



FCC EMI TEST REPORT

FCC ID : TX2-RTL8735BDM
Equipment : 11n RTL8735BDM combo module
Brand Name : REALTEK
Model Name : RTL8735BDM
Applicant : Realtek Semiconductor Corp.
No. 2, Innovation Road II, Hsinchu Science
Park, Hsinchu 300, Taiwan
Manufacturer : Realtek Semiconductor Corp.
No. 2, Innovation Road II, Hsinchu Science
Park, Hsinchu 300, Taiwan
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. 21, 2023 to Nov. 23, 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.

Louis Wu

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
FC371824	01	Initial issue of report	Jan. 10, 2024

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.107	AC Conducted Emission	Pass	4.21 dB under the limit at 0.15 MHz
3.2	15.109	Radiated Emission	Pass	9.63 dB under the limit at 161.49 MHz

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: Alan Liu

Report Producer: Lilian Hou

1. General Description

1.1. Product Feature of Equipment Under Test

Product Feature	
General Specs	
Bluetooth - LE, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n.	

1.2. Antenna Information

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4GHz	WLAN 5GHz	Bluetooth					
1	1	1	1	LYNwave	ALA110-222050-300011	PIFA	IPEX MHF4	Note 1
2	1	1	1	RTANT	K212-10068-A	PIFA	IPEX MHF4	

Note 1

Ant.	Port			WLAN 2.4GHz	WLAN 5GHz	Bluetooth
	WLAN 2.4GHz	WLAN 5GHz	Bluetooth			
1	1	1	1	3.50	5.00	3.50
2	1	1	1	2.77	0.84	2.77

Note 2: The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

Note 3: There are two antenna models provided by different manufacturers. All tests were conducted using the high-gain antenna.

1.3. Modification of EUT

No modifications made to the EUT during the testing.

1.4. Test Location

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

FCC designation No.: TW1093

1.5. 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.

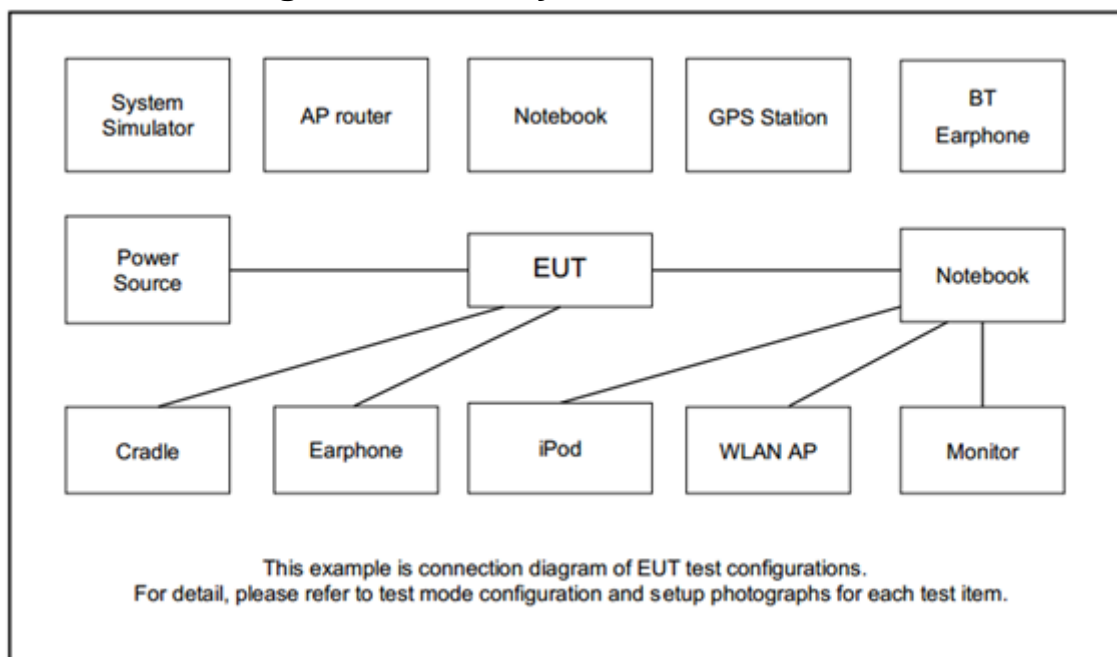
2. Test Configuration of Equipment Under Test

