

MEASUREMENT/TECHNICAL REPORT
FCC Part 15 Subpart CIssued: May 15th, 2007

Name and Address of the Applicant: SII DATA SERVICE
8-1 Nakase, Mihamachi, Chiba-shi, Chiba-ken
261-8507 Japan

Test Item: Handheld Terminal of Order Entry System

Identification: SA-4320

Serial No.: 66010753 (Radiated measurement)
66010755 (Conducted measurement)

Sample No.: 2

FCC ID: VCSSA-4320

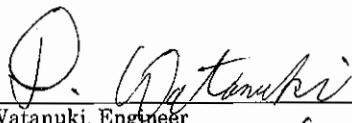
Sample Receipt Date: November 27th, 2006

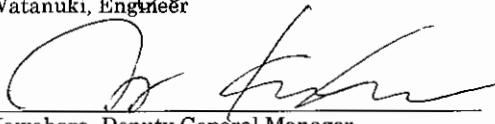
Test Specification: CFR 47 Part.15 Subpart C 15.247

Date of Testing: May 12th to 15th

Test Result: PASS

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Tested by: 
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Date

Reviewed by: 
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Date

Notes:

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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	:	SII Data Service
Model (defined as "EUT")	:	SA-4320
Nominal Voltage	:	DC 3.7V
Type of Modulation	:	<input checked="" type="checkbox"/> DSSS <input type="checkbox"/> FHSS <input type="checkbox"/> Other
FCC ID	:	VCSSA-4320
The type of the equipment	:	<input checked="" type="checkbox"/> Stand-alone <input type="checkbox"/> Combined Equipment <input type="checkbox"/> Plug -In Card <input type="checkbox"/> Other
The type of the antenna	:	<input checked="" type="checkbox"/> Integral <input type="checkbox"/> external <input type="checkbox"/> Other
The type of power source	:	<input type="checkbox"/> AC mains <input type="checkbox"/> Dedicated AC adapter (VAC) <input type="checkbox"/> DC Voltage <input checked="" type="checkbox"/> Battery
The type of battery (if applicable)	:	Re-chargeable Li-ion Battery
Type of Operation	:	<input type="checkbox"/> Continuous <input checked="" type="checkbox"/> Burst <input type="checkbox"/> Intermittent
Stand by Mode	:	<input type="checkbox"/> Available <input checked="" type="checkbox"/> N/A
Intended functions	:	Entering order with wireless function
The type of modulation	:	CCK
The bandwidth of the IF filters	:	5MHz
Method of Communication Link	:	Software to make high speed RF transmitting
The operating frequency band	:	2,412 to 2,462 MHz
The thermal limitation	:	5 to 40 degree
Other	:	

1.2 Antenna Description

The following antenna is provided to EUT as the integrated original antenna.

No.	Type Name	Gain	Antenna Type	Remarks
1	ANTB24-038A0	-3 dBi	Capacity Coupling Antenna	Originally Integrated.

1.3 Accompanied Peripherals Description

The following equipment is accompanied with EUT as its peripheral.

No.	Equipment Name	Manufacturer	Type Name	Serial Number	Remarks
1	Battery	SII Data Service	SA-4003-00	N/A	3.7V, 1000mA * Several batteries are used for continuous operation
2	Base Station	SII Data Service	SA1320	IS#012	
3	Repeater	SII Data Service	SA-2330	EST#009	

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 November 2, 2004 under CFR 47 Part.2.948.

2.3 Tractability

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

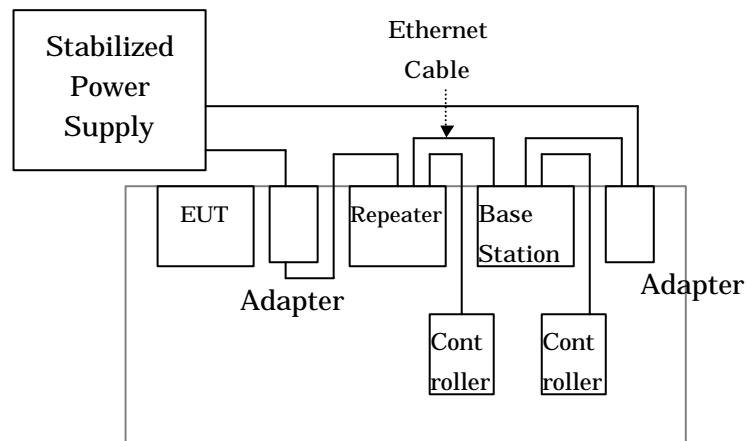
Section	Test Item	Limit	Result
15. 207	AC Power Conducted Emission	See 5.1.2	N/A
15. 247(a)(2)	Spectrum Bandwidth of Direct Sequence Spread Spectrum System	Min. 500kHz	Pass
15. 247(b)	Maximum Peak Output Power	Max. 30dBm	Pass
15. 247(c)	Transmitter Radiated Emissions	20dB less than the peak value	Pass
15. 247(d)	Power Spectrum Density	Max. 8dBm	Pass
15. 247(c)	Band Edge Measurement	See 5.7.2	Pass

4. Test Configuration

4.1 15. 207 AC Power Conducted Emission in Shield Room

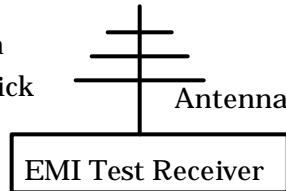
This measurement is not applicable.

4.2 15. 247(c) Transmitter Radiated Emissions and Band Edge (Radiated) in 3m Anechoic Chamber

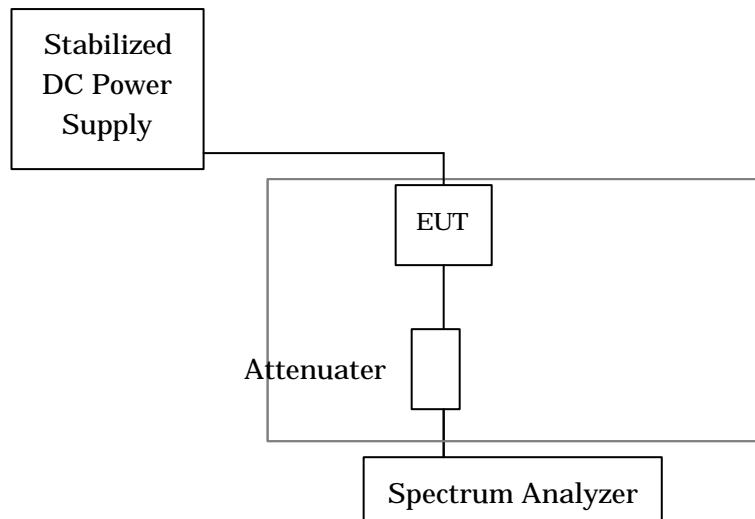


Non-conductive table, 0.8m high

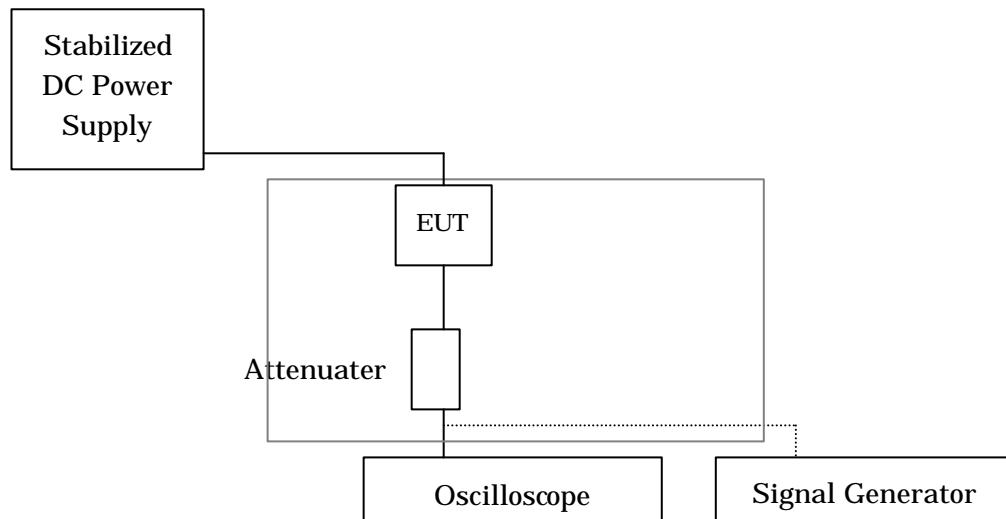
Non-conductive board, 12mm thick



4.3 All Other Test Items (Except Maximum Peak Output Power)



4.4 Maximum Peak Output Power



4.5 Test Mode

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

Maximum Peak Output Power measurement is performed with an external stabilized power supply voltage varied between 85% and 115% of the nominal rated supply voltage in accordance with the section 15.31 (e) of the part.

However, 3.36 VDC applied as lower varied voltage, which is more than 85% because it is the lowest threshold limit to work.

5. Measurement Result

5.1 15.207 AC Power Conducted Emission

5.1.1 Setting Remarks

- Configure the EUT System in accordance with ANSI C63.4-2003.
- A wooden test table (1.5m×1.0m, height 0.8m) is used.
- EUT's dedicated AC adapter connected to Artificial Mains Network (AMN).
- Other power cord of support equipment is connected to another AMN to isolate its emission from the measured emission of EUT.
- The measuring port of AMN for support equipment is terminated by the 50Ω
- Activate the EUT System and run the software prepared for the test, if necessary.
- See test configuration figure 4.1.

5.1.2 Minimum Standard

(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.

5.1.3 Result

This measurement is not applicable.

Uncertainty of measurement : ± 2.26 dB
Temperature, Humidity : -----

5.1.4 Measured Data

N/A

5.2 15. 247(a)(2) Spectrum Bandwidth of Direct Sequence Spread Spectrum System

5.2.1 Setting Remarks

- The both side of 6dB down value from peak power are measured by using delta-maker function of the spectrum analyzer.
- The spectrum analyzer is set-up as following;

❖ Frequency Span	: 30 MHz
❖ Resolution bandwidth	: 100 kHz
❖ Video bandwidth	: 300 kHz
❖ Sweep	: 1sec
❖ Detector function	: Peak
❖ Trace Mode	: Max Hold

- See test configuration figure 4.1.

5.2.2 Minimum Standard

(2) Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.2.3 Result

EUT complies with the requirement.

