

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

Test Report No. : W166R-D007
AGR No. : A164A-091
Applicant : RAYENCE Co., Ltd.
Address : 14, Samsung 1-ro 1-gil, Hwaseong-si, Gyeonggi-do, South Korea
Manufacturer : RAYENCE Co., Ltd.
Address : 14, Samsung 1-ro 1-gil, Hwaseong-si, Gyeonggi-do, South Korea
Type of Equipment : Interface Box
FCC ID. : QIIRYRAP001A
IC Certification No. : 10742A-RAP001A
Model Name : RAP001A
Serial number : N/A
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SUMMARY

The equipment complies with the regulation; **FCC PART 15 SUBPART E Section 15.407 and IC RSS-Gen Issue 4 Nov 2014 and RSS-247 Issue 1 May 2015**

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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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W166R-D007	June 07, 2016	Initial Issue	All

1. VERIFICATION OF COMPLIANCE

Applicant : RAYENCE Co., Ltd.
 Address : 14, Samsung 1-ro 1-gil, Hwaseong-si, Gyeonggi-do, South Korea
 Contact Person : Ha Nam-young / Assistant Manager
 Telephone No. : +82-31-8015-6465
 Fax No. : +82-31-8015-6591
 FCC ID : QIIRYRAP001A
 IC Certification No. : 10742A-RAP001A
 Model Name : RAP001A
 Serial Number : N/A
 Date : June 07, 2016

EQUIPMENT CLASS	FCC : Unlicensed National Information infrastructure(UNII) IC : Low Power License-Exempt Radio-communication Device
E.U.T. DESCRIPTION	Interface Box
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 E Section 15.407 RSS-Gen Issue 4 Nov 2014, RSS-247 Issue 1 May 2015
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&IC 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
15.407(a)	RSS-247A9.2	26 dB Bandwidth	PASS
15.407(a)	RSS-247A9.2	Maximum Conducted Output Power	Met the Limit / PASS
15.407(a)	RSS-247A9.2	Peak Power Spectral Density	Met the Limit / PASS
15.407(g)	RSS-247A1.1.4	Frequency Stability	Met the Limit / PASS
15.407(b)	RSS-247A9.2&RSS Gen	Undesirable Emissions	Met the Limit / PASS
15.205, 15.407(b)	-	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Met the Limit / PASS
15.207	RSS GEN	AC Conducted Emissions 150 kHz-30 MHz	Met the Limit / PASS
15.407(h)	RSS-247A9.3	Dynamic frequency Selection	N/A (See Note 1)

Note 1 : The Equipment Under Test (EUT) shall not use the DFS band.

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 E Section 15.407, IC RSS-Gen Issue 4 Nov 2014 and RSS-247 Issue 1 May 2015

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.

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 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, 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

3. GENERAL INFORMATION

3.1 Product Description

The RAYENCE Co., Ltd., Model RAP001A (referred to as the EUT in this report) is an Interface Box. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Interface Box		
FREQUENCY RANGE	5 150 MHz ~ 5 250 MHz Band	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20))	
		5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40))	
		5 210 MHz (802.11ac(VHT80))	
	5 725 MHz ~ 5 850 MHz Band	5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20))	
		5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40))	
		5 775 MHz (802.11ac(VHT80))	
MAX. RF OUTPUT POWER	Ant.0	5 150 MHz ~ 5 250 MHz Band	Wi-Fi 802.11a (13.45 dBm) Wi-Fi 802.11n(HT20) MHz (9.16 dBm) Wi-Fi 802.11n(HT40) MHz (10.15 dBm) Wi-Fi 802.11ac(VHT20) MHz (9.04 dBm) Wi-Fi 802.11ac(VHT40) MHz (10.13 dBm) Wi-Fi 802.11ac(VHT80) MHz (10.04 dBm)
		5 725 MHz ~ 5 850 MHz Band	Wi-Fi 802.11a (17.03 dBm) Wi-Fi 802.11n(HT20) MHz (16.26 dBm) Wi-Fi 802.11n(HT40) MHz (6.36 dBm) Wi-Fi 802.11ac(VHT20) MHz (16.30 dBm) Wi-Fi 802.11ac(VHT40) MHz (6.40 dBm) Wi-Fi 802.11ac(VHT80) MHz (9.96 dBm)
	Ant.1	5 150 MHz ~ 5 250 MHz Band	Wi-Fi 802.11a (12.85 dBm) Wi-Fi 802.11n(HT20) MHz (8.71 dBm) Wi-Fi 802.11n(HT40) MHz (9.81 dBm) Wi-Fi 802.11ac(VHT20) MHz (8.69 dBm) Wi-Fi 802.11ac(VHT40) MHz (9.83 dBm) Wi-Fi 802.11ac(VHT80) MHz (9.34 dBm)
		5 725 MHz ~ 5 850 MHz Band	Wi-Fi 802.11a (17.19 dBm) Wi-Fi 802.11n(HT20) MHz (16.55 dBm) Wi-Fi 802.11n(HT40) MHz (6.00 dBm) Wi-Fi 802.11ac(VHT20) MHz (16.45 dBm) Wi-Fi 802.11ac(VHT40) MHz (6.00 dBm) Wi-Fi 802.11ac(VHT80) MHz (9.96 dBm)

MAX. RF OUTPUT POWER	Ant.2	5 150 MHz ~ 5 250 MHz Band	Wi-Fi 802.11a (12.81 dBm) Wi-Fi 802.11n(HT20) MHz (8.61 dBm) Wi-Fi 802.11n(HT40) MHz (9.82 dBm) Wi-Fi 802.11ac(VHT20) MHz (8.59 dBm) Wi-Fi 802.11ac(VHT40) MHz (9.88 dBm) Wi-Fi 802.11ac(VHT80) MHz (9.27 dBm)	
		5 725 MHz ~ 5 850 MHz Band	Wi-Fi 802.11a (17.06 dBm) Wi-Fi 802.11n(HT20) MHz (15.97 dBm) Wi-Fi 802.11n(HT40) MHz (6.31 dBm) Wi-Fi 802.11ac(VHT20) MHz (15.99 dBm) Wi-Fi 802.11ac(VHT40) MHz (6.31 dBm) Wi-Fi 802.11ac(VHT80) MHz (10.16 dBm)	
	MIMO	5 150 MHz ~ 5 250 MHz Band	Wi-Fi 802.11n(HT20) MHz (13.50 dBm) Wi-Fi 802.11n(HT40) MHz (14.64 dBm) Wi-Fi 802.11ac(VHT20) MHz (13.51 dBm) Wi-Fi 802.11ac(VHT40) MHz (14.66 dBm) Wi-Fi 802.11ac(VHT80) MHz (14.34 dBm)	
		5 725 MHz ~ 5 850 MHz Band	Wi-Fi 802.11n(HT20) MHz (21.04 dBm) Wi-Fi 802.11n(HT40) MHz (11.00 dBm) Wi-Fi 802.11ac(VHT20) MHz (21.02 dBm) Wi-Fi 802.11ac(VHT40) MHz (11.01 dBm) Wi-Fi 802.11ac(VHT80) MHz (14.80 dBm)	
	MODULATION TYPE			OFDM Modulation(BPSK/QPSK/16QAM/64QAM)
	ANTENNA TYPE			Dipole antenna
ANTENNA GAIN	5 150 MHz ~ 5 250 MHz Band		6.533 dBi	
	5 725 MHz ~ 5 850 MHz Band		6.415 dBi	
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	40 MHz, 25 MHz			

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	MJ Technology	N/A	N/A
Power Board 1	N/A	N/A	N/A
Power Board 2	XP Power	ECS45US12	N/A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
RAP001A	RAYENCE Co., Ltd.	Interface Box (EUT)	Notebook PC, Jig
Latitude D505	Dell Asia Pacific Sdn.	Notebook PC	EUT, Adapter
HA65NS0-00	Hipro Electronics (Dongguan) Co., Ltd.	Adapter	Notebook PC
N/A	N/A	Jig	EUT, Notebook PC

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting mode is programmed.

5 150 MHz ~ 5 250 MHz Band

Modulation & Channel selected	DATA RATE	OUTPUT POWER		
		Ant 0	Ant 1	Ant 2
802.11a (Middle Channel)	6 Mbps	13.45	12.85	12.81
	9 Mbps	13.40	12.79	12.73
	12 Mbps	13.28	12.73	12.66
	18 Mbps	13.14	12.58	12.59
	24 Mbps	12.99	12.38	12.37
	36 Mbps	12.72	12.24	12.10
	48 Mbps	12.09	11.57	11.53
	54 Mbps	11.96	11.35	11.44
HT20 (Middle Channel)	6.5 Mbps	9.16	8.71	8.61
	13 Mbps	9.11	8.68	8.54
	19.5 Mbps	8.99	8.60	8.46
	26 Mbps	8.92	8.53	8.38
	39 Mbps	8.78	8.40	8.28
	52 Mbps	7.37	6.83	6.70
	58.5 Mbps	6.04	5.43	5.30
	65 Mbps	5.15	4.71	4.59
HT40 (High Channel)	13.5 Mbps	10.15	9.81	9.82
	27 Mbps	9.73	9.42	9.38
	40.5 Mbps	9.71	9.23	9.10
	54 Mbps	9.28	8.90	8.95
	81 Mbps	8.89	8.61	8.62
	108 Mbps	7.73	7.35	7.37
	121.5 Mbps	6.58	6.14	7.18
	135 Mbps	5.95	5.64	5.67

VHT20 (Middle Channel)	6.5 Mbps	9.04	8.69	8.59
	13 Mbps	8.97	8.62	8.46
	19.5 Mbps	8.83	8.53	8.35
	26 Mbps	8.89	8.60	8.44
	39 Mbps	8.73	8.36	8.28
	52 Mbps	6.89	6.68	6.39
	58.5 Mbps	5.60	5.26	5.14
	65 Mbps	4.95	4.60	4.46
	78 Mbps	4.83	4.46	4.40
VHT40 (High Channel)	13.5 Mbps	10.13	9.83	9.88
	27 Mbps	9.69	9.38	9.42
	40.5 Mbps	9.51	9.24	9.28
	54 Mbps	9.39	9.06	9.22
	81 Mbps	9.02	8.73	8.74
	108 Mbps	7.91	7.49	7.58
	121.5 Mbps	6.64	6.31	6.39
	135 Mbps	6.02	5.70	5.80
	162 Mbps	5.65	5.41	5.45
	180 Mbps	5.55	5.29	5.38
VHT80 (Low Channel)	29.3 Mbps	10.04	9.34	9.27
	58.5 Mbps	9.63	8.97	8.81
	87.8 Mbps	9.30	8.58	8.50
	117 Mbps	8.95	8.26	8.09
	175.5 Mbps	8.64	7.91	7.87
	234 Mbps	8.71	7.99	7.94
	263.3 Mbps	8.62	7.95	7.89
	292.5 Mbps	8.55	7.88	7.79
	351 Mbps	8.35	7.61	7.55
	390 Mbps	8.22	7.56	7.51

The worse case data rate for each modulation is determined 6 Mbps(Ant.0) / 6 Mbps(Ant.1) / 6 Mbps(Ant.2) for IEEE 802.11a, 6.5 Mbps(Ant.0) / 6.5 Mbps(Ant.1) / 6.5 Mbps(Ant.2) for HT20, 13.5 Mbps(Ant.0) / 13.5 Mbps(Ant.1) / 13.5 Mbps(Ant.2) for HT40, 6.5 Mbps(Ant.0) / 6.5 Mbps(Ant.1) / 6.5 Mbps(Ant.2) for VHT20, 13.5 Mbps(Ant.0) / 13.5 Mbps(Ant.1) / 13.5 Mbps(Ant.2) for VHT40, 29.3 Mbps(Ant.0) / 29.3 Mbps(Ant.1) / 29.3 Mbps(Ant.2) for VHT80.

5 725 MHz ~ 5 850 MHz Band

Modulation & Channel selected	DATA RATE	OUTPUT POWER		
		Ant 0	Ant 1	Ant 2
802.11a (Middle Channel)	6 Mbps	17.03	17.19	17.06
	9 Mbps	16.99	17.15	16.99
	12 Mbps	16.92	17.10	16.96
	18 Mbps	16.81	16.94	16.85
	24 Mbps	16.57	16.81	16.58
	36 Mbps	16.38	16.43	16.42
	48 Mbps	15.70	15.83	15.78
	54 Mbps	15.58	15.73	15.66
HT20 (Middle Channel)	6.5 Mbps	16.26	16.55	15.97
	13 Mbps	16.12	16.47	15.84
	19.5 Mbps	16.03	16.39	15.75
	26 Mbps	15.99	16.30	15.68
	39 Mbps	15.81	16.21	15.57
	52 Mbps	14.18	14.50	13.78
	58.5 Mbps	12.87	13.67	12.53
	65 Mbps	12.21	12.25	12.13
HT40 (Low Channel)	13.5 Mbps	6.36	6.00	6.31
	27 Mbps	5.93	5.55	5.86
	40.5 Mbps	5.84	5.34	5.78
	54 Mbps	5.60	5.24	5.51
	81 Mbps	5.24	4.89	5.21
	108 Mbps	5.39	5.05	5.30
	121.5 Mbps	5.24	4.91	5.21
	135 Mbps	5.20	4.85	5.15

VHT20 (Middle Channel)	6.5 Mbps	16.30	16.45	15.99
	13 Mbps	16.23	16.34	15.85
	19.5 Mbps	16.08	16.18	15.74
	26 Mbps	16.20	16.35	15.93
	39 Mbps	16.00	16.29	15.55
	52 Mbps	14.24	14.53	14.02
	58.5 Mbps	12.86	13.02	12.52
	65 Mbps	12.17	12.31	11.85
	78 Mbps	12.05	12.20	11.68
VHT40 (Low Channel)	13.5 Mbps	6.40	6.00	6.31
	27 Mbps	6.03	5.59	5.91
	40.5 Mbps	5.86	5.43	5.73
	54 Mbps	5.64	5.50	5.58
	81 Mbps	5.21	4.86	5.11
	108 Mbps	5.55	5.18	5.47
	121.5 Mbps	5.40	5.04	5.33
	135 Mbps	5.34	4.97	5.21
	162 Mbps	5.01	4.60	4.96
	180 Mbps	4.91	4.55	4.81
VHT80 (Low Channel)	29.3 Mbps	9.96	9.96	10.16
	58.5 Mbps	9.61	9.67	9.73
	87.8 Mbps	9.12	9.28	9.73
	117 Mbps	8.86	8.92	9.07
	175.5 Mbps	8.54	8.63	8.88
	234 Mbps	8.63	8.67	8.91
	263.3 Mbps	8.49	8.60	8.76
	292.5 Mbps	8.48	8.57	8.65
	351 Mbps	8.29	8.34	8.40
	390 Mbps	8.15	8.20	8.32

The worse case data rate for each modulation is determined 6 Mbps(Ant.0) / 6 Mbps(Ant.1) / 6 Mbps(Ant.2) for IEEE 802.11a, 6.5 Mbps(Ant.0) / 6.5 Mbps(Ant.1) / 6.5 Mbps(Ant.2) for HT20, 13.5 Mbps(Ant.0) / 13.5 Mbps(Ant.1) / 13.5 Mbps(Ant.2) for HT40, 6.5 Mbps(Ant.0) / 6.5 Mbps(Ant.1) / 6.5 Mbps(Ant.2) for VHT20, 13.5 Mbps(Ant.0) / 13.5 Mbps(Ant.1) / 13.5 Mbps(Ant.2) for VHT40, 29.3 Mbps(Ant.0) / 29.3 Mbps(Ant.1) / 29.3 Mbps(Ant.2) for VHT80.

5.4 Configuration of Test System

Line Conducted Test: The EUT was connected to LISN. 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: 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.

5.5 Antenna Requirement

For intentional device, according to section 15.203 and RSS-Gen Issue 4 November 2014 Section 8.3, 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 WLAN Dipole antenna(Reverse SMA type), so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Test, 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 Test, the following operating mode was investigated.

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

7. MINIMUM 26 dB BANDWIDTH & 99 % OCCUPIED BANDWIDTH

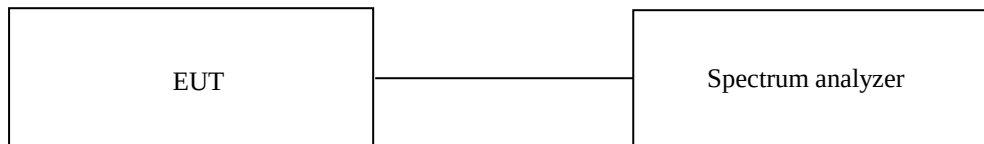
7.1 Operating environment

Temperature : 24 °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 100 kHz, and peak detection was used. The 26 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 26 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.

7.4.1 Test data for 802.11a RLAN Mode

7.4.1.1 Test data for Antenna 0

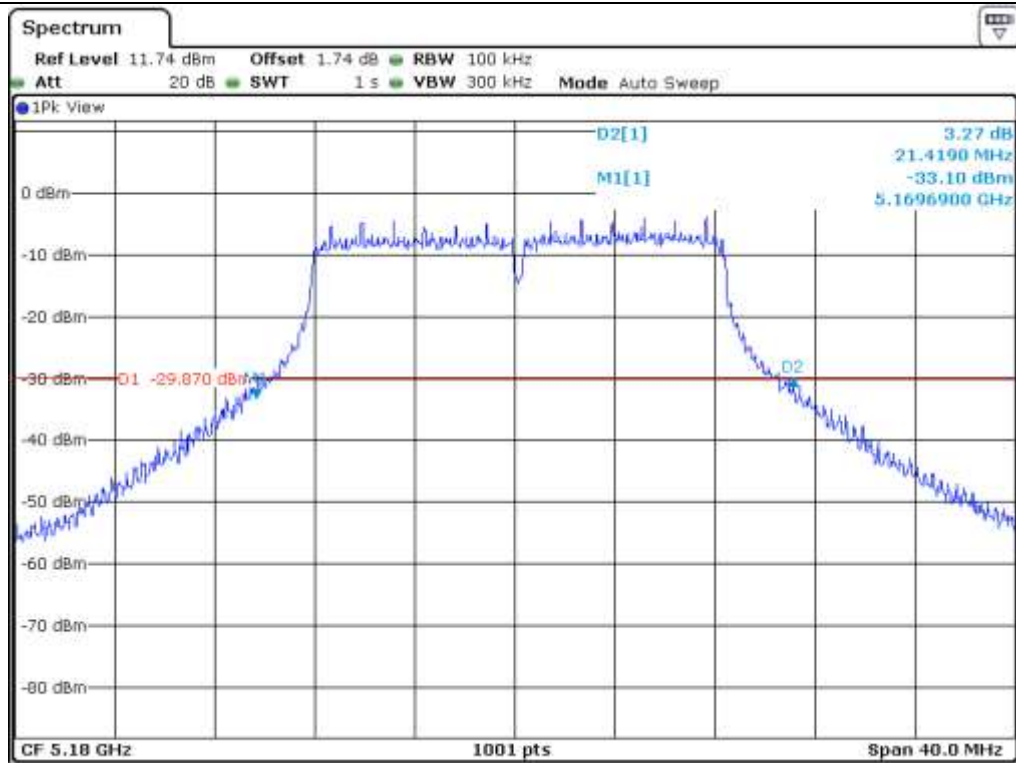
-. Test Date : May 02, 2016

-. Test Result : Pass

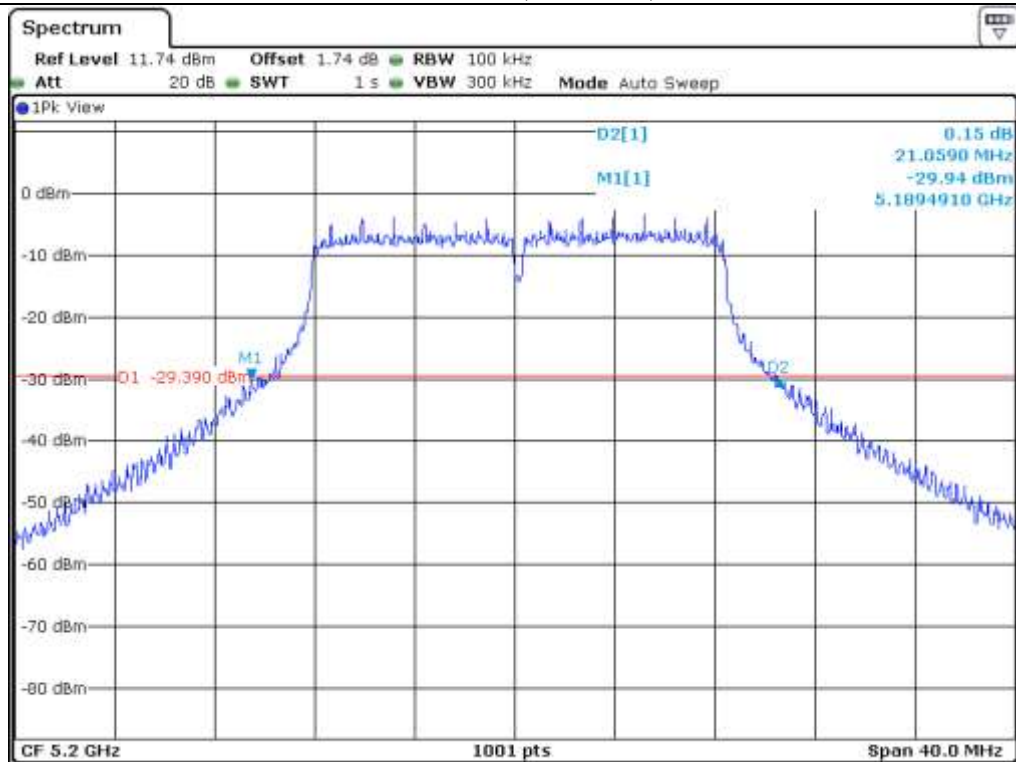
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180	21.42	16.50
	Middle	5 200	21.06	16.46
	High	5 240	21.58	16.50
5 725 ~ 5 850	Low	5 745	20.46	16.46
	Middle	5 785	22.26	16.50
	High	5 825	20.50	16.46



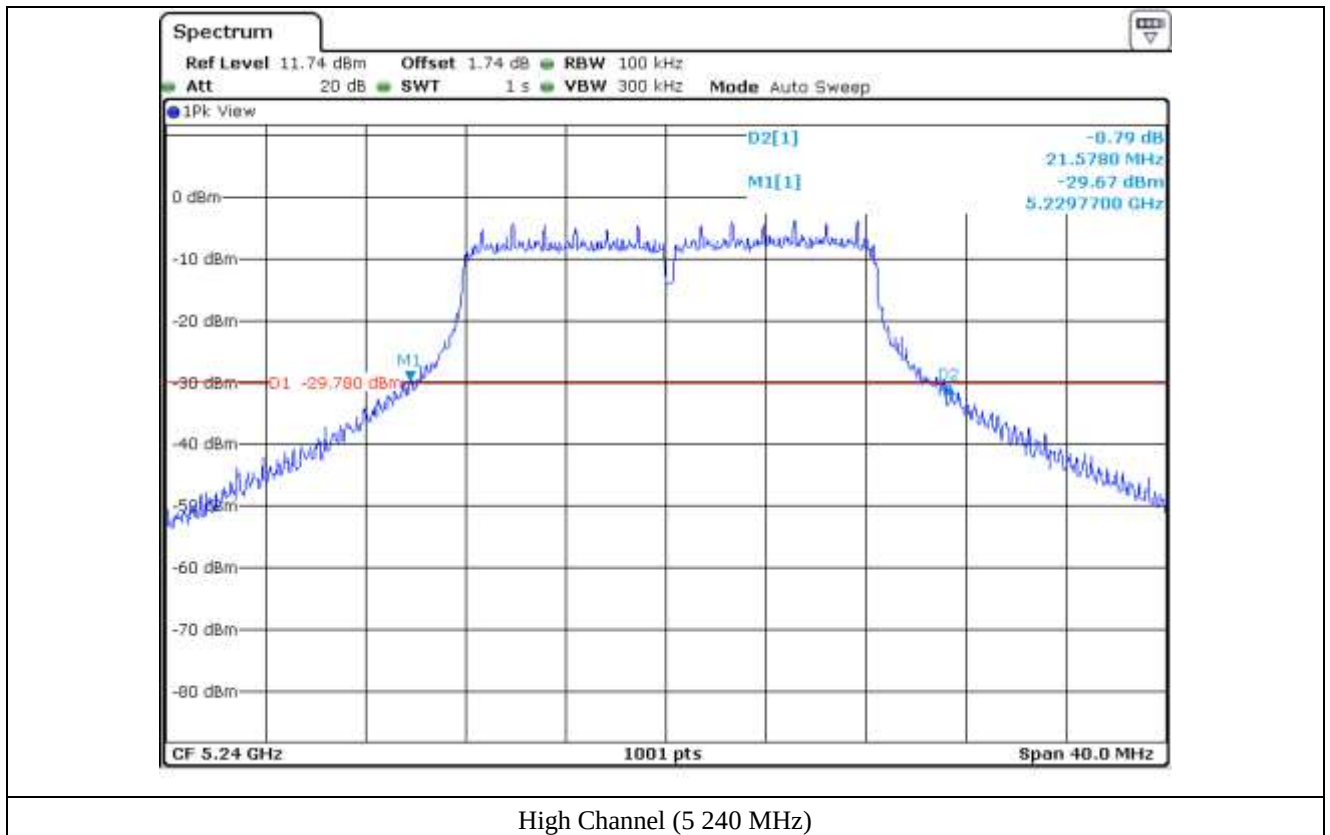
Tested by: Jun-Hui, Lee / Senior Engineer

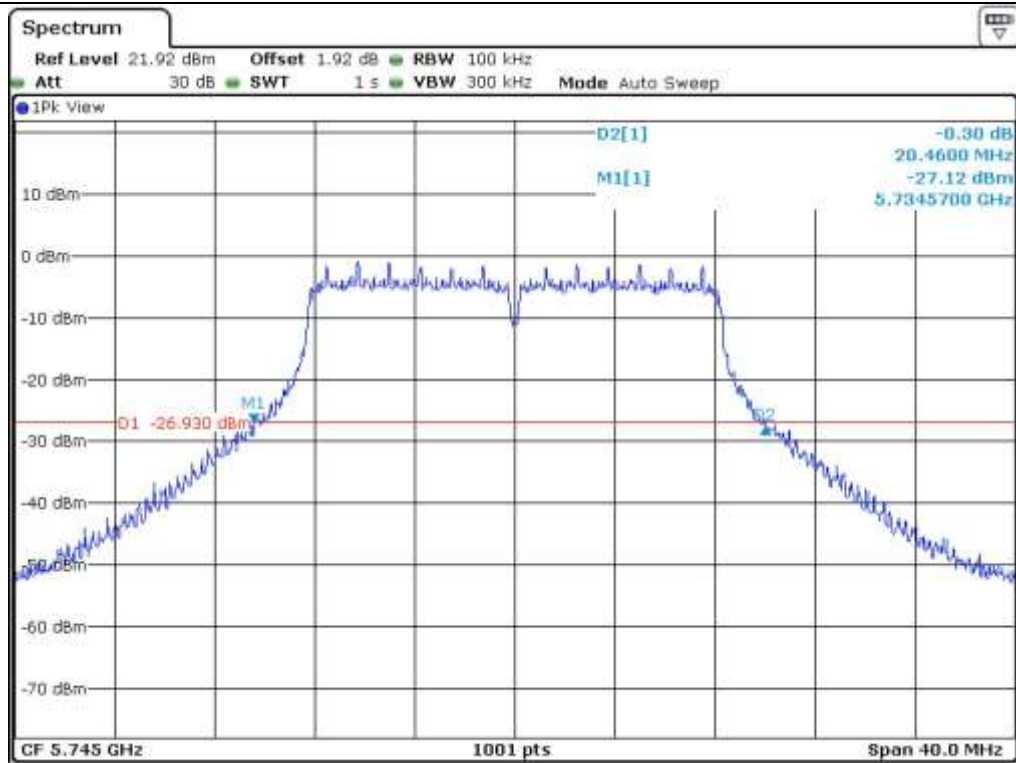


Low Channel (5 180 MHz)

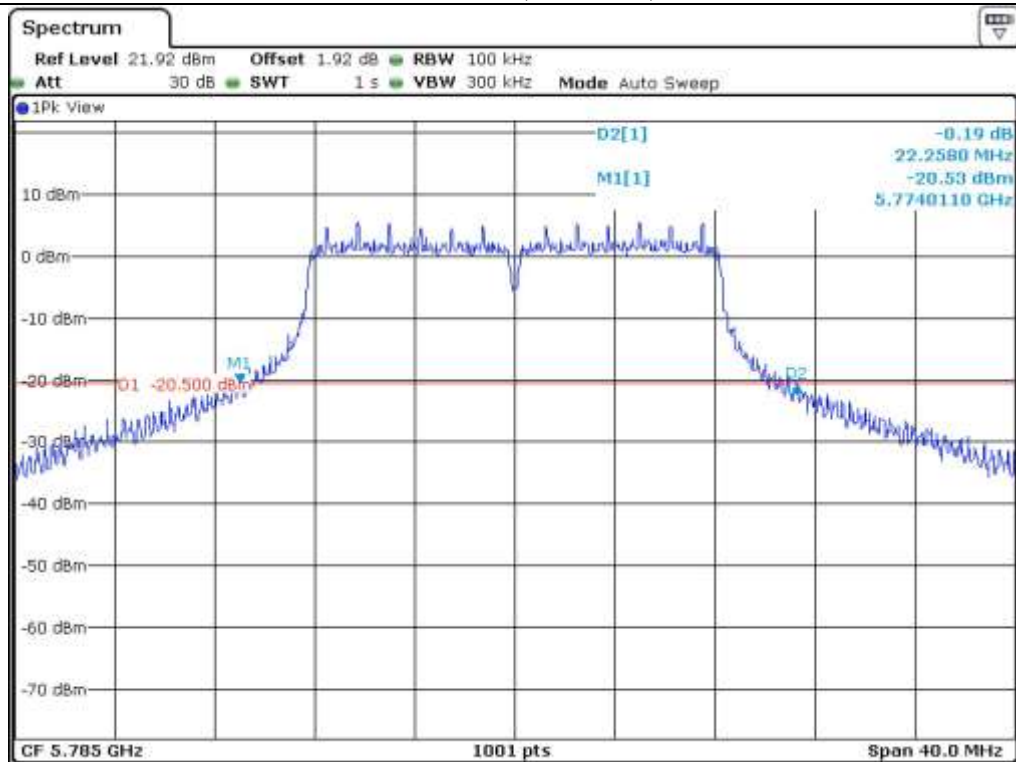


Middle Channel (5 200 MHz)

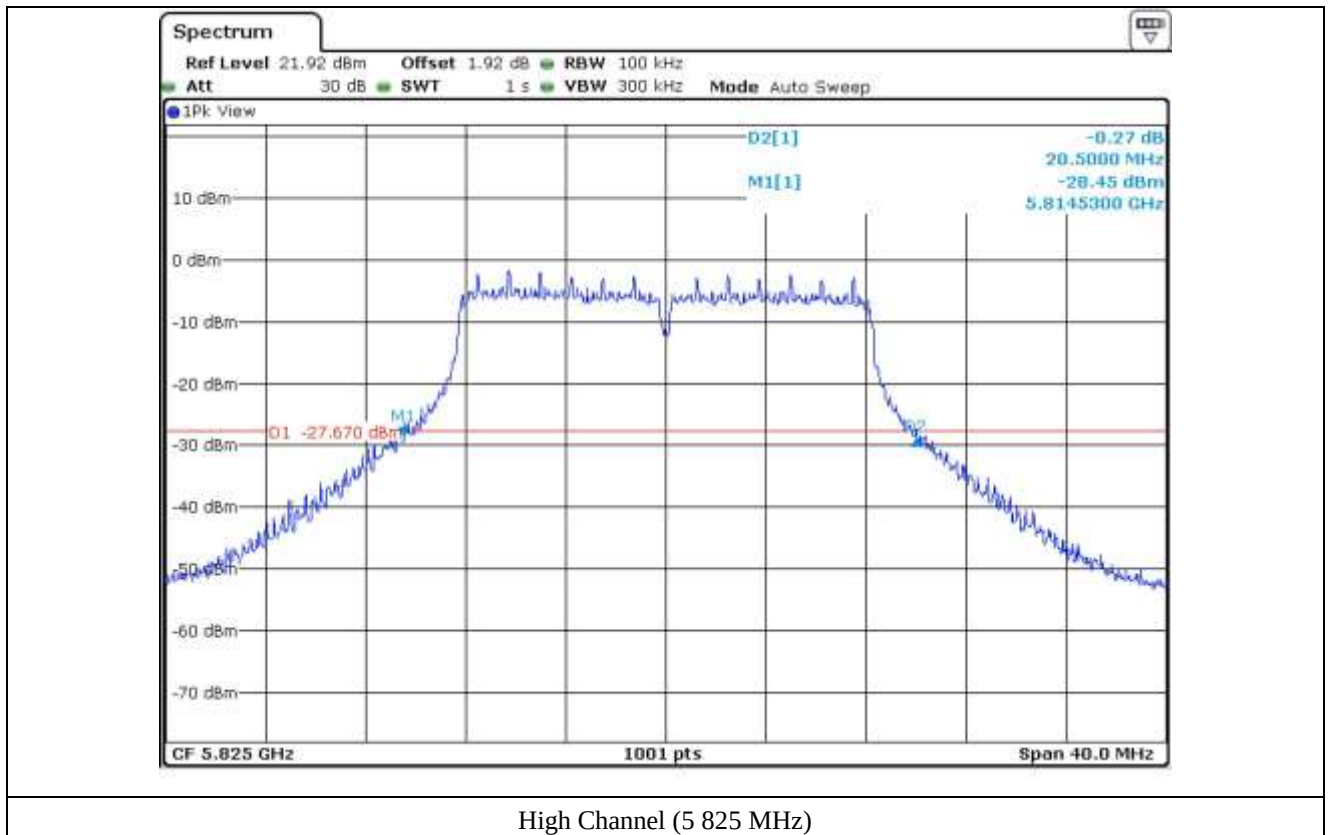


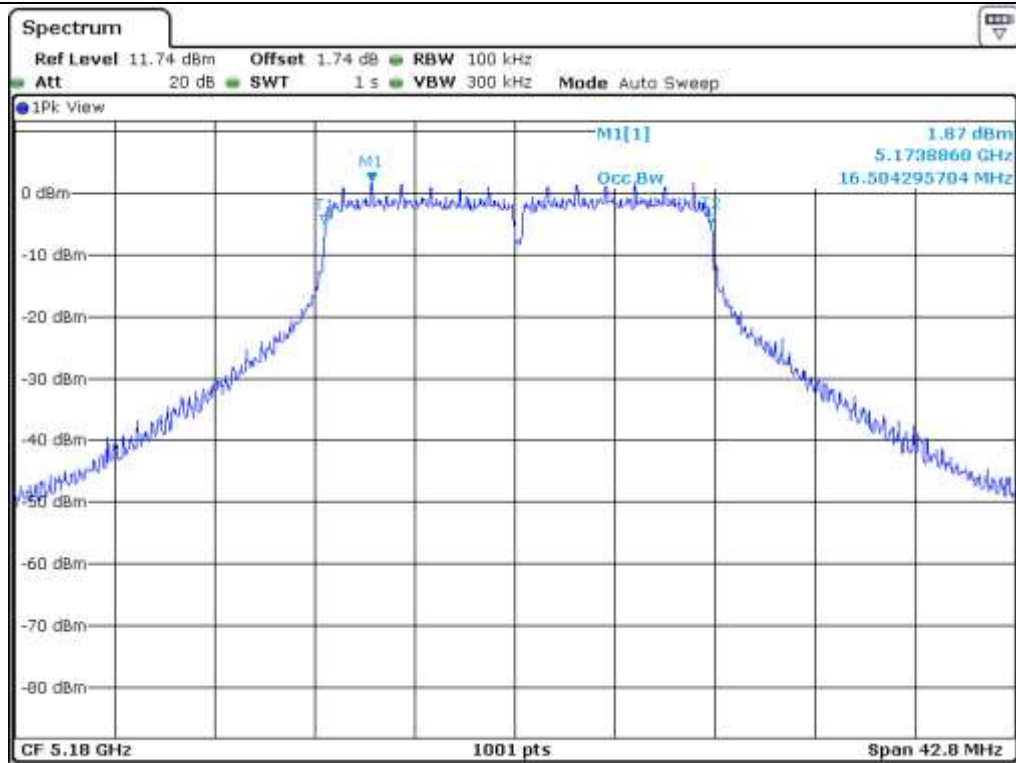


Low Channel (5.745 MHz)

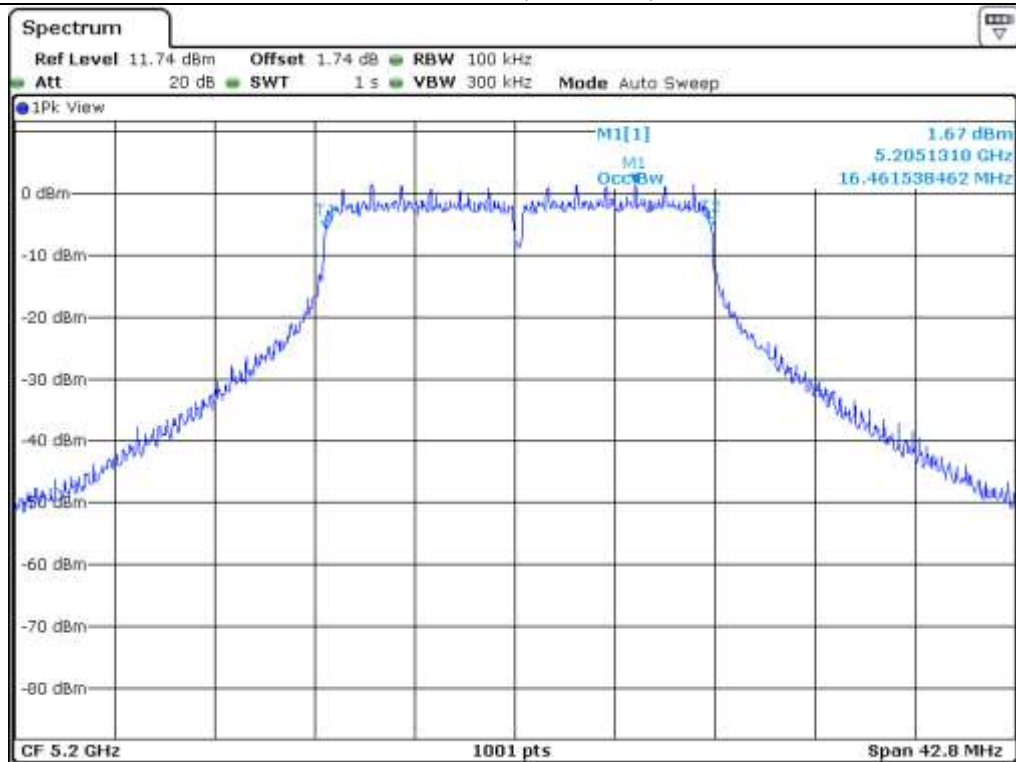


Middle Channel (5.785 MHz)

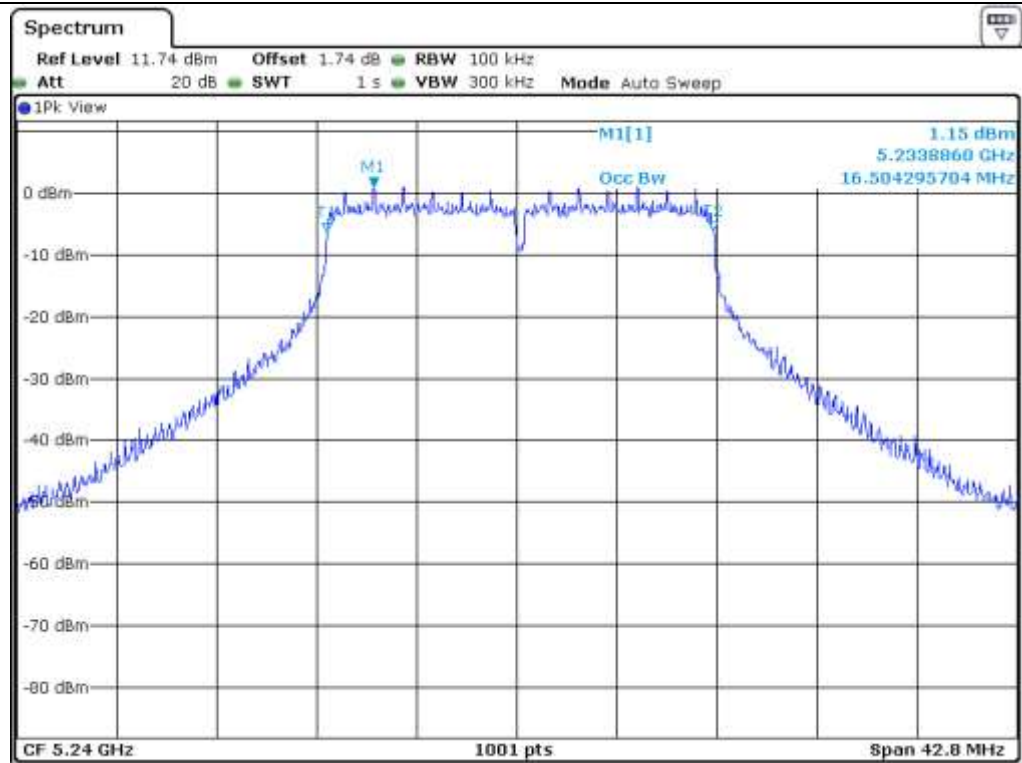




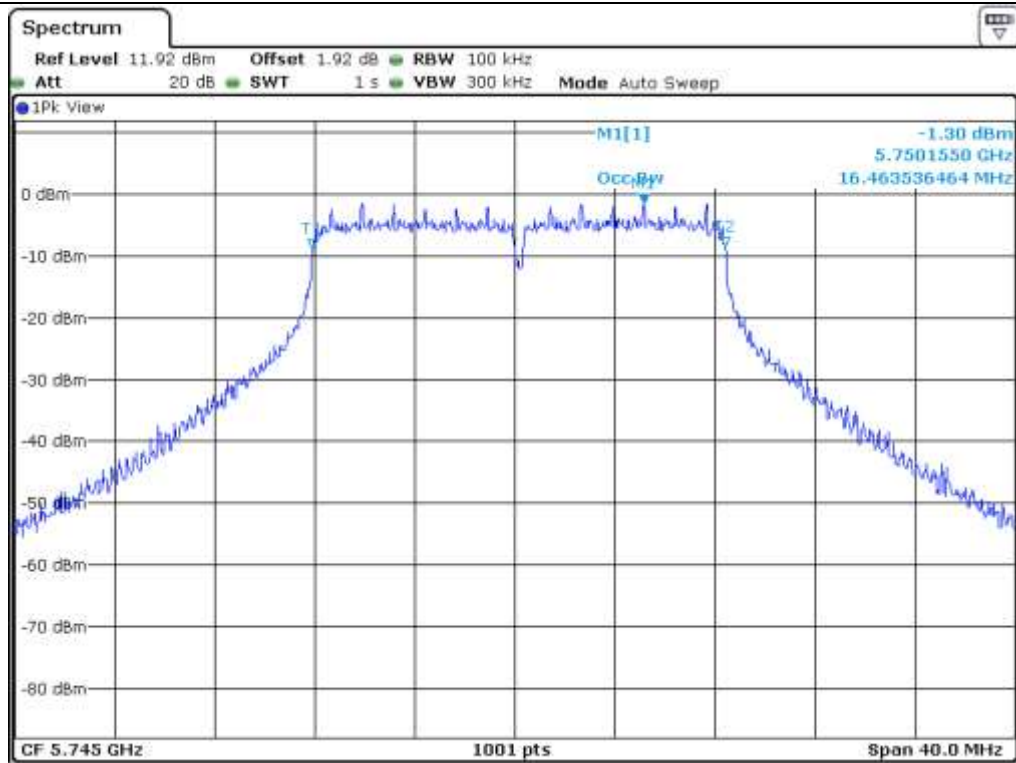
Low Channel (5 180 MHz)



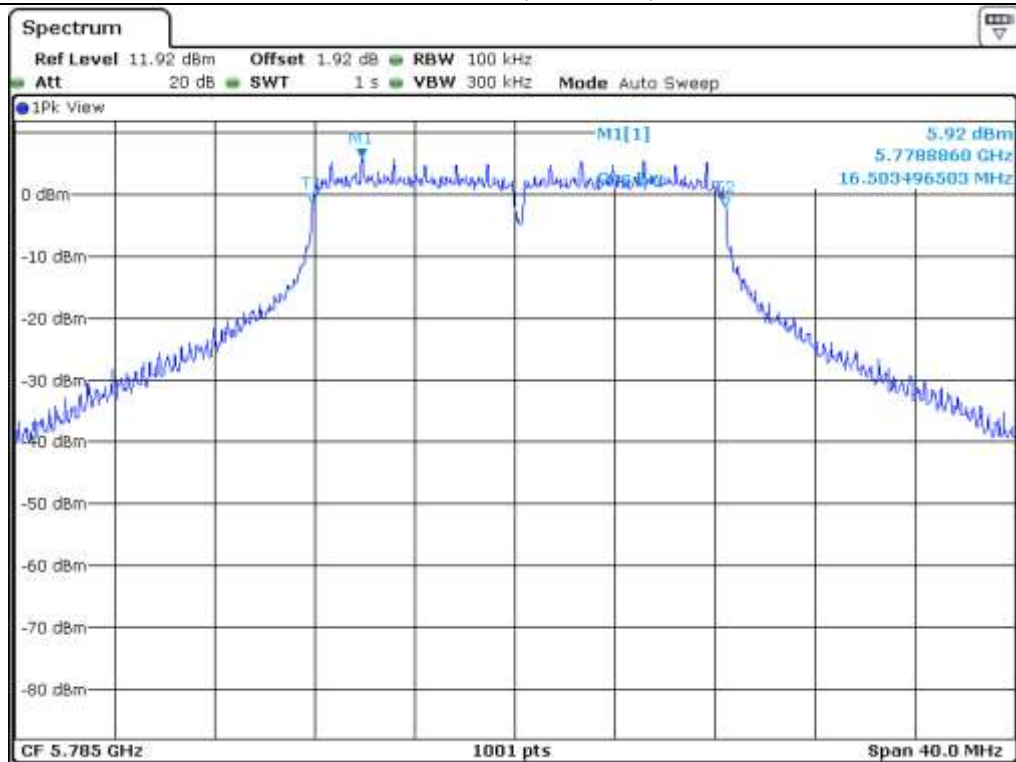
Middle Channel (5 200 MHz)



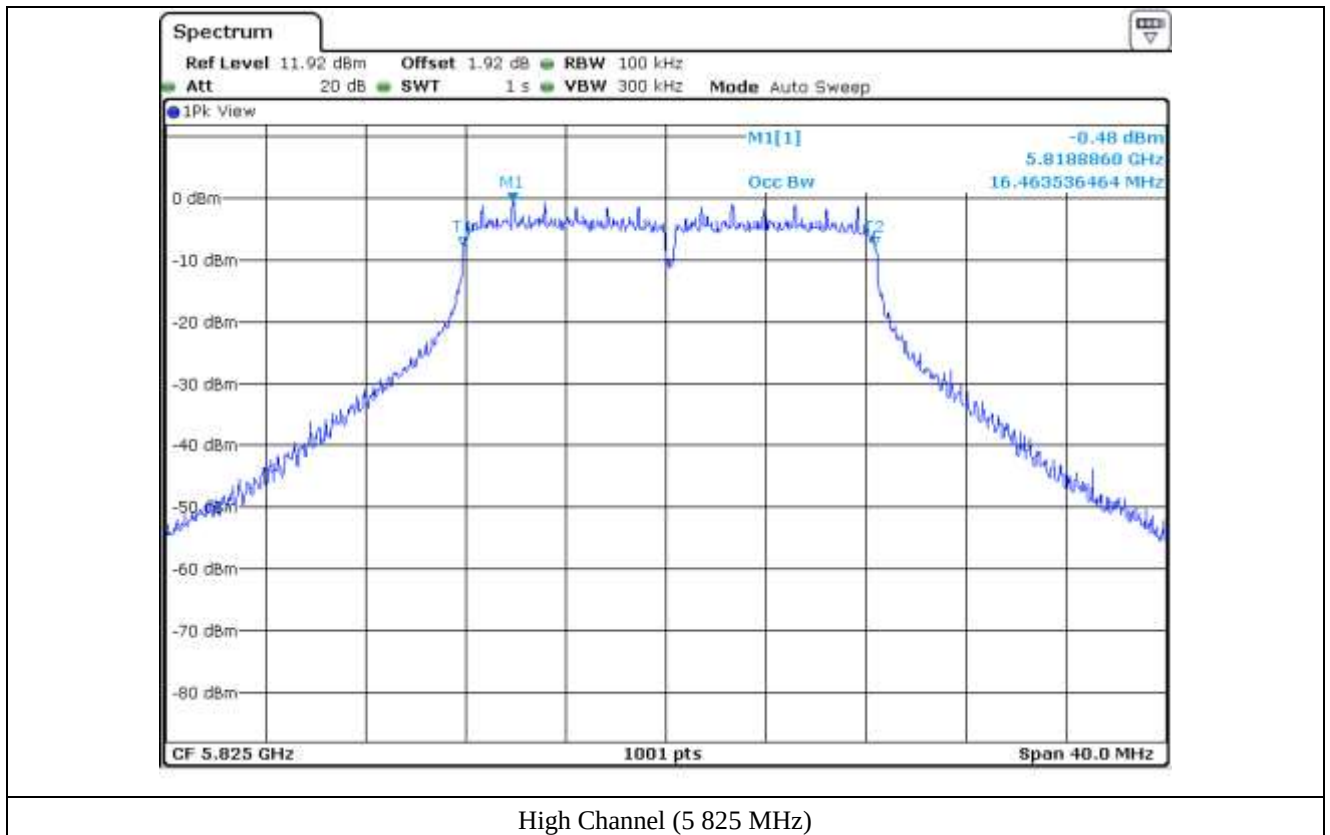
High Channel (5 240 MHz)



Low Channel (5.745 MHz)



Middle Channel (5.785 MHz)



7.4.1.2 Test data for Antenna 1

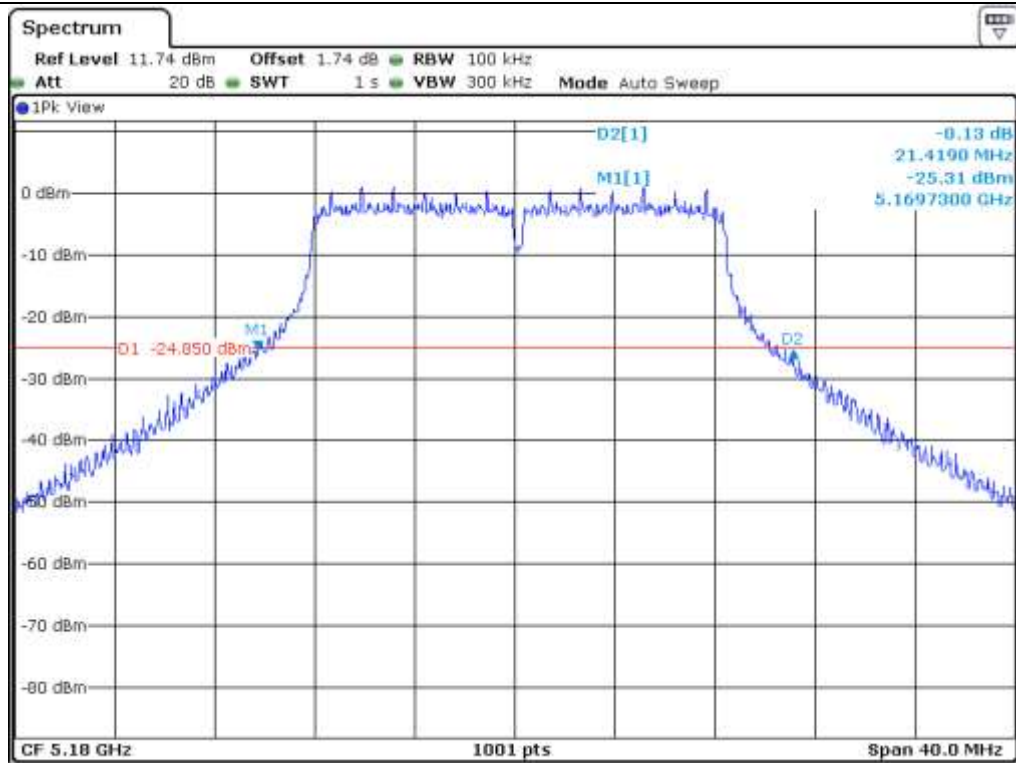
-. Test Date : May 02, 2016

-. Test Result : Pass

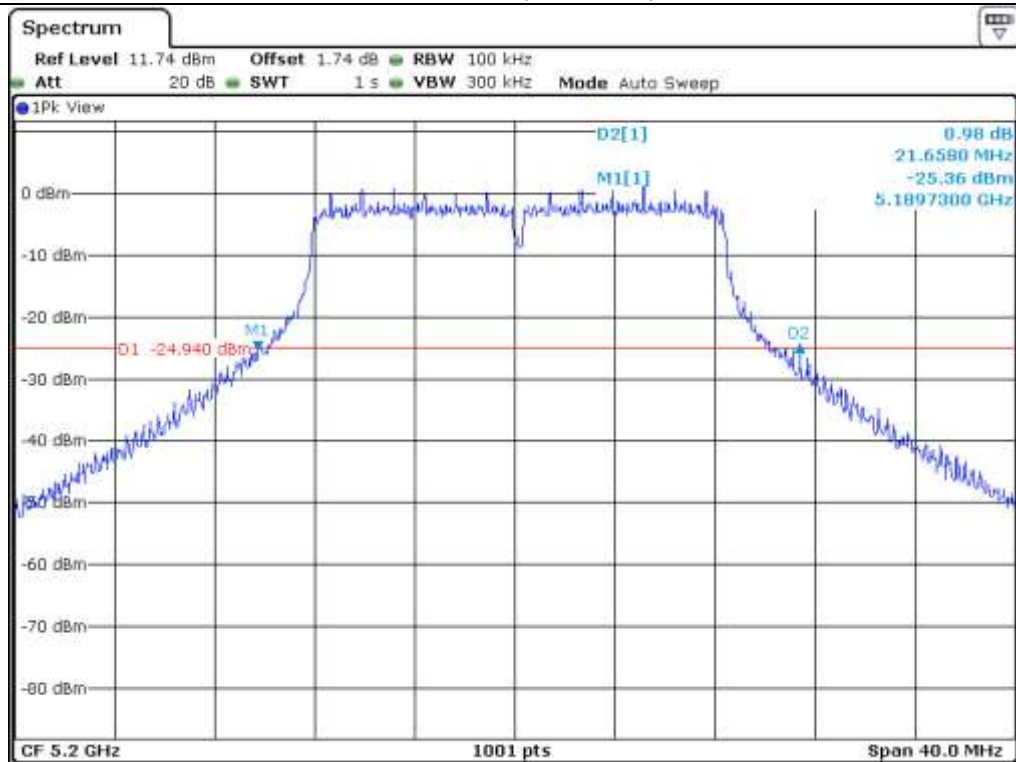
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180	21.42	16.50
	Middle	5 200	21.66	16.50
	High	5 240	21.94	16.46
5 725 ~ 5 850	Low	5 745	20.50	16.46
	Middle	5 785	21.42	16.82
	High	5 825	20.38	16.46



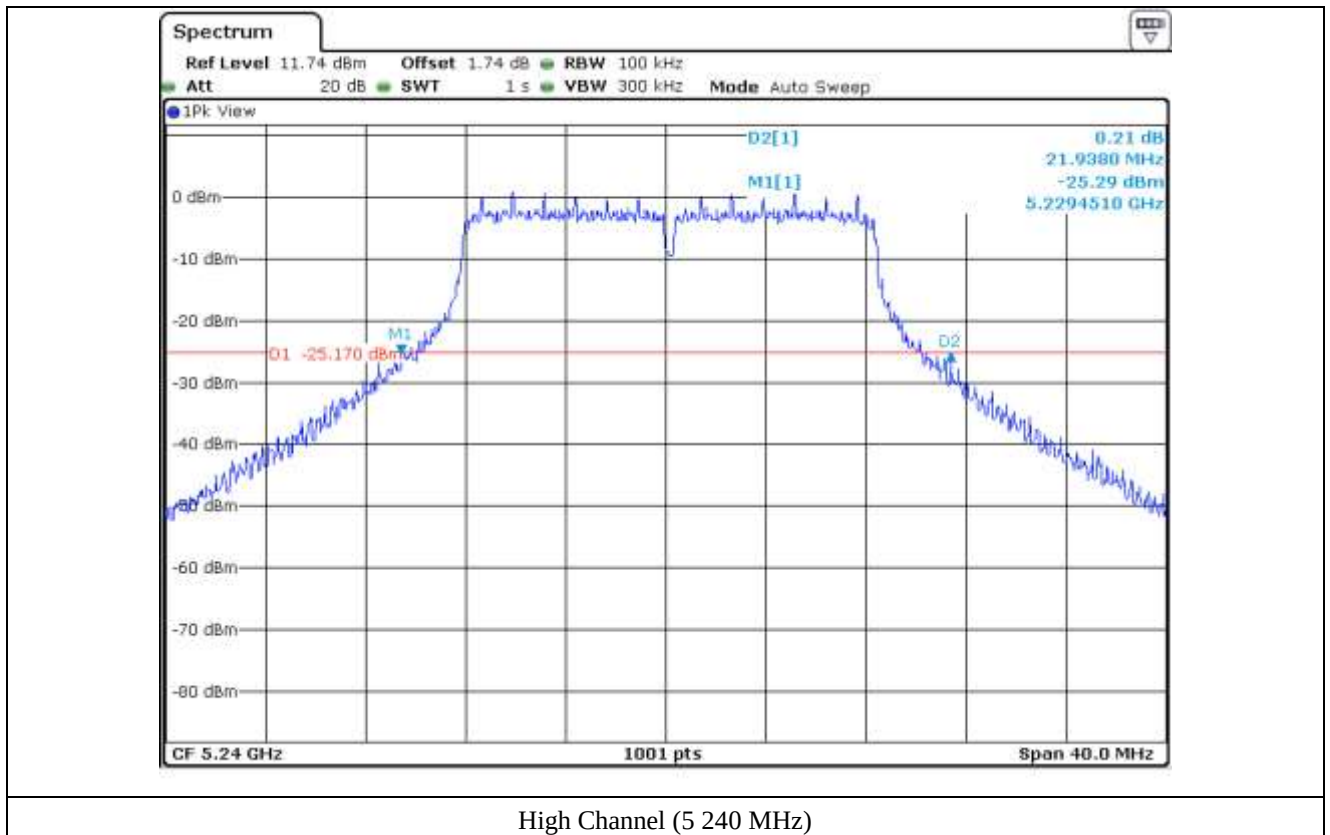
Tested by: Jun-Hui, Lee / Senior Engineer

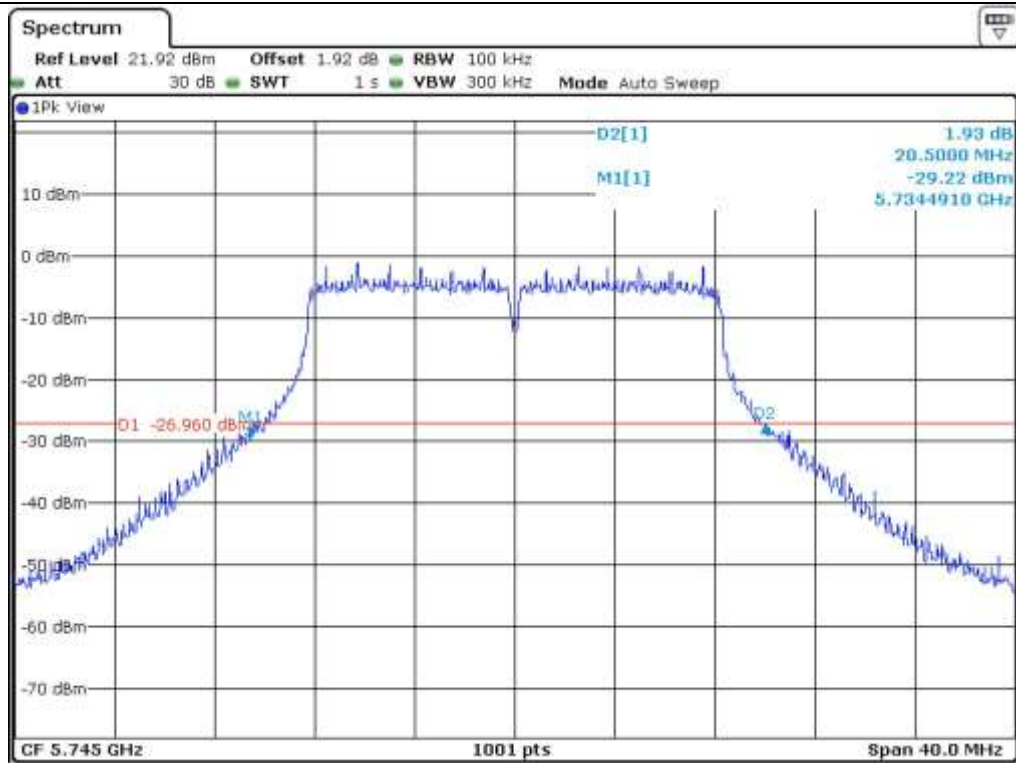


Low Channel (5 180 MHz)

