



Dates of Tests: March 16~20, 2009  
Test Report S/N: LR500190903C  
Test Site : LTA CO., LTD.

## CERTIFICATION OF COMPLIANCE

FCC ID.

**UG9-UBBNH1**

APPLICANT

**Ubixon Co., Ltd.**

<b>Equipment Class</b>	:	<b>Part 15 Spread Spectrum Transmitter (DSS)</b>
<b>Manufacturing Description</b>	:	<b>Bluetooth Stereo Headset</b>
<b>Manufacturer</b>	:	<b>Ubixon Co., Ltd.</b>
<b>Model name</b>	:	<b>UBHS-NE1</b>
<b>Variant Model name</b>	:	<b>LUBIX NE1, RF-MAB2</b>
<b>Test Device Serial No.:</b>	:	<b>Identical prototype</b>
<b>Rule Part(s)</b>	:	<b>FCC Part 15.247 Subpart C; ANSI C-63.4-2003</b>
<b>Frequency Range</b>	:	<b>2402 ~ 2480MHz</b>
<b>RF power</b>	:	<b>-3.41 dBm - Conducted</b>
<b>Data of issue</b>	:	<b>March 21, 2009</b>

This test report is issued under the authority of:

The test was supervised by:




Dong -Min JUNG, Technical Manager

Kyung-Taek LEE, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. This report must not be used by the applicant to claim product endorsement by any agency.



NVLAP LAB Code.: 200723-0

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## 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 TECHNICAL CHARACTERISTICS TEST .....	6
3.2.1 CARRIER FREQUENCY SEPARATION .....	6
3.2.2 NUMBER OF HOPPING FREQUENCIES .....	8
3.2.3 20 dB BANDWIDTH .....	10
3.2.4 TIME OF OCCUPANCY (Dwell Time) .....	14
3.2.5 TRANSMITTER OUTPUT POWER .....	18
3.2.6 BAND – EDGE & SPURIOUS .....	21
3.2.7 FIELD STRENGTH OF HARMONICS .....	27
3.2.8 AC CONDUCTED EMISSIONS .....	30
<b>APPENDIX</b>	
APPENDIX TEST EQUIPMENT USED FOR TESTS .....	33

## 1. General information's

### 1-1 Test Performed

Company name : LTA Co., Ltd.  
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822  
 Web site : <http://www.ltalab.com>  
 E-mail : [chahn@ltalab.com](mailto:chahn@ltalab.com)  
 Telephone : +82-31-323-6008  
 Facsimile : +82-31-323-6010

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”.

### 1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2009-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2009-06-20	EMC accredited Lab.
FCC	U.S.A	610755	2011-04-22	FCC filing
VCCI	JAPAN	R2133, C2307	2011-06-21	VCCI registration
IC	CANADA	IC5799	2010-05-03	IC filing

## 2. Information's about test item

### 2-1 Applicant & Manufacturer

Company name : Ubixon Co., Ltd.  
 Address : 801, Ssanglim Bldg, 151-11, Ssanglim-dong, Chung-gu  
 Seoul, Korea 100-400  
 Tel / Fax : +82-2-6320-0190 / +82-2-6320-0198

### 2-2 Equipment Under Test (EUT)

Trade name : Bluetooth Stereo Headset  
 FCC ID : UG9-UBBNH1  
 Model name : UBHS-NH1  
 Variant Model name : LUBIX NE1, RF-MAB2  
 Serial number : Identical prototype  
 Date of receipt : March 16, 2009  
 EUT condition : Pre-production, not damaged  
 Antenna type : PCB Pattern antenna, Max Gain 0.6 dBi  
 Frequency Range : 2402 ~ 2480MHz  
 RF output power : -3.41 dBm -- Conducted  
 Number of channels : 79  
 Channel spacing : 1MHz  
 Channel Access Protocol : Frequency Hopping Spread Spectrum (FHSS)  
 Type of Modulation : GFSK  
 Power Source : 3.7 Vdc from Internal Battery(Lithium Ion Polymer Battery)

### 2-3 Tested frequency

	LOW	MID	HIGH
Frequency (MHz)	2402	2441	2480

### 2-4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
Note PC	SP28-M150	393B93AY200589R	SAMSUNG
-	-	-	-

### 3. Test Report

#### 3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	Carrier Frequency Separation	> 25 kHz	Conducted	C
15.247(a)	Number of Hopping Frequencies	> 15 hops		C
15.247(a)	20 dB Bandwidth 99% Bandwidth	> 1.5 MHz		C
15.247	Dwell Time	< 0.4 seconds		C
15.247(b)	Transmitter Output Power	< 250 mWatt		C
15.247(d)	Conducted Spurious emission	> 20 dBc		C
15.247(d)	Band Edge	> 20 dBc		C
15.249 / 15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)		Radiated
15.109	Field Strength	-	C	
15.207 / 15.107	AC Conducted Emissions	EN 55022	Line Conducted	C
15.203	Antenna requirement	-	-	C

*Note 1:* C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

*Note 2:* The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003

#### → Antenna Requirement

The Ubixon Co., Ltd. (FCC ID: UG9-UBBNH1) unit complies with the requirement of §15.203.

The antenna is the PCB Pattern antenna.

## 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 = 10 kHz (1% of the span or more)      Sweep = auto

VBW = 10 kHz      Detector function = peak

Trace = max hold

#### Measurement Data:

Test Results	
Carrier Frequency Separation (MHz)	Result
0.999	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 two-thirds of 20dB bandwidth of the hopping channel, whichever is greater.

#### Measurement Setup

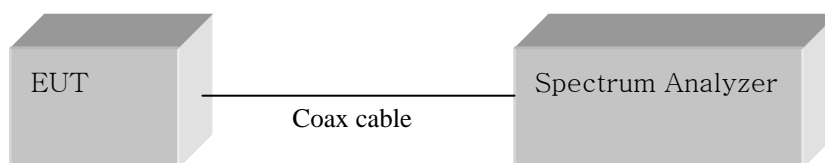
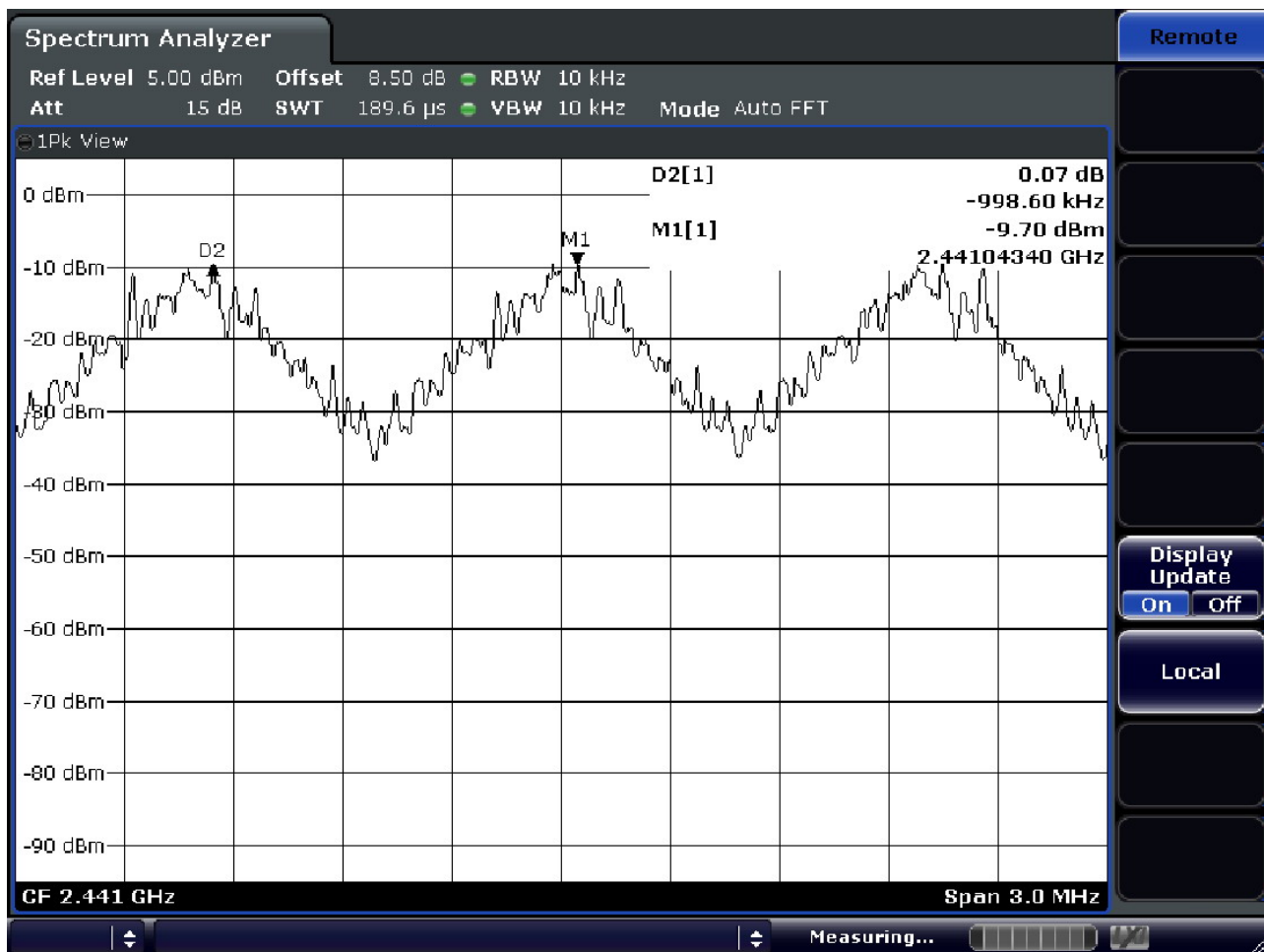


Figure 1: Measurement setup for the carrier frequency separation

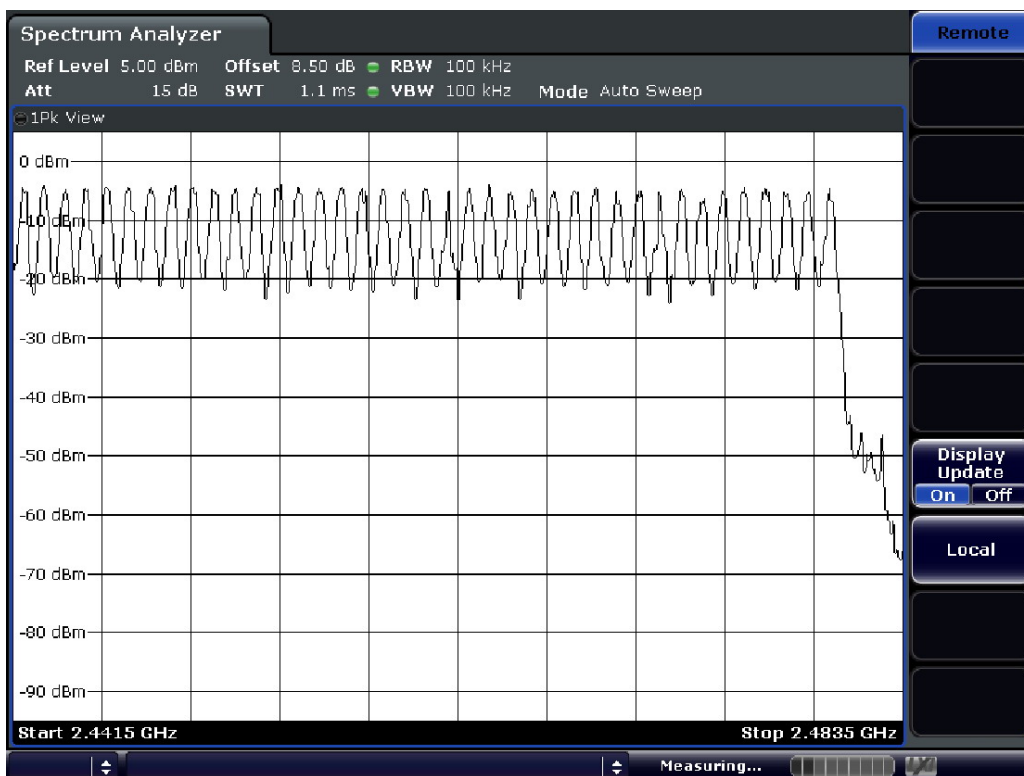
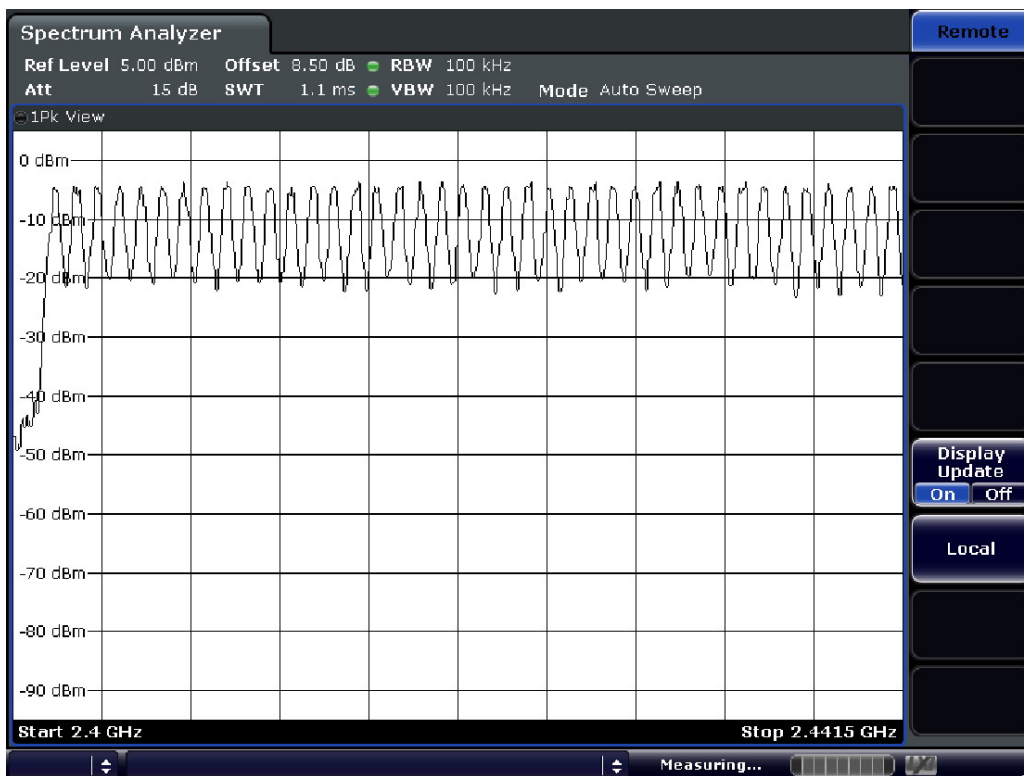
### Carrier Frequency Separation







