MEASUREMENT/TECHNICAL REPORT
FCC Part 15 Subpart C

Issued: May 19, 2009

Name and Address of the Applicant:	Shinkawa Sensor Technology, Inc. 4-22 Yoshikawa Kogyodanchi Higashi-hiroshima, Hiroshima 739-0153 JAPAN
Test Item:	Converter
Identification:	SD-1C2
Serial No.:	---
FCC ID:	XBNSD-1C2
Sample Receipt Date:	April 13, 2009
Test Specification:	FCC Part 15 Subpart C, 15.249
Date of Testing:	May 13, 14, and 15, 2009
Test Result:	PASS

Report Prepared by: Cosmos Corporation
2-3571 Ohnogi, Watarai-cho, Watarai-gun, Mie, Japan 516-2102
Phone: +81-596-63-0707 Fax: +81-596-63-0777

Tested by: O. Itogawa — O. Itogawa, Engineer — May 19, 2009 — Date

Reviewed by: Y. Kawahara — Y. Kawahara, Deputy General Manager — May 19, 2009 — Date

Notes:
1. This report should not be reproduced except in full, without the written approval of Cosmos Corporation.
2. All measurement data contained in this report may have uncertainty. A judgment for the limitation should be taken into the count.
3. The report in this report apply only to the sample tested.

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1. Description of Equipment Under Test

1.1 Product Description

Manufacturer	: Shinkawa Sensor Technology, Inc.
Model (referred to as the EUT)	: SD-1C2
Nominal Voltage	: DC 12V
Type of Modulation	: O-QPSK
Mode of Operation	: ☐ duplex ☐ 1/2 duplex ☒ simplex ☐ other
The type of the equipment	: ☐ Stand-alone ☐ Combined Equipment ☐ Plug –In Card ☒ Other (Module Unit)
The type of the antenna	: ☒ Integral ☐ external ☐ Other
The type of power source	: ☐ AC mains ☐ Dedicated AC adapter (V) ☒ DC Voltage ☐ Battery
The type of battery (if applicable)	: N/A
Type of Operation	: ☐ Continuous ☐ Burst ☒ Intermittent
Stand by Mode	: ☐ Available ☒ N/A
Intended functions	: Wireless data collector
The bandwidth of the IF filters	: N/A
Method of Communication Link	: Software to make maximum speed transmitting
The operating frequency band	: 2405 to 2480 MHz
The thermal limitation	: 0～50℃

1.2 Antenna Description

No.	Type Name	Gain	Antenna Type	Remarks
1	SNB-2.4G-2500	Less than -2.6dBi	λ /2	Originally Integrated.

1.3 Accompanied Peripherals Description

No.	Equipment Name	Manufacturer	Type Name	Serial Number	Remarks
1	---	---	---	---	---

2. General Information

2.1 Test Methodology

All measurement subject to the present report was carried out according to the procedures in ANSI C63.4: 2003.

2.2 Test Facility

All measurement was performed in the following facility;

Cosmos Corporation EMC Lab. Ohnogi

(2-3571 Ohaza-iwatachi, Ohnogi, Watarai-cho, Watarai-gun, Mie-ken 516-2102, Japan) The test firm has been filed since March 7, 2008 under CFR 47 Part.2.948.

2.3 Traceability

The calibration of measurement equipment used in the test subject to the present report is designed and operated to ensure that the measurement is traceable to national standards of measurement or equivalent abroad.

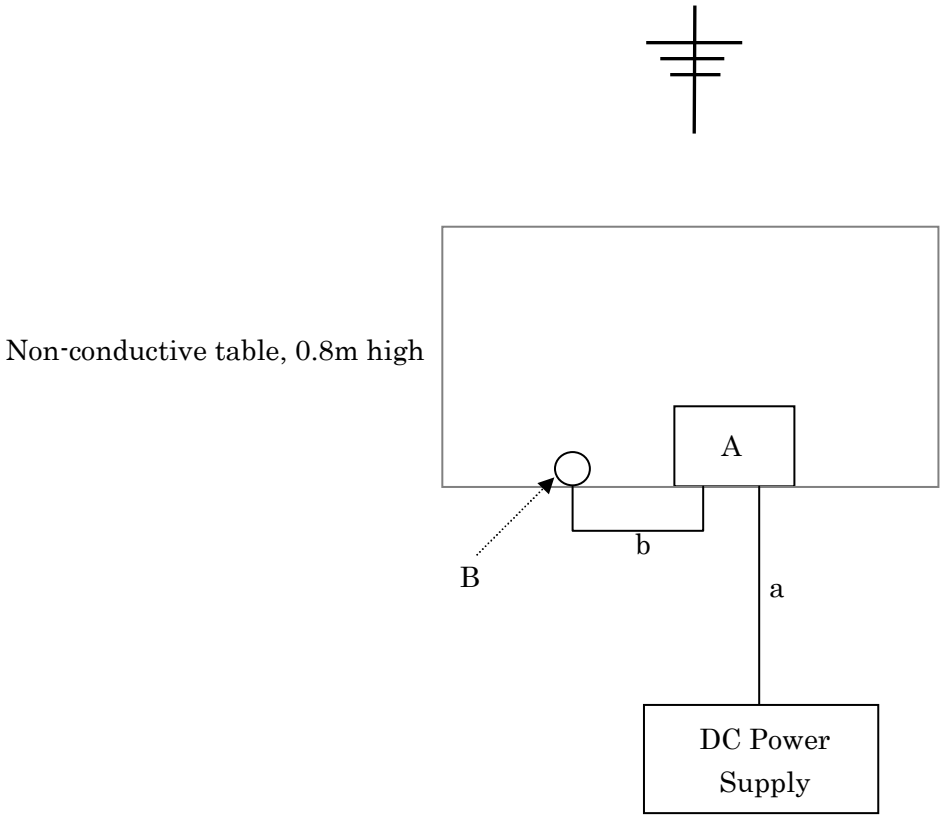
3. Summary of Test Results

Section	Test Item	Limit	Result
15. 207	AC Power Conducted Emission	See 5.2.2	Pass
15. 215 (c)	20 dB Bandwidth	---	Pass
15. 247 (d)	Band Edge Measurement	See 5.3.2	Pass
15. 249 (a)	The Field Strength of Emissions	See 5.1.2	Pass

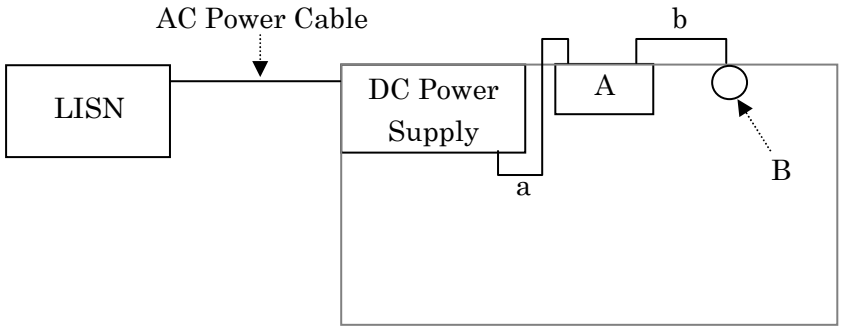
4. Test Configuration

	Instrument	Model		Cable	Length	Shield
A	EUT	SD-1C2	**a**	DC Power Cord	2.0 m	×
B	Antenna	---	**b**	Antenna Cable	2.4 m	○

4.1 15. 249 (a) The Field Strength of Emissions



4.2 15. 207 AC Power Conducted Emission



4.3 Test Mode

In test configurations above, EUT makes continuous RF transmitting with maximum power.

5. Measurement Result

5.1 15. 249(a) The Field Strength of Emissions

5.1.1 Setting Remarks

- The data lists in "5.1.4 Measured Data " list the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit.
- In the frequency range between 30MHz to 25 GHz (as 10th harmonics), the Electric Field Strength is measured in accordance with ANSI C63.4: 2003 and CISPR22: 1997.
- The test setup is made in accordance with ANSI C63.4: 2003.
- The antenna is measured at 1-4m height.
- The EUT is placed on the non-conductive table in the center of turntable. The height of this table is 0.8m.
- The distance between equipment and antenna is 3 m.
- The measurement is carried out with both horizontal and vertical antenna polarization.
- The highest radiation from the equipment is recorded.
- By varying the configuration of the test sample and the cable routing, it is attempted to maximize the emission.
- The test receiver with Quasi Peak and Average detector is in compliance with CISPR 16-1.
- The spectrum analyzer is set-up as following;

(Frequency range : 30 - 1000 MHz)

- ✓ Resolution bandwidth : 100 kHz
- ✓ Video bandwidth : 300 kHz
- ✓ Detector function : Peak
- ✓ Trace Mode : Max Hold

(Frequency range : Above 1000 MHz)

- ✓ Resolution bandwidth : 1 MHz
- ✓ Video bandwidth : 1 MHz
- ✓ Detector function : Peak
- ✓ Trace Mode : Max Hold

- EMI Test Receiver analyzer is set-up as following;

- ✓ IF bandwidth : 120 kHz (Quasi-Peak Detector)
- ✓ IF bandwidth : 1 MHz (Average Detector)

- See test configuration figure 4.1.

5.1.2 Minimum Standard

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (microvolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

5.1.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 3.28 dB
Temperature, Humidity : Refer to each data table

Note: All measurements was performed with supply voltage varied ±15%, but all results were same. Therefore the data with rated voltage shall be recorded in this report.

