

RADIO TEST REPORT

(for Bluetooth classic)

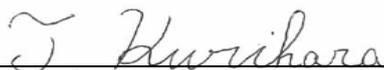
Project No. : JB-Z0126-E
 Client : Sony Corporation
 Address : 1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan
 Type of Equipment : WiFi / Bluetooth Module
 Model No. : FL-N01-WBM
 Serial No. : c62e
 FCC ID : AK8FLN01WBM
 Regulation Applied : 47 CFR Part 15 Subpart C
Final Judgment : Passed
 Sample Receipt : February 18, 2016
 Original Testing : February 25, 2016 - March 25, 2016
 Amend Testing : May 19, 2016 - May 24, 2016
 Original Reported : April 06, 2016
 Amend Reported : June 27, 2016

Reported by :

Approved Signatory :



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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.

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TESTING CERT #3203.01

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.

1. General Information

1.1. Description of Equipment Under Test (EUT)

General specification

Test Sample Condition	:	Pre-production
Type of Equipment	:	Wi-Fi/Bluetooth Module
Trade Name	:	SONY
Model No.	:	FL-N01-WBM
Serial No.	:	c62e
Power Rating	:	DC3.3V (The EUT was supplied with the power from the host device)
Software Ver.	:	develop #158

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	:	Dipole antenna
Antenna connector type	:	X.FL
Antenna gain	:	-1.4 dBi
Operating Temperature	:	5 to 35deg.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	14.70 dB (QP) 0.551 MHz L1	0.15 MHz - 30 MHz	Complied
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	22.29 dB	Carrier	Complied
Radiated Spurious Emissions	0.2 dB (QP) 156.004 MHz Horizontal	9 kHz - 25 GHz (excluding carrier and band edge)	Complied
Conducted Spurious Emissions for Band Edge *1	31.34 dB Margin 2391.47 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.

Other requirements

Part 15.31(e) Supply voltage requirement

: Complied (The EUT is provided with stable DC 3.3V from the host device)

Part 15.203 / 212 Antenna requirement

: Complied (Users cannot replace the external antenna, since it is mounted to the EUT inside)

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 :

AC Power-line Conducted Emissions

Dimensions of the EUT table 0.8 m height, 2 m width and 1 m depth.

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	3 MHz
Conducted Spurious Emissions for Band Edge	Peak	100 kHz

AC Power-line Conducted Emissions

1. The non-conductive table (EUT table) made of (FRP, wood, other non-conductive material) was placed 0.4 m from its rear to the vertical reference ground plane.
2. The EUT was placed on the center of tabletop and its rear was flush with the rear of the table, connected through a LISN to the input power mains.
3. The LISN was placed in 80 cm from the nearest part of the EUT chassis.
4. The excess length of the AC cable between the EUT and the LISN receptacle, or an adaptor or extension cable connected to and measured with LISN, was folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
5. The connection of the all other equipment to the second LISN was performed. The second LISN was terminated with a 50-ohm terminator.
6. Interconnecting cables that hang closer than 40 cm to the horizontal reference ground plane was folded back and forth forming a bundle 30 to 40 cm long, hanging approximately in the middle between the horizontal reference ground plane and the tabletop.
7. Find the worst mode and arrangement of the EUT according to the follows;
 - Connecting all peripherals and change the position of peripherals and cables.
 - Changing the all test operation modes of the EUT.
 - On every condition, exploring the highest emissions with the spectrum analyzer.
(150kHz - 30MHz, peak detector, RBW: 10 kHz)
8. On the worst condition of the EUT found in above, choose the 6 highest emissions on the spectrum data. The final measurements carried out on these emissions with EMI test receiver.
(quasi-peak and average detector, RBW: 9 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 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 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)
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 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)

7. 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.

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

8. 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	BDR *4	DH5	2402MHz *4
Carrier Frequency Separation, Number of Hopping Frequencies, Time of Occupancy (Dwell Time)	BDR	DH5	Hopping ON
	EDR	3DH5	
20dB Bandwidth, Maximum Peak Conducted Output Power, Radiated Spurious Emissions	BDR	DH5	2402 MHz
	EDR	3DH5	2441 MHz 2480 MHz
Conducted Spurious Emissions for Band Edge	BDR	DH5	2402 MHz
	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 final test was performed with the representative mode that had been found as the worst emission mode while exploratory testing.

The Software for Operating Mode

Name : Labtool
Version : 2.2.0.75-15.2.7.p22_Release

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)

Symbol	Item	Manufacturer	Model No.	Serial No.
A	WiFi / Bluetooth Module	SONY	FL-N01-WBM	c62e

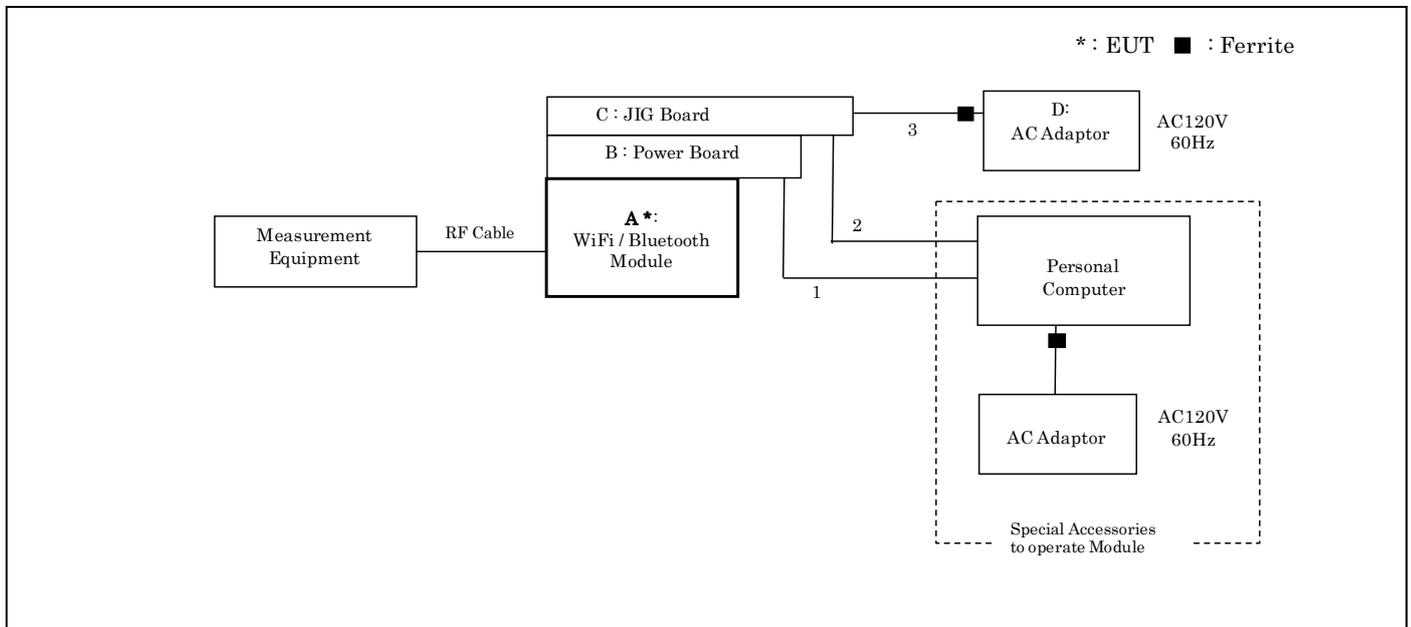
Support equipment for operation

Symbol	Item	Manufacturer	Model No.	Serial No.
B	Power Board	SONY	-	-
C	JIG Board	-	-	-
D	AC Adaptor	GO FORWARD ENTERPRISE	GF12-US0520	1410-08

Type of Cable

Symbol	Description	Identification (Manufacturer etc)	Shielded Yes/No	Ferrite Core	Bundled	Length (m)
1	USB Cable	-	Yes	No	-	1.2
2	USB Cable	-	Yes	No	-	0.9
3	AC Adaptor Cable	-	No	Yes (x1)	-	1.5

System configuration



Radiated Spurious Emissions

The equipment under test (EUT)

Symbol	Item	Manufacturer	Model No.	Serial No.
A-1	WiFi / Bluetooth Module	SONY	FL-N01-WBM	c62e
A-2	Antenna	SONY	FPC-ANT-B	-

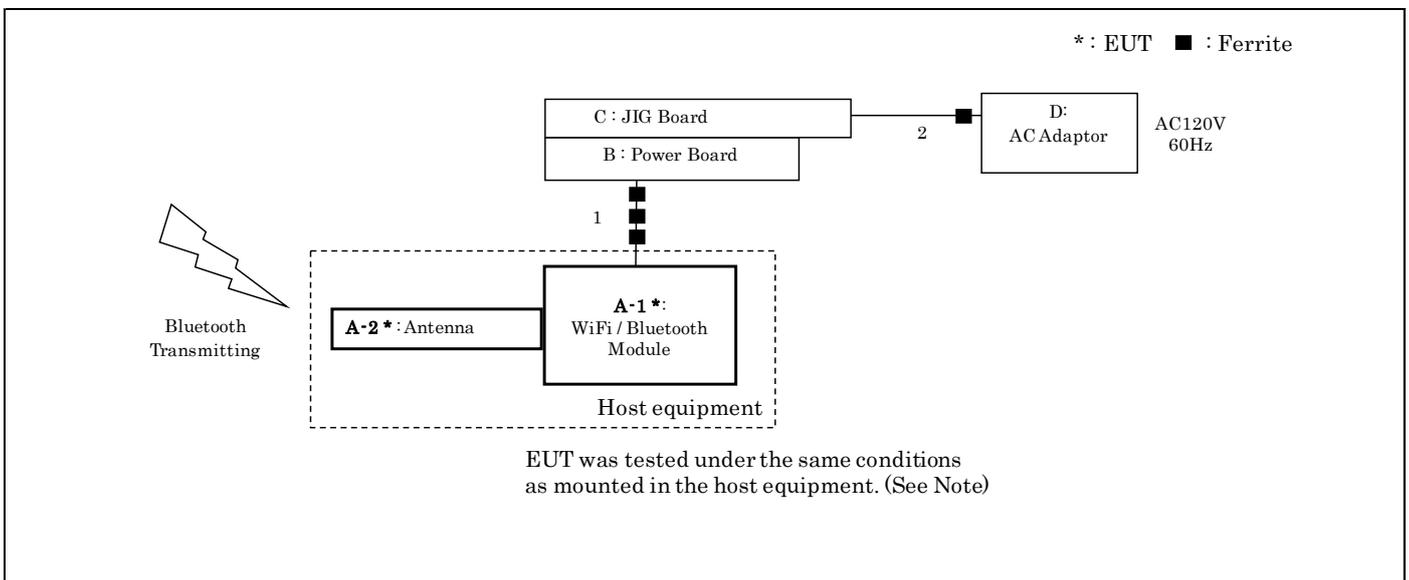
Support equipment for operation

Symbol	Item	Manufacturer	Model No.	Serial No.
B	Power Board	-	-	-
C	JIG Board	-	-	-
D	AC Adaptor	GO FORWARD ENTERPRISE	GF12-US0520	1410-08

Type of cable

Symbol	Description	Identification (Manufacturer etc)	Shielded Yes/No	Ferrite Core	Bundled	Length (m)
1	B to B Extended Cable	-	No	Yes (x3)	-	0.1
2	AC Adaptor Cable	-	No	Yes (x1)	-	1.5

System configuration



- Note:
- The radio specifications (e.g. Tx power, channel) of this host equipment (refers to Clause 6.3 "Setup 2: Module product") is same as final product (refers to Clause 6.3 "Setup 1: Final product") specifications.
 - Module product setup was confirmed by comparing with final product setup with normal communicating mode, since final product cannot operate with continuous transmission.
 - Hereby, module product which confirmed worst condition was measured with continuous transmission.

AC Power-line Conducted Emissions

The equipment under test (EUT)

Symbol	Item	Manufacturer	Model No.	Serial No.
A-1	WiFi / Bluetooth Module	SONY	FL-N01-WBM	c62e
A-2	Antenna	SONY	FPC-ANT-B	-

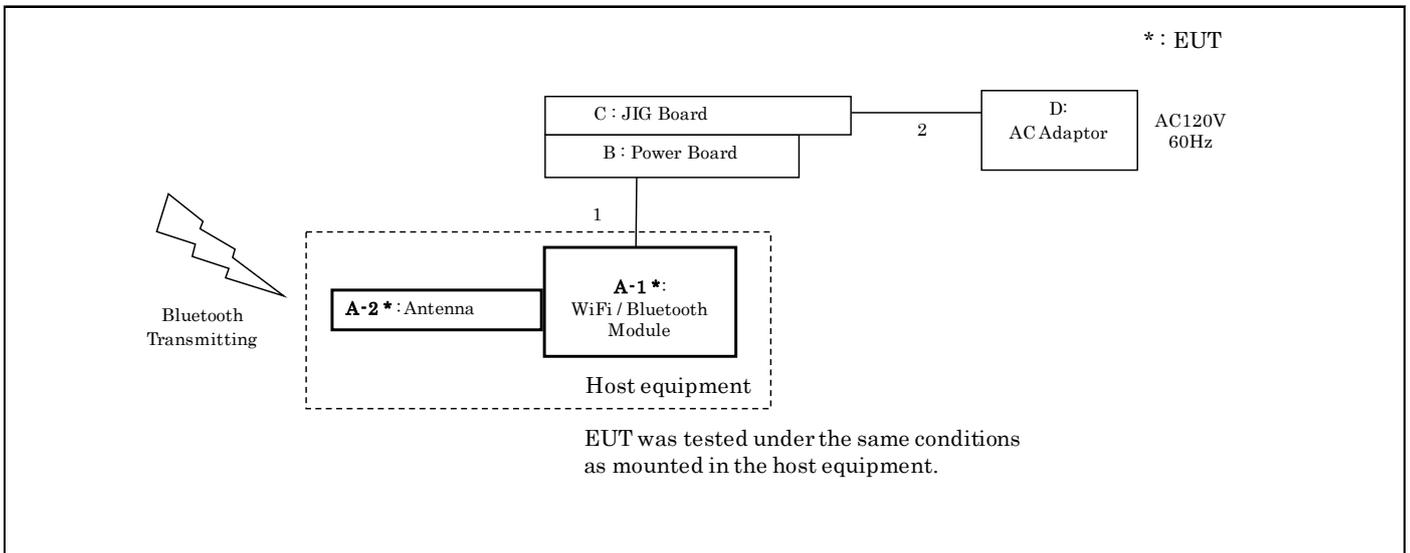
Support equipment for operation

Symbol	Item	Manufacturer	Model No.	Serial No.
B	Power Board	-	-	-
C	JIG Board	-	-	-
D	AC Adaptor	GO FORWARD ENTERPRISE	GF12-US0520	1410-08

Type of Cable

Symbol	Description	Identification (Manufacturer etc)	Shielded Yes/No	Ferrite Core	Bundled	Length (m)
1	B to B Extended Cable	-	No	No	-	0.1
2	AC Adaptor Cable	-	No	No	Bundled	1.5

System configuration

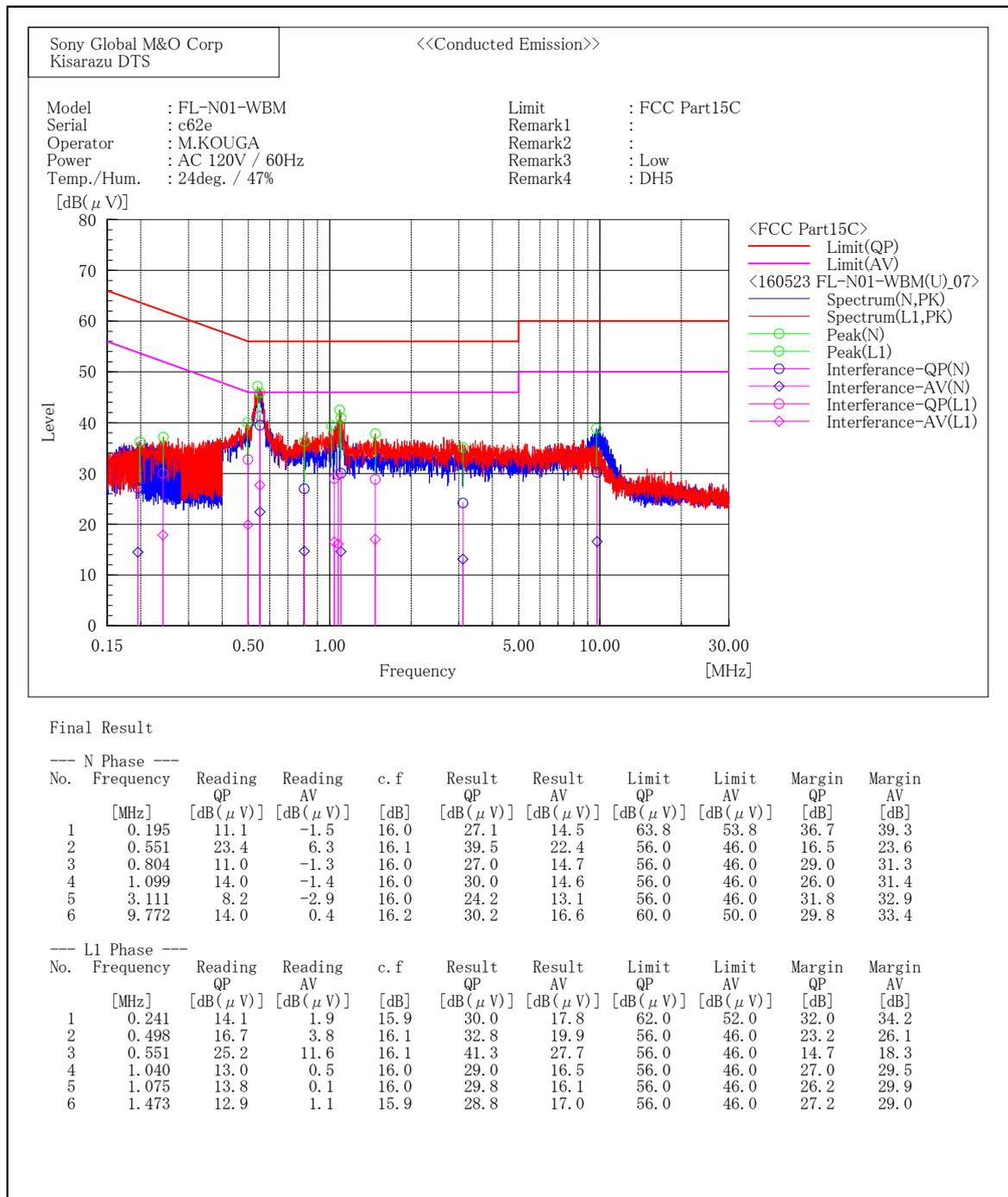


3. Test Data

3.1. AC Power-line Conducted Emissions

1) Date of measurement : May 23, 2016

[BDR(DH5)/2402MHz]

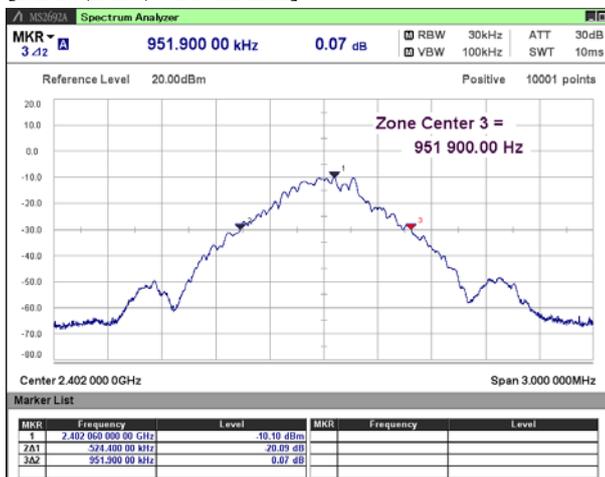


3.2. 20dB Bandwidth

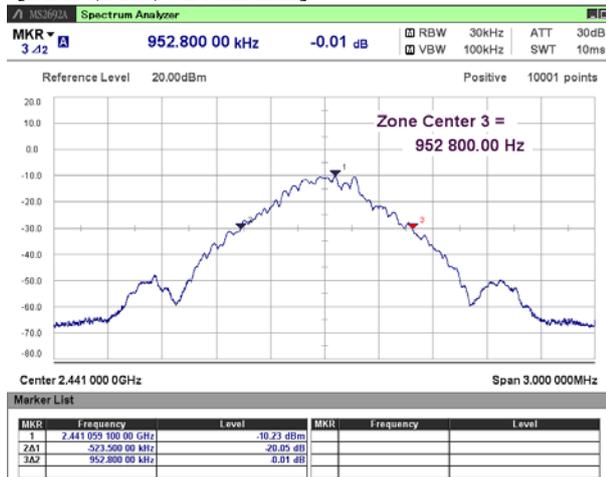
- 1) Ambient temperature : 23.9 deg.C
- 2) Relative humidity : 45.1 %
- 3) Date of measurement : 26 February 2016
- 4) Measured by : S.ONOTORA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Result [MHz]	Limit [MHz]
BDR	DH5	2402	0.952	-
		2441	0.953	-
		2480	0.949	-
EDR	3DH5	2402	1.265	-
		2441	1.264	-
		2480	1.263	-

[BDR (DH5) / 2402MHz]



[BDR (DH5) / 2441MHz]



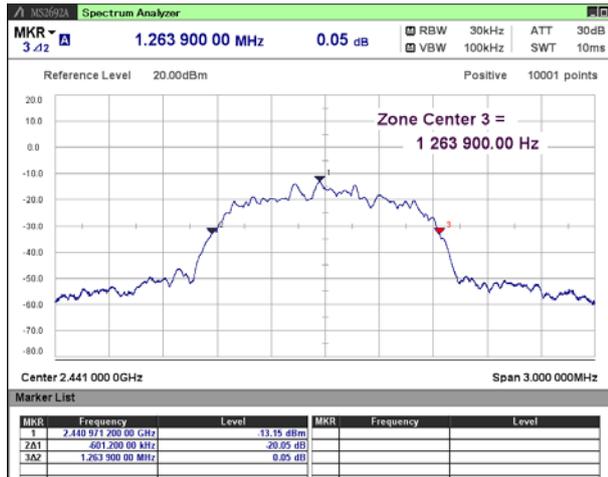
[BDR (DH5) / 2480MHz]



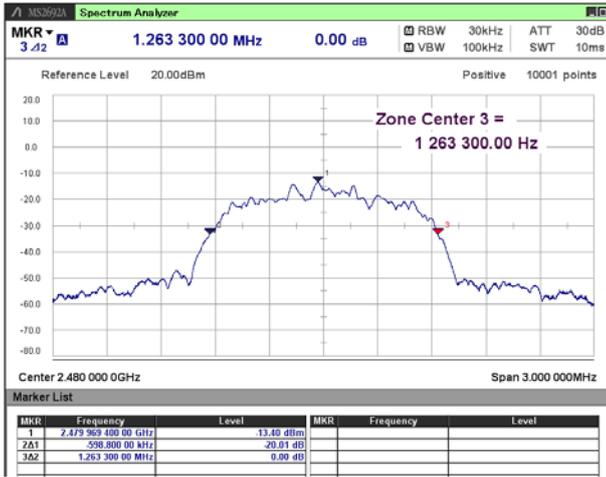
[EDR (3DH5) / 2402MHz]



[EDR (3DH5) / 2441MHz]



[EDR (3DH5) / 2480MHz]



3.3. Carrier Frequency Separation

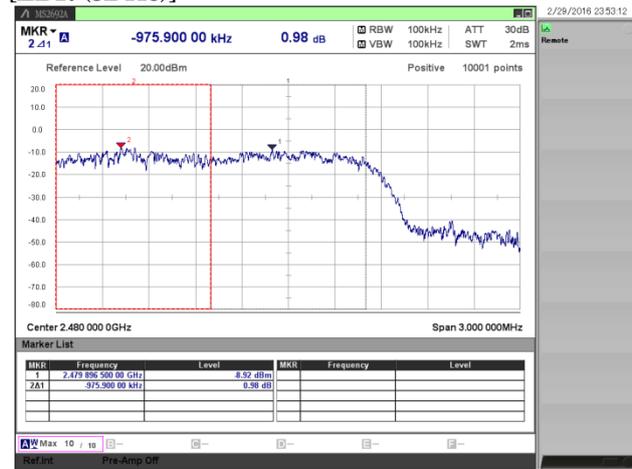
- 1) Ambient temperature : 23.4 deg.C
- 2) Relative humidity : 40.5 %
- 3) Date of measurement : 29 February 2016
- 4) Measured by : S.ONOTORA
- 5) Operating mode : Transmitting mode

Mode		Reading [kHz]	Limit [kHz]
BDR	DH5	998.7	≥ 635.2
EDR	3DH5	975.9	≥ 843.2

[BDR (DH5)]



[EDR (3DH5)]

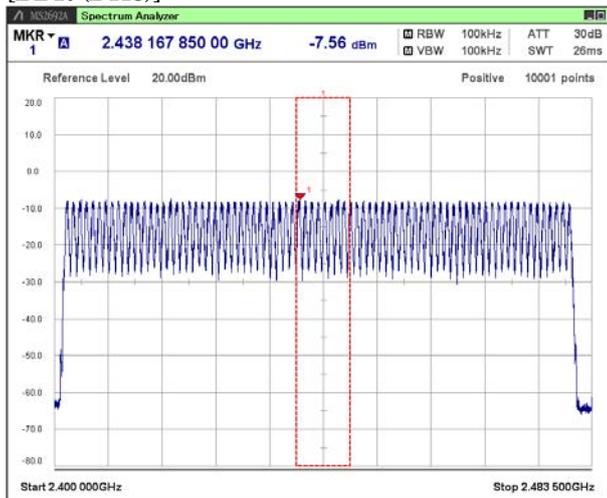


3.4. Number of Hopping Frequencies

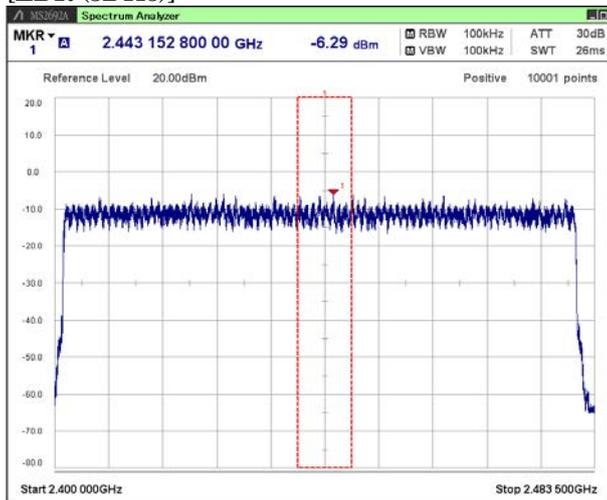
- 1) Ambient temperature : 23.9 deg.C
- 2) Relative humidity : 45.1 %
- 3) Date of measurement : 26 February 2016
- 4) Measured by : S.ONOTORA
- 5) Operating mode : Transmitting mode

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

[BDR (DH5)]



[EDR (3DH5)]

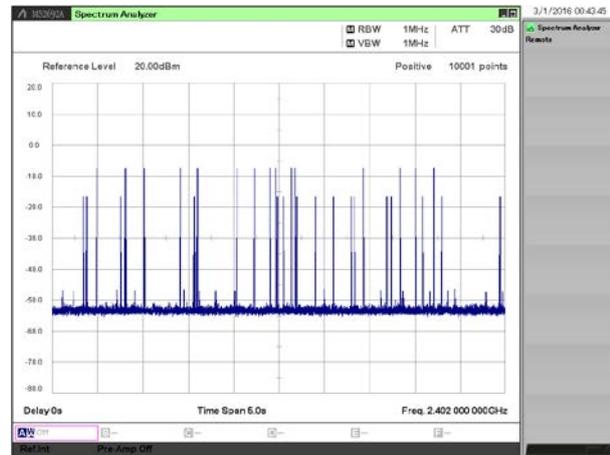
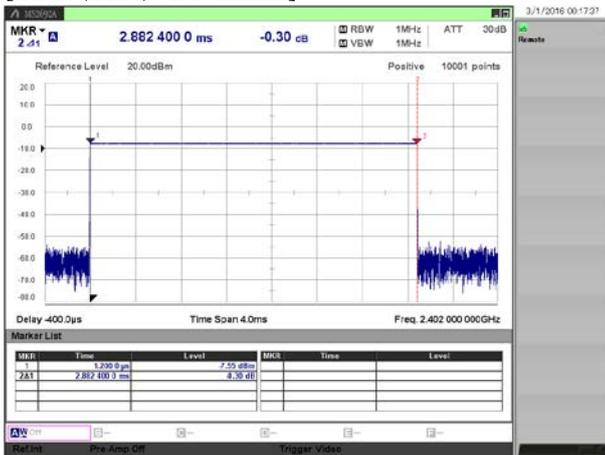


