FCC Test Report

Report No.:	RF190716C36
FCC ID:	C3K1915
Test Model:	1915
Received Date:	Jul. 3, 2019
Test Date:	Jul. 8 to 19, 2019
Issued Date:	Jul. 22, 2019
Applicant:	MICROSOFT CORPORATION
Address:	ONE Microsoft WAY REDMOND, WA 98052-6399
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
FCC Registration / Designation Number:	198487 / TW2021

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF190716C36	Original release.	Jul. 22, 2019

1 Certificate of Conformity

Product:	Wireless charger
Brand:	Microsoft
Test Model:	1915
Sample Status:	Engineering sample
Applicant:	MICROSOFT CORPORATION
Test Date:	Jul. 8 to 19, 2019
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 : Jessica Cheng , **Date:** Jul. 22, 2019

Jessica Cheng / Senior Specialist

Approved by : Rex. Lai , **Date:** Jul. 22, 2019

Rex Lai / Associate Technical Manager

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 -14.29dB at 0.45078MHz.
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-86.31dB 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 -11.33dB at 108.47MHz.
15.225 (e)	The frequency tolerance	PASS	Meet the requirement of limit.
15.215 (c)	20dB Bandwidth	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

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	2.77 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.43 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless charger
Brand	Microsoft
Test Model	1915
Status of EUT	Engineering sample
Power Supply Rating	5Vdc , 200mA
Modulation Type	ASK
Transfer Rate	106Kbit/s
Operating Frequency	13.56MHz
Number of Channel	1
Antenna Type	NFC FPC loop antenna
Field Strength	37.69dBuV/m
Dimensions	162.9mm*17mm *9.9 mm
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	USB to type C shielded cable (0.45m)
Maximum Power Output from the Charging Coil	300mW

Note:

1. The EUT was pre-tested with the following modes:
   - ✧ Operating + Charging mode (EUT + AC adapter)
   - ✧ Operating + Charging mode (EUT +Notebook)

   The worst emission level was found when the EUT tested under **Operating + Charging mode (EUT + Notebook)**, therefore only its test data was recorded in this report.
2. The EUT was pre-tested with the following modes:
   - ➢ EUT Charging with 10% Load
   - ➢ EUT Charging with 50% Load
   - ➢ EUT Charging with Full Load

   The worst emission level was found when the EUT tested under **EUT Charging with Full Load**, therefore, only its test data was recorded in this report.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

One channel was 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	
A	√	√	√	√	Operating+Charging with full load Mode with Notebook
B	√	√	-	√	Standby Mode with Notebook
C	-	√	-	-	Operating+Charging with full load Mode with adapter
D	-	√	-	-	Standby Mode with adapter

Where **RE:** Radiated Emission **PLC:** Power Line Conducted Emission
FS: Frequency Stability **EB:** 20dB Bandwidth measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.

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
A & B	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
A & B & C & D	1	1	ASK

Frequency Stability:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ 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
A	1	1	ASK

20dB Bandwidth:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ 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
A & B	1	1	ASK

TEST CONDITION:

Applicable To	Environmental Conditions	Input Power	Tested By
RE	25deg. C, 76%RH	120Vac, 60Hz (System)	Ian Chang
PLC (Mode A & B)	25deg. C, 75%RH	120Vac, 60Hz (System)	Starltaly Wu
PLC (Mode C & D)	25deg. C, 75%RH	120Vac, 60Hz (Adapter)	Starltaly Wu
FS	25deg. C, 76%RH	120Vac, 60Hz (System)	Saxon Lee
EB	25deg. C, 76%RH	120Vac, 60Hz (System)	Saxon Lee

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	81A4	YD02TWDP	N/A	Provided by Lab
B.	Load	N/A	N/A	N/A	N/A	Supplied by client
C.	Adapter	HTC	TC-U250	N/A	N/A	Provided by Lab

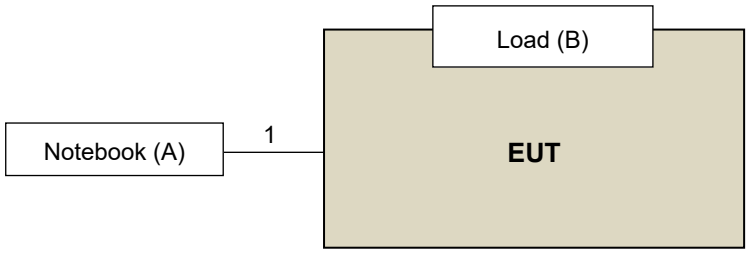
Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB to Type C cable	1	0.45	Y	0	Supplied by client

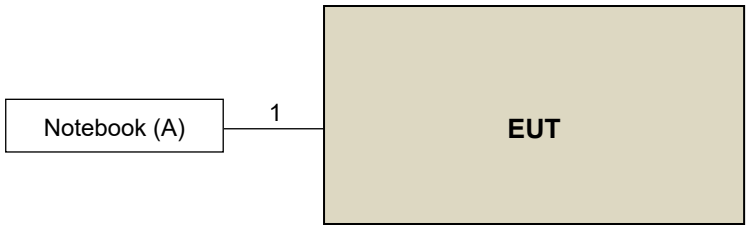
Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test

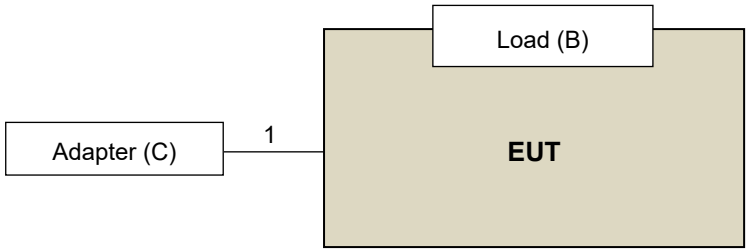
Test Mode A:



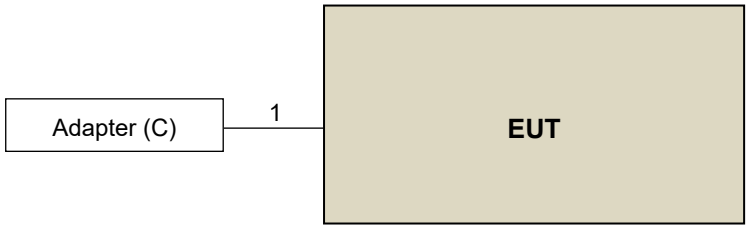
Test Mode B:



Test Mode C:



Test Mode D



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

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

(b) 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.

(c) 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.

(d) 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 as below table:

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.	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	Jun. 3, 2019	Jun. 2, 2021
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. 11, 2019	Jun. 10, 2020
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
Anritsu Power Sensor	MA2411B	0738404	Apr. 16, 2019	Apr. 15, 2020
Anritsu Power Meter	ML2495A	0842014	Apr. 16, 2019	Apr. 15, 2020
DIGITAL POWER METER IDRC	CP-240	240515	Sep. 13, 2018	Sep. 12, 2019
Temperature & Humidity Chamber	MHU-225AU	920409	May 24, 2019	May 23, 2020
AC Power Source ExTech	CFW-105	E000603	NA	NA

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 Frequency range 9kHz~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 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 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 Frequency range 30 ~ 1000MHz

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:

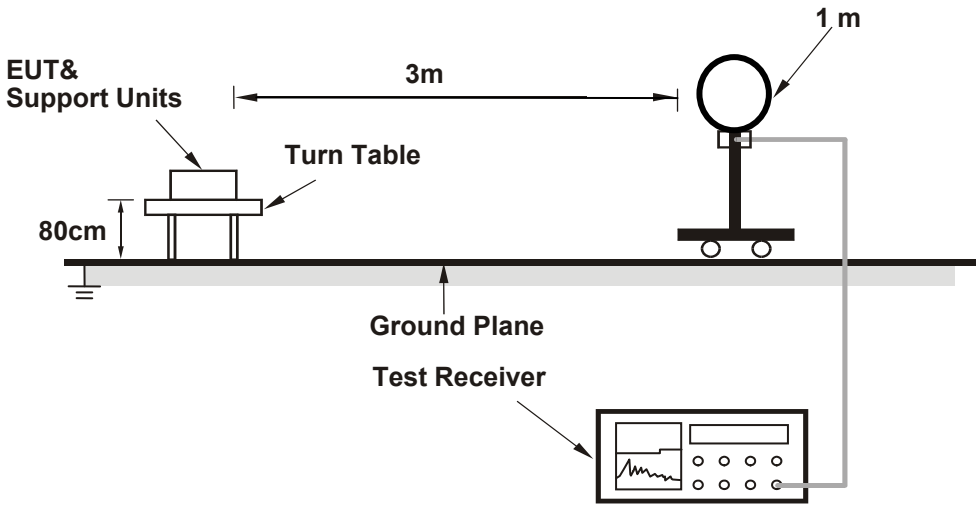
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

