

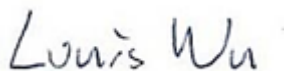


# FCC EMI TEST REPORT

**FCC ID** : 2ADZRBEACON24  
**Equipment** : NOKIA WiFi Beacon 24  
**Brand Name** : NOKIA  
**Model Name** : Beacon 24  
**Applicant** : Nokia Shanghai Bell Co., Ltd.  
No.388, Ningqiao Rd, Pilot Free Trade Zone,  
Shanghai, 201206 P.R. China  
**Manufacturer** : Nokia of America Corporation  
2301 Sugar Bush Rd. Raleigh, NC 27612  
**Standard** : FCC 47 CFR FCC Part 15 Subpart B Class B

The product was received on Nov. 13, 2023 and testing was performed from Nov. 23, 2023 to Nov. 28, 2023. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4a-2017 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Louis Wu

**Sporton International Inc. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



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## History of this test report

Report No.	Version	Description	Issue Date
FC3N0940	01	Initial issue of report	Jan. 19, 2024
FC3N0940	02	Revise Product Feature This report is an updated version, replacing the report issued on Jan. 19, 2024.	Jan. 30, 2024

## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.107	AC Conducted Emission	Pass	8.21 dB under the limit at 0.15 MHz
3.2	15.109	Radiated Emission	Pass	5.17 dB under the limit at 52.41 MHz for Quasi-Peak

**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/manufacture 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 section "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: Wei Chen**

**Report Producer: Mila Chen**

## 1. General Description

### 1.1. Product Feature of Equipment Under Test

Product Feature	
<b>General Specs</b> Wi-Fi 2.4GHz 802.11b/g/n/ax/be, Wi-Fi 5GHz 802.11a/n/ac/ax/be, Wi-Fi 6GHz 802.11ax/be	
<b>Antenna Type</b> <b>WLAN:</b> PCB Antenna	

**Remark:** The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

Specification of Accessories				
<b>Adapter 1</b>	<b>Brand Name</b>	SOY	<b>Model Name</b>	SOY-1200400US-433
<b>Adapter 2</b>	<b>Brand Name</b>	MOSO	<b>Model Name</b>	MS-V4000R120-050A0-US

### 1.2. Modification of EUT

No modifications made to the EUT during the testing.

### 1.3. Test Location

<b>Test Site</b>	Sporton International Inc. EMC & Wireless Communications Laboratory
<b>Test Site Location</b>	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
<b>Test Site No.</b>	<b>Sporton Site No.</b>
	CO05-HY, 03CH06-HY

FCC designation No.: TW1093

### 1.4. Applicable Standards

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

- ♦ FCC 47 CFR FCC Part 15 Subpart B Class B
- ♦ ANSI C63.4a-2017

**Remark:** All test items were verified and recorded according to the standards and without any deviation during the test.

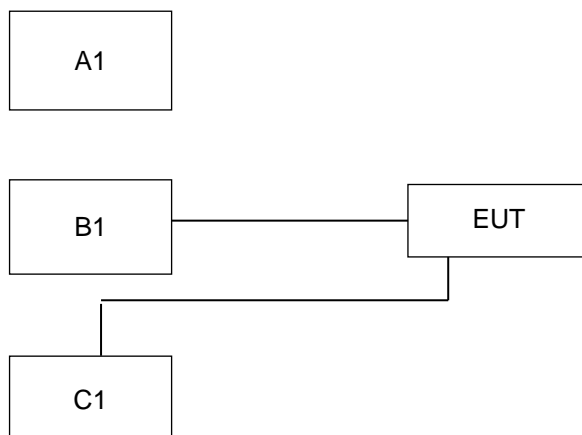
## 2. Test Configuration of Equipment Under Test

### 2.1. Test Mode

The EUT is tested along with the peripherals, operating under possible configurations in compliant with normal operation. The maximum emissions can be identified by a pre-scan carried out in different orientations of placement pursuant to ANSI C63.4a-2017. Frequency range covered: Conduction Emission (150 kHz to 30 MHz), Radiation Emission (30 MHz to the 5<sup>th</sup> harmonics of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Functions Enabled
<b>AC Conducted Emission</b>	Mode 1: WLAN (2.4GHz) Idle + WLAN (5GHz) Idle + WLAN (6GHz) Idle + LAN Link with Notebook + AC adapter 1
	Mode 2: WLAN (2.4GHz) Idle + WLAN (5GHz) Idle + WLAN (6GHz) Idle + LAN Link with Notebook + AC adapter 2
<b>Radiated Emissions</b>	Mode 1: WLAN (2.4GHz) Idle + WLAN (5GHz) Idle + WLAN (6GHz) Idle + LAN Link with Notebook + AC adapter 1
	Mode 2: WLAN (2.4GHz) Idle + WLAN (5GHz) Idle + WLAN (6GHz) Idle + LAN Link with Notebook + AC adapter 2
<b>Remark:</b>	
1. The worst case of AC is mode 1; only the test data of this mode was reported.	
2. The worst case of RE is mode 1; only the test data of this mode was reported.	

