FCC TEST REPORT

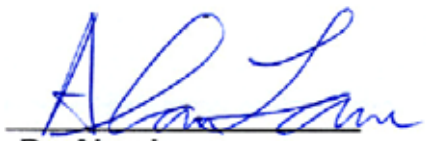
CATEGORY	:	Portable
PRODUCT NAME	:	802.11g USB Wireless Dongle
FCC ID.	:	RU5AWG01U
FILING TYPE	:	Certification
MODEL NAME	:	AWG01U
APPLICANT	:	**Asia Pacific Microsystems, Inc.** No. 2 R&D Road 6, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.
MANUFACTURER	:	Same as applicant
ISSUED BY	:	**SPORTON 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.
Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

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.

Lab Code: 200079-0

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History of this test report

Original Report Issue Date: Dec. 07, 2004

Report No.: FR483129-01

■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

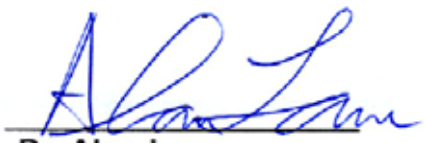
with

47 CFR FCC Part 15 Subpart C (Section 15.247)

PRODUCT NAME	:	802.11g USB Wireless Dongle
MODEL NAME	:	AWG01U
APPLICANT	:	**Asia Pacific Microsystems, Inc.** No. 2 R&D Road 6, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.
MANUFACTURER	:	Same as applicant

I **HEREBY** CERTIFY THAT:

The measurements shown in this test report were made in accordance with the procedures given in ANSI C63.4 - 2003 and all test are performed according to 47 CFR FCC Part 15. Testing was carried out on Oct. 22, 2004 at SPORTON International Inc. LAB.



Dr. Alan Lane
Vice General Manager
Sporton International Inc.

1. General Description of Equipment under Test

1.1. Applicant

Asia Pacific Microsystems, Inc.
No. 2 R&D Road 6, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.

1.2. Manufacturer

Same as applicant

1.3. Basic Description of Equipment under Test

This product is a wireless USB Dongle with 802.11b/g wireless solution. The 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 / DQPSK / DBPSK) OFDM (16QAM / 64QAM / DQPSK / DBPSK)
Number of Channels	:	11
Frequency Band	:	2400MHz ~ 2483.5MHz
Carrier Frequency	:	See section 1.6 for details
Data Rate	:	CCK : 1, 2, 5.5, 11Mbps OFDM : 54, 48,36, 24,18,12, 6Mbps
Channel Bandwidth	:	22MHz
Max. Conducted Output Power	:	CCK : 12.30 dBm ; 64QAM : 12.17 dBm
Antenna Type	:	See section 1.5 for details
Communication Type	:	Duplex
Testing Duty Cycle	:	100.00%
Power Rating (DC/AC, Voltage)	:	3.30 VDC
Test Power Source	:	N/A
Temperature Range (Operating)	:	0 ~ 55 ℃

1.5. Antenna Description

1 type of antenna is filed in this project.

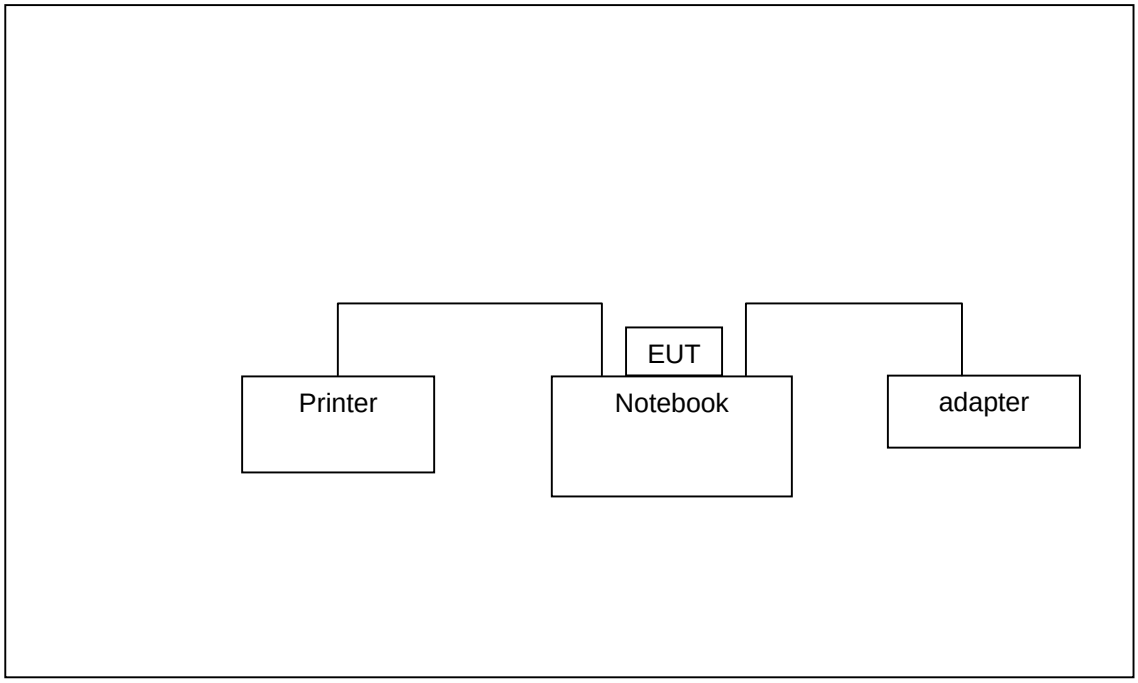
No.	Antenna Type	Gain (dBi)
1	Chip Antenna	2.60dBi @2.4GHz

1.6. Table for Carrier Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	05	2432 MHz	09	2452 MHz	-	-
02	2417 MHz	06	2437 MHz	10	2457 MHz	-	-
03	2422 MHz	07	2442 MHz	11	2462 MHz	-	-
04	2427 MHz	08	2447 MHz	-	-	-	-

2. Test Configuration of the Equipment under Test

2.1. Connection Diagram of Test System



2.2. The Test Mode Description

For DSSS modulation, CCK is the worst case on all test items.
For OFDM modulation, 64QAM is the worst case on all test items.
Spurious emission below 1GHz is independent of channel selection, so only channel 11 with 64QAM modulation was worst case tested.
AC conduction emission is independent of channel selection, so only channel 11 with 64QAM modulation was case tested.

2.3. Description of Test Supporting Units

Support unit	Brand	Model No.	Serial No.	FCC ID	Data cable (m)
Notebook	COMPAQ	PRESARIO 1500	SP0004	DoC	-
Printer	EPSON	Stylus Color 680	SP0016	DoC	1

3. General Information of Test

3.1. Test Facility

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	:	03CH03-HY / TH01-HY

3.2. Test Conditions

Normal Voltage	:	3.30V
Extreme Voltages	:	3.80V and 2.81V
Normal Temperature	:	20°C
Extreme Temperature	:	0 °C and 55 °C

3.3. Standards for Methods of Measurement

Here is the list of the standards followed in this test report.
ANSI C63.4-2003
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.

3.5. Frequency Range Investigated

Radiated emission test: from 30 MHz to 10th carrier harmonic

3.6. Test Distance

The test distance of radiated emission (30MHz~1GHz) test from antenna to EUT is 3 M.
The test distance of radiated emission (1GHz~10th carrier harmonic) test from antenna to EUT is 1 M.

3.7. Test Software

During testing, 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.

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	6dB Spectrum Bandwidth	Pass
5.2	15.247	Maximum Conducted Output Power	Pass
5.3	15.247	Peak Power Spectral Density	Pass
5.4	15.247	Band Edges Emission	Pass
5.5	15.207	AC Power Line Conducted Emission	Pass
5.6	15.209/15.247	Spurious Radiated Emission	Pass
5.7	15.203/15.247	Antenna Requirement	Pass
5.8	2.1091	Maximum Permissible Exposure	Pass

5. Test Result

5.1. Test of 6dB Spectrum Bandwidth

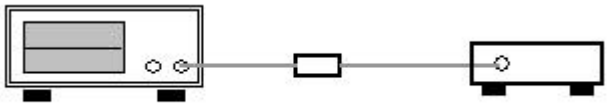
5.1.1. Measuring Instruments

Item 18 of the table is 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 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



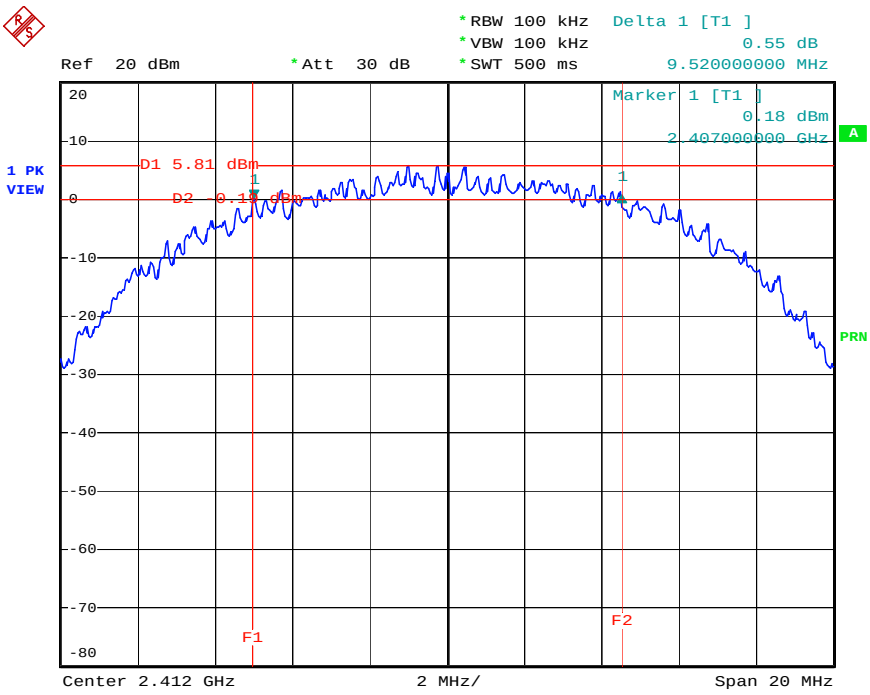
Spectrum Analyzer **EUT**

5.1.4. Test Result: See spectrum analyzer plots below

- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Sam Lee

Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
CCK	01	2412 MHz	9.52	0.5
CCK	06	2437 MHz	9.52	0.5
CCK	11	2462 MHz	9.52	0.5
64QAM	01	2412 MHz	16.40	0.5
64QAM	06	2437 MHz	16.40	0.5
64QAM	11	2462 MHz	16.40	0.5