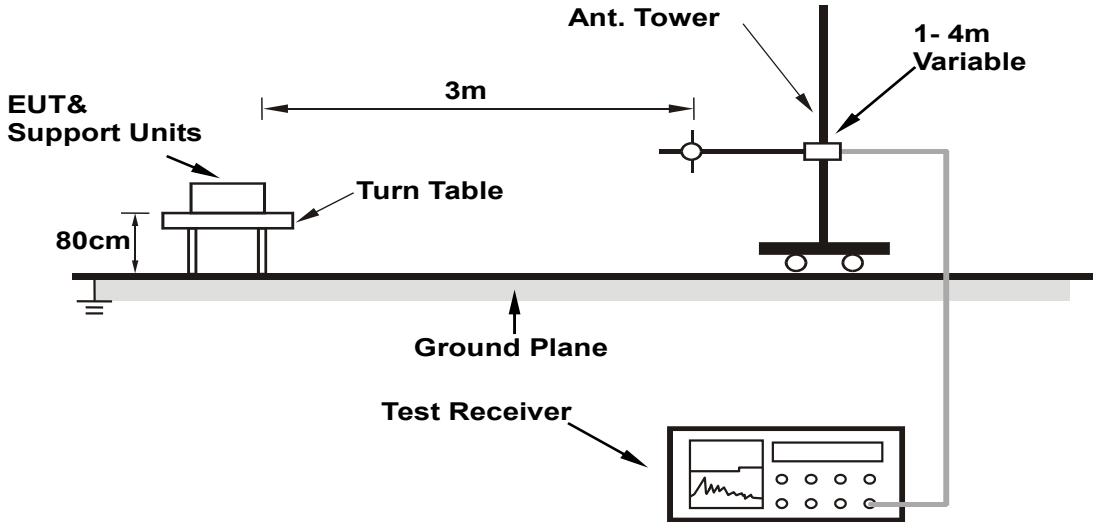
No deviation.

4.1.5 Test Setup

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

Test Mode A:

a. Connected the EUT to Notebook
b. Set the EUT under transmission condition continuously at specific channel frequency.
c. Set the EUT under full load for the test.

Test Mode B:

a. Connected the EUT to Notebook
b. Set the EUT under standby condition.

4.1.7 Test Results

Mode A

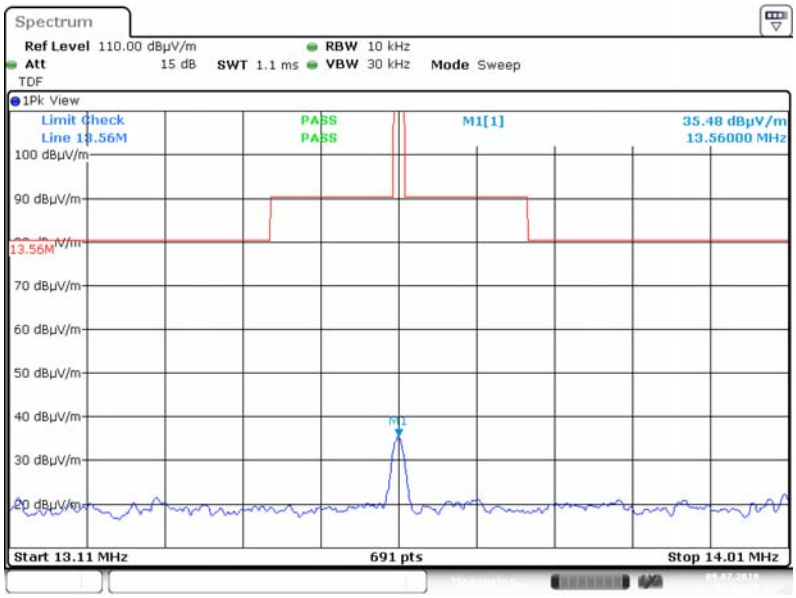
Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	13.553MHz ~ 13.567MHz		

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	*13.56	35.48 QP	124.00	-88.52	1.00	343	34.19	1.29

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

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
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Antenna Polarity & Test Distance: Loop Antenna Parallel At 30m				
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	*13.56	-4.52 QP	84.0 QP	-88.52

Remarks: Emission Level at 30m = Emission Level at 3m + $20\log(3/30)^2$

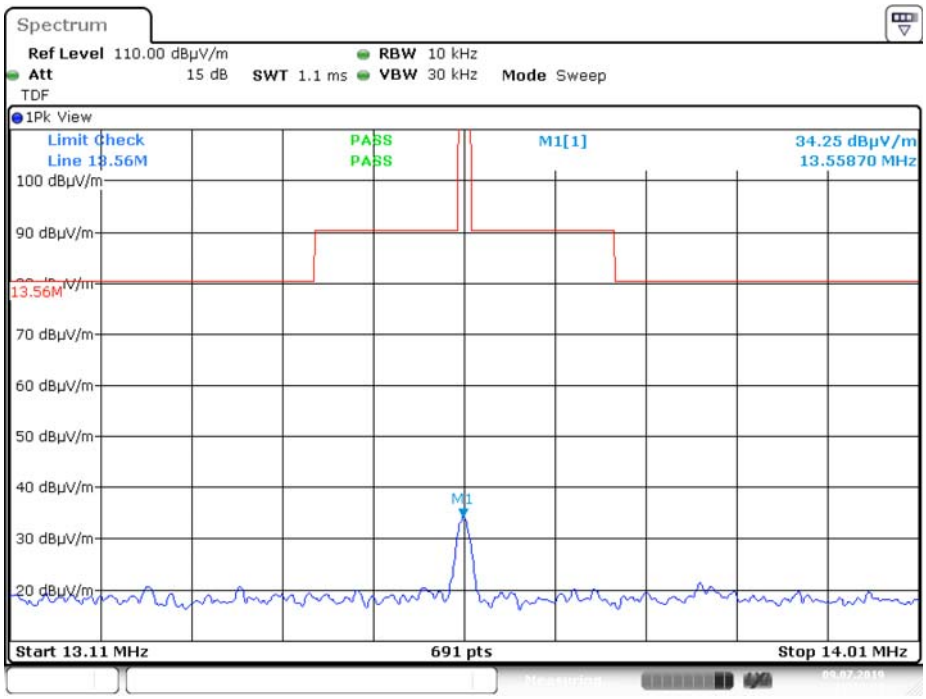
Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	13.553MHz ~ 13.567MHz		

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	*13.56	34.25 QP	124.00	-89.75	1.00	297	32.96	1.29

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

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
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Antenna Polarity & Test Distance: Loop Antenna Perpendicular At 30m				
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	*13.56	-4.75QP	84.0 QP	-89.75

Remarks: Emission Level at 30m = Emission Level at 3m + $20\log(3/30)^2$

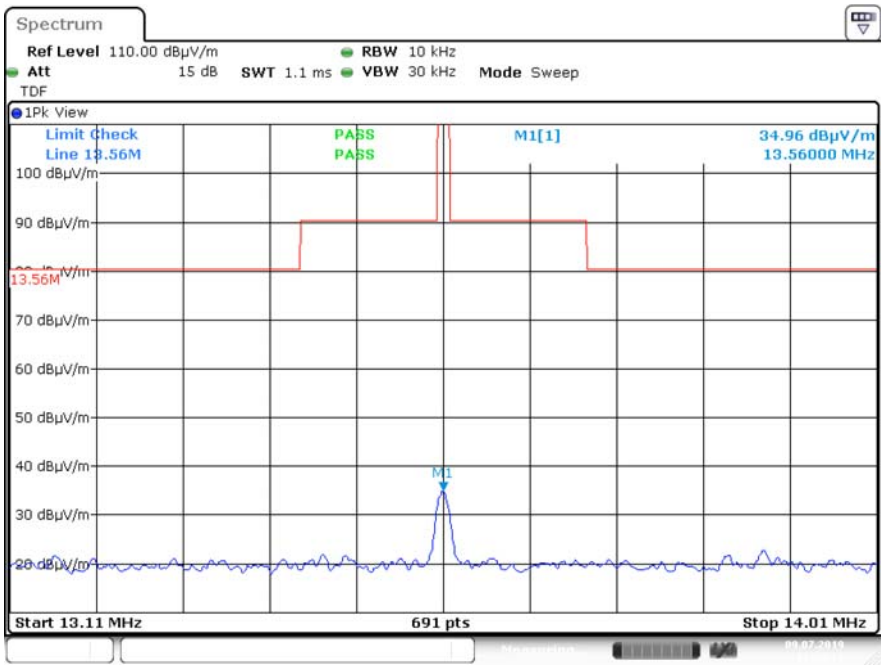
Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	13.553MHz ~ 13.567MHz		

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	*13.56	34.96 QP	124.00	-89.04	1.00	336	33.67	1.29

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

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
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Antenna Polarity & Test Distance: Loop Antenna Ground-parallel At 30m				
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	*13.56	-5.04QP	84.0 QP	-89.04

Remarks: Emission Level at 30m = Emission Level at 3m + $20\log(3/30)^2$

Mode B

Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	13.553MHz ~ 13.567MHz		

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	*13.56	37.69 QP	124.00	-86.31	1.00	123	36.40	1.29

