

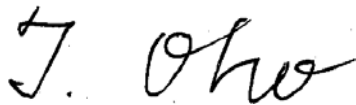
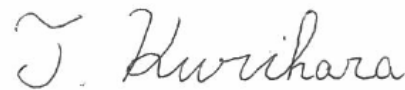
# RADIO TEST REPORT

(for Bluetooth classic)

Project No. : JB-Z0397  
 Client : Sony Corporation  
 Address : 1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan  
 Type of Equipment : Digital Music Player  
 Model No. : NW-A55  
 FCC ID : AK8NWA50  
 Regulation Applied : 47 CFR Part 15 Subpart C  
**Final Judgment** : **Passed**  
 Sample Receipt : April 3, 2018  
 Testing : April 12, 2018 - April 23, 2018  
 Reported : April 24, 2018

Reported by :

Approved Signatory :

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 EMC/RF Test Laboratory, Main Lab.  
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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.

The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in Sony Global Manufacturing & Operations Corporation EMC/RF Test Laboratory.



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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 : Digital Music Player  
 Trade Name : SONY  
 Model No. : NW-A55  
 Serial No. : 2, 4  
 Power Rating : DC 3.7V (The EUT was supplied with the power from built-in battery)

#### Similar model(s) to be covered by this report

Model No. :

Model No.	Point of Difference
NW-A55	Memory size only. (16 GB) *EUT
NW-A56	Memory size only. (32 GB)
NW-A57	Memory size only. (64 GB)

These points of difference do not affect the measurement results.  
 Total 3 models are covered by this report.

#### Radio specification

Function of the Equipment : Transceiver  
 Operating Frequency : 2402 - 2480MHz  
 Modulation Type : FHSS (GFSK,  $\pi/4$ DQPSK, 8DPSK)  
 Channel Spacing : 1MHz  
 Channel Bandwidth : 1MHz  
 Number of channels : 79  
 Antenna Type : Inverted-F antenna  
 Antenna connector Type : None  
 Antenna Gain : 1.0 dBi  
 Operating Temperature : +5 to +35 deg.C

## 1.2. Summary of Test Result

Test Item	Worst Margin	Test Frequency band	Results
AC Power-line Conducted Emissions	16.4 dB (QP) 0.194 MHz N	150 kHz - 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	22.13 dB	Carrier	Complied
Radiated Spurious Emissions	3.9 dB (AV) 7206.009 MHz Horizontal	9 kHz - 25 GHz (excluding carrier and band edge)	Complied
Conducted Spurious Emissions for Band Edge *1	38.08 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.

## 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 Section 15.207 / 15.247  
 Test Method : ANSI C63.10 - 2013  
 DA 00-705 (March 30, 2000)

Test Condition

AC Power-line Conducted Emissions

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

Radiated Spurious Emissions

Test Distance :  3 m  10m (9kHz - 30 MHz)  
 3 m  10m (30 - 1000 MHz)  
 3 m (1 - 25 GHz)

Dimensions of the EUT table : 0.8m (below 1GHz) or 1.5m (above 1GHz) height, 2m width and 1m 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 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 spectrum analyzer.

Test Item	Detector	RBW
<b>* Antenna-port Conducted Measurements</b>		
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	N/A
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	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

\*: 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	9 kHz (6 dB) *1	9 kHz (6 dB) *1	120 kHz (6 dB)	1 MHz (6 dB)
VBW	N/A	N/A	N/A	3 MHz (for peak) 10 Hz (for average)
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.

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 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

## AC Power-line Conducted Emissions

## Shielded Room

4th Site  EMC Site

## 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

- 20dB Bandwidth
- Carrier Frequency Separation
- Number of Hopping Frequencies
- Time of Occupancy (Dwell Time)
- Maximum Peak Conducted Output Power
- 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
Conducted Spurious Emissions	1 - 6 GHz	± 0.89 dB

Test Item	Frequency	Distance	4th Site
AC Power-line Conducted Emissions	150kHz - 30MHz	-	± 3.34 dB
Radiated Emissions	9 kHz - 30 MHz	3m	± 2.59 dB
	30 - 300 MHz	3m	± 4.18 dB
	300 - 1000 MHz	3m	± 4.04 dB
	1 - 7 GHz	3m	± 4.63 dB
	7 - 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

The tests have been carried out the following conditions.

Test Items	Operating Mode *1	Packet type *2,3	Test Channels
AC Power-line Conducted Emissions *4	BDR	DH5	2441MHz
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	2402MHz, 2441MHz, 2480MHz
	EDR	3DH5	
Conducted Spurious Emissions for Band Edge	BDR	DH5	2402MHz
	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 : Diagnosis

Version : 3.02.02

Special accessories needed for connecting the EUT to achieve compliance:

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

### 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	Digital Music Player	SONY	NW-A55	4

Support equipment for operation

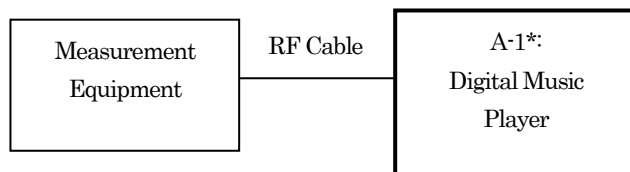
Symbol	Item	Manufacturer	Model No.	Serial No.
-	-	-	-	-

Type of cable

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

System configuration

\*: EUT



### Radiated Spurious Emissions Measurement

The equipment under test (EUT)

Symbol	Item	Manufacturer	Model No.	Serial No.
A-2	Digital Music Player	SONY	NW-A55	2

Support equipment for operation

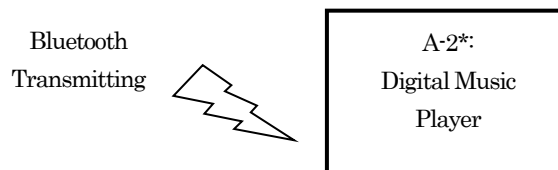
Symbol	Item	Manufacturer	Model No.	Serial No.
-	-	-	-	-

Type of cable

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

System configuration

\*: EUT



AC Power-line Conducted Emissions and Radiated Spurious Emissions Measurement

The equipment under test (EUT)

Symbol	Item	Manufacturer	Model No.	Serial No.
A-2	Digital Music Player	SONY	NW-A55	2

Support equipment for operation

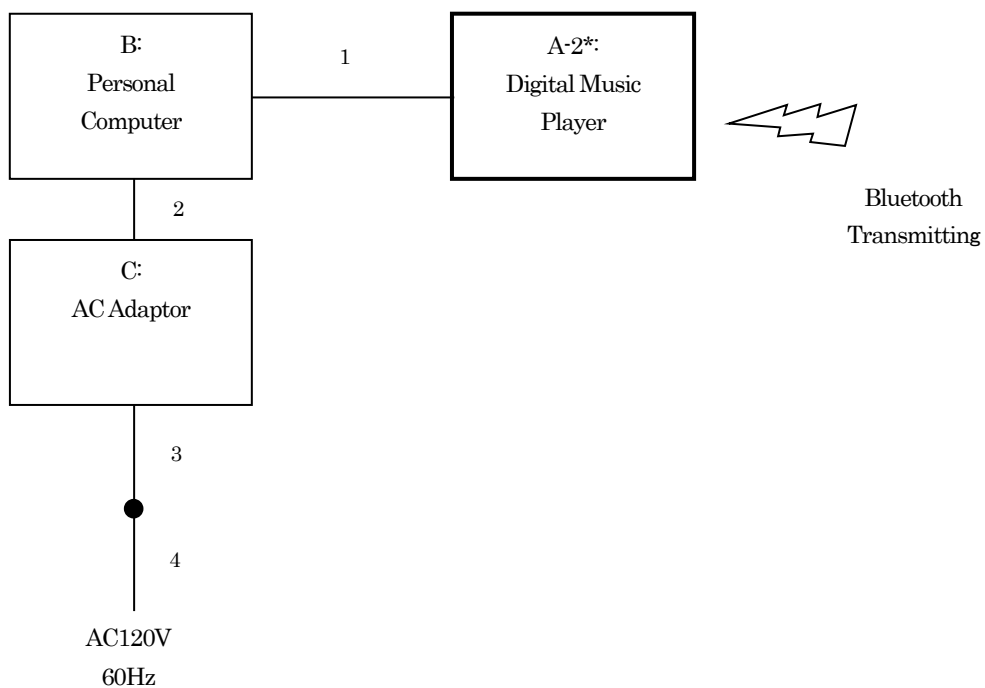
Symbol	Item	Manufacturer	Model No.	Serial No.
B	Personal Computer	SONY	PCG-71611N	1006554
C	AC Adaptor	SONY	VGP-AC19V41	148753032 0255555

Type of cable

Symbol	Description	Identification (Manufacturer etc.)	Shielded YES / NO	Ferrite Core	Length (m)	Bundled
1	USB cable	SONY	YES	NO	1.0	-
2	DC cable	-	NO	NO	1.7	Bundled
3	AC cable	-	NO	NO	0.7	-
4	AC Extension Cable	lian dung	NO	NO	0.1	-

System configuration

\*: EUT

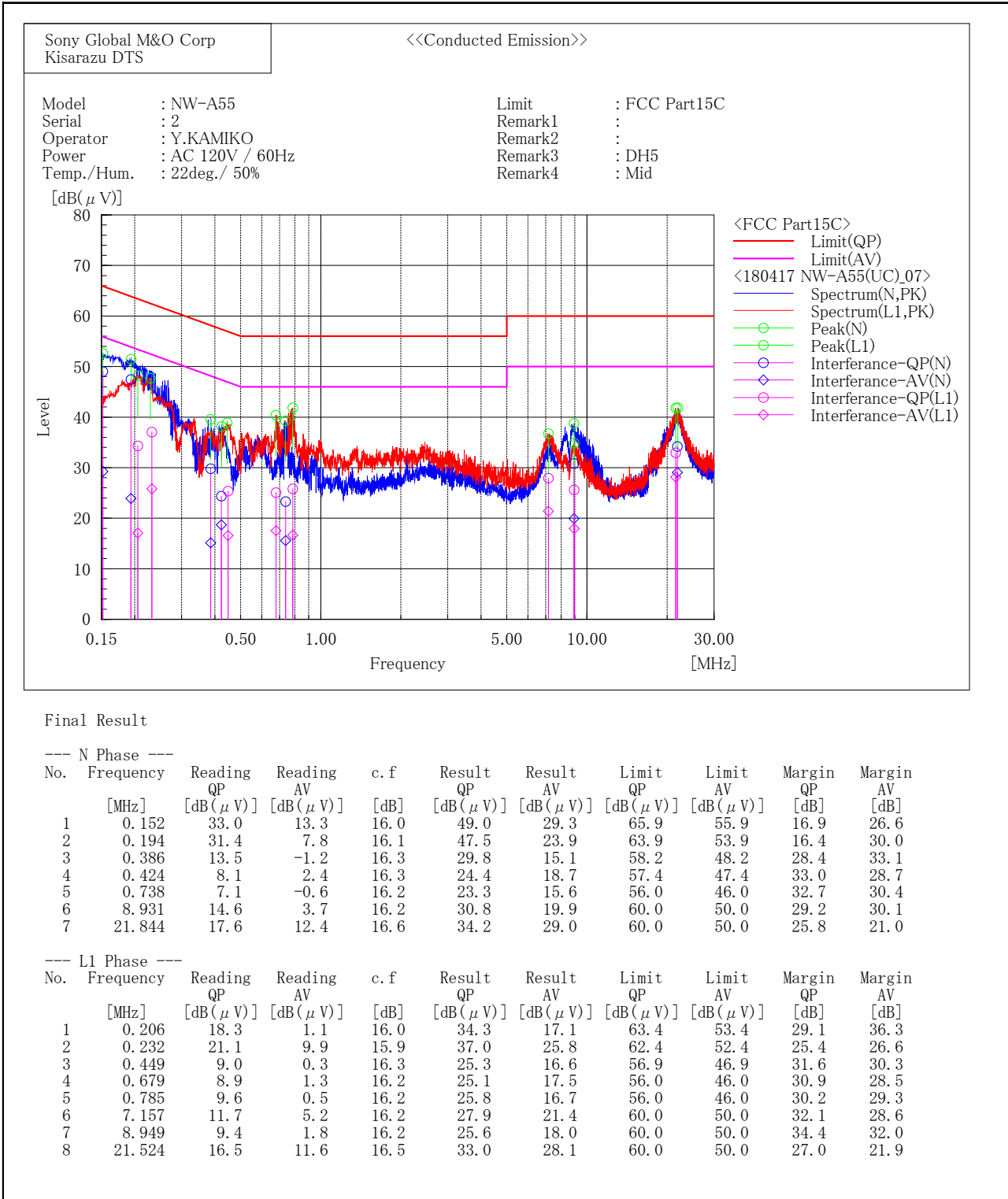


### 3. Test Data

#### 3.1. AC Power-line Conducted Emissions

1) Date of measurement : April 17, 2018

[BDR( DH5 )/2441MHz]



3.2. 20dB Bandwidth

- 1) Ambient temperature : 22.7 deg.C
- 2) Relative humidity : 57.0 %
- 3) Date of measurement : April 23, 2018
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Result [MHz]	Limit [MHz]
BDR	DH5	2402	1.045	-
		2441	1.040	-
		2480	1.046	-
EDR	3DH5	2402	1.285	-
		2441	1.285	-
		2480	1.283	-

[BDR / 2402MHz]



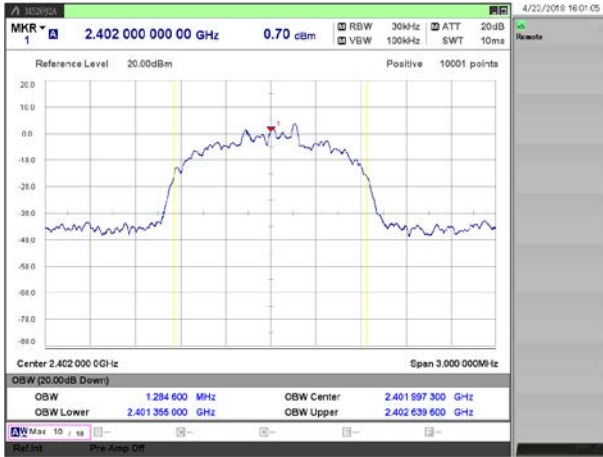
[BDR / 2441MHz]



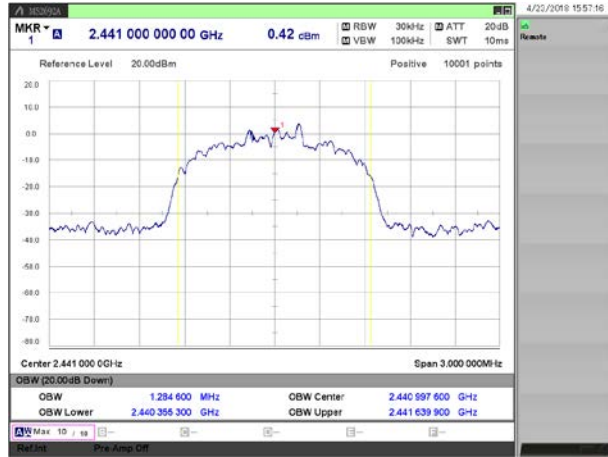
[BDR / 2480MHz]



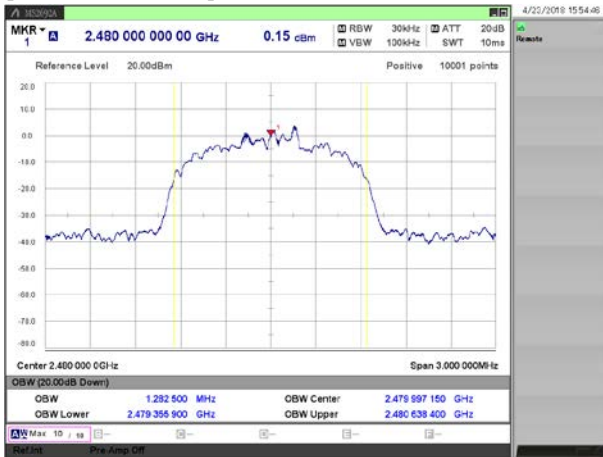
[EDR / 2402MHz]



[EDR / 2441MHz]



[EDR / 2480MHz]



### 3.3. Carrier Frequency Separation

- 1) Ambient temperature : 22.7 deg.C
- 2) Relative humidity : 57.0 %
- 3) Date of measurement : April 23, 2018
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Reading [kHz]	Limit [kHz]
BDR	DH5	1013.7	$\leq 697.6$
EDR	3DH5	1019.4	$\leq 856.4$

[BDR]



[EDR]



### 3.4. Number of Hopping Frequencies

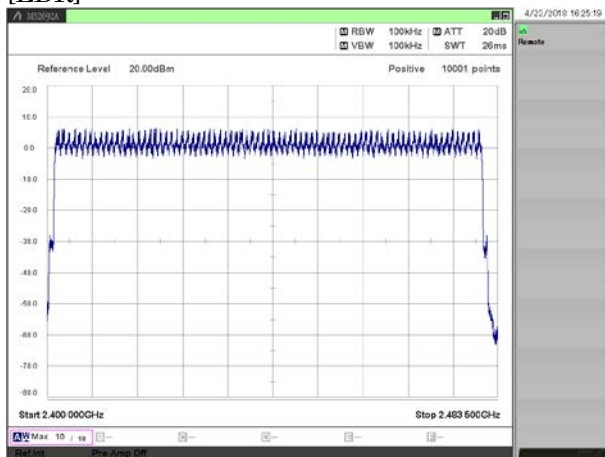
- 1) Ambient temperature : 22.7 deg.C
- 2) Relative humidity : 57.0 %
- 3) Date of measurement : April 23, 2018
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

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

[BDR]



[EDR]



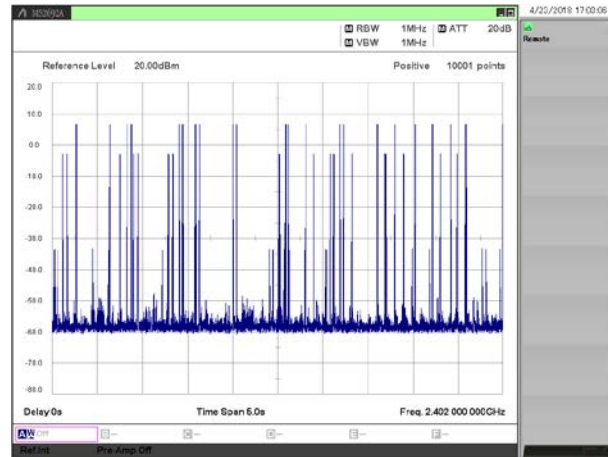
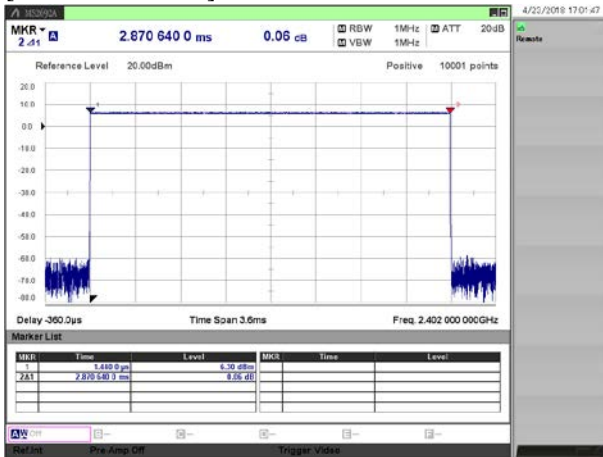


3.5. Time of Occupancy (Dwell Time)

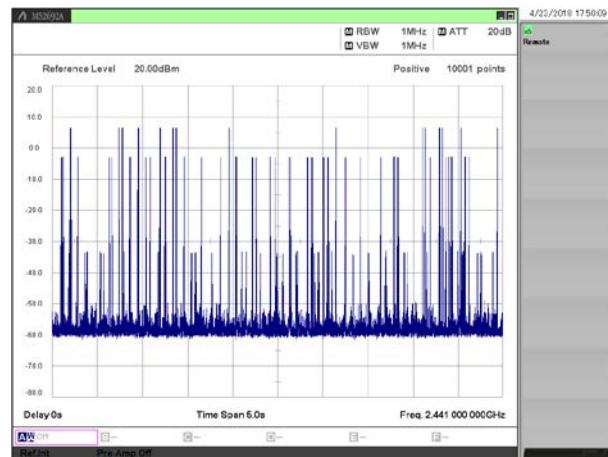
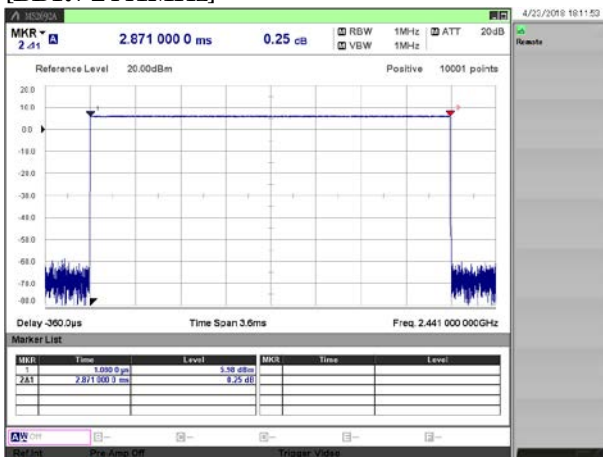
- 1) Ambient temperature : 22.7 deg.C
- 2) Relative humidity : 57.0 %
- 3) Date of measurement : April 23, 2018
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Dwell Time [msec]	Cycle [time]	Result [msec]	Limit [msec]
BDR	DH5	2402	2.87	18.7	338.7	≦ 400.0
		2441	2.87	18.7	338.7	≦ 400.0
		2480	2.87	18.0	326.6	≦ 400.0
EDR	3DH5	2402	2.88	17.2	312.1	≦ 400.0
		2441	2.88	17.8	324.2	≦ 400.0
		2480	2.88	18.8	342.4	≦ 400.0

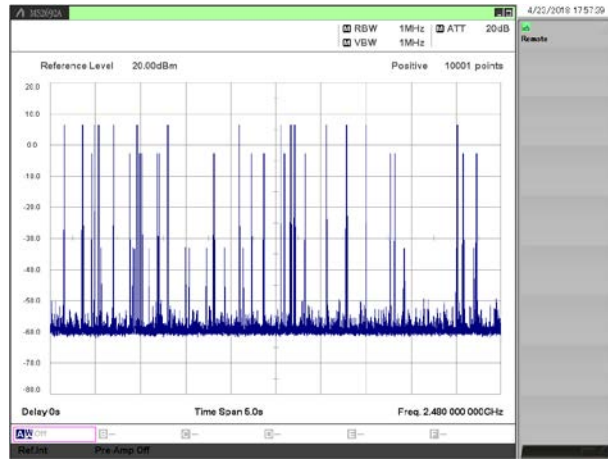
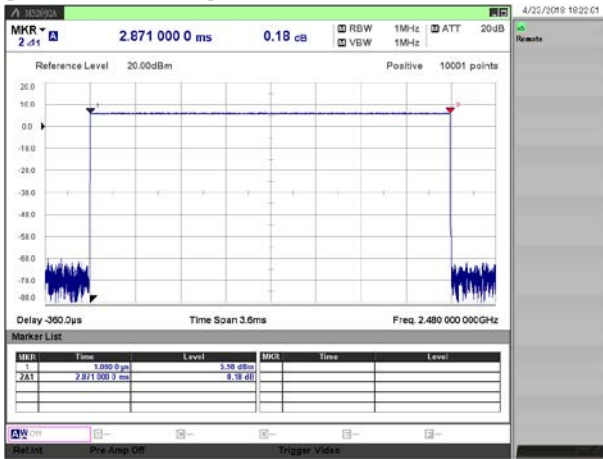
[BDR / 2402MHz]



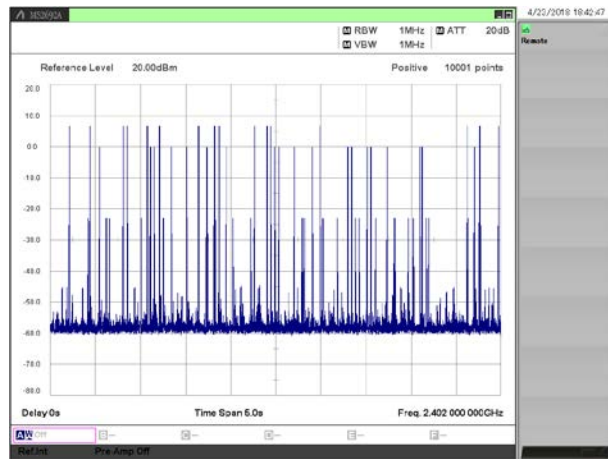
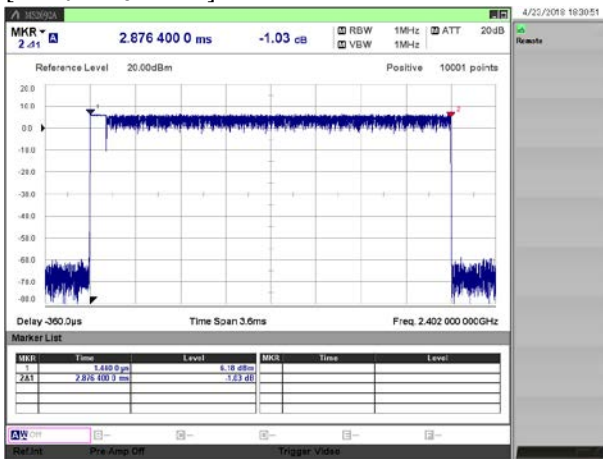
[BDR / 2441MHz]



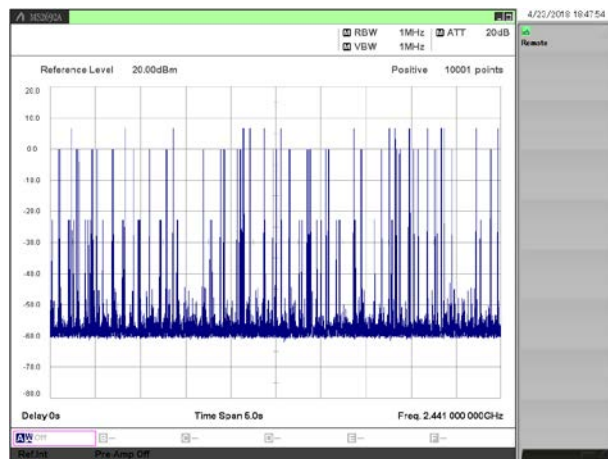
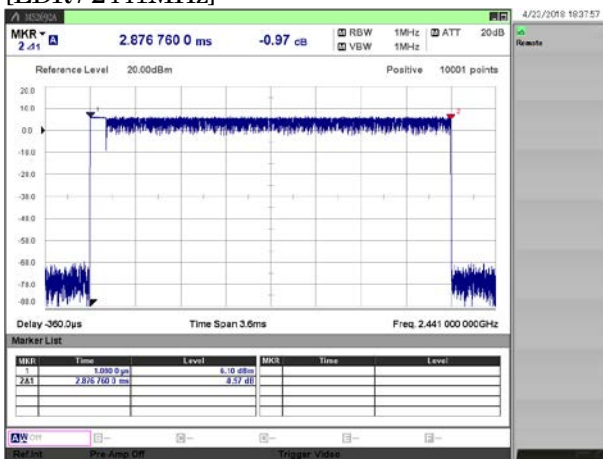
[BDR / 2480MHz]



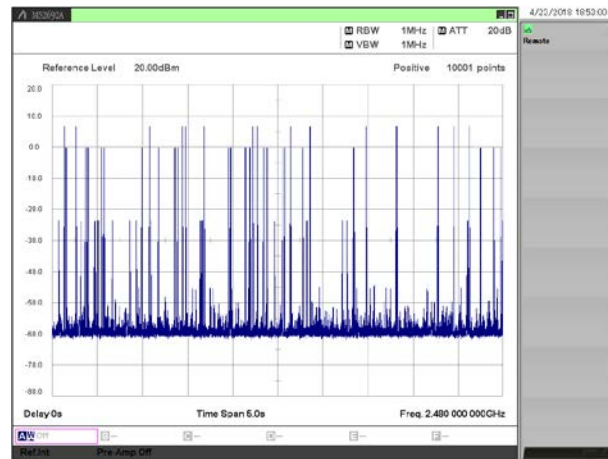
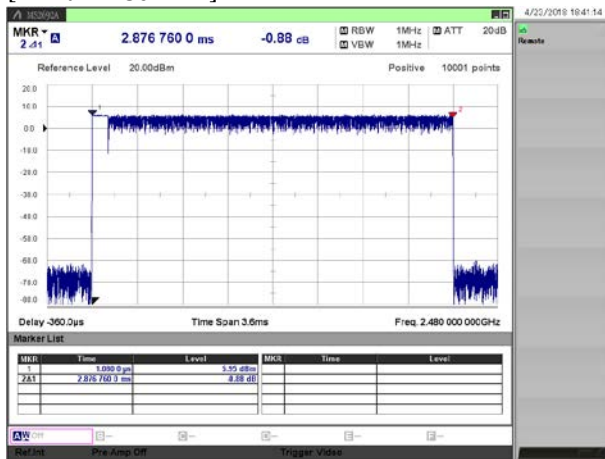
[EDR / 2402MHz]



