



TESTING LABORATORY
CERTIFICATE #4820.01



FCC PART 15 B TEST REPORT

For

freeVoice AG

Industriestrasse 4a CH-8604 Volketswil Switzerland

FCC ID: 2APKR-FBT650B

Report Type: Original Report	Product Type: freeVoice Space Bluetooth Headset
Report Number:	RXM190125055-00A
Report Date:	2019-05-15
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

EUT Name:	freeVoice Space Bluetooth Headset
EUT Model:	FBT650B
Multiple Models:	9605 BT, ZUMBTP-400
Highest Operation Frequency:	2480 MHz
Rated Input Voltage:	DC3.7V from Battery
External Dimension:	176mm(L)*134mm(W)*57 mm(H)
Serial Number:	190125055
EUT Received Date:	2019.03.13

Note: The series products models 9605 BT, ZUMBTP-400 are electrically identical with FBT650B, we selected FBT650B for fully testing, the details of the difference between them were explained in the attached declaration letter.

Objective

This test report is prepared on behalf of *freeVoice* AG in accordance with Part 2, Subpart J, and Part 15-Subparts A and B of the Federal Communications Commission's rules.

The objective of the manufacturer is to determine the compliance of EUT with FCC Part 15 B Class B.

Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID: 2APKR-FBT650B.
Part of system submissions with FCC ID: 2APKR-FCT170.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Unwanted Emissions, radiated	30M~200MHz: 4.55 dB, 200M~1GHz: 5.92 dB, 1G~6GHz: 4.98 dB, 6G~18GHz: 5.89 dB, 18G~26.5G: 5.47 dB, 26.5G~40G: 5.63 dB
Temperature	±1 °C
Humidity	±5%
AC Power Lines Conducted Emission	3.12 dB (150 kHz to 30 MHz)

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in charging and music playing mode.

EUT Exercise Software

No software was used during testing.

Equipment Modifications

No modification was made to the EUT tested.

Local Support Equipment List and Details

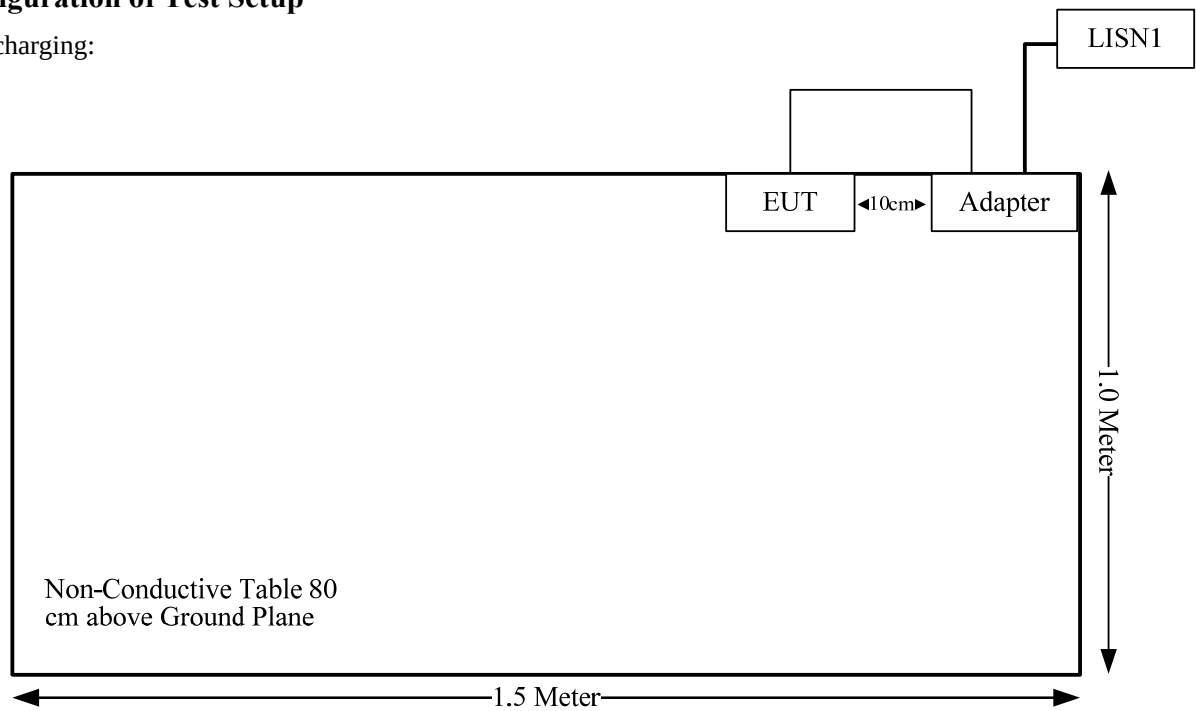
Manufacturer	Description	Model	Serial Number
Mobistel	Adapter	HJ-0501000B3	/
Huawei	Mobile phone	Mate 20	HJS0219220000121

Support Cable List and Details

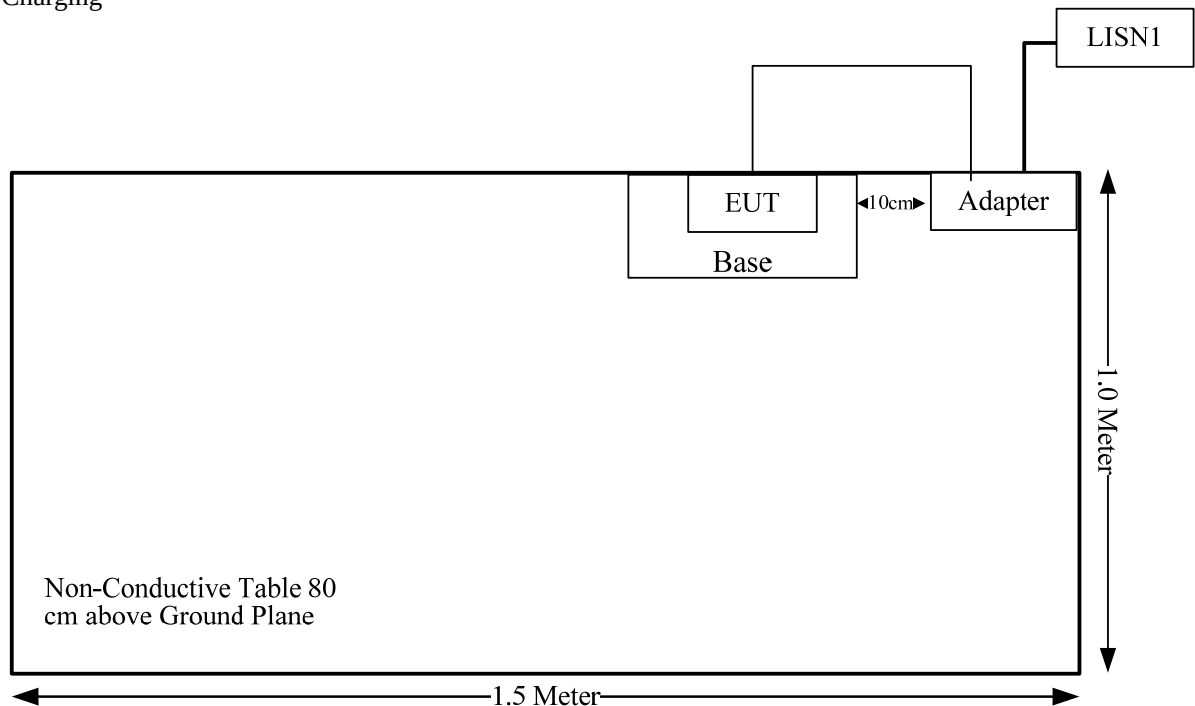
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Adapter Cable	No	No	1.5	Adapter or Base	EUT

