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

Test Report No.	**: W163R-D042**
AGR No.	**: A161A-258**
Applicant	**: BLUEBIRD INC.**
Address	**: (Dogok-dong, SEI Tower13,14)39, Eonjuro30-gil, Gangnam-gu, Seoul, South Korea**
Manufacturer	**: BLUEBIRD INC.**
Address	**: (Dogok-dong, SEI Tower13,14)39, Eonjuro30-gil, Gangnam-gu, Seoul, South Korea**
Type of Equipment	**: Premium Tablet**
FCC ID.	**: SS4ST100**
Model Name	**: ST100**
Multiple Model Name:	**N/A**
Serial number	**: N/A**
Total page of Report	**: 83 pages (including this page)**
Date of Incoming	**: February 01, 2016**
Date of issue	**: March 16, 2016**

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.

Reviewed by: Jae-Ho, Lee / Chief Engineer
ONETECH Corp.

Approved by: Sung-ik, Han/ Managing Director
ONETECH Corp.

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EMC Testing Div : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W163R-D042	March 16, 2016	Initial Issue	All

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: BLUEBIRD INC.
ADDRESS	: (Dogok-dong, SEI Tower13,14)39, Eonjuro30-gil, Gangnam-gu, Seoul, South Korea
CONTACT PERSON	: Jae-ho, Lee / Assistant Manager
TELEPHONE NO	: +82-70-7730-8210
FCC ID	: SS4ST100
MODEL NAME	: ST100
SERIAL NUMBER	: N/A
DATE	: March 16, 2016

EQUIPMENT CLASS	***DSS – PART 15 SPREAD SPECTRUM TRANSMITTER***
KIND OF EQUIPMENT	Premium Tablet
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
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 Semi Anechoic Chamber

-. 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.

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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 (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
15.209	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: 2013. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

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2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862 Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-4617/ G-666/ T-1842

IC (Industry Canada) – Registration No. Site# 3736A-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

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3. GENERAL INFORMATION

3.1 Product Description

The BLUEBIRD INC., Model ST100 (referred to as the EUT in this report) is a Premium Tablet. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Premium Tablet	
OPERATING FREQUENCY	2 402 MHz ~ 2 480 MHz	
RF OUTPUT POWER	1 Mbps	0.10 dBm
	2 Mbps	-0.11 dBm
	3 Mbps	0.42 dBm
NUMBER OF CHANNEL	79 Channels	
MODULATION TYPE	GFSK for 1 Mbps, π/4-DQPSK for 2 Mbps, 8-DPSK for 3 Mbps	
ANTENNA TYPE	PIFA Antenna	
ANTENNA GAIN	0.49 dBi	
LIST OF EACH OSC. OR CRYSTAL. FREQ.(FREQ.>=1 MHz)	26 MHz	
RATED SUPPLY VOLTAGE	DC 3.8 V	

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

-. None

4. EUT MODIFICATIONS

-. None

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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
Display Controller Board	Kingdisplay	KD101N37-40NA-A1-REVB	
Display Panel	N/A	N/A	
Main Board	N/A	N/A	
Battery	Guandong TeamGiant New Energy Tech.Limited Liability Co.,LTD	BAT-ST100	
SUB Board	N/A	TVE1015IST-SUB-V1.1	
Sensor	N/A	CMK-TVE1013-B-V5B1.0	
Antenna	N/A	MICRO RF Rev 3.0	
Camera module	N/A	CMK-TVE1010I-F-V2B2.0	
Touch sensor controller Board	N/A	101332C-Q-00	
Wireless Module	HUAWEI TECHNOLOGIES CO.,LTD.	MU739	QISMU739

5.2 Peripheral equipment

Model	Manufacturer	Description	Connected to
N/A	N/A	N/A	N/A

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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 tested in a Transmitting mode. The EUT was connected to USB and the power of USB was connected to Adapter. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions.

Radiated Emission Test: The EUT was tested in a charging mode and Transmitter mode. Preliminary radiated emissions test were conducted using the procedure in ANSI C63. 10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 m Semi Anechoic Chamber.

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.

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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 PIFA 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)
Charging & 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	
Charging & Transmitting Mode	X

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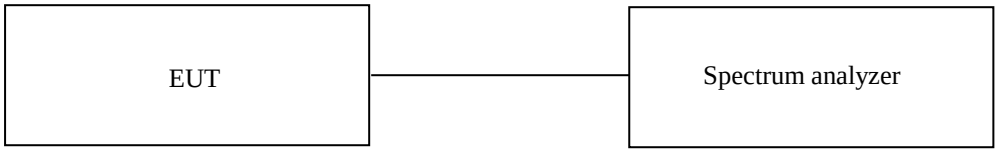
7. MINIMUM 20 dB BANDWIDTH

7.1 Operating environment

Temperature	:	23 °C
Relative humidity	:	47 % R.H.

7.2 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.



7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 22, 2015 (1Y)

All test equipment used is calibrated on a regular basis.

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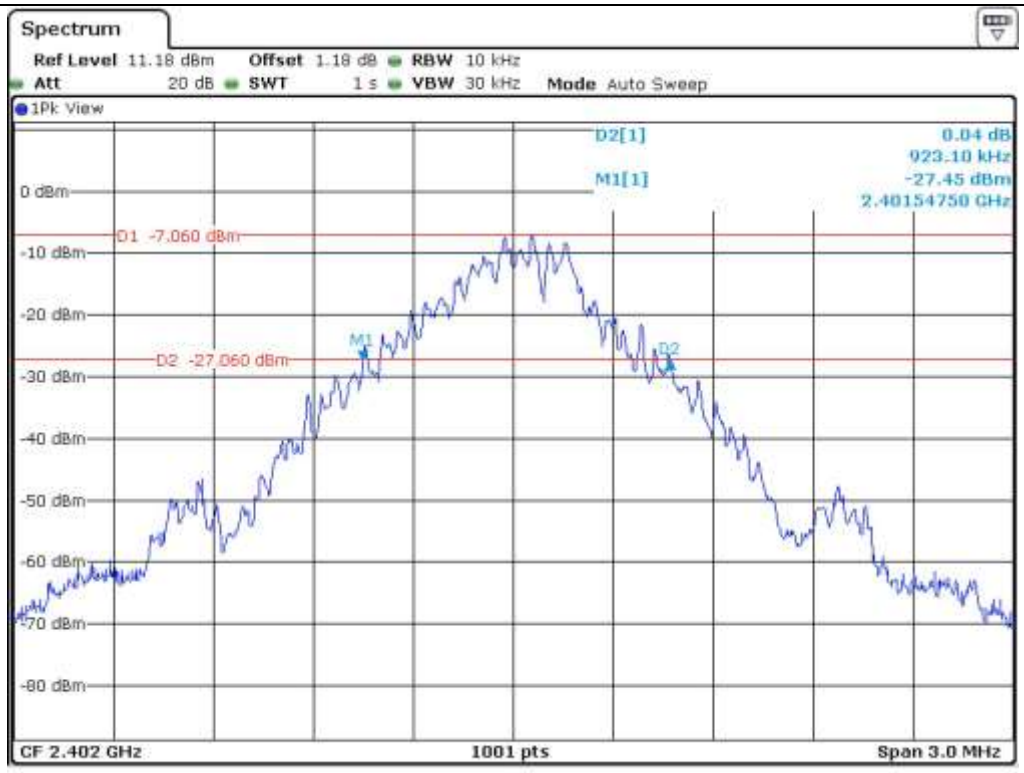
7.4 Test data for 1 Mbps

-. Test Date : March 10, 2016

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402	923.10
Middle	2 441	923.10
High	2 480	923.10

Tested by: Jun-Hui, Lee / Senior Engineer



Low Channel

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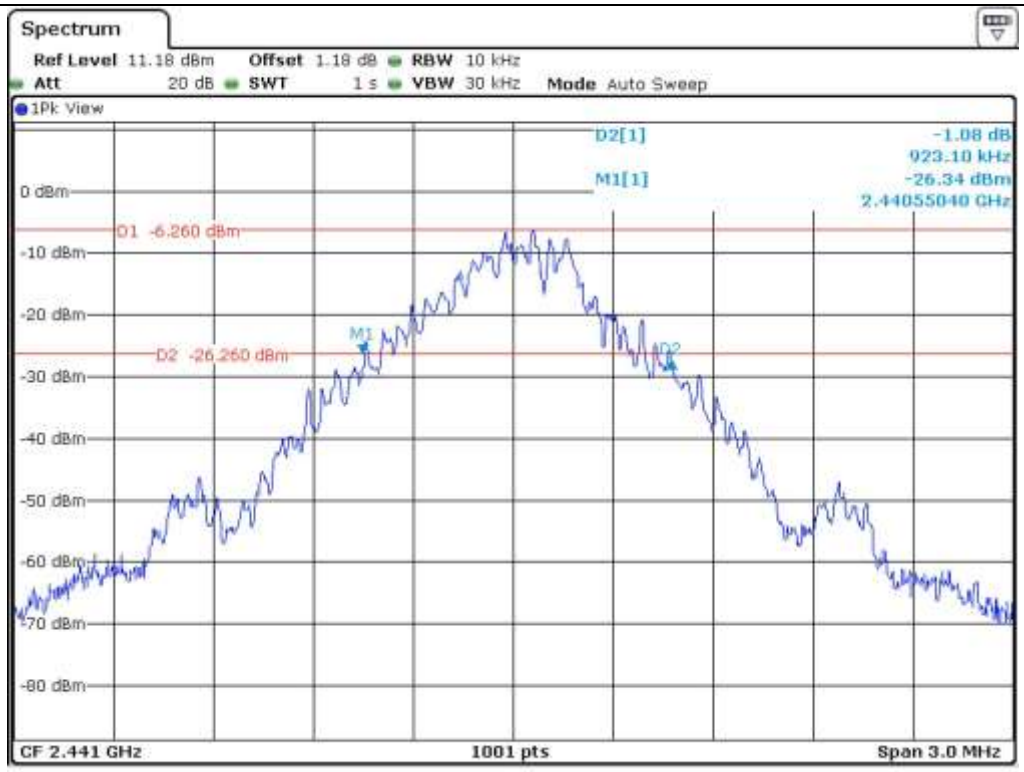
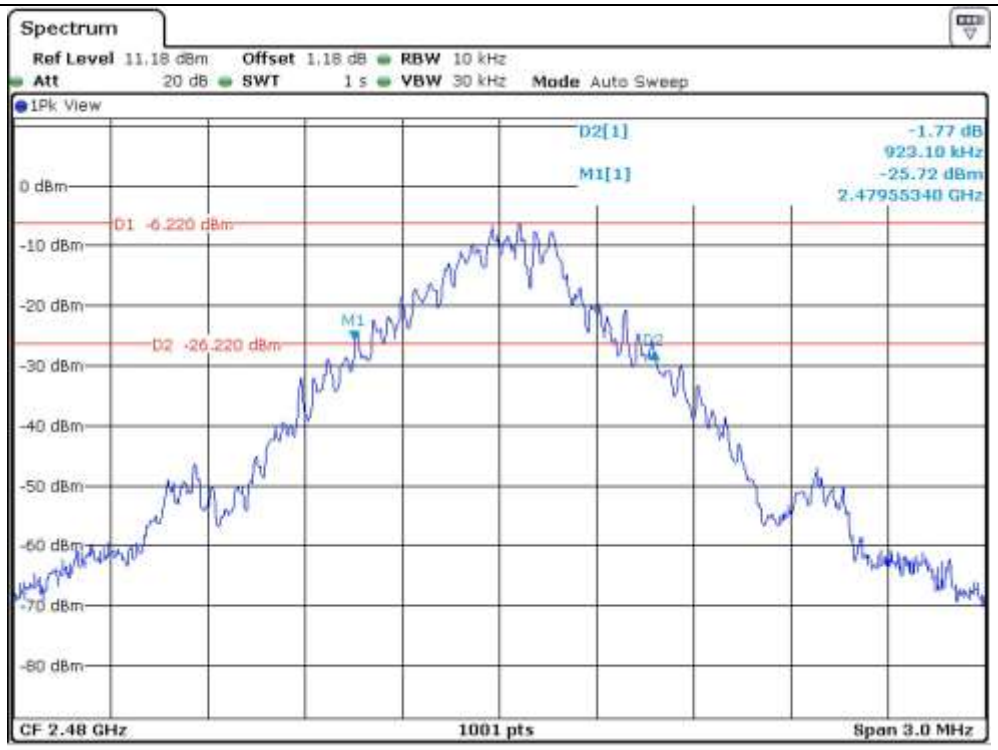


Middle Channel



High Channel

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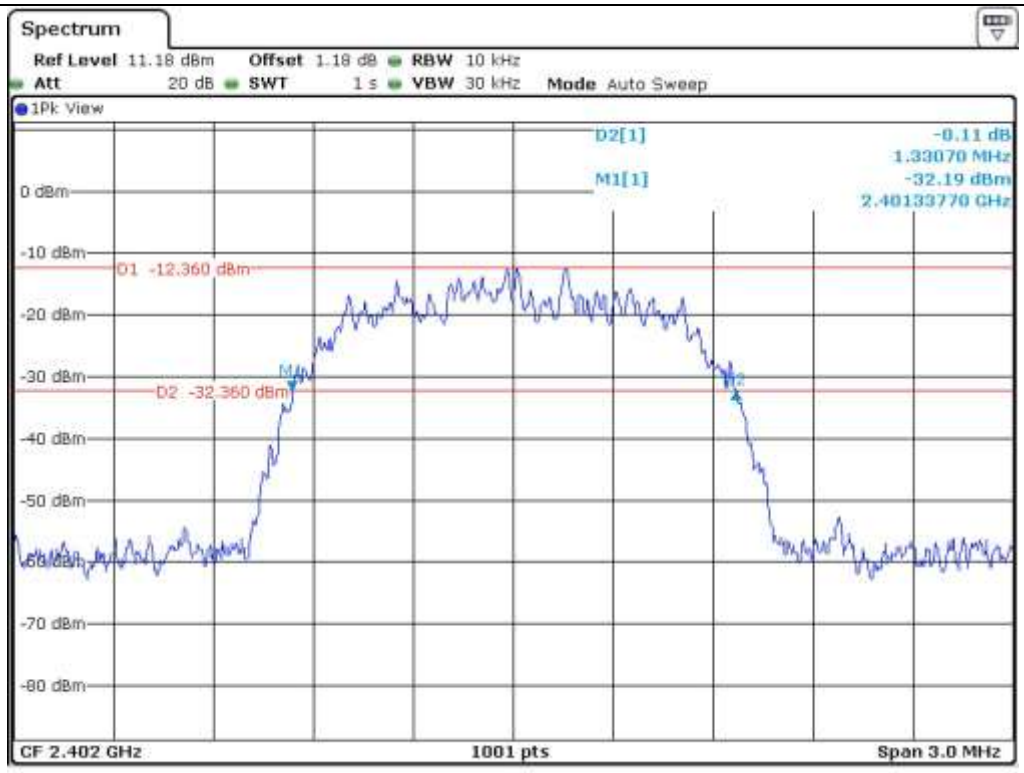
7.5 Test data for 2 Mbps

-. Test Date : March 10, 2016

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402	1 330.70
Middle	2 441	1 330.70
High	2 480	1 330.70

Tested by: Jun-Hui, Lee / Senior Engineer



Low Channel

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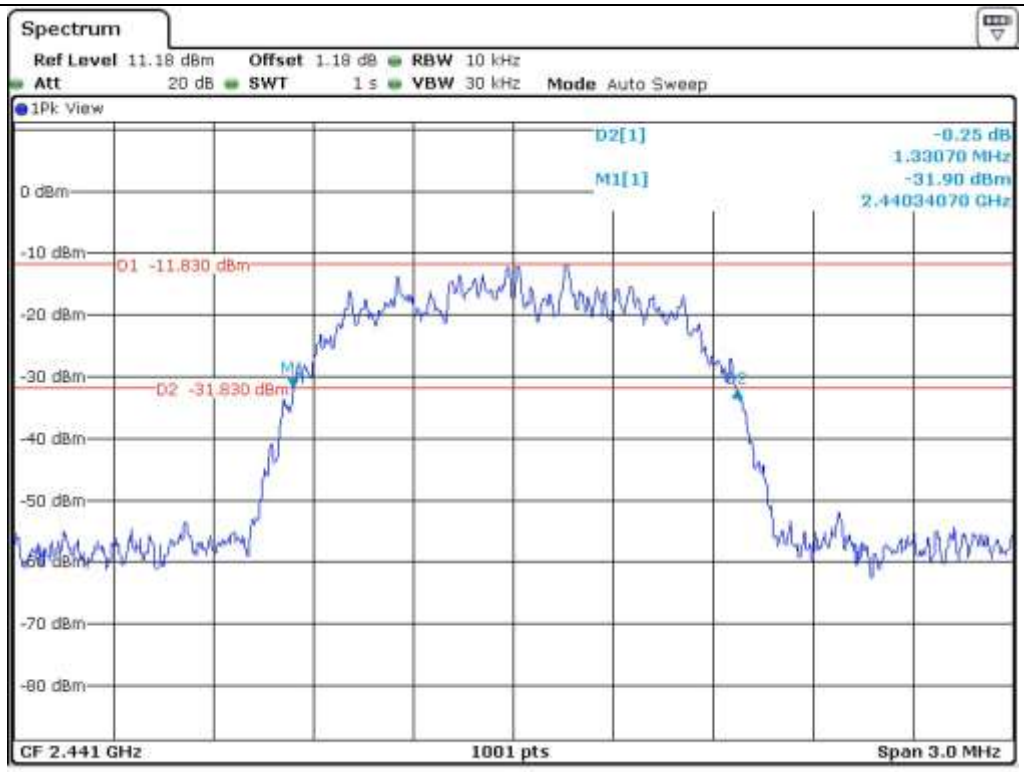
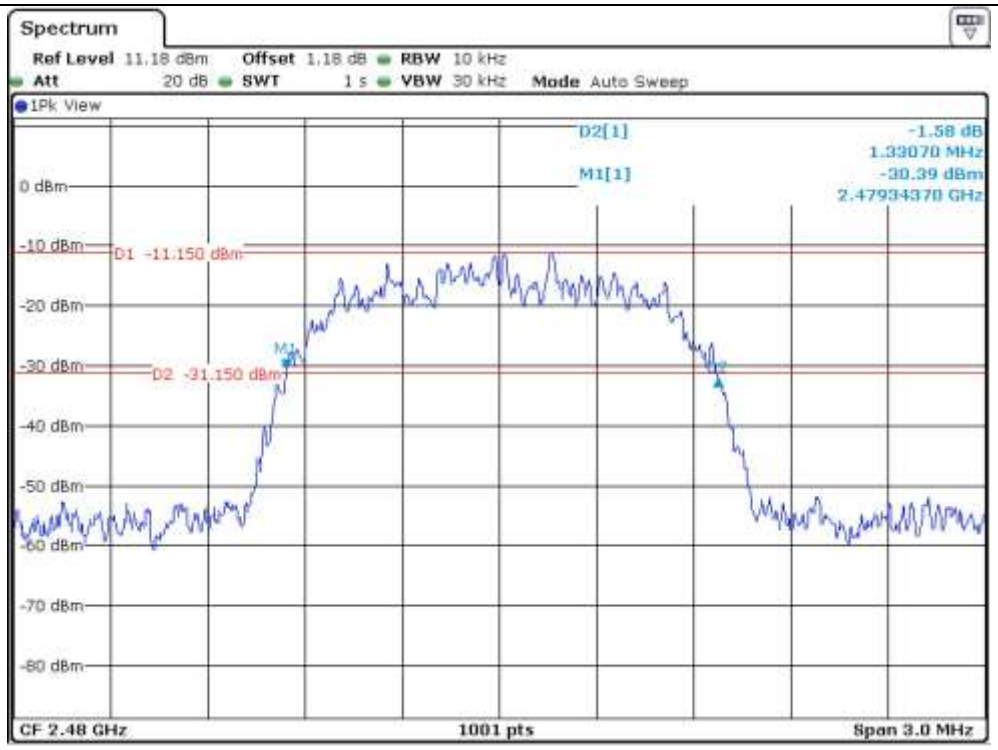


Middle Channel



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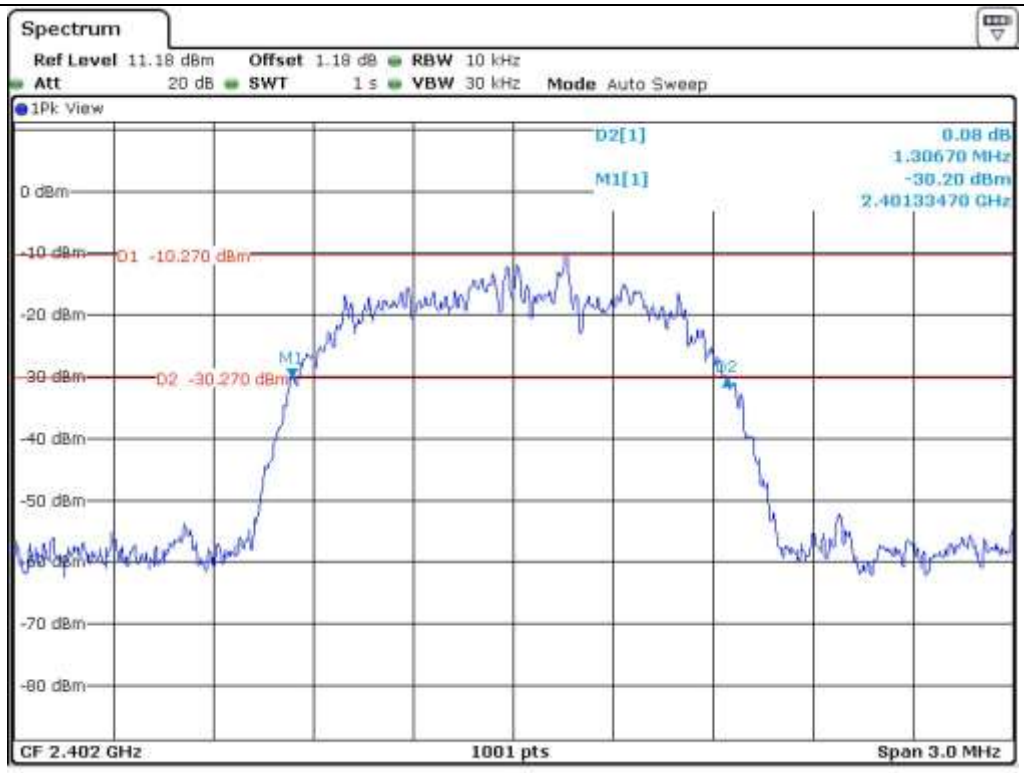
7.6 Test data for 3 Mbps

-. Test Date : March 10, 2016

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402	1 306.70
Middle	2 441	1 306.70
High	2 480	1 306.70

Tested by: Jun-Hui, Lee / Senior Engineer



Low Channel

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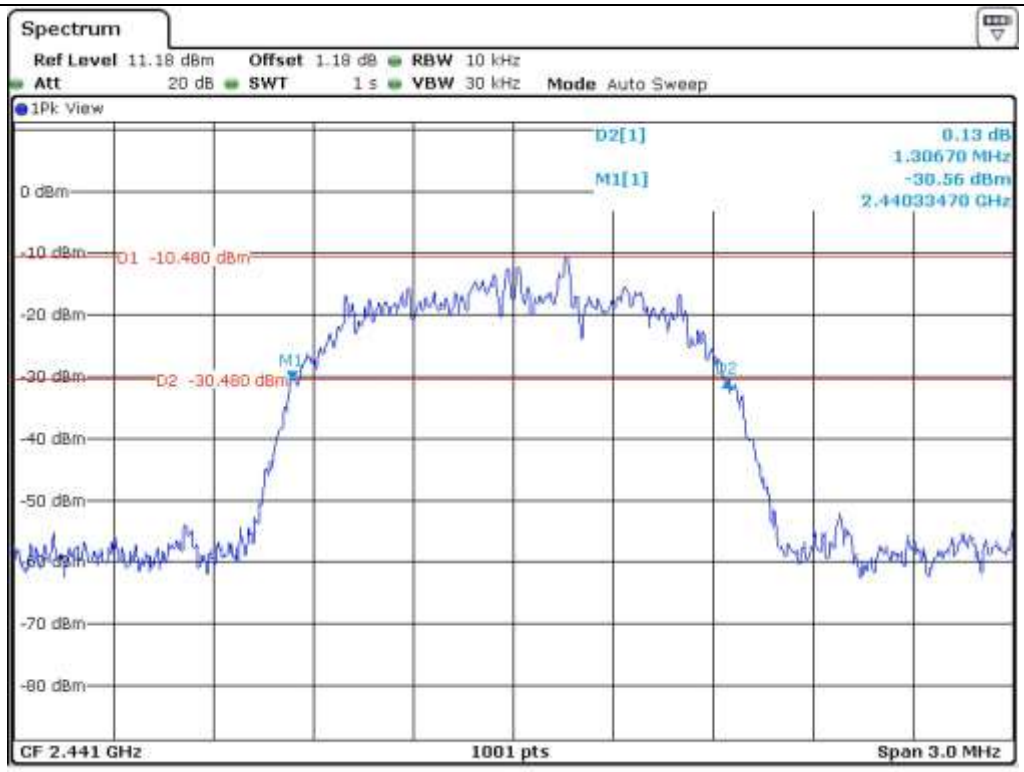
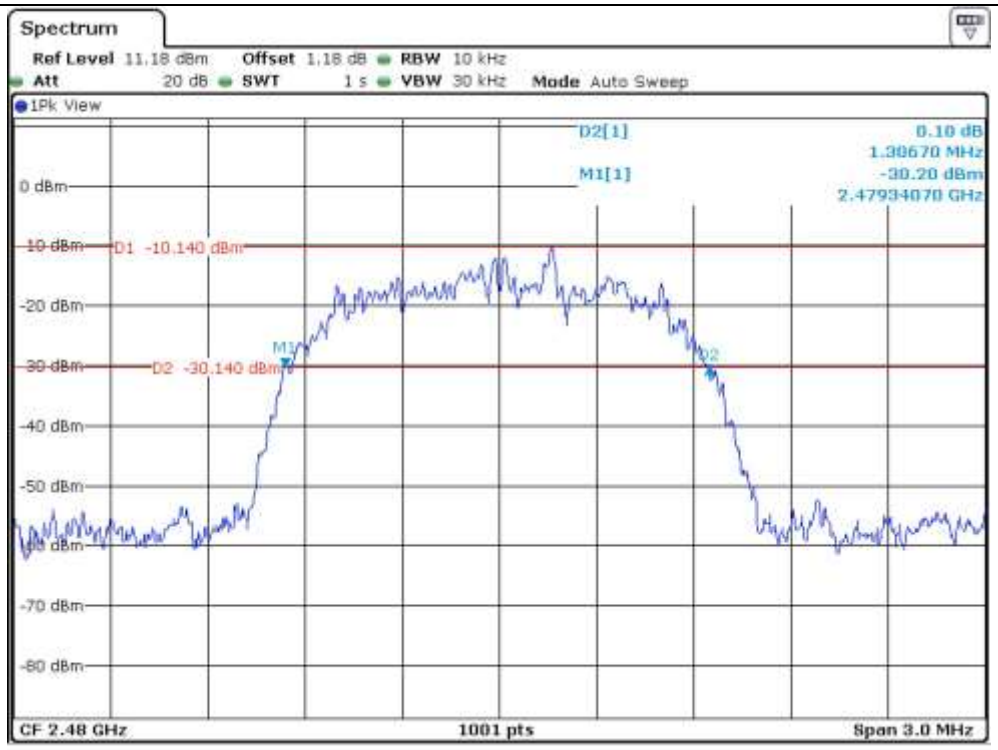


Middle Channel



High Channel

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8. HOPPING FREQUENCY SEPARATION

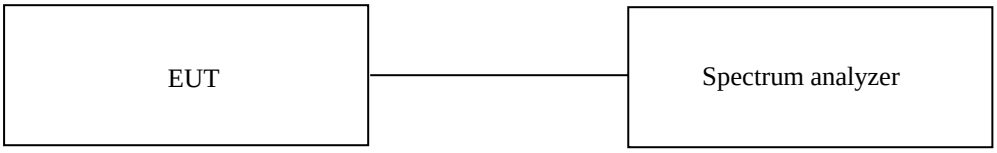
8.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % R.H.

