RADIO TEST REPORT

(for Bluetooth Low Energy)

Project No.	:	JB-Z0364
Client	:	Sony Corporation
Address	:	1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan
Type of Equipment	:	Helmet Mounted Wireless Headset
Model No.	:	NYSNO-10
FCC ID	:	AK8NYSNO10
Regulation Applied	:	47 CFR Part 15 Subpart C
Final Judgment	**:**	**Passed**
Sample Receipt	:	October 05, 2017
Testing	:	October 16, 2017 - November 03, 2017
Reported	:	November 14, 2017

Reported by :

T. Oho

Takanori Oho
Technical Manager
EMC/RF Test Laboratory, Main Lab.
Design Technology Division
Sony Global Manufacturing & Operations Corporation

Approved Signatory :

T. Kurihara

Teruki Kurihara
Technical Manager
EMC/RF Test Laboratory, Main Lab.
Design Technology Division
Sony Global Manufacturing & Operations Corporation

Notice

** These test results relate only to the items (combination equipment, test configuration, operation condition etc.) tested.*
** This report shall not be reproduced except in full, without written approval of the laboratory.*
** This report must not be used by the client to claim product endorsement by A2LA or any agency of the U.S. Government.*
** 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.

A2LA ACCREDITED
TESTING CERT #3203.01

TABLE OF CONTENTS

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.

1. General Information

1.1. Description of Equipment Under Test (EUT)

General specification

Test Sample Condition	: ☐ Prototype ☒ Pre-production ☐ Mass-production
Type of Equipment	: Helmet Mounted Wireless Headset
Trade Name	: SONY
Model No.	: NYSNO-10
Serial No.	: 5001063, 5001062
Power Rating	: DC 3.6 V

Radio specification

Function of the Equipment	: Transceiver
Operating Frequency	: 2402 - 2480 MHz
Modulation Type	: GFSK
Channel Spacing	: 2 MHz
Channel Bandwidth	: 2 MHz
Number of channels	: 40
Antenna Type	: Monopole Antenna
Antenna connector Type	: None
Antenna Gain	: 3.5 dBi
Operating Temperature	: -10 to +40 deg.C

1.2. Summary of Test Result

47 CFR Part 15 Subpart C § 15.247 [DTS]

Test Item	Worst Margin	Test Frequency band	Results
AC Power-line Conducted Emissions	-	150 kHz - 30 MHz	N/A *2
6dB Bandwidth	Refer to the test data	Carrier	Complied
Maximum Peak Conducted Output Power	28.53 dB	Carrier	Complied
Power Spectral Density	23.00 dB	Carrier	Complied
Radiated Spurious Emissions	10.1 dB (AV) 7439.884 MHz Horizontal	9 kHz - 25 GHz (excluding carrier and band edge)	Complied
Conducted Spurious Emissions for Band Edge *1	26.49 dB 2399.99 MHz	Carrier band edge	Complied

*1: Conducted Spurious Emission 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 Emission 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 DTS Meas. Guidance v04

Test Condition
Radiated Spurious Emissions
Test Distance : ☒ 3 m ☐ 10m (9 kHz - 30 MHz)
☒ 3 m ☐ 10m (30 - 1000 MHz)
☒ 3 m (1 - 25 GHz)
Dimensions of the EUT table : 0.8m (below 1 GHz) or 1.5m (above 1 GHz) height, 2m width and 1m depth.

1.4. Measurement Procedures

We performed the measurements in accordance with NV3-06, available upon the request.
☒ No deviation
☐ Deviation from the above procedure

The summary of the above procedure is mentioned below

Antenna-port Conducted Measurement

1. Antenna-port of the EUT was connected to the power sensor (Maximum peak conducted output power) or spectrum analyzer. (other test items).

2. For each EUT operation mode, the Antenna-port Conducted Measurements were measured with power meter or spectrum analyzer.

Test Item * Antenna-port Conducted Measurements	Detector	RBW
6dB Bandwidth	Peak	100 kHz
Maximum Peak Conducted Output Power	Peak	-
Power Spectral Density	Peak	3 kHz
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 compensated the distance factor with follows;
   9 kHz - 490 kHz [Limit at 3m] = [Limit at 300m] + 40log (300[m] / 3[m])
   490 kHz - 30 MHz [Limit at 3m] = [Limit at 30m] + 40log (30[m] / 3[m])

5. Find the worst arrangement of the EUT as follows;
   - Rotate the turntable and/or scanning the antenna.
   - On every condition, explore the highest emissions with the spectrum analyzer.
     (9 kHz - 25 GHz, peak detector)

6. On the worst arrangement of the EUT found in above, choose the three highest harmonics or spurious emissions on the spectrum data.(*excluding carrier band edges)
   The final measurements are performed with all test operating modes for these emissions as follows;

   The test antenna and the turntable were performed with follows;

	9 kHz - 30 MHz	30 MHz - 1000 MHz	1 GHz - 25 GHz
Antenna	Loop Antenna	Bi-conical Antenna, Log-periodic Antenna	Horn Antenna
Antenna scanning range	1m, Vertical, 360 degrees	1 - 4m, Horizontal and Vertical	1 - 4m *, 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 - 90 kHz 110 kHz - 490 kHz	90 kHz- 110 kHz 490 kHz - 30 MHz	30 MHz - 1000 MHz	1 GHz - 25 GHz
Detector	Peak / Average	Quasi-peak	Quasi-peak	Peak / Average
RBW	200 Hz (6dB) or 9 kHz (6dB) *1	200 Hz (6dB) or 9 kHz (6dB) *1	120 kHz (6dB)	1 MHz (6dB)
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 - 150 kHz	150 kHz - 30 MHz	30 MHz - 25 GHz
Detector	Peak	Peak	Peak
RBW	300 Hz (6dB) *	10 kHz (6dB) *	100 kHz (6dB)
Instrument	Spectrum analyzer	Spectrum analyzer	Spectrum analyzer

   *: Correction factor of RBW was compensated to a measurement result by the following formula.
   C.F. of RBW [dB] = 10*log (100 kHz / used RBW)

8. If the final average measurement result exceeded the limit in the authorized band edge, the integration method is carried out with follows;

	2483.5 - 2485.5 MHz
Detector	Peak
RBW	100 kHz (6dB)
Instrument	Spectrum analyzer
Function	Channel Power (integration BW : 1 MHz)

9. Although these tests 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.

1.5. Test Facility

Address of Test Facility

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

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

Phone : +81 438 37 2750

Radiated Spurious Emission

Semi-Anechoic chamber

☒ 4th Site ☐ EMC Site

Antenna-port Conducted Measurements *

Shielded Room

☒ 4th Site SR1

*Note: This item contains the following

-6dB Bandwidth
-Maximum Peak Conducted Output Power
-Power Spectral Density
-Conducted Spurious Emissions for Band Edge

A2LA Accreditation for Test Facility

The above test facility has been fully reported to A2LA and accepted as follows:

A2LA Certificate No. : 3203.01

Cert. Validated Date : 31 Oct 2019

1.6. Uncertainty

Test Item	Frequency	4th Site SR1
Conducted Output Power	1 - 6 GHz	± 0.84 dB
Power Spectral Density, Conducted Spurious Emissions	1 - 6 GHz	± 0.89 dB

Test Item	Frequency	Distance	4th Site	EMC Site
AC Power-line Conducted Emissions	150 kHz - 30 MHz	-	± 3.34 dB	± 3.34 dB
Radiated Emissions	Below 30 MHz	3m	± 2.59 dB	± 2.59 dB
	30 - 300 MHz	3m	± 4.18 dB	± 4.18 dB
	300 - 1000 MHz	3m	± 4.04 dB	± 4.04 dB
	1 - 6 GHz	3m	± 4.63 dB	± 4.63 dB
	6 - 18 GHz	3m	± 5.31 dB	± 5.31 dB
	18 - 26.5 GHz	3m	± 5.78 dB	± 5.78 dB

2. System Test Configuration

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. Test Operating Conditions

The tests have been carried out the following conditions.

Test Items	Operating Mode	Data Rate	Test Channels
6dB Bandwidth, Maximum Peak Conducted Output Power, Power Spectral Density, Radiated Spurious Emissions	Bluetooth Low Energy	1 Mbps	2402 MHz, 2442 MHz, 2480 MHz
Conducted Spurious Emissions for Band Edge	Bluetooth Low Energy	1 Mbps	2402 MHz

The Software for Operating Mode Name : BlueSuite
Version : 2.5.0

Special accessories needed for connecting the EUT to achieve compliance:

Item	Manufacturer	Model No.	Serial No.	Remark
Personal Computer	SONY	PCG-71611N	1006554	-
AC ADAPTER	SONY	VPC-CB19FJ	148753032 0255555	-

2.3. 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 :

2.4. Configuration of Tested System

Antenna-port Conducted Measurements

The equipment under test (EUT)

Symbol	Item	Manufacturer	Model No.	Serial No.
A-1	Helmet Mounted Wireless Headset	SONY	NYSNO-10	5001063

Support equipment for operation

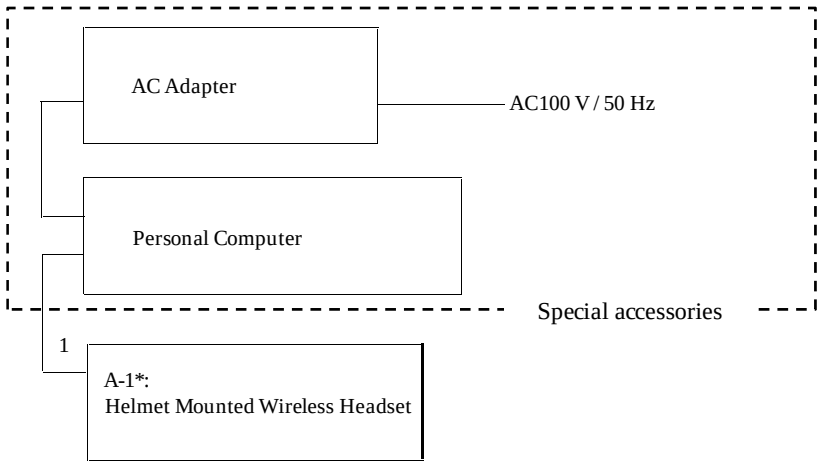
Symbol	Item	Manufacturer	Model No.	Serial No.
-	-	-	-	-

Type of cable

Symbol	Description	Identification (Manufacturer etc.)	Shielded YES / NO	Ferrite Core	Length (m)	Bundled
1	USB Cable	-	YES	NO	0.5	-

System configuration

*: EUT



Radiated Spurious Emissions Measurement

The equipment under test (EUT)

Symbol	Item	Manufacturer	Model No.	Serial No.
A-2	Helmet Mounted Wireless Headset	SONY	NYSNO-10	50001062

Support equipment for operation

Symbol	Item	Manufacturer	Model No.	Serial No.
-	-	-	-	-

Type of cable

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

System configuration

*: EUT

3. Test Data

3.1. 6dB Bandwidth

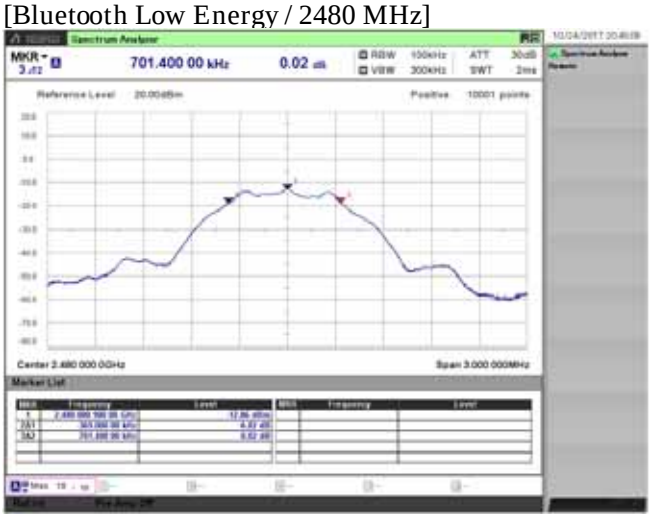
1) Ambient temperature : 22.2 deg.C
2) Relative humidity : 51.0 %
3) Date of measurement : October 24, 2017
4) Measured by : M.KOUGA
5) Operating mode : Transmitting mode

Mode	Rate [Mbps]	Channel [MHz]	Result [MHz]	Limit [MHz]
BLE	1	2402	690.300	0.5
		2442	700.800	0.5
		2480	701.400	0.5

[Bluetooth Low Energy / 2402 MHz]

[Bluetooth Low Energy / 2442 MHz]

[Bluetooth Low Energy / 2480 MHz]



3.2. Maximum Peak Conducted Output Power

1) Ambient temperature : 22.6 deg.C
2) Relative humidity : 57.7 %
3) Date of measurement : October 16, 2017
4) Measured by : M.KOUGA
5) Operating mode : Transmitting mode

Maximum Peak Conducted Output Power

Mode	Rate [Mbps]	Channel [MHz]	Reading(PK) [dBm]	C.F. [dB]	Result(PK) [dBm]	Result(PK) [W]	Limit [dBm]	Margin [dB]
BLE	1	2402	-10.08	11.55	1.47	0.00140	30.0	28.53
		2442	-10.18	11.55	1.37	0.00137	30.0	28.63
		2480	-11.37	11.55	0.18	0.00104	30.0	29.82

Maximum Average Conducted Output Power (for SAR measurement)