Uncertainty of measurement	: ± 0.8 dB
Temperature, Humidity	: 28 °C, 45%

5.2.4 Measured Data

Frequency (MHz)	Measured Bandwidth (MHz)	Limit (MHz)
CCK (11Mbps)		
2412 (1ch)	8.70	> 0.5
2437 (6ch)	9.24	> 0.5
2462 (11ch)	10.2	> 0.5

5.3 15. 247(b) Maximum Peak Output Power**5.3.1 Setting Remarks**

- See test configuration figure 4.4.
- The maximum peak output power is measured as following;
 1. The diode detector is inserted between EUT and the oscilloscope.
 2. The oscilloscope is used to read the peak response of the detector.
 3. Replaced EUT by the signal generator (SG).
 4. Adjusted the frequency of SG to the fundamental frequency.
 5. Adjusted the amplitude of SG to be the same peak recorded in 2.
- The spectrum analyzer is set-up as following;

 Voltage level range : 20 mV / Div
  Sampling time : 500S / s

5.3.2 Minimum Standard

The maximum peak output power shall not exceed 1 watt. If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.3.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 0.5 dB
 Temperature, Humidity : 28 °C, 45%

5.3.4 Measured Data

Frequency (MHz)	P/S (V)	Peak Power (dBm)	Limit (dB)	Margin (dB)
CCK (11 Mbps)				
2412 (1ch)	3.36	11.9	30	18.1
	3.7	11.2	30	18.8
	4.26	3.9	30	26.1
2437 (6ch)	3.36	10.5	30	19.5
	3.7	10.8	30	19.2
	4.26	6.3	30	23.7
2462 (11ch)	3.36	10.5	30	19.5
	3.7	10.5	30	19.5
	4.26	6.9	30	23.1

5.4 15. 247(c) Transmitter Radiated Emissions (Conducted)**5.4.1 Setting Remarks**

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable and 10 dB attenuator.
- The Spectrums are scanned from the lowest generated frequency of EUT up to the 10th harmonics by using the spectrum analyzer.
- The spectrum analyzer is set-up as following;

❖ Resolution bandwidth	: 100 kHz
❖ Video bandwidth	: 100 kHz
❖ Sweep	: Auto
❖ Detector function	: Peak
❖ Trace Mode	: Max Hold

- See test configuration figure 4.3.

5.4.2 Minimum Standard

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

5.4.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 0.8 dB

Temperature, Humidity : 28 °C, 45 %

5.4.4 Measured Data (No emission exceeding the 20dB limit was found)





5.5 15. 247(c) Transmitter Radiated Emissions (Radiated)**5.5.1 Setting Remarks**

- The data lists in “5.5.4 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 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 16-1:1993.
- The spectrum analyzer is set-up as following;

(Frequency range : 30 - 1000 MHz)

~~EE~~ Resolution bandwidth : 100 kHz
 ~~EE~~ Video bandwidth : 300 kHz
 ~~EE~~ Detector function : Peak
 ~~EE~~ Trace Mode : Max Hold

(Frequency range : Above 1000 MHz)

~~EE~~ Resolution bandwidth : 1 MHz
 ~~EE~~ Video bandwidth : 1 MHz
 ~~EE~~ Detector function : Peak
 ~~EE~~ Trace Mode : Max Hold

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

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

- See test configuration figure 4.2.

5.5.2 Minimum Standard

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.5.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 3.28 dB

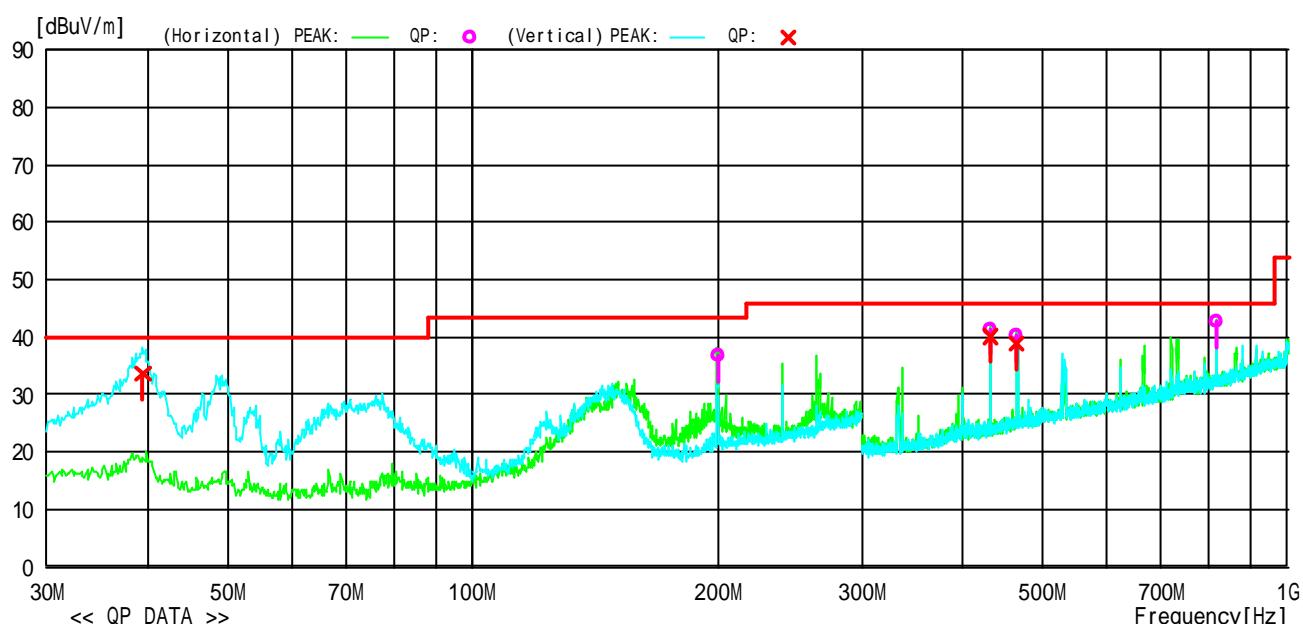
Temperature, Humidity : See each data table

5.5.4 Measured Data

30MHz to 1GHz, Channel 1

Model Name : SA-1310/SA-2310/SA-4310
 Serial No. : IS#012 / EST#009 / 66010752
 Operator : M. Yamanaka
 Power Supply : AC 120V, 60Hz
 Job No. :
 Temp./Humi. : 22 /35%
 Condition : Operated
 Remark : CH:1 RATE:11Mbps TX1
 Memo : 30MHz-300MHz BC:VHBB 9124, 300MHz-1GHz LP:UHALP 9108 A1

LIMIT : Fcc15C 15_209 (3m) 30MHz-1000MHz

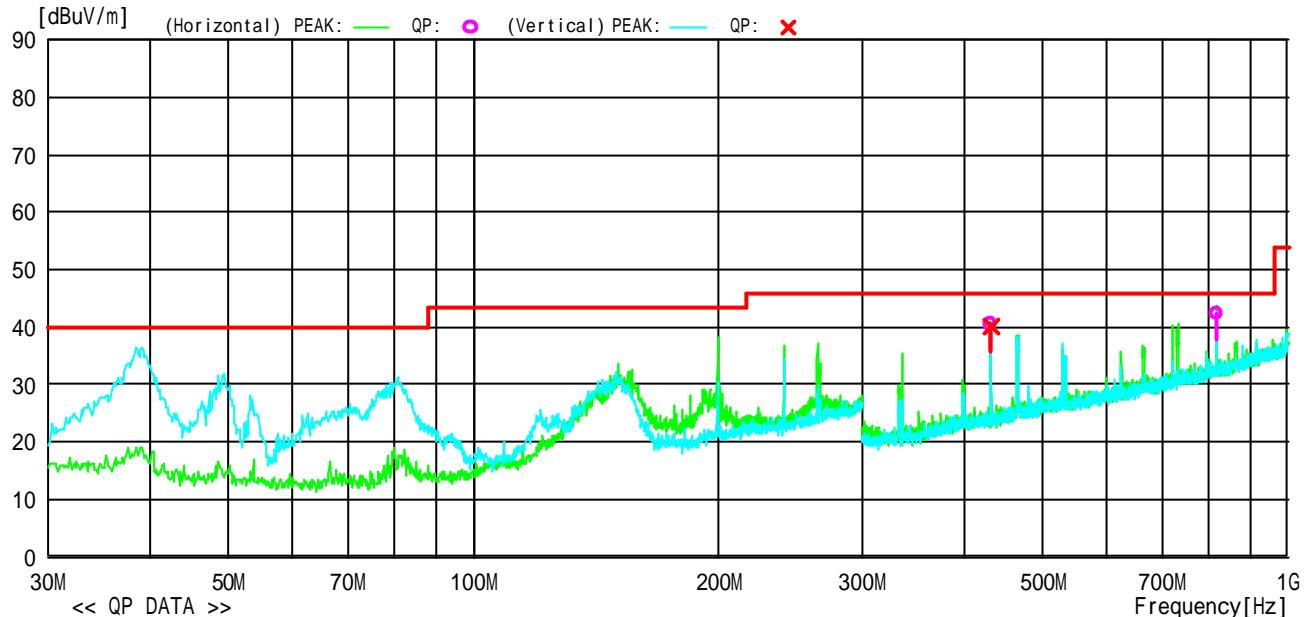


No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment									
											[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type
1	199.884	45.3	-8.4	36.9	43.5	6.6	Hori.	100	112	BC										
2	432.059	46.5	-5.0	41.5	46.0	4.5	Hori.	100	30	LP										
3	464.755	44.0	-3.8	40.2	46.0	5.8	Hori.	100	263	LP										
4	816.117	41.2	1.6	42.8	46.0	3.2	Hori.	100	91	LP										
5	39.444	46.6	-13.0	33.6	40.0	6.4	Vert.	100	159	BC										
6	432.079	45.1	-5.0	40.1	46.0	5.9	Vert.	100	256	LP										
7	464.744	42.7	-3.8	38.9	46.0	7.1	Vert.	100	256	LP										

30MHz to 1GHz, Channel 6

Model Name : SA-1310/SA-2310/SA-4310
Serial No. : IS#012 / EST#009 / 66010752
Operator : M. Yamanaka
Power Supply : AC 120V, 60Hz
Job No :
Temp./Humi. : 22 /35%
Condition : Operated
Remark : CH:6 RATE:11Mbps TX1
Memo : 30MHz-300MHz BC:VHBB 9124, 300MHz-1GHz LP:UHALP 9108 A1