8.2 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.



8.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 22, 2015 (1Y)

All test equipment used is calibrated on a regular basis.

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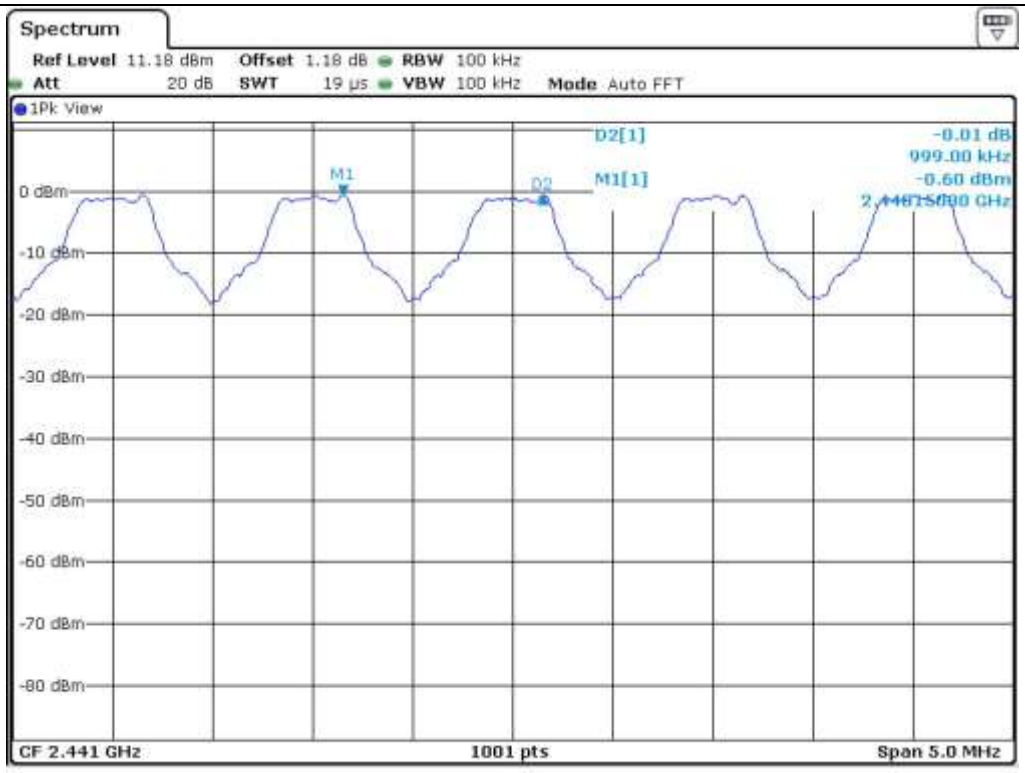
8.4 Test data for 1 Mbps

-. Test Date : March 10, 2016

-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	615.40	Separated by a minimum of 25 kHz

Tested by: Jun-Hui, Lee / Senior Engineer



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EMC Testing Div : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

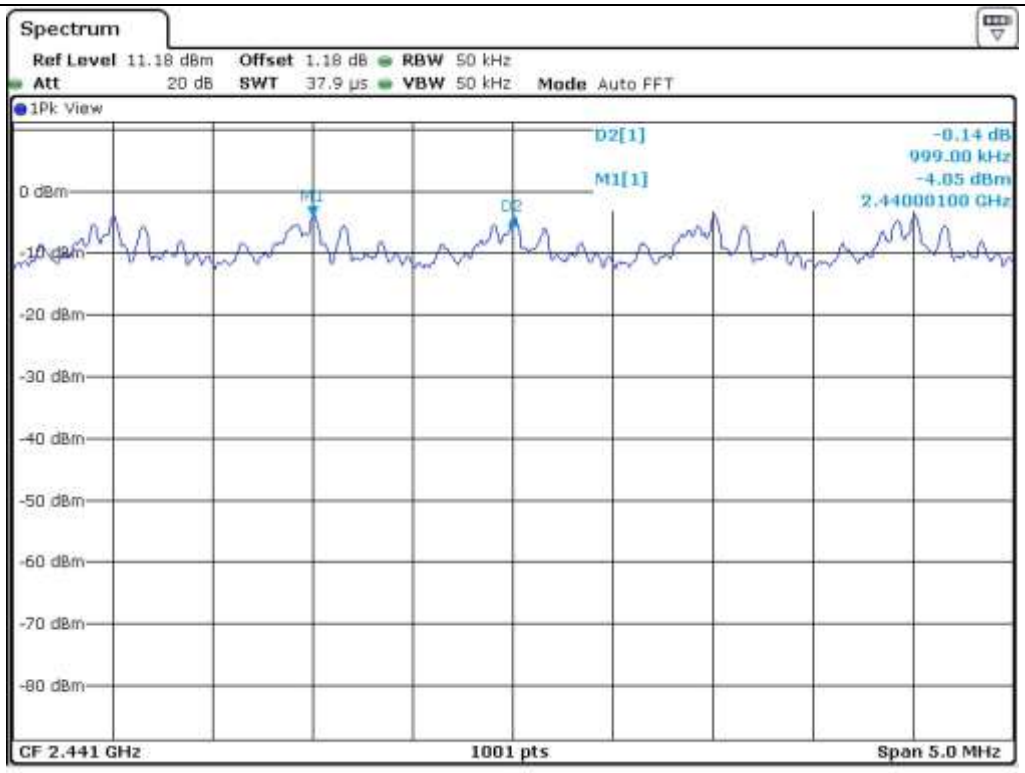
8.5 Test data for 2 Mbps

-. Test Date : March 10, 2016

-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	887.13	Separated by a minimum of 25 kHz

Tested by: Jun-Hui, Lee / Senior Engineer



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EMC Testing Div : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

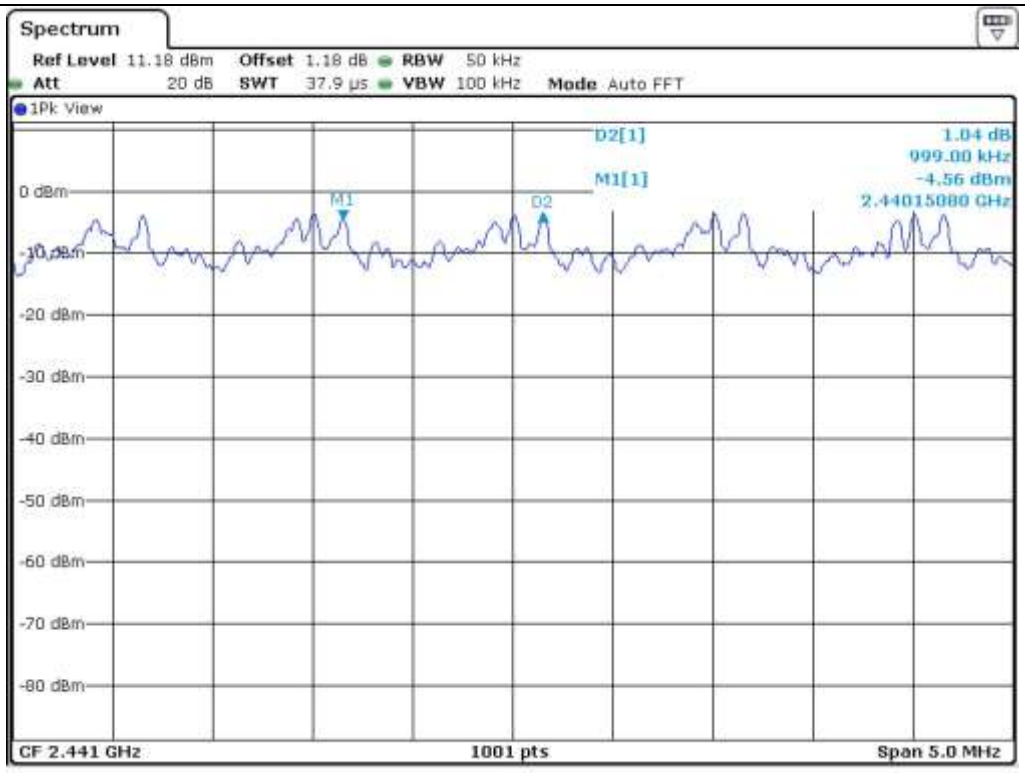
8.6 Test data for 3 Mbps

-. Test Date : March 10, 2016

-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	871.13	Separated by a minimum of 25 kHz

Tested by: Jun-Hui, Lee / Senior Engineer



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EMC Testing Div : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

9. NUMBER OF HOPPING CHANNELS

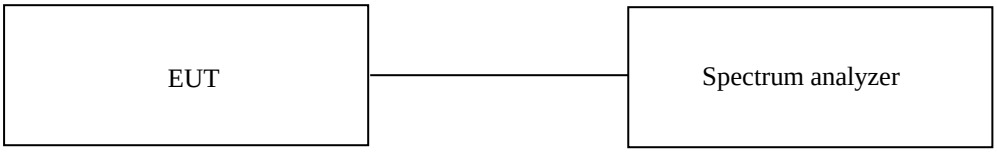
9.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % R.H.

9.2 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 1 MHz. The analyzer is set to peak hold and then complete pseudo-random hopping sequence of the transmitter is captured.



9.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 22, 2015 (1Y)

All test equipment used is calibrated on a regular basis.

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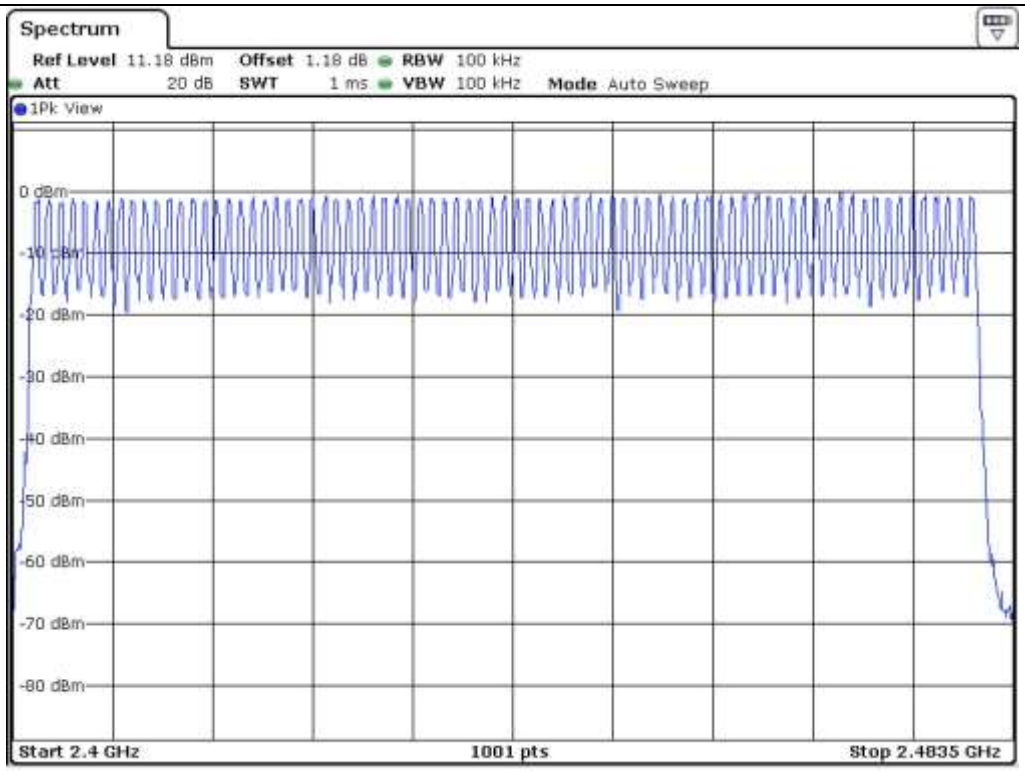
9.4 Test data for 1 Mbps

-. Test Date : March 10, 2016

-. Test Result : Pass

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

Tested by: Jun-Hui, Lee / Senior Engineer



Total number of hopping channel: 28+30+21 = 79

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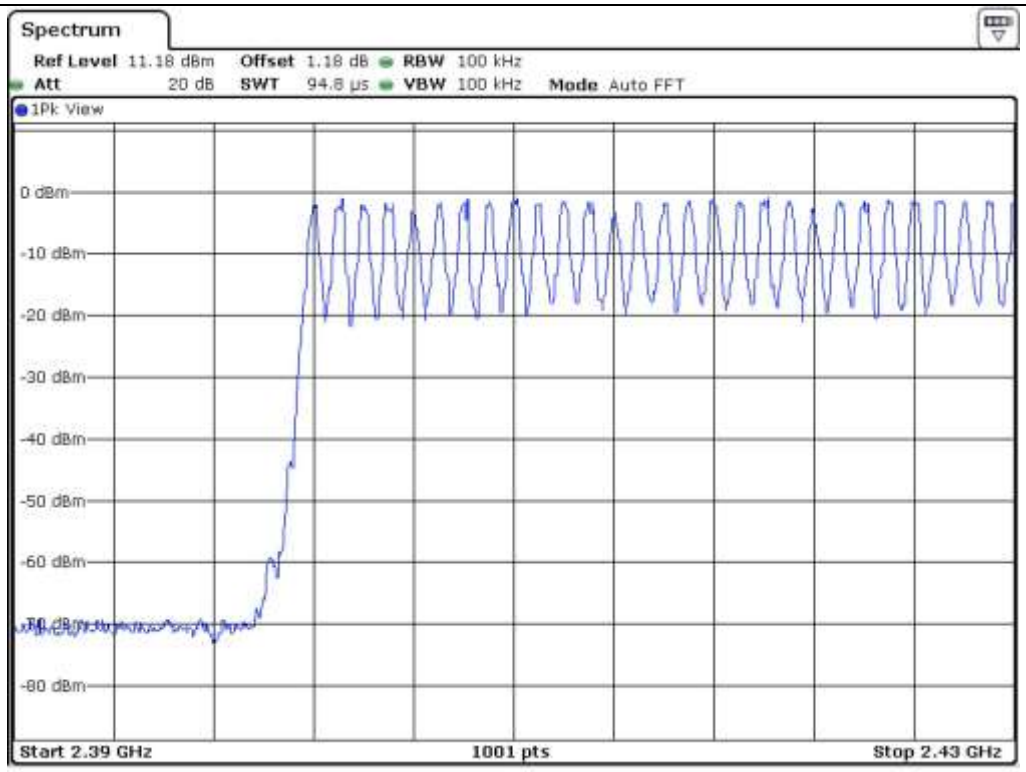
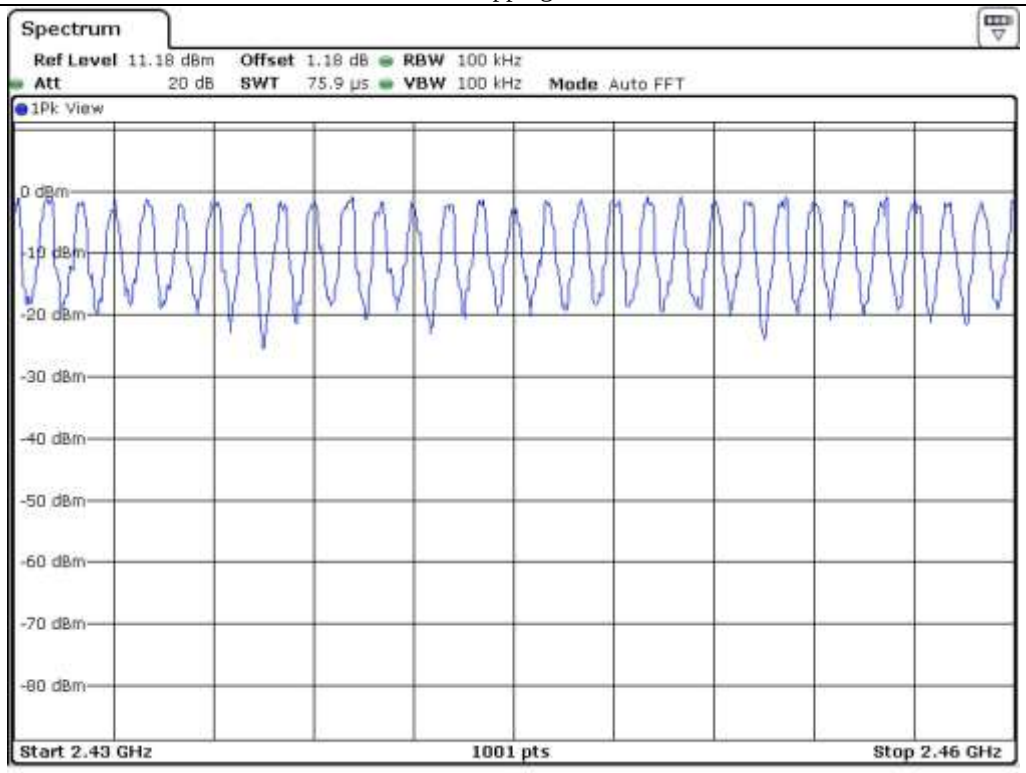
EMC Testing Div : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



Number of hopping channel: 28



Number of hopping channel: 30

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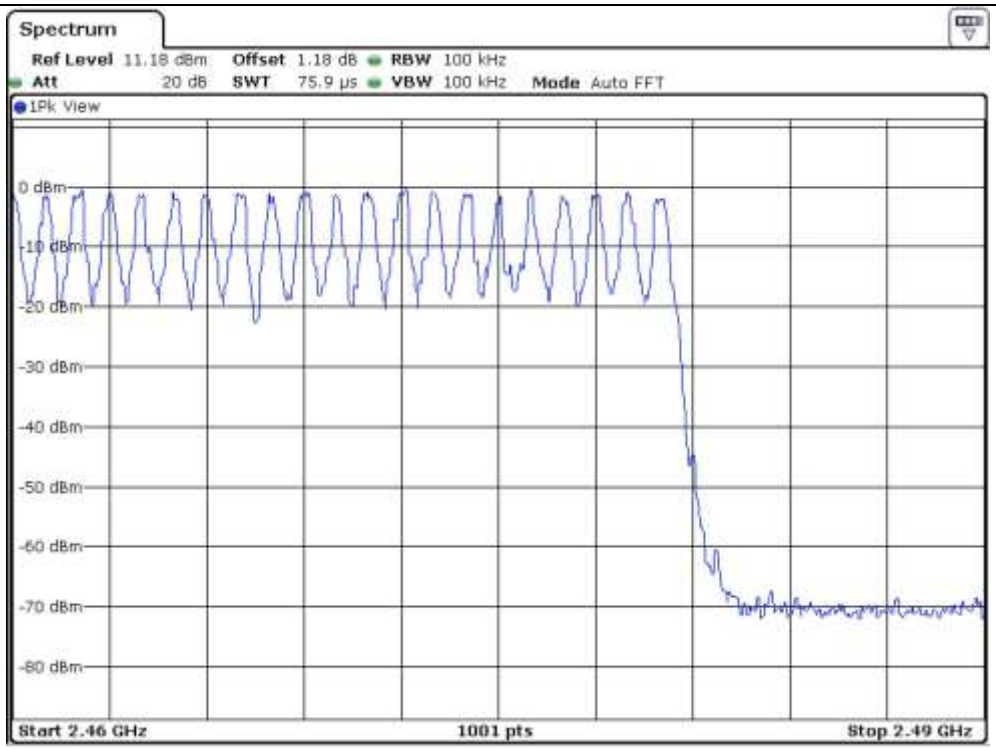

Number of hopping channel: 21

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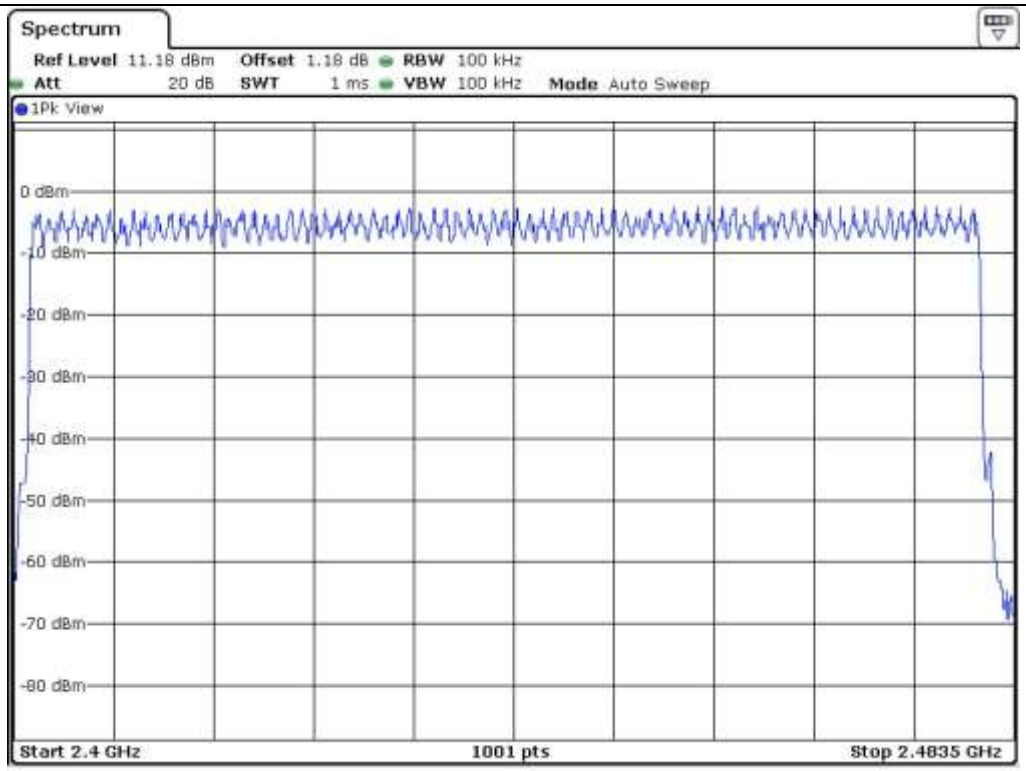
9.5 Test data for 2 Mbps

-. Test Date : March 10, 2016

-. Test Result : Pass

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

Tested by: Jun-Hui, Lee / Senior Engineer



Total number of hopping channel: 28+30+21 = 79

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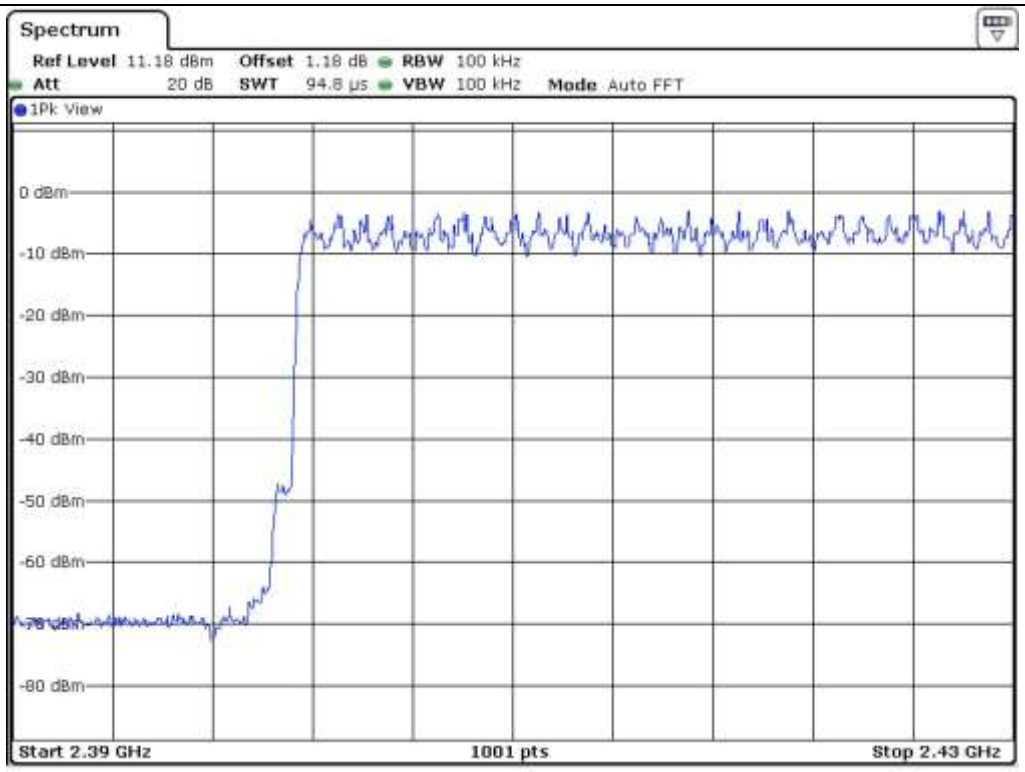
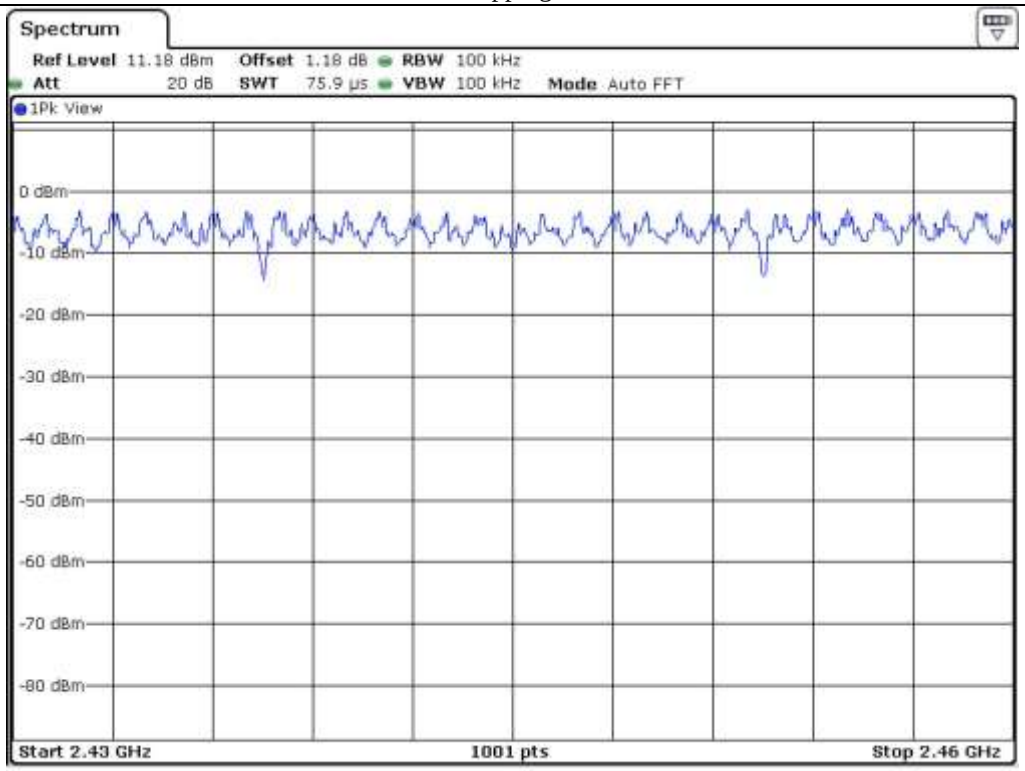


