

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : E141R-052

AGR No. : A13DA-230

Applicant : LG Electronics USA

Address : 1000 Sylvan Avenue Englewood Cliffs, NJ 07632, United States

Manufacturer : LG Electronics Inc.

Address : 222 LG-ro, Jinwi-Myeon, Pyeongtaek -Si, Gyeonggi-Do, 451-713, Korea

Type of Equipment : LG HEART RATE EARPHONES

FCC ID. : BEJ9QK-DMFR74

Model Name : FR74

Serial number : N/A

Total page of Report : 88 pages (including this page)

Date of Incoming : January 08, 2014

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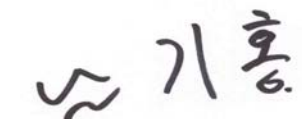
SUMMARY

The equipment complies with the regulation; **FCC PART 15 SUBPART C Section 15.247**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by:



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ONETECH Corp.

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ONETECH Corp.

CONTENTS

PAGE

1. VERIFICATION OF COMPLIANCE	6
2. TEST SUMMARY	7
2.1 TEST ITEMS AND RESULTS	7
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS	7
2.3 RELATED SUBMITTAL(S) / GRANT(S)	7
2.4 PURPOSE OF THE TEST	7
2.5 TEST METHODOLOGY	7
2.6 TEST FACILITY	7
3. GENERAL INFORMATION	8
3.1 PRODUCT DESCRIPTION	8
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.	8
4. EUT MODIFICATIONS	8
5. SYSTEM TEST CONFIGURATION	9
5.1 JUSTIFICATION	9
5.2 PERIPHERAL EQUIPMENT	9
5.3 MODE OF OPERATION DURING THE TEST	9
5.4 CONFIGURATION OF TEST SYSTEM	9
5.5 ANTENNA REQUIREMENT	10
6. PRELIMINARY TEST	10
6.1 AC POWER LINE CONDUCTED EMISSIONS TESTS	10
6.2 GENERAL RADIATED EMISSIONS TESTS	10
7. MINIMUM 20 DB BANDWIDTH	11
7.1 20 dB BANDWIDTH	11
7.1.1 <i>Operating environment</i>	11
7.1.2 <i>Test set-up</i>	11
7.1.3 <i>Test equipment used</i>	11
7.1.4 <i>Test data for 1 Mbps</i>	12
7.1.5 <i>Test data for 2 Mbps</i>	14
7.1.6 <i>Test data for 3 Mbps</i>	16
7.2 HOPPING FREQUENCY SEPARATION	18
7.2.1 <i>Operating environment</i>	18

7.2.2 Test set-up	18
7.2.3 Test equipment used	18
7.2.4 Test data for 1 Mbps	19
7.2.5 Test data for 2 Mbps	20
7.2.6 Test data for 3 Mbps	21
7.3 NUMBER OF HOPPING CHANNELS	22
7.3.1 Operating environment.....	22
7.3.2 Test set-up	22
7.3.3 Test equipment used	22
7.3.4 Test data for Mbps 1	23
7.3.5 Test data for Mbps 2	26
7.3.6 Test data for Mbps 3	29
7.4 TIME OF OCCUPANCY	32
7.4.1 Operating environment.....	32
7.4.2 Test set-up	32
7.4.3 Test equipment used	32
7.4.4 Test data for 1 Mbps	33
7.4.5 Test data for 2 Mbps	35
7.4.6 Test data for 3 Mbps	37
8 MAXIMUM PEAK OUTPUT POWER.....	39
8.1 OPERATING ENVIRONMENT	39
8.2 TEST SET-UP	39
8.3 TEST EQUIPMENT USED	39
8.4 TEST DATA FOR 1 MBPS	40
8.5 TEST DATA FOR 2 MBPS	42
8.6 TEST DATA FOR 3 MBPS	44
9 100 KHZ BANDWIDTH OUTSIDE THE FREQUENCY BAND	46
9.1 OPERATING ENVIRONMENT	46
9.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	46
9.3 TEST SET-UP FOR RADIATED MEASUREMENT	46
9.4 TEST EQUIPMENT USED	46
9.5 TEST DATA FOR 1 MBPS	47
9.5.1 Test data for conducted emission	47
9.5.2 Test data for radiated emission	52
9.6 TEST DATA FOR 2 MBPS	57
9.6.1 Test data for conducted emission	57

9.6.2 Test data for radiated emission	62
9.7 TEST DATA FOR 3 MBPS	67
9.7.1 Test data for conducted emission	67
9.7.2 Test data for radiated emission	72
9.8 TEST DATA FOR CHARGING MODE.....	77
9.8.1 Test data for 30 MHz ~ 1 000 MHz.....	77
9.8.2 Test data for Below 30 MHz	78
9.8.3 Test data for above 1 GHz	78
10 CONDUCTED EMISSION TEST	79
10.1 OPERATING ENVIRONMENT	79
10.2 TEST SET-UP	79
10.3 TEST EQUIPMENT USED	79
10.4 TEST DATA FOR 1 MBPS	80
10.5 TEST DATA FOR 2 MBPS	82
10.6 TEST DATA FOR 3 MBPS	84
10.7 TEST DATA FOR CHARGING MODE.....	86
11 RADIO FREQUENCY EXPOSURE.....	88
11.1 RF EXPOSURE LIMIT	88
11.2 EUT DESCRIPTION.....	88
11.3 TEST RESULT.....	88

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
E141R-052	January 22, 2014	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

APPLICANT : LG Electronics USA
ADDRESS : 1000 Sylvan Avenue Englewood Cliffs, NJ 07632, United States
CONTACT PERSON : Yongduk Kwon / Research Engineer
TELEPHONE NO : +82-31-610-9606
FCC ID : BEJ9QK-DMFR74
MODEL NAME : FR74
BRAND NAME : -
SERIAL NUMBER : N/A
DATE : January 22, 2014

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
KIND OF EQUIPMENT	LG HEART RATE EARPHONES
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2009
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	3 m open area test site

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.247 (a) (1)	Carrier Frequency Separation	Met the Limit / PASS
15.247 (a) (1) (iii)	Minimum Number of Hopping Channels	Met the Limit / PASS
15.247 (a) (1) (iii)	Average Time of Occupancy	Met the Limit / PASS
15.247 (b) (1)	Maximum Peak Conducted Output Power	Met the Limit / PASS
15.247 (b) (5)	Radio Frequency Exposure Level	Met requirement / PASS
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	Met the Limit / PASS
15.247 (d)	Radiated Emission which fall in the Restricted Band	Met the Limit / PASS
15.247 (d)	Peak Power Spectral Density	Met the Limit / PASS
15.209	Radiated Emission Limits, General Requirement	Met the Limit / PASS
15.207	Conducted Limits	Met the Limit / PASS
15.203	Antenna Requirement	Met requirement / PASS

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.247

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2009. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The open area test site is located at 307-51 Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do and 10 m Semi Anechoic Chamber (SAC) and conducted measurement facilities are located at 301-14, Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. The Onetech Corp. has been accredited as a Conformity Assessment Body (CAB) with designation number KR0013 under APEC TEL MAR between the RRA and the FCC.

3. GENERAL INFORMATION

3.1 Product Description

The LG Electronics USA, Model FR74 (referred to as the EUT in this report) is a LG HEART RATE EARPHONES. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	LG HEART RATE EARPHONES	
OPERATING FREQUENCY	2 402 MHz ~ 2 480 MHz	
RF OUTPUT POWER	1 Mbps	0.99 dBm
	2 Mbps	0.82 dBm
	3 Mbps	1.02 dBm
NUMBER OF CHANNEL	79 Channels	
MODULATION TYPE	GFSK for 1 Mbps, DQPSK for 2 Mbps, 8-DPSK for 3 Mbps	
ANTENNA TYPE	Chip Antenna	
ANTENNA GAIN	1.99 dBi	
LIST OF EACH OSC. OR CRYSTAL. FREQ.(FREQ.>=1 MHz)	26 MHz	
RATED SUPPLY VOLTAGE	DC 3.7 V	

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None

5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	LG Electronics Inc.	N/A	N/A

5.2 Peripheral equipment

-. None

5.3 Mode of operation during the test

For Bluetooth function testing, software used to control the EUT for staying in continuous transmitting and receiving mode is programmed. The EUT was set at Low Channel (2 402 MHz), Middle Channel (2 441 MHz), and High Channel (2 480 MHz) with each data transfer rate, 1 Mbps, 2 Mbps, and 3 Mbps. To get a maximum radiated emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XZ” axis, but the worst data was recorded in this test report.

5.4 Configuration of Test System

Line Conducted Test: The EUT was connected to USB and the power of USB was connected to Notebook PC. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2009 7.3.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2009 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 m open area test site. The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

5.5 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The transmitter antenna of the EUT is a chip antenna, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

7. MINIMUM 20 dB BANDWIDTH

7.1 20 dB BANDWIDTH

7.1.1 Operating environment

Temperature : 24 °C
Relative humidity : 42 % R.H.

7.1.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 10 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.



7.1.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101372	May 20, 2013(1Y)

All test equipment used is calibrated on a regular basis.

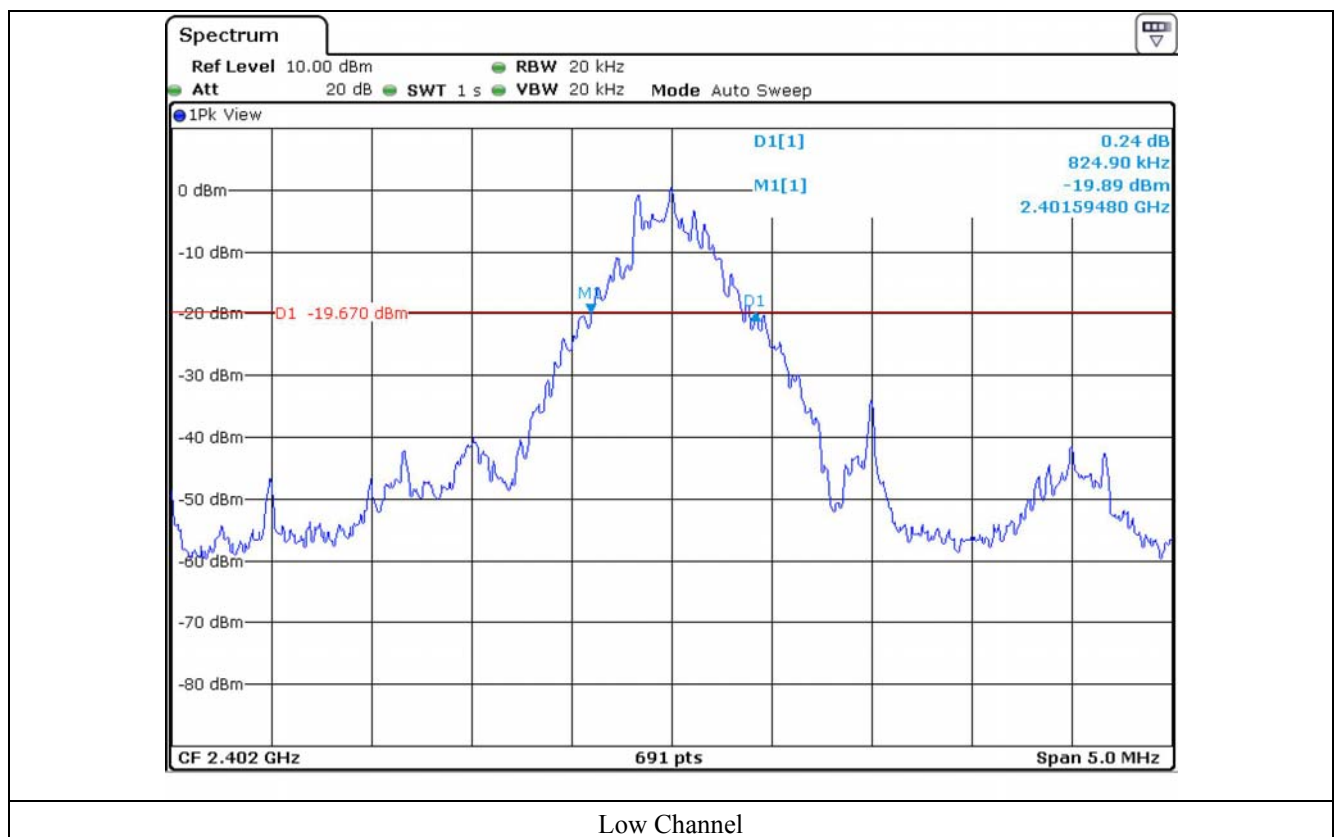
7.1.4 Test data for 1 Mbps

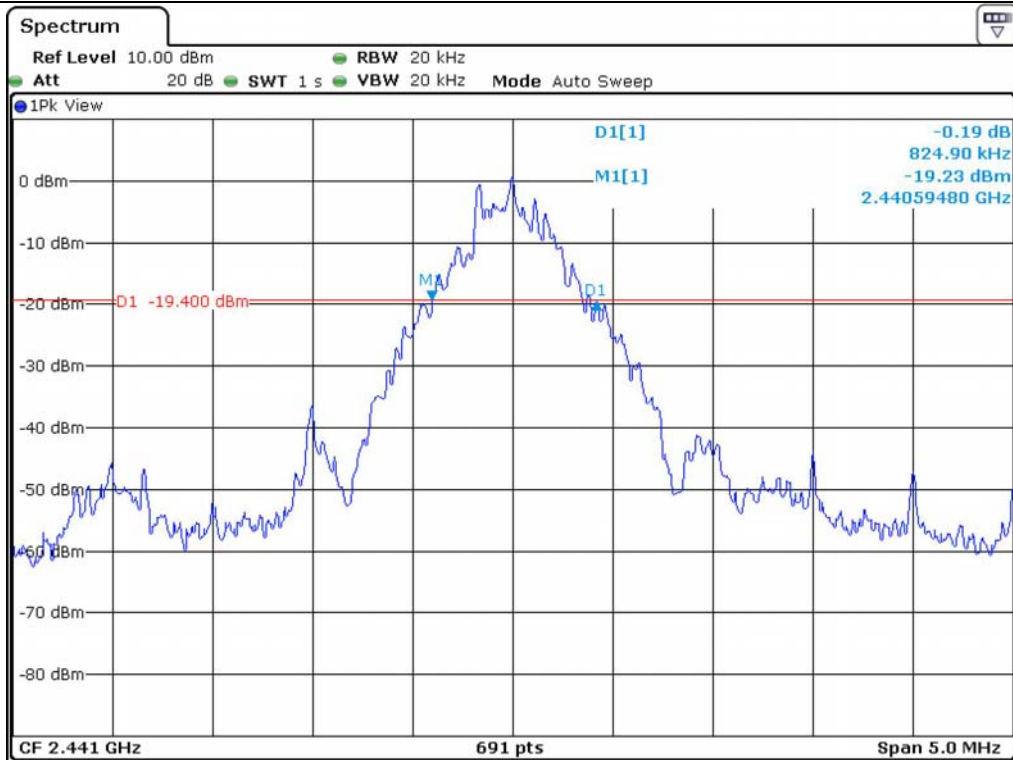
-. Test Date : January 13, 2014

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402	824.90
Middle	2 441	824.90
High	2 480	824.90

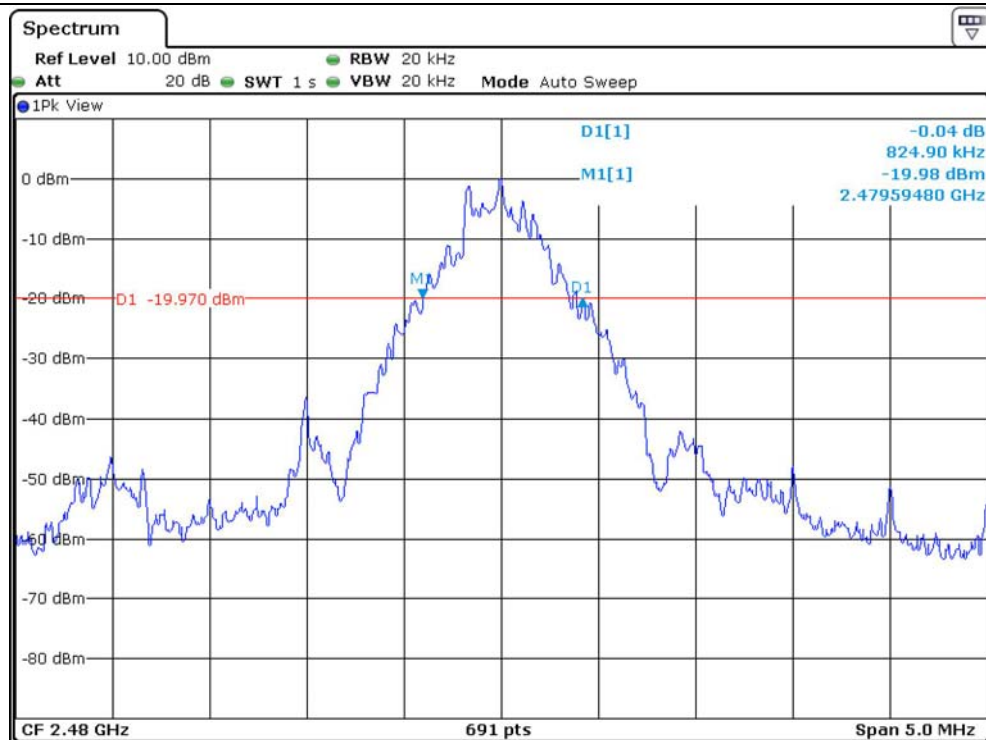
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Middle Channel



High Channel

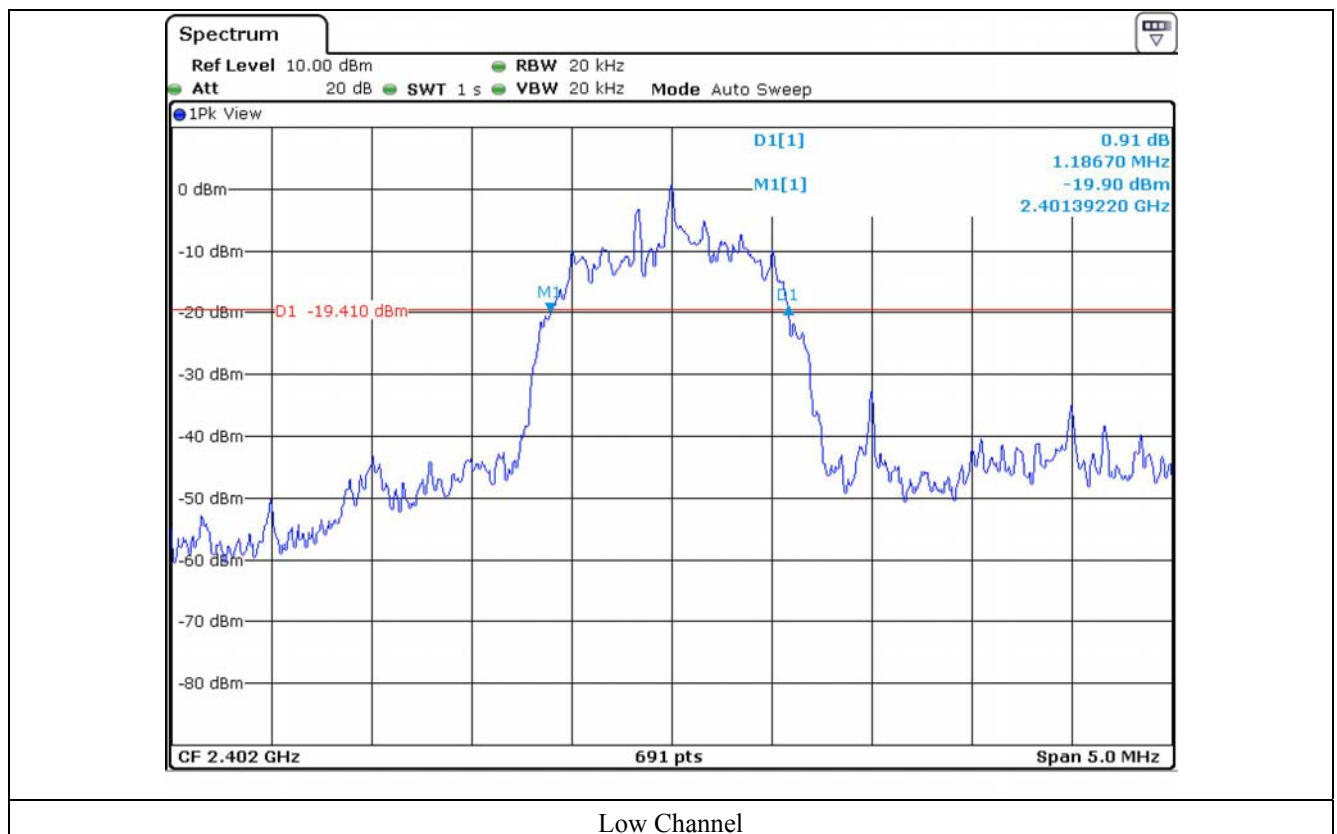
7.1.5 Test data for 2 Mbps

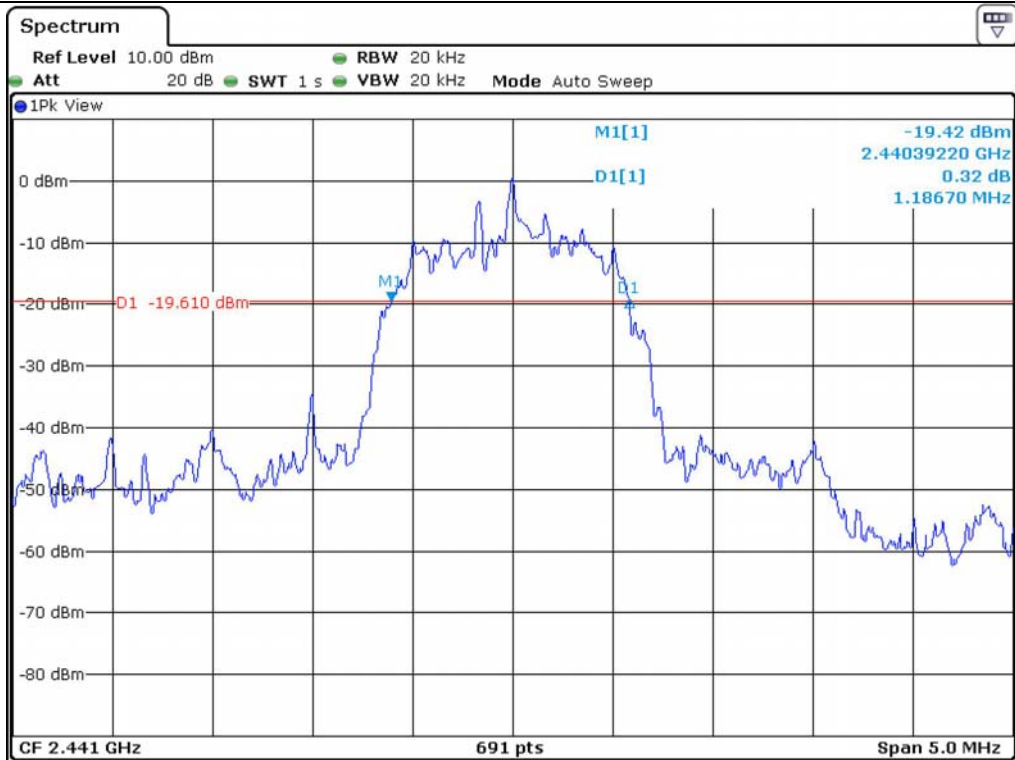
-. Test Date : January 13, 2014

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402	1 186.70
Middle	2 441	1 186.70
High	2 480	1 186.70

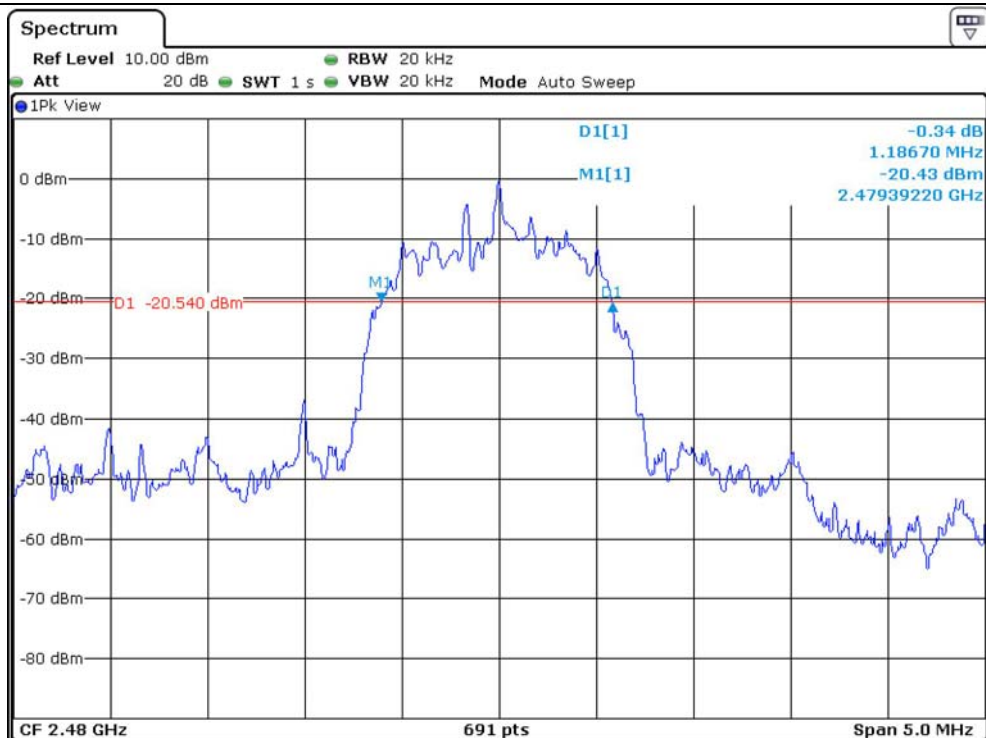
01 2014

Tested by: Hong-Kyu, Lee/ Engineer





Middle Channel



High Channel

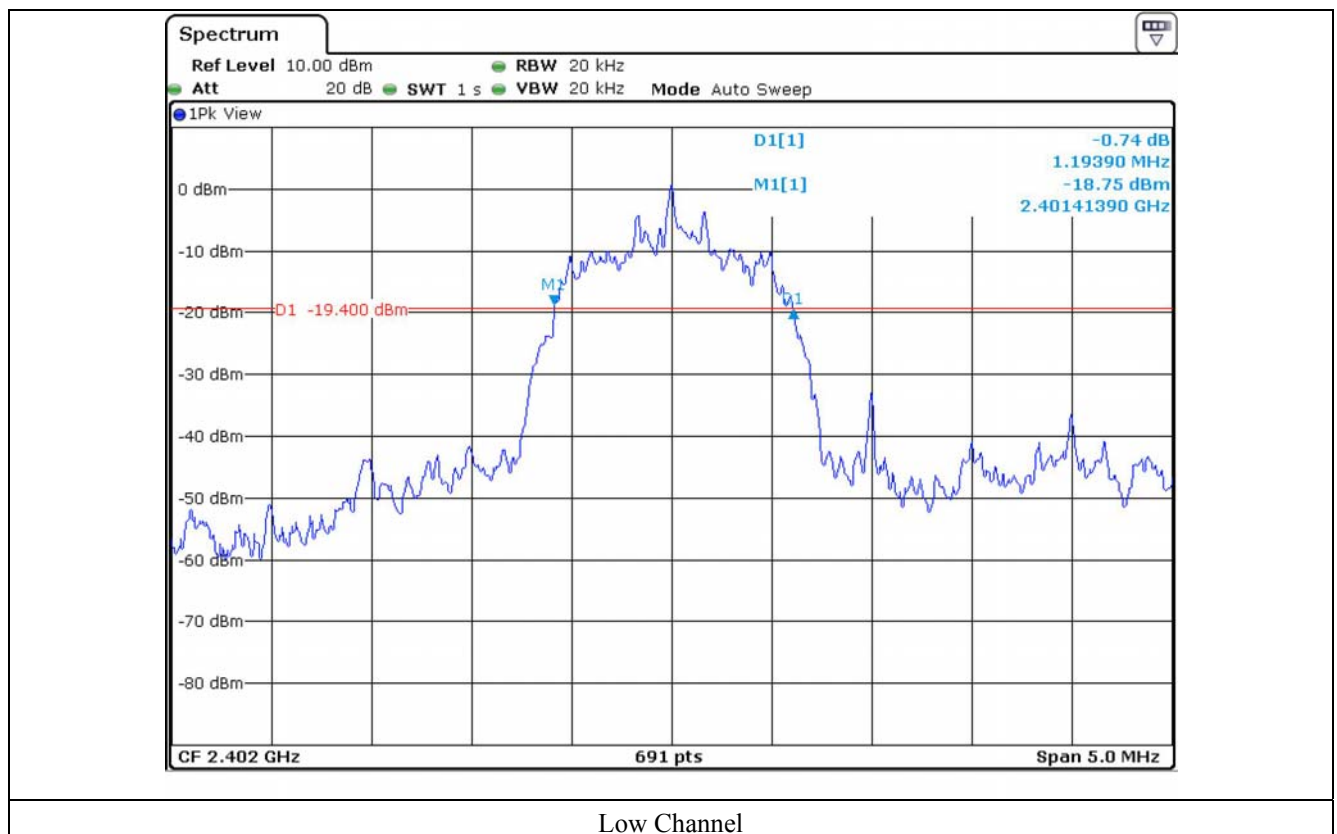
7.1.6 Test data for 3 Mbps

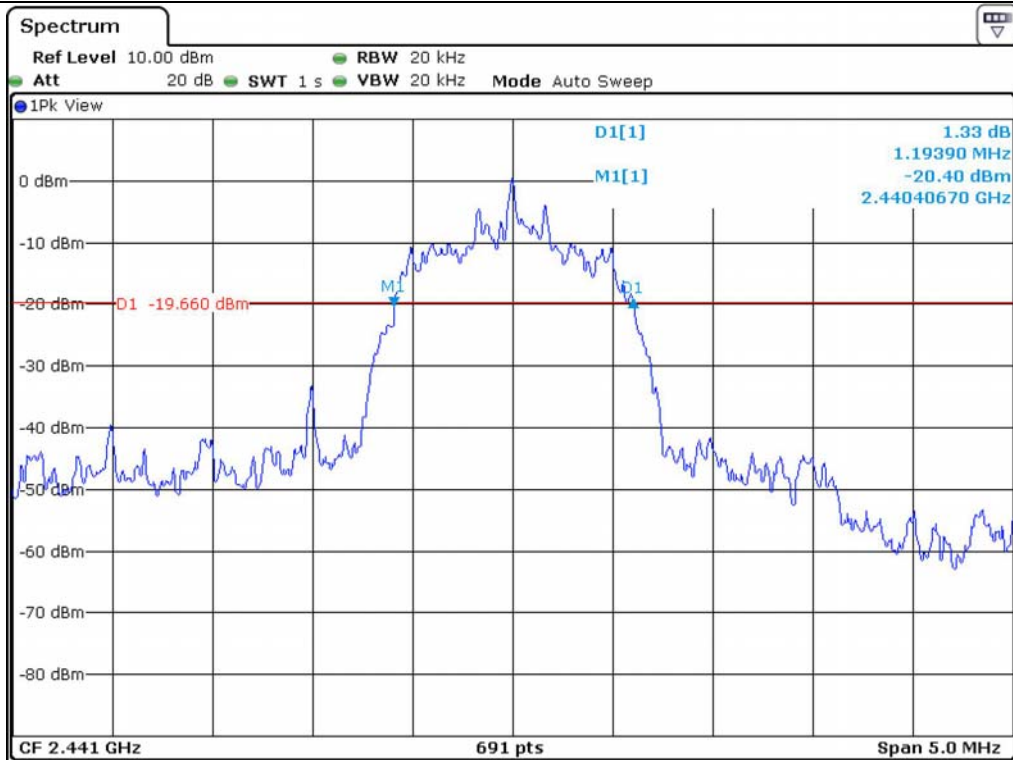
-. Test Date : January 13, 2014

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402	1 193.90
Middle	2 441	1 193.90
High	2 480	1 193.90

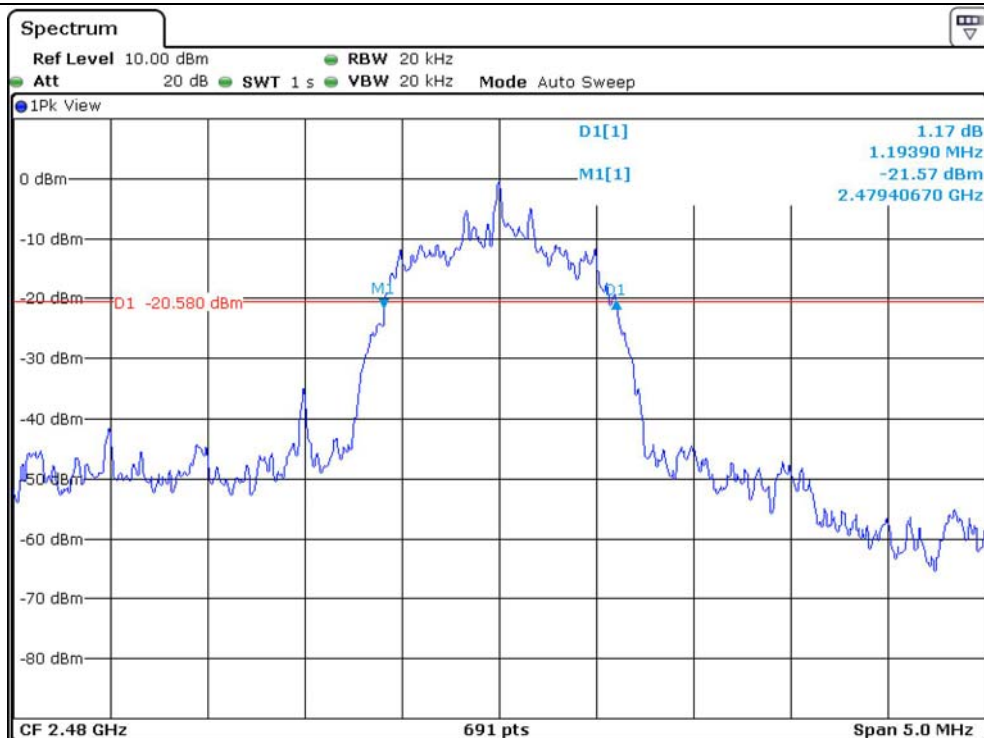
01 2014

Tested by: Hong-Kyu, Lee/ Engineer





Middle Channel



High Channel

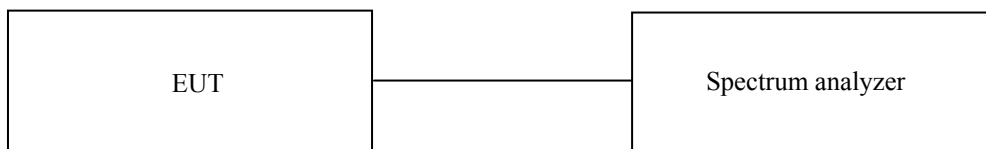
7.2 HOPPING FREQUENCY SEPARATION

7.2.1 Operating environment

Temperature : 24 °C
Relative humidity : 42 % R.H.

