

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : Astarte/SoftGate
Model No. : ASW2201, ANW2202
FCC ID : ROL- ASW2201
Filing Type : Certification
Applicant : Astarte Technology Co., Ltd.
11F, NO.116, Dah-Yeh RD., Peitou 112 Taipei, Taiwan,
R.O.C.

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SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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History of this test report

Original Report Issue Date: Nov. 26, 2003

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

Equipment : Astarte/SoftGate
Model No. : ASW2201, ANW2202
FCC ID : ROL- ASW2201
Filing Type : Certification
Applicant : Astarte Technology Co., Ltd.
11F, NO.116, Dah-Yeh RD., Peitou 112 Taipei, Taiwan,
R.O.C.

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the equipment under test was **passed** all test items required in FCC Part 15 subpart C, relative to the equipment under test. Testing was carried out on Nov.19.2003 at **SPORTON International Inc.** LAB.



Joe Yang

Director

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1. General Description of Equipment under Test

1.1. Applicant

Astarte Technology Co., Ltd.

11F, NO.116, Dah-Yeh RD., Peitou 112 Taipei, Taiwan, R.O.C.

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

Equipment	: Astarte/SoftGate
Model No.	: ASW2201, ANW2202
FCC ID	: ROL-ASW2201
Trade Name	: Astarte
Power Supply Type	: Switching (from system)
AC Power Cord	: AC 110V, 0.8meter, 3pin (from system)

1.4. Feature of Equipment under Test

1. Host/Radio Interface	Meet 802.11b specification
2. Type of Modulation	DBPSK,DQPSK, CCK
3. Number of Channels	11
4. Frequency Band	2400~2483.5 MHz
5. Carrier Frequency of each channel	2412+N*5 MHz,.N=0~10
6. Bandwidth of each channel	22 MHz
7. Maximum Output Power to Antenna	16.65 dBm
8. IF & L.O. frequency	374 MHz, 2038+N*5 MHz, N=0~10
9. Type of Antenna Connector	N/A
10. Antenna Type / Class and Gain	PCB Antenna , 0dBi
11. Function Type	Transceiver
12. Power Rating (DC/AC , Voltage)	DC, 3.3V 450mA
13. Duty Cycle	N/A.
14. Basic function of product	802.11b PCMCIA card

2. Test Configuration of Equipment under Test

2.1. Test Manner

- a. The EUT has been associated with personal computer and peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner, which tended to maximize its emission characteristics in a typical application.
- b. The complete test system included VIEWSONIC MONITOR, LOGITECH (USB)MOUSE, EPSON PRINTER, DELL NOTE BOOK, GATEWAY (USB) KEYBOARD and EUT for EMI test.
- c. The following test modes were performed for conduction test:
 - Mode 1: CH01 (2412MHz)
 - Mode 2: CH06 (2437MHz)
 - Mode 3: CH11 (2462MHz)
- d. The following test modes were performed for radiation test:
 - Mode 1: CH01 (2412MHz)
 - Mode 2: CH06 (2437MHz)
 - Mode 3: CH11 (2462MHz)
- e. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 24835MHz.

2.2. Description of Test System

Support Unit 1. –MONITOR (VIEWSONIC)

FCC ID	: N/A
Model No.	: DTPC-22
Serial No.	: SP0054
Data Cable	: Double-shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. – (USB) MOUSE (LOGITECH)

FCC ID	: N/A
Model No.	: M-8E58
Serial No.	: SP0041
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 3. -- PRINTER (EPSON)

FCC ID : N/A
Model No. : STYLUS COLOR C61
Power Supply Type : Linear
Power Cord : Non-Shielded
Serial No. : SP0048
Data Cable : Shielded, 1.35m
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

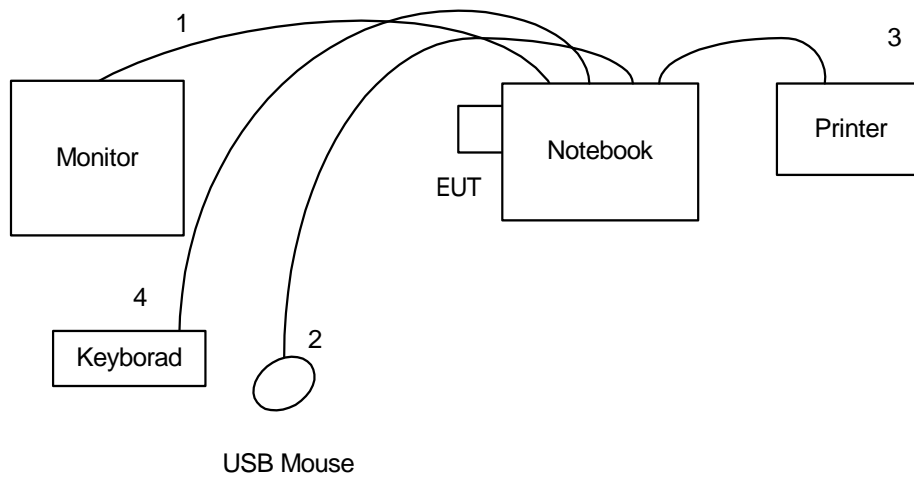
Support Unit 4. – NOTE BOOK (DELL)

FCC ID : E2K24CLIVS
Model No. : PP052
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0051
Data Cable : Shielded, 1.7m

Support Unit 5. – (USB) KEY BOARD (GATEWAY)

FCC ID : N/A
Model No. : SK-9900W
Power Supply Type : Switching
Power Cord : Non-Shielded
Serial No. : SP0257
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

2.3. Connection Diagram of Test System



1. The I/O cable is connected from Notebook to the support unit 1.
2. The I/O cable is connected from Notebook to the support unit 2.
3. The I/O cable is connected from Notebook to the support unit 3.
4. The I/O cable is connected from Notebook to the support unit 5.