Number of hopping channel: 28



Number of hopping channel: 30

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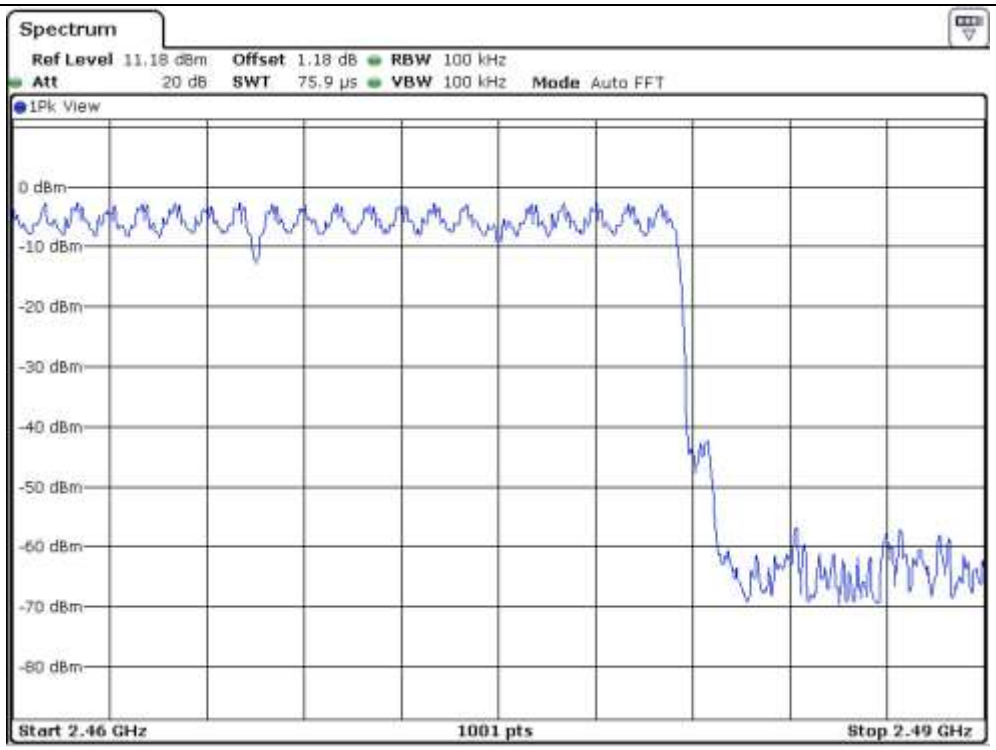

Number of hopping channel: 21

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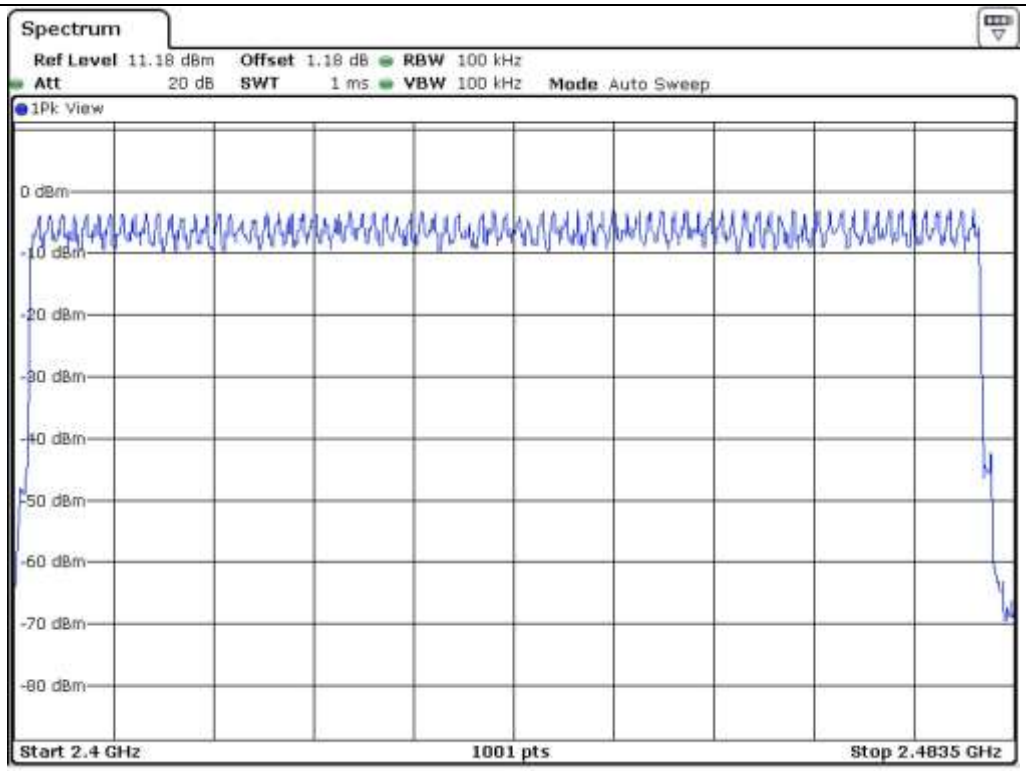
9.6 Test data for 3 Mbps

-. Test Date : March 10, 2016

-. Test Result : Pass

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

Tested by: Jun-Hui, Lee / Senior Engineer



Total number of hopping channel: 28+30+21 = 79

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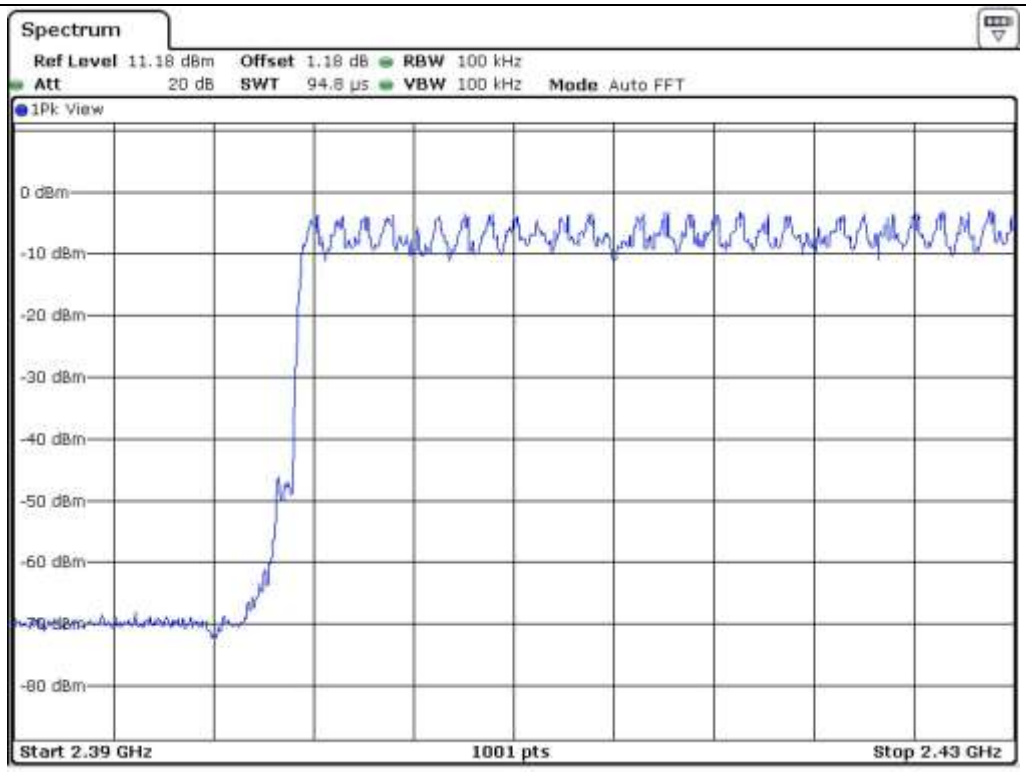
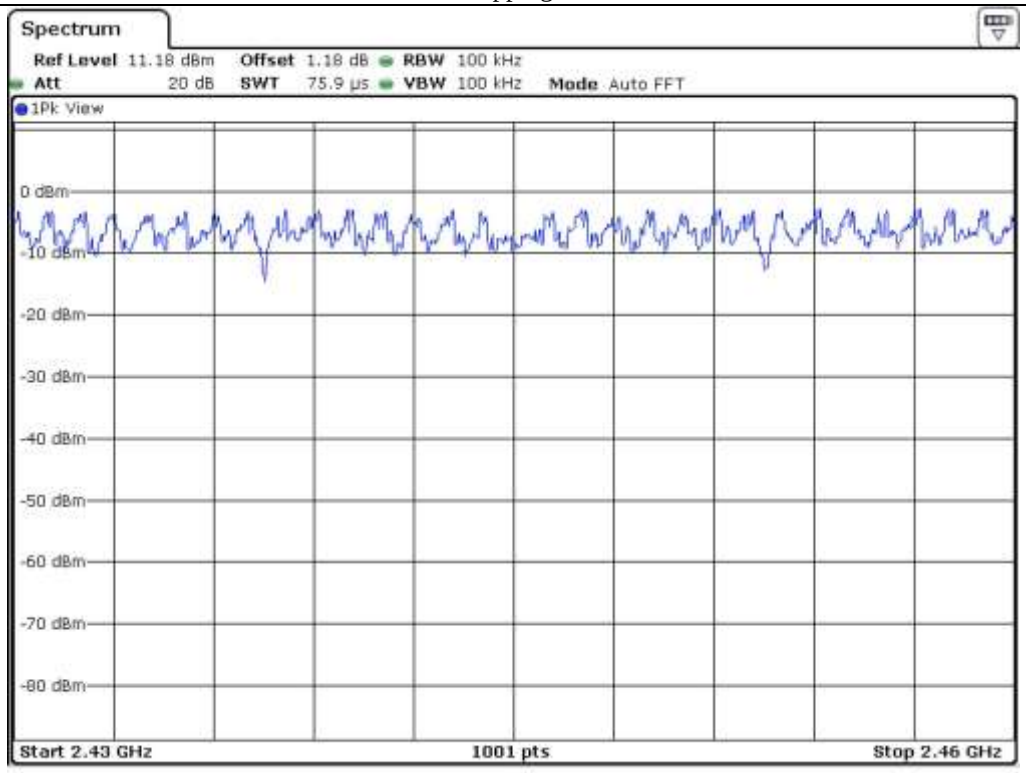


Number of hopping channel: 28



Number of hopping channel: 30

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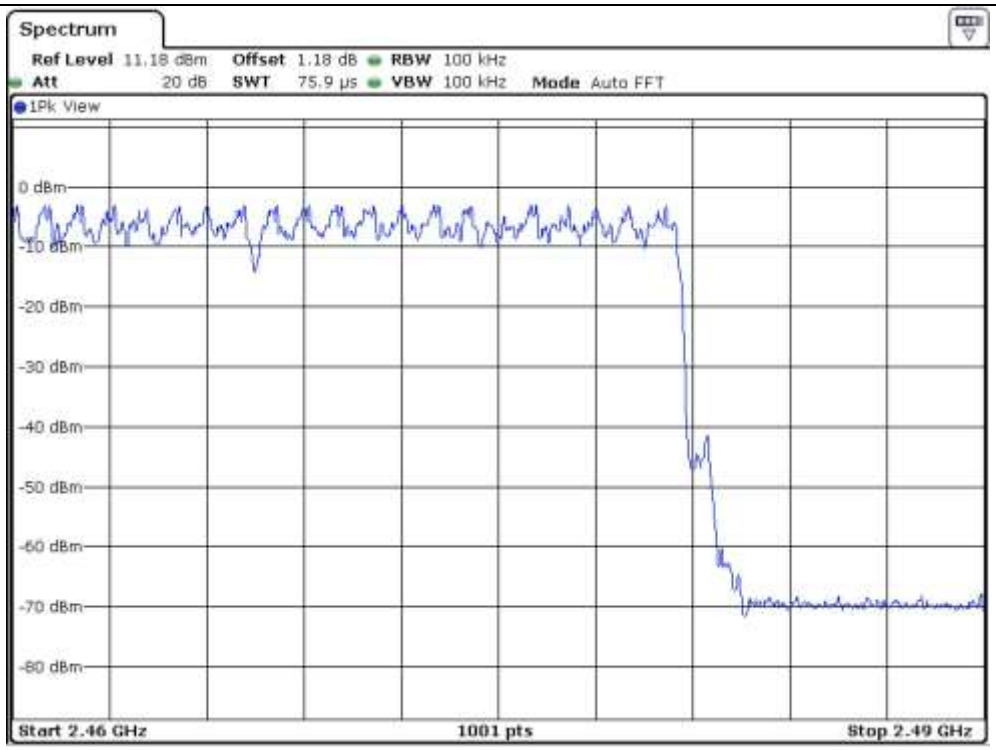

Number of hopping channel: 21

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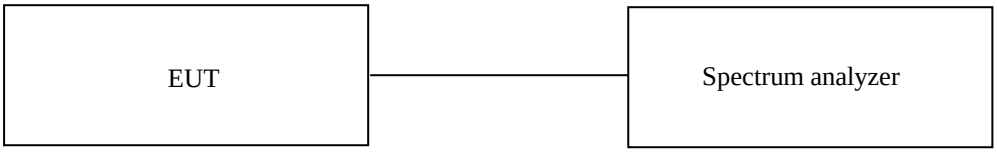
10. TIME OF OCCUPANCY

10.1 Operating environment

Temperature	:	23 °C
Relative humidity	:	47 % R.H.

10.2 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.



10.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 22, 2015 (1Y)

All test equipment used is calibrated on a regular basis.

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10.4 Test data for 1 Mbps

-. Test Date : March 10, 2016

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 µs 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 (s)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.380	10.13	31.6	121.64	400	PASS
DH3	1.640	5.06	31.6	262.23	400	
DH5	2.210	3.38	31.6	236.05	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.

Tested by: Jun-Hui, Lee / Senior Engineer

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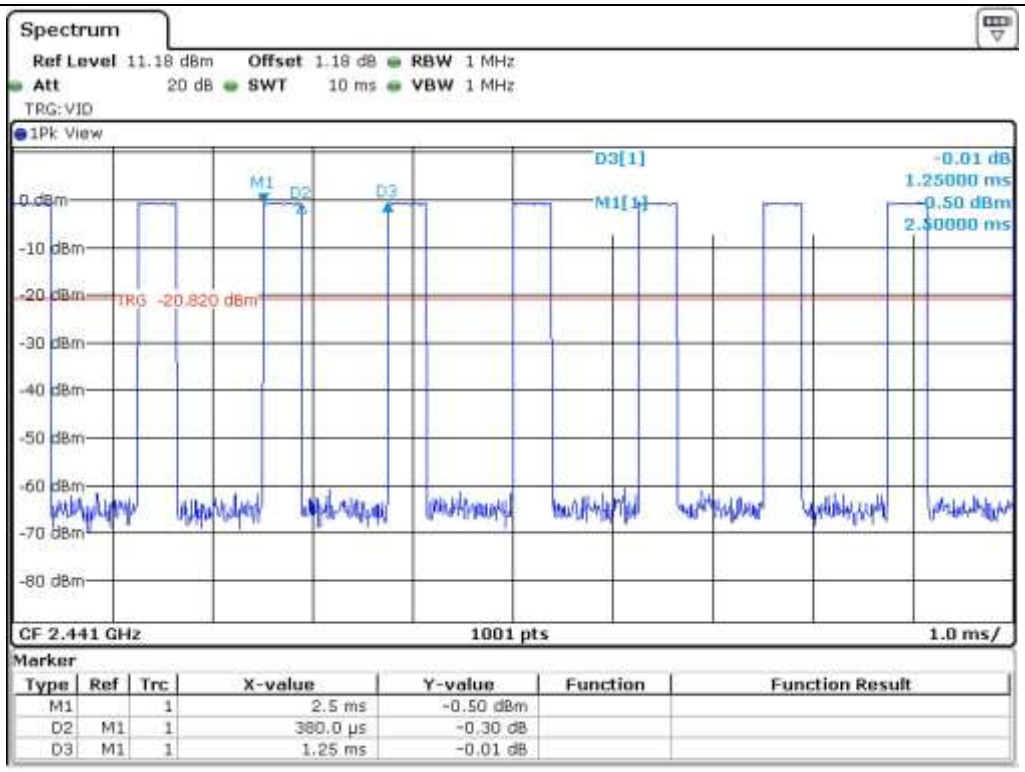
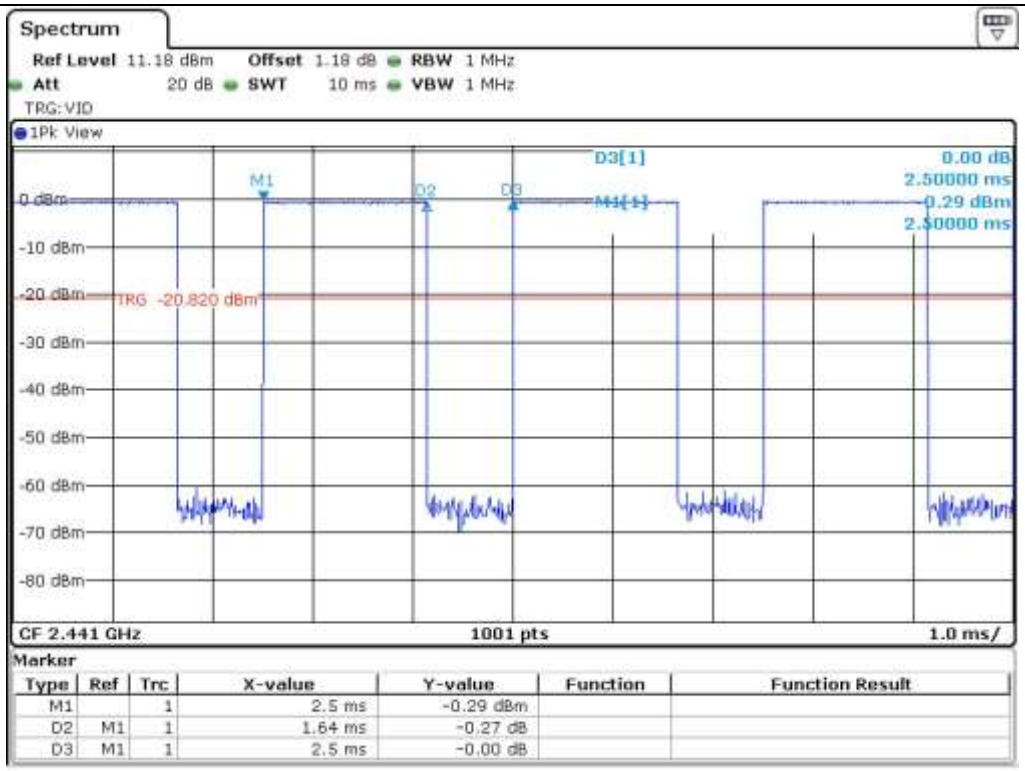


DH1



DH3

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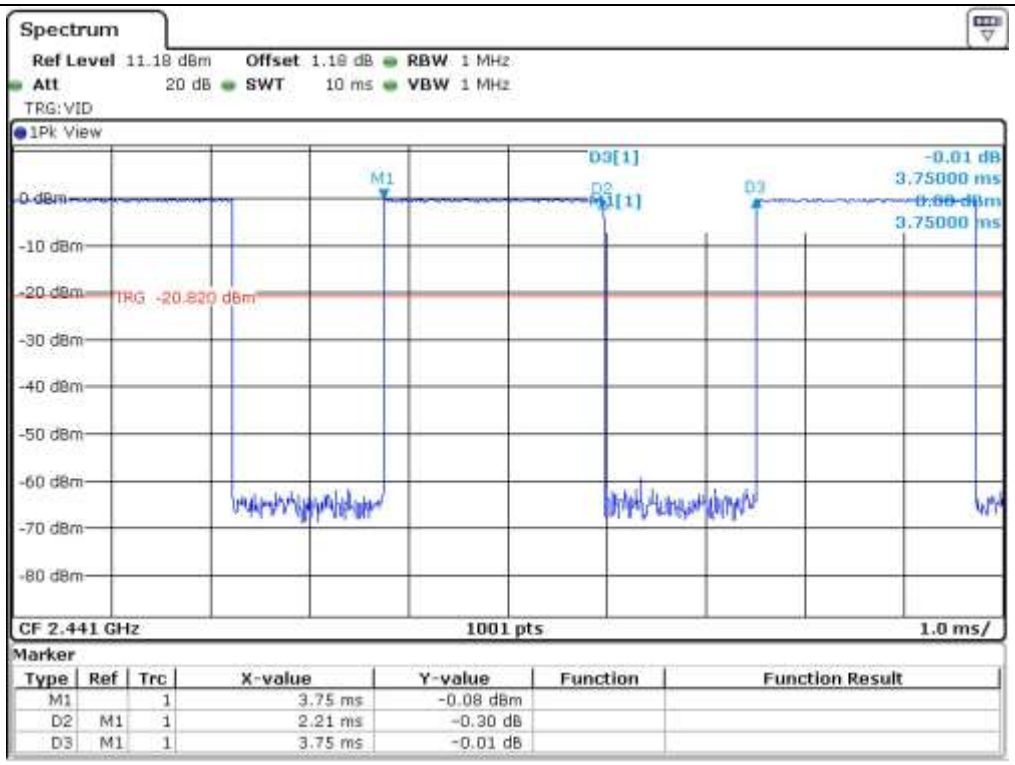

DH5

HEAD OFFICE : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Gyunggi-Do, 462-121, Korea
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10.5 Test data for 2 Mbps

-. Test Date : March 10, 2016

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

For 2-DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for 2-DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and 2-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 2-DH1, and 5.06 times (= 1 600/4/79) for 2-DH3, and 3.38 times (= 1 600/6/79) for 2-DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (s)	Total Dwell Time (ms)	Limit (ms)	Test Result
2-DH1	0.390	10.13	31.6	124.84	400	PASS
2-DH3	1.190	5.06	31.6	190.28	400	
2-DH5	1.190	3.38	31.6	127.10	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.

