



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

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

<http://www.digitalemcc.com>

CERTIFICATION OF COMPLIANCE

Samsung Electronics Huizhou Co., Ltd.

516-229 Chen Jiang Town, Huizhou-City, Guangdong-Province, China.

Dates of Tests: January 12 ~ 27, 2005

Test Report S/N: DR50110502A

Test Site : DIGITAL EMC CO., LTD.

FCC ID

A3LBTW200

APPLICANT

Samsung Electronics Huizhou Co., Ltd.

FCC Classification	:	FHSS Sequence Spread Spectrum (FHSS)
Device name	:	2ch Audio Transceiver
Manufacturer	:	Samsung Electronics Huizhou Co., Ltd
Model name	:	BTW200
Test Device Serial number	:	Identical prototype
FCC Rule Part(s)	:	FCC Part 15.247 Subpart C; ANSI C-63.4-2001
Frequency Range	:	2402 ~ 2480 MHz
Max. Output power	:	0.028 W Conducted
Data of issue	:	January 30, 2005

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

TABLE OF CONTENTS

1. GENERAL INFORMATION'S	3
2. INFORMATION'S ABOUT TEST ITEM	4
3. TEST REPORT	5
3.1 SUMMARY OF TESTS	5
3.2 TRANSMITTER REQUIREMENTS	6
3.2.1 CARRIER FREQUENCY SEPARATION	6
3.2.2 NUMBER OF HOPPING FREQUENCIES	8
3.2.3 20 dB BANDWIDTH	11
3.2.4 TIME OF OCCUPANCY (Dwell Time)	14
3.2.5 PEAK OUTPUT POWER	16
3.2.6 BAND - EDGE (at 20 dB blow)	19
3.2.7 OUT OF BAND EMISSION - RADIATED	26
3.2.8 AC CONDUCTED EMISSIONS	27
3.3 RECEIVER REQUIREMENTS	28
3.3.1 AC CONDUCTED EMISSIONS	28
3.3.2 OUT OF BAND EMISSION - RADIATED	29
ANNEX TEST EQUIPMENT USED FOR TESTS	30

1. General information's

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 : demc@unitel.co.kr

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 competents of calibration and testing laboratory".

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

Test operator: engineer

January 30, 2005

Won -Jong LEE



Data

Name

Signature

Report Reviewed By: Technical Director

January 30, 2005

Harvey Sung



Data

Name

Signature

Ordering party:

Company name : Samsung Electronics Huizhou Co., Ltd.
Address : Chen Jiang Town, Guangdong-Province,
Zip code : 516-229
City/town : Huizhou-City
Country : China
Date of order : January 12, 2005

2. Information's about test item

A3LBTW200

2.1 Equipment information

Equipment model name	BTW200
Type of equipment	Bluetooth Module
Frequency band	2402 ~ 2480 MHz
Type of Modulation	GFSK
Channel Spacing	1.0 MHz
Type of antenna	Chip Antenna (Max. Gain: 4.4dBi)
Power	DC 5 V by main system

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 VDC (powered by power supply)

2.4 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 Section(s)	Parameter	Limit	Test Condition	Status (note 1)
I. Transmit mode(Tx)				
15.247(a)	Carrier Frequency Separation	> 25 kHz	Conducted	C
	Number of Hopping Frequencies	> 75 hops		C
	20 dB Bandwidth	< 1 MHz		C
	Dwell Time	0.4 seconds within a 30 second period per any frequency		C
15.247(b)	Transmitter Output Power	< 1 Watt		C
15.247(c)	Band-edge (or Occupied BW for IC)	2400 < f < 2483.5 MHz		C
	Out of Band Emissions (Bandwidth at 20 dB blow)	The radiated emission to any 100 kHz of outband shall be at least 20dB below the highest inband spectral density.		C
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	< FCC 15.209 limits	Radiated	C
15.207	AC Conducted Emissions	EN 55022	Line Conducted	NA
II. Receive mode(Rx)				
15.207	AC Conducted Emissions	EN 55022	Line Conducted	NA
15.209	Occupied Band Width Out-of-Band Emissions (Band Width at 20dB below)	< FCC 15.209 limits	Radiated	C
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2001

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: Complies

Frequency of marker #1 (MHz)	Frequency of marker #2 (MHz)	Test Results	
		Carrier Frequency Separation (MHz)	Result
2441.020	2442.015	0.995	Complies

- 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

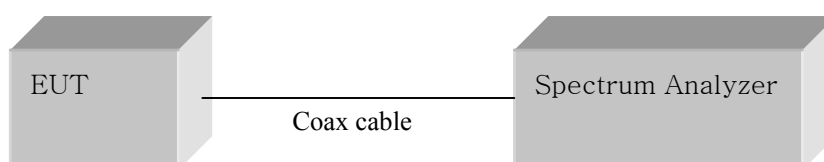
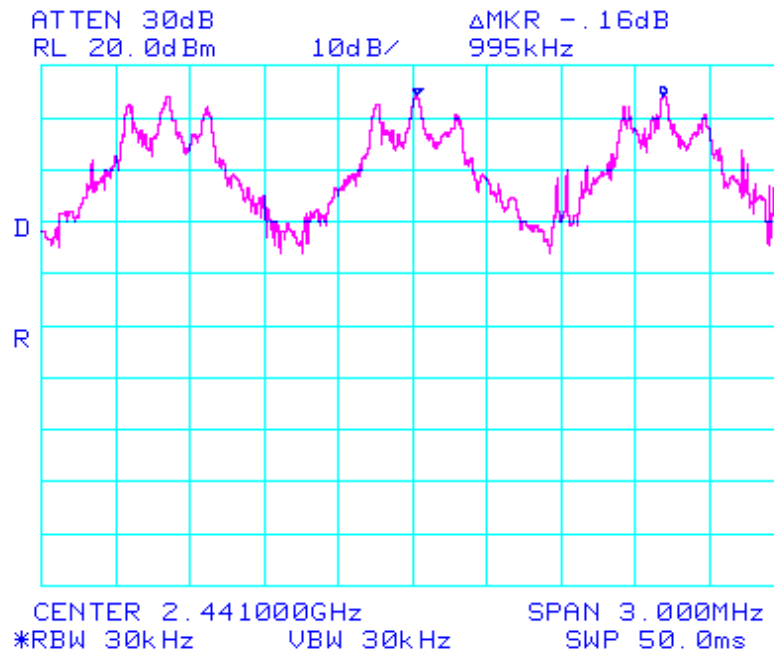


Figure 1: Measurement setup for the carrier frequency separation

TEST EQUIPMENT USED: 01, 19, 50

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 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 = 2464.5MHz, Stop = 2489.5 MHz

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

VBW = 300 kHz (VBW $\geq$ RBW) Detector function = peak

Trace = max hold Span = 25MHz

Measurement Data: **Complies**

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

- See next pages for actual measured spectrum plots.

