

RADIO TEST REPORT

(for Bluetooth classic)

Project No. : JB-Z0138-A

Client : Sony Corporation

Address : 1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan

Type of Equipment : Wireless Noise Canceling Stereo Headset

Model No. : MDR-1000X

Serial No. : 1000053,2000035

FCC ID : AK8MDR1000X

Regulation Applied : 47 CFR Part 15 Subpart C

Final Judgment : Passed

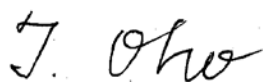
Sample Receipt : May 20, 2016

Testing : June 2, 2016 - June 10, 2016

Reported : June 23, 2016

Reported by :

Approved Signatory :



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

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TESTING 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.

1. General Information

1.1. Description of Equipment Under Test (EUT)

General specification

Test Sample Condition	: Pre-production
Type of Equipment	: Wireless Noise Canceling Stereo Headset
Trade Name	: SONY
Model No.	: MDR-1000X
Serial No.	: 1000053,2000035
Power Rating	: DC3.7V(The EUT was supplied with the power from built-in battery)

Radio specification

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 chip antenna
Antenna connector type	: None
Antenna gain	: +1.6 dBi
Operating Temperature	: 0 to 40deg.C

1.2. Summary of Test Result

47 CFR Part 15 Subpart C § 15.247 [DSS]

Test Item	Worst Margin	Test Frequency band	Results
AC Power-line Conducted Emissions	-	-	N/A *2
20dB Bandwidth	Refer to the test data	Carrier	Complied
Carrier Frequency Separation	Refer to the test data	Carrier	Complied
Number of Hopping Frequencies	Refer to the test data	Carrier	Complied
Time of Occupancy (Dwell Time)	Refer to the test data	Carrier	Complied
Maximum Peak Conducted Output Power	24.84 dB	Carrier	Complied
Radiated Spurious Emissions	7.0 dB (AV) 4960.068 MHz Horizontal	9 kHz - 25 GHz (excluding carrier and band edge)	Complied
Conducted Spurious Emissions for Band Edge *1	14.99 dB Margin 2400.00 MHz	Carrier band edge	Complied

Note

*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 Part 15 Subpart C
 Test Method : ANSI C63.10 - 2013
 DA 00-705 (March 30, 2000)

Test Condition :

Radiated Spurious Emissions

Test Distance ☒ 3 m ☐ 10 m (9 kHz - 30 MHz)
☒ 3 m ☐ 10 m (30 - 1000 MHz)
☒ 3 m (1 - 25 GHz)
 Dimensions of the EUT table 0.8m(for MHz), 1.5m(for GHz) height, 2 m width and 1 m depth.

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

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

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

$$490 \text{ kHz} - 30 \text{ MHz} [\text{Limit at 3m}] = [\text{Limit at 30m}] + 40\log(30[\text{m}] / 3[\text{m}])$$
- 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 - 25 GHz, peak detector)
- 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 of all test operating modes carried out on these emissions as follows;

The test antenna and the turntable were performed with follows;

	9kHz - 30MHz	30MHz - 1000MHz	above 1GHz
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

*: 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	above 1GHz
Detector	Peak / Average	Quasi-peak	Quasi-peak	Peak / Average
RBW	9 kHz (6dB) *1	9 kHz (6dB) *1	120 kHz (6dB)	1 MHz (3dB)
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)

- If the final measurement result exceeded the limit(FCC 15.209(a)) in non-restricted band(excluding carrier band edges), the measurement is carried out additionally and compared with the limit (-20dBc) 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 - 30MHz	above 30MHz
Detector	Peak	Peak	Peak
RBW	3 dB RBW: 300 Hz *	3 dB RBW: 10 kHz *	3 dB RBW: 100 kHz
Instrument	Spectrum analyzer	Spectrum analyzer	Spectrum analyzer

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

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

- 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 937606.

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

AC Power-line Conducted Emissions

Shielded Room
☐ 4th Site

Radiated Spurious Emission

Semi-Anechoic chamber
☒ 4th Site

Antenna-port Conducted Measurements

Shielded Room
☒ 4th Site SR1

A2LA Accreditation for Test Facility

The above test facility has been fully reported to A2LA and accepted as follows:
Effective dates: 2015-09-15 through 2017-10-31

1.6. Uncertainty

Test Item	Frequency	4th Site SR1	
Conducted Output Power, Conducted Spurious Emissions	below 6 GHz	-	± 0.89 dB

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

Transmitting mode

Test Items	Operating Mode *1	Packet type *2, 3	Test Channels
AC Power-line Conducted Emissions	-	-	-
Carrier Frequency Separation, Number of Hopping Frequencies, Time of Occupancy (Dwell Time)	BDR	DH5	Hopping ON
	EDR	3DH3	
20dB Bandwidth, Maximum Peak Conducted Output Power, Radiated Spurious Emissions	BDR	DH5	2402 MHz
	EDR	3DH3	2441 MHz 2480 MHz
Conducted Spurious Emissions for Band Edge	BDR	DH5	2402 MHz
	EDR	3DH3	

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: EDR worst bitrate has been decided based on the result of maximum duty cycle for Time of Occupancy measurement. Other measurements were decided based on the result of Maximum Peak Conducted Output Power.

The Software for Operating Mode

Name : BlueSuite

Version : 2.5.8

Special accessories needed for connecting the EUT to achieve compliance:

Item	Manufacturer	Model No.	Serial No.	Remark
Personal Computer	SONY	VPCZ21ADZ	1009099	-
AC Adaptor	SONY	VGP-AC19V25	148013121 0212911	-

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) consists of

Symbol	Item	Manufacturer	Model No.	Serial No.
A	Wireless Noise Canceling Stereo Headset	SONY	MDR-1000X	1000053

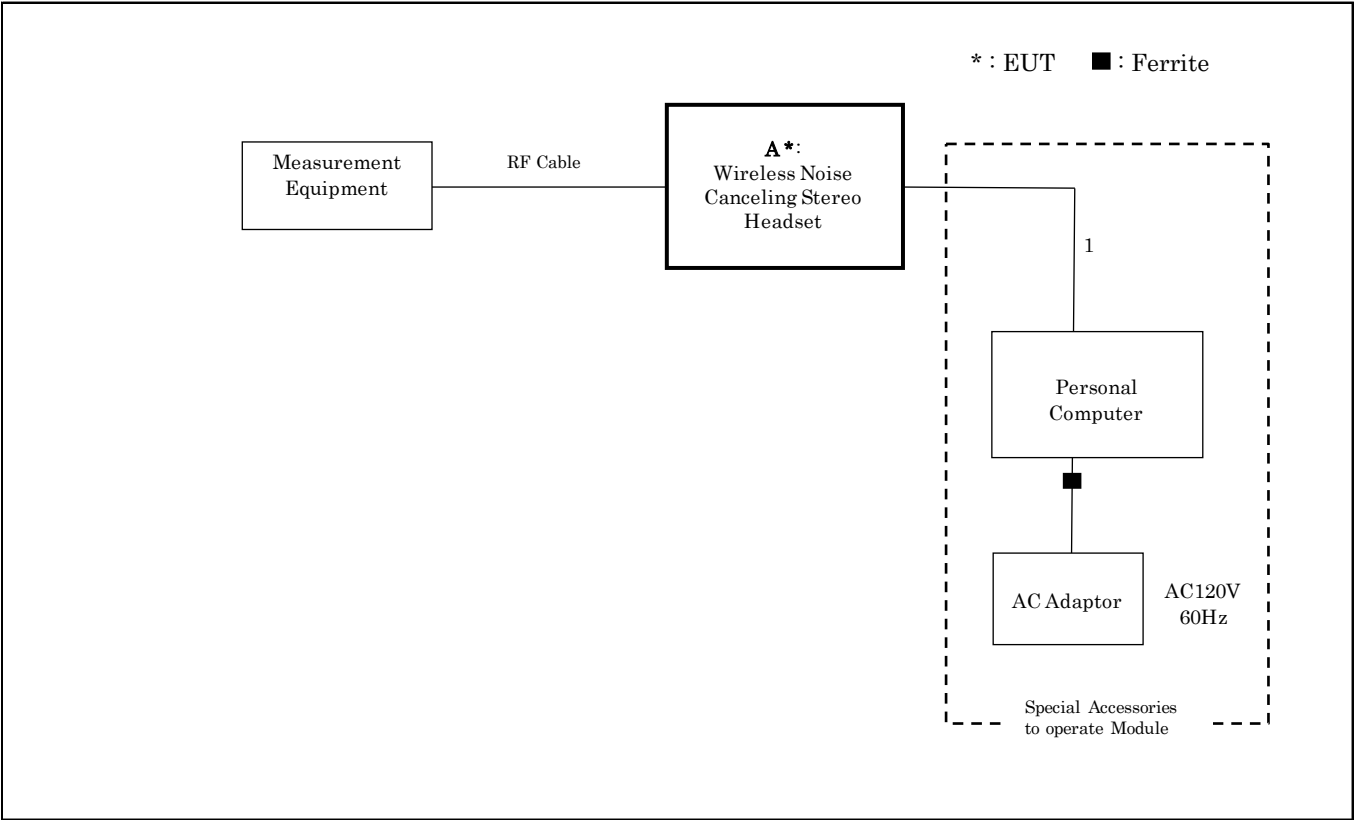
The measurement was carried out with the following support equipment connected

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

Type of Cable

Symbol	Description	Identification (Manufacturer etc)	Shielded Yes/No	Ferrite Core	Bundled	Length (m)
1	USB Cable	SONY	Yes	No	-	0.5

System configuration



Radiated Spurious Emissions

The equipment under test (EUT) consists of

Symbol	Item	Manufacturer	Model No.	Serial No.
A	Wireless Noise Canceling Stereo Headset	SONY	MDR-1000X	2000035

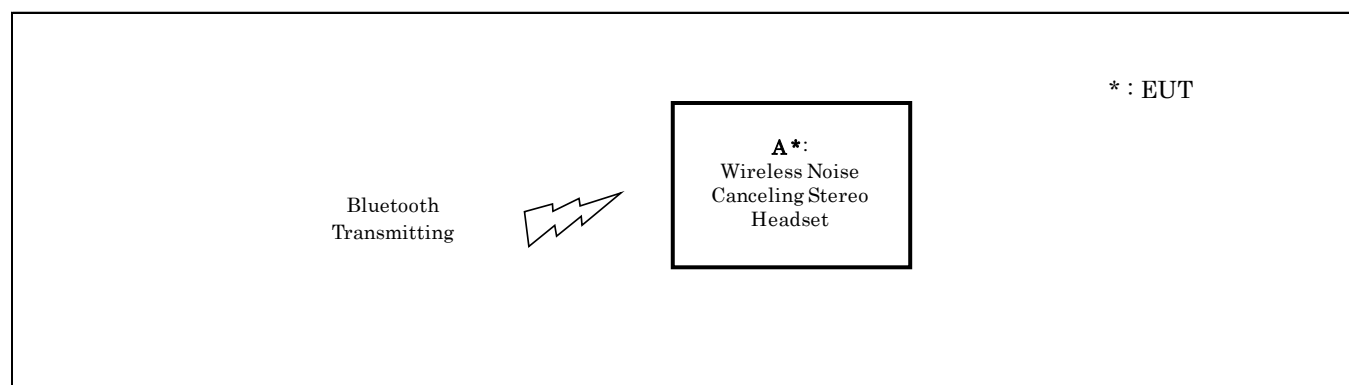
The measurement was carried out with the following support equipment connected

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

Type of Cable

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

System configuration



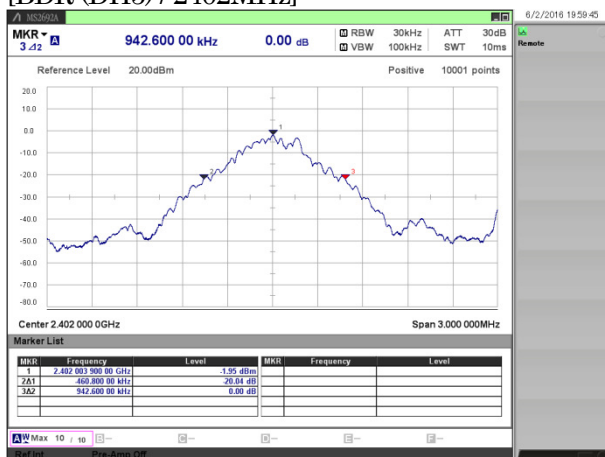
3. Test Data

3.1. 20dB Bandwidth

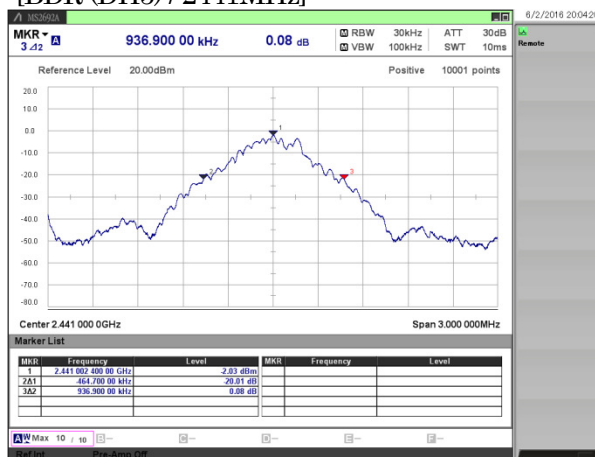
- 1) Ambient temperature : 22.6 deg.C
- 2) Relative humidity : 46.0 %
- 3) Date of measurement : 02 June 2016
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Result [MHz]	Limit [MHz]
BDR	DH5	2402	0.943	-
		2441	0.937	-
		2480	0.934	-
EDR	3DH3	2402	1.226	-
		2441	1.224	-
		2480	1.229	-

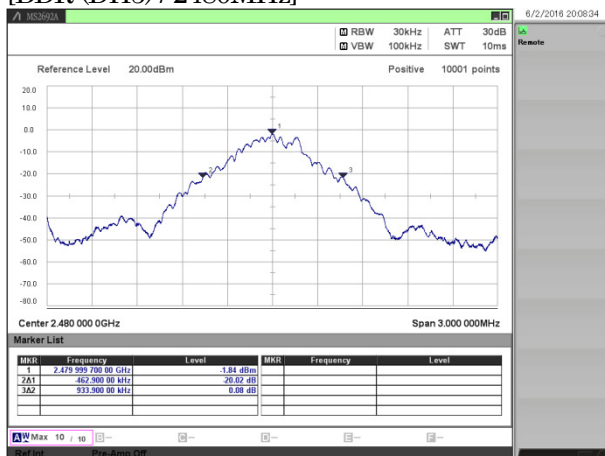
[BDR (DH5) / 2402MHz]



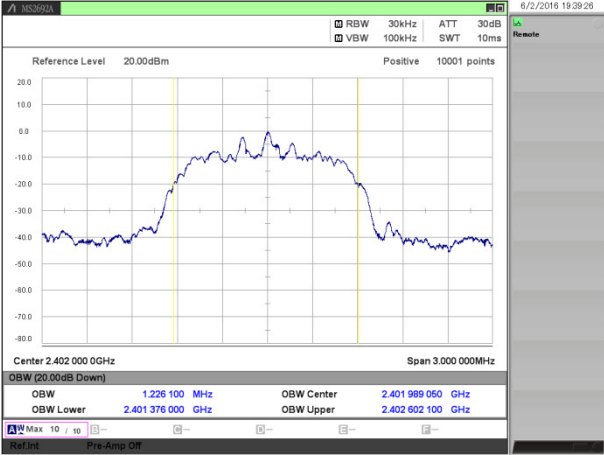
[BDR (DH5) / 2441MHz]



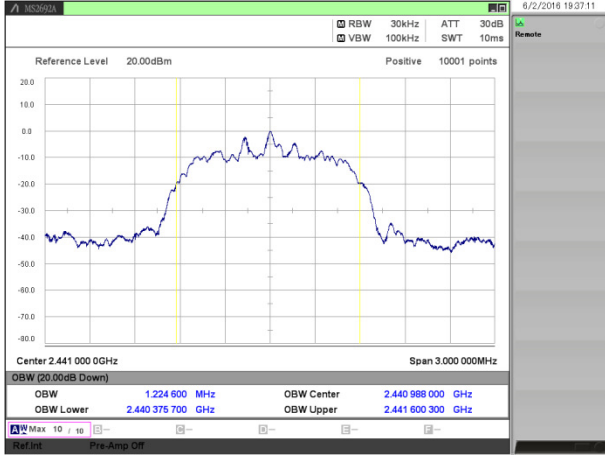
[BDR (DH5) / 2480MHz]



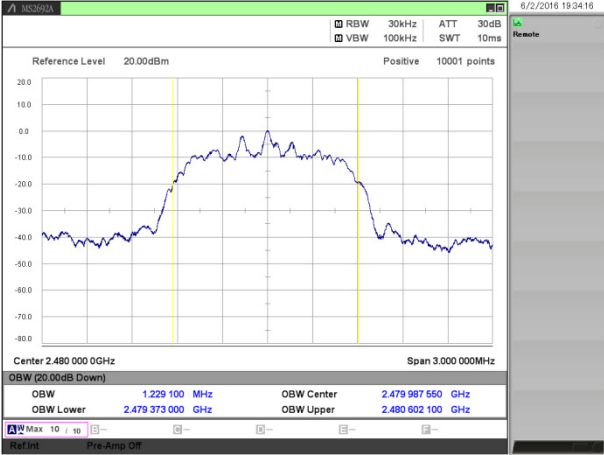
[EDR (3DH3) / 2402MHz]



[EDR (3DH3) / 2441MHz]



[EDR (3DH3) / 2480MHz]

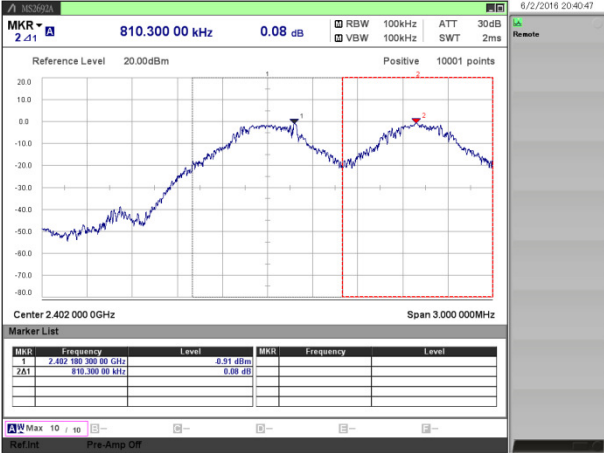


3.2. Carrier Frequency Separation

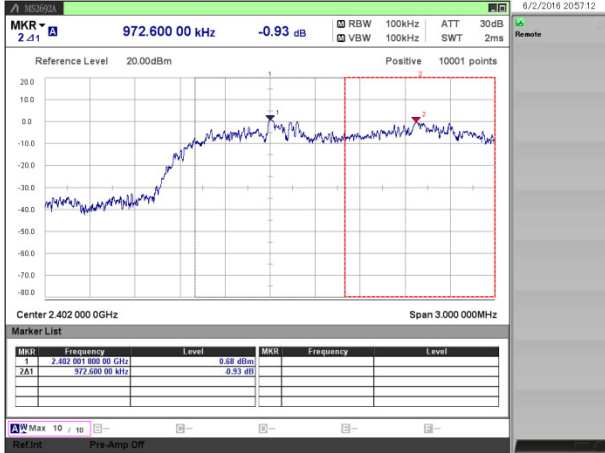
- 1) Ambient temperature : 22.6 deg.C
- 2) Relative humidity : 46.0 %
- 3) Date of measurement : 02 June 2016
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Reading [kHz]	Limit [kHz]
BDR	DH5	810.3	≥ 628.4
EDR	3DH3	972.6	≥ 819.4

[BDR (DH5)]



[EDR (3DH3)]



3.3. Number of Hopping Frequencies

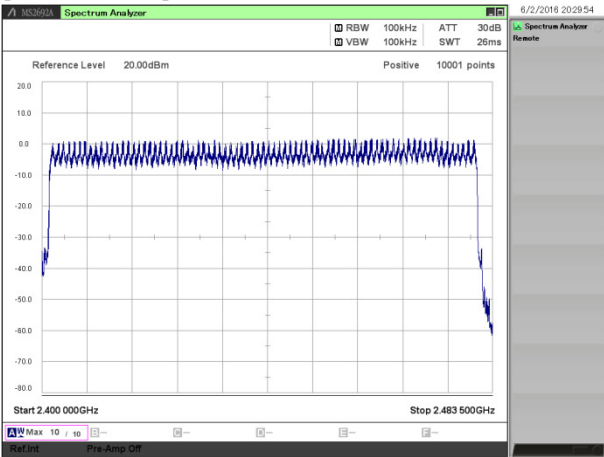
- 1) Ambient temperature : 22.6 deg.C
- 2) Relative humidity : 46.0 %
- 3) Date of measurement : 02 June 2016
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Number [channel]	Limit [channel]
BDR	DH5	79	≥ 15
EDR	3DH3	79	≥ 15

[BDR (DH5)]



[EDR (3DH3)]

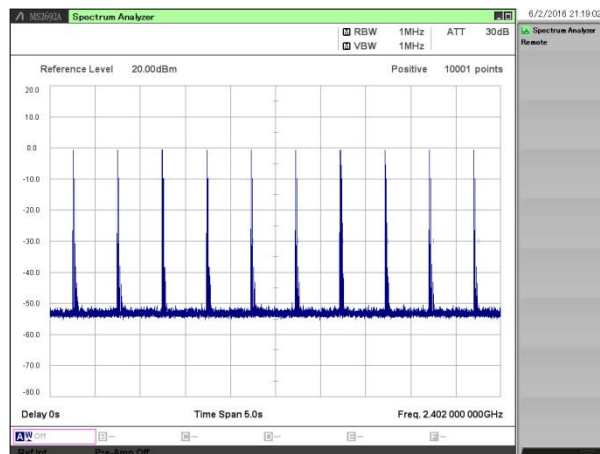
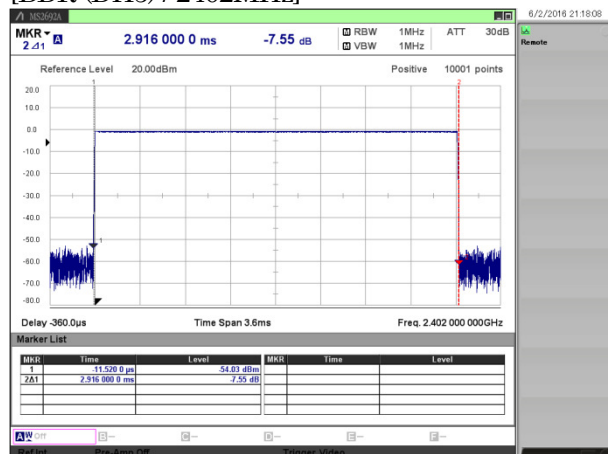


3.4. Time of Occupancy (Dwell Time)

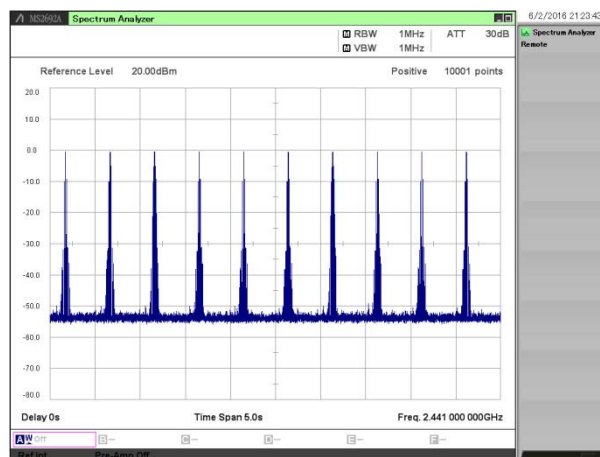
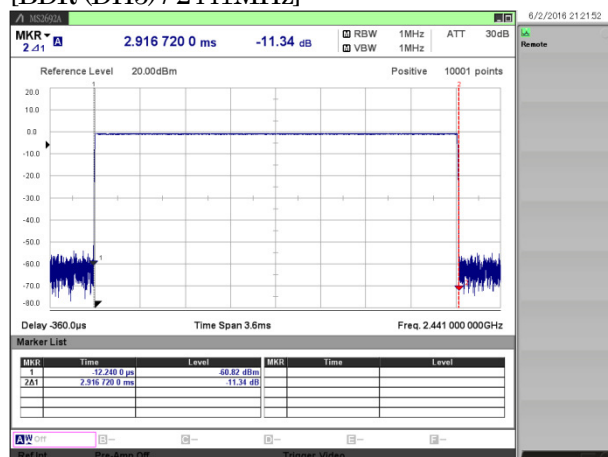
- 1) Ambient temperature : 22.6 deg.C
- 2) Relative humidity : 46.0 %
- 3) Date of measurement : 02 June 2016
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Dwell Time [msec]	Cycle [time]	Result [msec]	Limit [msec]
BDR	DH5	2402	2.92	10	184.3	≤ 400.0
		2441	2.92	10	184.3	≤ 400.0
		2480	2.92	10	184.3	≤ 400.0
EDR	3DH3	2402	1.68	12	127.5	≤ 400.0
		2441	1.68	13	138.2	≤ 400.0
		2480	1.68	13	138.3	≤ 400.0

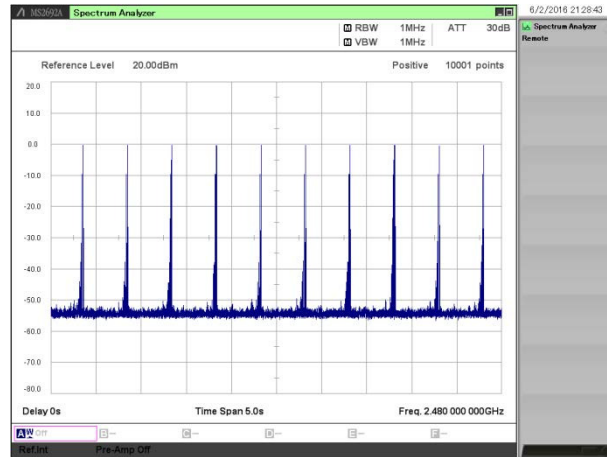
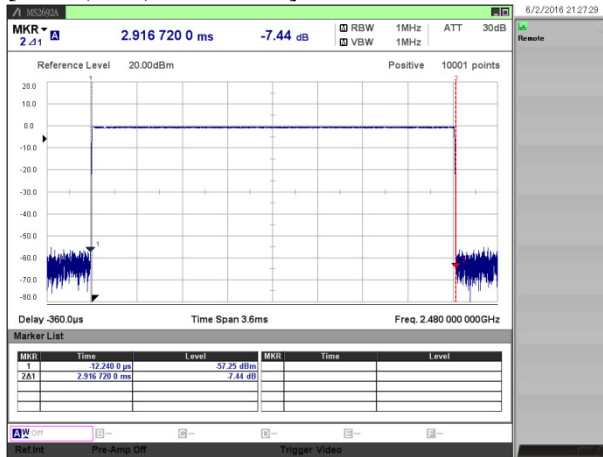
[BDR (DH5) / 2402MHz]



