

# FCC TEST REPORT

**CATEGORY:** Portable End Product  
**PRODUCT NAME:** 802.11g WLAN+Class 2 Bluetooth Combo Dongle  
**FCC ID.:** RU5AWGB2U  
**FILING TYPE:** Certification  
**MODEL (TRADE) NAME:** AWGBTU (apm)  
WB-688C (SparkLAN)  
BTW-4401 (Anextek)  
BTW212G1 (Suncore)  
WNC-0302USB (LevelOne)  
**APPLICANT:** Asia Pacific Microsystems, Inc.  
No. 2, R&D Road 6, Science-Based Industrial Park,  
Hsinchu, Taiwan, R.O.C.  
**MANUFACTURER:** The 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

## Table of Contents

History of this test report.....	ii
<b>1. General Description of Equipment under Test.....</b>	<b>1</b>
1.1 Applicant.....	1
1.2 Manufacturer .....	1
1.3 Basic Description of Equipment under Test .....	1
1.4 Features of Equipment under Test .....	1
1.5 Table for Carrier Frequencies.....	2
<b>2. Test Configuration of the Equipment under Test.....</b>	<b>4</b>
2.1 Description of the Test.....	4
2.2 Frequency Range Investigated.....	4
2.3 Details of the Supporting Units .....	4
2.4 Connection Diagram of Test System.....	5
2.5 Test Software .....	5
<b>3. Test Location and Standards .....</b>	<b>6</b>
3.1 Test Location .....	6
3.2 Test Conditions.....	6
3.3 Test Standards .....	6
3.4 DoC Statement .....	6
<b>4. Test Result and Details .....</b>	<b>7</b>
4.1 Summary of the Test Results .....	7
<b>5. Test Result .....</b>	<b>9</b>
5.1 Test of 6dB Spectrum Bandwidth (WLAN) .....	9
5.2 Test of Maximum Conducted Output Power (WLAN).....	13
5.3 Test of Peak Power Spectral Density (WLAN) .....	15
5.4 Test of Band Edges Emission (WLAN).....	20
5.5 Test of Hopping Channel Bandwidth (BLUETOOTH).....	23
5.6 Test of Number of Hopping Frequency (BLUETOOTH).....	26
5.7 Test of Hopping Channel Separation (BLUETOOTH) .....	28
5.8 Test of Dwell Time of Each Frequency (BLUETOOTH) .....	31
5.9 Test of Maximum Peak Output Power (BLUETOOTH) .....	34
5.10 Test of Band Edges of the Operation Frequency (BLUETOOTH) .....	35
5.11 Test of AC Power Line Conducted Emission .....	38
5.12 Test of Spurious Radiated Emission .....	42
5.14 Antenna Requirements.....	56
<b>6. List of Measuring Equipments Used .....</b>	<b>57</b>
<b>Appendix A. Photographs of EUT.....</b>	<b>A1 ~ A13</b>

## 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

Asia Pacific Microsystems, Inc.

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

### 1.2 Manufacturer

The same as Applicant.

### 1.3 Basic Description of Equipment under Test

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

### 1.4 Features of Equipment under Test

ITEMS	DESCRIPTION
Type of Modulation	WLAN: DSSS / OFDM BLUETOOTH: FHSS
Number of Channels	WLAN: 11 BLUETOOTH: 79
Frequency Band	2400MHz ~ 2483.5MHz
Carrier Frequency	Please reference table below
Channel Bandwidth	WLAN: 22MHz BLUETOOTH: 1MHz
Output Power	WLAN: 12.30dBm (CCK) ; 12.17 dBm (OFDM) BLUETOOTH: 3.55dBm
Antenna Type / Gain	WLAN: Printed / 2 dBi BLUETOOTH: Chip / -3 dBi
Function Type	Transceiver
Power Rating (DC/AC, Voltage)	3.5 VDC
Temperature Range (Operating)	0 ~ 55 °C

## 1.5 Table for Carrier Frequencies

### WLAN

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		

## BLUETOOTH

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	27	2429 MHz	54	2456 MHz
01	2403 MHz	28	2430 MHz	55	2457 MHz
02	2404 MHz	29	2431 MHz	56	2458 MHz
03	2405 MHz	30	2432 MHz	57	2459 MHz
04	2406 MHz	31	2433 MHz	58	2460 MHz
05	2407 MHz	32	2434 MHz	59	2461 MHz
06	2408 MHz	33	2435 MHz	60	2462 MHz
07	2409 MHz	34	2436 MHz	61	2463 MHz
08	2410 MHz	35	2437 MHz	62	2464 MHz
09	2411 MHz	36	2438 MHz	63	2465 MHz
10	2412 MHz	37	2439 MHz	64	2466 MHz
11	2413 MHz	38	2440 MHz	65	2467 MHz
12	2414 MHz	39	2441 MHz	66	2468 MHz
13	2415 MHz	40	2442 MHz	67	2469 MHz
14	2416 MHz	41	2443 MHz	68	2470 MHz
15	2417 MHz	42	2444 MHz	69	2471 MHz
16	2418 MHz	43	2445 MHz	70	2472 MHz
17	2419 MHz	44	2446 MHz	71	2473 MHz
18	2420 MHz	45	2447 MHz	72	2474 MHz
19	2421 MHz	46	2448 MHz	73	2475 MHz
20	2422 MHz	47	2449 MHz	74	2476 MHz
21	2423 MHz	48	2450 MHz	75	2477 MHz
22	2424 MHz	49	2451 MHz	76	2478 MHz
23	2425 MHz	50	2452 MHz	77	2479 MHz
24	2426 MHz	51	2453 MHz	78	2480 MHz
25	2427 MHz	52	2454 MHz		
26	2428 MHz	53	2455 MHz		

## 2. Test Configuration of the Equipment under Test

### 2.1 Description of the Test

- a) For WLAN, spurious emission below 1GHz is independent of channel selection, so only channel 13 with 64QAM modulation was tested.
- b) For BLUETOOTH, spurious emission below 1GHz is independent of channel selection, so only channel 78 was tested.
- c) The following modes were tested:
  - CH 01 (2412 MHz) - WLAN
  - CH 06 (2437 MHz) - WLAN
  - CH 11 (2462 MHz) - WLAN
  - CH 00 (2402 MHz) - Bluetooth
  - CH 39 (2441 MHz) - Bluetooth
  - CH 78 (2480 MHz) - Bluetooth

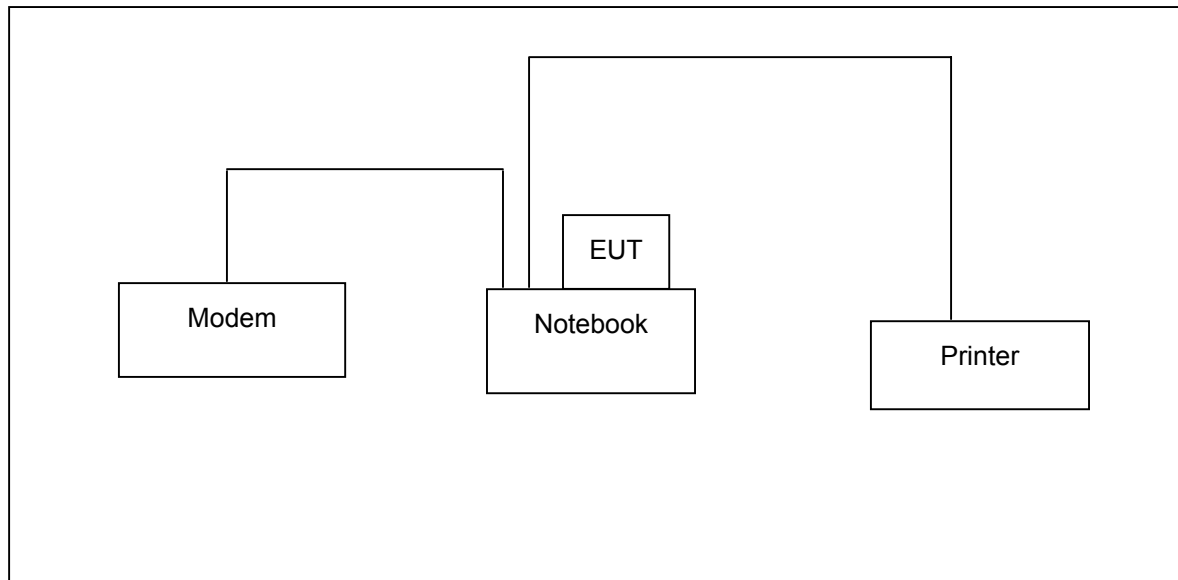
### 2.2 Frequency Range Investigated

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

### 2.3 Details of the Supporting Units

Support unit	Brand	Model No.	Serial No.	FCC ID	Data cable (m)
Notebook	DELL	PP01L	SP0030	DoC	-
Printer	EPSON	Stylus Color 680	SP0016	DoC	1
Modem	ACEEX	-	-	Doc	-

## 2.4 Connection Diagram of Test System



## 2.5 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.



### 3. Test Location and Standards

#### 3.1. Test Location

**Test Location** : Sporton Hwa Ya Testing Building

**Address** : No. 52, Hwa Ya 1<sup>st</sup> 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 : 3.5VDC  
Extreme Voltages : NA  
Normal Temperature : 20 °C  
Extreme Temperatures : 0 °C and 50 °C

#### 3.3. Test Standards

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.

## 4. Test Result and Details

### 4.1. Summary of the Test Results

#### WLAN

Applied Standard: 47 CFR Part 15 and Part 2			
Paragraph	FCC Rule	Description of Test	Result
5.1	15.247(a)(1)	6dB Spectrum Bandwidth	Pass
5.2	15.247(a)(iii)	Maximum Peak Output Power	Pass
5.3	15.247(a)(1)	Peak Power Spectral Density	Pass
5.4	15.247(a)(iii)	Band Edges of the Operation Frequency	Pass
5.11	15.107/15.207	AC Power Line Conducted Emission	Pass
5.12	15.209/15.247(c)	Spurious Radiated Emission	Pass
5.12	15.203	Antenna Requirement	Pass

**Bluetooth**

Applied Standard: 47 CFR Part 15 and Part 2			
Paragraph	FCC Rule	Description of Test	Result
5.5	15.247	Hopping Channel Bandwidth	Pass
5.6	15.247	Number of Hopping Frequency Used	Pass
5.7	15.247	Hopping Channel Separation	Pass
5.8	15.247	Dwell Time of Each Frequency	Pass
5.9	15.247	Maximum Peak Output Power	Pass
5.10	15.247	Band Edges Emission	Pass
5.11	15.207	AC Power Line Conducted Emission	Pass
5.12	15.209/15.247	Spurious Radiated Emission	Pass
5.13	15.203/15.247	Antenna Requirement	Pass

## 5. Test Result

### 5.1 Test of 6dB Spectrum Bandwidth (WLAN)

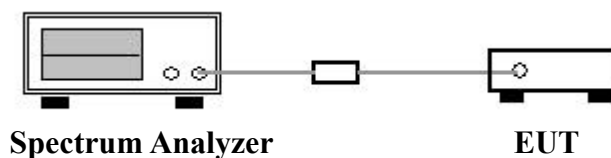
#### 5.1.1 Measuring Instruments

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

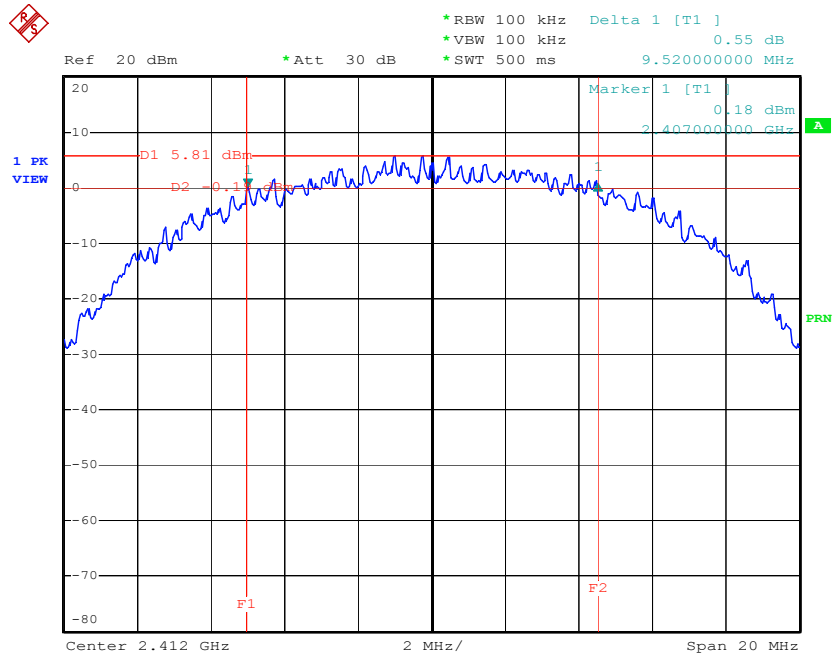


#### 5.1.4 Test Result: See spectrum analyzer plots below

- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100%
- Test Engineer: Sam Lee

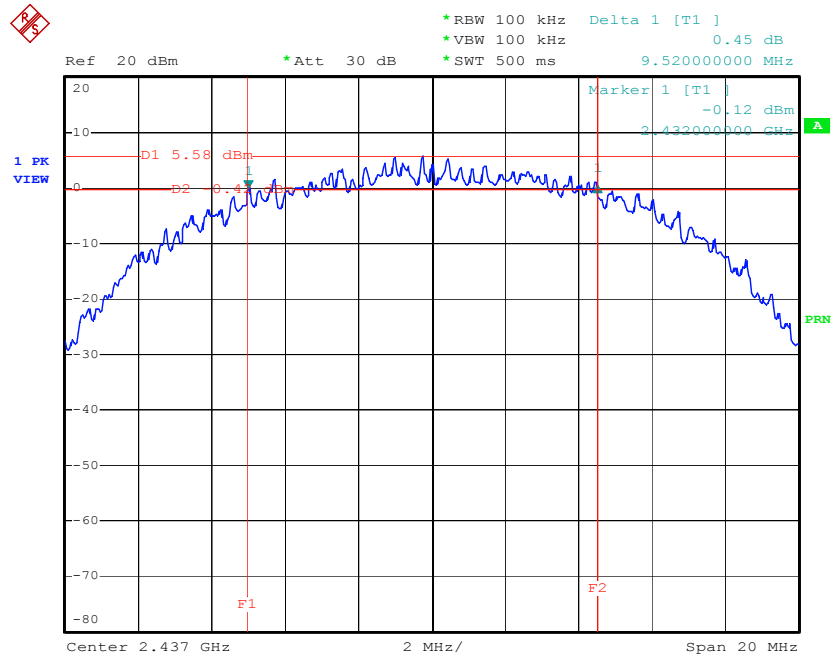
Modulation Type	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Min. Limit (MHz)
CCK	01	2412 MHz	9.52	0.5
CCK	06	2437 MHz	9.52	0.5
CCK	11	2462 MHz	9.52	0.5
64QAM	01	2412 MHz	16.40	0.5
64QAM	06	2437 MHz	16.40	0.5
64QAM	11	2462 MHz	16.40	0.5

Modulation Type: CCK (Channel 2412 MHz) :



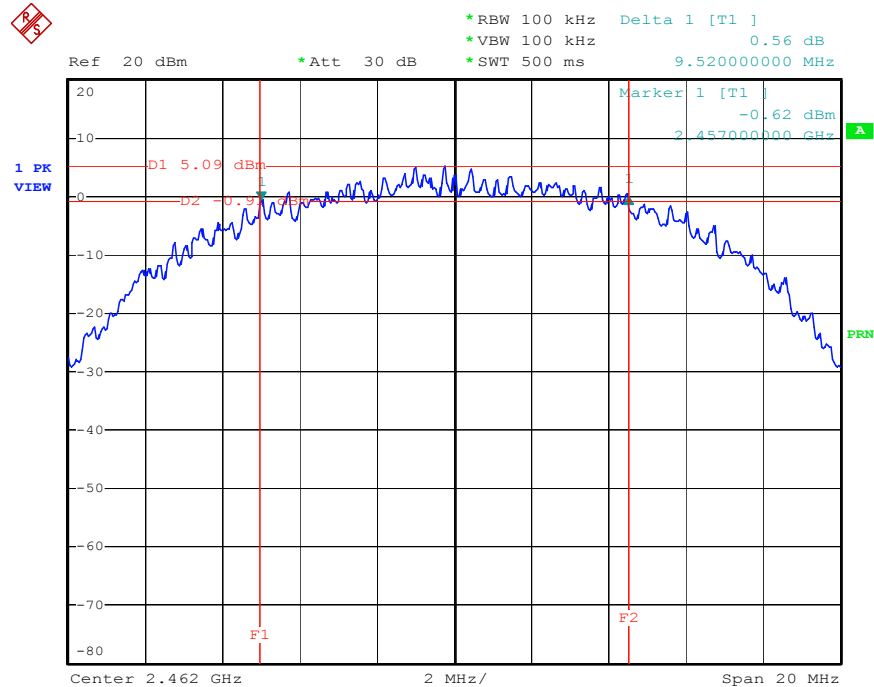
Date: 2.OCT.2004 15:10:58

Modulation Type: CCK (Channel 2437 MHz) :



