

# DIGITAL EMC CO., LTD.

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# CERTIFICATION OF COMPLIANCE

Firmtech CO., LTD. D801,Sigma2 Officetel,Gumi-Dong 18.Bundang-Gu, Sungnam-si,Kyunggi-Do,Korea

Dates of Tests: April 2 ~ 18, 2007 Test Report S/N: DR50110704G Test Site: DIGITAL EMC CO., LTD.

FCC ID

U8D-FB900AS

**APPLICANT** 

Firmtech CO., LTD.

FCC Classification : Frequency Hopping Spread Spectrum (FHSS)

Device name : Bluetooth SPP Bridge
Manufacturer : Firmtech CO., LTD.

FCC ID : U8D-FB900AS

Model name : FB900AS

Test Device Serial number : Identical prototype

FCC Rule Part(s) : FCC Part 15.247 Subpart C

ANSI C-63.4-2003

Frequency Range : 2402 ~ 2480 MHz

Max. Output power : 14.74dBm Conducted

Data of issue : April 19, 2007

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



NVLAP LAB CODE 200559-0

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## 1. General information

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.

Address: 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080

http://www.digitalemc.com E-mail : Harveysung@digitalemc.com

Tel: +82-31-321-2664 Fax: +82-31-321-1664

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the

"General requirements for the competent of calibration and testing laboratory".

This laboratory is accredited by NVLAP for NVLAP Lab. Code: 200559-0.

Test operator: engineer

April 19,2007 Won-Jung LEE

Data Name Signature

Report Reviewed By: manager

April 19,2007 Harvay Sung

Data Name Signature

Ordering party:

Company name : Firmtech Co., LTD

Address : D801,Sigma2 Officetel, Gumi-Dong 18,Bundang-Gu,

City/town : Kyunggi-Do ,Sungnam-si

Country : Korea Zip code : 463-741

Date of order : March 20, 2007

## 2. Information about test item

## U8D-FB900AS

## 2.1 Equipment information

Equipment model no.	FB900AS
Equipment serial no.	Identical prototype
Type of equipment	Bluetooth SPP Bridge
Frequency band	2402 ~ 2480 MHz
Type of Modulation	GFSK
Channel Access Protocol	Frequency Hopping
Channel Spacing	1.0 MHz
Type of antenna	Chip Antenna

## 2.2 Tested frequency

Frequency	TX	RX
Low frequency	2402MHz	2402MHz
Middle frequency	2441MHz	2441MHz
High frequency	2480MHz	2480MHz

## 2.3 Tested environment

Temperature	:	15 ~ 35 (°C)
Relative humidity content	:	20 ~ 75 %
Air pressure	:	86 ~ 103 kPa
Details of power supply	:	5.0 VDC

## 2.4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
Adaptor	KSAFB0500050W1EU		Kuantech Co., Ltd

## **2.5** EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing

-> None

# 3. Test Report

# 3.1 Summary of tests

Carrier Frequency Separation   > 25 kHz   Carrier Frequency Separation   > 75 hops   Carrier Frequency Separation   Carrier Frequency Separation   Separatio	FCC Part	Parameter	Limit	Test	Status
Carrier Frequency Separation > 25 kHz  Number of Hopping Frequencies > 75 hops  20 dB Bandwidth < 1 MHz  Dwell Time	Section(s)	rarameter	Limit	Condition	(note 1)
Number of Hopping Frequencies > 75 hops  20 dB Bandwidth < 1 MHz  Dwell Time	I. Test Items				
15.247(a) 20 dB Bandwidth < 1 MHz  Dwell Time		Carrier Frequency Separation	> 25 kHz		С
Dwell Time    Dwell Time		Number of Hopping Frequencies	> 75 hops		С
Dwell Time second period per any frequency Conducted  15.247(b) Transmitter Output Power < 1Watt C  Band-edge /Conducted The radiated emission to any 100 kHz of outband shall be at least 20dB below the highest inband spectral density.  C  Conducted C  C  AC Line	15.247(a)	20 dB Bandwidth	< 1 MHz		С
Band-edge /Conducted  The radiated emission to any 100 kHz of outband shall be at least 20dB below the highest inband spectral density.  Conducted Spurious Emissions  Radiated Emissions  FCC 15.209 Limits  Radiated  C  AC Line		Dwell Time	second period per any	Conducted	С
15.247(c)  Conducted Spurious Emissions  Conducted Spurious Emissions  Conducted Spurious Emissions  15.205  Radiated Emissions  Radiated Emissions  Radiated Emissions  Conducted Spurious Emissions  FCC 15.209 Limits  Radiated  Conducted Spurious Emissions  Conducted Spurious Emissions  FCC 15.209 Limits  Radiated  Conducted Spurious Emissions  Conducted Emissions  Cond	15.247(b)	Transmitter Output Power	< 1Watt		С
15.247(c) Conducted Spurious Emissions shall be at least 20dB below the highest inband spectral density.  15.205 15.209 Radiated Emissions FCC 15.209 Limits Radiated C  AC Line		L DANG-EUSE /CONGUCIEG			С
Radiated Emissions FCC 15.209 Limits Radiated C  AC Line	15.247(c)	Conducted Spurious Emissions	shall be at least 20dB below the highest inband		С
15.209 AC Line	15.205	Padiated Emissions	ECC 15 200 Limits	Dadiated	C
	15.209	Radiated Emissions	FCC 13.209 Littlits	Radiated	
	15.207	AC Conducted Emissions	EN 55022	AC Line	С
AC Conducted Emissions EN 35022 Conducted	13.207	Ac Conducted Emissions	EN 33022	Conducted	

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003

## 3.2 Transmitter requirements

## 3.2.1 Carrier Frequency Separation

#### **Procedure:**

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 30 kHz (1% of the span or more) Sweep = auto

VBW = 30 kHz Detector function = peak

Trace = max hold

#### **Measurement Data:**

Frequency of marker #1	Frequency of marker #2	Test Results	
(MHz)	(MHz)	Carrier Frequency Separation (MHz)	Result
2440.989	2441.986	0.997	Complies

<sup>-</sup> See next pages for actual measured spectrum plots.

