

RADIO TEST REPORT

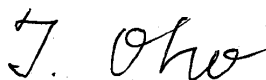
(for Bluetooth classic)

Project No. : JB-Z0636
Client : Sony Corporation
Client's Address : 1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan
Product Name : Wireless Noise Canceling Stereo Headset
Model No. : WF-SP800N(Left part, Right part)
FCC ID : AK8WFSP800N
Test Standard : 47 CFR Part 15 Subpart C
Sample Receipt Date : October 28, 2019
Test Date : November 9, 2019 to November 19, 2019
Report Date : November 28, 2019
Test Result : Complied

Notice :

- * These test results relate only to the items (combination equipment, test configuration, operation condition etc.) tested.
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- * This report must not be used by the client to claim product endorsement by A2LA or any agency of the U.S.
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- * All test results are traceable to the national and / or international standards.
- * The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in Sony Global Manufacturing & Operations Corporation EMC/ RF Test Laboratory.

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Format No.: NV1-1-01 Version 5.0

Sony Global Manufacturing & Operations Corporation EMC/RF Test Laboratory, Main Lab.

A2LA Cert. #3203.01

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Note

- ☒-indicates that the listed condition, standard or equipment is applicable for this report.
☐-indicates that the listed condition, standard or equipment is not applicable for this report.

Revision History

Revision	Date	Overview	Page
JB-Z0636 (Original)	November 28, 2019	-	-

Disclaimer

This report includes the information provided by the customer as below;

- Cover page : Client and product related information
- Clause 1.1 : Description of Equipment Under Test (EUT)
- Clause 2 : Operating mode / conditions

* The laboratory is not responsible for any test results affected by the above information.

1. General Information

1.1. Description of Equipment Under Test (EUT)

General Specification

Test Sample Condition : ☐ Prototype ☒ Pre-production ☐ Mass-production
Product Name : Wireless Noise Canceling Stereo Headset
Trade Name : SONY
Model No. : WF-SP800N(Left part, Right part)
Serial No. : 675, 676, 659
Power Rating of the EUT : DC 3.7 V (The EUT was supplied with the power from the built-in battery)

Similar model(s) to be covered by this report

Model No. : None

Radio Specification (*L/ R common)

Function of the Equipment : Transceiver
Operating Frequency : 2402 - 2480 MHz
Modulation Type : FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Channel Spacing : 1 MHz
Channel Bandwidth : 1 MHz
Number of channels : 79
Antenna Type : Monopole Pattern Antenna
Antenna Connector Type : None
Antenna Gain : -1.59 dBi
Operating Temperature : +0 to +40 deg.C

* Only left part was representatively tested by client request since left part and right part are the same specification.

1.2. Summary of Test Result

Test Item	Test Method	Worst Margin	Results	Note
AC Power-line Conducted Emissions	-	-	N/A	*2
20dB Bandwidth	Conducted	Refer to the test data	Complied	-
Carrier Frequency Separation	Conducted	Refer to the test data	Complied	-
Number of Hopping Frequencies	Conducted	Refer to the test data	Complied	-
Time of Occupancy (Dwell Time)	Conducted	Refer to the test data	Complied	-
Maximum Peak Conducted Output Power	Conducted	11.47 dB	Complied	-
Radiated Spurious Emissions	Radiated	3.6 dB (AV) 4803.990 MHz Vertical	Complied	-
Conducted Spurious Emissions for Band Edge	Conducted	33.44 dB 2399.79 MHz	Complied	*1

Note

*1: Conducted Spurious Emissions measurement was tested for the only frequencies in the non-restricted carrier band edges, since the spurious emissions in other non-restricted band were complied with Radiated Spurious Emissions measurement.

*2: This item was not applied to the EUT since its transmission is stopped when the battery is being charged by the PC connected to AC Power-line.

Other requirements

Part 15.31(e) Supply voltage requirement

: Complied (The EUT was tested with a new battery.)

Part 15.203 / 212 Antenna requirement

: Complied (The EUT has an internal antenna which cannot be replaced by users.)

1.3. Tested Methodology

Test Standard : 47 CFR Part15 Subpart C

Test Method : ANSI C63.10 - 2013

KDB 558074 D01 15.247 Meas Guidance v05r02

Test Condition

Radiated Spurious Emissions

Test Distance : ☒ 3 m ☐ 10m (9 kHz to 30 MHz)
☒ 3 m ☐ 10m (30 MHz to 1000 MHz)
☒ 3 m (1 GHz to 26.5 GHz)

Dimensions of the EUT table : 0.8 m (below 1 GHz) or 1.5 m (above 1 GHz) height, 1.5 m width and 1 m depth.

Dimensions of validated test volume : 2 m diameter, 3 m top height, 0.5 m bottom height.

1.4. Measurement Procedures

We performed the measurements in accordance with NV3-12, available upon the request.

☒ No deviation

☐ Deviation from the above procedure

The summary of the above procedure is mentioned below

Antenna-port Conducted Measurements

1. Antenna-port of the EUT was connected to the power sensor (Maximum Peak Conducted Output Power) or the spectrum analyzer. (other test items).
2. For each EUT operation mode, the Antenna-port Conducted Measurements were measured with the power sensor or the spectrum analyzer.

Test Item	Detector	RBW
Antenna-port Conducted Measurements		
20dB Bandwidth	Peak	30 kHz
Carrier Frequency Separation	Peak	100 kHz
Number of Hopping Frequencies	Peak	100 kHz
Time of Occupancy (Dwell Time)	Peak	1 MHz
Maximum Peak Conducted Output Power	Peak	-
Conducted Spurious Emissions for Band Edge	Peak	100 kHz

Radiated Spurious Emissions

1. The non-conductive table (EUT table) made of (☐ FRP, ☒ Styrene Foam, ☐ other non-conductive material) was placed in the center of the turntable.
2. The EUT was placed on the center of the tabletop.
3. The test antenna was placed away from the EUT at test distance.
4. The limits were compensated the distance factor with follows:

$$9 \text{ kHz to } 490 \text{ kHz [Limit at 3 m]} = [\text{Limit at 300 m}] + 40\log(300[\text{m}] / 3[\text{m}])$$

$$490 \text{ kHz to } 30 \text{ MHz [Limit at 3 m]} = [\text{Limit at 30 m}] + 40\log(30[\text{m}] / 3[\text{m}])$$
5. Find the worst arrangement of the EUT according to follows:
 - Rotating the turntable and/or scanning the antenna.
 - On every condition, exploring the highest emissions with the spectrum analyzer.
(9 kHz to 26.5 GHz, peak detector)
6. On the worst arrangement of the EUT found in above, choose the six highest harmonics or spurious emissions on the spectrum data.(*excluding carrier band edges)
 The final measurements of all test operating modes carried out on these emissions as follows;

The test antenna and the turntable were performed with follows;

	9 kHz to 30 MHz	30 MHz to 1000 MHz	1 GHz to 26.5 GHz
Antenna	Loop Antenna	Bi-conical Antenna, Log-periodic Antenna	Horn Antenna
Antenna scanning range	1 m, Vertical, 360 degrees	1 m to 4 m, Horizontal and Vertical	1 m to 4 m *, Horizontal and Vertical
Turntable rotating range	360 degrees	360 degrees	360 degrees

*: When the measurement frequencies above 1 GHz, final measurements are performed keeping the antenna in the "cone of radiation" from EUT area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.

Instruments settings were carried out with follows;

	9 kHz to 90 kHz 110 kHz to 490 kHz	90 kHz to 110 kHz 490 kHz to 30 MHz	30 MHz to 1000 MHz	1 GHz to 26.5 GHz
Detector	Peak / Average	Quasi-peak	Quasi-peak	Peak / Average
RBW	200 Hz (6 dB) or 9 kHz (6 dB) *1	200 Hz (6 dB) or 9 kHz (6 dB) *1	120 kHz (6 dB)	1 MHz (6 dB)
VBW	N/A	N/A	N/A	3 MHz (for peak) 10 kHz (for average) *2
Instrument	EMI test receiver	EMI test receiver	EMI test receiver	Spectrum analyzer

*1: When the measurement frequencies below 150 kHz, RBW: 200 Hz was used.

*2: VBW setting (for average) was higher than 1/T. (T is the minimum transmission duration)

7. If the final measurement result exceeded the limit in non-restricted band(excluding carrier band edges), the measurement is carried out additionally with follows;

Measurement points

- Fundamental Frequency
- Frequency that exceeded the limit in non-restricted band (excluding carrier band edges)

	9 kHz to 150 kHz	150 kHz to 30 MHz	30 MHz to 26.5 GHz
Detector	Peak	Peak	Peak
RBW	300 Hz (6 dB) *	10 kHz (6 dB) *	100 kHz (6 dB)
Instrument	Spectrum analyzer	Spectrum analyzer	Spectrum analyzer

*: Correction factor of RBW was compensated to a measurement result by the following formula.

$$\text{C.F. of RBW [dB]} = 10 \cdot \log(100 \text{ kHz} / \text{used RBW})$$

8. Although these tests for below 30MHz were performed other than open field area test site, adequate comparison measurements were confirmed against 30 m open field area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788 D01.
- Further these test for above 1GHz were performed test site complied with CISPR 16-1-4.
- In the case of EUT size smaller than the validated test volume, the antenna position is adjusted such that the distance between the EUT and the antenna reference point is identical to the 3m used for the S-VSWR validation measurements. These method based on clause 7.3.1 of CISPR16-1-4 Edition 4, therefore correcting distance factor is not applied.

1.5. Test Location

Test Facility Name : Sony Global Manufacturing & Operations Corporation
EMC/RF Test Laboratory, Main Lab.

Address : 8-4 Shiomi Kisarazu-shi Chiba-ken, 292-0834, Japan

Phone : +81 438 37 2750

A2LA Certificate No. : 3203.01

Cert. Validated Date : October 31, 2021

Antenna port Conducted Measurements

Shielded Room

☒ 4th Site SR1

Radiated Spurious Emissions

Semi-Anechoic chamber

☐ 4th Site ☒ EMC Site

1.6. Uncertainty

Test Item	Frequency	4th Site SR1
Maximum Conducted Output Power	1 GHz to 6 GHz	± 0.84 dB
Conducted Spurious Emissions	below 6 GHz	± 1.25 dB

Test Item	Frequency	Distance	4th Site	EMC Site
Radiated Emissions	9 kHz to 30 MHz	3m	± 2.60 dB	± 3.13 dB
	30 MHz to 1000 MHz	3m	± 4.96 dB	± 5.26 dB
	1 GHz to 18 GHz	3m	± 5.22 dB	± 5.50 dB
	18 GHz to 26.5 GHz	3m	± 5.36 dB	± 5.63 dB

2. Test Specification

2.1. Validation

The system was configured for testing in a typical (as a customer would normally use it).
The tests were conducted with the worst-case modes as follows.

2.2. Operating Condition

The tests have been carried out the following conditions.

[Transmitting mode]

Test Items	Test Channels	Packet Type *1 *2 *3
Radiated Spurious Emissions (below 1GHz) *4	2402 MHz	BDR : DH5
20dB Bandwidth, Maximum Peak Conducted Output Power, Radiated Spurious Emissions (above 1GHz)	2402 MHz 2441 MHz 2480 MHz	BDR : DH5 EDR : 3DH5
Carrier Frequency Separation, Number of Hopping Frequencies, Time of Occupancy (Dwell Time)	Hopping ON	BDR : DH5 EDR : 3DH5
Conducted Spurious Emissions for Band Edge	2402 MHz	BDR : DH5 EDR : 3DH5

Note

*1: Inquiry mode was not performed based on the result of pre-compliance testing.

*2: The worst packet type has been decided based on the result of maximum duty cycle and pre-compliance testing in the actual product specification.

*3: Packet type for EDR has been decided based on the result of Maximum Peak Conducted Output Power.

*4: The test was performed with the representative mode that had been found as the worst emissions while exploratory testing.

The Software for Operating Mode

Software Name : MT2811S_BT_Test
Software Version : 012

2.3. Special Accessories

Special accessories needed for connecting the EUT to achieve compliance:

Item	Manufacturer	Model No.	Serial No.	Remark
-	-	-	-	-

2.4. EUT Modifications

- ☒ No equipment modification to achieve compliance to the standard levels was done during the tests.
☐ Equipment was modified to achieve compliance to the standard level as below.

Responsible Party Signature

Typed/ Print Name :
Responsible Party :
Position :
Date :

2.5. Configuration of EUT System

Antenna-port Conducted Measurements

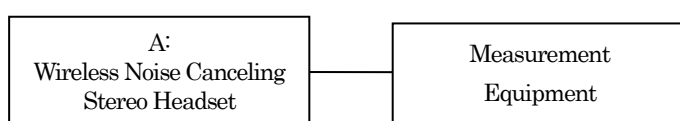
[EUT and Associated Equipment (AE)]

Symbol	EUT/ AE	Item	Manufacturer	Model No.	Serial No.
A	EUT	Wireless Noise Canceling Stereo Headset	SONY	WF-SP800N(Left part)	675

[Type of Cable]

Symbol	Description	Identification (Manufacturer etc.)	Shielded Yes / No	Ferrite Core	Length (m)	Bundled
-	-	-	-	-	-	-

[Connecting Diagram]



Radiated Spurious Emissions

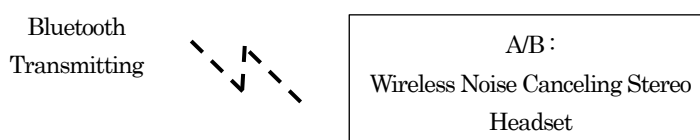
[EUT and Associated Equipment (AE)]

Symbol	EUT/ AE	Item	Manufacturer	Model No.	Serial No.
A	EUT	Wireless Noise Canceling Stereo Headset	SONY	WF-SP800N(Left part)	676
B	EUT	Wireless Noise Canceling Stereo Headset	SONY	WF-SP800N(Left part)	659

[Type of Cable]

Symbol	Description	Identification (Manufacturer etc.)	Shielded Yes / No	Ferrite Core	Length (m)	Bundled
-	-	-	-	-	-	-

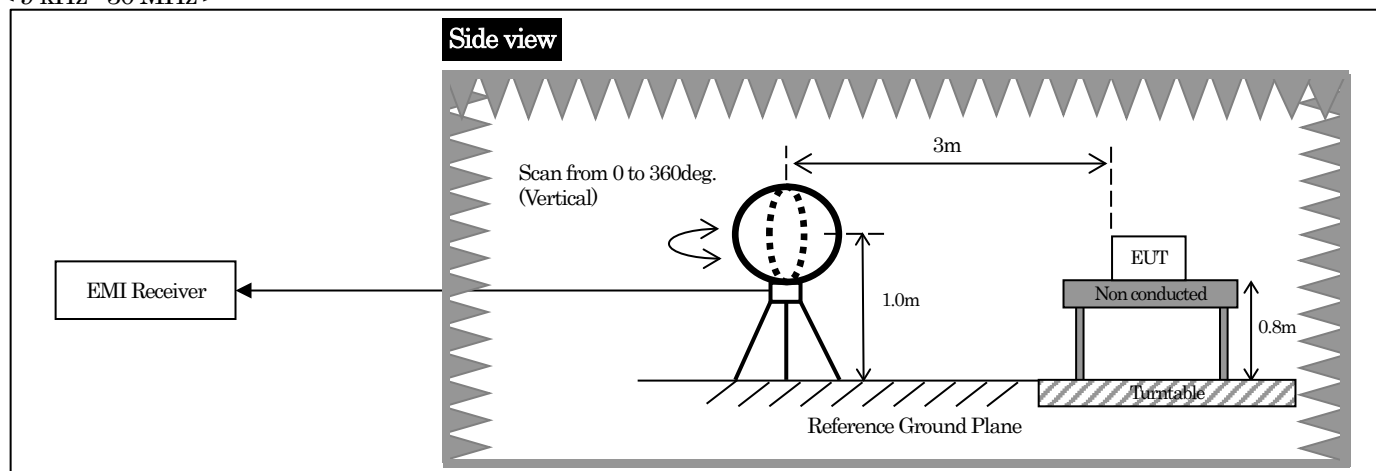
[Connecting Diagram]



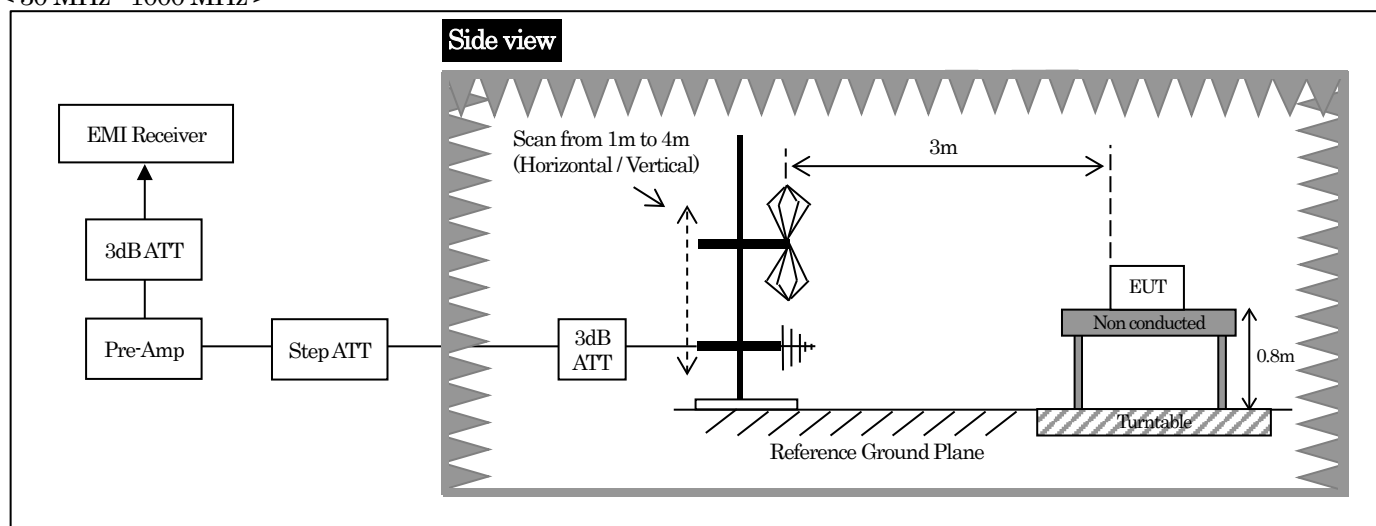
2.6. View of Measurement Facility

Radiated spurious emissions

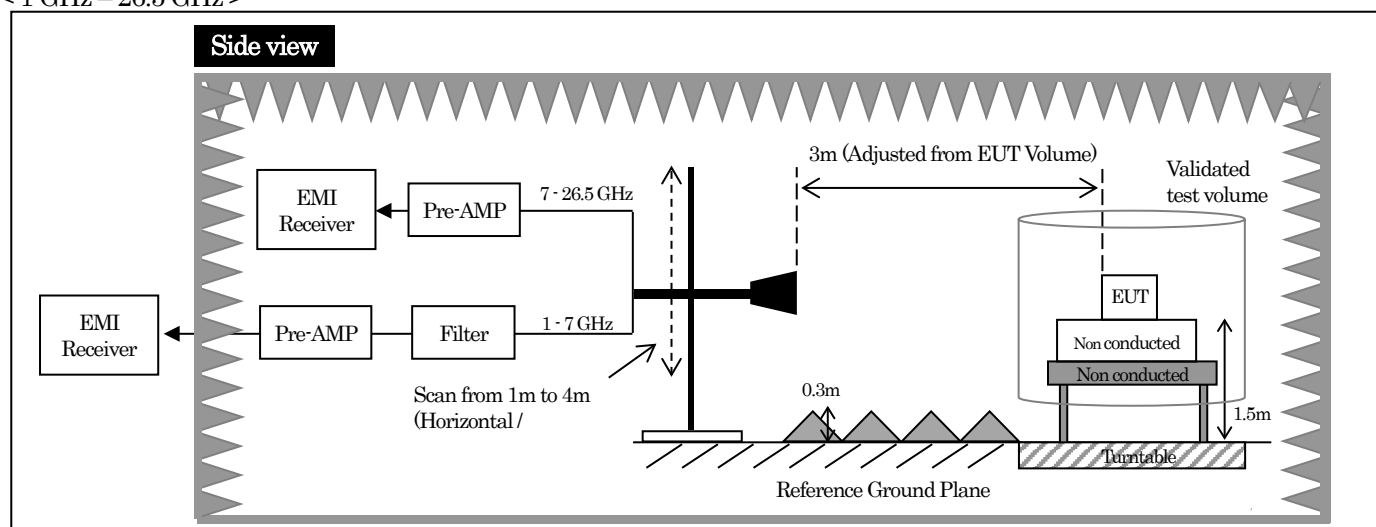
< 9 kHz - 30 MHz >



< 30 MHz - 1000 MHz >



< 1 GHz - 26.5 GHz >

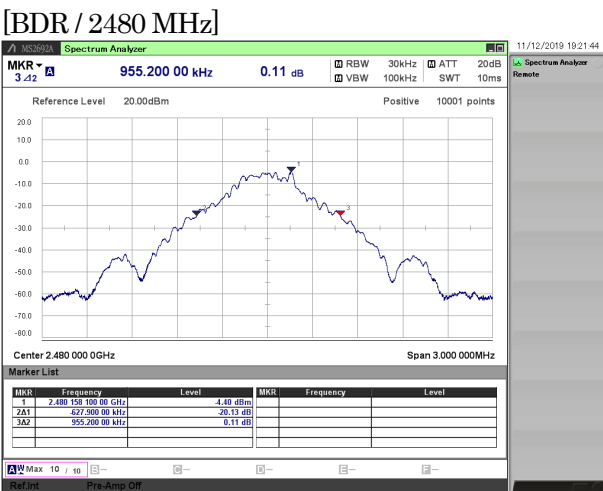
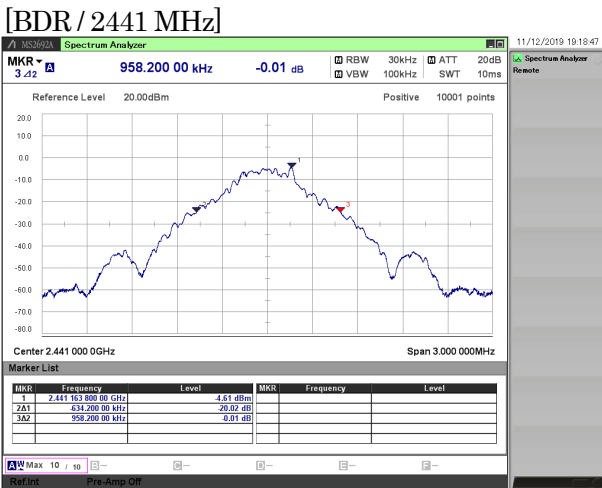
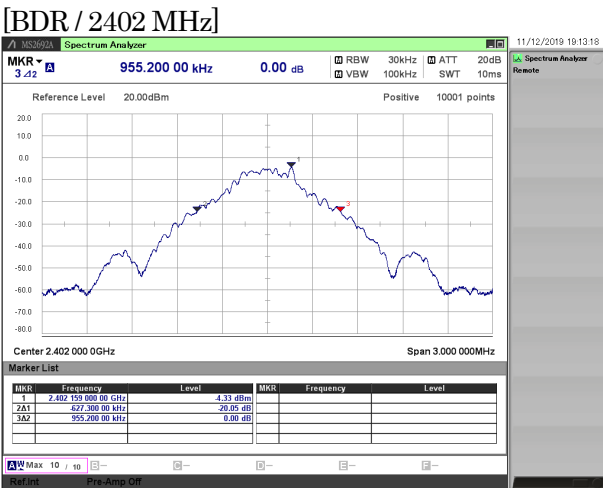


