

FCC Test Report

Report No.: RFBEBU-WTW-P21071064

FCC ID: E8HWBS21F1LUA

Test Model: WBS21F1LUA

Series Model: WBS21F1LUAXXXXX (where X may be 0-9, a-z, A-Z, ".", "-" or blank)

Received Date: 2021/7/29

Test Date: 2021/8/3 ~ 2021/8/13

Issued Date: 2021/9/24

Applicant: Chicony Electronics Co., Ltd.

Address: No.69, Sec. 2, Guangfu Rd., Sanchong Dist., New Taipei City 241,
Taiwan(R.O.C.)

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**FCC Registration /
Designation Number:** 198487 / TW2021



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results	5
2.1 Measurement Uncertainty	5
2.2 Modification Record	5
3 General Information	6
3.1 General Description of EUT	6
3.2 Description of Test Modes	7
3.2.1 Test Mode Applicability and Tested Channel Detail	9
3.3 Description of Support Units	10
3.3.1 Configuration of System under Test	10
3.4 General Description of Applied Standards	10
4 Test Types and Results	11
4.1 Radiated Emission and Bandedge Measurement	11
4.1.1 Limits of Radiated Emission and Bandedge Measurement	11
4.1.2 Test Instruments	11
4.1.3 Test Procedures	12
4.1.4 Deviation from Test Standard	12
4.1.5 Test Set Up	13
4.1.6 EUT Operating Conditions	13
4.1.7 Test Results	14
4.2 Conducted Emission Measurement	26
4.2.1 Limits of Conducted Emission Measurement	26
4.2.2 Test Instruments	26
4.2.3 Test Procedures	27
4.2.4 Deviation from Test Standard	27
4.2.5 Test Setup	27
4.2.6 EUT Operating Conditions	27
4.2.7 Test Results	28
5 Pictures of Test Arrangements	32
Appendix – Information of the Testing Laboratories	33

Release Control Record

Issue No.	Description	Date Issued
RFBEBU-WTW-P21071064	Original release	2021/9/24

1 Certificate of Conformity

Product: USI Rechargeable Active Pen

Brand: Chicony

Test Model: WBS21F1LUA

Series Model: WBS21F1LUAXXXX (where X may be 0-9, a-z, A-Z, ".", "-" or blank)

Sample Status: Engineering sample

Applicant: Chicony Electronics Co., Ltd.

Test Date: 2021/8/3 ~ 2021/8/13

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.209)
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by :

Annie Chang

Date: 2021/9/24

Annie Chang / Senior Specialist

Approved by :

Rex Lai

Date: 2021/9/24

Rex Lai / Associate Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.209)

FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -29.07dB at 0.43550MHz
15.209	Radiated Emission Test	Pass	Meet the requirement of limit. Minimum passing margin is -5.84dB at 43.58MHz

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.00 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1GHz	5.70 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	USI Rechargeable Active Pen
Brand	Chicony
Test Model	WBS21F1LUA
Series Model	WBS21F1LUAXXXXX (where X may be 0-9, a-z, A-Z, ".", "-" or blank)
Model Difference	Marketing purpose
Sample Status	Engineering sample
Power Supply Rating	3.7Vdc from battery or 5Vdc, 500mA via USB interface
Modulation Type	PSK
Operating Frequency	111-494kHz
Number of Channel	384
Antenna Type	Loop antenna
Field Strength	-32.89dBuV/m @300m
Accessory Device	N/A
Data Cable Supplied	Shielded USB Type C cable (0.17m)

Note:

1. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

384 channels are provided for EUT:

Channel	Freq. (kHz)	Channel	Freq. (kHz)	Channel	Freq. (kHz)	Channel	Freq. (kHz)	Channel	Freq. (kHz)
1	111	51	161	101	211	151	261	201	311
2	112	52	162	102	212	152	262	202	312
3	113	53	163	103	213	153	263	203	313
4	114	54	164	104	214	154	264	204	314
5	115	55	165	105	215	155	265	205	315
6	116	56	166	106	216	156	266	206	316
7	117	57	167	107	217	157	267	207	317
8	118	58	168	108	218	158	268	208	318
9	119	59	169	109	219	159	269	209	319
10	120	60	170	110	220	160	270	210	320
11	121	61	171	111	221	161	271	211	321
12	122	62	172	112	222	162	272	212	322
13	123	63	173	113	223	163	273	213	323
14	124	64	174	114	224	164	274	214	324
15	125	65	175	115	225	165	275	215	325
16	126	66	176	116	226	166	276	216	326
17	127	67	177	117	227	167	277	217	327
18	128	68	178	118	228	168	278	218	328
19	129	69	179	119	229	169	279	219	329
20	130	70	180	120	230	170	280	220	330
21	131	71	181	121	231	171	281	221	331
22	132	72	182	122	232	172	282	222	332
23	133	73	183	123	233	173	283	223	333
24	134	74	184	124	234	174	284	224	334
25	135	75	185	125	235	175	285	225	335
26	136	76	186	126	236	176	286	226	336
27	137	77	187	127	237	177	287	227	337
28	138	78	188	128	238	178	288	228	338
29	139	79	189	129	239	179	289	229	339
30	140	80	190	130	240	180	290	230	340
31	141	81	191	131	241	181	291	231	341
32	142	82	192	132	242	182	292	232	342
33	143	83	193	133	243	183	293	233	343
34	144	84	194	134	244	184	294	234	344
35	145	85	195	135	245	185	295	235	345
36	146	86	196	136	246	186	296	236	346
37	147	87	197	137	247	187	297	237	347
38	148	88	198	138	248	188	298	238	348
39	149	89	199	139	249	189	299	239	349
40	150	90	200	140	250	190	300	240	350
41	151	91	201	141	251	191	301	241	351
42	152	92	202	142	252	192	302	242	352
43	153	93	203	143	253	193	303	243	353
44	154	94	204	144	254	194	304	244	354
45	155	95	205	145	255	195	305	245	355
46	156	96	206	146	256	196	306	246	356
47	157	97	207	147	257	197	307	247	357
48	158	98	208	148	258	198	308	248	358
49	159	99	209	149	259	199	309	249	359
50	160	100	210	150	260	200	310	250	360