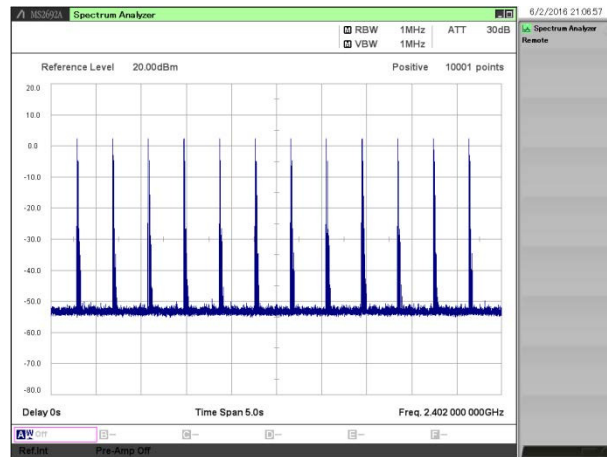
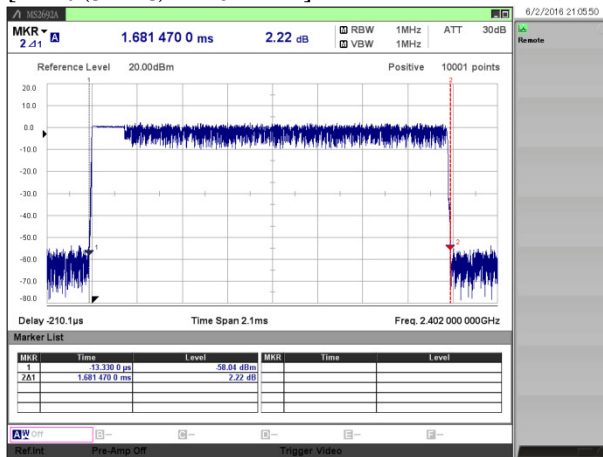
[BDR (DH5) / 2441MHz]



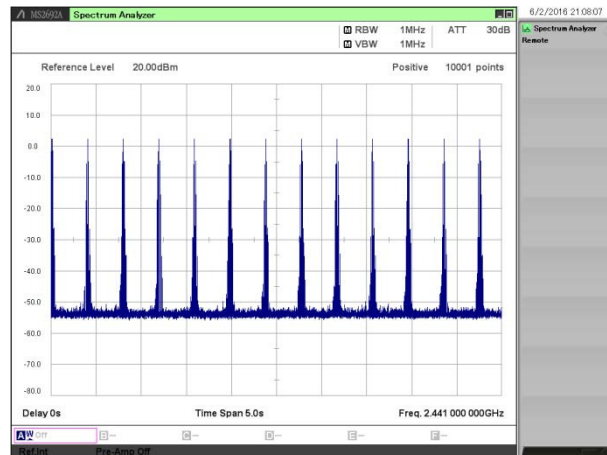
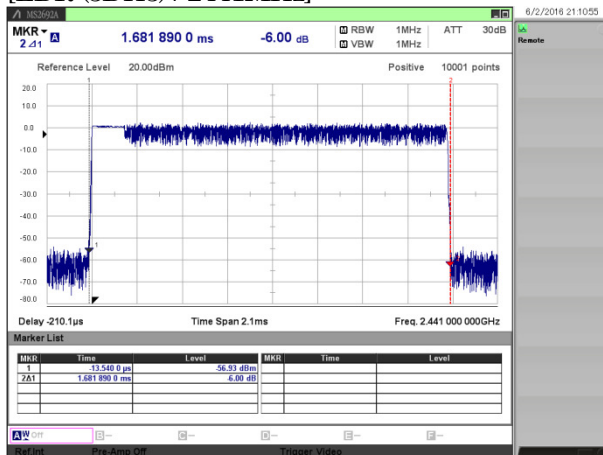
[BDR (DH5) / 2480MHz]



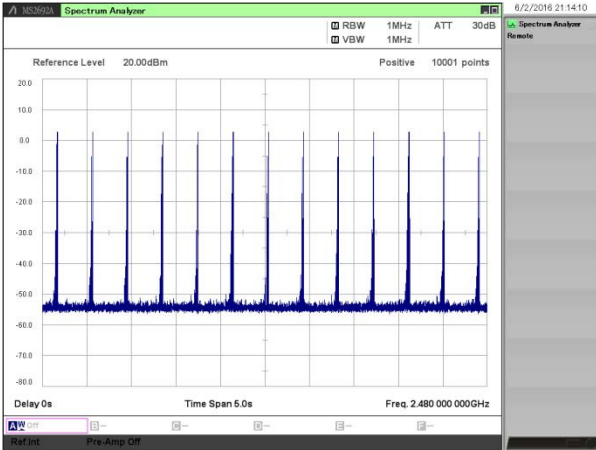
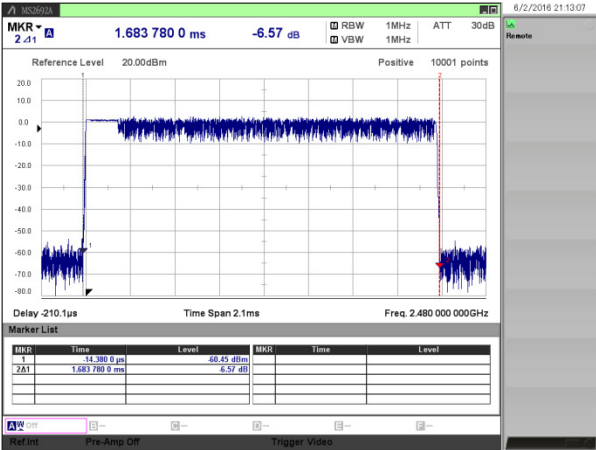
[EDR (3DH3) / 2402MHz]



[EDR (3DH3) / 2441MHz]



[EDR (3DH3) / 2480MHz]



3.5. Maximum Peak Conducted Output Power

- 1) Ambient temperature : 22.6 deg.C
- 2) Relative humidity : 46.0 %
- 3) Date of measurement : 02 June 2016
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

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	-9.28	10.55	1.27	0.00134	30.0	1.0	28.73
		2441	-9.09	10.55	1.46	0.00140	30.0	1.0	28.54
		2480	-9.30	10.55	1.25	0.00133	30.0	1.0	28.75
EDR	2DH3	2402	-6.41	10.55	4.14	0.00259	30.0	1.0	25.86
		2441	-6.28	10.55	4.27	0.00267	30.0	1.0	25.73
		2480	-6.13	10.55	4.42	0.00277	30.0	1.0	25.58
	3DH3	2402	-5.64	10.55	4.91	0.00310	30.0	1.0	25.09
		2441	-5.39	10.55	5.16	0.00328	30.0	1.0	24.84
		2480	-5.39	10.55	5.16	0.00328	30.0	1.0	24.84

Average Conducted Output Power (for SAR measurement)

Mode		Channel [MHz]	Reading(AV) [dBm]	C.F. [dB]	Duty Factor [dB]	Result(AV) [dBm]	Result(AV) [W]
BDR	DH5	2402	-13.31	10.55	3.28	0.52	0.00113
		2441	-13.16	10.55	3.28	0.67	0.00117
		2480	-13.29	10.55	3.28	0.54	0.00113
EDR	2DH3	2402	-14.56	10.55	4.70	0.69	0.00117
		2441	-14.50	10.55	4.70	0.75	0.00119
		2480	-14.19	10.55	4.70	1.06	0.00128
	3DH3	2402	-14.52	10.55	4.70	0.73	0.00118
		2441	-14.26	10.55	4.70	0.99	0.00126
		2480	-14.18	10.55	4.70	1.07	0.00128

Duty Cycle check

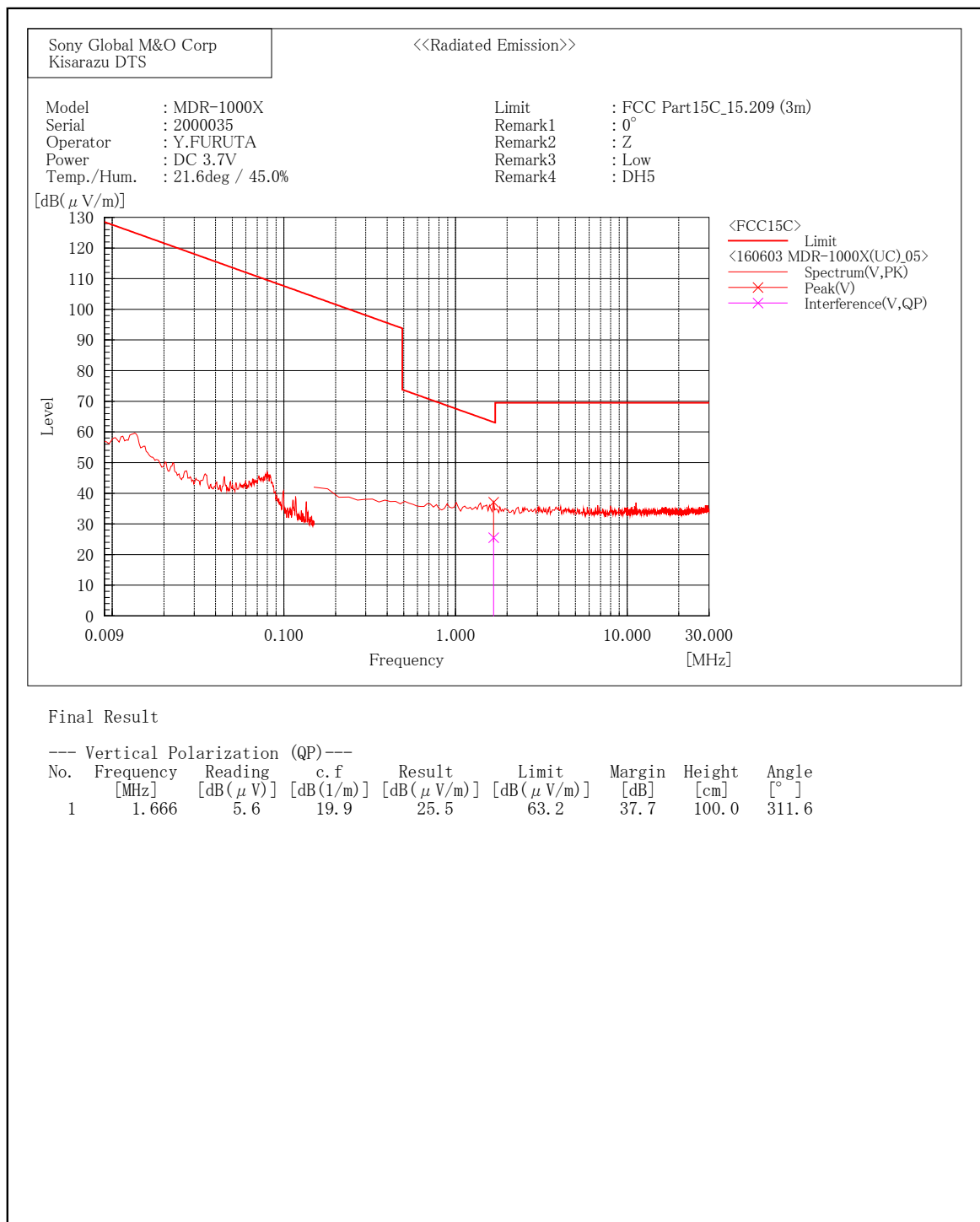
Mode		Channel [MHz]	T(on+off) [msec]	T(on) [msec]	Duty Cycle [%]	Duty Factor [dB]
BDR	DH1	2441	1.250	0.399	31.92	4.96
	DH3	2441	3.750	1.670	44.53	3.51
	DH5	2441	6.260	2.940	46.96	3.28
EDR	2DH1	2441	1.250	0.416	33.28	4.78
	2DH3	2441	4.990	1.690	33.87	4.70
	2DH5	2441	12.500	2.980	23.84	6.23
	3DH1	2441	1.250	0.416	33.28	4.78
	3DH3	2441	4.990	1.690	33.87	4.70
	3DH5	2441	12.500	2.980	23.84	6.23

3.6. Radiated Spurious Emissions

9 kHz - 30 MHz

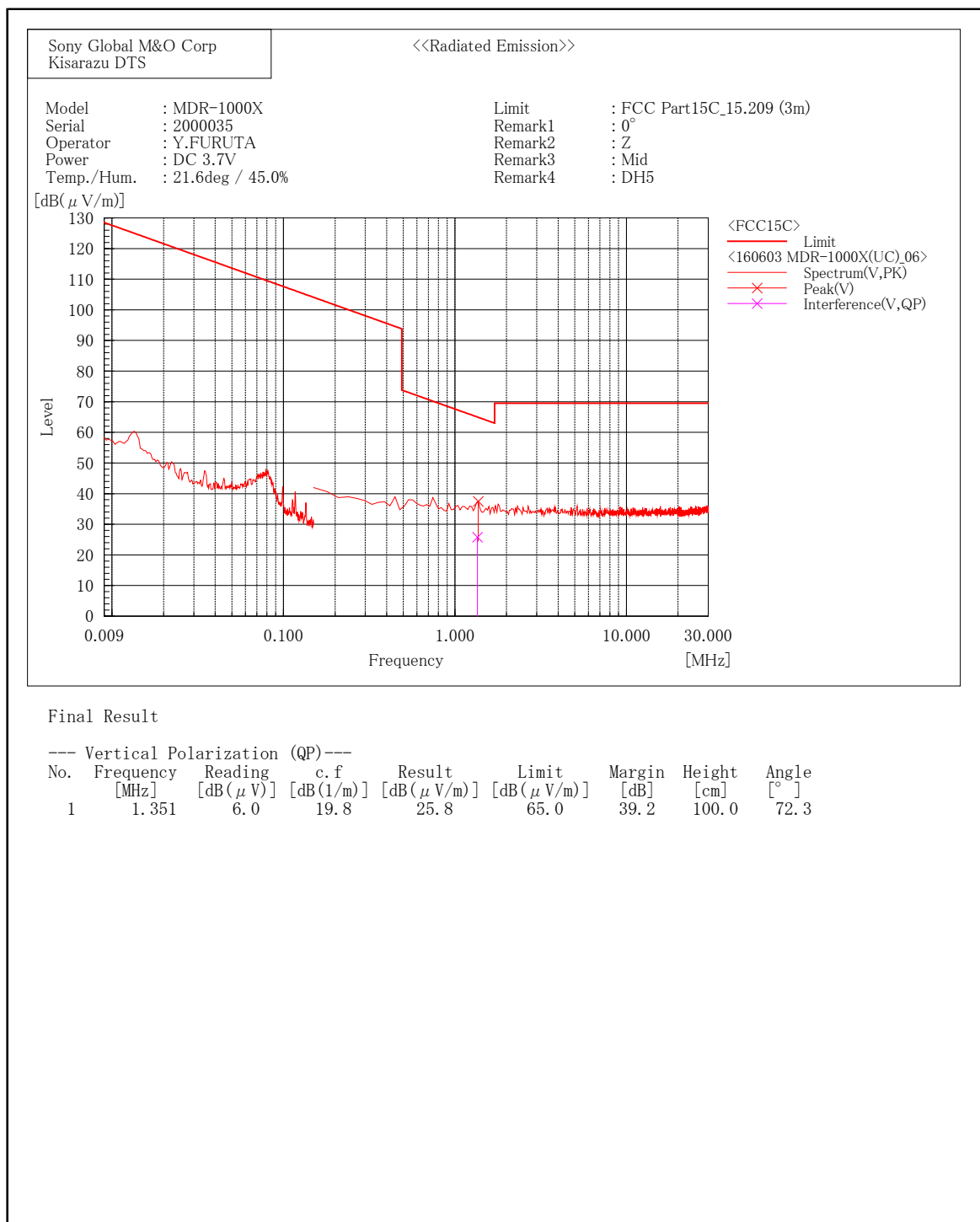
1) Date of measurement : June 03, 2016

[BDR(DH5)/2402MHz]



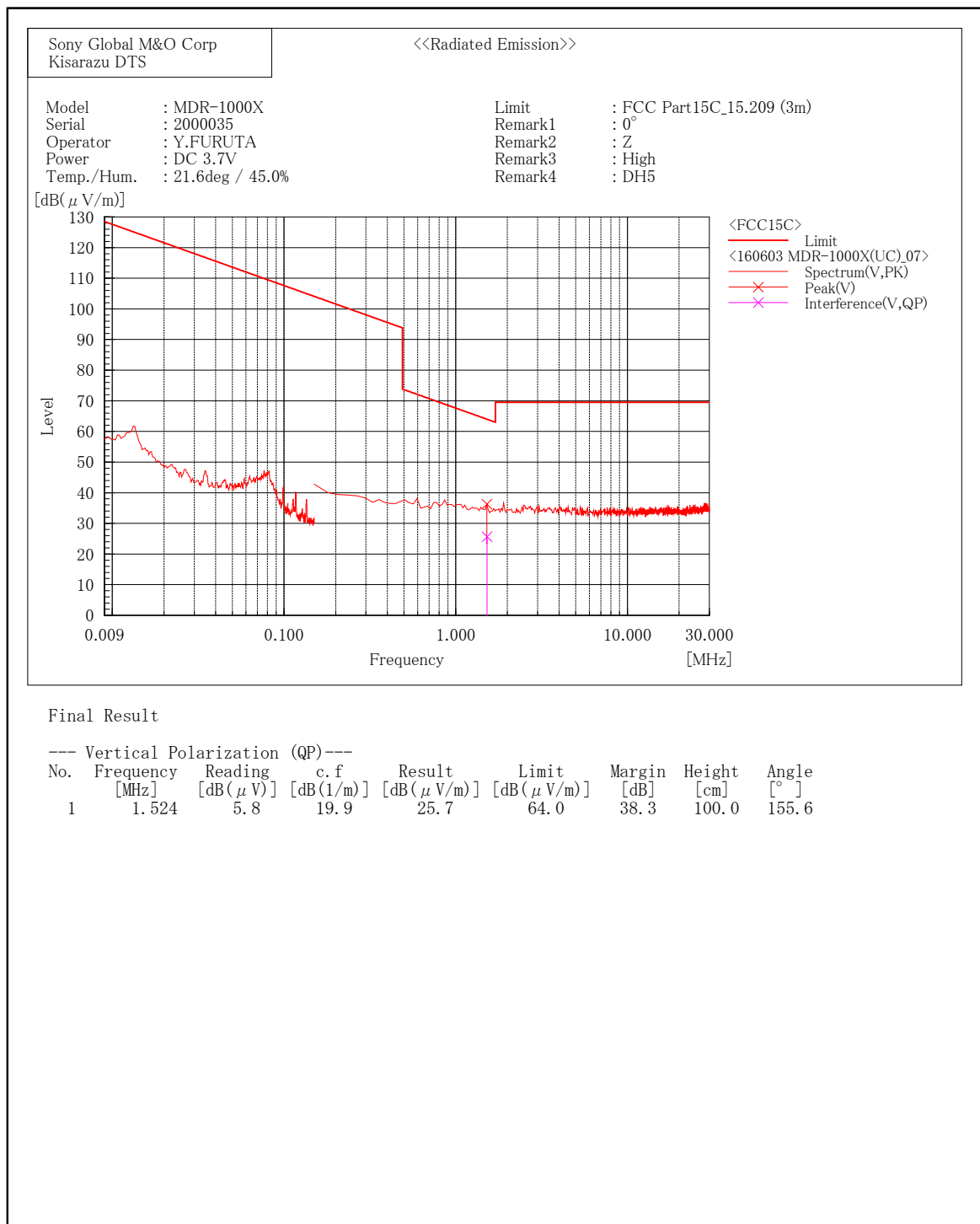
1) Date of measurement : June 03, 2016

[BDR(DH5)/2441MHz]



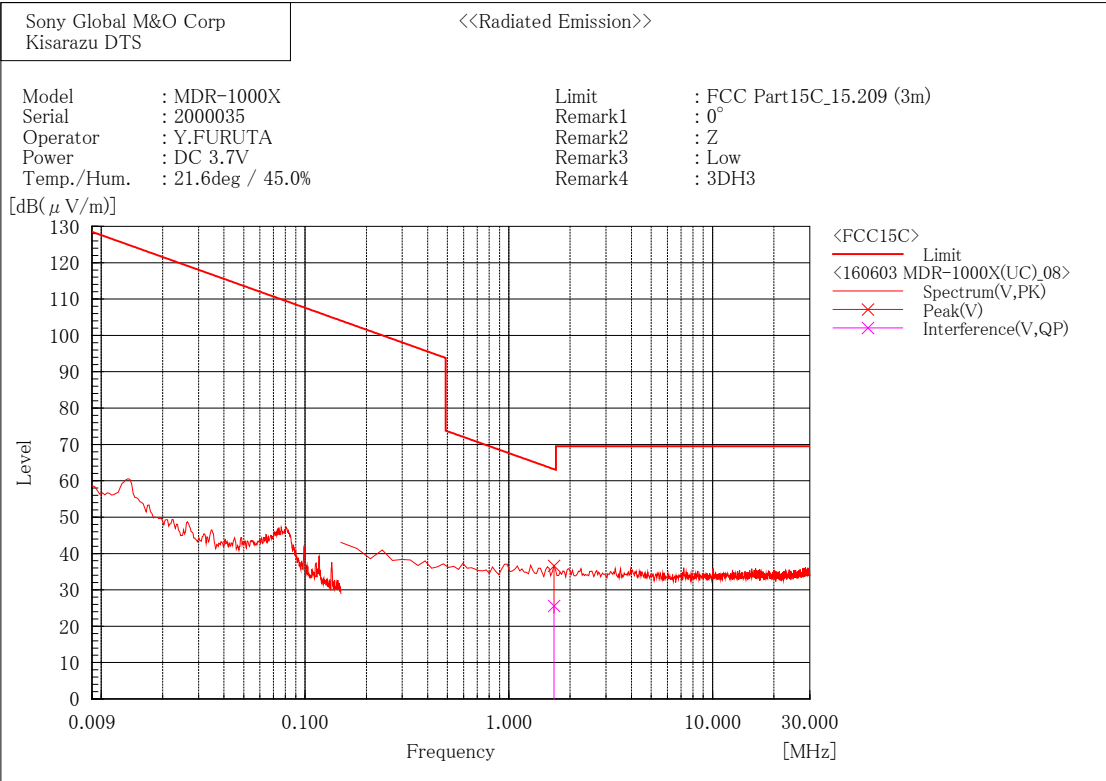
1) Date of measurement : June 03, 2016

[BDR(DH5)/2480MHz]



1) Date of measurement : June 03, 2016

[EDR(3DH3)/2402MHz]



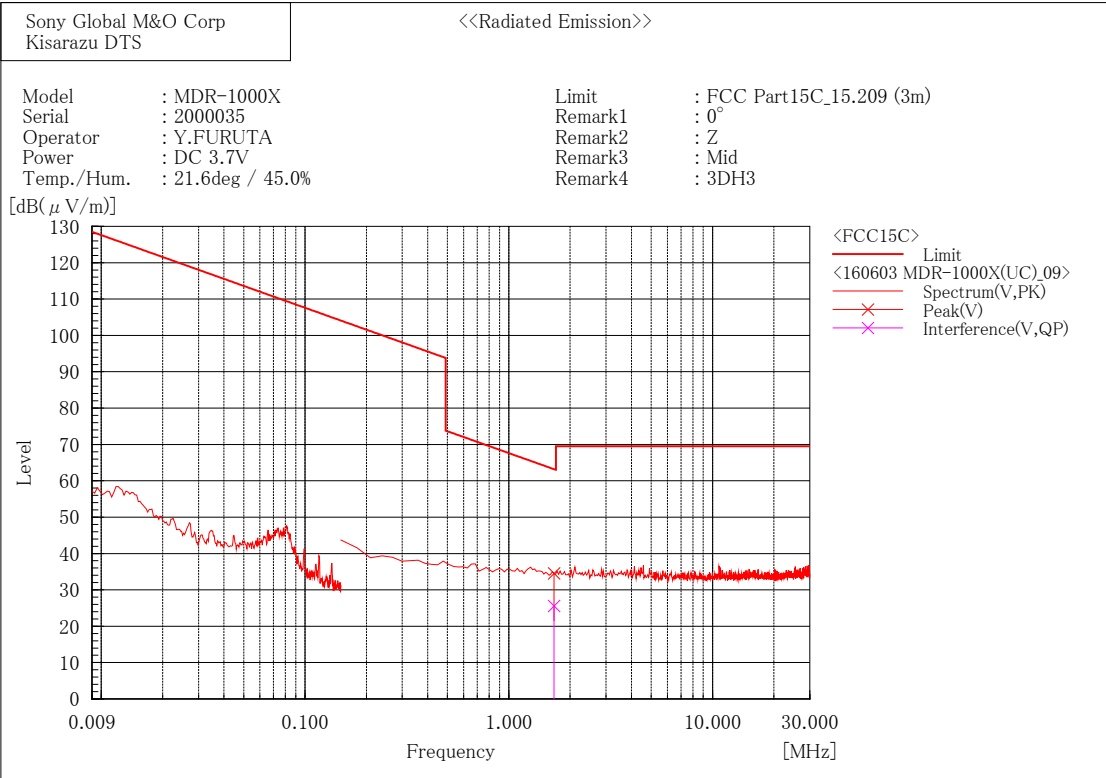
Final Result

--- 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	1.667	5.7	19.9	25.6	63.2	37.6	100.0	187.9

1) Date of measurement : June 03, 2016

[EDR(3DH3)/2441MHz]



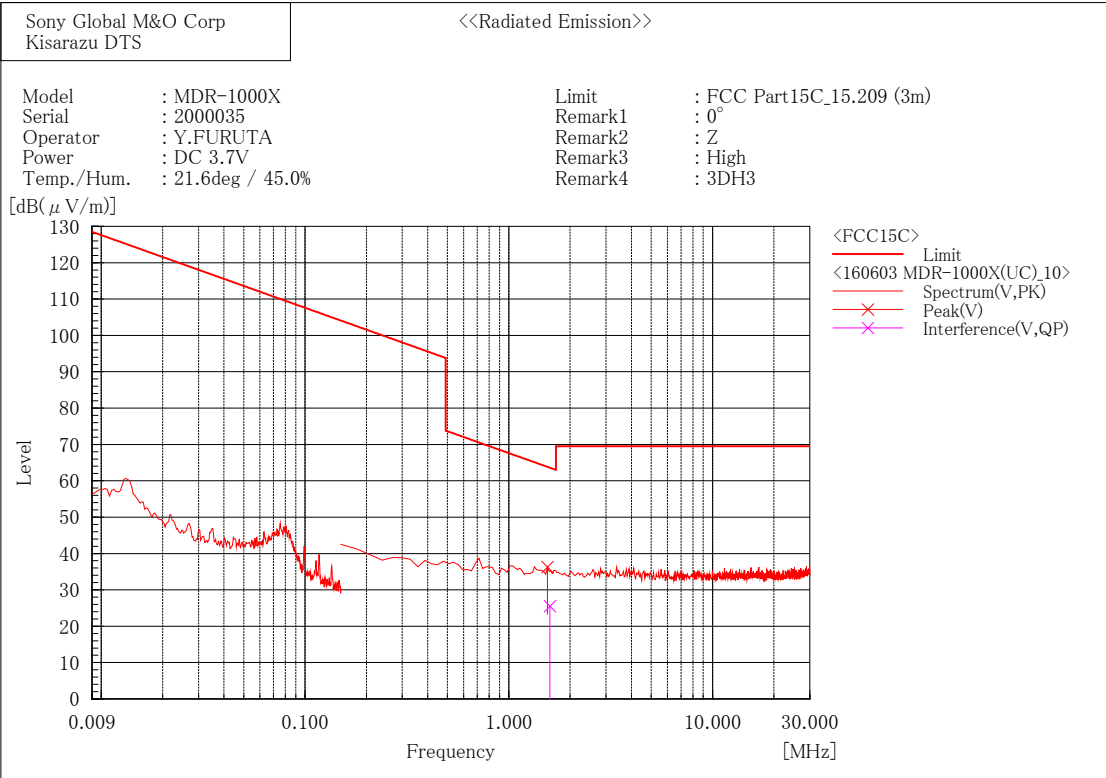
Final Result

--- 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	1.664	5.7	19.9	25.6	63.2	37.6	100.0	64.0