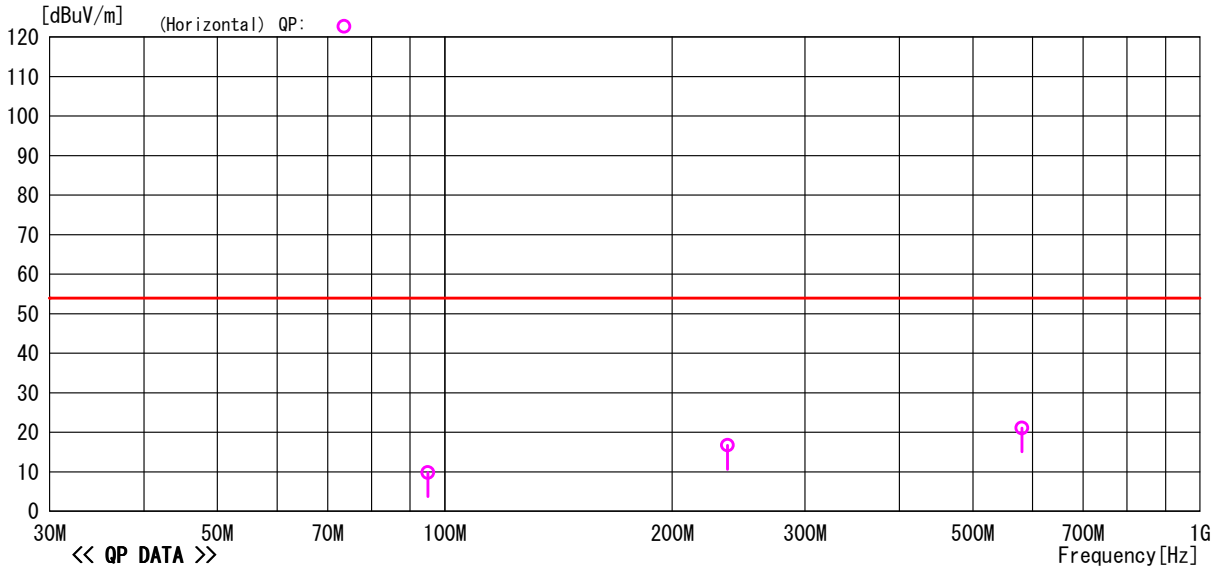
5.1.4 Measured Data

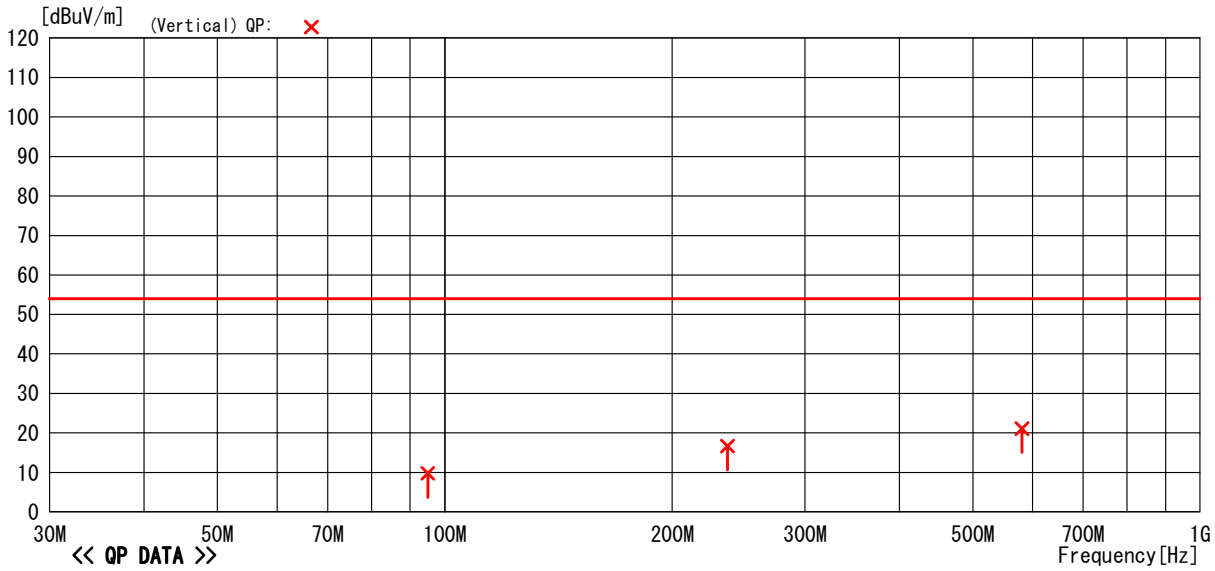
30MHz to 1GHz, CH 00

Model Name	: SD-1C2	Job No	: CJ09-082296E
Serial No.	: None	Temp./Humi.	: 24℃/32%
Operator	: O. Itogawa	Condition	: TX CH00(2405MHz)
Power Supply	: DC12V	Remark	:

Memo : RBW:30M～1GHz(120kHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz





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5.1.4 Measured Data (Continued)

30MHz to 1GHz, CH 00

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No : CJ09-082296E
Temp./Humi. : 24℃/32%
Condition : TX CH00(2405MHz)
Remark :

Memo : RBW:30M～1GHz(120kHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz

<< QP DATA >>

No	Freq.	Reading	Ant.Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	94.959	23.6	9.4	4.9	28.1	9.8	54.0	44.2	Hori.	100	0	BC	
2	236.874	22.1	16.0	6.1	27.5	16.7	54.0	37.3	Hori.	100	0	BC	
3	581.162	23.4	18.0	8.3	28.6	21.1	54.0	32.9	Hori.	100	0	LP	
4	94.959	23.6	9.4	4.9	28.1	9.8	54.0	44.2	Vert.	100	0	BC	
5	236.874	22.1	16.0	6.1	27.5	16.7	54.0	37.3	Vert.	100	0	BC	
6	581.162	23.4	18.0	8.3	28.6	21.1	54.0	32.9	Vert.	100	0	LP	

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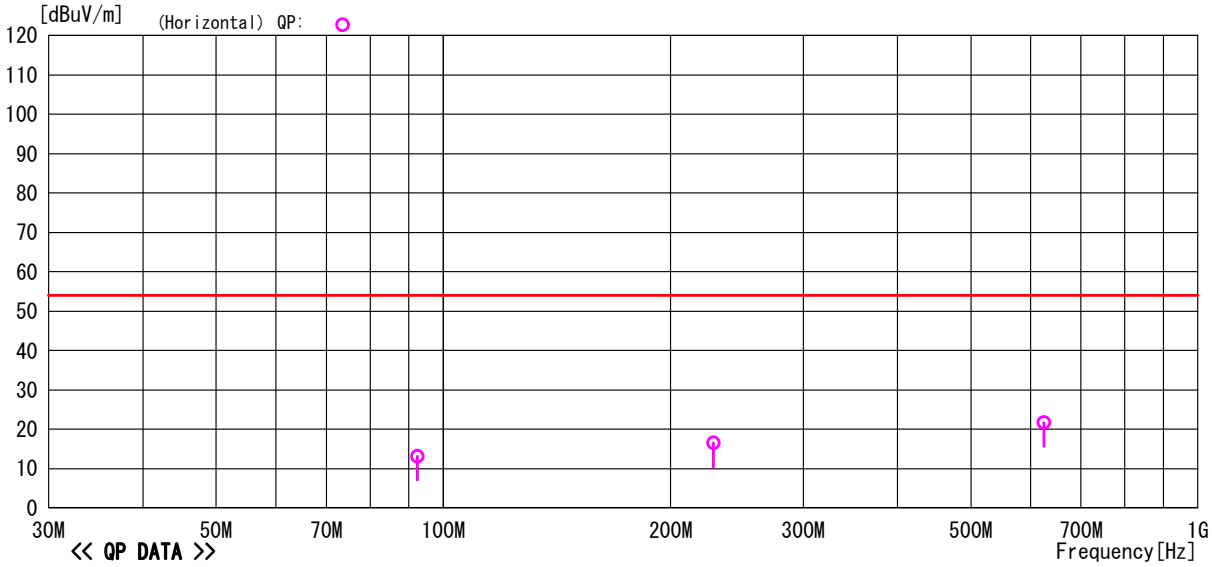
5.1.4 Measured Data (Continued)

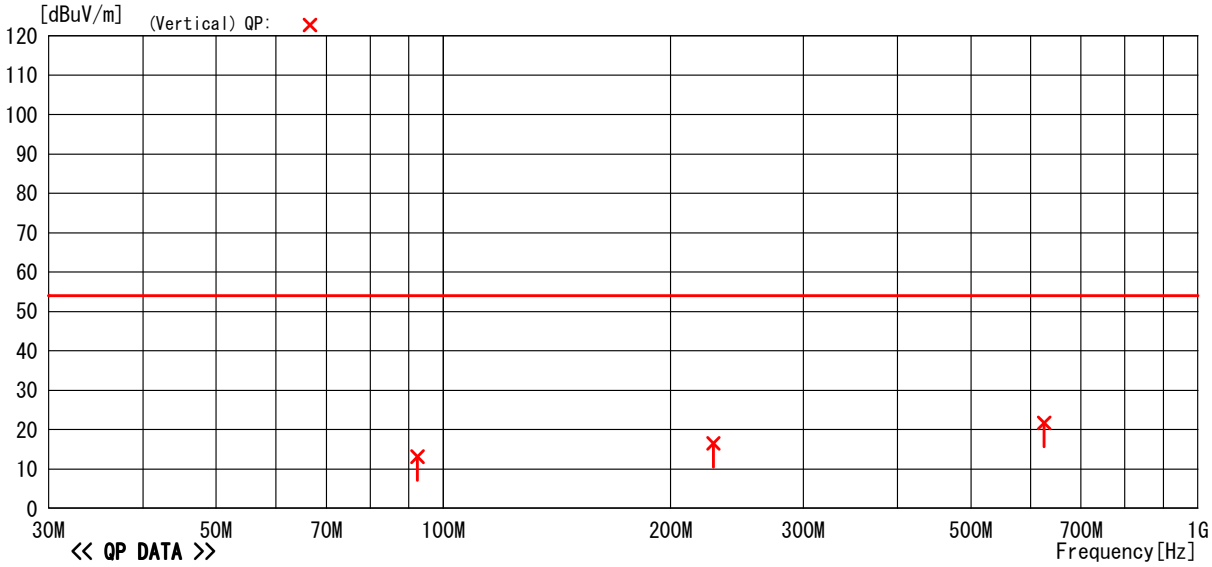
30MHz to 1GHz, CH 07

Model Name	: SD-1C2	Job No	: CJ09-082296E
Serial No.	: None	Temp./Humi.	: 23℃/32%
Operator	: O.Itogawa	Condition	: TX CH07(2440MHz)
Power Supply	: DC12V	Remark	:

Memo : RBW:30M～1GHz(120kHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz





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5.1.4 Measured Data (Continued)

30MHz to 1GHz, CH 07

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No : CJ09-082296E
Temp./Humi. : 23℃/32%
Condition : TX CH07(2440MHz)
Remark :

Memo : RBW:30M～1GHz(120kHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz

<< QP DATA >>

No	Freq.	Reading	Ant.Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	92.434	27.0	9.3	4.9	28.1	13.1	54.0	40.9	Hori.	100	0	BC	
2	228.056	22.3	15.7	6.0	27.5	16.5	54.0	37.5	Hori.	100	0	BC	
3	625.350	23.4	18.4	8.5	28.6	21.7	54.0	32.3	Hori.	100	0	LP	
4	92.434	27.0	9.3	4.9	28.1	13.1	54.0	40.9	Vert.	100	0	BC	
5	228.056	22.3	15.7	6.0	27.5	16.5	54.0	37.5	Vert.	100	0	BC	
6	625.350	23.4	18.4	8.5	28.6	21.7	54.0	32.3	Vert.	100	0	LP	