Channel	Freq. (kHz)	Channel	Freq. (kHz)	Channel	Freq. (kHz)	Channel	Freq. (kHz)	Channel	Freq. (kHz)
251	361	281	391	311	421	341	451	371	481
252	362	282	392	312	422	342	452	372	482
253	363	283	393	313	423	343	453	373	483
254	364	284	394	314	424	344	454	374	484
255	365	285	395	315	425	345	455	375	485
256	366	286	396	316	426	346	456	376	486
257	367	287	397	317	427	347	457	377	487
258	368	288	398	318	428	348	458	378	488
259	369	289	399	319	429	349	459	379	489
260	370	290	400	320	430	350	460	380	490
261	371	291	401	321	431	351	461	381	491
262	372	292	402	322	432	352	462	382	492
263	373	293	403	323	433	353	463	383	493
264	374	294	404	324	434	354	464	384	494
265	375	295	405	325	435	355	465		
266	376	296	406	326	436	356	466		
267	377	297	407	327	437	357	467		
268	378	298	408	328	438	358	468		
269	379	299	409	329	439	359	469		
270	380	300	410	330	440	360	470		
271	381	301	411	331	441	361	471		
272	382	302	412	332	442	362	472		
273	383	303	413	333	443	363	473		
274	384	304	414	334	444	364	474		
275	385	305	415	335	445	365	475		
276	386	306	416	336	446	366	476		
277	387	307	417	337	447	367	477		
278	388	308	418	338	448	368	478		
279	389	309	419	339	449	369	479		
280	390	310	420	340	450	370	480		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To		Description
	RE<1G	PLC	
A	√	Note 1	EUT Operating Mode
B	√	√	EUT Charging Mode (Powered from Notebook)
C	√	√	EUT Charging Mode (Powered from Adapter)

Where **RE<1G**: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

NOTE:

1. No need to concern of Conducted Emission due to the EUT is powered by battery.
2. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Z-plane.

Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Operating Frequency (kHz)	Tested Frequency (kHz)	Modulation Type
A	111-494	250	PSK
B & C	-	-	-

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Operating Frequency (kHz)	Tested Frequency (kHz)	Modulation Type
B & C	-	-	-

Test Condition:

Applicable To	EUT Configure Mode	Environmental Conditions	Input Power	Tested by
RE<1G	A	24 deg. C, 59% RH	3.7Vdc	Ian Chang
	B	24 deg. C, 71% RH	120Vac, 60Hz (System)	Ian Chang
	C	24 deg. C, 71% RH	120Vac, 60Hz (Adapter)	Ian Chang
PLC	B	25 deg. C, 75% RH	120Vac, 60Hz (System)	Ian Chang
	C	25 deg. C, 75% RH	120Vac, 60Hz (Adapter)	Ian Chang

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

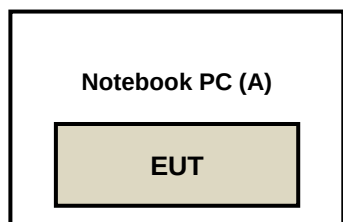
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook PC	Chromebook	Chromebook	N/A	N/A	Supplied by client
B.	Adapter	Apple	A1385	N/A	N/A	Provided by Lab

Note: All power cords of the above support units are non-shielded (1.8m).

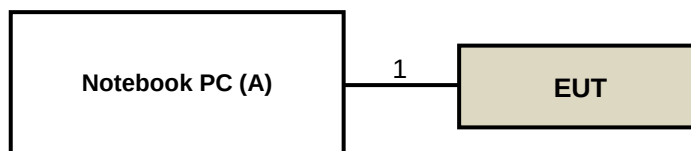
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB Type C cable	1	0.17	Y	0	Supplied by applicant

3.3.1 Configuration of System under Test

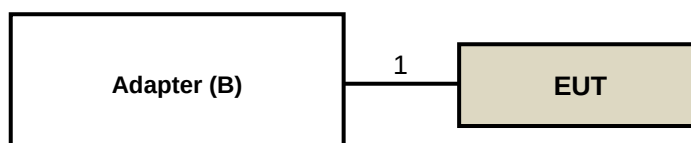
Mode A:



Mode B:



Mode C:



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.209)

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

For Frequency Below 30MHz

Frequency (MHz)	Field Strength (dBuV/m)		Measurement Distance (meters)
	uV/m	dBuV/m	
0.009 – 0.490	2400 / F (kHz)	48.52-13.80	300
0.490 – 1.705	24000 / F (kHz)	33.80-22.97	30
1.705 – 30.0	30	29.54	30

For Frequency Between 30-1000MHz

Frequency (MHz)	uV/m (at 3m)	dBuV/m (at 3m)
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

4.1.2 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Test Receiver Agilent	N9038A	MY51210129	2021/3/12	2022/3/11
Software BVADT	ADT_Radiated_V8.7.08	NA	NA	NA
Software BVADT	ADT_RF Test Software V6.6.5.4	NA	NA	NA
Auto Control System(Antenna Tower, Table, Controller) ADT	SC100+AT100+TT100	0306	NA	NA
Pre_Amplifier EMCI	EMC001340	980269	2021/6/29	2022/6/28
LOOP ANTENNA EMCI	LPA600	270	2019/8/23	2021/8/22
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2021/7/13	2022/7/12
Pre_Amplifier HP	8447D	2432A03504	2021/2/18	2022/2/17
Bi-log Broadband Antenna Schwarzbeck	VULB9168	139	2020/11/6	2021/11/5
Attenuator Mini-Circuits	UNAT-5+	PAD-CH6-01	2021/7/13	2022/7/12
RF Coaxial Cable Pacific	8D-FB	Cable-CH6-02	2021/7/13	2022/7/12

NOTE: 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in Chamber No. 6.
 3. Tested Date: 2021/8/3 ~ 2021/8/13

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode, except for the frequency band (9kHz-90kHz, 110kHz-490kHz) set to average detect function and peak detect function.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200Hz at frequency range 9kHz to 150kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency range 150kHz to 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna 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.
- d. 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 and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

