

APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
Xiamen Prima Technology Inc

WiFi module
Model No.: WPC0GR2231

FCC ID: 2ADID-WPC0GR

Prepared for : Xiamen Prima Technology Inc.
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Report No. : ATE20161393
Date of Test : May 13, 2016--Aug 02, 2016
Date of Report : Aug 03, 2016

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Test Report Certification

Applicant : Xiamen Prima Technology Inc

Manufacturer : Xiamen Prima Technology Inc

EUT Description : WiFi module

(A) MODEL NO.: WPC0GR2231

(B) Trade Mark : PRIMA

(C) Voltage: DC 12V

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.407:2015

ANSI C63.10: 2013

KDB 789033 D02 General UNII Test Procedures New Rules v01r02

KDB 558074 D01 DTS Meas Guidance v03r05

KDB 662911 D01 Multiple Transmitter Output v02r01

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.407 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

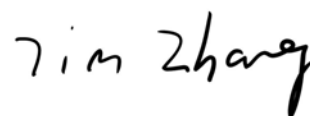
Date of Test :

May 13, 2016--Aug 02, 2016

Date of Report:

Aug 03, 2016

Prepared by :



(Tim.zhang, Engineer)

Approved & Authorized Signer :



(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	WiFi module
Model Number	:	WPC0GR2231
IEEE 802.11 WLAN	:	802.11a (20 MHz channel bandwidth) , 802.11n (20 MHz channel bandwidth), 802.11n (40 MHz channel bandwidth), 802.11ac (20 MHz channel bandwidth), 802.11ac (40 MHz channel bandwidth)
Frequency Range	:	U-NII(5150-5250, 5725-5850MHz)
Number of Channels	:	$f_c = 5000 \text{ MHz} + N * 5 \text{ MHz}$, where: - f_c = “Operating Frequency” in MHz, - N = “Channel Number”. 5150-5250 MHz: $N = 36$ to 48 with step of 4 for the 20 MHz channel bandwidth. $N = 38$ to 46 with step of 4 for the 40 MHz channel bandwidth. 5725-5850 MHz: $N = 149$ to 165 with step of 4 for the 20 MHz channel bandwidth. $N = 151$ to 159 with step of 4 for the 40 MHz channel bandwidth.
$G_{\text{ANT MAX}}$	:	ANT1:2 dBi (per antenna port, max.) ANT2:2 dBi(per antenna port, max.)
Array Gain	:	For power spectral density (PSD) measurements on all devices, $\text{Array Gain} = 10 \log(N_{\text{ANT}}/N_{\text{SS}}) \text{ dB} = 10 \log(2/1) = 3.01$ devices can operate with one spatial stream ($N_{\text{SS}} = 1$), N_{ANT} = number of transmit antennas. For power measurements on IEEE 802.11 devices $\text{Array Gain} = 0 \text{ dB}$ (i.e., no array gain) for $N_{\text{ANT}} \leq 4$
Directional gain	:	$G_{\text{ANT}} + \text{Array Gain} = 5.01$
Type of Antenna	:	SISO (for 802.11a/n/ac) MIMO Antenna(for 802.11n/ac)

Power Supply : DC 12V

Modulation Type : BPSK/QPSK/16QAM/64QAM (OFDM)

TPC : Not Supported

Applicant : Xiamen Prima Technology Inc
Address : No.178, Xinfeng Road, Xiamen, Fujian, P.R. China.

Manufacturer : Xiamen Prima Technology Inc
Address : Wanlida, Industry Zone Building C, Nanjing Fujian, P.R. China.

Date of sample received : May 13, 2016

Date of Test : May 13, 2016--Aug 02, 2016

1.2. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen

Listed by FCC

The Registration Number is 752051

Listed by Industry Canada

The Registration Number is 5077A-2

Accredited by China National Accreditation Committee
for Laboratories

The Certificate Registration Number is L3193

Name of Firm : ACCURATE TECHNOLOGY CO. LTD

Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
Science & Industry Park, Nanshan, Shenzhen, Guangdong
P.R. China

1.3. Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 3.08dB, k=2
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2
(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2
(Above 1GHz)

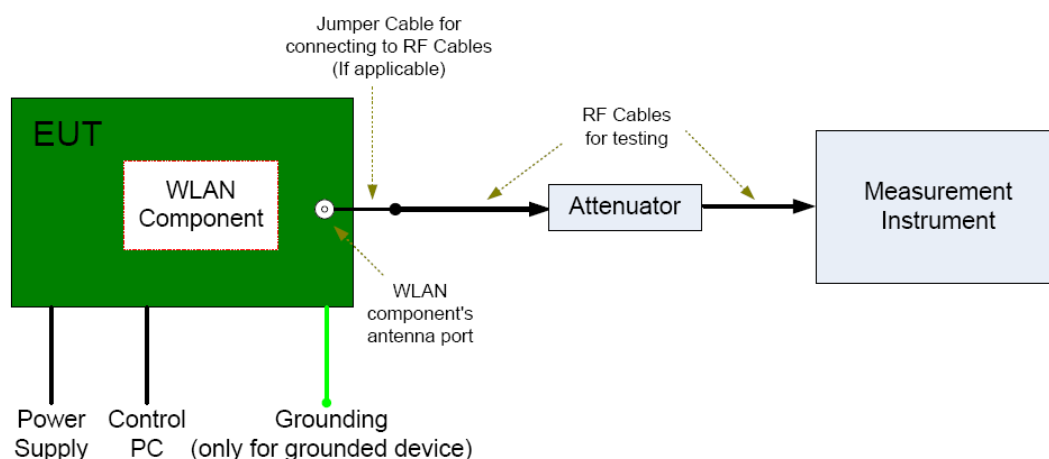
2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

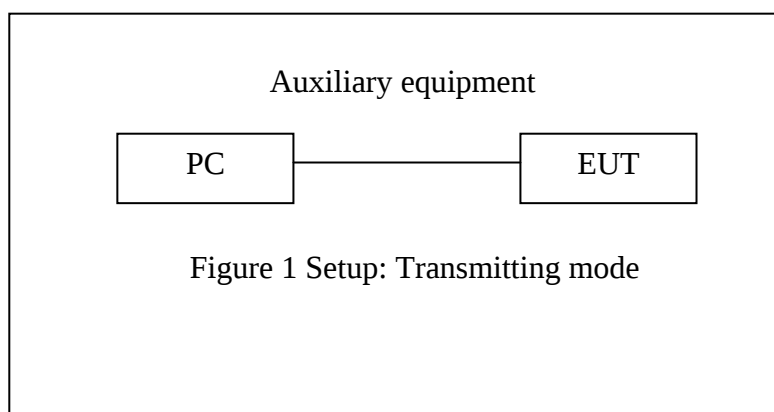
Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 10, 2016	Jan. 09, 2017
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 10, 2016	Jan. 09, 2017
Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	Jan. 10, 2016	Jan. 09, 2017
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 10, 2016	Jan. 09, 2017
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 14, 2016	Jan. 13, 2017
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 14, 2016	Jan. 13, 2017
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 14, 2016	Jan. 13, 2017
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 14, 2016	Jan. 13, 2017
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 10, 2016	Jan. 09, 2017
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 10, 2016	Jan. 09, 2017
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 10, 2016	Jan. 09, 2017
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 10, 2016	Jan. 09, 2017

3. OPERATION OF EUT DURING TESTING

3.1. Test setups



3.2. Configuration and peripherals



(EUT: WiFi module)

Note: The EUT have two antenna(1 and 2), They can transmit simultaneously,

3.3. Test mode

Test Mode	Test Modes Description
11A	IEEE 802.11a with data rate of 6 Mbps using SISO mode.
11N20	IEEE 802.11n with data rate of MCS0 and bandwidth of 20 MHz using SISO mode.
11N20m	IEEE 802.11n with data rate of MCS8 and bandwidth of 20 MHz using MIMO mode.
11N40	IEEE 802.11n with data rate of MCS0 and bandwidth of 40 MHz using SISO mode.
11N40m	IEEE 802.11n with data rate of MCS8 and bandwidth of 40 MHz using MIMO mode.
11AC20	IEEE 802.11ac with data rate of MCS0 and bandwidth of 20 MHz using SISO mode.
11AC20m	IEEE 802.11ac with data rate of MCS8 and bandwidth of 20 MHz using SISO mode.
11AC40	IEEE 802.11ac with data rate of MCS0 and bandwidth of 40 MHz using SISO mode.
11AC40m	IEEE 802.11ac with data rate of MCS8 and bandwidth of 40 MHz using MIMO mode.

NOTE: Worst cases for each IEEE 802.11 mode are selected to perform tests.

4. TEST PROCEDURES AND RESULTS

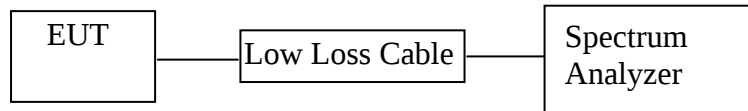
Description of Test	Band	FCC Rules	Requirements	Result
AC power Line Conducted Emission Test	N/A	N/A	N/A	N/A
Emission Bandwidth	5150-5250	15.403(i), 15.407(a)(1)	No limit.	Compliant
	5725-5850	15.403(i), 15.407(e)	≥ 500 kHz.	
Occupied Bandwidth	5150-5250 5725-5850	KDB 789033 §D	No limit	Compliant
Maximum Conducted Output Power	5150-5250	15.407(a)(1) 15.407(a)(4)	< 250mW (avg during transmission)	Compliant
	5725-5850	15.407(a)(3)	< 1W (avg during transmission)	
Peak Power Spectral Density	5150-5250	15.407(a)(1) 15.407(a)(4)	<11dBm/MHz (avg during transmission)	Compliant
	5725-5850	15.407(a)(3) 15.407(a)(4)	<30dBm/500KHz (avg during transmission)	
Unwanted Emissions	5150-5250	15.407(b)(1) 15.407(b)(6) 15.407(b)(7) 15.209	F<1GHz: § 15.209/§7.2.5 limit (QP). F $\geq$ 1GHz & out-restricted: <-27dBm/MHz PK e.i.r.p. (exl. 5.15-5.35 GHz). F $\geq$ 1GHz & in-restricted: § 15.209/§7.2.5 limit (AV&PK).	
	5725-5850	15.407(b)(4) 15.407(b)(6) 15.407(b)(7) 15.209	F<1GHz: § 15.209/§7.2.5 limit (QP). F $\geq$ 1GHz & out-restricted: <-17dBm/MHz PK e.i.r.p.(from the edge to 10 MHz above or below the band edge); <-27dBm/MHz PK e.i.r.p(for frequencies 10 MHz or greater above or below the band edge) (exl. 5725-5850 GHz). F $\geq$ 1GHz & in-restricted: § 15.209/§7.2.5 limit (AV&PK).	
Frequency Stability	5150-5250 5725-5850	15.407(g)	FCC Part 15.407(g)	Compliant

Antenna Requirement	N/A	15.203, 15.204(b), 15.204(c), 15.212(a), 2.929(b)	N/A	Compliant
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Note: The power supply mode of the EUT is DC 12V, According to the FCC standard requirements, conducted emission is not applicable.

5. 6DB OCCUPIED BANDWIDTH TEST

5.1. Block Diagram of Test Setup



(EUT: WiFi module)

5.2. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 kHz for the band 5.725-5.85 GHz

5.3. Operating Condition of EUT

5.3.1. Setup the EUT and simulator as shown as Section 5.1.

5.3.2. Turn on the power of all equipment.

5.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 5725-5850MHz.

5.4. Test Procedure

5.4.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

5.4.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

5.4.3. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

5.5.Test Result

The test was performed with 802.11a				
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	6dB Bandwidth ANT 2(MHz)	Limit (MHz)
149	5745	16.280	16.411	> 0.5MHz
165	5825	16.281	16.411	> 0.5MHz

The test was performed with 802.11n20				
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	6dB Bandwidth ANT 2(MHz)	Limit (MHz)
149	5745	17.670	17.670	> 0.5MHz
165	5825	17.670	17.627	> 0.5MHz

The test was performed with 802.11ac20				
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	6dB Bandwidth ANT 2(MHz)	Limit (MHz)
149	5745	17.279	17.279	> 0.5MHz
165	5825	16.888	16.975	> 0.5MHz

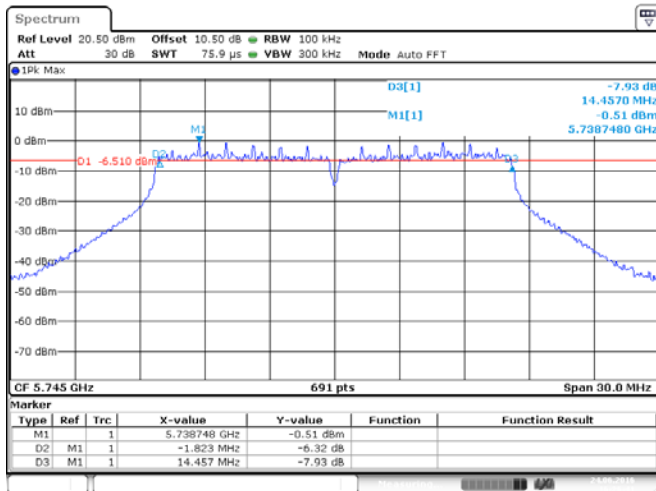
The test was performed with 802.11n40				
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	6dB Bandwidth ANT 2(MHz)	Limit (MHz)
151	5755	35.977	35.977	> 0.5MHz
159	5795	35.977	35.977	> 0.5MHz

The test was performed with 802.11ac40				
Channel	Frequency (MHz)	6dB Bandwidth ANT 1 (MHz)	6dB Bandwidth ANT 2(MHz)	Limit (MHz)
151	5755	35.716	35.716	> 0.5MHz
159	5795	35.890	35.890	> 0.5MHz

The spectrum analyzer plots are attached as below.

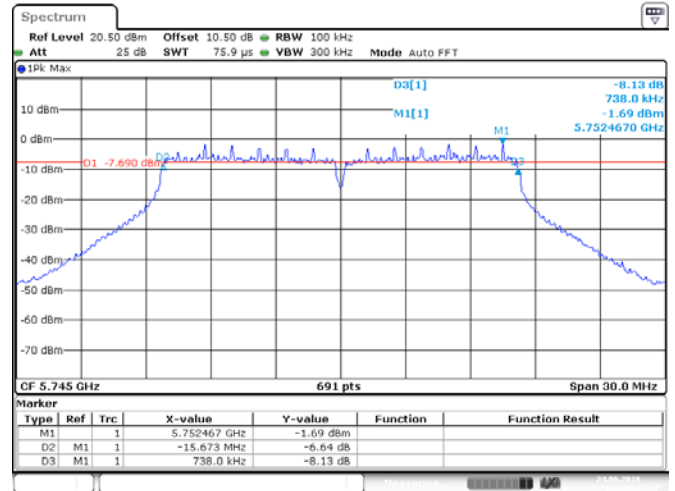
6dB Bandwidth

ANT 1(802.11A)

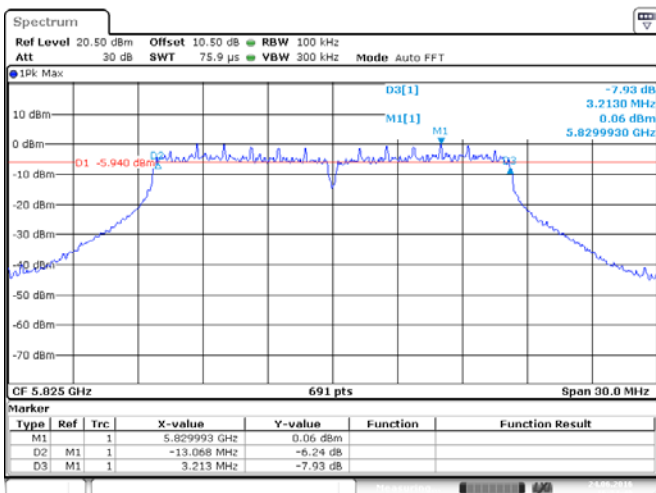


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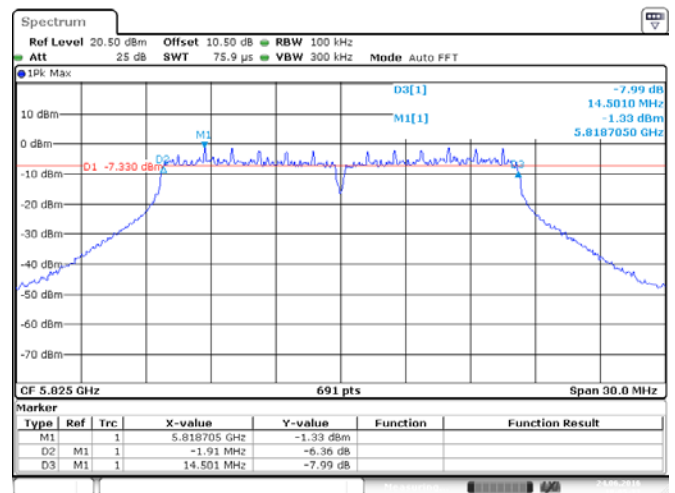
ANT 2(802.11A)



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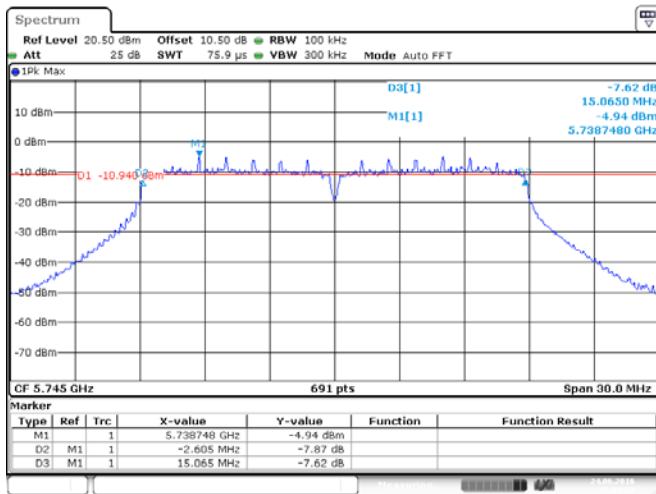


