Shenzhen Huatongwei International Inspection Co., Ltd.
1/F,Bldg 3,Hongfa Hi-tech Industrial Park,Genyu Road,Tianliao,Gongming,Shenzhen,China
Phone:86-755-26748019 Fax:86-755-26748089 http://www.szhtw.com.cn

TEST REPORT

Report Reference No. ..... :	**TRE1605009206**	R/C…….: 36262
FCC ID ..... :	**YY3-14242**	
Applicant's name ..... :	**Handheld Group AB**	
Address.....:	Kinnegatan 17, 53133, Lidköping, Sweden	
Manufacturer.....:	Handheld Group AB	
Address.....:	Kinnegatan 17, 53133, Lidköping, Sweden	
Test item description ..... :	**Rugged Mobile PDA**	
Trade Mark .....:	Handheld	
Model/Type reference.....:	NAUTIZ X2	
Listed Model(s) .....:	-	
Standard ..... :	**FCC CFR Title 47 Part 15 Subpart E Section 15.407**	
Date of receipt of test sample……..:	May.19, 2016	
Date of testing……:	May.20, 2016 ~ Jun.14, 2016	
Date of issue……...:	Jun.15, 2016	
Result.....……..:	**PASS**	

Compiled by (position+printedname+signature)...:	File administrators Candy Liu	Candy Liu
Supervised by (position+printedname+signature)....:	Project Engineer Lion Cai	Lion Cai
Approved by (position+printedname+signature)....:	RF Manager Hans Hu	Hans Hu

Testing Laboratory Name ..... :	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address.....:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Contents

1. APPLICABLE STANDARDS ANDTEST DESCRIPTION

1.1. Applicable Standards

The tests were performed according to following standards:
FCC Rules Part 15.407: General technical requirements.

ANSI C63.10-2013:AmericanNationalStandardforTestingUnlicensedWirelessDevices

KDB789033 D02 V01R02: GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

1.2. Test Description

ReportSection	Test Item	FCC Rule	Result
4.1	Antenna Requirement	15.203	Pass
4.2	Line Conducted Emission (AC Main)	15.207	Pass
4.3	Maximum Conducted Output Power	15.407 (a.1)(a.2)(a.3)	Pass
4.4	Maximum Power Spectral Density	15.407 (a.1)(a.2)(a.3)	Pass
4.5	6dB&26dB Bandwidth	15.407(a.5)	Pass
4.6	Radiated Emissions & Bandedge	15.407(b.1)(b.2)(b.4)	Pass
4.7	Frequency Stability	15.407(g)	Pass
4.8	TPC and DFS	15.407(h)	Pass

Remark: 1.The measurement uncertainty is not included in the test result.
2.The EUT is a client device without radar detection.a TPC mechanism is not required for systems with an e.i.r.p. of less than 500mW.

2. SUMMARY

2.1. Client Information

Applicant:	Handheld Group AB
Address:	Kinnegatan 17, 53133, Lidköping, Sweden
Manufacturer:	Handheld Group AB
Address:	Kinnegatan 17, 53133, Lidköping, Sweden

2.2. Product Description

Name of EUT	Rugged Mobile PDA
Trade Mark:	Handheld
Model No.:	NAUTIZ X2
Listed Model(s):	-
IMEI 1:	869881011800052
Power supply:	DC 3.7V From internal battery
Adapter information1:	Model:FJ-SW1260502000UN Input:AC 100-240V 50/60Hz 0.4A Max Output: 5Vd.c., 2000mA
Adapter information2:	Model:FJ-SW1202000N Input:AC 100-240V 50/60Hz 0.6A Max Output: 12Vd.c., 2000mA
5G WIFI	
Supported type:	802.11a/802.11ac/802.11n
Modulation:	BPSK /QPSK /16QAM /64QAM
Operation frequency:	Band I:5150MHz-5250MHz Band II:5250MHz-5350MHz(Client device) Band IV:5725MHz-5850MHz
Channel Bandwidth	802.11a/n(H20):20MHz 802.11ac/n(H40):40MHz
Channel separation:	5MHz
Antenna type:	Internal Antenna
Antenna gain:	1.5dBi