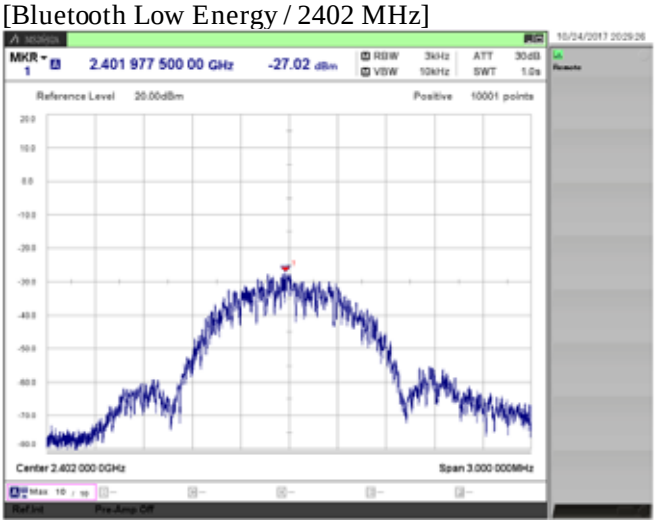
Mode	Rate [Mbps]	Channel [MHz]	Reading(AV) [dBm]	C.F. [dB]	Duty Factor [dB]	Result(AV) [dBm]	Result(AV) [W]
BLE	1	2402	-12.90	11.55	2.01	0.66	0.00116
		2442	-12.89	11.55	2.01	0.67	0.00117
		2480	-14.17	11.55	2.01	-0.61	0.00087

3.3. Power Spectral Density

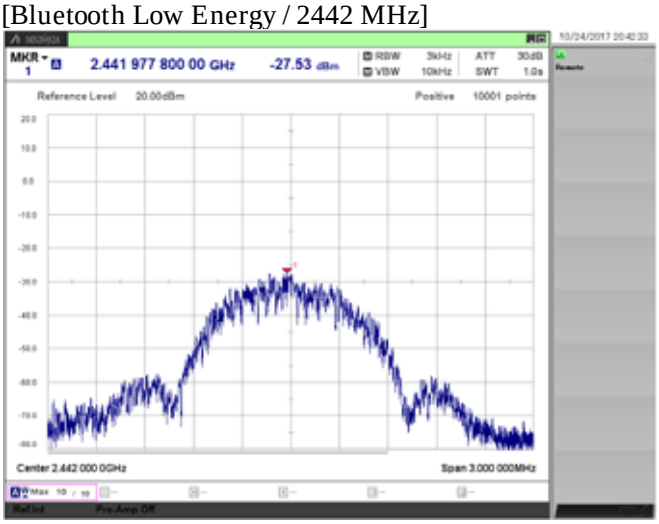
1) Ambient temperature : 22.2 deg.C
2) Relative humidity : 51.0 %
3) Date of measurement : October 24, 2017
4) Measured by : M.KOUGA
5) Operating mode : Transmitting mode

Mode	Rate [Mbps]	Channel [MHz]	Reading(PK) [dBm]	C.F. [dB]	Result(PK) [dBm]	Limit [dBm]	Margin [dB]
BLE	1	2402	-27.02	12.02	-15.00	8.0	23.00
		2442	-27.53	12.02	-15.51	8.0	23.51
		2480	-28.76	12.02	-16.74	8.0	24.74

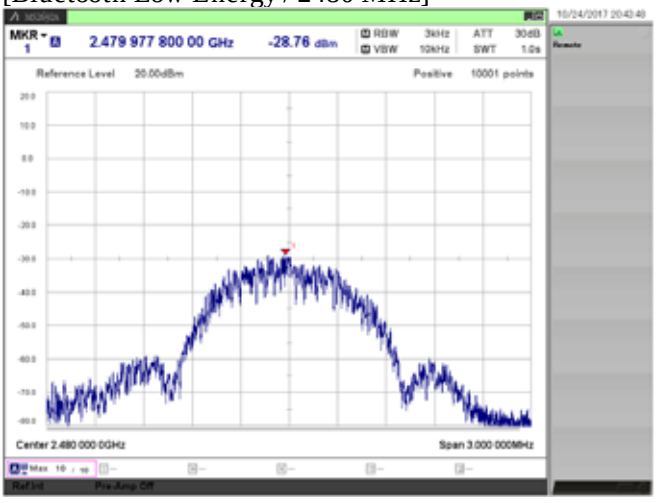
[Bluetooth Low Energy / 2402 MHz]



[Bluetooth Low Energy / 2442 MHz]



[Bluetooth Low Energy / 2480 MHz]

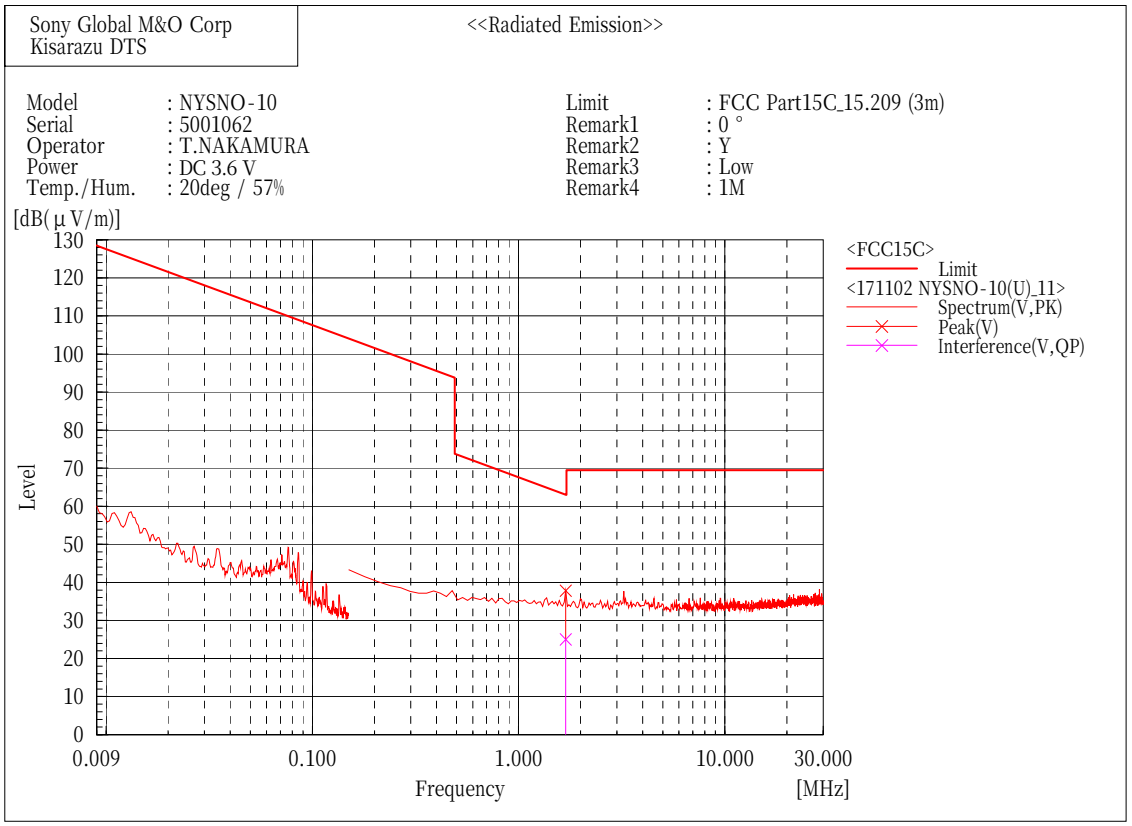


3.4. Radiated Spurious Emissions

1) Date of measurement

9 kHz - 30 MHz	:	November, 02 2017 (all mode)
30 MHz - 1000 MHz	:	November, 04 2017 (all mode)
1 GHz - 6GHz	:	October 26, 2017 (all mode)
6GHz - 18GHz	:	November 01, 2017 (all mode)
18GHz - 24.835GHz	:	November 03, 2017 (all mode)

9 kHz - 30 MHz
[Bluetooth Low Energy (1 Mbps) / 2402 MHz]

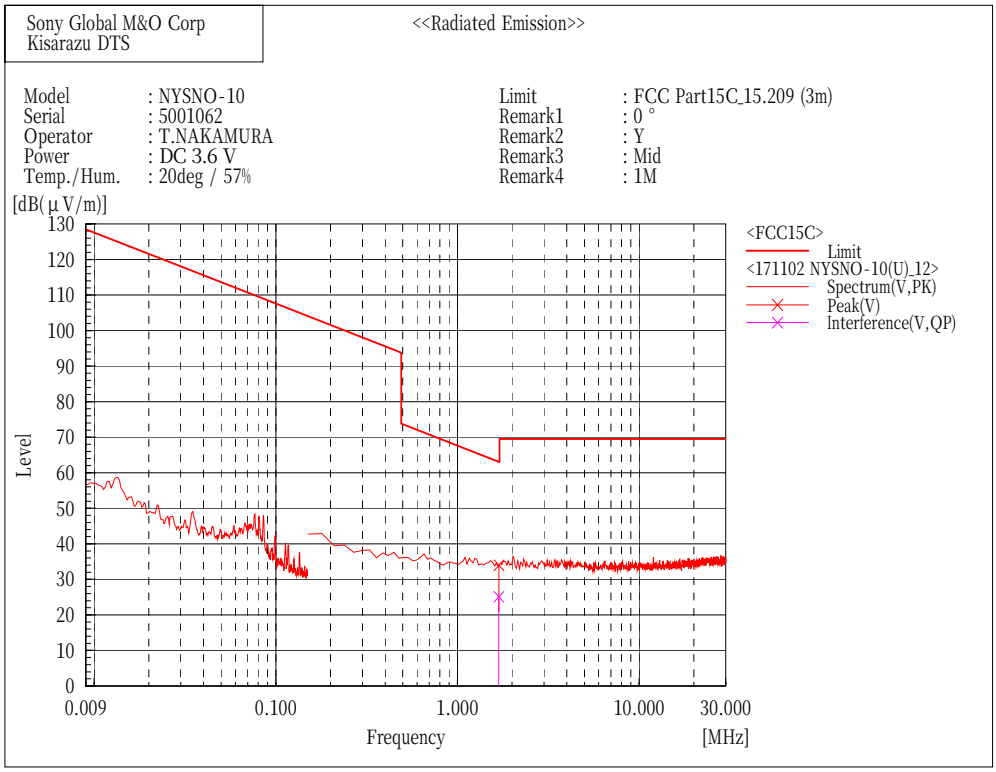


Final Result

--- 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	1.692	5.0	20.0	25.0	63.1	38.1	100.0	346.9

[Bluetooth Low Energy (1 Mbps) / 2442 MHz]

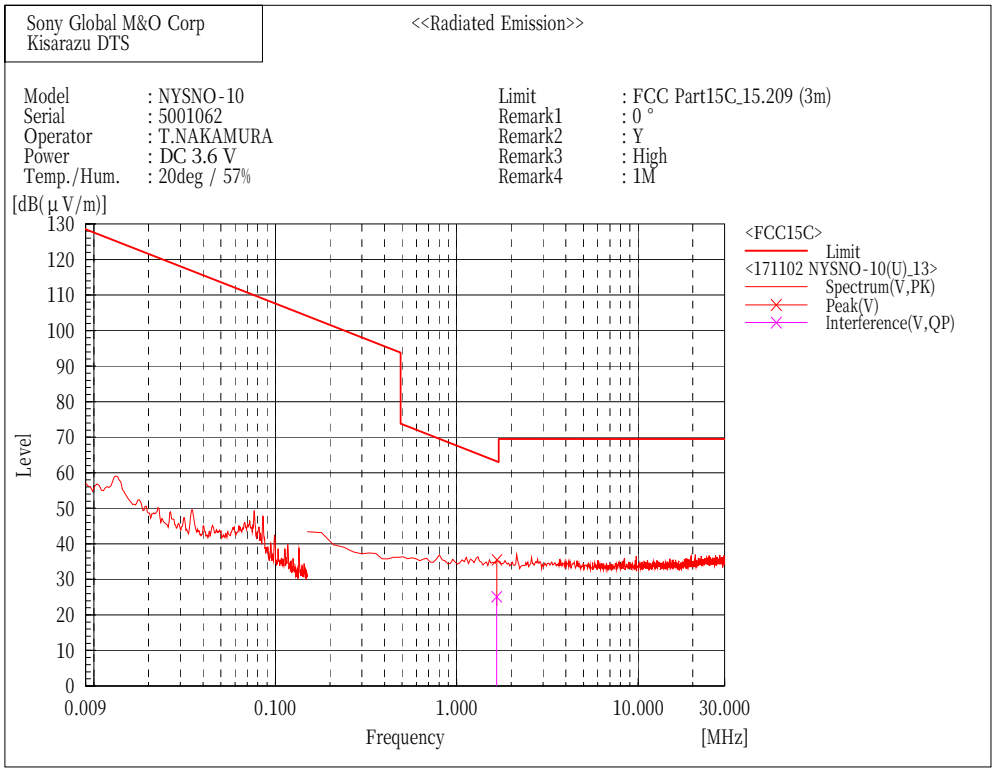


Final Result

--- 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	1.686	5.1	20.0	25.1	63.1	38.0	100.0	5.3

[Bluetooth Low Energy (1 Mbps) / 2480 MHz]