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

RBW = 30 kHz

Sweep = auto

VBW = 30 kHz (VBW  $\geq$  RBW)

Detector function = peak

Trace = max hold

dB/Div = 5dB

#### Measurement Data: Basic Mode

Frequency (MHz)	Channel No.	Test Results(MHz)	
		20dB Bandwidth	99% Bandwidth
2402	0	0.821	0.855
2441	39	0.816	0.860
2480	78	0.821	0.860

- See next pages for actual measured spectrum plots.

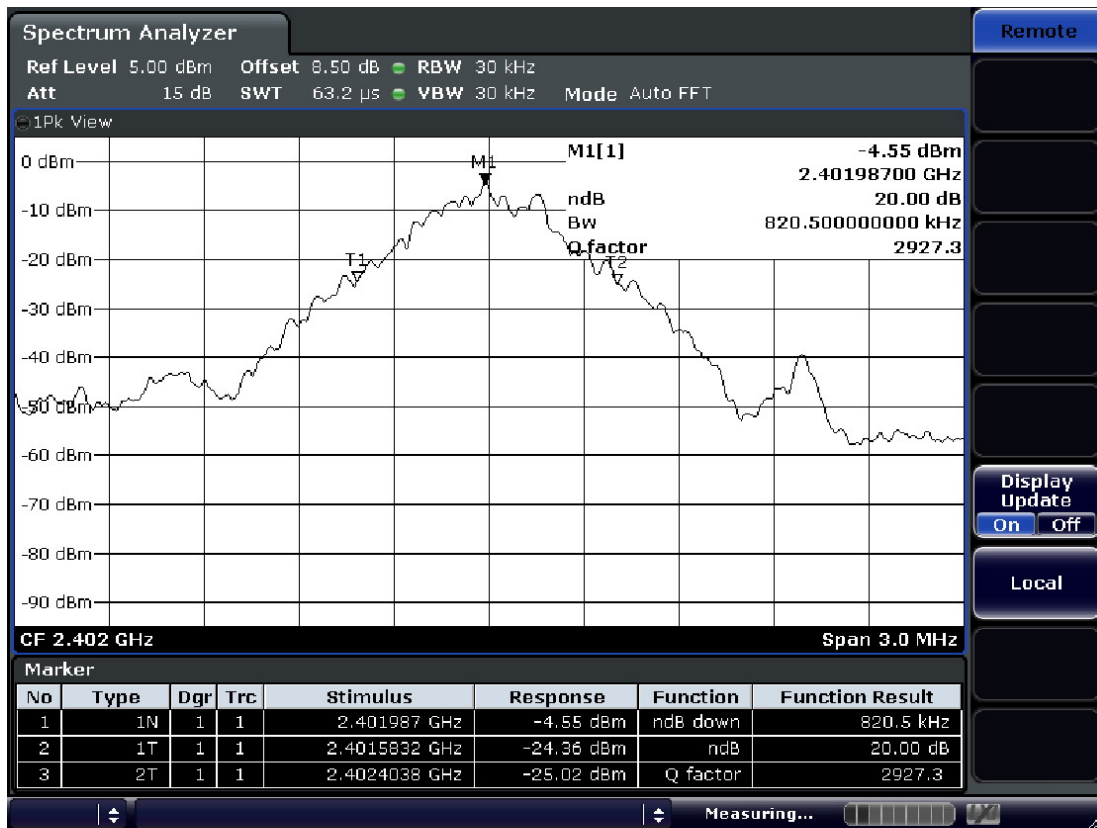
#### Minimum Standard:

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of 20dB bandwidth of the hopping channel, whichever is greater. Therefore, limit of 20dB bandwidth is 1.5MHz.

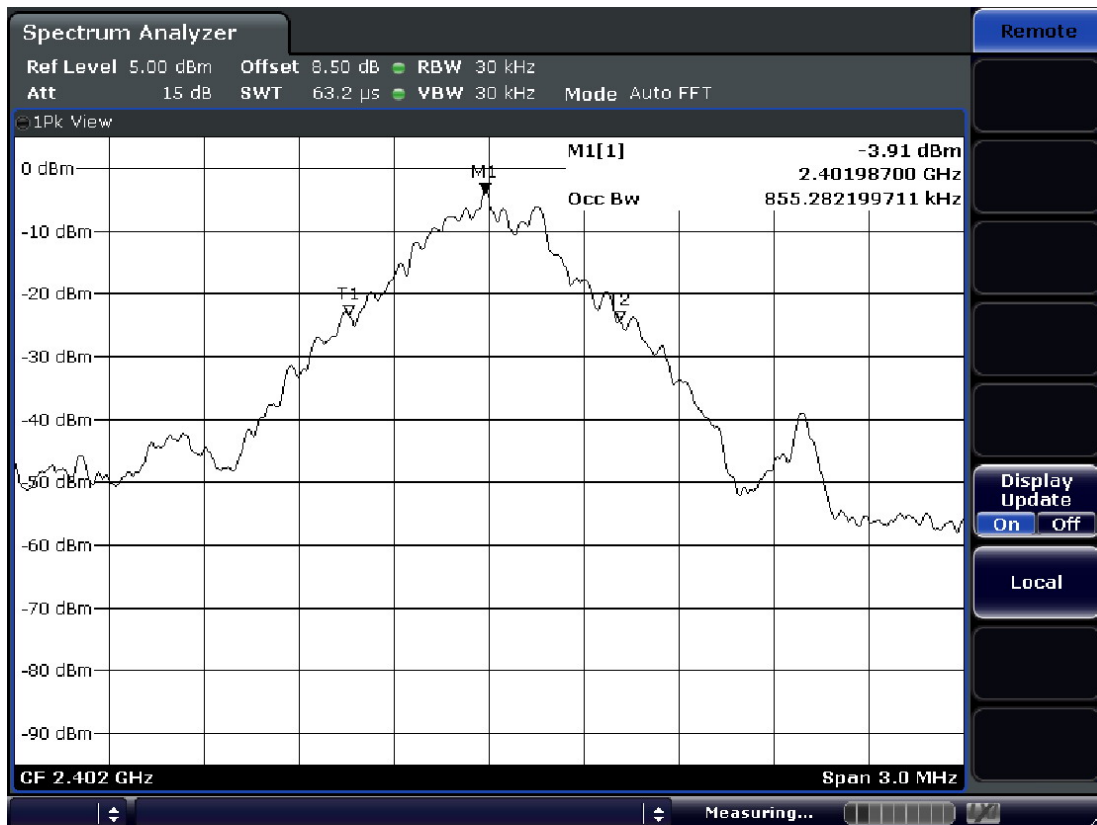
#### Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