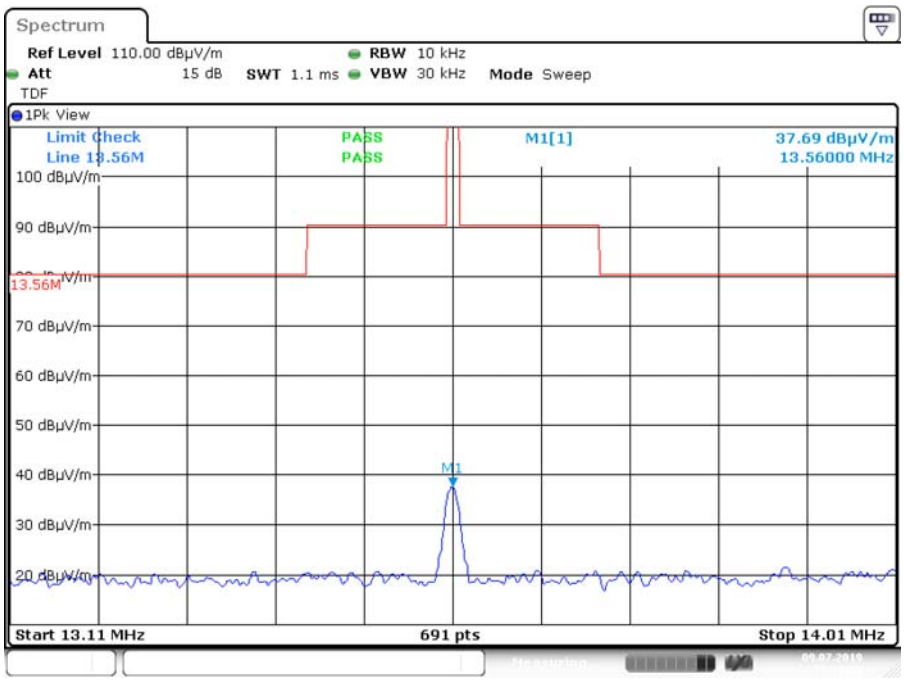
REMARKS:

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

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
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Antenna Polarity & Test Distance: Loop Antenna Parallel At 30m				
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	*13.56	-2.31 QP	84.0 QP	-86.31

Remarks: Emission Level at 30m = Emission Level at 3m + $20\log(3/30)^2$

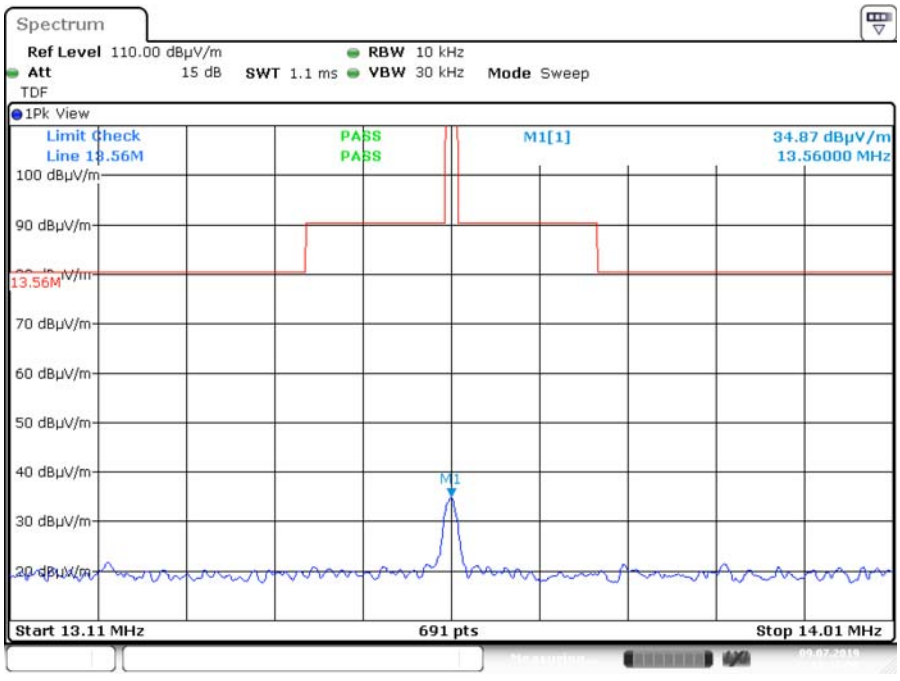
Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	13.553MHz ~ 13.567MHz		

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	*13.56	34.87 QP	124.00	-89.13	1.00	194	33.58	1.29

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

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
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Antenna Polarity & Test Distance: Loop Antenna Perpendicular At 30m				
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	*13.56	-5.13QP	84.0 QP	-89.13

Remarks: Emission Level at 30m = Emission Level at 3m + $20\log(3/30)^2$

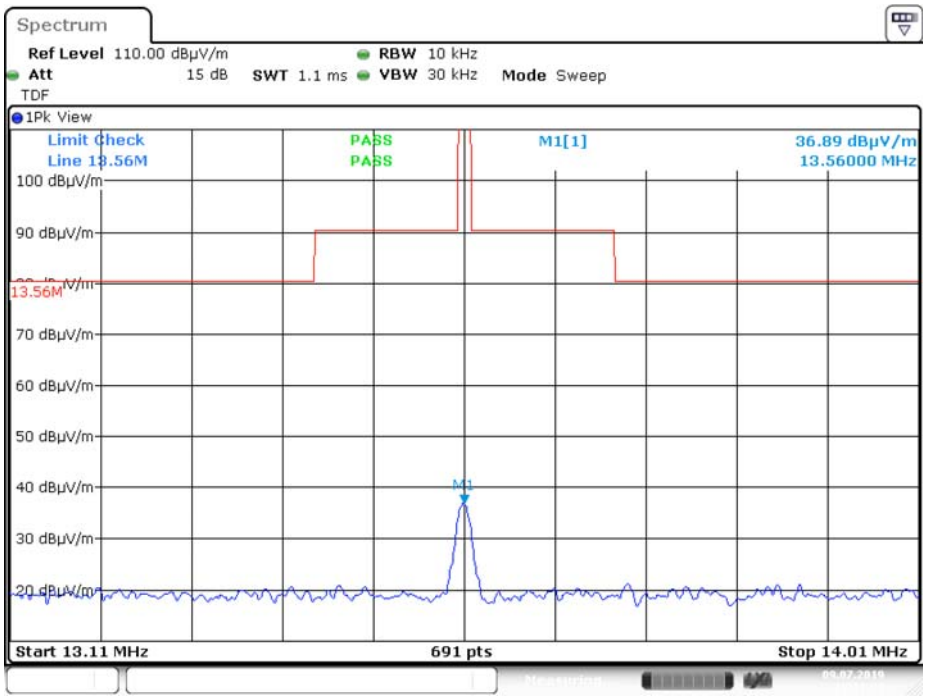
Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	13.553MHz ~ 13.567MHz		

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	*13.56	36.89 QP	124.00	-87.11	1.00	141	35.60	1.29

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

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
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Antenna Polarity & Test Distance: Loop Antenna Ground-parallel At 30m				
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	*13.56	-3.11QP	84.0 QP	-87.11

Remarks: Emission Level at 30m = Emission Level at 3m + $20\log(3/30)^2$

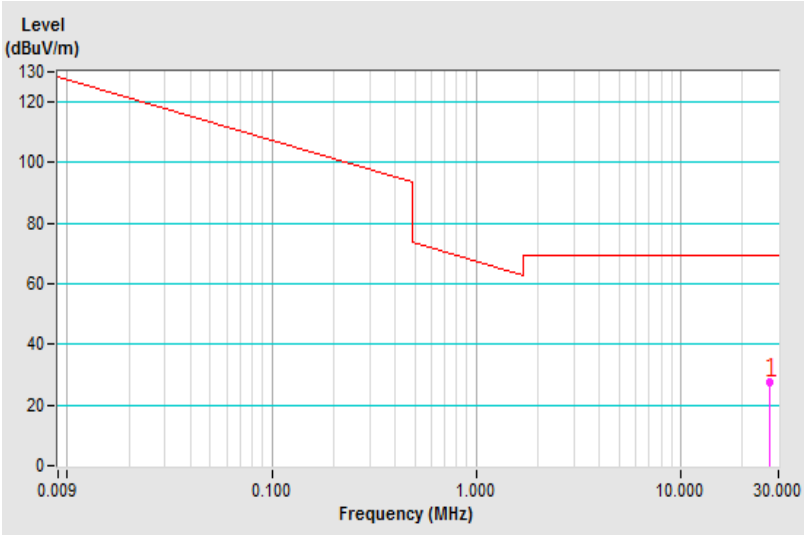
Mode A

Channel	Channel 1	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	27.12	27.51 QP	69.54	-42.03	1.00	263	29.36	-1.85