2.3. Operation state

◆ **Test frequency list**

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

20MHz				40MHz			
Band	Test Channel	Channel	Frequency (MHz)	Band	Test Channel	Channel	Frequency (MHz)
Band I	Low	36	5180	Band I	Low	38	5190
		40	5200		High	46	5230
	Mid	44	5220	Band II	Low	54	5270
	High	48	5240		High	62	5310
Band II	Low	52	5260	Band IV	Low	151	5755
		56	5280		High	159	5795
	Mid	60	5300				
	High	64	5320				
Band IV	Low	149	5745				
		153	5765				
	Mid	157	5785				
		161	5805				
	High	165	5825				

◆ **Data Rated**

Preliminary tests were performed in different data rate, and found which the below bit rate is worst case mode, so only show data which it is a worst case mode.

Mode	datarate (worst mode)
802.11a	6Mbps
802.11ac	13.5Mbps
802.11n(H20)	MCS0
802.11n(H40)	MCS0

◆ **Test mode**

For RF test items:

the engineering test program was provided and enabled to make EUT continuous transmit/receive. The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

For AC power line conducted emissions:

the EUT was set to connect with the WLAN AP under large package sizes transmission.

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

○	Wireless Router	Length (m) :	2
		Manufacturer :	Aruba Networks, Inc.
		FCCID:	Q9DAPINR15515P
		Model No. :	APIN0114

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Laboratory:Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China
Phone: 86-755-26748019 Fax: 86-755-26748089

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225
Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

A2LA-Lab Cert. No. 3902.01
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until December 31, 2016.

FCC-Registration No.: 317478
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

IC-Registration No.: 5377A&5377B
The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016.
Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec.03, 2014, valid time is until Dec.03, 2017.

ACA
Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

VCCI
The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2484. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 29, 2015.
Radiated disturbance above 1GHz measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2013. Valid time is until Dec. 23, 2016.
Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.
Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

DNV
Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2016.

3.3. Equipments Used during the Test

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Ultra-Broadband Antenna	ShwarzBeck	VULB9163	538	2015/11/02
2	EMI TEST RECEIVER	Rohde&Schwarz	ESI 26	100009	2015/11/02
3	EMI TEST Software	Audix	E3	N/A	N/A
4	TURNTABLE	ETS	2088	2149	N/A
5	ANTENNA MAST	ETS	2075	2346	N/A
6	EMI TEST Software	Rohde&Schwarz	ESK1	N/A	N/A
7	HORNANTENNA	ShwarzBeck	9120D	1011	2015/11/02
8	Amplifer	Sonoma	310N	E009-13	2015/11/02
9	JS amplifer	Rohde&Schwarz	JS4-00101800-28-5A	F201504	2015/11/02
10	High pass filter	Compliance Direction systems	BSU-6	34202	2015/11/02
11	HORNANTENNA	ShwarzBeck	9120D	1012	2015/11/02
12	Amplifer	Compliance Direction systems	PAP1-4060	120	2015/11/02
13	Loop Antenna	Rohde&Schwarz	HFH2-Z2	100020	2015/11/02
14	TURNTABLE	MATURO	TT2.0	----	N/A
15	ANTENNA MAST	MATURO	TAM-4.0-P	----	N/A
16	Horn Antenna	SCHWARZBECK	BBHA9170	25841	2015/11/02
17	ULTRA-BROADBAND ANTENNA	Rohde&Schwarz	HL562	100015	2015/11/02

Conducted test					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal
1	Spectrum Analyzer	Rohde&Schwarz	FSV40	100048	2015/11/02
2	OSP	Rohde&Schwarz	OSP120	101317	2015/11/02
3	OSP	Rohde&Schwarz	OSP-B157	100890	2015/11/02
4	EXG Vector signal Generator	Agilent	E4483C	182541	2015/11/02
5	EXG Analog signal Generator	Keysight	N5171B	134281	2015/11/02
6	EXA Signal Analyzer	Agilent	N9010A	184247	2015/11/02
7	Power Meter	Agilent	U2021XA	178231	2015/11/02
8	DAQ Device	Agilent	U2531A	132812	2015/11/02

