

FCC Test Report

Report No.: RF190402D14

FCC ID: E8HAS2001

Test Model: AS2001

Received Date: Mar. 21, 2019

Test Date: Mar. 21, 2019

Issued Date: Apr. 10, 2019

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

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R.O.C.

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



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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	6
3.2.1 Test Mode Applicability and Tested Channel Detail	7
3.3 Description of Support Units	8
3.3.1 Configuration of System under Test	8
3.4 General Description of Applied Standards	8
4 Test Types and Results	9
4.1 Radiated Emission and Bandedge Measurement	9
4.1.1 Limits of Radiated Emission and Bandedge Measurement	9
4.1.2 Test Instruments	10
4.1.3 Test Procedures	11
4.1.4 Deviation from Test Standard	11
4.1.5 Test Set Up	12
4.1.6 EUT Operating Conditions	12
4.1.7 Test Results	13
4.2 Channel Bandwidth	18
4.2.1 Test SetUp	18
4.2.2 Test Instruments	18
4.2.3 Test Procedure	18
4.2.4 Deviation from Test Standard	18
4.2.5 EUT Operating Conditions	18
4.2.6 Test Results	19
5 Pictures of Test Arrangements	20
Appendix – Information of the Testing Laboratories	21

Release Control Record

Issue No.	Description	Date Issued
RF190402D14	Original release	Apr. 10, 2019

1 Certificate of Conformity

Product: Active Stylus

Brand: DELL

Test Model: AS2001

Sample Status: Engineering sample

Applicant: Chicony Electronics Co., Ltd.

Test Date: Mar. 21, 2019

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 :



Date:

Apr. 10, 2019

Jessica Cheng / Senior Specialist

Approved by :



Date:

Apr. 10, 2019

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	N/A	Power supply is 1.5Vdc from battery
15.215	Channel Bandwidth Measurement		
15.209	Radiated Emission Test	Pass	Meet the requirement of limit. Minimum passing margin is -16.12 dB at 50.758 MHz

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) (\pm)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.54 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Active Stylus
Brand	DELL
Test Model	AS2001
Sample Status	Engineering sample
Power Supply Rating	1.5Vdc from AAAA battery
Modulation Type	ASK
Operating Frequency	18kHz ~ 44kHz
Antenna Type	Loop antenna
Field Strength	49.75dBuV/m
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT is an Active Stylus.
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

The following test frequency is provided to this EUT.

Operating Frequency (kHz)	Tested Frequency (kHz)
18-44	25

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To			Description
	RE<1G	PLC	CBW	
-	√	Note 1	√	-

Where **RE<1G**: Radiated Emission below 1GHz **PLC**: Power Line Conducted Emission
CBW: Channel Bandwidth

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 2 axis (X.Z). 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
-	18-44	25	ASK

Channel Bandwidth 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
-	18-44	25	ASK

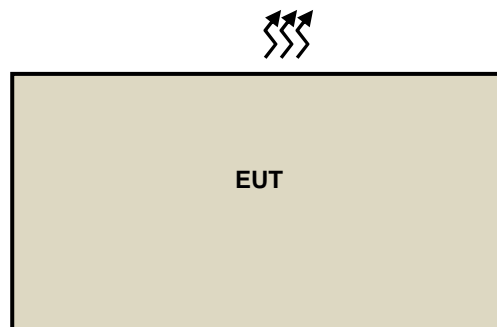
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE<1G	25 deg. C, 76% RH	1.5Vdc	Ian Chang
CBW	25 deg. C, 76% RH	1.5Vdc	Saxon Lee

3.3 Description of Support Units

The EUT has been tested as an independent unit without any necessary accessories or support units.

3.3.1 Configuration of System under Test



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)	Class A (at 10m)		Class B (at 3m)	
	uV/m	dBuV/m	uV/m	dBuV/m
30-88	90	39.1	100	40.0
88-216	150	43.5	150	43.5
216-960	210	46.4	200	46.0
Above 960	300	49.5	500	54.0

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 20, 2019	Feb. 19, 2020
HP Preamplifier	8449B	3008A01201	Feb. 21, 2019	Feb. 20, 2020
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 20, 2019	Feb. 19, 2020
Agilent TEST RECEIVER	N9038A	MY51210129	Mar. 05, 2019	Mar. 04, 2020
Schwarzbeck Antenna	VULB 9168	139	Nov. 26, 2018	Nov. 25, 2019
Schwarzbeck Antenna	VHBA 9123	480	May 19, 2017	May 18, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 25, 2018	Nov. 24, 2019
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Nov. 25, 2018	Nov. 24, 2019
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF102	Cable-CH6-01	Aug. 13, 2018	Aug. 12, 2019
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8-3.6m	Aug. 13, 2018	Aug. 12, 2019
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 4, 2018	Jun. 3, 2019
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Aug. 3, 2018	Aug. 2, 2019
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
EMCO Horn Antenna	3115	00028257	Nov. 25, 2018	Nov. 24, 2019
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 27, 2018	Sep. 26, 2019

- 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 horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.