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 5th harmonics of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Functions Enabled
AC Conducted Emission	Mode 1: WLAN (2.4GHz) Link + Bluetooth - LE Link + USB Cable (Charging from Notebook)
	Mode 2: WLAN (5GHz) Idle + Bluetooth - LE Idle + USB Cable (Charging from Notebook)
	Mode 3: WLAN (5GHz) Link + Bluetooth - LE Link + USB Cable (Charging from Laptop) + Camera
Radiated Emissions	Mode 1: WLAN (2.4GHz) Link + Bluetooth - LE Link + USB Cable (Charging from Notebook)
	Mode 2: WLAN (5GHz) Idle + Bluetooth - LE Idle + USB Cable (Charging from Notebook)
	Mode 3: WLAN (5GHz) Link + WLAN (5GHz) Link + USB Cable (Charging from Laptop) + Camera
Remark: 1. The worst case of AC is mode 2; 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



2.3. Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8m
2.	WLAN AP	ASUS	GT-AXE11000	MSQ-RTAJF00	N/A	Unshielded, 1.8m
3.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0m	N/A
4.	Notebook	Dell	Latitude 3400	FCC DoC	N/A	AC I/P : Unshielded, 1.2m DC O/P : Shielded, 1.8m
5.	Notebook	Dell	Latitude 3420	FCC DoC	N/A	AC I/P : Unshielded, 1.2m DC O/P : Shielded, 1.8m
6.	Mobile Phone	Apple	A1586	BCG-E2816A	N/A	N/A
7.	Fixture	REALTEK	AmebaPRO2 adapter	N/A	N/A	N/A

2.4. EUT Operation Test Setup

The EUT is attached to the Bluetooth or WLAN AP during the test.

EUT links with Notebook via WLAN function and executes ping.

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.