[EDR / 2441MHz]



[EDR / 2480MHz]



## 3.6. Maximum Peak Conducted Output Power

- 1) Ambient temperature : 23.9 deg.C
- 2) Relative humidity : 50.1 %
- 3) Date of measurement : April 12, 2018
- 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	6.90	0.40	7.30	0.00537	30.0	1.0	22.70
		2441	6.77	0.40	7.17	0.00521	30.0	1.0	22.83
		2480	6.75	0.40	7.15	0.00519	30.0	1.0	22.85
EDR	2DH5	2402	7.28	0.40	7.68	0.00586	30.0	1.0	22.32
		2441	7.30	0.40	7.70	0.00589	30.0	1.0	22.30
		2480	7.30	0.40	7.70	0.00589	30.0	1.0	22.30
	3DH5	2402	7.42	0.40	7.82	0.00605	30.0	1.0	22.18
		2441	7.45	0.40	7.85	0.00610	30.0	1.0	22.15
		2480	7.47	0.40	7.87	0.00612	30.0	1.0	22.13

## 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	5.38	0.40	1.20	6.98	0.00499
		2441	5.30	0.40	1.20	6.90	0.00490
		2480	5.28	0.40	1.20	6.88	0.00488
EDR	2DH5	2402	3.88	0.40	1.20	5.48	0.00353
		2441	3.93	0.40	1.20	5.53	0.00357
		2480	3.88	0.40	1.20	5.48	0.00353
	3DH5	2402	3.88	0.40	1.17	5.45	0.00351
		2441	3.93	0.40	1.17	5.50	0.00355
		2480	3.88	0.40	1.17	5.45	0.00351

## Duty Cycle check

Mode		Channel [MHz]	T(on+off) [msec]	T(on) [msec]	Duty Cycle [%]
BDR	DH1	2441	1.250	0.360	28.80
	DH3	2441	2.500	1.620	64.80
	DH5	2441	3.740	2.840	75.94
EDR	2DH1	2441	1.250	0.371	29.68
	2DH3	2441	2.500	1.620	64.80
	2DH5	2441	3.740	2.840	75.94
	3DH1	2441	1.250	0.371	29.68
	3DH3	2441	2.500	1.620	64.80
	3DH5	2441	3.740	2.860	76.47

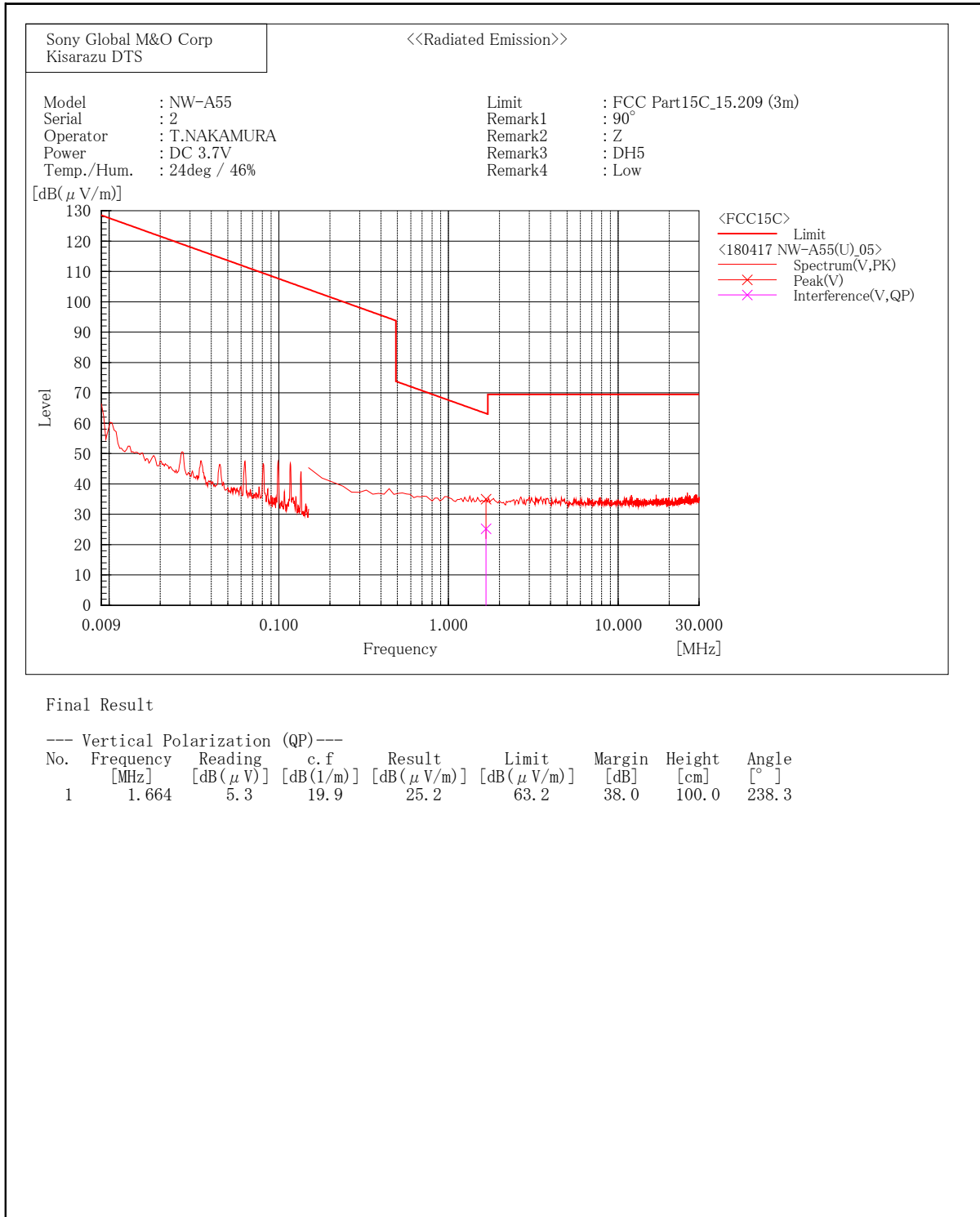
### 3.7. Radiated Spurious Emissions

1) Date of measurement

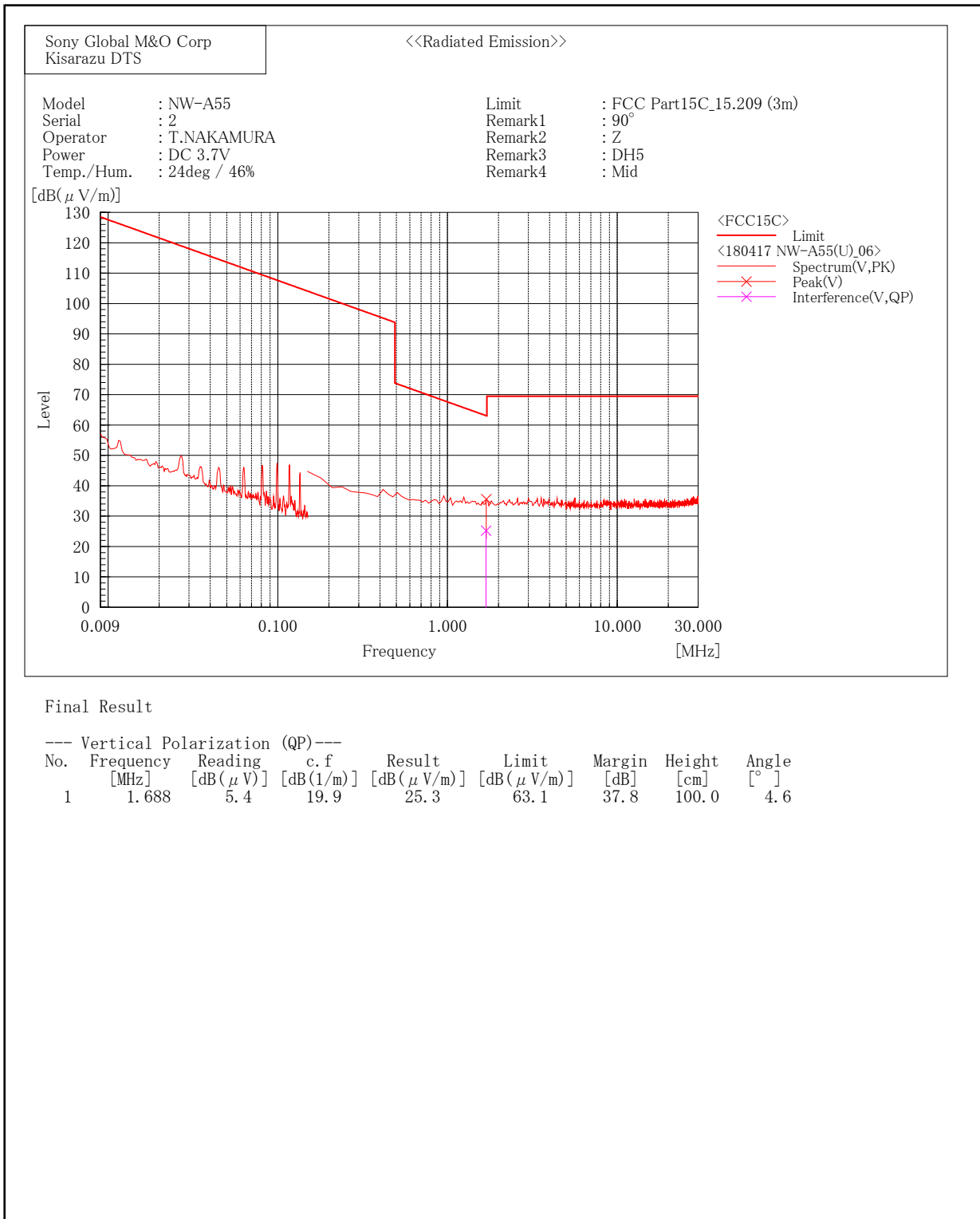
9kHz - 30MHz : April 17, 2018  
 30MHz - 1000MHz : April 17, 2018  
 1GHz - 7GHz : April 16, 2018  
 7GHz - 18GHz : April 19, 2018  
 18GHz - 25GHz : April 18, 2018

**9 kHz - 30 MHz**

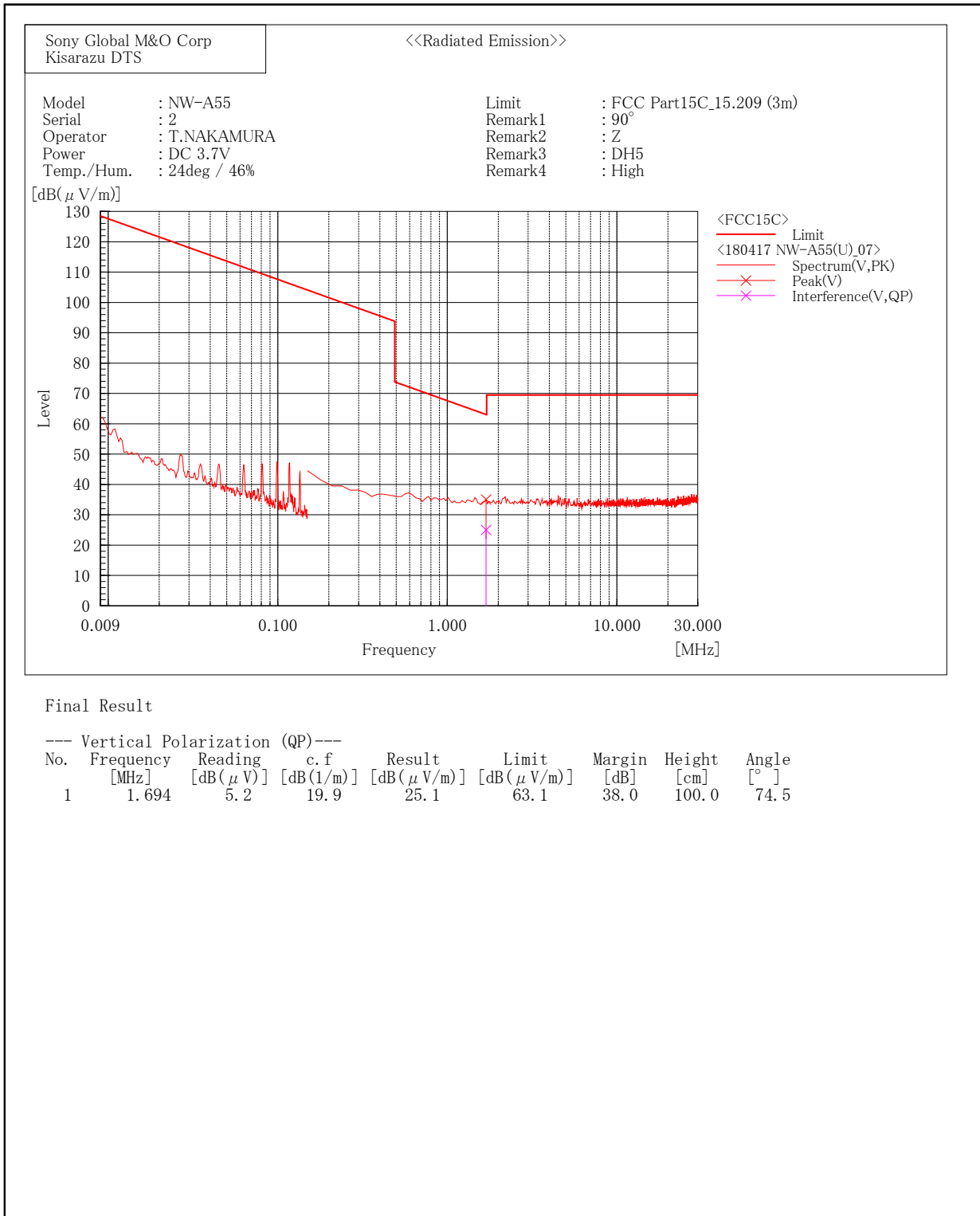
[BDR( DH5 )/2402MHz]



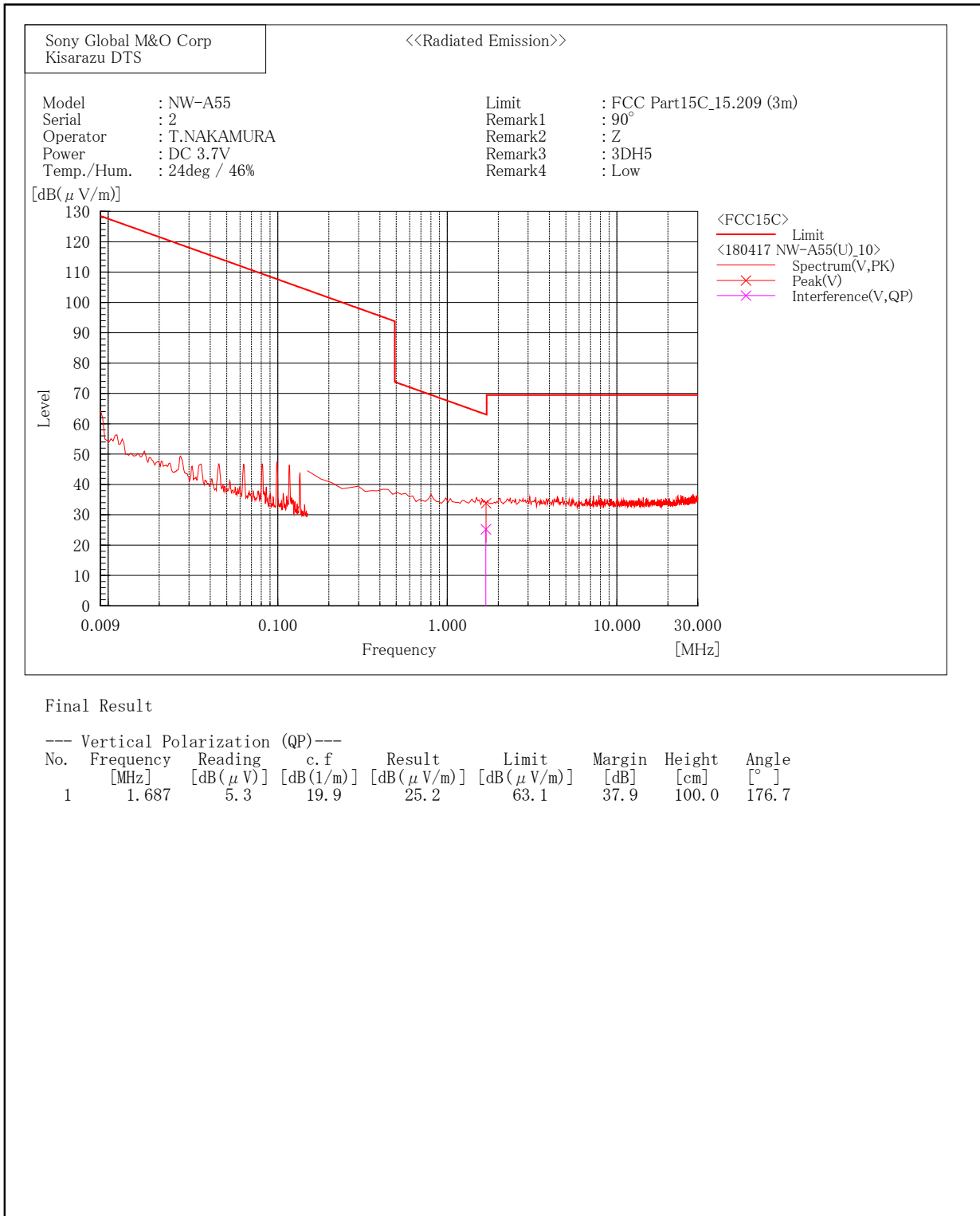
[BDR( DH5 )/2441MHz]



[BDR( DH5 )/2480MHz]

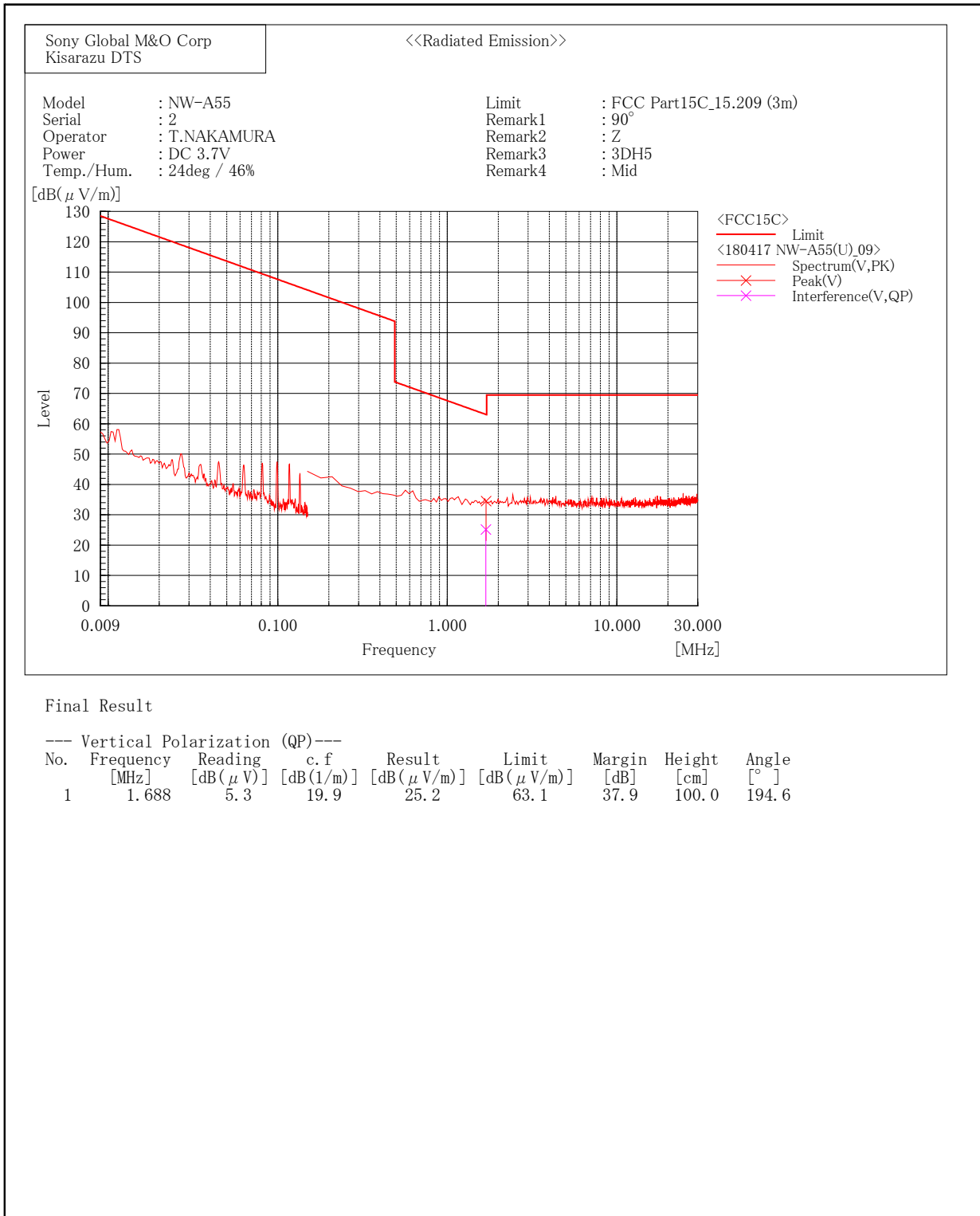


[EDR( 3DH5 )/2402MHz]

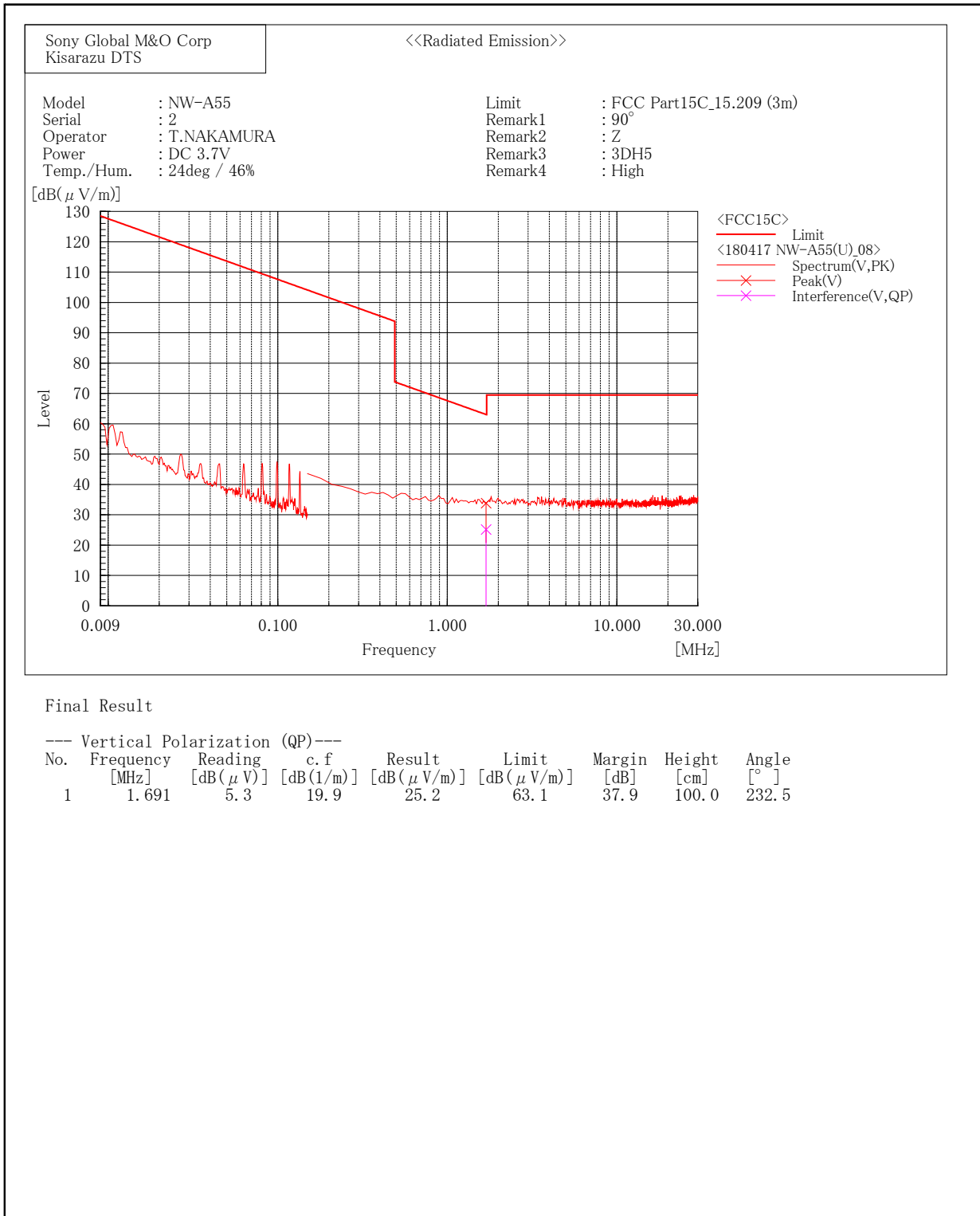




[EDR( 3DH5 )/2441MHz]

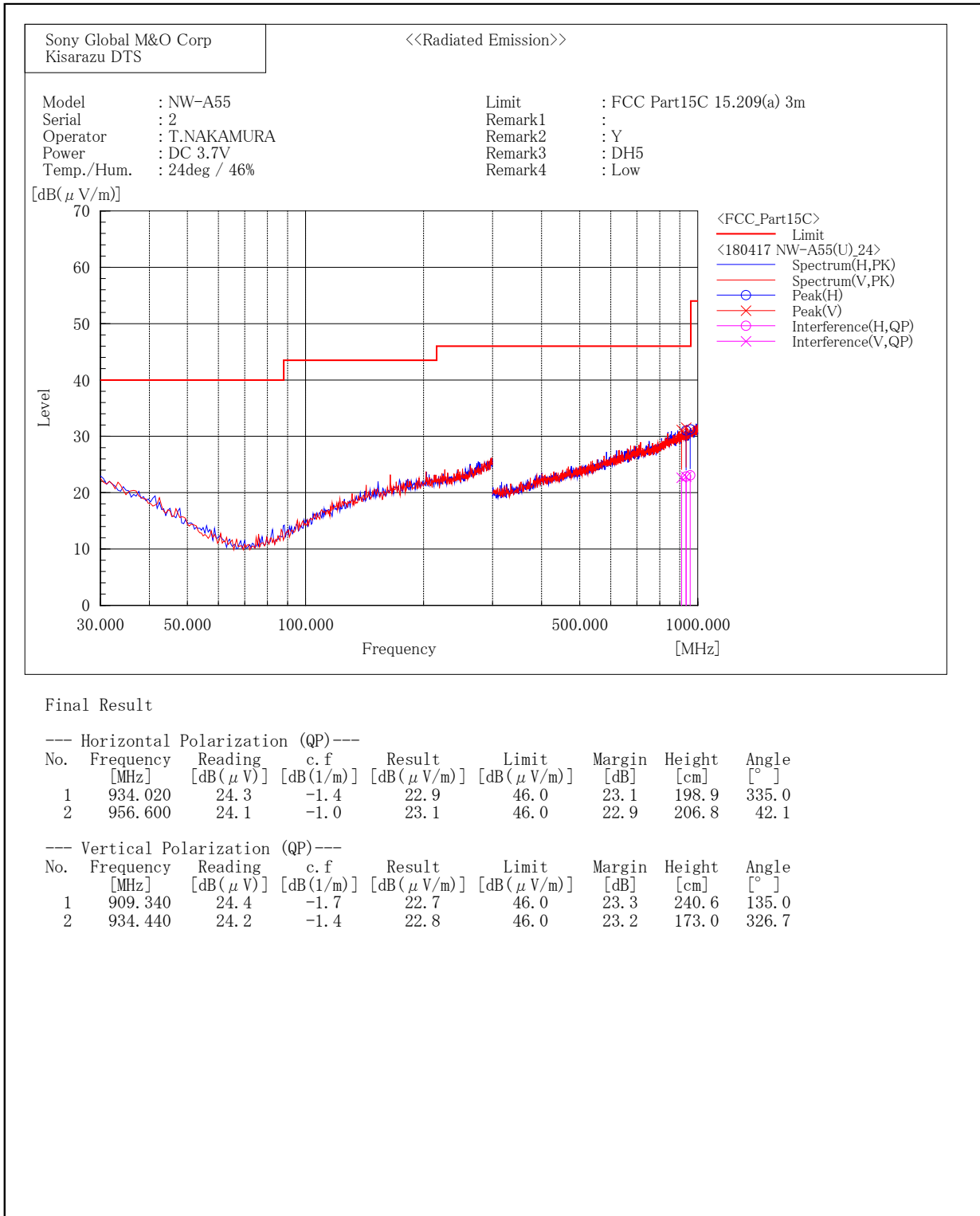


[EDR( 3DH5 )/2480MHz]