Note:

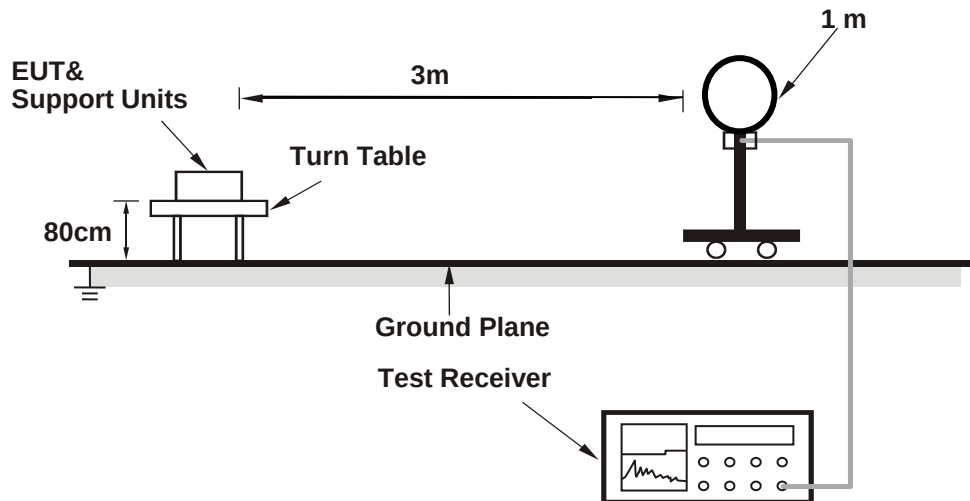
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

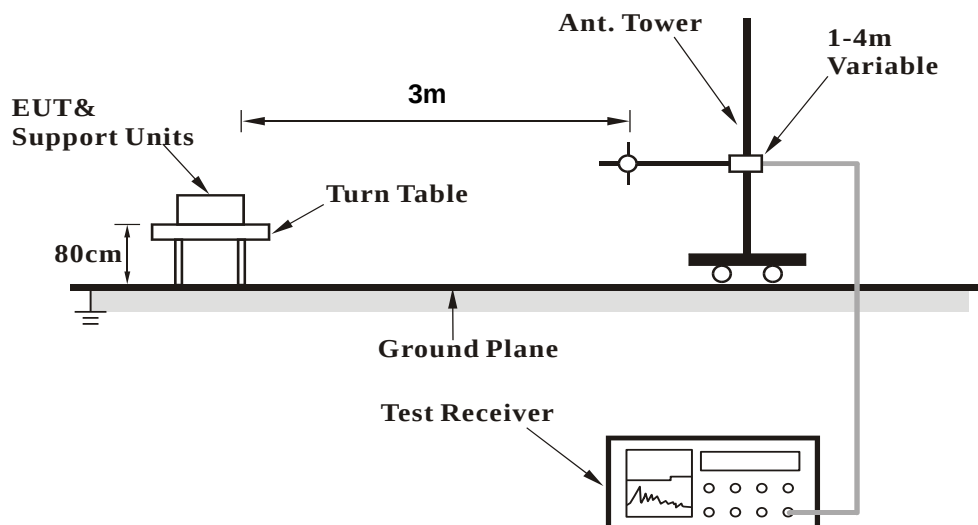
No deviation.

4.1.5 Test Set Up

For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

Mode A:

- Put the EUT on the Notebook.
- Set the EUT under transmission condition continuously at specific channel frequency.

Mode B & C:

- Connect the EUT to Notebook or Adapter.
- Set the EUT under charging condition.

4.1.7 Test Results

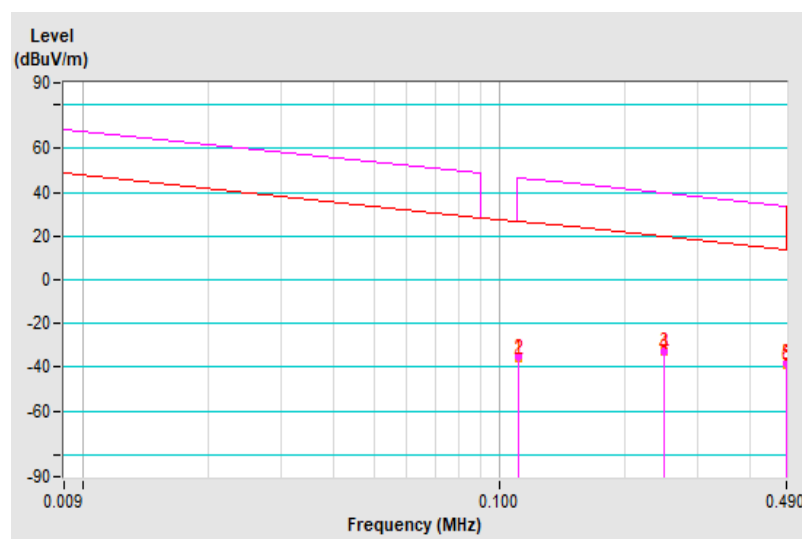
9kHz~490kHz Data:

Test Frequency	250kHz	Detector Function	Peak (PK) Average (AV)
Frequency Range	9kHz ~ 490kHz		
Test Mode	A		

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.111	-35.39 PK	46.69	-82.08	1.00	337	24.56	-59.95
2	0.111	-35.66 AV	26.69	-62.35	1.00	337	24.29	-59.95
3	*0.250	-32.43 PK	39.64	-72.07	1.00	127	33.14	-65.57
4	*0.250	-32.89 AV	19.64	-52.53	1.00	127	32.68	-65.57
5	0.489	-38.16 PK	33.82	-71.98	1.00	63	32.76	-70.92
6	0.489	-38.74 AV	13.82	-52.56	1.00	63	32.18	-70.92

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for below 0.49MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.
Distance factor@3m = $40 \cdot \log(3/300) = -80\text{dB}$

