FCC TEST REPORT

CATEGORY	:	Portable Product
PRODUCT NAME	:	USB Dongle
FCC ID.	:	ROL-ASS21110128
FILING TYPE	:	Certification
BRAND NAME	:	Astarte/SoftGate
MODEL NAME	:	ASS2111/128MB
APPLICANT	:	**Astarte Technology** 11F, No.166, Dah-Yeh Rd., Peitou 112, Taipei, Taiwan, R.O.C.
MANUFACTURER	:	Same as Applicant
ISSUED BY	:	**SPORTON INTERNATIONAL INC.** 6F, No. 106, Sec. 1, Hsin Tai Wu Rd., His Chih, Taipei Hsien, Taiwan, R.O.C.

Statements:

The test result in this report refers exclusively to the presented test model / sample.

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Certificate or Test Report could not be used by the applicant to claim the product endorsement by CNLA, NVLAP or any agency of U.S. government.

The test equipment used to perform the test are calibrated and traceable to NML/ROC or NIST/USA.

Dr. Alan Lane
Vice General Manager
Sporton International Inc.

NVLAP®
Lab Code: 200079-0

Table of Contents

History of this test report

■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

1. General Description of Equipment under Test

1.1. Applicant

Astarte Technology

11F, No.166, 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

This product is a USB Dongle with IEEE 802.11b wireless function. The radio technical data has been listed on section " Features of Equipment under Test ". This proudct is intented to be plugged in the USB port of the computer.

1.4. Features of Equipment under Test

ITEMS	DESCRIPTION
Type of Modulation	DSSS (CCK / QPSK / BPSK),
Number of Channels	11
Frequency Band	2400MHz ~ 2483.5MHz
Carrier Frequency	Please reference table below.
Channel Bandwidth	8.86 MHz
Output Power	13.20 dBm (peak)
Antenna Type / Gain	Chip Antenna / 0dBi
Function Type	Transceiver
Power Rating (DC/AC, Voltage)	3.3 VDC
Temperature Range (Operating)	-20 ~ 60℃

1.5. Table for Carrier Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412 MHz	5	2432 MHz	9	2452 MHz
2	2417 MHz	6	2437 MHz	10	2457 MHz
3	2422 MHz	7	2442 MHz	11	2462 MHz
4	2427 MHz	8	2447 MHz		

2. Test Configuration of the Equipment under Test

2.1. Description of the Test

a. During testing, the equipment was placed on a non-conducting support.
b. The following test modes were performed:
   Mode 1 : CH 01 2412MHz
   Mode 2 : CH 06 2437MHz
   Mode 3 : CH 11 2462MHz
c. Spurious emission below 1GHz is independent of channel selection, so only CH 11 was tested.
d. This EUT is DC powered, the AC power conduction was tested under the configuration which the EUT was plugged in the notebook computer.
e. The EUT has been programmed to continuously transmit or receive during testing. The used peripherals as well as the configuration fulfill the requirements of ANSI C63.4:2001.
f. The configuration is operated in a manner which tends to maximize its emission characteristics in a typical application.
g. 3 meters measurement distance in semi-anechoic chamber was used in this test.

2.2. Frequency Range Investigated

a. Conducted power line test: from 150 kHz to 30 MHz
b. Radiated emission test: from 30 MHz to 25000 MHz

2.3. Description of Test Supporting Units

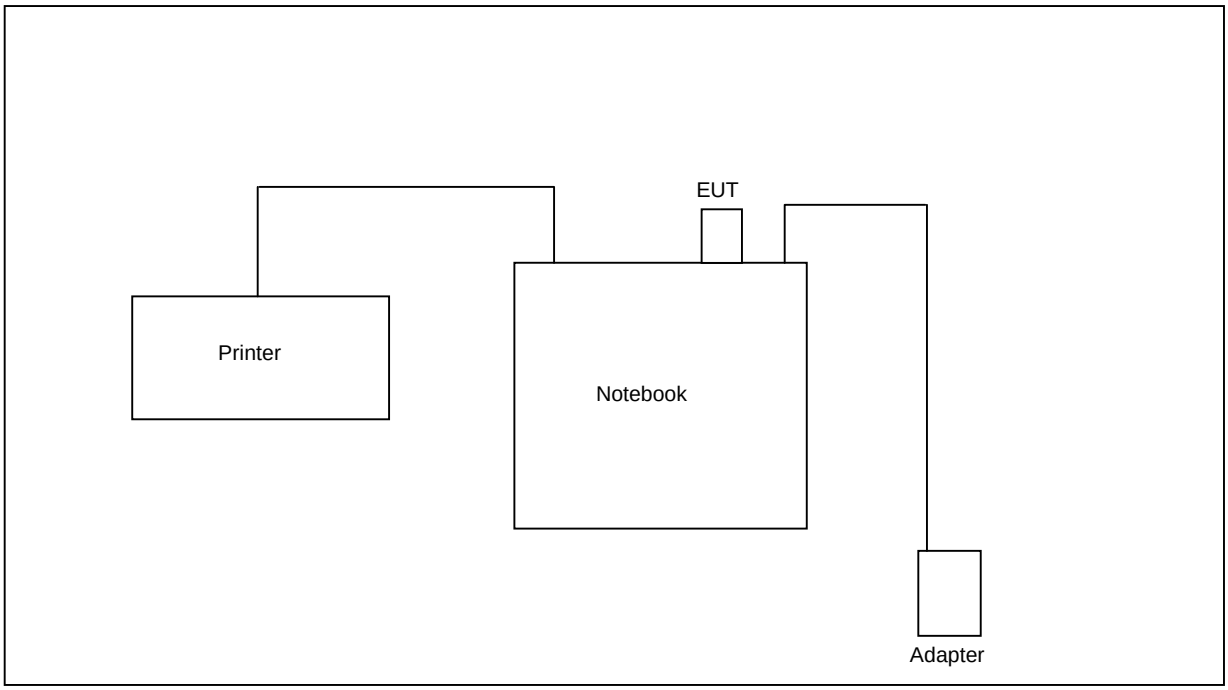
Support Unit 1. – Notebook (COMPAQ)

FCC ID	: N/A
Model No.	: Presario 1500
Serial No.	: SP0004
Remark	: This support device was tested to comply with FCC standards and authorized under Declaration of Conformity.

Support Unit 2. – Printer (EPSON)

FCC ID	: N/A
Model No.	: Stylus Color 680
Serial No.	: SP0016
Remark	: This support device was tested to comply with FCC standards and authorized under Declaration of Conformity and data cable is 1.35m of the shielded.

2.4. Connection Diagram of Test System



2.5. Test Software

There are 2 software may be used in the testing.

a. Channel & Power Controlling Software: This was provided by the manufacturer and is able to let the test engineer select the operating channel as well as the RF output power. The parameters for channel selection is trying to offer the test engineer the ability to fix the operating channel for testing, both normal data and continuously transmitting modes are allowed, and that for RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

b. "H" Pattern Generator: Except Access Point, the supporting equipment such as monitor or printer is always available. Under testing, these supporting equipment has to also under working condition. "H" Pattern Generator is able to continuously transmitting "H" character to those supporting equipments.

3. Test Location and Standards

3.1. Test Location

Test Location : Sporton Hwa Ya Testing Building

Address : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
Tel: +886 3 327 3456 Fax: +886 3 318 0055

Test Site No. : CO04-HY, 03CH03-HY

3.2. Test Conditions

Normal Voltage	: 120V/60Hz (host equipment)
Extreme Voltage	: 138V and 102V (host equipment)
Normal Temperature	: 20 ℃
Extreme Temperature	: -20 ℃ and 60 ℃

3.3. Standards for Methods of Measurement

Here is the list of the standards followed in this test report.

ANSI C63.4-2001

47 CFR Part 15 Subpart C (Section 15.247)

3.4. DoC Statement

This EUT is also classified as a device of computer peripheral Class B which DoC has to be followed. It has been verified according to the rule of 47 CFR part 15 Subpart B, and found that all the requirements has been fulfilled.