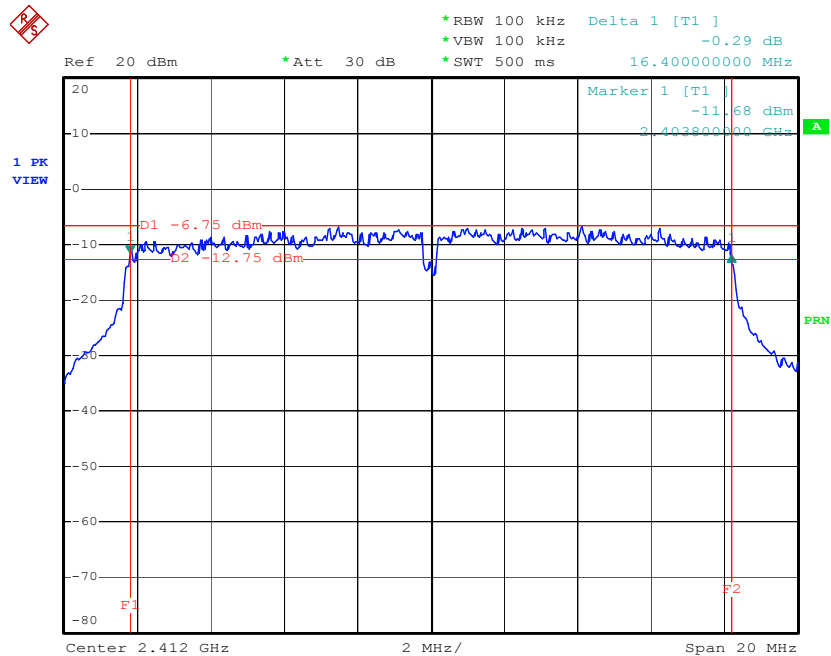
Date: 2.OCT.2004 15:12:12

Modulation Type: CCK (Channel 2462 MHz) :



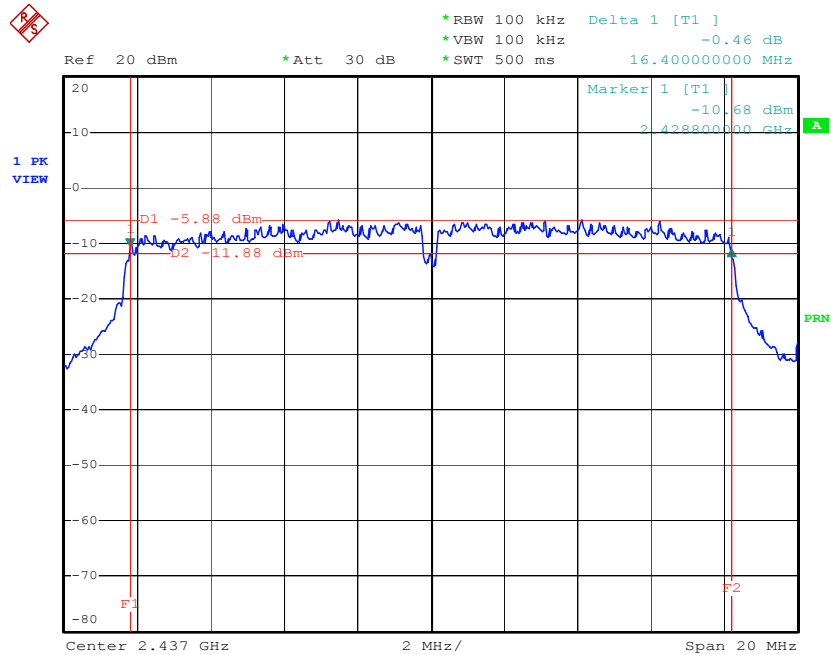
Date: 2.OCT.2004 15:13:22

Modulation Type: 64QAM (Channel 2412 MHz) :



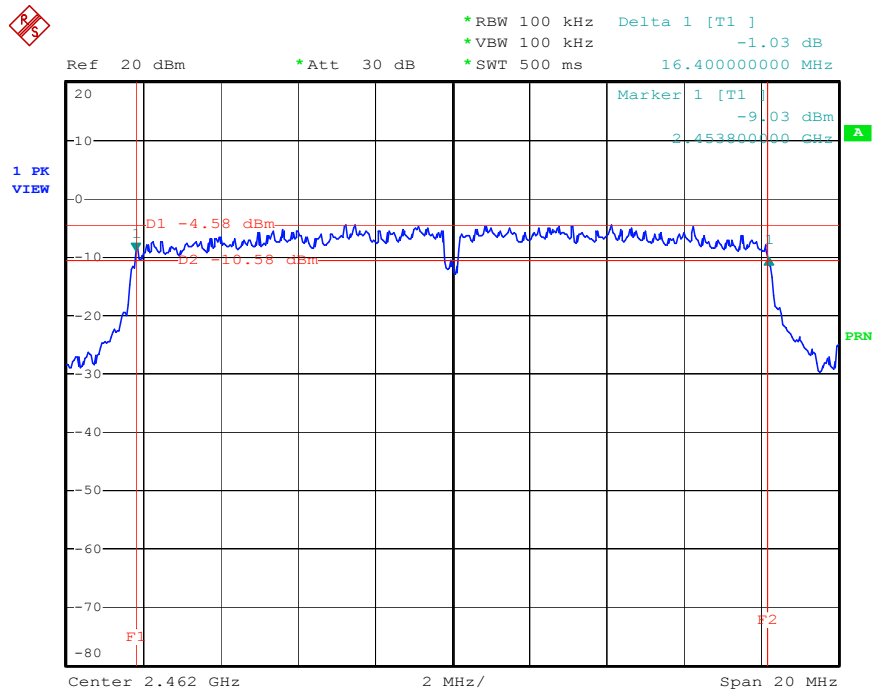
Date: 4.OCT.2004 20:02:09

Modulation Type: 64QAM (Channel 2437 MHz) :



Date: 4.OCT.2004 20:03:28

Modulation Type: 64QAM (Channel 2462 MHz) :



Date: 4.OCT.2004 20:05:29

## 5.2 Test of Maximum Conducted Output Power (WLAN)

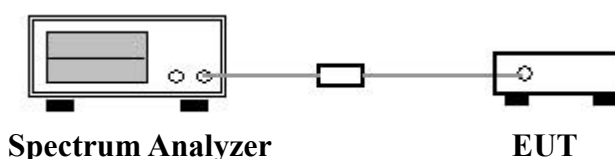
### 5.2.1 Measuring Instruments

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 26dB bandwidth range.
2. Repeated the above "1" for the middle and highest channel of the EUT.

### 5.2.3 Test Setup Layout



### 5.2.4 Test Result of Conducted Power

- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100%
- 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%
- Test Engineer: Sam Lee

Antenna No.	Gain (dBi)	Modulation Type	Channel	Frequency (MHz)	Output Power (dBm)	Limits (dBm)
1	2.00	CCK	01	2412 MHz	14.90	36
1	2.00	CCK	06	2437 MHz	14.88	36
1	2.00	CCK	11	2462 MHz	14.9	36
1	2.00	64QAM	01	2412 MHz	14.59	36
1	2.00	64QAM	06	2437 MHz	14.77	36
1	2.00	64QAM	11	2462 MHz	14.64	36

### 5.3 Test of Peak Power Spectral Density (WLAN)

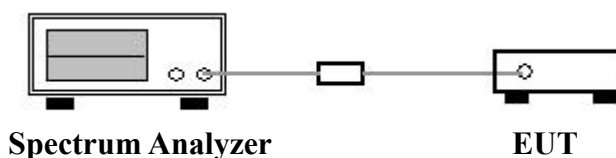
#### 5.3.1 Measuring Instruments

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

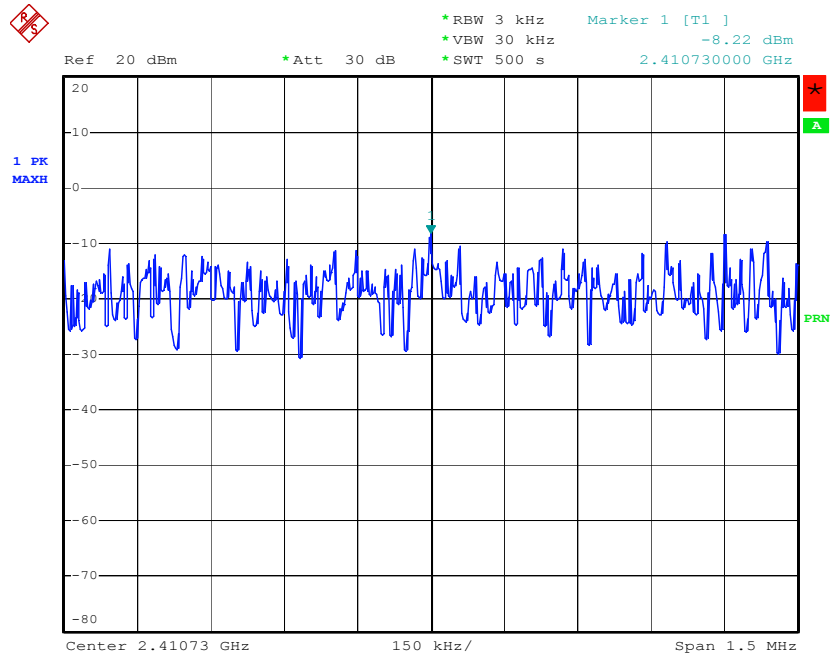


#### 5.3.4 Test Result: See spectrum analyzer plots below

- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100%
- Test Engineer: Sam Lee

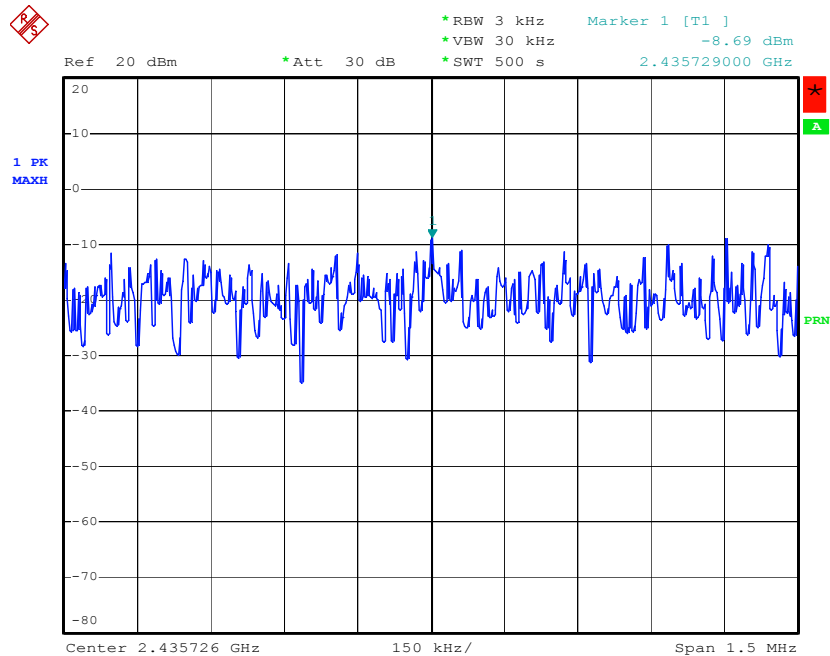
Modulation Type	Channel	Frequency (MHz)	Power Density (dBm)	Limits (dBm)
CCK	01	2412 MHz	-16.46	8
CCK	06	2437 MHz	-16.55	8
CCK	11	2462 MHz	-16.31	8
64QAM	01	2412 MHz	-21.10	8
64QAM	06	2437 MHz	-20.88	8
64QAM	11	2462 MHz	-21.97	8

Modulation Type: CCK (Channel 2412 MHz) :



Date: 2.OCT.2004 15:24:35

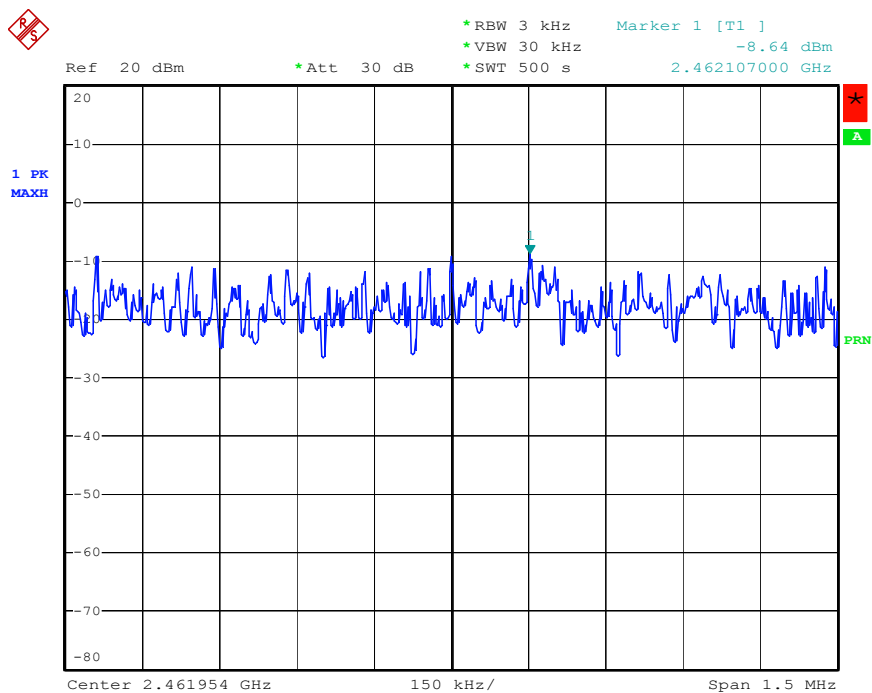
Modulation Type: CCK (Channel 2437 MHz) :



Date: 2.OCT.2004 15:25:52

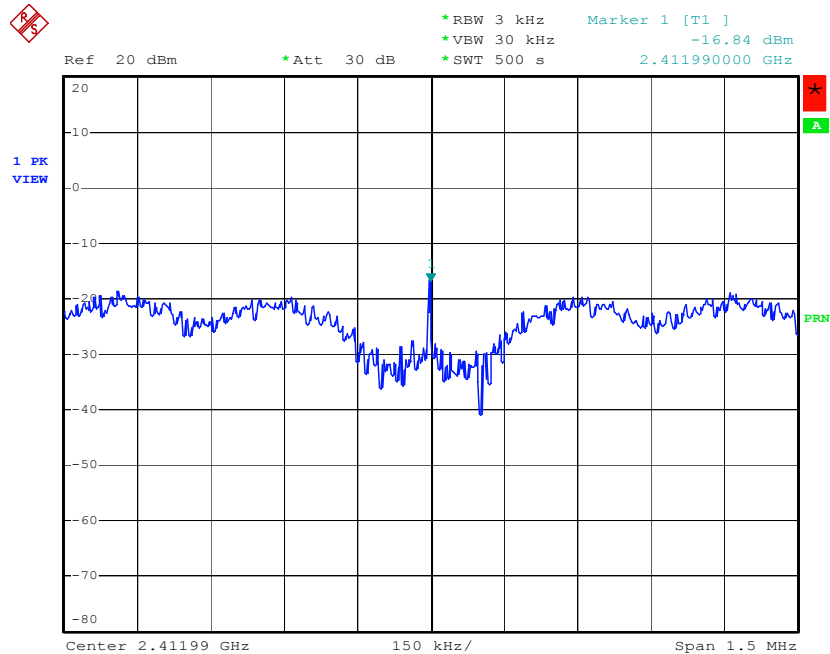


Modulation Type: CCK (Channel 2462 MHz) :



