

# DIGITAL EMC CO., LTD.

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# **CERTIFICATION OF COMPLIANCE**

#### RANDOM RESEARCH INC.

#802, 803 Dongmoon-Goodmorning Tower1, 1323 Baekseok, Ilsan, Goyang, Gyeong-gi, 410-817, Korea Dates of Tests: March 31 ~ April 06, 2009

Test Report S/N: DR50110904F Test Site: DIGITAL EMC CO., LTD.

FCC ID

**APPLICANT** 

**W88DJG08080R** 

RANDOM RESEARCH INC.

FCC Equipment Class : Part 15 Spread Spectrum Transmitter(DSS)

Device name : Baby Monitor with Bluetooth
Manufacturer : RANDOM RESEARCH INC.

FCC ID : W88DJG08080R IC ID : 8270A-08080

Test Device Serial number : Identical prototype

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

ANSI C63.4-2003

**RSS-210** 

Frequency Range : 2402 ~ 2480 MHz Max. Output power : 7.58 dBm Conducted

Data of issue : April 07, 2009

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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

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".

Test operator: Engineer

April 07, 2009 D.C. Cha

Data Name Signature

**Report Reviewed By: Technical Director** 

April 07, 2009 Harvey Sung

Data Name Signature

Ordering party:

Company name : RANDOM RESEARCH INC.

Address #802, 803 Dongmoon-Goodmorning Tower1, 1323 Baekseok, Ilsan

City/town : Goyang, Gyeong-gi

Postal Code : 410-817 Country : Korea

Date of order : March 19, 2009

## 2. Information about test item

## W88DJG08080R

## 2.1 Equipment information

Equipment model name.	08080
Equipment serial no.	Identical prototype
Type of equipment	Baby Monitor with Bluetooth
Frequency band	2402 ~ 2480 MHz
Type of Modulation	GFSK
Spread Spectrum	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	:	3.7V DC

## 2.4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer	
-	-	-	-	

## 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

FCC Part / RSS-210 or GEN	Parameter	Limit (Using in 2400 ~ 2483.5MHz)	Test Condition	Status (note 1)
I. Transmit mod	le (Tx)			
15.247( ) /	Carrier Frequency Separation	>= 20dB BW or >= Two- Thirds of the 20dB BW		С
15.247(a) /	Number of Hopping Frequencies	>= 15 hops		С
A8.1(a),(b),(d)	20 dB Bandwidth	None		С
	Dwell Time	=< 0.4 seconds	0 1 1	С
15.247(b) / A8.4(2)	Transmitter Output Power	=< 1Watt , if CHs >= 75 Others =<0.125W	Conducted	С
	Band-edge /Conducted	The radiated emission to any	1	С
15.247(c) / A8.5 Conducted Spurious Emissions		- 100 kHz of outband shall be at least 20dB below the highest inband spectral density.		С
15.205,15.209 / A8.5	Radiated Emissions	FCC 15.209	Radiated	С
15.207 / 7.2.2	AC Conducted Emissions	EN 55022	AC Line Conducted	NA
II. Receive mode	e (Rx)			
15.107 / 7.2.2	AC Conducted Emissions	EN 55022	Line Conducted	NA
15.109 / 7.2.3.2	Receiver Spurious Emissions	< FCC 15.209 limits	Radiated	С

Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable

Note 2: When this device is in charging status, the Bluetooth function is disabled.

Note 3:Computing device peripheral portion and class B digital portion were tested and approved by FCC DoC and verification procedure.

<sup>\*</sup>The sample was tested according to the following specification:

<sup>-</sup> RSS-210; FCC Parts 15.247; ANSI C-63.4-2003, DA00-705

#### 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 Sweep = auto

VBW = 30 kHz Detector function = peak

Trace = max hold

#### - Measurement Data:

_ · · · ·   · · · · · · · · · · · · · ·	Frequency of marker #2	Test Results		
	(MHz)	Carrier Frequency Separation (MHz)	Result	
2440.010	2441.012	1.002	Comply	

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

#### - Minimum Standard:

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

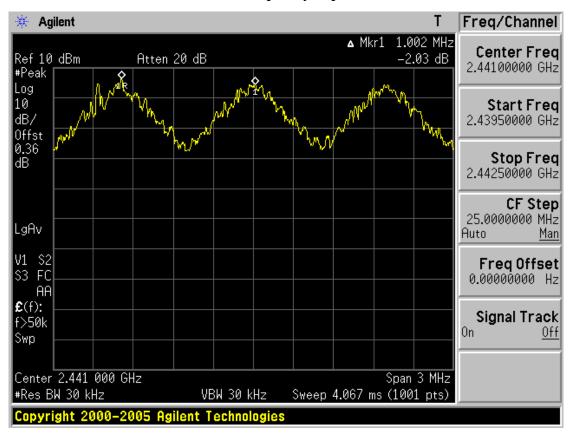
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW

#### - Measurement Setup



Figure 1: Measurement setup for the carrier frequency separation

## **Carrier Frequency Separation**



## 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 disabled at the middle channel.

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 = 2464.5MHz, Stop = 2489.5 MHz

RBW = 300 kHz (1% of the span or more) Sweep = auto

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

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

#### - Measurement Data: Comply

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

- See next pages for actual measured spectrum plots.