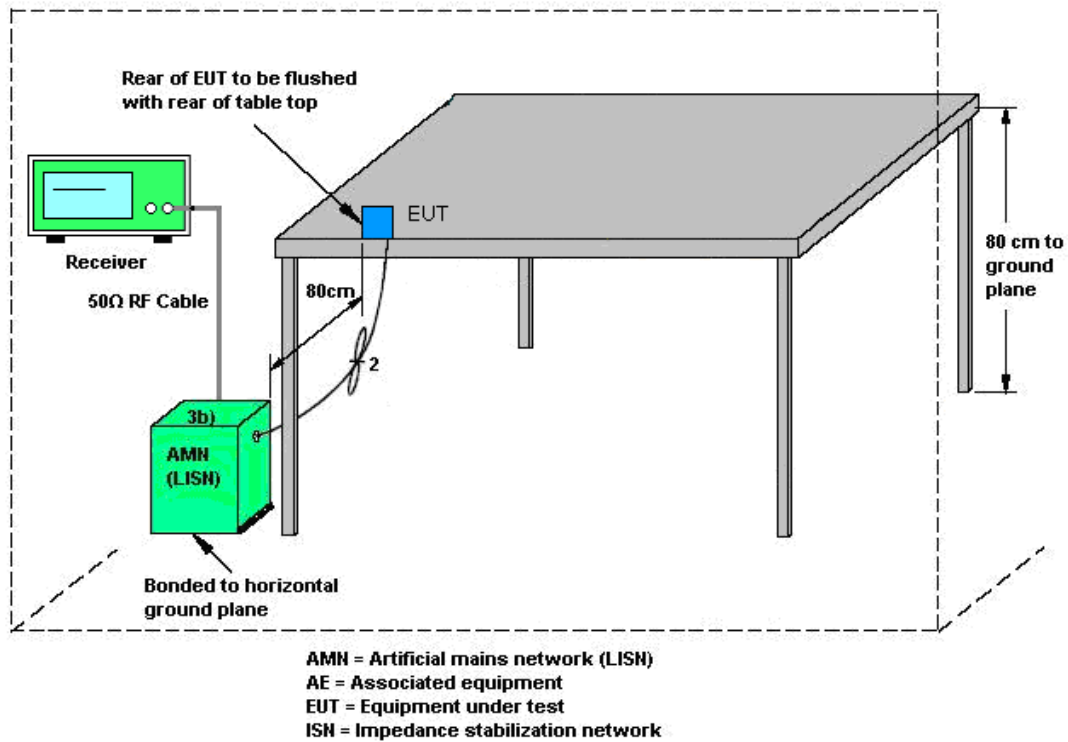
3.1.2. Measuring Instruments

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

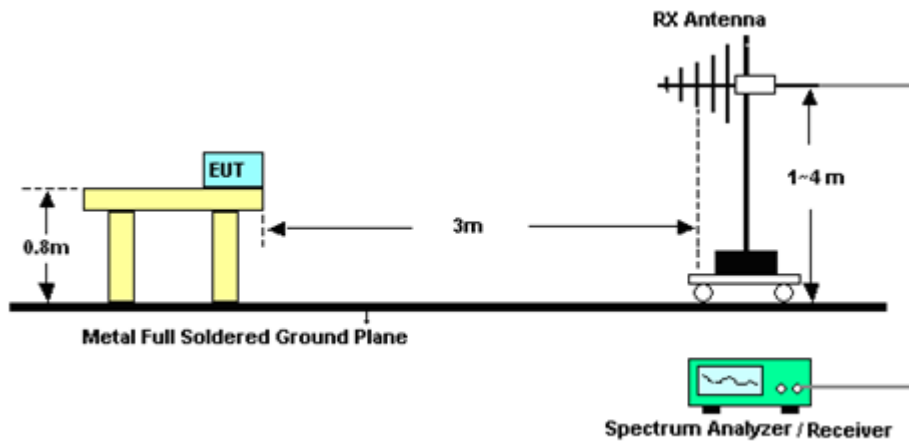
Please refer to the measuring equipment list in this test report.

3.2.3. Test Procedures

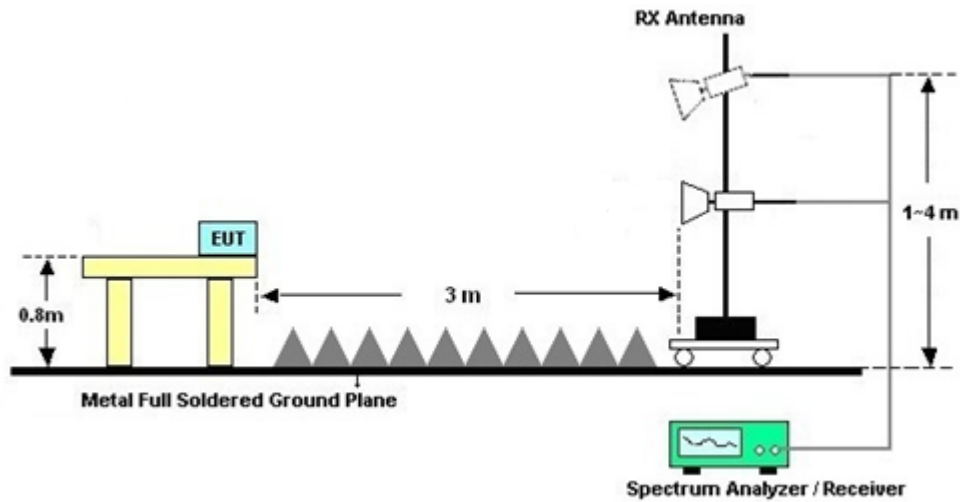
1. The EUT is placed on a turntable with 0.8 meter above ground.
2. The EUT is set 3 meters (30MHz~18GHz) and 1 meters (18GHz~40GHz) from the interference receiving antenna, which is mounted on the top of a variable height antenna tower.
3. The table is rotated 360 degrees to determine the position of 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

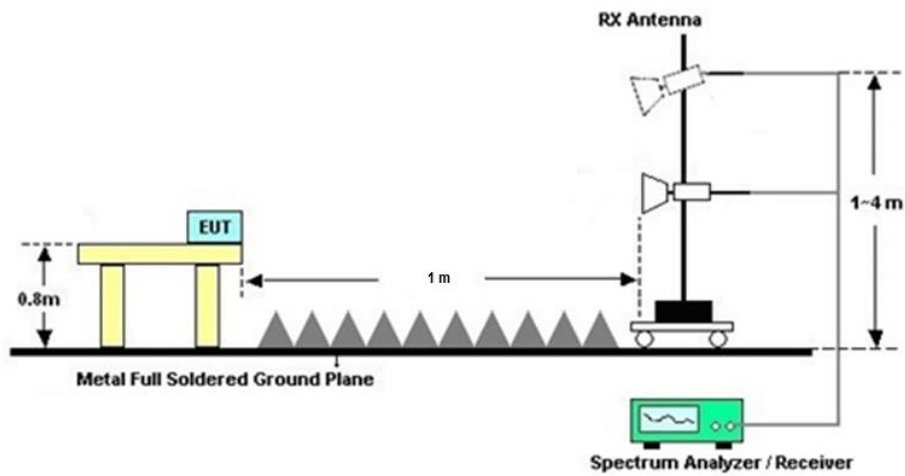
For Radiated Emissions from 30 MHz to 1 GHz