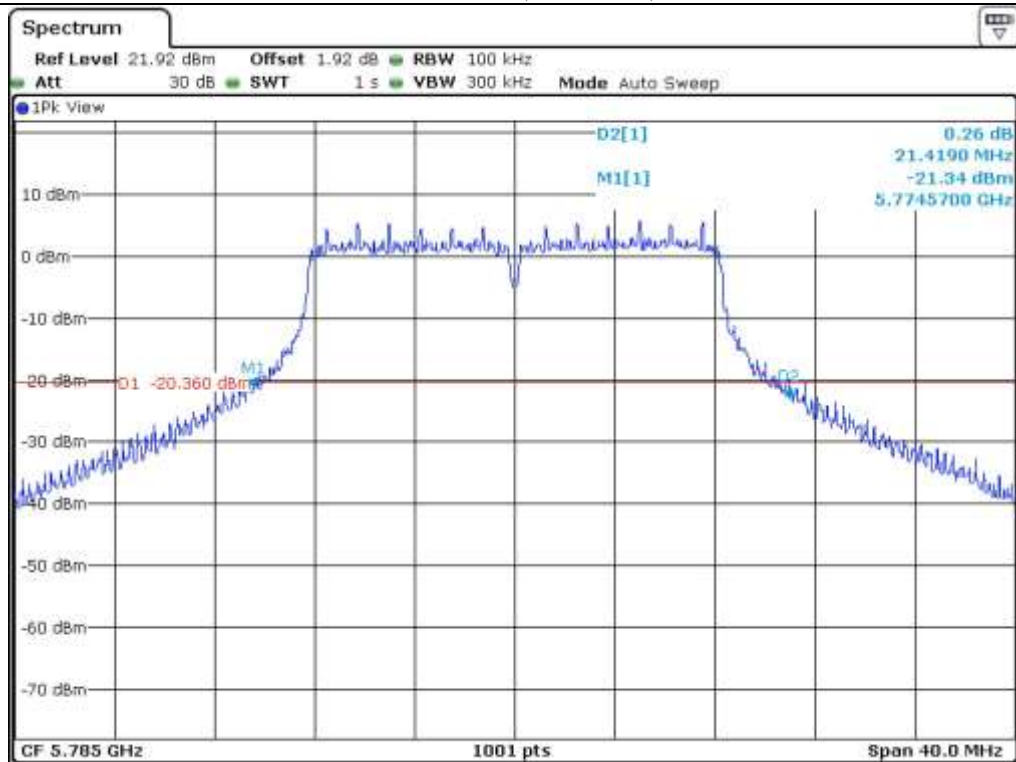


Middle Channel (5 200 MHz)

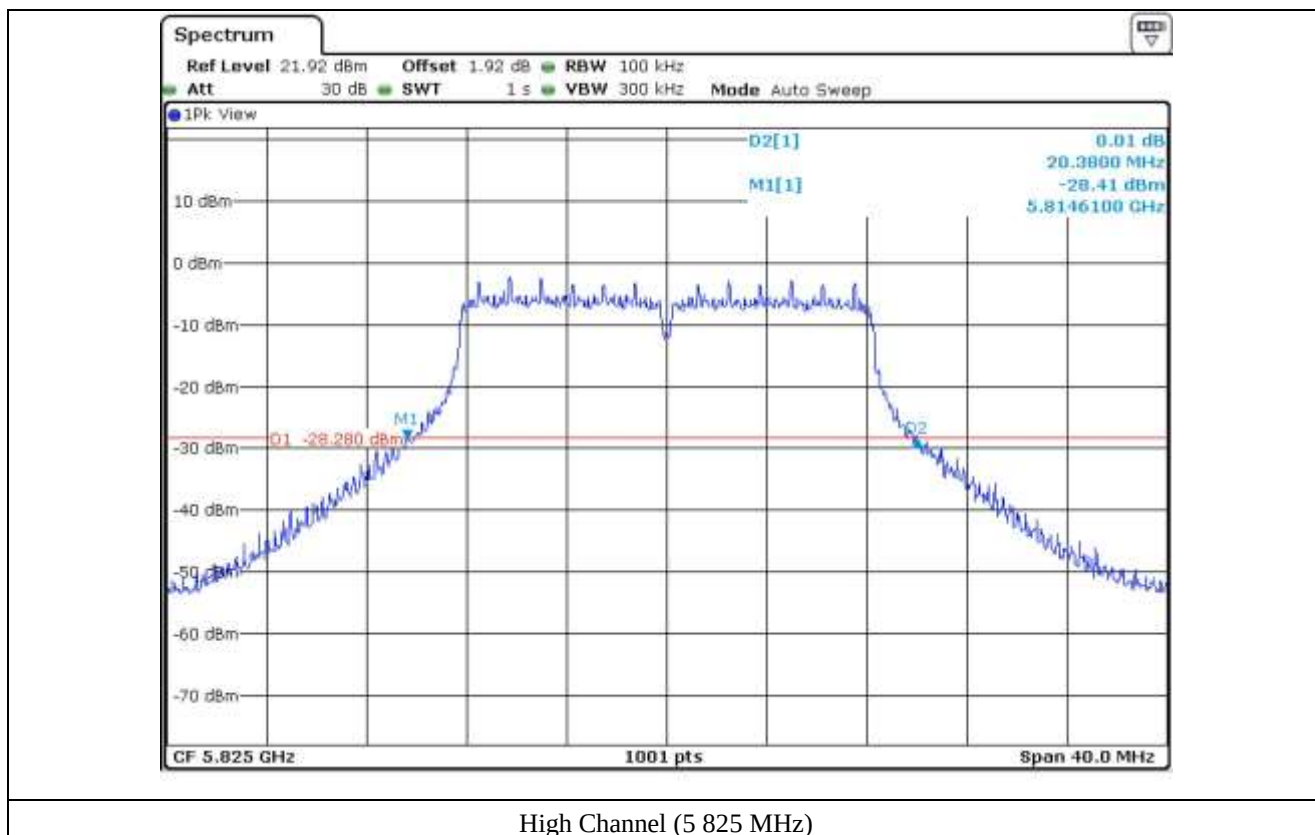


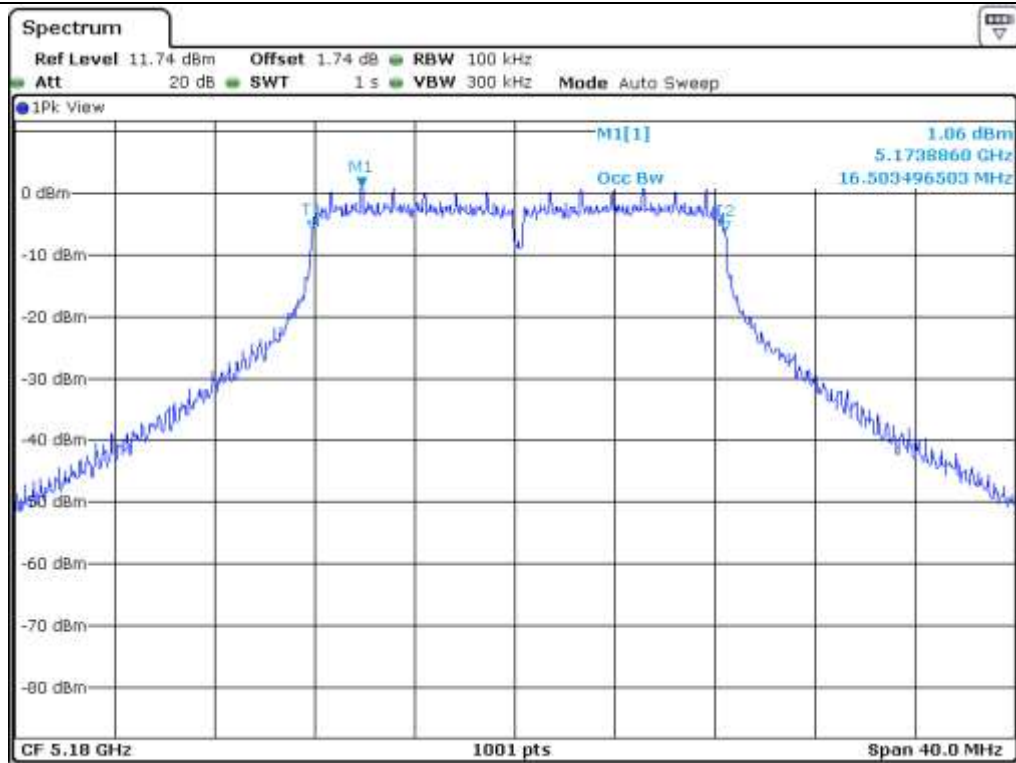


Low Channel (5.745 MHz)

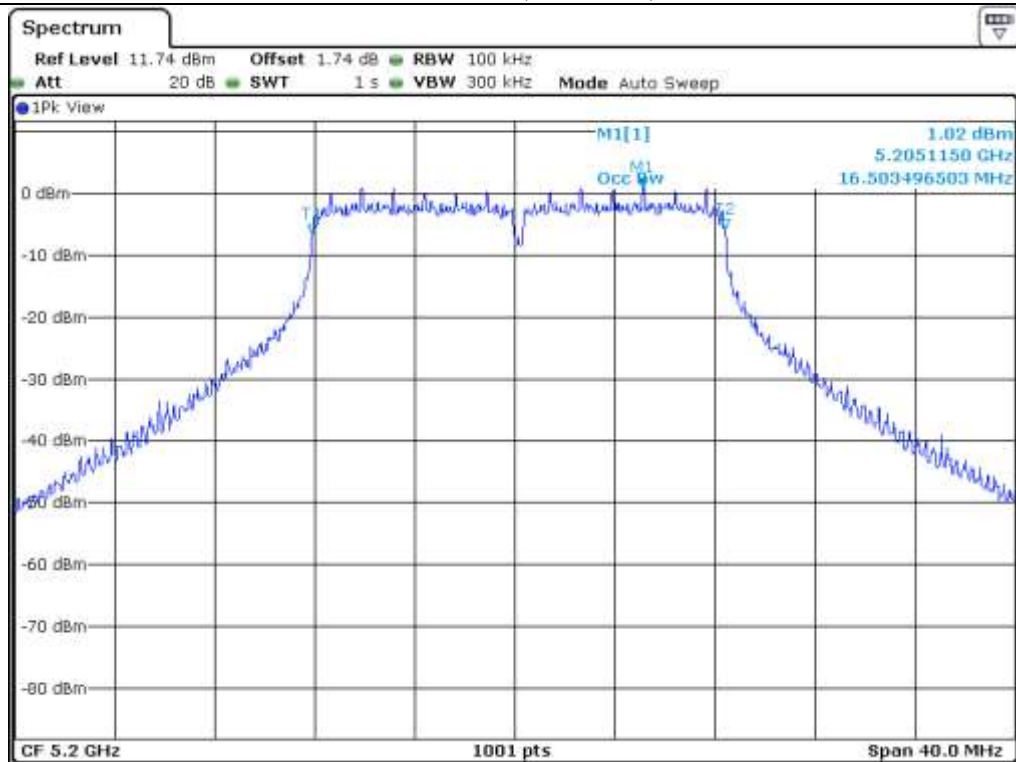


Middle Channel (5.785 MHz)

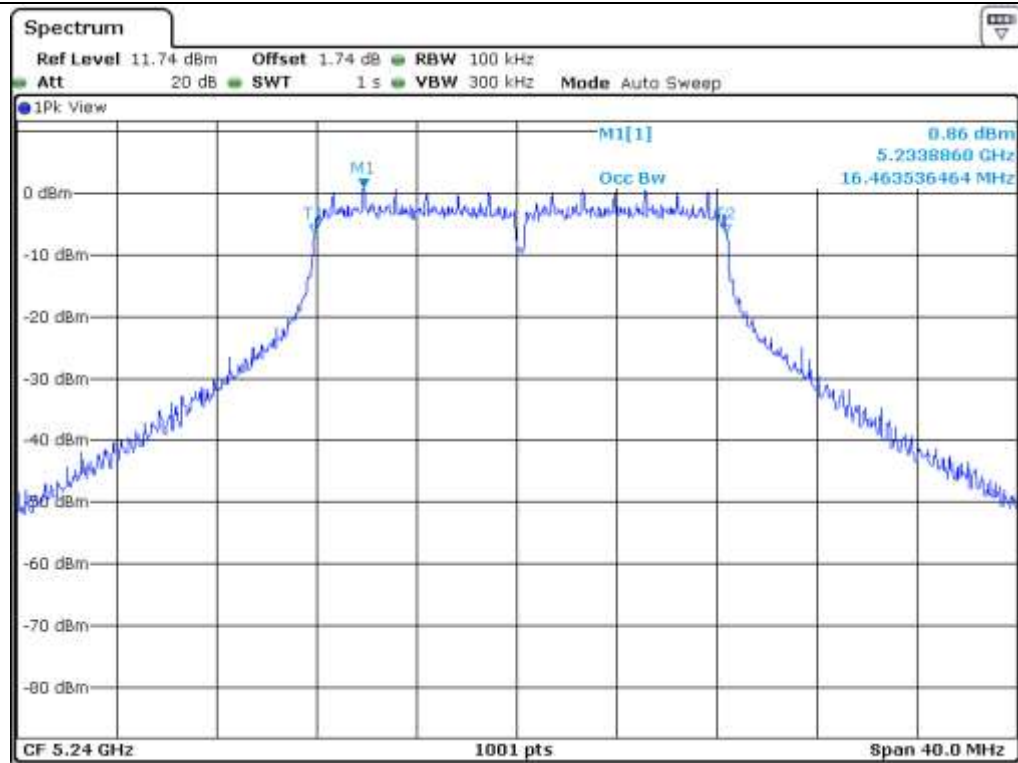




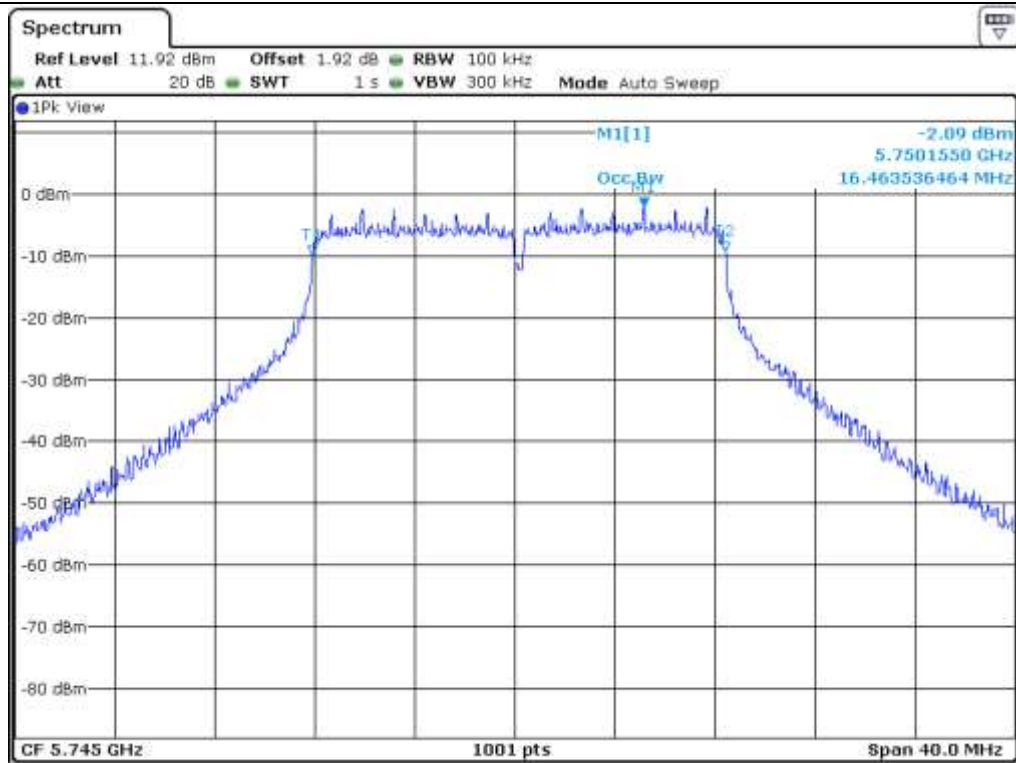
Low Channel (5 180 MHz)



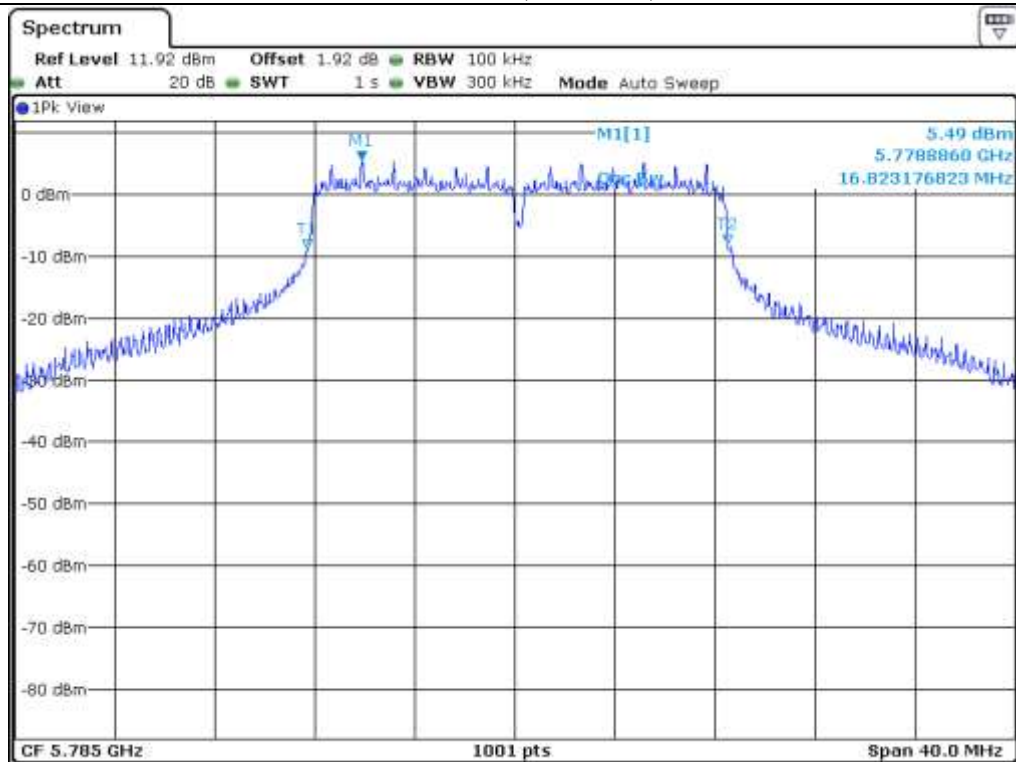
Middle Channel (5 200 MHz)



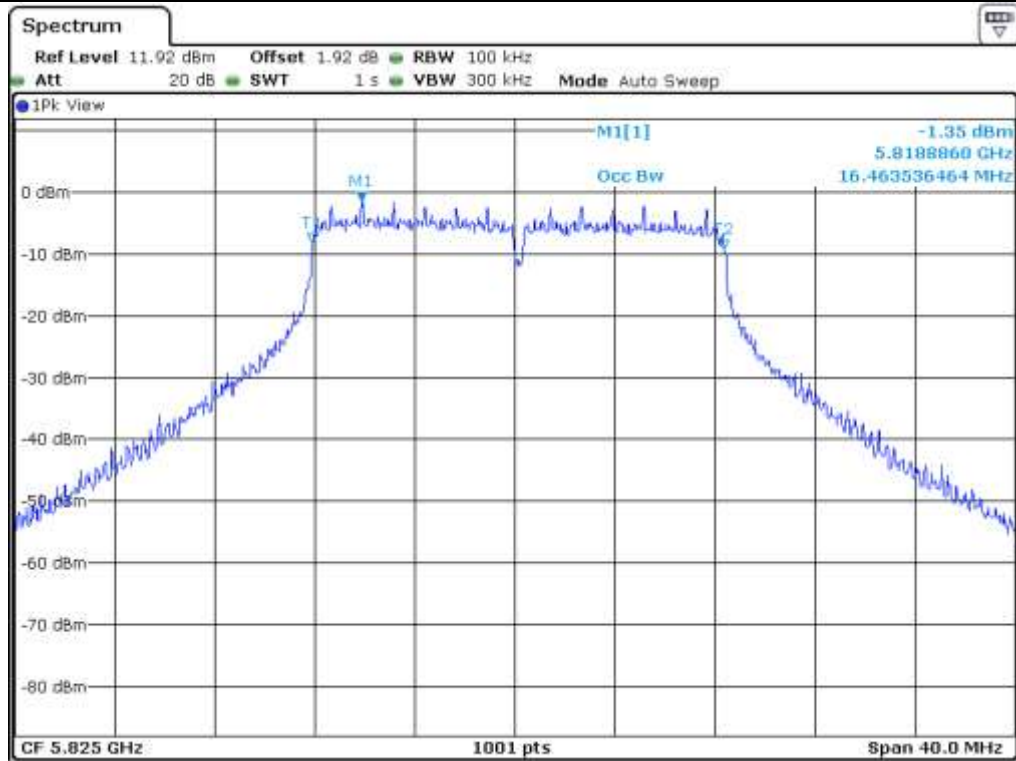
High Channel (5 240 MHz)



Low Channel (5.745 MHz)



Middle Channel (5.785 MHz)



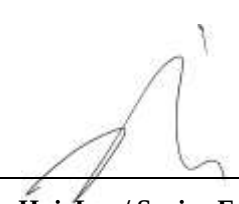
High Channel (5 825 MHz)

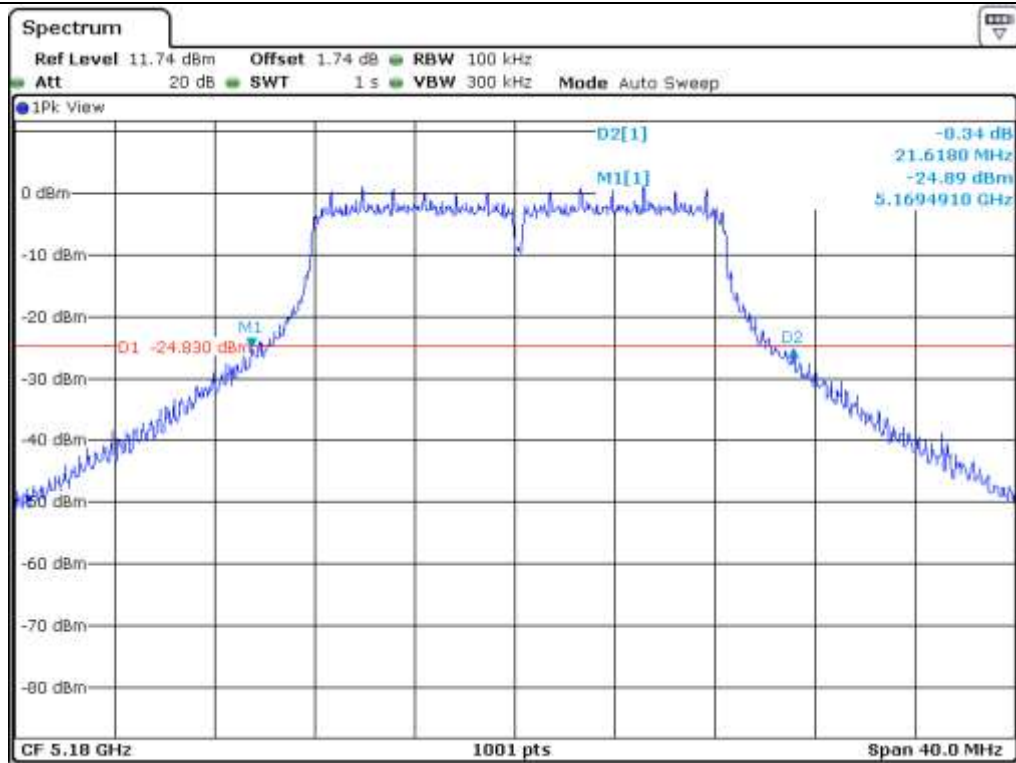
7.4.1.3 Test data for Antenna 2

-. Test Date : May 02, 2016

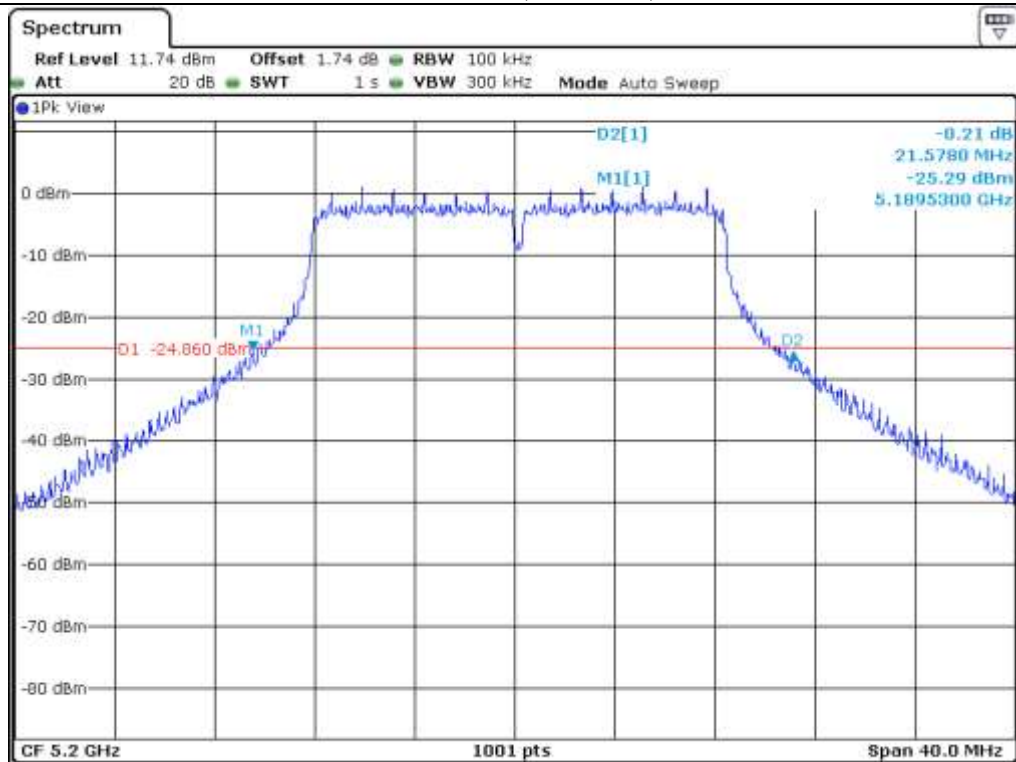
-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180	21.62	16.50
	Middle	5 200	21.58	16.46
	High	5 240	21.30	16.46
5 725 ~ 5 850	Low	5 745	20.98	16.46
	Middle	5 785	22.78	16.50
	High	5 825	20.74	16.46

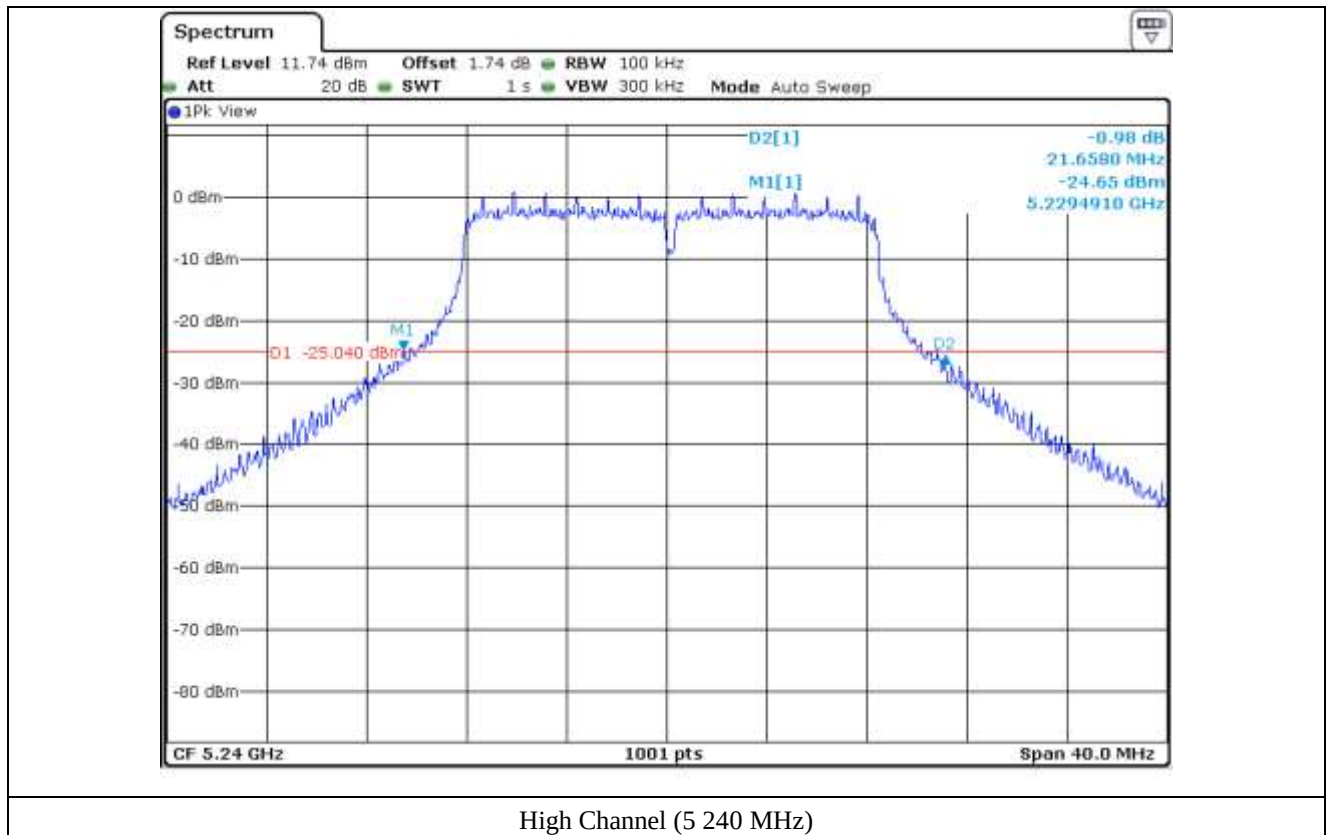

Tested by: Jun-Hui, Lee / Senior Engineer

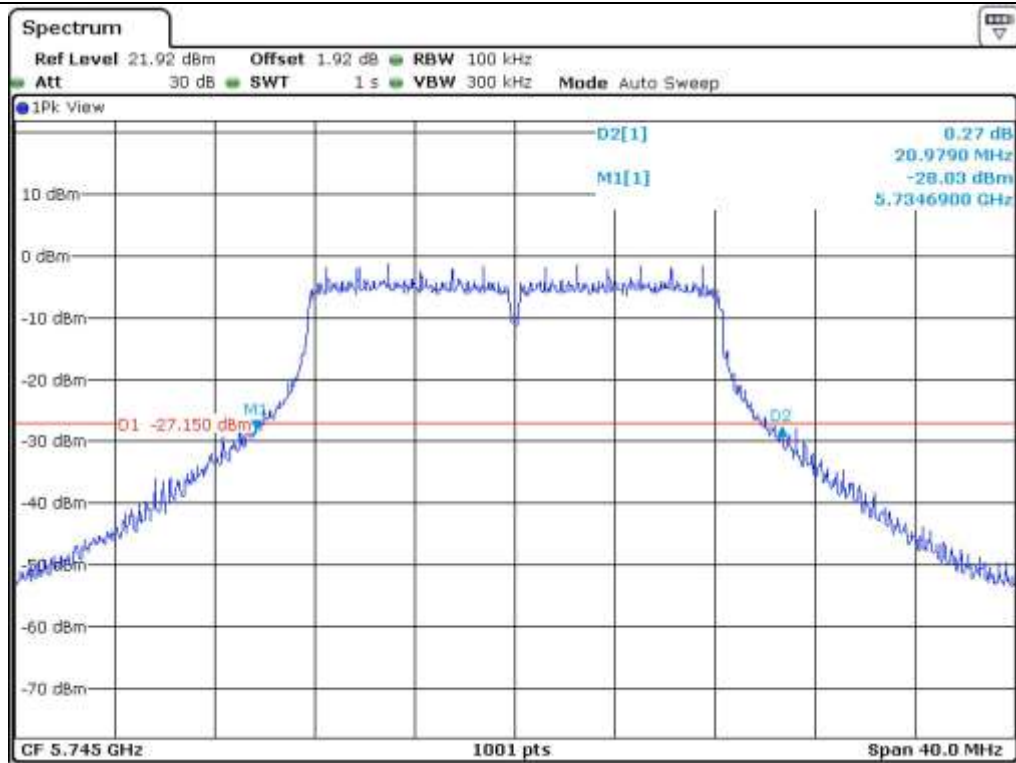


Low Channel (5 180 MHz)

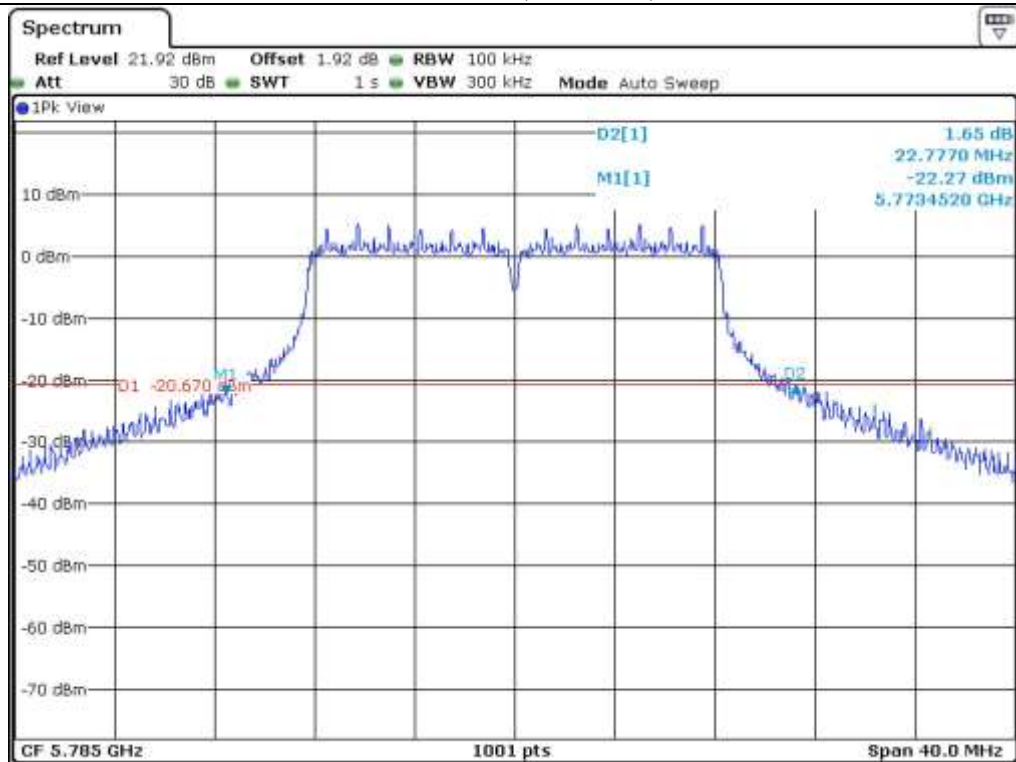


Middle Channel (5 200 MHz)

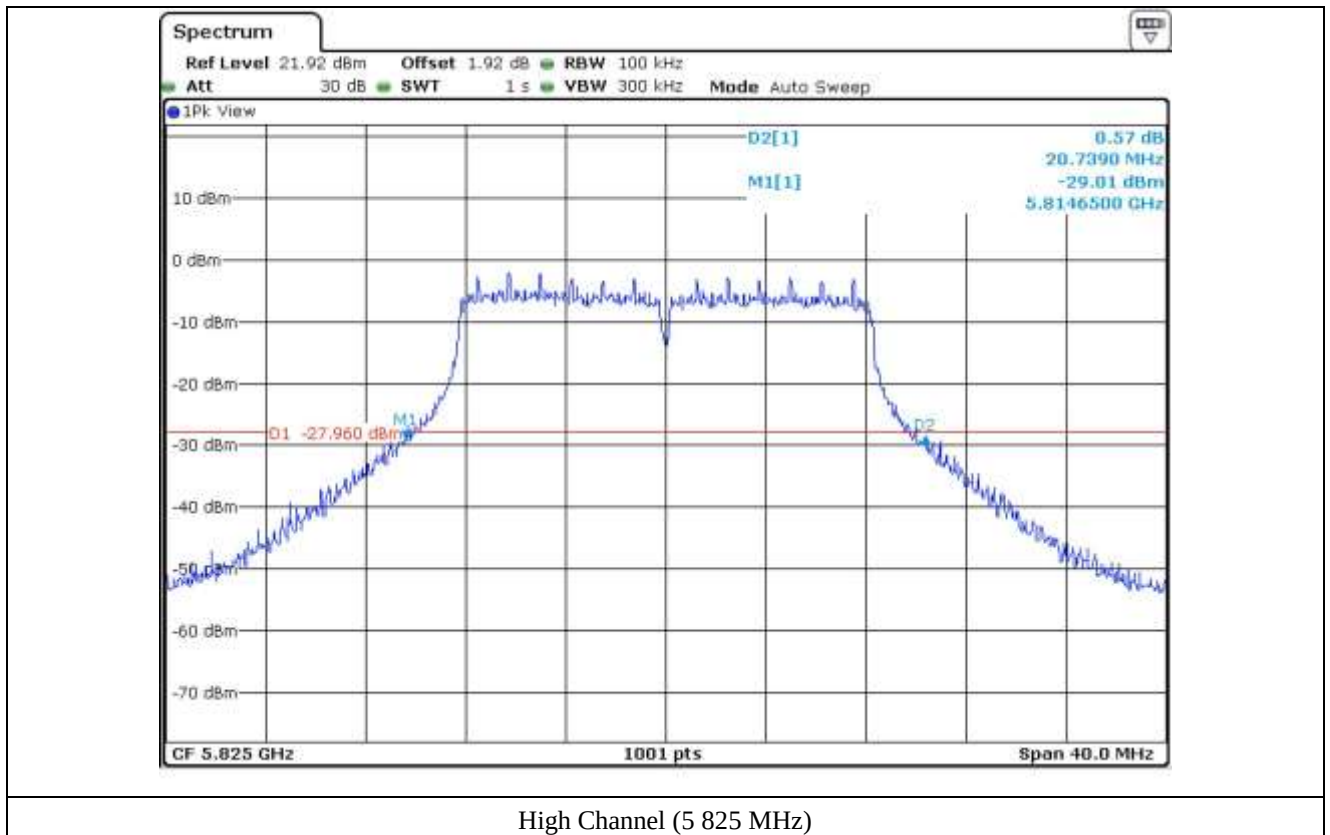


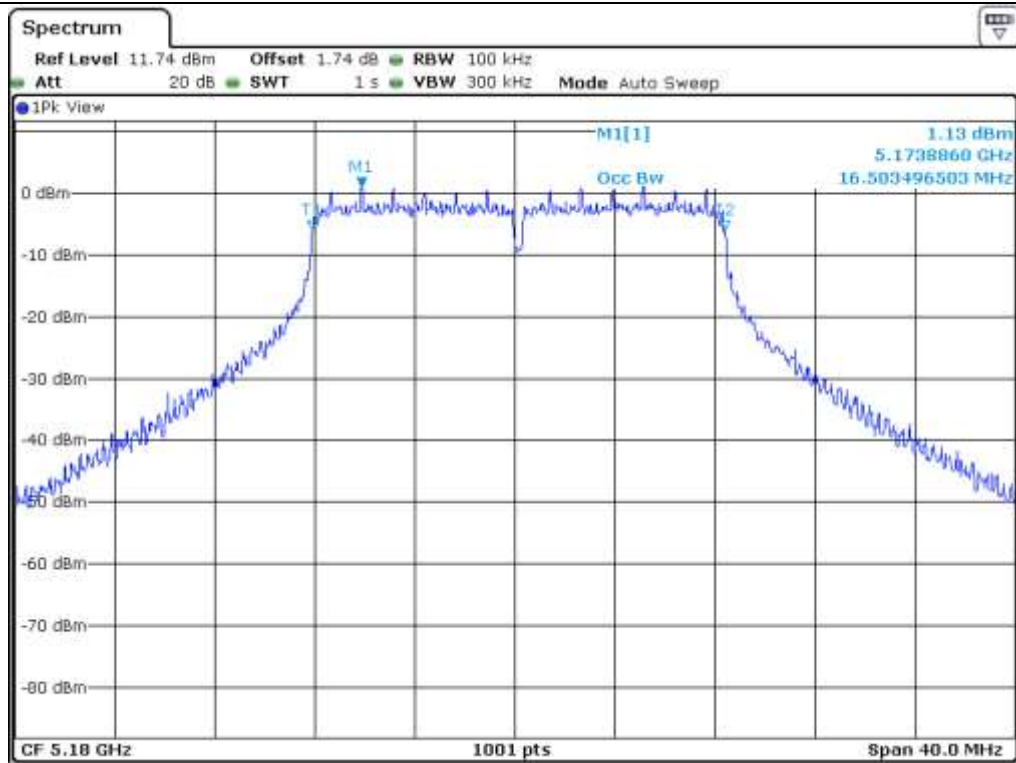


Low Channel (5.745 MHz)

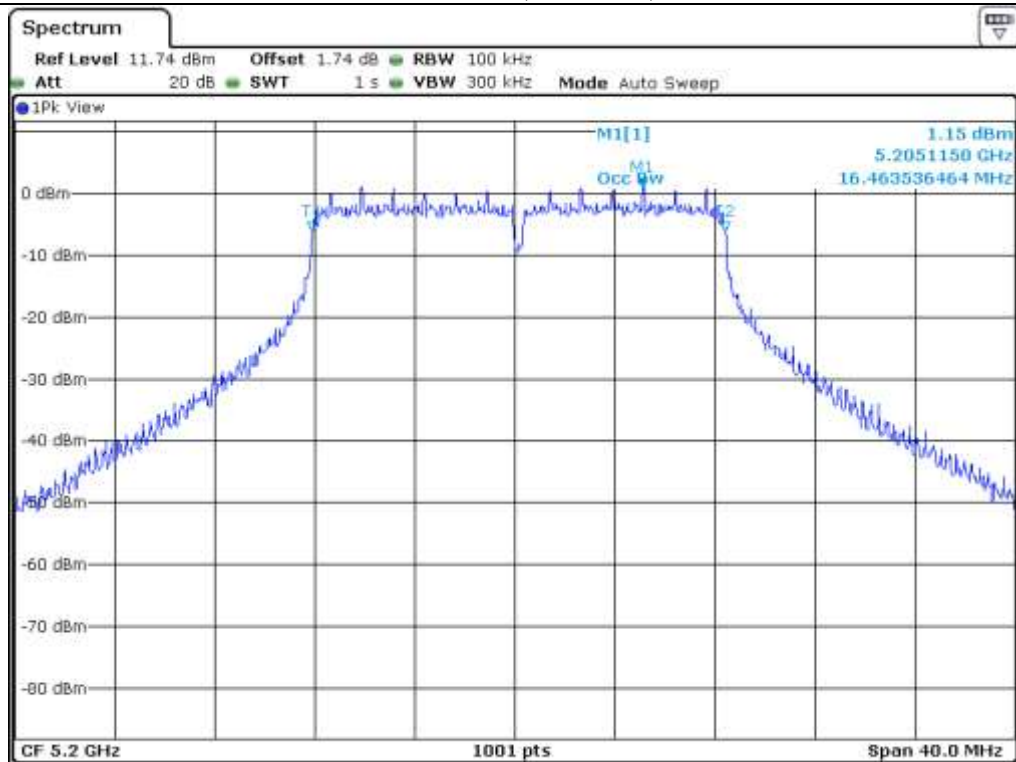


Middle Channel (5.785 MHz)

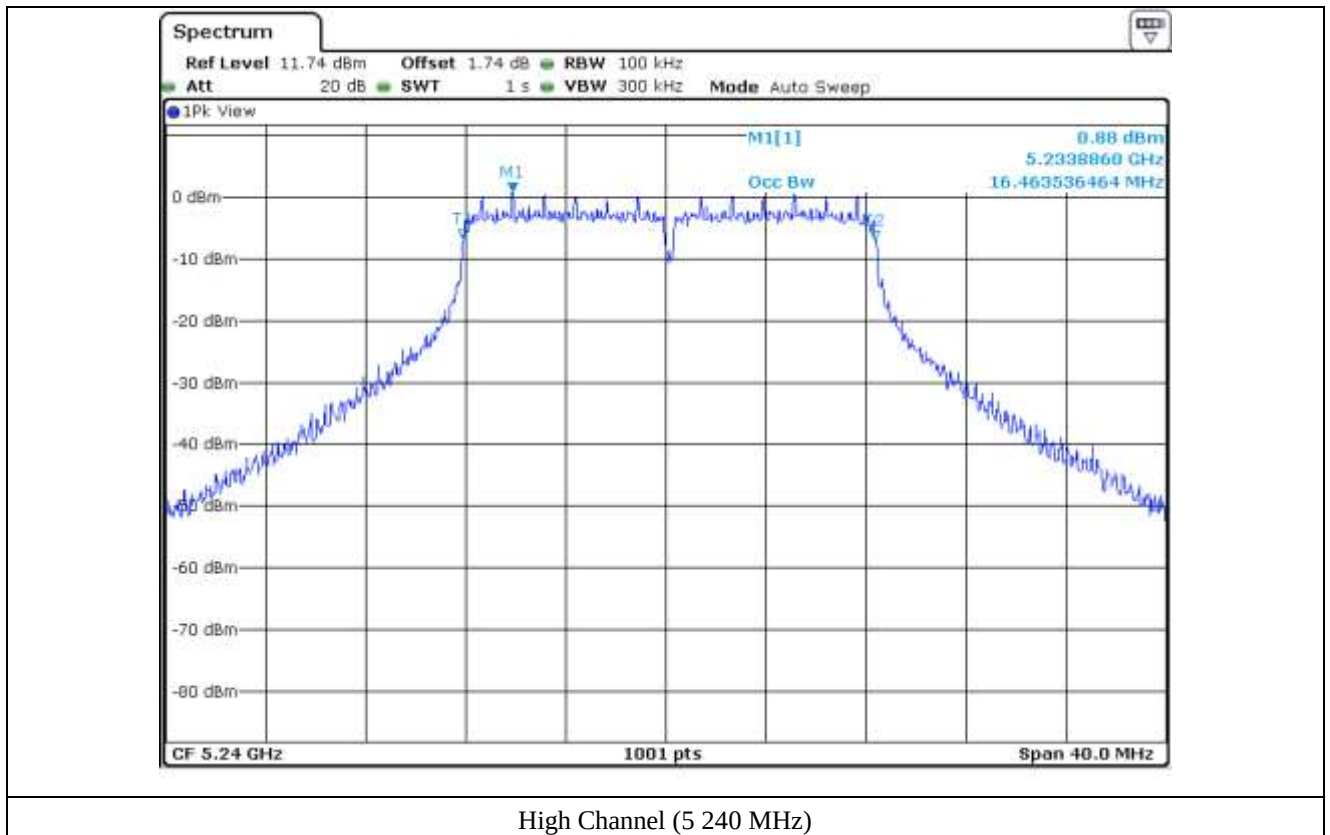


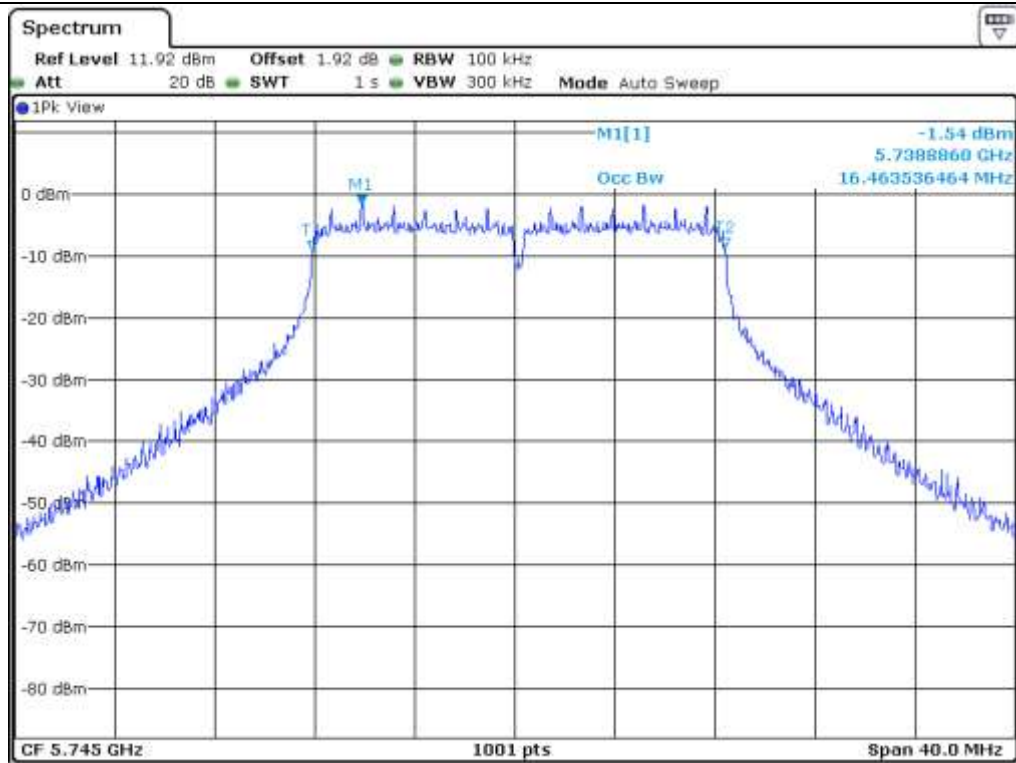


Low Channel (5 180 MHz)

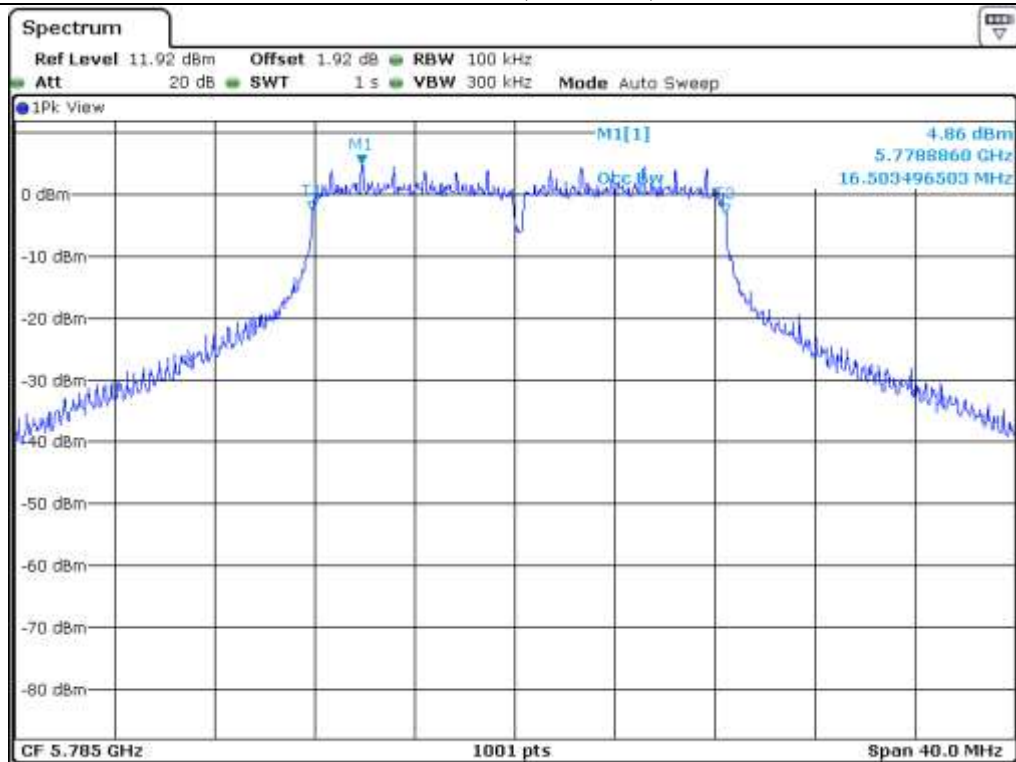


Middle Channel (5 200 MHz)

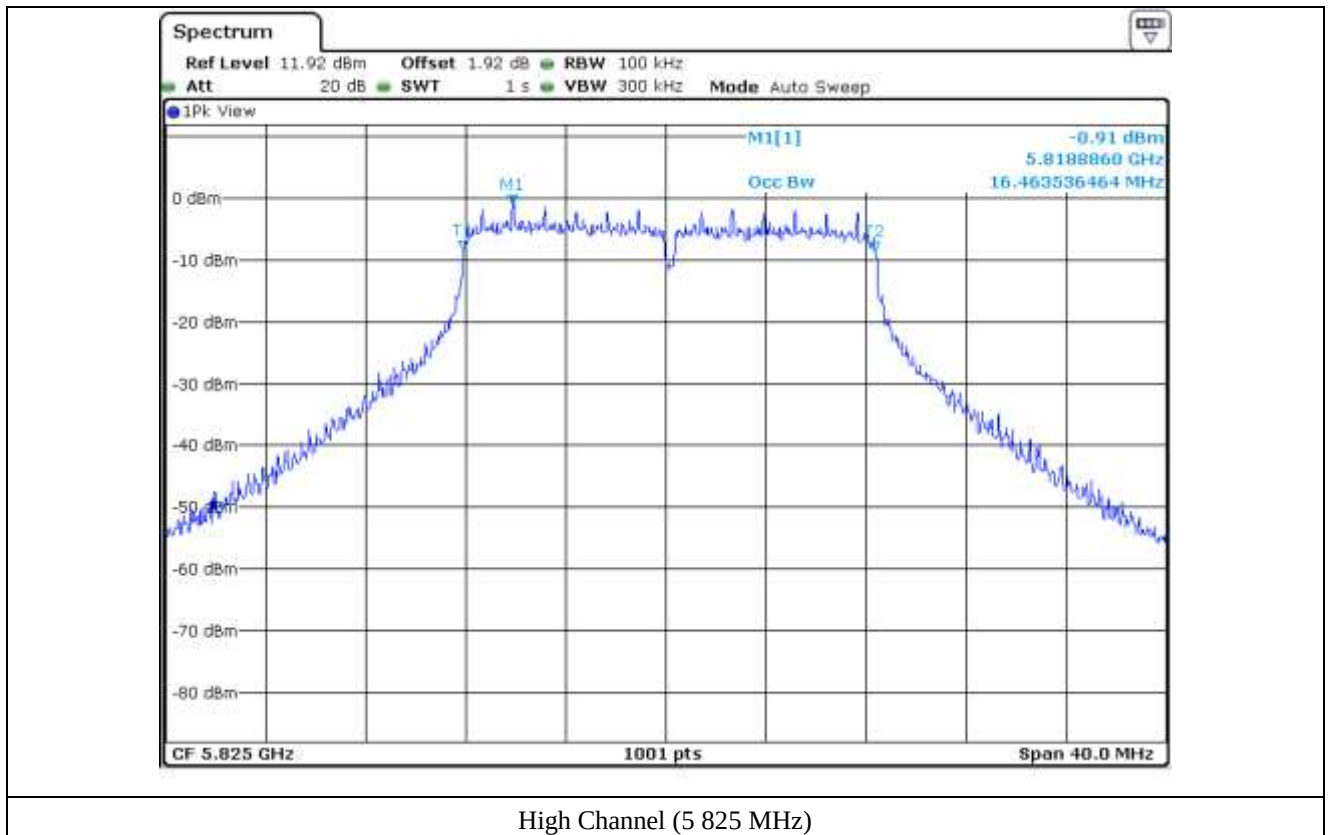




Low Channel (5.745 MHz)



Middle Channel (5.785 MHz)



7.4.2 Test data for 802.11n_HT20 RLAN Mode

7.4.2.1 Test data for Antenna 0

-. Test Date : May 02, 2016

-. Test Result : Pass

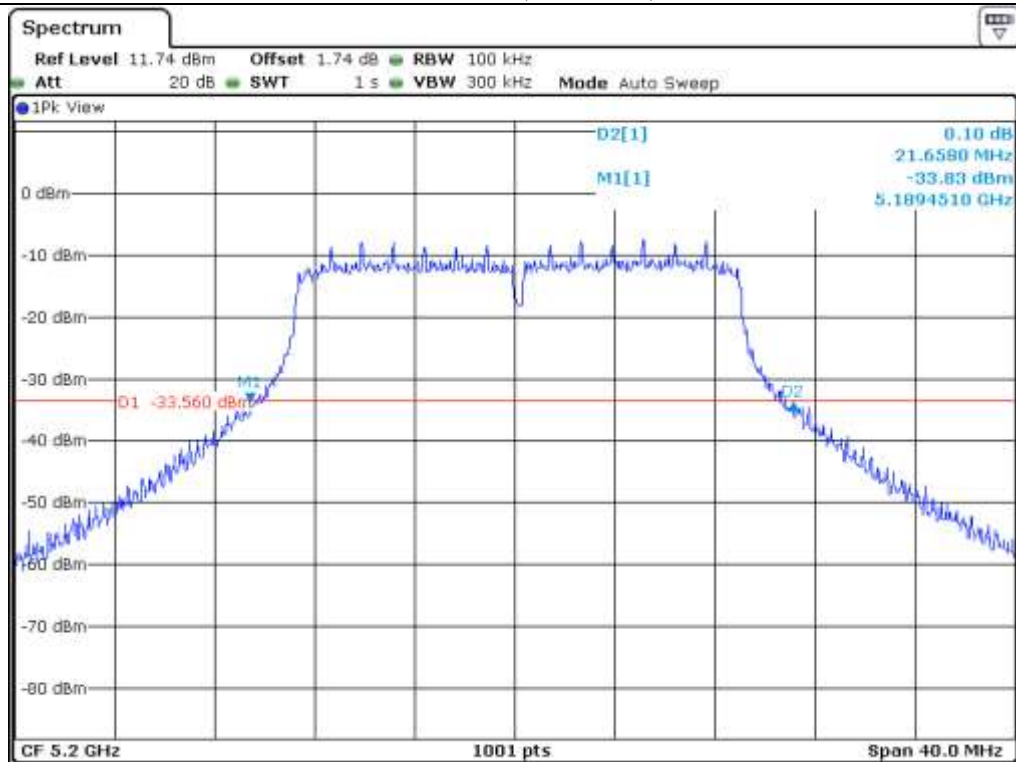
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180	21.58	17.66
	Middle	5 200	21.66	17.66
	High	5 240	21.98	17.66
5 725 ~ 5 850	Low	5 745	20.86	17.66
	Middle	5 785	21.98	17.70
	High	5 825	21.02	17.66



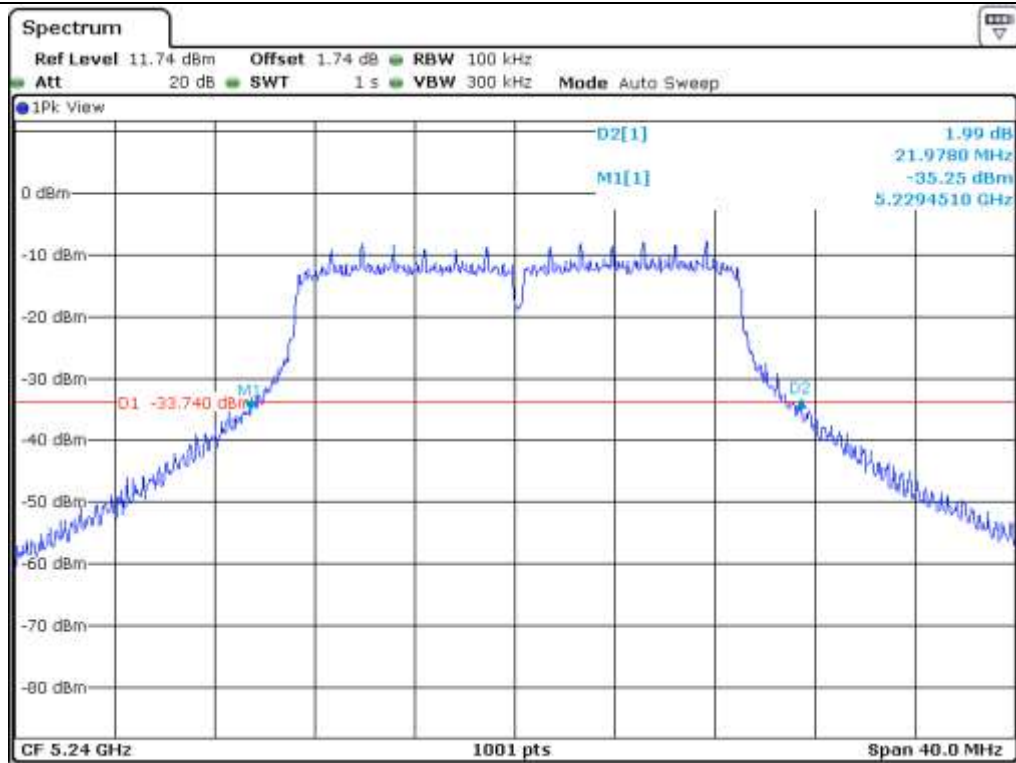
Tested by: Jun-Hui, Lee / Senior Engineer