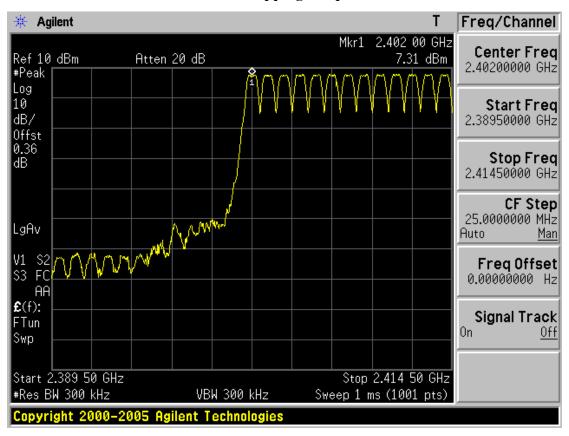
#### - Minimum Standard:

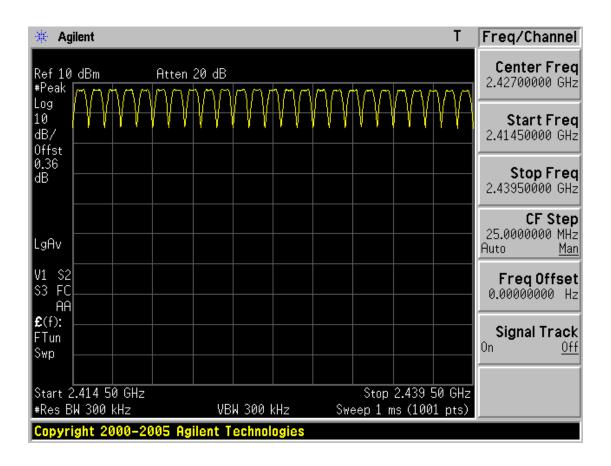
At least 15 hopes

#### - Measurement Setup

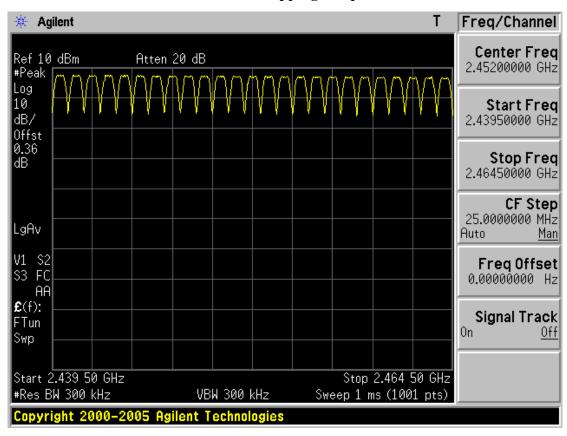
Same as the Chapter 3.2.1 (Figure 1)

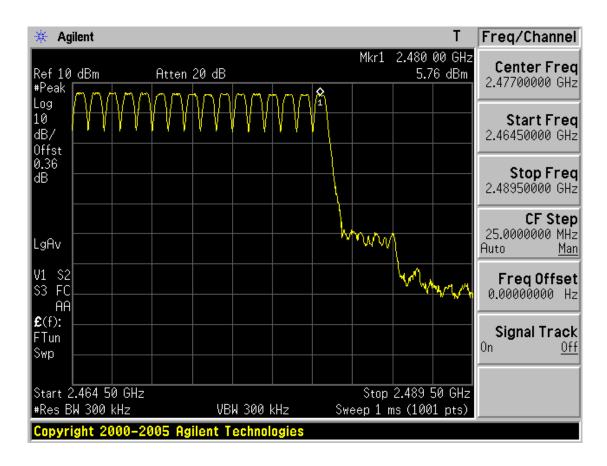
#### **Number of Hopping Frequencies**





## **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 = 5 MHz

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

 $VBW = 10 \text{ kHz} (VBW \ge RBW)$  Detector function = peak

Trace = max hold

#### - Measurement Data:

Frequency		Test Results		
(MHz)	Channel No.	Measured Bandwidth (MHz)	Result	
2402	1	0.935	Comply	
2441	40	0.935	Comply	
2480	79	0.935	Comply	

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

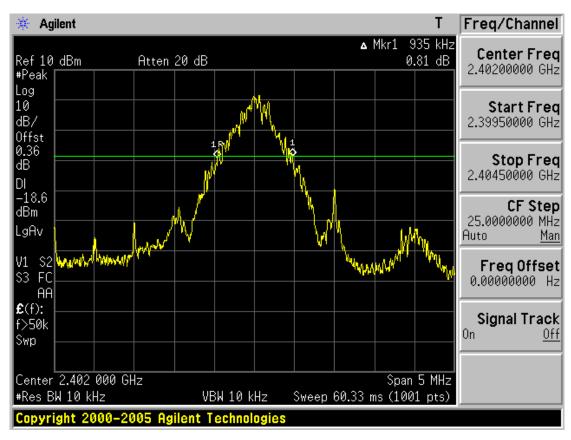
#### - Minimum Standard:

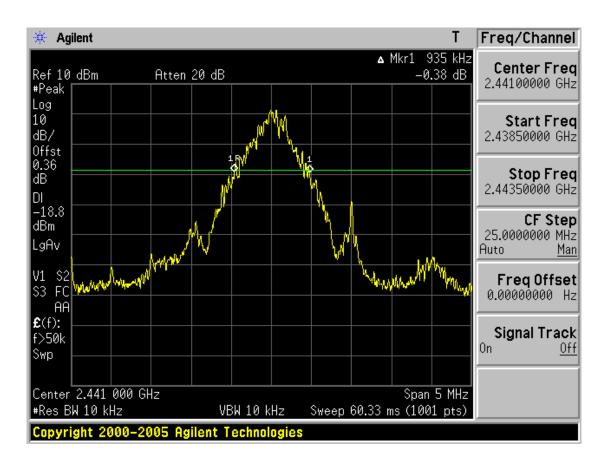
None

#### - Measurement Setup

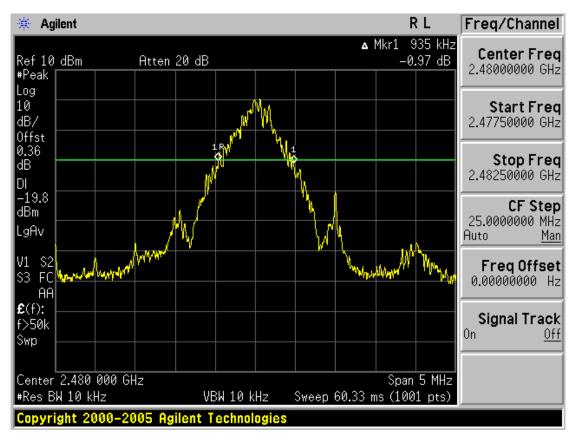
Same as the Chapter 3.2.1 (Figure 1)

#### 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: See next pages for actual measured spectrum plots.

Packet Type	Burst On Time (ms)	Period (ms)	Number of hopping Channels	DWELL TIME (s)	Result
DH 5	2.90	3.75	79	0.309	Comply

Note: Each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event.

DWELL TIME=(0.4 x Number of hopping Channels) x Burst On time / (period x Number of hopping Channels)

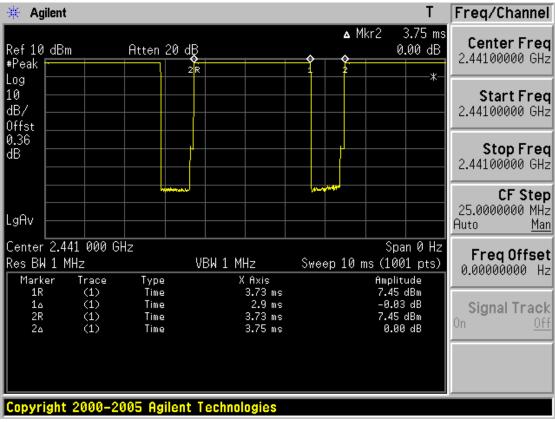
#### - Minimum Standard:

No greater than 0.4 seconds

#### - Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

# Time of Occupancy for Packet Type DH 5



## 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	CI		Test Results	
(MHz)	Ch.	dBm	mW	Result
2402	1	7.58	5.728	Comply
2441	40	7.48	5.598	Comply
2480	79	6.01	3.990	Comply

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

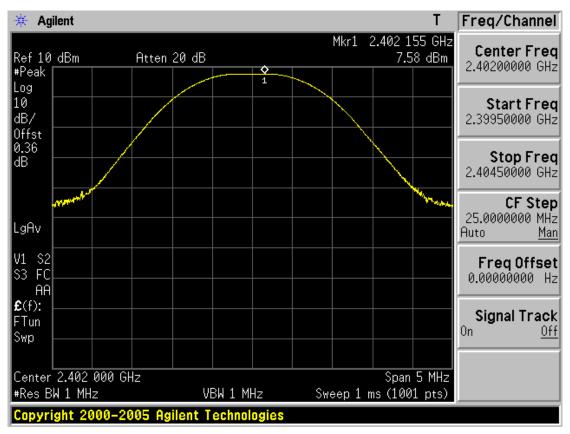
#### - Minimum Standard:

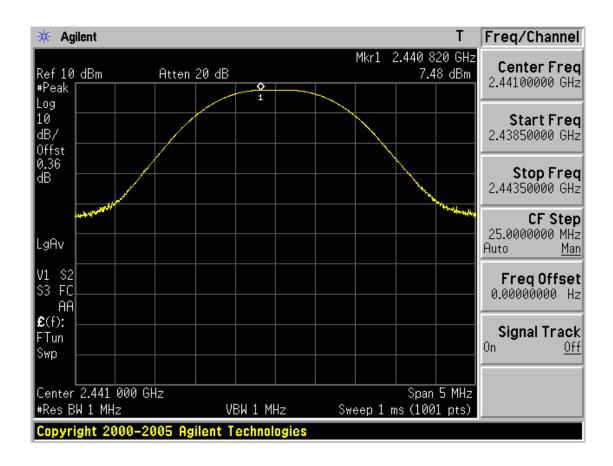
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: **1 Watt**. For all other frequency hopping systems in the 2400-2483.5 MHz band: **0.125 Watts** 

#### - Measurement Setup

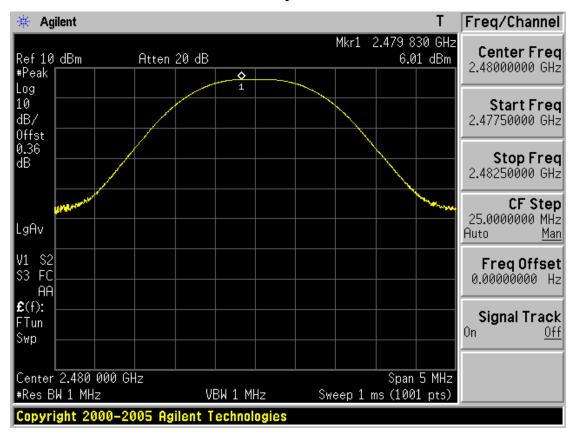
Same as the Chapter 3.2.1 (Figure 1)