3.5. Time of Occupancy (Dwell Time)

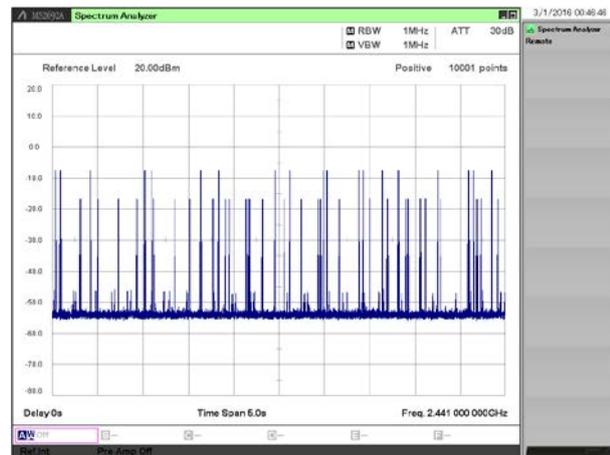
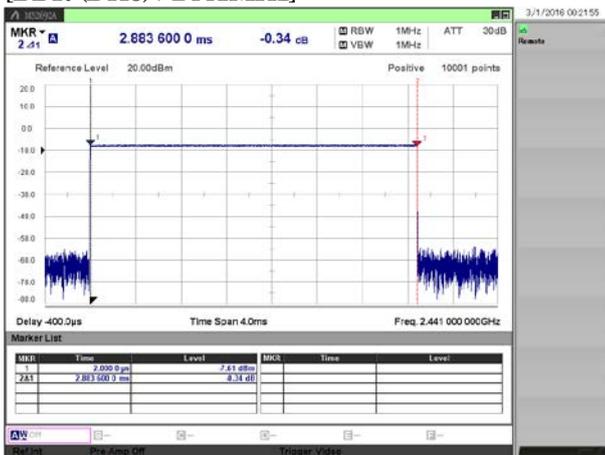
- 1) Ambient temperature : 23.4 deg.C
- 2) Relative humidity : 40.5 %
- 3) Date of measurement : 29 February 2016
- 4) Measured by : S.ONOTORA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Dwell Time [msec]	Cycle [time]	Result [msec]	Limit [msec]
BDR	DH5	2402	2.88	15	273.0	≤ 400.0
		2441	2.88	18	327.6	≤ 400.0
		2480	2.88	17	309.4	≤ 400.0
EDR	3DH5	2402	2.88	16	291.2	≤ 400.0
		2441	2.88	18	327.6	≤ 400.0
		2480	2.88	18	327.6	≤ 400.0

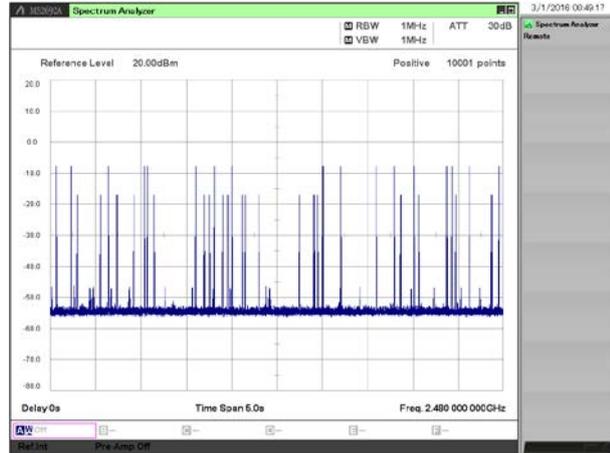
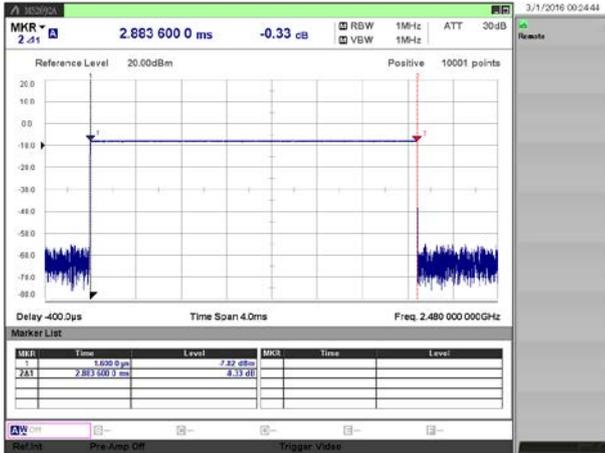
[BDR (DH5) / 2402MHz]



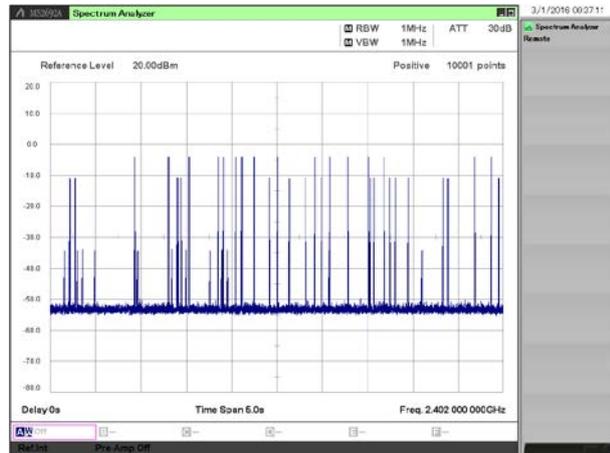
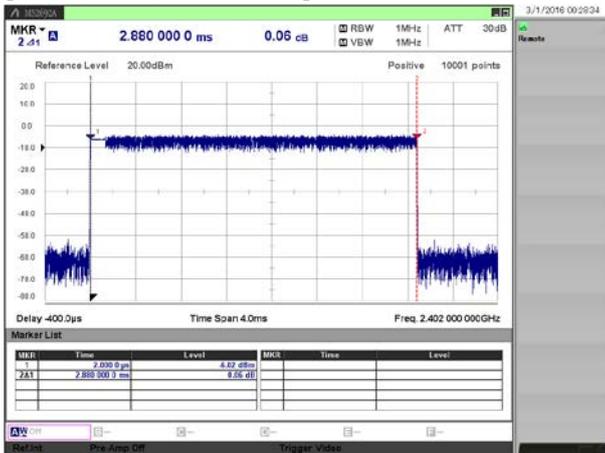
[BDR (DH5) / 2441MHz]



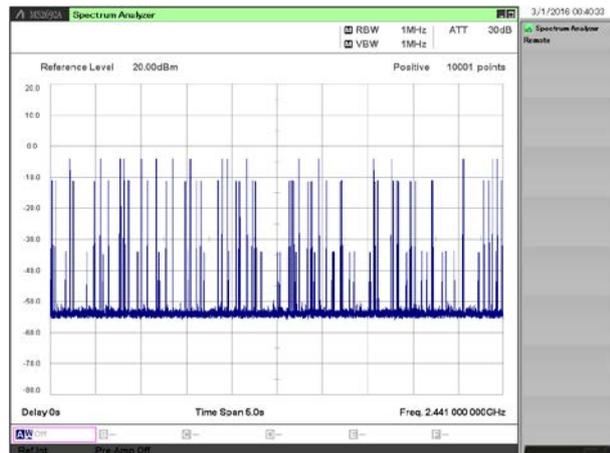
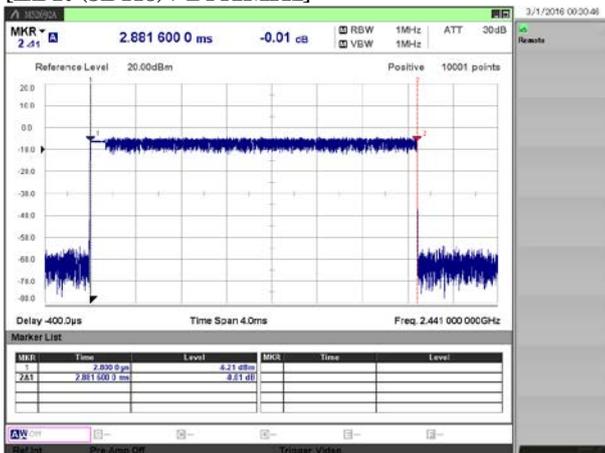
[BDR (DH5) / 2480MHz]



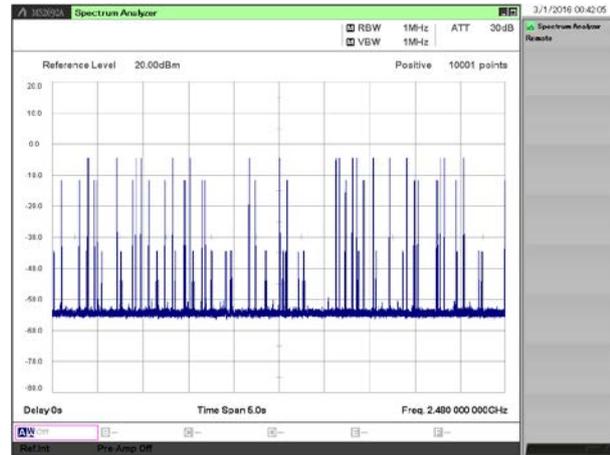
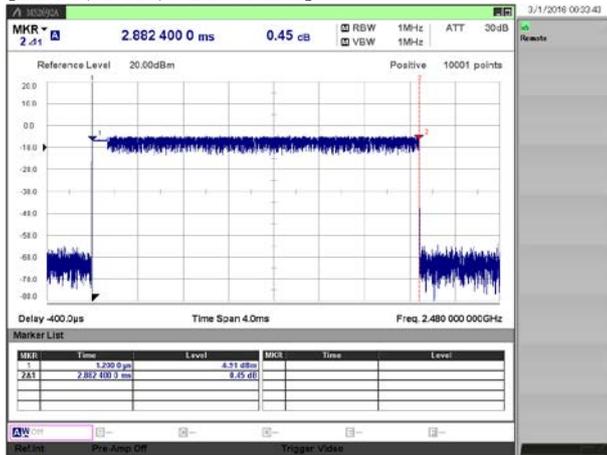
[EDR (3DH5) / 2402MHz]



[EDR (3DH5) / 2441MHz]



[EDR (3DH5) / 2480MHz]



3.6. Maximum Peak Conducted Output Power

- 1) Ambient temperature : 23.9 deg.C
- 2) Relative humidity : 45.1 %
- 3) Date of measurement : 26 February 2016
- 4) Measured by : S.ONOTORA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Reading (PK) [dBm]	C.F. [dB]	Result (PK) [dBm]	Result (PK) [W]	Limit [dBm]	Limit [W]	Margin [dB]
BDR	DH5	2402	-7.19	11.00	3.81	0.00240	30.0	1.0	26.19
		2441	-7.32	11.00	3.68	0.00233	30.0	1.0	26.32
		2480	-7.54	11.00	3.46	0.00222	30.0	1.0	26.54
EDR	2DH5	2402	-3.56	11.00	7.44	0.00555	30.0	1.0	22.56
		2441	-3.72	11.00	7.28	0.00535	30.0	1.0	22.72
		2480	-4.03	11.00	6.97	0.00498	30.0	1.0	23.03
	3DH5	2402	-3.29	11.00	7.71	0.00590	30.0	1.0	22.29
		2441	-3.43	11.00	7.57	0.00571	30.0	1.0	22.43
		2480	-3.74	11.00	7.26	0.00532	30.0	1.0	22.74

Duty Cycle check

Mode		Channel [MHz]	T (on+off) [msec]	T(on) [msec]	Duty Cycle [%]
BDR	DH1	2441	1.250	0.379	30.35
	DH3	2441	2.500	1.634	65.37
	DH5	2441	3.748	2.882	76.89
EDR	2DH1	2441	1.251	0.380	30.38
	2DH3	2441	2.500	1.633	65.32
	2DH5	2441	3.753	2.878	76.69
	3DH1	2441	1.251	0.378	30.22
	3DH3	2441	2.499	1.628	65.15
	3DH5	2441	3.751	2.880	76.78

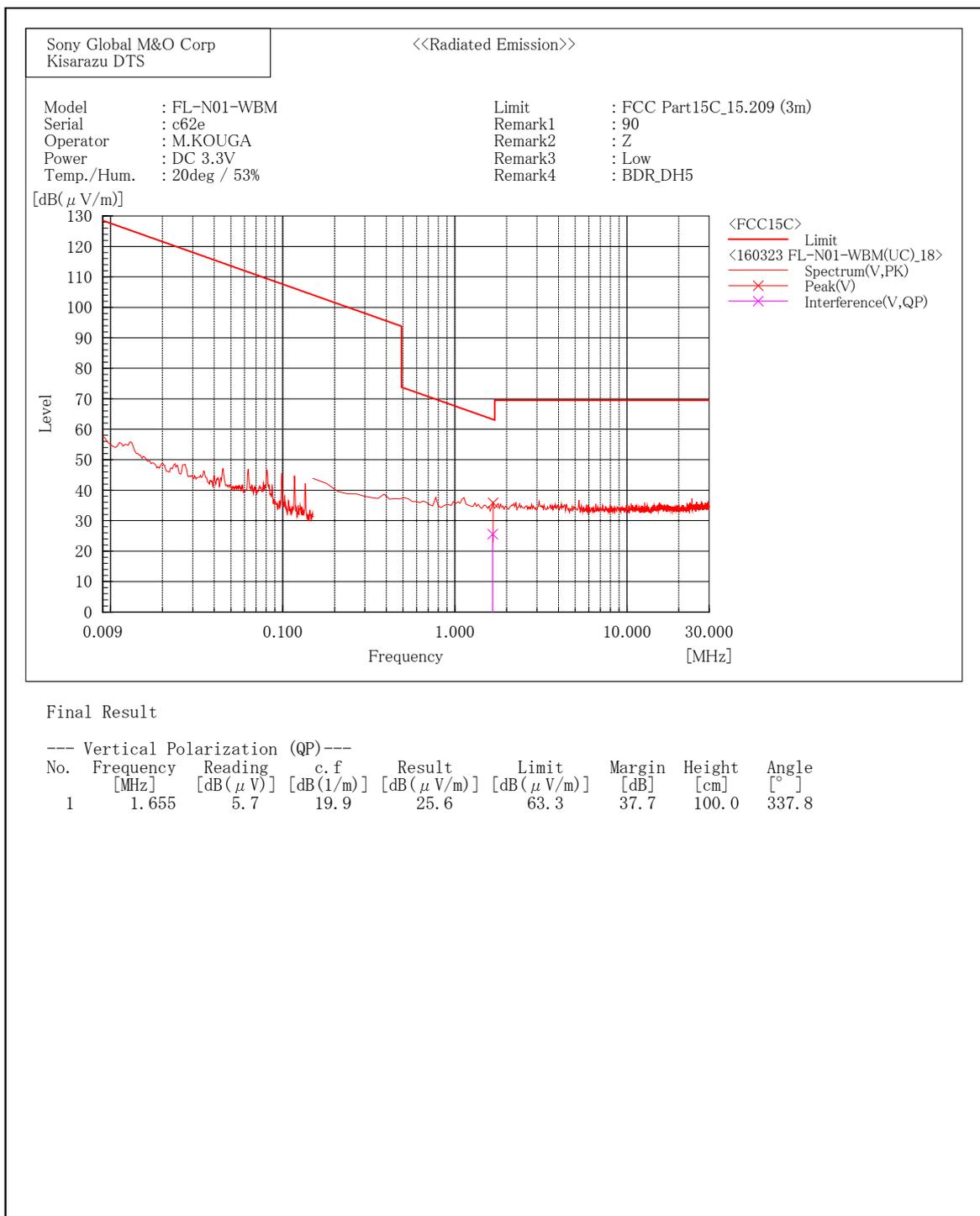
3.7. Radiated Spurious Emissions

1) Date of measurement

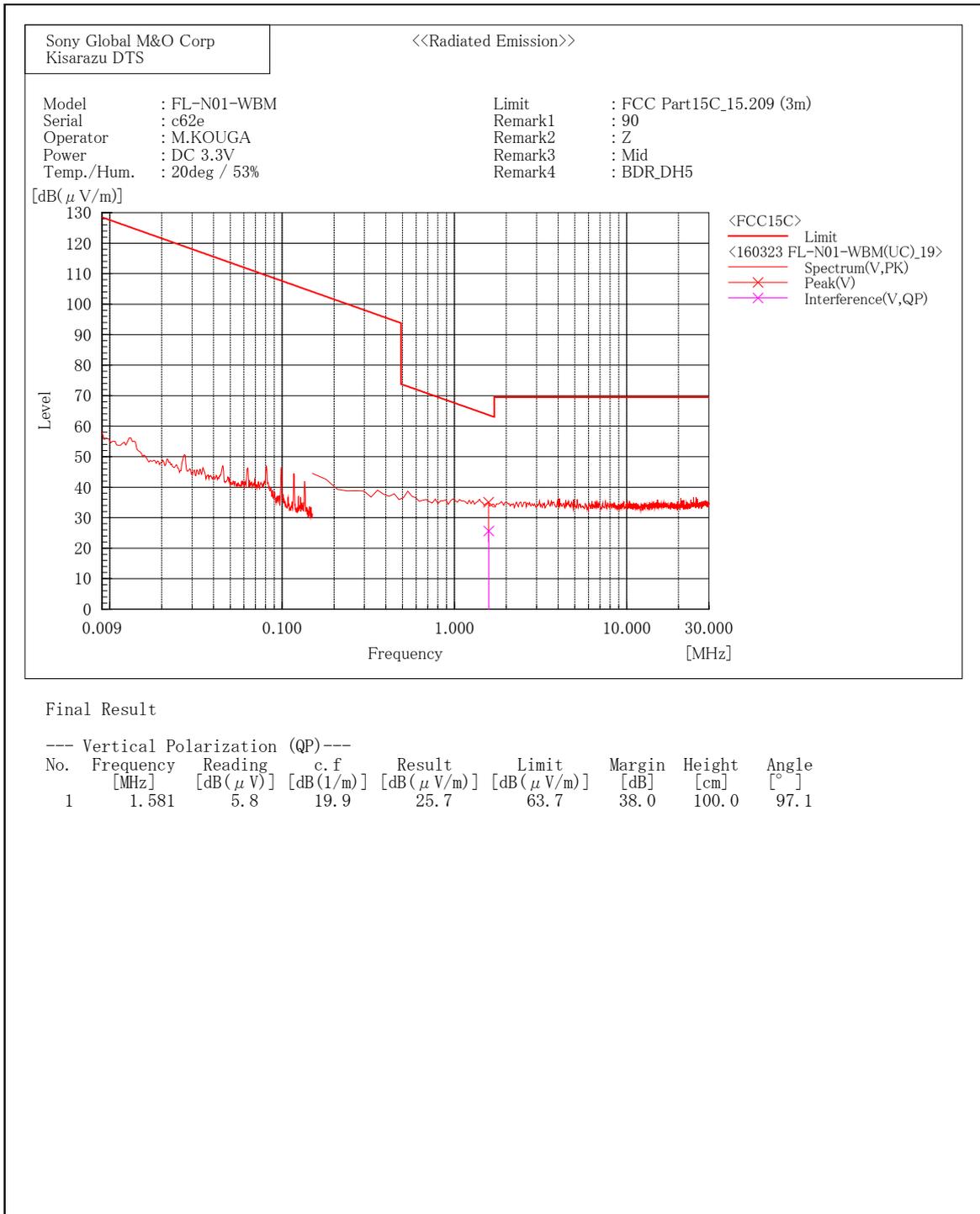
9kHz - 30MHz : March 23, 2016 (all mode)
 30MHz - 1000MHz : March 10, 2016 (all mode)
 1GHz - 6GHz : March 11, 2016 (DH5 / 2402MHz) March 12, 2016 (other mode)
 May 24, 2016 (band edge plot data)
 6GHz - 18GHz : March 18, 2016 (all mode)
 18GHz - 24.835GHz : March 17, 2016 (all mode)

9 kHz - 30 MHz

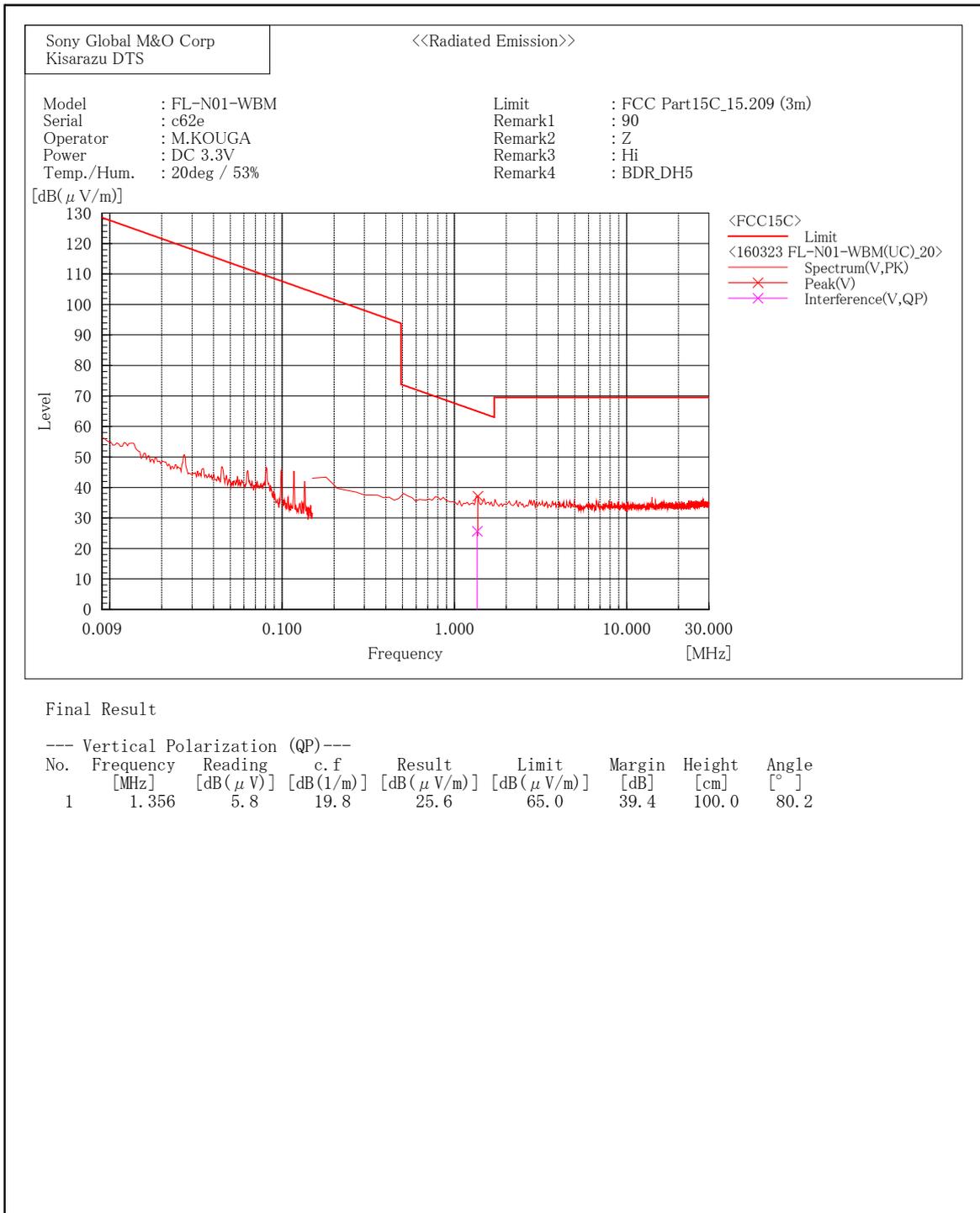
[BDR(DH5)/2402MHz]



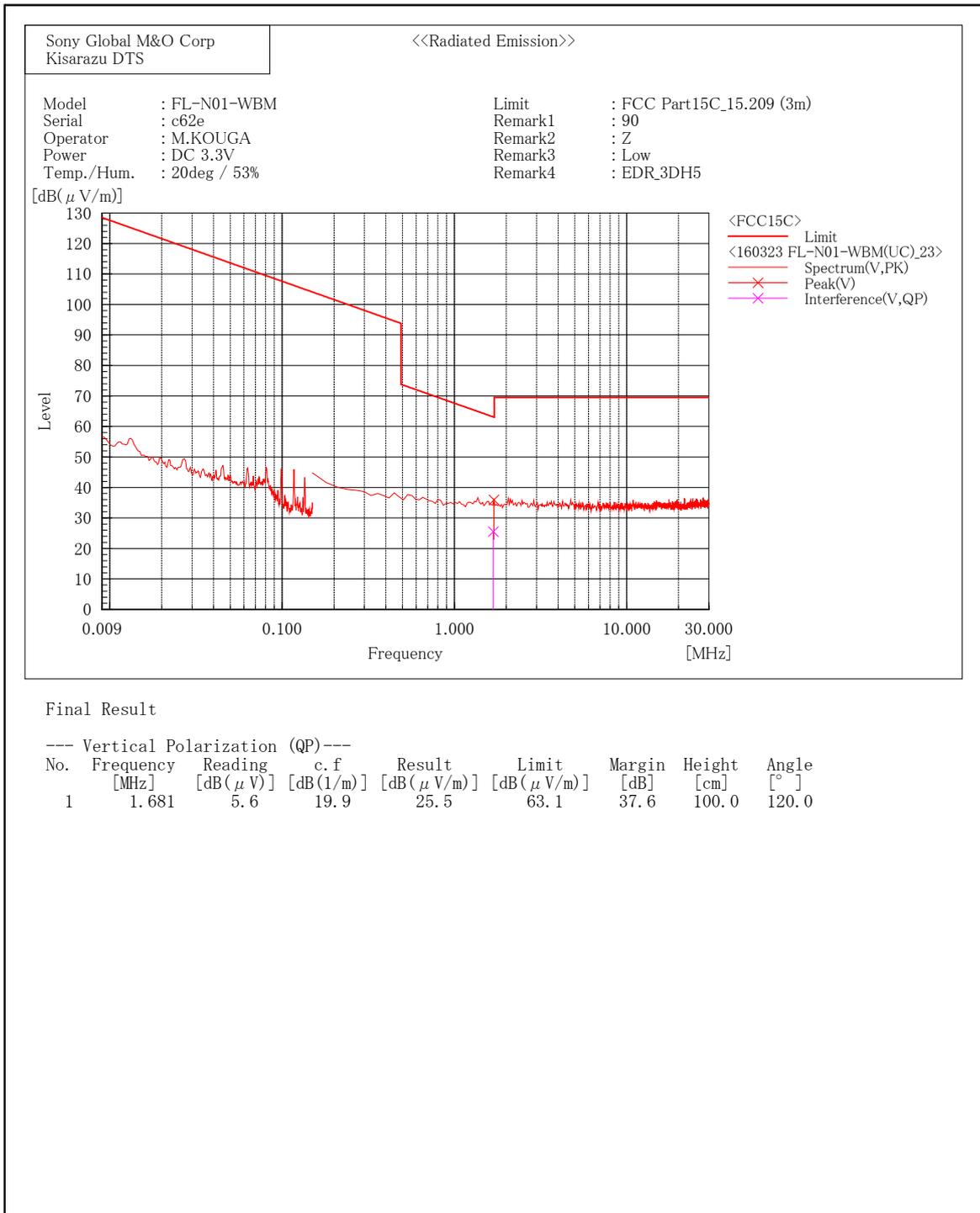
[BDR(DH5)/2441MHz]



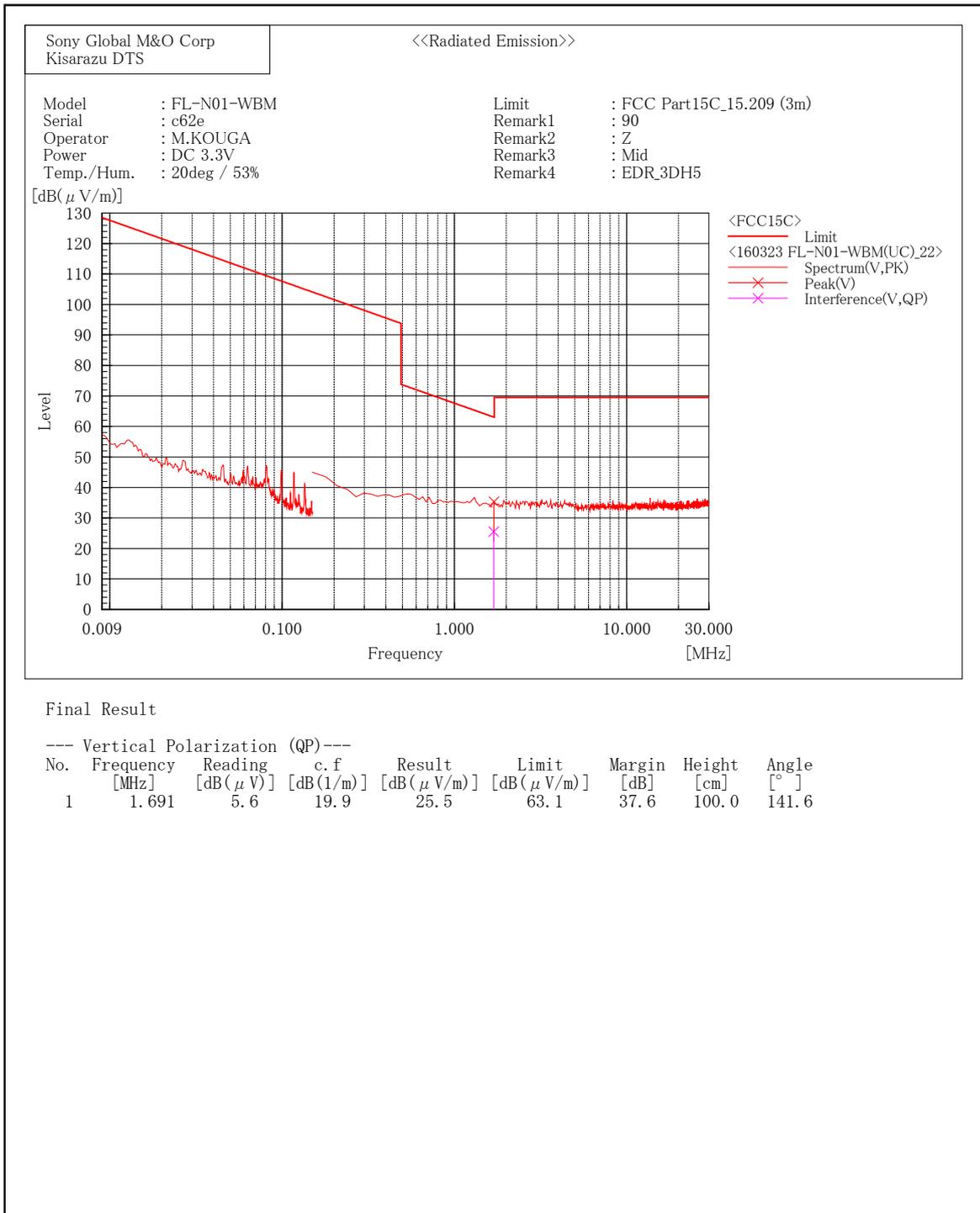
[BDR(DH5)/2480MHz]