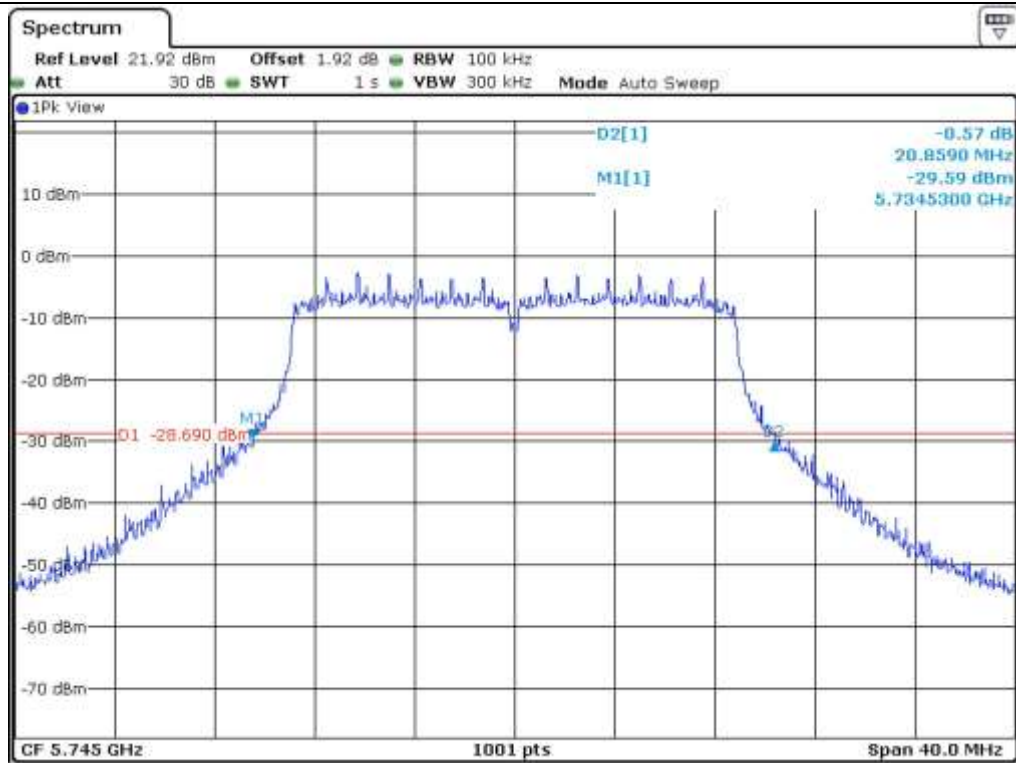
Low Channel (5 180 MHz)



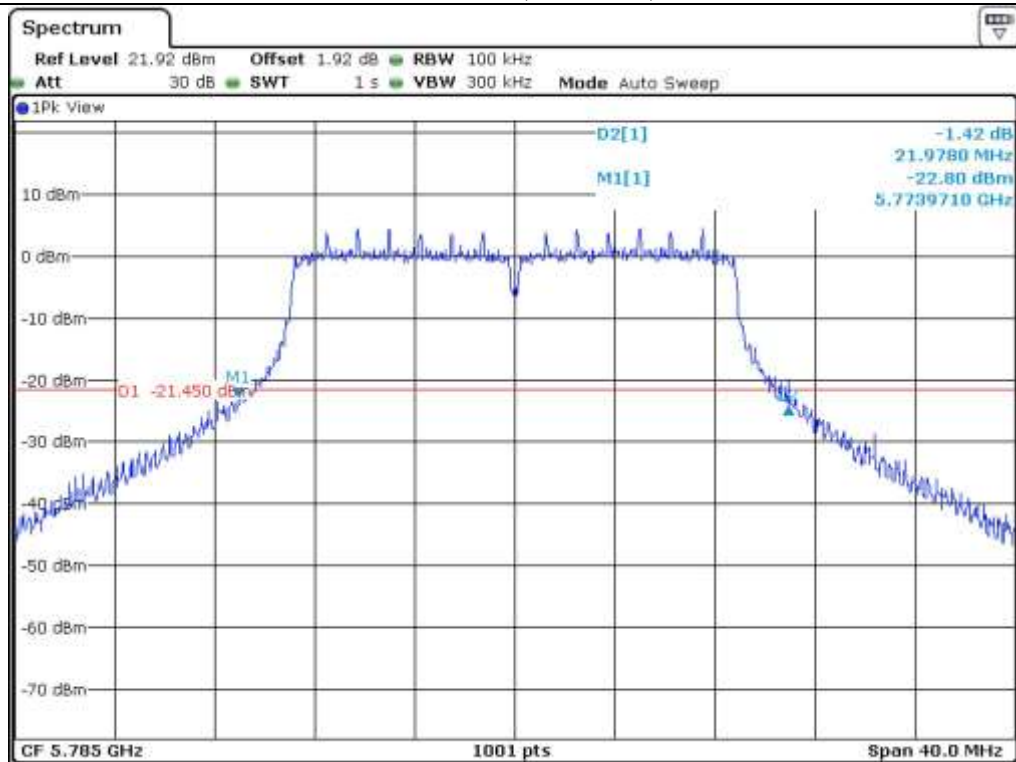
Middle Channel (5 200 MHz)



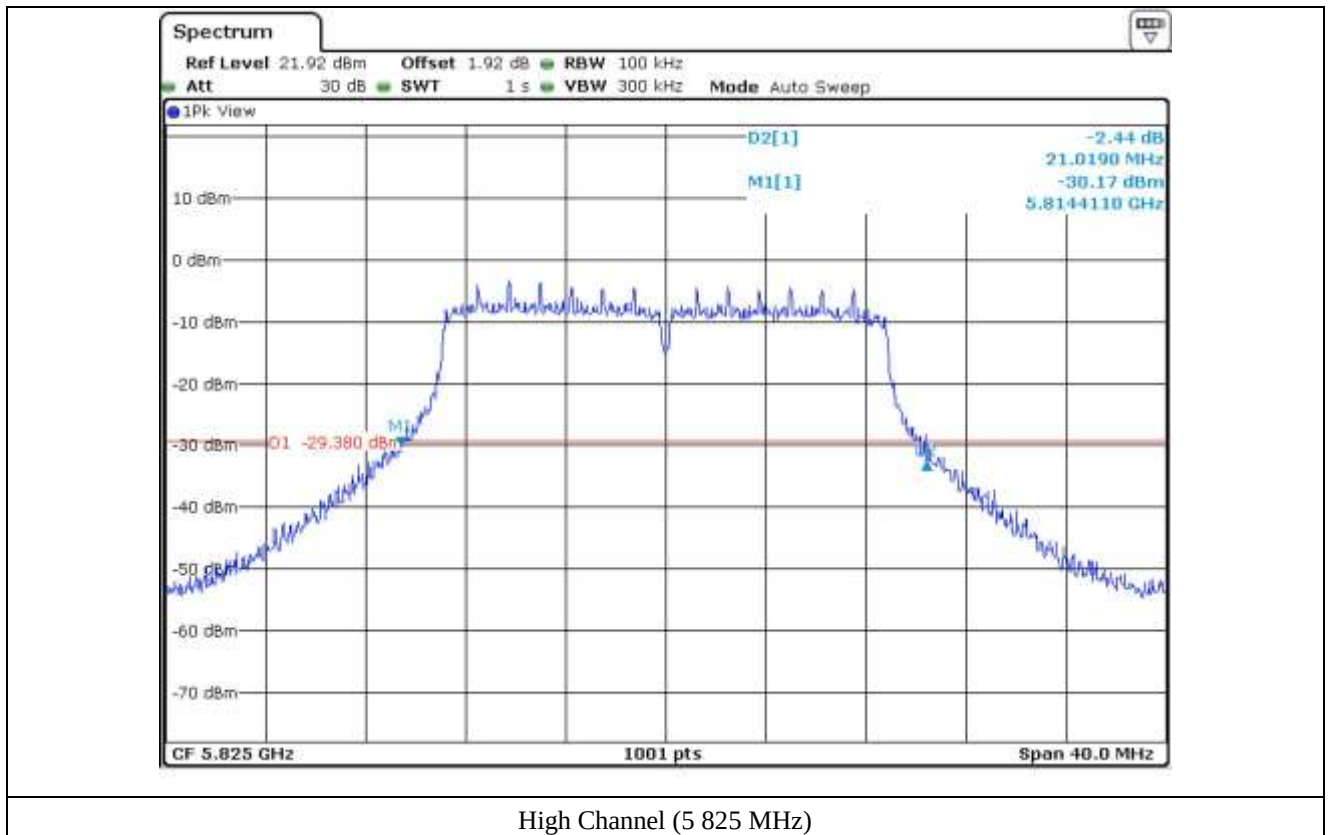
High Channel (5 240 MHz)

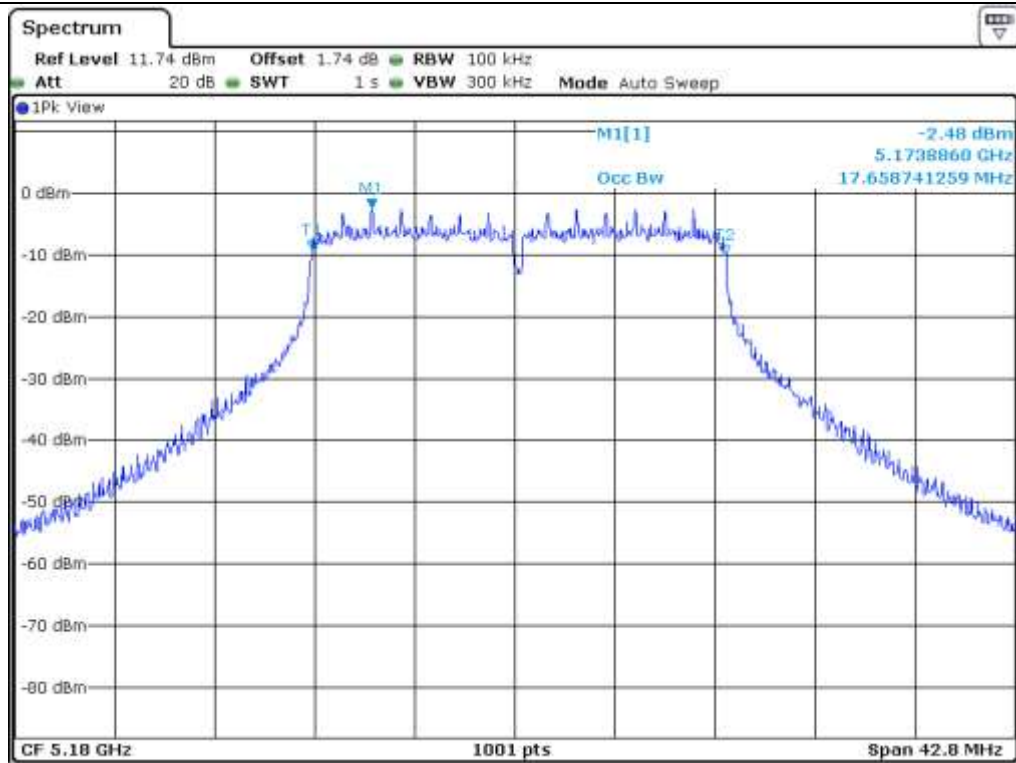


Low Channel (5.745 MHz)

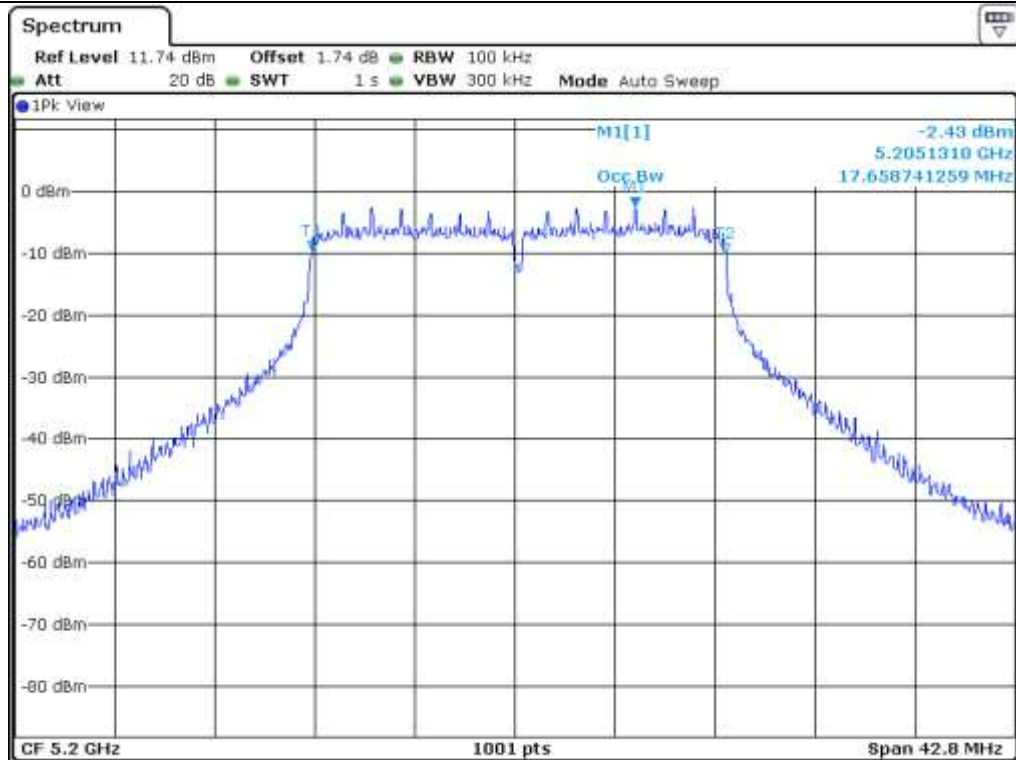


Middle Channel (5.785 MHz)

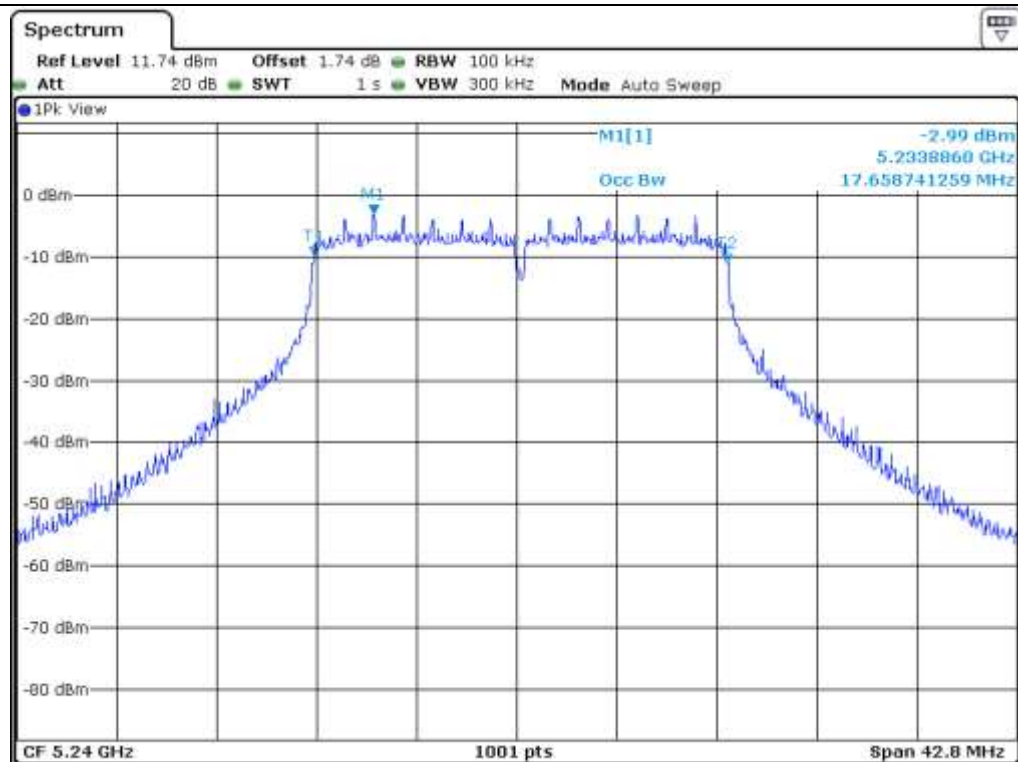




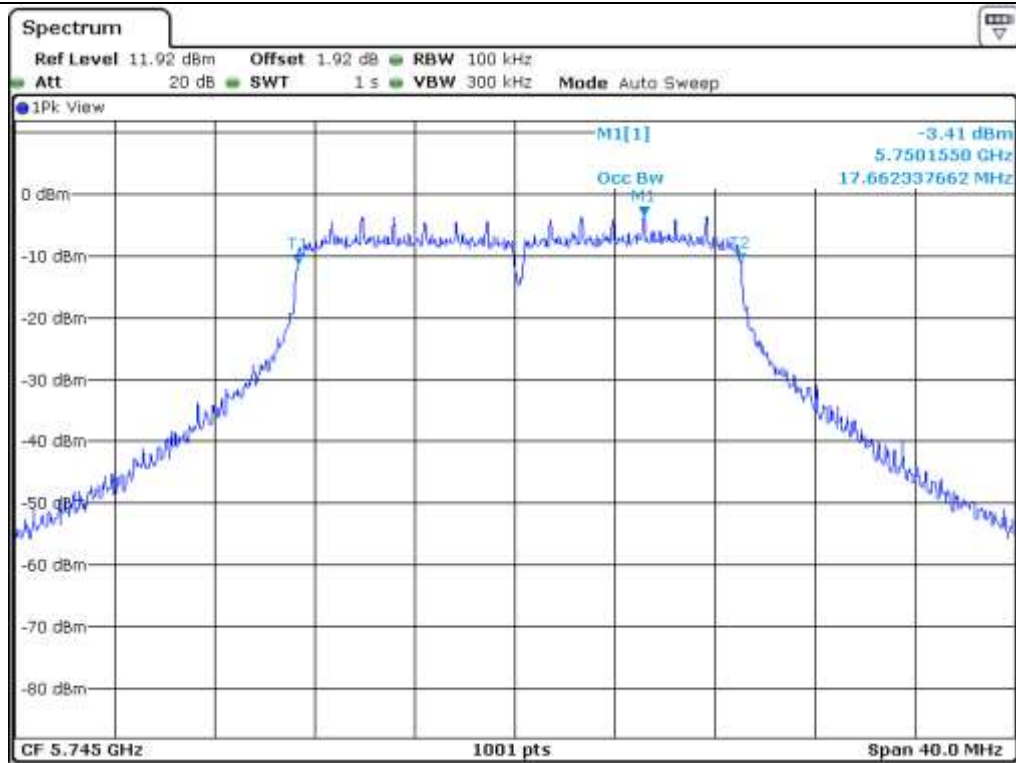
Low Channel (5 180 MHz)



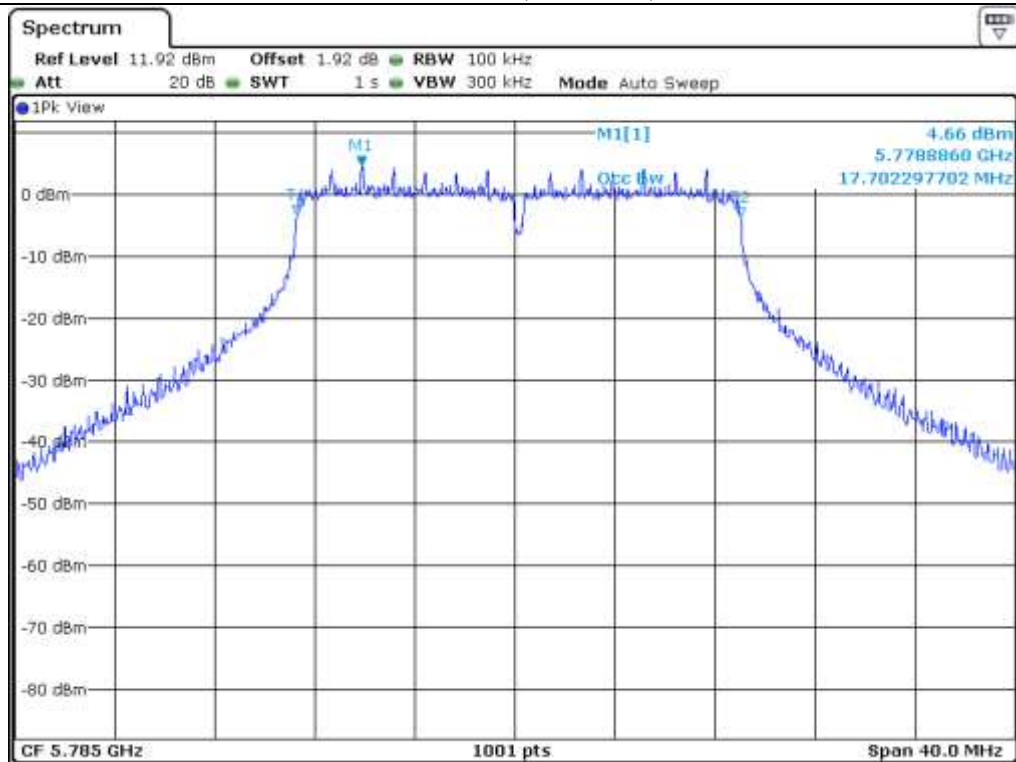
Middle Channel (5 200 MHz)



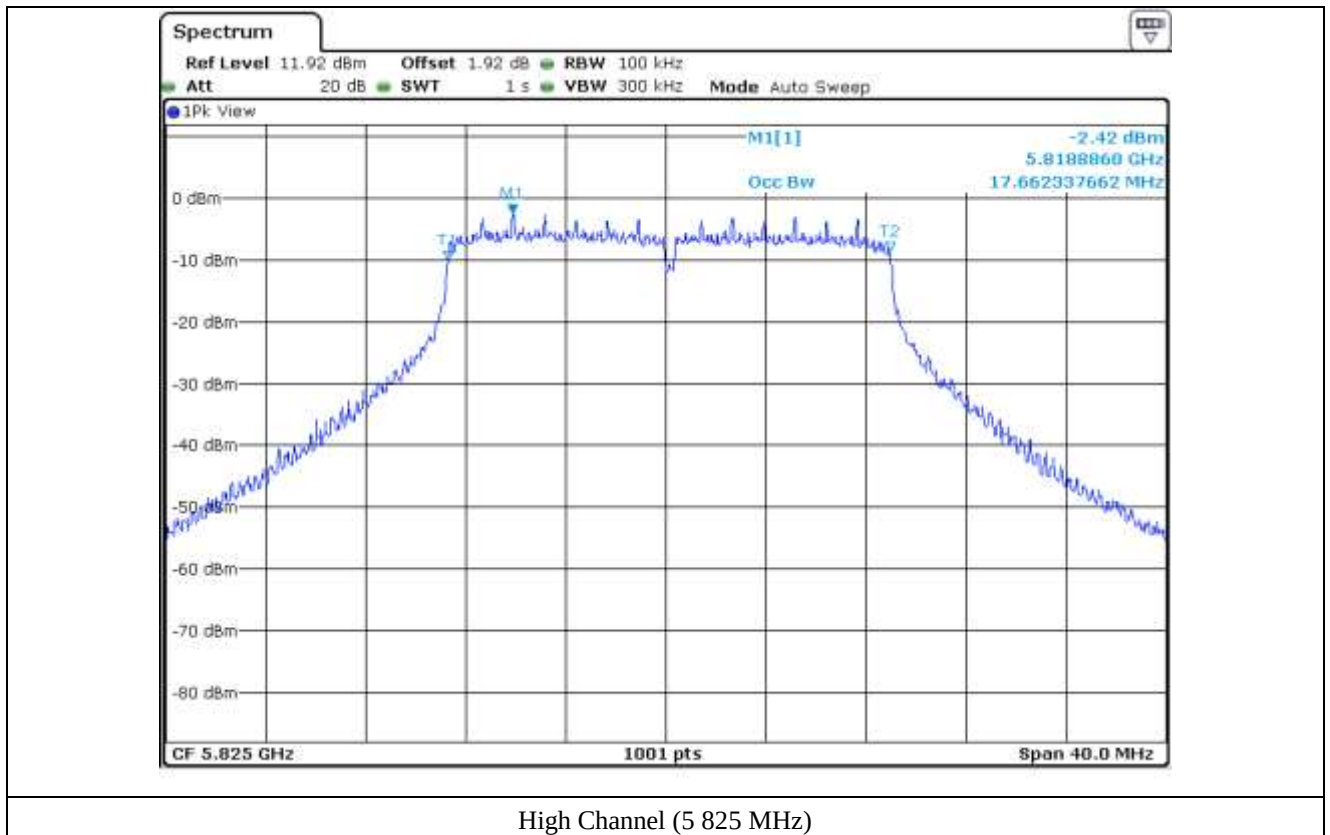
High Channel (5 240 MHz)



Low Channel (5.745 MHz)



Middle Channel (5.785 MHz)



7.4.2.2 Test data for Antenna 1

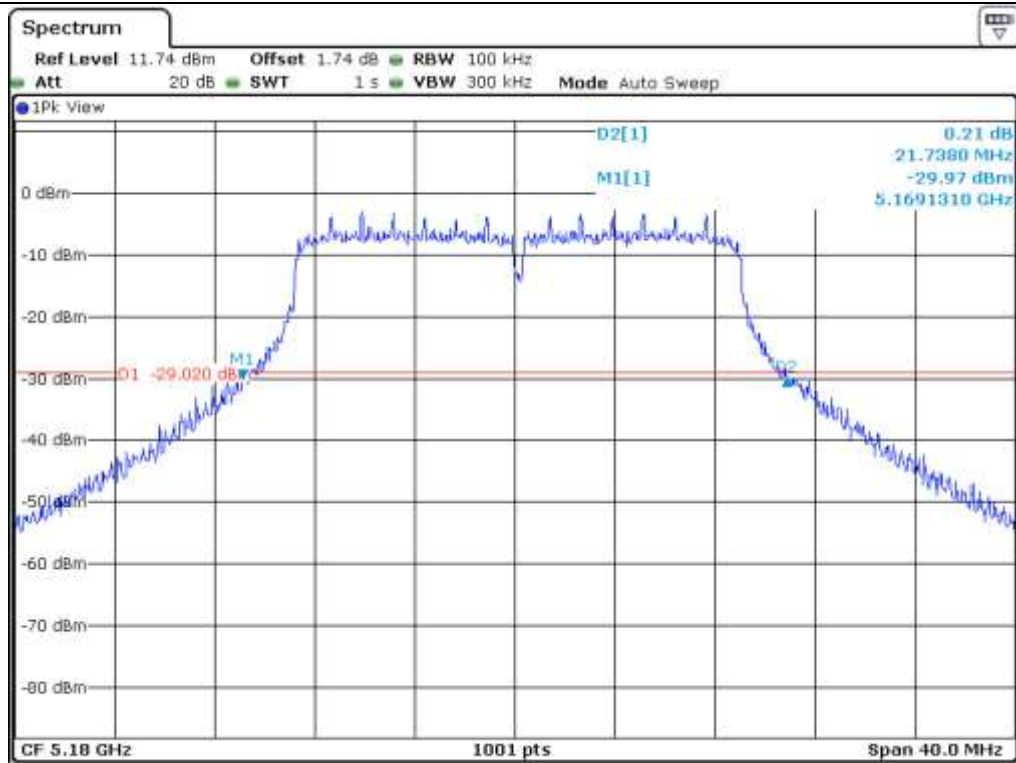
-. Test Date : May 02, 2016

-. Test Result : Pass

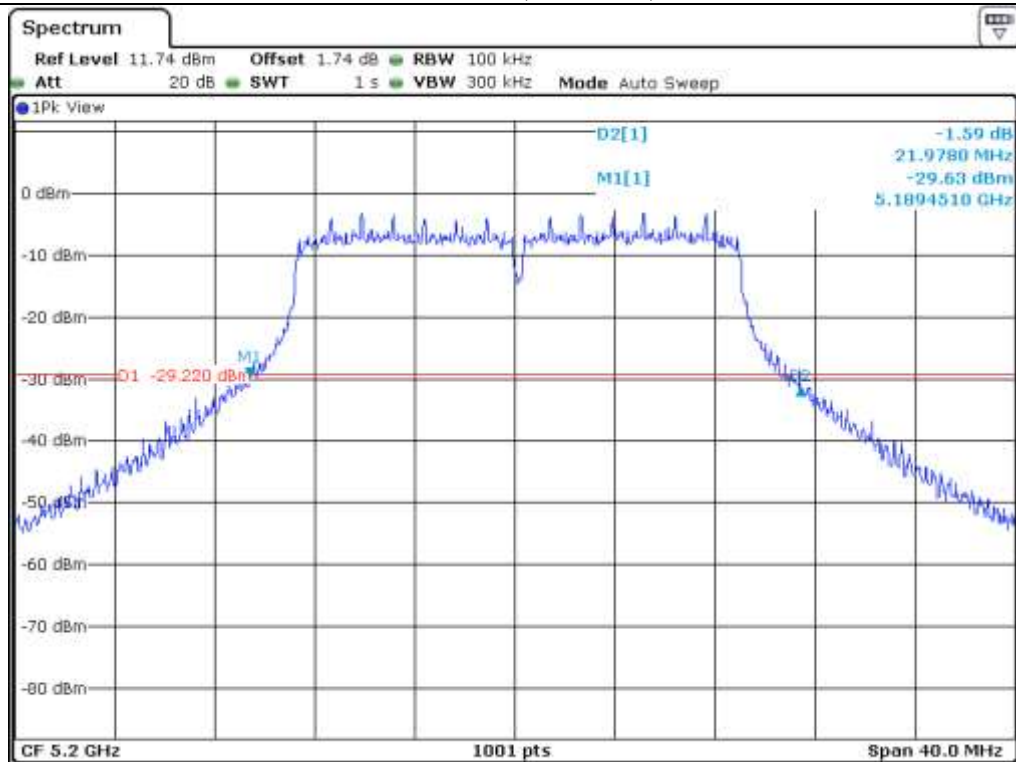
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180	21.74	17.70
	Middle	5 200	21.98	17.70
	High	5 240	21.62	17.66
5 725 ~ 5 850	Low	5 745	21.30	17.66
	Middle	5 785	21.62	17.78
	High	5 825	21.18	17.66



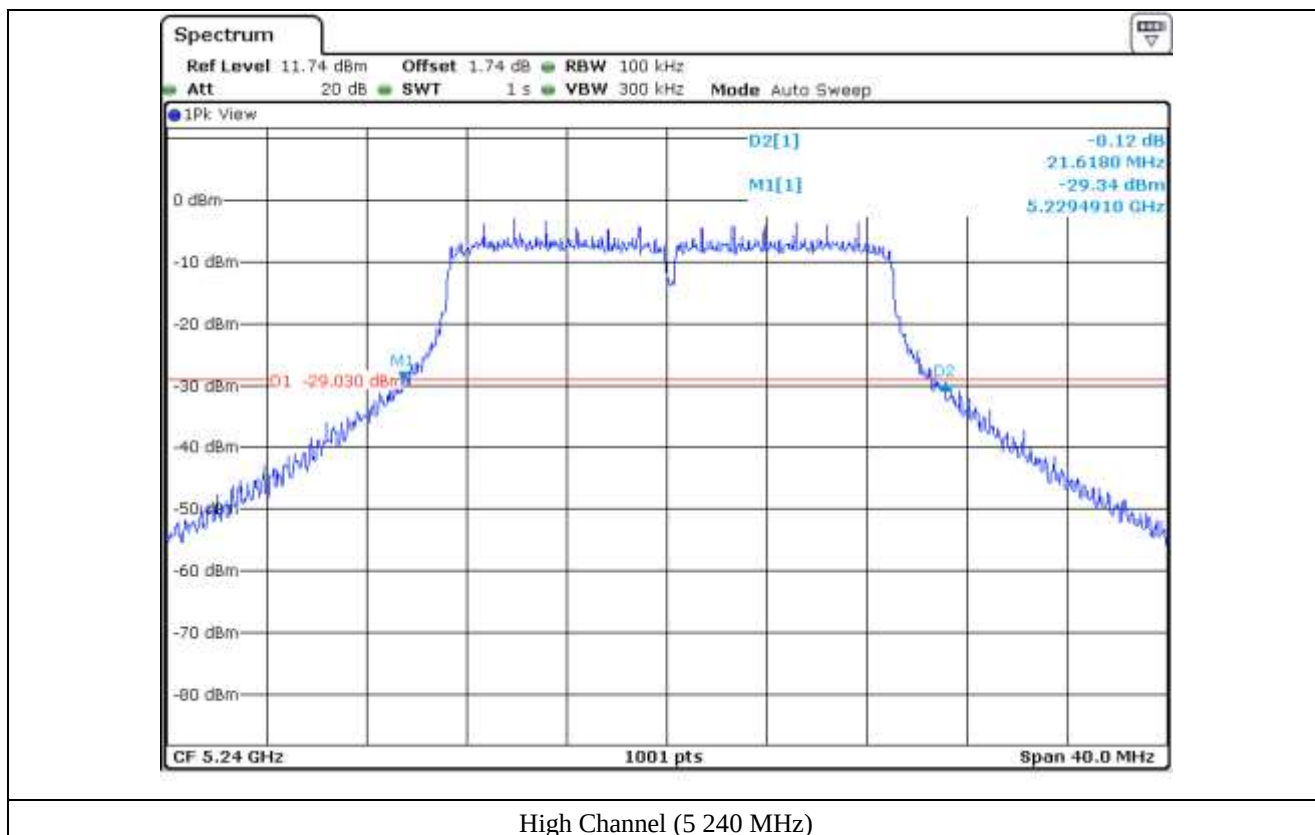
Tested by: Jun-Hui, Lee / Senior Engineer

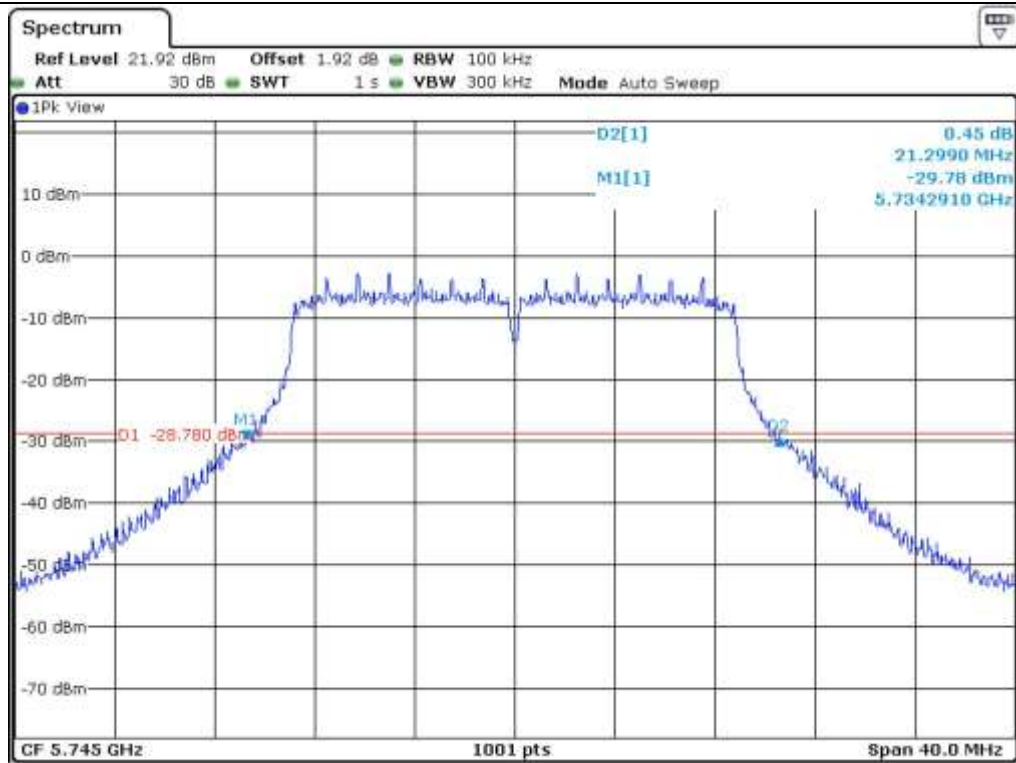


Low Channel (5 180 MHz)

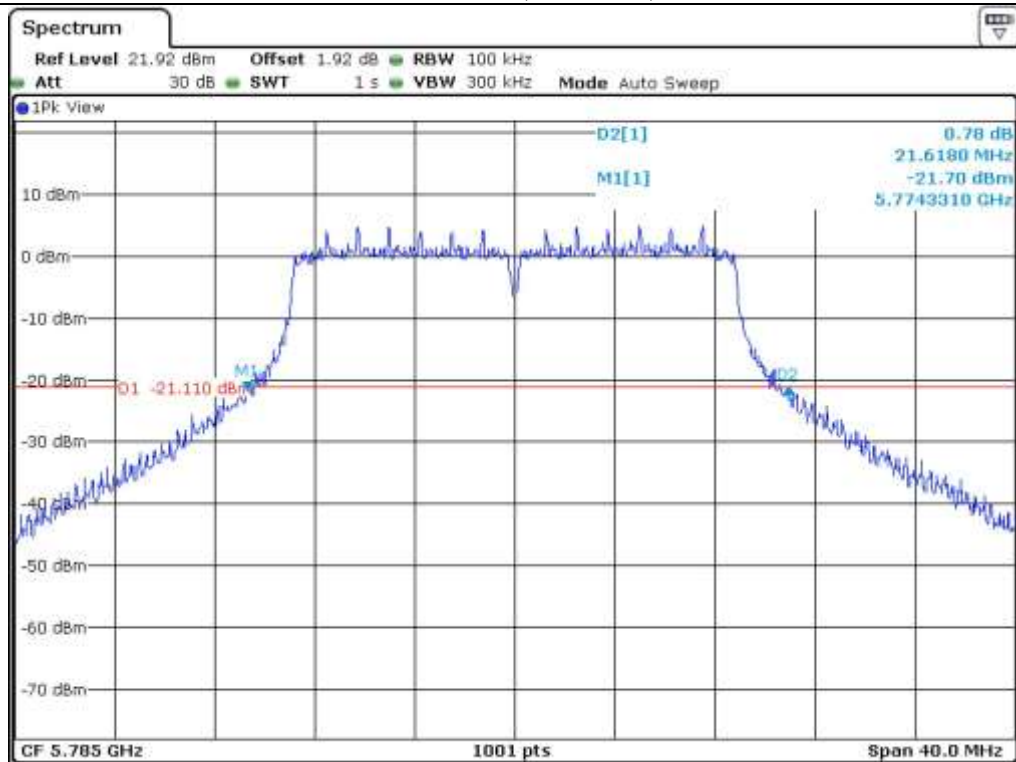


Middle Channel (5 200 MHz)

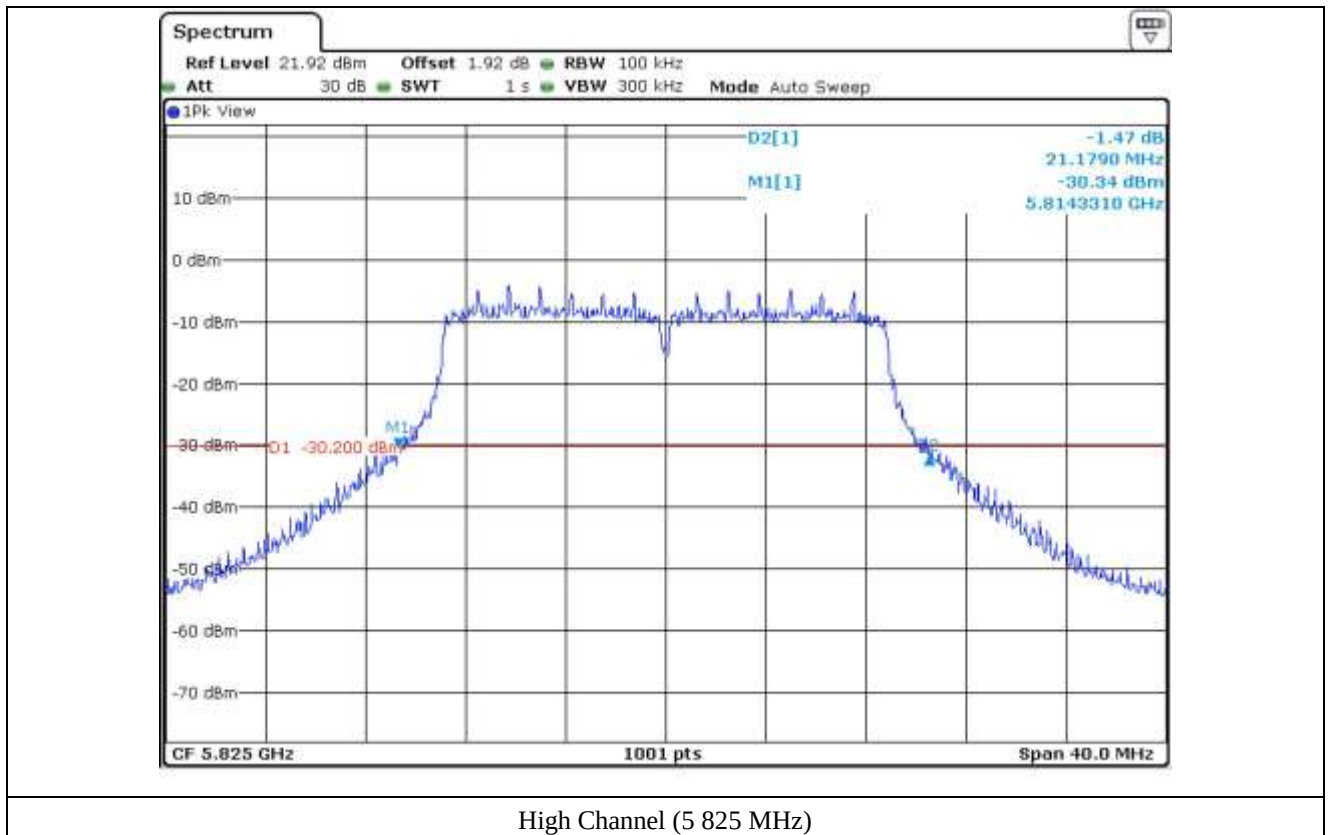


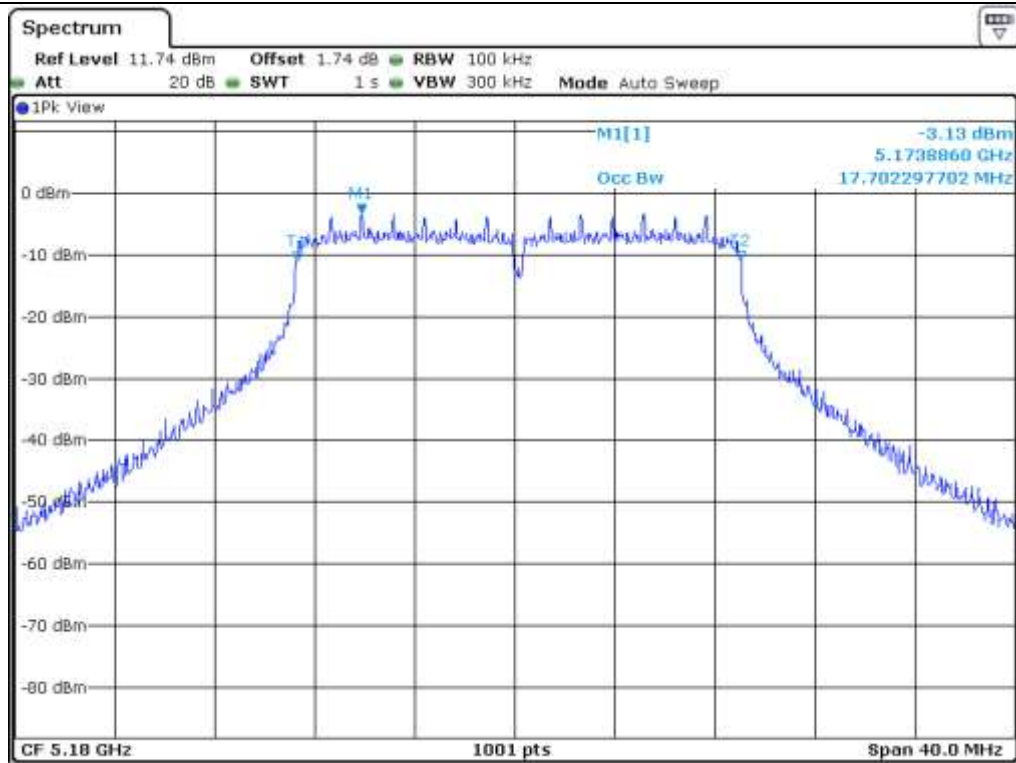


Low Channel (5.745 MHz)

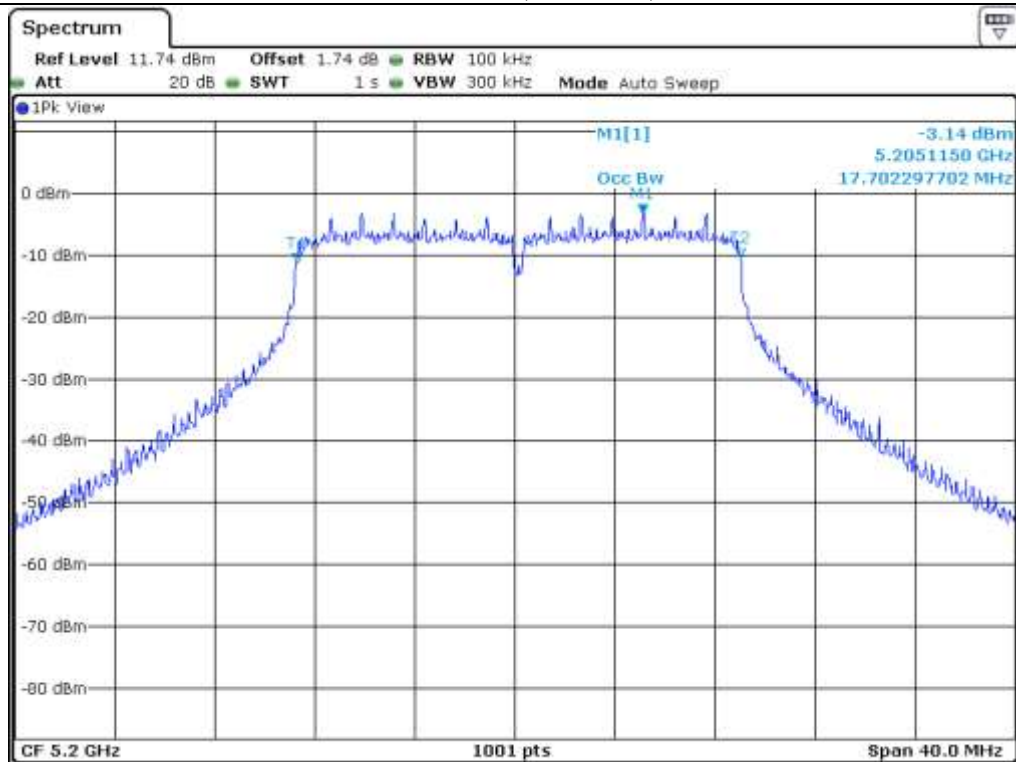


Middle Channel (5.785 MHz)

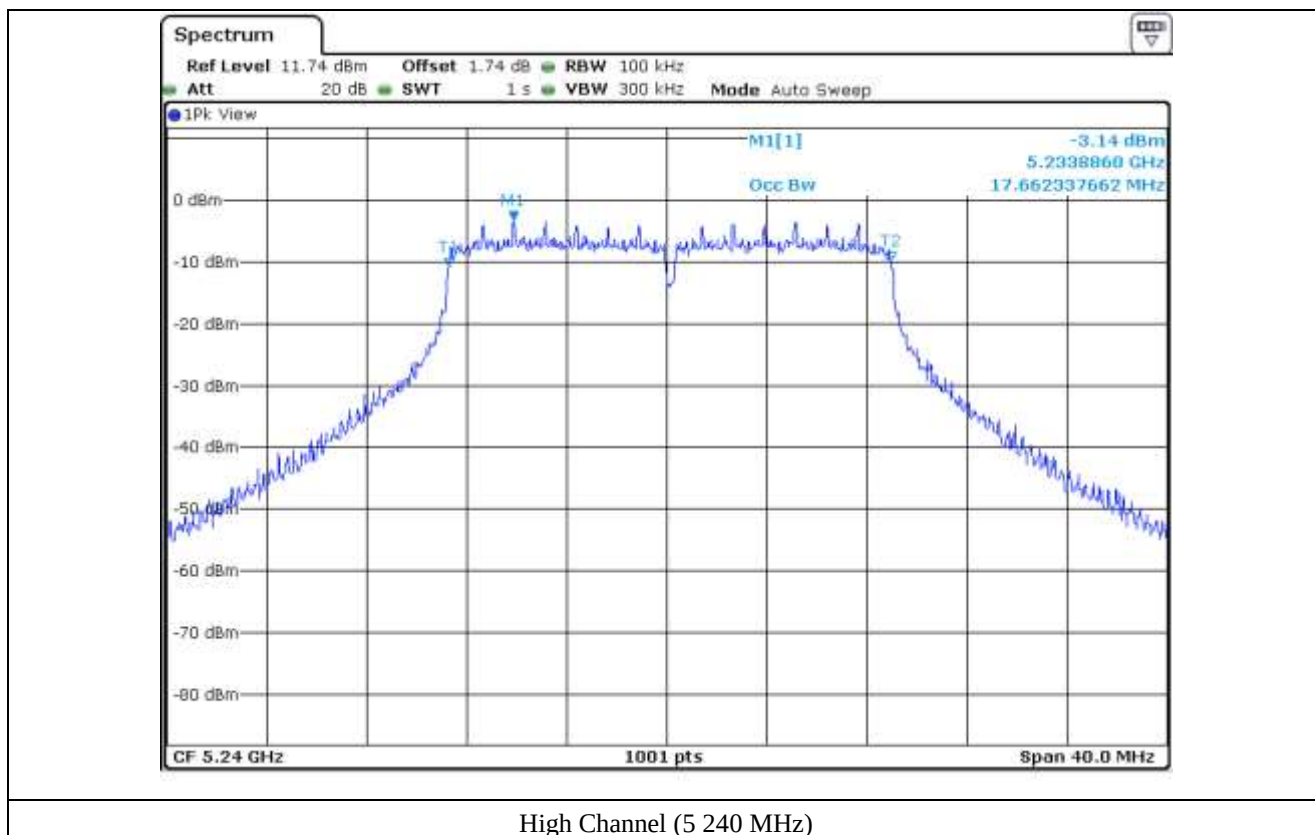


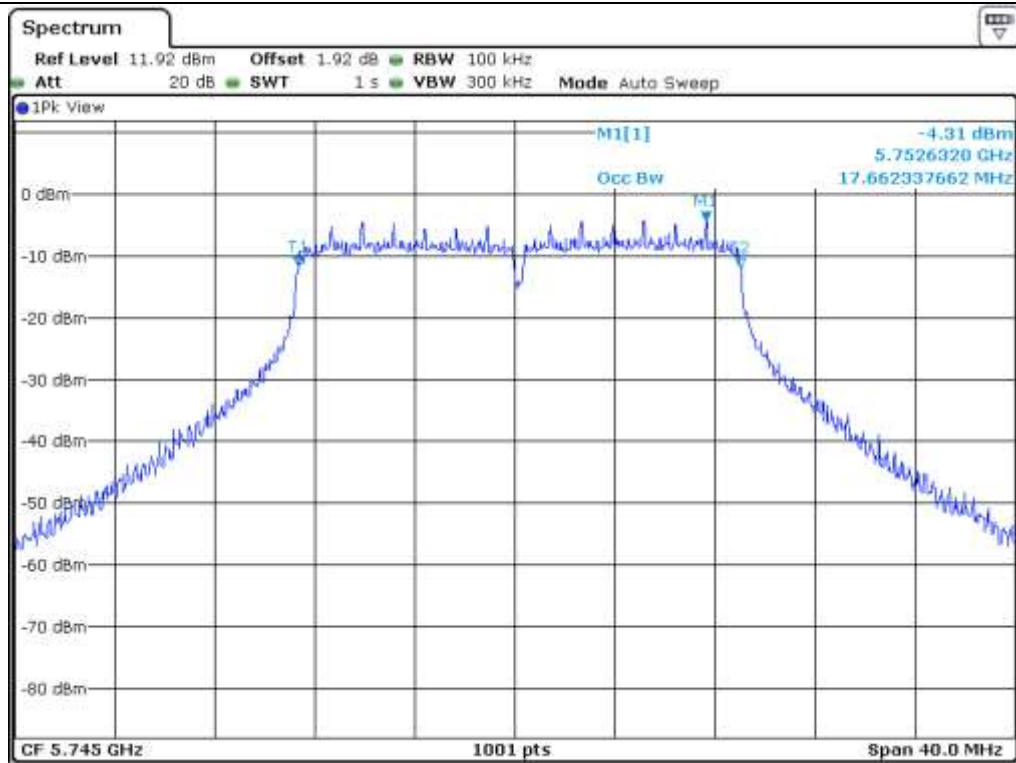


Low Channel (5 180 MHz)

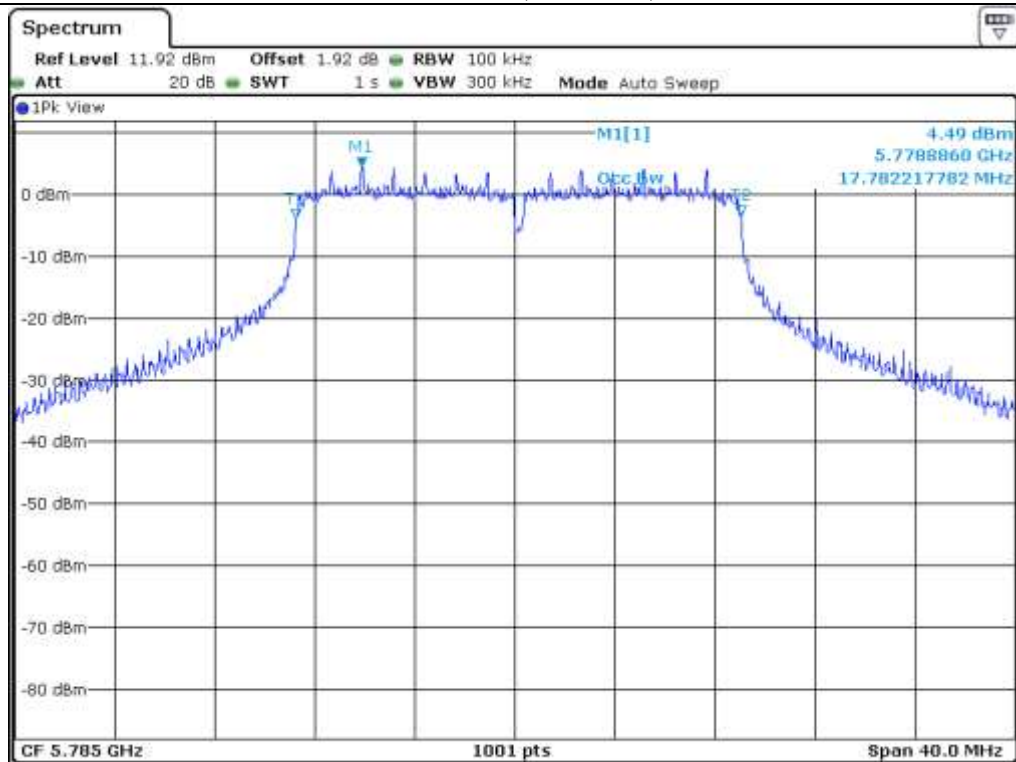


Middle Channel (5 200 MHz)

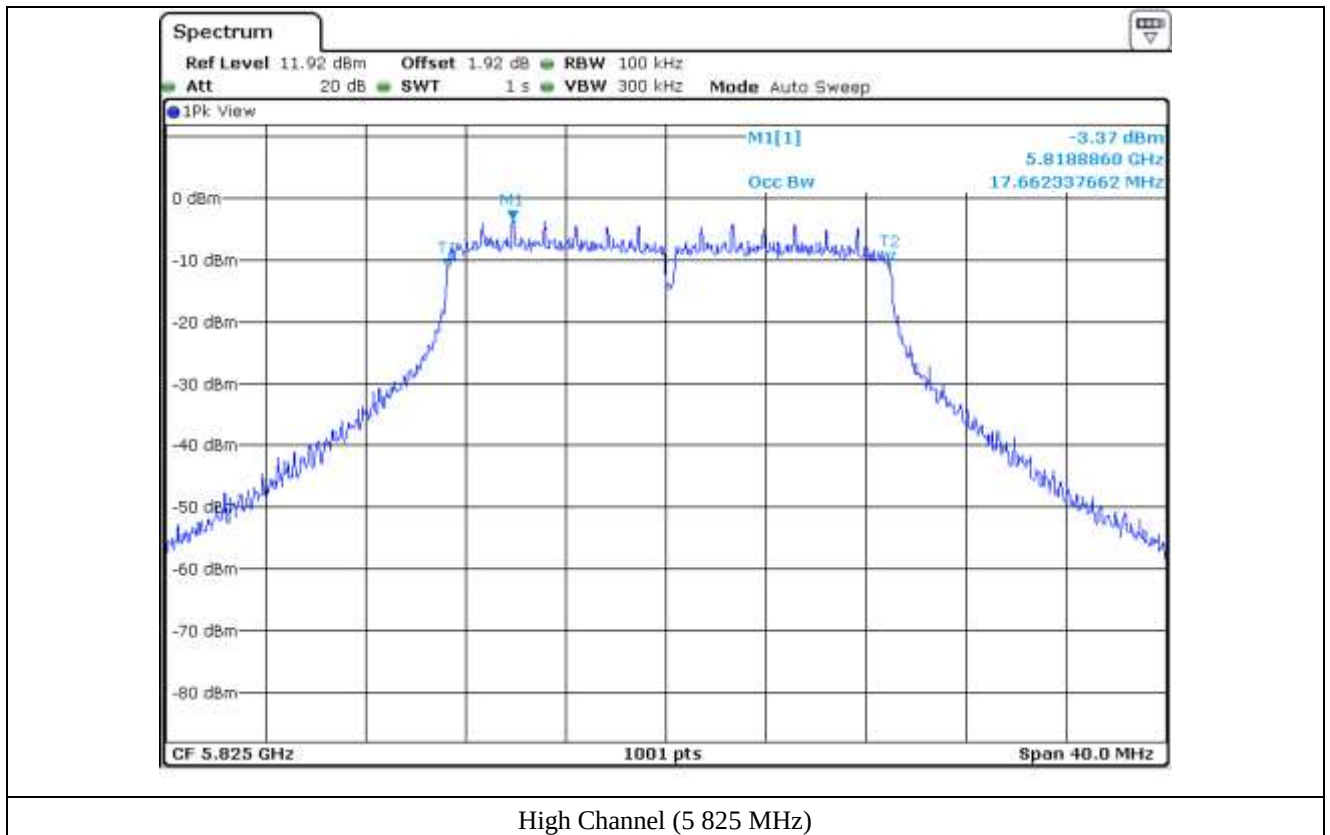




Low Channel (5.745 MHz)



Middle Channel (5.785 MHz)



7.4.2.3 Test data for Antenna 2

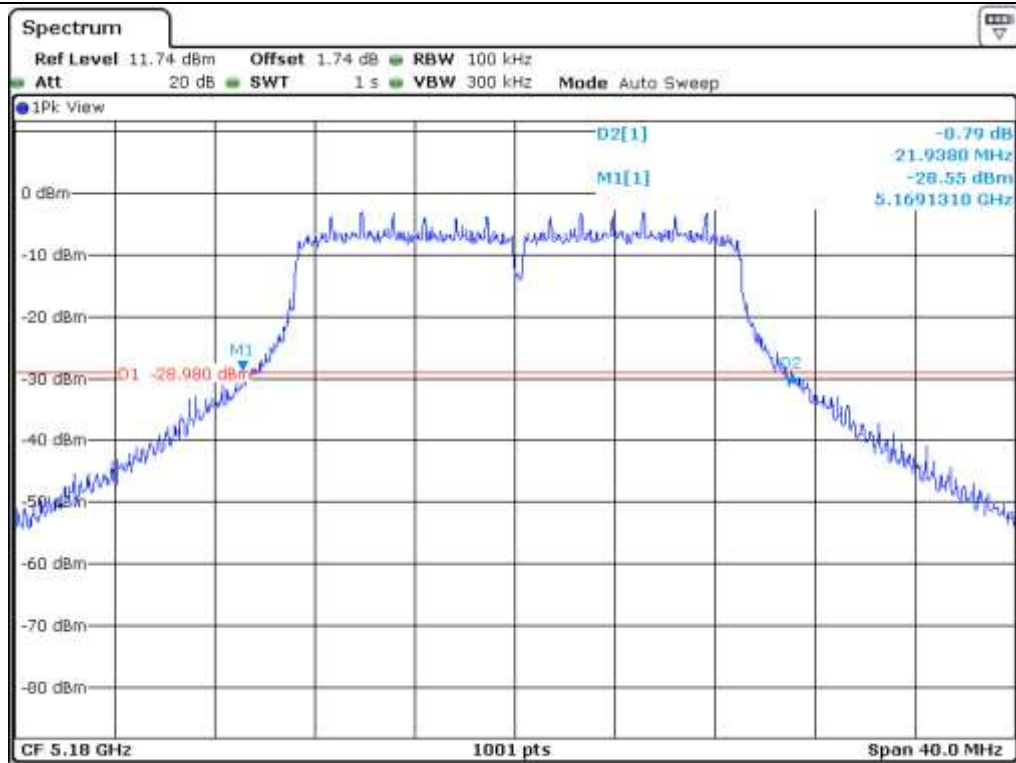
-. Test Date : May 02, 2016

-. Test Result : Pass

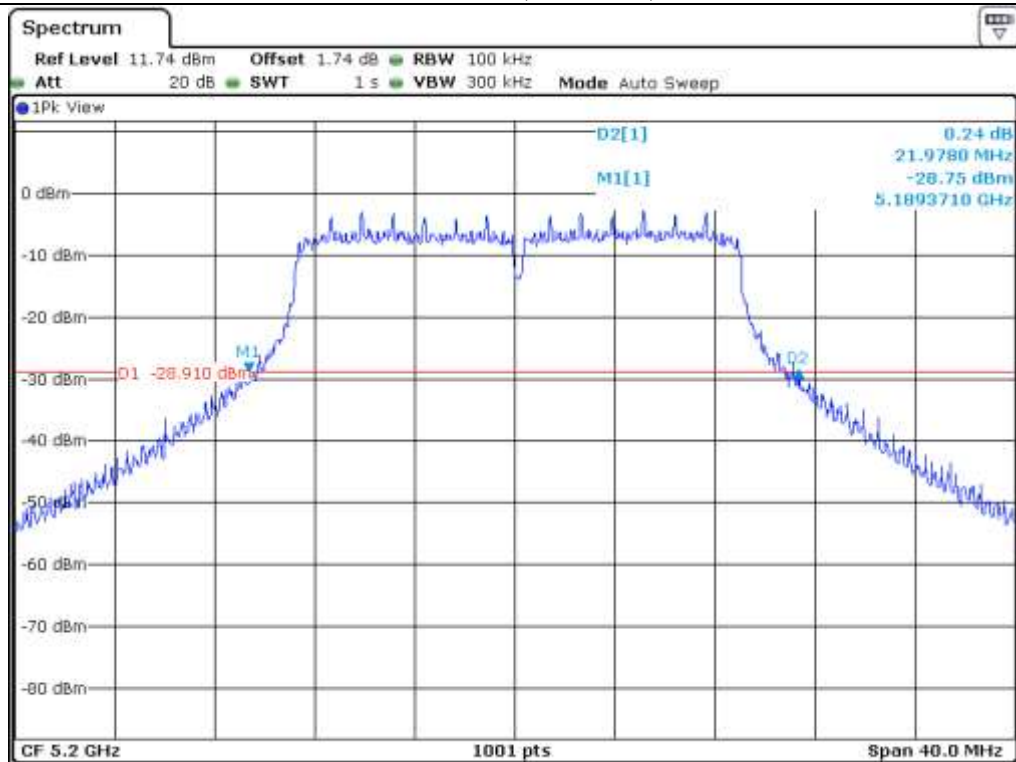
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180	21.94	17.70
	Middle	5 200	21.98	17.66
	High	5 240	21.82	17.70
5 725 ~ 5 850	Low	5 745	21.22	17.66
	Middle	5 785	21.94	17.70
	High	5 825	21.34	17.66