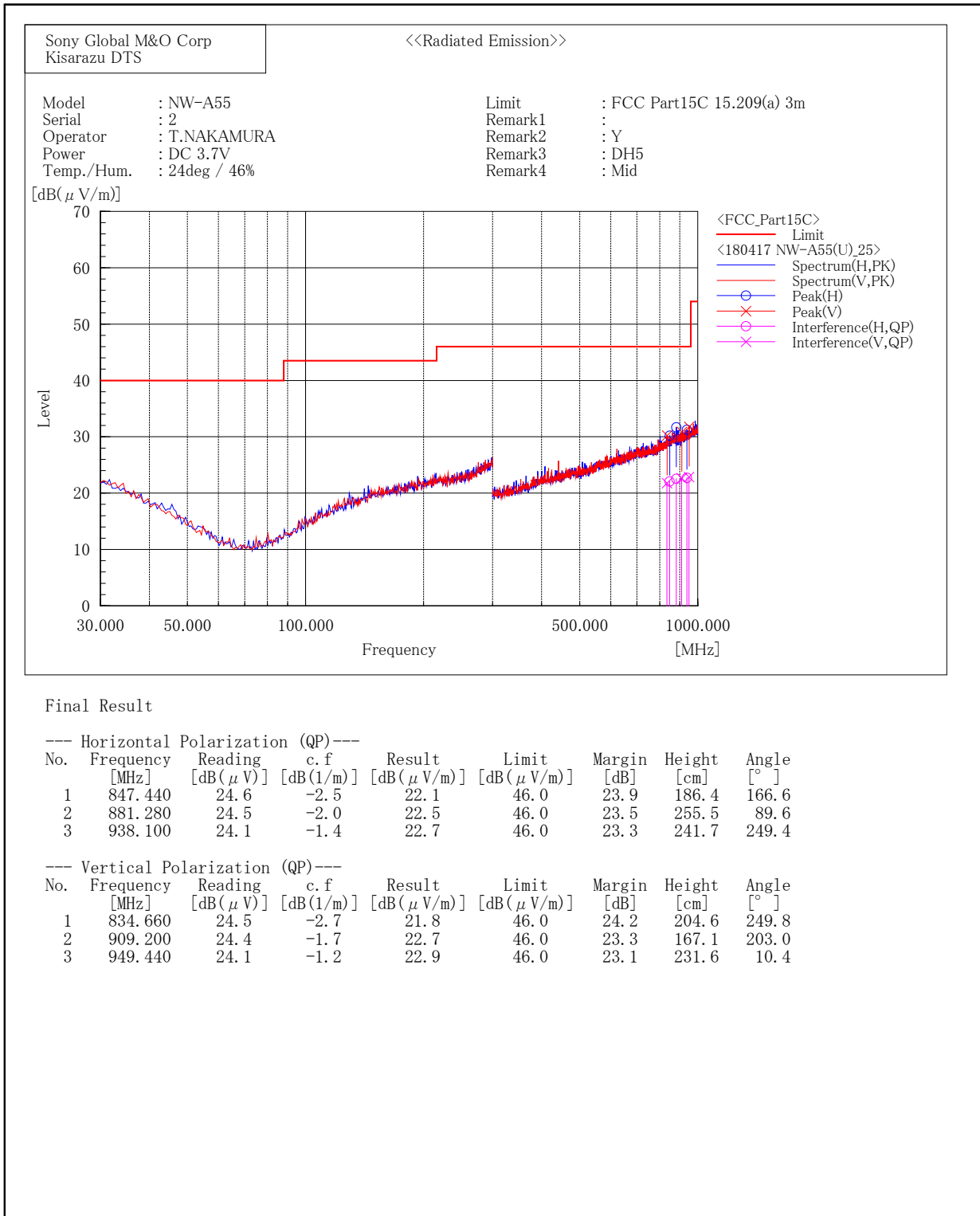


**30 MHz - 1000 MHz**

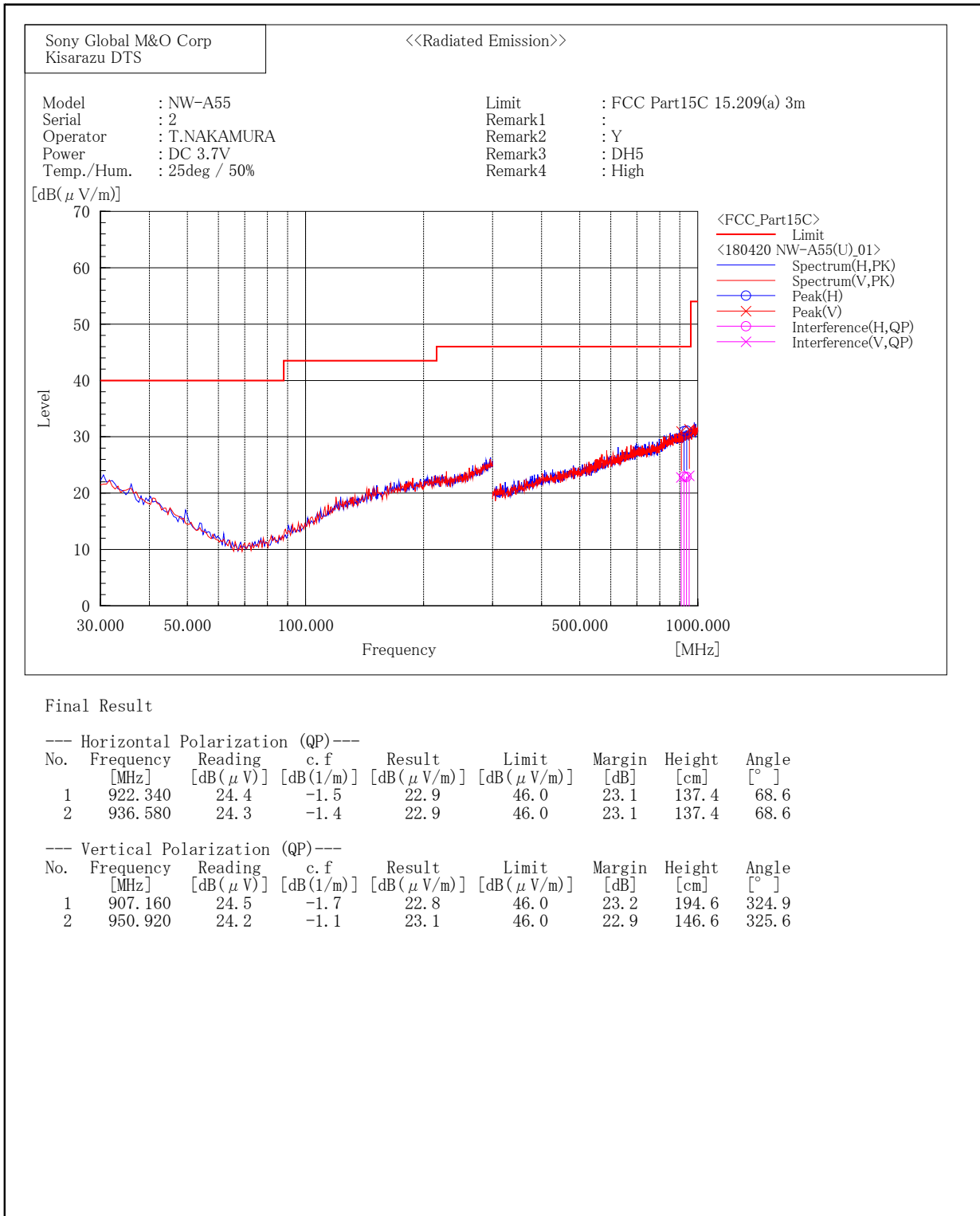
[BDR( DH5 )/2402MHz]



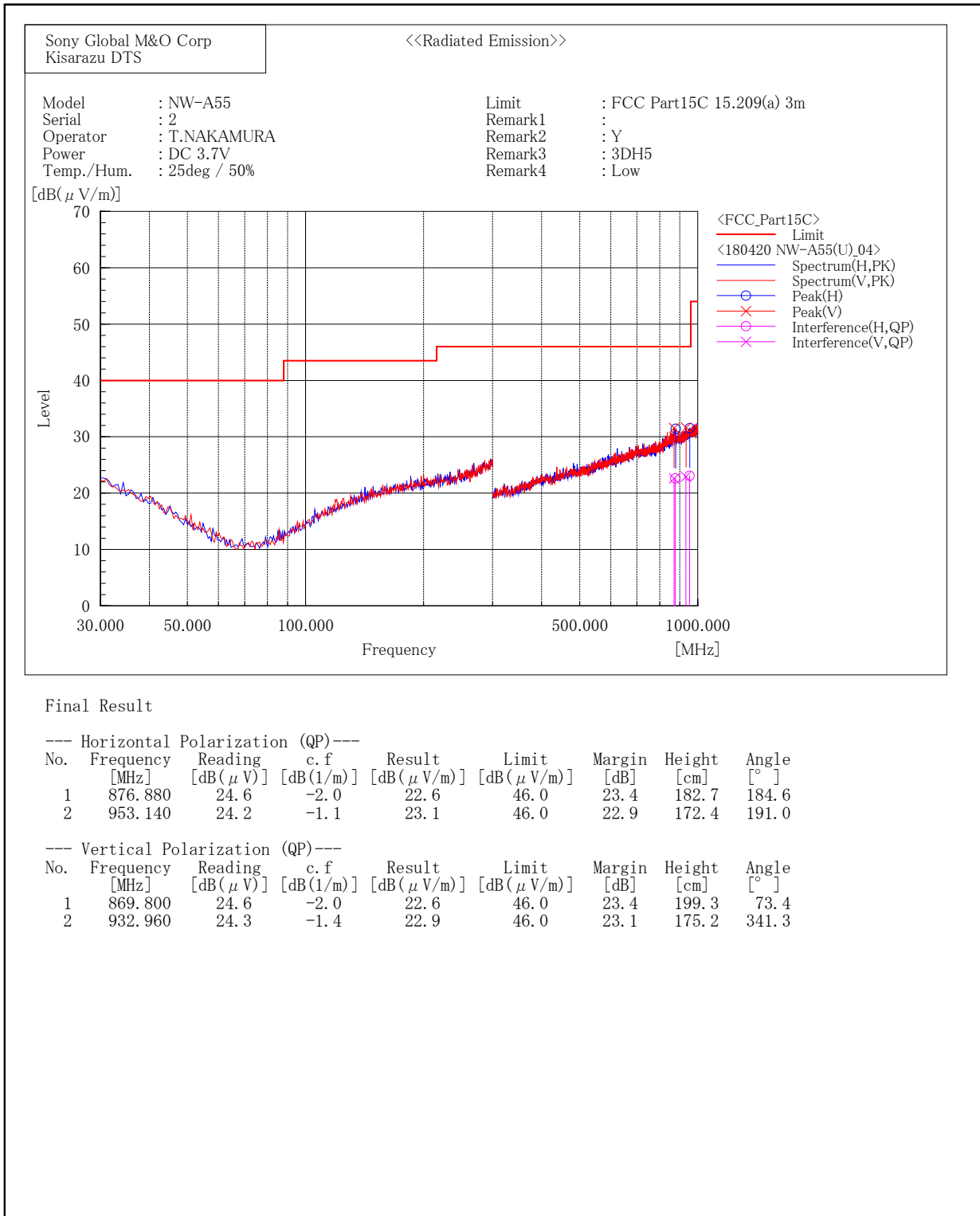
[BDR( DH5 )/2441MHz]



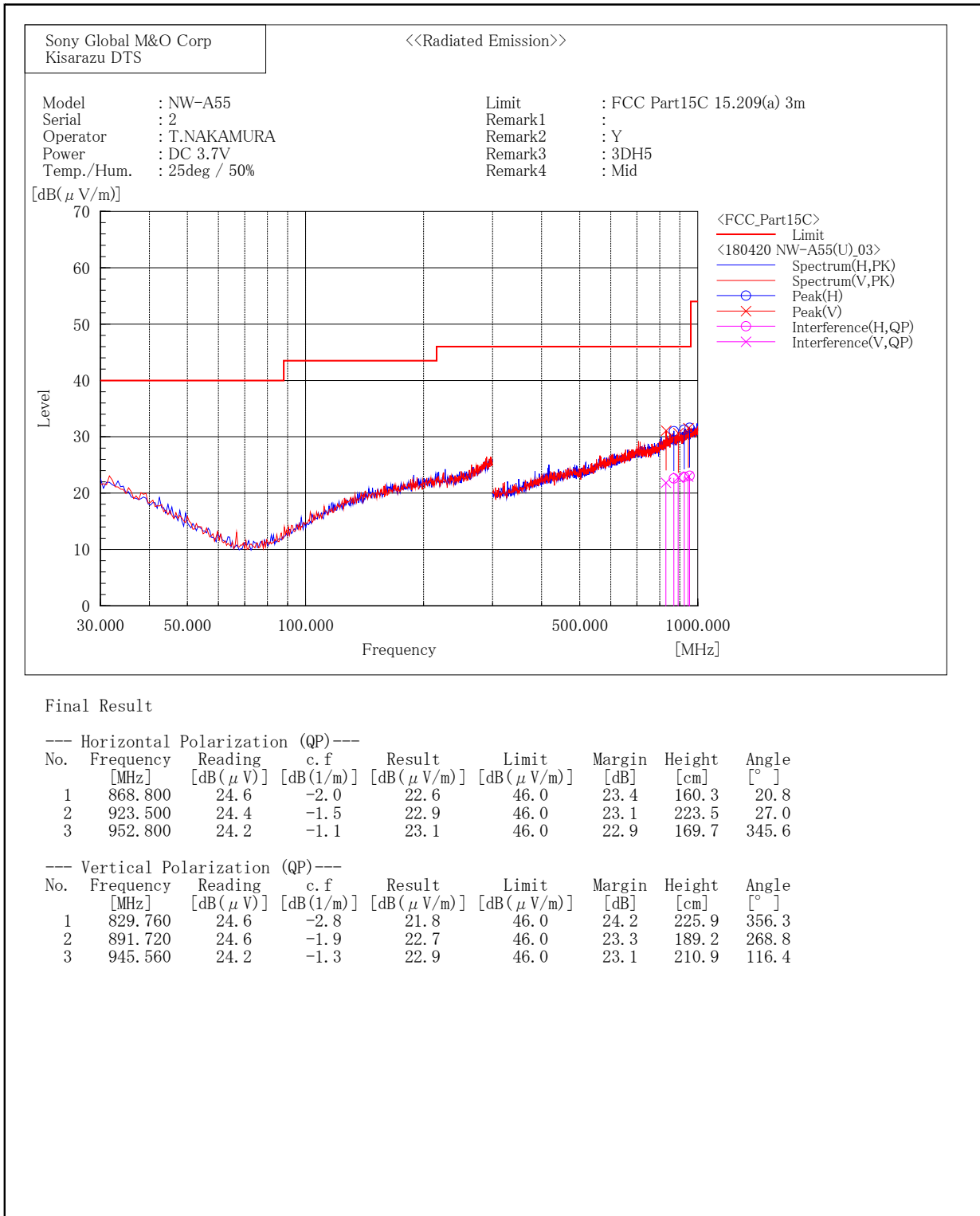
[BDR( DH5 )/2480MHz]



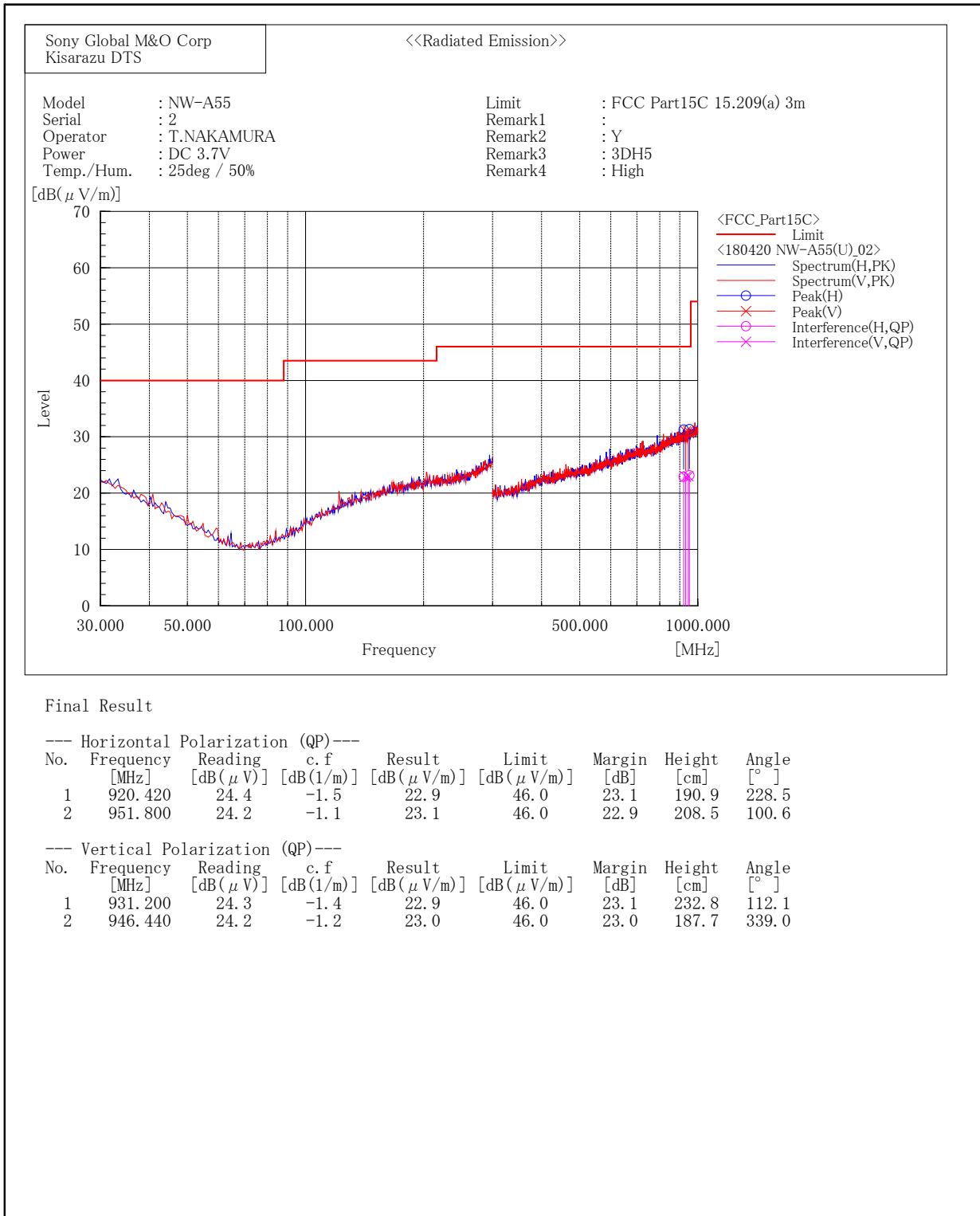
[EDR( 3DH5 )/2402MHz]



[EDR( 3DH5 )/2441MHz]



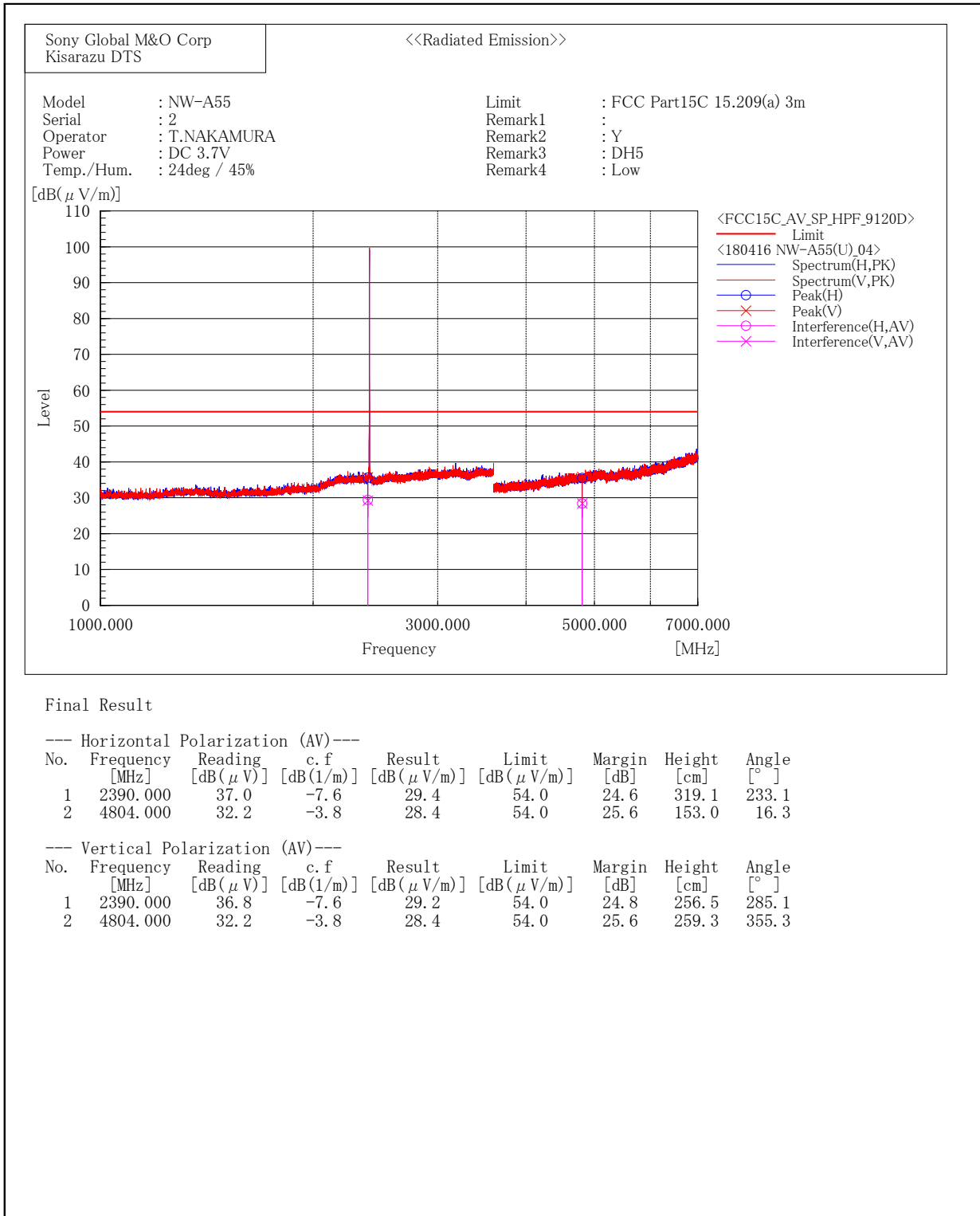
[EDR( 3DH5 )/2480MHz]



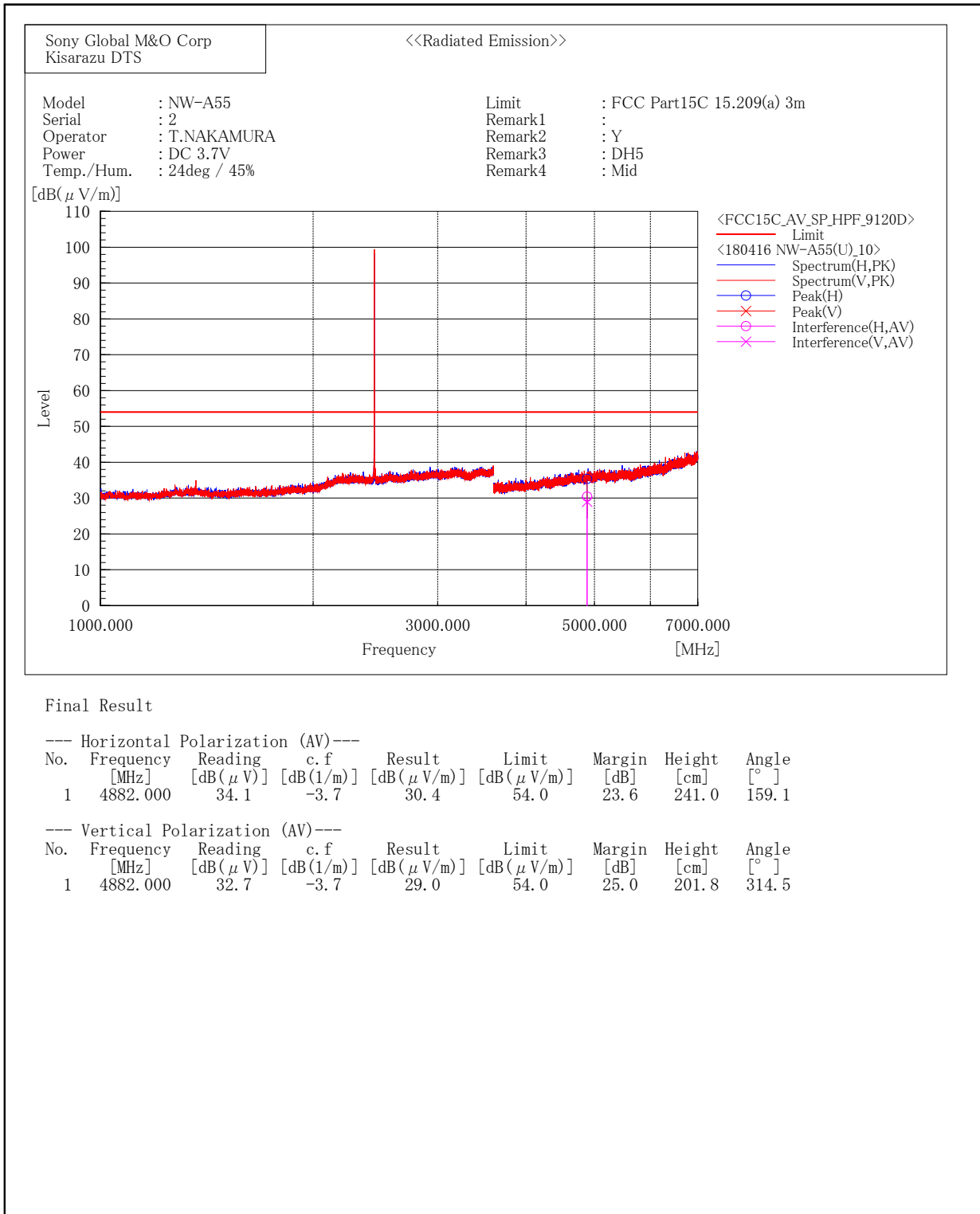


1GHz - 7 GHz

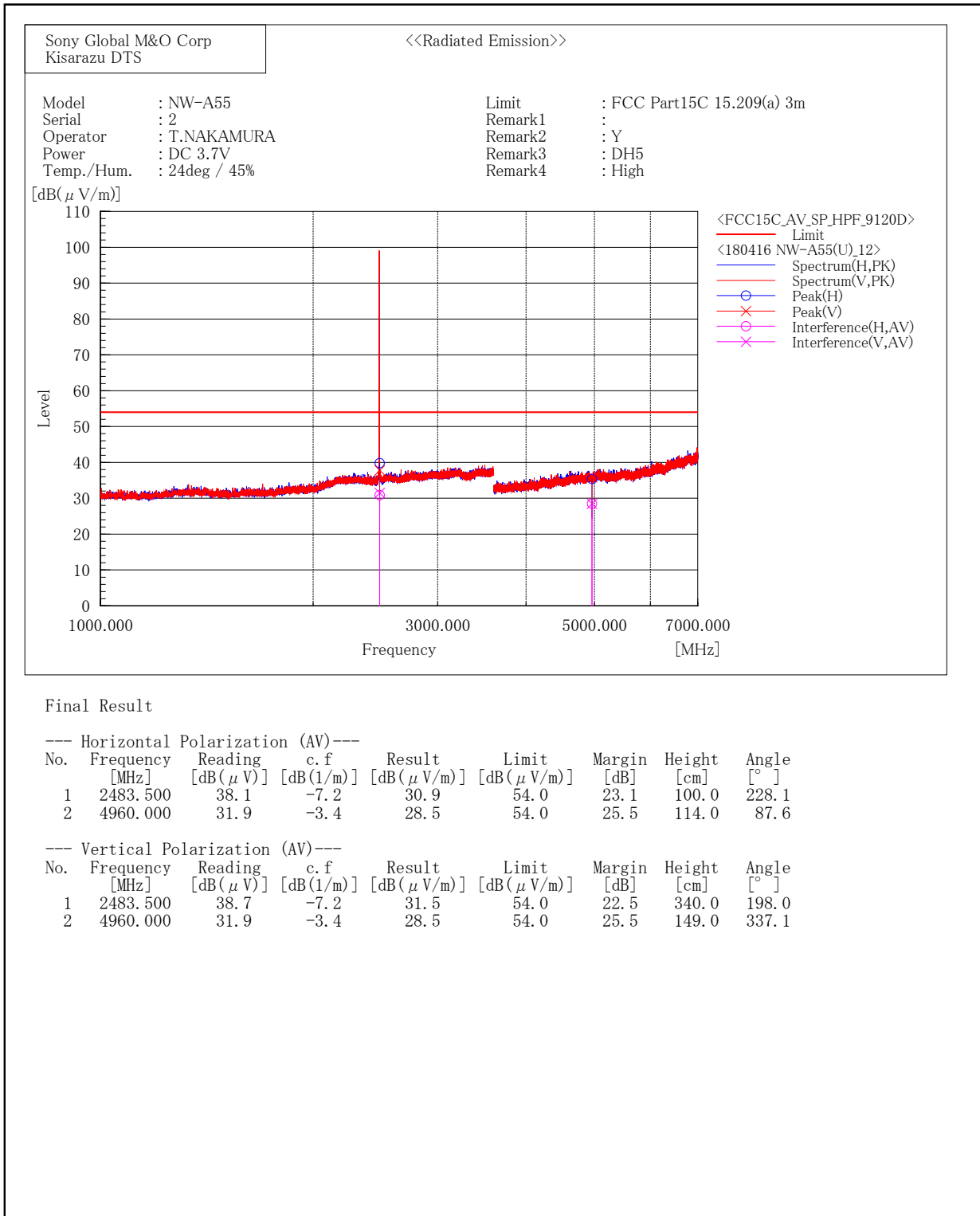
[BDR( DH5 )/2402MHz]



