FCC Test Report

Report No: FCS202007064

Issued for

Applicant:	Comark LLC
Address:	440 FORTUNE BLVD MILFORD, MA01757, USA
Product Name:	6” Rugged PDA
Brand Name:	COMARK
Model Name:	COMARK-6
Series Model:	COMARK-6W,COMARK-6A,COMARK-6Q
FCC ID:	2AO8O-COMARK-6

Issued By: Flux Compliance Service Laboratory
Add: Room 105 Floor Bao hao Technology Building 1 NO.15 Gong yeWest Road Hi-Tech Industrial, Song shan lake Dongguan
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Revision History

Rev.	Issue Date	EFFECT PAGE	Contents
01	09 July 2020	All	Initial Issue

TEST RESULT CERTIFICATION

Applicant's Name .....:	Comark LLC
Address .....:	440 FORTUNE BLVD MILFORD, MA01757, USA
Manufacture's Name .....:	Comark LLC
Address .....:	440 FORTUNE BLVD MILFORD, MA01757, USA

Product Description

Product Name .....:	6" Rugged PDA
Brand Name .....:	COMARK
Model Name .....:	COMARK-6
Series Model .....:	COMARK-6W,COMARK-6A,COMARK-6Q
Test Standards .....:	FCC Part 15E 15.407
Test Procedure .....:	ANSI C63.10-2013 and KDB 789033 D02 General UNII Test Procedures New Rules v02r01 .

This device described above has been tested FCS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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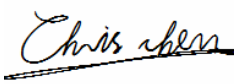
Date of Test.....:

Date (s) of performance of tests	15 June 2020 ~ 09 July 2020
Date of Issue.....:	09 July 2020
Test Result .....:	Pass

Prepared By : 

(Chris Chen)

Approved By : 

(Brown Lu)

1. SUMMARY OF TEST RESULTS

The EUT have been tested according to the applicable standards as referenced below.		
FCC Part15 (15.407) , Subpart E		
Description of Test Item	**Standard**	**Results**
AC Power Line Conducted Emissions	FCC §15.207/ RSS-Gen	PASS
Spurious Radiated Emissions	FCC §15.209(a), 15.407(b)	PASS
26 dB and 99% Emission Bandwidth	FCC §15.407(a)	PASS
Maximum Conducted Output Power	FCC §407(a)(1)	PASS
Band Edges	FCC §2.1051, §15.407(b)	PASS
Power Spectral Density	FCC §15.407(a)(1)	PASS
Spurious Emissions at Antenna Terminals	FCC §2.1051, §15.407(b)	PASS
Frequency Stability	FCC §15.407(a)(6)	PASS
Antenna Requirement	FCC §15.203	PASS

1.1 Test Laboratory

Company Name:	Flux Compliance Service Laboratory
Address:	Room 105 Floor Bao hao Technology Building 1 NO.15 Gong yeWest Road Hi-Tech Industrial, Song shan lake Dongguan
Telephone:	+86-769-27280901
Fax:	+86-769-27280901
FCC Test Firm Registration Number: 514908 Designation number: CN0127 A2LA accreditation number：5545.01	

1.2 Measurement Uncertainty

The reported uncertainty of measurement **y** ±**U**,where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**,providing a level of confidence of approximately **95** %.

	Items	Uncertainty
	RF output power, conducted	±0.71dB
	Unwanted Emissions, conducted	±2.988 dB
	Conducted Emission (9KHz-150KHz)	±4.13 dB
	Conducted Emission (150KHz-30MHz)	±4.74 dB
	All emissions,radiated(<1G) 30MHz-1000MHz	±5.2 dB
	All emissions,radiated(>1G) 1000MHz -3000MHz	±4.66 dB
	All emissions,radiated(<1G) 3000MHz -6000MHz	±5.31 dB

1.3 Test Environment Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature rang:	20-26℃
Humidity range:	40-65%
Pressure range:	86-106Kpa

2. GENERAL TEST INFORMATION

2.1. DESCRIPTION OF EUT

EUT* Name	:	6” Rugged PDA
Model Number	:	COMARK-6,COMARK-6W,COMARK-6A,COMARK-6Q
EUT function description	:	6” Rugged PDA with WiFi & BT function.
Power supply	:	Adapter:FJ-SW1260502500UN INPUT: 100-240V~ 50/60Hz 0.4A OUTPUT: DC 5V 2.5A
Operation frequency	:	WiFi: 802.11a/802.11n(HT20) /ac(VHT20): 5180MHz~5240MHz; 5745MHz~5825MHz 802.11n(HT40)/ac(VHT40): 5190MHz~5230MHz; 5755MHz~5795MHz 802.11ac(VHT80): 5210MHz,5775MHz
Modulation	:	OFDM with OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM for 802.11a/n/ac;
Data Rate	:	802.11 a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20):MCS0-MCS7; 802.11n(HT40): MCS0-MCS7; 802.11ac(HT20/HT40/HT80):Up to 433Mbps
Antenna Type	:	FPCB Antenna, Antenna A only WIFI, Antenna B WIFI&BT maximum PK gain: Antenna A :1.5dBi(Main) Antenna B : 1.5dBi(Aux)
Battery	:	DC 3.7V 5000mAh Li Battery
Hardware version number		EM_I62H_MB_PCB_V14R4
Software versionnumber		10.0.17763.1
Date of Receipt	:	2020/07/09
Sample Type	:	N/A
Connecting I/O Port(s)		Please refer to the User's Manual
Note: For a more detailed features description, please refer to the manufacturer’s specifications or the User's Manual.		

Channel List							
802.11a/n/ac(20MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	40	5200	44	5220	48	5240
149	5745	153	5765	157	5785	161	5805
165	5825	--	--	--	--	--	--
802.11n/ac(40MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230	--	--	--	--
151	5755	155	5775	159	5795	--	--
802.11 ac(80MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210	--	--	--	--	--	--
155	5775	--	--	--	--	--	--

2.2. ACCESSORIES OF EUT

Description of Accessories	Shielded Type	Ferrite Core	Length
Adapter	SHENZHEN FUJIA APPLIANCE CO.,LTD	FJ-SW1260502500UN	/

2.3. ASSISTANT EQUIPMENT USED FOR TEST

Description of Assistant equipment	Manufacturer	Model number or Type	EMC Compliance	SN
/	/	/	/	/

2.4. BLOCK DIAGRAM OF EUT CONFIGURATION FOR TEST

2.5. TEST ENVIRONMENT CONDITIONS

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Link Mode
Mode 2	802.11a / n 20/ac20 CH36/ CH44/ CH48 802.11a / n 20/ac20 CH149/ CH157/ CH165
Mode 3	802.11n40/ac40 CH38/ CH46 802.11 n40/ac40 CH151/ CH159

For Radiated Emission	
Final Test Mode	Description
Mode 1	Link Mode
Mode 2	802.11a / n 20/ac20 CH36/ CH44/ CH48 802.11a / n 20/ac20 CH149/ CH157/ CH165
Mode 3	802.11n40/ac40 CH38/ CH46 802.11 n40/ac40 CH151/ CH159

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

(3) The EUT was used fully-charged battery and programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

(4) The EUT does not support MIMO mode.

2.1 Equipments List

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESRP 3	FCS-E001	2020.05.31	2021.05.30
Signal Analyzer	R&S	FSV40-N	FCS-E012	2020.06.05	2021.06.04
Active loop Antenna	ZHINAN	ZN30900C	FCS-E013	2019.10.11	2020.10.10
Bilog Antenna	SCHWARZBECK	VULB 9168	FCS-E002	2019.10.26	2020.10.25
Horn Antenna	SCHWARZBECK	BBHA 9120D	FCS-E003	2020.05.31	2021.05.30
SHF-EHF Horn Antenna (18G-40GHz)	A-INFO	LB-180400-KF	FCS-E018	2020.05.31	2021.05.30
Pre-Amplifier(0.1M-3 GHz)	EMCI	EM330N	FCS-E004	2020.05.31	2021.05.30
Pre-Amplifier (1G-18GHz)	N/A	TSAMP-0518SE	FCS-E014	2019.10.03	2020.10.02
Temperature & Humidity	HTC-1	victor	FCS-E005	2020.05.31	2021.05.30

Conduction Test equipment

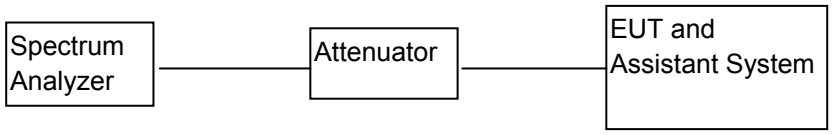
Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	FCS-E020	2020.05.31	2021.05.30
LISN	R&S	ENV216	FCS-E007	2020.05.15	2021.05.14
LISN	ETS	3810/2NM	FCS-E009	2019.10.15	2020.10.14
Temperature & Humidity	HTC-1	victor	FCS-E008	2020.05.31	2021.05.30

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Company No.	Last calibration	Calibrated until
MXA SIGNAL Analyzer	Keysight	N9020A	FCS-E015	2019.10.02	2020.10.01

3. POWER SPECTRAL DENSITY TEST

3.1. BLOCK DIAGRAM OF TEST SETUP



3.2. APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)(3)

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi..

3.3. TEST PROCEDURE

（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:

a) Set RBW ≥ 1/T, where T is defined in section II.B.I.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

3.4. TEST RESULT

CH. No.	Frequency	Power Density ANT A (dBm/MHz)	Power Density ANT B (dBm/MHz)	total power density (dBm/MHz)	Limit (dBm/MHz)	Result
TX 802.11a Mode						
CH36	5180	5.84	5.80	--	11	Pass
CH44	5220	4.82	4.80	--	11	Pass
CH48	5240	4.94	4.92	--	11	Pass
CH 149	5745	0.35	0.33	--	30	Pass
CH 157	5785	1.59	1.54	--	30	Pass
CH 165	5825	2.42	2.40	--	30	Pass
TX 802.11n20 Mode						
CH36	5180	4.64	4.61	--	11	Pass
CH44	5220	4.23	4.20	--	11	Pass
CH48	5240	4.44	4.43	--	11	Pass
CH 149	5745	0.30	0.27	--	30	Pass
CH 157	5785	1.71	1.68	--	30	Pass
CH 165	5825	1.20	1.16	--	30	Pass

CH. No.	Frequency	Power Density ANT A (dBm/MHz)	Power Density ANT B (dBm/MHz)	total power density (dBm/MHz)	Limit (dBm/MHz)	Result
TX 802.11n40 Mode						
CH38	5190	-0.46	-0.49	--	11	Pass
CH46	5230	-0.55	-0.58	--	11	Pass
CH151	5755	-4.77	-4.80	--	30	Pass
CH159	5795	-3.45	-3.47	--	30	Pass

CH. No.	Frequency	Power Density ANT A (dBm/MHz)	Power Density ANT B (dBm/MHz)	total power density (dBm/MHz)	Limit (dBm/MHz)	Result
TX 802.11 ac(VHT20) Mode						
CH36	5180	4.83	4.80	--	11	Pass
CH44	5220	4.73	4.71	--	11	Pass
CH48	5240	4.56	4.53	--	11	Pass
CH 149	5745	0.89	0.85	--	30	Pass
CH 157	5785	1.00	0.96	--	30	Pass
CH 165	5825	2.03	2.01	--	30	Pass

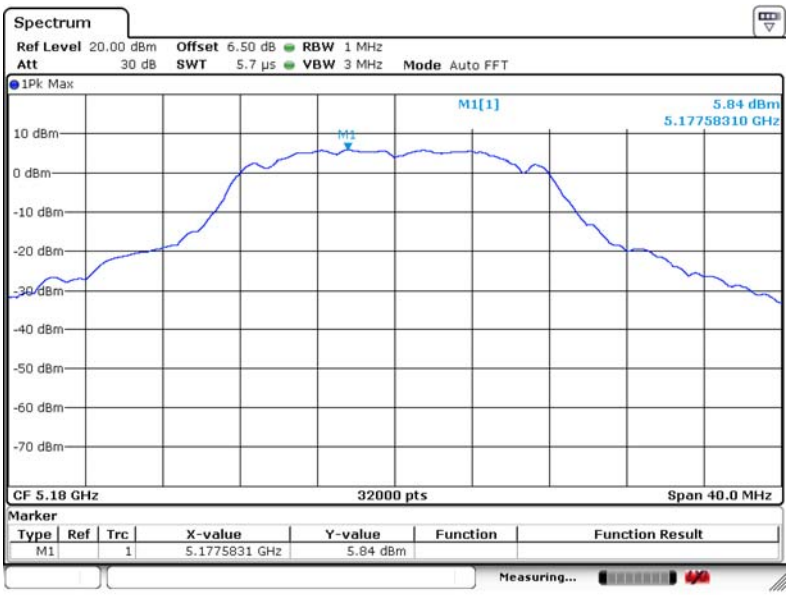
CH. No.	Frequency	Power Density ANT A (dBm/MHz)	Power Density ANT B (dBm/MHz)	total power density (dBm/MHz)	Limit (dBm/MHz)	Result
TX 802.11 ac(VHT40) Mode						
CH38	5190	-0.25	-0.30	--	11	Pass
CH46	5230	-0.58	-0.61	--	11	Pass
CH151	5755	-4.25	-4.28	--	30	Pass
CH159	5795	-3.76	-3.79	--	30	Pass
TX 802.11 ac(VHT80) Mode						
CH42	5210	-4.44	-4.47	--	11	Pass
CH155	5775	-7.06	-7.09	--	30	Pass

Note: The worst data is Antenna A, only shown Antenna A Plot.

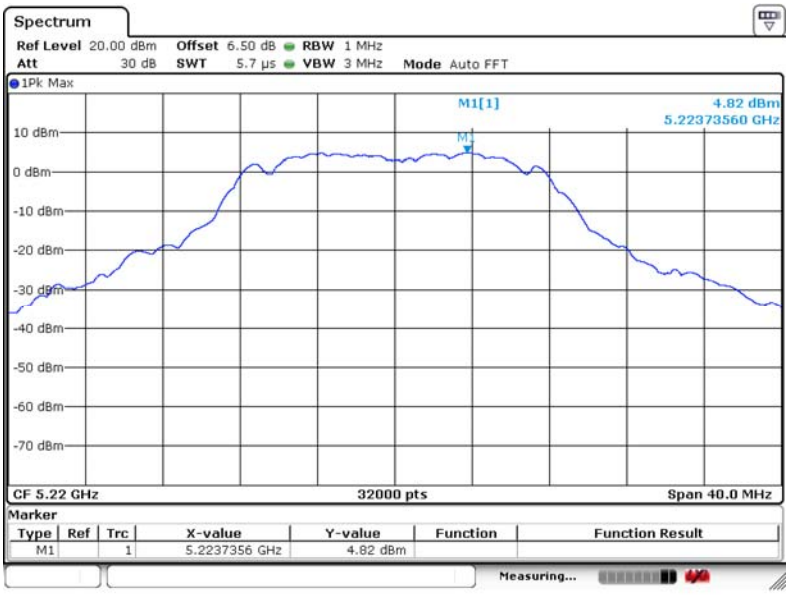
Test plots as followed: Antenna A

802.11a

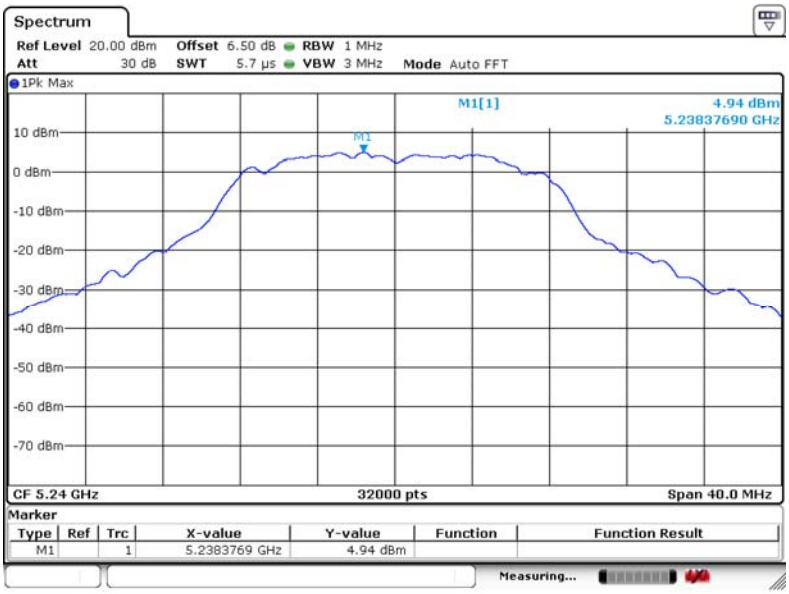
Channel: 36



Channel: 44

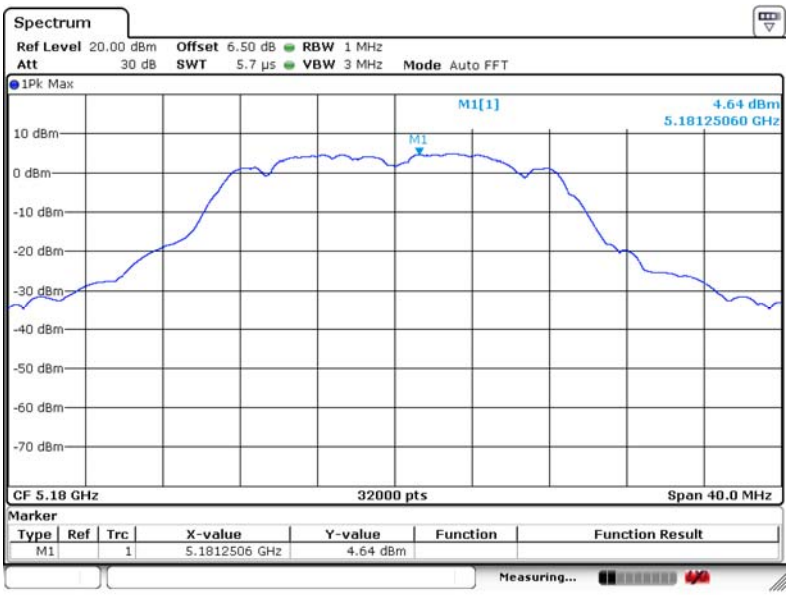


Channel: 48


Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 1 MHz
Att 30 dB SWT 5.7 µs VBW 3 MHz Mode Auto FFT
1Pk Max
M1[1]
4.94 dBm
5.23837690 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.24 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.2383769 GHz 4.94 dBm
Measuring...

802.11n20

Channel: 36



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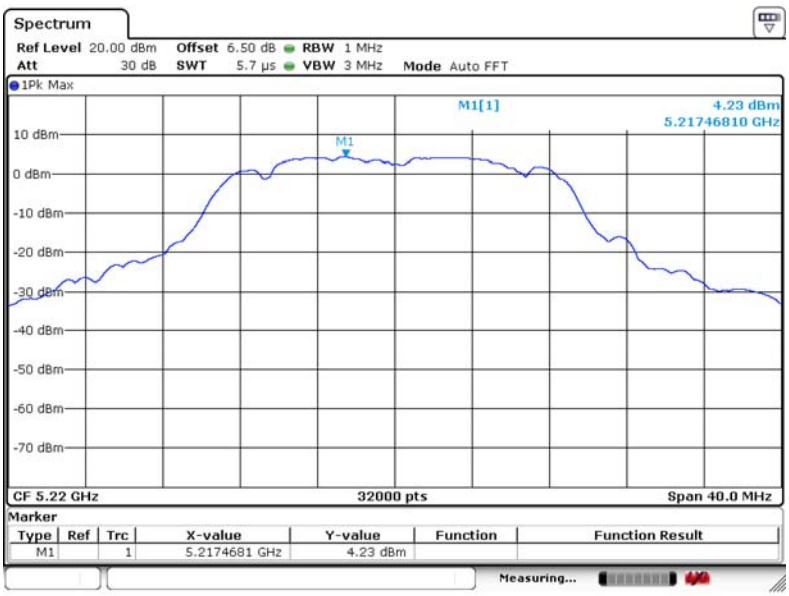
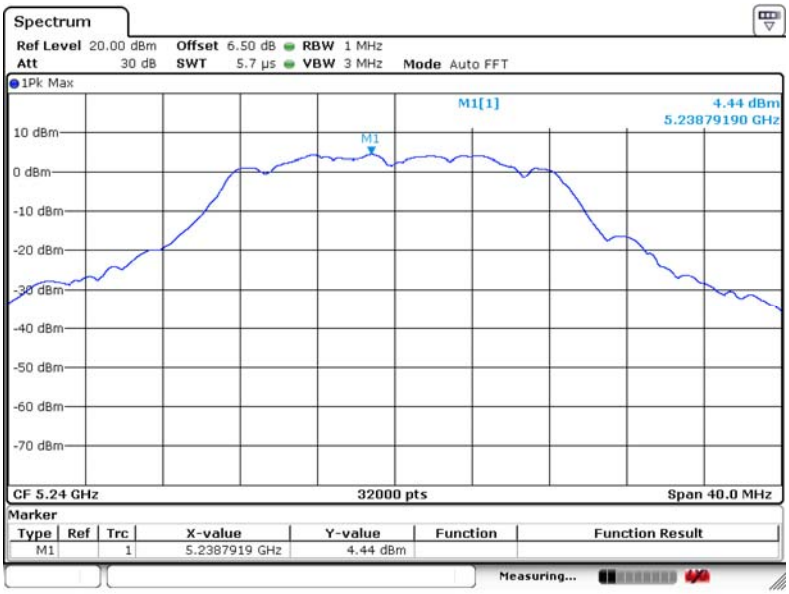
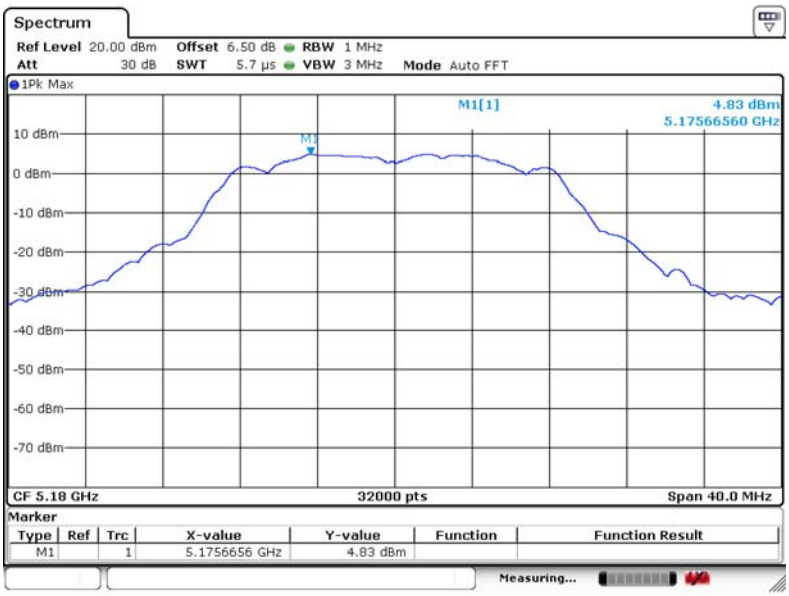


Channel: 48


Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 1 MHz
Att 30 dB SWT 5.7 µs VBW 3 MHz Mode Auto FFT
1Pk Max
M1[1]
4.44 dBm
5.23879190 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.24 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.2387919 GHz 4.44 dBm
Measuring...