3. Operation of Equipment under Test

An executive program, EMCTEST.EXE under WIN2000, which generates a complete line of continuously repeating " H" pattern was used as the test software.

The program was executed as follows:

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the hard disk drive and runs it.
- c. The PC sends " H" messages to the monitor, and the monitor displays " H" patterns on the screen.
- d. The PC sends " H" messages to the printer, then the printer prints them on the paper.
- e. The PC sends " H" messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- f. Repeat the steps from c to e.

At the same time, the following programs were executed:

Executed the Wpdiag and the EUT was keeping transmitting signals at fixed frequency.

4. General Information of Test

4.1. Test Site Location :

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,
Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.

TEL : 886-3-327-3456

FAX : 886-3-318-0055

Test Site No : CO01-HY, 03CH03-HY

4.2. Test Voltage

110V/60HZ

4.3. Standard for Methods of Measurement

FCC Part 15, Subpart C

4.4. Test in Compliance with

ANSI C63.4-2001 for conducted power line test and radiated emission test,

“Guidance on Measurements for Direct Sequence Spread Spectrum Systems” for test of 6dB Bandwidth

“Guidance on Measurements for Direct Sequence Spread Spectrum Systems” for test of Maximum Peak Output Power

“Guidance on Measurements for Direct Sequence Spread Spectrum Systems” for test of 100kHz Bandwidth of Frequency Band Edges

“Guidance on Measurements for Direct Sequence Spread Spectrum Systems” for test of Power Spectral Density

4.5. Frequency Range Investigated

- a. Conduction: from 150 KHz to 30 MHz
- b. Radiation: from 30 MHz to 24835MHz

4.6. Test Distance

The test distance of radiated emission from antenna to EUT is 3 M.

5. Report of Measurements and Examinations

5.1. List of Measurements and Examinations

FCC Rule	Description of Test	Result
15.207	Conducted Emission	Pass
<u>15.247(a)(2)</u>	6dB Bandwidth	Pass
<u>15.247(b)(3)</u>	Maximum Peak Output Power	Pass
15.209	Radiated Emission	Pass
<u>15.247(c)</u>	100kHz Bandwidth of Frequency Band Edges	Pass
<u>15.247(d)</u>	Power Spectral Density	Pass
<u>15.203</u>	Antenna Requirement	Pass

5.2. 6dB Bandwidth

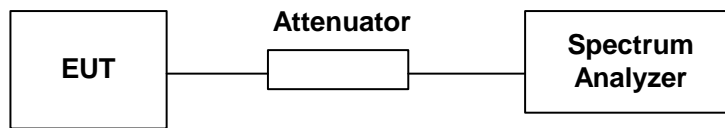
Measuring Instruments :

As described in chapter 7 of this test report.

Test Procedure :

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The 6 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6 dB.

Test Setup Layout :



Test Result : The spectrum analyzer plots are attached as below

- Temperature : 26 °C
- Relative Humidity : 64%
- Antenna Gain: 0 dBi

Channel	Frequency (MHz)	6dB Emission bandwidth (MHz)	Limits (MHz)	Plot Ref. No.
01	2412	10.2 MHz	0.5	1
06	2437	10.2 MHz	0.5	2
11	2462	8.92 MHz	0.5	3

5.3. Maximum Peak Output Power

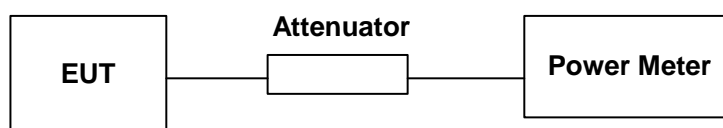
Measuring Instruments :

As described in chapter 7 of this test report.

Test Procedure :

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

Test Setup Layout :



Test Result : See spectrum analyzer plots below

- Temperature : 26°C
- Relative Humidity :64 %
- Antenna Gain: 0 dBi

Channel	Frequency (MHz)	Measured Output Power (mWatt)	Measured Output Power (dBm)	Limits (Watt/dBm)
01	2412	36.73	15.65	1W/30 dBm
06	2437	46.24	16.65	1W/30 dBm
11	2462	39.45	15.96	1W/30 dBm

5.4. Power Spectral Density

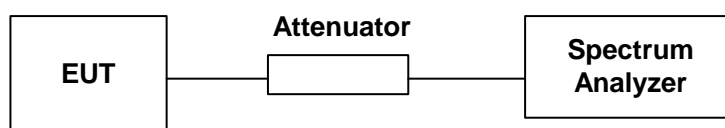
Measuring Instruments :

As described in chapter 7 of this test report.