#### **Minimum Standard:**

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

#### **Measurement Setup**

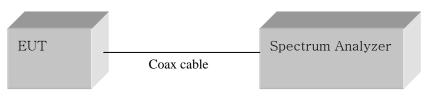
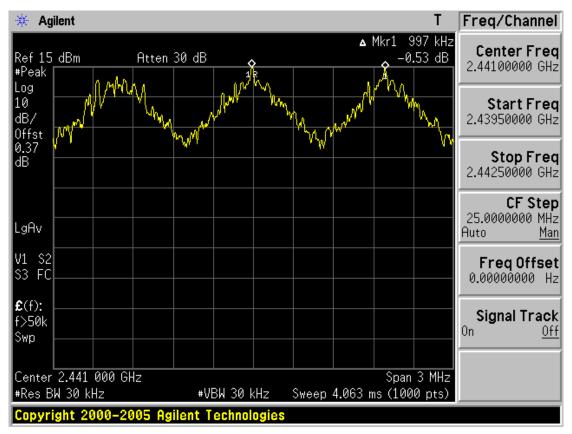


Figure 1: Measurement setup for the carrier frequency separation

## **Carrier Frequency Separation (M1 Port)**



## 3.2.2 Number of Hopping Frequencies

#### **Procedure:**

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, four frequency ranges within the 2400 ~ 2483.5 MHz FH band were examined.

The spectrum analyzer is set to:

Frequency range 1: Start = 2389.5MHz, Stop = 2414.5 MHz 2: Start = 2414.5MHz, Stop = 2439.5 MHz

3: Start = 2439.5MHz, Stop = 2464.5 MHz

 $4: Start = 2464.5 MHz, \quad Stop = 2489.5 \ MHz$   $RBW = 300 \ kHz \ (1\% \ of \ the \ span \ or \ more) \qquad \qquad Sweep = auto$ 

 $VBW = 300 \text{ kHz} (VBW \ge RBW)$  Detector function = peak

Trace =  $\max \text{ hold}$  Span = 25MHz

#### **Measurement Data: Complies**

Total number of Hopping Channels	79
----------------------------------	----

- See next pages for actual measured spectrum plots.

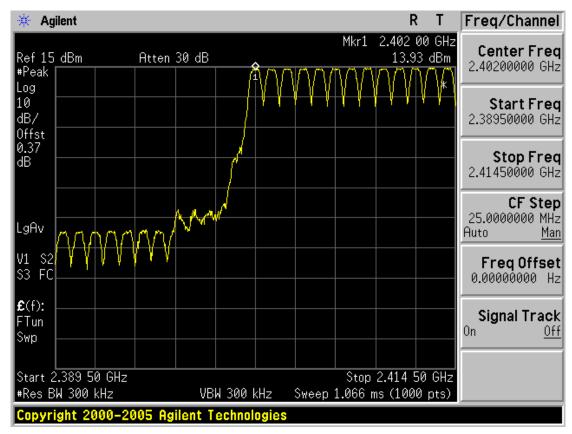
### **Minimum Standard:**

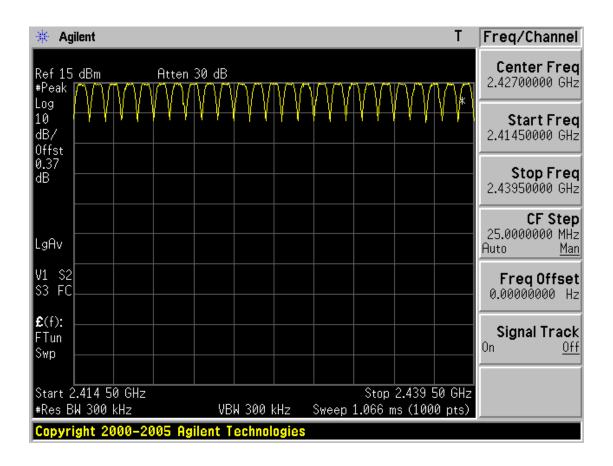
At least 75 hopes

#### Measurement Setup

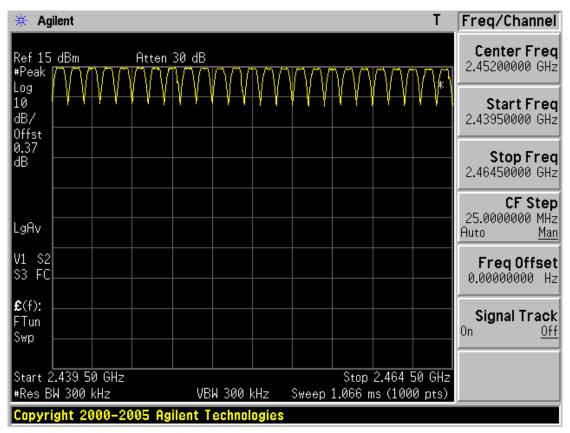
Same as the Chapter 3.2.1 (Figure 1)

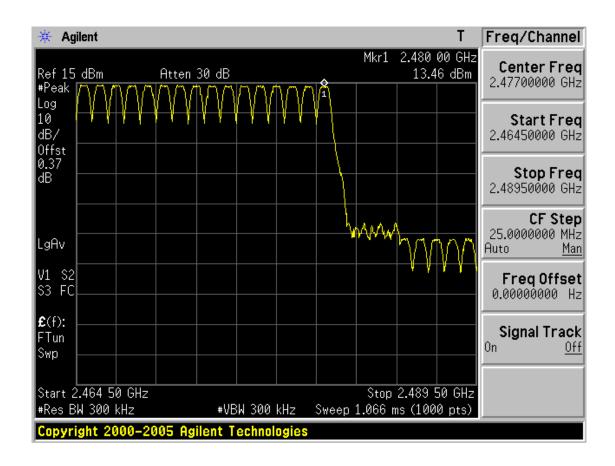
## **Number of Hopping Frequencies**





## **Number of Hopping Frequencies**





#### 3.2.3 20 dB Bandwidth

#### **Procedure:**

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels...