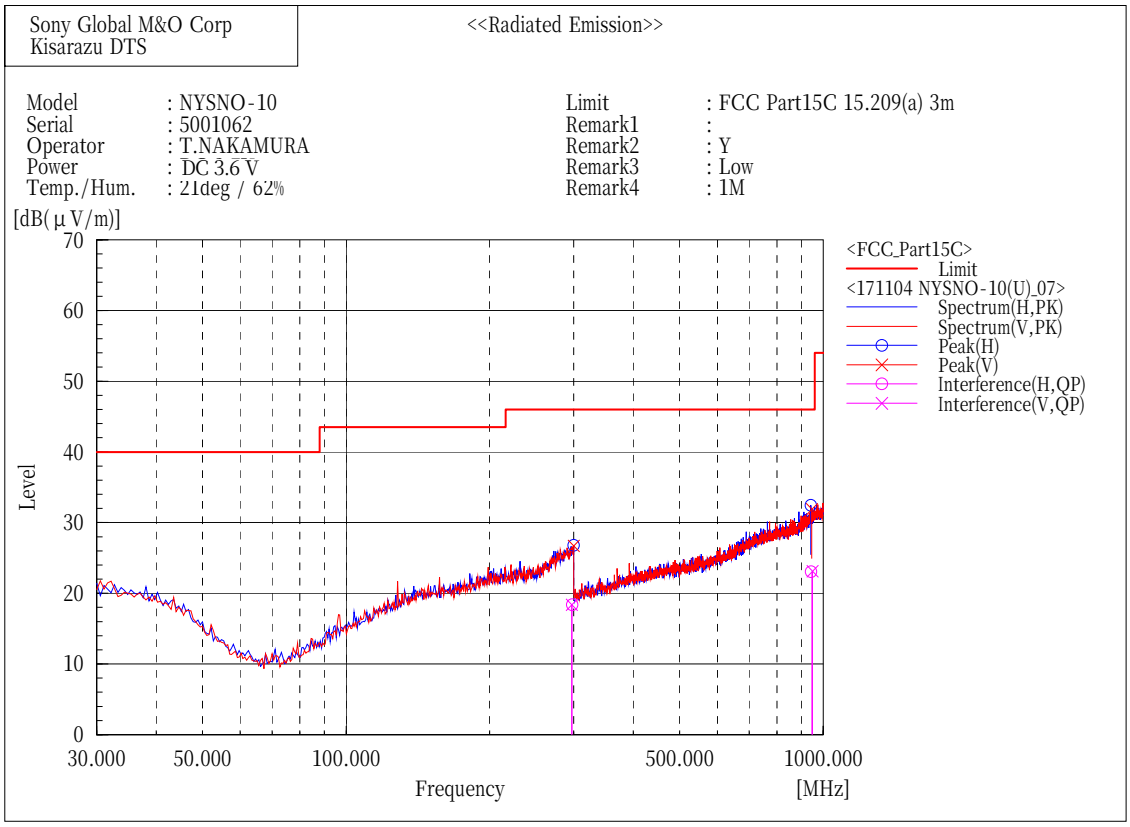


Final Result

--- 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	1.659	5.1	20.0	25.1	63.2	38.1	100.0	118.5

30 MHz - 1000 MHz
[Bluetooth Low Energy (1 Mbps) / 2402 MHz]



Final Result

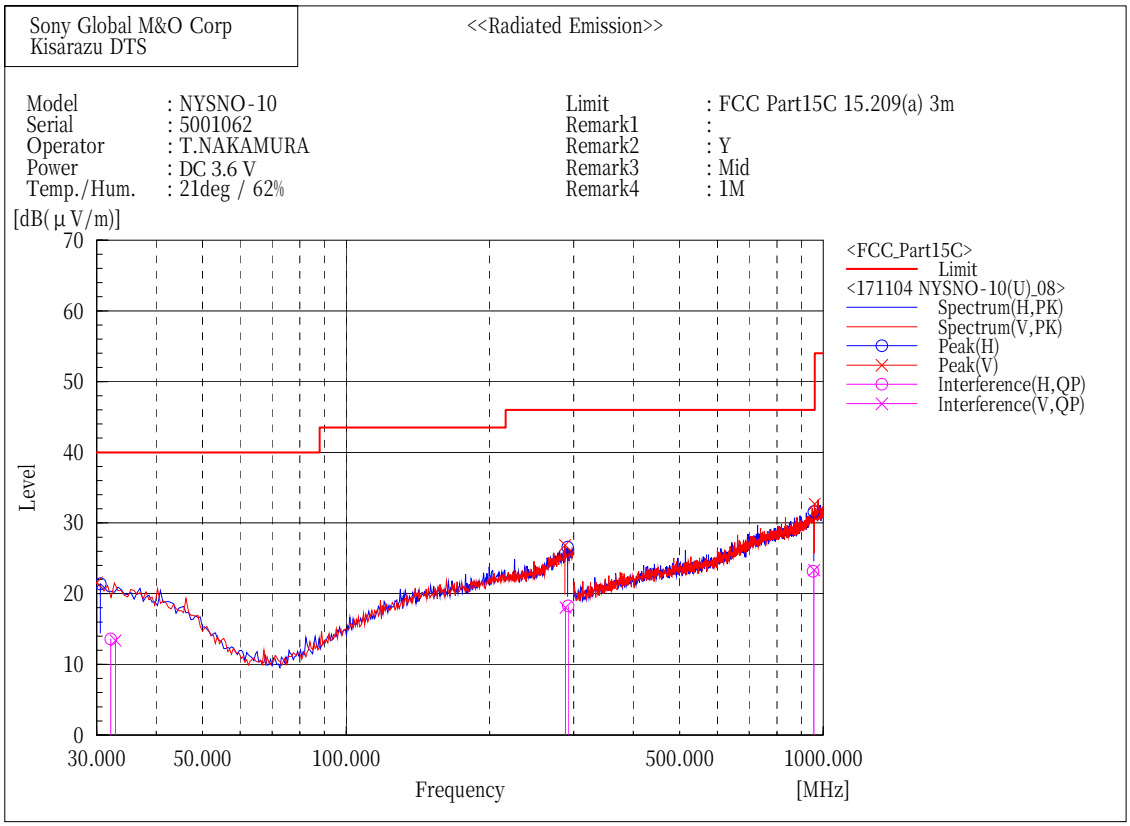
--- Horizontal Polarization (QP)---

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	297.750	24.3	-5.9	18.4	46.0	27.6	265.3	93.0
2	943.460	24.3	-1.2	23.1	46.0	22.9	234.8	35.9

--- 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	296.940	24.3	-5.9	18.4	46.0	27.6	206.9	60.6
2	949.700	24.2	-1.1	23.1	46.0	22.9	173.4	238.7

[Bluetooth Low Energy (1 Mbps) / 2442 MHz]



Final Result

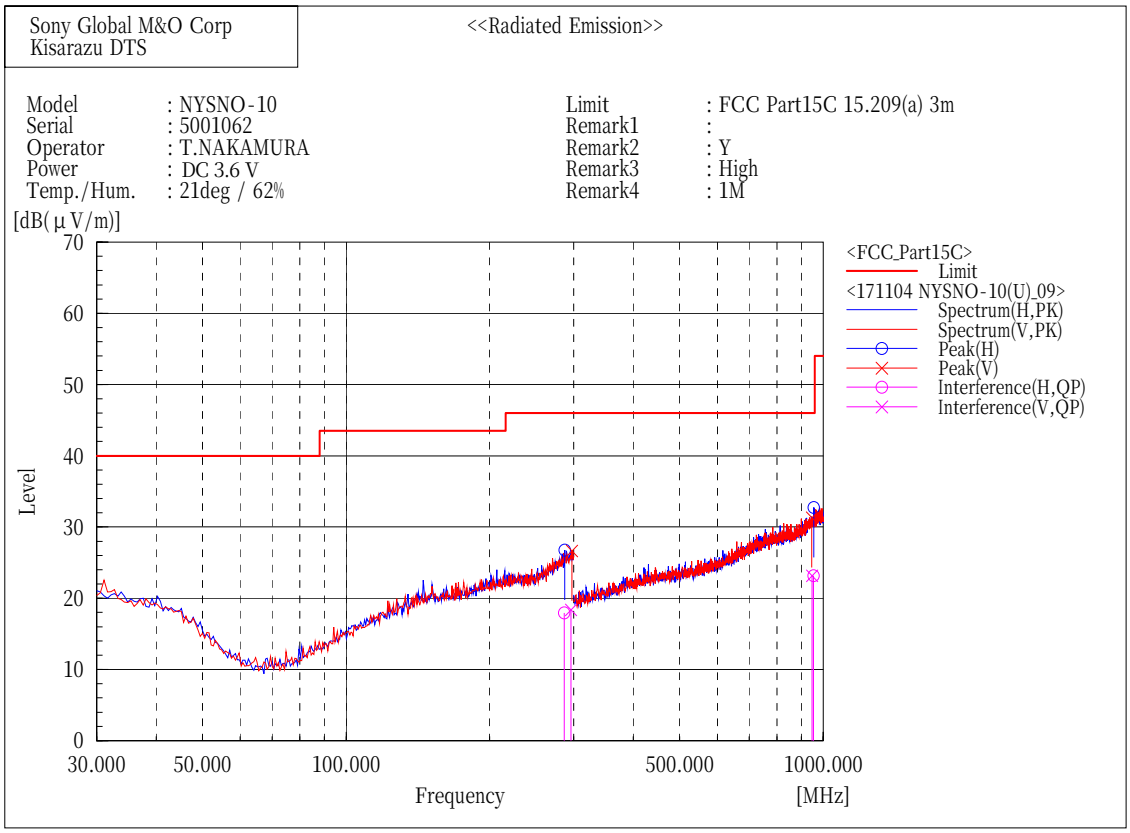
--- Horizontal Polarization (QP)---

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	32.108	25.3	-11.7	13.6	40.0	26.4	275.9	351.1
2	292.199	24.3	-6.0	18.3	46.0	27.7	212.9	134.9
3	952.480	24.2	-1.0	23.2	46.0	22.8	173.1	122.0

--- 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	32.868	25.3	-11.9	13.4	40.0	26.6	176.8	111.0
2	288.264	24.3	-6.2	18.1	46.0	27.9	202.5	211.1
3	956.720	24.2	-0.9	23.3	46.0	22.7	132.9	43.1

[Bluetooth Low Energy (1 Mbps) / 2480 MHz]



Final Result

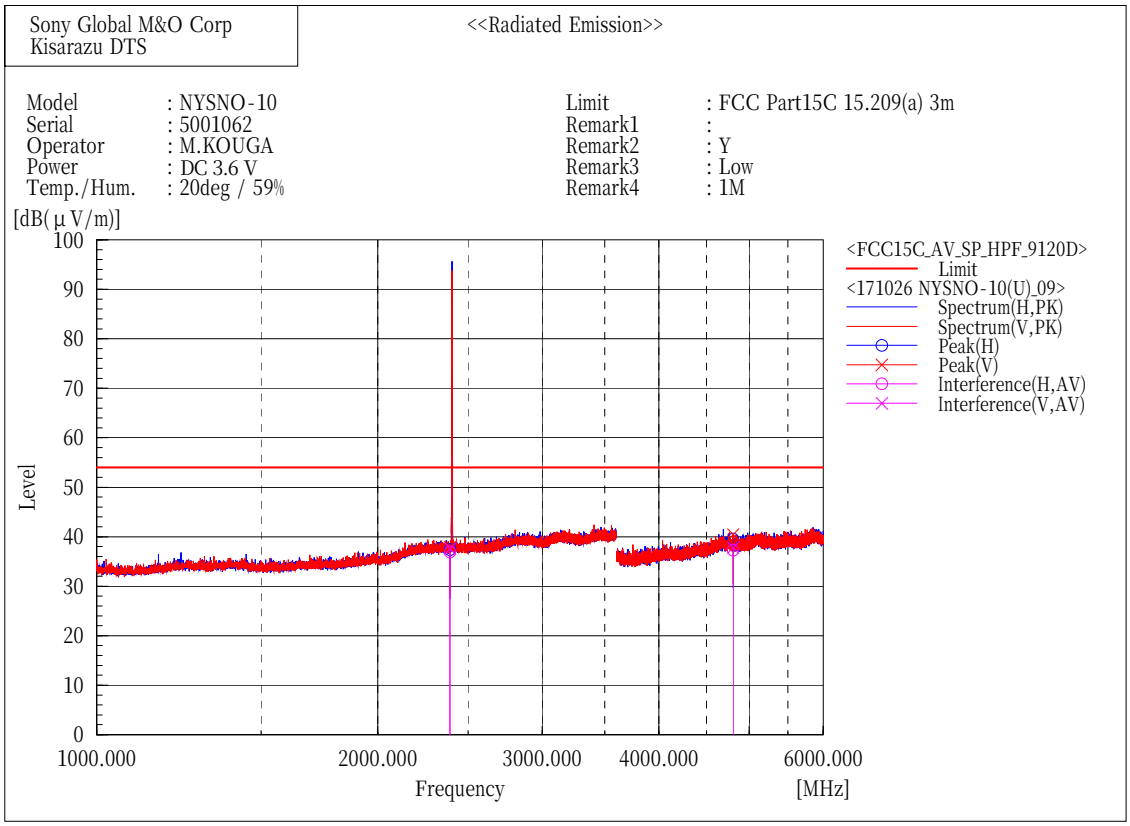
--- Horizontal Polarization (QP)---

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	286.523	24.2	-6.3	17.9	46.0	28.1	279.3	319.0
2	953.820	24.2	-1.0	23.2	46.0	22.8	222.2	88.7