7.2.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The frequency span is set to 10 MHz. The analyzer is set to peak hold then a pseudo-random hopping sequence of the transmitter is captured. The mark delta function was used to measure the frequency separation between two adjacent hopping channels.



7.2.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101372	May 20, 2013(1Y)

All test equipment used is calibrated on a regular basis.

7.2.4 Test data for 1 Mbps

-. Test Date : January 13, 2014

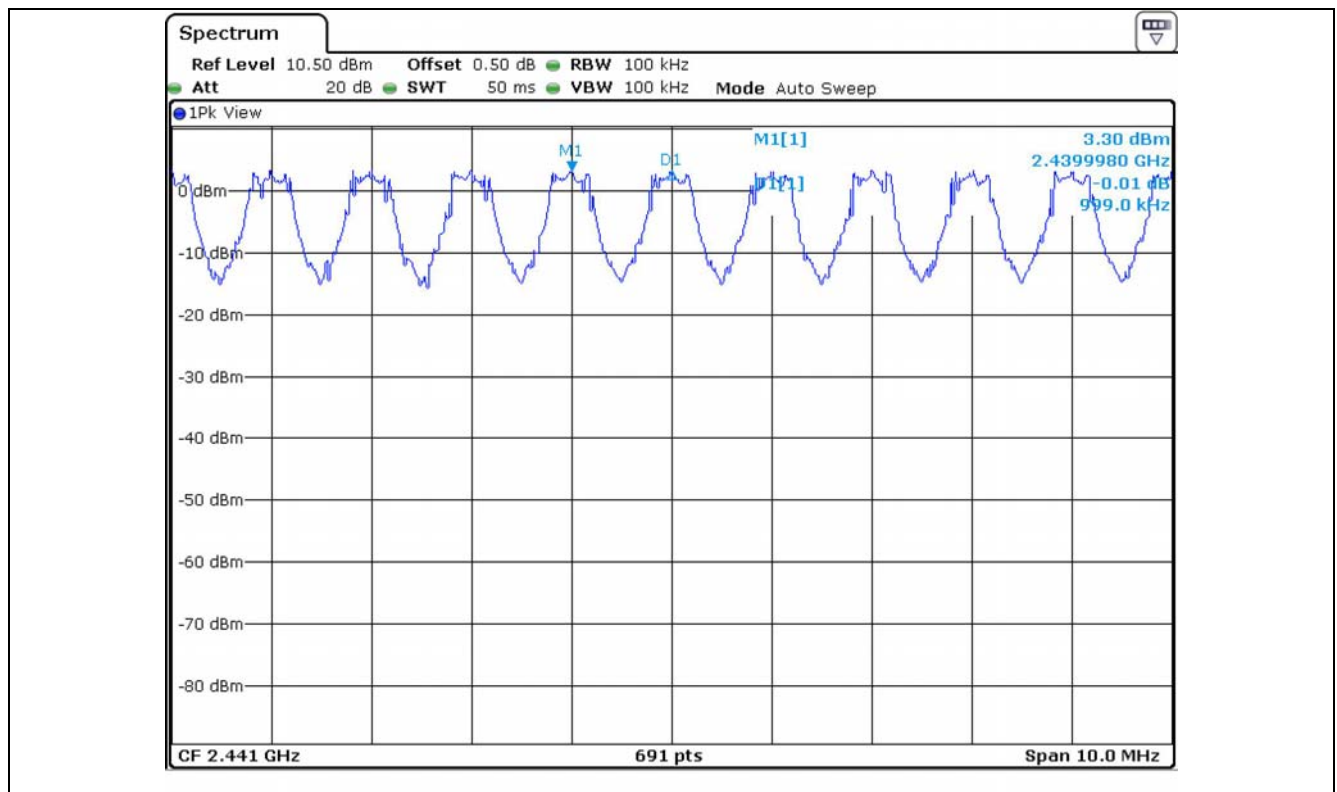
-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	549.9	Separated by a minimum of 25 kHz

Remark: See next page for an overview sweep performed with peak detector.

0 | 30 2.

Tested by: Hong-Kyu, Lee/ Engineer



7.2.5 Test data for 2 Mbps

-. Test Date : January 13, 2014

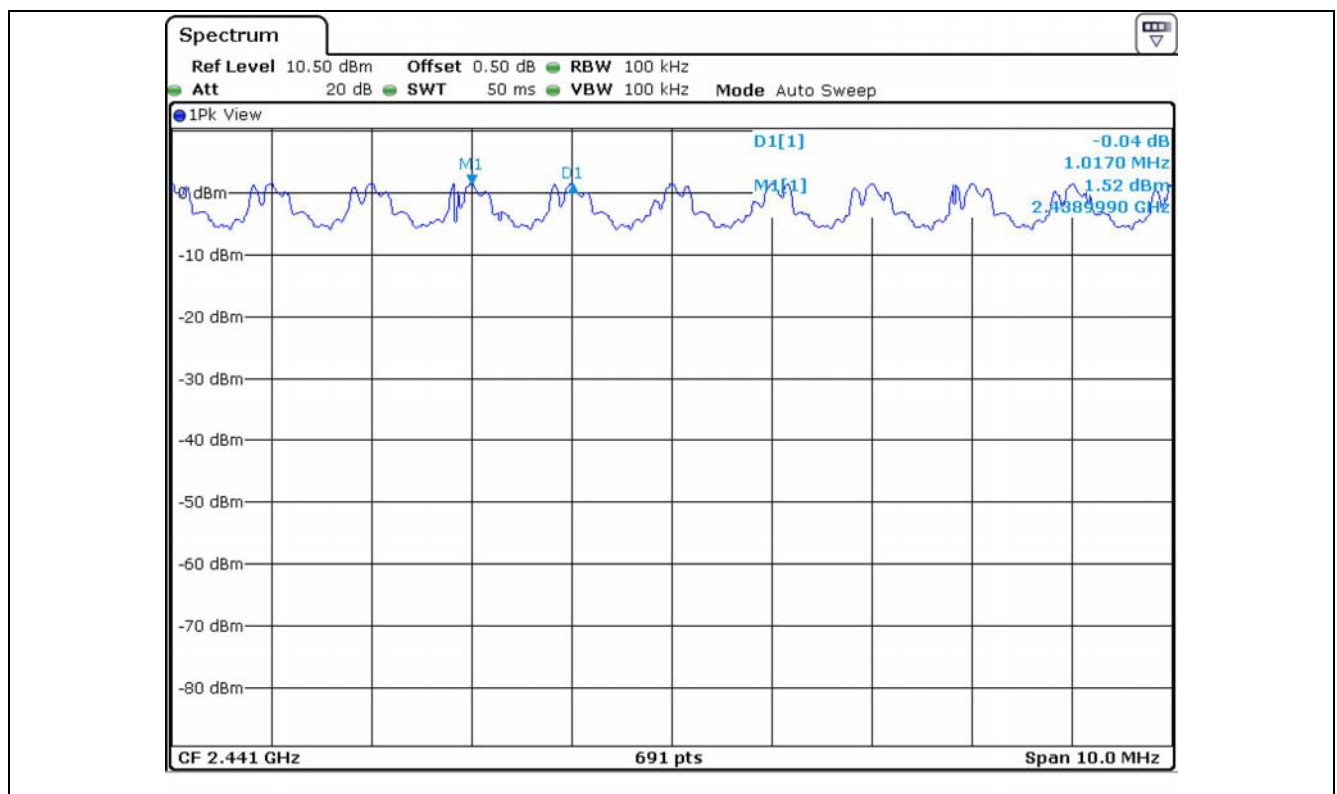
-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
1 017.00	791.1	Separated by a minimum of 25 kHz

Remark: See next page for an overview sweep performed with peak detector.

0 | 30 21.

Tested by: Hong-Kyu, Lee/ Engineer



7.2.6 Test data for 3 Mbps

-. Test Date : January 13, 2014

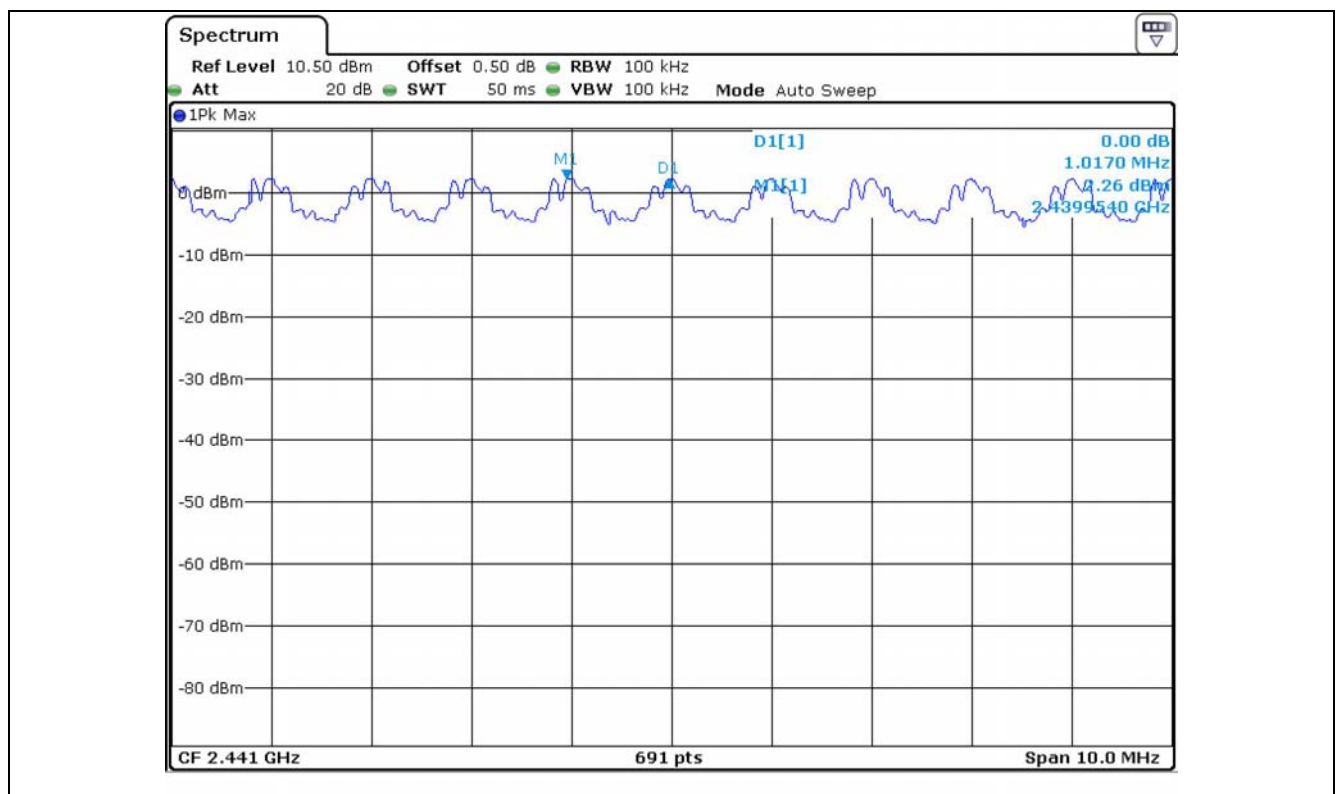
-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
1 017.00	795.9	Separated by a minimum of 25 kHz

Remark: See next page for an overview sweep performed with peak detector.

0 | 30 2.

Tested by: Hong-Kyu, Lee/ Engineer



7.3 NUMBER OF HOPPING CHANNELS

7.3.1 Operating environment

Temperature : 25 °C
Relative humidity : 47 % R.H.

7.3.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The frequency span is set to 100 MHz and the resolution bandwidth is set to 100 kHz. The analyzer is set to peak hold and then complete pseudo-random hopping sequence of the transmitter is captured.



7.3.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101372	May 20, 2013(1Y)

All test equipment used is calibrated on a regular basis.

7.3.4 Test data for Mbps 1

-. Test Date : January 13, 2014

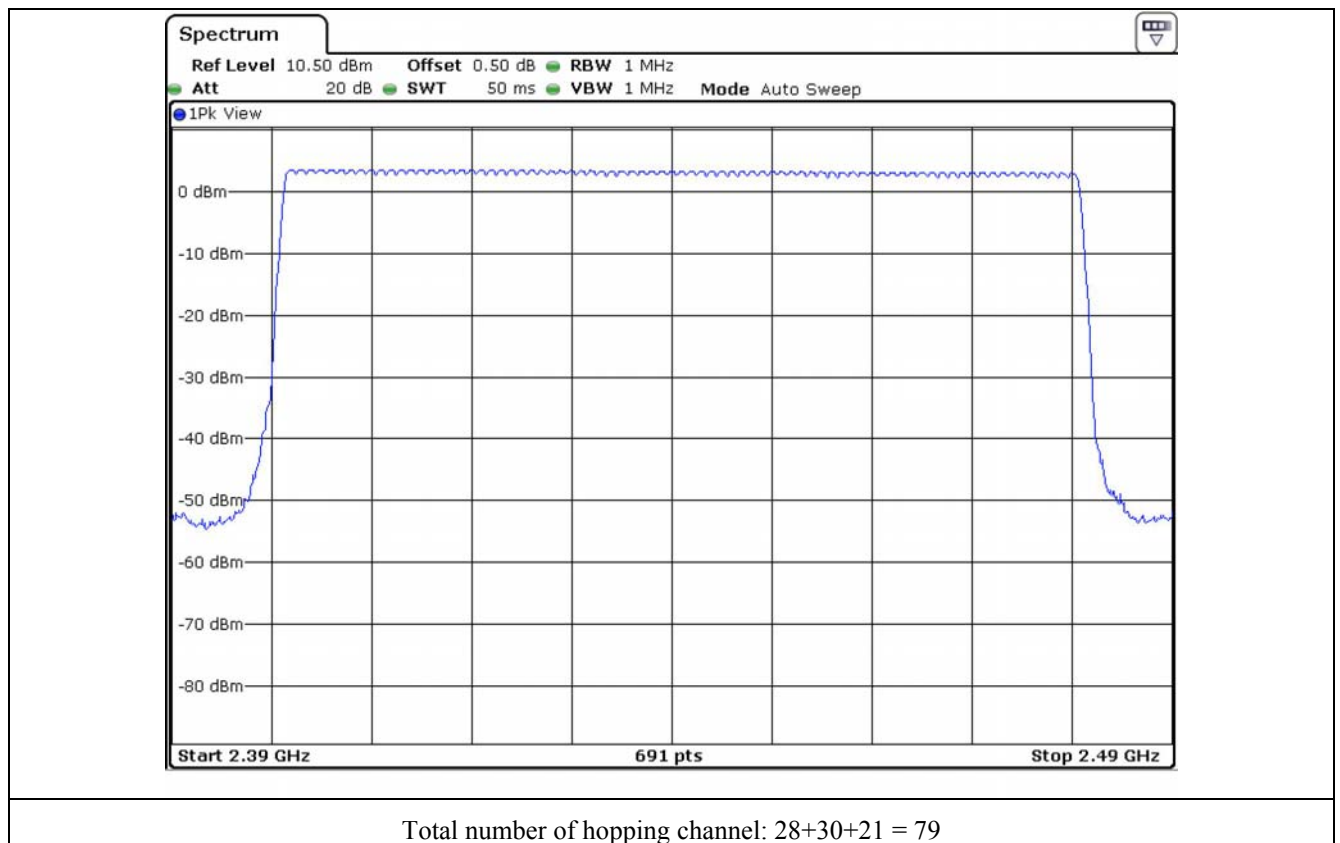
-. Test Result : Pass

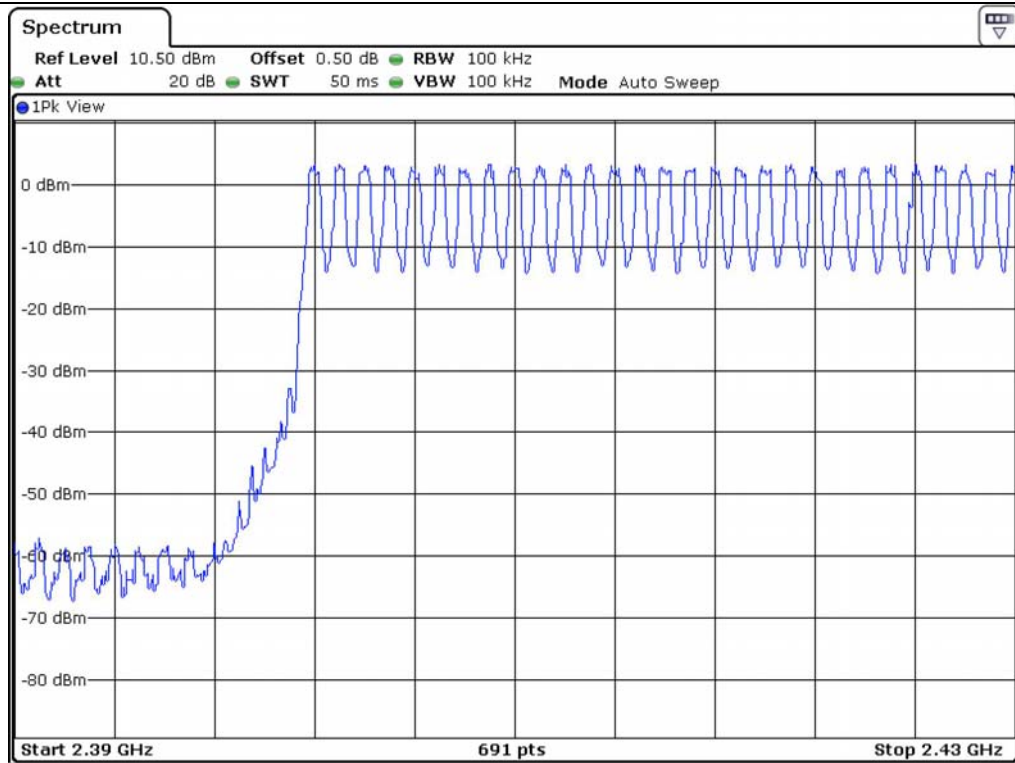
Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
1 Mbps	79	Minimum of 15	64

Remark: See next page for an overview sweep performed with peak detector.

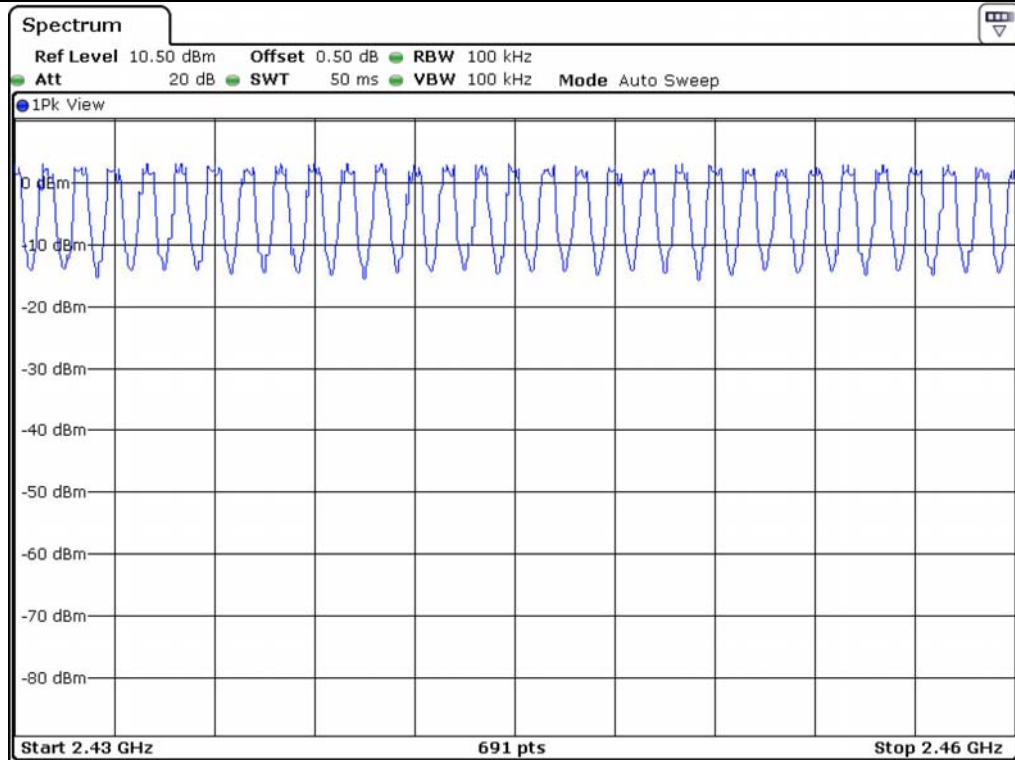
0 | 30 21.

Tested by: Hong-Kyu, Lee/ Engineer

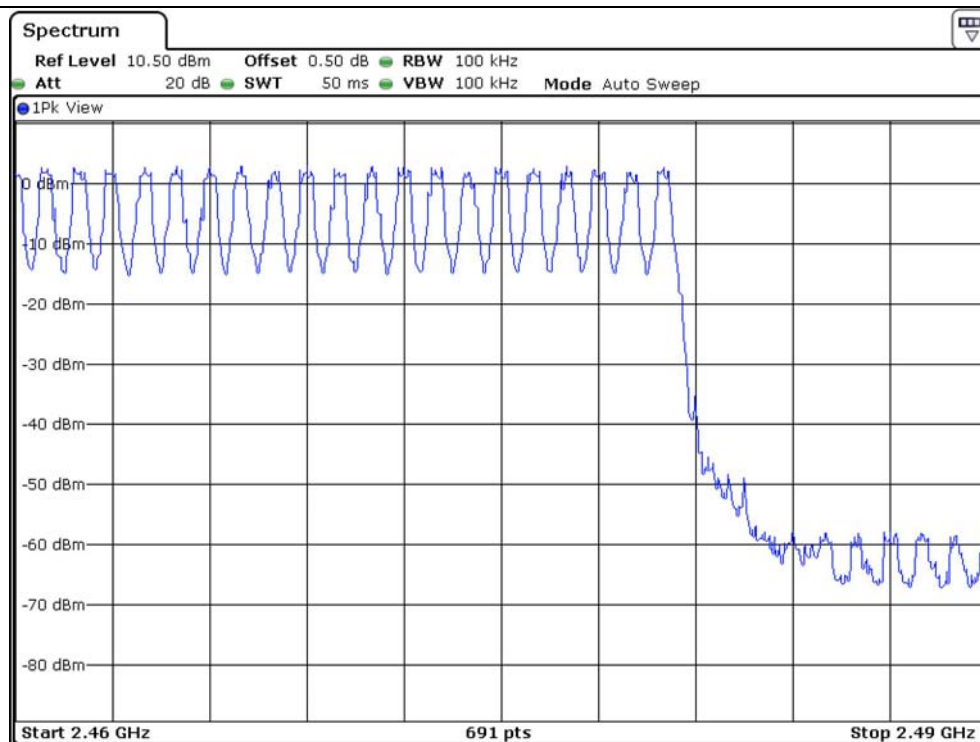




Number of hopping channel: 28



Number of hopping channel: 30



Number of hopping channel: 21

7.3.5 Test data for Mbps 2

-. Test Date : January 13, 2014

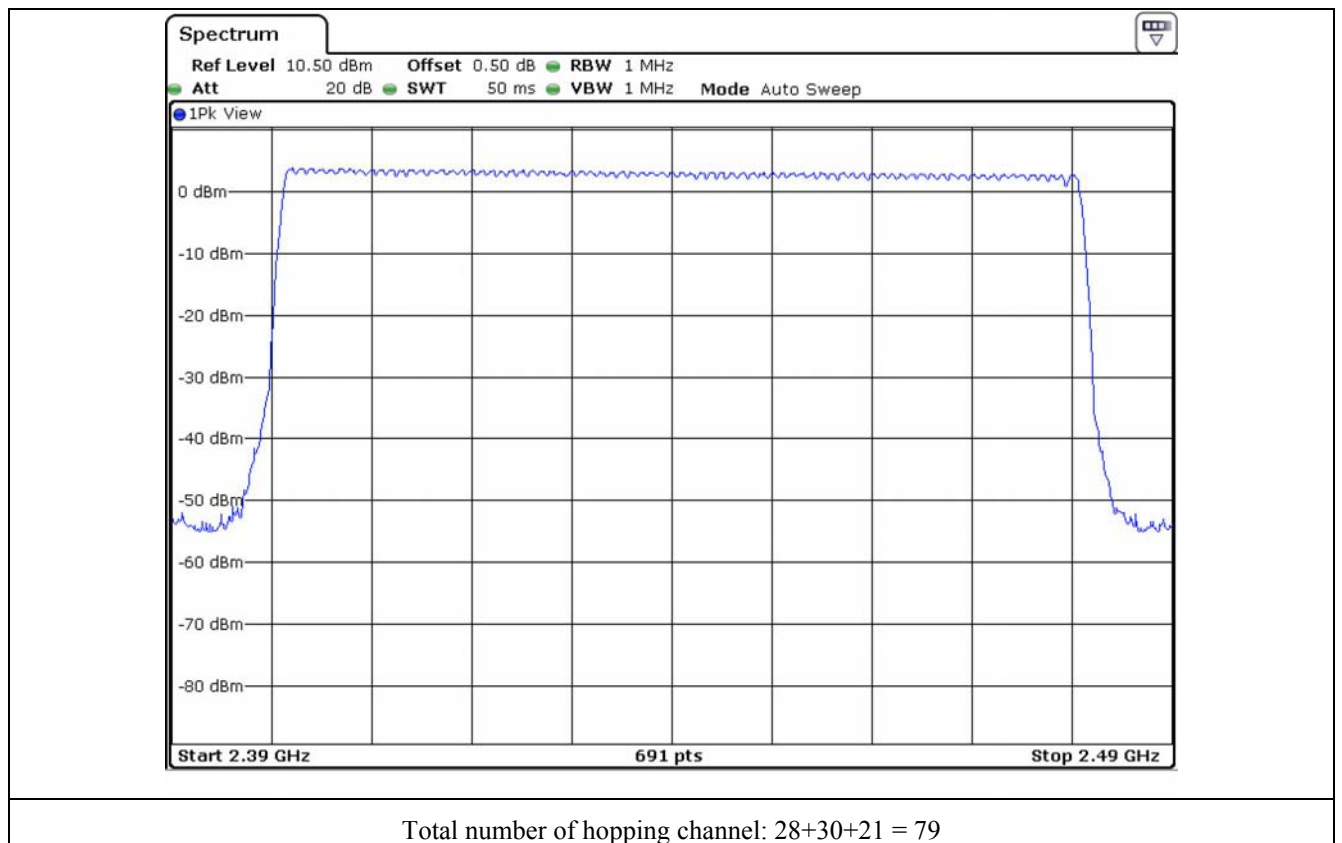
-. Test Result : Pass

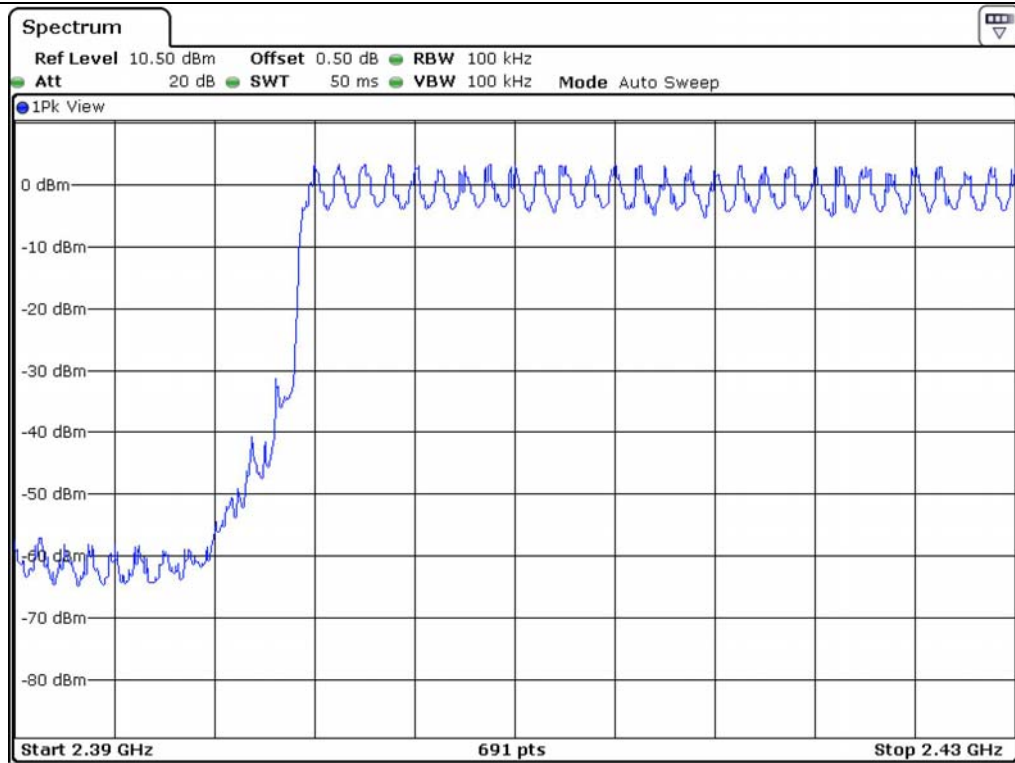
Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
2 Mbps	79	Minimum of 15	64

Remark: See next page for an overview sweep performed with peak detector.