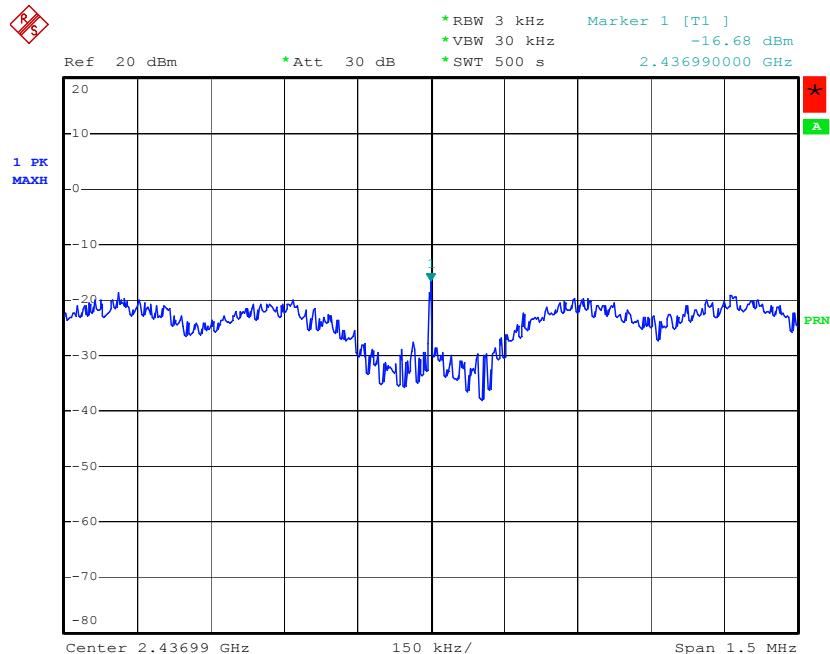
Date: 2.OCT.2004 15:31:25

Modulation Type: 64QAM (Channel 2412 MHz) :



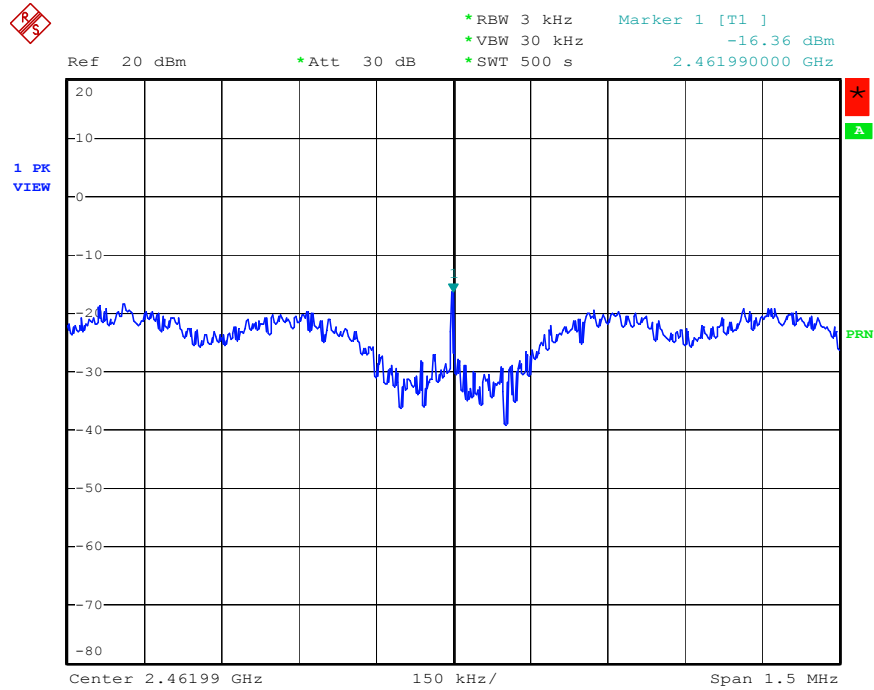
Date: 4.OCT.2004 22:00:37

Modulation Type: 64QAM (Channel 2437 MHz) :



Date: 4.OCT.2004 21:58:52

Modulation Type: 64QAM (Channel 2462 MHz) :



Date: 4.OCT.2004 22:01:48

## 5.4 Test of Band Edges Emission (WLAN)

### 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.

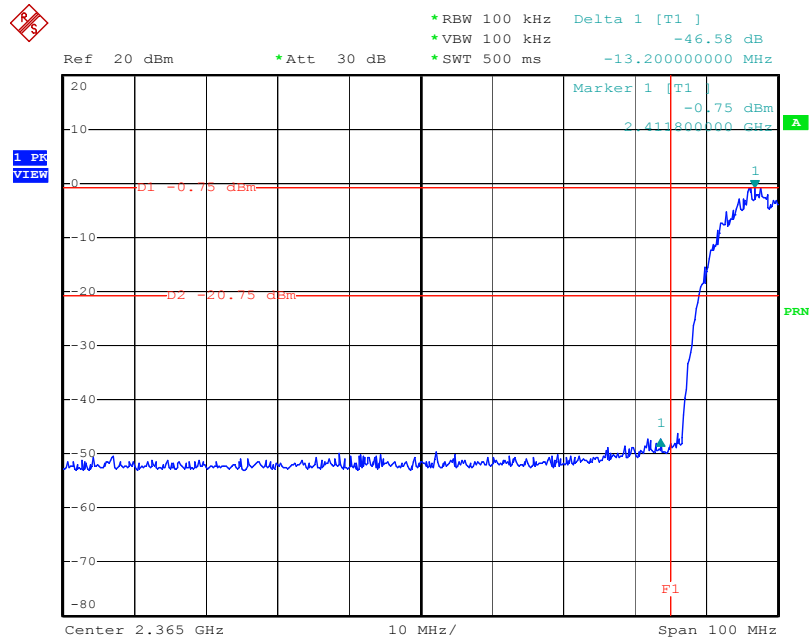
### 5.4.3 Test Result

- Temperature: 23°C
- Relative Humidity: 50%
- Duty Cycle of the Equipment During the Test: 100%
- Test Engineer: Sam Lee

Modulation	Test	Freq.	Level*	Margin	Limit	Trace
Type	Channel	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(PK/AV)
CCK	01	2371.370	58.53	-15.47	74	PK
CCK	01	2371.370	52.13	-1.87	54	AV
CCK	11	2488.220	57.82	-16.18	74	PK
CCK	11	2488.220	51.65	-2.35	54	AV
64QAM	01	2374.410	58.60	-15.40	74	PK
64QAM	01	2374.410	50.30	-3.70	54	AV
64QAM	11	2492.970	57.12	-16.88	74	PK
64QAM	11	2492.970	51.34	-2.66	54	AV

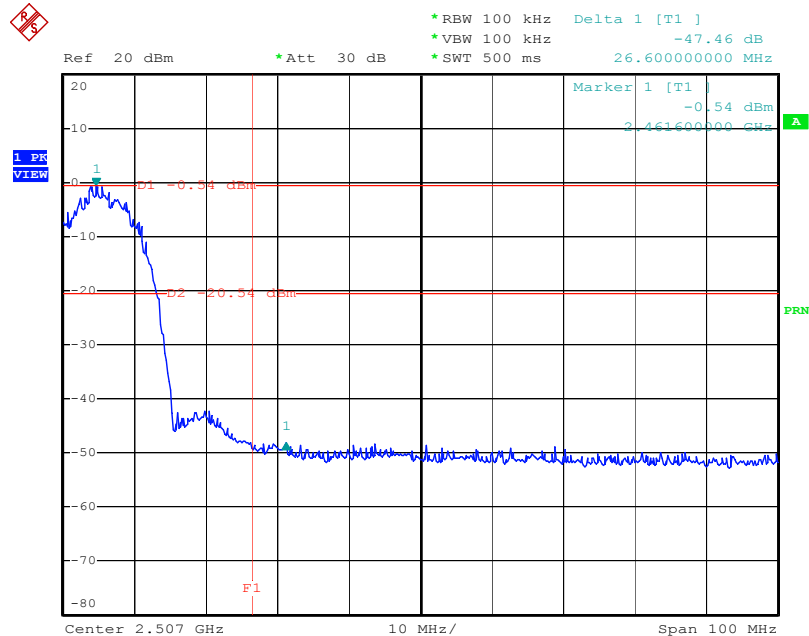
Level\* : The max field strength in the restricted bands.

Modulation Type: CCK (Channel 2412 MHz) :



Date: 7.DEC.2004 12:15:53

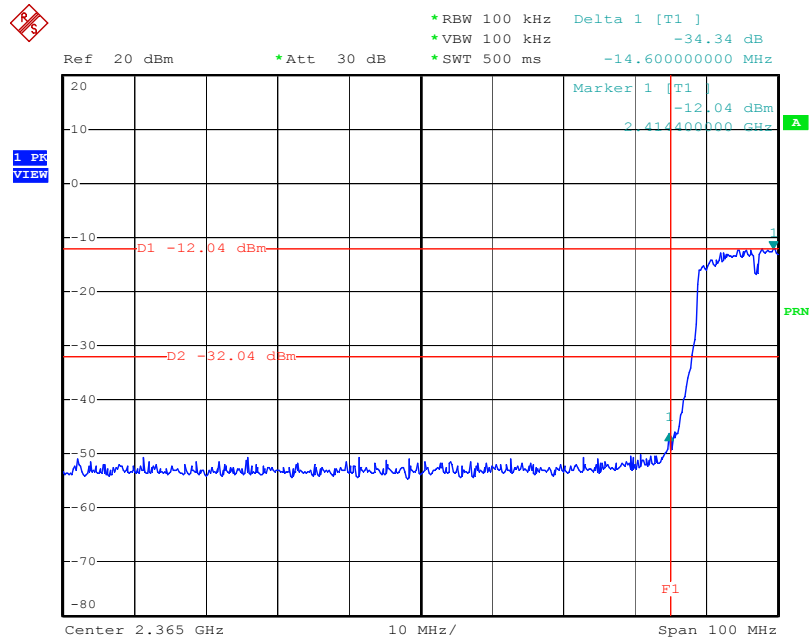
Modulation Type: CCK (Channel 2462 MHz) :



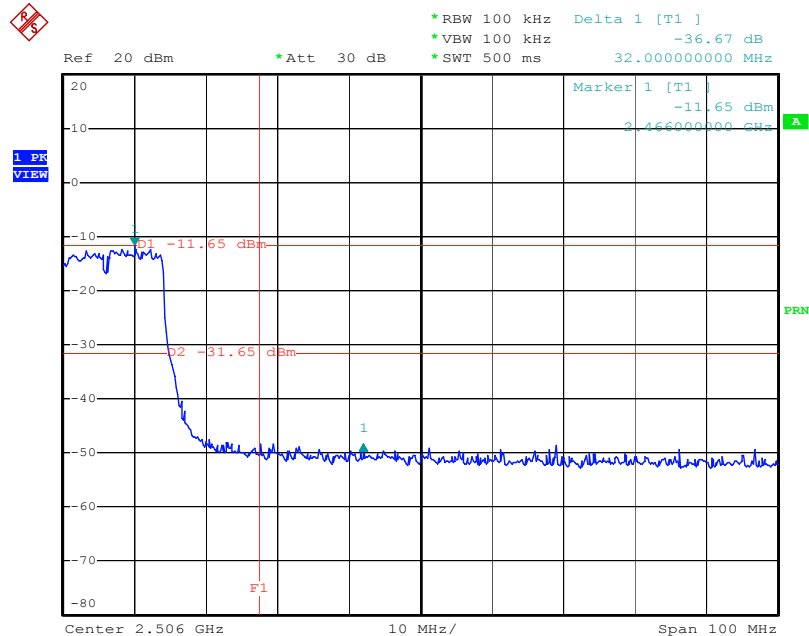
Date: 7.DEC.2004 12:14:11



Modulation Type: 64QAM (Channel 2412 MHz) :



Modulation Type: 64QAM (Channel 2412 MHz) :



## 5.5 Test of Hopping Channel Bandwidth (BLUETOOTH)

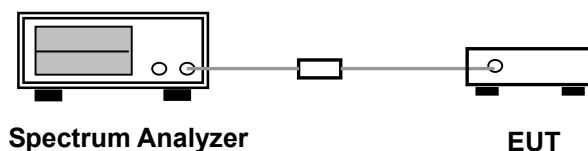
### 5.5.1 Measuring Instruments

Item 9 of the table on section 6.

### 5.5.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 30KHz and VBW to 100KHz.
3. The Hopping Channel bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

### 5.5.3 Test Setup Layout

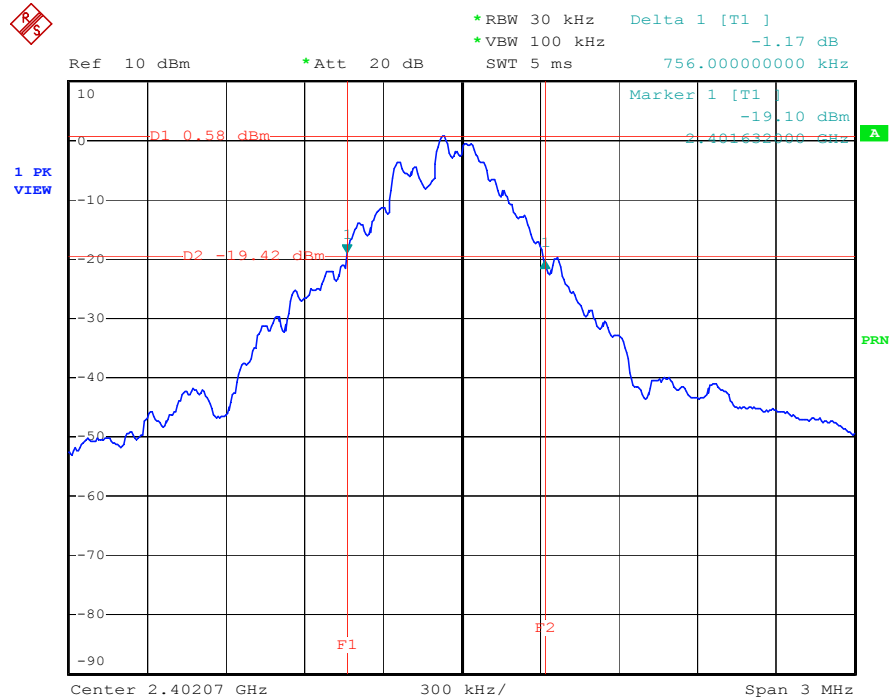


### 5.5.4 Test Result : See spectrum analyzer plots below

- Operating Mode: Continuously Transmitting
- Temperature: 26°C
- Relative Humidity: 57 %
- Duty Cycle of the Equipment During the Test: 100%
- Test Engineer: Sam Lee

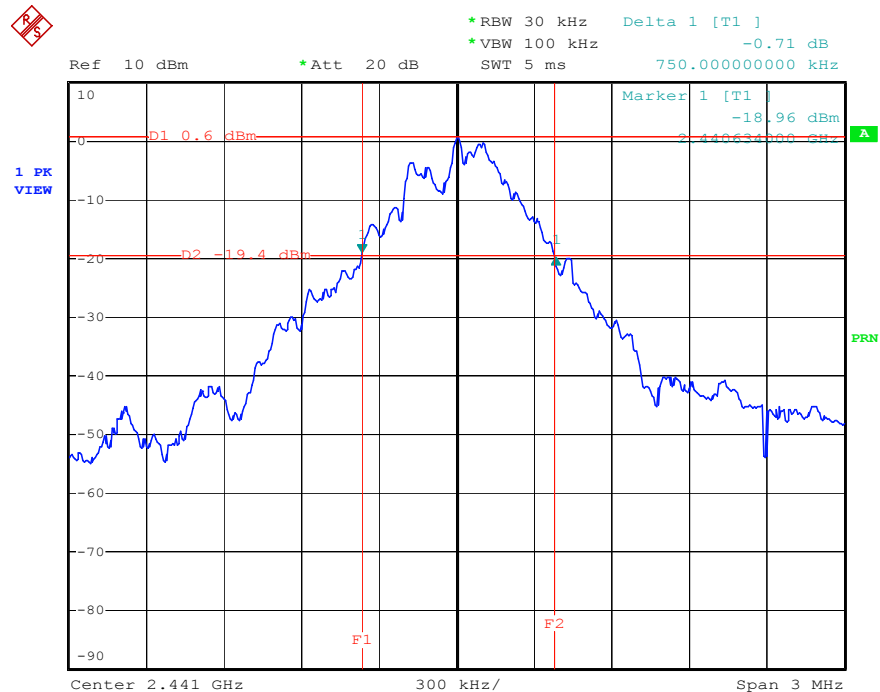
Channel	Frequency (MHz)	Hopping Channel Bandwidth (KHz)
00	2402	756.000
39	2441	750.000
78	2480	750.000