--- 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	296.035	24.3	-5.9	18.4	46.0	27.6	178.4	345.1
2	948.060	24.3	-1.1	23.2	46.0	22.8	132.2	29.0

1 GHz - 6 GHz
[Bluetooth Low Energy (1 Mbps) / 2402 MHz]



Final Result

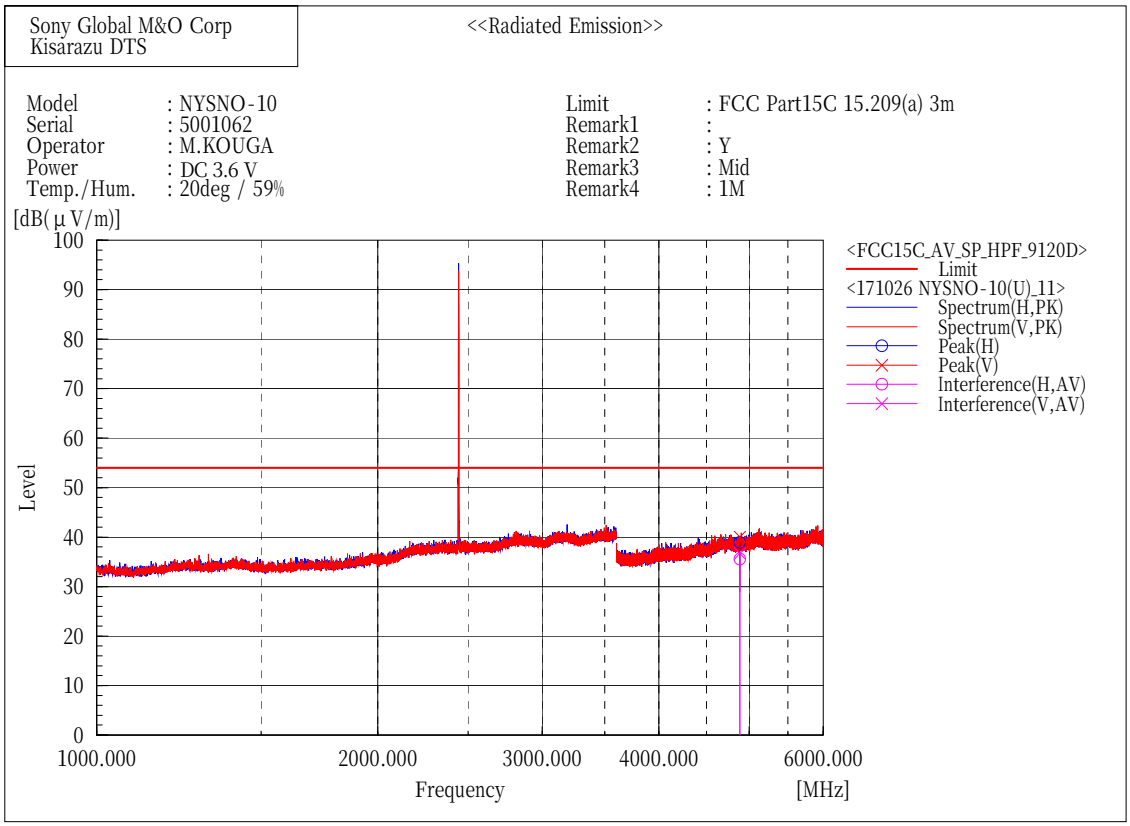
--- Horizontal Polarization (AV)---

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	39.0	-2.1	36.9	54.0	17.1	100.0	53.4
2	4804.485	34.8	2.5	37.3	54.0	16.7	280.0	320.0

--- 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	39.7	-2.1	37.6	54.0	16.4	100.0	130.1
2	4803.929	35.3	2.5	37.8	54.0	16.2	179.4	35.4

[Bluetooth Low Energy (1 Mbps) / 2442 MHz]



Final Result

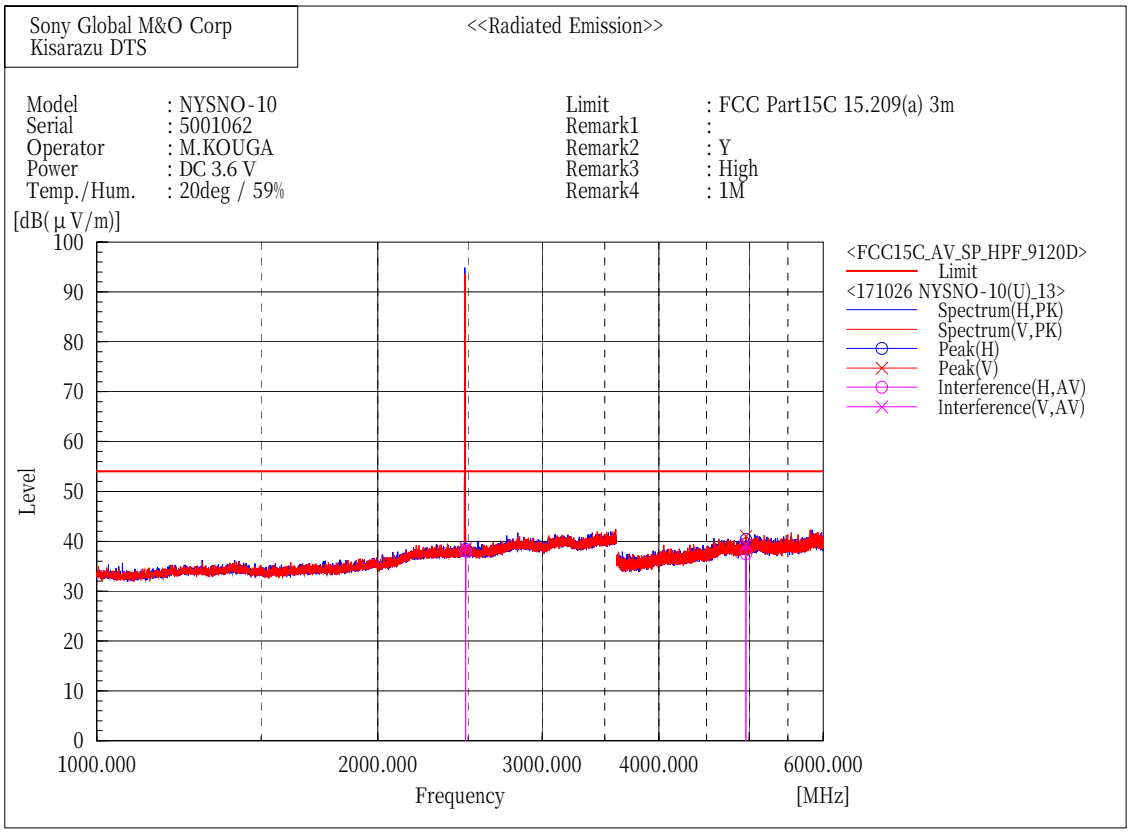
--- Horizontal Polarization (AV)---

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	4884.103	33.2	2.4	35.6	54.0	18.4	337.8	78.6

--- 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	4883.988	34.3	2.4	36.7	54.0	17.3	106.0	255.9

[Bluetooth Low Energy (1 Mbps) / 2480 MHz]



Final Result

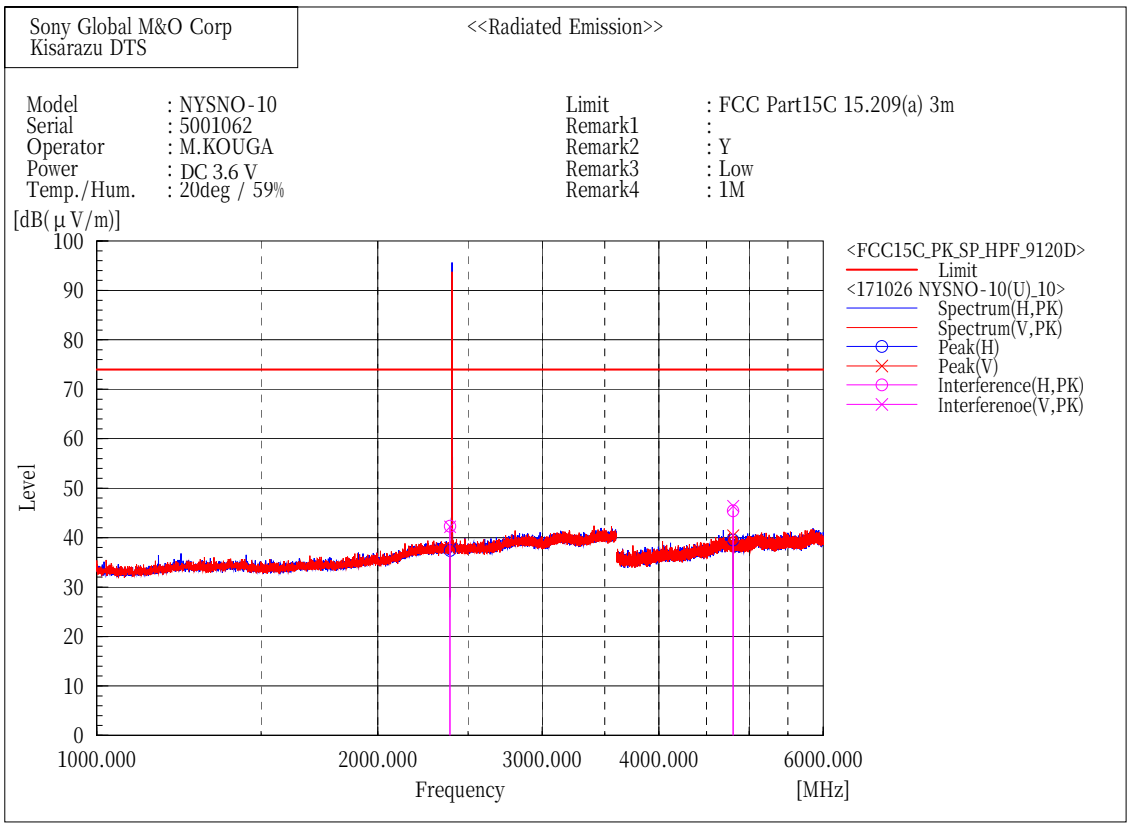
--- Horizontal Polarization (AV)---

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	39.8	-1.8	38.0	54.0	16.0	377.0	111.5
2	4959.696	35.0	2.5	37.5	54.0	16.5	379.5	126.2

--- 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	2483.500	40.5	-1.8	38.7	54.0	15.3	252.5	359.2
2	4959.964	36.9	2.5	39.4	54.0	14.6	285.9	180.2

[Bluetooth Low Energy (1 Mbps) / 2402 MHz]



Final Result

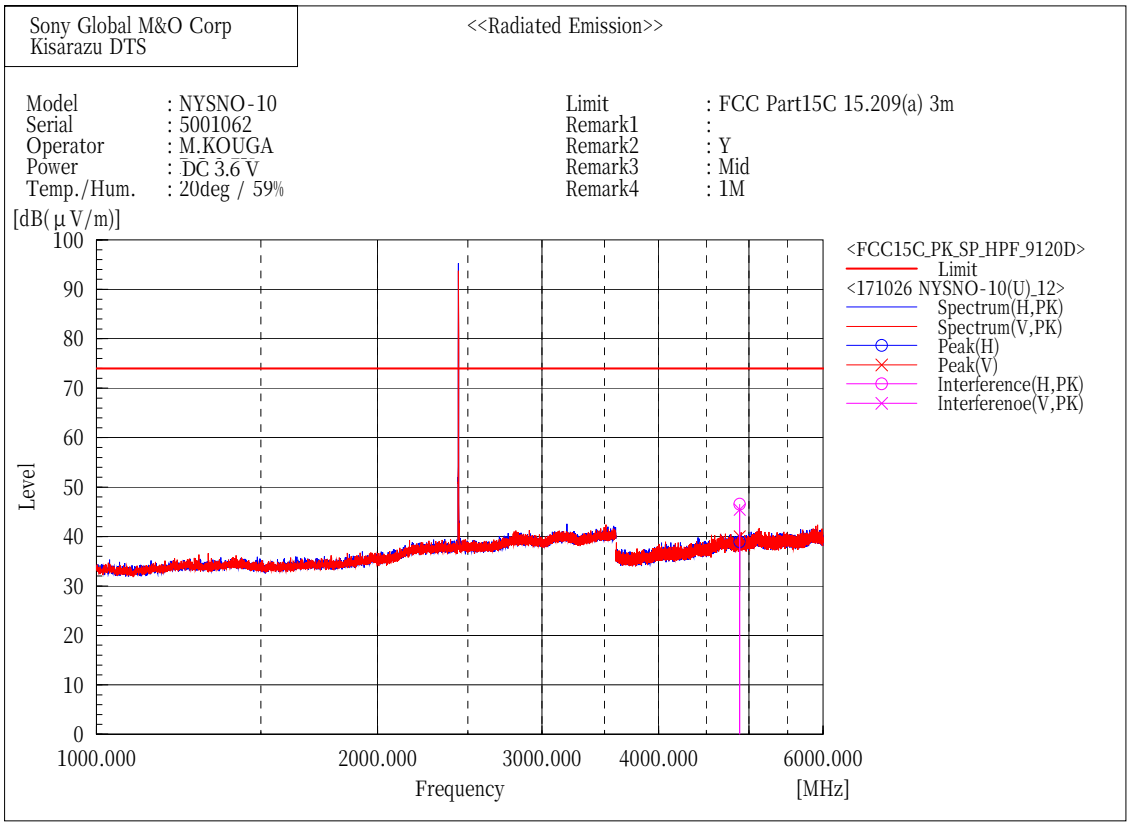
--- Horizontal Polarization (PK)---

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	44.4	-2.1	42.3	74.0	31.7	119.0	53.6
2	4803.714	42.9	2.5	45.4	74.0	28.6	286.9	312.9