Configuration of Test Setup

USB charging:



Base Charging

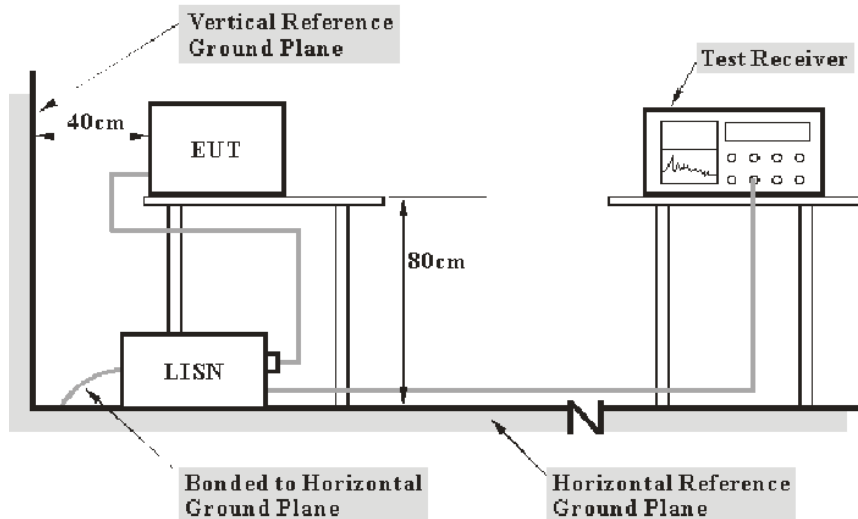


SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	Conducted Emissions	Compliance
§15.109	Radiated Emissions	Compliance

FCC§15.107 - CONDUCTED EMISSIONS

EUT Setup



Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15 B Class B limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The adapter was connected to the Main LISN with 120V/60Hz AC power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	101121	2019-03-23	2020-03-23
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-01	2018-09-05	2019-09-05
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A
R&S	Two-line V-network	ENV 216	101614	2018-12-10	2019-12-10
R&S	L.I.S.N	ESH2-Z5	892107/021	2018-09-19	2019-09-19

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed traceable to National Primary Standards and International System of Units (SI).

Test Procedure

During the conducted emission test, the adapter of laptop was connected to the outlet of the first LISN and the other support equipments were connected to the outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

V_C : corrected voltage amplitude

V_R : reading voltage amplitude

A_C : attenuation caused by cable loss

VDF : voltage division factor of AMN or ISN

The “**Margin**” column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15 B Class B.

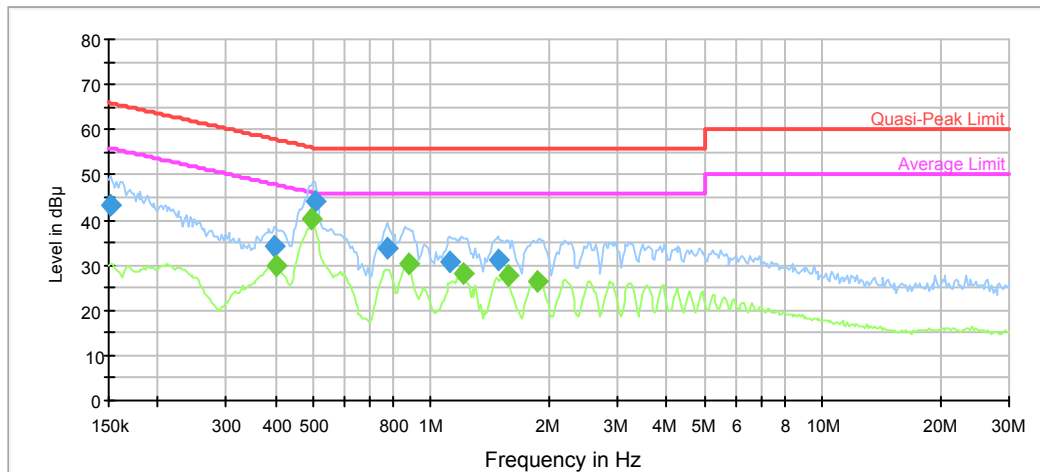
Test Data**Environmental Conditions**

Temperature:	25.2 °C
Relative Humidity:	59 %
ATM Pressure:	101.1 kPa

The testing was performed by Lucy Lu on 2019-05-09

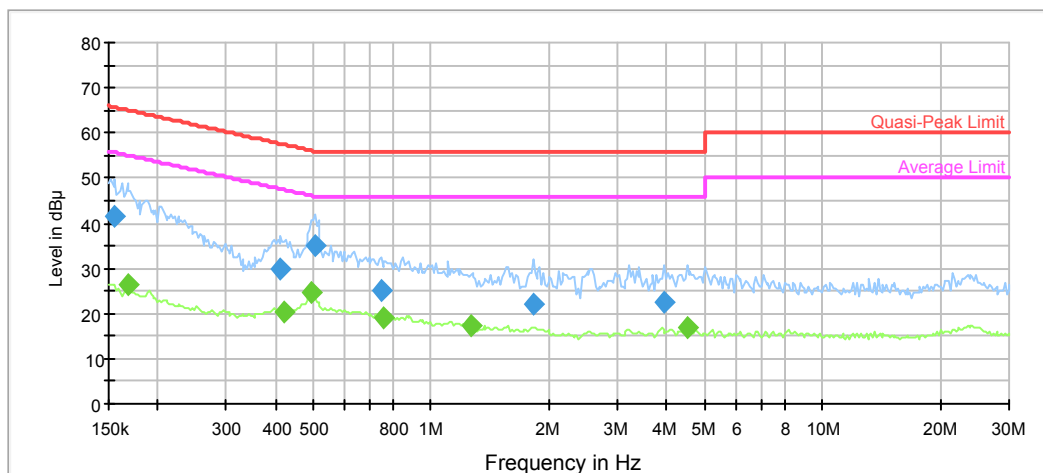
Test Mode: USB Charging and music playing

AC120V, 60Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.151500	43.1	9.000	L1	11.2	22.8	65.9
0.397728	34.2	9.000	L1	10.0	23.7	57.9
0.505009	44.2	9.000	L1	9.9	11.8	56.0
0.774673	33.6	9.000	L1	9.8	22.4	56.0
1.119461	30.5	9.000	L1	9.8	25.5	56.0
1.479134	31.1	9.000	L1	9.8	24.9	56.0

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.401705	29.9	9.000	L1	10.0	17.9	47.8
0.495058	40.1	9.000	L1	9.9	6.0	46.1
0.872921	30.4	9.000	L1	9.8	15.6	46.0
1.212216	27.9	9.000	L1	9.8	18.1	46.0
1.570131	27.6	9.000	L1	9.7	18.4	46.0
1.878108	26.6	9.000	L1	9.7	19.4	46.0