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

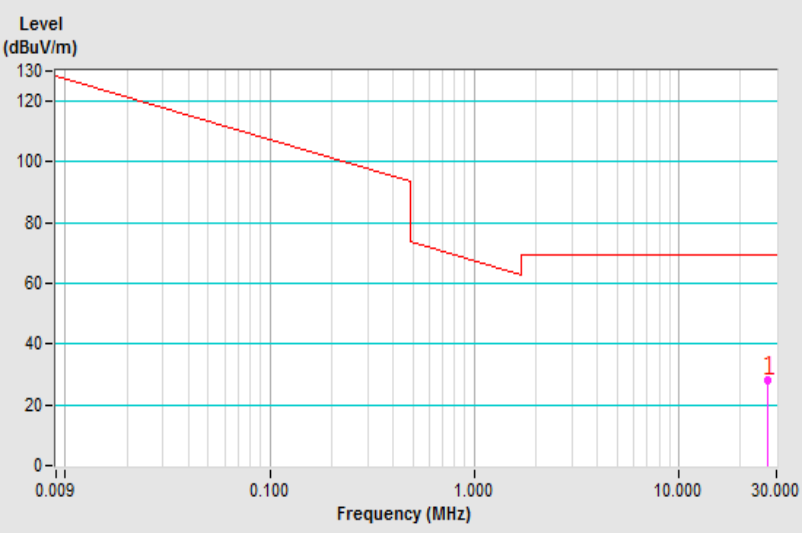


Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		

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	27.12	27.98 QP	69.54	-41.56	1.00	23	29.83	-1.85

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

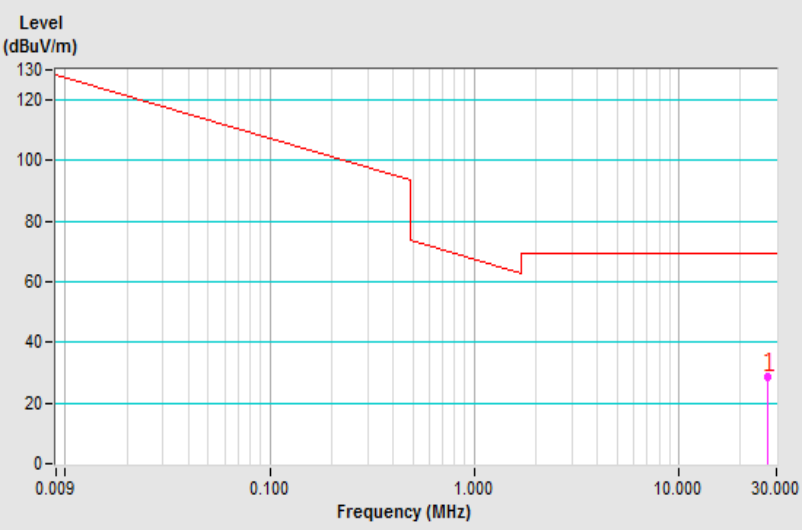


Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		

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	27.12	28.39 QP	69.54	-41.15	1.00	360	30.24	-1.85

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



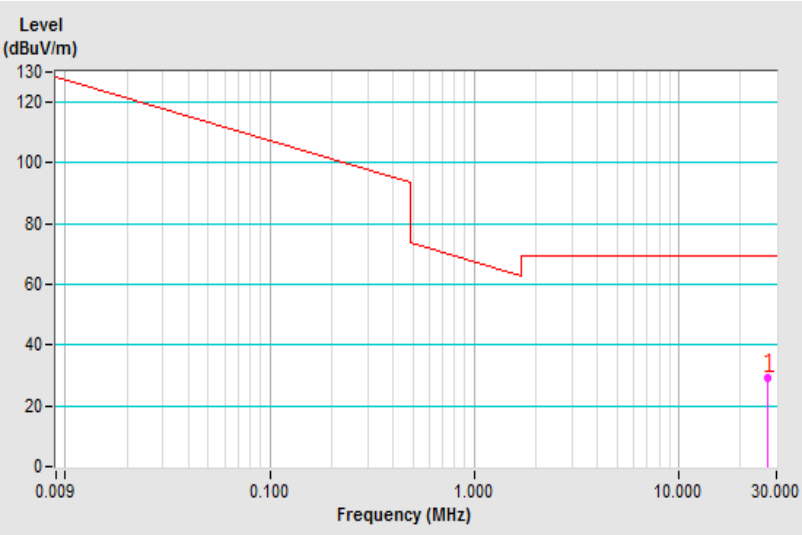
Mode B

Channel	Channel 1	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	27.12	28.97 QP	69.54	-40.57	1.00	13	30.82	-1.85

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

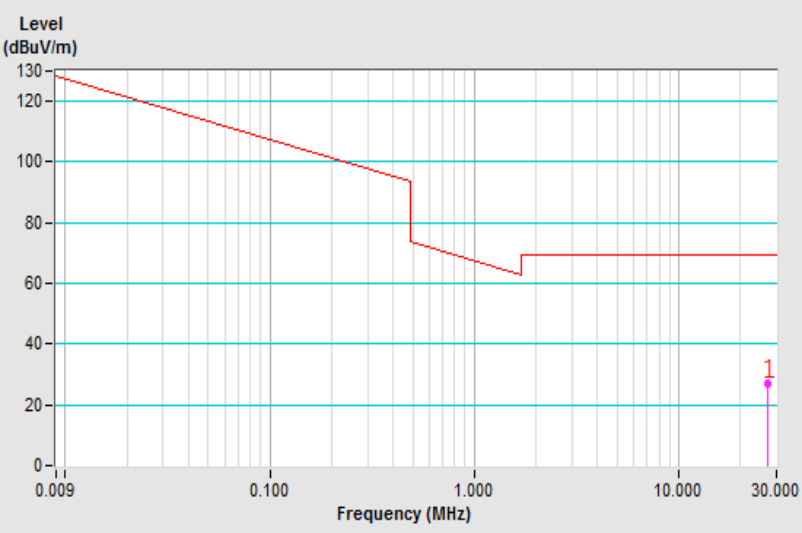


Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		

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	27.12	26.79 QP	69.54	-42.75	1.00	98	28.64	-1.85

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

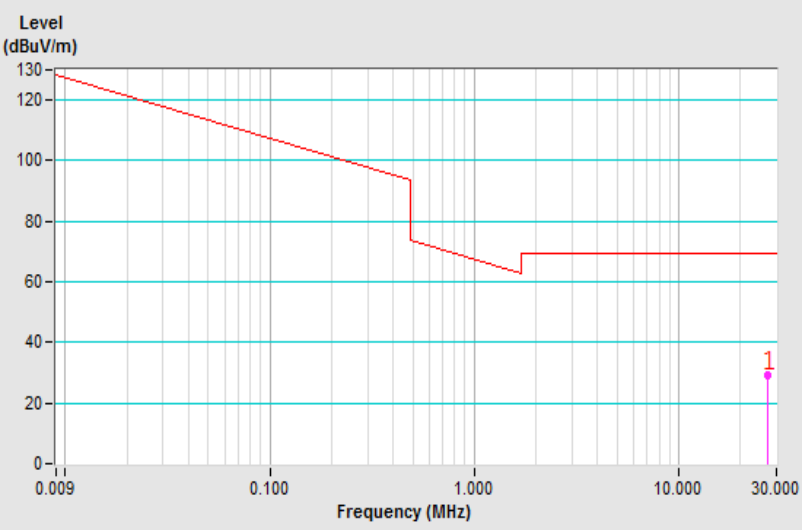


Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	9 kHz ~ 30 MHz		

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	27.12	29.09 QP	69.54	-40.45	1.00	283	30.94	-1.85

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



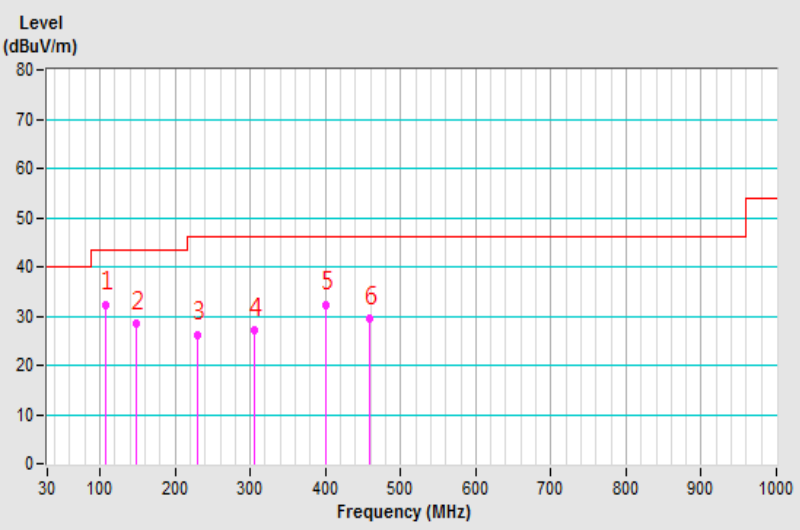
Mode A

Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	30MHz ~ 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	**108.47**	**32.17 QP**	**43.50**	**-11.33**	**1.61 H**	**360**	**42.28**	**-10.11**
2	148.87	28.38 QP	43.50	-15.12	1.62 H	152	35.23	-6.85
3	229.29	26.17 QP	46.00	-19.83	1.93 H	155	34.60	-8.43
4	305.77	27.00 QP	46.00	-19.00	1.28 H	104	31.85	-4.85
5	400.01	32.26 QP	46.00	-13.74	1.50 H	88	35.57	-3.31
6	458.55	29.35 QP	46.00	-16.65	2.03 H	360	31.25	-1.90