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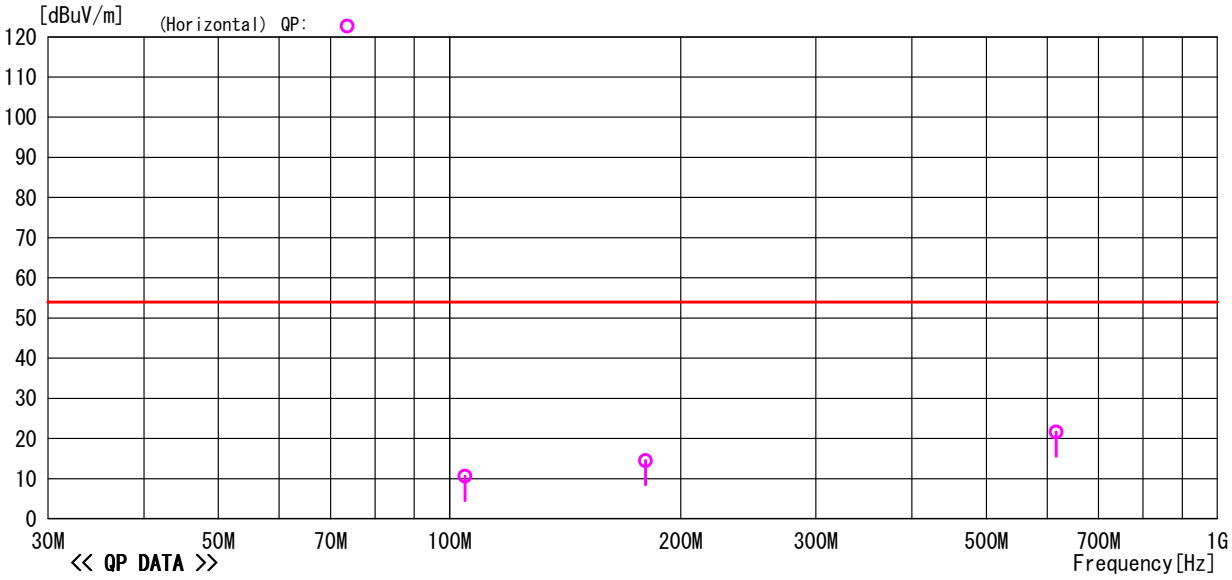
5.1.4 Measured Data (Continued)

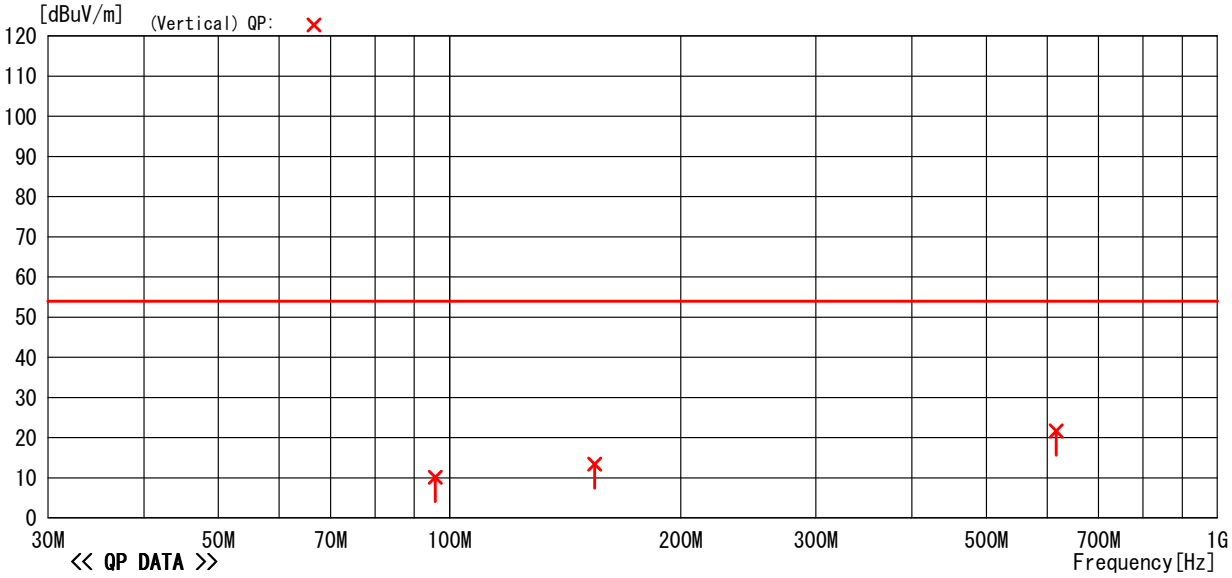
30MHz to 1GHz, CH F

Model Name	: SD-1C2	Job No	: CJ09-082296E
Serial No.	: None	Temp./Humi.	: 23℃/32%
Operator	: O.Itogawa	Condition	: TX CHOF(2480MHz)
Power Supply	: DC12V	Remark	:

Memo : RBW:30M～1GHz(120kHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz





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5.1.4 Measured Data (Continued)

30MHz to 1GHz, CH F

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No : CJ09-082296E
Temp./Humi. : 23℃/32%
Condition : TX CH0F(2480MHz)
Remark :

Memo : RBW:30M～1GHz(120kHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz

<< QP DATA >>

No	Freq.	Reading	Ant.Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	104.810	24.0	9.7	5.0	28.1	10.6	54.0	43.4	Hori.	100	0	BC	
2	179.960	23.9	12.7	5.7	27.8	14.5	54.0	39.5	Hori.	100	0	BC	
3	616.332	23.4	18.3	8.5	28.6	21.6	54.0	32.4	Hori.	100	0	LP	
4	95.801	23.9	9.4	4.9	28.1	10.1	54.0	43.9	Vert.	100	0	BC	
5	154.509	23.7	12.1	5.5	27.9	13.4	54.0	40.6	Vert.	100	0	BC	
6	616.332	23.4	18.3	8.5	28.6	21.6	54.0	32.4	Vert.	100	0	LP	

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5.1.4 Measured Data (Continued)

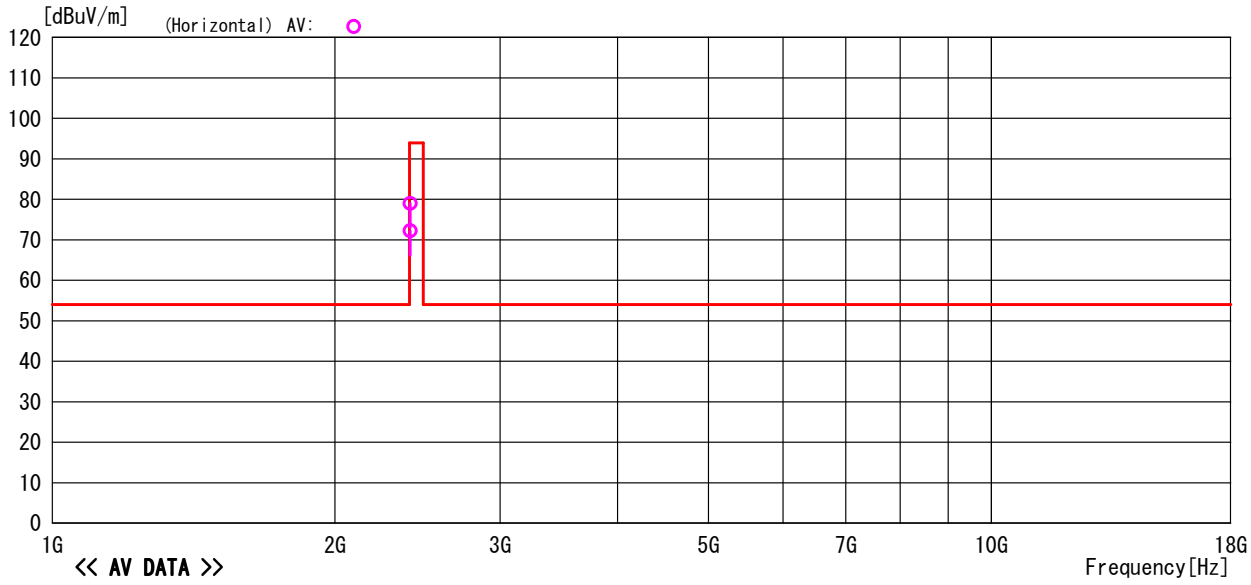
1GHz to 18GHz, CH 00

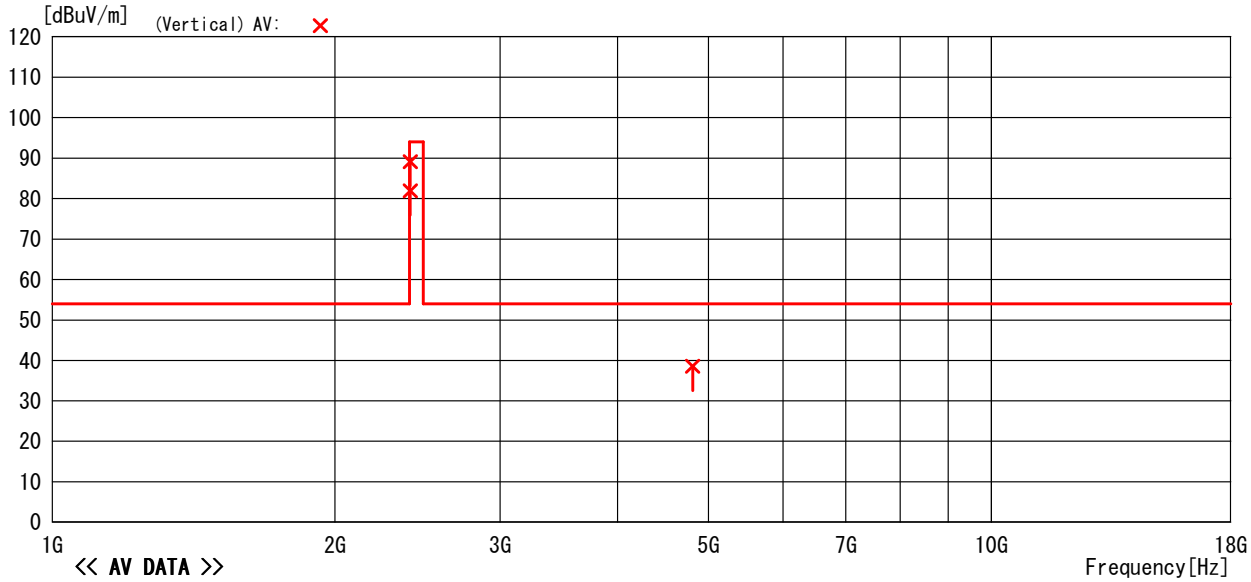
Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No. : CJ09-082296E
Temp/Humi : 24℃/32%
Condition : TX CH00(2405MHz)
Remark :

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz





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5.1.4 Measured Data (Continued)

1GHz to 18GHz, CH 00

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No. : CJ09-082296E
Temp/Humi : 24℃/32%
Condition : TX CH00(2405MHz)
Remark :

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz

<<AV DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2405.410	74.0	28.1	-29.8	0.0	72.3	94.0	21.8	Hori.	180	207	HRN	AV
2	2405.450	83.6	28.1	-29.8	0.0	81.9	94.0	12.1	Vert.	145	209	HRN	AV
3	4808.991	33.8	32.1	-27.3	0.0	38.6	54.0	35.5	Vert.	100	139	HRN	AV

<<PEAK DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2405.410	80.7	28.1	-29.8	0.0	79.0	114.0	35.0	Hori.	180	207	HRN	PK
2	2405.450	90.8	28.1	-29.8	0.0	89.1	114.0	24.9	Vert.	145	209	HRN	PK
3	4808.991	34.0	32.1	-27.3	0.0	38.8	74.0	35.3	Vert.	100	139	HRN	PK