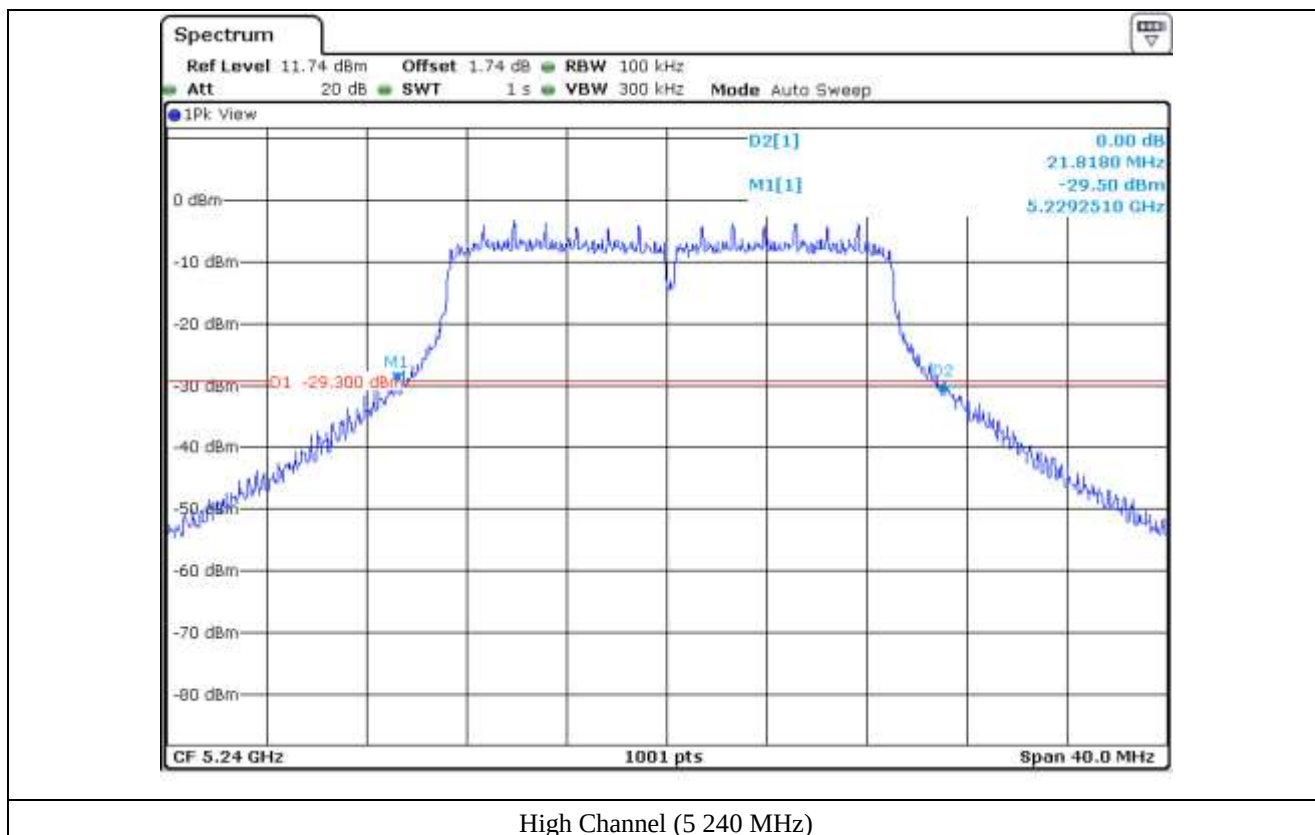
Tested by: Jun-Hui, Lee / Senior Engineer

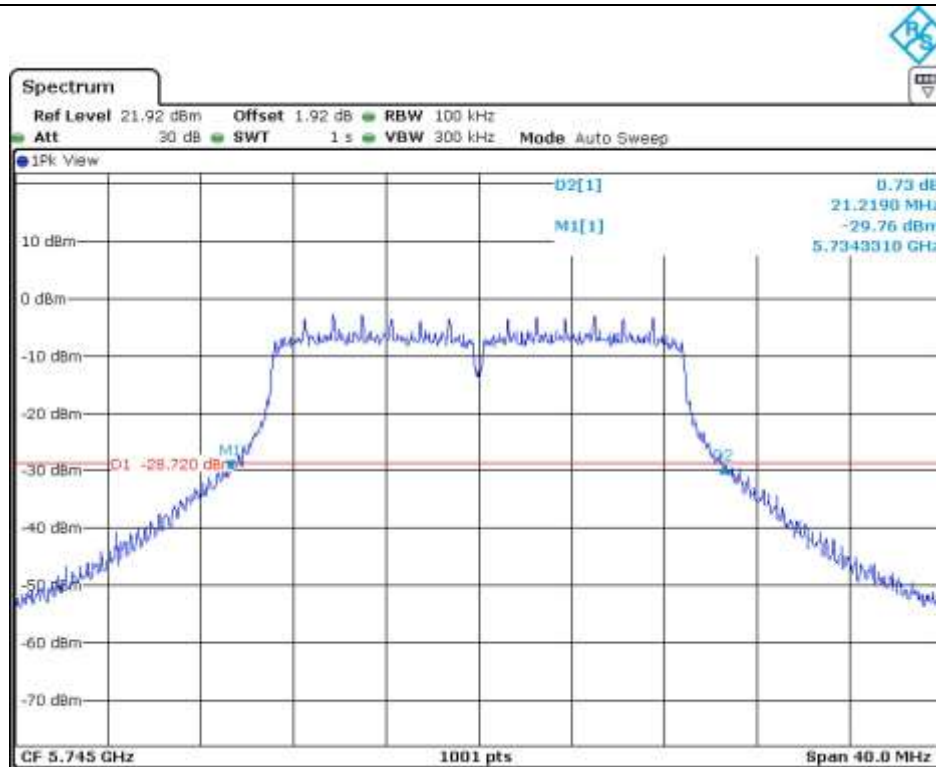


Low Channel (5 180 MHz)

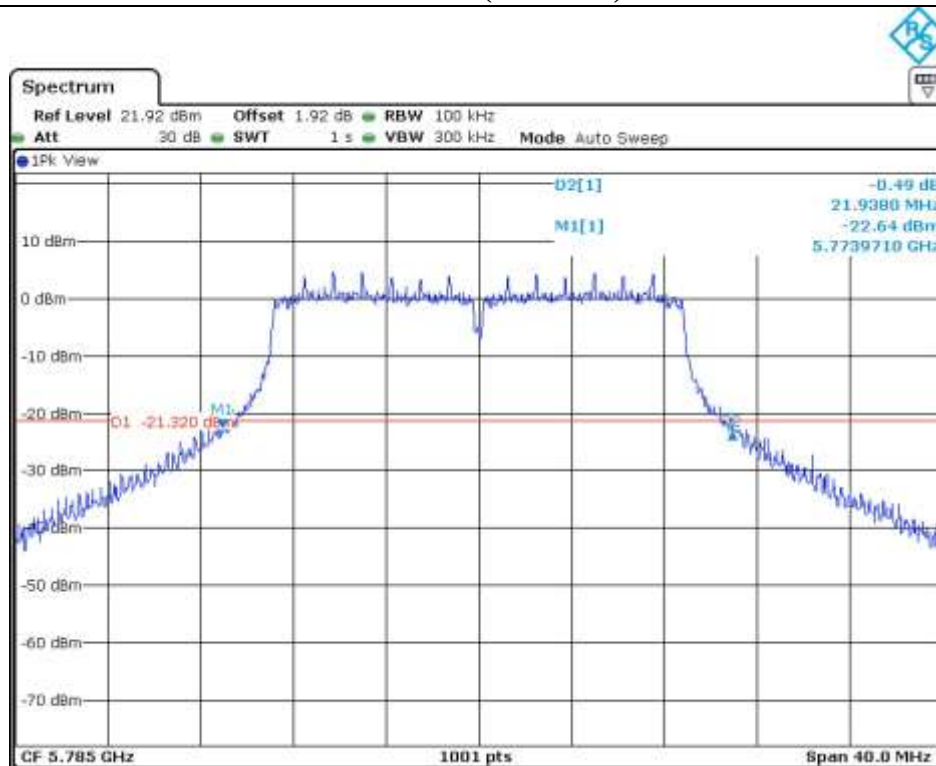


Middle Channel (5 200 MHz)

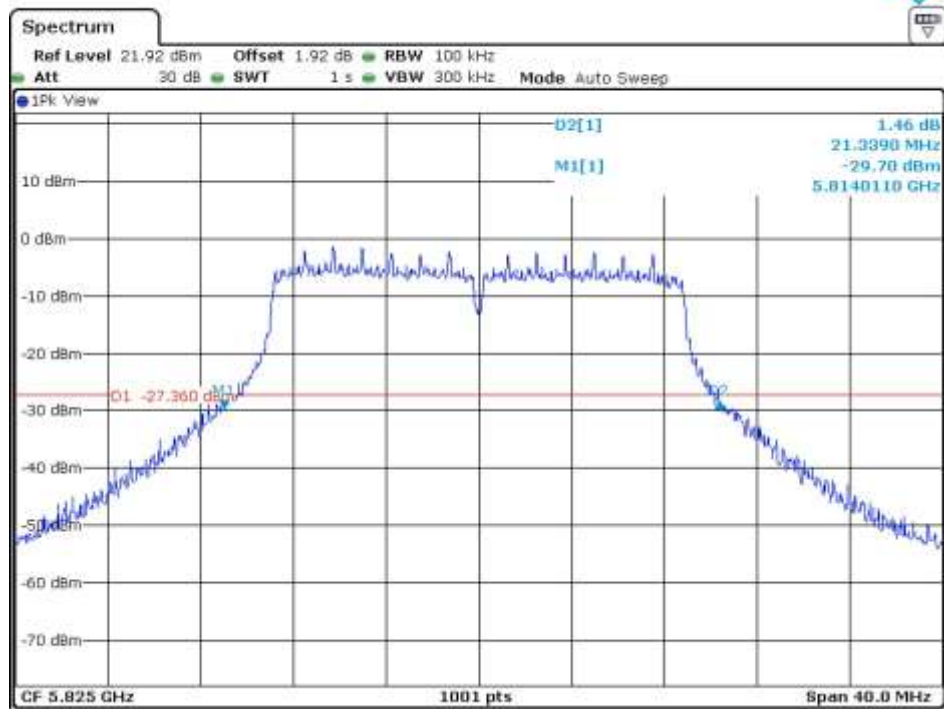




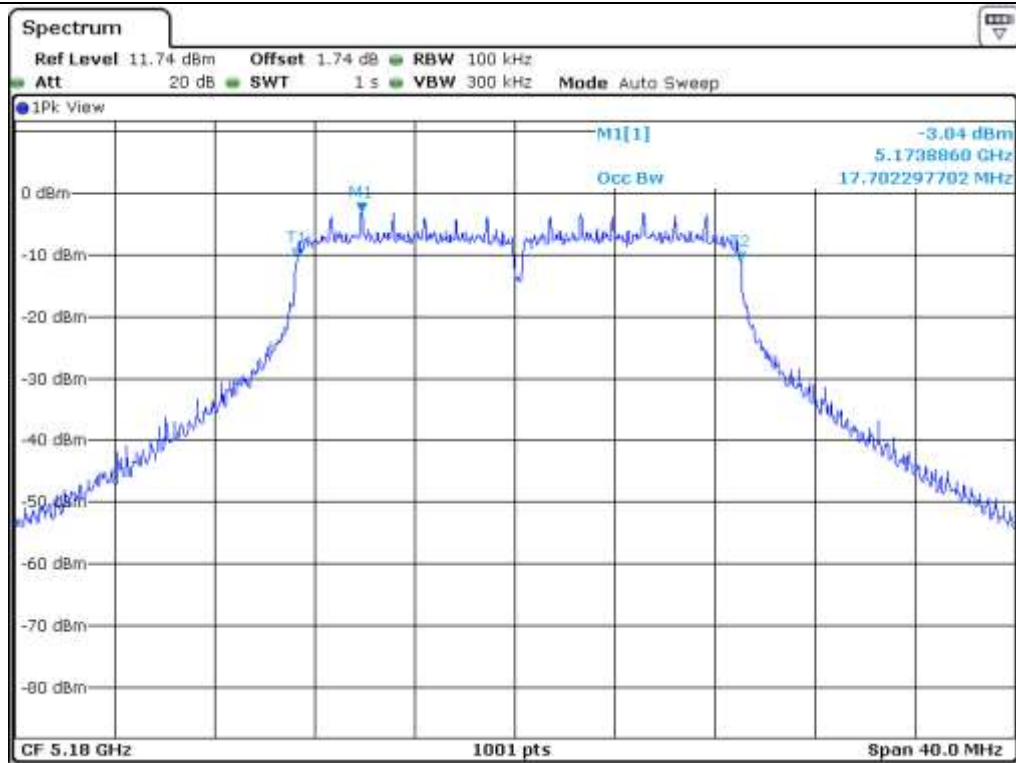
Low Channel (5 745 MHz)



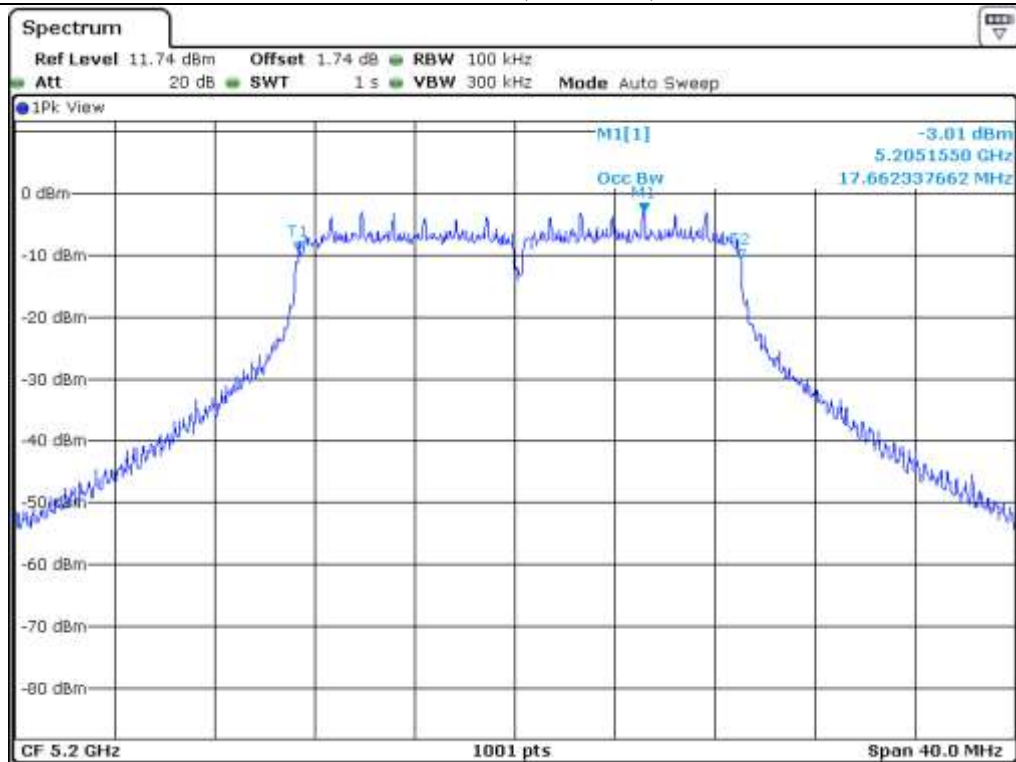
Middle Channel (5 785 MHz)



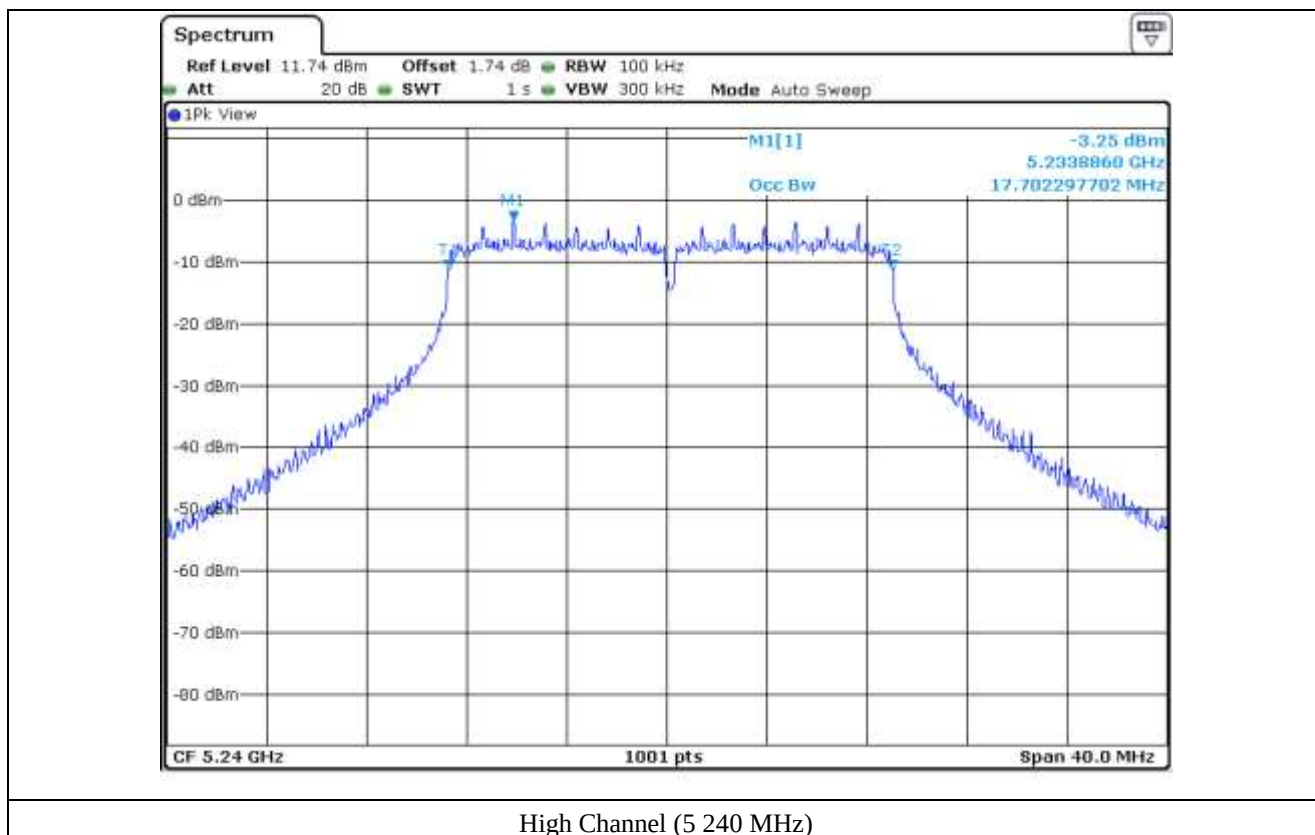
High Channel (5 825 MHz)

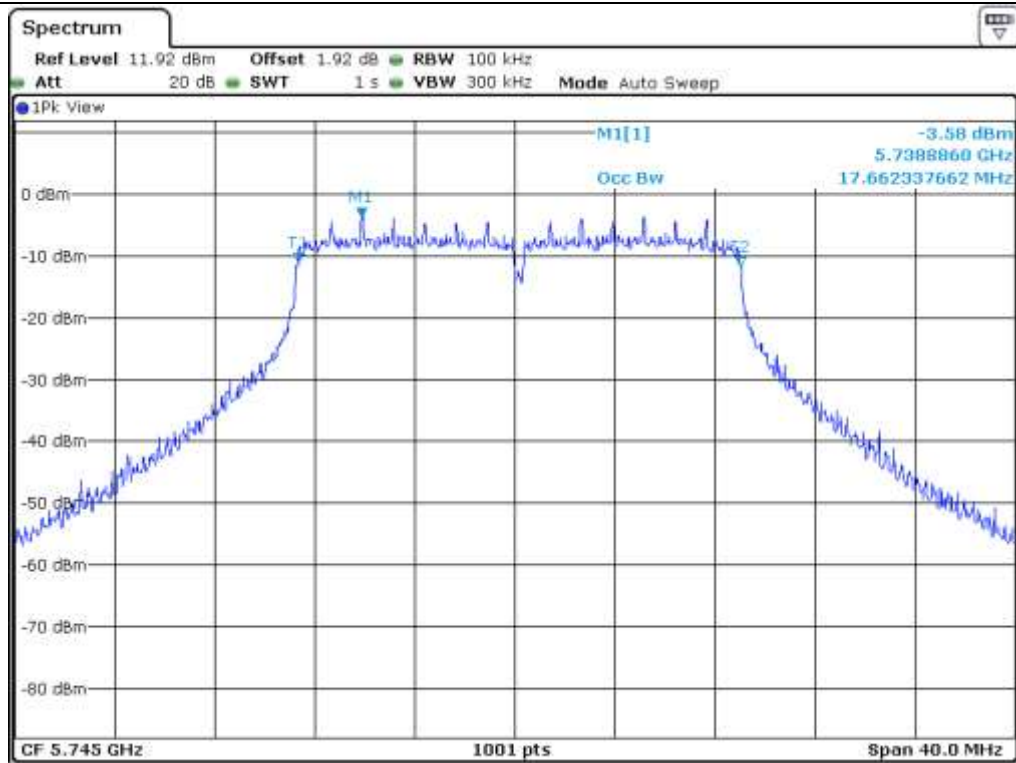


Low Channel (5 180 MHz)

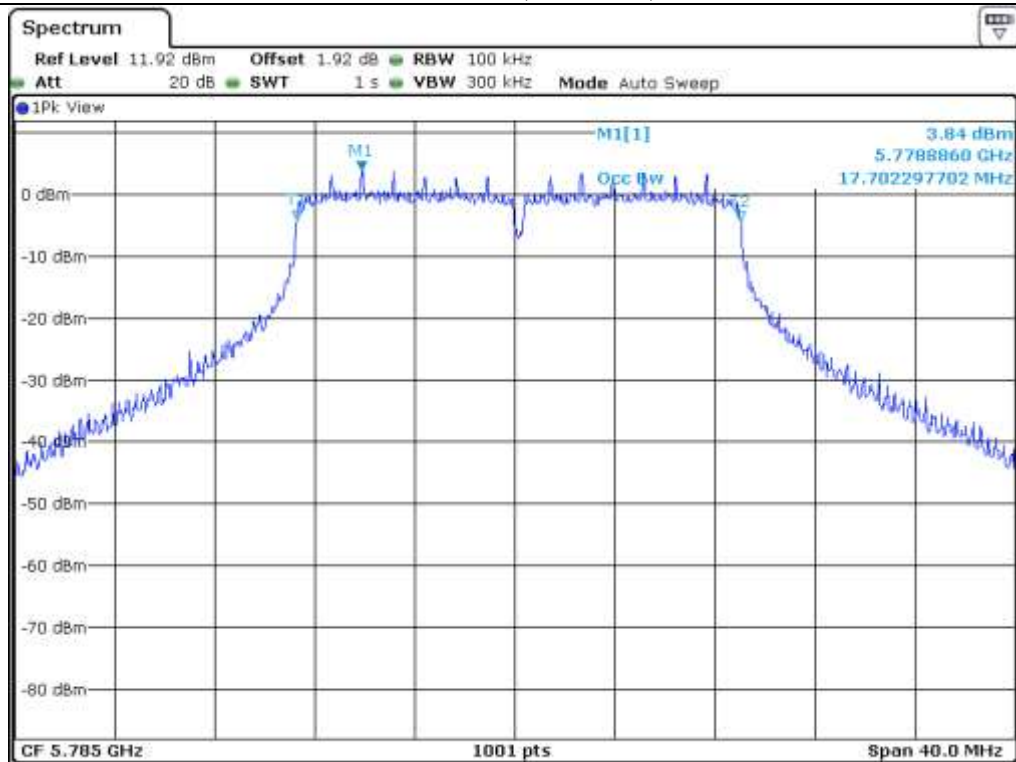


Middle Channel (5 200 MHz)

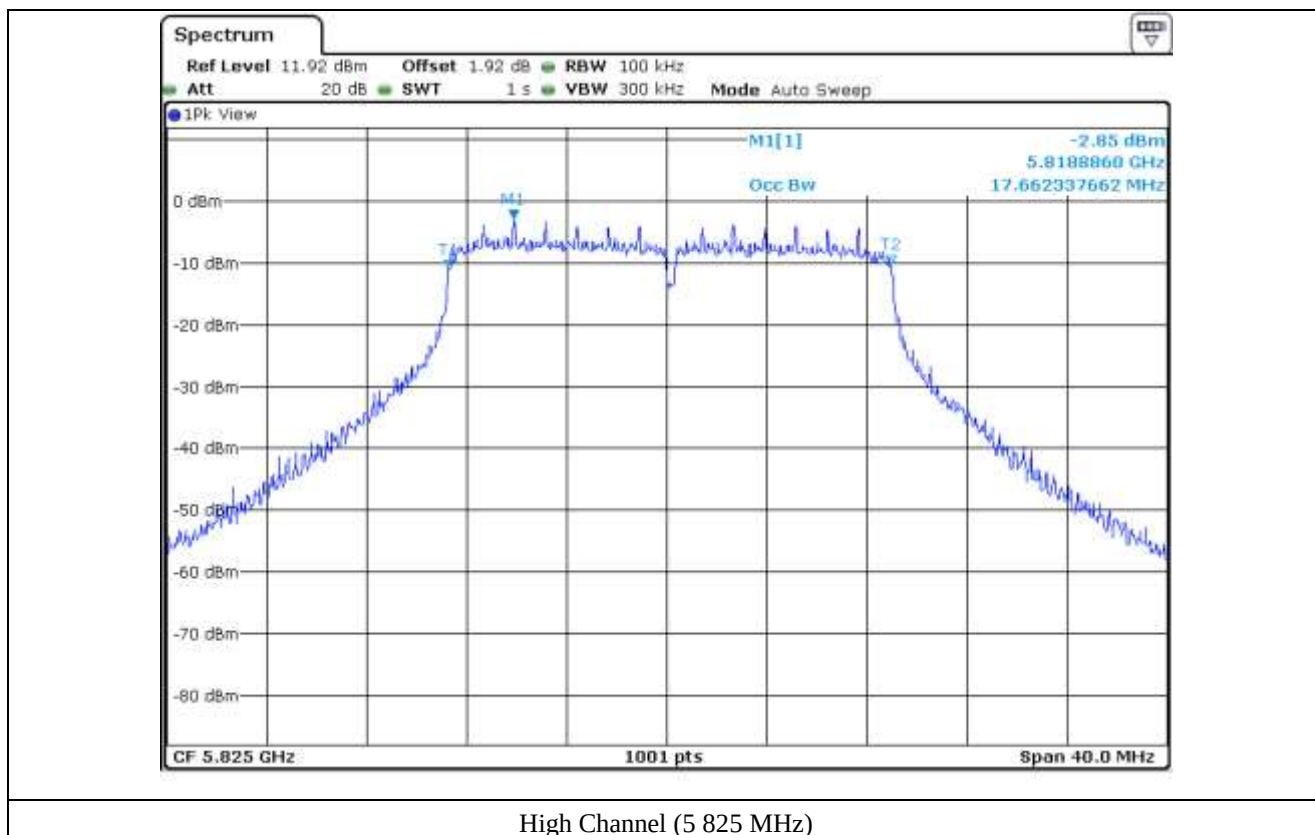




Low Channel (5.745 MHz)



Middle Channel (5.785 MHz)



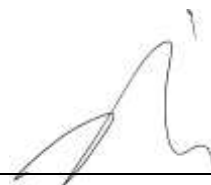
7.4.3 Test data for 802.11n_HT40 RLAN Mode

7.4.3.1 Test data for Antenna 0

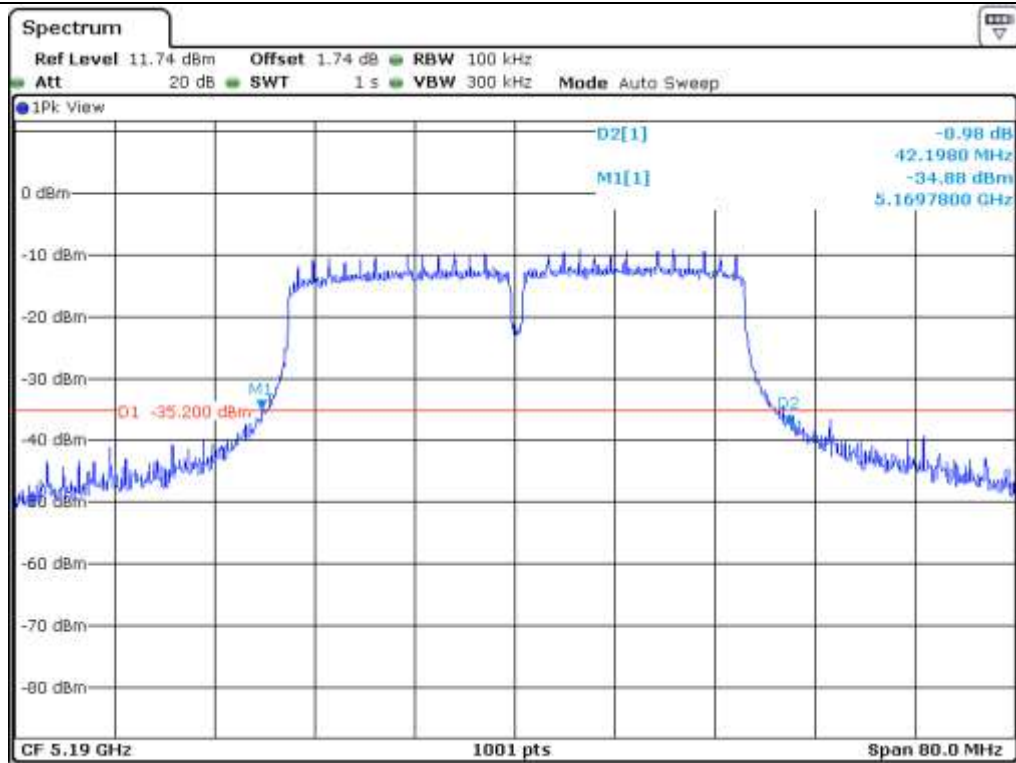
-. Test Date : May 02, 2016

-. Test Result : Pass

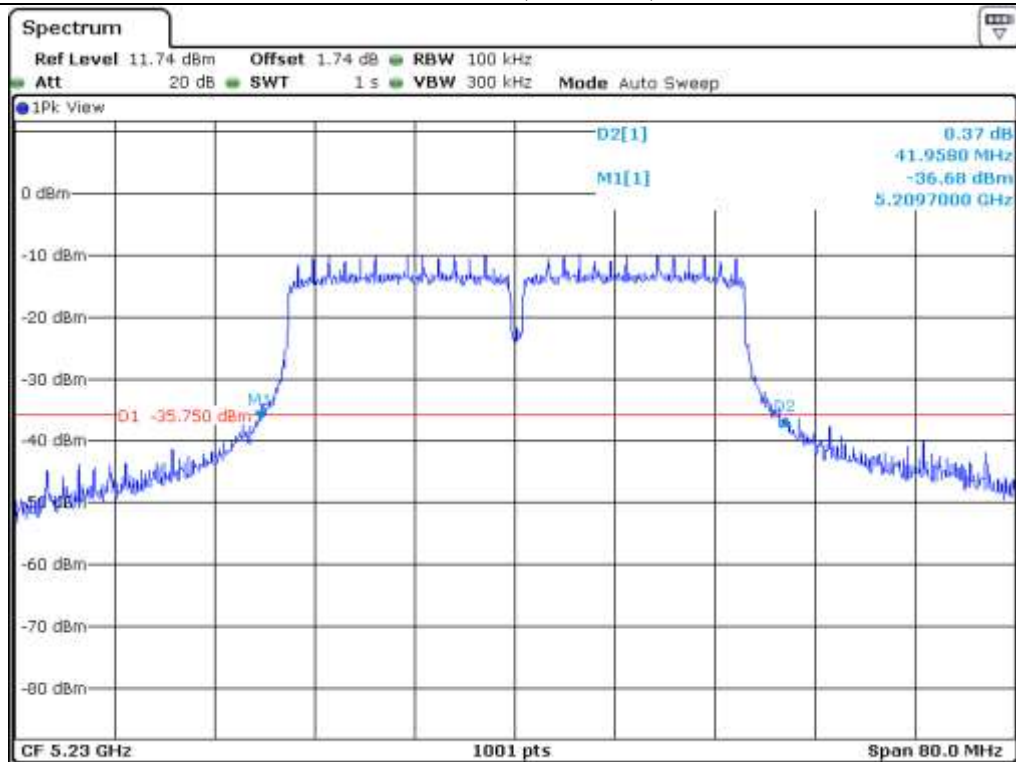
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190	42.20	36.12
	High	5 230	41.96	36.12
5 725 ~ 5 850	Low	5 755	40.44	36.12
	High	5 795	41.08	36.20



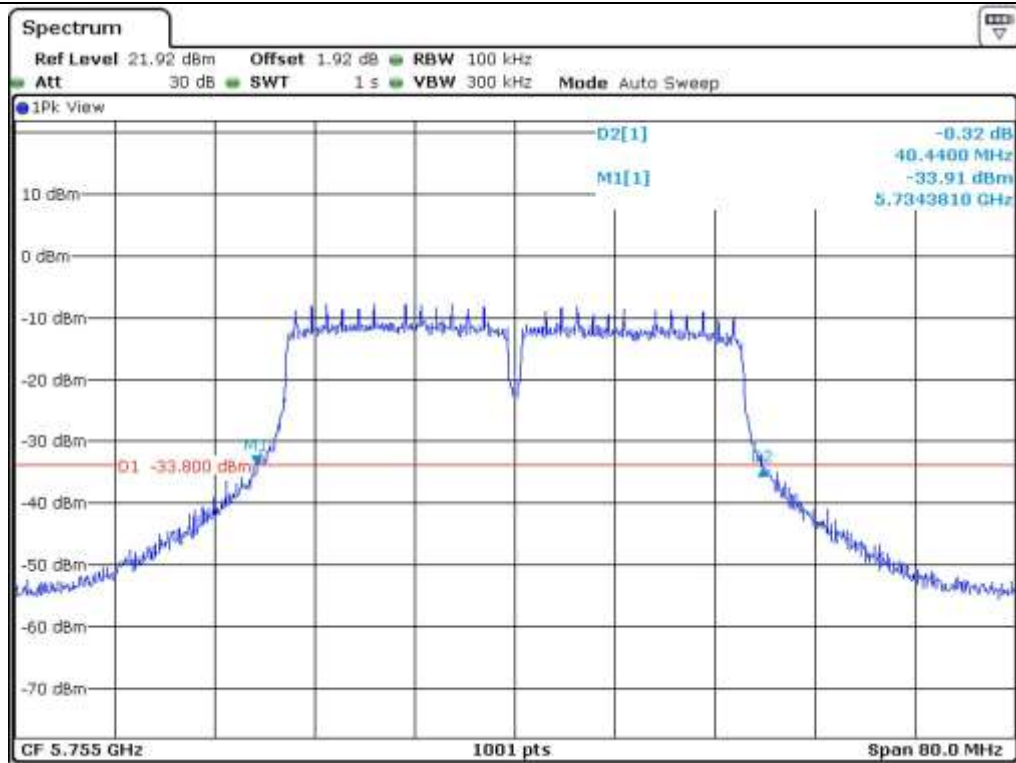
Tested by: Jun-Hui, Lee / Senior Engineer



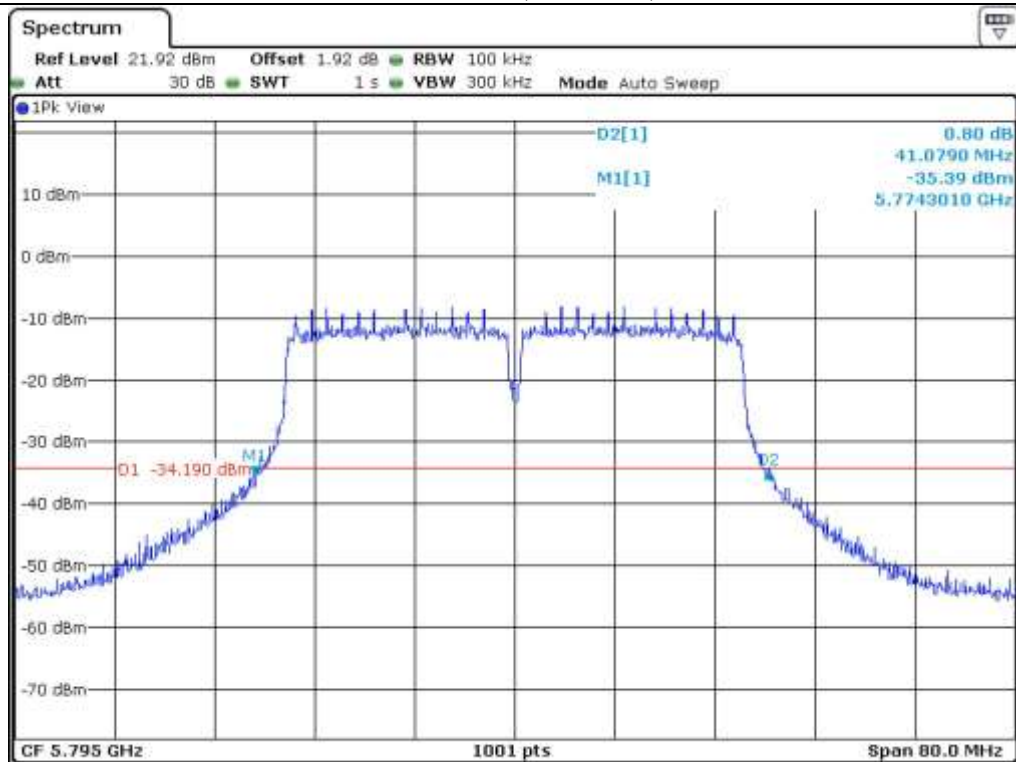
Low Channel (5 190 MHz)



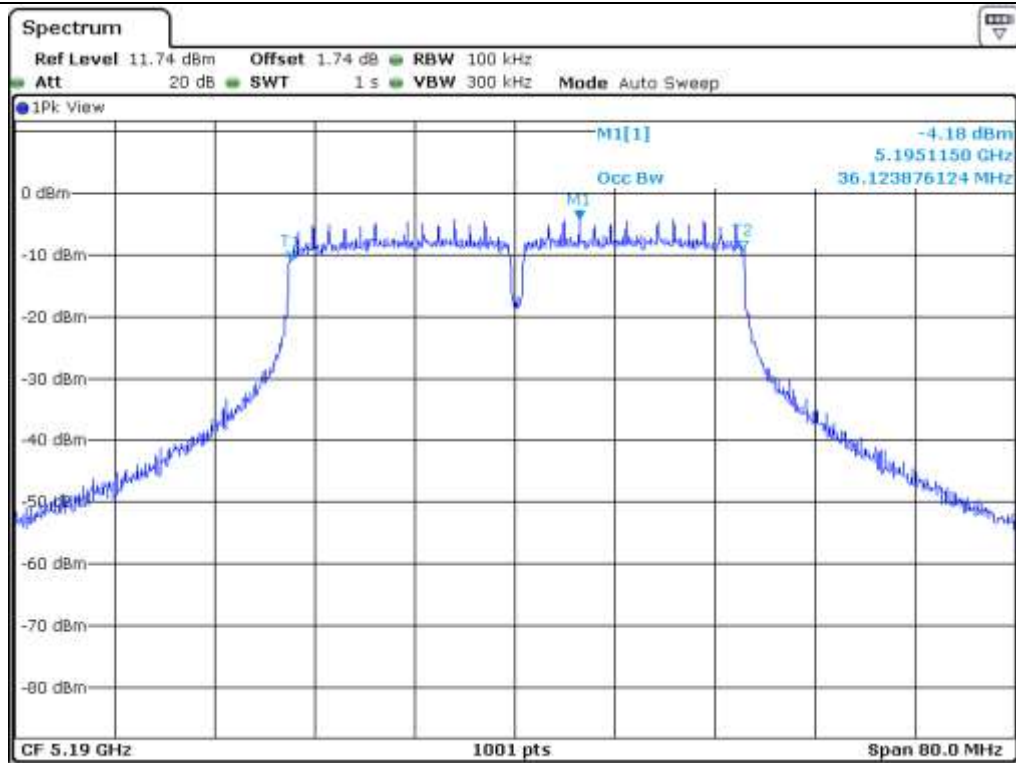
High Channel (5 230 MHz)



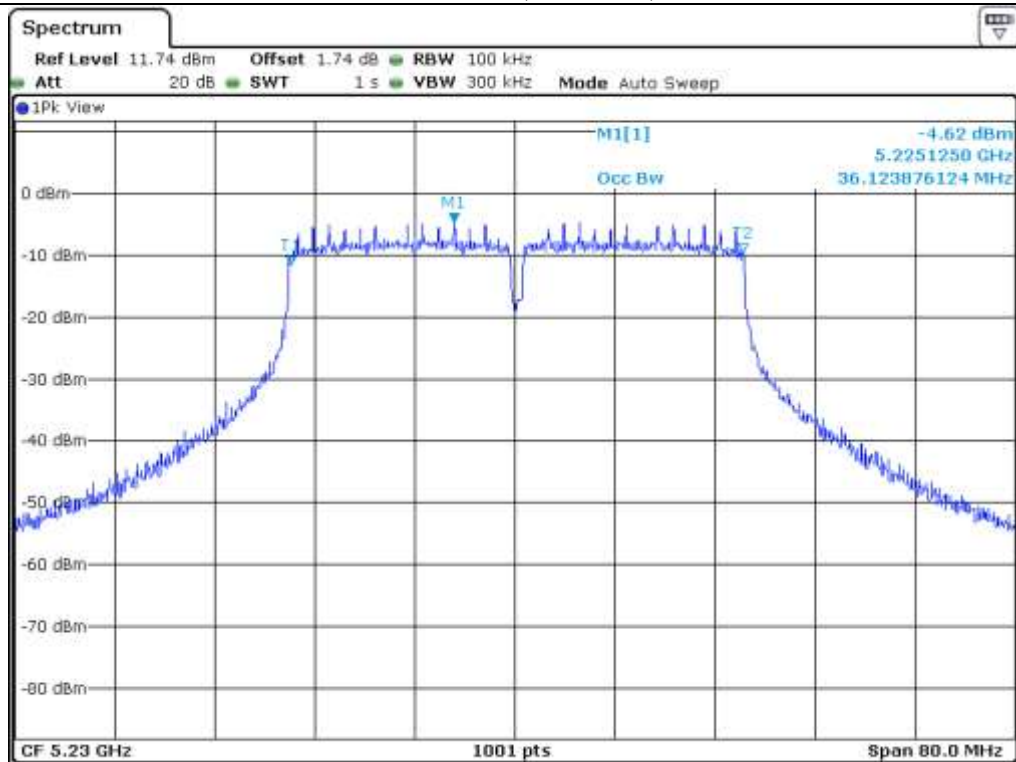
Low Channel (5 755 MHz)



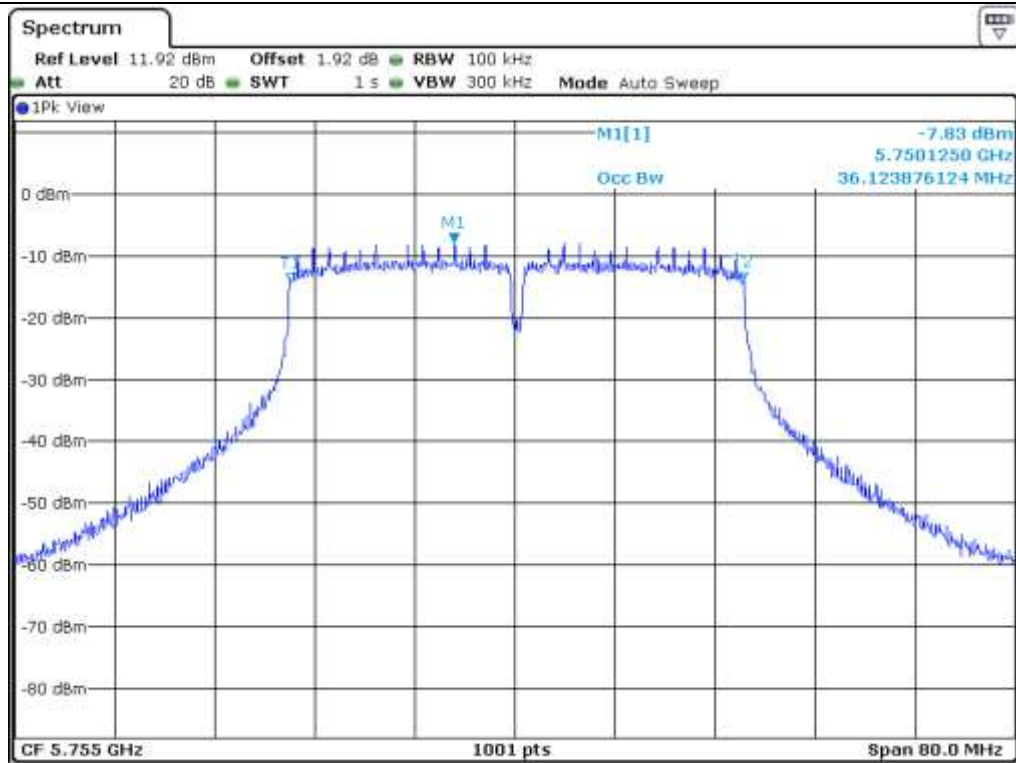
High Channel (5 795 MHz)



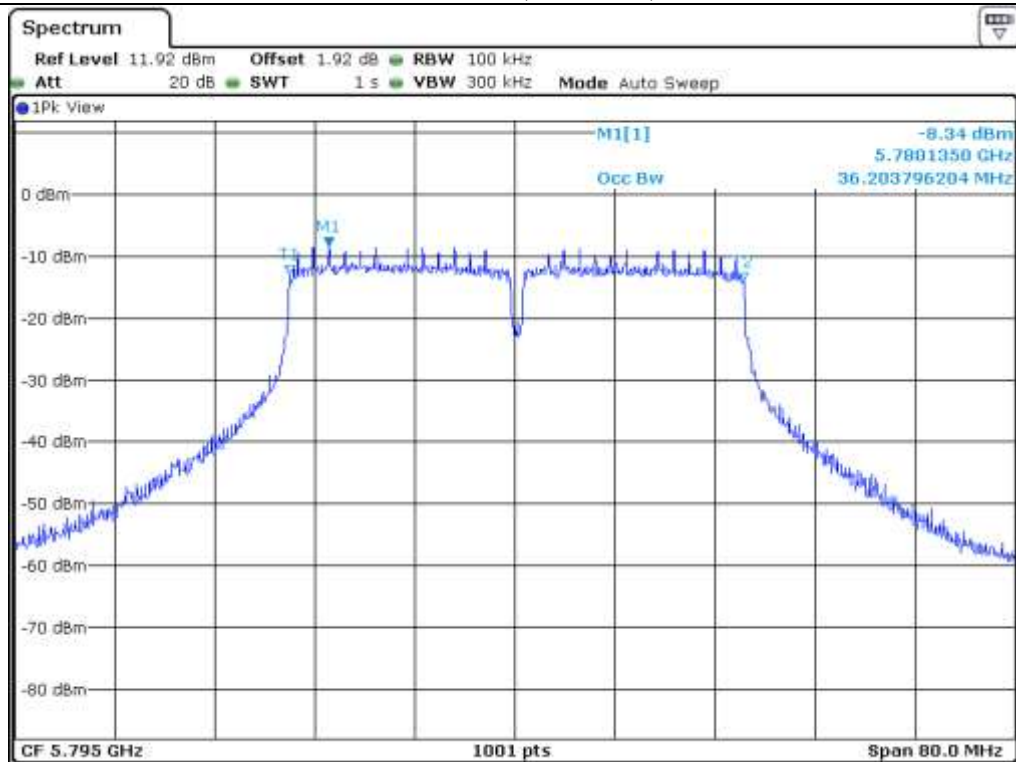
Low Channel (5 190 MHz)



High Channel (5 230 MHz)



Low Channel (5.755 MHz)



High Channel (5.795 MHz)

7.4.3.2 Test data for Antenna 1

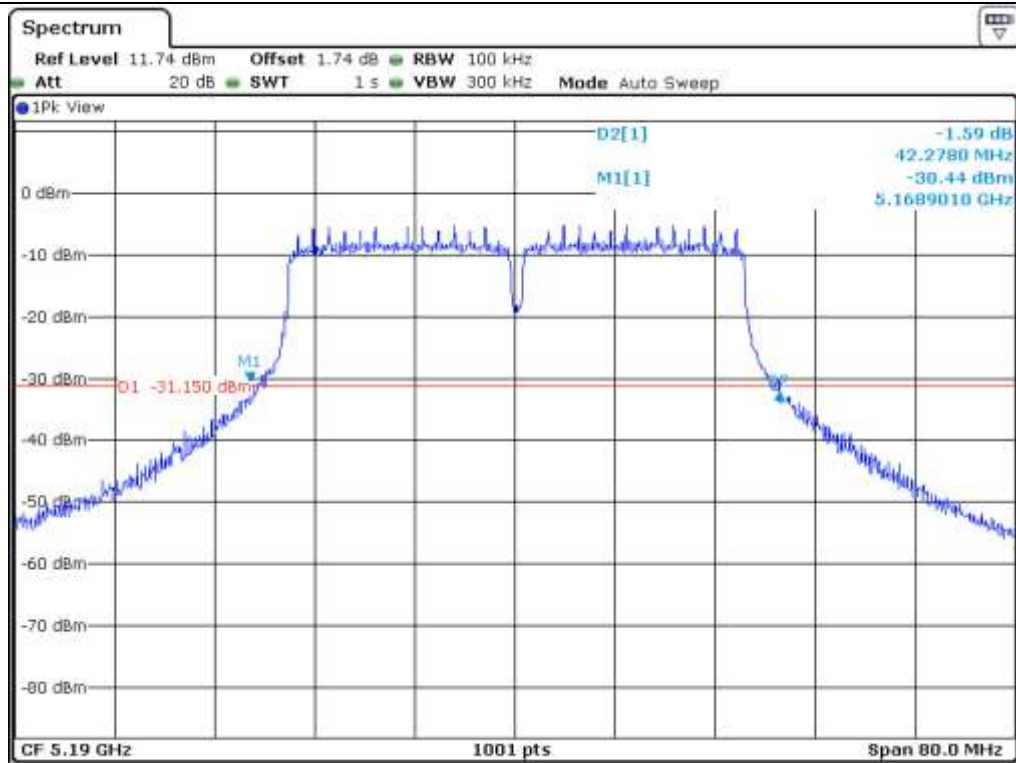
-. Test Date : May 02, 2016

-. Test Result : Pass

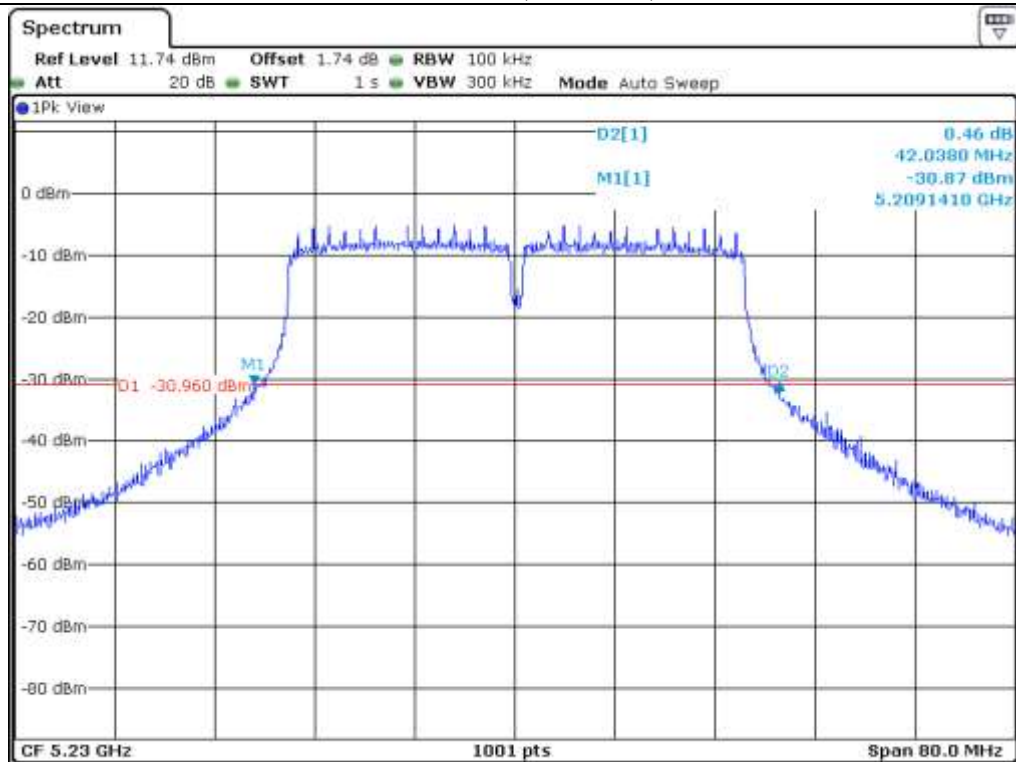
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190	42.28	36.20
	High	5 230	42.04	36.20
5 725 ~ 5 850	Low	5 755	40.80	36.12
	High	5 795	41.64	36.20



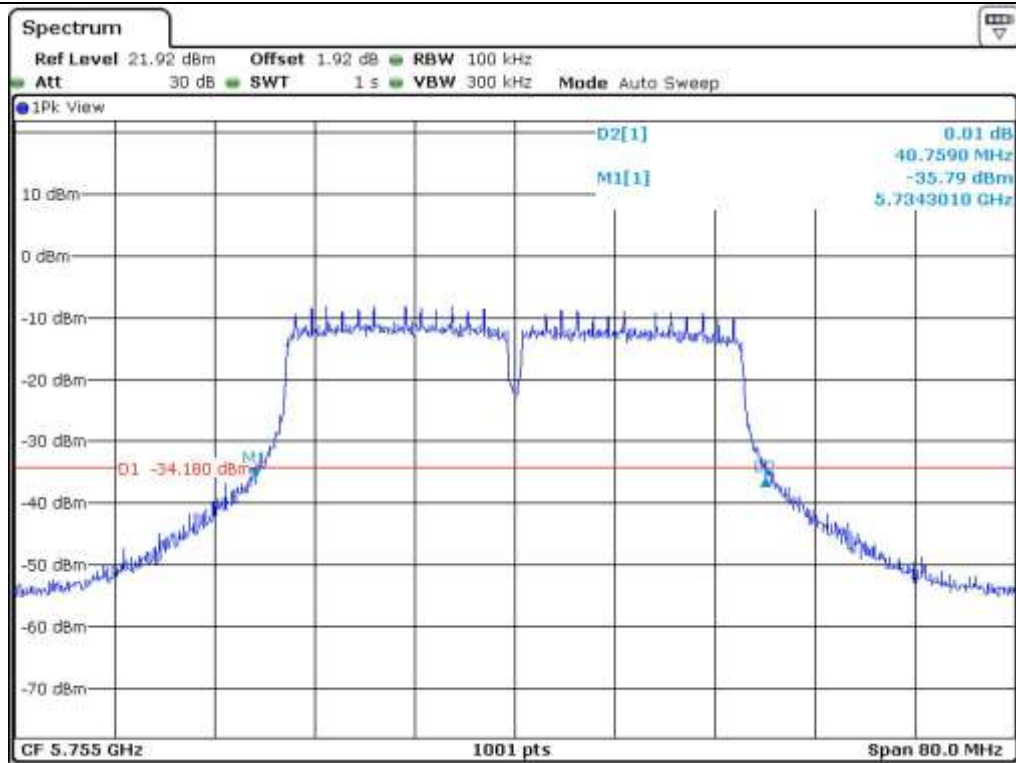
Tested by: Jun-Hui, Lee / Senior Engineer



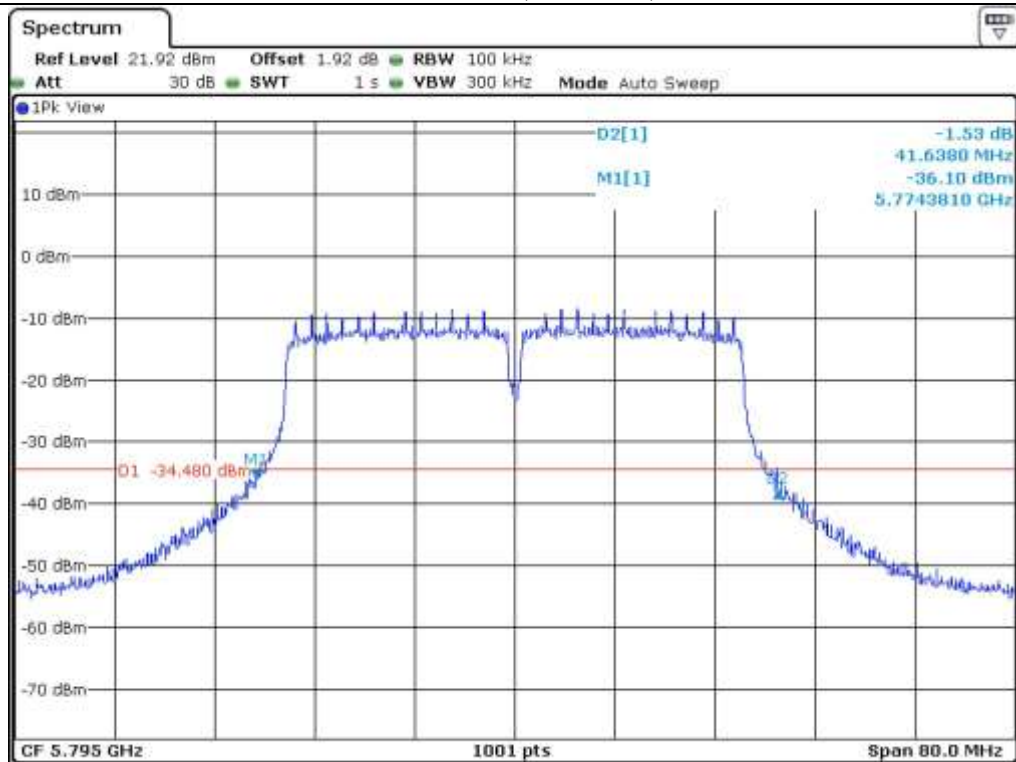
Low Channel (5 190 MHz)



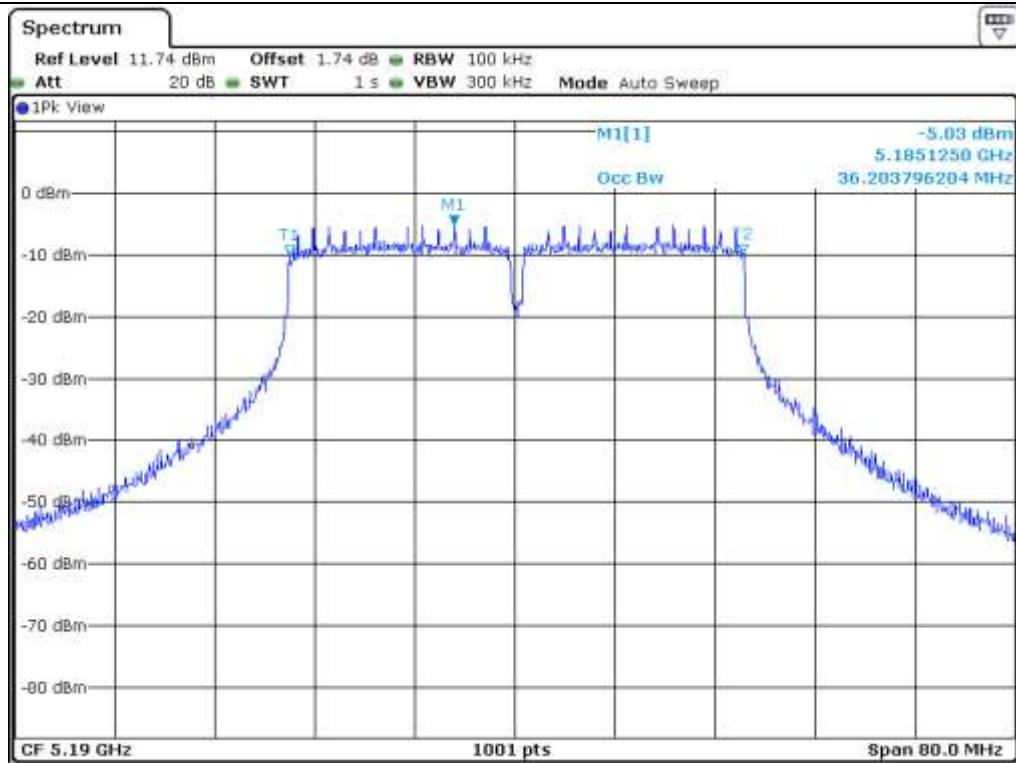
High Channel (5 230 MHz)