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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 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.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

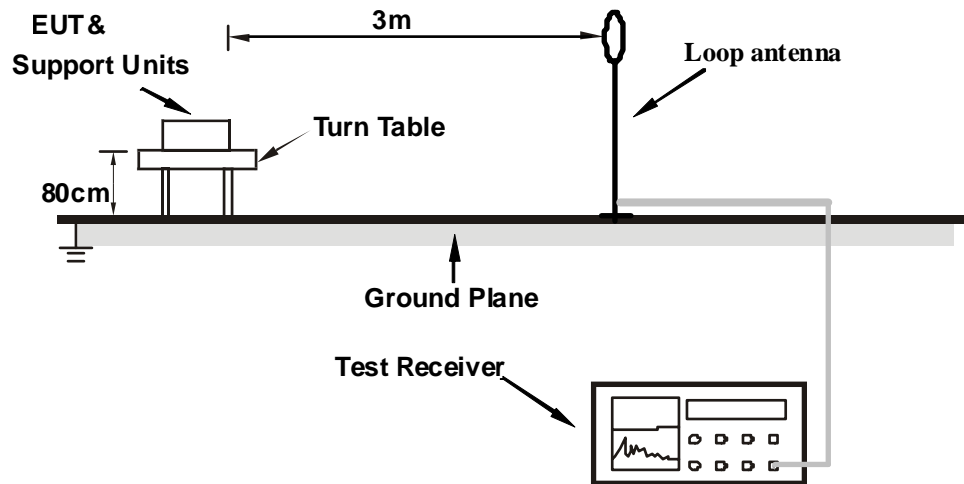
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

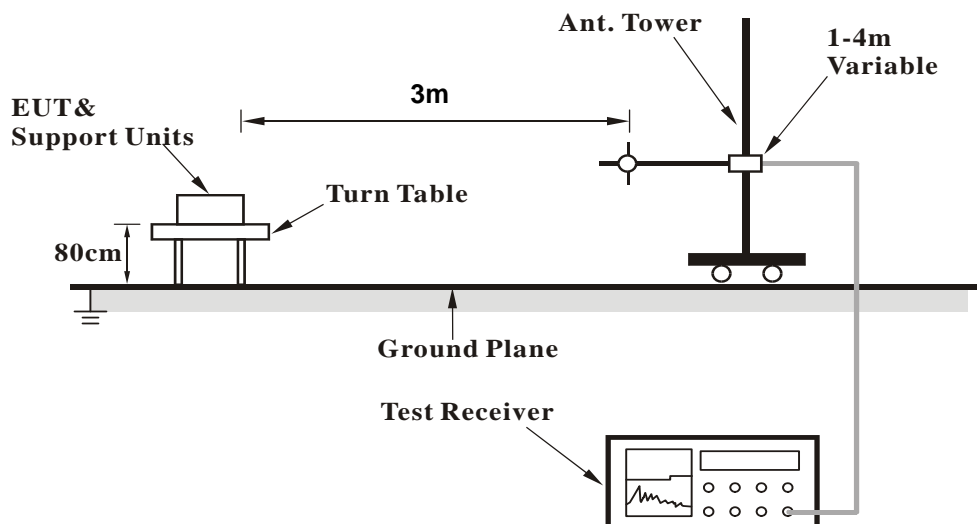
No deviation.