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

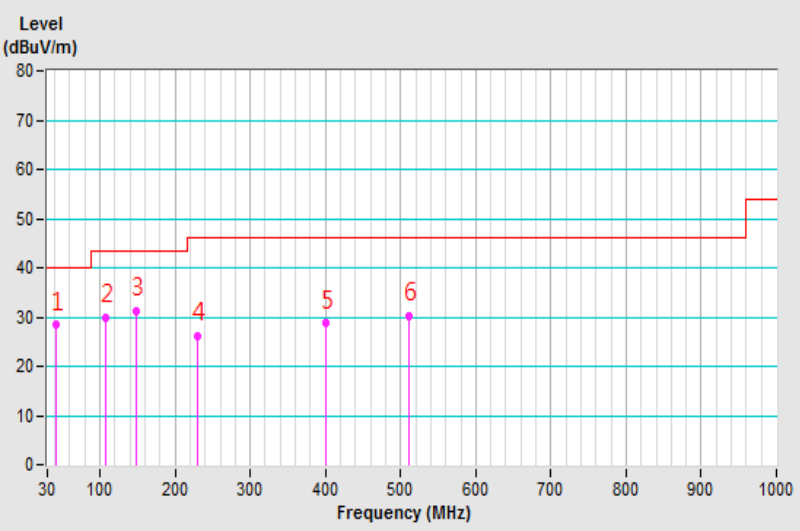


Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	30MHz ~ 1GHz		

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	40.67	28.36 QP	40.00	-11.64	1.00 V	360	36.00	-7.64
2	108.47	29.89 QP	43.50	-13.61	1.62 V	261	40.00	-10.11
3	148.44	31.14 QP	43.50	-12.36	1.06 V	195	38.05	-6.91
4	229.24	26.21 QP	46.00	-19.79	1.52 V	360	34.65	-8.44
5	399.96	28.71 QP	46.00	-17.29	1.15 V	144	32.02	-3.31
6	510.88	30.33 QP	46.00	-15.67	1.74 V	134	31.38	-1.05

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



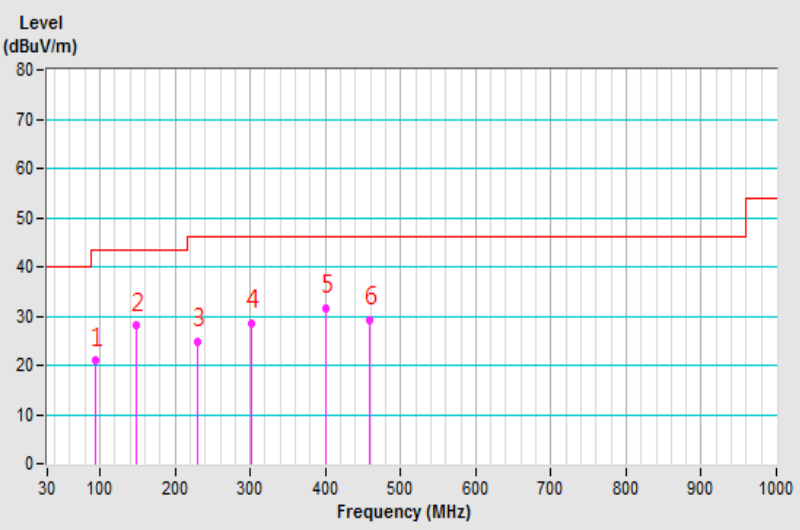
Mode B

Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	30MHz ~ 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	94.12	20.85 QP	43.50	-22.65	1.85 H	308	32.87	-12.02
2	148.49	28.01 QP	43.50	-15.49	1.94 H	160	34.91	-6.90
3	229.29	24.78 QP	46.00	-21.22	1.45 H	100	33.21	-8.43
4	301.65	28.39 QP	46.00	-17.61	1.53 H	80	33.36	-4.97
5	399.96	31.58 QP	46.00	-14.42	1.08 H	324	34.89	-3.31
6	458.50	29.08 QP	46.00	-16.92	1.27 H	360	30.98	-1.90

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

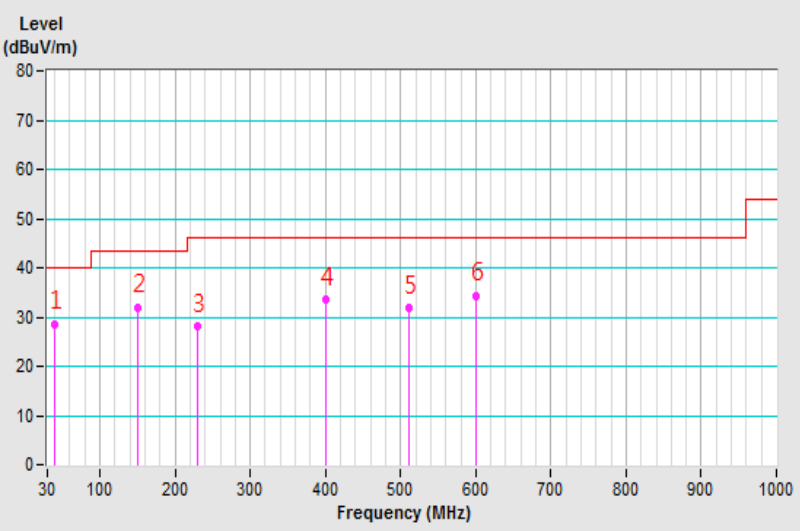


Channel	Channel 1	Detector Function	Quasi-Peak
Frequency Range	30MHz ~ 1GHz		

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	38.92	28.51 QP	40.00	-11.49	1.64 V	129	36.32	-7.81
2	149.46	31.95 QP	43.50	-11.55	1.34 V	185	38.79	-6.84
3	229.24	28.02 QP	46.00	-17.98	1.28 V	74	36.46	-8.44
4	400.01	33.41 QP	46.00	-12.59	1.78 V	64	36.72	-3.31
5	510.93	31.73 QP	46.00	-14.27	1.52 V	109	32.78	-1.05
6	600.02	34.38 QP	46.00	-11.62	1.88 V	32	33.44	0.94

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



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.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	838251/021	Nov. 1, 2018	Oct. 31, 2019
ROHDE & SCHWARZ Artificial Mains Network (For EUT)	ENV216	101195	May 9, 2019	May 8, 2020
LISN With Adapter (for EUT)	101195	N/A	May 9, 2019	May 8, 2020
EMCO L.I.S.N. (For peripherals)	3825/2	9504-2359	Jul. 26, 2018	Jul. 25, 2019
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 14, 2019	May 13, 2020
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With10dB PAD	5D-FB	Cable-C03.01	Sep. 18, 2018	Sep. 17, 2019
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-300	Jan. 25, 2019	Jan. 24, 2020
LYNICS Terminator (For EMCO LISN)	0900510	E1-01-301	Jan. 25, 2019	Jan. 24, 2020
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 21, 2018	Nov. 20, 2019
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 21, 2018	Nov. 20, 2019

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 Shielded Room No. 3.

4.2.3 Test Procedures

a. 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.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

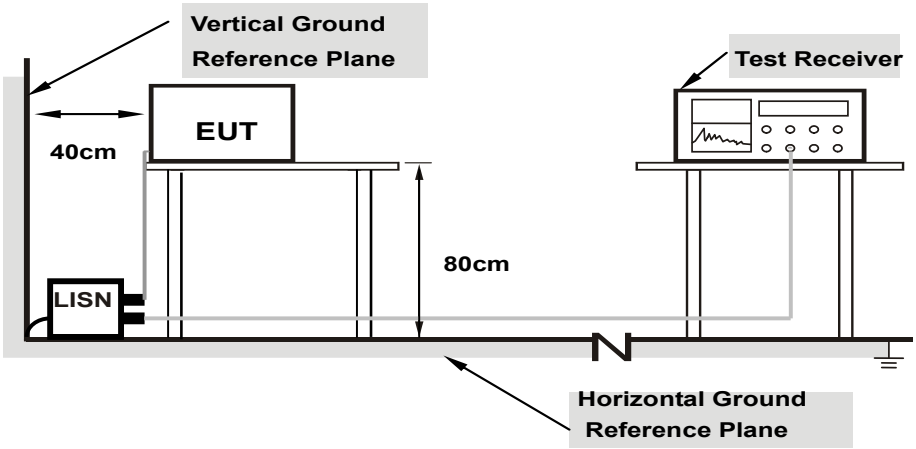
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

4.2.6 EUT Operating Conditions

Test Mode A:

a. Connected the EUT to Notebook
b. Set the EUT under transmission condition continuously at specific channel frequency.
c. Set the EUT under full load for the test.

Test Mode B:

a. Connected the EUT to Notebook
b. Set the EUT under standby condition.

Test Mode C:

a. The EUT powered by adapter.
b. Set the EUT under transmission condition continuously at specific channel frequency.
c. Set the EUT under full load for the test.

Test Mode D:

a. The EUT powered by adapter.
b. Set the EUT under standby condition.