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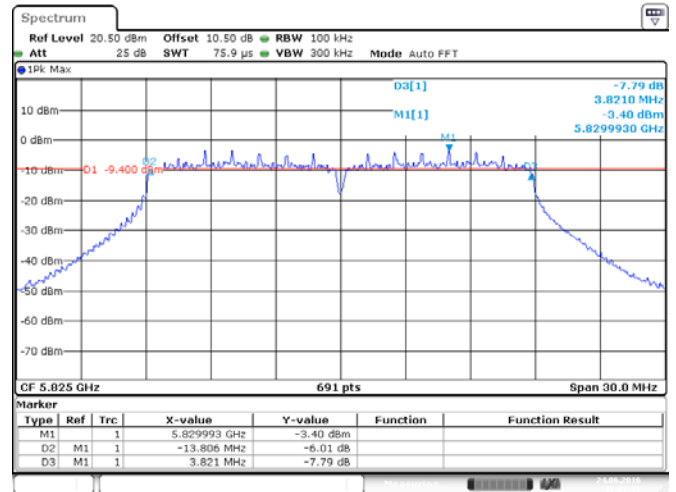
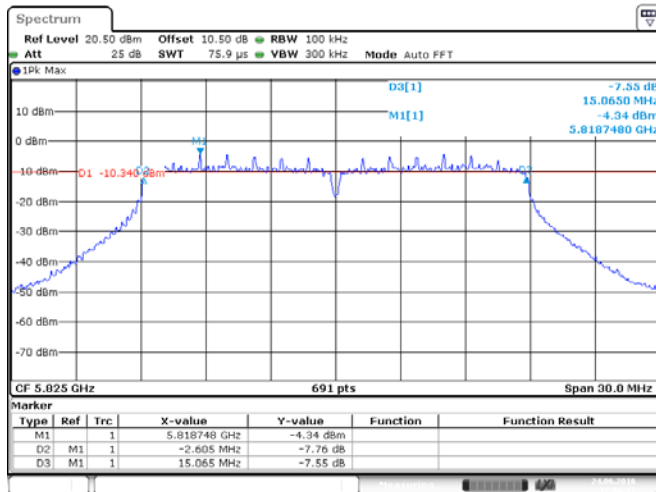
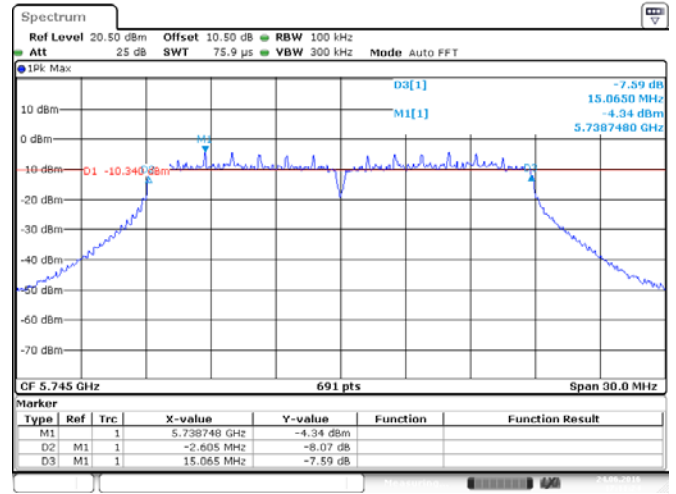


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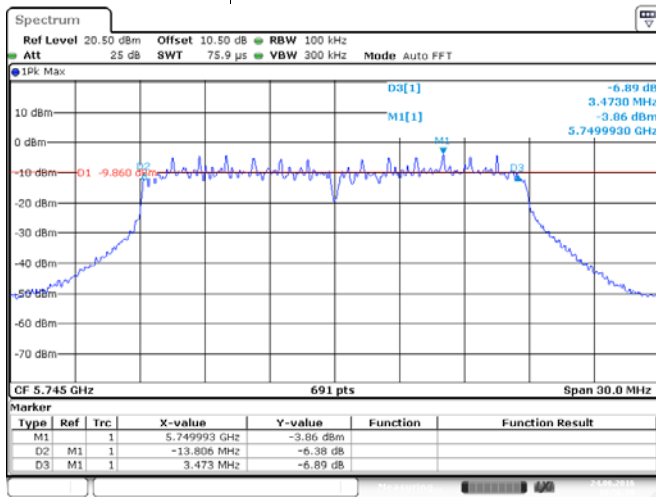
ANT 1(802.11N20)



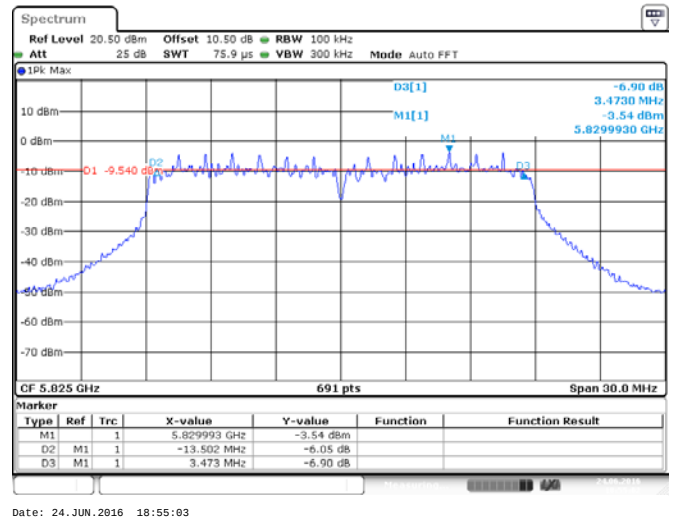
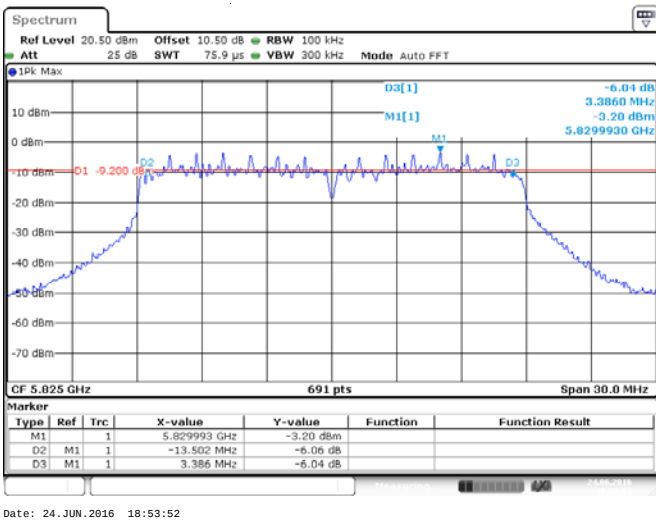
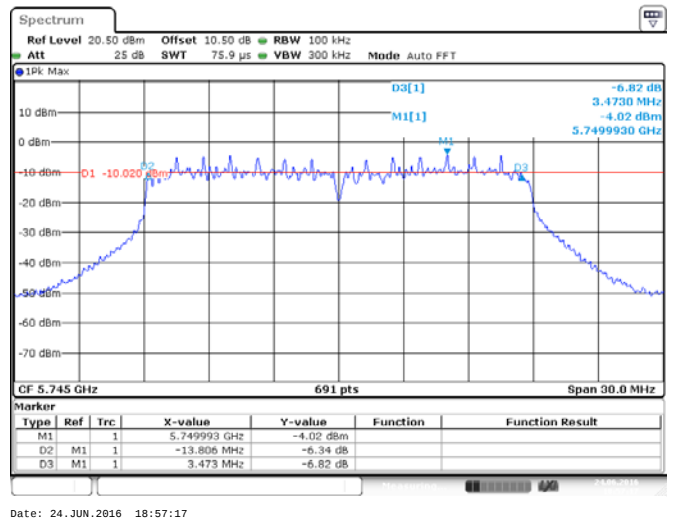
ANT 2(802.11N20)



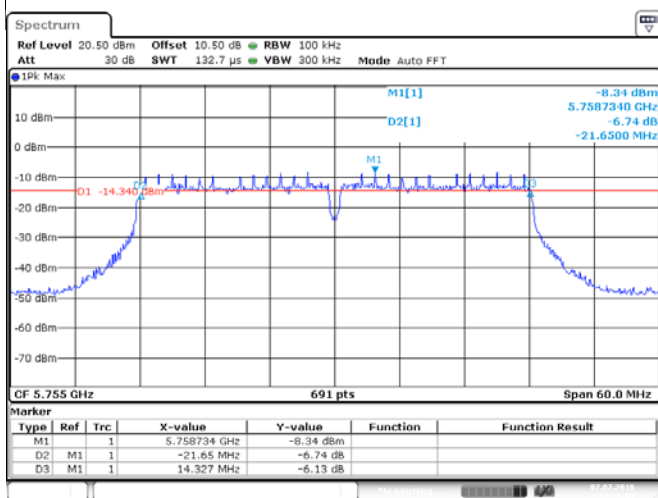
ANT 1(802.11ac20)



ANT 2(802.11ac20)

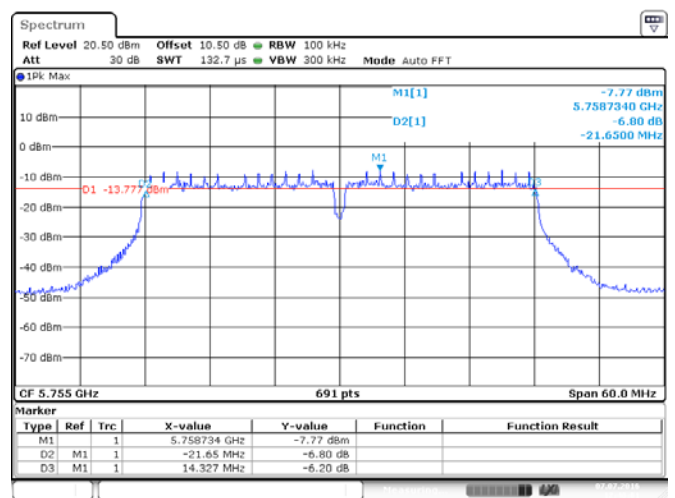


ANT 1(802.11N40)

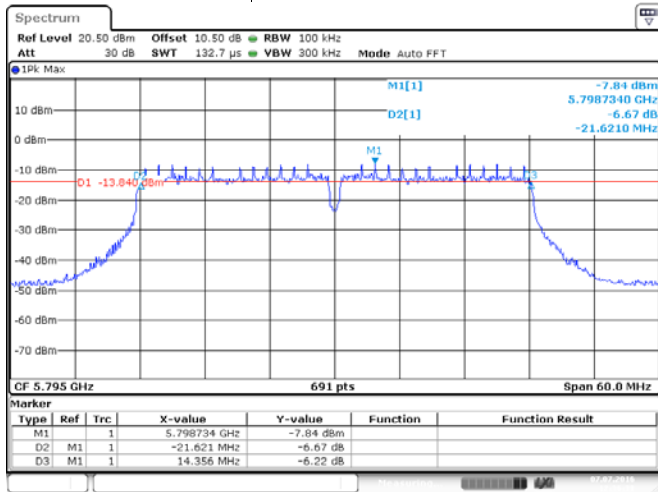


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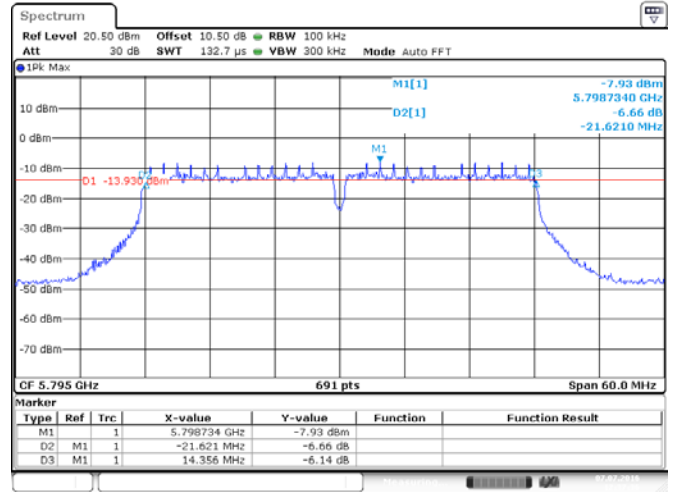
ANT 2(802.11N40)



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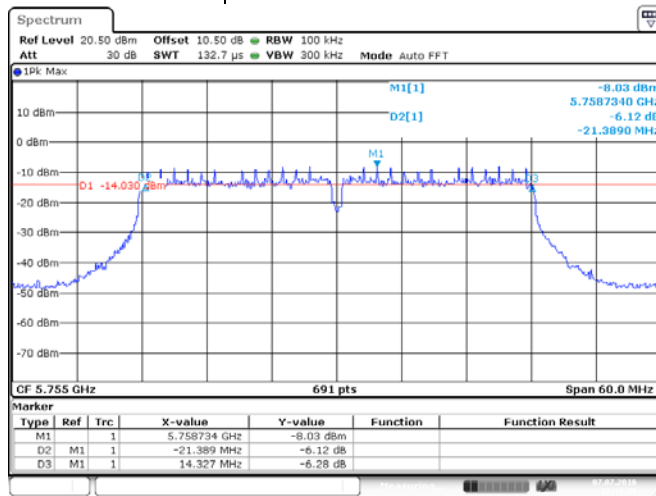


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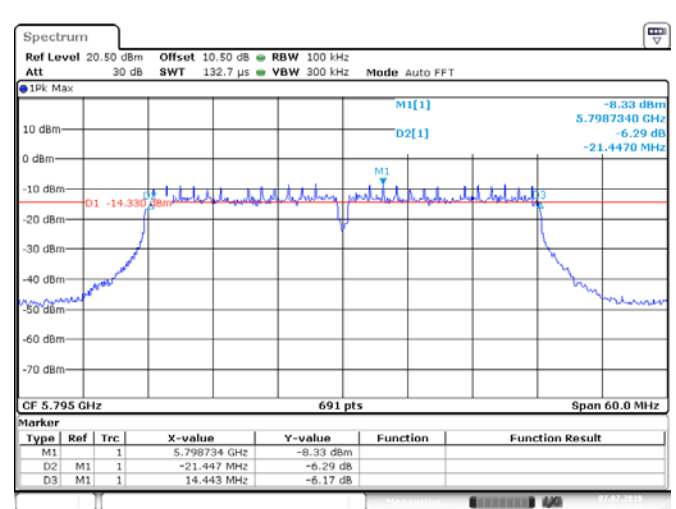
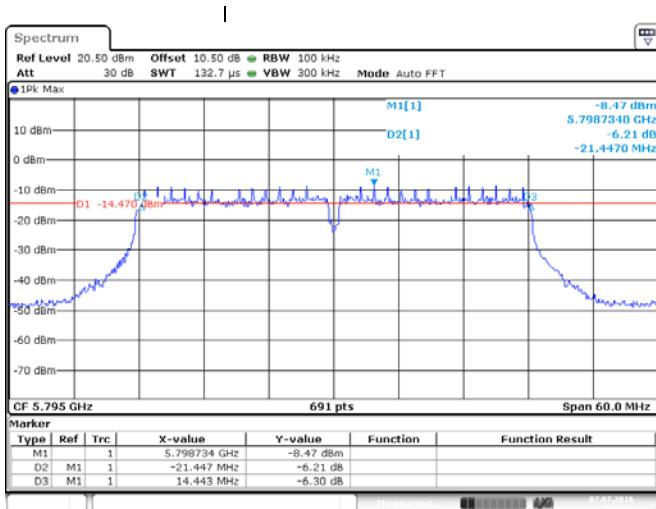
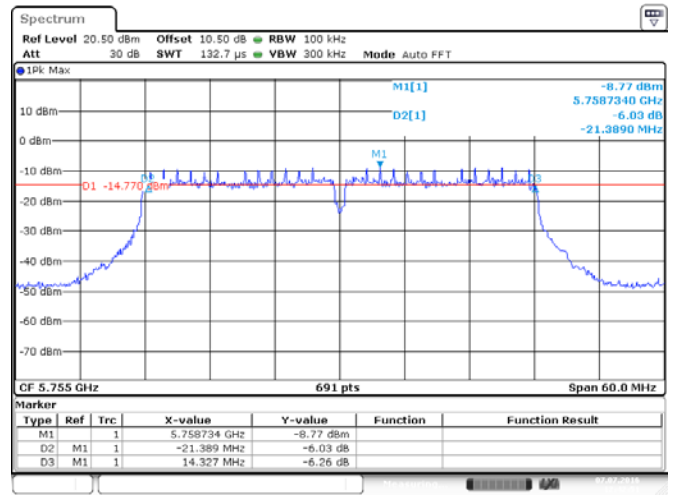


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ANT 1(802.11ac40)

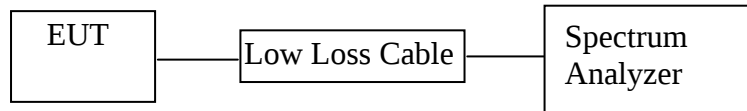


ANT 2(802.11ac40)



6. 26DB OCCUPIED BANDWIDTH TEST

6.1. Block Diagram of Test Setup



(EUT: WiFi module)

6.2. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.3. Operating Condition of EUT

6.3.1. Setup the EUT and simulator as shown as Section 6.1.

6.3.2. Turn on the power of all equipment.

6.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250MHz.

6.4. Test Procedure

6.4.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.4.2. Set RBW = approximately 1% of the emission bandwidth.

6.4.3. Set the VBW > RBW.

6.4.4. Detector = Peak.

6.4.5. Trace mode = max hold.

6.4.6. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

6.5. Test Result

The test was performed with 802.11a				
Channel	Frequency (MHz)	26dB Bandwidth ANT 1 (MHz)	26dB Bandwidth ANT 2(MHz)	Limit (MHz)
36	5180	21.100	20.970	> 0.5MHz
48	5240	21.100	21.187	> 0.5MHz

The test was performed with 802.11n20				
Channel	Frequency (MHz)	26dB Bandwidth ANT 1 (MHz)	26dB Bandwidth ANT 2(MHz)	Limit (MHz)
36	5180	22.055	21.708	> 0.5MHz
48	5240	22.055	22.142	> 0.5MHz

The test was performed with 802.11ac20				
Channel	Frequency (MHz)	26dB Bandwidth ANT 1 (MHz)	26dB Bandwidth ANT 2(MHz)	Limit (MHz)
36	5180	22.229	22.402	> 0.5MHz
48	5240	22.055	21.968	> 0.5MHz

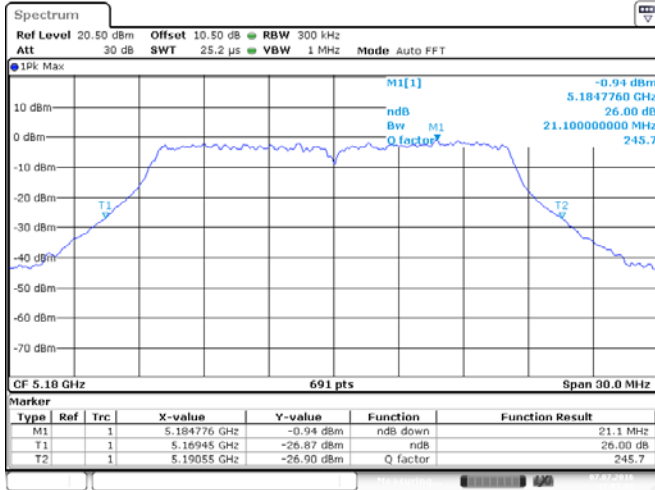
The test was performed with 802.11n40				
Channel	Frequency (MHz)	26dB Bandwidth ANT 1 (MHz)	26dB Bandwidth ANT 2(MHz)	Limit (MHz)
38	5190	43.763	43.763	> 0.5MHz
46	5230	43.589	43.763	> 0.5MHz

The test was performed with 802.11ac40				
Channel	Frequency (MHz)	26dB Bandwidth ANT 1 (MHz)	26dB Bandwidth ANT 2(MHz)	Limit (MHz)
38	5190	44.718	44.891	> 0.5MHz
46	5230	44.805	44.891	> 0.5MHz

The spectrum analyzer plots are attached as below.