4. List of Measurements

4.1. Summary of the Test Results

Applied Standard: 47 CFR Part 15 and Part 2			
Paragraph	**FCC Rule**	**Description of Test**	**Result**
5.1	15.247(a)(2)	6dB Spectrum Bandwidth (DSSS System)	Pass
5.2	15.247(b)	Maximum Peak Output Power	Pass
5.3	15.247(d)	Peak Power Spectral Density	Pass
5.4	15.247(c)	Band Edges Emission	Pass
5.5	15.107/15.207	AC Power Line Conducted Emission	Pass
5.6	15.209/15.247(c)	Spurious Radiated Emission	Pass
5.7	15.203	Antenna Requirement	Pass

5. Test Result

5.1. Test of 6dB Spectrum Bandwidth (DSSS System)

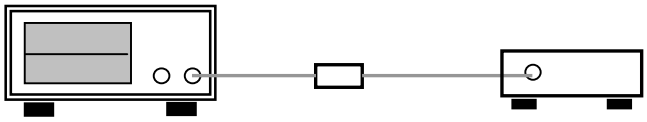
5.1.1 Measuring Instruments

Item 9 of the table on section 6.

5.1.2 Test Procedures

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 6dB bandwidth is defined as the spectrum width with level higher than 6dB below the peak level.
4. Repeat above 1~3 points for the middle and highest channel of the EUT.

5.1.3 Test Setup Layout



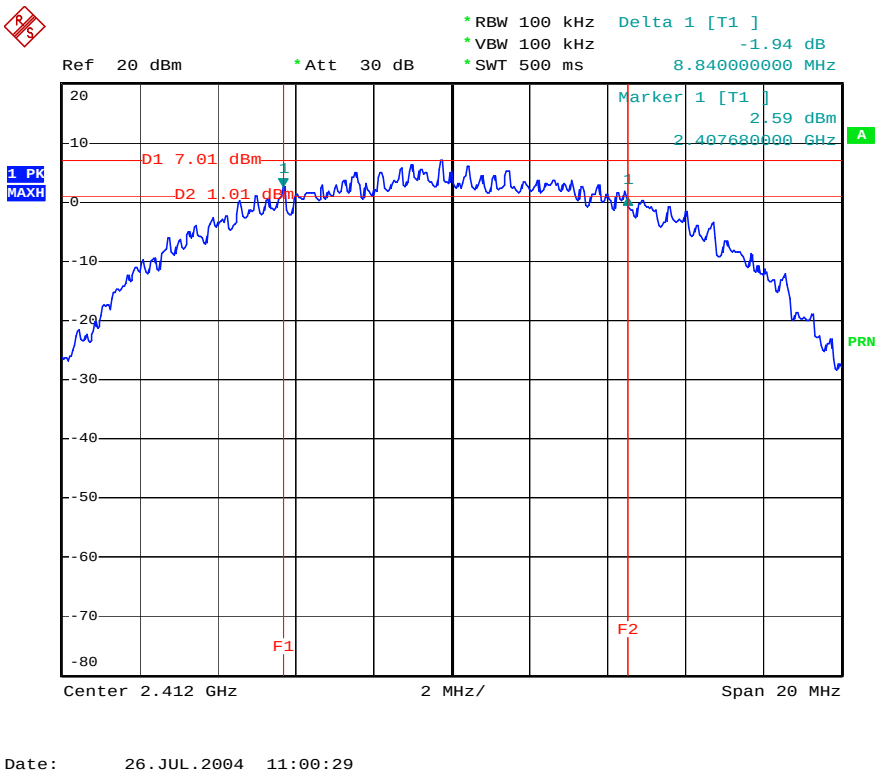
Spectrum analyzer **EUT**

5.1.4 Test Result : See spectrum analyzer plots below

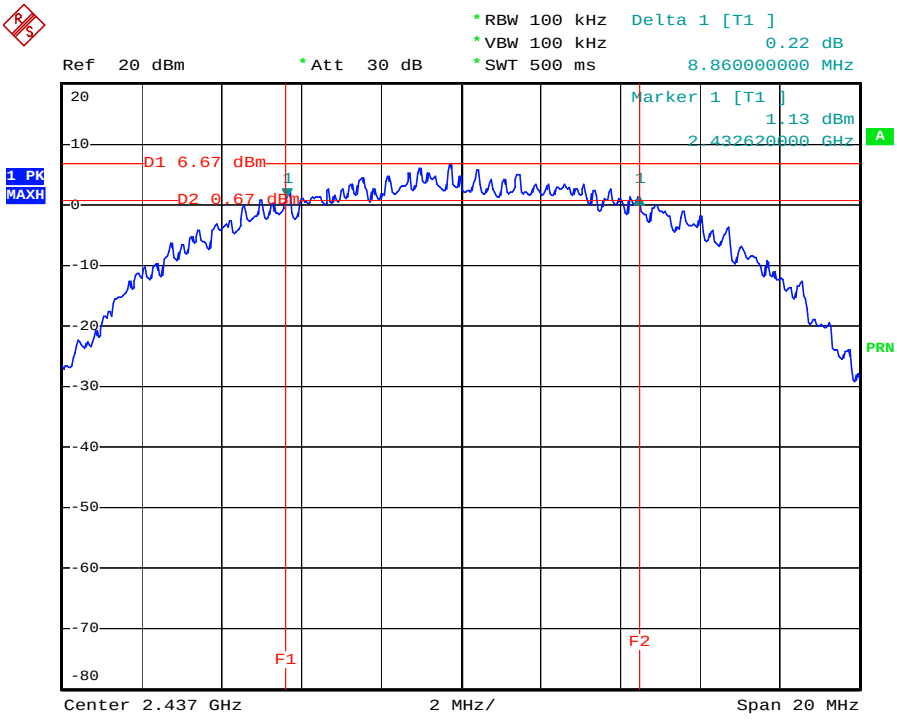
- Temperature: 25°C
- Relative Humidity: 65%
- Duty Cycle of the Equipment During the Test: 100%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
01	2412	8.84	0.5
06	2437	8.86	0.5
11	2462	8.86	0.5

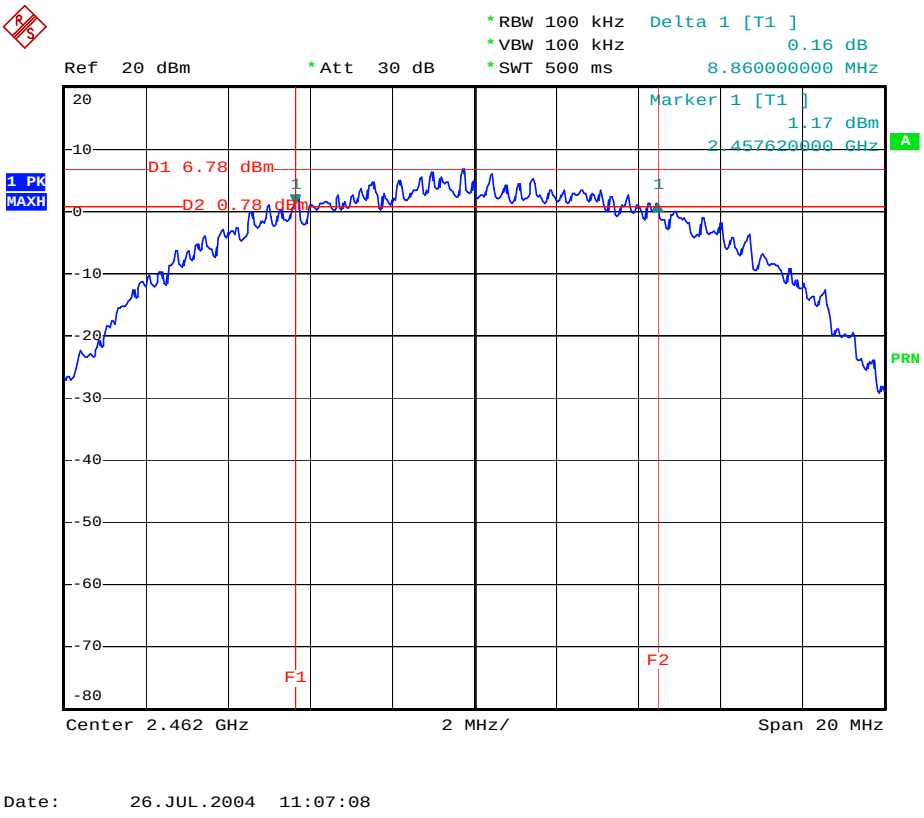
(Channel 01)：



(Channel 06)：



(Channel 11)：


*RBW 100 kHz
*VBW 100 kHz
*SWT 500 ms
Delta 1 [T1]
0.16 dB
8.860000000 MHz
Ref 20 dBm
*Att 30 dB
Marker 1 [T1]
1.17 dBm
2.457620000 GHz
D1 6.78 dBm
D2 0.78 dBm
1 PK
MAXH
A
PRN
F1
F2
Center 2.462 GHz
2 MHz/
Span 20 MHz
Date: 26.JUL.2004 11:07:08

5.2. Test of Maximum Peak Output Power

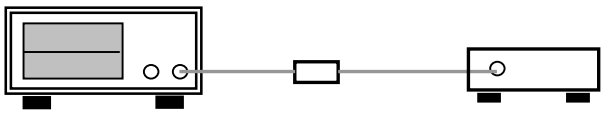
5.2.1 Measuring Instruments

Item 9 of the table on section 6.