802.11ac20

Channel: 36



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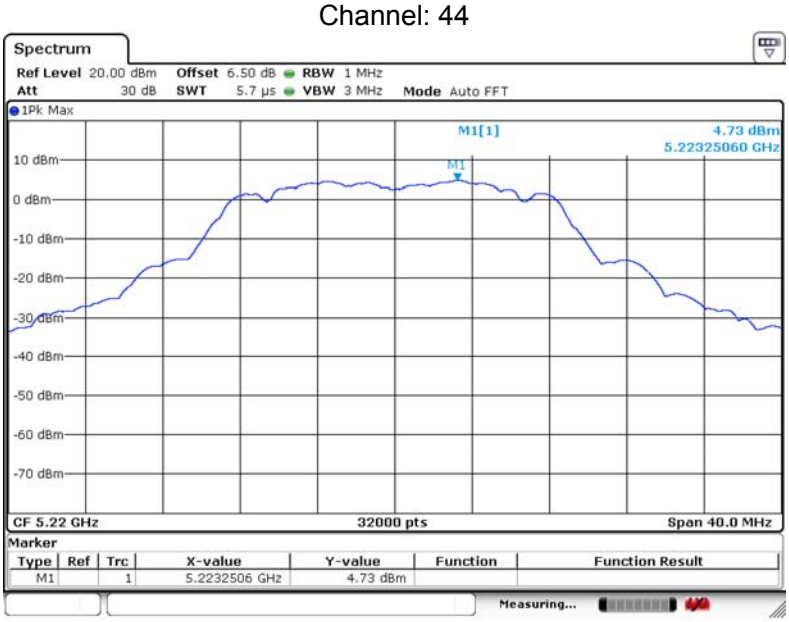

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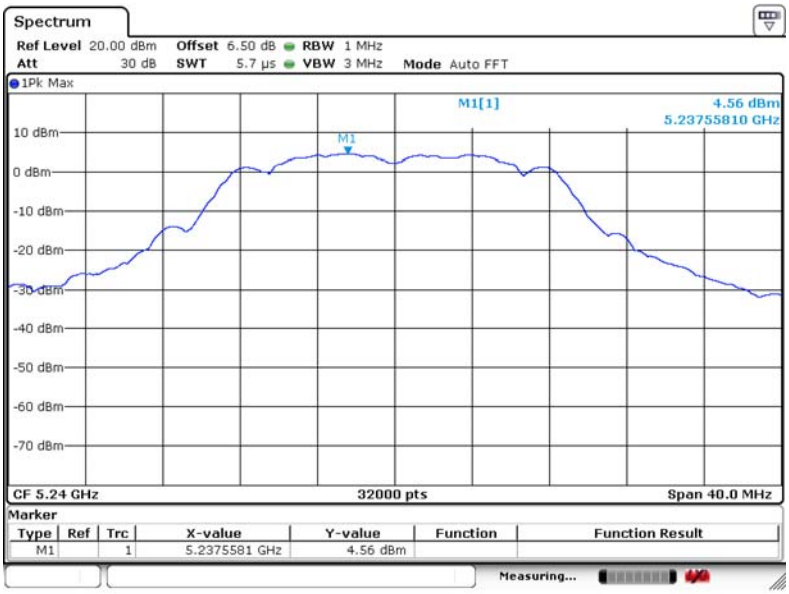
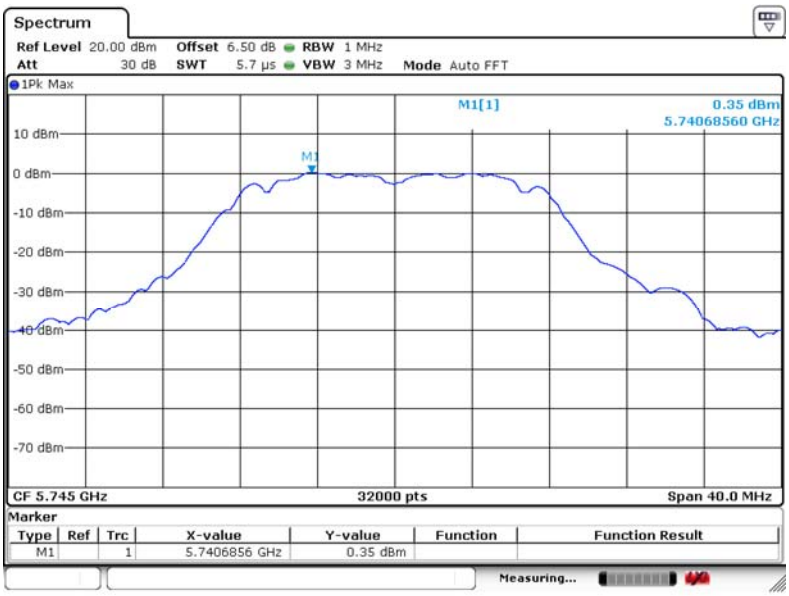
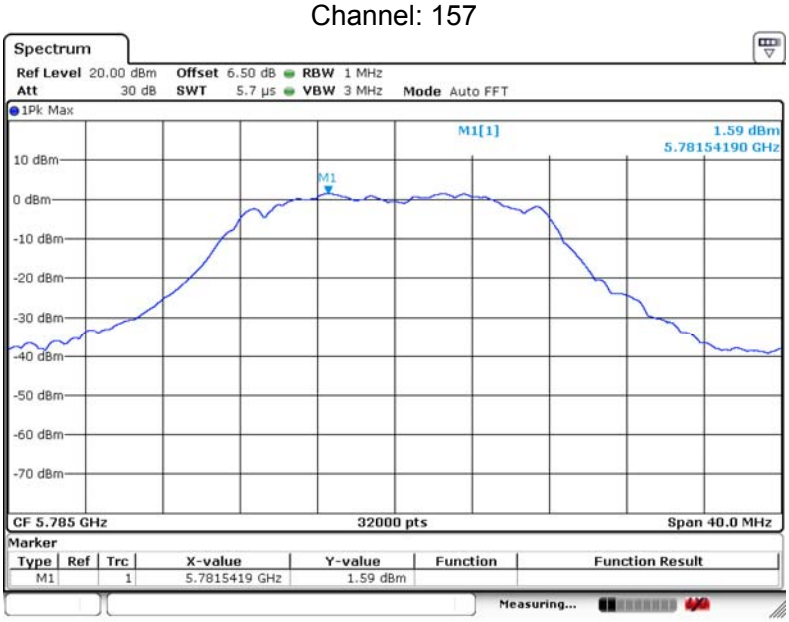

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 1 MHz
Att 30 dB SWT 5.7 µs VBW 3 MHz Mode Auto FFT
1Pk Max
M1[1] 4.56 dBm
5.23755810 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.24 GHz 32000 pts Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.2375581 GHz 4.56 dBm
Measuring...

802.11a

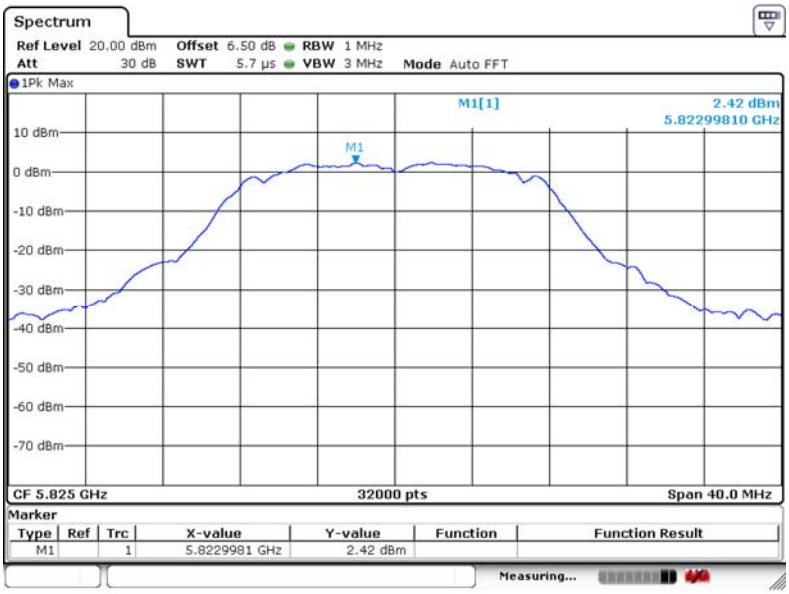
Channel: 149



Channel: 157

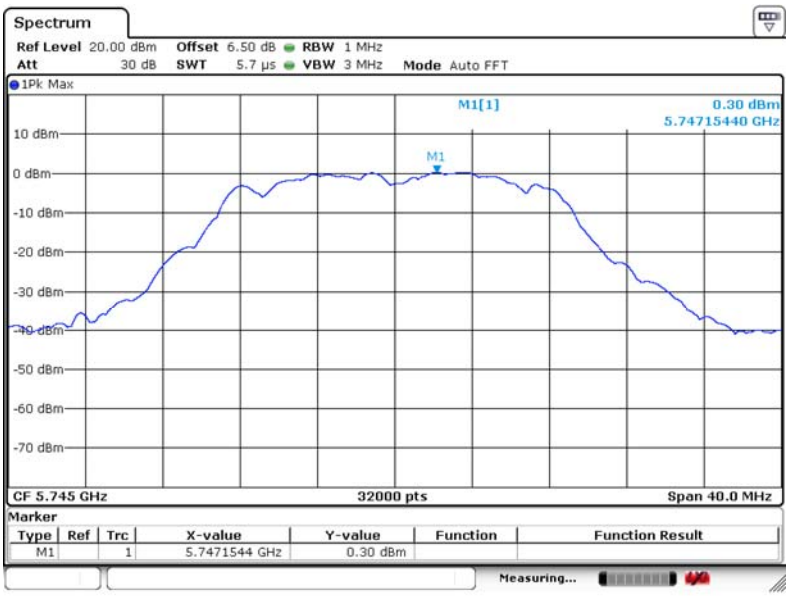


Channel: 165

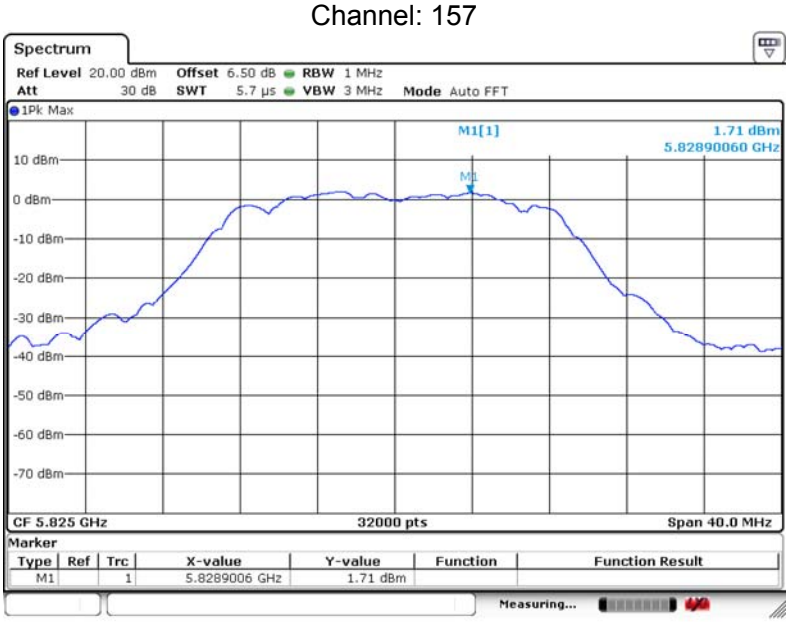

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 1 MHz
Att 30 dB SWT 5.7 µs VBW 3 MHz Mode Auto FFT
1Pk Max
M1[1] 2.42 dBm
5.82299810 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.825 GHz 32000 pts Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.8229981 GHz 2.42 dBm
Measuring...

802.11n20

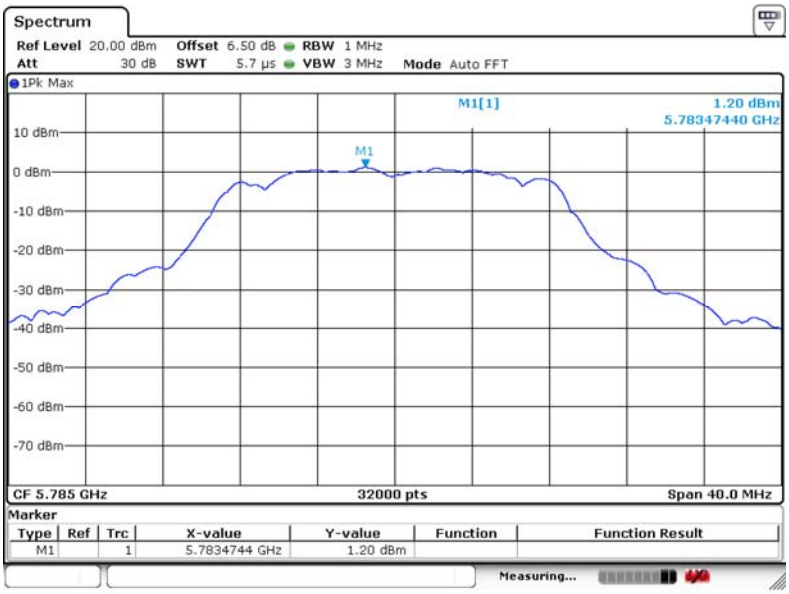
Channel: 149



Channel: 157

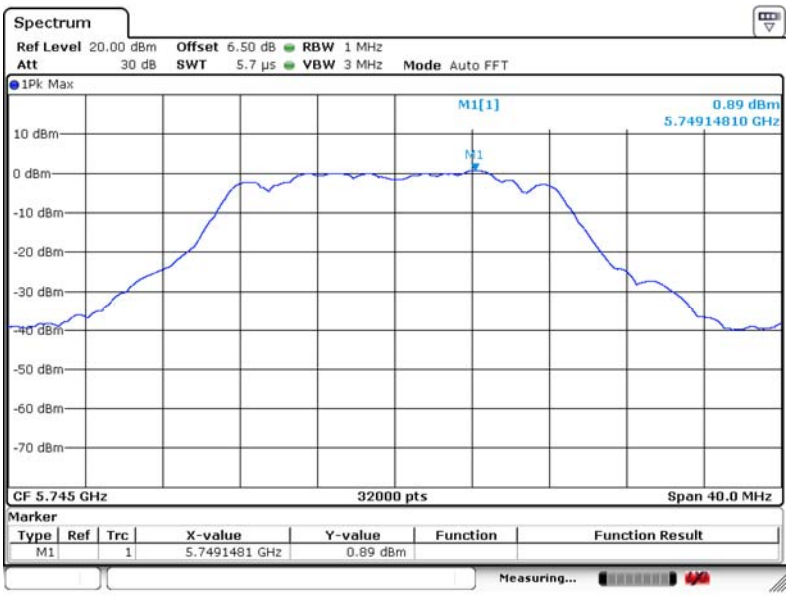


Channel: 165

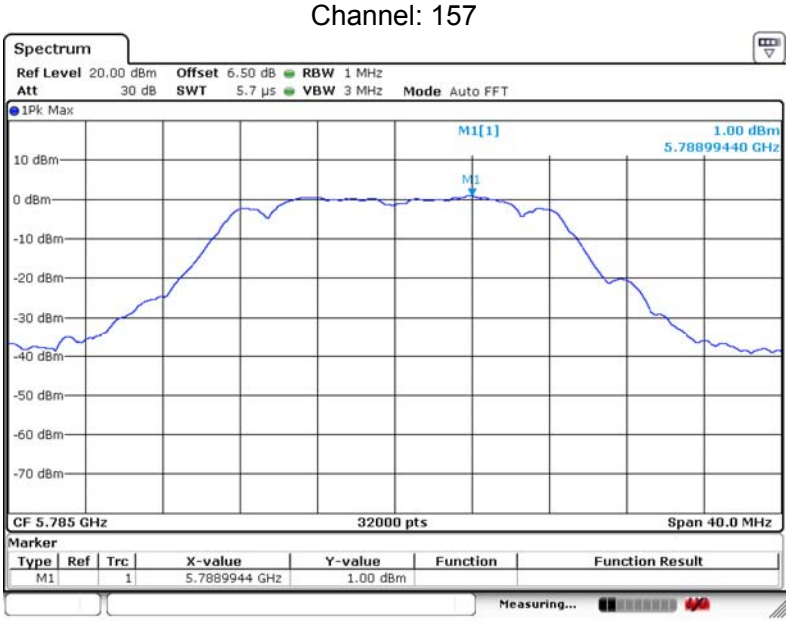

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 1 MHz
Att 30 dB SWT 5.7 µs VBW 3 MHz Mode Auto FFT
1Pk Max
M1[1] 1.20 dBm
5.78347440 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 5.785 GHz 32000 pts Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.7834744 GHz 1.20 dBm
Measuring...

802.11ac20

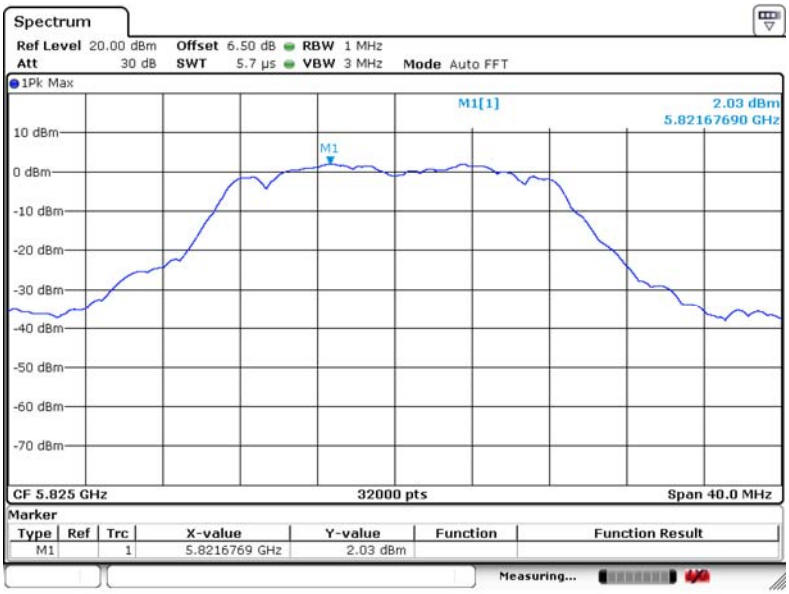
Channel: 149



Channel: 157

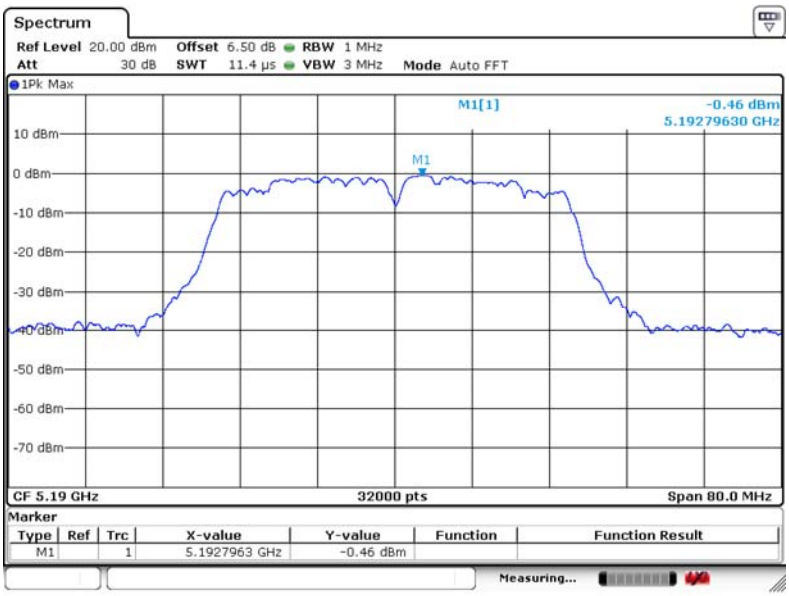


Channel: 165

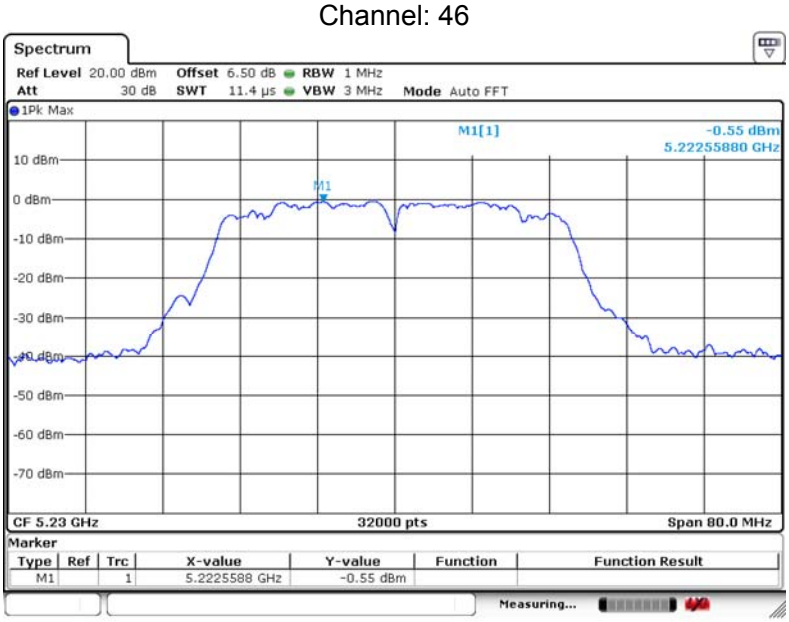

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 1 MHz
Att 30 dB SWT 5.7 µs VBW 3 MHz Mode Auto FFT
1Pk Max
M1[1]
2.03 dBm
5.82167690 GHz
M1
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.825 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.8216769 GHz 2.03 dBm
Measuring...