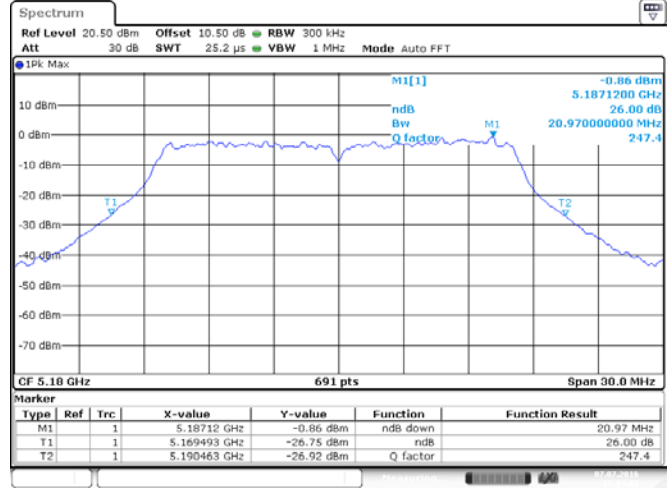
26dB Bandwidth

ANT 1(11A)

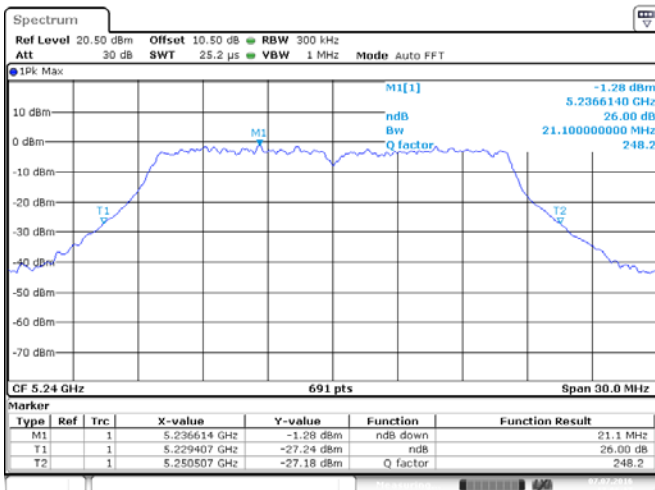


Date: 7.JUL.2016 12:03:32

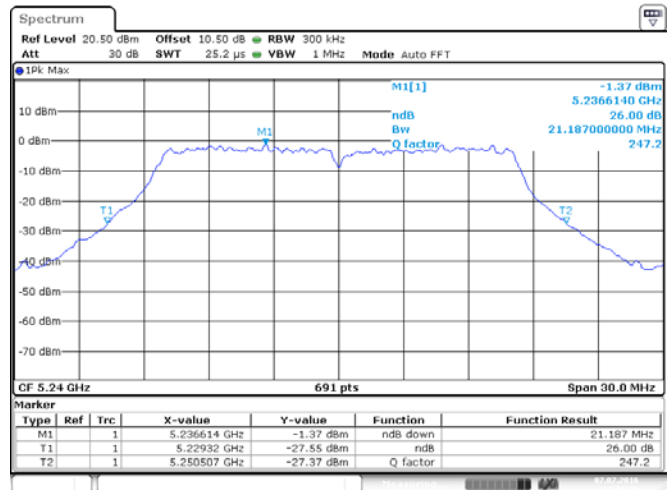
ANT 2(11A)



Date: 7.JUL.2016 12:04:03

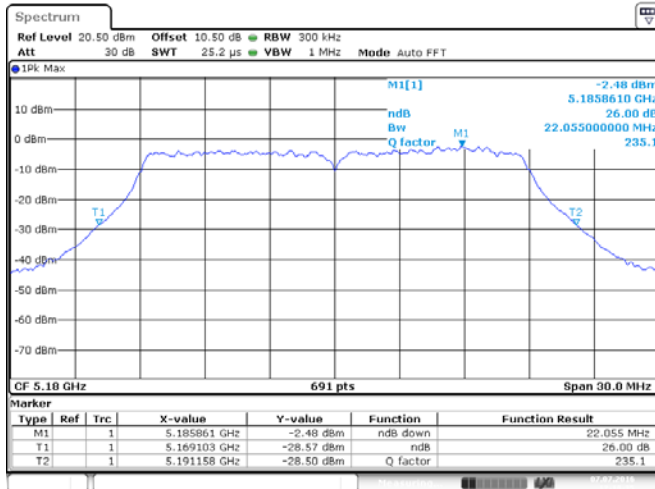


Date: 7.JUL.2016 12:06:17



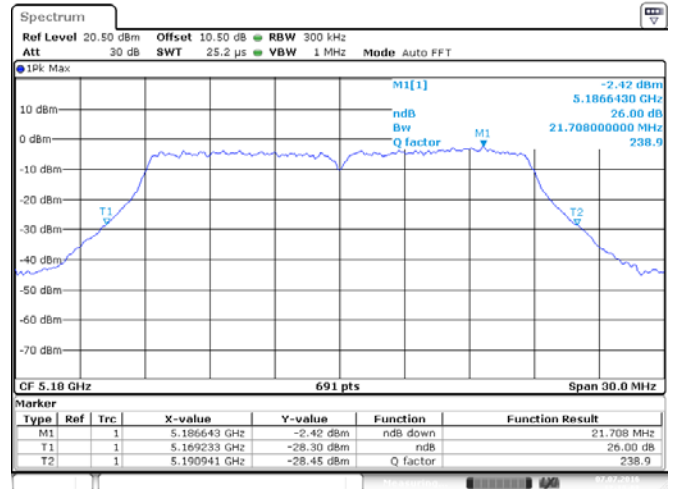
Date: 7.JUL.2016 12:06:38

ANT 1(11N20)

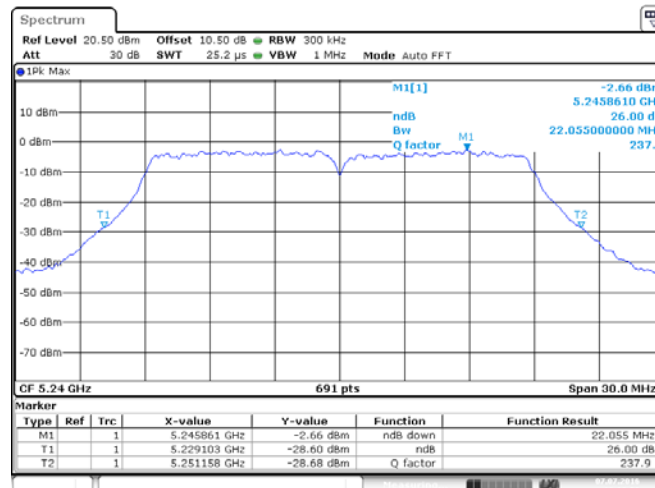


Date: 7.JUL.2016 12:10:35

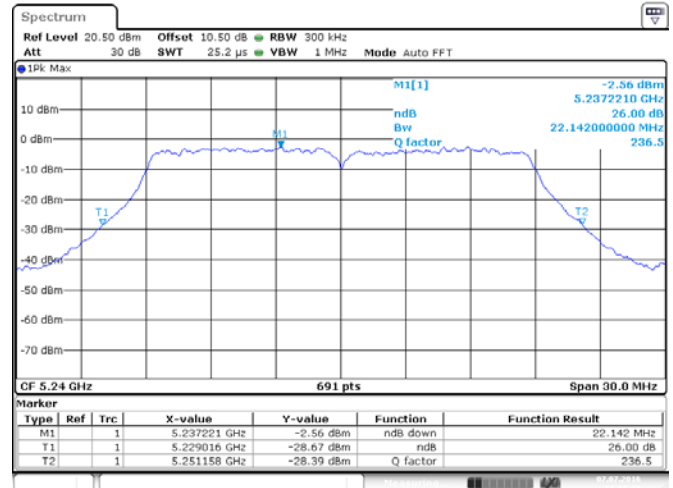
ANT 2(11N20)



Date: 7.JUL.2016 12:10:08

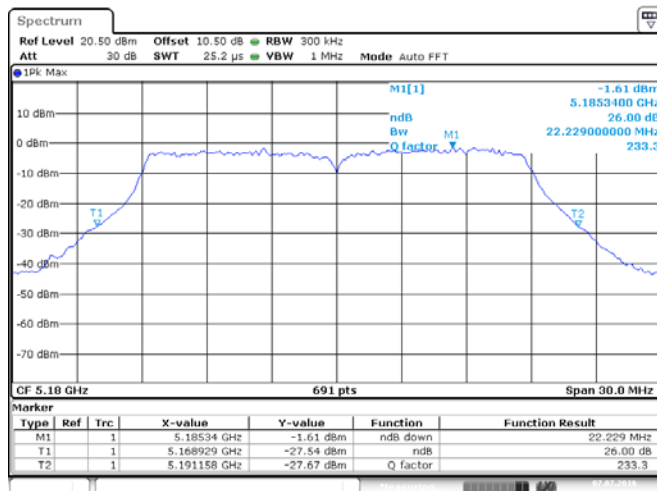


Date: 7.JUL.2016 12:08:58

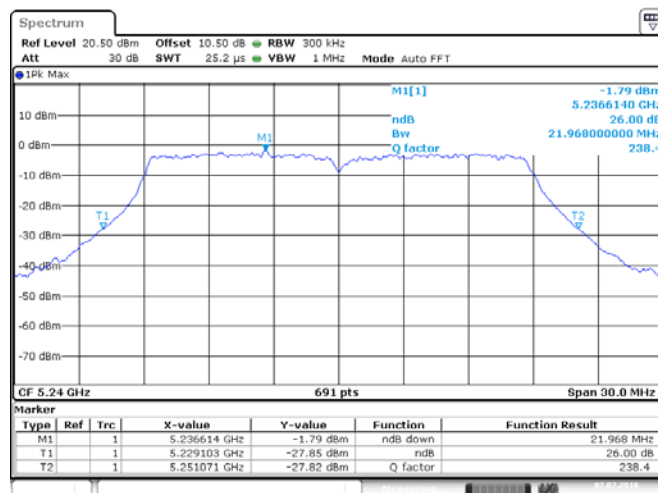
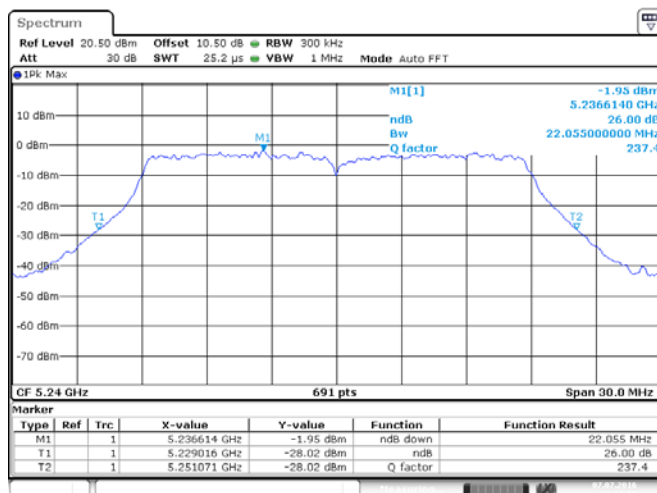
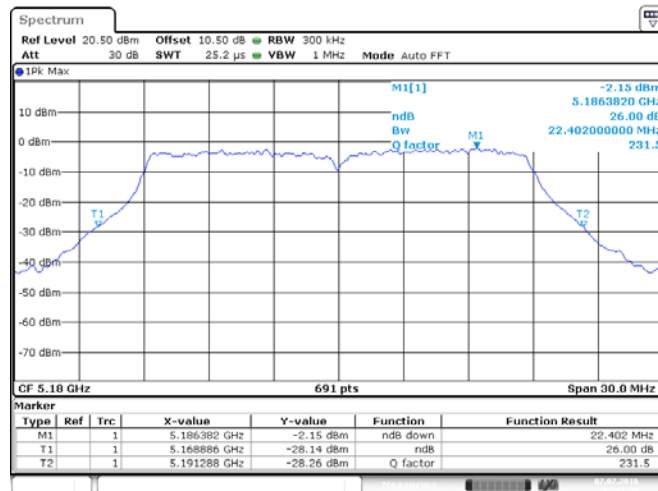


Date: 7.JUL.2016 12:08:38

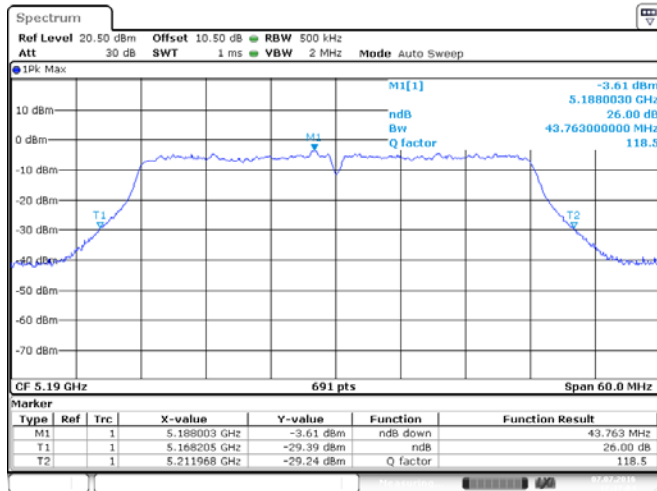
ANT 1(802.11ac20)



ANT 2(802.11ac20)

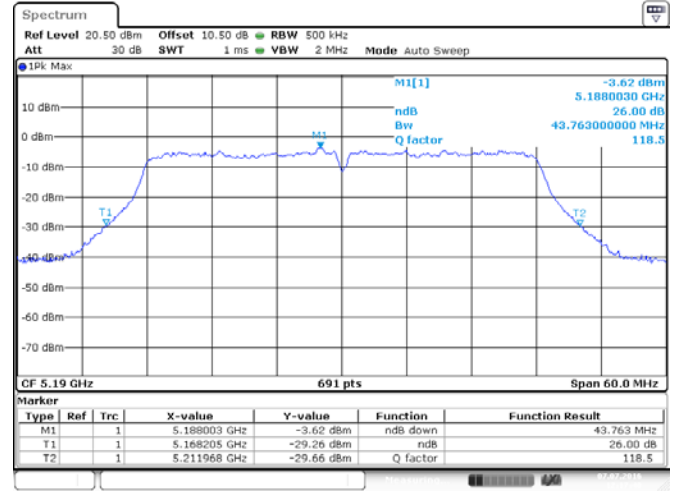


ANT 1(802.11n40)

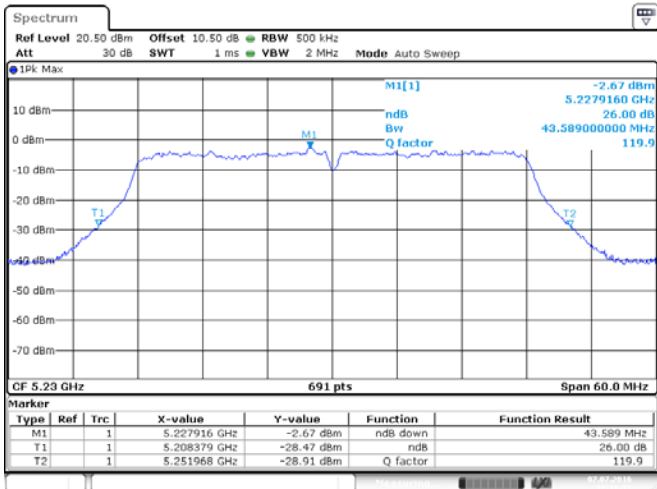


Date: 7.JUL.2016 12:17:04

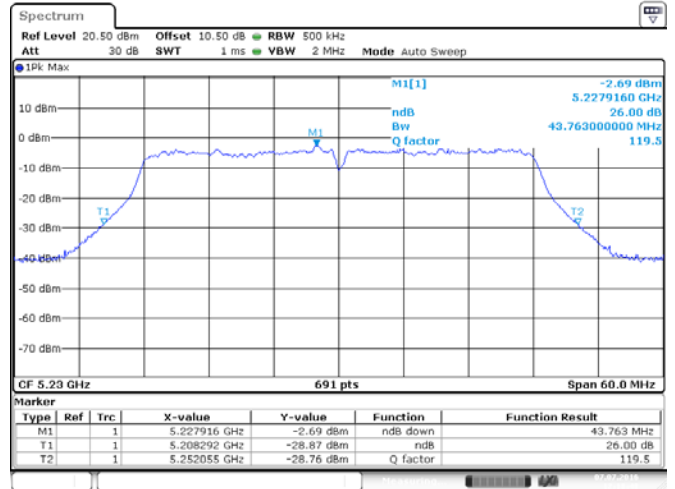
ANT 2(802.11n40)



Date: 7.JUL.2016 12:17:40

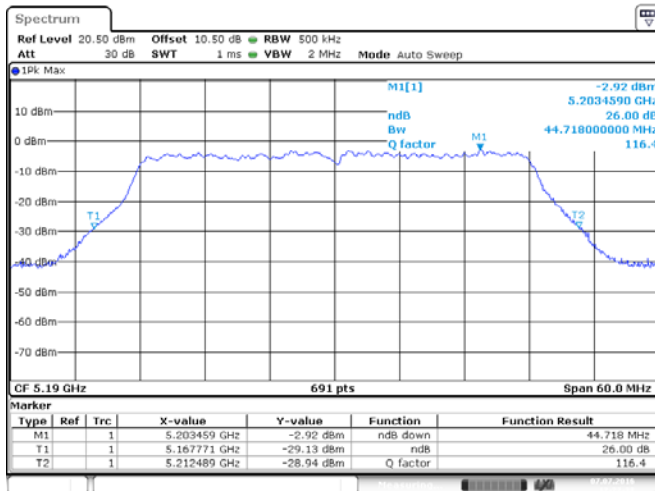


Date: 7.JUL.2016 12:18:32



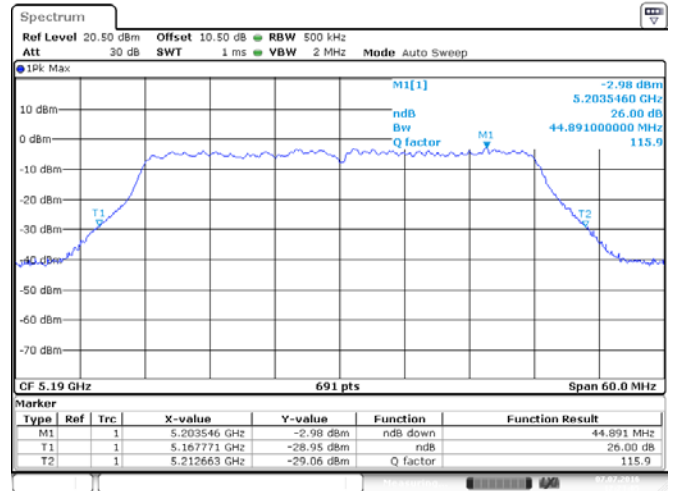
Date: 7.JUL.2016 12:18:48

ANT 1(802.11ac40)

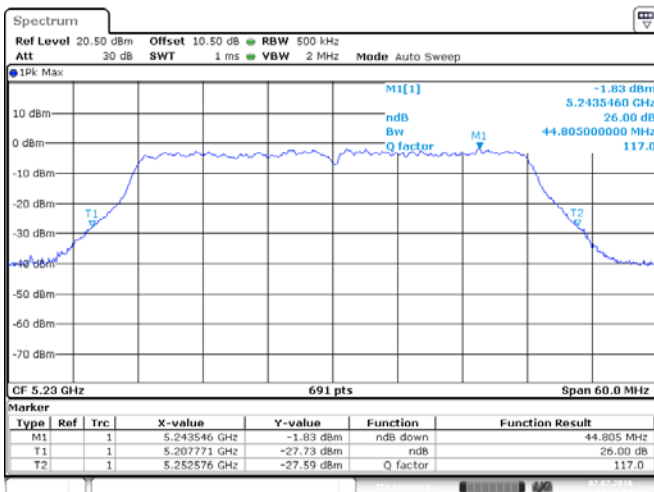


Date: 7 JUL 2016 12:22:38

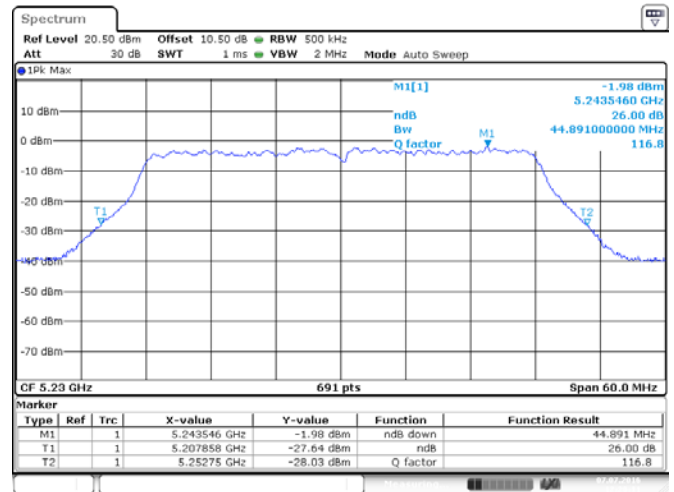
ANT 2(802.11ac40)



Date: 7 JUL 2016 12:23:05



Date: 7 JUL 2016 12:20:57



Date: 7 JUL 2016 12:20:11

7. 99% BANDWIDTH MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. The Requirement For Section 15.407

The 99% occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99% occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99% occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

7.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250 and 5725-5850MHz.