5.2.2 Test Procedures

1. The transmitter output was connected to the vertical channel of the oscilloscope through a detector.
2. Observe the duty cycle X from the oscilloscope and the record the detected voltage level A.
3. Replace the EUT via the signal generator, calibrate the reading via the carrier frequency.
4. The duty cycle X has to be calibrated on the output power of the signal generator.
5. Repeated the 1~4 for the middle and highest channel of the EUT.

5.2.3 Test Setup Layout



5.2.4 Test Result：See spectrum analyzer plots below

- Temperature: 25°C
- Relative Humidity: 65 %
- Duty Cycle of the Equipment During the Test: 100%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mWatt)	Limits (dBm)
01	2412	13.16	20.7014	30 dBm
06	2437	13.20	20.8930	30 dBm
11	2462	13.05	20.1837	30 dBm

5.3. Test of Peak Power Spectral Density

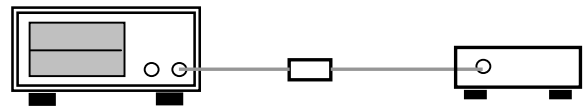
5.3.1 Measuring Instruments

Item 9 of the table on section 6.

5.3.2 Test Procedures

1. The transmitter output is connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 3kHz and VBW to 30kHz.
3. Mark the frequency with maximum peak power as the center of the display of the spectrum
4. Set the span to 1.5MHz and the sweep time to 500s and record the maximum peak value.
5. Repeated the 1~4 for the middle and highest channel of the EUT.

5.3.3 Test Setup Layout



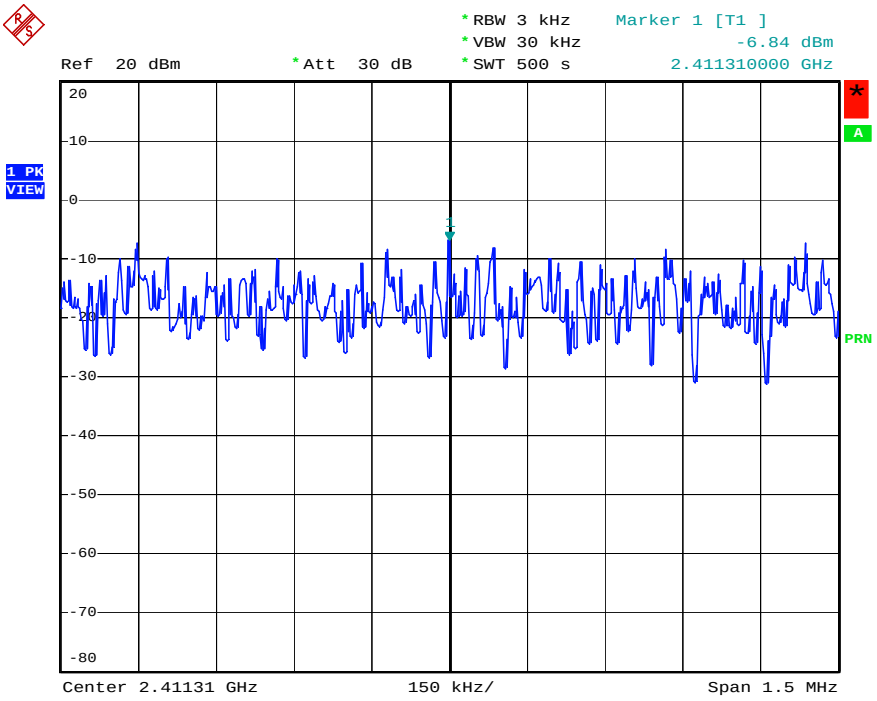
Spectrum analyzer **EUT**

5.3.4 Test Result : See spectrum analyzer plots below

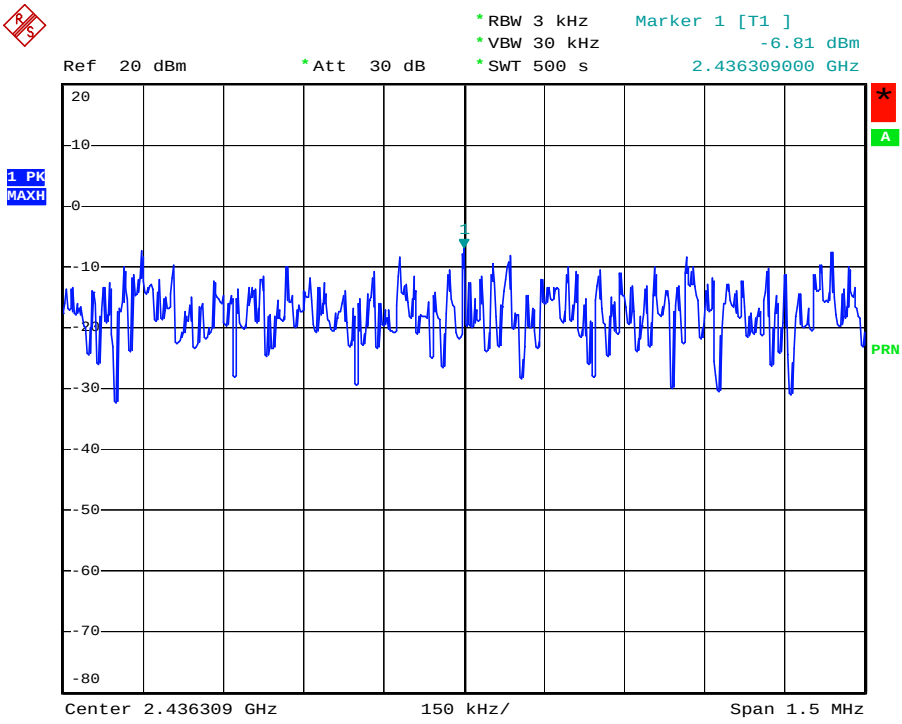
- Temperature: 25°C
- Relative Humidity: 65 %
- Duty Cycle of the Equipment During the Test: 100%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
01	2412	-6.84	8
06	2437	-6.81	8
11	2462	-6.61	8

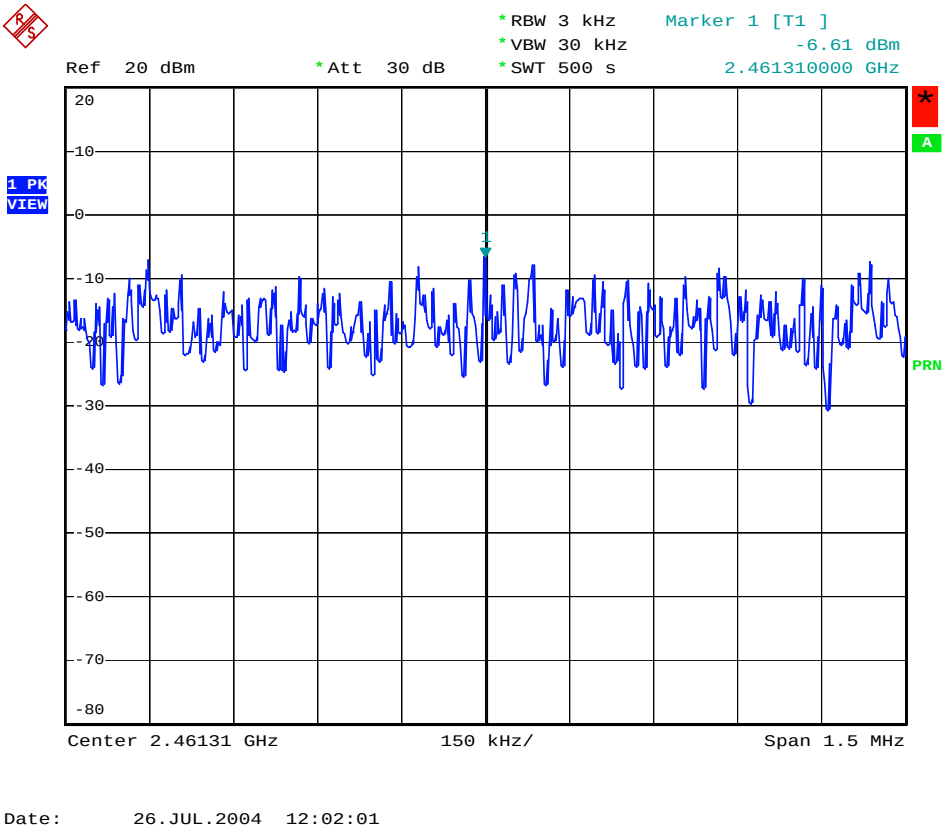
(Channel 01)：



(Channel 06)：



(Channel 11)：


*RBW 3 kHz
*VBW 30 kHz
*SWT 500 s
Marker 1 [T1]
-6.61 dBm
2.461310000 GHz
Ref 20 dBm
*Att 30 dB
1 PK
VIEW
PRN
A
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.46131 GHz
150 kHz/
Span 1.5 MHz
Date: 26.JUL.2004 12:02:01

5.4. Test of Band Edges Emission

5.4.1 Measuring Instruments

Item 9 of the table on section 6.