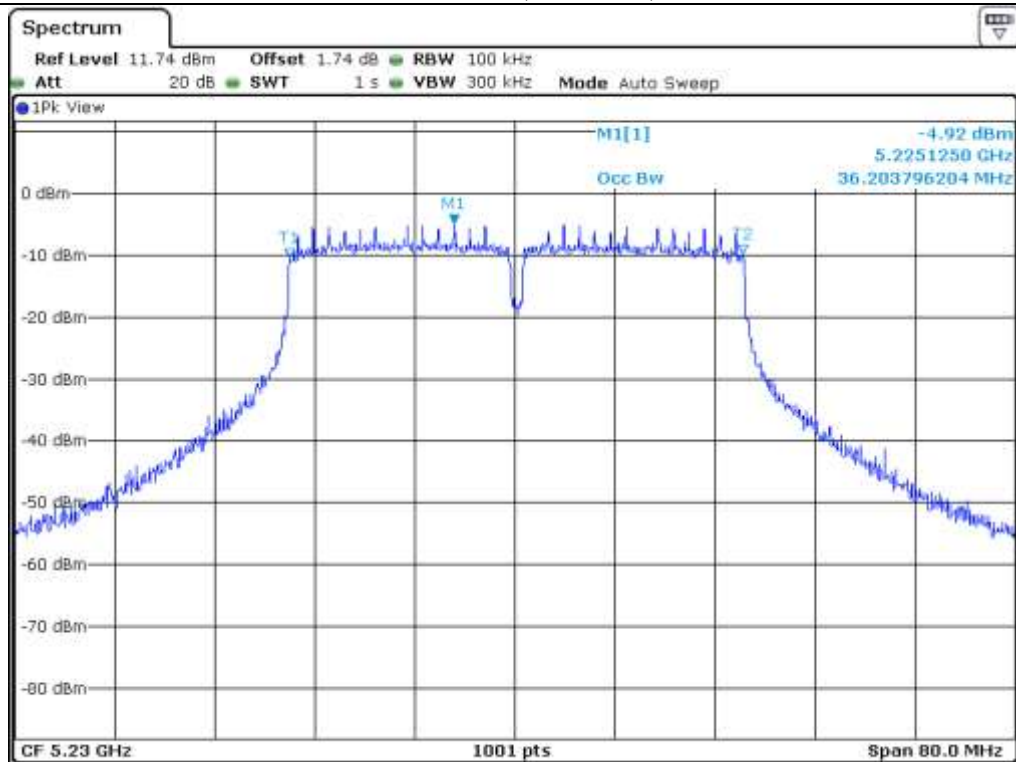
Low Channel (5.755 MHz)



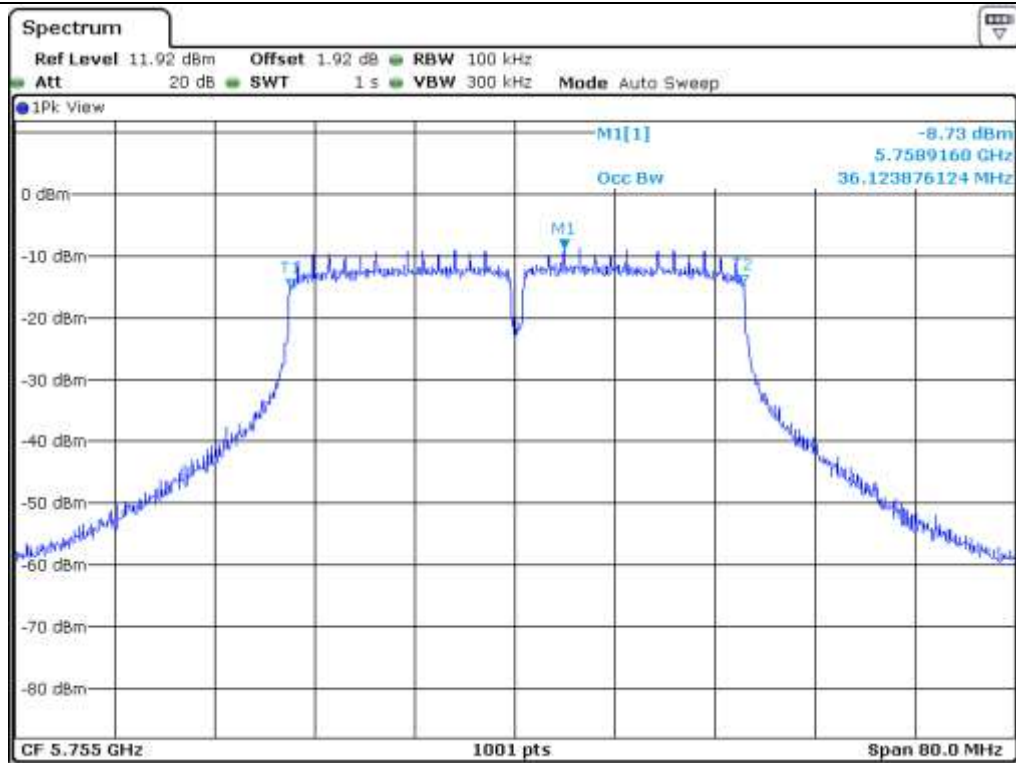
High Channel (5.795 MHz)



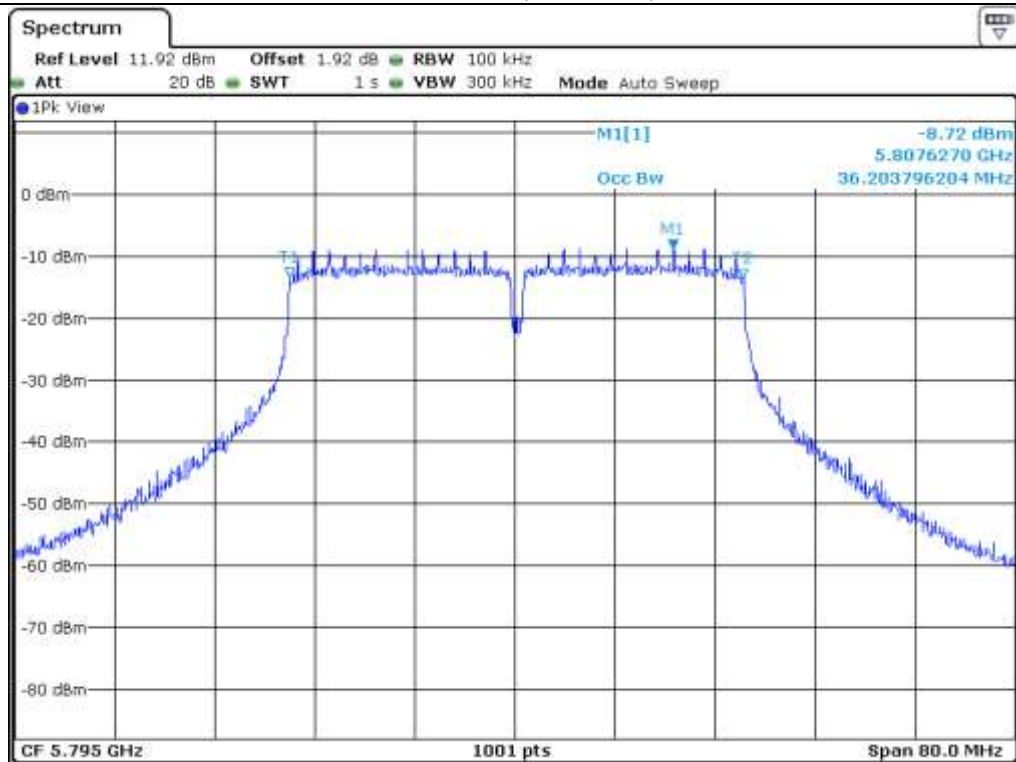
Low Channel (5 190 MHz)



High Channel (5 230 MHz)



Low Channel (5.755 MHz)



High Channel (5.795 MHz)

7.4.3.3 Test data for Antenna 2

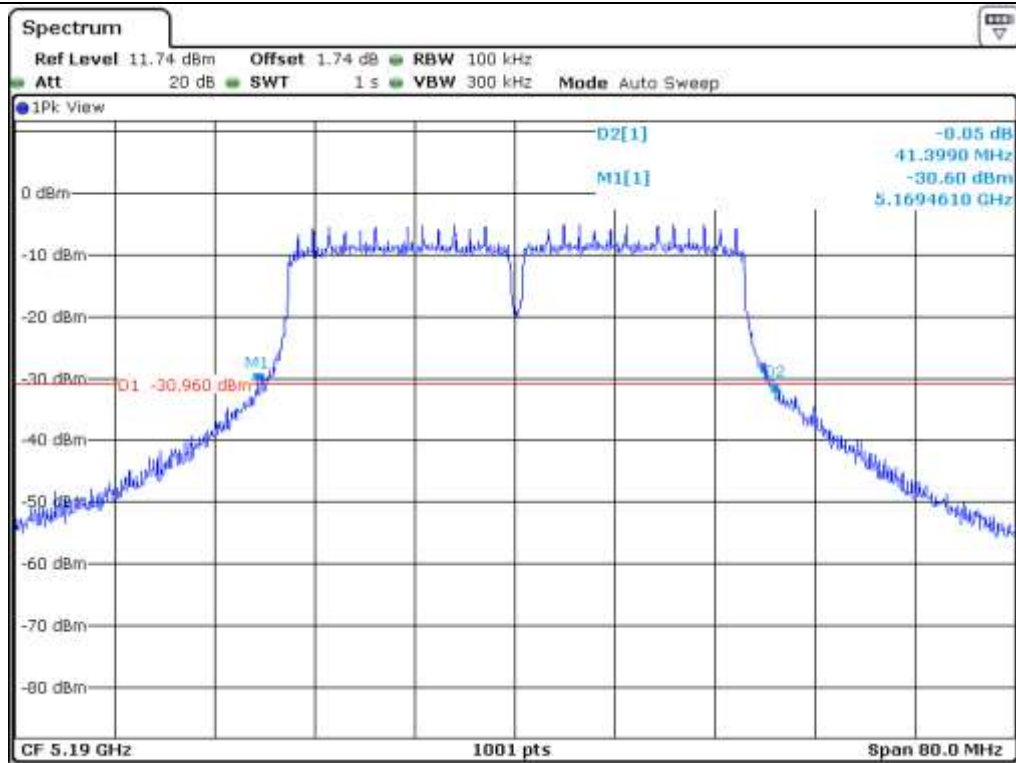
-. Test Date : May 02, 2016

-. Test Result : Pass

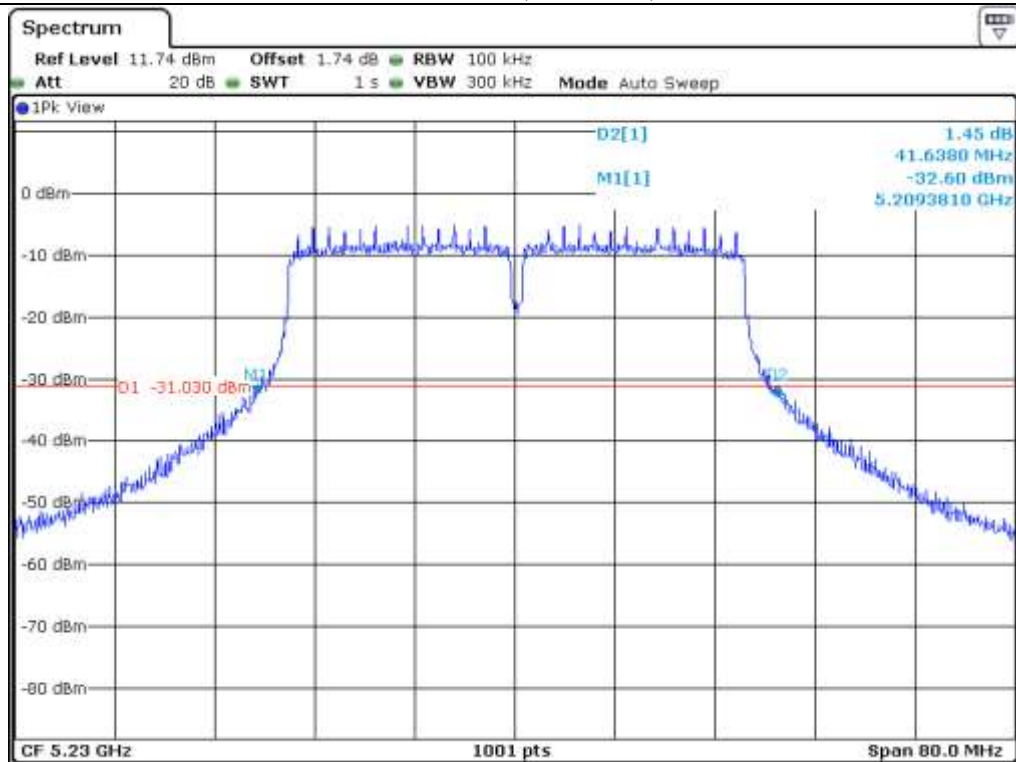
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190	41.40	36.20
	High	5 230	41.64	36.12
5 725 ~ 5 850	Low	5 755	40.28	36.20
	High	5 795	41.24	36.20



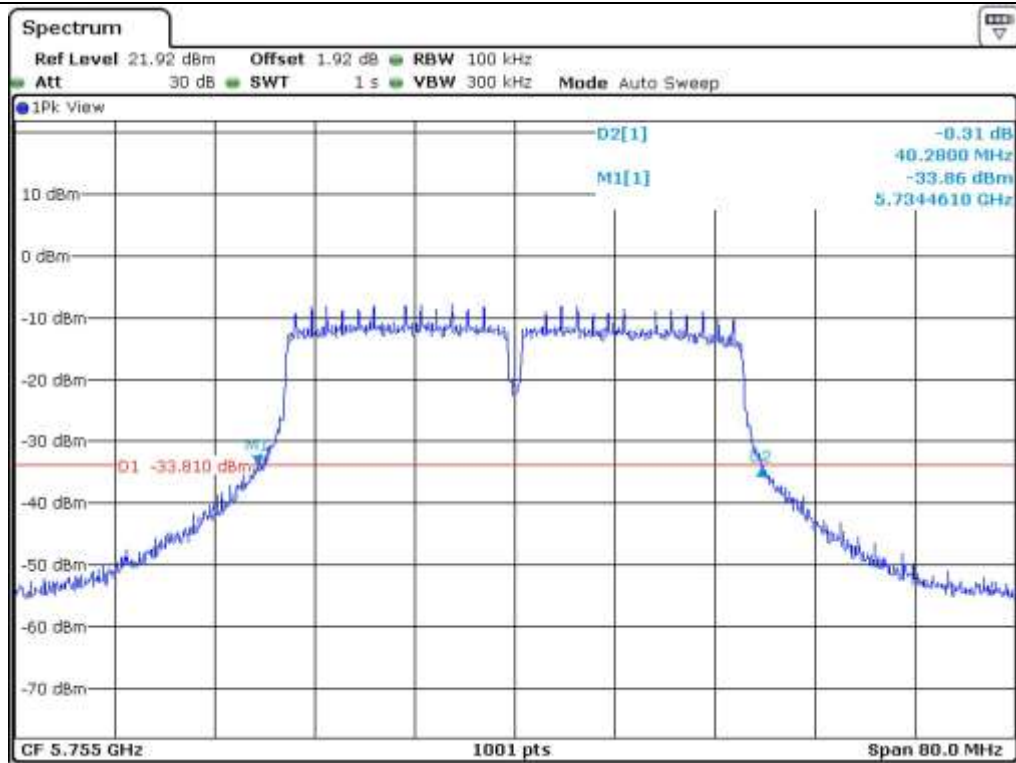
Tested by: Jun-Hui, Lee / Senior Engineer



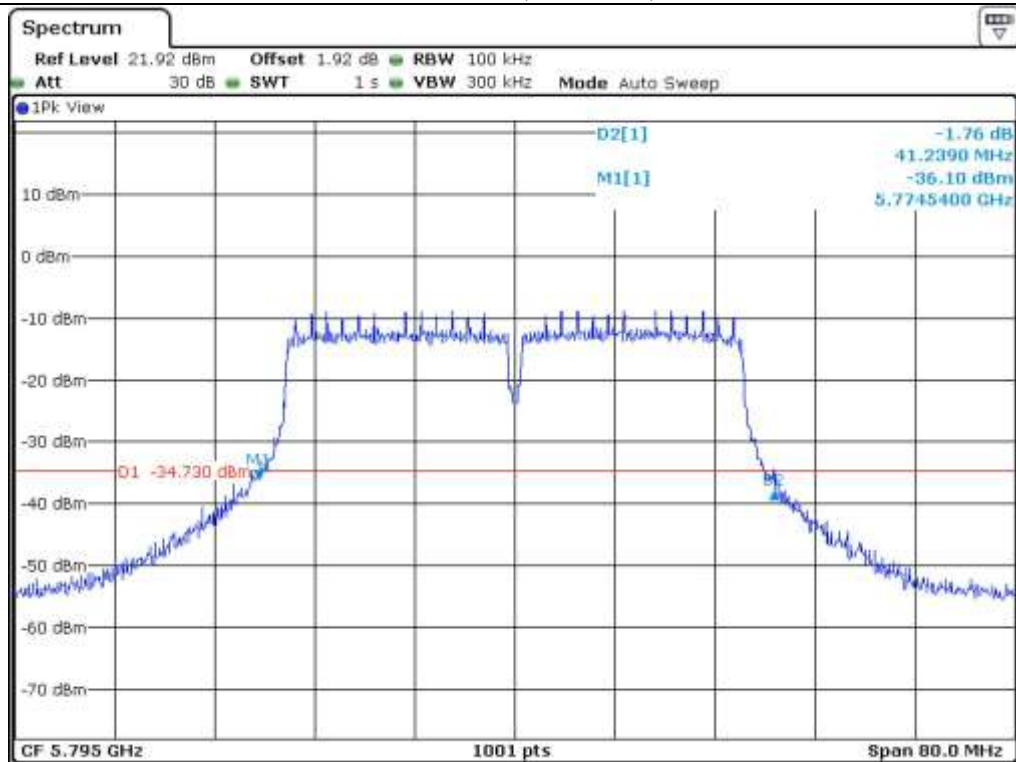
Low Channel (5 190 MHz)



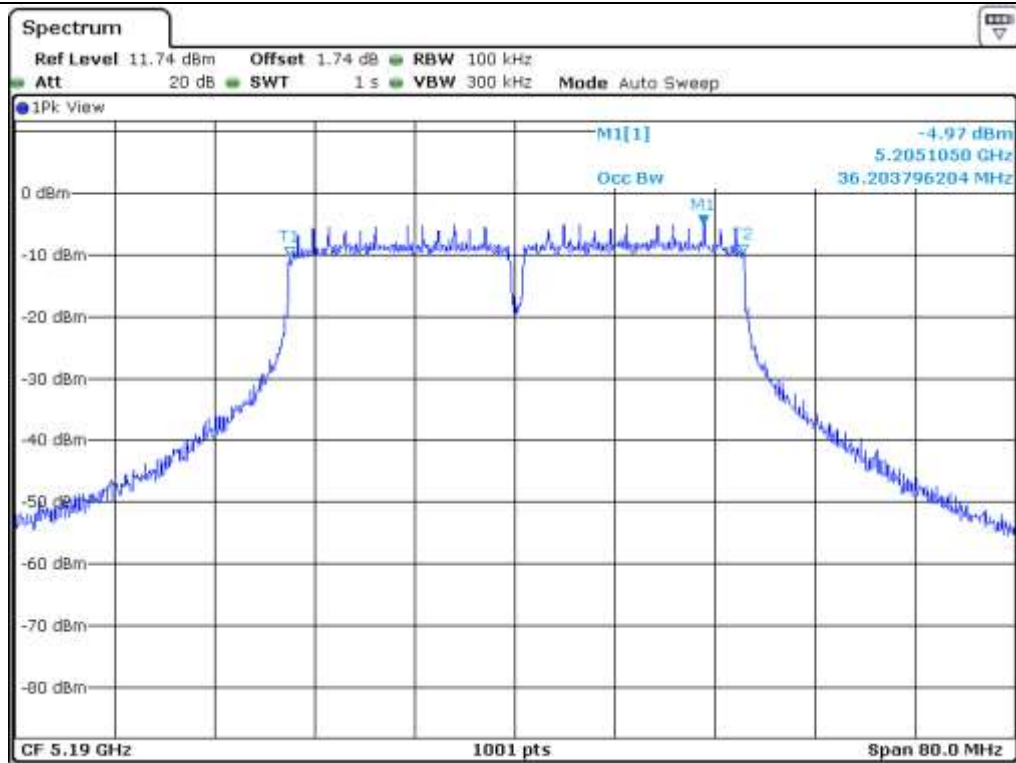
High Channel (5 230 MHz)



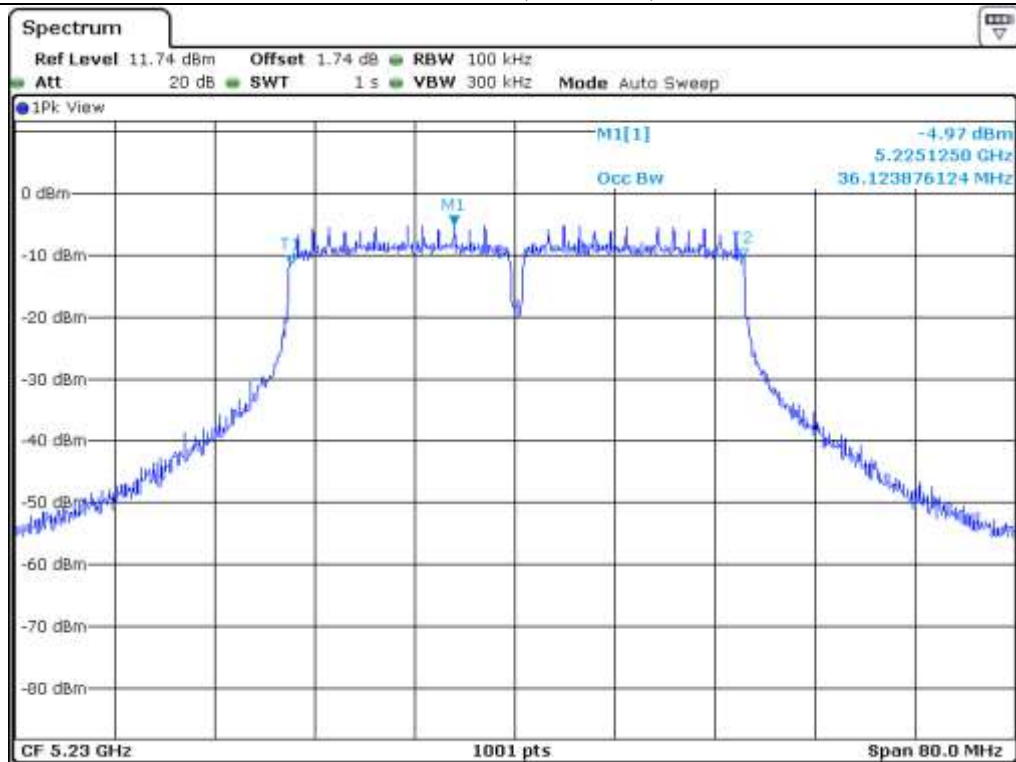
Low Channel (5 755 MHz)



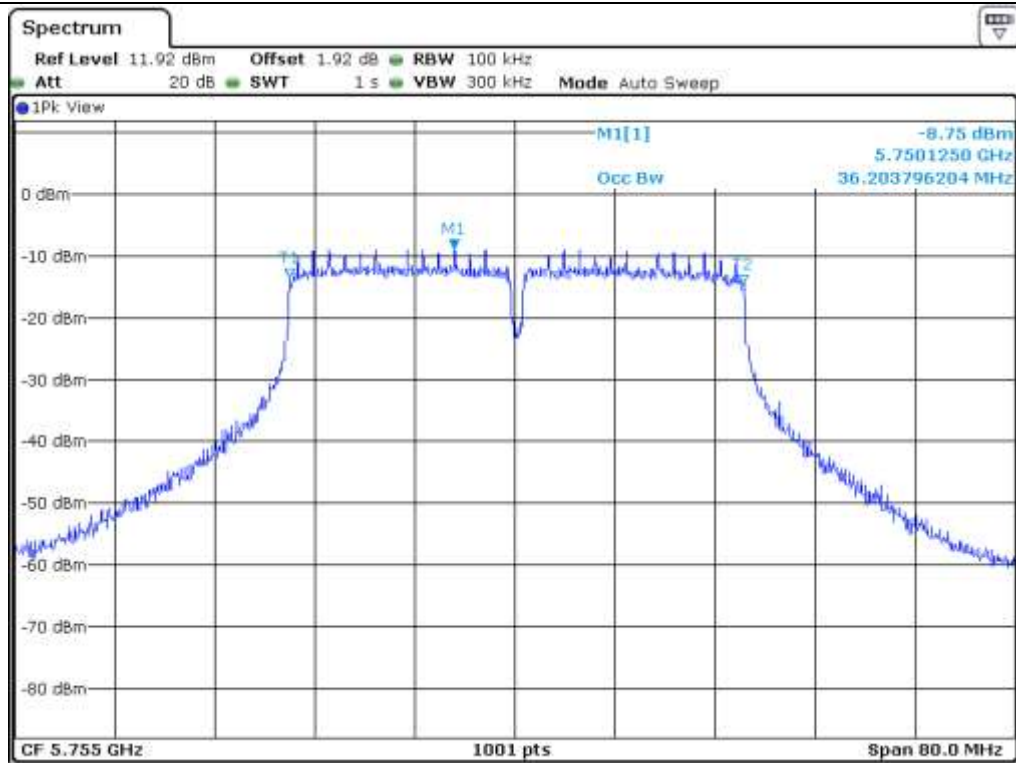
High Channel (5 795 MHz)



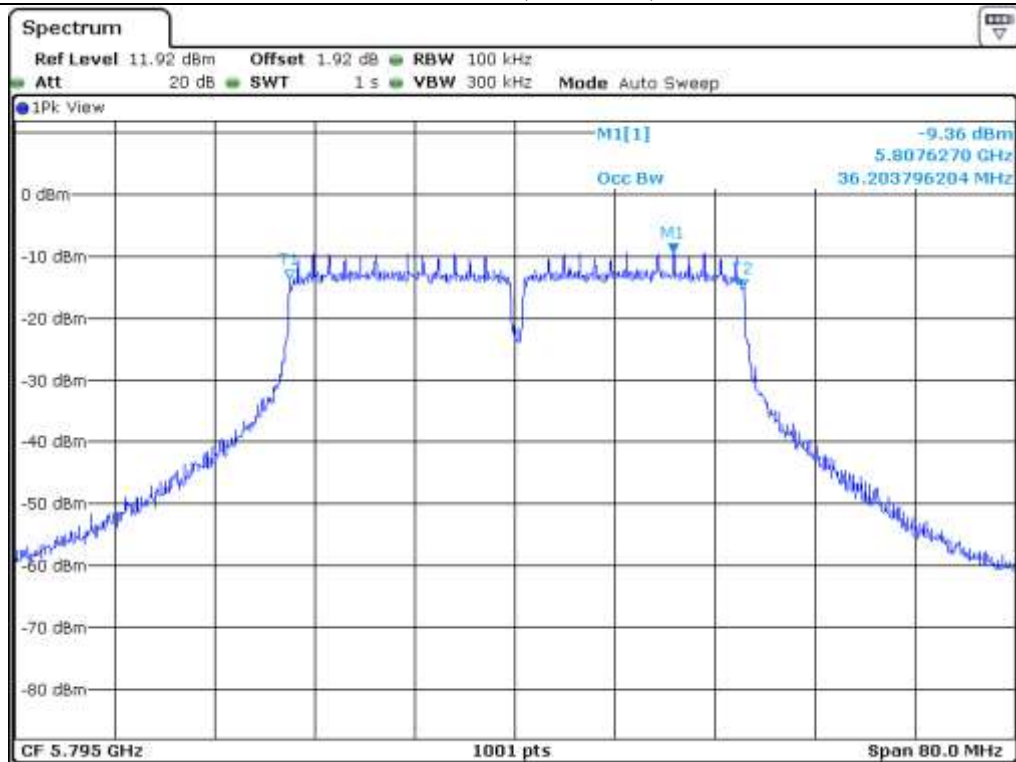
Low Channel (5 190 MHz)



High Channel (5 230 MHz)



Low Channel (5.755 MHz)



High Channel (5.795 MHz)

7.4.4 Test data for 802.11ac20 RLAN Mode

7.4.4.1 Test data for Antenna 0

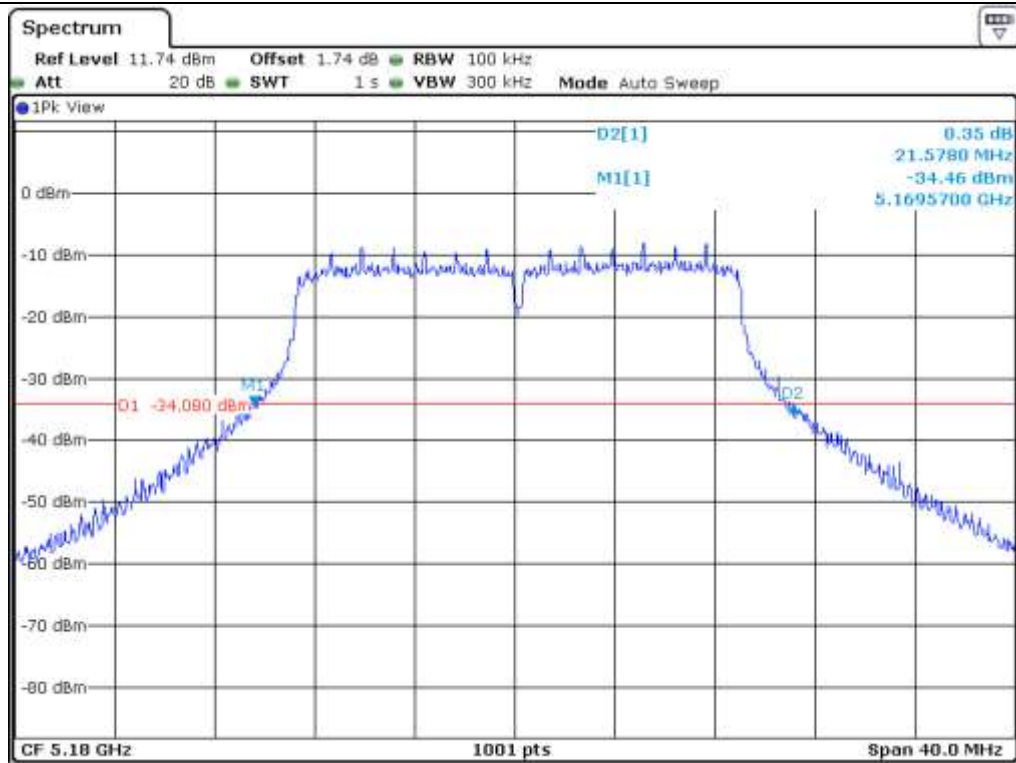
-. Test Date : May 02, 2016

-. Test Result : Pass

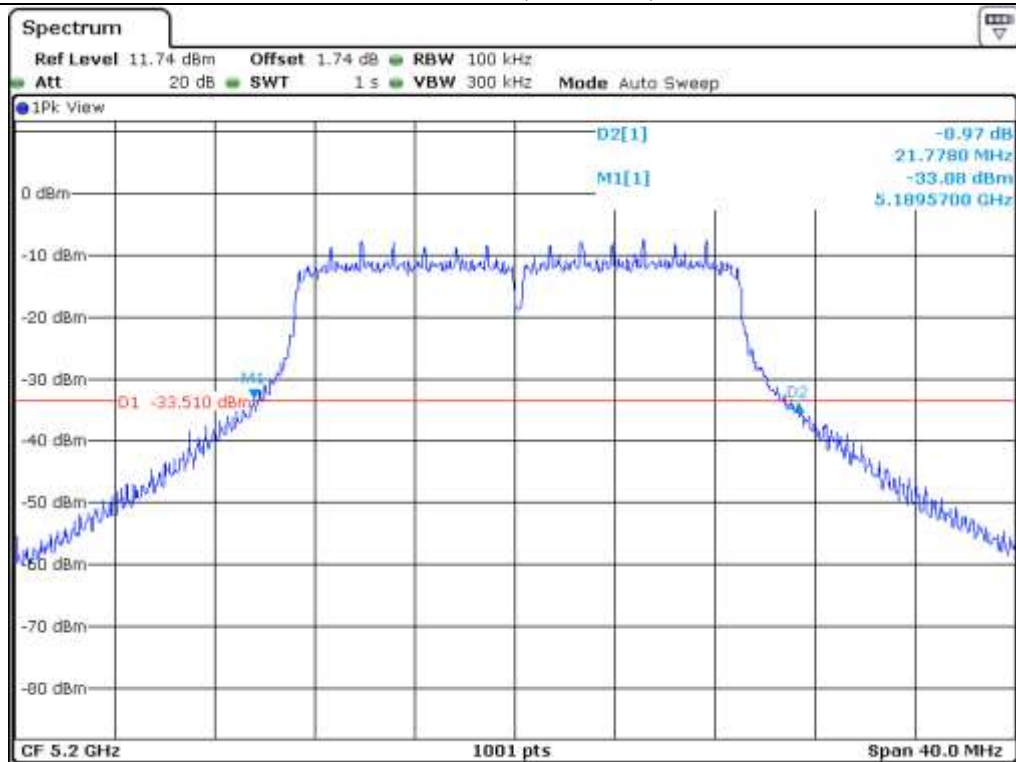
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180	21.58	17.66
	Middle	5 200	21.78	17.66
	High	5 240	21.62	17.66
5 725 ~ 5 850	Low	5 745	21.06	17.66
	Middle	5 785	21.58	17.70
	High	5 825	21.38	17.66



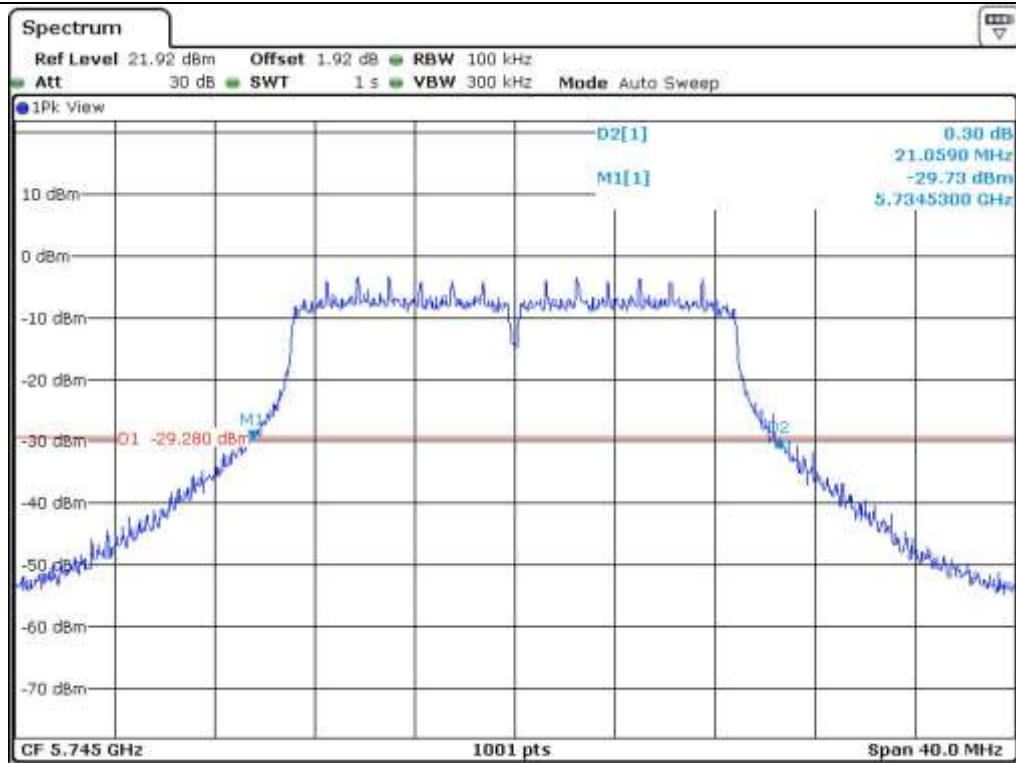
Tested by: Jun-Hui, Lee / Senior Engineer



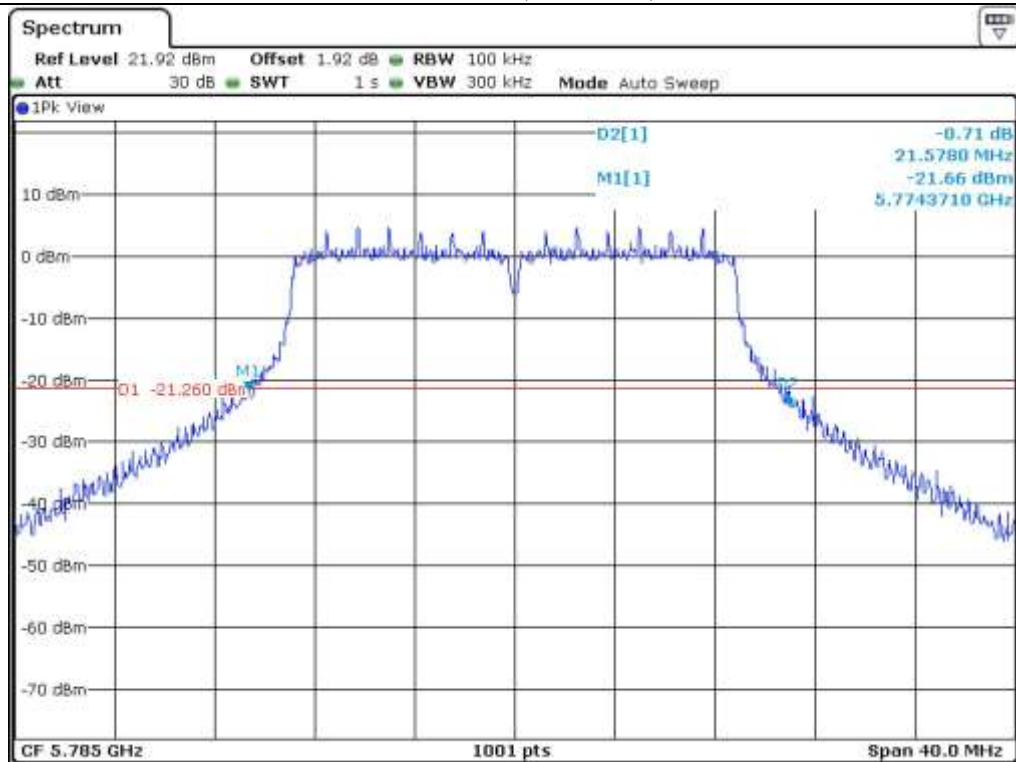
Low Channel (5 180 MHz)



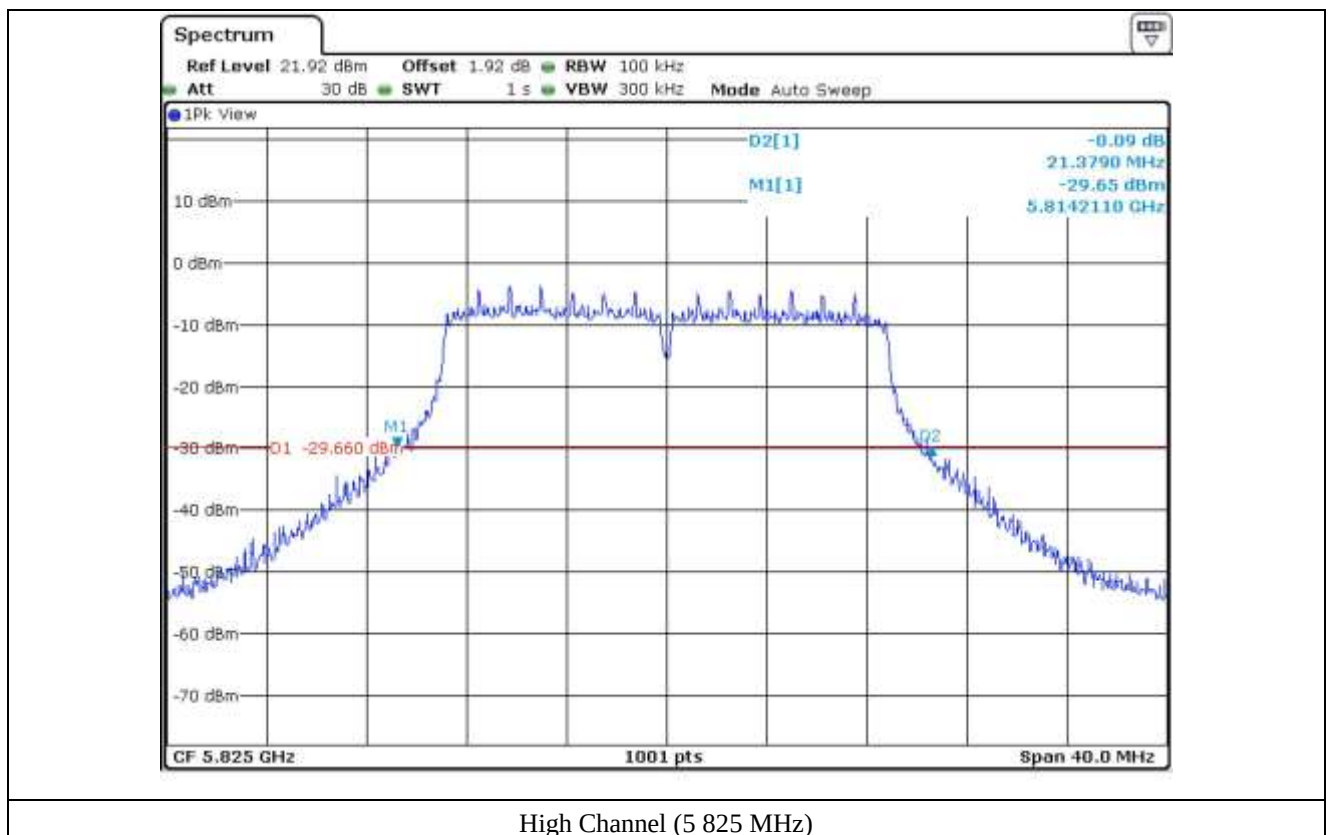
Middle Channel (5 200 MHz)

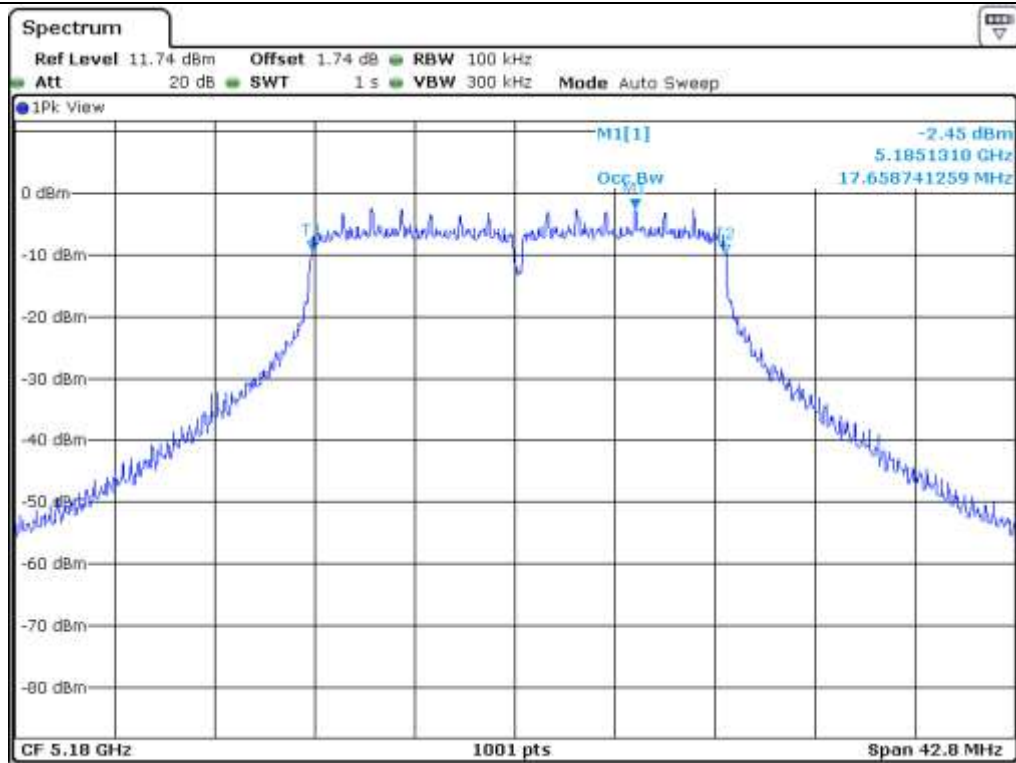


Low Channel (5.745 MHz)

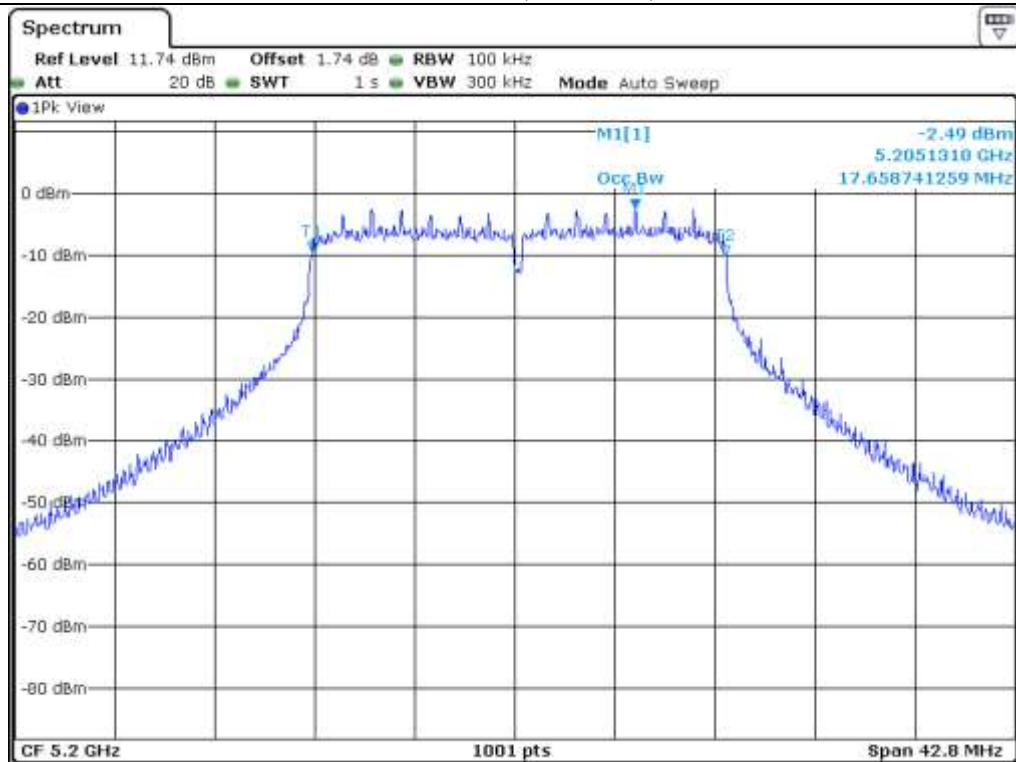


Middle Channel (5.785 MHz)

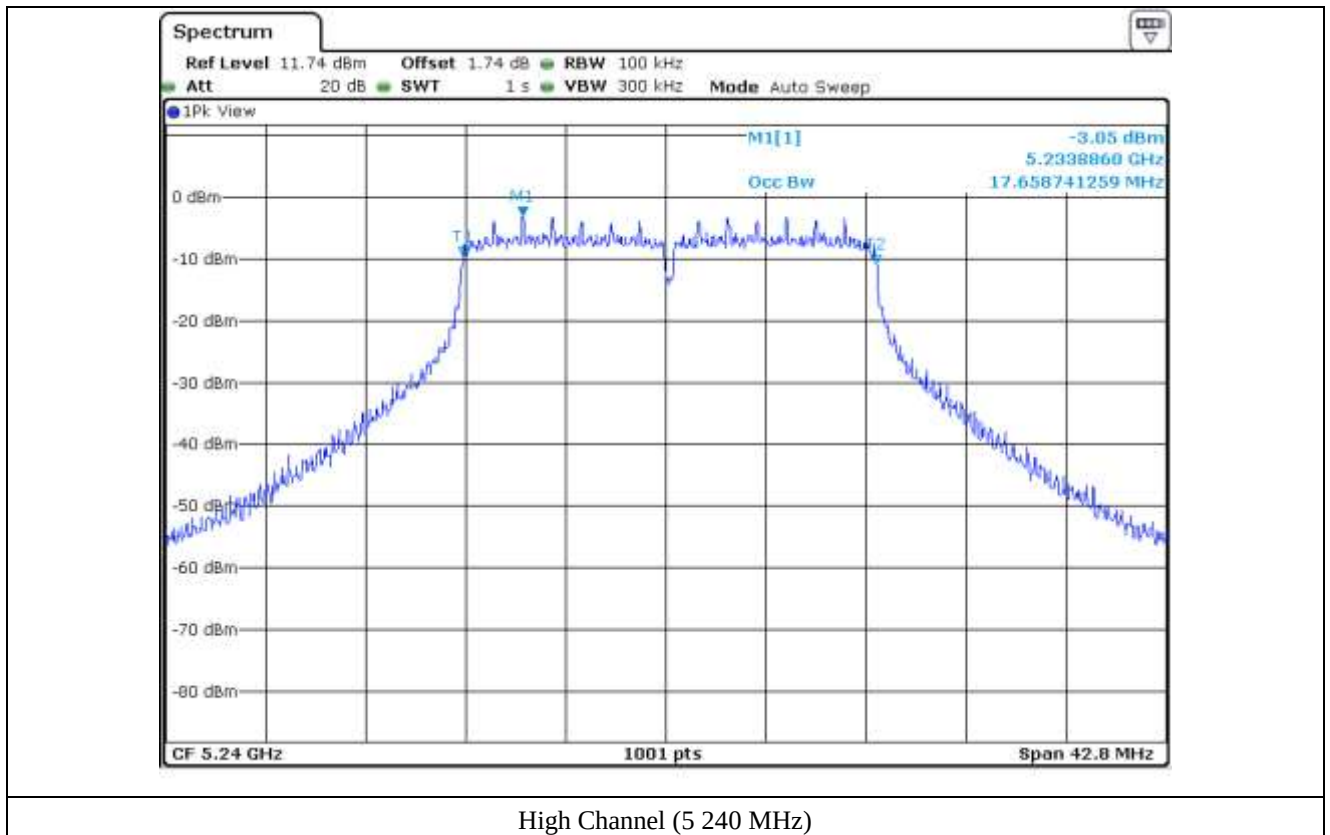


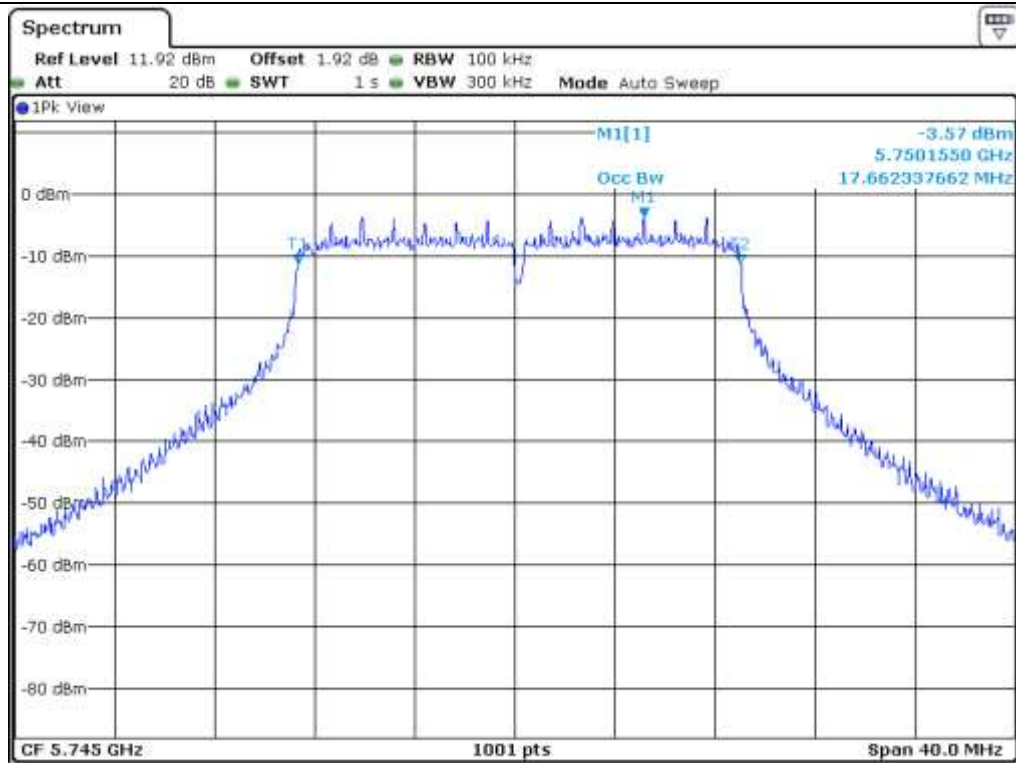


Low Channel (5 180 MHz)

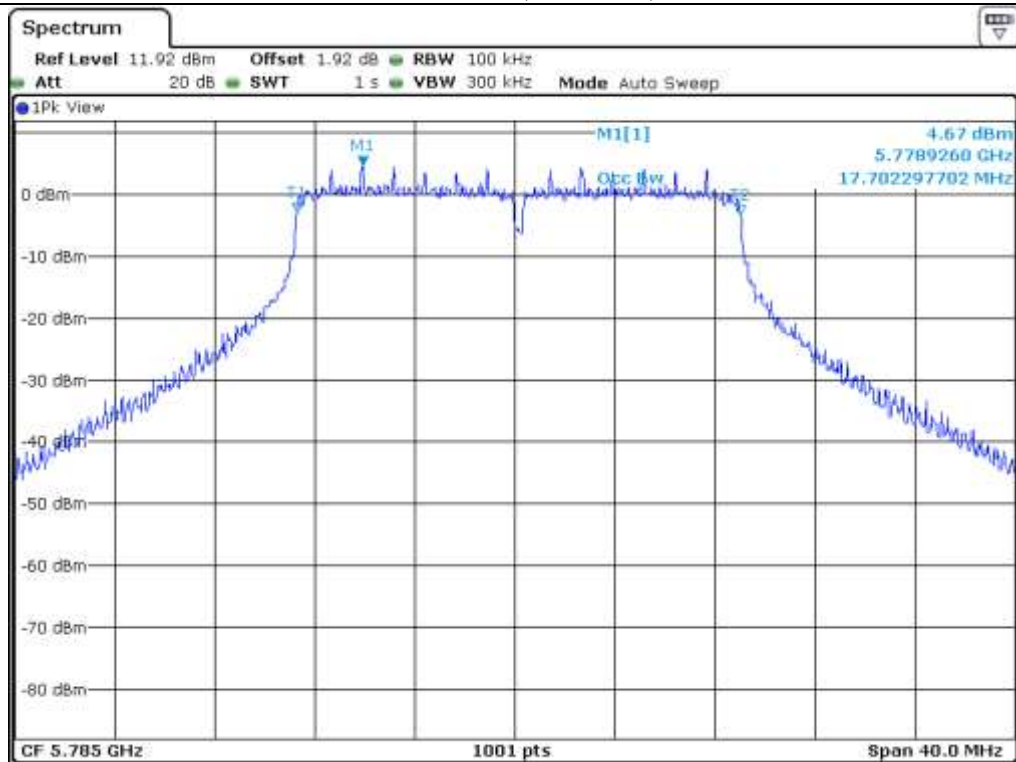


Middle Channel (5 200 MHz)

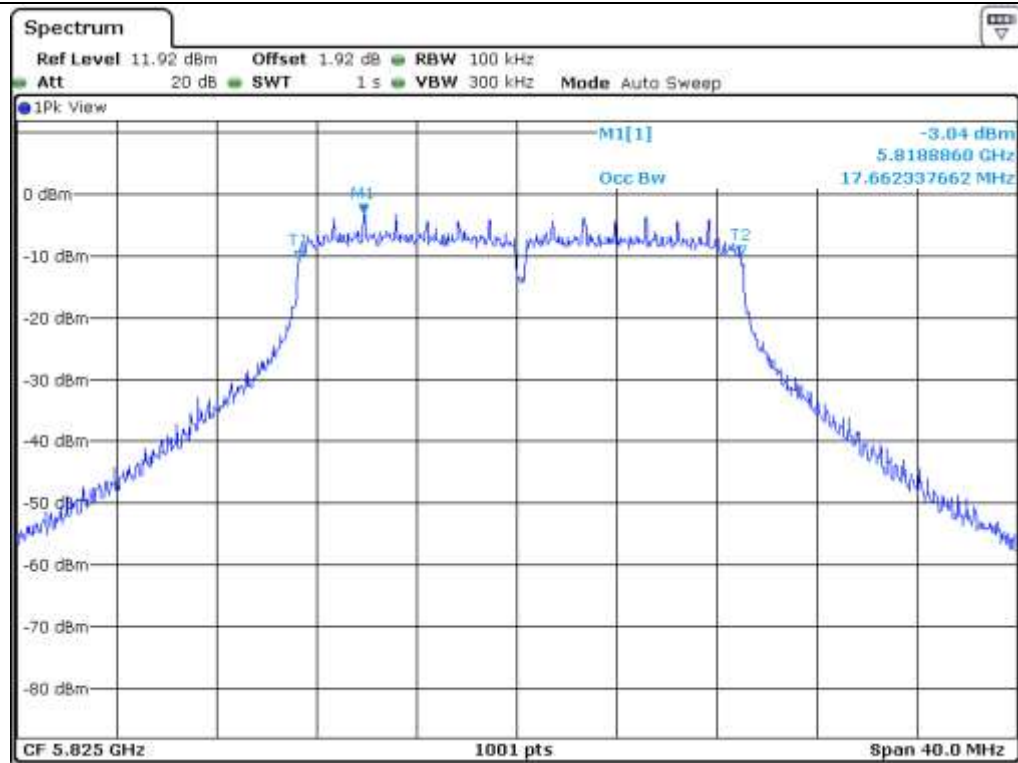




Low Channel (5.745 MHz)



Middle Channel (5.785 MHz)



High Channel (5 825 MHz)

7.4.4.2 Test data for Antenna 1

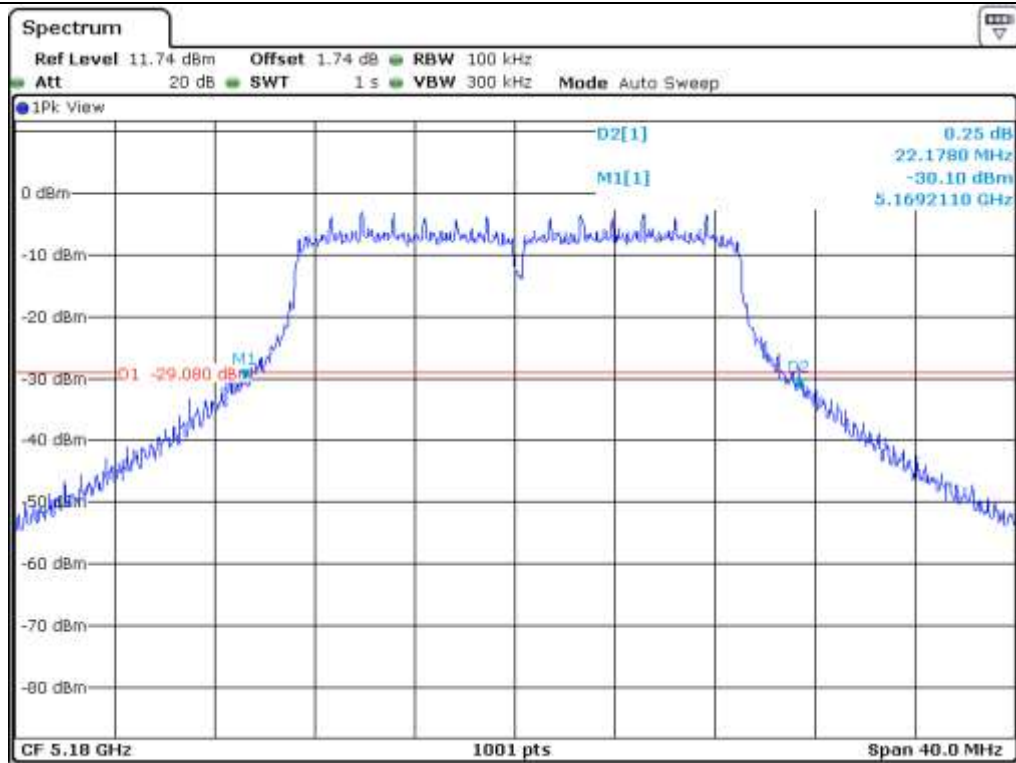
-. Test Date : May 02, 2016

-. Test Result : Pass

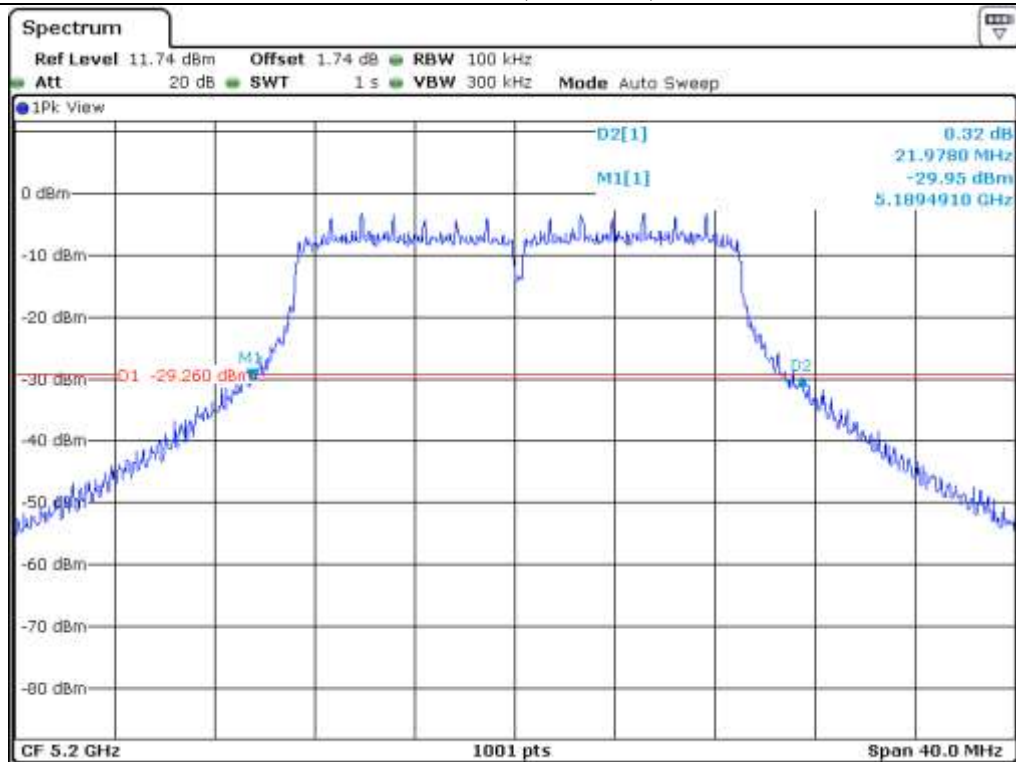
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180	22.18	17.70
	Middle	5 200	21.98	17.70
	High	5 240	22.06	17.66
5 725 ~ 5 850	Low	5 745	21.10	17.66
	Middle	5 785	21.38	17.78
	High	5 825	21.66	17.66