Test Procedure :

1. The transmitter output was connected to spectrum analyzer through an attenuator.
2. The spectrum analyzer's resolution bandwidth were set at 3KHz RBW and 30KHz VBW as that of the fundamental frequency. Set the sweep time=span/3KHz.
3. The power spectral density was measured and recorded.
4. The Sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

Test Setup Layout :



Test Result : See spectrum analyzer plots below

- Temperature : 26°C
- Relative Humidity : 64 %

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Plot Ref. No.
01	2412	-9.64	8	4
06	2437	-8.85	8	5
11	2462	-8.83	8	6

5.5. Test of Conducted Emission

Conducted Emissions were measured from 150 KHz to 30 MHz with a bandwidth of 9 KHz and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

5.5.1. Major Measuring Instruments :

● Test Receiver	(R&S ESCS 30)
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

5.5.2 Test Procedures :

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connect to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 KHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.5.3 Test Result of Conducted Emission :

- Frequency Range of Test : from 150KHz to 30 MHz. 6dB Bandwidth : 9KHz
- Test Mode : Mode 1
- Temperature : 24.5°C
- Relative Humidity : 50 %

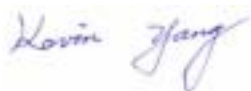
The test was passed at the minimum margin that marked by the frame in the following table

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : Astarte / SoftGate
 Power : AC 110 V / 60 Hz
 Model : ASU2201
 Memo : TX CH 01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.220	45.56	-17.28	62.84	45.29	0.10	0.17	QP
2	0.220	23.72	-29.12	52.84	23.45	0.10	0.17	Average
3	0.227	44.29	-18.28	62.57	44.02	0.10	0.17	QP
4	0.227	30.05	-22.52	52.57	29.78	0.10	0.17	Average
5	0.339	17.32	-31.90	49.22	17.10	0.10	0.12	Average
6	0.339	29.83	-29.39	59.22	29.61	0.10	0.12	QP
7	1.907	19.93	-26.07	46.00	19.74	0.10	0.09	Average
8	1.907	32.12	-23.88	56.00	31.93	0.10	0.09	QP
9	3.701	16.30	-29.70	46.00	16.05	0.10	0.15	Average
10	3.701	27.24	-28.76	56.00	26.99	0.10	0.15	QP
11	9.710	26.87	-23.13	50.00	26.39	0.20	0.28	Average
12	9.710	31.69	-28.31	60.00	31.21	0.20	0.28	QP

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : Astarte / SoftGate
 Power : AC 110 V / 60 Hz
 Model : ASU2201
 Memo : TX CH 01

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.227	44.27	-18.29	62.56	44.00	0.10	0.17	QP
2	0.227	29.97	-22.59	52.56	29.70	0.10	0.17	Average
3	0.331	30.03	-29.41	59.44	29.81	0.10	0.12	QP
4	0.331	16.28	-33.16	49.44	16.06	0.10	0.12	Average
5	0.537	20.91	-35.09	56.00	20.74	0.10	0.07	QP
6	0.537	14.39	-31.61	46.00	14.22	0.10	0.07	Average
7	1.909	30.65	-25.35	56.00	30.46	0.10	0.09	QP
8	1.909	16.55	-29.45	46.00	16.36	0.10	0.09	Average
9	3.939	16.43	-29.57	46.00	16.07	0.20	0.16	Average
10	3.939	27.33	-28.67	56.00	26.97	0.20	0.16	QP
11	9.760	31.52	-28.48	60.00	31.04	0.20	0.28	QP
12	9.760	26.25	-23.75	50.00	25.77	0.20	0.28	Average



Test Engineer : Kevin Yang

- Test Mode : Mode 2
- Temperature : 24.5°C
- Relative Humidity : 50 %

The test was passed at the minimum margin that marked by the frame in the following table

Site : CO01-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : Astarte / SoftGate
 Power : AC 110 V / 60 Hz
 Model : ASW2201
 Memo : TX CH 06

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.216	45.56	-17.41	62.97	45.29	0.10	0.17	QP
2	0.216	19.97	-33.00	52.97	19.70	0.10	0.17	Average
3	0.327	32.78	-26.74	59.52	32.56	0.10	0.12	QP
4	0.327	13.53	-35.99	49.52	13.31	0.10	0.12	Average
5	1.908	28.64	-27.36	56.00	28.45	0.10	0.09	QP
6	1.908	17.78	-28.22	46.00	17.59	0.10	0.09	Average
7	4.148	15.94	-30.06	46.00	15.58	0.20	0.16	Average
8	4.148	25.85	-30.15	56.00	25.49	0.20	0.16	QP
9	10.130	25.53	-24.47	50.00	25.05	0.20	0.28	Average
10	10.130	30.62	-29.38	60.00	30.14	0.20	0.28	QP
11	26.281	18.25	-41.75	60.00	17.22	0.53	0.50	QP
12	26.281	13.64	-36.36	50.00	12.61	0.53	0.50	Average

Site : CO01-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : Astarte / SoftGate
 Power : AC 110 V / 60 Hz
 Model : ASW2201
 Memo : TX CH 06