5.4.2 Test Procedures

1. The transmitter is set to the lowest channel.
2. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.
3. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100MHz bandwidth from lower band edge.
4. The lowest band edges emission was measured and recorded.
5. The transmitter set to the highest channel and repeated 2~4.

5.4.3 Test Result :

- Test Engineer: Sam Lee

(A) Left Edge

The band edge emission plot shows 45.08dB delta between carrier maximum power and local maximum emission in the restricted band.

CH01 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
94.05	45.08	48.97	54.00	-5.03

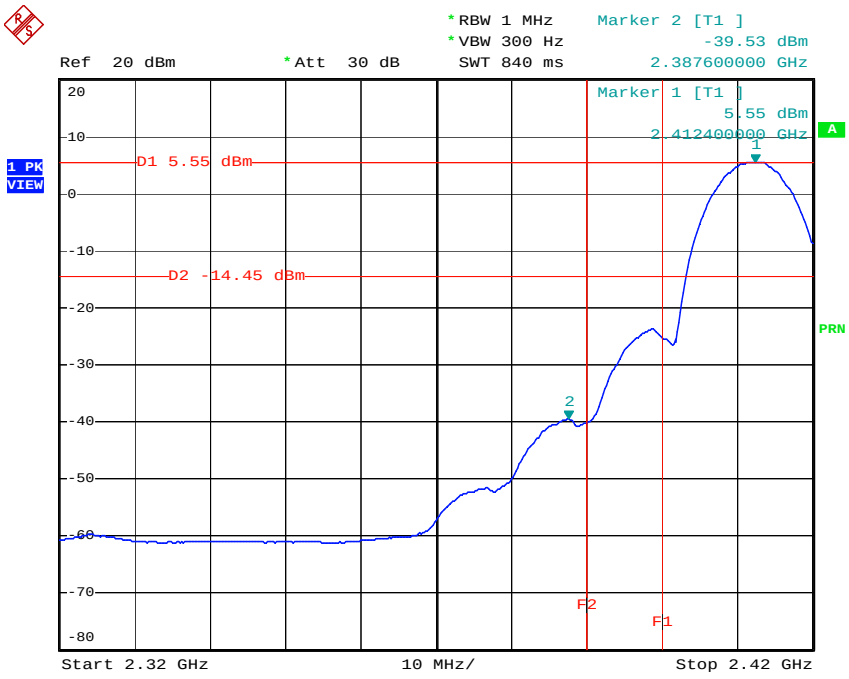
(B) Right Edge

The band edge emission plot shows 45.41 dB delta between carrier maximum power and local maximum emission in the restricted band.

CH11 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
93.51	45.41	48.10	54.00	-5.903

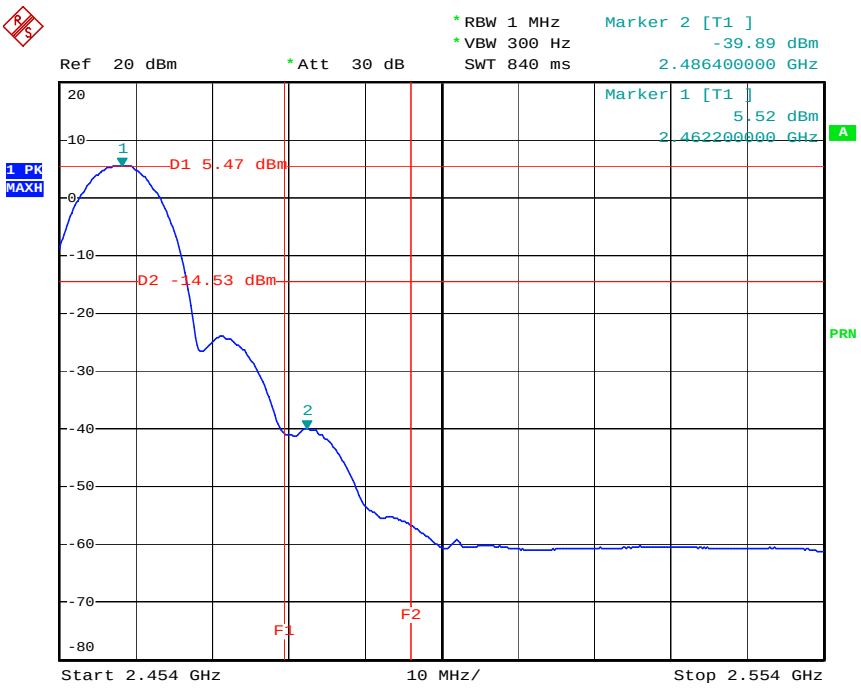
＊The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

(Channel 11)：



Date: 26.JUL.2004 11:51:46

(Channel 01)：



Date: 26.JUL.2004 10:41:54

Observation： All emissions in the 100kHz bandwidth are 20dB lower than the carrier strength.

5.5. Test of AC Power Line Conducted Emission

5.5.1 Measuring Instruments

Please reference item 1~7 in chapter 6 for the instruments used for testing.

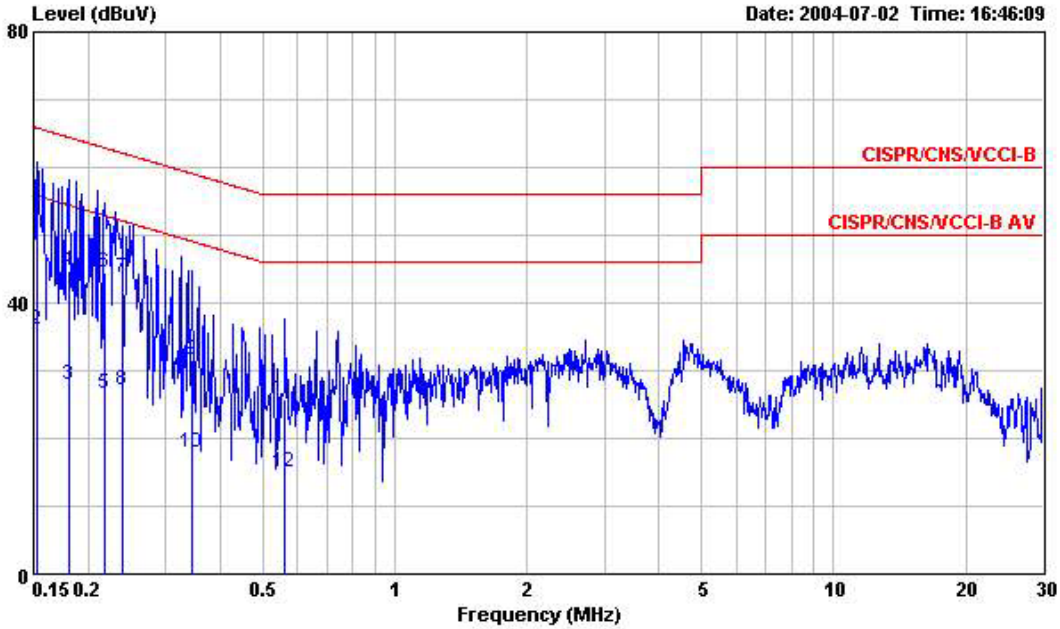
5.5.2 Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connected to the other LISNs. The LISN should provides 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Use the Channel & Power Controlling software to make the EUT working on selected channel and expected output power, then use the “H” Patter Generator software to make the supporting equipments stay on working condition.
7. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
8. The measurement has to be done between each power line and ground at the power terminal for each RF channel. Only one RF channel has to be investigated since this test is independent with the RF channel selection.