Tested by: Jun-Hui, Lee / Senior Engineer

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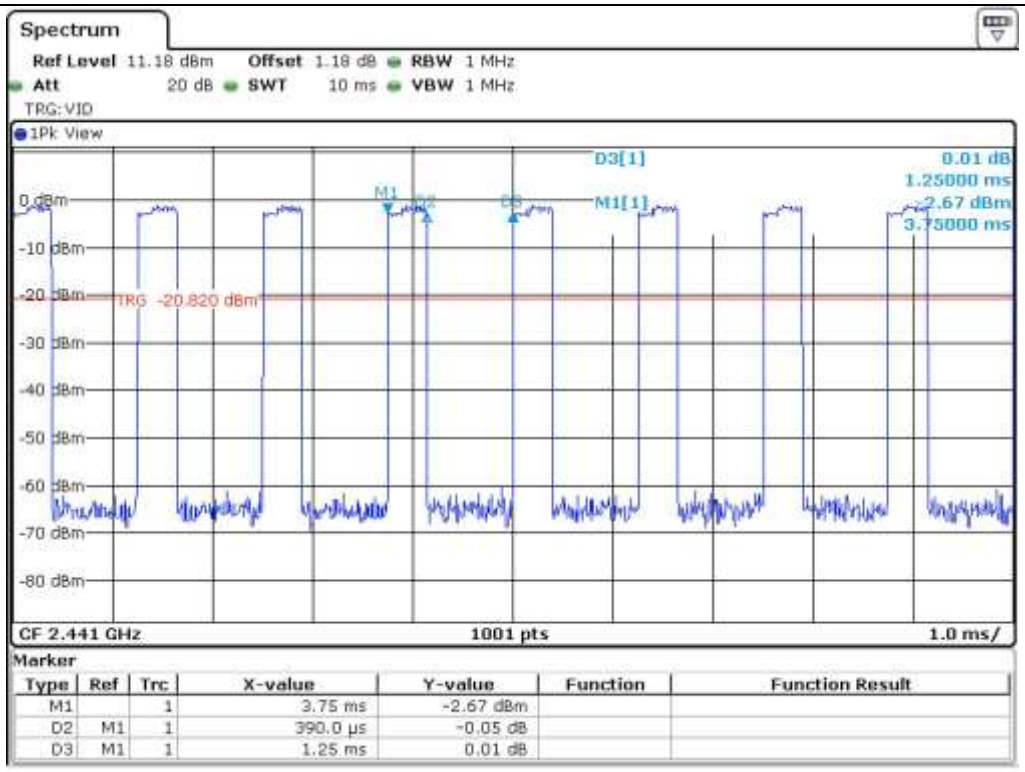
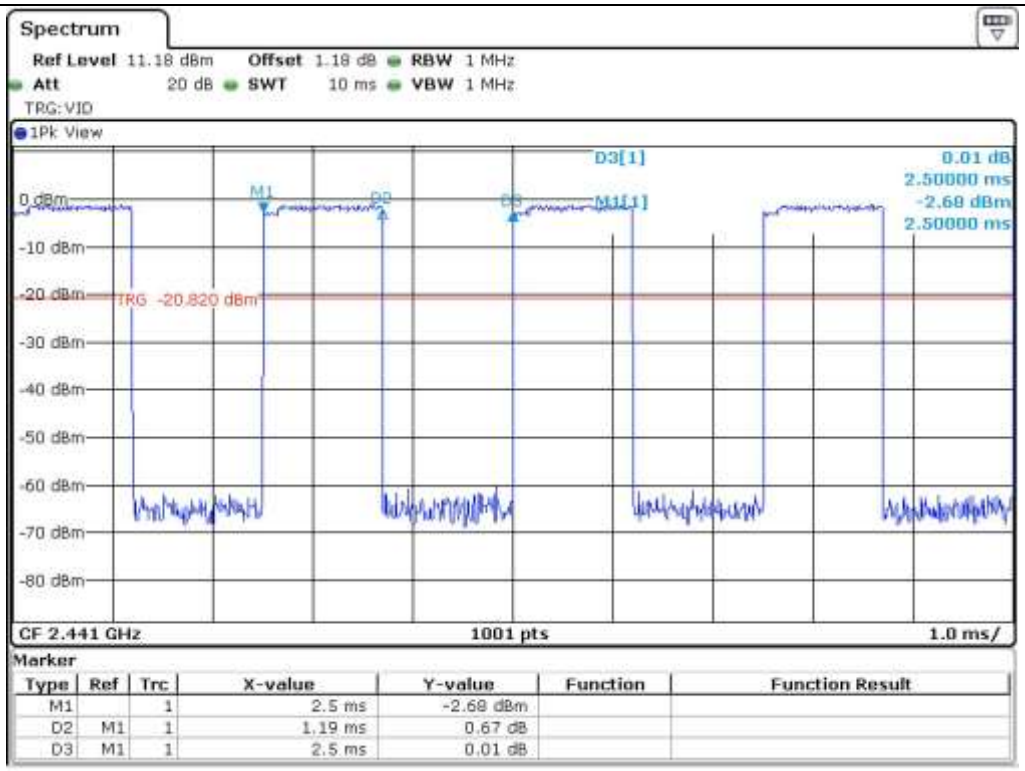


DH1



DH3

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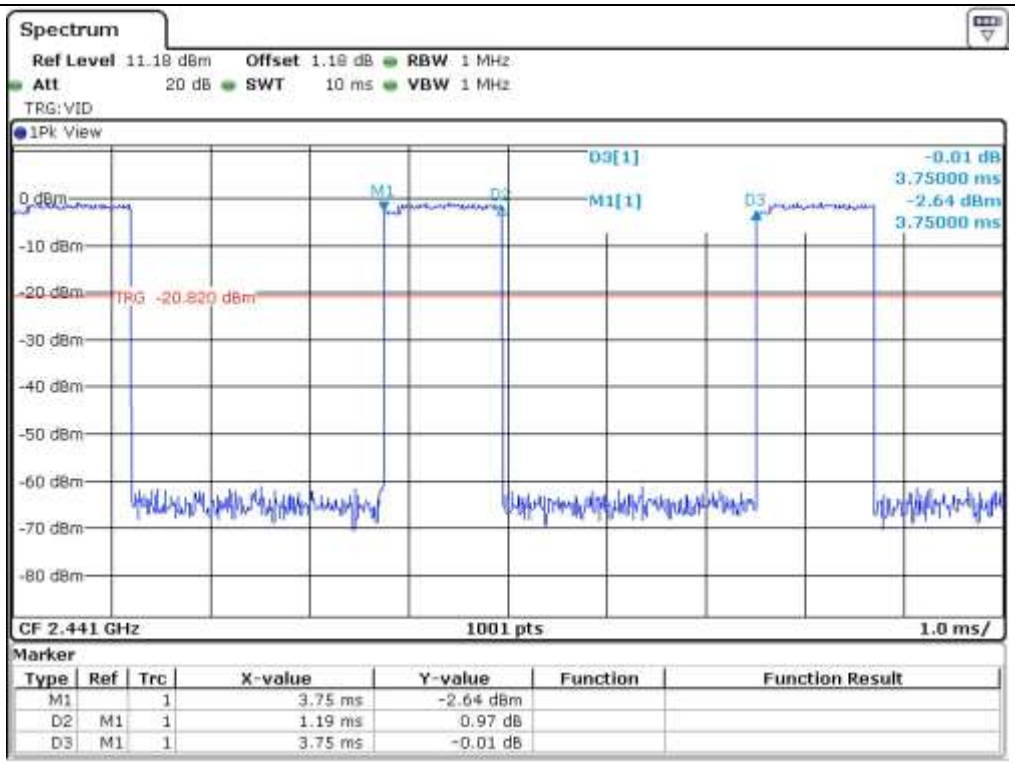

DH5

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10.6 Test data for 3 Mbps

-. Test Date : March 10, 2016

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

For 3-DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for 3-DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and 3-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 3-DH1, and 5.06 times (= 1 600/4/79) for 3-DH3, and 3.38 times (= 1 600/6/79) for 3-DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
3-DH1	0.390	10.13	31.6	124.84	400	PASS
3-DH3	0.850	5.06	31.6	135.91	400	
3-DH5	0.850	3.38	31.6	90.79	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.

Tested by: Jun-Hui, Lee / Senior Engineer

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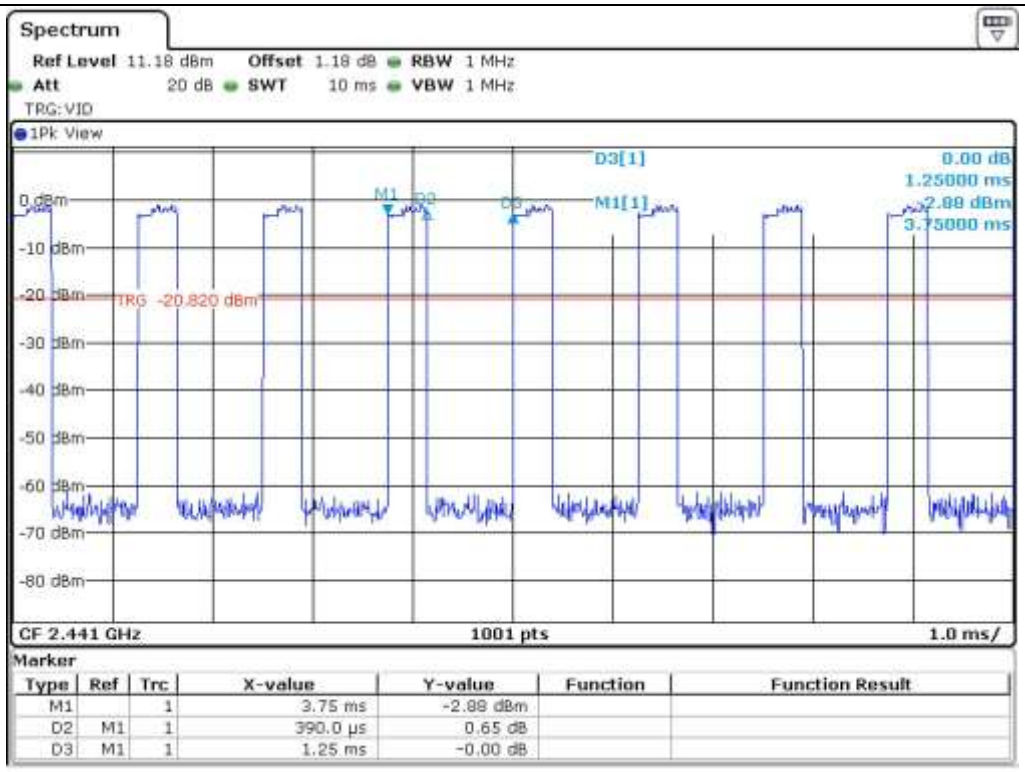
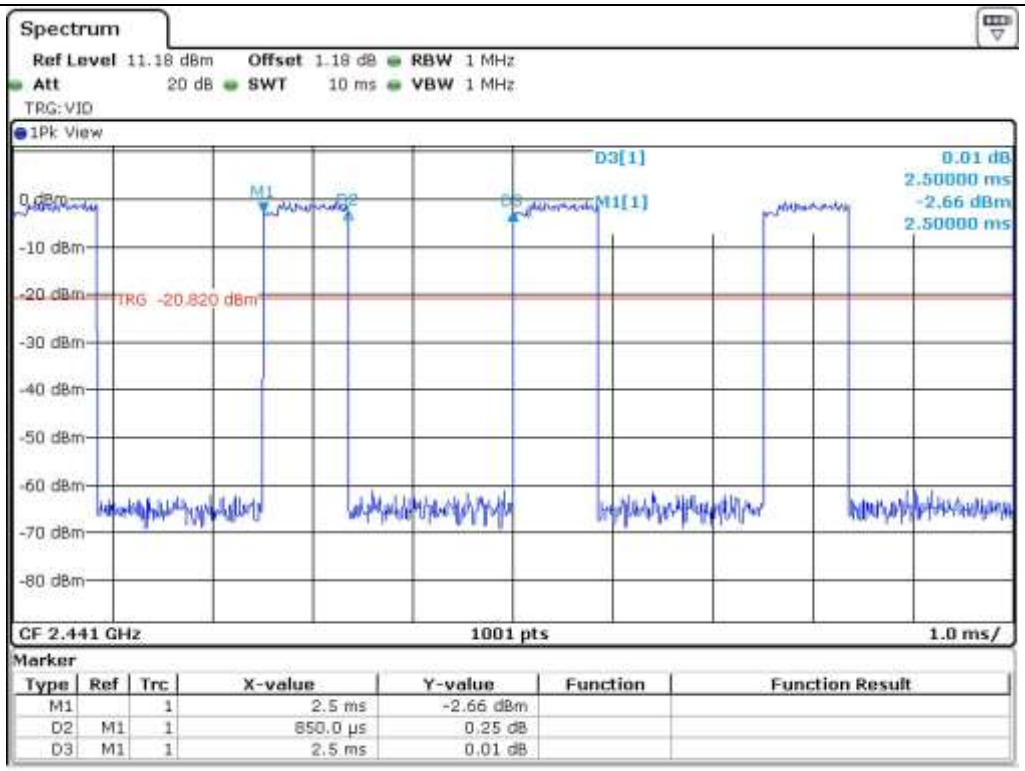


DH1



DH3

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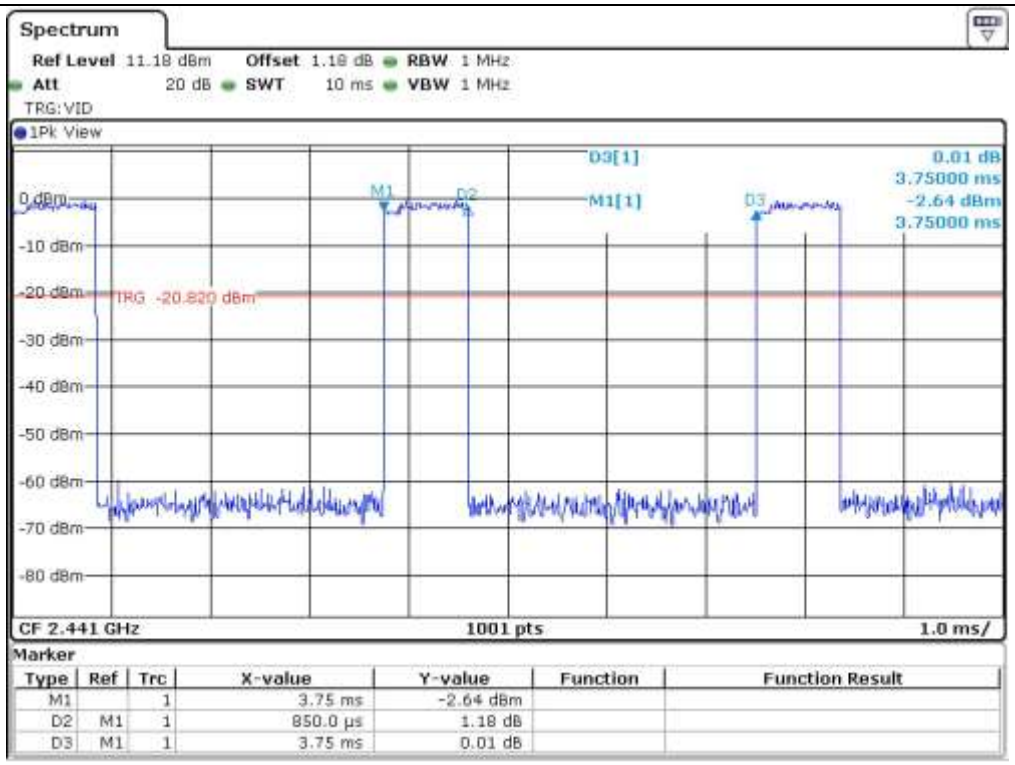

DH5

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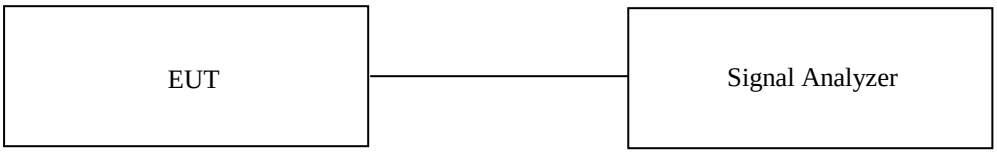
11. MAXIMUM PEAK OUTPUT POWER

11.1 Operating environment

Temperature	:	23 °C
Relative humidity	:	47 % R.H

11.2 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.



11.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 22, 2015 (1Y)

All test equipment used is calibrated on a regular basis.

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EMC Testing Div : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)

11.4 Test data for 1 Mbps

-. Test Date : March 10, 2016

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402	-0.77	21.00	21.77
MIDDLE	2 441	-0.13	21.00	21.13
HIGH	2 480	0.10	21.00	20.90

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Tested by: Jun-Hui, Lee / Senior Engineer

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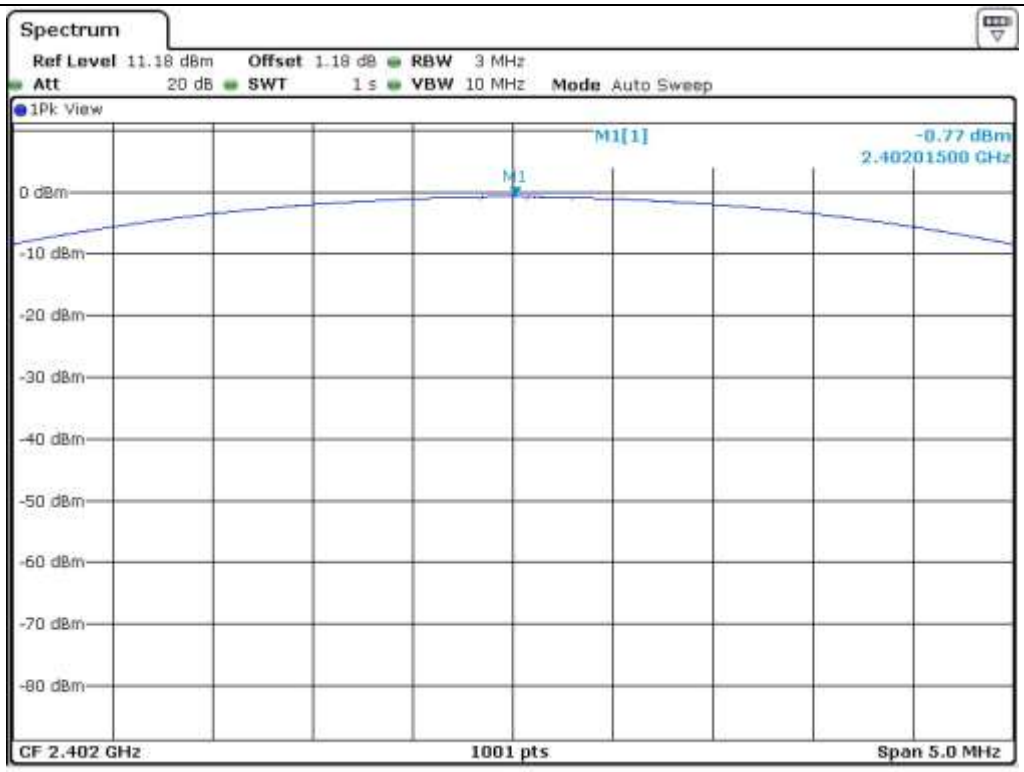
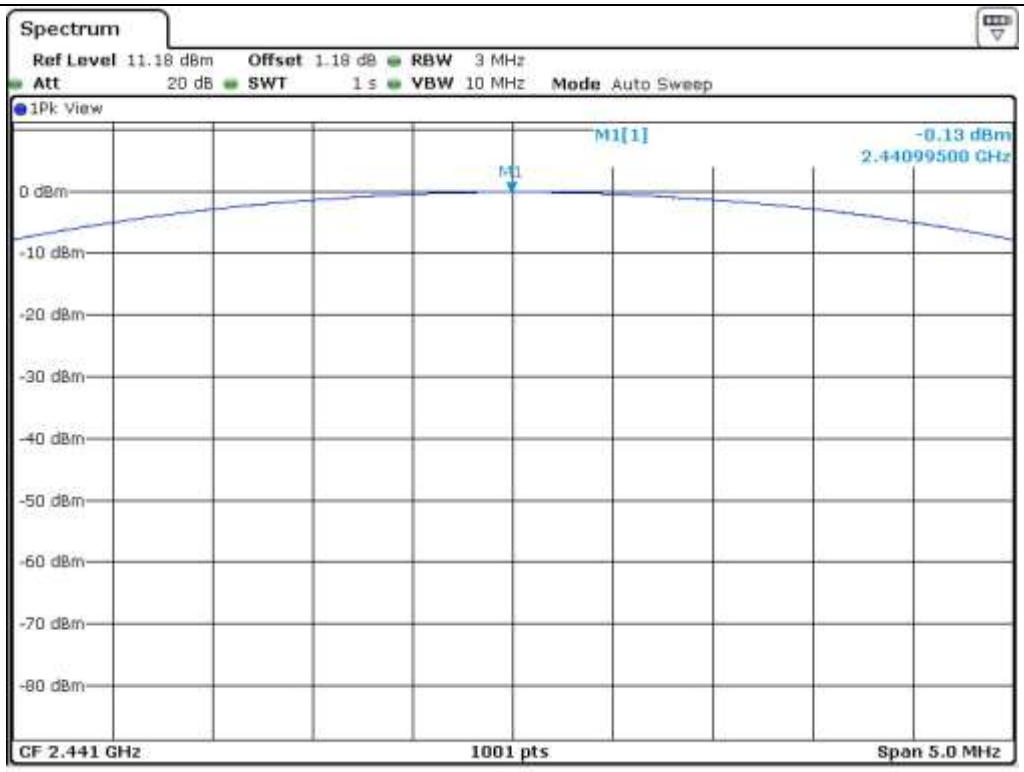


Low Channel



Middle Channel

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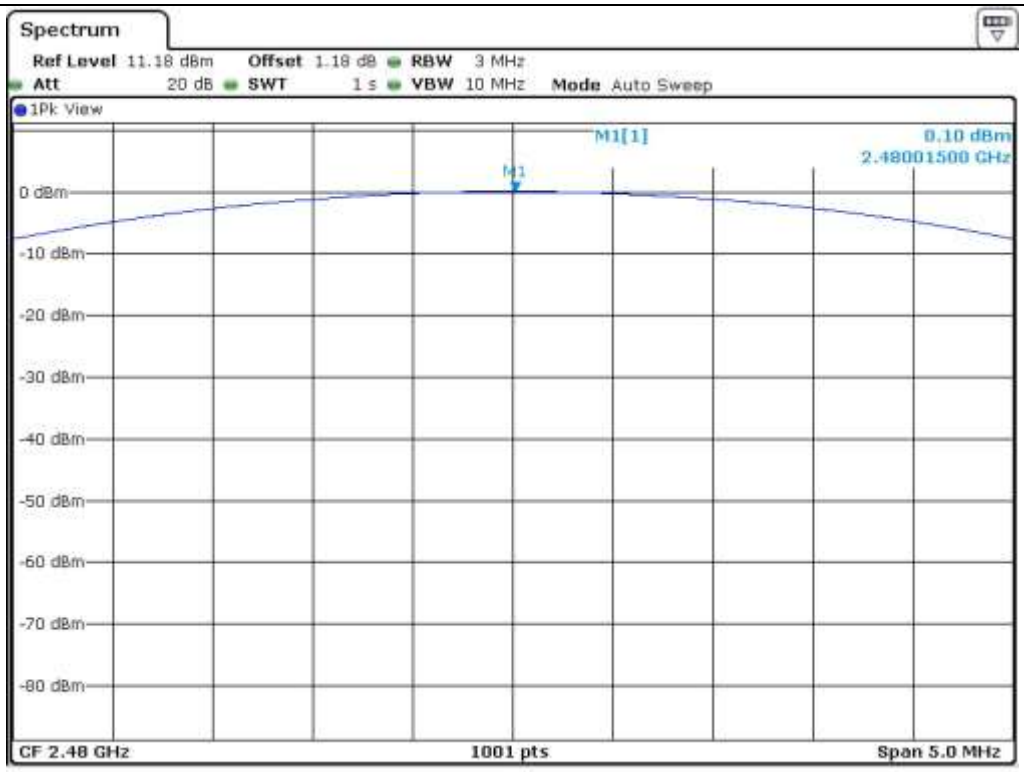

High Channel

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11.5 Test data for 2 Mbps

-. Test Date : March 10, 2016

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402	-1.21	21.00	22.21
MIDDLE	2 441	-0.37	21.00	21.37
HIGH	2 480	-0.11	21.00	21.11

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Tested by: Jun-Hui, Lee / Senior Engineer

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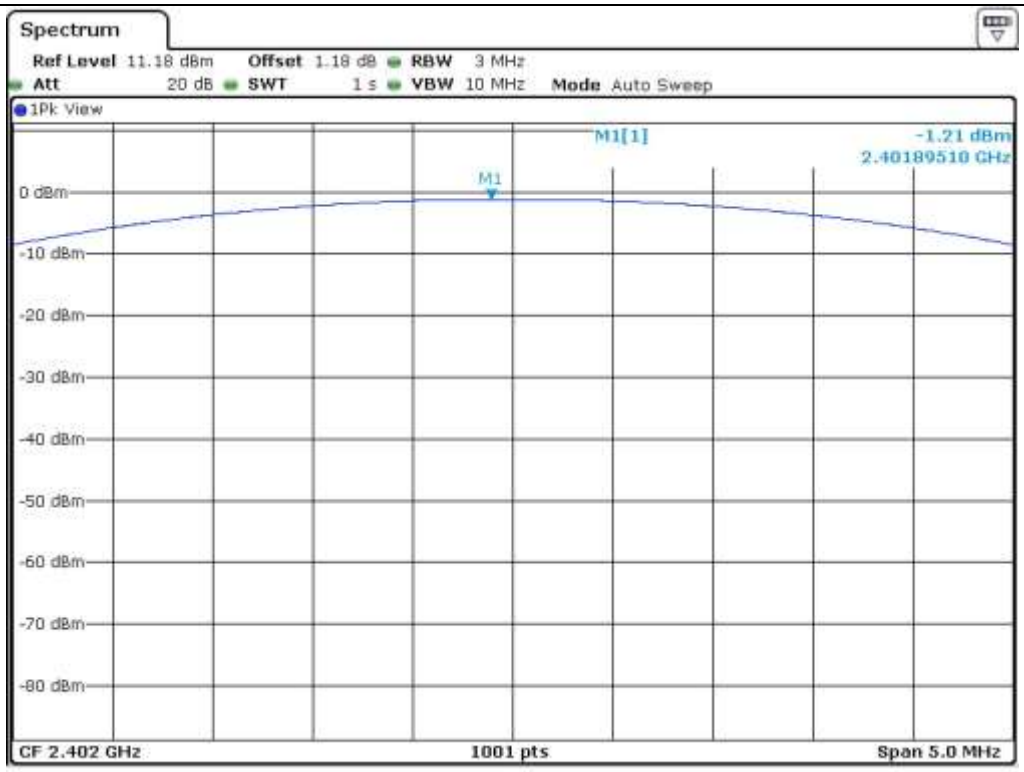
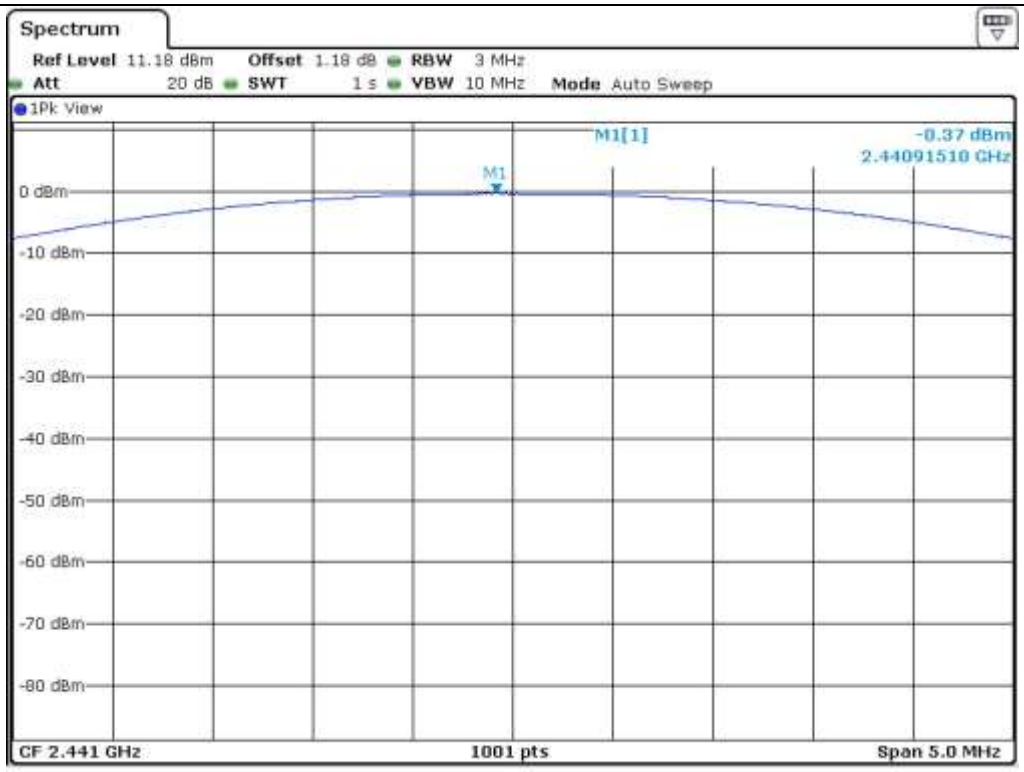