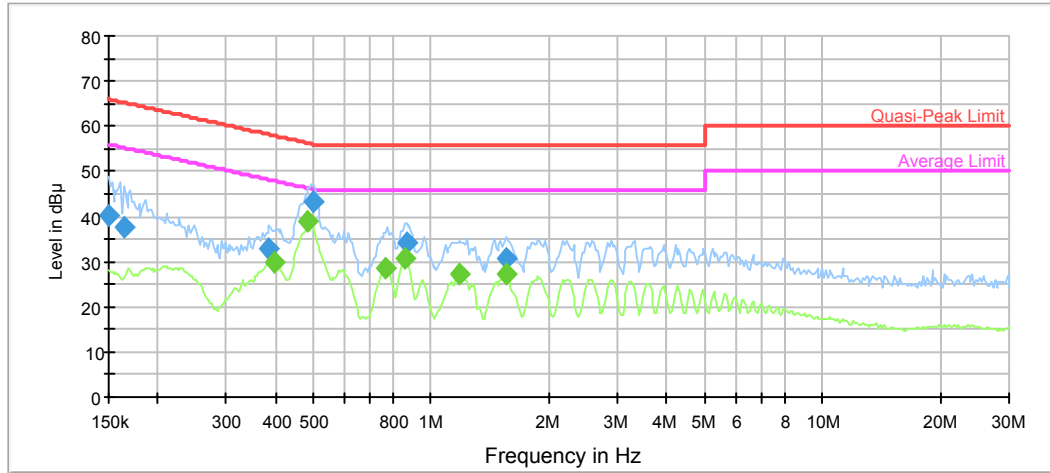
AC120V, 60Hz, Neutral:

Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.156091	41.4	9.000	N	11.1	24.3	65.7
0.413877	30.0	9.000	N	9.9	27.6	57.6
0.505009	35.1	9.000	N	9.9	20.9	56.0
0.744445	25.0	9.000	N	9.8	31.0	56.0
1.822873	22.1	9.000	N	9.8	33.9	56.0
3.961170	22.7	9.000	N	9.8	33.3	56.0

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.167350	26.2	9.000	N	10.9	28.9	55.1
0.422196	20.5	9.000	N	9.9	26.9	47.4
0.495058	24.6	9.000	N	9.9	21.5	46.1
0.759409	19.1	9.000	N	9.8	26.9	46.0
1.261437	17.5	9.000	N	9.8	28.5	46.0
4.508181	16.8	9.000	N	9.8	29.2	46.0

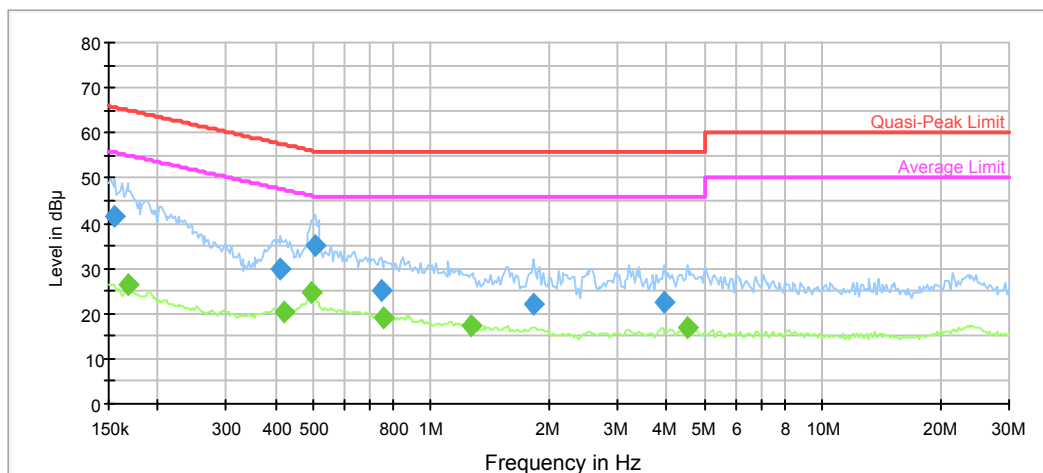
Test Mode: Base Charging and music playing

AC120V, 60Hz, Line:



Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	40.0	9.000	L1	11.2	26.0	66.0
0.164053	37.8	9.000	L1	11.0	27.5	65.3
0.386031	32.9	9.000	L1	10.0	25.2	58.1
0.500009	43.4	9.000	L1	9.9	12.6	56.0
0.864278	34.2	9.000	L1	9.8	21.8	56.0
1.554585	30.8	9.000	L1	9.7	25.2	56.0

Frequency (MHz)	Average (dBμV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.397728	29.8	9.000	L1	10.0	18.1	47.9
0.485304	39.0	9.000	L1	9.9	7.2	46.2
0.767003	28.6	9.000	L1	9.8	17.4	46.0
0.855721	30.6	9.000	L1	9.8	15.4	46.0
1.188331	27.2	9.000	L1	9.8	18.8	46.0
1.554585	27.2	9.000	L1	9.7	18.8	46.0

AC120V, 60Hz, Neutral:

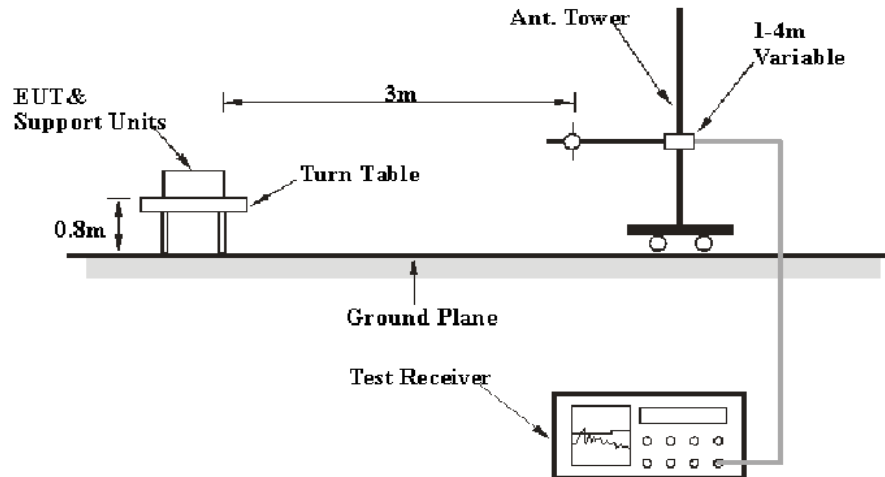
Frequency (MHz)	QuasiPeak (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.150000	41.7	9.000	N	11.2	24.3	66.0
0.401705	29.6	9.000	N	10.0	28.2	57.8
0.510059	34.1	9.000	N	9.9	21.9	56.0
0.751890	25.0	9.000	N	9.8	31.0	56.0
3.214213	23.2	9.000	N	9.8	32.8	56.0
4.375596	22.9	9.000	N	9.8	33.1	56.0