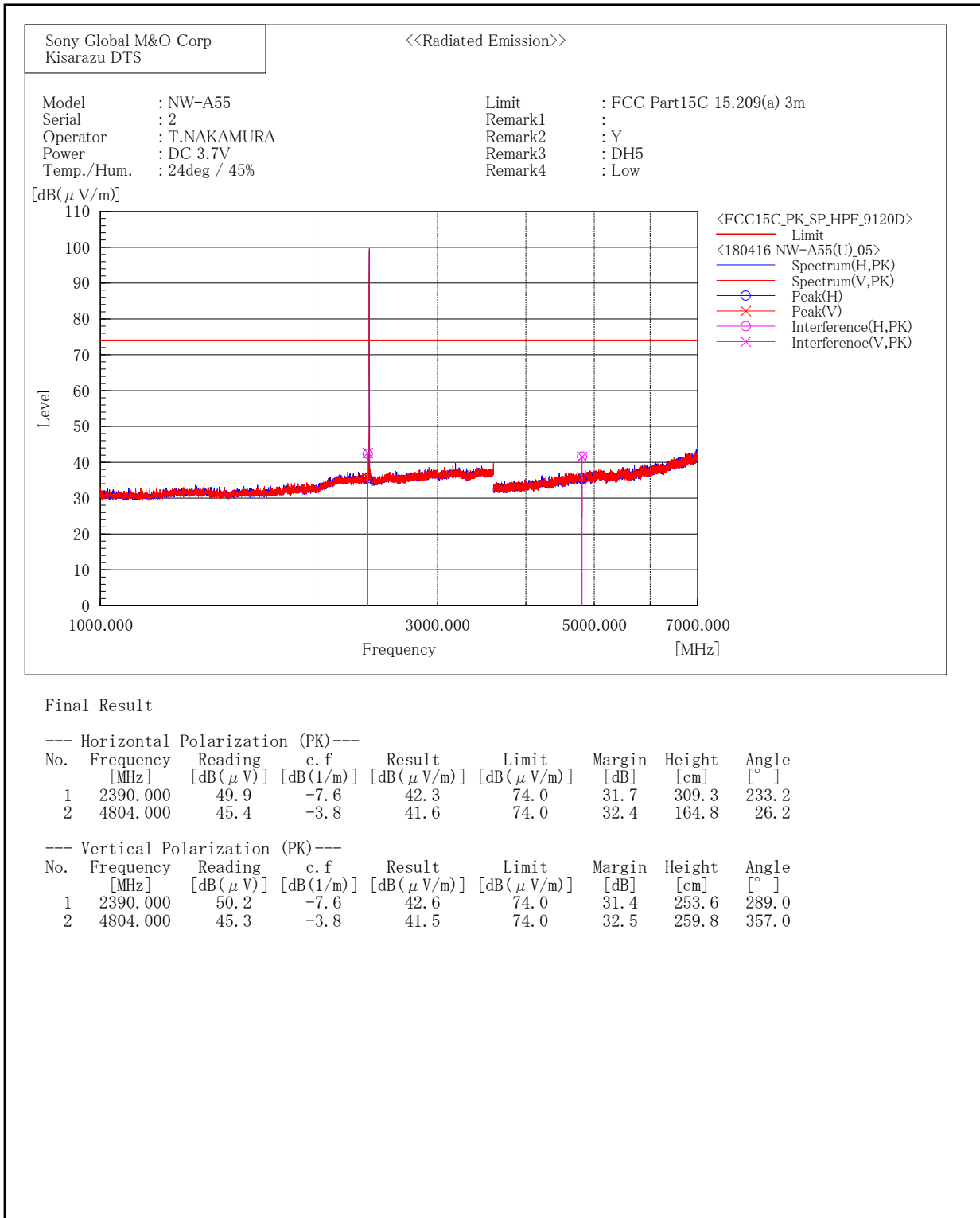
[BDR( DH5 )/2441MHz]



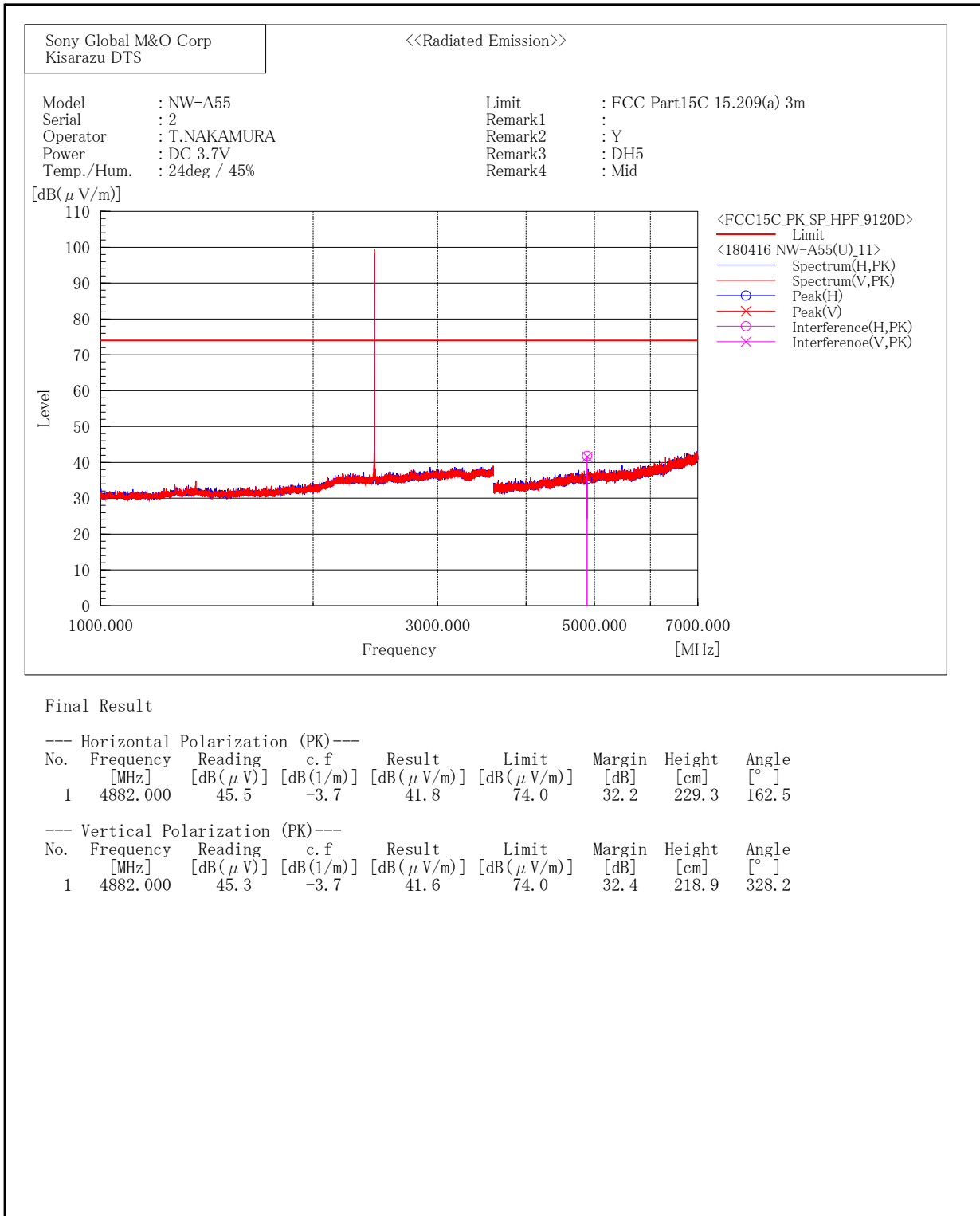
[BDR( DH5 )/2480MHz]



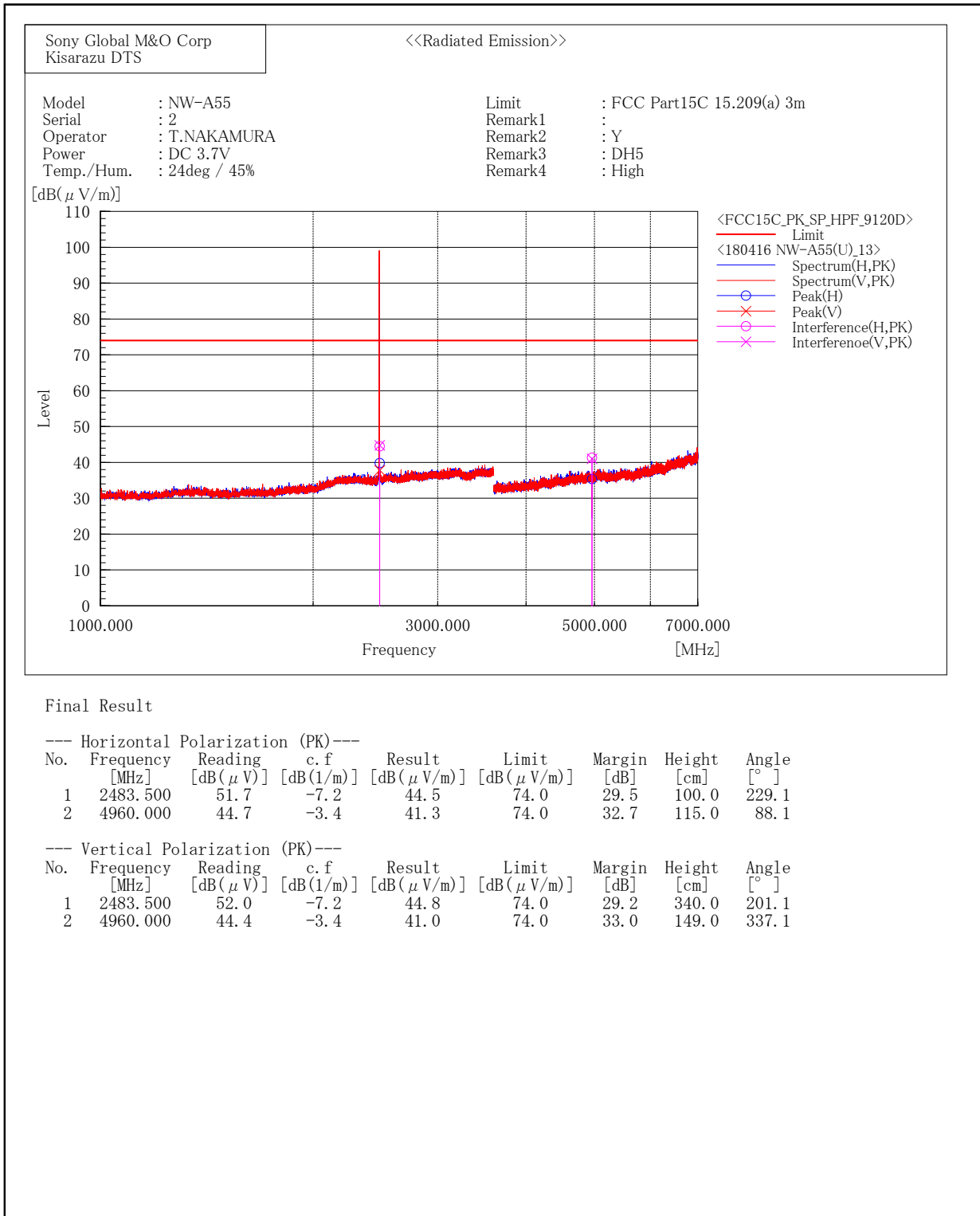
[BDR( DH5 )/2402MHz]



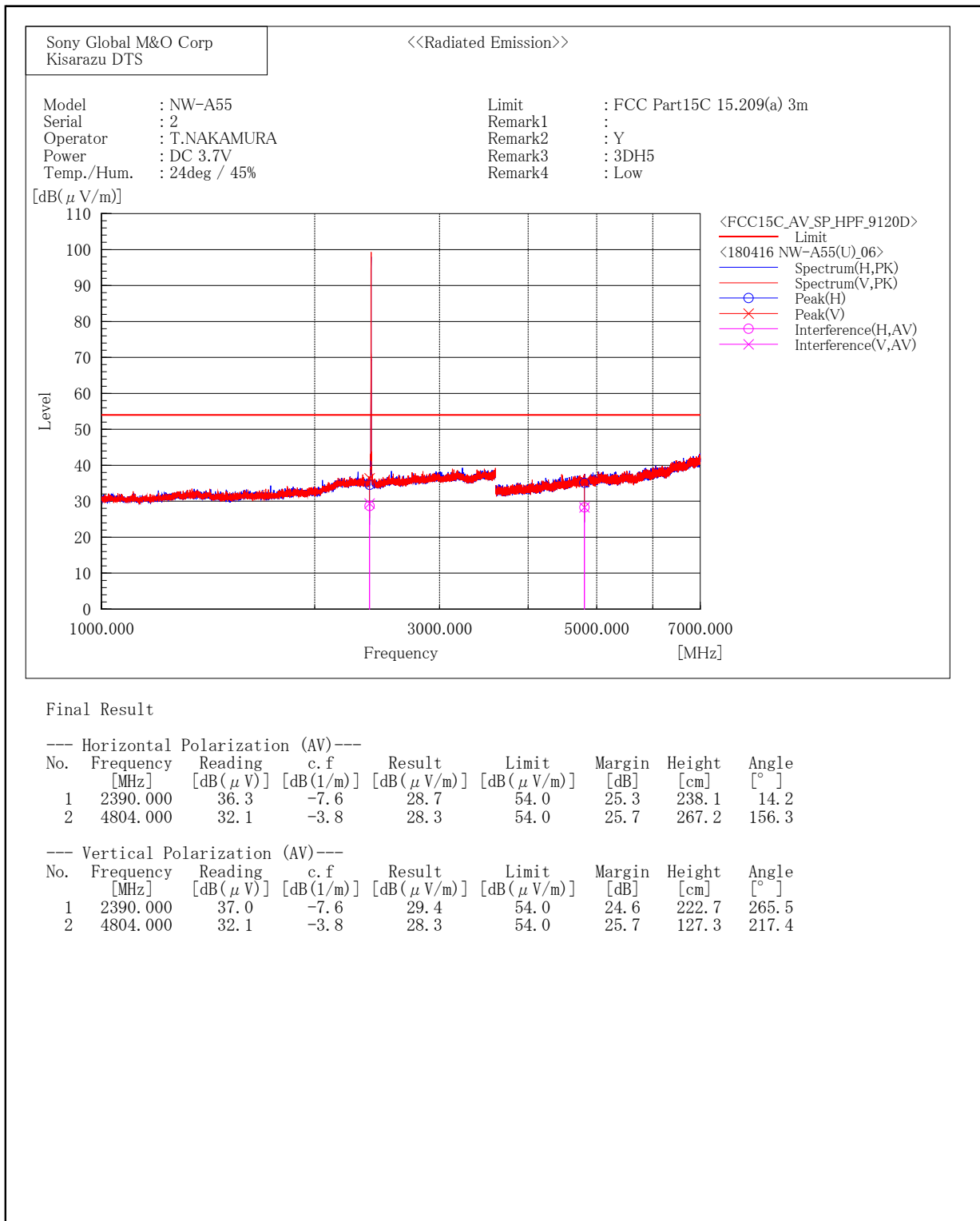
[BDR( DH5 )/2441MHz]



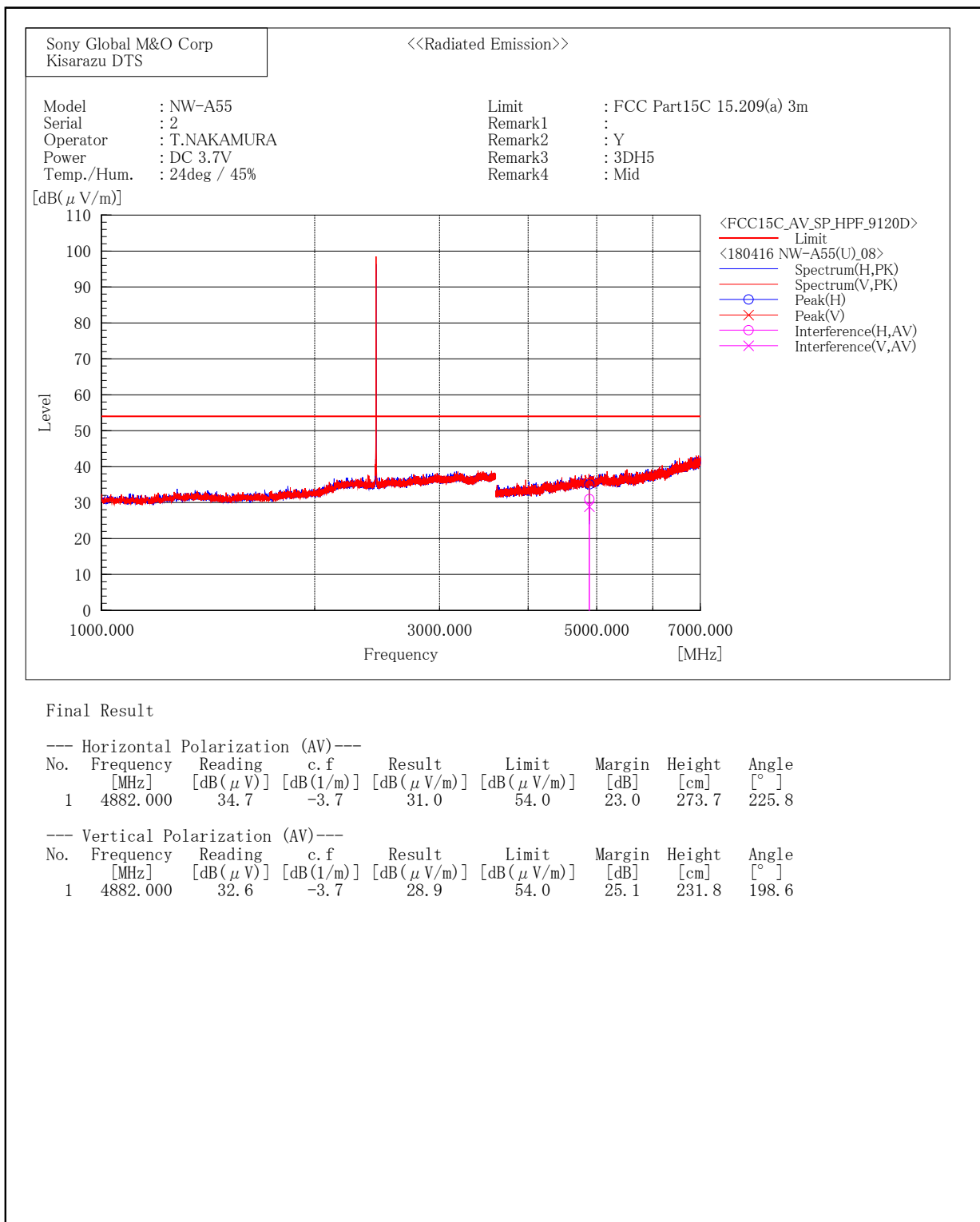
[BDR( DH5 )/2480MHz]



[EDR( 3DH5 )/2402MHz]

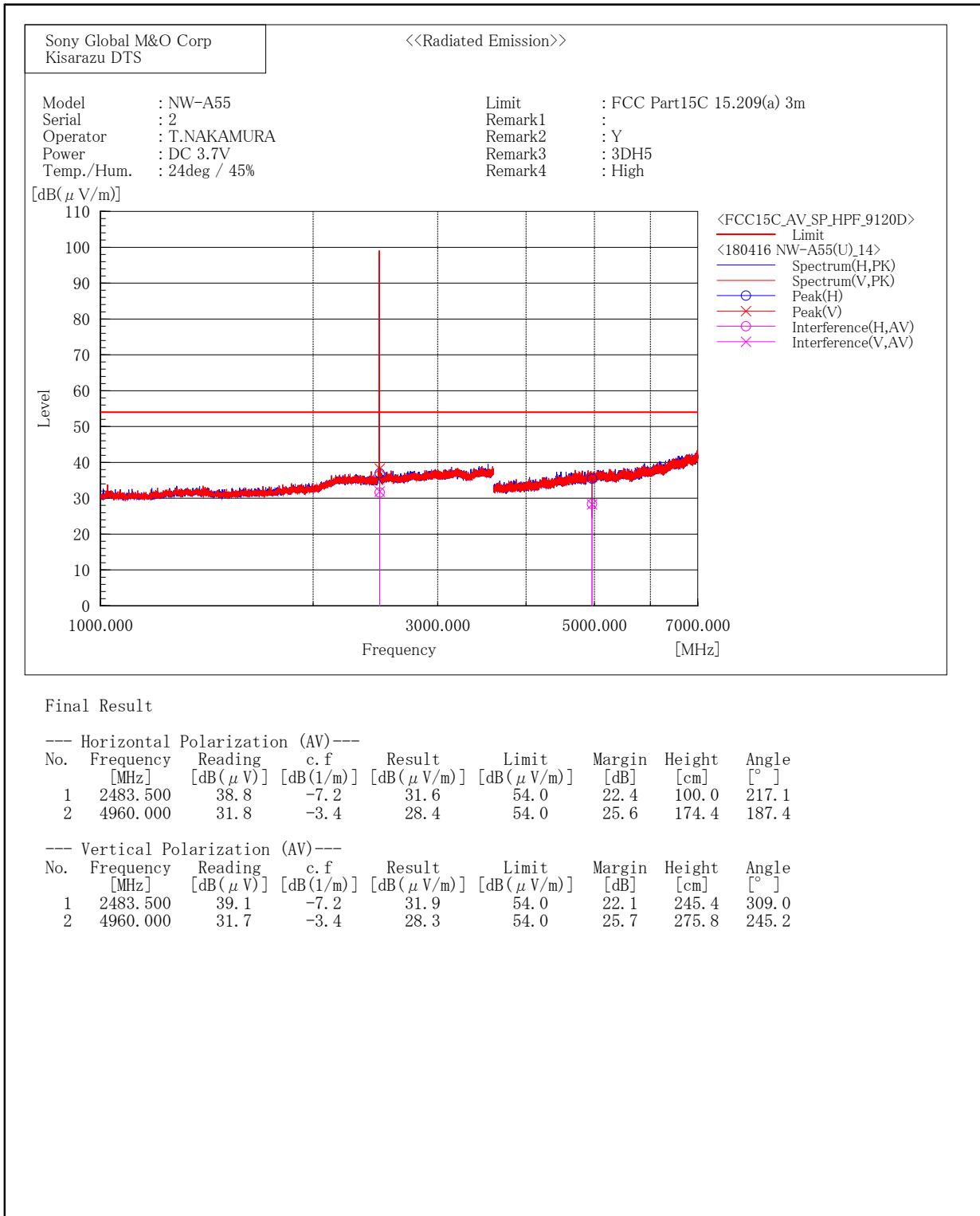


[EDR( 3DH5 )/2441MHz]