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. 22, 2023	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Dec. 01, 2022	Nov. 22, 2023	Nov. 30, 2023	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Oct. 26, 2023	Nov. 22, 2023	Oct. 25, 2024	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 01, 2022	Nov. 22, 2023	Nov. 30, 2023	Conduction (CO05-HY)
Four-Line V-Network	TESEQ	NNB52	36122	N/A	Mar. 13, 2023	Nov. 22, 2023	Mar. 12, 2024	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Nov. 22, 2023	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZB ECK	VTSD 9561-F N	00691	9kHz~200MHz	Jul. 28, 2023	Nov. 22, 2023	Jul. 27, 2024	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 29, 2022	Nov. 22, 2023	Dec. 28, 2023	Conduction (CO05-HY)
Amplifier	SONOMA	310N	186713	9kHz~1GHz	Apr. 17, 2023	Nov. 21, 2023~ Nov. 23, 2023	Apr. 16, 2024	Radiation (03CH06-HY)
Bilog Antenna	Schaffner	CBL 6111C & N-6-06	2725 & AT-N0601	30MHz~1GHz	Nov. 03, 2023	Nov. 21, 2023~ Nov. 23, 2023	Nov. 02, 2024	Radiation (03CH06-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Feb. 13, 2023	Nov. 21, 2023~ Nov. 23, 2023	Feb. 12, 2024	Radiation (03CH06-HY)
Horn Antenna	SCHWARZB ECK	BBHA 9120 D	9120D-02037	1GHz~18GHz	Dec. 30, 2022	Nov. 21, 2023~ Nov. 23, 2023	Dec. 29, 2023	Radiation (03CH06-HY)
Preamplifier	Jet-Power	JPA00101800-3 0-10P	1601180001	1GHz~18GHz	Jul. 16, 2023	Nov. 21, 2023~ Nov. 23, 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. 21, 2023~ Nov. 23, 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. 21, 2023~ Nov. 23, 2023	Jul. 02, 2024	Radiation (03CH06-HY)
Hygrometer	TECPEL	DTM-303B	TP210018	N/A	Oct. 24, 2023	Nov. 21, 2023~ Nov. 23, 2023	Oct. 23, 2024	Radiation (03CH06-HY)
Controller	INN-CO	EM1000	060782	Control Turn table & Ant Mast	N/A	Nov. 21, 2023~ Nov. 23, 2023	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1m~4m	N/A	Nov. 21, 2023~ Nov. 23, 2023	N/A	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0-360 degree	N/A	Nov. 21, 2023~ Nov. 23, 2023	N/A	Radiation (03CH06-HY)
Software	Audix	E3 6.2009-8-24(k5)	N/A	N/A	N/A	Nov. 21, 2023~ Nov. 23, 2023	N/A	Radiation (03CH06-HY)
Signal Analyzer	R&S	FSV3044	101104	10Hz~44GHz	Feb. 21, 2023	Nov. 21, 2023~ Nov. 23, 2023	Feb. 20, 2024	Radiation (03CH06-HY)
SHF-EHF Horn Antenna	SCHWARZB ECK	BBHA 9170	BBHA9170251	18~40GHz	Nov. 24, 2022	Nov. 21, 2023	Nov. 23, 2023	Radiation (03CH06-HY)
Preamplifier	EMEC	EM18G40G	0600789	18~40GHz	Jul. 25, 2023	Nov. 21, 2023	Jul. 24, 2024	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	801606/2	9KHz ~ 40GHz	Apr. 20, 2023	Nov. 21, 2023~ Nov. 23, 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
---	--------