4.2.7 Test Results

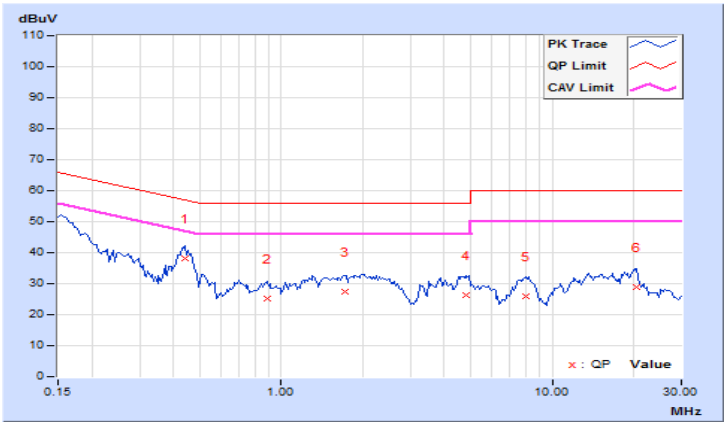
Mode A

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

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	0.43906	9.70	28.31	22.58	38.01	32.28	57.08	47.08	-19.07	-14.80
2	0.88438	9.76	15.49	10.85	25.25	20.61	56.00	46.00	-30.75	-25.39
3	1.71484	9.85	17.58	13.09	27.43	22.94	56.00	46.00	-28.57	-23.06
4	4.78516	9.99	16.49	7.87	26.48	17.86	56.00	46.00	-29.52	-28.14
5	8.00000	10.07	15.74	9.46	25.81	19.53	60.00	50.00	-34.19	-30.47
6	20.46875	10.24	18.82	14.51	29.06	24.75	60.00	50.00	-30.94	-25.25

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

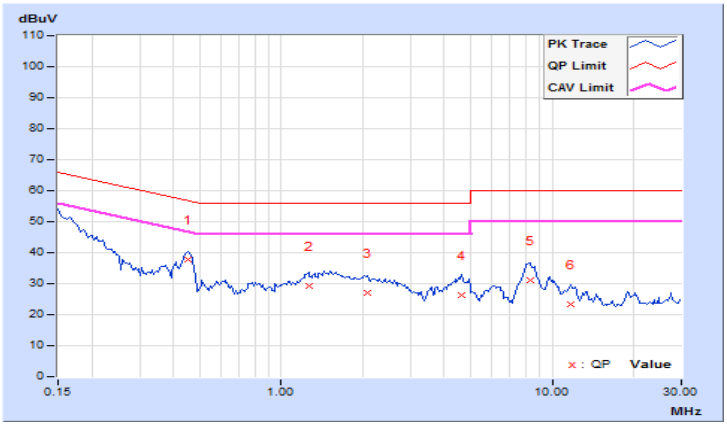


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	**0.45078**	**9.70**	**27.90**	**22.87**	**37.60**	**32.57**	**56.86**	**46.86**	**-19.26**	**-14.29**
2	1.26172	9.79	19.37	15.03	29.16	24.82	56.00	46.00	-26.84	-21.18
3	2.08203	9.85	17.34	13.07	27.19	22.92	56.00	46.00	-28.81	-23.08
4	4.65625	9.96	16.39	9.83	26.35	19.79	56.00	46.00	-29.65	-26.21
5	8.26953	10.04	21.14	14.75	31.18	24.79	60.00	50.00	-28.82	-25.21
6	11.71094	10.11	13.10	8.07	23.21	18.18	60.00	50.00	-36.79	-31.82

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



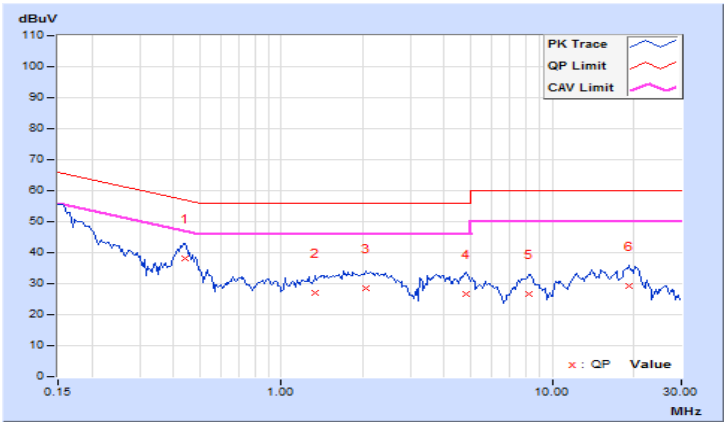
Mode B

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

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	0.43906	9.70	28.43	21.88	38.13	31.58	57.08	47.08	-18.95	-15.50
2	1.33594	9.81	17.17	12.37	26.98	22.18	56.00	46.00	-29.02	-23.82
3	2.05469	9.88	18.61	13.96	28.49	23.84	56.00	46.00	-27.51	-22.16
4	4.81641	9.99	16.76	8.28	26.75	18.27	56.00	46.00	-29.25	-27.73
5	8.24219	10.08	16.68	9.25	26.76	19.33	60.00	50.00	-33.24	-30.67
6	19.33203	10.23	18.93	14.38	29.16	24.61	60.00	50.00	-30.84	-25.39

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

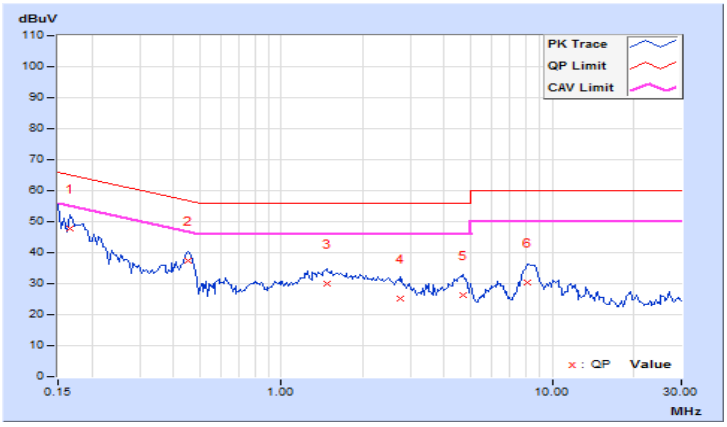


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.16562	9.64	37.96	22.43	47.60	32.07	65.18	55.18	-17.58	-23.11
2	0.45078	9.70	27.76	22.65	37.46	32.35	56.86	46.86	-19.40	-14.51
3	1.47266	9.81	20.02	15.73	29.83	25.54	56.00	46.00	-26.17	-20.46
4	2.76953	9.88	15.44	11.02	25.32	20.90	56.00	46.00	-30.68	-25.10
5	4.66406	9.96	16.48	9.98	26.44	19.94	56.00	46.00	-29.56	-26.06
6	8.10156	10.04	20.48	14.19	30.52	24.23	60.00	50.00	-29.48	-25.77

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



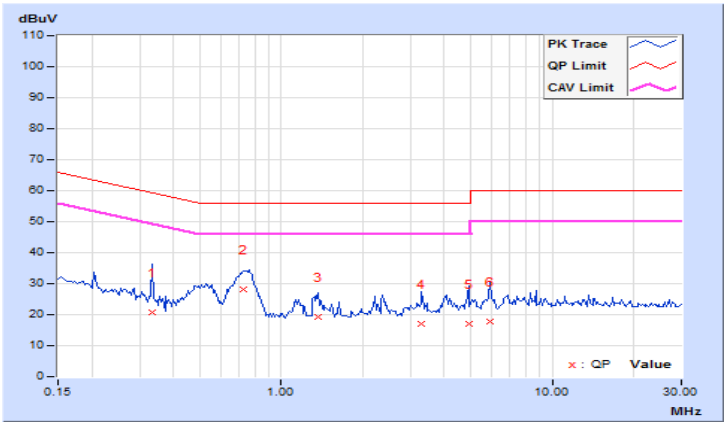
Mode C

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

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	0.33359	9.68	11.00	3.18	20.68	12.86	59.36	49.36	-38.68	-36.50
2	0.72813	9.74	18.57	7.31	28.31	17.05	56.00	46.00	-27.69	-28.95
3	1.36328	9.82	9.51	1.74	19.33	11.56	56.00	46.00	-36.67	-34.44
4	3.28906	9.94	7.22	0.96	17.16	10.90	56.00	46.00	-38.84	-35.10
5	4.94531	9.99	7.13	0.41	17.12	10.40	56.00	46.00	-38.88	-35.60
6	5.88672	10.02	7.75	1.11	17.77	11.13	60.00	50.00	-42.23	-38.87