7.5. Test Procedure

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW. Set VBW $\geq 3 * RBW$
4. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
5. Use the 99 % power bandwidth function of the instrument.

6. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

7.6.Test Result

The test was performed with 802.11a				
Channel	Frequency (MHz)	99% Bandwidth ANT 1 (MHz)	99% Bandwidth ANT 2(MHz)	Verdict
36	5180	16.975	16.975	PASS
48	5240	16.975	16.975	PASS
149	5745	16.932	16.932	PASS
165	5825	16.932	16.932	PASS

The test was performed with 802.11n20				
Channel	Frequency (MHz)	99% Bandwidth ANT 1 (MHz)	99% Bandwidth ANT 2(MHz)	Verdict
36	5180	18.017	18.191	PASS
48	5240	18.061	18.148	PASS
149	5745	18.061	18.104	PASS
165	5825	18.104	18.148	PASS

The test was performed with 802.11ac20				
Channel	Frequency (MHz)	99% Bandwidth ANT 1 (MHz)	99% Bandwidth ANT 2(MHz)	Verdict
36	5180	17.757	17.757	PASS
48	5240	17.757	17.757	PASS
149	5745	17.713	17.713	PASS
165	5825	17.757	17.713	PASS

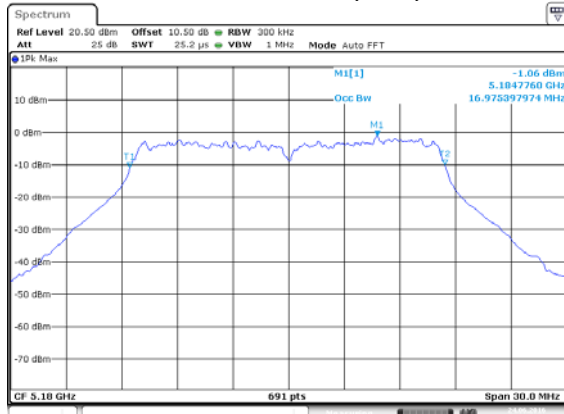
The test was performed with 802.11n40				
Channel	Frequency (MHz)	99% Bandwidth ANT 1 (MHz)	99% Bandwidth ANT 2(MHz)	Verdict
36	5180	37.25	37.16	PASS
48	5240	37.16	37.16	PASS
151	5755	37.16	37.16	PASS
159	5795	37.16	37.16	PASS

The test was performed with 802.11ac40				
Channel	Frequency (MHz)	99% Bandwidth ANT 1 (MHz)	99% Bandwidth ANT 2(MHz)	Verdict
36	5180	36.64	36.64	PASS
48	5240	36.64	36.64	PASS
151	5755	36.56	36.56	PASS
159	5795	36.64	36.56	PASS

The spectrum analyzer plots are attached as below.

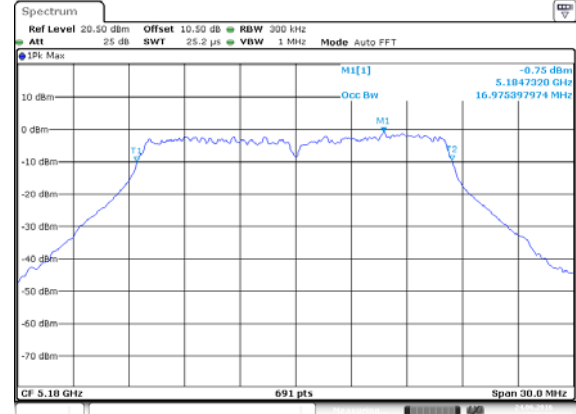
99% Bandwidth

ANT 1(11A)

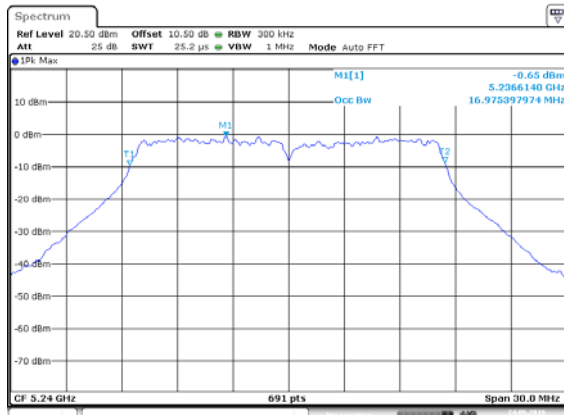


Date: 24 JUN 2016 16:13:42

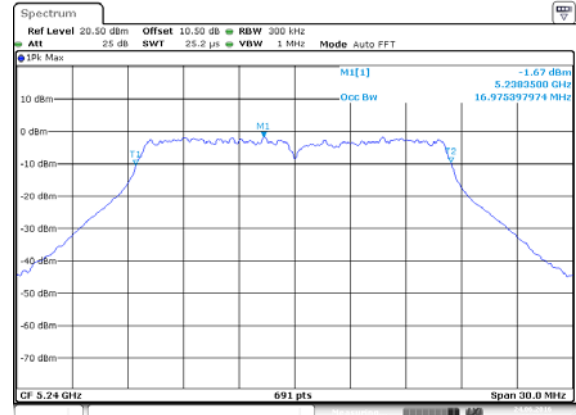
ANT 2(11A)



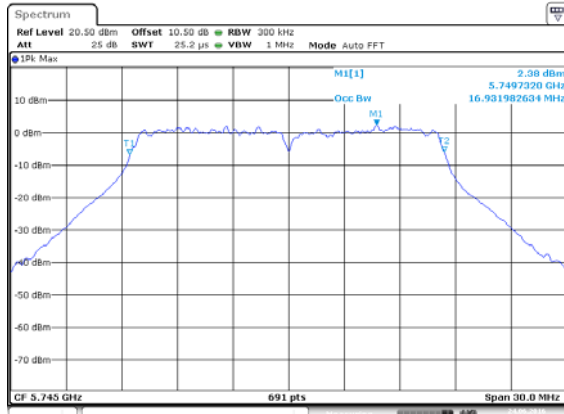
Date: 24 JUN 2016 17:59:58



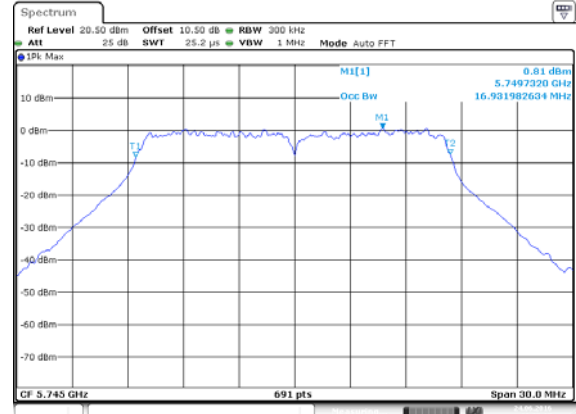
Date: 24 JUN 2016 16:18:38



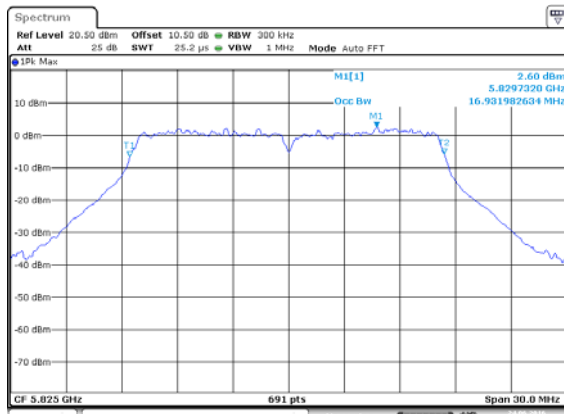
Date: 24 JUN 2016 18:02:09



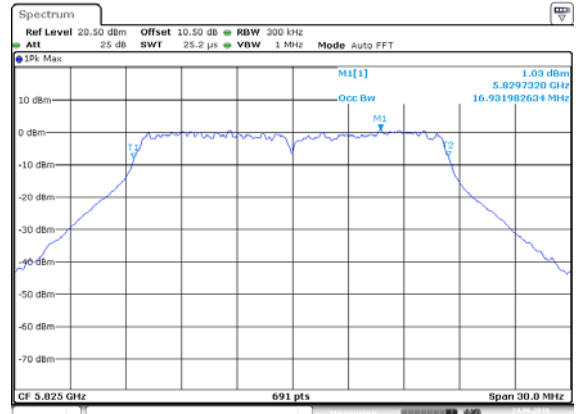
Date: 24 JUN 2016 16:20:13



Date: 24 JUN 2016 18:03:17

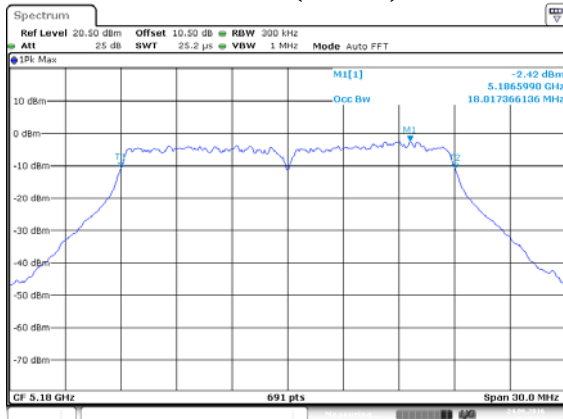


Date: 24 JUN 2016 16:21:15



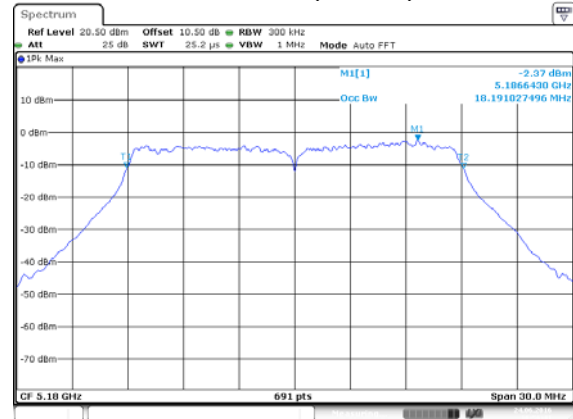
Date: 24 JUN 2016 18:04:14

ANT 1(11N20)

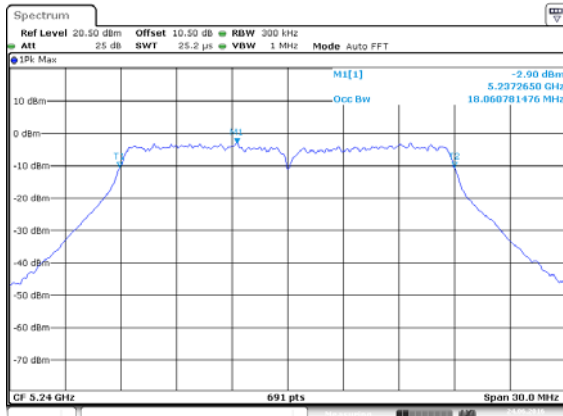


Date: 24.JUN.2016 16:55:54

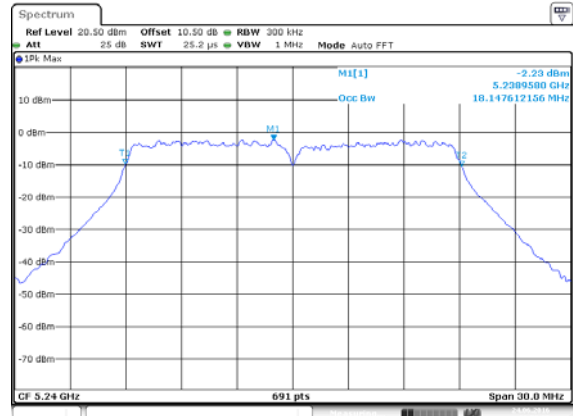
ANT 2(11N20)



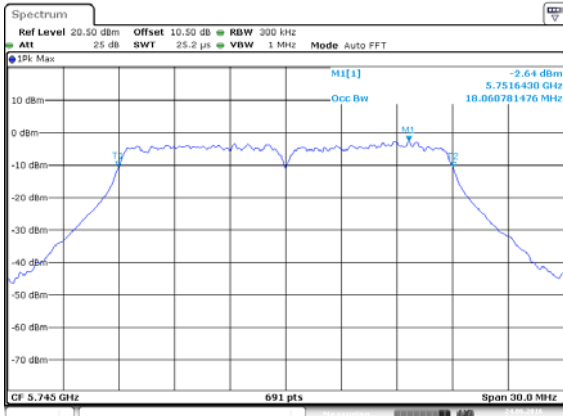
Date: 24.JUN.2016 16:56:41



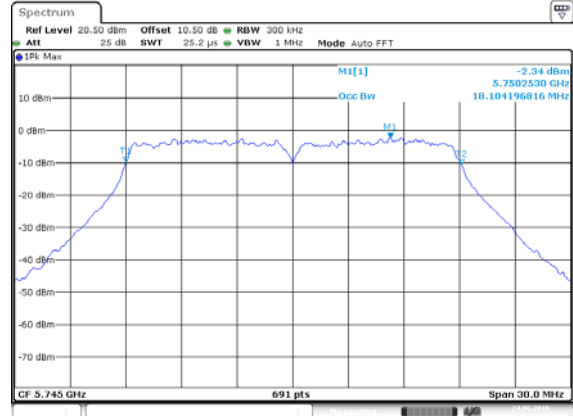
Date: 24.JUN.2016 16:57:59



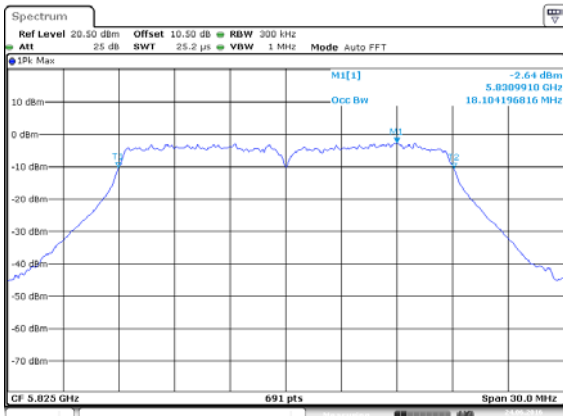
Date: 24.JUN.2016 16:58:40



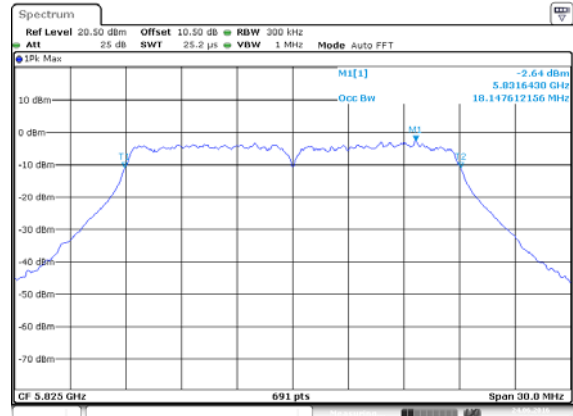
Date: 24.JUN.2016 16:53:38



Date: 24.JUN.2016 16:54:27

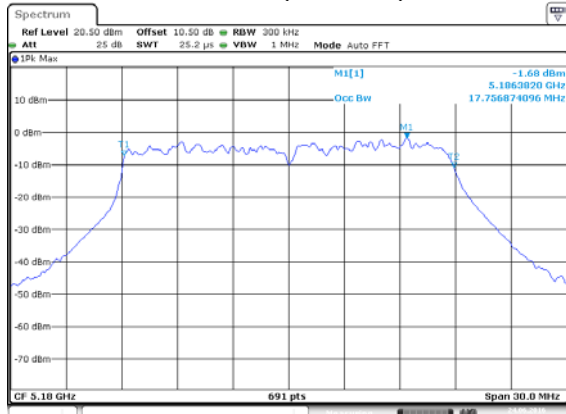


Date: 24.JUN.2016 16:52:10



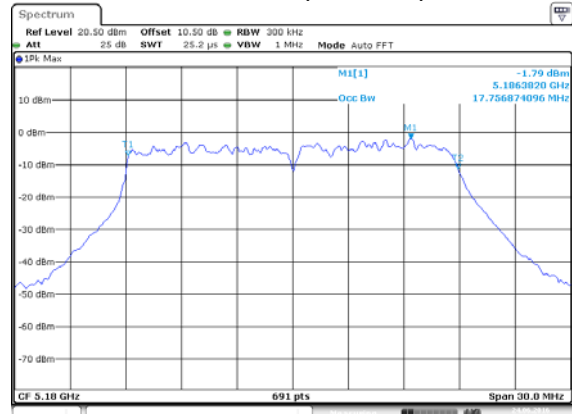
Date: 24.JUN.2016 16:51:20

ANT 1(11AC20)

