



Test report No. : 4790144110-US-R0-V0  
Page : 1 of 34  
Issued date : 2021/11/25  
FCC ID : HFS-A5WM

## RADIO TEST REPORT

**Product** : Server  
**Model Name** : A5WM  
**FCC ID** : HFS-A5WM  
**Test Regulation** : FCC 47 CFR Part 15 Subpart C (Section 15.225)  
**Received Date** : 2021/11/1  
**Test Date** : 2021/11/1 ~ 2021/11/8  
**Issued Date** : 2021/11/25

**Applicant** : Quanta Computer Inc.  
No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City  
33377, Taiwan

**Issued By** : Underwriters Laboratories Taiwan Co., Ltd.  
Building B and Building E, No. 372-7, Sec. 4, Zhongxing  
Rd., Zhudong Township, Hsinchu County, Taiwan



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Telephone : +886-2-7737-3000  
Facsimile (FAX) : +886-3-583-7948

Doc No: 17-EM-F0875 / 5.0





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Facsimile (FAX ) :+886-3-583-7948



## 1. Attestation of Test Results

**APPLICANT:** Quanta Computer Inc.  
 No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City  
 33377, Taiwan

**MANUFACTURER:** Quanta Computer Inc.  
 No. 188, Wenhua 2nd Road, Guishan District, Taoyuan City  
 33377, Taiwan

**EUT DESCRIPTION:** Server

**BRAND:** Quanta Computer Inc.

**MODEL:** A5WM

**SAMPLE STAGE:** Identical Prototype

**DATE of TESTED:** 2021/11/1 ~ 2021/11/8

<b>APPLICABLE STANDARDS</b>	
<b>STANDARD</b>	<b>Test Results</b>
FCC 47 CFR PART 15 Subpart C (Section 15.225)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Sally Lu  
 Project Handler

Date : 2021/11/25

Approved and Authorized By:

Mike Cai  
 Engineer Project Associate

Date : 2021/11/25

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## 2. Summary of Test Results

FCC Clause	Test Item	Result
15.203	Antenna requirement	PASS
15.207	AC Power Conducted Emission	PASS
15.215 (c)	20dB Bandwidth	PASS
15.225 (a)	The field strength of any emissions within the band 13.553-13.567 MHz	PASS
15.225 (b)	The field strength of any emissions within the bands 13.410-13.553 MHz and 13.567-13.710 MHz	PASS
15.225 (c)	The field strength of any emissions within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	PASS
15.225 (d)	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band	PASS
15.225 (e)	The frequency tolerance	PASS

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### 3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB174176 D01 Line Conducted FAQ v01r01, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013.

### 4. Facilities and Accreditation

<b>Test Location</b>	Underwriters Laboratories Taiwan Co., Ltd.
<b>Address</b>	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
<b>Accreditation Certificate</b>	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

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## 5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor  $k=2$ .

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	$\pm 3.1$ dB
RF Conducted	9 kHz - 40GHz	$\pm 1.9$ dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	$\pm 1.9$ dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	$\pm 5.4$ dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	$\pm 4.7$ dB

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## 6. Equipment under Test

### 6.1. Description of EUT

<b>Product</b>	Server
<b>Brand Name</b>	Quanta Computer Inc.
<b>Model Name</b>	A5WM
<b>Operating Frequency</b>	13.56 MHz
<b>Modulation</b>	ASK
<b>Normal Voltage</b>	240Vac/ 60Hz
<b>Sample ID</b>	4252684
<b>Maximum Field Strength (dBuV/m)</b>	51.03 dBuV/m

Note:

1. The EUT contains following accessory devices:

<b>Product</b>	<b>Brand</b>	<b>Model</b>	<b>Description</b>
K2 card	Annapurna	K2V4	-
K2 card	Annapurna	K2X-N	-

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer the manufacturer's or user's manual.
3. The EUT is Class A digital device that is marketed for use in a commercial, industrial or business environment.

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## 6.2. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Radiated Spurious Emission	966-2	21~27°C/ 51~57%RH	240Vac/ 60Hz	2021/11/01~ 2021/11/08	WaterNil Guan
AC power Line Conducted Emission	SR1	21~27°C/ 51~57%RH	240Vac/ 60Hz	2021/11/01~ 2021/11/08	WaterNil Guan

FCC Test Firm Registration Number: 498077

## 6.3. Channel List

1 channels are provided to this EUT:

Channel	Frequency (MHz)
1	13.56

## 6.4. Description of Available Antennas

Ant. No.	Transmitter Circuit	Brand Name	Model Name	Ant. Type	Maximum Gain (dBi)
1	Chain (0)	Smart Approach	SM-MFAD4-C02	FR4 Loop Coil	-

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

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## 6.5. Test Mode Applicability and Tested Channel Detail

- The EUT only one power source types: 240Vac.
- All final radiated testing was performed with the EUT in X axis.
- For below 30MHz Radiated Emission Measurement, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

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## 7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Spectrum Analyzer	Keysight	N9010A	MY56070827	2020/11/11	2021/11/10
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2020/12/11	2021/12/10
Loop Antenna	ETS lindgren	6502	00213440	2020/12/25	2021/12/24
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2021/1/13	2022/1/12
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2021/6/8	2022/6/7
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2021/1/22	2022/1/21
Temperature & Humidity Test Chamber	GIANT FORCE	GTH-150- 40-CP-AR	MAA1701-010	2021/3/22	2022/3/21
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2020/11/17	2021/11/16
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2021/8/30	2022/8/29
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2021/8/26	2022/8/25
Cables	TITAN	CFD200	T0732ACFD2 0020A300-1	2021/3/2	2022/3/1

UL Software		
Description	Name	Version
Radiated measurement	e3	6.191211 (V6)
AC power Line Conducted Emission	EZ_EMG	UL-3A1.2

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## 8. Description of Test Setup

### Support Equipment

ID	Equipment	Brand Name	Model Name	S/N	Remark
A	Monitor	LG	22MP58VQ	710NTVS2L751	Provided by Lab
B	Keyboard	Microsoft	1576	NA	Provided by Lab
C	Mouse	Microsoft	1113	X821908-015	Provided by Lab
D	HUB	D-Link	DES-1005A	QS2E1J3001782	Provided by Lab
E	Power Source	LITEON	PS-2162-1Q	NA	Supplied by client

### I/O Cables

ID	Equipment	Brand Name	Model Name	Length (m)	Remark
1	VGA Cable	HOTRON	E246588	1.46	With one core, Provided by Lab
2	Keyboard with USB Cable	Microsoft	1576	1.95	Provided by Lab
3	Mouse with USB Cable	Microsoft	1113	1.8	With one core, Provided by Lab
4	RJ45	Fastlink	FL-61STU-04	10	Number x 3 Provided by Lab
5	Fiber Cable	TE	QSFP-25	1	Supplied by client
6	AC Power Cable	PowerSync	TPCPHN0006	1.7	Number x 2 Provided by Lab