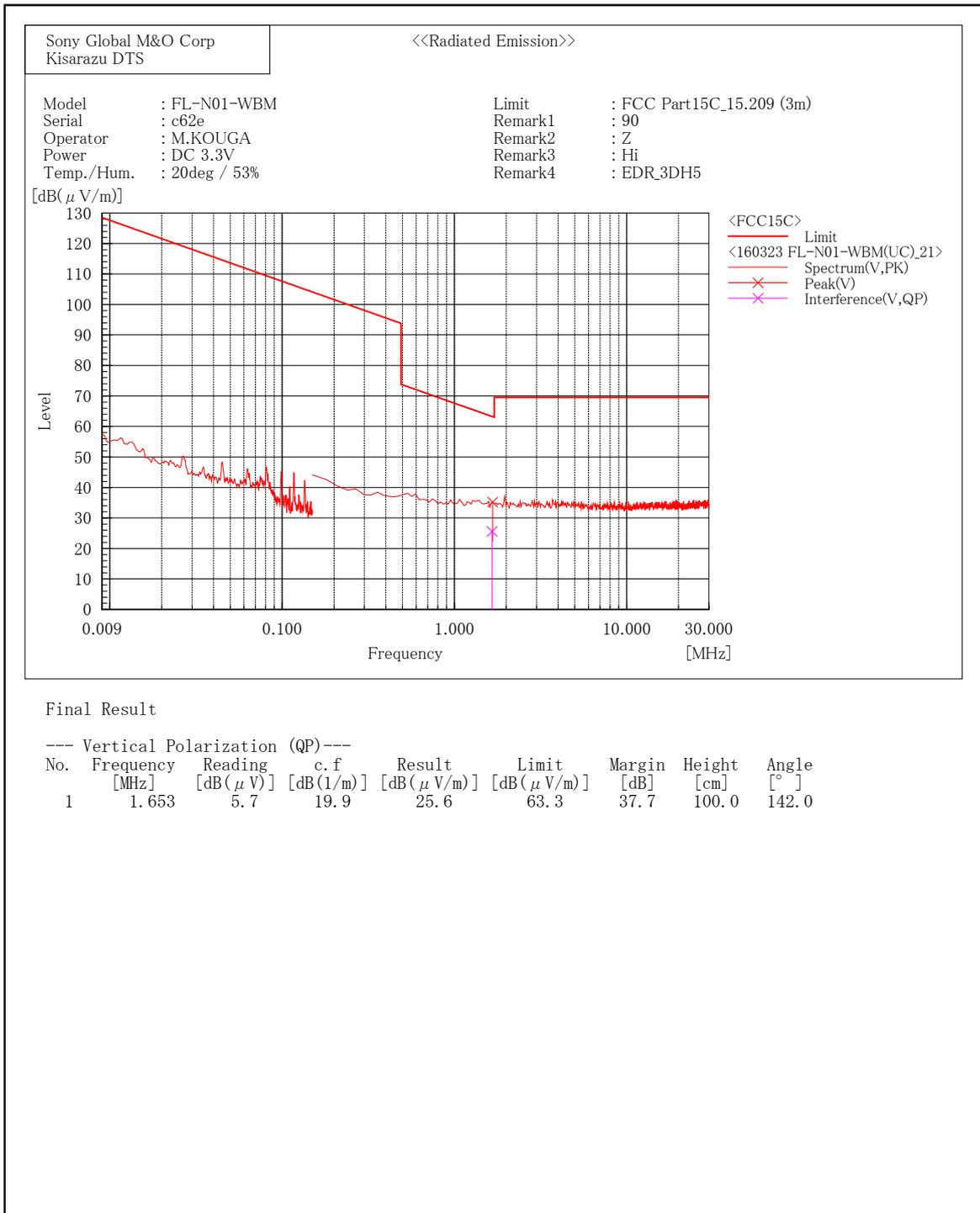
[EDR(3DH5)/2402MHz]



[EDR(3DH5)/2441MHz]

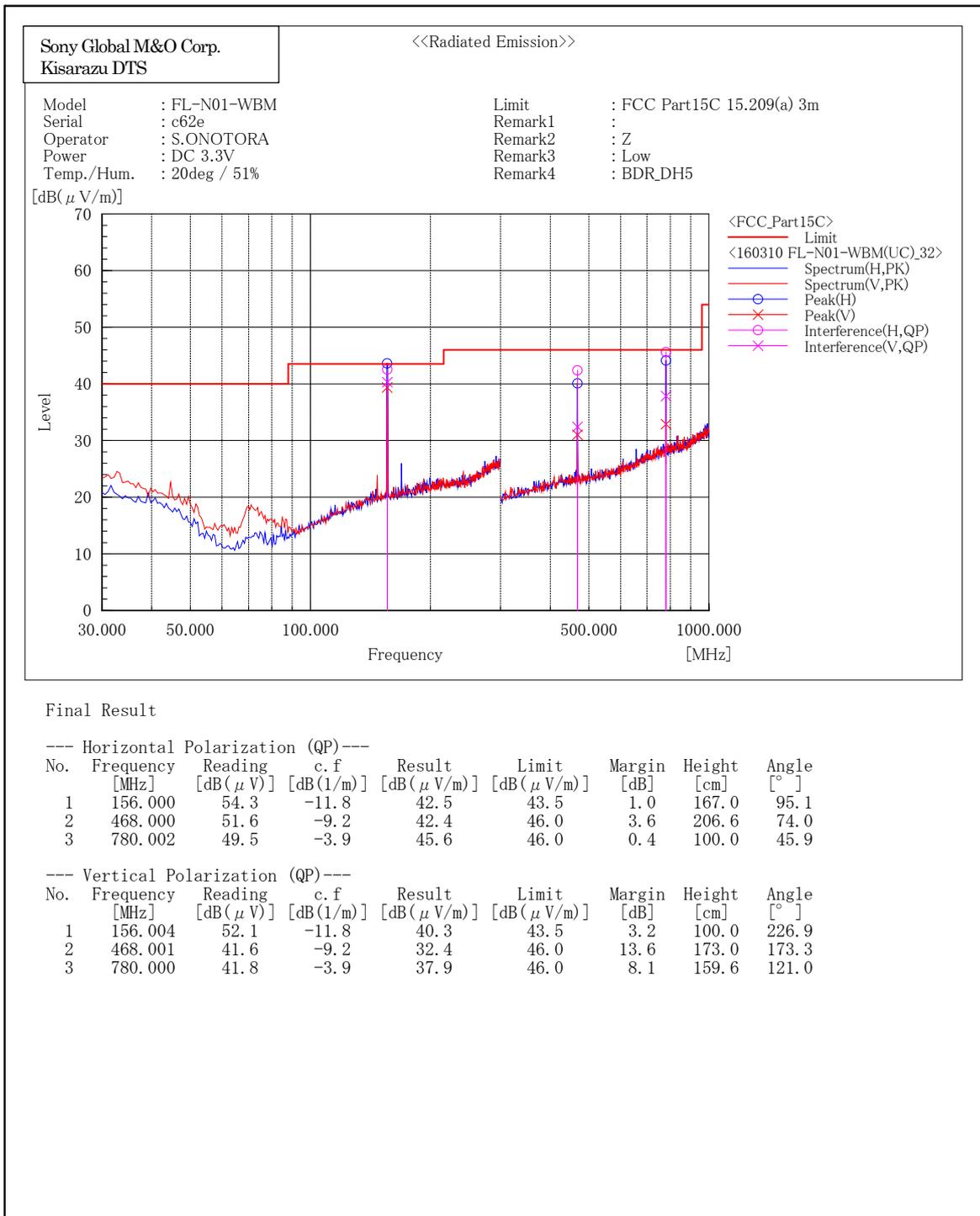


[EDR(3DH5)/2480MHz]

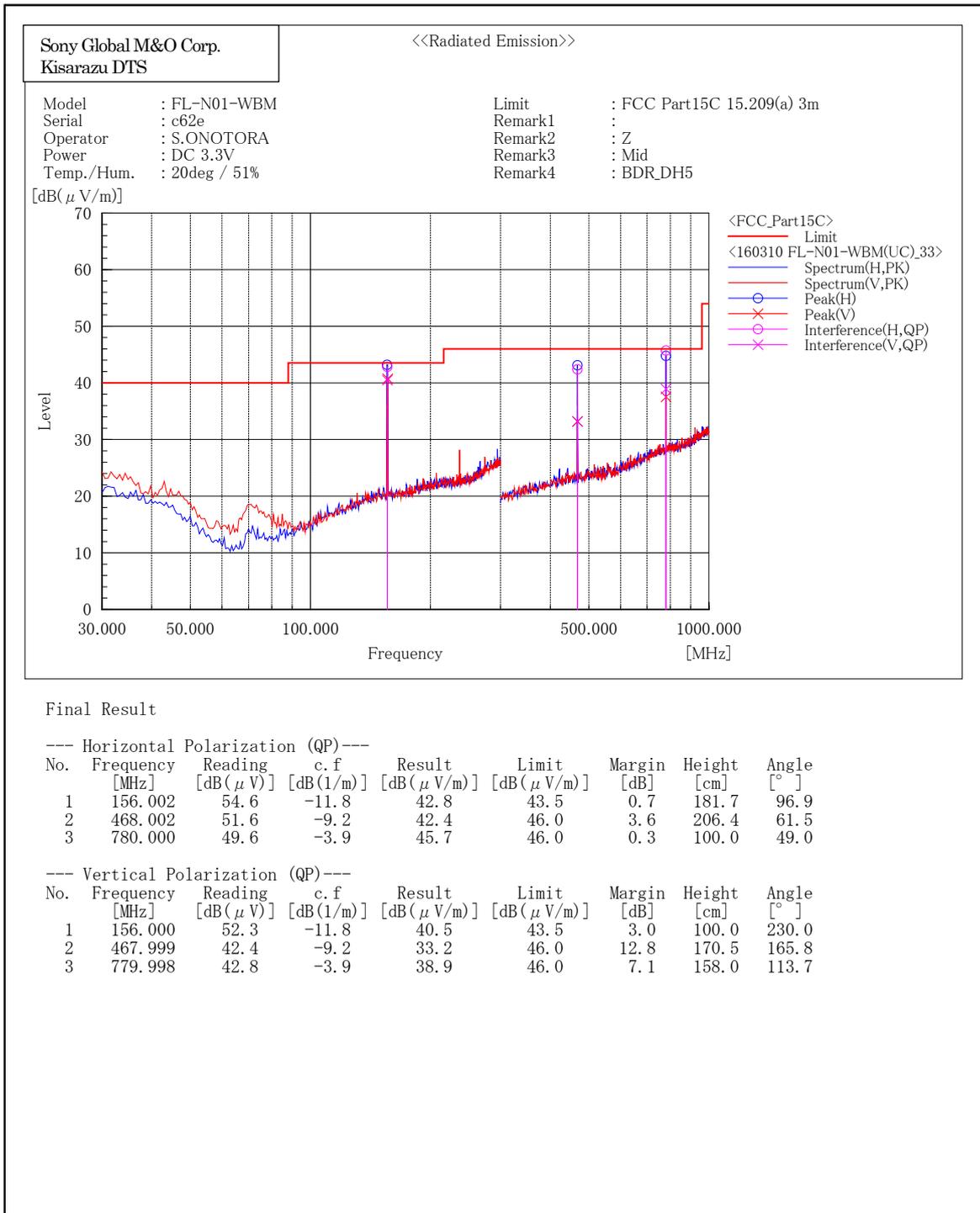


30 MHz - 1000 MHz

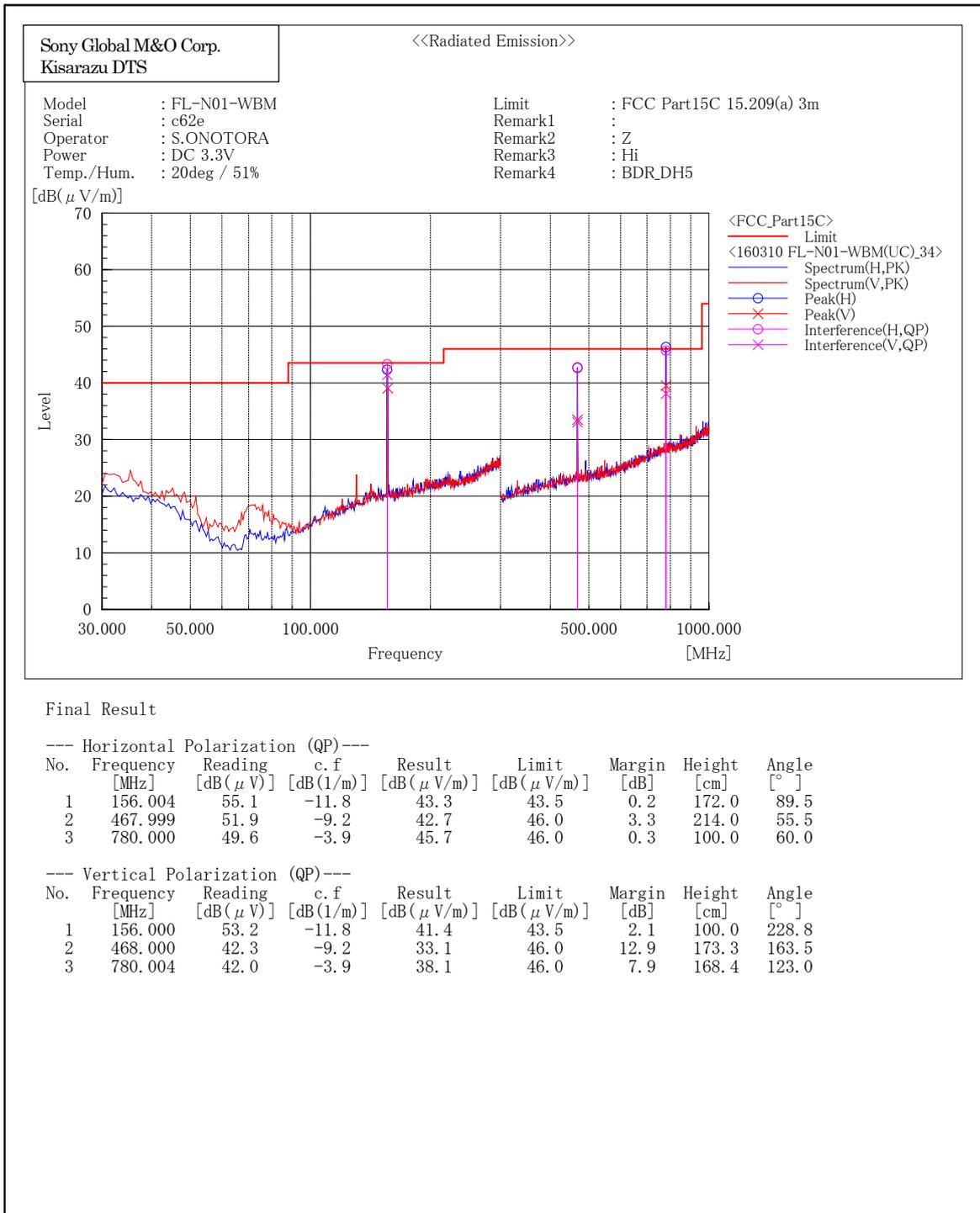
[BDR(DH5)/2402MHz]



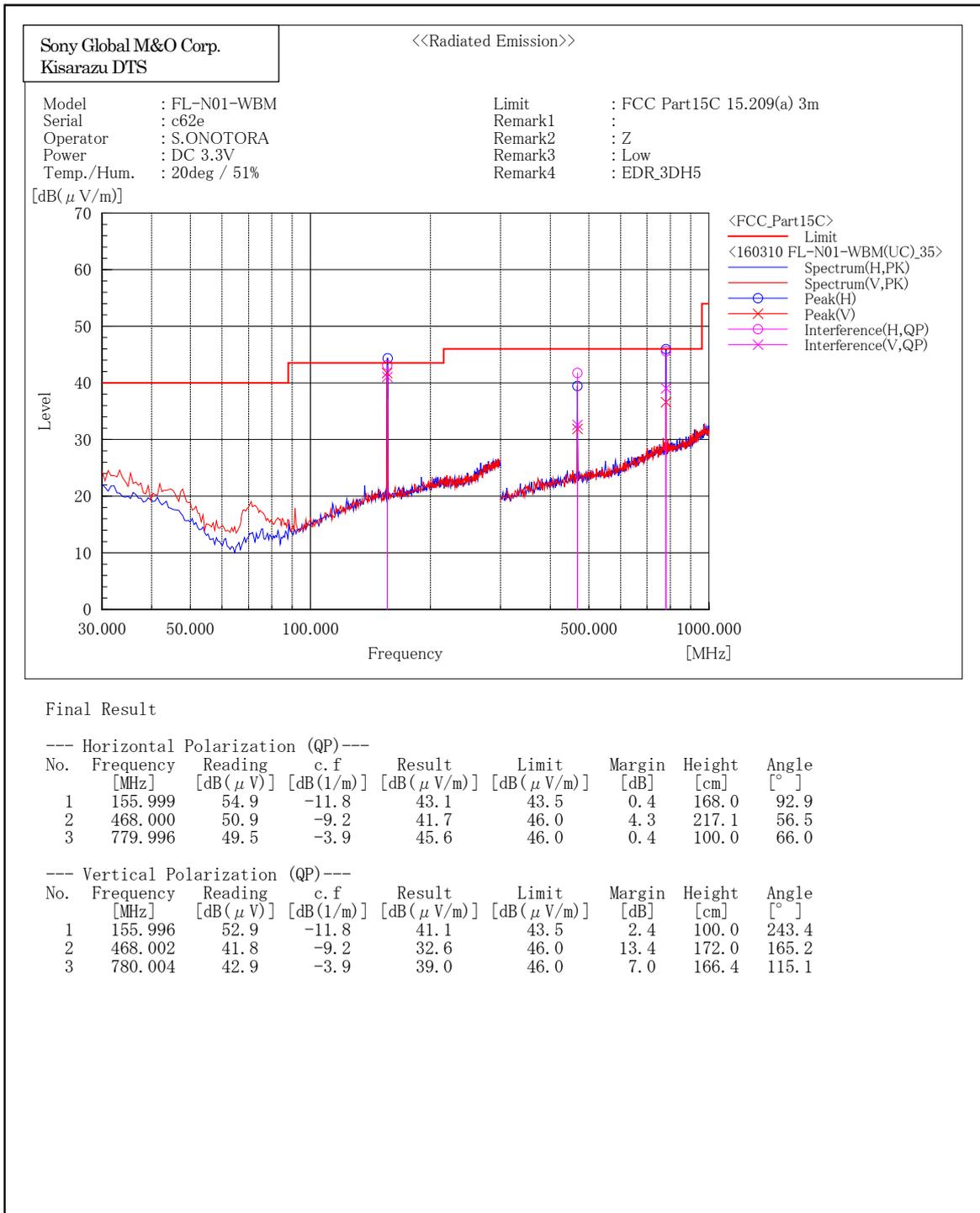
[BDR(DH5)/2441MHz]



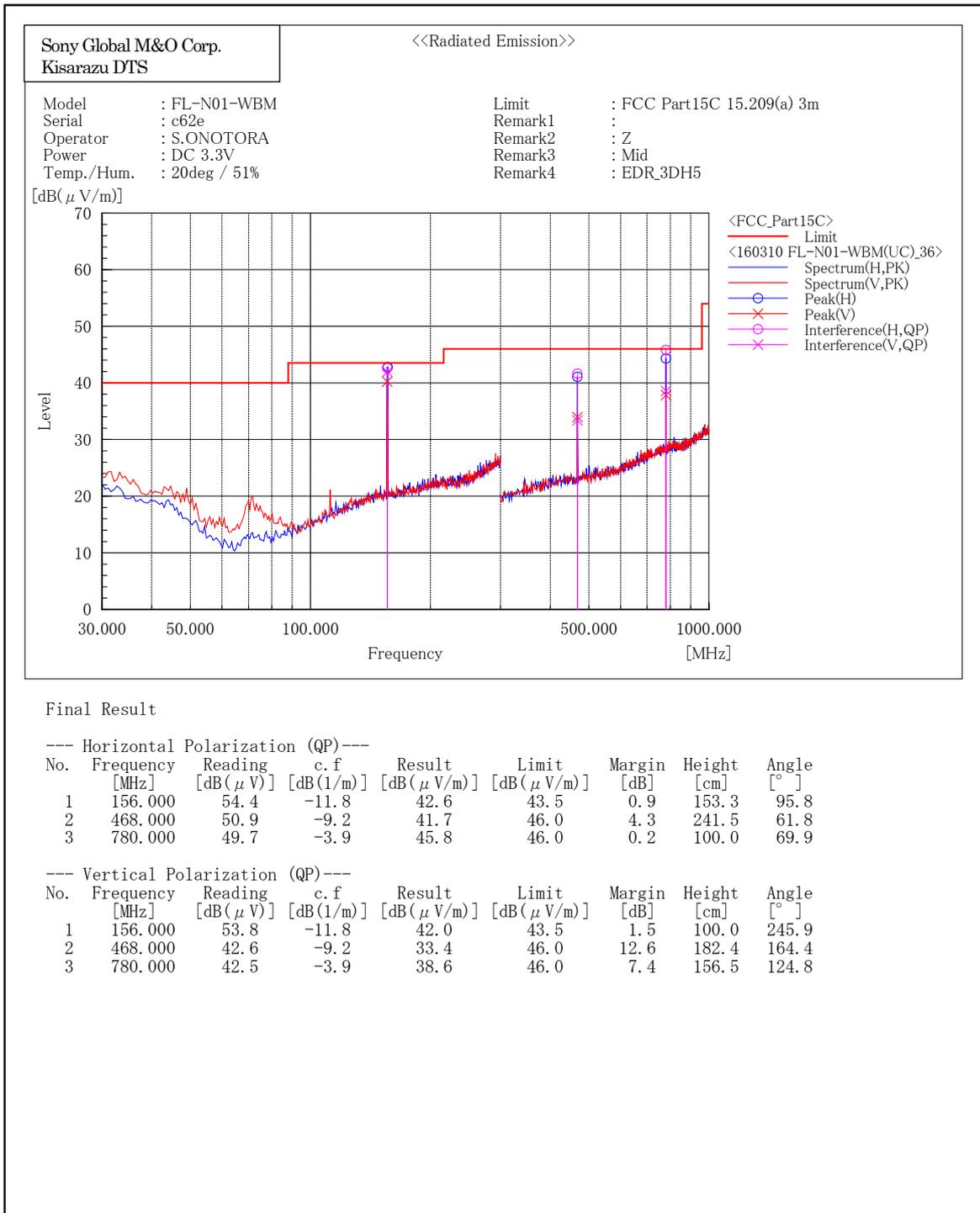
[BDR(DH5)/2480MHz]



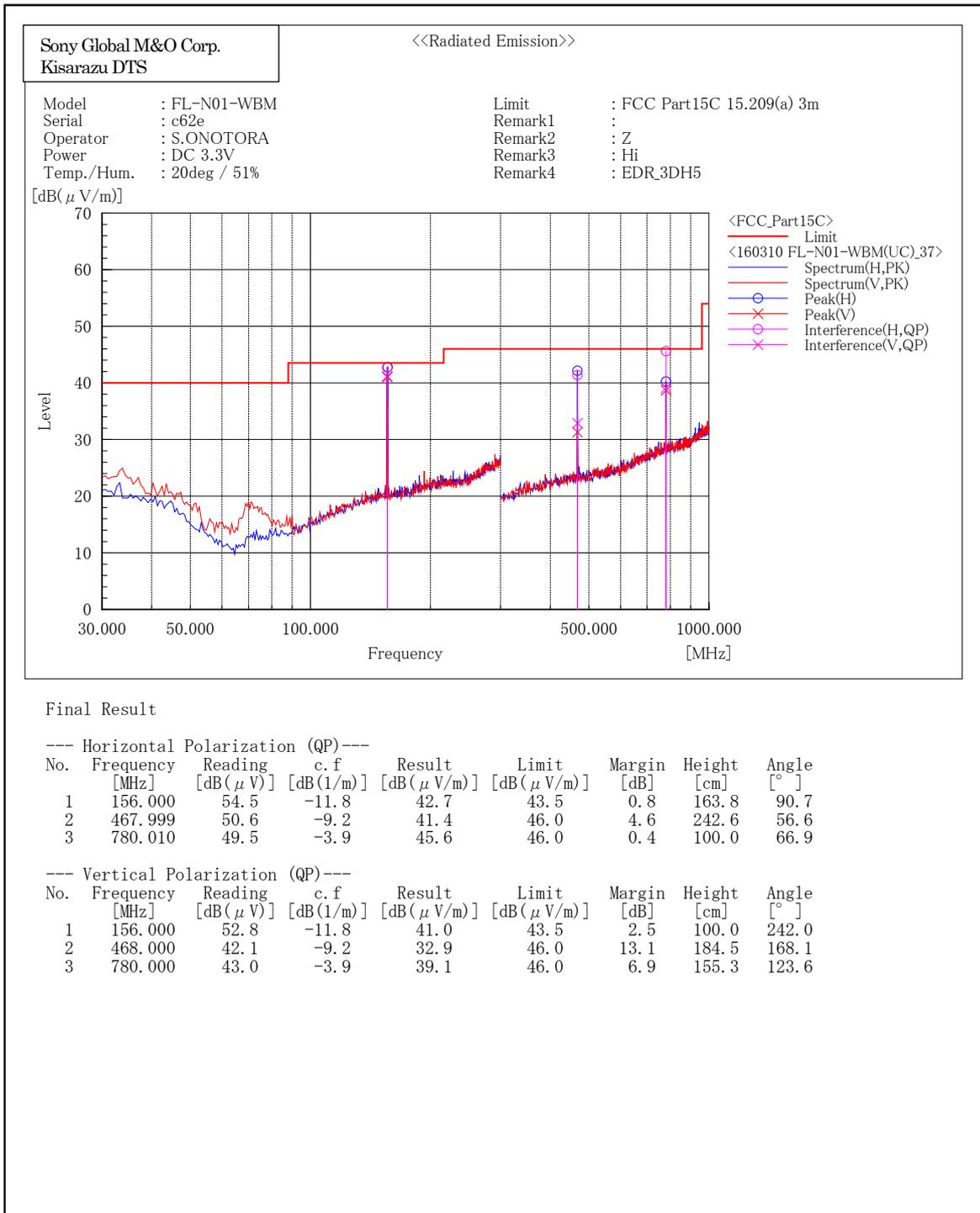
[EDR(3DH5)/2402MHz]



[EDR(3DH5)/2441MHz]

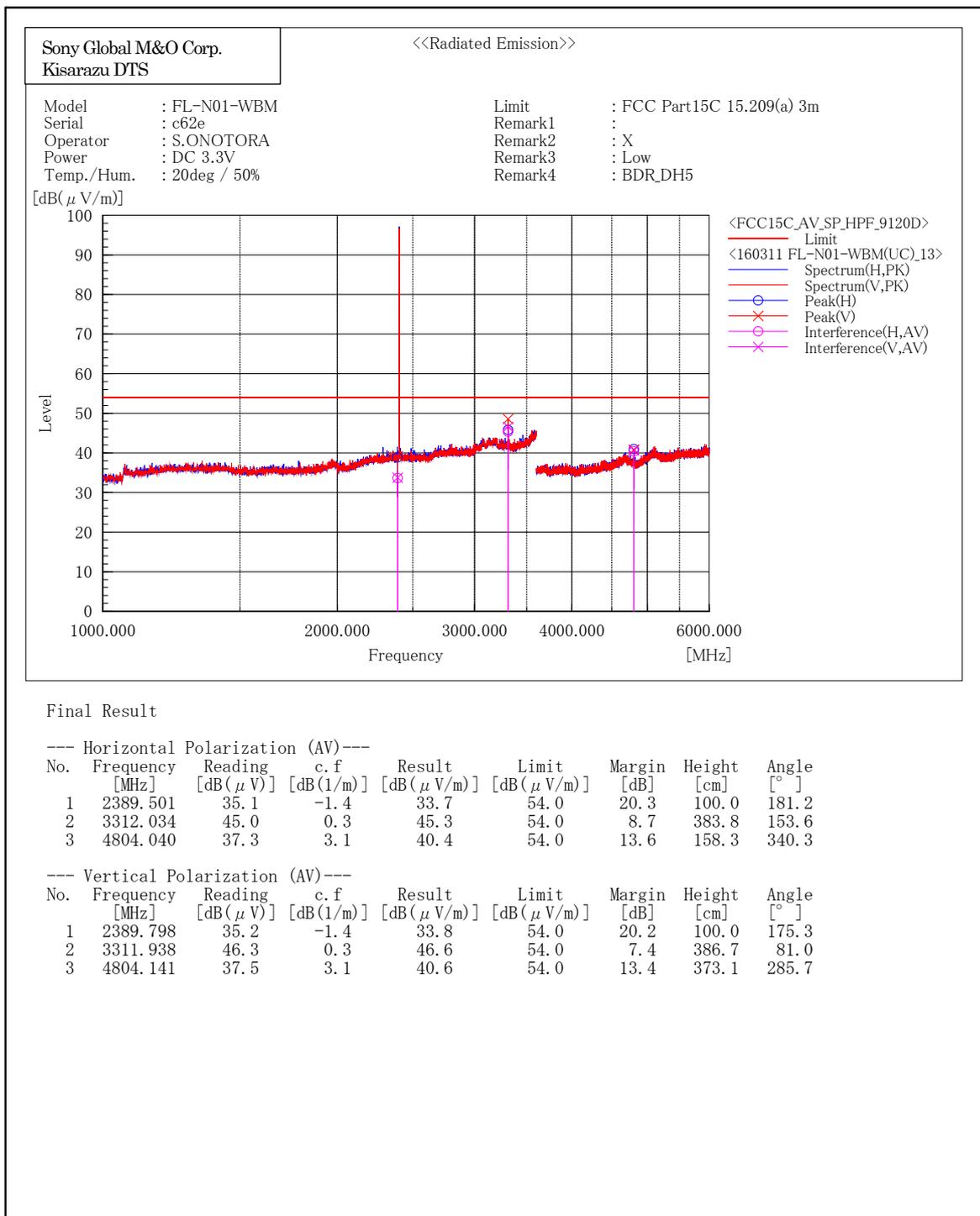


[EDR(3DH5)/2480MHz]