3. Test Data

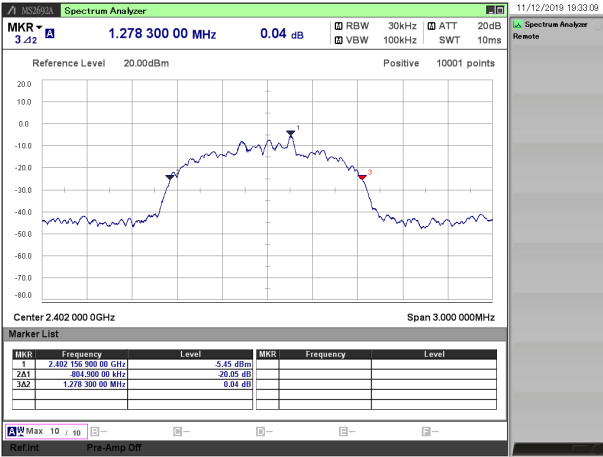
3.1. 20dB Bandwidth

- 1) Ambient temperature
- : 23.0 deg.C
- 2) Relative humidity
- : 46.5 %
- 3) Date of measurement
- : November 12, 2019
- 4) Measured by
- : M.KOUGA
- 5) Operating mode
- : Transmitting mode

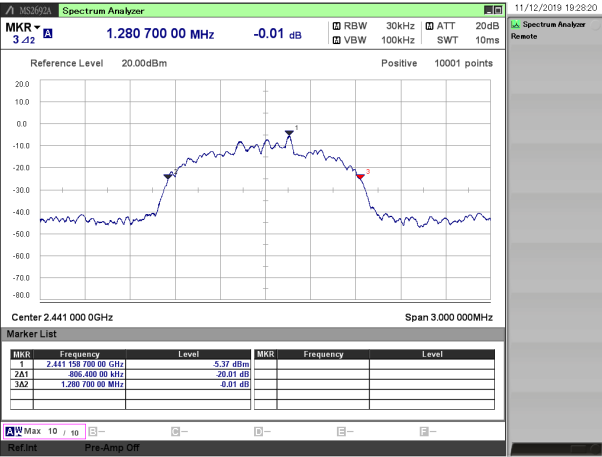
Mode		Channel [MHz]	Result [MHz]	Limit [MHz]
BDR	DH5	2402	0.955	-
		2441	0.958	-
		2480	0.955	-
EDR	3DH5	2402	1.278	-
		2441	1.281	-
		2480	1.284	-



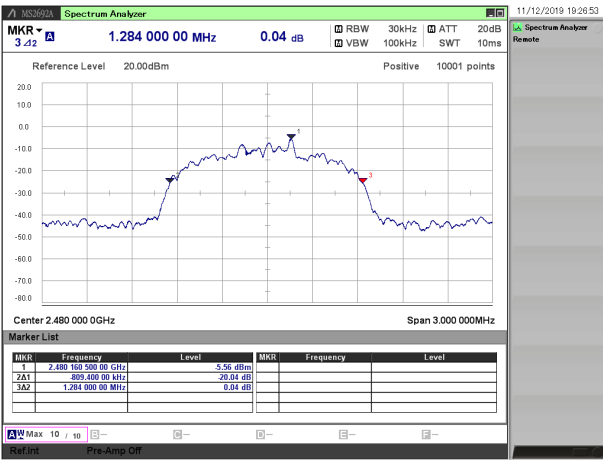
[EDR / 2402 MHz]



[EDR / 2441 MHz]



[EDR / 2480 MHz]



3.2. Carrier Frequency Separation

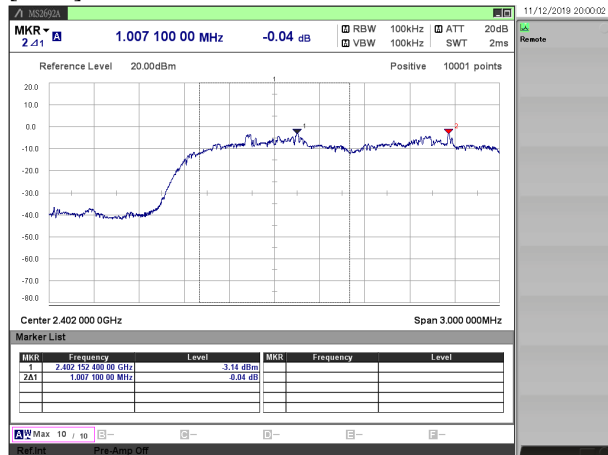
- 1) Ambient temperature : 23.0 deg.C
- 2) Relative humidity : 46.5 %
- 3) Date of measurement : November 12, 2019
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Reading [kHz]	Limit [kHz]
BDR	DH5	989.4	≥ 638.8
EDR	3DH5	1007.1	≥ 856.0

[BDR]



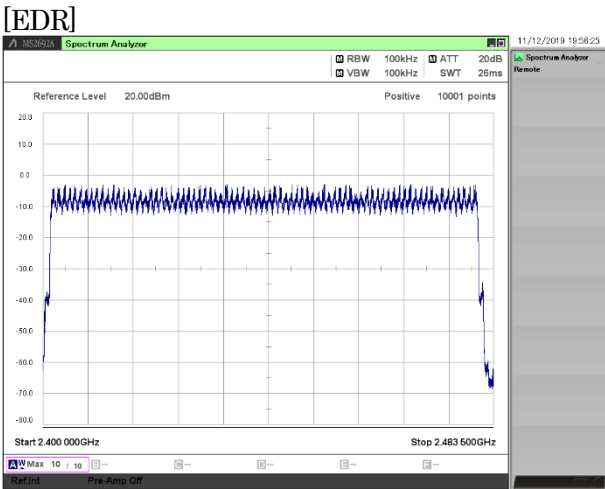
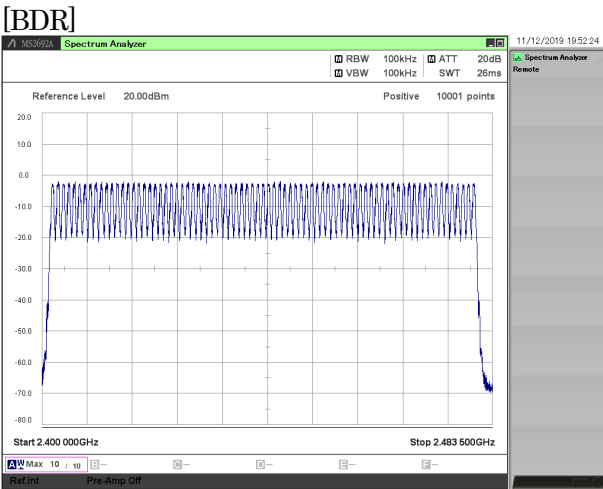
[EDR]



3.3. Number of Hopping Frequencies

- 1) Ambient temperature : 23.0 deg.C
- 2) Relative humidity : 46.5 %
- 3) Date of measurement : November 12, 2019
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Number [channel]	Limit [channel]
BDR	DH5	79	≥ 15
EDR	3DH5	79	≥ 15

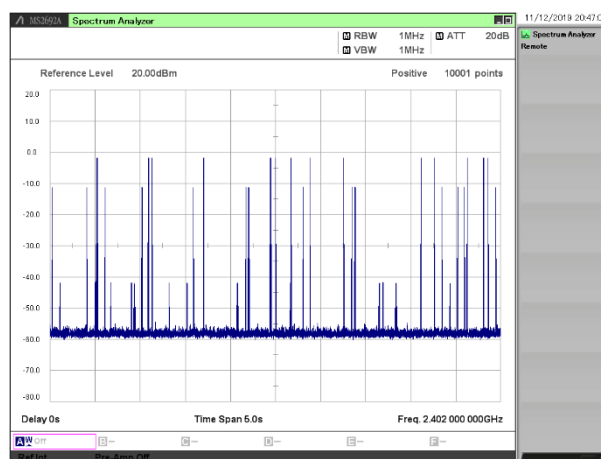
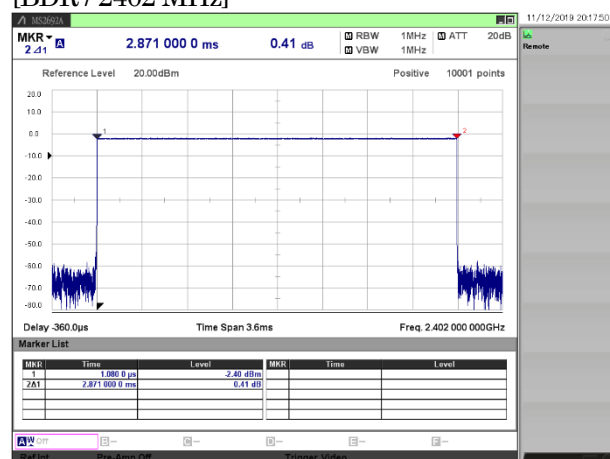


3.4. Time of Occupancy (Dwell Time)

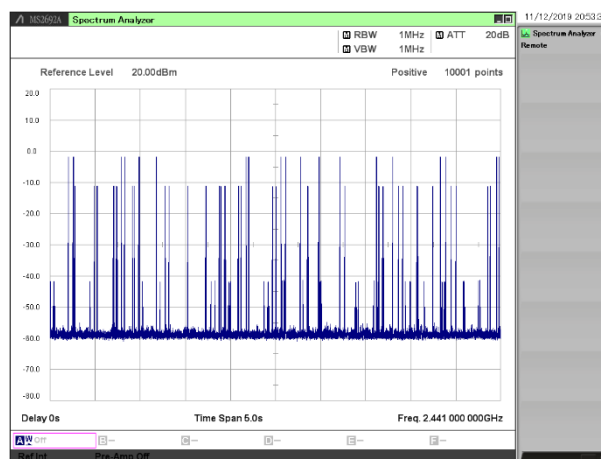
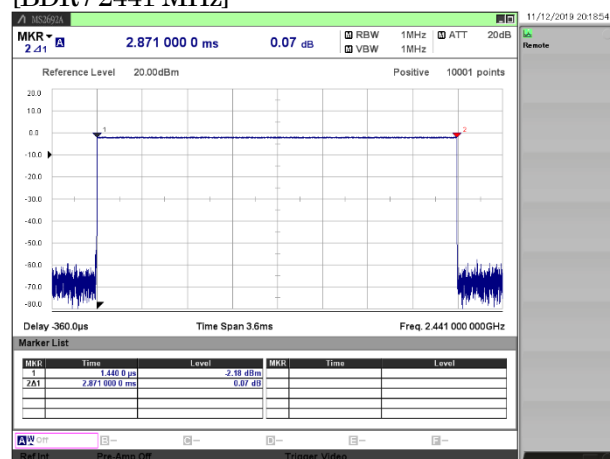
- 1) Ambient temperature : 23.0 deg.C
- 2) Relative humidity : 46.5 %
- 3) Date of measurement : November 12, 2019
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Dwell Time [msec]	Cycle [time]	Result [msec]	Limit [msec]
BDR	DH5	2402	2.87	17.4	315.7	≤ 400.0
		2441	2.87	18.6	337.5	≤ 400.0
		2480	2.87	16.8	304.8	≤ 400.0
EDR	3DH5	2402	2.88	18.8	341.9	≤ 400.0
		2441	2.88	16.6	301.9	≤ 400.0
		2480	2.88	17.3	314.7	≤ 400.0

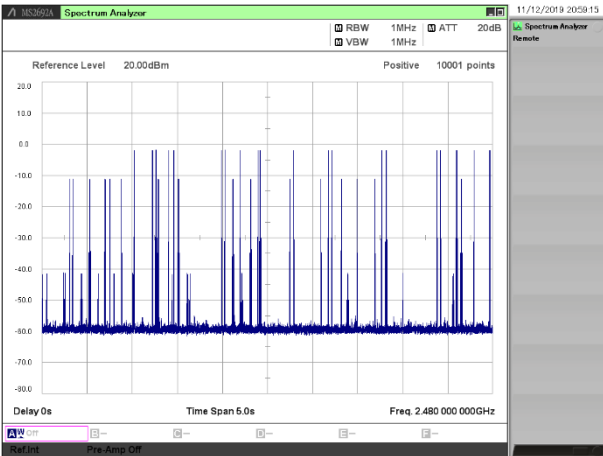
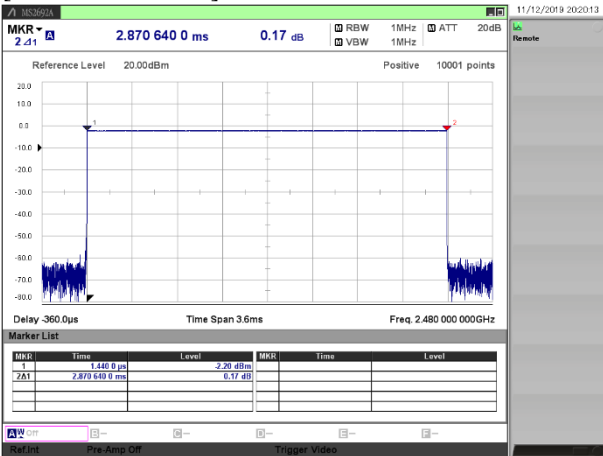
[BDR / 2402 MHz]



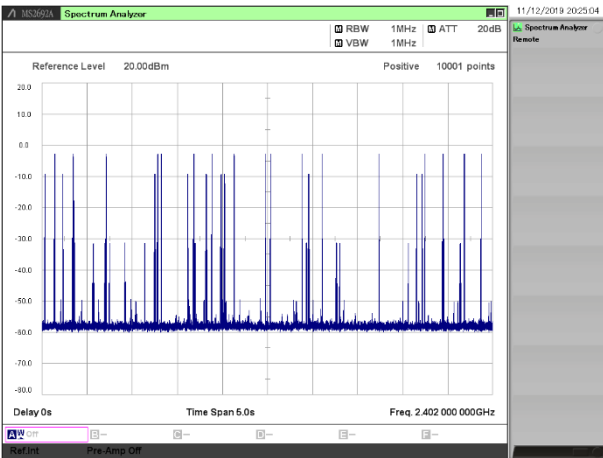
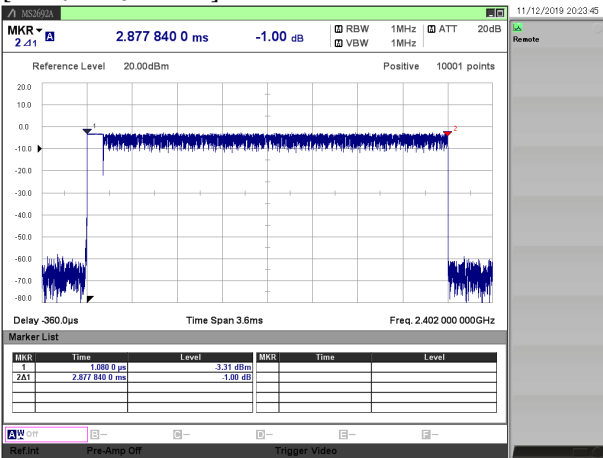
[BDR / 2441 MHz]



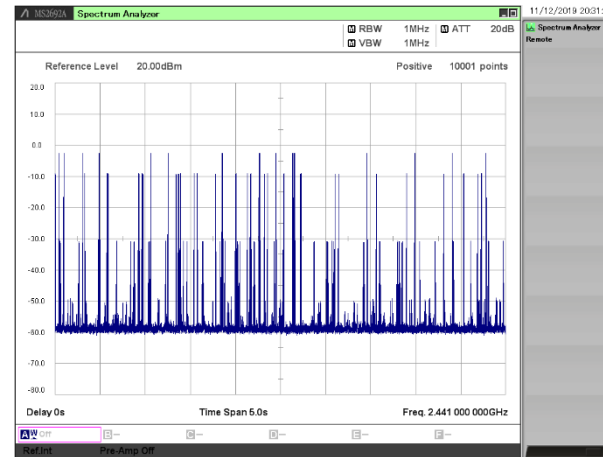
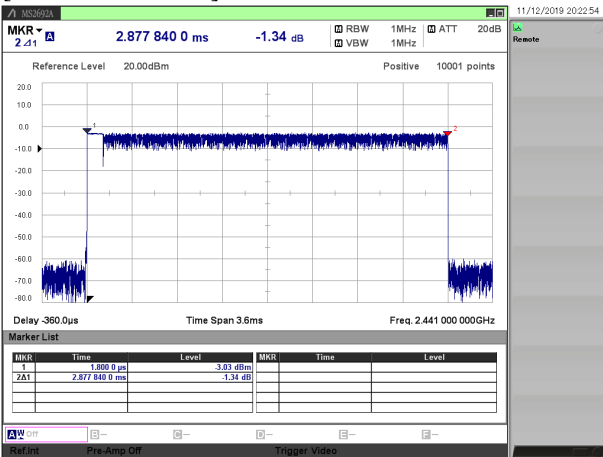
[BDR / 2480 MHz]

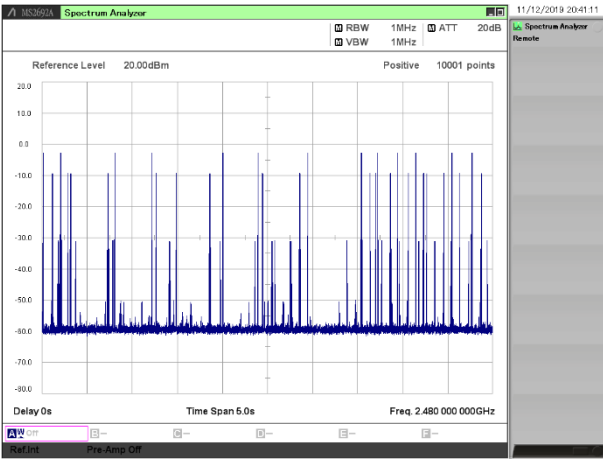
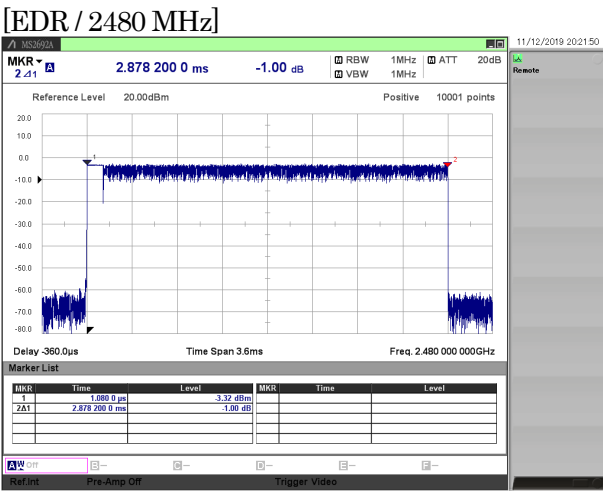


[EDR / 2402 MHz]



[EDR / 2441 MHz]





3.5. Maximum Peak Conducted Output Power

- 1) Ambient temperature : 20.3 deg.C
- 2) Relative humidity : 45.0 %
- 3) Date of measurement : November 9, 2019
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Maximum Peak Conducted Output Power

Mode		Channel [MHz]	Reading(PK) [dBm]	C.F. [dB]	Result(PK) [dBm]	Result(PK) [W]	Limit [dBm]	Limit [W]	Margin [dB]
BDR	DH5	2402	-1.39	10.85	9.46	0.00883	20.97	0.125	11.51
		2441	-1.35	10.85	9.50	0.00891	20.97	0.125	11.47
		2480	-1.45	10.85	9.40	0.00871	20.97	0.125	11.57
EDR	2DH5	2402	-1.74	10.85	9.11	0.00815	20.97	0.125	11.86
		2441	-1.69	10.85	9.16	0.00824	20.97	0.125	11.81
		2480	-1.82	10.85	9.03	0.00800	20.97	0.125	11.94
	3DH5	2402	-1.60	10.85	9.25	0.00841	20.97	0.125	11.72
		2441	-1.55	10.85	9.30	0.00851	20.97	0.125	11.67
		2480	-1.66	10.85	9.19	0.00830	20.97	0.125	11.78

Duty Cycle check

Mode		Channel [MHz]	T(on+off) [msec]	T(on) [msec]	Duty Cycle [%]
BDR	DH1	2441	1.250	0.368	29.41
	DH3	2441	2.500	1.624	64.94
	DH5	2441	3.750	2.871	76.56
EDR	2DH1	2441	1.250	0.376	30.10
	2DH3	2441	2.500	1.628	65.12
	2DH5	2441	3.750	2.874	76.62
	3DH1	2441	1.250	0.376	30.11
	3DH3	2441	2.500	1.627	65.06
	3DH5	2441	3.750	2.878	76.73

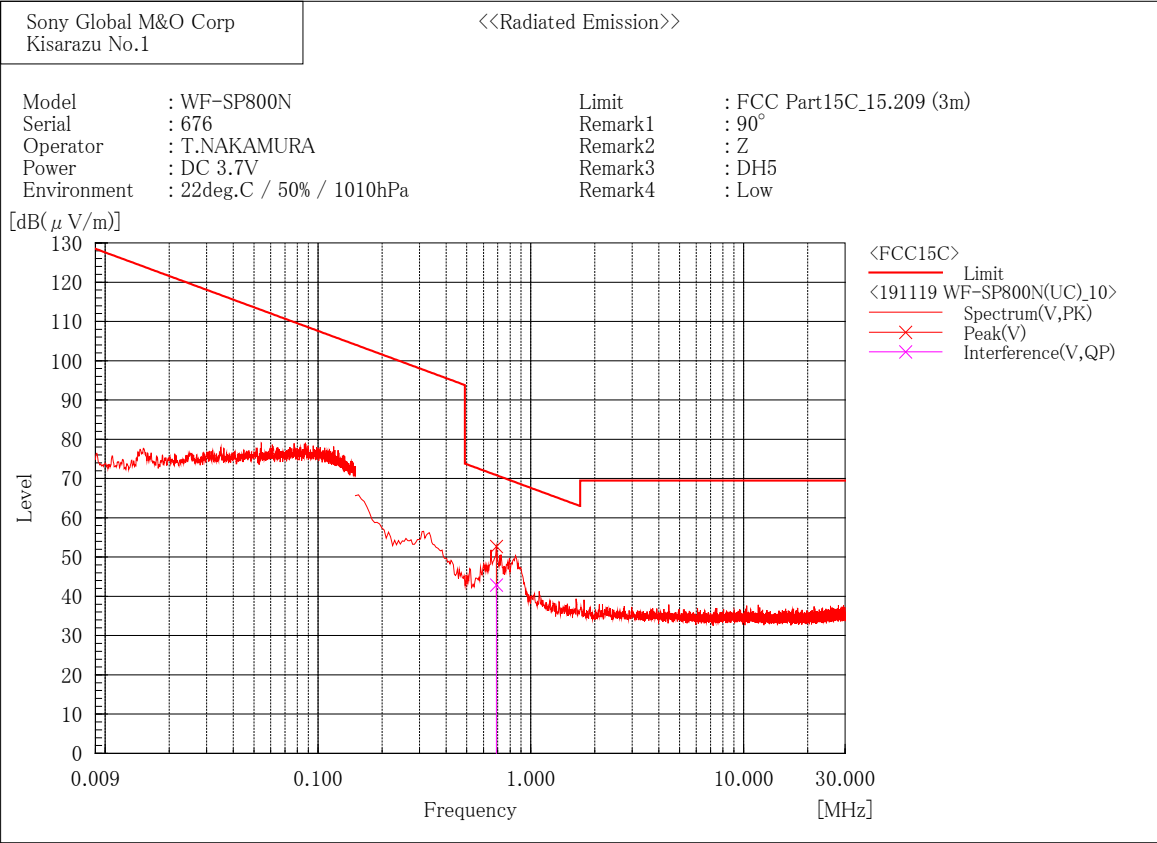
3.6. Radiated Spurious Emissions

1) Date of measurement

9 kHz to 30 MHz	: November 19, 2019	
30 MHz to 1000 MHz	: November 19, 2019	
1 GHz to 7 GHz	: November 14, 2019	November 15, 2019 (band edge plot data)
7 GHz to 18 GHz	: November 18, 2019	
18 GHz to 26.5 GHz	: November 18, 2019	

The test data is mentioned as follows.