## 2.2. Connection Diagram of Test System



Test Setup									
No.	Wireless Station	Connection Type	Test Mode						
			1	2	-	-	-	-	-
A1	Notebook	WiFi	X	X	-	-	-	-	-
No.	Power Source	Connection Type	1	2	-	-	-	-	-
B1	AC : 120V/60Hz	AC Power Cable	X	X	-	-	-	-	-
No.	Setup Peripherals	Connection Type	1	2	-	-	-	-	-
C1	Notebook	RJ-45 Cable	X	X	-	-	-	-	-

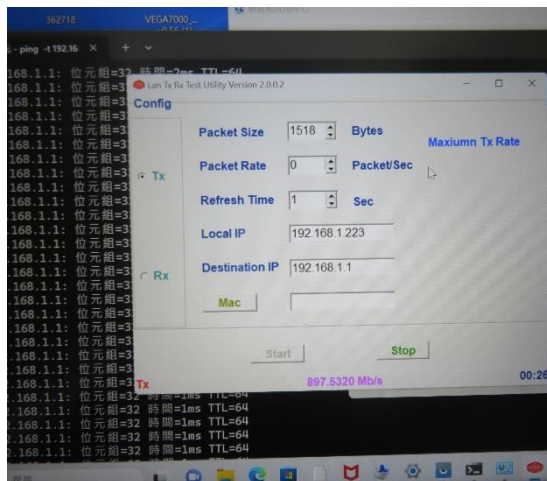
## 2.3. Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Latitude 3420	FCC DoC	N/A	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m
2.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m
3.	Notebook	DELL	E3340	FCC DoC	N/A	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m
4.	Notebook	DELL	P152G	FCC DoC	N/A	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m
5.	Notebook	ASUS	P2430U	FCC DoC	N/A	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m

## 2.4. EUT Operation Test Setup

The following programs installed in the EUT are programmed during the test:

1. EUT links with Notebook and executes LAN Test Tool via RJ-45 Cable.



**LAN Link**



### 3. Test Result

#### 3.1. Test of AC Conducted Emission Measurement

##### 3.1.1. Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

**<Class B>**

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

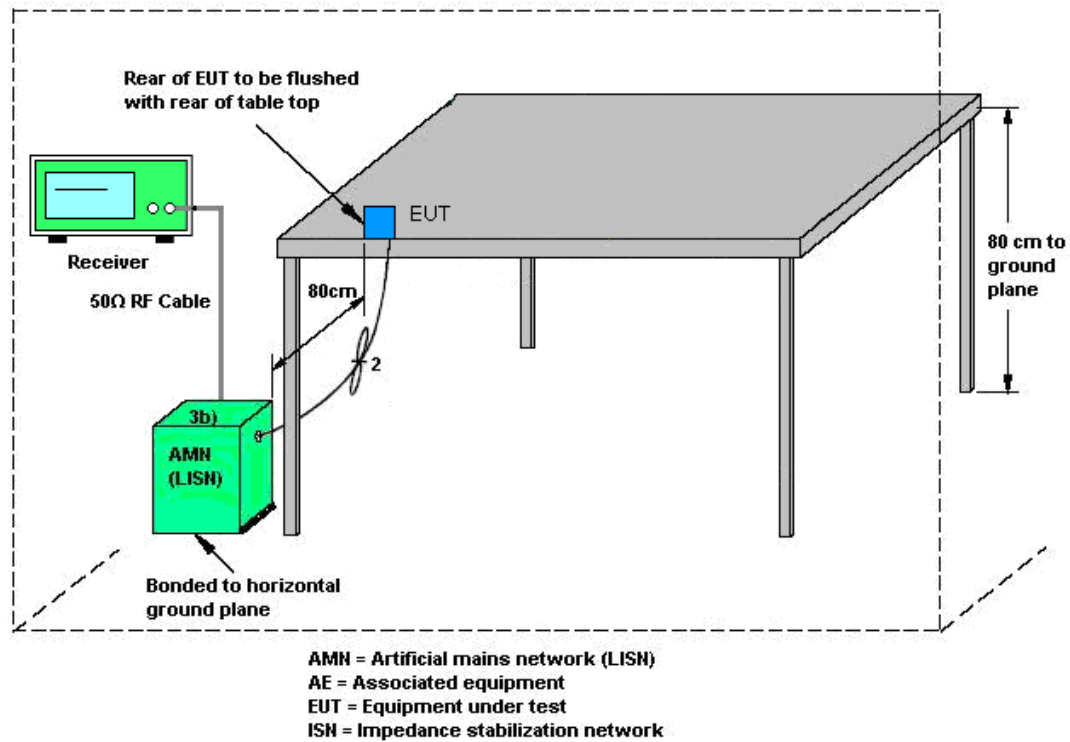
##### 3.1.2. Measuring Instruments

Please refer to the measuring equipment list in this test report.

##### 3.1.3. Test Procedure

1. The EUT is placed 0.4 meter away from the conducting wall of the shielding room, and is kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN shall be used.
6. Both Line and Neutral shall be tested in order to find out the maximum conducted emission.
7. The frequency range from 150 kHz to 30 MHz is scanned.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (If Bandwidth = 9 kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

### 3.1.4. Test Setup



### 3.1.5. Test Result of AC Conducted Emission

Please refer to Appendix A.