Minimum Standard:

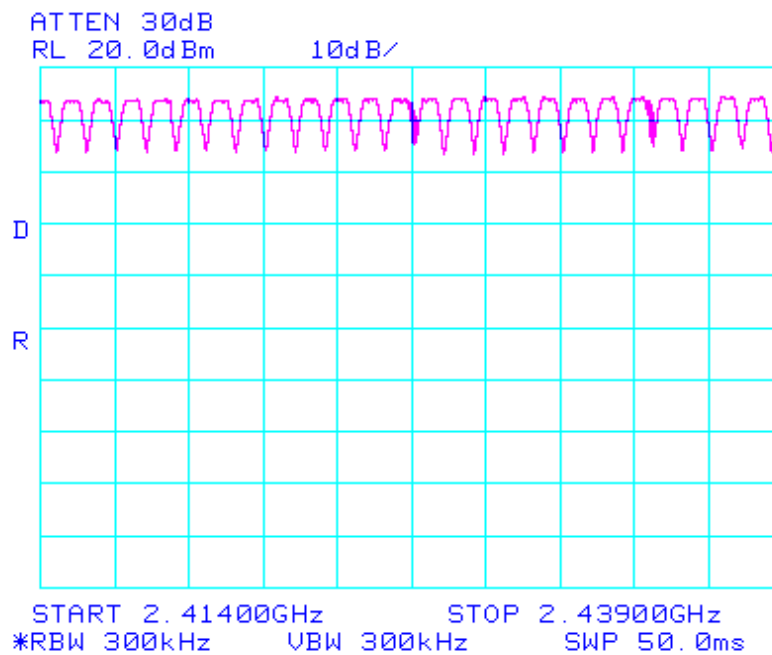
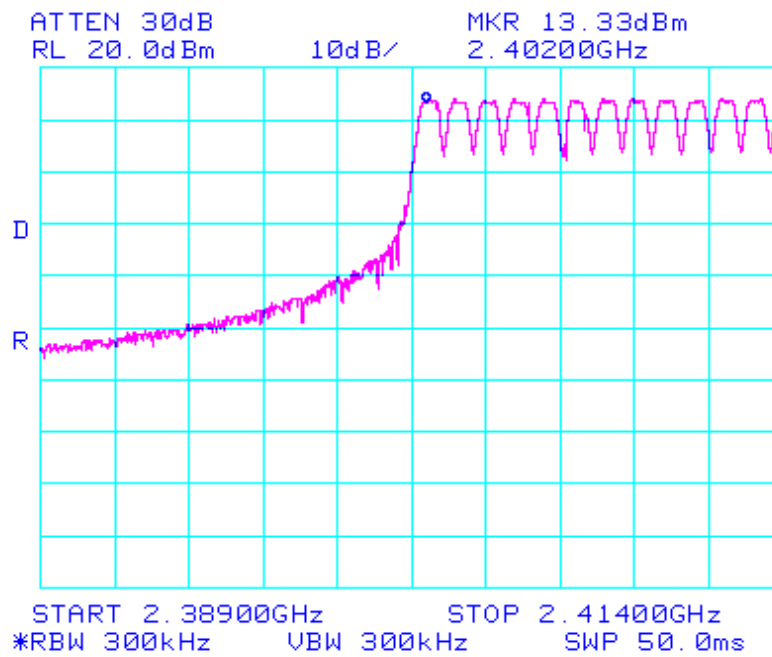
At least 75 hops

Measurement Setup

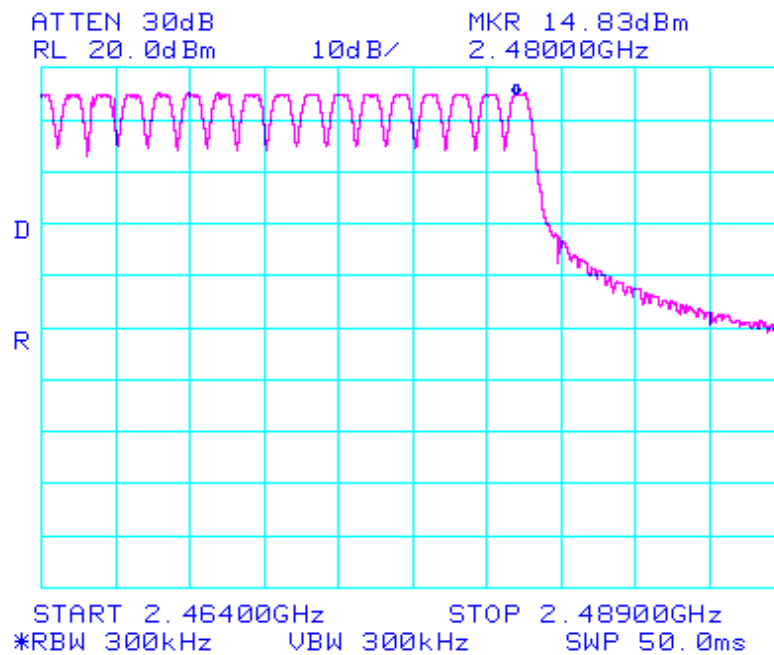
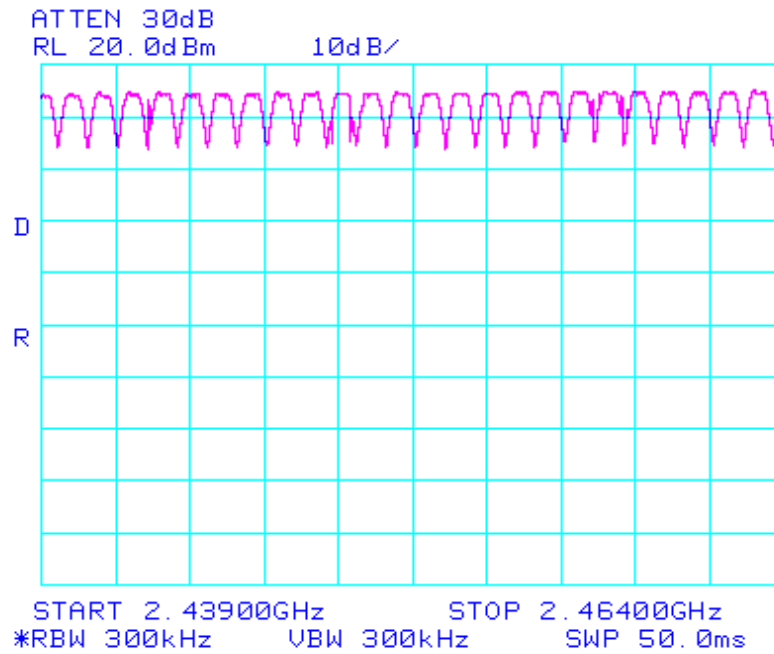
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 02, 19, 50

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 kHz (VBW $\geq$ RBW) Detector function = peak

Trace = max hold

Measurement Data: **Complies**

Frequency (MHz)	Channel No.	Test Results	
		Measured Bandwidth (MHz)	Result
2402	1	0.733	Complies
2441	40	0.743	Complies
2480	79	0.737	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