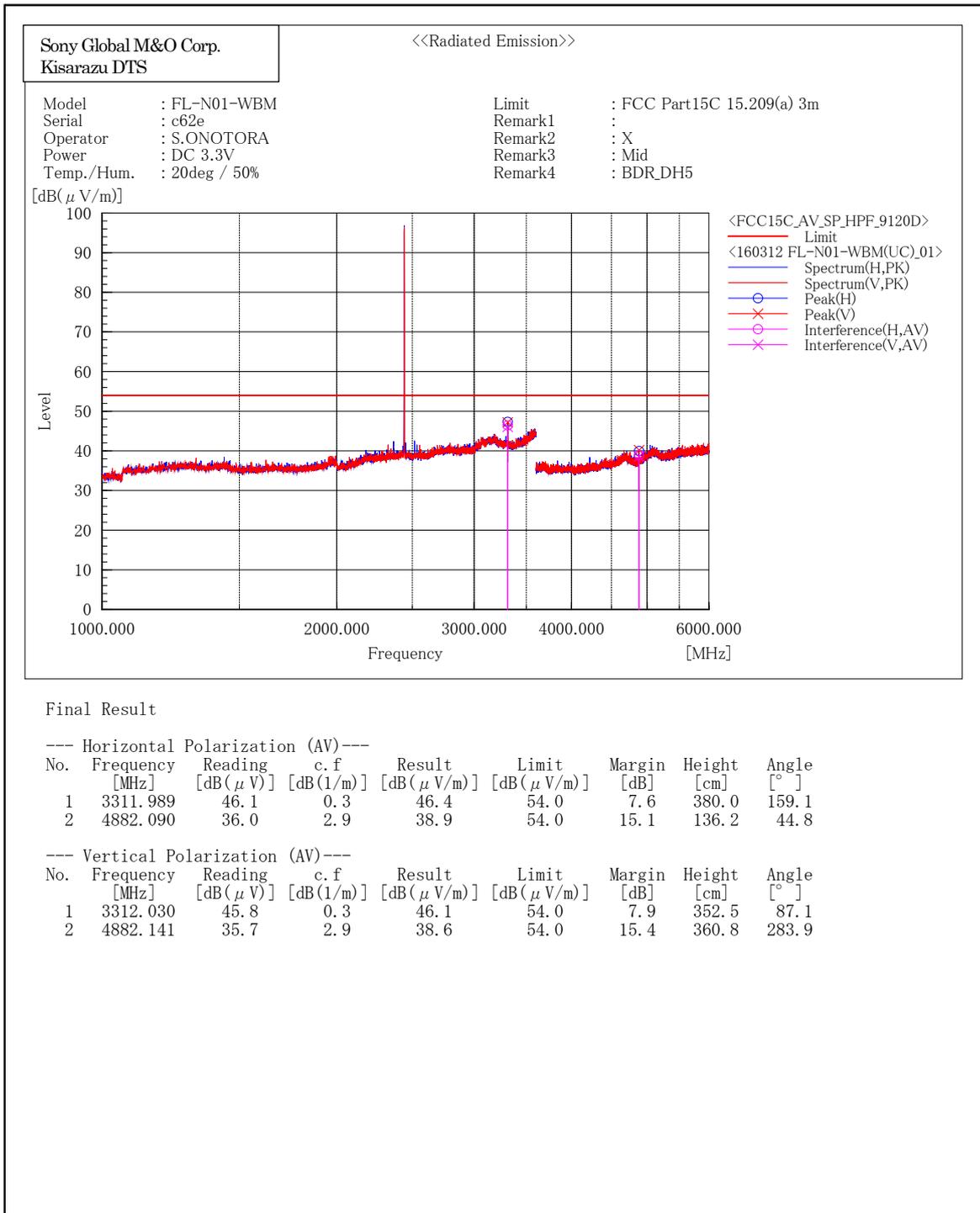


1GHz - 6 GHz

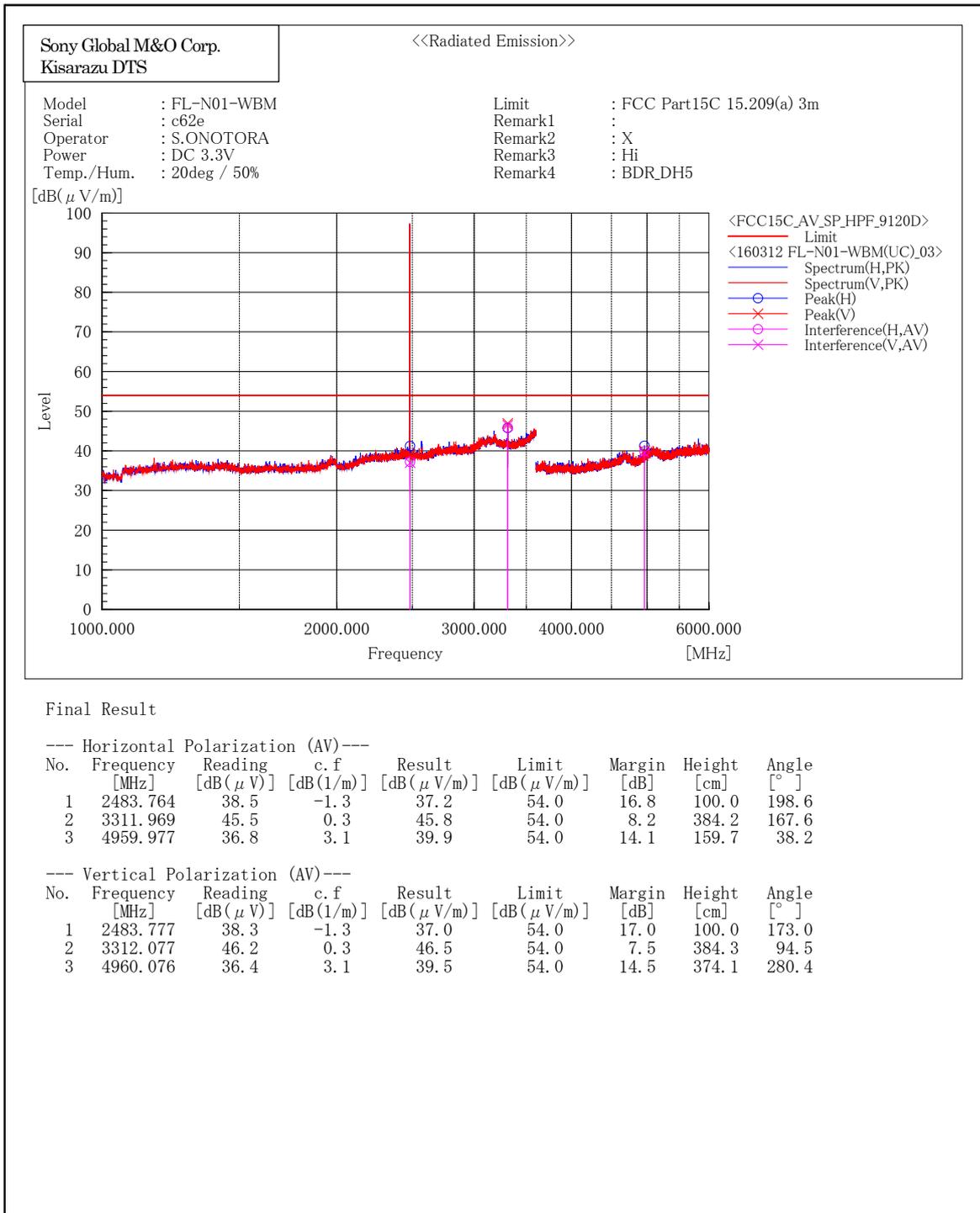
[BDR(DH5)/2402MHz]



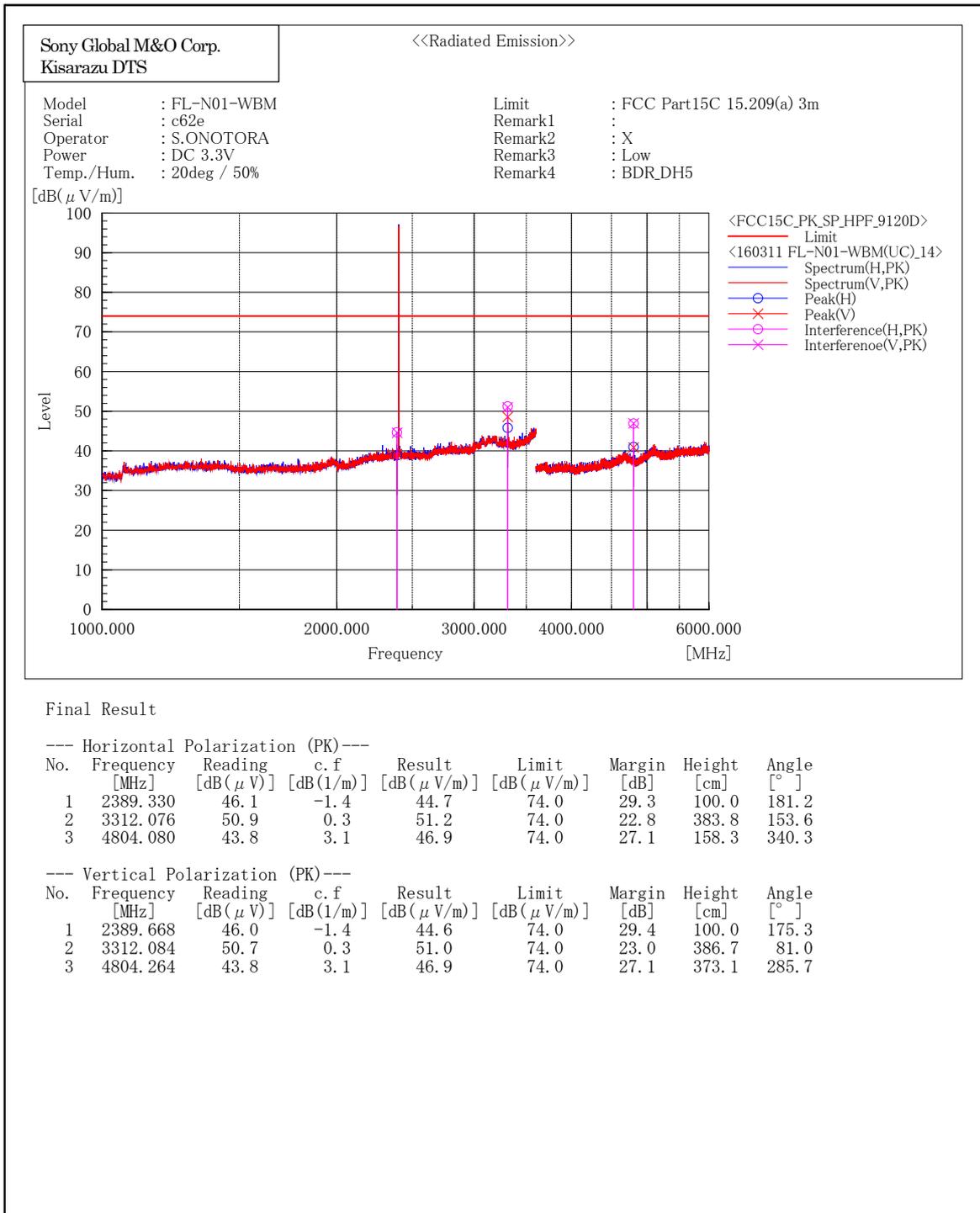
[BDR(DH5)/2441MHz]



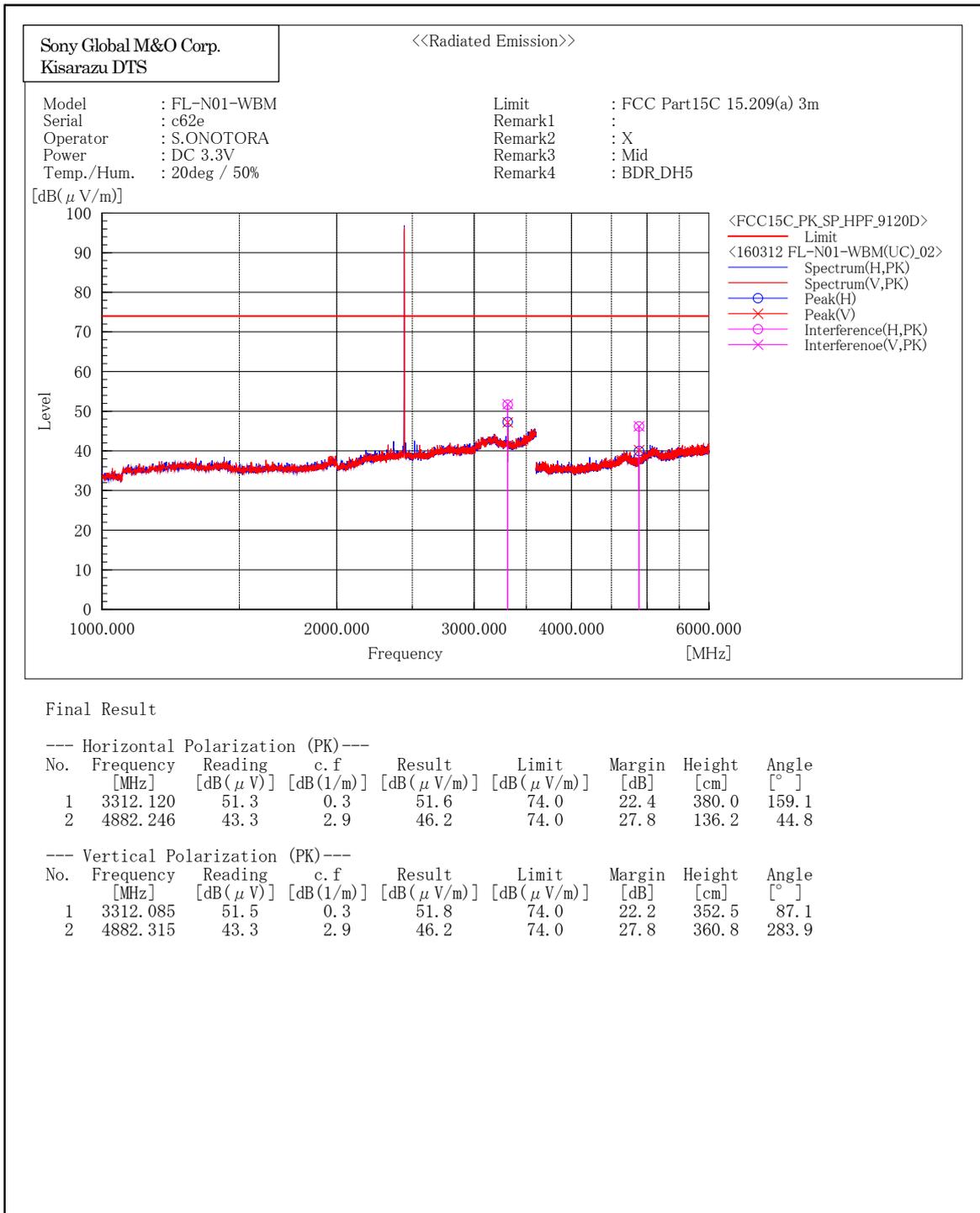
[BDR(DH5)/2480MHz]



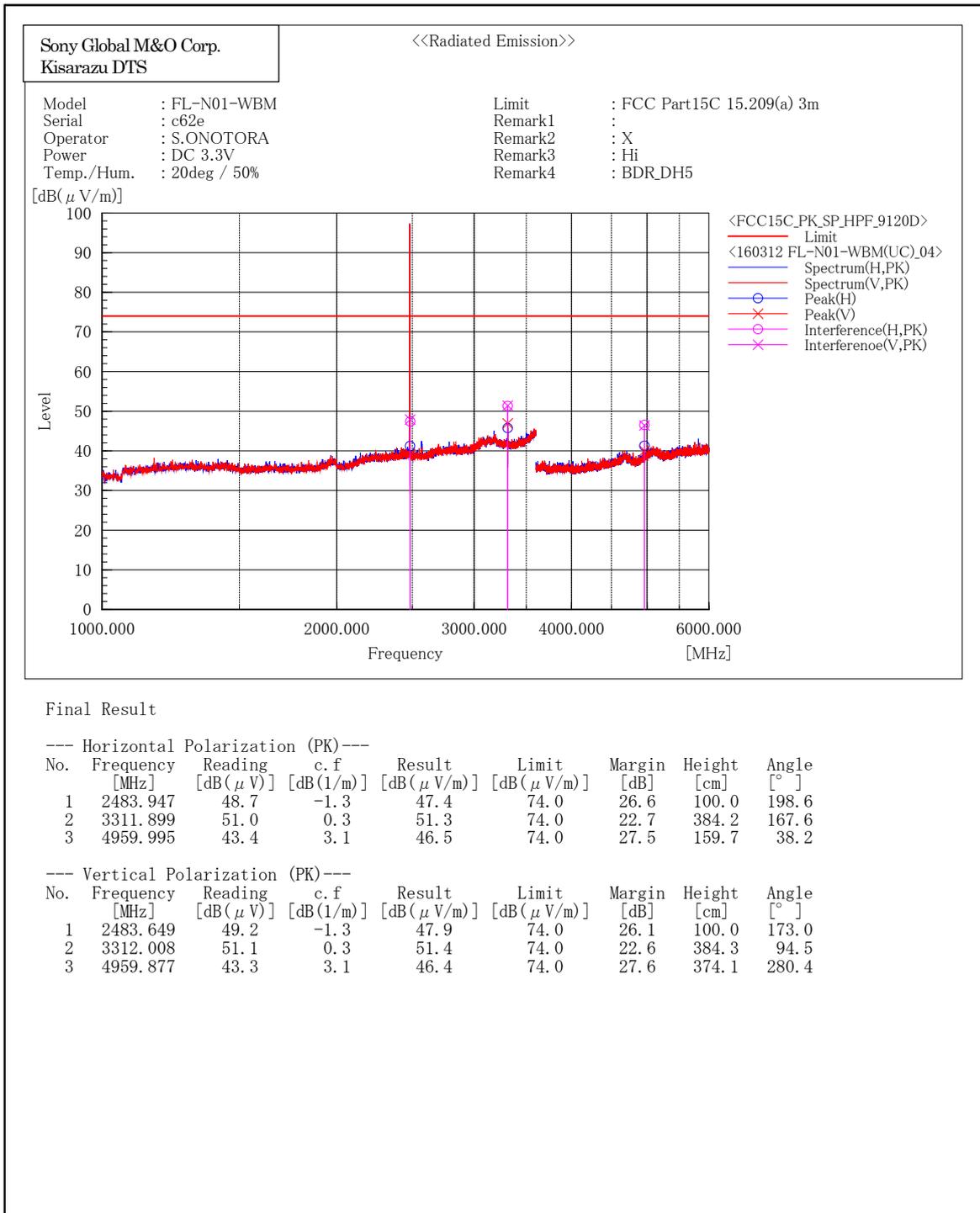
[BDR(DH5)/2402MHz]



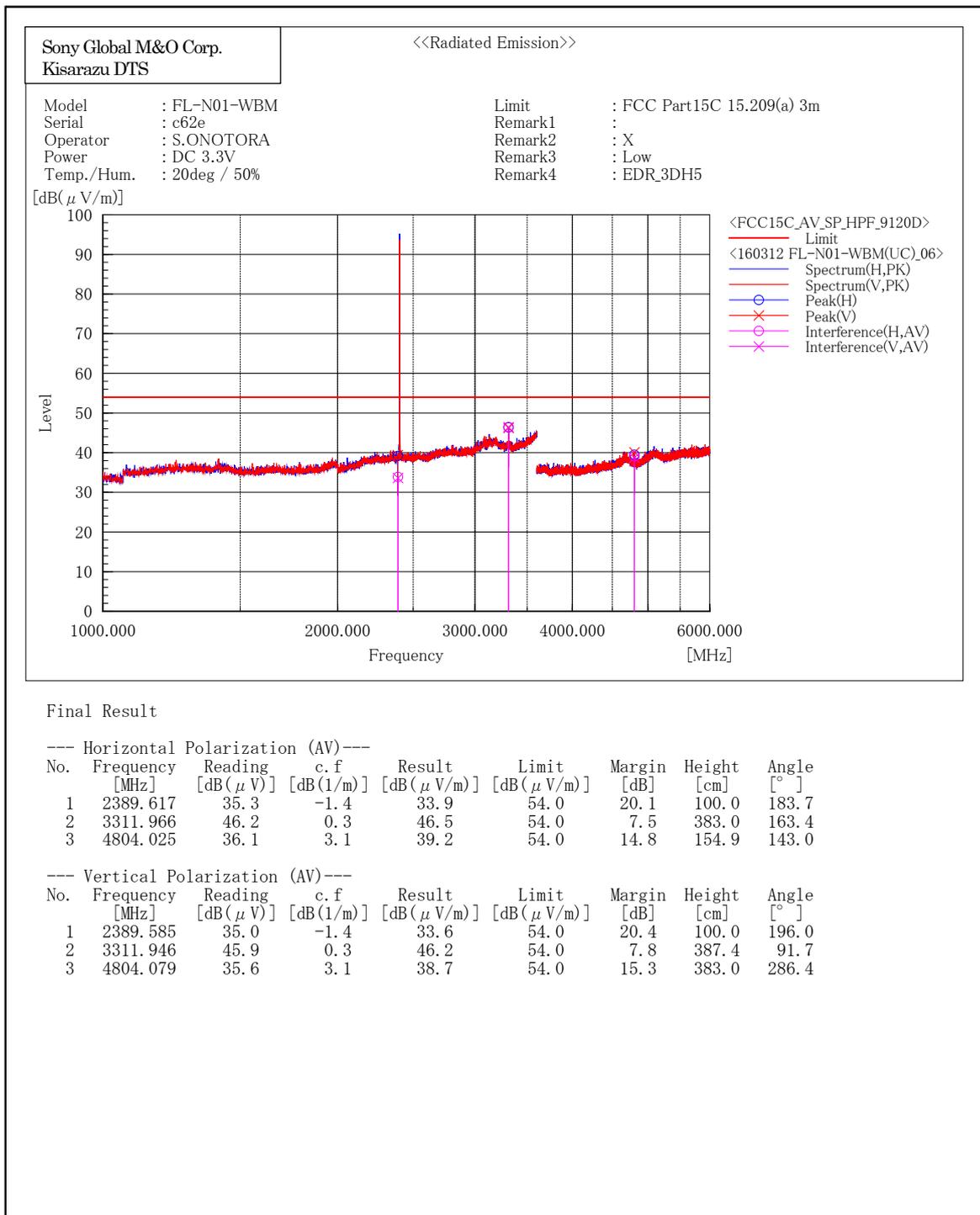
[BDR(DH5)/2441MHz]



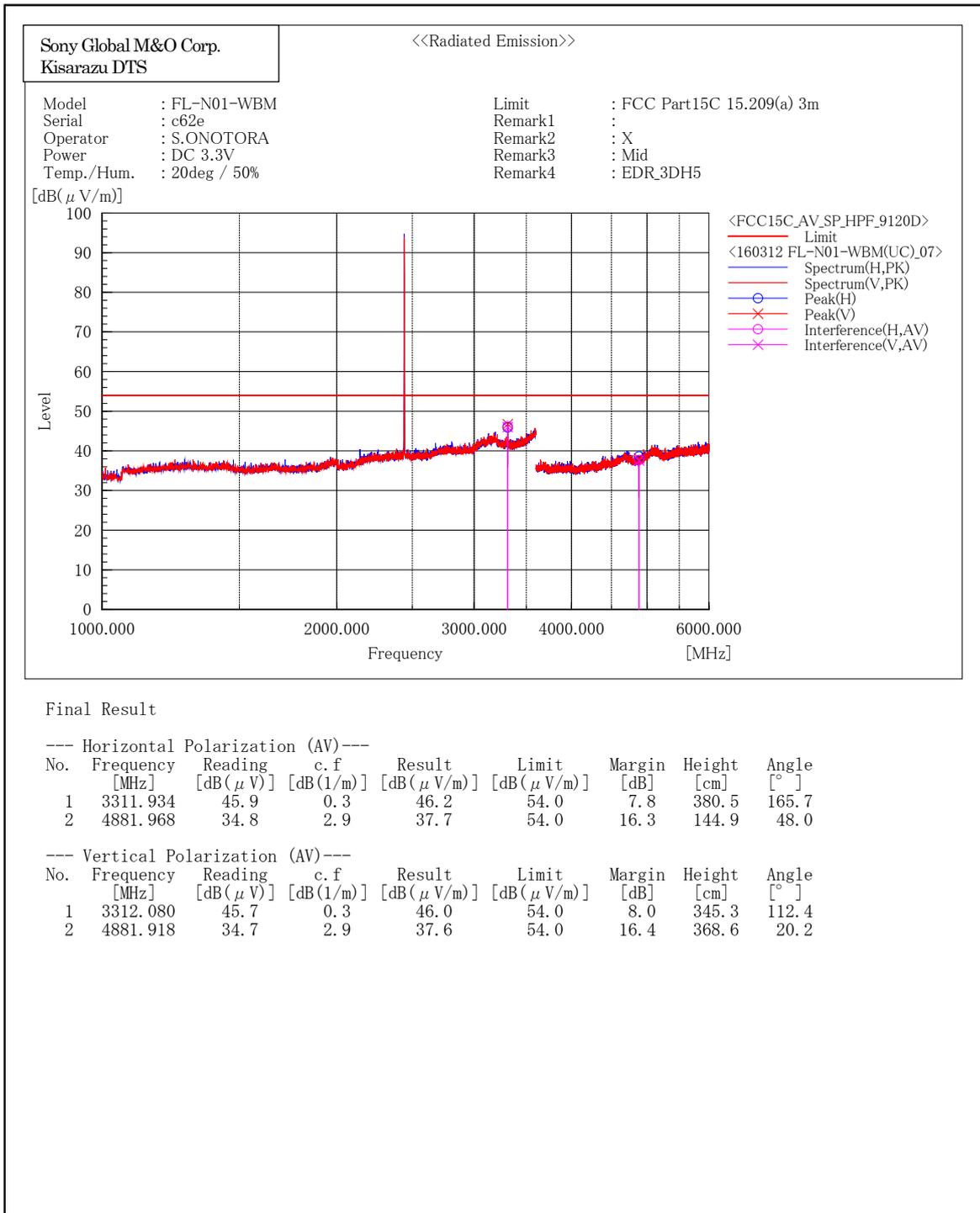
[BDR(DH5)/2480MHz]



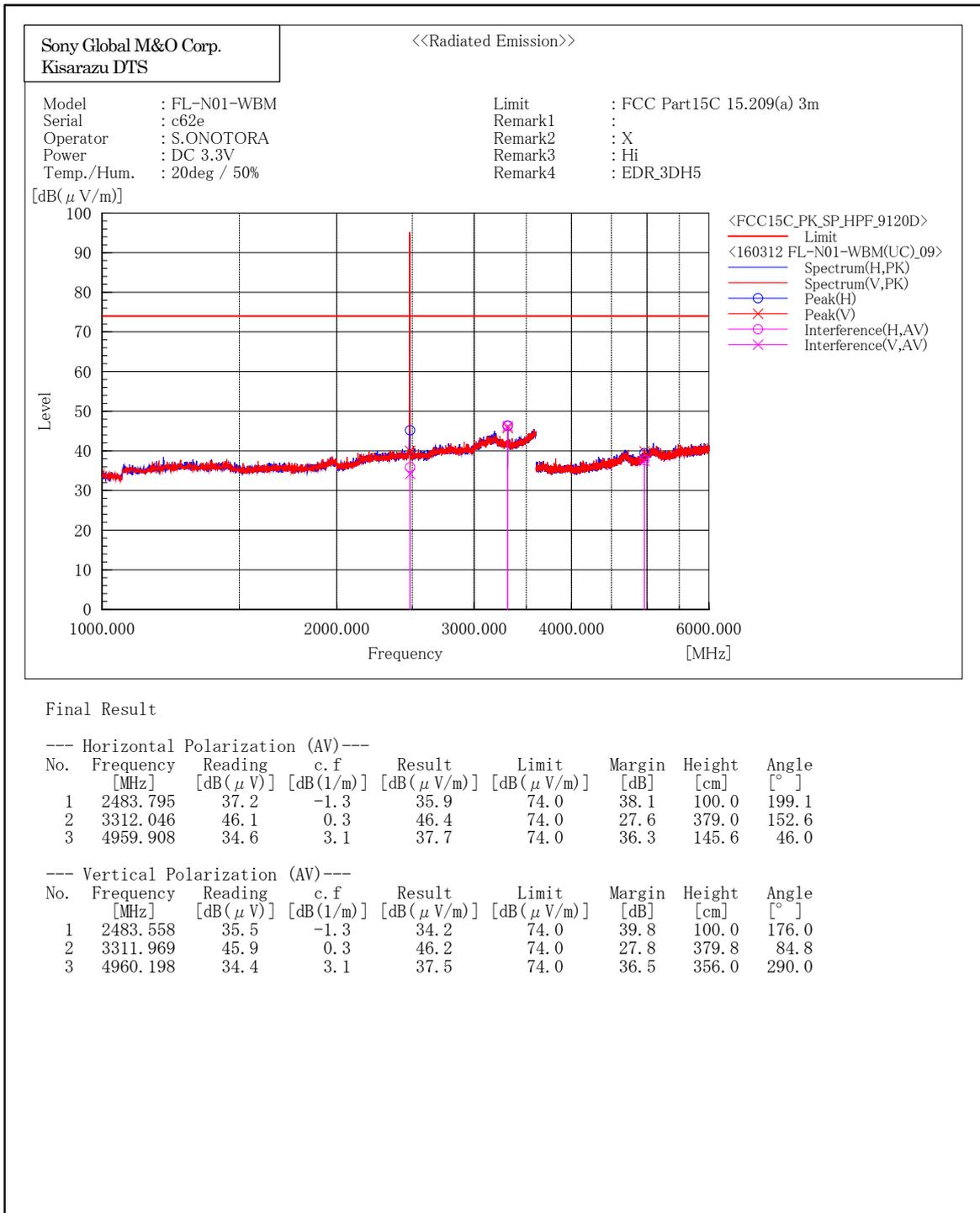
[EDR(3DH5)/2402MHz]