Low Channel



Middle Channel

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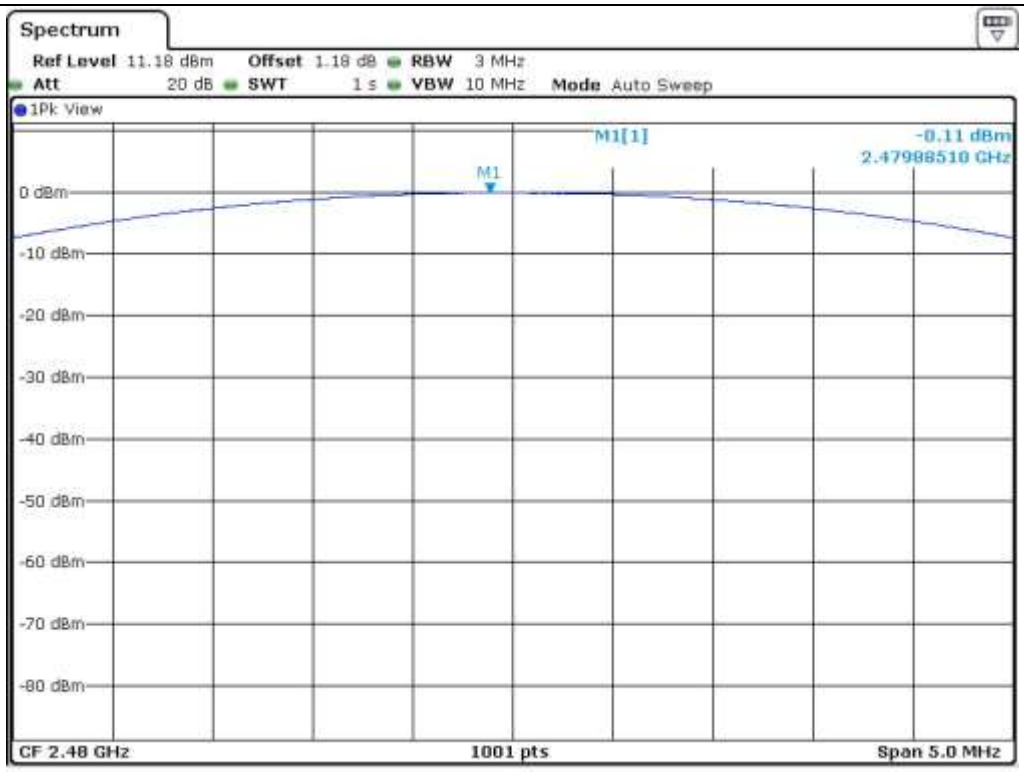

High Channel

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11.6 Test data for 3 Mbps

-. Test Date : March 10, 2016

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402	-0.72	21.00	21.72
MIDDLE	2 441	0.14	21.00	20.86
HIGH	2 480	0.42	21.00	20.58

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

Tested by: Jun-Hui, Lee / Senior Engineer

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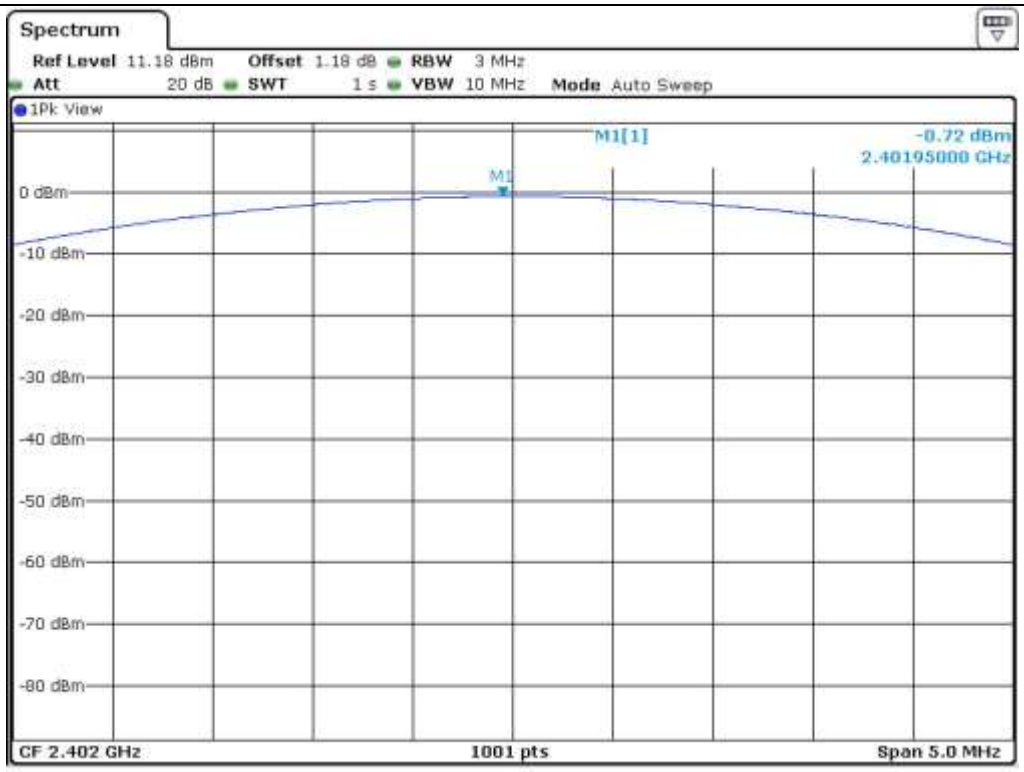
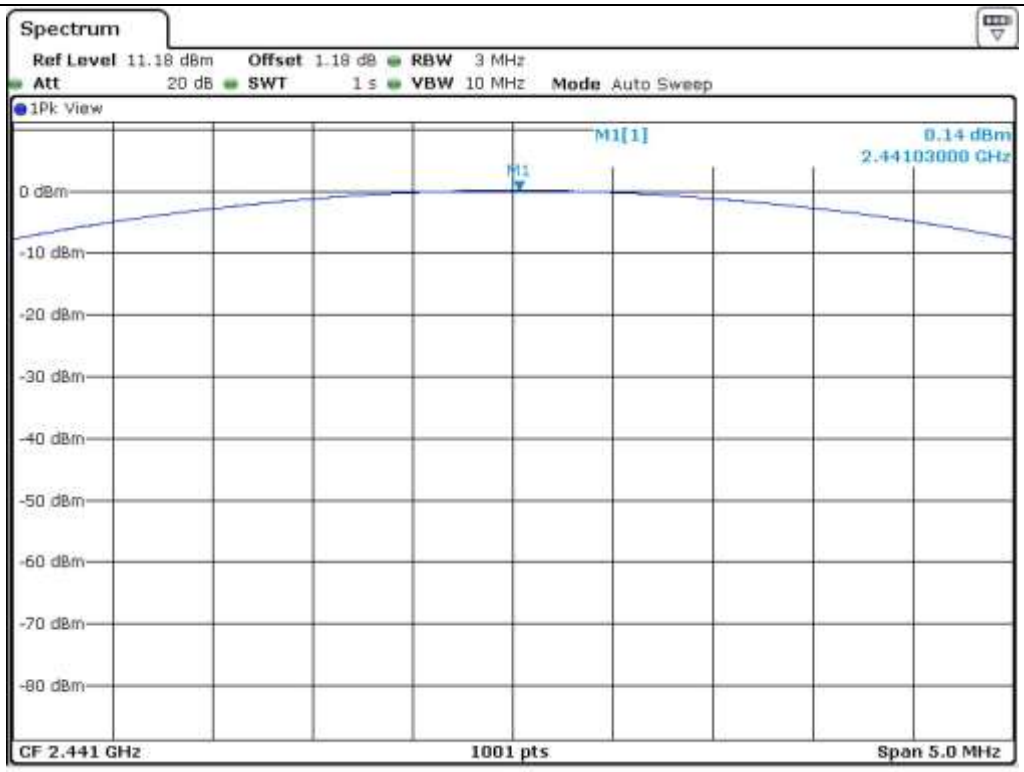


Low Channel



Middle Channel

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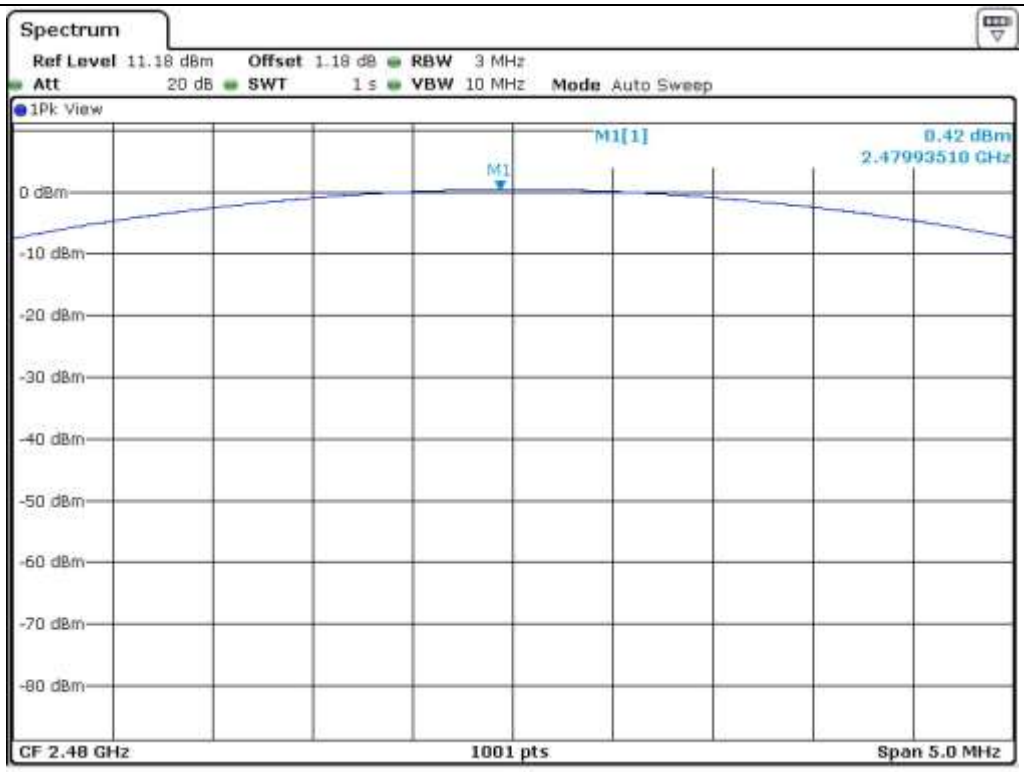

High Channel

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12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

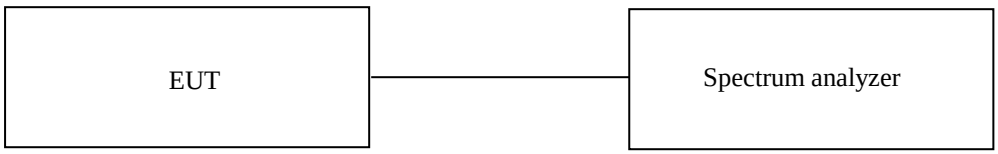
12.1 Operating environment

Temperature : 23 °C

Relative humidity : 47 % R.H

12.2 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.



12.3 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 30 kHz to 26.5 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.

12.4 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
☐ -	ESCI	Rohde & Schwarz	EMI Test Receiver	101012	Nov. 02, 2015 (1Y)
■ -	ESU	Rohde & Schwarz	EMI Test Receiver	100261	Apr. 29, 2015 (1Y)
☐ -	8564E	HP	Spectrum Analyzer	3650A00756	Apr. 28, 2015 (1Y)
☐ -	FSP	Rohde & Schwarz	Spectrum Analyzer	100017	Oct. 07, 2015 (1Y)
■ -	310N	Sonoma Instrument	AMPLIFIER	312544	Apr. 29, 2015 (1Y)
■ -	FSV30	Rohde & Schwarz	Signal Analyzer	101372	Apr. 29, 2015 (1Y)
■ -	SCU-18	Rohde & Schwarz	PRE-AMPLIFIER	102209	Jun. 04, 2015 (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
■ -	HFH2-Z2	Rohde & Schwarz	Loop Antenna	879 285/26	Dec. 09, 2014 (2Y)
■ -	VULB9163	Schwarzbeck	TRILOG Broadband Antenna	9163-255	May 02, 2014 (2Y)
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D295	Aug. 31, 2015 (2Y)
■ -	BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	N/A
■ -	83051A	Agilent	Microwave System Preamplifer	3950M00201	Apr. 30, 2015 (1Y)

All test equipment used is calibrated on a regular basis.

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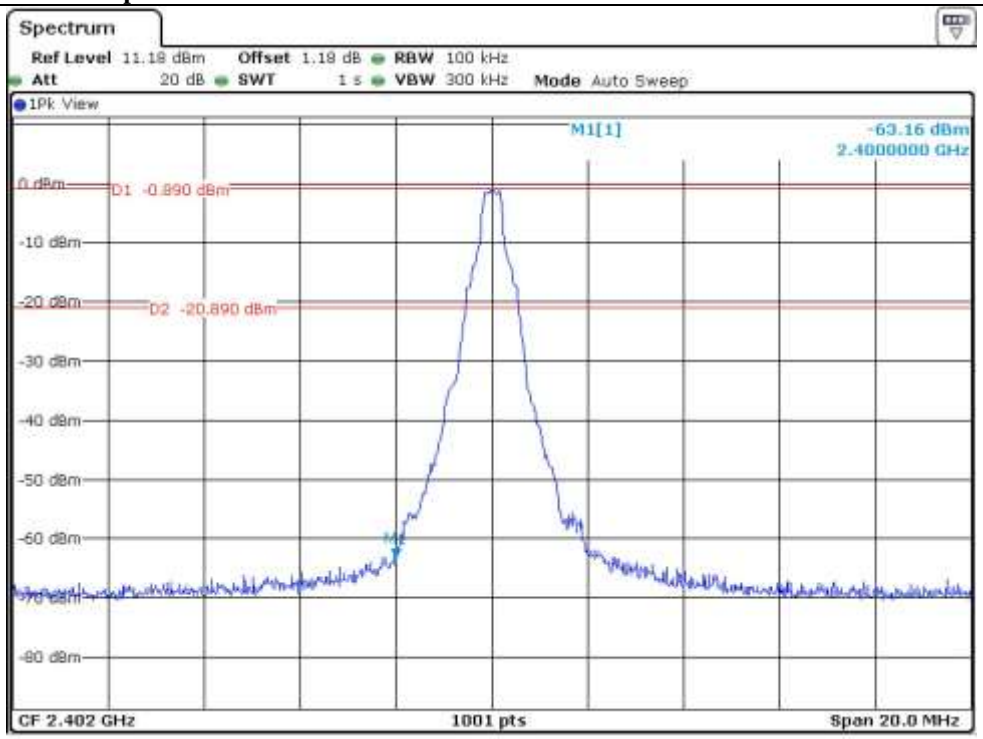
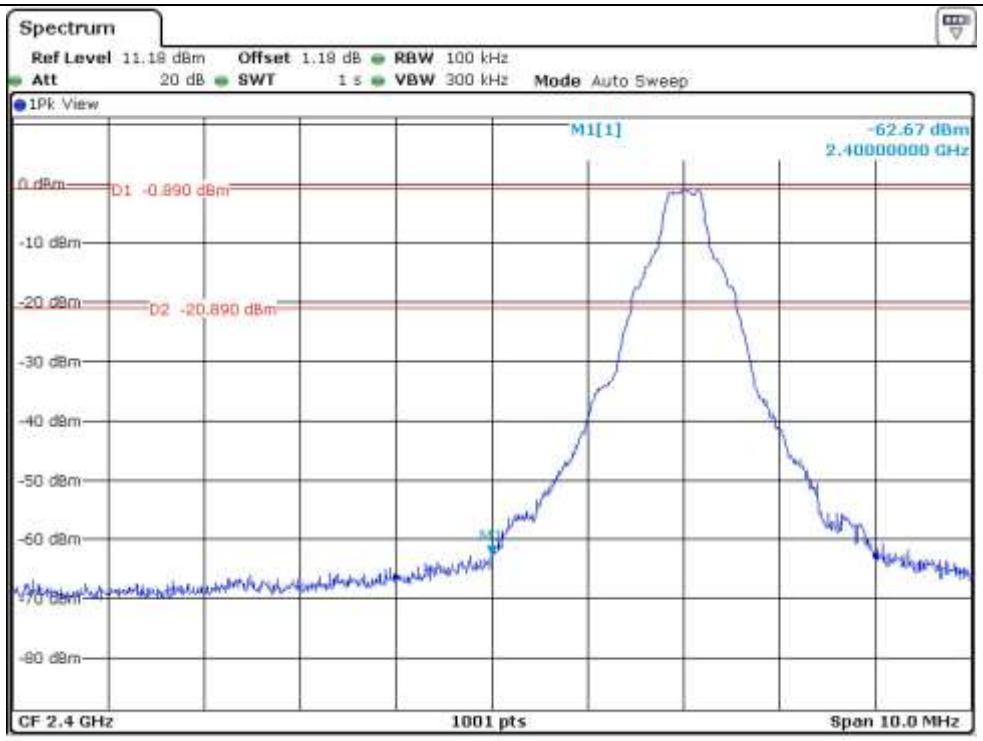
12.5 Test data for conducted emission

12.5.1 Test data for 1 Mbps



Low Channel



Low Channel

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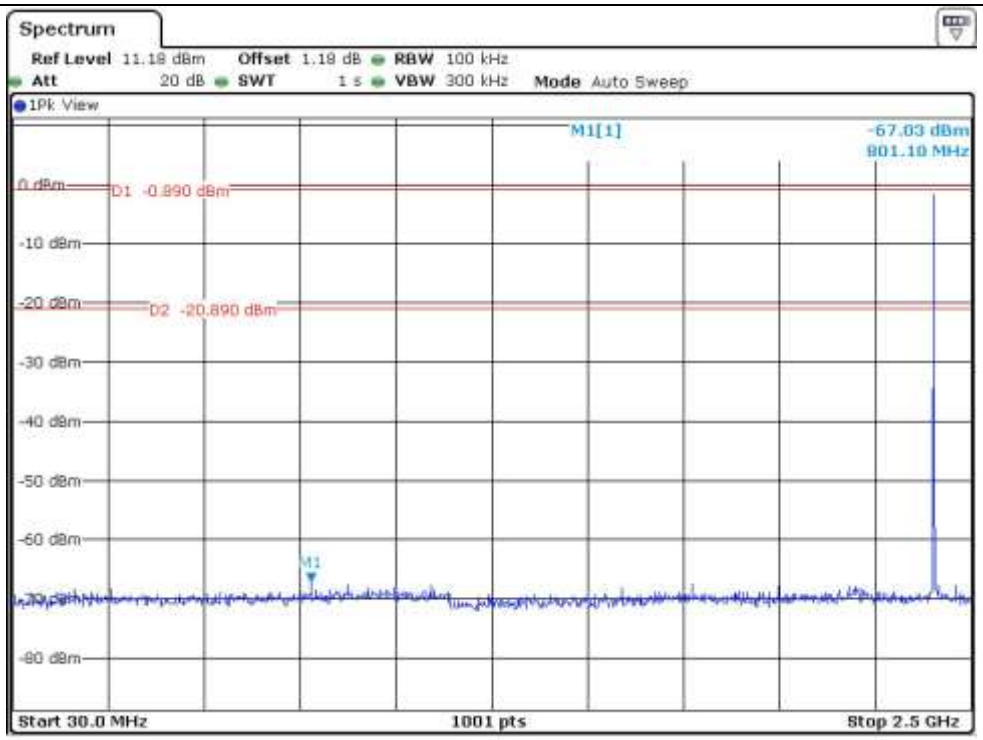
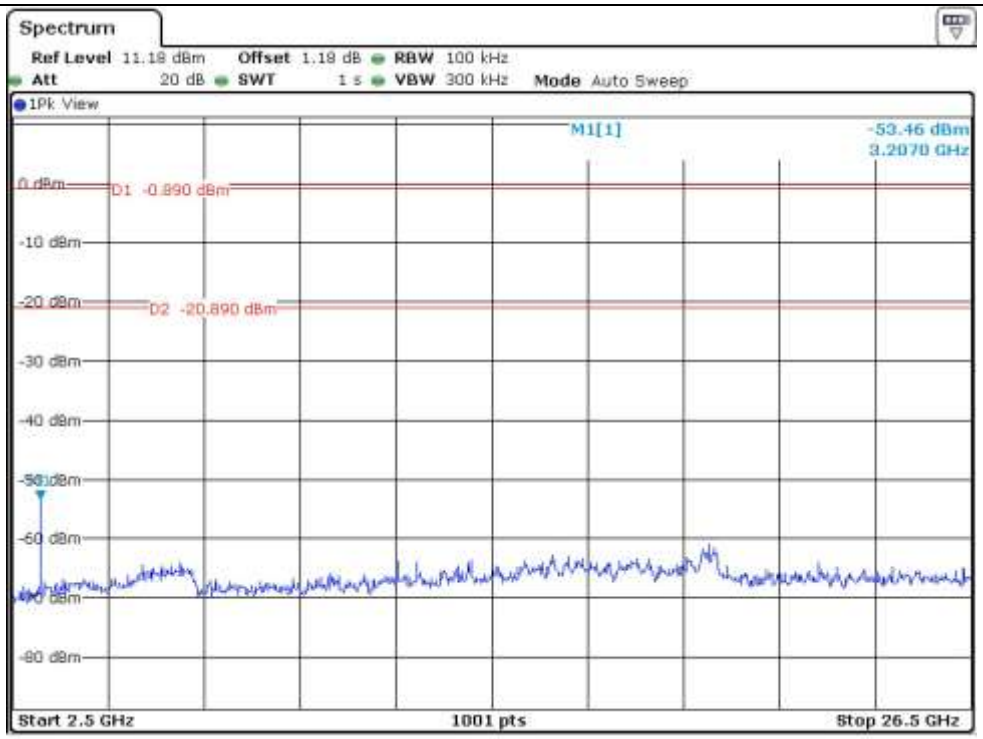


Low Channel



Low Channel

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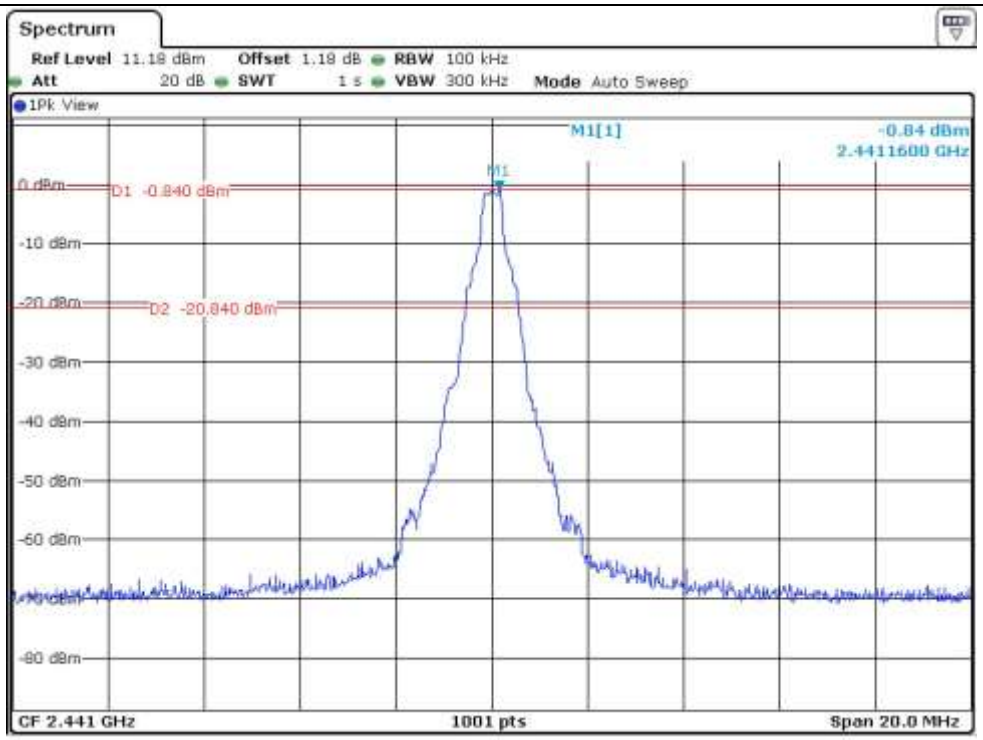
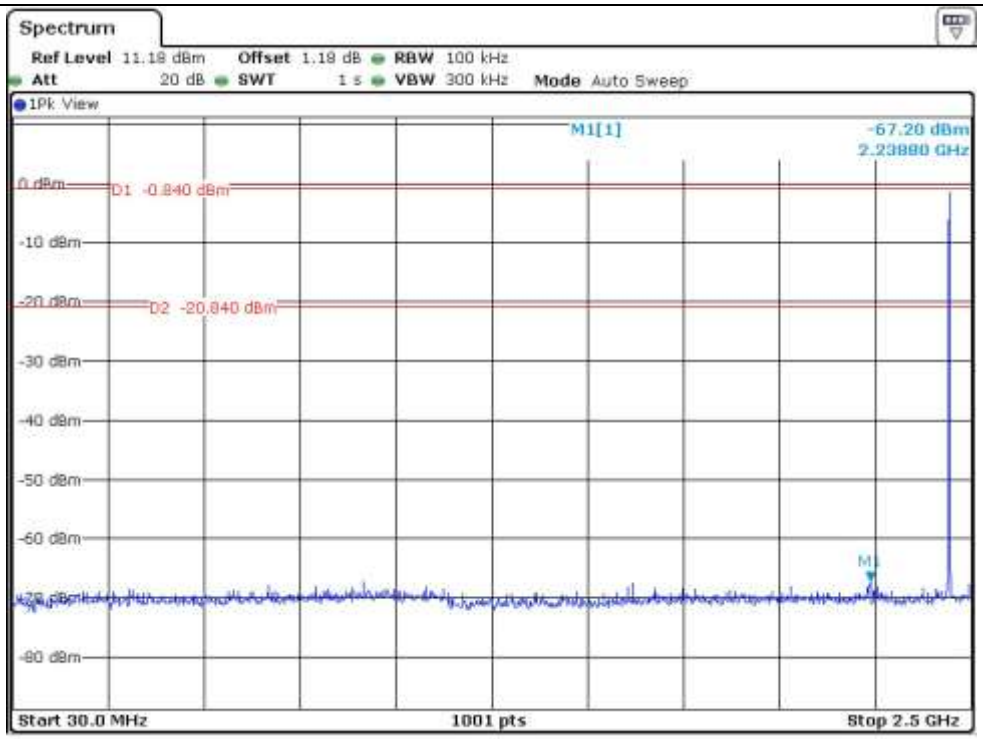