1) Date of measurement : June 03, 2016

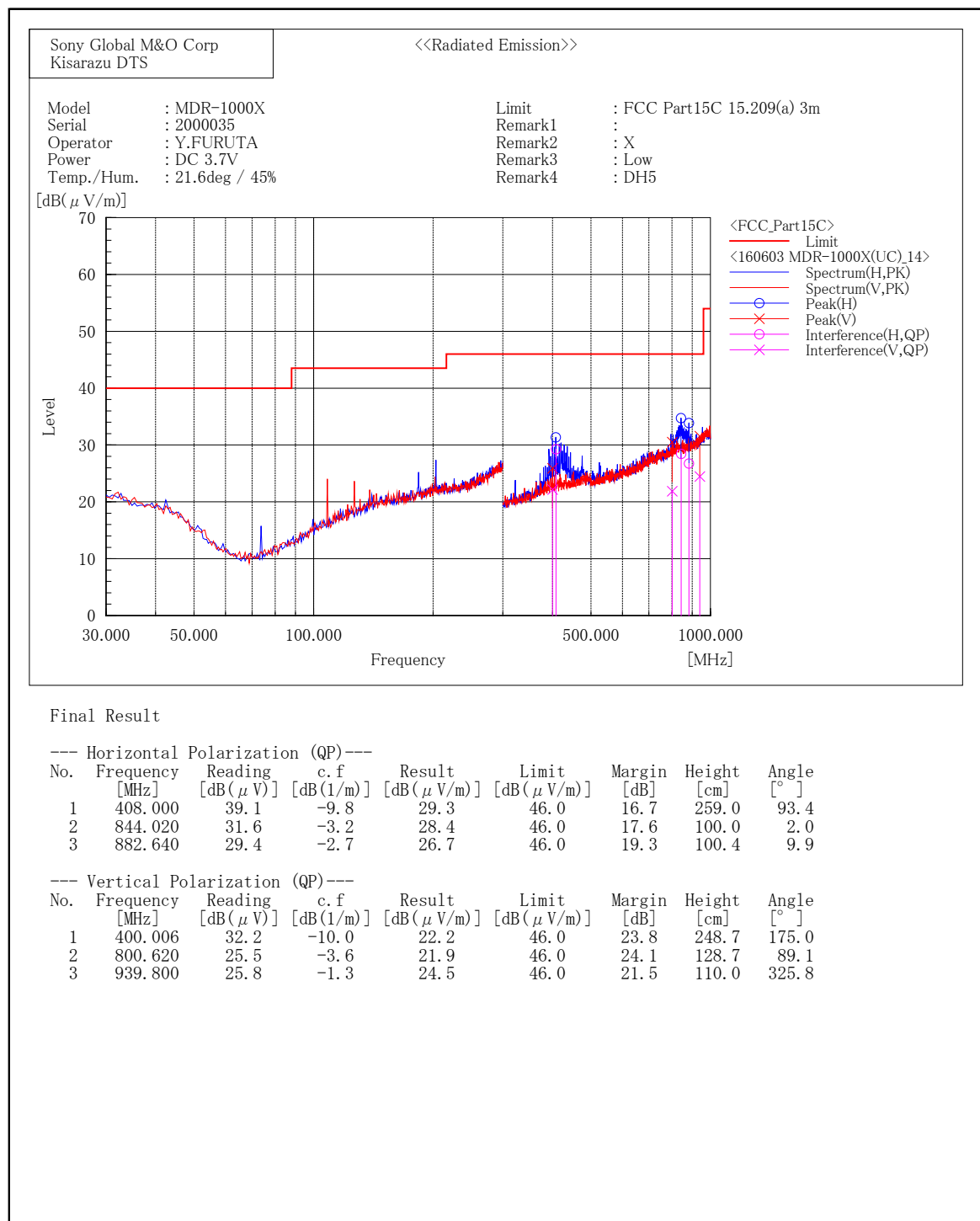
[EDR(3DH3)/2480MHz]



30 MHz - 1000 MHz

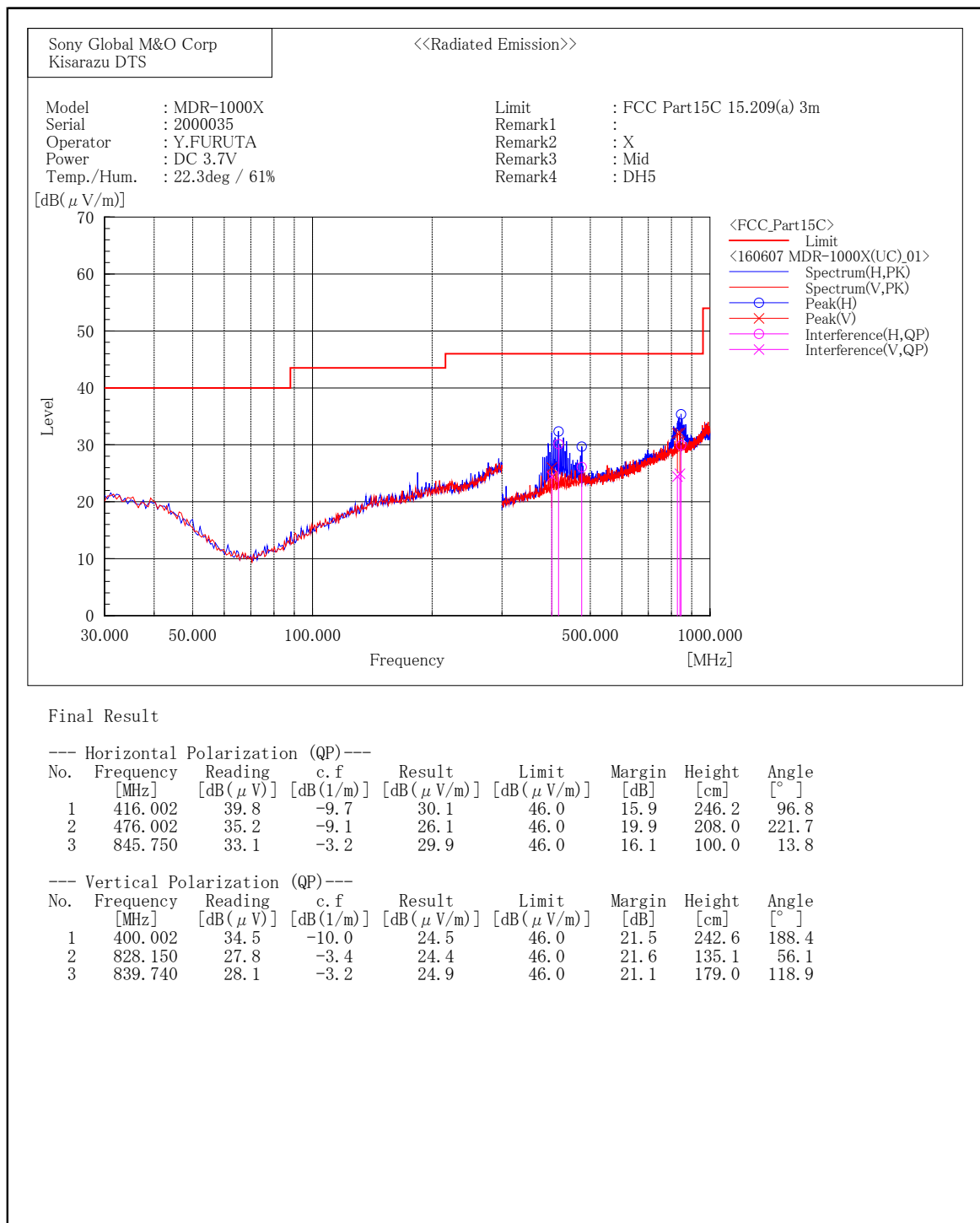
1) Date of measurement : June 03, 2016

[BDR(DH5)/2402MHz]



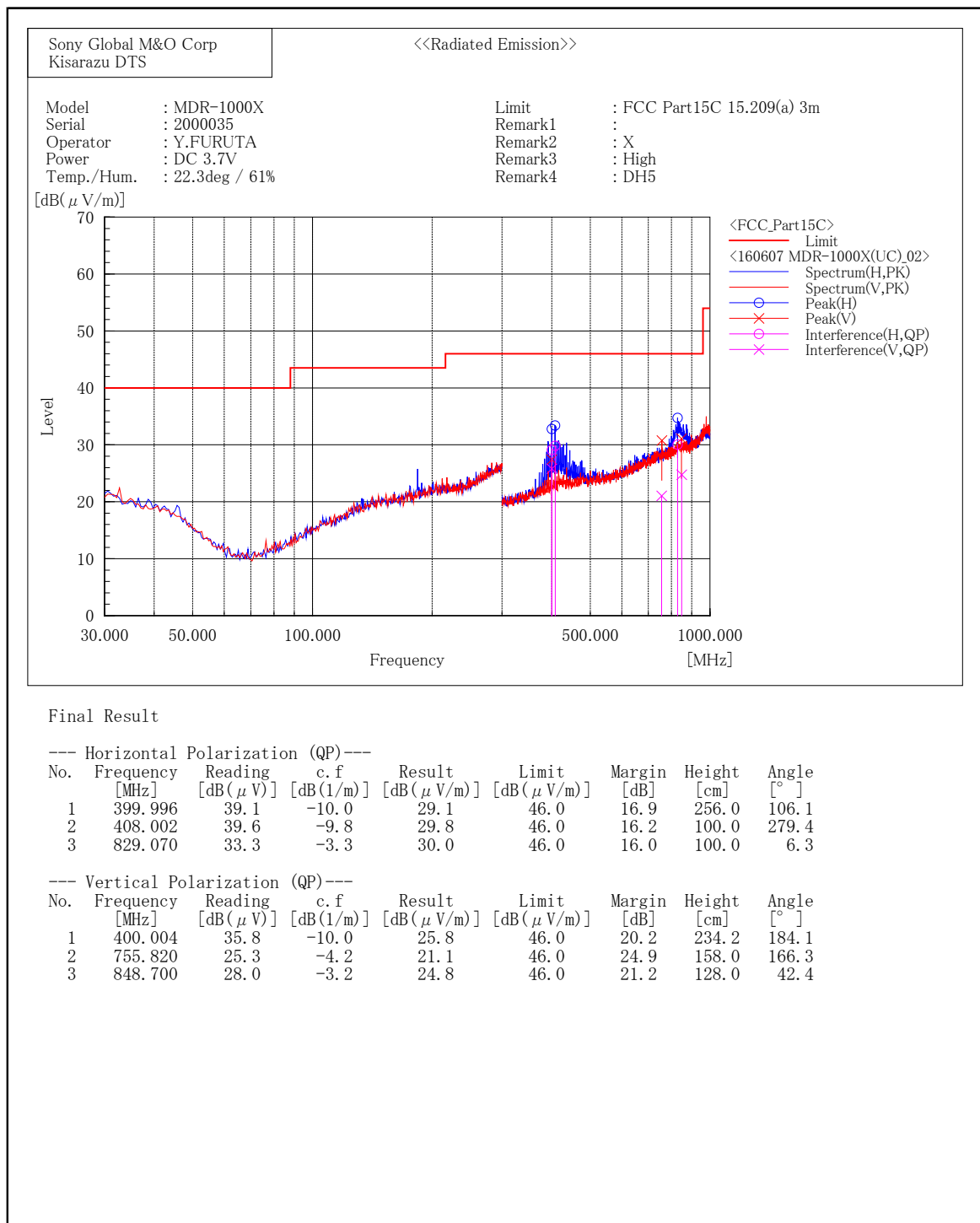
1) Date of measurement : June 07, 2016

[BDR(DH5)/2441MHz]



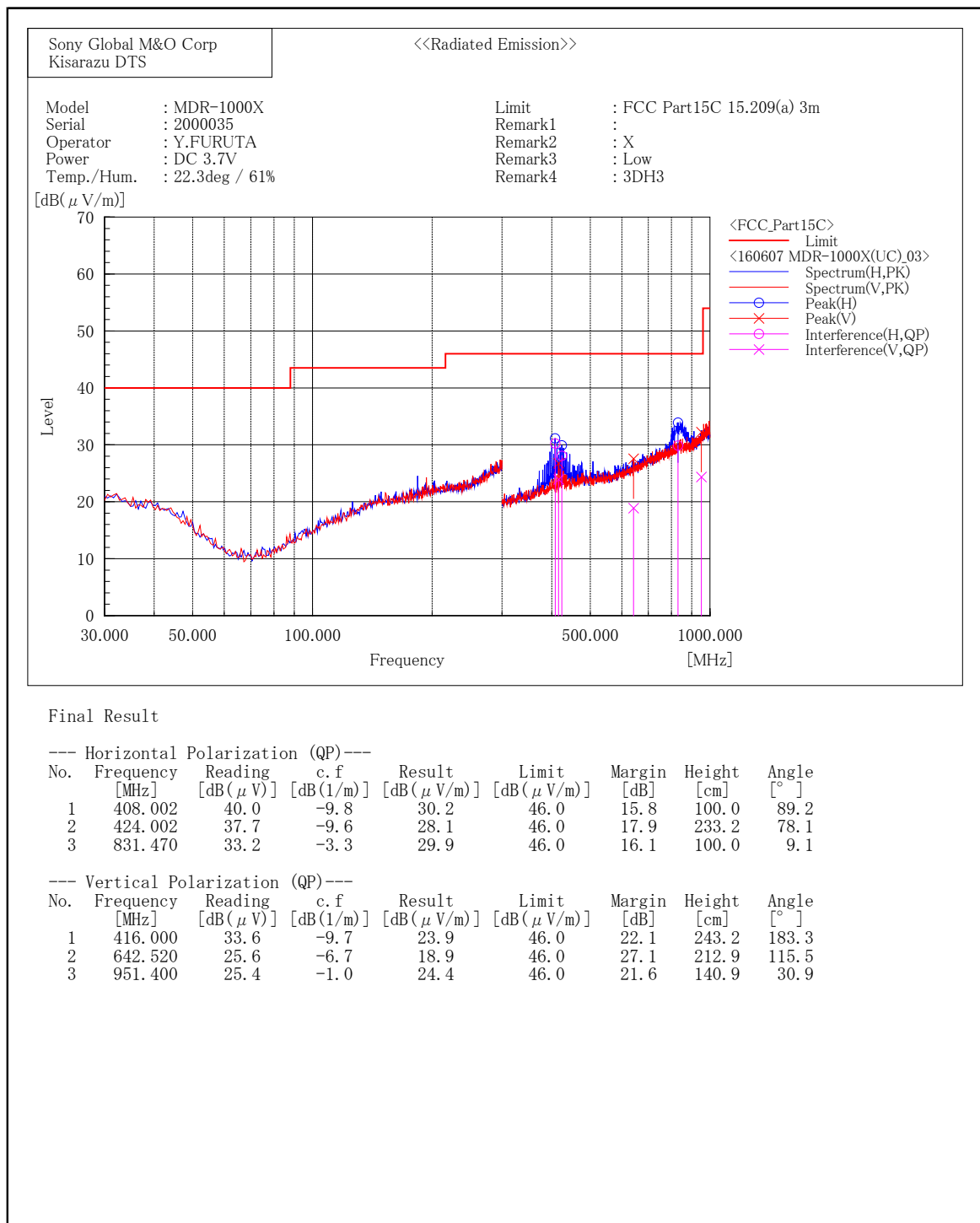
1) Date of measurement : June 07, 2016

[BDR(DH5)/2480MHz]



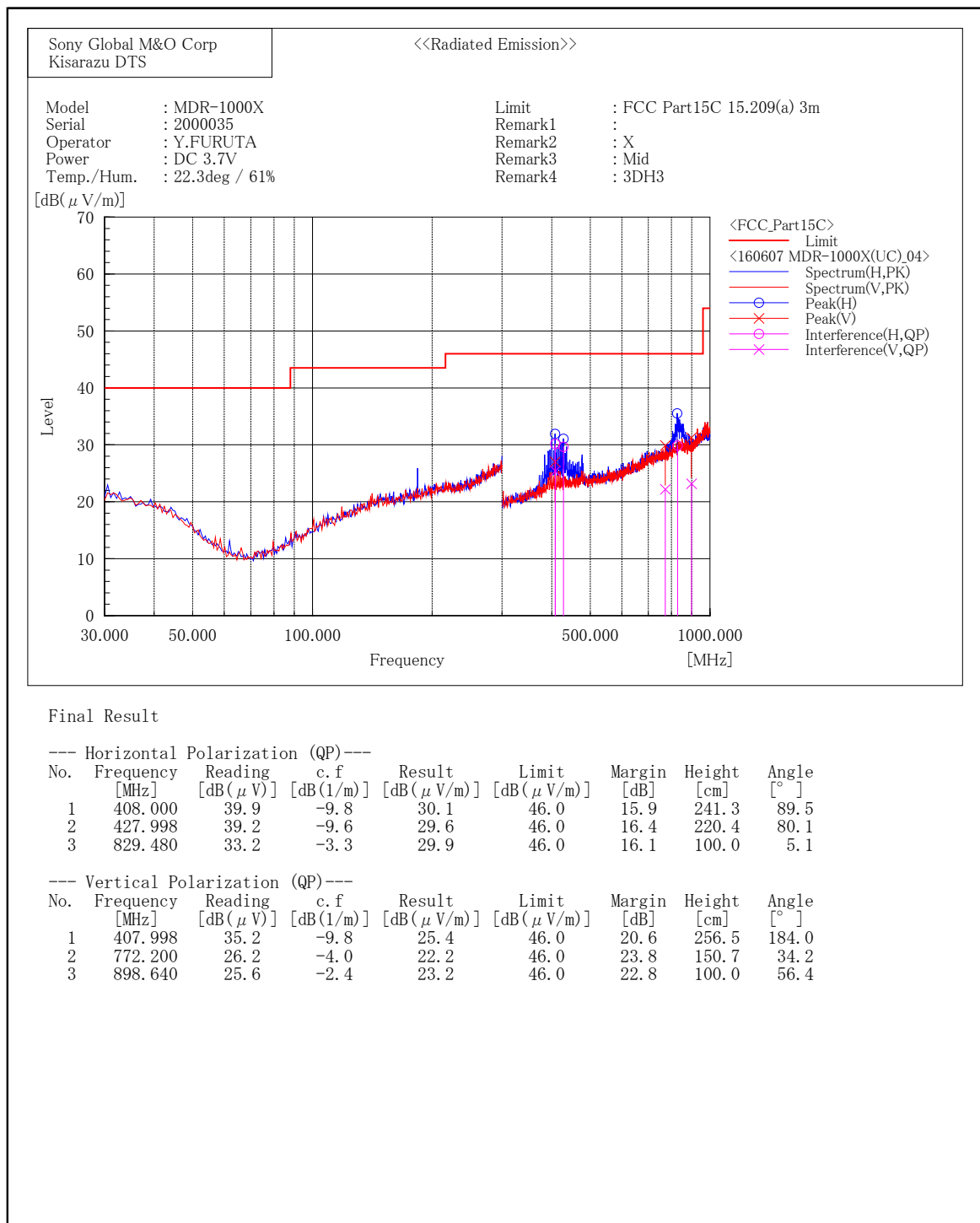
1) Date of measurement : June 07, 2016

[EDR(3DH3)/2402MHz]



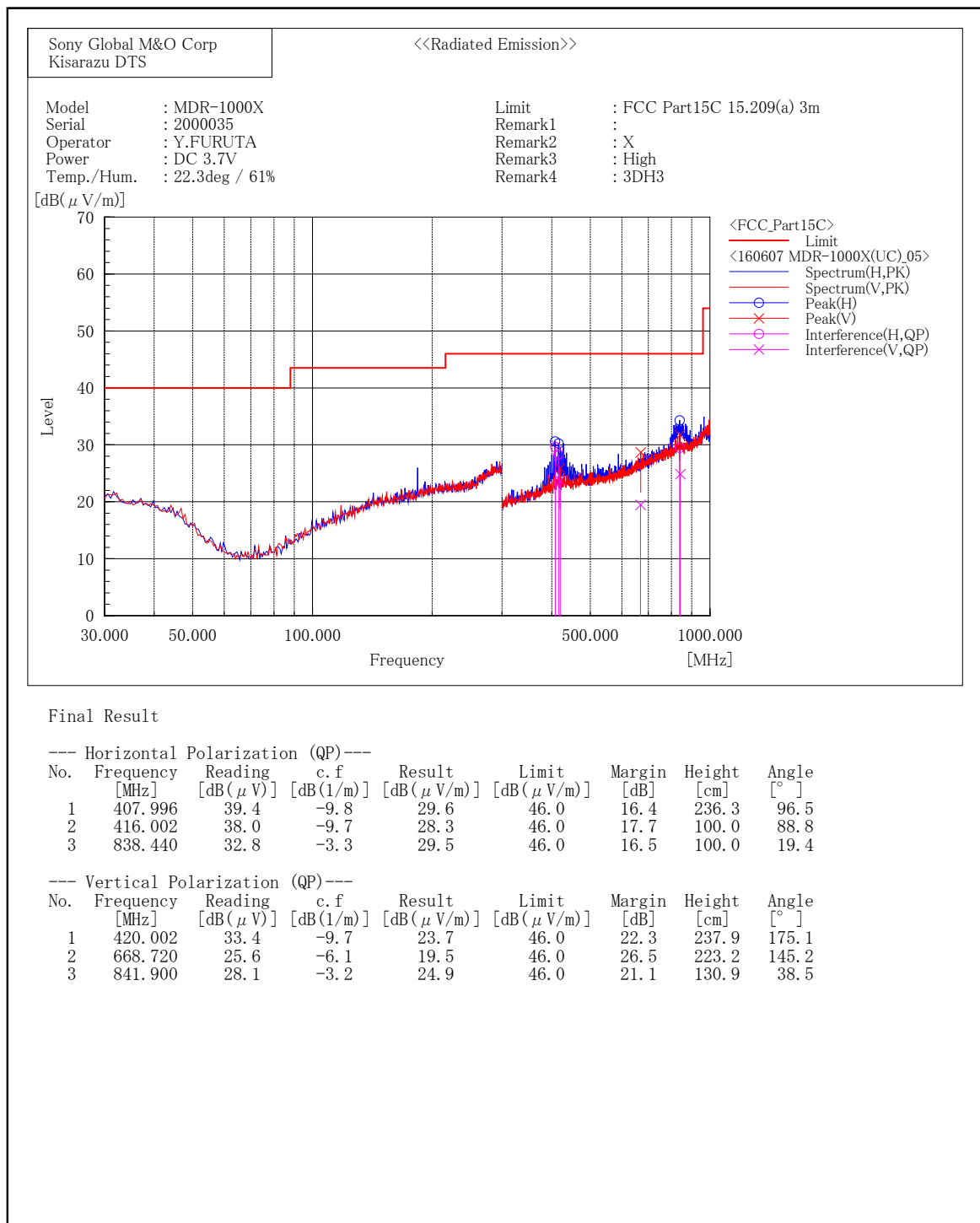
1) Date of measurement : June 07, 2016

[EDR(3DH3)/2441MHz]



1) Date of measurement : June 07, 2016

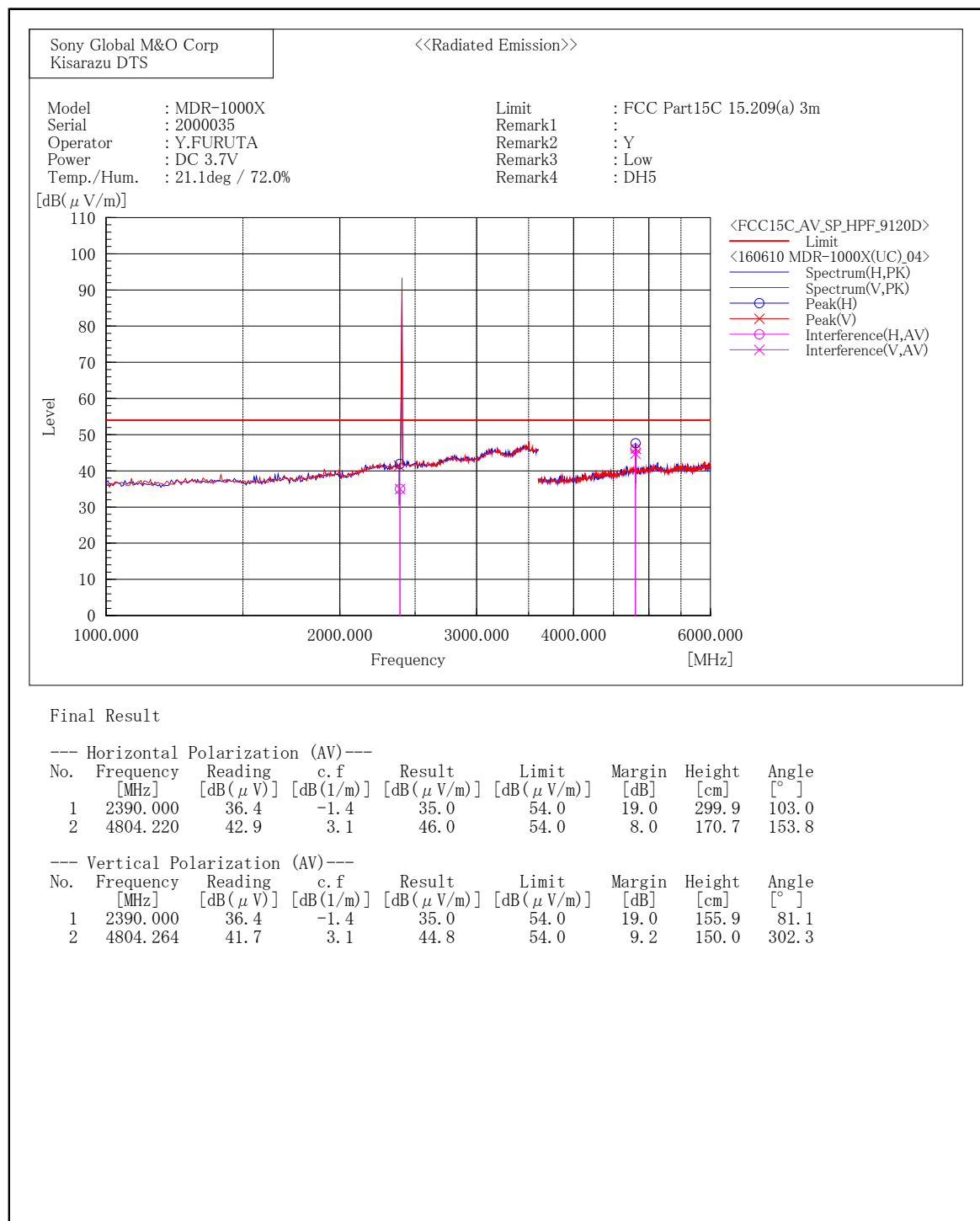
[EDR(3DH3)/2480MHz]