LIMIT : Fcc15C 15_209 (3m) 30MHz-1000MHz

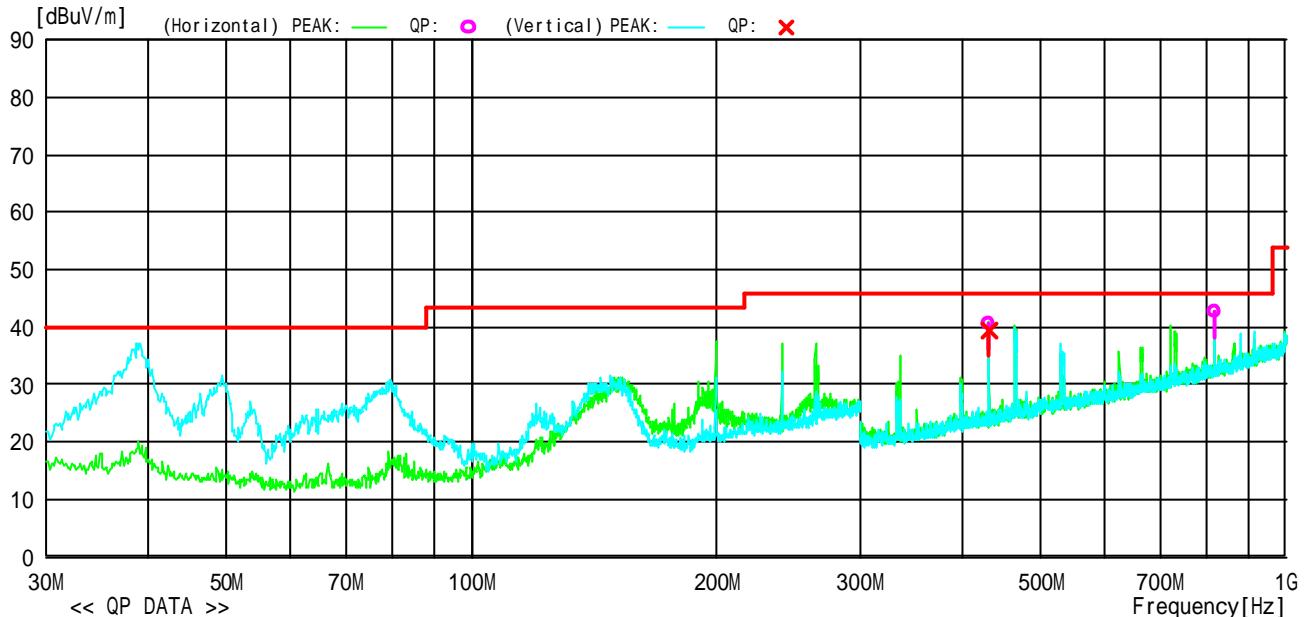


No	Freq. [MHz]	Reading [dBuV]	C.Fac [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola.	Height [cm]	Angle [deg]	Ant	Comment	
											[H/V]	Type
1	432.079	45.5	-5.0	40.5	46.0	5.5	Hori.	100	284	LP		
2	816.127	40.8	1.6	42.4	46.0	3.6	Hori.	100	99	LP		
3	432.069	45.1	-5.0	40.1	46.0	5.9	Vert.	100	264	LP		

30MHz to 1GHz, Channel 11

Model Name : SA-1310/SA-2310/SA-4310
Serial No. : IS#012 / EST#009 / 66010752
Operator : M. Yamanaka
Power Supply : AC 120V, 60Hz
Job No :
Temp./Humi. : 22 /35%
Condition : Operated
Remark : CH:11 RATE:11Mbps TX1
Memo : 30MHz-300MHz BC:VHBB 9124, 300MHz-1GHz LP:UHALP 9108 A1

LIMIT : Fcc15C 15_209 (3m) 30MHz-1000MHz



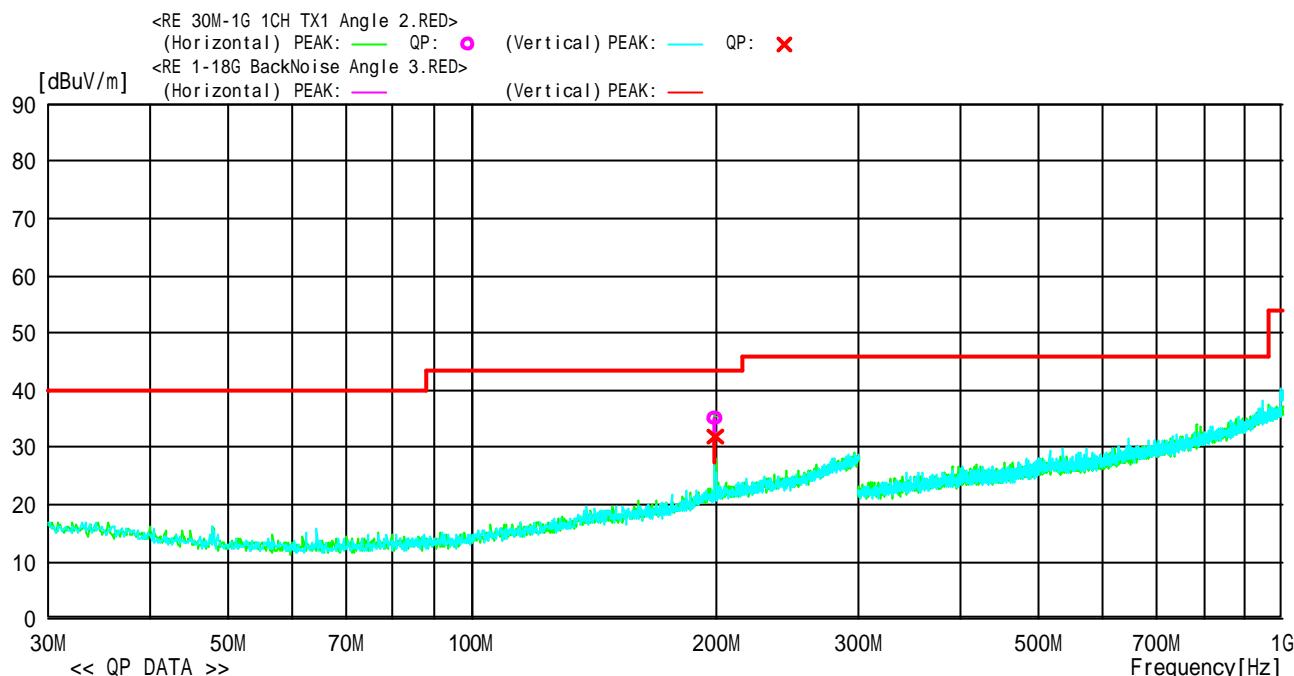
No	Freq. [MHz]	Reading [dBuV]	C.Fac [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant	Comment	
1	432.049	45.6	-5.0	40.6	46.0	5.4	Hori.	100	273	LP		
2	816.127	41.0	1.6	42.6	46.0	3.4	Hori.	100	88	LP		
3	432.049	44.5	-5.0	39.5	46.0	6.5	Vert.	100	272	LP		

30MHz to 1GHz, Channel 1

Model Name : SA-4310
 Serial No. : 66010752
 Operator : M.Yamanaka
 Power Supply : DC 3.7 V
 Memo : RBW:30M ~ 1GHz(120kHz)

Job No : CJ06-057319E
 Temp./Humi. : 26 /43%
 Condition : Operated Angle 2
 Remark : CH:01 TX1

LIMIT : FCC 15.209 3m



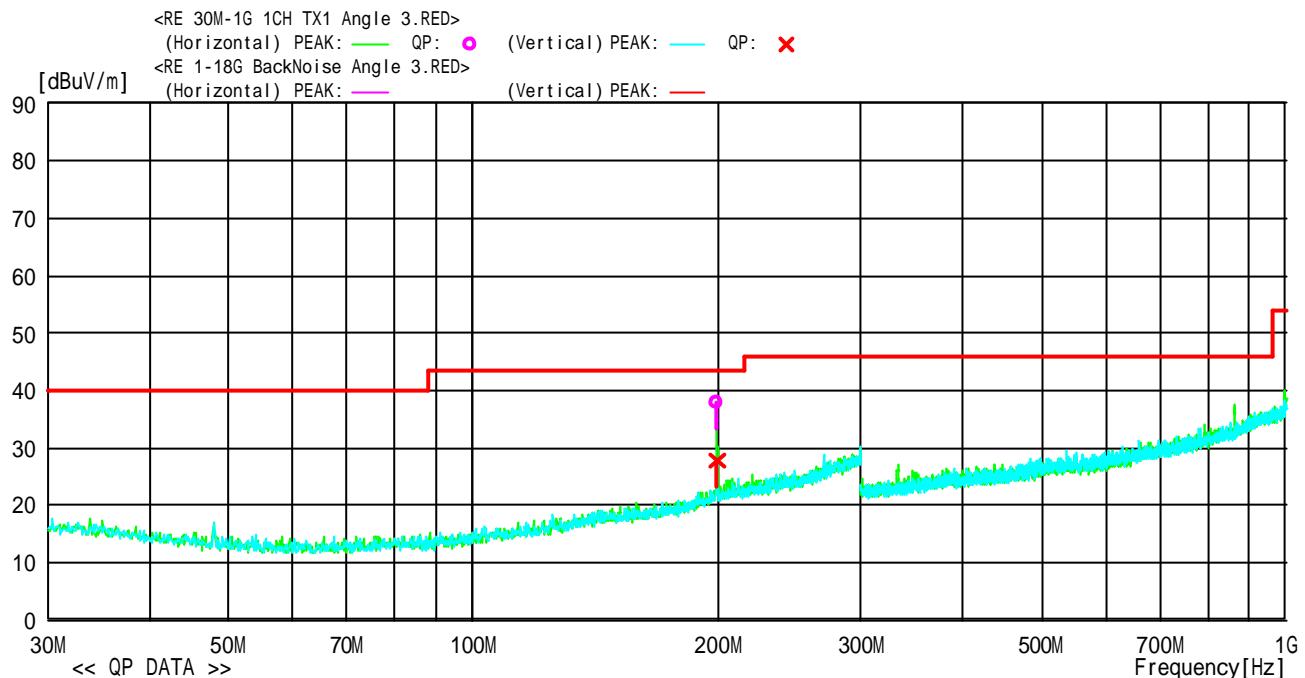
No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment	
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type		
1	199.824	42.5	-7.5	35.0	43.5	8.5	Hori.	100	288	BC	QP	
2	199.514	39.3	-7.5	31.8	43.5	11.7	Vert.	100	200	BC	QP	

30MHz to 1GHz, Channel 1

Model Name : SA-4310
 Serial No. : 66010752
 Operator : M.Yamanaka
 Power Supply : DC 3.7 V
 Memo : RBW:30M ~ 1GHz(120kHz)

Job No : CJ06-057319E
 Temp./Humi. : 26 /43%
 Condition : Operated Angle 3
 Remark : CH:01 TX1

LIMIT : FCC 15.209 3m



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	199.524	45.3	-7.5	37.8	43.5	5.7	Hori.	158	39	BC	
2	199.444	35.2	-7.5	27.7	43.5	15.8	Vert.	169	117	BC	

