01-KS)

NCR: No Calibration Required

5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.9dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.9dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0dB**