802.11n40

Channel: 38

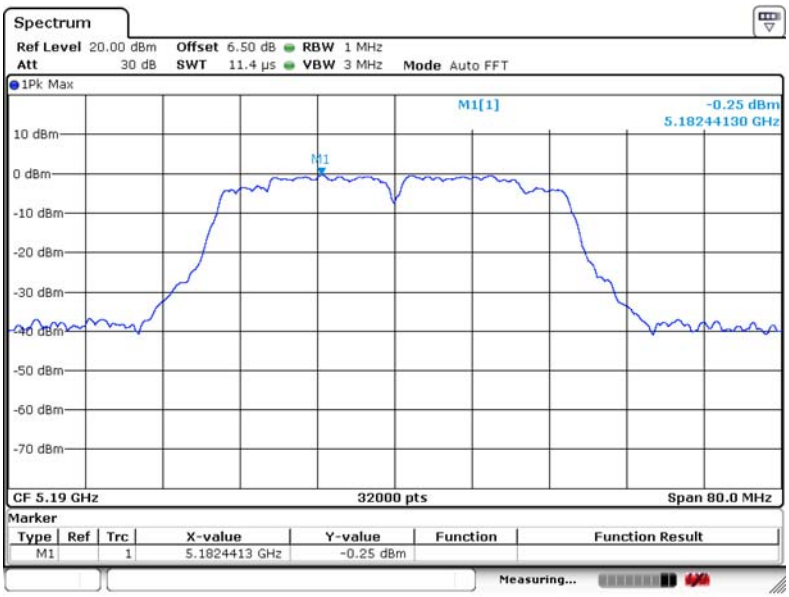


Channel: 46

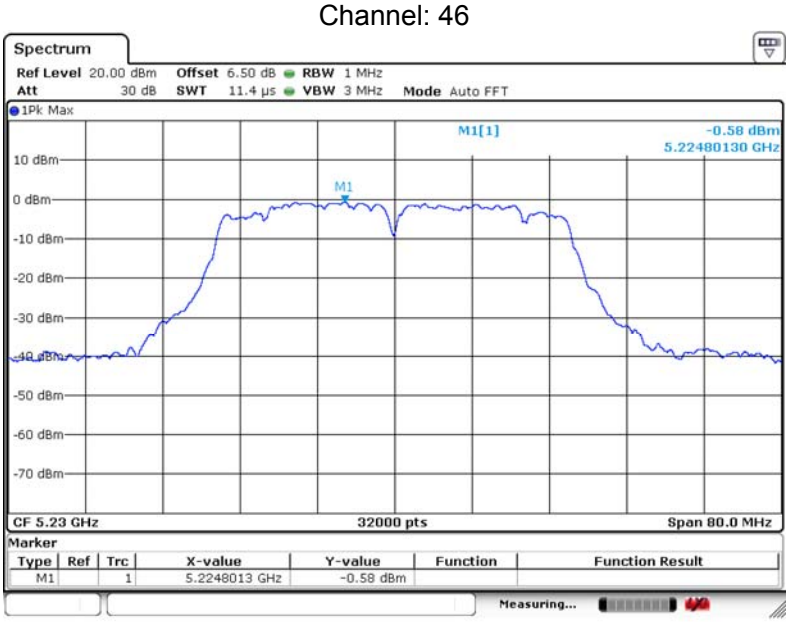


802.11ac40

Channel: 38

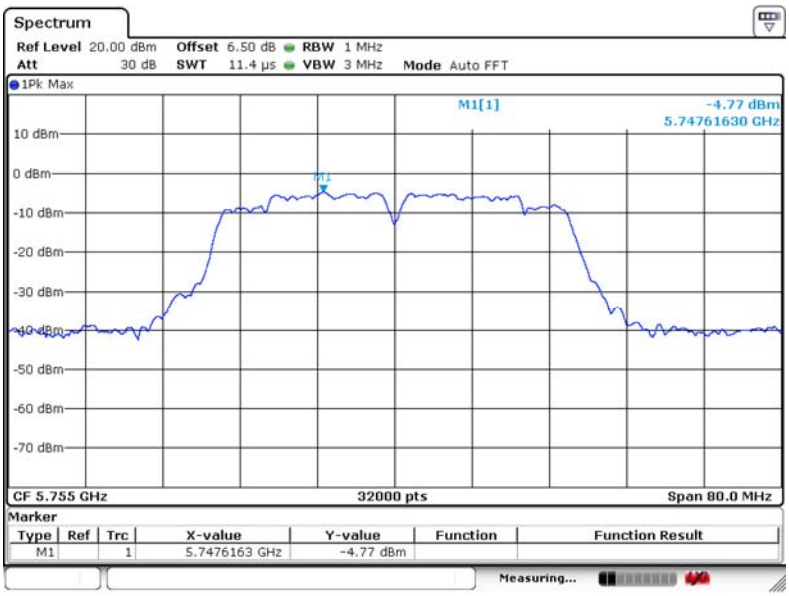


Channel: 46

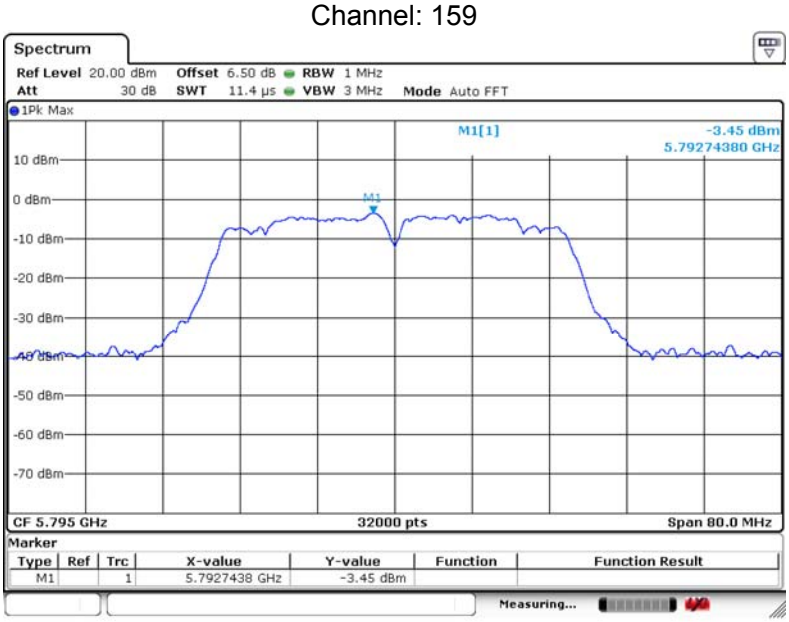


802.11n40

Channel: 151

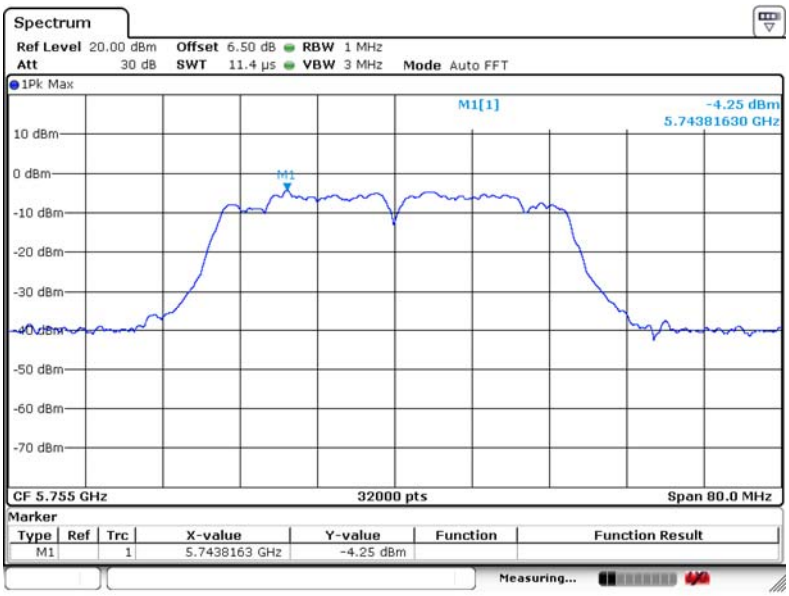


Channel: 159

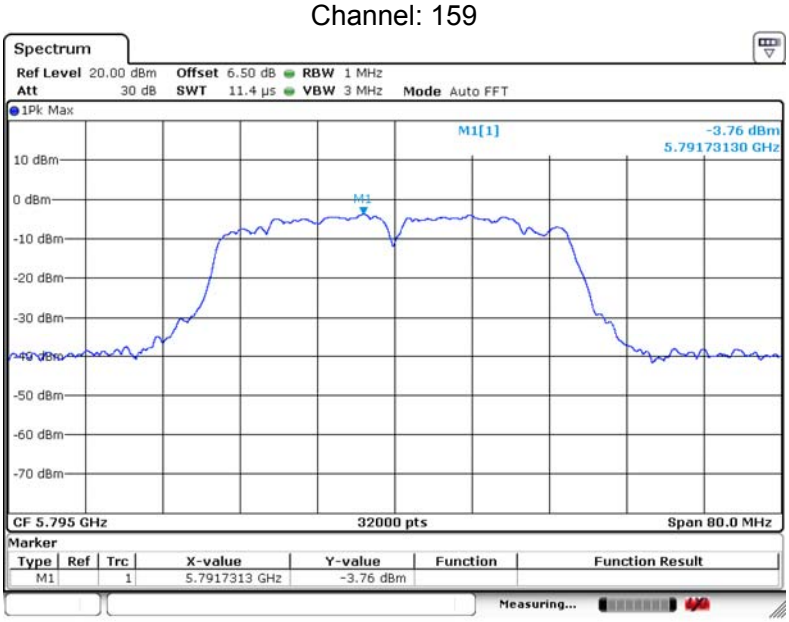


802.11ac40

Channel: 151

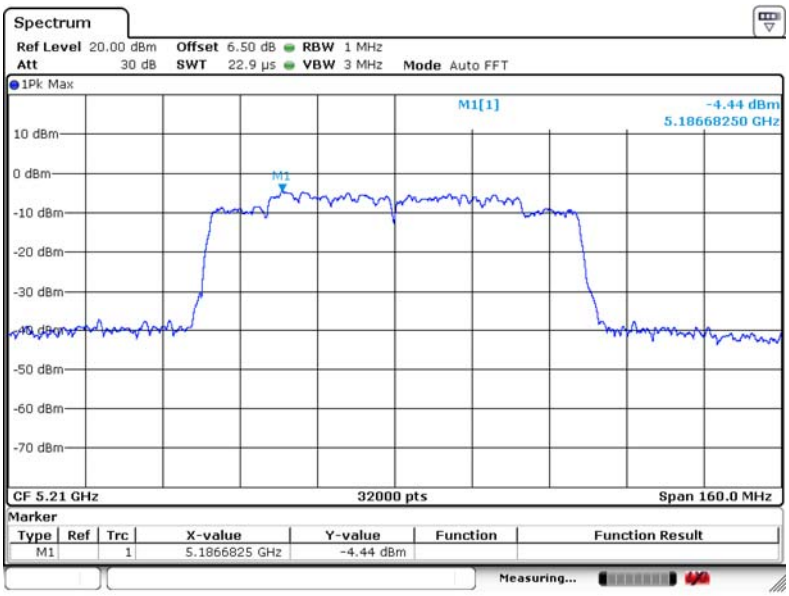


Channel: 159

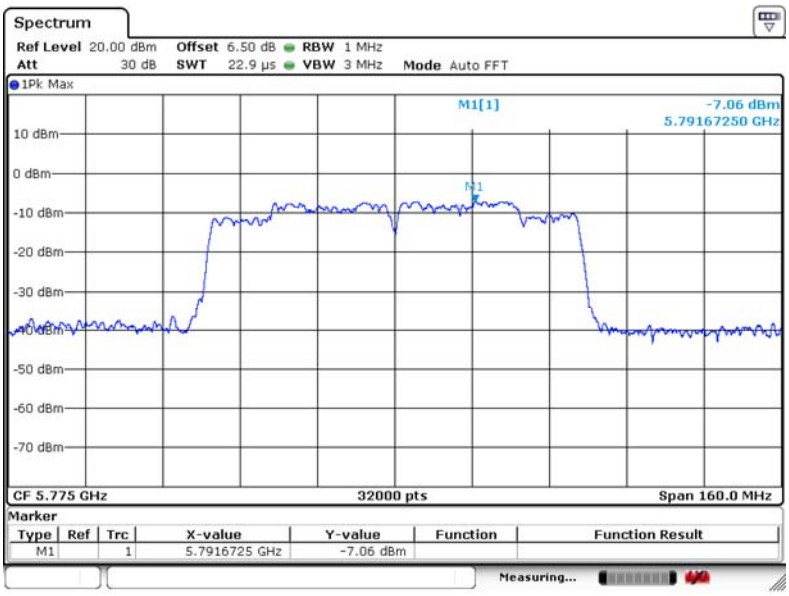


802.11ac80

Channel:42

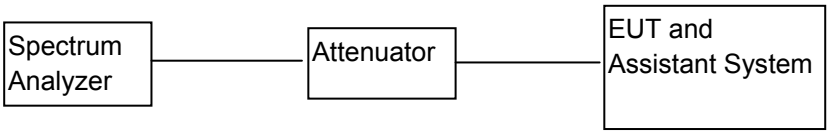


Channel: 155



4. 26 dB & 99% Emission Bandwidth

4.1. BLOCK DIAGRAM OF TEST SETUP



4.2. APPLIED PROCEDURES / LIMIT

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power
is integrated over the full reference bandwidth.

4.3. TEST PROCEDURE

a) Set RBW = approximately 1% of the emission bandwidth.

b) Set the VBW > RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) 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%.

The following procedure shall be used for measuring (99 %) power bandwidth:

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
4. Set VBW ≥ 3 · RBW
5. 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.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. 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.

4.4. TEST RESULT

CH. No.	Frequency (MHz)	26dB Occupied Bandwidth (MHz)			99% Occupied Bandwidth (MHz)		
		802.11a	802.11n (HT20)	802.11ac (VHT20)	802.11a	802.11n (HT20)	802.11ac (VHT20)
36	5180.00	24.74	24.77	24.06	16.63	17.81	17.81
44	5220.00	24.83	24.76	24.49	16.80	17.90	17.92
48	5240.00	24.83	24.60	24.99	16.79	17.92	17.89
CH. No.	Frequency (MHz)	6dB Occupied Bandwidth (MHz)			99% Occupied Bandwidth (MHz)		
		802.11a	802.11n (HT20)	802.11ac (VHT20)	802.11a	802.11n (HT20)	802.11ac (VHT20)
149	5745.00	15.13	15.12	15.12	16.71	17.80	17.84
157	5785.00	15.12	15.12	15.13	16.64	17.75	17.82
165	5825.00	15.12	15.12	15.12	16.68	17.73	17.79

CH. No.	Frequency (MHz)	26dB Occupied Bandwidth (MHz)		99% Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(VHT40)	802.11n(HT40)	802.11ac(VHT40)
38	5190.00	42.11	42.35	36.21	36.26
46	5230.00	44.47	43.85	36.24	36.09
CH. No.	Frequency (MHz)	6B Occupied Bandwidth (MHz)		99% Occupied Bandwidth (MHz)	
		802.11n(HT40)	802.11ac(VHT40)	802.11n(HT40)	802.11ac(VHT40)
151	5755.00	35.11	35.11	36.36	36.12
159	5795.00	35.10	35.10	36.35	36.13

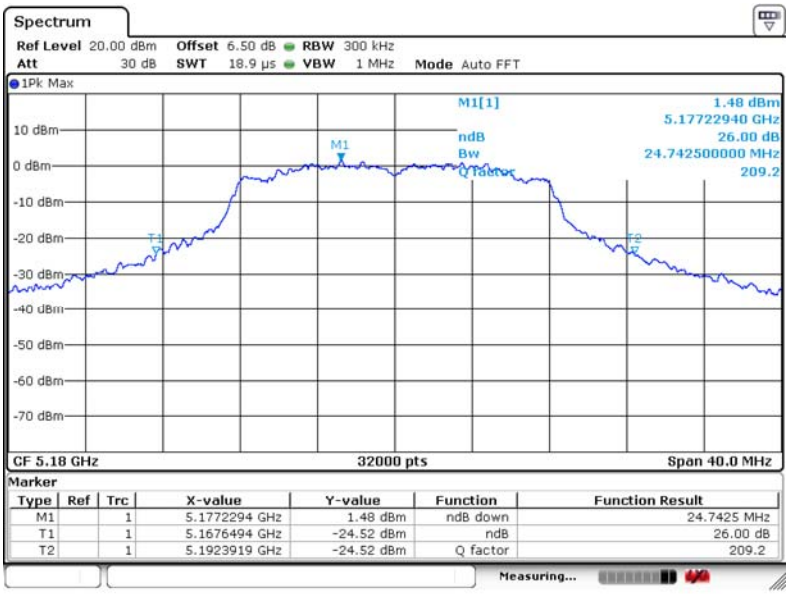
CH. No.	Frequency (MHz)	26dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
		802.11ac(VHT80)	802.11ac(VHT80)
42	5210	82.25	75.11
CH. No.	Frequency (MHz)	6dB Occupied Bandwidth (MHz) 802.11ac(VHT80)	99% Occupied Bandwidth (MHz) 802.11ac(VHT80)
155	5775	75.11	75.38

Note: The worst data is Antenna A, only shown Antenna A Plot.

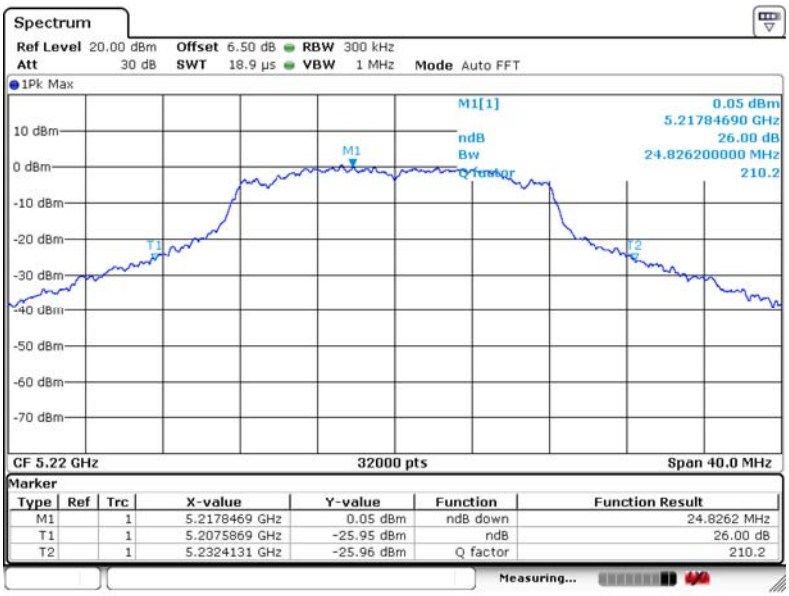
Test plots as followed: Antenna A

26dB BW 802.11a

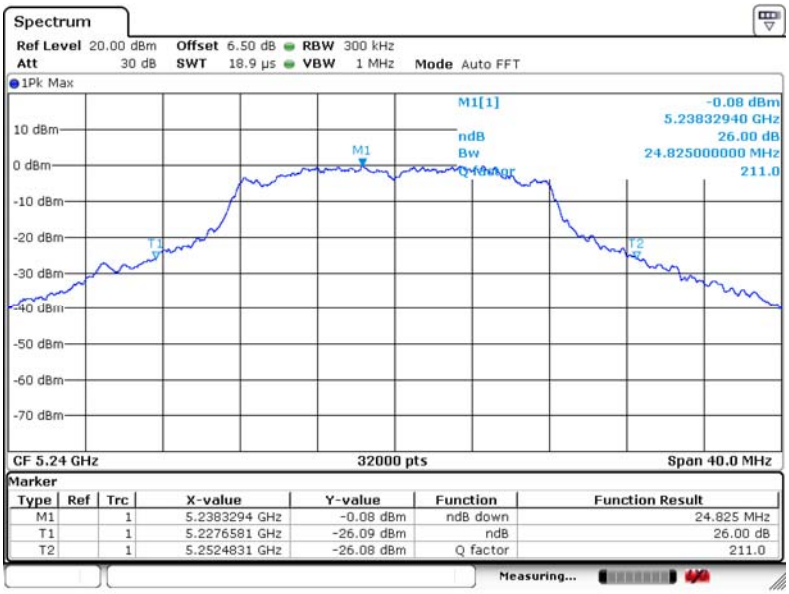
Channel: 36



Channel: 44

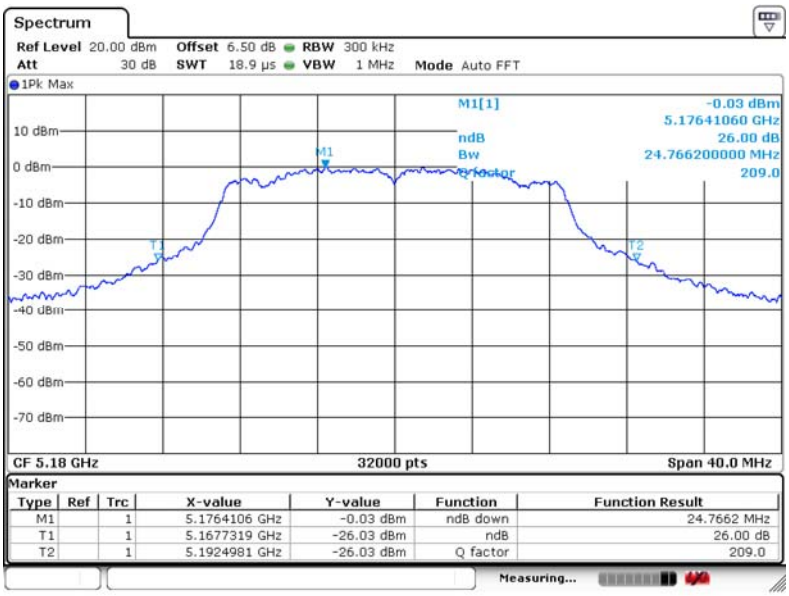


Channel: 48

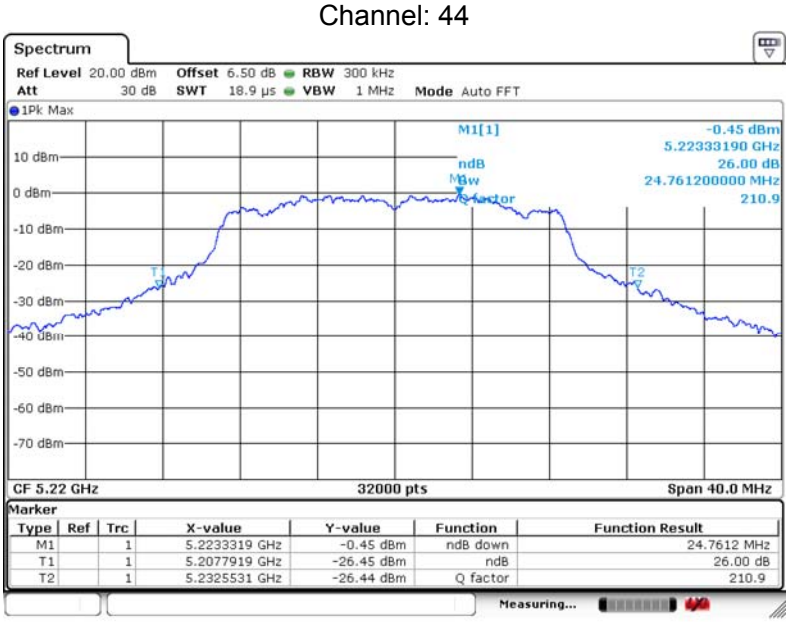

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 300 kHz
Att 30 dB SWT 18.9 µs VBW 1 MHz Mode Auto FFT
1Pk Max
M1[1]
-0.08 dBm
5.23832940 GHz
ndB 26.00 dB
Bw 24.825000000 MHz
Q-Factor 211.0
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
T1
T2
CF 5.24 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.2383294 GHz -0.08 dBm ndB down 24.825 MHz
T1 1 5.2276581 GHz -26.09 dBm ndB 26.00 dB
T2 1 5.2524831 GHz -26.08 dBm Q factor 211.0
Measuring...

26dB BW 802.11n20

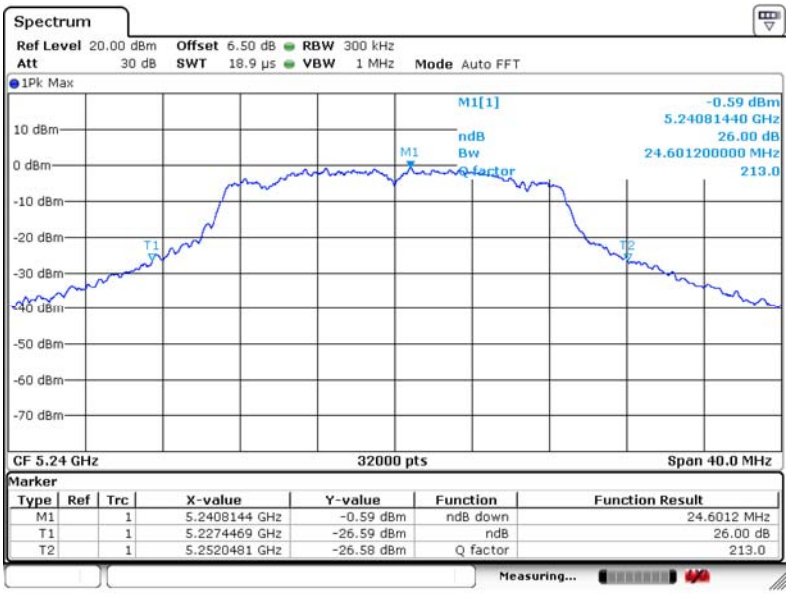
Channel: 36



Channel: 44

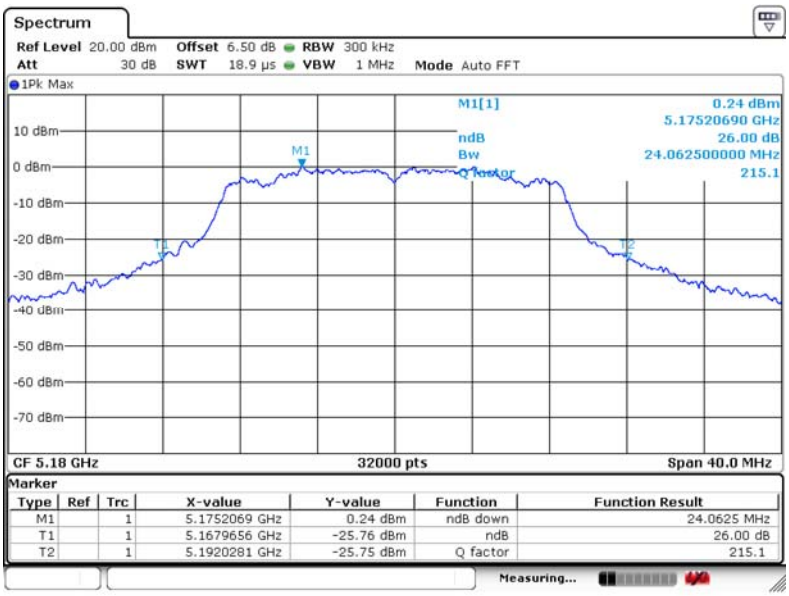


Channel: 48

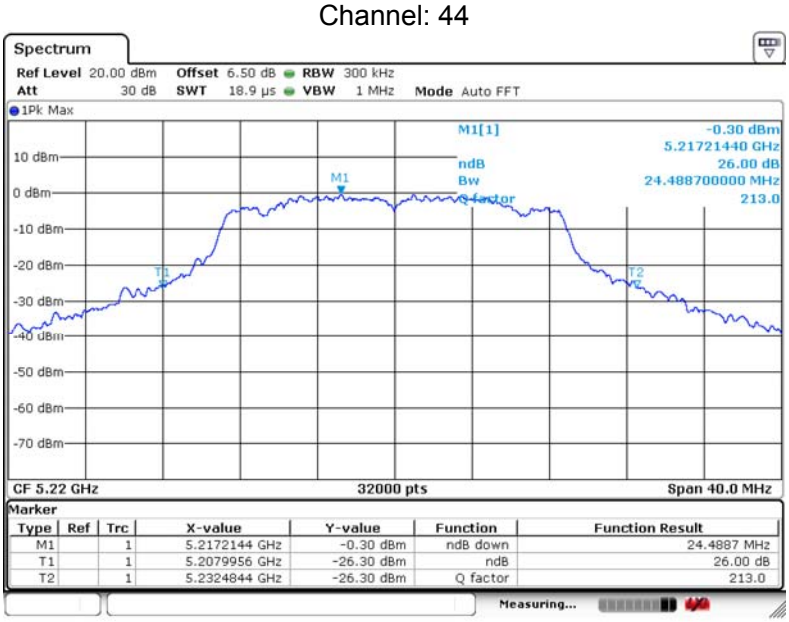

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 300 kHz
Att 30 dB SWT 18.9 µs VBW 1 MHz Mode Auto FFT
1Pk Max
M1[1]
-0.59 dBm
5.24081440 GHz
ndB 26.00 dB
Bw 24.601200000 MHz
Q factor 213.0
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
T1
T2
CF 5.24 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.2408144 GHz -0.59 dBm ndB down 24.6012 MHz
T1 1 5.2274469 GHz -26.59 dBm ndB 26.00 dB
T2 1 5.2520481 GHz -26.58 dBm Q factor 213.0
Measuring...

26dB BW 802.11ac20

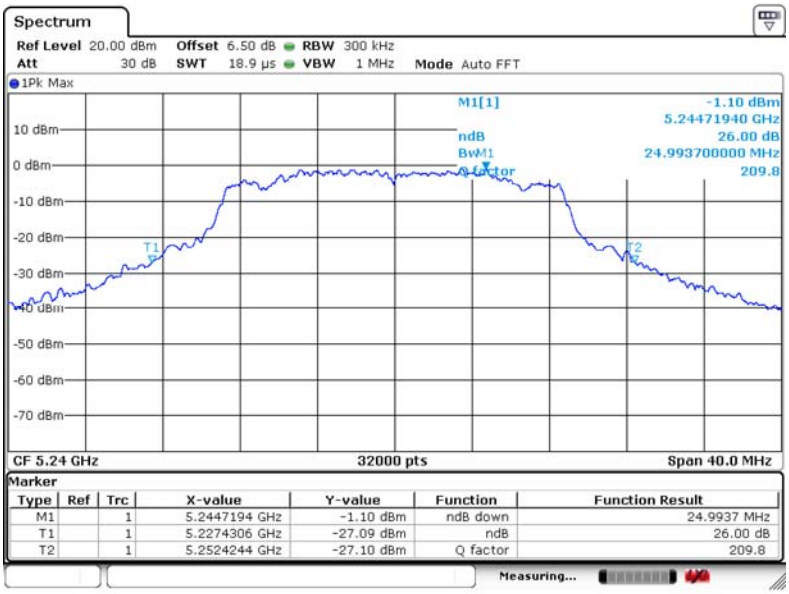
Channel: 36



Channel: 44

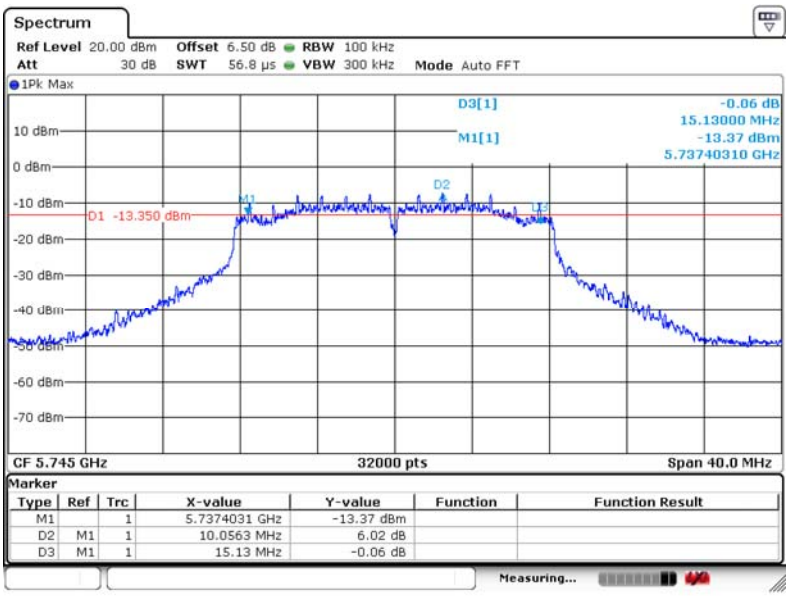


Channel: 48

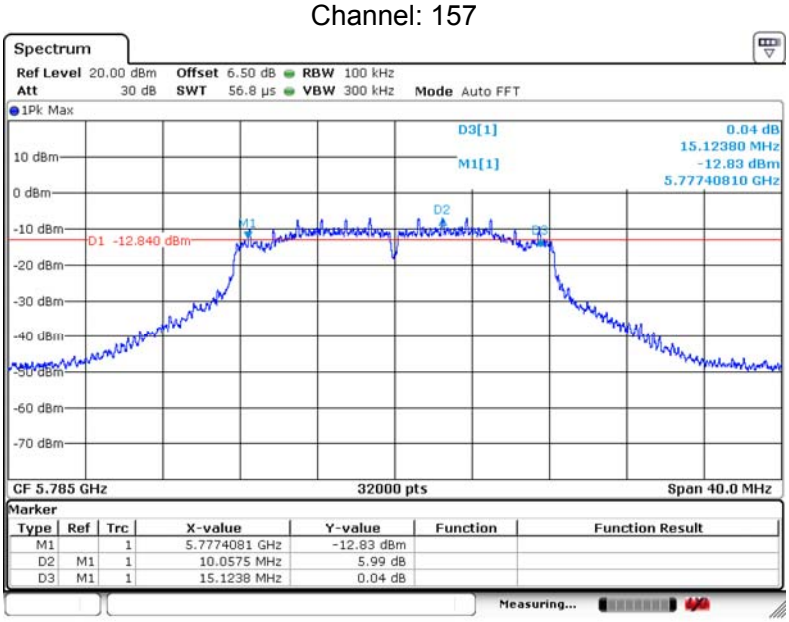

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 300 kHz
Att 30 dB SWT 18.9 µs VBW 1 MHz Mode Auto FFT
1Pk Max
M1[1]
-1.10 dBm
5.24471940 GHz
ndB 26.00 dB
BwM1 24.993700000 MHz
Q factor 209.8
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
T1
T2
CF 5.24 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.2447194 GHz -1.10 dBm ndB down 24.9937 MHz
T1 1 5.2274306 GHz -27.09 dBm ndB 26.00 dB
T2 1 5.2524244 GHz -27.10 dBm Q factor 209.8
Measuring...