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

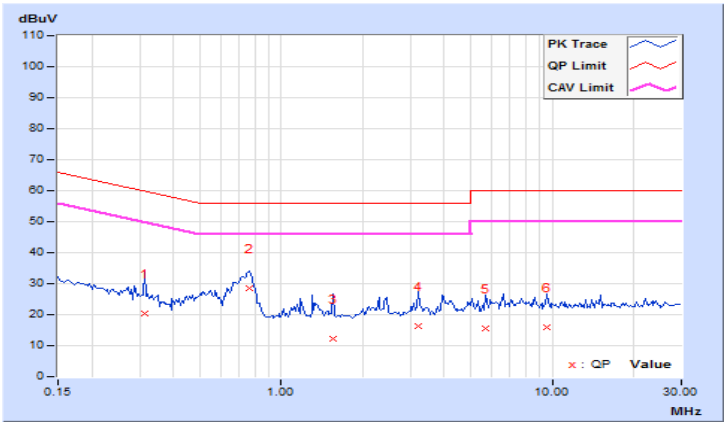


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.31406	9.67	10.61	5.48	20.28	15.15	59.86	49.86	-39.58	-34.71
2	0.76719	9.74	18.71	6.51	28.45	16.25	56.00	46.00	-27.55	-29.75
3	1.55469	9.81	2.28	0.15	12.09	9.96	56.00	46.00	-43.91	-36.04
4	3.20703	9.90	6.30	0.14	16.20	10.04	56.00	46.00	-39.80	-35.96
5	5.70313	9.98	5.43	2.26	15.41	12.24	60.00	50.00	-44.59	-37.76
6	9.56641	10.07	5.82	0.65	15.89	10.72	60.00	50.00	-44.11	-39.28

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



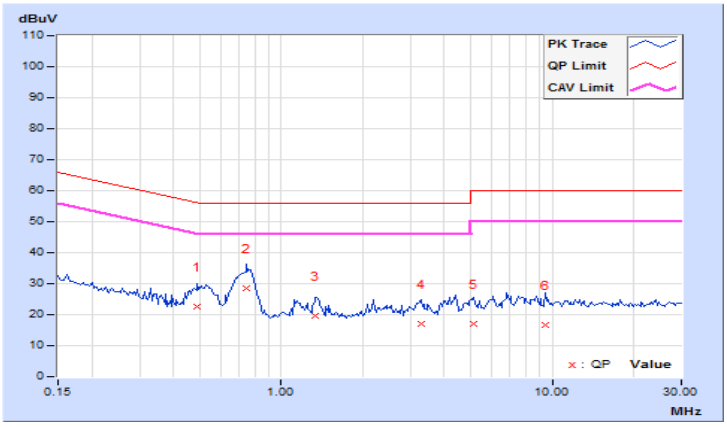
Mode D

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

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	0.48984	9.70	12.87	0.37	22.57	10.07	56.17	46.17	-33.60	-36.10
2	0.74766	9.74	18.71	8.39	28.45	18.13	56.00	46.00	-27.55	-27.87
3	1.33594	9.81	9.67	1.35	19.48	11.16	56.00	46.00	-36.52	-34.84
4	3.28125	9.94	7.19	0.99	17.13	10.93	56.00	46.00	-38.87	-35.07
5	5.14063	10.00	7.22	0.40	17.22	10.40	60.00	50.00	-42.78	-39.60
6	9.46094	10.11	6.69	0.29	16.80	10.40	60.00	50.00	-43.20	-39.60

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

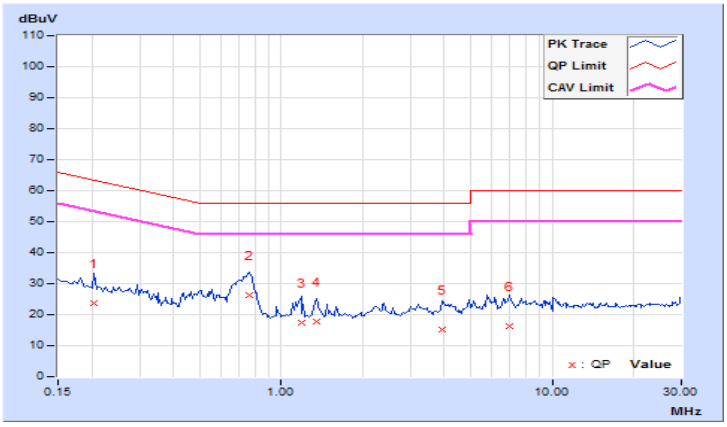


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.20469	9.65	14.06	3.11	23.71	12.76	63.42	53.42	-39.71	-40.66
2	0.75938	9.74	16.39	6.11	26.13	15.85	56.00	46.00	-29.87	-30.15
3	1.18359	9.78	7.55	0.47	17.33	10.25	56.00	46.00	-38.67	-35.75
4	1.34766	9.80	7.91	0.41	17.71	10.21	56.00	46.00	-38.29	-35.79
5	3.94141	9.94	5.25	1.70	15.19	11.64	56.00	46.00	-40.81	-34.36
6	6.97656	10.01	6.30	0.38	16.31	10.39	60.00	50.00	-43.69	-39.61

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

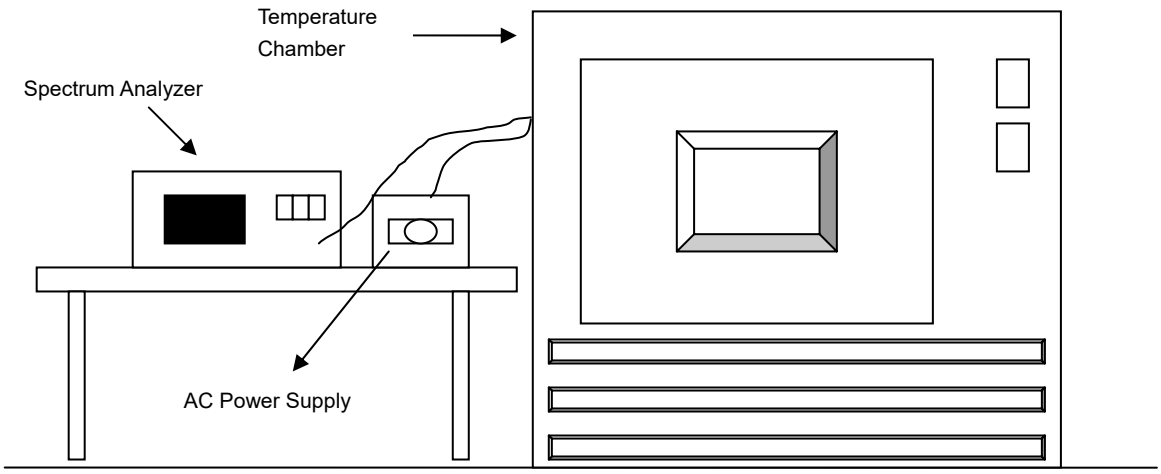


4.3 Frequency Stability

4.3.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier signal shall be maintained within +/- 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

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.

b. Turned the EUT on and coupled its output to a spectrum analyzer.

c. Turned the EUT off and set the chamber to the highest temperature specified.

d. Allowed sufficient time (approximately 30 min) for the temperature of the chamber to stabilize then turned the EUT on and measured the operating frequency.

e. Repeated step d with the next desire until all temperature points are completed.

f. The test chamber was allowed to stabilize at +25 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

Frequency Stability Versus Temp.													
Temp. (℃)	Power Supply (Vac)	0 Minute			2 Minute			5 Minute			10 Minute		
		Measured Frequency (MHz)	Drift (MHz)	Drift (%)	Measured Frequency (MHz)	Drift (MHz)	Drift (%)	Measured Frequency (MHz)	Drift (MHz)	Drift (%)	Measured Frequency (MHz)	Drift (MHz)	Drift (%)
50	120	13.5593	-0.0007	-0.0054	13.5603	0.0003	0.0021	13.5607	0.0007	0.0051	13.5597	-0.0003	-0.0026
40	120	13.5604	0.0004	0.0028	13.5596	-0.0004	-0.0032	13.5604	0.0004	0.0030	13.5602	0.0002	0.0015
30	120	13.5607	0.0007	0.0052	13.5599	-0.0001	-0.0010	13.5600	0.0000	0.0000	13.5609	0.0009	0.0063
20	120	13.5597	-0.0003	-0.0025	13.5597	-0.0003	-0.0025	13.5597	-0.0003	-0.0025	13.5597	-0.0003	-0.0025
10	120	13.5613	0.0013	0.0095	13.5591	-0.0009	-0.0064	13.5610	0.0010	0.0074	13.5609	0.0009	0.0064
0	120	13.5617	0.0017	0.0128	13.5594	-0.0006	-0.0048	13.5608	0.0008	0.0060	13.5593	-0.0007	-0.0052
-10	120	13.5619	0.0019	0.0140	13.5596	-0.0004	-0.0029	13.5607	0.0007	0.0052	13.5596	-0.0004	-0.0029
-20	120	13.5621	0.0021	0.0155	13.5598	-0.0002	-0.0015	13.5609	0.0009	0.0066	13.5598	-0.0002	-0.0015