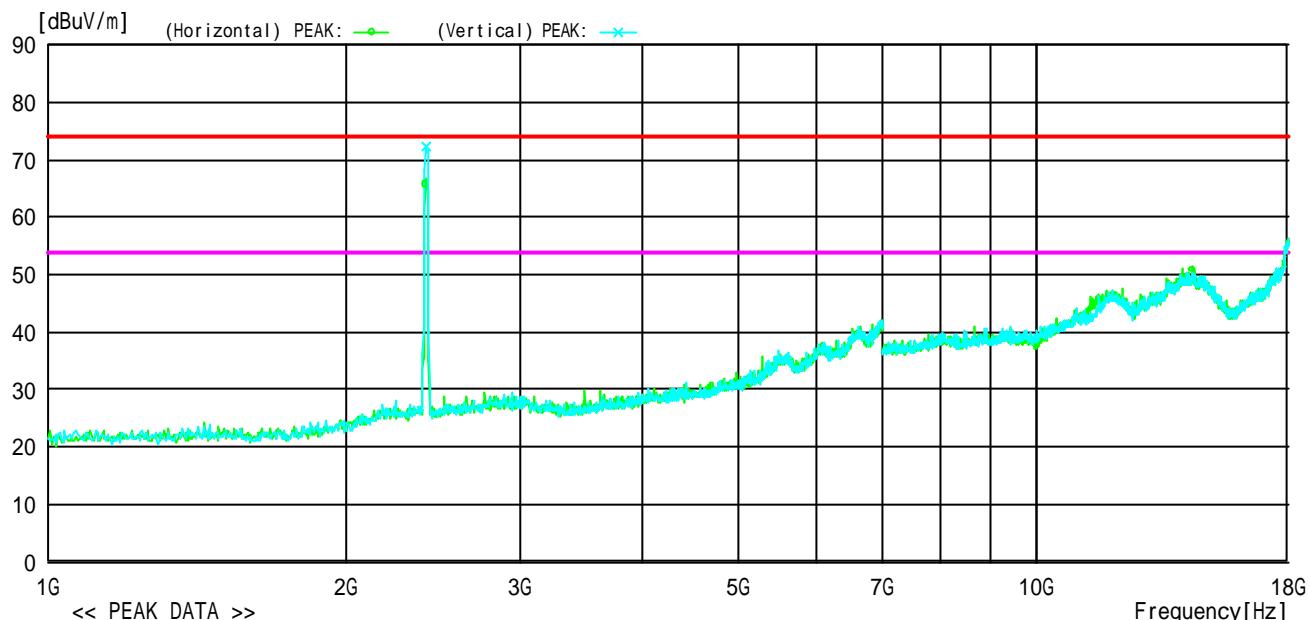
1GHz to 18GHz, Channel 1

Model Name : SA-1310/SA-2310/SA-4310
Serial No. : IS#012 / EST#009 / 66010752
Operator : M. Yamanaka
Power Supply : AC120V, 60Hz

Job No. :
Temp/Humi : 25deg. 32%
Condition : Operated
Remark : CH:1 RATE:11Mbps TX1

Memo :

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)
FCC Subpart C 15.209 (3m) 1G-26.5GHz(AV)



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2410.816	68.2	-2.6	65.6	74.0	8.4	Hori.	100	140	HRN	
2	2410.816	74.9	-2.6	72.3	74.0	1.7	Vert.	100	1	HRN	
3	4408.810	27.2	21.9	49.1	74.0	24.9	Vert.	100	26	HRN	
4	4408.810	29.0	21.9	50.9	74.0	23.1	Hori.	100	1	HRN	

* Only fundamental emissions were found.

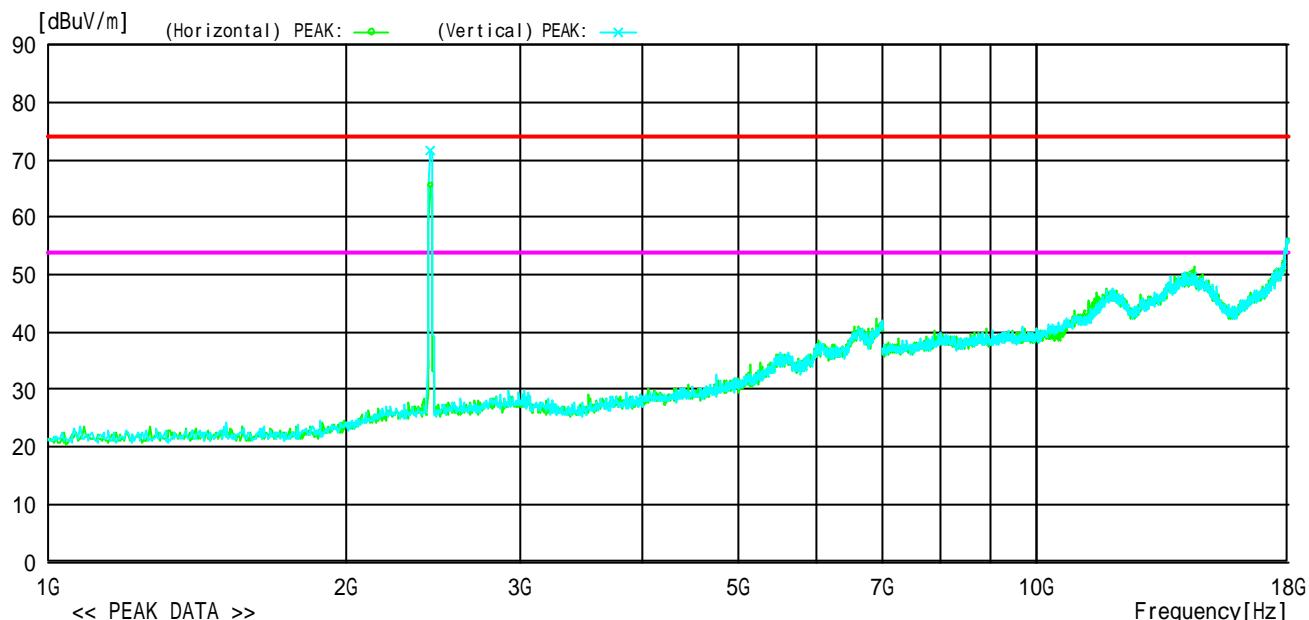
1GHz to 18GHz, Channel 6

Model Name : SA-1310/SA-2310/SA-4310
Serial No. : IS#012 / EST#009 / 66010752
Operator : M. Yamanaka
Power Supply : AC120V, 60Hz

Job No. :
Temp/Humi : 25deg. 32%
Condition : Operated
Remark : CH:6 RATE:11Mbps TX1

Memo :

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)
FCC Subpart C 15.209 (3m) 1G-26.5GHz(AV)



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2438.872	67.9	-2.4	65.5	74.0	8.5	Hori.	100	358	HRN	
2	2438.872	74.0	-2.4	71.6	74.0	2.4	Vert.	100	115	HRN	
3	4393.780	28.1	21.9	50.0	74.0	24.0	Hori.	100	1	HRN	
4	4393.780	27.8	21.9	49.7	74.0	24.3	Vert.	100	159	HRN	

* Only fundamental emissions were found.

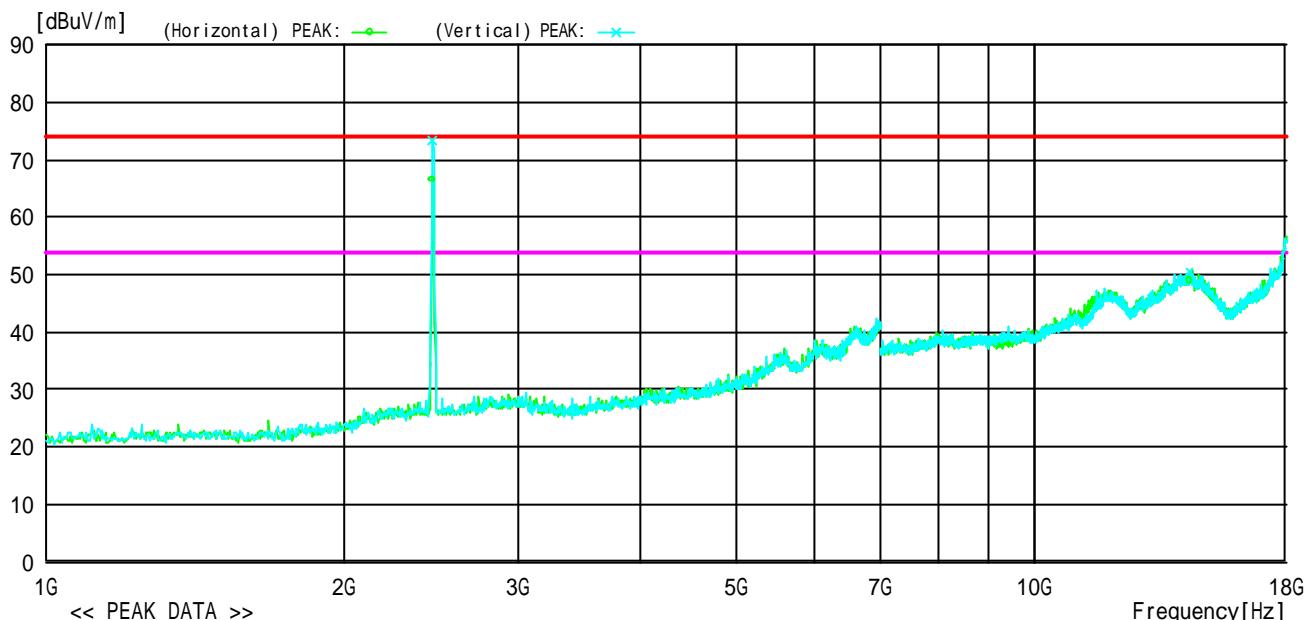
1GHz to 18GHz, Channel 11

Model Name : SA-1310/SA-2310/SA-4310
Serial No. : IS#012 / EST#009 / 66010752
Operator : M. Yamanaka
Power Supply : AC120V, 60Hz

Job No. :
Temp/Humi : 25deg. 32%
Condition : Operated
Remark : CH:11 RATE:11Mbps TX1

Memo :

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)
FCC Subpart C 15.209 (3m) 1G-26.5GHz(AV)



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2462.920	68.9	-2.4	66.5	74.0	7.5	Hori.	100	358	HRN	
2	2462.920	75.8	-2.4	73.4	74.0	0.6	Vert.	100	1	HRN	
3	4378.750	27.2	21.8	49.0	74.0	25.0	Hori.	100	29	HRN	
4	4378.750	28.7	21.8	50.5	74.0	23.5	Vert.	100	264	HRN	

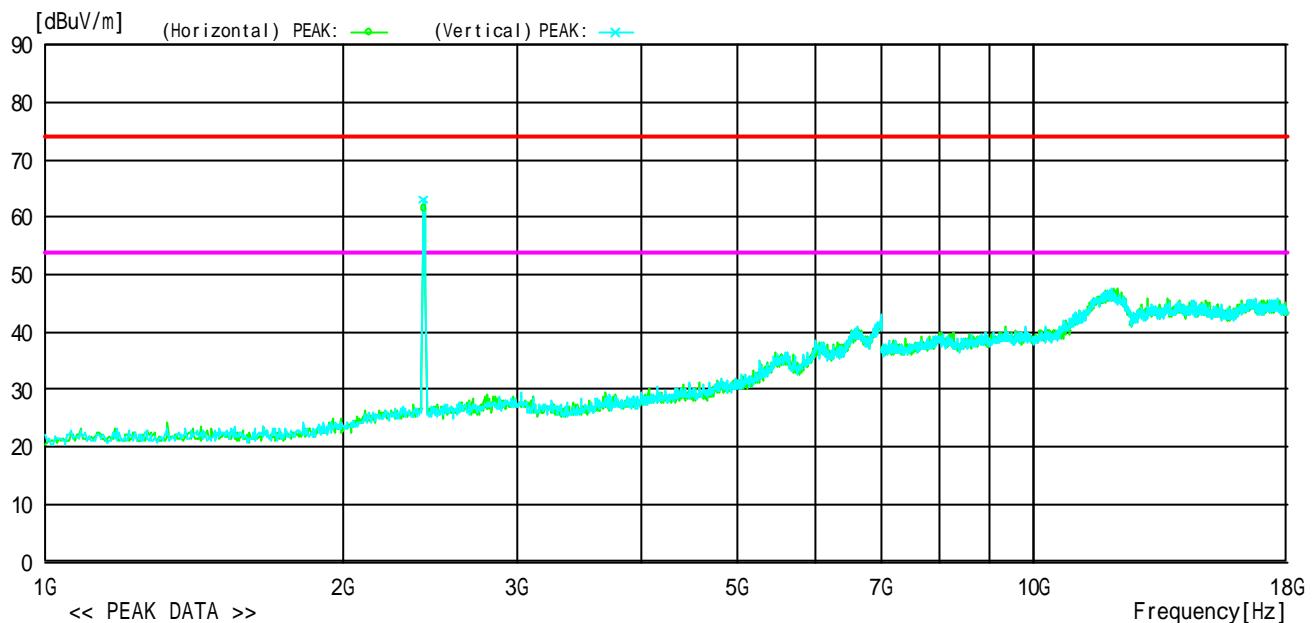
* Only fundamental emissions were found.