5.5.3 Test Result of Conducted Emission

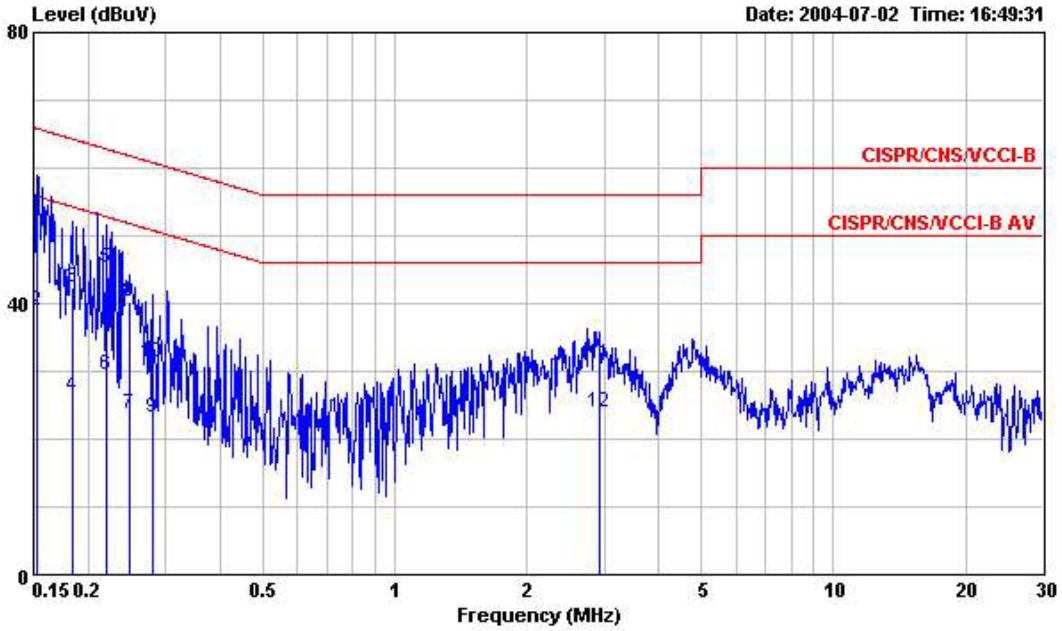
Test Mode	RF Link	Tested By	John Huang
Temperature / Humidity	26deg. C / 62%		

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1532130	50.14	-15.68	65.82	50.03	0.10	0.01	QP
2	0.1532130	36.06	-19.76	55.82	35.95	0.10	0.01	Average
3	0.1815220	27.86	-26.56	54.42	27.75	0.10	0.01	Average
4	0.1815220	44.76	-19.66	64.42	44.65	0.10	0.01	QP
5	0.2173520	26.49	-26.43	52.92	26.38	0.10	0.01	Average
6	0.2173520	44.48	-18.44	62.92	44.37	0.10	0.01	QP
7	0.2394540	43.73	-18.39	62.12	43.62	0.10	0.01	QP
8	0.2394540	26.99	-25.13	52.12	26.88	0.10	0.01	Average
9	0.3446300	31.49	-27.60	59.09	31.37	0.10	0.02	QP
10	0.3446300	17.86	-31.23	49.09	17.74	0.10	0.02	Average
11	0.5611100	25.81	-30.19	56.00	25.68	0.10	0.03	QP
12	0.5611100	15.07	-30.93	46.00	14.94	0.10	0.03	Average

Neutral to Ground

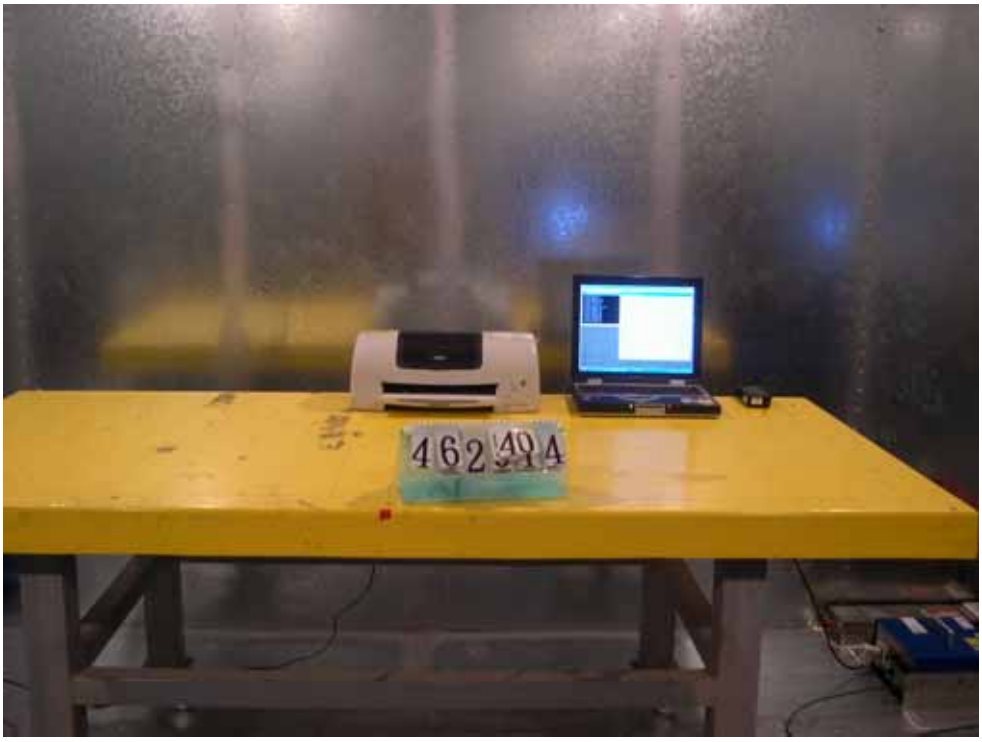


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1532130	50.16	-15.66	65.82	50.05	0.10	0.01	QP
2	0.1532130	38.96	-16.86	55.82	38.85	0.10	0.01	Average
3	0.1844300	42.38	-21.90	64.28	42.27	0.10	0.01	QP
4	0.1844300	26.25	-28.03	54.28	26.14	0.10	0.01	Average
5	0.2208340	45.14	-17.65	62.79	45.03	0.10	0.01	QP
6	0.2208340	29.59	-23.20	52.79	29.48	0.10	0.01	Average
7	0.2481360	23.64	-28.18	51.82	23.53	0.10	0.01	Average
8	0.2481360	40.19	-21.63	61.82	40.08	0.10	0.01	QP
9	0.2792500	23.12	-27.72	50.84	23.01	0.10	0.01	Average
10	0.2792500	31.39	-29.45	60.84	31.28	0.10	0.01	QP
11	2.920	30.99	-25.01	56.00	30.79	0.15	0.05	QP
12	2.920	24.00	-22.00	46.00	23.80	0.15	0.05	Average