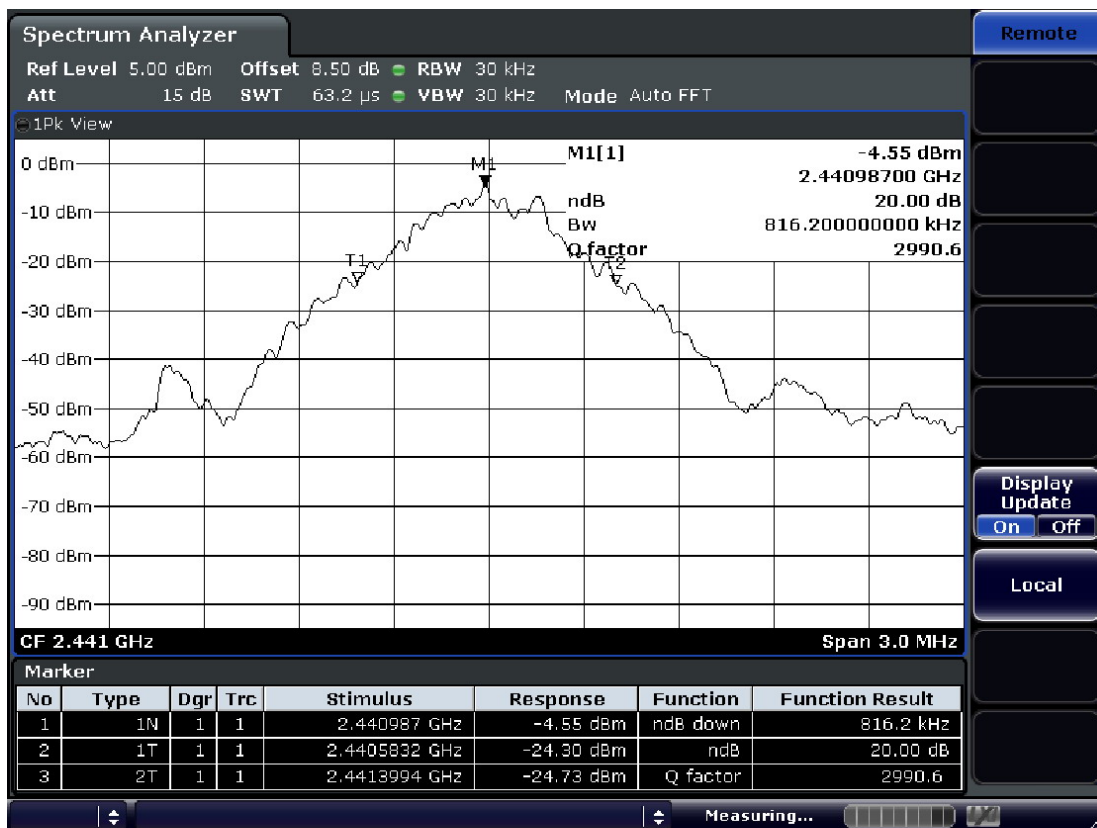
### LOW Channel 20 dB Bandwidth



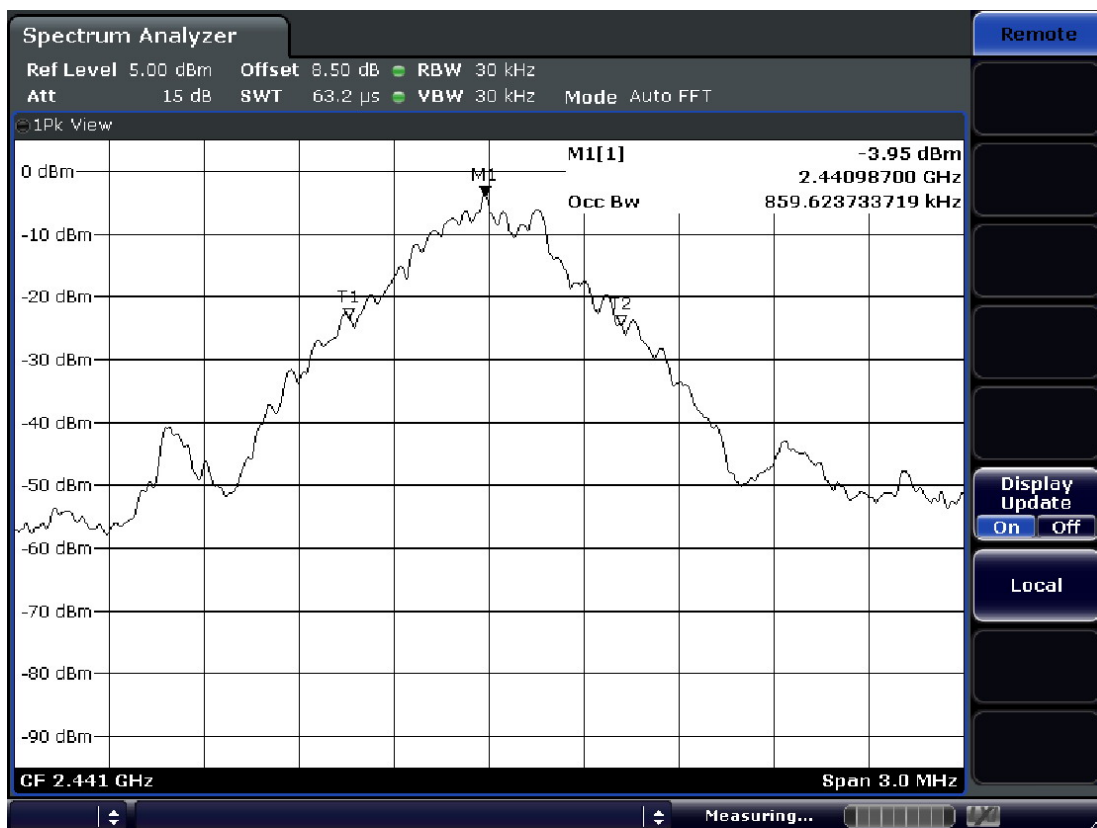
### 99% Bandwidth



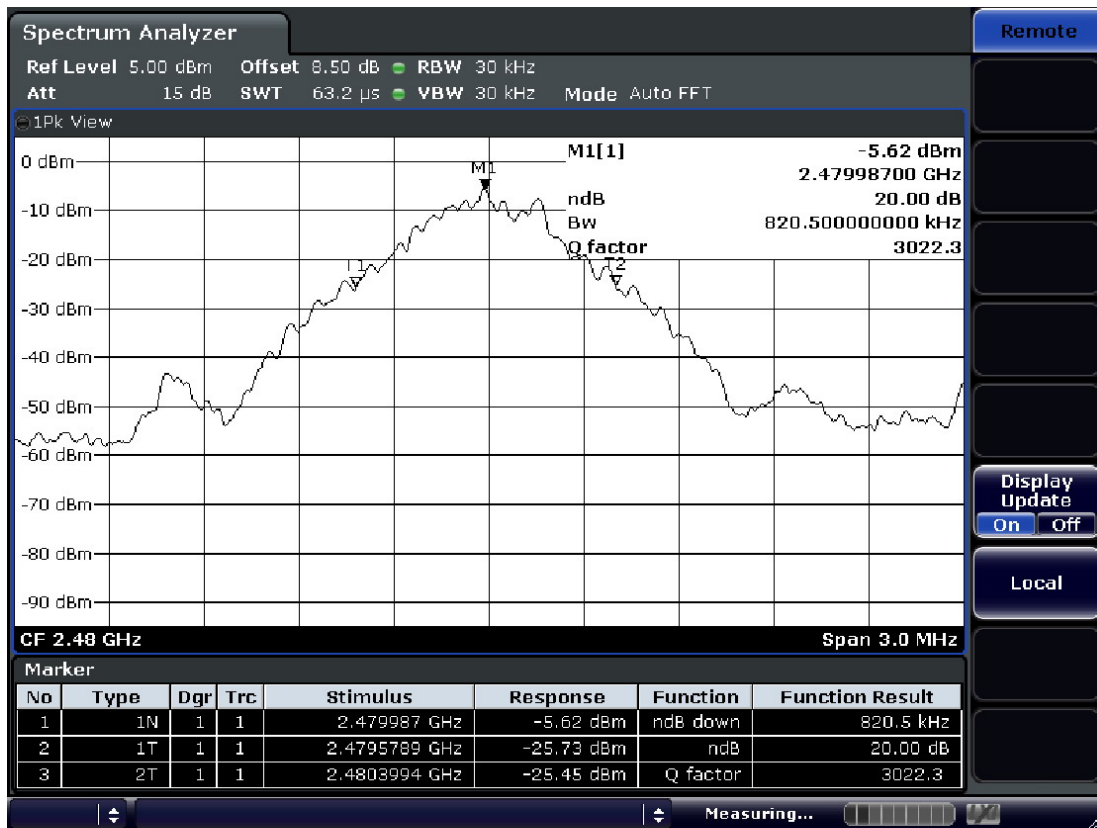
**MID Channel**  
**20 dB Bandwidth**



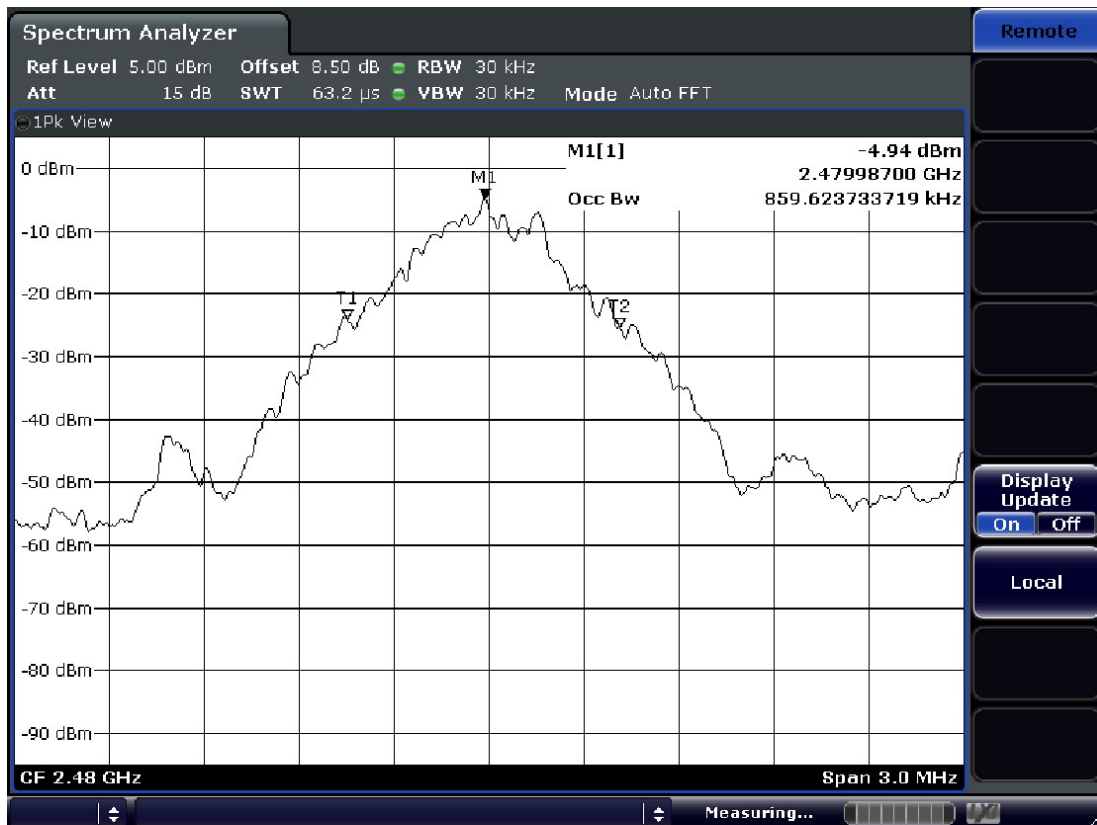
**99% Bandwidth**



### HIGH Channel 20 dB Bandwidth



### 99% 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 ≥ RBW)

Trace = max hold

Detector function = peak

#### Measurement Data:

Frequency (MHz)	Packet	Test Results				
		Duration one of Transmission (ms)	Hop.Number @ 3.16s	Time of Occupancy @ 3.16s (ms)	Measurement time (s)	Dwell Time (ms)
2441	DH1	0.4261	32	13.6352	31.6	143.62411
	DH3	1.6609	16	26.5744	31.6	279.91701
	DH5	2.9449	10	29.449	31.6	310.19613

- See next pages for actual measured spectrum plots.
- dwell time = {(number of hopping per second / number of slot) x duration time per channel} x 0.4 ms

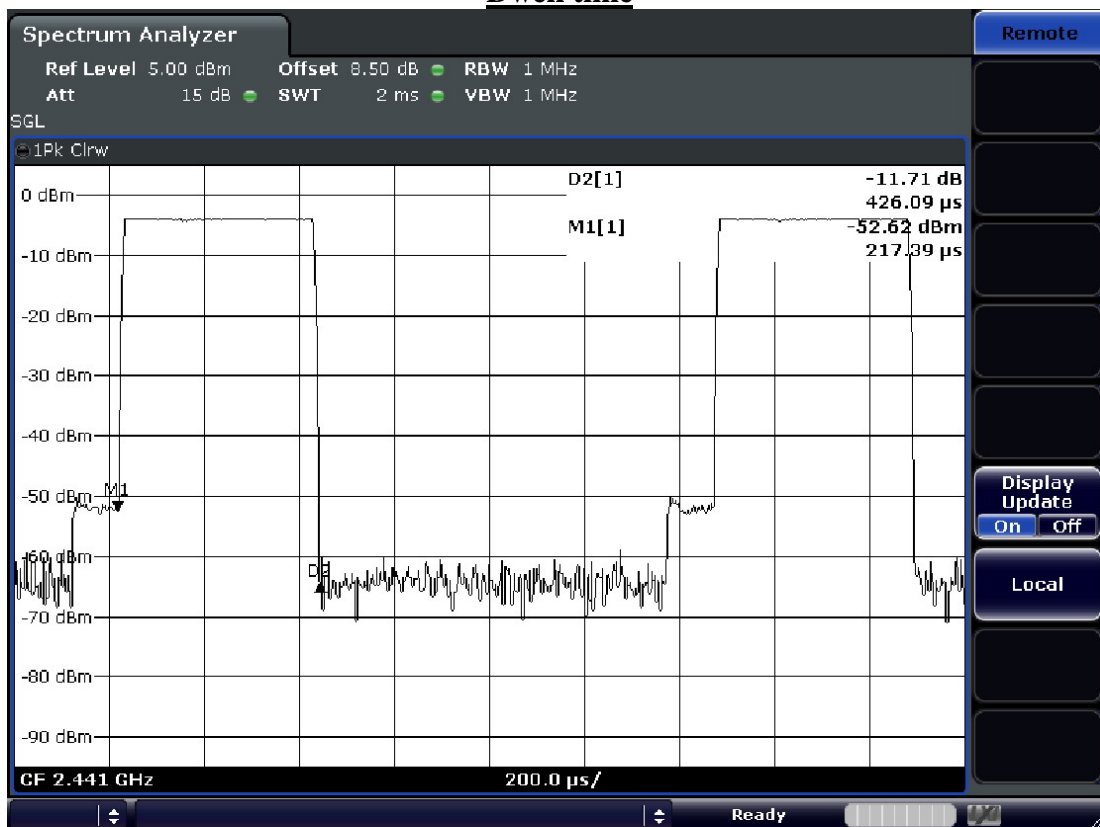
#### Minimum Standard:

0.4 seconds within a 31.6 second period per any frequency

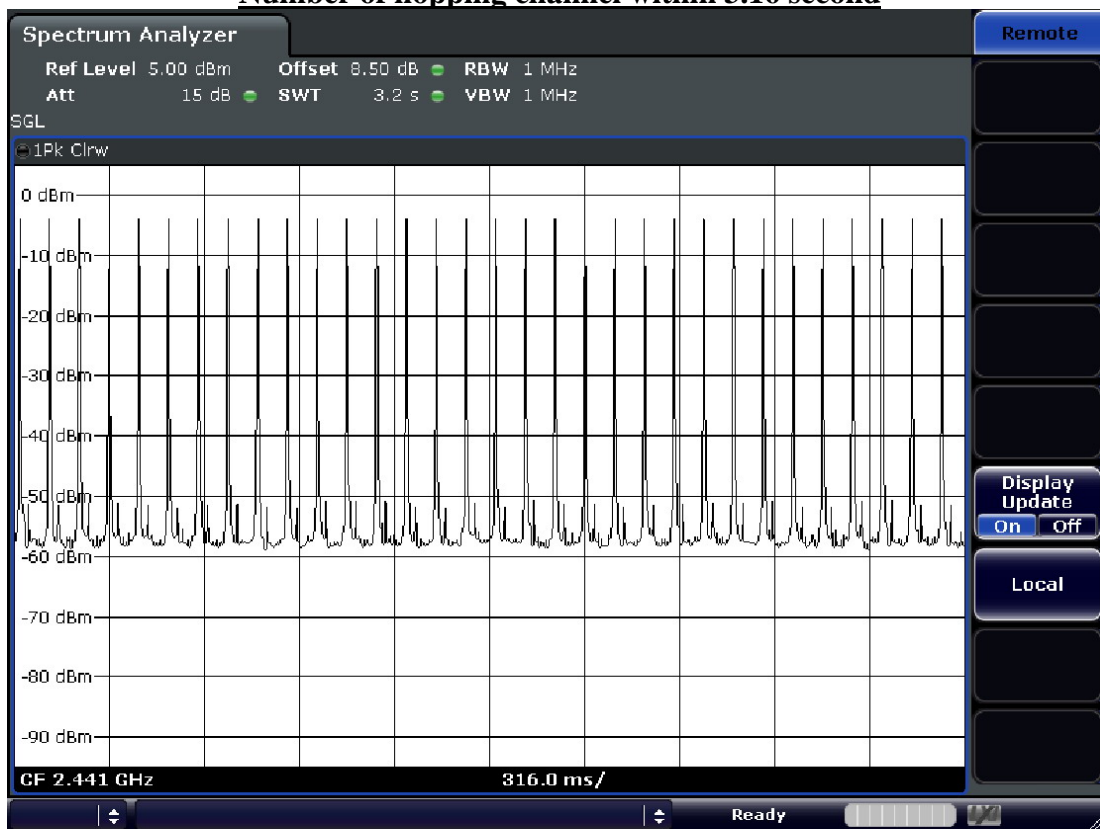
#### Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

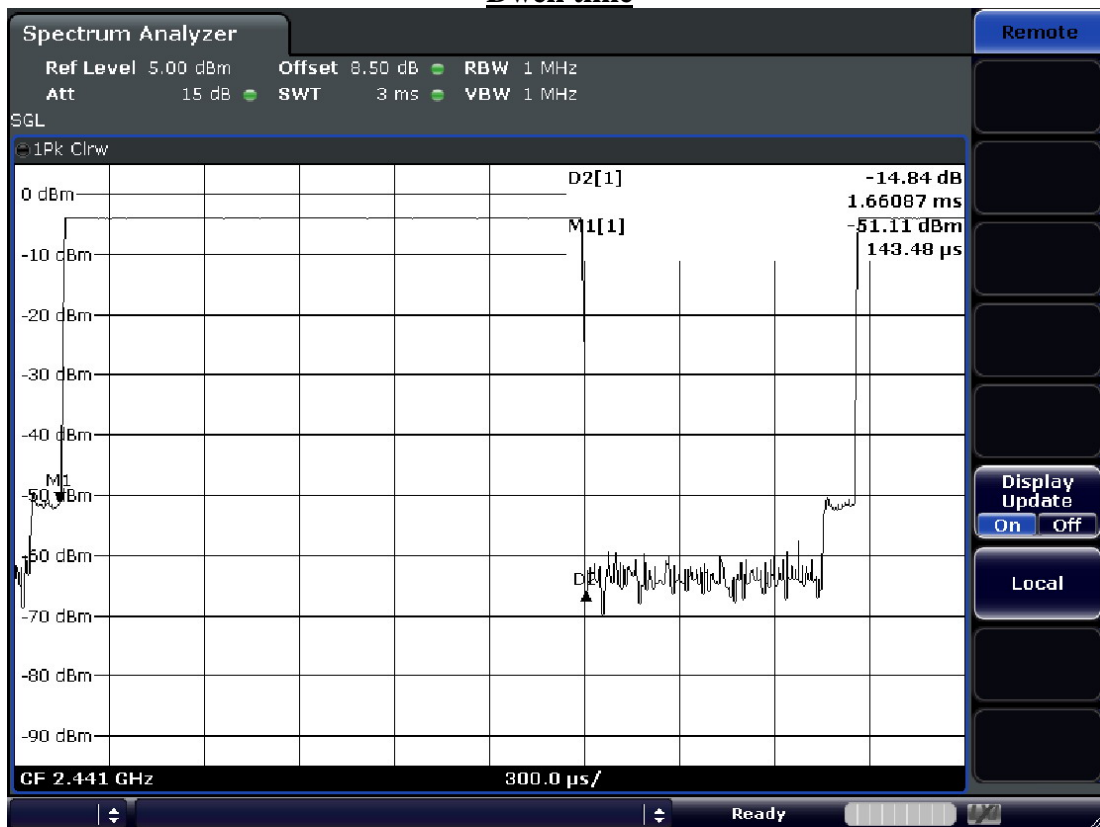
### DH1 Dwell time



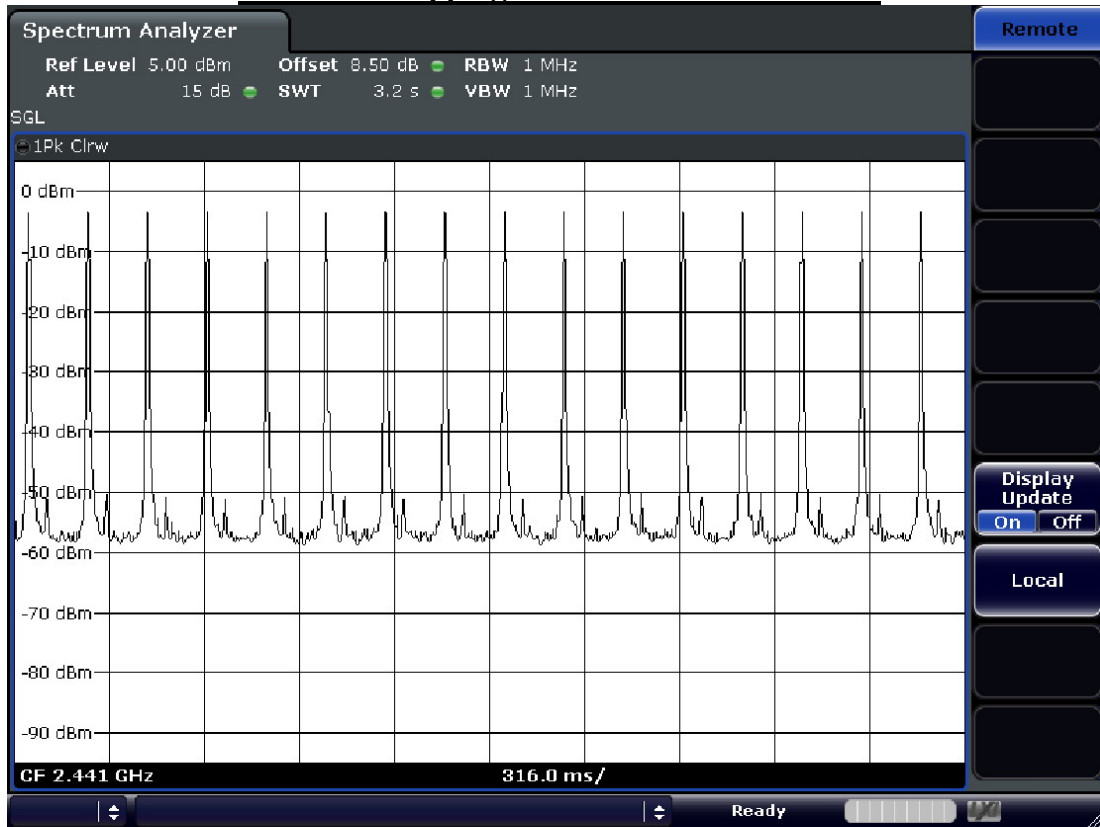
### Number of hopping channel within 3.16 second