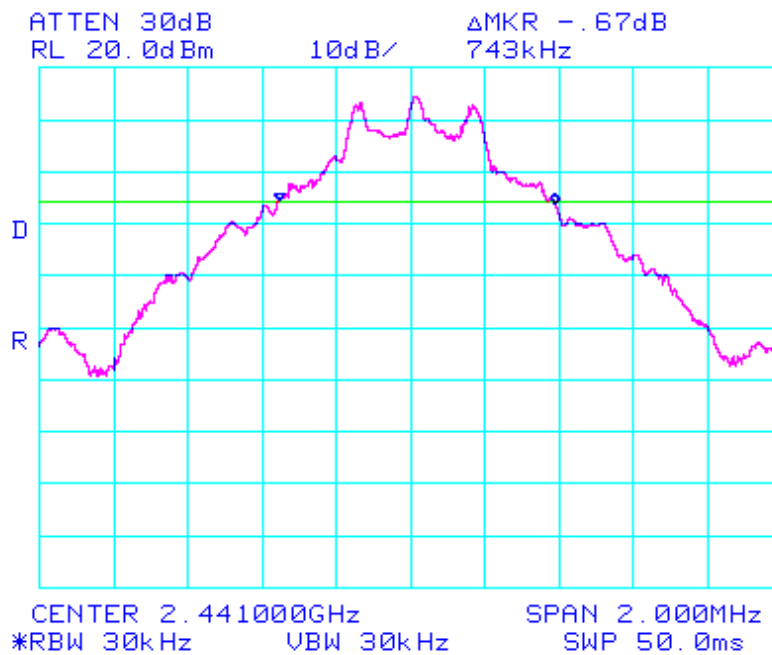
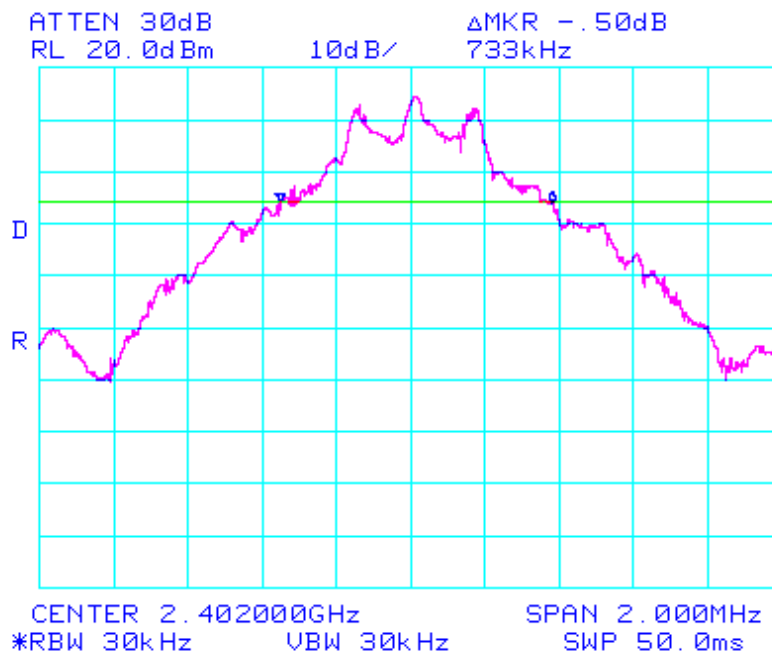
The transmitter shall have a maximum 20dB bandwidth of 1 MHz.

Measurement Setup

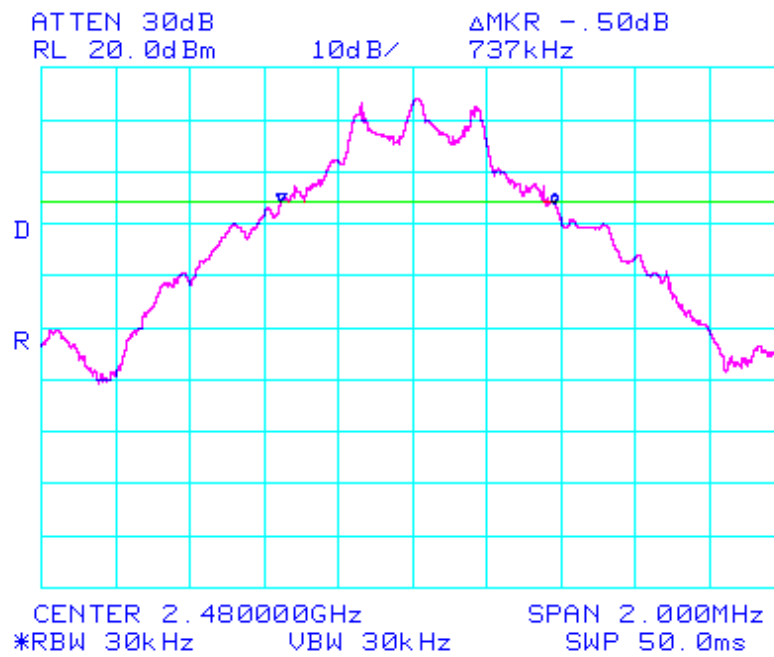
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 01, 19, 50.....

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 $\geq$ RBW)

Trace = max hold

Detector function = peak

Measurement Data: **Complies**

- See next pages for actual measured spectrum plots.

Minimum Standard:

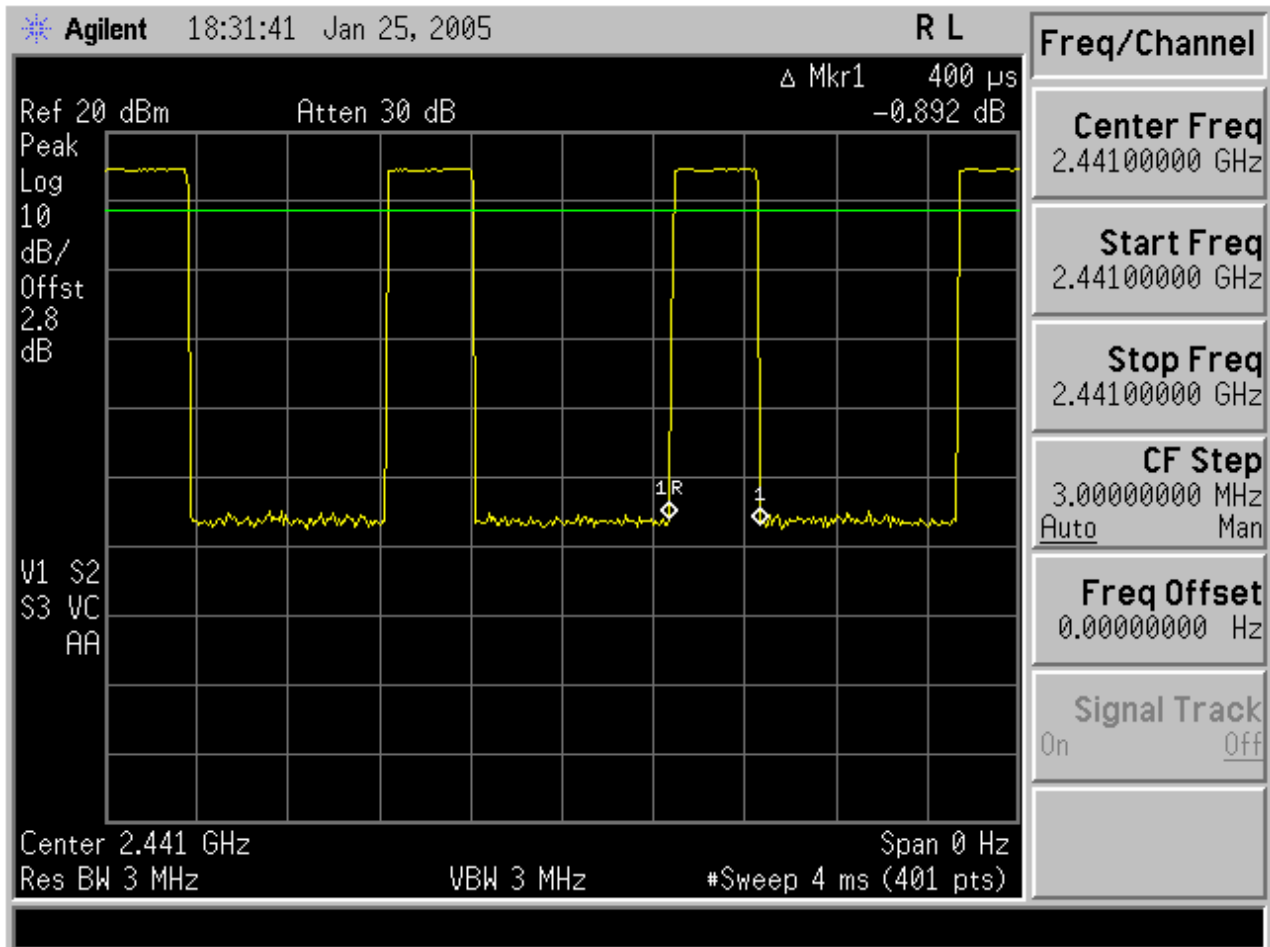
0.4 seconds within a 30 second period per any frequency