1GHz - 6 GHz

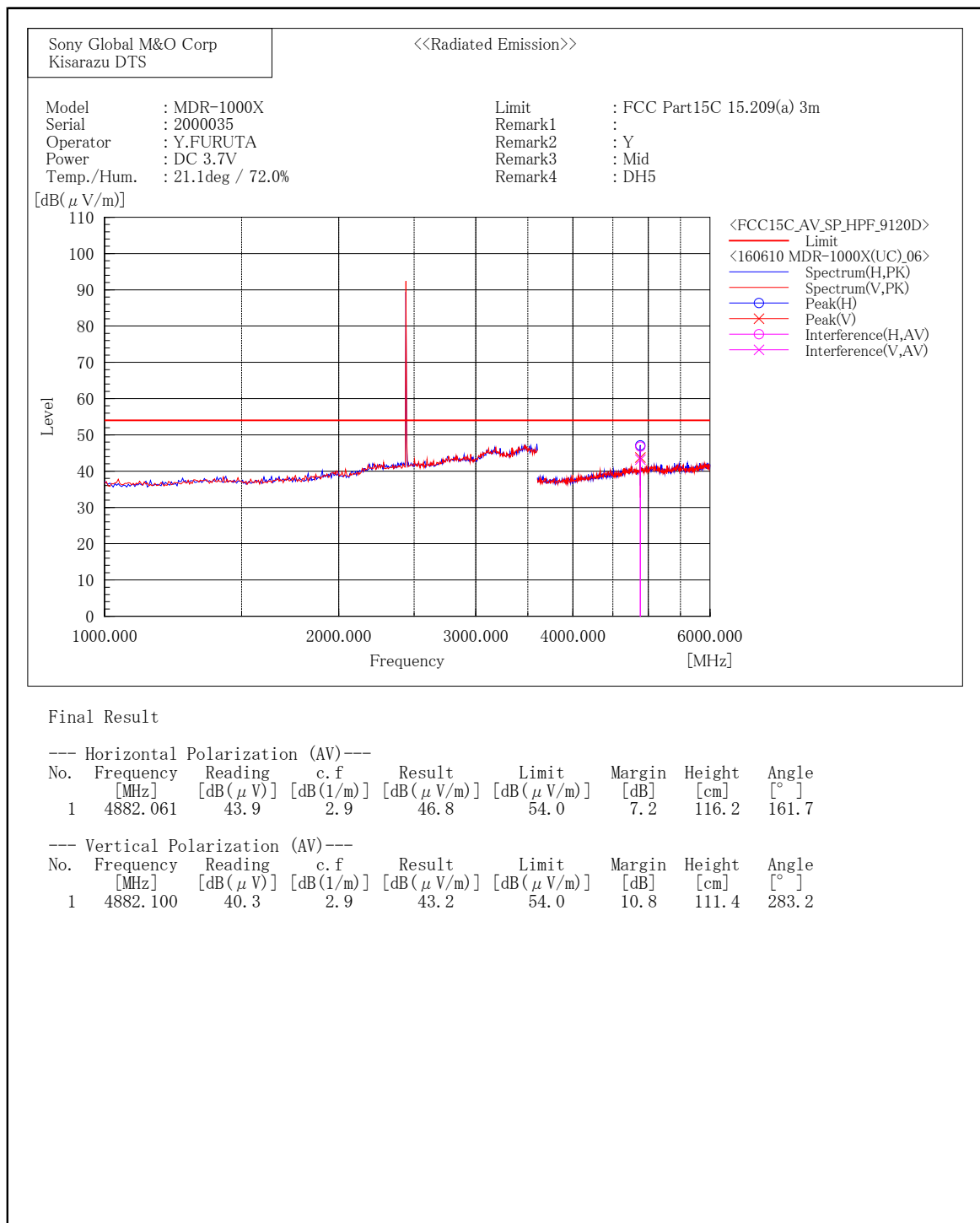
1) Date of measurement : June 10, 2016

[BDR(DH5)/2402MHz]



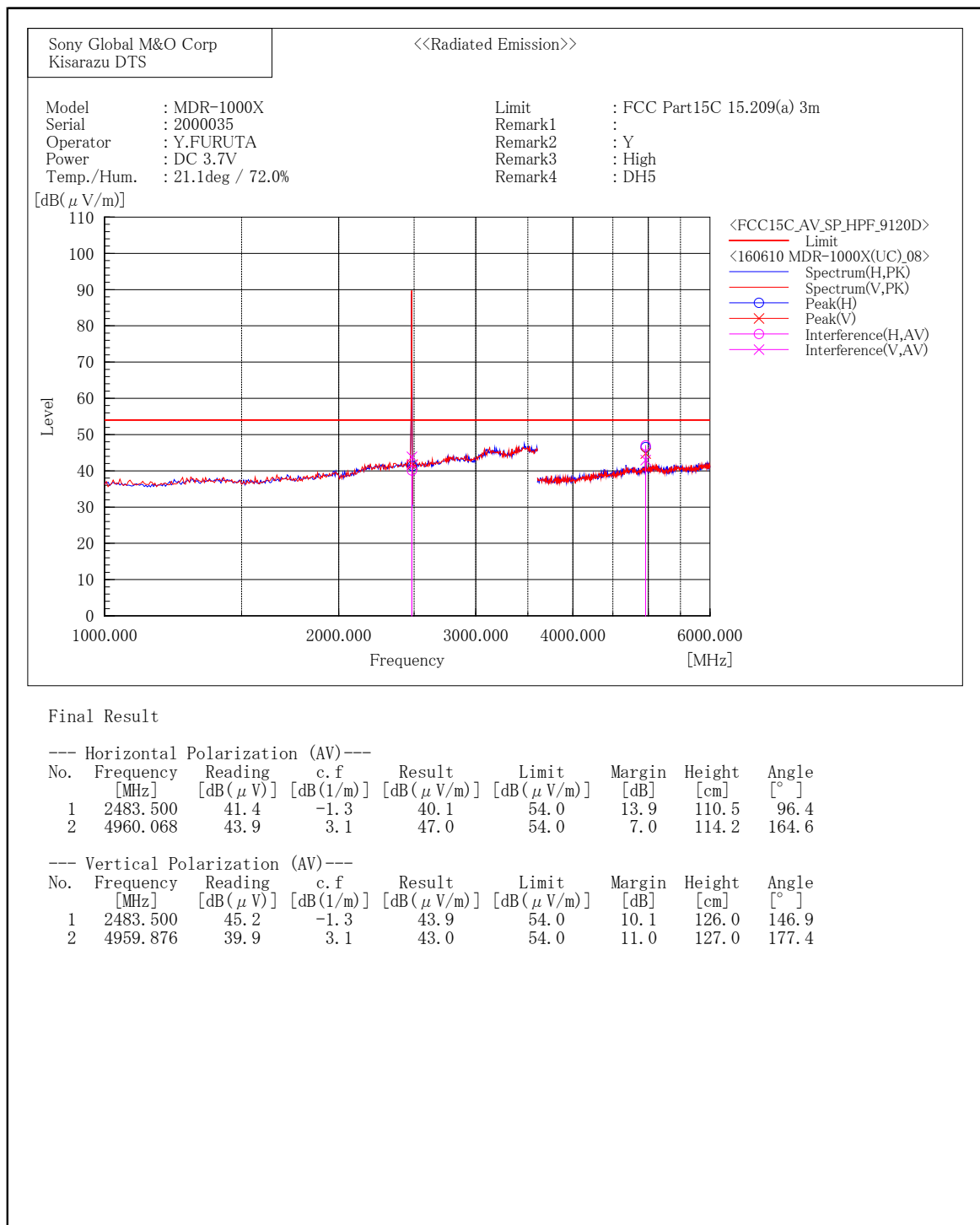
1) Date of measurement : June 10, 2016

[BDR(DH5)/2441MHz]



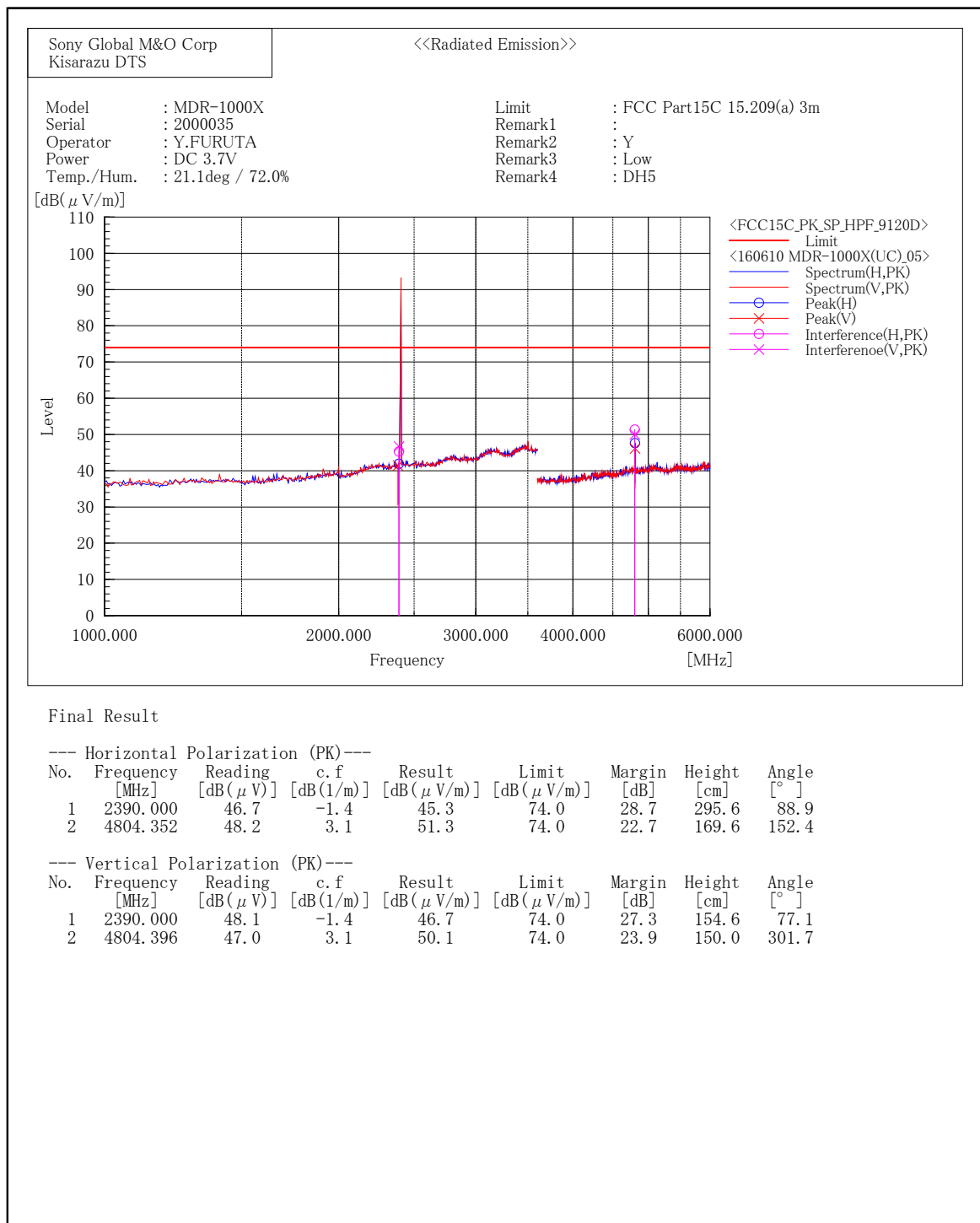
1) Date of measurement : June 10, 2016

[BDR(DH5)/2480MHz]



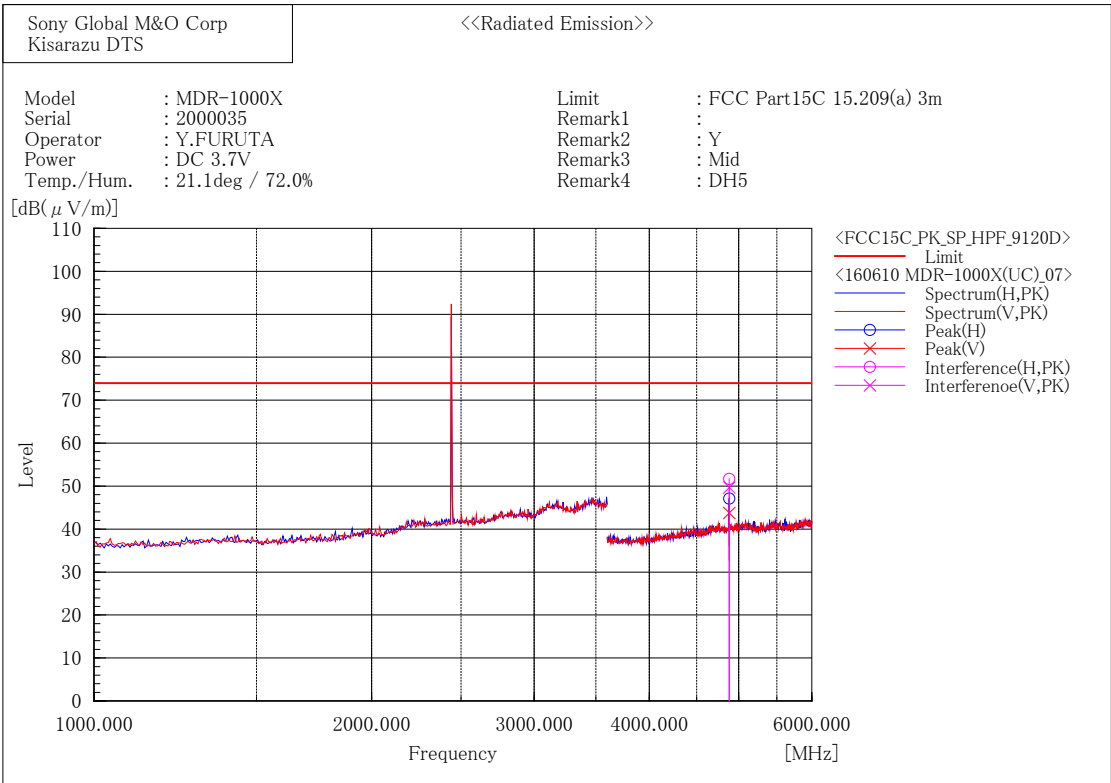
1) Date of measurement : June 10, 2016

[BDR(DH5)/2402MHz]



1) Date of measurement : June 10, 2016

[BDR(DH5)/2441MHz]

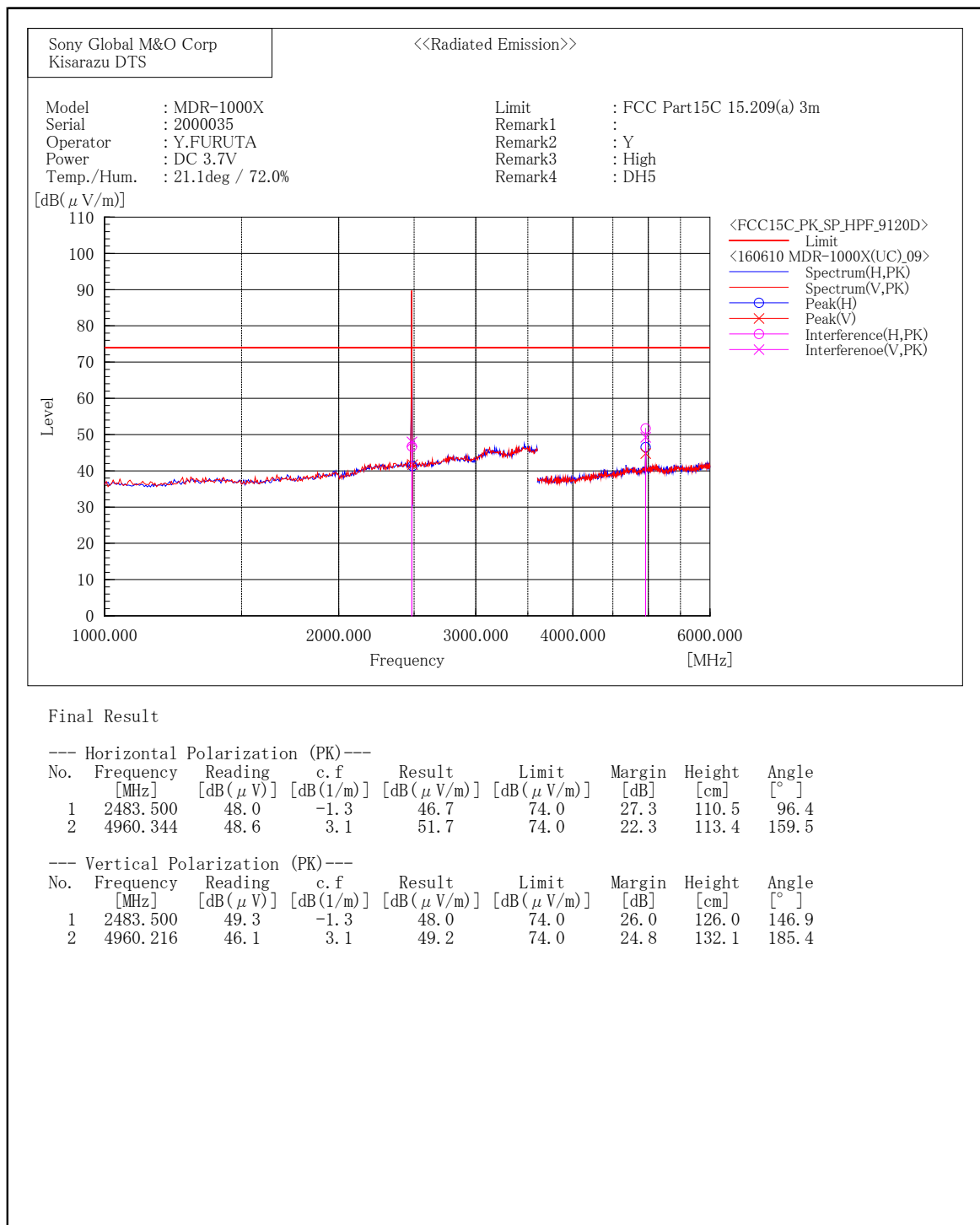


Final Result

--- 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	4881.737	48.8	2.9	51.7	74.0	22.3	110.5	162.1
--- 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	4881.768	46.8	2.9	49.7	74.0	24.3	116.8	282.9

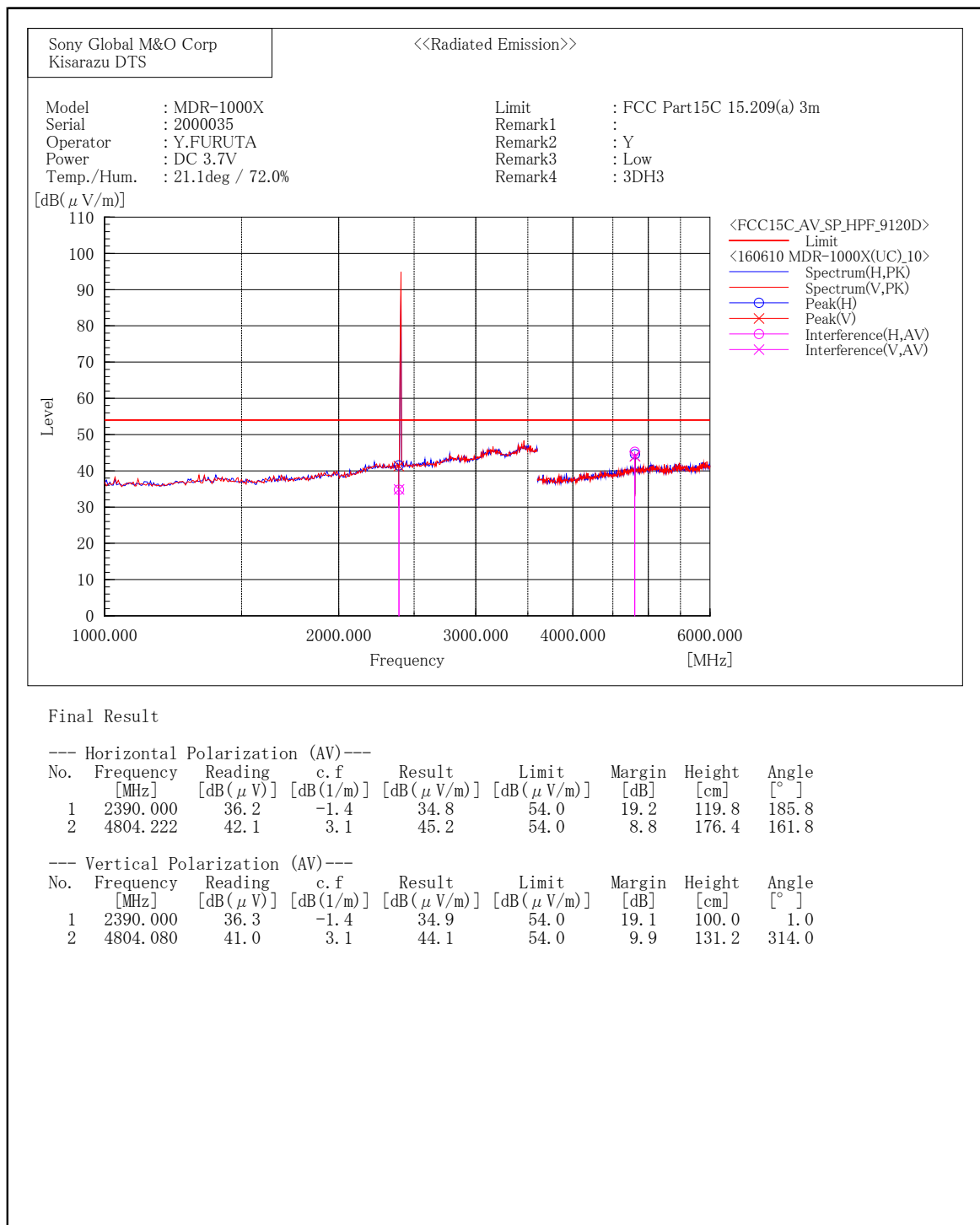
1) Date of measurement : June 10, 2016

[BDR(DH5)/2480MHz]



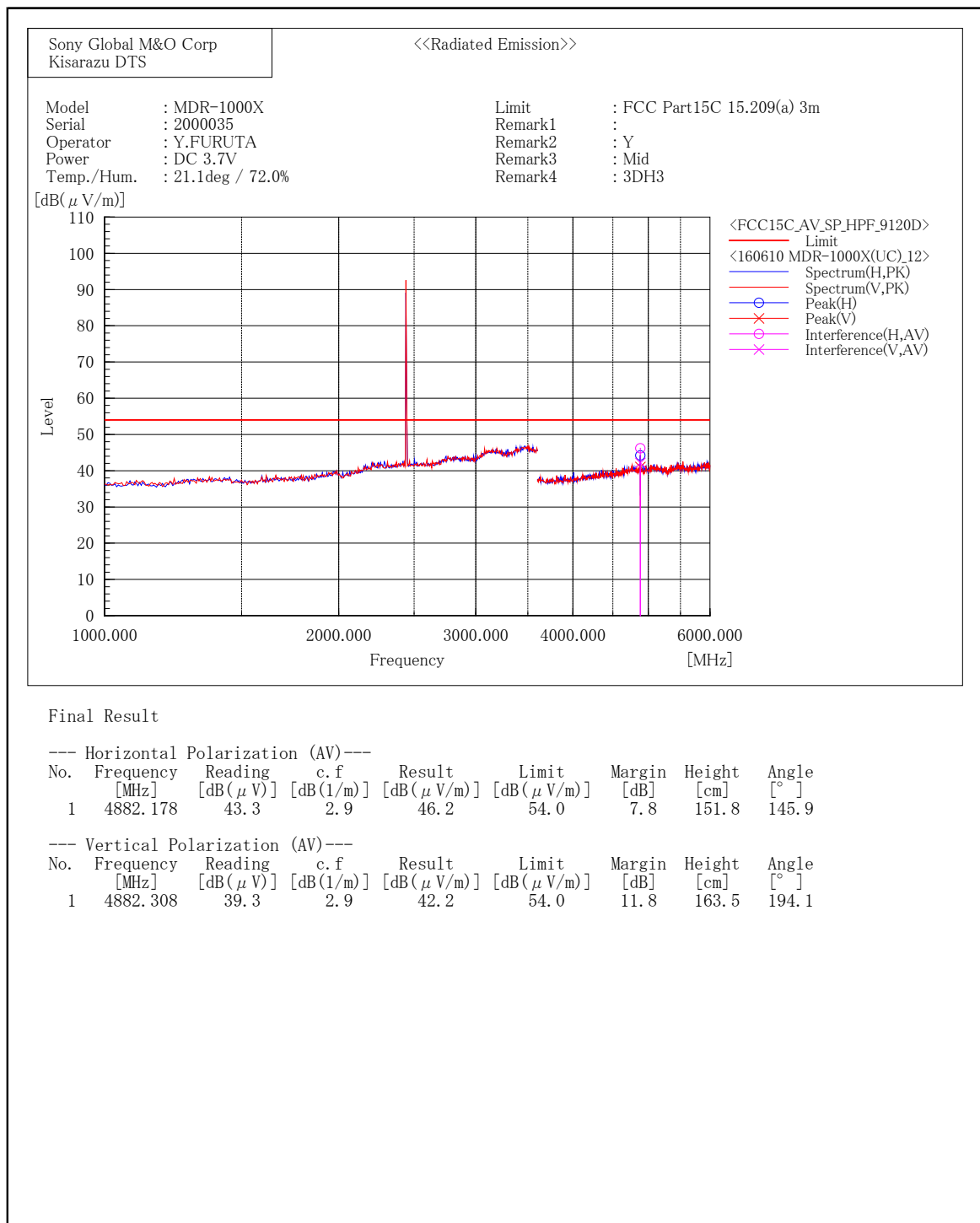
1) Date of measurement : June 10, 2016

[EDR(3DH3)/2402MHz]



