



# RADIO TEST REPORT

**FCC ID** : Z3WAIR4985  
**Equipment** : Wi-Fi 6E Smart Mesh System  
**Brand Name** : Airties  
**Model Name** : Air 4985  
**Applicant** : Airties Wireless Networks  
Sehit Mehmet Mikdat Uluunlu Sokagi No:23  
Esentepe, Sisli İstanbul, 34394 Turkey  
**Manufacturer** : Airties Wireless Networks  
Sehit Mehmet Mikdat Uluunlu Sokagi No:23  
Esentepe, Sisli İstanbul, 34394 Turkey  
**Standard** : 47 CFR FCC Part 15.407

The product was received on Jan. 06, 2023, and testing was started from Jan. 06, 2023 and completed on Jan. 19, 2023. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

**Sporton International Inc. Hsinchu Laboratory**

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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### Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.407(b)	Unwanted Emissions	PASS	-

**Conformity Assessment Condition:**

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

**Disclaimer:**

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

**Reviewed by: Sam Chen**

**Report Producer: Viola Huang**



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
5150-5250	a, n (HT20), ac (VHT20), ax (HEW20)	5180-5240	36-48 [4]
5250-5350		5260-5320	52-64 [4]
5470-5725		5500-5720	100-144 [12]
5725-5850		5745-5825	149-165 [5]
5150-5250	n (HT40), ac (VHT40), ax (HEW40)	5190-5230	38-46 [2]
5250-5350		5270-5310	54-62 [2]
5470-5725		5510-5710	102-142 [6]
5725-5850		5755-5795	151-159 [2]
5150-5250	ac (VHT80), ax (HEW80)	5210	42 [1]
5250-5350		5290	58 [1]
5470-5725		5530-5690	106-138 [3]
5725-5850		5775	155 [1]
5150-5350	ac (VHT160), ax (HEW160)	5250	50 [1]
5470-5725		5570	114 [1]

Band	Mode	BWch (MHz)	Nant
5.15-5.25GHz	802.11a	20	4TX
5.15-5.25GHz	802.11n HT20	20	4TX
5.15-5.25GHz	802.11n HT20-BF	20	4TX
5.15-5.25GHz	802.11ac VHT20	20	4TX
5.15-5.25GHz	802.11ac VHT20-BF	20	4TX
5.15-5.25GHz	802.11ax HEW20	20	4TX
5.15-5.25GHz	802.11ax HEW20-BF	20	4TX
5.15-5.25GHz	802.11n HT40	40	4TX
5.15-5.25GHz	802.11n HT40-BF	40	4TX
5.15-5.25GHz	802.11ac VHT40	40	4TX
5.15-5.25GHz	802.11ac VHT40-BF	40	4TX
5.15-5.25GHz	802.11ax HEW40	40	4TX
5.15-5.25GHz	802.11ax HEW40-BF	40	4TX
5.15-5.25GHz	802.11ac VHT80	80	4TX
5.15-5.25GHz	802.11ac VHT80-BF	80	4TX
5.15-5.25GHz	802.11ax HEW80	80	4TX



<b>Band</b>	<b>Mode</b>	<b>BWch (MHz)</b>	<b>Nant</b>
5.15-5.25GHz	802.11ax HEW80-BF	80	4TX
5.15-5.35GHz	802.11ac VHT160	160	4TX
5.15-5.35GHz	802.11ac VHT160-BF	160	4TX
5.15-5.35GHz	802.11ax HEW160	160	4TX
5.15-5.35GHz	802.11ax HEW160-BF	160	4TX
5.25-5.35GHz	802.11a	20	4TX
5.25-5.35GHz	802.11n HT20	20	4TX
5.25-5.35GHz	802.11n HT20-BF	20	4TX
5.25-5.35GHz	802.11ac VHT20	20	4TX
5.25-5.35GHz	802.11ac VHT20-BF	20	4TX
5.25-5.35GHz	802.11ax HEW20	20	4TX
5.25-5.35GHz	802.11ax HEW20-BF	20	4TX
5.25-5.35GHz	802.11n HT40	40	4TX
5.25-5.35GHz	802.11n HT40-BF	40	4TX
5.25-5.35GHz	802.11ac VHT40	40	4TX
5.25-5.35GHz	802.11ac VHT40-BF	40	4TX
5.25-5.35GHz	802.11ax HEW40	40	4TX
5.25-5.35GHz	802.11ax HEW40-BF	40	4TX
5.25-5.35GHz	802.11ac VHT80	80	4TX
5.25-5.35GHz	802.11ac VHT80-BF	80	4TX
5.25-5.35GHz	802.11ax HEW80	80	4TX
5.25-5.35GHz	802.11ax HEW80-BF	80	4TX
5.47-5.725GHz	802.11a	20	4TX
5.47-5.725GHz	802.11n HT20	20	4TX
5.47-5.725GHz	802.11n HT20-BF	20	4TX
5.47-5.725GHz	802.11ac VHT20	20	4TX
5.47-5.725GHz	802.11ac VHT20-BF	20	4TX
5.47-5.725GHz	802.11ax HEW20	20	4TX
5.47-5.725GHz	802.11ax HEW20-BF	20	4TX
5.47-5.725GHz	802.11n HT40	40	4TX
5.47-5.725GHz	802.11n HT40-BF	40	4TX
5.47-5.725GHz	802.11ac VHT40	40	4TX
5.47-5.725GHz	802.11ac VHT40-BF	40	4TX
5.47-5.725GHz	802.11ax HEW40	40	4TX
5.47-5.725GHz	802.11ax HEW40-BF	40	4TX
5.47-5.725GHz	802.11ac VHT80	80	4TX
5.47-5.725GHz	802.11ac VHT80-BF	80	4TX
5.47-5.725GHz	802.11ax HEW80	80	4TX
5.47-5.725GHz	802.11ax HEW80-BF	80	4TX
5.47-5.725GHz	802.11ac VHT160	160	4TX



<b>Band</b>	<b>Mode</b>	<b>BWch (MHz)</b>	<b>Nant</b>
5.47-5.725GHz	802.11ac VHT160-BF	160	4TX
5.47-5.725GHz	802.11ax HEW160	160	4TX
5.47-5.725GHz	802.11ax HEW160-BF	160	4TX
5.725-5.85GHz	802.11a	20	4TX
5.725-5.85GHz	802.11n HT20	20	4TX
5.725-5.85GHz	802.11n HT20-BF	20	4TX
5.725-5.85GHz	802.11ac VHT20	20	4TX
5.725-5.85GHz	802.11ac VHT20-BF	20	4TX
5.725-5.85GHz	802.11ax HEW20	20	4TX
5.725-5.85GHz	802.11ax HEW20-BF	20	4TX
5.725-5.85GHz	802.11n HT40	40	4TX
5.725-5.85GHz	802.11n HT40-BF	40	4TX
5.725-5.85GHz	802.11ac VHT40	40	4TX
5.725-5.85GHz	802.11ac VHT40-BF	40	4TX
5.725-5.85GHz	802.11ax HEW40	40	4TX
5.725-5.85GHz	802.11ax HEW40-BF	40	4TX
5.725-5.85GHz	802.11ac VHT80	80	4TX
5.725-5.85GHz	802.11ac VHT80-BF	80	4TX
5.725-5.85GHz	802.11ax HEW80	80	4TX
5.725-5.85GHz	802.11ax HEW80-BF	80	4TX

**Note:**

- ◆ 11a, HT20 and HT40 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- ◆ VHT20, VHT40, VHT80 and VHT160 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation.
- ◆ HEW20, HEW40, HEW80 and HEW160 use a combination of OFDMA-BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM modulation.
- ◆ BWch is the nominal channel bandwidth.



**1.1.2 Antenna Information**

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz					
1	1	-	1	AirTies	ANT A00	PCB	N/A	Note 1
2	2	-	2	AirTies	ANT A11	PCB	N/A	
3	-	1	-	AirTies	ANT A0X	PCB	N/A	
4	-	2	-	AirTies	ANT A1X	PCB	N/A	
5	-	3	-	AirTies	ANT A2X	PCB	N/A	
6	-	4	-	AirTies	ANT A3X	PCB	N/A	

Note 1:

**<Antenna Gain>**

Ant.	Port			Antenna Gain (dBi)								
	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	WLAN 2.4GHz	WLAN 5GHz				WLAN 6GHz			
					UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 5	UNII 6	UNII 7	UNII 8
1	1	-	1	4.21	-	-	-	-	1.32	1.46	1.76	2.61
2	2	-	2	4.42	-	-	-	-	1.62	1.98	2.47	2.12
3	-	1	-	-	3.49	3.27	2.85	2.09	-	-	-	-
4	-	2	-	-	3.58	2.61	4.52	2.72	-	-	-	-
5	-	3	-	-	2.41	2.6	3.51	5.47	-	-	-	-
6	-	4	-	-	4.45	4.89	4.53	4.93	-	-	-	-

**< Directional Gain>**

Item	Directional Gain (dBi)								
	WLAN 2.4GHz	WLAN 5GHz				WLAN 6GHz			
		UNII 1	UNII 2A	UNII 2C	UNII 3	UNII 5	UNII 6	UNII 7	UNII 8
2T1S	4.52	-	-	-	-	3.75	3.57	4.12	4.26
4T1S	-	4.57	4.92	5.39	5.58	-	-	-	-

Note 2: The above information (except gain) was declared by manufacturer.

The directional gain is measured which follows the procedure of KDB 662911 D03.

Note 3: The EUT has six antennas.:

**For 2.4GHz function:**

**For 802.11 b/g/n/VHT/ax (2TX/2RX):**

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

**For 5GHz function:**

**For 802.11a/n/ac/ax (4TX/4RX):**

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

**For 6GHz function:**

**For 802.11ax (2TX/2RX):**

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.





