

FCC Test Report

Report No.: RF200615C06-5

FCC ID: H8NTN502A1

Test Model: TN502A1

Series Model: TN502A1(WOS), access, access(WOS) (refer to item 3.1 for more details)

Received Date: Apr. 04, 2020

Test Date: Apr. 30 ~ Oct. 23, 2020

Issued Date: Oct. 27, 2020

Applicant: ASKEY COMPUTER CORP.

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23585, TAIWAN, R.O.C.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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FCC Registration / 788550 / TW0003
Designation Number:



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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	7
3.2.1 Test Mode Applicability and Tested Channel Detail.....	8
3.3 Description of Support Units	10
3.3.1 Configuration of System under Test	10
3.4 General Description of Applied Standards	11
4 Test Types and Results	12
4.1 Radiated Emission Measurement	12
4.1.1 Limits of Radiated Emission Measurement	12
4.1.2 Test Instruments	13
4.1.3 Test Procedures.....	14
4.1.4 Deviation from Test Standard	15
4.1.5 Test Set Up	15
4.1.6 EUT Operating Conditions.....	15
4.1.7 Test Results	16
4.2 Conducted Emission Measurement	35
4.2.1 Limits of Conducted Emission Measurement	35
4.2.2 Test Instruments	35
4.2.3 Test Procedures.....	36
4.2.4 Deviation from Test Standard	36
4.2.5 Test Setup.....	36
4.2.6 EUT Operating Conditions.....	36
4.2.7 Test Results	37
4.3 Frequency Stability.....	43
4.3.1 Limits of Frequency Stability Measurement	43
4.3.2 Test Setup.....	43
4.3.3 Test Instruments	43
4.3.4 Test Procedure	44
4.3.5 Deviation from Test Standard	44
4.3.6 EUT Operating Conditions.....	44
4.3.7 Test Result.....	45
4.4 20dB Bandwidth	46
4.4.1 Limits of 20dB Bandwidth Measurement	46
4.4.2 Test Setup.....	46
4.4.3 Test Instruments	46
4.4.4 Test Procedures.....	46
4.4.5 Deviation from Test Standard	46
4.4.6 EUT Operating Conditions.....	46
4.4.7 Test Results	47
5 Pictures of Test Arrangements.....	51
Appendix – Information of the Testing Laboratories	52

Release Control Record

Issue No.	Description	Date Issued
RF200615C06-5	Original release	Oct. 27, 2020

1 Certificate of Conformity

Product: TurboFon E4 / Handheld Device (refer to item 3.1 for more details)

Brand: TURBONET / Coppernic (refer to item 3.1 for more details)

Test Model: TN502A1

Series Model: TN502A1(WOS), access, access(WOS) (refer to item 3.1 for more details)

Sample Status: Engineering sample

Applicant: ASKEY COMPUTER CORP.

Test Date: Apr. 30 ~ Oct. 23, 2020

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.225)
47 CFR FCC Part 15, Subpart C (Section 15.215)
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 : Polly Chen , **Date:** Oct. 27, 2020
Polly Chen / Specialist

Approved by : Bruce Chen , **Date:** Oct. 27, 2020
Bruce Chen / Senior Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.225, 15.215)			
FCC Clause	Test Item	Result	Remarks
15.207	Conducted emission test	Pass	Meet the requirement of limit. Minimum passing margin is -2.07dB at 13.56200MHz.
15.225 (a)	The field strength of any emissions within the band 13.553-13.567 MHz	Pass	Meet the requirement of limit. Minimum passing margin is -59.2dB at 13.56MHz.
15.225 (b)	The field strength of any emissions within the bands 13.410-13.553 MHz and 13.567-13.710 MHz	Pass	Meet the requirement of limit.
15.225 (c)	The field strength of any emissions within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	Pass	Meet the requirement of limit.
15.225 (d)	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band	Pass	Meet the requirement of limit. Minimum passing margin is -5.3dB at 30.00MHz.
15.225 (e)	The frequency tolerance	Pass	Meet the requirement of limit.
15.215 (c)	20dB Bandwidth	Pass	Meet the requirement of limit.

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)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	TurboFon E4 / Handheld Device (Refer to Note)
Brand	TURBONET / Coppernic (Refer to Note)
Test Model	TN502A1
Series Model	TN502A1(WOS), access, access(WOS)
Model Difference	Refer to Note
Sample Status	Engineering sample
Power Supply Rating	3.85Vdc (from battery) 5.0Vdc / 9.0Vdc / 12.0Vdc (from adapter)
Modulation Type	ASK
Operating Frequency	13.56MHz
Data Rate	Type A: 106 kbit/s Type B: 106 kbit/s Type F: 424 kbit/s Type V: 848kbit/s
Field Strength	24.8dBuV/m (QP) (30m)
Antenna Type	Loop antenna
Antenna Connector	NA
Accessory Device	Refer to note
Cable Supplied	0.95m shielded USB cable without core

Note:

1. All models are listed as below. Model TN502A1 is the representative for final test.

Brand	Product name	Model	Difference	
TURBONET	TurboFon E4	TN502A1	With scanner	-
		TN502A1(WOS)	Without scanner	-
Coppernic	Handheld Device	access	With scanner	Model: access is electrically identical to TN502A1, different brands and model names are for marketing purpose.
		access(WOS)	Without scanner	Model: access(WOS) is electrically identical to TN502A1(WOS), different brands and model names are for marketing purpose.

2. The EUT consumes power from the following accessory devices.

Battery	
Brand	ETI
Model	BP19-002710
Rating	3.85Vdc, 4000mAh, 15.4Wh

Adapter	
Brand	CHANNEL WELL TECHNOLOGY
Model	2ACP0183C
Input Power	100-240Vac~0.5A , 50/60Hz
Output Power	5.0Vdc / 3.0A 15.0W / 9.0Vdc / 2.0A 18.0W / 12.0Vdc / 1.5A 18.0W

Item	Brand	Model	Description
Docking Station 1 (optional)	TURBONET	DS12310	The models and brand names of docking station are electrically identical, different models and brand names are for marketing purpose. The docking station 1 was chosen for final test.
Docking Station 2 (optional)	COPPERNIC	DS-ACCESS	
Data Cable Supplied	0.95m shielding USB cable without core		
Adapter (For docking use)			
Brand	Sunny ELECTRONICS CORP.		
Model	SYS1541-2412		
Input Power	100-240Vac, 1.0A, 50/60Hz		
Output Power	+12Vdc, 2A		
Power line	1.5m power cable without core		

3. 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.

3.2 Description of Test Modes

1 channel is provided to this EUT

Channel	Freq. (MHz)
1	13.56

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE	PLC	FS	EB	
A1	√	√	√	√	NFC: Tag Type A: EUT with Adapter
A2	-	√	-	-	NFC: Tag Type A: EUT with Notebook
A3	√	√	-	-	NFC: Tag Type A: EUT with Docking Station
B	√	-	-	√	NFC: Tag Type B: EUT with Adapter
C	√	-	-	√	NFC: Tag Type F: EUT with Adapter
D	√	-	-	√	NFC: Tag Type V: EUT with Adapter

Where RE: Radiated Emission
FS: Frequency Stability

PLC: Power Line Conducted Emission
EB: 20dB Bandwidth measurement

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Y-plane **for mode A1, A2, B, C, D.**
2. "-": Means no effect.

Radiated 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	Available Channel	Tested Channel	Modulation Type
A1, A3, B, C, D	1	1	ASK

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	Available Channel	Tested Channel	Modulation Type
A1, A2, A3	1	1	ASK

Frequency Stability:

- ☒ 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	Available Channel	Tested Channel	Modulation Type
A1	1	1	ASK

20dB Bandwidth:

- ☒ 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	Available Channel	Tested Channel	Modulation Type
A1, B, C, D	1	1	ASK

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE	23 deg. C, 67% RH 23 deg. C, 66% RH	120Vac, 60Hz	Adair Peng, Titan Hsu
PLC	23 deg. C, 67% RH 25 deg. C, 69% RH	120Vac, 60Hz	Adair Peng, Luis Lee
FS	25 deg. C, 67% RH	3.85Vdc	Adair Peng
BW	23 deg. C, 67% RH	120Vac, 60Hz	Adair Peng

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	Lenovo	80Q7	PF0KUGU6	FCC DoC Approved	-
B.	Docking Station	TURBONET	DS12310	NA	NA	Provided by client
C.	Adapter	Sunny ELECTRONICS CORP.	SYS1541-2412	NA	NA	Provided by client

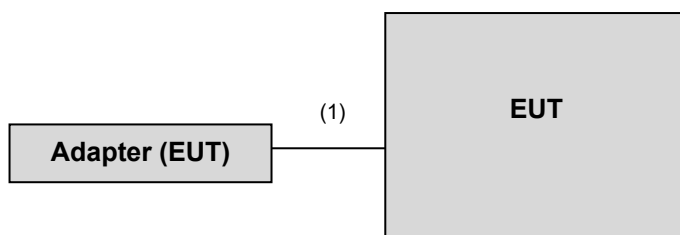
Note:

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

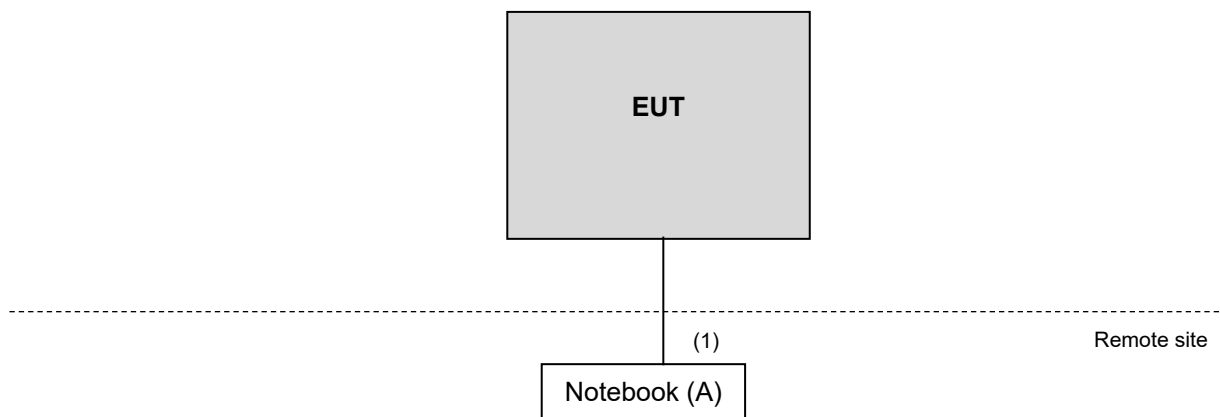
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	0.95	Y	0	Accessory
2.	Power cable	1	1.5	-	0	Provided by client
3.	USB cable	1	0.95	Y	0	Accessory of cradle

3.3.1 Configuration of System under Test

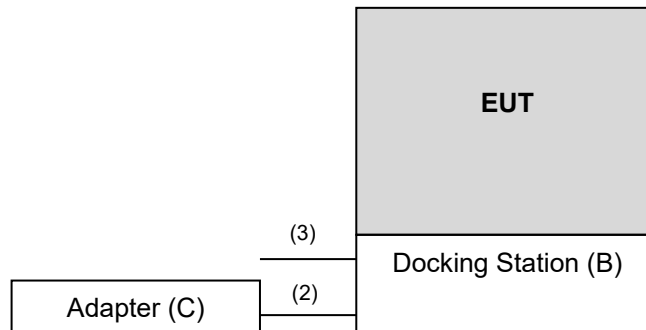
Mode A1, B, C, D



Mode A2



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 (15.225)

FCC Part 15, Subpart C (15.215)

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 Measurement

4.1.1 Limits of Radiated Emission Measurement

The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Dec. 31, 2019	Dec. 30, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jun. 04, 2019 Jun. 09, 2020	Jun. 03, 2020 Jun. 08, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 11, 2019	Nov. 10, 2020
HORN Antenna SCHWARZBECK	9120D	209	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019 Jul. 06, 2020	Jun. 30, 2020 Jul. 05, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 20, 2019 Aug. 16, 2020	Aug. 19, 2020 Aug. 15, 2021
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 23, 2020	Mar. 22, 2021
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH3-01	Aug. 20, 2019 Aug. 16, 2020	Aug. 19, 2020 Aug. 15, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 20, 2019 Aug. 16, 2020	Aug. 19, 2020 Aug. 15, 2021
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM- SM-8000	Cable-CH3-03 (309224+170907)	Aug. 20, 2019 Aug. 16, 2020	Aug. 19, 2020 Aug. 15, 2021
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190 004/MY55190007/MY55 210005	Jul. 15, 2019 Jul. 13, 2020	Jul. 14, 2020 Jul. 12, 2021

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 HwaYa Chamber 3.

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 30MHz ~ 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:

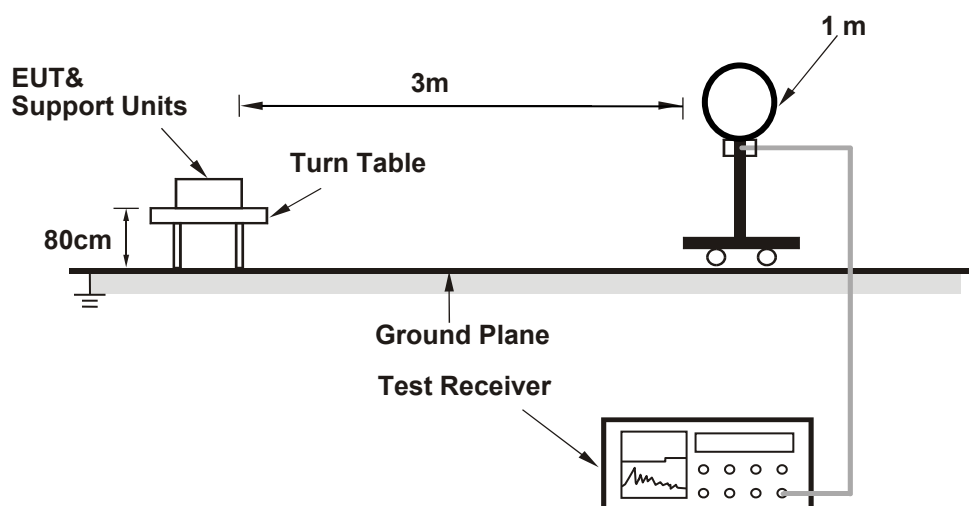
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

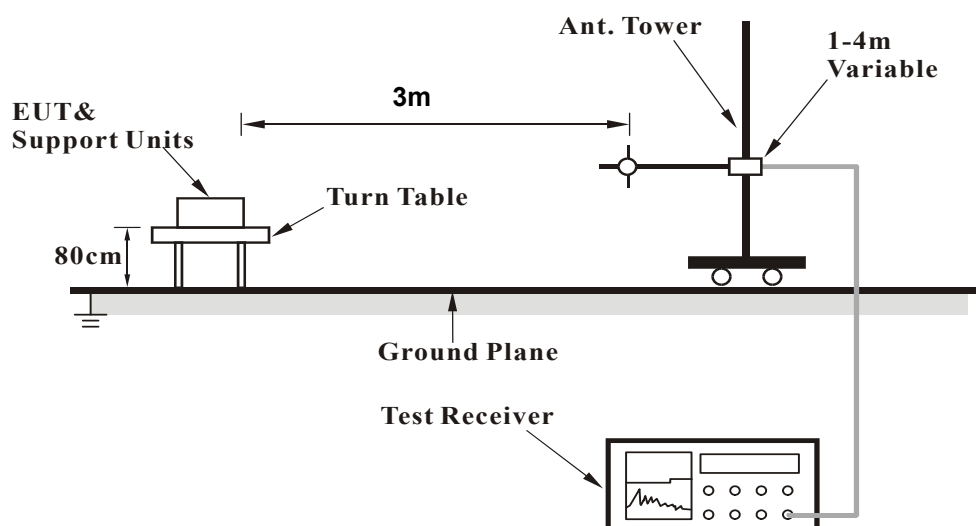
No deviation.

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

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 66% RH	Tested By	Titan Hsu
Test Mode	A1		

Antenna Polarity & Test Distance: Loop Antenna Parallel At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	24.8 QP	84.0	-59.2	1.00	146	43.5	-18.7

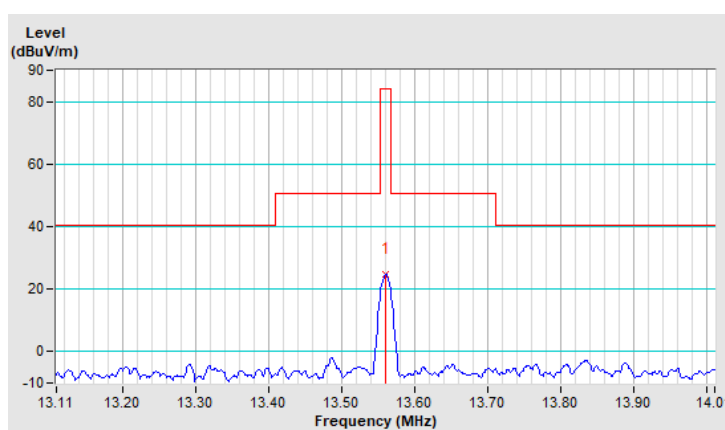
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ” : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 66% RH	Tested By	Titan Hsu
Test Mode	A1		

Antenna Polarity & Test Distance: Loop Antenna Perpendicular At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	21.2 QP	84.0	-62.8	1.00	235	39.9	-18.7