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 01, 19, 50

Dwell Time for BTW200



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 $\geq$ RBW)

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data: **Complies**

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2402	1	14.33	0.027	Complies
2441	40	14.50	0.028	Complies
2480	79	14.17	0.026	Complies

- See next pages for actual measured spectrum plots.

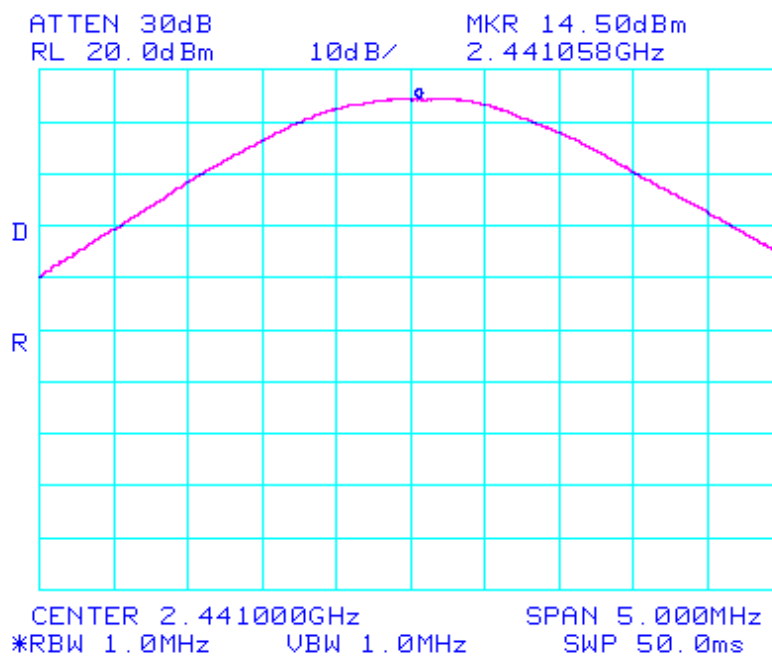
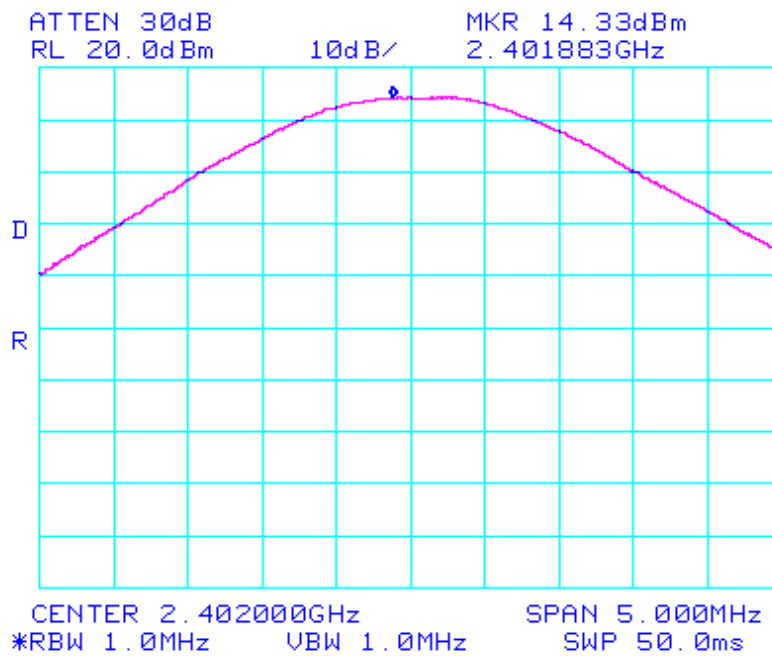
Minimum Standard:	< 1W
--------------------------	------

Measurement Setup

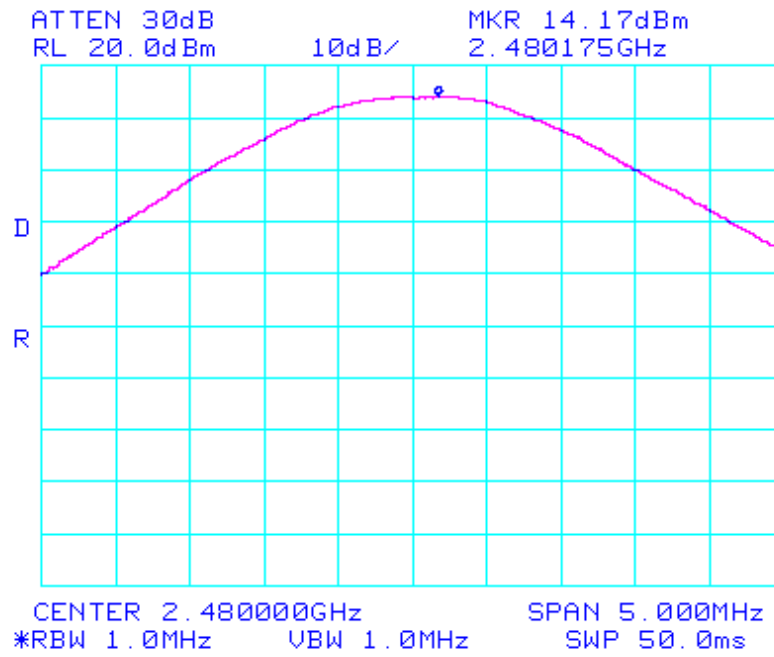
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 01, 19, 50

Peak Output Power



Peak Output Power



3.2.6 Band - edge (at 20 dB blow)

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.