### DH3 Dwell time

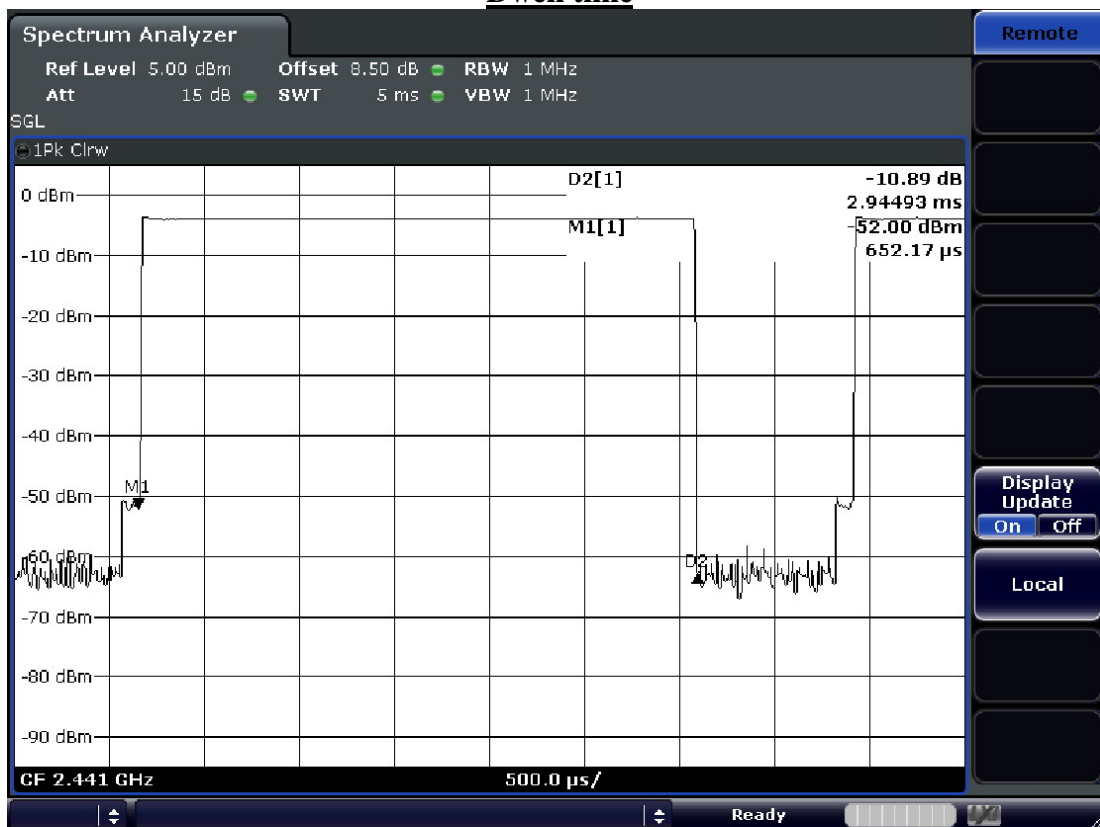


### Number of hopping channel within 3.16 second

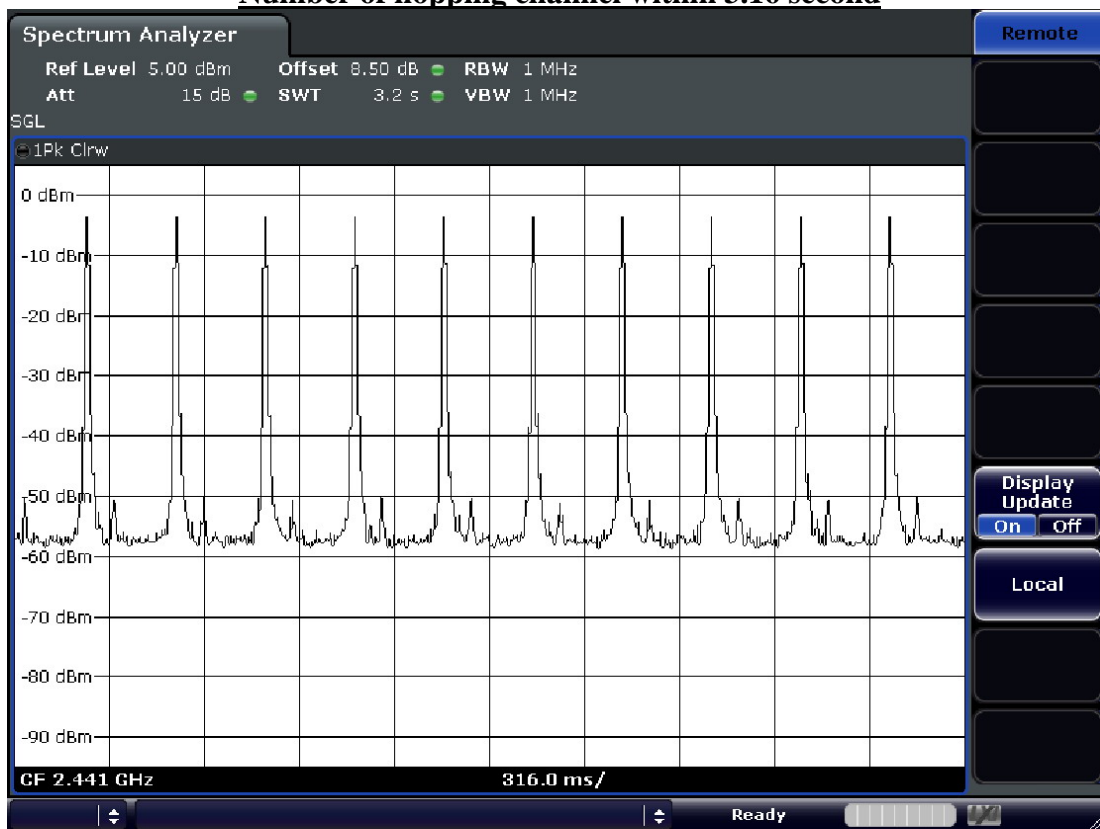




### DH5 Dwell time



### Number of hopping channel within 3.16 second



### 3.2.5 Transmitter 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 = 20 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 3 MHz (greater than the 20dB bandwidth of the emission being measured)

VBW = 3 MHz (VBW  $\geq$  RBW)

Detector function = peak

Trace = max hold

Sweep = auto

#### Measurement Data: Basic Mode

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2402	0	-3.43	0.4539	Complies
2441	39	-3.41	0.4560	Complies
2480	78	-4.39	0.3639	Complies

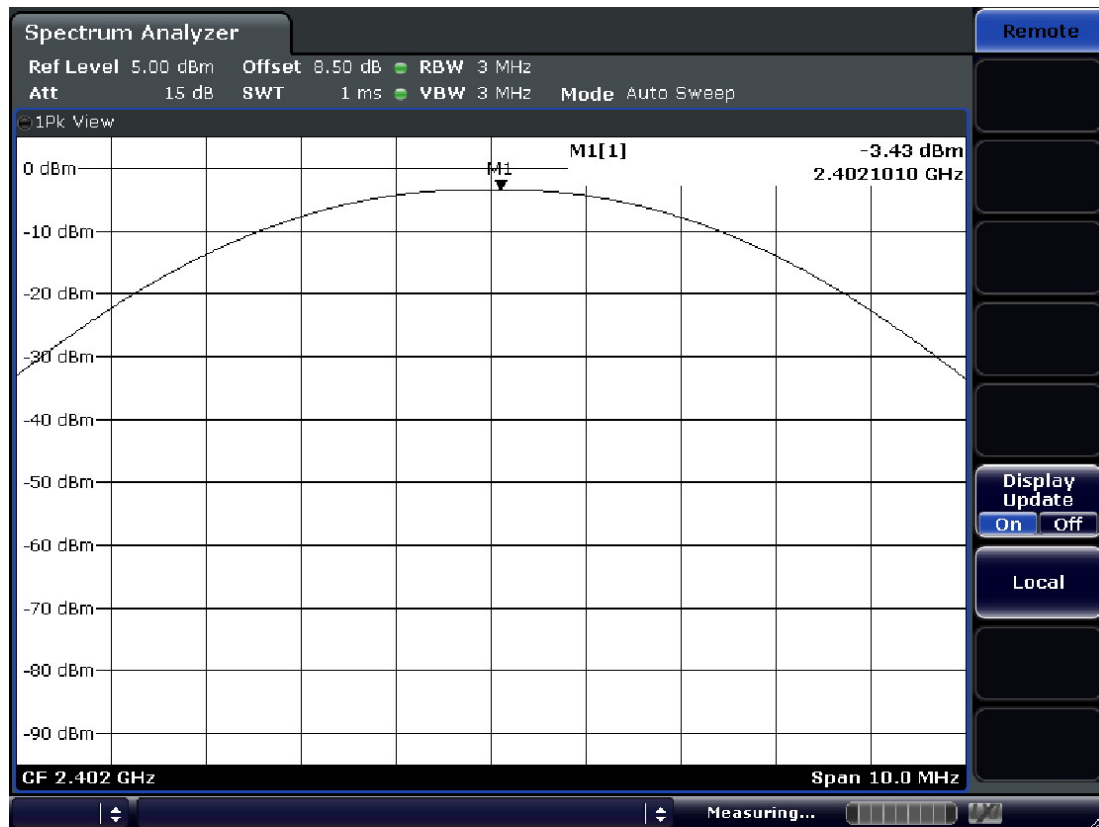
- See next pages for actual measured spectrum plots.

<b>Minimum Standard:</b>	< 250 mW
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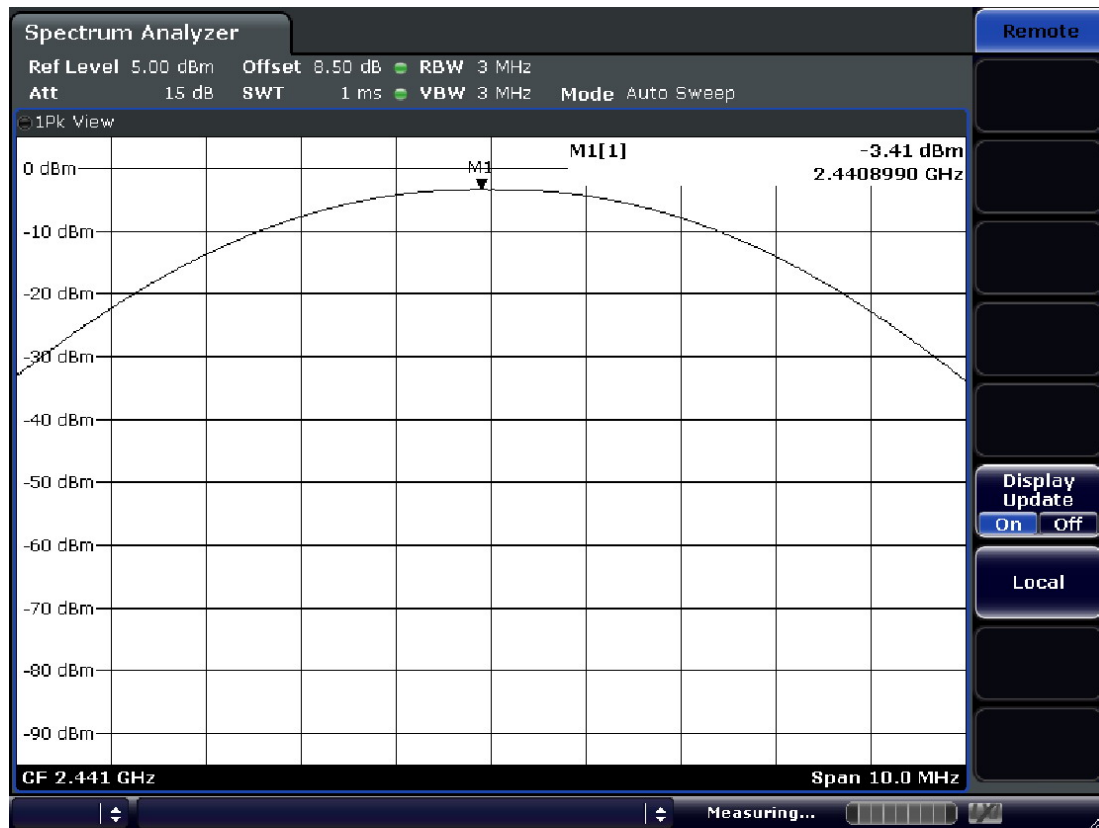
#### Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