Modulation Type: CCK (Channel 01)：



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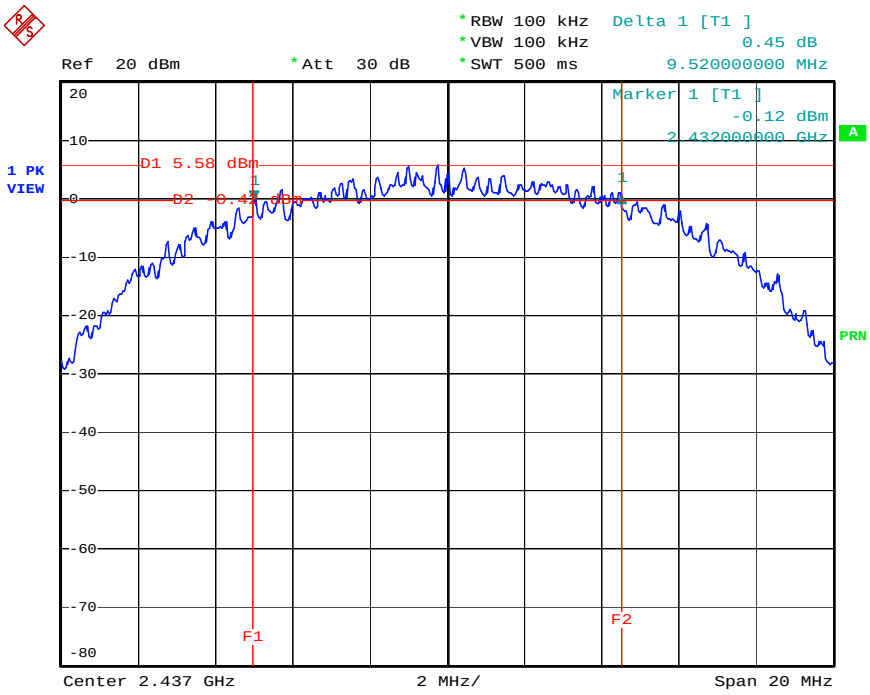
Modulation Type: CCK (Channel 06)：



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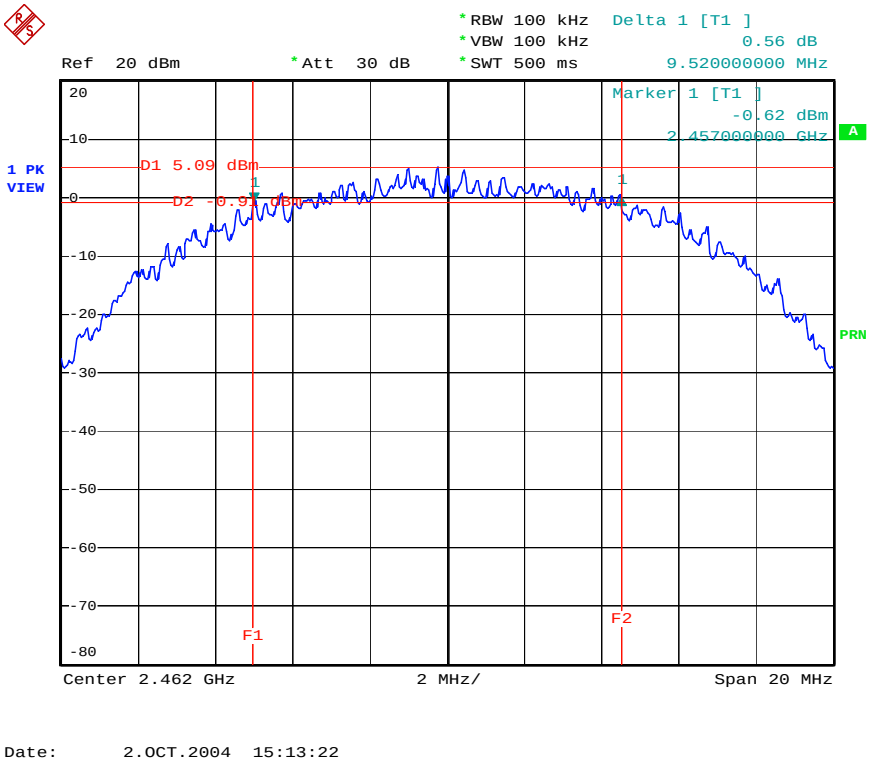
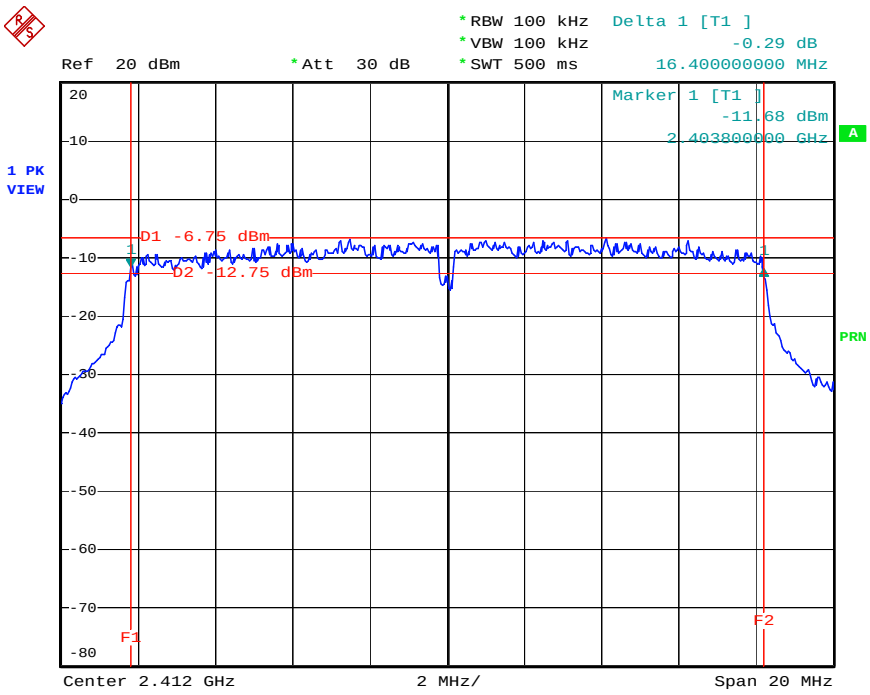
Modulation Type: CCK (Channel 11)：



Modulation Type: 64QAM (Channel 01)：



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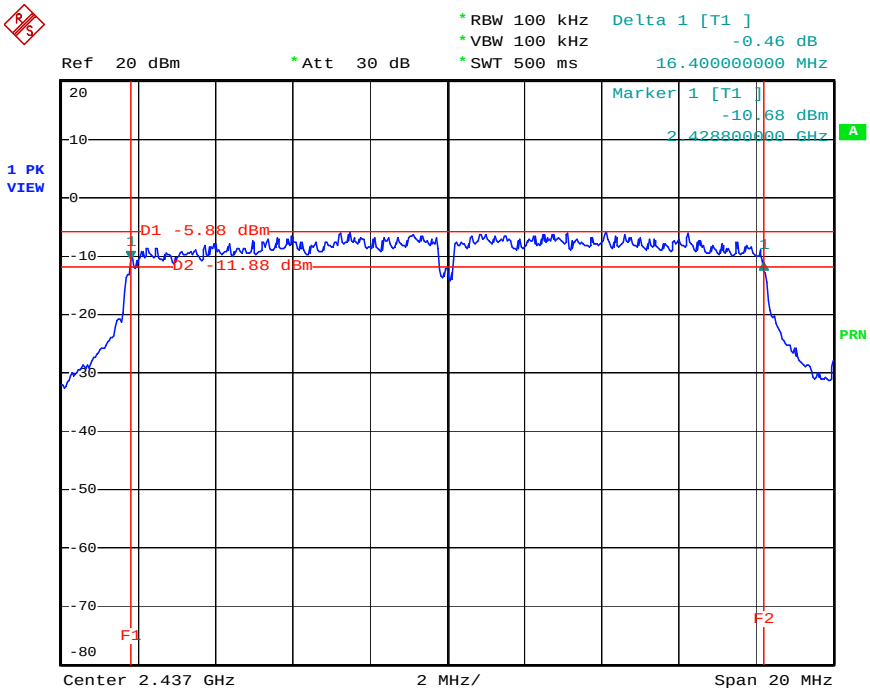
Modulation Type: 64QAM (Channel 06)：