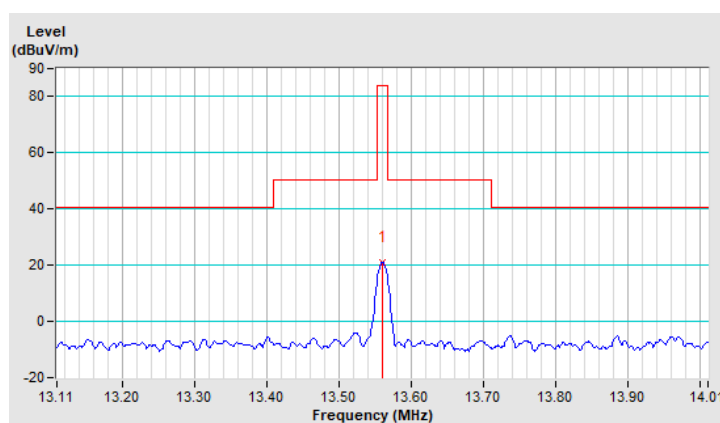
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ” : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 66% RH	Tested By	Titan Hsu
Test Mode	A1		

Antenna Polarity & Test Distance: Loop Antenna Ground Parallel At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	18.3 QP	84.0	-65.7	1.00	339	37.0	-18.7

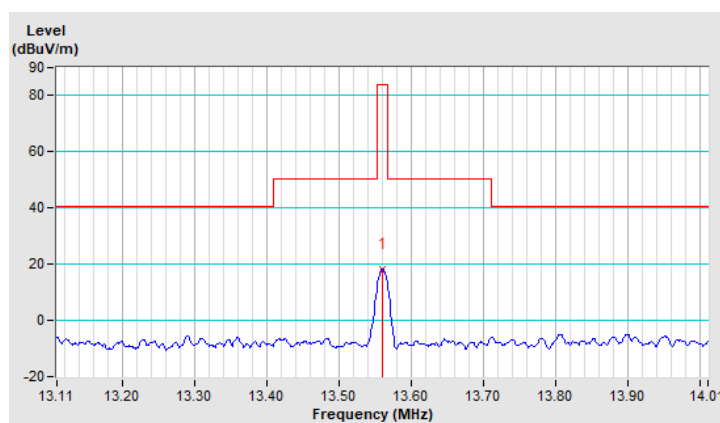
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “ : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m

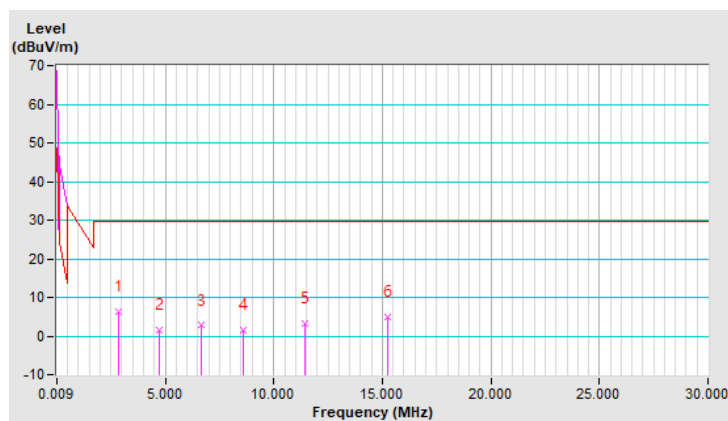


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 66% RH	Tested By	Titan Hsu
Test Mode	A1		

Antenna Polarity & Test Distance: Loop Antenna Parallel At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	2.83	6.2 QP	29.5	-23.3	1.00	262	26.9	-20.7
2	4.75	1.6 QP	29.5	-27.9	1.00	132	21.6	-20.0
3	6.66	2.7 QP	29.5	-26.8	1.00	358	22.2	-19.5
4	8.57	1.4 QP	29.5	-28.1	1.00	9	20.5	-19.1
5	11.44	3.2 QP	29.5	-26.3	1.00	198	21.9	-18.7
6	15.22	4.8 QP	29.5	-24.7	1.00	5	23.4	-18.6

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. For 0.49 ~ 30MHz, the measured field strength was extrapolated to distance 30 meters Distance factor@3m = $40 \cdot \log(3/30) = -40\text{dB}$

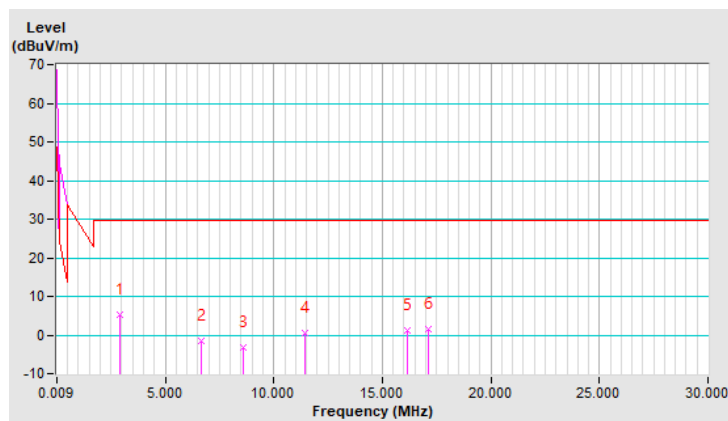


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 66% RH	Tested By	Titan Hsu
Test Mode	A1		

Antenna Polarity & Test Distance: Loop Antenna Perpendicular At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	2.92	5.3 QP	29.5	-24.2	1.00	44	26.0	-20.7
2	6.66	-1.6 QP	29.5	-31.1	1.00	9	17.9	-19.5
3	8.57	-3.2 QP	29.5	-32.7	1.00	52	15.9	-19.1
4	11.44	0.4 QP	29.5	-29.1	1.00	223	19.1	-18.7
5	16.18	1.2 QP	29.5	-28.3	1.00	1	19.8	-18.6
6	17.13	1.5 QP	29.5	-28.0	1.00	56	20.0	-18.5

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. For 0.49 ~ 30MHz, the measured field strength was extrapolated to distance 30 meters Distance factor@3m = $40 \cdot \log(3/30) = -40\text{dB}$

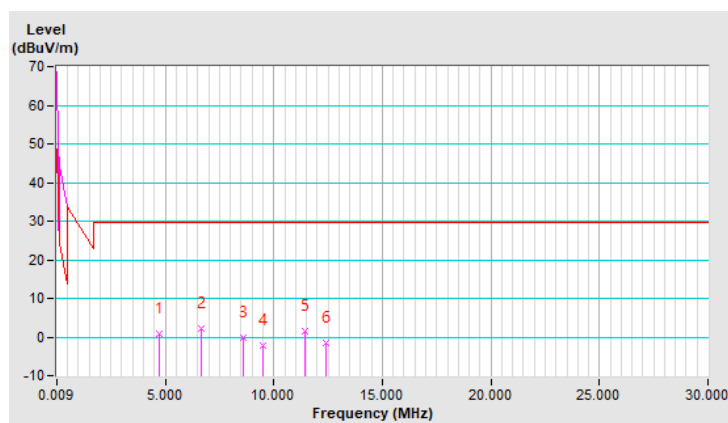


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 30MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 66% RH	Tested By	Titan Hsu
Test Mode	A1		

Antenna Polarity & Test Distance: Loop Antenna Ground Paralle At 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	4.75	0.7 QP	29.5	-28.8	1.00	65	20.7	-20.0
2	6.66	2.1 QP	29.5	-27.4	1.00	232	21.6	-19.5
3	8.57	0.0 QP	29.5	-29.5	1.00	168	19.1	-19.1
4	9.53	-2.1 QP	29.5	-31.6	1.00	84	16.8	-18.9
5	11.44	1.4 QP	29.5	-28.1	1.00	287	20.1	-18.7
6	12.40	-1.6 QP	29.5	-31.1	1.00	113	17.1	-18.7

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. For 0.49 ~ 30MHz, the measured field strength was extrapolated to distance 30 meters Distance factor@3m = $40 \cdot \log(3/30) = -40\text{dB}$

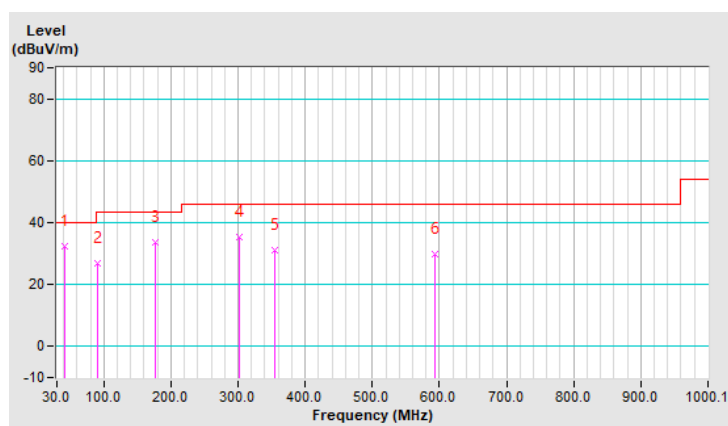


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 67% RH	Tested By	Greg Lin
Test Mode	A1		

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	41.25	32.3 QP	40.0	-7.7	2.00 H	68	41.5	-9.2
2	90.46	26.7 QP	43.5	-16.8	2.00 H	288	41.0	-14.3
3	176.22	33.8 QP	43.5	-9.7	1.49 H	274	43.2	-9.4
4	302.75	35.4 QP	46.0	-10.6	1.00 H	131	42.7	-7.3
5	354.77	31.1 QP	46.0	-14.9	1.00 H	131	37.2	-6.1
6	592.38	29.8 QP	46.0	-16.2	2.00 H	208	28.9	0.9