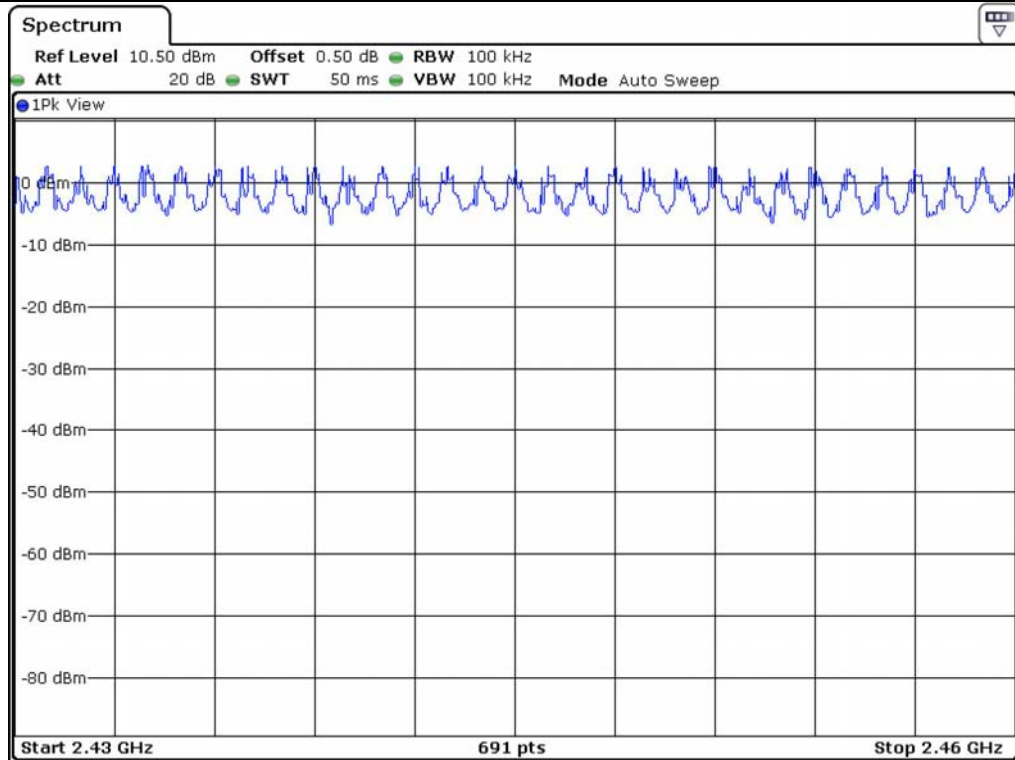
0 | 30 21.

Tested by: Hong-Kyu, Lee/ Engineer

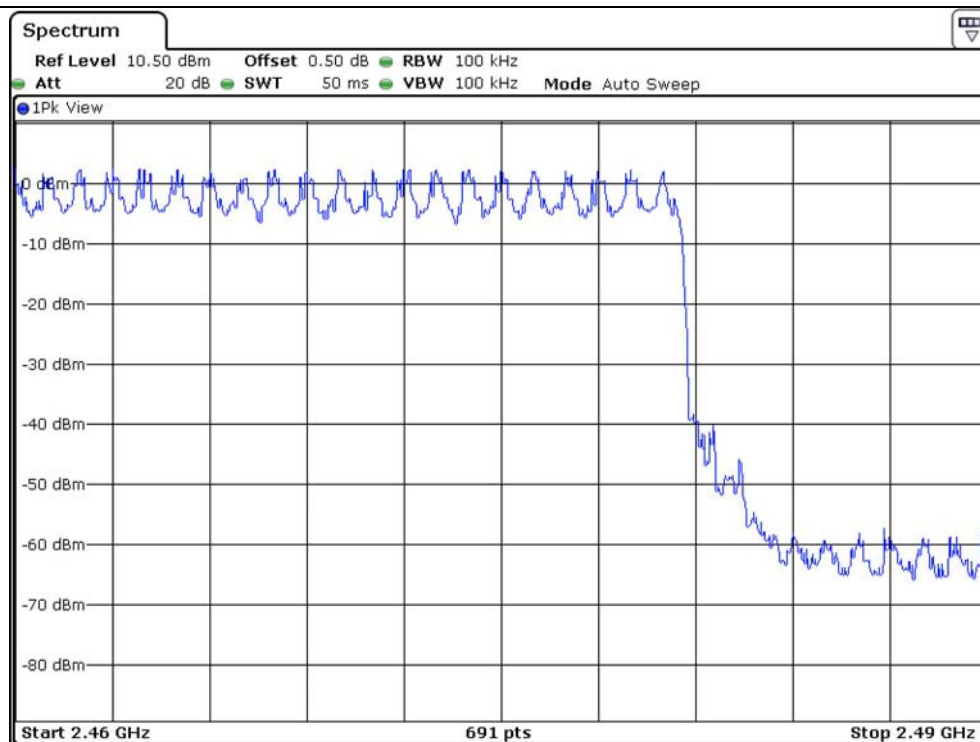




Number of hopping channel: 28



Number of hopping channel: 30



Number of hopping channel: 21

7.3.6 Test data for Mbps 3

-. Test Date : January 13, 2014

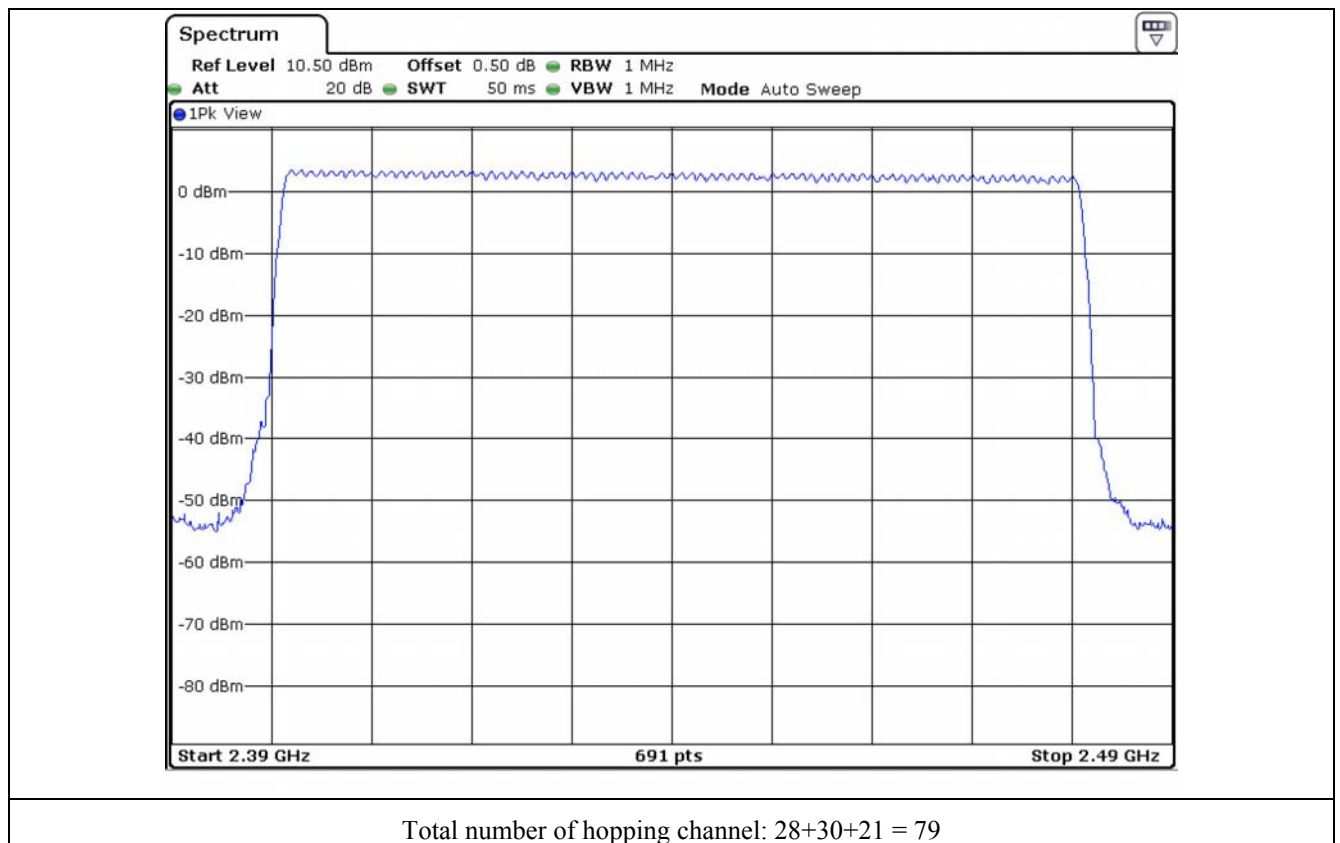
-. Test Result : Pass

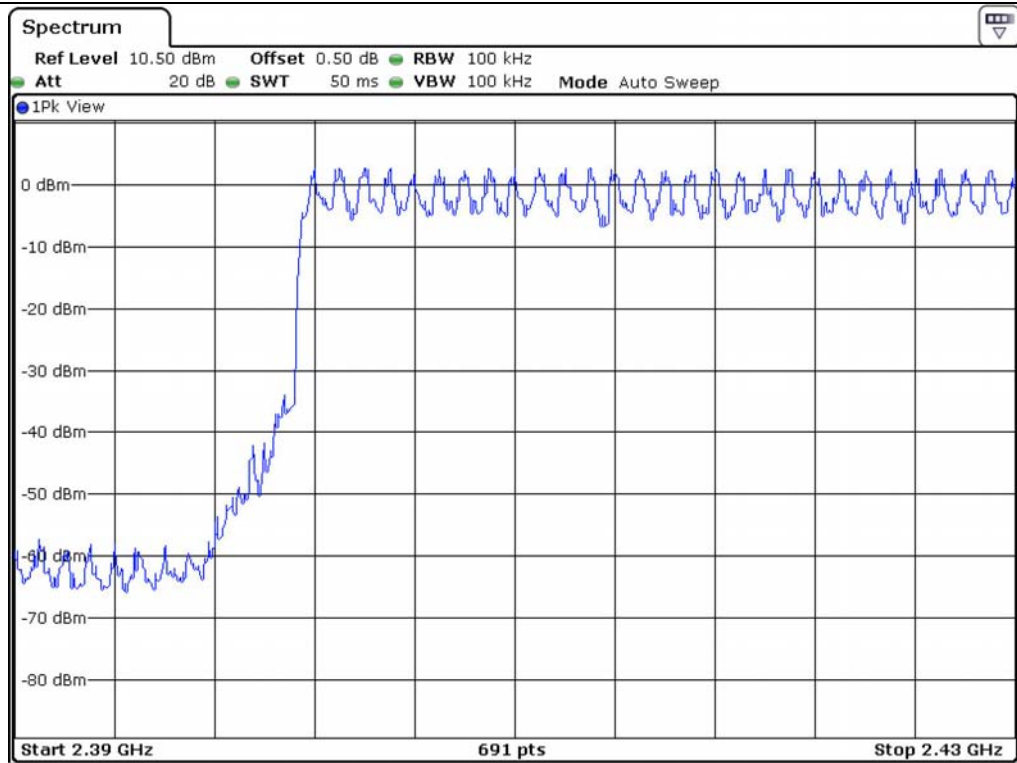
Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
3 Mbps	79	Minimum of 15	64

Remark: See next page for an overview sweep performed with peak detector.

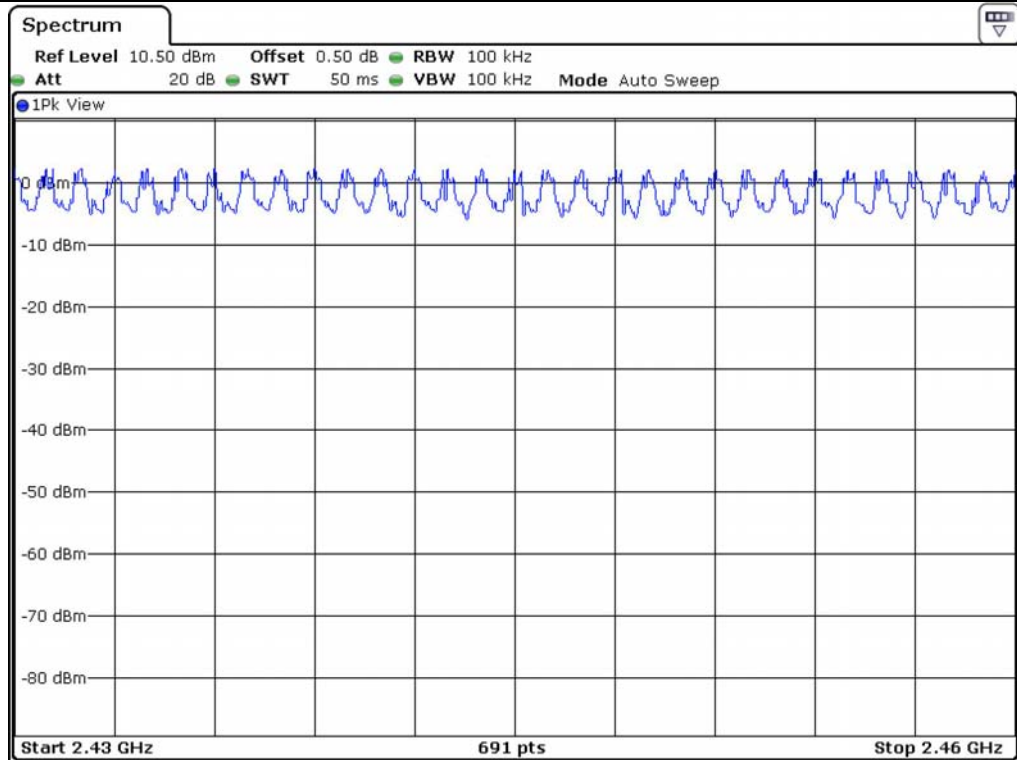
0 | 30 21.

Tested by: Hong-Kyu, Lee/ Engineer

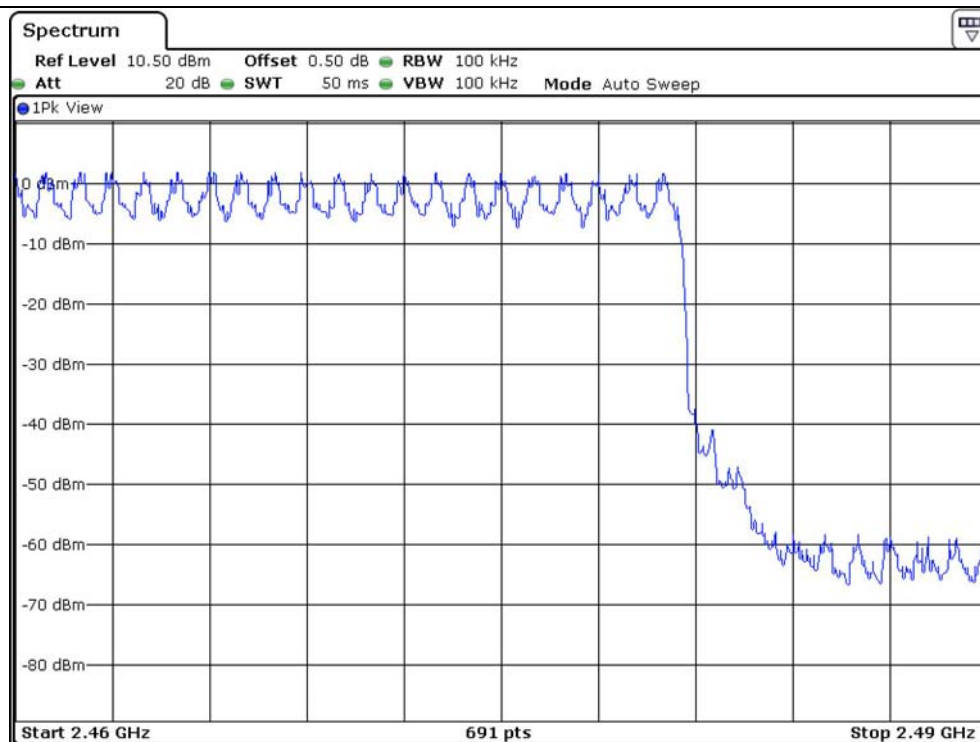




Number of hopping channel: 28



Number of hopping channel: 30



Number of hopping channel: 21

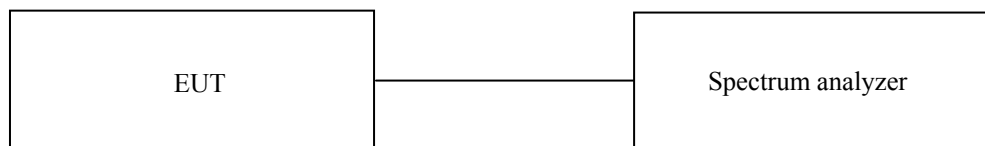
7.4 TIME OF OCCUPANCY

7.4.1 Operating environment

Temperature : 24 °C
Relative humidity : 42 % R.H.

7.4.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The transmitter is set to operate in its normal frequency hopping mode. The center frequency of the spectrum analyzer is set to one of hopping channels near the center of the operating band and span is set to zero Hz. The sweep time is set to display one complete pulse. The mark delta function is used to measure the duration of the pulses.



7.4.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101372	May 20, 2013(1Y)

All test equipment used is calibrated on a regular basis.

7.4.4 Test data for 1 Mbps

-. Test Date : January 13, 2014

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 μ s with 79 channels.

For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second ($= 1\,600/2/79$) for DH1, and 5.06 times ($= 1\,600/4/79$) for DH3, and 3.38 times ($= 1\,600/6/79$) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.406	10.13	31.6	129.90	400	PASS
DH3	1.638	5.06	31.6	261.86	400	
DH5	2.899	3.38	31.6	309.59	400	

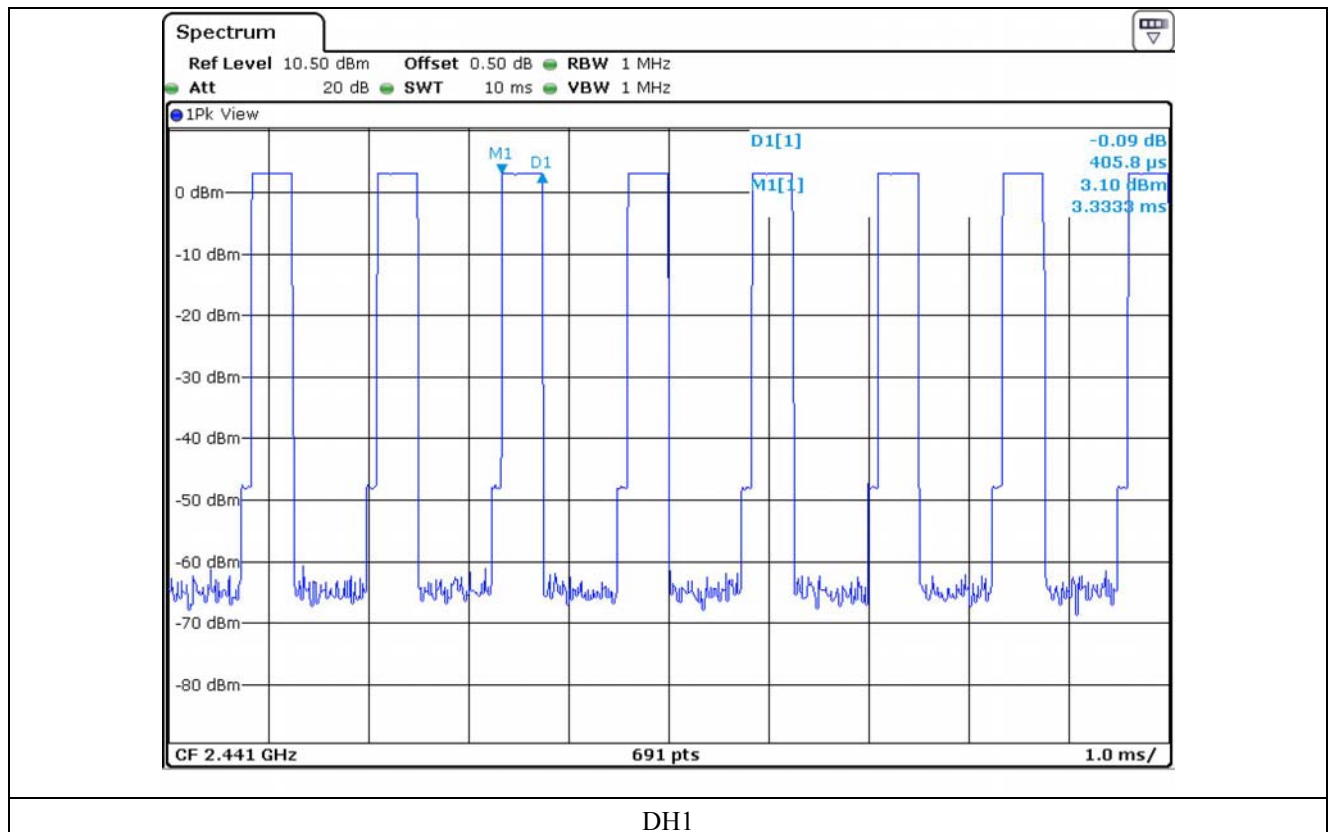
Total dwell time is calculated as following.

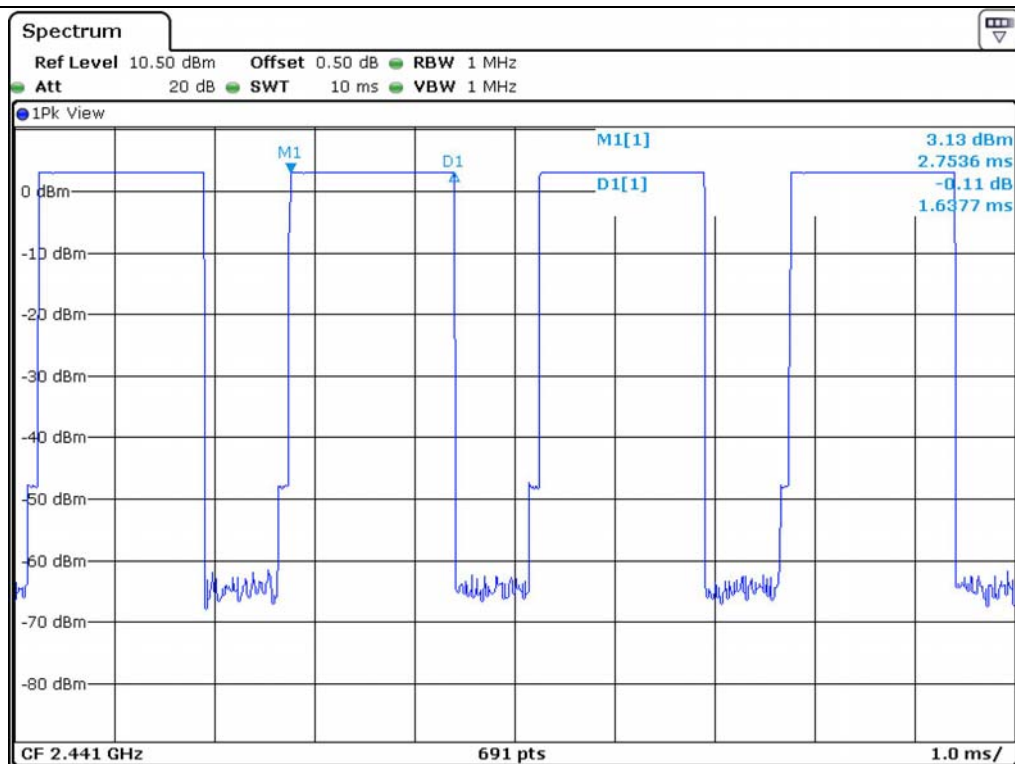
Total Dwell Time = Pulse time * Hops per second with channels * period time

Remark: See next page for an overview sweep performed with peak detector.

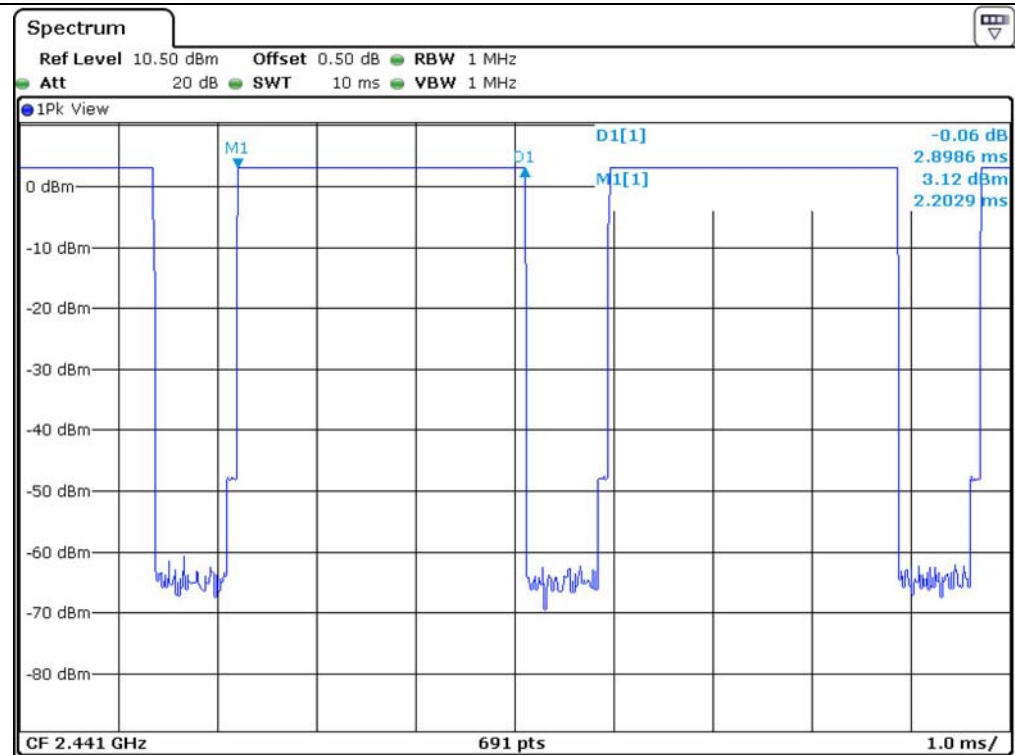
01 3033

Tested by: Hong-Kyu, Lee/ Engineer





DH3



DH5

7.4.5 Test data for 2 Mbps

-. Test Date : January 13, 2014

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 μ s with 79 channels.

For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second ($= 1\,600/2/79$) for DH1, and 5.06 times ($= 1\,600/4/79$) for DH3, and 3.38 times ($= 1\,600/6/79$) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.406	10.13	31.6	129.90	400	PASS
DH3	1.638	5.06	31.6	261.86	400	
DH5	2.899	3.38	31.6	309.59	400	

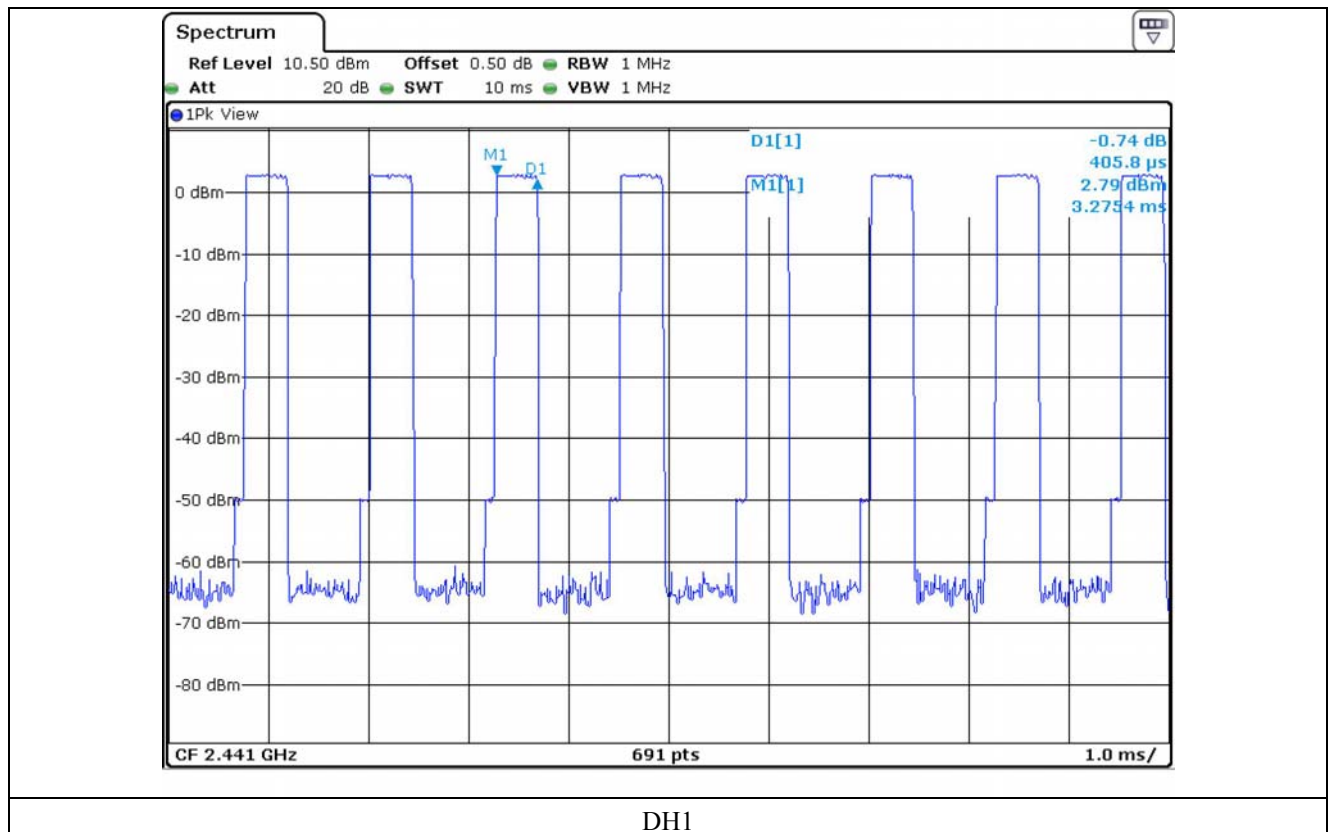
Total dwell time is calculated as following.