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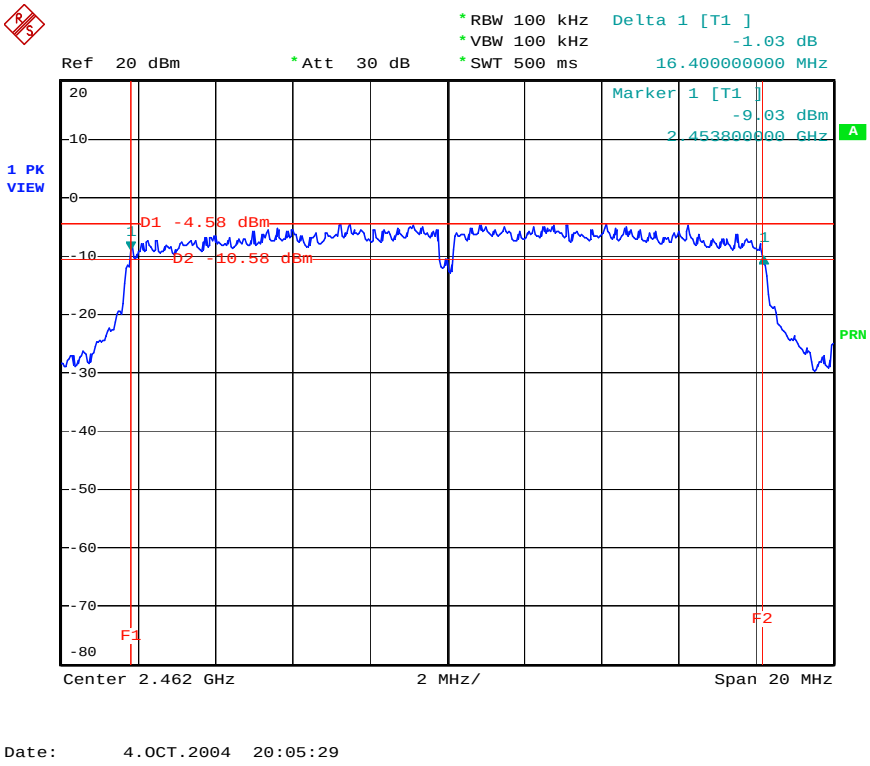
Modulation Type: 64QAM (Channel 11)：



5.2. Test of Maximum Conducted Output Power

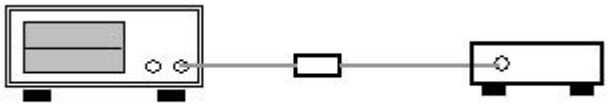
5.2.1. Measuring Instruments

Item 18 of the table is on section 6.

5.2.2. Test Procedures

1. According to FCC DA 02-2138 test procedure, use channel power function of spectrum analyzer to measure the power over 26dBbandwidth range.
2. Repeated the above “1” for the middle and highest channel of the EUT.

5.2.3. Test Setup Layout



Spectrum Analyzer **EUT**

5.2.4. Test Result of Conducted Power

- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Sam Lee

Modulation Type	Channel	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
CCK	01	2412 MHz	12.30	30
CCK	06	2437 MHz	12.28	30
CCK	11	2462 MHz	12.30	30
64QAM	01	2412 MHz	11.99	30
64QAM	06	2437 MHz	12.17	30
64QAM	11	2462 MHz	12.04	30

The max output power : CCK modulation is 12.30 dBm. 64QAM modulation is 12.17 dBm.

5.2.5. Test Result of EIRP Power

- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Sam Lee

Antenna No.	Gain (dBi)	Modulation Type	Channel	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
1	2.60	CCK	01	2412 MHz	14.90	36
1	2.60	CCK	06	2437 MHz	14.88	36
1	2.60	CCK	11	2462 MHz	14.9	36
1	2.60	64QAM	01	2412 MHz	14.59	36
1	2.60	64QAM	06	2437 MHz	14.77	36
1	2.60	64QAM	11	2462 MHz	14.64	36

5.3. Test of Peak Power Spectral Density

5.3.1. Measuring Instruments

Item 18 of the table is 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

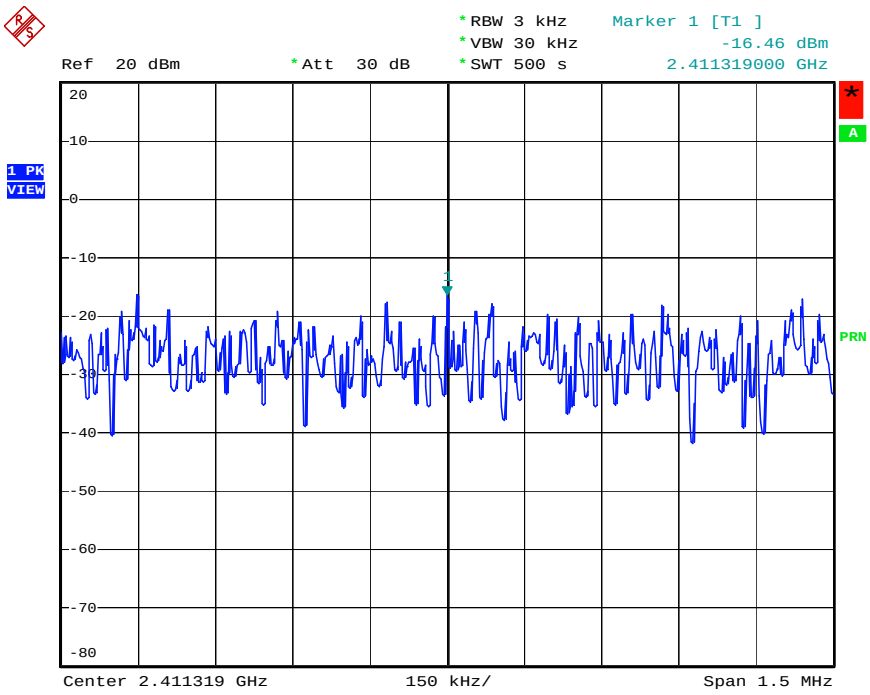
Spectrum Analyzer **EUT**

5.3.4. Test Result: See spectrum analyzer plots below

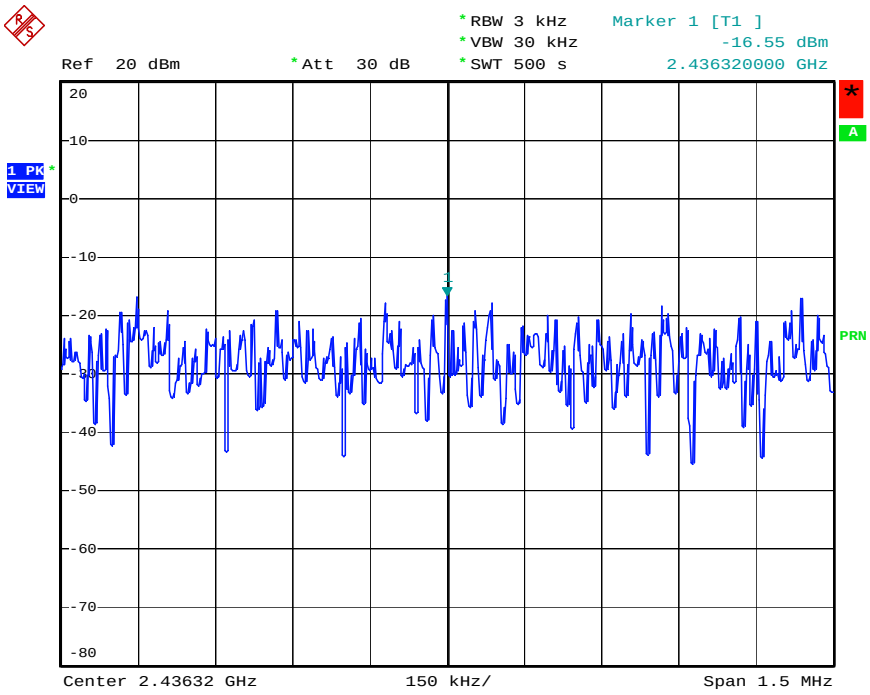
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Sam Lee

Modulation Type	Channel	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
CCK	01	2412 MHz	-16.46	8
CCK	06	2437 MHz	-16.55	8
CCK	11	2462 MHz	-16.31	8
64QAM	01	2412 MHz	-21.10	8
64QAM	06	2437 MHz	-20.88	8
64QAM	11	2462 MHz	-21.97	8