--- 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	44.3	-2.1	42.2	74.0	31.8	100.0	130.2
2	4803.889	43.9	2.5	46.4	74.0	27.6	237.1	38.1

[Bluetooth Low Energy (1 Mbps) / 2442 MHz]



Final Result

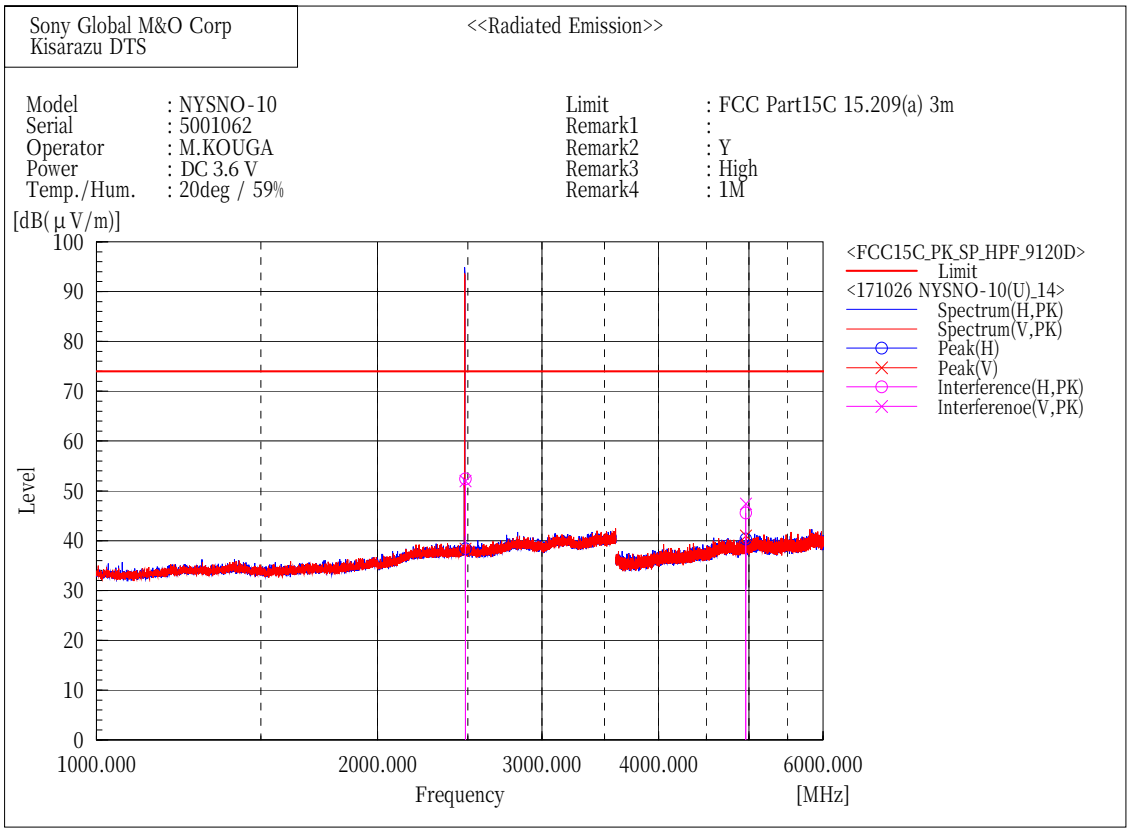
--- Horizontal Polarization (PK)---

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	4884.721	44.1	2.4	46.5	74.0	27.5	337.9	83.2

--- 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	4883.677	43.1	2.4	45.5	74.0	28.5	106.0	253.4

[Bluetooth Low Energy (1 Mbps) / 2480 MHz]



Final Result

--- Horizontal Polarization (PK)---

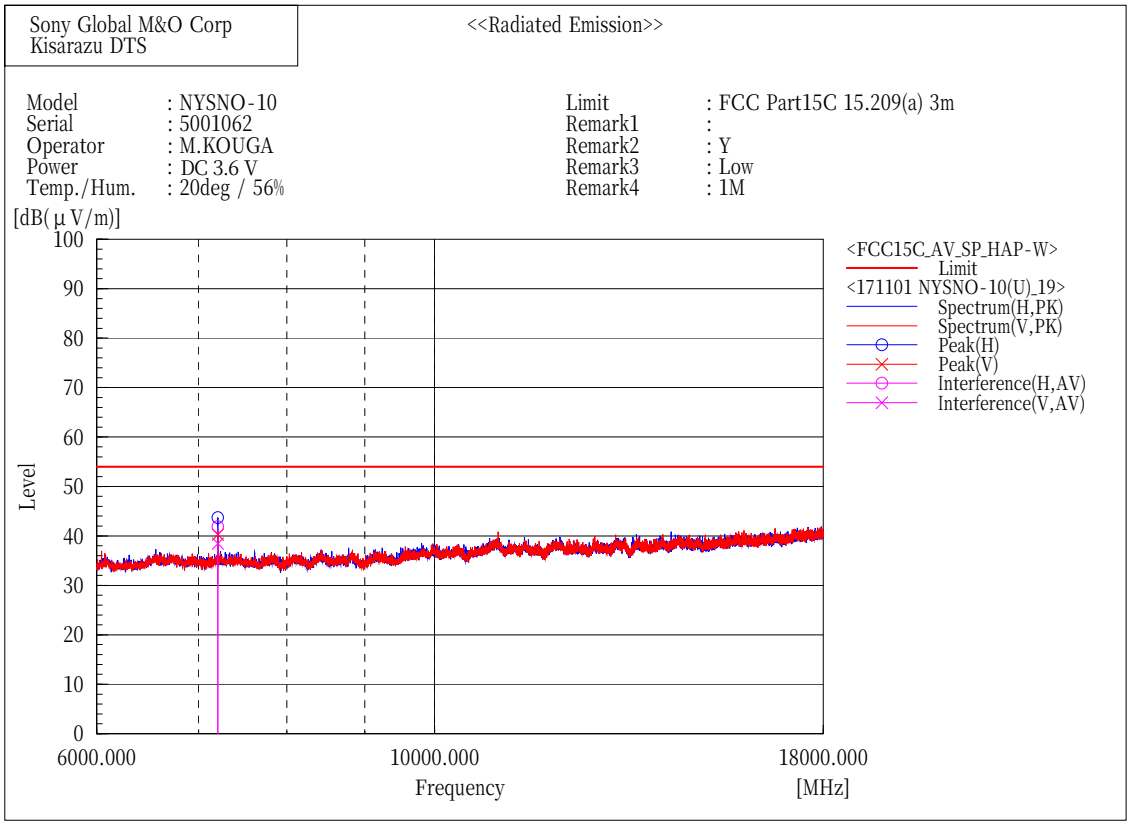
No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	2483.500	54.2	-1.8	52.4	74.0	21.6	376.5	110.8
2	4959.956	43.1	2.5	45.6	74.0	28.4	378.4	127.2

--- 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	53.8	-1.8	52.0	74.0	22.0	253.0	0.8
2	4959.363	44.9	2.5	47.4	74.0	26.6	285.9	182.2

6 GHz - 18 GHz

[Bluetooth Low Energy (1 Mbps) / 2402 MHz]



Final Result

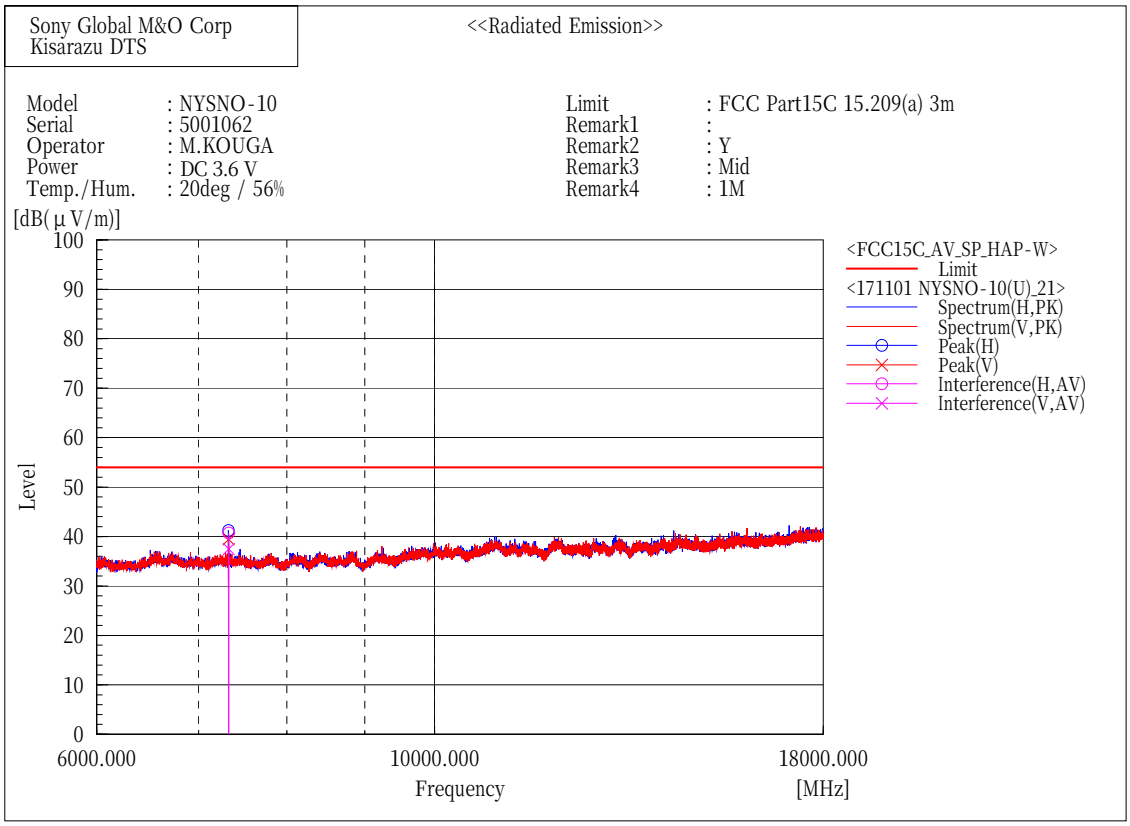
--- Horizontal Polarization (AV)---

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	7205.910	50.8	-8.9	41.9	54.0	12.1	262.2	313.4

--- 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	7206.035	47.4	-8.9	38.5	54.0	15.5	235.0	265.0

[Bluetooth Low Energy (1 Mbps) / 2442 MHz]



Final Result

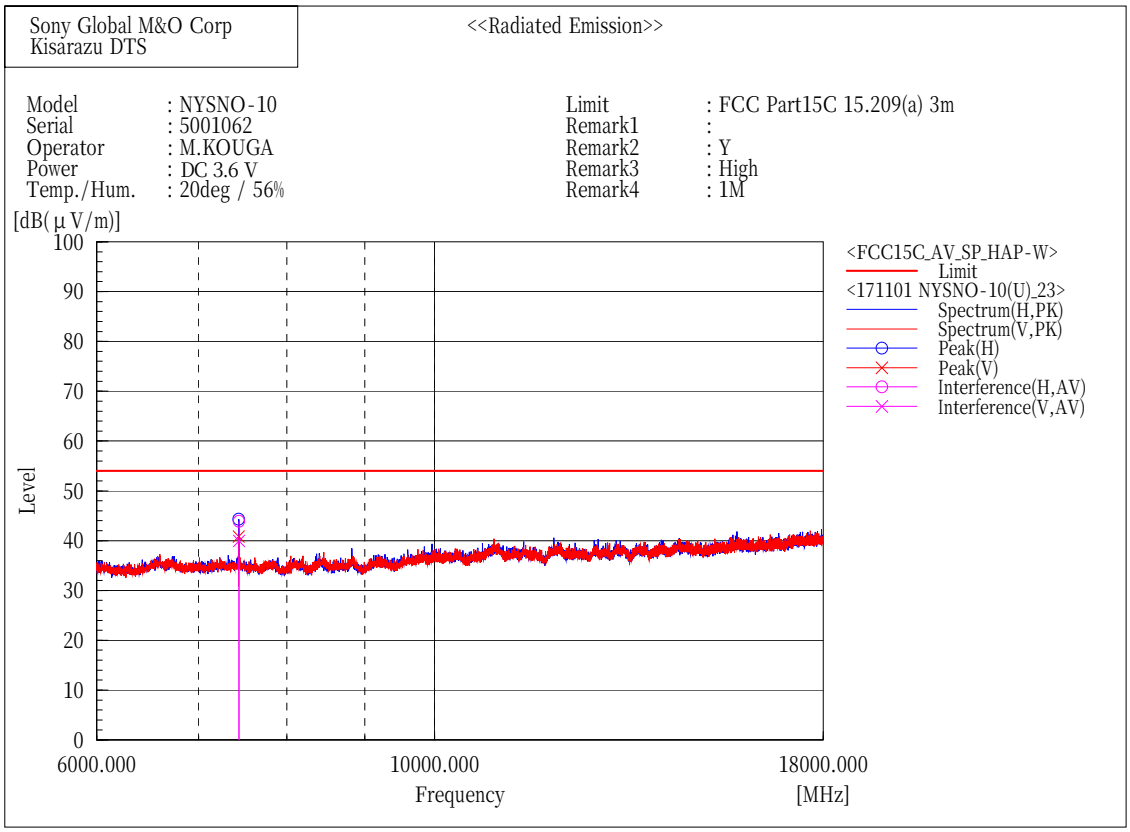
--- Horizontal Polarization (AV)---

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	7325.539	49.4	-8.7	40.7	54.0	13.3	284.0	316.0