Middle Channel



Middle Channel

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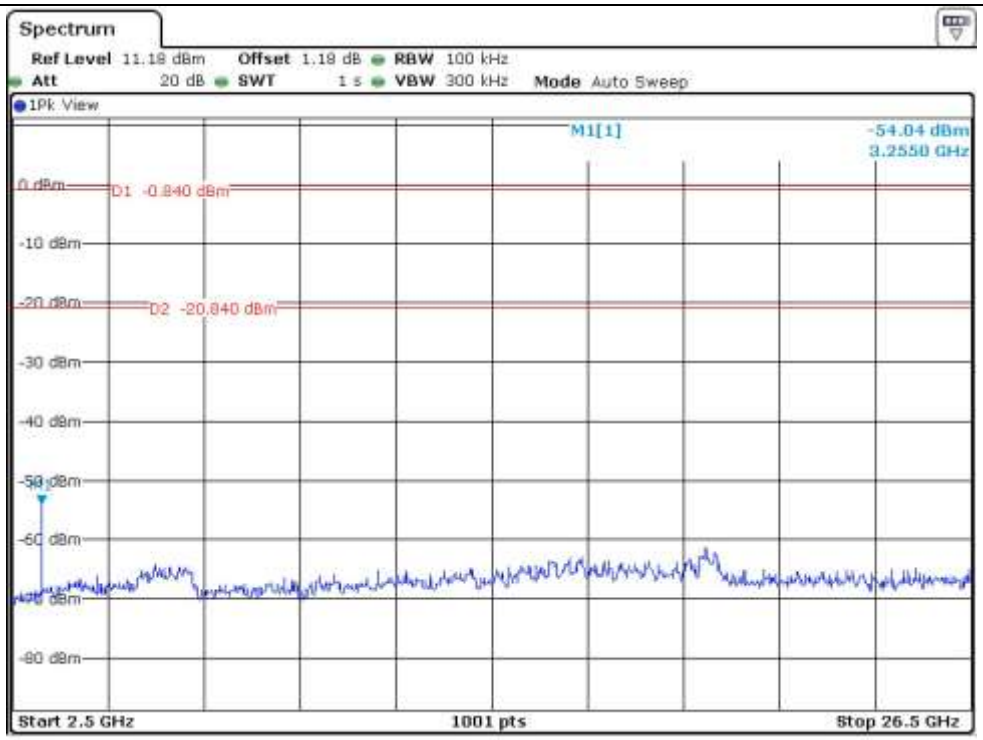

Middle Channel

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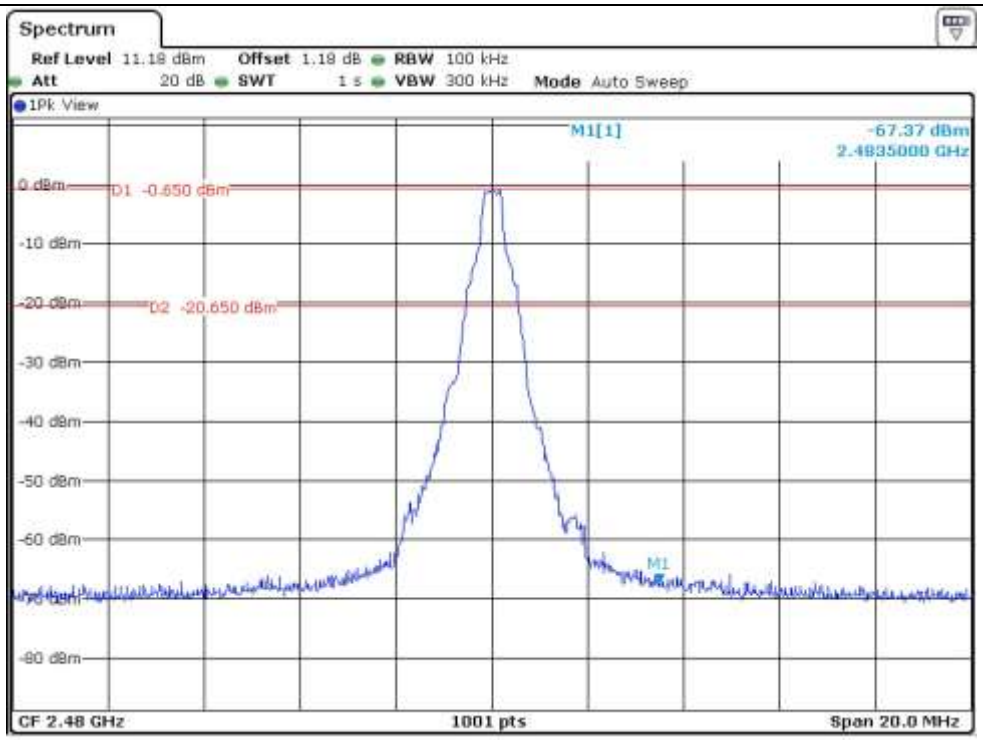
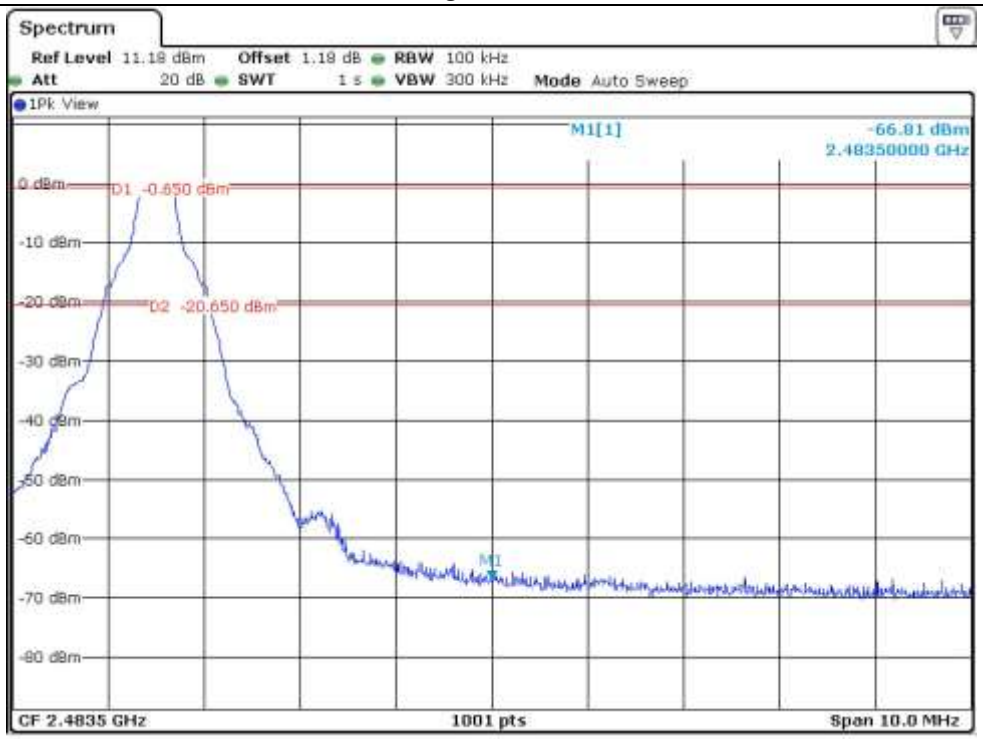


High Channel



High Channel

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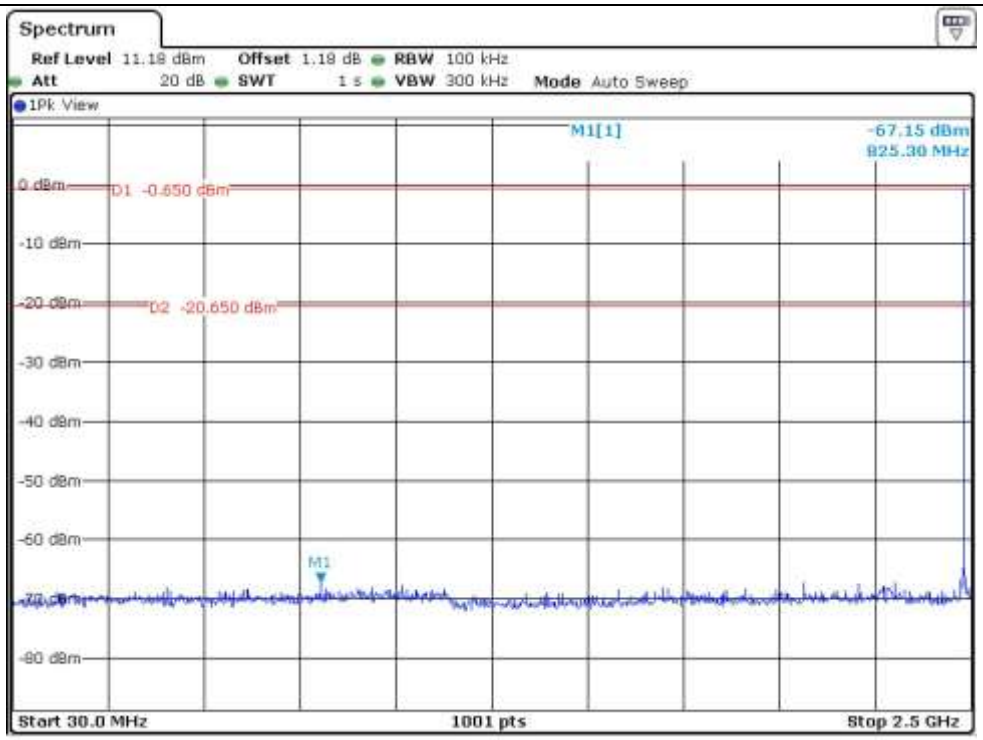

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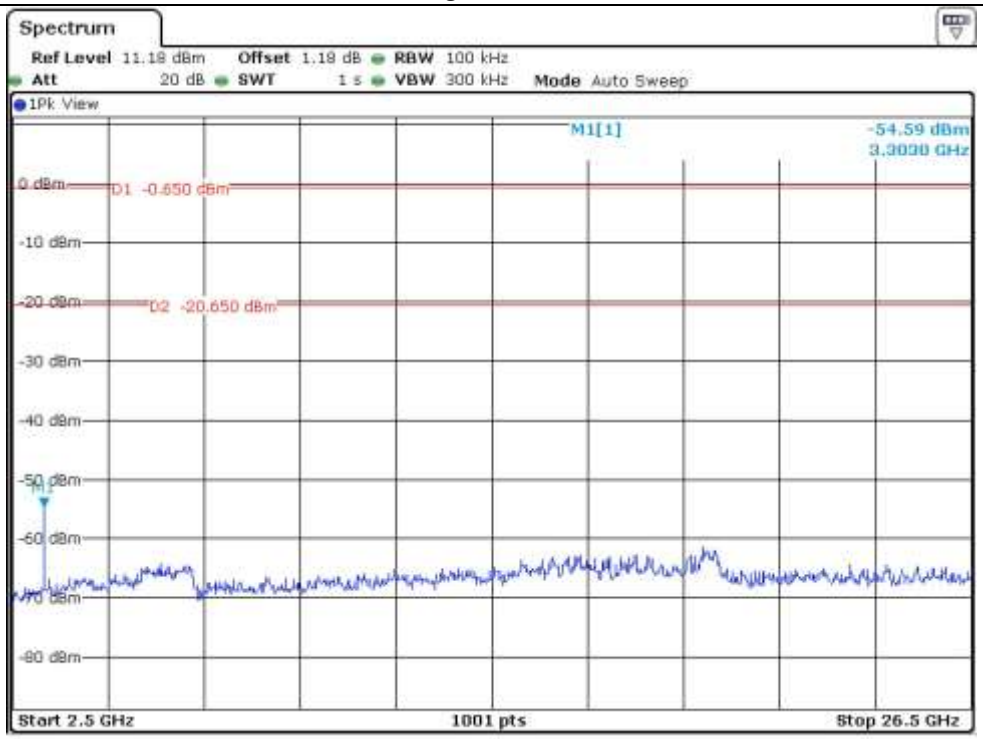

High Channel

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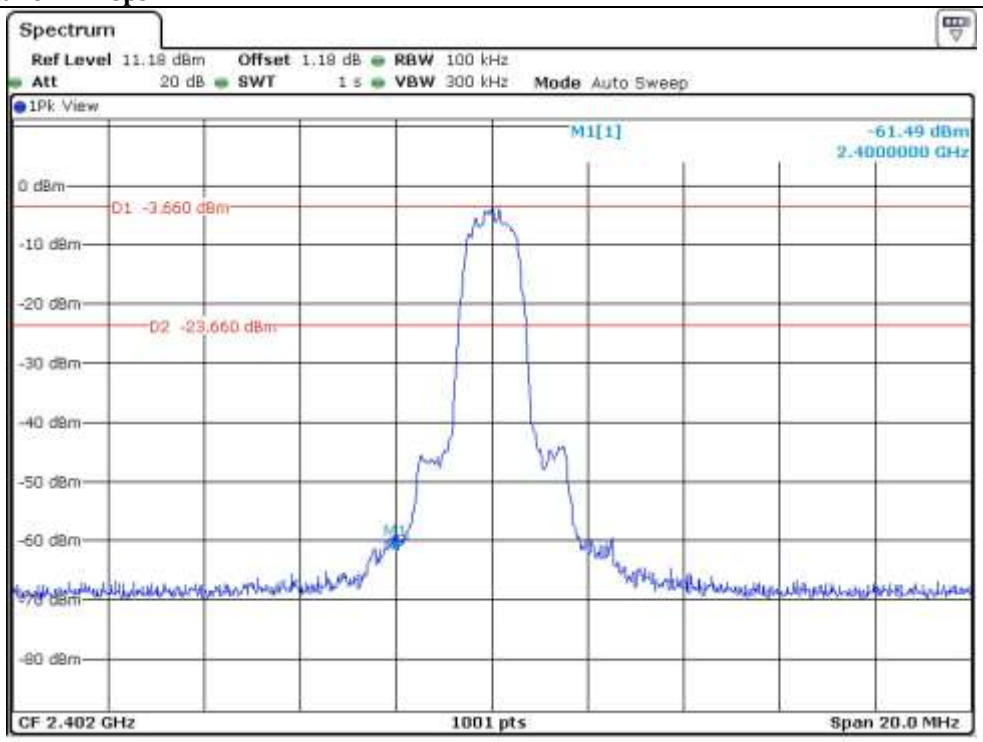
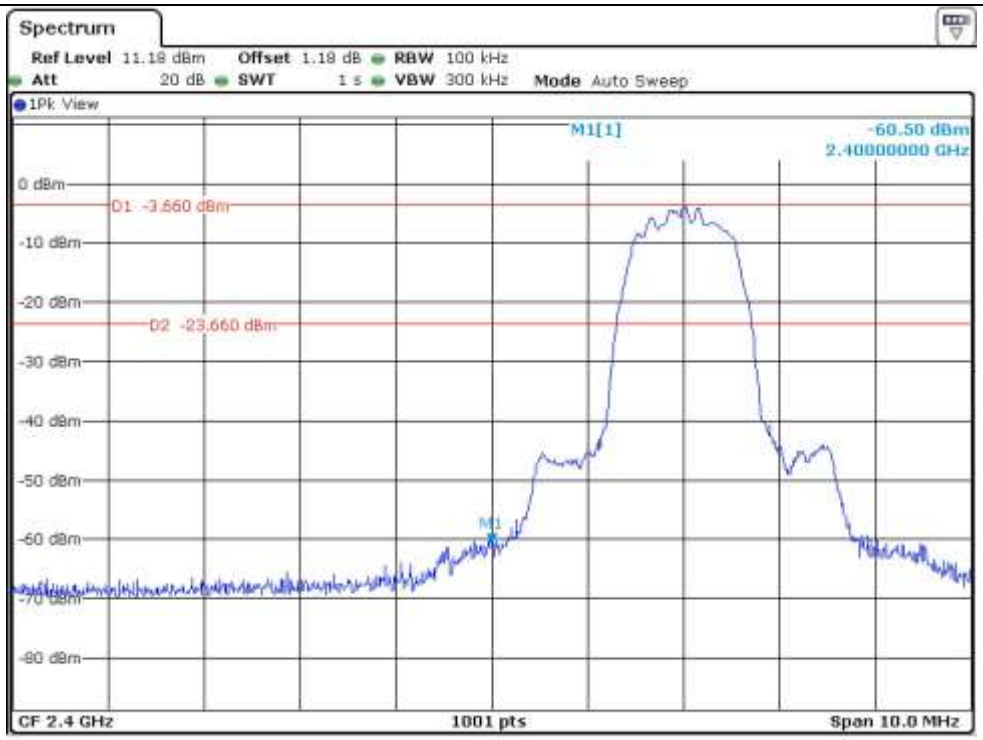
12.5.2 Test data for 2 Mbps



Low Channel



Low Channel

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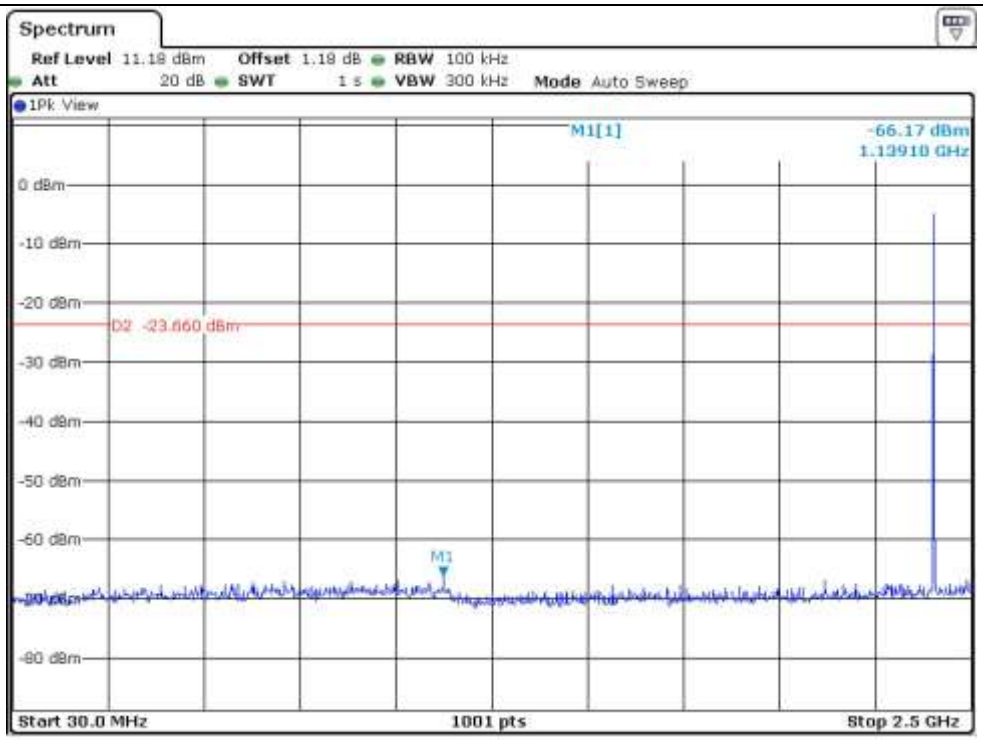

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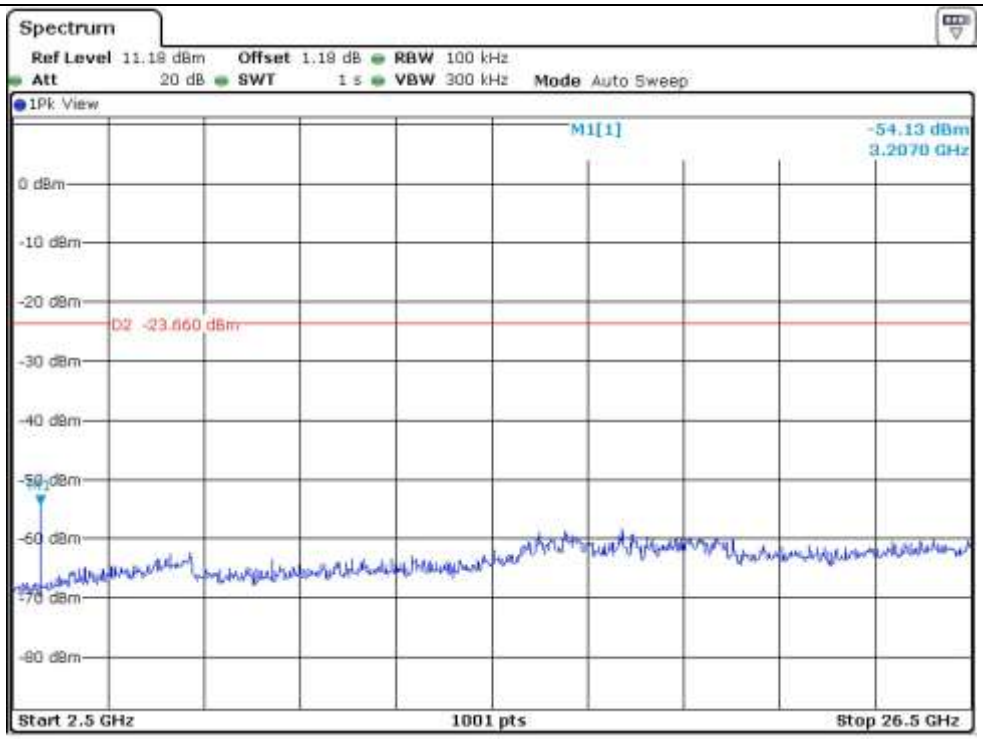

Low Channel

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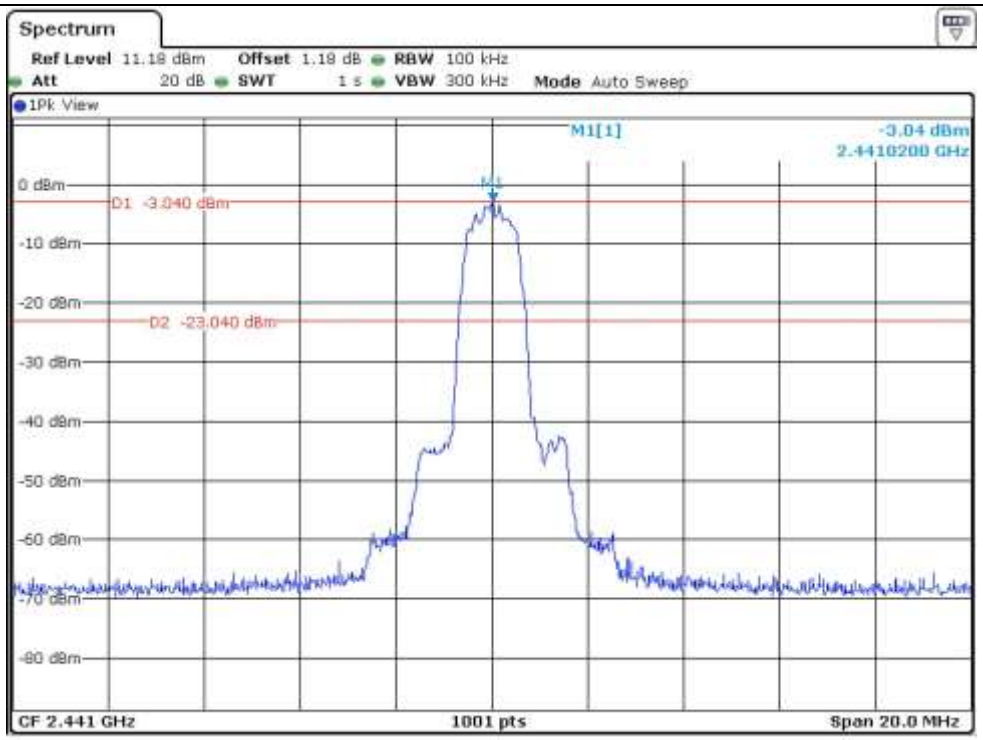
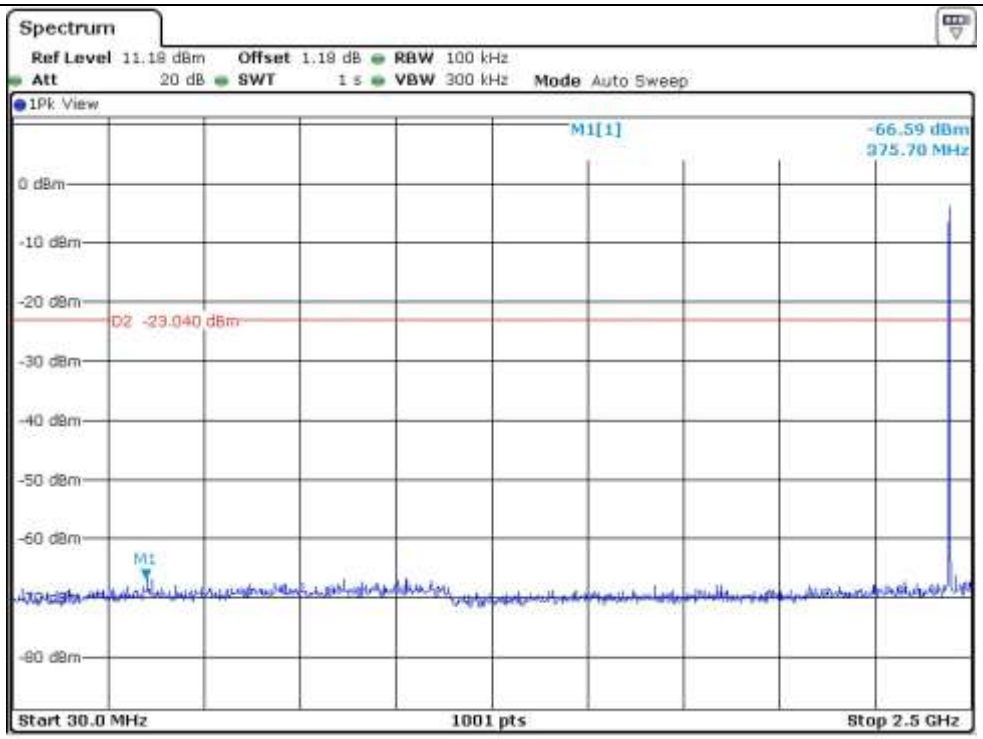


Middle Channel



Middle Channel

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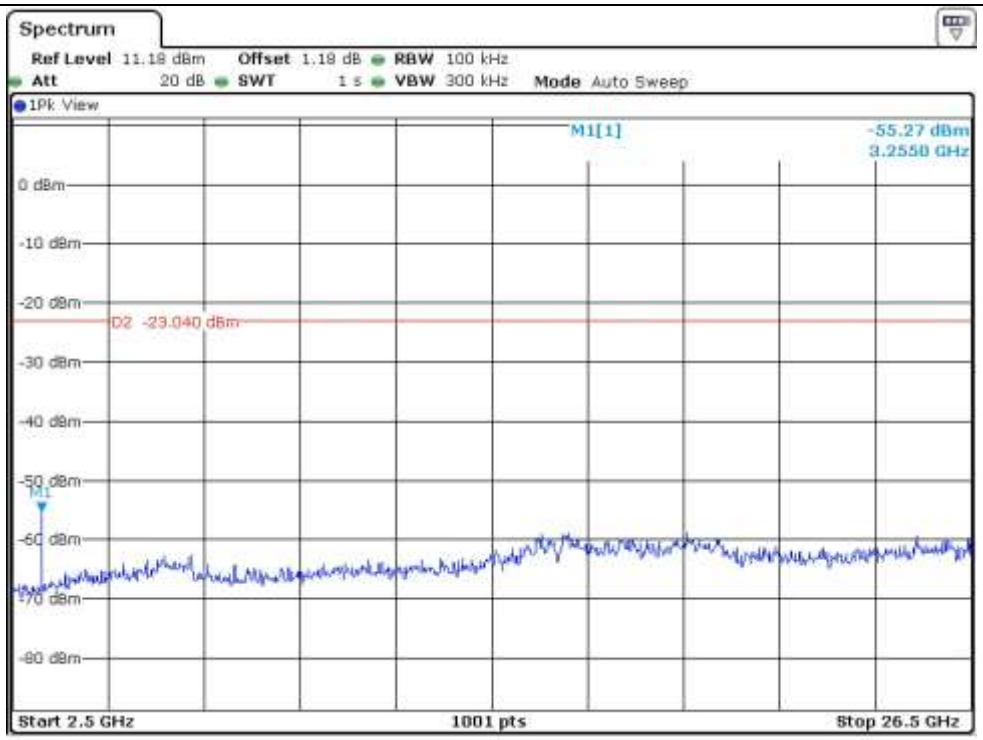