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

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

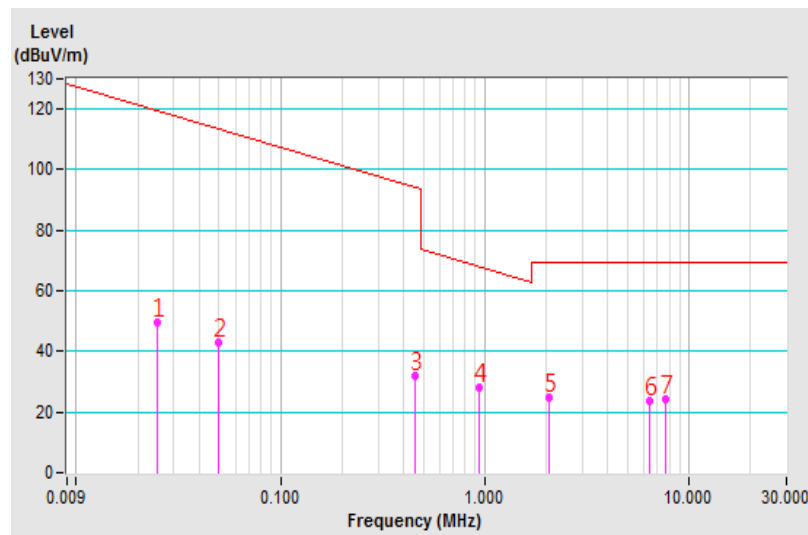
Below 30MHz Data:

Test Frequency	25kHz	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		

Antenna Polarity & Test Distance: Loop Antenna Parallel 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	*0.025	49.75 QP	119.65	-69.90	1.00	183	15.41	34.34
2	0.050	43.06 QP	113.63	-70.57	1.00	316	15.52	27.54
3	0.453	31.77 QP	94.48	-62.71	1.00	284	21.99	9.78
4	0.931	28.25 QP	68.23	-39.98	1.00	128	22.91	5.34
5	2.065	24.82 QP	69.54	-44.72	1.00	176	22.02	2.80
6	6.394	23.46 QP	69.54	-46.08	1.00	312	21.85	1.61
7	7.707	23.98 QP	69.54	-45.56	1.00	240	22.44	1.54

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. Limit @3m=Limit@300m+40log(300 / 3)=Limit@300m+80
8. Limit @3m=Limit@30m+40log(30 / 3)=Limit@30m+40

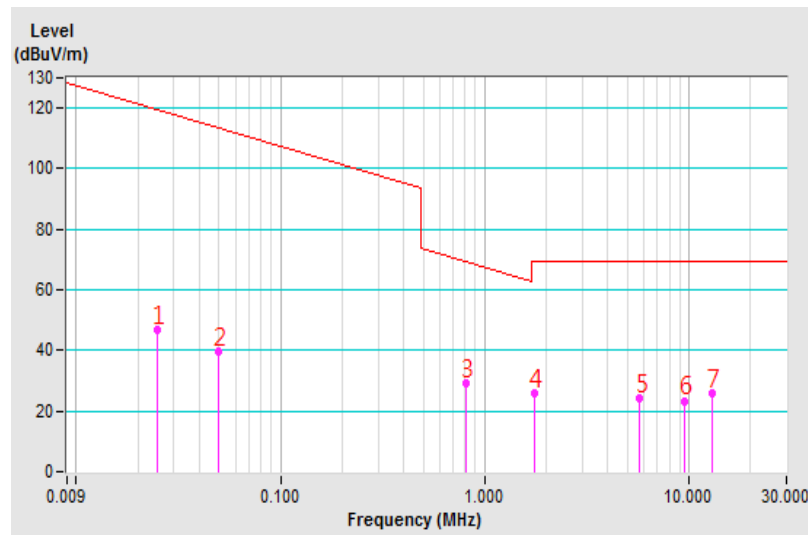


Test Frequency	25kHz	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		

Antenna Polarity & Test Distance: Loop Antenna Perpendicular 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	*0.025	46.82 QP	119.65	-72.83	1.00	0	12.48	34.34
2	0.050	39.65 QP	113.63	-73.98	1.00	129	12.11	27.54
3	0.811	29.07 QP	69.42	-40.35	1.00	53	22.86	6.21
4	1.741	25.85 QP	69.54	-43.69	1.00	98	22.39	3.46
5	5.760	23.99 QP	69.54	-45.55	1.00	118	22.40	1.59
6	9.538	23.38 QP	69.54	-46.16	1.00	302	22.13	1.25
7	13.047	25.75 QP	69.54	-43.79	1.00	360	24.51	1.24

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. Limit @3m=Limit@300m+40log(300 / 3)=Limit@300m+80
8. Limit @3m=Limit@30m+40log(30 / 3)=Limit@30m+40