--- 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	7325.315	46.2	-8.7	37.5	54.0	16.5	265.4	260.0

[Bluetooth Low Energy (1 Mbps) / 2480 MHz]



Final Result

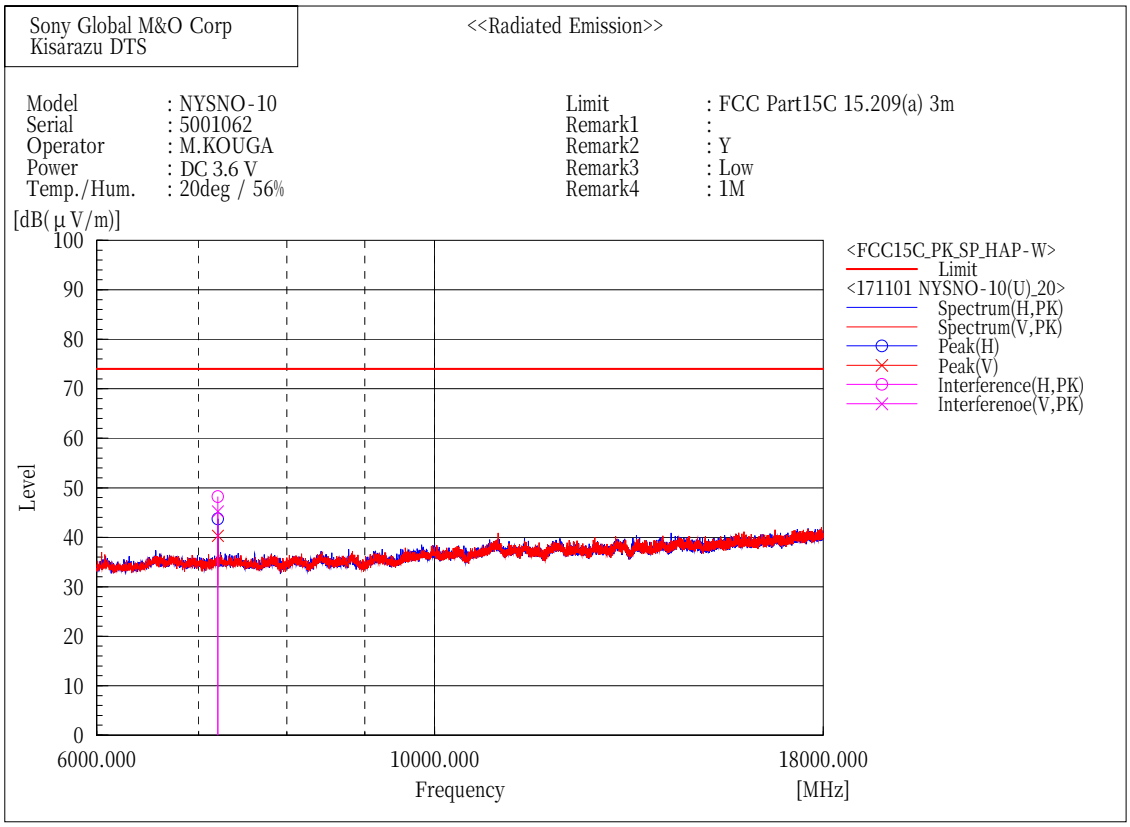
--- Horizontal Polarization (AV)---

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	7439.884	52.6	-8.7	43.9	54.0	10.1	280.0	318.0

--- 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	7439.899	48.7	-8.7	40.0	54.0	14.0	249.3	253.0

[Bluetooth Low Energy (1 Mbps) / 2402 MHz]



Final Result

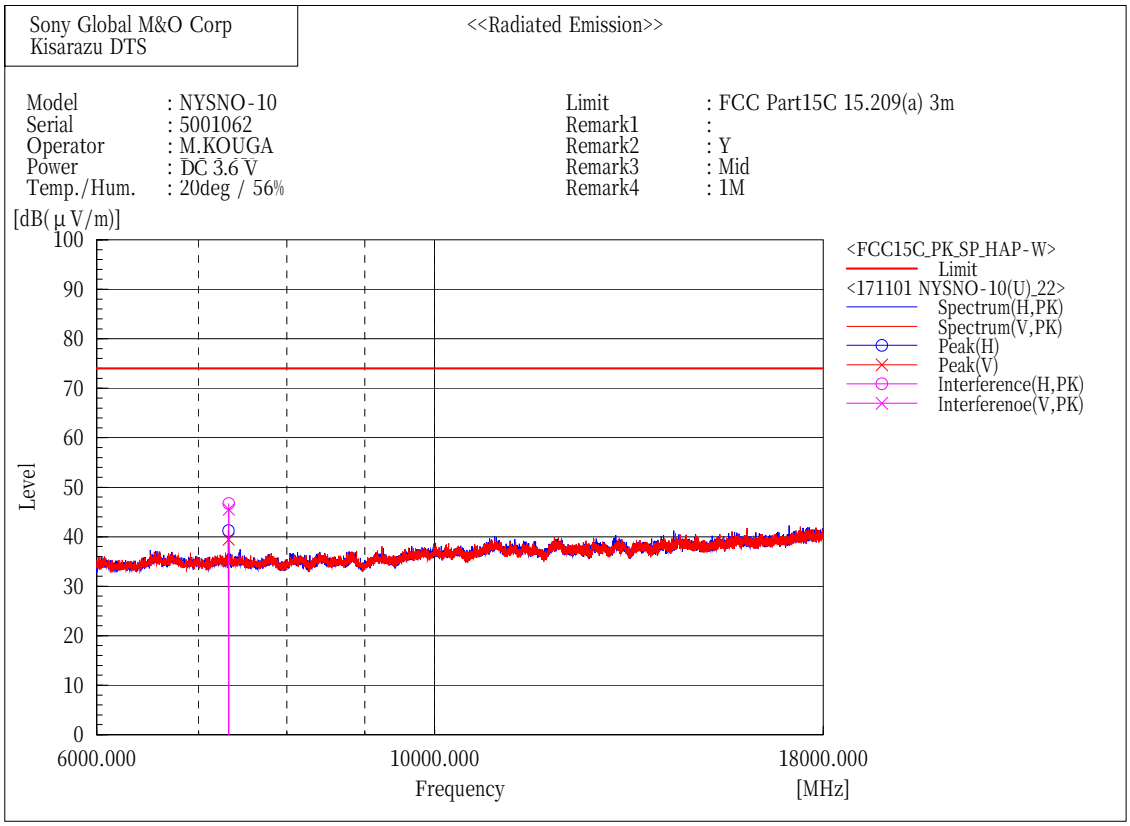
--- Horizontal Polarization (PK)---

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	7206.807	57.1	-8.9	48.2	74.0	25.8	262.0	312.0

--- 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	7206.727	54.1	-8.9	45.2	74.0	28.8	235.0	264.0

[Bluetooth Low Energy (1 Mbps) / 2442 MHz]



Final Result

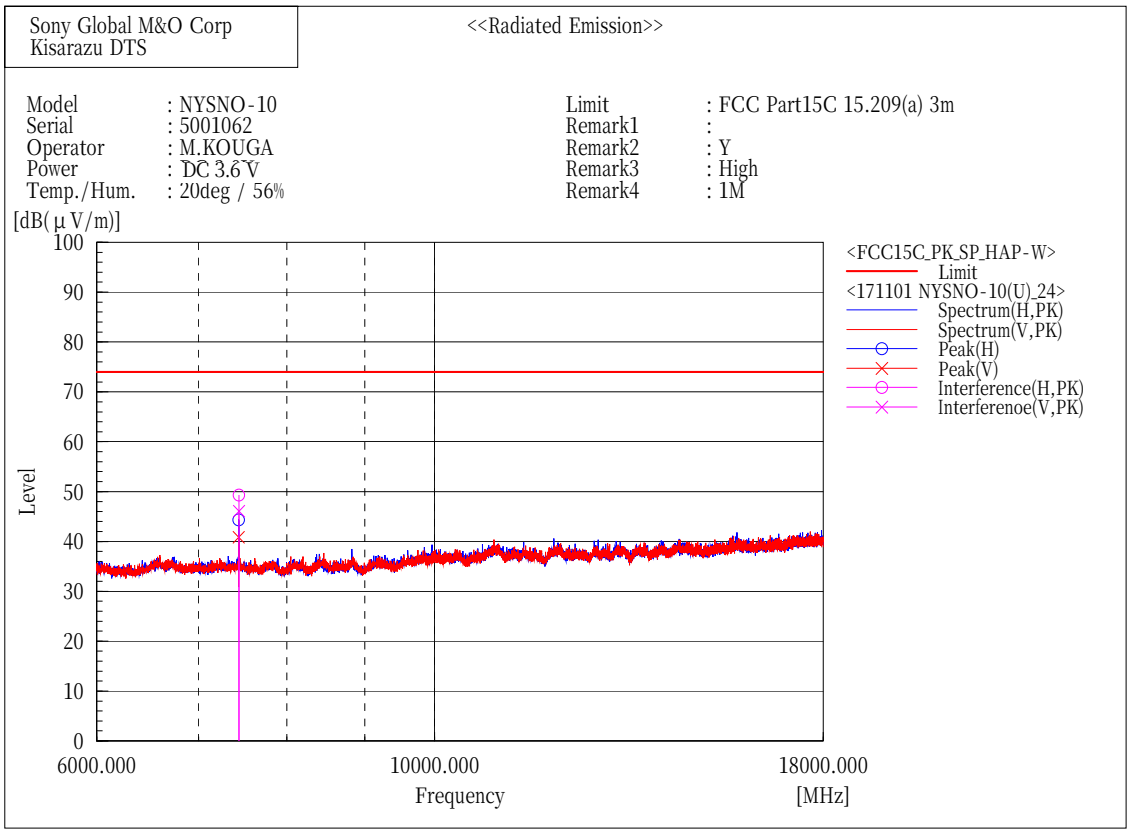
--- Horizontal Polarization (PK)---

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	7325.301	55.4	-8.7	46.7	74.0	27.3	283.0	315.0

--- 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	7325.212	54.2	-8.7	45.5	74.0	28.5	263.0	260.0

[Bluetooth Low Energy (1 Mbps) / 2480 MHz]



Final Result

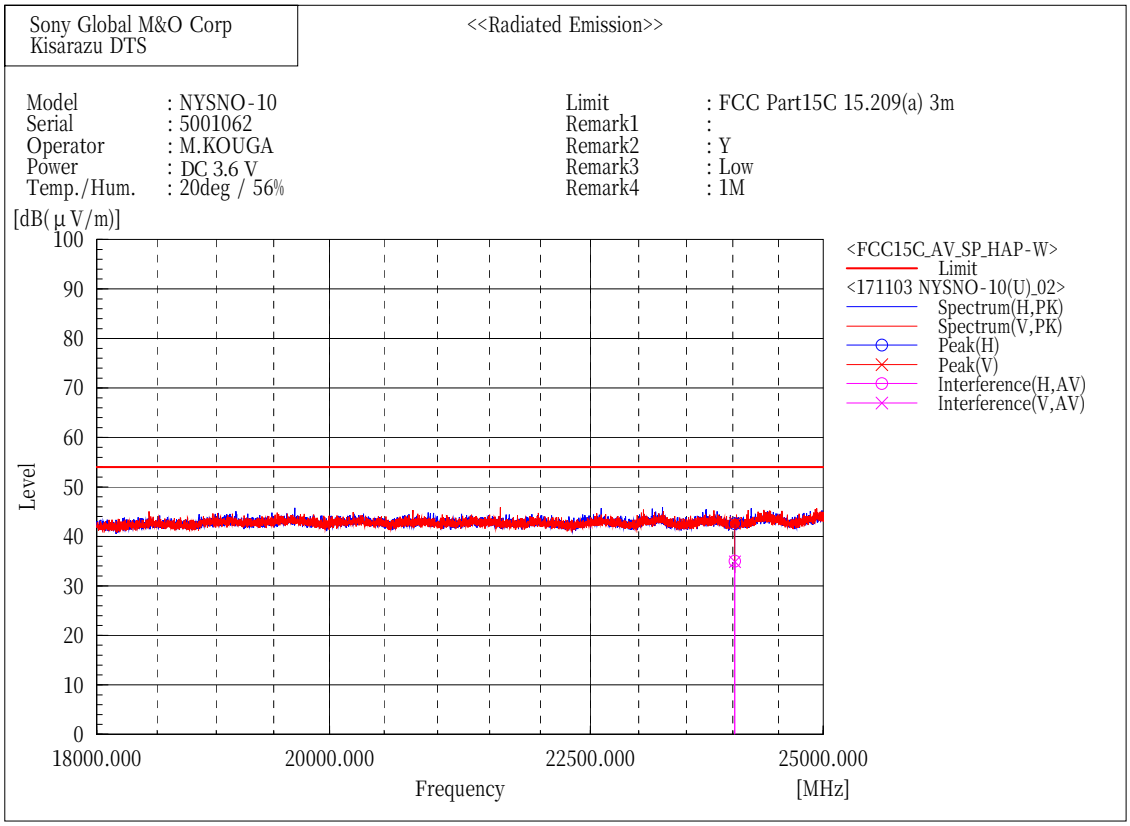
--- Horizontal Polarization (PK)---

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	7439.211	58.0	-8.7	49.3	74.0	24.7	280.0	320.4