Middle Channel

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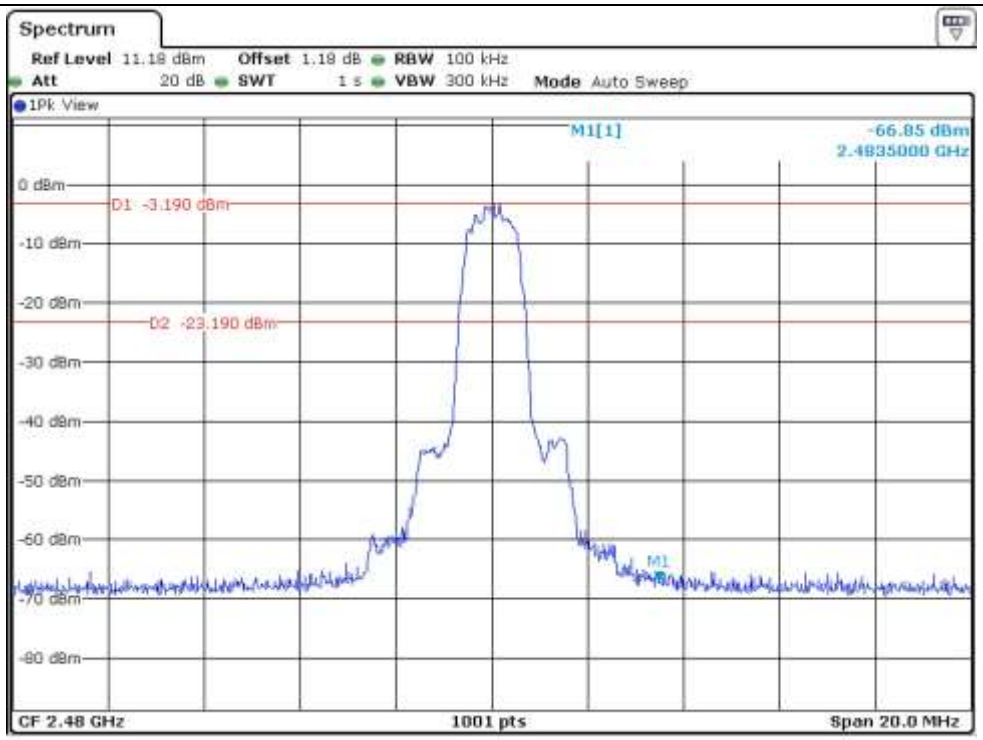
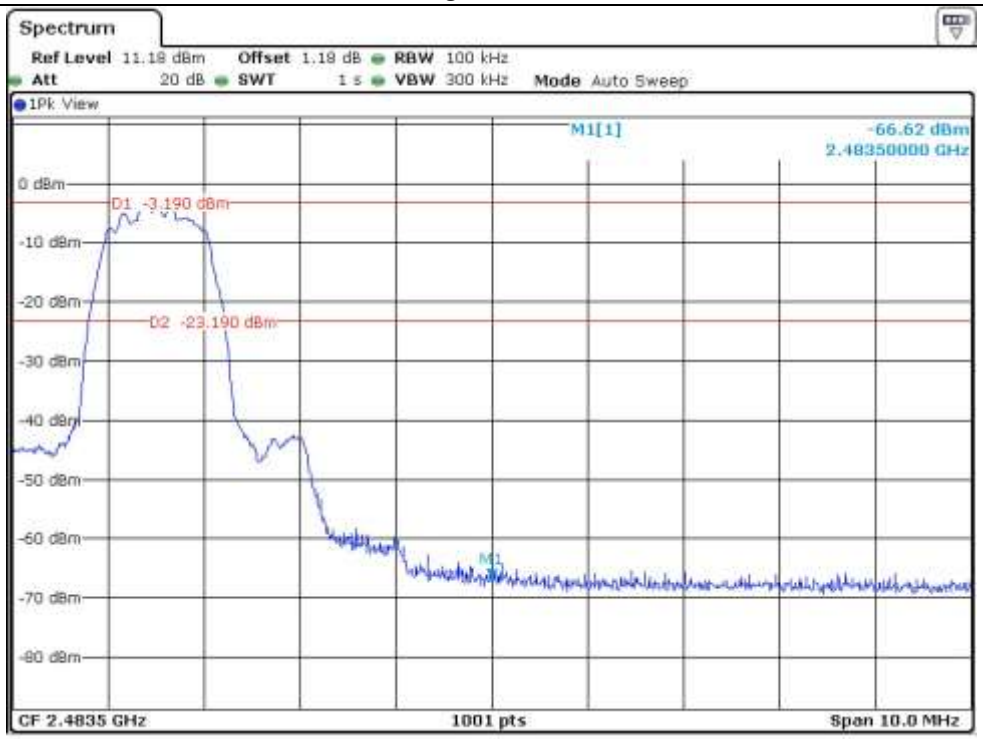


High Channel



High Channel

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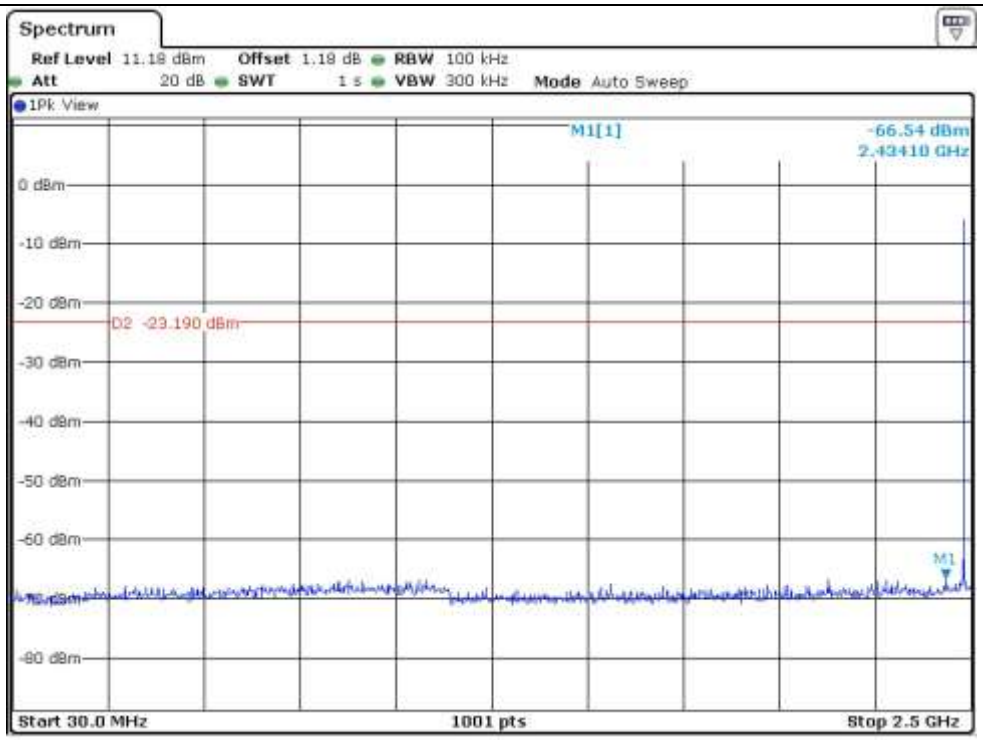
EMC Testing Div : 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do 464-862 Korea (TEL: 82-31-765-8289, FAX: 82-31-766-2904)



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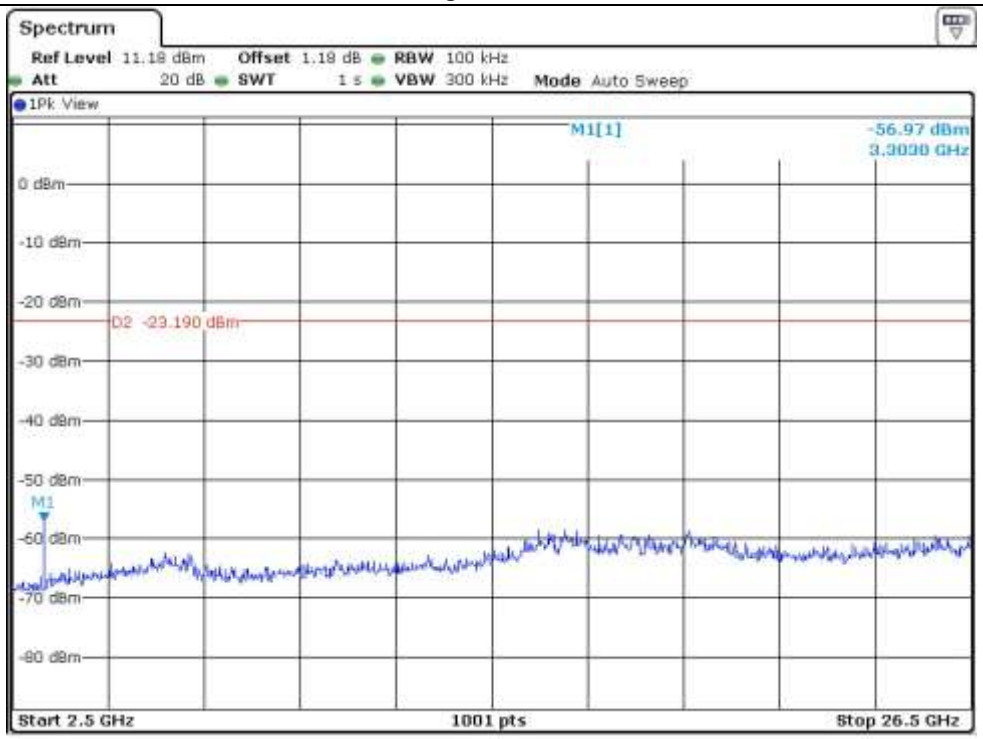

High Channel

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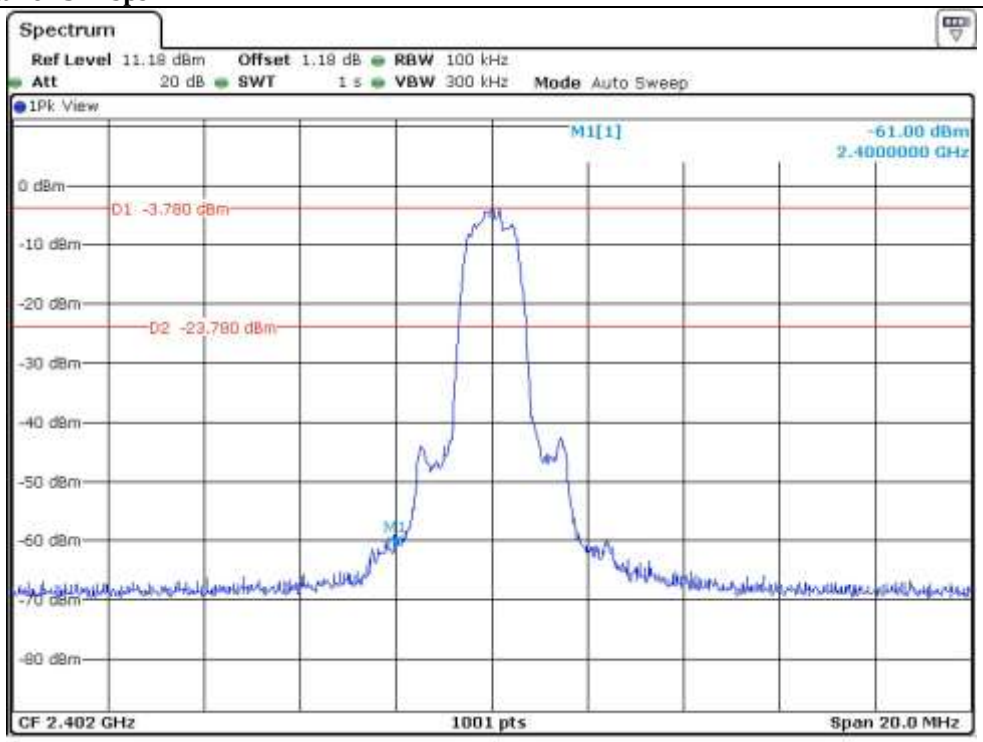
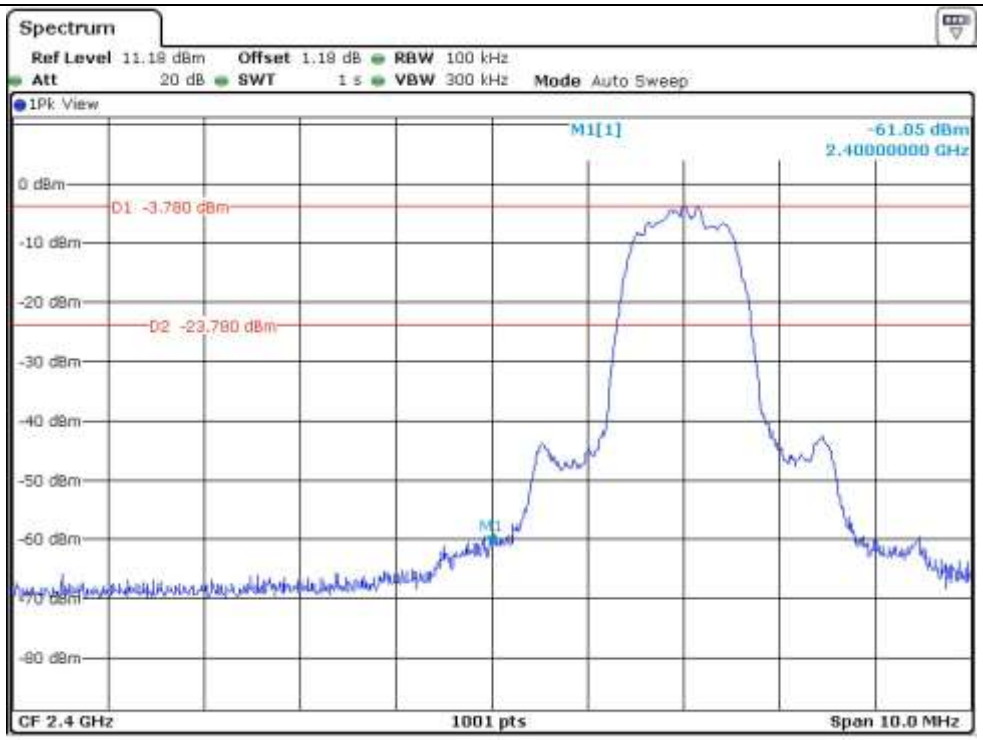
12.5.3 Test data for 3 Mbps



Low Channel



Low Channel

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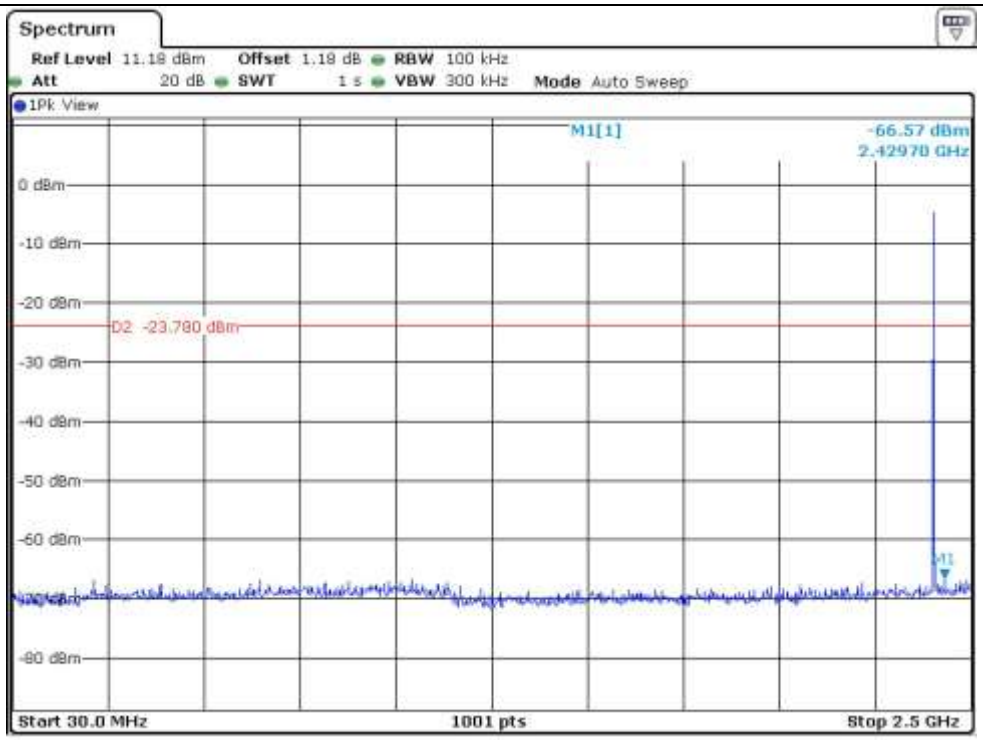

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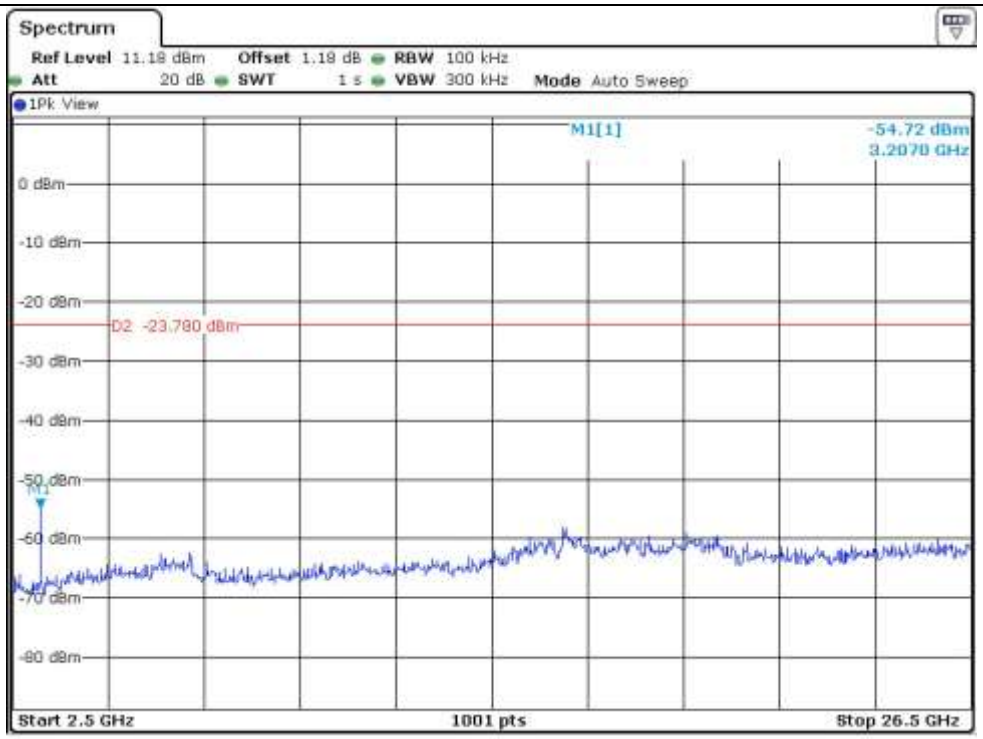

Low Channel

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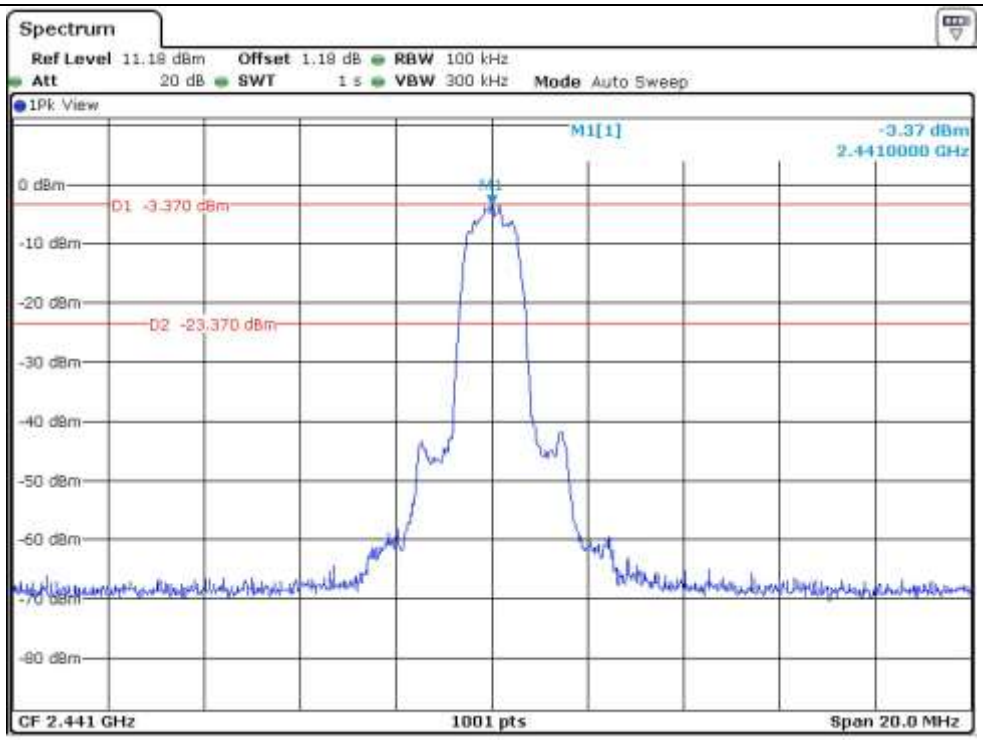
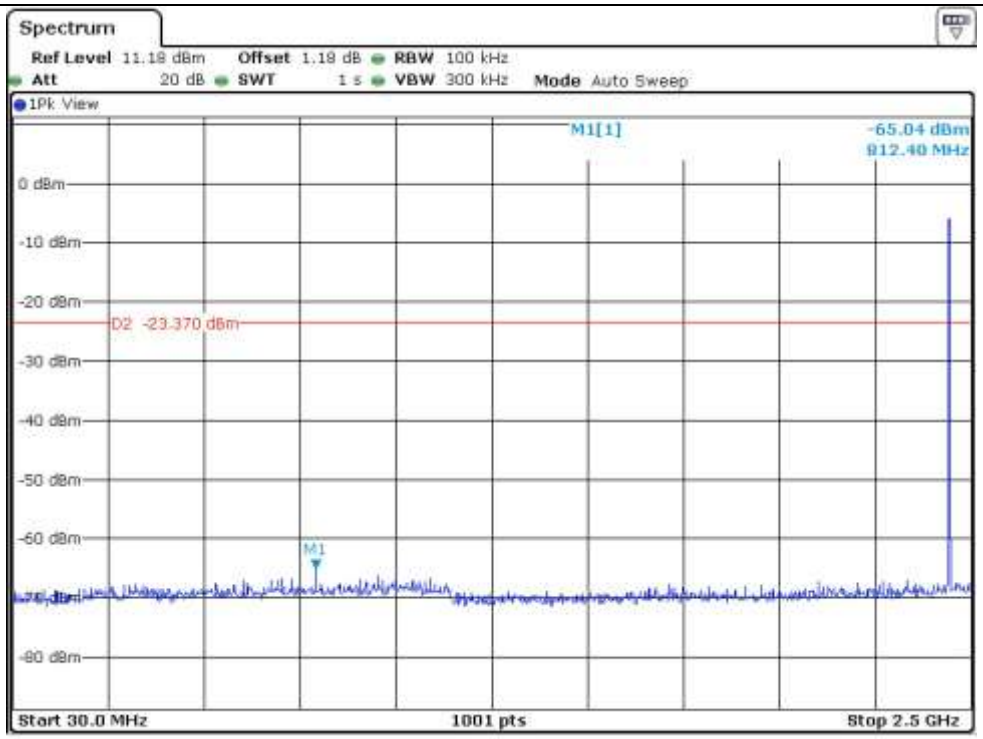


Middle Channel



Middle Channel

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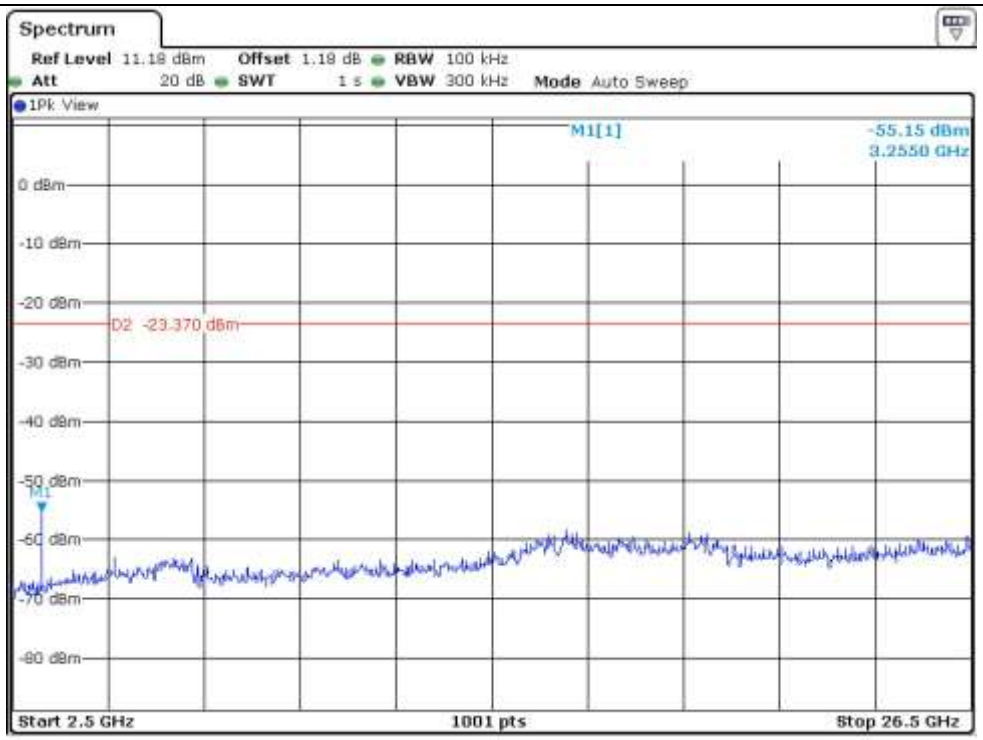