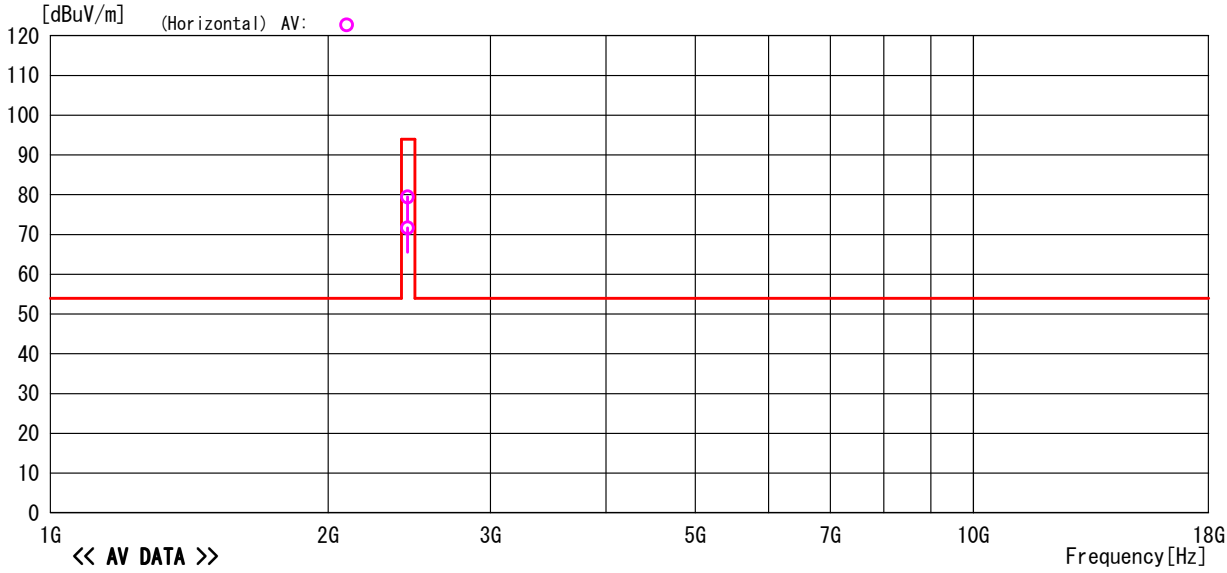
5.1.4 Measured Data (Continued)

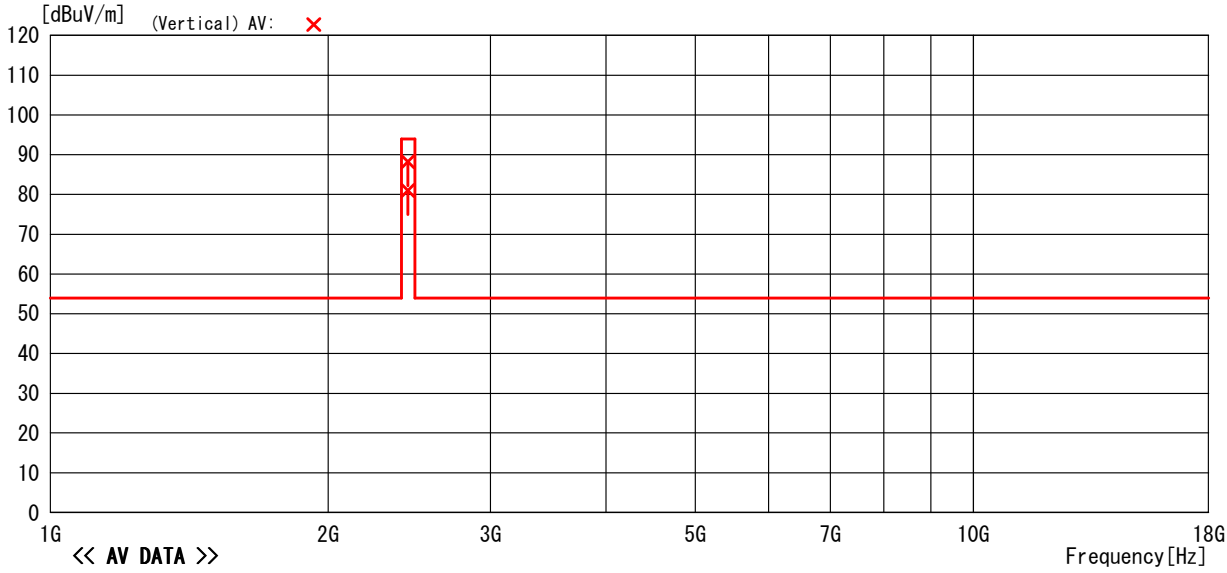
1GHz to 18GHz, CH 07

Model Name	: SD-1C2	Job No.	: CJ09-082296E
Serial No.	: None	Temp/Humi	: 24℃/32%
Operator	: O.Itogawa	Condition	: TX CH07(2440MHz)
Power Supply	: DC12V	Remark	:

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz





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5.1.4 Measured Data (Continued)

1GHz to 18GHz, CH 07

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No. : CJ09-082296E
Temp/Humi : 24℃/32%
Condition : TX CH07(2440MHz)
Remark :

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz

<<AV DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2439.578	73.2	28.2	-29.8	0.0	71.6	94.0	22.4	Hori.	100	217	HRN	AV
2	2440.520	82.6	28.2	-29.8	0.0	81.0	94.0	13.1	Vert.	105	135	HRN	AV

<<PEAK DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2439.578	81.0	28.2	-29.8	0.0	79.4	114.0	34.6	Hori.	100	217	HRN	PK
2	2440.520	89.8	28.2	-29.8	0.0	88.2	114.0	25.8	Vert.	105	135	HRN	PK

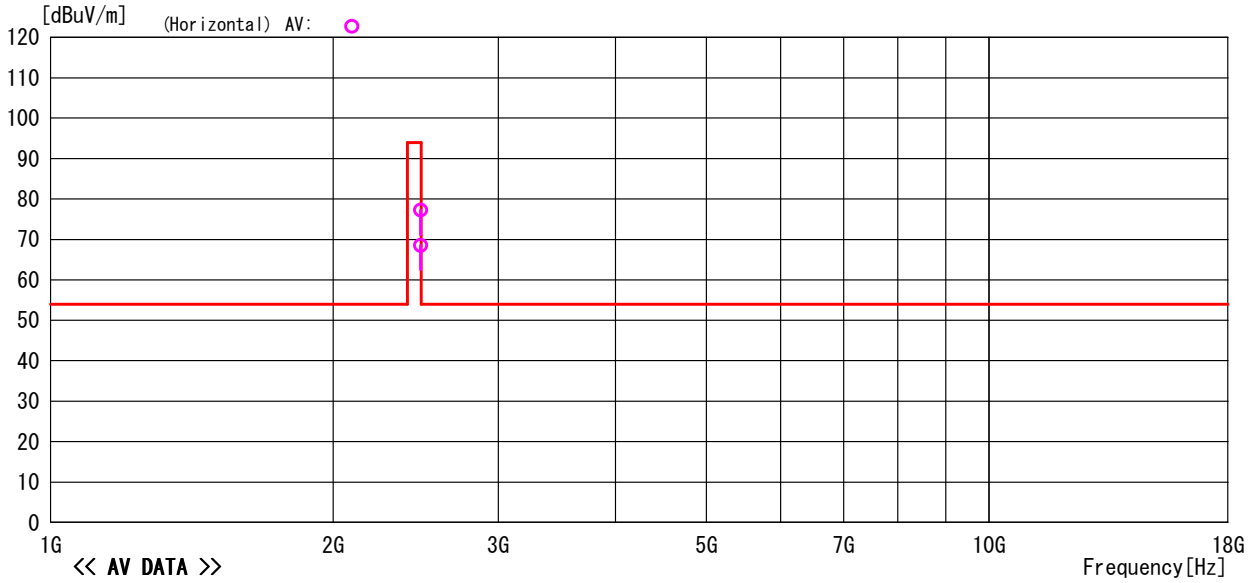
5.1.4 Measured Data (Continued)

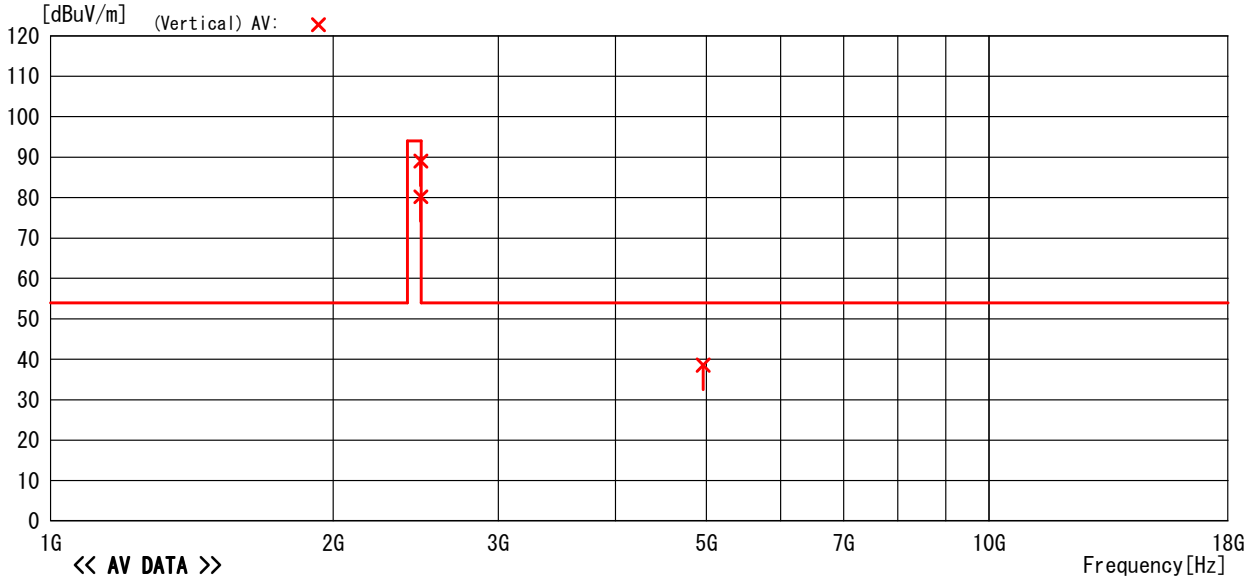
1GHz to 18GHz, CH F

Model Name	: SD-1C2	Job No.	: CJ09-082296E
Serial No.	: None	Temp/Humi	: 24℃/32%
Operator	: O.Itogawa	Condition	: TX CH:F(2480MHz)
Power Supply	: DC12V	Remark	:

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz





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5.1.4 Measured Data (Continued)

1GHz to 18GHz, CH F

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No. : CJ09-082296E
Temp/Humi : 24℃/32%
Condition : TX CH:F(2480MHz)
Remark :