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.158	28.85	-36.71	65.56	28.59	0.10	0.16	QP
2	0.158	14.88	-40.68	55.56	14.62	0.10	0.16	Average
3	0.214	45.16	-17.87	63.03	44.89	0.10	0.17	QP
4	0.214	17.03	-36.00	53.03	16.76	0.10	0.17	Average
5	0.347	26.12	-32.91	59.03	25.90	0.10	0.12	QP
6	0.347	20.66	-28.37	49.03	20.44	0.10	0.12	Average
7	1.780	32.50	-23.50	56.00	32.31	0.10	0.09	QP
8	1.780	21.18	-24.82	46.00	20.99	0.10	0.09	Average
9	3.663	25.78	-30.22	56.00	25.53	0.10	0.15	QP
10	3.663	17.33	-28.67	46.00	17.08	0.10	0.15	Average
11	9.810	31.99	-28.01	60.00	31.51	0.20	0.28	QP
12	9.810	26.82	-23.18	50.00	26.34	0.20	0.28	Average



Test Engineer : Kevin Yang

- Test Mode : Mode 3
- Temperature : 24.5°C
- Relative Humidity : 50 %

The test was passed at the minimum margin that marked by the frame in the following table

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 NEUTRAL
 EUT : Astarte / SoftGate
 Power : AC 110 V / 60 Hz
 Model : ASU2201
 Memo : TX CH 11

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
	0.220	43.57	-19.26	62.83	43.30	0.10	0.17	QP
2	0.220	32.79	-20.04	52.83	32.52	0.10	0.17	Average
3	0.330	32.47	-26.99	59.46	32.25	0.10	0.12	QP
4	0.330	22.49	-26.97	49.46	22.27	0.10	0.12	Average
5	0.541	23.82	-32.18	56.00	23.65	0.10	0.07	QP
6	0.541	17.88	-28.12	46.00	17.71	0.10	0.07	Average
7	2.010	29.09	-26.91	56.00	28.89	0.10	0.10	QP
8	2.010	17.75	-28.25	46.00	17.55	0.10	0.10	Average
9	4.270	26.13	-29.87	56.00	25.76	0.20	0.17	QP
10	4.270	14.33	-31.67	46.00	13.96	0.20	0.17	Average
11	10.070	30.98	-29.02	60.00	30.50	0.20	0.28	QP
12	10.070	25.86	-24.14	50.00	25.38	0.20	0.28	Average

Site : C001-HY
 Condition : CNS/VCCI/CISPR-B 2003 2001/008 LINE
 EUT : Astarte / SoftGate
 Power : AC 110 V / 60 Hz
 Model : ASU2201
 Memo : TX CH 11

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.220	43.41	-19.41	62.82	43.14	0.10	0.17	QP
2	0.220	32.78	-20.04	52.82	32.51	0.10	0.17	Average
3	0.329	27.83	-31.65	59.48	27.61	0.10	0.12	QP
4	0.329	20.73	-28.75	49.48	20.51	0.10	0.12	Average
5	0.771	24.34	-31.66	56.00	24.20	0.10	0.04	QP
6	0.771	11.25	-34.75	46.00	11.11	0.10	0.04	Average
7	1.900	32.21	-23.79	56.00	32.02	0.10	0.09	QP
8	1.900	21.62	-24.38	46.00	21.43	0.10	0.09	Average
9	3.780	27.53	-28.47	56.00	27.27	0.10	0.16	QP
10	3.780	17.85	-28.15	46.00	17.59	0.10	0.16	Average
11	10.180	31.06	-28.94	60.00	30.58	0.20	0.28	QP
12	10.180	26.15	-23.85	50.00	25.67	0.20	0.28	Average



Test Engineer : Kevin Yang

5.6. Test of Radiated Emission

Radiated emissions from 30 MHz to 24.835 GHz were measured according to the methods defines in ANSI C63.4-2001. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions

5.6.1 Major Measuring Instruments

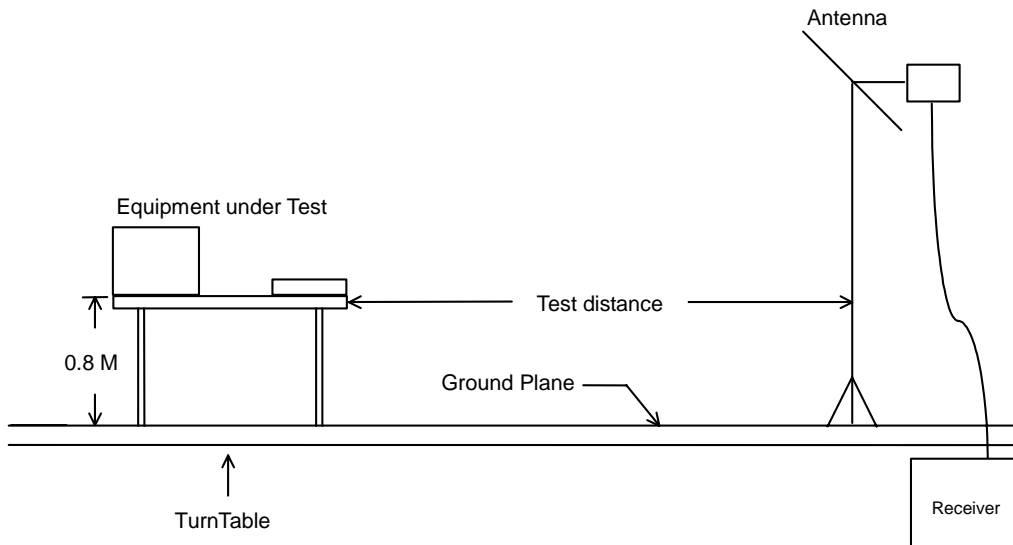
- Amplifier (MITEQ AFS44)
 - RF Gain 40 dB
 - Signal Input 100 MHz to 26.5 GHz