5.5.4 Photographs of Conducted Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW

SIDE VIEW

5.6. Test of Spurious Radiated Emission

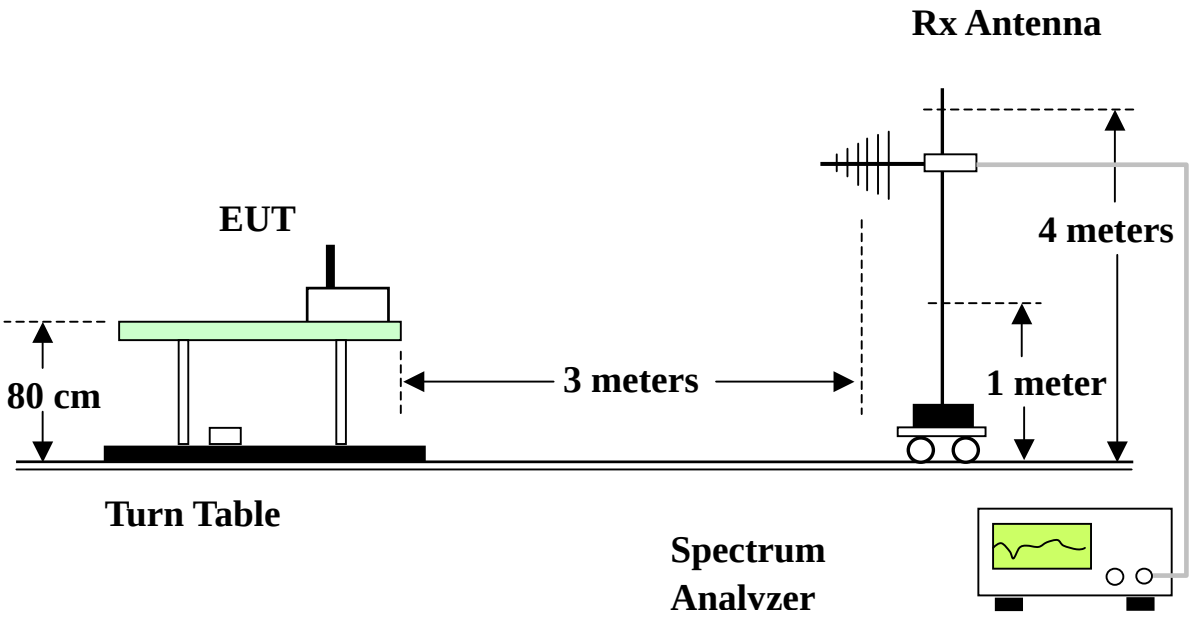
5.6.1 Measuring Instruments

Please reference item 8~19 in chapter 6 for the instruments used for testing.

5.6.2 Test Procedures

a) Configure the EUT according to ANSI C63.4.
b) The EUT was placed on the top of the turn table 0.8 meter above ground.
c) The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turn table.
d) Power on the EUT and all the supporting units.
e) The turn table was rotated by 360 degrees to determine the position of the highest radiation.
f) The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
g) For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
h) Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
i) For emission above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
j) If the emission level of the EUT in peak mode was 3 dB lower than the average 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 for below 1GHz and average method for above the 1GHz. the reported.
k) For testing above 1GHz, the emission level of the EUT in peak mode was 20dB higher 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 Test Setup Layout



5.6.4 Test Results and Limit

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

Test Mode	CH 11	**Temperature**	25 deg. C	**Tested By**	Steve Chen
Freq. Range	30MHz~1GHz	**Humidity**	64%		

(A) Polarization: Horizontal

	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	132.340	33.44	-10.06	43.50	47.77	11.45	2.05	27.83	QP	---	---
2	161.580	31.96	-11.54	43.50	44.66	12.77	2.31	27.78	QP	---	---
3	165.830	37.38	-6.12	43.50	49.80	13.02	2.33	27.77	QP	---	---
1	343.200	39.49	-6.51	46.00	48.49	15.30	3.21	27.51	QP	---	---
2 !	397.600	45.03	-0.97	46.00	53.62	15.74	3.46	27.79	QP	135	218
3 !	899.200	40.40	-5.60	46.00	42.28	21.08	5.34	28.30	QP	---	---

(B) Polarization: Vertical

	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	54.990	24.60	-15.40	40.00	41.12	10.21	1.26	27.99	QP	---	---
2	131.830	26.22	-17.28	43.50	40.57	11.43	2.06	27.84	QP	---	---
3	165.660	24.18	-19.32	43.50	36.61	13.01	2.33	27.77	QP	---	---
1 !	397.600	44.35	-1.65	46.00	52.94	15.74	3.46	27.79	QP	---	---
2	793.600	39.96	-6.04	46.00	43.34	20.33	5.08	28.79	QP	---	---
3	925.600	38.72	-7.28	46.00	40.10	21.47	5.42	28.27	QP	---	---

Test Mode	Mode 1 (2412MHz)	Temperature	25 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	64%		

(A) Polarization: Horizontal

	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	1190.000	44.54	-9.46	54.00	59.26	24.36	1.22	40.30	Average	105	206
2	1588.000	40.16	-13.84	54.00	53.74	25.58	1.50	40.66	Average	---	---
3	2278.000	41.61	-12.39	54.00	53.09	27.85	1.74	41.07	Average	---	---
1	4822.000	49.03	-24.97	74.00	55.70	33.23	2.47	42.37	Peak	---	---
2	4822.000	39.66	-14.34	54.00	46.33	33.23	2.47	42.37	Average	---	---

(B) Polarization: Vertical

	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	1750.000	37.26	-16.74	54.00	50.34	26.19	1.49	40.76	Average	---	---
2	2236.000	39.59	-14.41	54.00	51.20	27.73	1.71	41.05	Average	---	---
3	2278.000	43.58	-10.42	54.00	55.06	27.85	1.74	41.07	Average	---	---
1	4822.000	55.54	-18.46	74.00	62.21	33.23	2.47	42.37	Peak	---	---
2	4822.000	43.45	-10.55	54.00	50.12	33.23	2.47	42.37	Average	---	---

Test Mode	Mode 2 (2437MHz)	Temperature	25 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	66%		

(A) Polarization: Horizontal

	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	1190.000	44.25	-9.75	54.00	58.97	24.36	1.22	40.30	Average	---	---
2	1588.000	40.79	-13.21	54.00	54.37	25.58	1.50	40.66	Average	---	---
3	2302.000	43.69	-10.31	54.00	55.12	27.91	1.75	41.09	Average	---	---
1	4876.000	52.41	-21.59	74.00	58.98	33.35	2.52	42.44	Peak	---	---
2	4876.000	40.91	-13.09	54.00	47.48	33.35	2.52	42.44	Average	---	---

(B) Polarization: Vertical

	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	2262.000	41.56	-12.44	54.00	53.09	27.80	1.73	41.06	Average	---	---
2	2302.000	45.97	-8.03	54.00	57.40	27.91	1.75	41.09	Average	---	---
3	2358.000	41.69	-12.31	54.00	53.06	28.06	1.69	41.12	Average	---	---
1	4876.000	59.22	-14.78	74.00	65.79	33.35	2.52	42.44	Peak	---	---
2	4876.000	47.67	-6.33	54.00	54.24	33.35	2.52	42.44	Average	103	226

Test Mode	Mode 3 (2462MHz)	Temperature	25 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	66%		

(A) Polarization: Horizontal

	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	2150.000	41.17	-32.83	74.00	52.97	27.51	1.69	41.00	Peak	---	---
2	2244.000	41.83	-32.17	74.00	53.40	27.76	1.72	41.05	Peak	---	---
3	2326.000	46.28	-27.72	74.00	57.69	27.97	1.72	41.10	Peak	---	---
1	4924.000	52.52	-21.48	74.00	59.10	33.46	2.47	42.51	Peak	---	---
2	4924.000	41.24	-12.76	54.00	47.82	33.46	2.47	42.51	Average	---	---

(B) Polarization: Vertical

	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	1190.000	48.72	-5.28	54.00	63.44	24.36	1.22	40.30	Average	102	220
2	2156.000	41.21	-12.79	54.00	53.00	27.52	1.69	41.00	Average	---	---
3	2332.000	43.88	-10.12	54.00	55.29	27.99	1.71	41.11	Average	---	---
1	4924.000	58.95	-15.05	74.00	65.53	33.46	2.47	42.51	Peak	---	---
2	4924.000	46.86	-7.14	54.00	53.44	33.46	2.47	42.51	Average	---	---