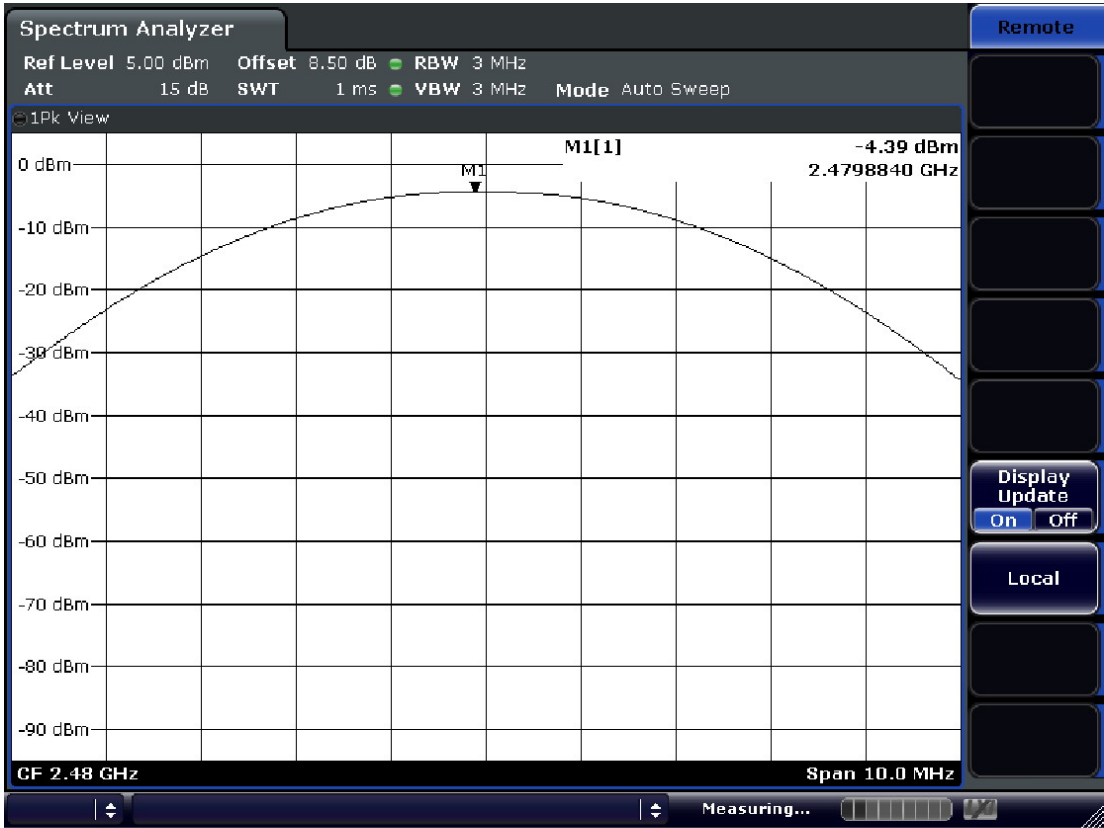
### LOW



### MID



**HIGH**



### 3.2.6 Band Edge

**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 = 10 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.

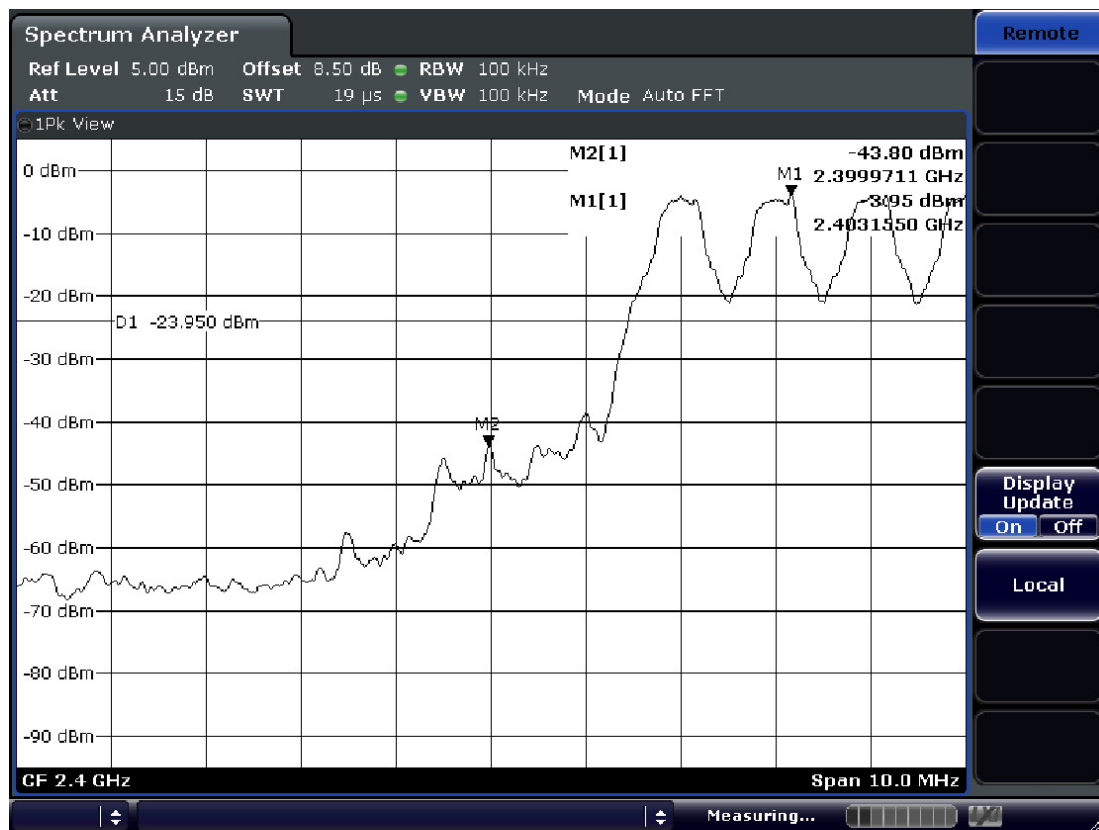
<b>Minimum Standard:</b>	> 20 dBc
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**Measurement Setup**

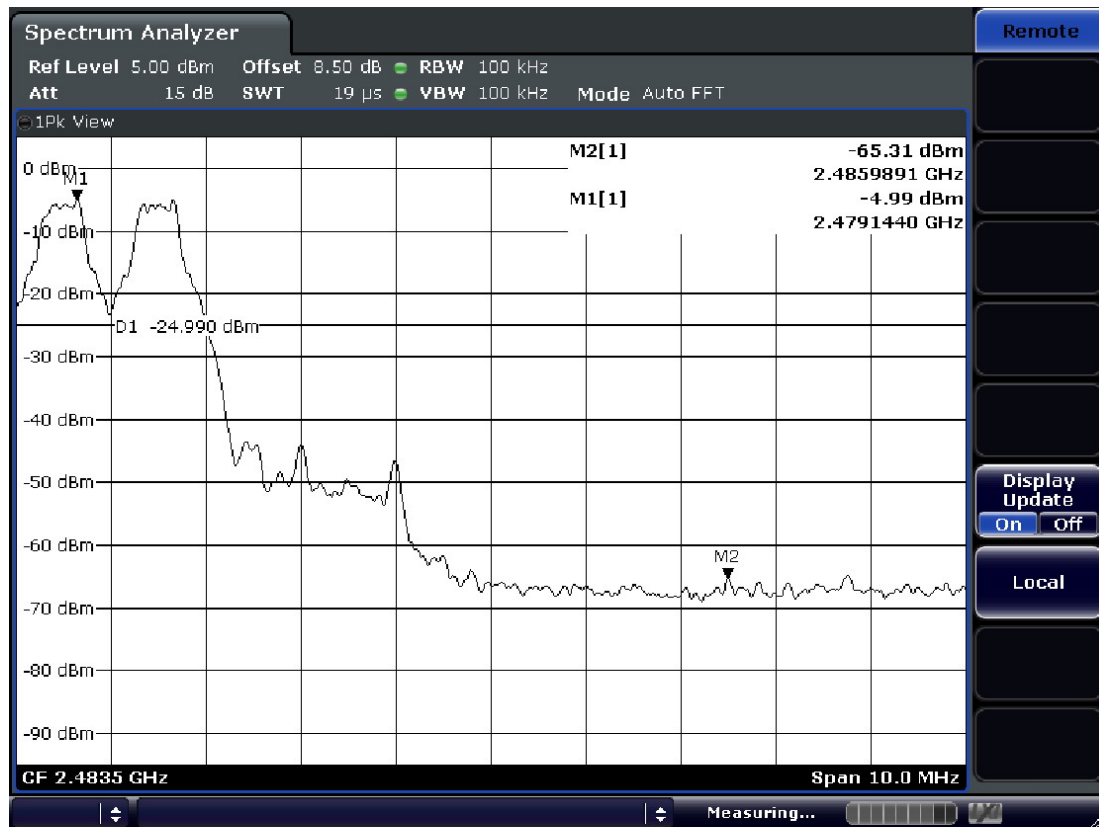
Same as the Chapter 3.2.1 (Figure 1)

**Band – edge**

**Lower edge**



**Upper edge**



**Band-edges in the restricted band 2483.5 ~ 2500 MHz measurement**

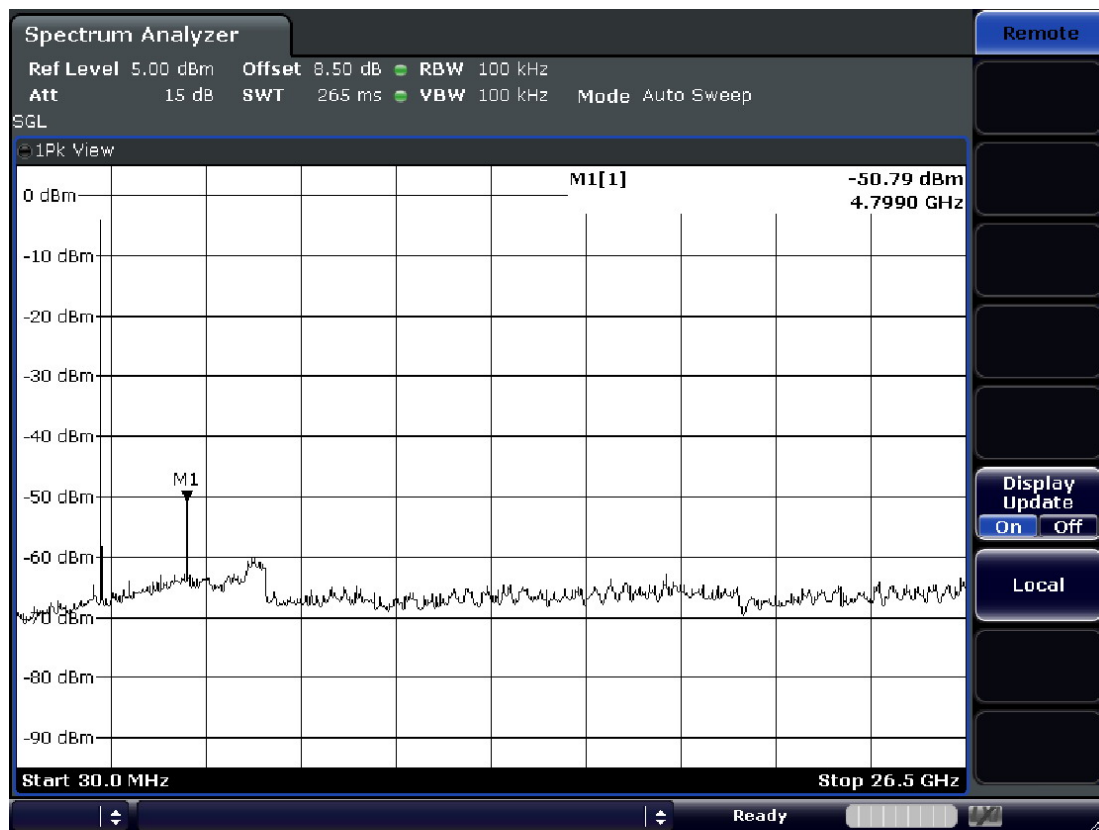
- Document DA 00-705 Marker Delta Method

-

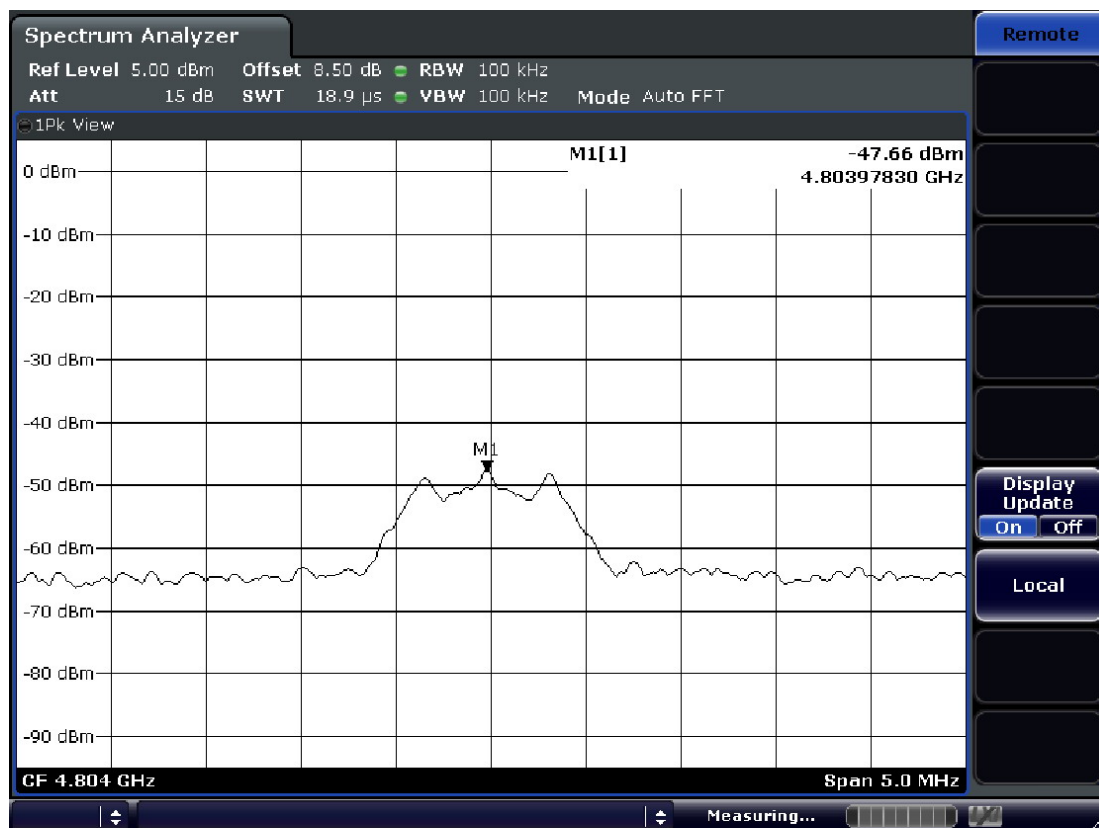
Frequency (MHz)	Detect mode	Pol.	Reading (dBuV/m)	T.F (dB)	Step 1 Data	delta	Step 3 Data	Limit
2483.5	PK	V	99.33	1.1	100.43	65.31	35.12	74
	AV	V	86.33	1.1	87.43	65.31	22.12	54