1.1.3 EUT Operational Condition

EUT Power Type	From Power Adapter			
Beamforming Function	<input checked="" type="checkbox"/>	With beamforming	<input type="checkbox"/>	Without beamforming
	The product has beamforming function for n/VHT/ax in 2.4GHz, n/ac/ax in 5GHz and ax in 6GHz.			
Weather Band	<input checked="" type="checkbox"/>	With 5600~5650MHz	<input type="checkbox"/>	Without 5600~5650MHz
Function	<input type="checkbox"/>	Outdoor P2M	<input checked="" type="checkbox"/>	Indoor P2M
	<input type="checkbox"/>	Fixed P2P	<input type="checkbox"/>	Client
	<input checked="" type="checkbox"/>	Point-to-multipoint	<input type="checkbox"/>	Point-to-point
TPC Function	<input checked="" type="checkbox"/>	With TPC	<input type="checkbox"/>	Without TPC
Channel Puncturing Function	<input type="checkbox"/>	Supported	<input checked="" type="checkbox"/>	Unsupported
Support RU	<input checked="" type="checkbox"/>	Full RU	<input type="checkbox"/>	Partial RU
Test Software Version	Access Manual Tool 3.2.1.3			
Serial Number	AW2862239000027			
SW version	4.144.8.0_wltest			
HW version	PCB-4985-D01-M01-R03			

Note: The above information was declared by manufacturer.

1.1.4 Table for EUT supports functions

Function	Support Band
AP Router	WLAN 2.4GHz, WLAN 5GHz UNII 1~3 and WLAN 6GHz UNII 5~8
Mesh	WLAN 5GHz UNII 1~3 and WLAN 6GHz UNII 5~8

Note 1: After evaluating, AP Router was selected to test and record in the report.

Note 2: The above information was declared by manufacturer.

1.1.5 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
802.11a	0.947	0.24	2.064m	1k
802.11ax HEW160-BF	0.931	0.31	4.813m	300

Note:

- ◆ DC is Duty Cycle.
- ◆ DCF is Duty Cycle Factor.



**1.1.6 Table for Permissive Change**

This product is an extension of original one reported under Sporton project number: FR281911AB

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
<ol style="list-style-type: none"> <li>1. Adding one adapter model name: NBS24M120200VU</li> <li>2. PCB layout and P/N changed from PCB-4985-D01-M01-R02 to PCB-4985-D01-M01-R03 PCB layout and P/N changed from PCB-4985-D01-M01-R02 to PCB-4985-D01-M01-R03.</li> <li>3. Layout change for adding capacitors new brand: Richtek, model NO. RT6278BHGQUF, and change power inductor, old brand: TAI-TECH, model No : TMPF0402LR-1R2MN-ABD, new brand: MAGLAYERS, model NO: MNR-8040-2R0N-CP.</li> <li>4. Layout changed for 3.3V DC switcher.</li> <li>5. Layout change for new DC switcher design , power inductor changed, old brand: Chilisin, model NO. BMMA000606301R2MX1, new brand : MAGLAYERS, model No. MNR-8040-1R4M-BL.</li> <li>6. Layout change for new 5V DC switcher design</li> <li>7. The RJ45 connector changed, The old Part Number: SK01-G110060NL ,brand: CSAK, and the new part number is SK01-G110067NL, brand: CSAK.</li> <li>8. MLCCs have been added to CPU Core regulator output and Radio IC Core regulator output according to Broadcom suggestion.( C1091, C1092,C1094). Brand : Taiyo Yuden , model No: JMK107BC6106MA-T.</li> <li>9. Reserved MLCCs have been added according to 1.8V power rail measurements, brand :Yageo , model NO. : CC0402KRX5R6BB104.</li> <li>10. JTAG_SEL function of the Radio IC has been cancelled, and the component at position R178 has been removed.</li> <li>11. Co-existence filters have been removed(by passed) from 2.4G RX Chains (U17, U19).</li> </ol>	<ol style="list-style-type: none"> <li>1. AC Conducted Emissions.</li> <li>2. Unwanted Emissions Below 1GHz.</li> </ol>



<p>12. MLCC capacitor packages have been removed for 6G &amp; 5G FEM supply circuitry, the placement is C412, C384, C356, C328.</p> <p>13. 6 GHZ Co-existence filters have been removed (by passed) from 5G RX Chains (FL1, FL4, FL7, FL10).</p>	<ol style="list-style-type: none"><li>1. AC Conducted Emissions.</li><li>2. Unwanted Emissions Below 1GHz.</li><li>3. Unwanted Emissions Above 1GHz, After evaluating, the worst case is found at 802.11a CH48 (5240MHz), 802.11ax HEW160-BF CH50 (5250MHz) and retest these channels only and for above 1GHz will be based on original output power to retest.</li></ol>
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### 1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2013
- ♦ FCC KDB 789033 D02 v02r01

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ FCC KDB 662911 D03 v01
- ♦ FCC KDB 412172 D01 v01r01
- ♦ FCC KDB 414788 D01 v01r01

### 1.3 Testing Location Information

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu (TAF: 3787)	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.) TEL: 886-3-656-9065 FAX: 886-3-656-9085 Test site Designation No. TW3787 with FCC. Conformity Assessment Body Identifier (CABID) TW3787 with ISED.

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
Radiated Below 1GHz	03CH05-CB	Ederson Huang	21.5~22.9 / 64~68	Jan. 06, 2023~Jan. 18, 2023
Radiated Above 1GHz	03CH03-CB	Wendy Hsu	23.8~24.9 / 55~58	Jan. 10, 2023~Jan. 11, 2023
AC Conduction	CO01-CB	Tum Chen	23~24 / 58~59	Jan. 09, 2023~Jan. 19, 2023

### 1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	5.2 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.7 dB	Confidence levels of 95%



## 2 Test Configuration of EUT

### 2.1 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	AC power-line conducted emissions
<b>Condition</b>	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
<b>Operating Mode</b>	Normal Link
1	AP Router Mode: EUT + Adapter 1
2	AP Router Mode: EUT + Adapter 2
For operating mode 2 is the worst case and it was record in this test report.	

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	Unwanted Emissions
<b>Test Condition</b>	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
<b>Operating Mode &lt; 1GHz</b>	Normal Link
1	AP Router Mode: EUT in X axis + Adapter 1
2	AP Router Mode: EUT in Y axis + Adapter 1
3	AP Router Mode: EUT in Z axis + Adapter 1
Mode 2 has been evaluated to be the worst case among Mode 1~3, thus measurement for Mode 4 will follow this same test mode.	
4	AP Router Mode: EUT in Y axis + Adapter 2
Mode 4 generated the worst test result, so it was recorded in this report.	
<b>Operating Mode &gt; 1GHz</b>	CTX The EUT was performed at X axis, Y axis and Z axis position. The worst case was found at Y axis, thus the measurement will follow this same test
1	EUT in Y axis



## **2.2 EUT Operation during Test**

For CTX Mode:

non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

beamforming mode:

During the test, the following programs under WIN XP were executed.

The program was executed as follows:

1. During the test, the EUT operation to normal function.
2. Executed command fixed test channel under DOS.
3. Executed "Lantest.exe" to link with the remote workstation to transmit and receive packet by WLAN module and transmit duty cycle no less than 98%.

For Normal Link:

During the test, the EUT operation to normal function.



## 2.3 Accessories

Accessories			
Equipment Name	Brand Name	Model Name	Rating
Adapter 1	MOSO	MS-V2000R120-024H0-US	Input: 100-240V~50/60Hz, 0.7A max. Output: 12.0V, 2.0A
Adapter 2	NetBit	NBS24M120200VU	Input: 100-120V~50/60Hz, 0.6A Output: 12.0V, 2.0A
Others			
RJ-45 cable*1: Non-shielded, 1.5m			

## 2.4 Support Equipment

For AC Conduction:

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	2.5G WAN NB	DELL	E6430	N/A
B	LAN NB	DELL	E6430	N/A
C	2.4G NB	DELL	E6430	N/A
D	5G NB	DELL	E6430	N/A
E	6G NB	DELL	E6430	N/A
F	6G Client	INTEL	AX210	N/A

For Radiated (below 1GHz):

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	Notebook(LAN)	DELL	E4300	N/A
B	2.5G PC(WAN)	DELL	T3400	N/A
C	Notebook(WIFI 2.4G)	DELL	E4300	N/A
D	Notebook(WIFI 5G)	DELL	E4300	N/A
E	Notebook(WIFI 6E)	DELL	E4300	N/A
F	WLAN module	Intel	AX210NGW	PD9AX210NG



For Radiated (above 1GHz):  
For non beamforming mode

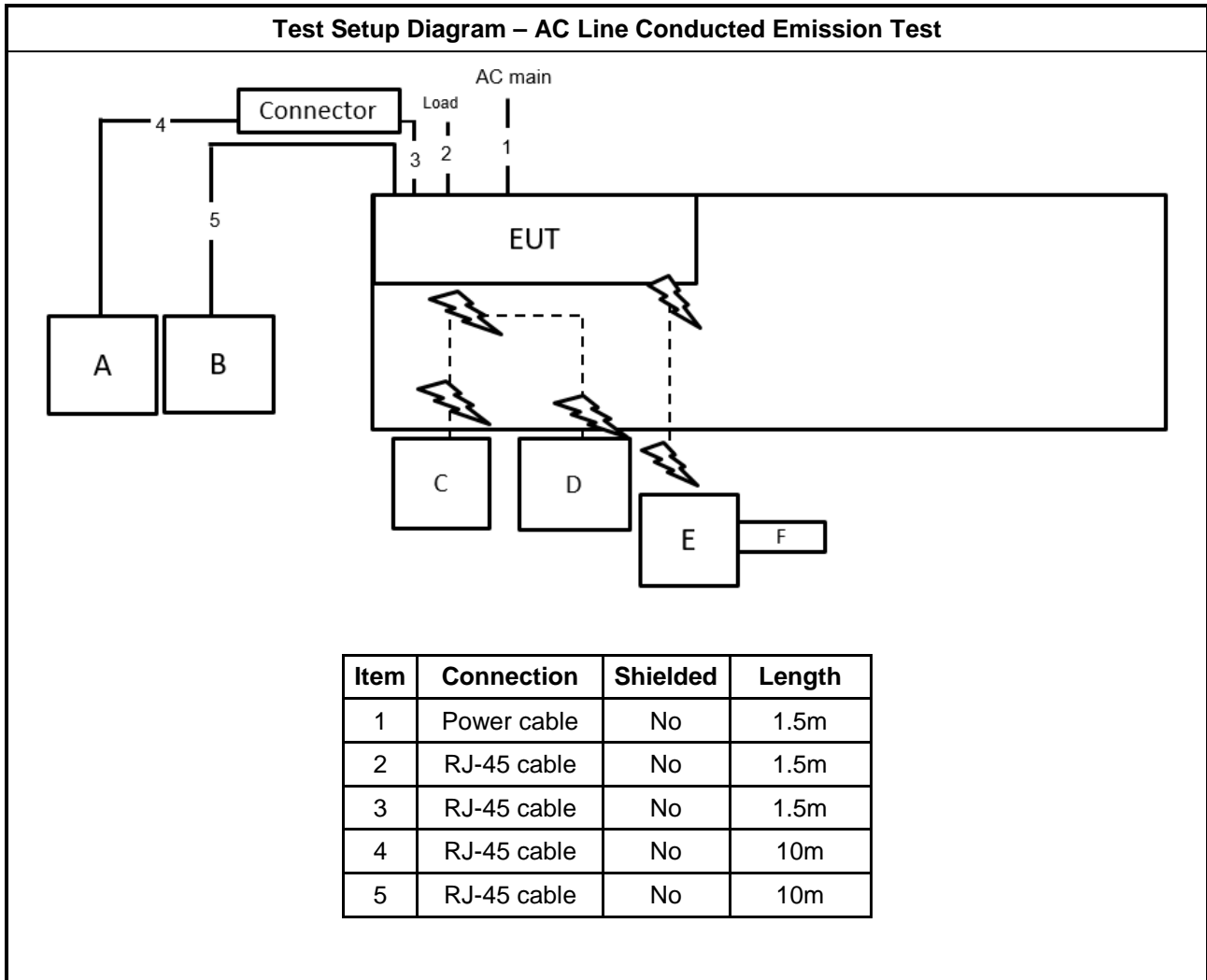
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	Notebook	DELL	E4300	N/A