(Channel 00) :



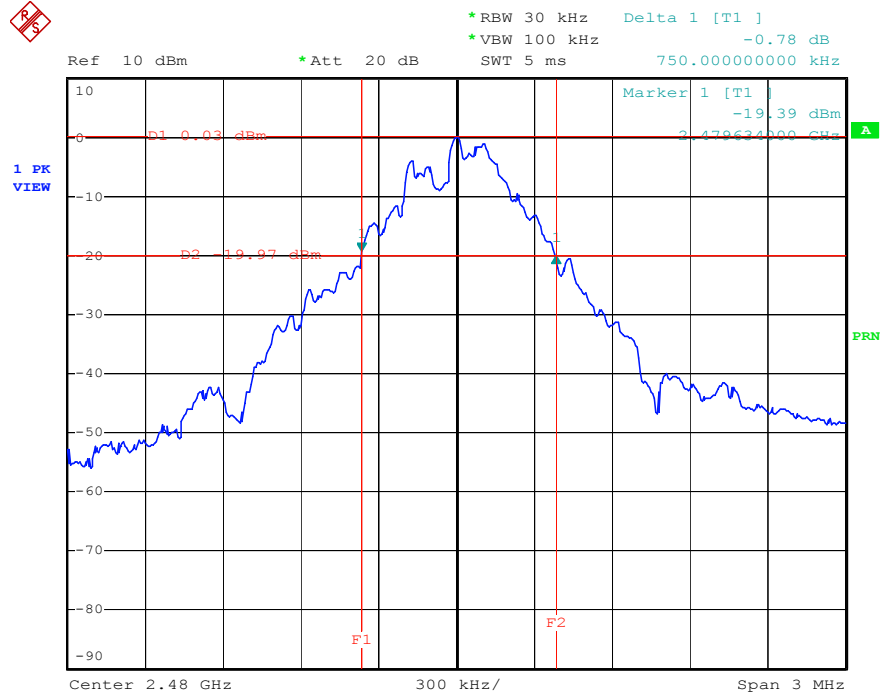
Date: 30.SEP.2004 23:44:16

(Channel 39) :



Date: 30.SEP.2004 23:45:53

(Channel 78) :



Date: 30.SEP.2004 23:47:31

## 5.6 Test of Number of Hopping Frequency (BLUETOOTH)

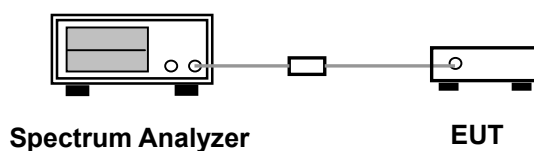
### 5.6.1 Measuring Instruments

Item 9 of the table on section 6.

### 5.6.2 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 number of hopping frequency used is defined total number of the channels available on the spectrum.

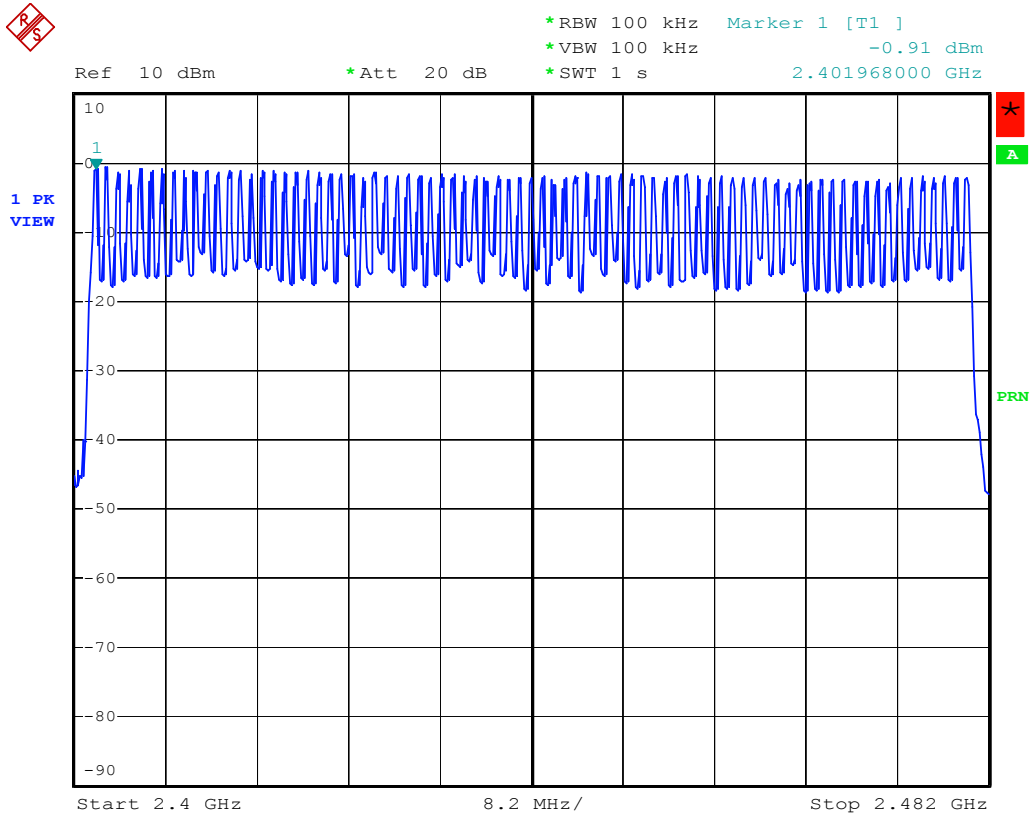
### 5.6.3 Test Setup Layout



### 5.6.4 Test Result : See spectrum analyzer plots below

- Operating Mode: Normal Hopping
- Temperature: 26°C
- Relative Humidity: 57 %
- Duty Cycle of the Equipment During the Test: 100%
- Test Engineer: Sam Lee

Number of Hopping Frequency	Limit
79	75



Date: 30.SEP.2004 20:24:13

## 5.7 Test of Hopping Channel Separation (BLUETOOTH)

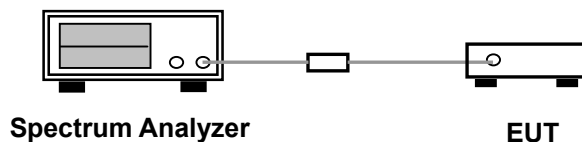
### 5.7.1 Measuring Instruments

Item 9 of the table on section 6.

### 5.7.2 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 300KHz.
3. The Hopping Channel Separation is defined as the separation between 2 neighboring hopping frequencies.

### 5.7.3 Test Setup Layout



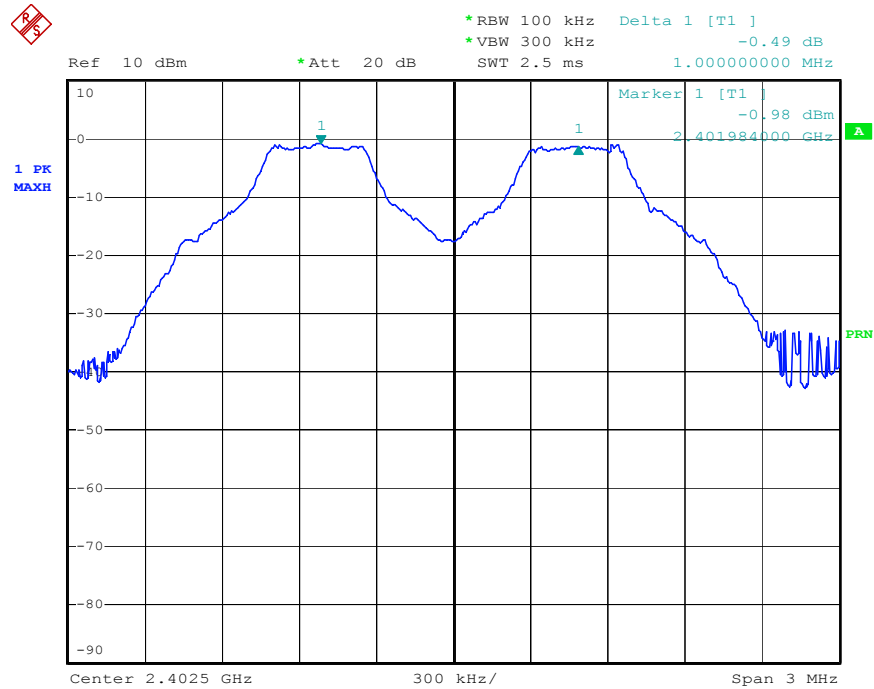
### 5.7.4 Test Result : The spectrum analyzer plots are attached as below

- Operating Mode: Normal Hopping
- Temperature: 26°C
- Relative Humidity: 57 %
- Duty Cycle of the Equipment During the Test: 100%
- Test Engineer: Sam Lee

Channel	Frequency ( MHz )	Hopping Channel Separation ( KHz )	Limits ( KHz )
00	2402	1000.0000	756.000
39	2441	1000.0000	750.000
78	2480	1000.0000	750.000

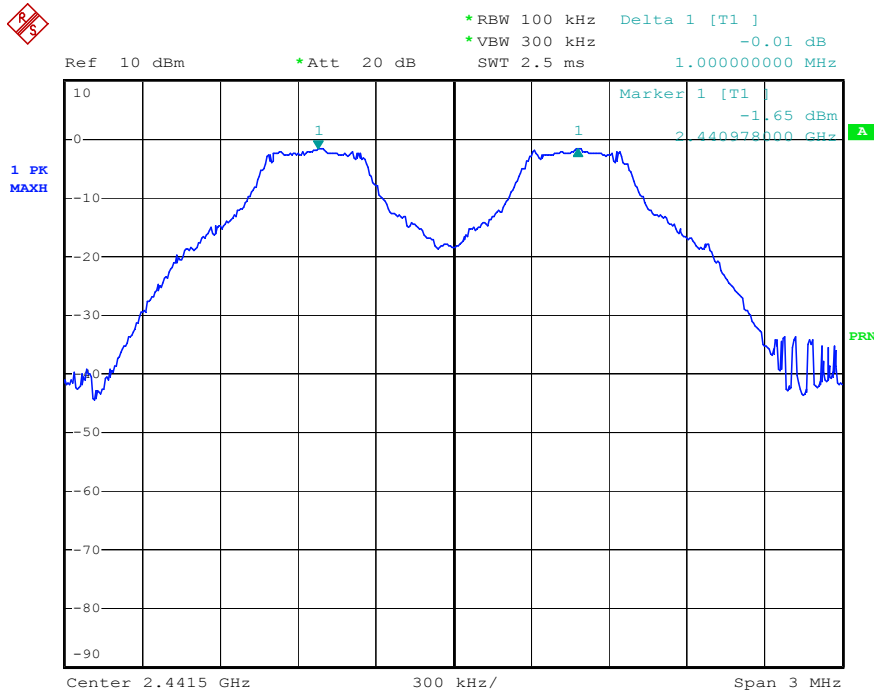
Note: The limit is 25KHz or 20dB bandwidth , which is greater.

(Channel 00) :



Date: 30.SEP.2004 20:52:42

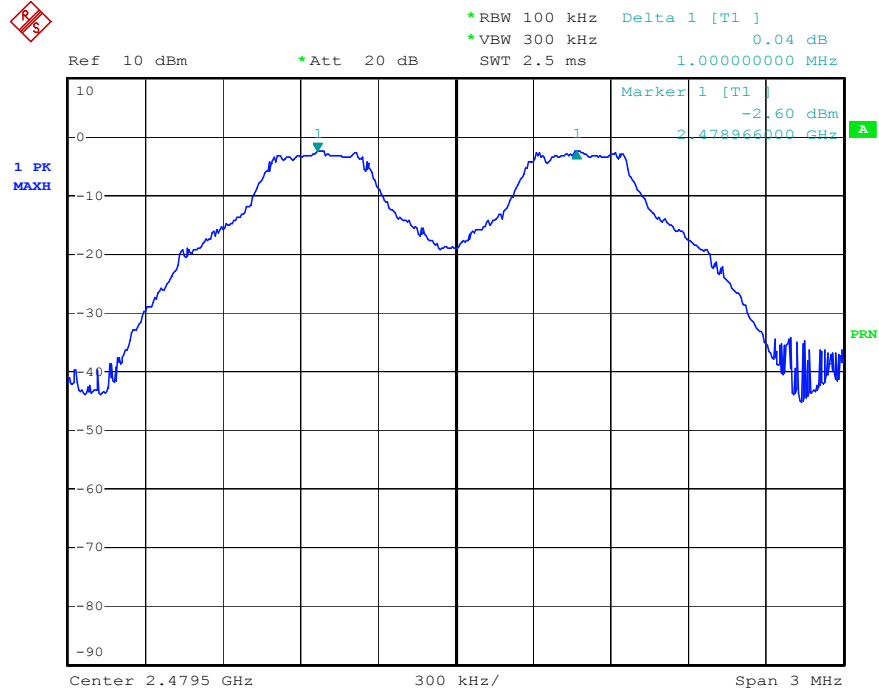
(Channel 39) :



Date: 30.SEP.2004 20:53:47



(Channel 78) :



Date: 30.SEP.2004 20:54:28

## 5.8 Test of Dwell Time of Each Frequency (BLUETOOTH)

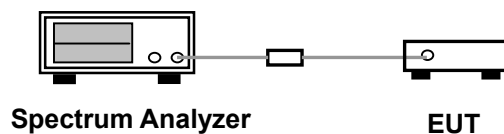
### 5.8.1 Measuring Instruments

Item 9 of the table on section 6.

### 5.8.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
3. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
4. Set the EUT for DH5 packet transmitting.
5. Measure the maximum time duration,  $t$ , of one single pulse.
6. DH5 Packet permit maximum 320 hops per second in 79 channels. So, the dwell time is the time duration of the pulse times 128 within 31.6 seconds.

### 5.8.3 Test Setup Layout

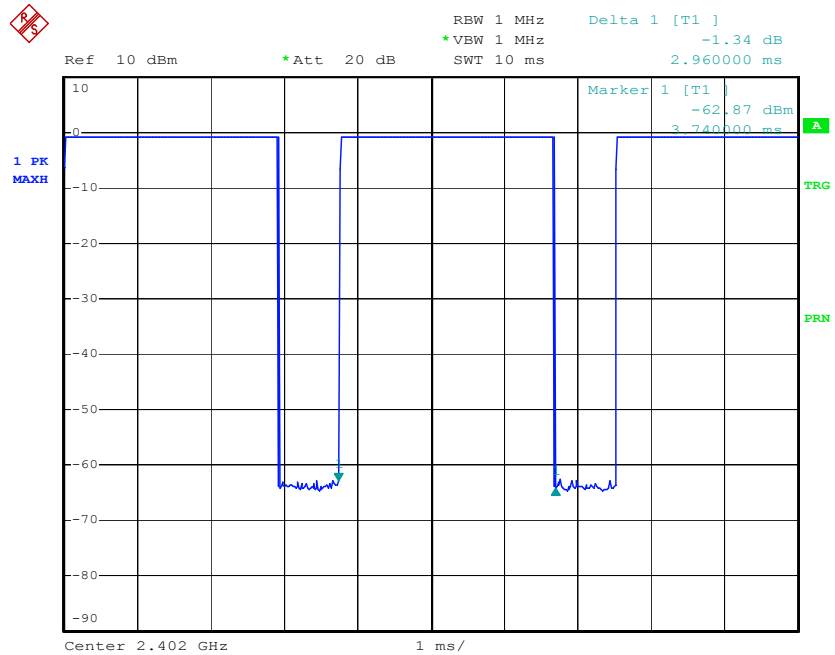


### 5.8.4 Test Result : See spectrum analyzer plots below

- Operating Mode: Normal Hopping
- Temperature: 26°C
- Relative Humidity: 57 %
- Duty Cycle of the Equipment During the Test : 100%
- Test Engineer: Sam Lee