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is ( as close as possible to ) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 2 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 10 kHz (1% of the 20dB bandwidth or more) Sweep = auto

 $VBW = 30 \text{ kHz} (VBW \ge RBW)$  Detector function = peak

Trace = max hold

#### **Measurement Data:**

#### - M1 Port

Frequency	Frequency		Test Results		Results
(MHz)	Channel No.	Measured Bandwidth (MHz)	Result		
2402	1	0.851	Complies		
2441	40	0.841	Complies		
2480	79	0.791	Complies		

<sup>-</sup> See next pages for actual measured spectrum plots.

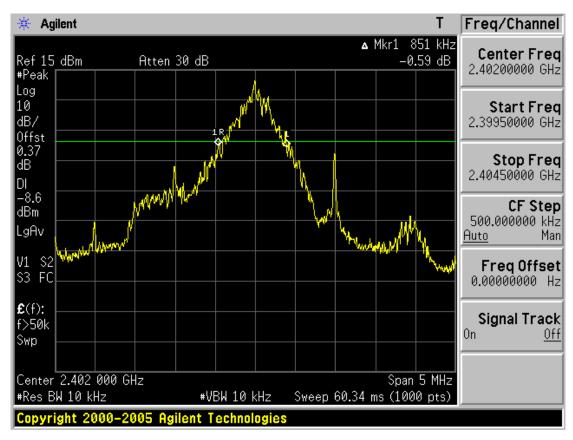
## **Minimum Standard:**

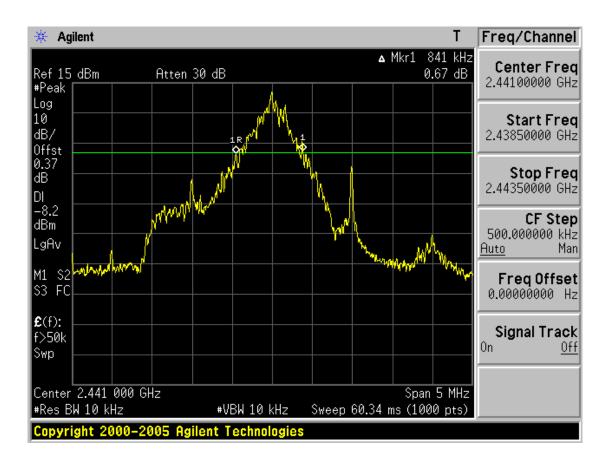
The transmitter shall have a maximum 20dB bandwidth of 1 MHz.

## **Measurement Setup**

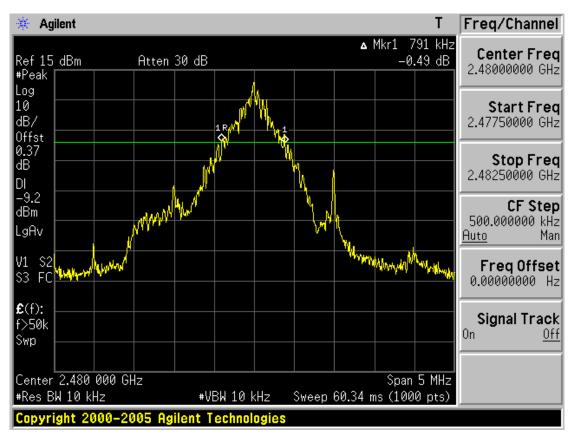
Same as the Chapter 3.2.1 (Figure 1)

#### 20 dB Bandwidth





### 20 dB Bandwidth



## 3.2.4 Time of Occupancy (Dwell Time)

#### **Procedure:**

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Center frequency = 2441 MHz Span = zero

RBW = 1 MHz  $VBW = 1 MHz (VBW \ge RBW)$ 

Trace = max hold Detector function = peak

#### **Measurement Data:**

De ale 4 Terre	Burst duration in one	Test R	Results
Packet Type	hop (us)	Dwell Time (ms)	Result
DH 1	425.6	136.228	Complies
DH 3	1678	270.426	Complies
DH 5	2920	310.950	Complies

<sup>-</sup> See next pages for actual measured spectrum plots.

#### **Minimum Standard:**

0.4 seconds within a 30 second period per any frequency

## **Measurement Setup**

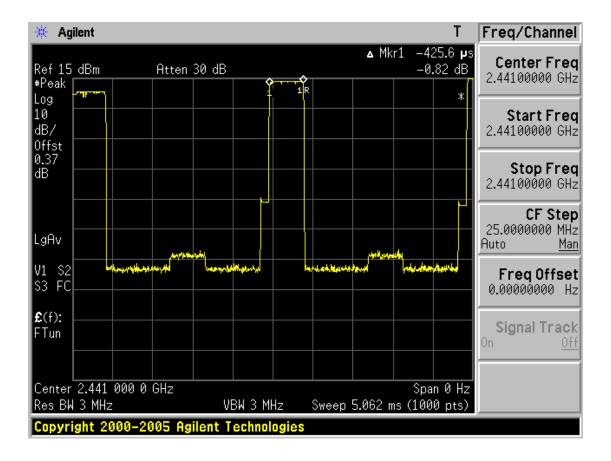
Same as the Chapter 3.2.1 (Figure 1)

### **Time of Occupancy for Packet Type DH 1**

The system makes worst case 1600 hopes per second or 1 time slot has a length of 625 us with 79 channels. A DH 1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/2 = 800 hops per second with 79 channels. So you have each channel 800/79 = 10.13 times per second and so for a period of  $0.4 \times 79 = 31.6$  seconds you have  $10.13 \times 31.6 = 320.11$  times of appearance.