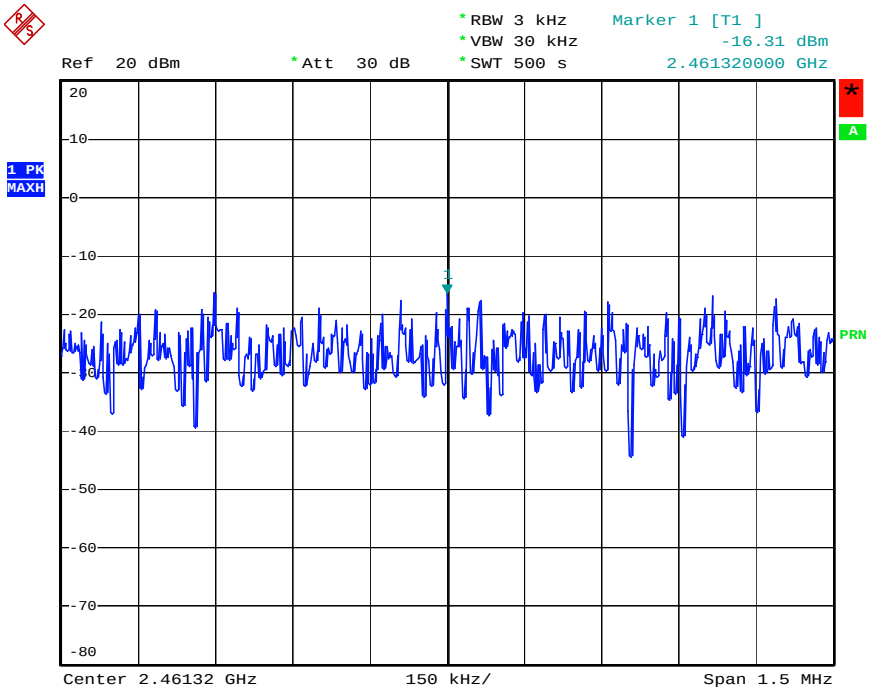
Modulation Type: CCK (Channel 01)：



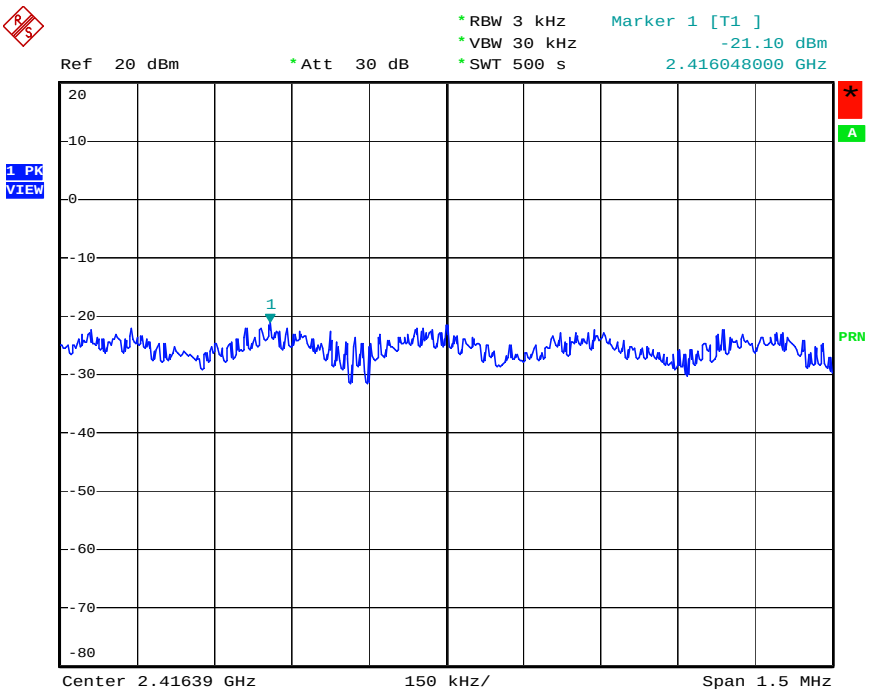
Modulation Type: CCK (Channel 06)：



Modulation Type: CCK (Channel 11)：



Modulation Type: 64QAM (Channel 01)：



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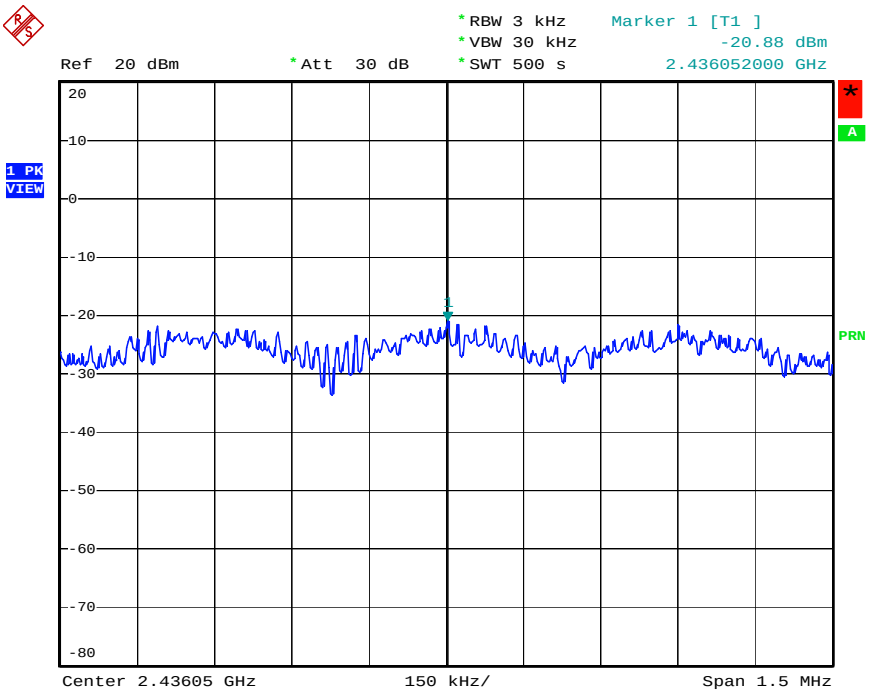
Modulation Type: 64QAM (Channel 06)：



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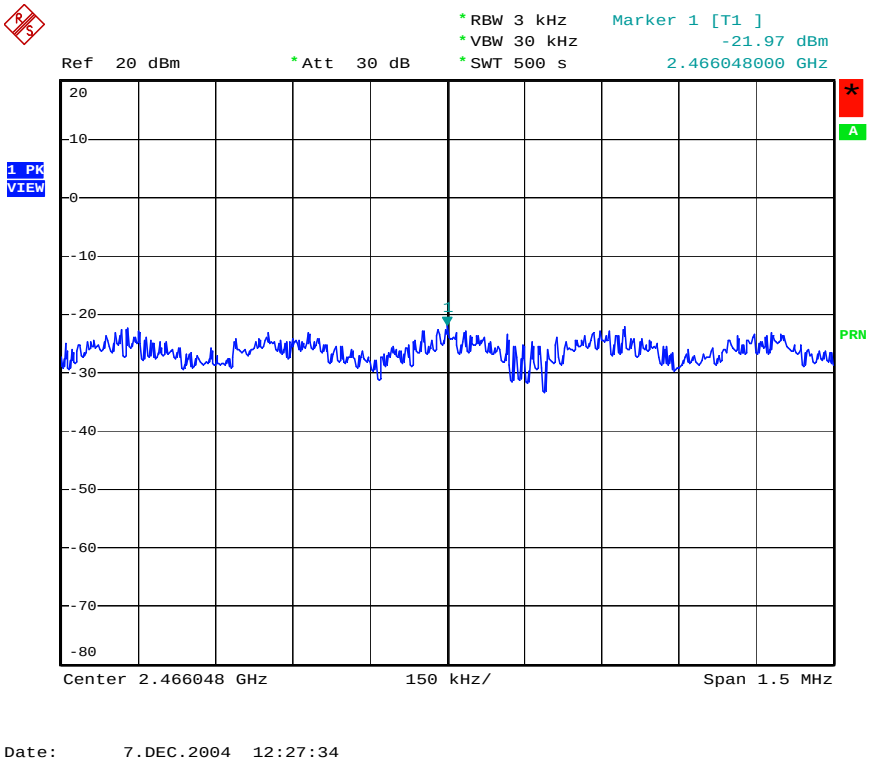
Modulation Type: 64QAM (Channel 11)：



5.4. Test of Band Edges Emission

5.4.1. Measuring Instruments

Item 18 of the table is 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.

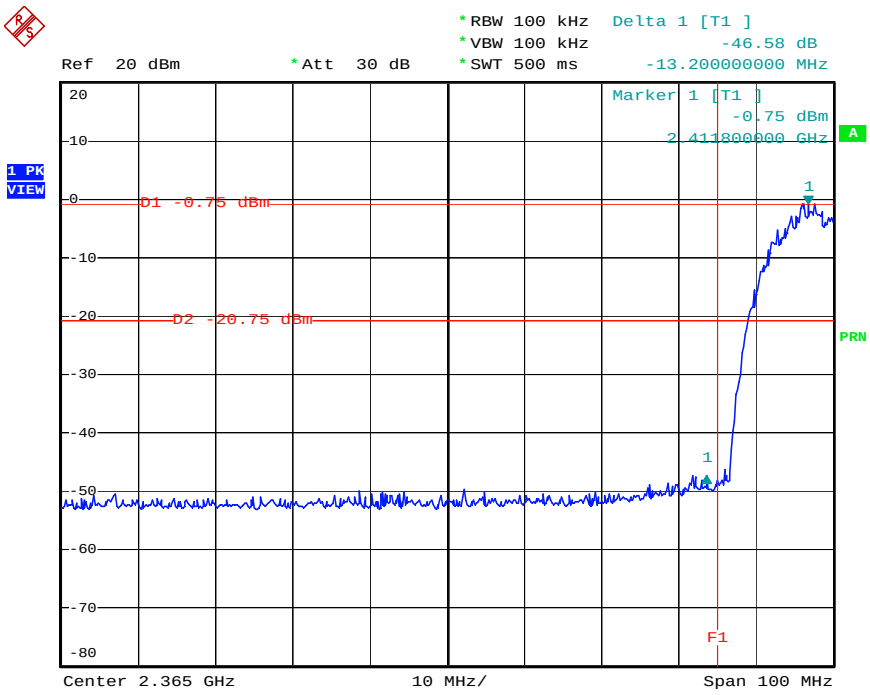
5.4.3. Test Result:

Temperature: 23°C
Relative Humidity: 50%
Duty Cycle of the Equipment During the Test: 100.00%
Test Engineer: Sam Lee

Modulation Type	Test Channel	Freq. (MHz)	Level* (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Trace (PK/AV)
CCK	01	2371.37	58.53	-15.47	74	PK
CCK	01	2488.22	52.13	-1.87	54	AV
CCK	11	2371.37	57.82	-16.18	74	PK
CCK	11	2488.22	51.65	-2.35	54	AV
64QAM	01	2374.41	58.60	-15.40	74	PK
64QAM	01	2374.41	50.30	-3.70	54	AV
64QAM	11	2492.97	57.12	-16.88	74	PK
64QAM	11	2492.97	51.34	-2.66	54	AV

Level* : The max field strength in the restricted bands.