Total Dwell Time = Pulse time * Hops per second with channels * period time

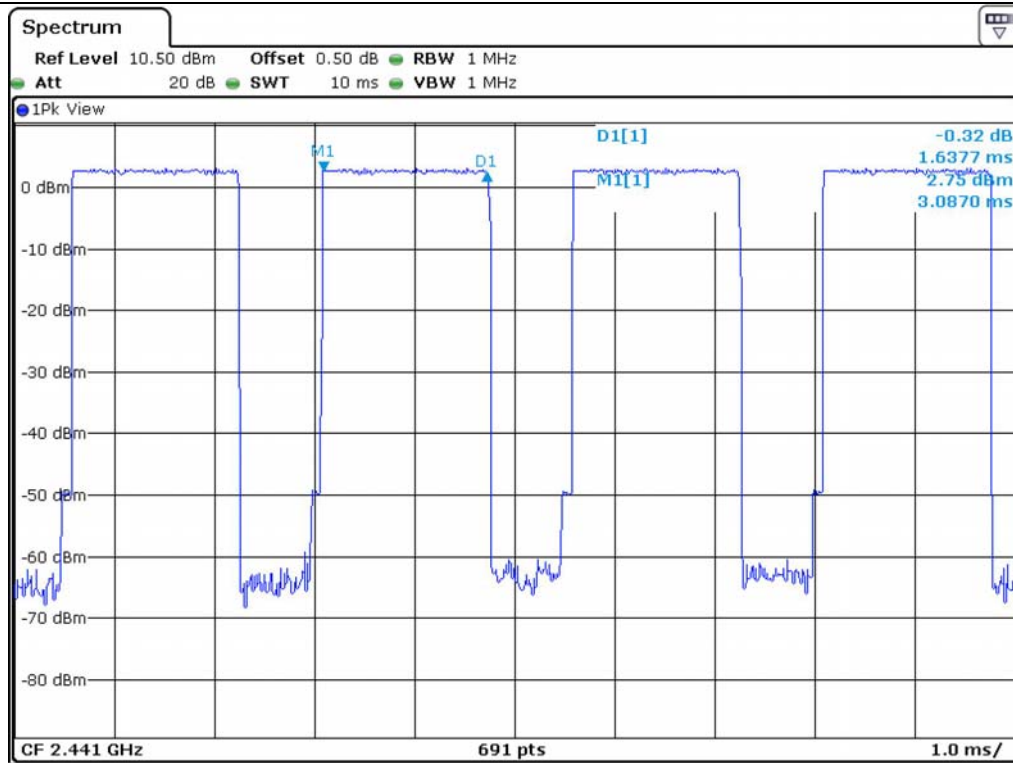
Remark: See next page for an overview sweep performed with peak detector.

01 30 31

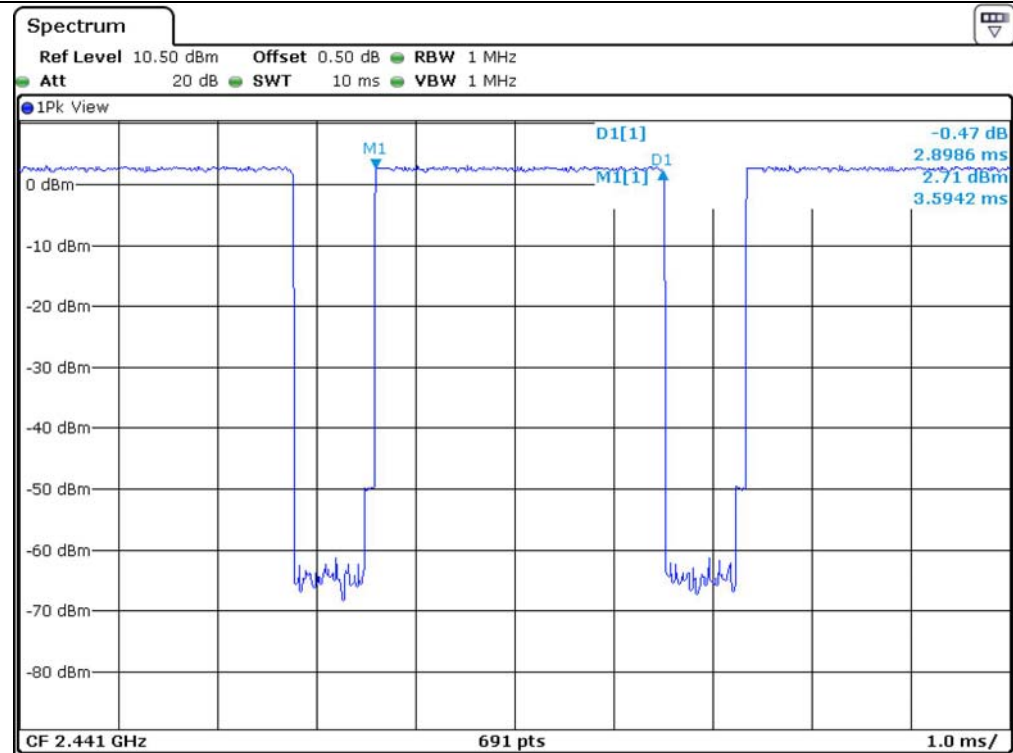
Tested by: Hong-Kyu, Lee/ Engineer



DH1



DH3



DH5

7.4.6 Test data for 3 Mbps

-. Test Date : January 13, 2014

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 μ s with 79 channels.

For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second ($= 1\,600/2/79$) for DH1, and 5.06 times ($= 1\,600/4/79$) for DH3, and 3.38 times ($= 1\,600/6/79$) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.406	10.13	31.6	129.90	400	PASS
DH3	1.638	5.06	31.6	261.86	400	
DH5	2.899	3.38	31.6	309.59	400	

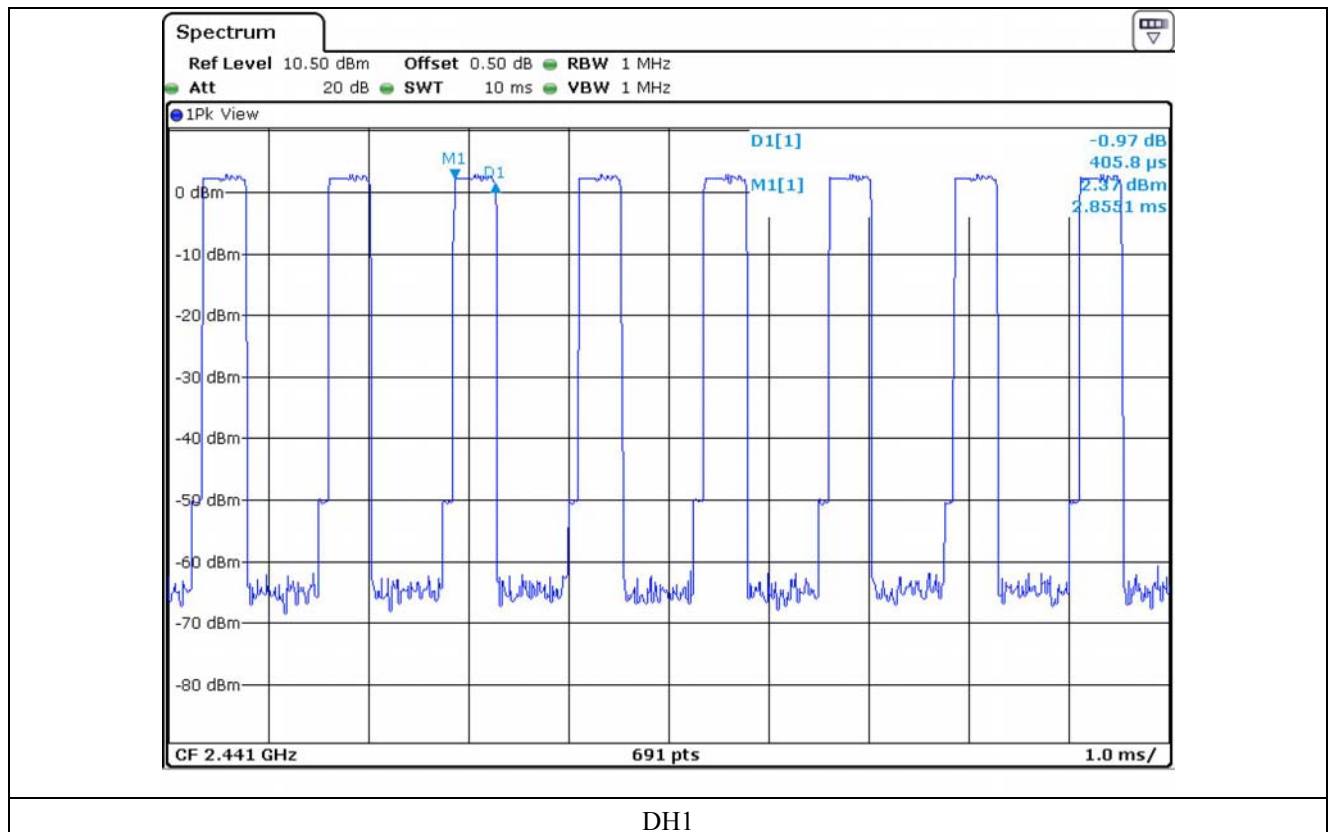
Total dwell time is calculated as following.

Total Dwell Time = Pulse time * Hops per second with channels * period time

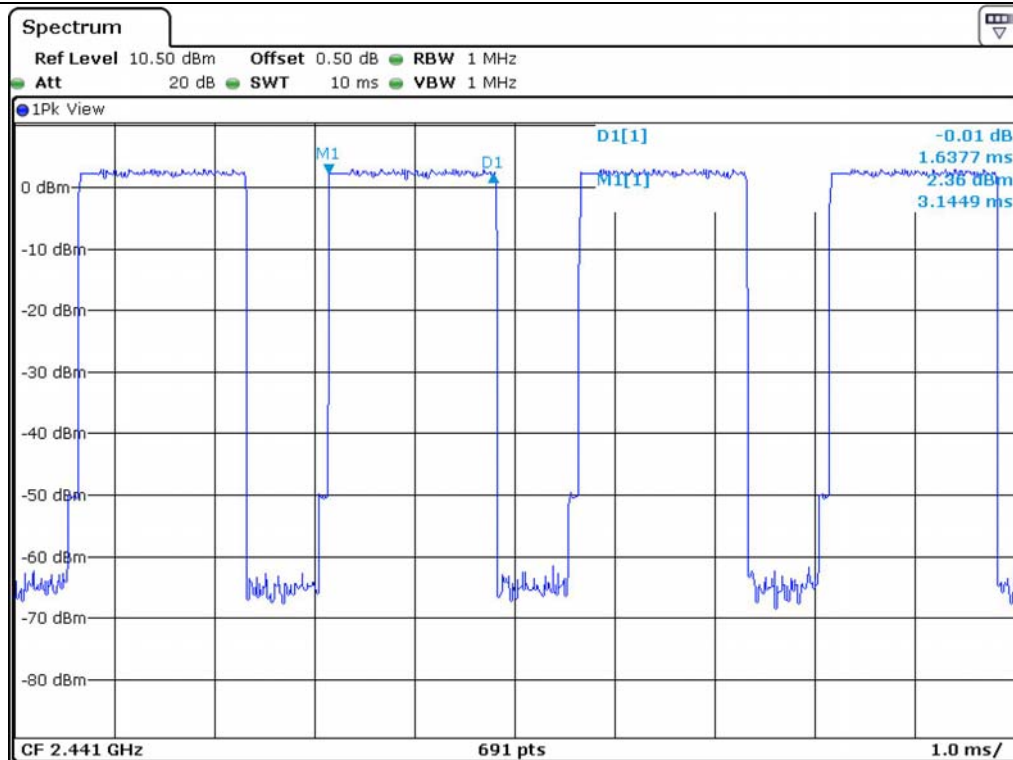
Remark: See next page for an overview sweep performed with peak detector.

01 30 31

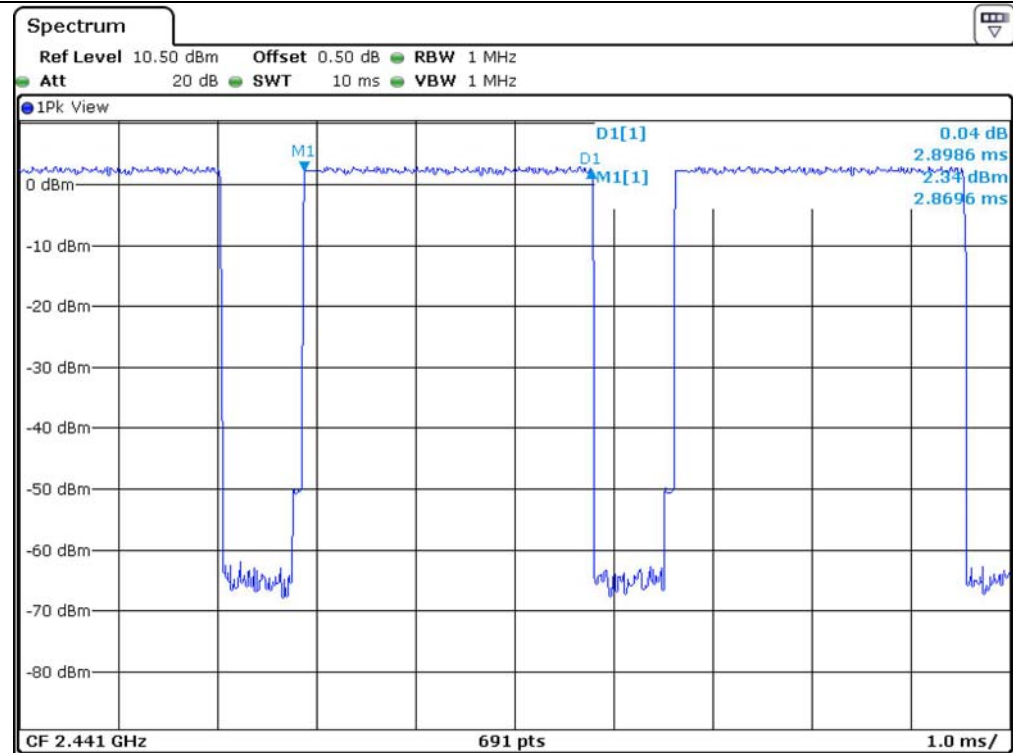
Tested by: Hong-Kyu, Lee/ Engineer



DH1



DH3



DH5

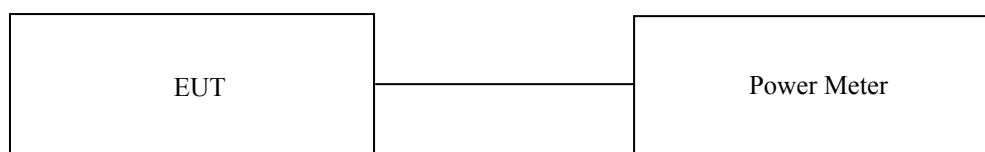
8 MAXIMUM PEAK OUTPUT POWER

8.1 Operating environment

Temperature : 24 °C
Relative humidity : 42 % R.H.

8.2 Test set-up

The maximum peak output power was measured with the spectrum analyzer connected to the antenna output of the EUT. The EUT was operating in transmit mode at the appropriate center frequency.



8.3 Test equipment used

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ - FSV30	Rohde & Schwarz	Signal Analyzer	101372	May 20, 2013(1Y)

All test equipment used is calibrated on a regular basis.

8.4 Test data for 1 Mbps

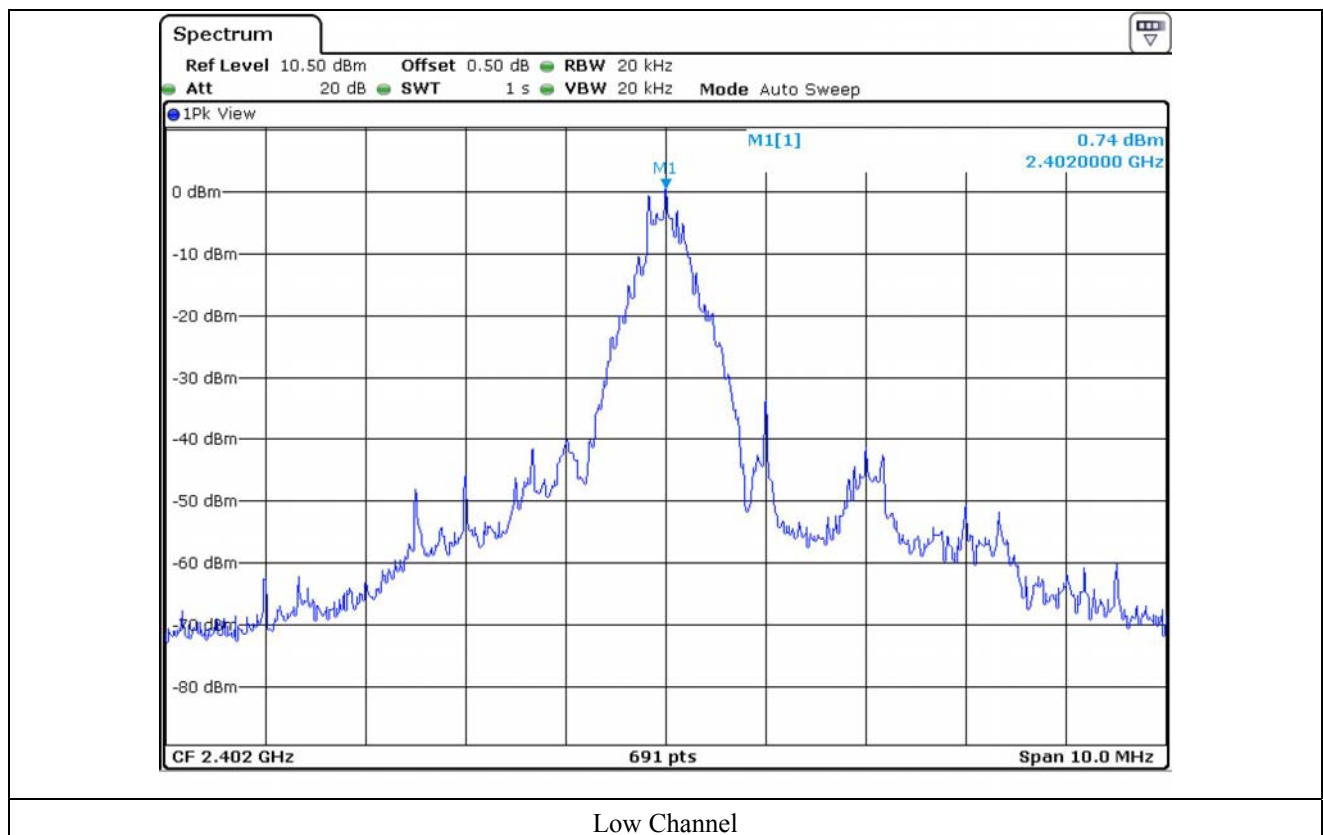
-. Test Date : January 13, 2014

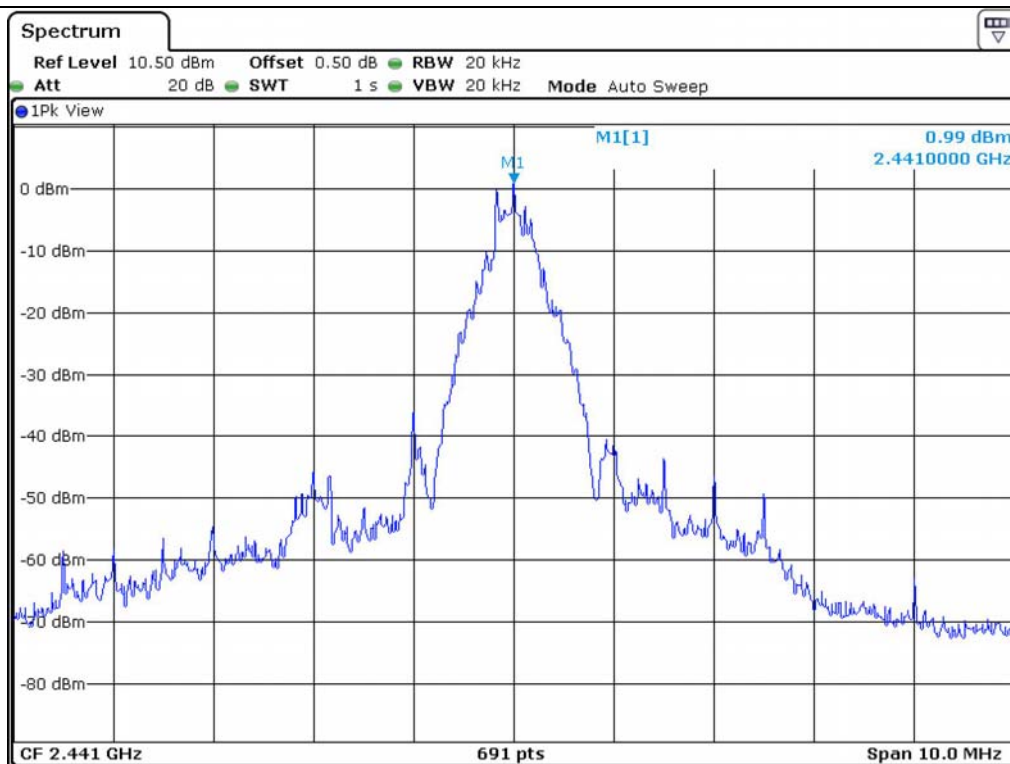
-. Test Result : Pass

CHANNE L	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402	0.74	30.00	26.42
Middle	2 441	0.99	30.00	26.67
High	2 480	0.45	30.00	26.93

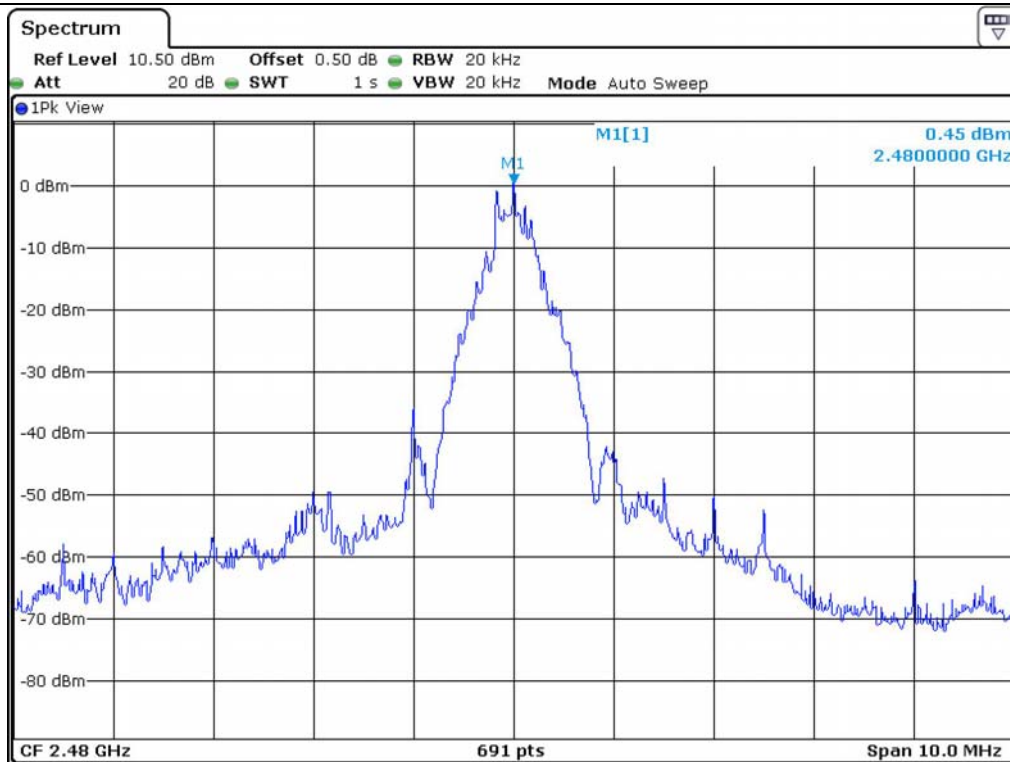
이영진

Tested by: Hong-Kyu, Lee/ Engineer





Middle Channel



High Channel

8.5 Test data for 2 Mbps

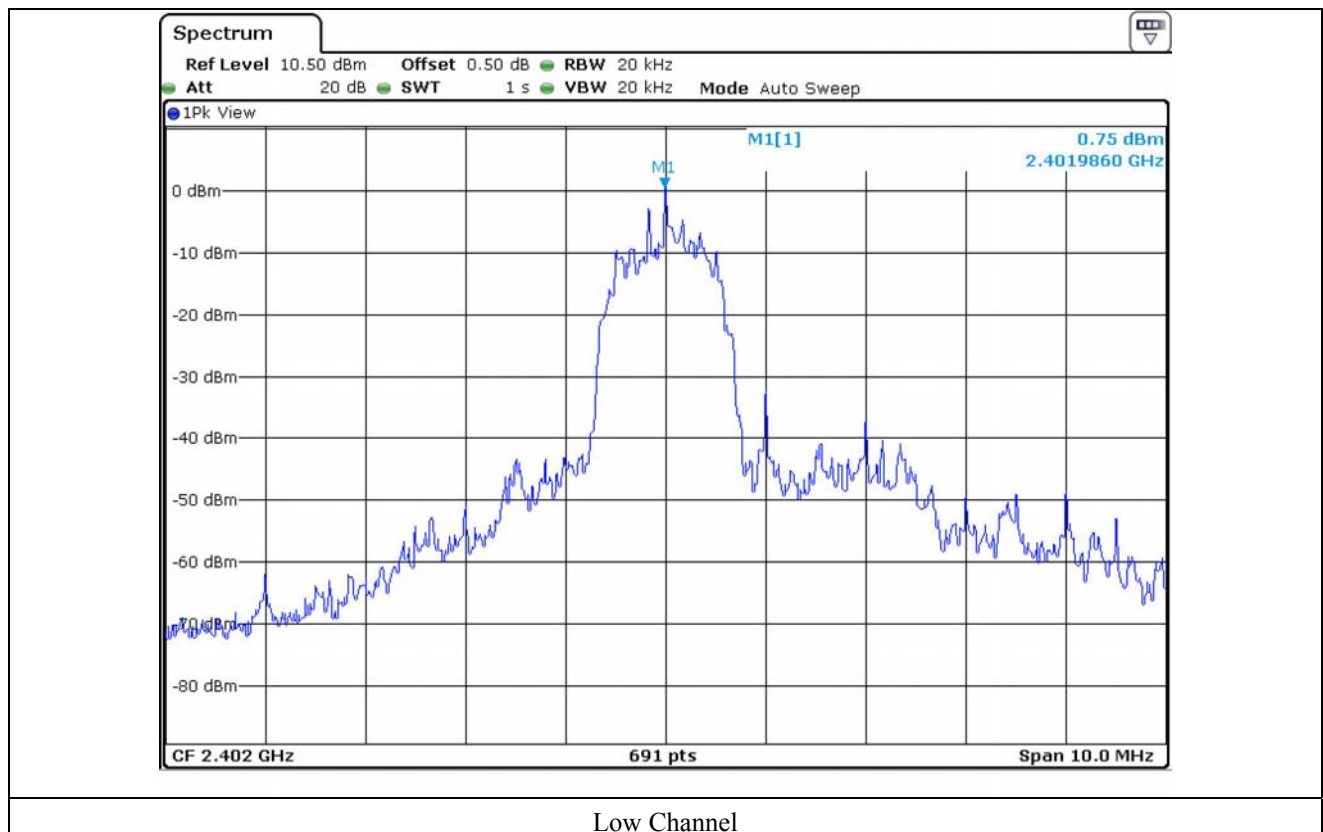
-. Test Date : January 13, 2014

-. Test Result : Pass

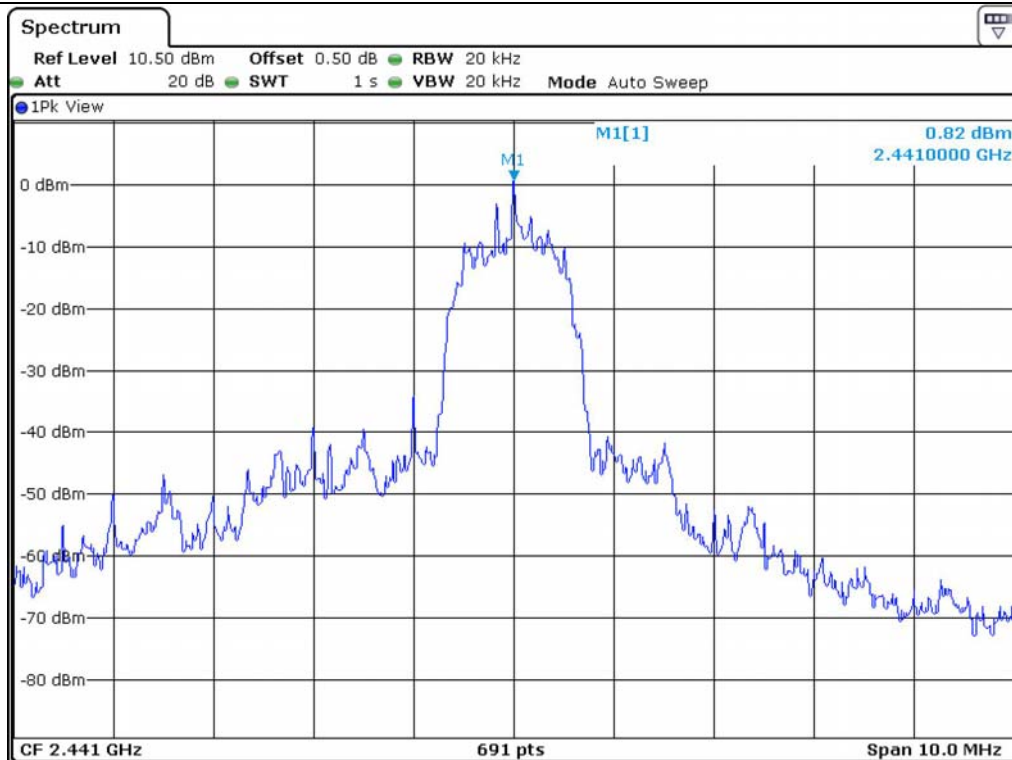
CHANNE L	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402	0.75	3.94	30.00
Middle	2 441	0.82	3.40	30.00
High	2 480	-0.09	2.92	30.00