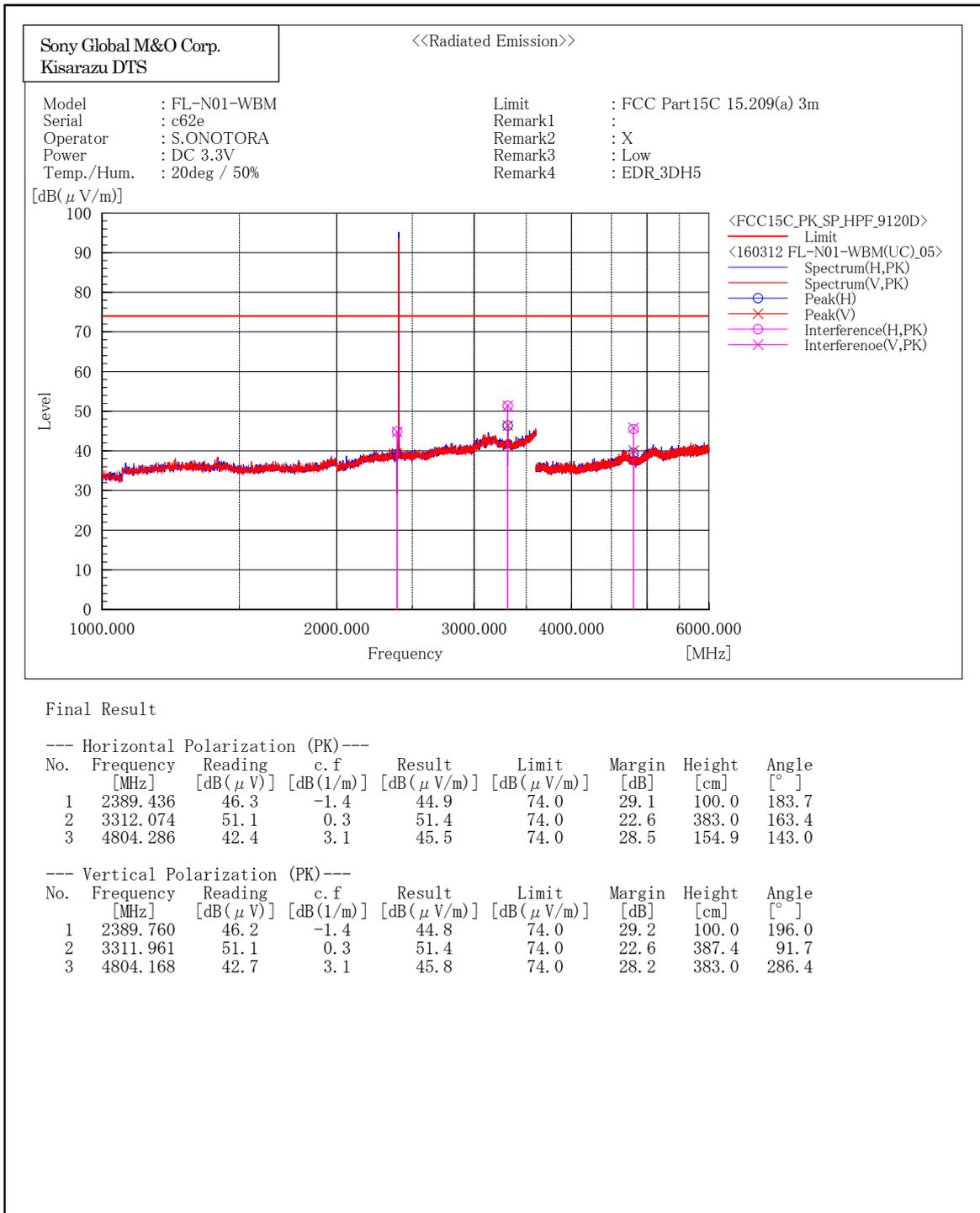
[EDR(3DH5)/2441MHz]



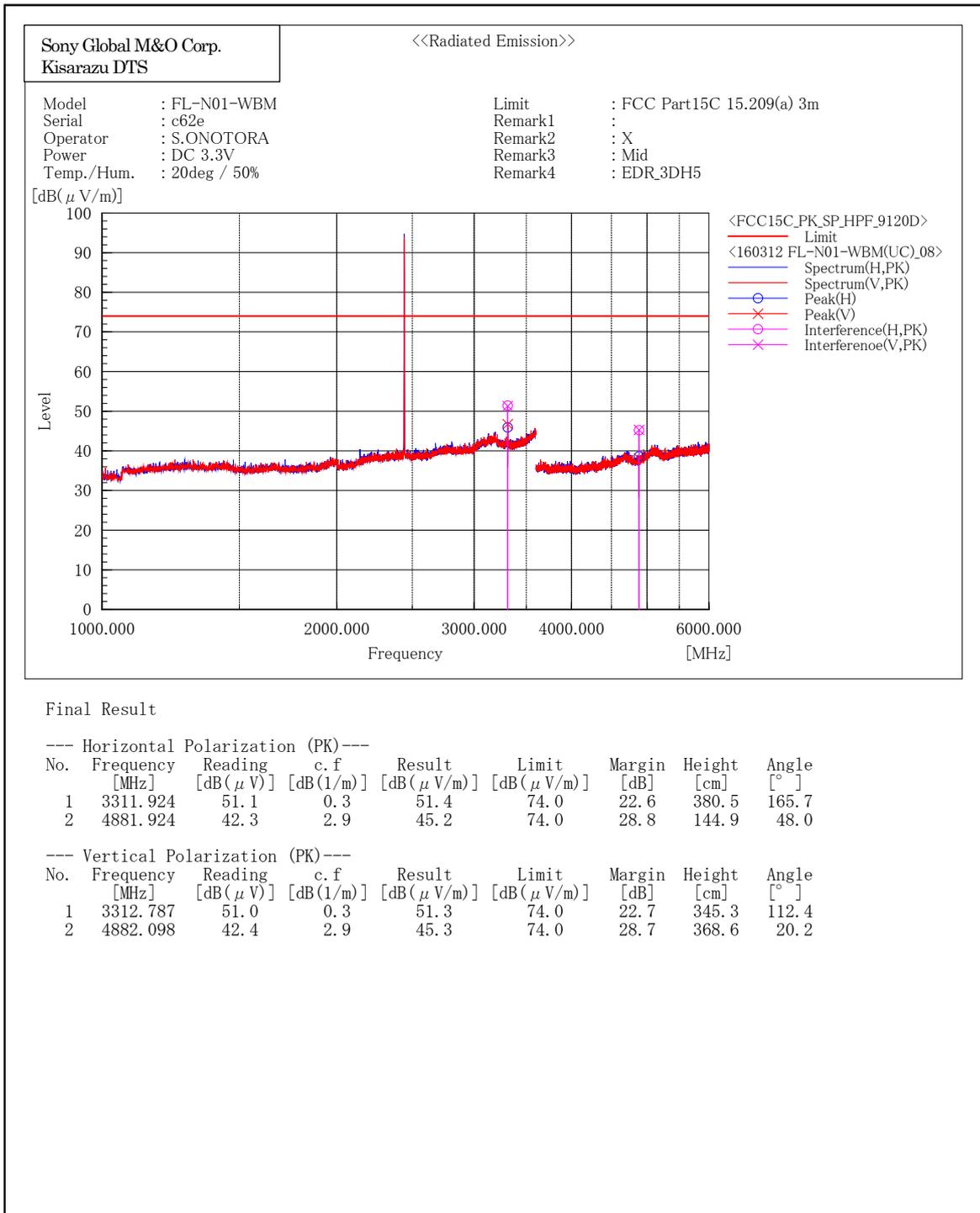
[EDR(3DH5)/2480MHz]



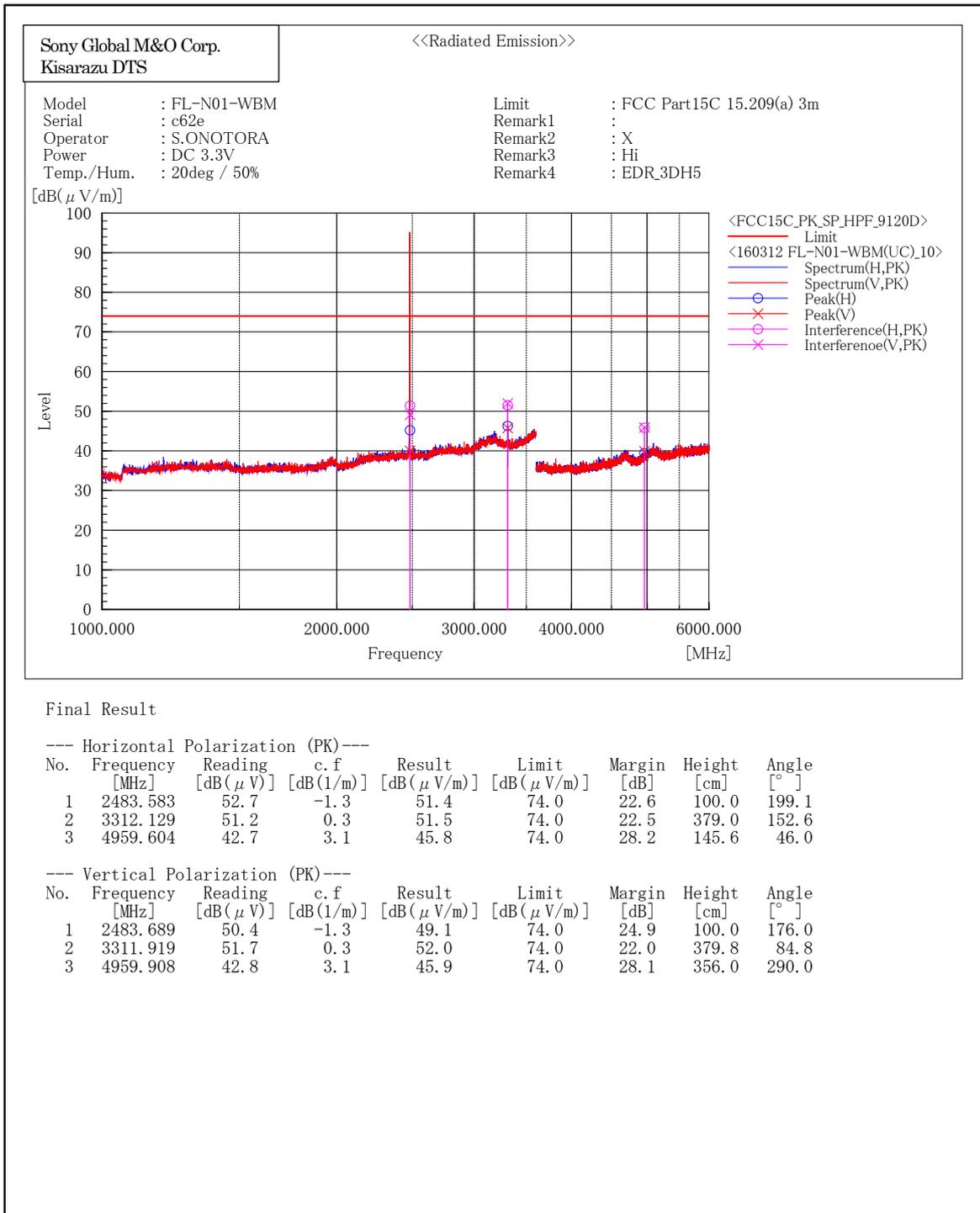
[EDR(3DH5)/2402MHz]



[EDR(3DH5)/2441MHz]

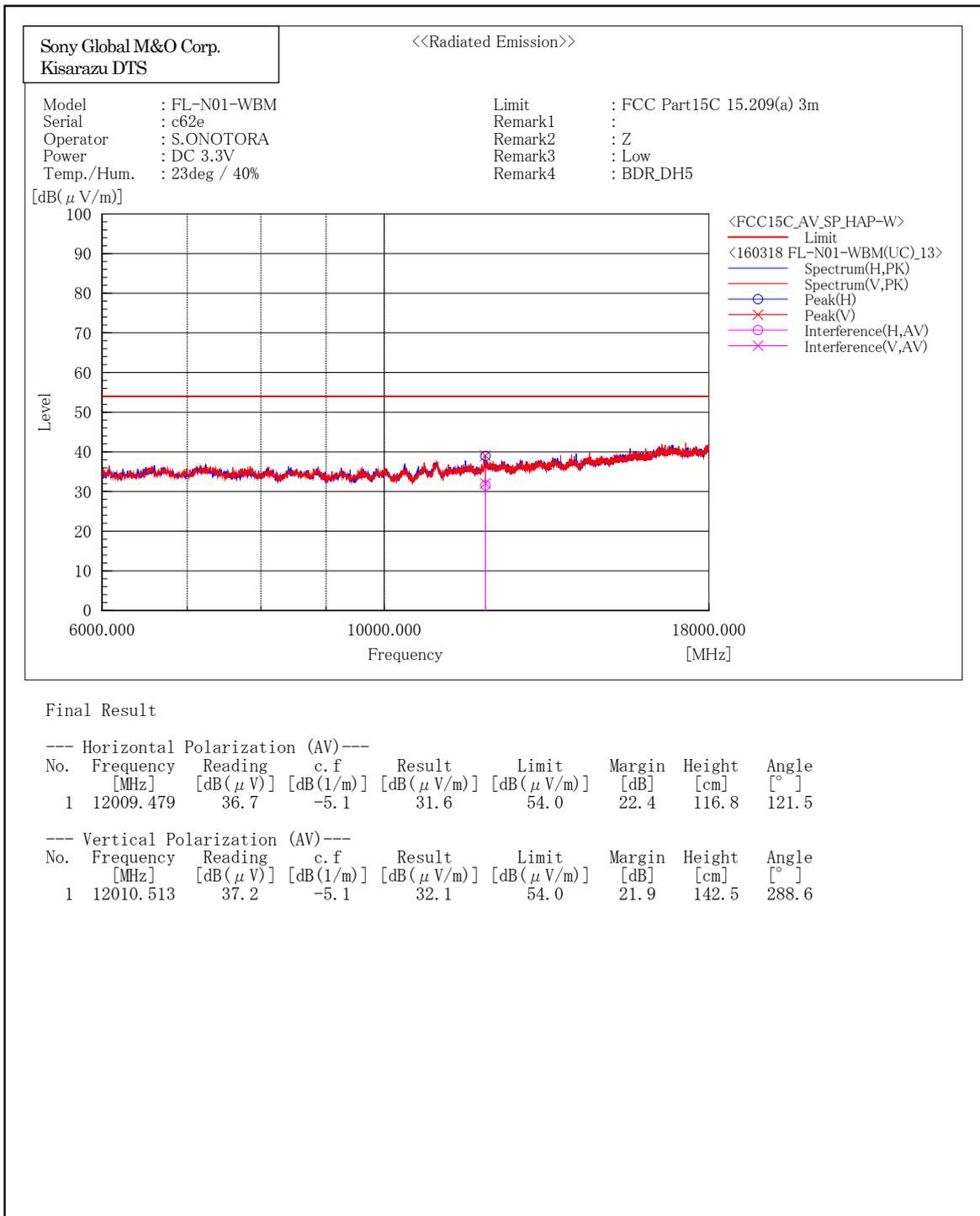


[EDR(3DH5)/2480MHz]

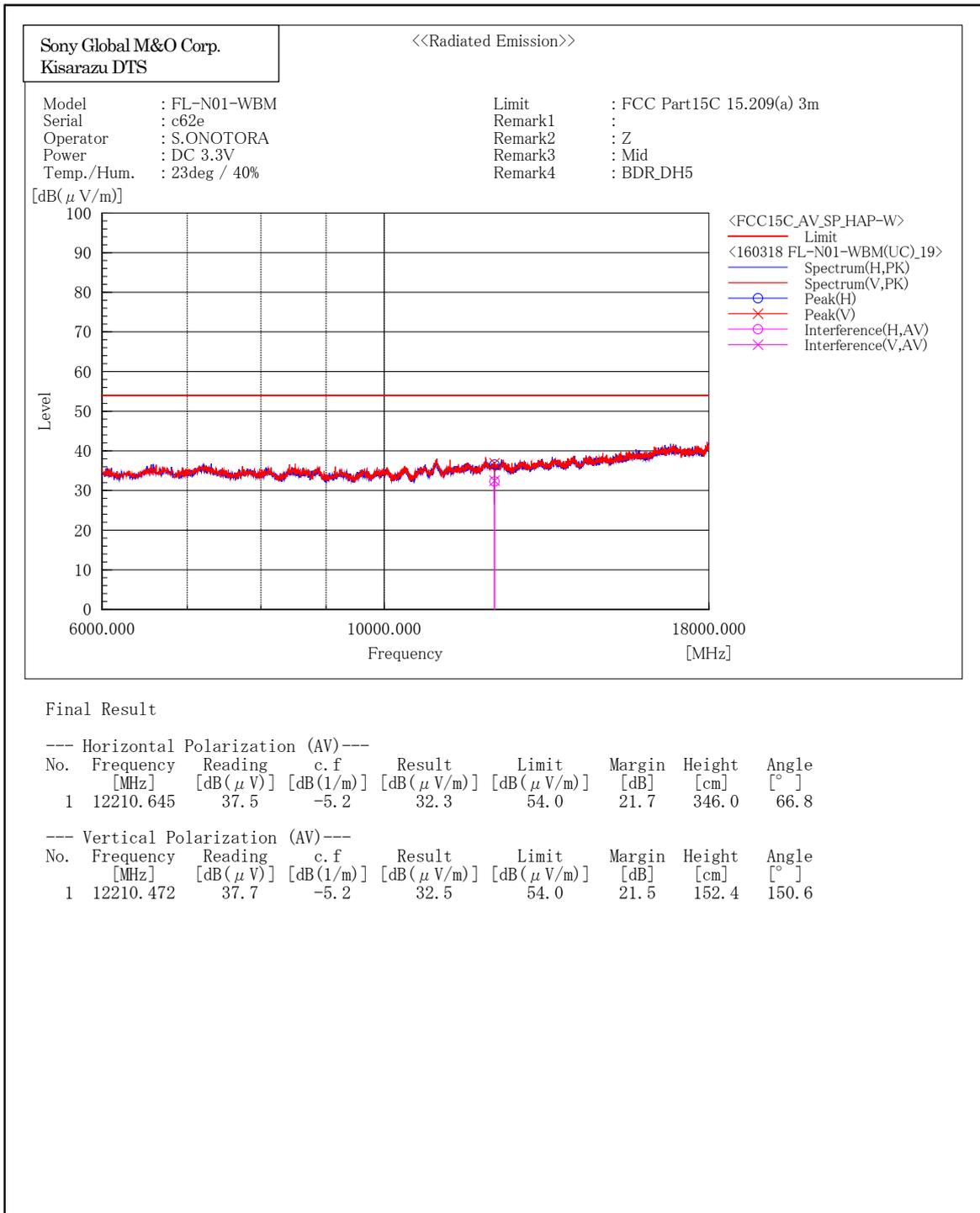


6 GHz - 18 GHz

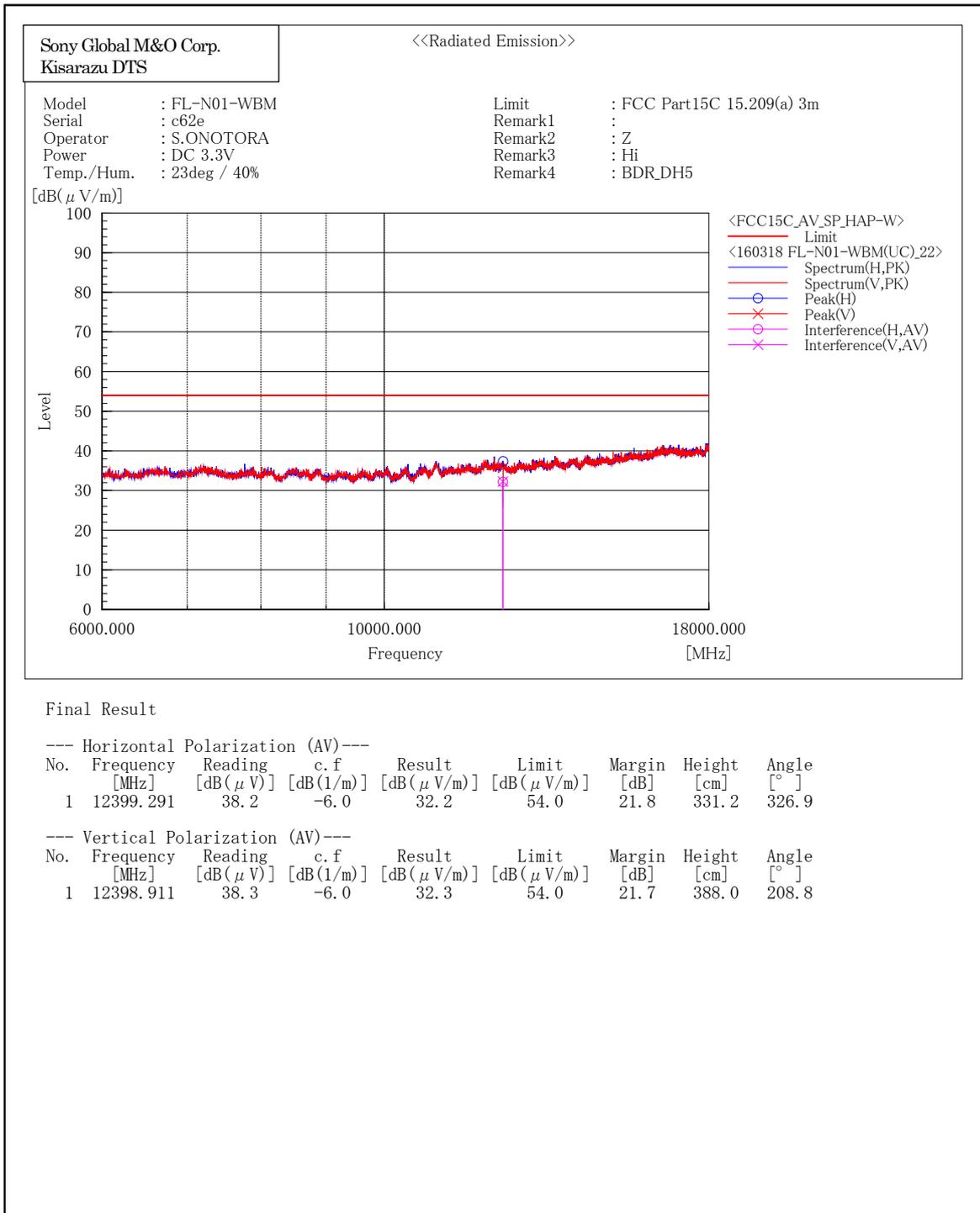
[BDR(DH5)/2402MHz]



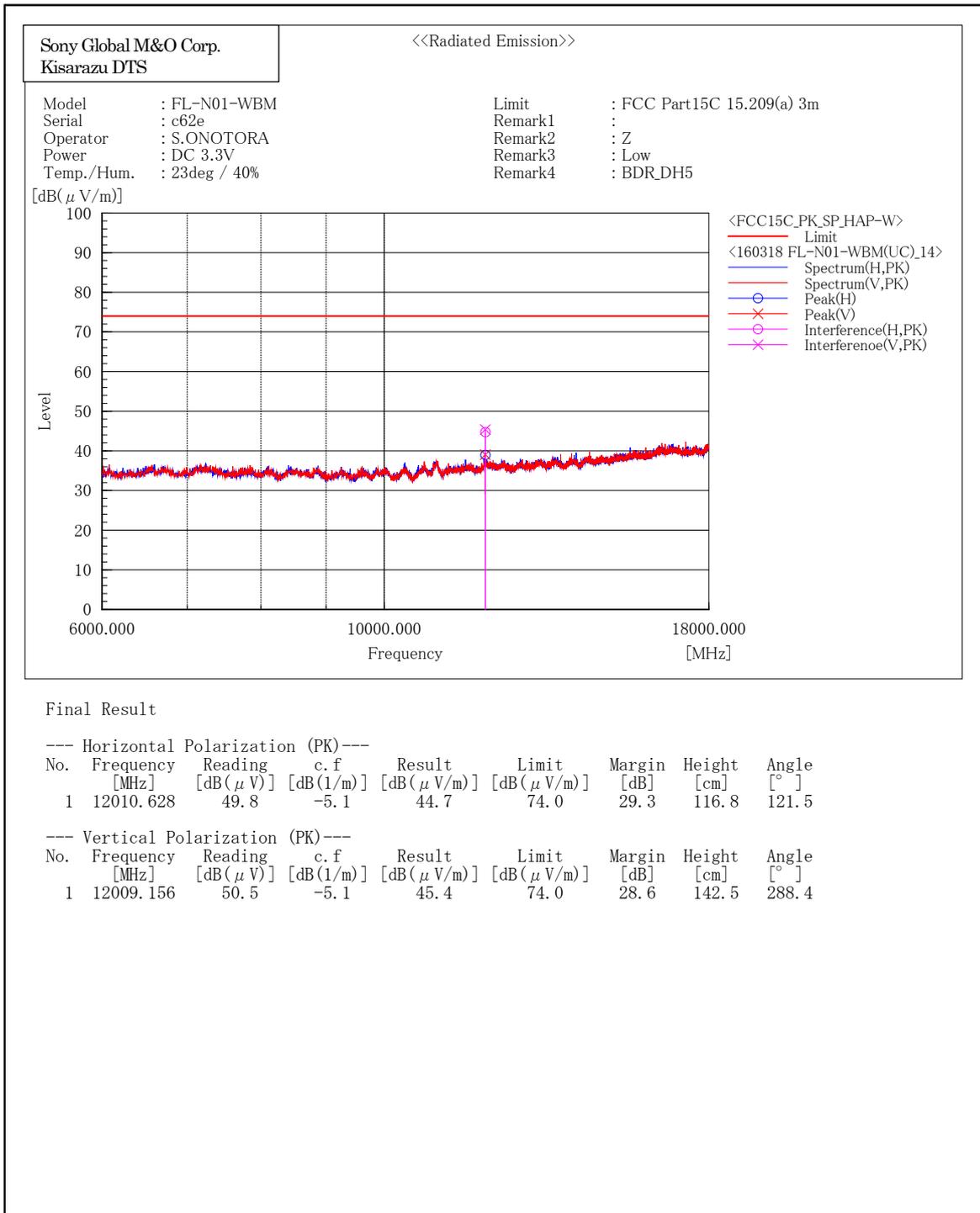
[BDR(DH5)/2441MHz]



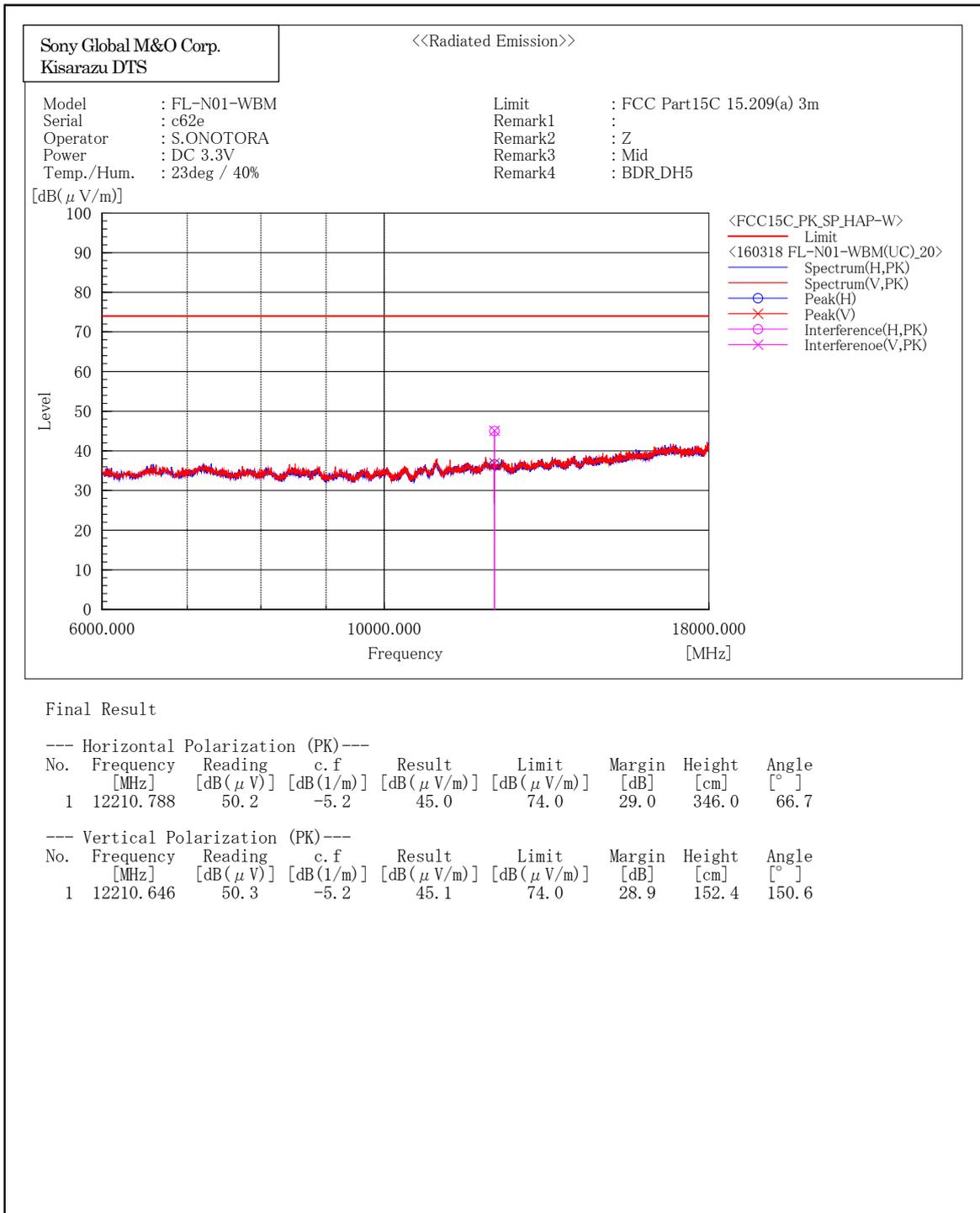
[BDR(DH5)/2480MHz]