### Test Setup

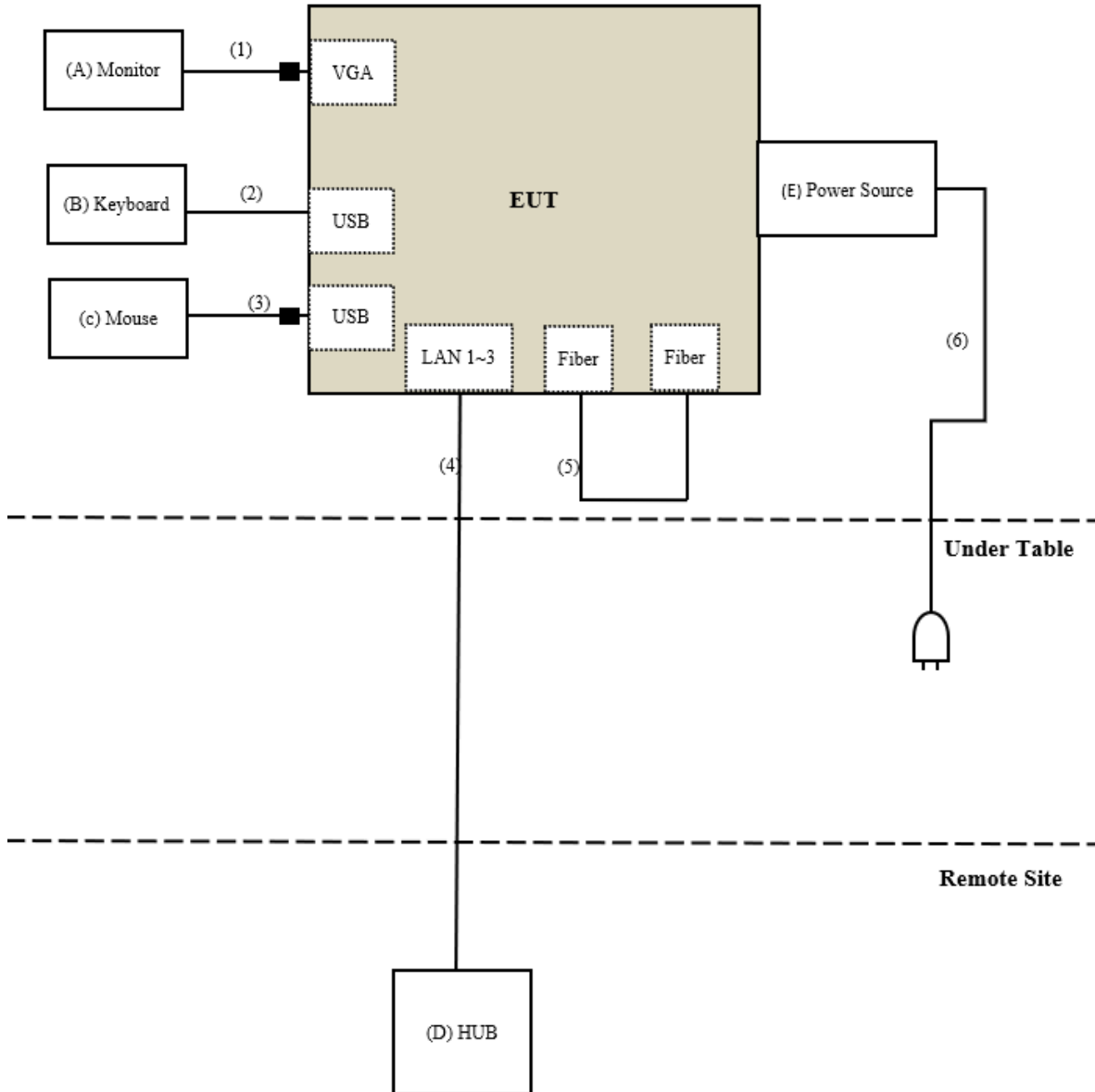
Controlled using a bespoke application (IPMITOOL) on a EUT. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

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**Setup Diagram for Test**



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## 9. Test Result

### 9.1. Radiated Spurious Emission

#### Requirements

- (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 1000 MHz, 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.

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## **Test Procedures**

[For 9 kHz ~ 30 MHz]

- 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. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

NOTE:

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

[For above 30 MHz]

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 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. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

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 (includes all external accessories) and the worst-case emissions are reported.

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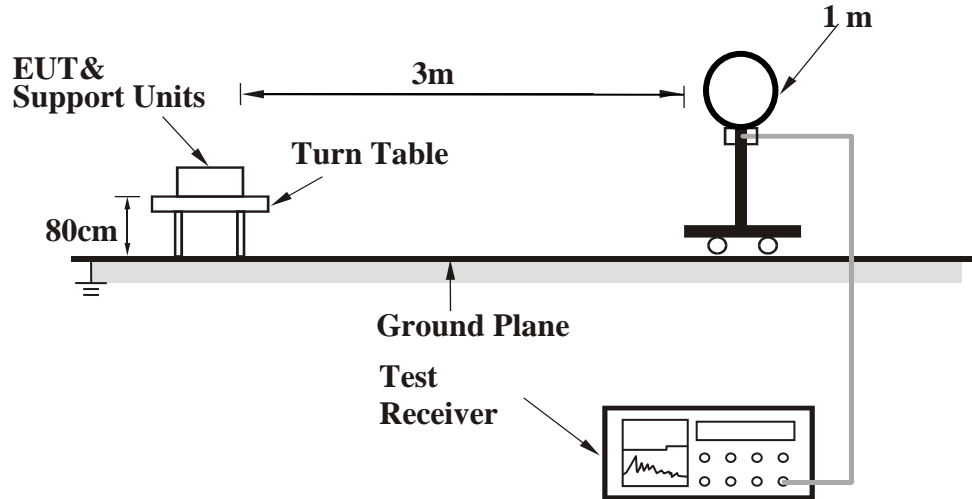
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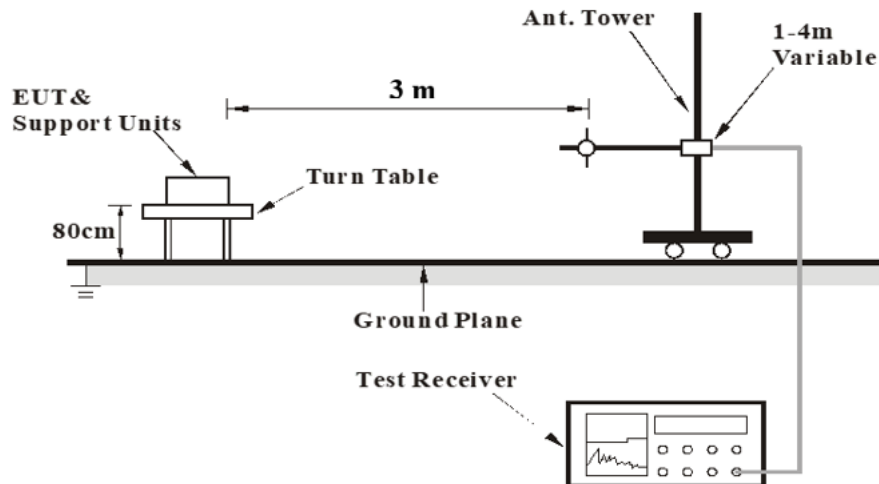
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## Test Setup

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



For the actual test configuration, please refer to the Setup Configurations.