01 2014

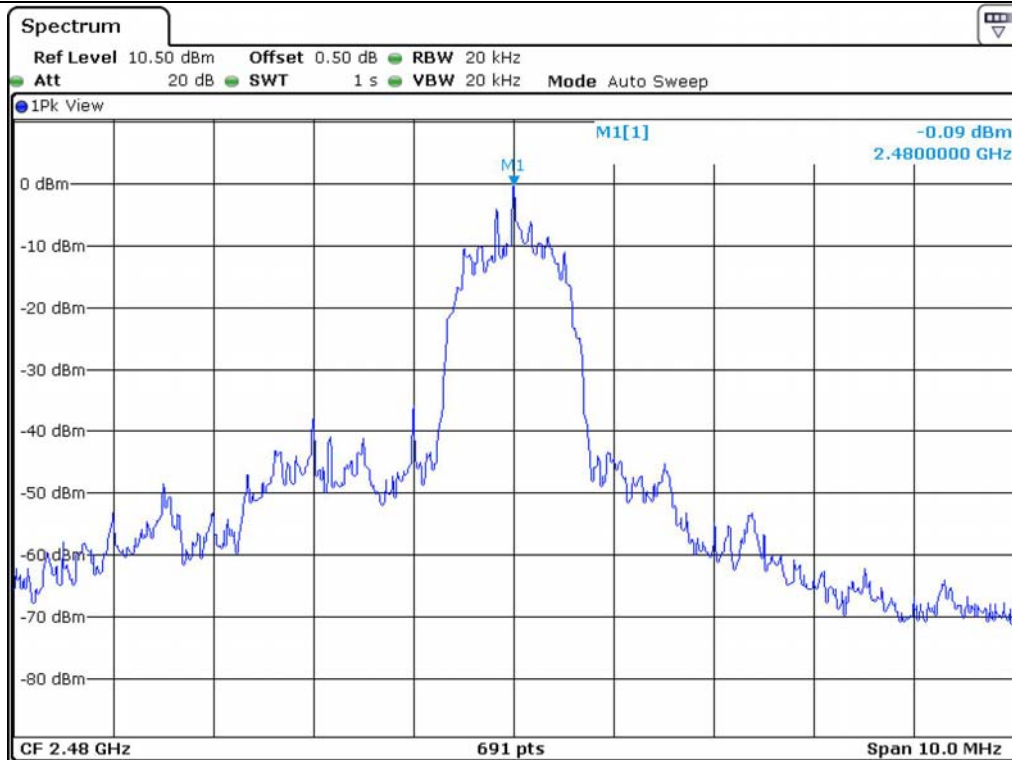
Tested by: Hong-Kyu, Lee/ Engineer



Low Channel



Middle Channel



High Channel

8.6 Test data for 3 Mbps

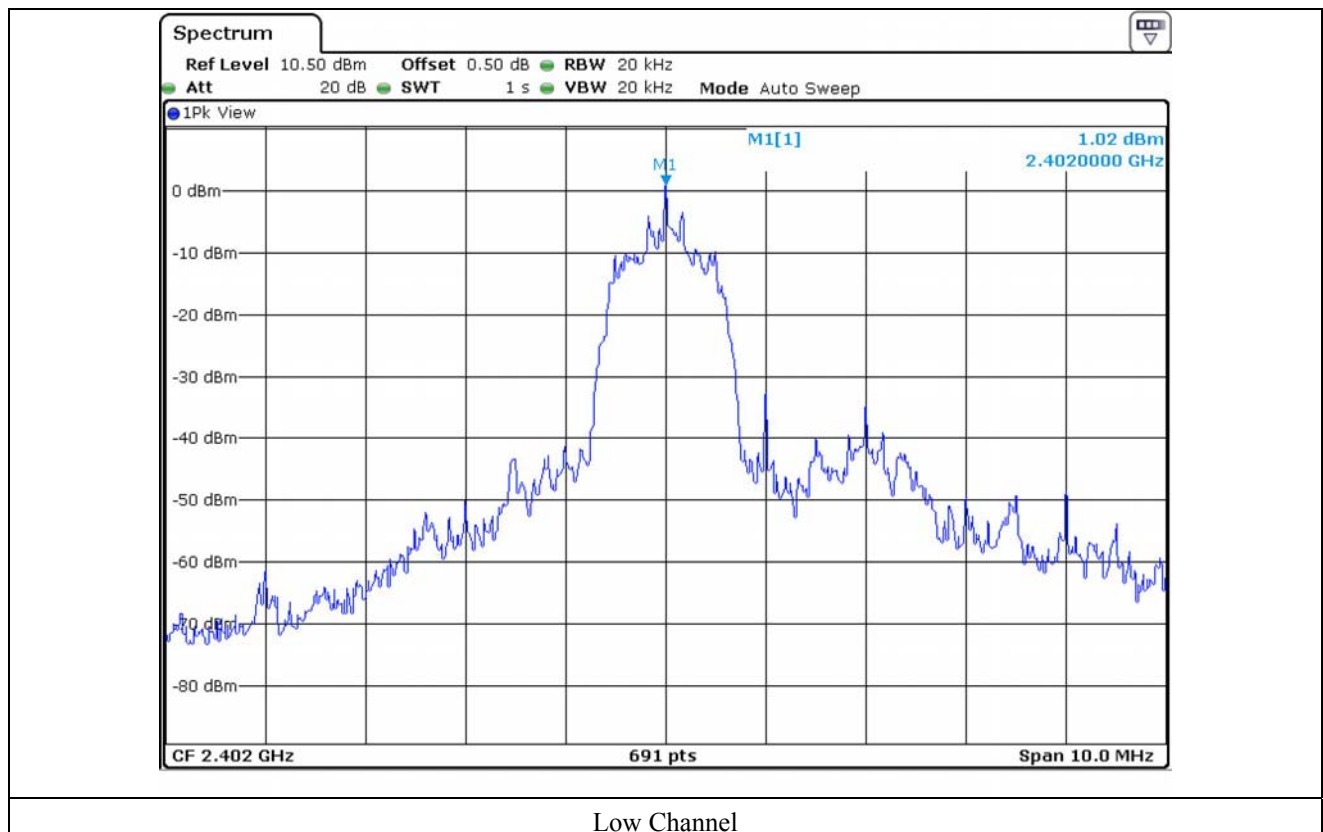
-. Test Date : January 13, 2014

-. Test Result : Pass

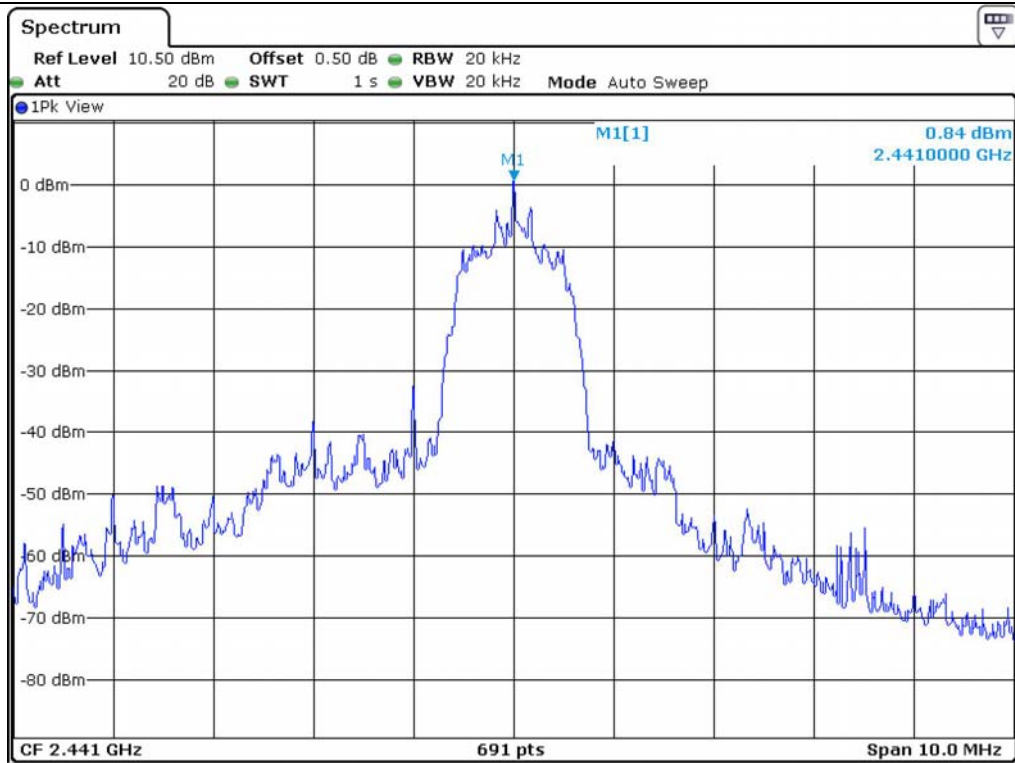
CHANNE L	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402	1.02	3.75	30.00
Middle	2 441	0.84	3.31	30.00
High	2 480	-0.10	2.79	30.00

01/20/14

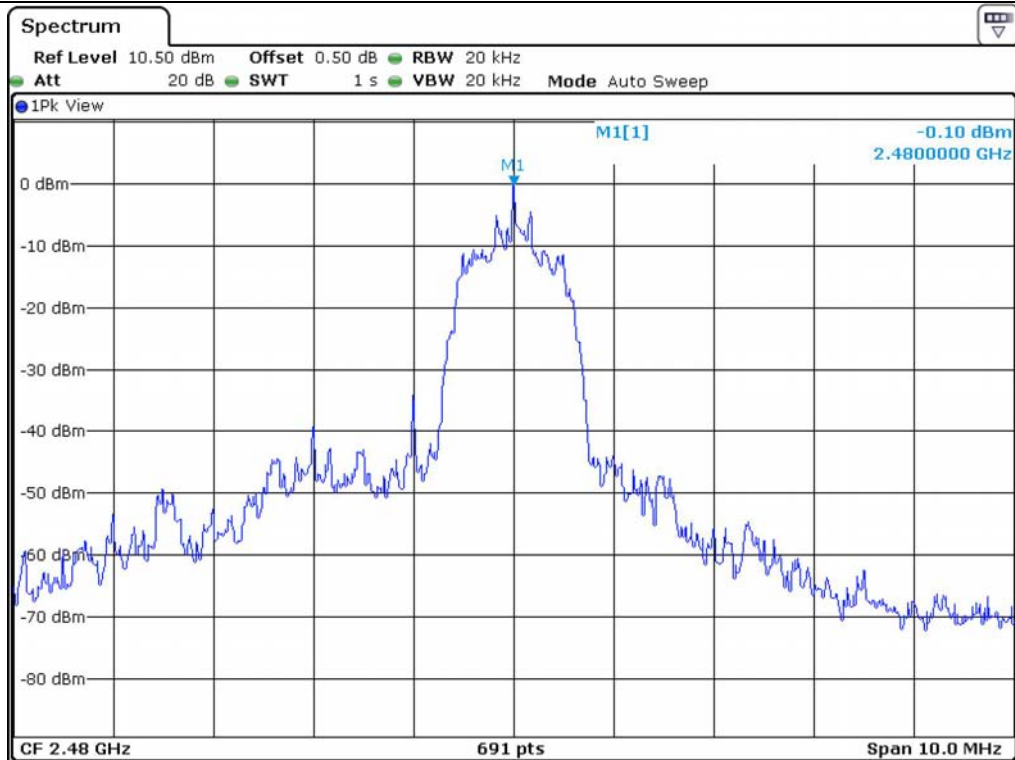
Tested by: Hong-Kyu, Lee/ Engineer



Low Channel



Middle Channel



High Channel

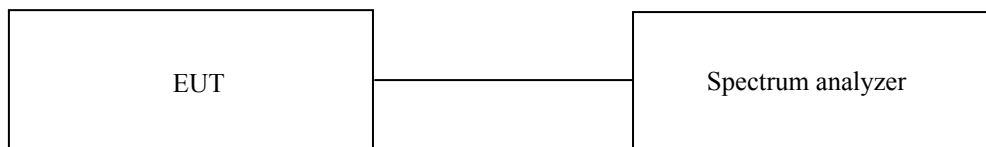
9 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

9.1 Operating environment

Temperature : 24 °C
Relative humidity : 44 % R.H.

9.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and video bandwidth is set to 100 kHz, and peak detection was used.



9.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 m, open-field test site. The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane.

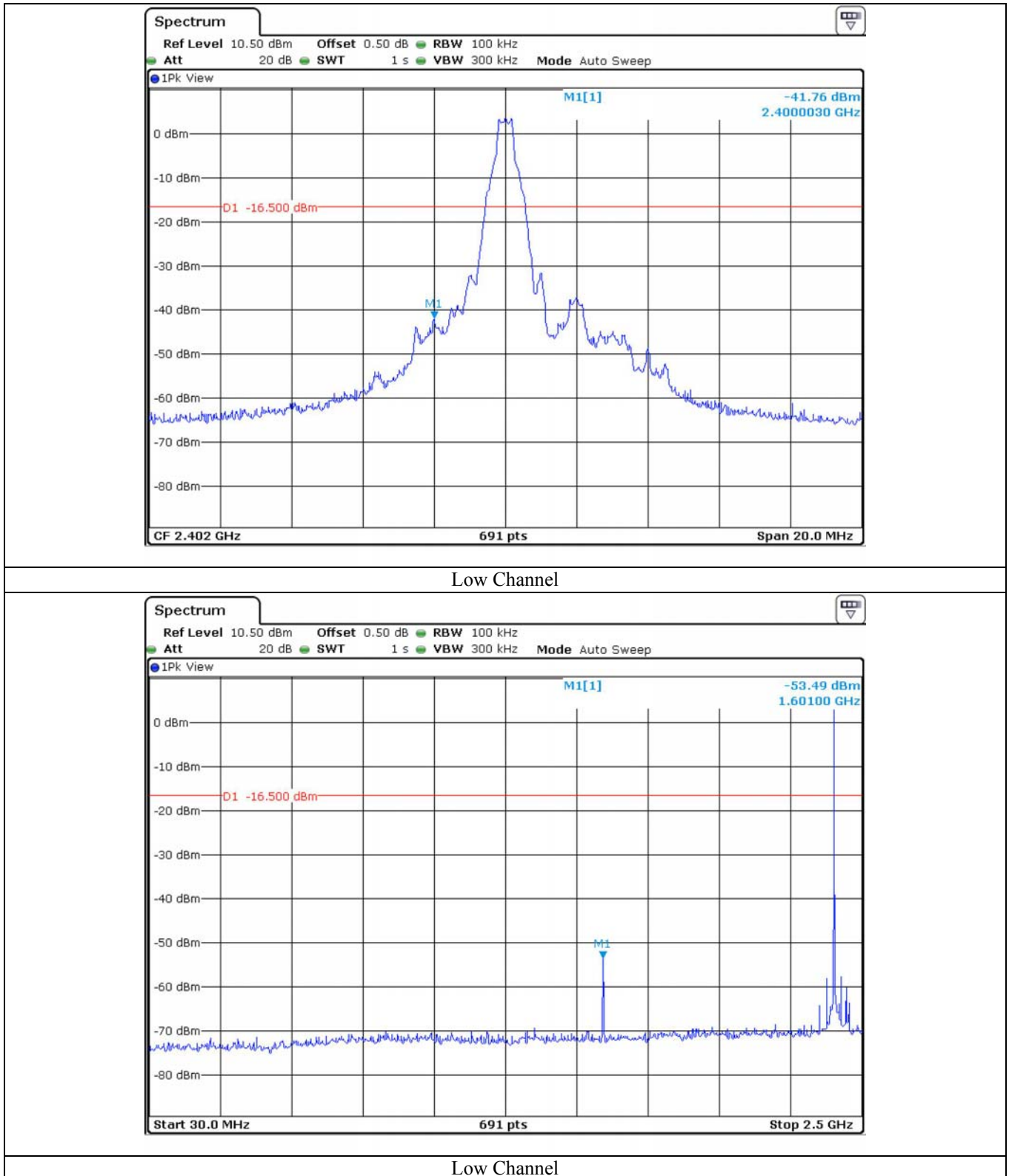
The frequency spectrum from 9 KHz to 25 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 ms in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

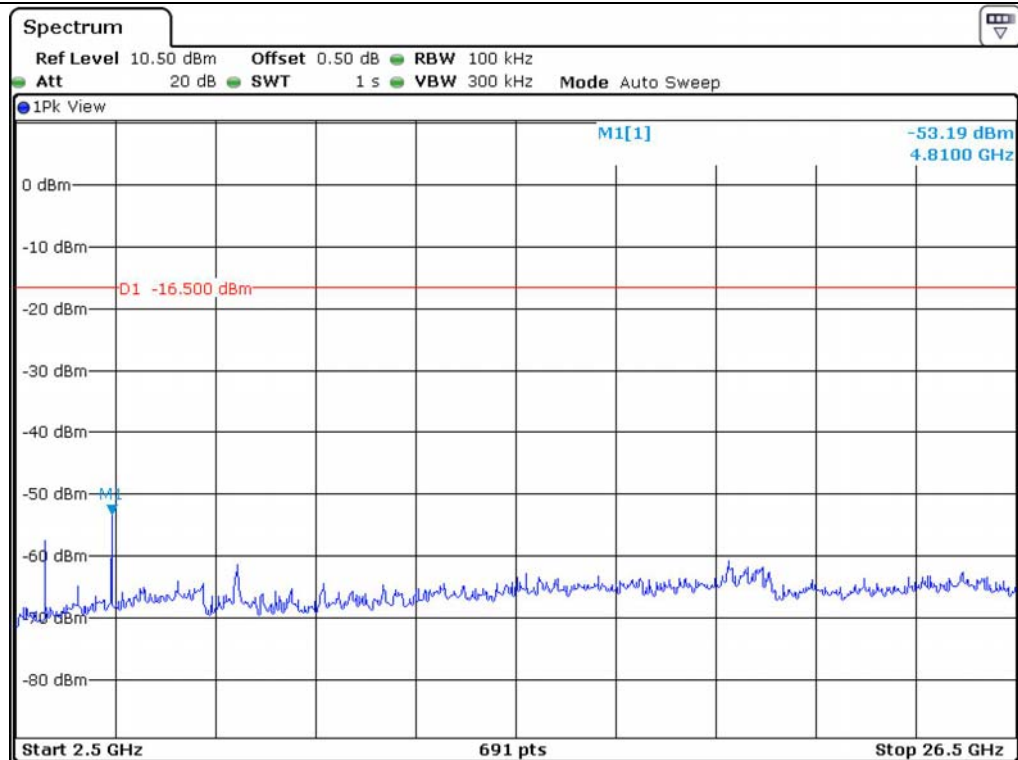
9.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
□ -	ESCI	Rohde & Schwarz	EMI Test Receiver	101012	Nov. 11, 2013(1Y)
■ -	ESU	Rohde & Schwarz	EMI Test Receiver	100261	May 27, 2013(1Y)
■ -	310N	Sonoma Instrument	AMPLIFIER	312544	May 21, 2013(1Y)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101372	May 20, 2013(1Y)
■ -	SCU-18	Rohde & Schwarz	PRE-AMPLIFIER	10041	Jan. 20, 2014(1Y)
■ -	MA240	HD GmbH	Antenna Master	N/A	N/A
■ -	HD100	HD GmbH	Position Controller	N/A	N/A
■ -	DS420S	HD GmbH	Turn Table	N/A	N/A
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-255	Apr. 24, 2012(2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	Sep. 30, 2013(2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Mar. 06, 2013(2Y)
■ -	HFH2-Z2	Rohde & Schwarz	Loop Antenna	879285/26	Dec. 11, 2012(2Y)
■ -	83051A	Agilent	Microwave System Preamplifier	3950M00201	May 22, 2013(1Y)