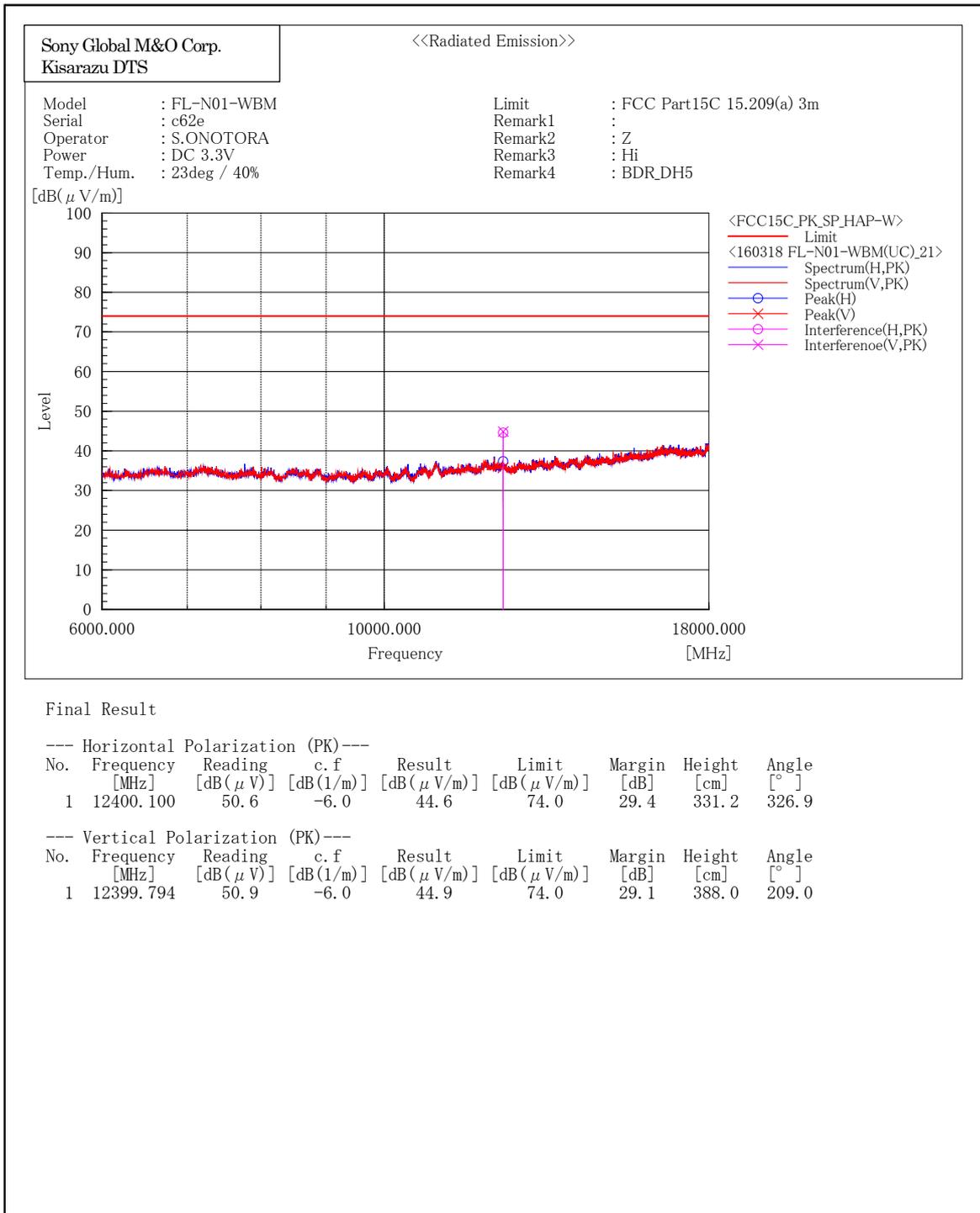
[BDR(DH5)/2402MHz]



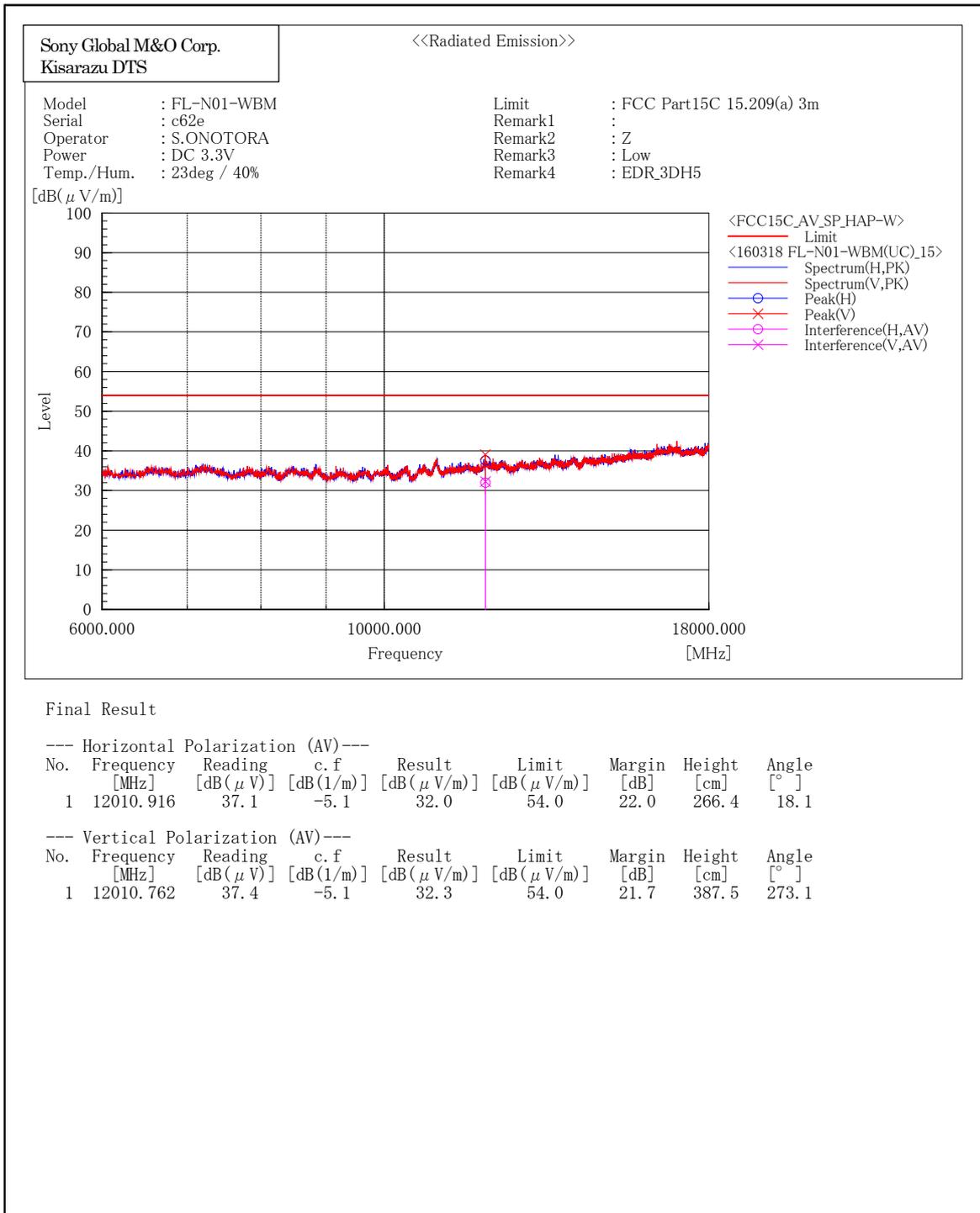
[BDR(DH5)/2441MHz]



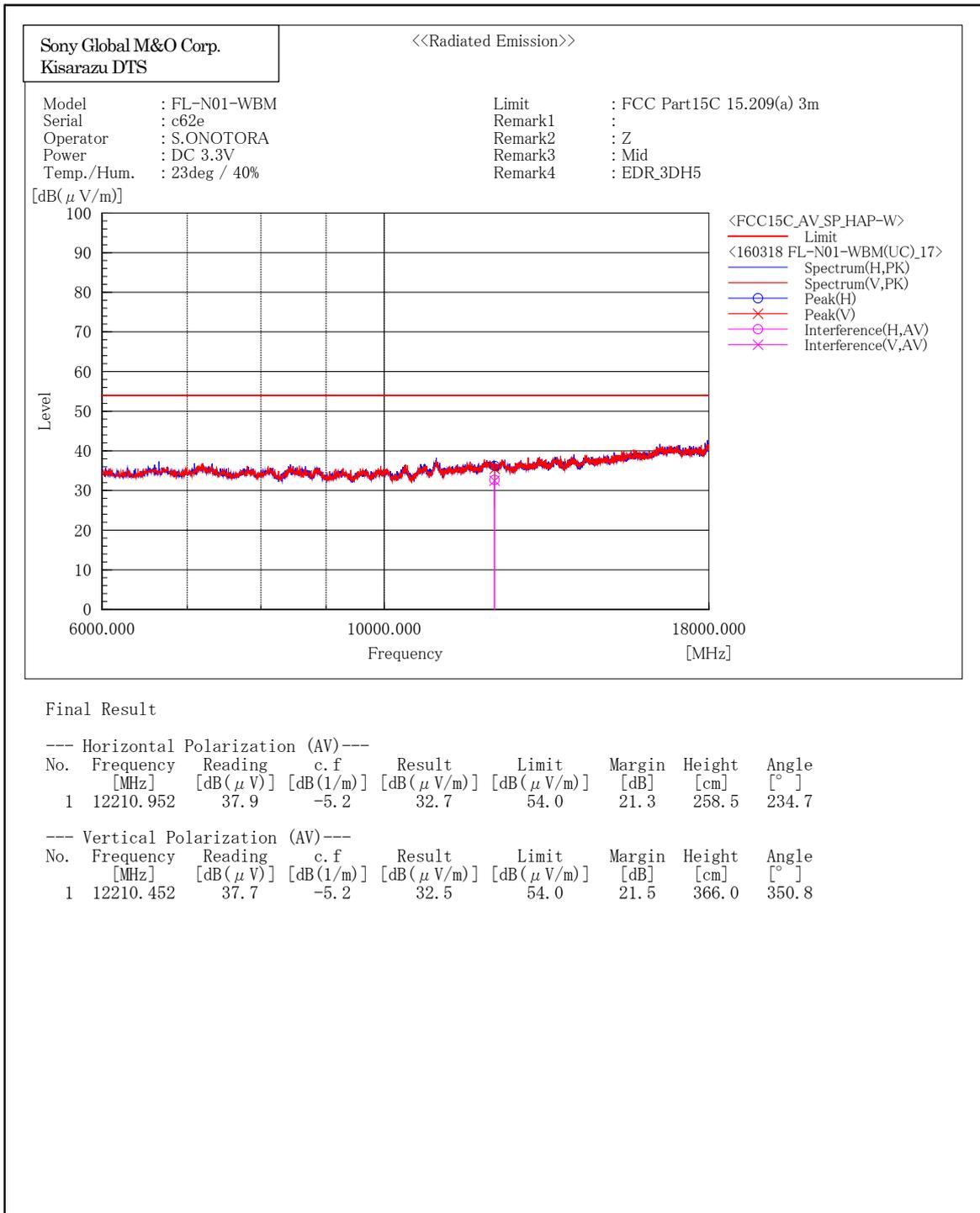
[BDR(DH5)/2480MHz]



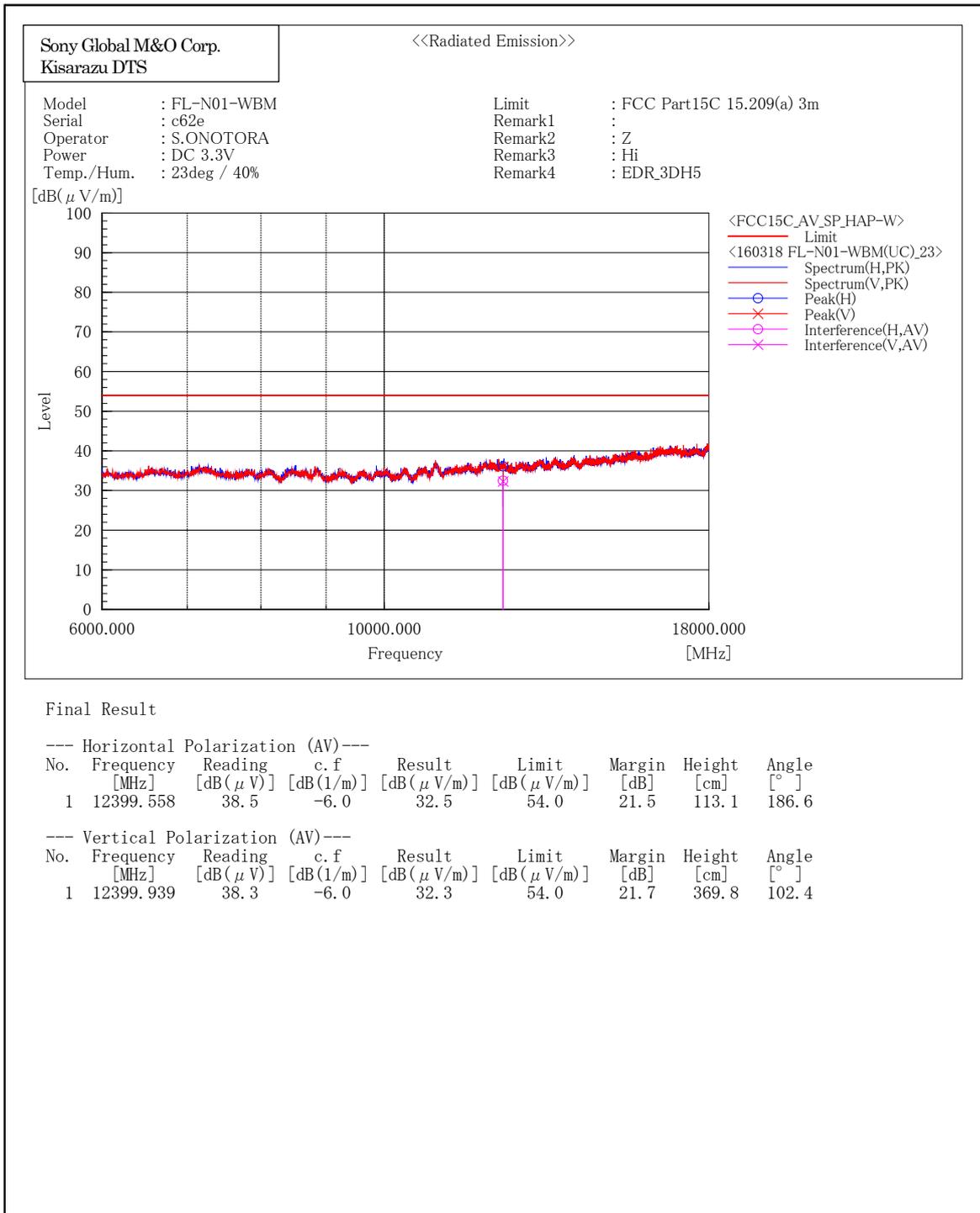
[EDR(3DH5)/2402MHz]



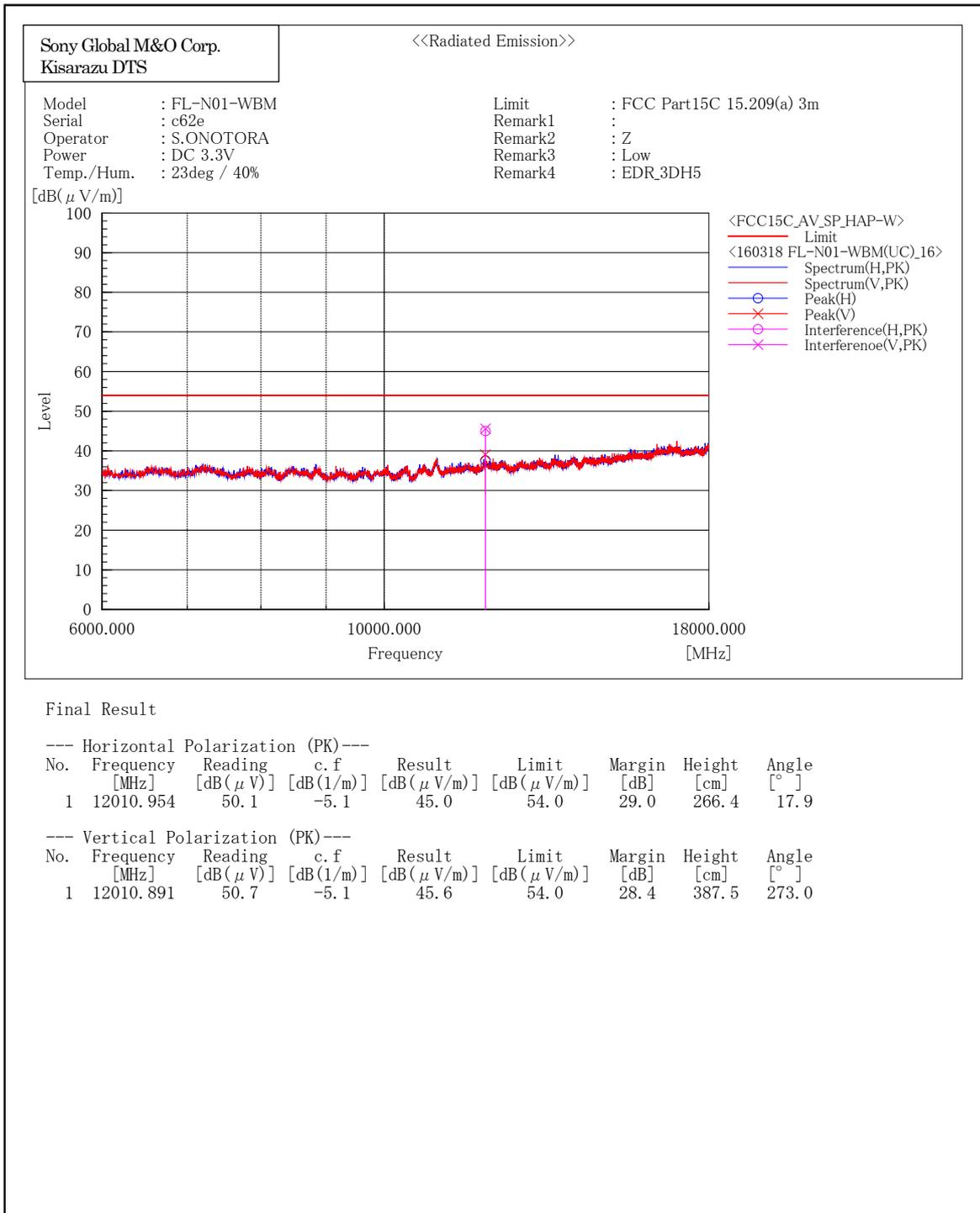
[EDR(3DH5)/2441MHz]



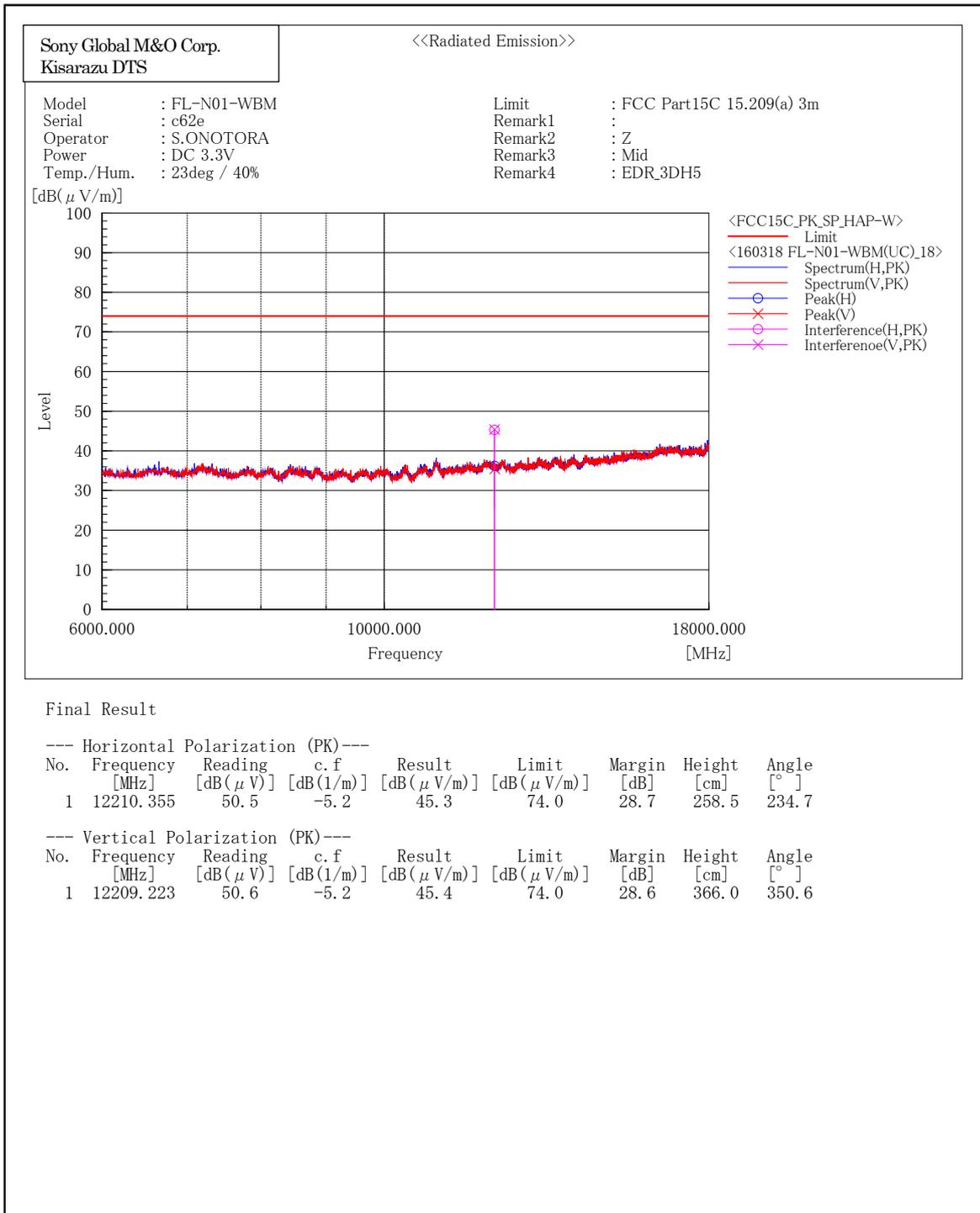
[EDR(3DH5)/2480MHz]



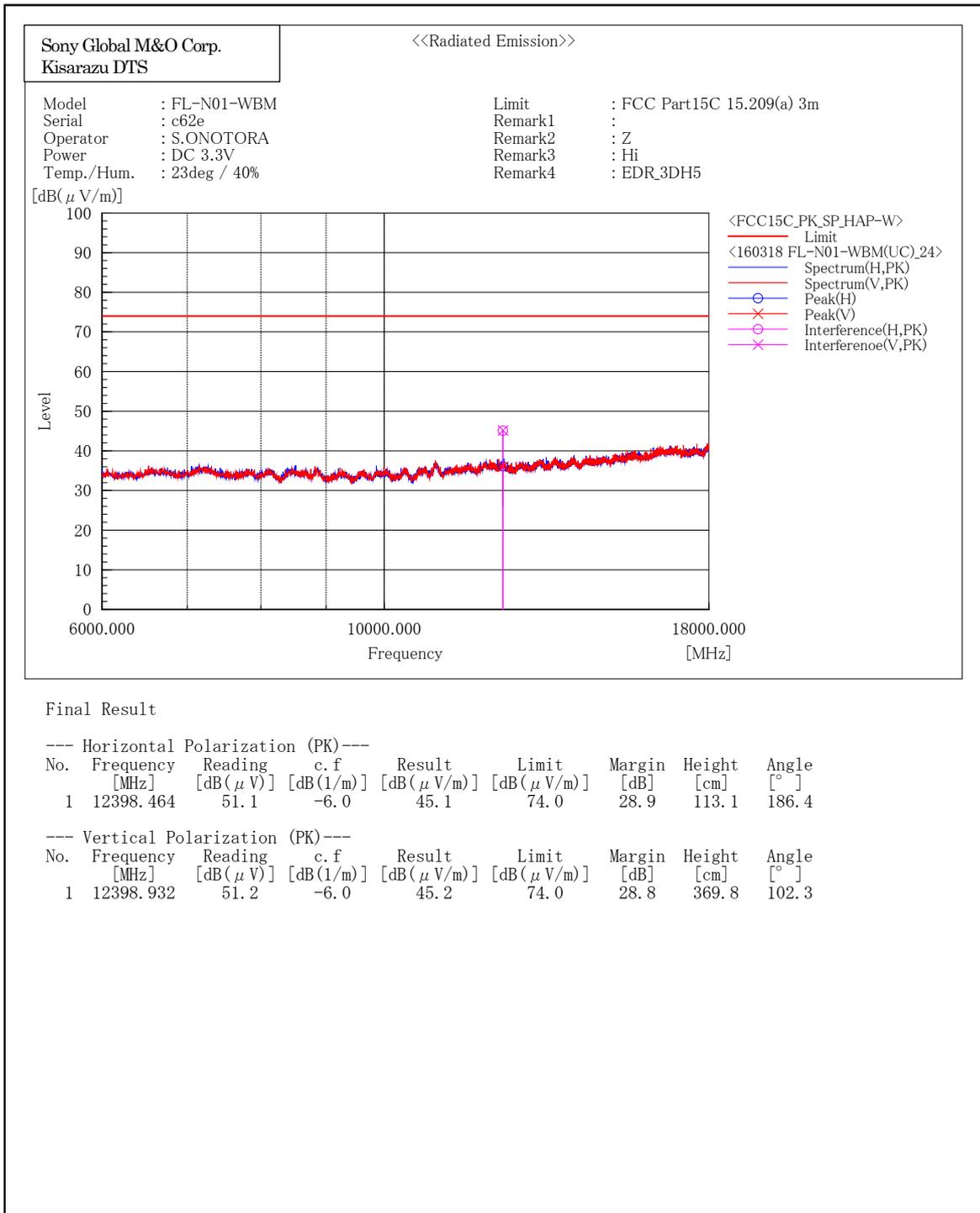
[EDR(3DH5)/2402MHz]



[EDR(3DH5)/2441MHz]

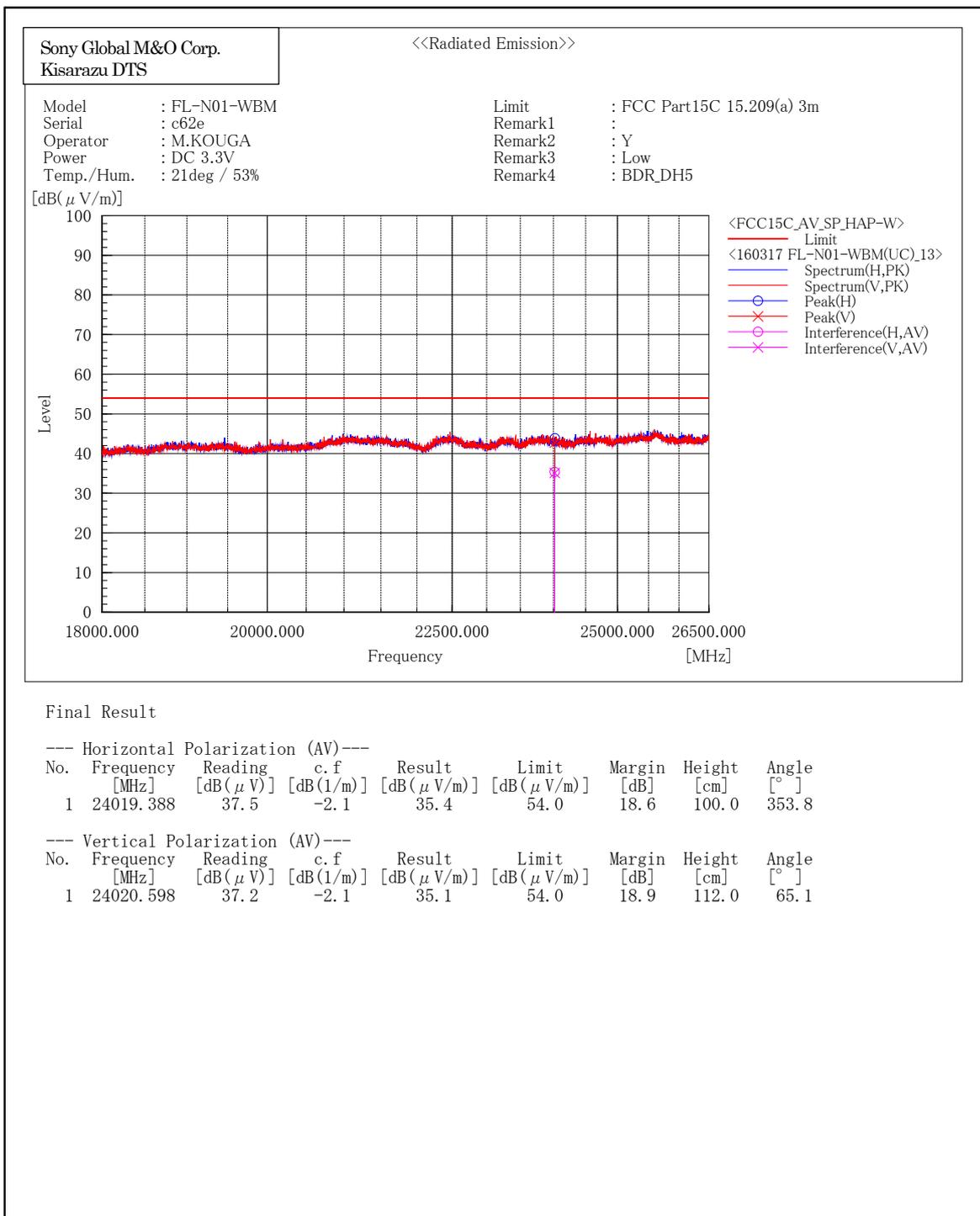


[EDR(3DH5)/2480MHz]