Each Tx-time per appearance is 425.6 us

So we have  $320.11 \times 425.6 \text{us} = 136.228 \text{ ms per } 31.6 \text{ seconds.}$ 

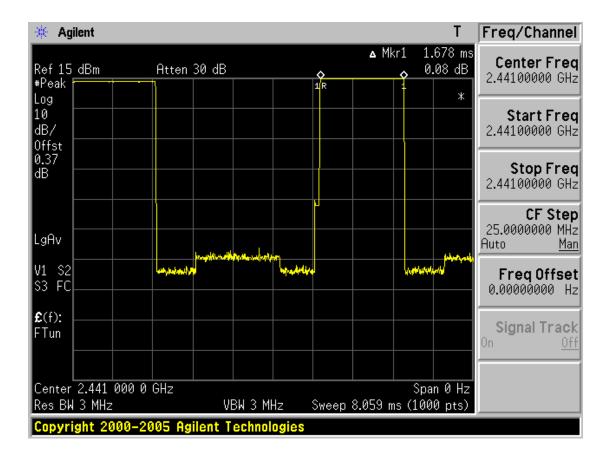


## **Time of Occupancy for Packet Type DH 3**

The system makes worst case 1600 hopes per second or 1 time slot has a length of 625 us with 79 channels. A DH 3 Packet need 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/4 = 400 hops per second with 79 channels. So you have each channel 400/79 = 5.1 times per second and so for a period of 0.4 x 79 = 31.6 seconds you have 5.1 x 31.6 = 161.16 times of appearance.

Each Tx-time per appearance is 1.678 ms

So we have  $161.16 \times 1.678 \text{ ms} = 270.426 \text{ ms per } 31.6 \text{ seconds.}$ 

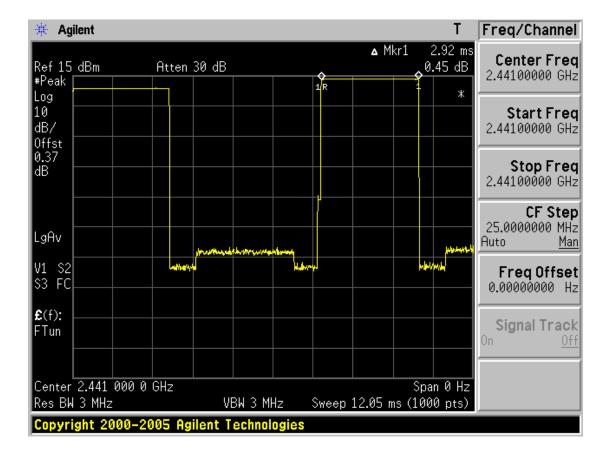


### Time of Occupancy for Packet Type DH 5

The system makes worst case 1600 hopes per second or 1 time slot has a length of 625 us with 79 channels. A DH 5 Packet need 5 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 1600/6 = 266.67 hops per second with 79 channels. So you have each channel 266.67/79 = 3.37 times per second and so for a period of  $0.4 \times 79 = 31.6$  seconds you have  $3.37 \times 31.6 = 106.49$  times of appearance.

Each Tx-time per appearance is 2.92 ms

So we have  $106.49 \times 2.92 \text{ ms} = 310.950 \text{ ms per } 31.6 \text{ seconds.}$ 



## 3.2.5 Peak Output Power

#### **Procedure:**

The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 1 MHz (greater than the 20dB bandwidth of the emission being measured)

 $VBW = 1 MHz (VBW \ge RBW)$  Detector function = peak

Trace =  $\max$  hold Sweep = auto

#### **Measurement Data:**

Frequency	Ch		Test Results	
(MHz)	Ch.	dBm	mW	Result
2402	1	14.27	26.730	Complies
2441	40	14.74	29.785	Complies
2480	79	13.78	23.878	Complies

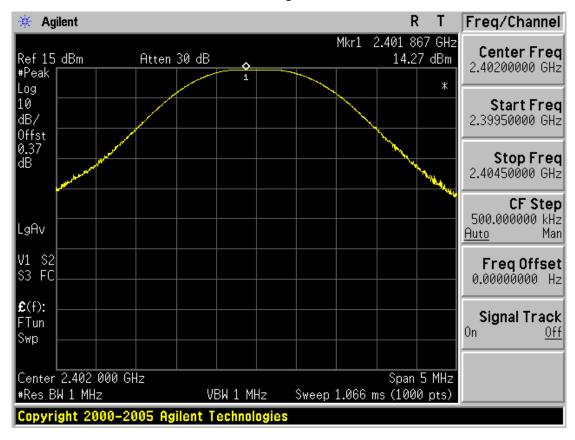
<sup>-</sup> See next pages for actual measured spectrum plots.

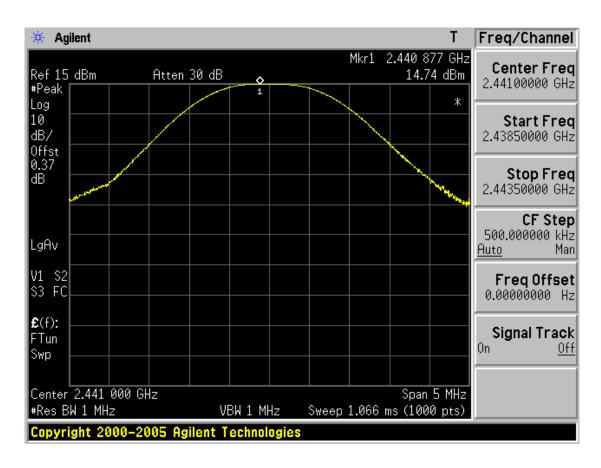
Minimum Standard:	< 1W
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#### **Measurement Setup**

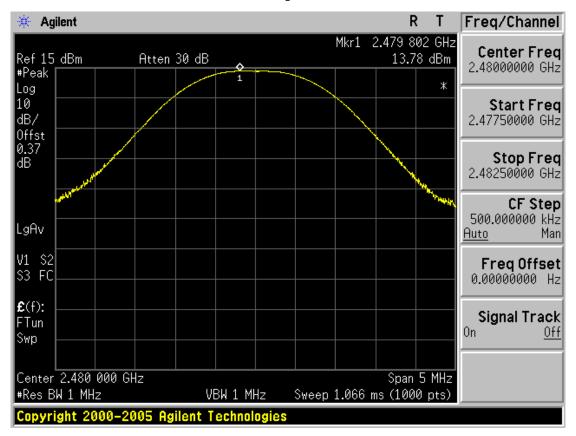
Same as the Chapter 3.2.1 (Figure 1)