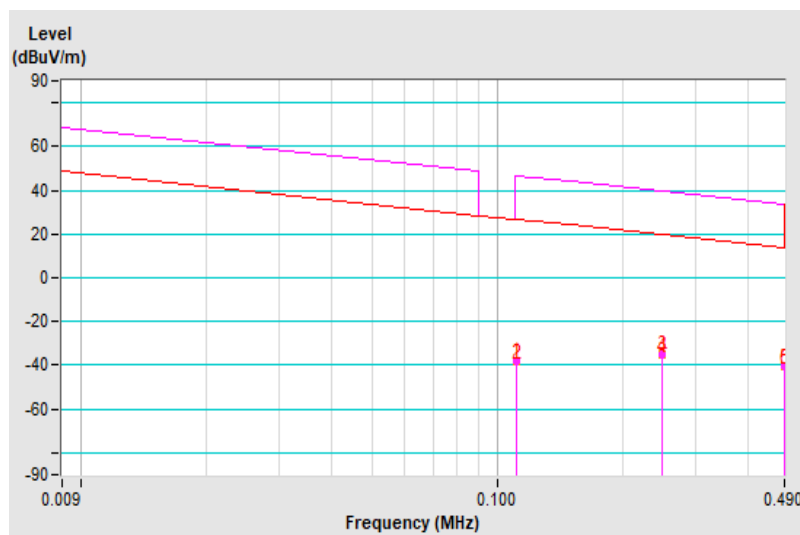


Test Frequency	250kHz	Detector Function	Peak (PK) Average (AV)
Frequency Range	9kHz ~ 490kHz		
Test Mode	A		

Antenna Polarity : Perpendicular								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.111	-37.85 PK	46.69	-84.54	1.00	194	22.10	-59.95
2	0.111	-38.23 AV	26.69	-64.92	1.00	194	21.72	-59.95
3	*0.250	-34.87 PK	39.64	-74.51	1.00	239	30.70	-65.57
4	*0.250	-35.27 AV	19.64	-54.91	1.00	239	30.30	-65.57
5	0.489	-40.51 PK	33.82	-74.33	1.00	102	30.41	-70.92
6	0.489	-40.77 AV	13.82	-54.59	1.00	102	30.15	-70.92

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for below 0.49MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.
Distance factor@3m = $40 \cdot \log(3/300) = -80\text{dB}$

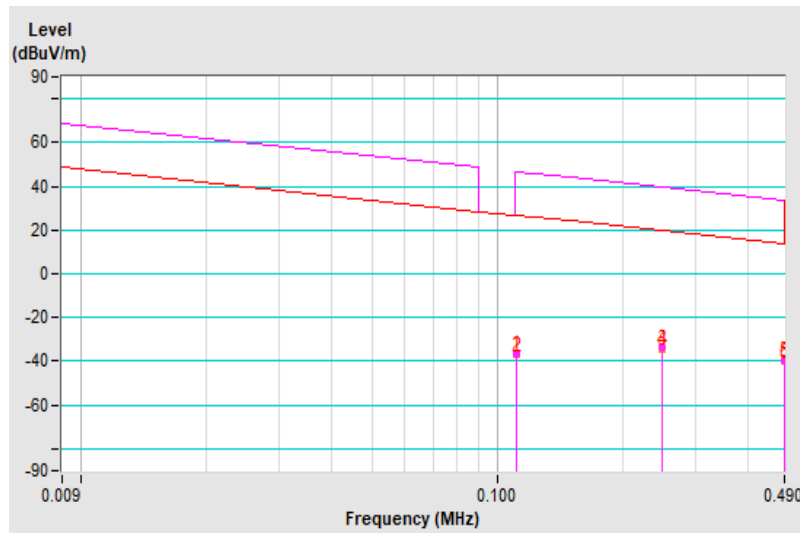


Test Frequency	250kHz	Detector Function	Peak (PK) Average (AV)
Frequency Range	9kHz ~ 490kHz		
Test Mode	A		

Antenna Polarity : Ground-parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.111	-36.55 PK	46.69	-83.24	1.00	167	23.40	-59.95
2	0.111	-36.98 AV	26.69	-63.67	1.00	167	22.97	-59.95
3	*0.250	-33.84 PK	39.64	-73.48	1.00	114	31.73	-65.57
4	*0.250	-34.36 AV	19.64	-54.00	1.00	114	31.21	-65.57
5	0.489	-39.28 PK	33.82	-73.10	1.00	208	31.64	-70.92
6	0.489	-39.84 AV	13.82	-53.66	1.00	208	31.08	-70.92

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. The test distance for below 0.49MHz is 3m, extrapolate the measured field strength to a distance of 300 meters.
Distance factor@3m = $40 \cdot \log(3/300) = -80\text{dB}$



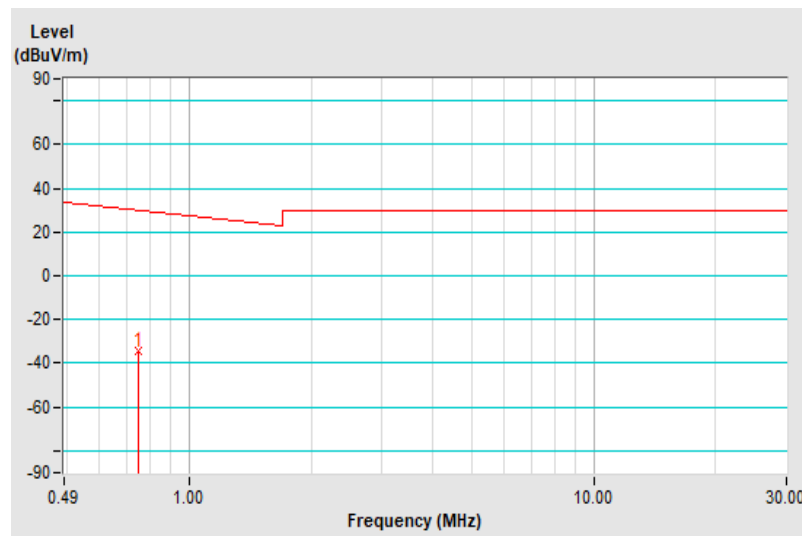
490kHz~30MHz Data:

Test Frequency	250kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	490kHz ~ 30MHz		
Test Mode	A		