9 kHz to 30 MHz
[BDR (DH5) / 2402 MHz]

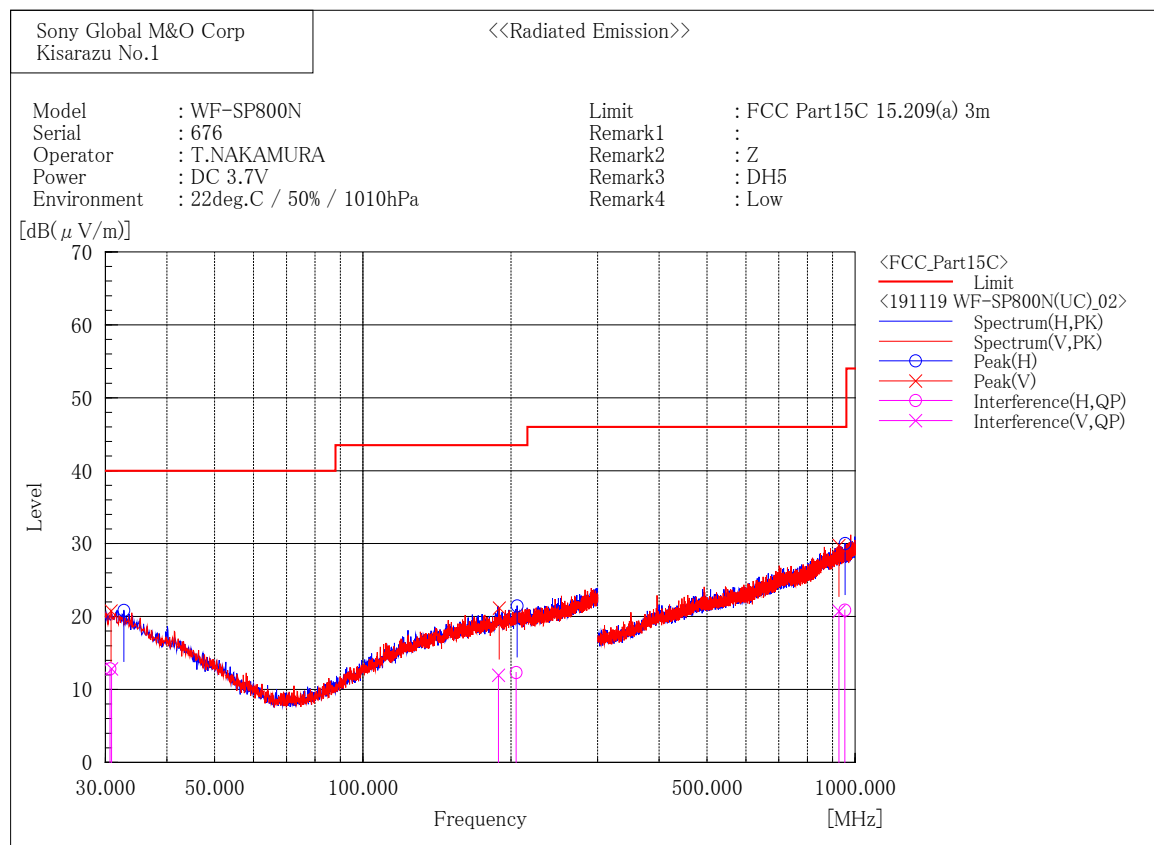


Final Result

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c.f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	0.689	23.2	19.7	42.9	70.9	28.0	100.0	10.2

30 MHz to 1000 MHz
[BDR(DH5) / 2402 MHz]



Final Result

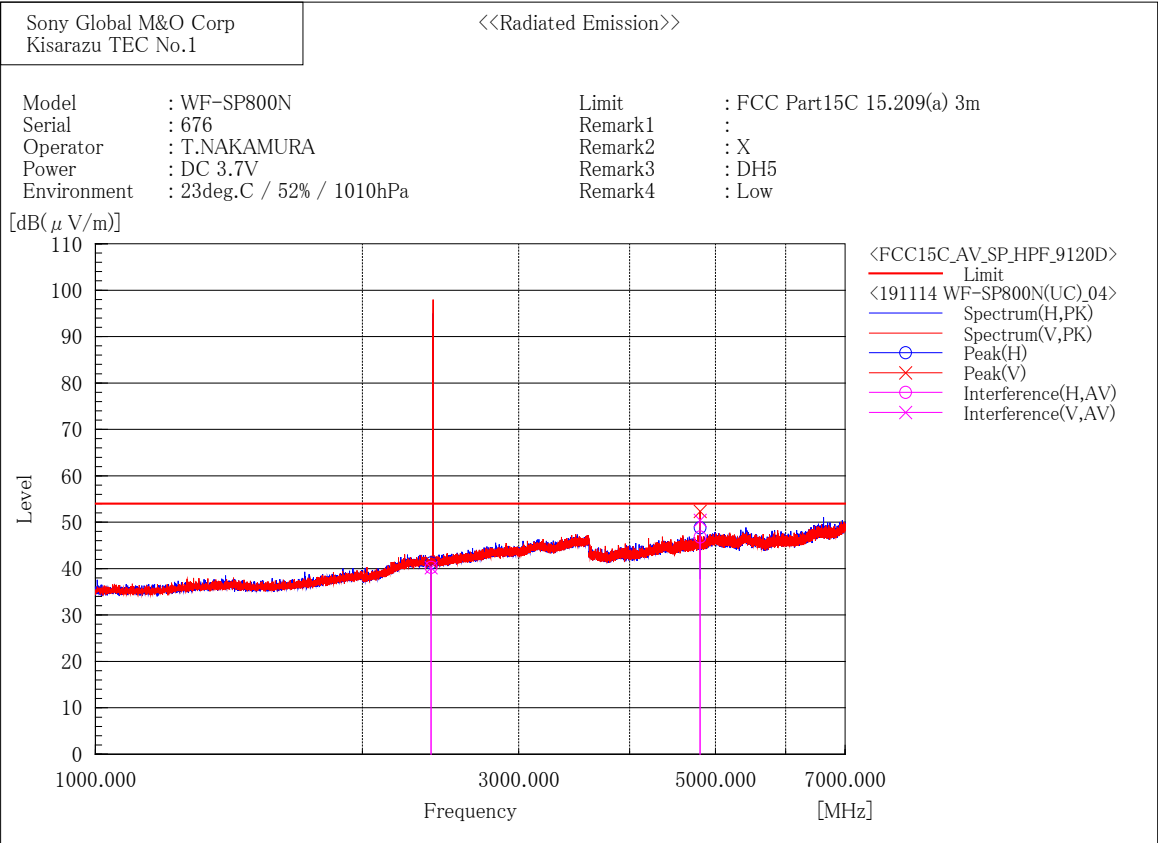
--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	30.652	19.9	-7.1	12.8	40.0	27.2	153.4	172.3
2	204.840	19.7	-7.4	12.3	43.5	31.2	100.0	334.3
3	953.223	19.6	1.3	20.9	46.0	25.1	256.1	20.0

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	30.889	20.0	-7.2	12.8	40.0	27.2	190.3	173.0
2	188.580	19.9	-7.9	12.0	43.5	31.5	296.8	157.4
3	926.843	19.9	0.8	20.7	46.0	25.3	180.0	247.3

1 GHz to 7 GHz
[BDR (DH5) / 2402 MHz]



Final Result

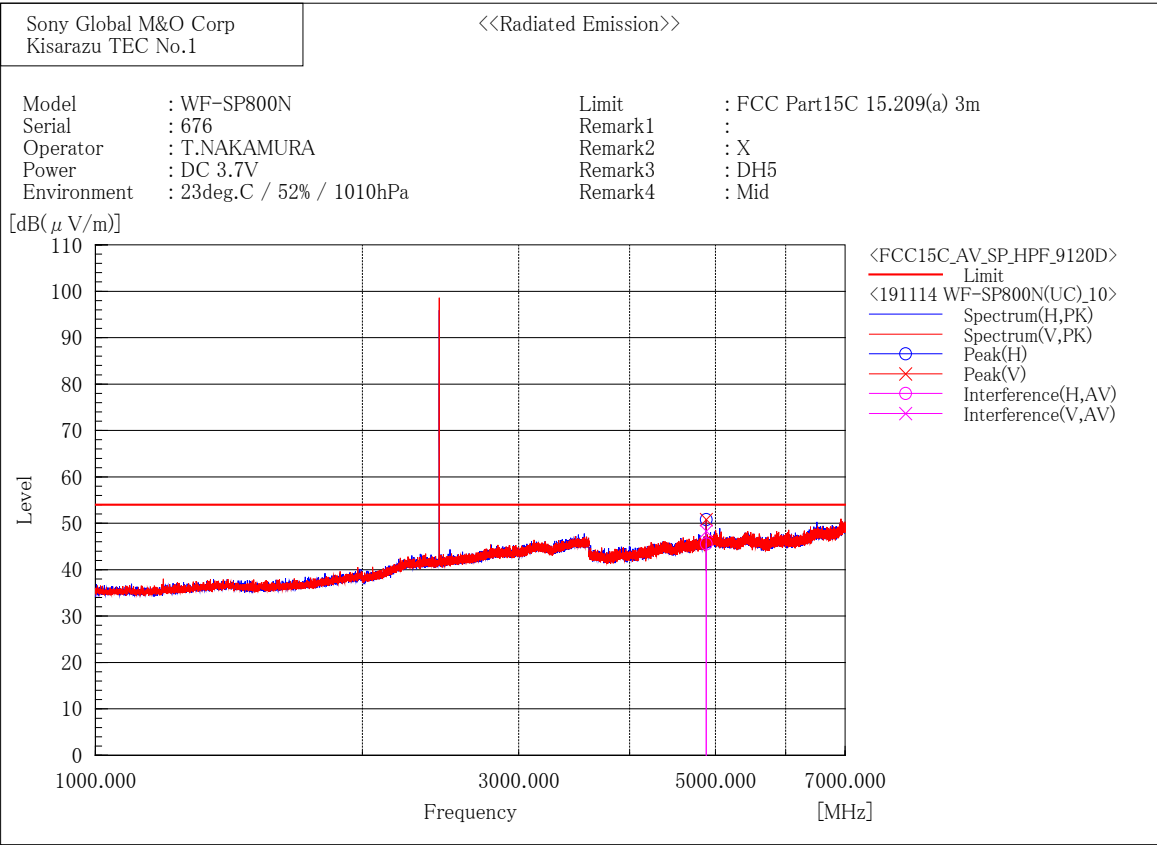
--- Horizontal Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	37.6	2.7	40.3	54.0	13.7	126.4	292.1
2	4804.004	35.9	10.9	46.8	54.0	7.2	168.8	283.0

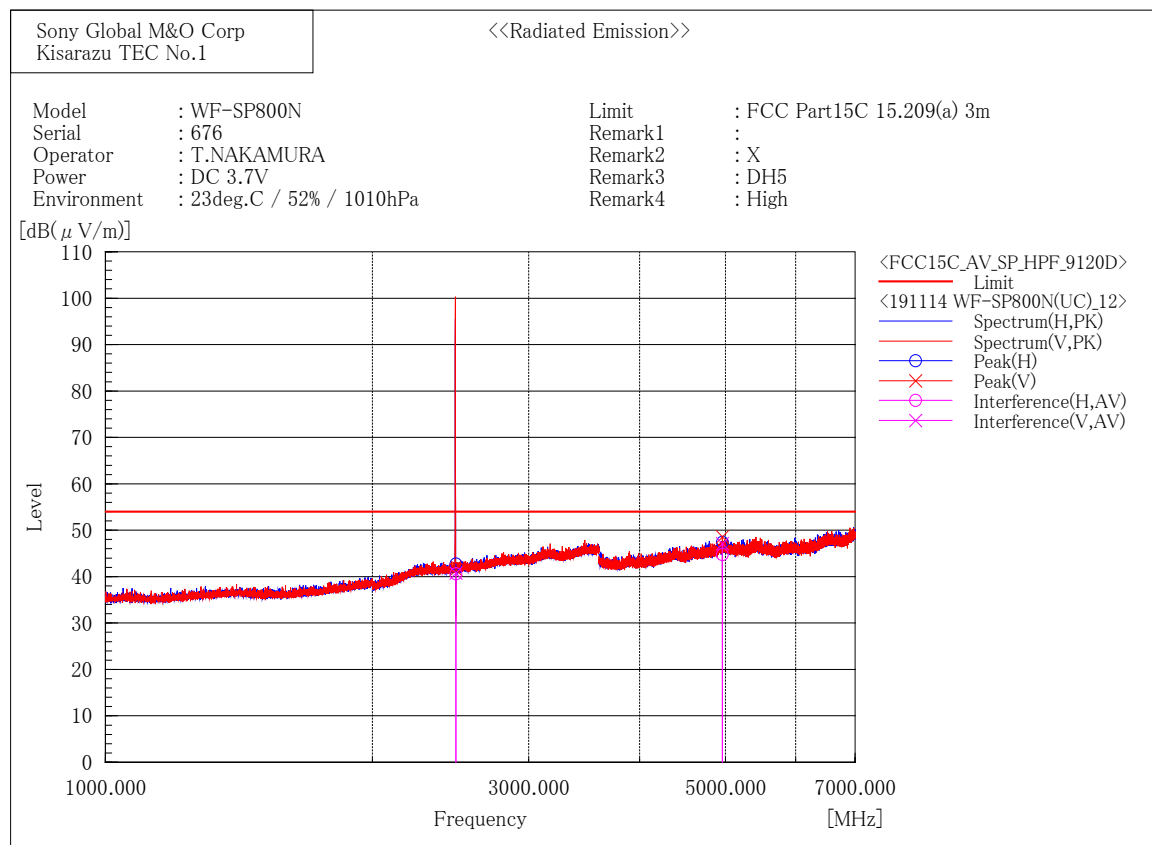
--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	37.5	2.7	40.2	54.0	13.8	137.7	220.0
2	4803.990	39.5	10.9	50.4	54.0	3.6	112.0	98.4

[BDR (DH5) / 2441 MHz]



[BDR (DH5) / 2480 MHz]



Final Result

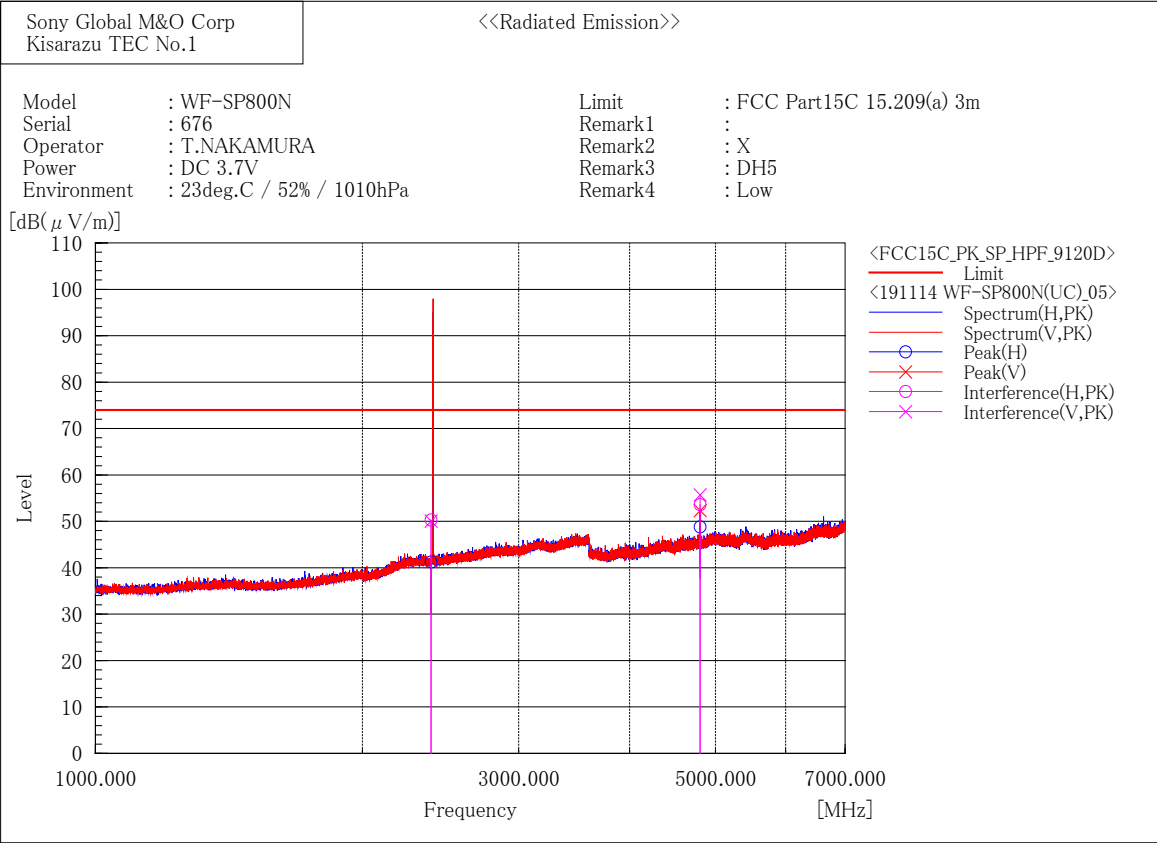
--- Horizontal Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2483.500	37.5	3.1	40.6	54.0	13.4	275.4	112.8
2	4960.023	33.5	11.3	44.8	54.0	9.2	112.8	62.4

--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2483.500	37.7	3.1	40.8	54.0	13.2	254.1	89.2
2	4960.016	35.8	11.3	47.1	54.0	6.9	121.1	91.2

[BDR (DH5) / 2402 MHz]



Final Result

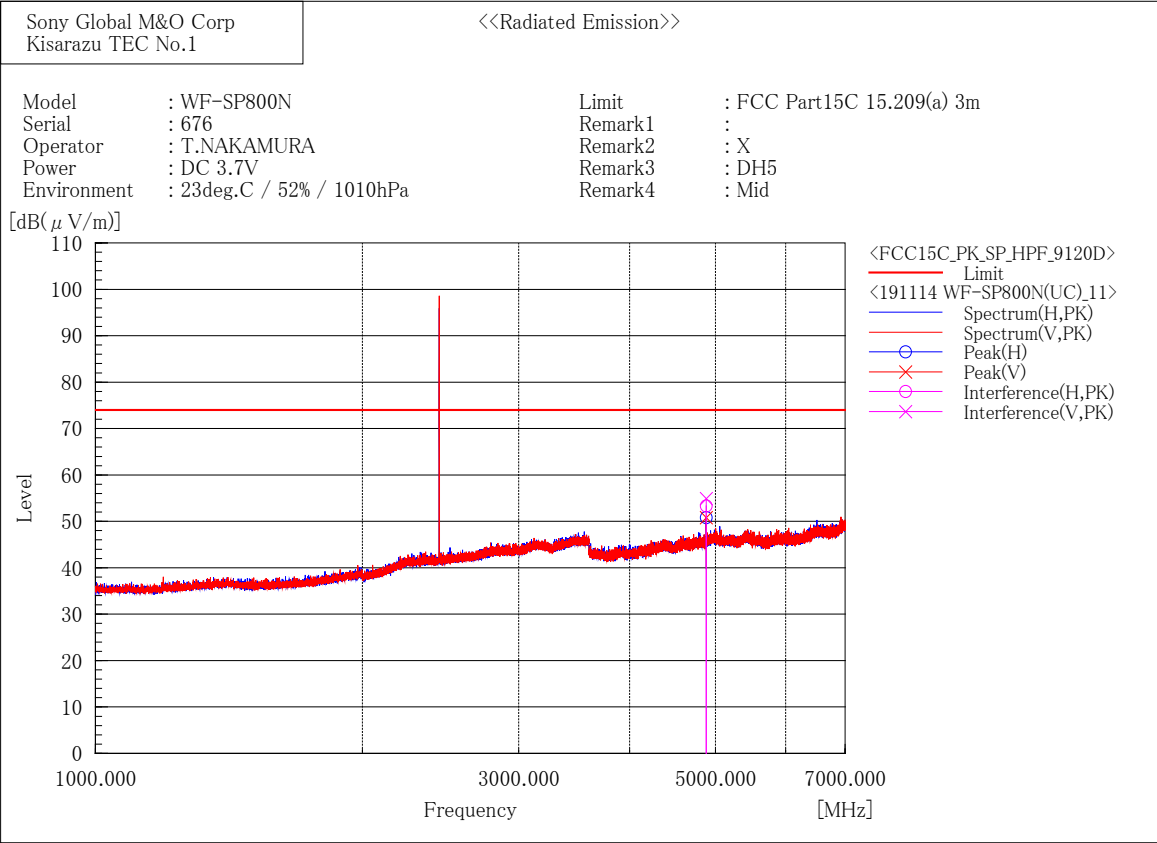
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	47.6	2.7	50.3	74.0	23.7	125.0	292.6
2	4804.043	42.7	10.9	53.6	74.0	20.4	170.0	284.5

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	47.4	2.7	50.1	74.0	23.9	136.7	220.5
2	4804.014	44.8	10.9	55.7	74.0	18.3	108.1	101.2

[BDR (DH5) / 2441 MHz]



Final Result

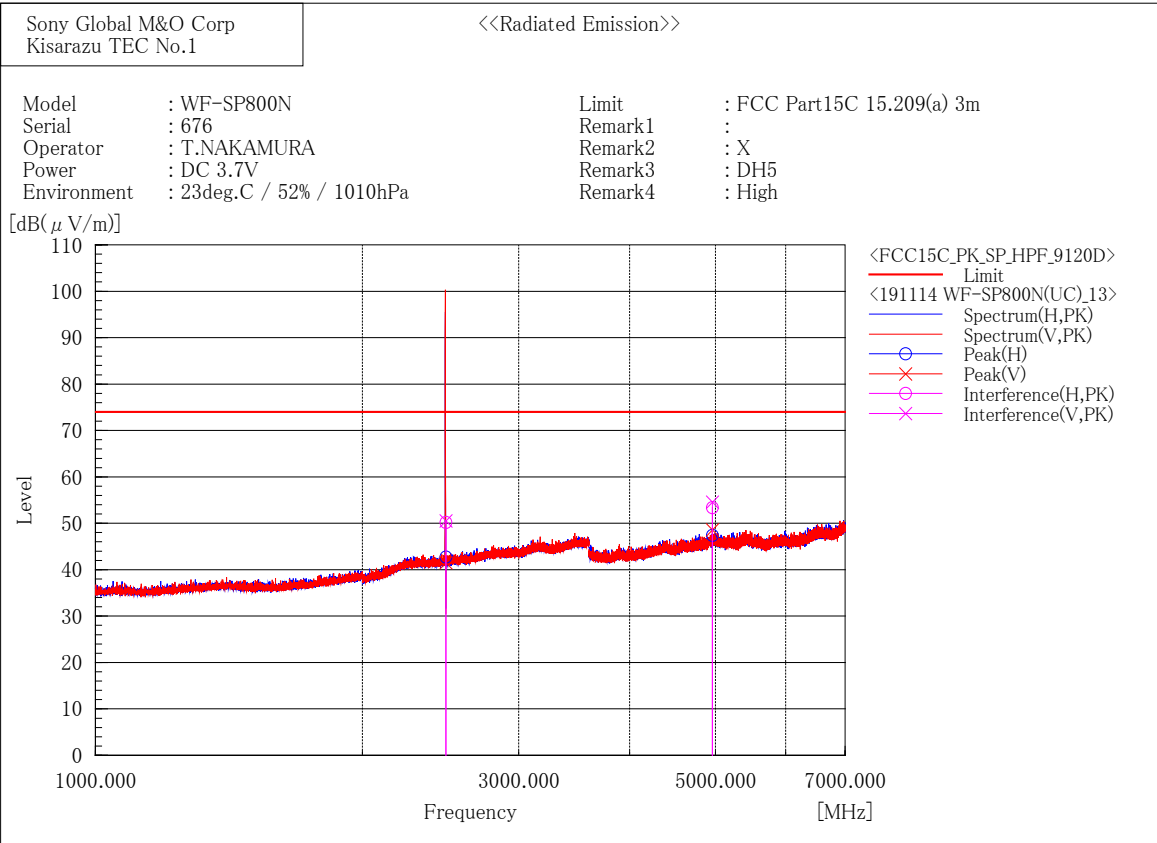
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	4882.020	42.3	11.0	53.3	74.0	20.7	100.0	299.5