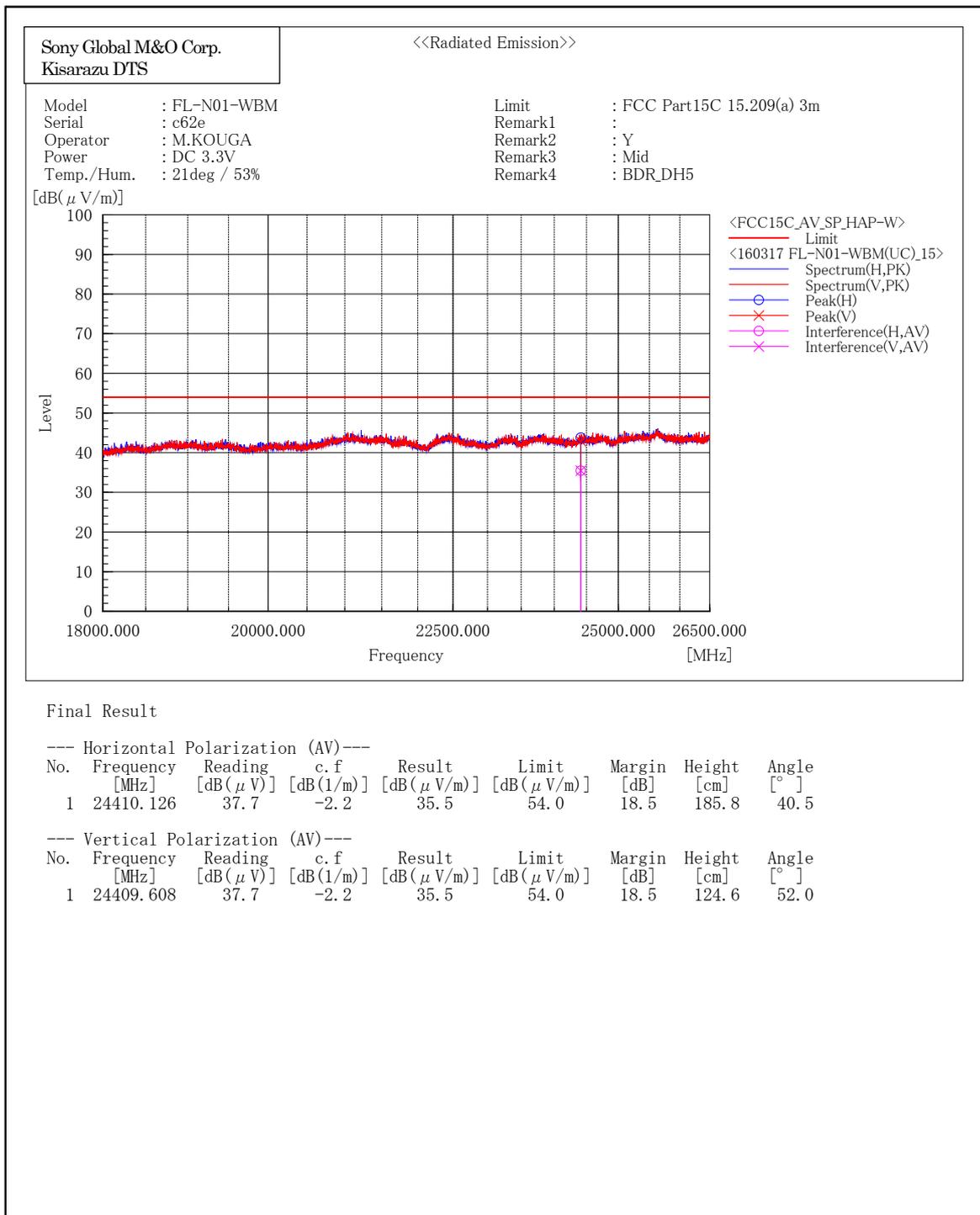


18 GHz – 24.835 GHz

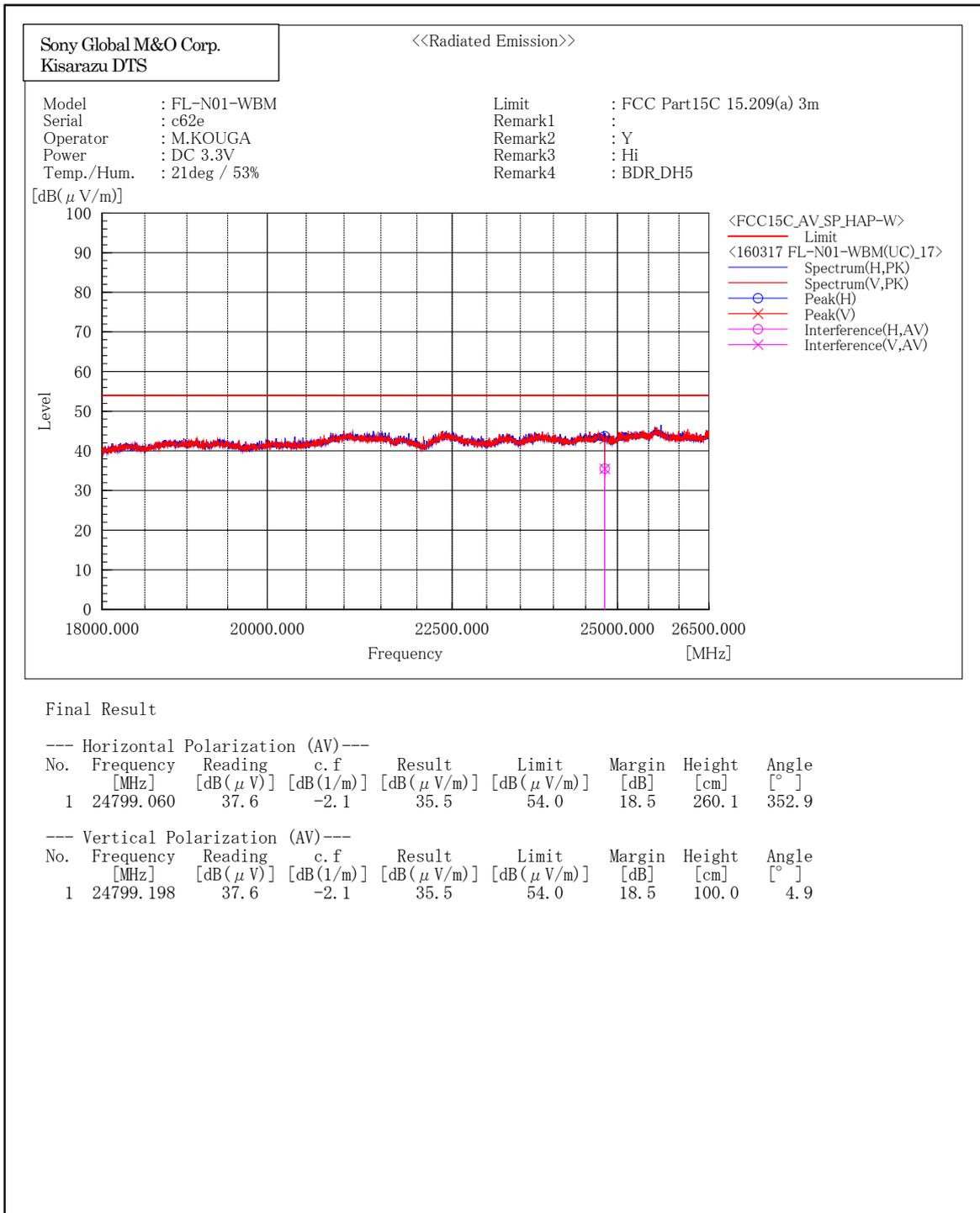
[BDR(DH5)/2402MHz]



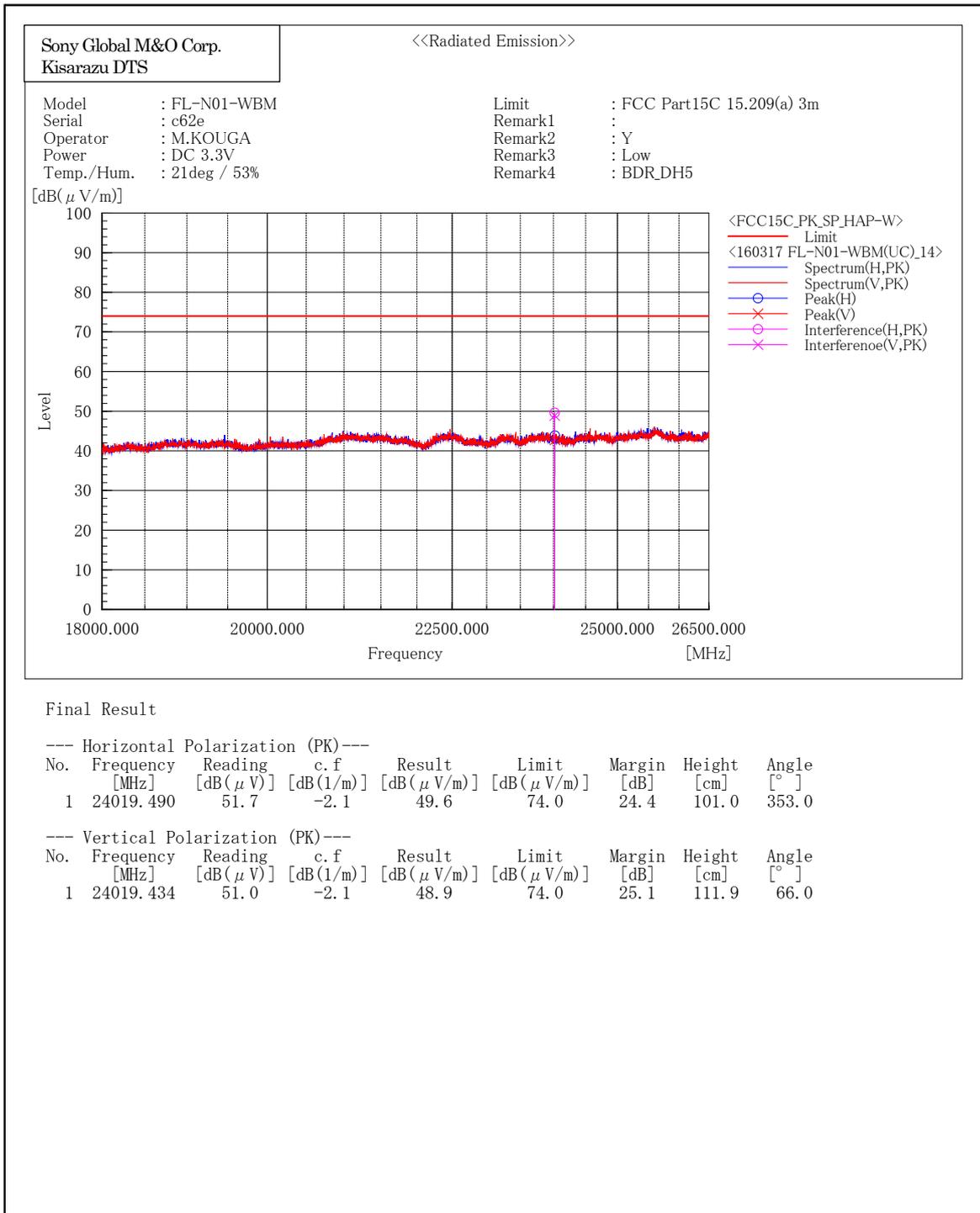
[BDR(DH5)/2441MHz]



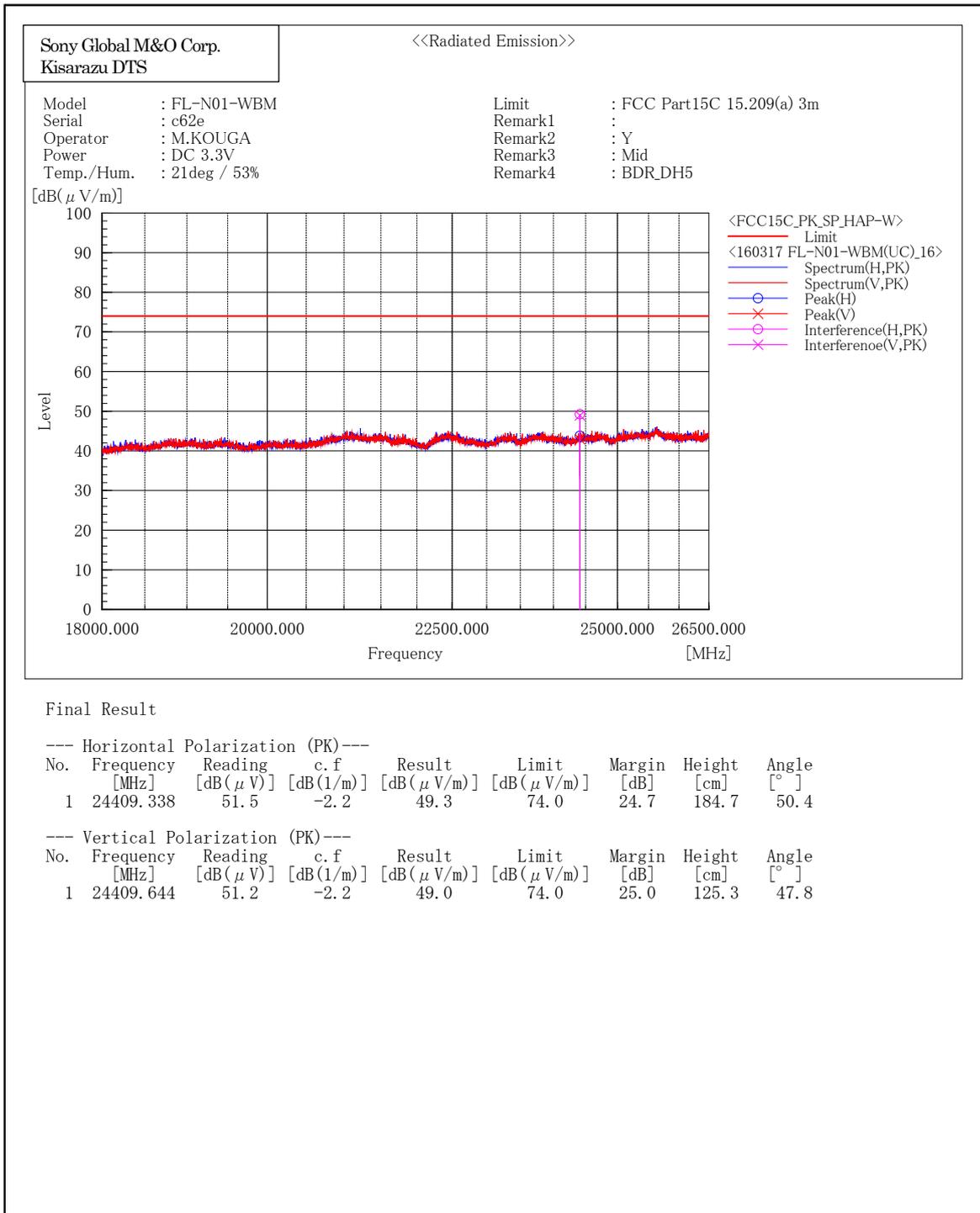
[BDR(DH5)/2480MHz]



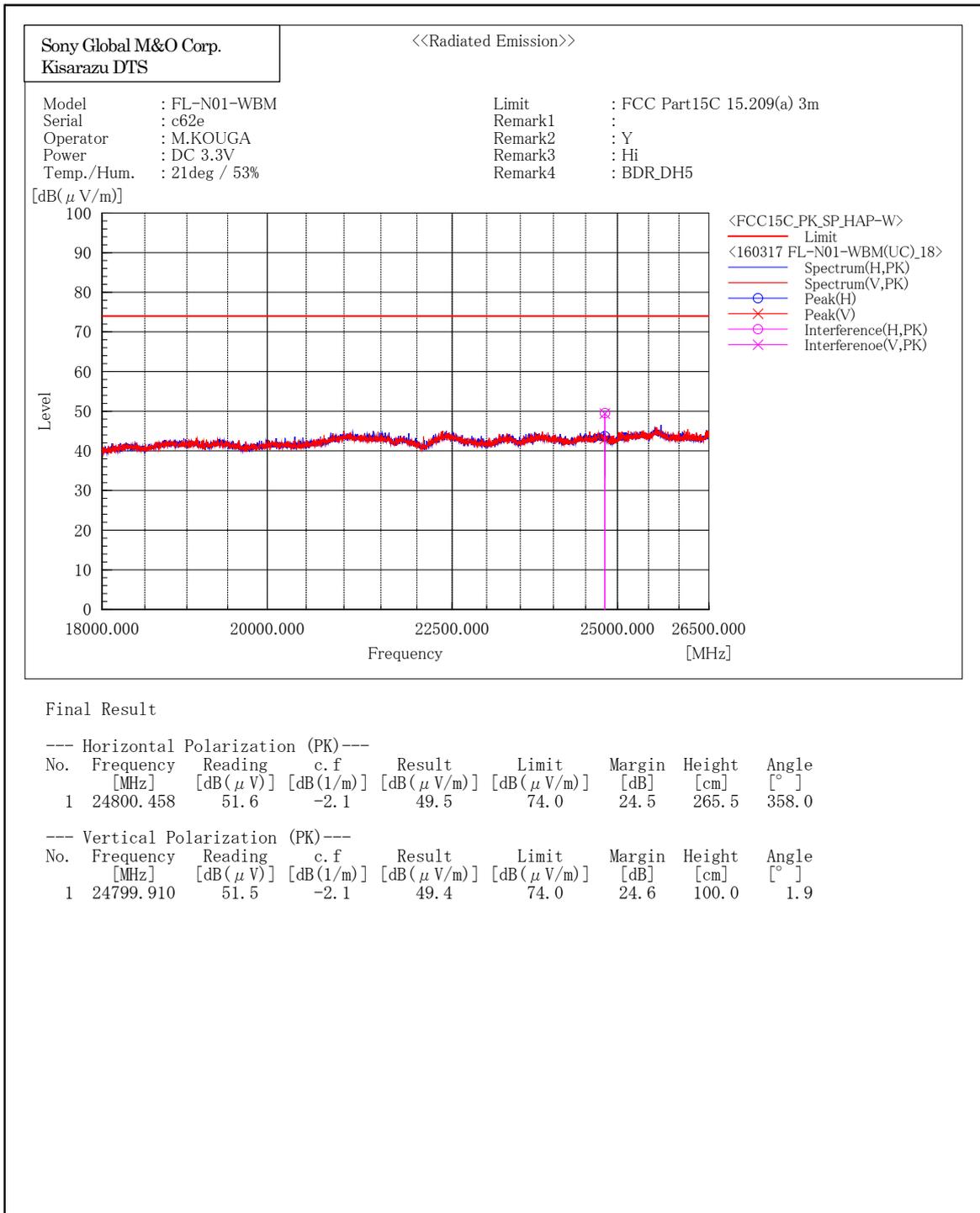
[BDR(DH5)/2402MHz]



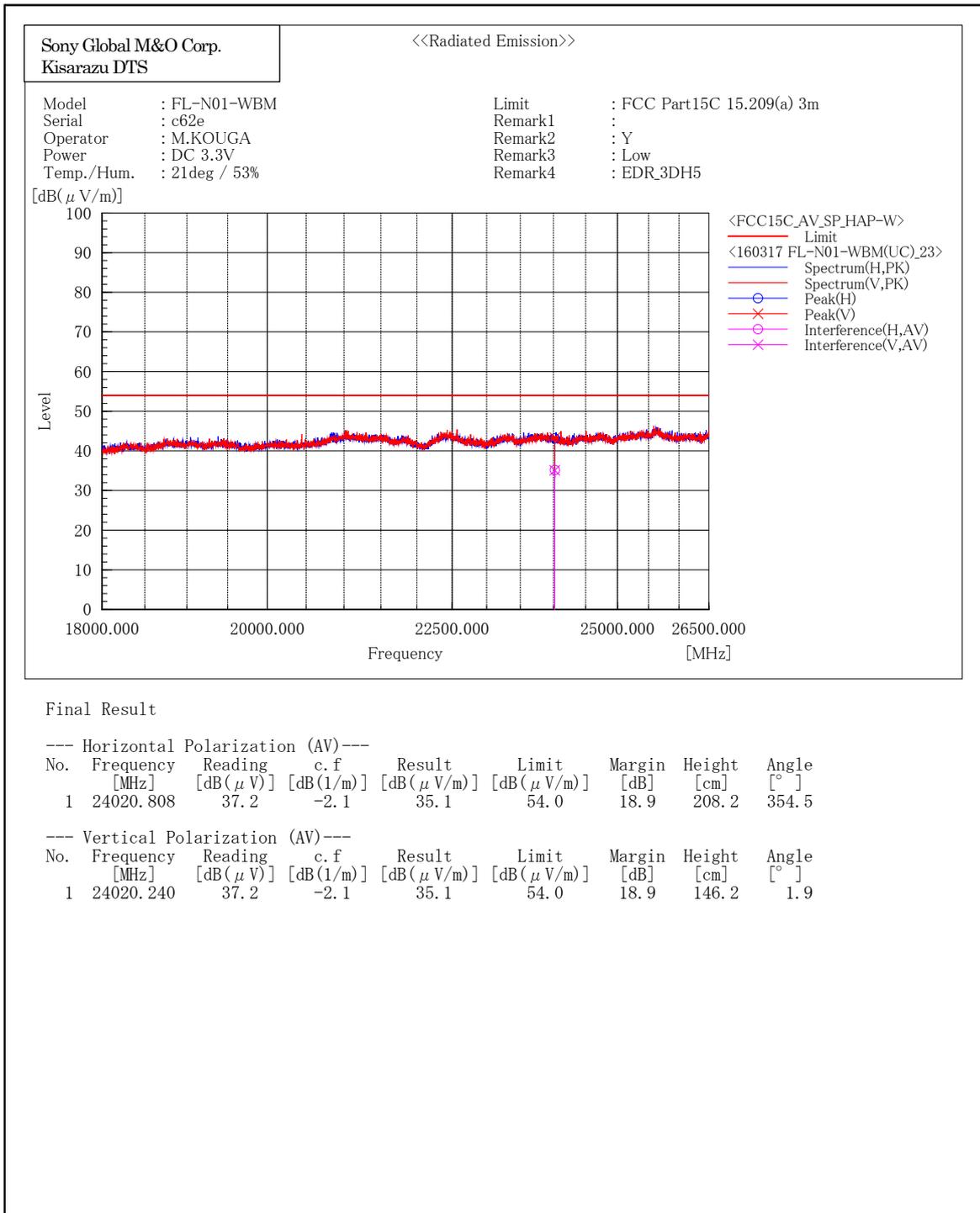
[BDR(DH5)/2441MHz]



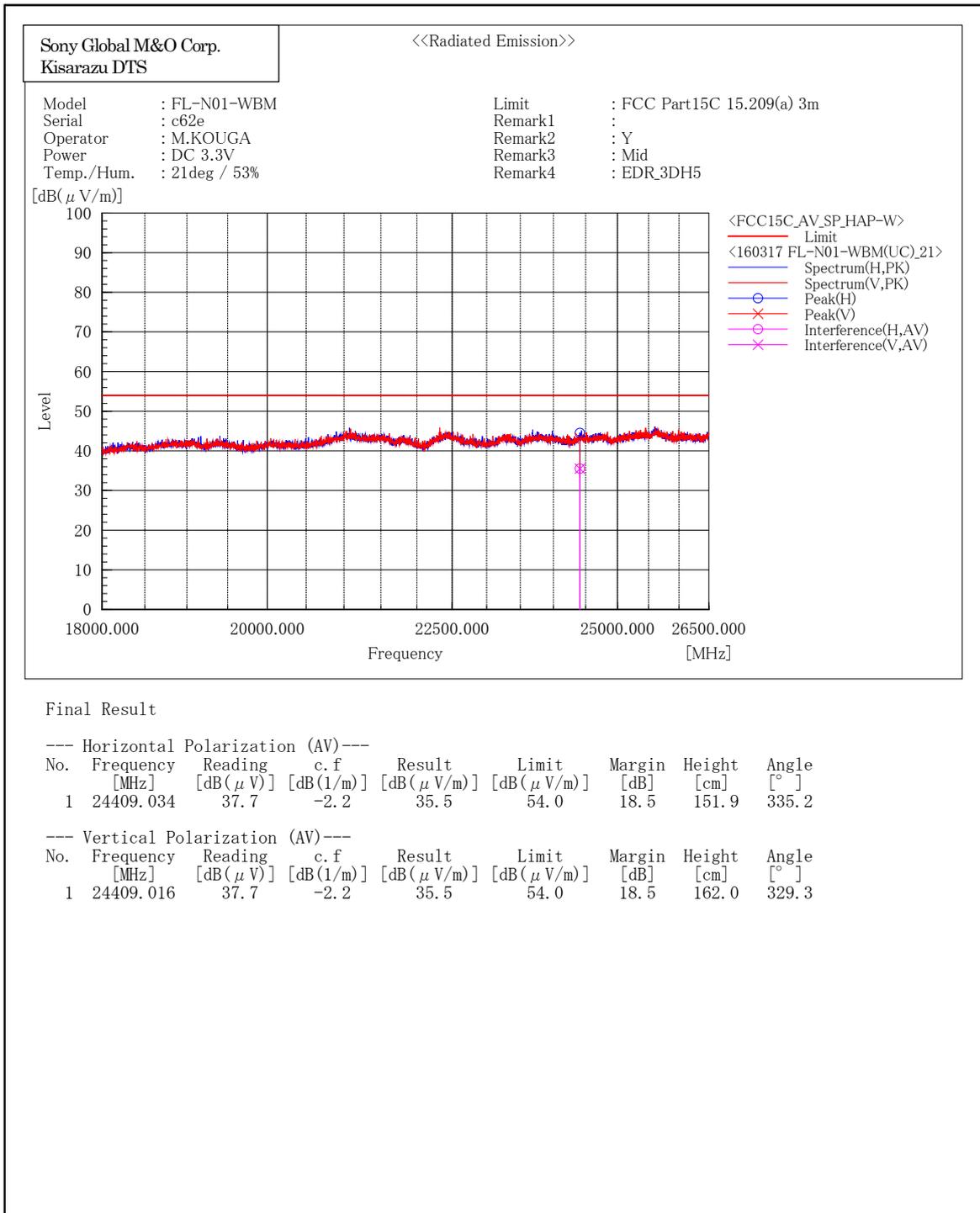
[BDR(DH5)/2480MHz]



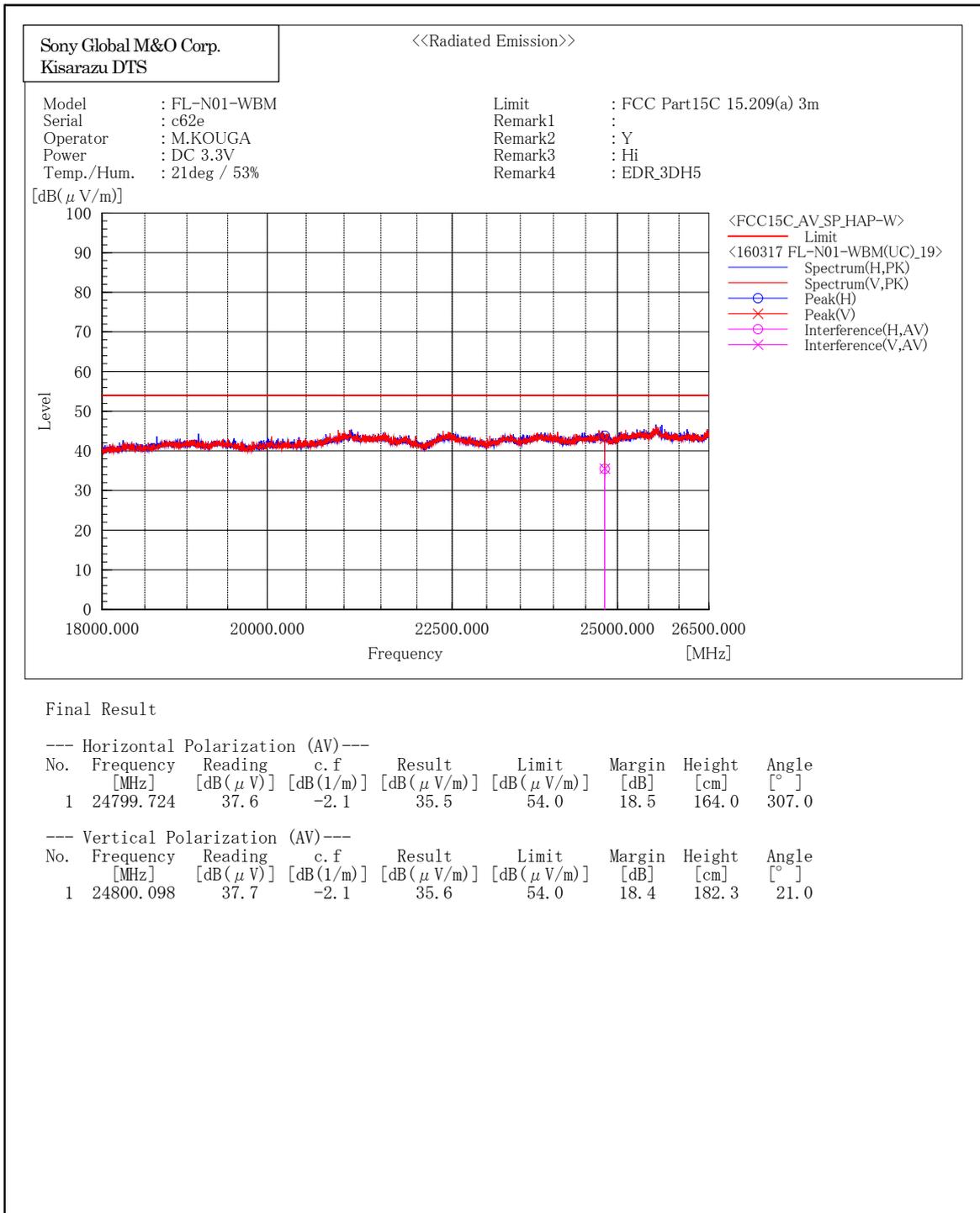
[EDR(3DH5)/2402MHz]