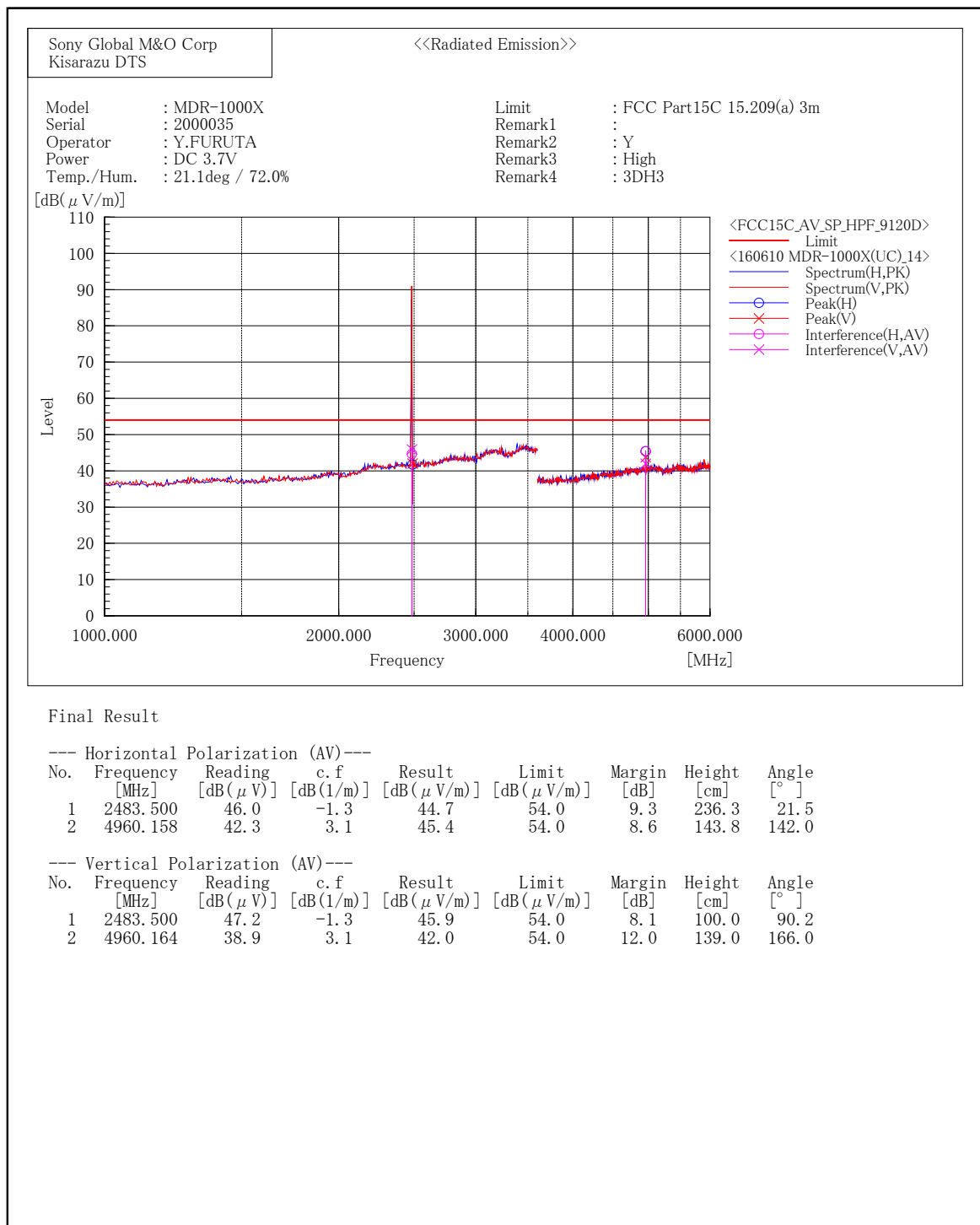
1) Date of measurement : June 10, 2016

[EDR(3DH3)/2441MHz]



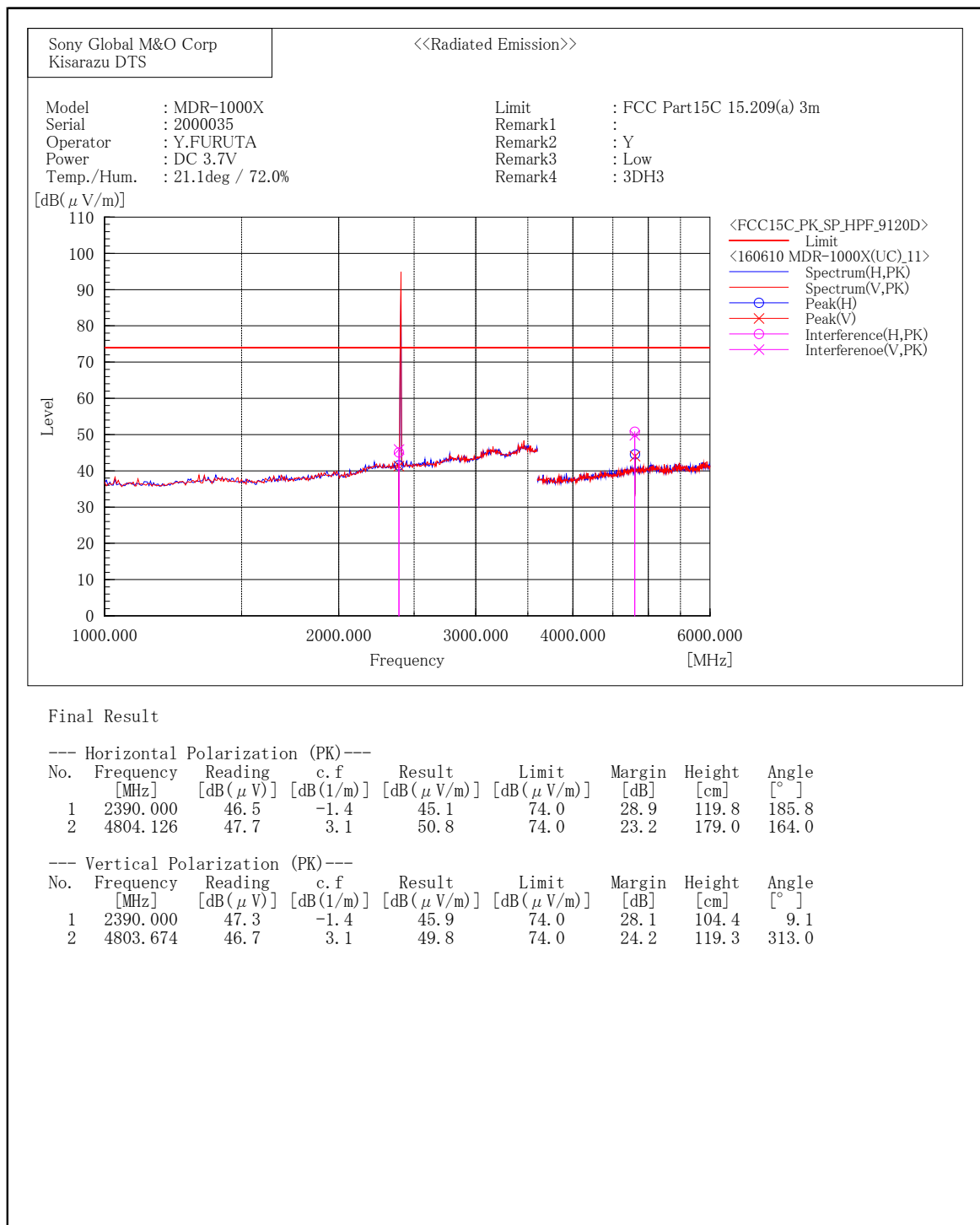
1) Date of measurement : June 10, 2016

[EDR(3DH3)/2480MHz]



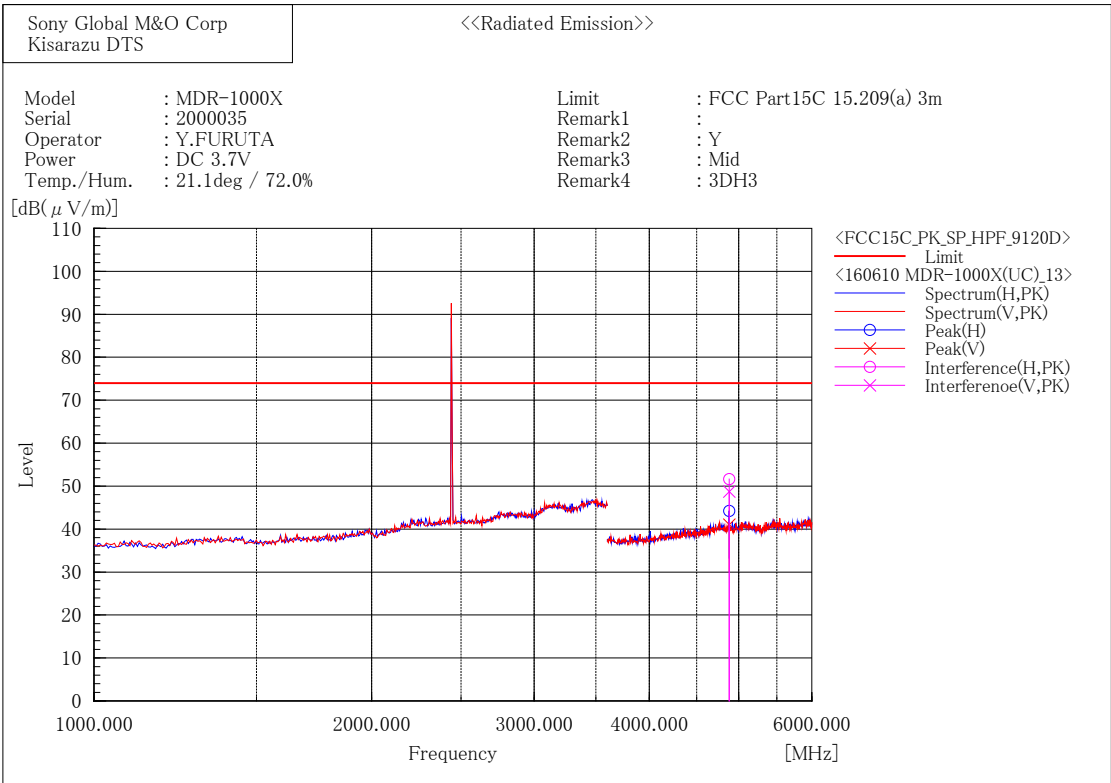
1) Date of measurement : June 10, 2016

[EDR(3DH3)/2402MHz]



1) Date of measurement : June 10, 2016

[EDR(3DH3)/2441MHz]



Final Result

--- Horizontal Polarization (PK)---

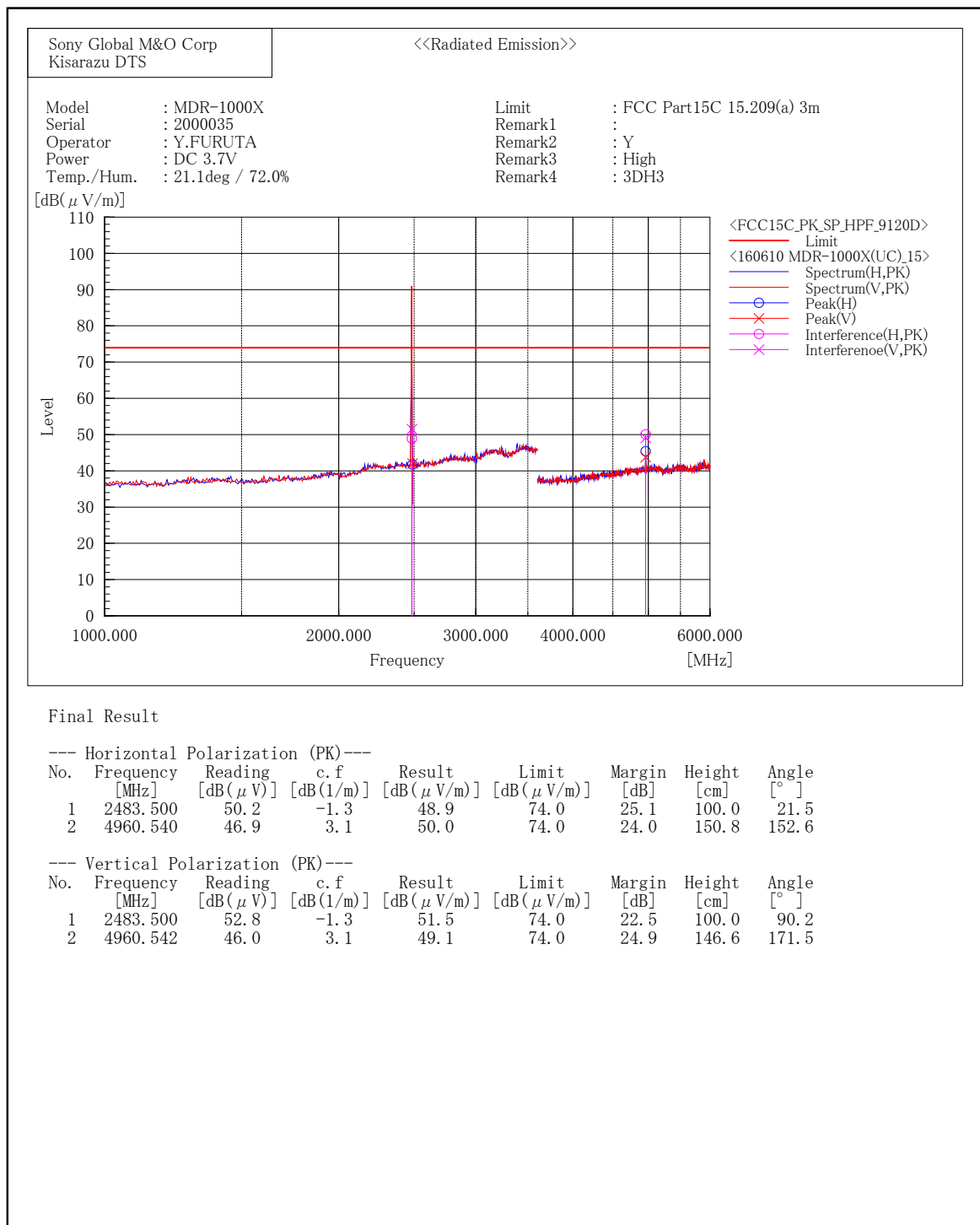
No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	4882.010	48.8	2.9	51.7	74.0	22.3	147.0	145.7

--- 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	4882.042	45.9	2.9	48.8	74.0	25.2	167.4	195.2

1) Date of measurement : June 10, 2016

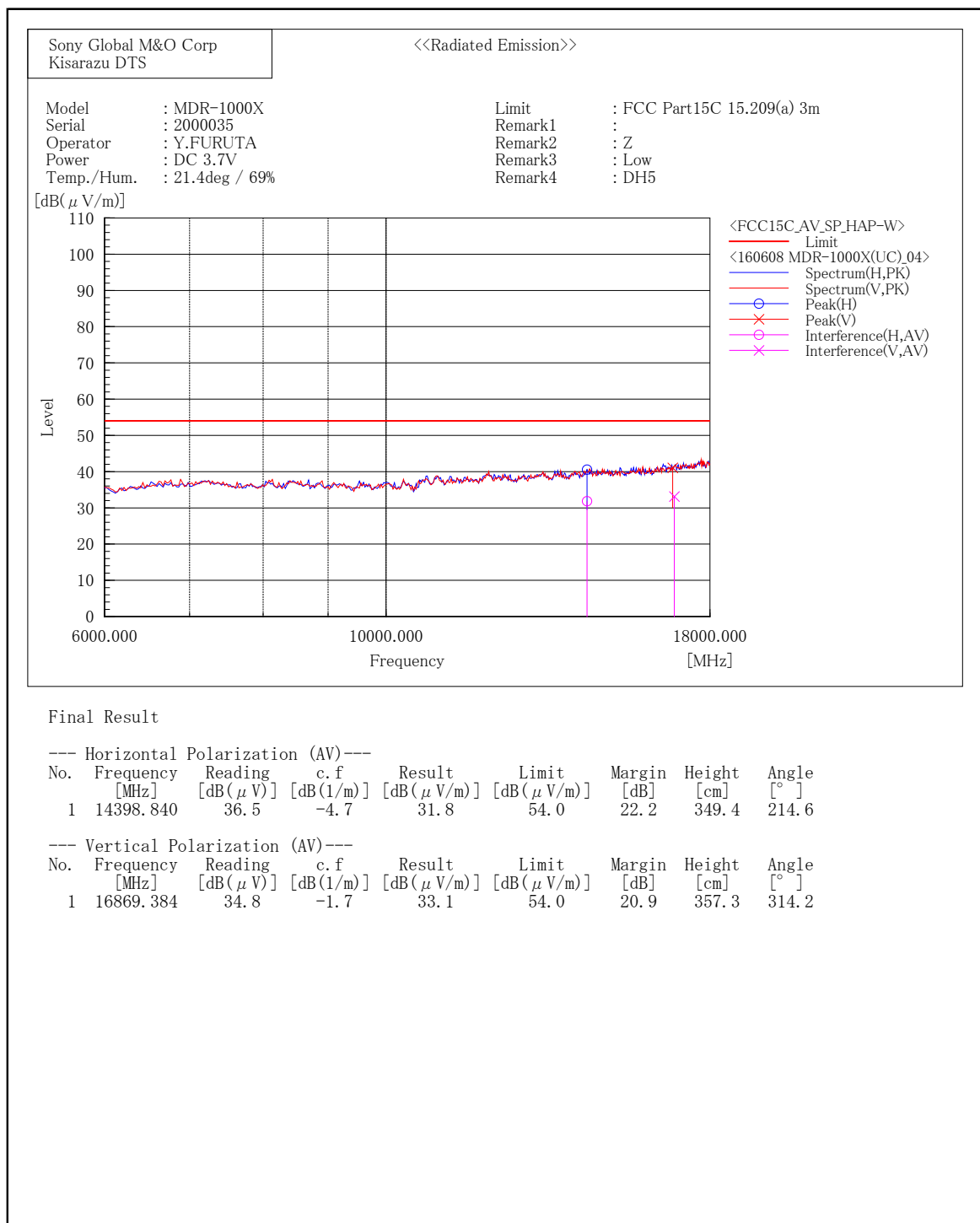
[EDR(3DH3)/2480MHz]



6 GHz - 18 GHz

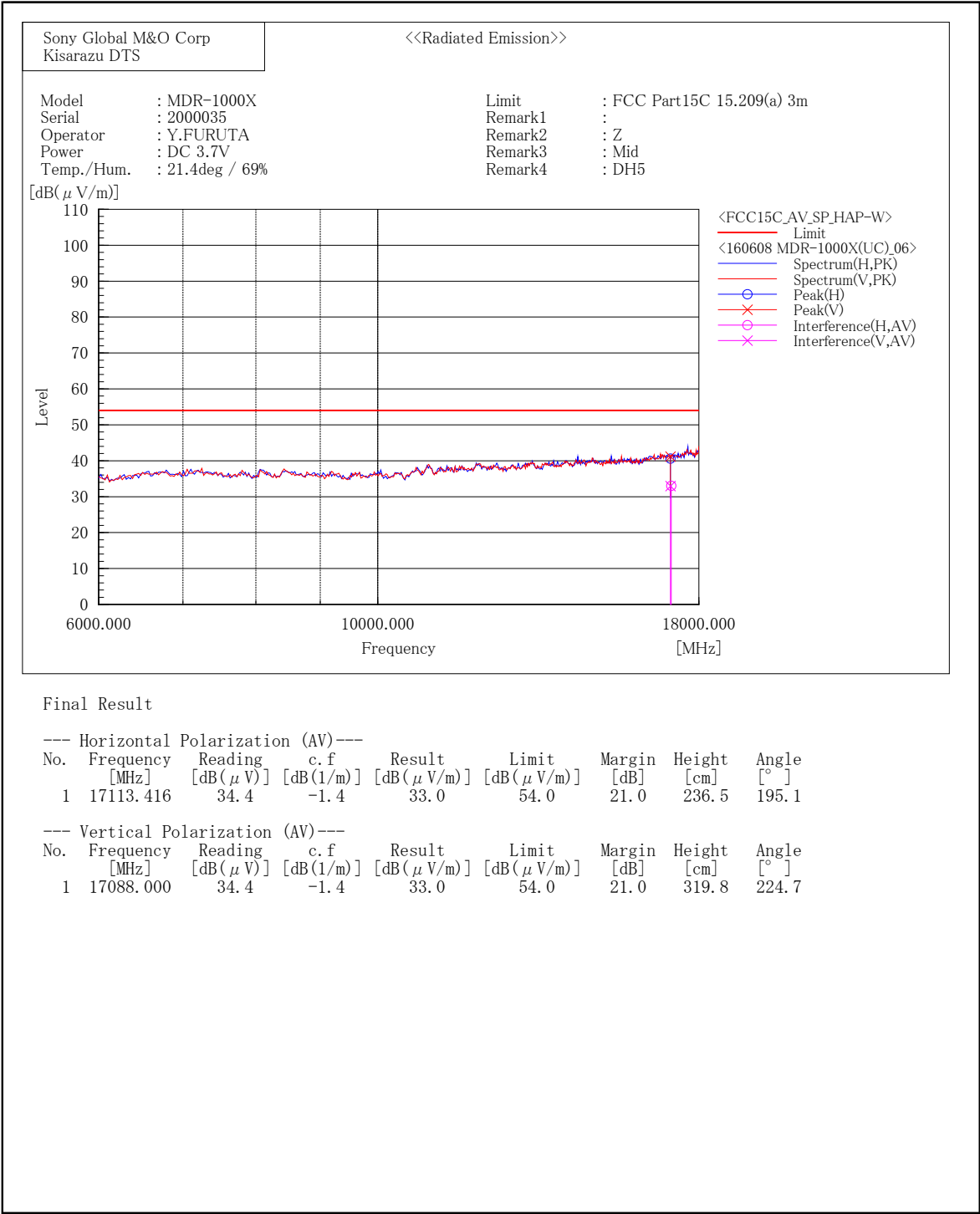
1) Date of measurement : June 08, 2016

[BDR(DH5)/2402MHz]



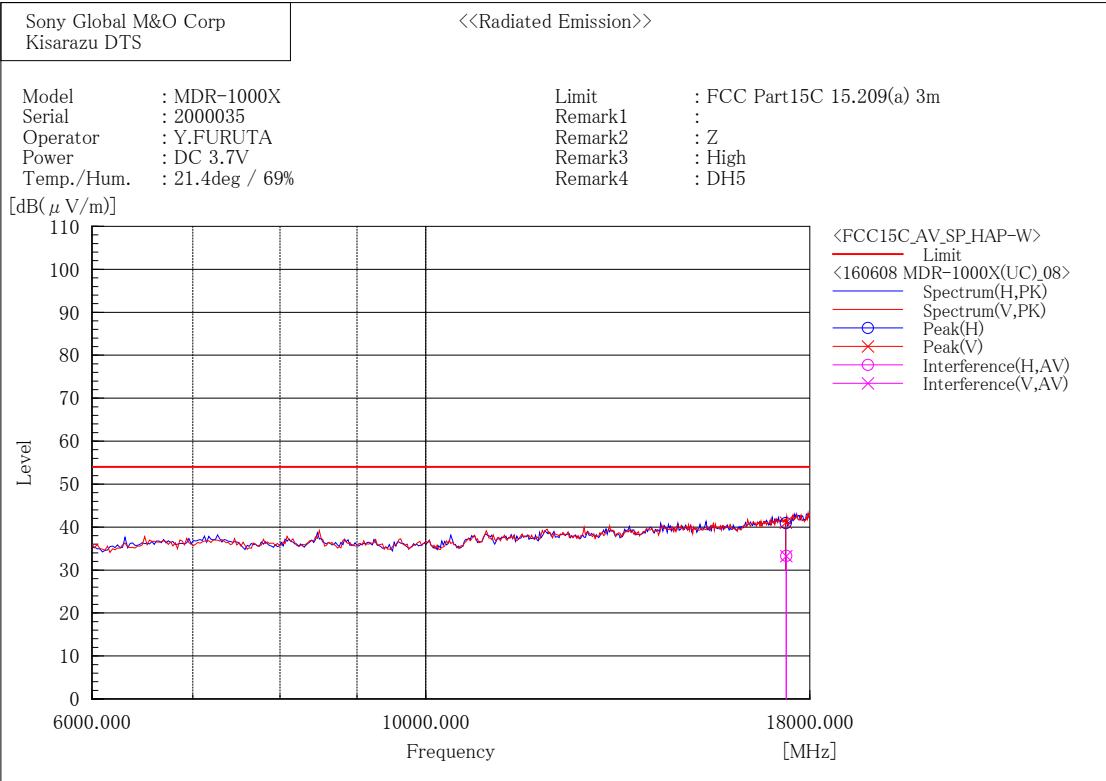
1) Date of measurement : June 08, 2016

[BDR(DH5)/2441MHz]



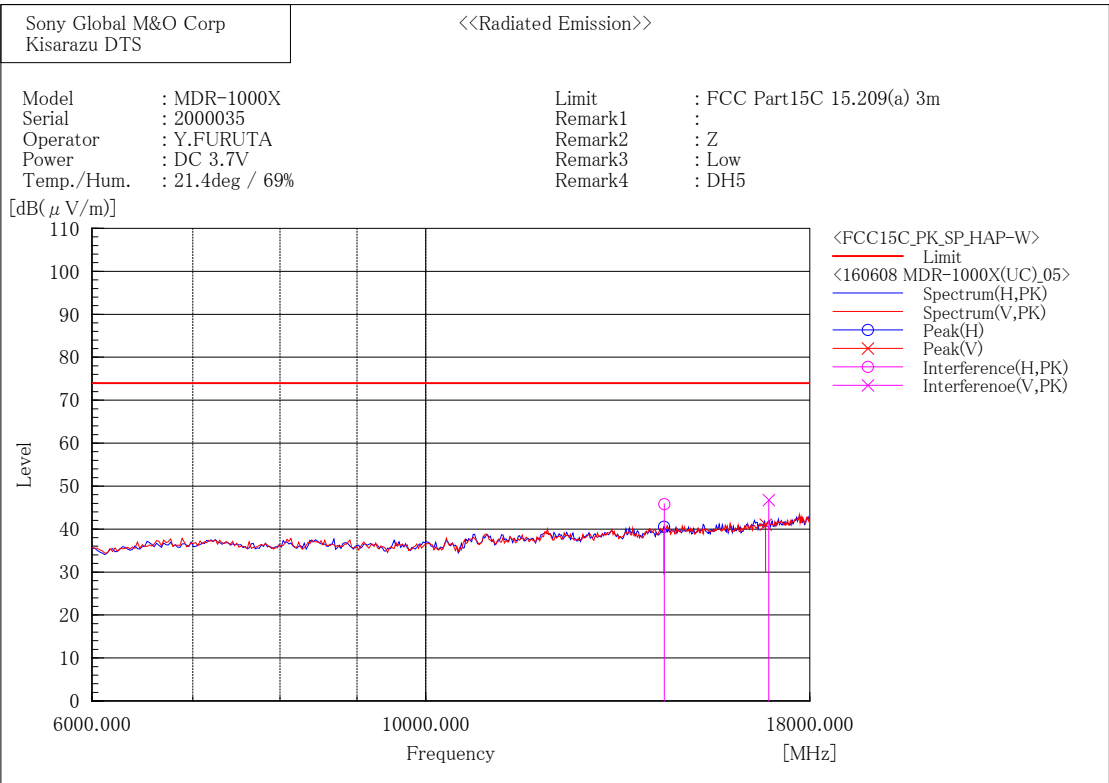
1) Date of measurement : June 08, 2016

[BDR(DH5)/2480MHz]