Frequency (MHz)	Average (dB μ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.430682	20.6	9.000	N	9.9	26.6	47.2
0.495058	24.3	9.000	N	9.9	21.8	46.1
0.872921	18.8	9.000	N	9.8	27.2	46.0
1.274051	17.2	9.000	N	9.8	28.8	46.0
3.214213	16.3	9.000	N	9.8	29.7	46.0
4.508181	17.0	9.000	N	9.8	29.0	46.0

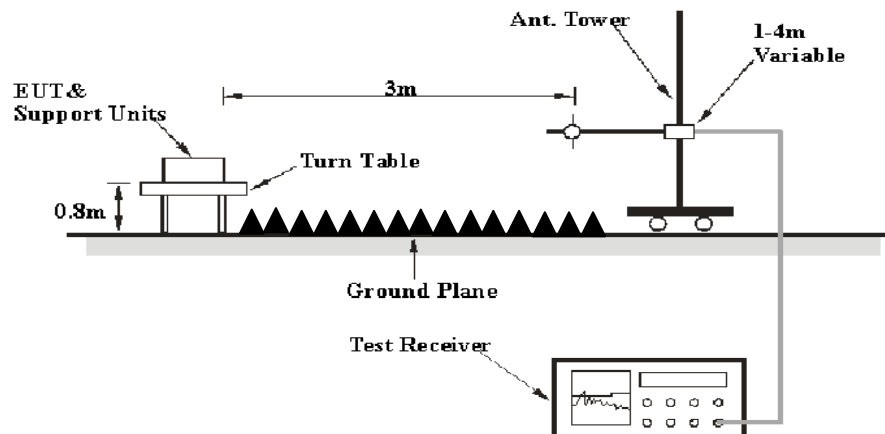
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber A test site for the range 30MHz to 1GHz and the 3 meters chamber test site A for above 1GHz, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 13.0 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1 MHz	Reduced VBW	/	AVG

If the maximized peak measured value complies with under the QP/Average limit more than 6dB, then it is unnecessary to perform an QP/Average measurement.

Test Procedure

During the radiated emissions, the adapter of laptop was connected to the first AC floor outlet and the other support equipments were connected to the second AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The data was recorded in the Quasi-peak detection mode for below 1 GHz, peak and average detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100035	2018-08-03	2019-08-03
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2018-09-05	2019-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2018-09-24	2019-09-24
HP	Amplifier	8447D	2727A05902	2018-09-05	2019-09-05
E-Microwave	Band-stop Filters	OBSF-2400-2483.5-S	OE01601525	2018/6/16	2019/6/16
Agilent	Spectrum Analyzer	E4440A	SG43360054	2019-01-04	2020-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2018-10-12	2021-10-12
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2018-09-05	2019-09-05
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2018-09-05	2019-09-05

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	100.7kPa

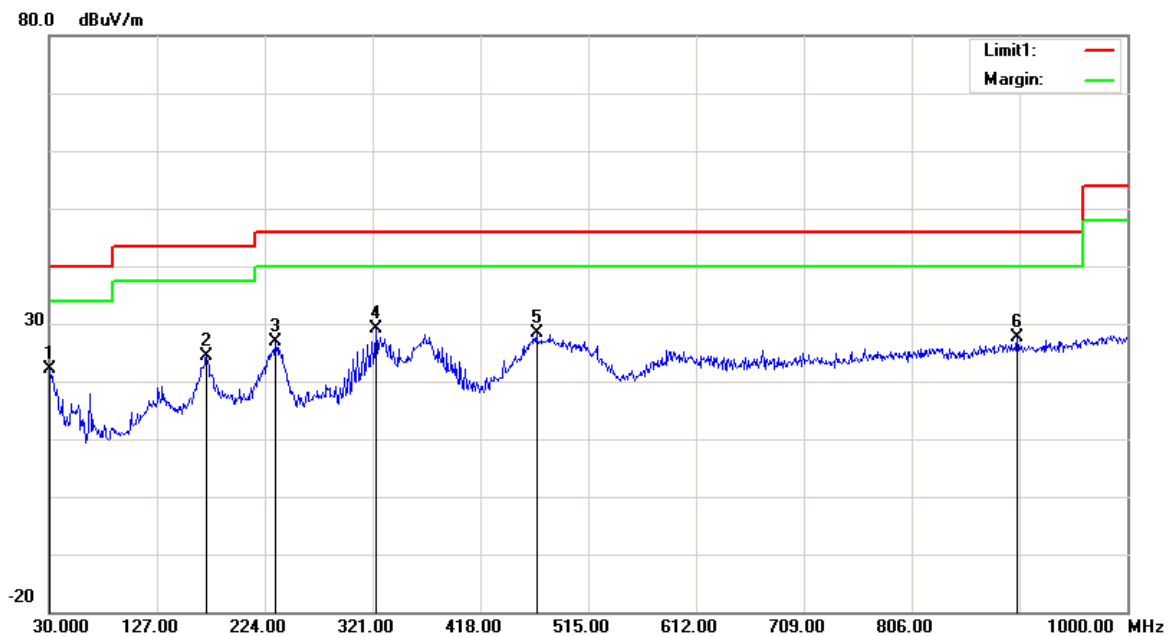
* The testing was performed by Tyler Pan on 2019-05-07

Test Result: Compliance

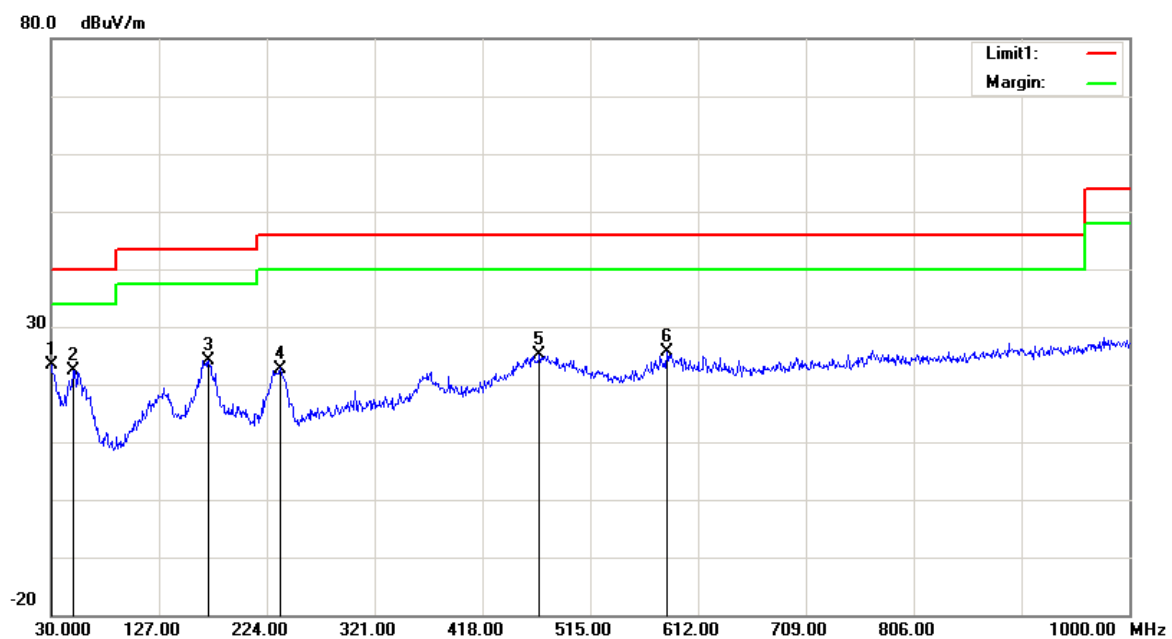
Test Mode: USB Charging& Playing

1) Below 1GHz:

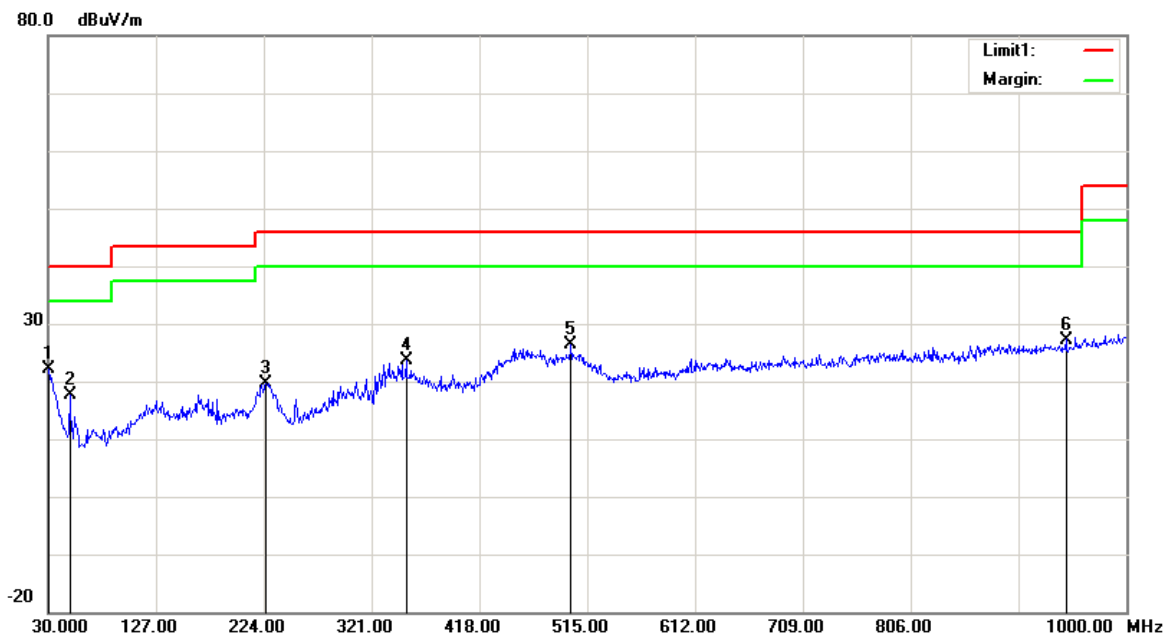
Horizontal



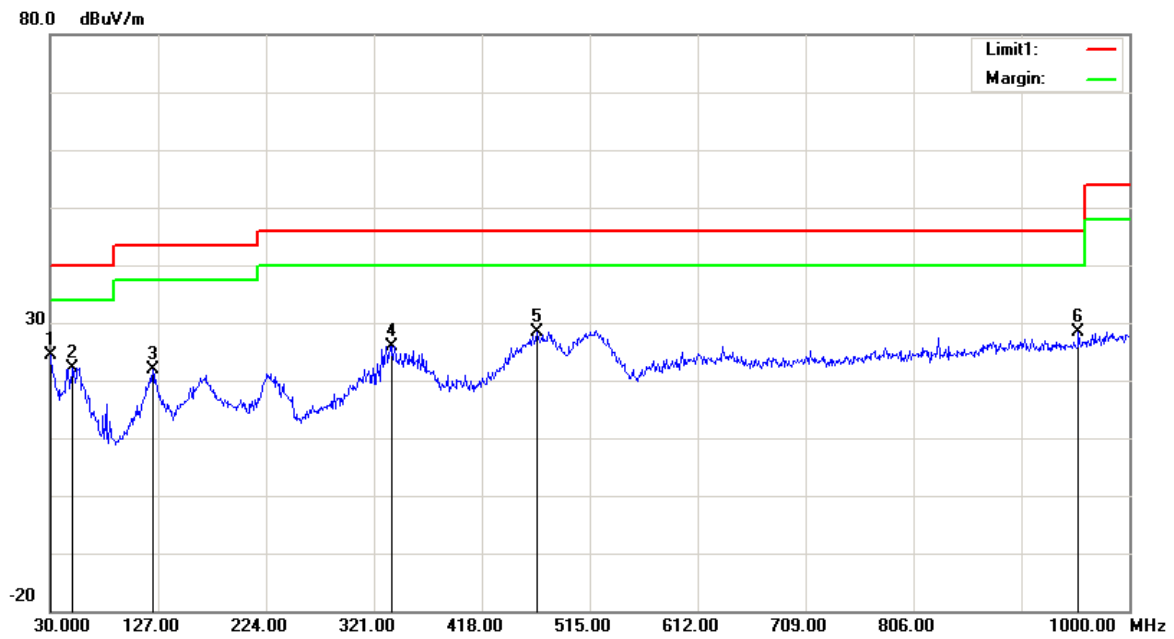
Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	26.39	peak	-4.20	22.19	40.00	17.81
171.6200	37.13	peak	-12.69	24.44	43.50	19.06
233.7000	39.26	peak	-12.31	26.95	46.00	19.05
323.9100	38.67	peak	-9.42	29.25	46.00	16.75
468.4400	34.81	peak	-6.53	28.28	46.00	17.72
901.0600	31.54	peak	-3.83	27.71	46.00	18.29

Vertical

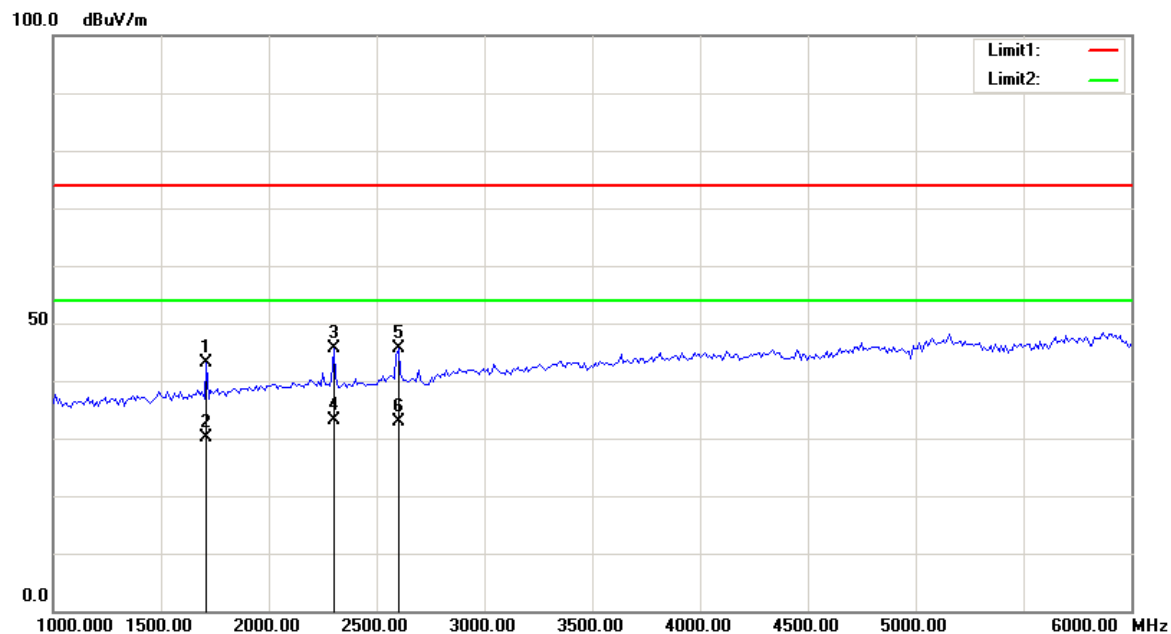
Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.0000	27.46	peak	-4.20	23.26	40.00	16.74
50.3700	39.63	peak	-17.20	22.43	40.00	17.57
171.6200	36.75	peak	-12.69	24.06	43.50	19.44
235.6400	34.94	peak	-12.19	22.75	46.00	23.25
469.4100	31.57	peak	-6.52	25.05	46.00	20.95
583.8700	30.70	peak	-5.13	25.57	46.00	20.43