## **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

Detector function = peak

Trace =  $\max$  hold Sweep = auto

#### - Measurement Data: Comply

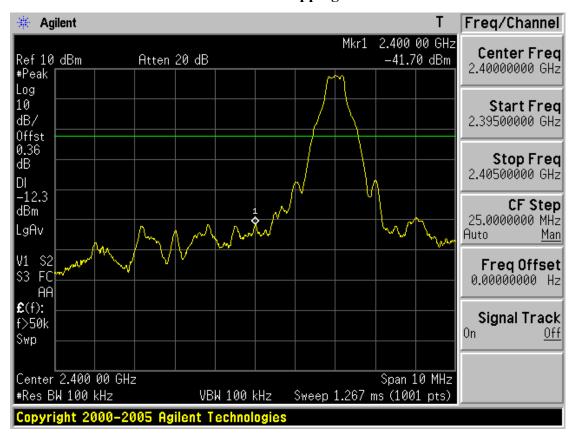
- See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc
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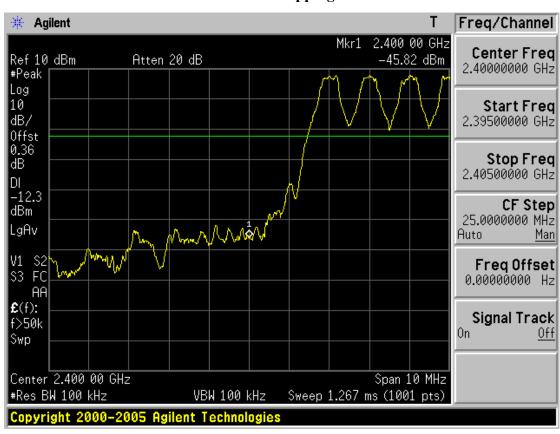
## - Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