## **Peak Output Power**





## **Peak Output Power**



## 3.2.6 Conducted Spurious Emissions

#### **Procedure:**

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz VBW = 100 kHz

Span = 100 MHz Detector function = peak

Trace =  $\max$  hold Sweep = auto

#### **Measurement Data: Complies**

- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc
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#### **Measurement Setup**

Same as the Chapter 3.2.1 (Figure 1)

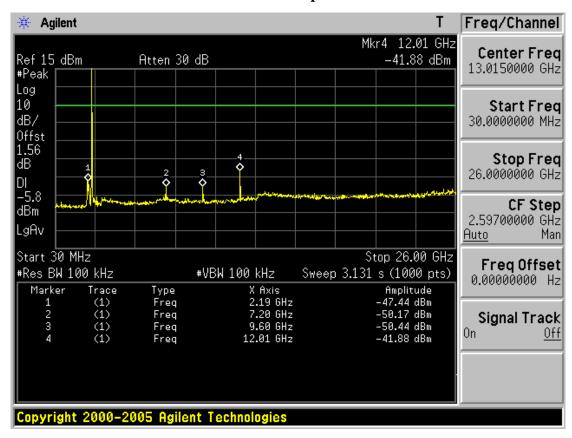
## Low band with hopping disabled



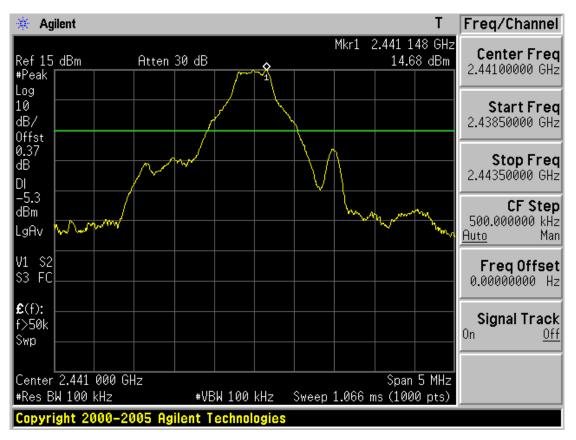
### Low band with hopping enabled



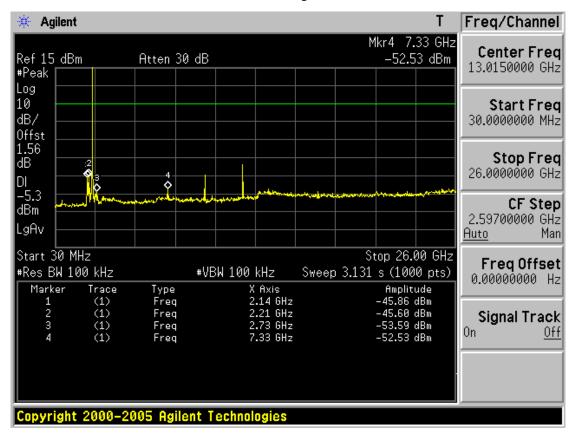
## Low channel spurious

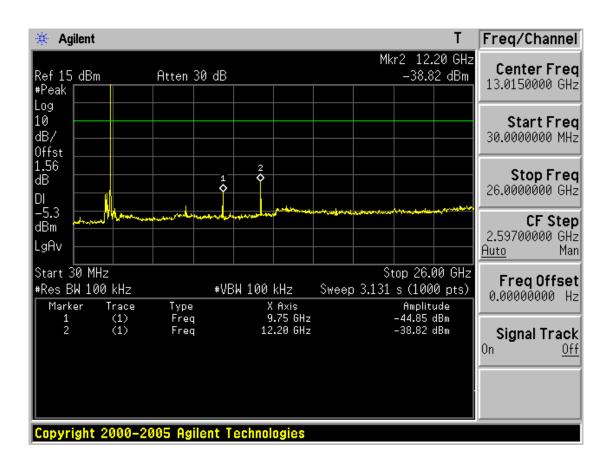


### Mid channel ref



### Mid channel spurious

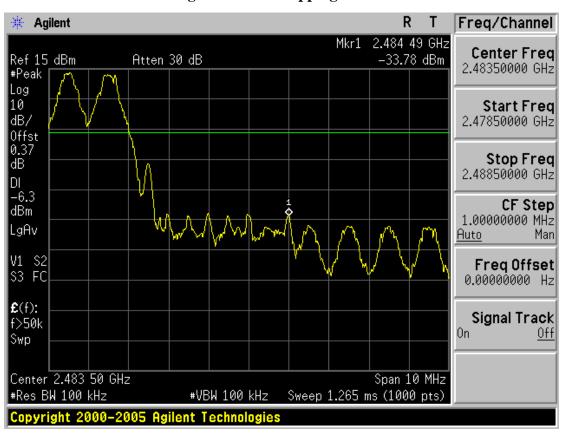




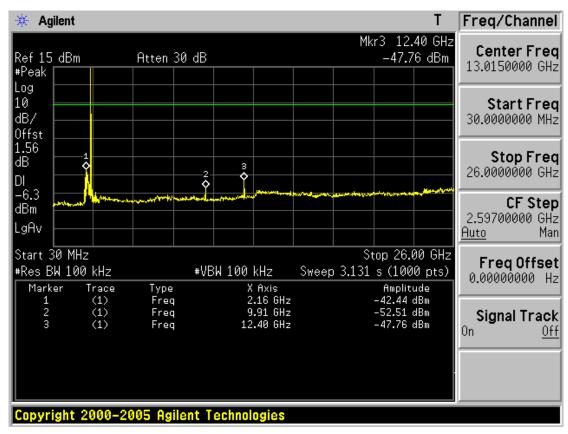
## High band with hopping disabled



### High band with hopping enabled



## **High channel spurious**



#### 3.2.7 Radiated Emissions

#### **Procedure:**

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10<sup>th</sup> harmonic.