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz

<<AV DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2479.464	70.1	28.2	-29.8	0.0	68.5	94.0	25.5	Hori.	145	211	HRN	AV
2	2480.486	81.8	28.2	-29.8	0.0	80.2	94.0	13.8	Vert.	100	79	HRN	AV
3	4959.043	32.8	32.3	-26.5	0.0	38.6	54.0	35.4	Vert.	100	60	HRN	AV

<<PEAK DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2479.464	78.8	28.2	-29.8	0.0	77.2	114.0	36.8	Hori.	145	211	HRN	PK
2	2480.486	90.6	28.2	-29.8	0.0	89.0	114.0	25.0	Vert.	100	79	HRN	PK
3	4959.043	33.0	32.3	-26.5	0.0	38.8	74.0	35.2	Vert.	100	60	HRN	PK

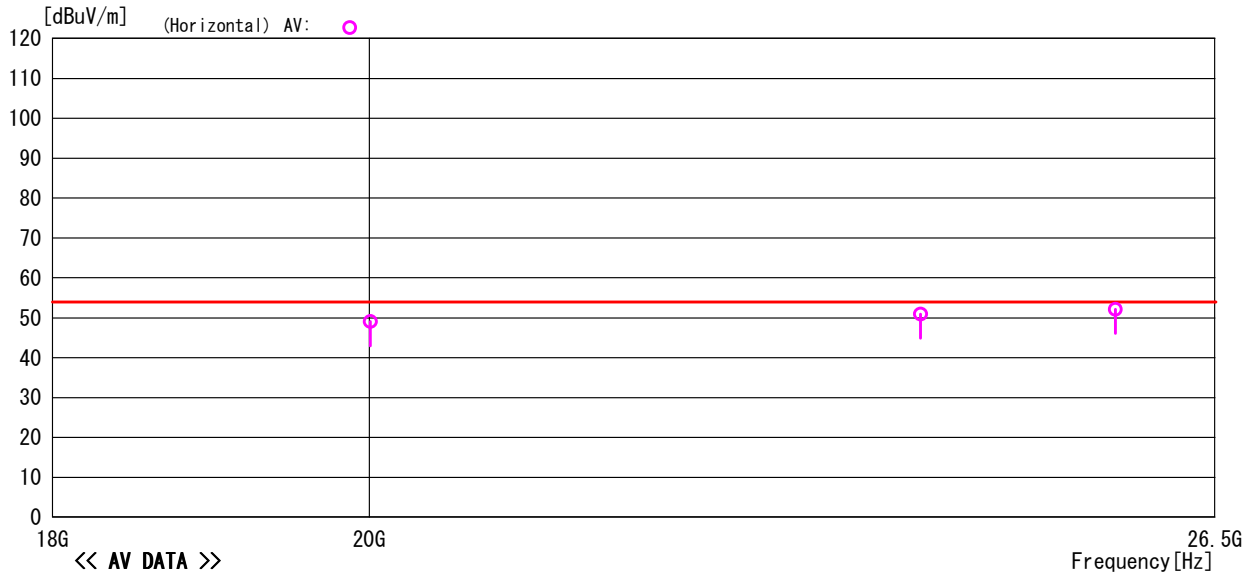
5.1.4 Measured Data (Continued)

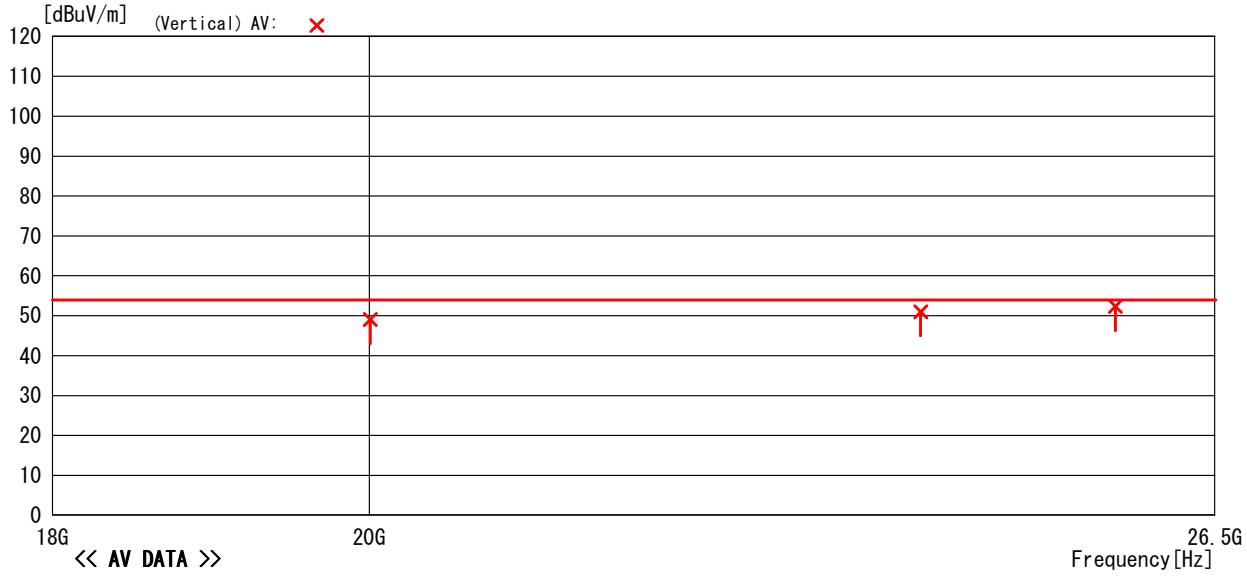
18GHz to 26.5GHz, CH 00

Model Name	: SD-1C2	Job No	: CJ09-082296E
Serial No.	: None	Temp/Humi	: 23℃/31%
Operator	: O.Itogawa	Condition	: CH00 (2405MHz)
Power Supply	: DC12V	Remark	:

Memo : RBW:1MHz(1G～)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz





-TEPTO-DV/Ver 1.80.0020

Note: Except for measured point, AV was within a limit.

5.1.4 Measured Data (Continued)

18GHz to 26.5GHz, CH 00

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No : CJ09-082296E
Temp/Humi : 23℃/31%
Condition : CH00 (2405MHz)
Remark :

Memo : RBW:1MHz(1G～)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz

<<AV DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	20008.020	28.7	40.1	16.2	36.0	49.0	54.0	5.0	Hori.	100	0	HRN	Freq:20008.020MHz (AV)
2	24030.060	30.2	39.9	18.1	37.3	50.9	54.0	3.1	Hori.	100	0	HRN	Freq:24030.060MHz (AV)
3	25638.270	30.2	40.2	18.9	37.2	52.1	54.0	1.9	Hori.	100	0	HRN	Freq:25638.270MHz (AV)
4	20008.020	28.7	40.1	16.2	36.0	49.0	54.0	5.0	Vert.	100	0	HRN	Freq:20008.020MHz (AV)
5	24030.060	30.3	39.9	18.1	37.3	51.0	54.0	3.0	Vert.	100	0	HRN	Freq:24030.060MHz (AV)
6	25638.270	30.4	40.2	18.9	37.2	52.3	54.0	1.7	Vert.	100	0	HRN	Freq:25638.270MHz (AV)

<<PEAK DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	20008.020	28.8	40.1	16.2	36.0	49.1	74.0	24.9	Hori.	100	0	HRN	Freq:20008.020MHz (PK)
2	24030.060	30.3	39.9	18.1	37.3	51.0	74.0	23.0	Hori.	100	0	HRN	Freq:24030.060MHz (PK)
3	25638.270	30.3	40.2	18.9	37.2	52.2	74.0	21.8	Hori.	100	0	HRN	Freq:25638.270MHz (PK)
4	20008.020	28.8	40.1	16.2	36.0	49.1	74.0	24.9	Vert.	100	0	HRN	Freq:20008.020MHz (PK)
5	24030.060	30.4	39.9	18.1	37.3	51.1	74.0	22.9	Vert.	100	0	HRN	Freq:24030.060MHz (PK)
6	25638.270	30.5	40.2	18.9	37.2	52.4	74.0	21.6	Vert.	100	0	HRN	Freq:25638.270MHz (PK)

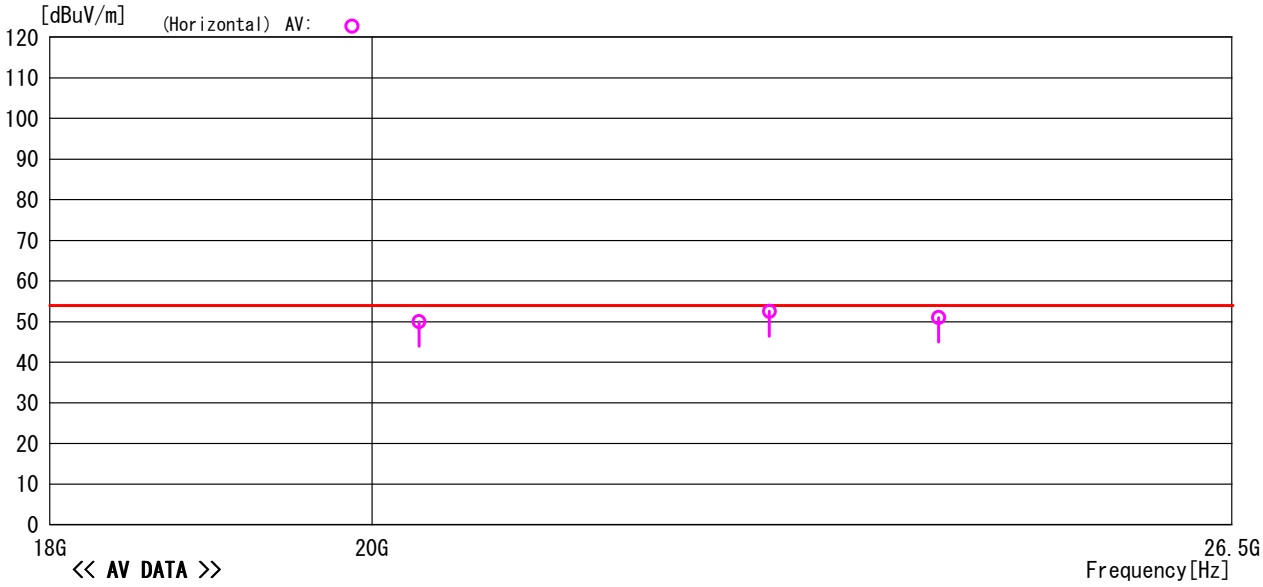
5.1.4 Measured Data (Continued)