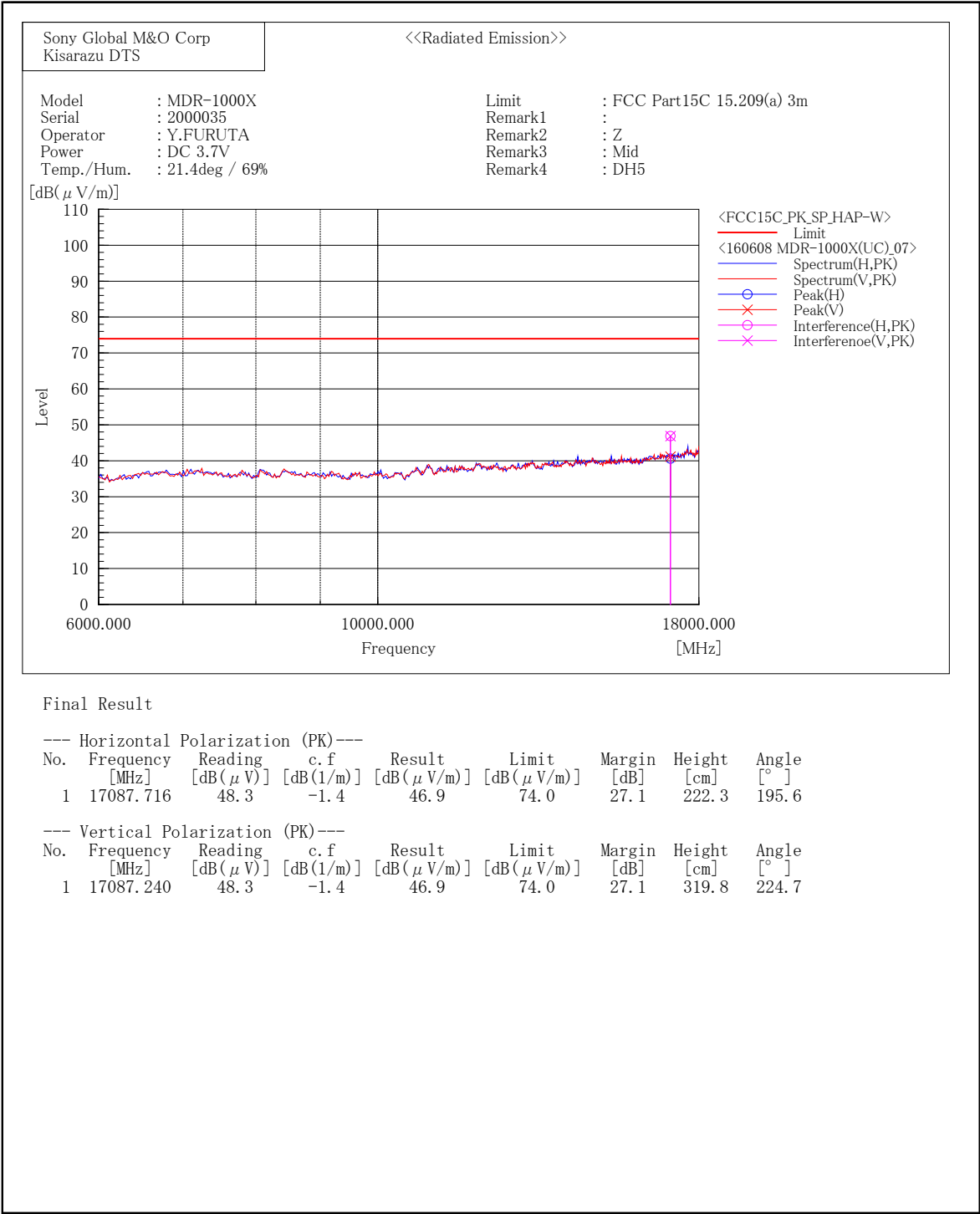
1) Date of measurement : June 08, 2016

[BDR(DH5)/2402MHz]



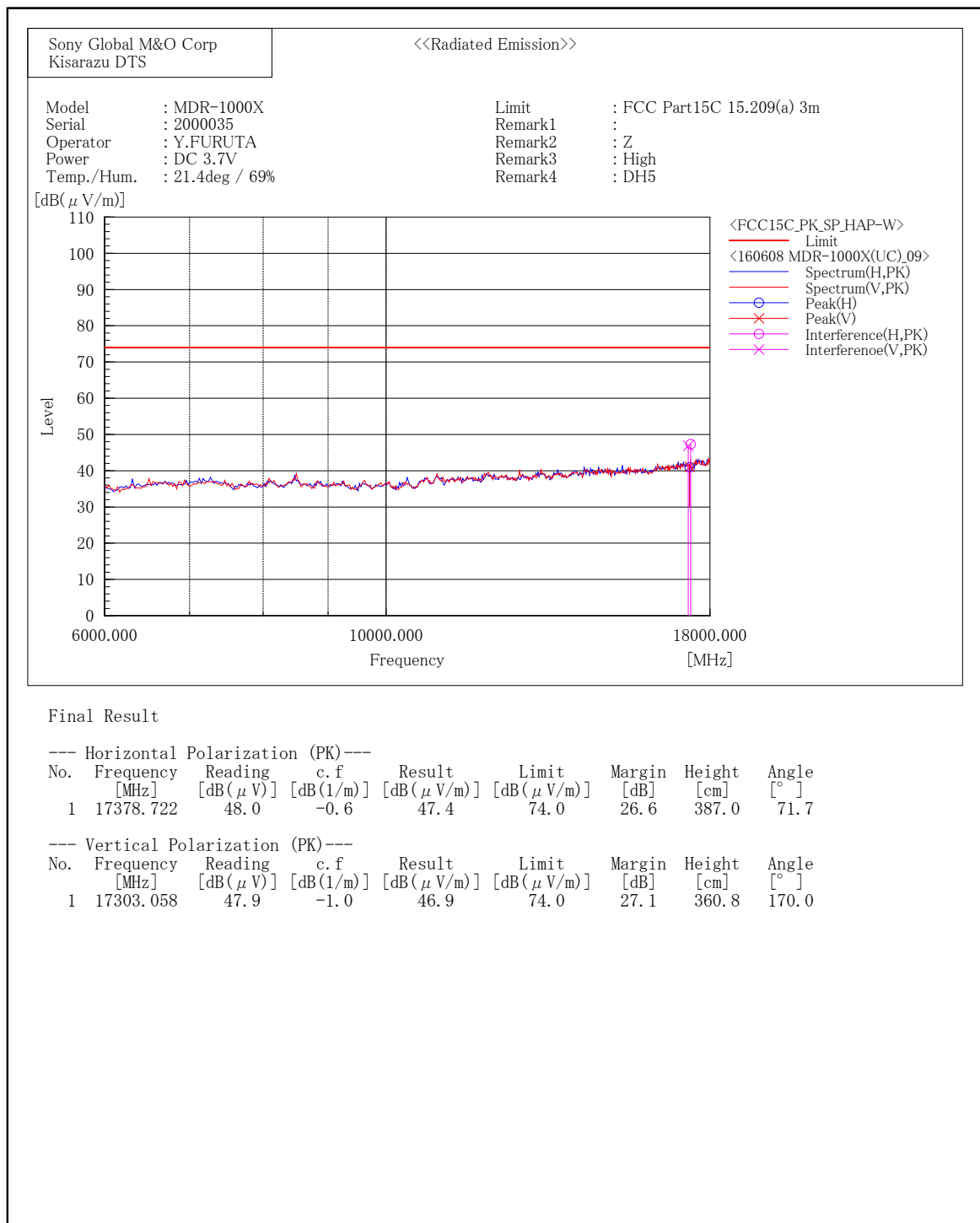
1) Date of measurement : June 08, 2016

[BDR(DH5)/2441MHz]



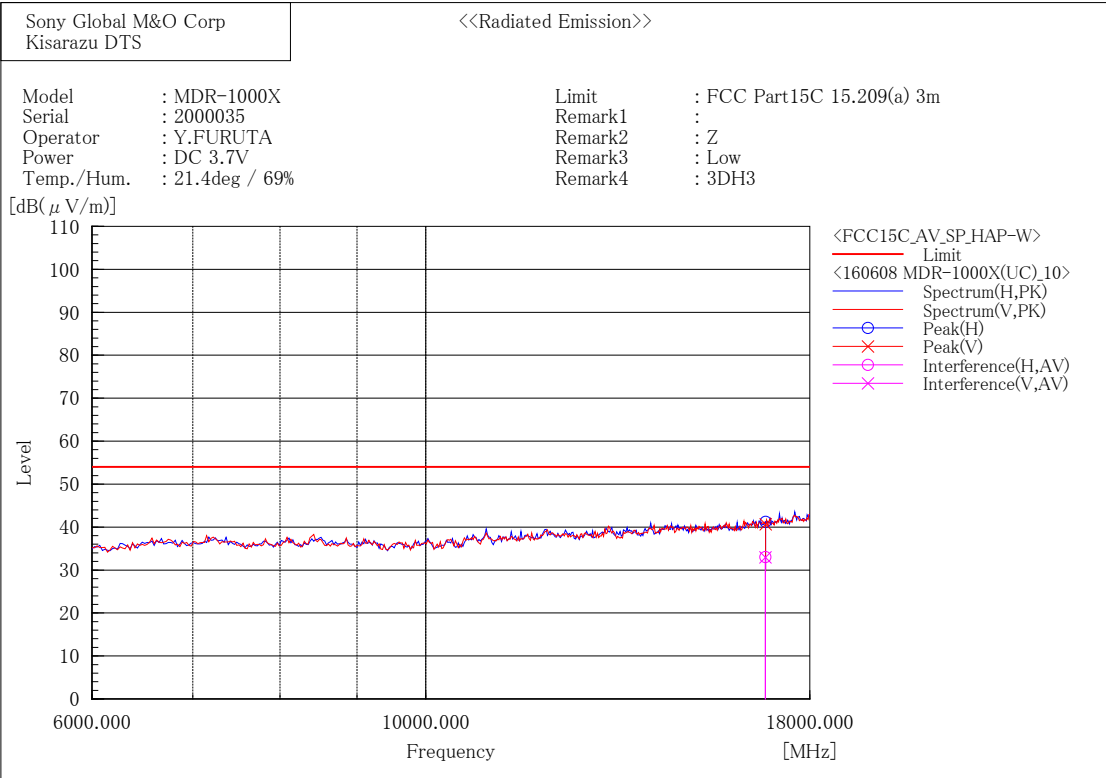
1) Date of measurement : June 08, 2016

[BDR(DH5)/2480MHz]



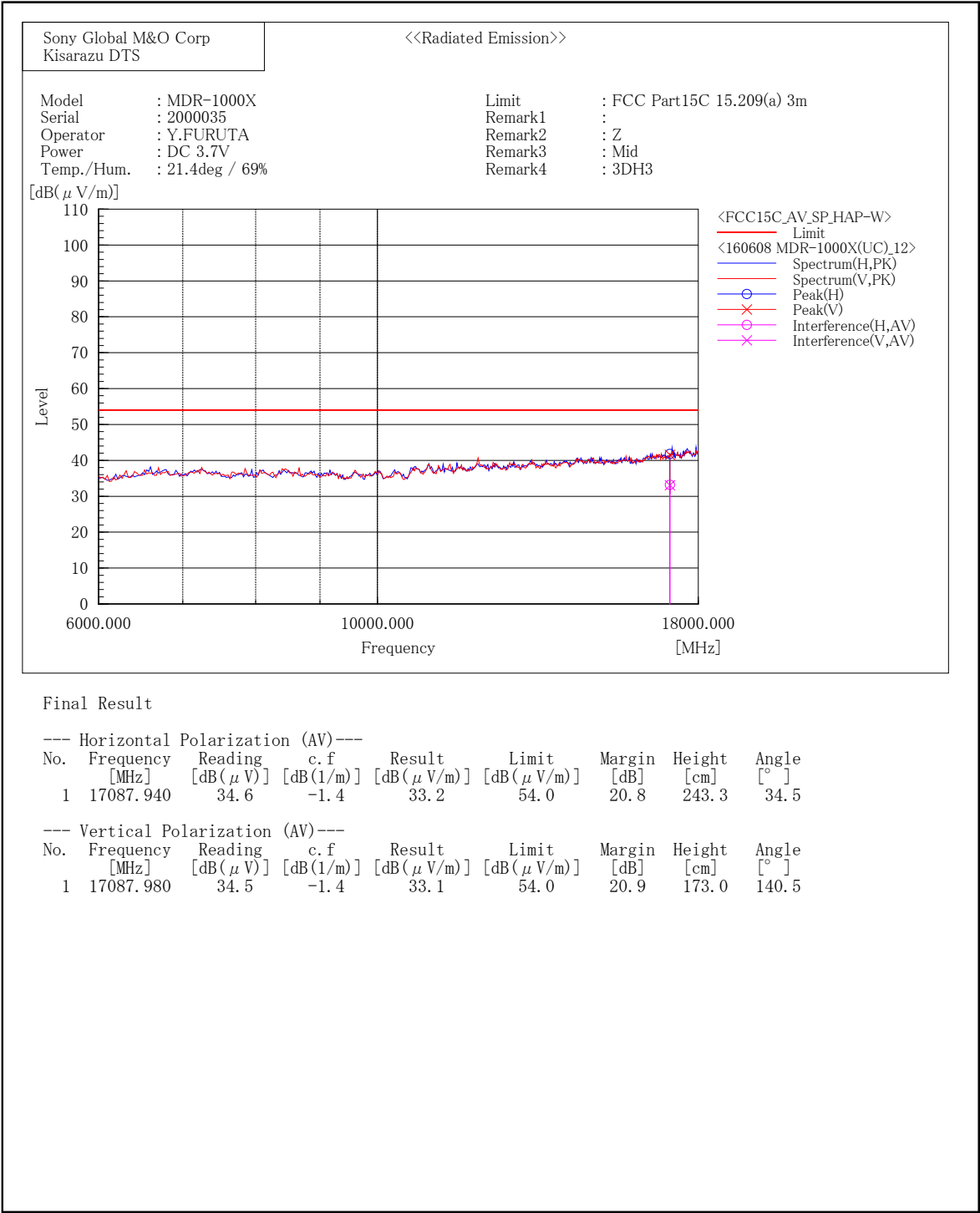
1) Date of measurement : June 08, 2016

[EDR(3DH3)/2402MHz]



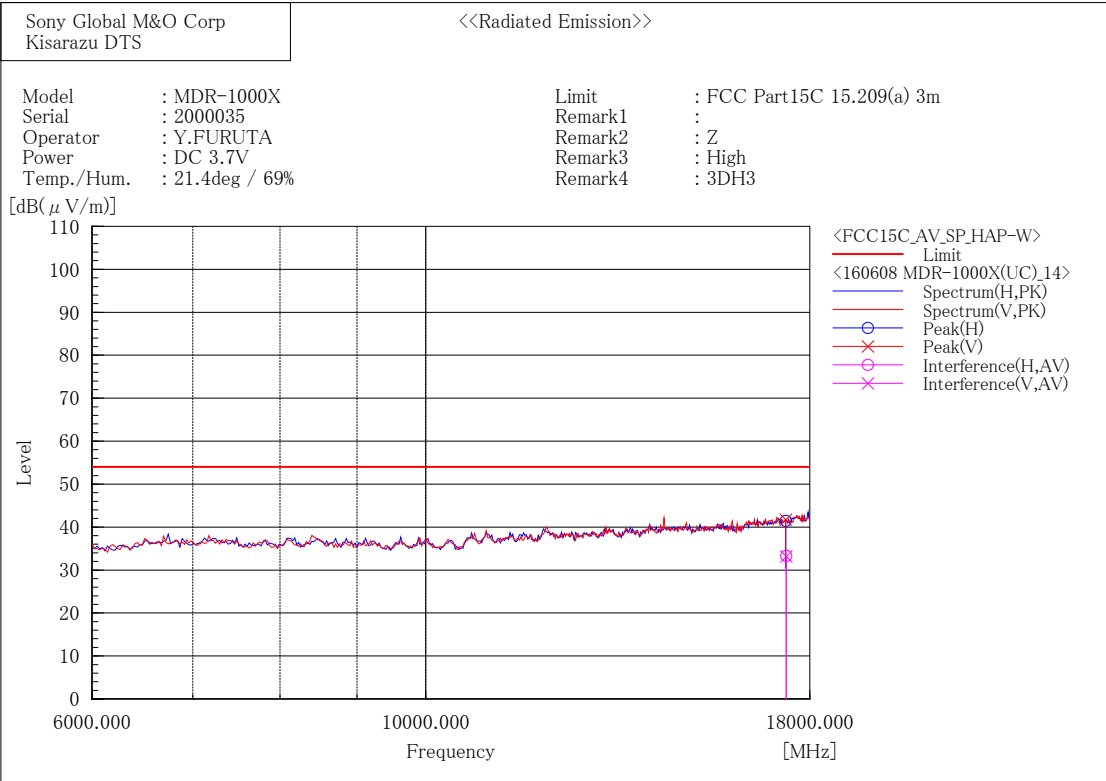
1) Date of measurement : June 08, 2016

[EDR(3DH3)/2441MHz]



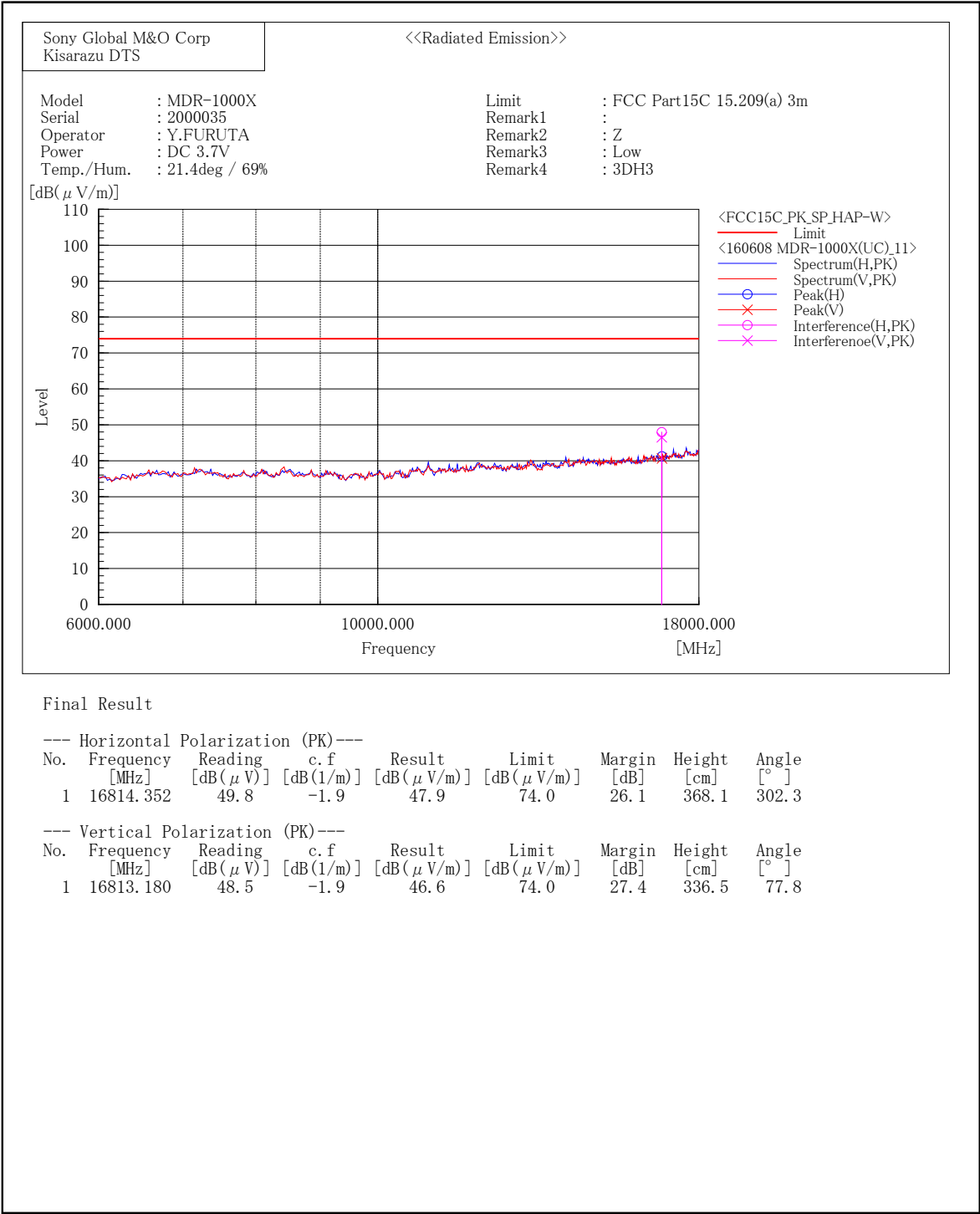
1) Date of measurement : June 08, 2016

[EDR(3DH3)/2480MHz]



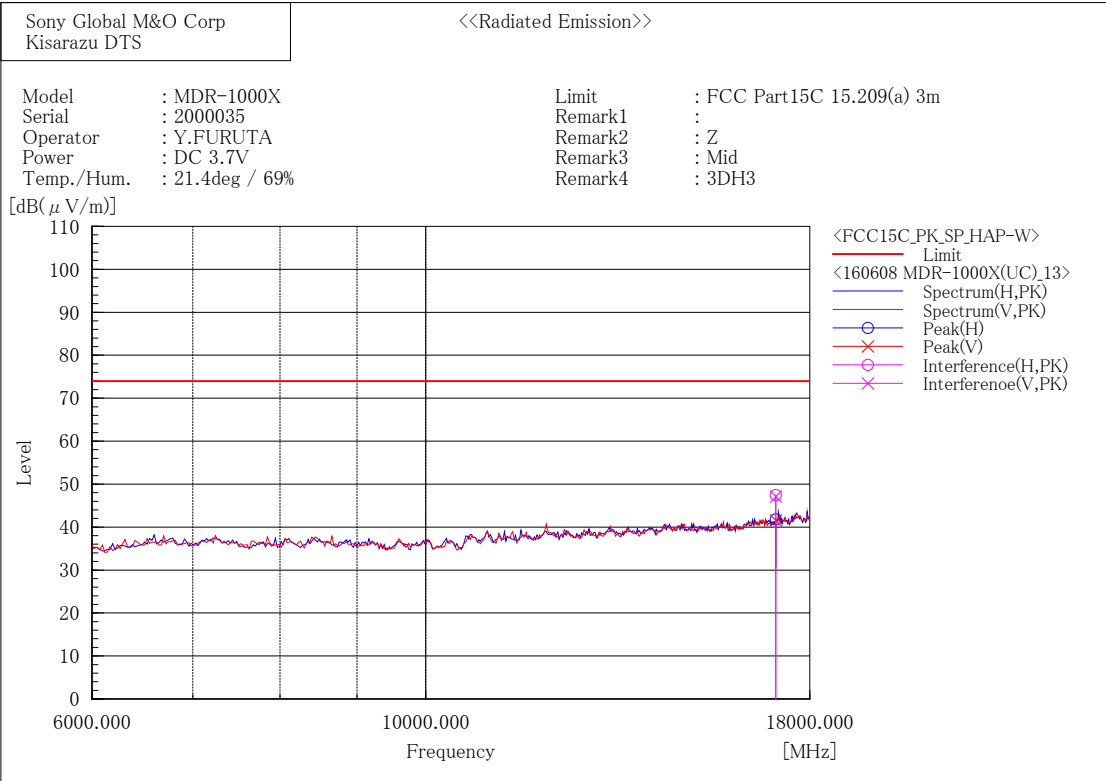
1) Date of measurement : June 08, 2016

[EDR(3DH3)/2402MHz]



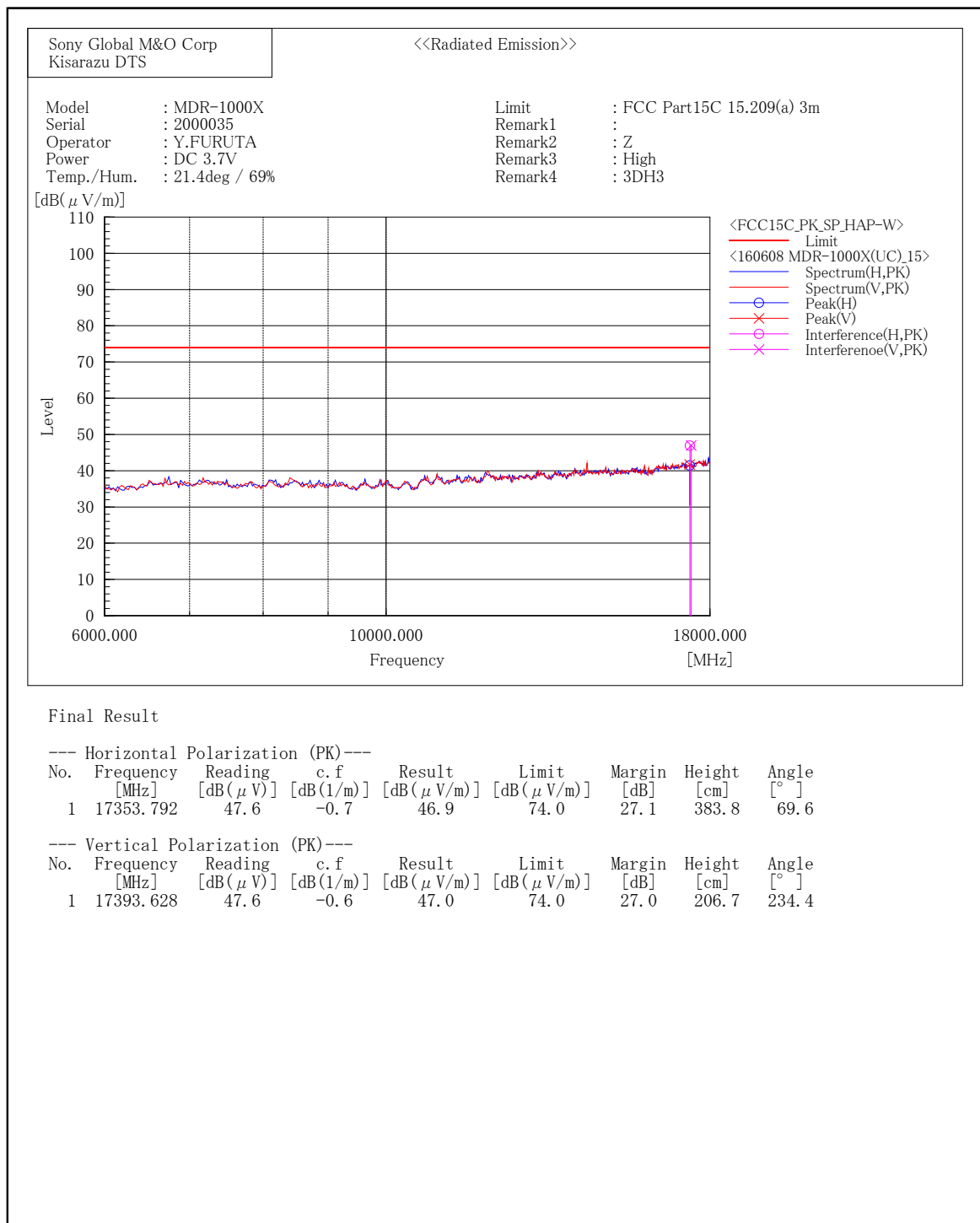
1) Date of measurement : June 08, 2016

[EDR(3DH3)/2441MHz]