 $RBW = 120 \text{ kHz} (30 \text{MHz} \sim 1 \text{ GHz})$   $VBW \geq RBW (Peak)$ 

= 1 MHz  $(1 \text{ GHz} \sim 10^{\text{th}} \text{ harmonic})$  VBW = 10 Hz (Average)

Trace =  $\max$  hold Sweep = auto

#### **Measurement Data: Complies**

- No emissions were detected at a level greater than 10dB below limit.

- Refer to the next page.

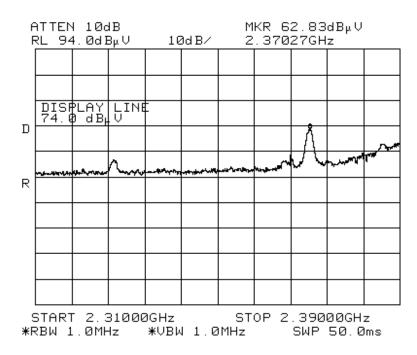
Minimum Standard: FCC Part 15.205 (a), 15.205(b), 15.209(a) and (b)

**Limit : FCC P15.209(a)** 

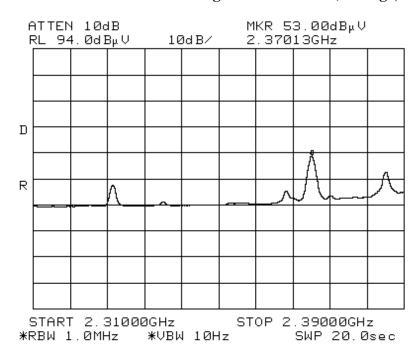
Frequency (MHz)	Limit (uV/m) @ 3m						
30 ~ 88	100 **						
88 ~ 216	150 **						
216 ~ 960	200 **						
Above 960	500						

<sup>\*\*</sup> Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

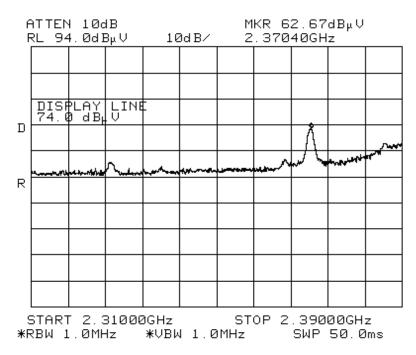
## Restricted Band Edge: Low Channel (Peak, Horizontal)



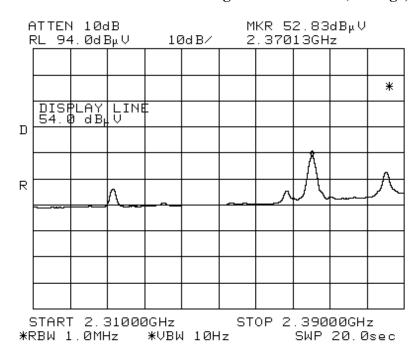
## **Restricted Band Edge: Low Channel (Average, Horizontal)**



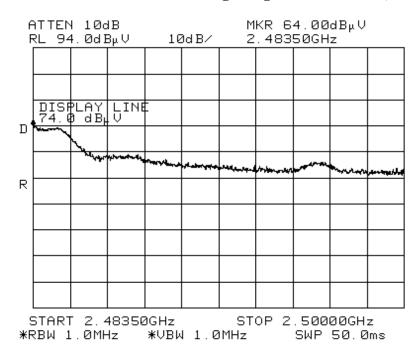
## Restricted Band Edge: Low Channel (Peak, Vertical)



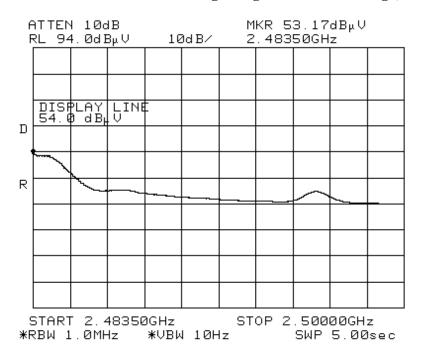
## Restricted Band Edge: Low Channel (Average, Vertical)



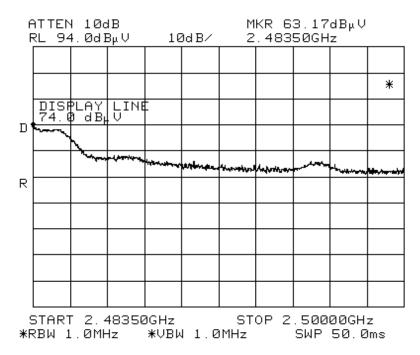
## Restricted Band Edge: High Channel (Peak, Horizontal)



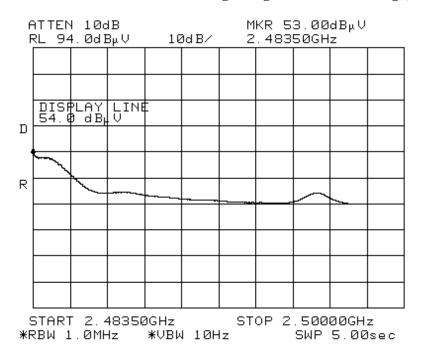
## **Restricted Band Edge: High Channel (Average, Horizontal)**



## Restricted Band Edge: High Channel (Peak, Vertical)



## Restricted Band Edge: High Channel (Average, Vertical)



## **Radiated Spurious Emission Data(Harmonics)**

Low Channe	Low Channel(2402MHz)													
Frequency (MHz)	ANT Pol. (H/V)	Reading Value (dBuV)		T.F	Result (dBuV)		Limit (dBuV)		Margin (dB)					
		PK	AV	(dB)	PK	AV	PK	AV	PK	AV				
7206	Н	44.00	42.83	10.57	54.57	53.40	74	54	19.43	0.6				
-	-	-	-	-	-	-	-	-	-	-				

## Middle Channel(2441MHz)

Frequency (MHz)	ANT Pol. (H/V)	Reading Value (dBuV)		T.F	Result (dBuV)		Limit (dBuV)		Margin (dB)	
		PK	AV	(dB)	PK	AV	PK	AV	PK	AV
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	1	1
-	-	-	-	-	-	-	-	-	-	-

## **High Channel(2480MHz)**

Frequency (MHz)	ANT Pol. (H/V)	Reading Value (dBuV)		T.F (dB)	Result (dBuV)		Limit (dBuV)		Margin (dB)	
		PK	AV	(ub)	PK	AV	PK	AV	PK	AV
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Not. 1. "\*\* ": No other emissions were detected at a level greater than 10dB below limit.