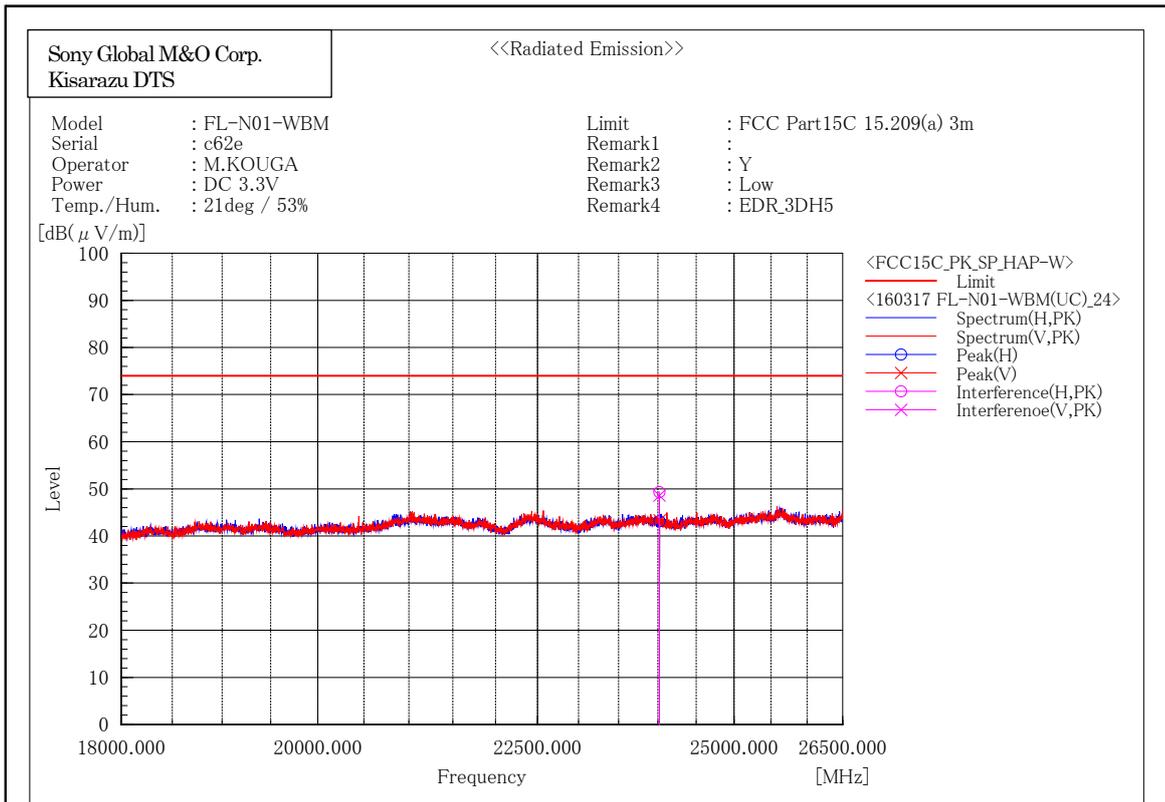
[EDR(3DH5)/2441MHz]



[EDR(3DH5)/2480MHz]



[EDR(3DH5)/2402MHz]



Final Result

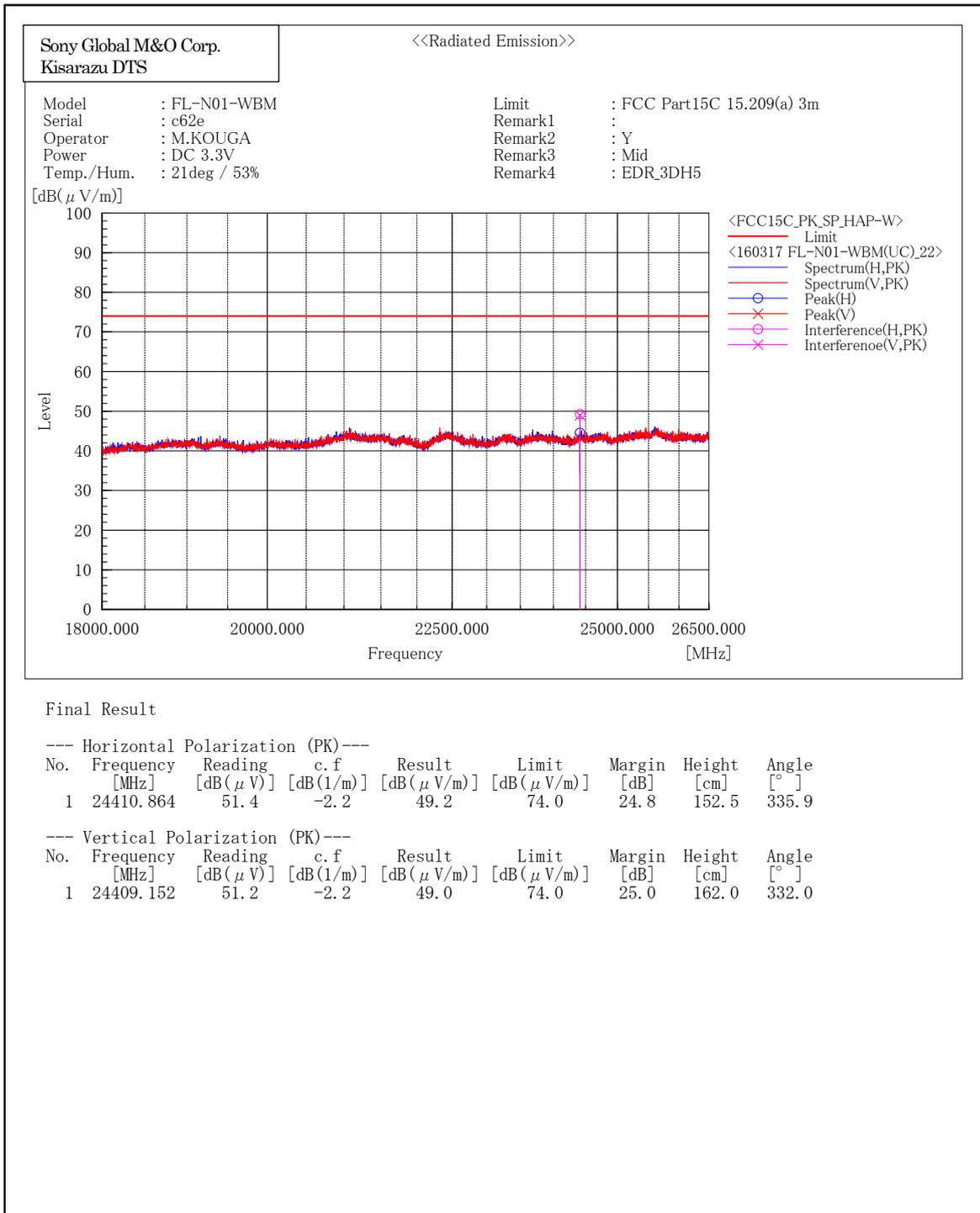
--- Horizontal Polarization (PK)---

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	24020.134	51.4	-2.1	49.3	74.0	24.7	195.6	355.0

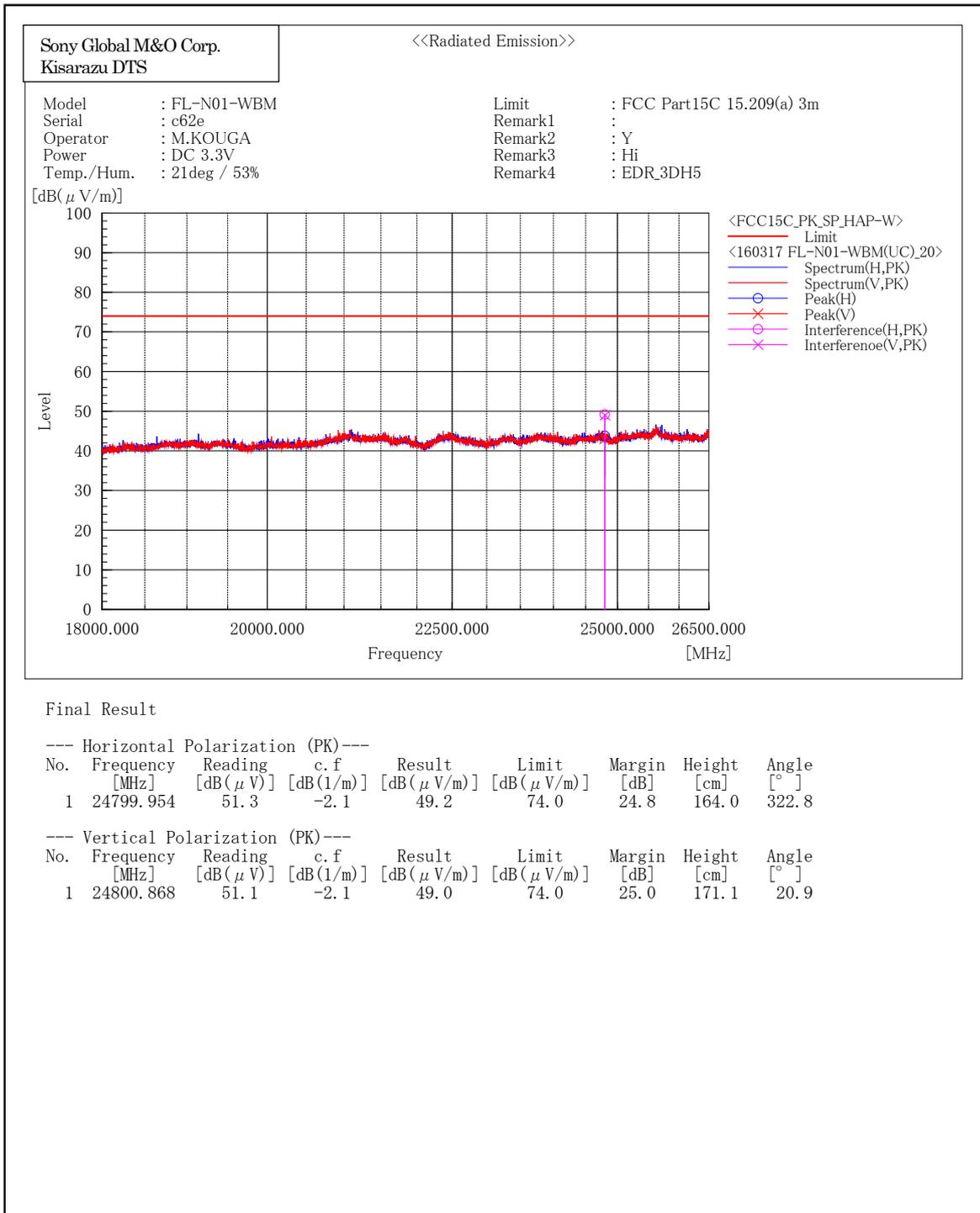
--- Vertical Polarization (PK)---

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	24019.766	50.7	-2.1	48.6	74.0	25.4	146.2	11.2

[EDR(3DH5)/2441MHz]



[EDR(3DH5)/2480MHz]

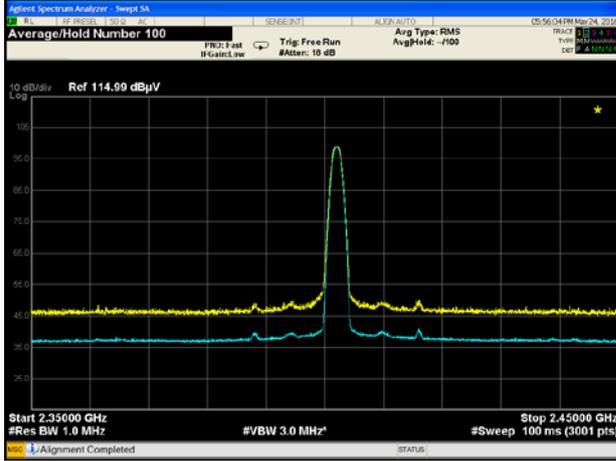


2.4GHz Restricted-Band Edge (Plot data)

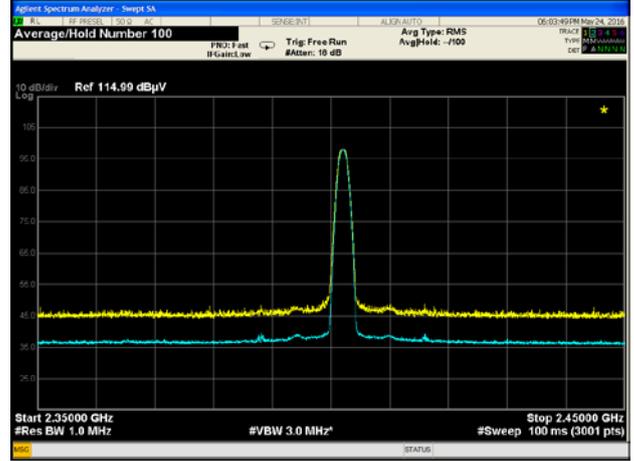
These plot data show peak (trace yellow) and average (trace blue) spectrum for worst case emissions in the restricted-band edges. (Restricted band edges: below 2390MHz and above 2483.5MHz)
The result of the final radiated emissions measurement refers in previous pages.

[BDR (DH5) / 2402MHz / X axis]

Horizontal

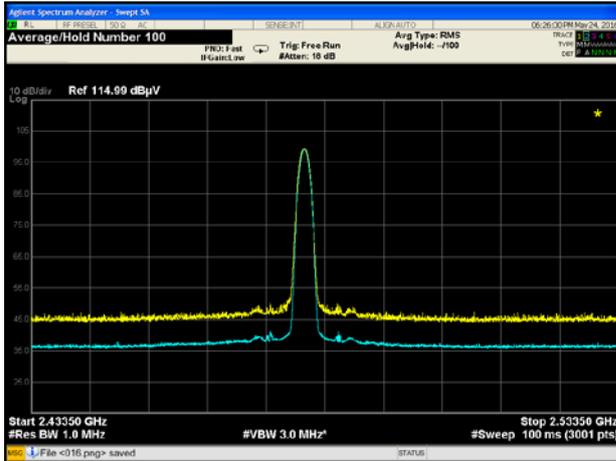


Vertical

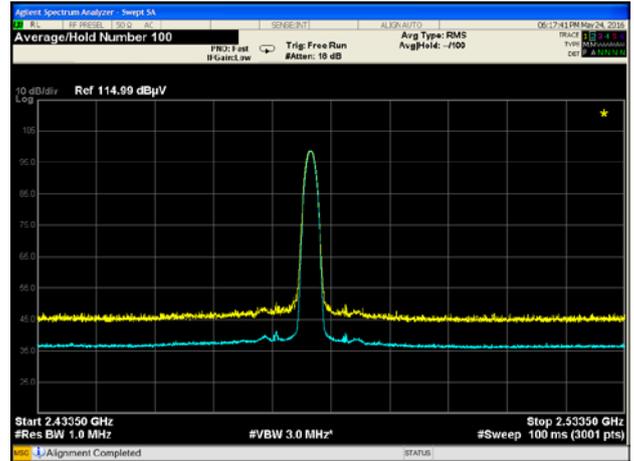


[BDR (DH5) / 2480MHz / X axis]

Horizontal

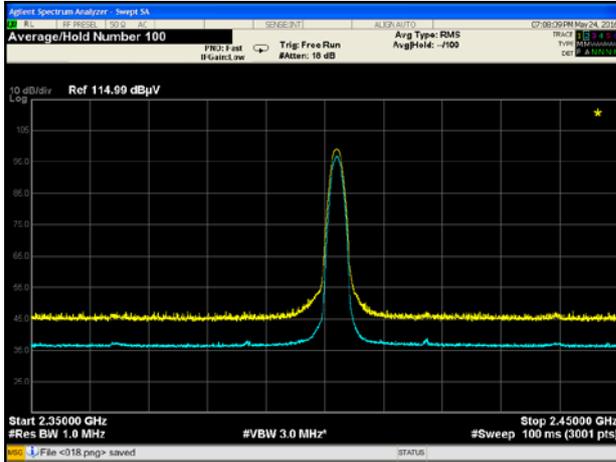


Vertical

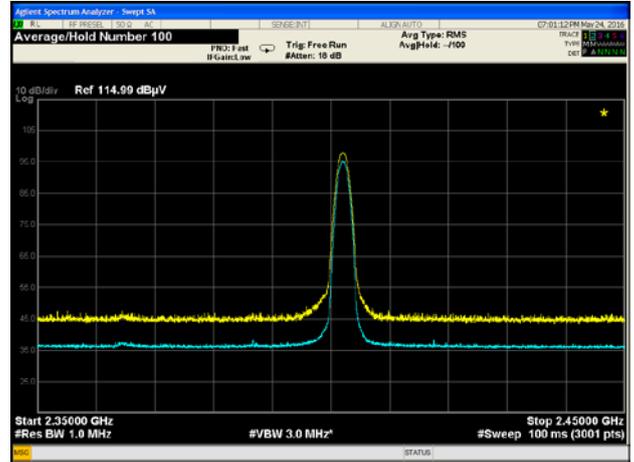


[EDR (3DH5) / 2402MHz]

Horizontal

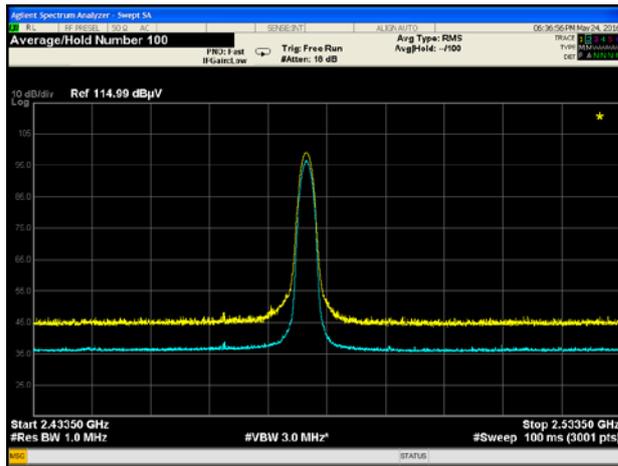


Vertical

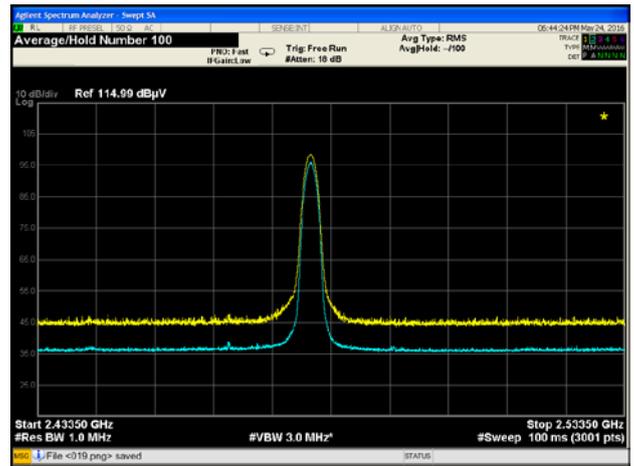


[EDR (3DH5) / 2480MHz]

Horizontal



Vertical

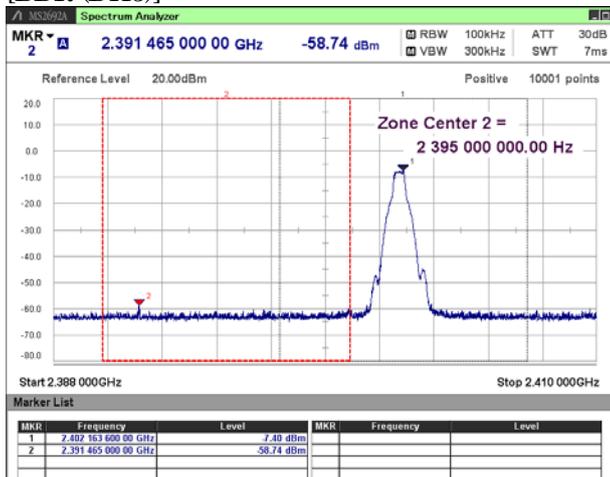


3.8. Conducted Spurious Emissions for Band Edge

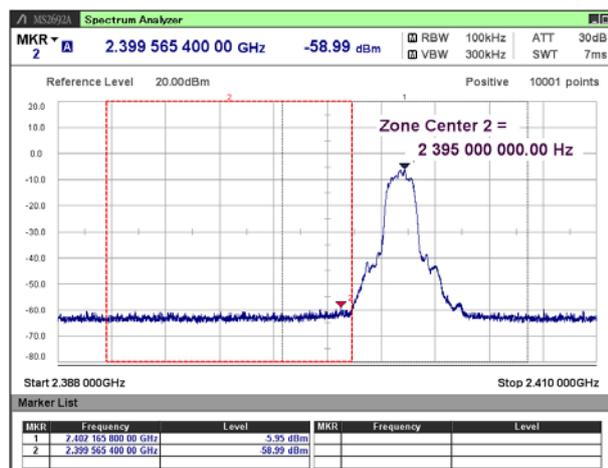
- 1) Ambient temperature : 23.9 deg.C
- 2) Relative humidity : 45.1 %
- 3) Date of measurement : 26 February 2016
- 4) Measured by : S.ONOTORA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Frequency [MHz]	Reading (PK) [dBm]	C.F. [dB]	Result (PK) [dBm]	Limit [dBm]	Margin [dB]
BDR	DH5	2402	2391.47	-58.74	11.00	-47.74	-16.4	31.34
			2402.16	-7.40	11.00	3.60	-	-
EDR	3DH5	2402	2399.57	-58.99	11.00	-47.99	-15.0	33.04
			2402.17	-5.95	11.00	5.05	-	-

[BDR (DH5)]



[EDR (3DH5)]



4. Method of Calculation

4.1. AC Power-line Conducted Emissions Measurement

Method of calculation : Software
 The Software for Calculation Name : EP5/ CE
 Version : Ver5.0.0

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

Note :

- (a) Meter Reading : Reading of the EMI test receiver or spectrum analyzer
- (b) C.F. : System Loss + Correction Factor of LISN

4.2. Time of Occupancy (Dwell Time) Measurement

Method of calculation : Software
 The Software for Calculation Name : SW-308
 Version : Ver2.3

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

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.

4.3. Maximum Peak Conducted Output Power Measurement

Method of calculation : Software
 The Software for Calculation Name : SW-308
 Version : Ver2.3

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

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

Notes :

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

4.4. Radiated Spurious Emission Measurement

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

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)

4.5. Conducted Spurious Emission for Band Edge Measurement

Method of calculation : Software
The Software for Calculation Name : SW-308
Version : Ver2.3

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. AC Power-line Conducted Emissions

4th Site Shielded Room

Control No.	Description	Model No.	Serial No.	Manufacture	Cal Int.	Last Cal.
<input checked="" type="checkbox"/>	-	Shield Room	-	TDK	-	-
<input checked="" type="checkbox"/>	M515	EMI Receiver	ESCI	100606	Rohde & Schwarz	12 15.07.07
<input type="checkbox"/>	M109	EMI Receiver	ESI7	100051	Rohde & Schwarz	12 16.03.15
<input type="checkbox"/>	M514	LISN	ENV216	100424	Rohde & Schwarz	12 15.04.07
<input type="checkbox"/>	M505	LISN	ENV216	100425	Rohde & Schwarz	12 15.05.02
<input type="checkbox"/>	M116	LISN	KNW-242	8-888-6	Kyoritsu	12 15.05.02
<input checked="" type="checkbox"/>	CS043	4th Site CE Cable SYSTEM	-	EMC/RF Test Lab.	12	15.10.28
<input checked="" type="checkbox"/>	M664	6dB Attenuator	6806.01.A	-	HUBER+SUHNER	12 15.10.28
<input checked="" type="checkbox"/>	M619	HIGH FREQUENCY FUSE	MP612A	-	Anritsu	12 15.10.28
<input type="checkbox"/>	M153	50 ohm Terminator	CT-01	-	TME	12 15.08.04
<input type="checkbox"/>	M159	50 ohm Terminator	T1302	-	Stack	12 15.08.04
<input checked="" type="checkbox"/>	M690	Thermo Meter	AD-5640A	201304	AND	12 15.11.15
<input checked="" type="checkbox"/>	M832	LISN	ENV216	100281	Rohde & Schwarz	12 15.12.01

5.2. Antenna-port Conducted Measurements

4th Site Shielded Room 1

Control No.	Description	Model No.	Serial No.	Manufacture	Cal Int.	Last Cal.
<input checked="" type="checkbox"/>	-	Shield Room	B83117-B2432-T161	P26428	Albatross Projects	-
<input checked="" type="checkbox"/>	W100	Signal Analyzer	MS2692A	6201338954	Anritsu	12 15.03.30
<input type="checkbox"/>	W006	Power meter	N1911A	MY50000295	Keysight Technologies	12 15.09.02
<input type="checkbox"/>	W007	Power Sensor	N1922A	MY50180022	Keysight Technologies	12 15.09.09
<input type="checkbox"/>	W104	Power Sensor	U2021XA	MY54040006	Keysight Technologies	12 15.12.14
<input type="checkbox"/>	W105	Power Sensor	U2021XA	MY54080005	Keysight Technologies	12 15.12.14
<input checked="" type="checkbox"/>	W029	10dB Attenuator	8493C	76549	Keysight Technologies	12 15.09.24
<input type="checkbox"/>	W110	10dB Attenuator	6610-SK-50-1	2	HUBER + SUHNER	12 15.06.08
<input type="checkbox"/>	WC02	RF Cable	SUCOFLEX102	34124/2	HUBER + SUHNER	12 15.10.16
<input type="checkbox"/>	WC03	RF Cable	SUCOFLEX102	34127/2	HUBER + SUHNER	12 15.10.08
<input checked="" type="checkbox"/>	WC05	RF Cable	SUCOFLEX102	34287/2	HUBER + SUHNER	12 15.10.16
<input type="checkbox"/>	WC06	RF Cable	SUCOFLEX102	34289/2	HUBER + SUHNER	12 15.10.08
<input checked="" type="checkbox"/>	M719	Thermo Meter	TH-321	140053	ASONE	12 15.06.10
<input type="checkbox"/>	M720	Thermo Meter	TH-321	140044	ASONE	12 15.05.15

5.3. Radiated Spurious Emissions

4th Site 10m Semi-Anechoic Chamber

Control No.	Description	Model No.	Serial No.	Manufacture	Cal Int.	Last Cal.	
<input checked="" type="checkbox"/>	M506	Semi-Anechoic Chamber	-	-	TDK	12	15.08.03
<input checked="" type="checkbox"/>	M575	EMI Receiver	ESCI	100161	Rohde & Schwarz	12	15.11.09
<input checked="" type="checkbox"/>	M669	EMI Receiver	N9038A	MY51210223	Keysight Technologies	12	15.05.19
<input checked="" type="checkbox"/>	A073	Loop Antenna	HFH2-Z2	100171	Rohde & Schwarz	12	15.10.12
<input checked="" type="checkbox"/>	A043	Biconical Antenna	BBA9106	V5(91032598)	Schwarzbeck	12	15.08.04
<input checked="" type="checkbox"/>	A046	Logperiodic Antenna	UHALP9108A1	0830	Schwarzbeck	12	15.08.06
<input checked="" type="checkbox"/>	A056	Horn Antenna	BBHA9120D	670	Schwarzbeck	12	16.01.27
<input checked="" type="checkbox"/>	A057	Horn Antenna	HAP06-18W	00000037	Toyo Corporation	12	15.08.04
<input checked="" type="checkbox"/>	A058	Horn Antenna	HAP18-26W	00000016	Toyo Corporation	12	16.01.26
<input checked="" type="checkbox"/>	CS039	RefSite RE Cable SYS3	-	-	EMC/RF Test Lab.	12	15.10.28
<input checked="" type="checkbox"/>	CS054	RefSite EMF Cable SYS	-	-	EMC/RF Test Lab.	12	15.10.28
<input checked="" type="checkbox"/>	CS064	RefSite RE Cable SYS8	-	-	EMC/RF Test Lab.	12	15.10.28
<input checked="" type="checkbox"/>	CS065	RefSite RE Cable SYS9	-	-	EMC/RF Test Lab.	12	15.10.28
<input checked="" type="checkbox"/>	M510	RF-Selector	NS4900	0802-226	Toyo Corporation	12	15.10.28
<input checked="" type="checkbox"/>	M706	3dB Attenuator	8491A	MY39267782	Keysight Technologies	12	15.10.28
<input checked="" type="checkbox"/>	M620	RF Pre-Amp	8447D	2944A10720	Keysight Technologies	12	15.10.28
<input checked="" type="checkbox"/>	M831	GHz Filter Box	FB-G1	002	Sony Global M&O	12	15.10.28
<input checked="" type="checkbox"/>	M689	Thermo Meter	AD-5640A	201303	AND	12	15.11.05
<input type="checkbox"/>	M485	EMI Receiver	ESCI	100626	Rohde & Schwarz	12	15.04.16
<input type="checkbox"/>	M798	Thermo Meter	AD-5640B	201501	AND	12	15.10.15
<input type="checkbox"/>							

About calibration interval

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