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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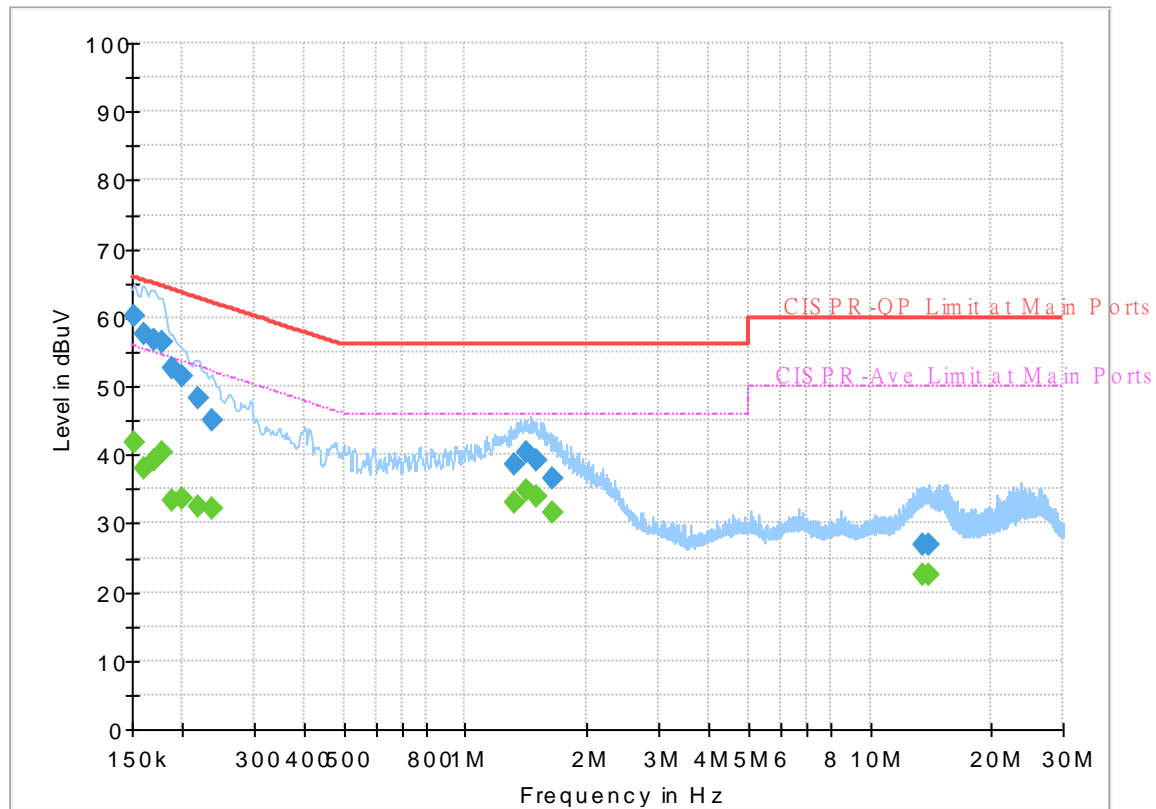
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Calvin Wang	Temperature :	23~26℃
		Relative Humidity :	45~55%

EUT Information

Report NO : 371824
Test Mode : Mode 2
Test Voltage : Power From System
Phase : Line

Full Spectrum



Final_Result

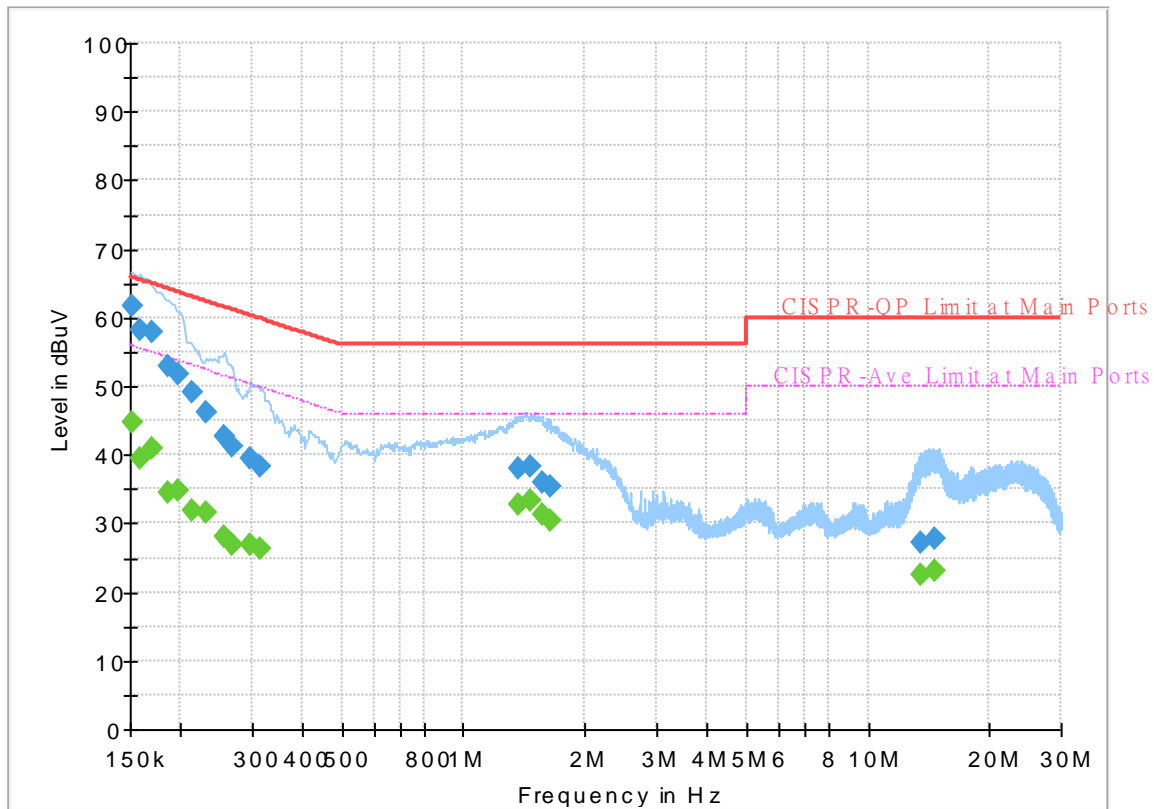
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	41.83	55.88	14.05	L1	OFF	19.9
0.152250	60.25	---	65.88	5.63	L1	OFF	19.9
0.161250	---	38.05	55.40	17.35	L1	OFF	19.9
0.161250	57.69	---	65.40	7.71	L1	OFF	19.9
0.170250	---	39.26	54.95	15.69	L1	OFF	19.9
0.170250	56.85	---	64.95	8.10	L1	OFF	19.9
0.177000	---	40.46	54.63	14.17	L1	OFF	19.9
0.177000	56.40	---	64.63	8.23	L1	OFF	19.9
0.188250	---	33.25	54.11	20.86	L1	OFF	19.9
0.188250	52.57	---	64.11	11.54	L1	OFF	19.9
0.199500	---	33.56	53.63	20.07	L1	OFF	19.9
0.199500	51.36	---	63.63	12.27	L1	OFF	19.9
0.217500	---	32.48	52.91	20.43	L1	OFF	19.9
0.217500	48.25	---	62.91	14.66	L1	OFF	19.9
0.235500	---	32.02	52.25	20.23	L1	OFF	19.9
0.235500	45.04	---	62.25	17.21	L1	OFF	19.9
1.315500	---	33.12	46.00	12.88	L1	OFF	20.0
1.315500	38.66	---	56.00	17.34	L1	OFF	20.0
1.414500	---	34.82	46.00	11.18	L1	OFF	20.0
1.414500	40.24	---	56.00	15.76	L1	OFF	20.0
1.502250	---	33.99	46.00	12.01	L1	OFF	20.0