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	4882.039	43.9	11.0	54.9	74.0	19.1	198.8	81.3

[BDR(DH5) / 2480 MHz]



Final Result

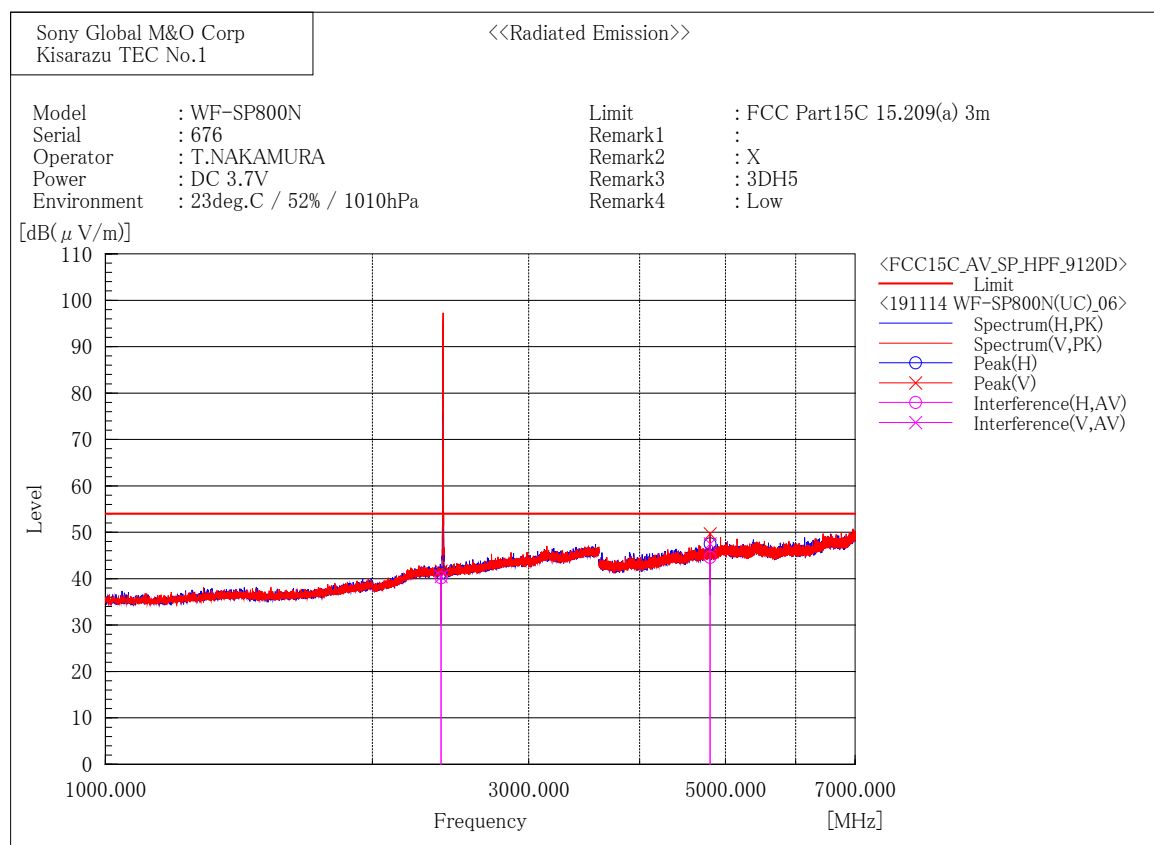
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c.f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2483.500	47.1	3.1	50.2	74.0	23.8	276.0	113.4
2	4960.078	42.1	11.3	53.4	74.0	20.6	114.0	63.0

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c.f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2483.500	47.4	3.1	50.5	74.0	23.5	254.1	90.9
2	4960.049	43.3	11.3	54.6	74.0	19.4	122.0	90.9

[EDR(3DH5) / 2402 MHz]



Final Result

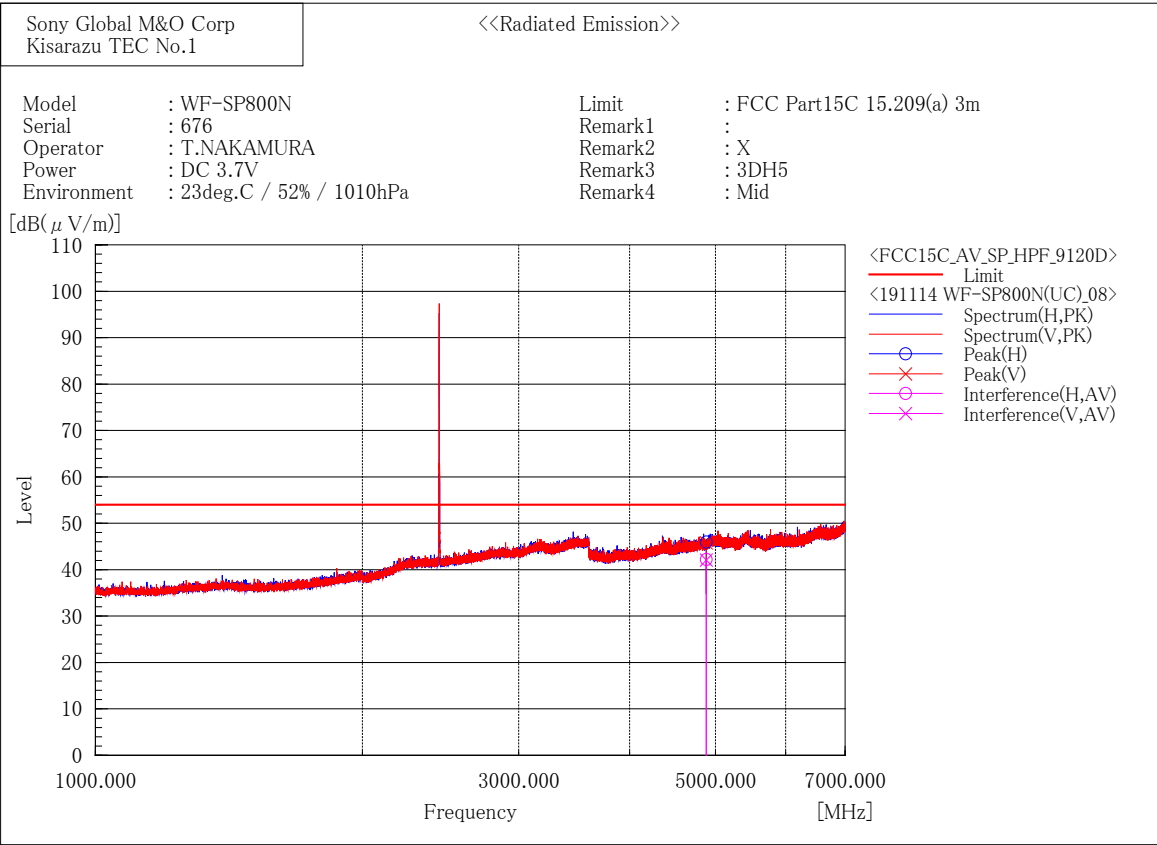
--- Horizontal Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	37.5	2.7	40.2	54.0	13.8	302.2	288.6
2	4804.088	33.7	10.9	44.6	54.0	9.4	115.0	88.4

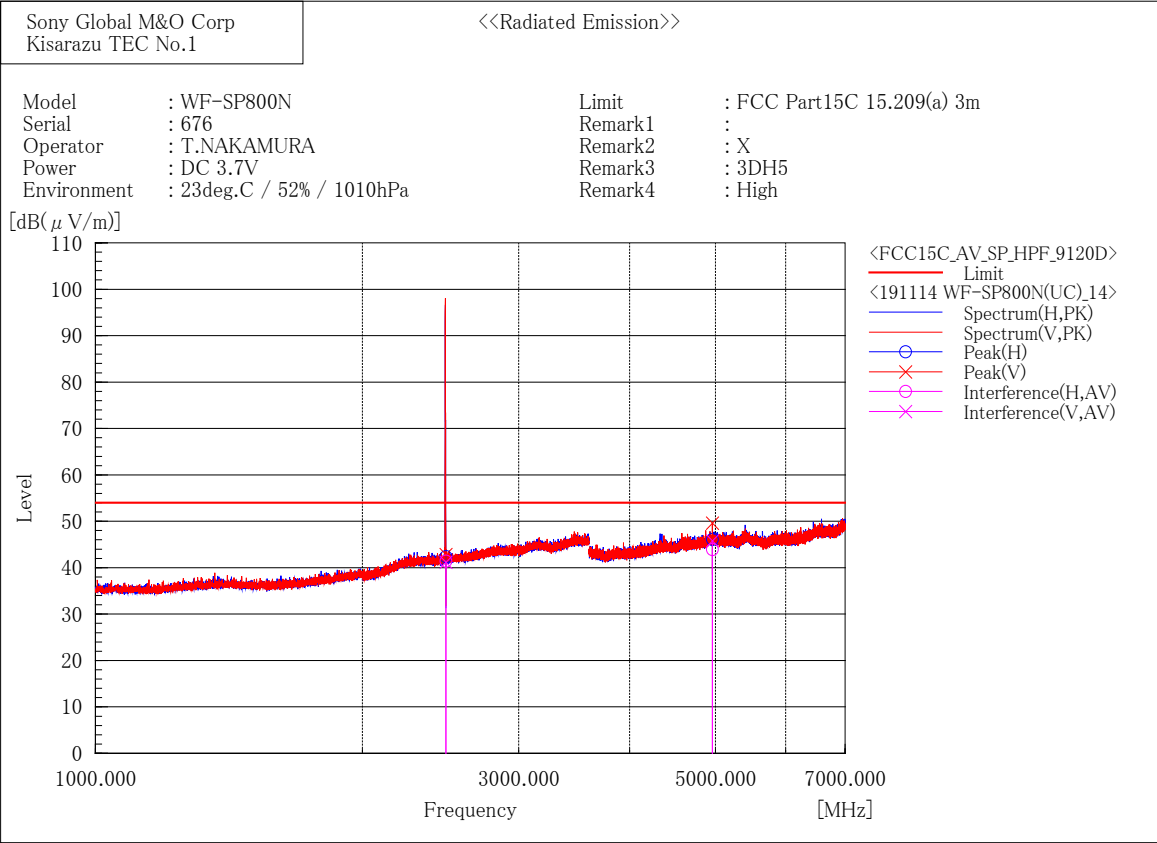
--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2390.000	37.8	2.7	40.5	54.0	13.5	308.5	194.3
2	4804.094	36.6	10.9	47.5	54.0	6.5	100.0	98.9

[EDR(3DH5) / 2441 MHz]



[EDR(3DH5) / 2480 MHz]



Final Result

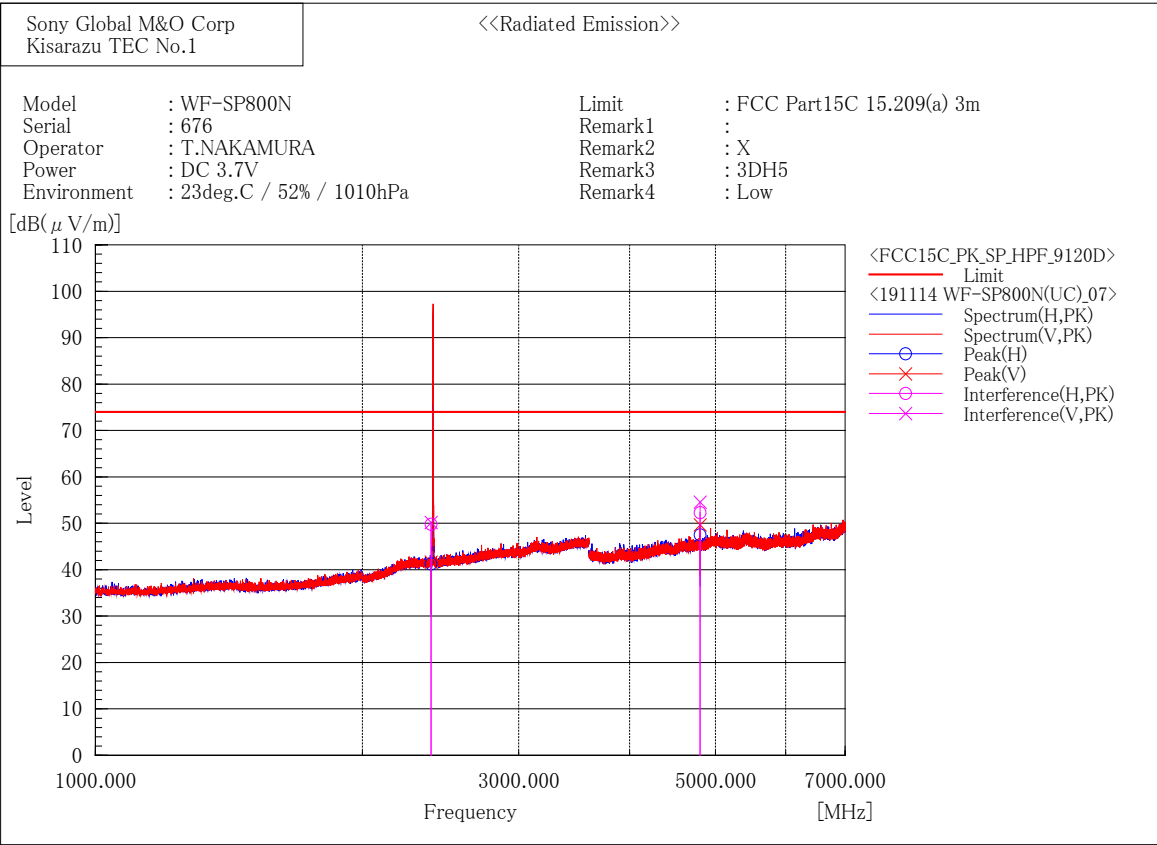
--- Horizontal Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2483.500	38.3	3.1	41.4	54.0	12.6	100.0	203.9
2	4960.002	32.6	11.3	43.9	54.0	10.1	132.4	322.7

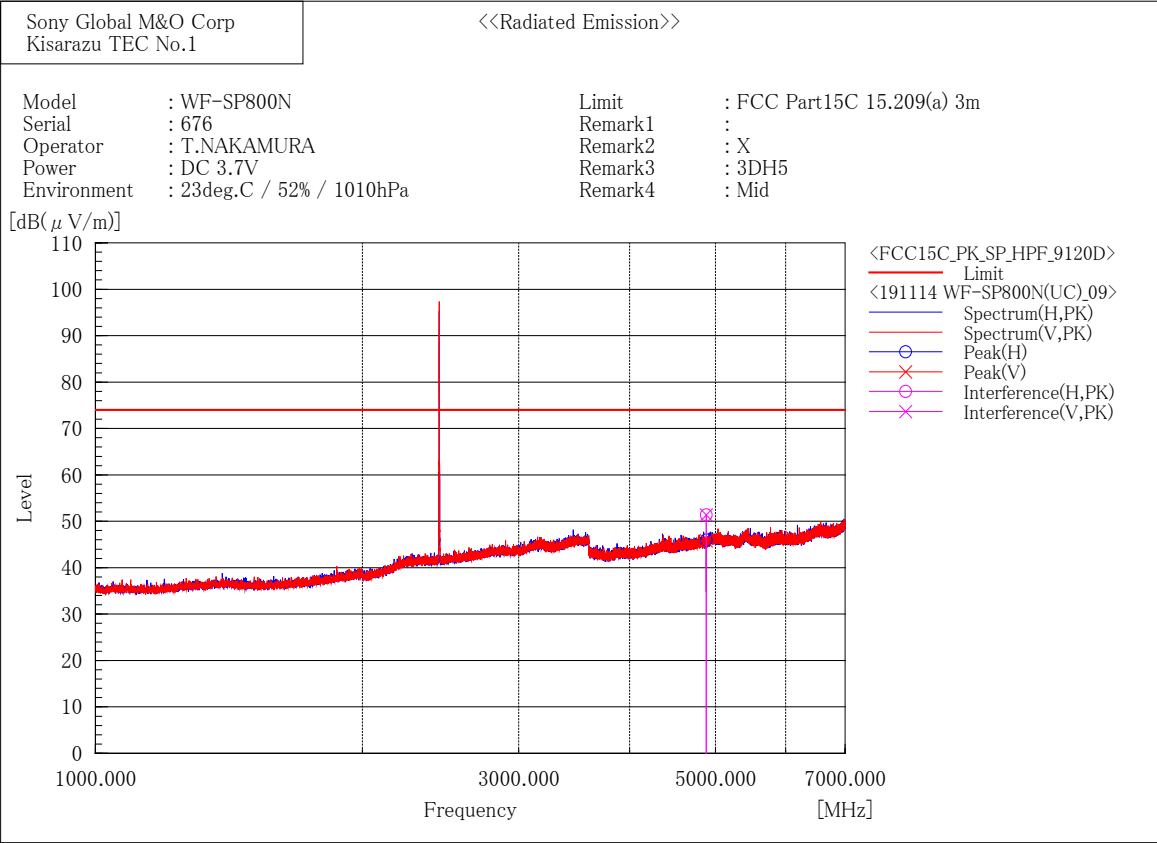
--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2483.500	38.1	3.1	41.2	54.0	12.8	130.3	215.9
2	4960.094	34.5	11.3	45.8	54.0	8.2	113.8	65.7

[EDR(3DH5) / 2402 MHz]



[EDR(3DH5) / 2441 MHz]



Final Result

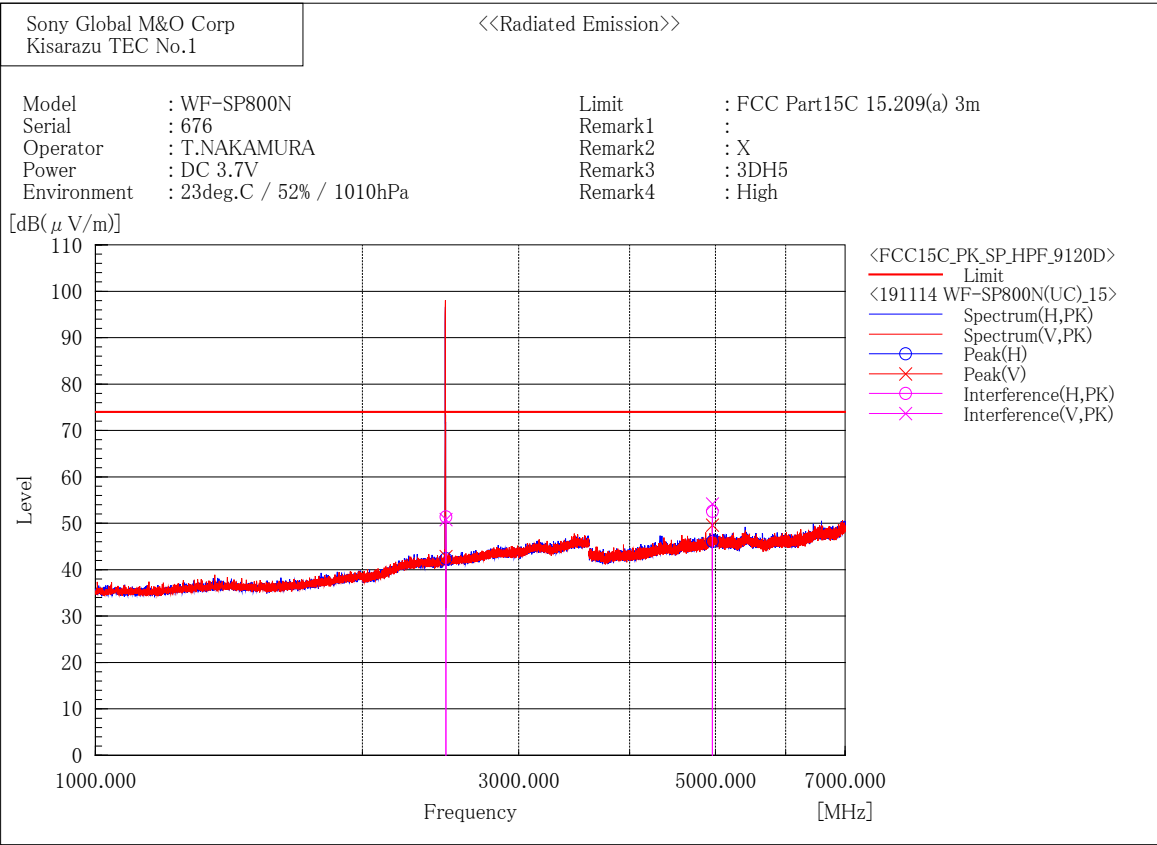
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	4882.000	40.4	11.0	51.4	74.0	22.6	100.0	263.2

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	4882.000	40.4	11.0	51.4	74.0	22.6	115.8	339.1

[EDR(3DH5) / 2480 MHz]