- Spectrum analyzer (R&S FSP40)
 - Attenuation 10 dB
 - Start Frequency 1 GHz
 - Stop Frequency 25 GHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 9 KHz to 40 GHz

5.6.2 Test Procedures

- A. The EUT was placed on a rotatable table top 0.8 meter above ground.
- B. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- C. The table was rotated 360 degrees to determine the position of the highest radiation.
- D. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- E. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- F. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- G. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- H. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

5.6.3 Typical Test Setup Layout of Radiated Emission



5.6.4. Test Result of Radiated Emission

- Test Mode: Mode 1 (2412MHz)
- Test Distance : 3 M
- Temperature : 24 °C
- Relative Humidity : 53%
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

```

Site      : 03CH03-HY
Condition : 3m 03CH03-MAT VERTICAL
EUT      : Astarte/SoftGate
Power    : 110V/60Hz
MODEL    : ASU2201
MEMO     : TX CH01 2412MHz
    
```

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	55.650	33.16	-6.84	40.00	53.92	5.73	1.50	27.99	Peak	107	349
2	191.730	29.55	-13.95	43.50	47.45	7.39	2.43	27.72	Peak	102	359
3	226.020	29.32	-16.68	46.00	44.60	9.69	2.63	27.60	Peak	109	349

```

Site      : 03CH03-HY
Condition : 3m 03CH03-MAT VERTICAL
EUT      : Astarte/SoftGate
Power    : 110V/60Hz
MODEL    : ASU2201
MEMO     : TX CH01 2412MHz
    
```

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	450.500	30.29	-15.71	46.00	39.57	15.34	3.63	28.25	Peak	102	343
2	662.600	33.36	-12.64	46.00	39.58	17.73	4.79	28.74	Peak	105	340
3	747.300	31.11	-14.89	46.00	36.57	18.37	4.92	28.75	Peak	109	338

Site : 03CH03-HY
 Condition : 3m HORN-ANT-6741 VERTICAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASU2201
 MEMO : TX CH01 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2385.600	47.15	-6.85	54.00	49.01	28.19	6.19	36.24	Average	101	42
2	2385.600	57.10	-16.90	74.00	58.96	28.19	6.19	36.24	Peak	101	42

Site : 03CH03-HY
 Condition : 3m 03CH03-MAT HORIZONTAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASU2201
 MEMO : TX CH01 2412MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	83.730	31.27	-8.73	40.00	50.45	7.14	1.61	27.93	Peak	101	339
2	179.850	35.67	-7.83	43.50	53.44	7.59	2.38	27.74	Peak	104	347
3	226.290	33.14	-12.86	46.00	48.38	9.71	2.64	27.59	Peak	113	347

Site : 03CH03-HY
 Condition : 3a 03CH03-MAT HORIZONTAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASW2201
 MEMO : TX CH01 2412MHz

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
			Limit	Line	Level	Factor	Loss	Factor		Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	394.500	35.09	-10.91	46.00	44.95	14.45	3.46	27.77	Peak	106	356
2	498.100	32.56	-13.44	46.00	41.30	15.00	3.94	28.68	Peak	112	351
3	747.300	33.96	-12.04	46.00	39.42	18.37	4.92	28.75	Peak	115	354

Site : 03CH03-HY
 Condition : 3a HORN-ANT-6741 HORIZONTAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASW2201
 MEMO : TX CH01 2412MHz

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
			Limit	Line	Level	Factor	Loss	Factor		Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2385.600	55.76	-18.24	74.00	57.62	28.19	6.19	36.24	Peak	107	86
2	2385.600	47.57	-6.43	54.00	49.43	28.19	6.19	36.24	Average	107	86

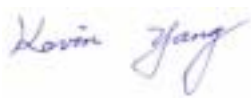
➤ For 2.386GHz ~ 24.835GHz

Remark: Frequency from 2386MHz to 24835MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor	Cable Loss	Reading (dBuV)	Limits (dBuV/m)	Emission (uV/m)	Level (dBuV/m)	Margin (uV/m)	Detect (dB)	Mode
2414.000	V	28.25	6.23	71.00	-	-	105.48	187931.68	-	Peak
2414.000	V	28.25	6.23	65.68	-	-	100.16	101859.14	-	AV
2414.000	H	28.25	6.23	67.76	-	-	102.24	129419.58	-	AV
2414.000	H	28.25	6.23	71.76	-	-	106.24	205116.22	-	Peak
4824.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
7236.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
9648.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
12060.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
14472.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
16884.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
19296.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
21708.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
24120.000	V/H	-	-	-	-	-	-	-	-	AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer : 
 Kevin Yang