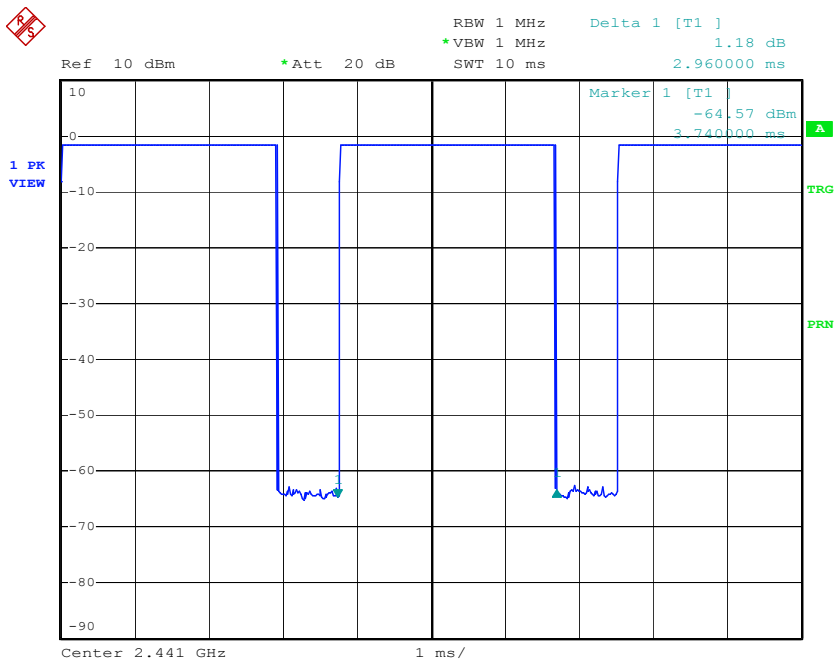
Channel	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
00	2402	2.96	0.37888	0.4
39	2441	2.96	0.37888	0.4
78	2480	2.96	0.37888	0.4

(Channel 00) :



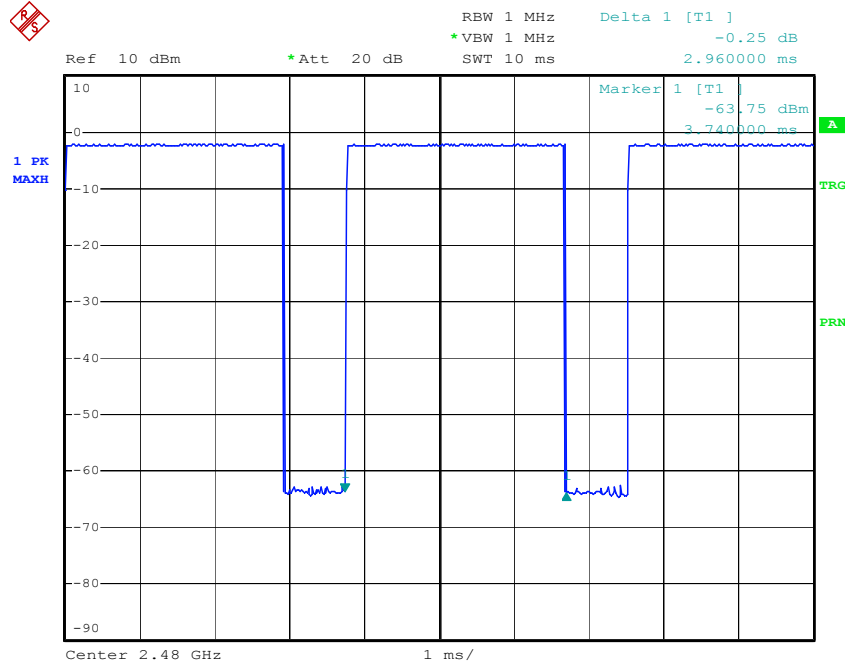
Date: 30.SEP.2004 20:50:00

(Channel 39) :



Date: 30.SEP.2004 20:47:30

(Channel 78) :



Date: 30.SEP.2004 20:49:00

## 5.9 Test of Maximum Peak Output Power (BLUETOOTH)

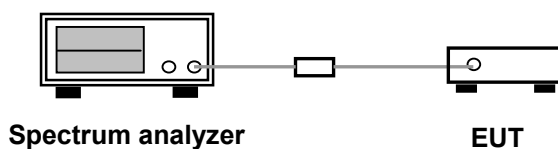
### 5.9.1 Measuring Instruments

Item 9 of the table on section 6.

### 5.9.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The center frequency of the spectrum analyzer was set to the fundamental frequency.
3. Adjust RBW to 1MHz and VBW to 3MHz.

### 5.9.3 Test Setup Layout



### 5.9.4 Test Result : See spectrum analyzer plots below

- Operating Mode: single channel continuous transmitting
- Temperature: 26°C
- Relative Humidity: 57 %
- Duty Cycle of the Equipment During the Test : 100%
- Test Engineer: Sam Lee

Channel	Frequency (MHz)	Measured Output Power (dBm)	Measured Output Power (mWatt)	Limit (Watt/dBm )
00	2402	3.55	2.264644308	1W/30 dBm
39	2441	3.15	2.065380156	1W/30 dBm
78	2480	2.41	1.741806873	1W/30 dBm

## 5.10 Test of Band Edges of the Operation Frequency (BLUETOOTH)

### 5.10.1 Measuring Instruments

Item 9 of the table on section 6.

### 5.10.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both of spectrum analyzer to 1MHz and VBW to 300Hz with convenient frequency span including 100 KHz bandwidth from band edge.
3. The band edges emission was measured and recorded.

### 5.10.3 Note on Band edge Emission

#### (A) Left Edge

The band edge emission plot shows 33.65dB delta between carrier maximum power and local maximum emission in the restricted band.

CH 00 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
77.48	33.65	42.39	54.00	-11.61

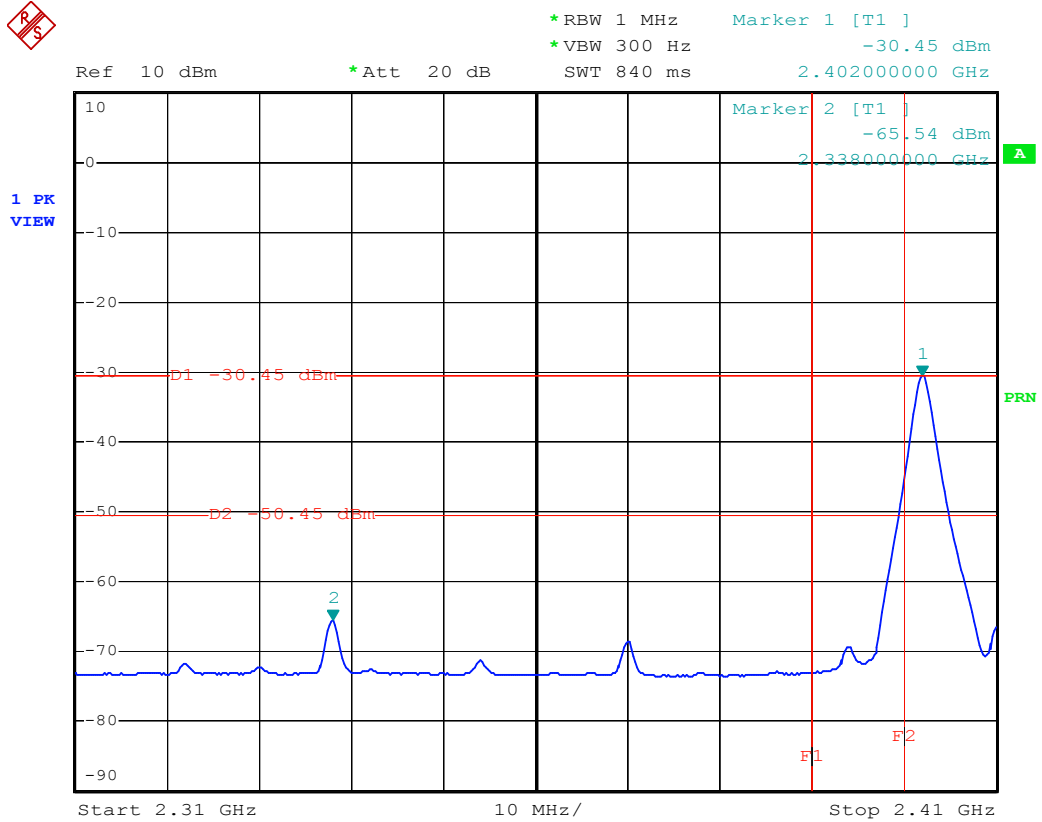
#### (B) Right Edge

The band edge emission plot shows 27.32dB delta between carrier maximum power and local maximum emission in the restricted band.

CH 78 Carrier power strength (dBuV/m)	Delta (dB)	The maximum field strength in restrict band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
75.97	27.32	51.32	54.00	-2.68

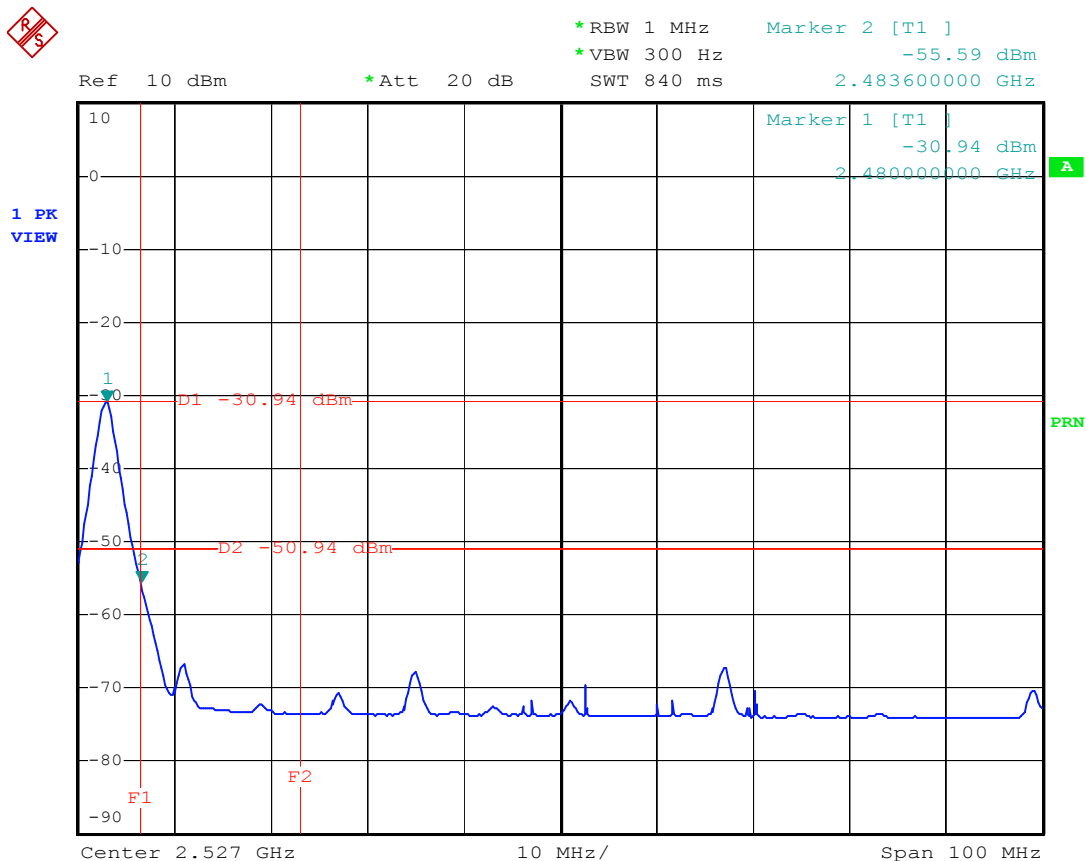
\* The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

(Channel 00) :



Date: 30.SEP.2004 23:10:55

(Channel 78) :



Date: 30.SEP.2004 23:12:43

Observation : All emissions in the 100kHz band edge are all lower than carrier by more than 20dB.



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## 5.11 Test of AC Power Line Conducted Emission

### 5.11.1 Measuring Instruments

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

### 5.11.2 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.

### 5.11.3 Test Result of Conducted Emission

- Test Mode: RF Link
- Frequency Range of Test: from 0.15 MHz to 30 MHz
- Temperature: 24°C
- Relative Humidity: 50%
- Test Engineer: Hikaru Chan
- All emissions not reported here are more than 10 dB below the prescribed limit.

#### **Line to Ground**

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Read Level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Remark
0.15	36.25	-29.45	65	35.85	0.1	0.3	QP
0.15	22.83	-32.87	55	22.43	0.1	0.3	Average
0.22	35.59	-26.98	62	35.45	0.1	0.04	QP
0.22	21.37	-31.20	52	21.23	0.1	0.04	Average
0.34	32.93	-26.25	59	32.73	0.1	0.10	QP
0.34	27.15	-22.03	49	26.95	0.1	0.10	Average
1.87	25.19	-30.81	56	25.03	0.1	0.06	QP
1.87	14.40	-31.6	46	14.24	0.1	0.06	Average
3.90	15.66	-30.34	46	15.36	0.2	0.10	Average
3.90	21.96	-34.04	56	21.66	0.2	0.10	QP
10.23	32.41	-27.59	60	31.81	0.2	0.40	QP
10.23	26.61	-23.39	50	26.01	0.2	0.40	Average

**Neutral to Ground**

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Read Level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Remark
0.151	44.85	-21.06	65	44.42	0.1	0.33	QP
0.15	24.88	-31.03	55	24.45	0.1	0.33	Average
0.22	40.76	-22.03	62	40.63	0.1	0.03	QP
0.22	25.53	-27.26	52	25.40	0.1	0.03	Average
0.34	33.48	-25.52	59	33.28	0.1	0.10	QP
0.34	19.24	-29.76	49	19.04	0.1	0.10	Average
1.82	28.02	-27.98	56	27.84	0.1	0.08	QP
1.82	18.19	-27.81	46	18.01	0.1	0.08	Average
4.38	15.6	-30.4	46	15.40	0.1	0.09	Average
4.38	23.96	-32.04	56	23.76	0.1	0.09	QP
10.34	28.01	-21.99	50	27.39	0.2	0.42	Average
10.34	33.68	-26.32	60	33.06	0.2	0.42	QP

#### 5.11.4 Photographs of Conducted Emission Test Configuration

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

FRONT VIEW



REAR VIEW



## 5.12 Test of Spurious Radiated Emission

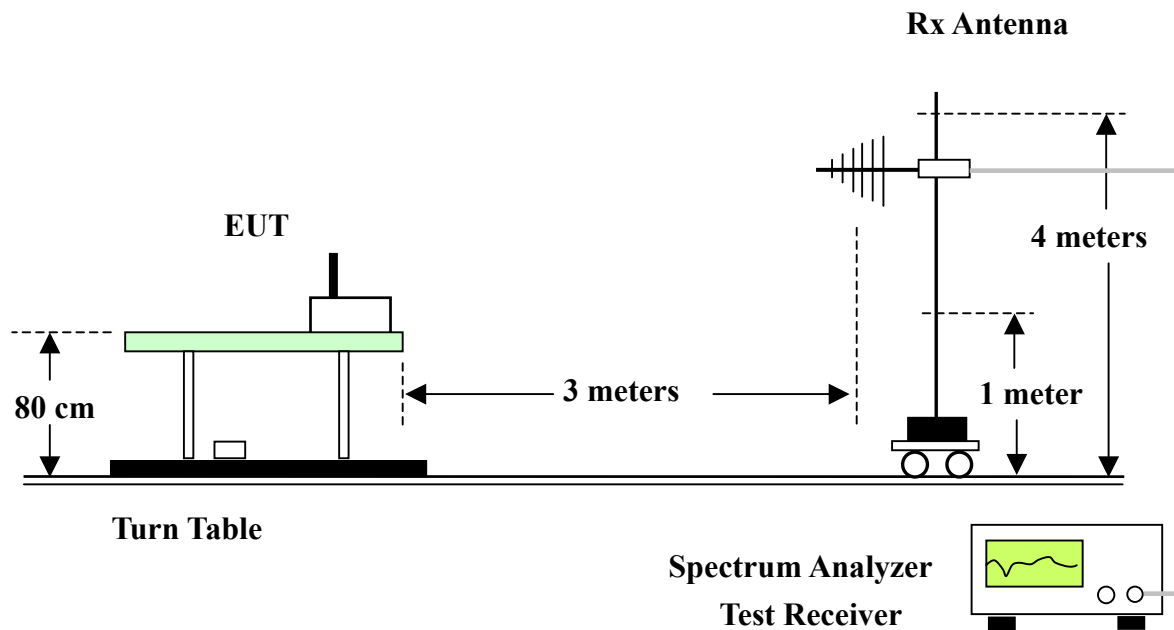
### 5.12.1 Measuring Instruments

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

### 5.12.2 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 & RBW for peak reading and 1MHz RBW & 300Hz VBW for average reading in spectrum analyzer.
10. 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.
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. ( For peak measurement, RB=VB=1MHz, for average measurement, RB=1MHz, VB=10Hz)