Modulation Type: CCK (Channel 01)：



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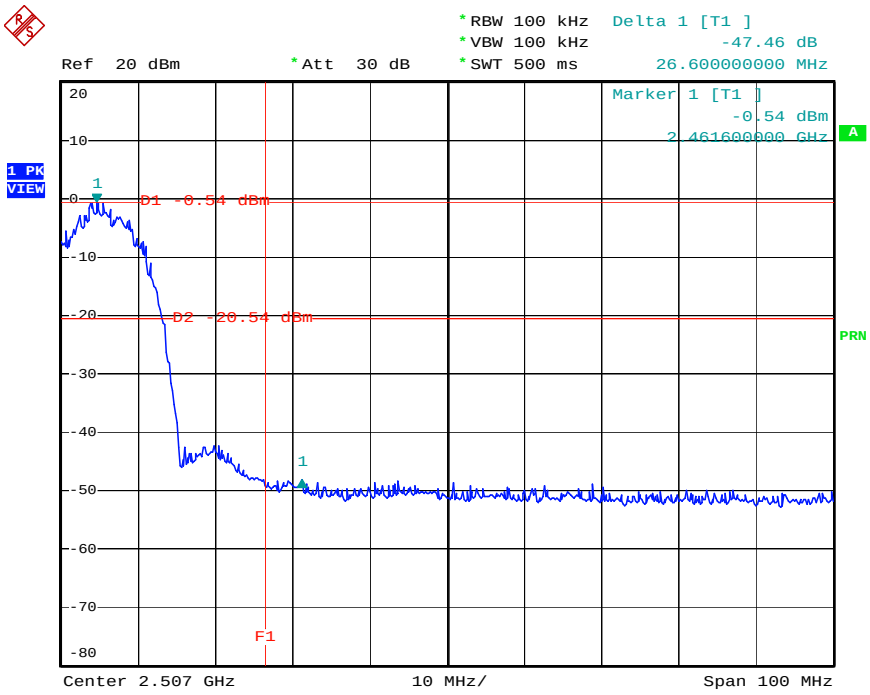
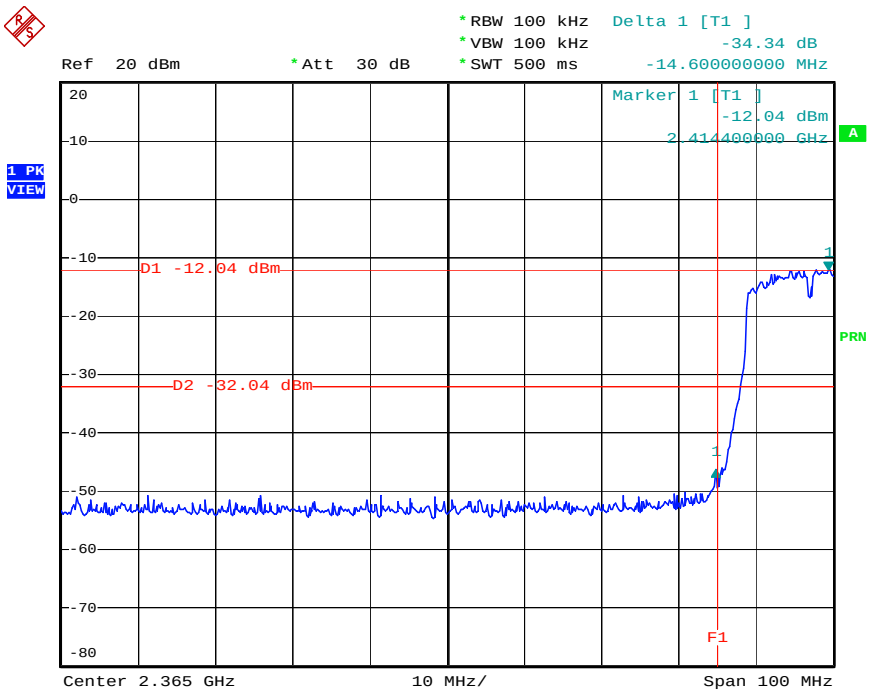
Modulation Type: CCK (Channel 11)：



Date: 7.DEC.2004 12:14:11

Modulation Type: 64QAM (Channel 01)：



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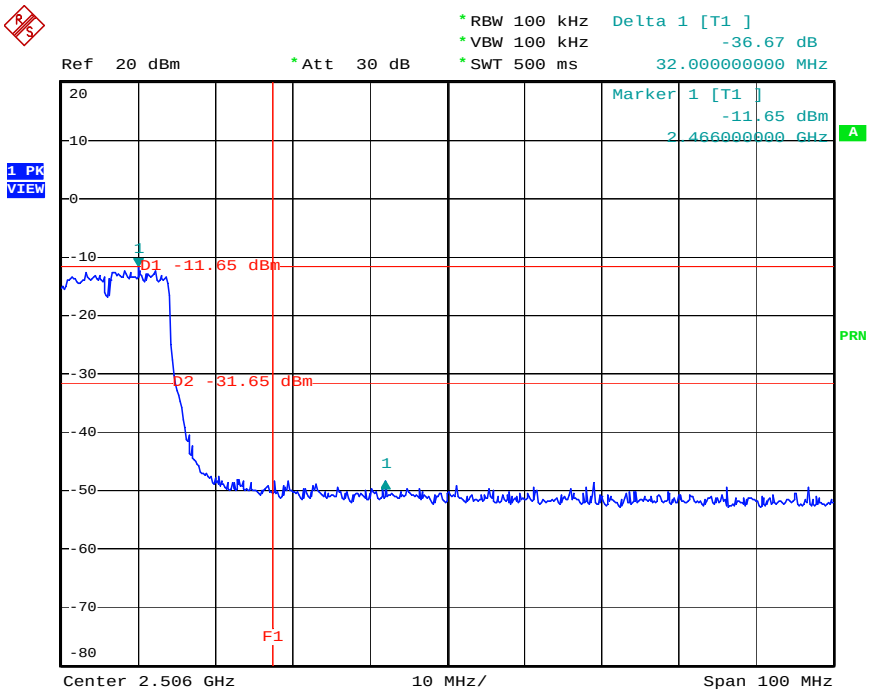
Modulation Type: 64QAM (Channel 11)：



Date: 7.DEC.2004 12:25:50

5.5. Test of AC Power Line Conducted Emission

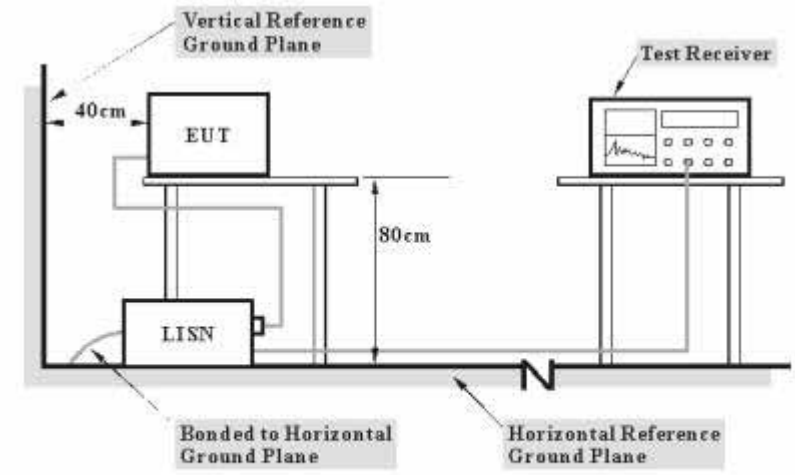
5.5.1. Measuring Instruments

Please reference item 1~5 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 Setup Layout



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

5.5.4. Test Result of Conducted Emission

- Temperature: 23°C
- Relative Humidity: 50%
- Test Engineer: Sky Wu

Line to Ground

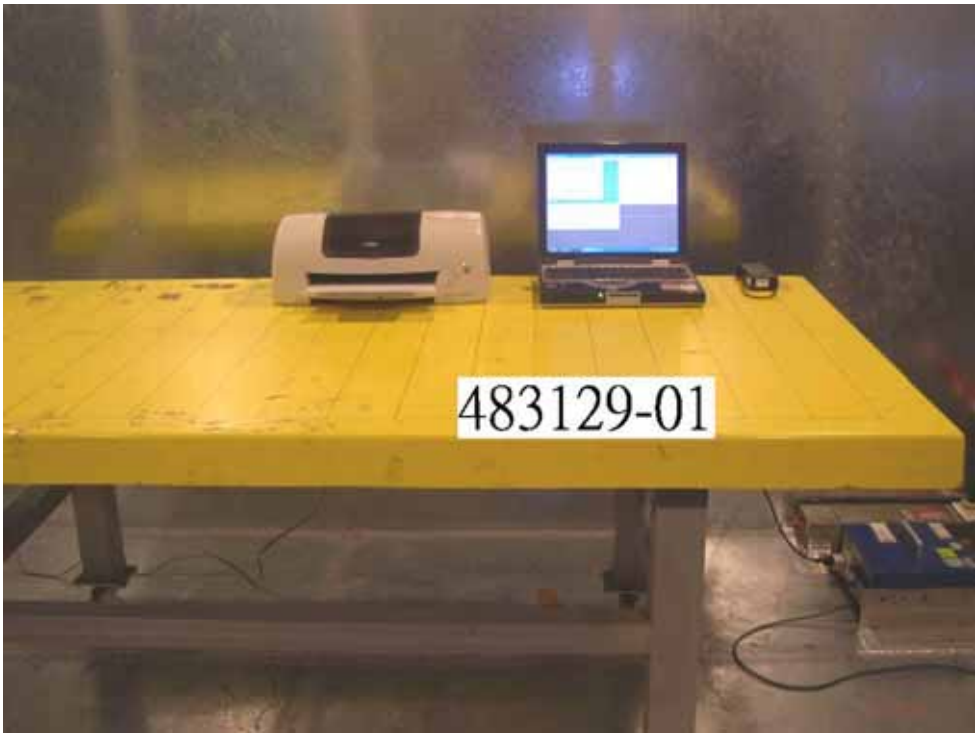
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.1564750	51.27	-14.38	65.65	51.16	0.10	0.01	QP
2	0.1564750	41.49	-14.16	55.65	41.38	0.10	0.01	Average
3	0.2028850	31.99	-31.50	63.49	31.88	0.10	0.01	QP
4	0.2028850	15.26	-38.23	53.49	15.15	0.10	0.01	Average
5	0.4214950	27.53	-29.89	57.42	27.41	0.10	0.02	QP
6	0.4214950	18.87	-28.55	47.42	18.75	0.10	0.02	Average
7	1.810	32.32	-23.68	56.00	32.20	0.10	0.02	QP
8	1.810	23.08	-22.92	46.00	22.96	0.10	0.02	Average
9	4.340	29.76	-26.24	56.00	29.49	0.20	0.07	QP
10	4.340	23.20	-22.80	46.00	22.93	0.20	0.07	Average
11	12.380	33.96	-26.04	60.00	33.62	0.20	0.14	QP
12	12.380	28.37	-21.63	50.00	28.03	0.20	0.14	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	0.1527470	52.61	-13.24	65.85	52.50	0.10	0.01	QP
2	0.1527470	42.45	-13.40	55.85	42.34	0.10	0.01	Average
3	0.2039630	31.36	-32.09	63.45	31.25	0.10	0.01	QP
4	0.2039630	15.07	-38.38	53.45	14.96	0.10	0.01	Average
5	1.100	30.34	-25.66	56.00	30.20	0.10	0.04	QP
6	1.100	19.87	-26.13	46.00	19.73	0.10	0.04	Average
7	1.850	30.68	-25.32	56.00	30.56	0.10	0.02	QP
8	1.850	21.25	-24.75	46.00	21.13	0.10	0.02	Average
9	4.570	30.21	-25.79	56.00	30.02	0.11	0.08	QP
10	4.570	23.83	-22.17	46.00	23.64	0.11	0.08	Average
11	12.250	27.91	-22.09	50.00	27.58	0.20	0.13	Average
12	12.250	33.51	-26.49	60.00	33.18	0.20	0.13	QP