- Test Mode: Mode 2 (2437 MHz)
- Test Distance : 3 M
- Temperature : 24°C
- Relative Humidity : 53 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

```

Site      : 03CH03-HY
Condition : 3m 03CH03-MAT VERTICAL
EUT       : Astarte/SoftGate
Power     : 110V/60Hz
MODEL     : ASW2201
MEMO     : TX CH06 2437MHz
    
```

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	51.060	33.12	-6.88	40.00	53.51	6.34	1.27	28.00	Peak	109	350
2	133.140	31.41	-12.09	43.50	46.80	10.44	2.00	27.83	Peak	117	350
3	226.290	27.13	-18.87	46.00	42.37	9.71	2.64	27.59	Peak	107	346
4	257.610	26.67	-19.33	46.00	39.70	11.66	2.78	27.47	Peak	104	342

```

Site      : 03CH03-HY
Condition : 3m 03CH03-MAT VERTICAL
EUT       : Astarte/SoftGate
Power     : 110V/60Hz
MODEL     : ASW2201
MEMO     : TX CH06 2437MHz
    
```

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	433.000	30.14	-15.86	46.00	39.49	15.10	3.64	28.09	Peak	119	347
2	662.600	30.99	-15.01	46.00	37.21	17.73	4.79	28.74	Peak	121	352
3	928.600	30.66	-15.34	46.00	33.87	19.52	5.54	28.27	Peak	115	358
1	2372.000	56.08	-17.92	74.00	57.99	28.16	6.17	36.24	Peak	100	31
2	2372.000	47.53	-6.47	54.00	49.44	28.16	6.17	36.24	Average	100	31

Site : 03CH03-HY
 Condition : 3a 03CH03-MAT HORIZONTAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASU2201
 MEMO : TX CH06 2437MHz

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
			Limit	Line	Level	Factor	Loss	Factor		Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	37.020	27.03	-12.97	40.00	41.94	12.06	1.06	28.03	Peak	217	323
2	133.140	27.92	-15.58	43.50	43.31	10.44	2.00	27.03	Peak	121	347
3	232.770	29.98	-16.02	46.00	44.64	10.30	2.61	27.57	Peak	117	337
4	266.250	31.89	-14.11	46.00	44.76	11.68	2.88	27.43	Peak	109	347
5	299.730	32.07	-13.13	46.00	45.02	11.36	2.99	27.30	Peak	104	352

Site : 03CH03-HY
 Condition : 3a 03CH03-MAT HORIZONTAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASU2201
 MEMO : TX CH06 2437MHz

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
			Limit	Line	Level	Factor	Loss	Factor		Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	363.000	34.48	-11.52	46.00	45.35	13.43	3.31	27.61	Peak	107	342
2	433.000	34.27	-11.73	46.00	43.62	15.10	3.64	28.09	Peak	105	337
3	747.300	33.68	-12.32	46.00	39.14	18.37	4.92	28.75	Peak	114	329

Site : 03CH03-HY
 Condition : 3a HORN-ANT-6741 HORIZONTAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASU2201
 MEMO : TX CH06 2437MHz

	Freq	Level	Over	Limit	Read	Probe	Cable	Preamp	Remark	Ant	Table
			Limit	Line	Level	Factor	Loss	Factor		Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2372.000	57.36	-16.64	74.00	59.27	28.16	6.17	36.24	Peak	108	82
2	2372.000	50.08	-3.92	54.00	51.99	28.16	6.17	36.24	Average	108	82


➤ For 2.373GHz ~ 24.850GHz

Remark: Frequency from 2373MHz to 24850MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor (dB/m)	Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	Emission (uV/m)	Level (dBuV/m)	Margin (uV/m)	Detect (dB)	Mode
2436.000	V	28.29	6.26	65.47	-	-	100.02	100230.52	-	AV
2436.000	V	28.29	6.26	71.84	-	-	106.39	208689.21	-	Peak
2436.000	H	28.29	6.26	70.29	-	-	104.84	174582.22	-	Peak
2436.000	H	28.29	6.26	67.22	-	-	101.77	122602.69	-	AV
4874.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
7311.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
9748.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
12185.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
14622.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
17059.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
19496.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
21933.000	V/H	-	-	-	-	-	-	-	-	AV/Peak
24370.000	V/H	-	-	-	-	-	-	-	-	AV/Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer : 
 Kevin Yang

- Test Mode: Mode 3 (2462 MHz)
- Test Distance : 3 M
- Temperature : 24°C
- Relative Humidity :53 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

The test was passed at the minimum margin that marked by the frame in the following table

■ Spurious Emission

```

Site      : 03CH03-HY
Condition : 3m 03CH03-MAT VERTICAL
EUT       : Astarte/SoftGate
Power     : 110V/60Hz
MODEL     : ASU2201
MEMO     : TX CH11 2462MHz
    
```

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	55.380	33.42	-6.58	40.00	54.11	5.76	1.54	27.99	Peak	115	342
2	132.330	29.95	-13.55	43.50	45.35	10.45	1.90	27.03	Peak	113	350
3	226.290	27.01	-18.99	46.00	42.25	9.71	2.64	27.59	Peak	117	347

```

Site      : 03CH03-HY
Condition : 3m 03CH03-MAT VERTICAL
EUT       : Astarte/SoftGate
Power     : 110V/60Hz
MODEL     : ASU2201
MEMO     : TX CH11 2462MHz
    
```