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

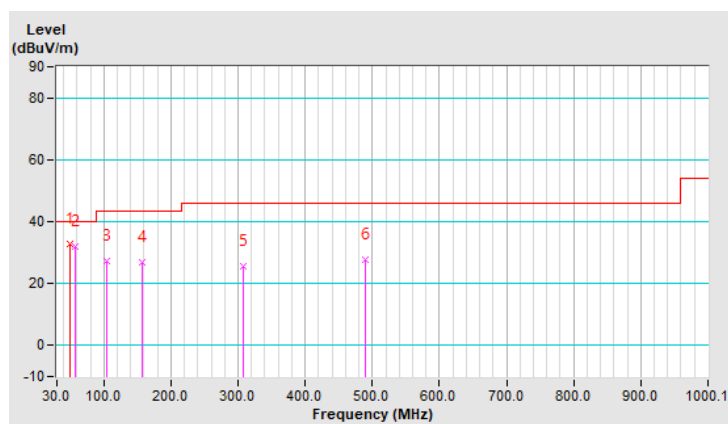


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 67% RH	Tested By	Greg Lin
Test Mode	A1		

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	50.41	32.9 QP	40.0	-7.1	1.00 V	304	41.6	-8.7
2	56.71	32.1 QP	40.0	-7.9	1.00 V	70	41.2	-9.1
3	104.51	27.2 QP	43.5	-16.3	1.00 V	14	39.6	-12.4
4	157.94	27.0 QP	43.5	-16.5	1.00 V	351	35.5	-8.5
5	308.38	25.5 QP	46.0	-20.5	2.00 V	48	32.6	-7.1
6	489.74	27.6 QP	46.0	-18.4	1.49 V	262	29.4	-1.8

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

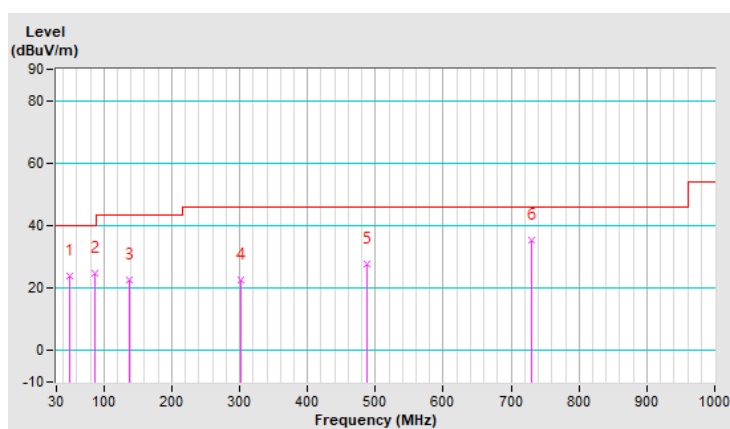


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 66% RH	Tested By	Titan Hsu
Test Mode	A3		

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	49.68	24.1 QP	40.0	-15.9	1.50 H	321	33.2	-9.1
2	87.64	24.7 QP	40.0	-15.3	1.50 H	128	39.0	-14.3
3	138.25	22.6 QP	43.5	-20.9	1.50 H	354	31.7	-9.1
4	302.72	22.5 QP	46.0	-23.5	1.00 H	343	29.2	-6.7
5	486.88	27.7 QP	46.0	-18.3	1.50 H	290	30.2	-2.5
6	730.09	35.3 QP	46.0	-10.7	1.00 H	97	32.7	2.6

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

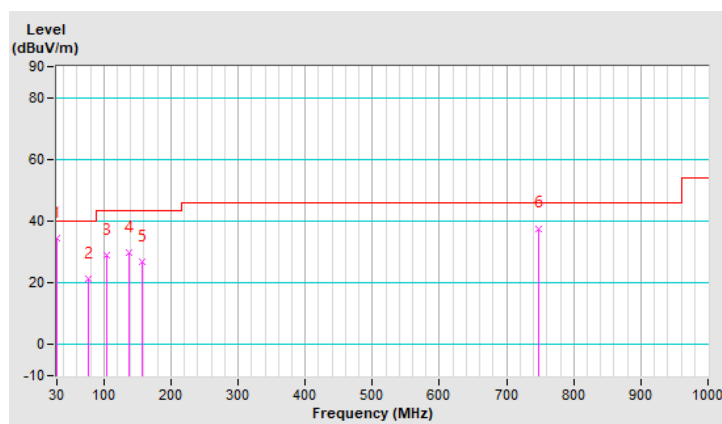


EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	Below 1000MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 66% RH	Tested By	Titan Hsu
Test Mode	A3		

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	30.00	34.7 QP	40.0	-5.3	1.00 V	180	45.3	-10.6
2	76.39	21.5 QP	40.0	-18.5	1.49 V	7	34.0	-12.5
3	104.51	28.9 QP	43.5	-14.6	1.00 V	163	41.3	-12.4
4	138.25	29.8 QP	43.5	-13.7	1.00 V	194	38.9	-9.1
5	157.93	26.7 QP	43.5	-16.8	1.00 V	183	35.0	-8.3
6	746.96	37.7 QP	46.0	-8.3	1.00 V	26	34.5	3.2

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



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	24 deg. C, 68% RH	Tested By	Titan Hsu
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Parallel At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	21.6 QP	84.0	-62.4	1.00	97	40.3	-18.7

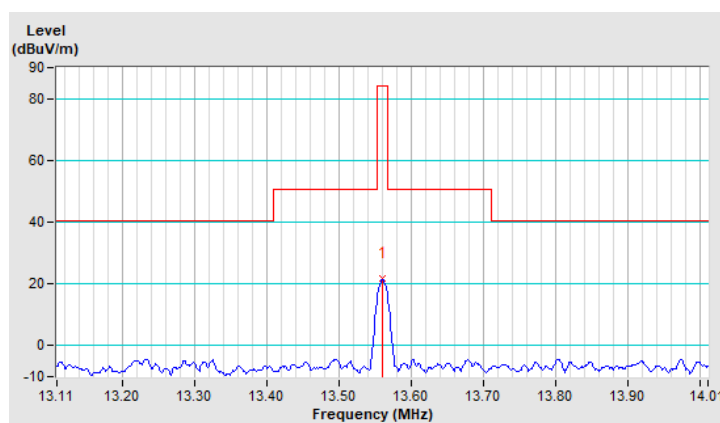
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ” : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	24 deg. C, 68% RH	Tested By	Titan Hsu
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Perpendicular At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	19.7 QP	84.0	-64.3	1.00	229	38.4	-18.7

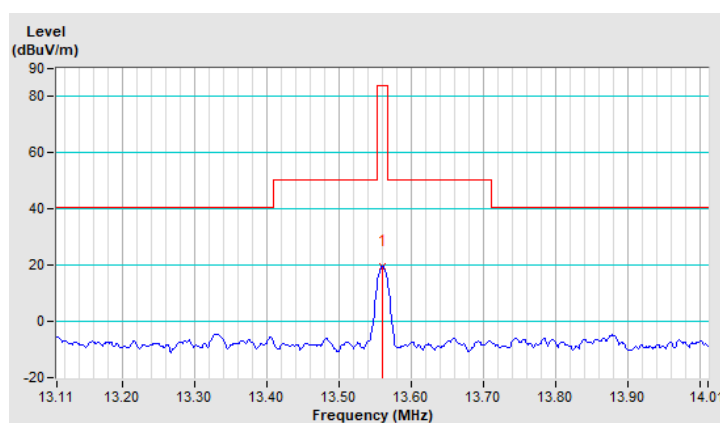
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “ : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	24 deg. C, 68% RH	Tested By	Titan Hsu
Test Mode	B		

Antenna Polarity & Test Distance: Loop Antenna Ground Parallel At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	16.5 QP	84.0	-67.5	1.00	336	35.2	-18.7

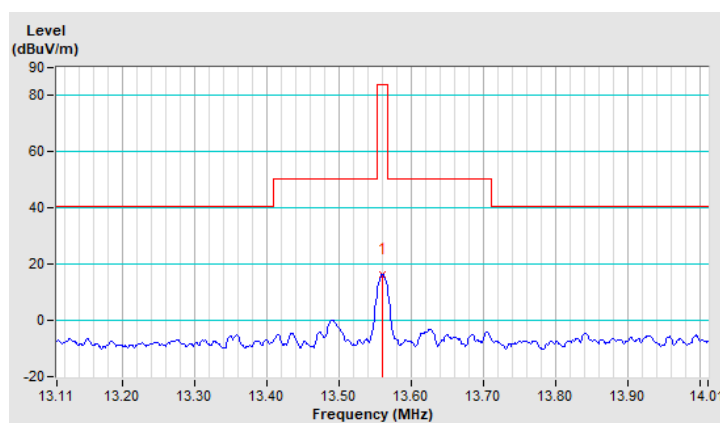
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “ : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 67% RH	Tested By	Titan Hsu
Test Mode	C		

Antenna Polarity & Test Distance: Loop Antenna Parallel At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	20.9 QP	84.0	-63.1	1.00	103	39.6	-18.7