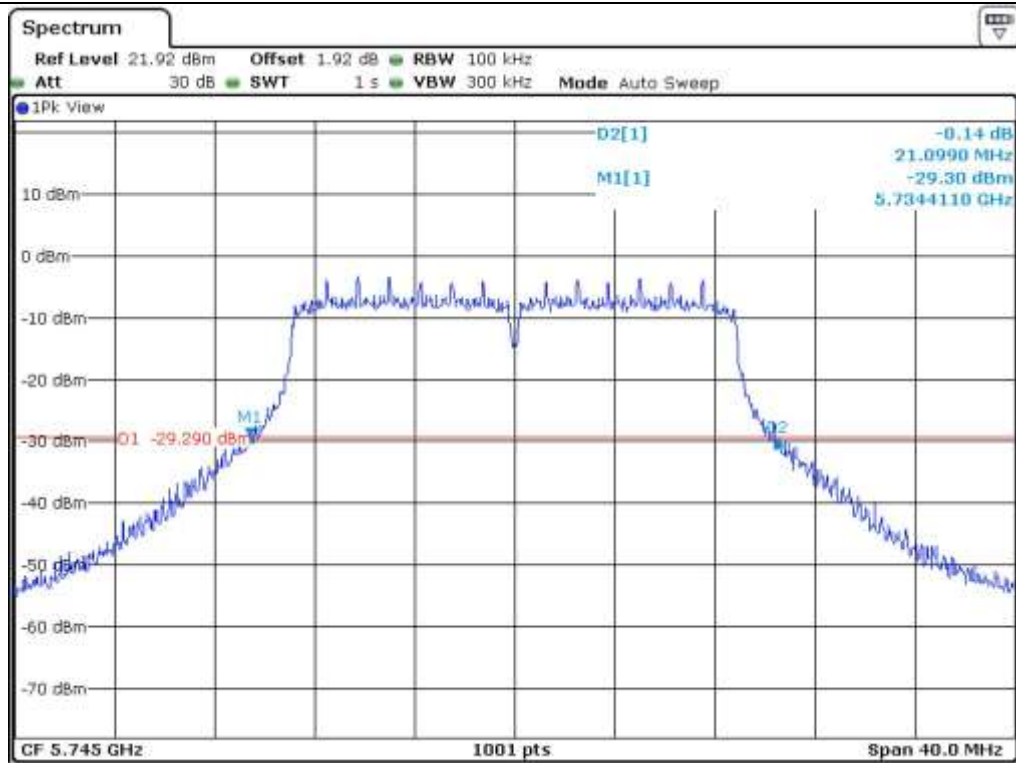
Tested by: Jun-Hui, Lee / Senior Engineer



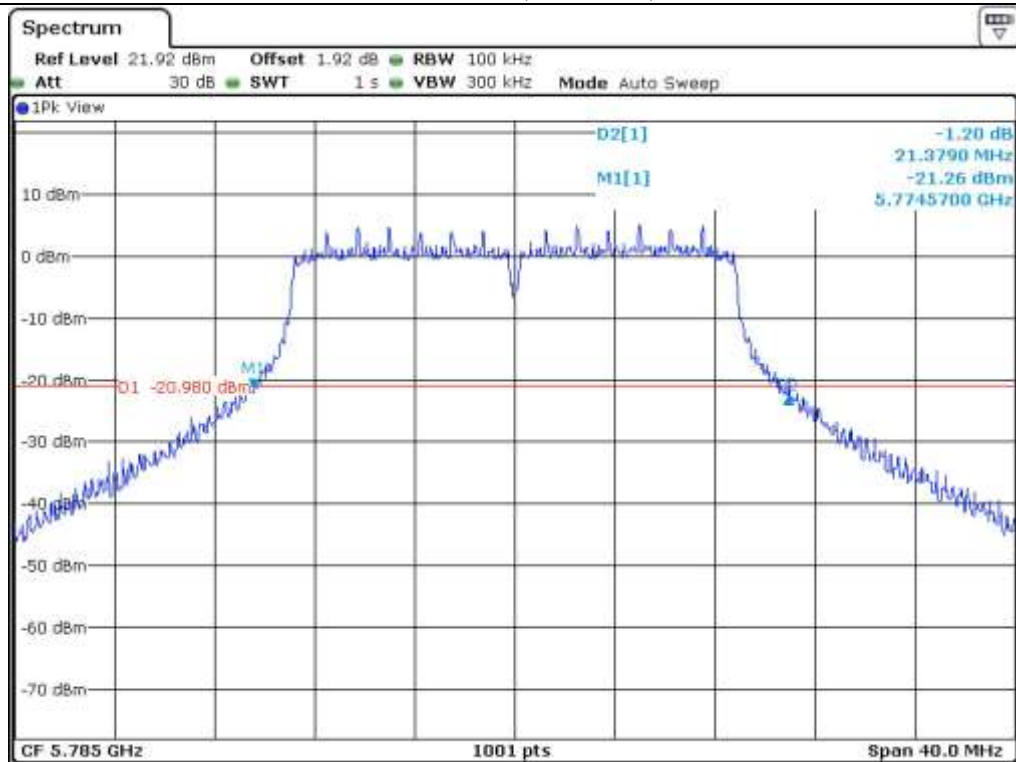
Low Channel (5 180 MHz)



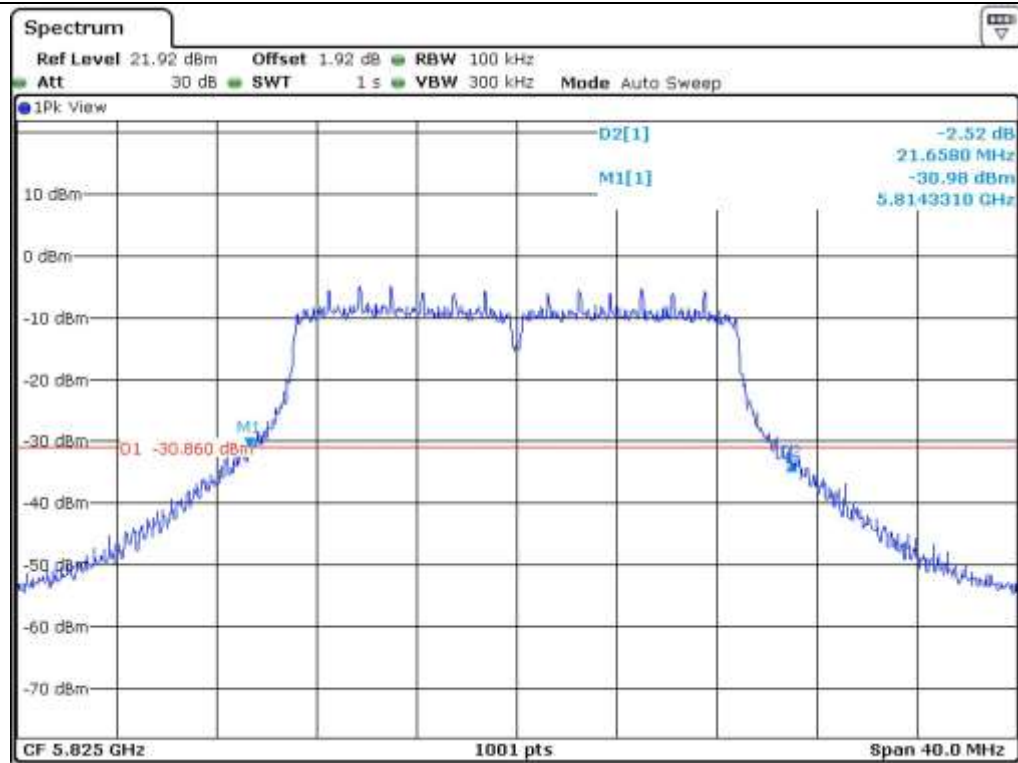
Middle Channel (5 200 MHz)



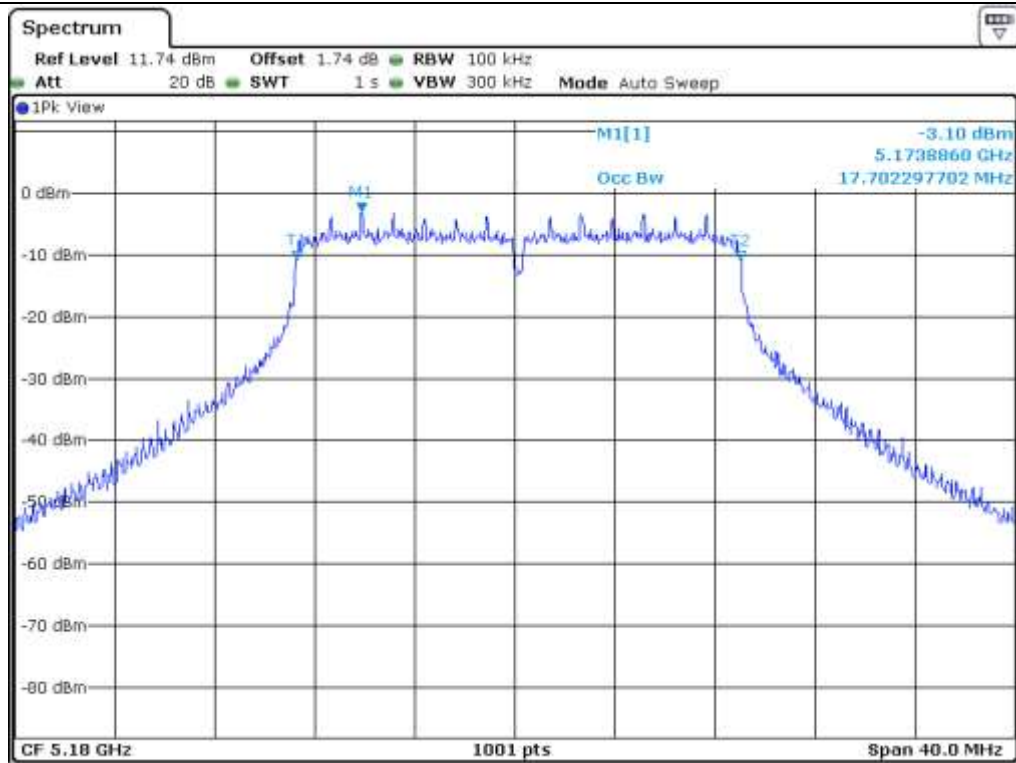
Low Channel (5.745 MHz)



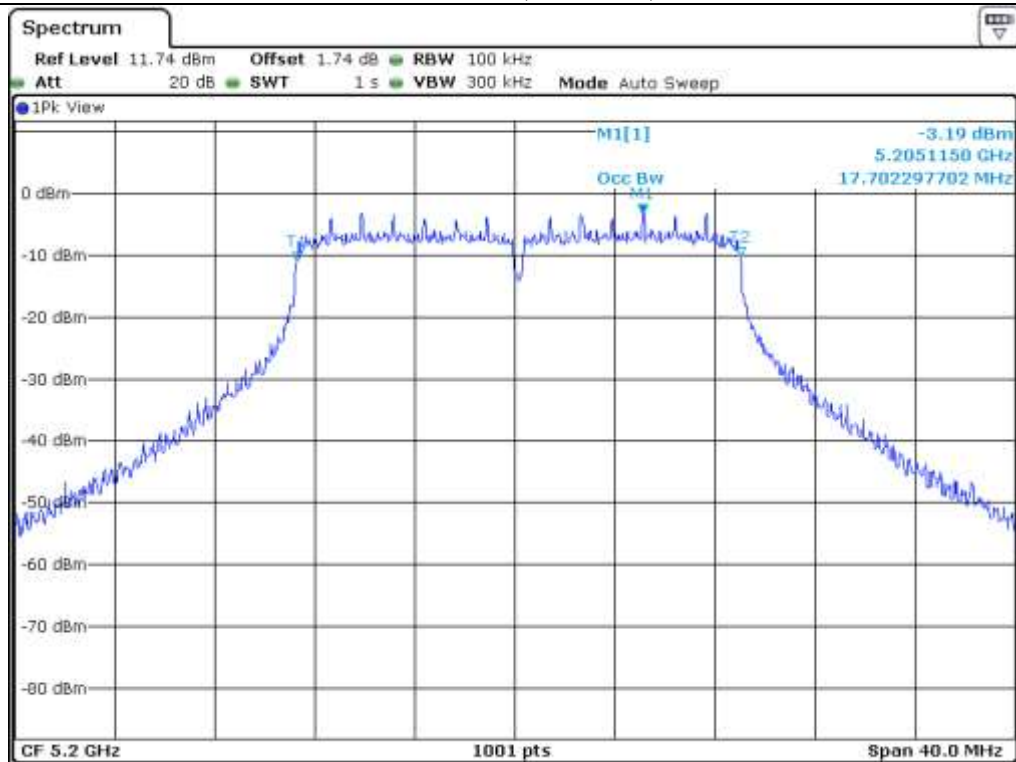
Middle Channel (5.785 MHz)



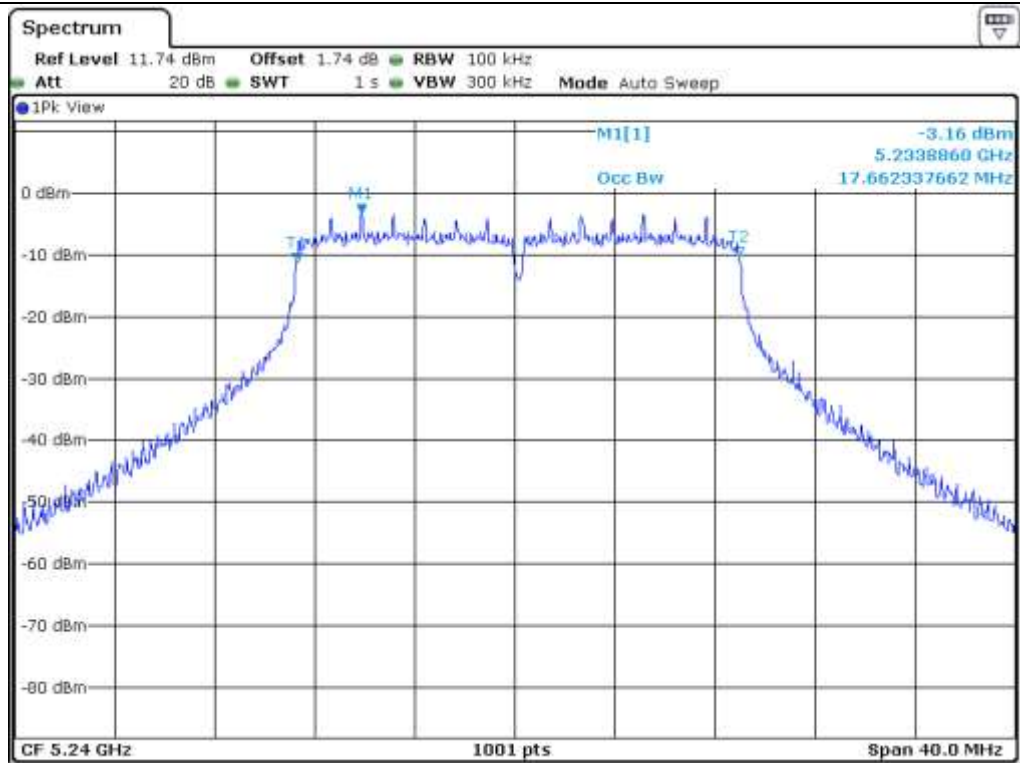
High Channel (5 825 MHz)



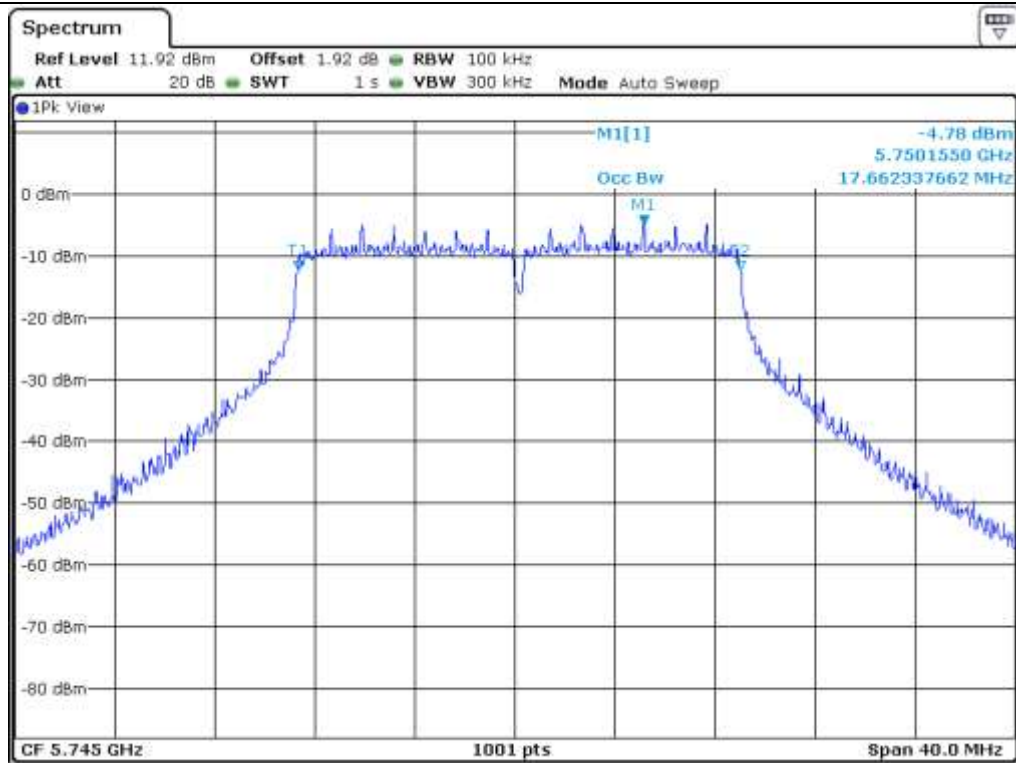
Low Channel (5 180 MHz)



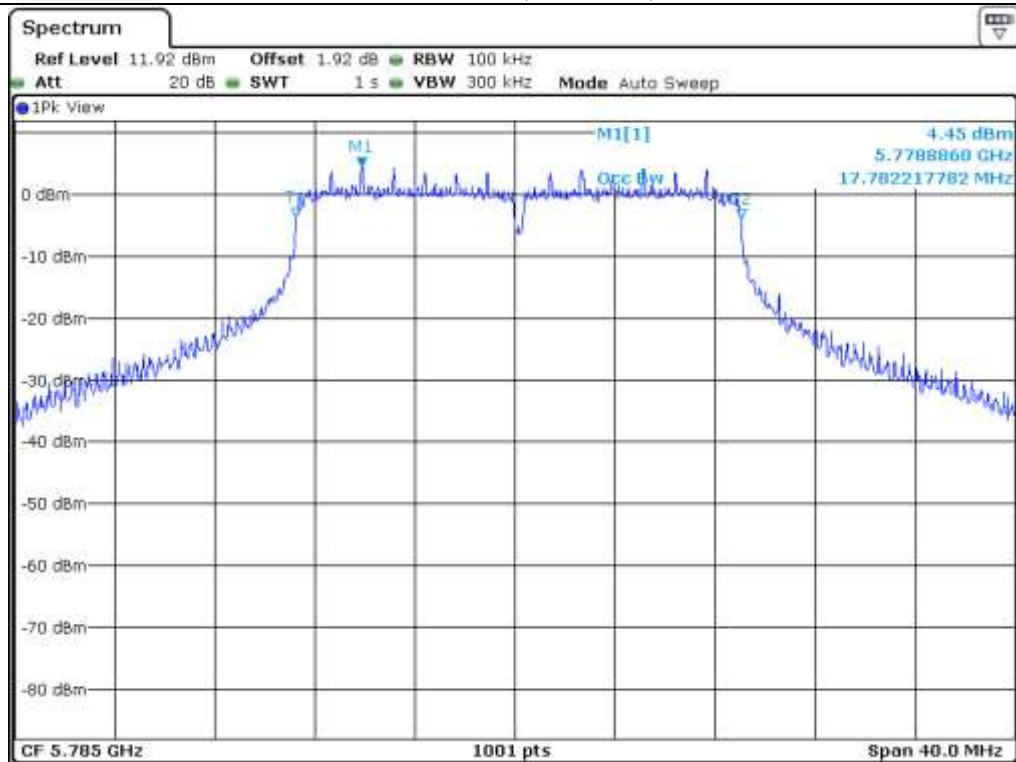
Middle Channel (5 200 MHz)



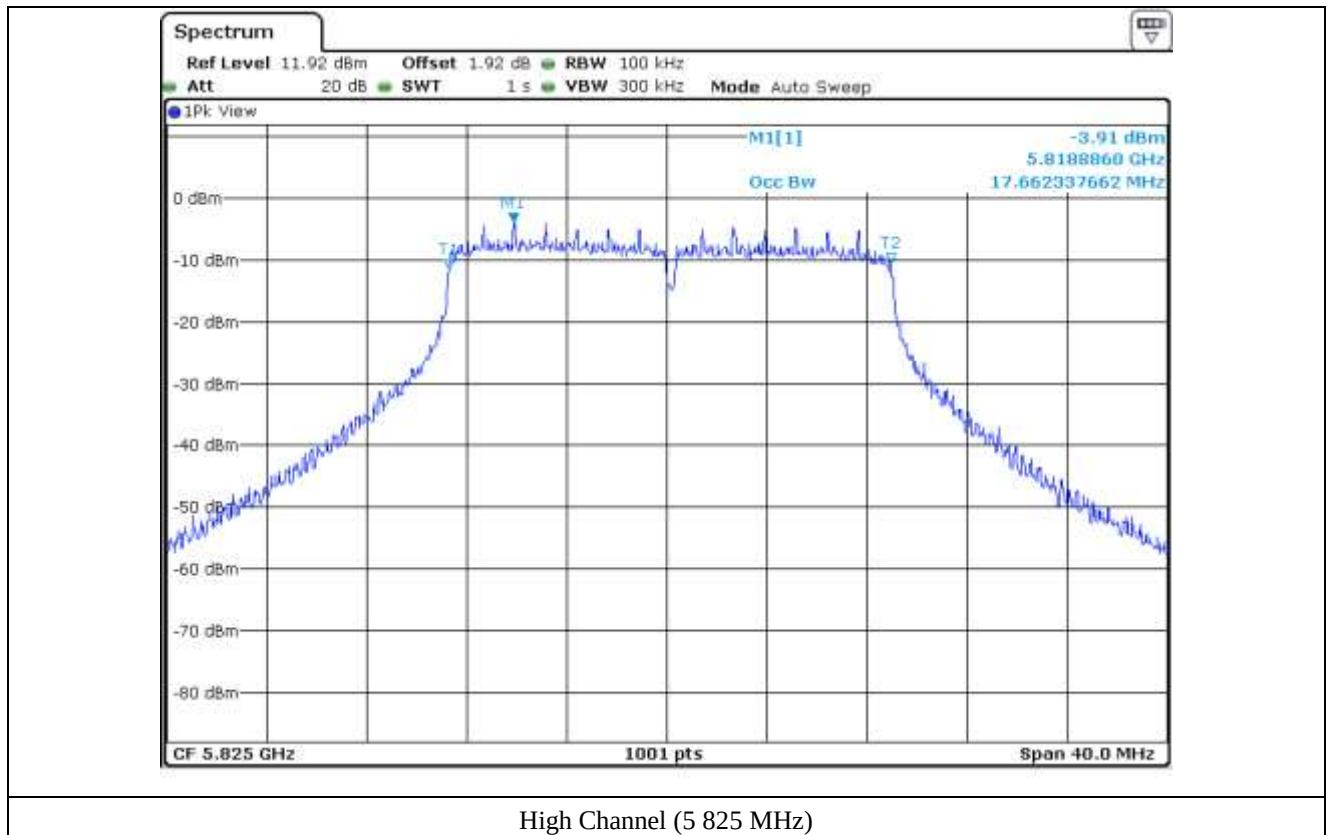
High Channel (5 240 MHz)



Low Channel (5.745 MHz)



Middle Channel (5.785 MHz)



7.4.4.3 Test data for Antenna 2

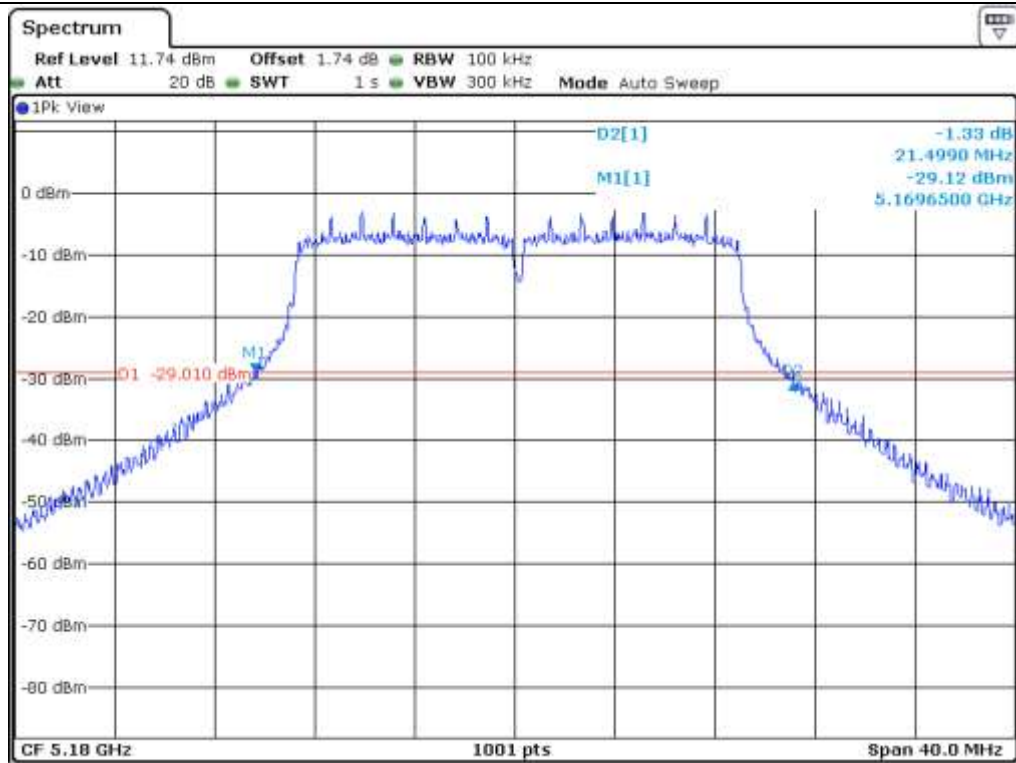
-. Test Date : May 02, 2016

-. Test Result : Pass

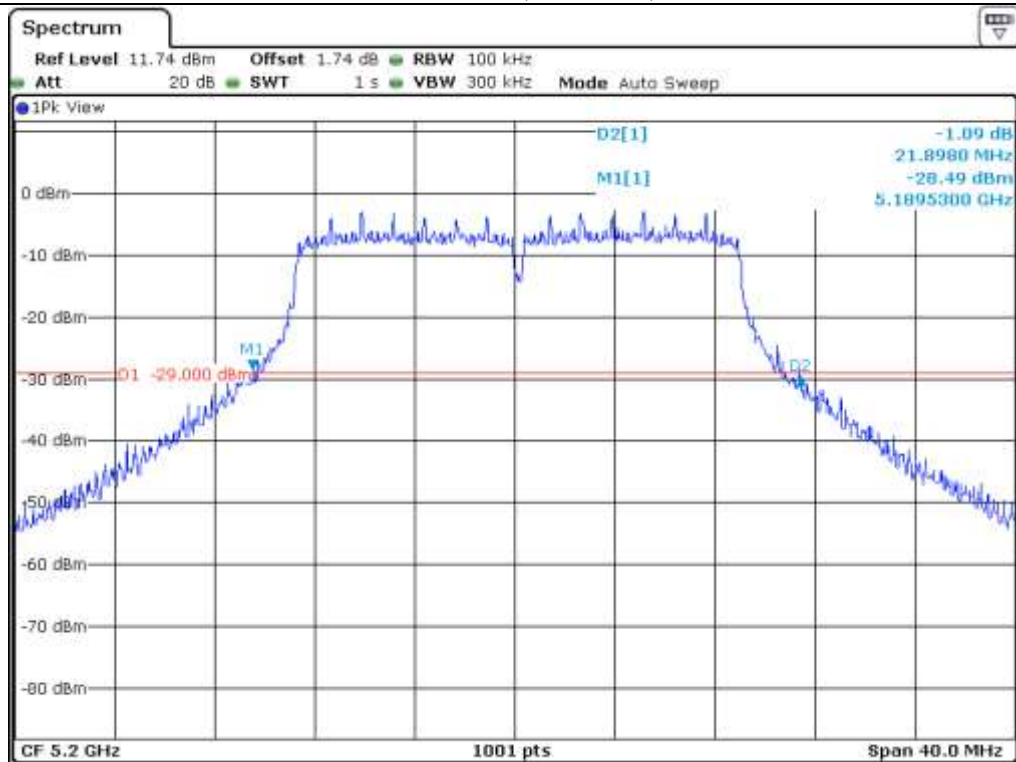
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180	21.50	17.70
	Middle	5 200	21.90	17.70
	High	5 240	21.62	17.70
5 725 ~ 5 850	Low	5 745	21.58	17.66
	Middle	5 785	21.66	17.70
	High	5 825	21.50	17.66



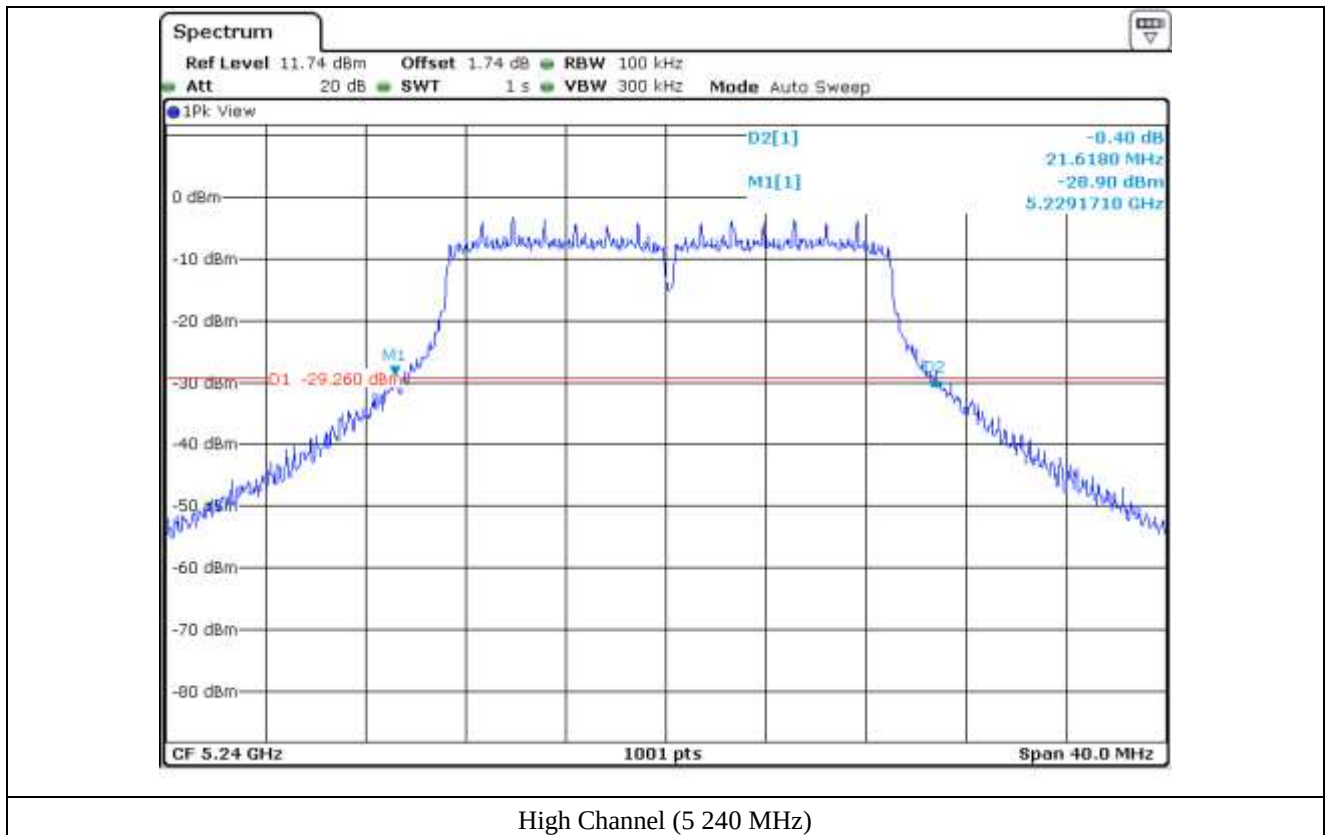
Tested by: Jun-Hui, Lee / Senior Engineer

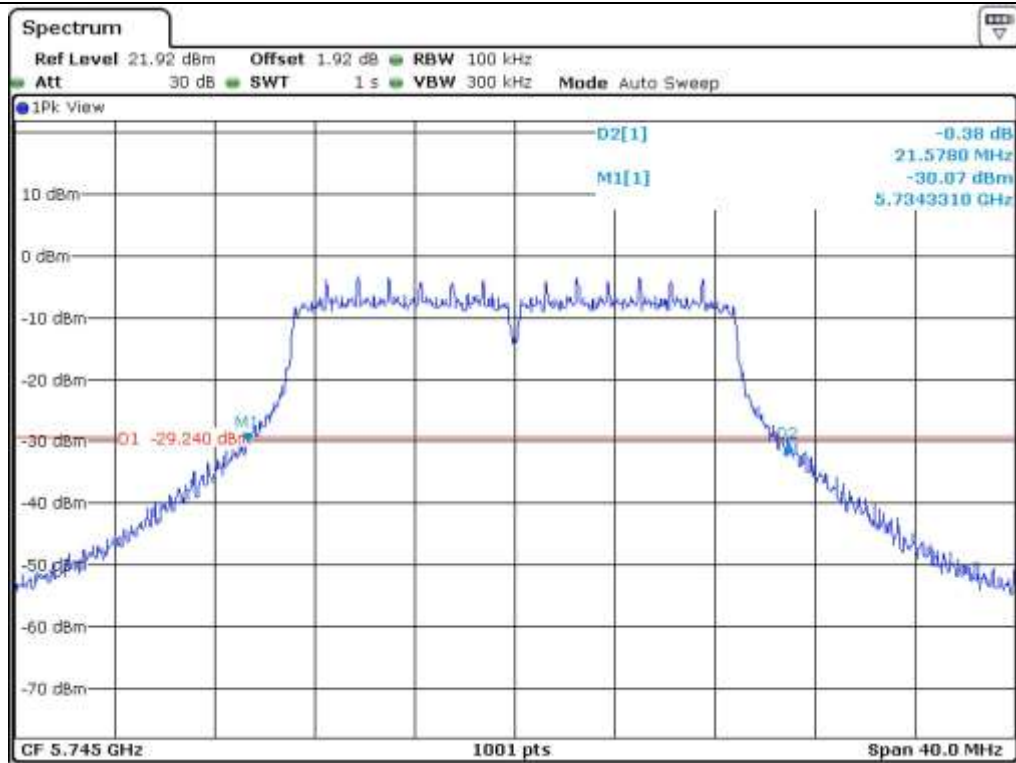


Low Channel (5 180 MHz)

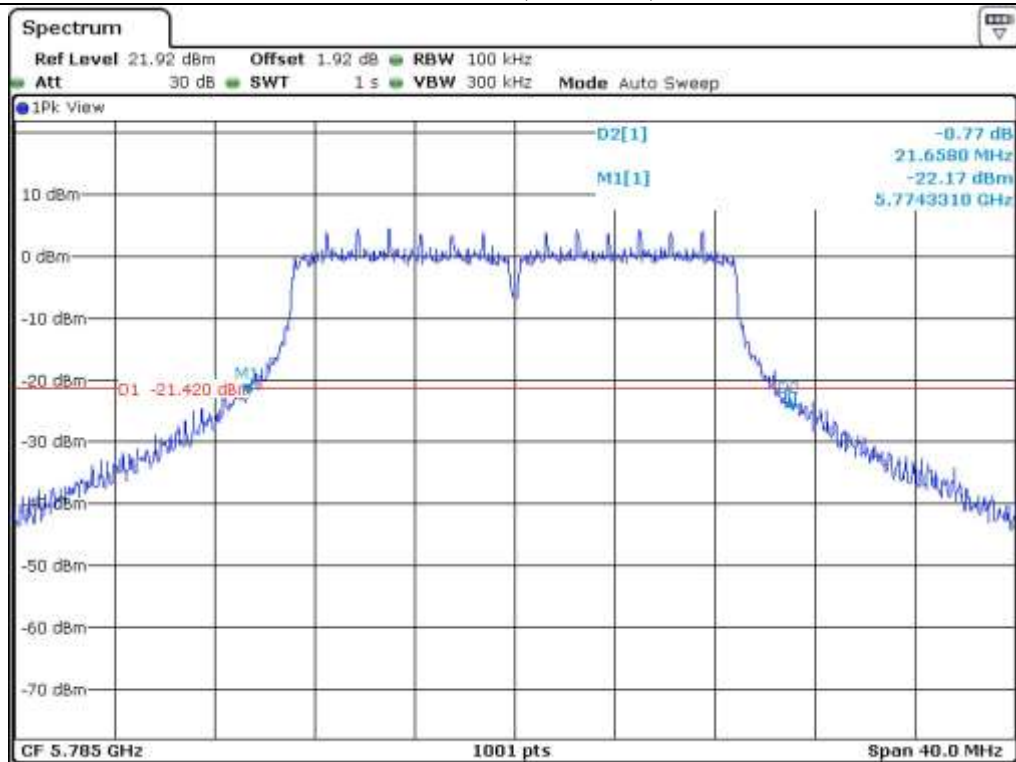


Middle Channel (5 200 MHz)

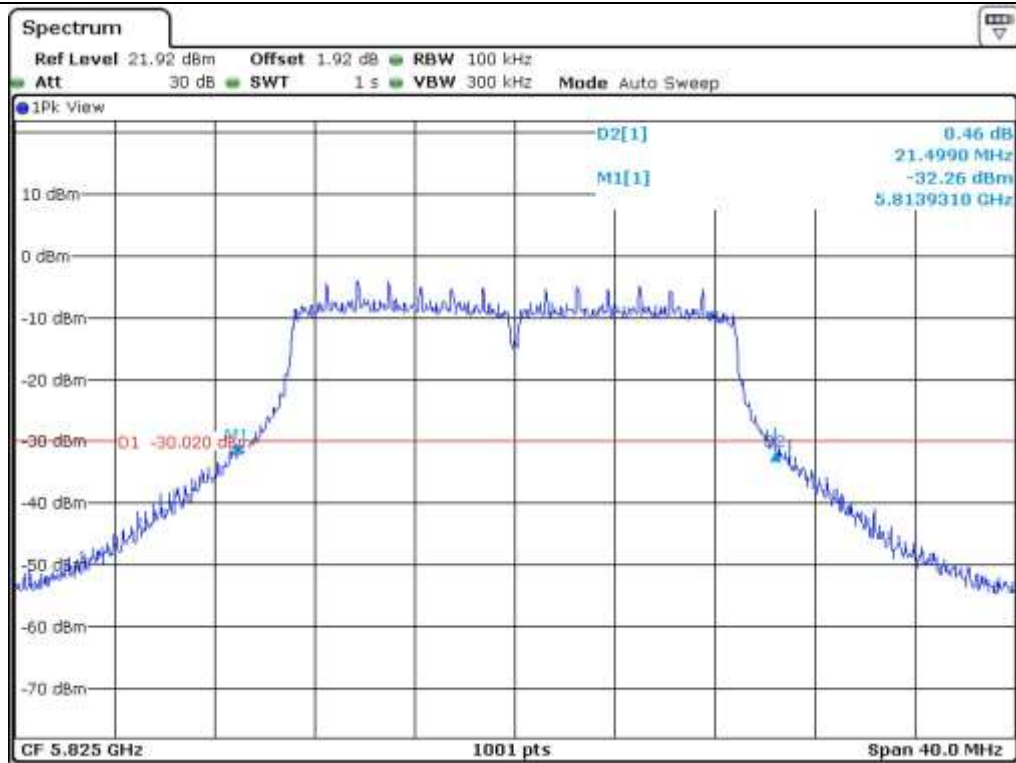




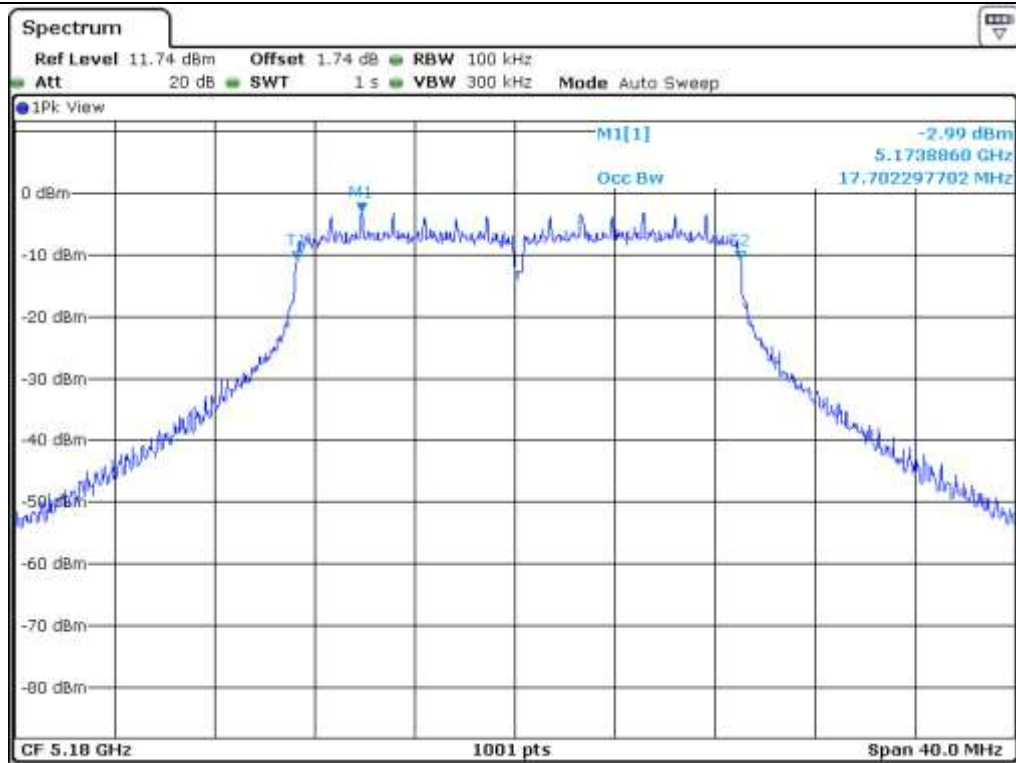
Low Channel (5.745 MHz)



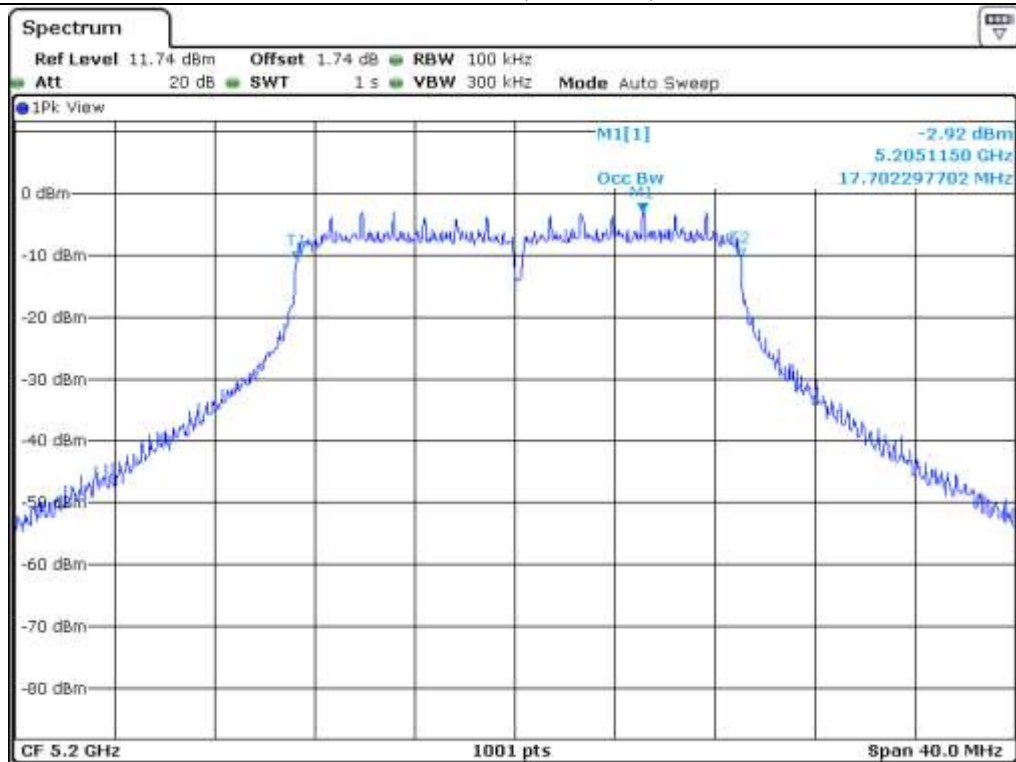
Middle Channel (5.785 MHz)



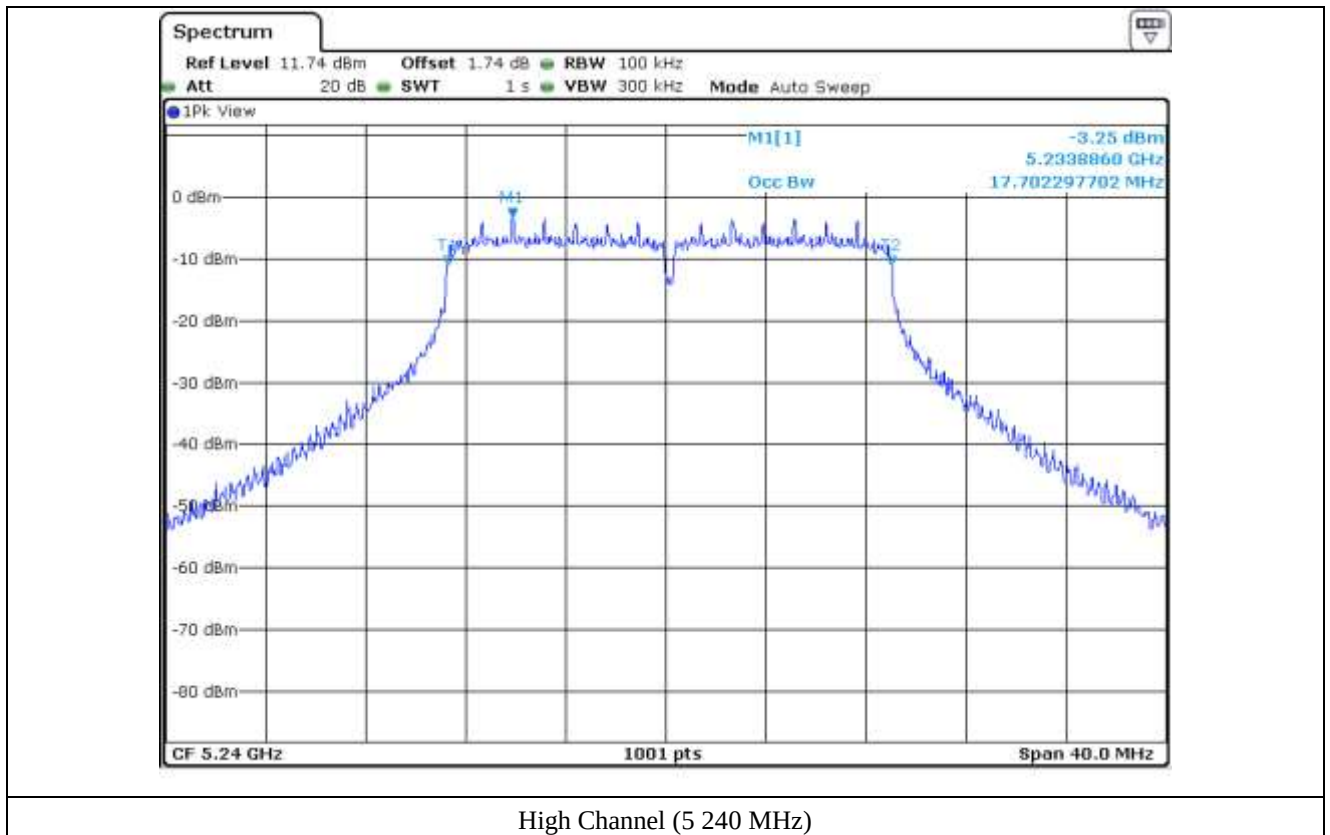
High Channel (5 825 MHz)

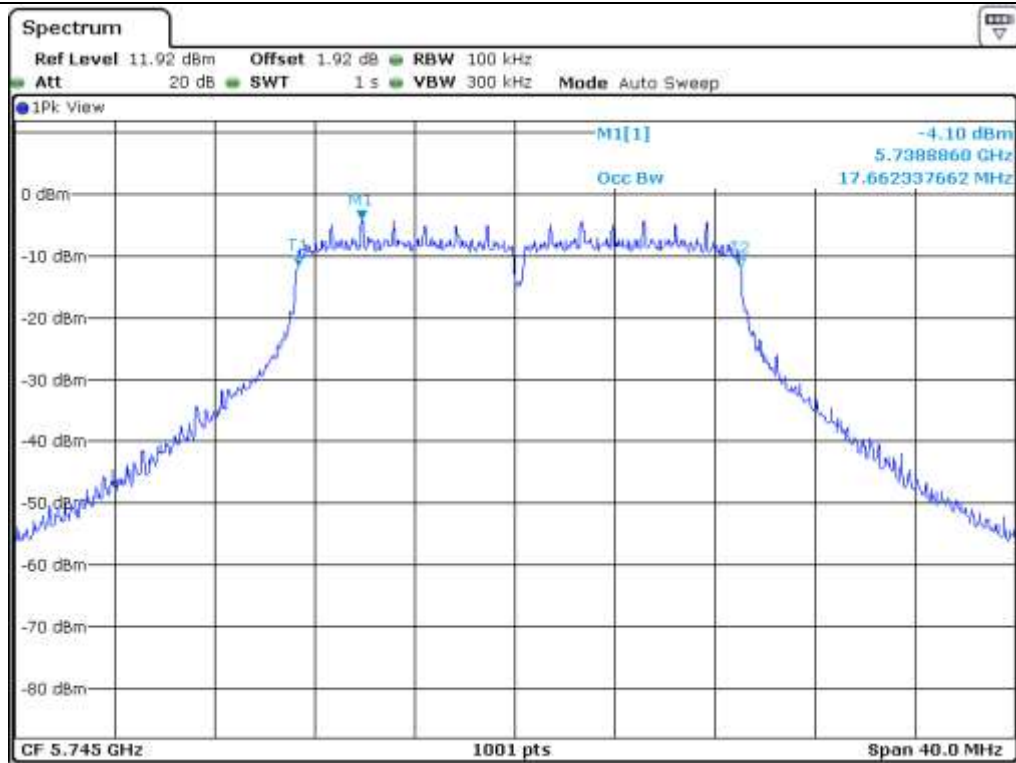


Low Channel (5 180 MHz)

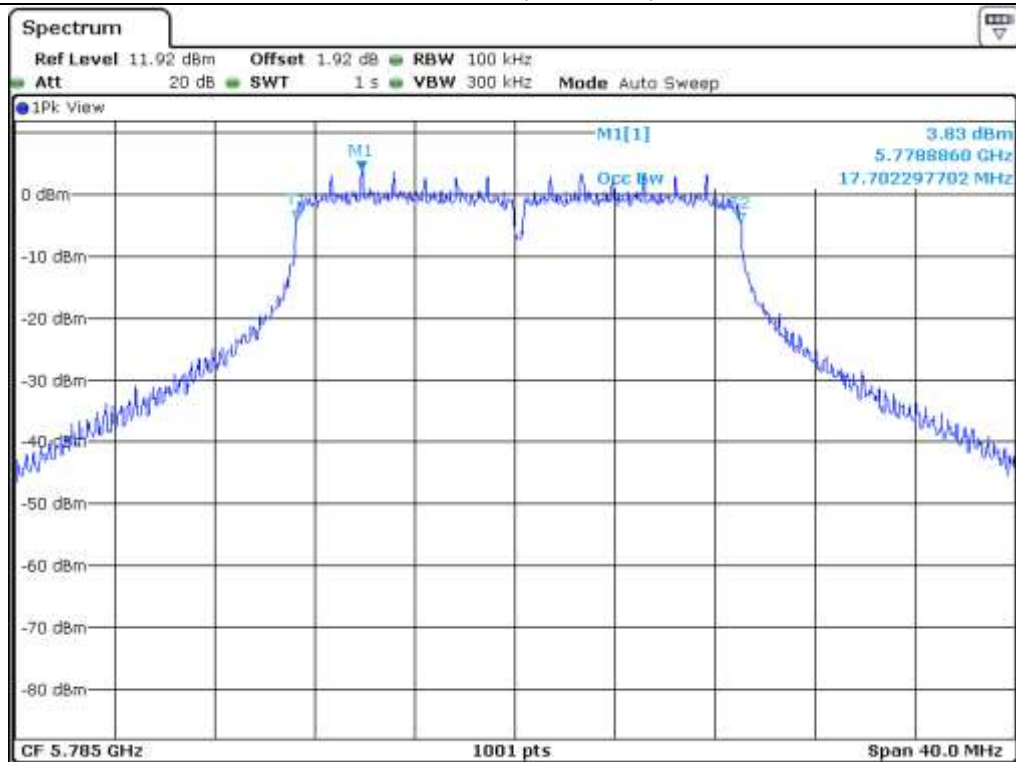


Middle Channel (5 200 MHz)

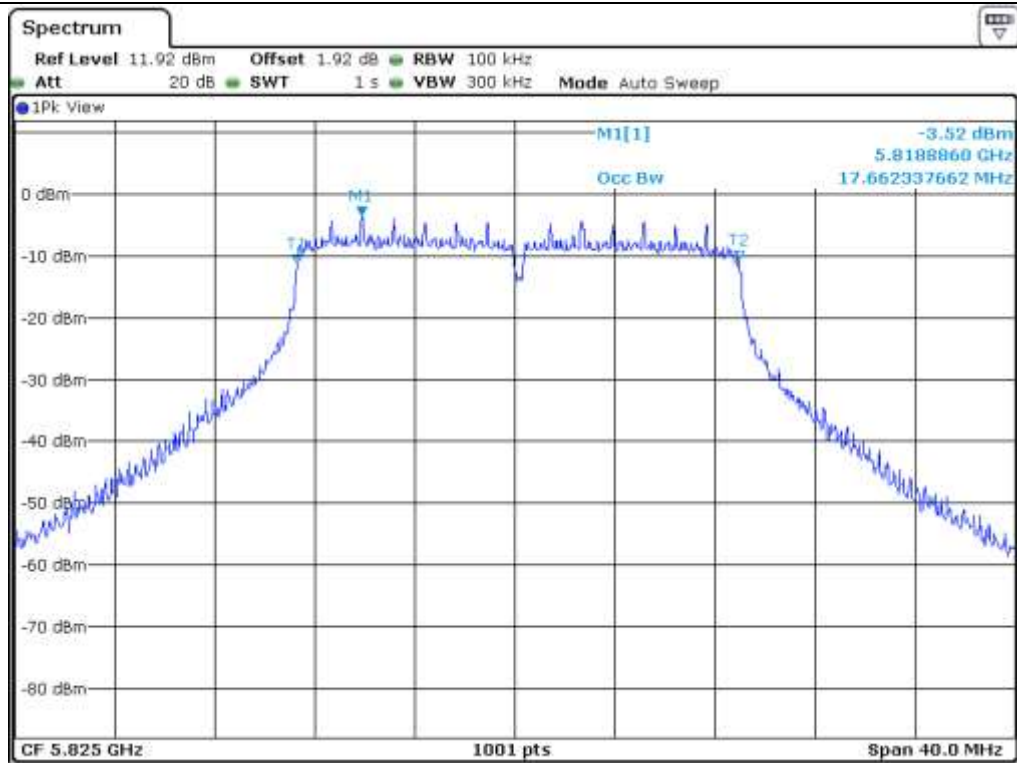




Low Channel (5.745 MHz)



Middle Channel (5.785 MHz)



High Channel (5 825 MHz)

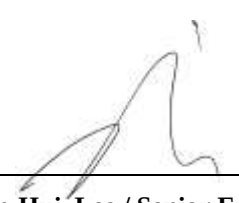
7.4.5 Test data for 802.11ac40 RLAN Mode

7.4.5.1 Test data for Antenna 0

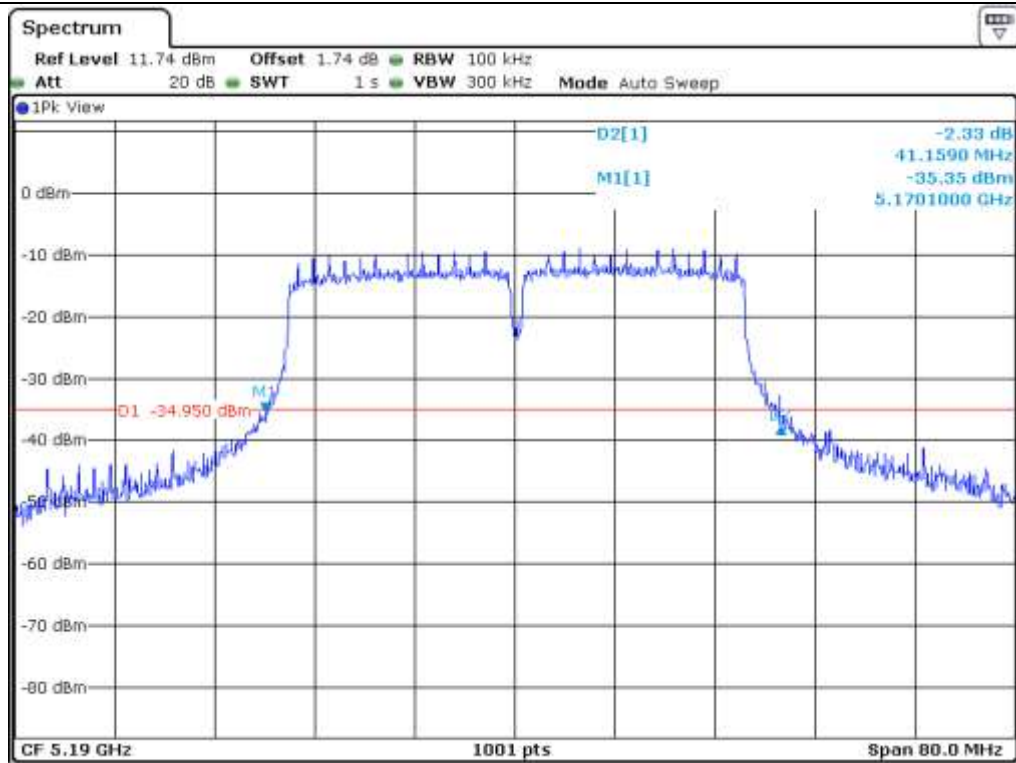
-. Test Date : May 02, 2016

-. Test Result : Pass

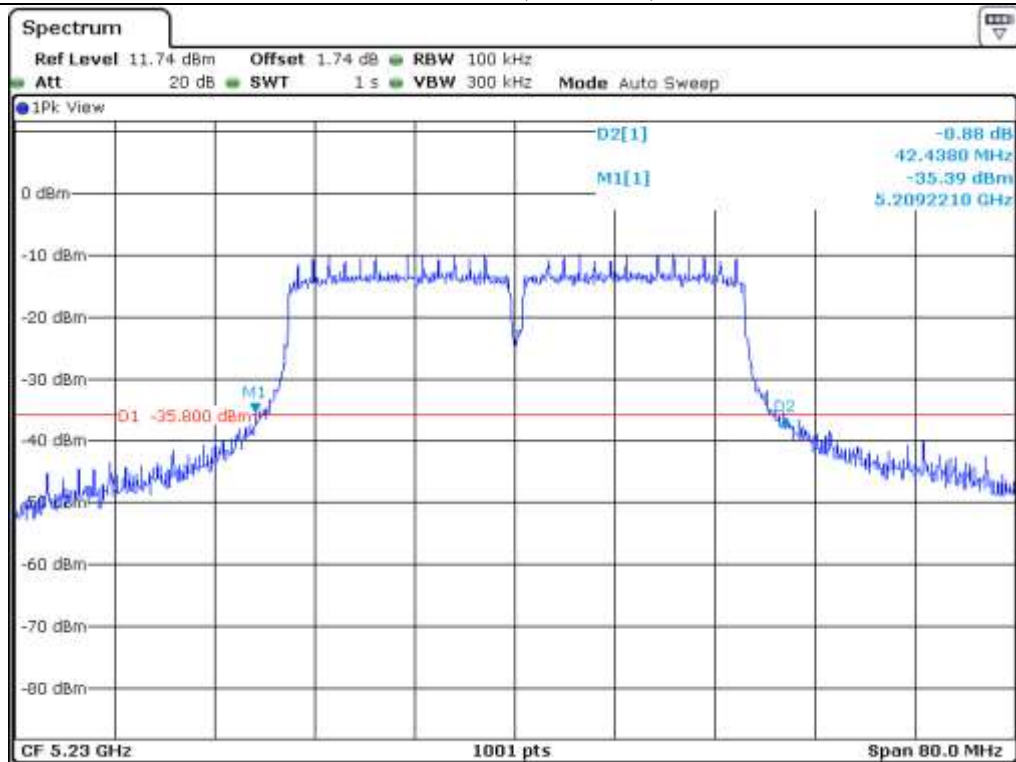
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190	41.16	36.12
	High	5 230	42.44	36.12
5 725 ~ 5 850	Low	5 755	40.44	36.12
	High	5 795	40.92	36.20