Middle Channel

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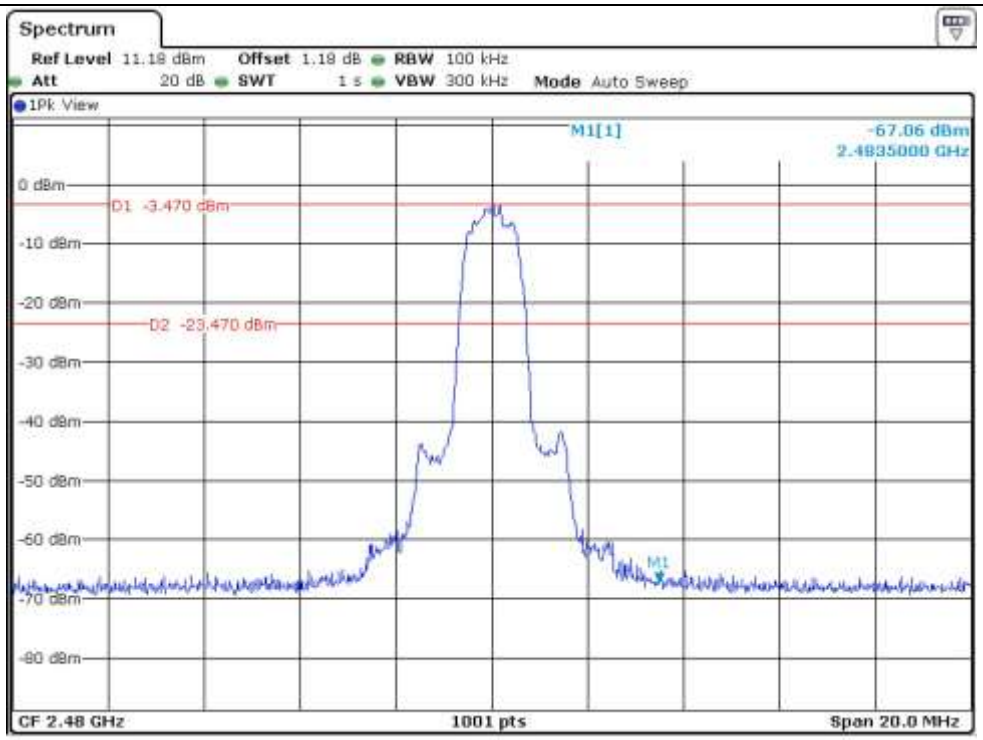
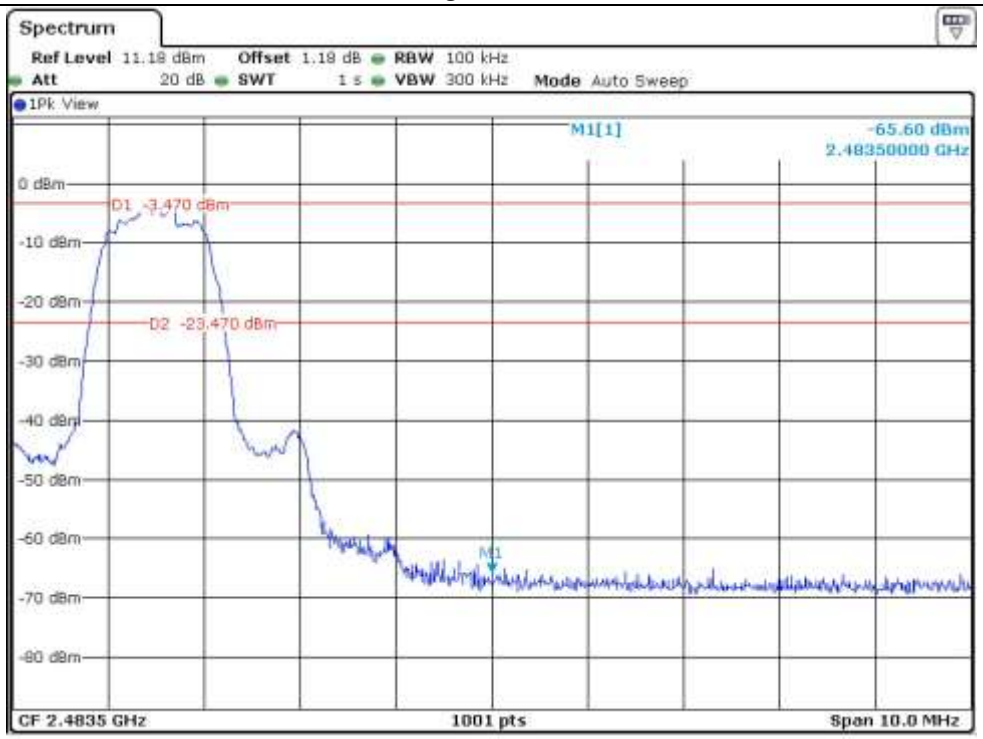


High Channel



High Channel

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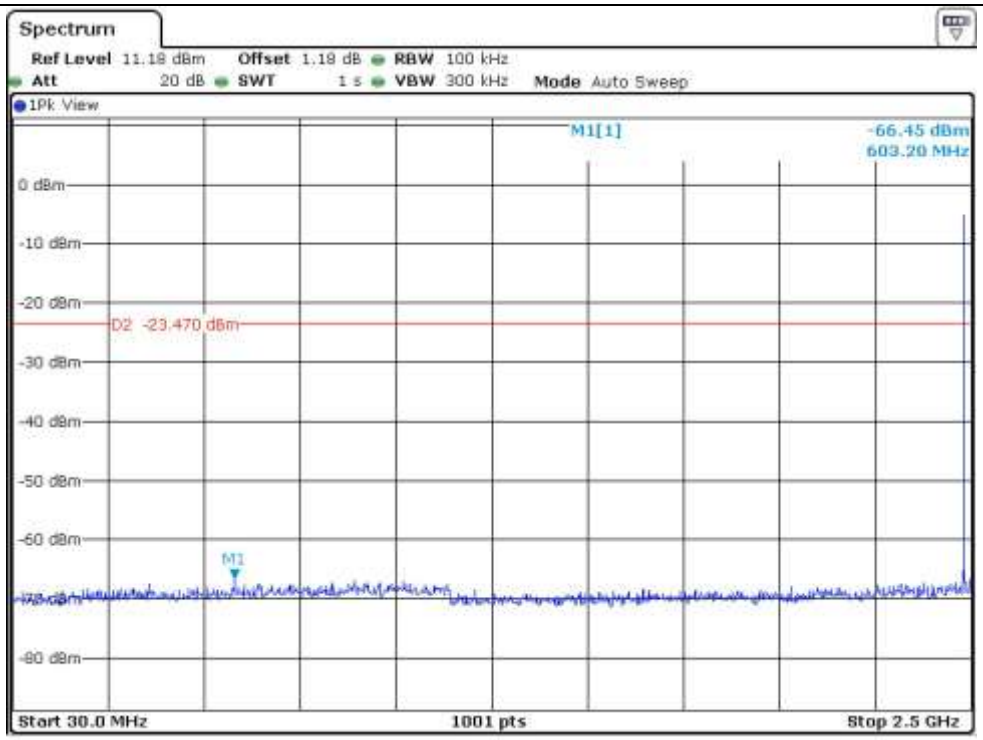
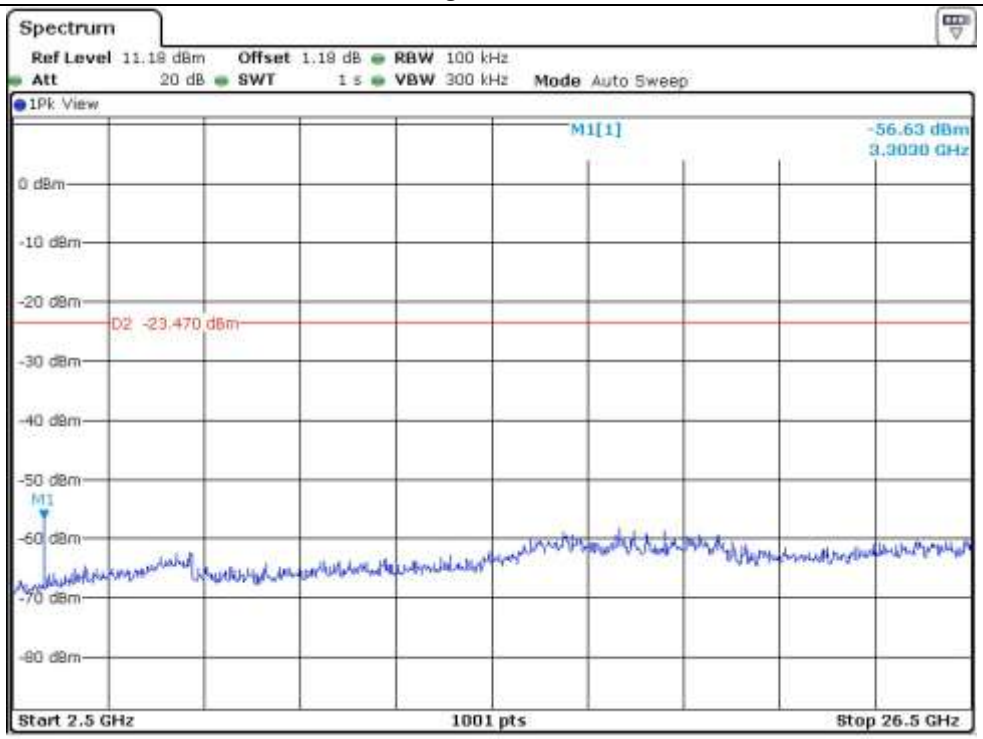


High Channel



High Channel

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12.6 Test data for Charging & Transmitting Mode radiated emission

12.6.1 Radiated Emission which fall in the Restricted Band

12.6.1.1 Test data for 1 Mbps

-. Test Date : March 06, 2016

-. 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 : Highest Output Power Transmitting Mode(Low Channel and 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									
2 379.62	47.37	Peak	H	27.10	7.50	43.00	38.97	74.00	35.03
	33.75	Average	H				25.35	54.00	28.65
2 371.43	48.44	Peak	V				40.04	74.00	33.96
	33.81	Average	V				25.41	54.00	28.59
Test Data for High Channel									
2 490.77	47.84	Peak	H	27.10	7.50	43.00	39.44	74.00	34.56
2 490.78	34.04	Average	H				25.64	54.00	28.36
2 492.48	48.20	Peak	V				39.80	74.00	34.20
	33.94	Average	V				25.54	54.00	28.46

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Jun-Hui, Lee / Senior Engineer

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12.6.1.2 Test data for 2 Mbps

-. Test Date : March 06, 2016

-. 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 : Highest Output Power Transmitting Mode(Low Channel and 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									
2 378.72	47.67	Peak	H	27.10	7.50	43.00	39.27	74.00	34.73
	33.75	Average	H				25.35	54.00	28.65
2 380.39	47.93	Peak	V				39.53	74.00	34.47
	33.73	Average	V				25.33	54.00	28.67
Test Data for High Channel									
2 488.72	48.22	Peak	H	27.10	7.50	43.00	39.82	74.00	34.18
	34.02	Average	H				25.62	54.00	28.38
2 487.46	48.19	Peak	V				39.79	74.00	34.21
	34.04	Average	V				25.64	54.00	28.36

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Jun-Hui, Lee / Senior Engineer

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12.6.1.3 Test data for 3 Mbps

-. Test Date : March 06, 2016

-. 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 : Highest Output Power Transmitting Mode(Low Channel and 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									
2 386.81	48.18	Peak	H	27.10	7.50	43.00	39.78	74.00	34.22
	33.71	Average	H				25.31	54.00	28.69
2 380.25	48.01	Peak	V				39.61	74.00	34.39
	33.74	Average	V				25.34	54.00	28.66
Test Data for High Channel									
2 486.23	47.85	Peak	H	27.10	7.50	43.00	39.45	74.00	34.55
	34.02	Average	H				25.62	54.00	28.38
2 487.76	48.72	Peak	V				40.32	74.00	33.68
	34.03	Average	V				25.63	54.00	28.37

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Tested by: Jun-Hui, Lee / Senior Engineer

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12.6.2 Spurious & Harmonic Radiated Emission above 1 GHz

12.6.2.1 Test data for 1 Mbps

-. Test Date : March 06, 2016

-. 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 ~ 26.5 GHz

-. Measurement distance : 3 m

-. Operating Condition : Highest Output Power Transmitting Mode

-. Result : PASSED

Frequency (GHz)	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									
4 804.00	51.55	Peak	H	30.60	11.10	42.50	50.75	74.00	23.25
	37.95	Average	H				37.15	54.00	16.85
	51.67	Peak	V				50.87	74.00	23.13
	37.48	Average	V				36.68	54.00	17.32
Test Data for Middle Channel									
4 882.00	52.10	Peak	H	30.70	11.20	42.50	51.50	74.00	22.50
	39.28	Average	H				38.68	54.00	15.32
	51.75	Peak	V				51.15	74.00	22.85
	38.39	Average	V				37.79	54.00	16.21
Test Data for High Channel									
4 960.00	51.61	Peak	H	30.80	11.30	42.50	51.21	74.00	22.79
	38.45	Average	H				38.05	54.00	15.95
	51.43	Peak	V				51.03	74.00	22.97
	38.29	Average	V				37.89	54.00	16.11

Tabulated test data for Restricted Band

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

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12.6.2.2 Test data for 2 Mbps

-. Test Date : March 06, 2016

-. 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 ~ 26.5 GHz

-. Measurement distance : 3 m

-. Operating Condition : Highest Output Power Transmitting Mode

-. Result : PASSED

Frequency (GHz)	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									
4 804.00	51.38	Peak	H	30.60	11.10	42.50	50.58	74.00	23.42
	37.24	Average	H				36.44	54.00	17.56
	52.16	Peak	V				51.36	74.00	22.64
	38.44	Average	V				37.64	54.00	16.36
Test Data for Middle Channel									
4 882.00	52.65	Peak	H	30.70	11.20	42.50	52.05	74.00	21.95
	37.50	Average	H				36.90	54.00	17.10
	52.03	Peak	V				51.43	74.00	22.57
	37.38	Average	V				36.78	54.00	17.22
Test Data for High Channel									
4 960.00	52.02	Peak	H	30.80	11.30	42.50	51.62	74.00	22.38
	67.21	Average	H				66.81	54.00	-12.81
	51.86	Peak	V				51.46	74.00	22.54
	37.32	Average	V				36.92	54.00	17.08

Tabulated test data for Restricted Band

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

Tested by: Jun-Hui, Lee / Senior Engineer

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12.6.2.3 Test data for 3 Mbps

-. Test Date : March 06, 2016

-. 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 ~ 26.5 GHz

-. Measurement distance : 3 m

-. Operating Condition : Highest Output Power Transmitting Mode

-. Result : PASSED

Frequency (GHz)	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									
4 804.00	51.97	Peak	H	30.60	11.10	42.50	51.17	74.00	22.83
	36.82	Average	H				36.02	54.00	17.98
	51.22	Peak	V				50.42	74.00	23.58
	37.02	Average	V				36.22	54.00	17.78
Test Data for Middle Channel									
4 882.00	51.58	Peak	H	30.70	11.20	42.50	50.98	74.00	23.02
	36.86	Average	H				36.26	54.00	17.74
	51.29	Peak	V				50.69	74.00	23.31
	37.00	Average	V				36.40	54.00	17.60
Test Data for High Channel									
4 960.00	51.58	Peak	H	30.80	11.30	42.50	51.18	74.00	22.82
	36.17	Average	H				35.77	54.00	18.23
	51.42	Peak	V				51.02	74.00	22.98
	36.49	Average	V				36.09	54.00	17.91

Tabulated test data for Restricted Band

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

Tested by: Jun-Hui, Lee / Senior Engineer

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12.6.3 Spurious Radiated Emission

12.6.3.1 Test Data for 30 MHz ~ 1 000 MHz

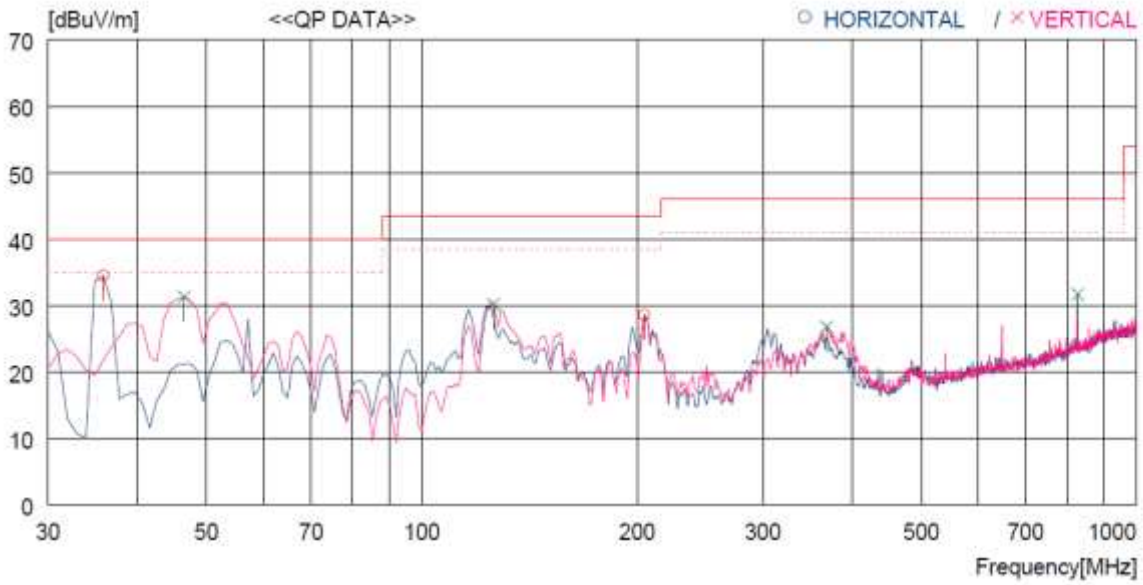
Humidity Level : (43 ~ 44) % R.H. Temperature: (23 ~ 24) °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Premium Tablet Date: March 09, 2016

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	35.820	53.2	12.3	1.8	32.8	34.5	40.0	5.5	300	208
2	204.600	46.7	10.9	3.8	32.8	28.6	43.5	14.9	100	359
----- Vertical ------										
3	46.490	48.4	13.9	1.9	32.9	31.3	40.0	8.7	100	257
4	126.030	50.5	9.6	3.3	33.2	30.2	43.5	13.3	100	137
5	368.530	39.1	15.2	5.1	32.6	26.8	46.0	19.2	100	109
6	827.331	35.9	21.2	8.0	33.4	31.7	46.0	14.3	100	0

Tested by: Jun-Hui, Lee / Senior Engineer

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12.6.3.2 Test Data for Below 30 MHz

-. Test Date : March 09, 2016

-. 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 Condition : Highest Output Power Transmitting Mode

-. 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)
Any emissions were not observed from the EUT.								

Tested by: Jun-Hui, Lee / Senior Engineer

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13. CONDUCTED EMISSION TEST

13.1 Operating environment

Temperature : (23 ~ 24) °C

Relative humidity : (46 ~ 49) % R.H.

13.2 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 μH + 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.

13.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
■ -	ESPI	Rohde & Schwarz	EMI Test Receiver	101278	Nov. 02, 2015 (1Y)
□ -	ESHS10	Rohde & Schwarz	EMI Test Receiver	834467/007	Apr. 29, 2015 (1Y)
□	NSLK8128	Schwarzbeck	AMN	8128-216	Apr. 06, 2015 (1Y)
■ -	NSLK8126	Schwarzbeck	AMN	8126-404	Apr. 29, 2015 (1Y)
□ -	3825/2	EMCO	AMN	9109-1869	Apr. 29, 2015 (1Y)
■ --	3825/2	EMCO	AMN	9109-1867	Apr. 29, 2015 (1Y)

All test equipment used is calibrated on a regular basis.

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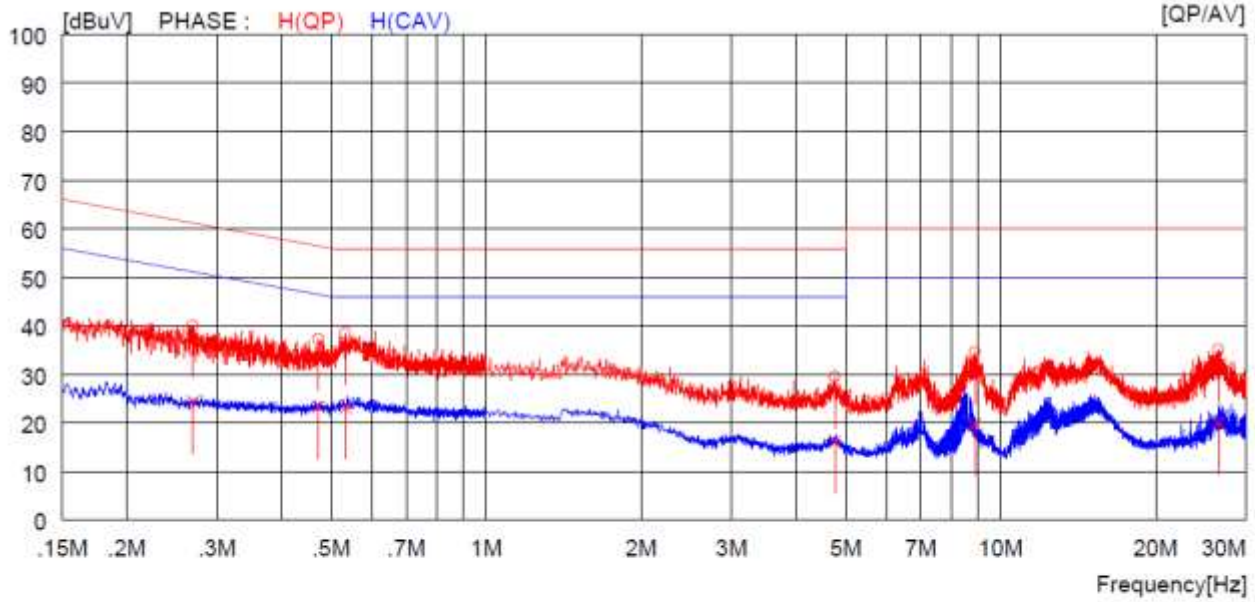
13.4 Test data for Charging & Transmitting Mode

-. Test Date : March 08, 2016

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : HOT LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.26900	30.1	----	9.9	40.0	----	61.1	----	21.1	----	H(QP)
2	0.47200	27.4	----	9.9	37.3	----	56.5	----	19.2	----	H(QP)
3	0.53200	28.5	----	10.0	38.5	----	56.0	----	17.5	----	H(QP)
4	4.76000	19.4	----	10.1	29.5	----	56.0	----	26.5	----	H(QP)
5	8.90000	24.3	----	10.3	34.6	----	60.0	----	25.4	----	H(QP)
6	26.51000	24.6	----	10.5	35.1	----	60.0	----	24.9	----	H(QP)
7	0.26900	----	14.4	9.9	----	24.3	----	51.1	----	26.8	H(CAV)
8	0.47200	----	13.4	9.9	----	23.3	----	46.5	----	23.2	H(CAV)
9	0.53200	----	13.2	10.0	----	23.2	----	46.0	----	22.8	H(CAV)
10	4.76000	----	6.0	10.1	----	16.1	----	46.0	----	29.9	H(CAV)
11	8.90000	----	9.3	10.3	----	19.6	----	50.0	----	30.4	H(CAV)
12	26.51000	----	9.5	10.5	----	20.0	----	50.0	----	30.0	H(CAV)

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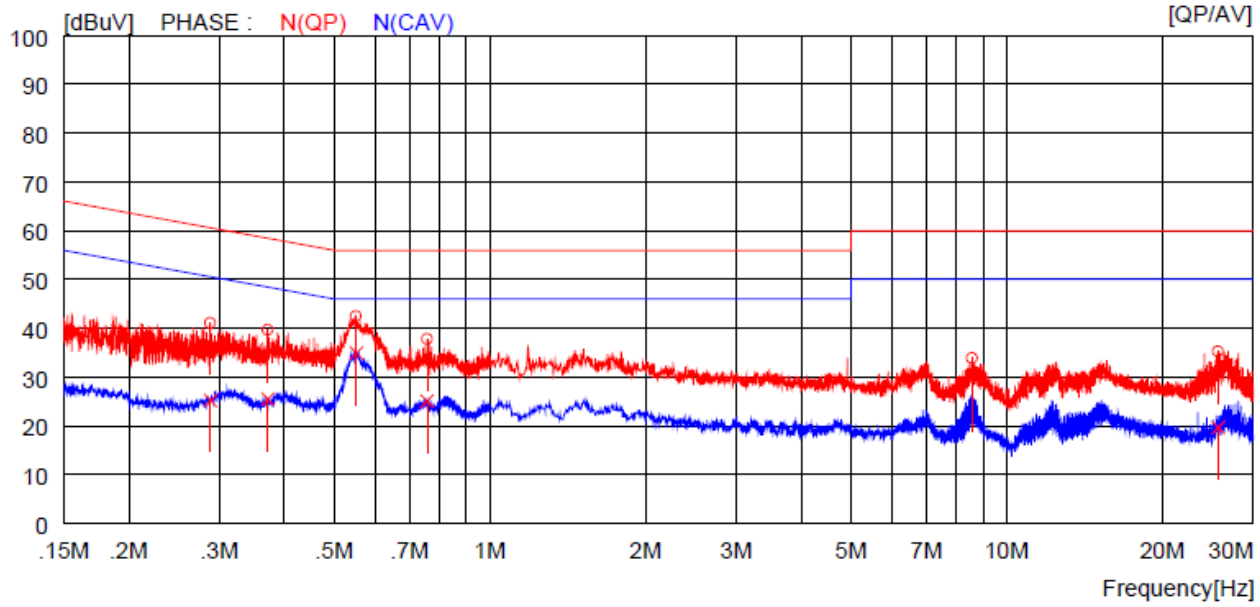
-. Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR QP [dB]	C.FACTOR AV [dBuV]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.28800	31.2	----	9.9		41.1	----	60.6	----	19.5	----	N(QP)
2	0.37200	29.7	----	9.9		39.6	----	58.5	----	18.9	----	N(QP)
3	0.55200	32.4	----	10.0		42.4	----	56.0	----	13.6	----	N(QP)
4	0.75600	27.8	----	10.0		37.8	----	56.0	----	18.2	----	N(QP)
5	8.57500	23.5	----	10.3		33.8	----	60.0	----	26.2	----	N(QP)
6	25.66000	24.7	----	10.5		35.2	----	60.0	----	24.8	----	N(QP)
7	0.28800	----	15.3	9.9		----	25.2	----	50.6	----	25.4	N(CAV)
8	0.37200	----	15.5	9.9		----	25.4	----	48.5	----	23.1	N(CAV)
9	0.55200	----	24.9	10.0		----	34.9	----	46.0	----	11.1	N(CAV)
10	0.75600	----	15.1	10.0		----	25.1	----	46.0	----	20.9	N(CAV)
11	8.57500	----	19.2	10.3		----	29.5	----	50.0	----	20.5	N(CAV)
12	25.66000	----	9.1	10.5		----	19.6	----	50.0	----	30.4	N(CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

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