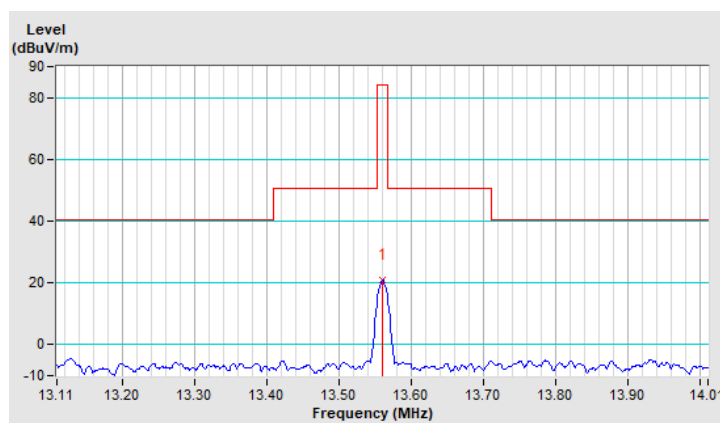
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ” : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

$$\begin{aligned}
 13.56\text{MHz} &= 15848\mu\text{V/m} & 30\text{m} \\
 &= 84\text{dBuV/m} & 30\text{m}
 \end{aligned}$$



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 67% RH	Tested By	Titan Hsu
Test Mode	C		

Antenna Polarity & Test Distance: Loop Antenna Perpendicular At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	18.8 QP	84.0	-65.2	1.00	222	37.5	-18.7

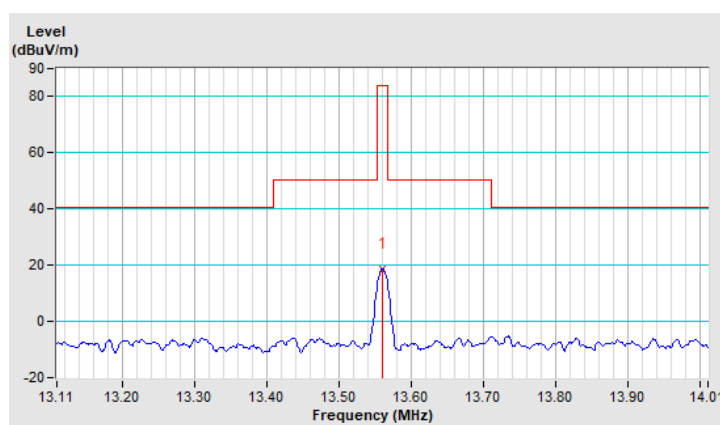
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ” : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 67% RH	Tested By	Titan Hsu
Test Mode	C		

Antenna Polarity & Test Distance: Loop Antenna Ground Parallel At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	17.7 QP	84.0	-66.3	1.00	331	36.4	-18.7

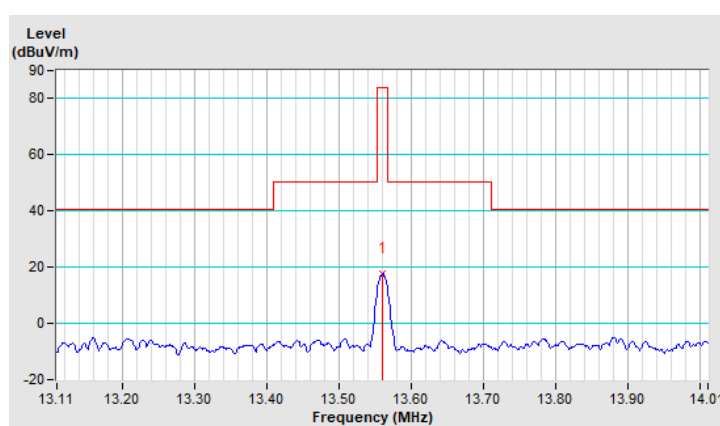
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “ : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 67% RH	Tested By	Titan Hsu
Test Mode	D		

Antenna Polarity & Test Distance: Loop Antenna Parallel At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	21.7 QP	84.0	-62.3	1.00	106	40.4	-18.7

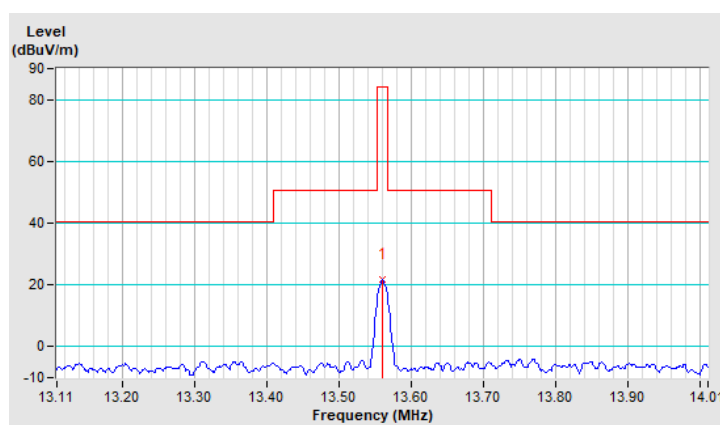
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ” : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 67% RH	Tested By	Titan Hsu
Test Mode	D		

Antenna Polarity & Test Distance: Loop Antenna Perpendicular At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	19.8 QP	84.0	-64.2	1.00	229	38.5	-18.7

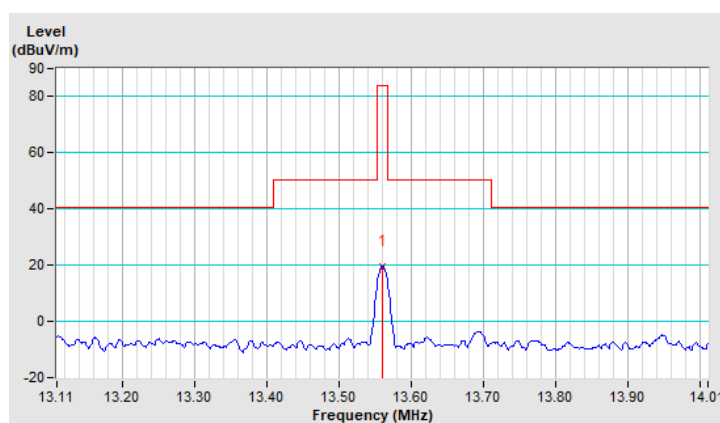
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “ : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	13.553 ~ 13.567MHz
Input Power	120Vac, 60Hz	Detector Function	Quasi-Peak
Environmental Conditions	23 deg. C, 67% RH	Tested By	Titan Hsu
Test Mode	D		

Antenna Polarity & Test Distance: Loop Antenna Ground Parallel At 30m								
No.	Freq. (MHz)	Emission Level (dBuV/m) (30m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV) (3m)	Correction Factor (dB/m)
1	*13.56	18.2 QP	84.0	-65.8	1.00	341	36.9	-18.7

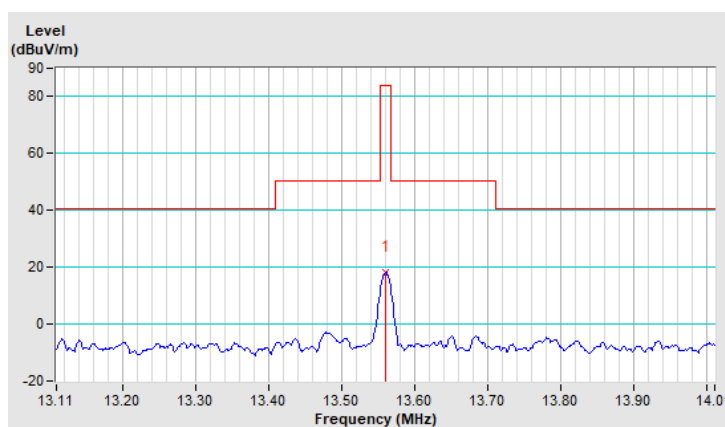
Remarks:

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
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * “ : Fundamental frequency
6. Above limits have been translated by the formula

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
 = 84dBuV/m 30m



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

Tested date: Apr. 30 ~ Oct. 23, 2020

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 11, 2019	Dec. 10, 2020
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
			Sep. 04, 2020	Sep. 03, 2021
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 20, 2020	Feb. 19, 2021
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 22, 2019	Aug. 21, 2020
			Aug. 28, 2020	Aug. 27, 2021
Software ADT	BV ADT_Conc_ 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 HwaYa Shielded Room 1 (Conduction 1).