For Beamforming mode

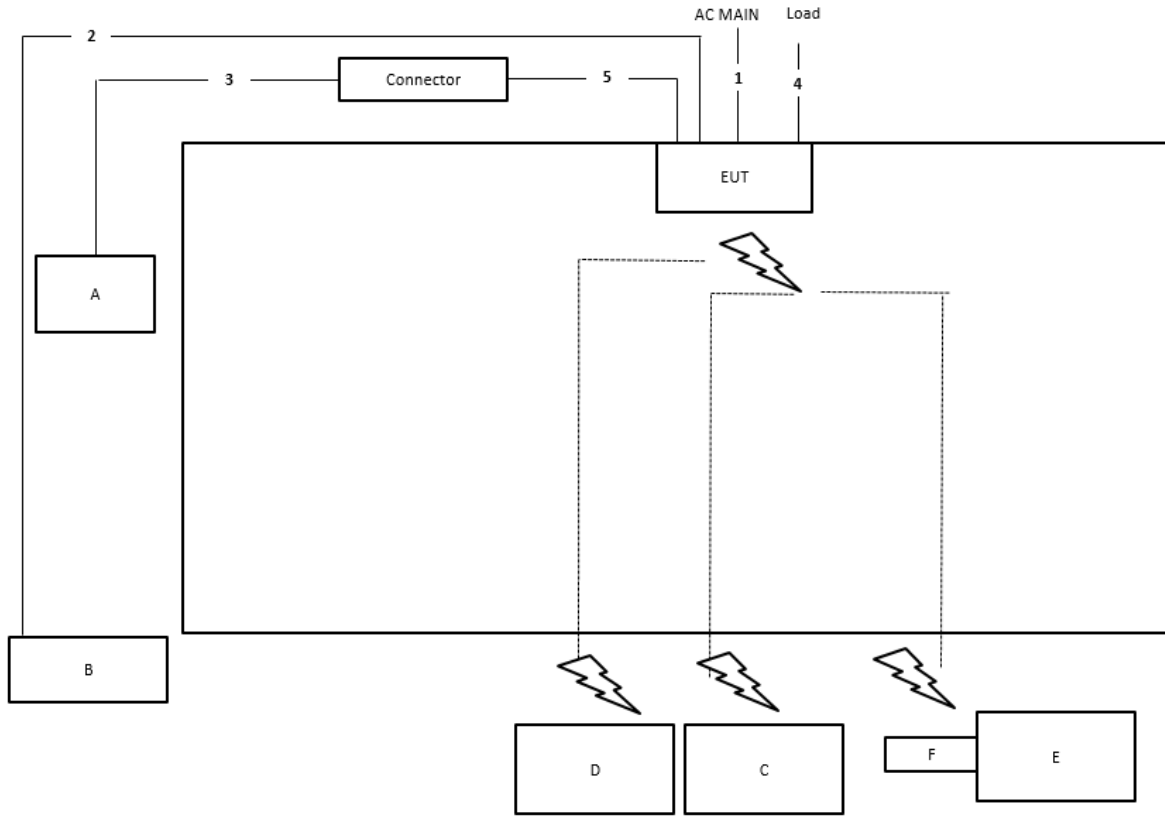
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	Notebook	DELL	E4300	N/A
B	WLAN module	Intel	AX210	N/A
C	Notebook	DELL	E4300	N/A