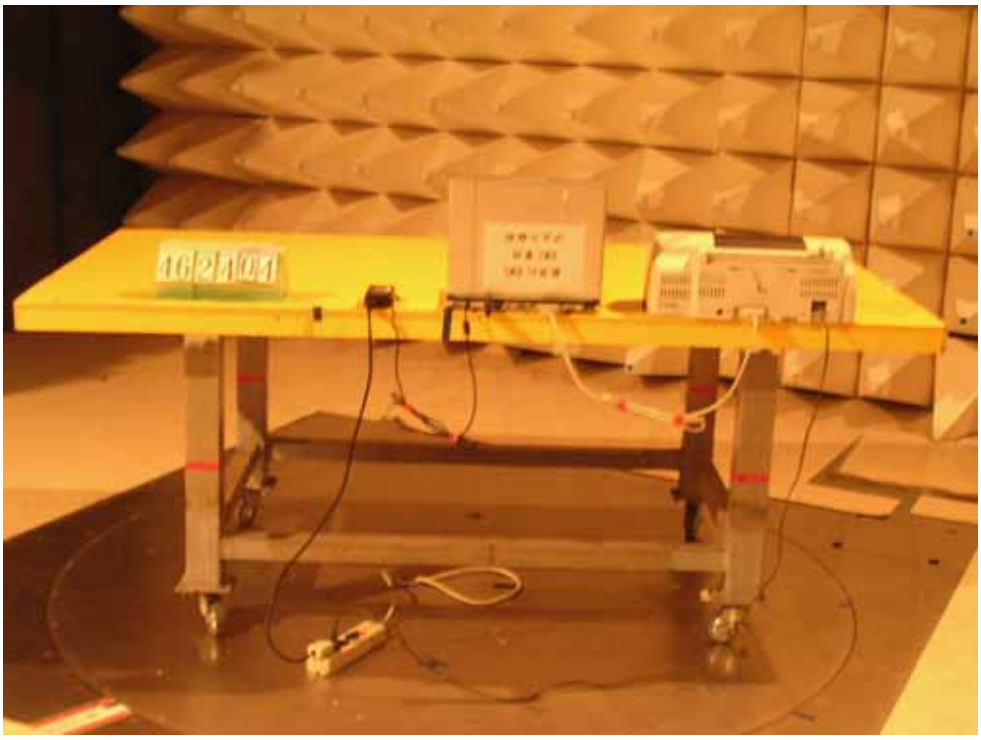
Remark: The emission except listed above is too low to be meausred.

5.6.5 Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW

REAR VIEW



5.7. Antenna Requirements

5.7.1 Standard Applicable

47 CFR Part15 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.

47 CFR Part15 Section 15.247 (b):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

5.7.2 Antenna Connected Construction

The antenna used in this product is chip antenna without antenna connector.

5.8. RF Exposure

The product is classified as portable device. The maximum output power is 13.2dBm which is lower than the power required for SAR testing, so there is no need to do the SAR test. The following information is the calculation of MPE for reference only.

5.8.1 Limit For Maximum Permissible Exposure (MPE)

This product can be classified as portable device, so the 2.5cm separation distance warning is required.

In this section, the power density at 2.5cm location is calculated to examine if it is lower than the limit.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

F = frequency in MHz

*Plane-wave equivalent power density

5.8.2 MPE Calculation Method

$$E\ (V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd\ (mW/cm^2) = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (mW)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=2.5cm, as well as the gain of the used antenna, the RF power density can be obtained.

5.8.3 Calculated Result and Limit

- Test Engineer: Sam Lee

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)
Channel 1	0	1.0	13.1600	20.7014	0.2634	1
Channel 6	0	1.0	13.2000	20.8930	0.2658	1
Channel 11	0	1.0	13.0500	20.1837	0.2568	1

From the calculated result shown in above table, the power density is lower than the limit.

6. List of Measuring Equipments Used

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
1	EMC Receiver	R&S	ESCS 30	100174	9 KHz – 2.75 GHz	Feb. 16, 2004	Conduction (CO04-HY)
2	LISN	MessTec	NNB-2/16Z	2001/004	9 KHz – 30 MHz	Jun. 09, 2004	Conduction (CO04-HY)
3	LISN (Support Unit)	MessTec	NNB-2/16Z	99041	9 KHz – 30 MHz	Apr. 27, 2004	Conduction (CO04-HY)
4	EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
5	RF Cable-CON	UTIFLEX	3102-26886-4	CB044	9KHz~30MHz	Apr. 21, 2004	Conduction (CO04-HY)
7	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2004	Radiation (03CH03-HY)
8	Spectrum analyzer	R&S	FSP40	100004	9KHZ~40GHz	Aug. 23, 2003	Radiation (03CH03-HY)
9	Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 05, 2003	Radiation (03CH03-HY)
10	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 28, 2004	Radiation (03CH03-HY)
11	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 28, 2004	Radiation (03CH03-HY)
12	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Dec. 03, 2003	Radiation (03CH03-HY)
13	Amplifier	MITEQ	AFS44	849984	100MHz~26.5GHz	Mar. 26, 2004	Radiation (03CH03-HY)
14	Horn Antenna	EMCO	3115	6821	1GHz – 18GHz	Sep. 12, 2003	Radiation (03CH03-HY)
15	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
16	Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
17	Horn Antenna	Schwarzbeck	BBHA9170	154	15GHz~40GHz	Jun. 09, 2004	Radiation (03CH03-HY)
18	RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Dec. 05, 2003	Radiation (03CH03-HY)

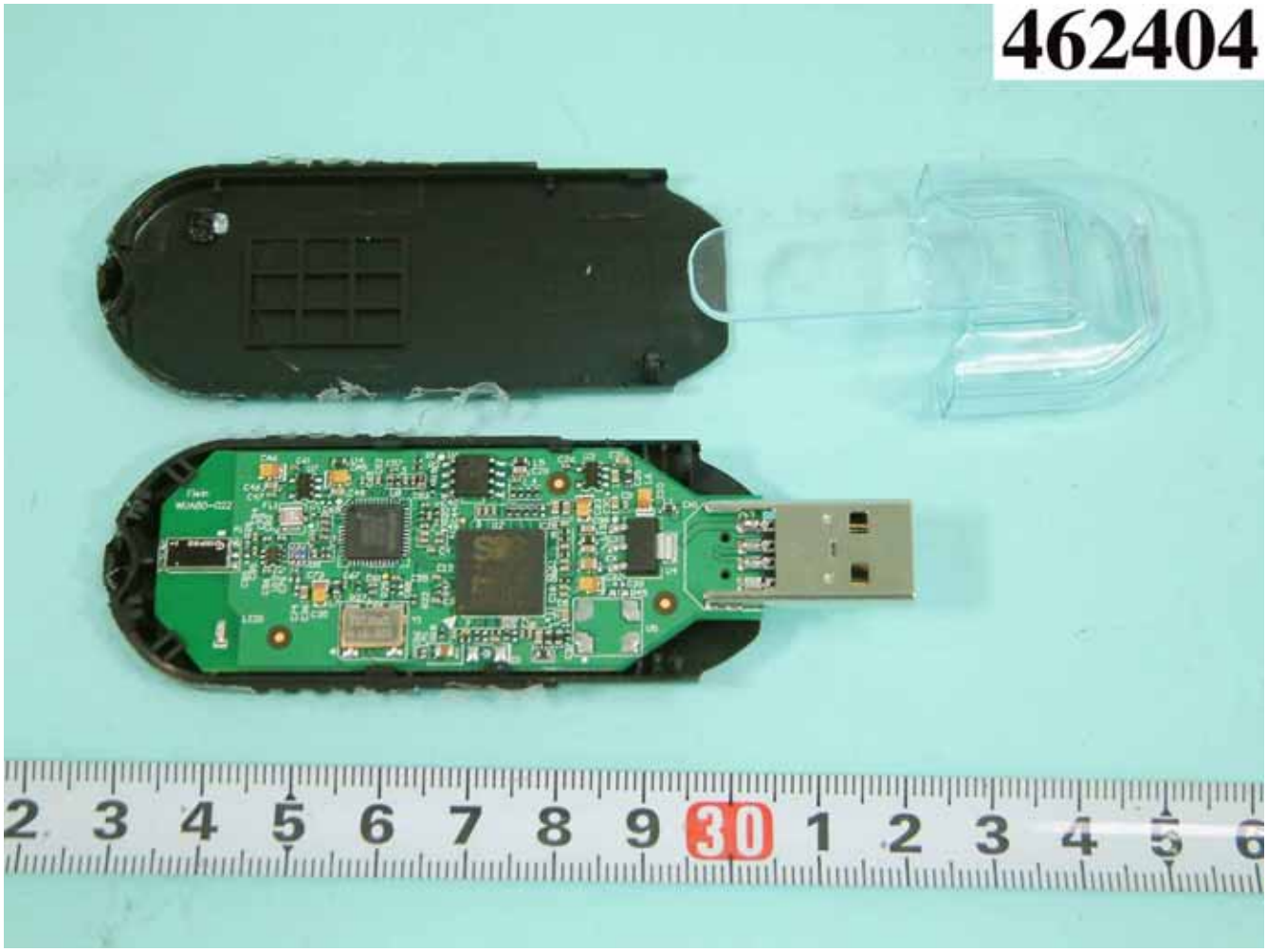
※ Calibration Interval of instruments listed above is one year.