1) Date of measurement : June 08, 2016

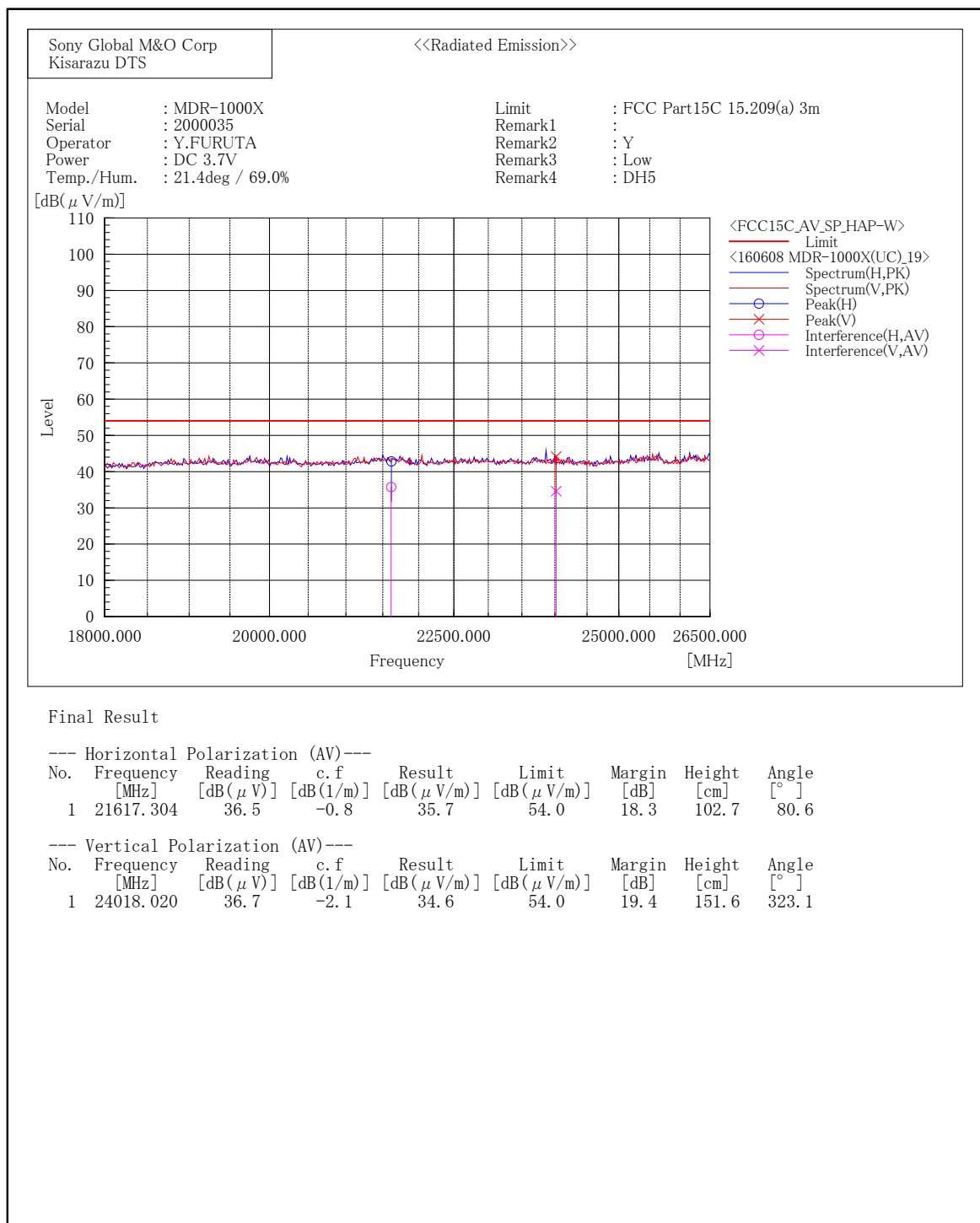
[EDR(3DH3)/2480MHz]



18 GHz – 24.835 GHz

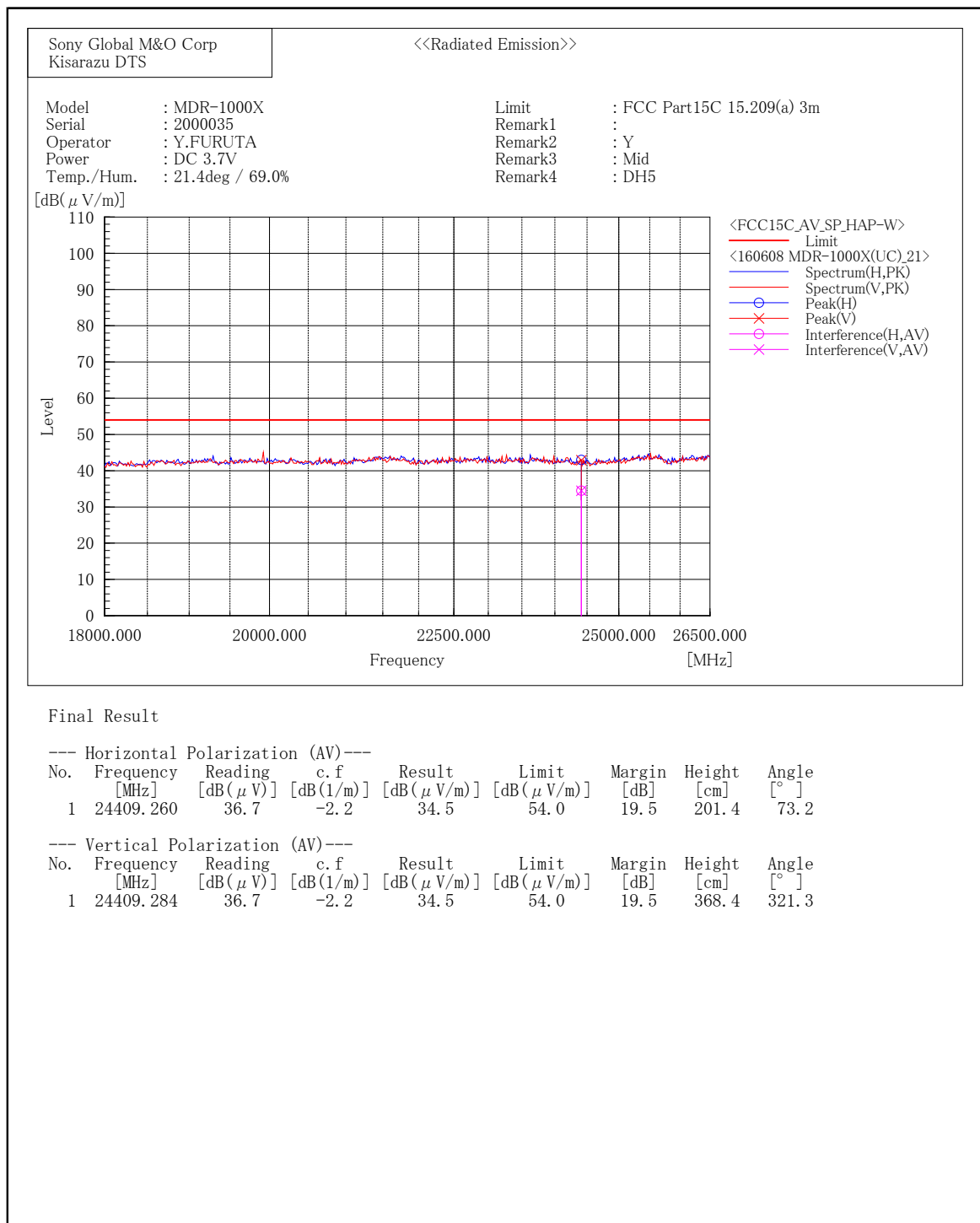
1) Date of measurement : June 08, 2016

[BDR(DH5)/2402MHz]



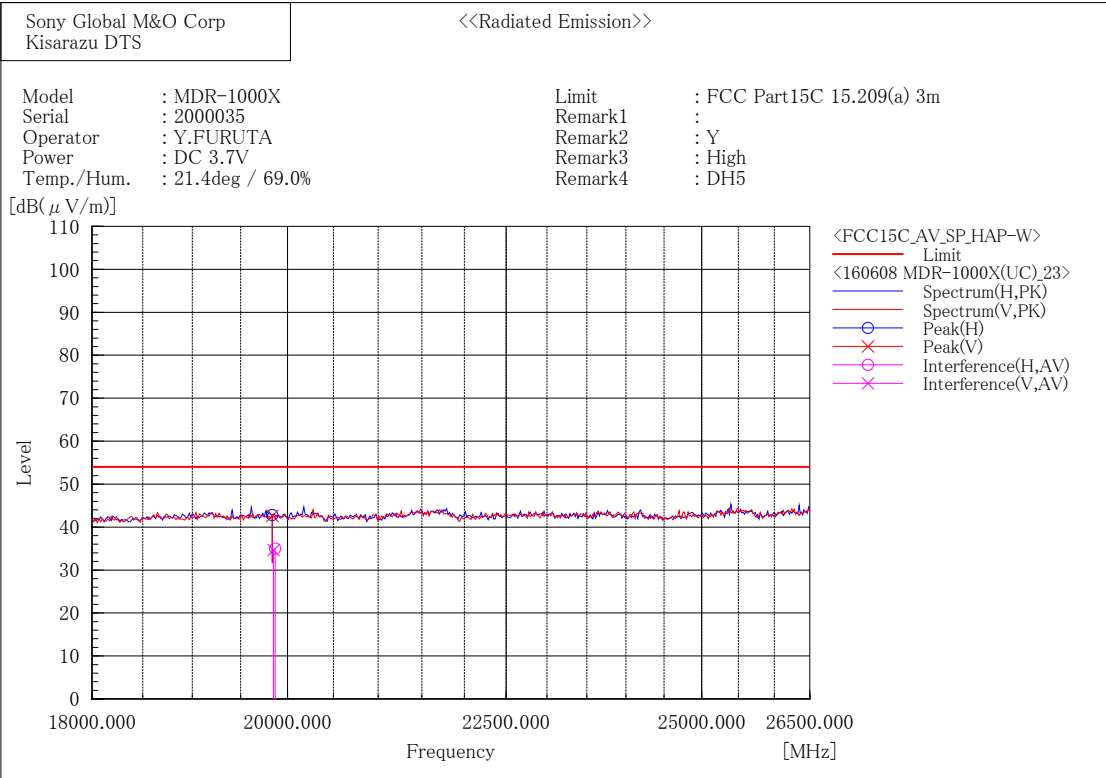
1) Date of measurement : June 08, 2016

[BDR(DH5)/2441MHz]



1) Date of measurement : June 08, 2016

[BDR(DH5)/2480MHz]

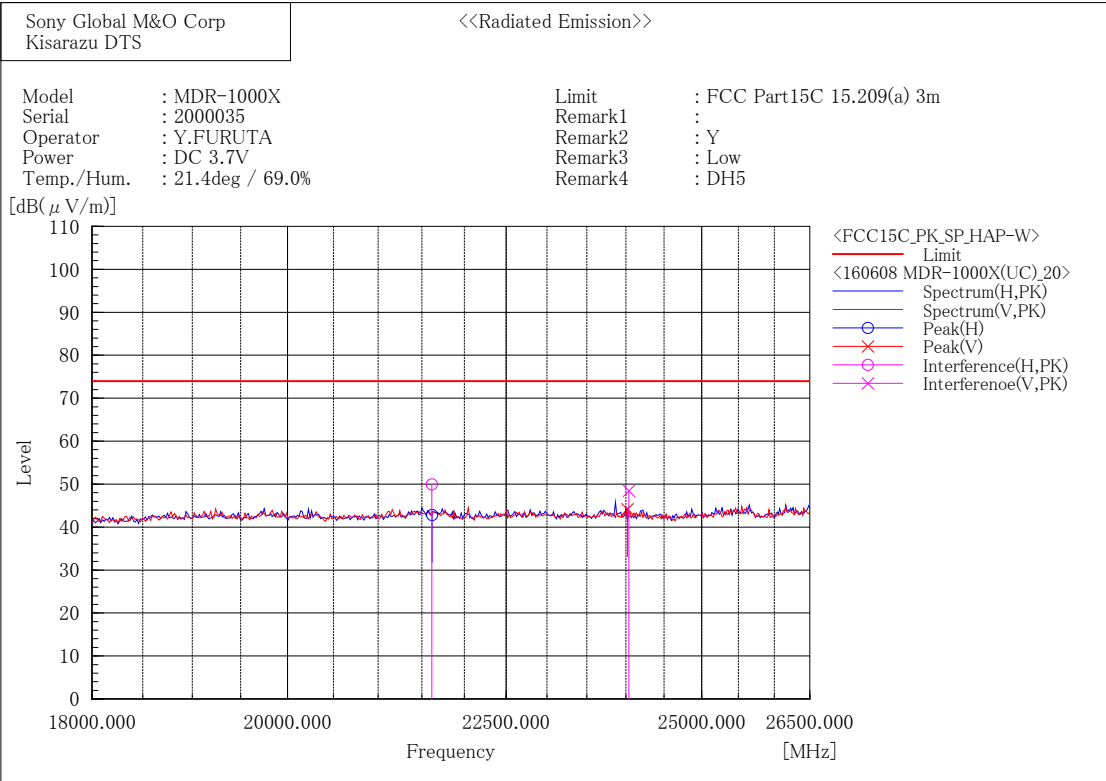


Final Result

--- 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	19866.194	35.4	-0.4	35.0	54.0	19.0	179.9	137.3
--- 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	19848.410	35.2	-0.5	34.7	54.0	19.3	163.3	133.9

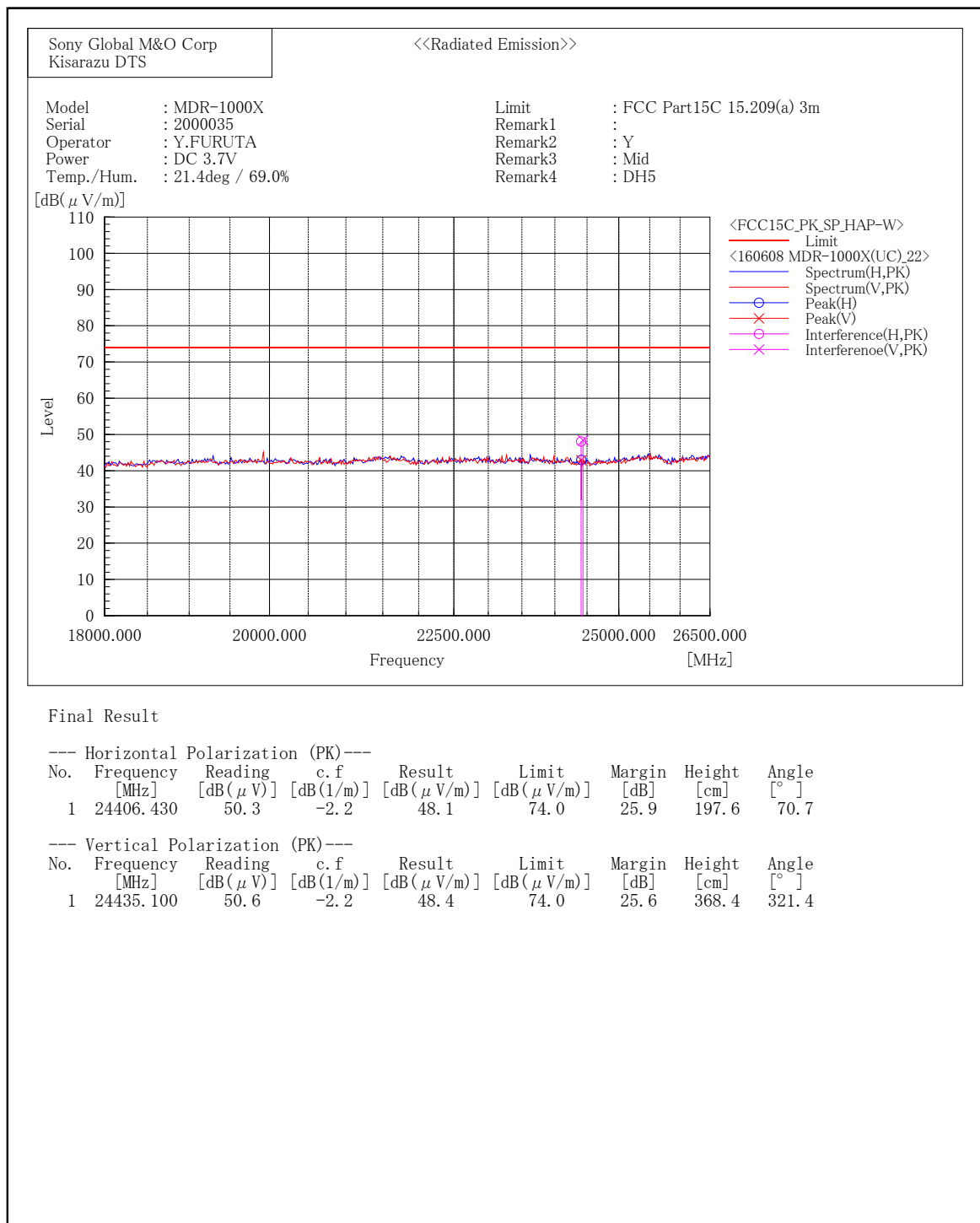
1) Date of measurement : June 08, 2016

[BDR(DH5)/2402MHz]



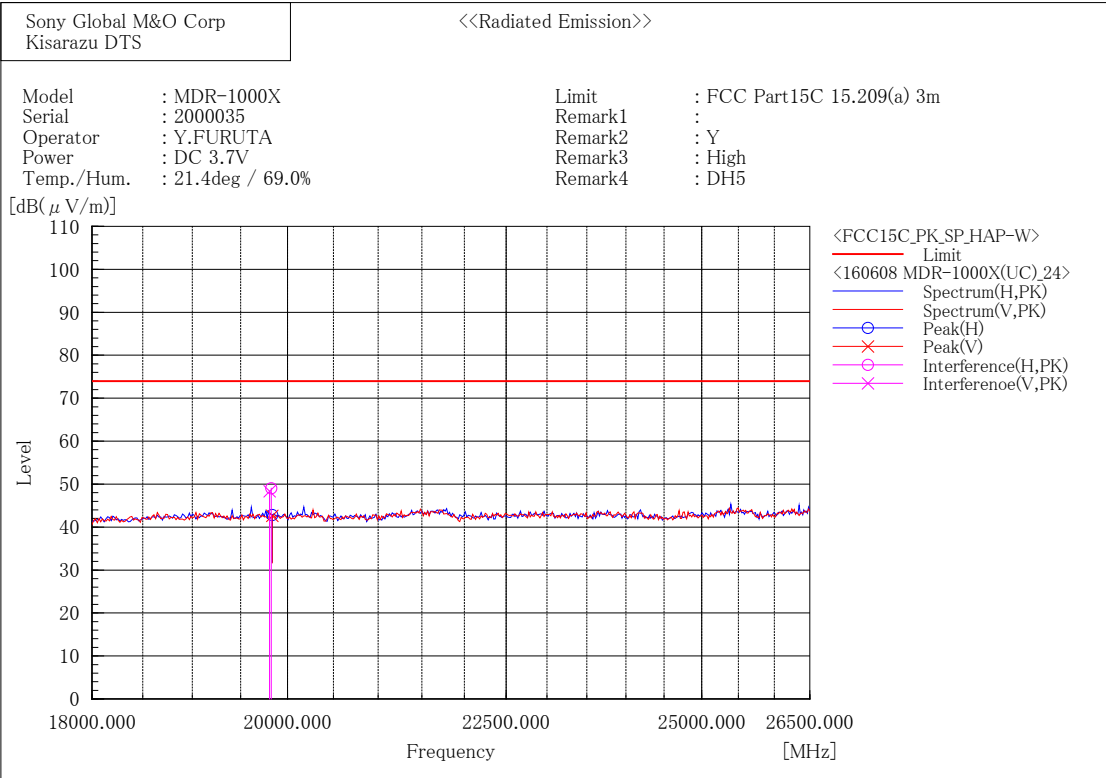
1) Date of measurement : June 08, 2016

[BDR(DH5)/2441MHz]



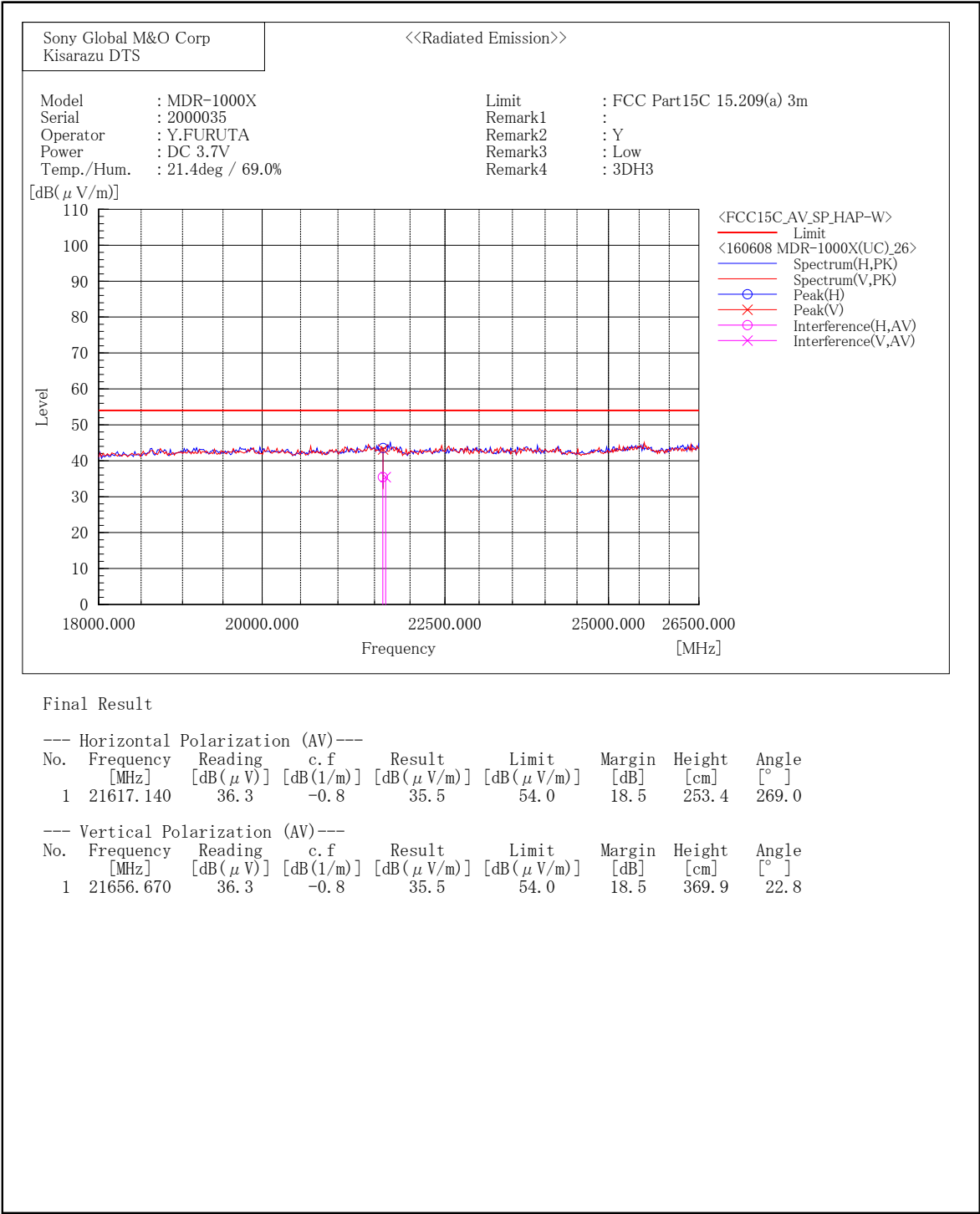
1) Date of measurement : June 08, 2016

[BDR(DH5)/2480MHz]



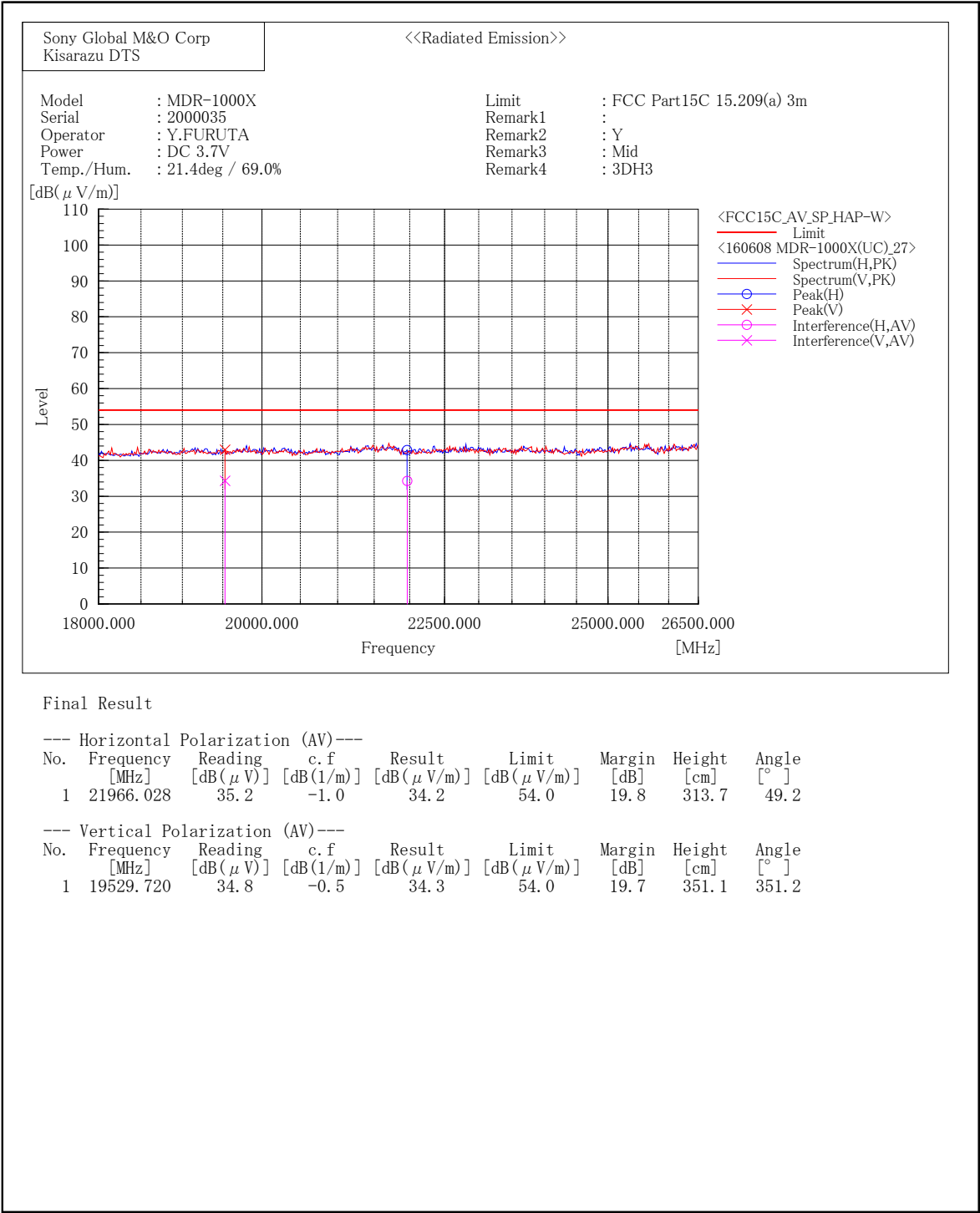
1) Date of measurement : June 08, 2016

[EDR(3DH3)/2402MHz]