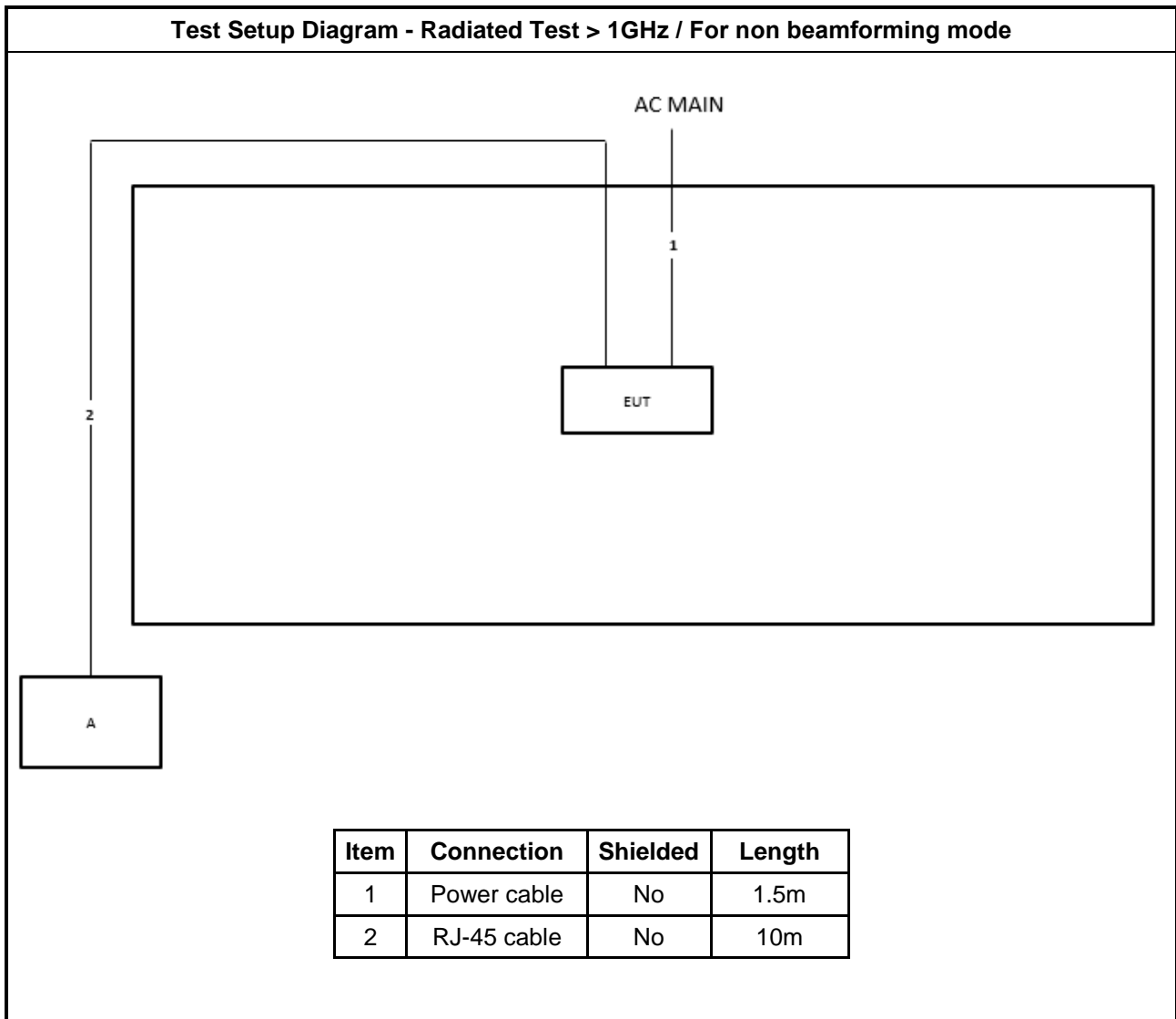
## 2.5 Test Setup Diagram



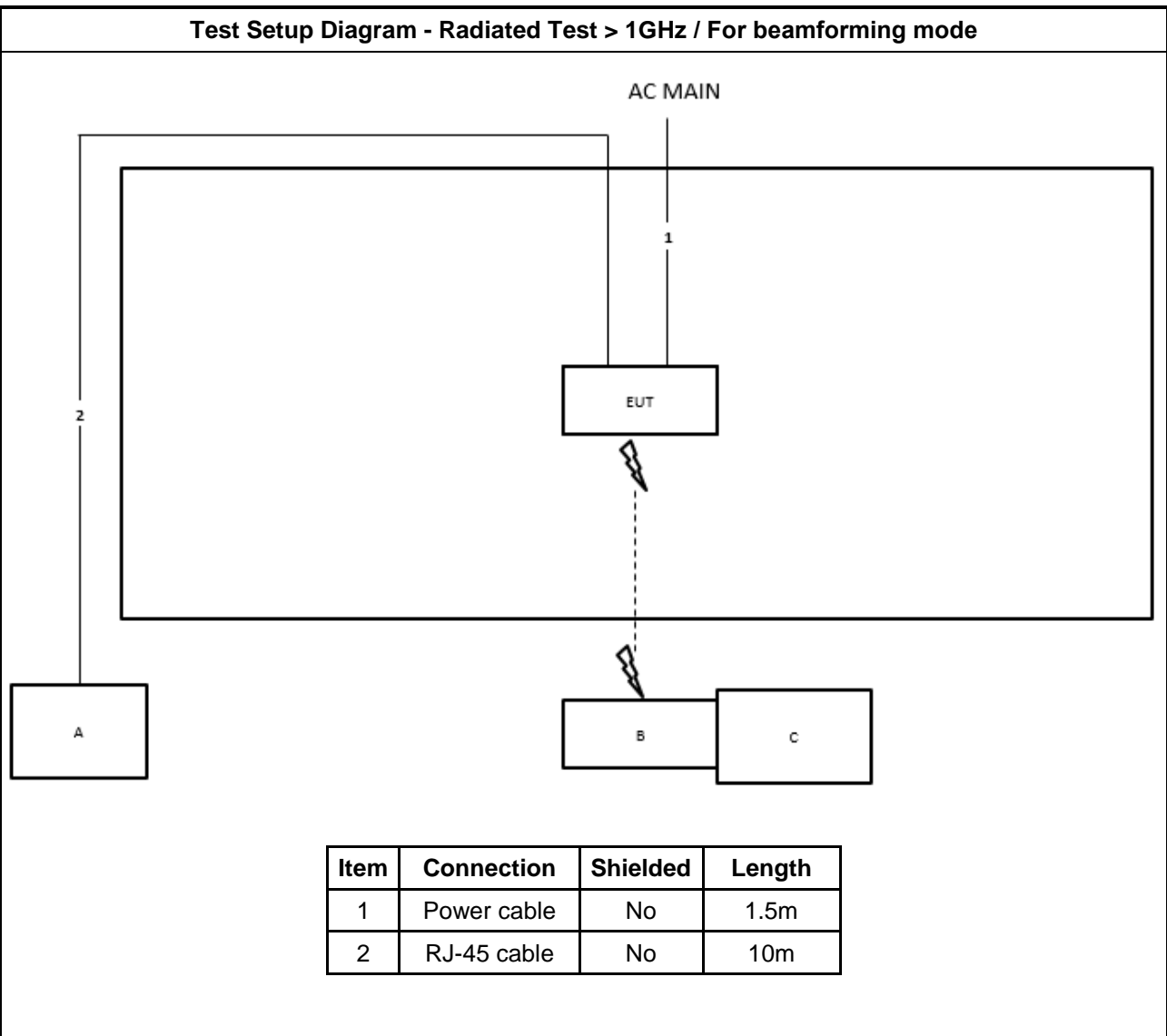
**Test Setup Diagram - Radiated Test < 1GHz**



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	1.0m
5	RJ-45 cable	No	1.5m



**Test Setup Diagram - Radiated Test > 1GHz / For beamforming mode**



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m



### 3 Transmitter Test Result

#### 3.1 AC Power-line Conducted Emissions

##### 3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: \* Decreases with the logarithm of the frequency.

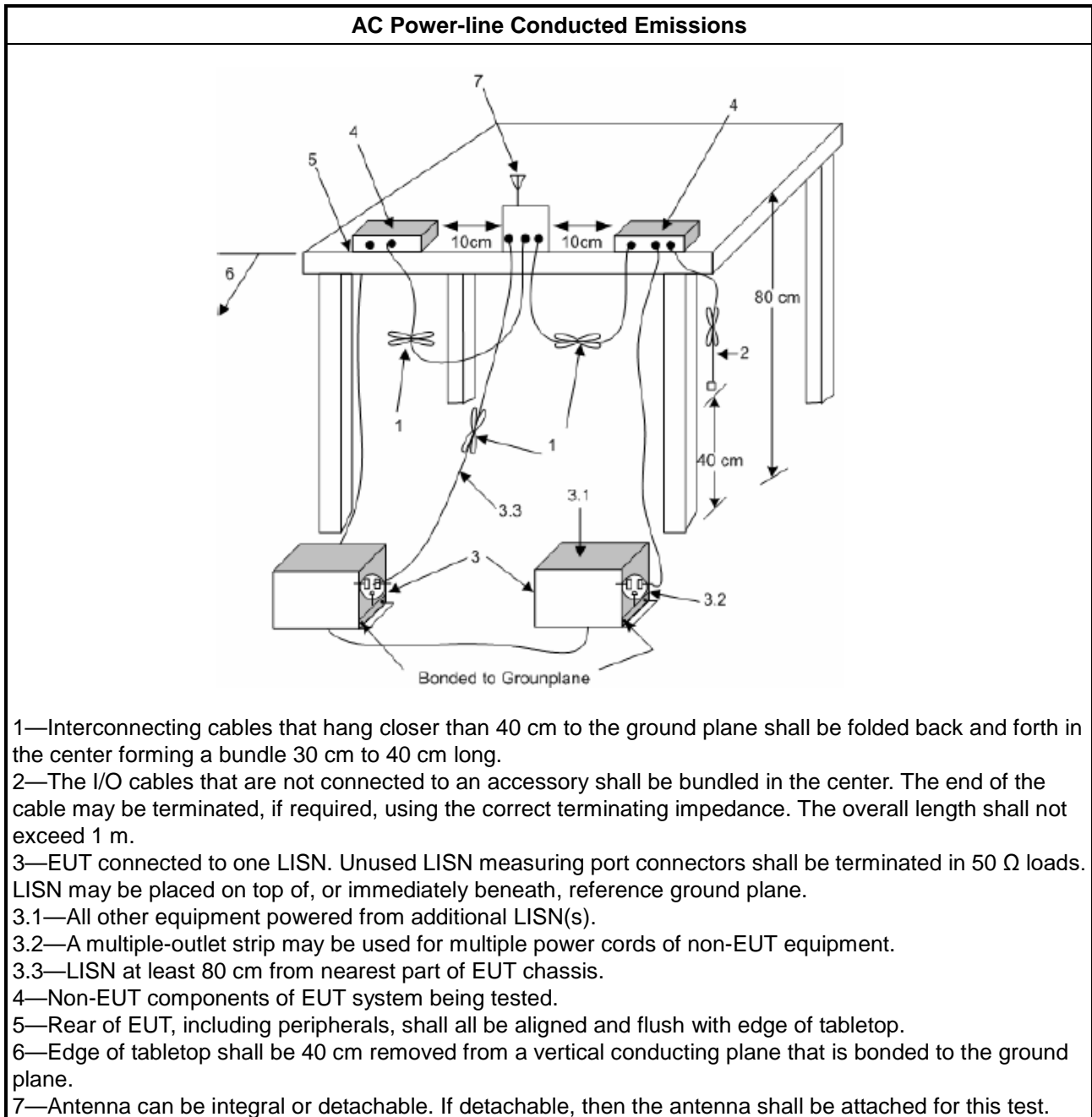
##### 3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

##### 3.1.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

### 3.1.4 Test Setup



### 3.1.5 Measurement Results Calculation

The measured Level is calculated using:

- a. Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level
- b. Margin = -Limit + Level

### 3.1.6 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A



### 3.2 Unwanted Emissions

#### 3.2.1 Transmitter Unwanted Emissions Limit

Unwanted emissions below 1 GHz and restricted band emissions above 1GHz limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

Un-restricted band emissions above 1GHz Limit	
Operating Band	Limit
<input checked="" type="checkbox"/> 5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m @3m]
<input checked="" type="checkbox"/> 5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m @3m]
<input checked="" type="checkbox"/> 5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m @3m]
<input checked="" type="checkbox"/> 5.725 - 5.85 GHz	all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of



linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

### 3.2.2 Measuring Instruments

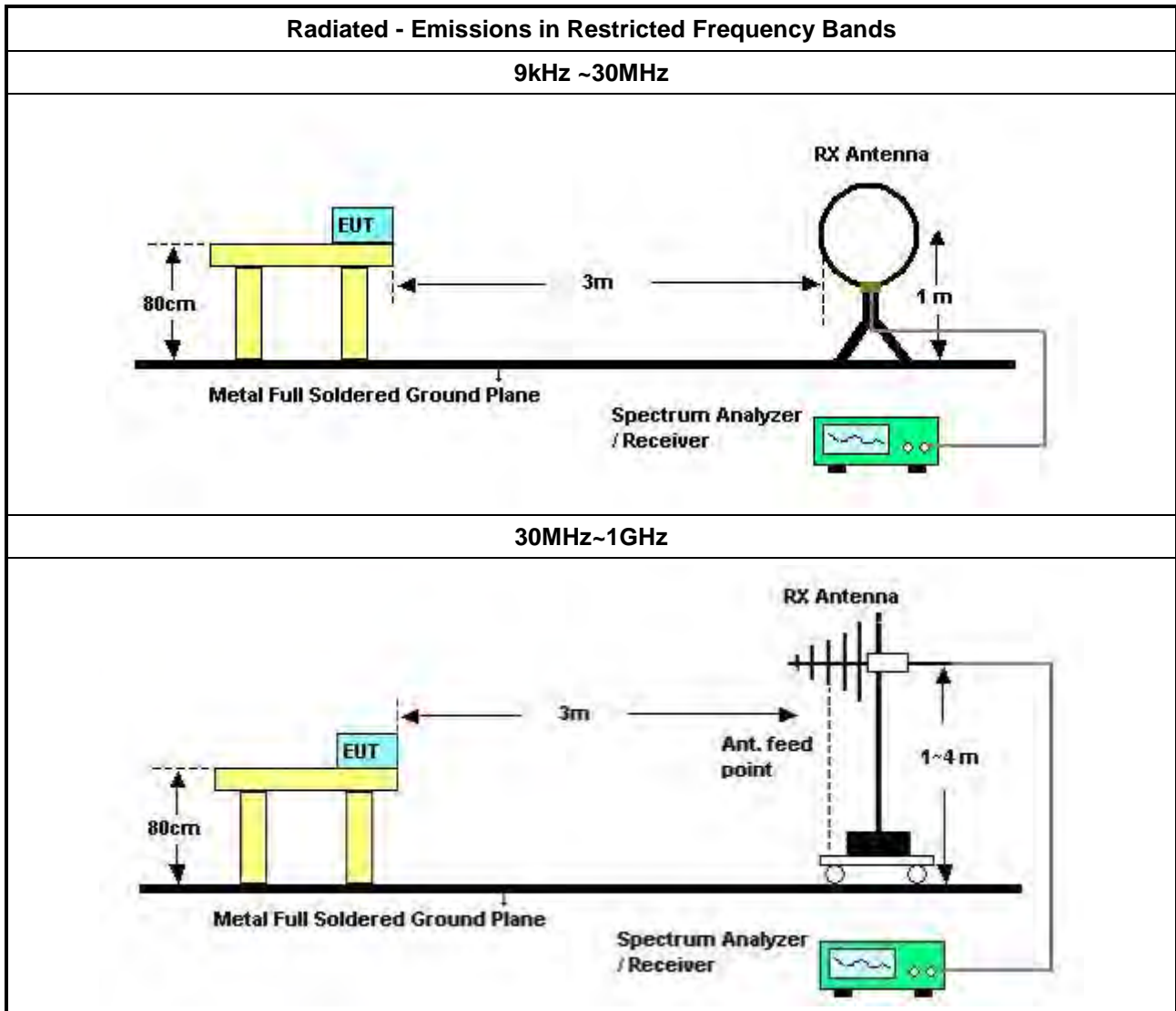
Refer a test equipment and calibration data table in this test report.