**Note) Step 1 = Reading + T.F****T.F = Ant.F + Cable loss – PreAmp Gain****Step 3 = Step 1 – Delta Value**

**Unwanted Emission – Low channel**  
**Frequency Range = 30 MHz ~ 26.5 GHz**

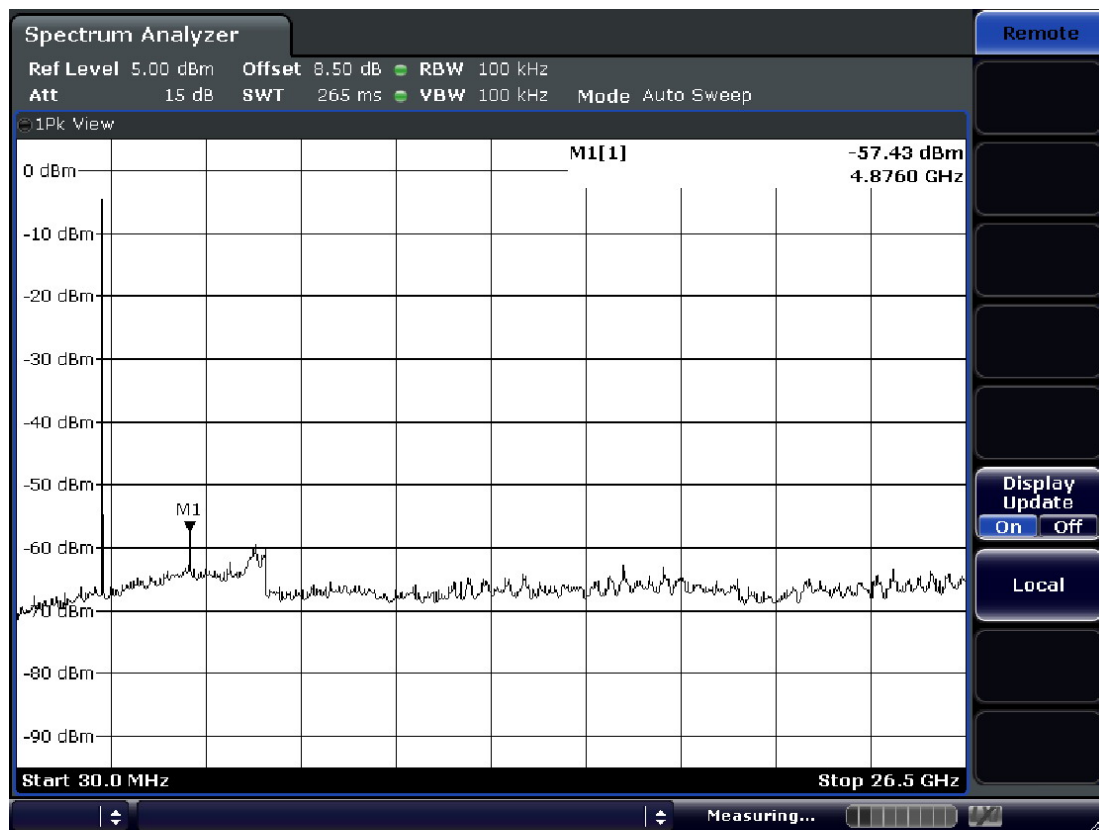


**-47.66 dBm at 4.804 GHz**

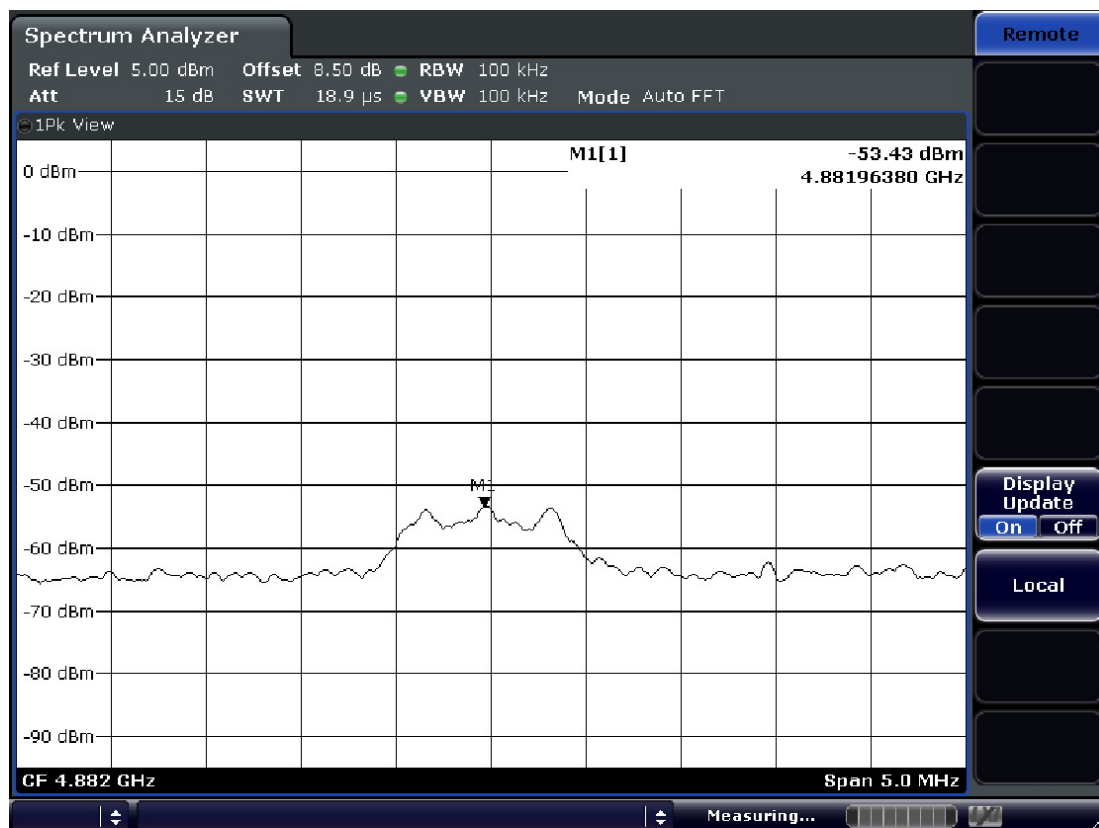




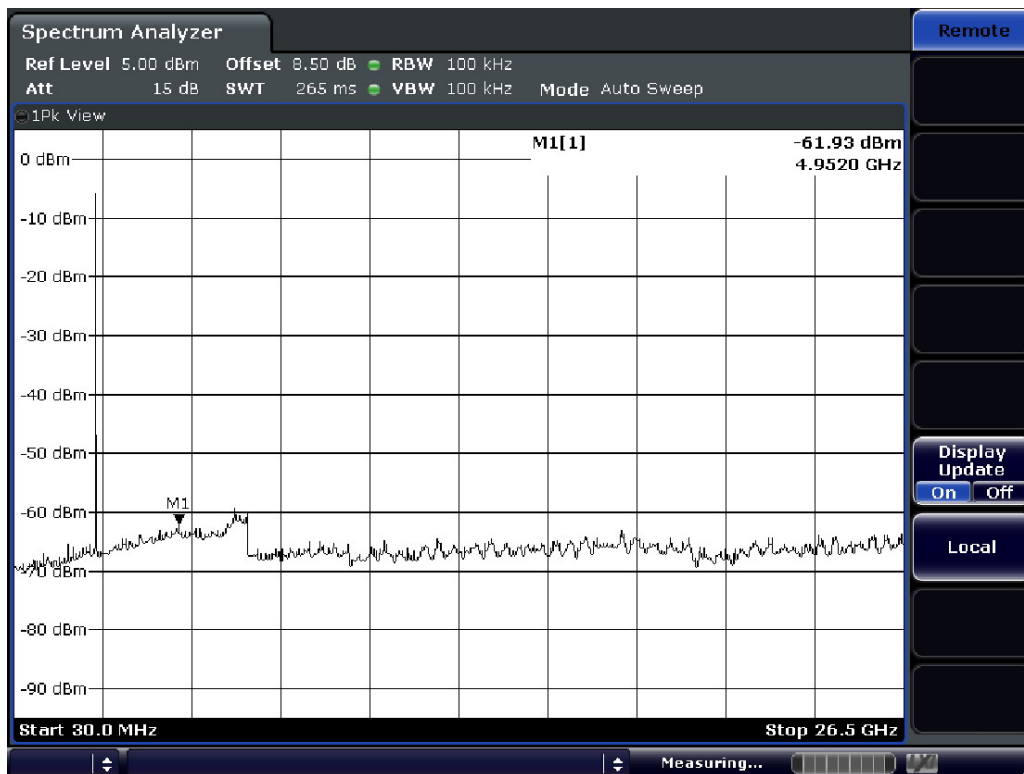
**Unwanted Emission – Middle channel**  
**Frequency Range = 30 MHz ~ 26.5 GHz**



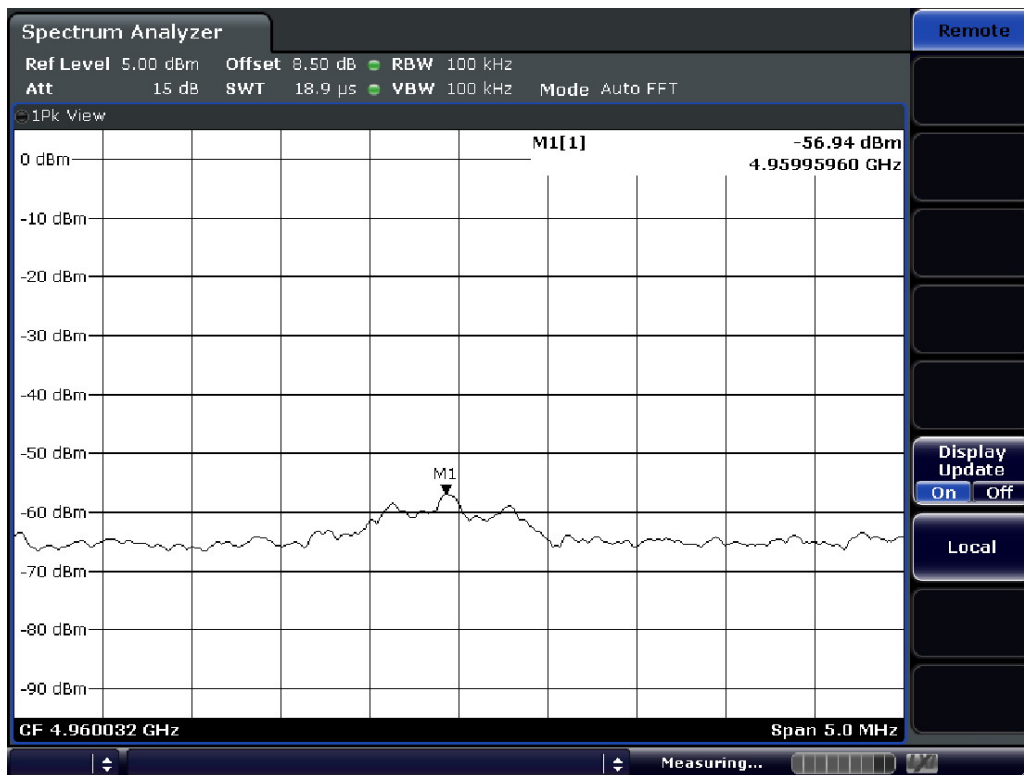
**-53.43 dBm at 4.882 GHz**



**Unwanted Emission – High channel**  
**Frequency Range = 30 MHz ~ 26.5 GHz**



**-42.50 dBm at 3.307 GHz**



### 3.2.7 Field Strength of Harmonics

#### 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 = 100 kHz ( 30MHz ~ 1 GHz)

= 1 MHz ( 1 GHz ~ 10<sup>th</sup> harmonic )

Span = 100 MHz

Trace = max hold

Peak:VBW  $\geq$  RBW

Average:VBW=10Hz

Detector function = Peak and Average

Sweep = auto

#### Measurement Data: Complies

- Refer to the next page.
- No other emissions were detected at a level greater than 10dB below limit.
- The three antennas were used with this EUT during the Testing.
- The used antenna is "R-AN2400-1901RS" and it gave the worse case emissions.

#### 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.

**Measurement Data:****1. PEAK data**

Low channel		Mid channel		High channel	
Frequency (MHz)	Level (dBuV/m)	Frequency (MHz)	Level (dBuV/m)	Frequency (MHz)	Level (dBuV/m)
1602	51.44	1626	50.44	1652	48.77
4804	53.48	4881	53.48	4959	53.98
-	-	-	-	-	-
-	-	-	-	-	-
Measurement uncertainty		± 6 dB			

-- Note) No other emissions were detected at a level greater than 20dB below limit.