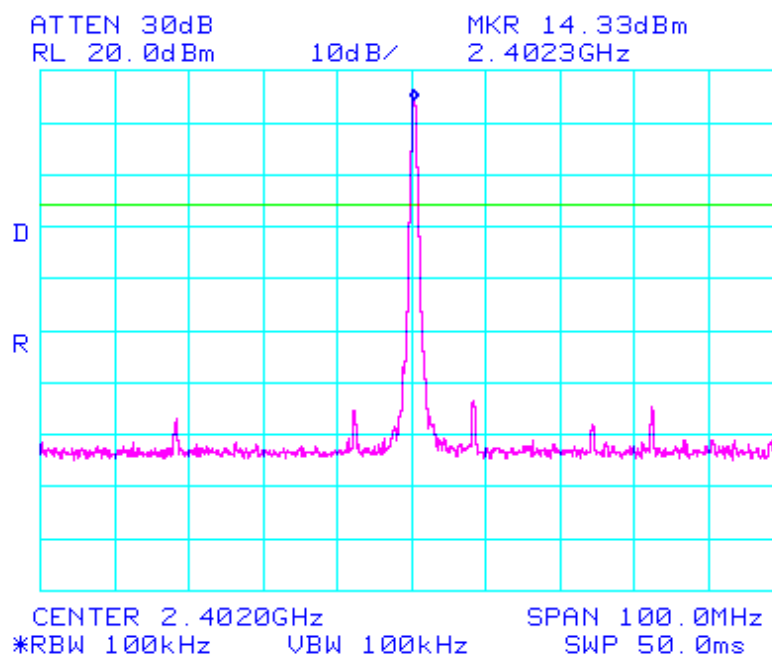
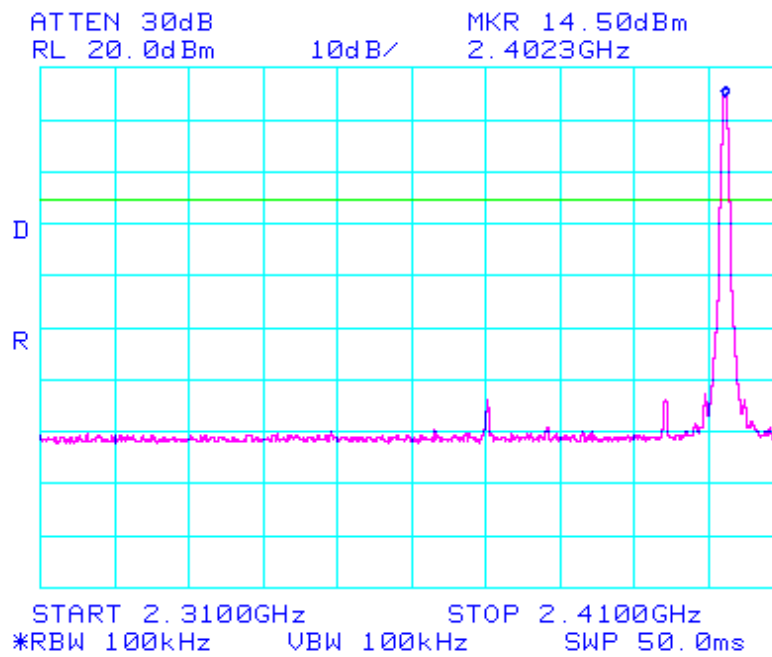
Minimum Standard:	> 20 dBc
--------------------------	----------

Measurement Setup

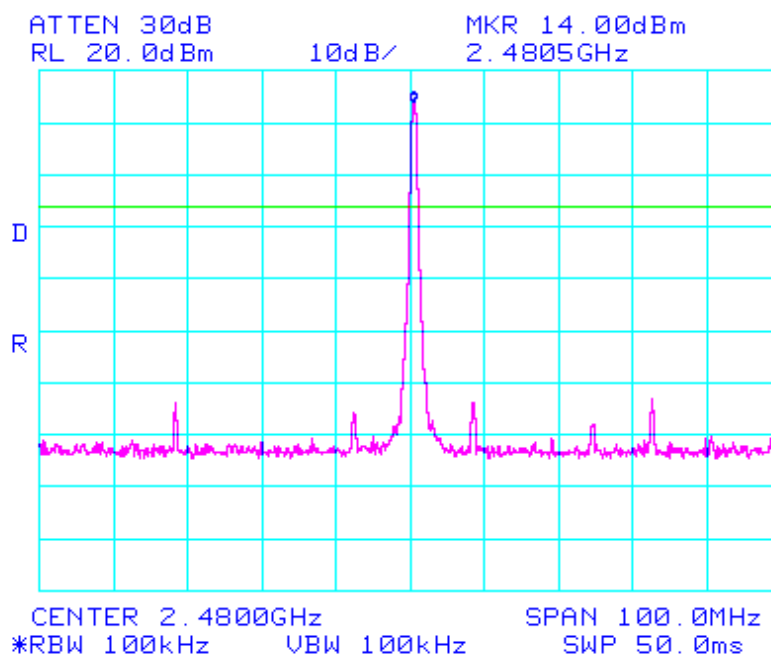
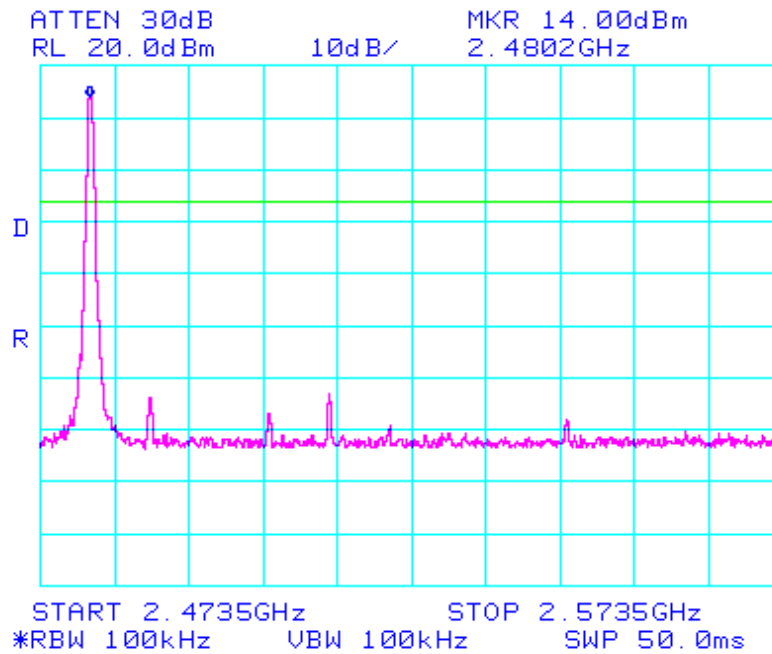
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 01, 02, 19, 50