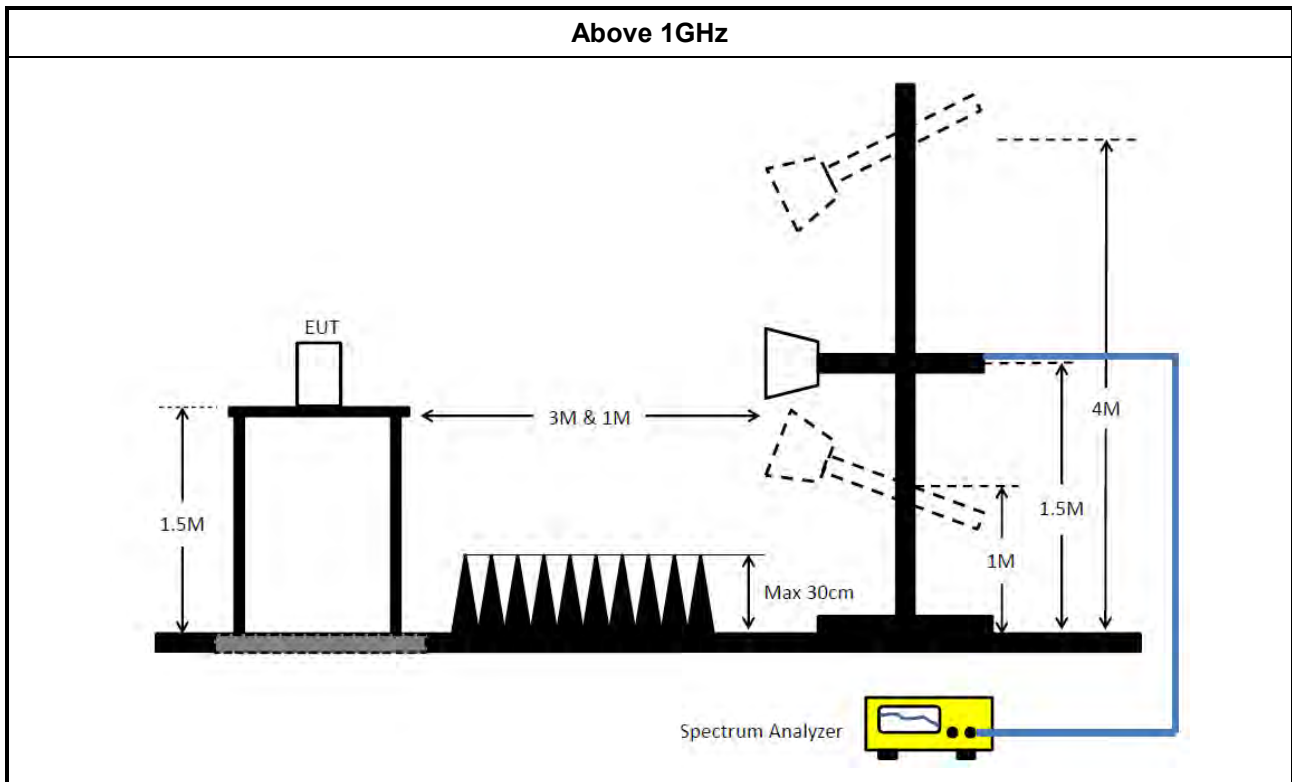
### 3.2.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> <li>▪ Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).</li> </ul>	
<ul style="list-style-type: none"> <li>▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].</li> </ul>	
<ul style="list-style-type: none"> <li>▪ For the transmitter unwanted emissions shall be measured using following options below:</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ Refer as FCC KDB 789033 D02, clause G)2) for unwanted emissions into non-restricted bands.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Refer as FCC KDB 789033 D02, clause G)1) for unwanted emissions into restricted bands.</li> </ul>
<input type="checkbox"/>	Refer as FCC KDB 789033 D02, G)6) Method AD (Trace Averaging).
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033 D02, G)6) Method VB (Reduced VBW).
<input type="checkbox"/>	Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as FCC KDB 789033 D02, clause G)5) measurement procedure peak limit.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak limit.
<ul style="list-style-type: none"> <li>▪ For radiated measurement.</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1GHz.</li> </ul>
<ul style="list-style-type: none"> <li>▪ The any unwanted emissions level shall not exceed the fundamental emission level.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.</li> </ul>	



**3.2.4 Test Setup**





### 3.2.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

### 3.2.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

### 3.2.7 Test Result of Transmitter Unwanted Emissions

Refer as Appendix B



## 4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.4GHz	Feb. 22, 2022	Feb. 21, 2023	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Feb. 09, 2022	Feb. 08, 2023	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Apr. 12, 2022	Apr. 11, 2023	Conduction (CO01-CB)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Feb. 10, 2022	Feb. 09, 2023	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	Oct. 18, 2022	Oct. 17, 2023	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	May 14, 2022	May 13, 2023	Radiation (05CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Mar. 14, 2022	Mar. 13, 2023	Radiation (05CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	Apr. 26, 2022	Apr. 25, 2023	Radiation (05CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 25, 2022	Mar. 24, 2023	Radiation (05CH05-CB)
CABLE	Woken	N/A	Low Cable-06	25MHz ~ 1GHz	Dec. 13, 2022	Dec. 12, 2023	Radiation (05CH05-CB)
RF Cable-high	Woken	RG402	High Cable-28	1GHz~18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (05CH05-CB)
RF Cable-high	Woken	RG402	High Cable-04+28	1GHz~18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (05CH05-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH05-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH03-CB	1GHz ~18GHz 3m	May 05, 2022	May 04, 2023	Radiation (03CH03-CB)
Horn Antenna	ETS · Lindgren	3115	6821	750MHz~18GHz	Jan. 21, 2022	Jan. 20, 2023	Radiation (03CH03-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2022	Aug. 21, 2023	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8449B	3008A02097	1GHz ~ 26.5GHz	Jul. 01, 2022	Jun. 30, 2023	Radiation (03CH03-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 16, 2022	Nov. 15, 2023	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP40	100019	9kHz ~ 40GHz	Jun. 10, 2022	Jun. 09, 2023	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-20+29	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH03-CB)



Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-29	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH03-CB)
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH03-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH03-CB)
High Cable	Woken	WCA0929M	40G#6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH03-CB)

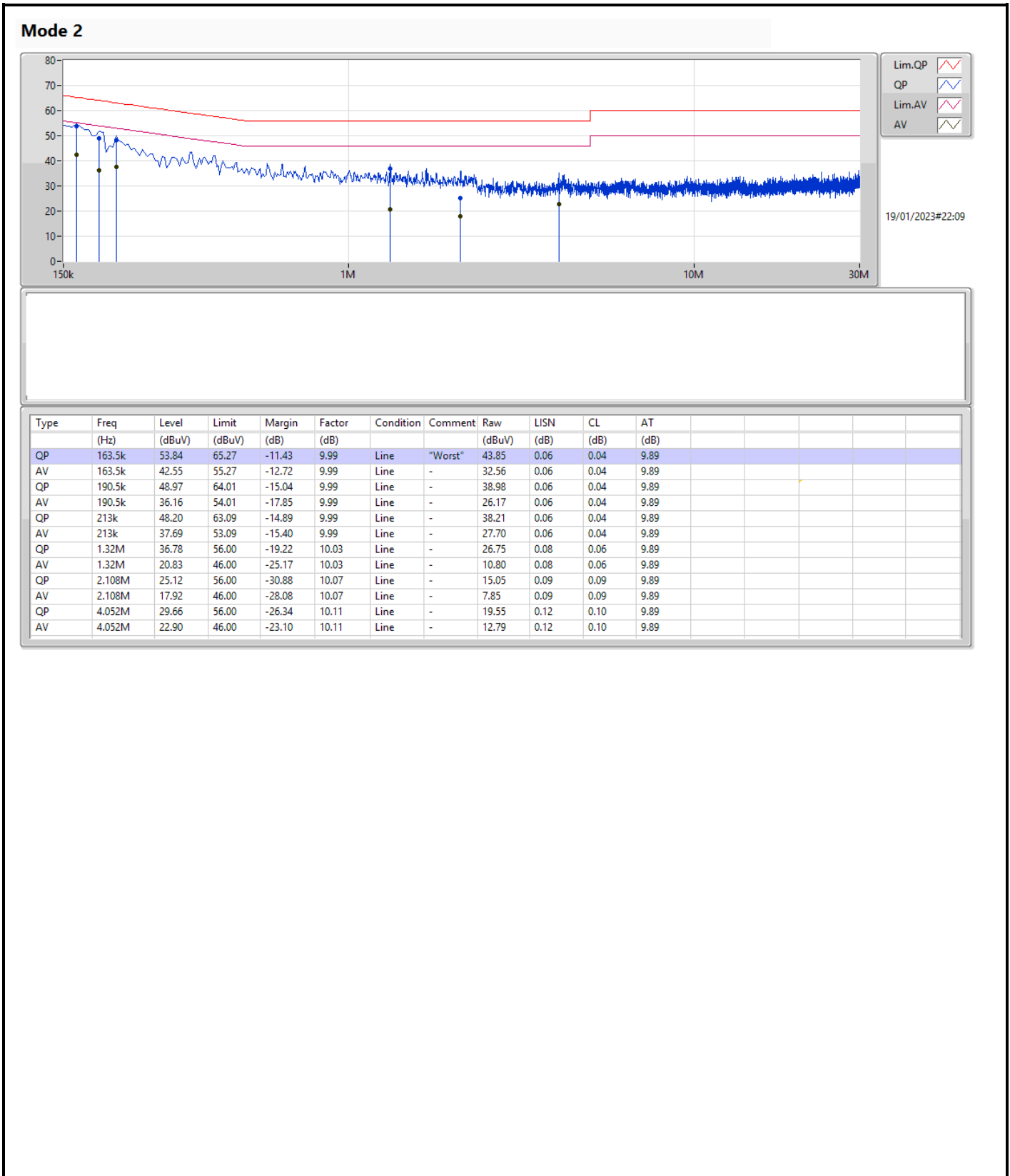
Note: Calibration Interval of instruments listed above is one year.