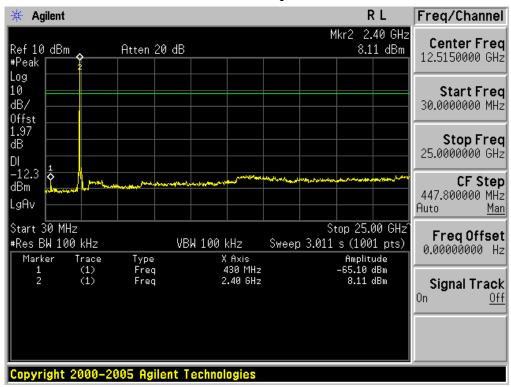
#### Low band with hopping disabled



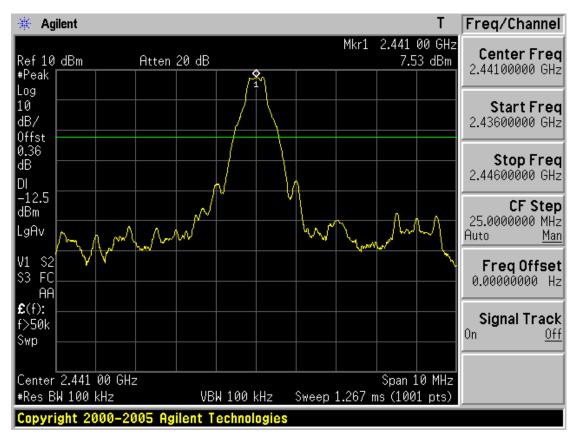
#### Low band with hopping enabled



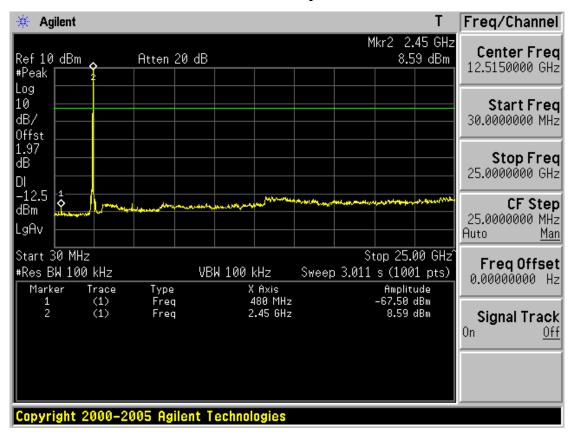
## Low channel spurious



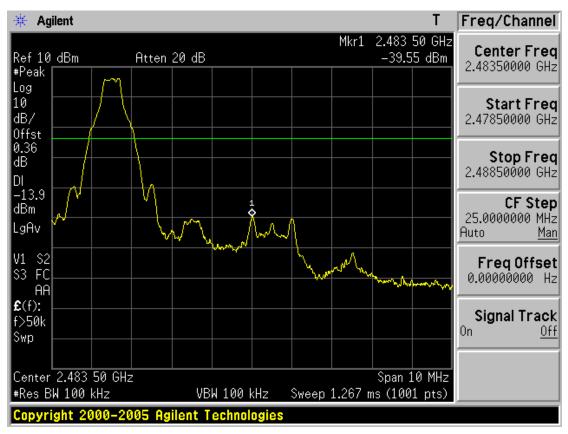
#### Mid channel ref



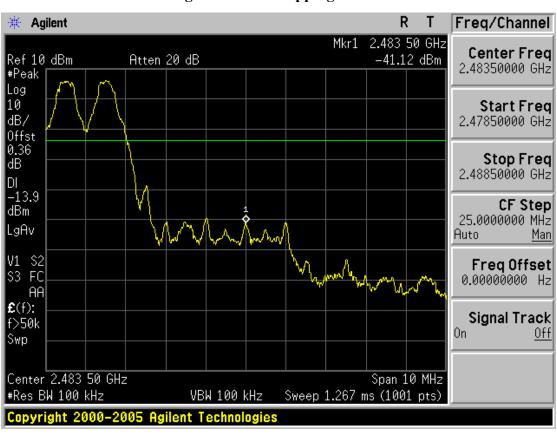
## Mid channel spurious



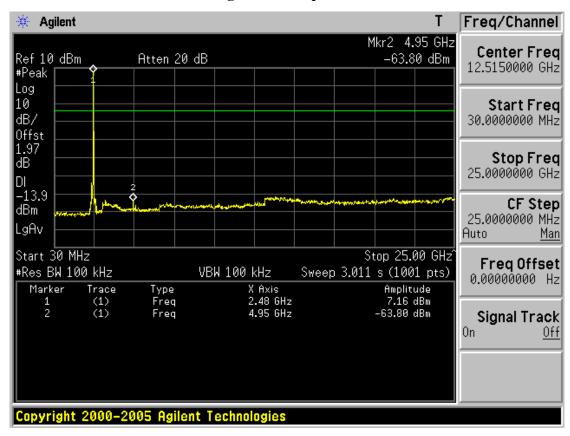
## High band with hopping disabled



#### 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 =  $30 \text{ MHz} \sim 10^{\text{th}}$  harmonic. RBW = 120 kHz (  $30 \text{MHz} \sim 1 \text{ GHz}$ ) VBW  $\geq \text{ RBW}$  (Peak) RBW = 1 MHz (1 GHz  $\sim 10^{\text{th}}$  harmonic) VBW = 10 Hz (Average) Sweep = auto

- Measurement Data: Comply (Refer to the next page.)

Note. 1: Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

#### - Minimum Standard:

#### • FCC Part 15.209(a) and (b)

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.

• FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	12.29 ~ 12.293	149.9 ~ 150.05	1645.5 ~ 1646.5	4.5 ~ 5.15	14.47 ~ 14.5
$0.495 \sim 0.505$	12.51975 ~ 12.52025	156.52475 ~ 156.52525	$1660 \sim 1710$	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.57675 ~ 12.57725	156.7 ~ 156.9	$1718.8 \sim 1722.2$	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	13.36 ~ 13.41	162.0125 ~ 167.17	$2200\sim2300$	$8.025 \sim 8.5$	22.01 ~ 23.12
4.17725 ~ 4.17775	16.42 ~ 16.423	167.72 ~ 173.2	$2310 \sim 2390$	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.69475 ~ 16.69525	240 ~ 285	$2483.5 \sim 2500$	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.80425 ~ 16.80475	322 ~ 335.4	$2655 \sim 2900$	10.6 ~ 12.7	36.43 ~ 36.5
$6.26775 \sim 6.26825$	25.5 ~ 25.67	399.90 ~ 410	$3260 \sim 3267$	13.25 ~ 13.4	Above 38.6
$6.31175 \sim 6.31225$	37.5 ~ 38.25	608 ~ 614	$3332 \sim 3339$		
8.291 ~ 8.294	73 ~ 74.6	960 ~ 1240	$3345.8 \sim 3358$		
8.362 ~ 8.366	74.8 ~ 75.2	$1300 \sim 1427$	$3600\sim4400$		
8.37625 ~ 8.38675	108 ~ 121.94	1435 ~ 1626.5			
8.41425 ~ 8.41475	123 ~ 138				

• FCC Part 15.205(b): The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

#### \* Agilent Freq/Channel Mkr2 2.389 47 GHz Center Freq Ref 94 dB**µ**V/m Atten 10 dB 49.78 dBµV/m 2.35000000 GHz #Peak Log 10 Start Freq dB/ 2.31000000 GHz Stop Freq 2.39000000 GHz 74.0 **CF Step** dB₽V∕ 2.40200000 GHz LgAv Auto Start 2.310 00 GHz Stop 2.390 00 GHz Freq Offset #Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts) 0.00000000 Hz X Axis 2.342 27 GHz 2.389 47 GHz Amplitude 74.39 dBµV/m 49.78 dBµV/m Marker Trace Туре (1) Freq (1)Freq Signal Track 0n <u>0ff</u> Copyright 2000-2005 Agilent Technologies

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

Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

#### \* Agilent Freq/Channel Mkr2 2.376 00 GHz Center Freq 39.66 dBpV/m Ref 94 dB**µ**V/m Atten 10 dB 2.35000000 GHz #Peak Log 10 Start Freq ldB/ 2.31000000 GHz ø Stop Freq 2.39000000 GHz 54.0 CF Step dB**µ**V, 2.40200000 GHz LgAv Auto Start 2.310 00 GHz Stop 2.390 00 GHz Freq Offset #Res BW 1 MHz #VBW 10 Hz Sweep 6.238 s (601 pts) 0.00000000 Hz Type Freq Amplitude 47.75 dBµV/m 39.66 dBµV/m Marker Trace (1) (1) 2.342 67 GHz Freq Signal Track 0n <u>0ff</u> Copyright 2000-2005 Agilent Technologies