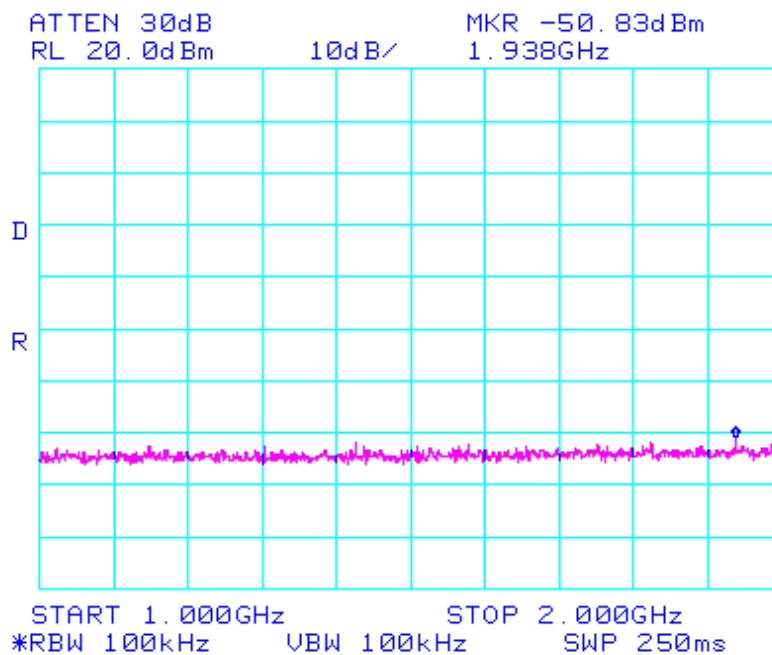
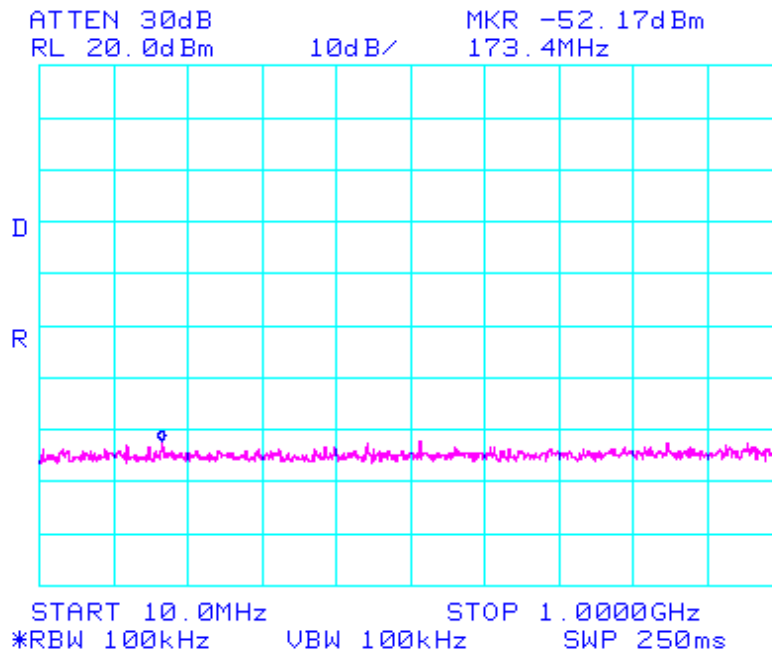
Band - edge (at 20 dB blow)



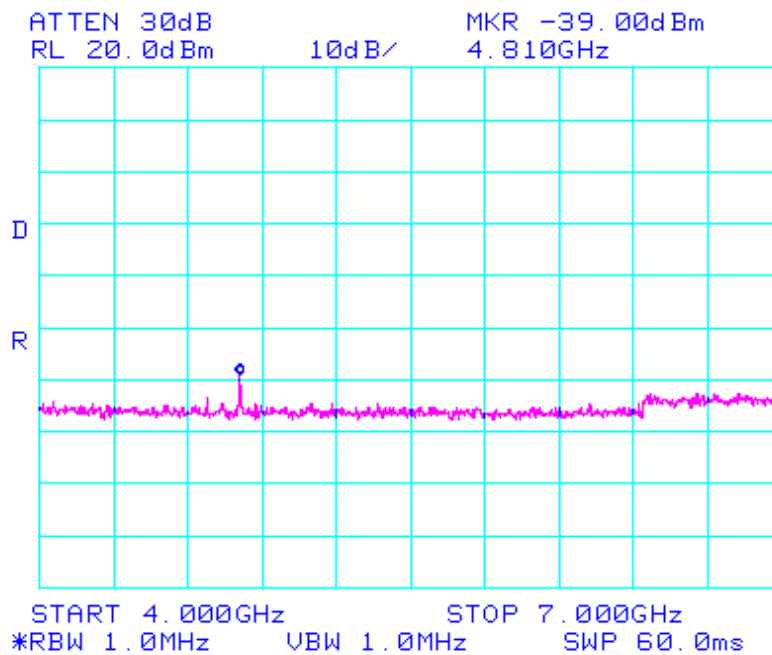
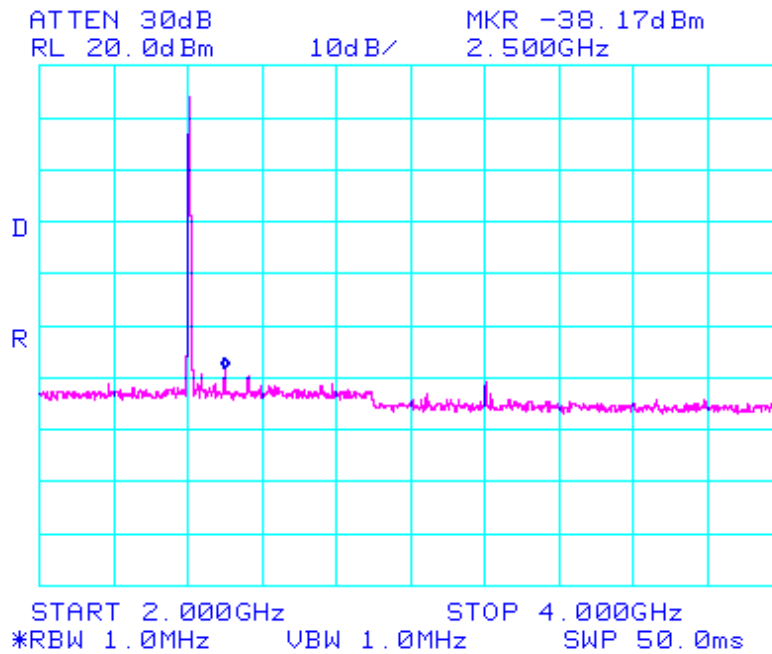
Band - edge (at 20 dB blow)