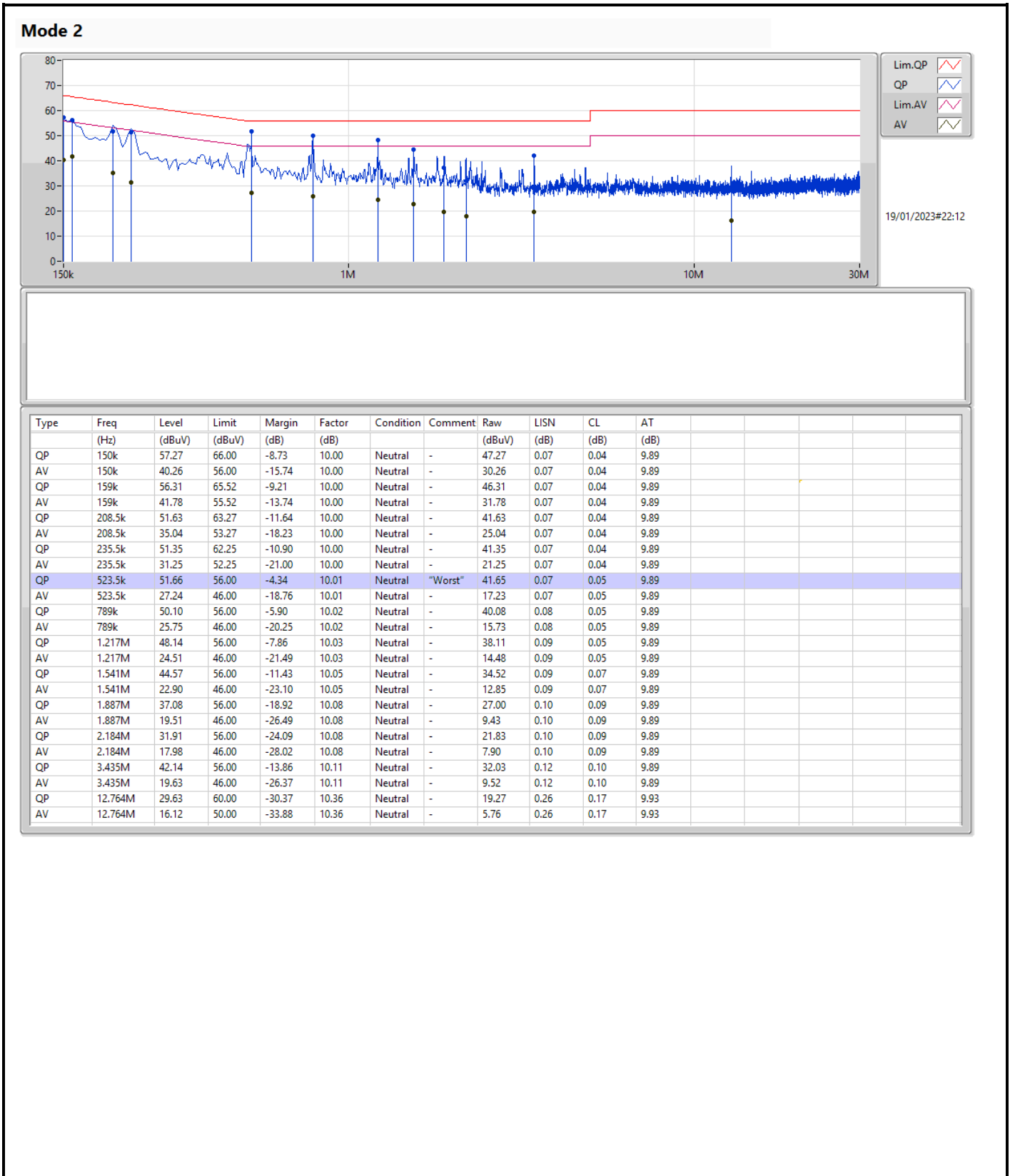
N.C.R. means Non-Calibration required.



**Summary**

Mode	Result	Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 2	Pass	QP	523.5k	51.66	56.00	-4.34	Neutral





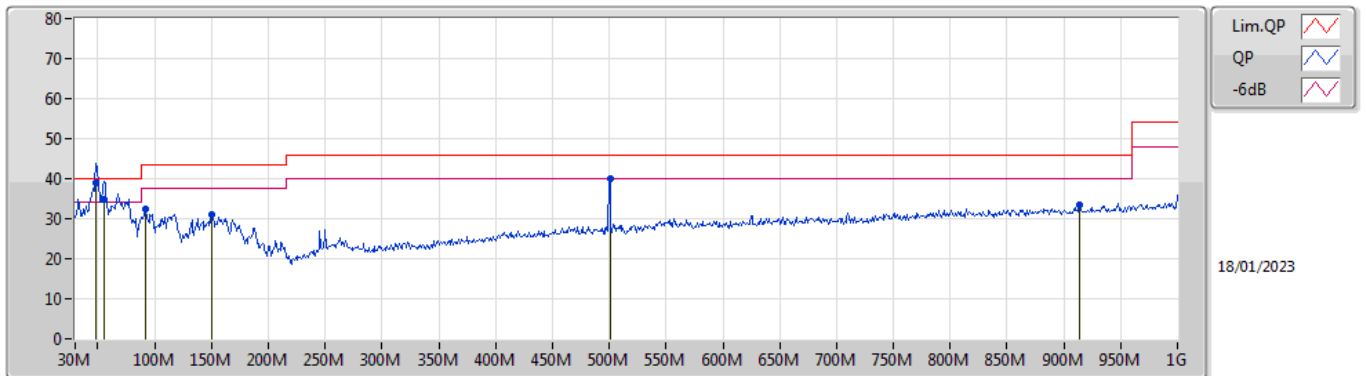


**Summary**

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 4	Pass	QP	48.43M	39.08	40.00	-0.92	Vertical

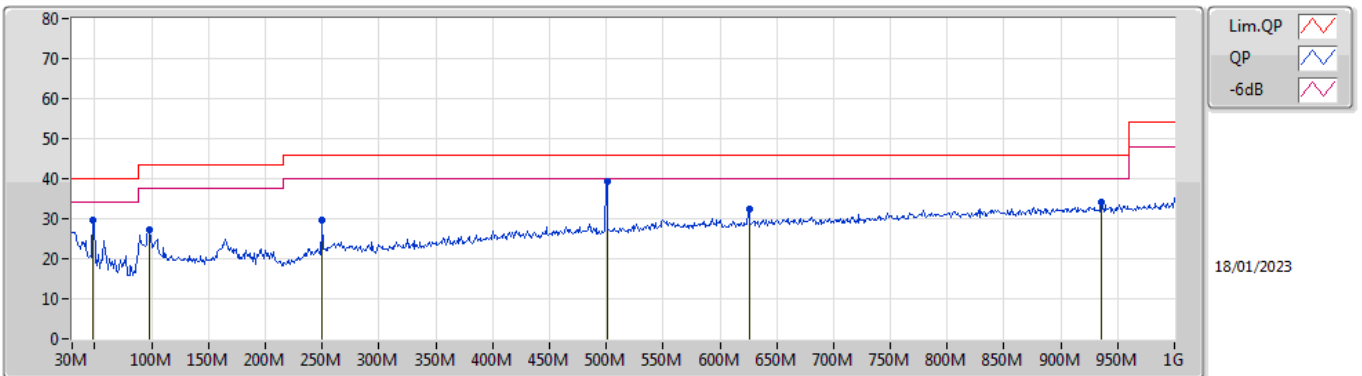


Mode 4



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)
QP	48.43M	39.08	40.00	-0.92	-16.02	3	Vertical	346	1.50	"Worst"	55.10	14.59	1.24	31.85
QP	55.22M	34.71	40.00	-5.29	-17.89	3	Vertical	112	1.25	-	52.60	12.69	1.31	31.89
PK	92.08M	32.34	43.50	-11.16	-15.18	3	Vertical	336	1.25	-	47.52	15.14	1.64	31.96
PK	150.28M	30.87	43.50	-12.63	-13.74	3	Vertical	170	1.00	-	44.61	16.18	2.08	32.00
PK	500.45M	40.14	46.00	-5.86	-5.21	3	Vertical	1	1.25	-	45.35	23.20	3.99	32.40
PK	913.67M	33.55	46.00	-12.45	-0.61	3	Vertical	29	2.00	-	34.16	26.20	5.68	32.49

Mode 4



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)
PK	48.43M	29.53	40.00	-10.47	-16.02	3	Horizontal	216	1.00	-	45.55	14.59	1.24	31.85
PK	97.9M	27.29	43.50	-16.21	-13.99	3	Horizontal	30	1.50	-	41.28	16.28	1.69	31.96
PK	250.19M	29.50	46.00	-16.50	-11.06	3	Horizontal	222	1.00	-	40.56	18.22	2.72	32.00
PK	500.45M	39.34	46.00	-6.66	-5.21	3	Horizontal	59	2.00	"Worst"	44.55	23.20	3.99	32.40
PK	625.58M	32.45	46.00	-13.55	-3.47	3	Horizontal	251	1.00	-	35.92	24.53	4.52	32.52
PK	935.98M	34.01	46.00	-11.99	-0.47	3	Horizontal	308	1.50	-	34.48	26.33	5.68	32.48