--- 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	7439.286	54.8	-8.7	46.1	74.0	27.9	250.0	254.0

18 GHz - 25 GHz
[Bluetooth Low Energy (1 Mbps) / 2402 MHz]



Final Result

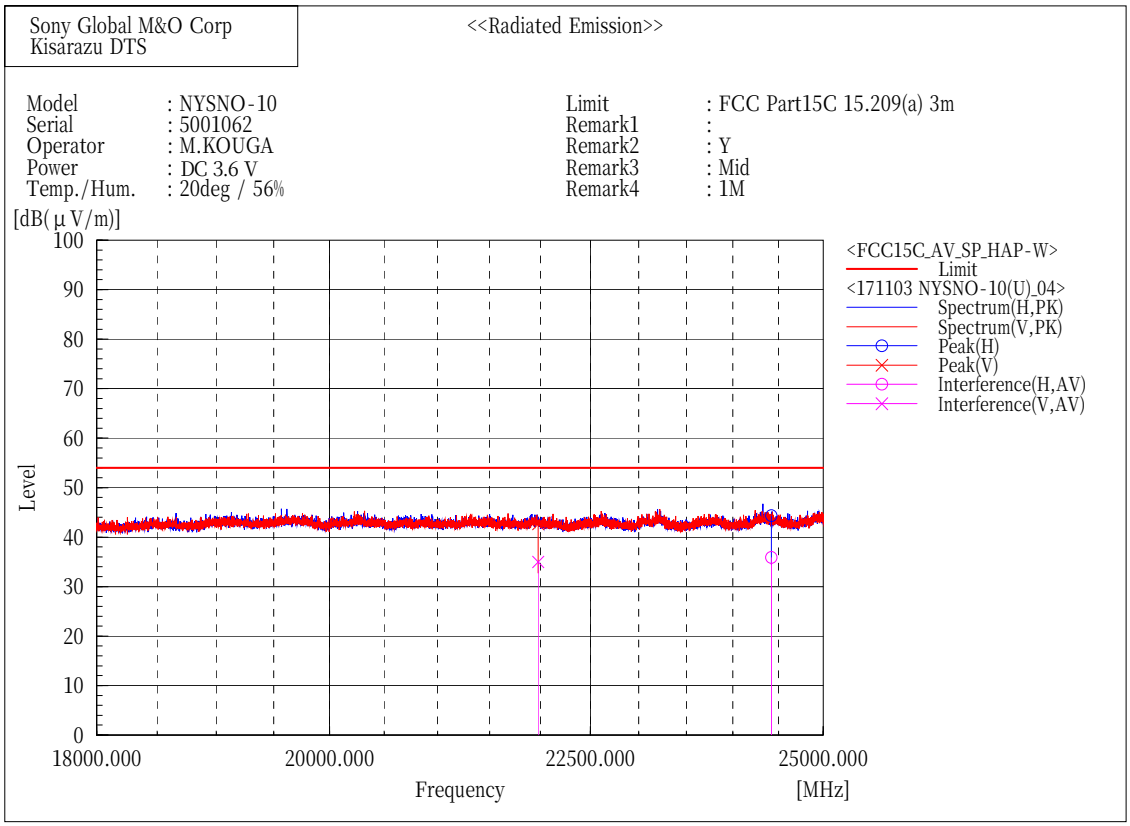
--- Horizontal Polarization (AV)---

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	24020.000	32.7	2.3	35.0	54.0	19.0	324.8	307.3

--- 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	24020.000	32.6	2.3	34.9	54.0	19.1	217.1	272.4

[Bluetooth Low Energy (1 Mbps) / 2442 MHz]



Final Result

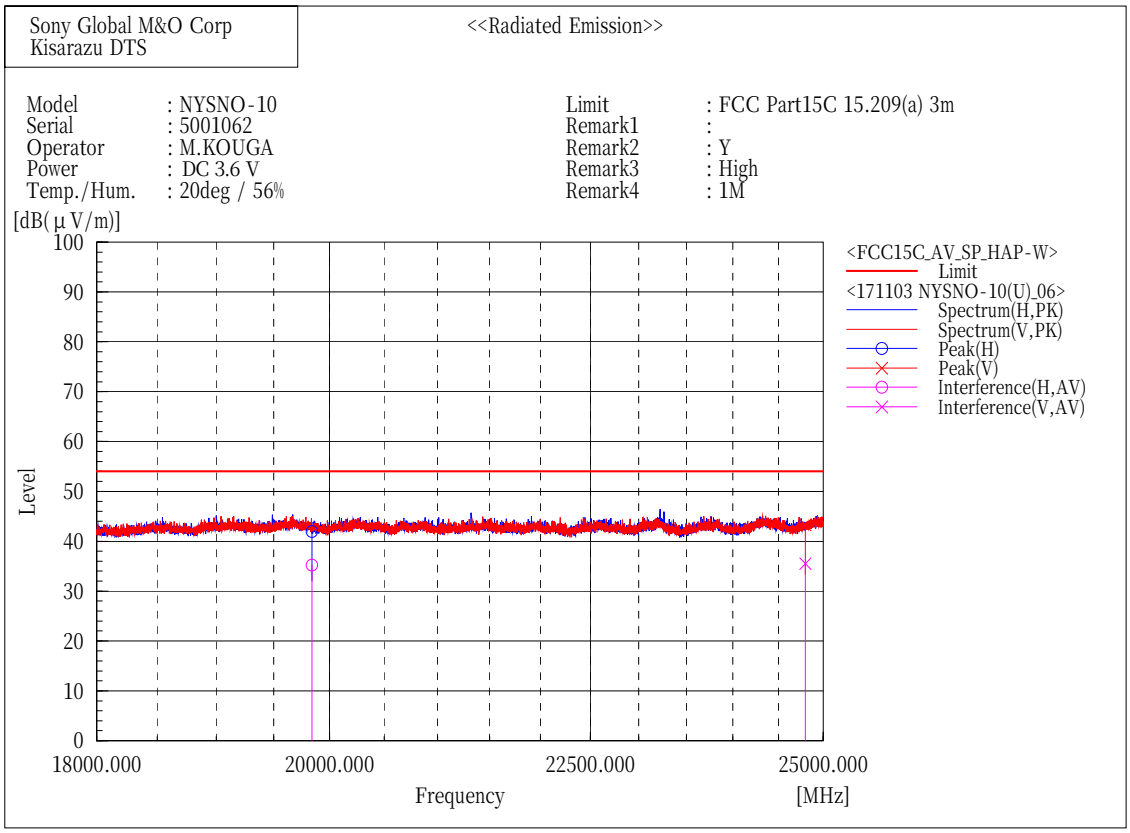
--- Horizontal Polarization (AV)---

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	24420.000	33.7	2.2	35.9	54.0	18.1	343.4	319.0

--- 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	21978.000	32.1	2.9	35.0	54.0	19.0	214.6	271.8

[Bluetooth Low Energy (1 Mbps) / 2480 MHz]



Final Result

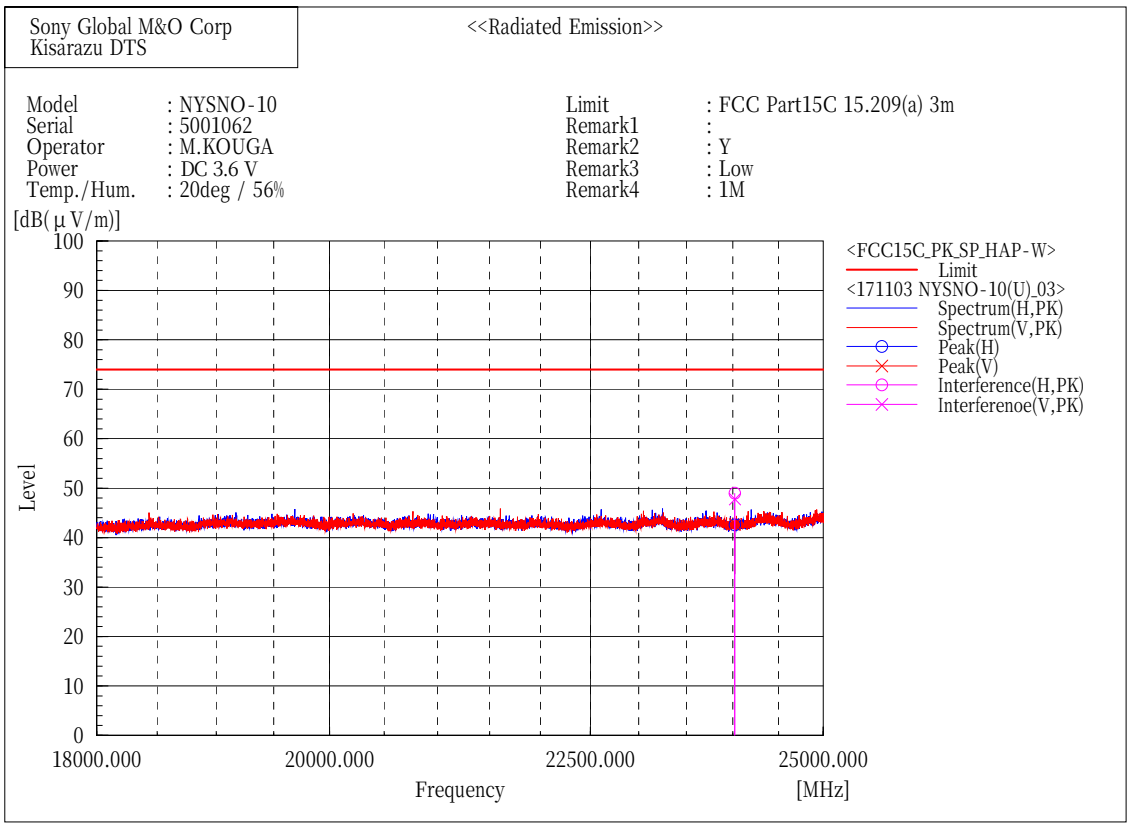
--- Horizontal Polarization (AV)---

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	19840.000	31.6	3.6	35.2	54.0	18.8	316.9	313.7

--- 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	24800.000	33.3	2.2	35.5	54.0	18.5	226.4	288.0

[Bluetooth Low Energy (1 Mbps) / 2402 MHz]



Final Result

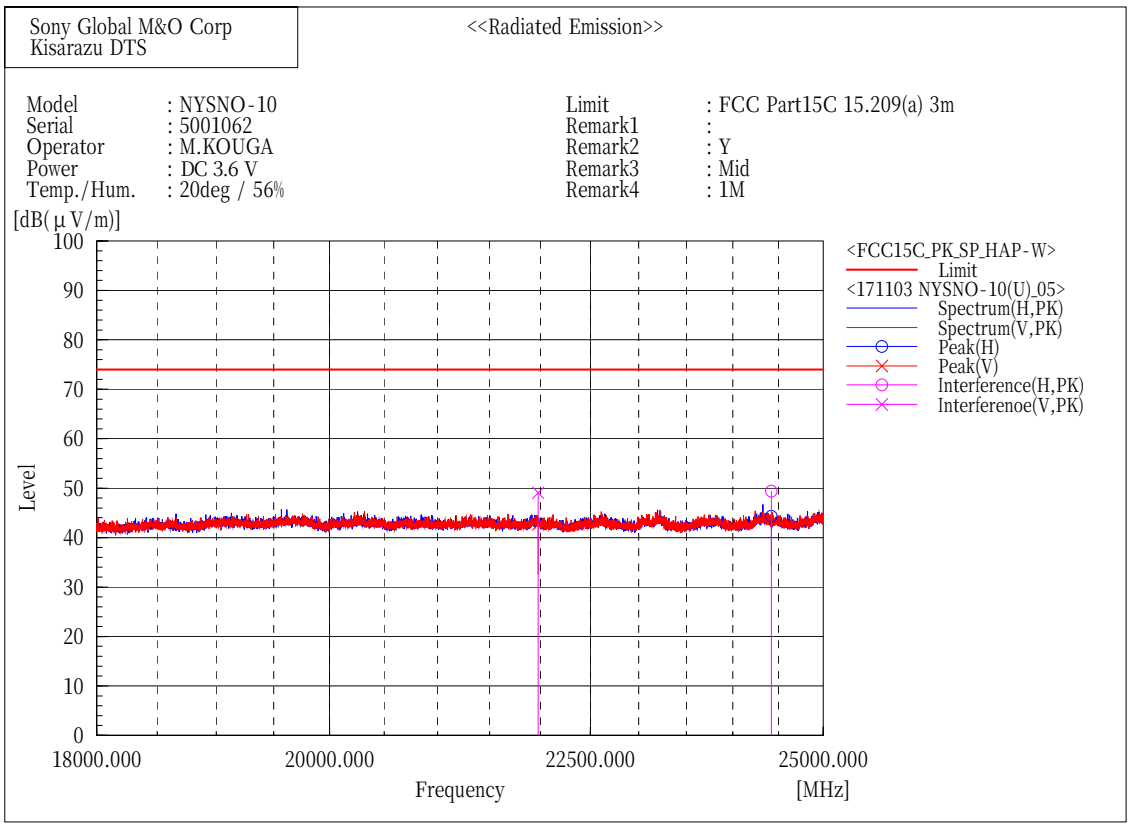
--- Horizontal Polarization (PK)---

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	24020.000	46.7	2.3	49.0	74.0	25.0	319.1	307.3