1.502250	39.31	---	56.00	16.69	L1	OFF	20.0
1.650750	---	31.70	46.00	14.30	L1	OFF	20.0
1.650750	36.68	---	56.00	19.32	L1	OFF	20.0
13.560000	---	22.61	50.00	27.39	L1	OFF	20.3
13.560000	27.03	---	60.00	32.97	L1	OFF	20.3
13.915500	---	22.54	50.00	27.46	L1	OFF	20.3
13.915500	26.89	---	60.00	33.11	L1	OFF	20.3

EUT Information

Report NO : 371824
 Test Mode : Mode 2
 Test Voltage : Power From System
 Phase : Neutral

Full Spectrum

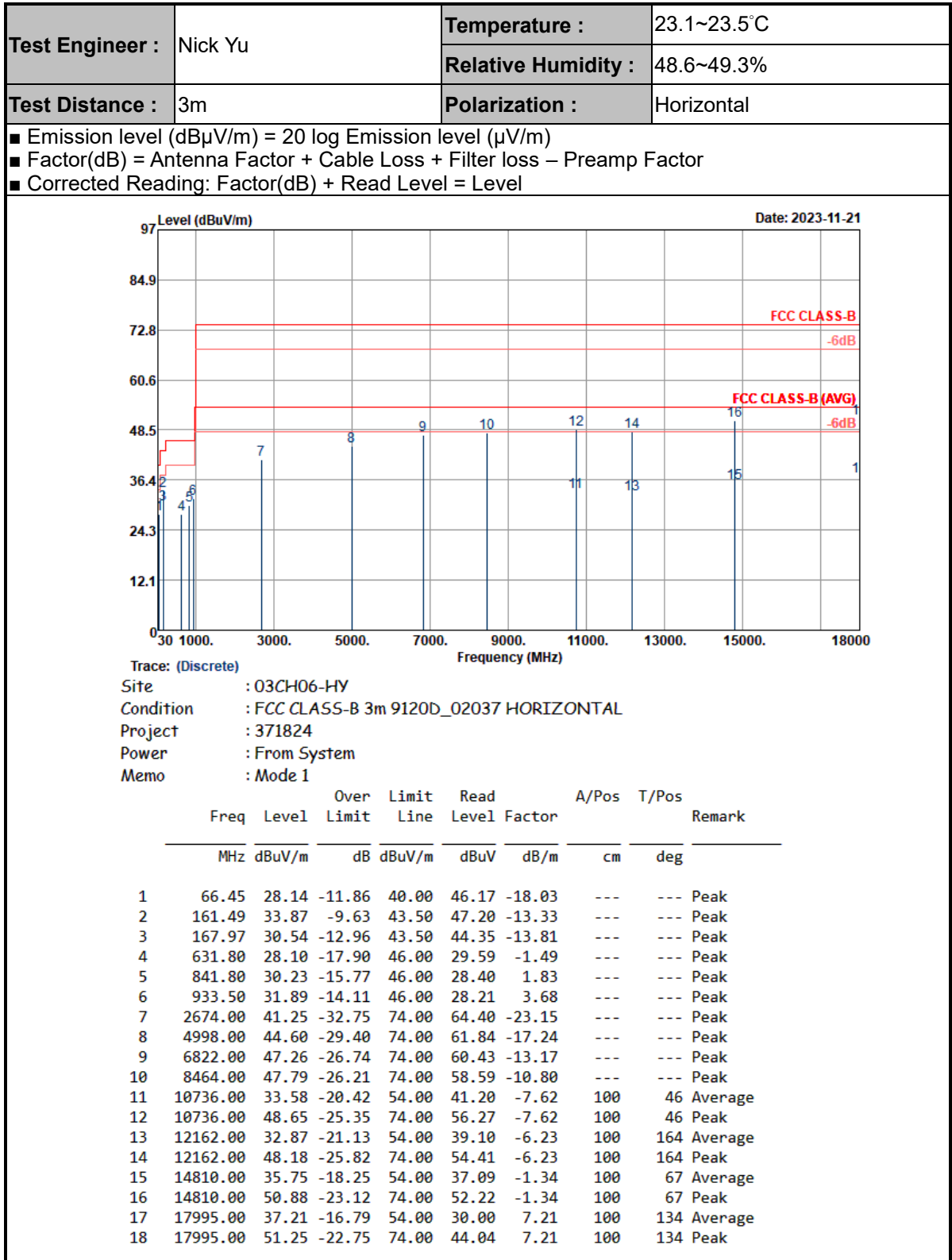


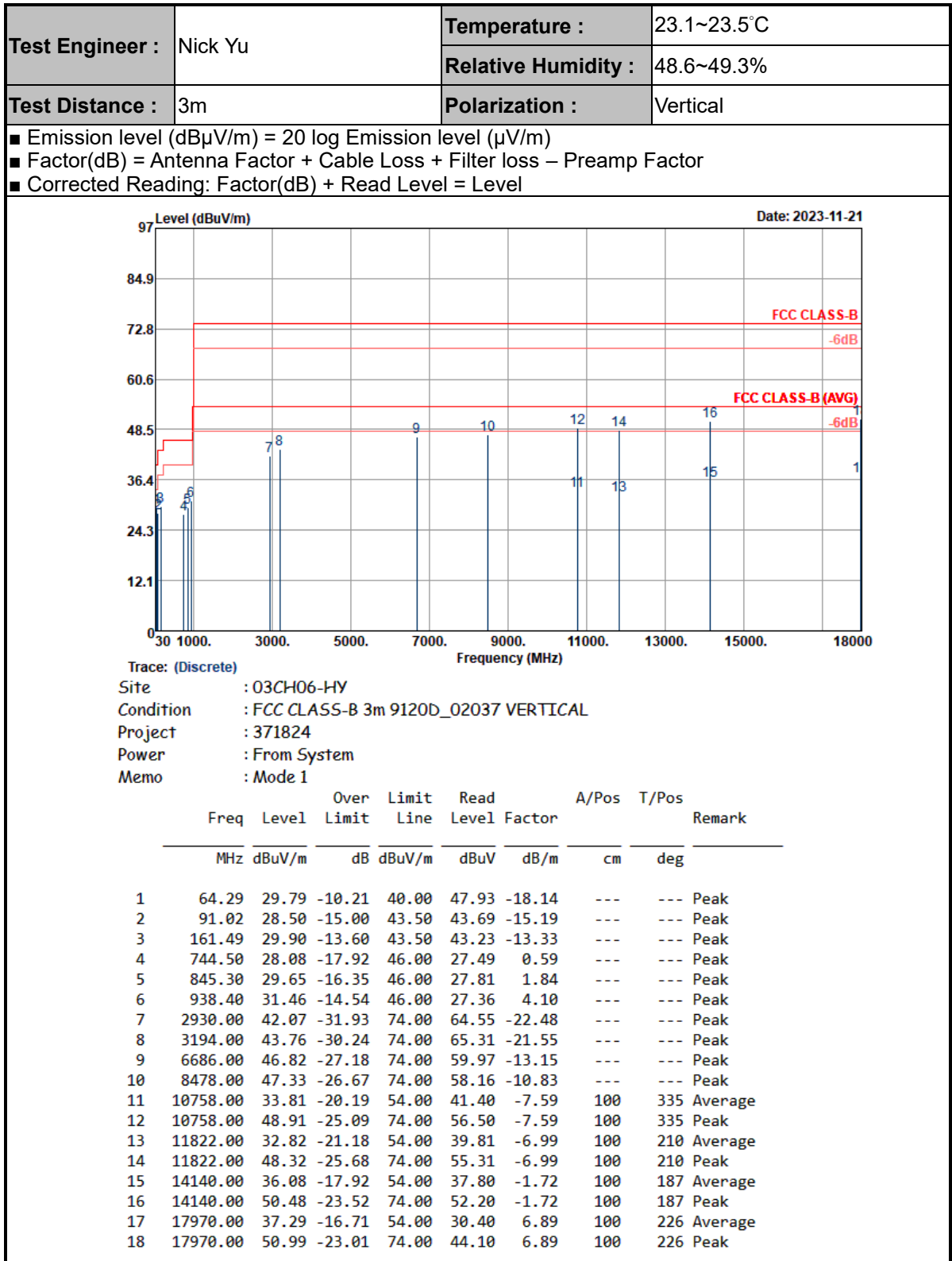
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	44.72	55.88	11.16	N	OFF	19.9
0.152250	61.67	---	65.88	4.21	N	OFF	19.9
0.159000	---	39.39	55.52	16.13	N	OFF	19.9
0.159000	58.20	---	65.52	7.32	N	OFF	19.9
0.170250	---	40.87	54.95	14.08	N	OFF	19.9
0.170250	57.87	---	64.95	7.08	N	OFF	19.9
0.186000	---	34.36	54.21	19.85	N	OFF	19.9
0.186000	53.06	---	64.21	11.15	N	OFF	19.9
0.197250	---	34.81	53.73	18.92	N	OFF	19.9
0.197250	51.66	---	63.73	12.07	N	OFF	19.9
0.213000	---	31.78	53.09	21.31	N	OFF	19.9
0.213000	49.01	---	63.09	14.08	N	OFF	19.9
0.231000	---	31.62	52.41	20.79	N	OFF	19.9
0.231000	46.12	---	62.41	16.29	N	OFF	19.9
0.255750	---	27.93	51.57	23.64	N	OFF	19.9
0.255750	42.61	---	61.57	18.96	N	OFF	19.9
0.269250	---	26.95	51.14	24.19	N	OFF	19.9
0.269250	41.29	---	61.14	19.85	N	OFF	19.9
0.298500	---	26.90	50.28	23.38	N	OFF	19.9
0.298500	39.59	---	60.28	20.69	N	OFF	19.9
0.314250	---	26.32	49.86	23.54	N	OFF	19.9