3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

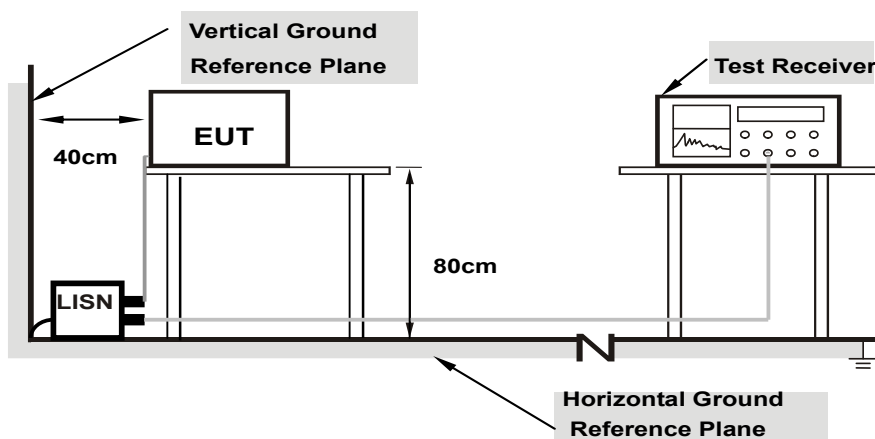
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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

Same as 4.1.6.

4.2.7 Test Results

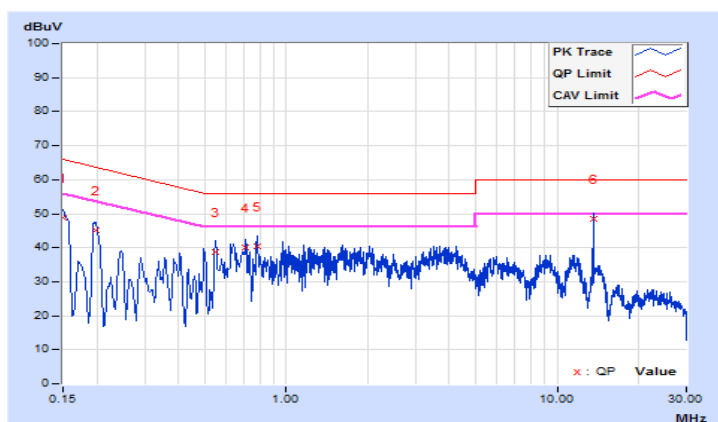
Type A

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A1		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.63	39.23	29.35	48.86	38.98	66.00	56.00	-17.14	-17.02
2	0.19728	9.62	35.54	26.14	45.16	35.76	63.72	53.72	-18.56	-17.96
3	0.54600	9.66	28.92	19.23	38.58	28.89	56.00	46.00	-17.42	-17.11
4	0.70600	9.67	30.35	17.26	40.02	26.93	56.00	46.00	-15.98	-19.07
5	0.77800	9.67	30.62	17.51	40.29	27.18	56.00	46.00	-15.71	-18.82
6	13.56200	9.89	38.52	38.04	48.41	47.93	60.00	50.00	-11.59	-2.07

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.

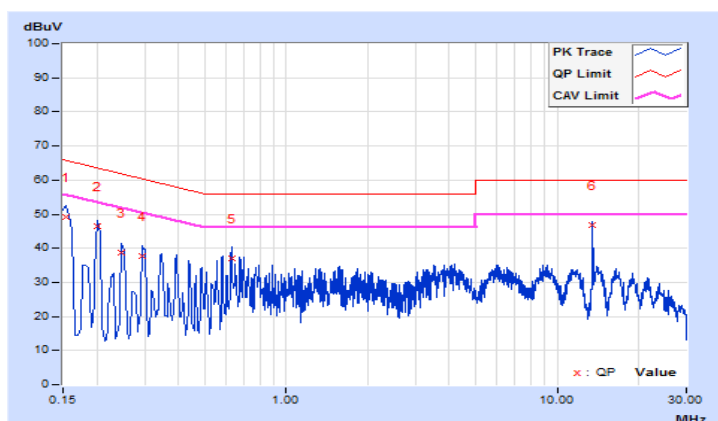


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A1		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15400	9.66	39.36	27.70	49.02	37.36	65.78	55.78	-16.76	-18.42
2	0.20200	9.64	36.76	23.57	46.40	33.21	63.53	53.53	-17.13	-20.32
3	0.24600	9.65	29.12	19.05	38.77	28.70	61.89	51.89	-23.12	-23.19
4	0.29400	9.65	27.94	16.30	37.59	25.95	60.41	50.41	-22.82	-24.46
5	0.63000	9.68	27.20	15.75	36.88	25.43	56.00	46.00	-19.12	-20.57
6	13.55800	9.96	36.96	35.99	46.92	45.95	60.00	50.00	-13.08	-4.05

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.

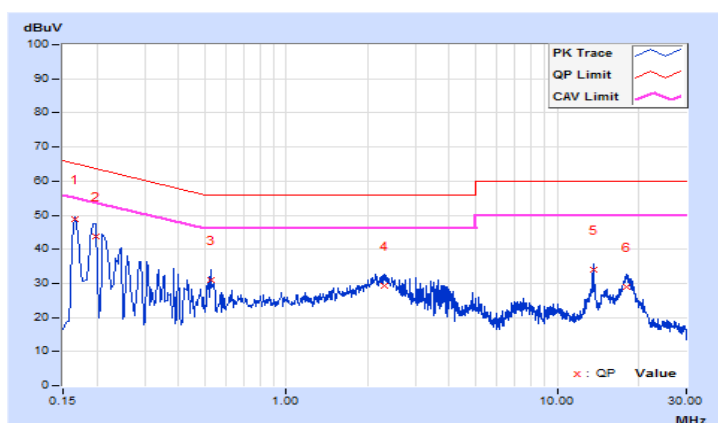


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A2		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16600	9.63	39.13	25.01	48.76	34.64	65.16	55.16	-16.40	-20.52
2	0.19800	9.62	34.17	19.42	43.79	29.04	63.69	53.69	-19.90	-24.65
3	0.52600	9.66	21.19	12.90	30.85	22.56	56.00	46.00	-25.15	-23.44
4	2.29800	9.74	19.43	14.99	29.17	24.73	56.00	46.00	-26.83	-21.27
5	13.56000	9.89	24.18	22.48	34.07	32.37	60.00	50.00	-25.93	-17.63
6	17.93400	9.91	18.95	13.92	28.86	23.83	60.00	50.00	-31.14	-26.17

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.

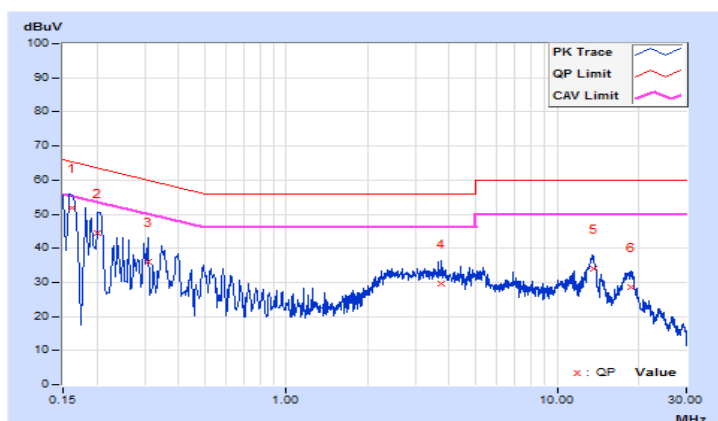


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A2		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16200	9.66	42.09	23.46	51.75	33.12	65.36	55.36	-13.61	-22.24
2	0.20201	9.64	34.87	16.29	44.51	25.93	63.53	53.53	-19.02	-27.60
3	0.31000	9.66	26.51	13.06	36.17	22.72	59.97	49.97	-23.80	-27.25
4	3.73800	9.81	19.79	14.35	29.60	24.16	56.00	46.00	-26.40	-21.84
5	13.56000	9.96	24.10	17.22	34.06	27.18	60.00	50.00	-25.94	-22.82
6	18.75800	10.02	18.46	13.41	28.48	23.43	60.00	50.00	-31.52	-26.57

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.

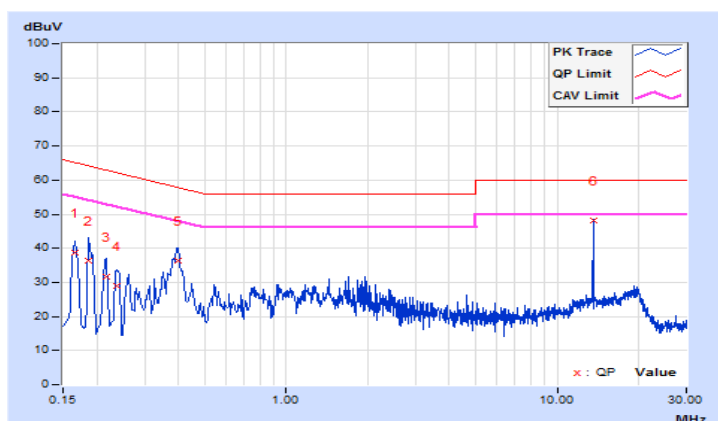


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A3		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16600	9.83	29.03	12.49	38.86	22.32	65.16	55.16	-26.30	-32.84
2	0.18600	9.84	26.58	10.29	36.42	20.13	64.21	54.21	-27.79	-34.08
3	0.21633	9.85	21.80	7.32	31.65	17.17	62.96	52.96	-31.31	-35.79
4	0.23723	9.85	19.00	5.33	28.85	15.18	62.19	52.19	-33.34	-37.01
5	0.39654	9.87	26.44	22.37	36.31	32.24	57.93	47.93	-21.62	-15.69
6	13.56200	10.12	38.10	29.94	48.22	40.06	60.00	50.00	-11.78	-9.94

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.