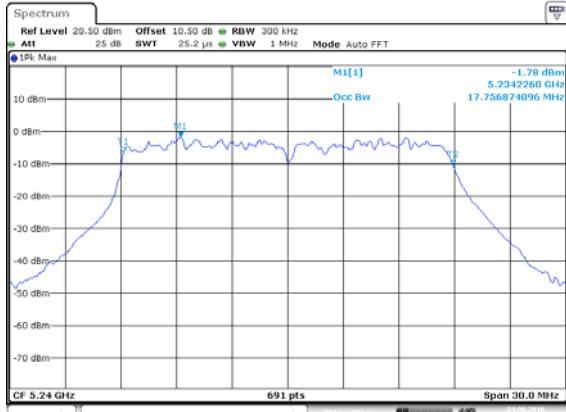


Date: 24.JUN.2016 18:45:51

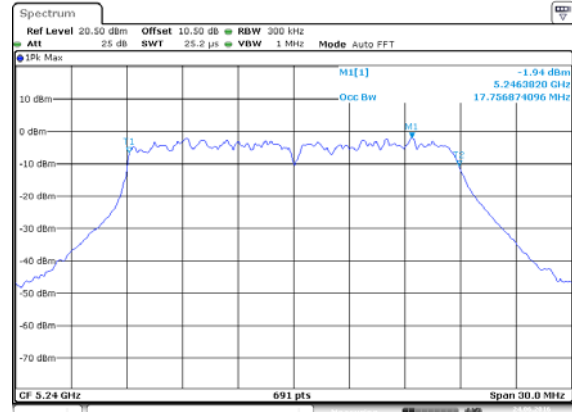
ANT 2(11AC20)



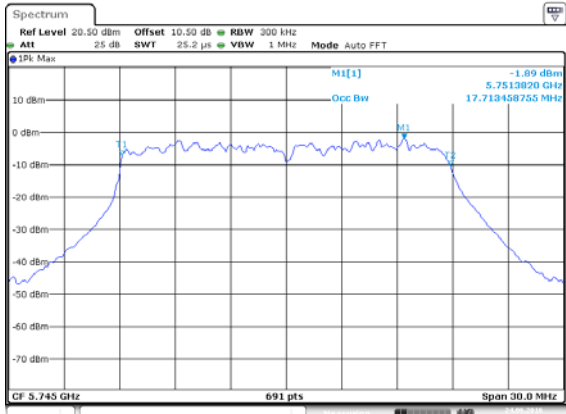
Date: 24.JUN.2016 18:46:28



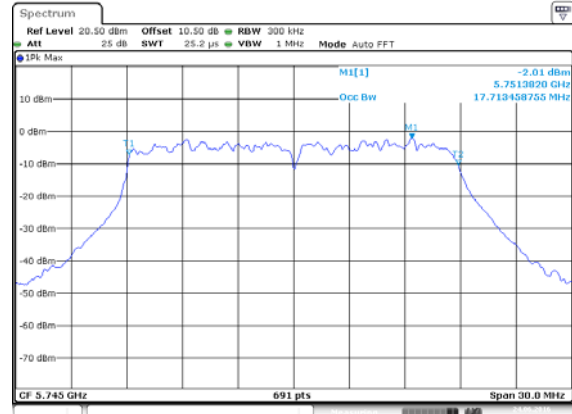
Date: 24.JUN.2016 18:47:54



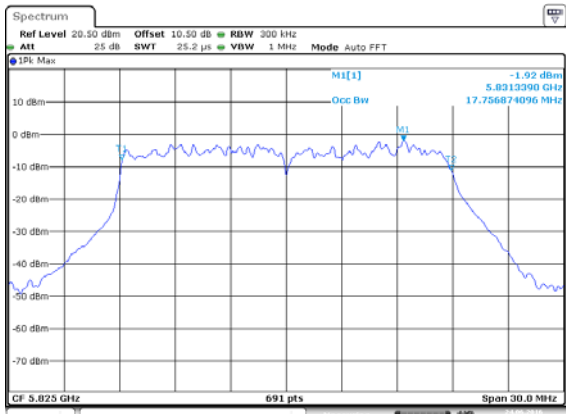
Date: 24.JUN.2016 18:48:21



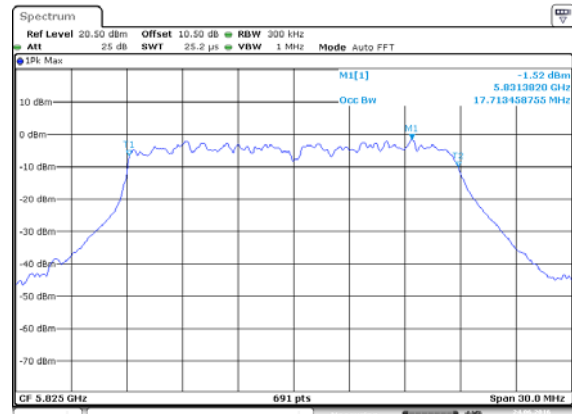
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Date: 24.JUN.2016 18:50:01

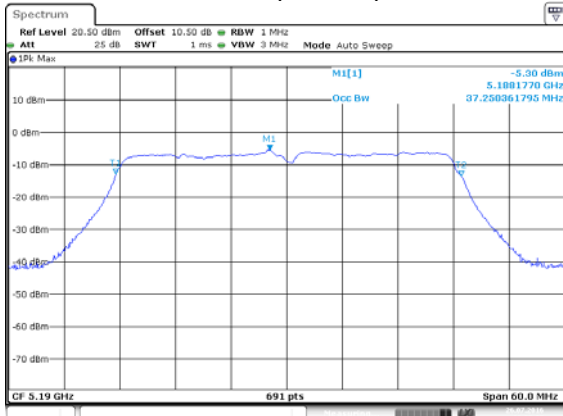


Date: 24.JUN.2016 18:51:30

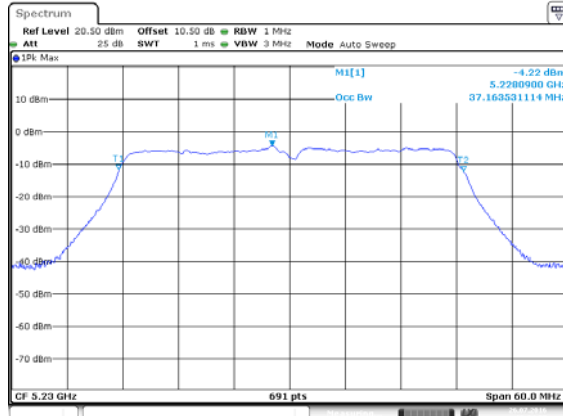


Date: 24.JUN.2016 18:52:13

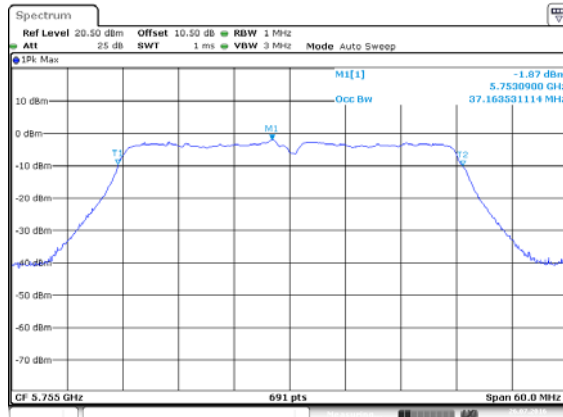
ANT 1(11N40)



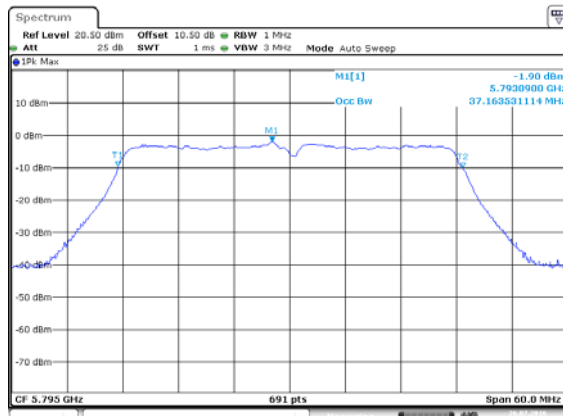
Date: 26.JUL.2016 16:23:03



Date: 26.JUL.2016 16:24:57

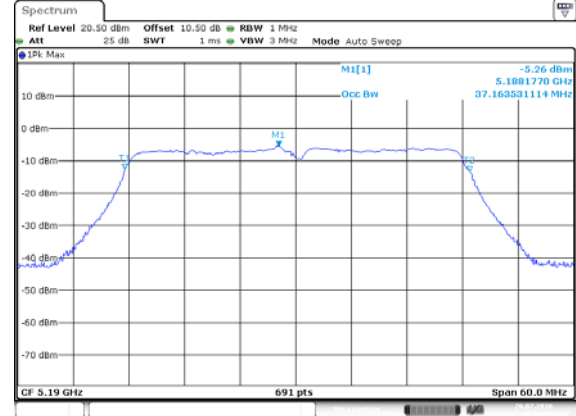


Date: 26.JUL.2016 16:34:32

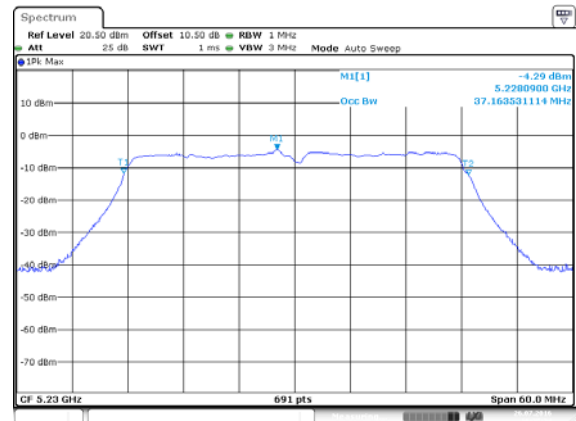


Date: 26.JUL.2016 16:36:04

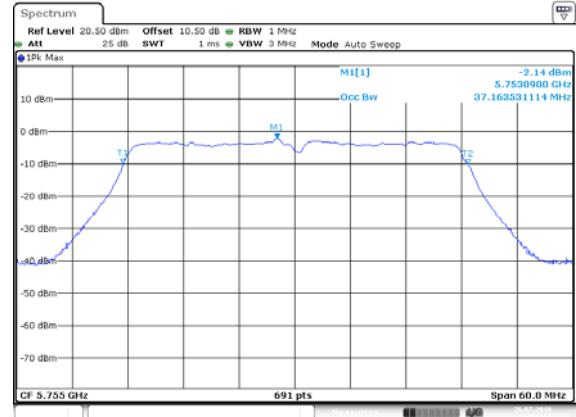
ANT 2(11N40)



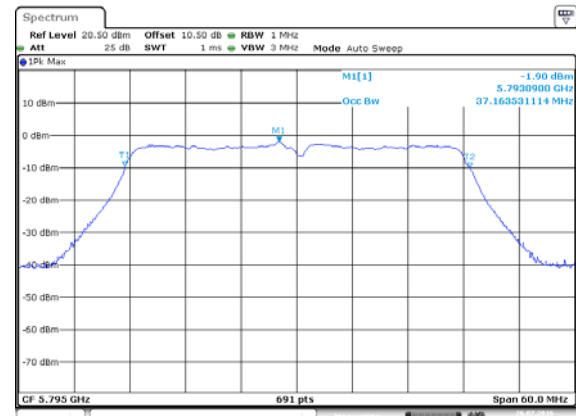
Date: 26.JUL.2016 16:26:05



Date: 26.JUL.2016 16:25:34

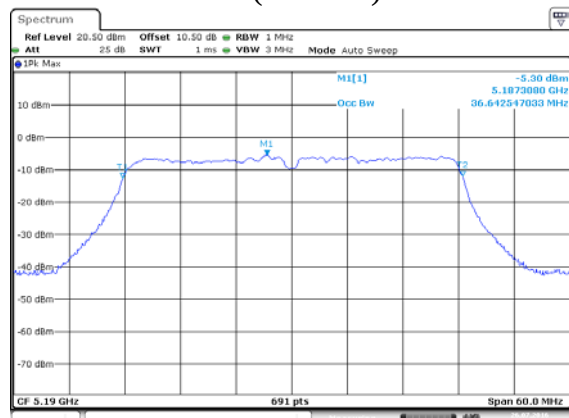


Date: 26.JUL.2016 16:35:19



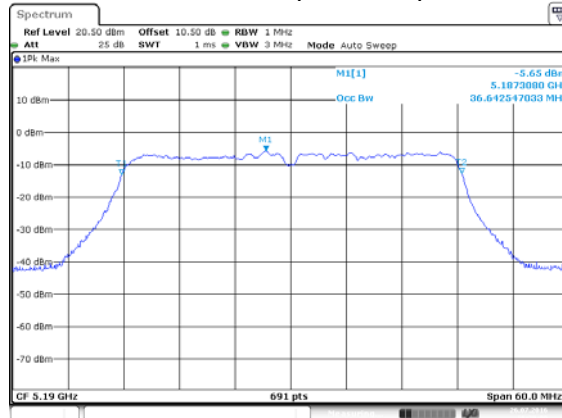
Date: 26.JUL.2016 16:36:04

ANT 1(11AC40)

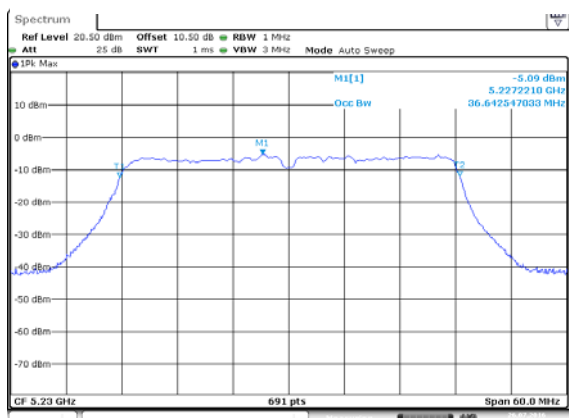


Date: 26.JUL.2016 16:27:31

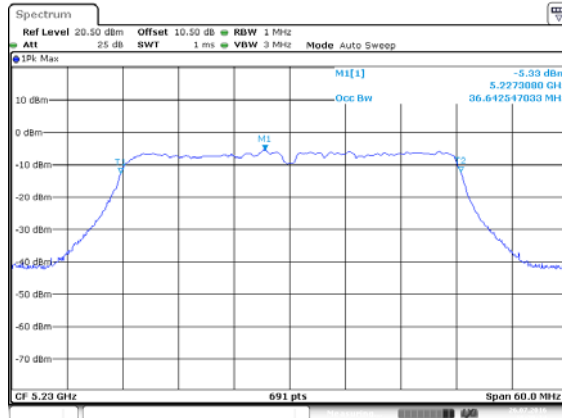
ANT 2(11AC40)



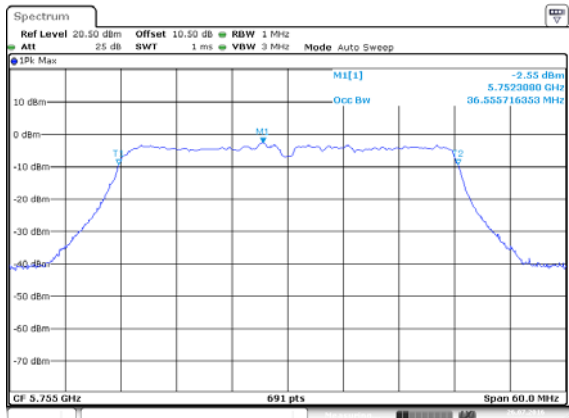
Date: 26.JUL.2016 16:28:00



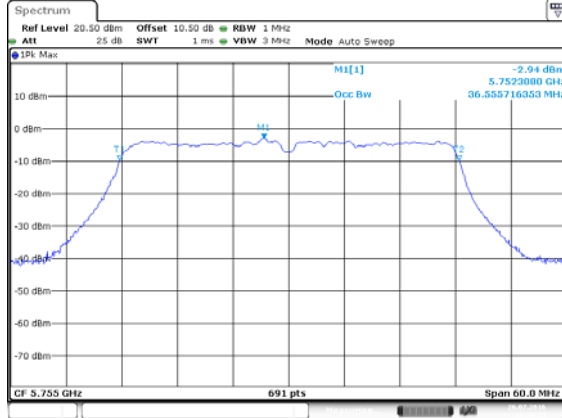
Date: 26.JUL.2016 16:28:46



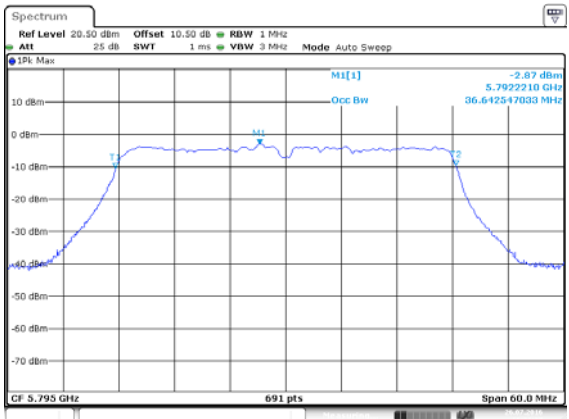
Date: 26.JUL.2016 16:29:15



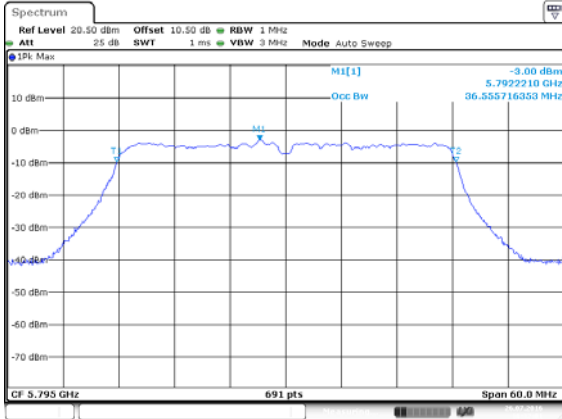
Date: 26.JUL.2016 16:30:16



Date: 26.JUL.2016 16:30:55



Date: 26.JUL.2016 16:31:37



Date: 26.JUL.2016 16:32:01

8. 20DB BANDWIDTH MEASUREMENT

8.1. Block Diagram of Test Setup



8.2. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.3. Operating Condition of EUT

8.3.1. Setup the EUT and simulator as shown as Section 8.1.

8.3.2. Turn on the power of all equipment.

8.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250 and 5725-5850MHz.