### 5.12.3 Test Setup Layout



5.12.4 Test Results for CH11 /2462 MHz ( for emission below 1GHz) (WLAN)

- 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



5.12.5 Test Results for CH 01 / 2412MHz ( for emission above 1GHz) (WLAN)

- 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	2372.000	53.99	-20.01	74.00	63.65	28.24	1.70	39.60	Peak	---	---
2	7236.000	56.77	-17.23	74.00	57.48	35.84	2.92	39.47	Peak	---	---
3	7236.000	45.37	-8.63	54.00	46.08	35.84	2.92	39.47	Average	---	---
4	9646.000	49.48	-4.52	54.00	46.24	38.28	3.70	38.74	Average	---	---
5	9646.000	55.19	-18.81	74.00	51.95	38.28	3.70	38.74	Peak	---	---

**(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	---	---
3	4822.000	53.32	-20.68	74.00	57.99	33.00	2.47	40.14	Peak	---	---
4	4822.000	42.04	-11.96	54.00	46.71	33.00	2.47	40.14	Average	---	---
5	7236.000	59.78	-14.22	74.00	60.49	35.84	2.92	39.47	Peak	---	---
6	7236.000	47.86	-6.14	54.00	48.57	35.84	2.92	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



5.12.6 Test Results for CH 06 / 2437 MHz ( for emission above 1GHz) (WLAN)

- 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	4880.000	49.13	-24.87	74.00	53.65	33.10	2.52	40.14	Peak	---	---
2	7310.000	44.51	-9.49	54.00	44.77	36.06	3.13	39.45	Average	---	---
3	7310.000	56.38	-17.62	74.00	56.64	36.06	3.13	39.45	Peak	---	---
4	9748.000	50.74	-3.26	54.00	47.27	38.47	3.71	38.71	Average	---	---
5	9748.000	56.75	-17.25	74.00	53.28	38.47	3.71	38.71	Peak	---	---

**(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	---	---
3	7310.000	46.49	-7.51	54.00	46.75	36.06	3.13	39.45	Average	---	---
4	7310.000	57.99	-16.01	74.00	58.25	36.06	3.13	39.45	Peak	---	---
5	9748.000	55.81	-18.19	74.00	52.34	38.47	3.71	38.71	Peak	---	---
6	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

5.12.7 Test Results for CH 11 / 2462MHz ( for emission above 1GHz) (WLAN)

- 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	4930.000	51.33	-22.67	74.00	55.83	33.19	2.46	40.15	Peak	---	---
2	7382.000	52.80	-1.20	54.00	53.16	36.28	2.79	39.43	Average	---	---
3	7382.000	62.68	-11.32	74.00	63.04	36.28	2.79	39.43	Peak	---	---
4	9846.000	50.48	-3.52	54.00	46.57	38.64	3.95	38.68	Average	---	---
5	9846.000	55.80	-18.20	74.00	51.89	38.64	3.95	38.68	Peak	---	---

**(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	---	---
3	7388.000	54.80	-19.20	74.00	55.12	36.30	2.81	39.43	Peak	---	---
4	7388.000	43.80	-10.20	54.00	44.12	36.30	2.81	39.43	Average	---	---
5	9846.000	55.24	-18.76	74.00	51.33	38.64	3.95	38.68	Peak	---	---
6	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

5.12.8 Test Results for CH 01 / 2412 MHz ( for emission above 1GHz) (WLAN)

- 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	2580.000	48.92	-25.08	74.00	57.80	28.77	1.90	39.55	Peak	---	---
2	4840.000	46.26	-27.74	74.00	50.87	33.02	2.51	40.14	Peak	---	---
3	7244.000	54.29	-19.71	74.00	54.93	35.86	2.97	39.47	Peak	---	---
4	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	2510.000	49.59	-24.41	74.00	58.77	28.55	1.85	39.58	Peak	---	---
2	4830.000	50.74	-23.26	74.00	55.40	33.01	2.47	40.14	Peak	---	---
3	7230.000	56.91	-17.09	74.00	57.67	35.82	2.89	39.47	Peak	---	---
4	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

5.12.9 Test Results for CH 06 / 2437 MHz ( for emission above 1GHz) (WLAN)

- 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	2360.000	49.35	-24.65	74.00	59.07	28.20	1.69	39.61	Peak	---	---
2	2550.000	47.87	-26.13	74.00	56.86	28.69	1.88	39.56	Peak	---	---
3	7308.000	54.52	-19.48	74.00	54.75	36.06	3.16	39.45	Peak	---	---
4	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	2370.000	51.89	-22.11	74.00	61.56	28.23	1.70	39.60	Peak	---	---
2	4880.000	50.56	-23.44	74.00	55.08	33.10	2.52	40.14	Peak	---	---
3	7318.000	58.24	-15.76	74.00	58.61	36.09	2.99	39.45	Peak	---	---
4	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



5.12.10 Test Results for CH 11 / 2462 MHz ( for emission above 1GHz) (WLAN)

- 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	2360.000	50.56	-23.44	74.00	60.28	28.20	1.69	39.61	Peak	---	---
2	4930.000	47.70	-26.30	74.00	52.20	33.19	2.46	40.15	Peak	---	---
3	7396.000	54.33	-19.67	74.00	54.60	36.32	2.83	39.42	Peak	---	---
4	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	2370.000	52.93	-21.07	74.00	62.60	28.23	1.70	39.60	Peak	---	---
2	4930.000	51.96	-22.04	74.00	56.46	33.19	2.46	40.15	Peak	---	---
3	7396.000	56.49	-17.51	74.00	56.76	36.32	2.83	39.42	Peak	---	---
4	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



# 5.12.11 Test Results and Limit (BLUETOOTH)

## 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 78 ( 2480MHz )	Temperature	24 deg. C	Tested By	Steve Chen
Freq. Range	30MHz~1GHz	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	37.310	29.16	-10.84	40.00	43.94	12.21	1.04	28.03	Peak	---	---
2	133.020	31.69	-11.81	43.50	45.08	12.41	2.03	27.83	Peak	---	---
3 !	195.580	39.58	-3.92	43.50	49.32	15.45	2.52	27.71	Peak	---	---
1 !	343.200	42.24	-3.76	46.00	51.44	15.10	3.21	27.51	QP	---	---
2	797.600	38.30	-7.70	46.00	40.11	21.87	5.12	28.80	Peak	---	---
3 !	826.400	42.25	-3.75	46.00	43.89	21.85	5.17	28.66	Peak	149	172

## (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	99.700	28.55	-14.95	43.50	45.69	8.98	1.78	27.90	Peak	---	---
2 !	132.510	37.63	-5.87	43.50	51.01	12.40	2.05	27.83	Peak	---	---
3	195.580	32.30	-11.20	43.50	42.04	15.45	2.52	27.71	Peak	---	---
1 !	343.200	42.03	-3.97	46.00	51.23	15.10	3.21	27.51	QP	---	---
2 !	797.600	41.37	-4.63	46.00	43.18	21.87	5.12	28.80	Peak	---	---
3 !	826.400	40.77	-5.23	46.00	42.41	21.85	5.17	28.66	Peak	---	---





Test Mode	CH 00 ( 2402MHz )	Temperature	24 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	66%		

### 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	1438.000	46.41	-7.59	54.00	62.52	25.01	1.46	42.58	Peak	---	---
2	1596.000	35.38	-18.62	54.00	50.89	25.60	1.51	42.62	Peak	---	---
3	1918.000	37.34	-16.66	54.00	51.42	27.05	1.56	42.69	Peak	---	---

### 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	1438.000	50.92	-3.08	54.00	67.03	25.01	1.46	42.58	Peak	105	216
2	1588.000	39.58	-14.42	54.00	55.14	25.56	1.50	42.62	Peak	---	---
3	2340.000	41.44	-12.56	54.00	54.21	28.17	1.69	42.63	Peak	---	---
1	4004.000	42.94	-11.06	54.00	52.23	32.50	2.01	43.80	Peak	---	---



Test Mode	CH 39 ( 2441MHz )	Temperature	24 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	1438.000	45.40	-8.60	54.00	61.51	25.01	1.46	42.58	Peak	---	---
2	1590.000	35.62	-18.38	54.00	51.17	25.57	1.50	42.62	Peak	---	---
3	1918.000	36.88	-17.12	54.00	50.96	27.05	1.56	42.69	Peak	---	---

**(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	1326.000	37.44	-16.56	54.00	53.81	24.81	1.35	42.53	Peak	---	---
2	1438.000	50.39	-3.61	54.00	66.50	25.01	1.46	42.58	Peak	104	185
3	1588.000	39.30	-14.70	54.00	54.86	25.56	1.50	42.62	Peak	---	---
1	3174.000	39.42	-14.58	54.00	49.77	30.49	2.18	43.02	Peak	---	---





Test Mode	CH 78 ( 2480MHz )	Temperature	24 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	66%		

### 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	1196.000	35.91	-18.09	54.00	52.60	24.57	1.22	42.48	Peak	---	---
2	1324.000	36.92	-17.08	54.00	53.28	24.81	1.36	42.53	Peak	---	---
3	1438.000	46.44	-7.56	54.00	62.55	25.01	1.46	42.58	Peak	---	---

### Vertical

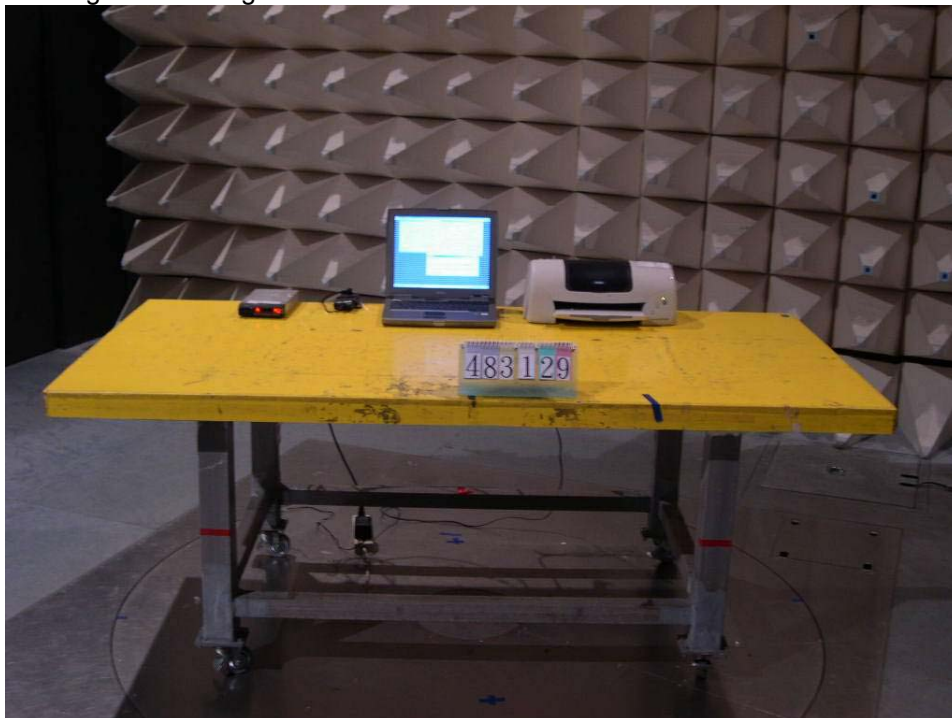
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	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	1324.000	37.96	-16.04	54.00	54.32	24.81	1.36	42.53	Peak	---	---
2	1438.000	50.90	-3.10	54.00	67.01	25.01	1.46	42.58	Peak	102	220
3	1588.000	39.59	-14.41	54.00	55.15	25.56	1.50	42.62	Peak	---	---
1	3174.000	40.30	-13.70	54.00	50.65	30.49	2.18	43.02	Peak	---	---
2	4132.000	41.49	-12.51	54.00	50.41	32.47	2.49	43.88	Peak	---	---

**Remark:** Spurious on higher frequency band, the emission emitted by the EUT is too low to be measured.

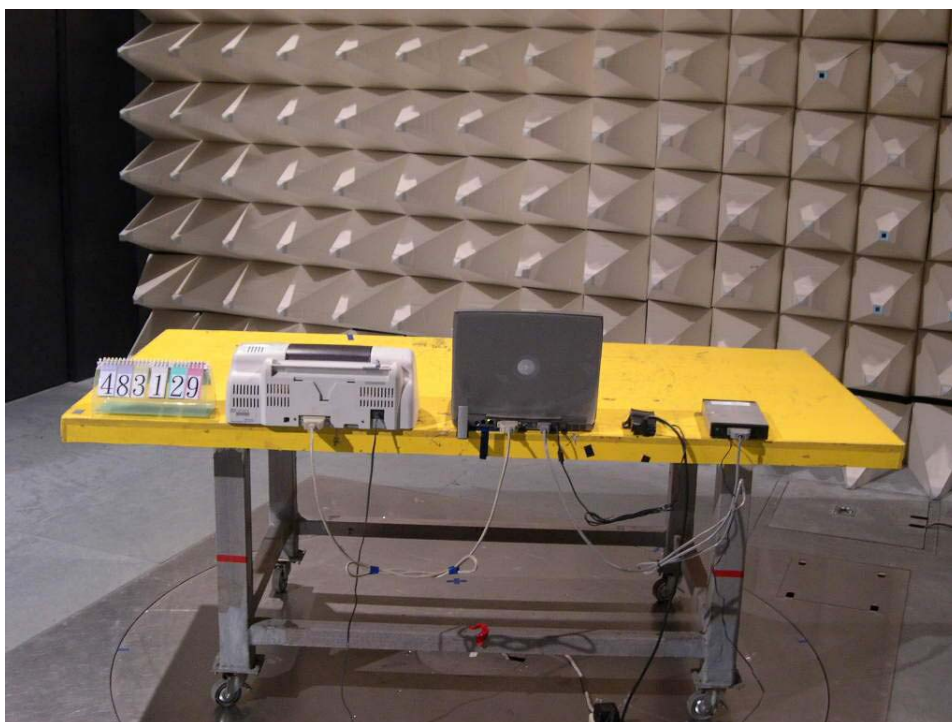
#### 5.13.5 Photographs of Radiated Emission Test Configuration

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

FRONT VIEW



REAR VIEW





## **5.14 Antenna Requirements**

### **5.14.1 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.

### **5.14.2 Antenna Connector Used in this Product**

The maximum Gain antenna used in this product is printed and ceramic antenna which is directly soldered on the PCB without antenna connector.

## 6. List of Measuring Equipments Used

	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	UTFLEX	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. 22, 2004	Radiation (03CH03-HY)
8	Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 04, 2004	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~26.5G Hz	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	15GHz~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.