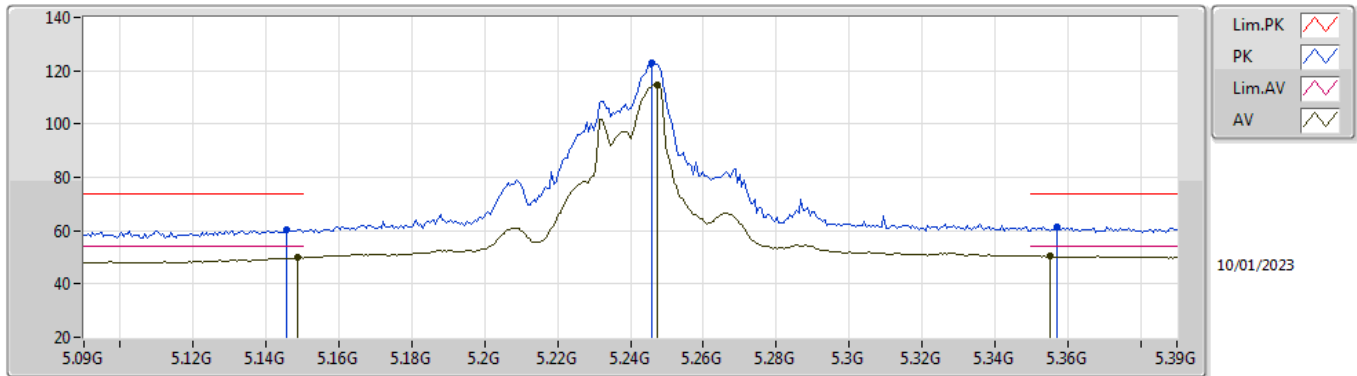


Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
5.15-5.25GHz	-	-	-	-	-	-	-	-	-	-	-
802.11a_Nss1,(6Mbps)_4TX	Pass	PK	10.47852G	66.56	68.20	-1.64	3	Vertical	4	1.90	-
5.25-5.35GHz	-	-	-	-	-	-	-	-	-	-	-
802.11ax HEW160-BF_Nss1,(MCS0)_4TX	Pass	AV	5.3508G	52.07	54.00	-1.93	3	Vertical	-0	1.01	-

### 5.15-5.25GHz\_802.11a\_Nss1,(6Mbps)\_4TX

#### 5240MHz\_TX

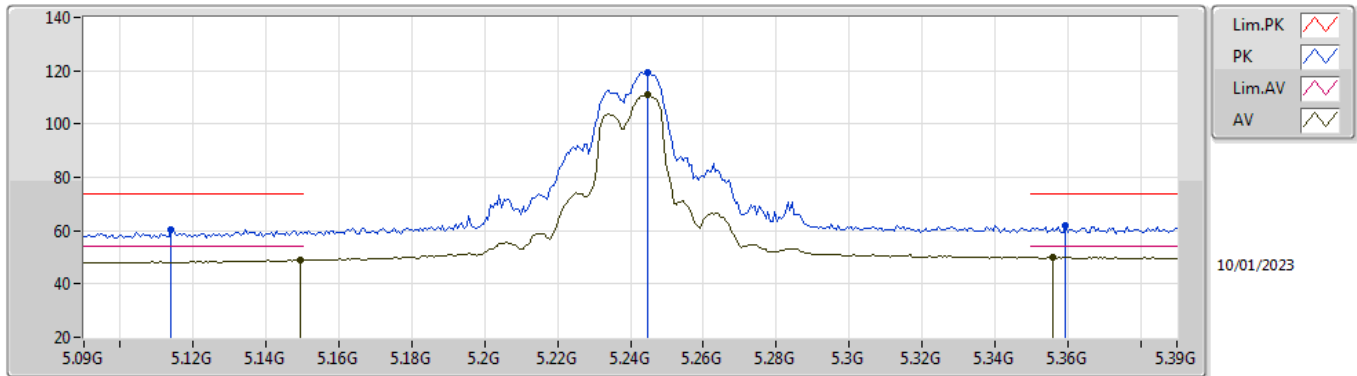


EUT\_Y\_4TX  
Setting 93  
03-1-5-5-10

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	5.1458G	60.53	74.00	-13.47	54.67	3	Vertical	188	2.00	-	33.99	6.75	34.88
AV	5.1488G	49.81	54.00	-4.19	43.94	3	Vertical	188	2.00	-	34.00	6.75	34.88
PK	5.246G	122.75	Inf	-Inf	116.43	3	Vertical	188	2.00	-	34.38	6.82	34.88
AV	5.2472G	114.52	Inf	-Inf	108.19	3	Vertical	188	2.00	-	34.39	6.82	34.88
PK	5.357G	61.34	74.00	-12.66	54.82	3	Vertical	188	2.00	-	34.51	6.88	34.87
AV	5.3552G	50.35	54.00	-3.65	43.83	3	Vertical	188	2.00	-	34.51	6.88	34.87

5.15-5.25GHz\_802.11a\_Nss1,(6Mbps)\_4TX

5240MHz\_TX

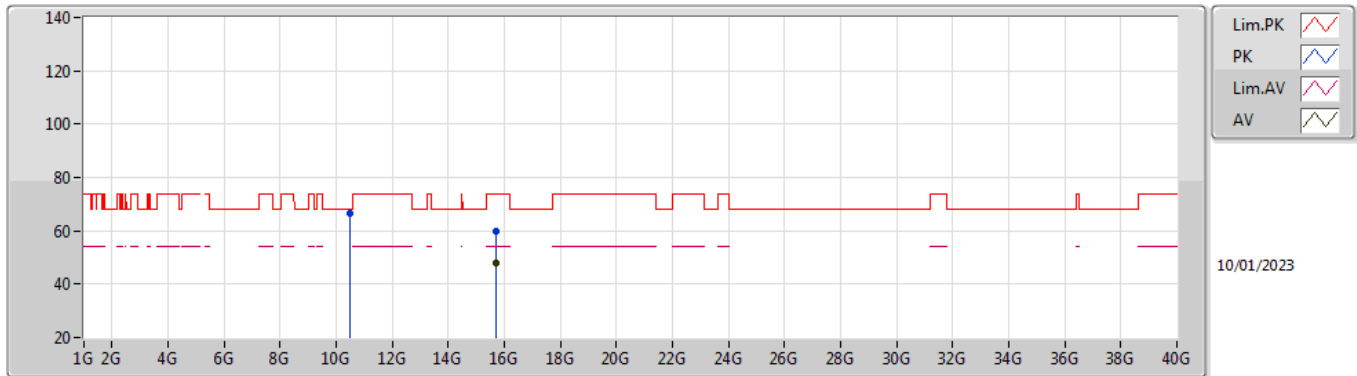


EUT\_Y\_4TX  
 Setting 93  
 03-1-5-5-10

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	5.114G	60.45	74.00	-13.55	54.69	3	Horizontal	269	1.90	-	33.93	6.71	34.88
AV	5.1494G	48.93	54.00	-5.07	43.06	3	Horizontal	269	1.90	-	34.00	6.75	34.88
PK	5.2448G	119.48	Inf	-Inf	113.16	3	Horizontal	269	1.90	-	34.38	6.82	34.88
AV	5.2448G	111.05	Inf	-Inf	104.73	3	Horizontal	269	1.90	-	34.38	6.82	34.88
PK	5.3594G	61.80	74.00	-12.20	55.27	3	Horizontal	269	1.90	-	34.52	6.88	34.87
AV	5.3558G	50.19	54.00	-3.81	43.67	3	Horizontal	269	1.90	-	34.51	6.88	34.87

5.15-5.25GHz\_802.11a\_Nss1,(6Mbps)\_4TX

5240MHz\_TX

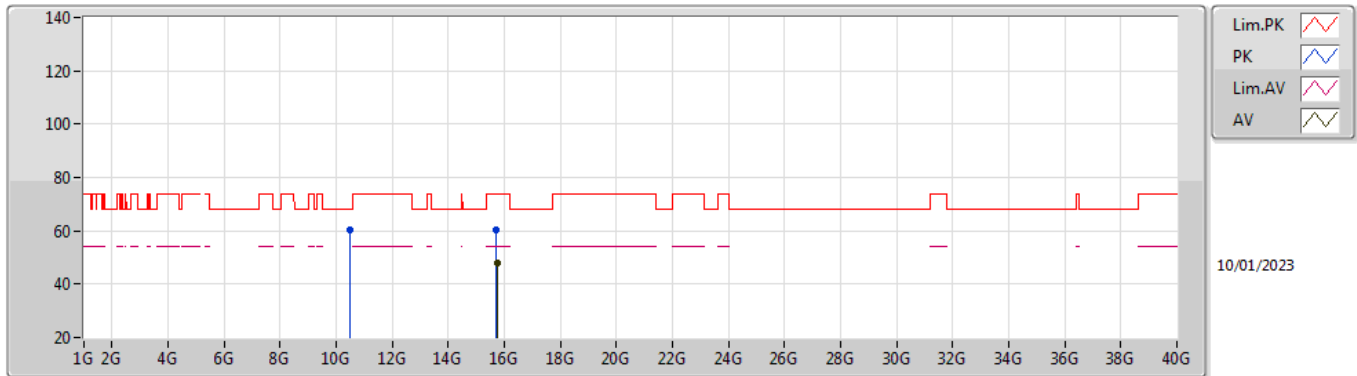


EUT Y\_4TX  
 Setting 93  
 03-I-S-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	10.47852G	66.56	68.20	-1.64	58.70	3	Vertical	4	1.90	-	38.20	12.26	42.60
PK	15.72412G	59.90	74.00	-14.10	47.79	3	Vertical	348	1.80	-	37.60	16.42	41.91
AV	15.71708G	48.06	54.00	-5.94	35.98	3	Vertical	348	1.80	-	37.57	16.42	41.91