6dB BW 802.11a

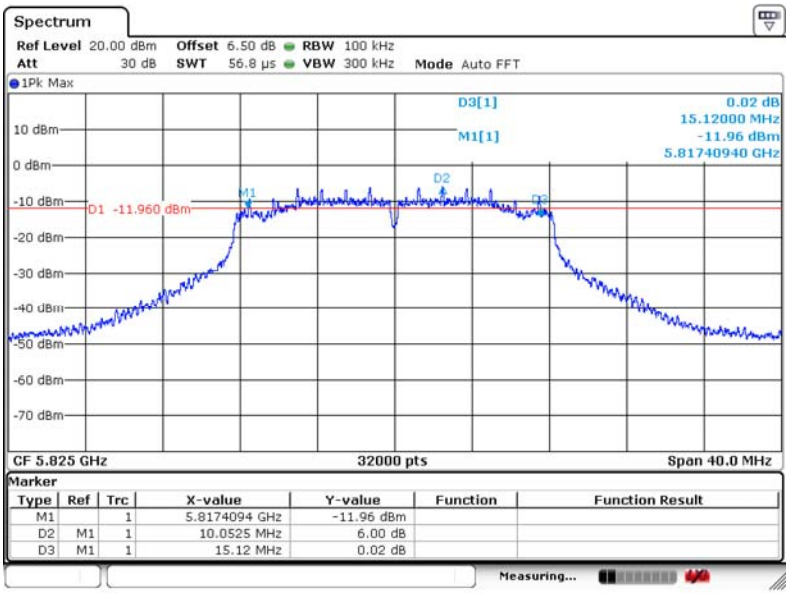
Channel: 149



Channel: 157

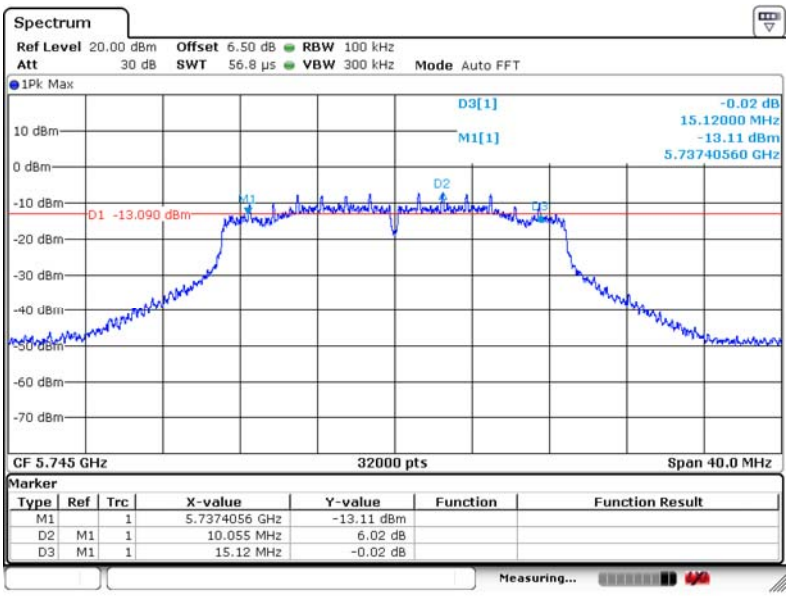


Channel: 165

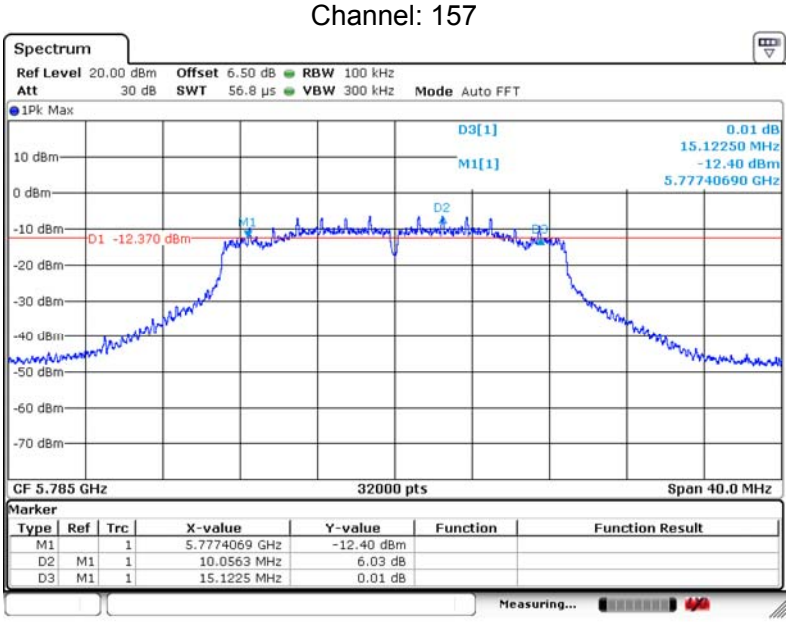

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 100 kHz
Att 30 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D3[1] 0.02 dB
15.12000 MHz
M1[1] -11.96 dBm
5.81740940 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
D1 -11.960 dBm
M1
D2
D3
CF 5.825 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.8174094 GHz -11.96 dBm
D2 M1 1 10.0525 MHz 6.00 dB
D3 M1 1 15.12 MHz 0.02 dB
Measuring...

6dB BW 802.11n20

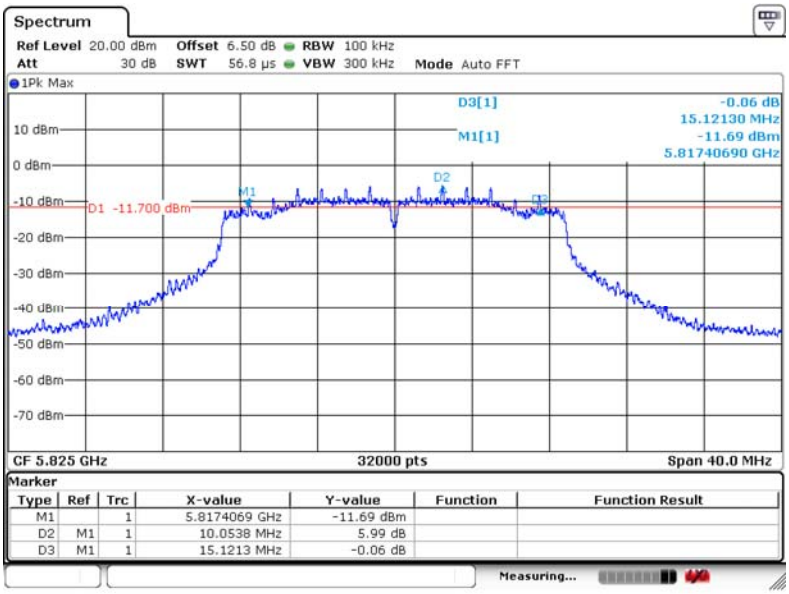
Channel: 149



Channel: 157

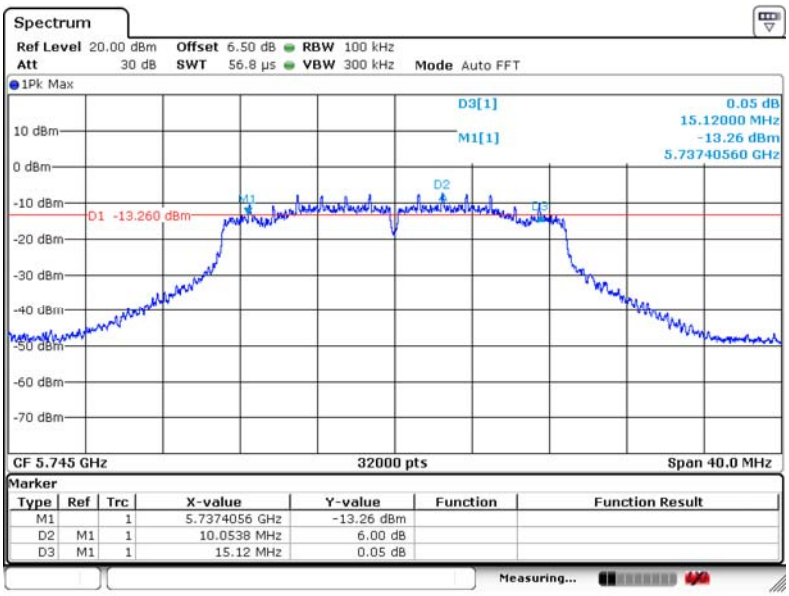


Channel: 165

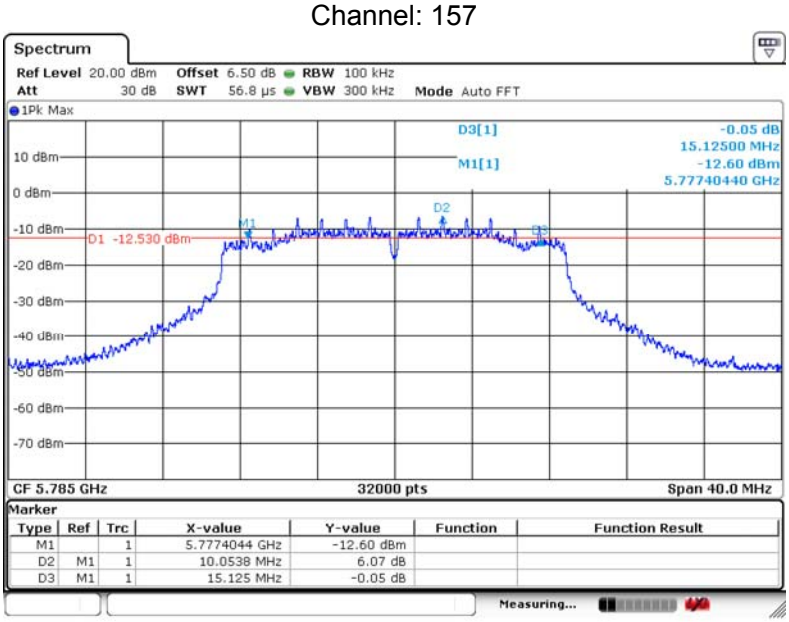

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 100 kHz
Att 30 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D3[1] -0.06 dB
15.12130 MHz
M1[1] -11.69 dBm
5.81740690 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
D1 -11.700 dBm
M1
D2
D3
CF 5.825 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.8174069 GHz -11.69 dBm
D2 M1 1 10.0538 MHz 5.99 dB
D3 M1 1 15.1213 MHz -0.06 dB
Measuring...

6dB BW 802.11ac20

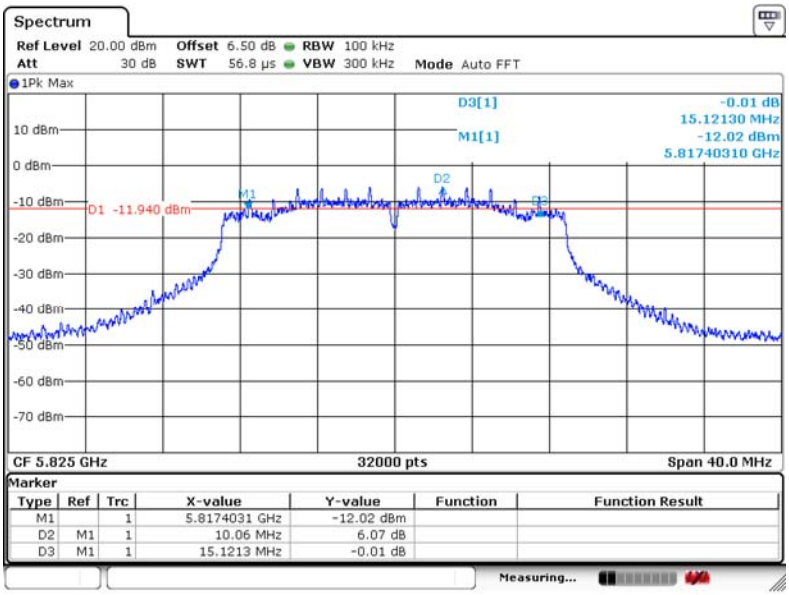
Channel: 149



Channel: 157

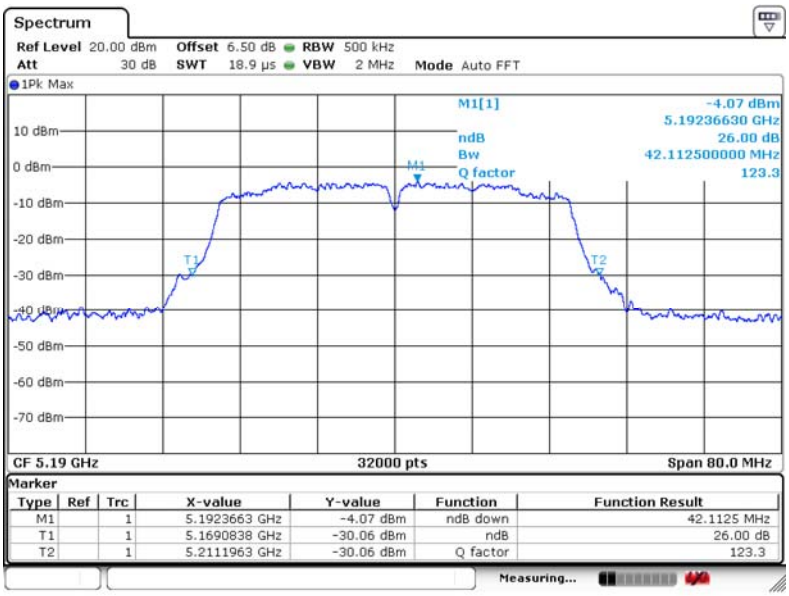


Channel: 165

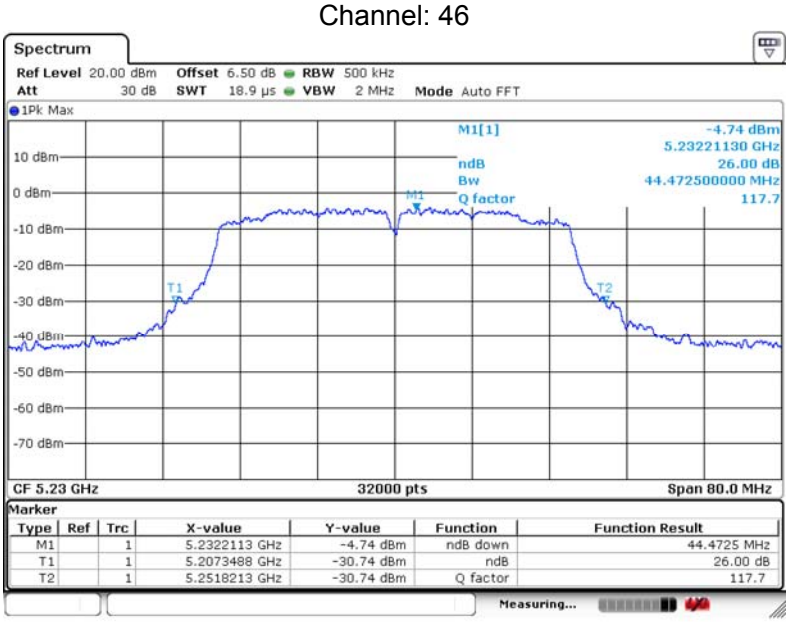

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 100 kHz
Att 30 dB SWT 56.8 µs VBW 300 kHz Mode Auto FFT
1Pk Max
D3[1] -0.01 dB
15.12130 MHz
M1[1] -12.02 dBm
5.81740310 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
D1 -11.940 dBm
M1
D2
D3
CF 5.825 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.8174031 GHz -12.02 dBm
D2 M1 1 10.06 MHz 6.07 dB
D3 M1 1 15.1213 MHz -0.01 dB
Measuring...