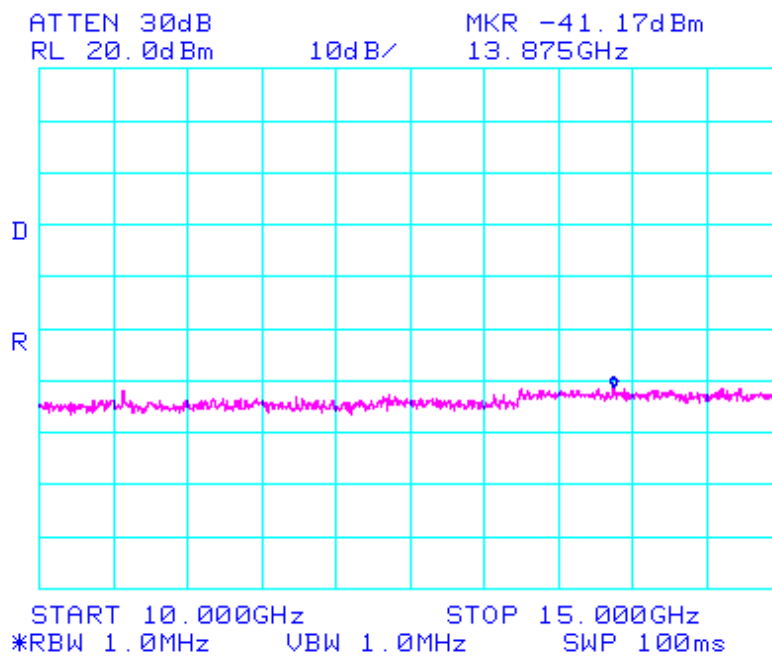
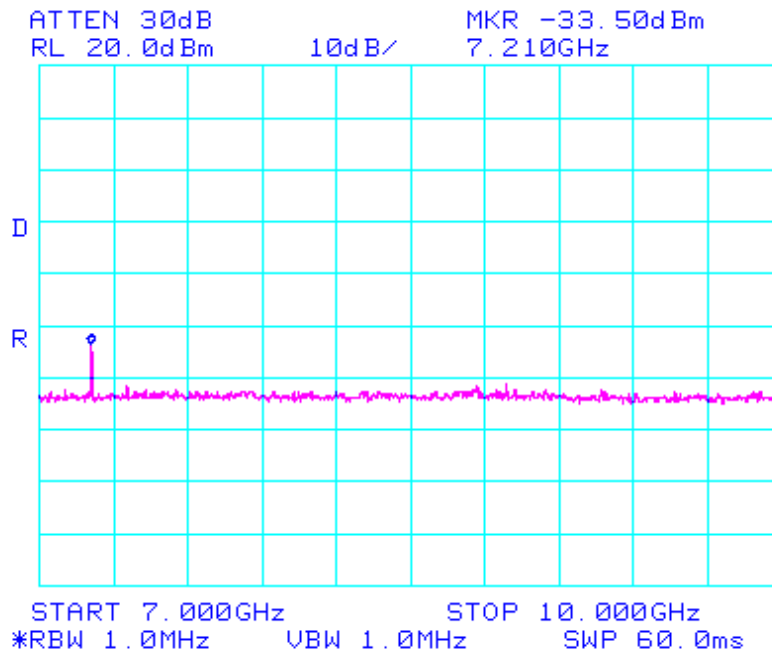
Band - edge (at 20 dB blow)
Frequency Range = 10 MHz ~ 10th harmonic.



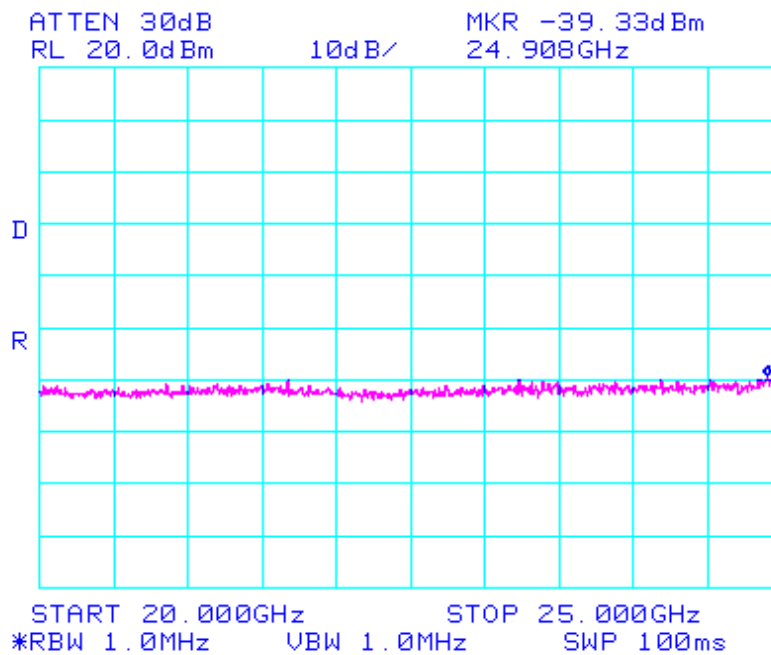
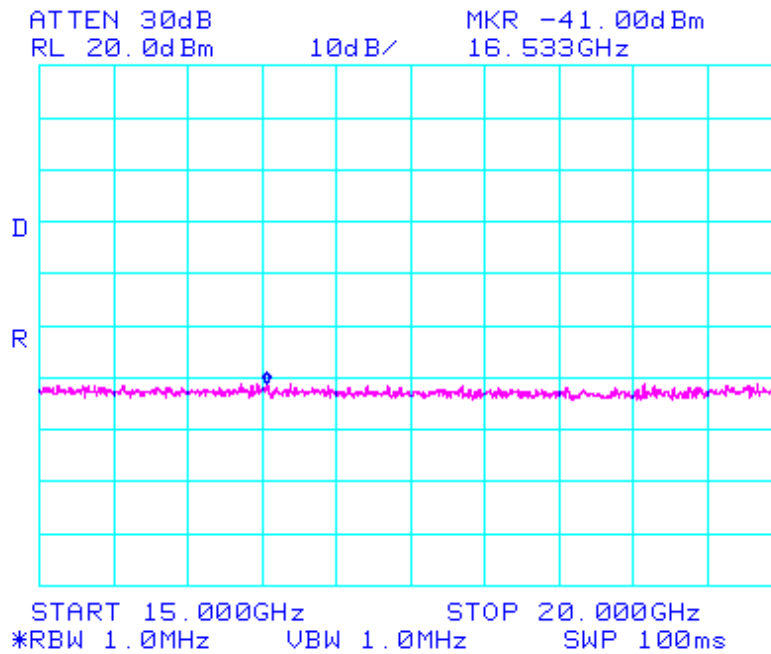
Band - edge (at 20 dB blow)
Frequency Range = 10 MHz ~ 10th harmonic.



Band - edge (at 20 dB blow)
Frequency Range = 10 MHz ~ 10th harmonic.



Band - edge (at 20 dB blow)
Frequency Range = 10 MHz ~ 10th harmonic.



3.2.7 Out of band Emission - Radiated

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 ~ 10th harmonic.