Final Result

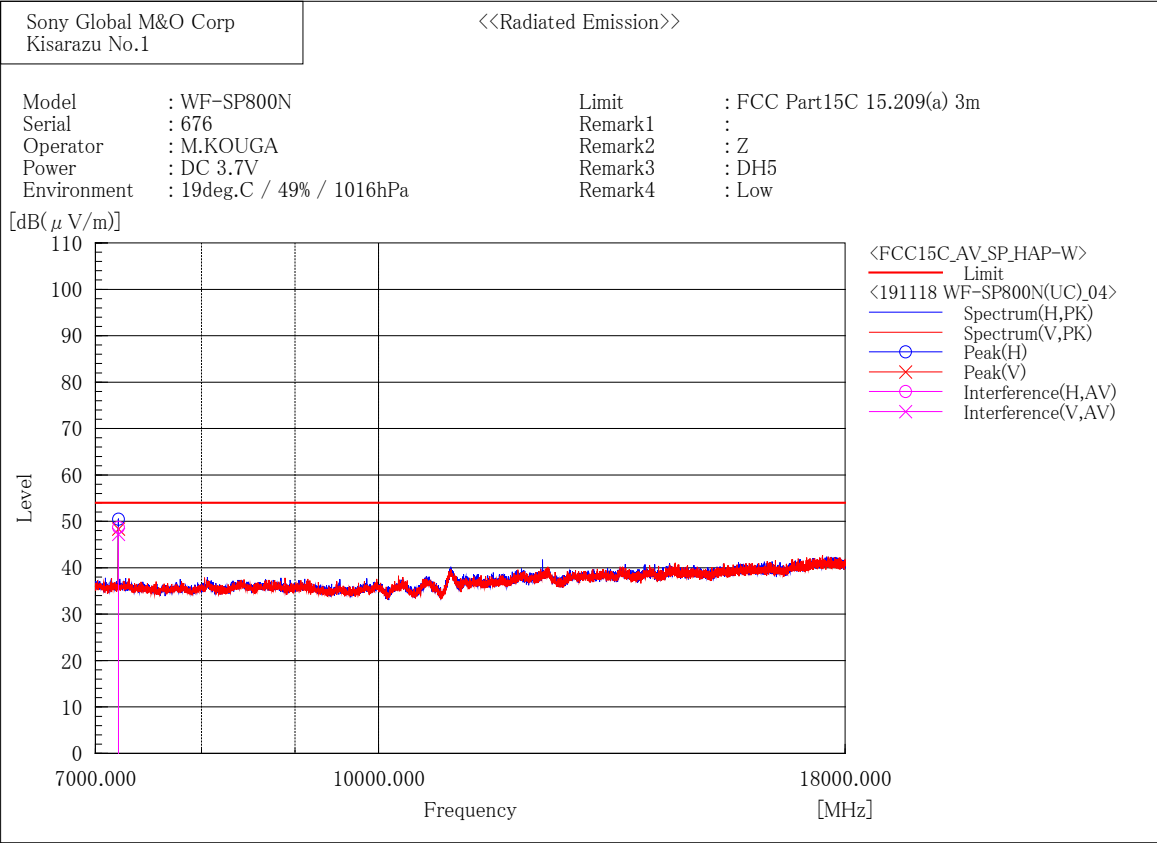
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2483.500	48.3	3.1	51.4	74.0	22.6	100.0	203.1
2	4960.004	41.3	11.3	52.6	74.0	21.4	133.0	321.3

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2483.500	47.7	3.1	50.8	74.0	23.2	131.1	215.5
2	4960.142	42.9	11.3	54.2	74.0	19.8	115.1	66.3

7 GHz to 18 GHz
[BDR (DH5) / 2402 MHz]



Final Result

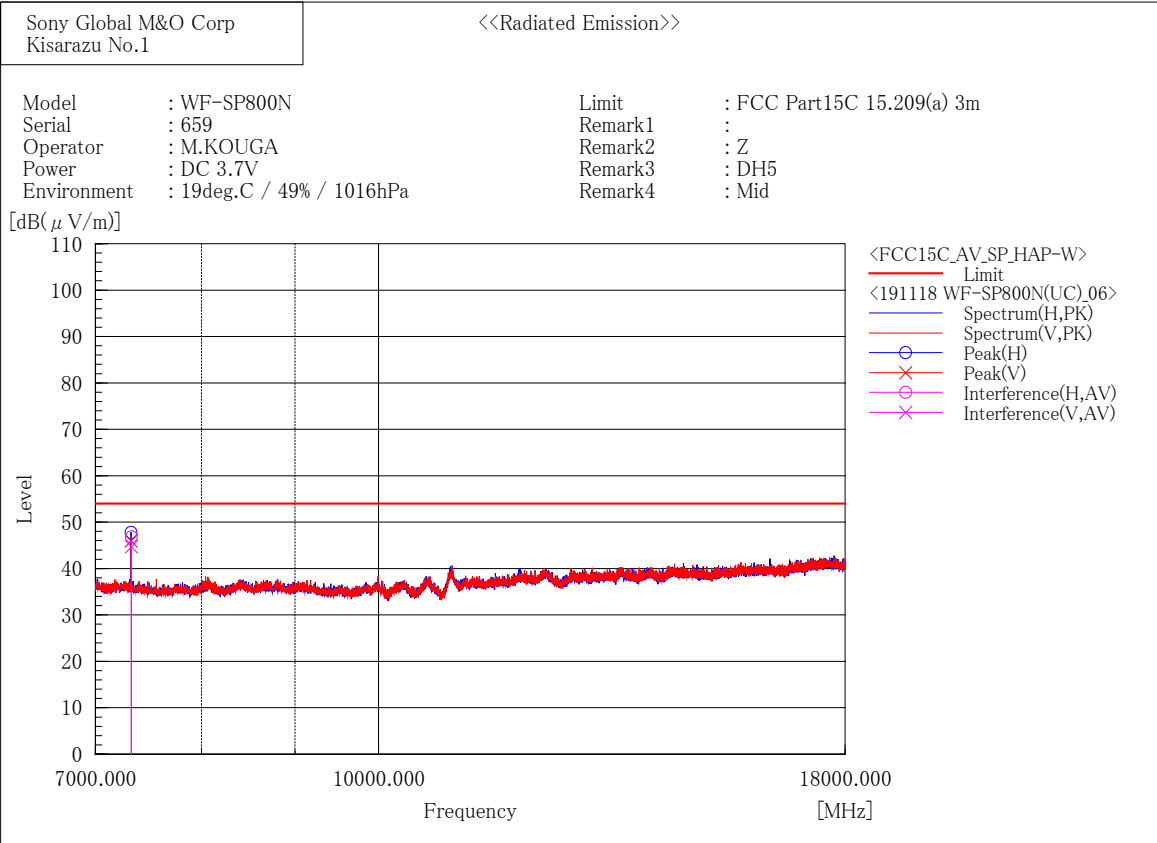
--- Horizontal Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7206.265	56.6	-7.9	48.7	54.0	5.3	100.0	15.8

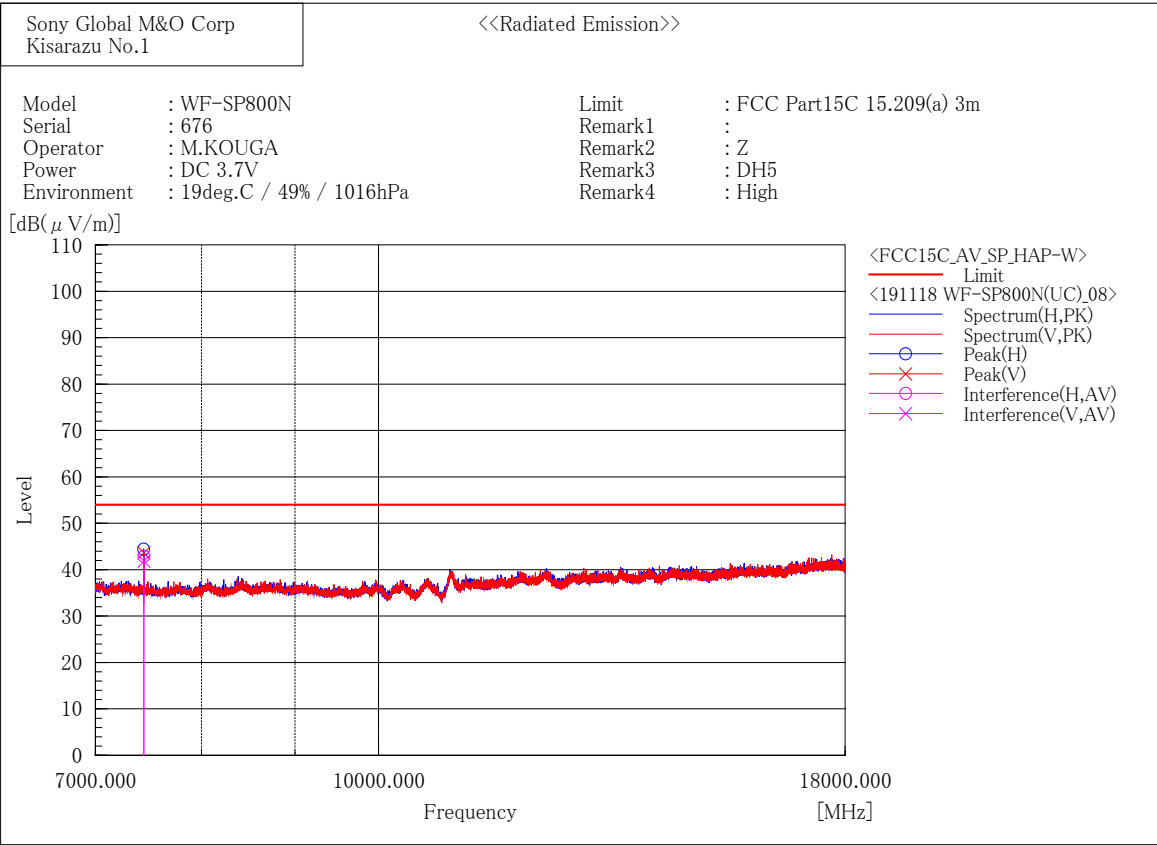
--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7206.117	55.1	-7.9	47.2	54.0	6.8	120.0	50.0

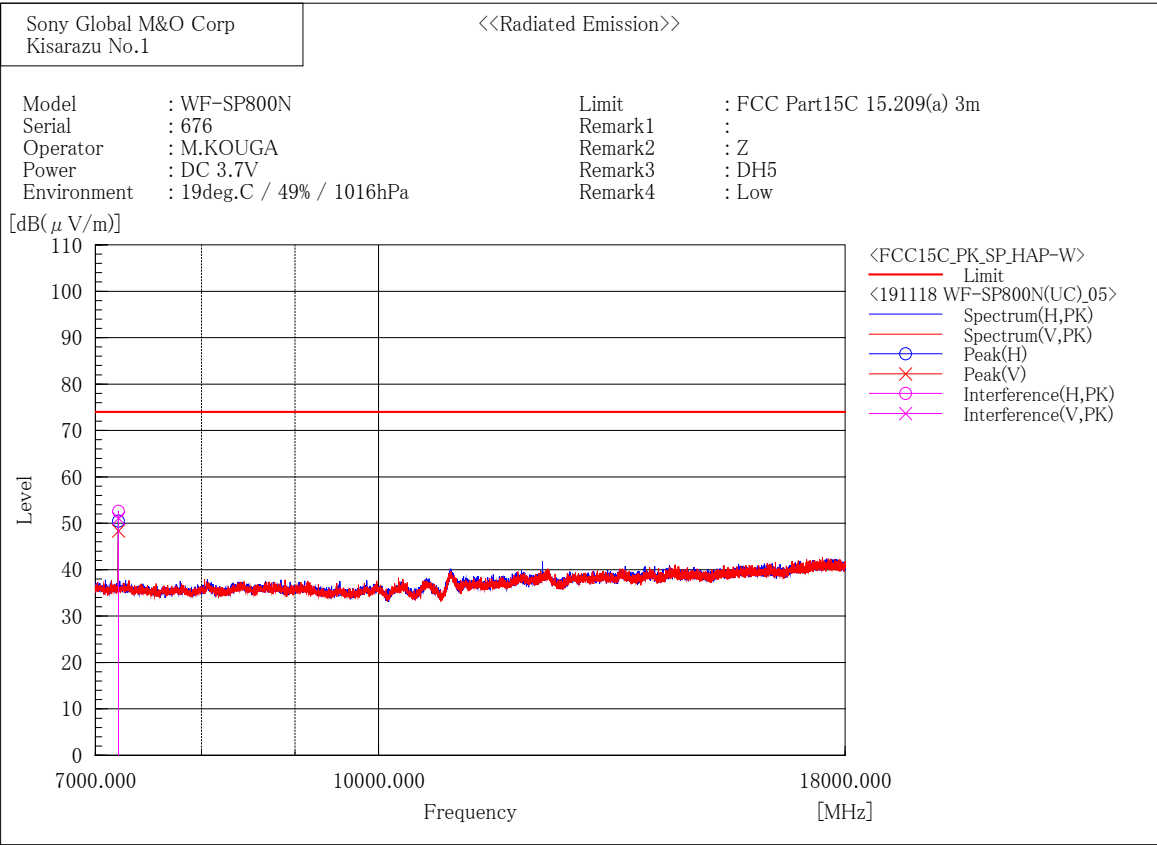
[BDR (DH5) / 2441 MHz]



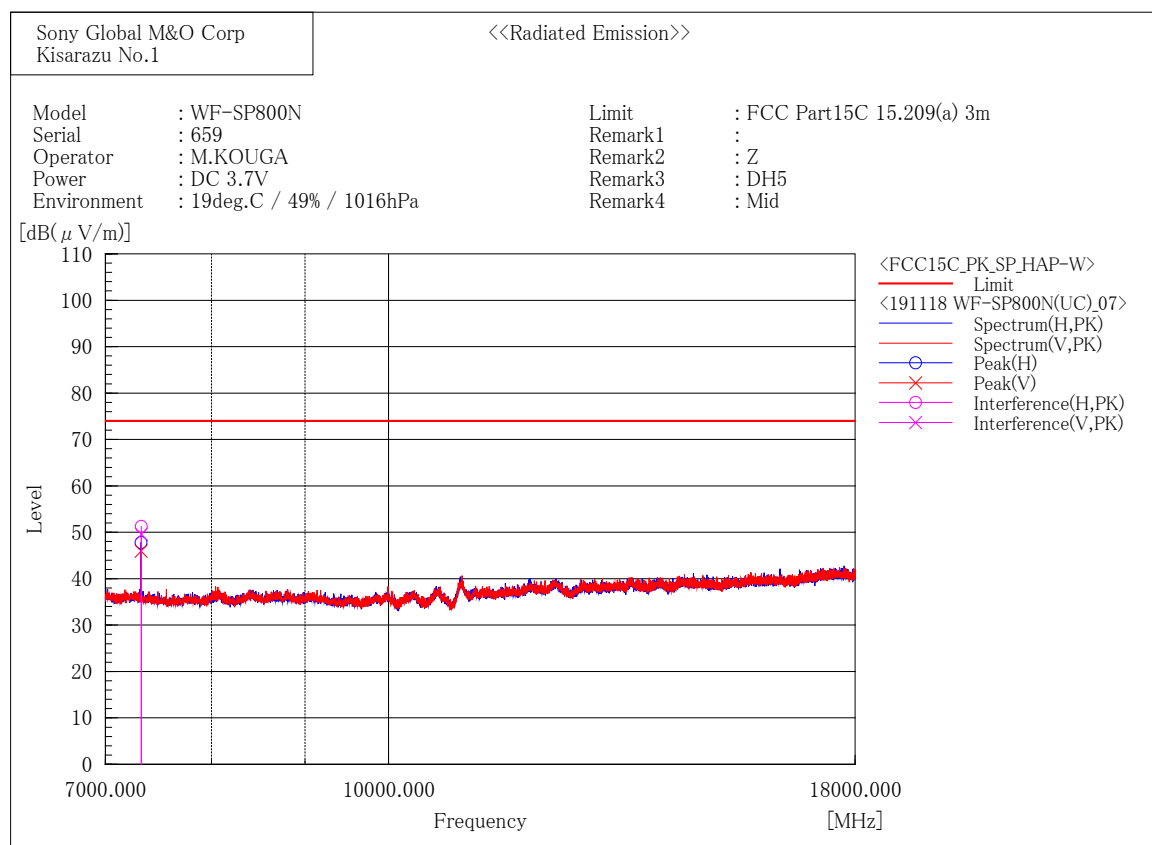
[BDR (DH5) / 2480 MHz]



[BDR (DH5) / 2402 MHz]



[BDR (DH5) / 2441 MHz]



Final Result

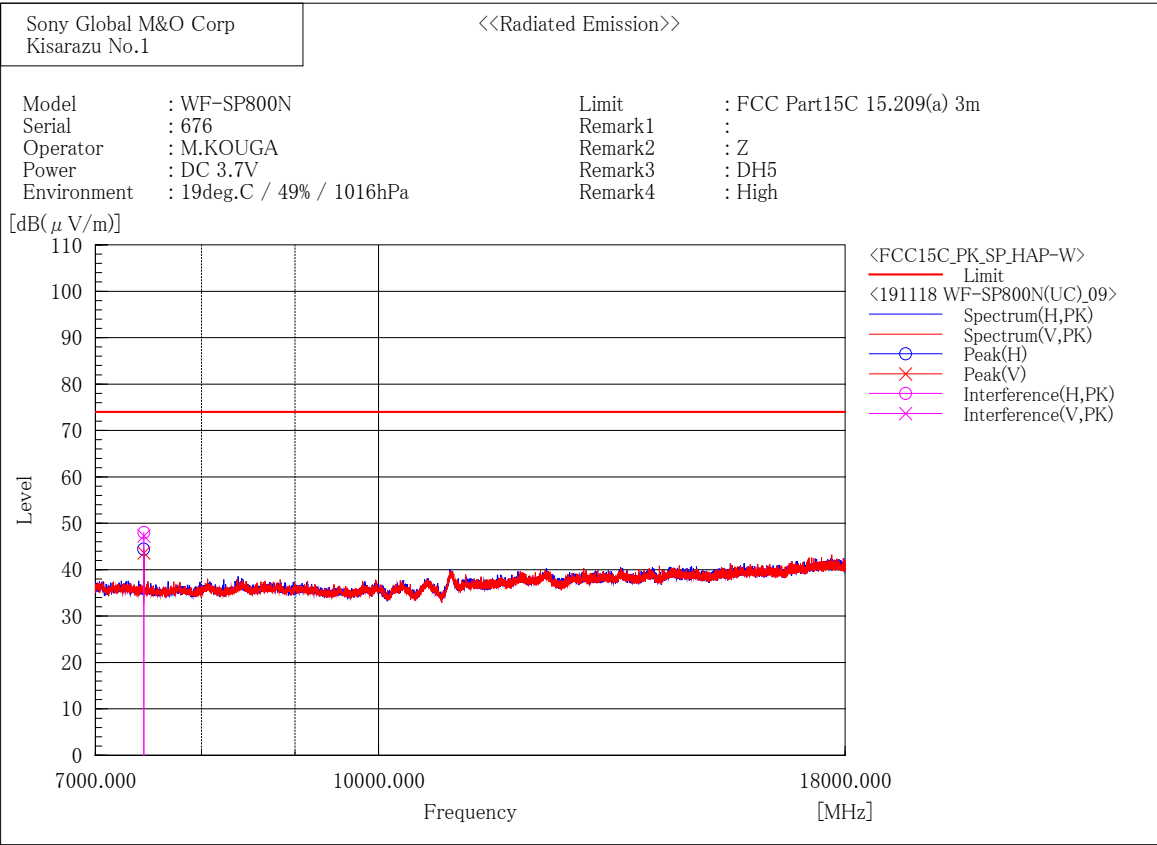
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7323.505	59.2	-7.9	51.3	74.0	22.7	114.0	29.0

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7323.470	57.5	-7.9	49.6	74.0	24.4	112.0	56.9

[BDR (DH5) / 2480 MHz]



Final Result

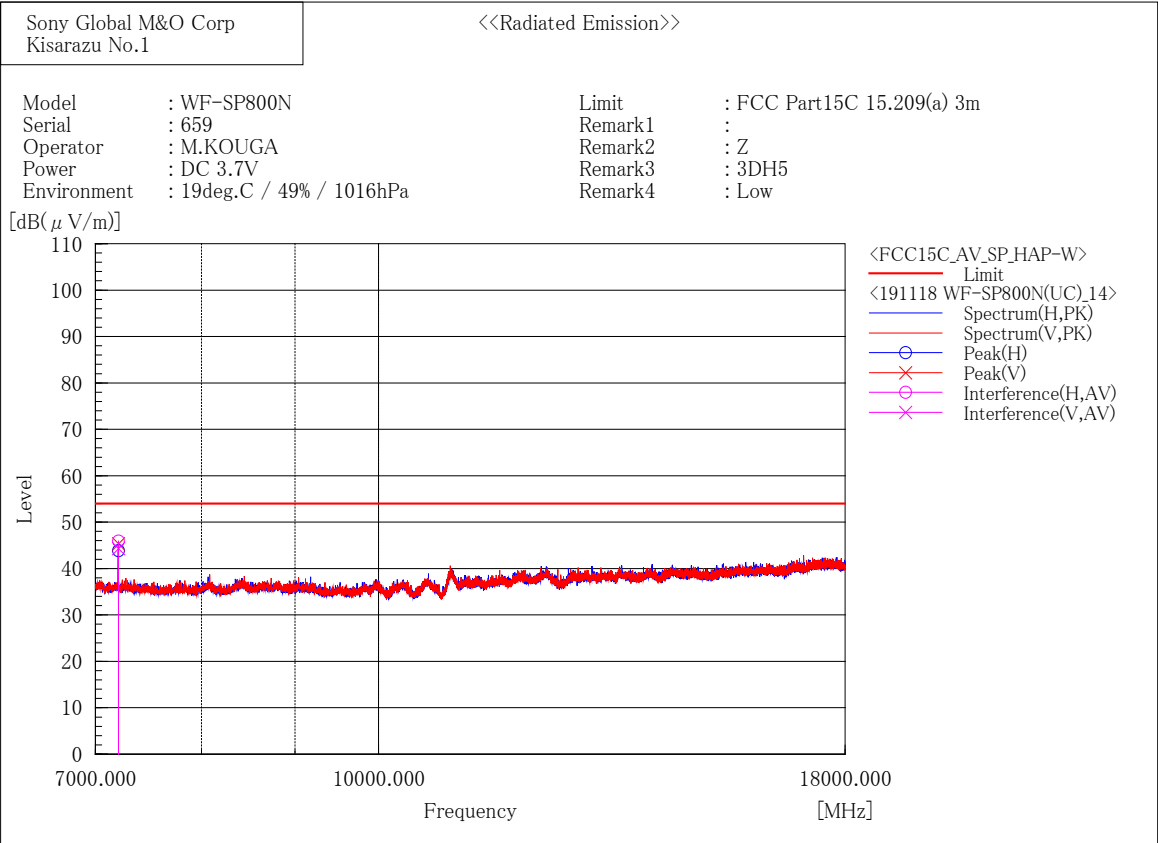
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7439.759	55.9	-7.9	48.0	74.0	26.0	107.0	23.9

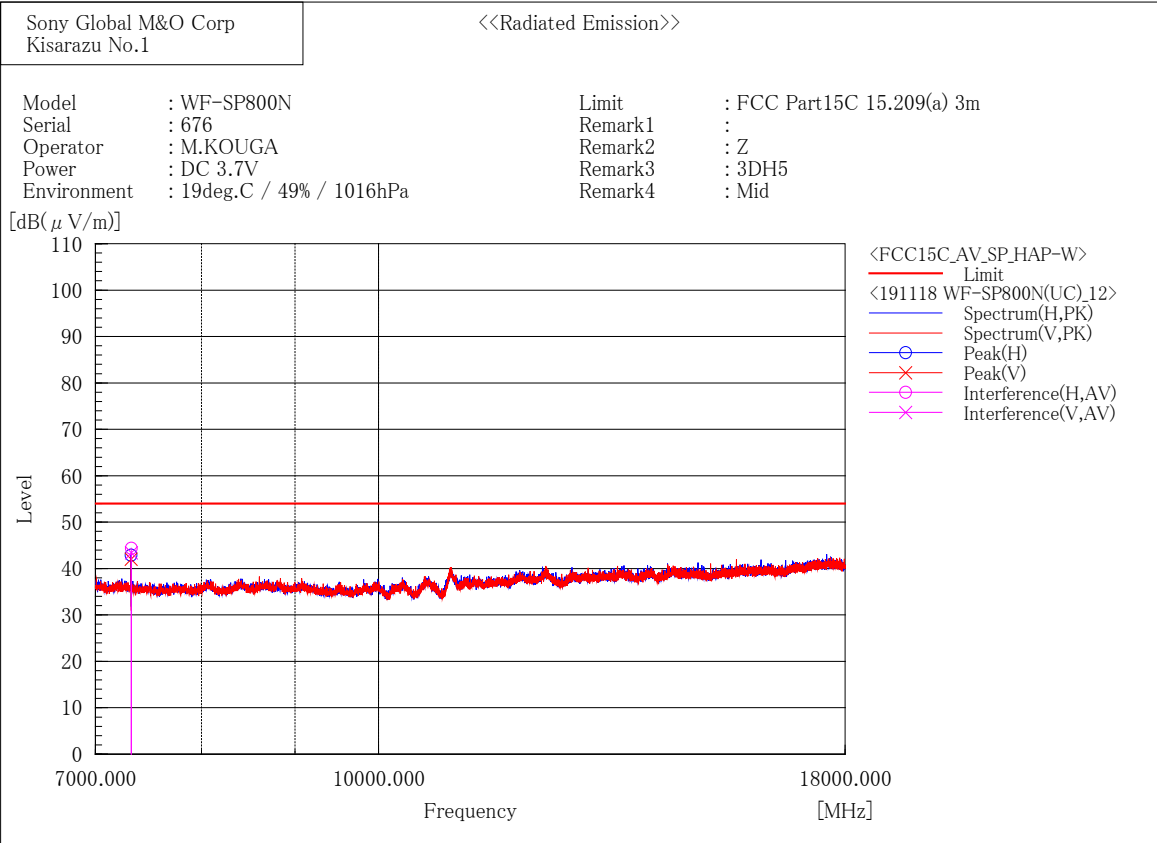
--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7440.430	55.2	-7.9	47.3	74.0	26.7	109.0	44.1