Antenna Polarity : Parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.750	-33.97 QP	30.10	-64.07	1.00	131	-0.87	-33.10

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 30 meters.
Distance factor@3m = $40 \cdot \log(3/30) = -40\text{dB}$

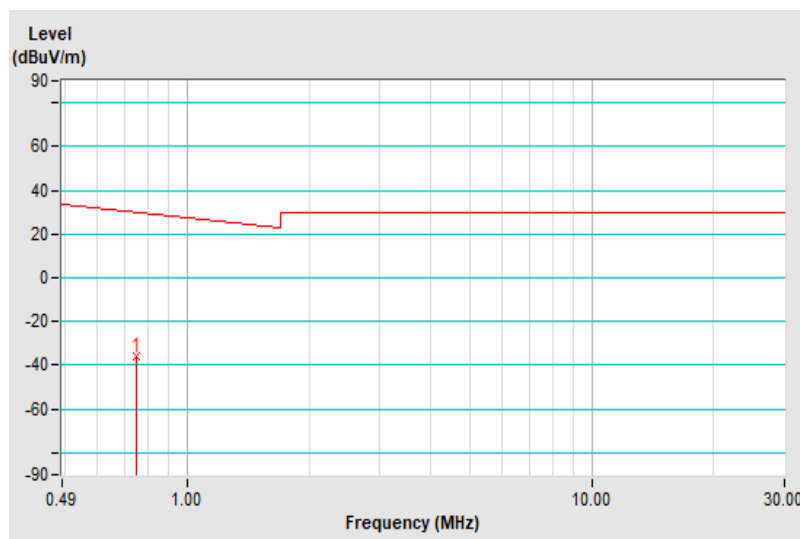


Test Frequency	250kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	490kHz ~ 30MHz		
Test Mode	A		

Antenna Polarity : Perpendicular								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.750	-35.84 QP	30.10	-65.94	1.00	198	-2.74	-33.10

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 30 meters.
Distance factor@3m = $40 \cdot \log(3/30) = -40\text{dB}$

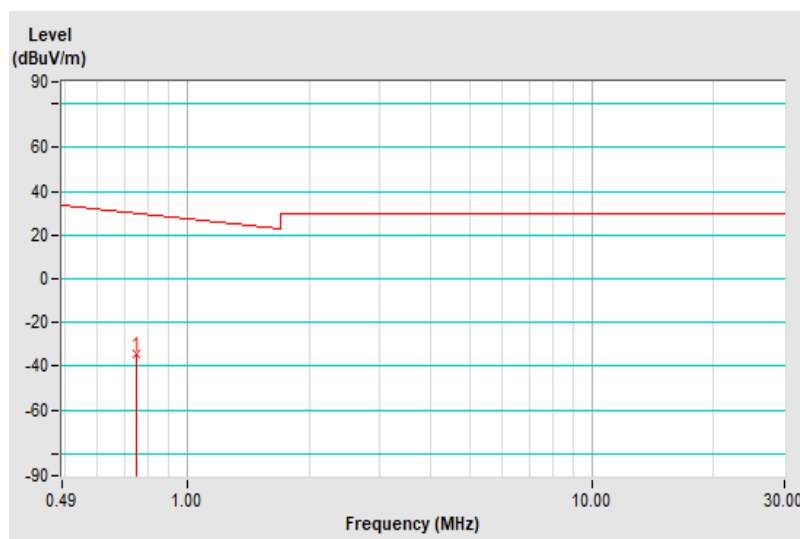


Test Frequency	250kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	490kHz ~ 30MHz		
Test Mode	A		

Antenna Polarity : Ground-parallel								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	0.750	-34.53 QP	30.10	-64.63	1.00	127	-1.43	-33.10

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + Distance Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. The test distance for 0.49 ~ 30MHz is 3m, extrapolate the measured field strength to a distance of 30 meters.
Distance factor@3m = $40 \cdot \log(3/30) = -40\text{dB}$



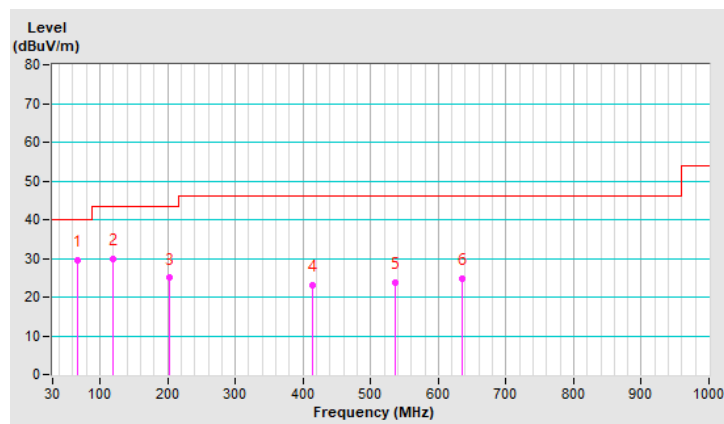
30MHz ~ 1GHz Data:

Test Frequency	250kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	30 MHz ~ 1GHz		
Test Mode	A		

Antenna Polarity & Test Distance: Horizontal At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	66.86	29.58 QP	40.00	-10.42	1.02 H	143	37.79	-8.21
2	118.27	29.76 QP	43.50	-13.74	1.58 H	200	38.76	-9.00
3	201.69	25.00 QP	43.50	-18.50	1.82 H	225	33.72	-8.72
4	415.09	23.17 QP	46.00	-22.83	2.42 H	284	24.93	-1.76
5	537.31	23.70 QP	46.00	-22.30	2.76 H	318	23.20	0.50
6	635.28	24.70 QP	46.00	-21.30	1.00 H	80	21.47	3.23

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.