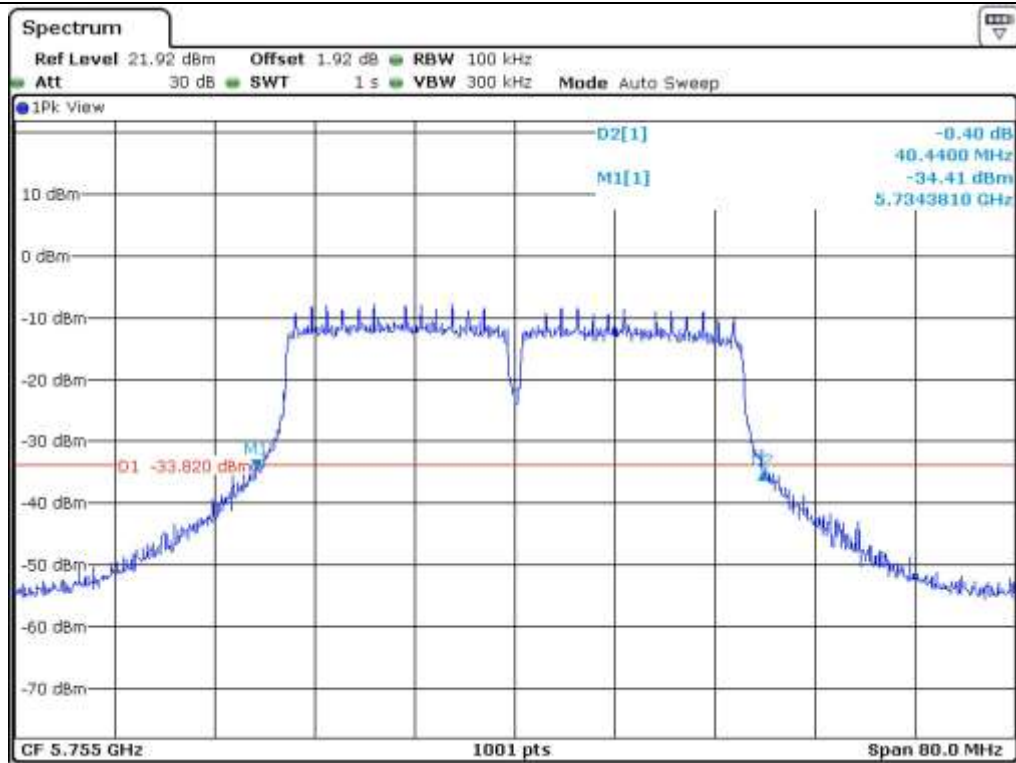
Tested by: Jun-Hui, Lee / Senior Engineer



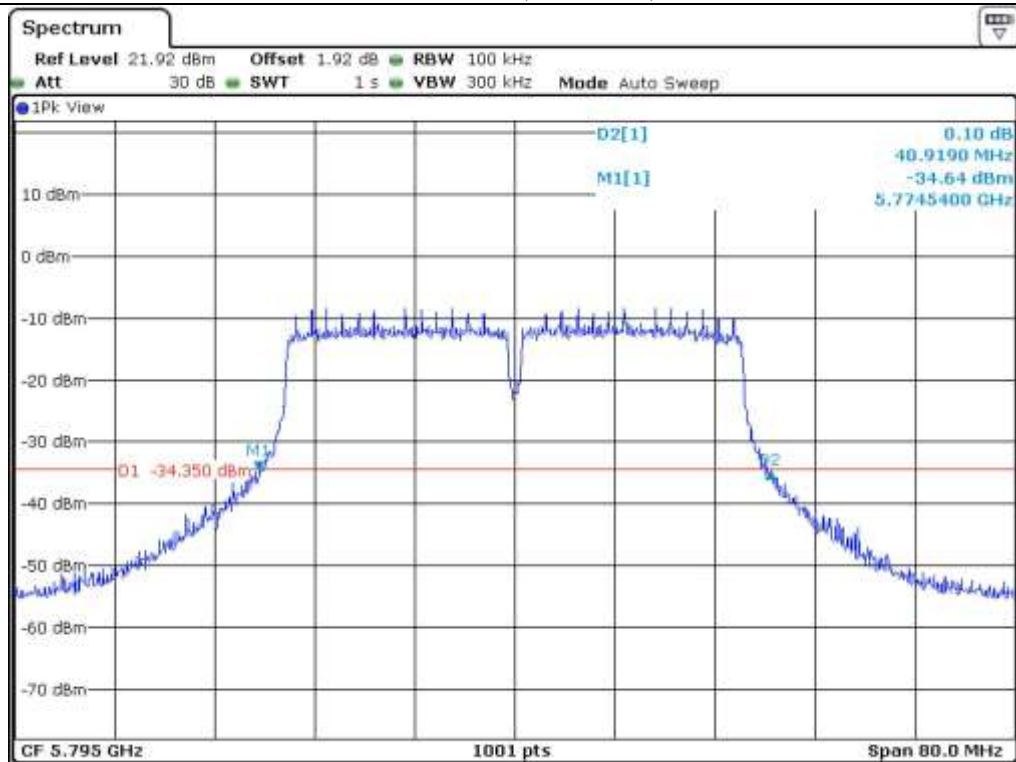
Low Channel (5 190 MHz)



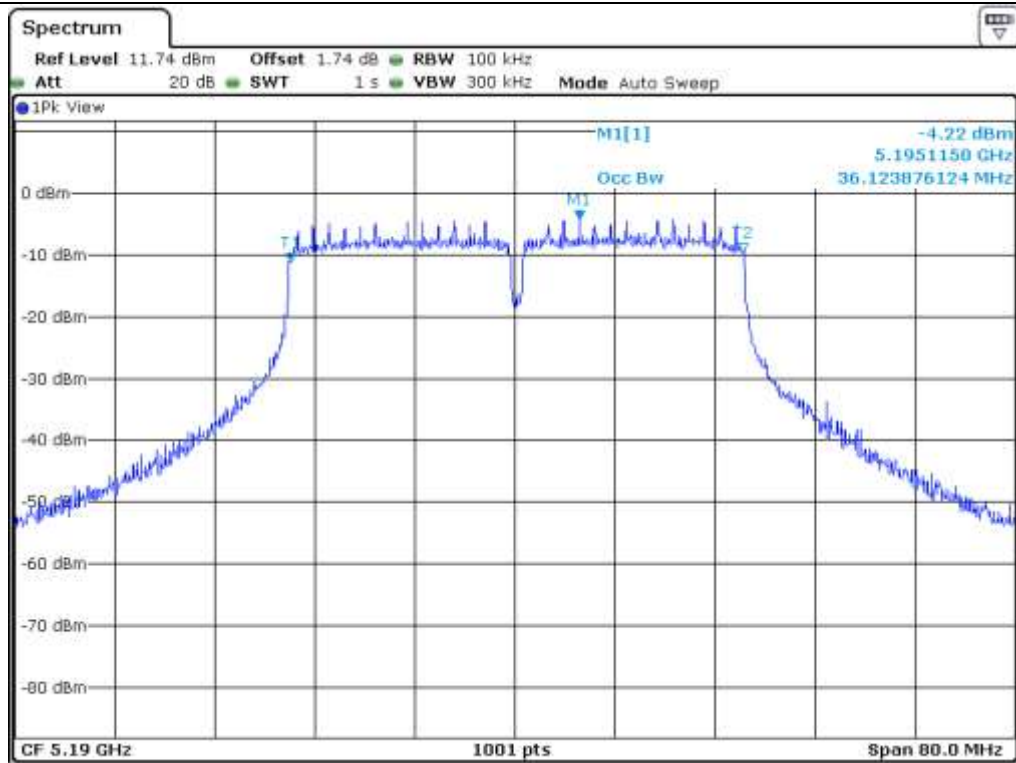
High Channel (5 230 MHz)



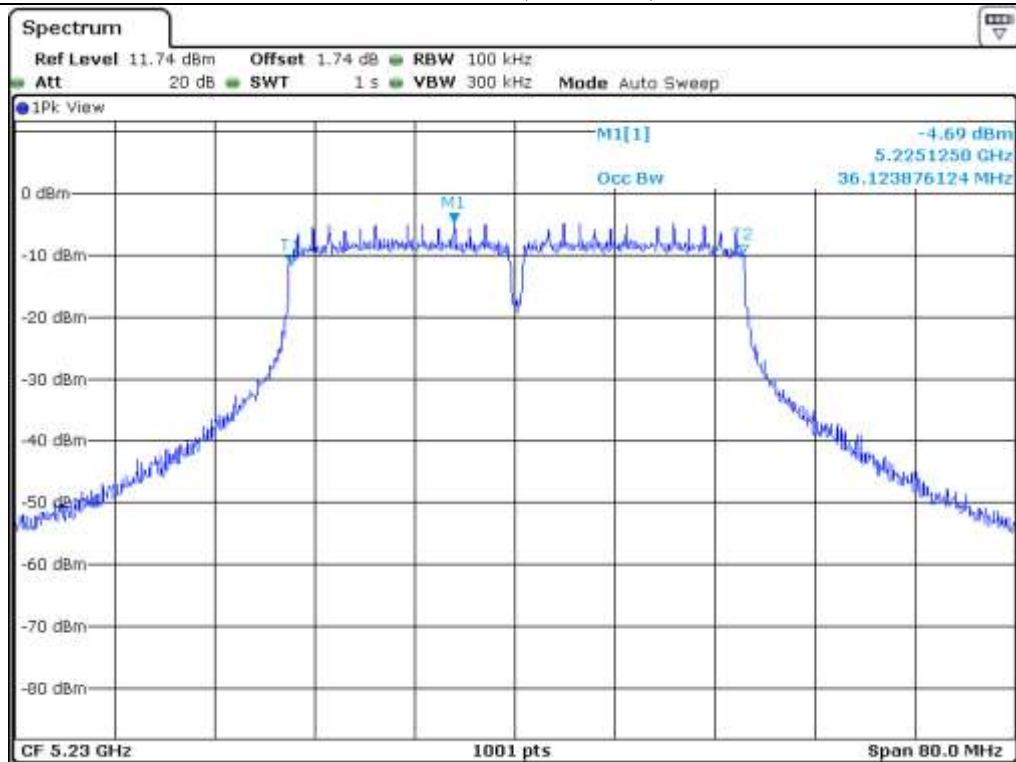
Low Channel (5.755 MHz)



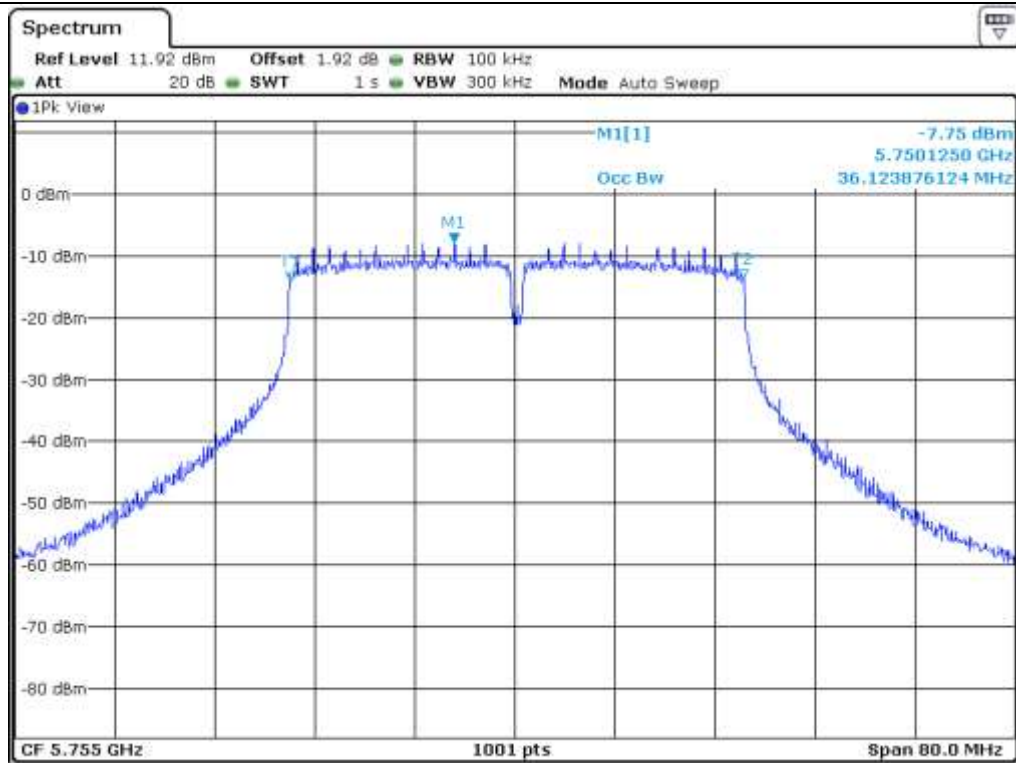
High Channel (5.795 MHz)



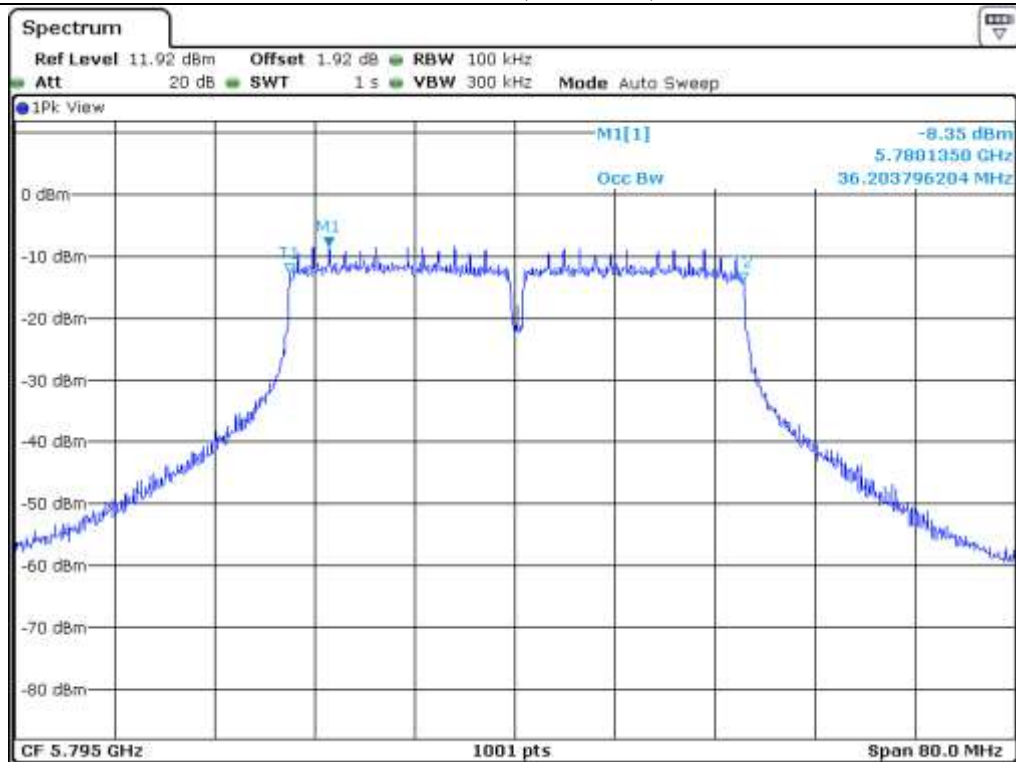
Low Channel (5 190 MHz)



High Channel (5 230 MHz)



Low Channel (5.755 MHz)



High Channel (5.795 MHz)

7.4.5.2 Test data for Antenna 1

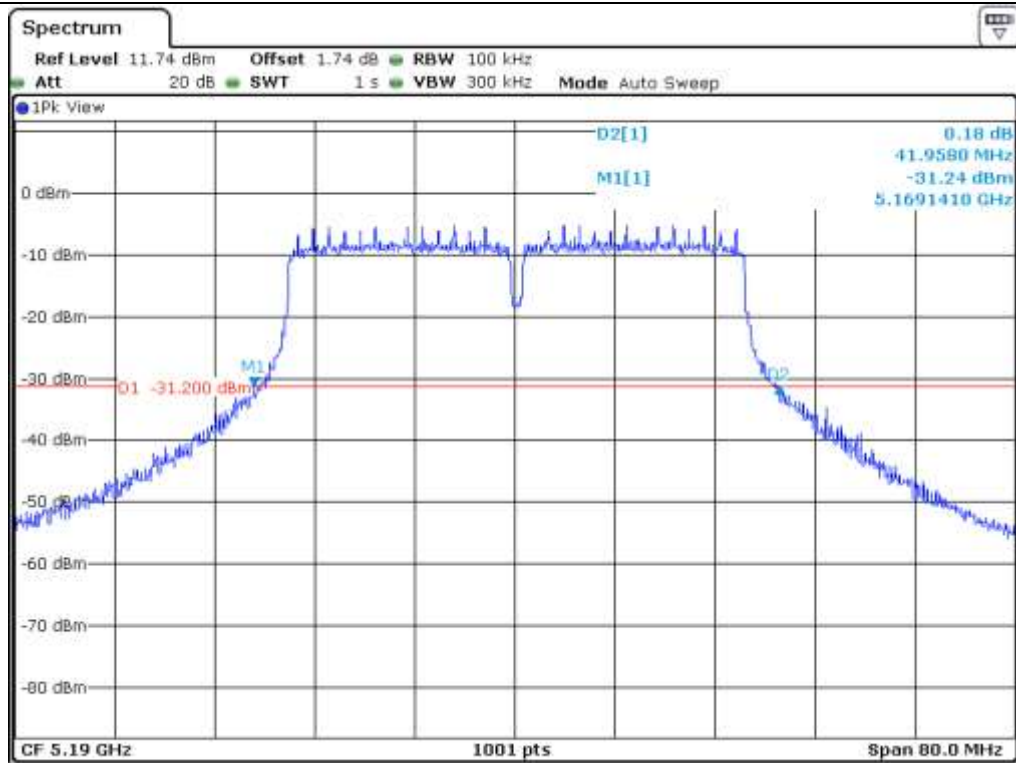
-. Test Date : May 02, 2016

-. Test Result : Pass

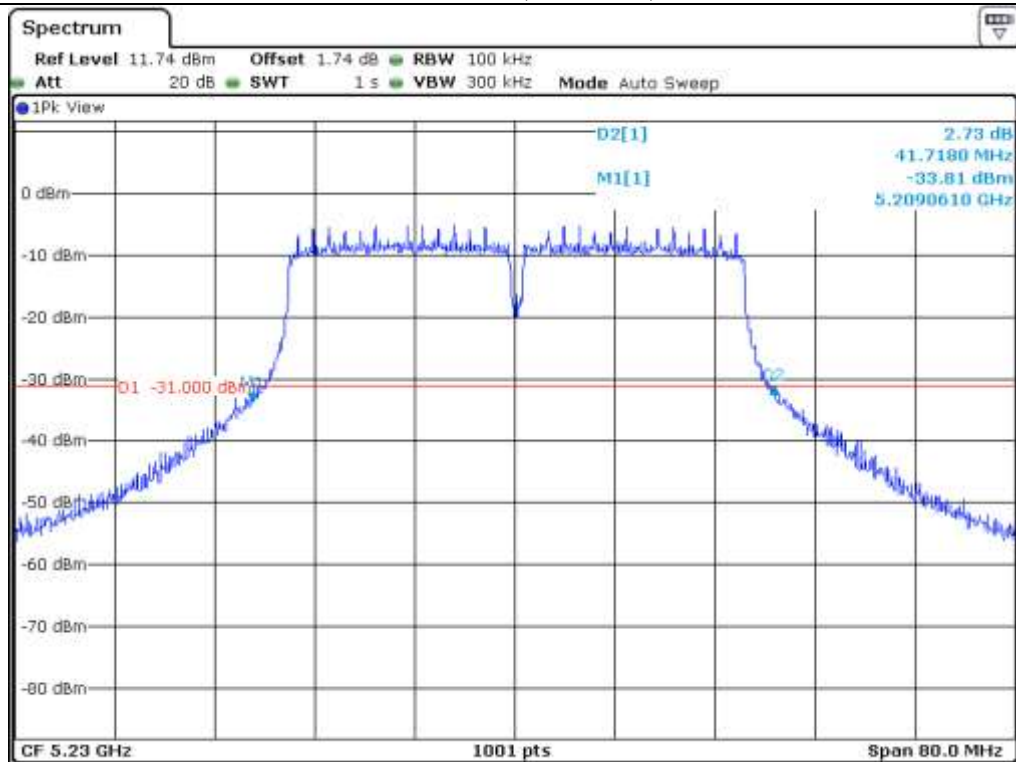
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190	41.96	36.12
	High	5 230	41.72	36.12
5 725 ~ 5 850	Low	5 755	41.16	36.12
	High	5 795	40.20	36.12



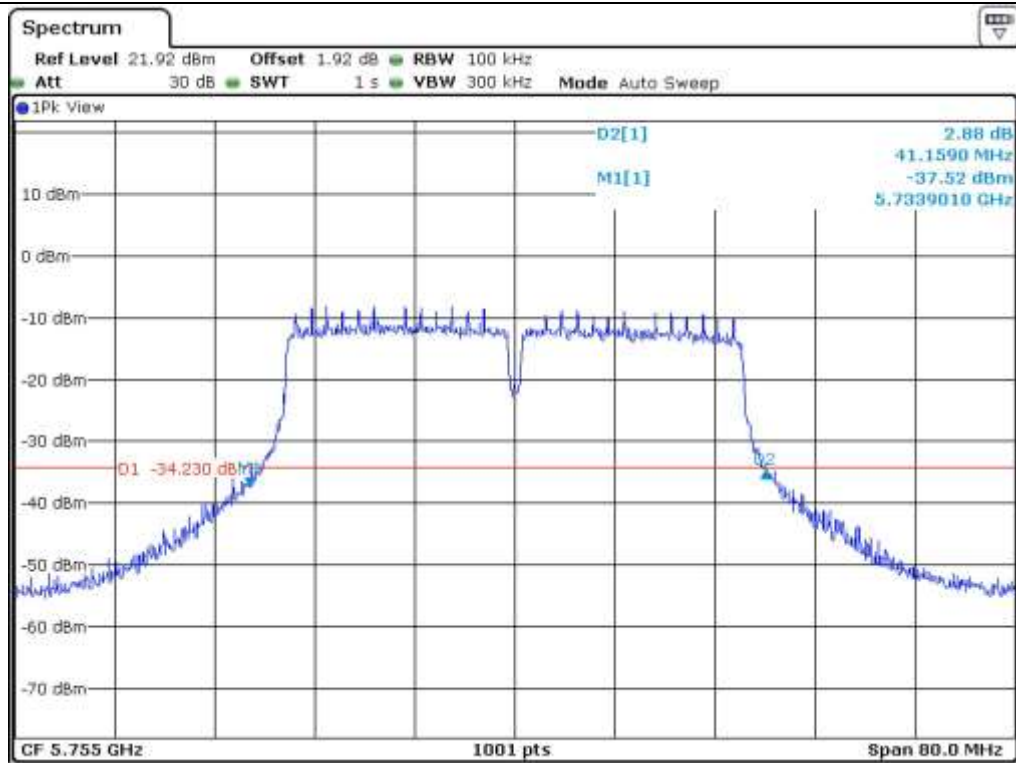
Tested by: Jun-Hui, Lee / Senior Engineer



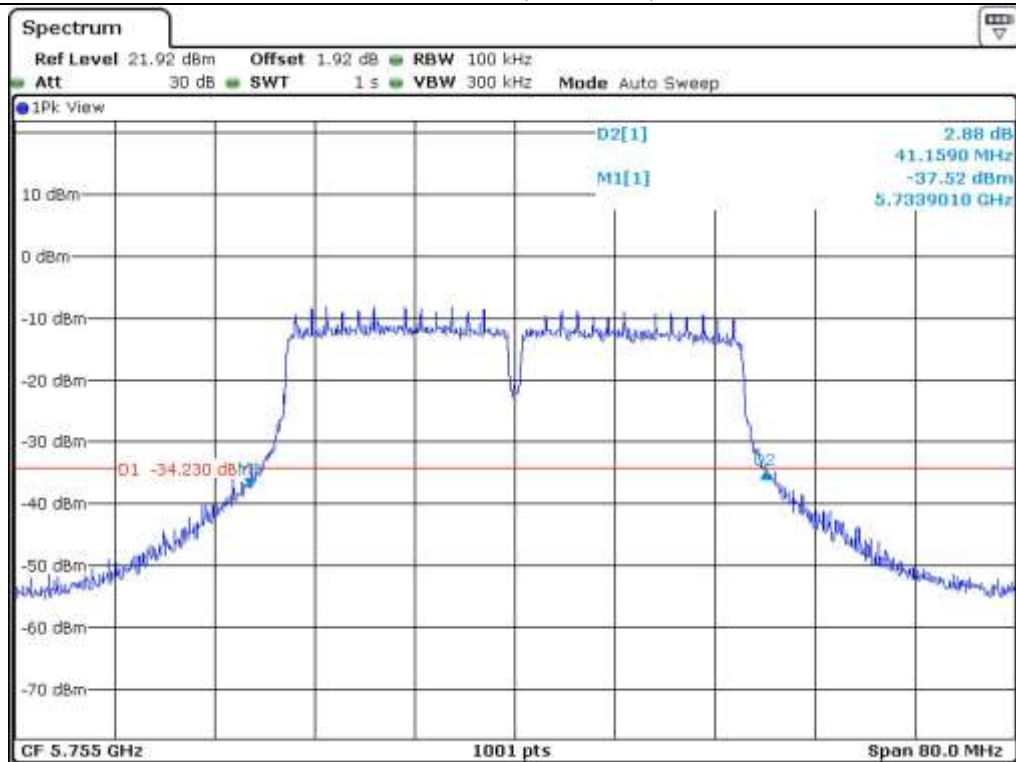
Low Channel (5 190 MHz)



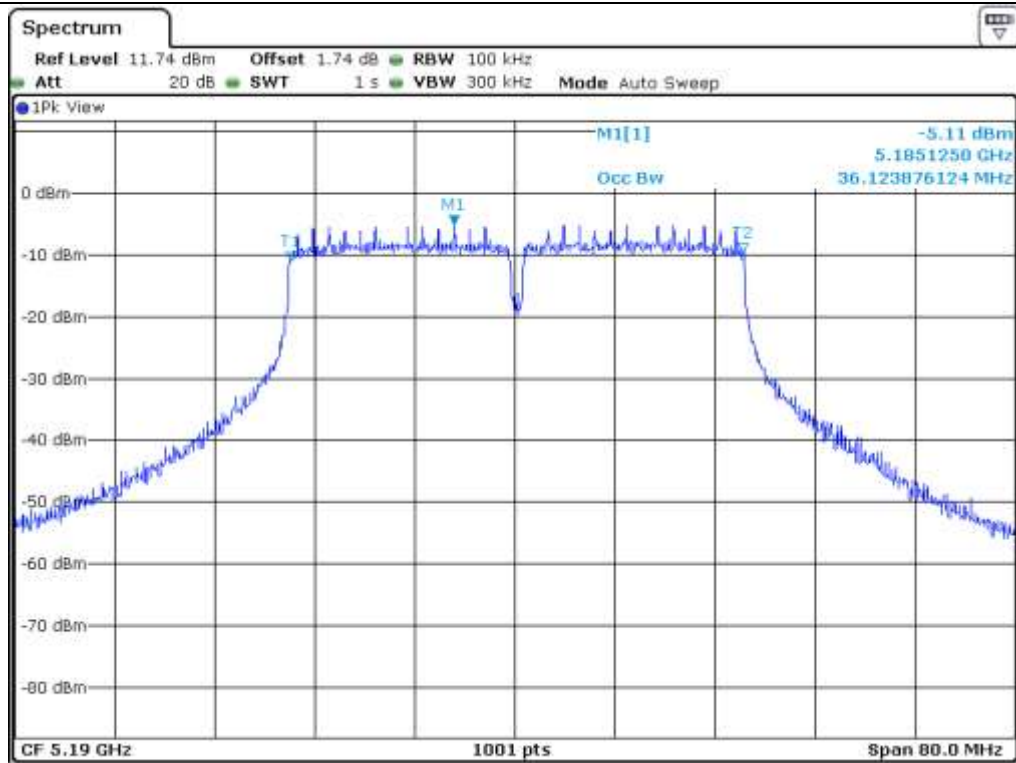
High Channel (5 230 MHz)



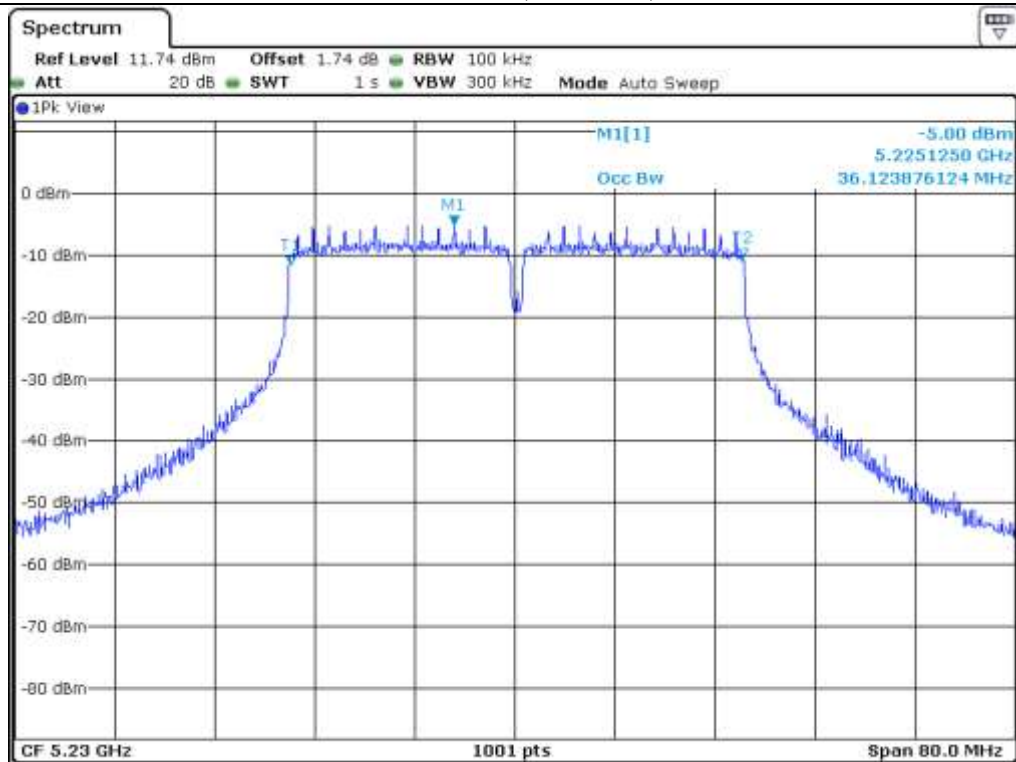
Low Channel (5 755 MHz)



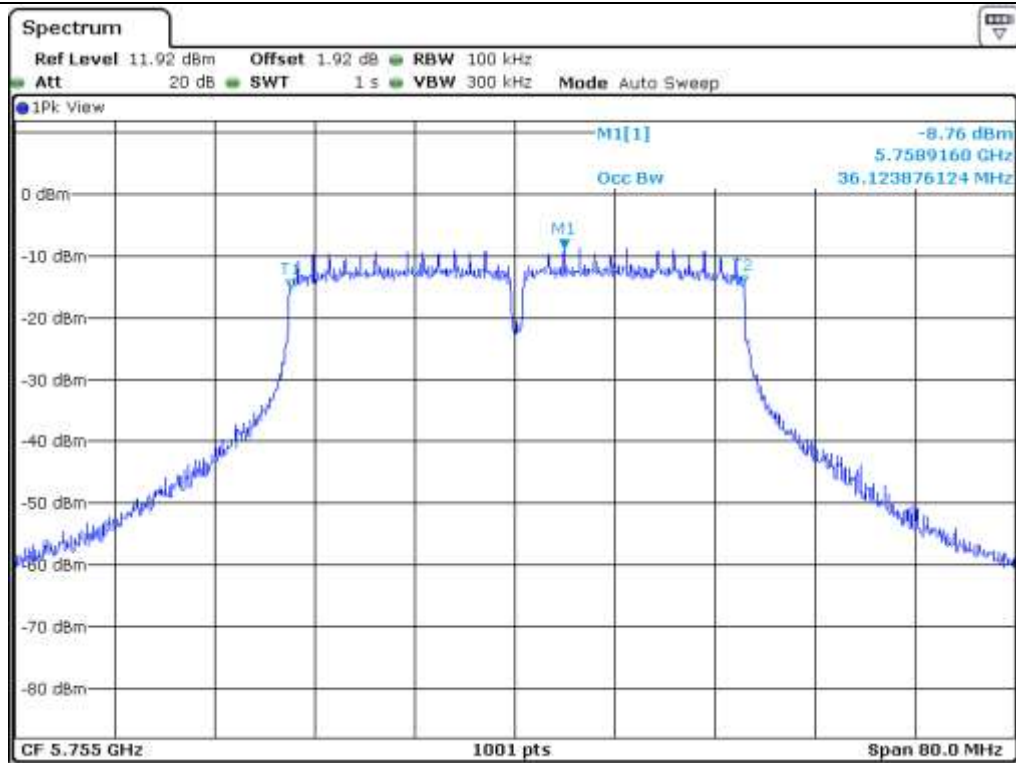
High Channel (5 795 MHz)



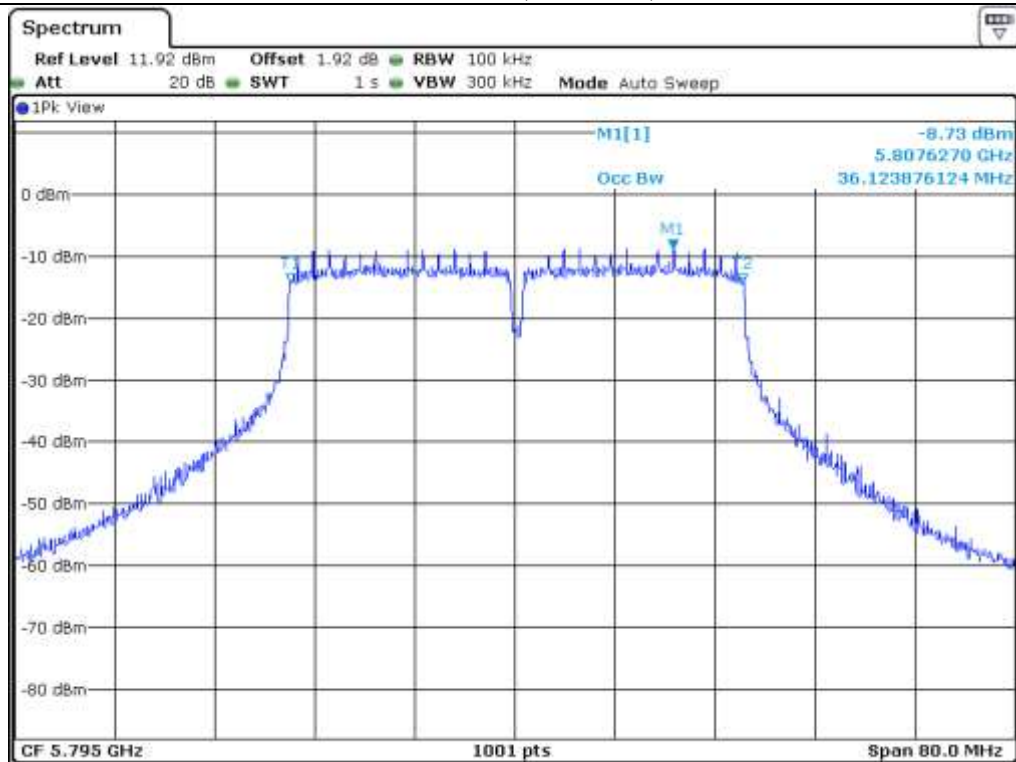
Low Channel (5 190 MHz)



High Channel (5 230 MHz)



Low Channel (5.755 MHz)



High Channel (5.795 MHz)

7.4.5.3 Test data for Antenna 2

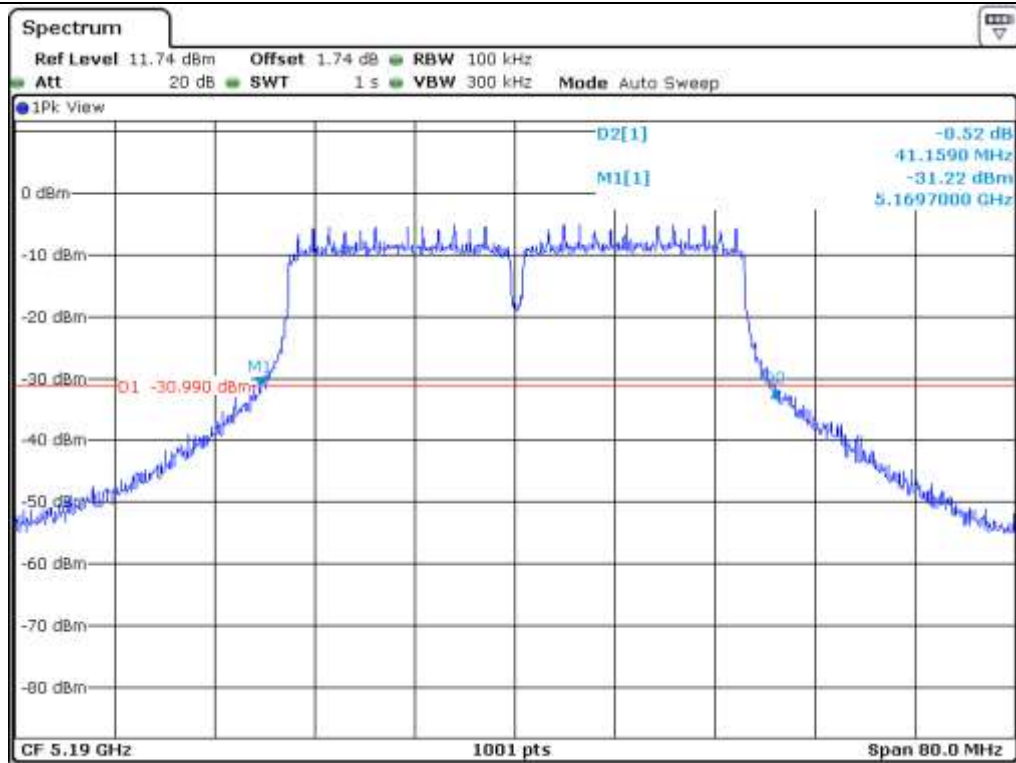
-. Test Date : May 02, 2016

-. Test Result : Pass

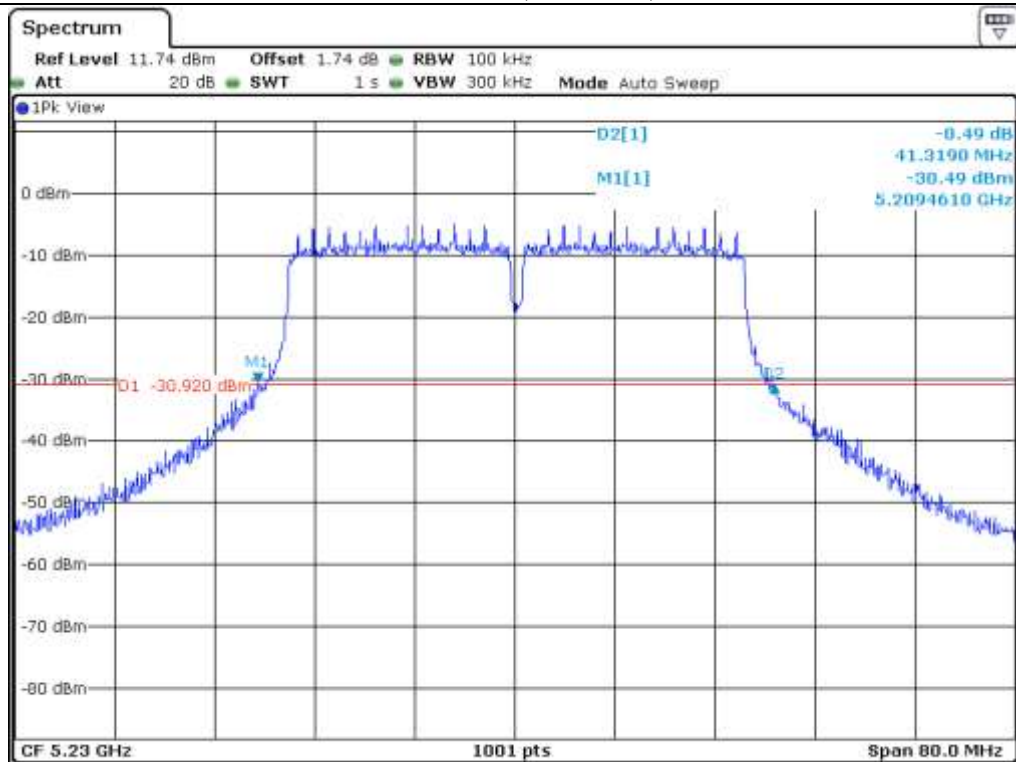
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190	41.16	36.12
	High	5 230	41.32	36.12
5 725 ~ 5 850	Low	5 755	40.36	36.20
	High	5 795	41.56	36.20



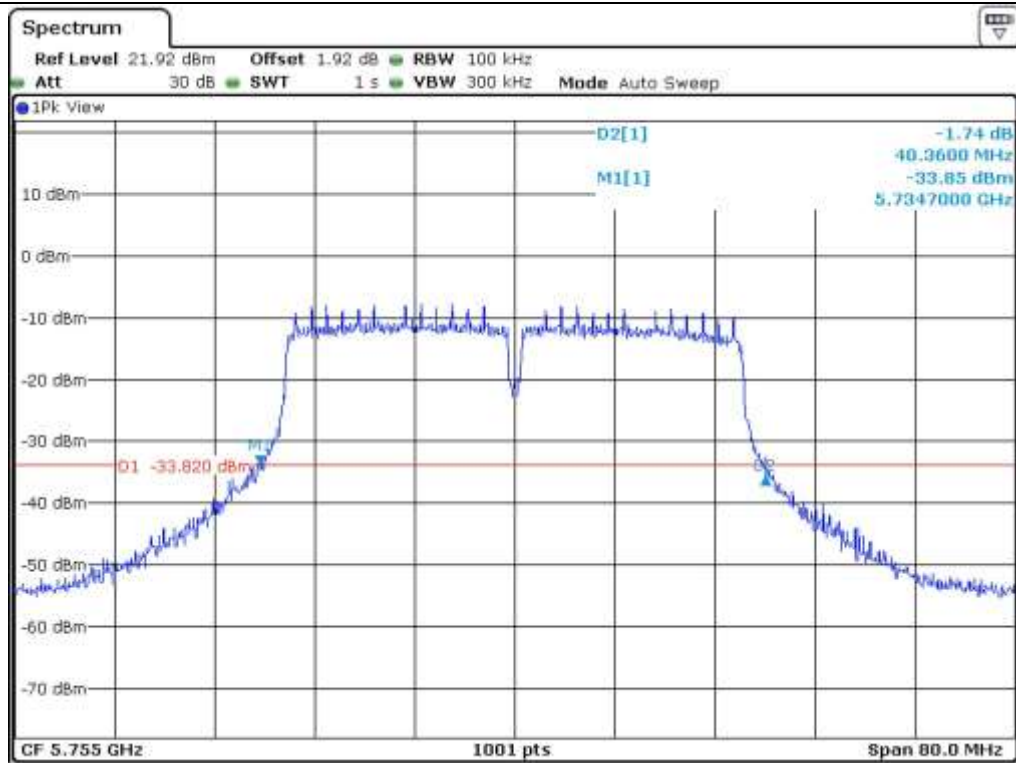
Tested by: Jun-Hui, Lee / Senior Engineer



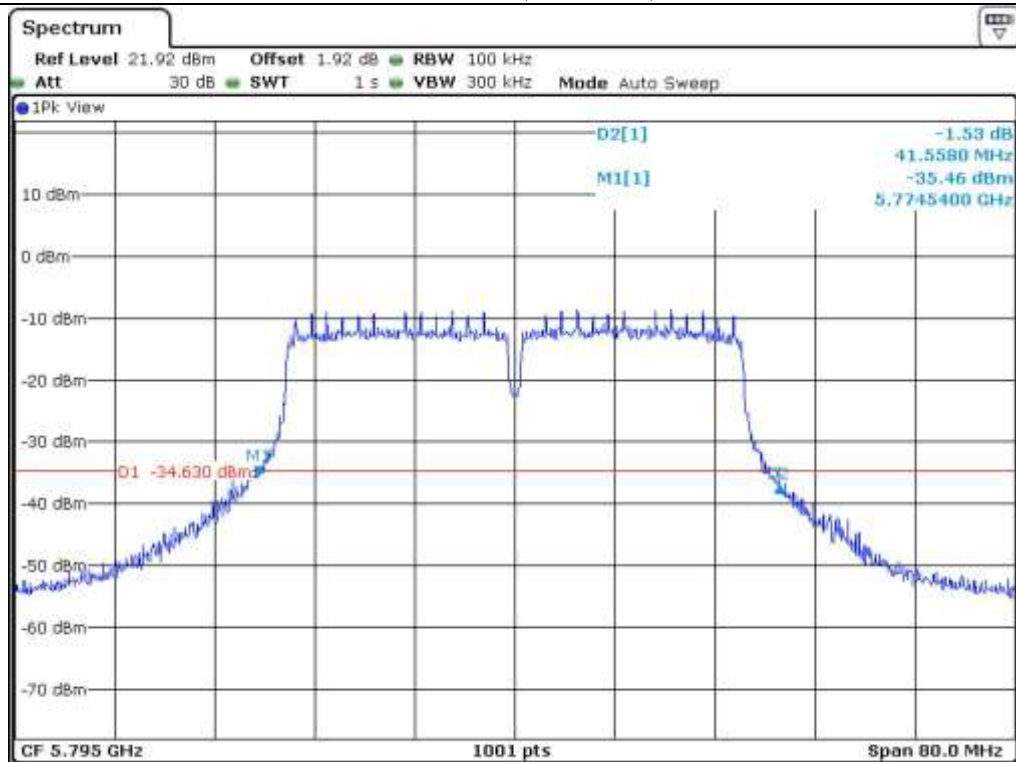
Low Channel (5 190 MHz)



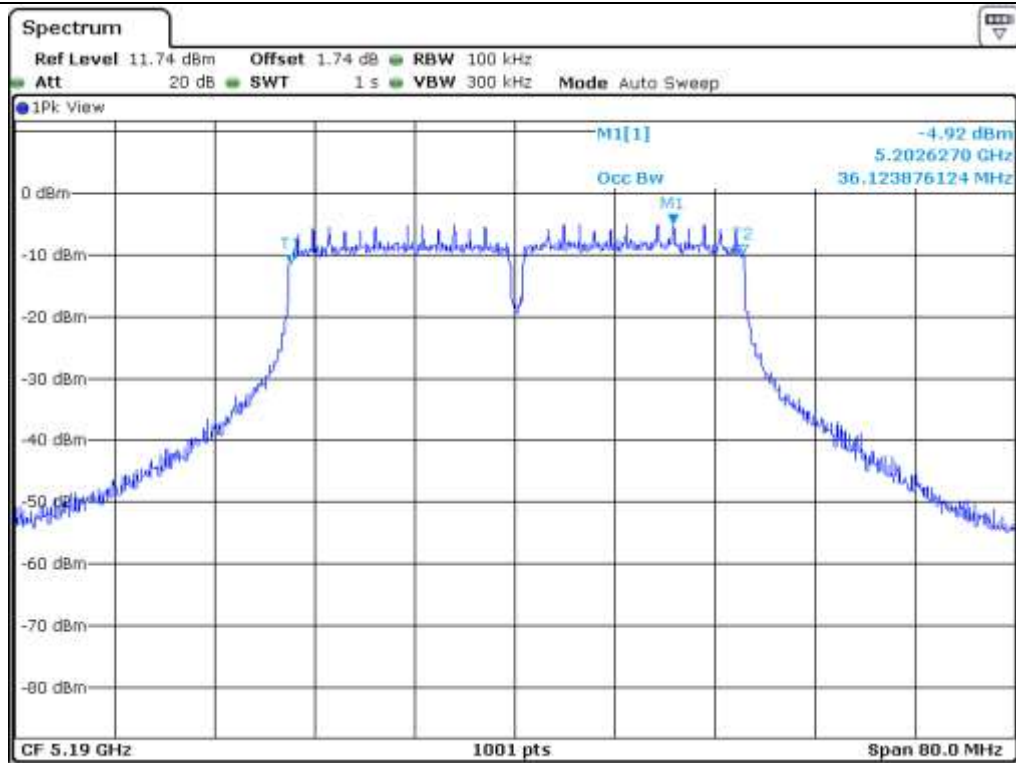
High Channel (5 230 MHz)



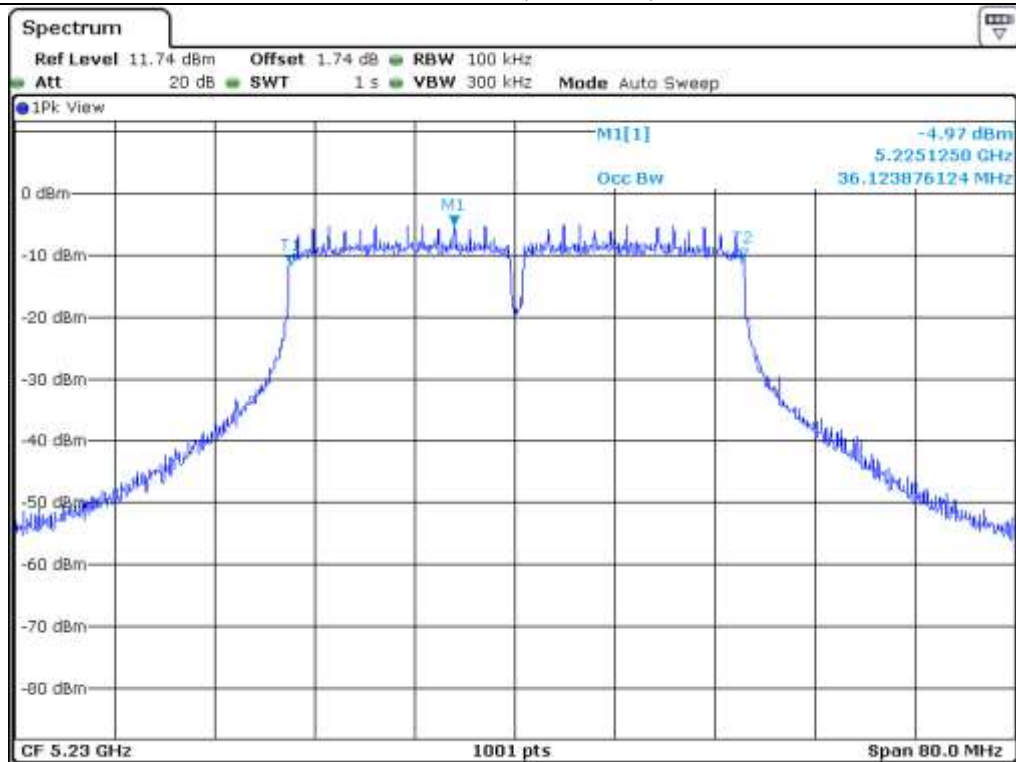
Low Channel (5.755 MHz)



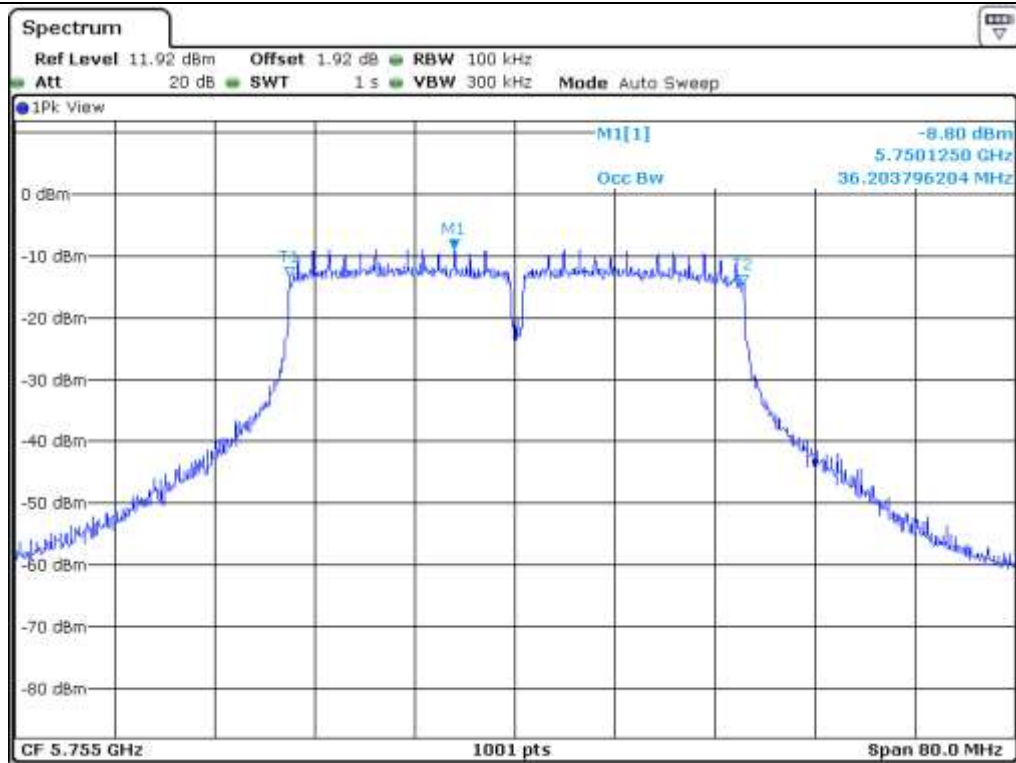
High Channel (5.795 MHz)



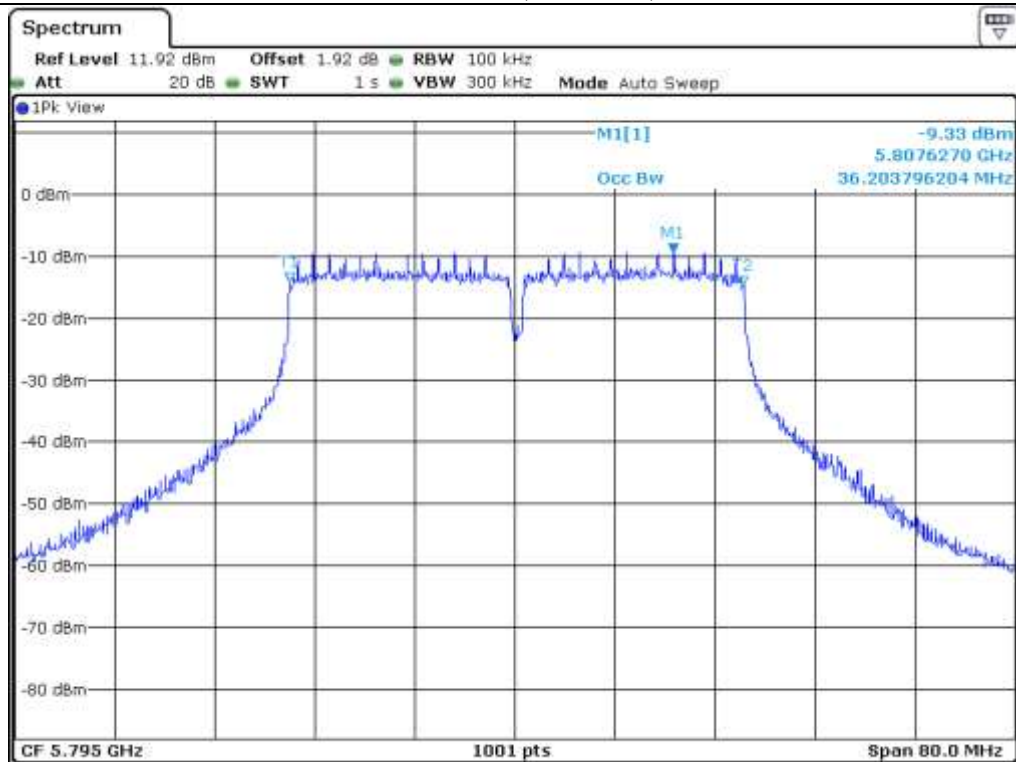
Low Channel (5 190 MHz)



High Channel (5 230 MHz)



Low Channel (5.755 MHz)



High Channel (5.795 MHz)

7.4.6 Test data for 802.11ac80 RLAN Mode

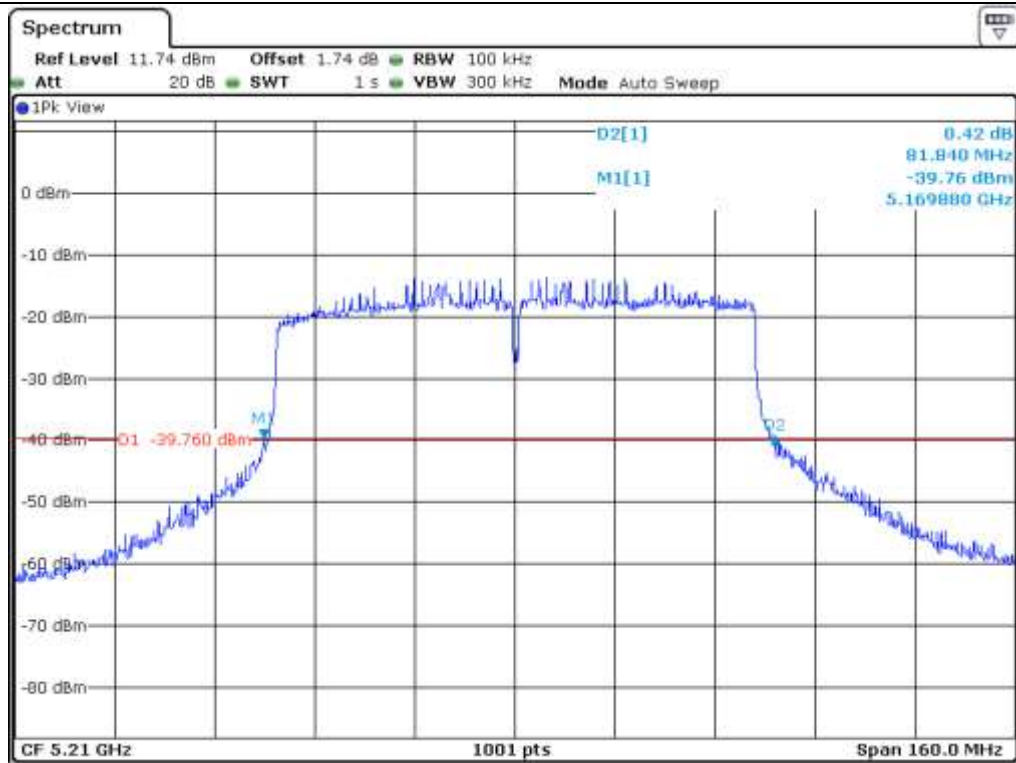
7.4.6.1 Test data for Antenna 0

-. Test Date : May 02, 2016

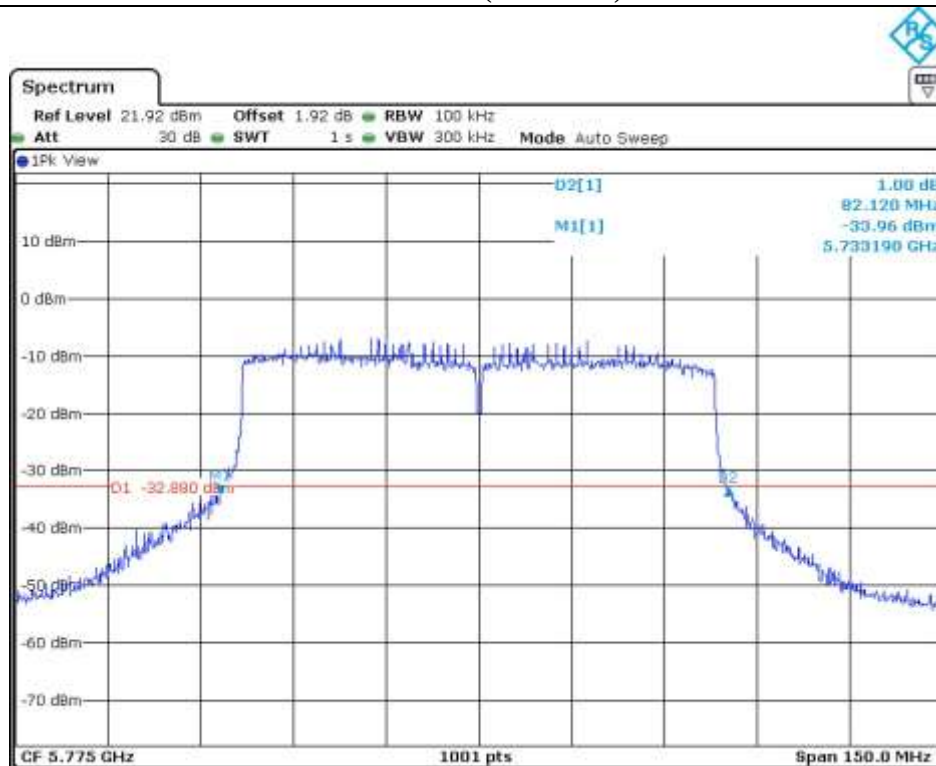
-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 210	81.84	75.60
5 725 ~ 5 850	Low	5 775	82.12	75.44