**2. AVERAGE data**

Low channel		Mid channel		High channel	
Frequency (MHz)	Level (dBuV/m)	Frequency (MHz)	Level (dBuV/m)	Frequency (MHz)	Level (dBuV/m)
1602	47.94	1626	44.27	1652	45.77
4804	45.98	4881	46.31	4959	46.81
-	-	-	-	-	-
-	-	-	-	-	-
Measurement uncertainty		± 6 dB			

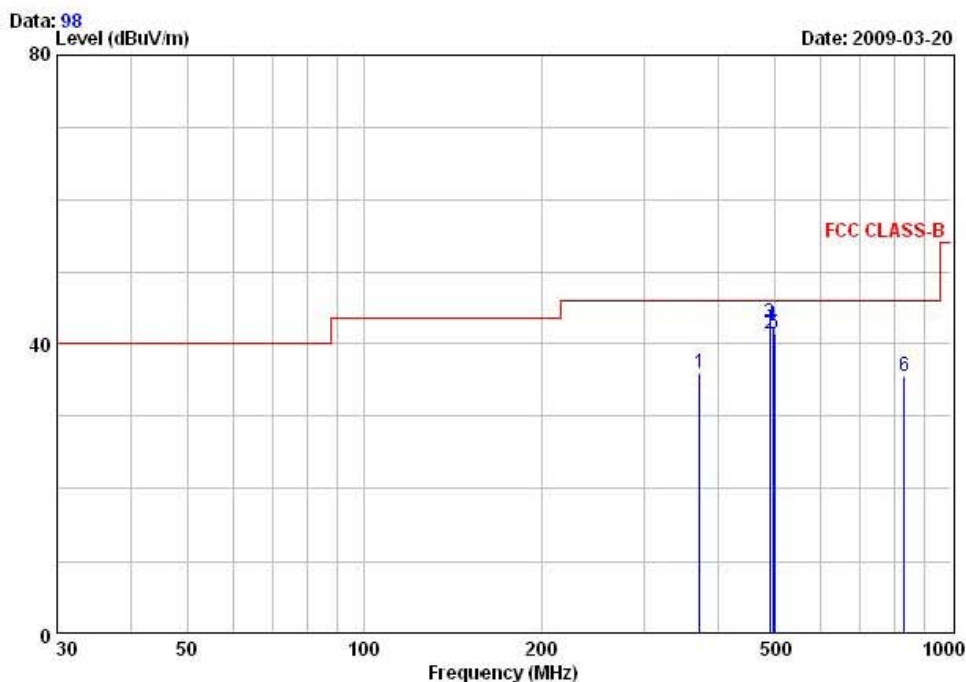
-- Note) No other emissions were detected at a level greater than 20dB below limit

**Normal operation mode**



243 Jubug-ri, yangji-Myeon, Youngin-si,  
Gyeonggi-do 449-822 Korea  
Tel :+82-31-3236008,9  
Fax:+82-31-3236010

EUT/Model No.: UBHS-NE1 TEST MODE: E/T + Charge mode  
Temp Humi : 21 / 31 Tested by: B.S.KIM



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV	dB	QP	dBuV/m	dB	cm	deg	
1	372.28	44.00	-8.03	35.97	46.00	10.03	100	0 HORIZONTAL
2	489.92	47.20	-5.76	41.44	46.00	4.56	100	43 HORIZONTAL
3	490.62	48.60	-5.75	42.85	46.00	3.15	100	38 HORIZONTAL
4	496.55	48.30	-5.70	42.60	46.00	3.40	199	21 HORIZONTAL
5	499.29	47.20	-5.68	41.52	46.00	4.48	200	28 HORIZONTAL
6	831.35	33.30	2.31	35.61	46.00	10.39	100	186 HORIZONTAL

Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

### 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: Complies

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 10dB below limit.
- The used antenna is "R-AN2400-1901RS" and it gave the worse case emissions.

#### 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

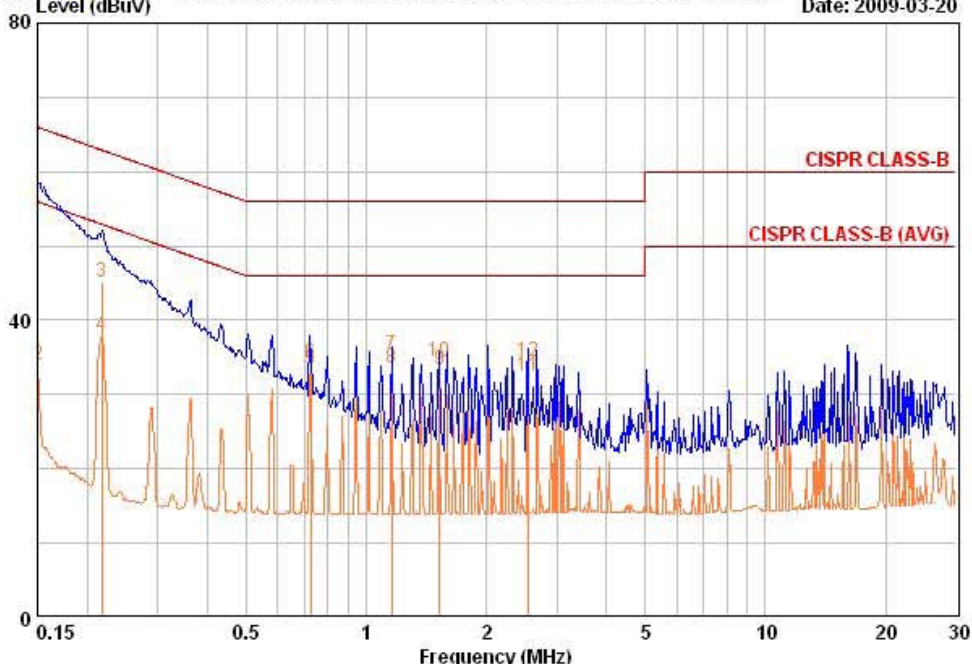
**AC Conducted Emissions at normal operation mode – Line**



243 Jubug-ri, yangji-Myeon, Youngin-si,  
Gyeonggi-do 449-822 Korea  
Tel +82-31-323-6008  
Fax:+82-31-323-6010

EUT / Model No. : UBHS-NE1 Phase : LINE  
 Test Mode : B/T + Charge mode Test Power : 120 / 60  
 Temp./Humi. : 16 / 45 Test Engineer : B.S.KIM

Data: 244 File: D:\Conducted Data\2009\LTA\_Conduction\_0903\_2.EMI (244) Date: 2009-03-20



Freq MHz	RD		C.F	Result		Limit		Margin	
	QP dBuV	AV dBuV		QP dBuV	AV dBuV	QP dBuV	AV dBuV	QP dB	AV dB
0.150	41.50	24.40	9.52	51.02	33.92	66.00	56.00	14.98	22.08
0.217	35.60	28.40	9.42	45.02	37.82	62.93	52.93	17.91	15.11
0.726	24.60	23.70	9.58	34.18	33.28	56.00	46.00	21.82	12.72
1.161	25.80	23.90	9.60	35.40	33.50	56.00	46.00	20.60	12.50
1.525	24.80	23.60	9.65	34.45	33.25	56.00	46.00	21.55	12.75
2.540	24.80	22.90	9.68	34.48	32.58	56.00	46.00	21.52	13.42

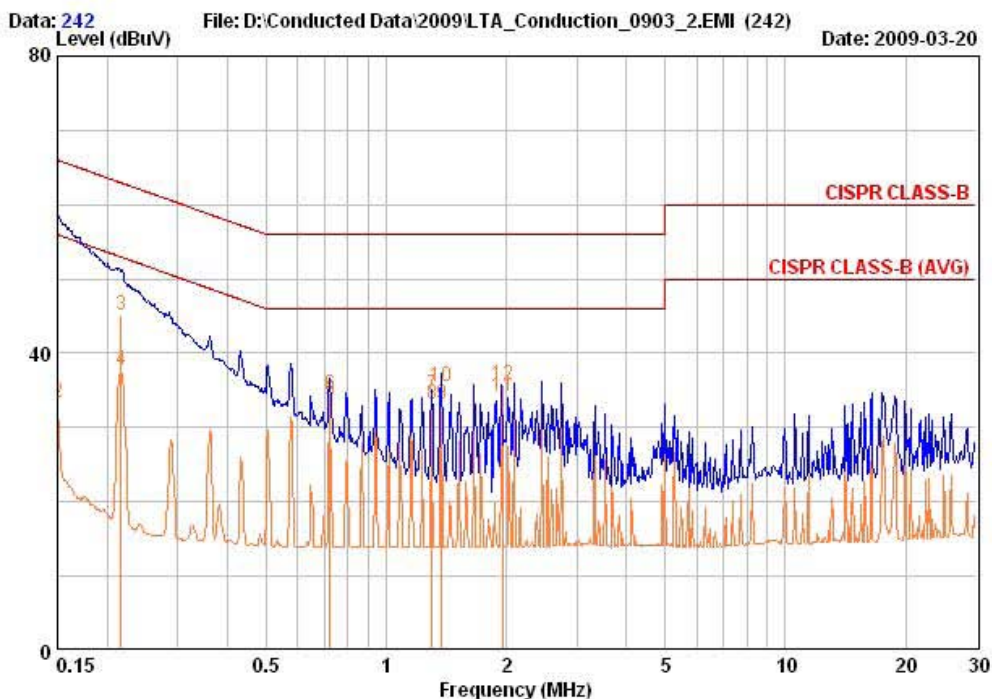
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

**AC Conducted Emissions at normal operation mode – Neutral**



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Fax:+82-31-323-6010

EUT / Model No. : UBHS-NE1	Phase : NEUTRAL
Test Mode : B/T + Charge mode	Test Power : 120 / 60
Temp./Humi. : 16 / 45	Test Engineer : B.S.KIM



Freq MHz	RD		C.F	Result		Limit		Margin	
	QP dBuV	AV dBuV		QP dBuV	AV dBuV	QP dBuV	AV dBuV	QP dB	AV dB
0.150	41.30	23.70	9.63	50.93	33.33	66.00	56.00	15.07	22.67
0.216	35.70	28.20	9.42	45.12	37.62	62.97	52.97	17.85	15.35
0.724	24.80	24.00	9.59	34.39	33.59	56.00	46.00	21.61	12.41
1.303	24.80	23.40	9.63	34.43	33.03	56.00	46.00	21.57	12.97
1.376	25.80	23.40	9.64	35.44	33.04	56.00	46.00	20.56	12.96
1.956	26.10	24.50	9.70	35.80	34.20	56.00	46.00	20.20	11.80

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss



APPENDIX

**TEST EQUIPMENT USED FOR TESTS**

	Description	Model No.	Serial No.	Manufacturer	Next Cal. Date
1	Spectrum Analyzer	8594E	3649A03649	HP	Apr-09
2	Signal Generator	8648C	3623A02597	HP	Apr-09
3	Attenuator (3dB)	8491A	37822	HP	Oct-09
4	Attenuator (10dB)	8491A	63196	HP	Oct-09
5	EMI Test Receiver	ESVD	843748/001	R&S	Aug-09
6	LISN	ENV216	100408	R&S	Oct-09
7	Two-Line V-Network	ESH3-Z5	893045/017	R&S	Oct-09
8	RF Amplifier	8447D	2944A07684	HP	Oct-09
9	RF Amplifier	8447D	2439A09058	HP	Oct-09
10	RF Amplifier	8449B	3008A02126	HP	Apr-09
11	Test Receiver	ESHS10	828404009	R&S	Aug-09
12	TRILOG Antenna	VULB 9160	9160-3212	SCHWARZBECK	Jul-09
13	Log.-Per. Antenna	VULP 9118	9118 A 401	SCHWARZBECK	Apr-09
14	Biconical Antenna	BBA 9106	VHA 9103-2315	SCHWARZBECK	Apr-09
15	Horn Antenna	3115	00055005	ETS LINDGREN	Mar-09
16	Dipole Antenna	VHA9103	2116	Schwarzbeck	Nov-09
17	Dipole Antenna	VHA9103	2117	Schwarzbeck	Nov-09
18	Dipole Antenna	UHA9105	2261	Schwarzbeck	Nov-09
19	Dipole Antenna	UHA9105	2262	Schwarzbeck	Nov-09
20	Spectrum Analyzer	FSV-30	100757	R&S	Feb-10
21	Spectrum Analyzer	8563E	3425A02505	HP	Apr-09
22	Hygro-Thermograph	THB-36	0041557-01	ISUZU	Apr-09
23	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	Jun-09
24	RF Switch	MP59B	6200414971	ANRITSU	Jun-09
25	RF Switch	MP59B	6200438565	ANRITSU	Jun-09
26	Power Divider	11636A	6243	HP	Oct-09
27	DC Power Supply	6622A	3448A03079	HP	Oct-09
28	Attenuator (30dB)	11636A	6243	HP	Oct-09
29	Frequency Counter	5342A	2826A12411	HP	Apr-09
30	Power Meter	EPM-441A	GB32481702	HP	Apr-09
31	Power Sensor	8481A	2702A64048	HP	Apr-09
32	Audio Analyzer	8903B	3729A18901	HP	Oct-09
33	Modulation Analyzer	8901B	3749A05878	HP	Oct-09
34	TEMP & HUMIDITY Chamber	YJ-500	L05022	JinYoung Tech	Oct-09
35	LOOP-ANTENNA	FMZB 1516	151602/94	SCHWARZBECK	Mar-09
36	Stop Watch	HS-3	601Q09R	CASIO	Apr-09