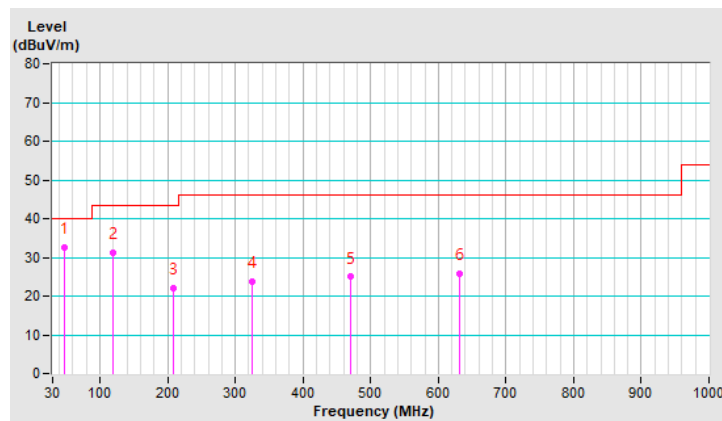


Test Frequency	250kHz	Detector Function	Quasi-Peak (QP)
Frequency Range	30 MHz ~ 1GHz		
Test Mode	A		

Antenna Polarity & Test Distance: Vertical At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	47.46	32.47 QP	40.00	-7.53	1.42 V	56	39.41	-6.94
2	119.24	31.25 QP	43.50	-12.25	1.70 V	84	40.17	-8.92
3	207.51	22.17 QP	43.50	-21.33	1.95 V	109	30.74	-8.57
4	323.91	23.82 QP	46.00	-22.18	2.20 V	134	27.23	-3.41
5	469.41	24.99 QP	46.00	-21.01	2.46 V	160	25.42	-0.43
6	631.40	25.77 QP	46.00	-20.23	2.80 V	194	22.61	3.16

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.

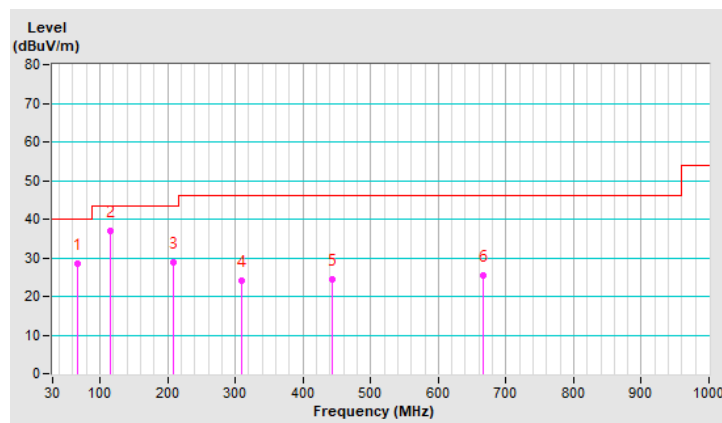


Frequency Range	30 MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	B		

Antenna Polarity & Test Distance: Horizontal At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	66.86	28.51 QP	40.00	-11.49	1.44 H	138	36.72	-8.21
2	114.39	36.95 QP	43.50	-6.55	1.62 H	156	46.34	-9.39
3	207.51	28.85 QP	43.50	-14.65	2.06 H	199	37.42	-8.57
4	308.39	24.11 QP	46.00	-21.89	2.44 H	237	27.96	-3.85
5	442.25	24.56 QP	46.00	-21.44	2.73 H	265	25.50	-0.94
6	666.32	25.50 QP	46.00	-20.50	3.19 H	310	22.09	3.41

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.

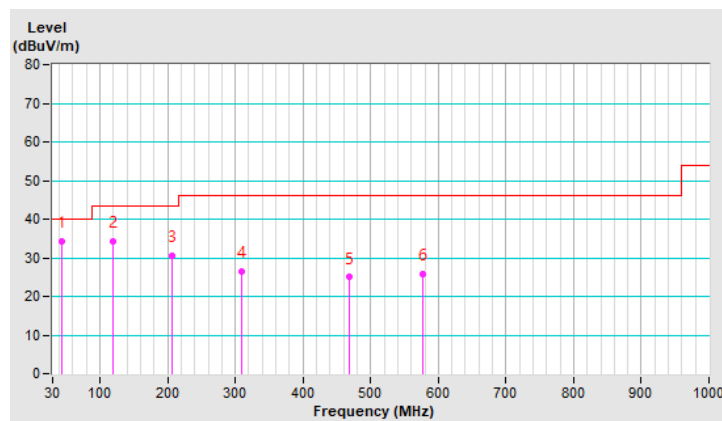


Frequency Range	30 MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	B		

Antenna Polarity & Test Distance: Vertical At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	43.58	34.16 QP	40.00	-5.84	1.38 V	53	41.41	-7.25
2	118.27	34.36 QP	43.50	-9.14	1.59 V	74	43.36	-9.00
3	206.54	30.50 QP	43.50	-13.00	1.82 V	97	39.11	-8.61
4	308.39	26.58 QP	46.00	-19.42	2.04 V	118	30.43	-3.85
5	468.44	25.00 QP	46.00	-21.00	2.36 V	150	25.44	-0.44
6	578.05	25.72 QP	46.00	-20.28	2.72 V	185	23.98	1.74

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.

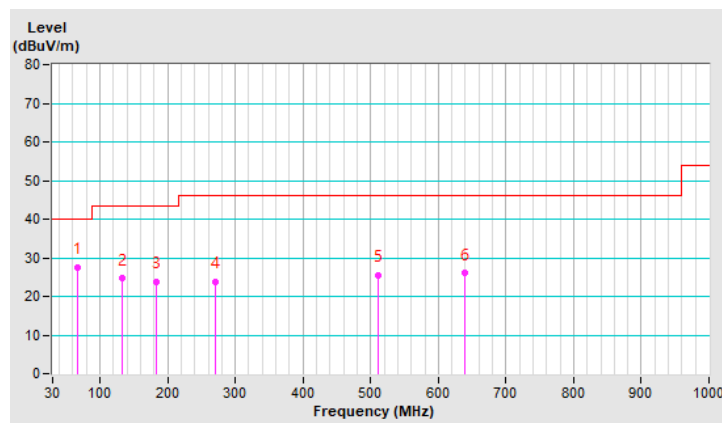


Frequency Range	30 MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	C		

Antenna Polarity & Test Distance: Horizontal At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	66.86	27.60 QP	40.00	-12.40	3.53 H	253	35.81	-8.21
2	132.82	24.64 QP	43.50	-18.86	3.36 H	237	31.96	-7.32
3	183.26	23.72 QP	43.50	-19.78	2.99 H	200	31.49	-7.77
4	269.59	23.85 QP	46.00	-22.15	2.62 H	164	29.07	-5.22
5	511.12	25.38 QP	46.00	-20.62	2.37 H	140	25.01	0.37
6	639.16	25.94 QP	46.00	-20.06	1.95 H	98	22.70	3.24

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.