--- 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	24020.000	45.5	2.3	47.8	74.0	26.2	217.1	272.0

[Bluetooth Low Energy (1 Mbps) / 2442 MHz]



Final Result

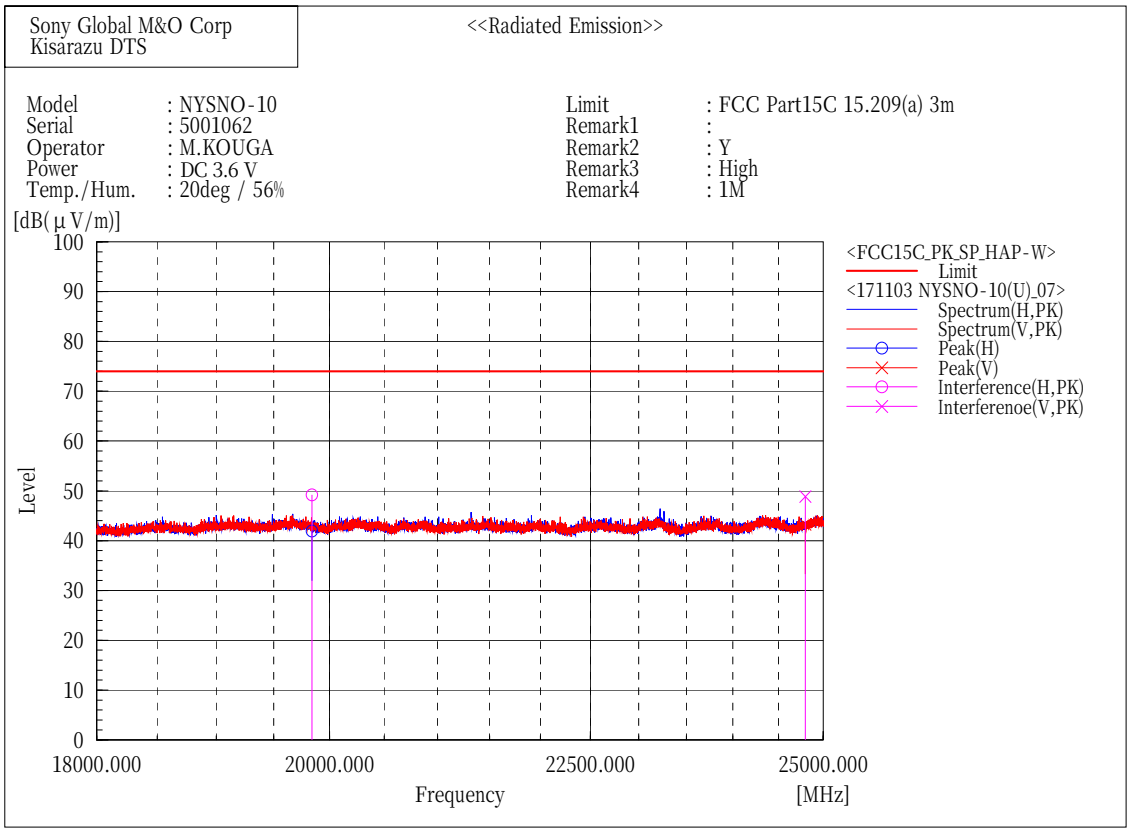
--- Horizontal Polarization (PK)---

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	24420.000	47.2	2.2	49.4	74.0	24.6	332.0	319.0

--- 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	21978.000	46.2	2.9	49.1	74.0	24.9	215.0	268.0

[Bluetooth Low Energy (1 Mbps) / 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	45.6	3.6	49.2	74.0	24.8	317.0	314.0

--- Vertical Polarization (PK)---

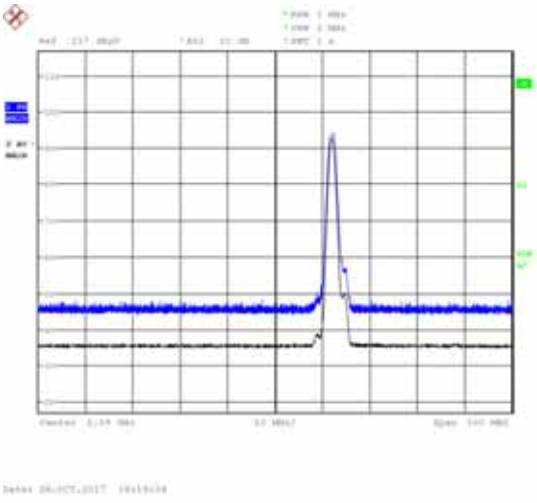
No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	24800.000	46.7	2.2	48.9	74.0	25.1	227.0	281.7

2.4GHz Restricted-Band Edge (Plot data)

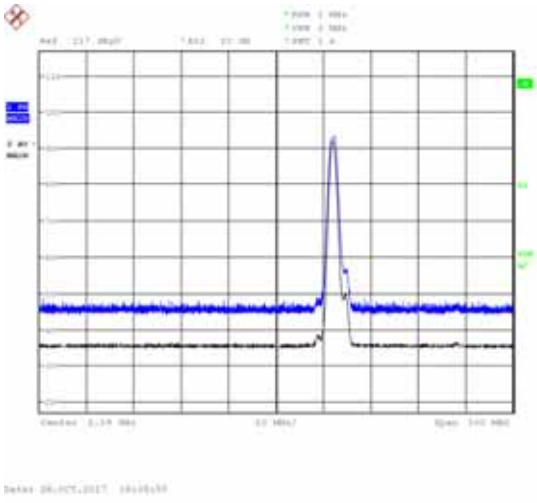
These plot data show peak (trace blue) and average (trace black) spectrum for worst case emissions in the restricted-band edges. (Restricted band edges: below 2390 MHz and above 2483.5 MHz)
The result of the final radiated emissions measurement refers in previous pages.

[Bluetooth Low Energy / 2402 MHz]

Horizontal

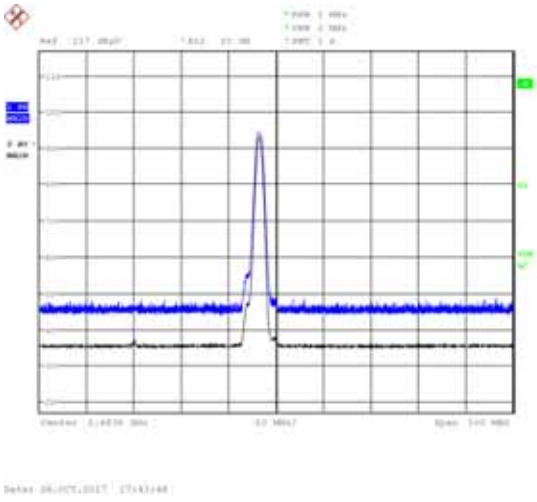


Vertical

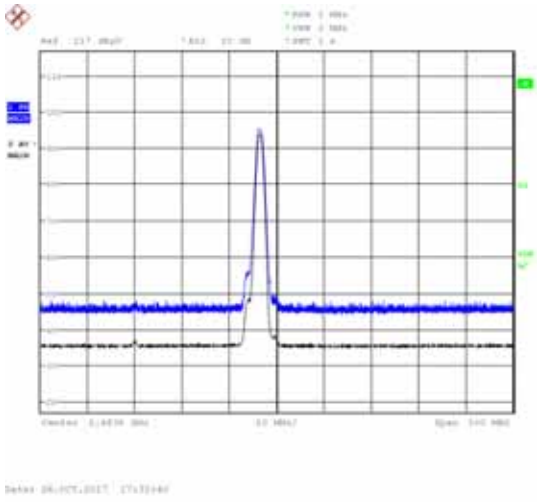


[Bluetooth Low Energy / 2480 MHz]

Horizontal



Vertical

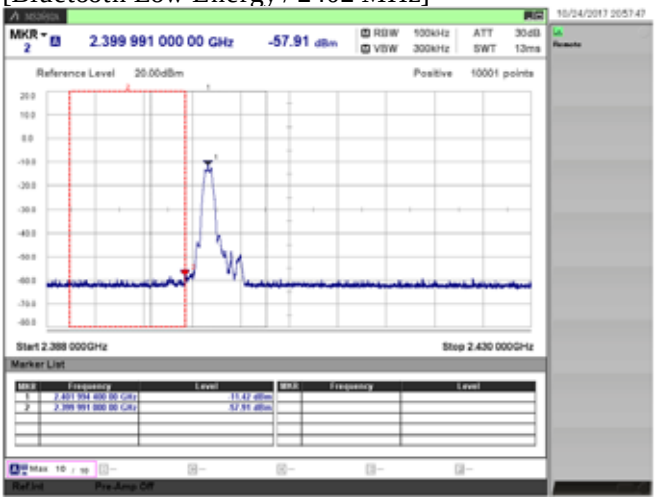


3.5. Conducted Spurious Emissions for Band Edge

1) Ambient temperature : 22.2 deg.C
2) Relative humidity : 51.0 %
3) Date of measurement : October 24, 2017
4) Measured by : M.KOUGA
5) Operating mode : Transmitting mode

Mode	Rate [Mbps]	Channel [MHz]	Frequency [MHz]	Reading(PK) [dBm]	C.F. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
BLE	1	2402	2399.99	-57.91	12.02	-45.89	-19.4	26.49
			2401.99	-11.42	12.02	0.60	-	-

[Bluetooth Low Energy / 2402 MHz]



4. Method of Calculation

4.1. Maximum Peak Conducted Output Power Measurement

Method of calculation	:	Software
The Software for Calculation	Name	: SW-316
	Version	: Ver.1.0

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

Notes :

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

4.2. Power Density Measurement

Method of calculation	:	Software
The Software for Calculation	Name	: SW-316
	Version	: Ver.1.0

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

Notes :

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

4.3. Radiated Spurious Emission Measurement

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

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

Notes :

(a) Meter Reading : Reading of the EMI test receiver or 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 Emission for Band Edge Measurement

Method of calculation	:	Software
The Software for Calculation	Name	: SW-316
	Version	: Ver.1.0

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

Notes :

(a) Meter Reading : Reading of the spectrum analyzer.

(b) C.F. : System Cable Loss + Attenuator 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

4th Site Shielded Room 1

	Ctrl.#	Equipment	Model No.	Serial No.	Manufacturer	Cal.Int.	Last Cal.
x	-	Shield Room	B83117-B2432-T161	P26428	Albatross Project	-	-
x	W100	Spectrum Analyzer	MS2692A	6201338954	Anritsu	12	17.04.14
x	W006	Power Meter	N1911A	MY50000295	Keysight Technologies	12	17.10.10
x	W007	Power Sensor	N1922A	MY50180022	Keysight Technologies	12	17.10.10
x	W029	10dB Attenuator	8493C	76549	Keysight Technologies	12	17.08.03
x	WC05	RF Cable	SUCOFLEX 102	34287	HUBER + SUHNER	12	17.08.03
x	M719	Thermometer	TH-321	140053	AS ONE	12	17.04.28

5.2. Radiated Spurious Emissions

4th Site 10m Semi-Anechoic Chamber

	Ctrl.#	Equipment	Model No.	Serial No.	Manufacturer	Cal.Int.	Last Cal.
x	M506	EMC Chamber	10m	-	TDK Corp.	12	17.07.10
x	M575	EMI Receiver	ESCI	100161	Rohde & Schwarz	12	17.04.19
x	M486	EMI Receiver	ESU40	100050	Rohde & Schwarz	12	17.05.15
x	A043	Biconical Antenna	BBA9106	VHA91032598 (V5)	Schwarzbeck	12	17.04.30
x	A046	Log-periodic Antenna	UHALP9108A1	0830	Schwarzbeck	12	17.04.30
x	A056	Horn Antenna (1-6 GHz)	BBHA9120D	670	Schwarzbeck	12	17.04.30
x	A057	Horn Antenna (6-18 GHz)	HAP06-18W	00000037	TOYO Corp.	12	17.04.30
x	A058	Horn Antenna (18-26.5 GHz)	HAP18-26W	00000016	TOYO Corp.	12	17.02.13
x	RA004	Loop Antenna	HFH2-Z2	882964/029	Rohde & Schwarz	12	17.10.11
x	CS039	Fourth Site RE Cable System 3	-	-	Internal Manufacturing	12	17.01.16
x	CS064	Fourth Site RE Cable System 8	-	-	Internal Manufacturing	12	17.01.16
x	CS065	Fourth Site RE Cable System 8	-	-	Internal Manufacturing	12	17.01.16
x	CS066	Fourth Site RE Cable System 9	-	-	Internal Manufacturing	12	17.01.16
x	M510	RF Selector	NS4900	0802-226	Toyo Corporation	12	17.01.16
x	M706	3dB Attenuator	8491A	MY39267782	Keysight Technologies	12	17.01.16
x	M620	RF Pre-Amp	8447D	2944A10720	Keysight Technologies	12	17.01.16
x	M831	GHz Filter Box	FB-G1	2	Sony Global M&O	12	17.01.16
x	M689	Thermo Meter	AD-5640A	201303	A&D	12	16.11.07
x	M749	Thermo Meter	CTH-201	004	CUSTON	12	17.10.17

About calibration interval

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