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
19	Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Sep. 03, 2003	Conducted (TH01-HY)
20	Power meter	R&S	NRVS	100444	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
21	Power sensor	R&S	NRV-Z55	100049	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
22	Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	Jun. 15, 2004	Conducted (TH01-HY)
23	AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	Jun. 16, 2004	Conducted (TH01-HY)
24	AC power source	G.W.	GPC-6030D	C671845	DC 1V~60V	Nov. 06, 2003	Conducted (TH01-HY)
25	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2003	Conducted (TH01-HY)
26	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz~7GHz	Jan. 01, 2004	Conducted (TH01-HY)
27	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz~1GHz	Jan. 01, 2004	Conducted (TH01-HY)

※ Calibration Interval of instruments listed above is one year.

APPENDIX A. Photographs of EUT

SPORTON International Inc.
TEL : 886-2-2696-2468
FAX : 886-2-2696-2255



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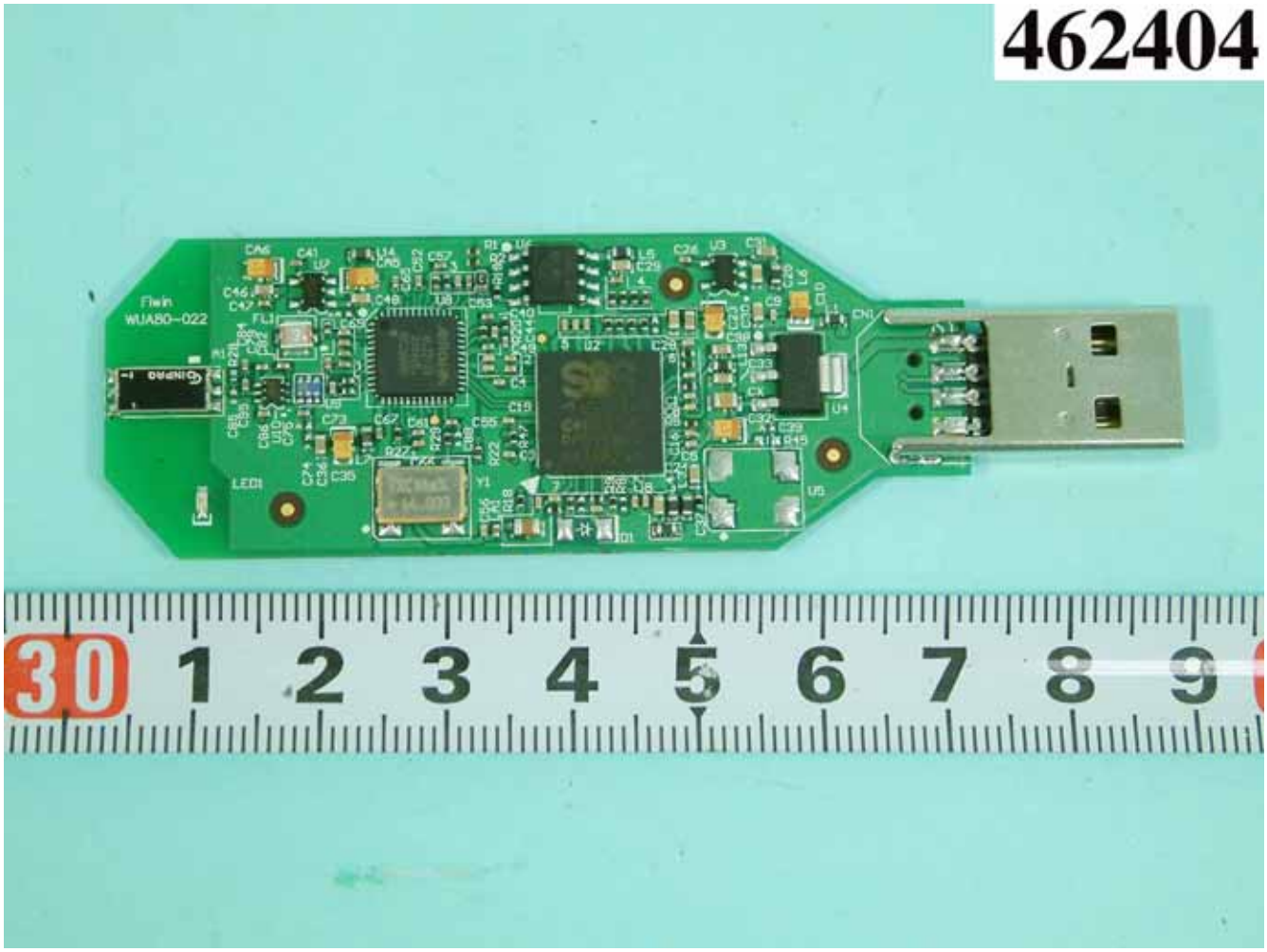

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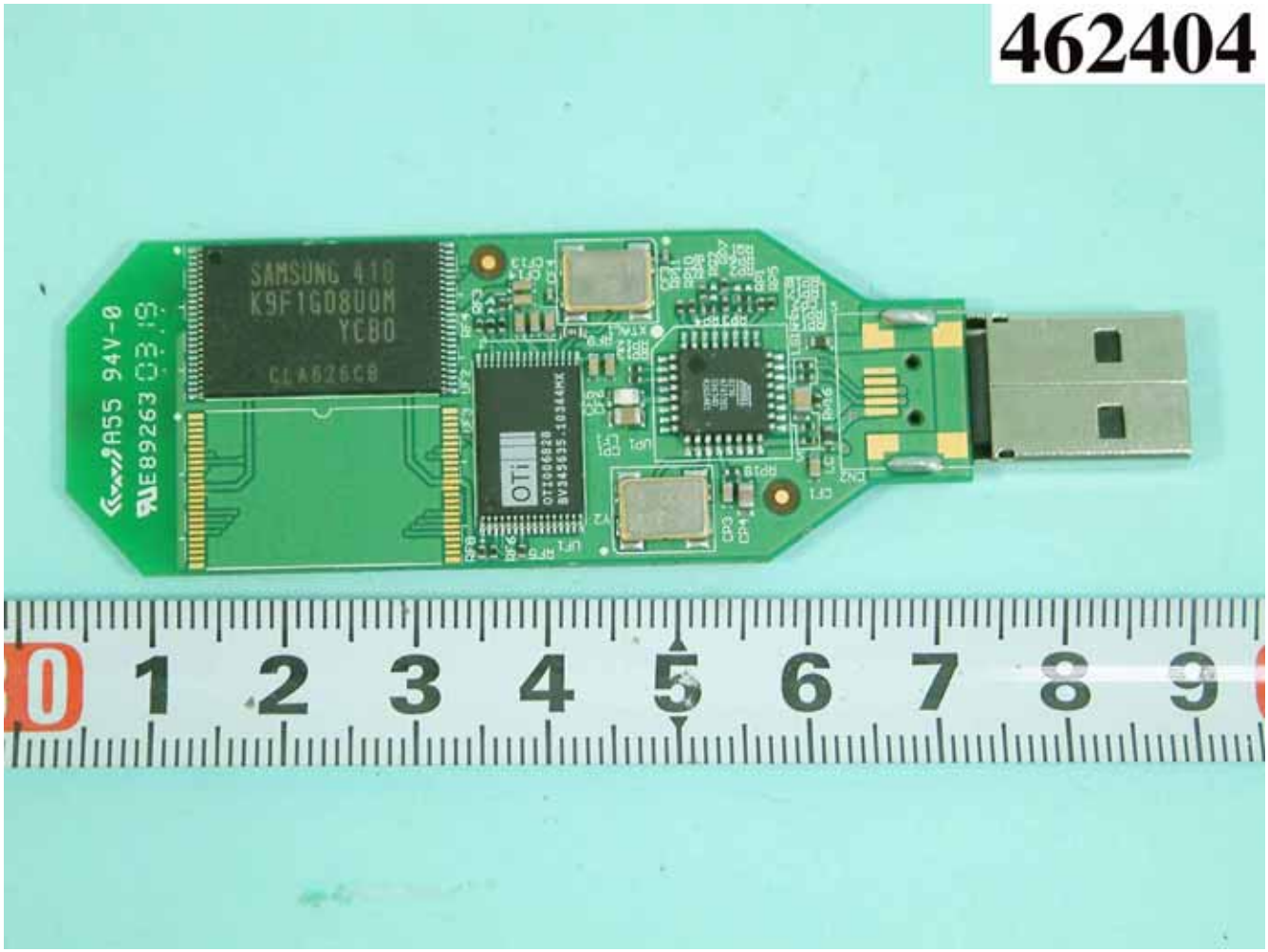

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