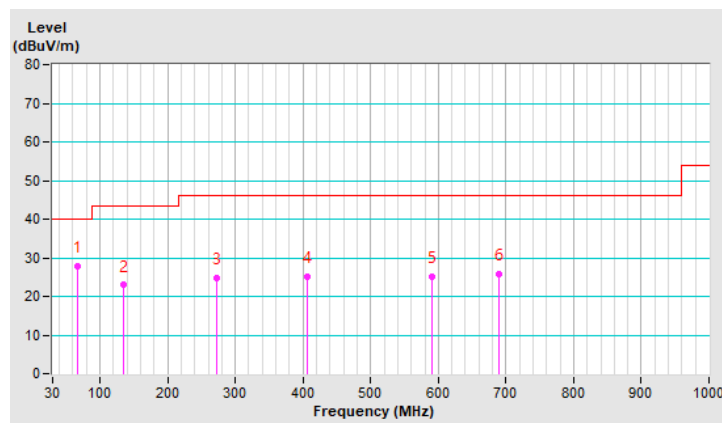


Frequency Range	30 MHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Test Mode	C		

Antenna Polarity & Test Distance: Vertical At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	66.86	27.77 QP	40.00	-12.23	2.40 V	233	35.98	-8.21
2	134.76	22.94 QP	43.50	-20.56	1.85 V	179	30.16	-7.22
3	271.53	24.71 QP	46.00	-21.29	1.28 V	123	29.80	-5.09
4	406.36	25.05 QP	46.00	-20.95	1.00 V	73	27.06	-2.01
5	589.69	25.16 QP	46.00	-20.84	1.00 V	38	23.08	2.08
6	688.63	25.74 QP	46.00	-20.26	1.00 V	6	22.03	3.71

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
Test Receiver ESR3 R&S	ESR3	102412	2021/1/29	2022/1/28
LISN SCHWARZBECK	NSLK 8128	8128-244	2020/11/19	2021/11/18
LISN SCHWARZBECK	NNLK8129	8129229	2021/5/20	2022/5/19
DC LISN SCHWARZBECK	NNLK 8121	8121-808	2021/4/18	2022/4/17
LISN SCHWARZBECK	NNLK 8121	8121-731	2021/4/28	2022/4/27
LISN R&S	ENV216	101196	2021/4/26	2022/4/25
LISN R&S	ESH3-Z5	100220	2020/12/1	2021/11/30
LISN R&S	ESH3-Z6	844950/018	2021/7/25	2022/7/24
DC LISN R&S	ESH3-Z6	100219	2021/7/25	2022/7/24
High Voltage Probe Schwarzbeck	TK9420	00982	2021/1/8	2022/1/7
RF Coaxial Cable Commate	5D-FB	Cable-CO5-01	2021/1/29	2022/1/28
Attenuator STI	STI02-2200-10	NO.4	2020/9/4	2021/9/3
50 Ohms Terminator LYNICS	0900510	E1-01-305	2021/2/17	2022/2/16
Isolation Transformer Erika Fiedler	D-65396	017	2020/9/14	2021/9/13
Software BVADT	Cond_V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in Linkou Conduction 05.

3. Tested Date: 2021/8/13

4.2.3 Test Procedures

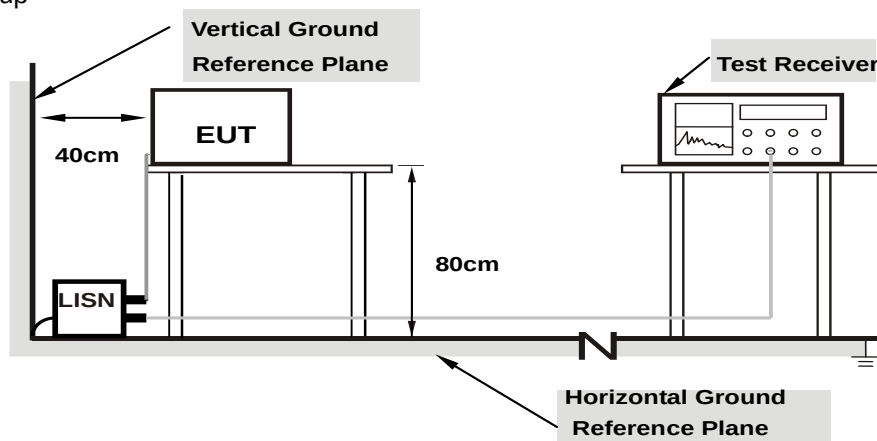
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

- Connect the EUT to Notebook or Adapter.
- Set the EUT under charging condition.

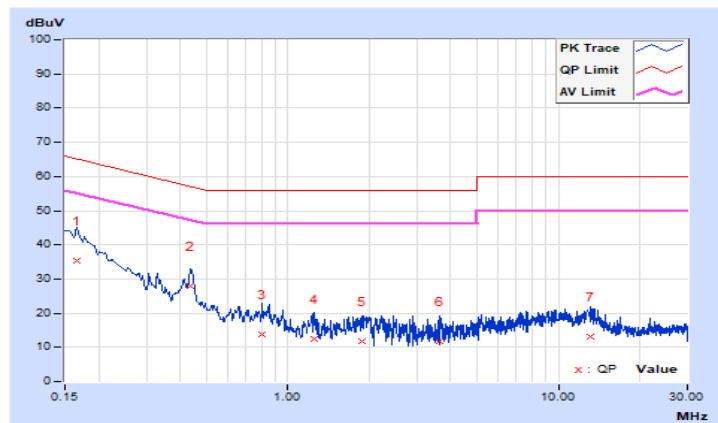
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	9.88	25.62	4.09	35.50	13.97	65.18	55.18	-29.68	-41.21
2	0.43550	9.89	18.19	7.03	28.08	16.92	57.15	47.15	-29.07	-30.23
3	0.80115	9.92	3.96	0.78	13.88	10.70	56.00	46.00	-42.12	-35.30
4	1.25482	9.95	2.39	1.14	12.34	11.09	56.00	46.00	-43.66	-34.91
5	1.88449	9.96	1.88	0.81	11.84	10.77	56.00	46.00	-44.16	-35.23
6	3.65044	10.01	1.94	0.04	11.95	10.05	56.00	46.00	-44.05	-35.95
7	13.20919	10.28	2.92	0.25	13.20	10.53	60.00	50.00	-46.80	-39.47