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

Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

#### \* Agilent Freq/Channel Mkr2 2.389 87 GHz Center Freq 47.85 dBpV/m Ref 94 dB**µ**V/m Atten 10 dB 2.35000000 GHz #Peak Log 10 Start Freq dB/ 2.31000000 GHz Stop Freq 2.39000000 GHz 74.0 **CF Step** dB₽V∕ 2.40200000 GHz \_gAv Auto <u>Man</u> Start 2.310 00 GHz Stop 2.390 00 GHz Freq Offset #Res BW 1 MHz #VBW 1 MHz Sweep 1 ms (601 pts) 0.00000000 Hz Amplitude 76.32 dBµV/m 47.85 dBµV/m Type Freq X Axis 2.348 40 GHz 2.389 87 GHz Marker Trace (1) (1)Freq Signal Track 0n <u>0ff</u> Copyright 2000-2005 Agilent Technologies

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

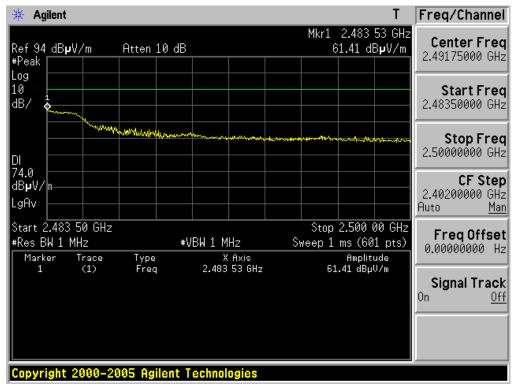
Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

#### \* Agilent Freq/Channel Mkr2 2.376 00 GHz Center Freq Ref 94 dB**µ**V/m Atten 10 dB 36.72 dBpV/m 2.35000000 GHz #Peak Log 10 Start Freq ldB/ 2.31000000 GHz Q Stop Freq -2 **◊** 2.39000000 GHz 54.0 **CF Step** dB**µ**V, 2.40200000 GHz LgAv Auto Start 2.310 00 GHz Stop 2.390 00 GHz Freq Offset #Res BW 1 MHz #VBW 10 Hz Sweep 6.238 s (601 pts) 0.00000000 Hz Type Freq X Axis 2.347 60 GHz Amplitude 47.63 dBµV/m 36.72 dBµV/m Marker Trace (1) (1) 2.376 00 GHz Freq Signal Track 0n <u>0ff</u> Copyright 2000-2005 Agilent Technologies

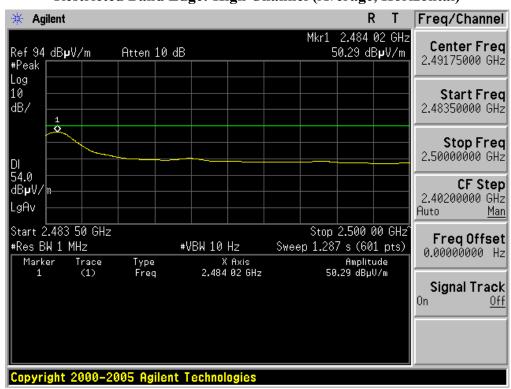
## Restricted Band Edge: Low Channel (Average, Vertical)

Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

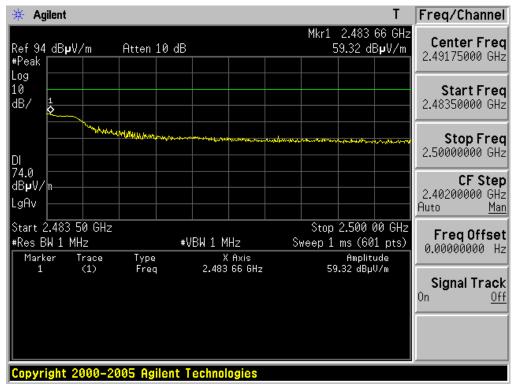
#### Restricted Band Edge: High Channel (Peak, Horizontal)



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



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



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



## Harmonic and other emissions Measurement Data: Fundamental Frequency = 2402MHz

Frequency ANT		Reading(dBuV)		T.F	Result(dBuV/m)			Limit(dBuV/m)			Margin(dB)			
(MHz)	Pol	QP	PK	AV	(dB/m)	QP	PK	AV	QP	PK	AV	QP	PK	AV
299.990	Hor	36.30	-	-	-5.65	30.65	-	-	46.00	-	-	15.35	-	-
4804	Hor	-	48.83	41.83	6.25	-	55.08	48.08	-	74.00	54.00	-	18.92	5.92
4804	Ver	-	51.32	43.79	6.25	-	57.57	50.04	-	74.00	54.00	-	16.43	3.96

#### Harmonic and other emissions Measurement Data: Fundamental Frequency = 2441MHz

Frequency	ANT	Reading(dBuV)		T.F	Result(dBuV/m)		Limit(dBuV/m)			Margin(dB)				
(MHz) Pol	QP	PK	AV	(dB/m)	QP	PK	AV	QP	PK	AV	QP	PK	AV	
298.580	Hor	34.70	-	-	-3.19	31.51	-	-	46.00	-	-	14.49	-	-
4882	Hor	-	51.43	43.96	6.55	-	57.98	50.51	-	74.00	54.00	-	16.02	3.49
4882	Ver	-	52.68	45.30	6.55	-	59.23	51.85	-	74.00	54.00	-	14.77	2.15