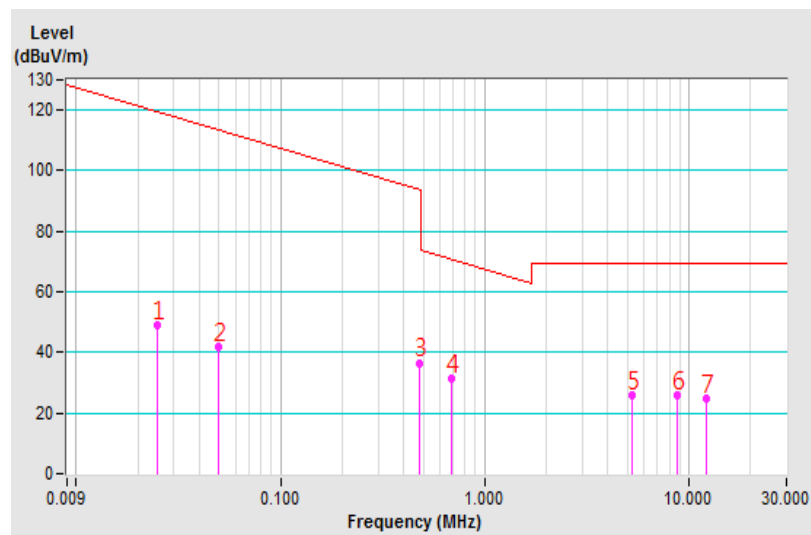


Test Frequency	25kHz	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		

Antenna Polarity & Test Distance: Loop Antenna Ground-parallel 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	*0.025	49.07 QP	119.65	-70.58	1.00	277	14.73	34.34
2	0.050	41.65 QP	113.63	-71.98	1.00	161	14.11	27.54
3	0.481	36.59 QP	93.96	-57.37	1.00	119	27.17	9.42
4	0.691	31.55 QP	70.81	-39.26	1.00	94	24.37	7.18
5	5.220	25.81 QP	69.54	-43.73	1.00	150	24.20	1.61
6	8.699	26.06 QP	69.54	-43.48	1.00	179	24.72	1.34
7	12.208	24.58 QP	69.54	-44.96	1.00	206	23.42	1.16

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “: Fundamental frequency.
6. Loop antenna was used for all radiated emission below 30MHz.
7. Limit @3m=Limit@300m+40log(300 / 3)=Limit@300m+80
8. Limit @3m=Limit@30m+40log(30 / 3)=Limit@30m+40



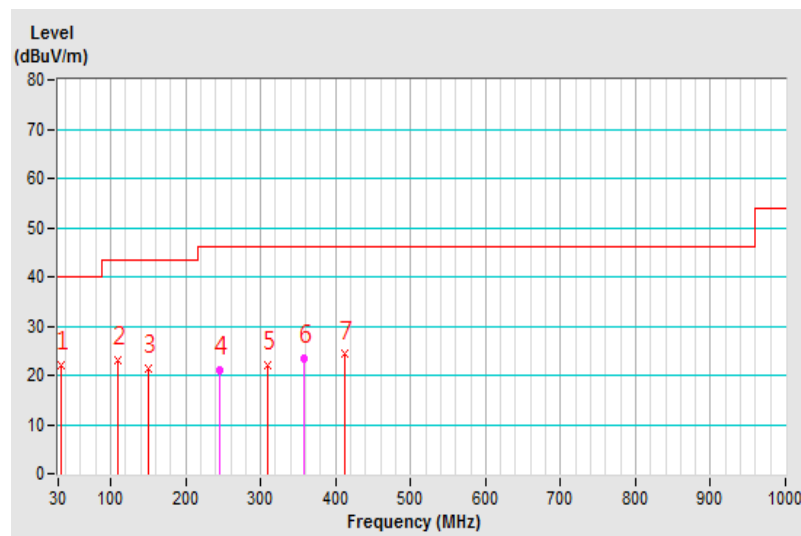
Below 1GHz Data:

Test Frequency	25kHz	Detector Function	Quasi-Peak
Frequency Range	30 MHz ~ 1GHz		

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	33.007	22.03 QP	40.00	-17.97	1.96 H	193	30.80	-8.77
2	109.103	23.13 QP	43.50	-20.37	1.82 H	272	33.21	-10.08
3	150.086	21.28 QP	43.50	-22.22	1.74 H	358	28.13	-6.85
4	244.661	20.99 QP	46.00	-25.01	1.85 H	198	28.14	-7.15
5	310.136	22.06 QP	46.00	-23.94	1.26 H	129	26.80	-4.74
6	358.636	23.48 QP	46.00	-22.52	1.43 H	360	27.54	-4.06
7	412.423	24.30 QP	46.00	-21.70	1.25 H	198	27.39	-3.09