	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
19	Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Sep. 02, 2004	Conducted (TH01-HY)
20	Power meter	R&S	NRVS	100967	DC~40GHz	Mar. 02, 2004	Conducted (TH01-HY)
21	Power sensor	R&S	NRV-Z51	100666	DC~40GHz	Mar 18, 2004	Conducted (TH01-HY)
22	Power Sensor	R&S	NRV-Z32	836953/060	30MHz-6GHz	Mar. 11, 2004	Conducted (TH01-HY)
23	AC power source	G.W.	GPC-6030D	C671845	DC 1V~60V	Nov. 05, 2004	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)

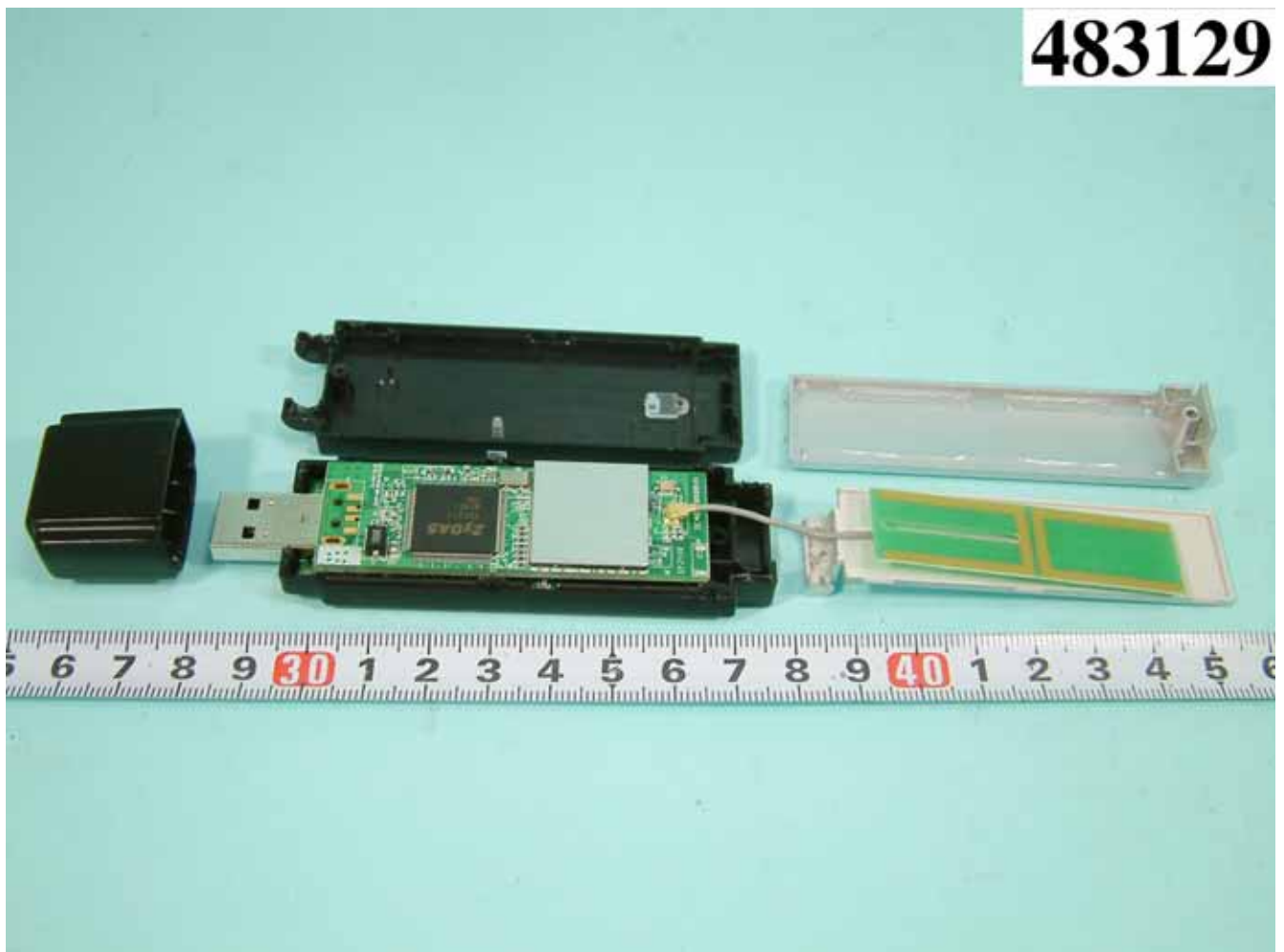
※ Calibration Interval of instruments listed above is one year.