## 3.2. Test of Radiated Emission Measurement

### 3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

### 3.2.2. Measuring Instruments

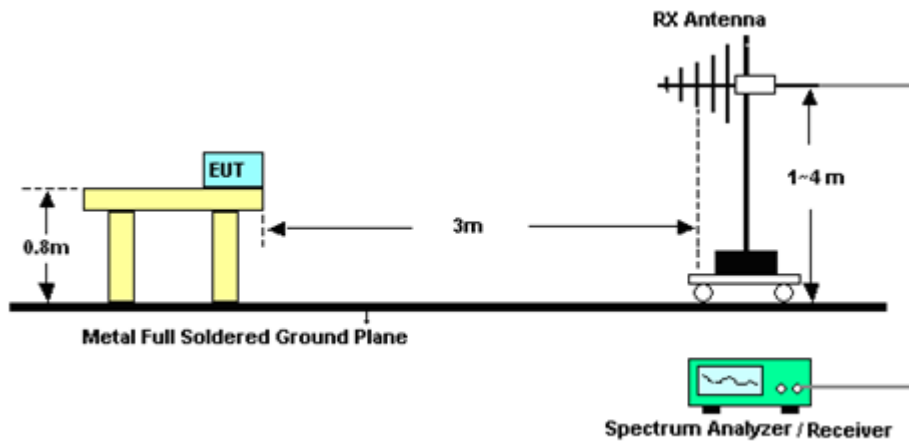
Please refer to the measuring equipment list in this test report.

### 3.2.3. Test Procedures

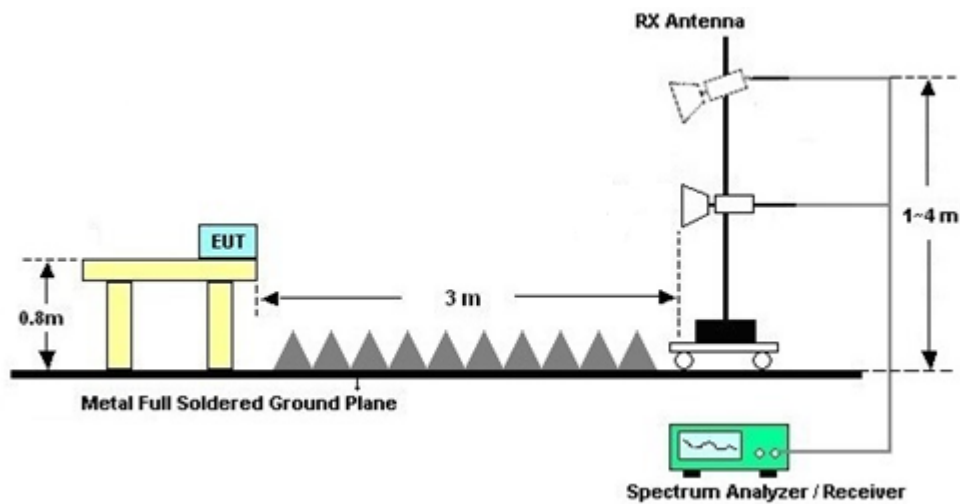
1. The EUT is placed on a turntable with 0.8 meter above ground.
2. The EUT is set 3 meters (1GHz~18GHz) and 1 meter (18GHz~40GHz) from the interference receiving antenna, which is mounted on the top of a variable height antenna tower.
3. The table is rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT is arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120 kHz/VBW=300 kHz for frequency below 1 GHz; RBW=1 MHz VBW=3 MHz (Peak), RBW=1 MHz/VBW=10 Hz (Average) for frequency above 1 GHz).
7. If the emission level of the EUT in peak mode is 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.

### 3.2.4. Test Setup of Radiated Emission

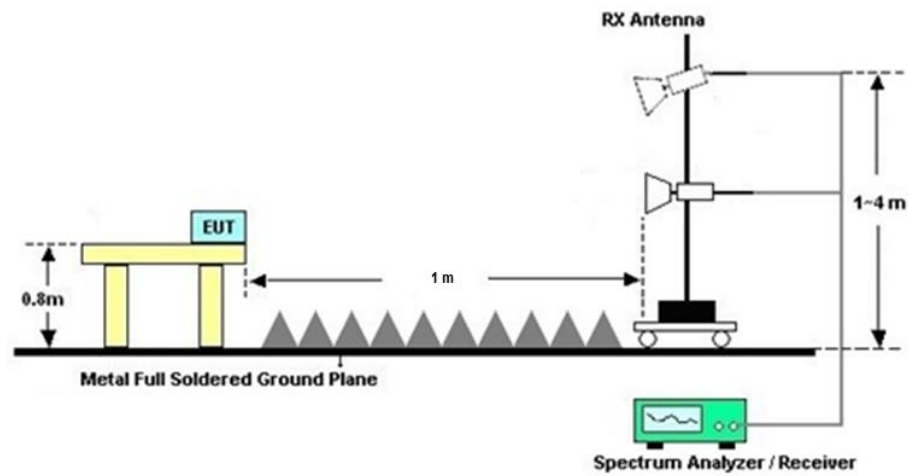
For Radiated Emissions from 30 MHz to 1 GHz



For Radiated Emissions from 1GHz to 18GHz



For Radiated Emissions above 18GHz



### 3.2.5. Test Result of Radiated Emission

Please refer to Appendix B.