- 2. T.F(Total Factor) = Cable Loss + Ant Factor AMP Gain
- 3. Result = Reading Value + T.F
- 4. Margin = Limit Result

# **Radiated Spurious Emission Data (Other Emissions)**

(Continued...)

Other Em	Other Emissions													
Brequency	ANT Pol.	Reading Value (dBuV)		lue	T.F	Result (dBuV)			Limit (dBuV)			Margin (dB)		
(WITIZ)	(H/V)	PK	QP	AV	(dB)	PK	QP	AV	PK	QP	AV	PK	QP	AV
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	ı	-	-	-	ı	-	-	-	-	-	-

Not. 1. "\*\* ": No emissions were detected at a level greater than 10dB below limit.

- 2. T.F(Total Factor) = Cable Loss + Ant Factor AMP Gain
- 3. Result = Reading Value + T.F
- 4. Margin = Limit Result

### 3.2.8 AC Line Conducted Emissions

#### **Procedure:**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

### **Measurement Data: Complies**

- Refer to the next page.

#### Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range	Conducted Limit (dBuV)					
(MHz)	Quasi-Peak	Average				
0.15 ~ 0.5	66 to 56 *	56 to 46 *				
0.5 ~ 5	56	46				
5 ~ 30	60	50				

<sup>\*</sup> Decreases with the logarithm of the frequency

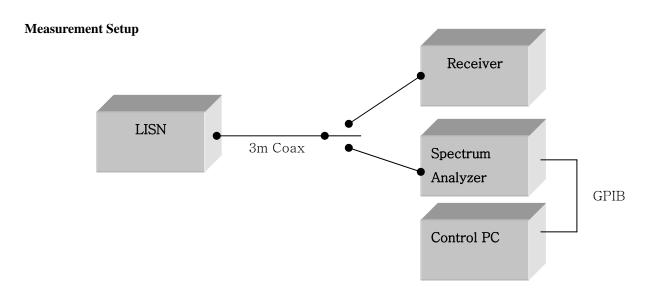
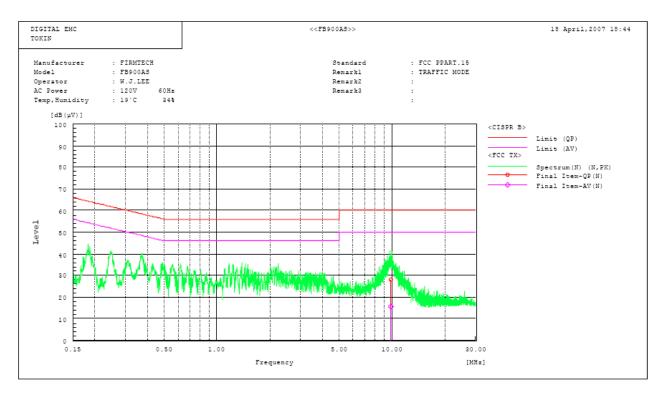
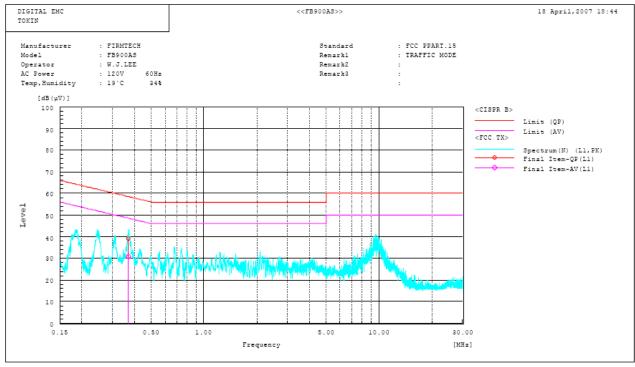
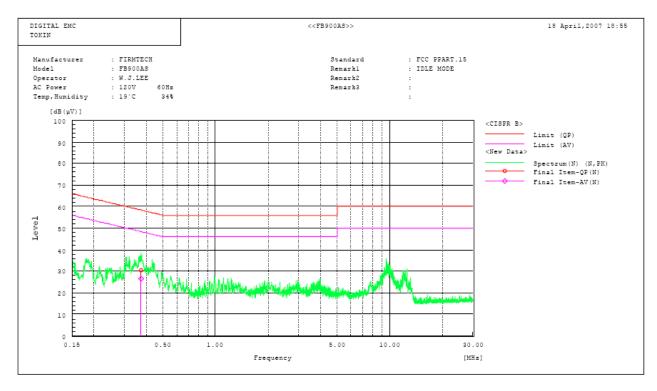


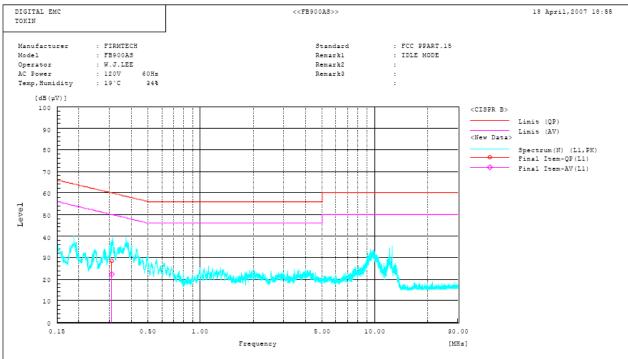
Figure 2: Measurement setup for AC Conducted Emission