0.314250	38.19	---	59.86	21.67	N	OFF	19.9
1.369500	---	32.71	46.00	13.29	N	OFF	20.0
1.369500	38.08	---	56.00	17.92	N	OFF	20.0
1.466250	---	33.21	46.00	12.79	N	OFF	20.0
1.466250	38.42	---	56.00	17.58	N	OFF	20.0
1.574250	---	31.18	46.00	14.82	N	OFF	20.0
1.574250	36.04	---	56.00	19.96	N	OFF	20.0
1.632750	---	30.34	46.00	15.66	N	OFF	20.0
1.632750	35.27	---	56.00	20.73	N	OFF	20.0
13.560000	---	22.65	50.00	27.35	N	OFF	20.4
13.560000	27.13	---	60.00	32.87	N	OFF	20.4
14.689500	---	23.11	50.00	26.89	N	OFF	20.4
14.689500	27.79	---	60.00	32.21	N	OFF	20.4

Appendix B. Radiated Emission Test Result







Test Engineer :	Nick Yu	Temperature :	23.1~23.5°C
		Relative Humidity :	48.6~49.3%
Test Distance :	1m	Polarization :	Horizontal
■ Emission level (dBμV/m) = 20 log Emission level (μV/m)			
■ Distance extrapolation factor (for above 18GHz) = 20 log (test distance / specific distance) (dB)			
■ EX.: Distance extrapolation factor = 20 log (1/3) = -9.54 (dB)			
■ Factor(dB) = Antenna Factor + Cable Loss + Filter loss – Preamp Factor + Distance extrapolation factor			
■ Level = Read Level + Factor(dB)			

Level (dBuV/m)

Date: 2023-11-21

Trace: (Discrete)

Site : 03CH06-HY

Condition : FCC CLASS-B 3m BBHA_9170251_211130 HORIZONTAL

Project : 371824

Power : From System

Memo : Mode 1

	Freq	Level	Over	Limit	Read	Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	cm	deg	
1	25480.00	37.84	-36.16	74.00	37.24	0.60	---	---	Peak
2	39978.00	46.35	-27.65	74.00	35.06	11.29	---	---	Peak