#### Harmonic and other emissions Measurement Data: Fundamental Frequency = 2480MHz

Frequency ANT		Reading(dBuV)		T.F	Result(dBuV/m)		Limit(dBuV/m)			Margin(dB)				
(MHz)	Pol	QP	PK	AV	(dB/m)	QP	PK	AV	QP	PK	AV	QP	PK	AV
300.190	Hor	35.30	-	-	-6.16	29.14	-	-	46.00	-	-	16.86	-	-
4960	Hor	-	49.14	41.42	6.92	-	56.06	48.34	-	74.00	54.00	-	17.94	5.66
4960	Ver	-	51.84	44.58	6.92	-	58.76	51.50	-	74.00	54.00	-	15.24	2.50

#### Note.

- 1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
- 2. If peak result meet AV limit, AV measurement is omitted.
- 3. Sample Calculation.

$$Margin = Limit - Result \qquad / \qquad Result = Reading + T.F \qquad / \qquad T.F = AF + CL - AG$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

#### 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 and average detector mode 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: N/A

Note: This test item is not applicable because when this device is in charging status, the Bluetooth function is disabled.

#### - 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

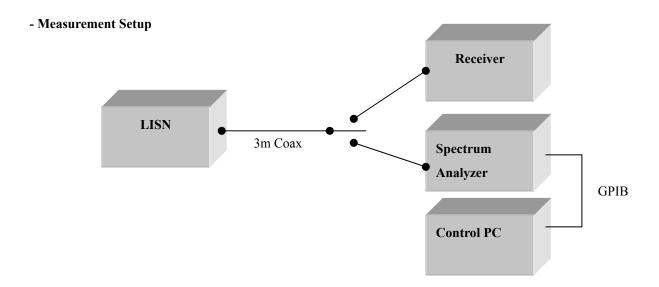


Figure 2: Measurement setup for AC Conducted Emission

## 3.3 Receiver requirements

## 3.3.1 AC Conducted Emissions (Receiver Mode)

#### - Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its receiving function. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) 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: N/A

This test item is not applicable because when this device is in charging status, the Bluetooth function is disabled.

#### - Minimum Standard: FCC Part 15.107(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

## 3.3.2 Out of Band Emissions – Radiated (Receiver Mode)

#### - 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 a 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:

Frequency Range =  $30 \text{ MHz} \sim 10^{\text{th}} \text{ harmonic.}$ 

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

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

VBW = 10Hz (Average),  $VBW \ge RBW$  (Peak)

Trace = max hold

Detector function = peak

Sweep = auto

- Measurement Data: Comply (Refer to the Next page)

#### - Minimum Standard: FCC Part 15.109(a)

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

#### Other emissions Measurement Data: RX Frequency = 2402 MHz

Frequency	P	Reading	C.F	Result	Limit	Margin
299.980	Н	34.20	-5.63	28.57	46.00	17.43
-	-	-	-	-	-	-

<sup>-</sup> No other emissions were detected at a level greater than 20dB below limit.

#### Other emissions Measurement Data: RX Frequency = 2441 MHz

Frequency	P	Reading	C.F	Result	Limit	Margin
299.990	Н	34.60	-5.65	28.95	46.00	17.05
-	-	-	-	-	-	-

<sup>-</sup> No other emissions were detected at a level greater than 20dB below limit.

#### Other emissions Measurement Data: RX Frequency = 2480 MHz

Frequency	P	Reading	C.F	Result	Limit	Margin
299.720	Н	33.80	-4.98	28.82	46.00	17.18
-	-	-	-	-	-	-

<sup>-</sup> No other emissions were detected at a level greater than 20dB below limit.

# APPENDIX

# TEST EQUIPMENT FOR TESTS

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

	T	34 6 4	M 11	Cal.Due.Date	Next.Due.Date	CAN
	Туре	Manufacturer	Model	(dd/mm/yy)	(dd/mm/yy)	S/N
$\boxtimes$	Spectrum Analyzer	Agilent	E4440A	06/11/08	06/11/09	MY45304199
	Spectrum Analyzer(RE)	H.P	8563E	13/10/08	13/10/09	3551A04634
	Spectrum Analyzer	Rohde Schwarz	FSP	09/09/08	09/09/09	100385
	Power Meter	H.P	EMP-442A	10/07/08	10/07/09	GB37170413
	Power Sensor	H.P	8481A	14/07/08	14/07/09	3318A96332
	Power Divider	Agilent	11636B	04/12/08	04/12/09	56471
	Power Splitter	Anritsu	K241B	14/10/08	14/10/09	020611
	Frequency Counter	H.P	5342A	16/09/08	16/09/09	2119A04450
	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/08	10/10/09	30604493/021031
$\boxtimes$	Digital Multimeter	H.P	34401A	13/03/09	13/03/10	3146A13475
	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-3
	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-2
	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-4
	Multifuction Synthesizer	HP	8904A	06/10/08	06/10/09	3633A08404
$\boxtimes$	Signal Generator	Rohde Schwarz	SMR20	13/03/09	13/03/10	101251
$\boxtimes$	Signal Generator	H.P	ESG-3000A	09/07/08	09/07/09	US37230529
	Amplifier	EMPOWER	BBS3Q7ELU	02/02/09	02/02/10	1020
	Vector Signal Generator	Rohde Schwarz	SMJ100A	02/02/09	02/02/10	100148
	Audio Analyzer	H.P	8903B	09/07/08	09/07/09	3011A09448
	Modulation Analyzer	H.P	8901B	18/07/08	18/07/09	3028A03029
	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	31/07/08	31/07/09	GB43461134
	Universal Radio communication Tester	Rohde Schwarz	CMU 200	13/03/09	13/03/10	107631
	Bluetooth Tester	TESCOM	TC-3000A	16/12/08	16/12/09	3000A4A0121
	BAND Reject Filter	Microwave Circuits	N0308372	06/10/08	06/10/09	3125-01DC0352
	BAND Reject Filter	Wainwright	WRCG1750	06/10/08	06/10/09	2
	High-Pass Filter	ANRITSU	MP526D	06/10/08	06/10/09	MP27756
	High-pass filter	Wainwright	WHKX2.1	N/A	N/A	1
$\boxtimes$	High-Pass Filter	Wainwright	WHKX3.0	N/A	N/A	9
	Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	10
	Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	27
	Tunable Notch Filter	Wainwright	WRCT1900.0/ 2200.0-5/40-10SSK	N/A	N/A	7
	AC Power supply	DAEKWANG	5KVA	13/03/09	13/03/10	20060321-1
	DC Power Supply	HP	6622A	13/03/09	13/03/10	3448A03760
	DC Power Supply	HP	6633A	13/03/09	13/03/10	3524A06634
$\boxtimes$	HORN ANT	ETS	3115	13/06/08	13/06/09	6419
	HORN ANT	ETS	3115	10/09/08	10/09/09	21097
	HORN ANT	A.H.Systems	SAS-574	13/06/08	13/06/09	154
	HORN ANT	A.H.Systems	SAS-574	13/06/08	13/06/09	155
	Dipole Antenna	Schwarzbeck	VHA9103	25/11/08	25/11/09	2116
	Dipole Antenna	Schwarzbeck	VHA9103	25/11/08	25/11/09	2117
	Dipole Antenna	Schwarzbeck	UHA9105	25/11/08	25/11/09	2261
	Dipole Antenna	Schwarzbeck	UHA9105	25/11/08	25/11/09	2262