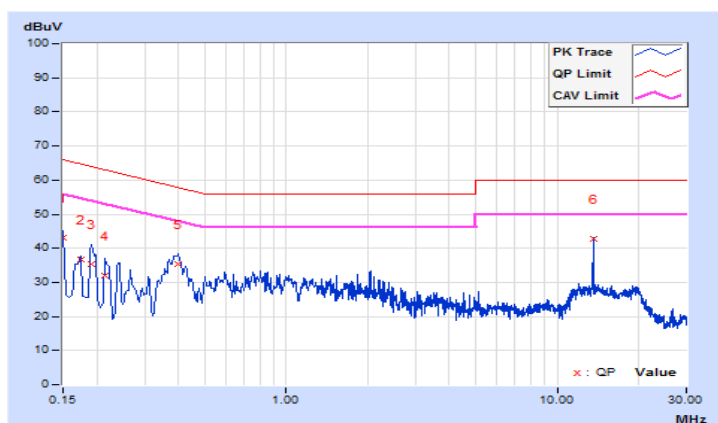


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A3		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.84	33.25	17.99	43.09	27.83	66.00	56.00	-22.91	-28.17
2	0.17384	9.84	26.87	14.60	36.71	24.44	64.77	54.77	-28.06	-30.33
3	0.19000	9.85	25.35	11.52	35.20	21.37	64.04	54.04	-28.84	-32.67
4	0.21400	9.85	22.16	8.41	32.01	18.26	63.05	53.05	-31.04	-34.79
5	0.39758	9.90	25.54	21.14	35.44	31.04	57.90	47.90	-22.46	-16.86
6	13.56200	10.21	32.39	26.07	42.60	36.28	60.00	50.00	-17.40	-13.72

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.

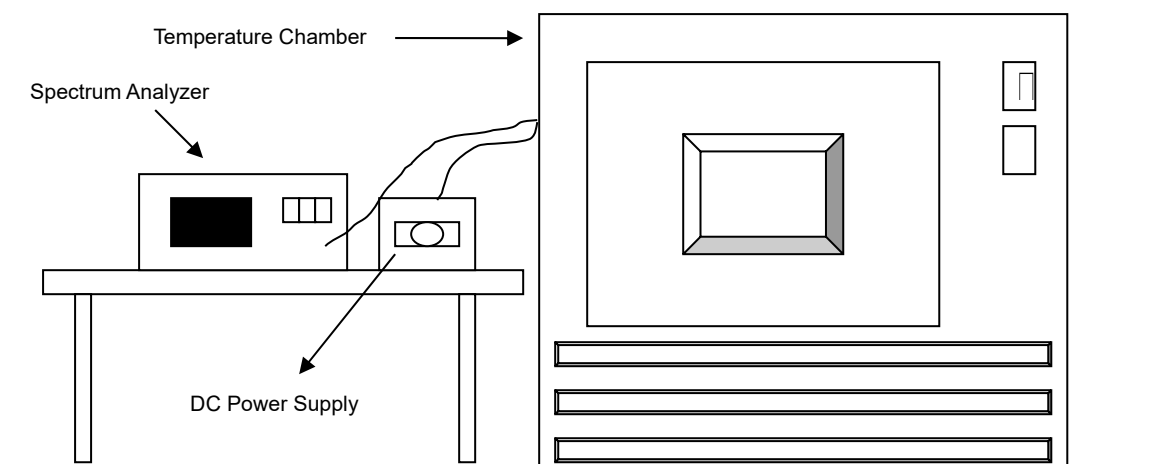


4.3 Frequency Stability

4.3.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.3.2 Test Setup



4.3.3 Test Instruments

Tested date: Apr. 30, 2020

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2019	Jun. 11, 2020
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 03, 2019	Jun. 02, 2020
Digital Multimeter Fluke	87-III	70360742	Jun. 27, 2019	Jun. 26, 2020
DC Power Supply Topward	6306A	727263	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.

4.3.4 Test Procedure

- a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- e. Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
- f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

Same as Item 4.1.6.

4.3.7 Test Result

Type A

Frequency Stability Versus Temp.									
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
50	3.85	13.56006	0.00044	13.56006	0.00044	13.56006	0.00044	13.56006	0.00044
40	3.85	13.56005	0.00037	13.56005	0.00037	13.56005	0.00037	13.56004	0.00029
30	3.85	13.56006	0.00044	13.56005	0.00037	13.56005	0.00037	13.56006	0.00044
20	3.85	13.55995	-0.00037	13.55996	-0.00029	13.55997	-0.00022	13.55997	-0.00022
10	3.85	13.56005	0.00037	13.56005	0.00037	13.56005	0.00037	13.56004	0.00029
0	3.85	13.56004	0.00029	13.56004	0.00029	13.56005	0.00037	13.56003	0.00022
-10	3.85	13.56002	0.00015	13.56002	0.00015	13.56001	0.00007	13.56002	0.00015
-20	3.85	13.56005	0.00037	13.56005	0.00037	13.56005	0.00037	13.56004	0.00029

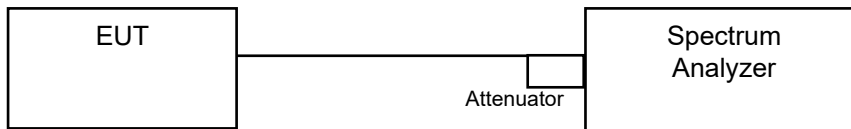
Frequency Stability Versus Voltage									
TEMP. (°C)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	4.23	13.55995	-0.00037	13.55996	-0.00029	13.55997	-0.00022	13.55997	-0.00022
	3.85	13.55995	-0.00037	13.55996	-0.00029	13.55997	-0.00022	13.55997	-0.00022
	3.65	13.55995	-0.00037	13.55996	-0.00029	13.55997	-0.00022	13.55997	-0.00022

4.4 20dB Bandwidth

4.4.1 Limits of 20dB Bandwidth Measurement

The 20dB bandwidth shall be specified in operating frequency band.

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1kHz RBW and 3kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.4.5 Deviation from Test Standard

No deviation.

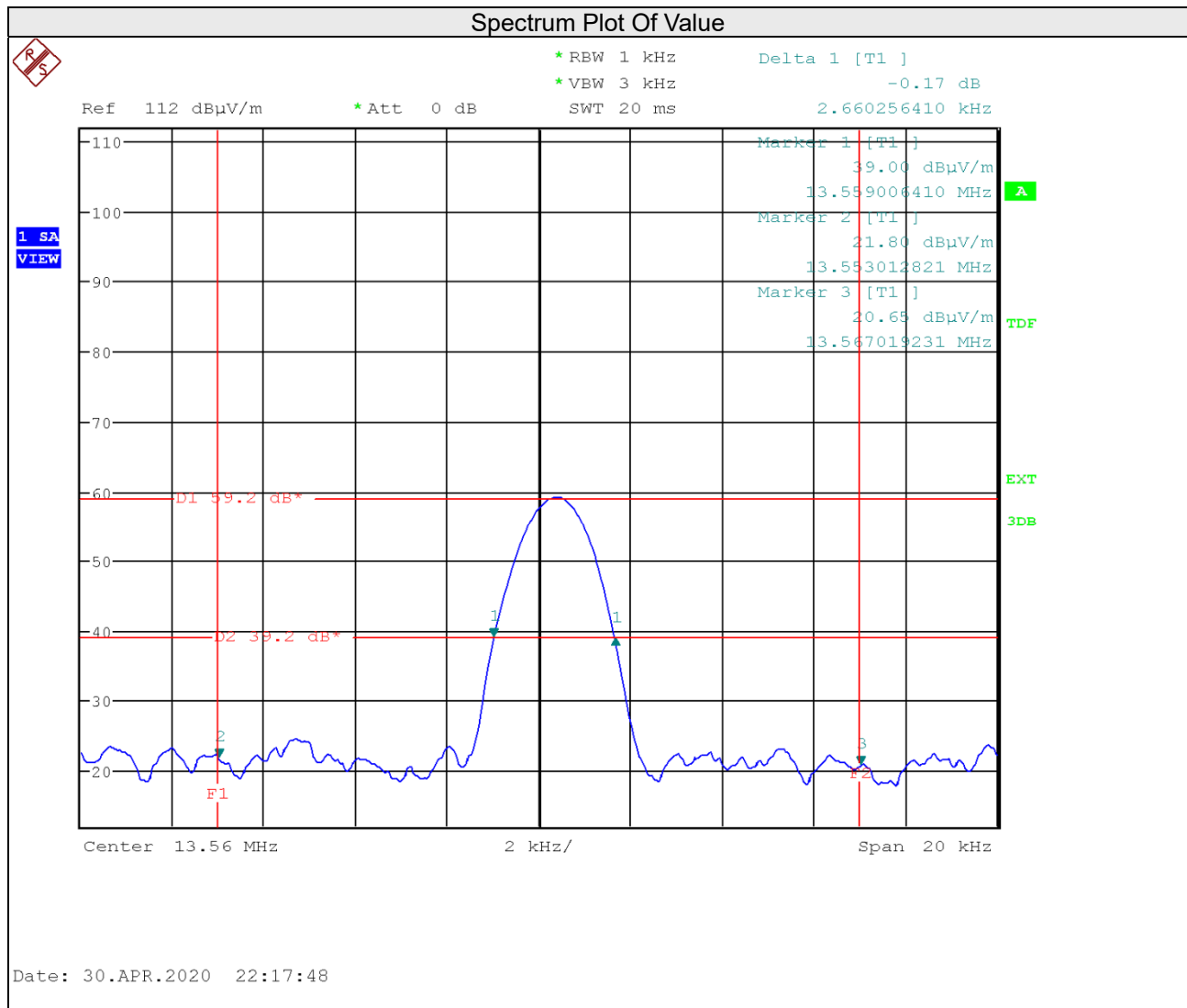
4.4.6 EUT Operating Conditions

Same as Item 4.1.6.