1GHz to 18GHz, Channel 1

Model Name : SA-4310
Serial No. : 66010752
Operator : M.Yamanaka
Power Supply : DC 3.7V
Memo : RBW:1GHz ~ (1MHz)

Job No. : CJ06-057319E
Temp/Humi : 26 /42%
Condition : Operated Angle 2
Remark : CH:1 TX1

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)
FCC Subpart C 15.209 (3m) 1G-26.5GHz(AV)



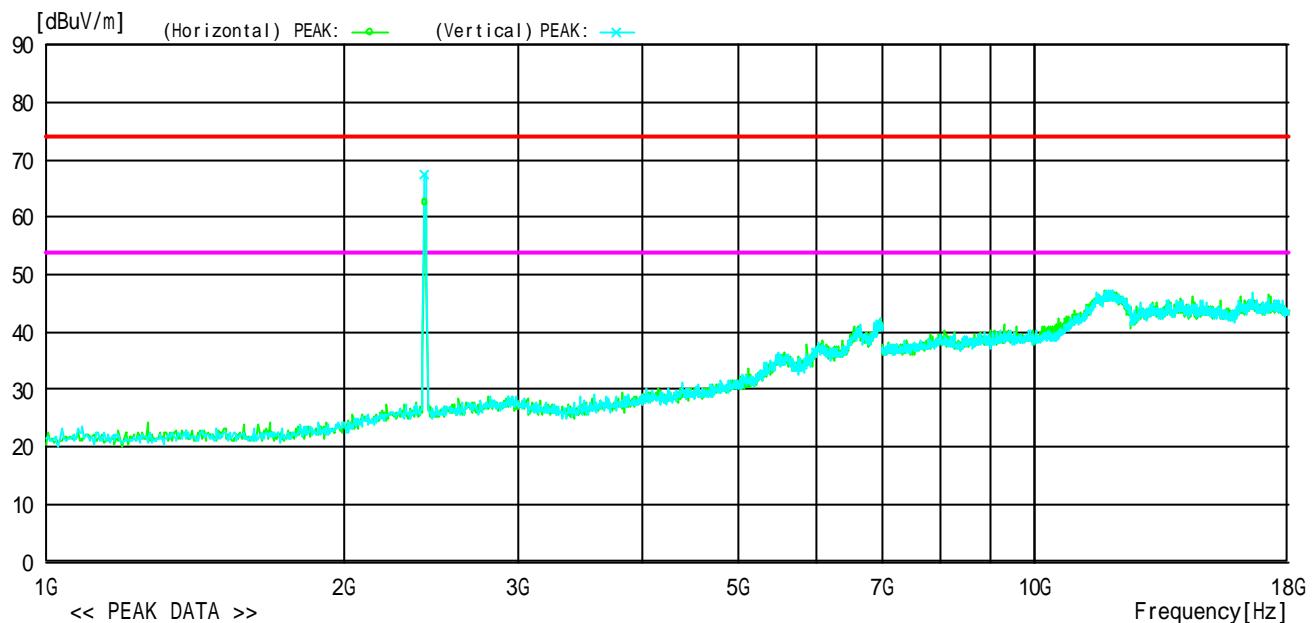
No	Freq. [MHz]	Reading [dBuV]	C.Fac [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant	Comment	
1	2414.824	64.2	-2.6	61.6	74.0	12.4	Hori.	100	272	HRN		
2	2414.824	65.7	-2.6	63.1	74.0	10.9	Vert.	100	1	HRN		

1GHz to 18GHz, Channel 1

Model Name : SA-4310
 Serial No. : 66010752
 Operator : M.Yamanaka
 Power Supply : DC 3.7V
 Memo : RBW:1GHz ~ (1MHz)

Job No. : CJ06-057319E
 Temp/Humi : 26 /42%
 Condition : Operated Angle 3
 Remark : CH:1 TX1

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)
 FCC Subpart C 15.209 (3m) 1G-26.5GHz(AV)



No	Freq. [MHz]	Reading [dBuV]	C.Fac [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant	Comment	
											Type	
1	2414.824	65.2	-2.6	62.6	74.0	11.4	Hori.	100	358	HRN		
2	2414.824	70.0	-2.6	67.4	74.0	6.6	Vert.	100	1	HRN		

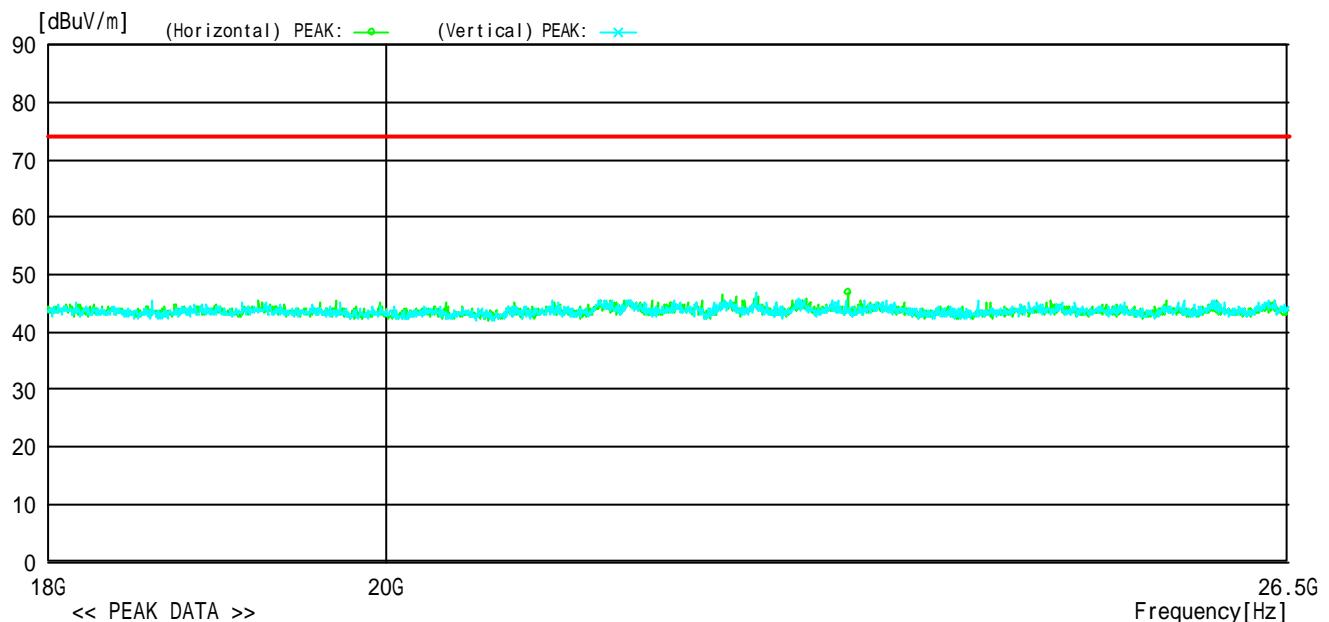
18GHz to 26.5GHz, Channel 1

Model Name : SA-1310/SA-2310/SA-4310
Serial No. : IS#012 / EST#009 / 66010752
Operator : D.Watanuki
Power Supply : AC 120V, 60Hz

Job No. :
Temp/Humi : 24 /41%
Condition : Operated
Remark : CH:1 RATE:11Mbps TX1

Memo :

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)



No	Freq. [MHz]	Reading [dBuV]	C.Fac [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant	Comment	
1	3098.740	39.8	7.0	46.8	74.0	27.2	Hori.	100	357	HRN		
2	3098.740	36.9	7.0	43.9	74.0	30.1	Vert.	100	20	HRN		

* No significant emissions were found.

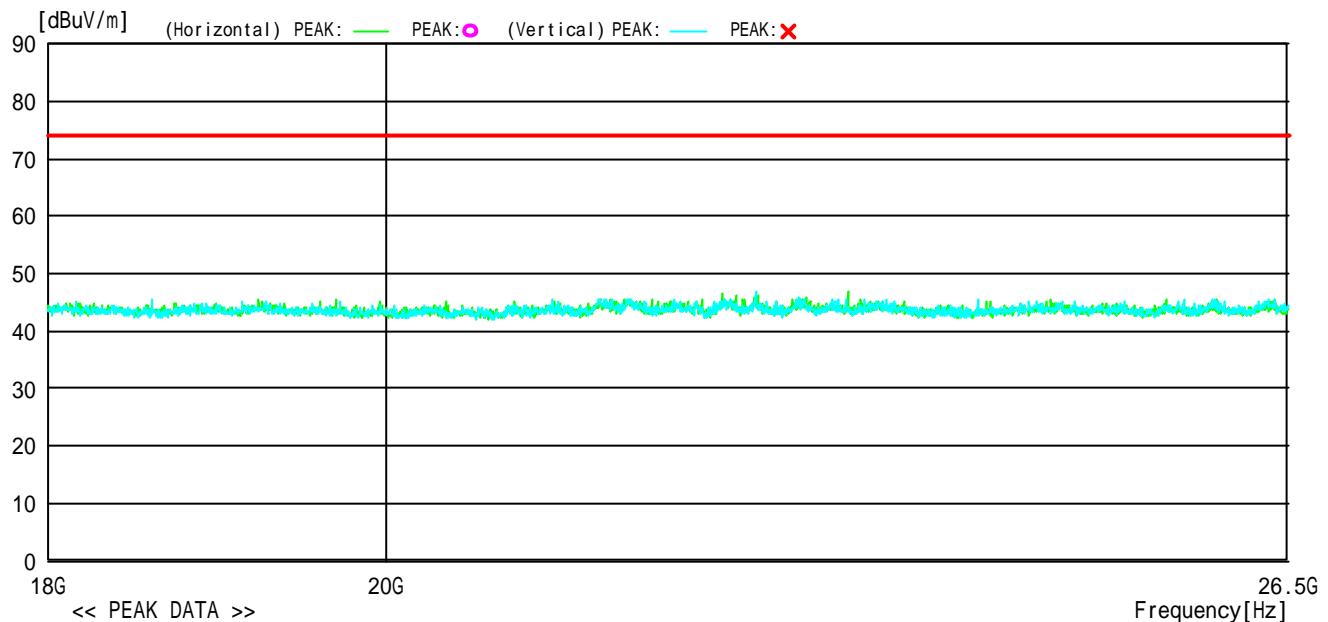
18GHz to 26.5GHz, Channel 1

Model Name : SA-4310
Serial No. : 66010752
Operator : M. Yamanaka
Power Supply : DC 3.7V