5.5.5. Photographs of Conducted Emission Test Configuration

FRONT VIEW



REAR VIEW

5.6. Test of Spurious Radiated Emission

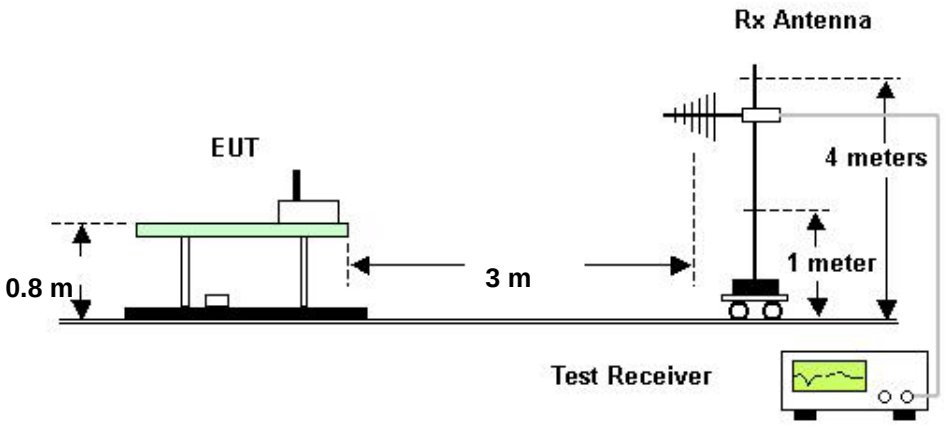
5.6.1. Measuring Instruments

Please reference item 6~17 in chapter 6 for the instruments used for testing.

5.6.2. Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT was placed on the top of the turn table 0.8 meter above ground.
3. 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.
4. Power on the EUT and all the supporting units.
5. The turn table was rotated by 360 degrees to determine the position of the highest radiation.
6. 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.
7. 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.
8. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
9. For emission above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
10. 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.
11. 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 for CH 11 / 2462 MHz (for emission below 1GHz)

- Modulation Type: 64QAM
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steve Chen

(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	33.57	-9.93	43.50	46.96	12.39	2.05	27.83	QP	---	---
2		166.340	34.76	-8.74	43.50	46.91	13.29	2.33	27.77	QP	---	---
3	!	195.580	40.99	-2.51	43.50	50.73	15.45	2.52	27.71	QP	---	---
1	!	259.200	41.42	-4.58	46.00	53.39	12.60	2.89	27.46	QP	---	---
2	!	343.200	44.35	-1.65	46.00	53.55	15.10	3.21	27.51	QP	127	181
3	!	397.600	42.77	-3.23	46.00	50.37	16.73	3.46	27.79	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		76.070	33.52	-6.48	40.00	50.37	9.62	1.48	27.95	QP	---	---
2	!	133.020	39.85	-3.65	43.50	53.24	12.41	2.03	27.83	QP	---	---
3	!	195.580	38.56	-4.94	43.50	48.30	15.45	2.52	27.71	QP	---	---
1	!	343.200	42.69	-3.31	46.00	51.89	15.10	3.21	27.51	QP	---	---
2		397.600	39.90	-6.10	46.00	47.50	16.73	3.46	27.79	QP	---	---
3	!	832.800	41.25	-4.75	46.00	42.82	21.83	5.23	28.63	QP	---	---

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

5.6.5. Test Results for CH 01 / 2412 MHz (for emission above 1GHz)

- Modulation Type: CCK
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steve Chen

(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	7236.000	56.77	-17.23	74.00	57.48	35.84	2.92	39.47	Peak	---	---
2	7236.000	45.37	-8.63	54.00	46.08	35.84	2.92	39.47	Average	---	---
1	9646.000	55.19	-18.81	74.00	51.95	38.28	3.70	38.74	Peak	---	---
2	9646.000	49.48	-4.52	54.00	46.24	38.28	3.70	38.74	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	2372.000	53.99	-20.01	74.00	63.65	28.24	1.70	39.60	Peak	---	---
2	2372.000	53.99	-0.01	54.00	63.65	28.24	1.70	39.60	Average	---	---
1	4822.000	53.32	-20.68	74.00	57.99	33.00	2.47	40.14	Peak	---	---
2	4822.000	42.04	-11.96	54.00	46.71	33.00	2.47	40.14	Average	---	---
1	7236.000	59.78	-14.22	74.00	60.49	35.84	2.92	39.47	Peak	---	---
2	7236.000	47.86	-6.14	54.00	48.57	35.84	2.92	39.47	Average	---	---
1	9646.000	53.45	-20.55	74.00	50.21	38.28	3.70	38.74	Peak	---	---
2	9646.000	48.39	-5.61	54.00	45.15	38.28	3.70	38.74	Average	---	---

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.6.6. Test Results for CH 06 / 2437 MHz (for emission above 1GHz)

- Modulation Type: CCK
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steve Chen

(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	7310.000	56.38	-17.62	74.00	56.64	36.06	3.13	39.45	Peak	---	---
2	7310.000	44.51	-9.49	54.00	44.77	36.06	3.13	39.45	Average	---	---
1	9748.000	56.75	-17.25	74.00	53.28	38.47	3.71	38.71	Peak	---	---
2	9748.000	50.74	-3.26	54.00	47.27	38.47	3.71	38.71	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	4876.000	55.71	-18.29	74.00	60.23	33.10	2.52	40.14	Peak	---	---
2	4876.000	44.13	-9.87	54.00	48.65	33.10	2.52	40.14	Average	---	---
1	7310.000	57.99	-16.01	74.00	58.25	36.06	3.13	39.45	Peak	---	---
2	7310.000	46.49	-7.51	54.00	46.75	36.06	3.13	39.45	Average	---	---
1	9748.000	55.81	-18.19	74.00	52.34	38.47	3.71	38.71	Peak	---	---
2	9748.000	51.42	-2.58	54.00	47.95	38.47	3.71	38.71	Average	---	---

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

5.6.7. Test Results for CH 11 / 2462 MHz (for emission above 1GHz)

- Modulation Type: CCK
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steve Chen

(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	7382.000	62.68	-11.32	74.00	63.04	36.28	2.79	39.43	Peak	---	---
2	7382.000	52.80	-1.20	54.00	53.16	36.28	2.79	39.43	Average	---	---
1	9846.000	55.80	-18.20	74.00	51.89	38.64	3.95	38.68	Peak	---	---
2	9846.000	50.48	-3.52	54.00	46.57	38.64	3.95	38.68	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	4924.000	57.77	-16.23	74.00	62.27	33.18	2.47	40.15	Peak	---	---
2	4924.000	45.86	-8.14	54.00	50.36	33.18	2.47	40.15	Average	---	---
1	7388.000	54.80	-19.20	74.00	55.12	36.30	2.81	39.43	Peak	---	---
2	7388.000	43.80	-10.20	54.00	44.12	36.30	2.81	39.43	Average	---	---
1	9846.000	55.24	-18.76	74.00	51.33	38.64	3.95	38.68	Peak	---	---
2	9846.000	50.07	-3.93	54.00	46.16	38.64	3.95	38.68	Average	---	---

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

5.6.8. Test Results for CH 01 / 2412 MHz (for emission above 1GHz)

- Modulation Type: 64QAM
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steve Chen

(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	7244.000	54.29	-19.71	74.00	54.93	35.86	2.97	39.47	Peak	---	---
2	7244.000	43.03	-10.97	54.00	43.67	35.86	2.97	39.47	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	7230.000	56.91	-17.09	74.00	57.67	35.82	2.89	39.47	Peak	---	---
2	7230.000	46.04	-7.96	54.00	46.80	35.82	2.89	39.47	Average	---	---

Note:

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

5.6.9. Test Results for CH 06 / 2437 MHz (for emission above 1GHz)

- Modulation Type: 64QAM
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steve Chen

(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	7308.000	54.52	-19.48	74.00	54.75	36.06	3.16	39.45	Peak	---	---
2	7308.000	43.48	-10.52	54.00	43.71	36.06	3.16	39.45	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	7318.000	58.24	-15.76	74.00	58.61	36.09	2.99	39.45	Peak	---	---
2	7318.000	47.31	-6.69	54.00	47.68	36.09	2.99	39.45	Average	---	---