RBW = 120 kHz (30MHz ~ 1 GHz)

VBW $\geq$ RBW

= 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data: **Complies**

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

Minimum Standard: FCC Part 15.209(a)

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

** 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.

TEST EQUIPMENT USED: 02, 22, 30, 31, 33, 34, 39, 40, 41, 47, 49

3.2.8 AC 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: Not Apply

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

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

* Decreases with the logarithm of the frequency

Measurement Setup

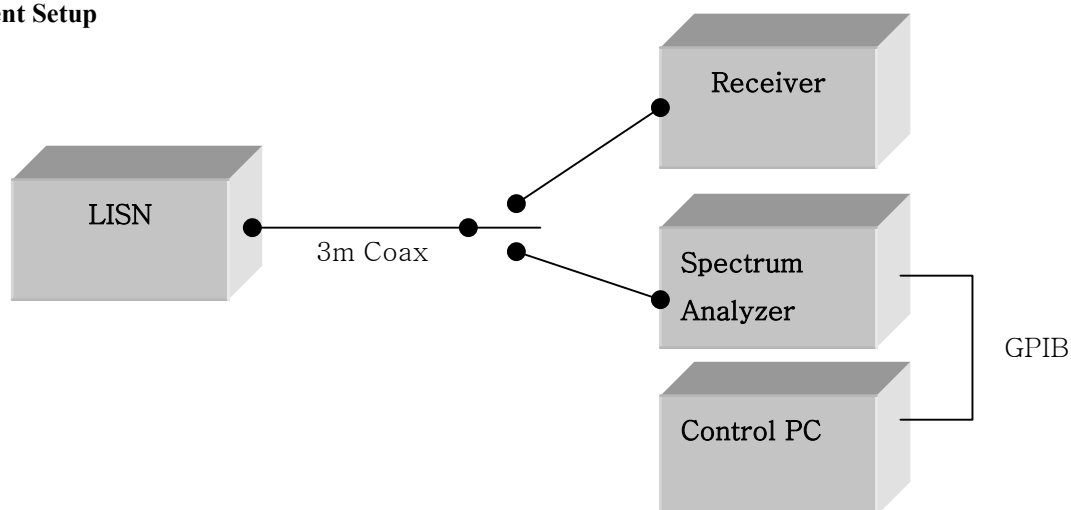


Figure 2: Measurement setup for AC Conducted Emission

TEST EQUIPMENT USED: 42, 43, 44, 45, 46, 48

3.3 Receiver requirements

3.3.1 AC 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 receiving function. 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: Not Apply

Minimum Standard: FCC Part 15.107(a)/EN 55022

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

* Decreases with the logarithm of the frequency

Measurement Setup

Same as the Chapter 3.2.9 (Figure 2)

TEST EQUIPMENT USED: 42, 43, 44, 45, 46, 48

3.3.2 Out of Band 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 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 MHz ~ 10th harmonic.

RBW = 120 kHz (30MHz ~ 1 GHz)

VBW $\geq$ RBW

= 1 MHz (1 GHz ~ 10th harmonic)

Trace = max hold

Detector function = peak

Sweep = auto

Measurement Data: **Complies**

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

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

TEST EQUIPMENT USED: 02, 22, 30, 31, 33, 34, 39, 40, 41, 47, 49

APPENDIX

TEST EQUIPMENT USED FOR TESTS

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

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
01	Spectrum Analyzer	Agilent	E4404B	19/11/05	US41061134
02	Spectrum Analyzer	H.P	8563E	25/09/05	3551A04634
03	Power Meter	H.P	EPM-442A	15/07/05	GB37170413
04	Power Sensor	H.P	8481A	15/07/05	3318A96332
05	Frequency Counter	H.P	5342A	07/10/05	2119A04450
06	Multifunction Synthesizer	H.P	8904A	07/10/05	3633A08404
07	Signal Generator	H.P	8673D	26/09/05	2844A00753
08	Signal Generator	H.P	E4421A	15/07/05	US37230529
09	Signal Generator	H.P	8657A	26/05/05	3430U02049
10	Audio Analyzer	H.P	8903B	21/07/05	3011A0944B
11	Modulation Analyzer	H.P	8901B	15/07/05	3028A03029
12	Sensor Module	H.P	11722A	15/07/05	3111A04665
13	Oscilloscope	LeCroy	9314A	10/10/05	93144390
14	CDMA Mobile Station Test Set	H.P	8924C	07/10/05	US35360688
15	Power Splitter	WEINSCHEL	1593	07/10/05	332
16	BAND Reject Filter	Microwave circuits INC.	NO308372	07/10/05	3125-01DC0312
17	BAND Reject Filter	Wainwright	WRCG1750	07/10/05	SN2
18	AC Power supply	DAEKWANG	5KVA	03/04/05	N/A
19	DC Power Supply	H.P	6622A	24/03/05	465487
20	Attenuator (30dB)	H.P	8498A	07/10/05	50101
21	Attenuator (10dB)	WEINSCHEL	23-10-34	07/10/05	BP4387
22	HORN ANT	EMCO	3115	04/04/05	6419
23	HORN ANT	EMCO	3115	01/10/05	21097
24	HORN ANT	A.H.Systems	SAS-574	09/11/06	154
25	HORN ANT	A.H.Systems	SAS-574	09/11/06	155
26	Dipole Antenna	Schwarzbeck	VHA9103	29/10/05	2116

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
27	Dipole Antenna	Schwarzbeck	VHA9103	29/10/05	2117
28	Dipole Antenna	Schwarzbeck	UHA9105	29/10/05	2261
29	Dipole Antenna	Schwarzbeck	UHA9105	29/10/05	2262
30	RFI/FIELD Intensity Meter	Kyorits	KNM-504D	25/07/05	SN-161-4
31	Frequency Converter	Kyorits	KCV-604C	25/07/05	4-230-3
32	TEMP & HUMIDITY Chamber	JISCO	J-RHC2	14/09/05	021031
33	Log Periodic Antenna	Schwarzbeck	UHALP9108A1	29/10/05	1098
34	Biconical Antenna	Schwarzbeck	VHA9103	29/10/05	VHA91031946
35	Digital Multimeter	H.P	34401A	07/04/05	3146A13475
36	Attenuator (10dB)	WEINSCHEL	23-10-34	07/10/05	BP4386
37	High-Pass Filter	ANRITSU	MP526	12/05/05	M27756
38	Attenuator (3dB)	Agilent	8491B	15/09/05	58177
39	Amplifier (25dB)	Agilent	8447D	08/10/05	2944A10144
40	Position Controller	TOKIN	5901T	N/A	14173
41	Driver	TOKIN	5902T2	N/A	14174
42	Spectrum Analyzer	H.P	8591E	23/05/05	3649A05889
43	RFI/FIELD Intensity Meter	Kyorits	KNW-2402	07/07/05	4N-170-3
44	LISN	Kyorits	KNW-407	16/08/05	8-317-8
45	LISN	Kyorits	KNW-242	16/08/05	8-654-15
46	CVCF	NF Electronic	4400	N/A	344536 4420064
47	Software	ToYo EMI	EP5/RE	N/A	Ver 2.0.800
48	Software	ToYo EMI	EP5/CE	N/A	Ver 2.0.801
49	Software	AUDIX	e3	N/A	Ver 3.0
50	Software	Agilent	Benchlink	N/A	A.01.09 021211