8.4. Test Procedure

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW. Set VBW $\geq 3 * RBW$
4. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
5. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst-case (i.e., the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the - 20 dB levels with respect to the reference level.

8.5.Test Result

The test was performed with 802.11a				
Channel	Frequency (MHz)	20dB Bandwidth ANT 1 (MHz)	20dB Bandwidth ANT 2 (MHz)	Verdict
36	5180	19.161	19.103	PASS
48	5240	19.276	19.045	PASS
149	5745	19.334	19.161	PASS
165	5825	19.508	19.624	PASS

The test was performed with 802.11n20				
Channel	Frequency (MHz)	20dB Bandwidth ANT 1 (MHz)	20dB Bandwidth ANT 2 (MHz)	Verdict
36	5180	20.26	20.55	PASS
48	5240	20.897	20.897	PASS
149	5745	20.434	20.434	PASS
165	5825	20.26	20.608	PASS

The test was performed with 802.11ac20				
Channel	Frequency (MHz)	20dB Bandwidth ANT 1 (MHz)	20dB Bandwidth ANT 2 (MHz)	Verdict
36	5180	19.797	19.797	PASS
48	5240	19.855	19.797	PASS
149	5745	19.392	19.797	PASS
165	5825	19.74	20.145	PASS

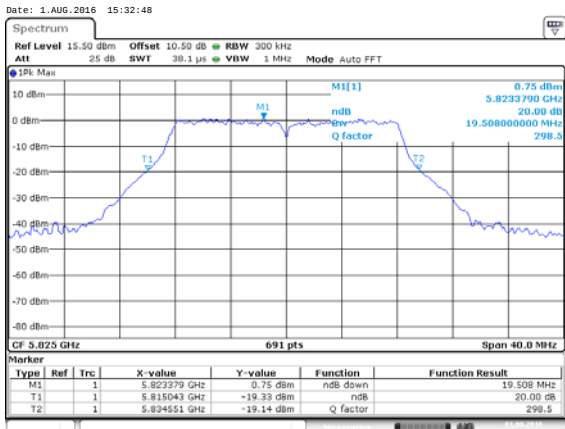
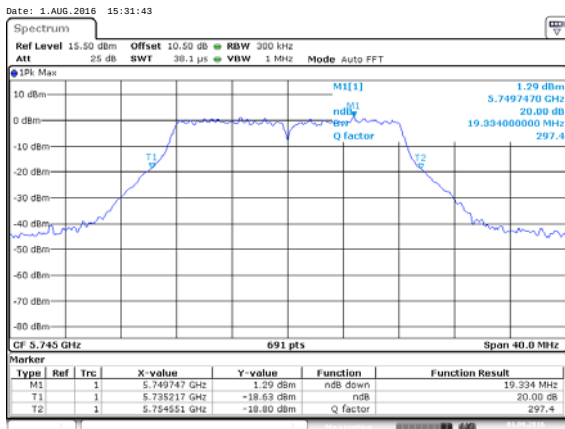
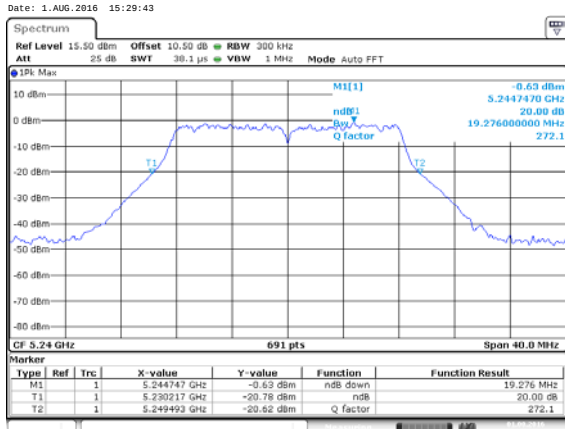
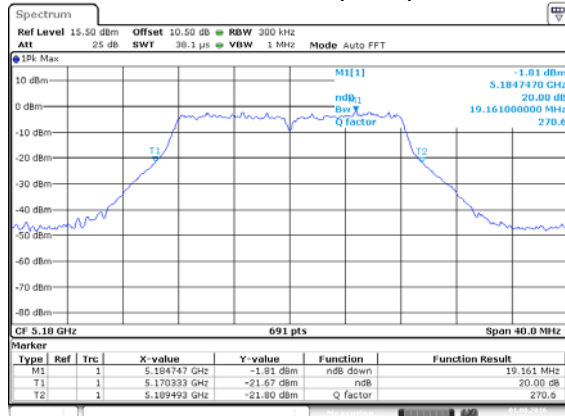
The test was performed with 802.11n40				
Channel	Frequency (MHz)	20dB Bandwidth ANT 1 (MHz)	20dB Bandwidth ANT 2 (MHz)	Verdict
36	5180	41.679	41.766	PASS
48	5240	41.592	41.679	PASS
151	5755	41.679	41.592	PASS
159	5795	41.592	41.766	PASS

The test was performed with 802.11ac40				
Channel	Frequency (MHz)	20dB Bandwidth ANT 1 (MHz)	20dB Bandwidth ANT 2 (MHz)	Verdict
36	5180	40.55	40.55	PASS
48	5240	40.463	40.55	PASS
151	5755	40.55	40.55	PASS
159	5795	40.55	40.637	PASS

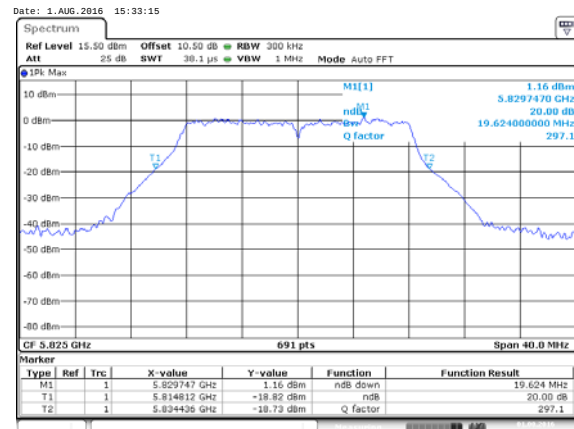
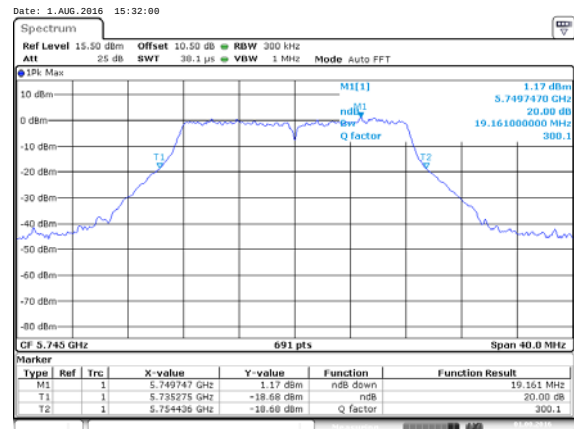
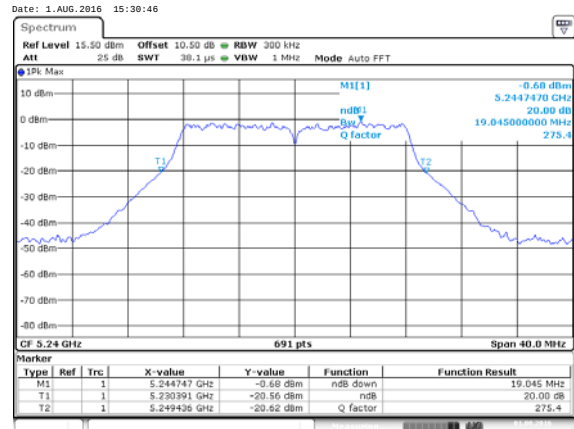
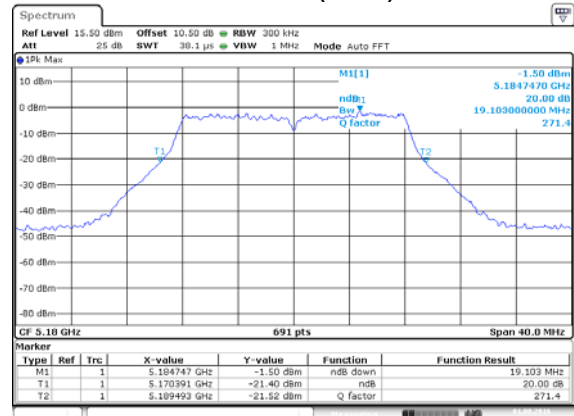
The spectrum analyzer plots are attached as below.

20dB Bandwidth

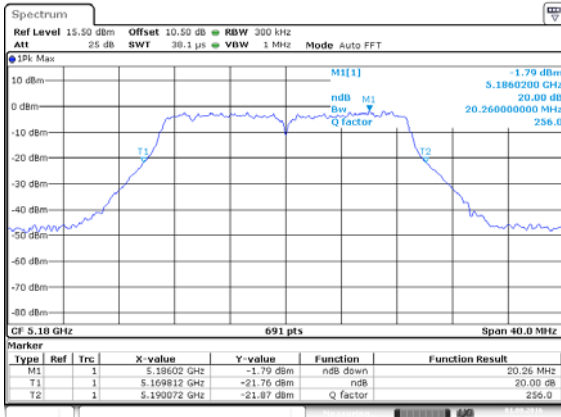
ANT 1(11A)



ANT 2(11A)

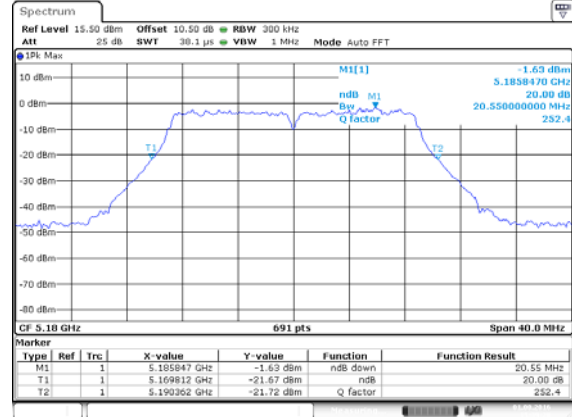


ANT 1(11N20)

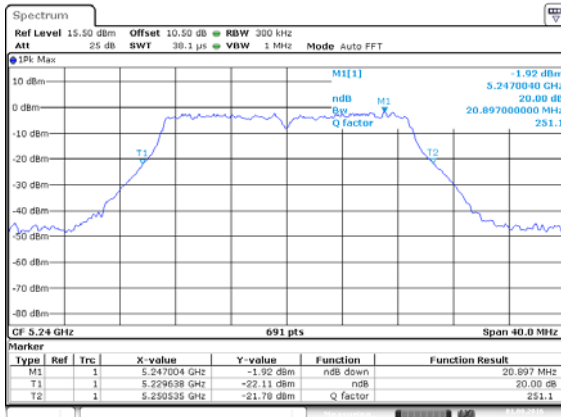


Date: 1.AUG.2016 15:39:15

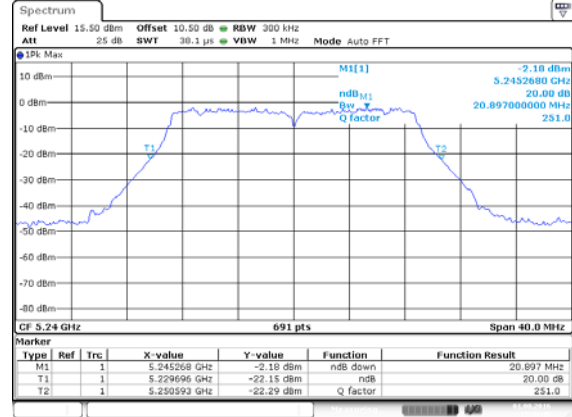
ANT 2(11N20)



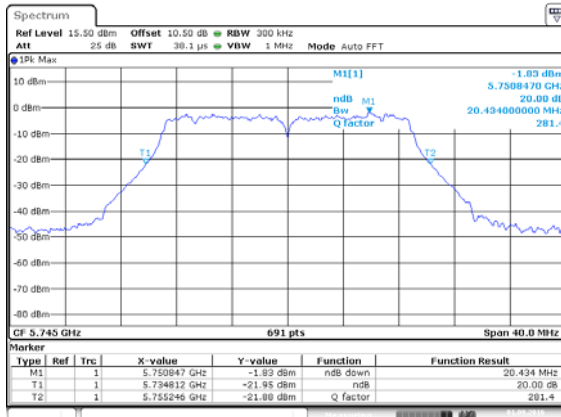
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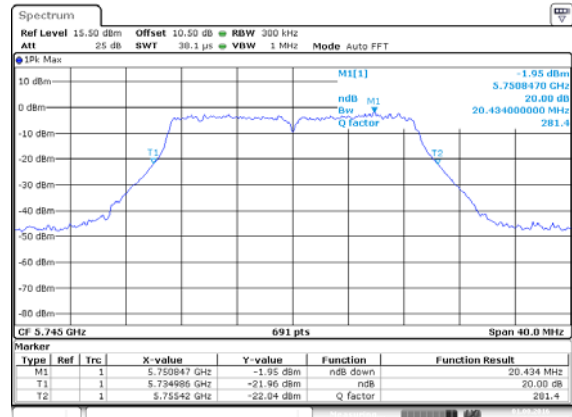
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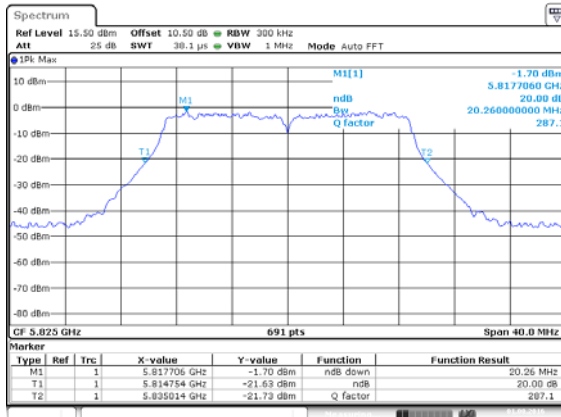
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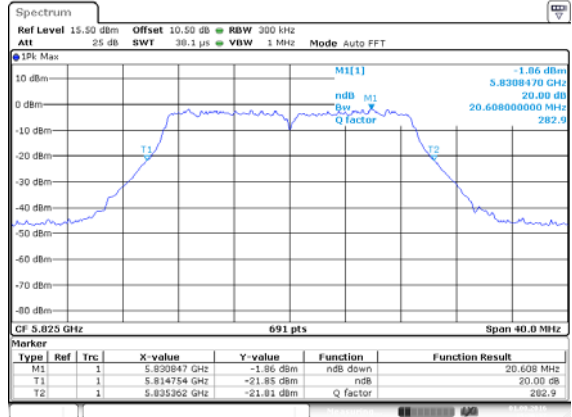
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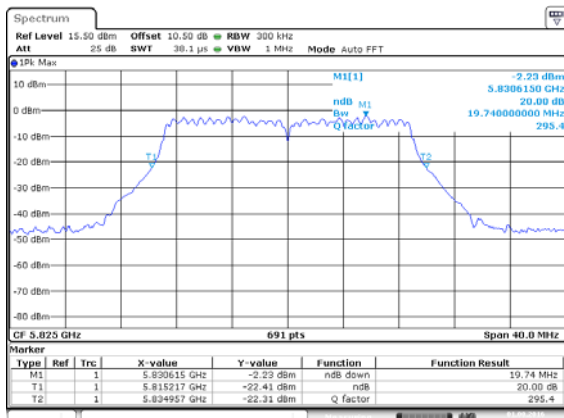
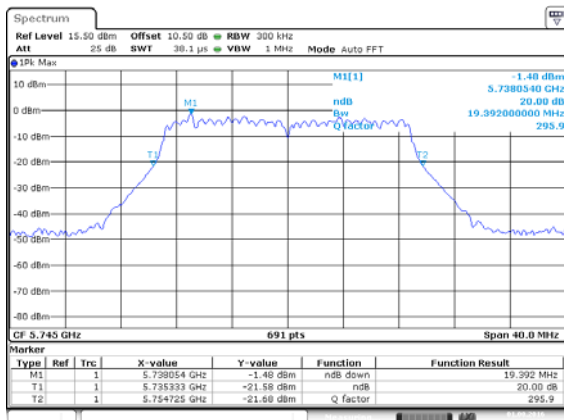
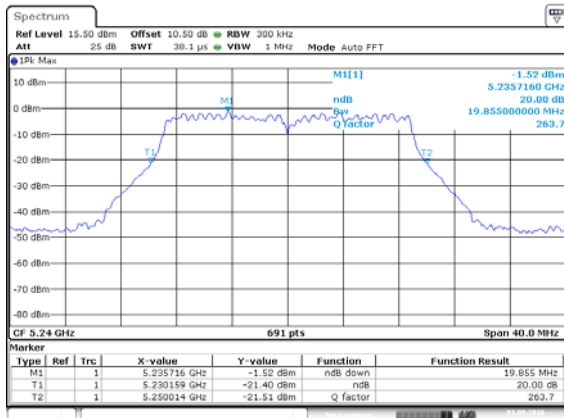
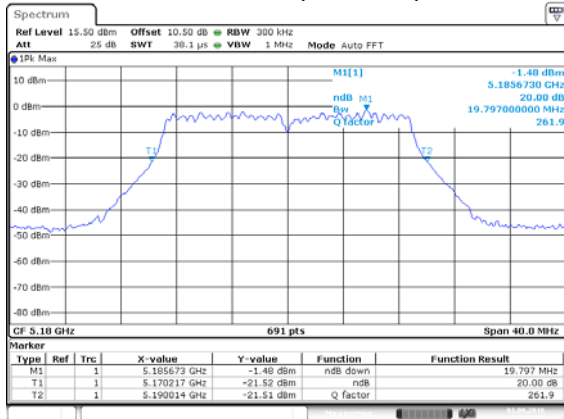