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	433.000	29.06	-16.94	46.00	38.41	15.10	3.64	28.09	Peak	125	342
2	662.600	29.01	-16.99	46.00	35.23	17.73	4.79	28.74	Peak	110	357
3	747.300	28.75	-17.25	46.00	34.21	18.37	4.92	28.75	Peak	142	353

Site : 03CH03-HY
 Condition : 3a HORN-ANT-6741 VERTICAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASU2201
 MEMO : TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2330.000	57.38	-16.62	74.00	59.43	28.08	6.12	36.25	Peak	100	268
2	2330.000	47.49	-6.51	54.00	49.54	28.08	6.12	36.25	Average	100	268
3	2388.000	46.09	-7.91	54.00	47.94	28.20	6.19	36.24	Average	100	172
4	2388.000	57.29	-16.71	74.00	59.14	28.20	6.19	36.24	Peak	100	172

Site : 03CH03-HY
 Condition : 3a 03CH03-MAT HORIZONTAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASU2201
 MEMO : TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	37.020	29.37	-10.63	40.00	44.28	12.06	1.06	28.03	Peak	100	352
2	113.970	27.52	-15.98	43.50	44.24	9.79	1.36	27.87	Peak	121	339
3	199.290	28.44	-15.06	43.50	46.42	7.27	2.45	27.70	Peak	114	349
4	264.900	31.63	-14.37	46.00	44.51	11.70	2.86	27.44	Peak	119	345
5	298.380	32.86	-13.14	46.00	45.82	11.37	2.98	27.31	Peak	109	349

Site : 03CH03-NY
 Condition : 3a 03CH03-MAT HORIZONTAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASW2201
 MEMO : TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	363.000	35.46	-10.54	46.00	46.33	13.43	3.31	27.61	Peak	130	349
2	598.200	30.09	-15.91	46.00	36.93	17.27	4.69	28.00	Peak	107	357
3	747.300	32.95	-13.05	46.00	38.41	18.37	4.92	28.75	Peak	108	352
4	881.000	33.67	-12.33	46.00	37.34	19.30	5.42	28.39	Peak	131	353

Site : 03CH03-NY
 Condition : 3a HORN-ANT-6741 HORIZONTAL
 EUT : Astarte/SoftGate
 Power : 110V/60Hz
 MODEL : ASW2201
 MEMO : TX CH11 2462MHz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2330.000	53.81	-20.19	74.00	55.86	28.08	6.12	36.25	Peak	100	116
2	2330.000	48.61	-5.39	54.00	50.66	28.08	6.12	36.25	Average	100	116
3	2386.800	54.49	-19.51	74.00	56.36	28.19	6.19	36.24	Peak	100	307
4	2386.800	45.03	-8.97	54.00	46.89	28.19	6.19	36.24	Average	100	307

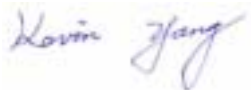
➤ For 2.387GHz ~ 24.850GHz

Remark: Frequency from 2837MHz to 24850MHz, the emission emitted by the EUT is too low to be measured

■ Field strength of fundamental and harmonics

Frequency (MHz)	Antenna Polarity	Cable Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	Emission (uV/m)	Level (dBuV/m)	Margin (uV/m)	Detect (dB)	Mode
2462.000	V	28.35	6.29	69.70	-	-	104.34	164816.24	-	Peak
2462.000	V	28.35	6.29	67.39	-	-	102.03	126328.11	-	AV
2462.000	H	28.35	6.29	69.31	-	-	103.95	157579.60	-	Peak
2462.000	H	28.35	6.29	64.17	-	-	98.81	87196.69	-	AV
4924.000	V/H	-	-	-	-	-	-	-	-	AV/ Peak
7386.000	V/H	-	-	-	-	-	-	-	-	AV/ Peak
9848.000	V/H	-	-	-	-	-	-	-	-	AV/ Peak
12310.000	V/H	-	-	-	-	-	-	-	-	AV/ Peak
14772.000	V/H	-	-	-	-	-	-	-	-	AV/ Peak
17234.000	V/H	-	-	-	-	-	-	-	-	AV/ Peak
19696.000	V/H	-	-	-	-	-	-	-	-	AV/ Peak
22158.000	V/H	-	-	-	-	-	-	-	-	AV/ Peak
24620.000	V/H	-	-	-	-	-	-	-	-	AV/ Peak

Remark: The emission emitted by the EUT is too low to be measured except the emission listed above,

Test Engineer : 
 Kevin Yang

5.7. Band Edges Measurement

5.7.1. Measuring Instruments :

As described in chapter 7 of this test report.

5.7.2. Test Procedure :

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100 KHz bandwidth from band edge.
3. The band edges was measured and recorded.

5.7.3. Test Result :

Test Result in lower band (Channel 1) : PASS
 Test Result in higher band(Channel 11) : PASS

Note on Band edge Emission

The band edge emission plot on appendix B page B7. shows 49.68dB delta between carrier maximum power and local maximum emission in the restricted band (2.390GHz).

The band edge emission plot on appendix B page B8. shows 49.17dB delta between carrier maximum power and local maximum emission in the restricted band (2.4835GHz).