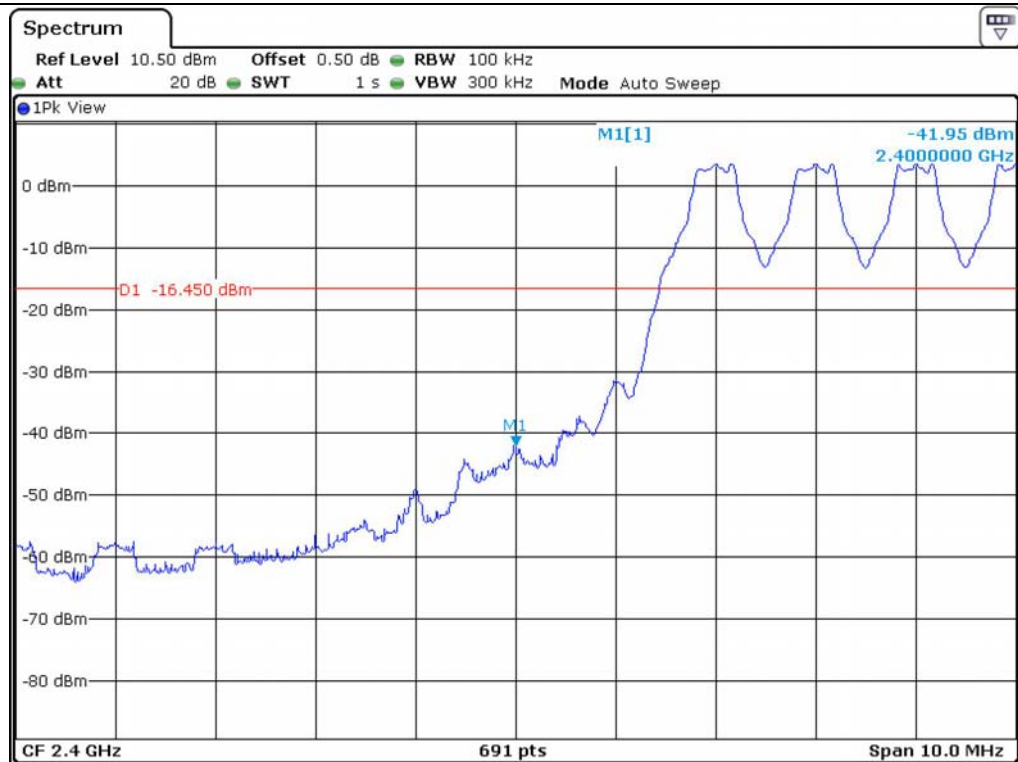
9.5 Test data for 1 Mbps

9.5.1 Test data for conducted emission

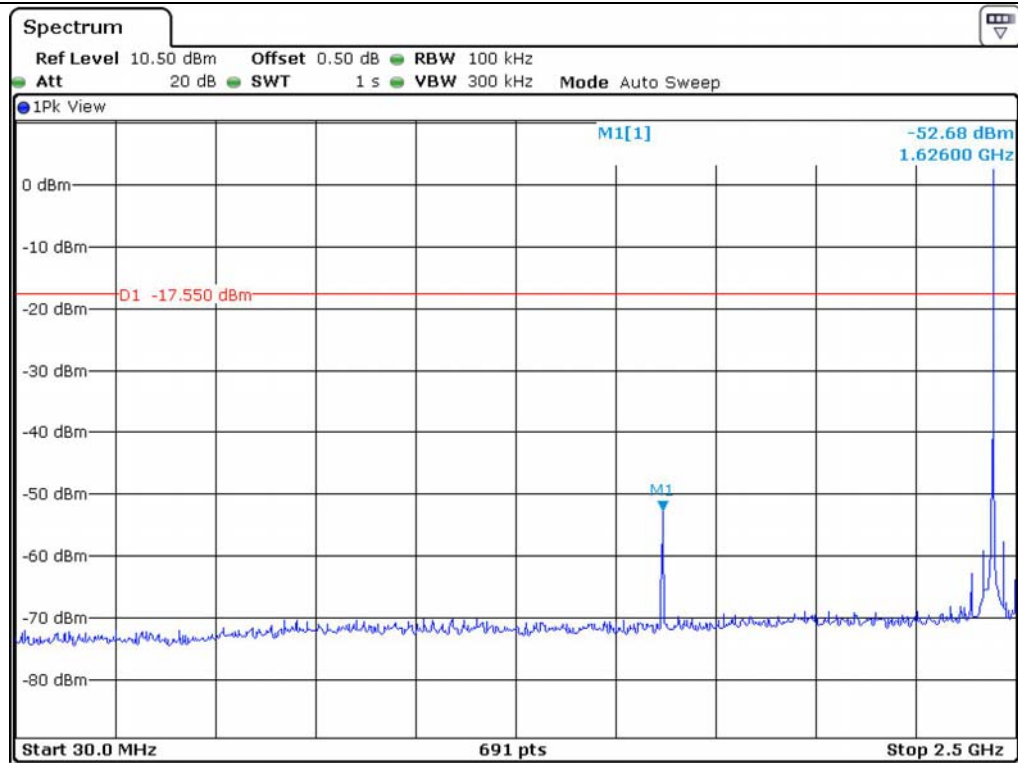




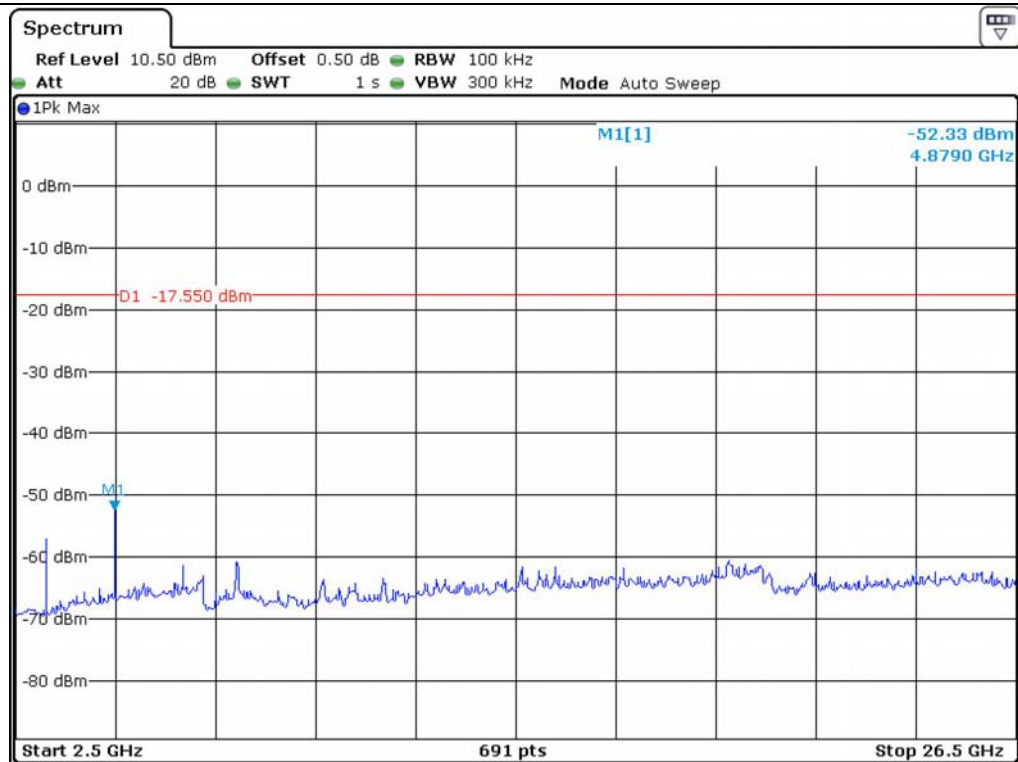
Low Channel



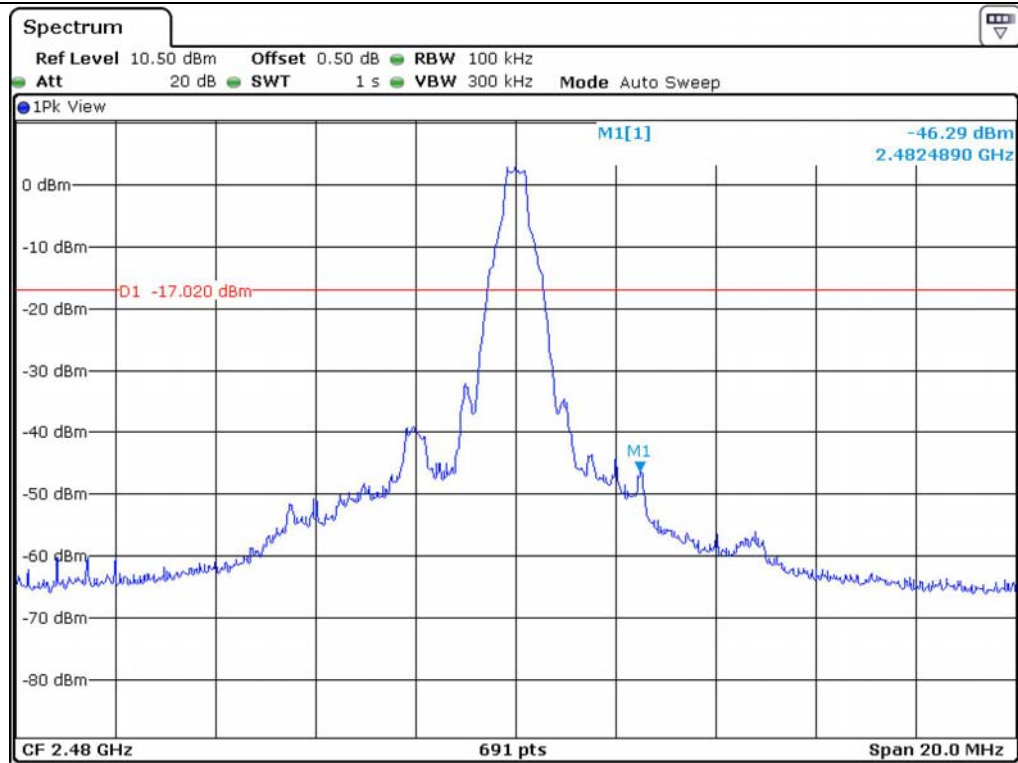
Low Channel



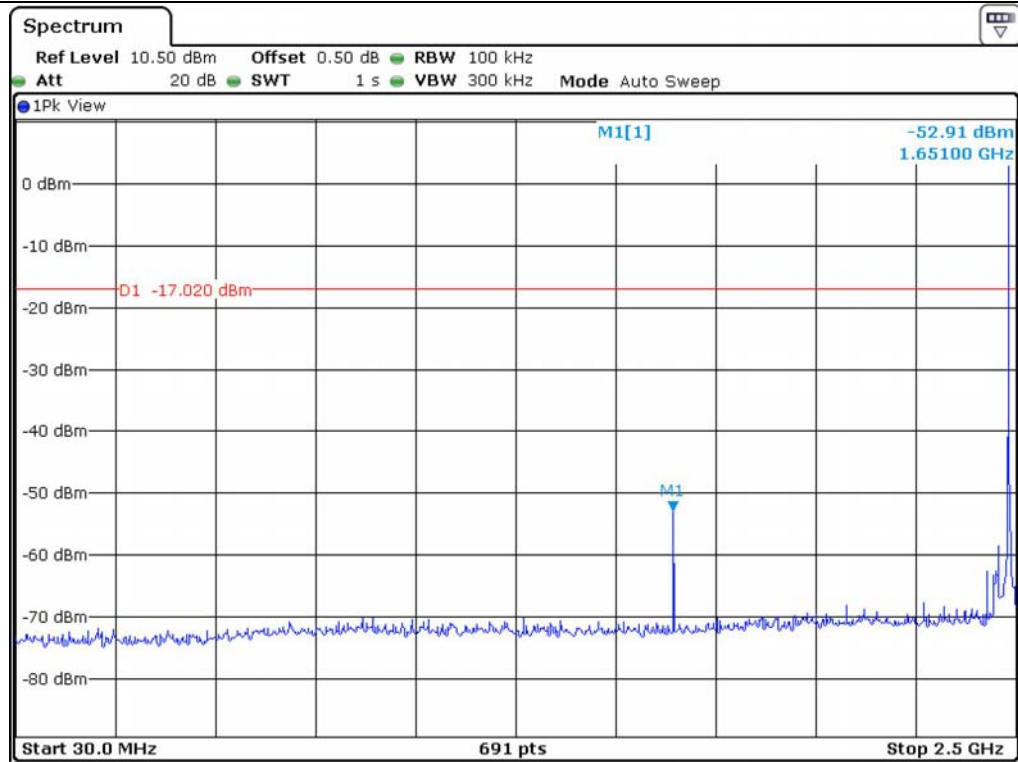
Middle Channel



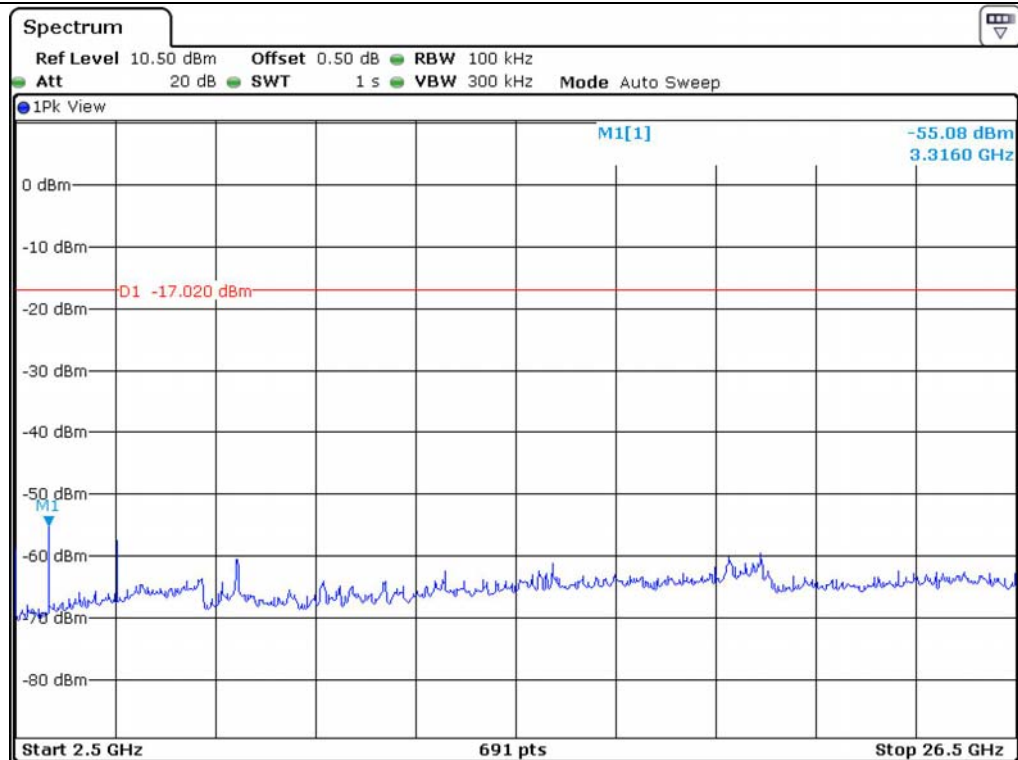
Middle Channel



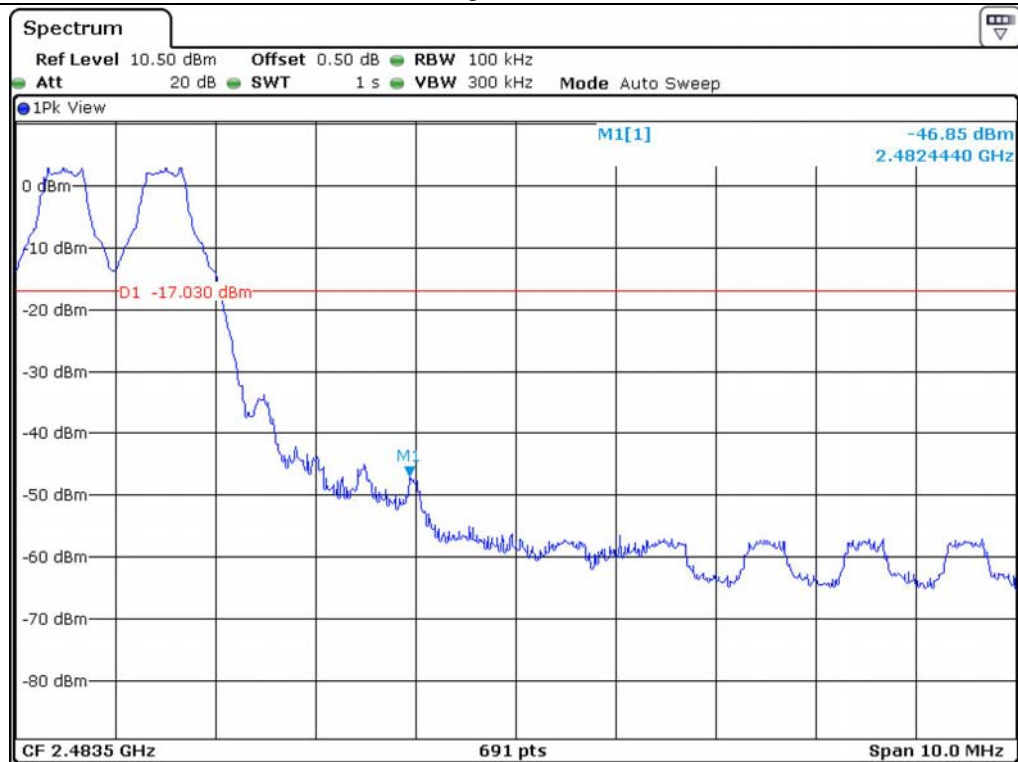
High Channel



High Channel



High Channel



High Channel

9.5.2 Test data for radiated emission

9.5.2.1 Radiated Emission which fall in the Restricted Band

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Measurement distance : 3 m
- Operating Condition : Low / High Channel
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 376.24	48.83	Peak	H	27.00	7.50	43.00	40.33	74.00	33.67
	36.85	Average	H				28.35	54.00	25.65
2 328.56	52.78	Peak	V				44.28	74.00	29.72
	36.34	Average	V				27.84	54.00	26.16
Test Data for High Channel									
2 488.91	48.76	Peak	H	27.40	7.70	43.00	40.86	74.00	33.14
	35.33	Average	H				27.43	54.00	26.57
2 494.68	51.06	Peak	V				43.16	74.00	30.84
	36.71	Average	V				28.81	54.00	25.19

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



Tested by: Hong-Kyu, Lee/ Engineer

9.5.2.2 Spurious & Harmonic Radiated Emission above 1 GHz

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 25 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 402.00	102.28	Peak	H	27.20	7.50	42.80	94.18	113.98	19.80
	91.09	Average	H				82.99	93.98	10.99
	95.63	Peak	V				87.53	113.98	26.45
	85.36	Average	V				77.26	93.98	16.72
4 804.00	57.88	Peak	H	30.70	11.10	42.50	57.18	73.98	16.80
	45.37	Average	H				44.67	53.98	9.31
	51.28	Peak	V				50.58	73.98	23.40
	39.04	Average	V				38.34	53.98	15.64
Test Data for Middle Channel									
2 441.00	99.78	Peak	H	27.30	7.60	42.90	91.78	113.98	22.20
	89.56	Average	H				81.56	93.98	12.42
	93.80	Peak	V				85.80	113.98	28.18
	81.40	Average	V				73.40	93.98	20.58
4 882.00	56.63	Peak	H	30.70	11.20	42.40	56.13	73.98	17.85
	46.28	Average	H				45.78	53.98	8.20
	50.84	Peak	V				50.34	73.98	23.64
	38.94	Average	V				38.44	53.98	15.54

-Continued

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for High Channel									
2 480.00	96.86	Peak	H	27.40	7.70	42.90	89.06	113.98	24.92
	84.50	Average	H				76.70	93.98	17.28
	93.38	Peak	V				85.58	113.98	28.40
	81.05	Average	V				73.25	93.98	20.73
4 960.00	56.25	Peak	H	30.80	11.80	42.30	56.55	73.98	17.43
	46.14	Average	H				46.44	53.98	7.54
	50.28	Peak	V				50.58	73.98	23.40
	38.34	Average	V				38.64	53.98	15.34

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band



Tested by: Hong-Kyu, Lee/ Engineer

9.5.2.3 Spurious Radiated Emission 30 MHz ~ 1 000 MHz

- Test Date : January 14, 2014
- Resolution bandwidth : 100 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel								
66.86	45.20	H	11.40	7.60	33.10	31.10	40.00	8.90
97.90	44.60	V	13.20	8.00	33.10	32.70	43.50	10.80
98.87	49.30	H	13.40	8.00	33.10	37.60	43.50	5.90
107.60	42.70	H	12.80	8.10	33.10	30.50	43.50	13.00
243.40	43.20	H	13.40	9.10	33.00	32.70	46.00	13.30
Test Data for Middle Channel								
66.86	44.90	H	11.40	7.60	33.10	30.80	40.00	9.20
97.90	43.90	V	13.20	8.00	33.10	32.00	43.50	11.50
98.87	48.80	H	13.40	8.00	33.10	37.10	43.50	6.40
107.60	41.70	H	12.80	8.10	33.10	29.50	43.50	14.00
243.40	42.60	H	13.40	9.10	33.00	32.10	46.00	13.90
Test Data for High Channel								
66.86	44.50	H	11.40	7.60	33.10	30.40	40.00	9.60
97.90	44.00	V	13.20	8.00	33.10	32.10	43.50	11.40
98.87	48.60	H	13.40	8.00	33.10	36.90	43.50	6.60
107.60	42.60	H	12.80	8.10	33.10	30.40	43.50	13.10
243.40	42.70	H	13.40	9.10	33.00	32.20	46.00	13.80

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Emission Level (dB}\mu\text{V/m)}$$



Tested by: Hong-Kyu, Lee/ Engineer

9.5.2.4 Test Data for Below 30 MHz

- Test Date : January 14, 2014
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

9.5.2.5 Test data for above 1 GHz

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

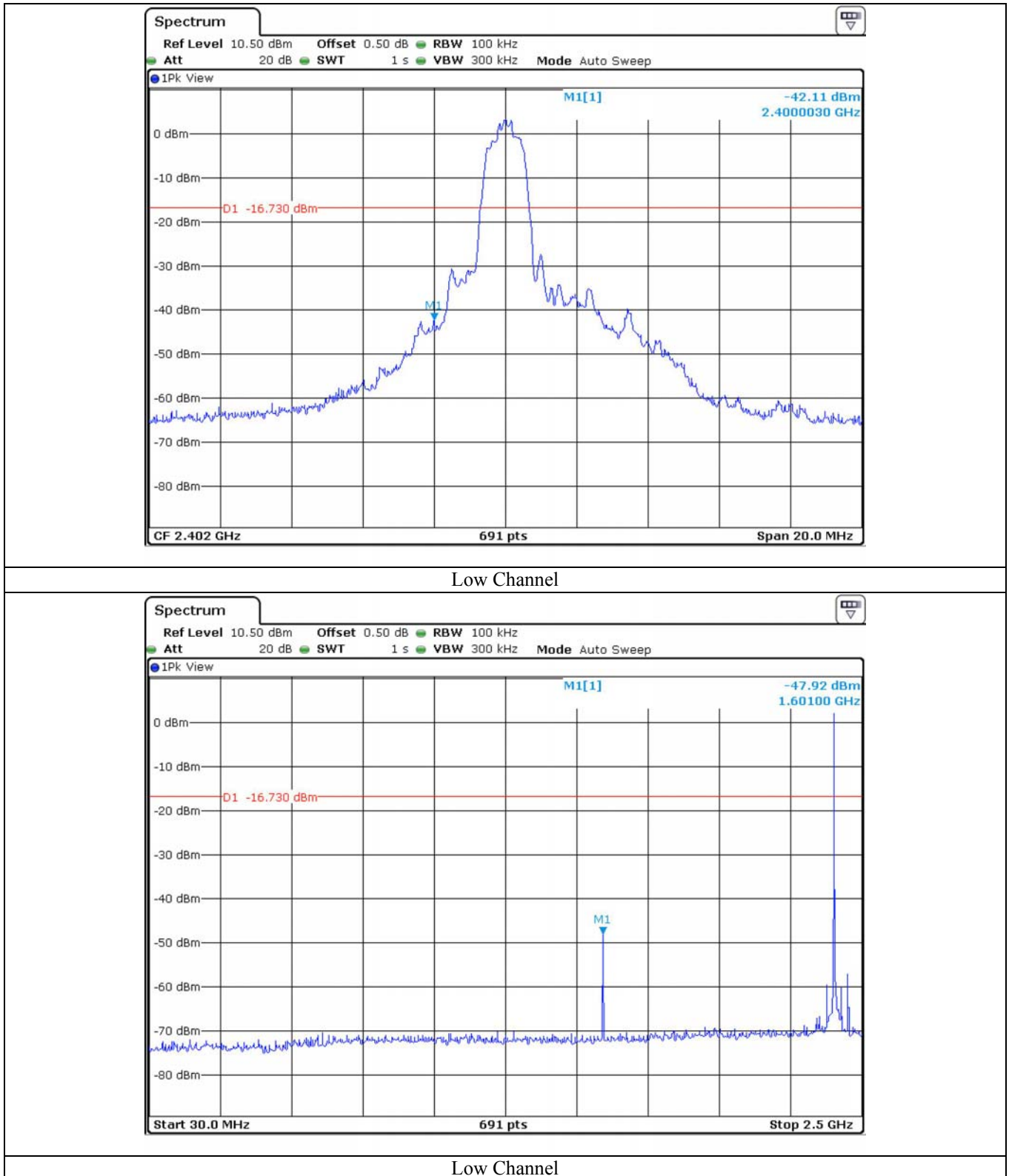
Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

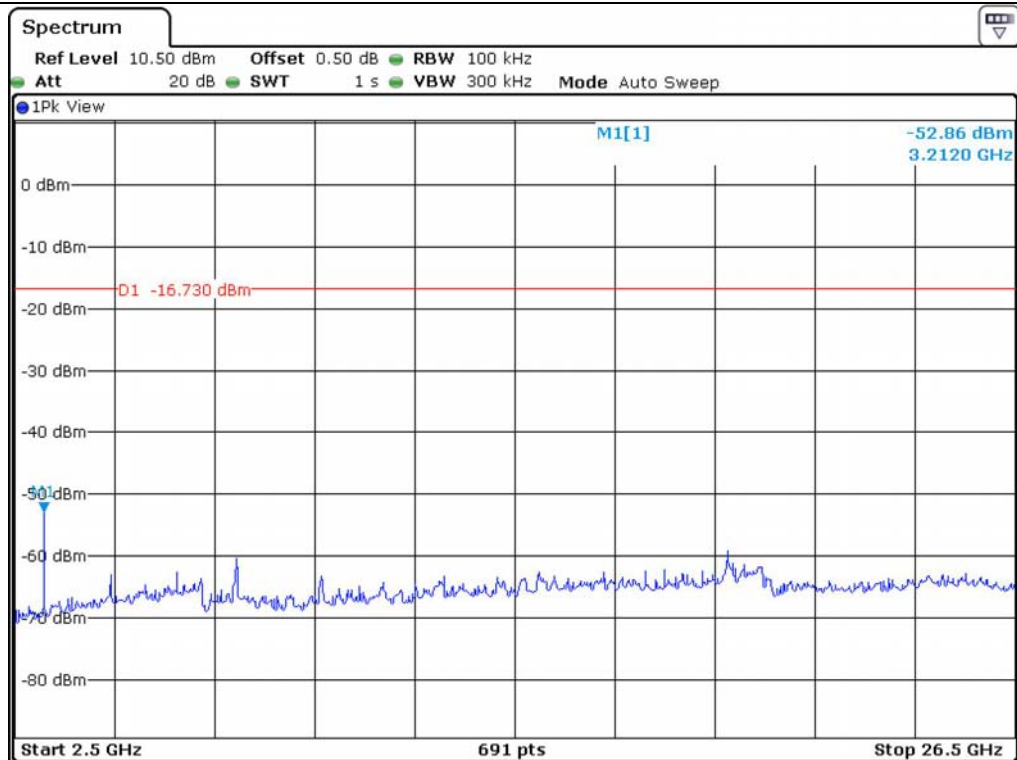
01 30 24

Tested by: Hong-Kyu, Lee/ Engineer

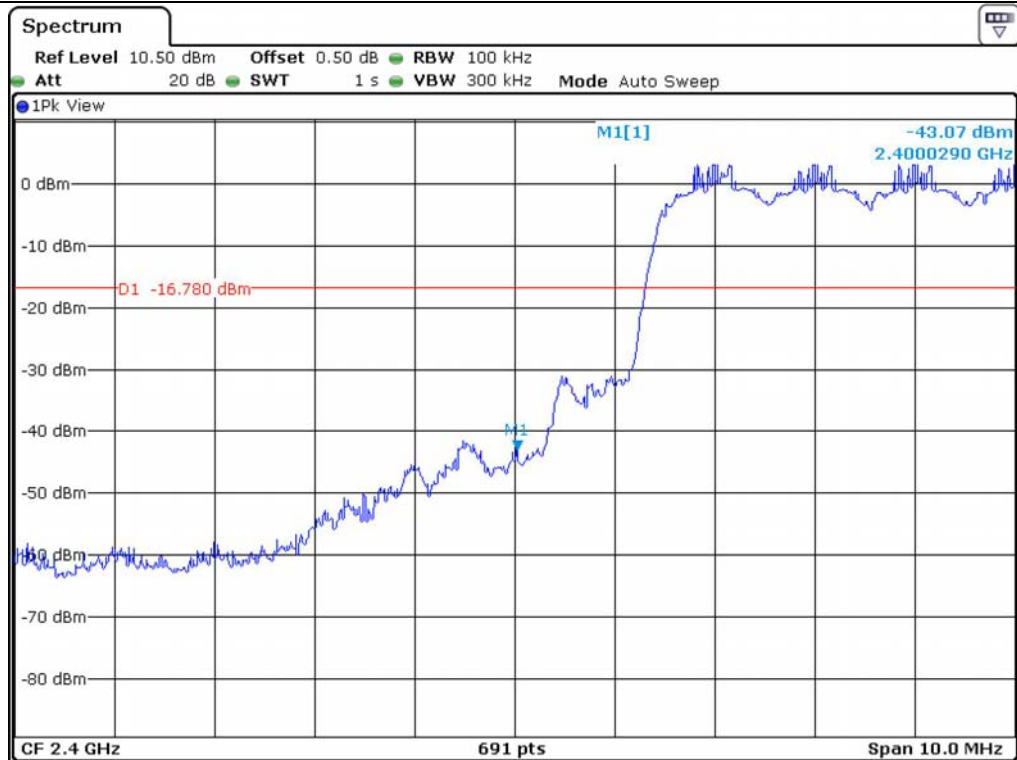
9.6 Test data for 2 Mbps

9.6.1 Test data for conducted emission

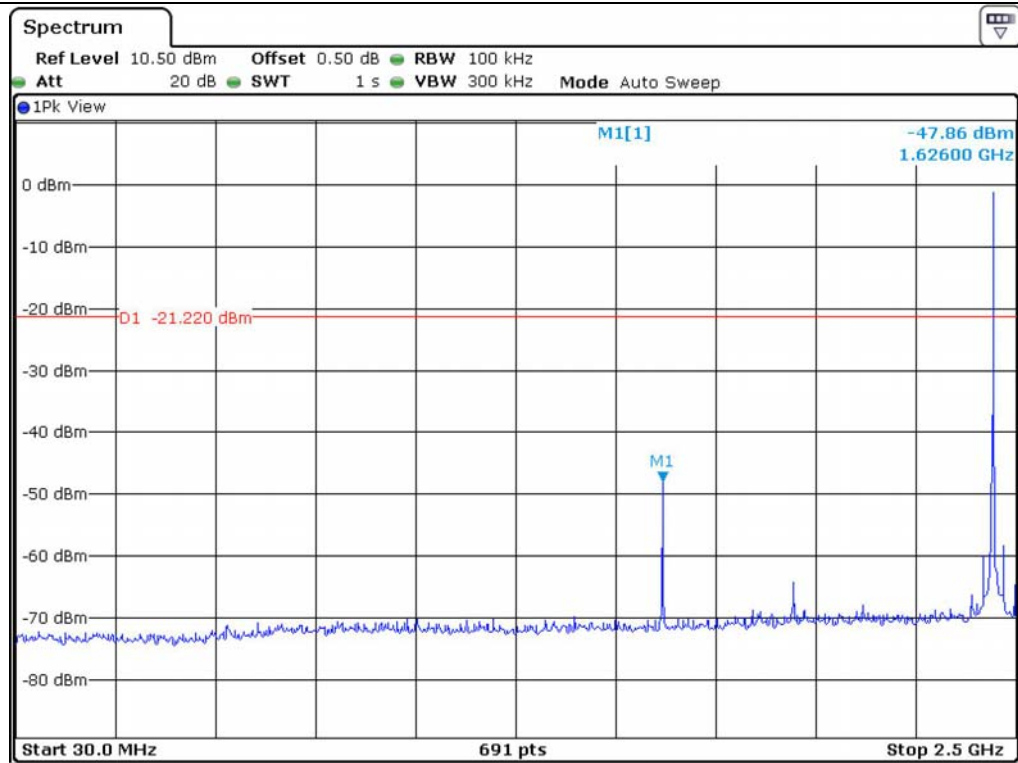




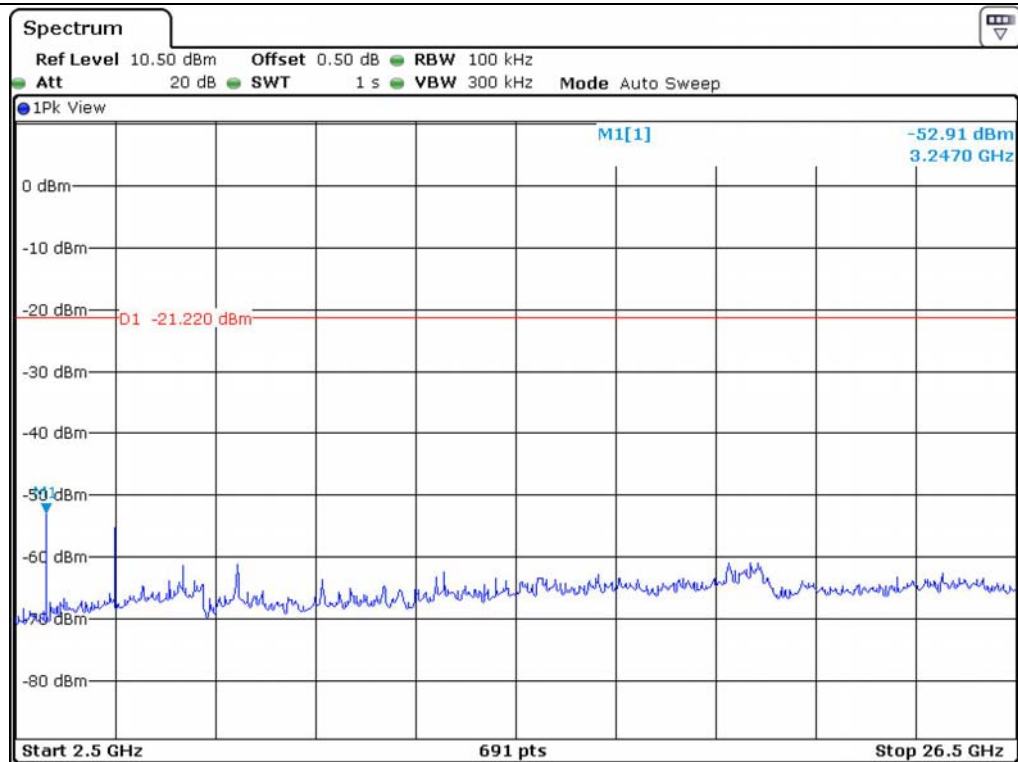
Low Channel



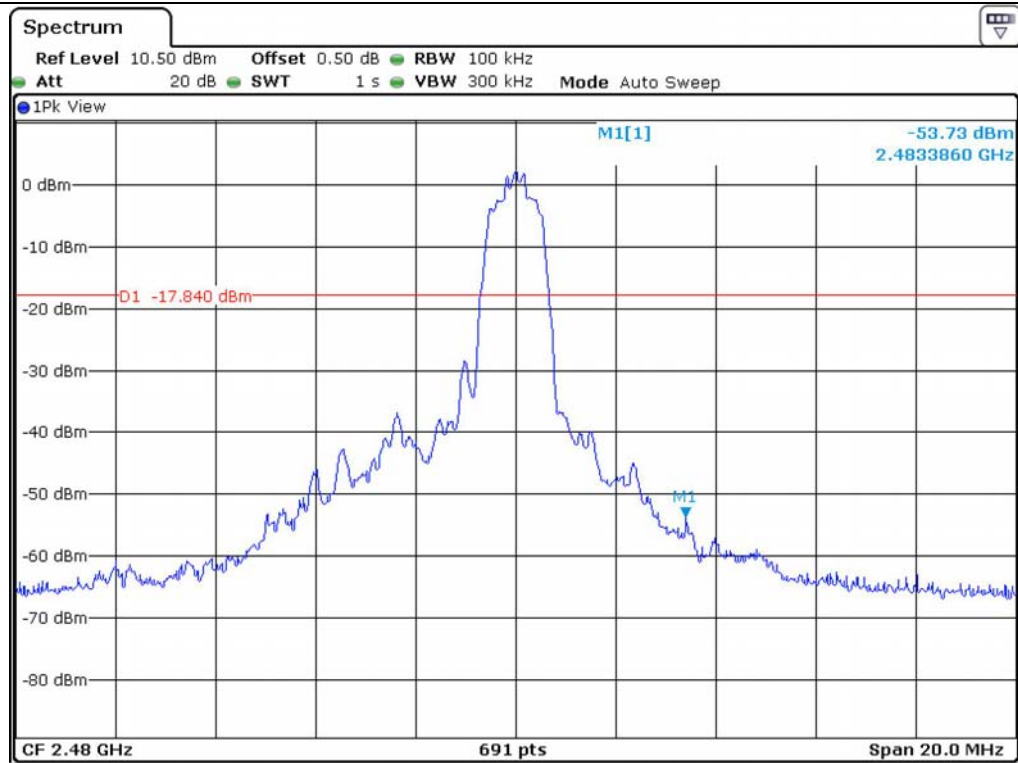
Low Channel



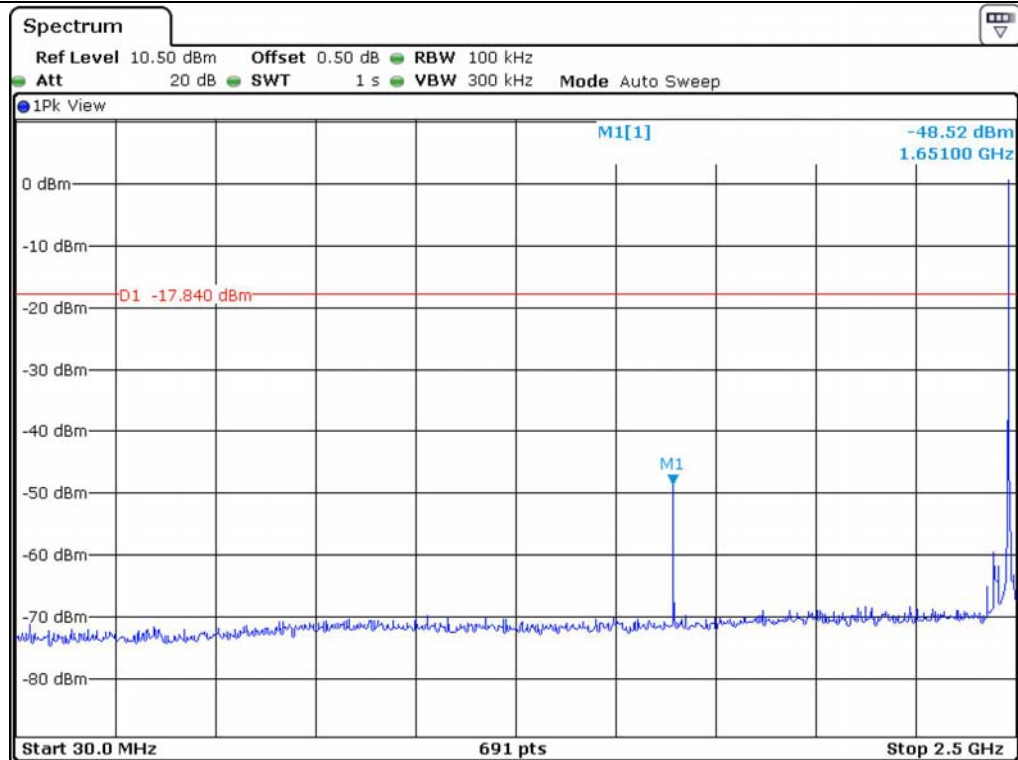
Middle Channel



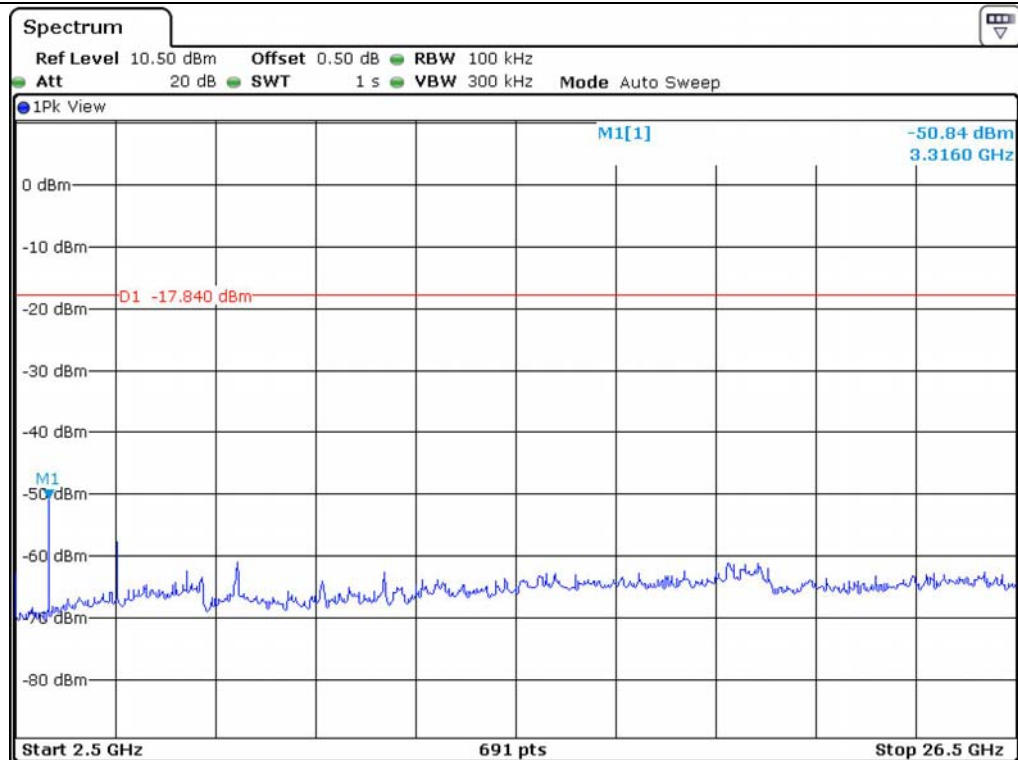
Middle Channel



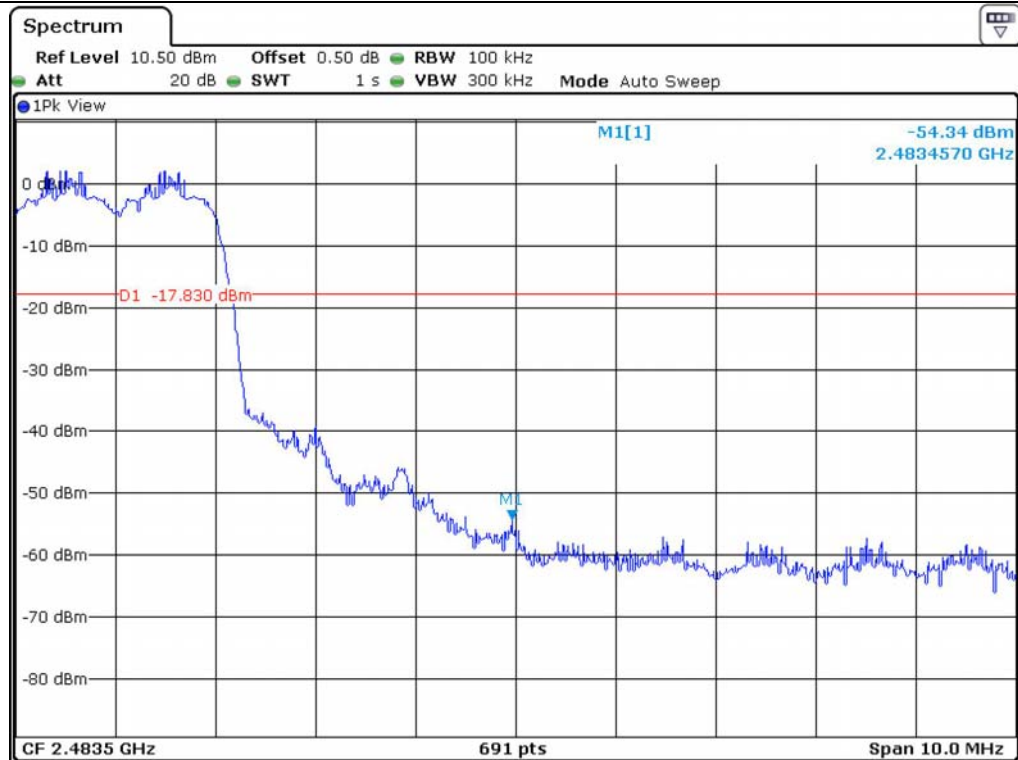
High Channel



High Channel



High Channel



High Channel

9.6.2 Test data for radiated emission

9.6.2.1 Radiated Emission which fall in the Restricted Band

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Measurement distance : 3 m
- Operating Condition : Low / High Channel
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 375.84	48.25	Peak	H	27.00	7.50	43.00	39.75	74.00	34.25
	36.23	Average	H				27.73	54.00	26.27
2 329.63	51.04	Peak	V				42.54	74.00	31.46
	35.33	Average	V				26.83	54.00	27.17
Test Data for High Channel									
2 497.82	47.93	Peak	H	27.40	7.70	43.00	40.03	74.00	33.97
	35.14	Average	H				27.24	54.00	26.76
2 496.15	50.28	Peak	V				42.38	74.00	31.62
	35.96	Average	V				28.06	54.00	25.94