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

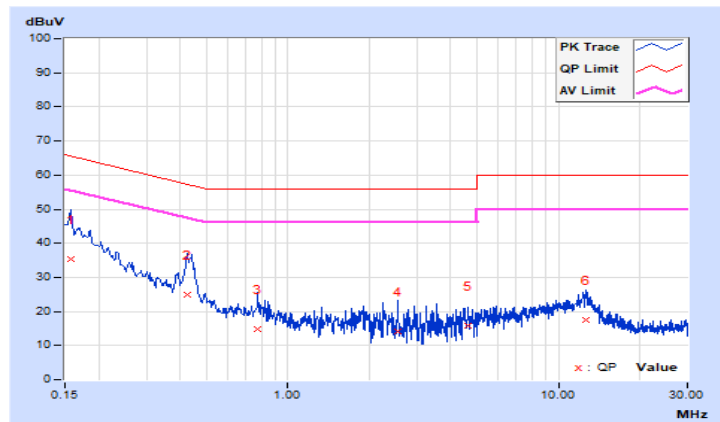


Frequency Range	150kHz ~ 30MHz	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	9.89	25.47	2.56	35.36	12.45	65.58	55.58	-30.22	-43.13
2	0.42377	9.90	15.02	4.08	24.92	13.98	57.37	47.37	-32.45	-33.39
3	0.77377	9.93	4.77	0.73	14.70	10.66	56.00	46.00	-41.30	-35.34
4	2.55536	9.99	4.03	1.63	14.02	11.62	56.00	46.00	-41.98	-34.38
5	4.63992	10.05	5.79	1.81	15.84	11.86	56.00	46.00	-40.16	-34.14
6	12.61863	10.28	7.08	1.72	17.36	12.00	60.00	50.00	-42.64	-38.00

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

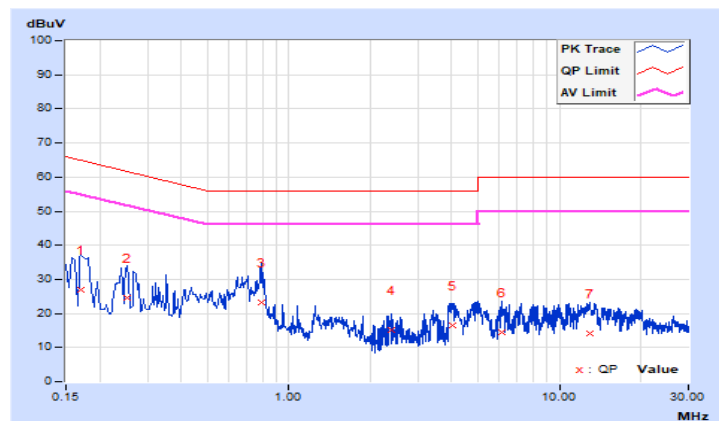


Frequency Range	150kHz ~ 30MHz	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16956	9.89	17.18	4.14	27.07	14.03	64.98	54.98	-37.91	-40.95
2	0.25169	9.89	14.64	0.95	24.53	10.84	61.70	51.70	-37.17	-40.86
3	0.78941	9.95	13.18	2.20	23.13	12.15	56.00	46.00	-32.87	-33.85
4	2.38719	10.02	4.97	1.64	14.99	11.66	56.00	46.00	-41.01	-34.34
5	4.03372	10.12	6.25	4.81	16.37	14.93	56.00	46.00	-39.63	-31.07
6	6.13810	10.21	4.20	1.91	14.41	12.12	60.00	50.00	-45.59	-37.88
7	12.90804	10.47	3.53	0.98	14.00	11.45	60.00	50.00	-46.00	-38.55

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

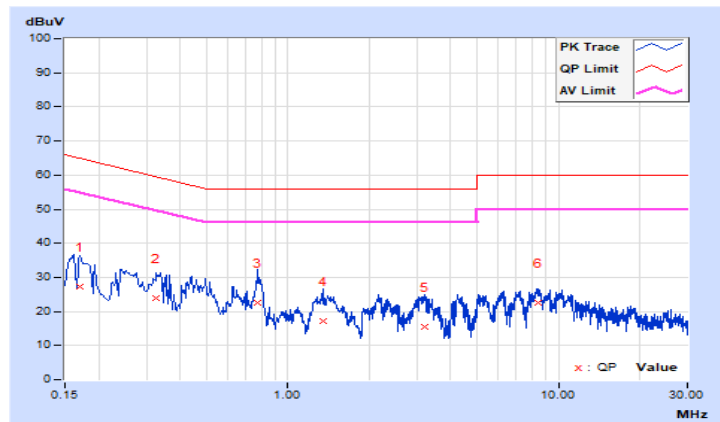


Frequency Range	150kHz ~ 30MHz	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16956	9.90	17.42	2.67	27.32	12.57	64.98	54.98	-37.66	-42.41
2	0.32599	9.92	14.05	3.05	23.97	12.97	59.55	49.55	-35.58	-36.58
3	0.76986	9.96	12.67	0.98	22.63	10.94	56.00	46.00	-33.37	-35.06
4	1.34478	10.00	7.05	0.61	17.05	10.61	56.00	46.00	-38.95	-35.39
5	3.22414	10.09	5.40	2.65	15.49	12.74	56.00	46.00	-40.51	-33.26
6	8.39475	10.30	12.11	1.37	22.41	11.67	60.00	50.00	-37.59	-38.33

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---