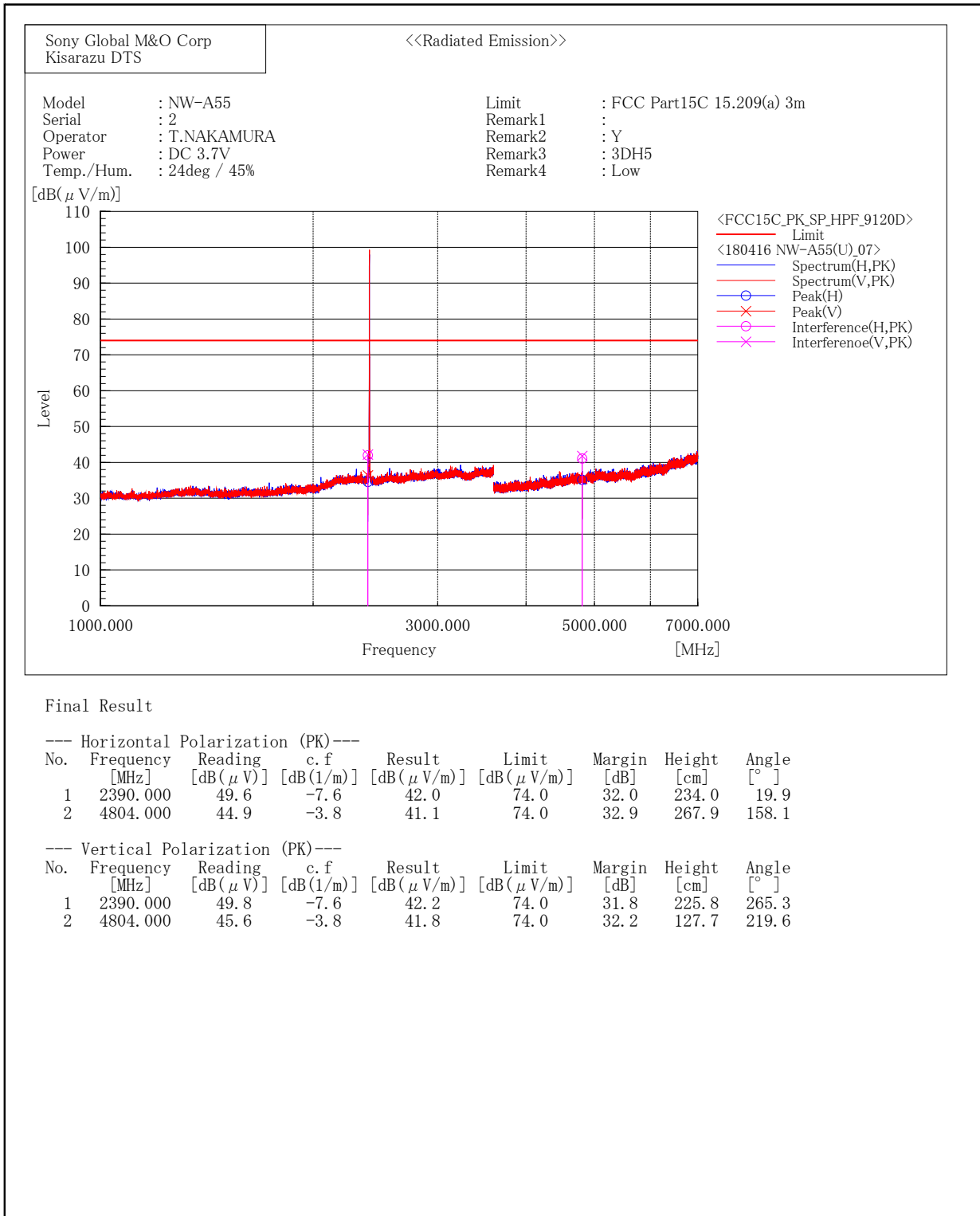




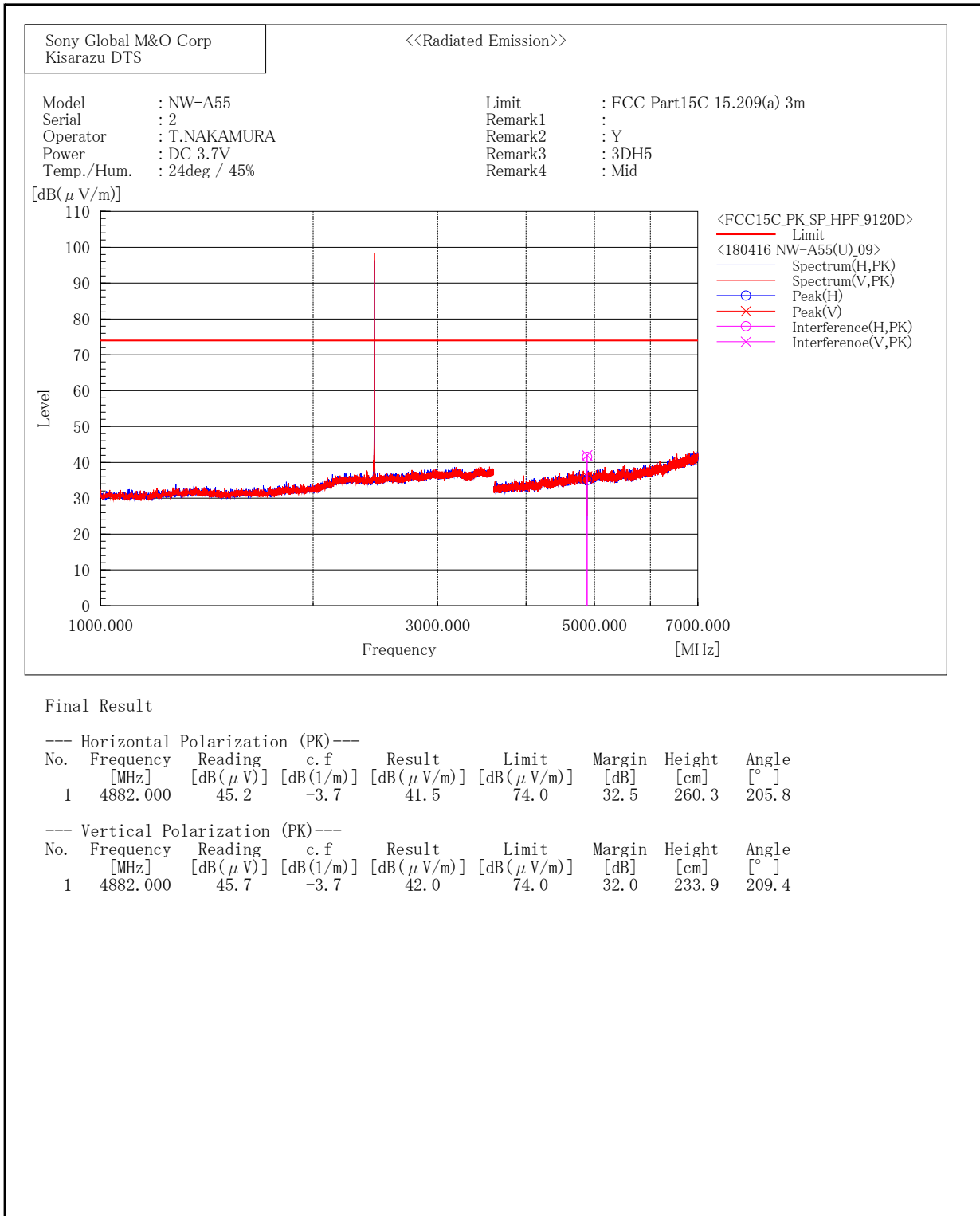
[EDR( 3DH5 )/2480MHz]



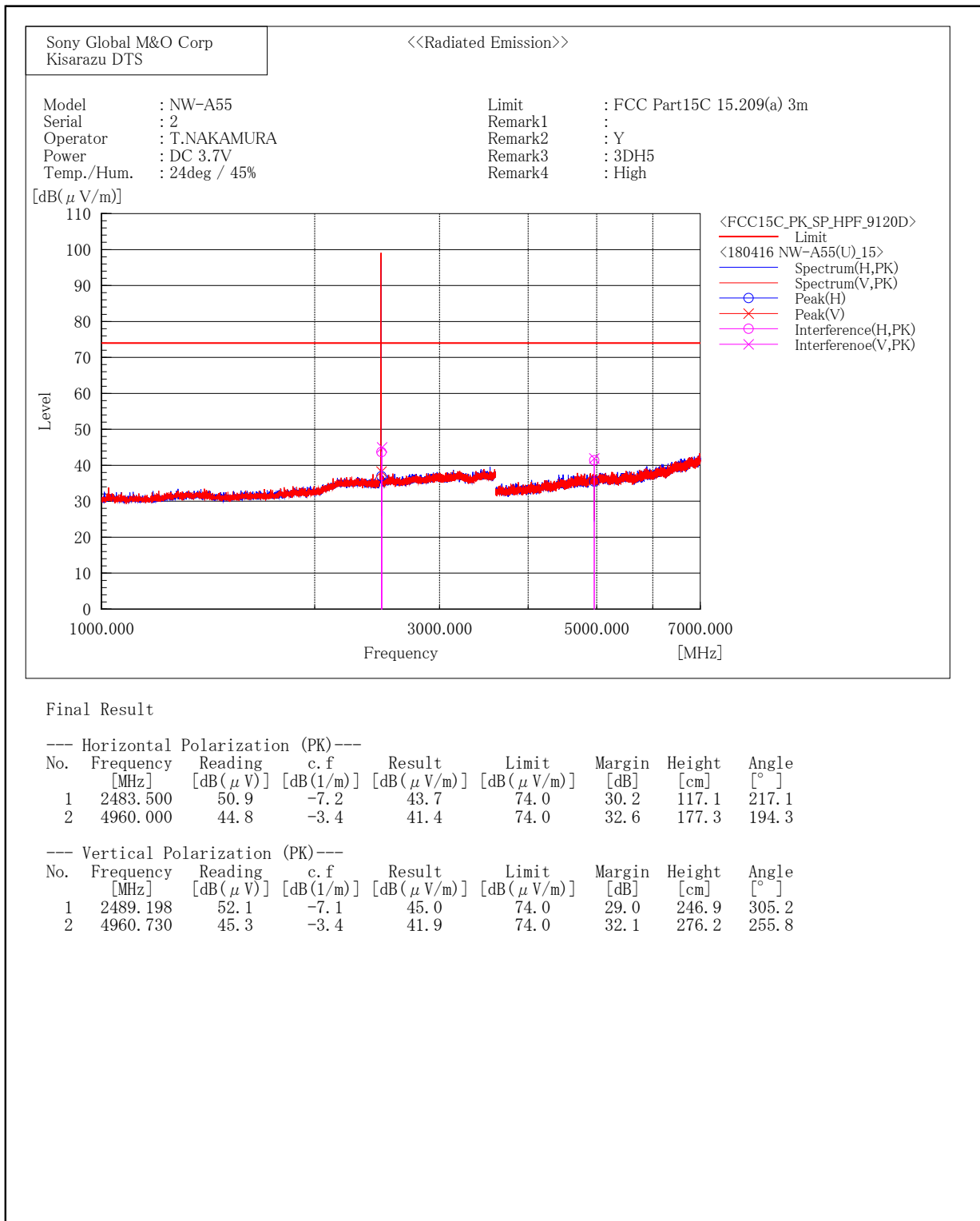
[EDR( 3DH5 )/2402MHz]



[EDR( 3DH5 )/2441MHz]

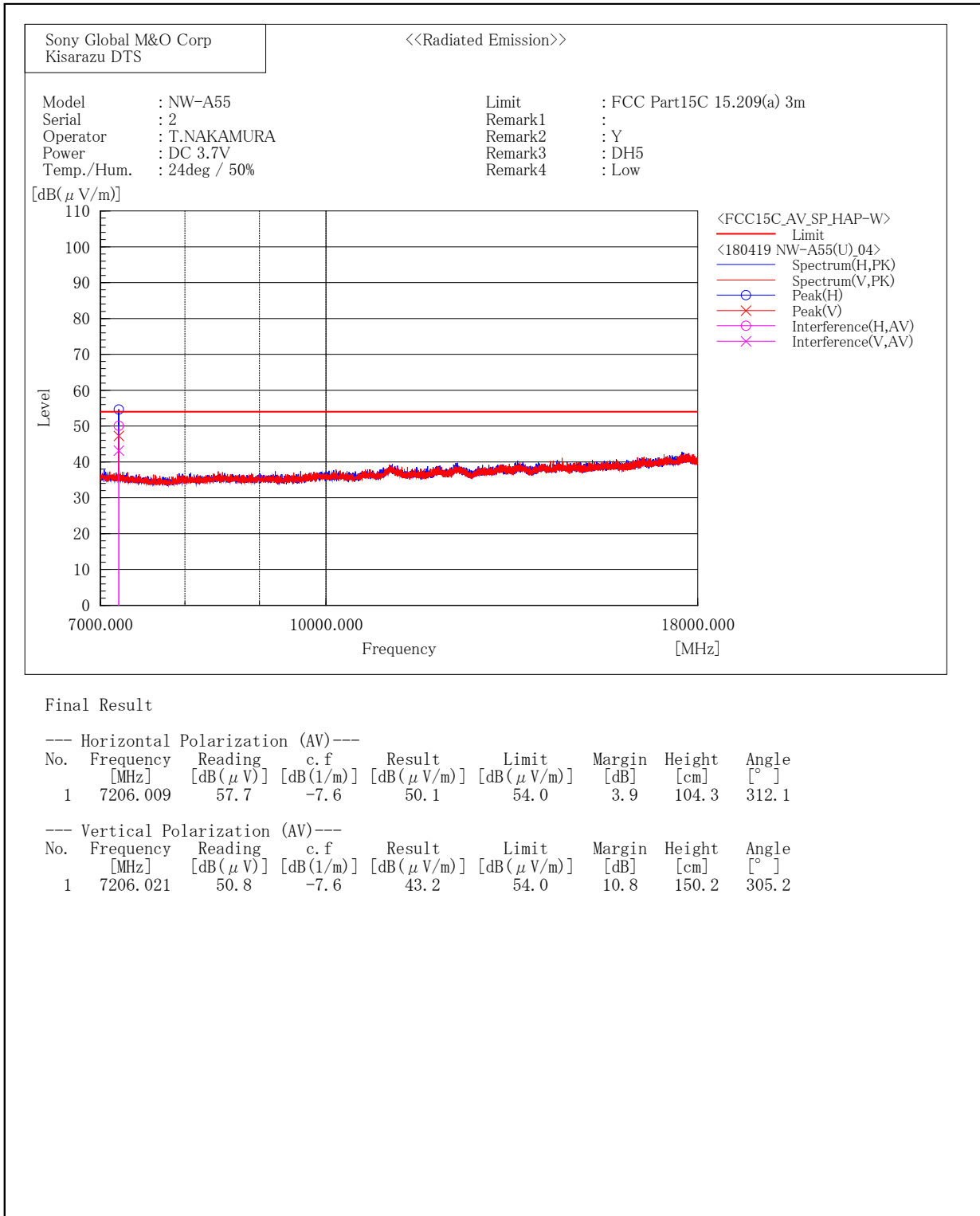


[EDR( 3DH5 )/2480MHz]

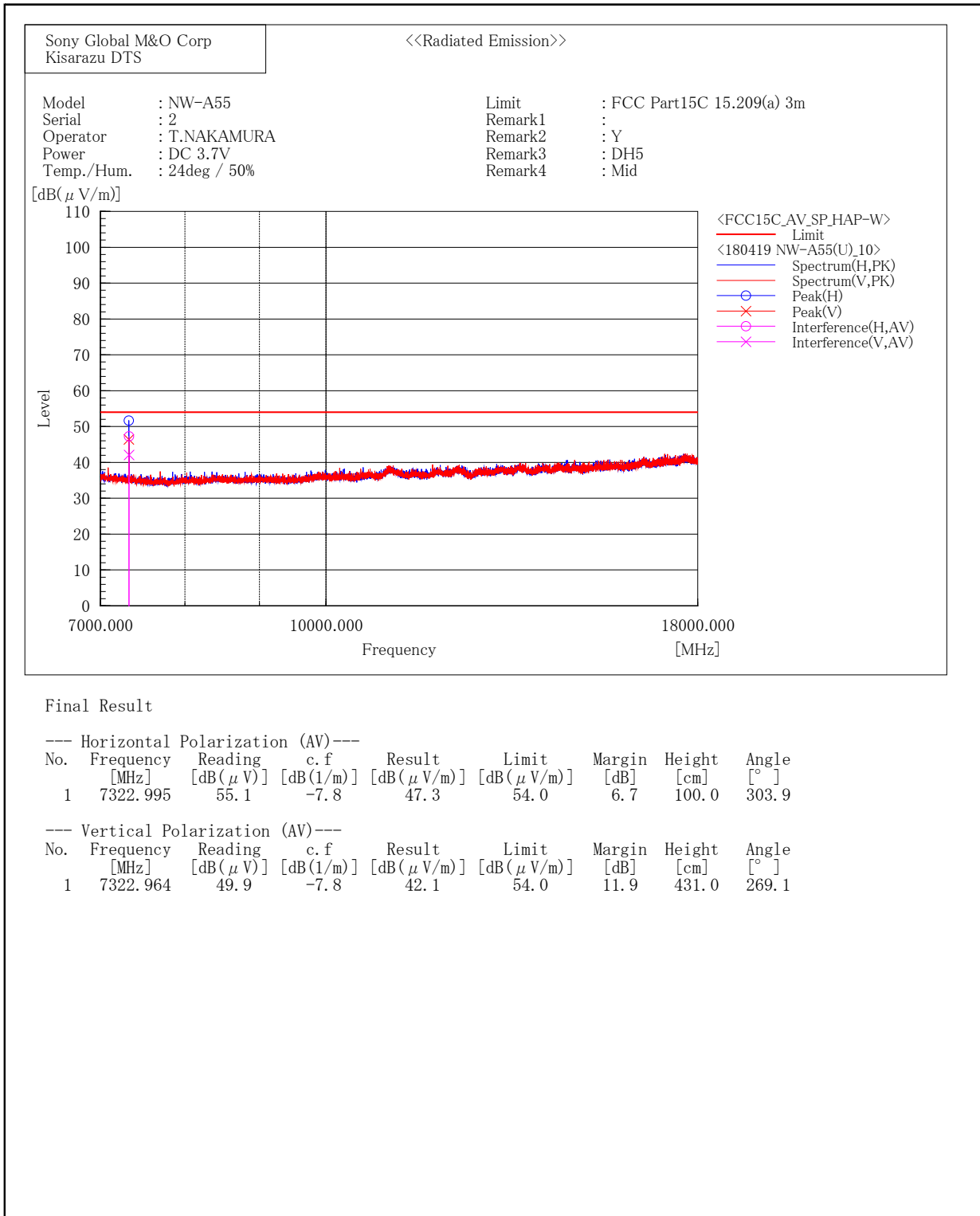


6 GHz - 18 GHz

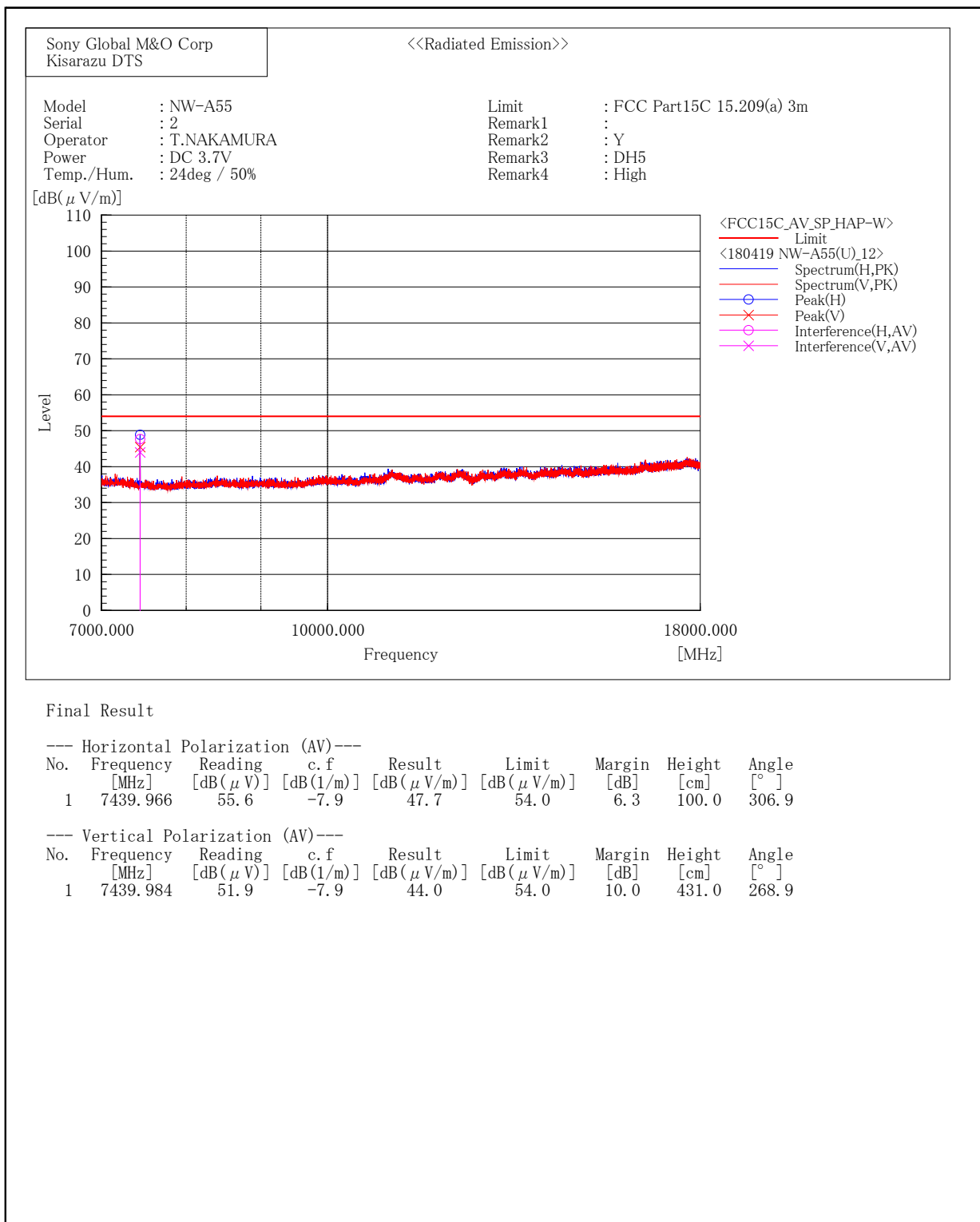
[BDR( DH5 )/2402MHz]



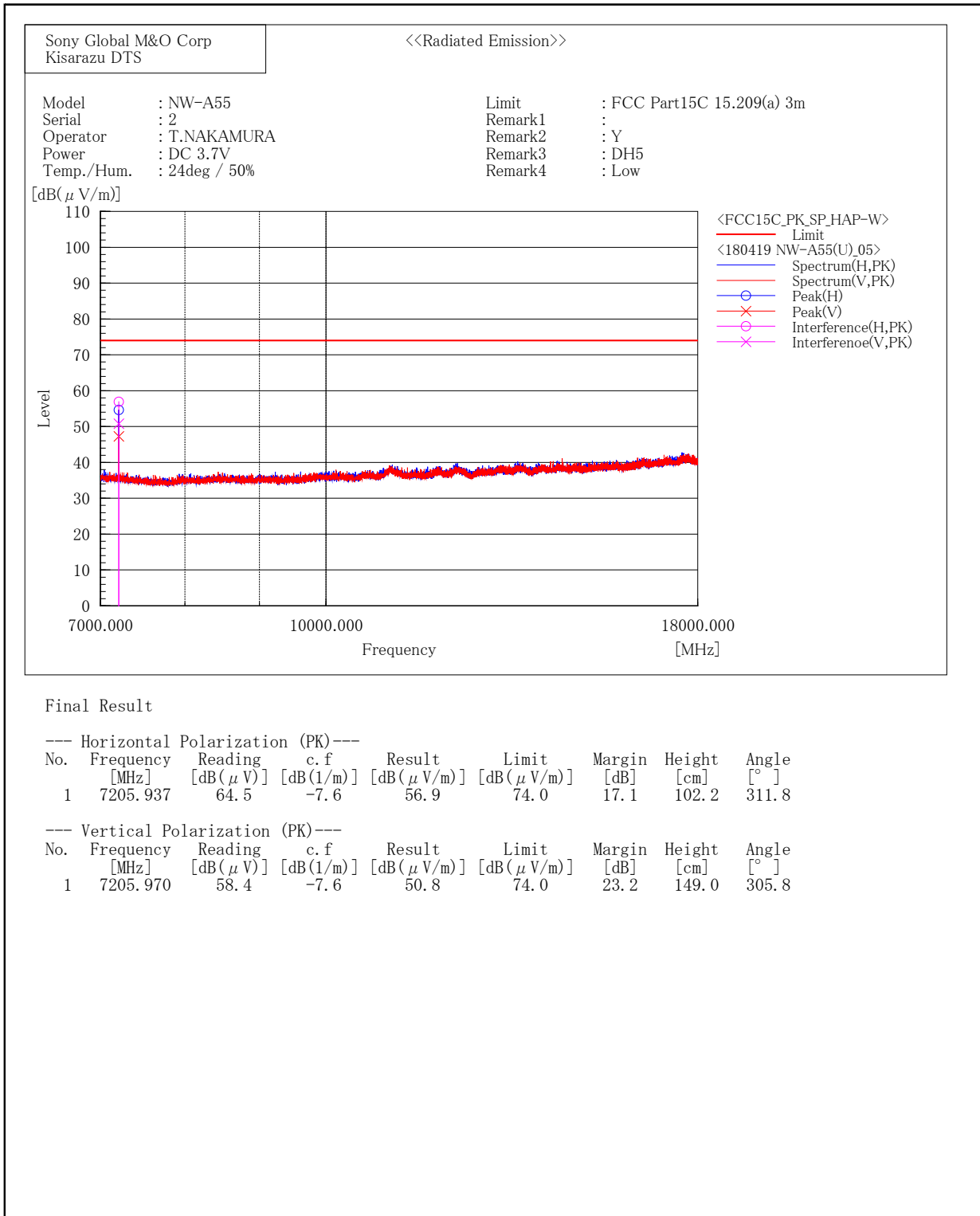
[BDR( DH5 )/2441MHz]



[BDR( DH5 )/2480MHz]

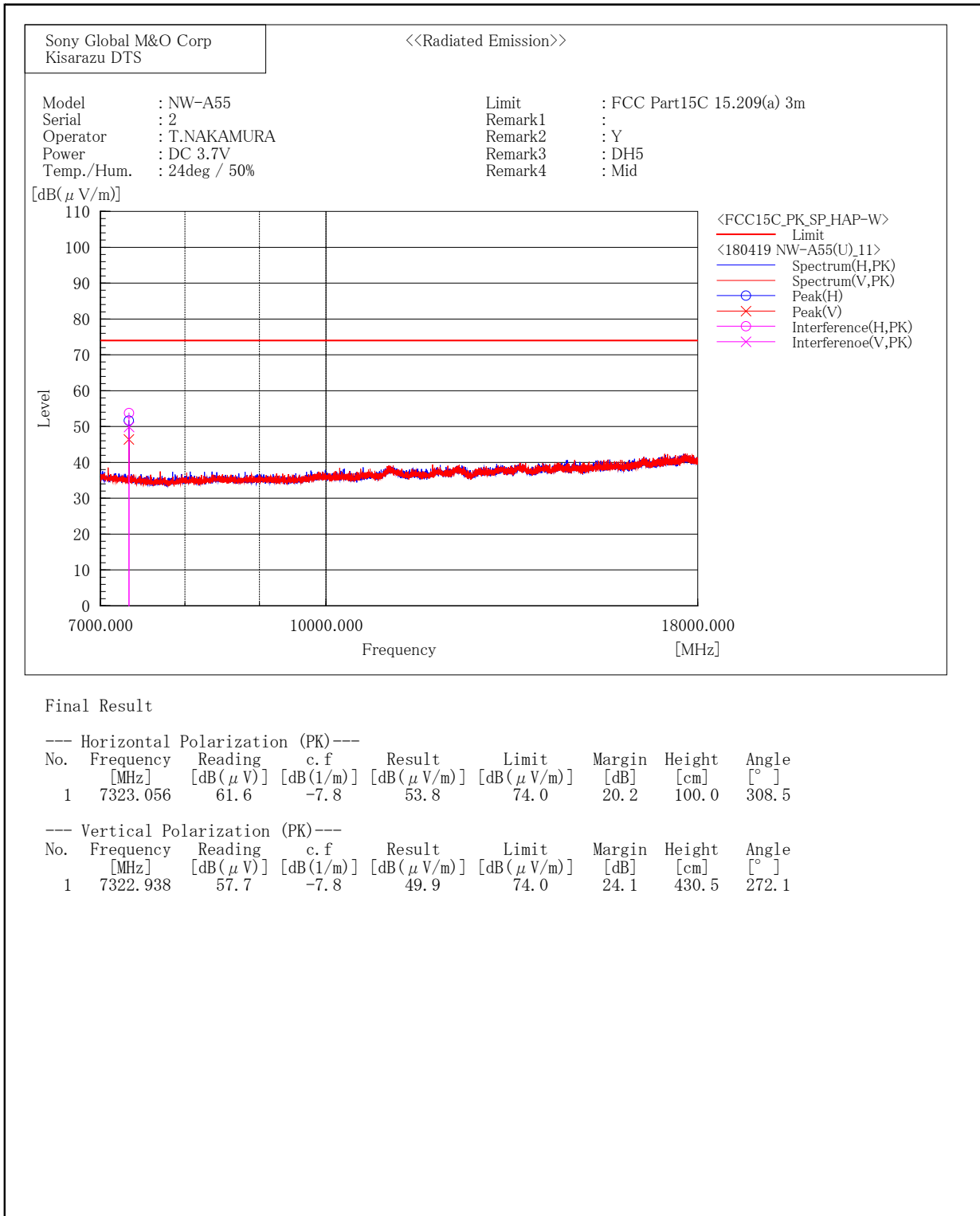


[BDR( DH5 )/2402MHz]