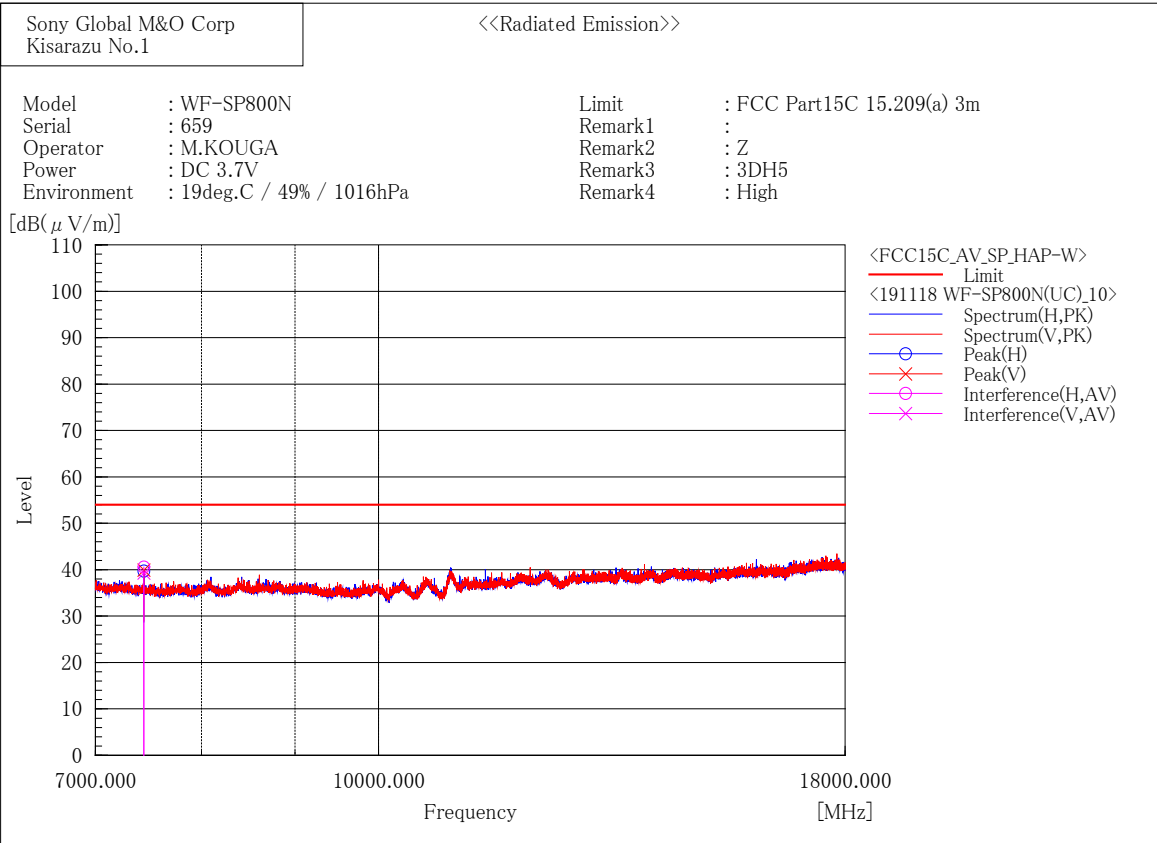
[EDR (3DH5) / 2402 MHz]



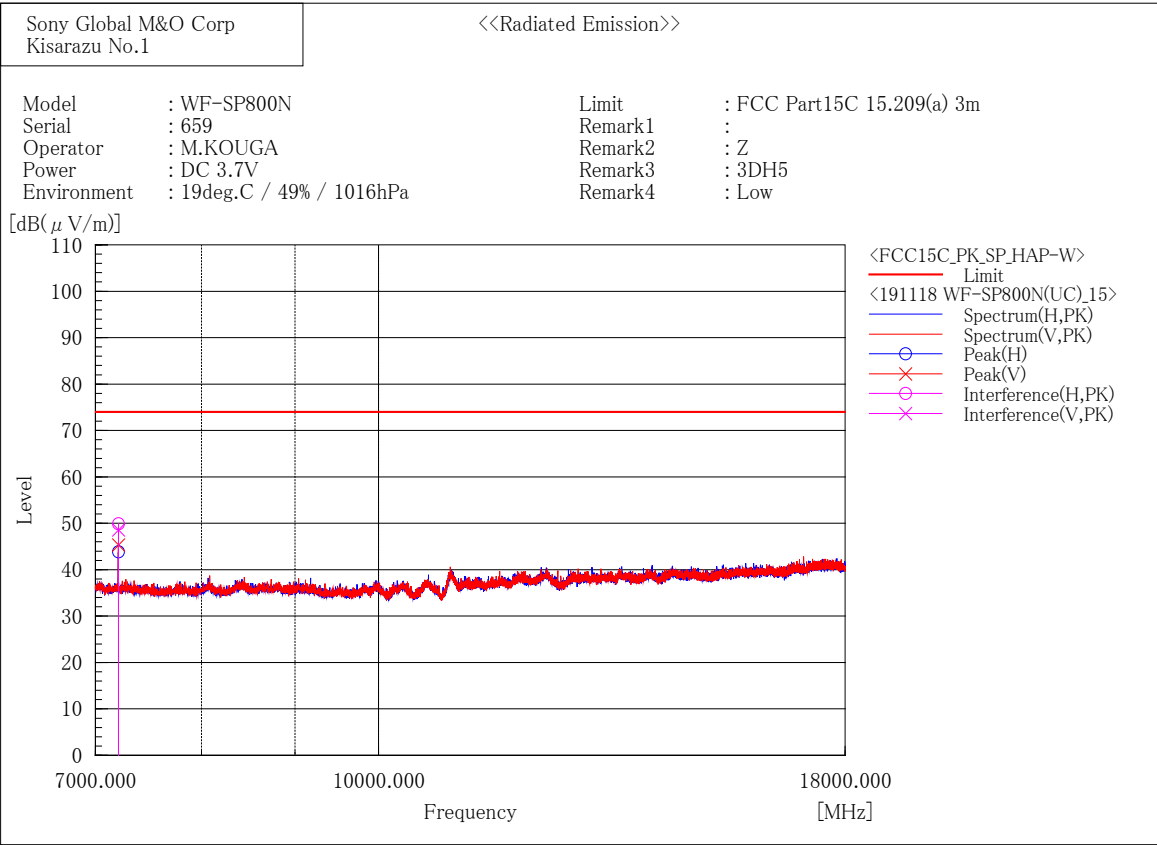
[EDR(3DH5) / 2441 MHz]



[EDR(3DH5) / 2480 MHz]



[EDR(3DH5) / 2402 MHz]



Final Result

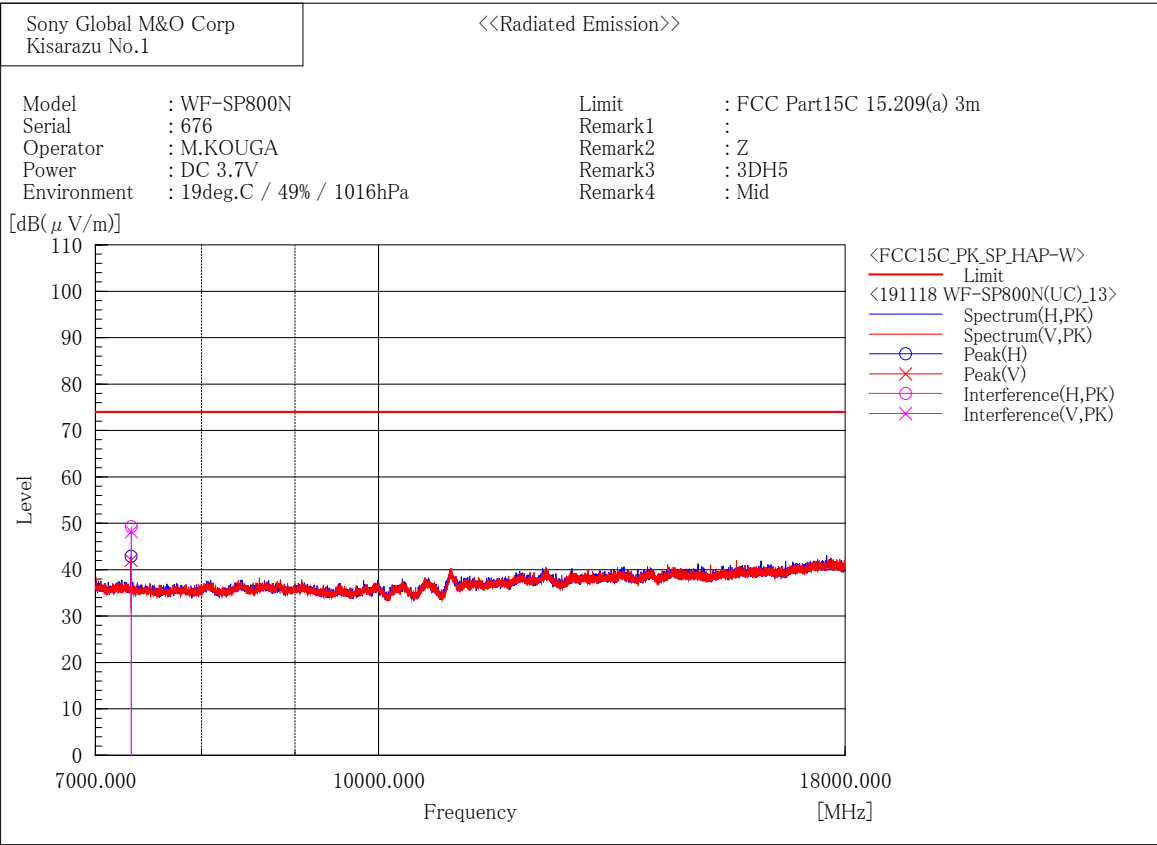
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7205.854	57.8	-7.9	49.9	74.0	24.1	108.0	8.1

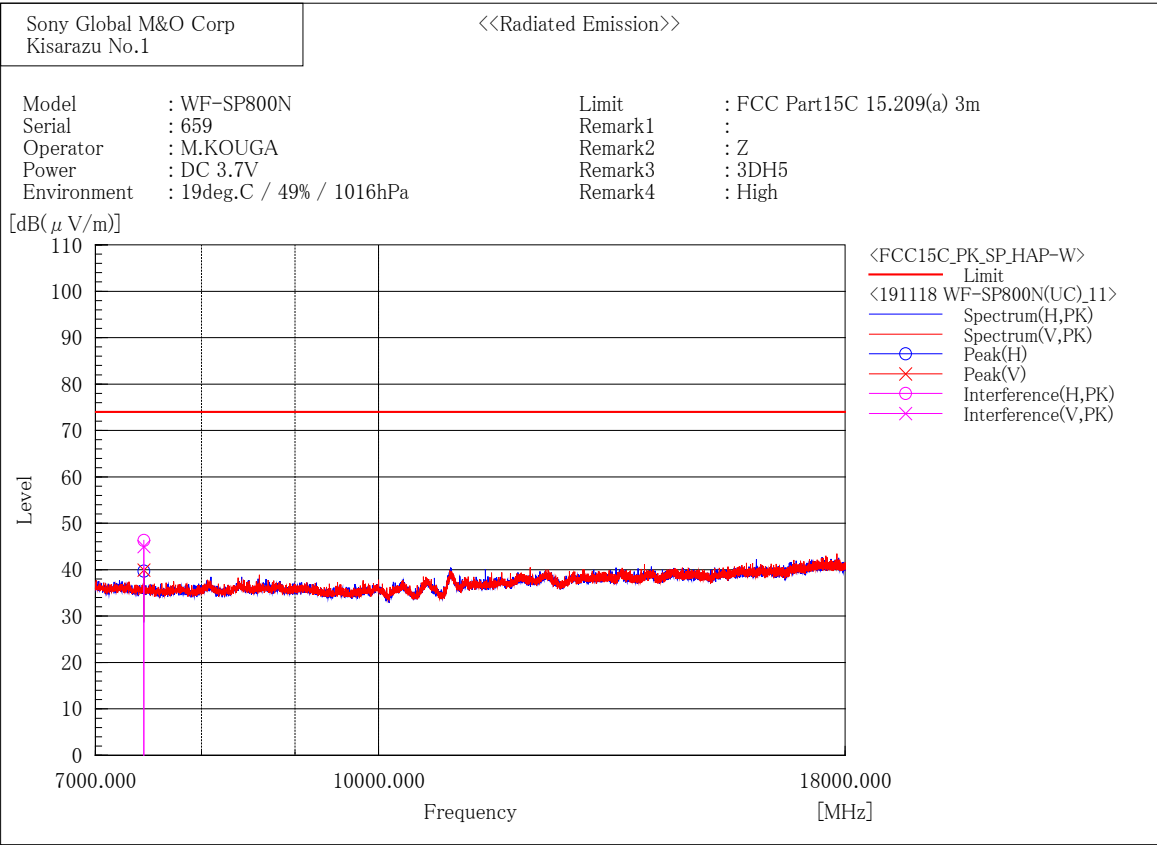
--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7206.610	56.5	-7.9	48.6	74.0	25.4	108.0	59.0

[EDR(3DH5) / 2441 MHz]



[EDR(3DH5) / 2480 MHz]



Final Result

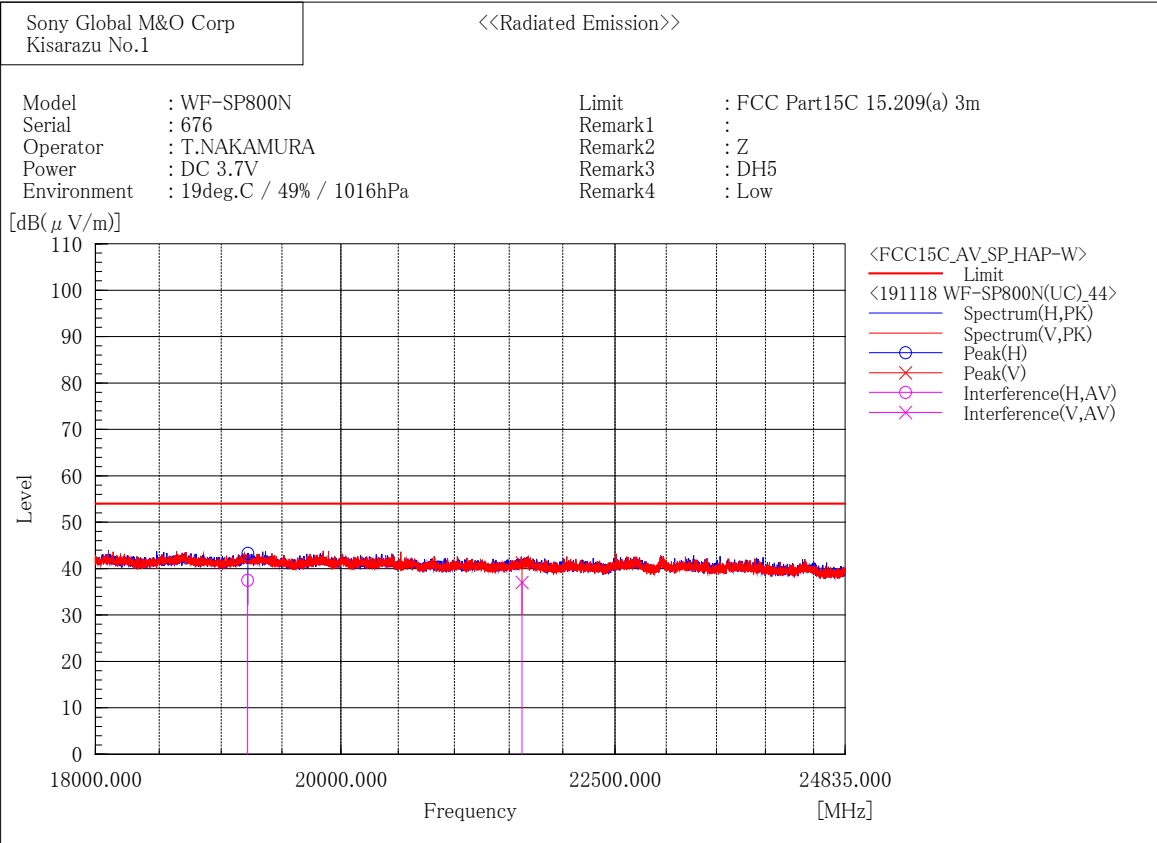
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7440.116	54.2	-7.9	46.3	74.0	27.7	111.0	21.0

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	7440.435	52.9	-7.9	45.0	74.0	29.0	130.0	66.1

18 GHz to 26.5 GHz
[BDR(DH5) / 2402 MHz]



Final Result

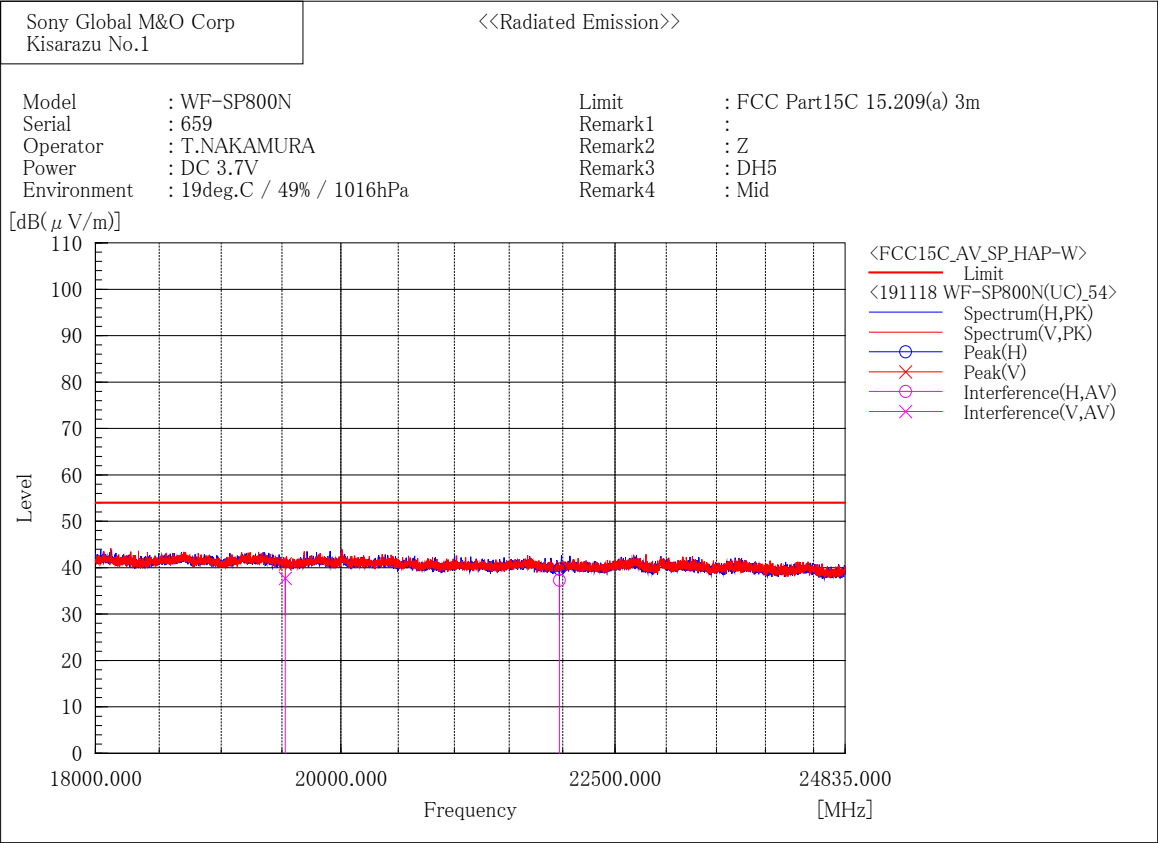
--- Horizontal Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	19216.000	38.3	-0.8	37.5	54.0	16.5	192.4	120.7

--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	21618.000	38.8	-1.8	37.0	54.0	17.0	130.2	171.6

[BDR(DH5) / 2441 MHz]



Final Result

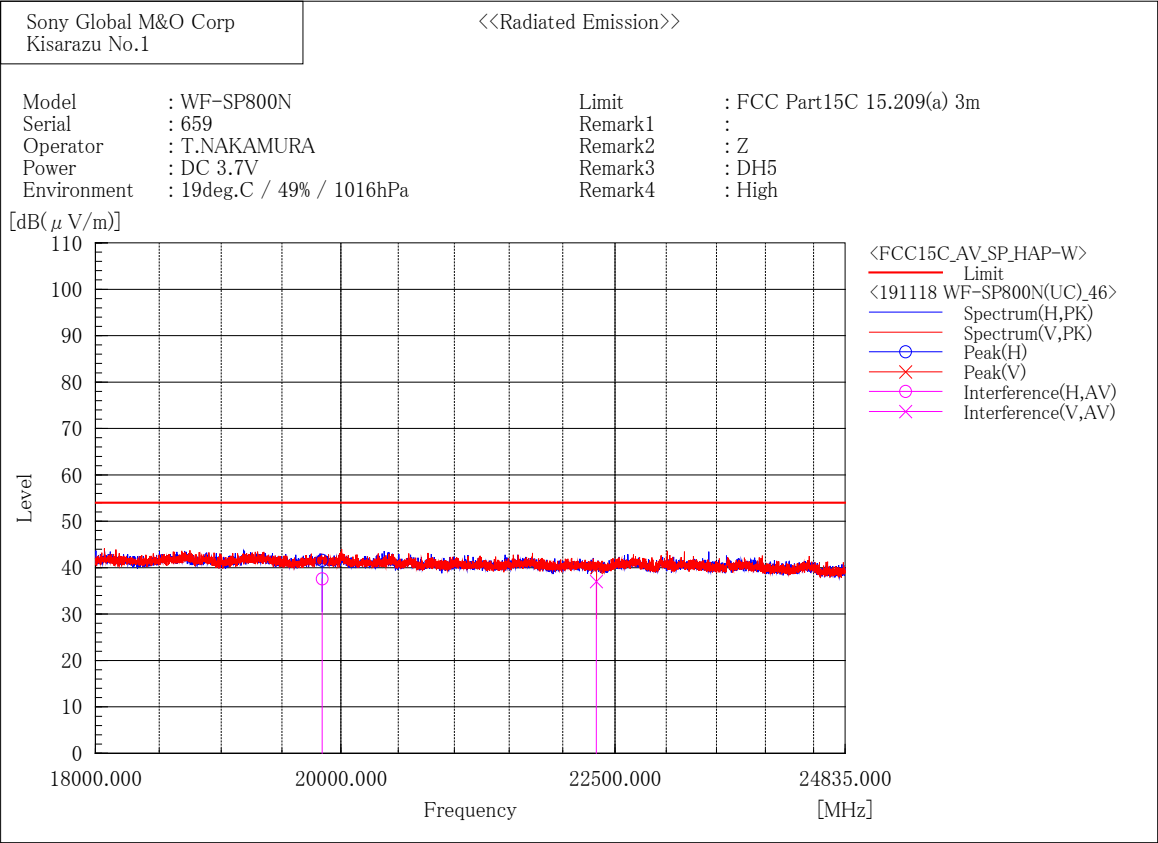
--- Horizontal Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	21969.000	39.3	-2.0	37.3	54.0	16.7	145.2	263.1