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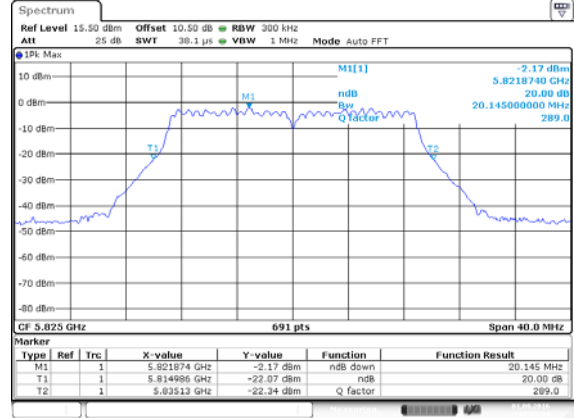
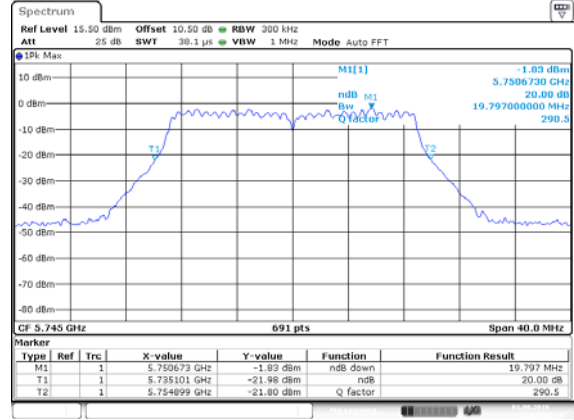
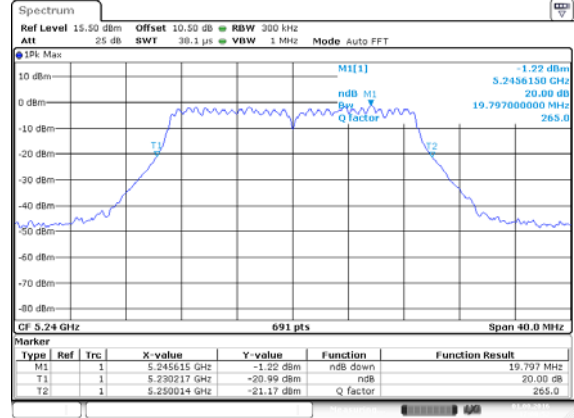
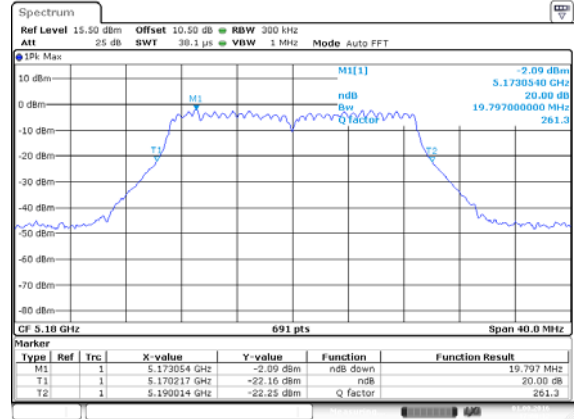


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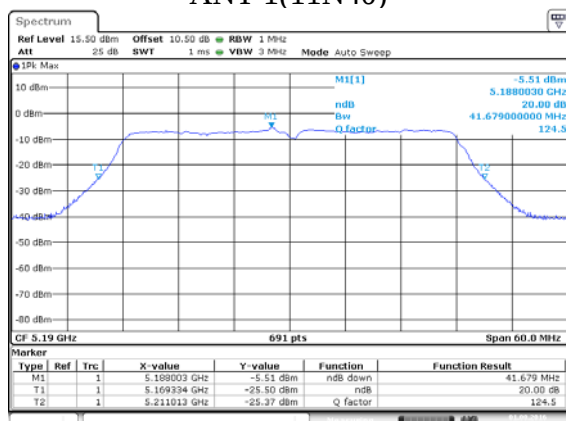
ANT 1(11AC20)



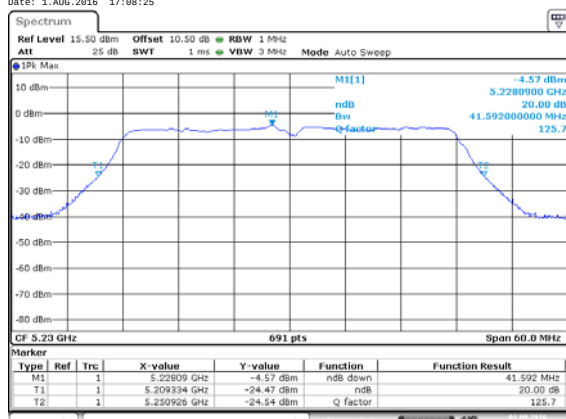
ANT 2(11AC20)



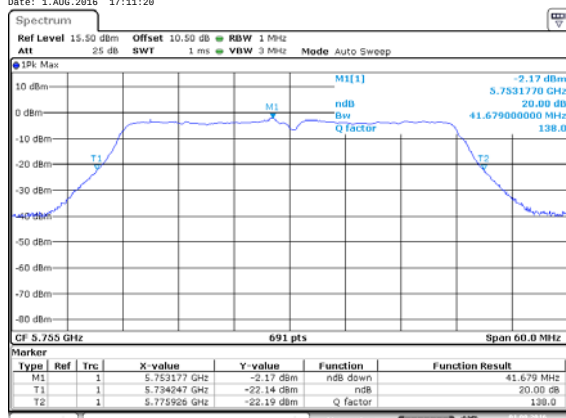
ANT 1(11N40)



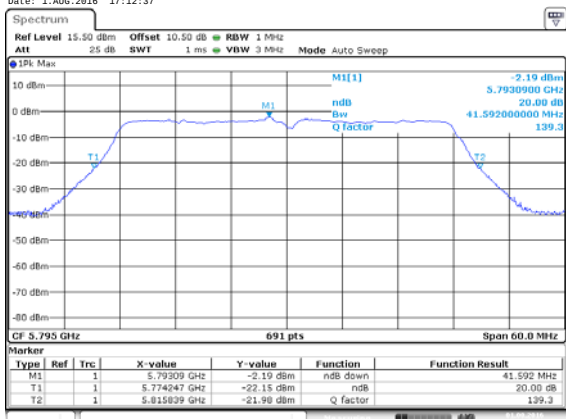
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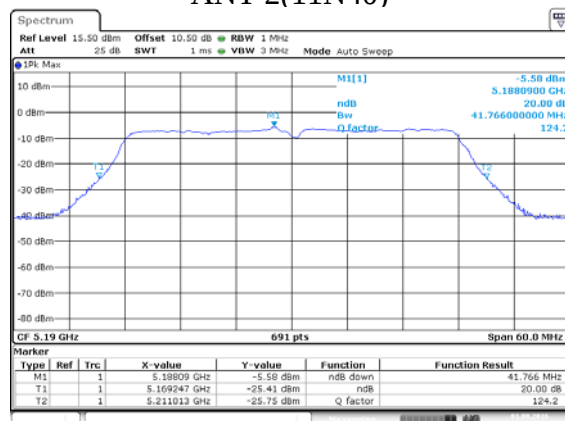


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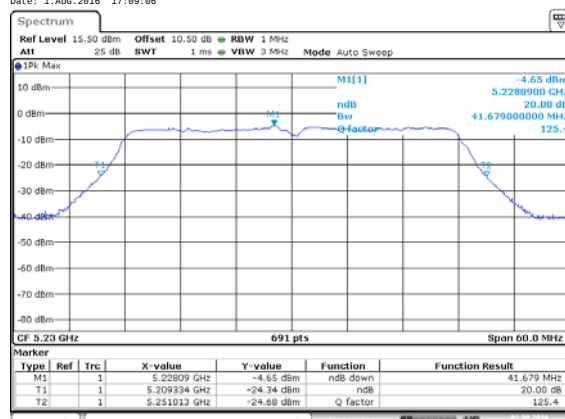


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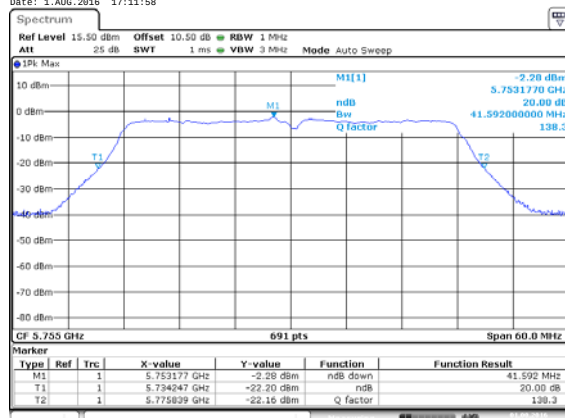
ANT 2(11N40)



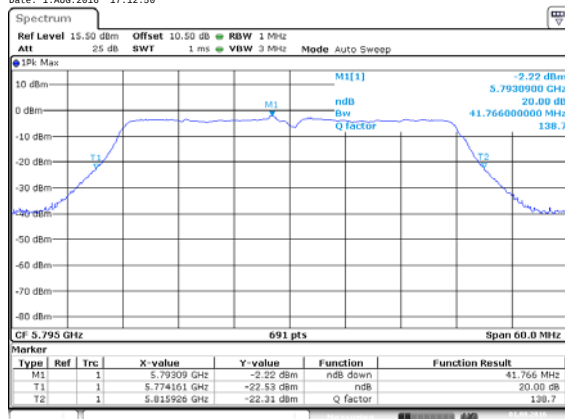
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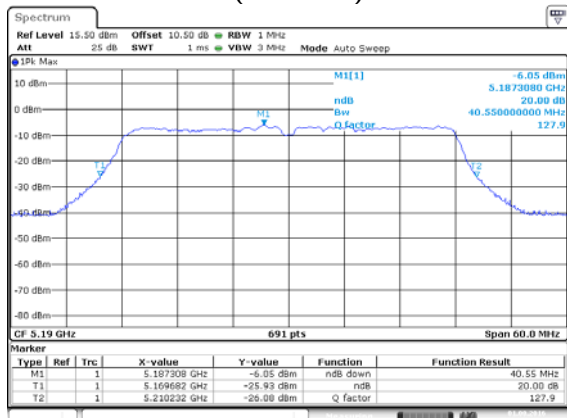


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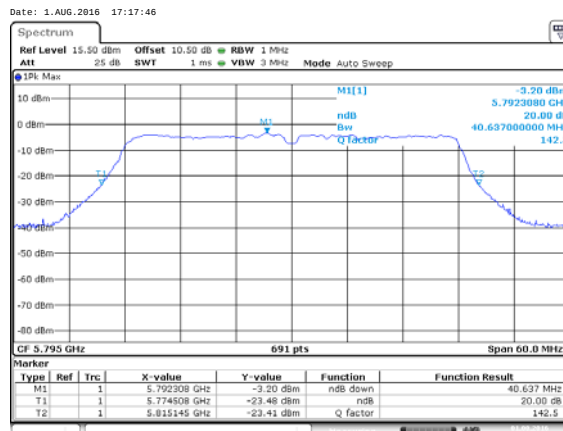
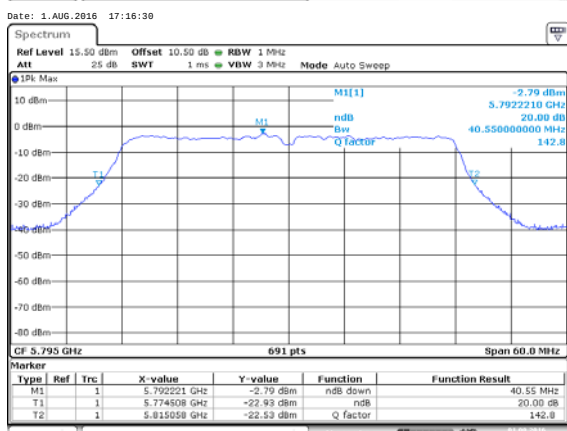
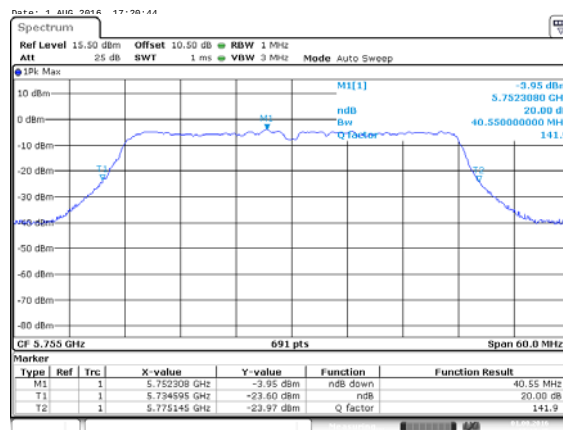
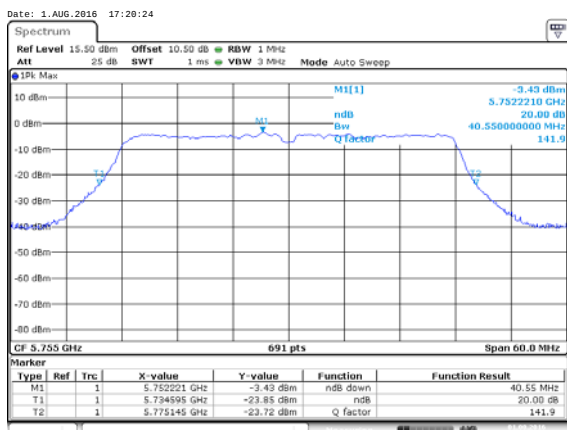
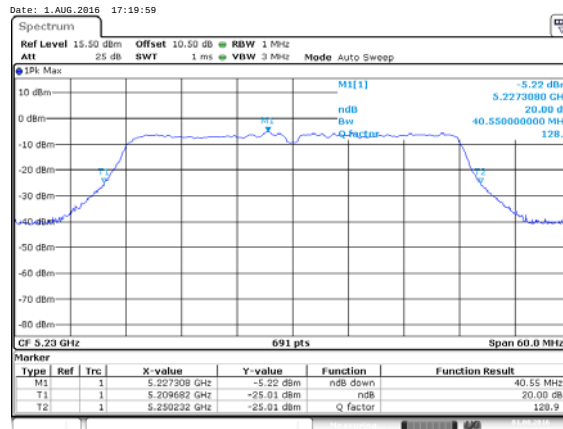
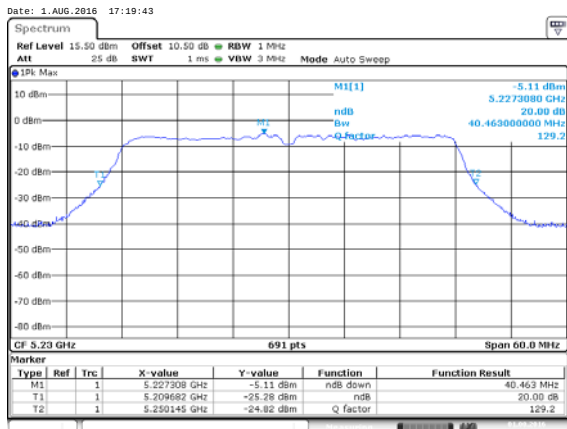
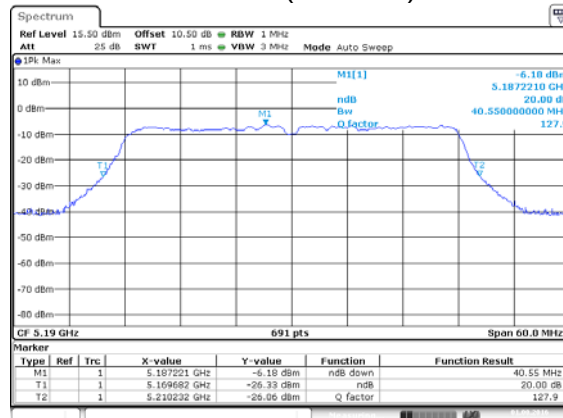


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ANT 1(11AC40)



ANT 2(11AC40)



9. MAXIMUM POWER SPECTRAL DENSITY TEST

9.1. Block Diagram of Test Setup



9.2. The Requirement For Section 15.407

Section 15.407: For the band 5.15–5.25GHz, the peak power spectral density shall not exceed 4dBm in any 1–MHz band. For the band 5.725–5.825GHz, the peak power spectral density shall not exceed 17dBm in any 1–MHz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

9.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 5150-5250 and 5725-5850MHz.

9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Measurement Procedure PKPSD:

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs

less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

1. Set $RBW \geq 1/T$, where T is defined in section II.B.1.a). Set $VBW \geq 3 RBW$.
2. If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10 \log(500 \text{ kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
3. If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10 \log(1\text{MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ is the reduced resolution bandwidth of spectrum analyzer set during measurement.
4. Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.
5. Detector = RMS.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.

9.5.3.Measurement the maximum power spectral density.

9.6.Test Result

The test was performed with 802.11a(SISO)				
Channel	Frequency (MHz)	Power Spectral Density ANT 1(dBm)	Power Spectral Density ANT 1(dBm)	Verdict
36	5180	-1.03	-1.08	PASS
48	5240	0.25	0.21	PASS
149	5745	-1.61	-1.68	PASS
165	5825	1.03	0.91	PASS

The test was performed with 802.11n20(SISO)				
Channel	Frequency (MHz)	Power Spectral Density ANT 1(dBm)	Power Spectral Density ANT 1(dBm)	Verdict
36	5180	-1.33	-1.31	PASS
48	5240	0.09	0.15	PASS
149	5745	-0.86	-1.12	PASS
165	5825	0.96	0.70	PASS

The test was performed with 802.11ac20(SISO)				
Channel	Frequency (MHz)	Power Spectral Density ANT 1(dBm)	Power Spectral Density ANT 1(dBm)	Verdict
36	5180	0.28	0.13	PASS
48	5240	1.34	1.18	PASS
149	5745	1.11	0.76	PASS
165	5825	1.44	1.07	PASS

The test was performed with 802.11n40(SISO)				
Channel	Frequency (MHz)	Power Spectral Density ANT 1(dBm)	Power Spectral Density ANT 1(dBm)	Verdict
38	5190	-1.44	-1.56	PASS
46	5230	-0.79	-0.99	PASS
151	5755	-0.23	-0.67	PASS
159	5795	0.85	0.54	PASS

The test was performed with 802.11ac40(SISO)				
Channel	Frequency (MHz)	Power Spectral Density ANT 1(dBm)	Power Spectral Density ANT 1(dBm)	Verdict
38	5190	-2.76	-3.09	PASS
46	5230	-2.19	-2.49	PASS
151	5755	-2.19	-2.37	PASS
159	5795	-1.19	-1.79	PASS

The test was performed with 802.11n20(MIMO)					
Channel	Frequency (MHz)	Power Spectral Density ANT 1(dBm)	Power Spectral Density ANT 2(dBm)	Power Spectral Density Total(dBm)	Verdict
36	5180	-3.78	-3.80	-0.77	PASS
48	5240	-2.68	-2.85	0.25	PASS
149	5745	-2.68	-2.83	0.26	PASS
165	5825	-1.74	-1.88	1.20	PASS

The test was performed with 802.11ac20(MIMO)

Channel	Frequency (MHz)	Power Spectral Density ANT 1(dBm)	Power Spectral Density ANT 2(dBm)	Power Spectral Density Total(dBm)	Verdict
36	5180	-2.26	-2.64	0.56	PASS
48	5240	-1.20	-1.38	1.72	PASS
149	5745	-1.78	-2.18	1.03	PASS
165	5825	-0.65	-0.62	2.38	PASS

The test was performed with 802.11n40(MIMO)

Channel	Frequency (MHz)	Power Spectral Density ANT 1(dBm)	Power Spectral Density ANT 2(dBm)	Power Spectral Density Total(dBm)	Verdict
38	5190	-3.73	-3.46	-0.58	PASS
46	5230	-2.17	-2.39	0.73	PASS
151	5755	-2.47	-2.82	0.37	PASS
159	5795	-2.24	-2.15	0.82	PASS