Job No. : CJ06-057319E
Temp/Humi : 26 /42%
Condition : Operated Angle 2
Remark : CH:1 TX1

Memo :

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	

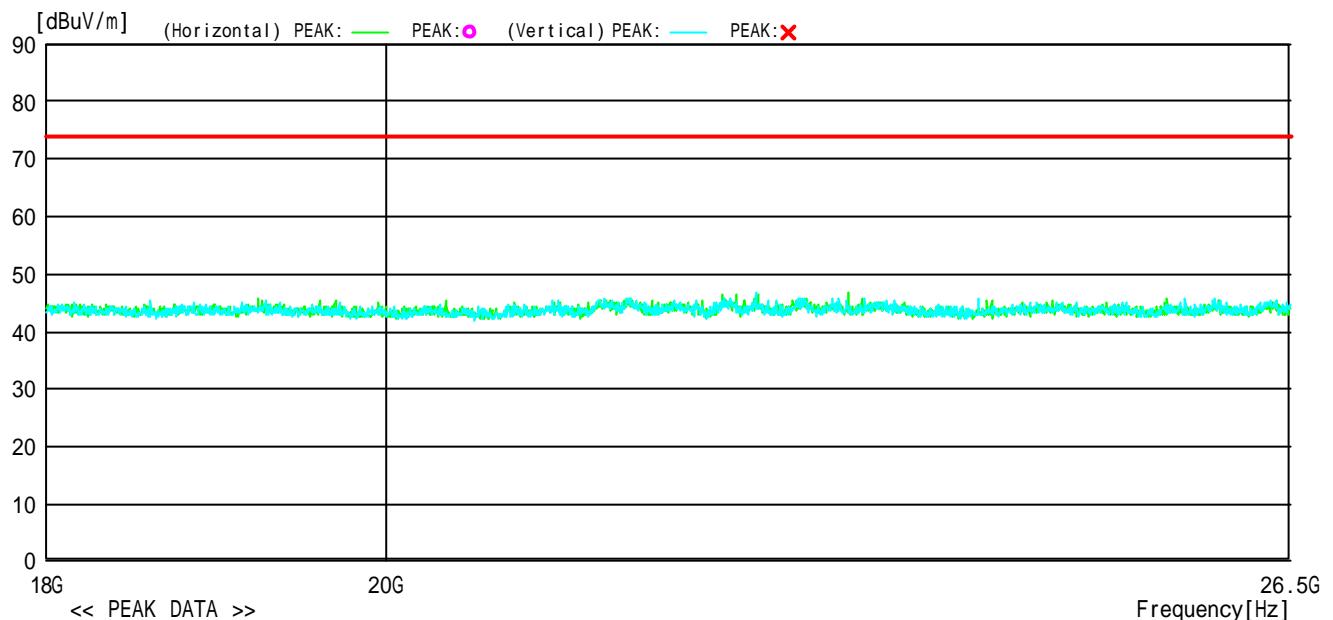
18GHz to 26.5GHz, Channel 1

Model Name : SA-4310
Serial No. : 66010752
Operator : M. Yamanaka
Power Supply : DC 3.7V

Job No. : CJ06-057319E
Temp/Humi : 26 /42%
Condition : Operated Angle 3
Remark : CH:1 TX1

Memo :

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	

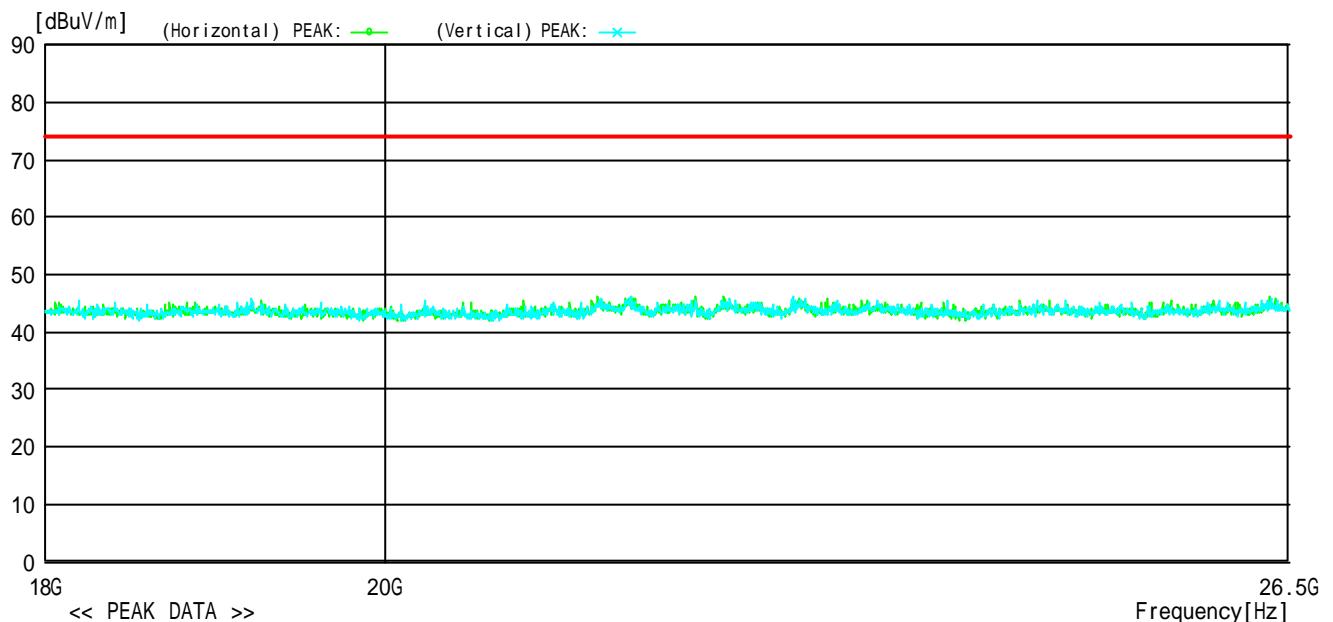
18GHz to 26.5GHz, Channel 6

Model Name : SA-1310/SA-2310/SA-4310
Serial No. : IS#012 / EST#009 / 66010752
Operator : D.Watanuki
Power Supply : AC 120V, 60Hz

Job No. :
Temp/Humi : 24 /41%
Condition : Operated
Remark : CH:6 RATE:11Mbps TX1

Memo :

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	

* No significant emissions were found.

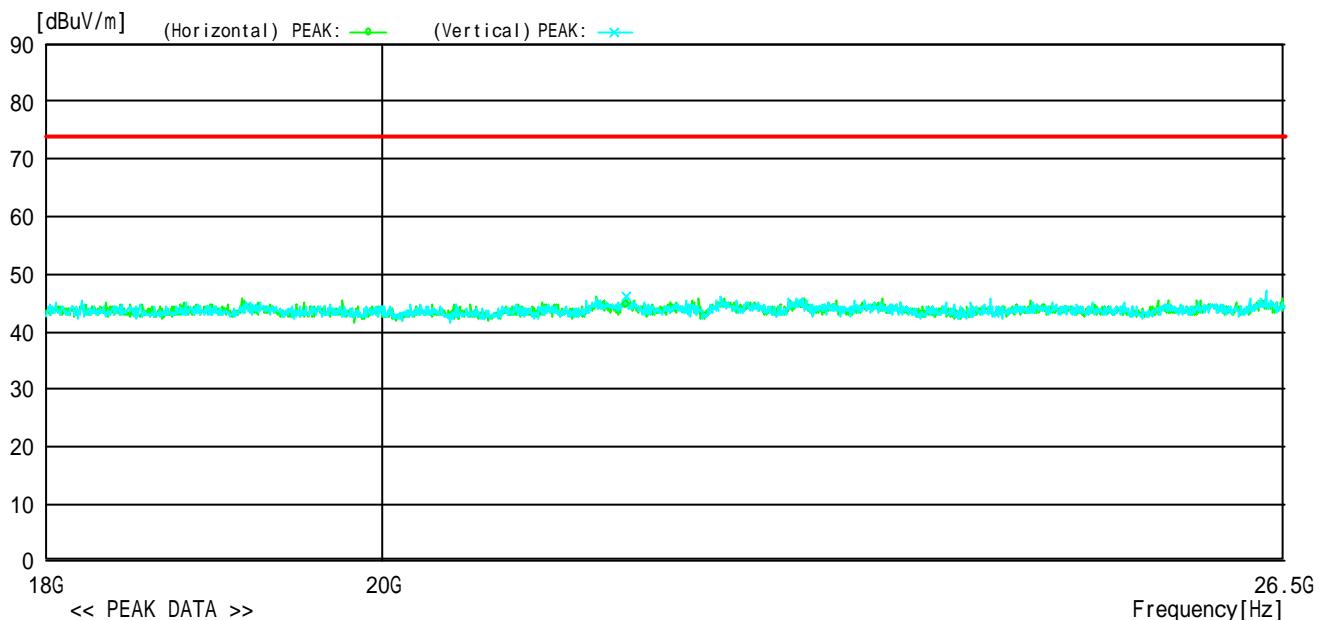
18GHz to 26.5GHz, Channel 11

Model Name : SA-1310/SA-2310/SA-4310
Serial No. : IS#012 / EST#009 / 66010752
Operator : D.Watanuki
Power Supply : AC 120V, 60Hz

Job No. :
Temp/Humi : 24 /41%
Condition : Operated
Remark : CH:11 RATE:11Mbps TX1

Memo :

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	1575.930	36.3	8.4	44.7	74.0	29.3	Hori.	100	358	HRN	
2	1575.930	37.6	8.4	46.0	74.0	28.0	Vert.	100	132	HRN	

* No significant emissions were found.