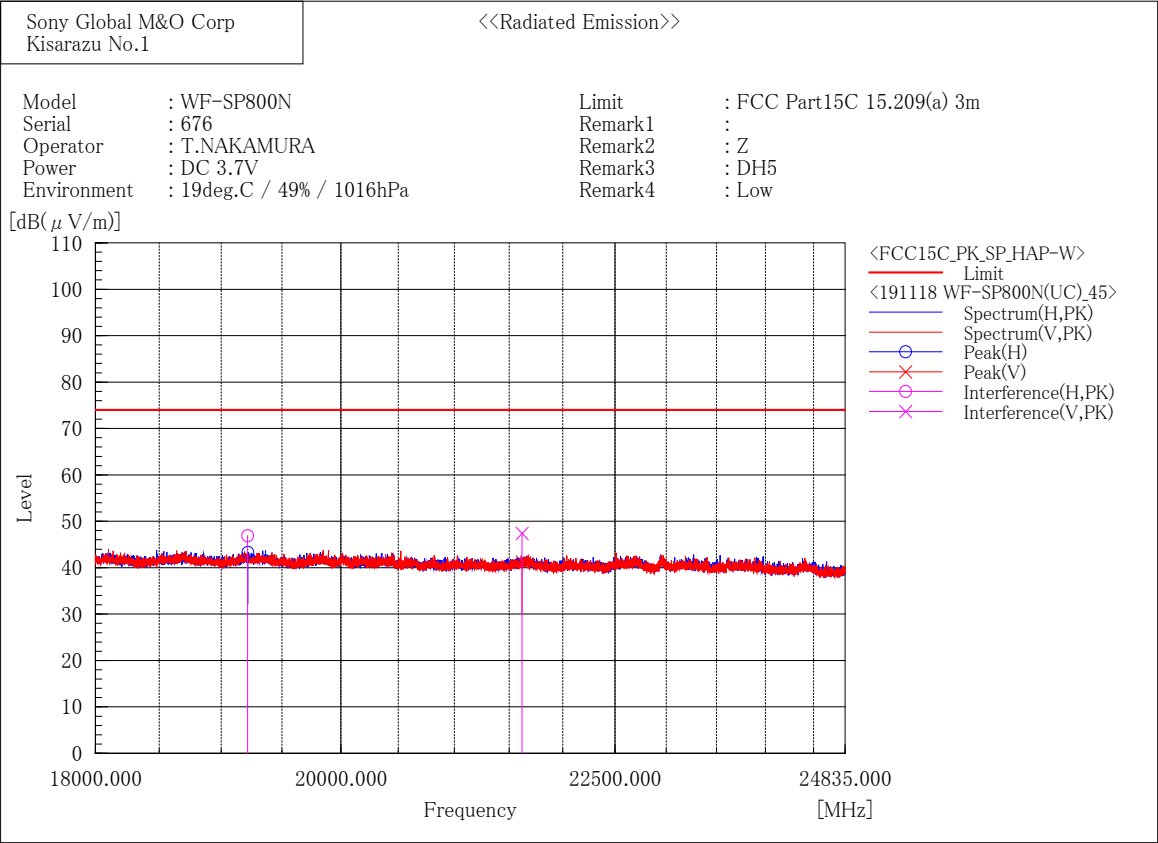
--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	19528.000	38.5	-0.8	37.7	54.0	16.3	124.6	135.7

[BDR(DH5) / 2480 MHz]



[BDR(DH5) / 2402 MHz]



Final Result

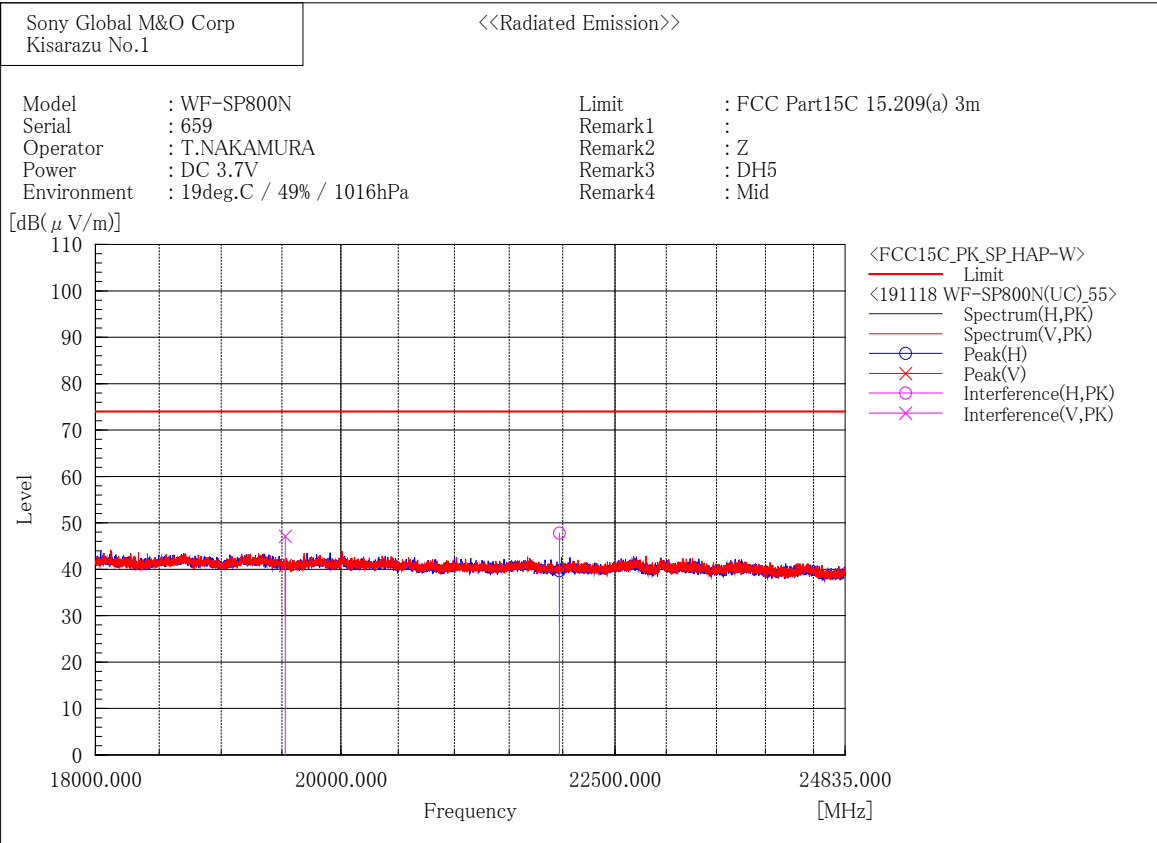
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	19216.000	47.7	-0.8	46.9	74.0	27.1	185.7	124.5

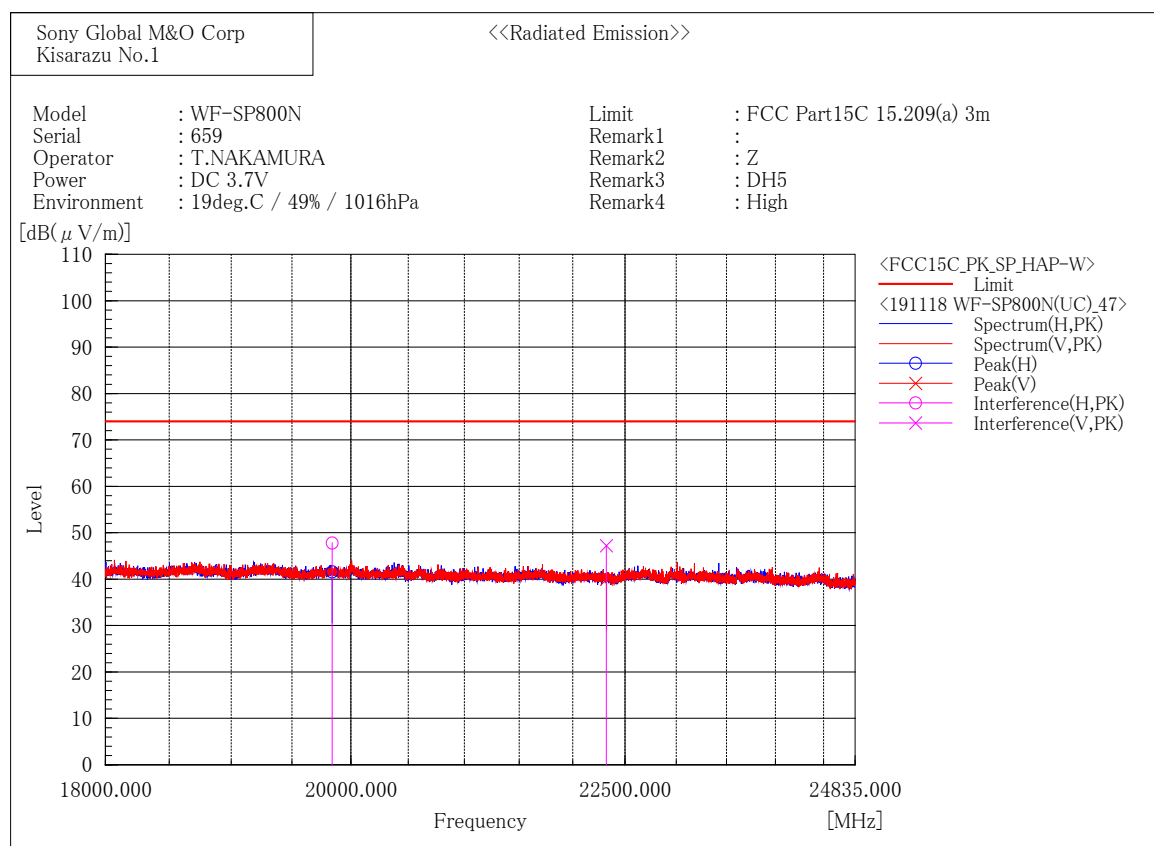
--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result [dB(μ V/m)]	Limit [dB(μ V/m)]	Margin [dB]	Height [cm]	Angle [°]
1	21618.000	49.2	-1.8	47.4	74.0	26.6	127.7	174.7

[BDR(DH5) / 2441 MHz]



[BDR(DH5) / 2480 MHz]



Final Result

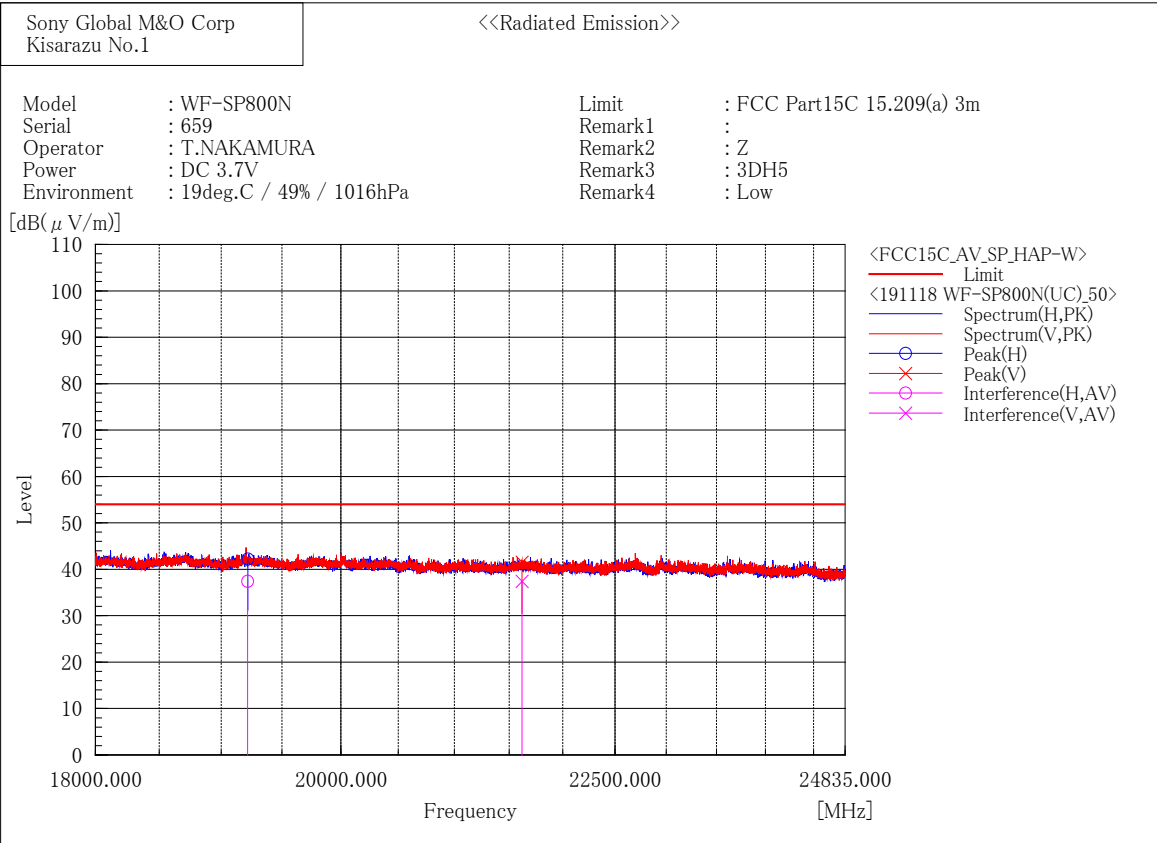
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	19840.000	48.7	-0.9	47.8	74.0	26.2	235.6	155.1

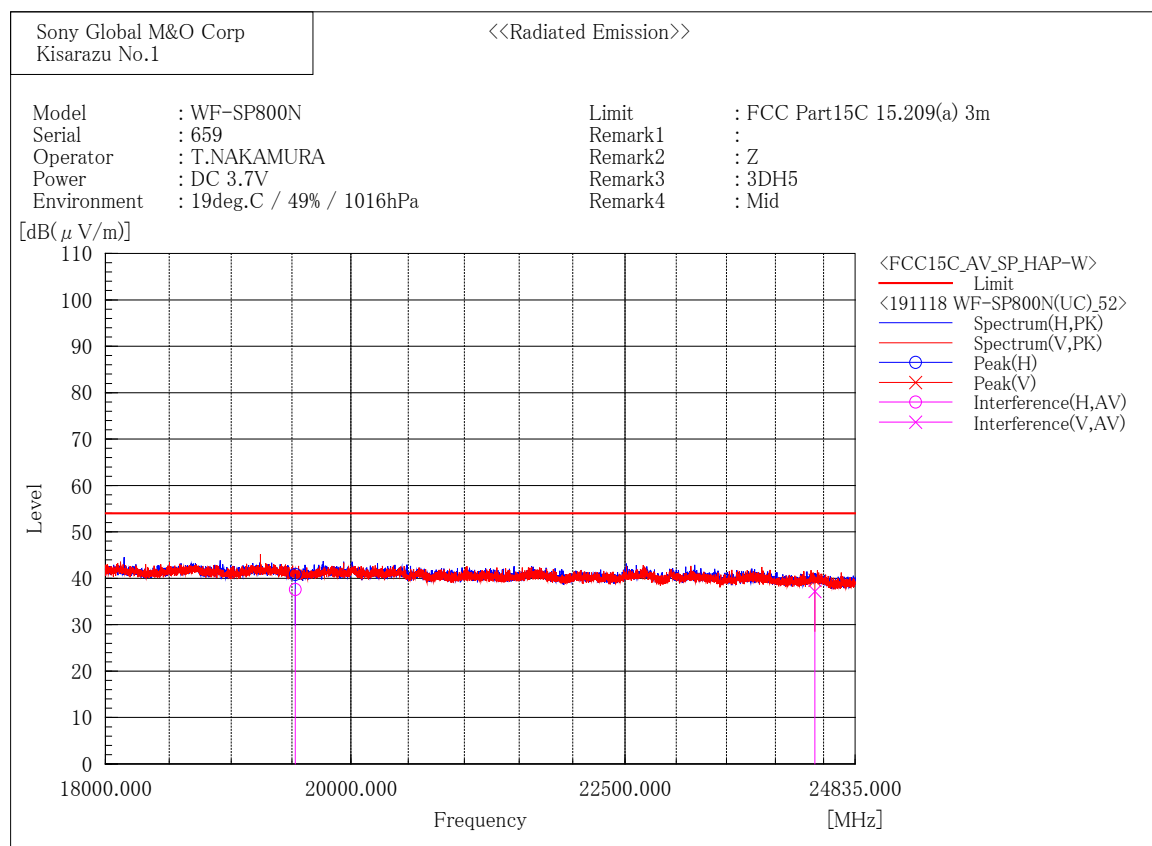
--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	22320.000	49.2	-2.0	47.2	74.0	26.8	132.2	221.4

[EDR(3DH5) / 2402 MHz]



[EDR(3DH5) / 2441 MHz]



Final Result

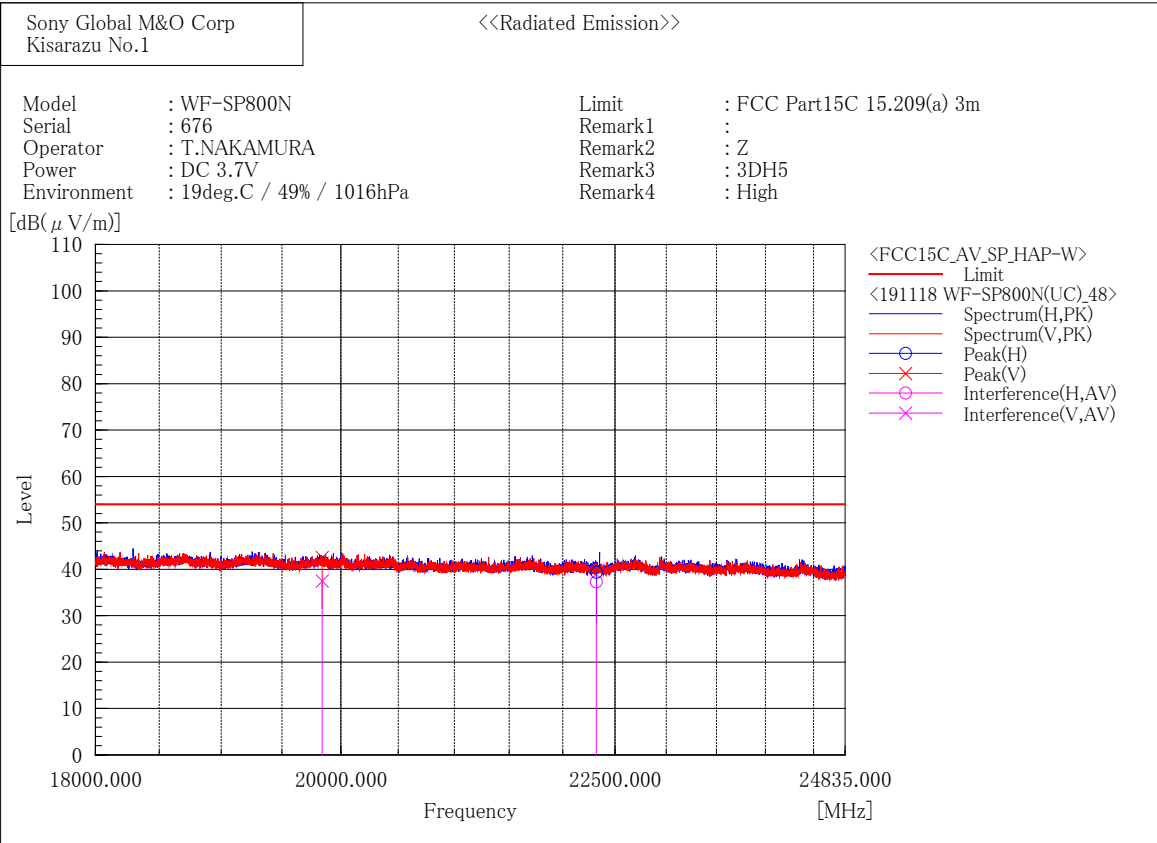
--- Horizontal Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	19528.000	38.4	-0.8	37.6	54.0	16.4	131.5	330.2

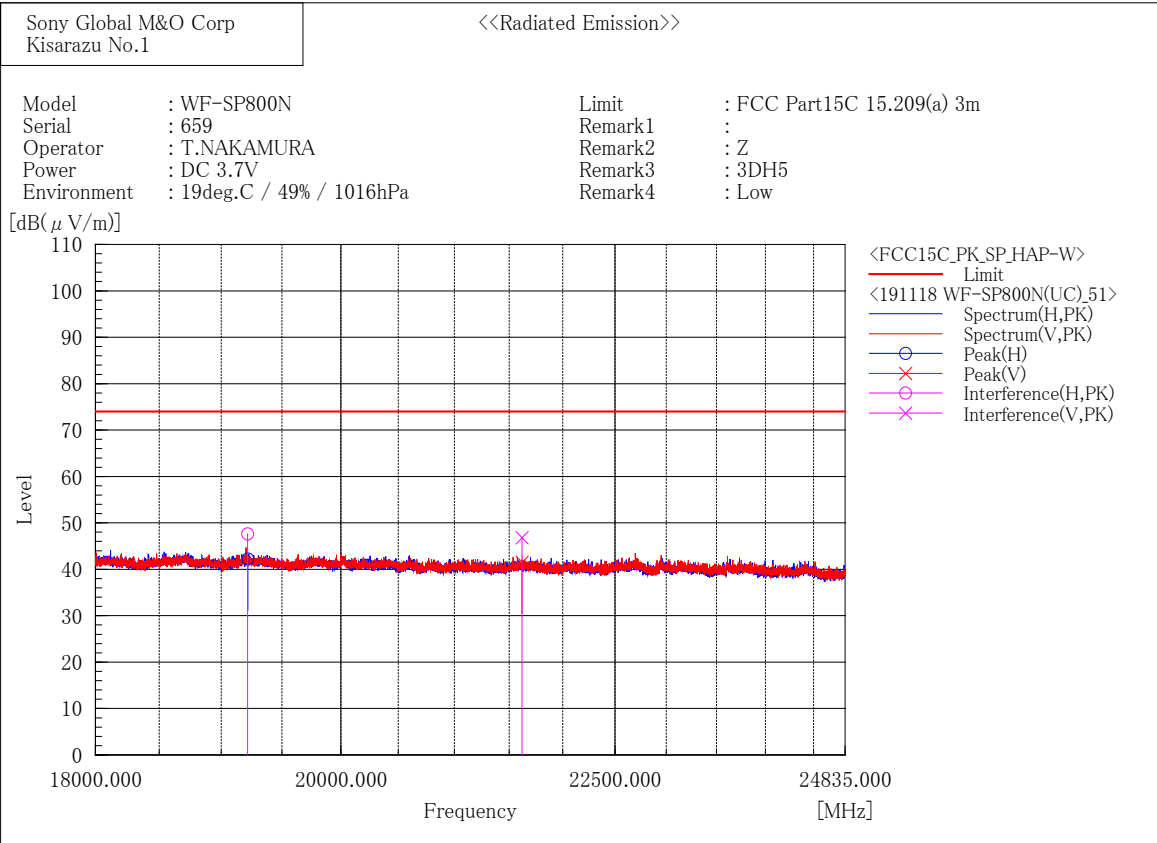
--- Vertical Polarization (AV)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	24410.000	39.8	-2.6	37.2	54.0	16.8	199.1	297.6