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.6.10. Test Results for CH 11 / 2462 MHz (for emission above 1GHz)

- Modulation Type: 64QAM
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steve Chen

(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	7396.000	54.33	-19.67	74.00	54.60	36.32	2.83	39.42	Peak	---	---
2	7396.000	43.78	-10.22	54.00	44.05	36.32	2.83	39.42	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	7396.000	56.49	-17.51	74.00	56.76	36.32	2.83	39.42	Peak	---	---
2	7396.000	44.42	-9.58	54.00	44.69	36.32	2.83	39.42	Average	---	---

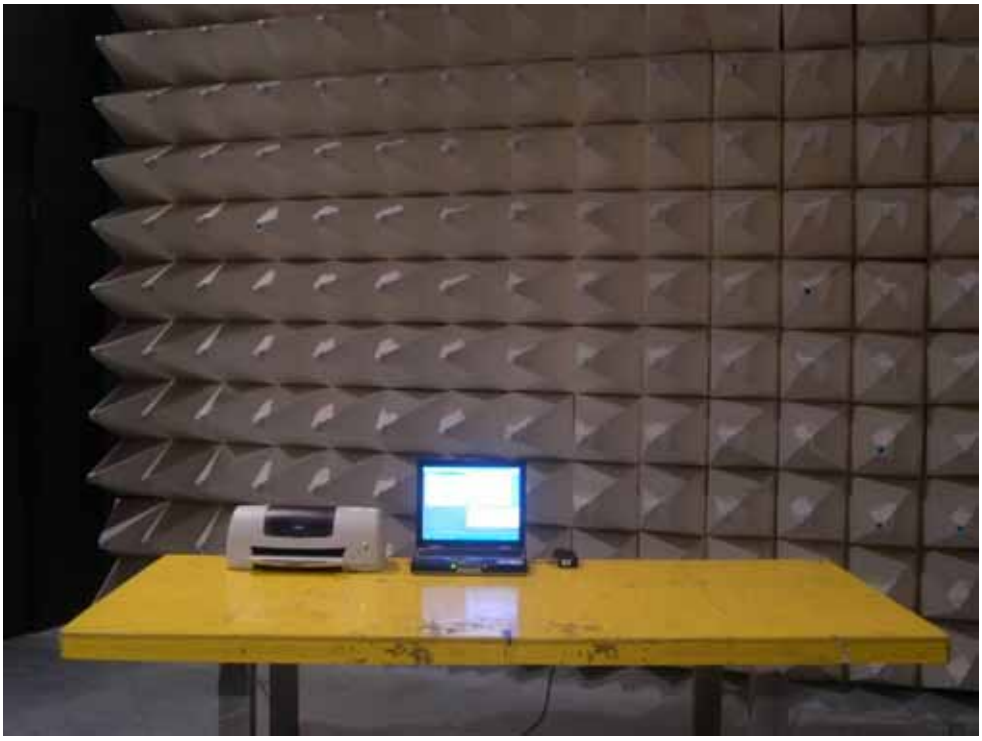
Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

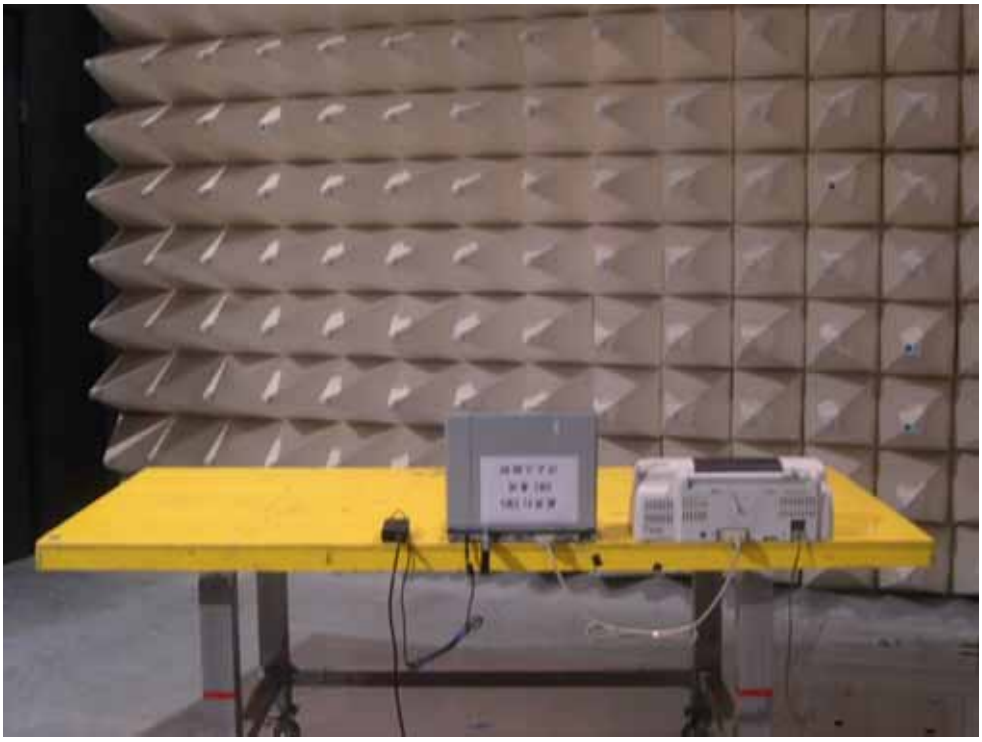
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

5.6.11. Photographs of Radiated Emission Test Configuration

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

There is no antenna connector for integral chip antenna.

5.8. RF Exposure

5.8.1. Limit For Maximum Permissible Exposure (MPE)

This product can be classified as mobile device, so the 20cm separation distance warning is required. In this section, the power density at 20cm 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=20cm, as well as the gain of the used antenna, the RF power density can be obtained.

5.8.3. Calculated Result and Limit

- Modulation Type: CCK
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steve Chen

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)
01	2.60	1.82	12.30	16.98	0.0062	**1**
06	2.60	1.82	12.28	16.90	0.0061	**1**
11	2.60	1.82	12.30	16.98	0.0062	**1**

- Modulation Type: 64QAM
- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100.00%
- Test Engineer: Steve Chen

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)
01	2.60	1.82	11.99	15.81	0.0057	**1**
06	2.60	1.82	12.17	16.48	0.0060	**1**
11	2.60	1.82	12.04	16.00	0.0058	**1**

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)
6	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2004	Radiation (03CH03-HY)
7	Spectrum analyzer	R&S	FSP40	100004	9KHZ~40GHz	Aug. 31, 2004	Radiation (03CH03-HY)
8	Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 05, 2003	Radiation (03CH03-HY)
9	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 28, 2004	Radiation (03CH03-HY)
10	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 28, 2004	Radiation (03CH03-HY)
11	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Dec. 03, 2003	Radiation (03CH03-HY)
12	Amplifier	MITEQ	AFS44	849984	100MHz~26.5GHz	Mar. 26, 2004	Radiation (03CH03-HY)
13	Horn Antenna	EMCO	3115	6821	1GHz – 18GHz	Sep. 11, 2004	Radiation (03CH03-HY)
14	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
15	Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
16	Horn Antenna	Schwarzbeck	BBHA9170	154	18GHz~40GHz	Jun. 09, 2004	Radiation (03CH03-HY)
17	RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Dec. 05, 2003	Radiation (03CH03-HY)

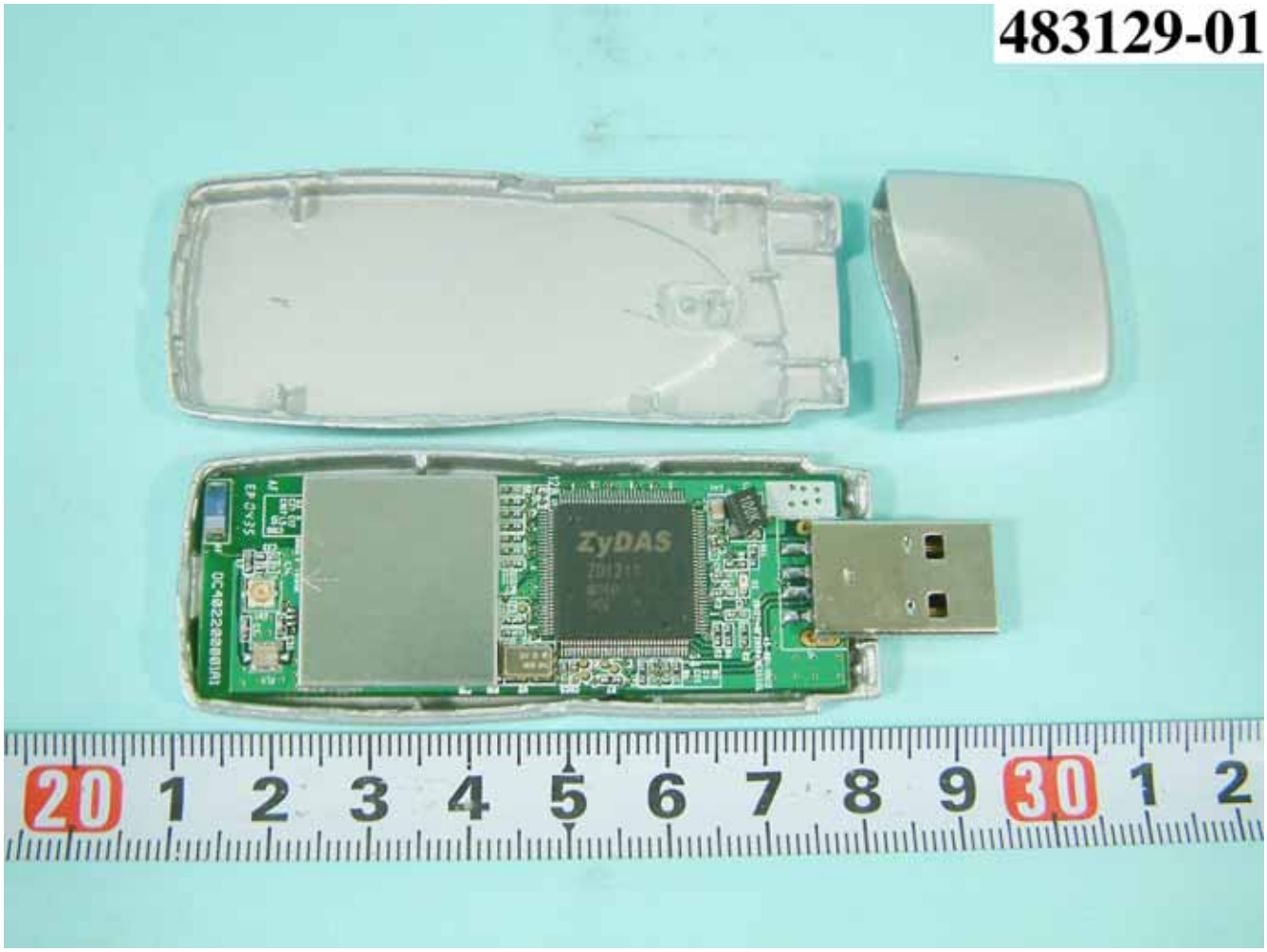
※ Calibration Interval of instruments listed above is one year.