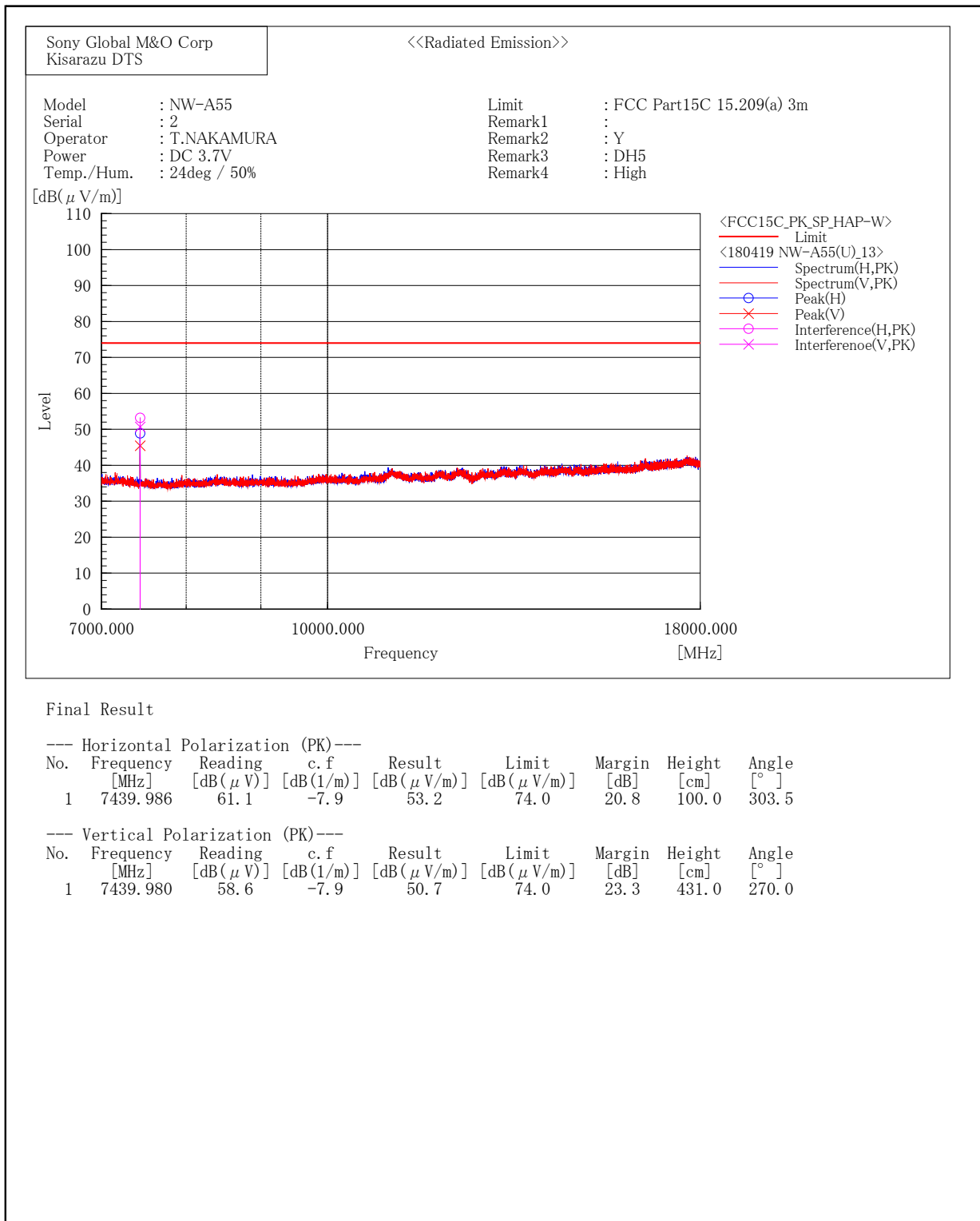




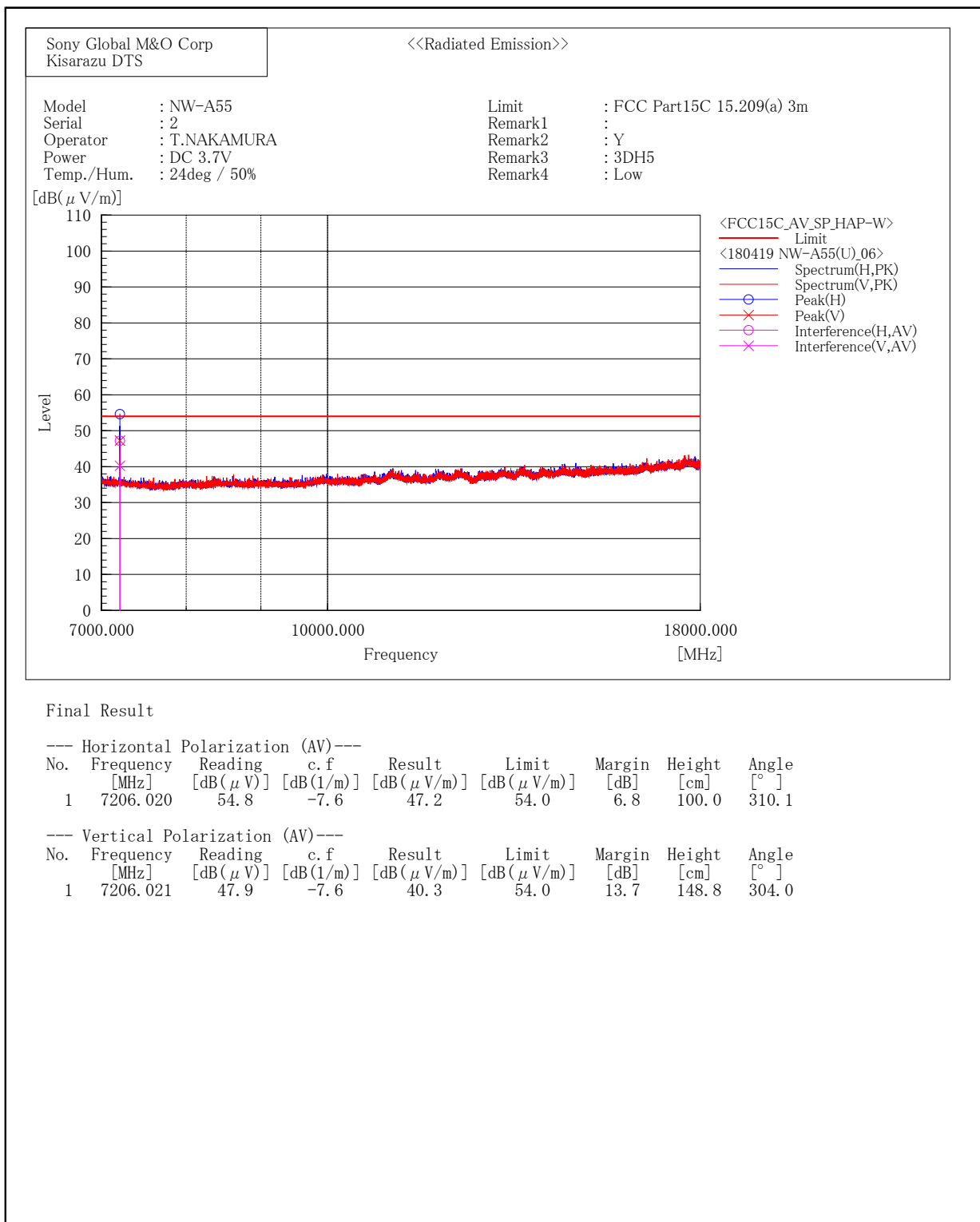
[BDR( DH5 )/2441MHz]



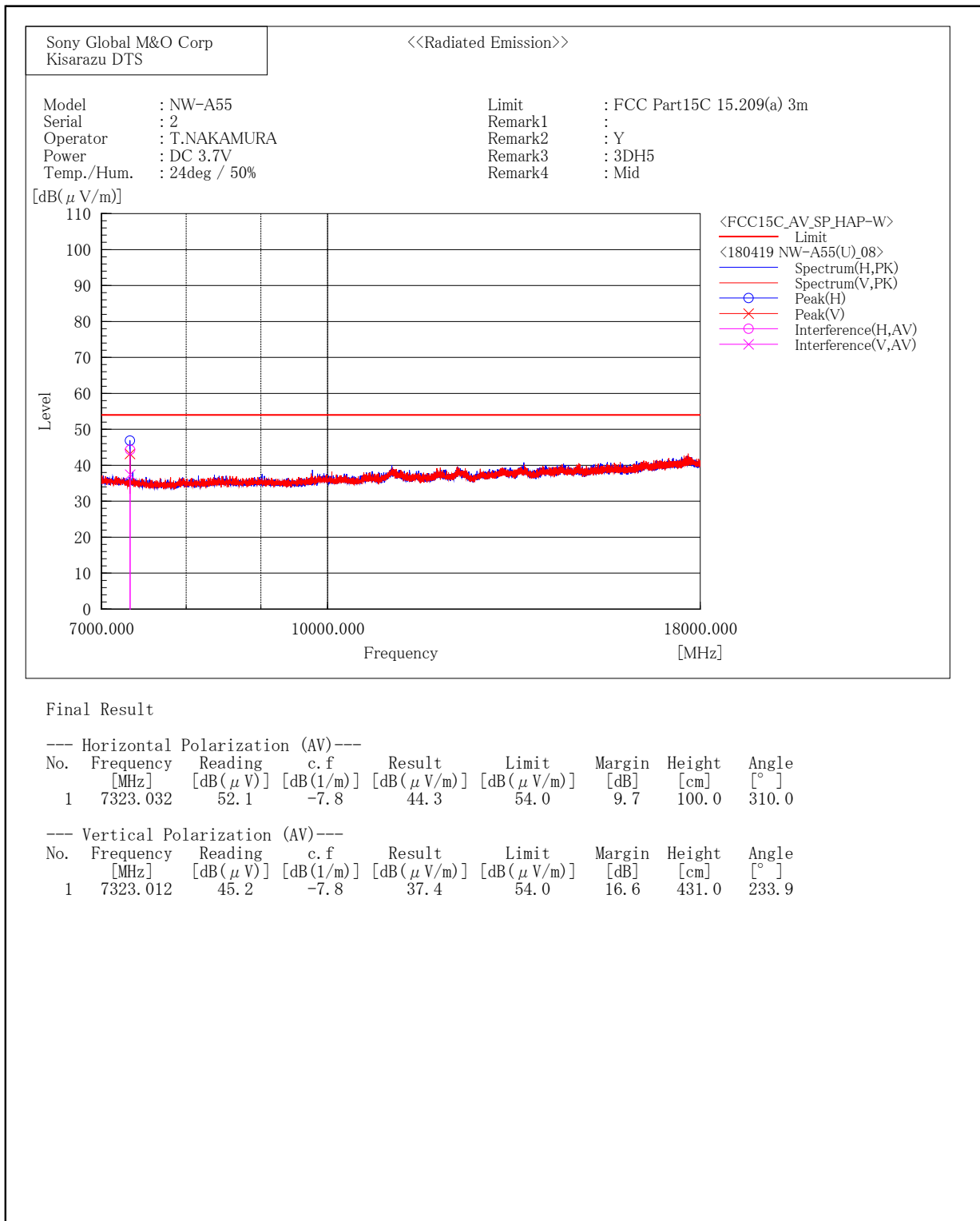
[BDR( DH5 )/2480MHz]



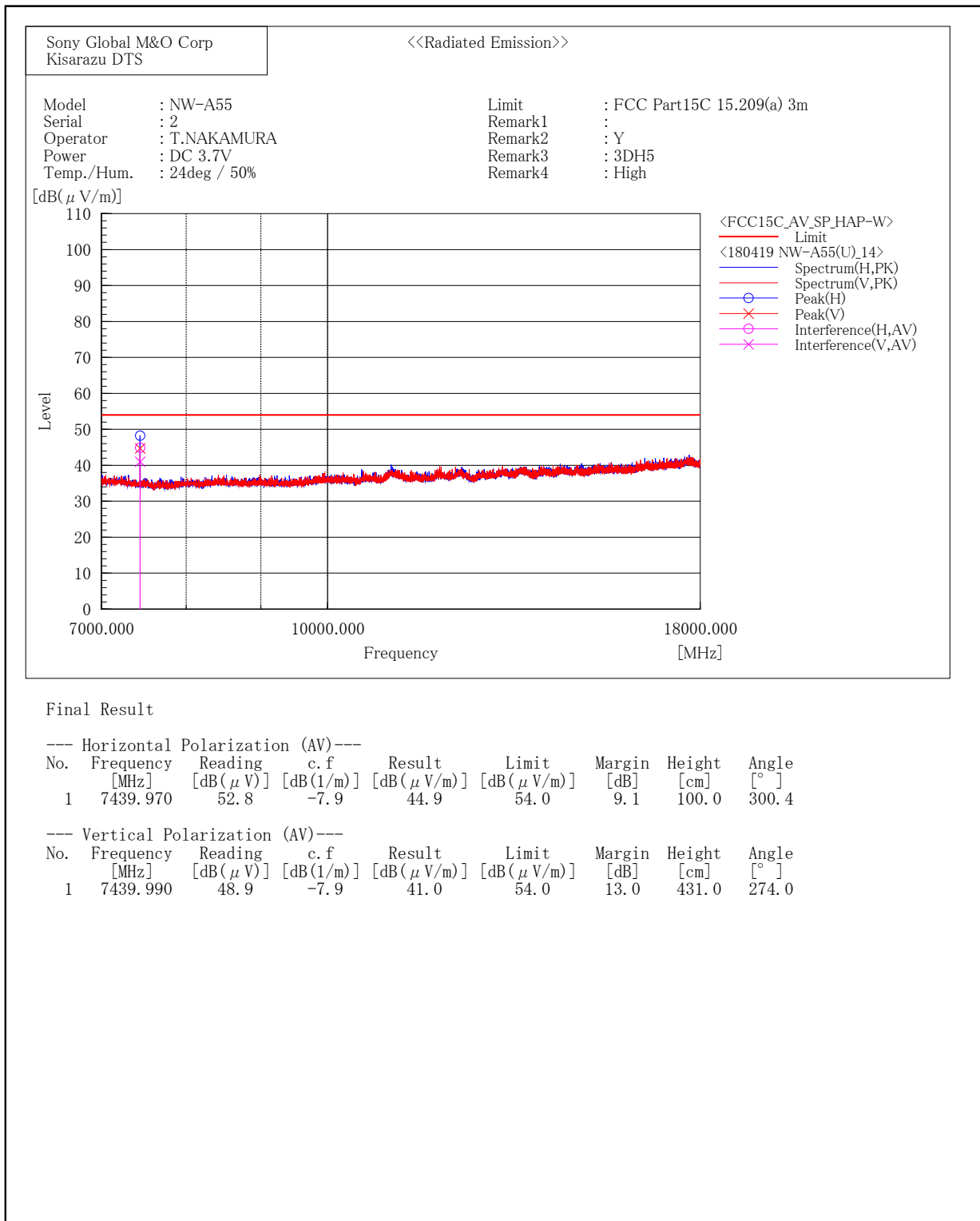
[EDR( 3DH5 )/2402MHz]



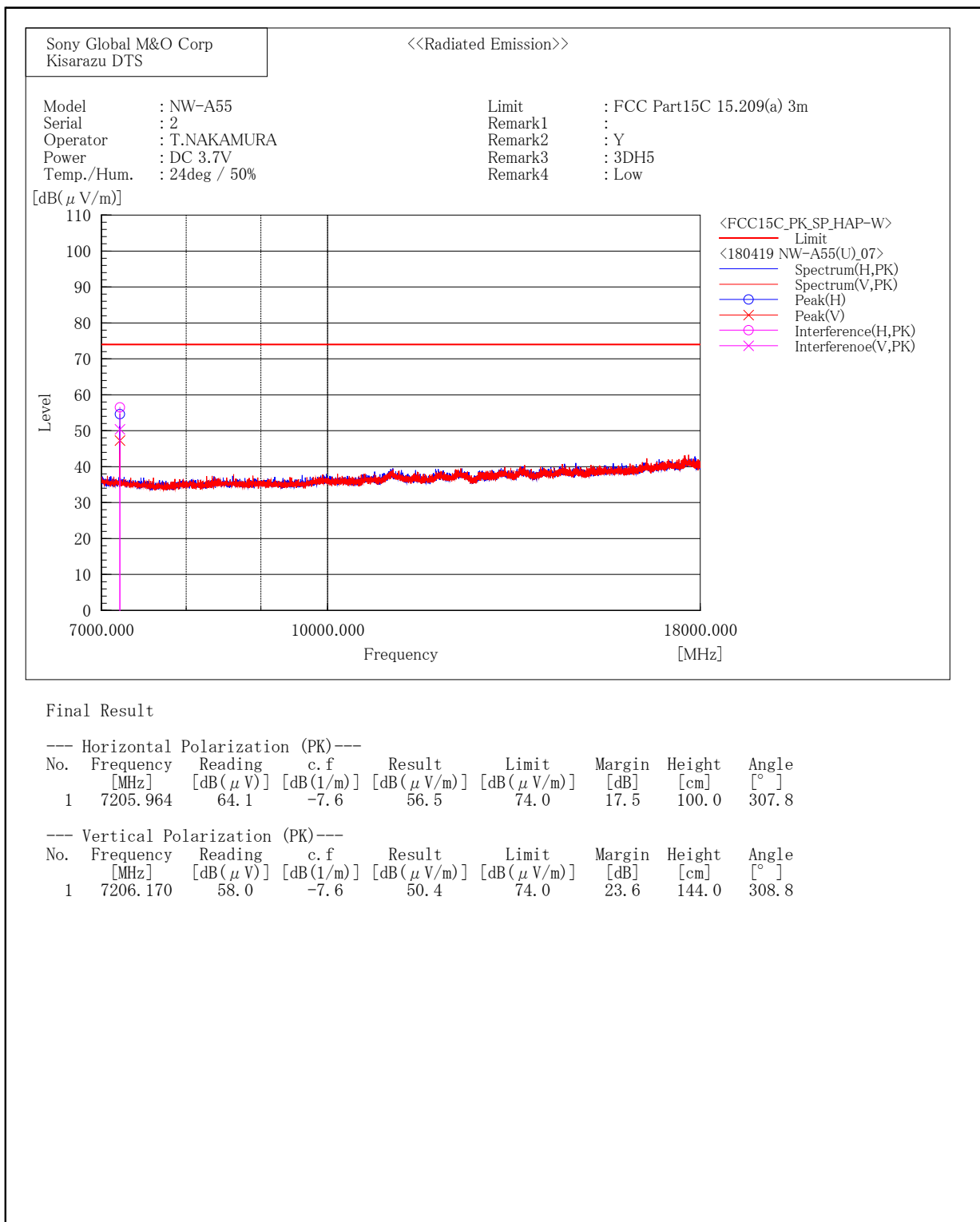
[EDR( 3DH5 )/2441MHz]



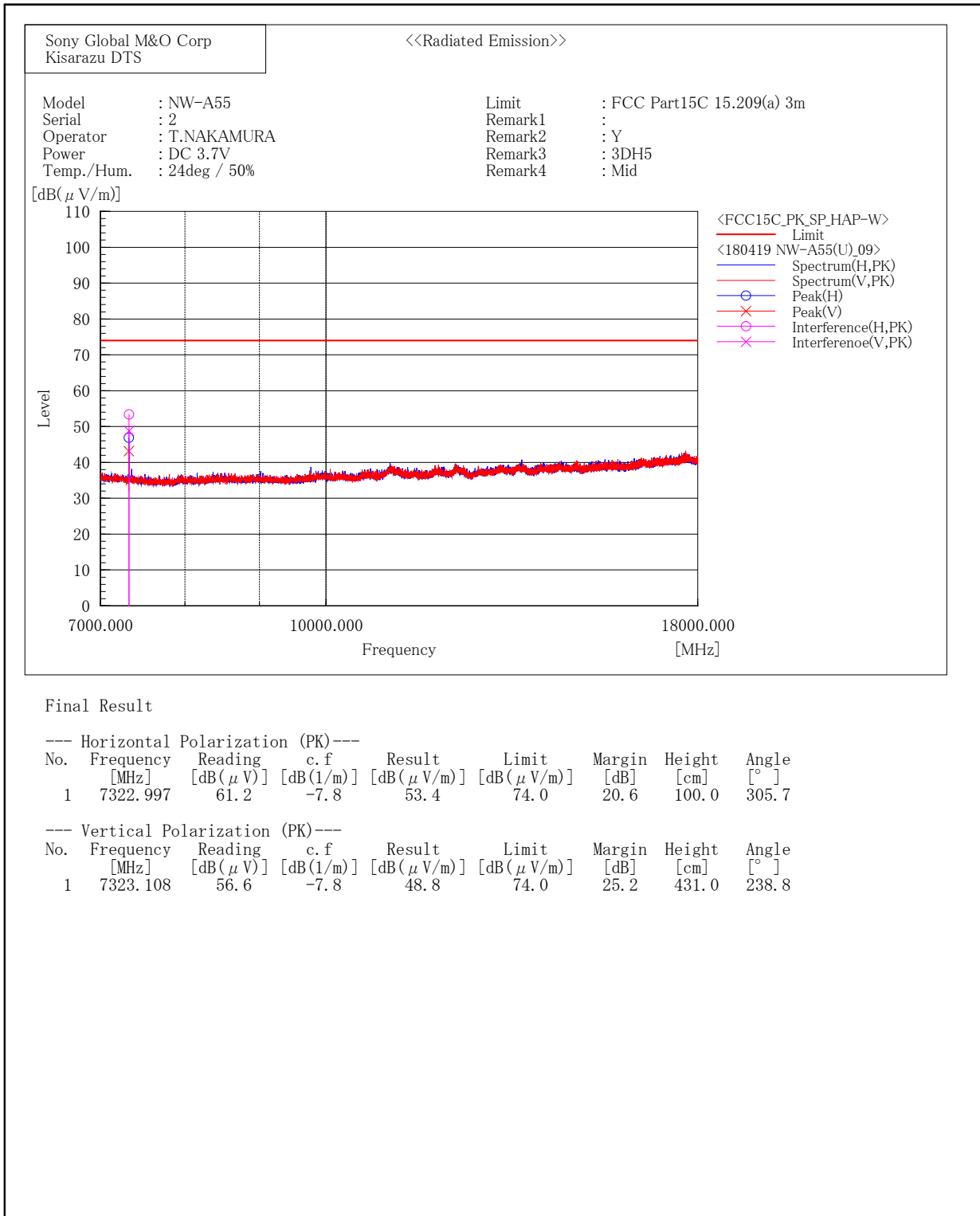
[EDR( 3DH5 )/2480MHz]



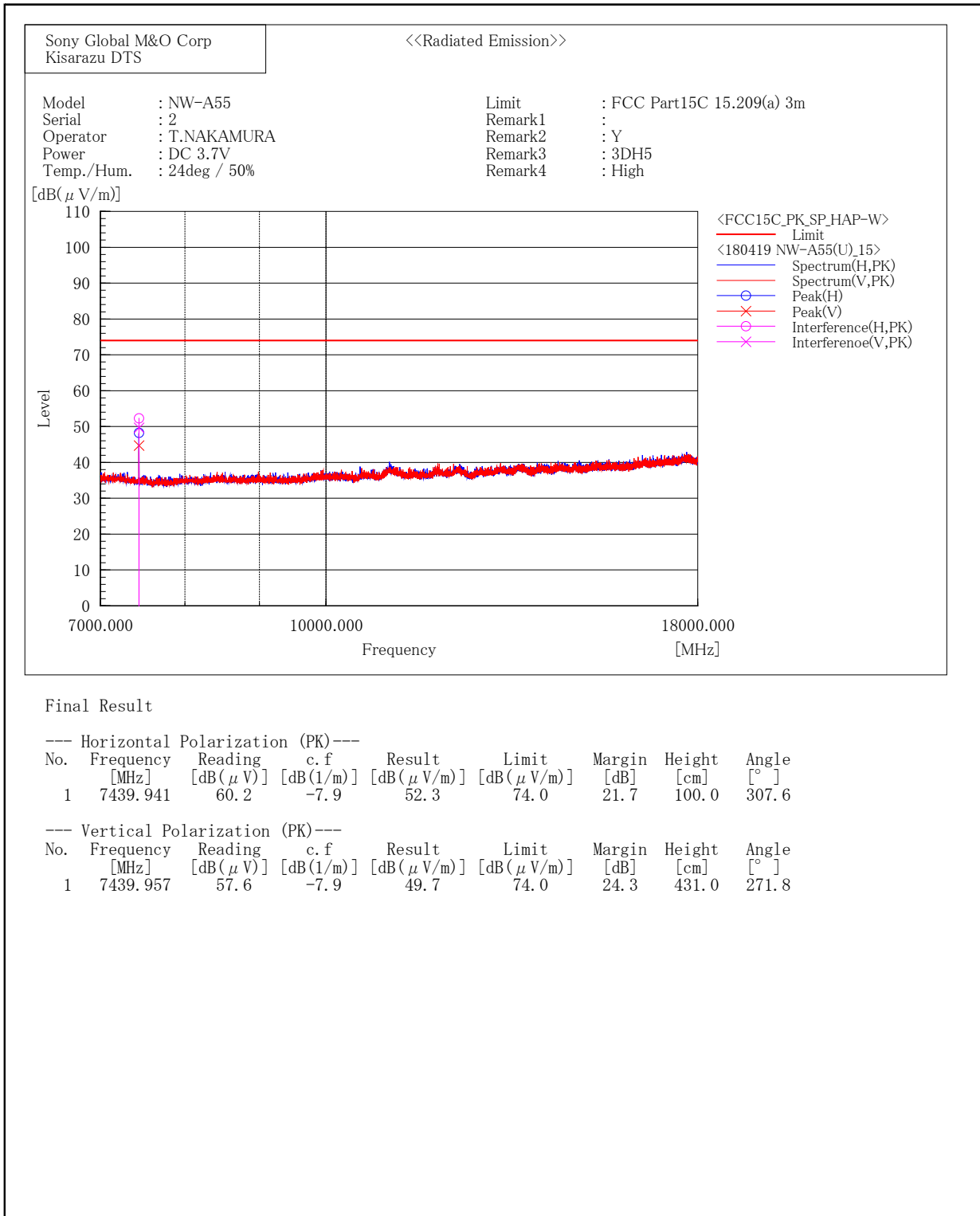
[EDR( 3DH5 )/2402MHz]



[EDR( 3DH5 )/2441MHz]



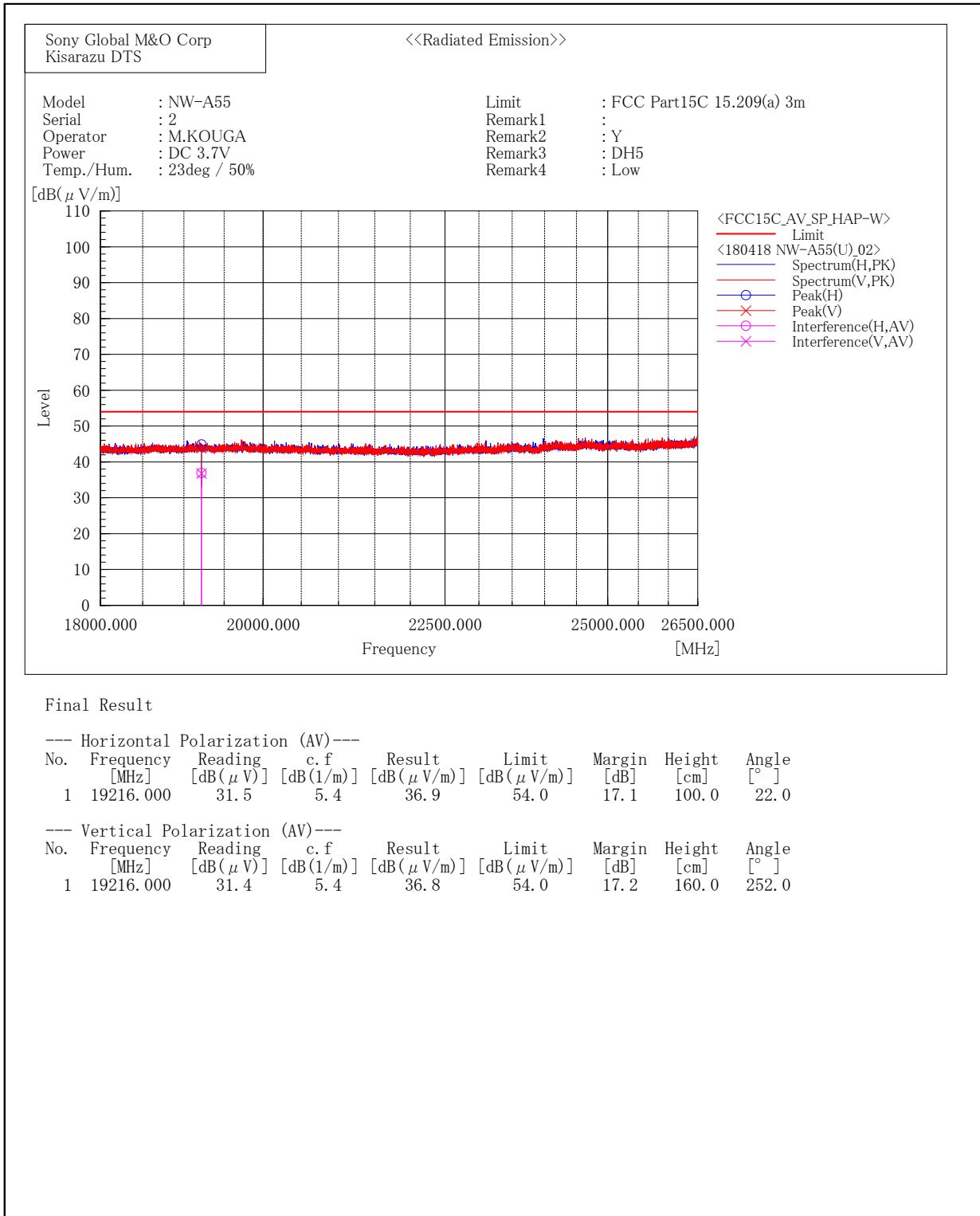
[EDR( 3DH5 )/2480MHz]