## 4. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Nov. 23, 2023	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2022	Nov. 23, 2023	Nov. 30, 2023	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Oct. 26, 2023	Nov. 23, 2023	Oct. 25, 2024	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 01, 2022	Nov. 23, 2023	Nov. 30, 2023	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Nov. 23, 2023	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-F N	00691	9kHz~200MHz	Jul. 28, 2023	Nov. 23, 2023	Jul. 27, 2024	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 29, 2022	Nov. 23, 2023	Dec. 28, 2023	Conduction (CO05-HY)
Amplifier	SONOMA	310N	186713	9kHz~1GHz	Apr. 17, 2023	Nov. 27, 2023~ Nov. 28, 2023	Apr. 16, 2024	Radiation (03CH06-HY)
Bilog Antenna	Schaffner	CBL 6111C & N-6-06	2725 & AT-N0601	30MHz~1GHz	Nov. 03, 2023	Nov. 27, 2023~ Nov. 28, 2023	Nov. 02, 2024	Radiation (03CH06-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Feb. 13, 2023	Nov. 27, 2023~ Nov. 28, 2023	Feb. 12, 2024	Radiation (03CH06-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02037	1GHz~18GHz	Dec. 30, 2022	Nov. 27, 2023~ Nov. 28, 2023	Dec. 29, 2023	Radiation (03CH06-HY)
Preamplifier	Jet-Power	JPA00101800-3 0-10P	1601180001	1GHz~18GHz	Jul. 16, 2023	Nov. 27, 2023~ Nov. 28, 2023	Jul. 15, 2024	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	SF102_2000mm SF102_3000mm SF102_7000mm	532421/2 532422/2 532299/2	30MHz to 40GHz	Jul. 03, 2023	Nov. 27, 2023~ Nov. 28, 2023	Jul. 02, 2024	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	104 SF102_2000mm SF102_3000mm SF102_7000mm	802433/4 532421/2 532422/2 532299/2	30Mhz to 18Ghz	Jul. 03, 2023	Nov. 27, 2023~ Nov. 28, 2023	Jul. 02, 2024	Radiation (03CH06-HY)
Hygrometer	TECPEL	DTM-303B	TP210018	N/A	Oct. 24, 2023	Nov. 27, 2023~ Nov. 28, 2023	Oct. 23, 2024	Radiation (03CH06-HY)
Controller	INN-CO	EM1000	060782	Control Turn table & Ant Mast	N/A	Nov. 27, 2023~ Nov. 28, 2023	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1m~4m	N/A	Nov. 27, 2023~ Nov. 28, 2023	N/A	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0-360 degree	N/A	Nov. 27, 2023~ Nov. 28, 2023	N/A	Radiation (03CH06-HY)
Software	Audix	E3 6.2009-8-24(k5)	N/A	N/A	N/A	Nov. 27, 2023~ Nov. 28, 2023	N/A	Radiation (03CH06-HY)
Signal Analyzer	R&S	FSV3044	101104	10Hz~44GHz	Feb. 21, 2023	Nov. 27, 2023~ Nov. 28, 2023	Feb. 20, 2024	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18~40GHz	May 15, 2023	Nov. 27, 2023~ Nov. 28, 2023	May 14, 2024	Radiation (03CH06-HY)
Preamplifier	EMEC	EM18G40G	0600789	18~40GHz	Jul. 25, 2023	Nov. 27, 2023~ Nov. 28, 2023	Jul. 24, 2024	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801606/2	9KHz ~ 40GHz	Apr. 20, 2023	Nov. 27, 2023~ Nov. 28, 2023	Apr. 19, 2024	Radiation (03CH06-HY)

## 5. Measurement Uncertainty

### Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	3.5 dB
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### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	6.3 dB
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 6000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.7 dB
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### Uncertainty of Radiated Emission Measurement (6000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.6 dB
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### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	5.2 dB
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## **Appendix A. AC Conducted Emission Test Results**

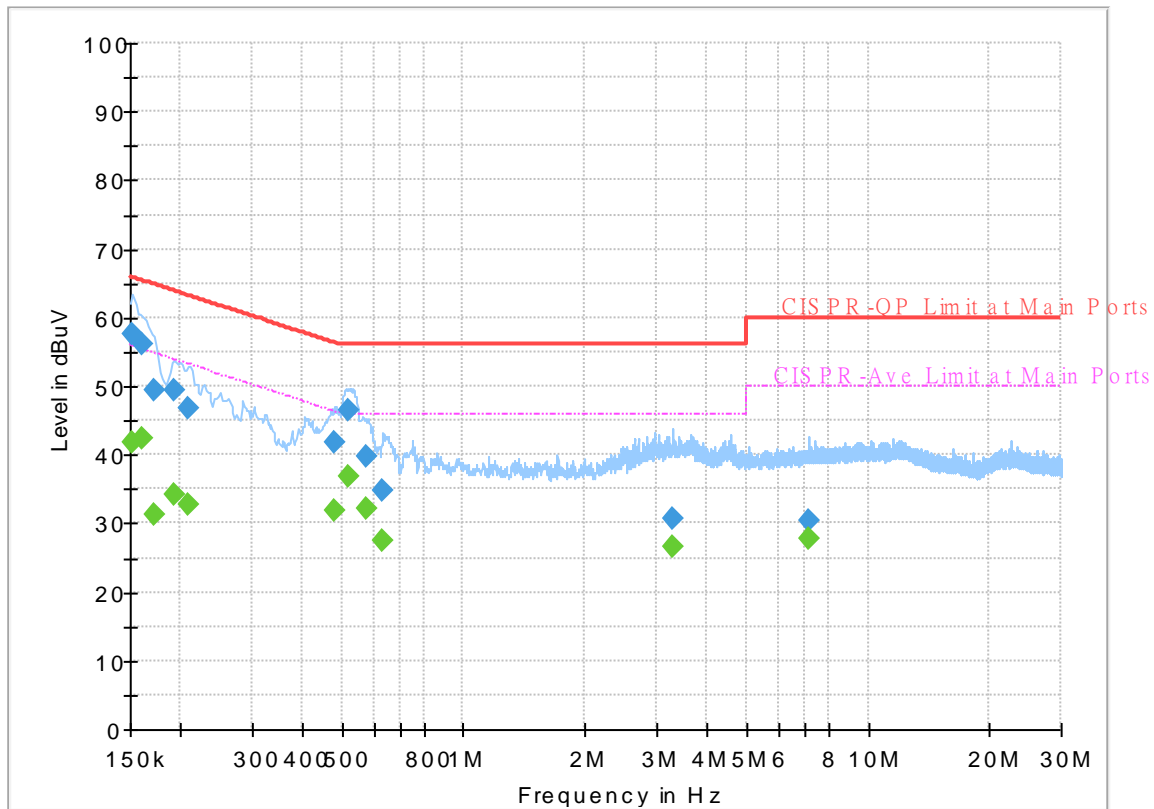
<b>Test Engineer :</b>	Calvin Wang	<b>Temperature :</b>	23~26°C
		<b>Relative Humidity :</b>	45~55%