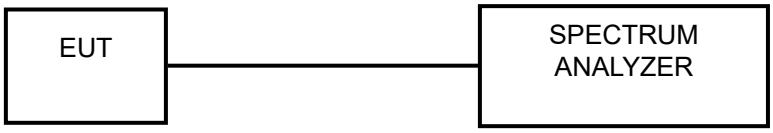
Frequency Stability Versus Voltage													
Temp. (℃)	Power Supply (Vac)	0 Minute			2 Minute			5 Minute			10 Minute		
		Measured Frequency (MHz)	Drift (MHz)	Drift (%)	Measured Frequency (MHz)	Drift (MHz)	Drift (%)	Measured Frequency (MHz)	Drift (MHz)	Drift (%)	Measured Frequency (MHz)	Drift (MHz)	Drift (%)
20	138	13.5615	0.0015	0.0108	13.5597	-0.0003	-0.0021	13.5606	0.0006	0.0042	13.5611	0.0011	0.0082
	120	13.5597	-0.0003	-0.0025	13.5612	0.0012	0.0085	13.5593	-0.0007	-0.0049	13.5612	0.0012	0.0091
	102	13.5600	0.0000	0.0003	13.5595	-0.0005	-0.0037	13.5618	0.0018	0.0133	13.5595	-0.0005	-0.0037

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 10kHz RBW and 30kHz 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

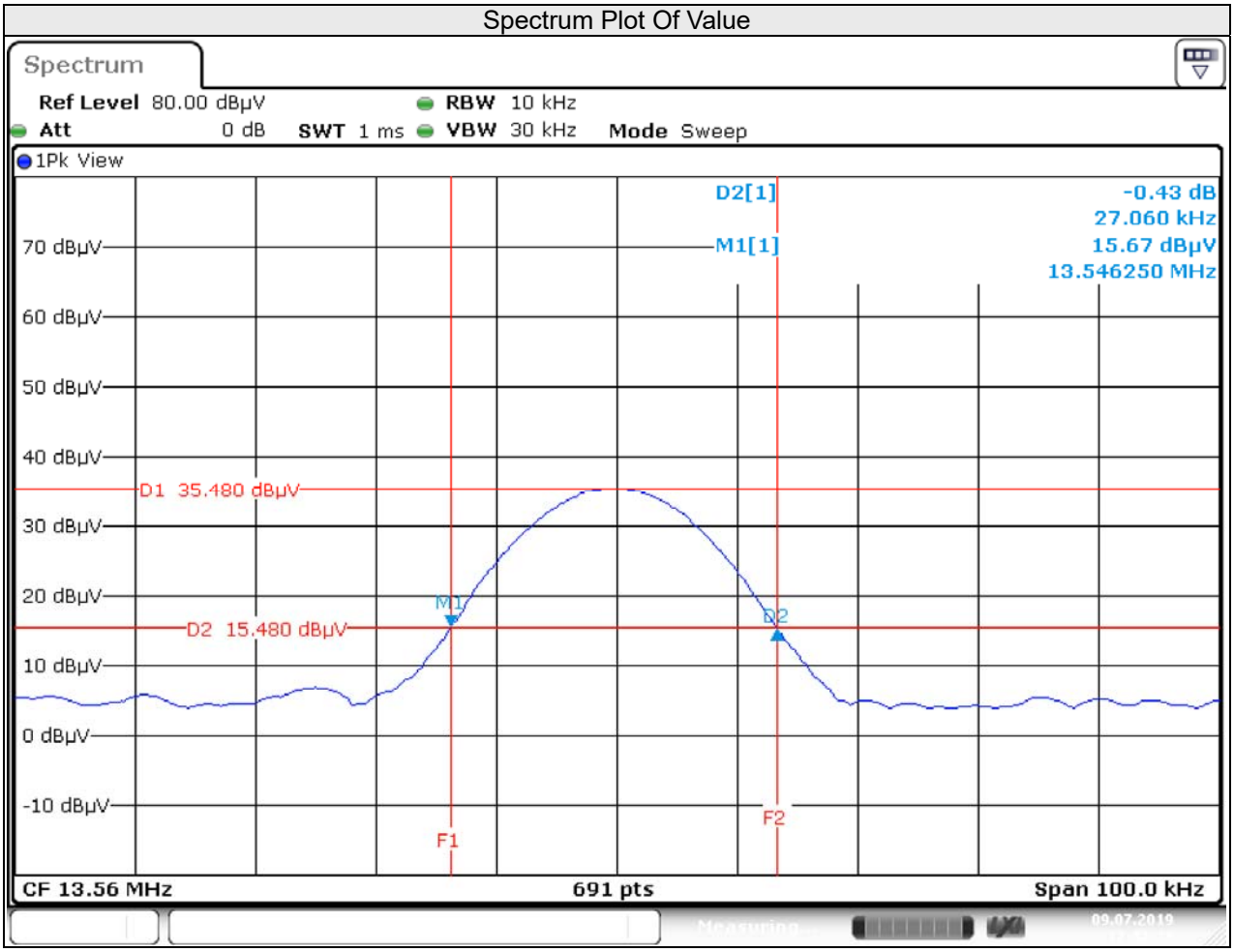
Same as Item 4.1.6.

4.4.7 Test Results

Mode A

Frequency (MHz)	20dB Bandwidth (kHz)	20dBc point (Low)(MHz)	20dBc point (High) (MHz)
13.56	27.060	13.54625	13.57331

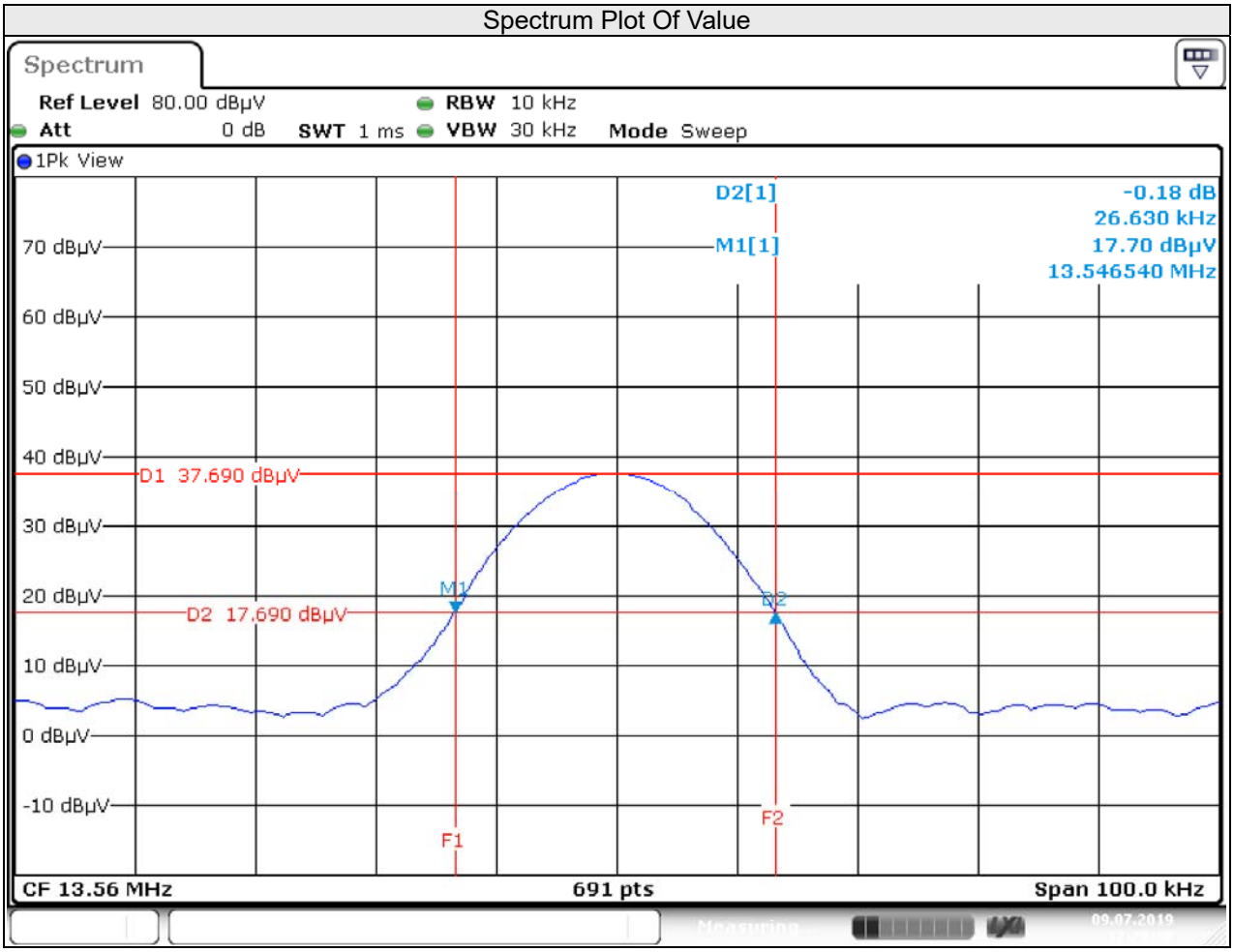
Spectrum Plot Of Value



Mode B

Frequency (MHz)	20dB Bandwidth (kHz)	20dBc point (Low)(MHz)	20dBc point (High) (MHz)
13.56	26.63	13.54654	13.57317

Spectrum Plot Of 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 according to ISO/IEC 17025.

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

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

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