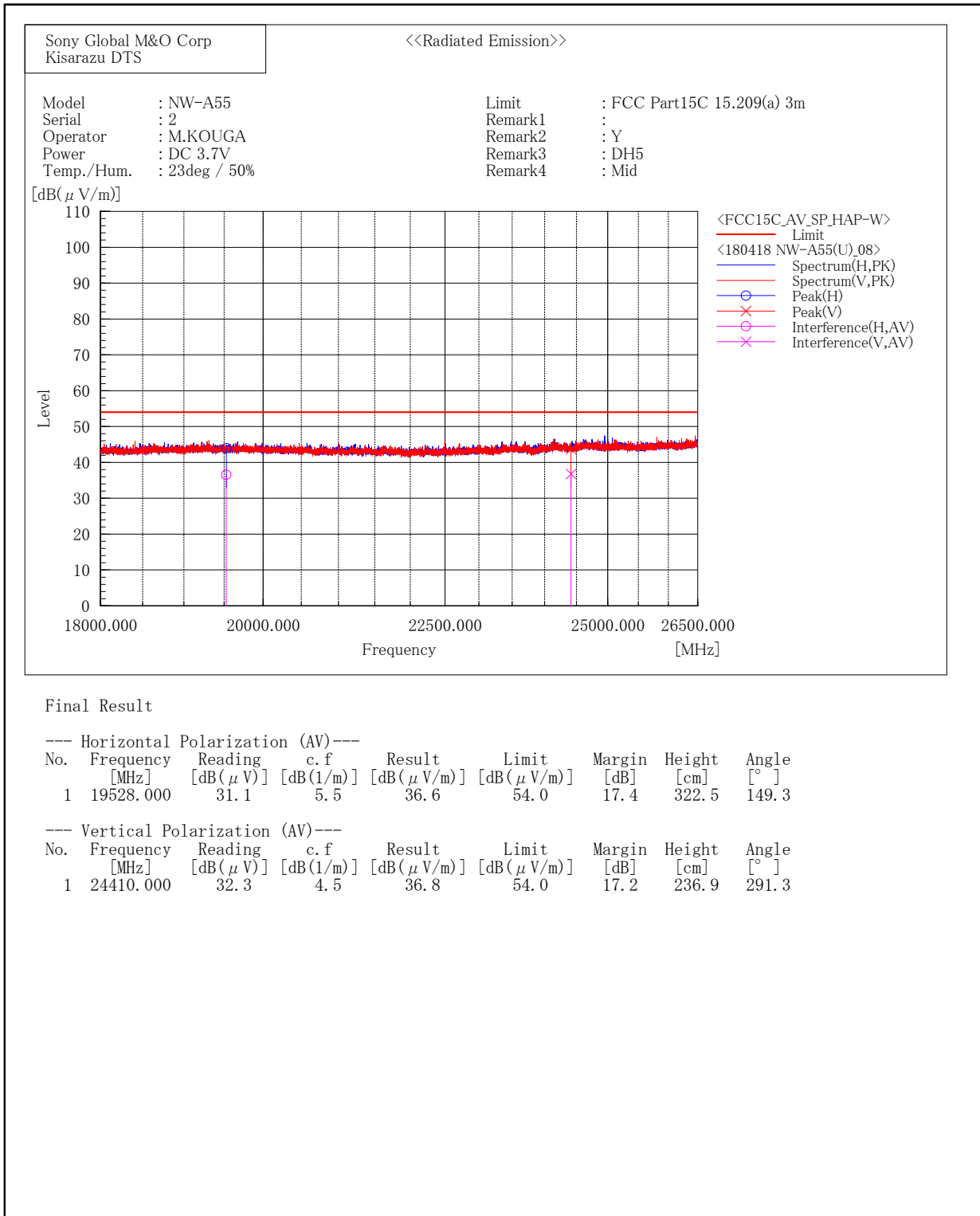


**18 GHz – 24.835 GHz**

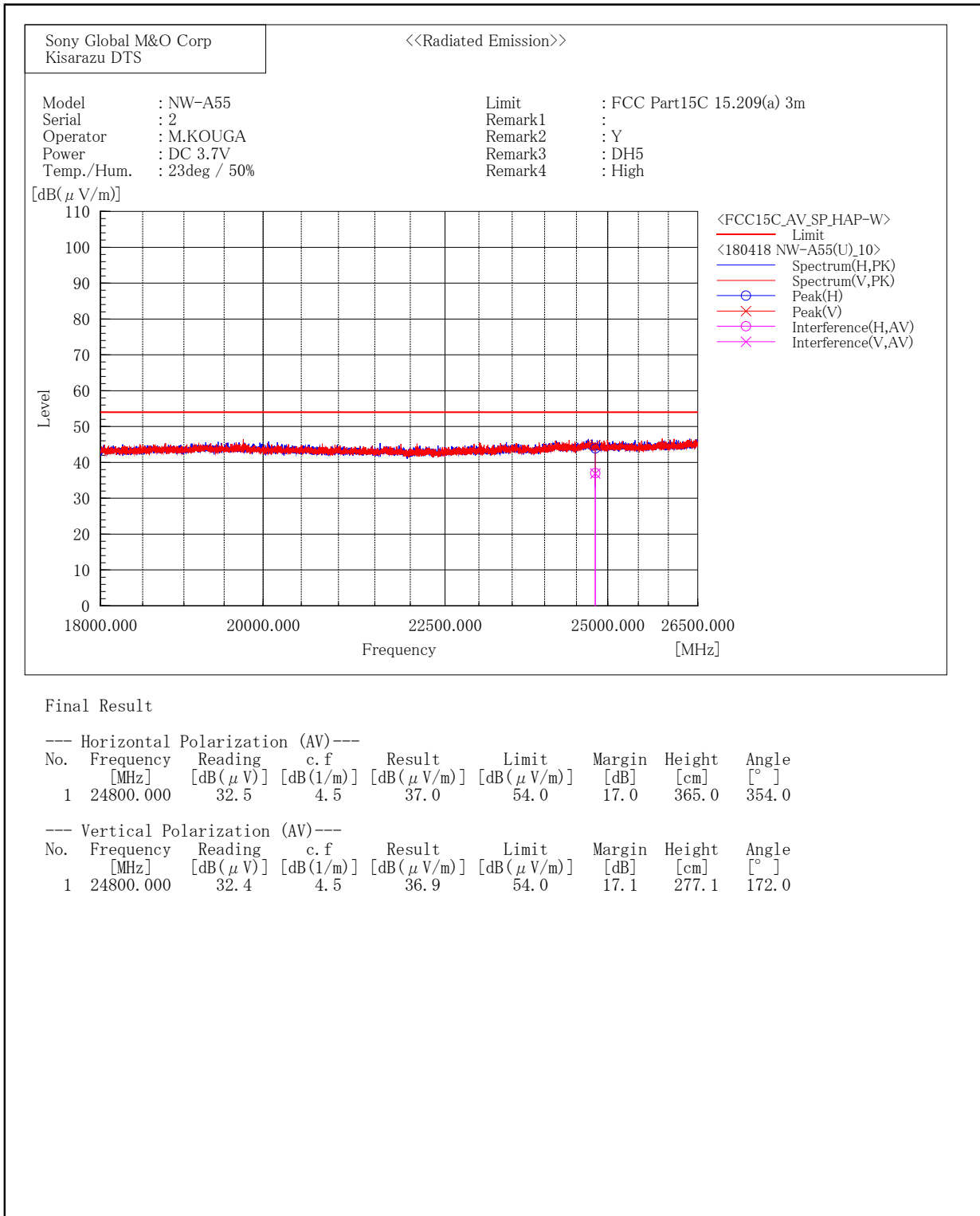
[BDR( DH5 )/2402MHz]



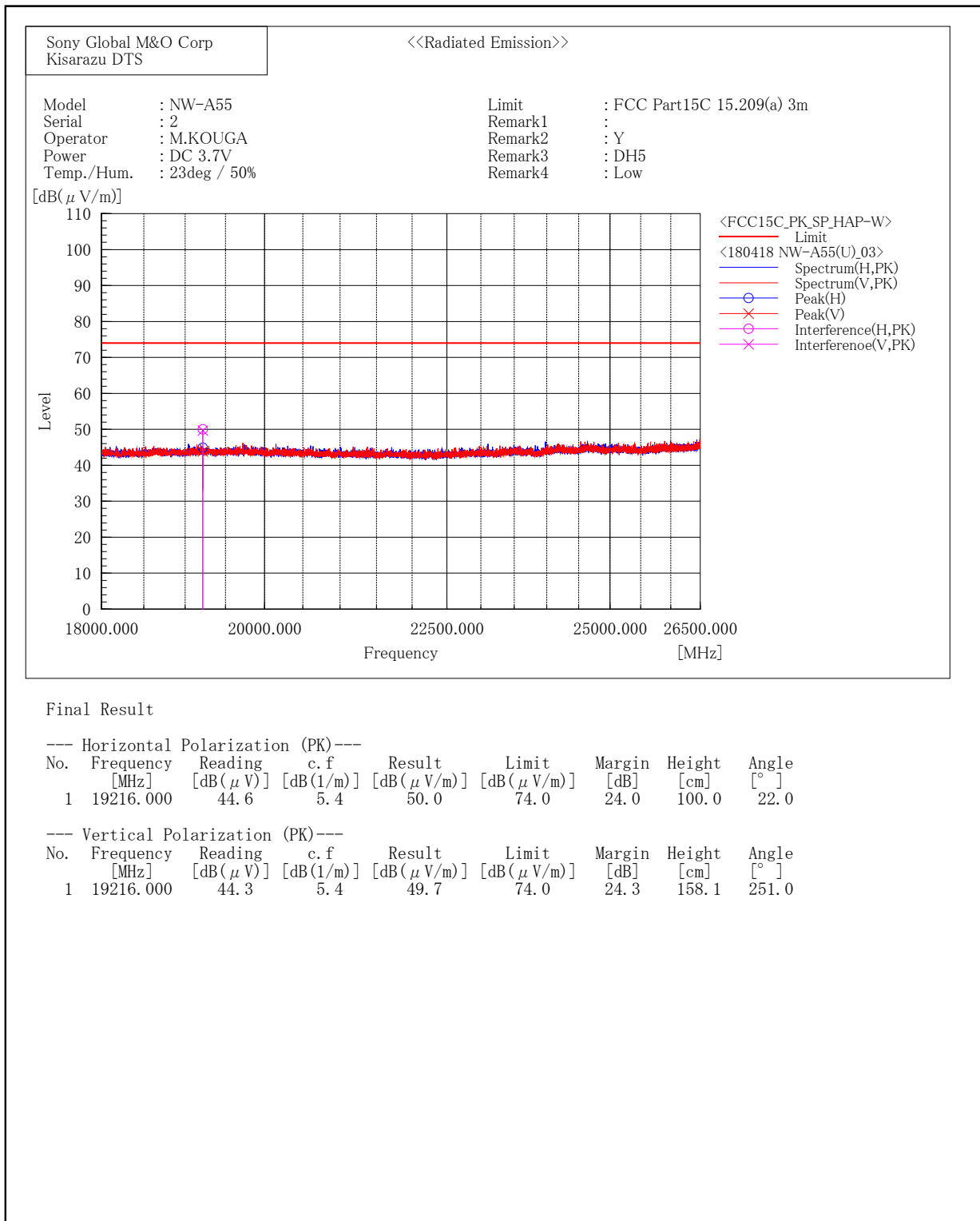
[BDR( DH5 )/2441MHz]



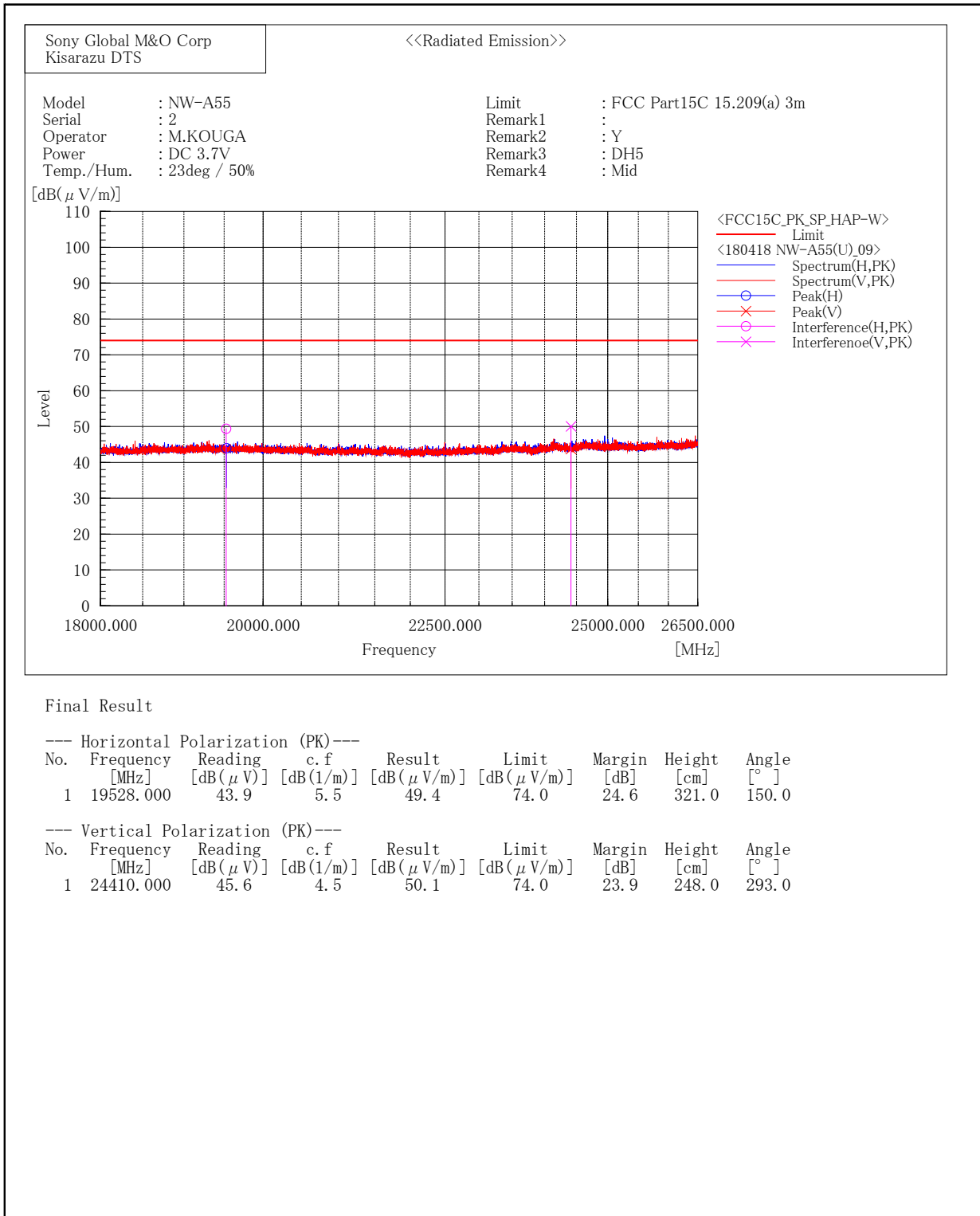
[BDR( DH5 )/2480MHz]



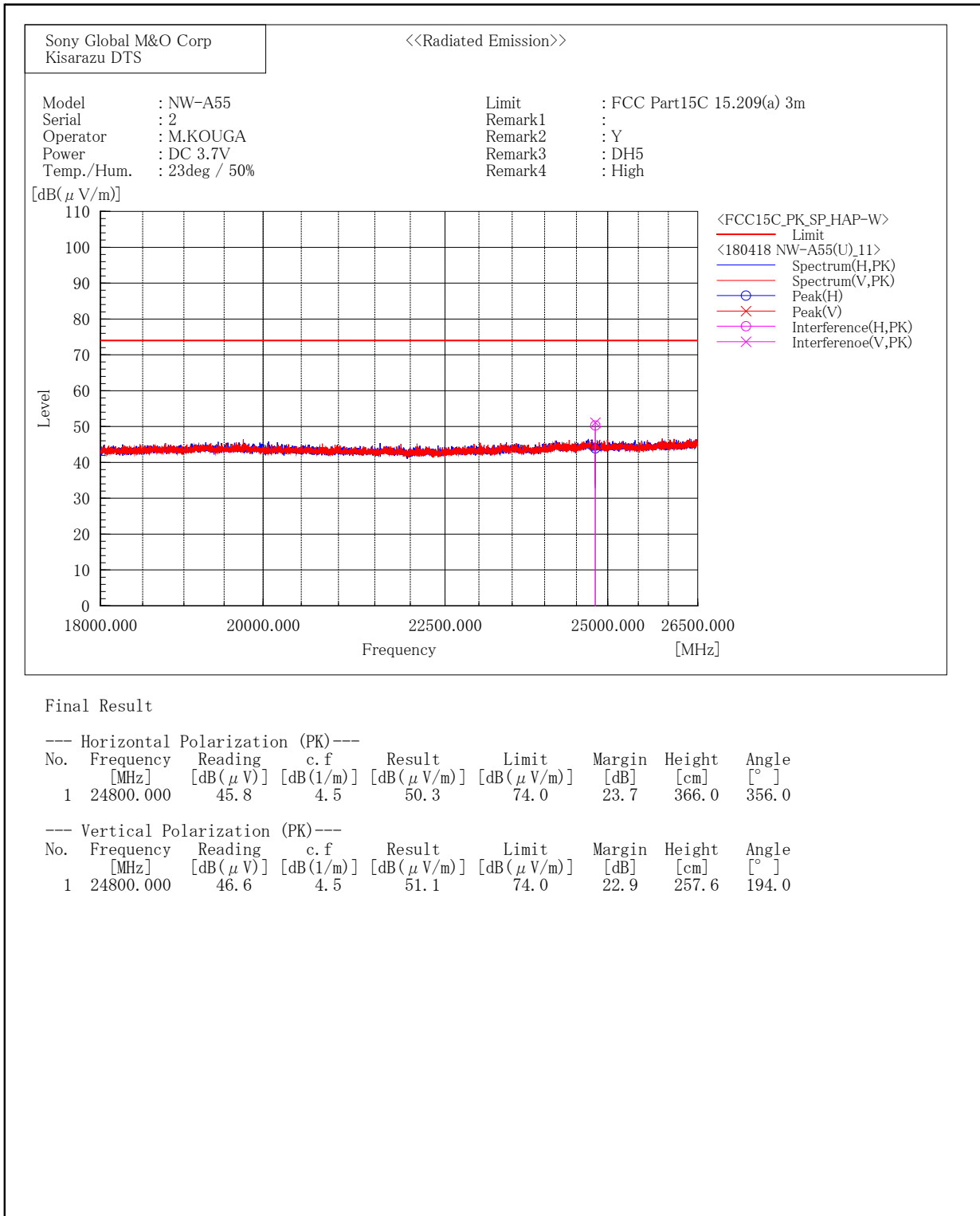
[BDR( DH5 )/2402MHz]



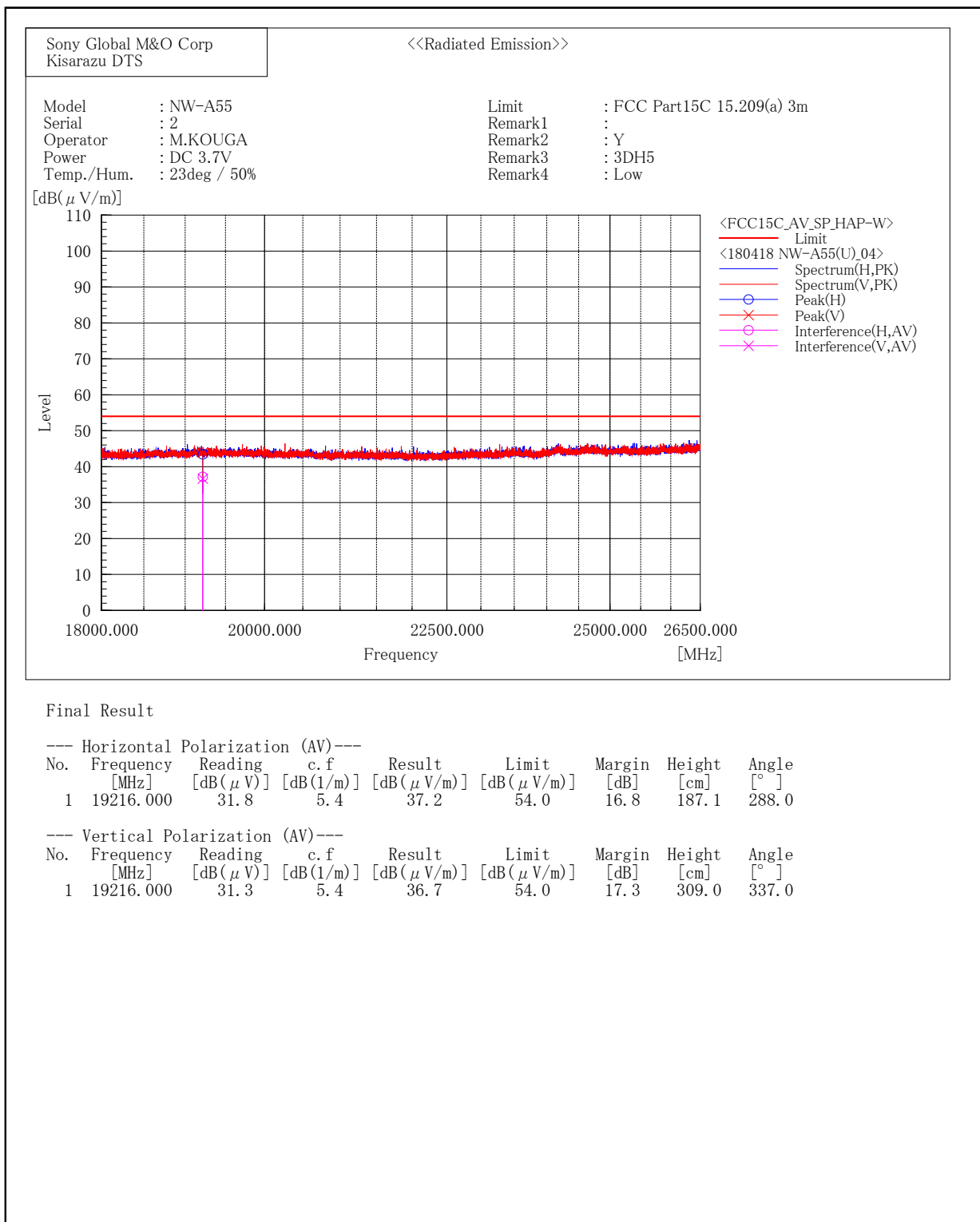
[BDR( DH5 )/2441MHz]



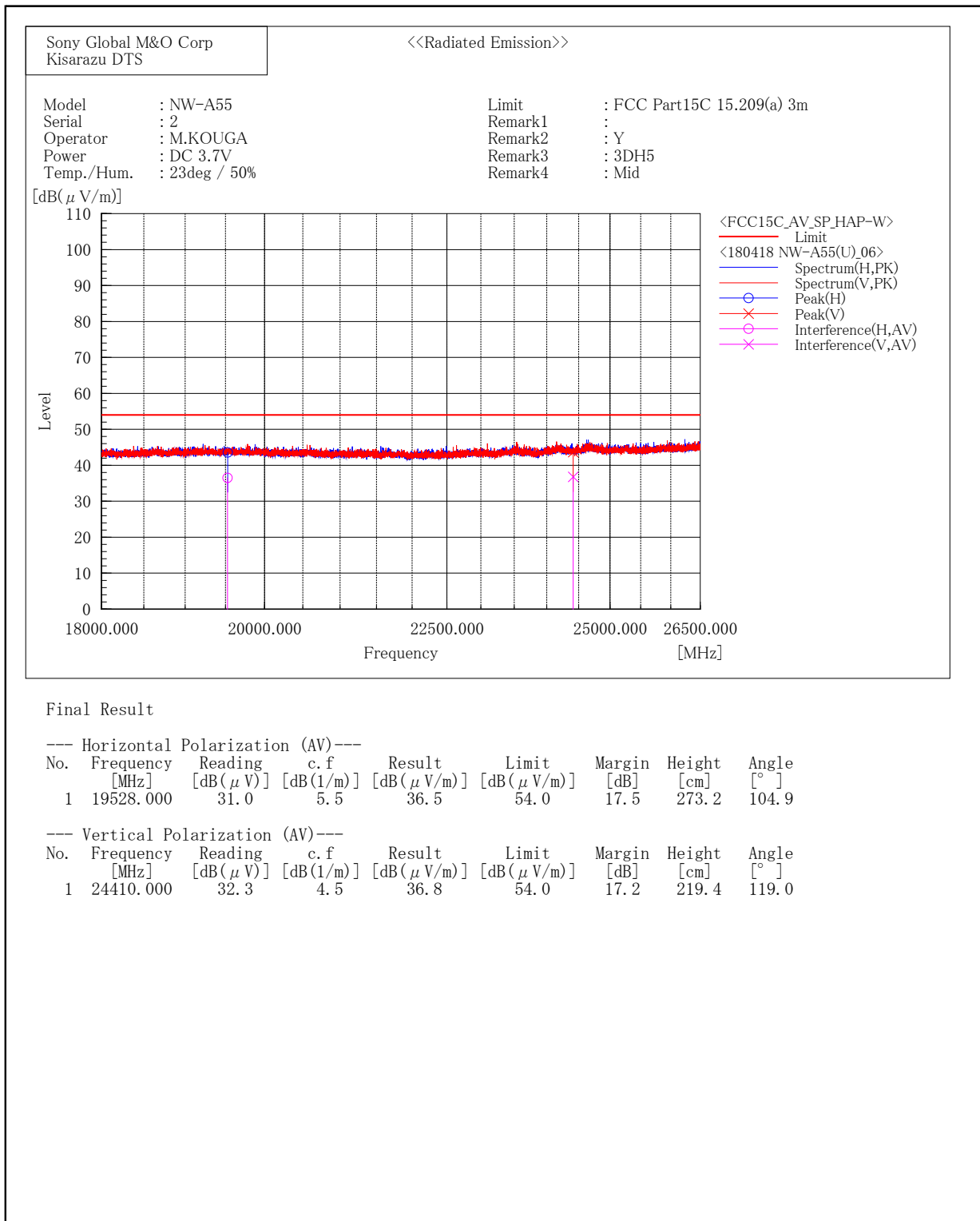
[BDR( DH5 )/2480MHz]



[EDR( 3DH5 )/2402MHz]