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. Margin value = Emission Level – Limit value

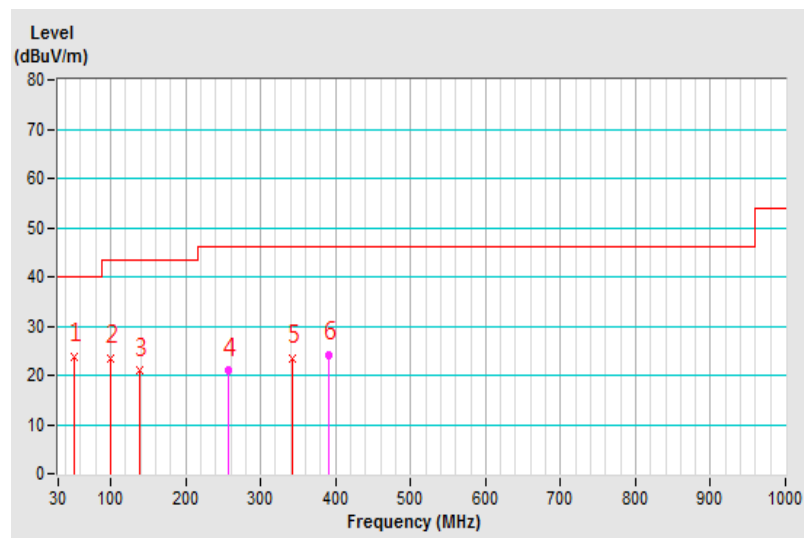


Test Frequency	25kHz	Detector Function	Quasi-Peak
Frequency Range	30 MHz ~ 1GHz		

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	50.758	23.88 QP	40.00	-16.12	1.34 V	123	31.02	-7.14
2	100.276	23.40 QP	43.50	-20.10	1.25 V	172	34.64	-11.24
3	137.815	20.89 QP	43.50	-22.61	1.08 V	276	28.28	-7.39
4	256.786	20.89 QP	46.00	-25.11	1.21 V	135	27.61	-6.72
5	342.486	23.52 QP	46.00	-22.48	1.11 V	351	27.88	-4.36
6	390.791	24.23 QP	46.00	-21.77	1.10 V	341	27.63	-3.40

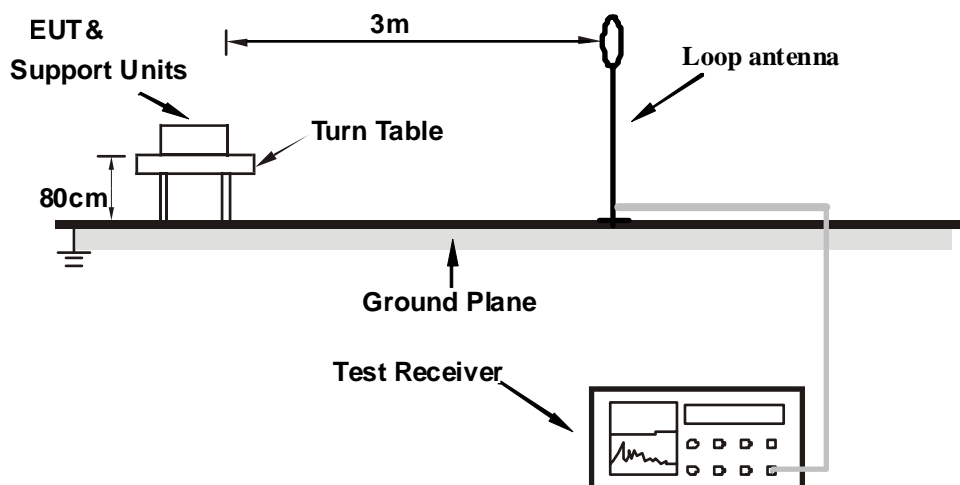
Remarks:

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. Margin value = Emission Level – Limit value



4.2 Channel Bandwidth

4.2.1 Test SetUp



4.2.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.3 Test Procedure

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Then the Loop antenna was rotated 360 degrees to determine the position of the highest radiation.
- The antenna is a broadband loop antenna, which is fixed of a 1m height above the ground, and set away from 3m to the EUT to find the disturbance reading on each frequency.
- The test-receiver system was set to Quasi-peak detect function and specified bandwidth.