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
18	Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Sep. 02, 2004	Conducted (TH01-HY)
19	Power meter	R&S	NRVS	100444	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
20	Power sensor	R&S	NRV-Z55	100049	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
21	Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	Jun. 15, 2004	Conducted (TH01-HY)
22	AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	Jun. 16, 2004	Conducted (TH01-HY)
23	AC power source	G.W.	GPC-6030D	C671845	DC 1V~60V	Nov. 06, 2003	Conducted (TH01-HY)
24	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Sep. 30, 2004	Conducted (TH01-HY)
25	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz~7GHz	Jan. 01, 2004	Conducted (TH01-HY)
26	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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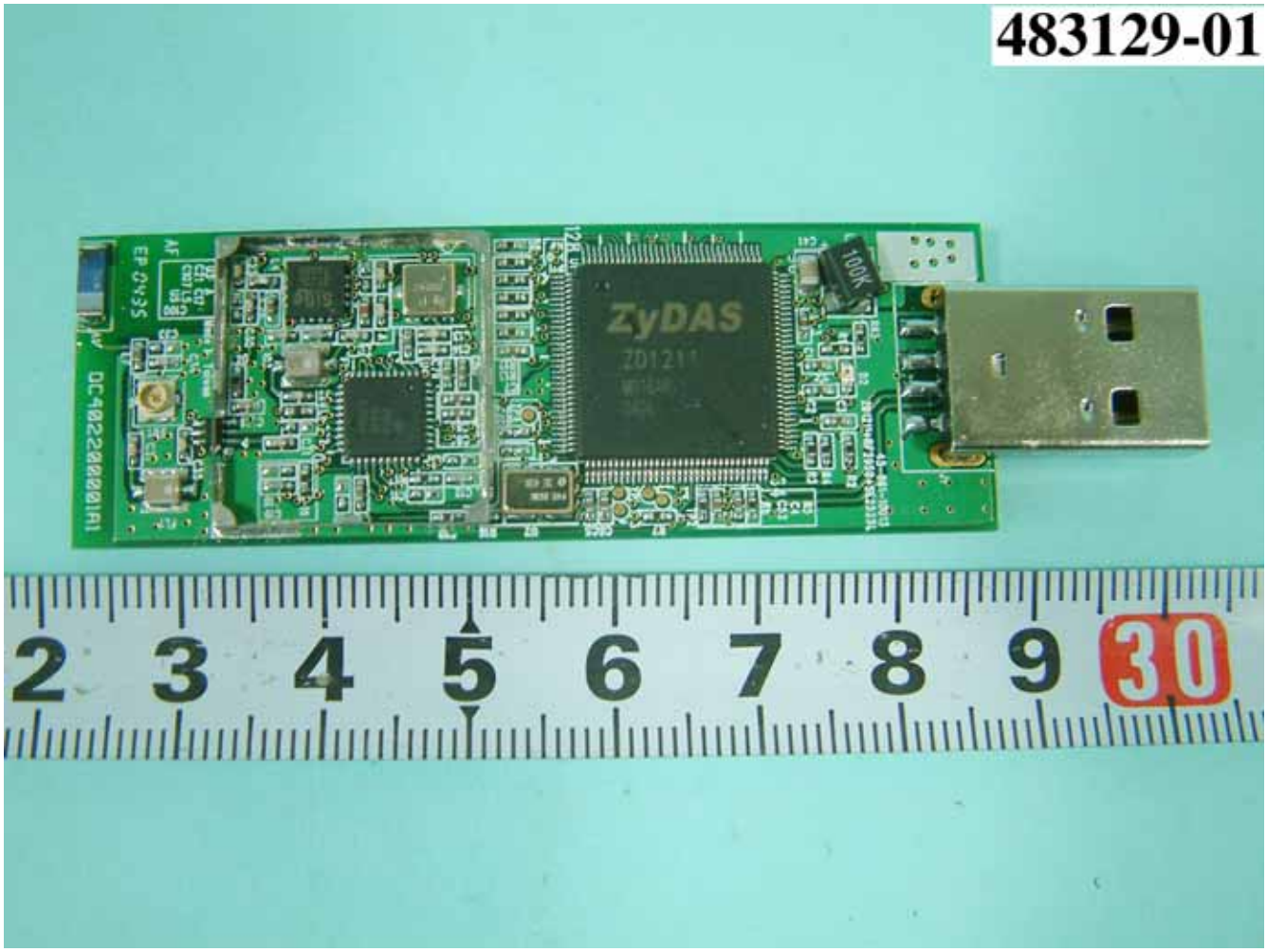

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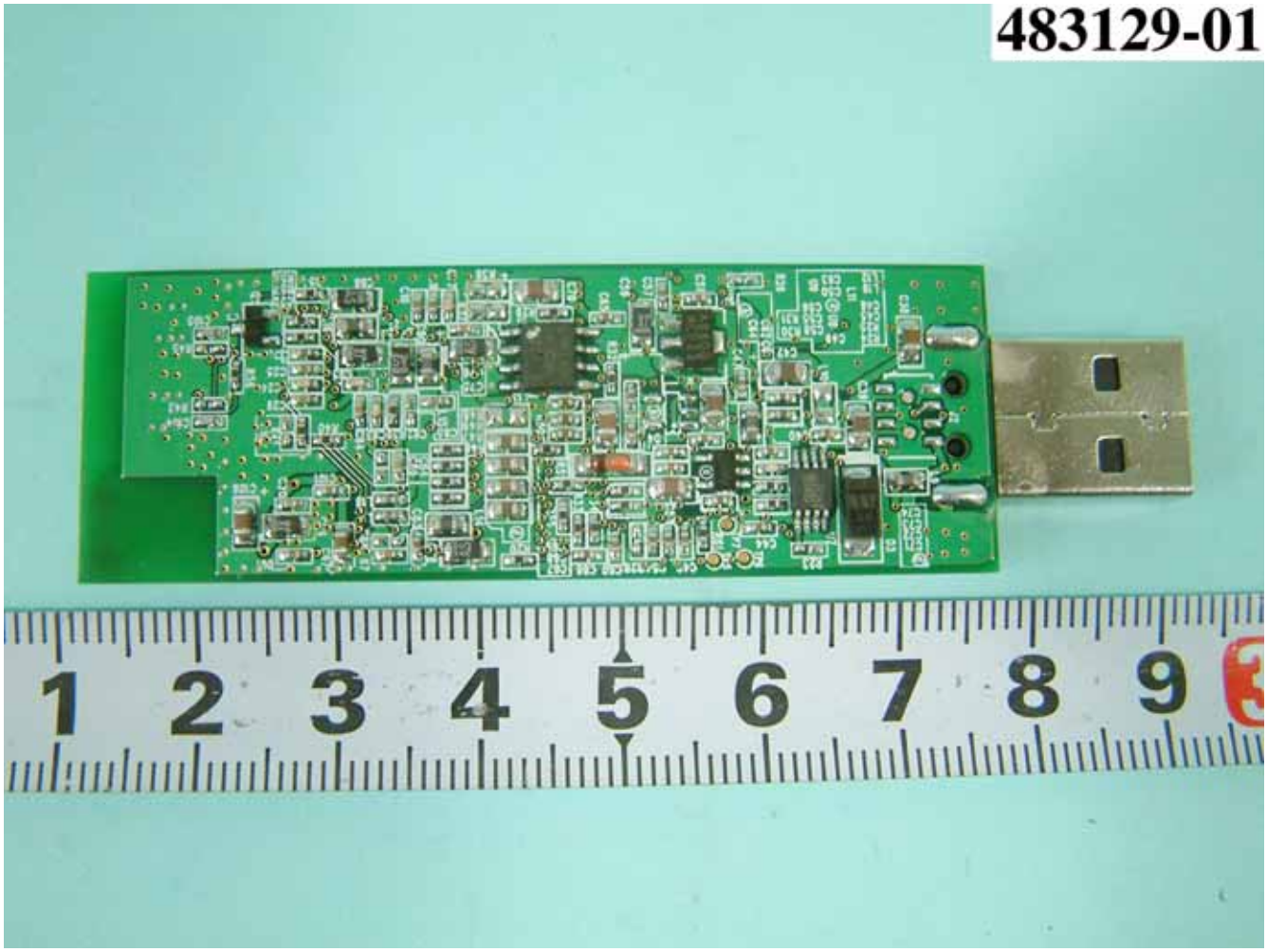

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