4.4.7 Test Results

Test Mode A1

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass / Fail
13.55634615359	13.559006410	13.553~13.567	Pass

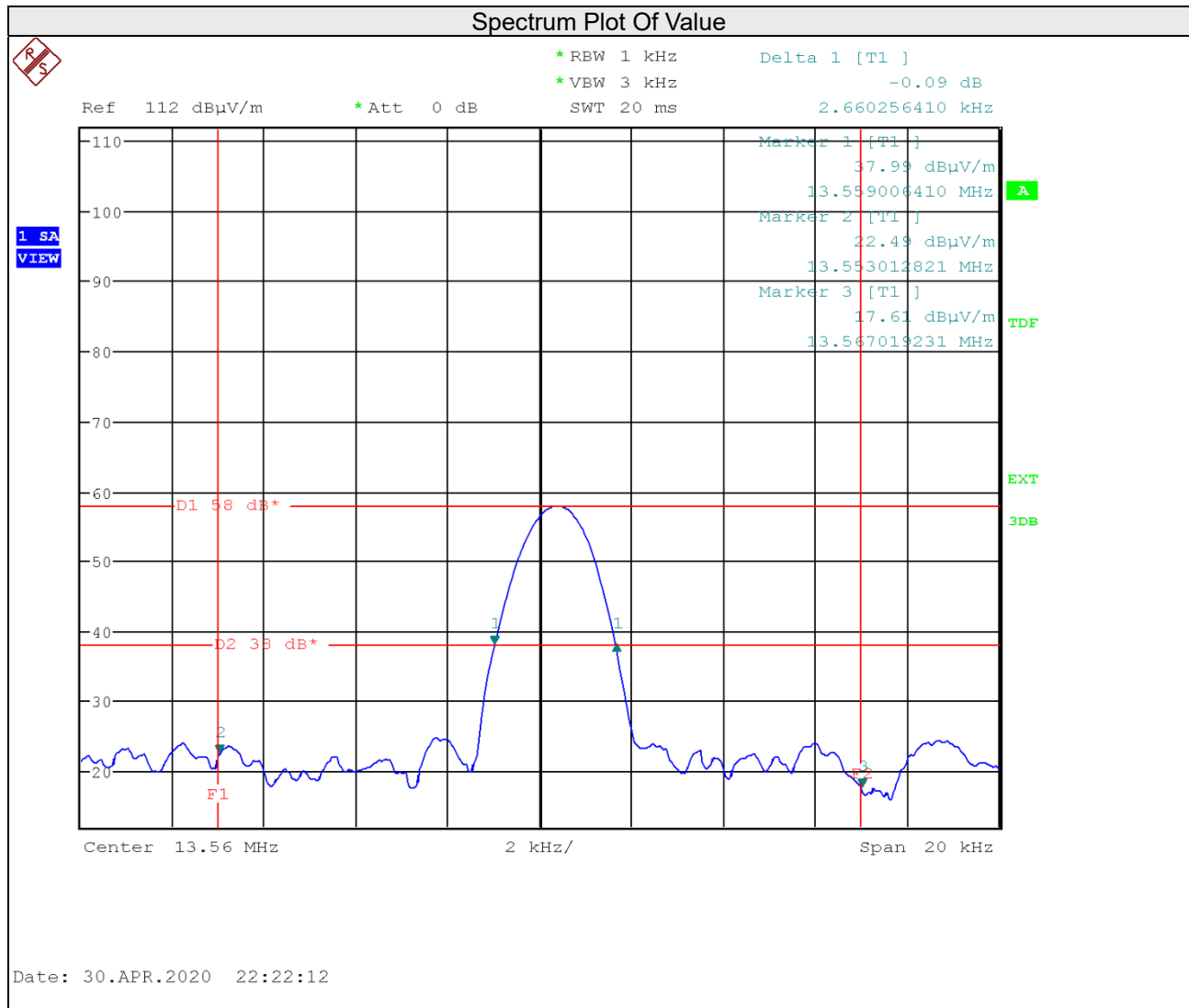


20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass / Fail
13.5563461536	13.559006410	13.553~13.567	Pass



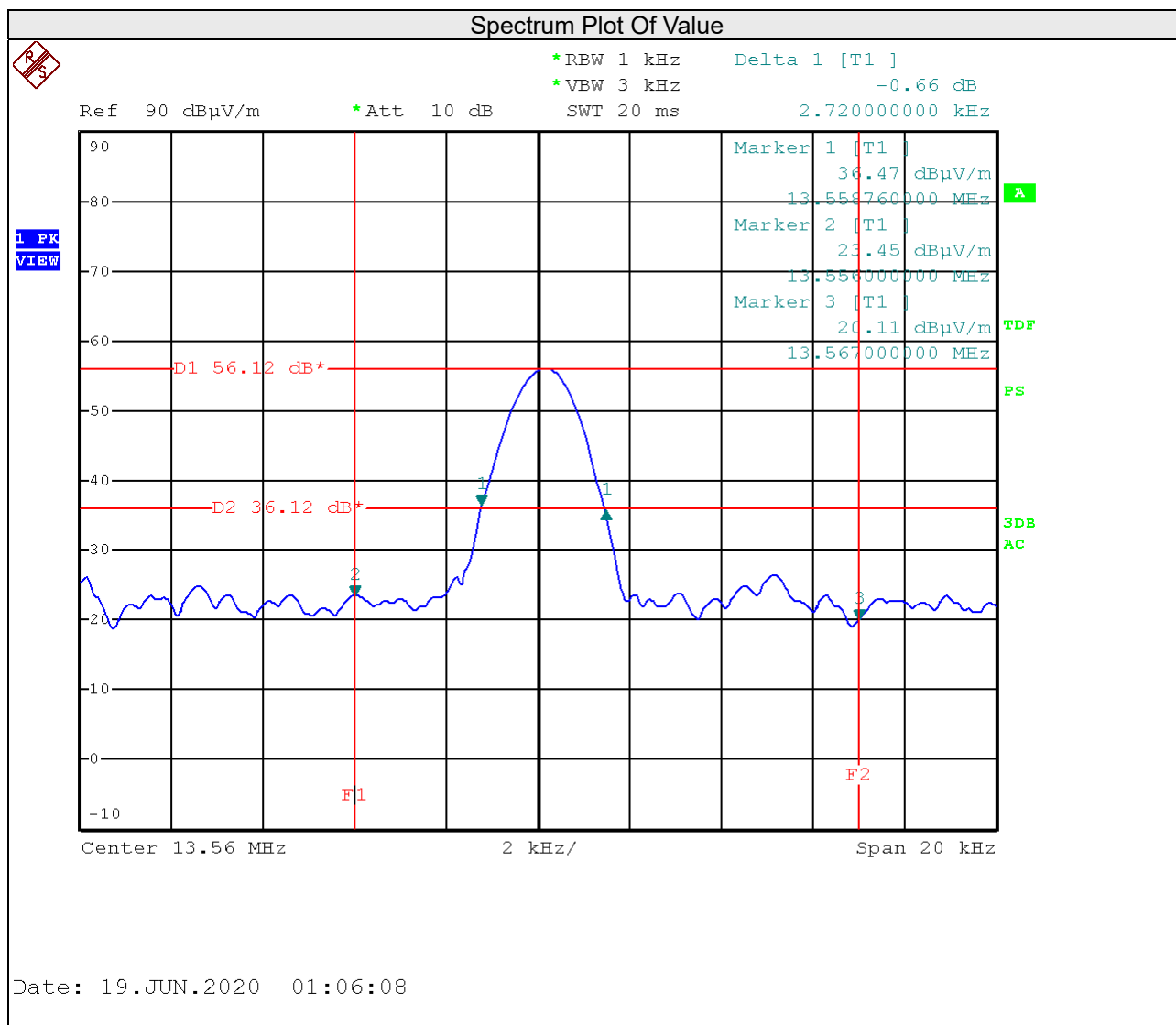
Test Mode C

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass / Fail
13.55634615359	13.559006410	13.553~13.567	Pass



Test Mode D

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass / Fail
13.556000000	13.558720000	13.553~13.567	Pass



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:

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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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