4.2.4 Deviation from Test Standard

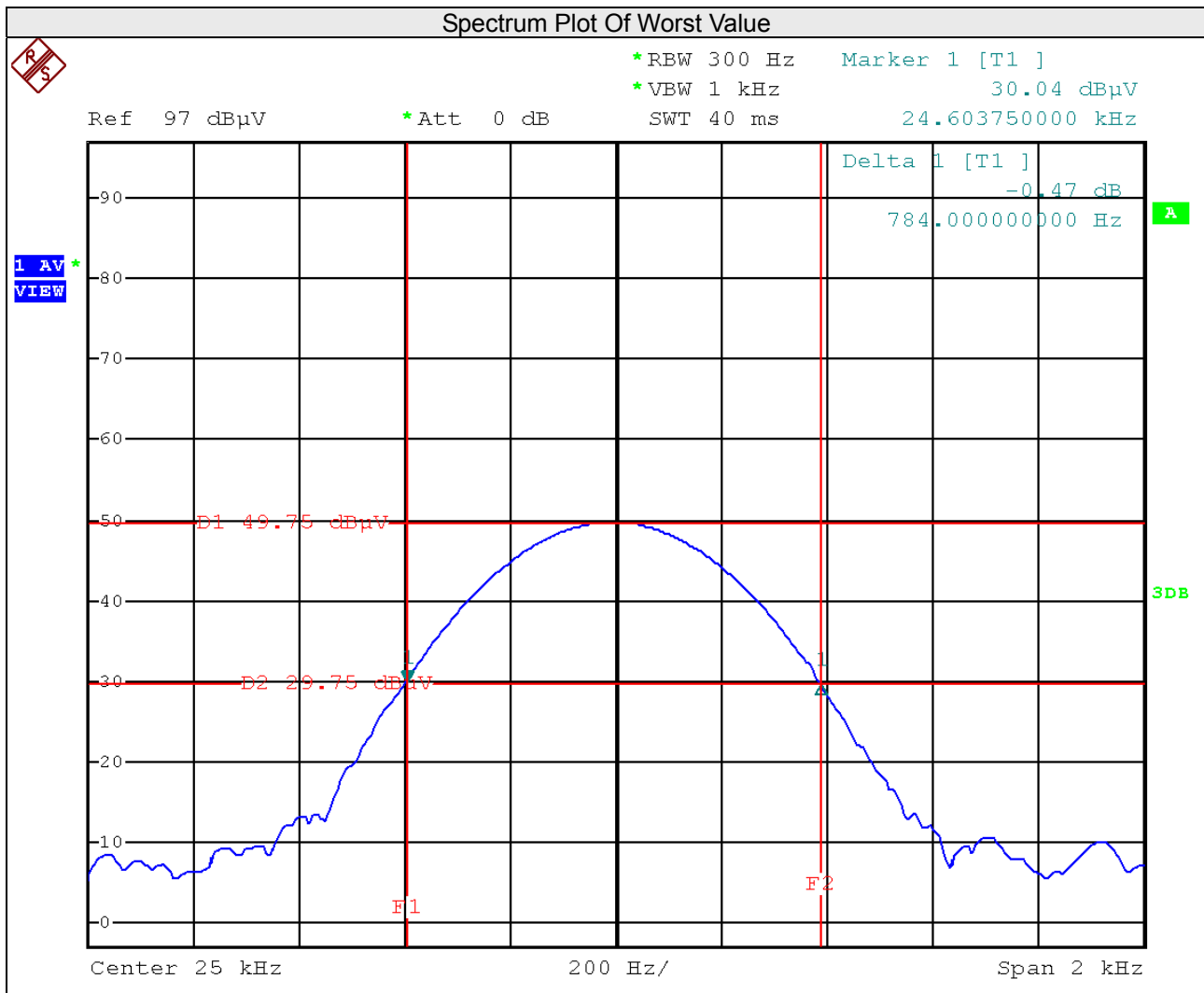
No deviation.

4.2.5 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously.

4.2.6 Test Results

Frequency (kHz)	20dB Bandwidth (kHz)
25	0.784



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.

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