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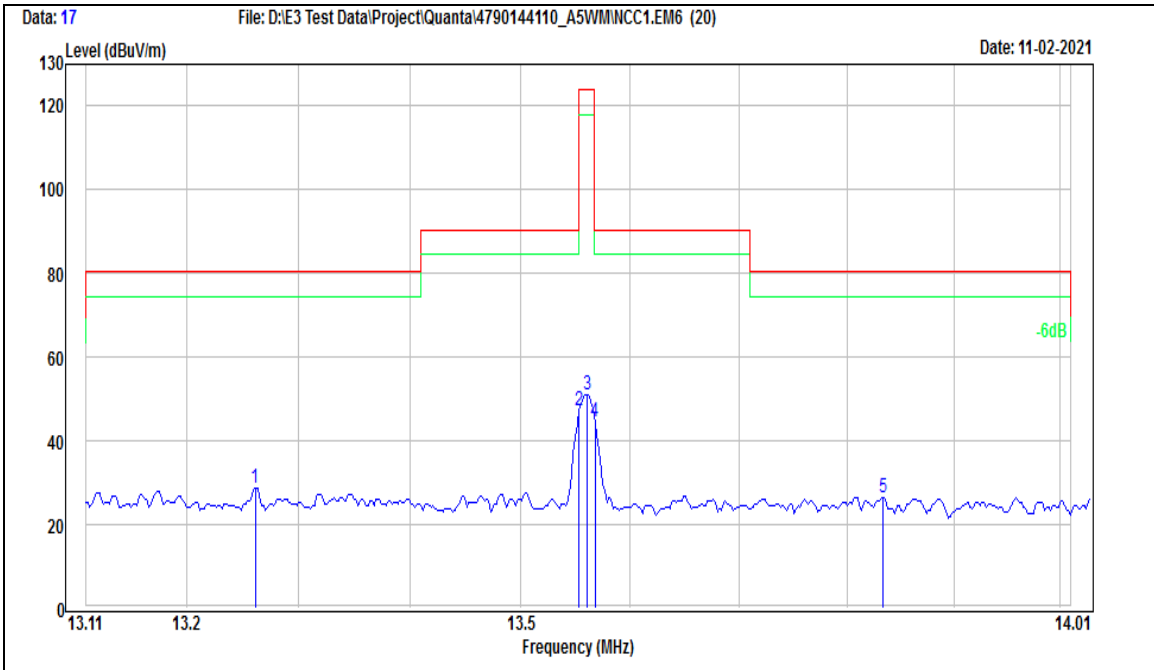
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## Test Data

EUT Test Condition			
Frequency Range	13.11MHz ~ 14.01MHz	Antenna Polarity	Parallel



Notation	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	13.261	15.92	12.77	28.69	80.51	-51.82	Peak
2	13.553	34.3	12.75	47.05	90.47	-43.42	Peak
3	13.561	38.28	12.75	51.03	124	-72.97	Peak
4	13.568	31.92	12.75	44.67	90.47	-45.8	Peak
5	13.834	13.78	12.74	26.52	80.51	-53.99	Peak

Note :

- Result (dBuV/m) = Reading (dBuV/m) + Correct (dB/m)
- Margin (dB) = Result (dBuV/m) - Limit (dBuV/m)
- Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
- 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:

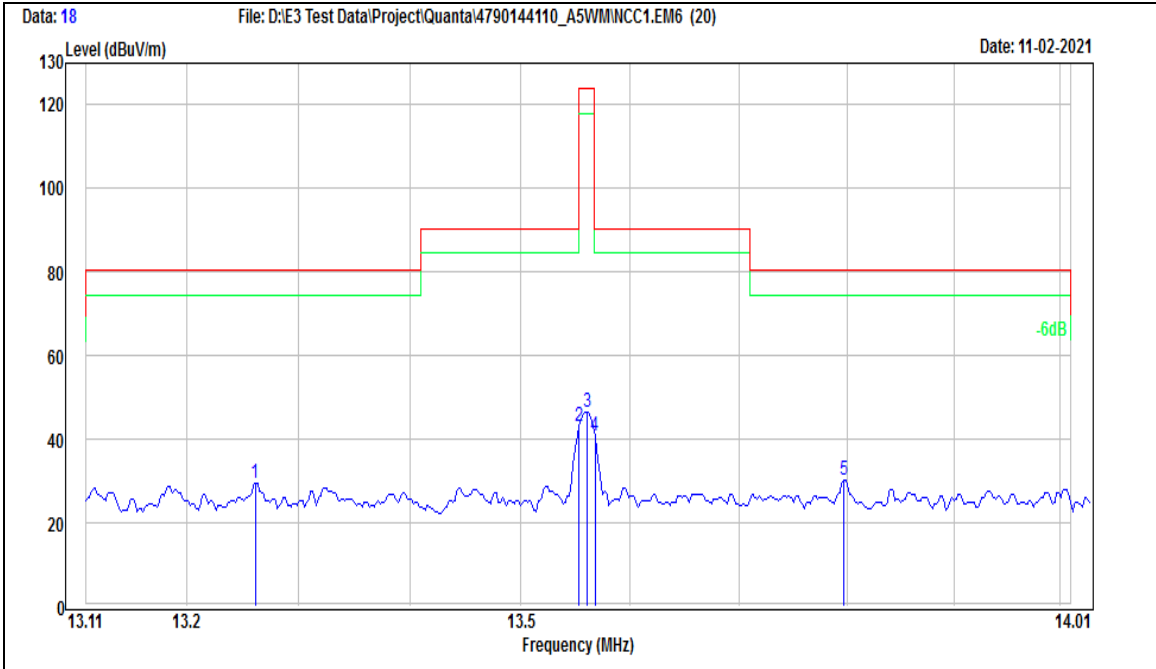
$$\begin{aligned}
 13.56\text{MHz} &= 15848\mu\text{V/m} && 30\text{m} \\
 &= 84\text{dBuV/m} && 30\text{m} \\
 &= 84+20\log(30/3)^2 && 3\text{m} \\
 &= 124\text{dBuV/m}
 \end{aligned}$$

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EUT Test Condition			
Frequency Range	13.11MHz ~ 14.01MHz	Antenna Polarity	Perpendicular



Notation	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	13.261	16.79	12.77	29.56	80.51	-50.95	Peak
2	13.553	30.35	12.75	43.1	90.47	-47.37	Peak
3	13.561	33.78	12.75	46.53	124	-77.47	Peak
4	13.568	27.94	12.75	40.69	90.47	-49.78	Peak
5	13.797	17.51	12.74	30.25	80.51	-50.26	Peak

Note :

1. Result (dBuV/m) = Reading (dBuV/m) + Correct (dB/m)
2. Margin (dB) = Result (dBuV/m) - Limit (dBuV/m)
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. Above limits have been translated by the formula.
5. 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:

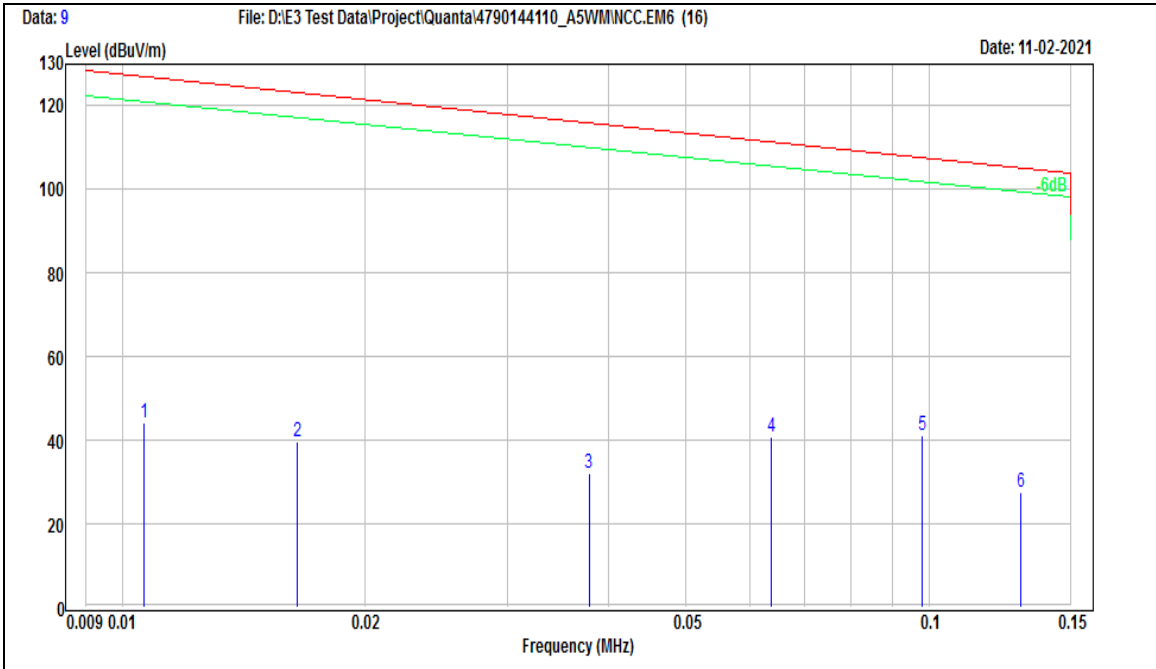
$$\begin{aligned}
 13.56\text{MHz} &= 15848\text{uV/m} && 30\text{m} \\
 &= 84\text{dBuV/m} && 30\text{m} \\
 &= 84+20\log(30/3)^2 && 3\text{m} \\
 &= 124\text{dBuV/m}
 \end{aligned}$$

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EUT Test Condition			
Frequency Range	9 kHz ~ 0.15 MHz	Antenna Polarity	Parallel



Notation	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.01066	26.65	17.46	44.11	127.05	-82.94	Peak
2	0.01648	23.5	16.11	39.61	123.27	-83.66	Peak
3	0.0379	18.26	13.79	32.05	116.03	-83.98	Peak
4	0.06377	28.27	12.73	41	111.51	-70.51	Peak
5	0.09808	29.25	11.81	41.06	107.77	-66.71	Peak
6	0.12995	15.5	11.94	27.44	105.33	-77.89	Peak

Remarks:

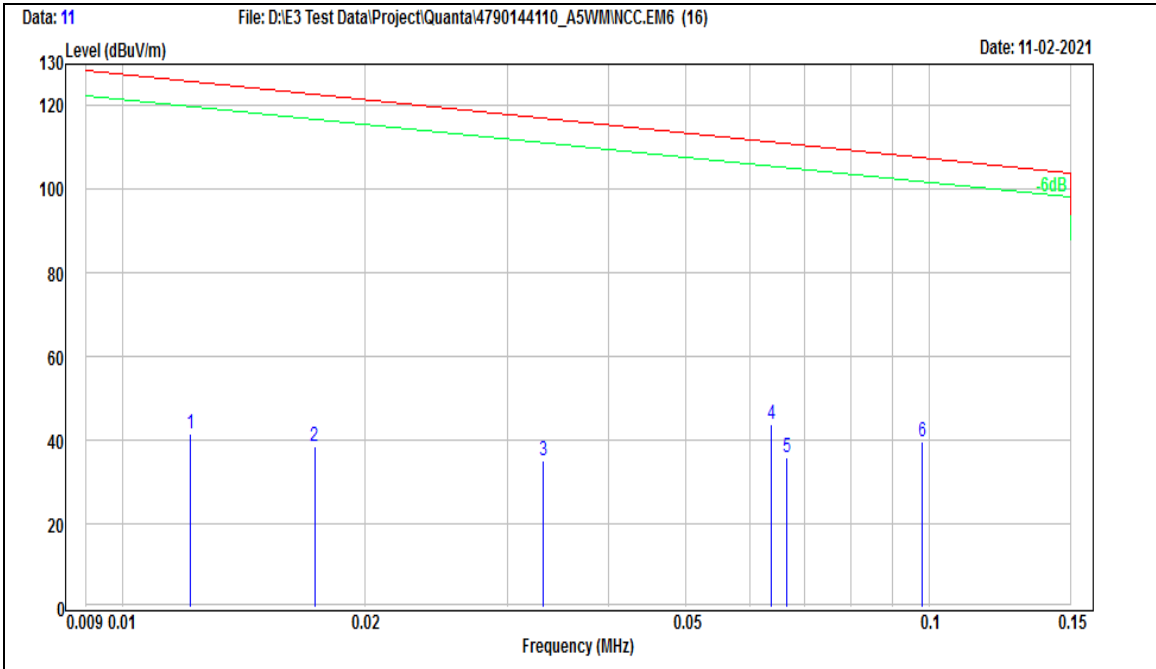
1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The other emission levels were very low against the limit.

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EUT Test Condition			
Frequency Range	9 kHz ~ 0.15 MHz	Antenna Polarity	Perpendicular



Notation	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.01216	24.35	17.05	41.4	125.9	-84.5	Peak
2	0.01734	22.76	15.96	38.72	122.83	-84.11	Peak
3	0.0333	20.9	14.06	34.96	117.16	-82.2	Peak
4	0.06377	31.2	12.73	43.93	111.51	-67.58	Peak
5	0.06671	23.27	12.65	35.92	111.12	-75.2	Peak
6	0.09808	27.99	11.81	39.8	107.77	-67.97	Peak

Remarks:

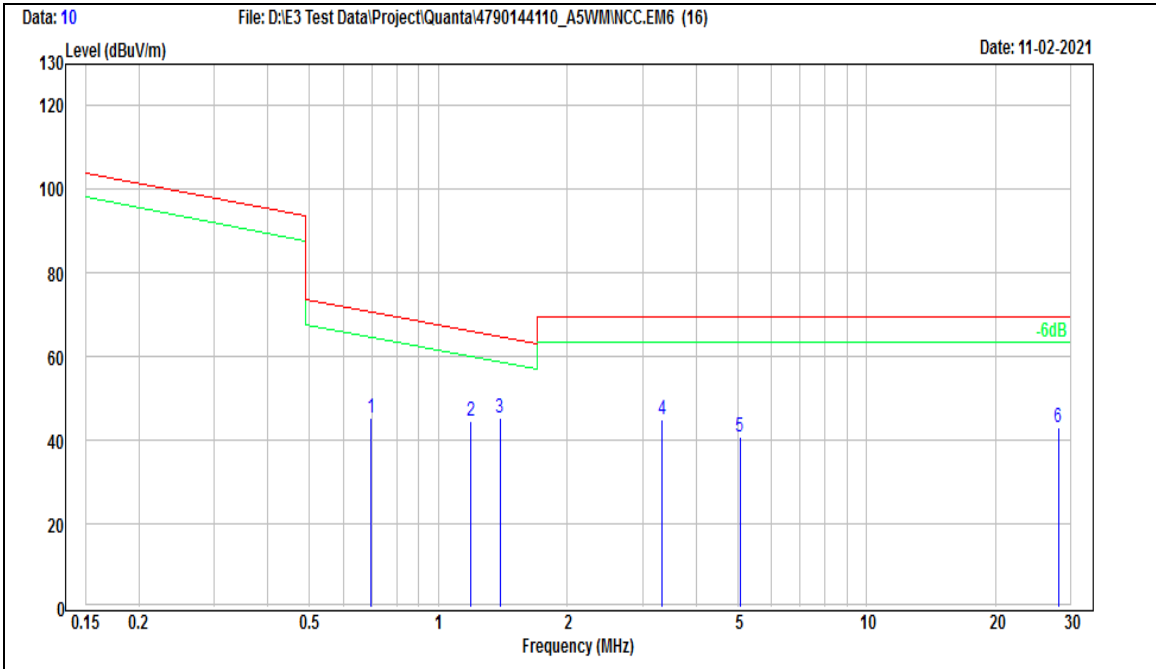
1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The other emission levels were very low against the limit.

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EUT Test Condition			
Frequency Range	0.15 MHz ~ 30 MHz	Antenna Polarity	Parallel



Notation	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.69725	32.76	12.5	45.26	70.74	-25.48	Peak
2	1.191	32.18	12.49	44.67	66.09	-21.42	Peak
3	1.396	32.75	12.42	45.17	64.71	-19.54	Peak
4	3.328	32.8	12.08	44.88	69.54	-24.66	Peak
5	5.058	28.47	12.17	40.64	69.54	-28.9	Peak
6	28.003	32.22	10.84	43.06	69.54	-26.48	Peak

Remarks:

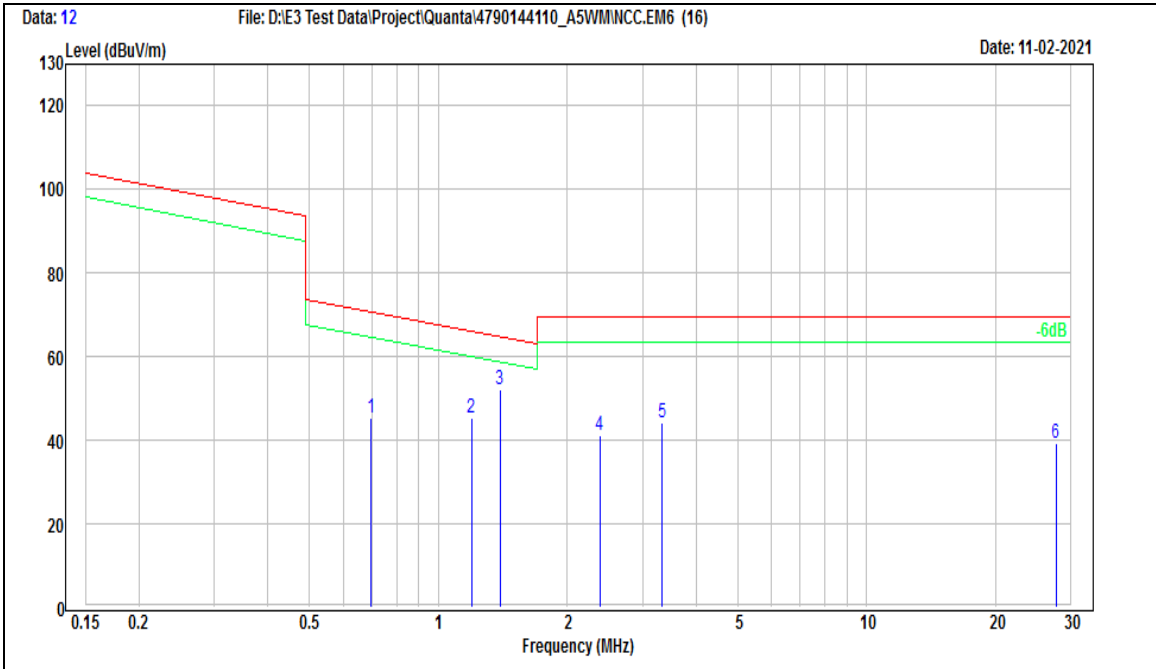
1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The other emission levels were very low against the limit.

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EUT Test Condition			
Frequency Range	0.15 MHz ~ 30 MHz	Antenna Polarity	Perpendicular



Notation	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.69725	32.87	12.5	45.37	70.74	-25.37	Peak
2	1.197	32.71	12.49	45.2	66.04	-20.84	Peak
3	1.396	39.57	12.42	51.99	64.71	-12.72	Peak
4	2.384	29.18	12.18	41.36	69.54	-28.18	Peak
5	3.328	32.16	12.08	44.24	69.54	-25.3	Peak
6	27.708	28.55	10.89	39.44	69.54	-30.1	Peak

Remarks:

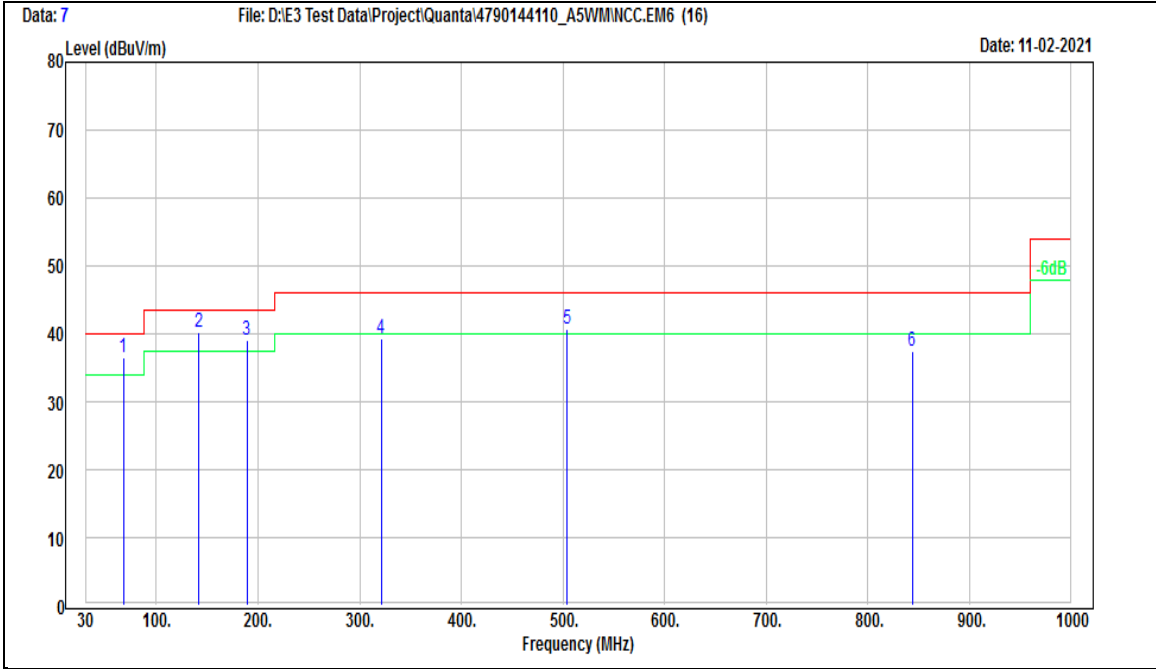
1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The other emission levels were very low against the limit.