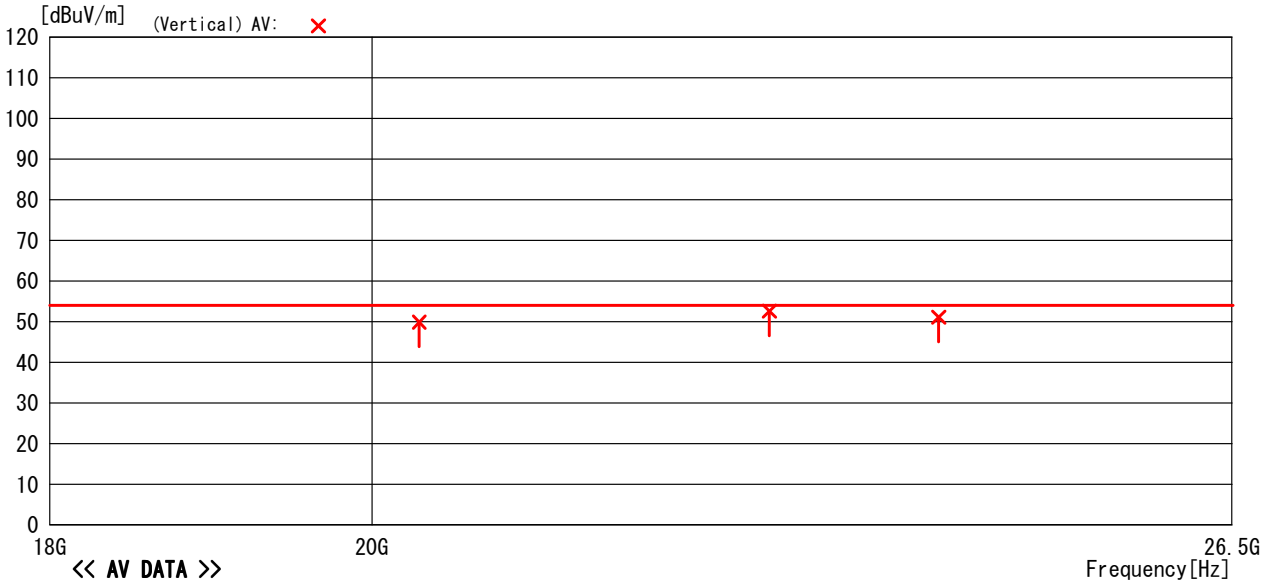
18GHz to 26.5GHz, CH 07

Model Name	: SD-1C2	Job No	: CJ09-082296E
Serial No.	: None	Temp/Humi	: 23℃/31%
Operator	: O.Itogawa	Condition	: CH07 (2440MHz)
Power Supply	: DC12V	Remark	:

Memo : RBW:1MHz(1G～)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz





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Note: Except for measured point, AV was within a limit.

5.1.4 Measured Data (Continued)

18GHz to 26.5GHz, CH 07

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No : CJ09-082296E
Temp/Humi : 23℃/31%
Condition : CH07 (2440MHz)
Remark :

Memo : RBW:1MHz(1G～)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz

<<AV DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	20312.780	29.8	40.0	16.4	36.2	50.0	54.0	4.0	Hori.	100	0	HRN	Freq:20312.780MHz (AV)
2	22777.940	31.5	40.5	17.5	37.0	52.5	54.0	1.5	Hori.	100	0	HRN	Freq:22777.940MHz (AV)
3	24075.150	30.3	39.9	18.1	37.3	51.0	54.0	3.0	Hori.	100	0	HRN	Freq:24075.150MHz (AV)
4	20312.780	29.7	40.0	16.4	36.2	49.9	54.0	4.1	Vert.	100	0	HRN	Freq:20312.780MHz (AV)
5	22777.940	31.6	40.5	17.5	37.0	52.6	54.0	1.4	Vert.	100	0	HRN	Freq:22777.940MHz (AV)
6	24075.150	30.4	39.9	18.1	37.3	51.1	54.0	2.9	Vert.	100	0	HRN	Freq:24075.150MHz (AV)

<<PEAK DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	20312.780	29.9	40.0	16.4	36.2	50.1	74.0	23.9	Hori.	100	0	HRN	Freq:20312.780MHz (PK)
2	22777.940	31.6	40.5	17.5	37.0	52.6	74.0	21.4	Hori.	100	0	HRN	Freq:22777.940MHz (PK)
3	24075.150	30.4	39.9	18.1	37.3	51.1	74.0	22.9	Hori.	100	0	HRN	Freq:24075.150MHz (PK)
4	20312.780	29.8	40.0	16.4	36.2	50.0	74.0	24.0	Vert.	100	0	HRN	Freq:20312.780MHz (PK)
5	22777.940	31.7	40.5	17.5	37.0	52.7	74.0	21.3	Vert.	100	0	HRN	Freq:22777.940MHz (PK)
6	24075.150	30.5	39.9	18.1	37.3	51.2	74.0	22.8	Vert.	100	0	HRN	Freq:24075.150MHz (PK)

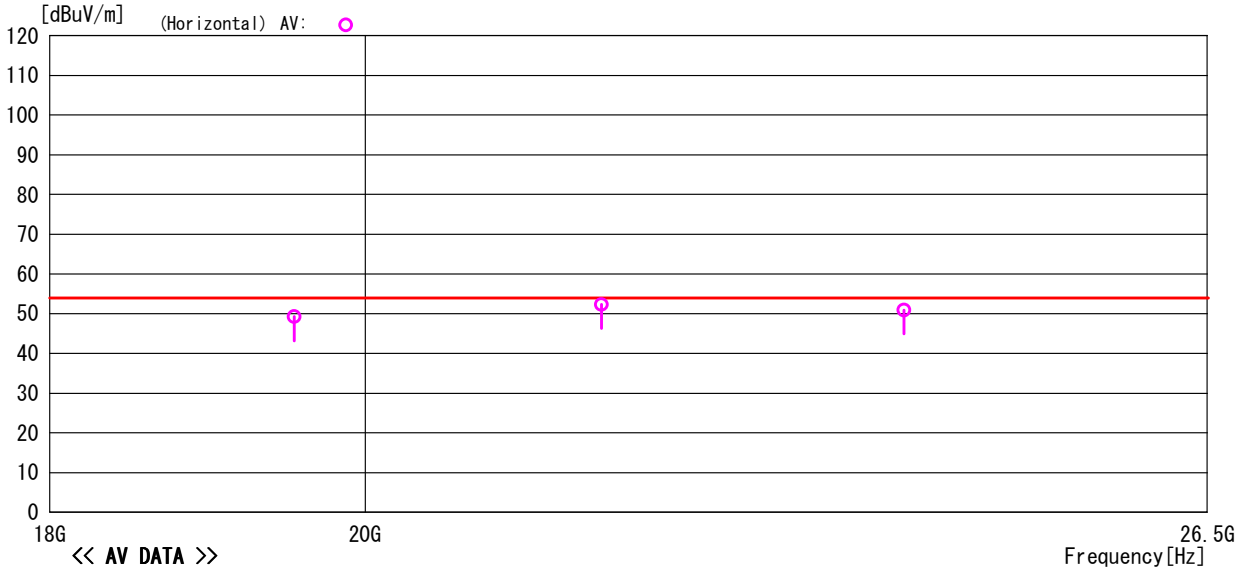
5.1.4 Measured Data (Continued)

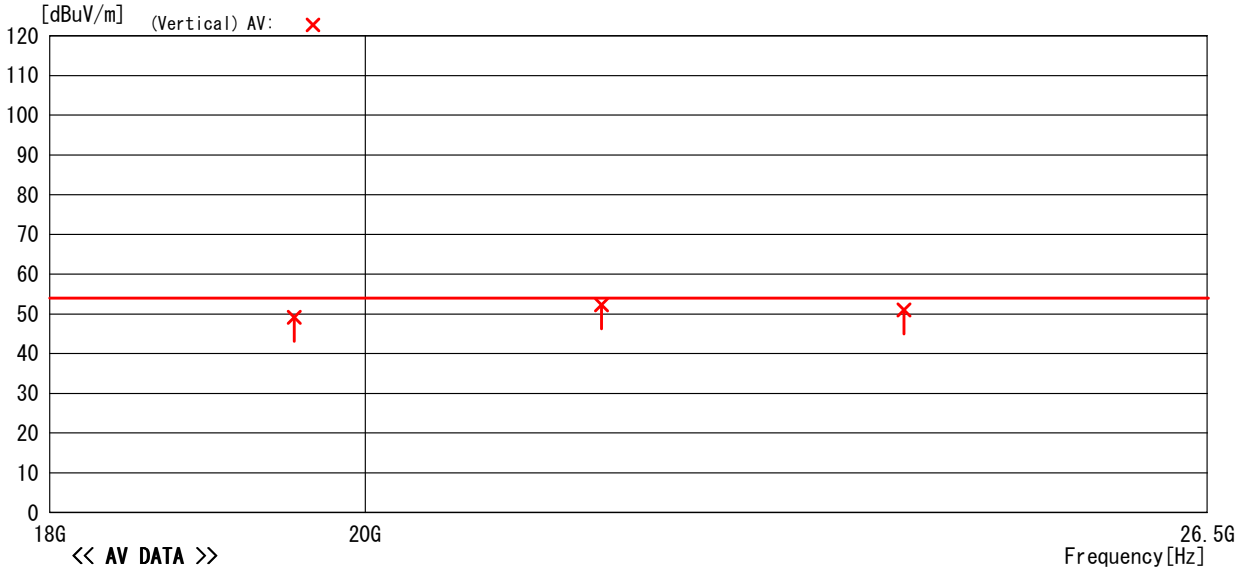
18GHz to 26.5GHz, CH F

Model Name	: SD-1C2	Job No	: CJ09-082296E
Serial No.	: None	Temp/Humi	: 23℃/31%
Operator	: O.Itogawa	Condition	: CHOF (2480MHz)
Power Supply	: DC12V	Remark	:

Memo : RBW:1MHz(1G～)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz





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Note: Except for measured point, AV was within a limit.