5.6 15. 247(d) Power Spectrum Density

5.6.1 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 peak output power is determined by using the marker-data function of spectrum analyzer.
- The spectrum analyzer is set-up as following;

❖ Frequency Span	: 1.5 MHz
❖ Resolution bandwidth	: 3 kHz
❖ Video bandwidth	: 3 MHz
❖ Sweep	: 500sec
❖ Detector function	: Peak
❖ Trace Mode	: Max Hold

- See test configuration figure 4.3.

5.6.2 Minimum Standard

(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.6.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 0.8 dB

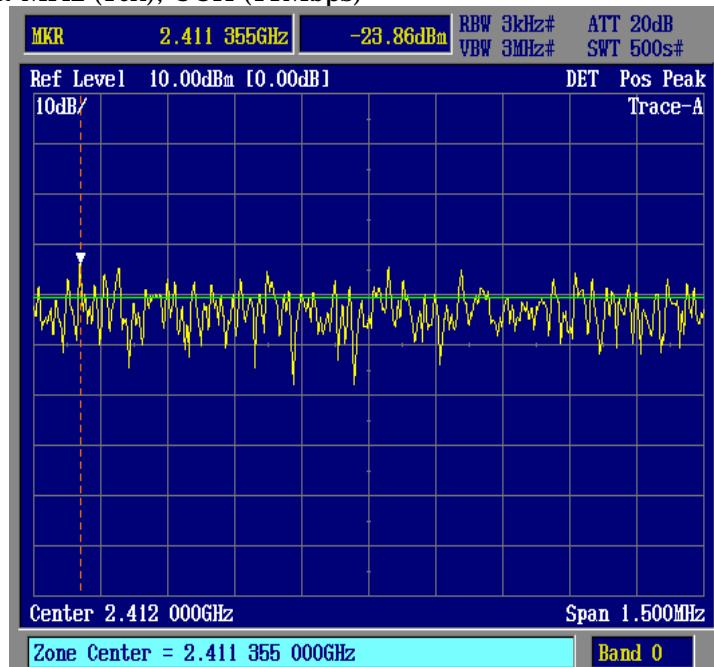
Temperature, Humidity : 28 °C, 45 %

5.6.4 Measured Data

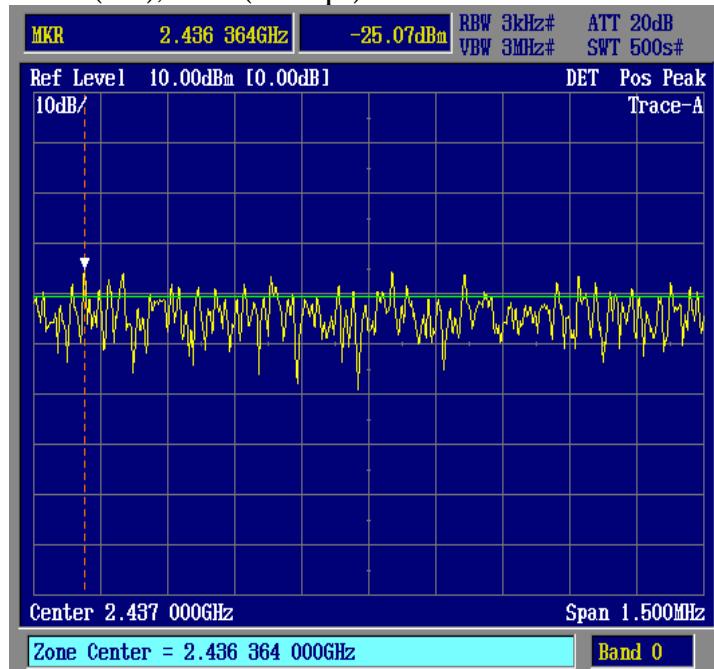
Frequency (MHz)	Correction Factor (dB)	Reading (dBm)	Peak Power	Limit (dBm)	Margin (dB)
CCK (11 Mbps)					
2412 (1ch)	10.33	-23.86	-13.53	8	21.53
2437 (6ch)	10.33	-25.07	-14.74	8	22.74
2462	10.32	-25.78	-15.46	8	23.46

* Correction Factor = Cable Loss (dB) + External Attenuator (dB)

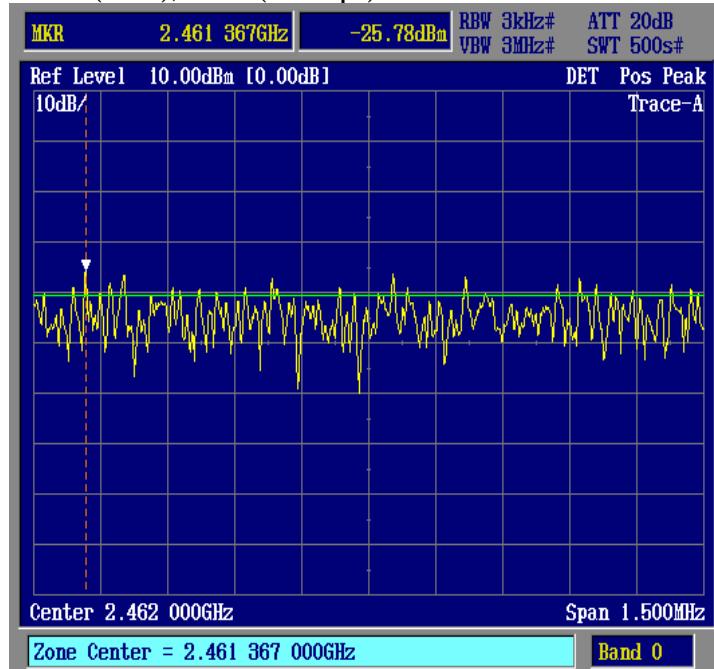
2412 MHz (1ch), CCK (11Mbps)



2437 MHz (6ch), CCK (11Mbps)



2462 MHz (11ch), CCK (11Mbps)



5.7 15. 247(c) Band Edge Measurement**5.7.1 Setting Remarks**

- 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	: 100 kHz, 300kHz (1% of frequency span)
❖ Video bandwidth	: > RBW
❖ Sweep	: Auto
❖ Detector function	: Peak
❖ Trace Mode	: Max Hold

- See test configuration figure 4.3.

5.7.2 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 (dB μ V)	
	Peak	Average
Below 2,390.0		
Above 2,483.5	74	54

5.7.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 2.6 dB

Temperature, Humidity : 23 °C, 43%

5.7.4 Measured Data

The band edge emissions are calculated as following;

Lower frequency 2,390 MHz (CCK)

	Level (dBuV/m)
P_{\max}	70.40
P_{av}	59.20
P_{dev}	29.56

Higher frequency 2,483.5 MHz (CCK)

	Level (dBuV/m)
P_{\max}	67.60
P_{av}	60.10
P_{dev}	36.96

	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
E_{be}	40.84	74.00	33.16
E_{av}	29.64	54.00	24.36

	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
E_{be}	30.64	74.00	43.36
E_{av}	23.14	54.00	30.86

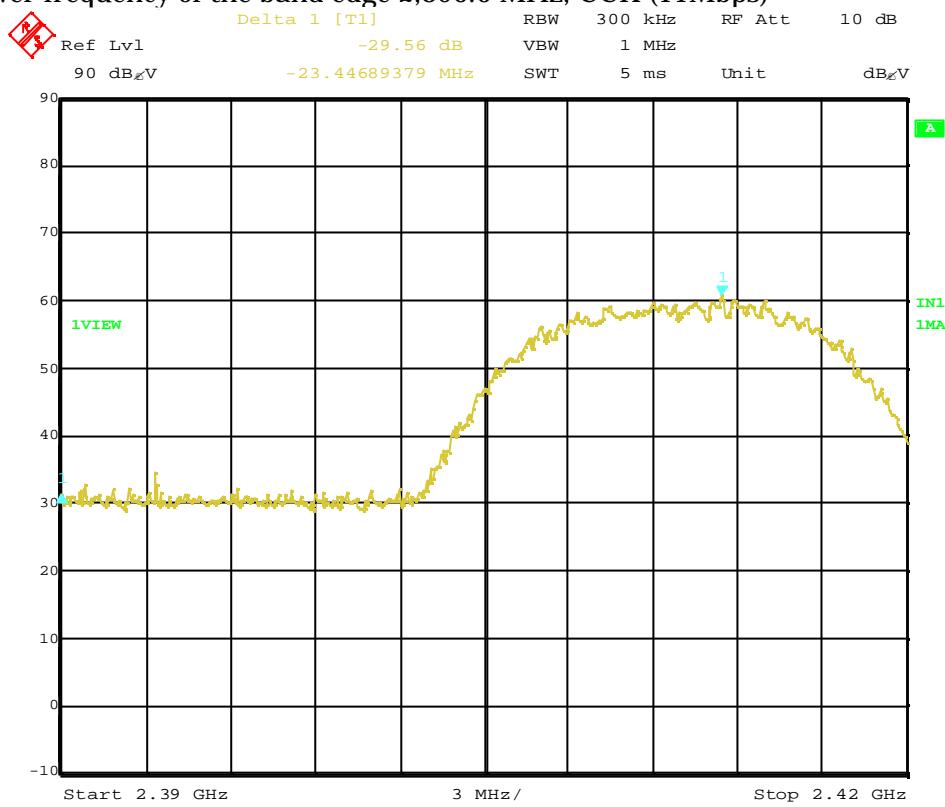
P_{\max} : Maximum peak power of the fundamental.

P_{dev} : The amplitude delta between the peak power and the band edge emission.

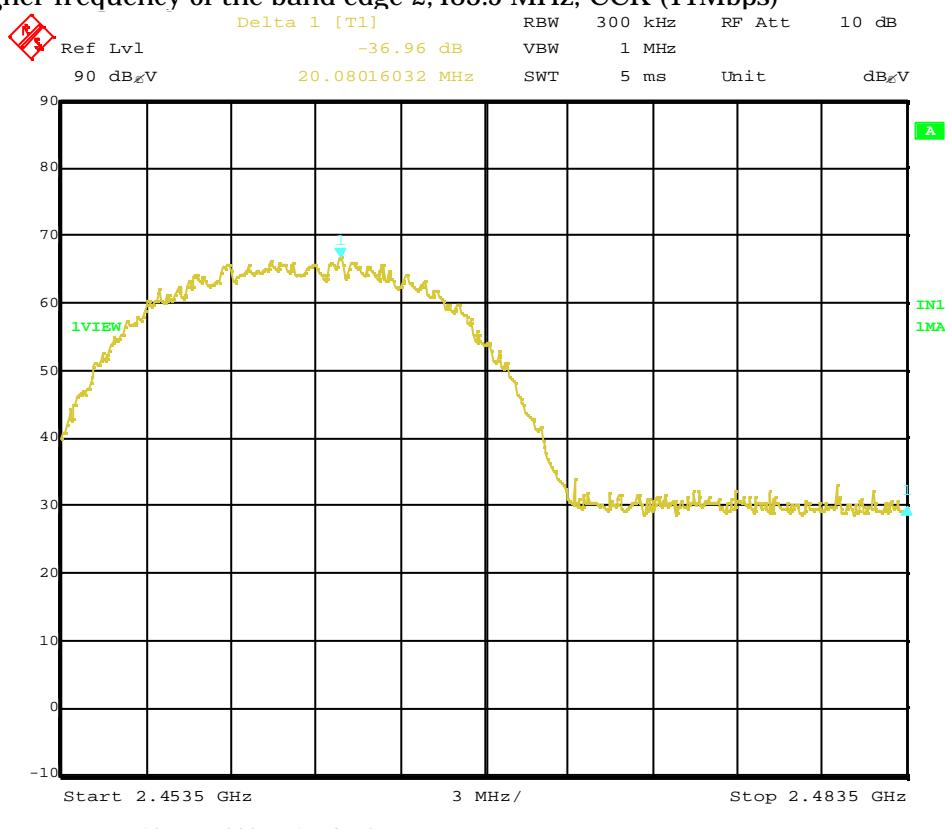
E_{be} : Band edge emission.