# EUT Information

Report NO : 3N0940  
 Test Mode : Mode 1  
 Test Voltage : 120Vac/60Hz  
 Phase : Line

## Full Spectrum



## Final\_Result

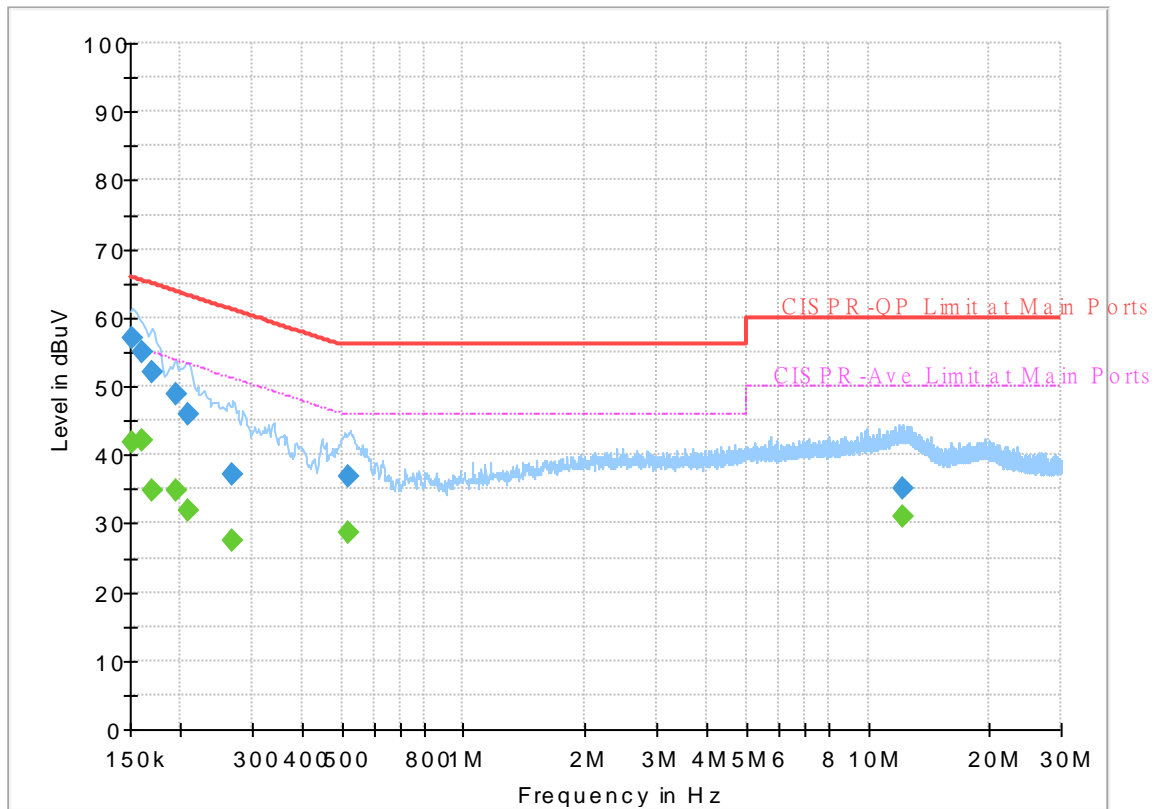
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	41.90	55.88	13.98	L1	OFF	19.9
0.152250	57.67	---	65.88	8.21	L1	OFF	19.9
0.161250	---	42.30	55.40	13.10	L1	OFF	19.9
0.161250	56.09	---	65.40	9.31	L1	OFF	19.9
0.172500	---	31.40	54.84	23.44	L1	OFF	19.9
0.172500	49.45	---	64.84	15.39	L1	OFF	19.9
0.192750	---	34.35	53.92	19.57	L1	OFF	19.9
0.192750	49.30	---	63.92	14.62	L1	OFF	19.9
0.208500	---	32.86	53.27	20.41	L1	OFF	19.9
0.208500	46.67	---	63.27	16.60	L1	OFF	19.9
0.480750	---	31.81	46.33	14.52	L1	OFF	19.9
0.480750	41.71	---	56.33	14.62	L1	OFF	19.9
0.521250	---	36.76	46.00	9.24	L1	OFF	19.9
0.521250	46.48	---	56.00	9.52	L1	OFF	19.9
0.577500	---	32.05	46.00	13.95	L1	OFF	19.9
0.577500	39.70	---	56.00	16.30	L1	OFF	19.9
0.633750	---	27.44	46.00	18.56	L1	OFF	19.9
0.633750	34.76	---	56.00	21.24	L1	OFF	19.9
3.284250	---	26.60	46.00	19.40	L1	OFF	20.0
3.284250	30.60	---	56.00	25.40	L1	OFF	20.0
7.167750	---	27.63	50.00	22.37	L1	OFF	20.1