5.1.4 Measured Data (Continued)

18GHz to 26.5GHz, CH F

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No : CJ09-082296E
Temp/Humi : 23℃/31%
Condition : CHOF (2480MHz)
Remark :

Memo : RBW:1MHz(1G～)

LIMIT : FCC Part15 C 15.249(3m)30MHz-26.5GHz

<<AV DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	19531.820	28.4	40.3	16.0	35.5	49.2	54.0	4.8	Hori.	100	0	HRN	Freq:19531.820MHz (AV)
2	21644.100	31.1	40.6	17.0	36.4	52.3	54.0	1.7	Hori.	100	0	HRN	Freq:21644.100MHz (AV)
3	23944.850	30.1	40.0	18.1	37.3	50.9	54.0	3.1	Hori.	100	0	HRN	Freq:23944.850MHz (AV)
4	19531.820	28.3	40.3	16.0	35.5	49.1	54.0	4.9	Vert.	100	0	HRN	Freq:19531.820MHz (AV)
5	21644.100	31.1	40.6	17.0	36.4	52.3	54.0	1.7	Vert.	100	0	HRN	Freq:21644.100MHz (AV)
6	23944.850	30.2	40.0	18.1	37.3	51.0	54.0	3.0	Vert.	100	0	HRN	Freq:23944.850MHz (AV)

<<PEAK DATA>>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	19531.820	28.5	40.3	16.0	35.5	49.3	74.0	24.7	Hori.	100	0	HRN	Freq:19531.820MHz (PK)
2	21644.100	31.2	40.6	17.0	36.4	52.4	74.0	21.6	Hori.	100	0	HRN	Freq:21644.100MHz (PK)
3	23944.850	30.2	40.0	18.1	37.3	51.0	74.0	23.0	Hori.	100	0	HRN	Freq:23944.850MHz (PK)
4	19531.820	28.4	40.3	16.0	35.5	49.2	74.0	24.8	Vert.	100	0	HRN	Freq:19531.820MHz (PK)
5	21644.100	31.2	40.6	17.0	36.4	52.4	74.0	21.6	Vert.	100	0	HRN	Freq:21644.100MHz (PK)
6	23944.850	30.3	40.0	18.1	37.3	51.1	74.0	22.9	Vert.	100	0	HRN	Freq:23944.850MHz (PK)

5.2 15. 207 AC Power Conducted Emission

5.2.1 Setting Remarks

- Configure the EUT System in accordance with ANSI C63.4-2003.
- Non-conductive board (10mm thick) for EUT and non-conductive table (80cm high) for personal computer were used.
- Other power cord of support equipment is connected to another LISN to isolate its emission from the measured emission of EUT.
- The measuring port of LISN for support equipment was terminated by the 50Ω
- Activate the EUT System and run the software prepared for the test, if necessary.
- Refer to test configuration figure 4.2.

5.2.2 Minimum Standard

15. 207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

5.2.3 Result

EUT complies with the requirement.

Uncertainty of measurement : ± 2.26 dB
Temperature, Humidity : 24˚C, 38 %

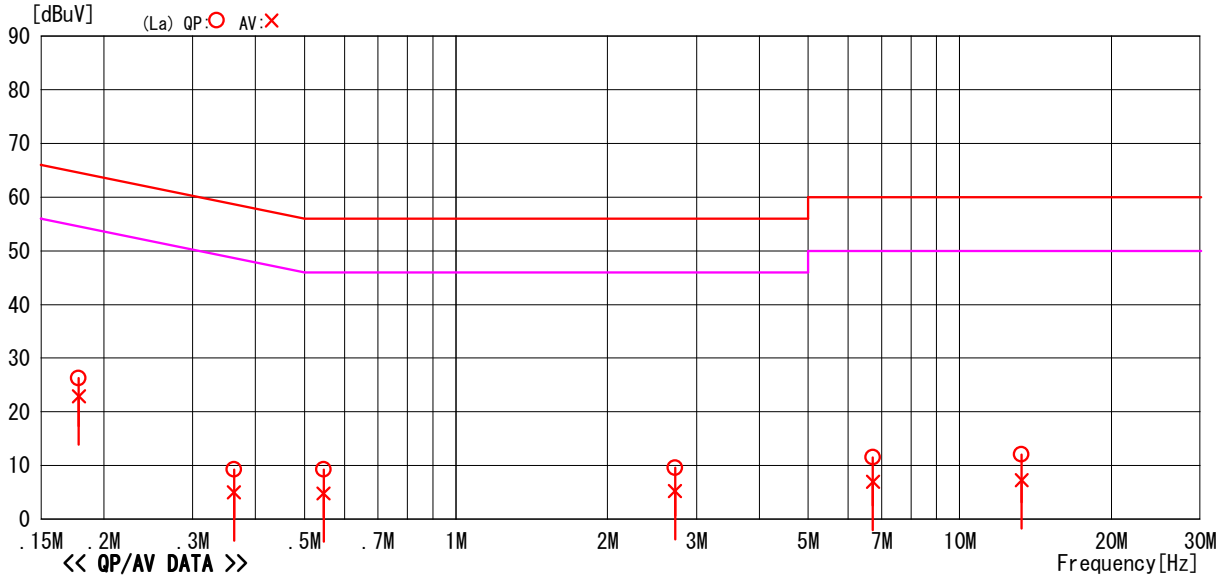
5.2.4 Measured Data

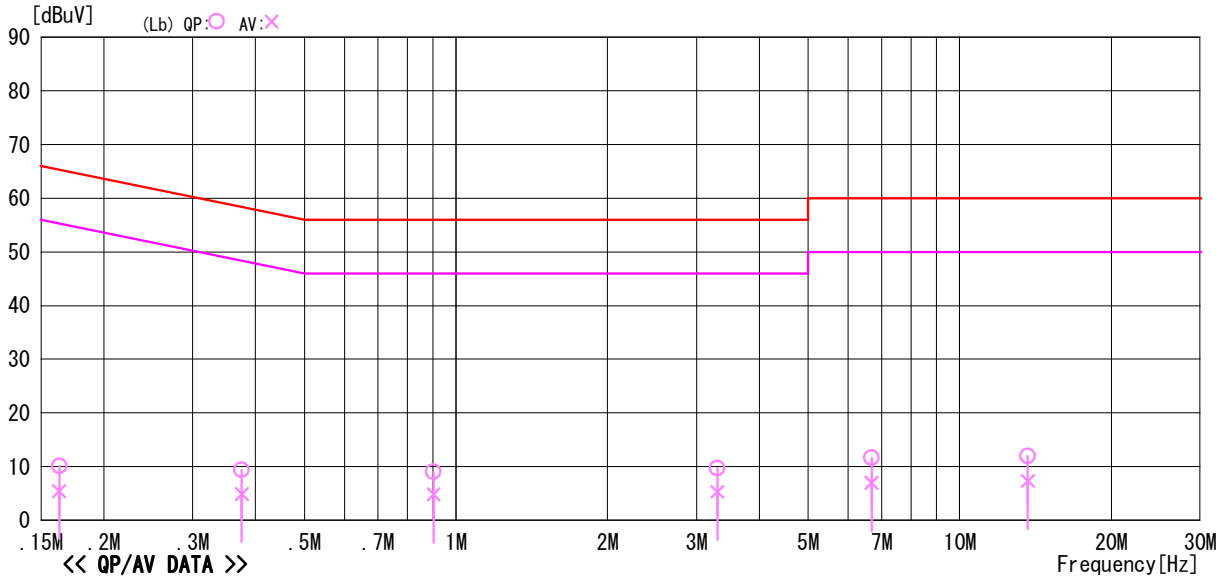
Measured Value Table

Model Name	: SD-1C2	Job No	: CJ09-082296E
Serial No.	: None	Temp/Humi	: 24℃/38%
Operator	: O.Itogawa	Condition	: Operated
Power Supply	: DC12V	Remark	:

Memo : RBW:9kHz(150k-30MHz)

LIMIT : FCC 15.207(QP)
FCC 15.207(AV)





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5.2.4 Measured Data (Continued)

Measured Value Table

Model Name : SD-1C2
Serial No. : None
Operator : O.Itogawa
Power Supply : DC12V

Job No : CJ09-082296E
Temp/Humi : 24℃/38%
Condition : Operated
Remark :

Memo : RBW:9kHz(150k-30MHz)

LIMIT : FCC 15.207(QP)
FCC 15.207(AV)

<< QP/AV DATA >>

No	Freq.	Reading Level		C.Fac	Results		Limit		Margin		Phase	Comment
		QP	AV		QP	AV	QP	AV	QP	AV		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.17825	16.2	12.8	10.1	26.3	22.9	64.6	54.6	38.3	31.7	La	
2	0.36225	-0.8	-5.1	10.1	9.3	5.0	58.7	48.7	49.4	43.7	La	
3	0.54540	-0.8	-5.3	10.1	9.3	4.8	56.0	46.0	46.7	41.2	La	
4	2.72250	-0.6	-5.0	10.2	9.6	5.2	56.0	46.0	46.4	40.8	La	
5	6.72450	1.0	-3.6	10.5	11.5	7.0	60.0	50.0	48.5	43.1	La	
6	13.27793	1.3	-3.5	10.8	12.1	7.3	60.0	50.0	47.9	42.7	La	
7	0.16320	-0.1	-4.7	10.2	10.1	5.5	65.3	55.3	55.2	49.8	Lb	
8	0.37530	-0.8	-5.2	10.1	9.3	4.9	58.4	48.4	49.1	43.5	Lb	
9	0.90240	-1.0	-5.4	10.1	9.1	4.8	56.0	46.0	46.9	41.3	Lb	
10	3.30250	-0.5	-4.9	10.2	9.7	5.3	56.0	46.0	46.3	40.7	Lb	
11	6.68450	1.3	-3.5	10.4	11.7	6.9	60.0	50.0	48.4	43.1	Lb	
12	13.65293	1.3	-3.4	10.7	12.0	7.3	60.0	50.0	48.0	42.7	Lb	

-TEPTO-DV/CE Ver1.50.0128

5.3 15. 247(d) Band Edge Measurement

5.3.1 Setting Remarks

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable and 10 dB attenuator.
- The loss of the coaxial cable is maximum 1 dB.
- The emission at the band edge is measured by using the marker function of spectrum analyzer.
- The peak of the in-band emission is measured by using the marker to peak function of spectrum analyzer.
- This measurement is repeated in both side of the spectrum.
- The spectrum analyzer is set-up as following;

✓	Frequency Span	: 30MHz
✓	Resolution bandwidth	: 300kHz (1% of frequency span)
✓	Video bandwidth	: > RBW
✓	Sweep	: Auto
✓	Detector function	: Peak
✓	Trace Mode	: Max Hold

- Where bandedge spectrum is too rough to find precise edge point, larger RBW i.e. 1MHz, 3MHz shall be applied as severer condition.
- See test configuration figure 4.2.