5.15-5.25GHz\_802.11a\_Nss1,(6Mbps)\_4TX

5240MHz\_TX

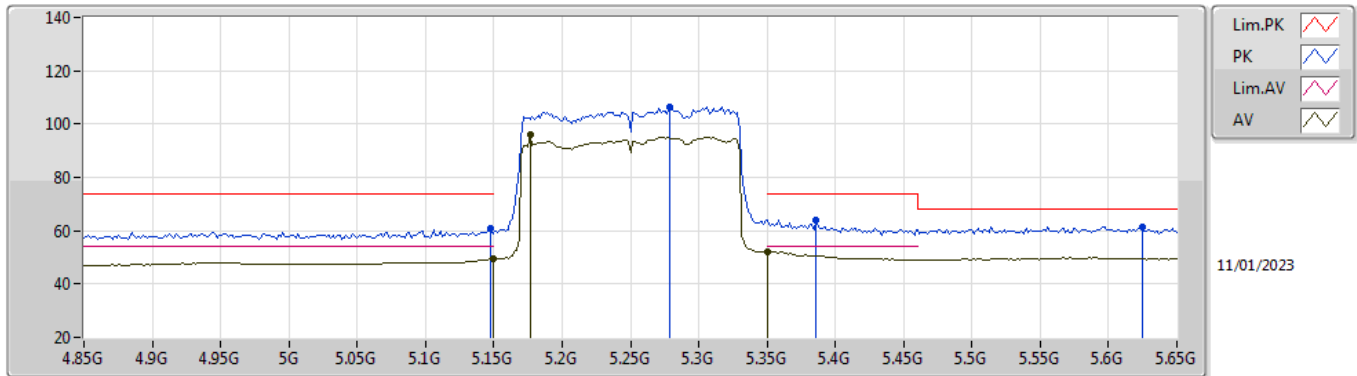


EUT Y\_4TX  
 Setting 93  
 03-I-S-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	10.47972G	60.55	68.20	-7.65	52.69	3	Horizontal	19	1.78	-	38.20	12.26	42.60
PK	15.7218G	60.09	74.00	-13.91	47.99	3	Horizontal	56	1.80	-	37.59	16.42	41.91
AV	15.72956G	48.18	54.00	-5.82	36.04	3	Horizontal	56	1.80	-	37.62	16.43	41.91

5.25-5.35GHz\_802.11ax HEW160-BF\_Nss1,(MCS0)\_4TX

5250MHz Straddle 5.25-5.35GHz\_TX



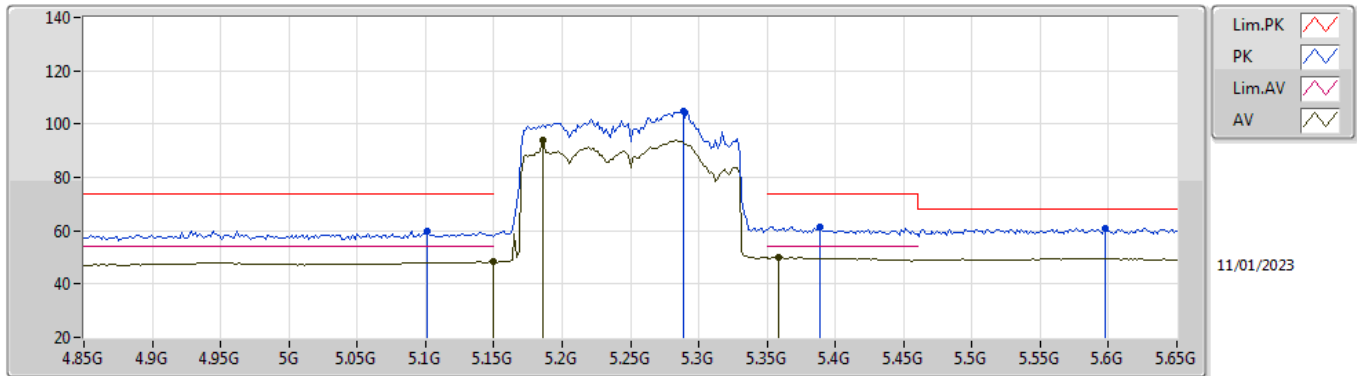
EUT\_Y\_4TX  
 Setting 55  
 03-1-5-5-10

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	5.1476G	60.65	74.00	-13.35	54.78	3	Vertical	-0	1.01	-	34.00	6.75	34.88
AV	5.1492G	49.47	54.00	-4.53	43.60	3	Vertical	-0	1.01	-	34.00	6.75	34.88
AV	5.1764G	95.85	Inf	-Inf	89.84	3	Vertical	-0	1.01	-	34.11	6.78	34.88
PK	5.2788G	106.57	Inf	-Inf	100.14	3	Vertical	-0	1.01	-	34.46	6.84	34.87
PK	5.386G	64.11	74.00	-9.89	57.52	3	Vertical	-0	1.01	-	34.57	6.89	34.87
AV	5.3508G	52.07	54.00	-1.93	45.56	3	Vertical	-0	1.01	-	34.50	6.88	34.87
PK	5.6244G	61.50	68.20	-6.70	54.73	3	Vertical	-0	1.01	-	34.55	7.11	34.89



5.25-5.35GHz\_802.11ax HEW160-BF\_Nss1,(MCS0)\_4TX

5250MHz Straddle 5.25-5.35GHz\_TX

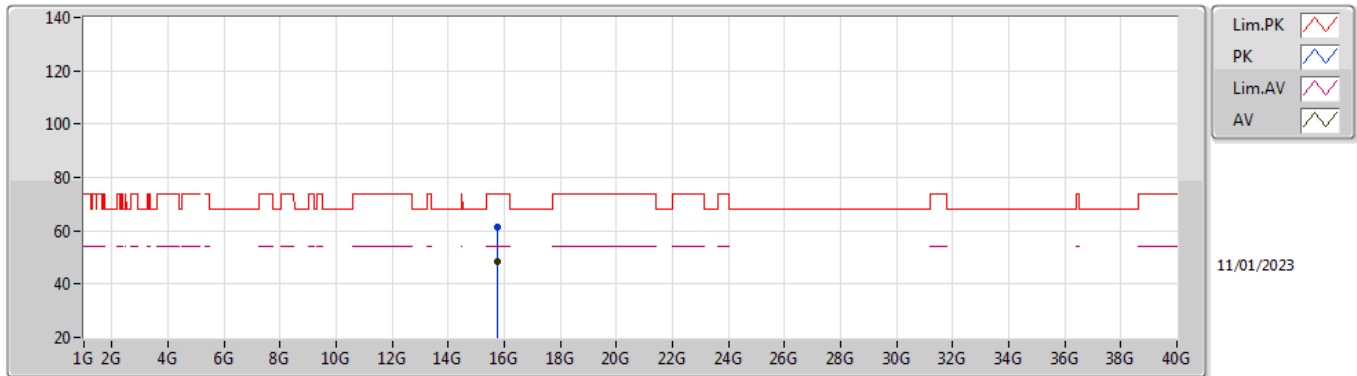


EUT\_Y\_4TX  
 Setting 55  
 03-1-5-5-10

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	5.1012G	59.98	74.00	-14.02	54.26	3	Horizontal	265.8	1.80	-	33.90	6.70	34.88
AV	5.1492G	48.36	54.00	-5.64	42.49	3	Horizontal	265.8	1.80	-	34.00	6.75	34.88
AV	5.186G	93.97	Inf	-Inf	87.92	3	Horizontal	265.8	1.80	-	34.14	6.79	34.88
PK	5.2884G	104.78	Inf	-Inf	98.33	3	Horizontal	265.8	1.80	-	34.48	6.84	34.87
PK	5.3892G	61.52	74.00	-12.48	54.92	3	Horizontal	265.8	1.80	-	34.58	6.89	34.87
AV	5.3588G	49.88	54.00	-4.12	43.35	3	Horizontal	265.8	1.80	-	34.52	6.88	34.87
PK	5.5972G	60.99	68.20	-7.21	54.17	3	Horizontal	265.8	1.80	-	34.60	7.10	34.88

5.25-5.35GHz\_802.11ax HEW160-BF\_Nss1,(MCS0)\_4TX

5250MHz Straddle 5.25-5.35GHz\_TX

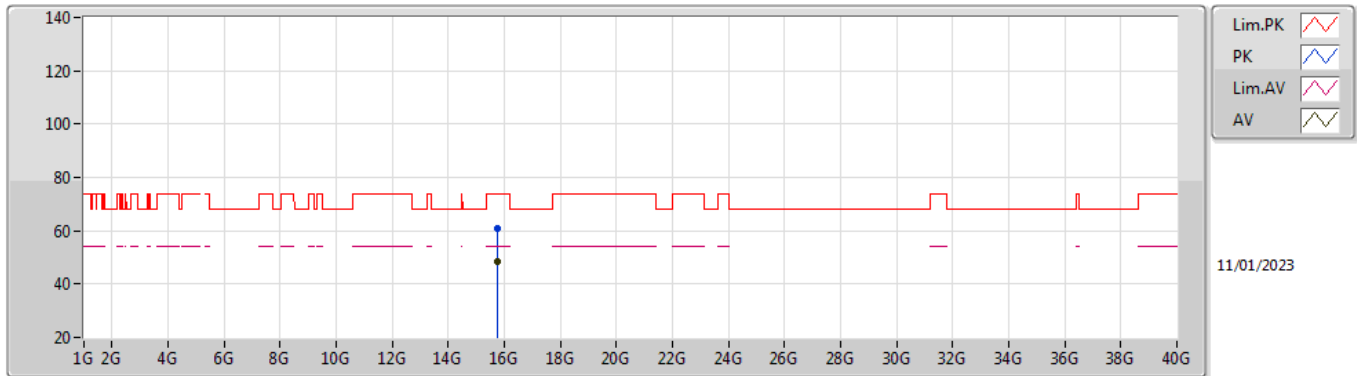


EUT Y\_4TX  
 Setting 55  
 03-I-S-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	15.74636G	61.32	74.00	-12.68	49.08	3	Vertical	311	3.00	-	37.69	16.45	41.90
AV	15.74576G	48.63	54.00	-5.37	36.40	3	Vertical	311	3.00	-	37.68	16.45	41.90

5.25-5.35GHz\_802.11ax HEW160-BF\_Nss1,(MCS0)\_4TX

5250MHz Straddle 5.25-5.35GHz\_TX



EUT\_Y\_4TX  
 Setting 55  
 03-I-S-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	15.74284G	60.75	74.00	-13.25	48.54	3	Horizontal	193	2.34	-	37.67	16.44	41.90
AV	15.75952G	48.55	54.00	-5.45	36.25	3	Horizontal	193	2.34	-	37.74	16.46	41.90