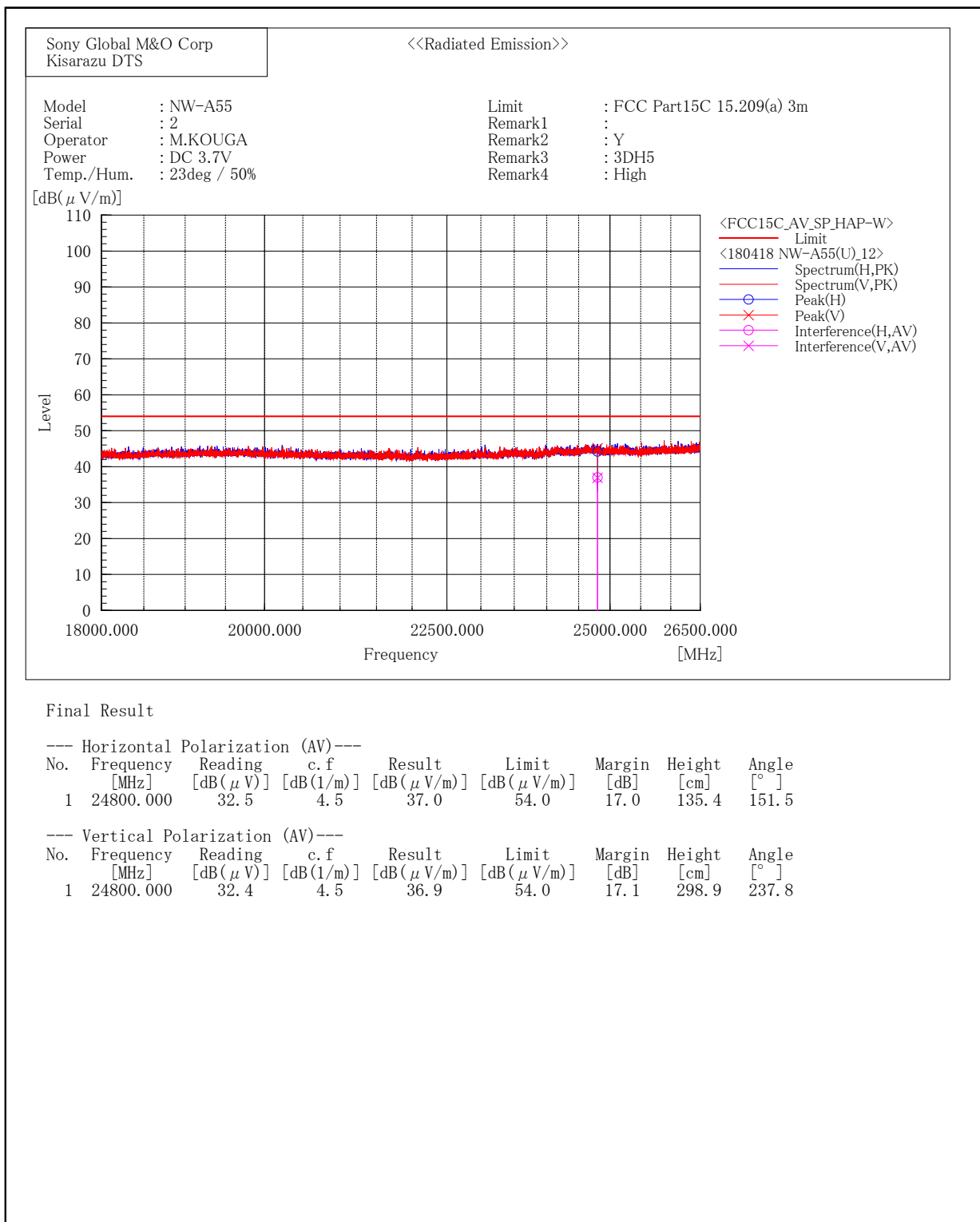


[EDR( 3DH5 )/2441MHz]

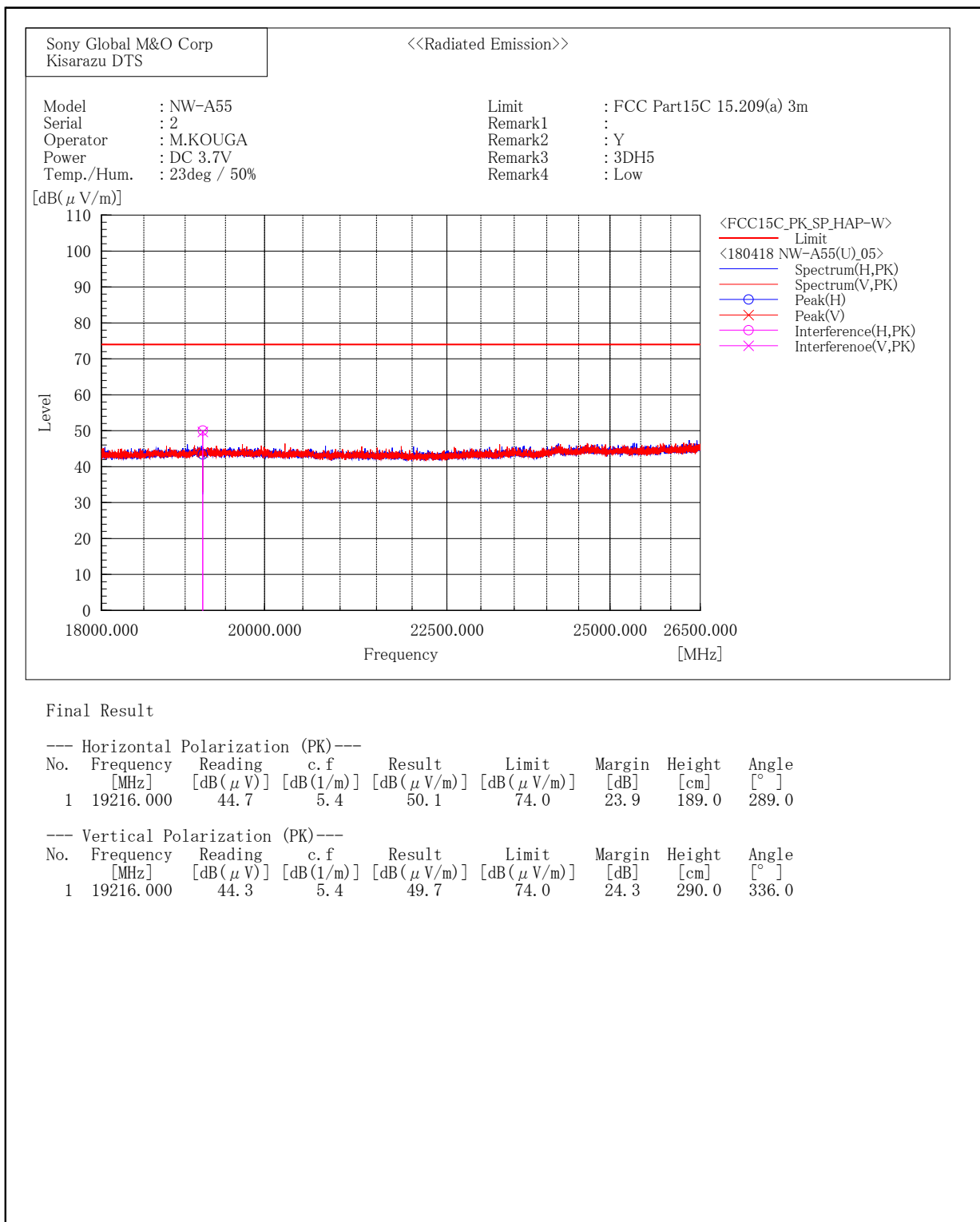




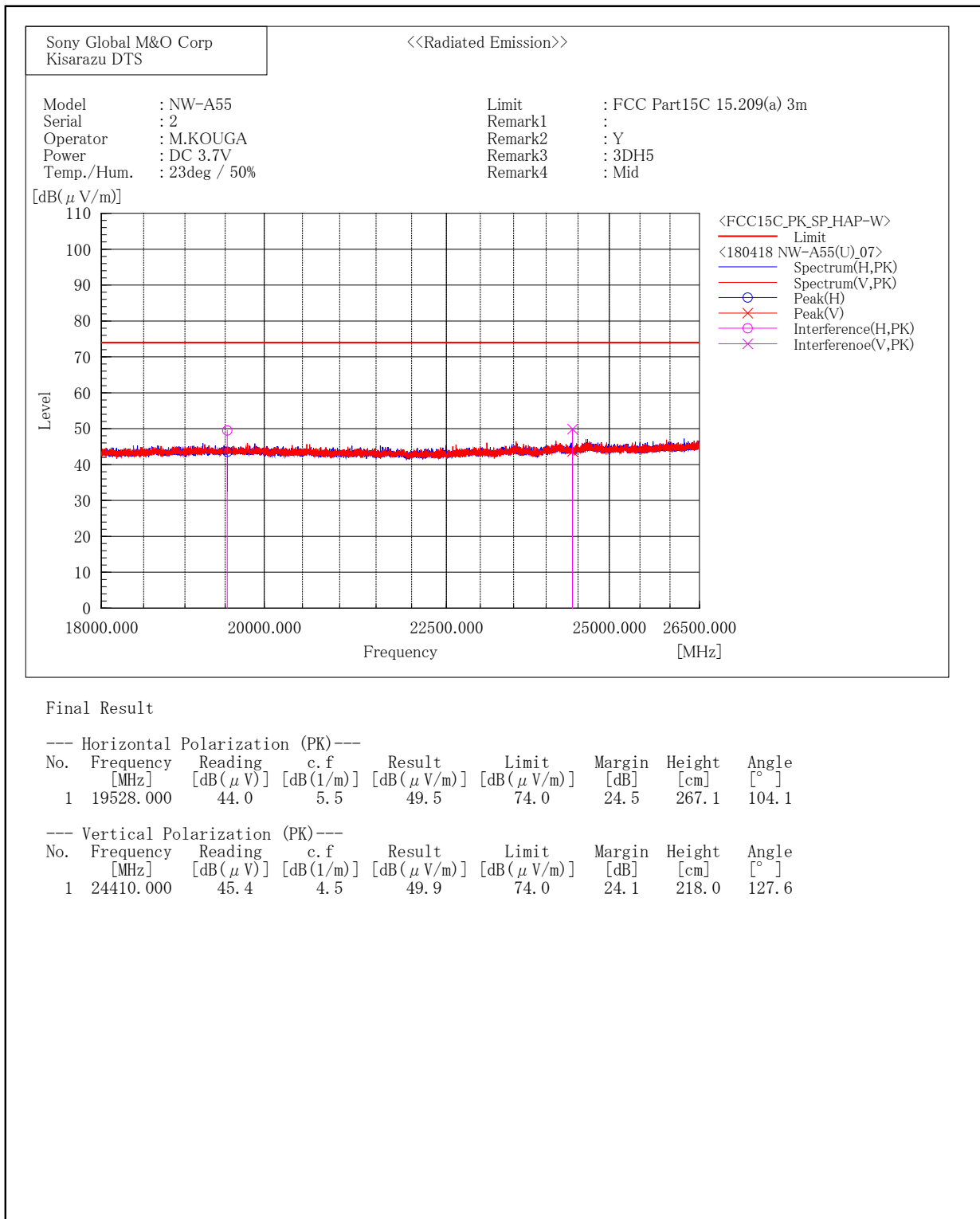
[EDR( 3DH5 )/2480MHz]



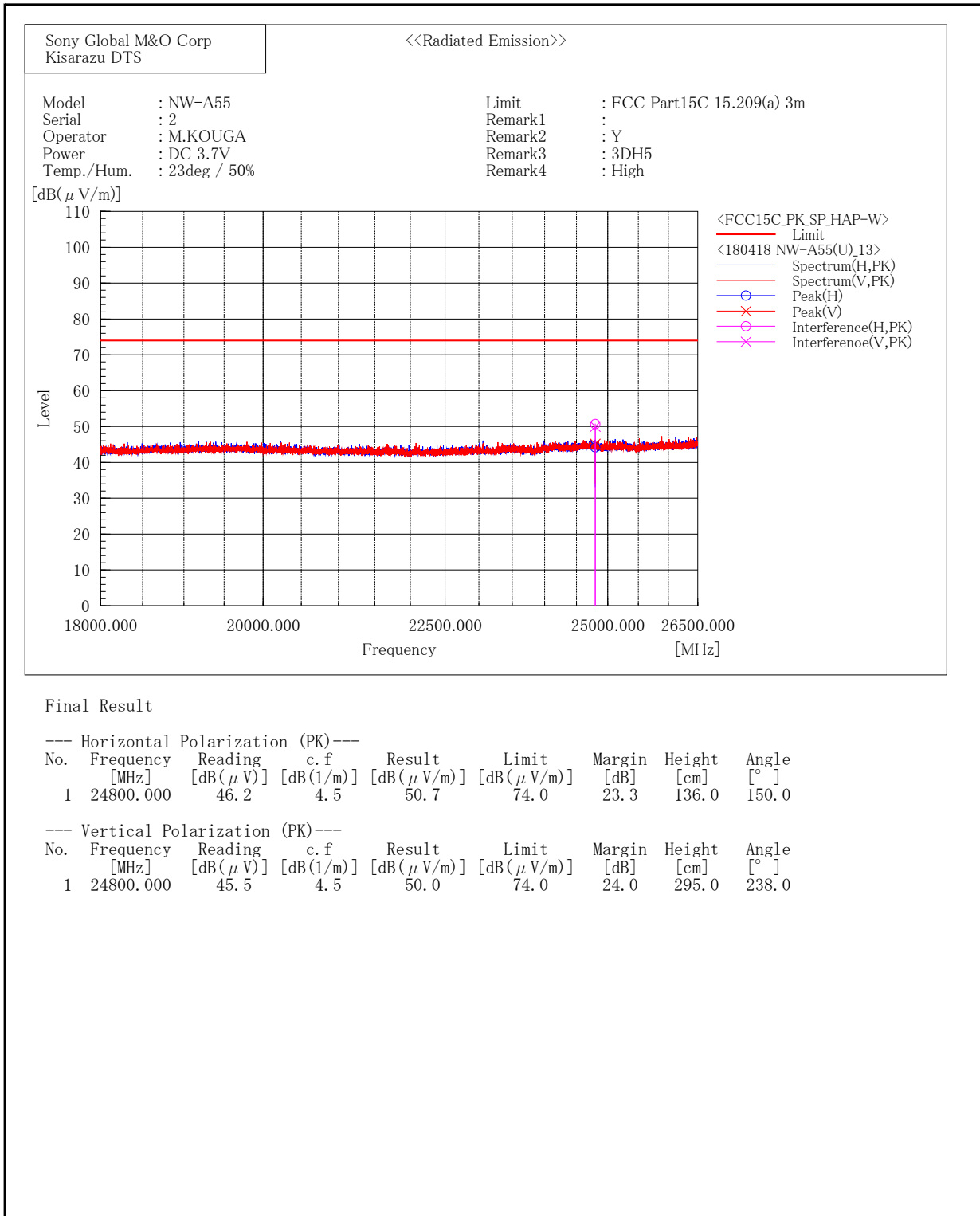
[EDR( 3DH5 )/2402MHz]



[EDR( 3DH5 )/2441MHz]



[EDR( 3DH5 )/2480MHz]



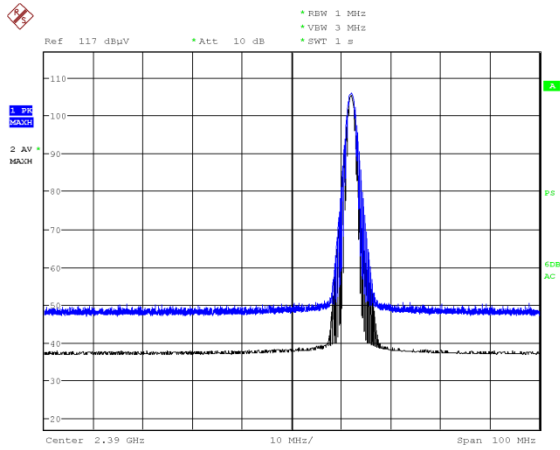
### 2.4GHz Restricted-Band Edge (Plot data)

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.

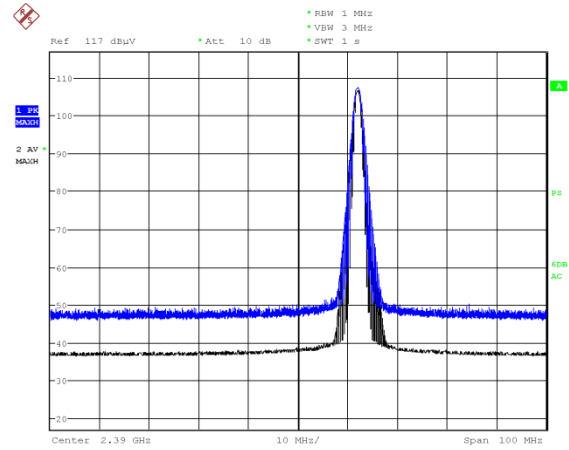
#### [BDR / 2402MHz]

Horizontal



Date: 16.APR.2018 18:29:29

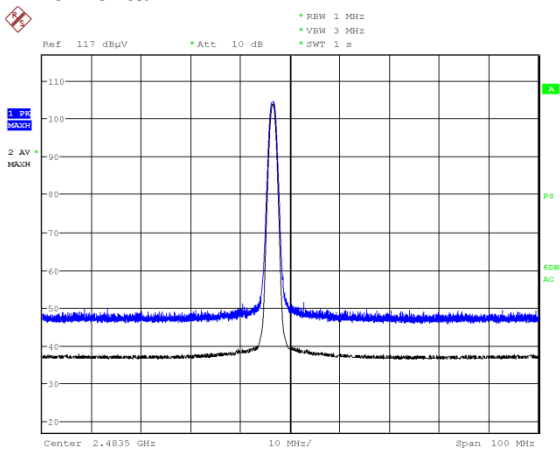
Vertical



Date: 16.APR.2018 18:50:20

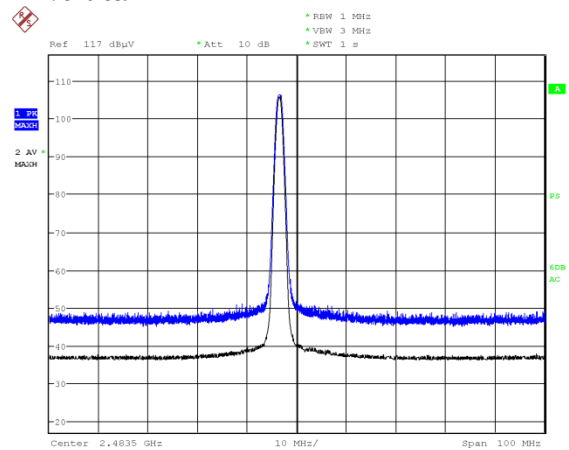
#### [BDR / 2480MHz]

Horizontal



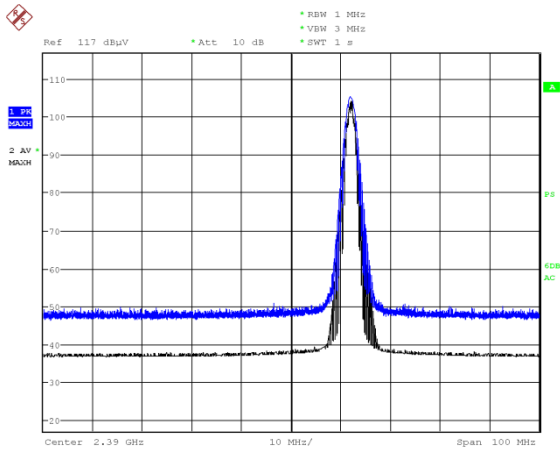
Date: 16.APR.2018 21:55:51

Vertical



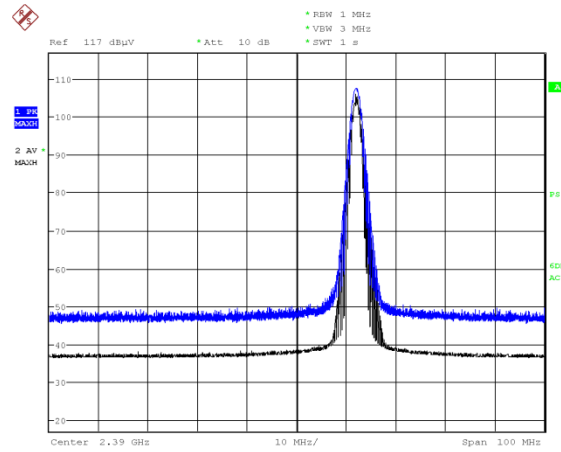
Date: 16.APR.2018 22:04:51

[EDR / 2402MHz]  
Horizontal



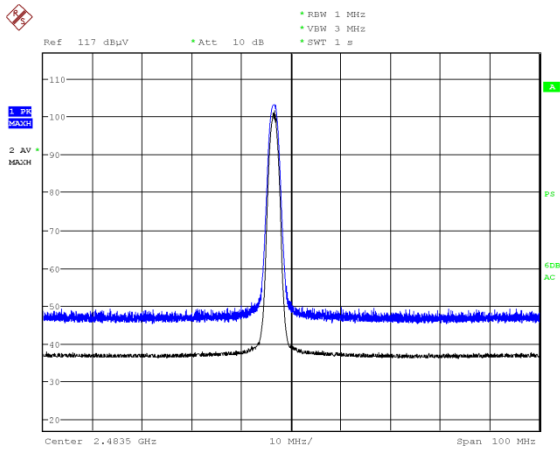
Date: 16.APR.2018 20:04:09

Vertical



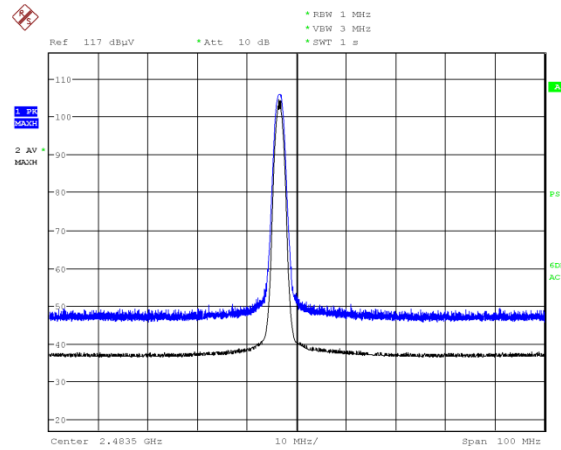
Date: 16.APR.2018 19:46:28

[EDR / 2480MHz]  
Horizontal



Date: 16.APR.2018 22:56:08

Vertical



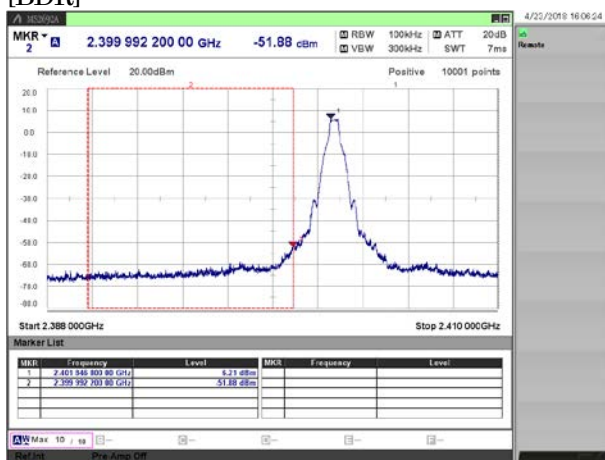
Date: 16.APR.2018 22:39:22

### 3.8. Conducted Spurious Emissions for Band Edge

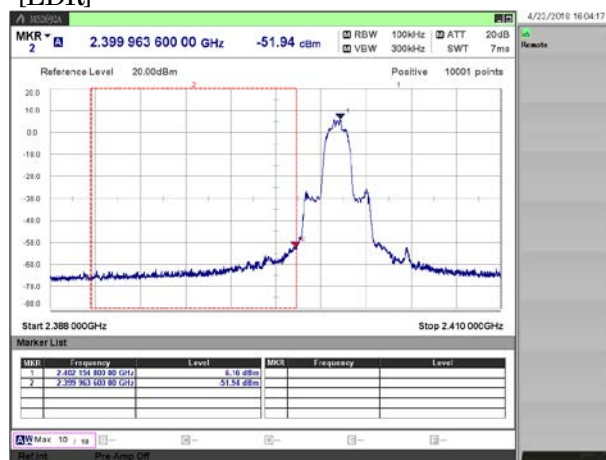
- 1) Ambient temperature : 22.7 deg.C
- 2) Relative humidity : 57.0 %
- 3) Date of measurement : April 23, 2018
- 4) Measured by : M.KOUGA
- 5) Operating mode : Transmitting mode

Mode		Channel [MHz]	Frequency [MHz]	Reading(PK) [dBm]	C.F. [dB]	Result(PK) [dBm]	Limit [dBm]	Margin [dB]
BDR	DH5	2402	2401.85	6.21	0.71	6.92	-	-
			2399.99	-51.88	0.71	-51.17	-13.1	38.08
EDR	3DH5	2402	2402.15	6.16	0.71	6.87	-	-
			2399.96	-51.94	0.71	-51.23	-13.1	38.10

[BDR]



[EDR]



## 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

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

Notes :

- (a) Meter Reading : Reading of the EMI test receiver.
- (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 : Ver.3.0

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

Notes :

- (a) Dwell Time : Transmission duration of 1 hopping.
- (b) Cycle : Number of hopping appearances on the spectrum analyzer.  
(The average of 5 measurements if it is random hopping equipment)
- (c) 31.6 :  $0.4 [ \text{sec} ] * \text{Number of Hopping Frequencies}(79)$
- (d) Sweep Time : Sweep time settings on the spectrum analyzer.

### 4.3. Maximum Peak Conducted Output Power Measurement

Method of calculation : Software  
 The Software for Calculation Name : SW-308  
 Version : Ver.3.0

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

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

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 : Ver.4.0.30

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

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 m/ 10 m)

## 4.5. Conducted Spurious Emission for Band Edge Measurement

Method of calculation : Software  
The Software for Calculation Name : SW-308  
Version : Ver.3.0

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

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

	Ctrl.#	Equipment	Model No.	Serial No.	Manufacturer	Cal.Int.	Last Cal.
x	-	Shield Room	-	-	TDK	-	-
x	M0970	EMI Test Receiver	ESCI	100511	Rohde & Schwarz	12	18.03.27
-	M0109	EMI Receiver	ESI7	100051	Rohde & Schwarz	12	18.04.13
x	CS0043	4th Site CE Cable SYSTEM	-	-	EMC/RF Test Lab.	12	17.11.19
x	M0664	6dB Attenuator	6806.01A	N/A	HUBER+SUHNER AG	12	17.11.19
x	M0619	HIGH FREQUENCY FUSE	MP612A	N/A	Anritsu	12	17.11.19
-	M0026	LISN	KNW-407	8-541-1	Kyoritsu	12	17.07.24
-	M0420	LISN	ESH3-Z5	829996/008	Rohde & Schwarz	12	17.08.04
x	M0833	LISN (for EUT)	ENV216	100293	Rohde & Schwarz	12	17.12.04
-	M0152	50 ohm Terminator	CT-01	N/A	TME	12	17.12.01
x	M0689	Thermometer	AD-5640A	AD-5640A	A&D	12	17.11.14

### 5.2. 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	W0101	Spectrum Analyzer	MS2692A	6201338955	Anritsu	12	18.04.19
x	W0006	Power Meter	N1911A	MY50000295	Keysight Technologies	12	17.10.03
x	W0007	Power Sensor	N1922A	MY50180022	Keysight Technologies	12	17.10.04
-	W0029	10dB Attenuator	8493C	76549	Keysight Technologies	12	17.08.03
x	WC0005	RF Cable	SUCOFLEX 102	34287	HUBER + SUHNER	12	17.08.03
x	M0720	Thermometer	TH-321	140044	AS ONE	12	17.06.09

### 5.3. Radiated Spurious Emissions

#### 4th Site 10m Semi-Anechoic Chamber

	Ctrl.#	Equipment	Model No.	Serial No.	Manufacturer	Cal.Int.	Last Cal.
x	M0506	EMC Chamber	None	-	TDK	12	17.07.10
x	M0504	EMI Receiver	ESC40	100086	Rohde&Schwarz	12	17.11.01
x	M0515	EMI Receiver	ESCI	100606	Rohde & Schwarz	12	17.09.29
x	A0073	Loop Antenna	HFH2-Z2	100171	Rohde&Schwarz	12	17.11.01
x	A0043	Biconical Antenna	BBA9106	V5(91032598)	Schwarzbeck	12	17.11.13
x	A0046	Log periodic Antenna	UHALP9108A1	0830	Schwarzbeck	12	17.11.13
x	A0056	Horn Antenna	BBHA9120D	670	Schwarzbeck	12	17.11.18
x	A0057	Horn Antenna	HAP06-18W	00000037	TOYO Corporation	12	17.11.18
x	A0058	Horn Antenna	HAP18-26W	00000016	TOYO Corporation	12	17.12.01
-	CS0037	Fourth Site RE Cable SYS1	-	-	EMC/RF Test Lab.	12	17.11.19
x	CS0039	Fourth Site RE Cable SYS3	-	-	EMC/RF Test Lab.	12	17.11.19
x	CS0054	Fourth Site EMF Cable SYS	-	-	EMC/RF Test Lab.	12	17.11.19
x	CS0064/0065	Fourth Site RE Cable SYS8	-	-	EMC/RF Test Lab.	12	17.11.19
x	M0510	RF Selector	NS4900	0802-226	TOYO Corporation	12	17.11.19
x	M0620	RF Pre-Amp	8447D	2944A10720	Keysight Technologies	12	17.11.19
x	M0706	3dB Attenuator	8491A	MY39267782	Keysight Technologies	12	17.11.19
x	M0831	GHz Filter Box	FB-G1	002	Sony GM&O	12	17.11.19
x	M0690	Thermometer	AD-5640A	201304	AND	12	17.11.14

About calibration interval

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