Test Mode: Base Charging& Playing**2) Below 1GHz:****Horizontal**

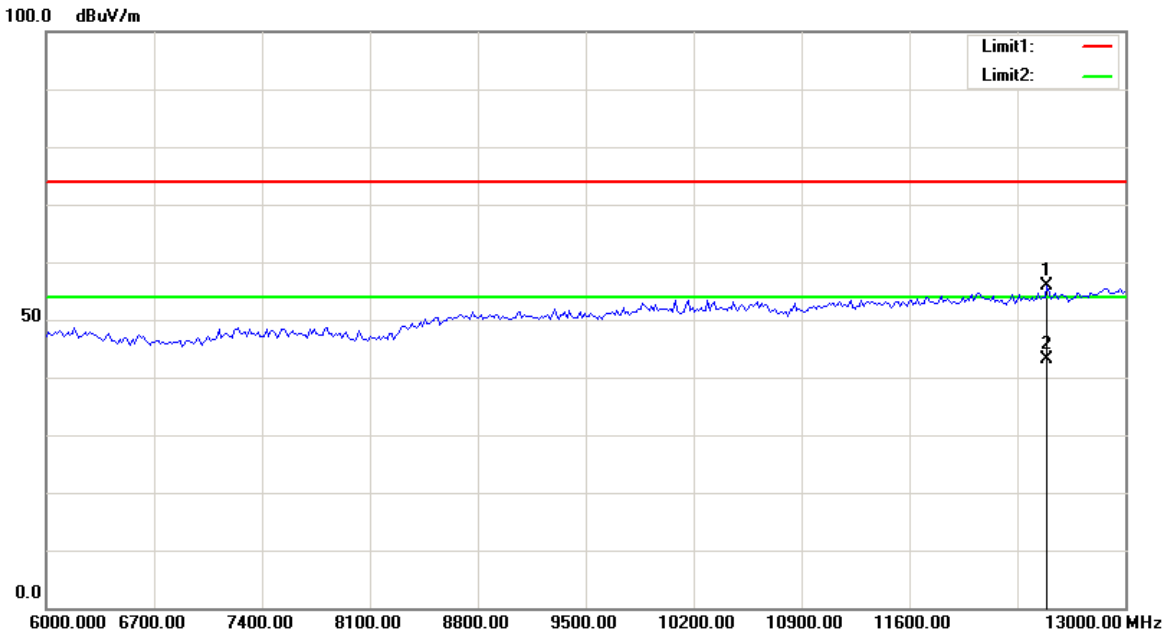
Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.9700	27.25	peak	-5.01	22.24	40.00	17.76
49.4000	34.56	peak	-16.92	17.64	40.00	22.36
225.9400	32.27	peak	-12.69	19.58	46.00	26.42
352.0400	32.66	peak	-9.02	23.64	46.00	22.36
500.4500	32.84	peak	-6.40	26.44	46.00	19.56
945.6800	30.64	peak	-3.39	27.25	46.00	18.75

Vertical

Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.9700	29.32	peak	-5.01	24.31	40.00	15.69
50.3700	39.34	peak	-17.20	22.14	40.00	17.86
122.1500	32.50	peak	-10.54	21.96	43.50	21.54
336.5200	35.34	peak	-9.43	25.91	46.00	20.09
467.4700	34.94	peak	-6.55	28.39	46.00	17.61
954.4100	31.61	peak	-3.31	28.30	46.00	17.70

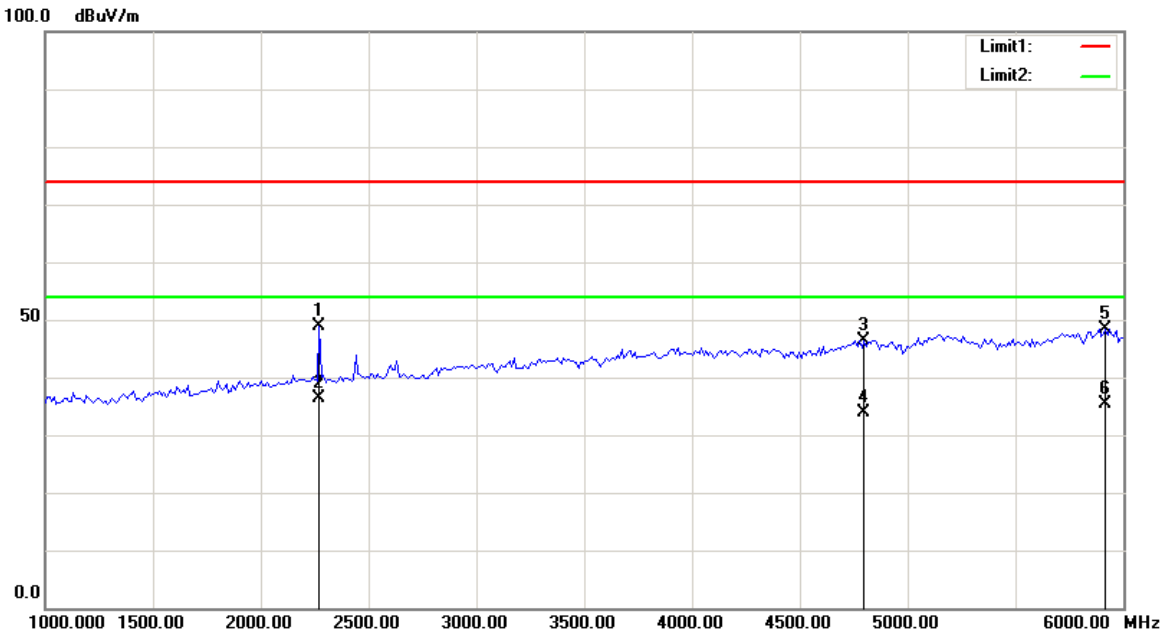
3) Above 1GHz:*Test Mode: USB Charging& Playing***Horizontal**

Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1711.423	51.44	peak	-8.39	43.05	74.00	30.95
1711.423	38.61	AVG	-8.39	30.22	54.00	23.78
2302.605	52.30	peak	-6.77	45.53	74.00	28.47
2302.605	39.81	AVG	-6.77	33.04	54.00	20.96
2603.206	51.37	peak	-5.83	45.54	74.00	28.46
2603.206	38.66	AVG	-5.83	32.83	54.00	21.17

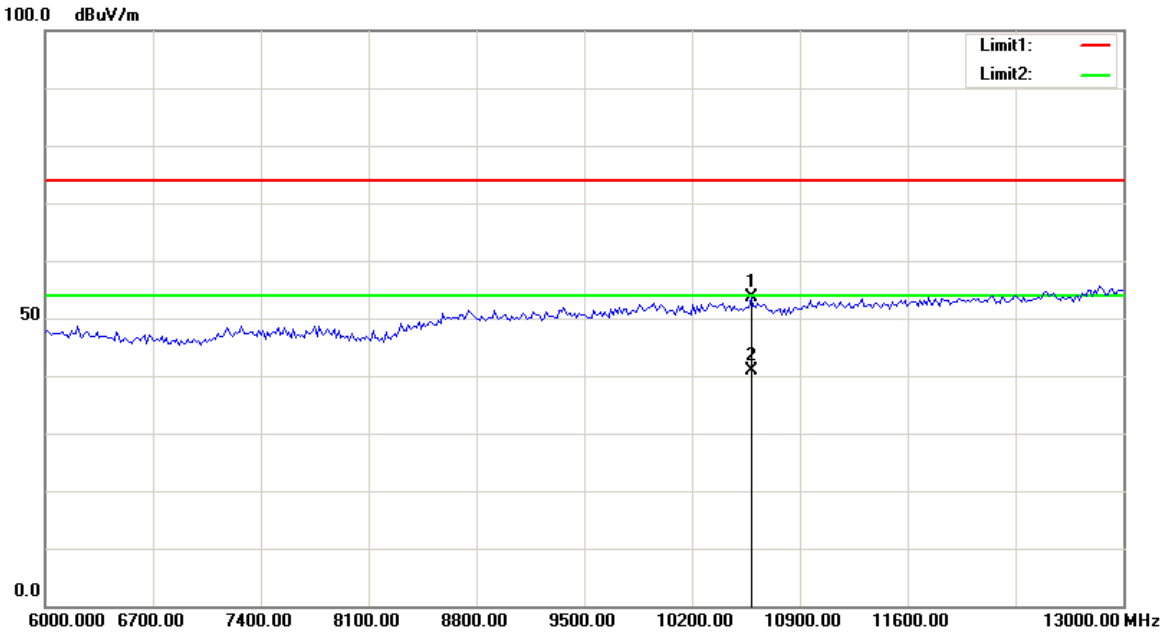


Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
12494.990	48.65	peak	7.27	55.92	74.00	18.08
12494.990	35.94	AVG	7.27	43.21	54.00	10.79

Vertical



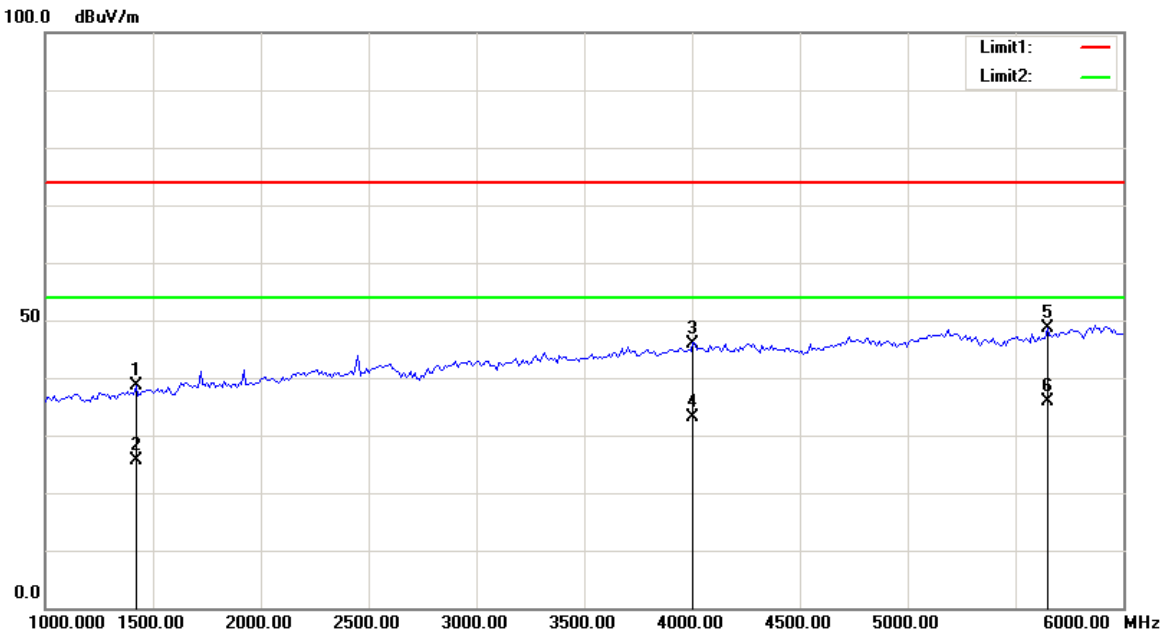
Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2272.545	55.59	peak	-6.76	48.83	74.00	25.17
2272.545	43.08	AVG	-6.76	36.32	54.00	17.68
4797.595	47.59	peak	-1.14	46.45	74.00	27.55
4797.595	34.99	AVG	-1.14	33.85	54.00	20.15
5919.840	47.59	peak	0.83	48.42	74.00	25.58
5919.840	34.67	AVG	0.83	35.50	54.00	18.50



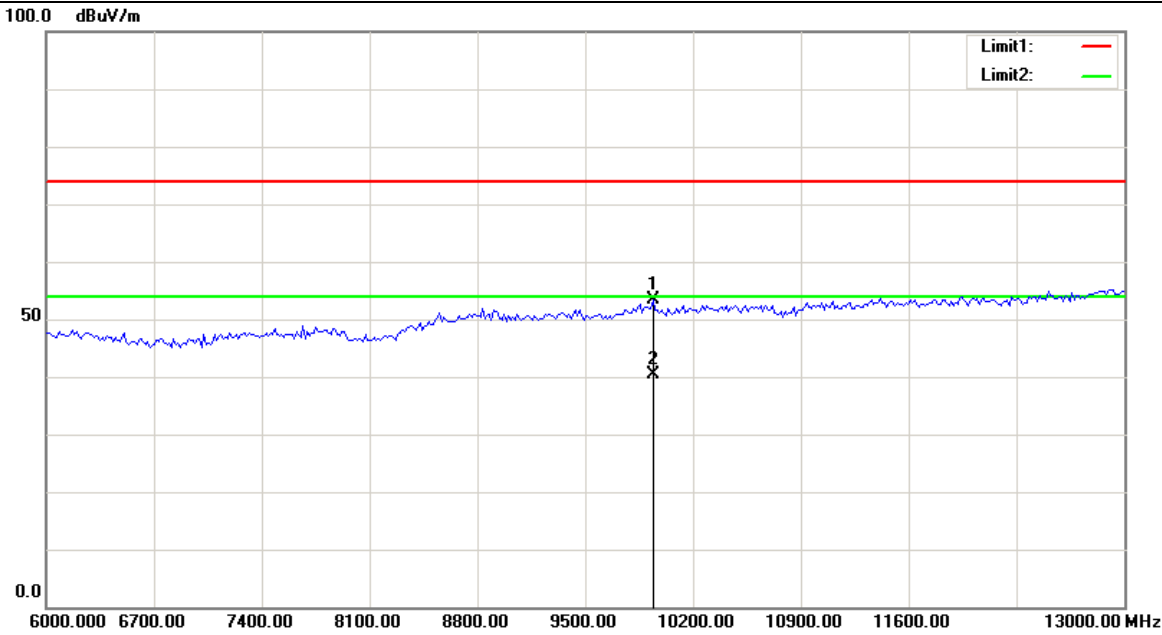
Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10587.174	45.84	peak	7.75	53.59	74.00	20.41
10587.174	33.07	AVG	7.75	40.82	54.00	13.18