7.167750	30.43	---	60.00	29.57	L1	OFF	20.1
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## EUT Information

Report NO : 3N0940  
Test Mode : Mode 1  
Test Voltage : 120Vac/60Hz  
Phase : Neutral

Full Spectrum

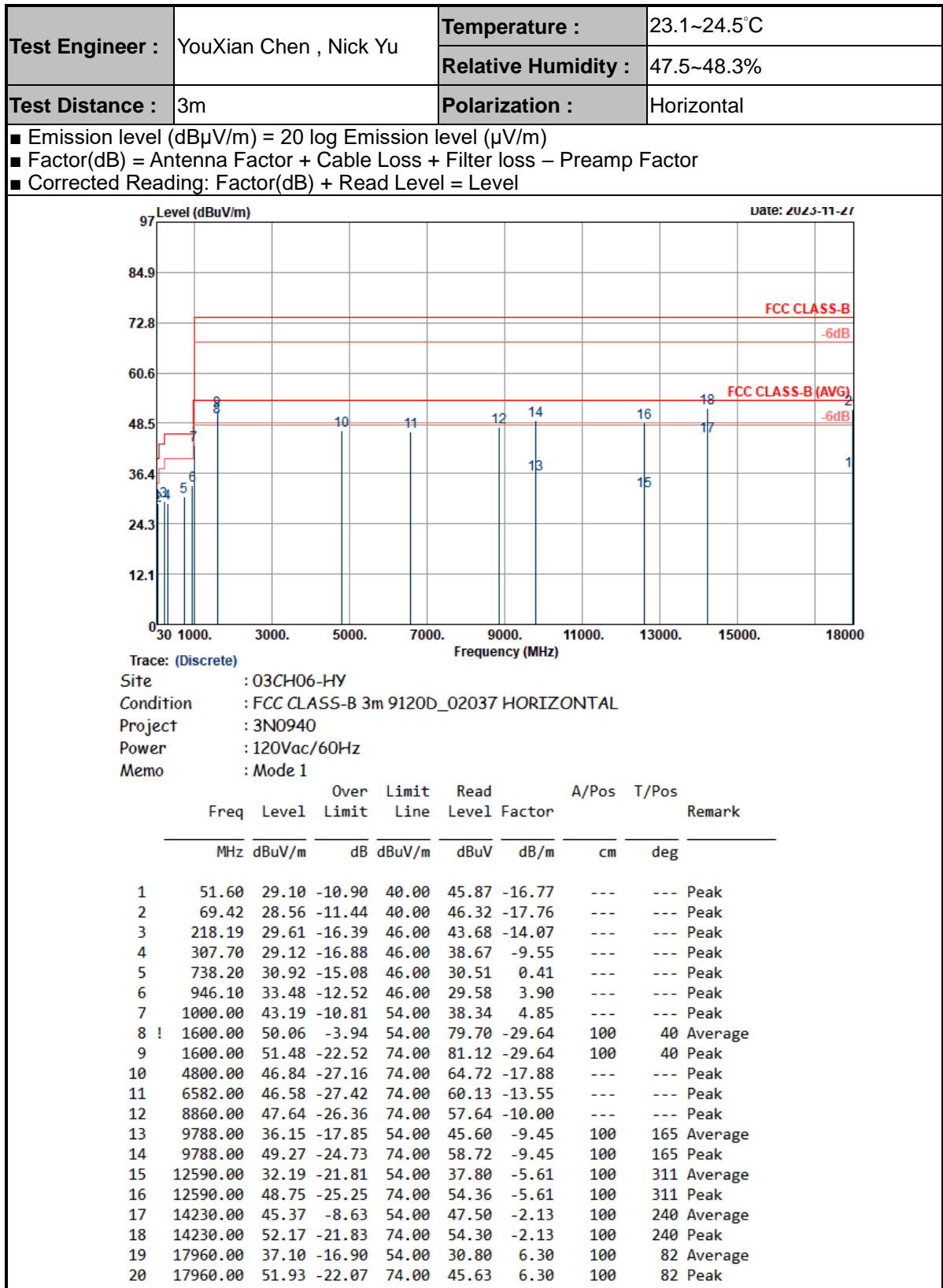


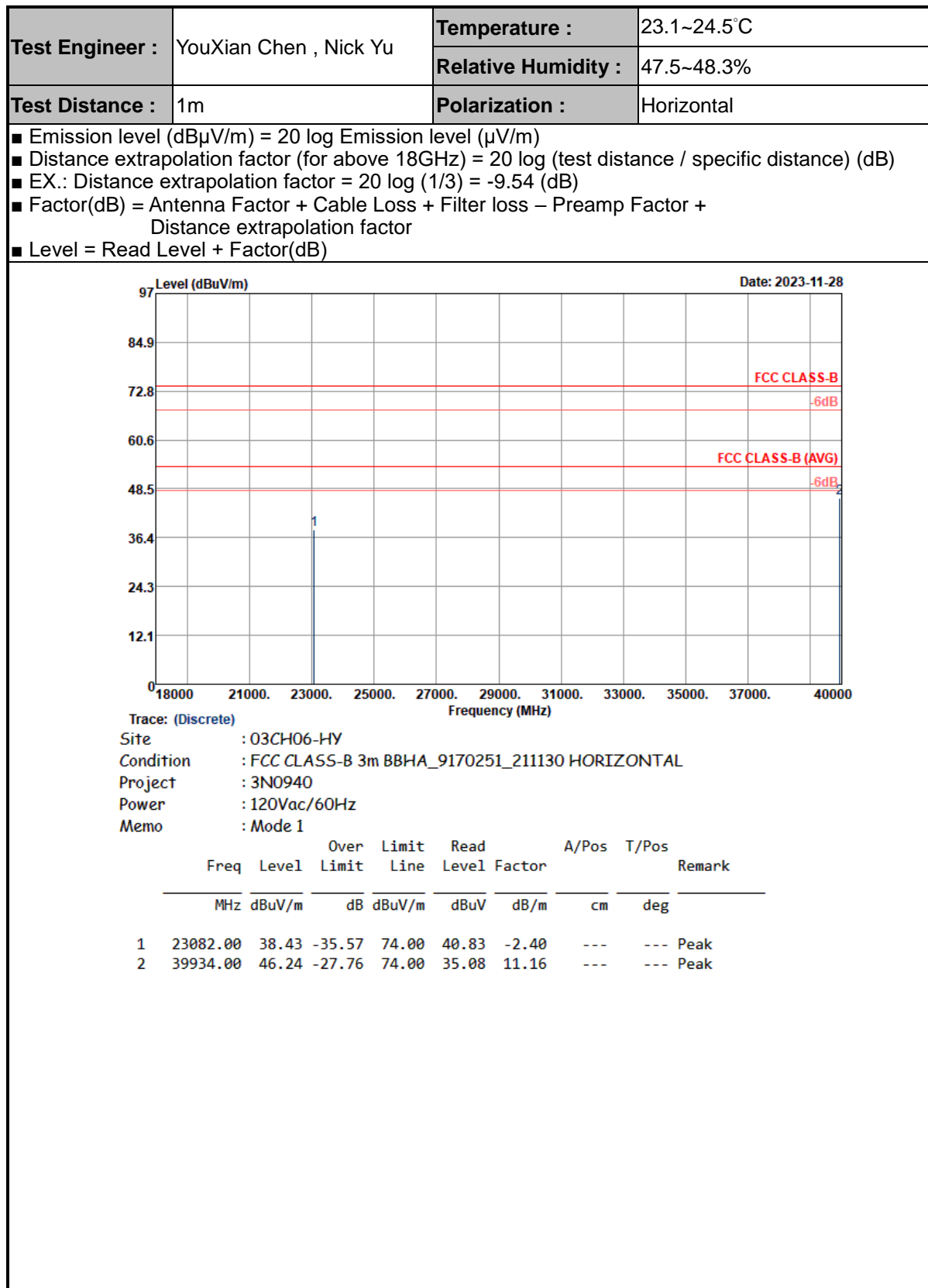
## Final\_Result

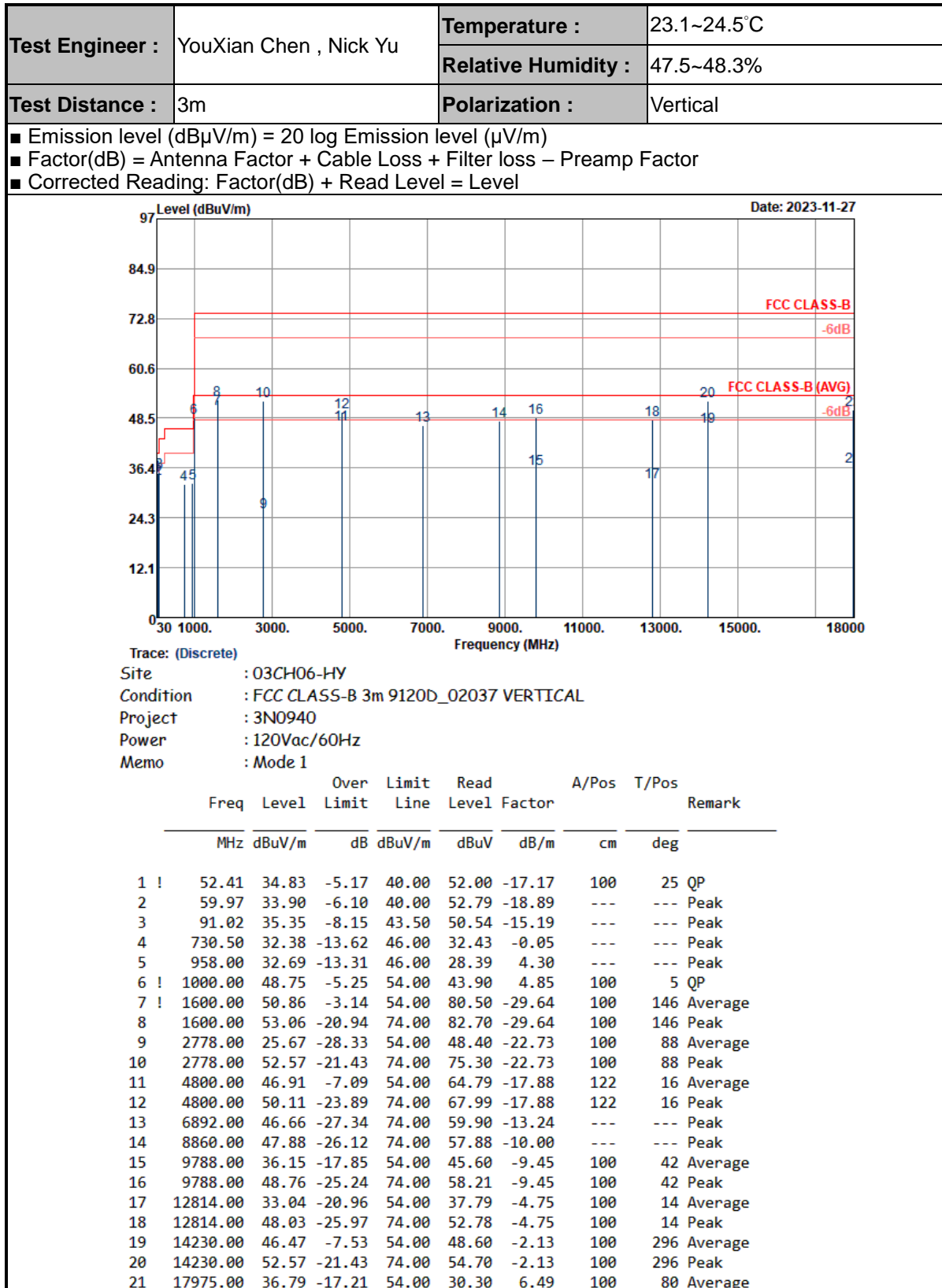
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	41.68	55.88	14.20	N	OFF	19.9
0.152250	57.13	---	65.88	8.75	N	OFF	19.9
0.161250	---	41.99	55.40	13.41	N	OFF	19.9
0.161250	54.95	---	65.40	10.45	N	OFF	19.9
0.170250	---	34.86	54.95	20.09	N	OFF	19.9