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EUT Test Condition			
Frequency Range	30MHz ~ 1 GHz	Antenna Polarity	Horizontal



Notation	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	67.83	49.97	-13.49	36.48	40	-3.52	Peak
2	141.55	52.29	-12.03	40.26	43.5	-3.24	Peak
3	189.08	52.17	-13.09	39.08	43.5	-4.42	Peak
4	321	48.54	-9.26	39.28	46	-6.72	Peak
5	504.33	45.38	-4.67	40.71	46	-5.29	Peak
6	843.83	35.47	1.97	37.44	46	-8.56	Peak

Remarks:

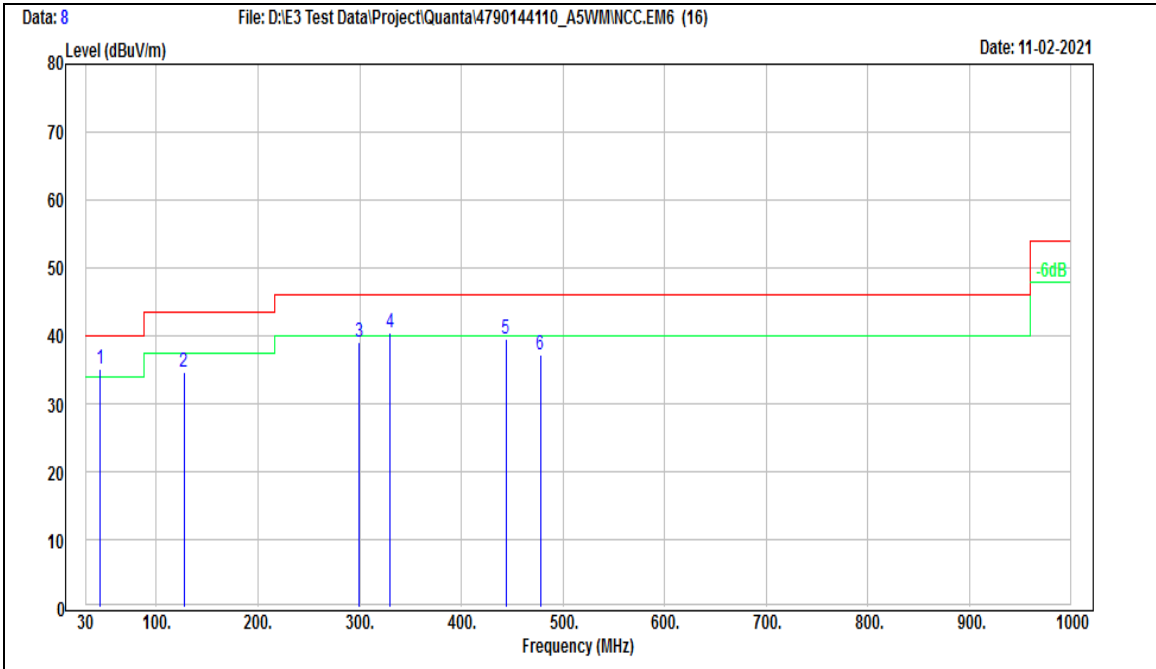
1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with QP limit, QP result is deemed to comply with QP limit.
5. The other emission levels were very low against the limit.

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EUT Test Condition			
Frequency Range	30MHz ~ 1 GHz	Antenna Polarity	Vertical



Notation	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	44.55	46.43	-11.34	35.09	40	-4.91	Peak
2	127	48.24	-13.65	34.59	43.5	-8.91	Peak
3	299.66	49.03	-9.94	39.09	46	-6.91	Peak
4	329.73	49.42	-9.04	40.38	46	-5.62	Peak
5	444.19	45.29	-5.82	39.47	46	-6.53	Peak
6	478.14	42.44	-5.17	37.27	46	-8.73	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with QP limit, QP result is deemed to comply with QP limit.
5. The other emission levels were very low against the limit.

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## 9.2. AC Power Line Conducted Emission

### Requirements

Frequency (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	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 0.50 MHz.

### 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:

1. 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.

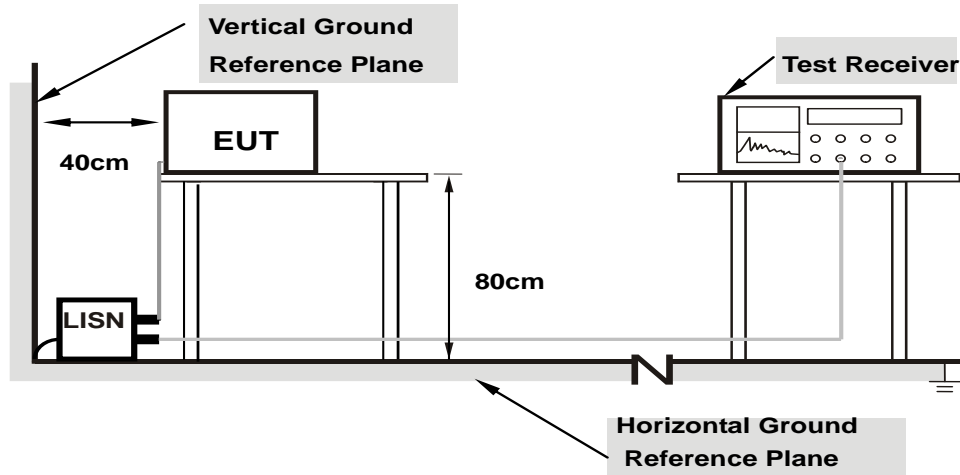
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## Test Setup



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

For the actual test configuration, please refer to the Setup Configurations.