## APPENDIX A. Photographs of EUT

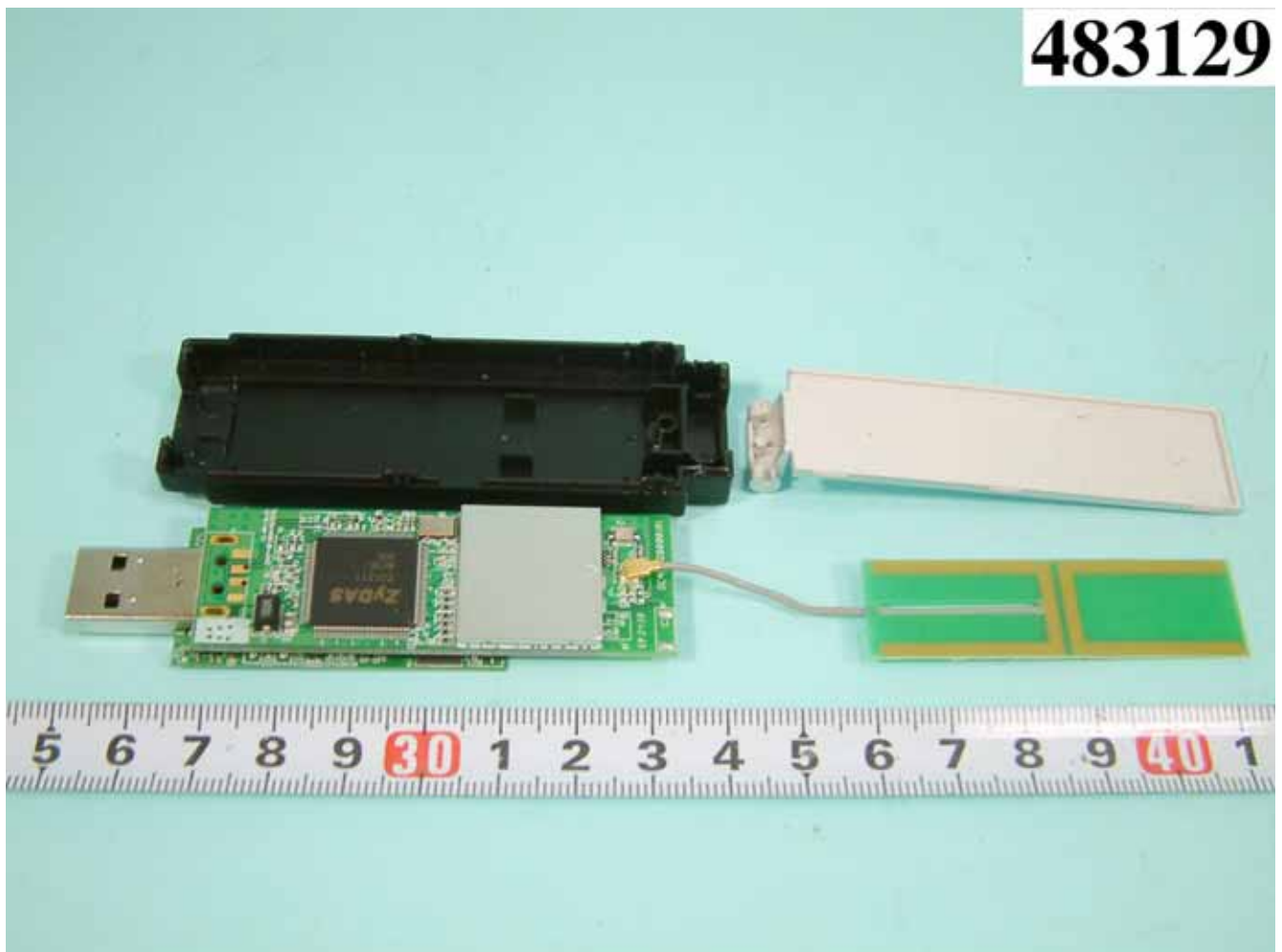


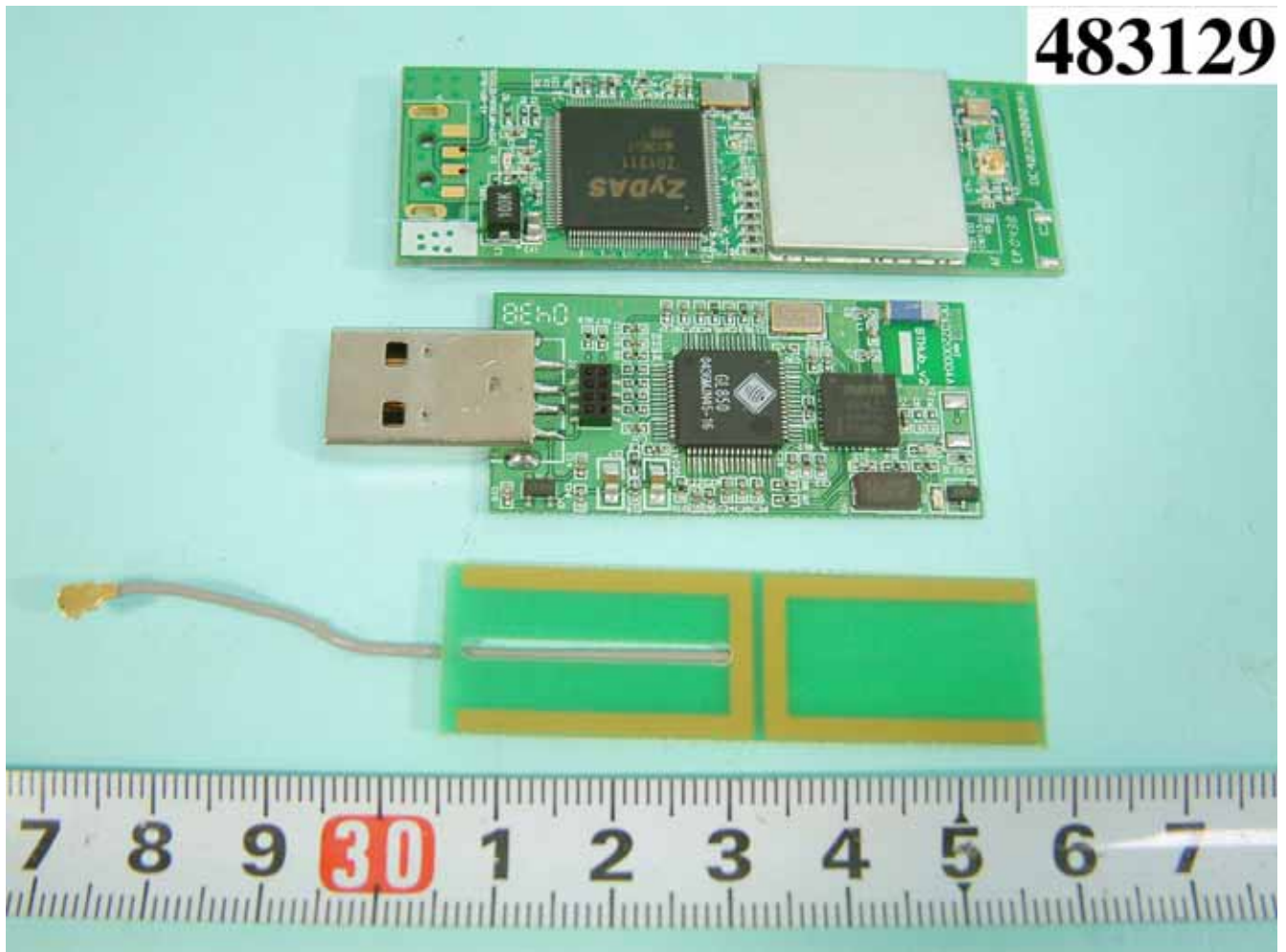


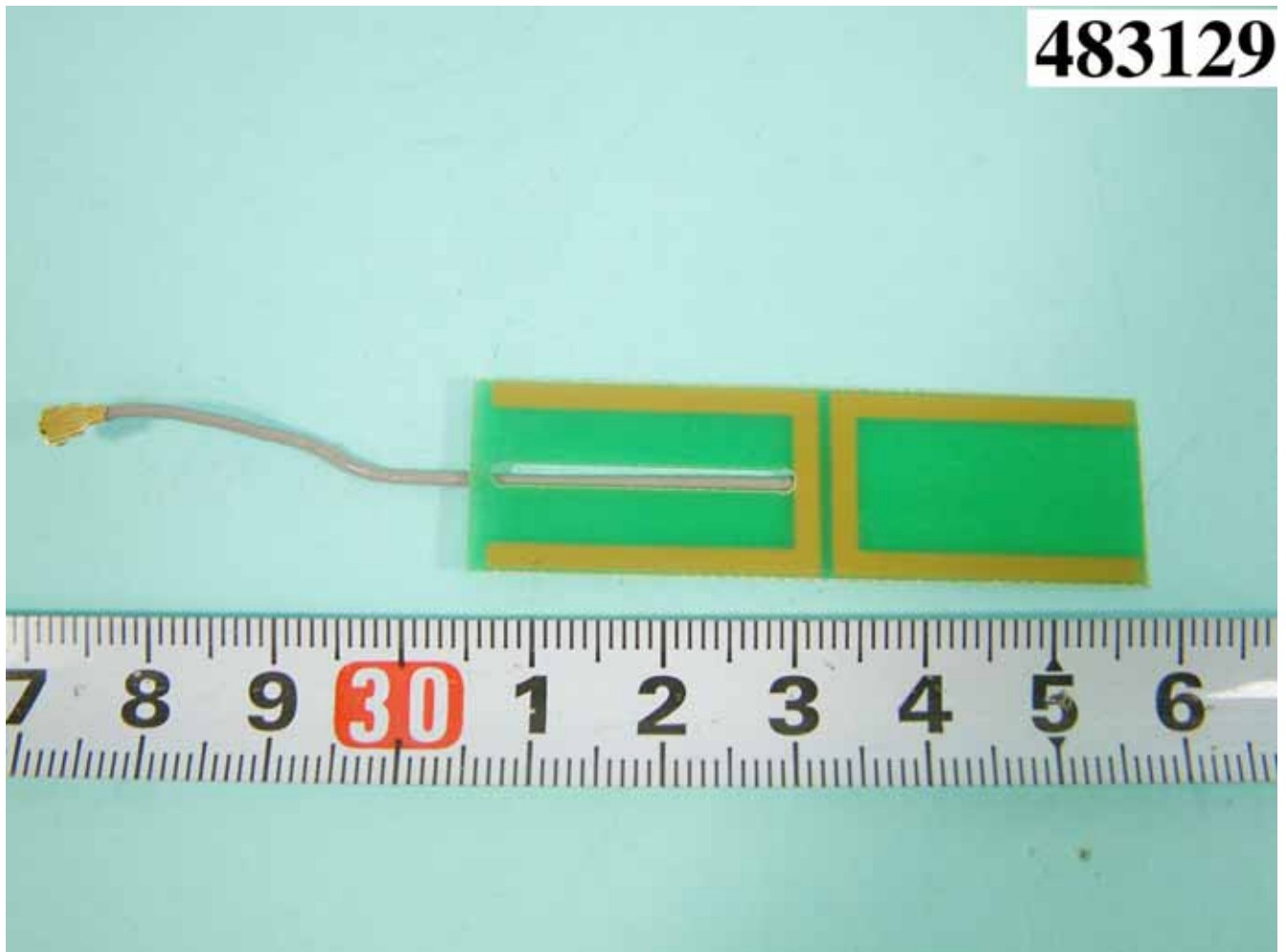


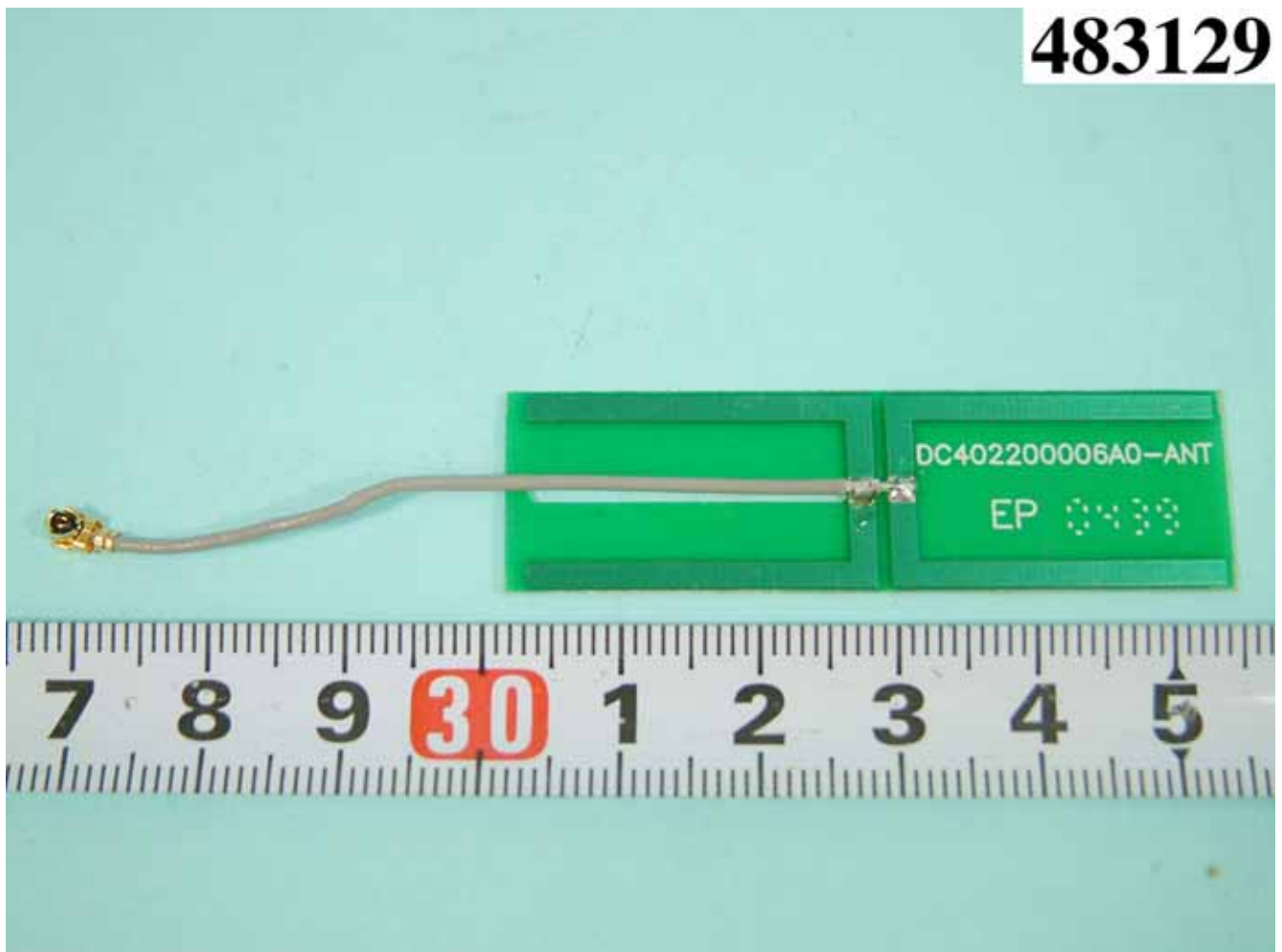




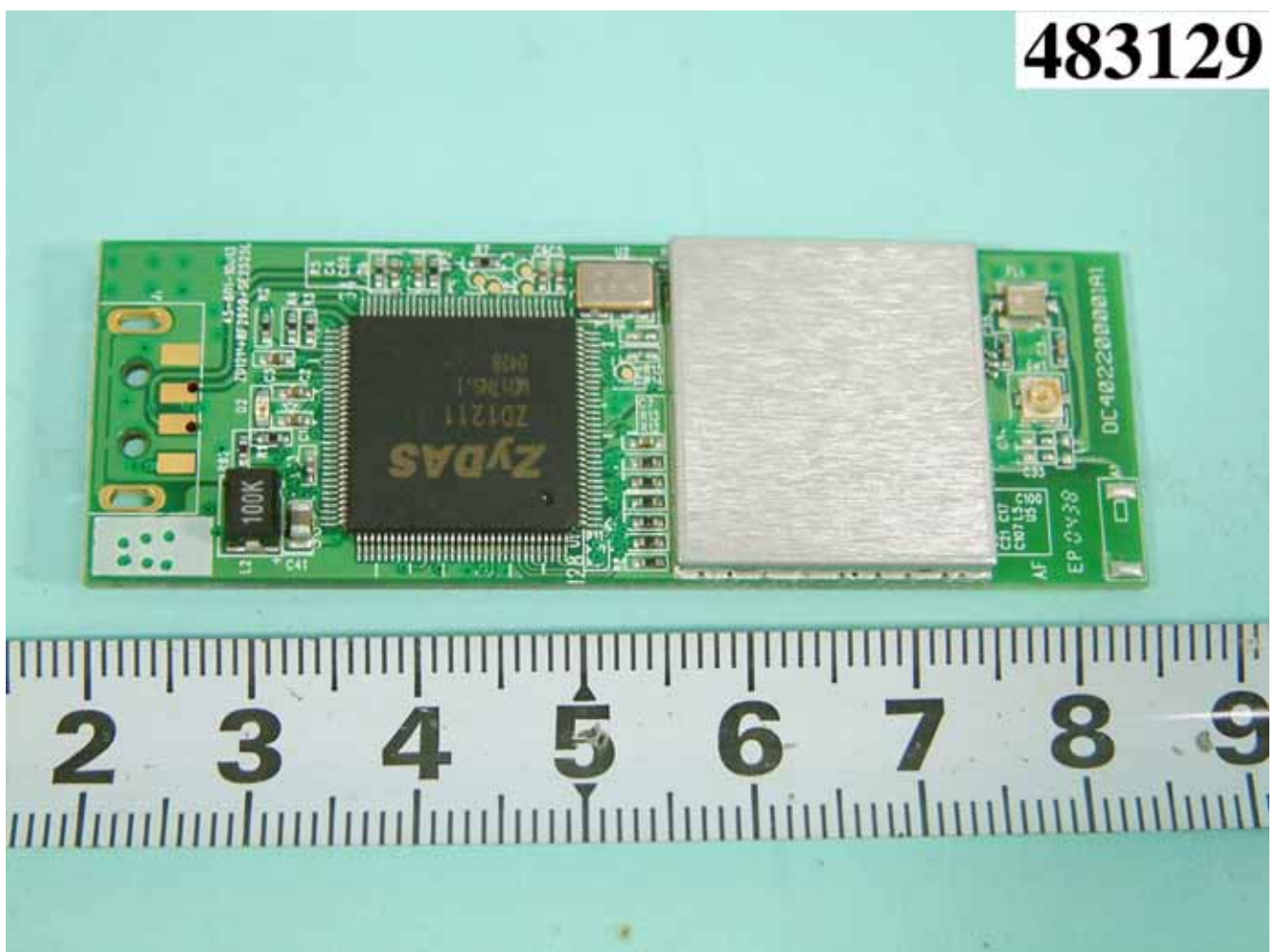






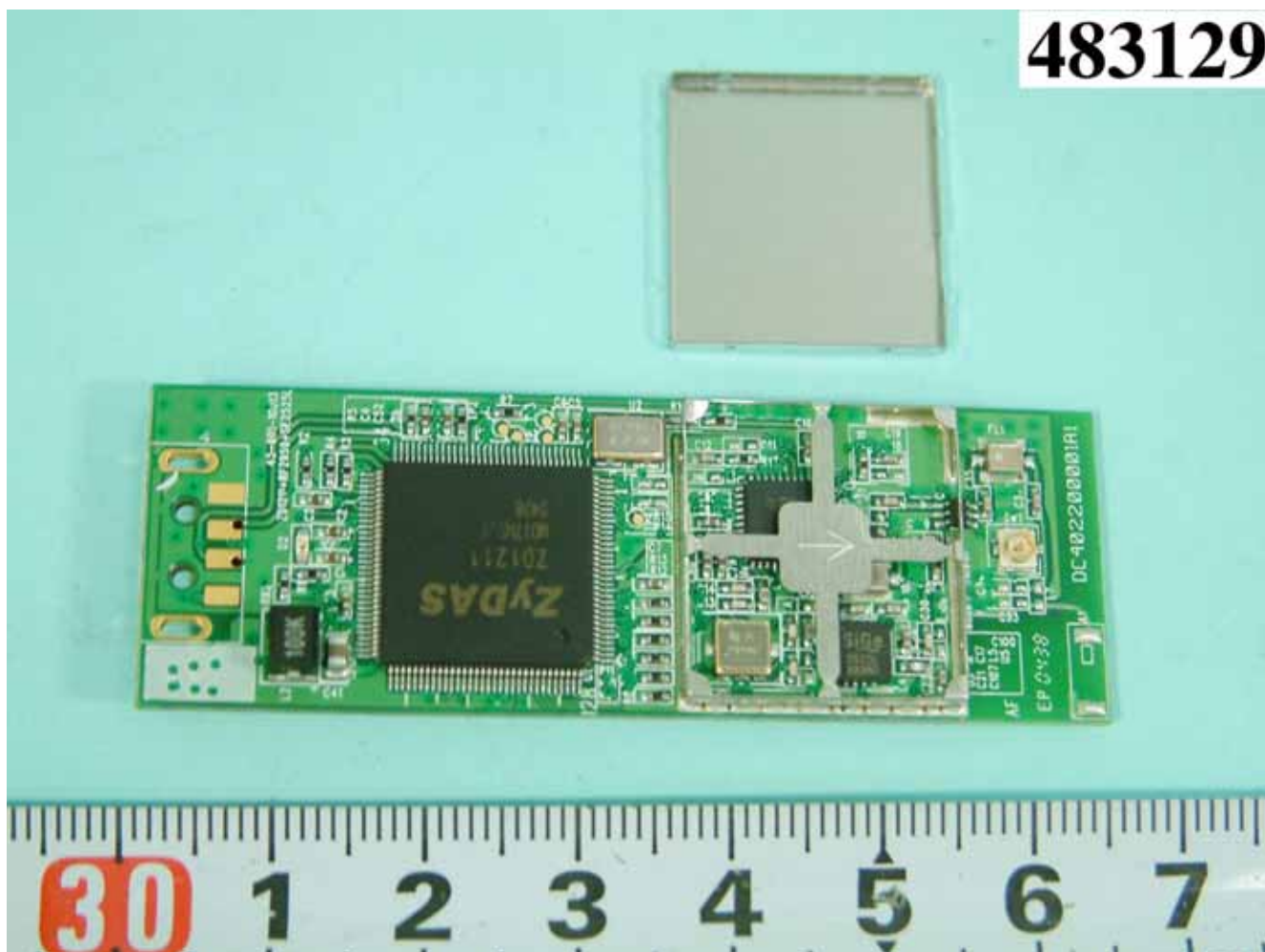


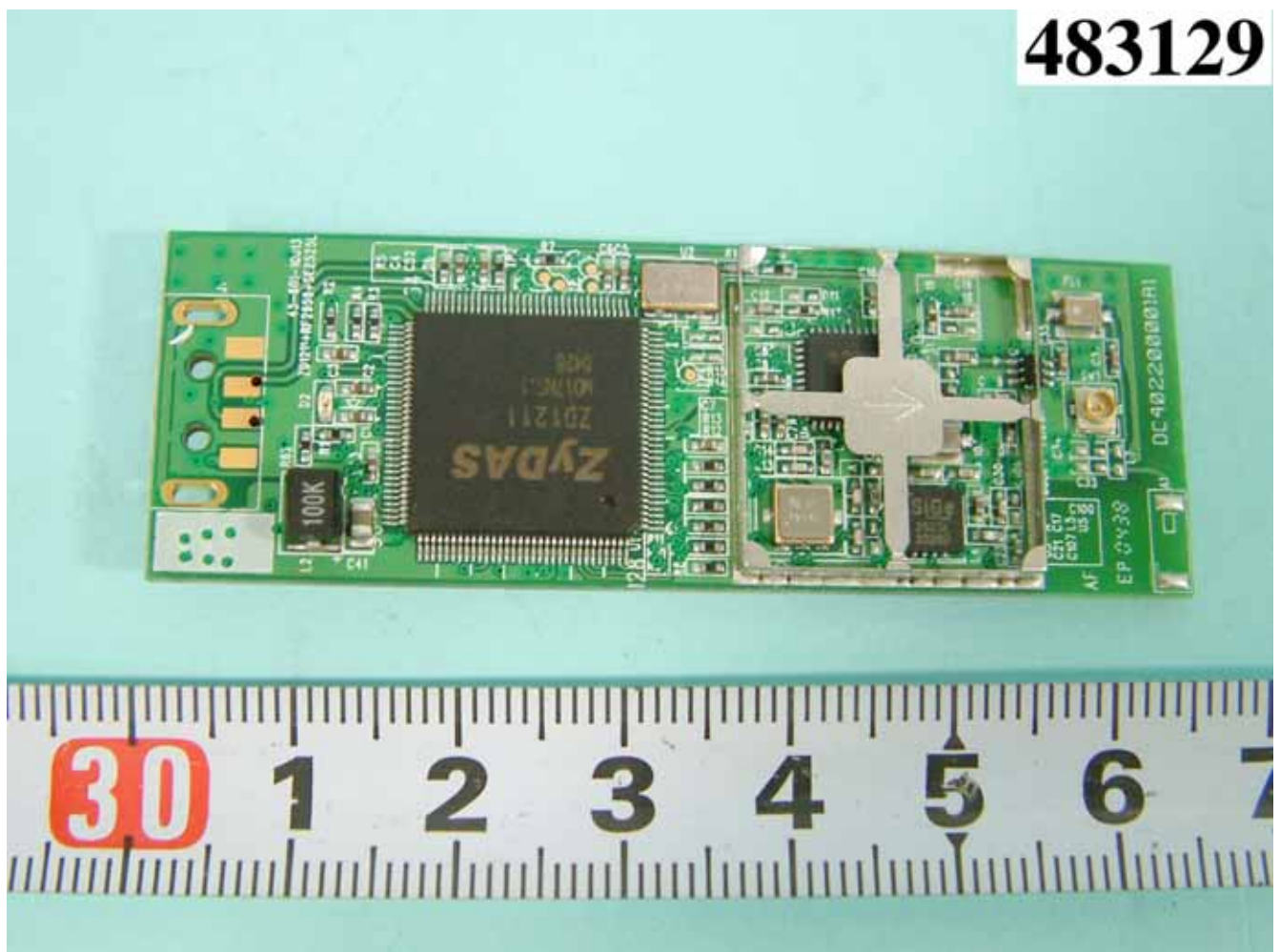
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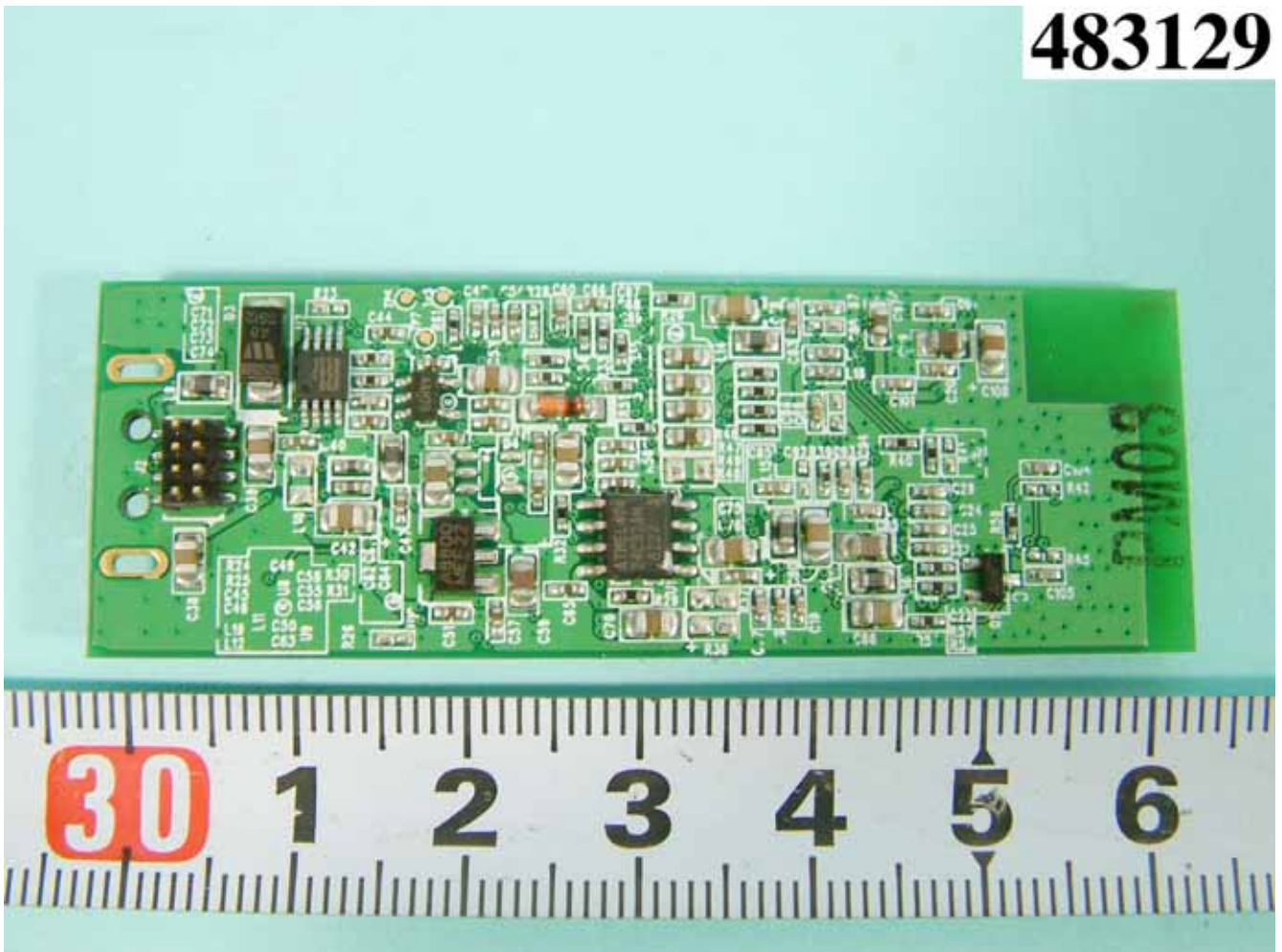


## APPENDIX A. Photographs of EUT





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