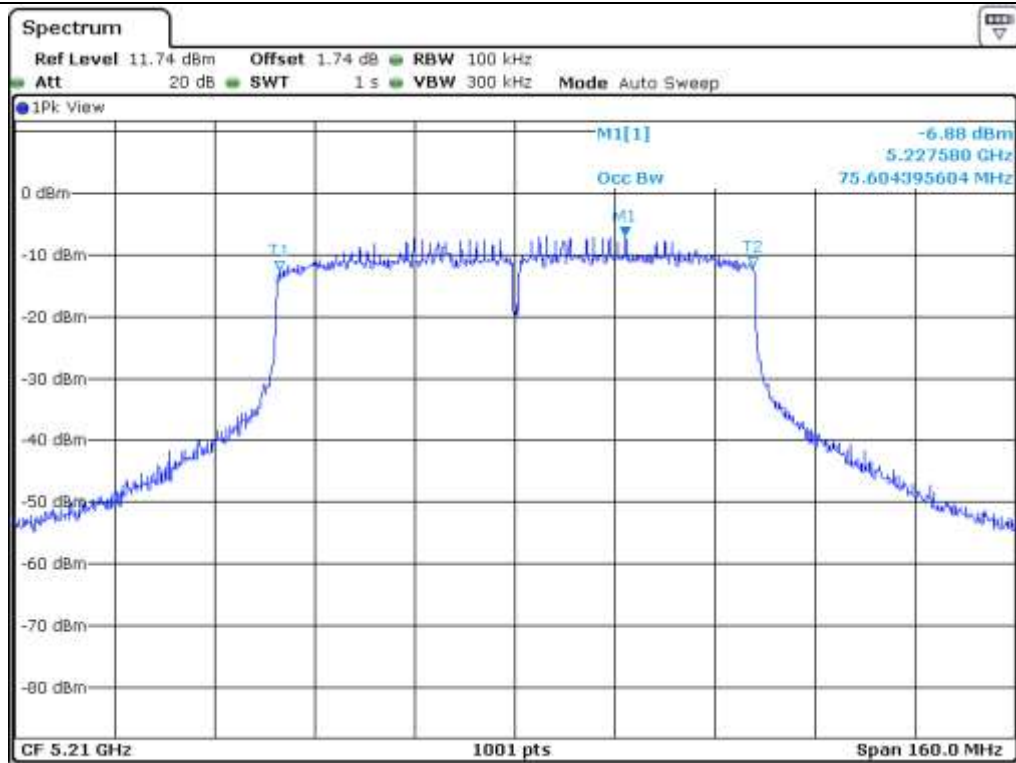

 Tested by: Jun-Hui, Lee / Senior Engineer



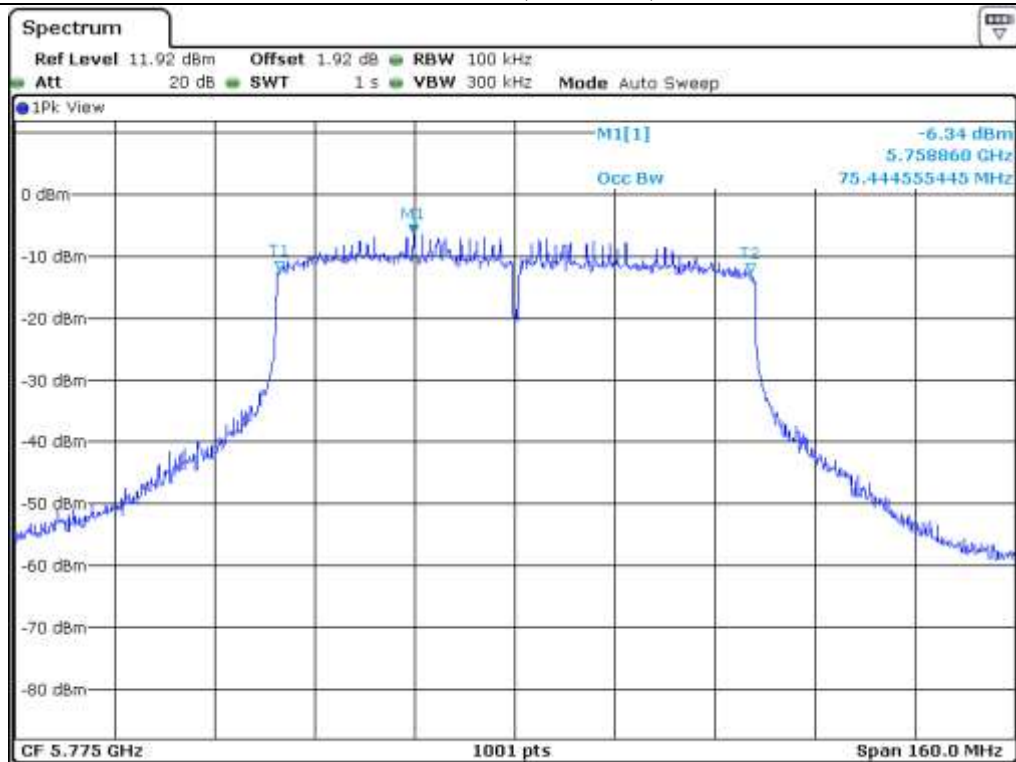
Low Channel (5 210 MHz)



Low Channel (5 775 MHz)



Low Channel (5 210 MHz)



Low Channel (5 775 MHz)

7.4.6.2 Test data for Antenna 1

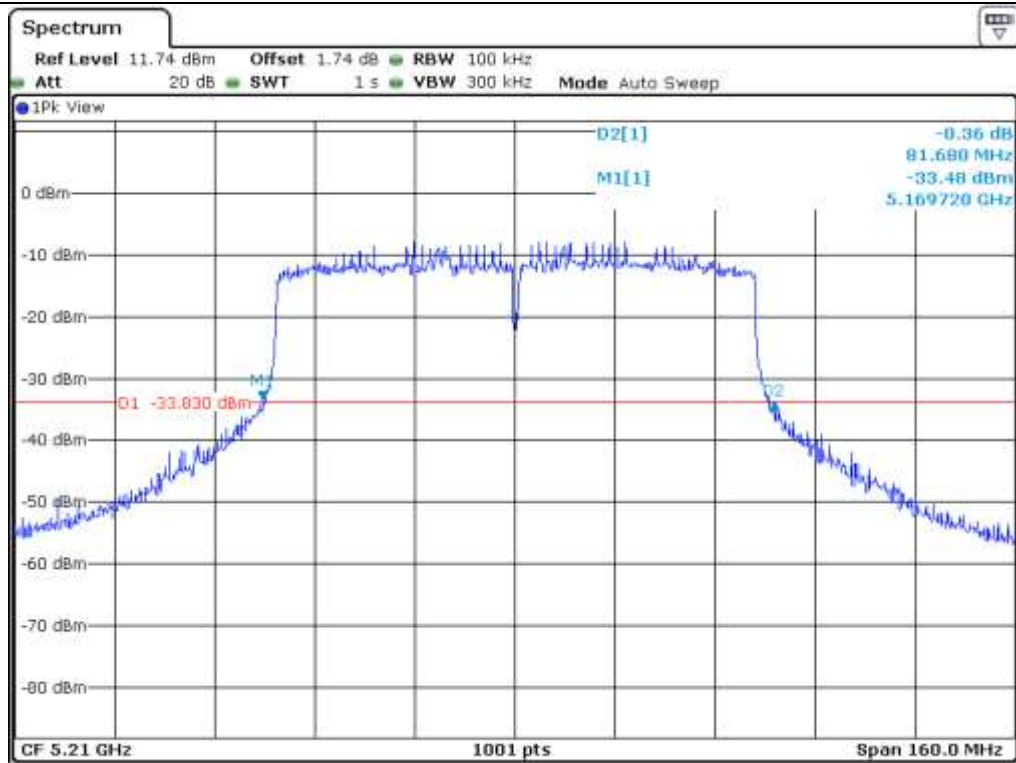
-. Test Date : May 02, 2016

-. Test Result : Pass

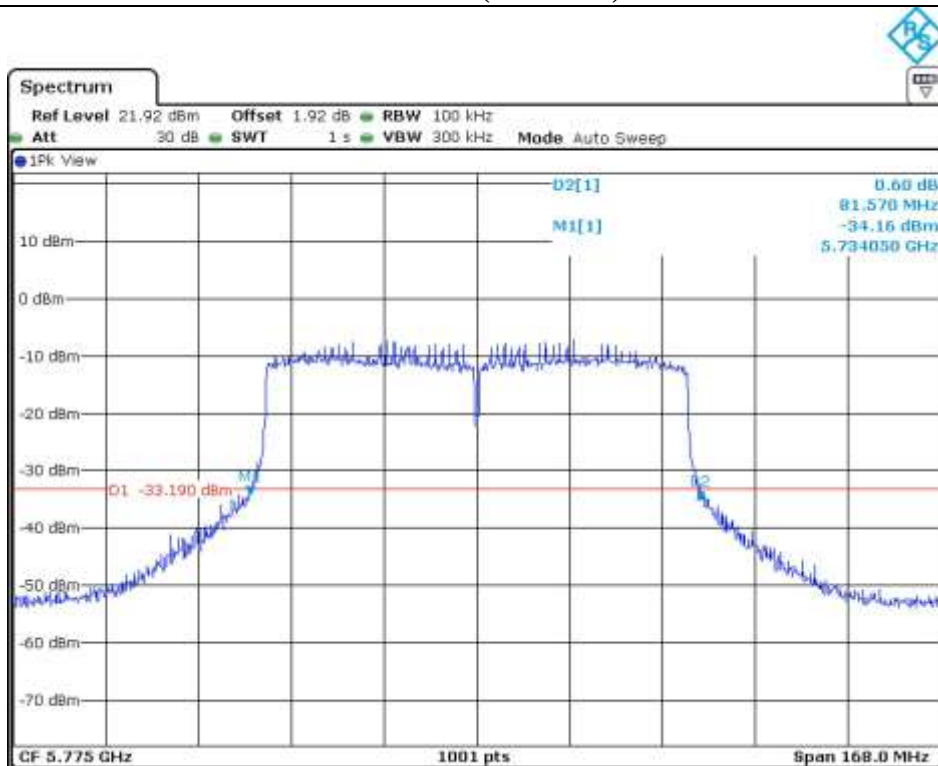
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 210	81.68	75.60
5 725 ~ 5 850	Low	5 775	81.57	75.44



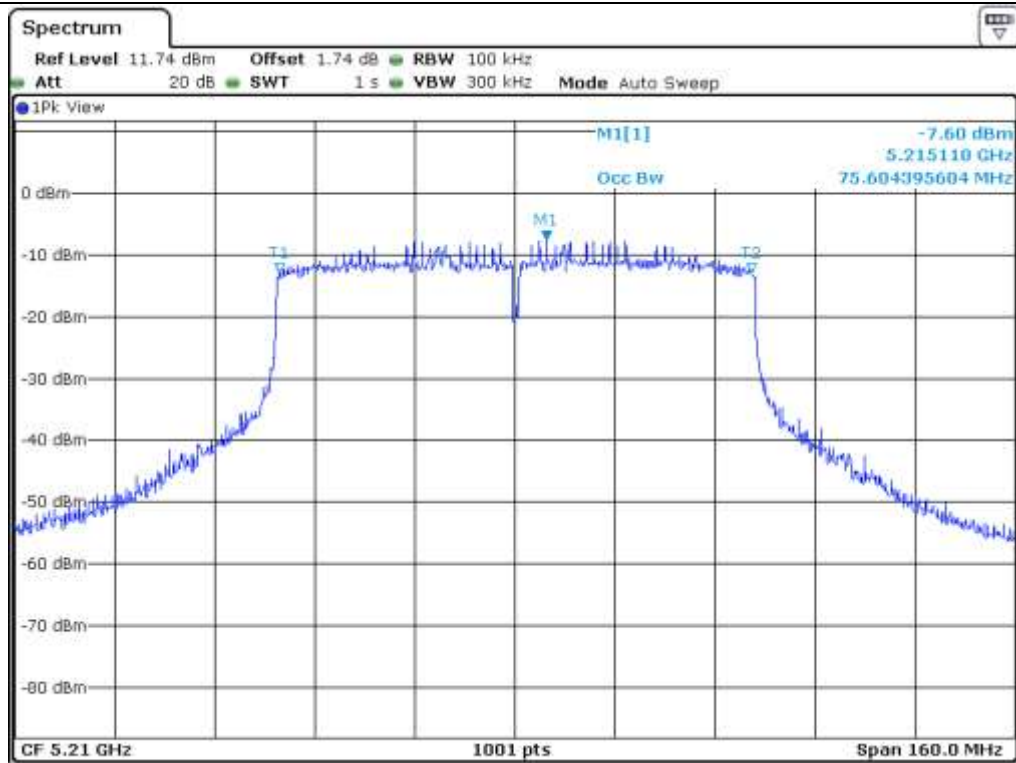
Tested by: Jun-Hui, Lee / Senior Engineer



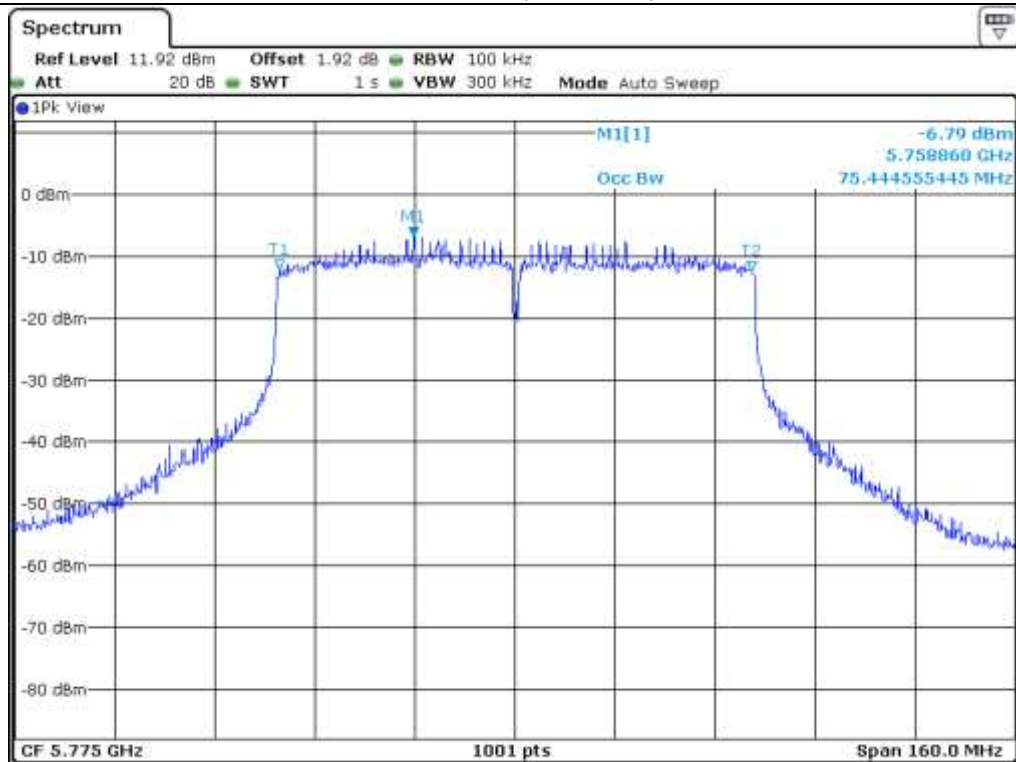
Low Channel (5 210 MHz)



Low Channel (5 775 MHz)



Low Channel (5 210 MHz)



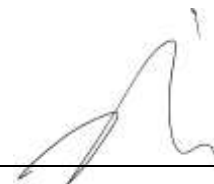
Low Channel (5 775 MHz)

7.4.6.3 Test data for Antenna 2

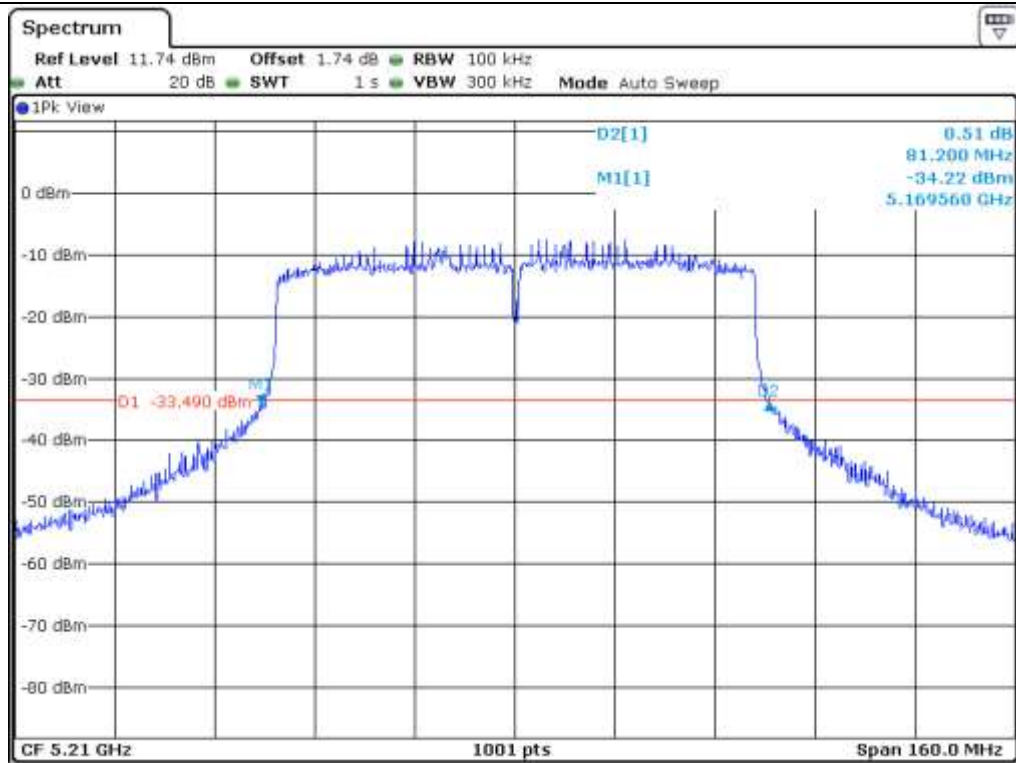
-. Test Date : May 02, 2016

-. Test Result : Pass

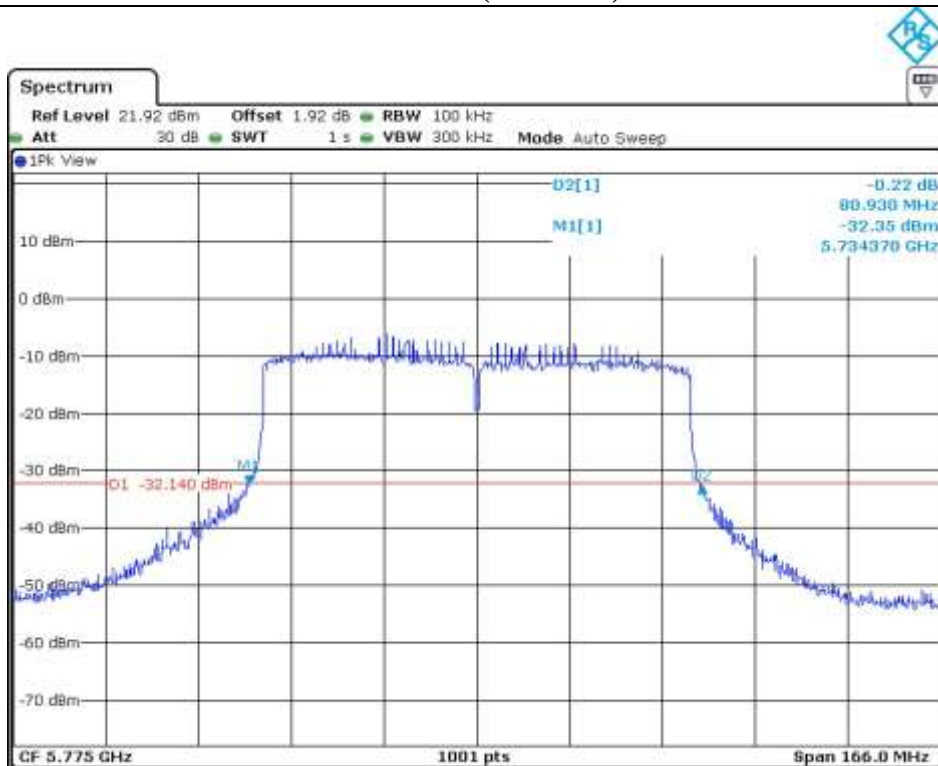
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
5 150 ~ 5 250	Low	5 210	81.20	75.44
5 725 ~ 5 850	Low	5 775	80.93	75.60



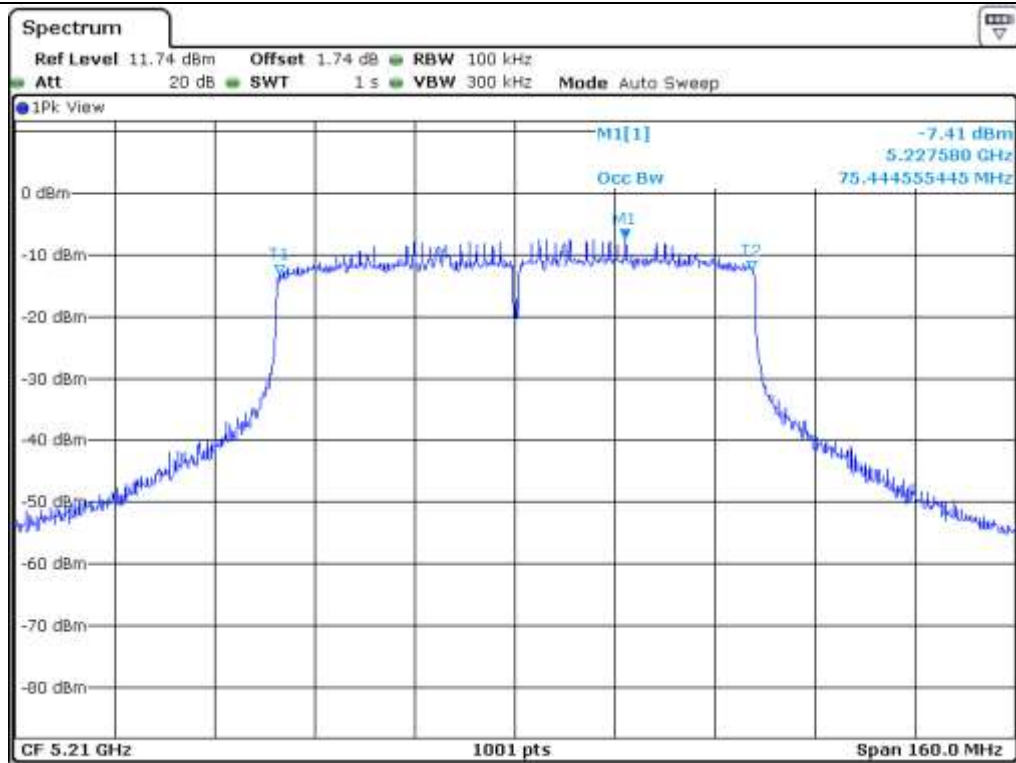
Tested by: Jun-Hui, Lee / Senior Engineer



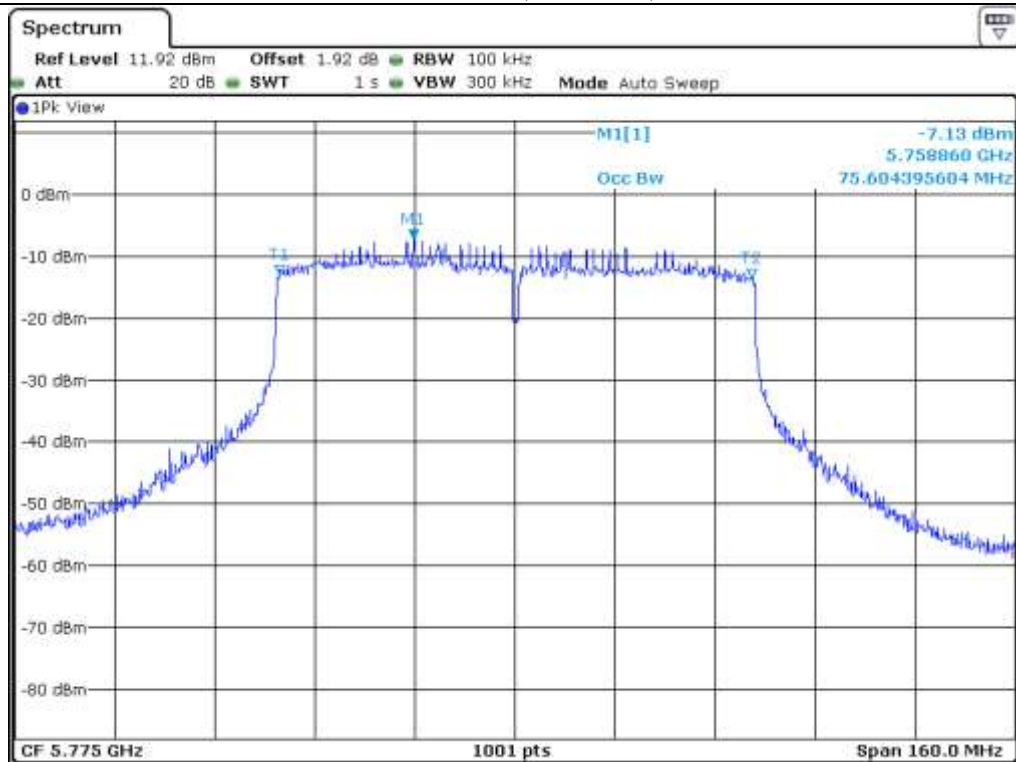
Low Channel (5 210 MHz)



Low Channel (5 775 MHz)



Low Channel (5 210 MHz)



Low Channel (5 775 MHz)

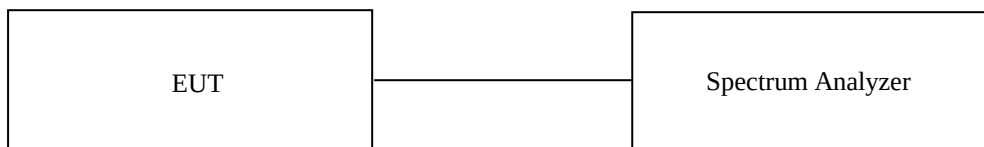
8. MAXIMUM PEAK OUTPUT POWER

8.1 Operating environment

Temperature : 24 °C
Relative humidity : 47 % 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 spectrum analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99 % bandwidth. 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.
■ - FSV40	Rohde & Schwarz	Signal Analyzer	101009	Jul. 22, 2015 (1Y)

All test equipment used is calibrated on a regular basis.

8.4 Test data for 802.11a RLAN Mode

8.4.1 Test data for Antenna 0

-. Test Date : May 02, 2016

-. Test Result : Pass

-. FCC Test data

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180	21.42	13.45	29.47	16.02
	Middle	5 200	21.06	13.28	29.47	16.19
	High	5 240	21.58	13.11	29.47	16.36
5 725 ~ 5 850	Low	5 745	20.46	10.42	29.59	19.17
	Middle	5 785	22.26	17.03	29.59	12.56
	High	5 825	20.50	9.50	29.59	20.09

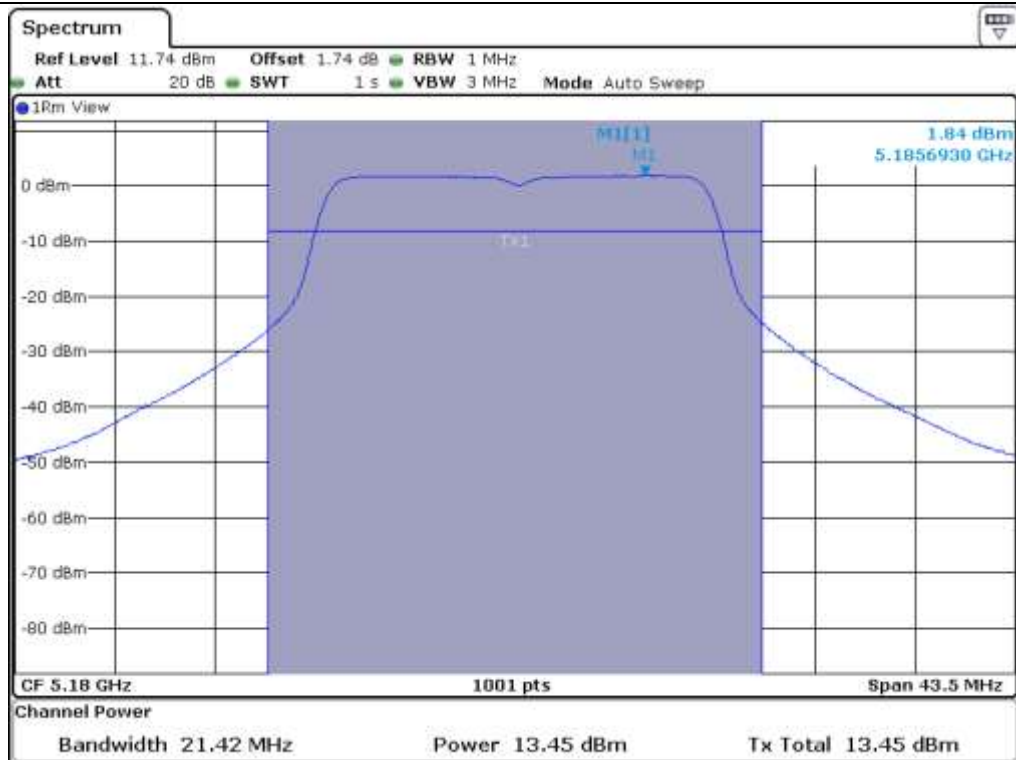
Remark: See next page for measurement data.

-. IC Test data

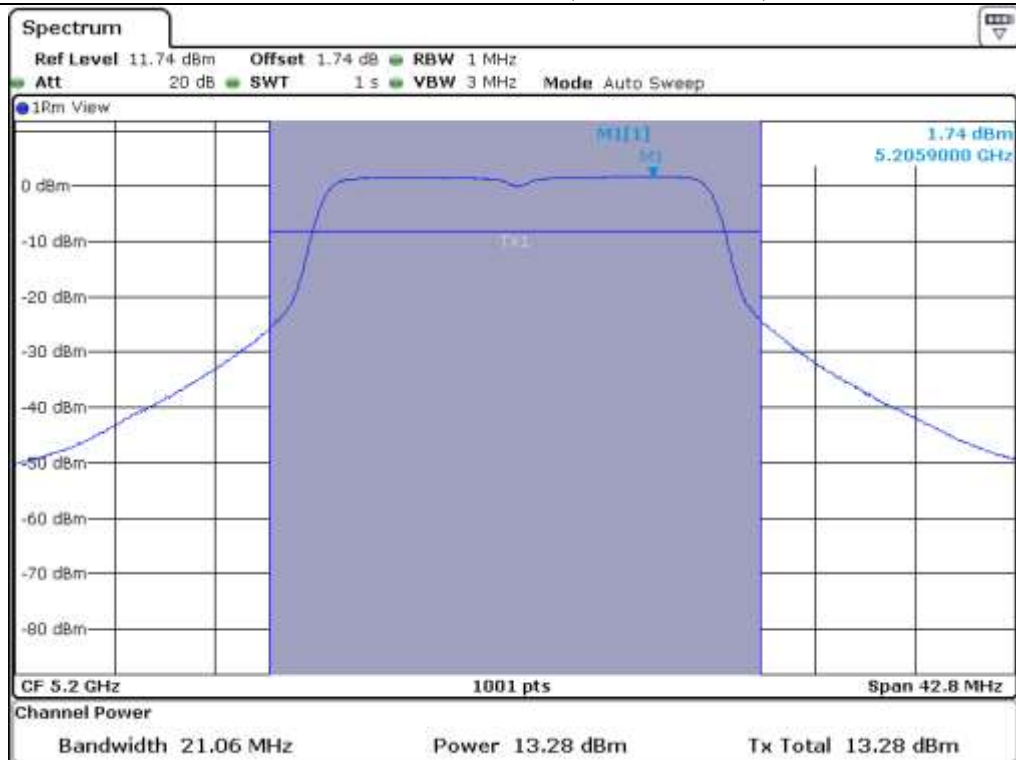
FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	Antenna Gain	99 % bandwidth (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)	EIRP (dBm)
5 150 ~ 5 250	Low	5 180	6.53	16.50	13.47	22.18	2.17	20.00
	Middle	5 200		16.46	13.22	22.16	2.41	19.75
	High	5 240		16.50	13.17	22.18	2.47	19.70
5 725 ~ 5 825	Low	5 745	6.42	16.46	10.27	29.59	19.32	-
	Middle	5 785		16.50	17.17	29.59	12.42	-
	High	5 825		16.46	10.92	29.59	18.67	-

Remark: See next page for measurement data.

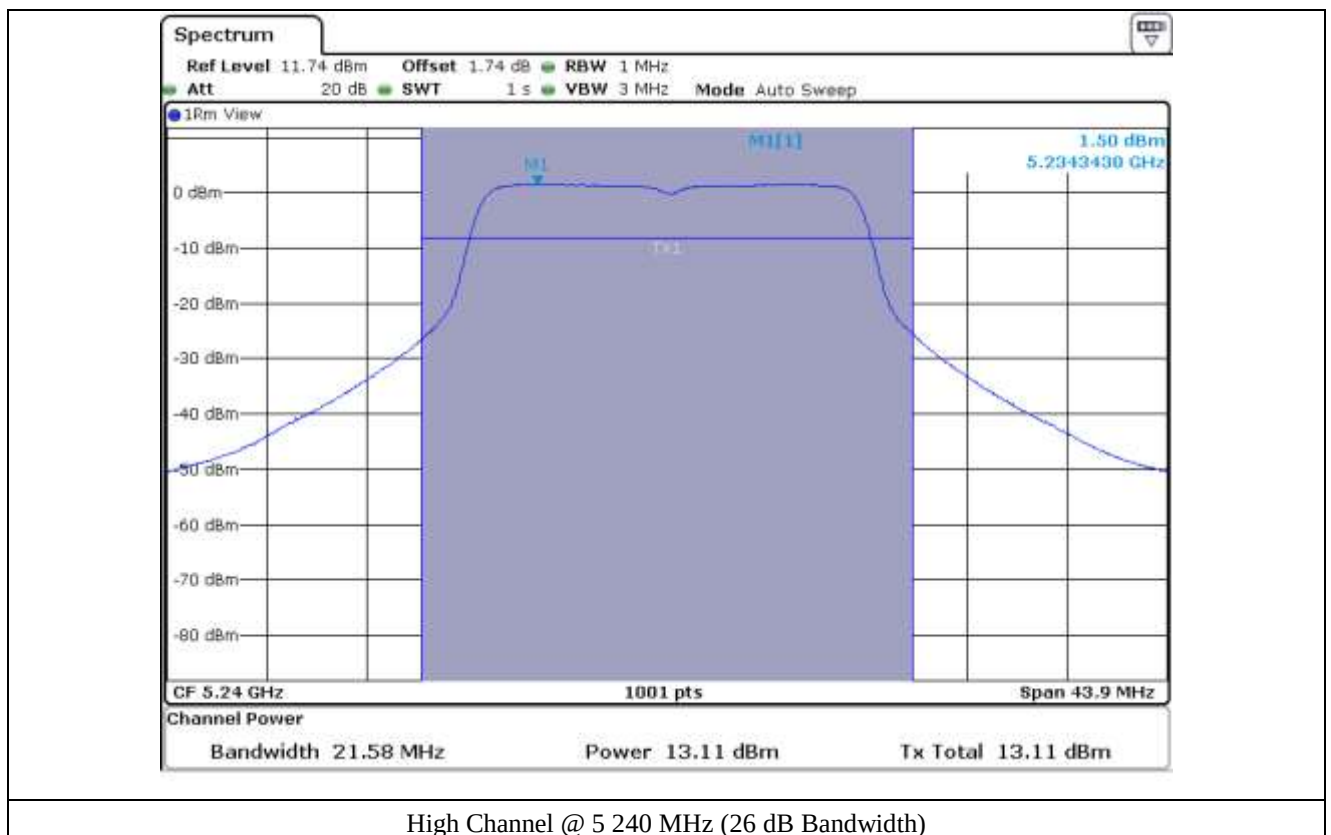

Tested by: Jun-Hui, Lee / Senior Engineer

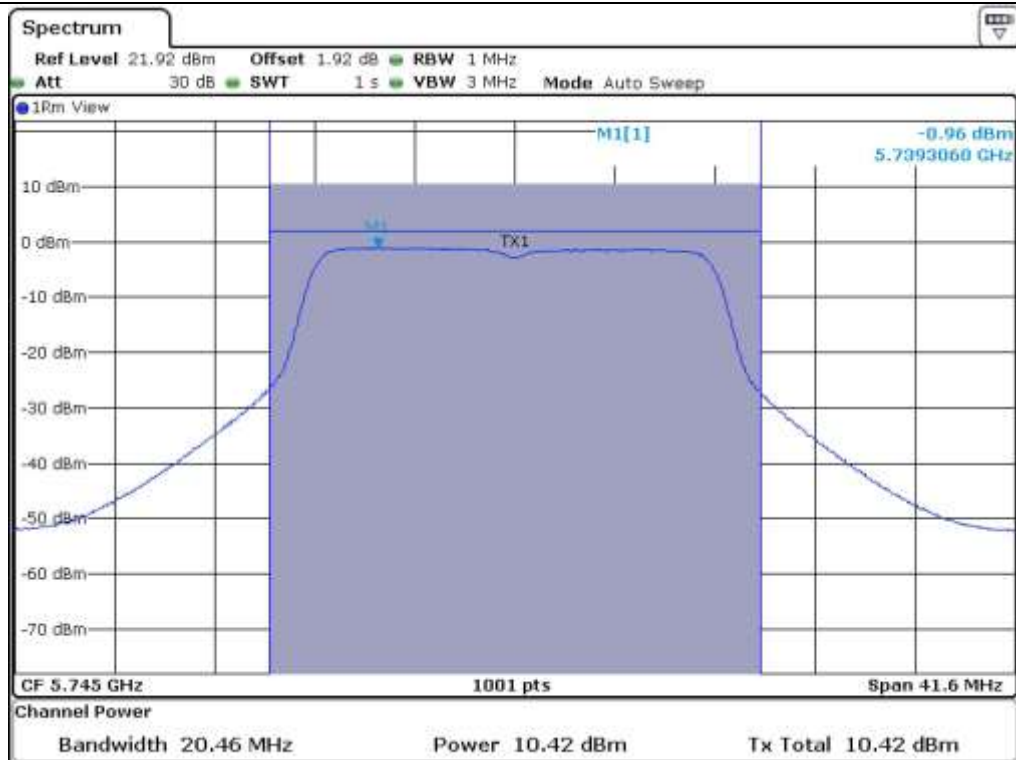


Low Channel @ 5.180 MHz (26 dB Bandwidth)

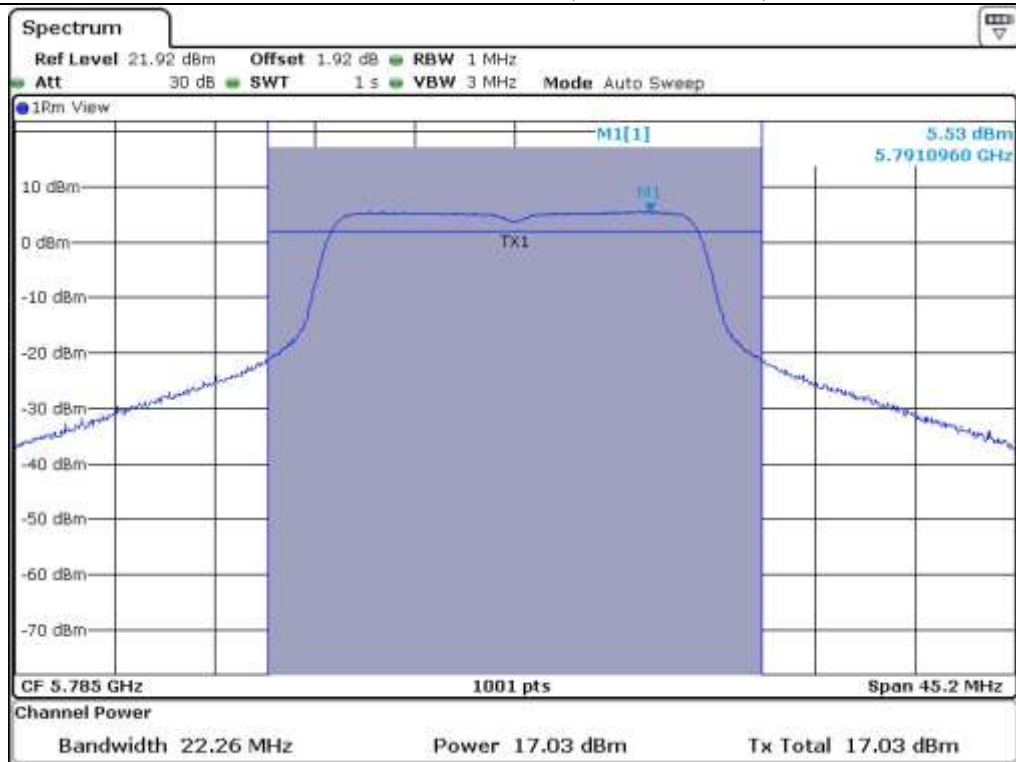


Middle Channel @ 5.200 MHz (26 dB Bandwidth)

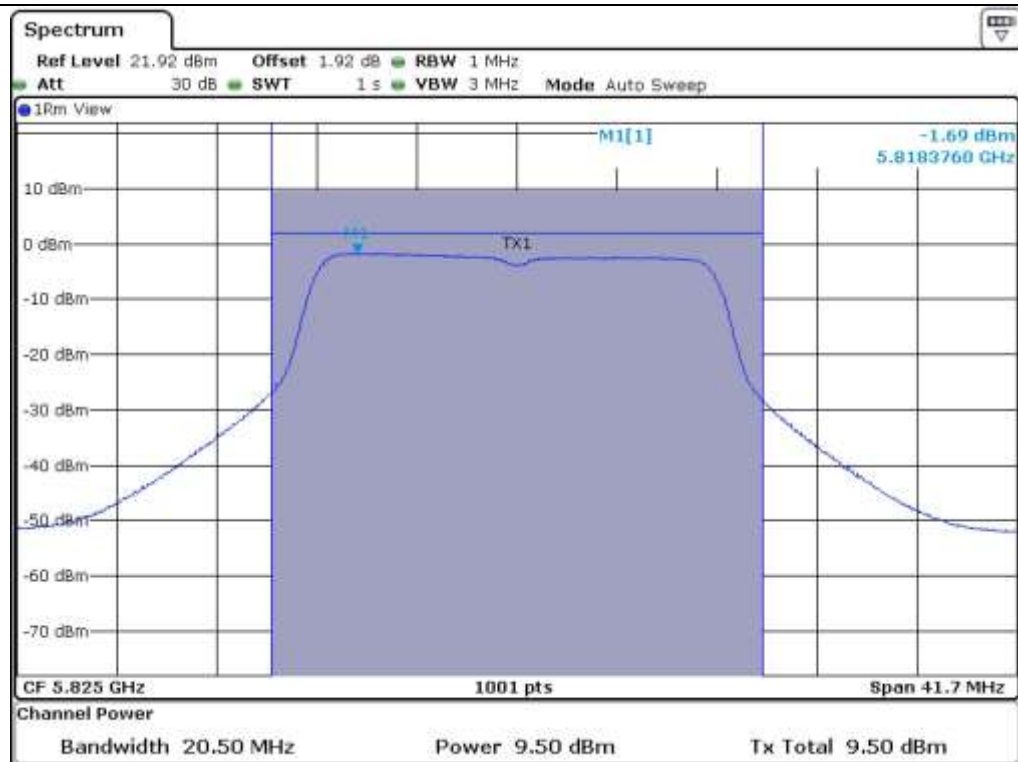




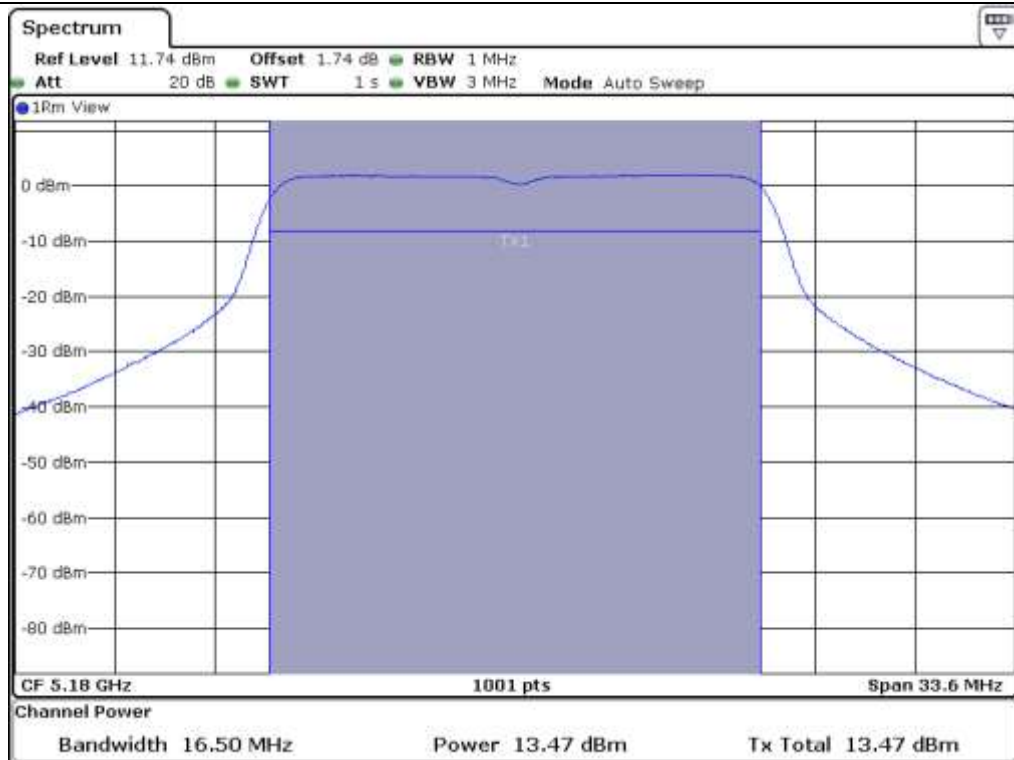
Low Channel @ 5.745 MHz (26 dB Bandwidth)



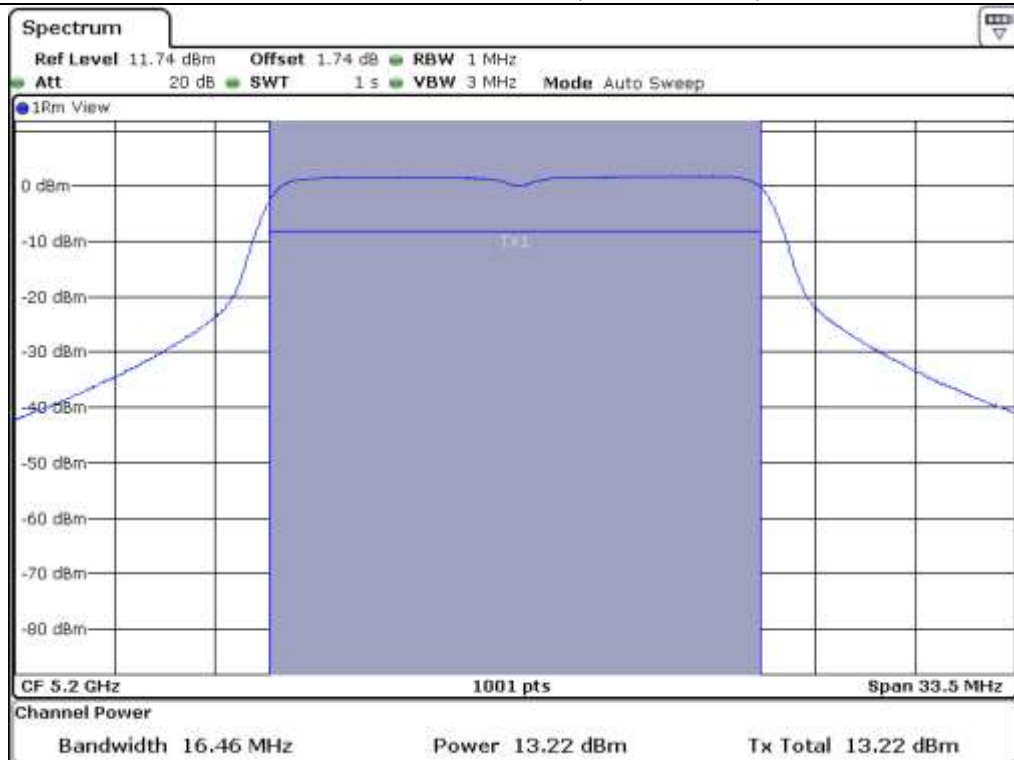
Middle Channel @ 5.785 MHz (26 dB Bandwidth)



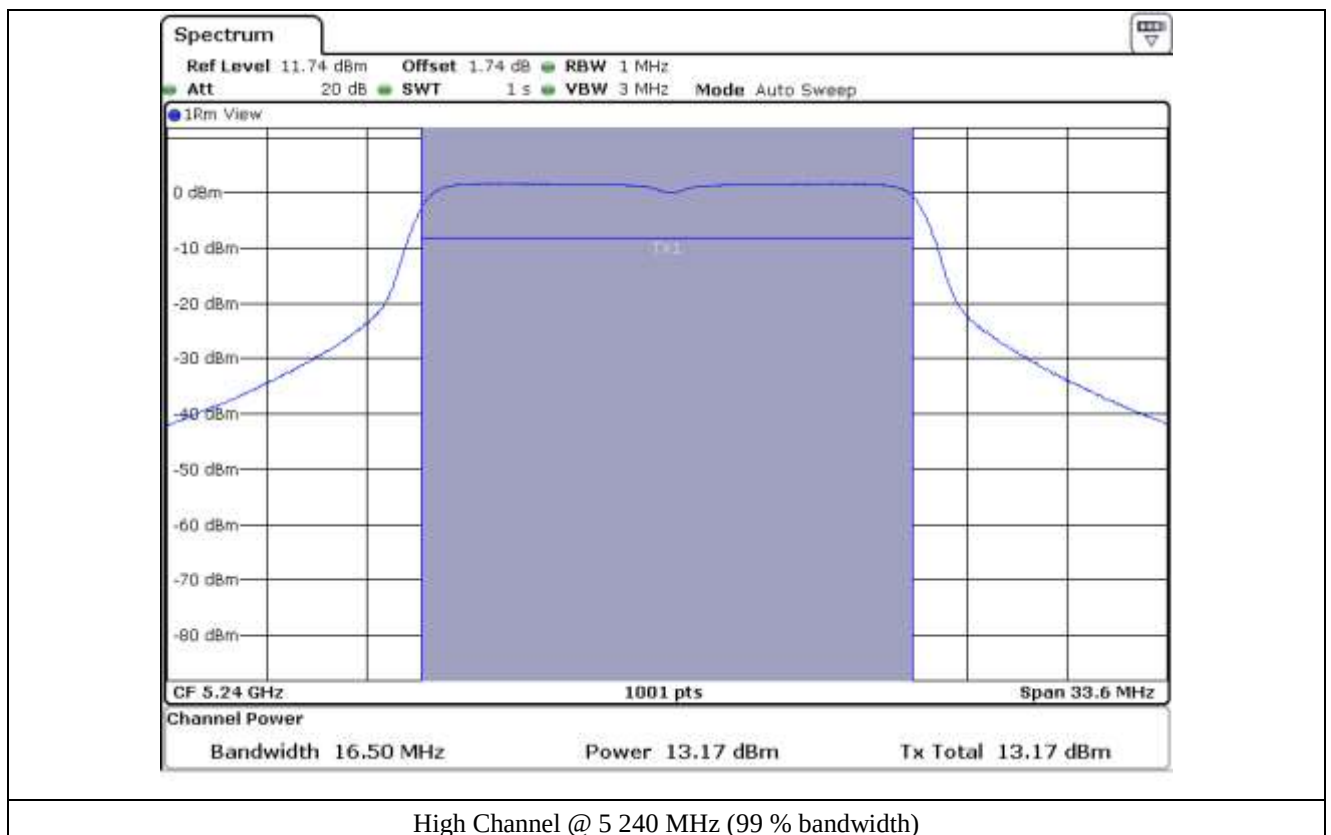
High Channel @ 5 825 MHz (26 dB Bandwidth)

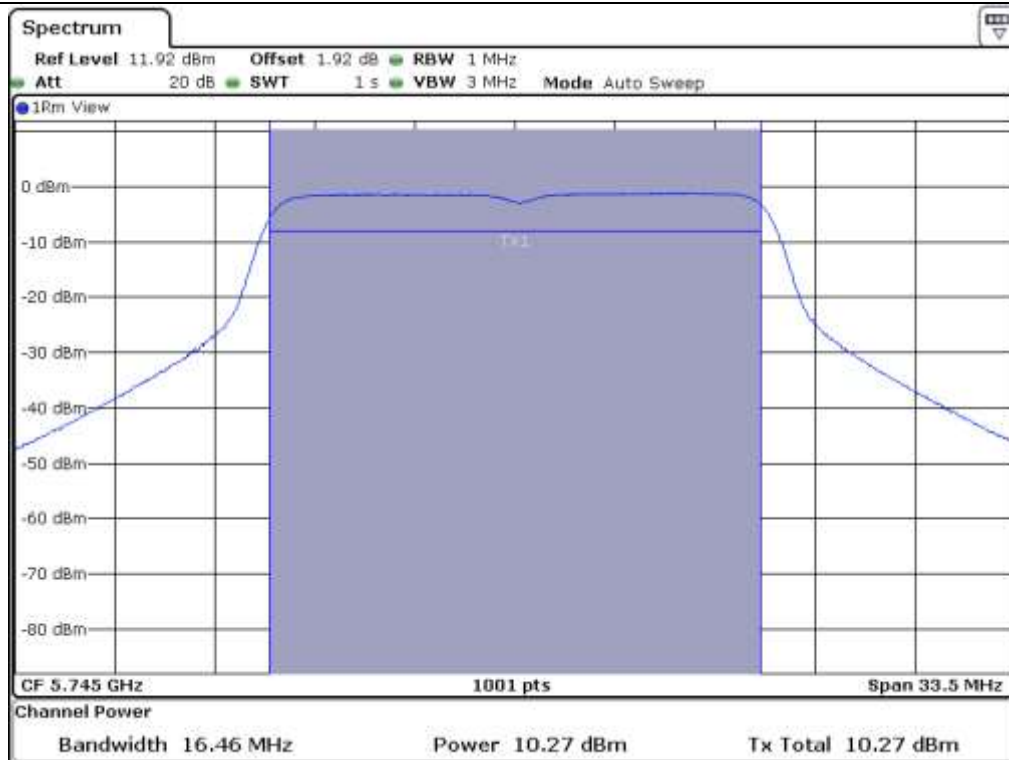


Low Channel @ 5 180 MHz (99 % bandwidth)

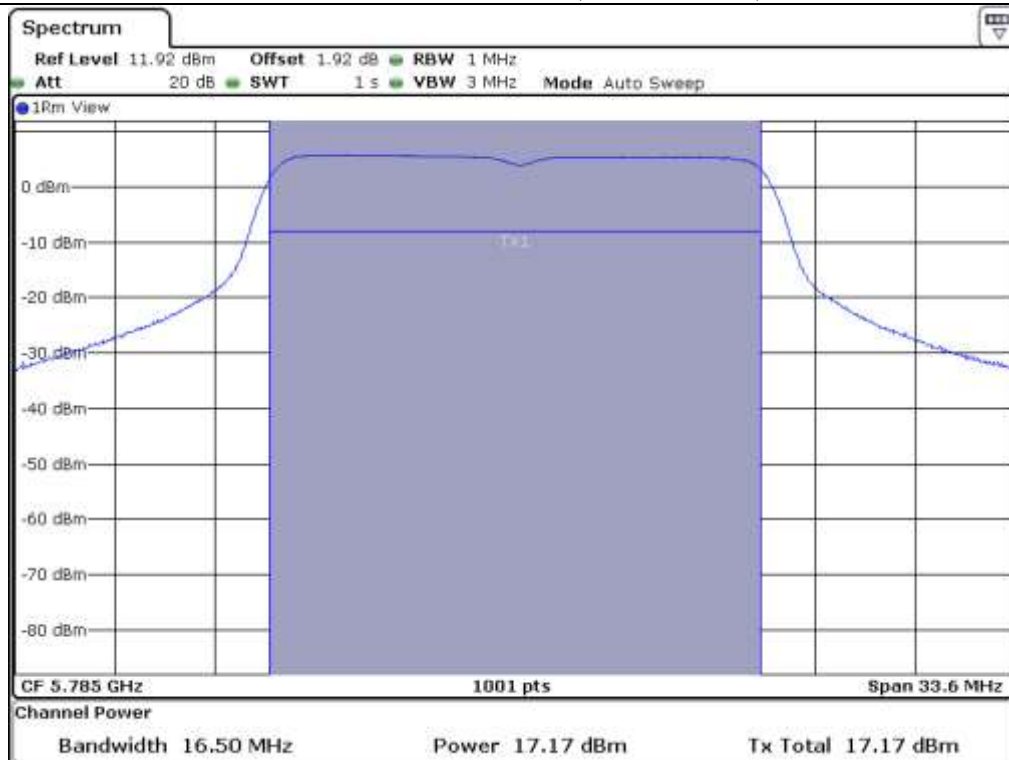


Middle Channel @ 5 200 MHz (99 % bandwidth)

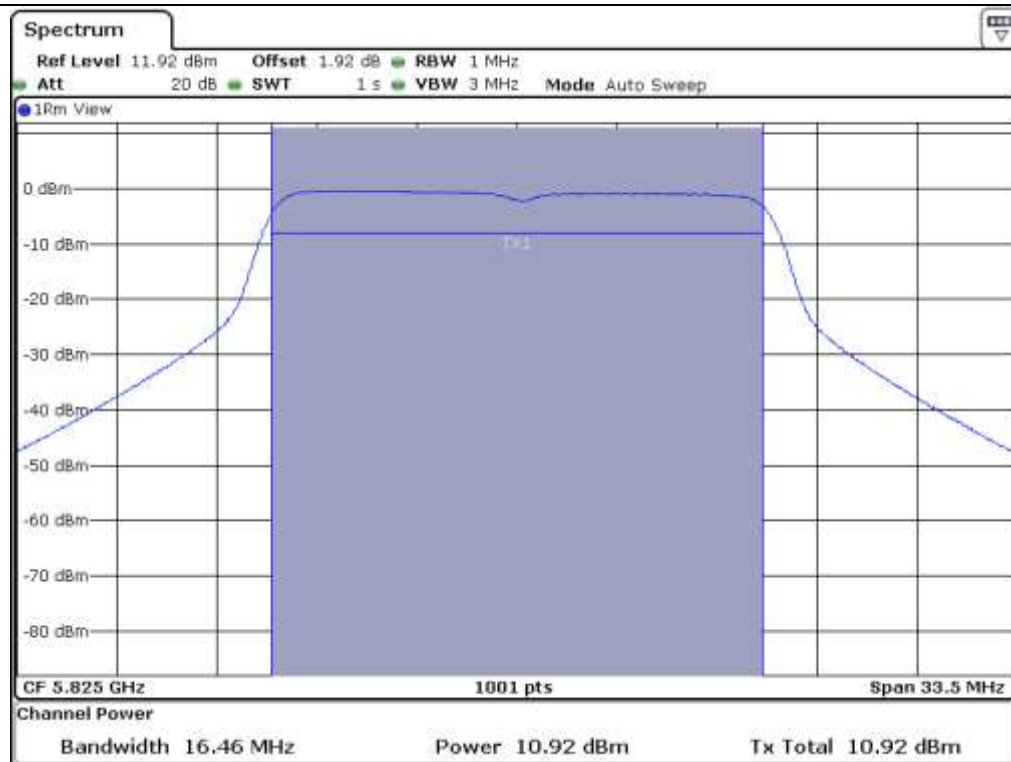




Low Channel @ 5.745 MHz (99 % bandwidth)



Middle Channel @ 5.785 MHz (99 % bandwidth)



High Channel @ 5 825 MHz (99 % bandwidth)