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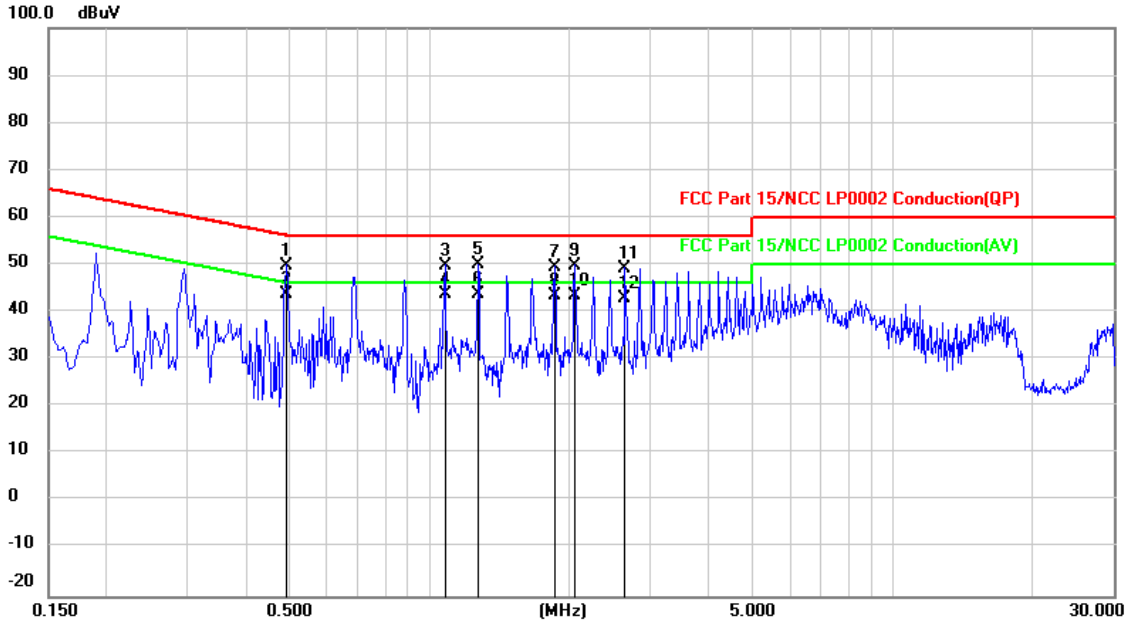
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### Test Data

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	150 kHz ~ 30 MHz

### Phase of Power : Line (L)



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No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.4905	30.29	19.49	49.78	56.16	-6.38	QP
2	0.4905	24.30	19.49	43.79	46.16	-2.37	AVG
3	1.0786	30.34	19.51	49.85	56.00	-6.15	QP
4	1.0786	24.22	19.51	43.73	46.00	-2.27	AVG
5	1.2746	30.48	19.51	49.99	56.00	-6.01	QP
6	1.2746	24.38	19.51	43.89	46.00	-2.11	AVG
7	1.8629	29.98	19.53	49.51	56.00	-6.49	QP
8	1.8629	23.92	19.53	43.45	46.00	-2.55	AVG
9	2.0591	30.20	19.53	49.73	56.00	-6.27	QP
10	2.0591	24.04	19.53	43.57	46.00	-2.43	AVG
11	2.6474	29.57	19.54	49.11	56.00	-6.89	QP
12	2.6474	23.42	19.54	42.96	46.00	-3.04	AVG

Remarks:

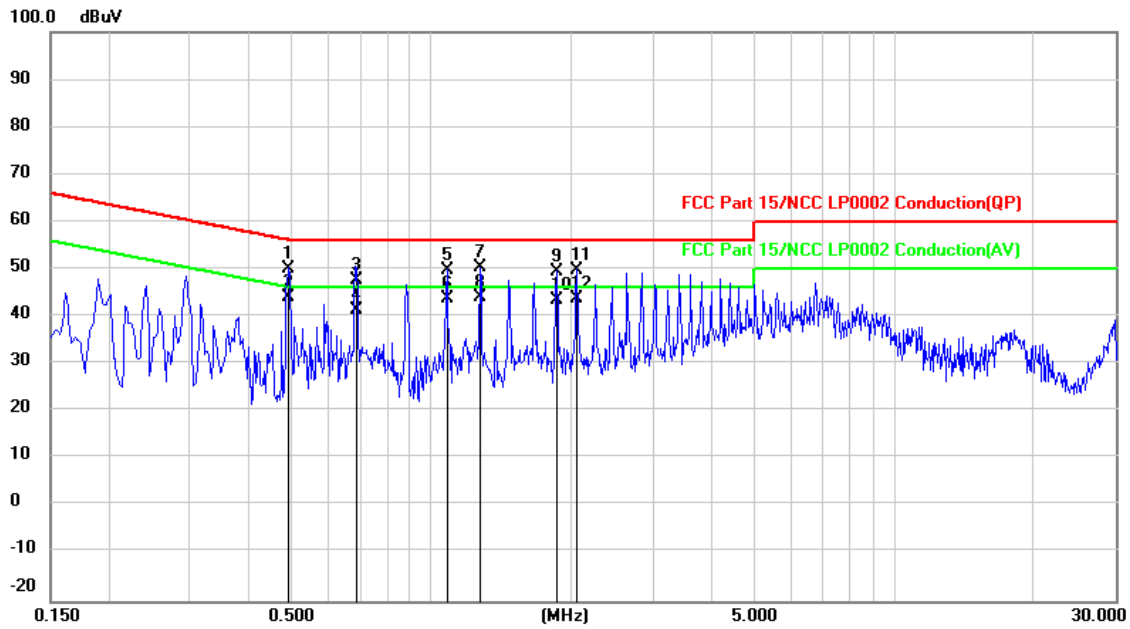
1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
2. Margin(dB) = Result value (dBuV) - Limit value (dBuV)
3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
4. The other emission levels were very low against the limit.

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### Phase of Power : Neutral (N)



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No.	Frequency (MHz)	Reading (dBuV)	Correct dB	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.4905	30.65	19.49	50.14	56.16	-6.02	QP
2	0.4905	24.63	19.49	44.12	46.16	-2.04	AVG
3	0.6866	28.12	19.50	47.62	56.00	-8.38	QP
4	0.6866	21.76	19.50	41.26	46.00	-4.74	AVG
5	1.0785	30.33	19.50	49.83	56.00	-6.17	QP
6	1.0785	24.16	19.50	43.66	46.00	-2.34	AVG
7	1.2746	30.70	19.50	50.20	56.00	-5.80	QP
8	1.2746	24.51	19.50	44.01	46.00	-1.99	AVG
9	1.8629	30.05	19.52	49.57	56.00	-6.43	QP
10	1.8629	23.97	19.52	43.49	46.00	-2.51	AVG
11	2.0590	30.29	19.52	49.81	56.00	-6.19	QP
12	2.0590	24.13	19.52	43.65	46.00	-2.35	AVG

Remarks:

1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
2. Margin(dB) = Result value (dBuV) - Limit value (dBuV)
3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
4. The other emission levels were very low against the limit.

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### 9.3. 20dB Bandwidth

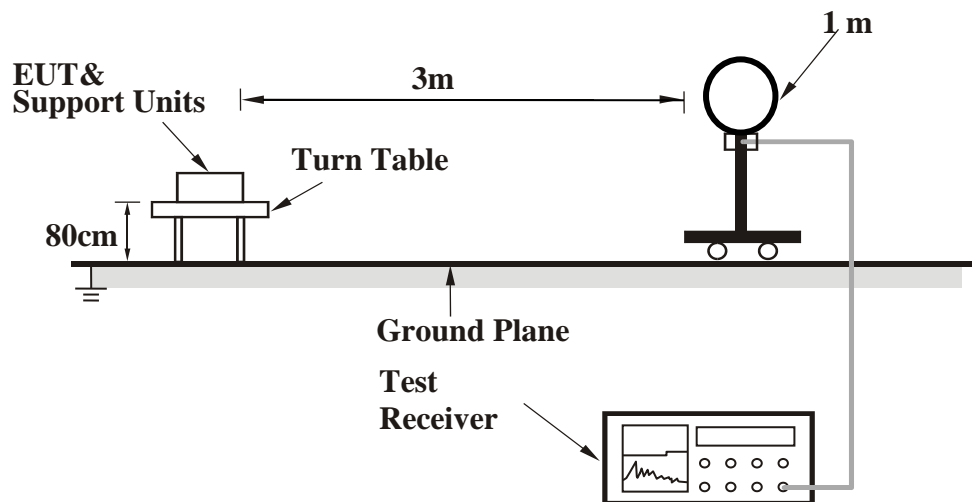
#### Requirements

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

#### Test Procedures

- The testing follows the guidelines in ANSI C63.10-2013.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.