****	*********	7 Reading Reading c.f Result Result Limit Limit Margin Margin Remark QP AV QP AV QP AV QP AV [dB(µV)] [dB(µV)] [dB) [dB(µV)] [dB(µV)] [dB(µV)] [dB] [dB] 0 27.7 15.4 0.4 28.1 15.8 60.0 50.0 31.9 34.2									
											18 April,2007 18:44
Mode Oper AC P	facturer  1 ator ower , Humidity rk1	: FIRMT : FB900 : W.J.L : 120V : 19°C	ECH AS EE 60Hz 34%								
****	*********	*******	********	*****	*******	*******	*******	********	******	******	***************************************
Fina	1 Result										
1	N Phase										
No.	Frequency [MHz]	QP	AV		QP	W.	QP	AV	QP	AV	Remark
1	9.840										
;	Ll Phase	-									
No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
1	(MHz) 0.370	[dB(μV)] 39.1	[dB(μV)] 30.6	(dB)	[dB(μV)] 39.2	[dB(µV)] 30.7	[dB(μV)] 58.5	[dB(µV)] 48.5	[dB] 19.3	[dB] 17.8	





****	********	******	********	******	******	*******	D.	GITAL EMC	******	******	***********************************
											18 April,2007 18:55
Mode Oper AC P Temp Rema Rema	facturer  it ator ower Humidity irk1 irk2 irk3	: FOC F : FIRMI : FREOD : W.J.L : 120V : 19°C : IDLE :	ECH AS EE 60Hz 34%		******	*******	*****	*********	******	*****	
Fina	1 Result										
	N Phase										
No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]	Remark
1	0.375	30.4	26.3	0.1	30.5	26.4	58.4	48.4	27.9	22.0	
	Ll Phase	_									
No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)] 60.0	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB] 27.8	Remark
1	0.310	28.3	22.1	0.1	28.4	22.2	60.0	50.0	31.6	27.8	

# APPENDIX

# TEST EQUIPMENT FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Туре	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
01	Spectrum Analyzer	Agilent	E4440A	05/10/07	MY45304199
02	Spectrum Analyzer	H.P	8563E	06/10/07	3551A04634
03	Power Meter	H.P	EPM-442A	06/07/07	GB37170413
04	Power Sensor	H.P	8481A	14/07/07	3318A96332
05	Frequency Counter	H.P	5342A	15/09/07	2119A04450
06	Multifunction Synthesizer	H.P	8904A	12/10/07	3633A08404
07	Signal Generator	Rohde Schwarz	SMR20	21/03/08	101251
08	Signal Generator	H.P	E4421A	06/07/07	US37230529
09	Audio Analyzer	H.P	8903B	06/07/07	3011A0944B
10	Modulation Analyzer	H.P	8901B	10/07/07	3028A03029
11	Oscilloscope	Tektronix	TDS3052	01/10/07	B016821
12	8960 Series 10 Wireless Comms Test Set	Agilent	Z5515C	13/06/08	GB43461134
13	Universal Radio Communication Test	Rohde Schwarz	CMU200	21/03/08	107631
14	CDMA Mobile Station Test Set	H.P	8924C	15/09/07	US35360688
15	PCS Interface	НР	83236B	15/09/07	3711J03014
16	Multi system Ue Tester	Japan Radid Co., Ltd	NJZ-2000	20/11/07	ET00095
17	Power Splitter	WEINSCHEL	1593	14/10/07	332
18	BAND Reject Filter	Microwave Circuits	N0308372	19/10/07	3125-01DC0312
19	BAND Reject Filter	Wainwright	WRCG1750	19/10/07	SN2
20	AC Power supply	DAEKWANG	5KVA	20/03/08	N/A
21	DC Power Supply	H.P	6622A	20/03/08	465487
22	HORN ANT	EMCO	3115	24/07/07	6419
23	HORN ANT	EMCO	3115	21/08/07	21097
24	HORN ANT	A.H.Systems	SAS-574	16/08/07	154
25	HORN ANT	A.H.Systems	SAS-574	16/08/07	155
26	Dipole Antenna	Schwarzbeck	VHA9103	18/11/07	2116
27	Dipole Antenna	Schwarzbeck	VHA9103	18/11/07	2117
28	Dipole Antenna	Schwarzbeck	UHA9105	18/11/07	2261
29	Dipole Antenna	Schwarzbeck	UHA9105	18/11/07	2262
30	Loop Antenna	ETS	6502	22/11/07	3471

	Туре	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
31	TEMP & HUMIDITY Chamber	JISCO	J-RHC2	13/09/07	021031
32	RFI/FIELD Intensity Meter	Kyorits	KNM-504D	21/07/07	4N-161-4
33	Frequency Converter	Kyorits	KCV-604C	21/07/07	4-230-3
34	Log Periodic Antenna	Schwarzbeck	UHALP9108A1	26/09/07	1098
35	Biconical Antenna	Schwarzbeck	VHA9103	12/09/07	2233
36	Digital Multimeter	H.P	34401A	20/03/08	3146A13475
37	Attenuator (10dB)	WEINSCHEL	23-10-34	17/10/07	BP4386
38	High-Pass Filter	ANRITSU	MP526	13/10/07	M27756
39	Attenuator (3dB)	Agilent	8491B	10/07/07	58177
40	Attenuator (10dB)	WEINSCHEL	23-10-34	26/01/08	BP4387
41	Attenuator (30dB)	H.P	8498A	17/10/07	50101
42	Amplifier (25dB)	Agilent	8447D	12/04/08	2944A10144
43	Amplifier (30dB)	Agilent	8449B	13/10/07	3008A01590
44	Position Controller	TOKIN	5901T	N/A	14173
45	Driver	TOKIN	5902T2	N/A	14174
46	Spectrum Analyzer	Agilent	8594E	04/11/07	3649A05889
47	RFI/FIELD Intensity Meter	Kyorits	KNW-2402	11/07/07	4N-170-3
48	LISN	Kyorits	KNW-407	19/08/07	8-317-8
49	LISN	Kyorits	KNW-242	09/10/07	8-654-15
50	CVCF	NF Electronic	4400	N/A	344536 4420064
51	Software	ToYo EMI	EP5/RE	N/A	Ver 2.0.800
52	Software	ToYo EMI	EP5/CE	N/A	Ver 2.0.801
53	Software	AUDIX	e3	N/A	Ver 3.0
54	Software	Agilent	Benchlink	N/A	A.01.09 021211