E_{av} : Average of the band edge emission.

Lower frequency of the band edge 2,390.0 MHz, CCK (11Mbps)



Higher frequency of the band edge 2,483.5 MHz, CCK (11Mbps)



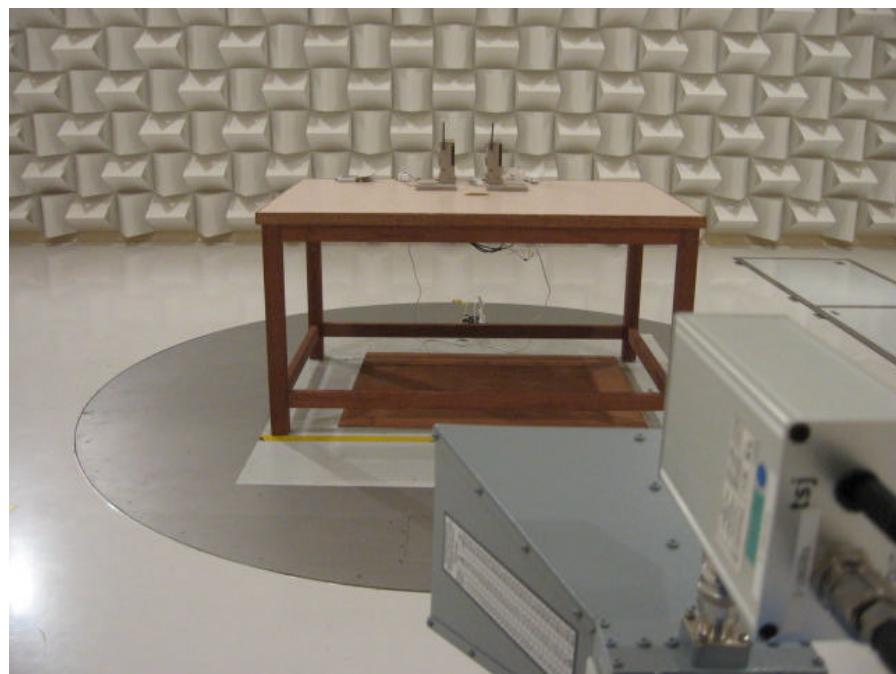
6. Photos

6.1 Setup Photo (Conducted Emission)

This measurement is not applicable.

6.2 Setup Photo (Radiated Emission)

Angle 1
Front View

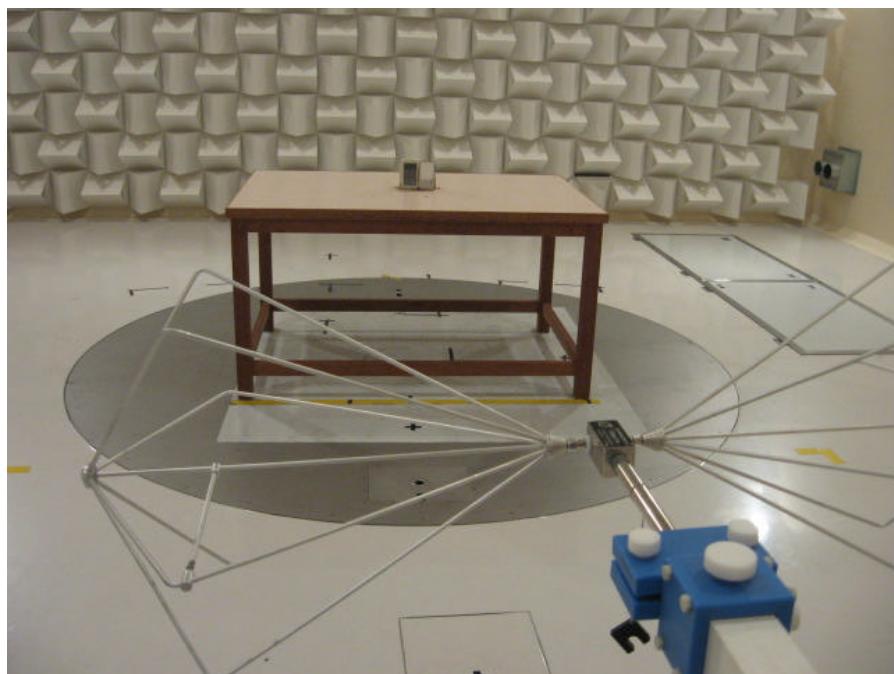


Rear View



6.2 Setup Photo (Radiated Emission)

Angle 2
Front View

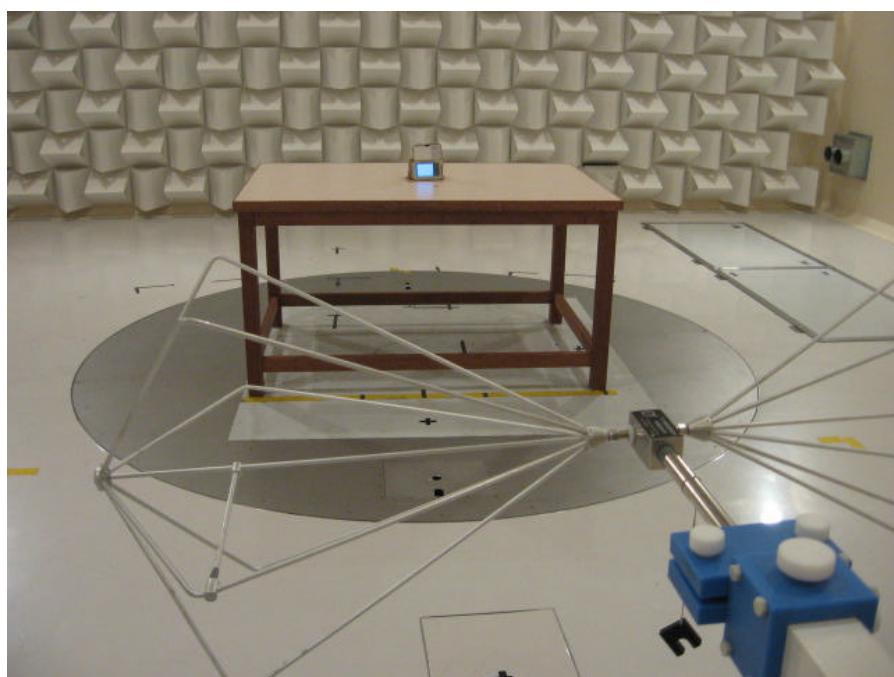


Rear View

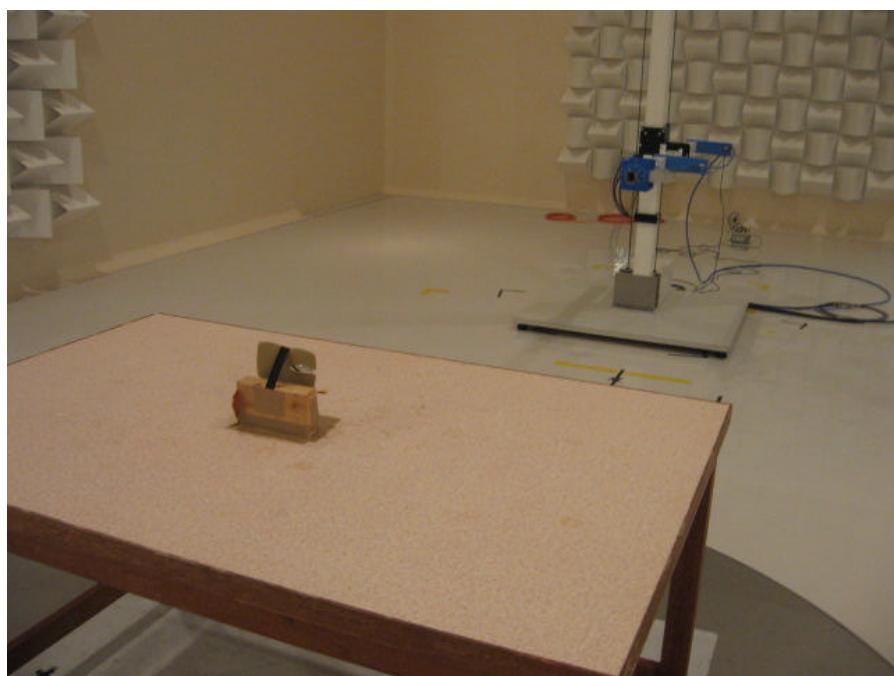


6.2 Setup Photo (Radiated Emission)

Angle 3
Front View



Rear View



7. List of Test Measurement Instruments

7.1 Conducted Emission

This measurement is not applicable.

7.2 Radiated Emission Measurement

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Programmable AC/DC Power Source	NF Corporation	ES18000W	425779	---
EMI Test Receiver	ROHDE & SCHWARZ	ESIB40	100211	April, 2007 April, 2008
Biconical Antenna (30 to 300MHz)	SCHWARZBECK	VHBB9124(Balun) BBA9106(Elements)	311	September, 2006 September, 2007
Log.-Periodic Antenna (300 MHz to 1 GHz)	SCHWARZBECK	UHALP 9108 A	645	September, 2006 September, 2007
Horn Antenna	SCHWARZBECK	BBHA 9120 D	446	September, 2006 September, 2007
Horn Antenna	ETS LINDGREN	3160-08	00033778	September, 2006 September, 2007
Horn Antenna	ETS LINDGREN	3160-09	00034723	September, 2006 September, 2007

7.3 Conducted Radio Measurement

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
DC Power Source	Kikusui	PAB	1210078	---
Spectrum Analyzer	Anritsu	MS2687B	620016270 6	April, 2007 April, 2008
Signal Generator	Agilent Technology	E8254A	US411401 86	June, 2006 June, 2007
Oscilloscope	Yokogawa	DL1720E	91F445216	May, 2006 May, 2007
Diode Detector	Agilent Technology	423B	MY422418 36	March, 2007 March, 2008
Coaxial RF Cable	TSSJ	TCF358AD500 05G07001	JK002503	---