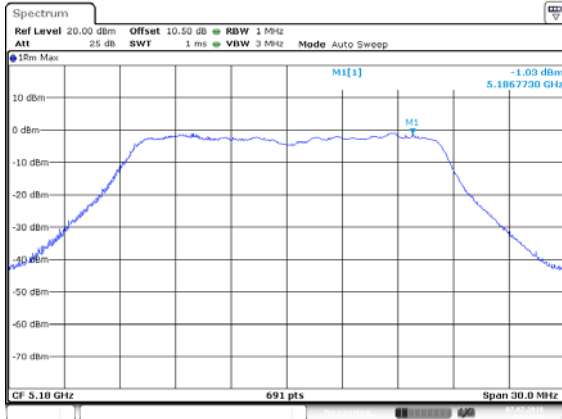
The test was performed with 802.11ac40(MIMO)

Channel	Frequency (MHz)	Power Spectral Density ANT 1(dBm)	Power Spectral Density ANT 2(dBm)	Power Spectral Density Total(dBm)	Verdict
38	5190	-5.16	-5.35	-2.24	PASS
46	5230	-5.64	-5.70	-2.66	PASS
151	5755	-4.66	-5.13	-1.88	PASS
159	5795	-3.38	-3.63	-0.49	PASS

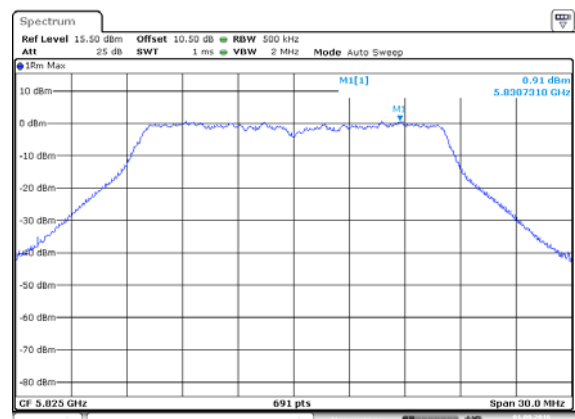
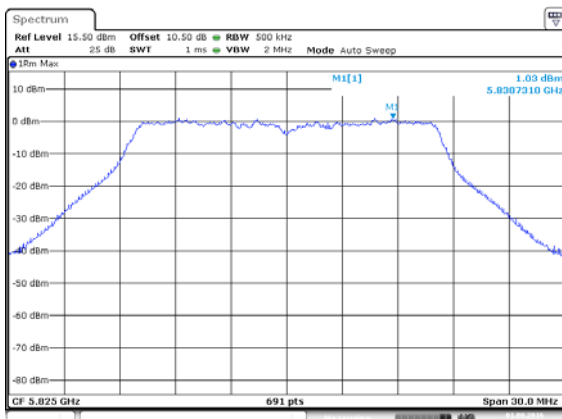
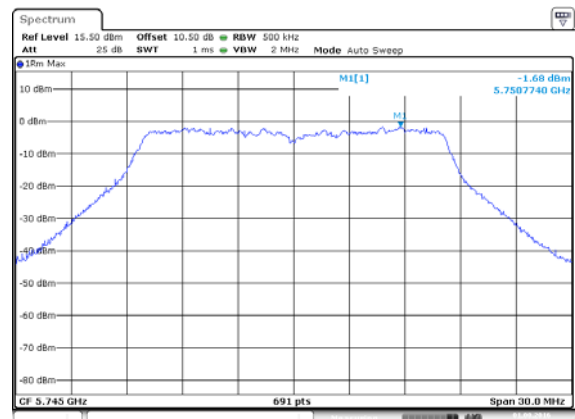
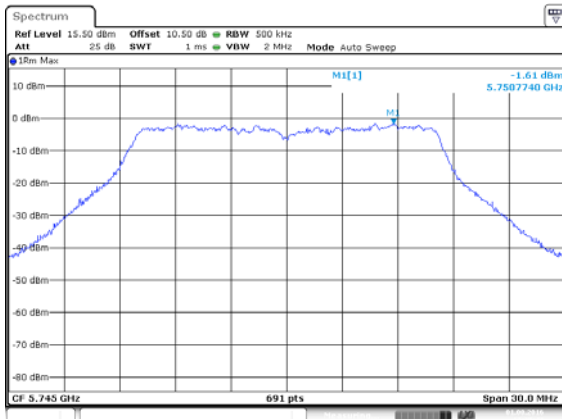
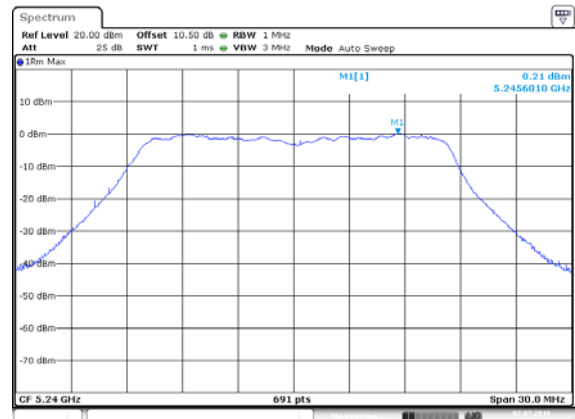
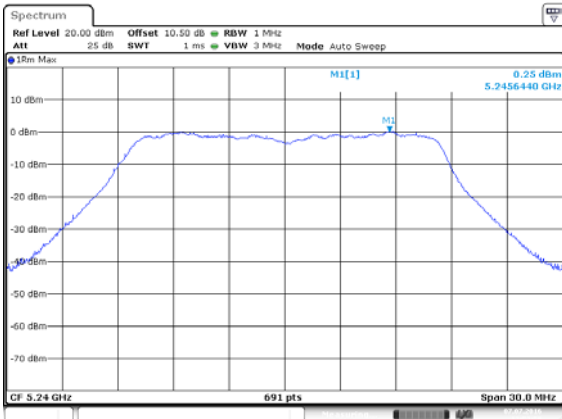
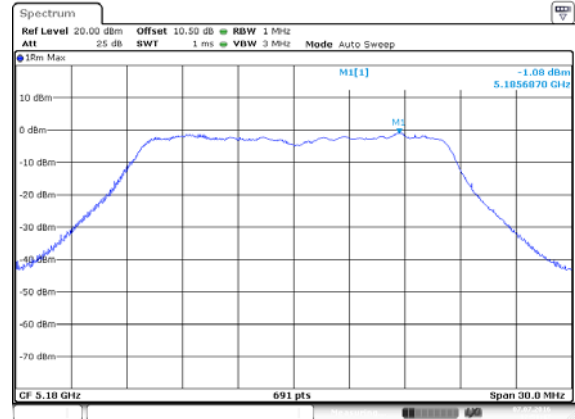
The spectrum analyzer plots are attached as below.

TEST MODE:SISO

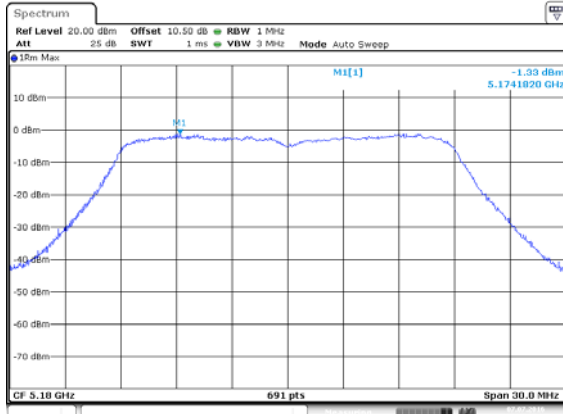
ANT 1(11A)



ANT 2(11A)

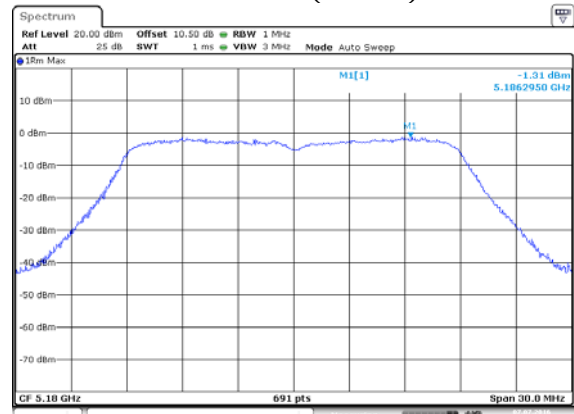


ANT 1(11N20)

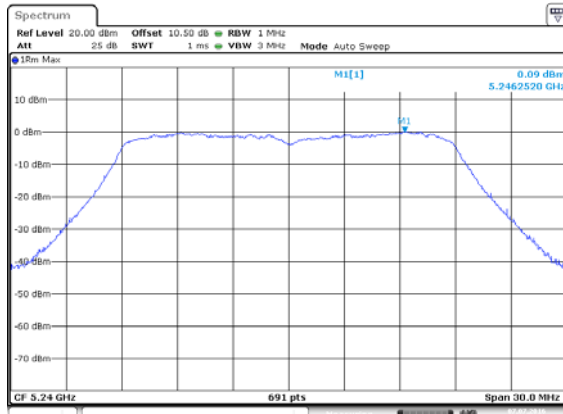


Date: 7.JUL.2016 13:01:01

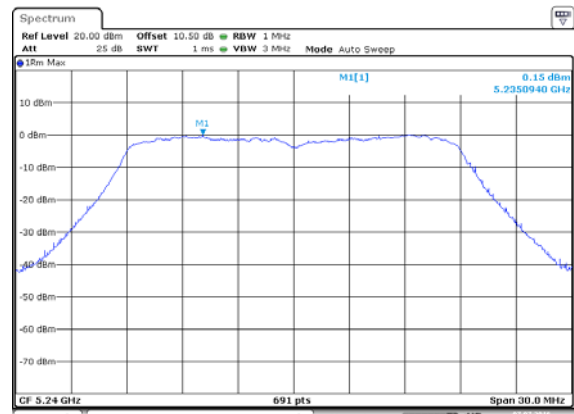
ANT 2(11N20)



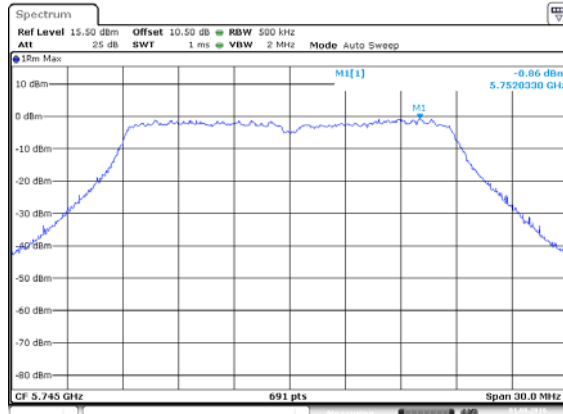
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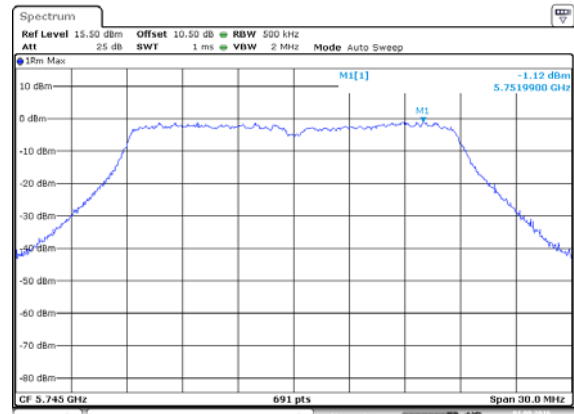
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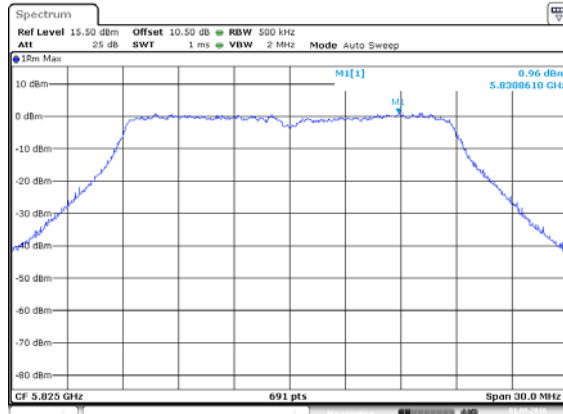
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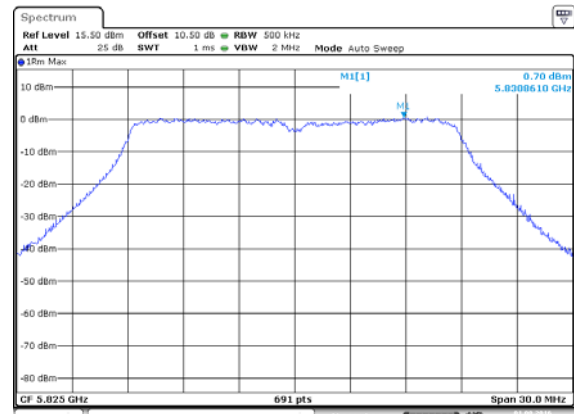
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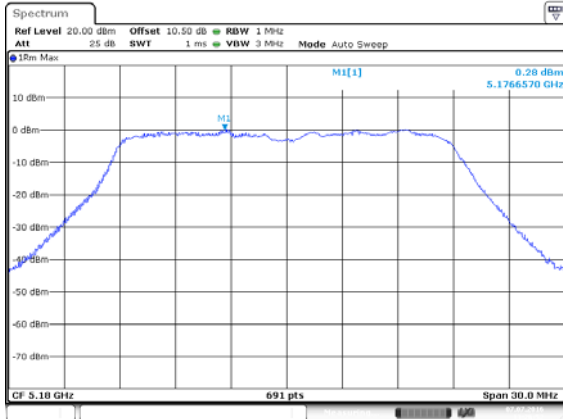


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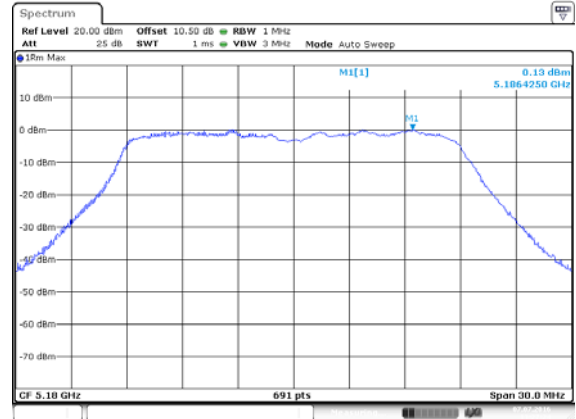
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ANT 1(11AC20)

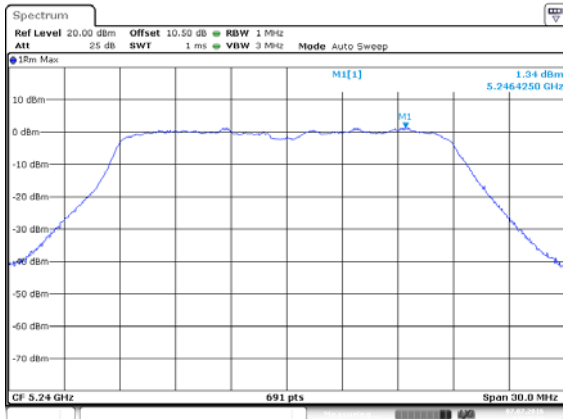


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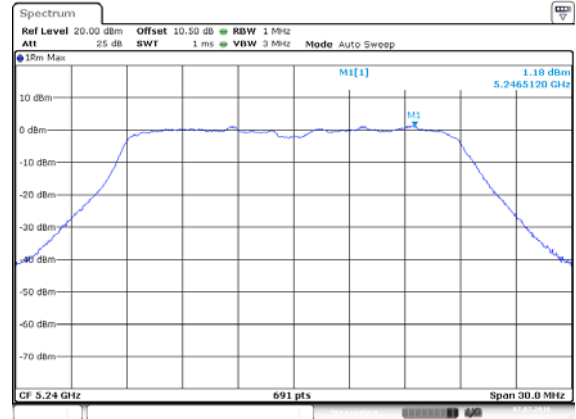
ANT 2(11AC20)



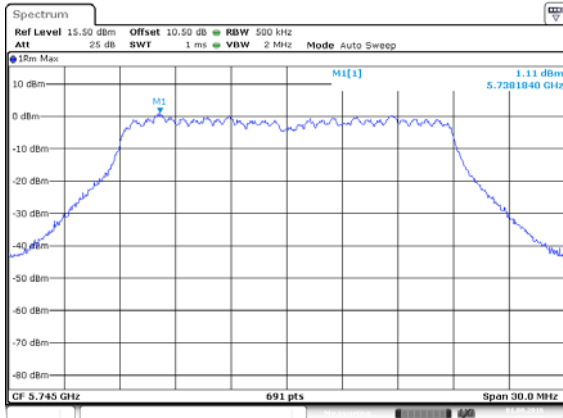
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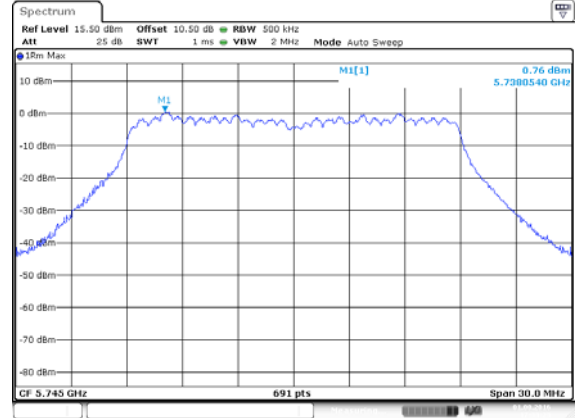
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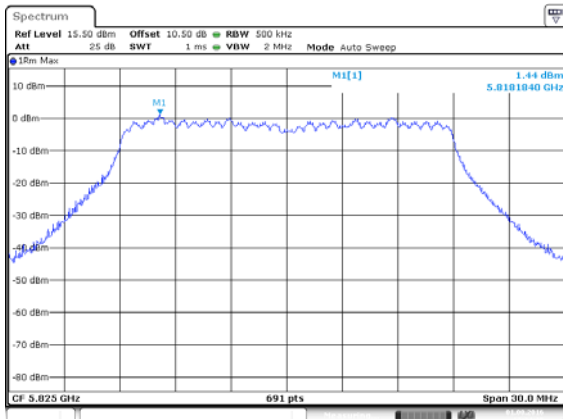
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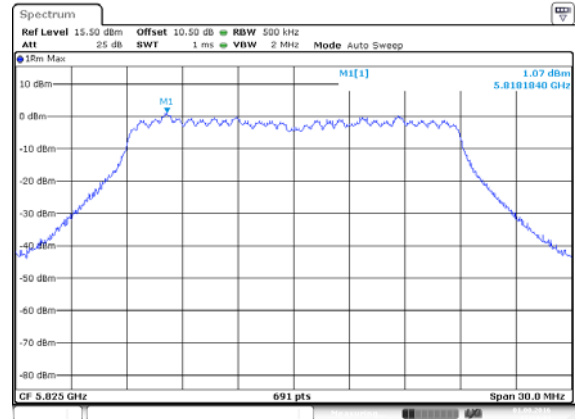
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