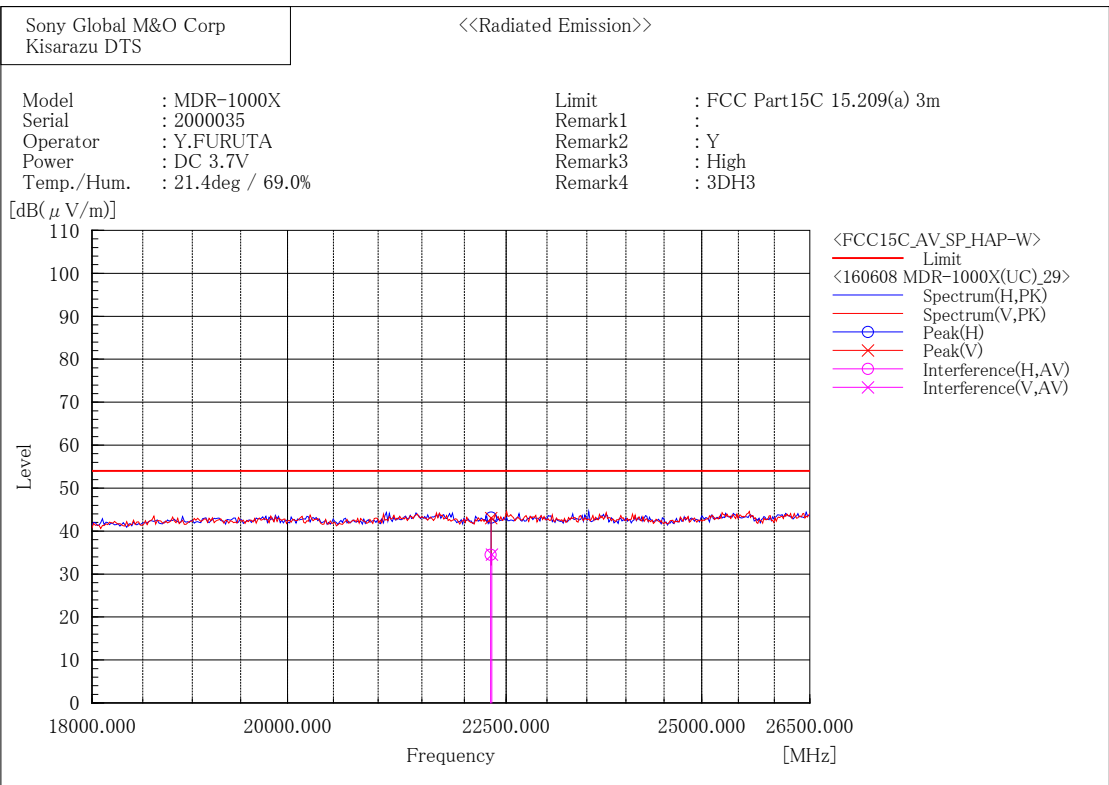
1) Date of measurement : June 08, 2016

[EDR(3DH3)/2441MHz]



1) Date of measurement : June 08, 2016

[EDR(3DH3)/2480MHz]



Final Result

--- Horizontal Polarization (AV)---

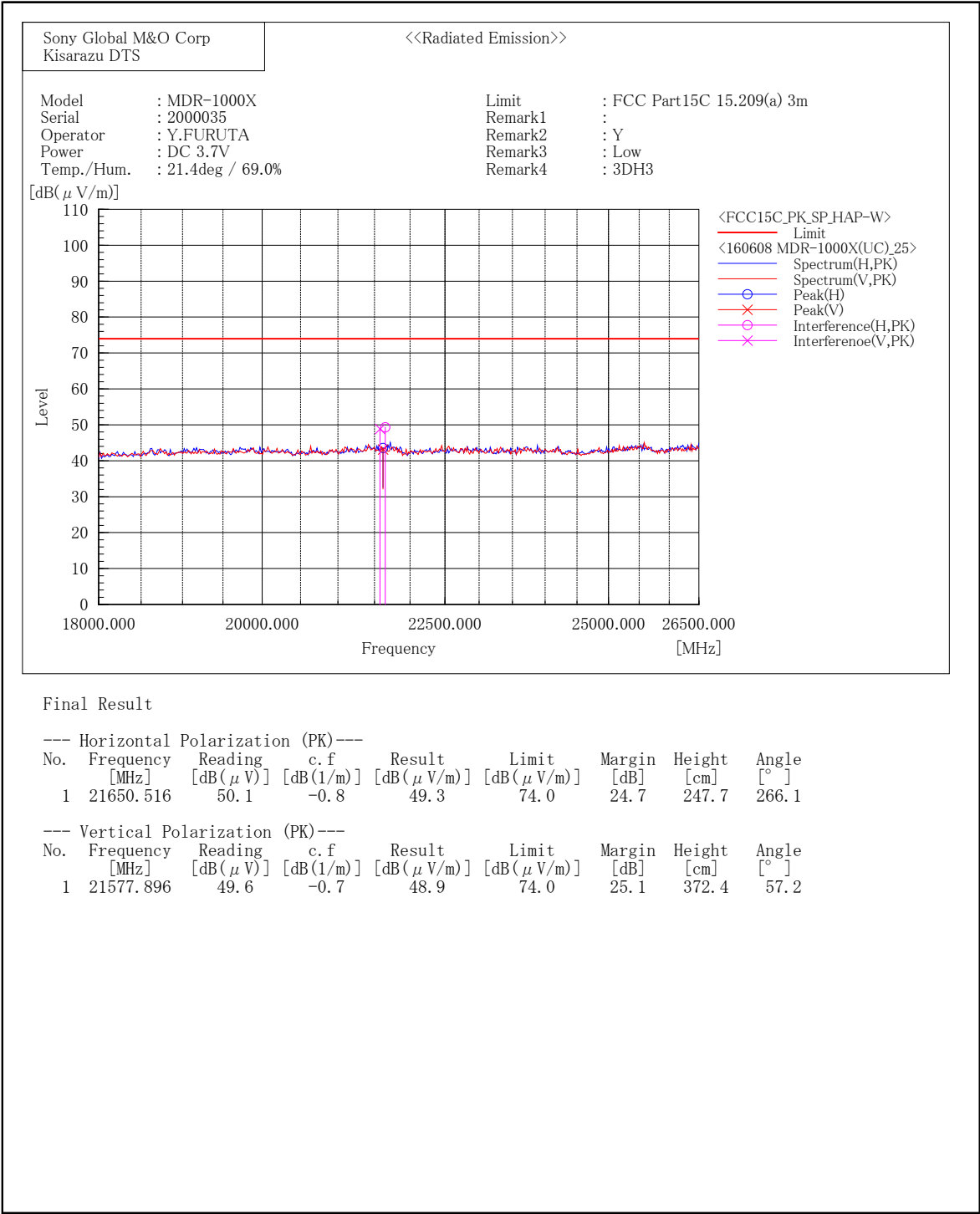
No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	22311.640	35.7	-1.2	34.5	54.0	19.5	351.2	197.7

--- 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	22327.356	35.8	-1.2	34.6	54.0	19.4	290.9	273.9

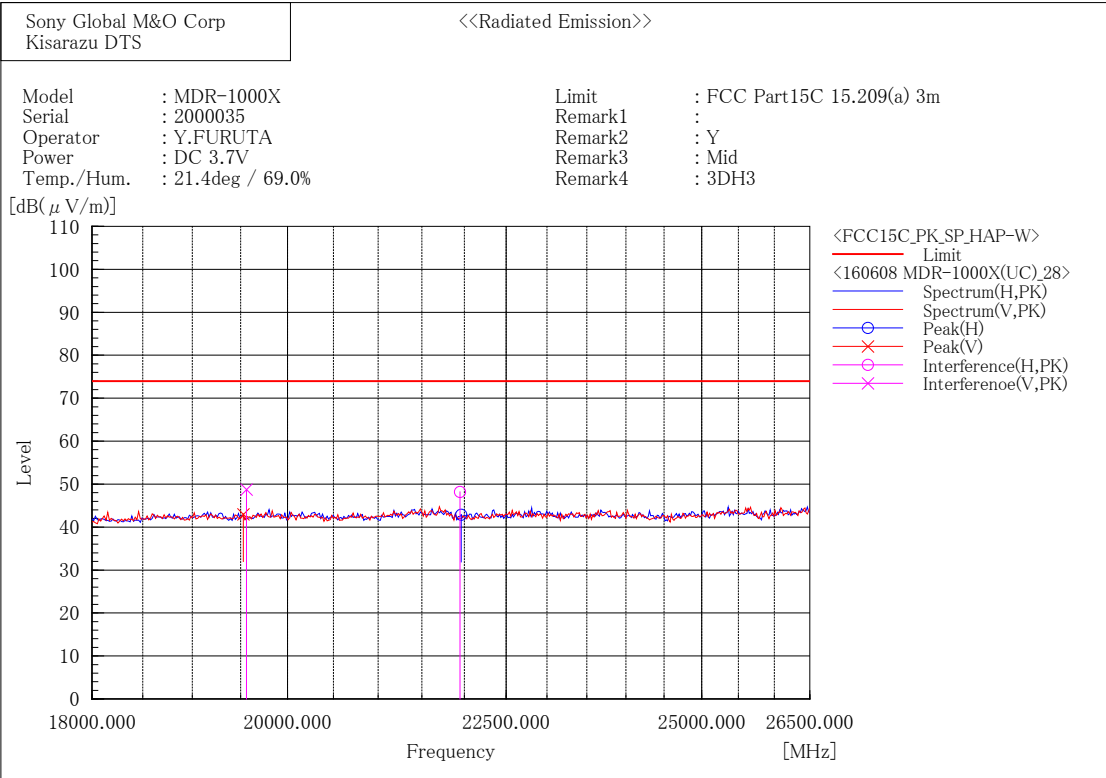
1) Date of measurement : June 08, 2016

[EDR(3DH3)/2402MHz]



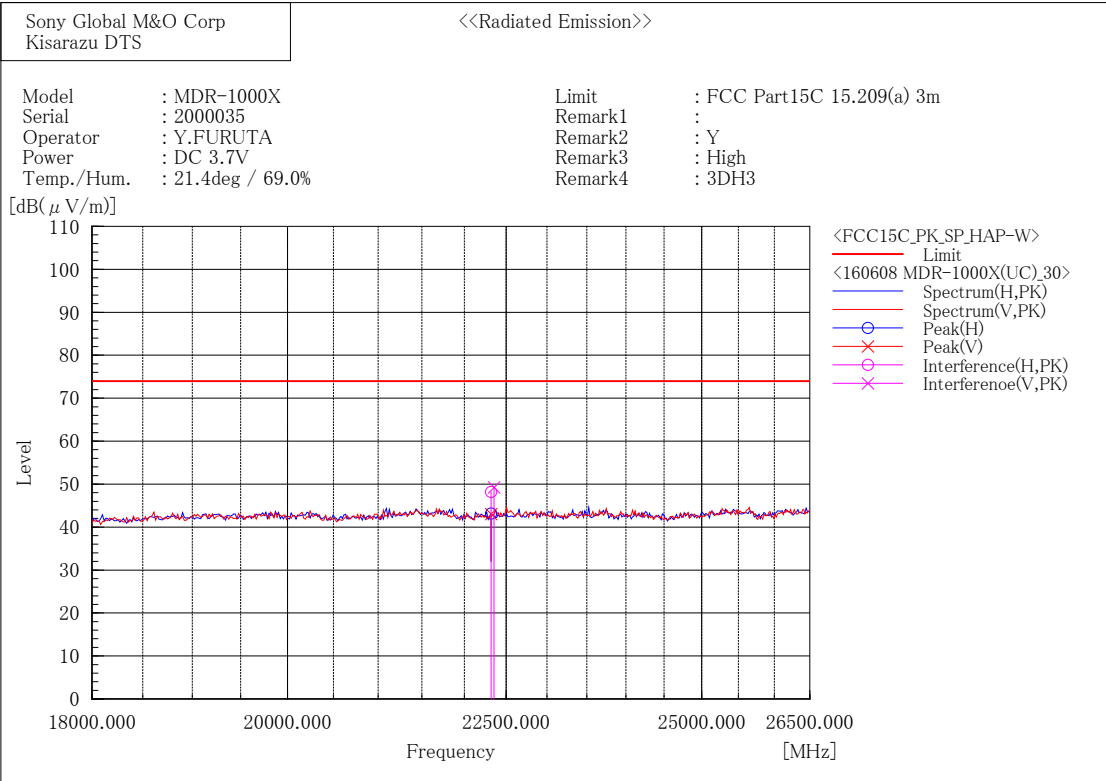
1) Date of measurement : June 08, 2016

[EDR(3DH3)/2441MHz]



1) Date of measurement : June 08, 2016

[EDR(3DH3)/2480MHz]



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	22319.422	49.4	-1.2	48.2	74.0	25.8	348.5	186.9

--- Vertical Polarization (PK)---

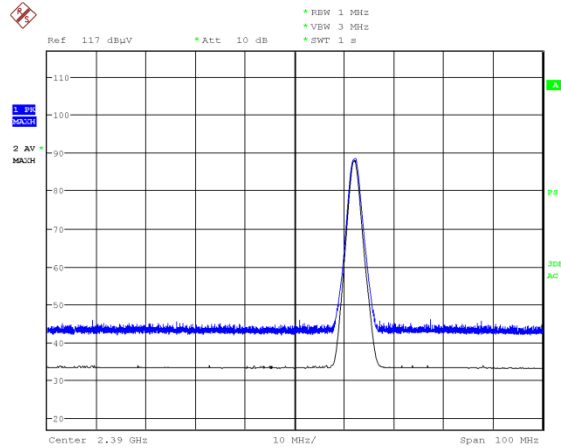
No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [°]
1	22352.508	50.5	-1.2	49.3	74.0	24.7	290.9	273.9

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 2390MHz and above 2483.5MHz)
The result of the final radiated emissions measurement refers in previous pages.

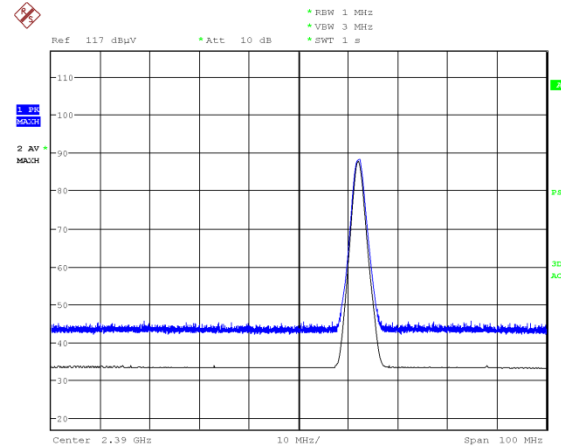
[BDR (DH5) / 2402MHz]

Horizontal



Date: 10.JUN.2016 14:53:23

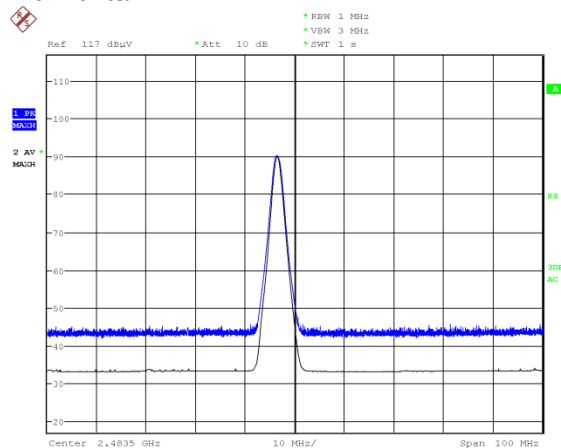
Vertical



Date: 10.JUN.2016 14:49:04

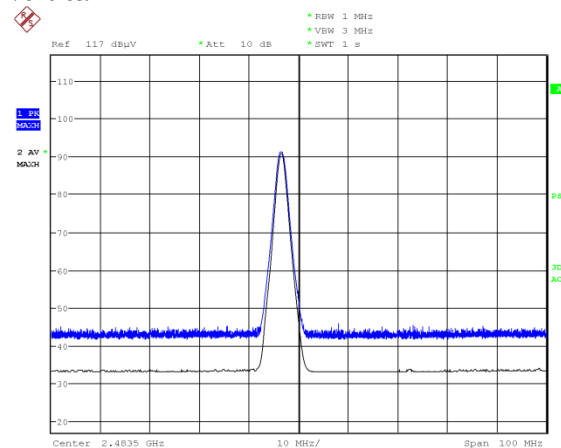
[BDR (DH5) / 2480MHz]

Horizontal



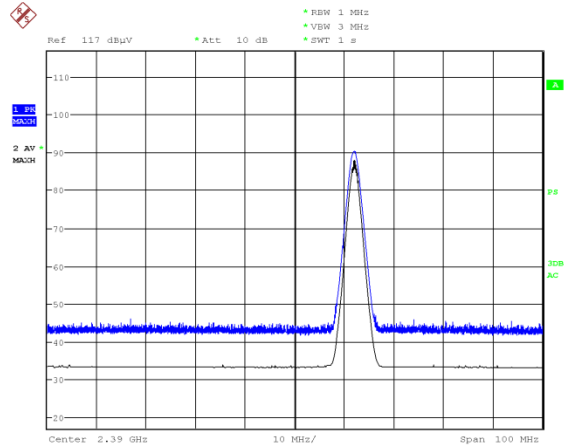
Date: 10.JUN.2016 17:16:40

Vertical



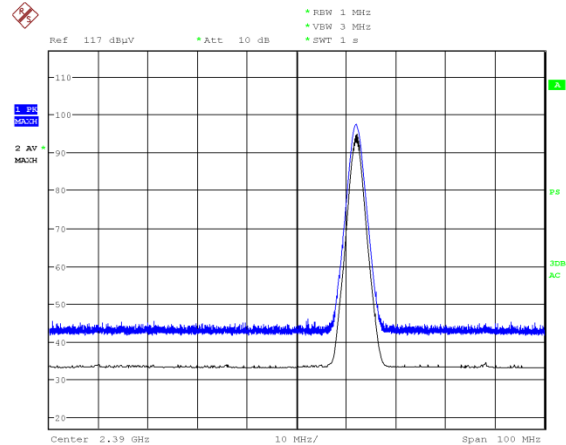
Date: 10.JUN.2016 17:25:22

[EDR (3DH3) / 2402MHz]
Horizontal



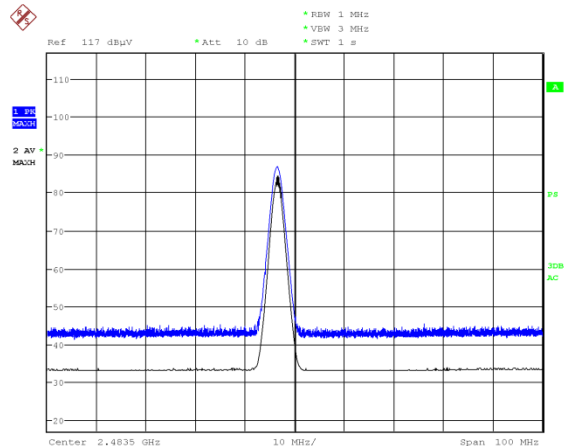
Date: 10.JUN.2016 18:39:12

Vertical



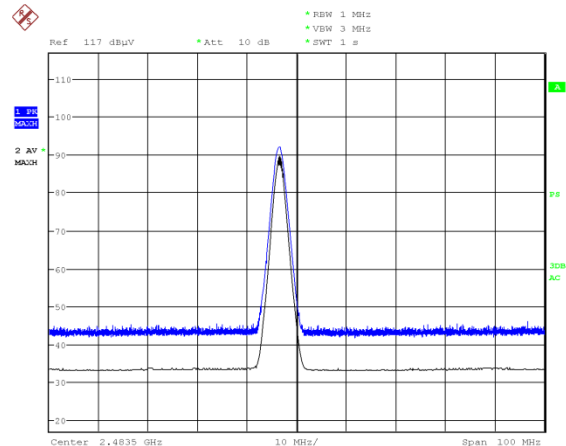
Date: 10.JUN.2016 18:41:50

[EDR (3DH3) / 2480MHz]
Horizontal



Date: 10.JUN.2016 20:11:47

Vertical



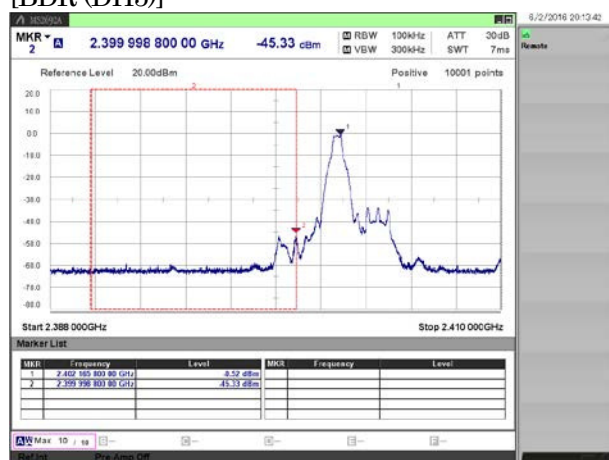
Date: 10.JUN.2016 20:08:17

3.7. Conducted Spurious Emissions for Band Edge

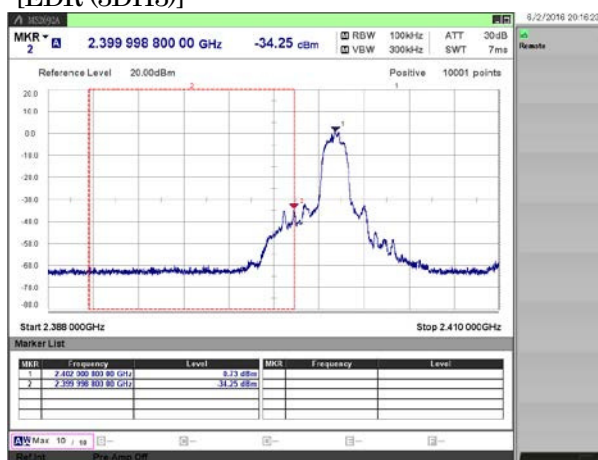
- 1) Ambient temperature : 22.6 deg.C
- 2) Relative humidity : 46.0 %
- 3) Date of measurement : 02 June 2016
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Frequency [MHz]	Reading(PK) [dBm]	C.F. [dB]	Result(PK) [dBm]	Limit [dBm]	Margin [dB]
BDR	DH5	2402	2402.17	-0.52	0.90	0.38	-	-
			2400.00	-45.33	0.90	-44.43	-19.6	24.81
EDR	3DH3	2402	2402.00	0.73	0.90	1.63	-	-
			2400.00	-34.25	0.90	-33.35	-18.4	14.99

[BDR (DH5)]



[EDR (3DH3)]



4. Method of Calculation

4.1. Time of Occupancy (Dwell Time) Measurement

Method of calculation : Software
 The Software for Calculation Name : SW-308
 Version : Ver2.5

$$\text{Test Result [msec]} = \text{Dwell Time [msec]} * \text{Cycle [time]} * 31.6 \text{ [sec]} / \text{Sweep Time [sec]}$$

Notes :

- (a) Dwell Time : Transmission duration of 1 hopping.
- (b) Cycle : Number of hopping appearances on the spectrum analyzer.
- (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 Measurement

Method of calculation : Software
 The Software for Calculation Name : SW-308
 Version : Ver2.5

$$\text{Test Result [dBm]} = \text{Meter Reading [dBm]} + \text{C.F. [dB]}$$

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

Notes :

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

4.3. Radiated Spurious Emission Measurement

Method of calculation : Software
 The Software for Calculation Name : V-Scan
 Version : Ver4.0.30

$$\text{Test Result [dBuV/m]} = \text{Meter Reading [dBuV]} + \text{C.F. [dB/m]}$$

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 + $20 \log (3 \text{ m} / 10 \text{ m})$

4.4. Conducted Spurious Emission for Band Edge Measurement

Method of calculation : Software
The Software for Calculation Name : SW-308
Version : Ver2.5

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

Notes :

- (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

4th Site Shielded Room 1

	Control No.	Description	Model No.	Serial No.	Manufacture	Cal Int.	Last Cal.
☒	-	Shield Room	B83117-B2432-T161	P26428	Albatross Projects	-	-
☐	W003	Spectrum Analyzer	E4440A	US42511926	Keysight Technologies	12	15.06.02
☒	W006	Power meter	N1911A	MY50000295	Keysight Technologies	12	15.09.02
☒	W007	Power Sensor	N1922A	MY50180022	Keysight Technologies	12	15.09.09
☐	W104	Power Sensor	U2021XA	MY54040006	Keysight Technologies	12	15.12.14
☐	W105	Power Sensor	U2021XA	MY54080005	Keysight Technologies	12	15.12.14
☒	W029	10dB Attenuator	8493C	76549	Keysight Technologies	12	15.09.24
☐	W110	10dB Attenuator	6610-SK-50-1	2	HUBER + SUHNER	12	15.06.08
☐	WC02	RF Cable	SUCOFLEX102	34124/2	HUBER + SUHNER	12	15.10.16
☐	WC03	RF Cable	SUCOFLEX102	34127/2	HUBER + SUHNER	12	15.10.08
☒	WC05	RF Cable	SUCOFLEX102	34287/2	HUBER + SUHNER	12	15.10.16
☐	WC06	RF Cable	SUCOFLEX102	34289/2	HUBER + SUHNER	12	15.10.08
☒	M719	Thermo Meter	TH-321	140053	ASONE	12	15.06.10
☐	M720	Thermo Meter	TH-321	140044	ASONE	12	16.05.26
☒	W100	Signal Analyzer	MS2692A	6201338954	Anritsu	12	16.04.15
☐							

5.2. Radiated Spurious Emissions

4th Site 10m Semi-Anechoic Chamber

	Control No.	Description	Model No.	Serial No.	Manufacture	Cal Int.	Last Cal.
☒	M506	Semi-Anechoic Chamber	-	-	TDK	12	15.08.03
☒	M575	EMI Receiver	ESCI	100161	Rohde & Schwarz	12	15.11.09
☐	M669	EMI Receiver	N9038A	MY51210223	Keysight Technologies	12	16.06.08
☒	A073	Loop Antenna	HFH2-Z2	100171	Rohde & Schwarz	12	15.10.12
☒	A043	Biconical Antenna	BBA9106	V5(91032598)	Schwarzbeck	12	15.08.04
☒	A046	Logperiodic Antenna	UHALP9108A1	0830	Schwarzbeck	12	15.08.06
☒	A056	Horn Antenna	BBHA9120D	670	Schwarzbeck	12	16.01.27
☒	A057	Horn Antenna	HAP06-18W	00000037	Toyo Corporation	12	15.08.04
☒	A058	Horn Antenna	HAP18-26W	00000016	Toyo Corporation	12	16.01.26
☒	CS039	RefSite RE Cable SYS3	-	-	EMC/RF Test Lab.	12	15.10.28
☒	CS054	RefSite EMF Cable SYS	-	-	EMC/RF Test Lab.	12	15.10.28
☒	CS064	RefSite RE Cable SYS8	-	-	EMC/RF Test Lab.	12	15.10.28
☒	CS065	RefSite RE Cable SYS9	-	-	EMC/RF Test Lab.	12	15.10.28
☒	M510	RF-Selector	NS4900	0802-226	Toyo Corporation	12	15.10.28
☒	M706	3dB Attenuator	8491A	MY39267782	Keysight Technologies	12	15.10.28
☒	M620	RF Pre-Amp	8447D	2944A10720	Keysight Technologies	12	15.10.28
☒	M831	GHz Filter Box	FB-G1	002	Sony Global M&O	12	15.10.28
☒	M689	Thermo Meter	AD-5640A	201303	A&D	12	15.11.05
☐	M485	EMI Receiver	ESCI	100626	Rohde & Schwarz	12	16.04.18
☐	M798	Thermo Meter	AD-5640B	201501	A&D	12	15.10.15
☒	M504	EMI Receiver	ESU40	100086	Rohde & Schwarz	12	15.11.18

About calibration interval

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