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



Tested by: Hong-Kyu, Lee/ Engineer

9.6.2.2 Spurious & Harmonic Radiated Emission above 1 GHz

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 25 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 402.00	102.32	Peak	H	27.20	7.50	42.80	94.22	113.98	19.76
	90.25	Average	H				82.15	93.98	11.83
	95.14	Peak	V				87.04	113.98	26.94
	81.47	Average	V				73.37	93.98	20.61
4 804.00	55.25	Peak	H	30.70	11.10	42.50	54.55	73.98	19.43
	41.88	Average	H				41.18	53.98	12.80
	54.69	Peak	V				53.99	73.98	19.99
	40.83	Average	V				40.13	53.98	13.85
Test Data for Middle Channel									
2 441.00	99.21	Peak	H	27.30	7.60	42.90	91.21	113.98	22.77
	88.36	Average	H				80.36	93.98	13.62
	92.17	Peak	V				84.17	113.98	29.81
	81.63	Average	V				73.63	93.98	20.35
4 882.00	55.74	Peak	H	30.70	11.20	42.40	55.24	73.98	18.74
	45.83	Average	H				45.33	53.98	8.65
	51.12	Peak	V				50.62	73.98	23.36
	39.66	Average	V				39.16	53.98	14.82

-Continued

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for High Channel									
2 480.00	96.38	Peak	H	27.40	7.70	42.90	88.58	113.98	25.40
	89.11	Average	H				81.31	93.98	12.67
	92.77	Peak	V				84.97	113.98	29.01
	85.43	Average	V				77.63	93.98	16.35
4 960.00	55.04	Peak	H	30.80	11.80	42.30	55.34	73.98	18.64
	45.39	Average	H				45.69	53.98	8.29
	50.17	Peak	V				50.47	73.98	23.51
	40.83	Average	V				41.13	53.98	12.85

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band



Tested by: Hong-Kyu, Lee/ Engineer

9.6.2.3 Spurious Radiated Emission 30 MHz ~ 1 000 MHz

- Test Date : January 14, 2014
- Resolution bandwidth : 100 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel								
66.86	46.10	H	11.40	7.60	33.10	32.00	40.00	8.00
97.90	45.40	V	13.20	8.00	33.10	33.50	43.50	10.00
98.87	49.80	H	13.40	8.00	33.10	38.10	43.50	5.40
107.60	43.30	H	12.80	8.10	33.10	31.10	43.50	12.40
243.40	44.10	H	13.40	9.10	33.00	33.60	46.00	12.40
Test Data for Middle Channel								
66.86	44.60	H	11.40	7.60	33.10	30.50	40.00	9.50
97.90	46.40	V	13.20	8.00	33.10	34.50	43.50	9.00
98.87	48.80	H	13.40	8.00	33.10	37.10	43.50	6.40
107.60	42.00	H	12.80	8.10	33.10	29.80	43.50	13.70
243.40	42.50	H	13.40	9.10	33.00	32.00	46.00	14.00
Test Data for High Channel								
66.86	45.00	H	11.40	7.60	33.10	30.90	40.00	9.10
97.90	44.50	V	13.20	8.00	33.10	32.60	43.50	10.90
98.87	48.50	H	13.40	8.00	33.10	36.80	43.50	6.70
107.60	42.10	H	12.80	8.10	33.10	29.90	43.50	13.60
243.40	43.10	H	13.40	9.10	33.00	32.60	46.00	13.40

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)



Tested by: Hong-Kyu, Lee/ Engineer

9.6.2.4 Test Data for Below 30 MHz

- Test Date : January 14, 2014
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

9.6.2.5 Test data for above 1 GHz

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

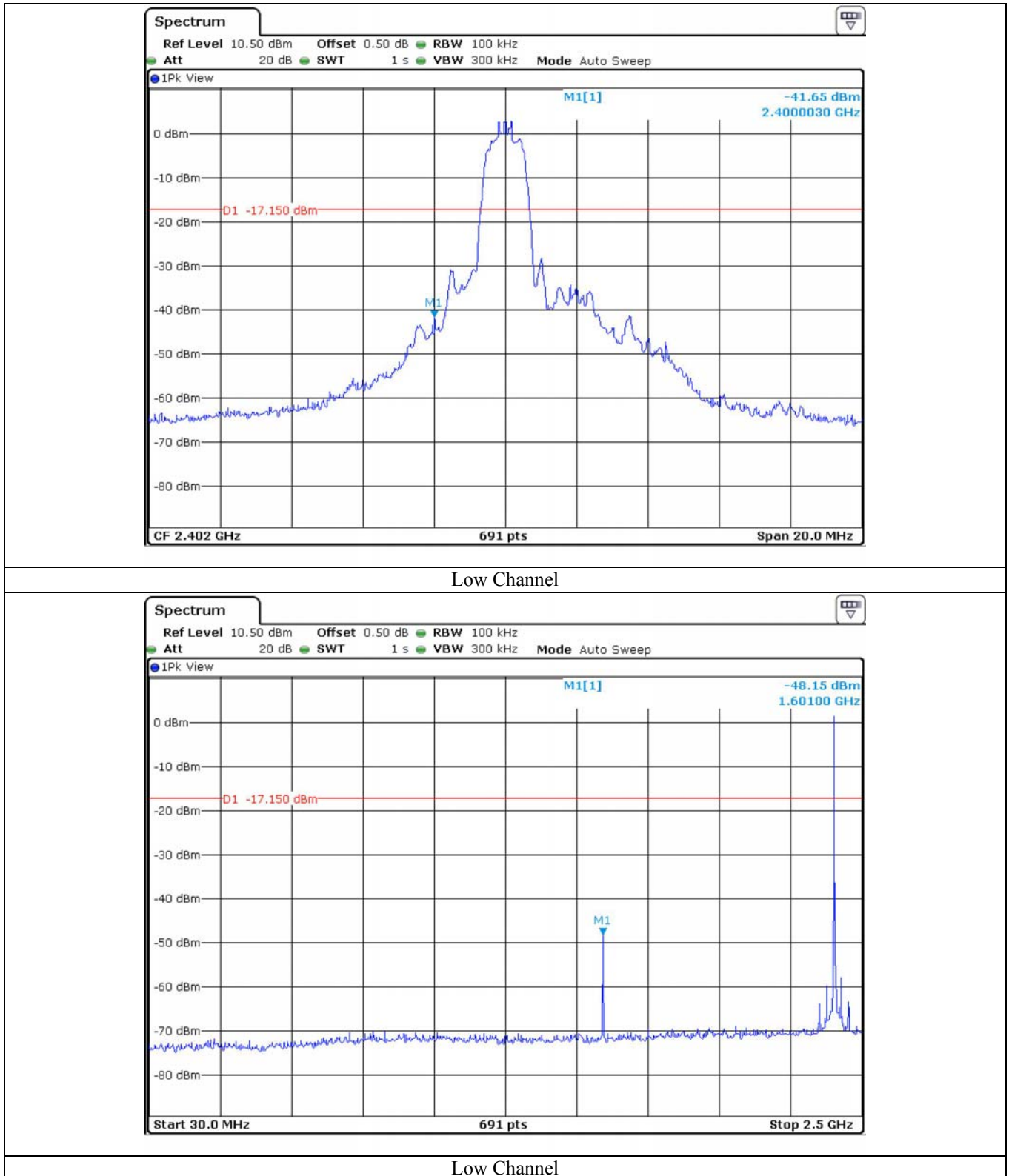
Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

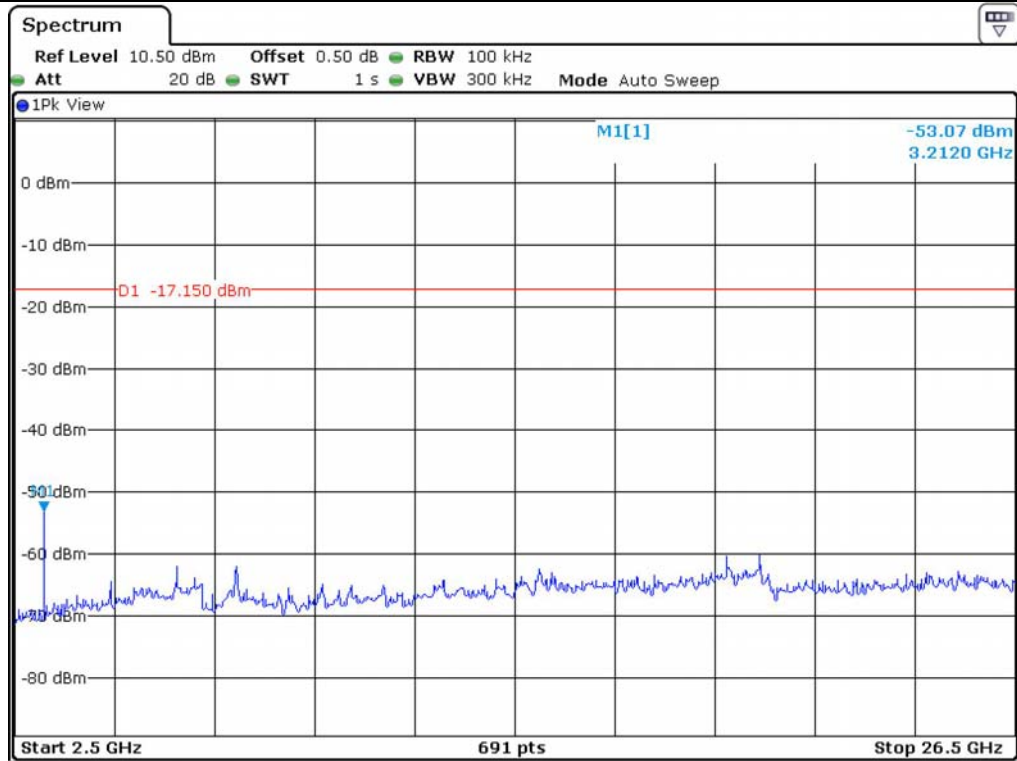


Tested by: Hong-Kyu, Lee/ Engineer

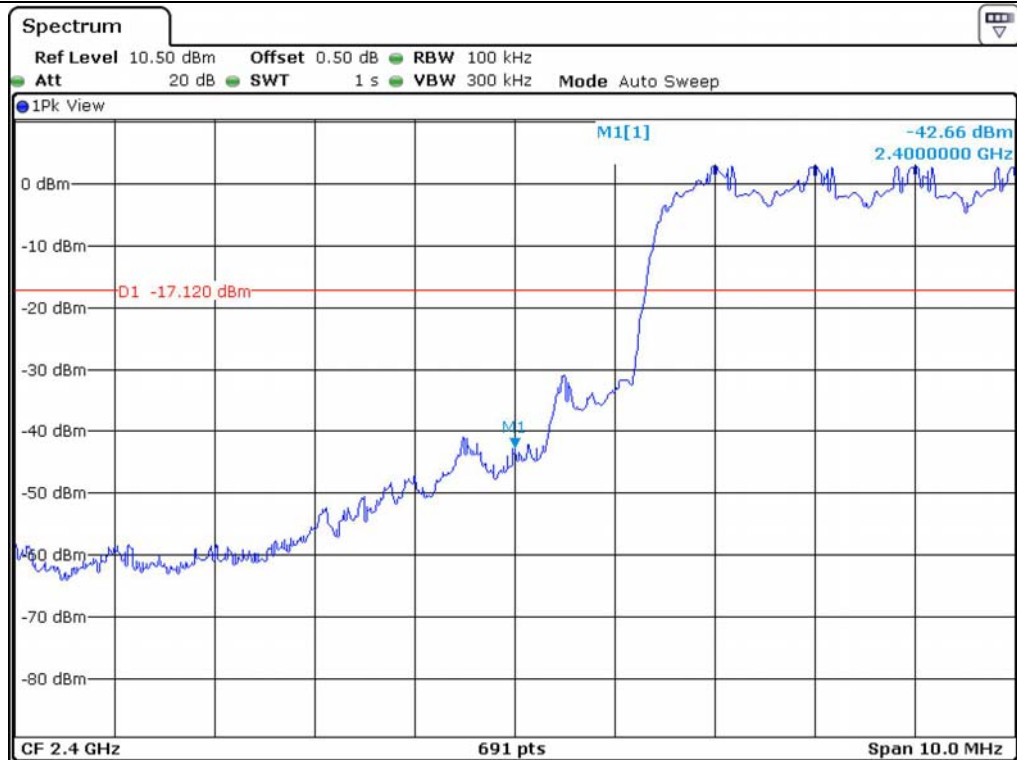
9.7 Test data for 3 Mbps

9.7.1 Test data for conducted emission

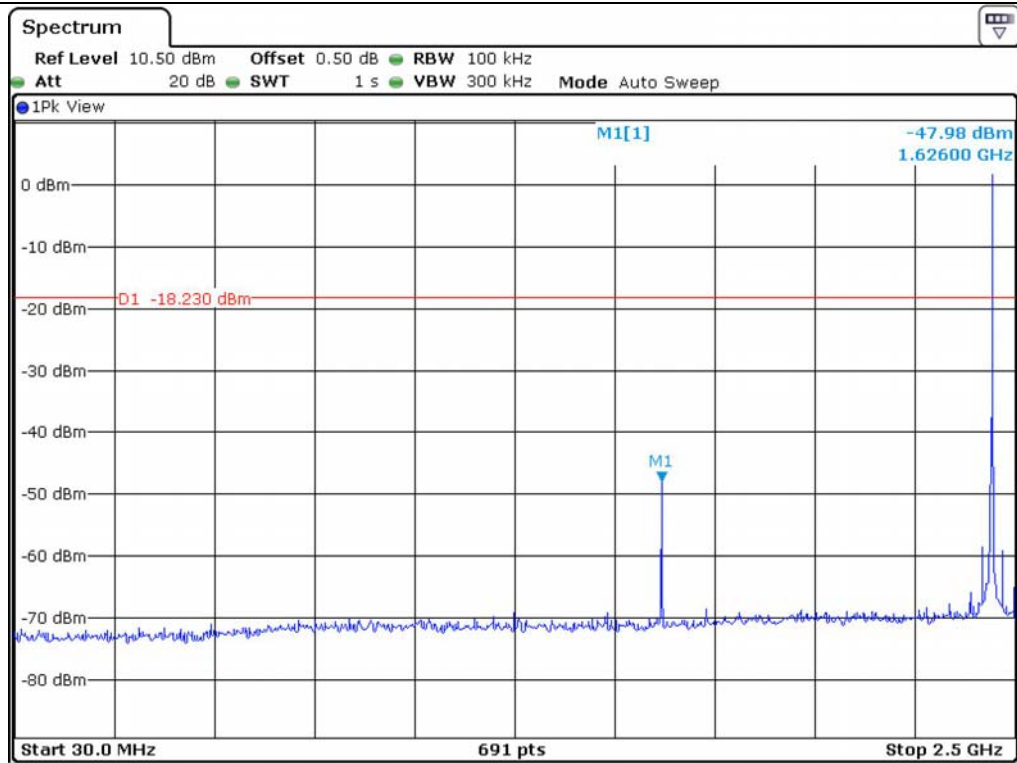




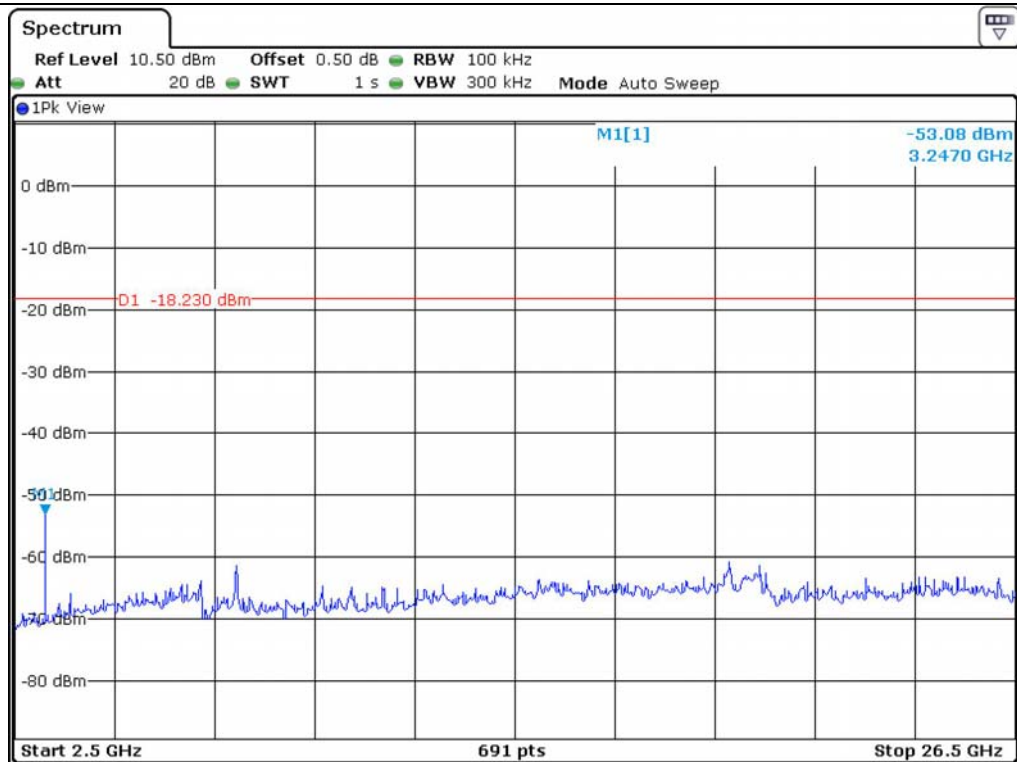
Low Channel



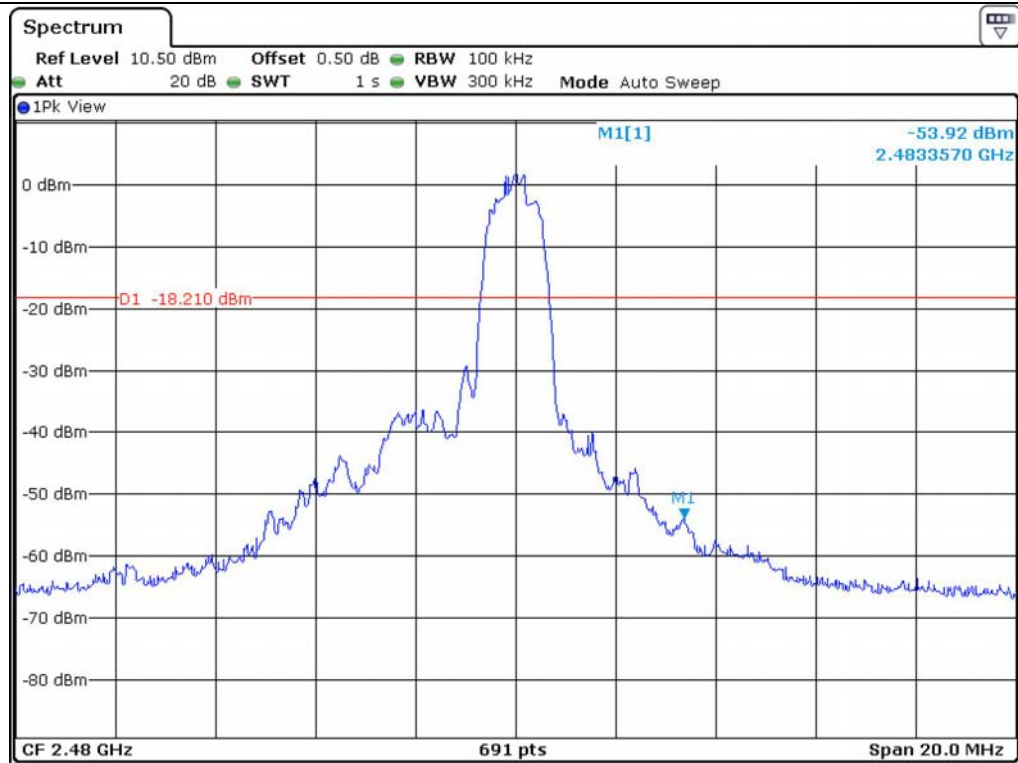
Low Channel



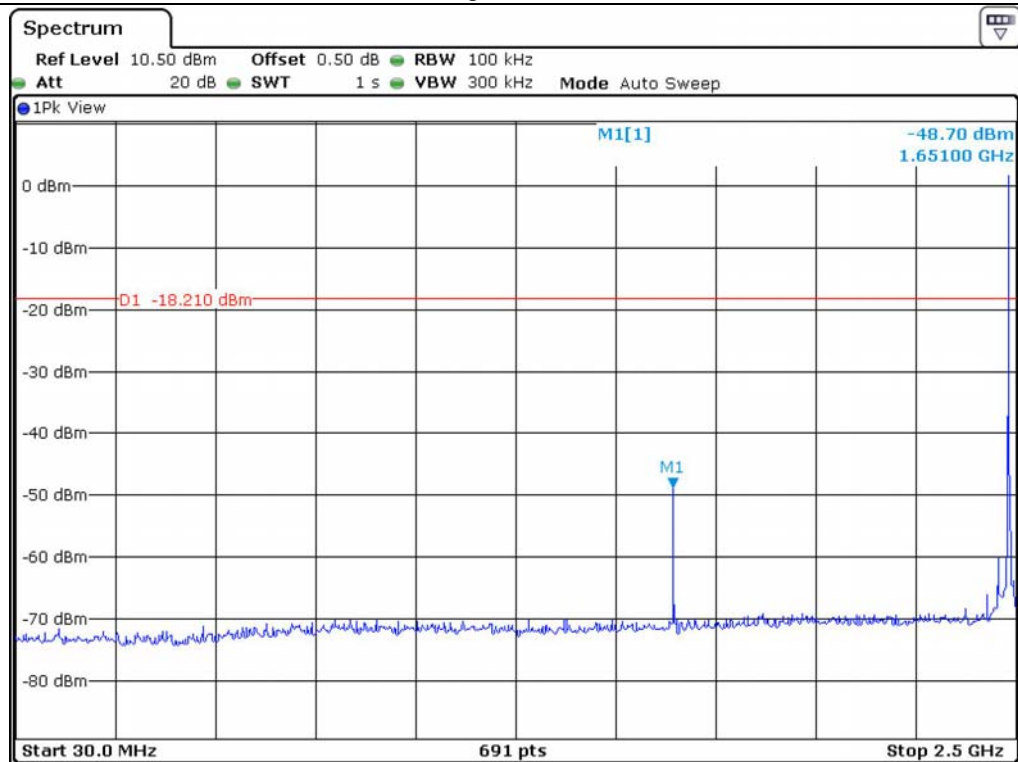
Middle Channel



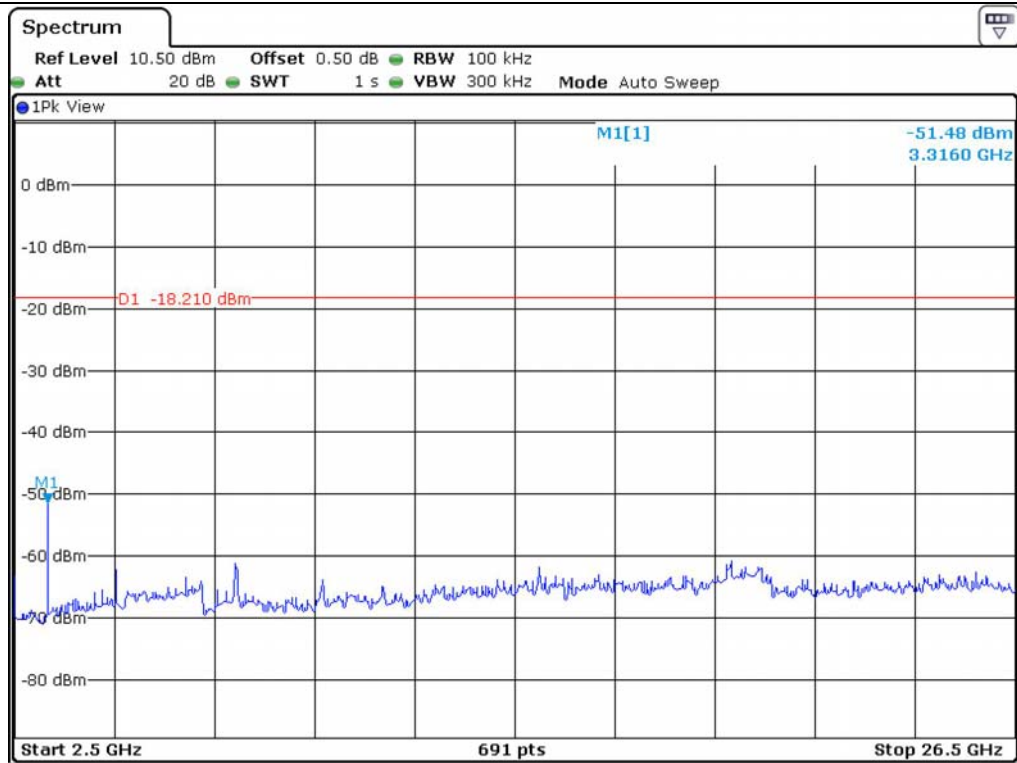
Middle Channel



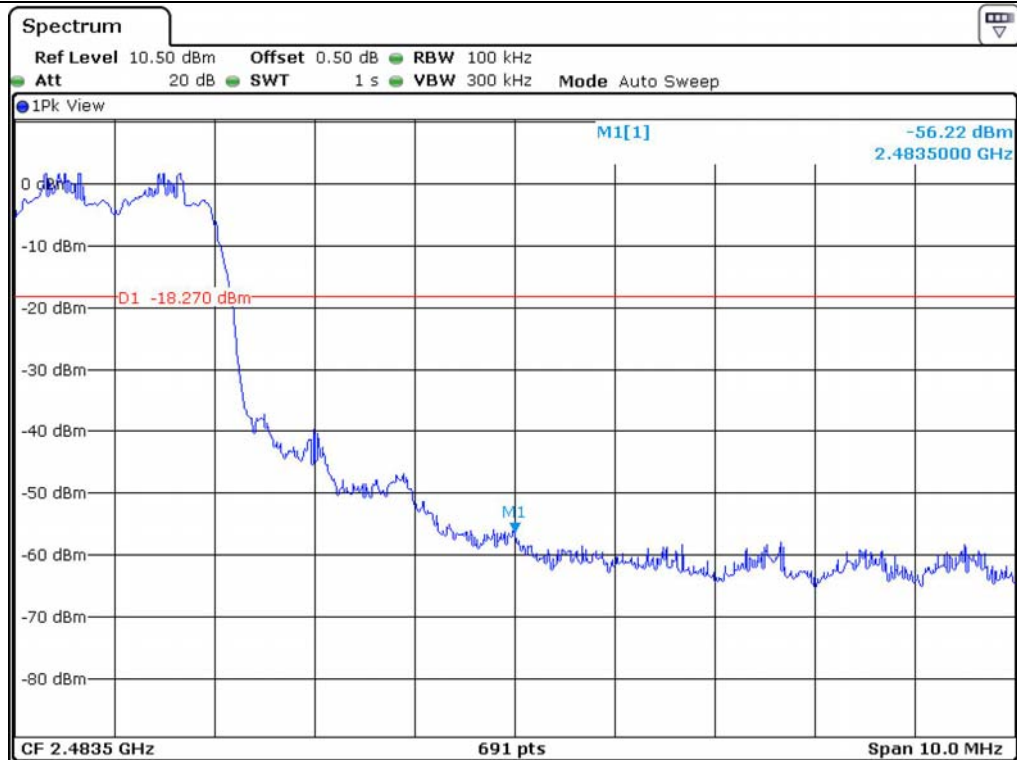
High Channel



High Channel



High Channel



High Channel

9.7.2 Test data for radiated emission

9.7.2.1 Radiated Emission which fall in the Restricted Band

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Measurement distance : 3 m
- Operating Condition : Low / High Channel
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 375.68	48.64	Peak	H	27.00	7.50	43.00	40.14	74.00	33.86
	36.94	Average	H				28.44	54.00	25.56
2 329.28	51.76	Peak	V				43.26	74.00	30.74
	35.79	Average	V				27.29	54.00	26.71
Test Data for High Channel									
2 497.40	48.98	Peak	H	27.40	7.70	43.00	41.08	74.00	32.92
	35.65	Average	H				27.75	54.00	26.25
2 496.08	51.31	Peak	V				43.41	74.00	30.59
	36.99	Average	V				29.09	54.00	24.91

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical



Tested by: Hong-Kyu, Lee/ Engineer

9.7.2.2 Spurious & Harmonic Radiated Emission above 1 GHz

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 25 GHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 402.00	102.48	Peak	H	27.20	7.50	42.80	94.38	113.98	19.60
	90.94	Average	H				82.84	93.98	11.14
	95.35	Peak	V				87.25	113.98	26.73
	82.36	Average	V				74.26	93.98	19.72
4 804.00	55.71	Peak	H	30.70	11.10	42.50	55.01	73.98	18.97
	42.16	Average	H				41.46	53.98	12.52
	54.43	Peak	V				53.73	73.98	20.25
	41.29	Average	V				40.59	53.98	13.39
Test Data for Middle Channel									
2 441.00	98.36	Peak	H	27.30	7.60	42.90	90.36	113.98	23.62
	87.24	Average	H				79.24	93.98	14.74
	91.04	Peak	V				83.04	113.98	30.94
	80.04	Average	V				72.04	93.98	21.94
4 882.00	54.99	Peak	H	30.70	11.20	42.40	54.49	73.98	19.49
	46.24	Average	H				45.74	53.98	8.24
	53.28	Peak	V				52.78	73.98	21.20
	40.97	Average	V				40.47	53.98	13.51

-Continued

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for High Channel									
2 480.00	96.44	Peak	H	27.40	7.70	42.90	88.64	113.98	25.34
	83.50	Average	H				75.70	93.98	18.28
	92.93	Peak	V				85.13	113.98	28.85
	77.45	Average	V				69.65	93.98	24.33
4 960.00	55.22	Peak	H	30.80	11.80	42.30	55.52	73.98	18.46
	45.97	Average	H				46.27	53.98	7.71
	51.04	Peak	V				51.34	73.98	22.64
	41.77	Average	V				42.07	53.98	11.91

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band



Tested by: Hong-Kyu, Lee/ Engineer

9.7.2.3 Spurious Radiated Emission 30 MHz ~ 1 000 MHz

- Test Date : January 14, 2014
- Resolution bandwidth : 100 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel								
66.86	44.40	H	11.40	7.60	33.10	30.30	40.00	9.70
97.90	44.30	V	13.20	8.00	33.10	32.40	43.50	11.10
98.87	48.60	H	13.40	8.00	33.10	36.90	43.50	6.60
107.60	42.60	H	12.80	8.10	33.10	30.40	43.50	13.10
243.40	43.00	H	13.40	9.10	33.00	32.50	46.00	13.50
Test Data for Middle Channel								
66.86	45.90	H	11.40	7.60	33.10	31.80	40.00	8.20
97.90	45.50	V	13.20	8.00	33.10	33.60	43.50	9.90
98.87	49.90	H	13.40	8.00	33.10	38.20	43.50	5.30
107.60	42.80	H	12.80	8.10	33.10	30.60	43.50	12.90
243.40	43.70	H	13.40	9.10	33.00	33.20	46.00	12.80
Test Data for High Channel								
66.86	45.60	H	11.40	7.60	33.10	31.50	40.00	8.50
97.90	44.90	V	13.20	8.00	33.10	33.00	43.50	10.50
98.87	49.70	H	13.40	8.00	33.10	38.00	43.50	5.50
107.60	43.50	H	12.80	8.10	33.10	31.30	43.50	12.20
243.40	44.00	H	13.40	9.10	33.00	33.50	46.00	12.50

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)



Tested by: Hong-Kyu, Lee/ Engineer

9.7.2.4 Test Data for Below 30 MHz

- Test Date : January 14, 2014
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

9.7.2.5 Test data for above 1 GHz

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								



Tested by: Hong-Kyu, Lee/ Engineer

9.8 Test data for Charging mode

9.8.1 Test data for 30 MHz ~ 1 000 MHz

- . Test Date : January 14, 2014
- . Resolution bandwidth : 100 kHz
- . Frequency range : 30 MHz ~ 1 000 MHz
- . Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
137.67	38.60	V	7.70	3.10	33.20	16.20	43.50	27.30
214.30	40.00	H	11.20	3.40	33.00	21.60	43.50	21.90
303.54	44.30	V	13.20	4.50	33.30	28.70	46.00	17.30
304.51	43.90	H	13.20	4.50	33.30	28.30	46.00	17.70
305.48	47.30	V	13.20	4.50	33.30	31.70	46.00	14.30
838.00	28.40	V	21.30	7.60	32.60	24.70	46.00	21.30

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Emission Level (dB}\mu\text{V/m)}$$



Tested by: Hong-Kyu, Lee/ Engineer

9.8.2 Test data for Below 30 MHz

- Test Date : January 14, 2014
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								

9.8.3 Test data for above 1 GHz

- Test Date : January 14, 2014
- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- Frequency range : 1 GHz ~ 26.5 GHz
- Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
It was not observed any emissions from the EUT.								