	Туре	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
	Coaxial Fixed Attenuators	Agilent	8491B	01/08/08	01/08/09	MY39260700
	Coaxial Fixed Attenuators	Agilent	8491B	15/07/08	15/07/09	MY39260699
	Attenuator (10dB)	WEINSCHEL	23-10-34	01/10/08	01/10/09	BP4386
	Attenuator (20dB)	WEINSCHEL	86-20-11	06/10/08	06/10/09	432
	Attenuator (10dB)	WEINSCHEL	86-10-11	06/10/08	06/10/09	446
	Attenuator (10dB)	WEINSCHEL	86-10-11	06/10/08	06/10/09	408
	Attenuator (40dB)	WEINSCHEL	57-40-33	01/10/08	01/10/09	NN837
	Attenuator (30dB)	JFW	50FH-030-300	13/03/09	13/03/10	060320-1
	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	11/07/08	11/07/09	788
	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	11/07/08	11/07/09	790
	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0215CAN	11/07/08	11/07/09	112
$\boxtimes$	Amplifier (30dB)	Agilent	8449B	13/10/08	13/10/09	3008A01590
	RF Power Amplifier	OPHIRRF	5069F	09/07/08	09/07/09	1006
	Software	Agilent	Benchlink	N/A	N/A	A.01.09 021211
	EMI TEST RECEIVER	R&S	ESU	02/02/09	02/02/10	100014
	BILOG ANTENNA	SCHAFFNER	CBL6112B	13/06/08	13/06/09	2737
	Amplifier (22dB)	H.P	8447E	05/02/09	05/02/10	2945A02865
	Position Controller	TOKIN	5905A	N/A	N/A	N/A
	Software	ToYo EMI	EP5/RE	N/A	N/A	Ver 2.0.800
$\boxtimes$	EMI TEST RECEIVER	R&S	ESCI	13/05/08	13/05/09	100364
$\boxtimes$	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A	13/06/08	13/06/09	590
$\boxtimes$	BICONICAL ANT.	Schwarzbeck	VHA 9103	13/06/08	13/06/09	2233
	LOG-PERIODIC ANT.	Schwarzbeck	UHALP 9108-A1	30/09/08	30/09/09	1098
	BICONICAL ANT.	Schwarzbeck	VHA 9103	30/09/08	30/09/09	91031946
$\boxtimes$	Low Noise Pre Amplifier	TSJ	MLA-100K01-B01-2	13/03/09	13/03/10	1252741
	Amplifier (25dB)	Agilent	8447D	21/05/08	21/05/09	2944A10144
	Amplifier (25dB)	Agilent	8447D	18/08/08	18/08/09	2648A04922
$\boxtimes$	Position Controller	TOKIN	5901T	N/A	N/A	14173
	Software	AUDIX	e3	N/A	N/A	Ver 3.0
	Driver	TOKIN	5902T2	N/A	N/A	14174
$\boxtimes$	Spectrum Analyzer(CE)	H.P	8591E	26/04/08	26/04/09	3649A05889
	LISN	Kyoritsu	KNW-407	04/08/08	04/08/09	8-317-8
$\boxtimes$	LISN	Kyoritsu	KNW-242	11/09/08	11/09/09	8-654-15
$\boxtimes$	CVCF	NF Electronic	4420	N/A	N/A	304935/337980
$\boxtimes$	Software	ToYo EMI	EP5/CE	N/A	N/A	Ver 2.0.801
$\boxtimes$	DC BLOCK	Hyuplip	KEL-007	N/A	N/A	7-1581-5
$\boxtimes$	50 ohm Terminator	HME	CT-01	22/01/09	22/01/10	N/A
$\boxtimes$	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	11/09/08	11/09/09	4N-170-3