26dB BW 802.11n40

Channel: 38

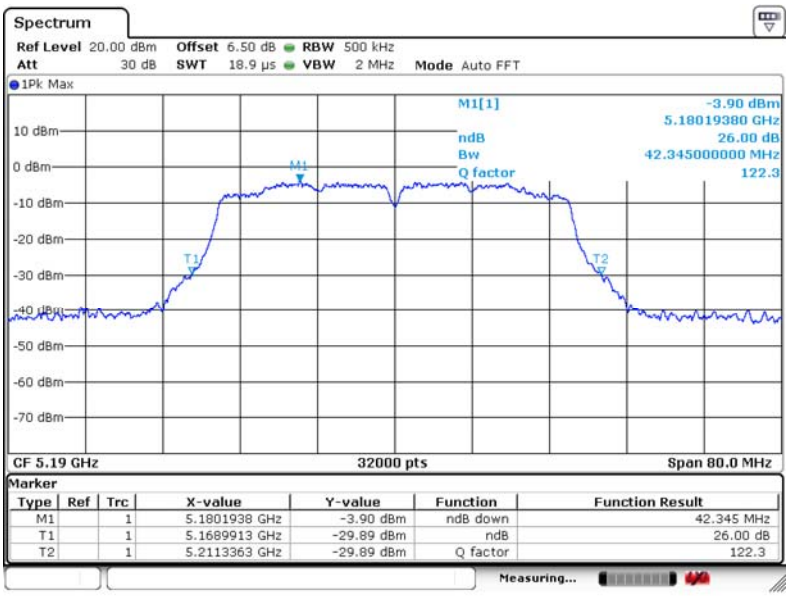


Channel: 46

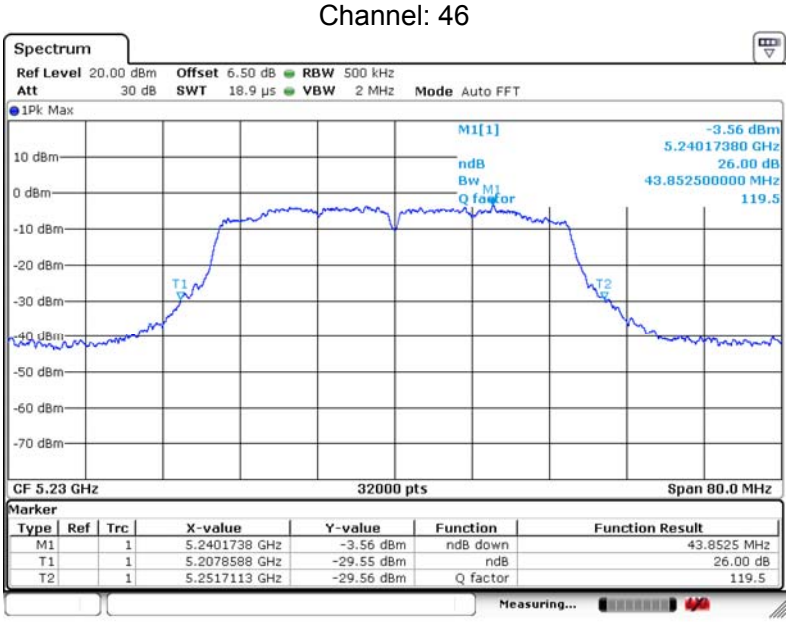


26dB BW 802.11ac40

Channel: 38

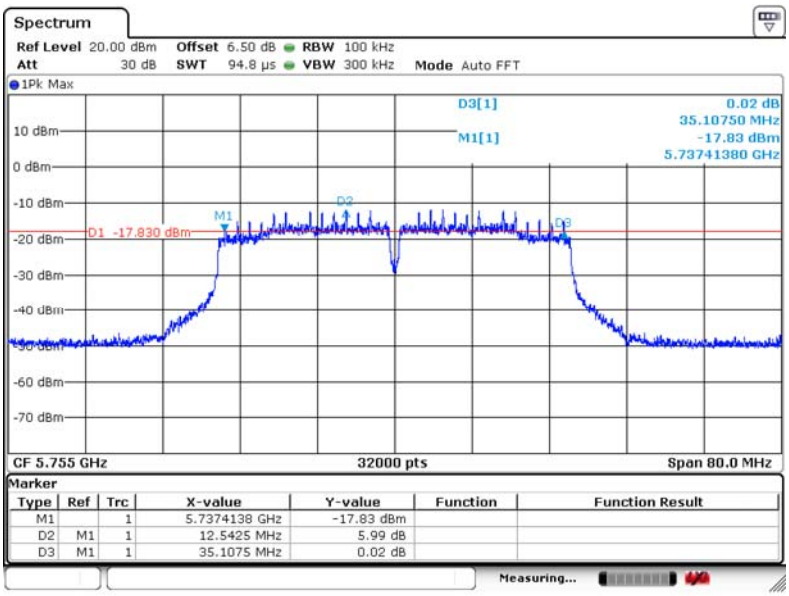


Channel: 46

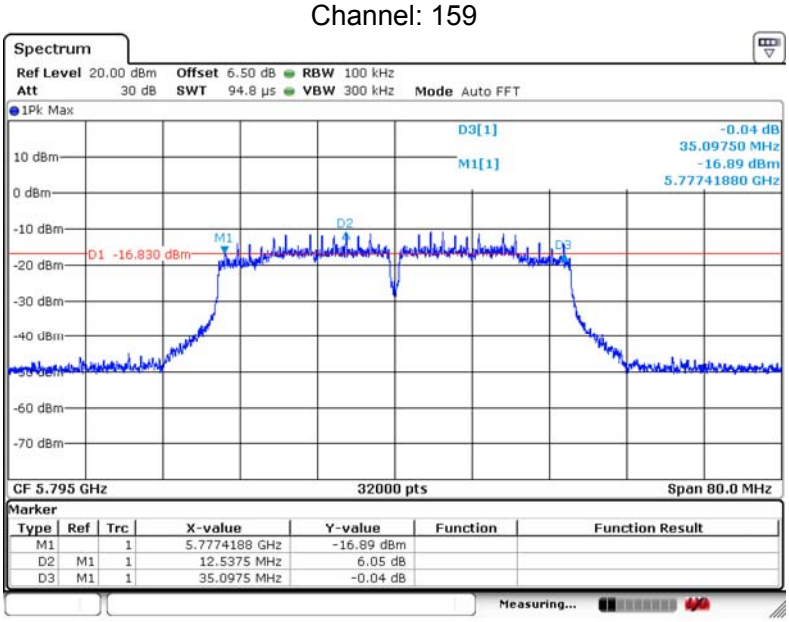


6dB BW 802.11n40

Channel: 151

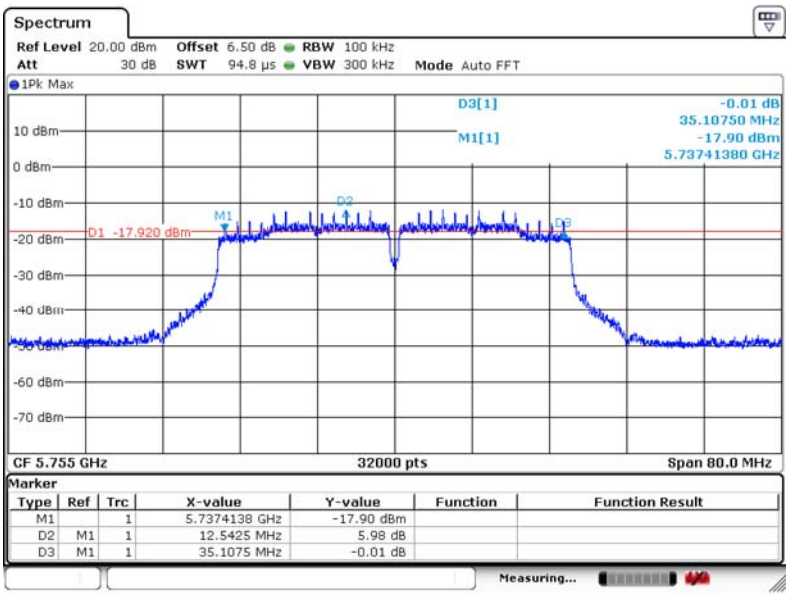


Channel: 159

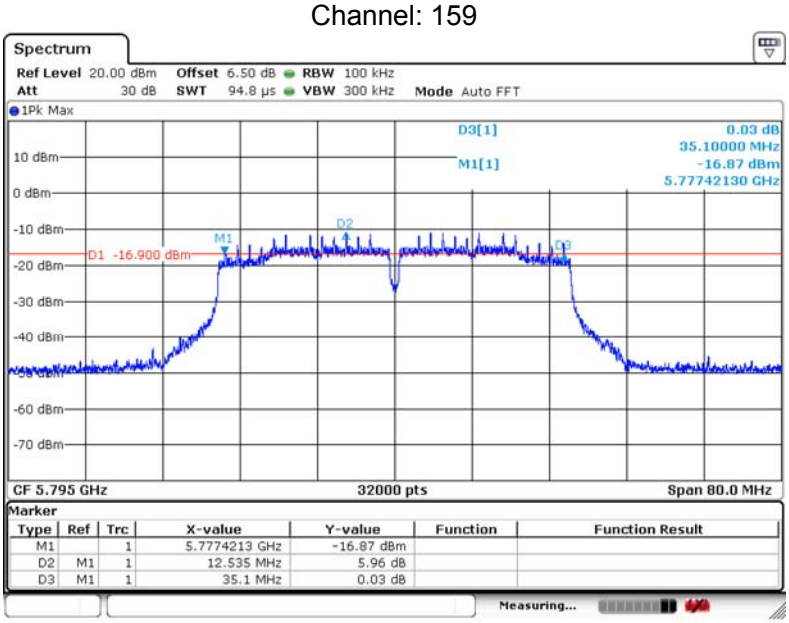


6dB BW 802.11ac40

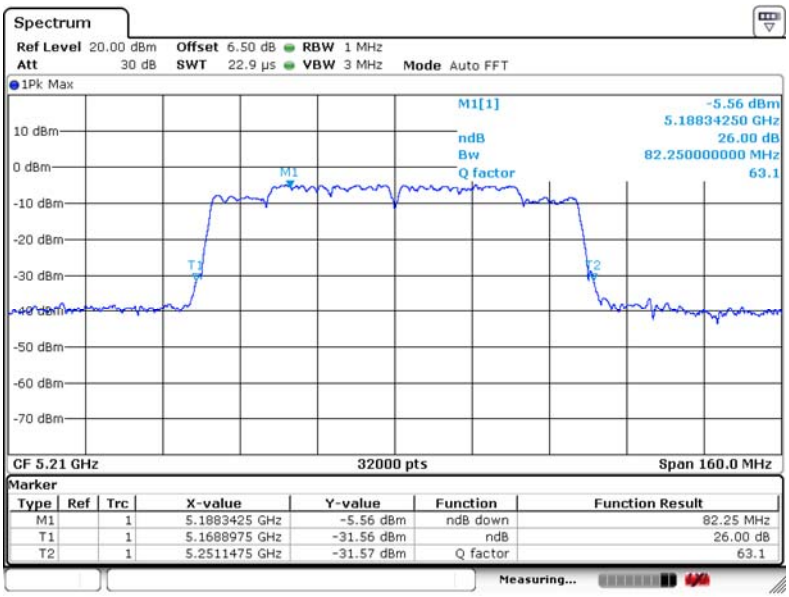
Channel: 151



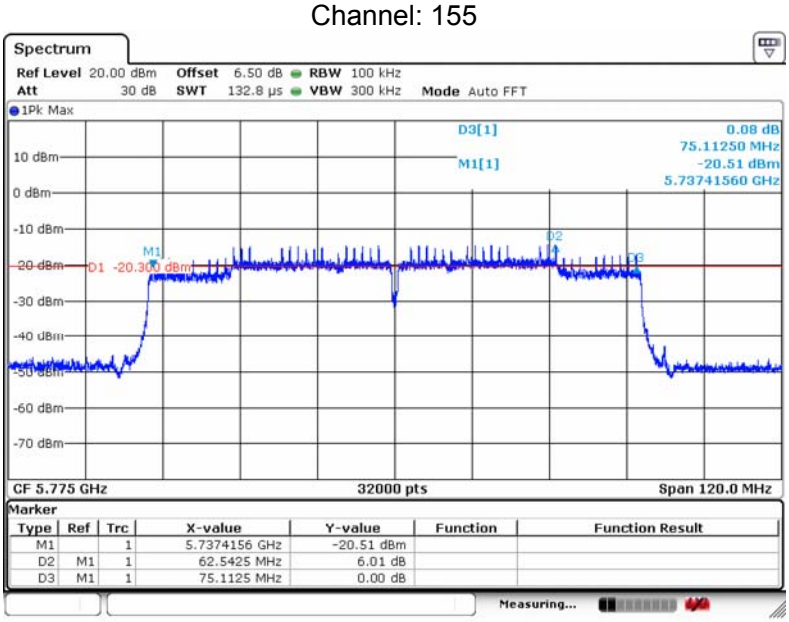
Channel: 159



26dB BW 802.11ac80
Channel:42

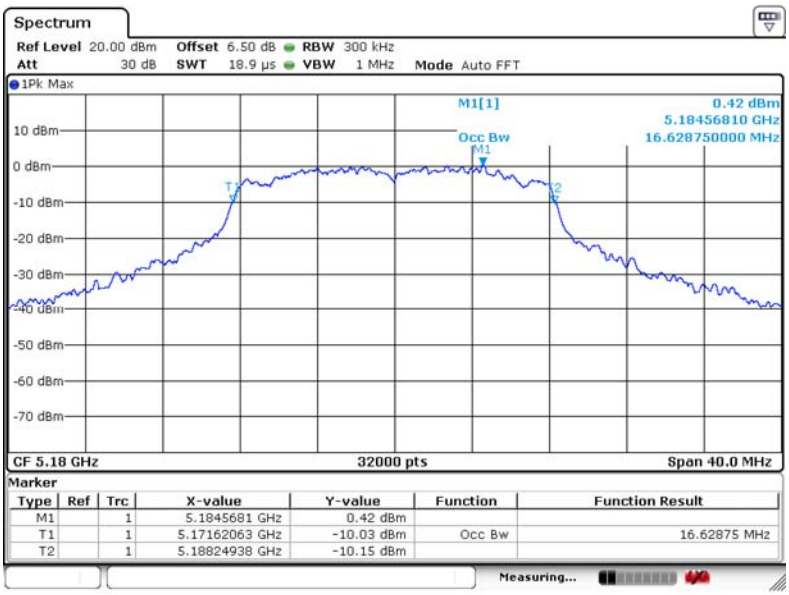


6dB BW 802.11ac80
Channel: 155

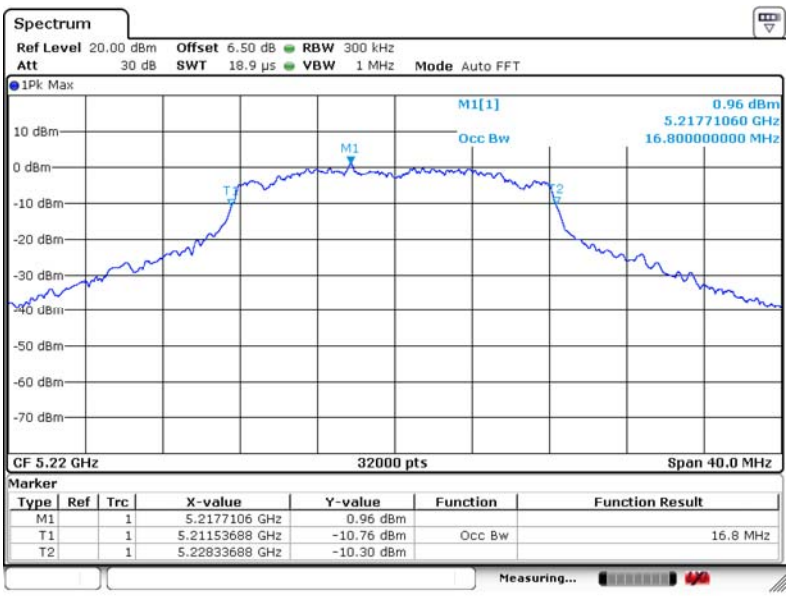


99% OBW 802.11a

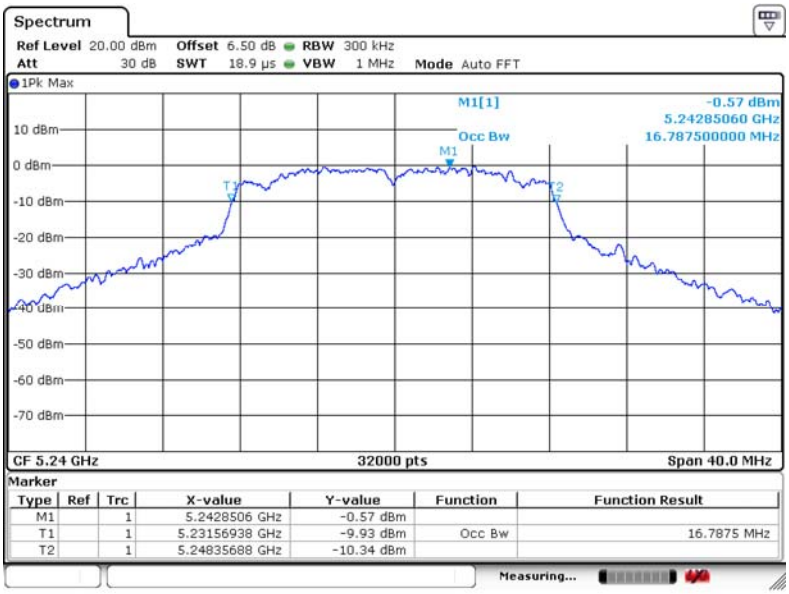
Channel: 36



Channel: 44

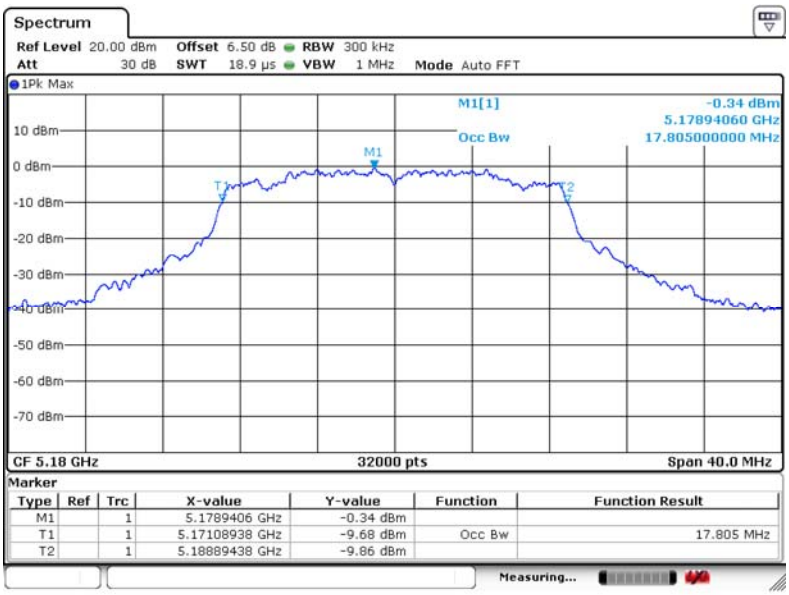


Channel: 48

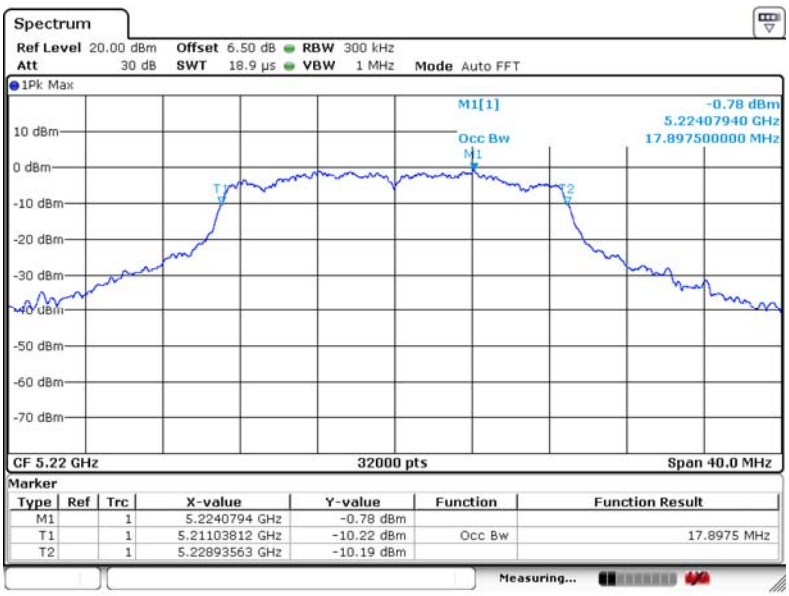

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 300 kHz
Att 30 dB SWT 18.9 µs VBW 1 MHz Mode Auto FFT
1Pk Max
M1[1] -0.57 dBm
5.24285060 GHz
Occ Bw 16.787500000 MHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.24 GHz 32000 pts Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.2428506 GHz -0.57 dBm
T1 1 5.23156938 GHz -9.93 dBm Occ Bw 16.7875 MHz
T2 1 5.24835688 GHz -10.34 dBm
Measuring...

99% OBW 802.11n20

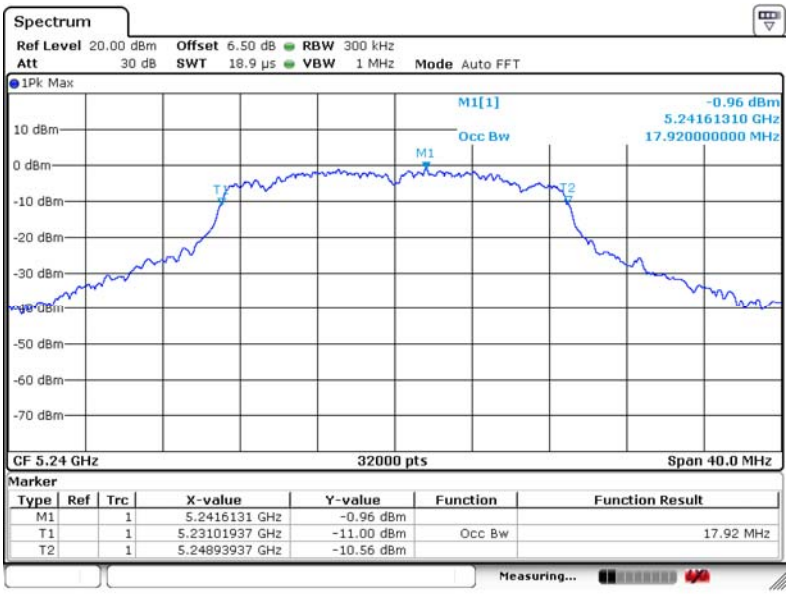
Channel: 36



Channel: 44

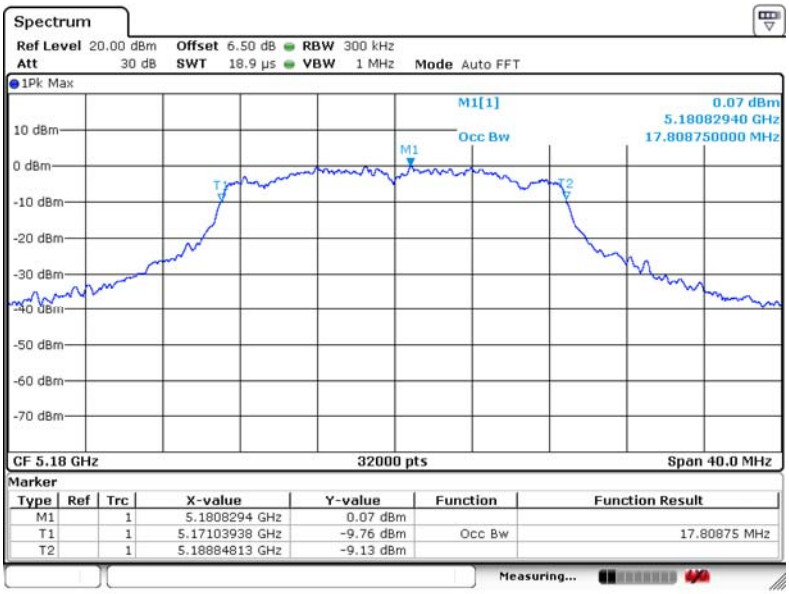


Channel: 48

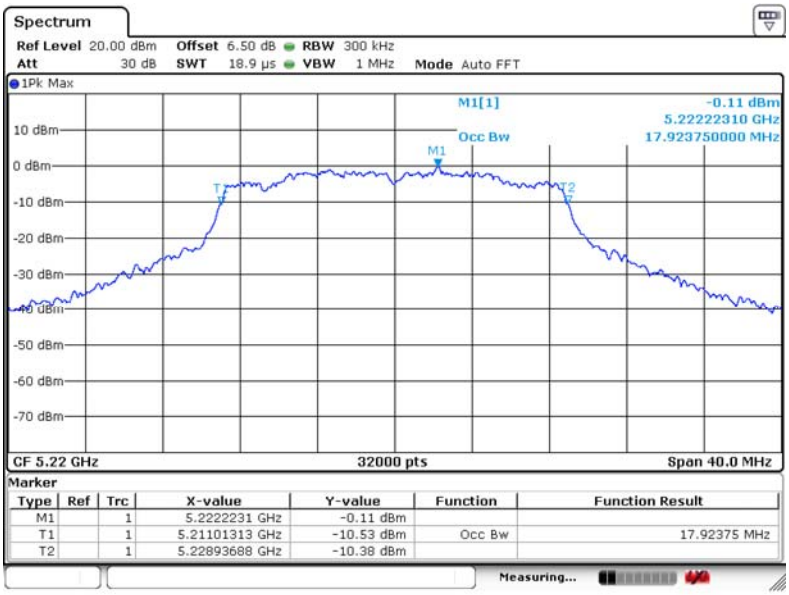

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 300 kHz
Att 30 dB SWT 18.9 µs VBW 1 MHz Mode Auto FFT
1Pk Max
M1[1] -0.96 dBm
5.24161310 GHz
Occ Bw 17.920000000 MHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.24 GHz 32000 pts Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.2416131 GHz -0.96 dBm
T1 1 5.23101937 GHz -11.00 dBm Occ Bw 17.92 MHz
T2 1 5.24893937 GHz -10.56 dBm
Measuring...

99% OBW 802.11ac20

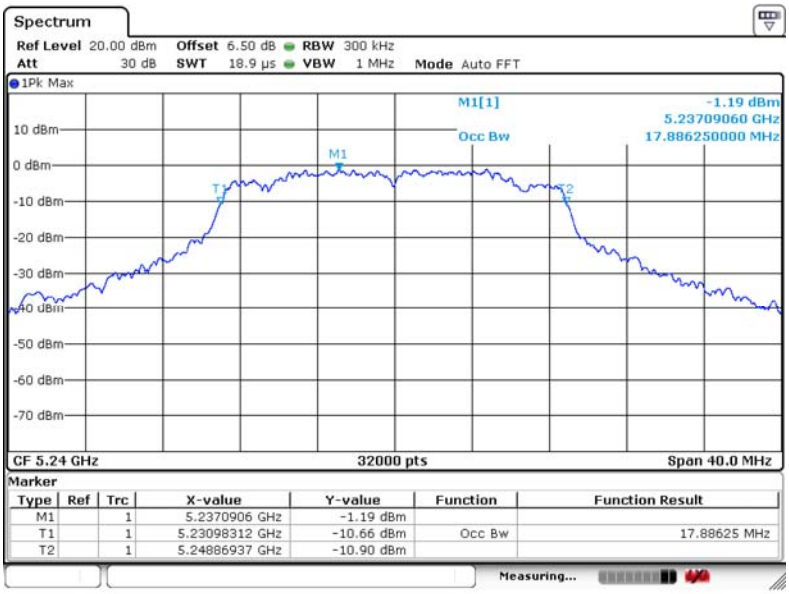
Channel: 36



Channel: 44

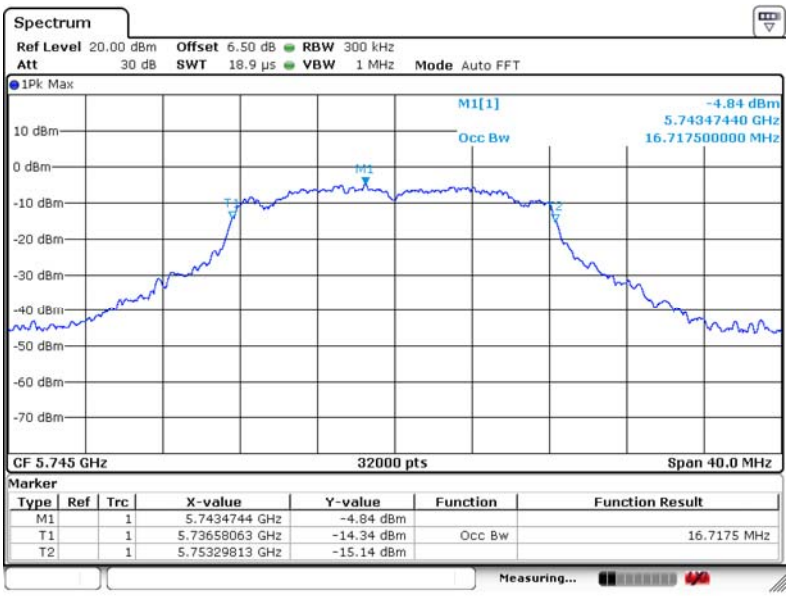


Channel: 48

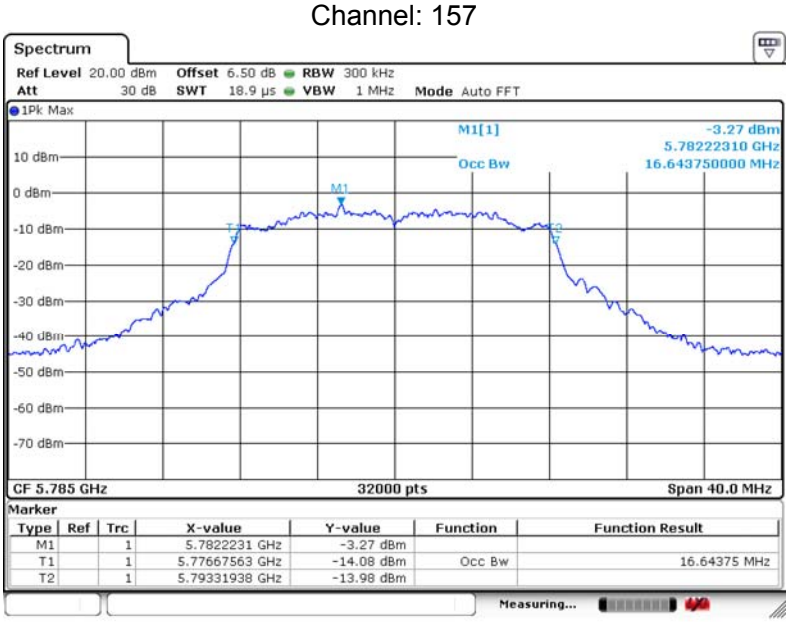

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 300 kHz
Att 30 dB SWT 18.9 µs VBW 1 MHz Mode Auto FFT
1Pk Max
M1[1] -1.19 dBm
5.23709060 GHz
Occ Bw 17.886250000 MHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
T1
T2
CF 5.24 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.2370906 GHz -1.19 dBm
T1 1 5.23098312 GHz -10.66 dBm Occ Bw 17.88625 MHz
T2 1 5.24886937 GHz -10.90 dBm
Measuring...

99% OBW 802.11a

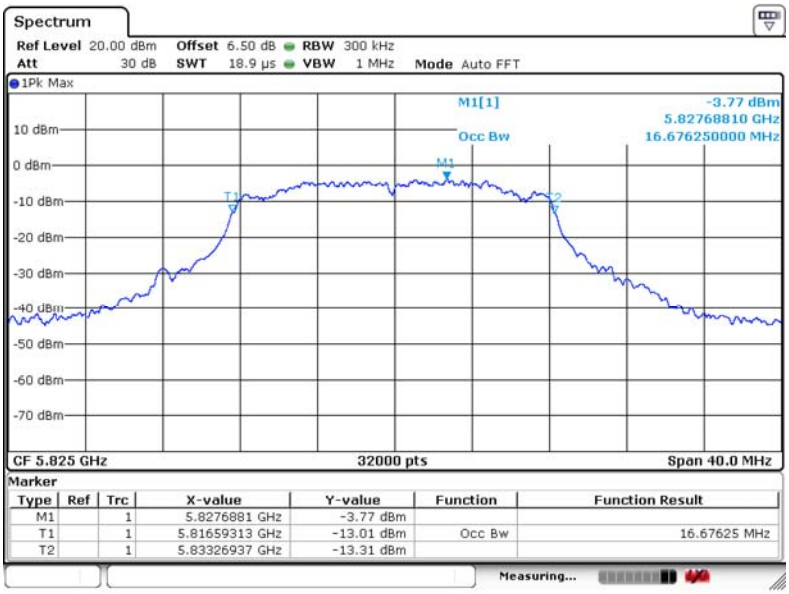
Channel: 149



Channel: 157

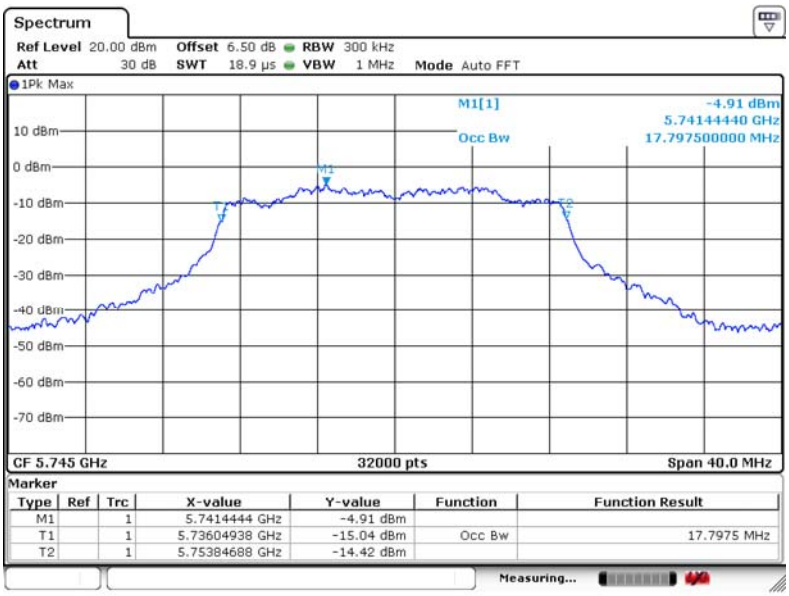


Channel: 165

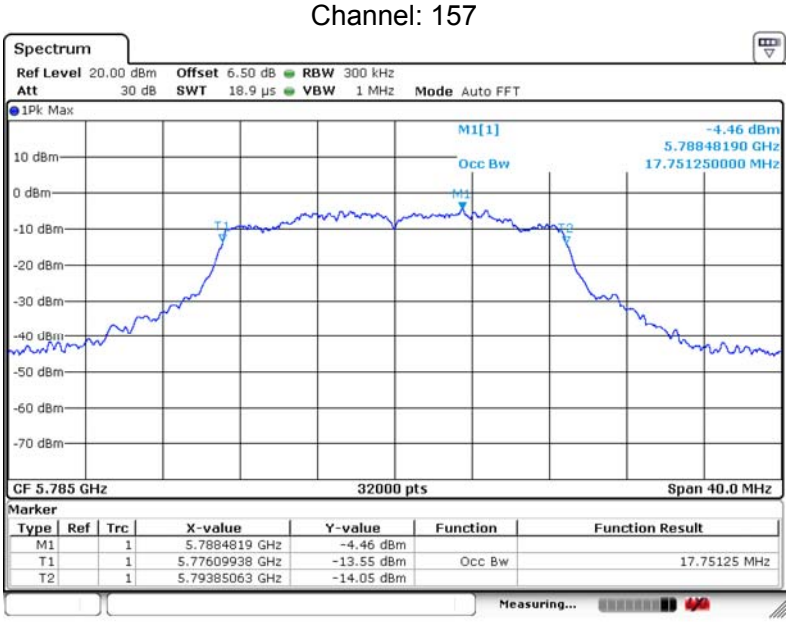

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 300 kHz
Att 30 dB SWT 18.9 µs VBW 1 MHz Mode Auto FFT
1Pk Max
M1[1] -3.77 dBm
5.82768810 GHz
Occ Bw 16.676250000 MHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.825 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.8276881 GHz -3.77 dBm
T1 1 5.81659313 GHz -13.01 dBm Occ Bw 16.67625 MHz
T2 1 5.83326937 GHz -13.31 dBm
Measuring...