Tested by: Hong-Kyu, Lee/ Engineer

10 CONDUCTED EMISSION TEST

10.1 Operating environment

Temperature : (22 ~ 23) °C
Relative humidity : (42 ~ 43) % R.H.

10.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a 50 Ω / 50 μ H + 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESHS10	Rohde & Schwarz	EMI Test Receiver	834467/007	Jul. 02, 2013 (1Y)
■ -	NSLK 8128	Schwarzbeck	LISN	8128-216	Jun. 07, 2013 (1Y)
□ -	3825/2	EMCO	LISN	9109-1867	May 20, 2013 (1Y)

All test equipment used is calibrated on a regular basis.

10.4 Test data for 1 Mbps

- Test Date : January 15, 2014
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Test Result : Passed

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.56	N	44.70	58.80	14.10
0.66	N	45.10	56.00	10.90
0.67	H	45.50	56.00	10.50
1.30	N	43.60	56.00	12.40
1.31	H	43.90	56.00	12.10
14.37	N	51.10	60.00	8.90
Frequency (MHz)	Line	Average (dBμV)		Margin (dB)
		Emission level	Limits	
0.66	N	41.70	46.00	4.30
0.67	H	41.80	46.00	4.20
1.31	H	37.10	46.00	8.90
15.05	H	41.60	50.00	8.40

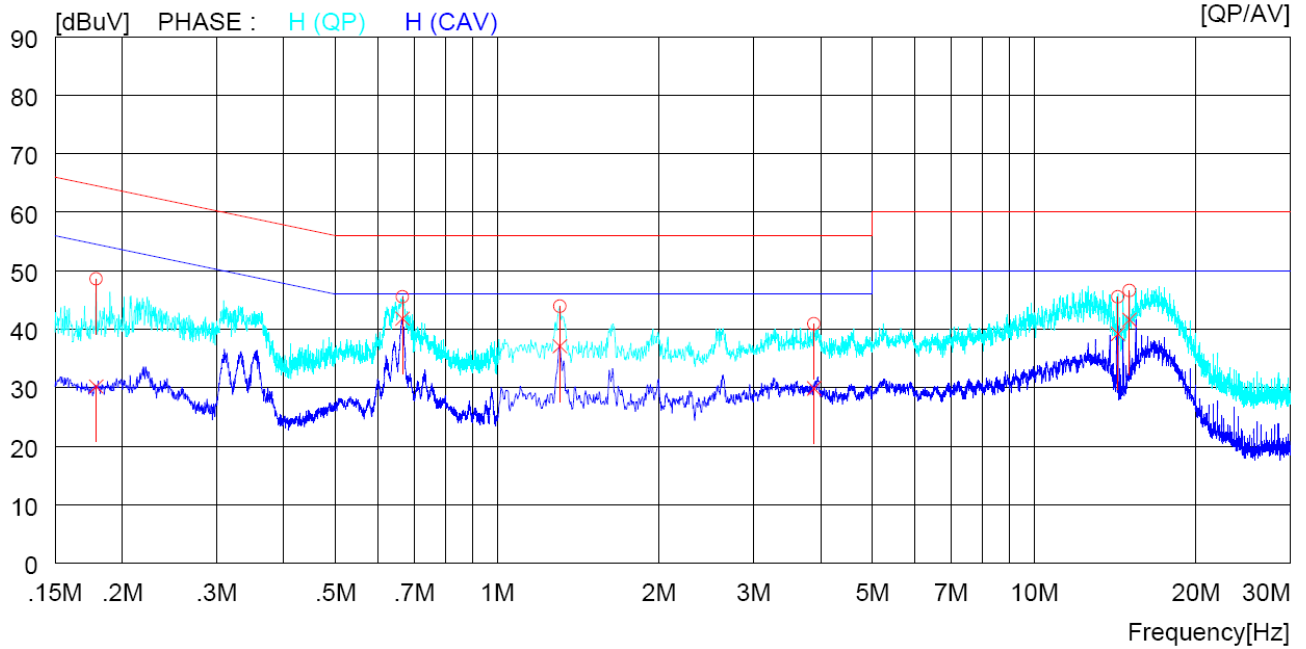
Line Conducted Emissions Tabulated Data

Remark : “H”: Hot Line, “N”: Neutral Line

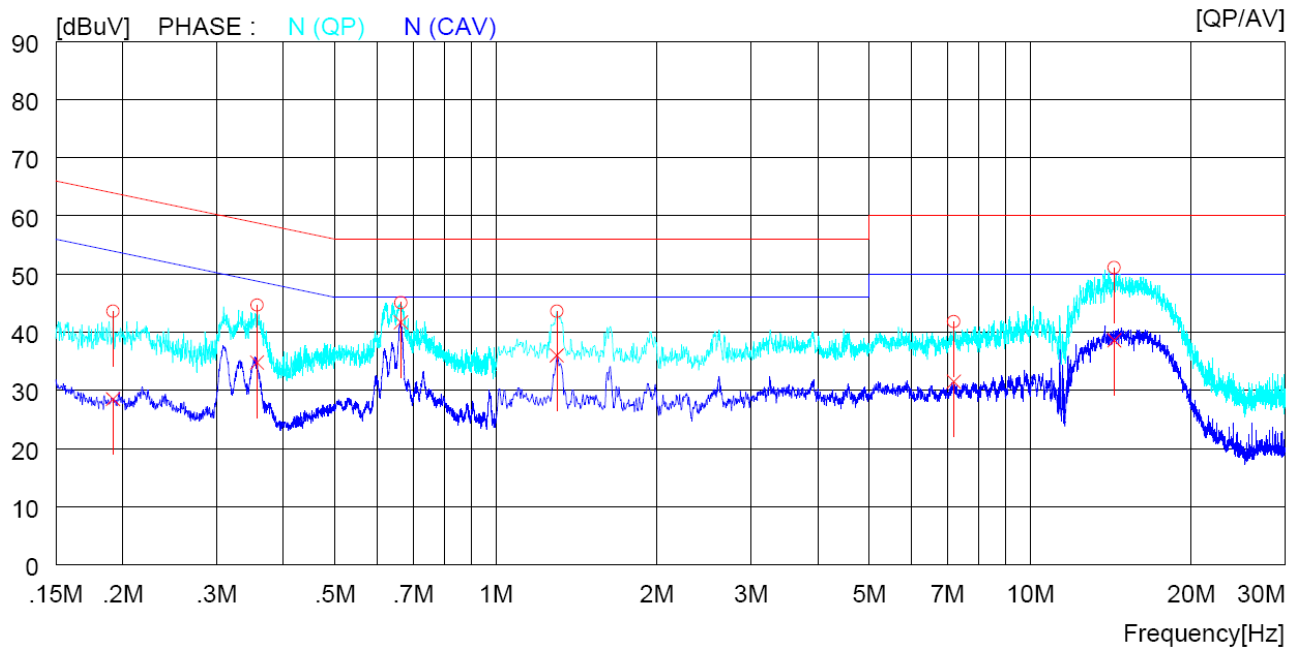


Tested by: Hong-Kyu, Lee/ Engineer

Graphical representation of Conducted Emission



HOT LINE



NEUTRAL LINE

10.5 Test data for 2 Mbps

- Test Date : January 15, 2014
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Test Result : Passed

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.66	N	45.70	56.00	10.30
0.67	H	44.90	56.00	11.10
1.31	N	43.60	56.00	12.40
13.74	N	51.20	60.00	8.80
15.05	H	46.60	60.00	13.40
15.86	H	48.10	60.00	11.90
Frequency (MHz)	Line	Average (dBμV)		Margin (dB)
		Emission level	Limits	
0.66	N	41.30	46.00	4.70
0.67	H	41.70	46.00	4.30
1.31	N	36.00	46.00	10.00
15.05	H	41.50	50.00	8.50

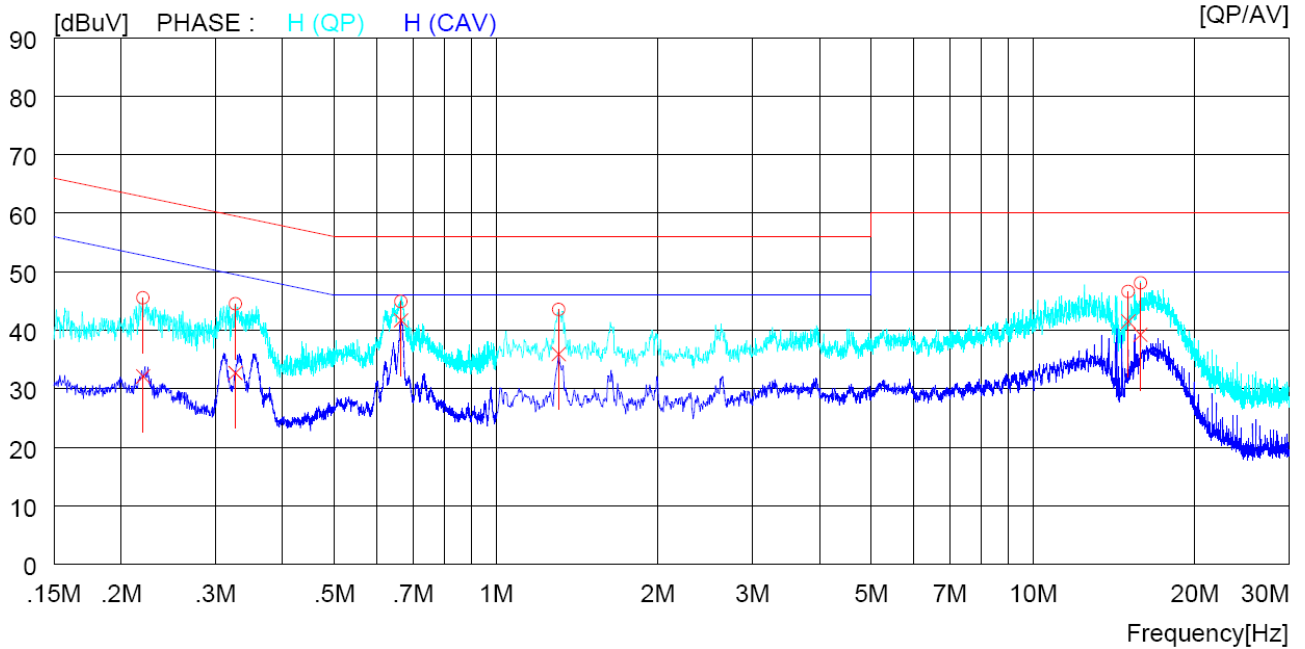
Line Conducted Emissions Tabulated Data

Remark : “H”: Hot Line, “N”: Neutral Line

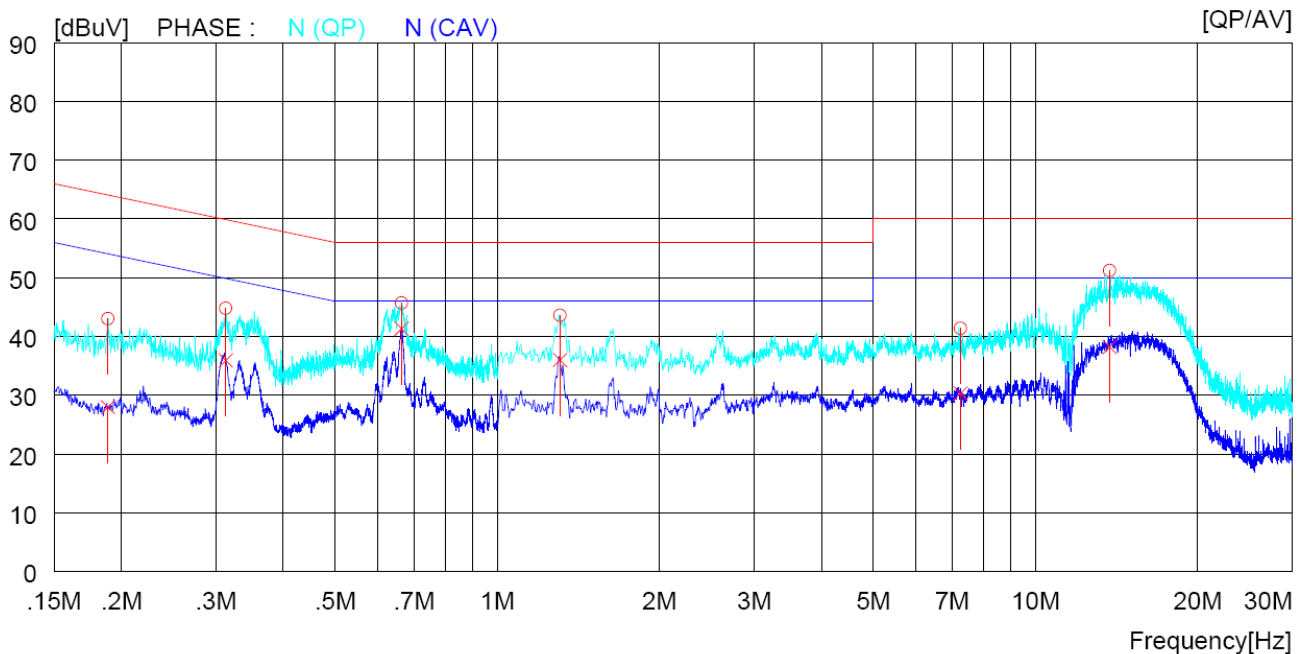


Tested by: Hong-Kyu, Lee/ Engineer

Graphical representation of Conducted Emission



HOT LINE



NEUTRAL LINE

10.6 Test data for 3 Mbps

- Test Date : January 15, 2014
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Test Result : Passed

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.66	H	45.40	56.00	10.60
0.67	N	45.20	56.00	10.80
1.30	N	43.20	56.00	12.80
14.34	H	47.30	60.00	12.70
15.05	H	47.00	60.00	13.00
15.23	N	49.50	60.00	10.50
Frequency (MHz)	Line	Average (dBμV)		Margin (dB)
		Emission level	Limits	
0.66	H	41.60	46.00	4.40
0.67	N	41.30	46.00	4.70
1.30	N	37.50	46.00	8.50
1.31	H	37.90	46.00	8.10

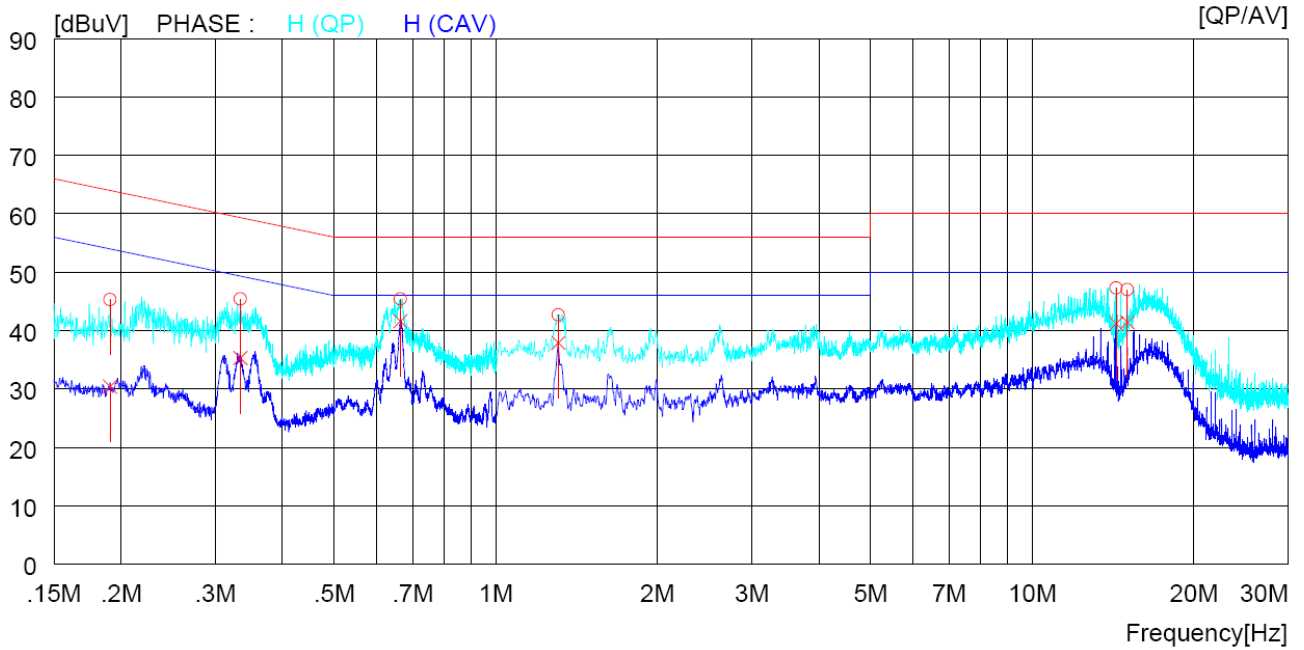
Line Conducted Emissions Tabulated Data

Remark : “H”: Hot Line, “N”: Neutral Line

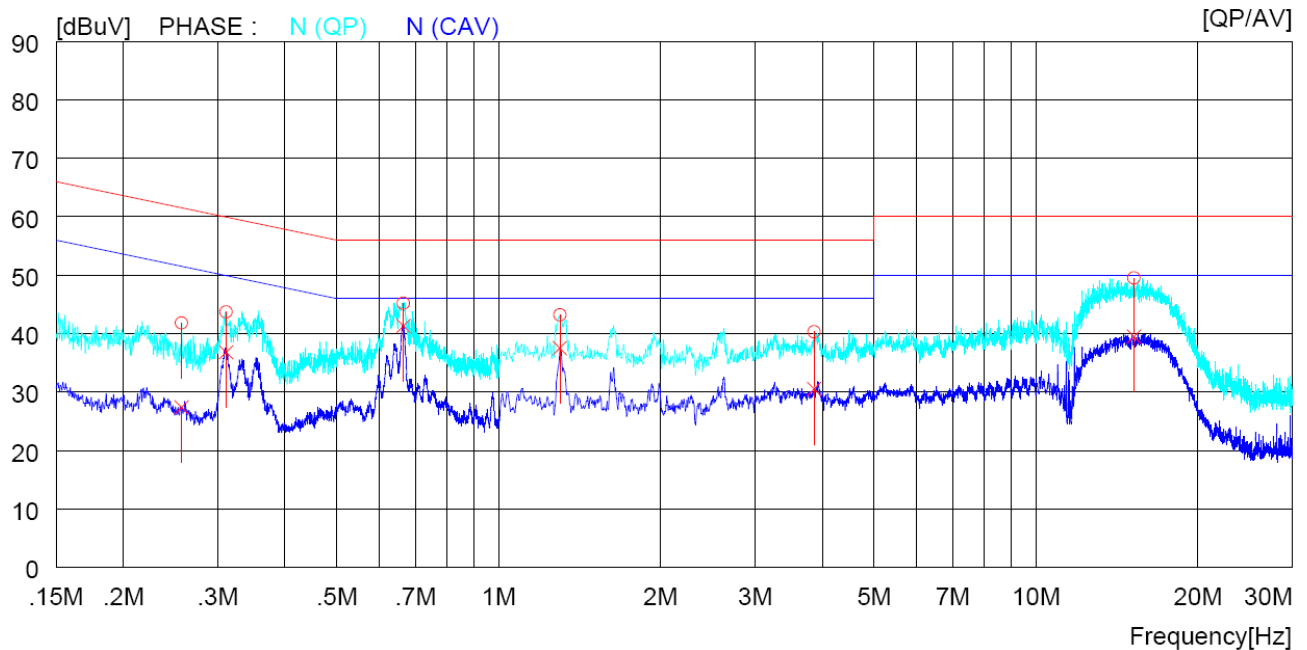


Tested by: Hong-Kyu, Lee/ Engineer

Graphical representation of Conducted Emission



HOT LINE



NEUTRAL LINE

10.7 Test data for Charging mode

- Test Date : January 15, 2014
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Test Result : Passed

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.15	H	39.20	65.90	26.70
0.43	N	33.40	57.20	23.80
0.78	H	29.40	56.00	26.60
1.84	N	31.20	56.00	24.80
10.24	H	34.30	60.00	25.70
14.34	N	36.10	60.00	23.90
Frequency (MHz)	Line	Average (dBμV)		Margin (dB)
		Emission level	Limits	
0.43	N	30.50	47.20	16.70
1.82	H	27.70	46.00	18.30
10.24	H	33.70	50.00	16.30
14.34	H	35.50	50.00	14.50

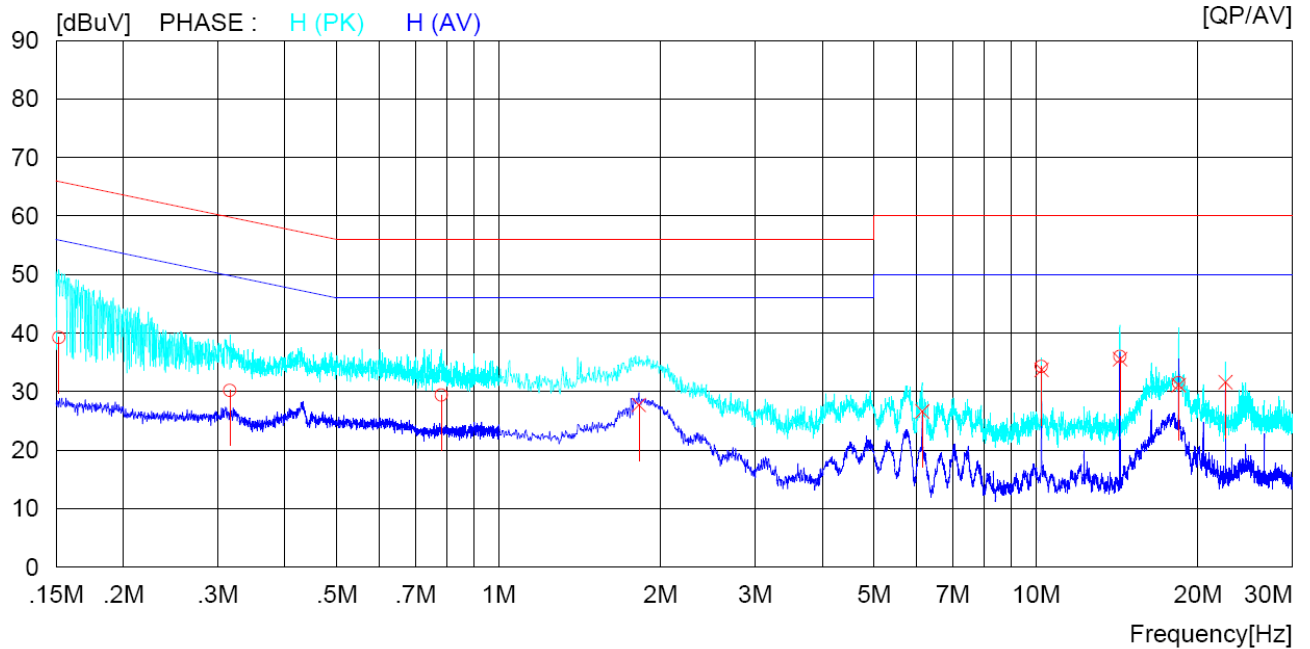
Line Conducted Emissions Tabulated Data

Remark : “H”: Hot Line, “N”: Neutral Line

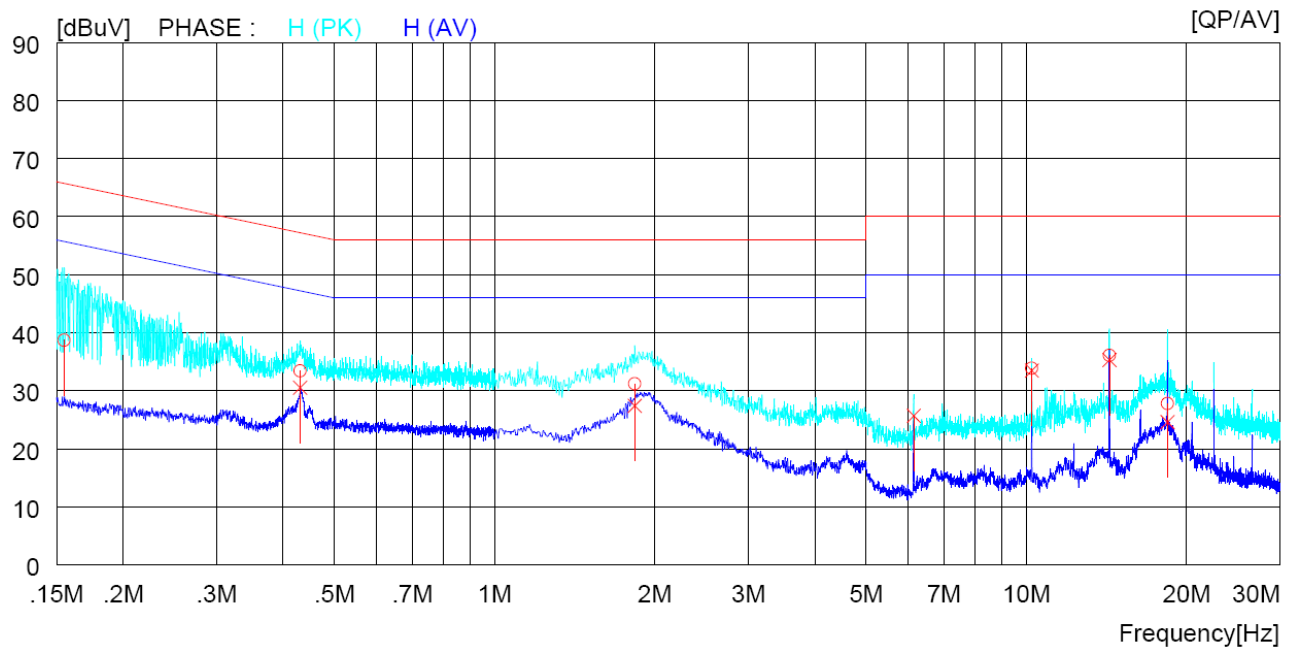


Tested by: Hong-Kyu, Lee/ Engineer

Graphical representation of Conducted Emission



HOT LINE



NEUTRAL LINE

11 RADIO FREQUENCY EXPOSURE

11.1 RF Exposure Limit

According to the FCC rule §1.1310 the limit for General Population/Uncontrolled exposure is 1 mW/cm² for the device operating 1 500 ~ 100 000 MHz.

11.2 EUT Description

Kind of EUT	Main Control Unit
Operating Frequency Band	☐ Wireless Microphone: 494.000 MHz ~ 501.000 MHz and 498.200 MHz ~ 505.200 MHz ☐ WLAN: 2 412 MHz ~ 2 462 MHz ☐ WLAN: 5 180 MHz ~ 5 320 MHz / 5 500 MHz ~ 5 700 MHz ☐ WLAN: 5 745 MHz ~ 5 825 MHz ☒ Bluetooth: 2 402 MHz ~ 2 480 MHz ☐ Zigbee: 2 465 MHz
Device Category	☒ Portable (< 20 cm separation) ☐ Mobile (> 20 cm separation) ☐ Others
Max. Output Power	1 Mbps: 0.99 dBm (1.26 mW) 2 Mbps: 0.82 dBm (1.21 mW) 3 Mbps: 1.02 dBm (1.26 mW)
Used Antenna	Chip Antenna
Used Antenna Gain	1.99 dBi
Exposure Evaluation Applied	☒ MPE ☐ SAR ☐ N/A

11.3 Test Result

According to the procedure, KDB 447498 D01, the standalone SAR test exclusion threshold is

$$[(\text{Max. Power of channel, including tune-up tolerance, mW})/(\text{Mim. test separation distance, mm})] \times [\sqrt{f(\text{GHz})}] < 3$$

$$= [1.26/5] \times \sqrt{2.480} = 0.40$$

Conclusion: The SAR test exclusion threshold is less than 3, so the device meets the RF Exposure Requirement and excluded SAR Test.