Polarity	The emission of carrier power strength (dB μ V/m)	The maximum field strength in restrict band (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
H	106.24	56.56	74.00	-17.44	Peak
H	103.95	54.78	74.00	-19.22	Peak
H	102.24	52.56	54.00	-1.44	Average
H	98.81	49.64	54.00	-4.36	Average
V	105.48	55.8	74.00	-18.2	Peak
V	104.34	55.17	74.00	-18.83	Peak
V	100.16	50.48	54.00	-3.52	Average
V	102.03	52.86	54.00	-1.14	Average

* The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

5.8. Antenna Requirements

The EUT use a undetachable PCB antenna. It is considered meet antenna requirement of FCC.

5.8.1. Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.8.2. Antenna Connected Construction

The maximum Gain antenna used in this product is PCB antenna with peak gain 0 dBi.

6. EMI Suppression Component List

No EMI suppression components.

7. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)	Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	15.35	0.92	1000	24.10	3.92
35	13.63	1.05	2000	27.40	5.66
40	11.11	1.08	3000	30.00	7.20
45	10.59	1.15	4000	32.60	9.36
50	6.47	1.29	5000	33.40	9.16
55	5.83	1.63	6000	34.20	10.70
60	5.18	1.30	7000	35.30	12.16
65	4.81	1.36	8000	36.90	13.12
70	4.43	1.43	9000	38.10	13.81
75	5.10	1.48	10000	39.00	14.83
80	5.91	1.53	11000	38.60	15.83
85	7.33	1.61	12000	39.50	17.11
90	8.74	1.69	13000	39.30	17.62
95	9.05	1.67	14000	41.60	18.37
100	9.36	1.76	15000	40.60	19.10
110	9.65	1.80	16000	37.20	19.72
120	9.97	1.90	17000	40.20	21.98
130	10.51	1.61	18000	48.90	21.22
140	10.32	2.14	19000	37.60	23.90
150	9.42	2.16	20000	37.30	24.07
160	8.09	2.16	21000	37.00	25.49
170	7.43	1.99	22000	38.00	24.92
180	7.60	2.39	23000	38.70	25.60
190	7.43	2.38	24000	38.60	25.70
200	7.26	2.46	25000	24.10	3.92
220	9.11	2.59	14000	27.40	5.66
240	10.88	2.68	15000	30.00	7.20
260	11.75	2.91	16000	32.60	9.36
280	11.55	2.92	17000	33.40	9.16
300	11.36	2.99	18000	34.20	10.70
320	12.03	3.03	19000	35.30	12.16
340	12.69	3.22	20000	36.90	13.12
360	13.33	3.28	21000	38.10	13.81
380	14.00	3.80	22000	39.00	14.83
400	14.63	3.80	23000	38.60	15.83
450	15.33	3.69	24000	39.50	17.11
500	16.03	3.93	25000	39.30	17.62
550	16.65	3.56			
600	17.29	4.15			
650	17.64	4.58			
700	18.00	4.73			
750	18.39	4.71			
800	18.79	4.99			
850	19.10	5.24			
900	19.42	5.38			
950	19.58	5.57			
1000	19.75	5.62			

8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100132	9 KHz – 2.75 GHz	Jun. 12, 2003	Conduction (CO01-HY)
LISN	MessTec	NNB-2/16Z	2001-008	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001-009	9 KHz – 30 MHz	Apr. 29, 2003	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	N/A	Conduction (CO01-HY)
RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9KHz~30MHz	Jan. 07, 2003	Conduction (CO01-HY)
50 ohm BNC type Terminal	NOBLE	50ohm	TM009	50 ohm	Apr. 24, 2003	Conduction (CO01-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2003	Radiation (03CH03-HY)
Spectrum analyzer	R&S	FSP40	100004	9KHz~40GHz	Aug. 07, 2003	Radiation (03CH03-HY)
Amplifier	MITEQ	AFS44	879981	100MHz~26.5GHz	Jul. 23, 2003	Radiation (03CH03-HY)
Horn Antenna	COM-POWER	AH-118	10094	1GHz – 18GHz	Apr. 10, 2003	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Mar. 14, 2003	Radiation (03CH03-HY)

Calibration Interval of instruments listed above is one year, except for Horn Antenna, BBHA9170.

9. Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m
Antenna factor calibration	normal(k=2)	±1
cable loss calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
Antenna Directivity	rectangular	±3
Antenna Factor V.S. Height	rectangular	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25
site imperfection	rectangular	±2
Mismatch Receiver VSWR $\Gamma_1=0.09$ Antenna VSWR $\Gamma_2=0.67$ Uncertainty= $20\log(1-\Gamma_1*\Gamma_2)$	U-shaped	±0.54
combined standard uncertainty Ue(y)	normal	±2.7
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	±5.4

$U = \{((1/2)^2 + (0.3/2)^2 + (2^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\} = 2.2$ for 10m test distance

$U = \{((1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\} = 2.7$ for 3m test distance

Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR $\Gamma_1=0.09$ LISN VSWR $\Gamma_2=0.33$ Uncertainty= $20\log(1-\Gamma_1*\Gamma_2)$	U-shaped	0.2
combined standard uncertainty Ue(y)	normal	±1.66
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	±3.32

$U = \{(0.3/2)^2 + (2^2 + 1.5^2 + 0.2^2)/3 + (0.2)^2/2\} = 1.66$