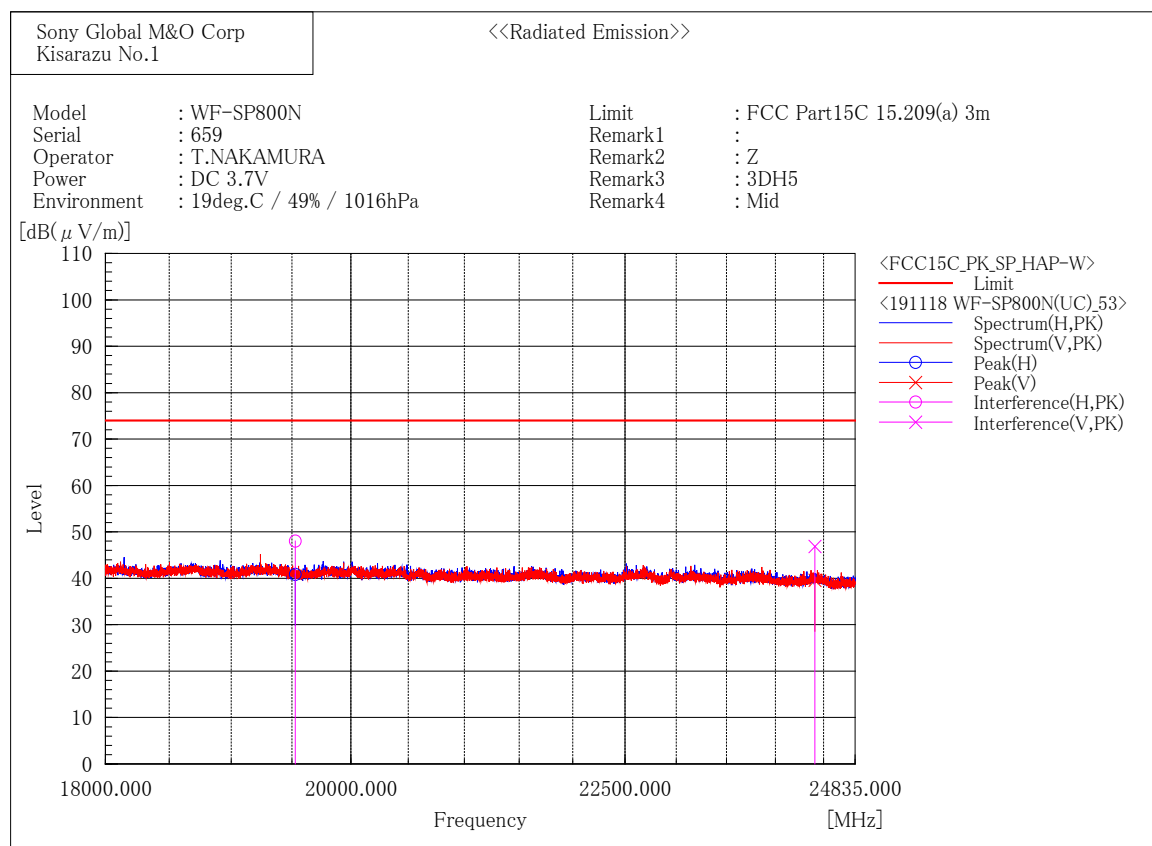
[EDR(3DH5) / 2480 MHz]



[EDR(3DH5) / 2402 MHz]



[EDR(3DH5) / 2441 MHz]



Final Result

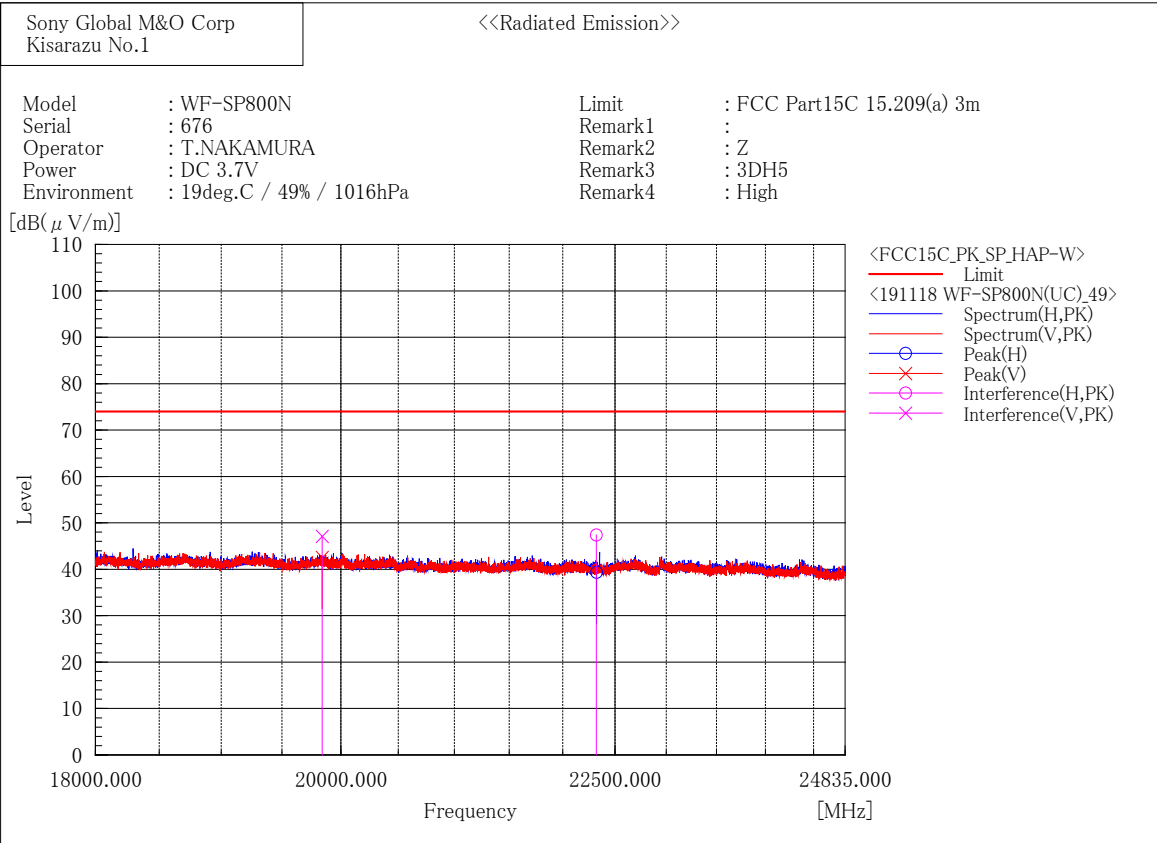
--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	19528.000	48.8	-0.8	48.0	74.0	26.0	119.4	343.1

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	24410.000	49.5	-2.6	46.9	74.0	27.1	187.0	303.0

[EDR(3DH5) / 2480 MHz]



Final Result

--- Horizontal Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	22320.000	49.4	-2.0	47.4	74.0	26.6	171.0	141.4

--- Vertical Polarization (PK)---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	19840.000	48.0	-0.9	47.1	74.0	26.9	222.8	260.6

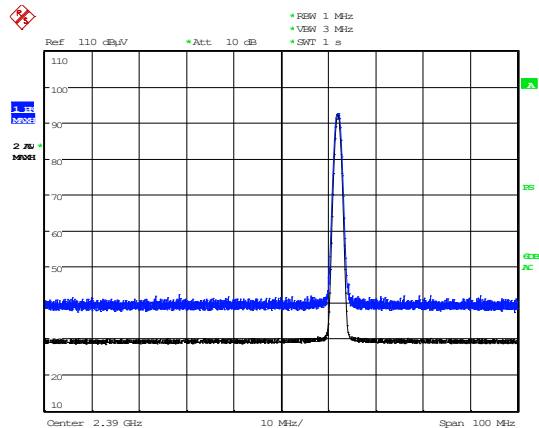
2.4 GHz Restricted-Band Edge (Plot data)

These plot data show peak (trace blue) and average (trace black) spectrum for worst case emissions in the restricted-band edges. (Restricted band edges: below 2390 MHz and above 2483.5 MHz)

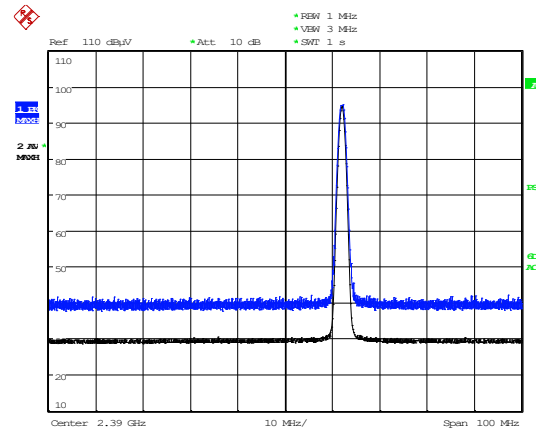
The result of the final radiated spurious emissions measurement refers in previous pages.

[BDR / 2402 MHz]

Horizontal

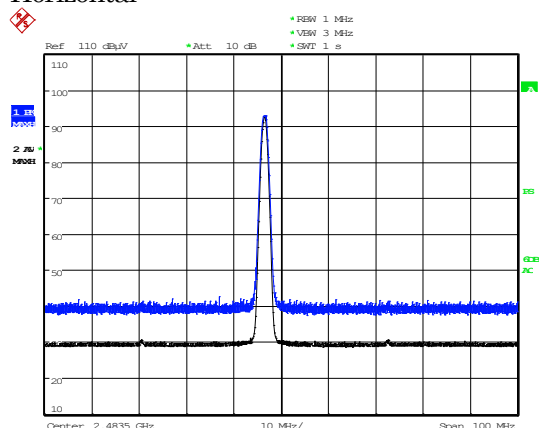


Vertical

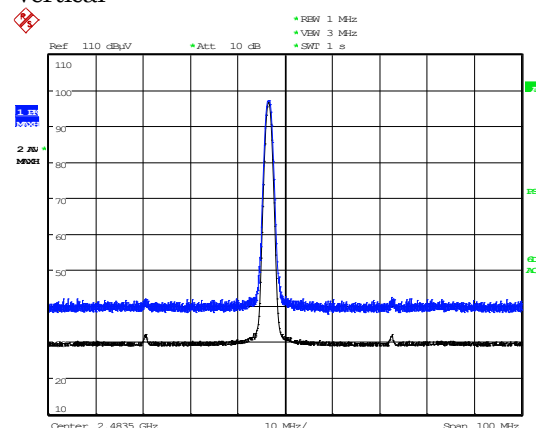


[BDR / 2480 MHz]

Horizontal

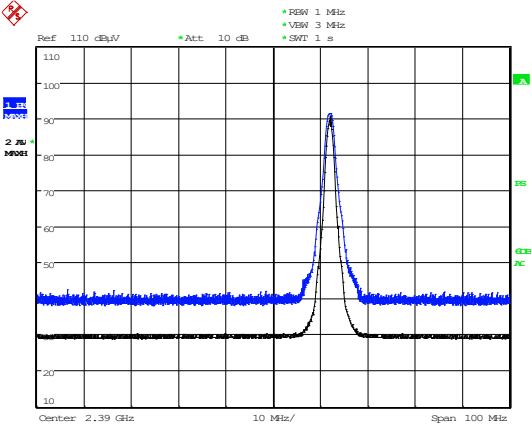


Vertical



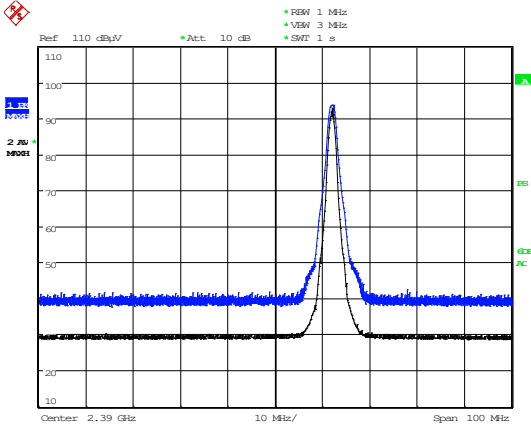
[EDR / 2402 MHz]

Horizontal



Date: 15.NOV.2019 00:06:49

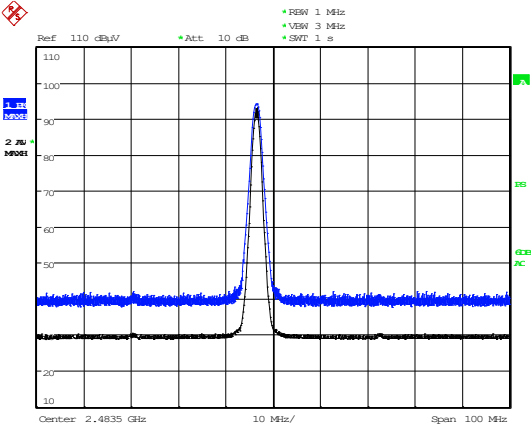
Vertical



Date: 15.NOV.2019 00:14:15

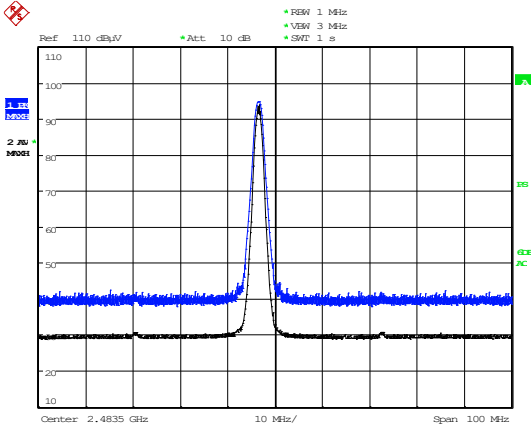
[EDR / 2480 MHz]

Horizontal



Date: 15.NOV.2019 04:20:21

Vertical



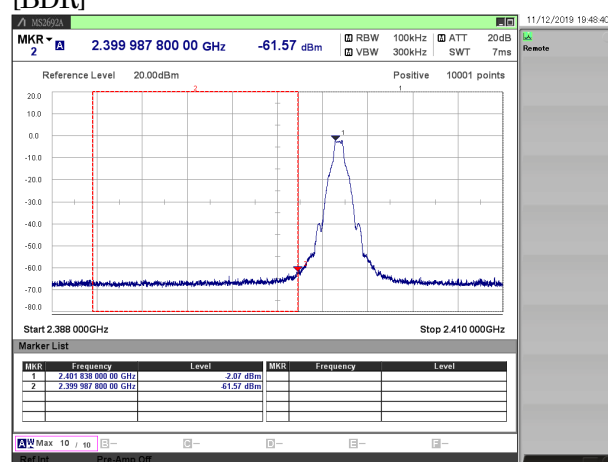
Date: 15.NOV.2019 04:10:57

3.7. Conducted Spurious Emissions for Band Edge

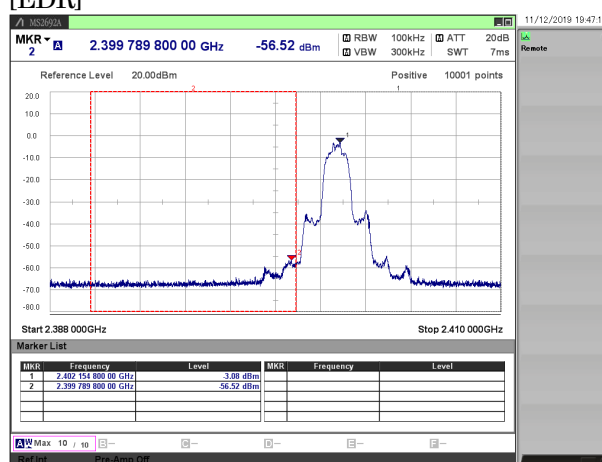
- 1) Ambient temperature : 23.0 deg.C
- 2) Relative humidity : 46.5 %
- 3) Date of measurement : November 12, 2019
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Frequency [MHz]	Reading(PK) [dBm]	C.F. [dB]	Result(PK) [dBm]	Limit [dBm]	Margin [dB]
BDR	DH5	2402	2401.84	-2.07	11.15	9.08	-	-
			2399.99	-61.57	11.15	-50.42	-10.9	39.50
EDR	3DH5	2402	2402.15	-3.08	11.15	8.07	-	-
			2399.79	-56.52	11.15	-45.37	-11.9	33.44

[BDR]



[EDR]



4. Method of Calculation

4.1. Time of Occupancy (Dwell Time)

Method of calculation : Software
 Software Name : SW-0308
 Software Version : Ver.4

Test Result [msec] = Dwell Time [msec] * Cycle [time] * 31.6 [sec] / Sweep Time [sec]

Note (a) Dwell Time : Transmission duration of 1 hopping.
 (b) Cycle : Number of hopping appearances on the spectrum analyzer.
 (The average of 10 measurements if it is random hopping equipment)
 (c) 31.6 : $0.4 \text{ [sec]} * \text{Number of Hopping Frequencies (79)}$
 (d) Sweep Time : Sweep time settings on the spectrum analyzer.

4.2. Maximum Peak Conducted Output Power

Method of calculation : Software
 Software Name : SW-0308
 Software Version : Ver.4

Test Result (PK) [dBm] = Meter Reading [dBm] + C.F. [dB]

Duty Cycle [%] = $T \text{ (Tx ON Time)} / T_{\text{(on+off)}} \text{ (Tx ON Time + Tx OFF Time)} * 100$

Note (a) Meter Reading : Reading of the power meter
 (b) C.F. : System Cable Loss + EUT Cable Loss
 (c) Duty Factor : $10\log \{ (Tx \text{ ON Time} + Tx \text{ OFF Time}) / (Tx \text{ ON Time}) \}$

4.3. Radiated Spurious Emissions

Method of calculation : Software
Software Name : V-Scan
Software Version : Ver.4.0.30

Test Result [dBuV/ m] = Meter Reading [dBuV] + C.F. [dB/ m]

Note (a) Meter Reading : Reading of the EMI test receiver or the spectrum analyzer.
(b) C.F. : ☒ Antenna Factor (including Balun Loss) + System GainLoss
: ☐ Antenna Factor (including Balun Loss) + System GainLoss + 20 log (3 m/ 10 m)

4.4. Conducted Spurious Emissions for Band Edge

Method of calculation : Software
Software Name : SW-0308
Software Version : Ver.4

Test Result [dBm] = Meter Reading [dBm] + C.F. [dB]

Note (a) Meter Reading : Reading of the spectrum analyzer.
(b) C.F. : System Cable Loss + EUT Cable Loss

5. List of Test Equipment

All test results are traceable to the national and/or international standards.

5.1. Antenna-port Conducted Measurements

	Ctrl#	Equipment	Model No.	Serial No.	Manufacturer	Cal.Interval	Last Cal.
-	W0140	Spectrum Analyzer	FSU26	200717	Rohde & Schwarz	12 months	19.09.22
x	W0100	Spectrum Analyzer	MS2692A	6201338954	Anritsu	12 months	19.05.09
x	W0006	Power Meter	N1911A	MY50000295	Agilent Technologies	12 months	19.10.10
x	W0007	Power Sensor	N1922A	MY50180022	Agilent Technologies	12 months	19.10.10
x	W0029	10dB Attenuator	8493C	76549	Agilent Technologies	12 months	19.09.22
-	WC0002	RF Cable	SUCOFLEX 102	34124/2	HUBER + SUHNER	12 months	19.09.22
-	WC0003	RF Cable	SUCOFLEX 102	34127/2	HUBER + SUHNER	12 months	19.09.22
-	WC0004	RF Cable	SUCOFLEX 102	34288/2	HUBER + SUHNER	12 months	19.09.22
x	WC0005	RF Cable	SUCOFLEX 102	34287/2	HUBER + SUHNER	12 months	19.09.22
-	WC0006	RF Cable	SUCOFLEX 102	34289/2	HUBER + SUHNER	12 months	19.09.22
-	WC0007	RF Cable	SUCOFLEX 102	34286/2	HUBER + SUHNER	12 months	19.09.22
-	M0720	Thermometer	TH-321	140036	AS ONE	12 months	19.07.22
x	M0719	Thermometer	TH-321	140036	AS ONE	12 months	19.05.20

5.2. Radiated Spurious Emissions

	Ctrl#	Equipment	Model No.	Serial No.	Manufacturer	Cal.Interval	Last Cal.
-	M0562	EMI Receiver	ESU26	100068	Rohde & Schwarz	12 months	19.07.08
-	M0959	EMI Receiver	ESU40	100041	Rohde & Schwarz	12 months	19.03.17
x	M0486	EMI Receiver	ESU40	100041	Rohde & Schwarz	12 months	19.09.22
x	M0685	EMI Receiver	N9038A	MY52260159	Agilent Technologies	12 months	19.03.01
x	A0057	Horn Antenna Pre-Amplifier Assembly	HAP06-18W	00000037	Toyo Corporation	12 months	19.06.01
x	A0073	Loop Antenna	HFH2-Z2	100171	Rohde & Schwarz	12 months	18.12.10
x	A0089	Biconical Antenna	BBA9106	VHA91032835	Schwarzbeck	12 months	18.12.03
x	A0088	Log periodic Antenna	UHALP9108A1	0649	Schwarzbeck	12 months	18.12.03
x	A0064	Horn Antenna	BBHA9120D	746	Schwarzbeck	12 months	18.11.04
-	A0078	Horn Antenna	HAP06-18W	00000070	Toyo Corporation	12 months	18.11.04
x	A0058	Horn Antenna	HAP18-26W	00000016	Toyo Corporation	12 months	18.12.01
x	CS0017	N-RE Cable System 1	-	-	-	12 months	18.11.04
x	CS0018	N-RE Cable System 2	-	-	-	12 months	18.11.04
x	CS0045	N-3m EMF Cable System	-	-	-	12 months	18.11.04
x	CS0074/0075	N-RE Cable SYSTEM 4	-	-	-	12 months	18.11.04
x	M0126	Step Attenuator	8494H	3837M01144	Agilent Technologies	12 months	18.11.04
x	M0752	Pre Amplifier	310N	320621	SONOMA INSTRUMENT	12 months	18.11.04
x	M0128	3dB Attenuator	8491A	53541	Agilent Technologies	12 months	18.11.04
x	M0609	3dB Attenuator	8491B	MY39265960	Agilent Technologies	12 months	18.11.04
x	M0737	GHz Filter Box	FB-G1	001	Sony EMCS	12 months	18.11.04
-	M5079	Temperature Meter	608-H2	41475953	testo	12 months	19.10.28
x	M5180	Temperature Meter	608-H2	41475964	testo	12 months	18.12.03

About calibration interval

Valid until the end of the month listed in "Cal. Int." column.