Test Mode: Base Charging& Playing

Horizontal

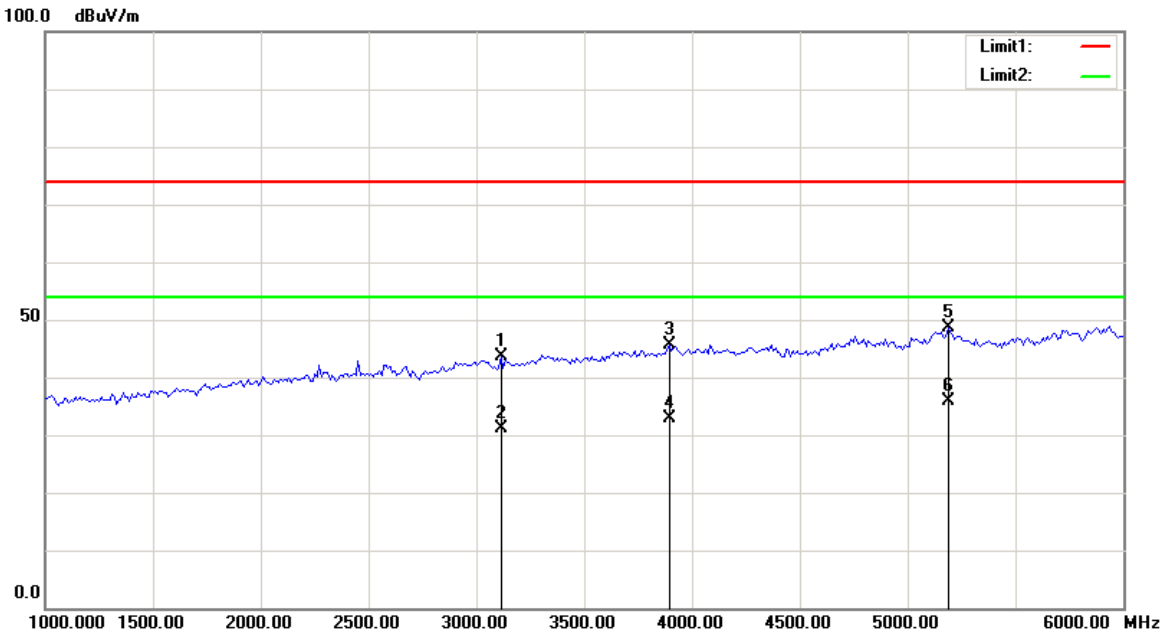


Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1420.842	48.05	peak	-9.44	38.61	74.00	35.39
1420.842	35.18	AVG	-9.44	25.74	54.00	28.26
4006.012	47.95	peak	-1.95	46.00	74.00	28.00
4006.012	35.08	AVG	-1.95	33.13	54.00	20.87
5649.299	48.43	peak	0.31	48.74	74.00	25.26
5649.299	35.66	AVG	0.31	35.97	54.00	18.03

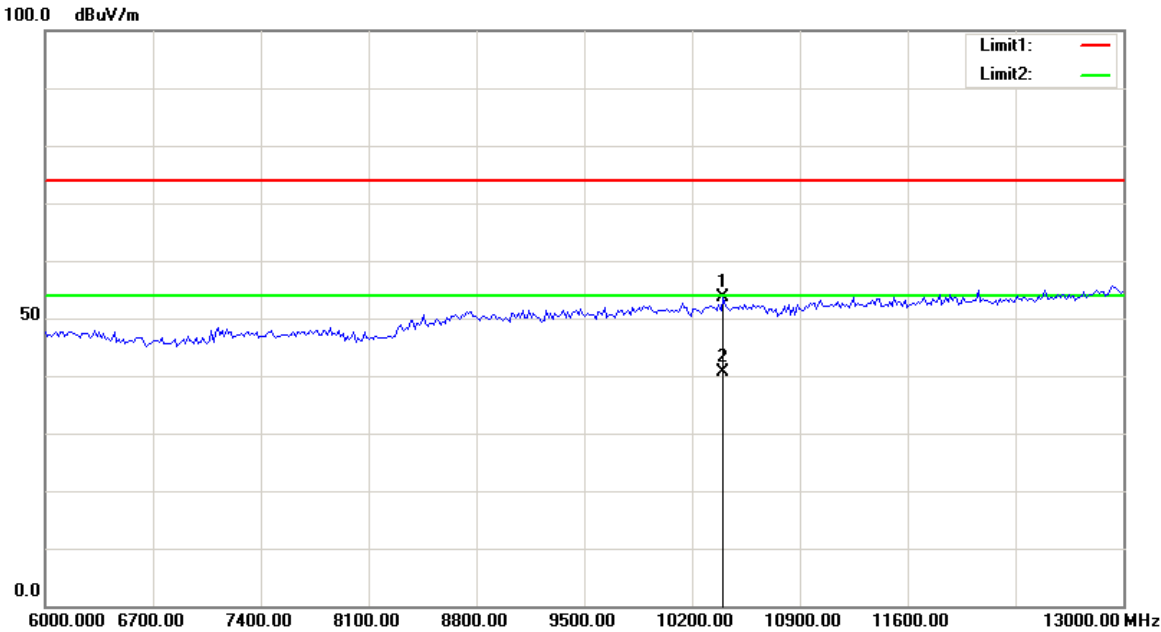


Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
9941.884	45.95	peak	7.36	53.31	74.00	20.69
9941.884	33.14	AVG	7.36	40.50	54.00	13.50

Vertical



Frequency (MHz)	Receiver Reading (dBμV)	Detector	Correction Factor (dB/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3114.229	48.09	peak	-4.38	43.71	74.00	30.29
3114.229	35.46	AVG	-4.38	31.08	54.00	22.92
3895.792	47.73	peak	-2.19	45.54	74.00	28.46
3895.792	34.95	AVG	-2.19	32.76	54.00	21.24
5188.377	48.92	peak	-0.21	48.71	74.00	25.29
5188.377	36.15	AVG	-0.21	35.94	54.00	18.06



Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
10404.810	45.89	peak	7.64	53.53	74.00	20.47
10404.810	33.11	AVG	7.64	40.75	54.00	13.25

****END OF REPORT****