#### Test Setup



For the actual test configuration, please refer to the Setup Configurations.

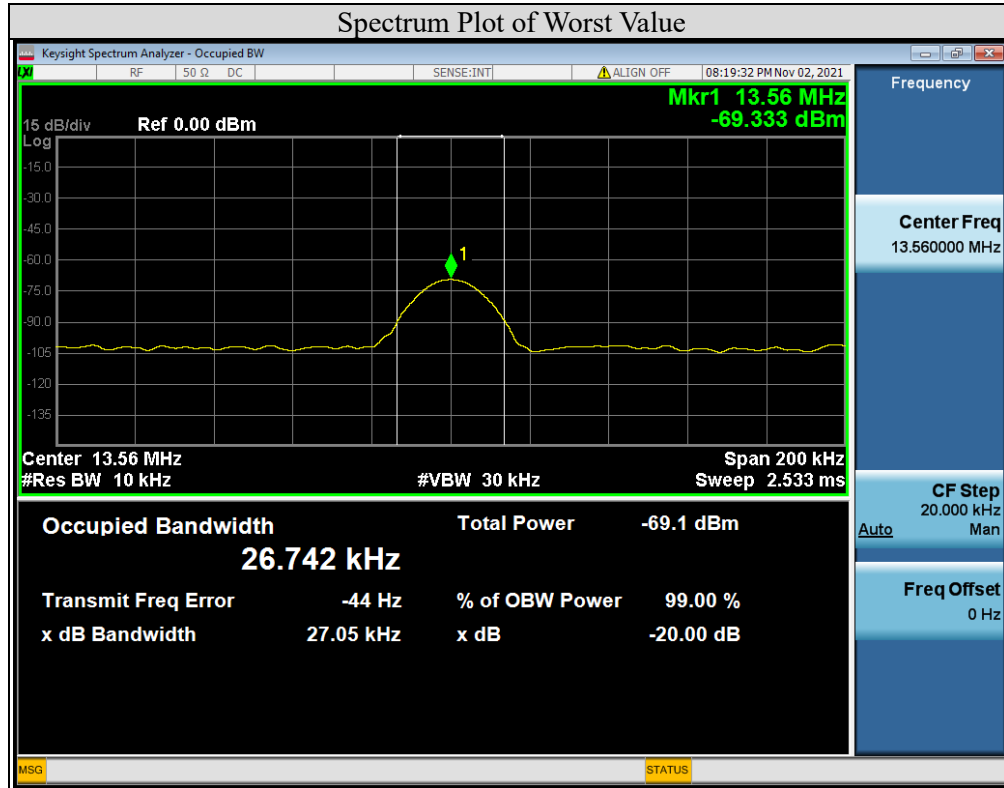
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**Test Data**

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
1	13.56	0.027



Note: The characteristics of the signal will cause the spectrum analyzer RBW to be unable to set comply with 1~5% emission bandwidth. However, set the RBW:10KHz for spectrum analyzer already can meet the emission is contained within the operated frequency band designated in the rule section, so no longer continue to reduce RBW setting.

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## 9.4. Frequency Stability

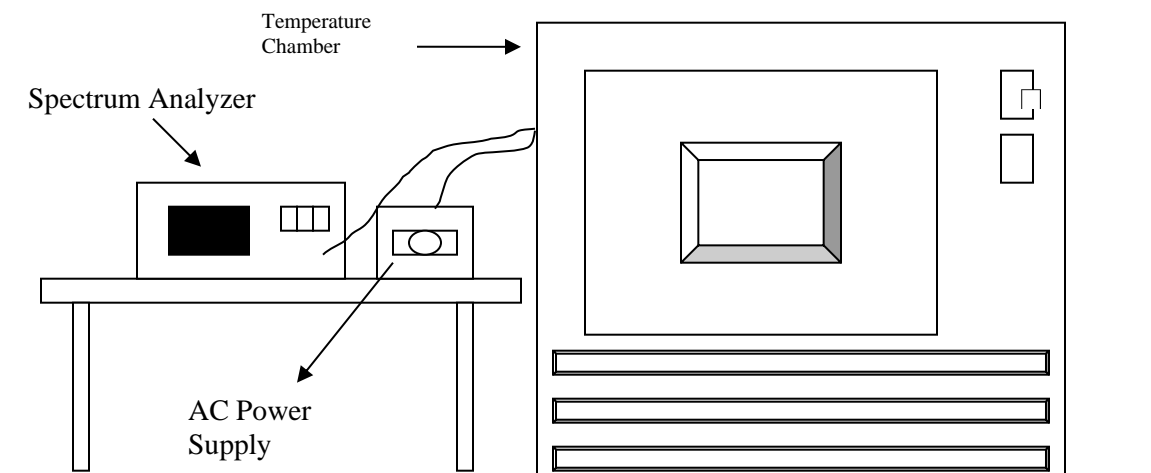
### Requirements

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.

### Test Procedures

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turned the EUT on and coupled its output to a spectrum analyzer.
- Turned the EUT off and set the chamber to the highest temperature specified.
- Allowed sufficient time (approximately 30 min) for the temperature of the chamber to stabilize then turned the EUT on and measured the operating frequency after 2, 5, and 10 minutes.
- Repeated step 2 and 3 with the temperature chamber set to the lowest temperature.
- 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.

### Test Setup



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**Test Data**

Frequency Stability Versus Temp.									
TEMP. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
50	220	13.55997	-0.00022	13.55996	-0.00029	13.55996	-0.00029	13.55997	-0.00022
40	220	13.55997	-0.00022	13.55997	-0.00022	13.55996	-0.00029	13.55997	-0.00022
30	220	13.55997	-0.00022	13.55997	-0.00022	13.55997	-0.00022	13.55997	-0.00022
20	220	13.55999	-0.00007	13.55997	-0.00022	13.55998	-0.00015	13.55998	-0.00015
10	220	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029
0	220	13.55994	-0.00044	13.55993	-0.00052	13.55994	-0.00044	13.55995	-0.00037
-10	220	13.56002	0.00015	13.56002	0.00015	13.56003	0.00022	13.56002	0.00015
-20	220	13.56002	0.00015	13.56002	0.00015	13.56002	0.00015	13.56002	0.00015
TEMP. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)	Measured Frequency (MHz)	Freq. Drift (ppm)
20	253	13.55999	-0.00007	13.55997	-0.00022	13.55998	-0.00015	13.55998	-0.00015
20	220	13.55999	-0.00007	13.55997	-0.00022	13.55998	-0.00015	13.55998	-0.00015
20	187	13.55999	-0.00007	13.55997	-0.00022	13.55998	-0.00015	13.55998	-0.00015

**END OF REPORT**

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