0.170250	52.03	---	64.95	12.92	N	OFF	19.9
0.195000	---	34.79	53.82	19.03	N	OFF	19.9
0.195000	48.76	---	63.82	15.06	N	OFF	19.9
0.208500	---	31.78	53.27	21.49	N	OFF	19.9
0.208500	45.97	---	63.27	17.30	N	OFF	19.9
0.269250	---	27.55	51.14	23.59	N	OFF	19.9
0.269250	37.24	---	61.14	23.90	N	OFF	19.9
0.521250	---	28.60	46.00	17.40	N	OFF	19.9
0.521250	36.79	---	56.00	19.21	N	OFF	19.9
12.241500	---	31.00	50.00	19.00	N	OFF	20.3
12.241500	35.17	---	60.00	24.83	N	OFF	20.3



## Appendix B. Radiated Emission Test Result



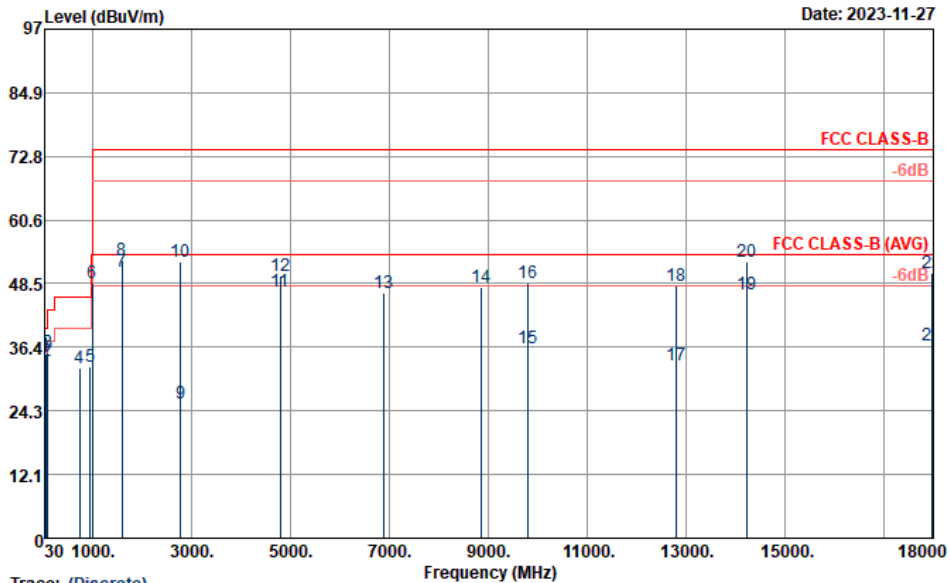






<b>Test Engineer :</b>	YouXian Chen , Nick Yu	<b>Temperature :</b>	23.1~24.5°C
		<b>Relative Humidity :</b>	47.5~48.3%
<b>Test Distance :</b>	3m	<b>Polarization :</b>	Vertical

- Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m)
- Factor(dB) = Antenna Factor + Cable Loss + Filter loss – Preamp Factor
- Corrected Reading: Factor(dB) + Read Level = Level



Site : 03CH06-HY  
Condition : FCC CLASS-B 3m 9120D\_02037 VERTICAL  
Project : 3N0940  
Power : 120Vac/60Hz  
Memo : Mode 1

No.	Freq	Level	Over	Limit	Read	Factor	A/Pos	T/Pos	Remark
			Limit	Line					
	MHz	dB $\mu$ V/m	dB	dB $\mu$ V/m	dB $\mu$ V	dB/m	cm	deg	
22	17975.00	50.47	-23.53	74.00	43.98	6.49	100	80	Peak