5.3.2 Minimum Standard

In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency of Emission (MHz)	Limit of the band edge spurious emission (dBμV)	
Below 2,400.0	Peak	Average
Above 2,483.5	74	54

5.3.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 2.6 dB
Temperature, Humidity : 24˚C, 40%

5.3.4 Measured Data

The band edge emissions are calculated as following;

(Horizontal)

CH	Pmax	Pav	Pdev	c.f.	Ebe	Eav	Limit(Ebe)	Limit(Eav)	Margin(Ebe)	Margin(Eav)
00 (2405 MHz)	84.40	74.52	40.50	−1.7	42.2	32.3	74.0	54.0	31.8	21.7
0F (2480 MHz)	82.74	73.89	33.44	−1.7	47.6	38.8	74.0	54.0	26.4	15.3

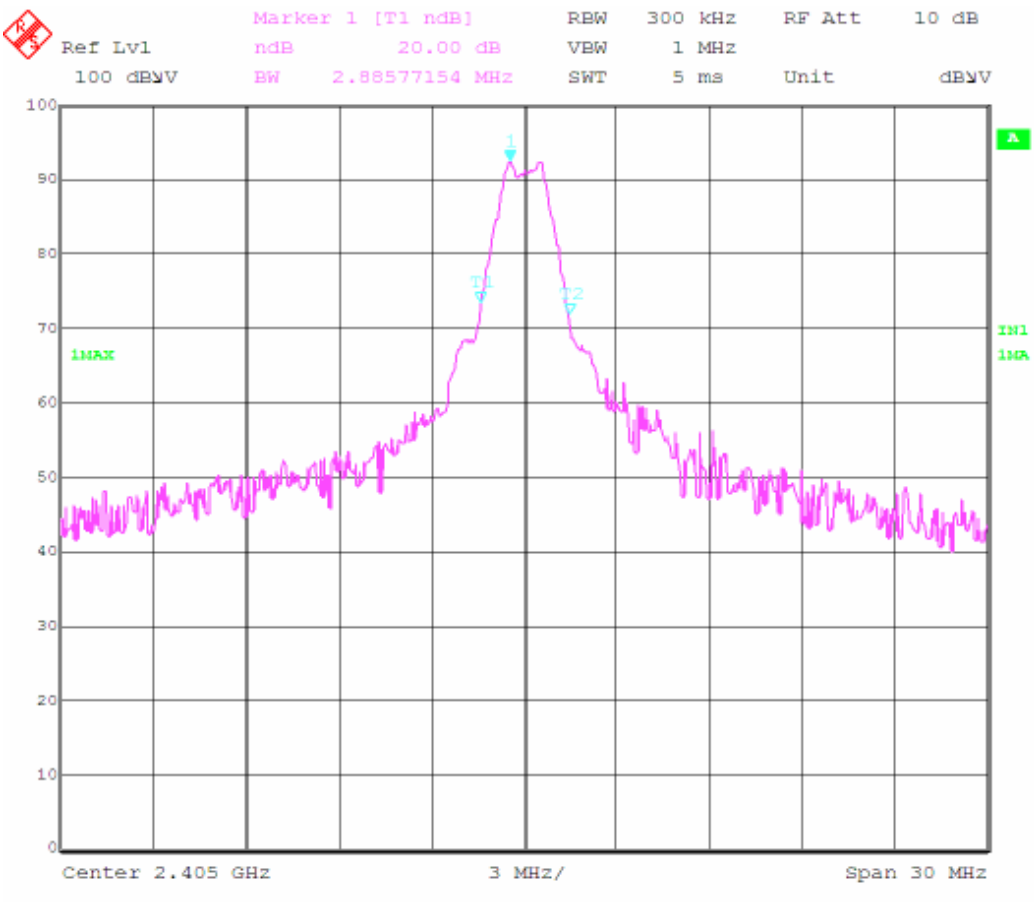
(Vertical)

CH	Pmax	Pav	Pdev	c.f.	Ebe	Eav	Limit(Ebe)	Limit(Eav)	Margin(Ebe)	Margin(Eav)
00 (2405 MHz)	94.40	84.50	46.60	−1.7	46.1	36.2	74.0	54.0	27.9	17.8
0F (2480 MHz)	89.24	80.05	39.21	−1.7	48.3	39.1	74.0	54.0	25.7	14.9

NOTE Vertical and Horizontal were measured and Vertical was confirmed as the worst.

P_{max} : Maximum peak power of the fundamental.
P_{av} : Average of the fundamental.
P_{dev} : The amplitude delta between the peak power and the band edge emission.
E_{be} : Band edge emission.
E_{av} : Average of the band edge emission.

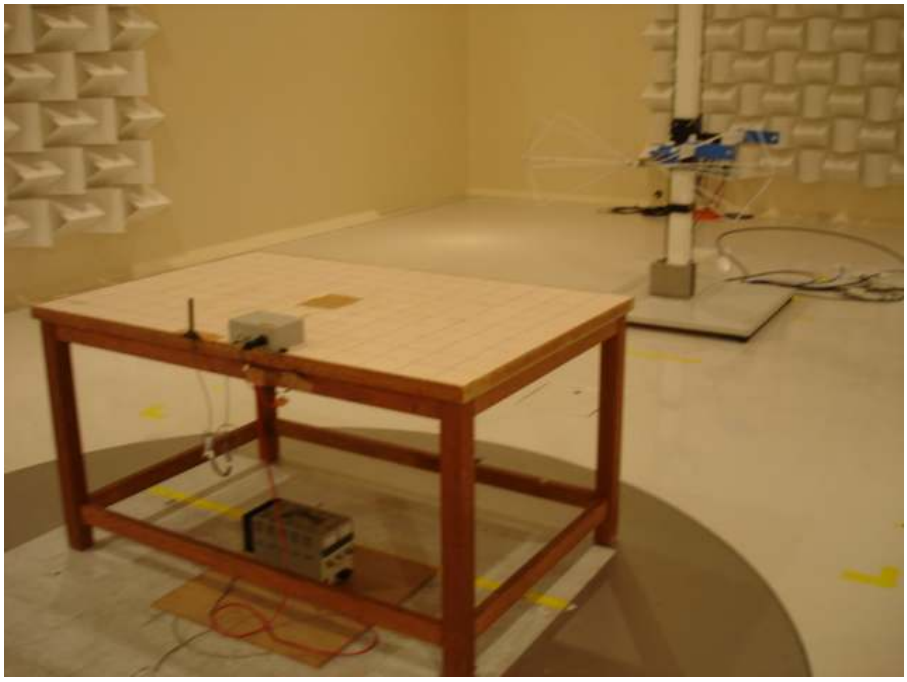
5.4 15. 215 (c) 20 dB Bandwidth



6. Photos

6.1 Setup Photo (Radiated Emission)

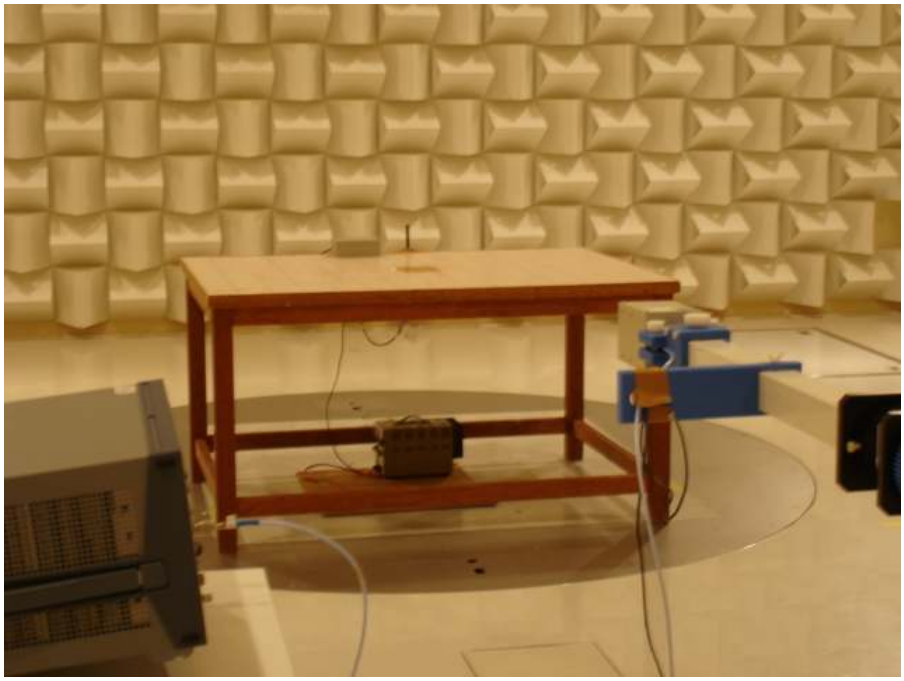
30 MHz – 1 GHz



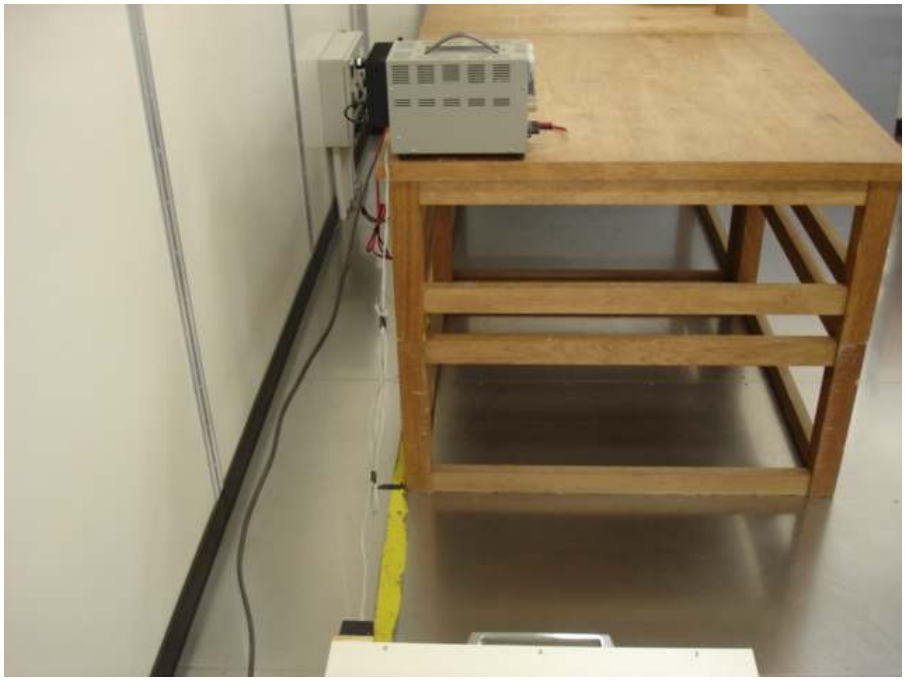
1 GHz – 18 GHz

6.1 Setup Photo (Continued)

18 GHz – 26.5 GHz



6.2 Setup Photo (Conducted Emission)



7. List of Test Measurement Instruments

7.1 Radiated Emission Measurement

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Programmable AC/DCPower Source	NF Corporation	ES18000W	425779	Confirmed Before Test
EMI Test Receiver	ROHDE& SCHWARZ	ESIB40	100211	February, 2009 February, 2010
Biconical Antenna (30to 300MHz)	SCHWARZBECK	VHBB9124(Balun) BBA9106(Elements)	9124-311	September,2008 September,2009
Log.-Periodic Antena (300MHz to1GHz)	SCHWARZBECK	UHALP9108A	645	September,2008 September,2009
Horn Antenna	SCHWARZBECK	BBHA9120D	443	September,2008 September,2009
Horn Antenna	ETS LINDGREN	3160-08	00033782	September,2008 September,2009
Horn Antenna	ETS LINDGREN	3160-09	00034723	September,2008 September,2009

7.2 AC Power Conducted Emission Measurement

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Spectrum Analyzer	ADVANTEST CORPORATION	R3132	140501174	July,2008 July,2010
EMI Test Receiver	ROHDE& SCHWARZ	ESCS30	100335	August,2008 August,2009
Artificial-Mains Network	KYORITSU CORPORATION	KNW-341C	8-1659-1	July,2008 July,2009
Transient Limiter	AGILENT TECHNOLOGIES	11947A	3107A03745	October,2008 October,2009
RF Selector	Techno Science Japan Corp.	RFM-E221	3148	Confirmed Before Test
AC Power Source	LEADER ELECTRONICS CORP.	LPS-163A	5060010	---