99% OBW 802.11n20

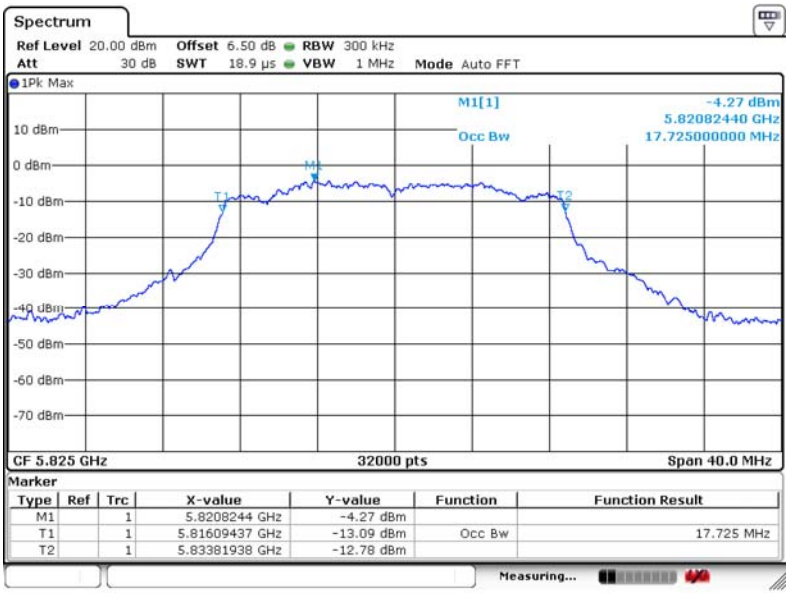
Channel: 149



Channel: 157

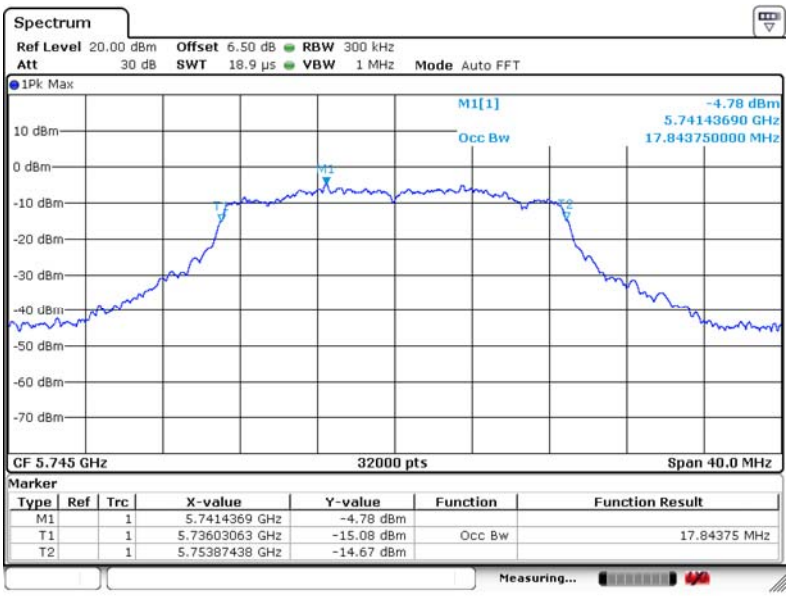


Channel: 165

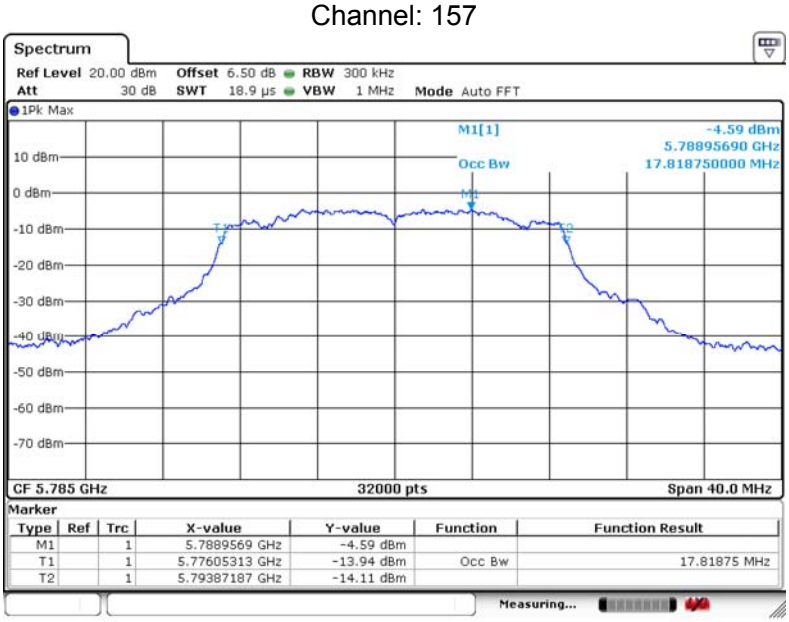

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 300 kHz
Att 30 dB SWT 18.9 µs VBW 1 MHz Mode Auto FFT
1Pk Max
M1[1] -4.27 dBm
5.82082440 GHz
Occ Bw 17.725000000 MHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.825 GHz 32000 pts Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.8208244 GHz -4.27 dBm
T1 1 5.81609437 GHz -13.09 dBm Occ Bw 17.725 MHz
T2 1 5.83381938 GHz -12.78 dBm
Measuring...

99% OBW 802.11ac20

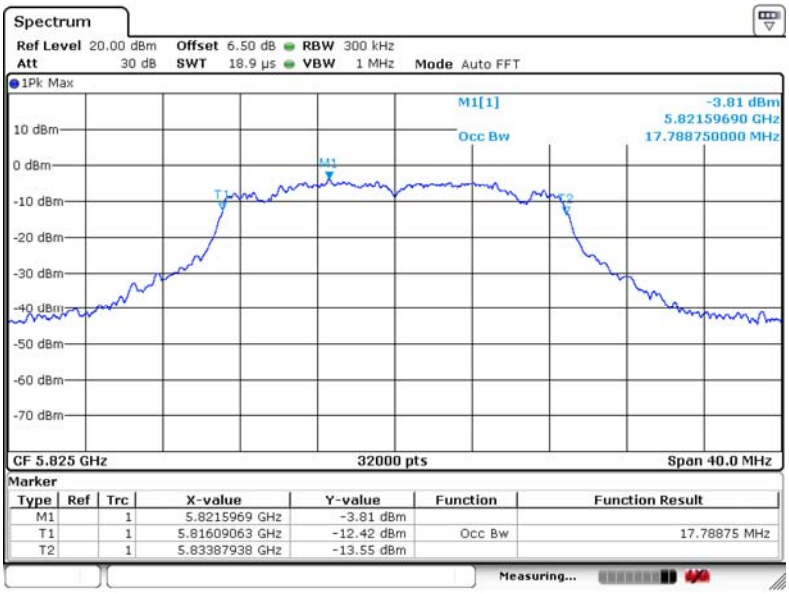
Channel: 149



Channel: 157

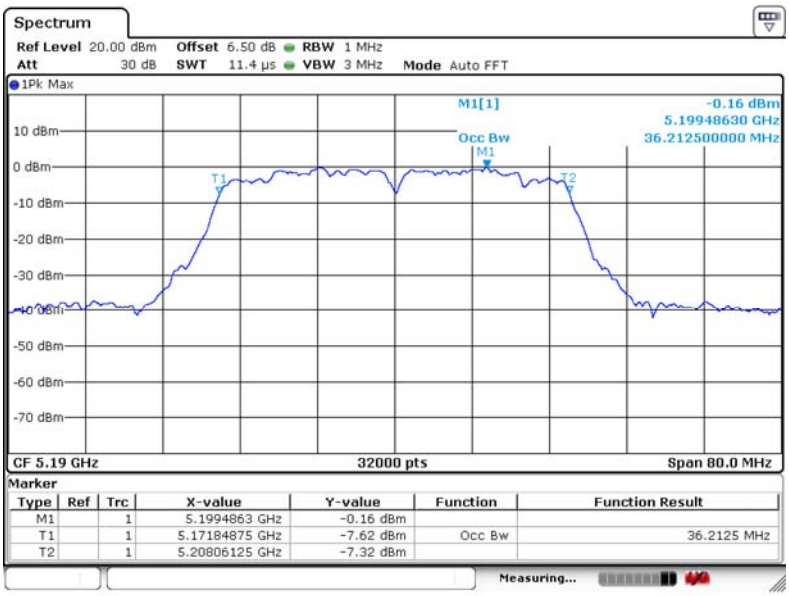


Channel: 165

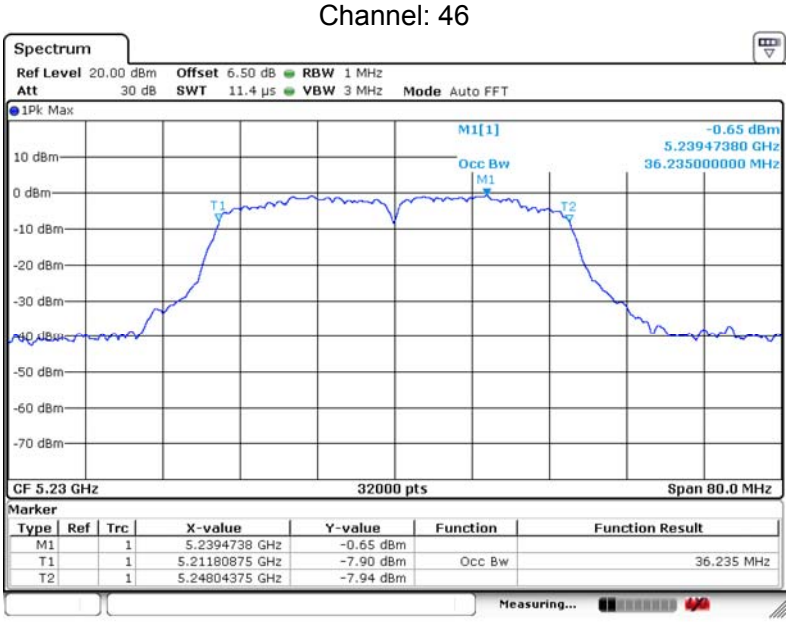

Spectrum
Ref Level 20.00 dBm Offset 6.50 dB RBW 300 kHz
Att 30 dB SWT 18.9 µs VBW 1 MHz Mode Auto FFT
1Pk Max
M1[1] -3.81 dBm
5.82159690 GHz
Occ Bw 17.788750000 MHz
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 5.825 GHz
32000 pts
Span 40.0 MHz
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 5.8215969 GHz -3.81 dBm
T1 1 5.81609063 GHz -12.42 dBm Occ Bw 17.78875 MHz
T2 1 5.83387938 GHz -13.55 dBm
Measuring...

99% OBW 802.11n40

Channel: 38

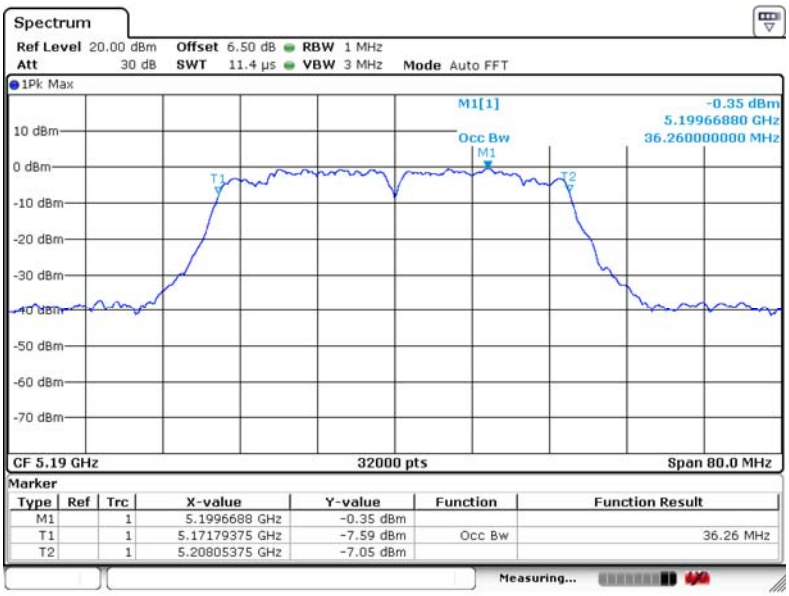


Channel: 46

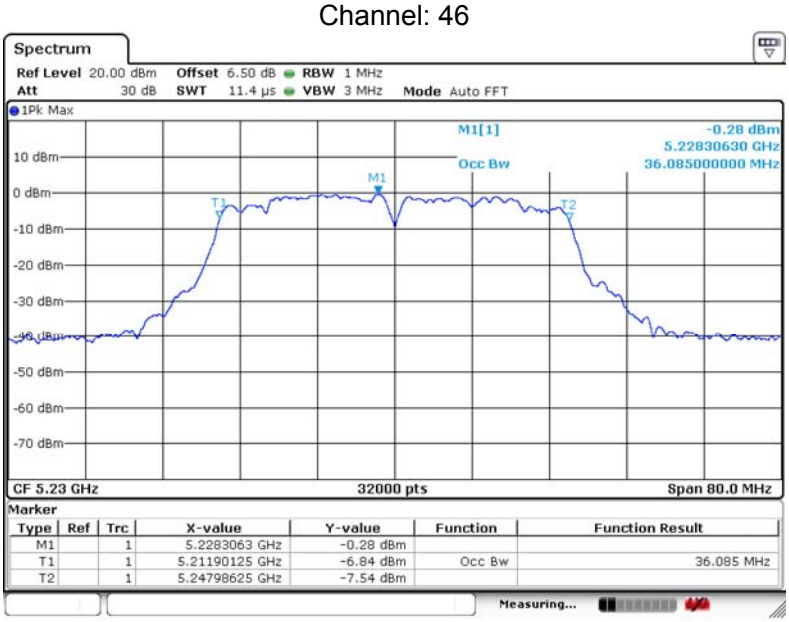


99% OBW 802.11ac40

Channel: 38

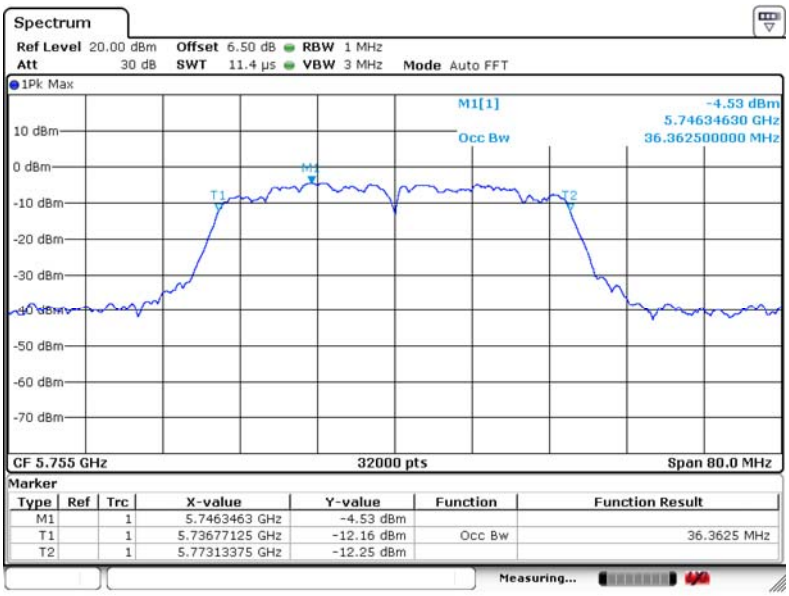


Channel: 46

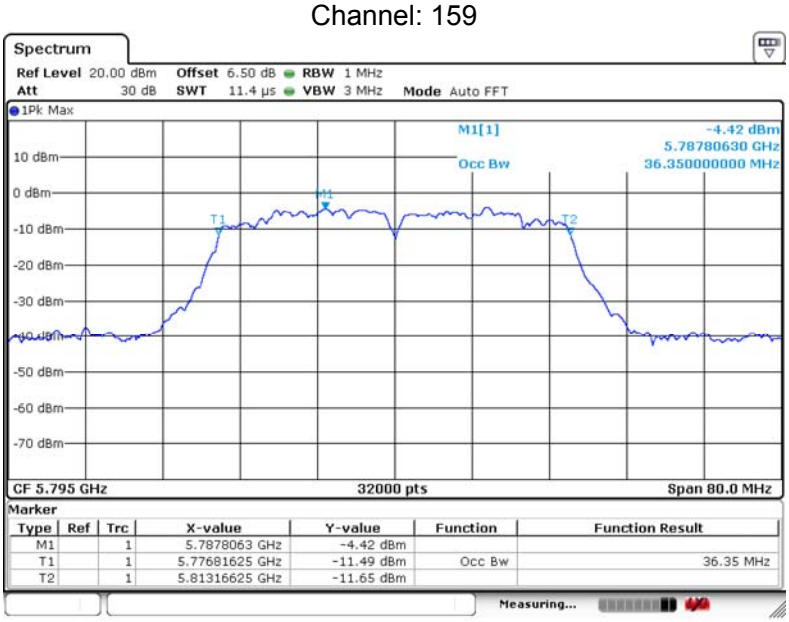


99% OBW 802.11n40

Channel: 151

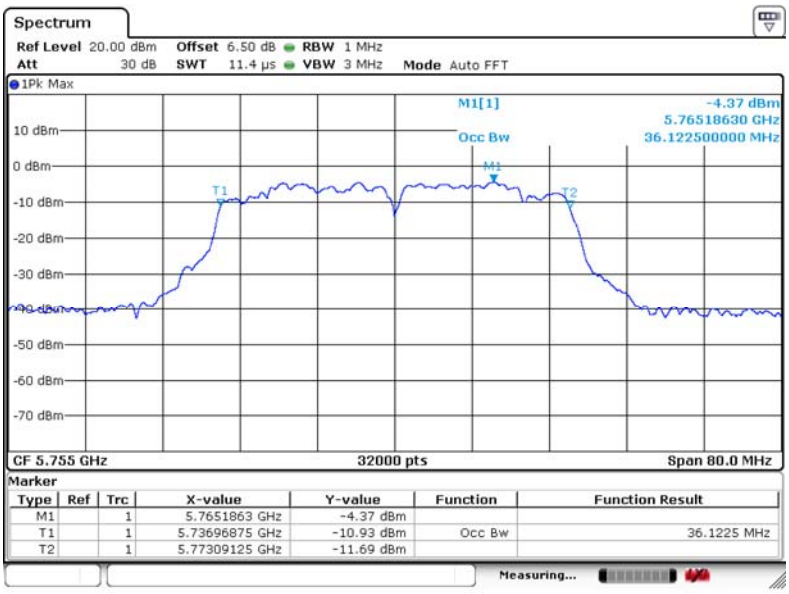


Channel: 159

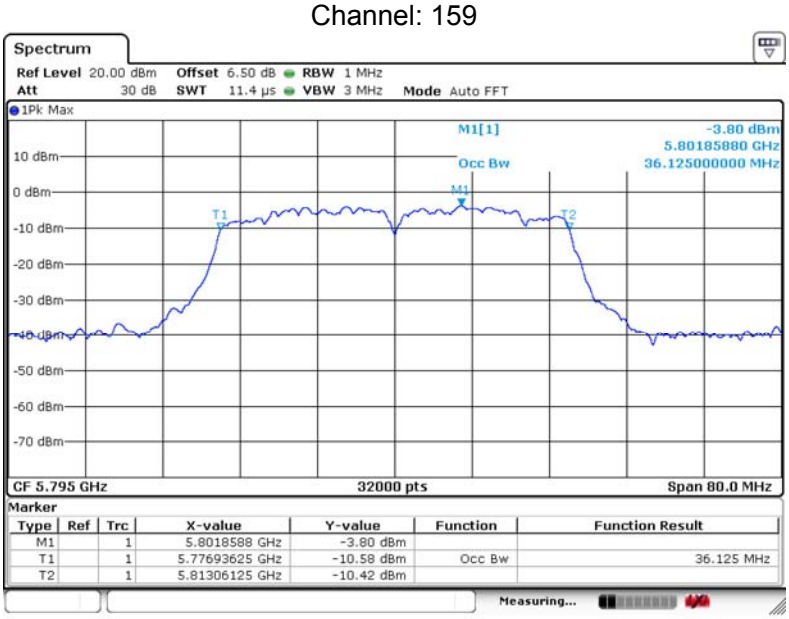


99% OBW 802.11ac40

Channel: 151

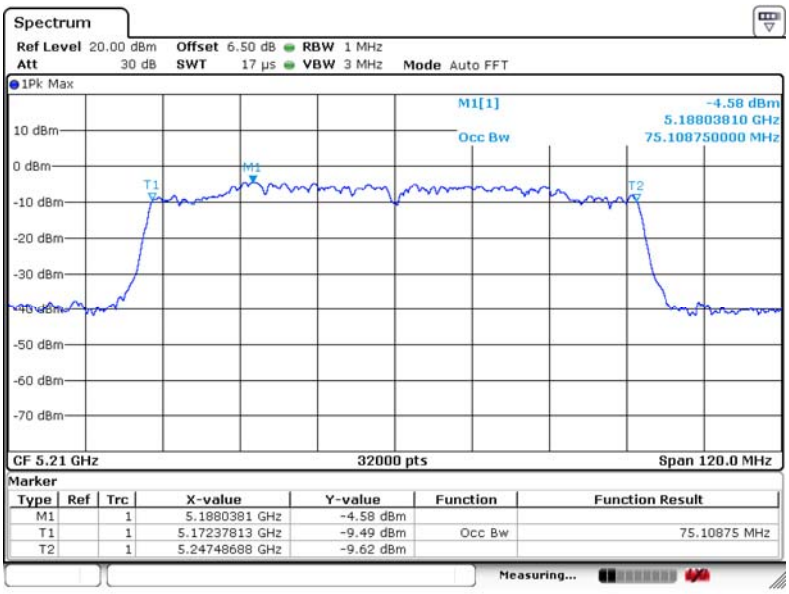


Channel: 159

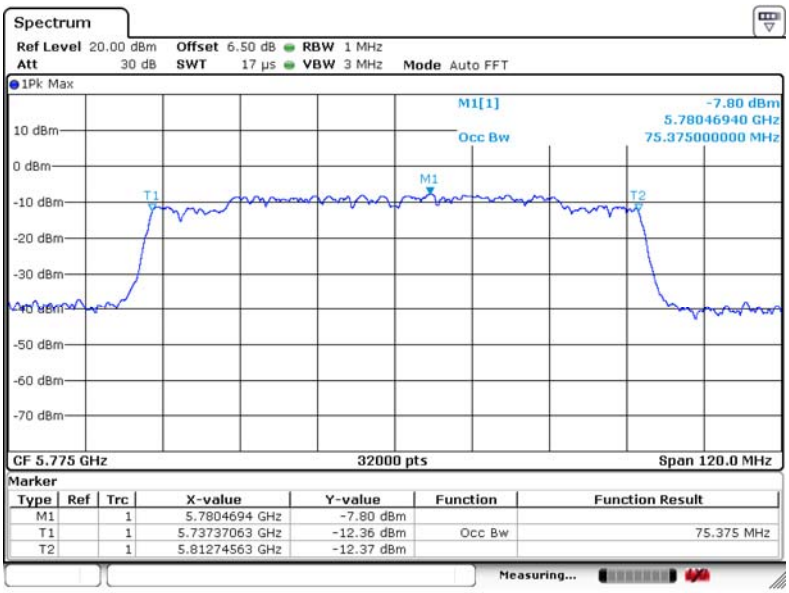


99% OBW 802.11ac80

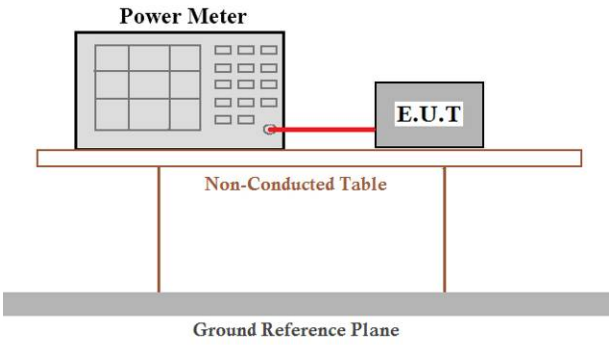
Channel:42



Channel:155



5. MAXIMUM CONDUCTED OUTPUT POWER

Test Requirement:	FCC Part15 E Section 15.407
Test Method:	KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Limit:	For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency bands of operation shall not exceed 250mW. For the band 5.745-5.850 GHz, the maximum conducted output power over the frequency bands of operation shall not exceed 30dBm
Test setup:	
Test procedure:	**Measurement using an RF average power meter** (i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied a) The EUT is configured to transmit continuously or to transmit with a constant duty cycle. b) At all times when the EUT is transmitting, it must be transmitting at its maximum power control level. c) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five. (ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in section B). (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter. (iv) Adjust the measurement in dBm by adding 10 log(1/x) where x is the duty cycle (e.g., 10log(1/0.25) if the duty cycle is 25 percent).
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details

5.1. TEST RESULT

Antenna A:

CH. No.	Frequency (MHz)	Output Power (dBm)			Limit(dBm)	Result
		802.11a	802.11n (HT20)	802.11ac (VHT20)		
36	5180.00	15.05	14.59	14.55	24	Pass
44	5220.00	14.95	14.36	14.34	24	Pass
48	5240.00	14.58	14.19	14.18	24	Pass
149	5745.00	10.07	9.56	9.55	30	Pass
157	5785.00	10.01	10.18	10.16	30	Pass
165	5825.00	11.11	10.98	10.95	30	Pass

CH. No.	Frequency (MHz)	Output Power (dBm)		Limit(dBm)	Result
		802.11n(HT40)	802.11ac(VHT40)		
38	5190.00	13.66	13.63	24	Pass
46	5230.00	13.23	13.20	24	Pass
151	5755.00	9.78	9.75	30	Pass
159	5795.00	10.20	10.17	30	Pass

CH. No.	Frequency (MHz)	Output Power (dBm)	Limit(dBm)	Result
		802.11ac(VHT80)		
42	5210.00	12.15	24	Pass
155	5775.00	9.75	30	Pass

Antenna B:

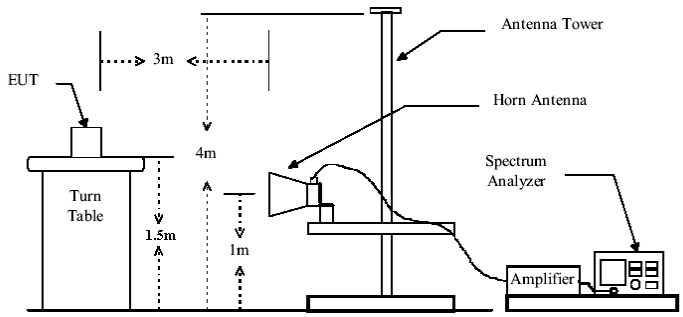
CH. No.	Frequency (MHz)	Output Power (dBm)			Limit(dBm)	Result
		802.11a	802.11n (HT20)	802.11ac (VHT20)		
36	5180.00	15.02	14.54	14.53	24	Pass
44	5220.00	14.94	14.32	14.30	24	Pass
48	5240.00	14.56	14.14	14.14	24	Pass
149	5745.00	10.05	9.53	9.52	30	Pass
157	5785.00	9.99	10.15	10.13	30	Pass
165	5825.00	11.07	10.94	10.91	30	Pass

CH. No.	Frequency (MHz)	Output Power (dBm)		Limit(dBm)	Result
		802.11n(HT40)	802.11ac(VHT40)		
38	5190.00	13.62	13.60	24	Pass
46	5230.00	13.19	13.16	24	Pass
151	5755.00	9.73	9.72	30	Pass
159	5795.00	10.15	10.14	30	Pass

CH. No.	Frequency (MHz)	Output Power (dBm)	Limit(dBm)	Result
		802.11ac(VHT80)		
42	5210.00	12.13	24	Pass
155	5775.00	9.70	30	Pass

6. Band Edges Measurement

<table>
<tr><td>Test Requirement:</td><td>FCC Part15 E Section 15.407 and 5.205</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10:2013</td></tr>
<tr><td>Test site:</td><td>Measurement Distance: 3m</td></tr>
<tr><td>Receiver setup:</td><td>
<table>
<tr><th>Frequency</th><th>Detector</th><th>RBW</th><th>VBW</th><th>Remark</th></tr>
<tr><td>30MHz-1GHz</td><td>Quasi-peak</td><td>100KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td>AV</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Limit (dBuV/m @3m)</th><th>Remark</th></tr>
<tr><td>30MHz-88MHz</td><td>40.0</td><td>Quasi-peak Value</td></tr>
<tr><td>88MHz-216MHz</td><td>43.5</td><td>Quasi-peak Value</td></tr>
<tr><td>216MHz-960MHz</td><td>46.0</td><td>Quasi-peak Value</td></tr>
<tr><td>960MHz-1GHz</td><td>54.0</td><td>Quasi-peak Value</td></tr>
<tr><td rowspan="2">Above 1GHz</td><td>54.0</td><td>Average Value</td></tr>
<tr><td>74.0</td><td>Peak Value</td></tr>
</table>
Undesirable emission limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
(3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.
</td></tr>
<tr><td>Test Procedure:</td><td>
a. The EUT was placed on the top of a rotating table 1.5 m above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
</td></tr>
</table>

Test setup:	Above 1GHz 
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Remark:

According to KDB 789033 v02r01 section G) 1) (d), for For measurements above 1000 MHz @ 3m distance, the limit of field strength is computed as follows:

E[dBuV/m] = EIRP[dBm] + 95.2;

For example, if EIRP = -27dBm

E[dBuV/m] = -27 + 95.2 = 68.2dBuV/m.

6.1. TEST RESULT

Peak value:

Test mode:		802.11a		Test channel:		Lowest	
Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector	Antenna Pol.
5150	48.54	7.18	55.72	68.2	-12.48	PK	H
5150	47.32	7.18	54.5	68.2	-13.7	PK	V
Test mode:		802.11a		Test channel:		Highest	
Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector	Antenna Pol.
5350	44.59	7.2	51.79	68.2	-16.41	PK	H
5350	52.16	7.2	59.36	68.2	-8.84	PK	V

Peak value:

Test mode:		802.11n(HT20)		Test channel:		Lowest	
Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector	Antenna Pol.
5150	49.63	7.18	56.81	68.2	-11.39	PK	H
5150	55.98	7.18	63.16	68.2	-5.04	PK	V
Test mode:		802.11n(HT20)		Test channel:		Highest	
Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector	Antenna Pol.
5350	46.14	7.2	53.34	68.2	-14.86	PK	H
5350	51.36	7.2	58.56	68.2	-9.64	PK	V

Peak value:

Test mode:		802.11n(HT40)		Test channel:		Lowest	
Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pol.
5150	44.57	7.18	51.75	68.2	-16.45	PK	H
5150	43.61	7.18	50.79	68.2	-17.41	PK	V
Test mode:		802.11n(HT40)		Test channel:		Highest	
Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pol.
5350	48.73	7.2	55.93	68.2	-12.27	PK	H
5350	46.26	7.2	53.46	68.2	-14.74	PK	V

Peak value:

Test mode:		802.11ac(VHT80)		Test channel:		Lowest	
Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pol.
5150	48.52	7.18	55.7	68.2	-12.5	PK	H
5150	47.14	7.18	54.32	68.2	-13.88	PK	V
Test mode:		802.11ac(VHT80)		Test channel:		Highest	
Frequency (MHz)	Reading Level	Factor	Measure Level	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Pol.
5350	48.03	7.2	55.23	68.2	-12.97	PK	H
5350	45.61	7.2	52.81	68.2	-15.39	PK	V

Test mode:	802.11a	Test channel:	Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725	43.01	8.79	51.8	74	-22.2	Horizontal
5741.35	82.45	8.57	91.02	N/A	N/A	Horizontal
5725	42.63	8.79	51.42	74	-22.58	Vertical
5741.35	85.14	8.57	93.71	N/A	N/A	Vertical

Average

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725	31.56	8.79	40.35	54	-13.65	31.16
5741.35	72.67	8.57	81.24	N/A	N/A	72.53
5725	30.74	8.79	39.53	54	-14.47	30.68
5741.35	75.25	8.57	83.82	N/A	N/A	75.49

Test mode:	802.11a	Test channel:	Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.2	79.61	8.79	88.4	N/A	N/A	79.25
5850	38.99	8.82	47.81	74	-26.19	38.97
5826.2	85.83	8.79	94.62	N/A	N/A	85.76
5850	39.94	8.82	48.76	74	-25.24	39.89

Average

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.2	71.16	8.79	79.95	N/A	N/A	Horizontal
5850	30.24	8.82	39.06	54	-14.94	Horizontal
5826.2	76.53	8.79	85.32	N/A	N/A	Vertical
5850	29.24	8.82	38.06	54	-15.94	Vertical

Test mode: 802.11n(HT20) Test channel: Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725	29.33	8.79	38.12	74	-35.88	Horizontal
5742.19	78.14	8.57	86.71	N/A	N/A	Horizontal
5725	40.25	8.79	49.04	74	-24.96	Vertical
5742.19	84.31	8.57	92.88	N/A	N/A	Vertical

Average

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725	28.94	8.79	37.73	54	-16.27	Horizontal
5742.19	68.73	8.57	77.3	N/A	N/A	Horizontal
5725	30.23	8.79	39.02	54	-14.98	Vertical
5742.19	75.98	8.57	84.55	N/A	N/A	Vertical

Test mode: 802.11n(HT20) Test channel: Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.2	77.73	8.79	86.52	N/A	N/A	Horizontal
5850	39.26	8.82	48.08	74	-25.92	Horizontal
5826.2	36.63	8.79	45.42	N/A	N/A	Vertical
5850	40.87	8.82	49.69	74	-24.31	Vertical

Average

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5826.2	68.99	8.79	77.78	N/A	N/A	Horizontal
5850	30.24	8.82	39.06	54	-14.94	Horizontal
5826.2	74.93	8.79	83.72	N/A	N/A	Vertical
5850	30.15	8.82	38.97	54	-15.03	Vertical

Test mode: 802.11n(HT40) Test channel: Lowest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725	40.03	8.52	48.55	74	-25.45	Horizontal
5745	75.84	8.57	84.41	N/A	N/A	Horizontal
5725	38.36	8.52	46.88	74	-27.12	Vertical
5745	84.93	8.57	93.5	N/A	N/A	Vertical

Average

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725	31.25	8.52	39.77	54	-14.23	Horizontal
5745	69.63	8.57	78.2	N/A	N/A	Horizontal
5725	29.74	8.52	38.26	54	-15.74	Vertical
5745	75.83	8.57	84.4	N/A	N/A	Vertical

Test mode: 802.11n(HT40) Test channel: Highest

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5784.88	78.77	8.68	87.45	N/A	N/A	Horizontal
5850	36.25	8.82	45.07	74	-28.93	Horizontal
5784.88	85.16	8.68	93.84	N/A	N/A	Vertical
5850	44.03	8.82	52.85	74	-21.15	Vertical

Average

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5784.88	71.62	8.68	80.3	N/A	N/A	Horizontal
5850	30.59	8.82	39.41	54	-14.59	Horizontal
5784.88	74.83	8.68	83.51	N/A	N/A	Vertical
5850	28.74	8.82	37.56	54	-16.44	Vertical

Test mode: 802.11ac(VHT80) Test channel: Middle

Peak value:

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.000	39.25	8.52	47.77	74	-26.23	Horizontal
5778.180	78.66	8.68	87.34	N/A	N/A	Horizontal
5850.000	37.49	8.82	46.31	74	-27.69	Horizontal
5725.000	38.57	8.52	47.09	74	-26.91	Vertical
5778.180	83.12	8.68	91.8	N/A	N/A	Vertical
5850.000	40.36	8.82	49.18	74	-24.82	Vertical

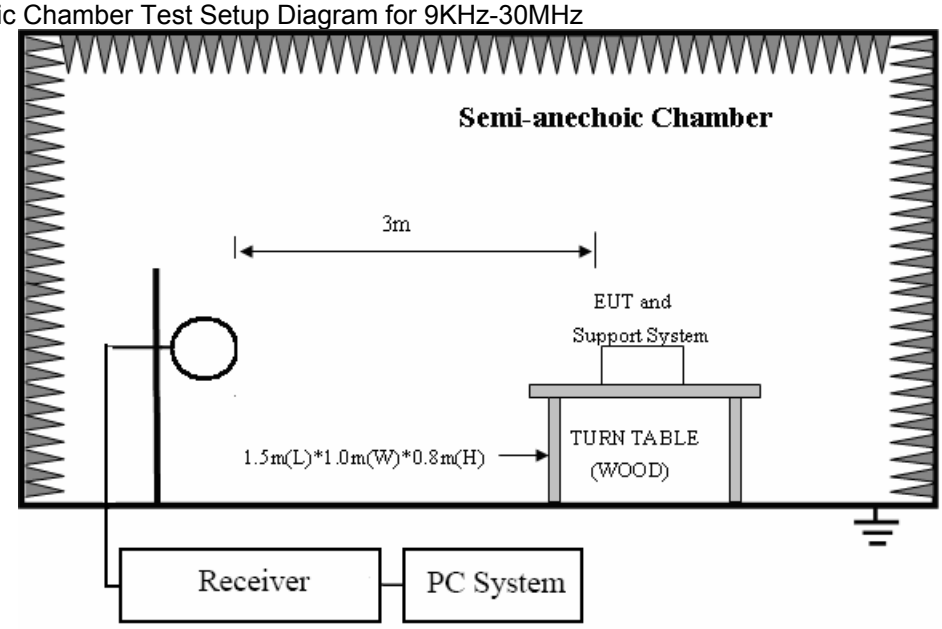
Average

Frequency (MHz)	Read Level (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
5725.000	32.13	8.52	40.65	54	-13.35	Horizontal
5778.180	70.21	8.68	78.89	N/A	N/A	Horizontal
5850.000	28.97	8.82	37.79	54	-16.21	Horizontal
5725.000	29.94	8.52	38.46	54	-15.54	Vertical
5778.180	72.85	8.68	81.53	N/A	N/A	Vertical
5850.000	30.16	8.82	38.98	54	-15.02	Vertical

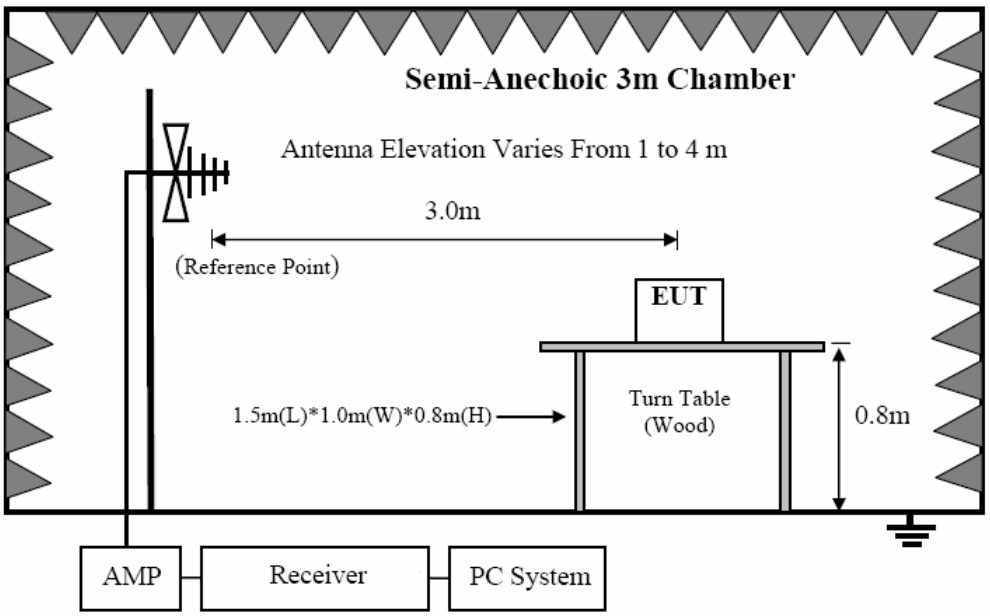
7. RADIATED EMISSION MEASUREMENT

7.1. Block diagram of test setup

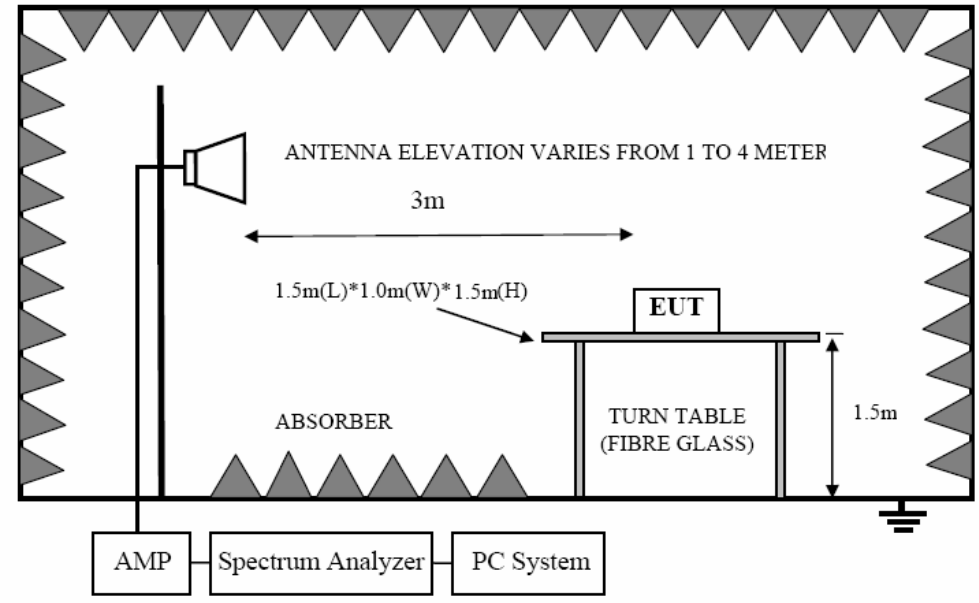
In 3m Anechoic Chamber Test Setup Diagram for 9KHz-30MHz



In 3m Anechoic Chamber Test Setup Diagram for 30MHz-1GHz



In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

7.2. Limit

9.3.1 FCC 15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

9.3.2. FCC 15.209 Limit.

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(KHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(KHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz and above 1000MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30MHz, measurement may be performed at a distance closer then that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$Limit_{3m}(dBuV/m) = Limit_{30m}(dBuV/m) + 40Log(30m/3m)$

9.3.3. Limit for this EUT

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 30dB below the fundamental emissions, or comply with 15.209 limits.

7.3. Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.

(2) Setup EUT and assistant system according clause 2.4 and 7.2

(3) Test antenna was located 3m(except 18GHz-40GHz was 1m) from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used
9KHz-30MHz	Active Loop antenna
30MHz-1GHz	Trilog Broadband Antenna
1GHz-18GHz	Double Ridged Horn Antenna(1GHz-18GHz)
18GHz-40GHz	Horn Antenna(18GHz-40GHz)

According ANSI C63.10:2013 clause 6.4.4.2 and 6,5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also be positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. for measurement above 30MHz, the Trilog Broadband Antenna or Horn Antenna was located 3m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(4) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9KHz to 25GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT was rotated 360 degree, the antenna height was varied from 1m to 4m(Except loop antenna, it's fixed 1m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) new battery is used during testing

(e) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.

Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated, and no any obvious emission were detected from 18GHz to 25GHz, so below final test was performed with frequency range from 9KHz to 18GHz.

(5) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 2013 on Radiated Emission test.

(6) The emissions from 9KHz to 1GHz were measured based on CISPR QP detector except for the frequency bands 9-90KHz, 110-490KHz, for emissions from 9KHz-90KHz,110KHz-490KHz and above 1GHz were measured based on average detector, for emissions above 1GHz, peak emissions also be measured and need comply with Peak limit.

(7) The emissions from 9KHz to 1GHz, QP or average values were measured with EMI receiver with below RBW

Frequency band	RBW
9KHz-150KHz	200Hz
150KHz-30MHz	9KHz
30MHz-1GHz	120KHz

（8）For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure(according ANSI C63.10:2013 clause 4.2.3.2.3 procedure for average measure). Peak detector is used for Peak and AV measurement both.

7.4. Test result(Below 30MHz)

EUT:	6” Rugged PDA	Model No.:	COMARK-6
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	120V 60Hz
Polarization:	--	Test Result:	Pass
Test Mode:	Keeping TX mode	Test By:	Smile

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	P
--	--	--	--	P

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

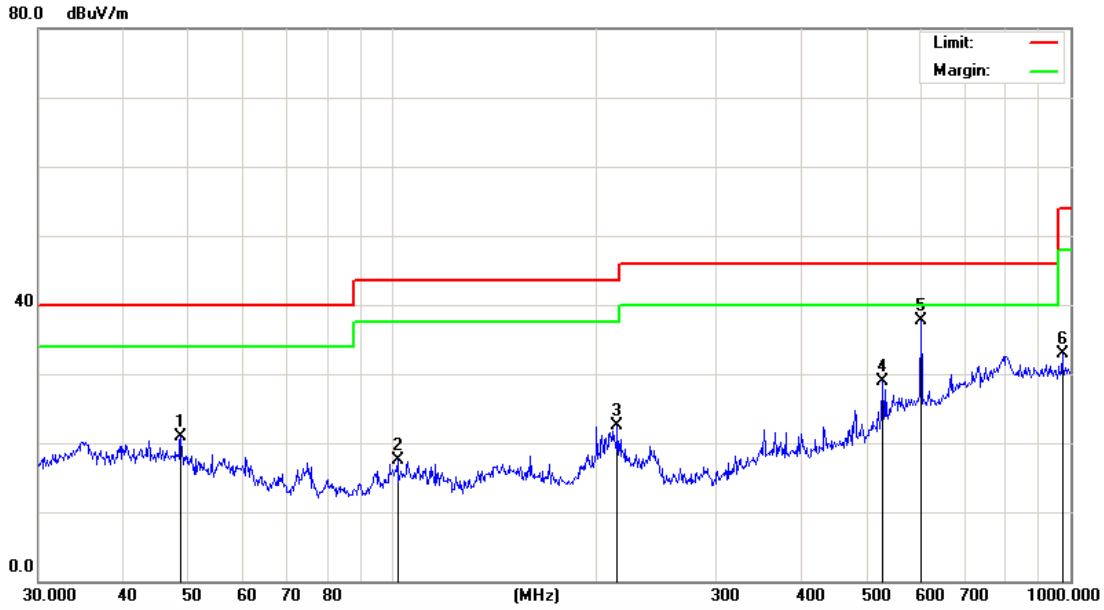
Distance extrapolation factor =20 log (specific distance/test distance)(dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

Note: The worst data is Antenna A, only shown Antenna A Plot.

TEST RESULTS (Between 30M – 1000 MHz)

EUT:	6” Rugged PDA	Model No.:	COMARK-6
Temperature:	24	Relative Humidity:	55%
Distance:	3m	Test Power:	AC120V/60Hz
Polarization:	Vertical	Test Result:	Pass
Standard:	(RE)FCC PART 15	Test By:	Smile
Test Mode:	Keeping TX mode		

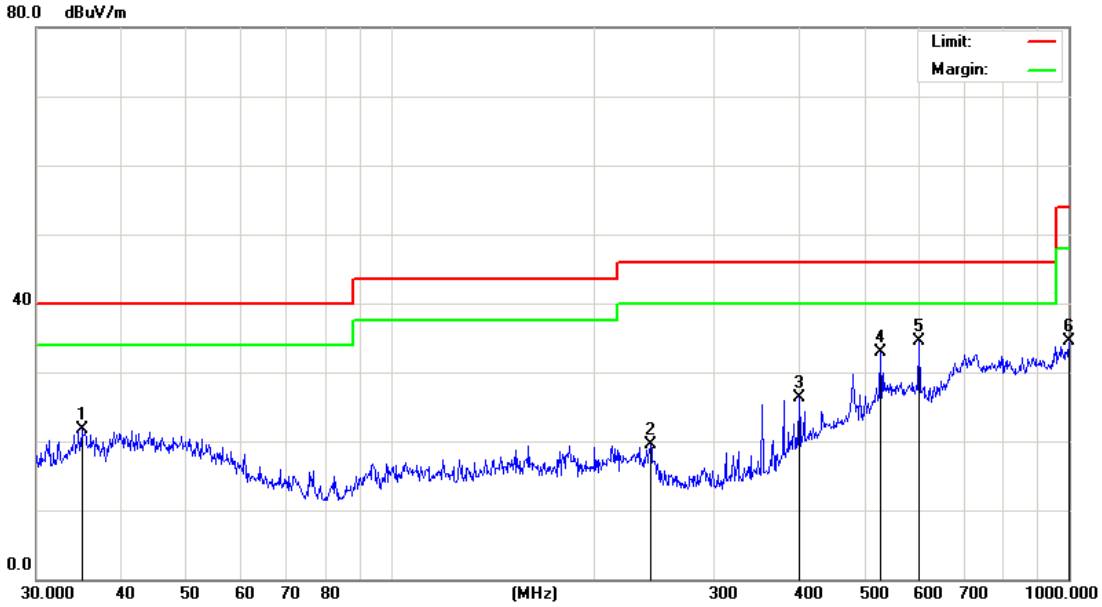


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		48.6719	26.50	-5.65	20.85	40.00	-19.15	peak
2		101.6443	25.87	-8.34	17.53	43.50	-25.97	peak
3		214.5142	27.59	-5.06	22.53	43.50	-20.97	peak
4		528.2458	28.66	0.32	28.98	46.00	-17.02	peak
5	*	601.4265	34.52	3.20	37.72	46.00	-8.28	peak
6		972.3374	26.80	6.04	32.84	54.00	-21.16	peak

The test result is calculated as the following:

(1) Result = Reading + Correct Factor
(2) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
(3) Margin = Result - Limit

EUT:	6” Rugged PDA	Model No.:	COMARK-6
Temperature:	24	Relative Humidity:	55%
Distance:	3m	Test Power:	AC120V/60Hz
Polarization:	**Horizontal**	Test Result:	Pass
Standard:	(RE)FCC PART 15	Test By:	Smile
Test Mode:	Keeping TX mode		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		35.0048	25.30	-3.60	21.70	40.00	-18.30	peak
2		241.6763	25.98	-6.51	19.47	46.00	-26.53	peak
3		400.4319	29.10	-2.84	26.26	46.00	-19.74	peak
4		528.2458	29.09	3.83	32.92	46.00	-13.08	peak
5	*	601.4265	30.14	4.35	34.49	46.00	-11.51	peak
6		1000.000	25.46	9.02	34.48	54.00	-19.52	peak

The test result is calculated as the following:

(4) Result = Reading + Correct Factor
(5) Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain + Attenuator
(6) Margin = Result - Limit

TEST RESULTS (Above 1000 MHz)

EUT:	6" Rugged PDA	Model No.:	COMARK-6
Temperature:	24℃	Relative Humidity:	55%
Distance:	3m	Test Power:	120V 60Hz
Polarization:		Test Result:	Pass
Test Mode:	TX-802.11a/n20/n40/ac20/ac40/ac/80	Test By:	Smile

Above 1GHz:

Mode	Polar (H/V)	Frequency (MHz)	Reading (dBμV)	Factor (dB)	Result (dBμV)	Limit (dBμV/m)	Margin (dB)	Detector (PK/AV)
802.11a-5180MHz	H	10360	33.93	12.56	46.49	74.00	-27.51	PEAK
	H	15540	36.10	16.45	52.55	74.00	-21.45	PEAK
	V	10360	35.97	12.56	48.53	74.00	-25.47	PEAK
	V	15540	36.31	16.45	52.76	74.00	-21.24	PEAK
802.11a-5220 MHz	H	10440	35.86	12.64	48.50	74.00	-25.50	PEAK
	H	15660	35.75	16.53	52.28	74.00	-21.72	PEAK
	V	10440	37.30	12.64	49.94	74.00	-24.06	PEAK
	V	15660	35.43	16.53	51.96	74.00	-22.04	PEAK
802.11a-5240 MHz	H	10480	33.11	12.68	45.79	74.00	-28.21	PEAK
	H	15720	34.37	16.54	50.91	74.00	-23.09	PEAK
	V	10480	35.70	12.68	48.38	74.00	-25.62	PEAK
	V	15720	34.50	16.54	51.04	74.00	-22.96	PEAK
802.11a-5745 MHz	H	11490	32.45	16.82	49.27	74.00	-24.73	PEAK
	H	17235	29.45	22.93	52.38	74.00	-21.62	PEAK
	V	11490	31.35	16.82	48.17	74.00	-25.83	PEAK
	V	17235	29.76	22.93	52.69	74.00	-21.31	PEAK
802.11a-5785 MHz	H	11570	32.27	16.71	48.98	74.00	-25.02	PEAK
	H	17355	27.18	24.37	51.55	74.00	-22.45	PEAK
	V	11570	29.76	16.71	46.47	74.00	-27.53	PEAK
	V	17355	27.99	24.37	52.36	74.00	-21.64	PEAK
802.11a-5825 MHz	H	11650	33.91	16.61	50.52	74.00	-23.48	PEAK
	H	17475	27.45	25.01	52.46	74.00	-21.54	PEAK
	V	11650	32.38	16.61	48.99	74.00	-25.01	PEAK
	V	17475	28.65	25.01	53.66	74.00	-20.34	PEAK

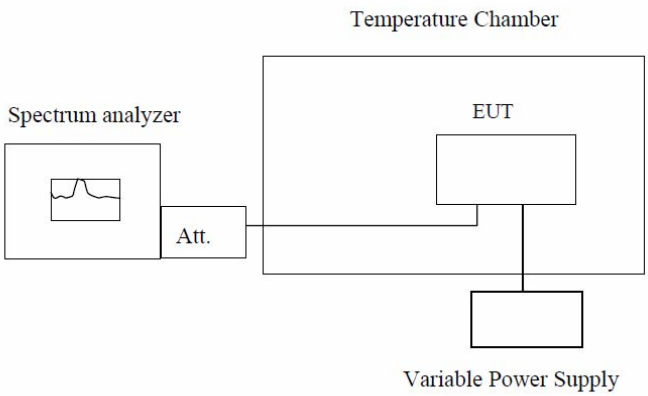
Mode	Polar (H/V)	Frequency (MHz)	Reading (dBμV)	Factor (dB)	Result (dBμV)	Limit (dBμV/m)	Margin (dB)	Detector (PK/AV)
802.11n HT20-5180MHz	H	10360	33.12	12.56	45.68	74.00	-28.32	PEAK
	H	15540	35.15	16.45	51.60	74.00	-22.40	PEAK
	V	10360	35.86	12.56	48.42	74.00	-25.58	PEAK
	V	15540	35.56	16.45	52.01	74.00	-21.99	PEAK
802.11n HT20-5220MHz	H	10440	34.92	12.64	47.56	74.00	-26.44	PEAK
	H	15660	33.18	16.53	49.71	74.00	-24.29	PEAK
	V	10440	35.76	12.64	48.40	74.00	-25.60	PEAK
	V	15660	35.65	16.53	52.18	74.00	-21.82	PEAK
802.11n HT20-5240MHz	H	10480	34.58	12.68	47.26	74.00	-26.74	PEAK
	H	15720	31.89	16.54	48.43	74.00	-25.57	PEAK
	V	10480	34.13	12.68	46.81	74.00	-27.19	PEAK
	V	15720	33.33	16.54	49.87	74.00	-24.13	PEAK
802.11n HT20-5745MHz	H	11490	30.47	16.82	47.29	74.00	-26.71	PEAK
	H	17235	29.77	22.93	52.70	74.00	-21.30	PEAK
	V	11570	32.95	16.71	49.66	74.00	-24.34	PEAK
	V	17235	28.02	22.93	50.95	74.00	-23.05	PEAK
802.11n HT20-5785MHz	H	11570	30.32	16.71	47.03	74.00	-26.97	PEAK
	H	17355	28.60	24.37	52.97	74.00	-21.03	PEAK
	V	11570	32.64	16.71	49.35	74.00	-24.65	PEAK
	V	17355	28.91	24.37	53.28	74.00	-20.72	PEAK
802.11n HT20-5825MHz	H	11650	32.57	16.61	49.18	74.00	-24.82	PEAK
	H	17475	27.77	25.01	52.78	74.00	-21.22	PEAK
	V	11650	34.24	16.61	50.85	74.00	-23.15	PEAK
	V	17475	28.13	25.01	53.14	74.00	-20.86	PEAK
802.11n HT40-5190MHz	H	10380	36.03	12.58	48.61	74.00	-25.39	PEAK
	H	15570	34.42	16.48	50.90	74.00	-23.10	PEAK
	V	10380	37.17	12.58	49.75	74.00	-24.25	PEAK
	V	15570	32.81	16.48	49.29	74.00	-24.71	PEAK

Mode	Polar (H/V)	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV/m)	Margin (dB)	Detector (PK/AV)
802.11n HT40-5230MHz	H	10460	36.66	12.66	49.32	74.00	-24.68	PEAK
	H	15690	34.76	16.53	51.29	74.00	-22.71	PEAK
	V	10460	36.10	12.66	48.76	74.00	-25.24	PEAK
	V	15690	33.69	16.53	50.22	74.00	-23.78	PEAK
802.11n HT40-5755MHz	H	11510	32.06	16.78	48.84	74.00	-25.16	PEAK
	H	17265	27.72	23.29	51.01	74.00	-22.99	PEAK
	V	11510	33.99	16.78	50.77	74.00	-23.23	PEAK
	V	17265	28.90	23.29	52.19	74.00	-21.81	PEAK
802.11n HT40-5795MHz	H	11590	30.75	16.69	47.44	74.00	-26.56	PEAK
	H	17385	26.50	24.73	51.23	74.00	-22.77	PEAK
	V	11590	32.68	16.69	49.37	74.00	-24.63	PEAK
	V	17385	27.53	24.73	52.26	74.00	-21.74	PEAK
802.11ac HT20-5180MHz	H	10360	34.21	12.56	46.77	74.00	-27.23	PEAK
	H	15540	34.17	16.45	50.62	74.00	-23.38	PEAK
	V	10360	33.03	12.56	45.59	74.00	-28.41	PEAK
	V	15540	34.72	16.45	51.17	74.00	-22.83	PEAK
802.11ac HT20-5220MHz	H	10440	34.42	12.64	47.06	74.00	-26.94	PEAK
	H	15660	30.90	16.53	47.43	74.00	-26.57	PEAK
	V	10440	32.51	12.64	45.15	74.00	-28.85	PEAK
	V	15660	31.77	16.53	48.30	74.00	-25.70	PEAK
802.11ac HT20-5240MHz	H	10480	34.10	12.68	46.78	74.00	-27.22	PEAK
	H	15720	32.40	16.54	48.94	74.00	-25.06	PEAK
	V	10480	32.24	12.68	44.92	74.00	-29.08	PEAK
	V	15720	33.80	16.54	50.34	74.00	-23.66	PEAK
802.11ac HT20-5745MHz	H	11490	31.91	16.82	48.73	74.00	-25.27	PEAK
	H	17235	29.59	22.93	52.52	74.00	-21.48	PEAK
	V	11490	31.58	16.82	48.40	74.00	-25.60	PEAK
	V	17235	28.79	22.93	51.72	74.00	-22.28	PEAK

Mode	Polar (H/V)	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV/m)	Margin (dB)	Detector (PK/AV)
802.11ac HT20-5785MHz	H	11570	32.83	16.71	49.54	74.00	-24.46	PEAK
	H	17355	26.95	24.37	51.32	74.00	-22.68	PEAK
	V	11570	31.49	16.71	48.20	74.00	-25.80	PEAK
	V	17355	27.92	24.37	52.29	74.00	-21.71	PEAK
802.11ac HT20-5825MHz	H	11650	31.28	16.61	47.89	74.00	-26.11	PEAK
	H	17475	26.24	25.01	51.25	74.00	-22.75	PEAK
	V	11650	32.08	16.61	48.69	74.00	-25.31	PEAK
	V	17475	28.27	25.01	53.28	74.00	-20.72	PEAK
802.11ac HT40-5190MHz	H	10380	33.22	12.58	45.80	74.00	-28.20	PEAK
	H	15570	34.90	16.48	51.38	74.00	-22.62	PEAK
	V	10380	34.76	12.58	47.34	74.00	-26.66	PEAK
	V	15570	32.85	16.48	49.33	74.00	-24.67	PEAK
802.11ac HT40-5230MHz	H	10460	34.38	12.66	47.04	74.00	-26.96	PEAK
	H	15690	31.63	16.53	48.16	74.00	-25.84	PEAK
	V	10460	34.08	12.66	46.74	74.00	-27.26	PEAK
	V	15690	32.38	16.53	48.91	74.00	-25.09	PEAK
802.11ac HT40-5755MHz	H	11510	31.17	16.78	47.95	74.00	-26.05	PEAK
	H	17265	26.65	23.29	49.94	74.00	-24.06	PEAK
	V	11510	31.98	16.78	48.76	74.00	-25.24	PEAK
	V	17265	27.54	23.29	50.83	74.00	-23.17	PEAK
802.11ac HT40-5795MHz	H	11590	32.01	16.69	48.70	74.00	-25.30	PEAK
	H	17385	26.44	24.73	51.17	74.00	-22.83	PEAK
	V	11590	30.68	16.69	47.37	74.00	-26.63	PEAK
	V	17385	27.04	24.73	51.77	74.00	-22.23	PEAK
802.11ac HT80-5210MHz	H	10420	32.77	12.62	45.39	74.00	-28.61	PEAK
	H	15630	32.60	16.52	49.12	74.00	-24.88	PEAK
	V	10420	33.50	12.62	46.12	74.00	-27.88	PEAK
	V	15630	32.04	16.52	48.56	74.00	-25.44	PEAK

Mode	Polar (H/V)	Frequency (MHz)	Reading (dBµV)	Factor (dB)	Result (dBµV)	Limit (dBµV/m)	Margin (dB)	Detector (PK/AV)
802.11ac HT80-5775MHz	H	11550	31.76	16.73	48.49	74.00	-25.51	PEAK
	H	17325	26.74	24.01	50.75	74.00	-23.25	PEAK
	V	11550	29.65	16.73	46.38	74.00	-27.62	PEAK
	V	17325	25.50	24.01	49.51	74.00	-24.49	PEAK
	The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:							
	Final Test Level =Receiver Reading + Antenna Factor + Cable Factor –Preamplifier Factor.							
	Average measurement was not performed if peak level lower than average limit. No any other emissions level very low which are attenuated less than 20dB below the limit. According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part. Hence there no other emissions have been reported.							

8. FREQUENCY STABILITY

Test Requirement:	FCC Part15 C Section 15.407(g)
Test Method:	ANSI C63.10:2013, FCC Part 2.1055
Limit:	Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified
Test Procedure:	The EUT was setup to ANSI C63.4, 2014; tested to 2.1055 for compliance to FCC Part 15.407(g) requirements.
Test setup:	 **Note :** Measurement setup for testing on Antenna connector
Test Instruments:	Refer to section 5.10 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

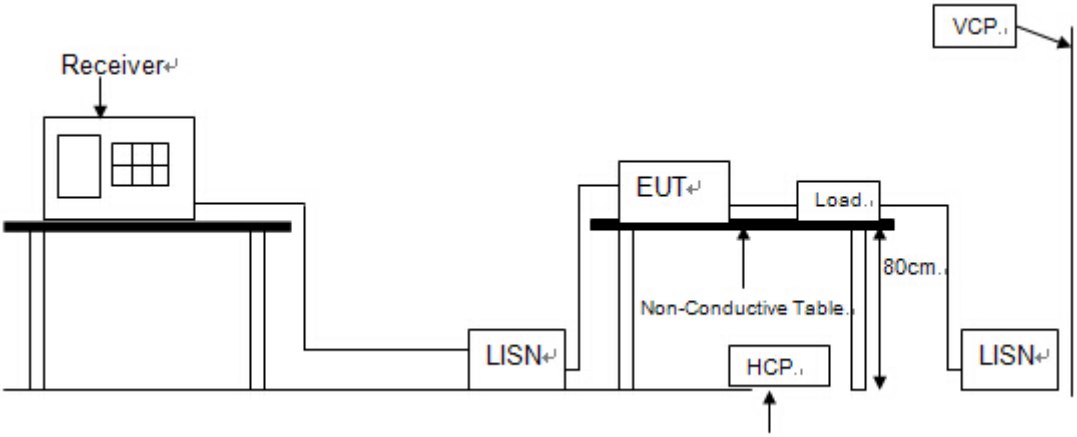
Frequency stability versus Temp.					
Power Supply: DC 7.6V					
Temp. (°C)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
-30	5180	5180.0823	5180.0530	5180.6312	5180.1205
	5200	5199.9047	5200.7178	5199.9426	5199.3557
	5220	5220.0749	5220.2704	5220.5773	5220.3428
	5240	5239.9736	5240.7087	5240.3067	5239.6264
	5745	5745.1361	5745.0728	5745.1267	5745.3071
	5785	5784.9197	5785.0513	5784.9929	5785.2764
	5825	5824.9568	5824.9967	5825.0877	5824.9274
-20	5180	5179.7870	5180.3728	5180.6327	5180.1217
	5200	5199.6470	5200.4173	5200.3171	5199.8058
	5220	5219.3215	5220.4926	5220.0882	5219.6629
	5240	5239.2259	5240.2337	5240.3975	5239.1041
	5745	5744.8633	5744.7282	5745.0153	5744.9061
	5785	5784.7821	5785.1706	5785.0914	5784.9619
	5825	5824.7223	5825.1820	5825.0292	5825.0517
-10	5180	5178.9625	5180.4225	5180.0913	5178.8050
	5200	5199.8390	5200.7351	5200.7931	5198.9705
	5220	5219.4682	5220.7383	5220.1894	5219.4931
	5240	5239.4264	5240.4978	5240.9386	5239.2893
	5745	5744.8180	5744.9174	5745.1018	5744.9422
	5785	5784.9497	5784.8542	5785.0194	5784.7420
	5825	5824.7144	5824.8389	5824.9831	5824.8850
0	5180	5180.3814	5180.6925	5180.4801	5179.2966
	5200	5199.4511	5200.6892	5200.6108	5199.8889
	5220	5219.3193	5219.8196	5220.2330	5219.9730
	5240	5239.6308	5240.8711	5240.3335	5239.5450
	5745	5744.9184	5745.0867	5745.0518	5745.1098
	5785	5785.0596	5784.9405	5784.8607	5784.7913
	5825	5824.9257	5825.1886	5824.9778	5824.8546

10	5180	5179.9233	5180.2083	5180.2244	5179.9214
	5200	5199.8249	5200.1920	5200.4742	5199.6691
	5220	5219.1457	5220.2058	5220.2667	5220.0113
	5240	5239.8287	5240.4180	5240.5910	5239.6658
	5745	5744.8718	5745.2647	5745.3361	5745.2156
	5785	5784.9287	5784.9093	5785.0994	5784.9189
	5825	5825.2567	5825.0045	5824.9206	5825.0298
20	5180	5179.8788	5180.1865	5180.2737	5179.4127
	5200	5199.6107	5200.2980	5200.8558	5199.3778
	5220	5219.3041	5220.9138	5220.3831	5219.5692
	5240	5239.1681	5240.8259	5240.2903	5239.5691
	5745	5744.8197	5744.8152	5745.0187	5744.9355
	5785	5784.8773	5784.8234	5784.8093	5784.9831
	5825	5824.9005	5824.7945	5825.3351	5824.9393
30	5180	5179.7383	5180.0207	5180.0812	5179.8171
	5200	5199.2620	5200.1976	5200.4241	5199.5145
	5220	5219.4346	5220.4967	5220.9050	5219.5266
	5240	5239.4280	5240.1762	5240.3751	5239.8821
	5745	5744.6817	5744.8417	5744.9060	5744.9313
	5785	5785.1749	5784.6595	5784.7359	5784.6433
	5825	5825.0881	5825.1197	5824.7279	5824.7510
40	5180	5179.7382	5180.7999	5180.3160	5180.2081
	5200	5199.2225	5200.4905	5200.8927	5199.8096
	5220	5219.4361	5220.6208	5220.9261	5220.0252
	5240	5239.1946	5241.0731	5240.9898	5240.0437
	5745	5745.1307	5745.3086	5745.2908	5745.3303
	5785	5785.0127	5785.1152	5784.9609	5785.0714
	5825	5825.1196	5824.9171	5824.9536	5824.7761
50	5180	5179.2935	5180.7985	5180.5052	5179.4190
	5200	5199.4867	5200.9250	5200.3521	5199.2014
	5220	5219.6987	5220.9407	5220.4179	5219.3238
	5240	5239.4618	5240.1740	5240.0118	5239.3417
	5745	5745.0447	5744.7938	5745.0321	5744.9430
	5785	5784.8828	5784.9206	5785.0016	5784.8034
	5825	5825.0191	5824.7908	5825.3276	5825.1263

Frequency stability versus Voltage					
Temperature: 25°C					
Power Supply (VDC)	Operating Frequency (MHz)	0 minute Measured Frequency (MHz)	2 minute Measured Frequency (MHz)	5 minute Measured Frequency (MHz)	10 minute Measured Frequency (MHz)
6.9	5180	5180.0149	5180.1233	5180.3045	5180.2780
	5200	5200.1423	5199.9362	5199.7369	5199.9845
	5220	5220.1046	5220.6364	5219.9412	5220.0237
	5240	5240.8537	5240.8381	5239.9563	5239.4377
	5745	5745.0680	5744.9858	5744.9318	5745.2478
	5785	5784.7368	5784.8922	5785.0027	5785.1510
	5825	5824.9500	5824.7824	5824.8000	5825.1455
7.6	5180	5181.2202	5180.1204	5179.1193	5179.1535
	5200	5200.1081	5200.5260	5199.8768	5199.1831
	5220	5220.2497	5220.2955	5219.9817	5219.4633
	5240	5239.8350	5240.7544	5239.1053	5239.6746
	5745	5744.8897	5744.9707	5745.2195	5744.9394
	5785	5784.6377	5784.9350	5785.0842	5784.7701
	5825	5824.8691	5824.9446	5824.7304	5824.8894
8.4	5180	5180.0103	5180.5340	5179.2130	5179.2026
	5200	5200.3505	5200.4215	5199.1013	5199.1716
	5220	5219.8042	5220.6407	5219.0766	5219.0778
	5240	5240.7582	5240.4814	5239.5046	5239.2721
	5745	5744.7005	5744.7759	5745.0115	5744.7761
	5785	5784.5451	5784.6932	5784.8617	5784.9383
	5825	5824.7860	5824.9848	5824.5922	5825.0236

9. POWER LINE CONDUCTED EMISSION

9.1 Block diagram of test setup



9.2 Power Line Conducted Emission Limits(Class B)

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

9.3 TEST PROCEDURE

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 KHz.

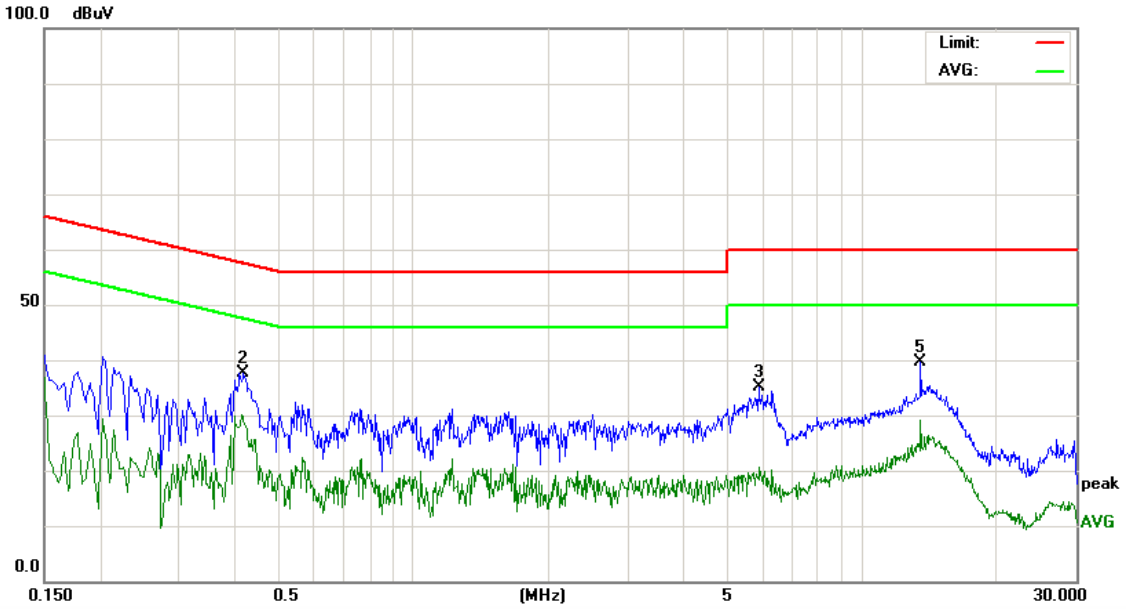
9.4 Test Result

PASS. (See below detailed test result)

Note1: All emissions not reported below are too low against the prescribed limits.

Note2: “-----” means peak detection; “-----” mans average detection

EUT:	6” Rugged PDA	Model No.:	COMARK-6
Temperature:	23℃	Relative Humidity:	52%
Probe:	N	Test Power:	AC 120V/60Hz
Test Time:	2020-06-19	Test Result:	Pass
Standard:	(CE)FCC PART 15 class B_QP		
Test Mode:	TX		
Note:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.4140	20.14	10.07	30.21	47.57	-17.36	AVG
2		0.4180	27.56	10.07	37.63	57.49	-19.86	peak
3		5.8700	25.03	10.06	35.09	60.00	-24.91	peak
4		5.9260	10.67	10.06	20.73	50.00	-29.27	AVG
5		13.5340	29.49	10.25	39.74	60.00	-20.26	peak
6		13.5340	18.91	10.25	29.16	50.00	-20.84	AVG

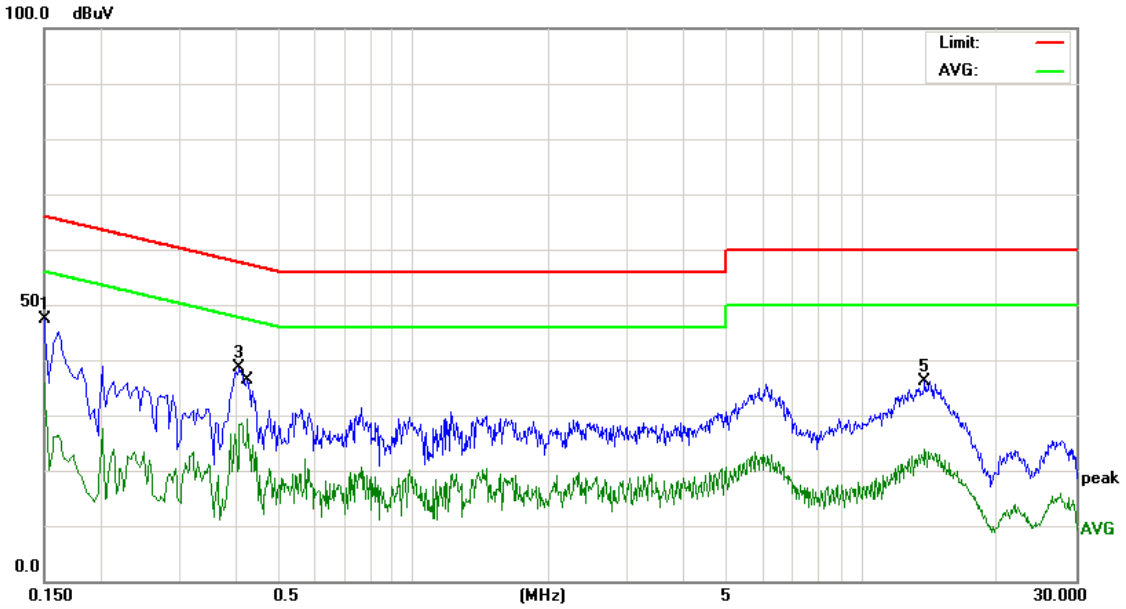
The test result is calculated as the following:

(1) Result = Reading + Correct Factor

(2) Correct Factor = (LISN, ISN, PLC or Current Probe) Factor + Cable Loss +Attenuator

(3) Margin = Result - Limit

EUT:	6” Rugged PDA	Model No.:	COMARK-6
Temperature:	23℃	Relative Humidity:	52%
Probe:	L1	Test Power:	AC 120V/60Hz
Test Time:	2020-06-19	Test Result:	Pass
Standard:	(CE)FCC PART 15 class B_QP		
Test Mode:	TX		
Note:			



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	35.54	11.94	47.48	65.99	-18.51	peak
2		0.1500	23.88	11.94	35.82	55.99	-20.17	AVG
3		0.4100	28.54	10.08	38.62	57.65	-19.03	peak
4	*	0.4260	19.36	10.07	29.43	47.33	-17.90	AVG
5		13.8140	25.88	10.25	36.13	60.00	-23.87	peak
6		13.8140	13.69	10.25	23.94	50.00	-26.06	AVG

The test result is calculated as the following:

(1) Result = Reading + Correct Factor
(2) Correct Factor = (LISN, ISN, PLC or Current Probe) Factor + Cable Loss +Attenuator
(3) Margin = Result - Limit

10. ANTENNA REQUIREMENTS

10.1. Limit

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

10.2. EUT ANTENNA

The antennas used for this product are built-in undetachable FPCB antenna and that no antenna other than that furnished by the responsible party shall be used with the device, the maximum peak gain of the transmit antenna is only 1.12 dBi. and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

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