The Cal.Interval was one year

3.4. Environmental conditions

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

Temperature:	15~35°C
lative Humidity:	30~60 %
Air Pressure:	950~1050mba

3.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01"Electromagnetic compatibilityand Radio spectrum Matters (ERM);Uncertainties in the measurementof mobile radio equipment characteristics;Part 1"and TR-100028-02 "Electromagnetic compatibilityand Radio spectrum Matters (ERM);Uncertainties in the measurementof mobile radio equipment characteristics;Part 2 " and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

Test Items	MeasurementUncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emissio 1~18GHz	5.16 dB	(1)
Radiated Emissio 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4. TEST CONDITIONS AND RESULTS

4.1. Antenna requirement

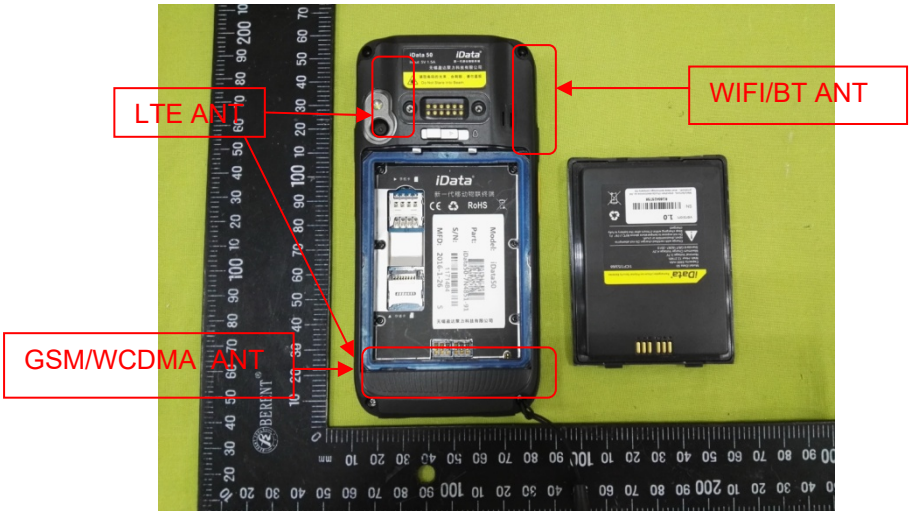
Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of anantenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Result:

The antenna is integral antenna, the best case gain of the antenna is 1.5dBi.



4.2. Conducted Emission (AC Main)

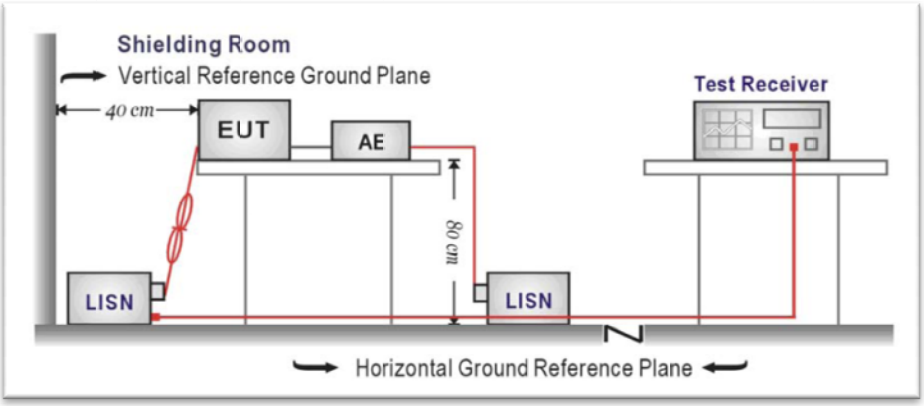
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION

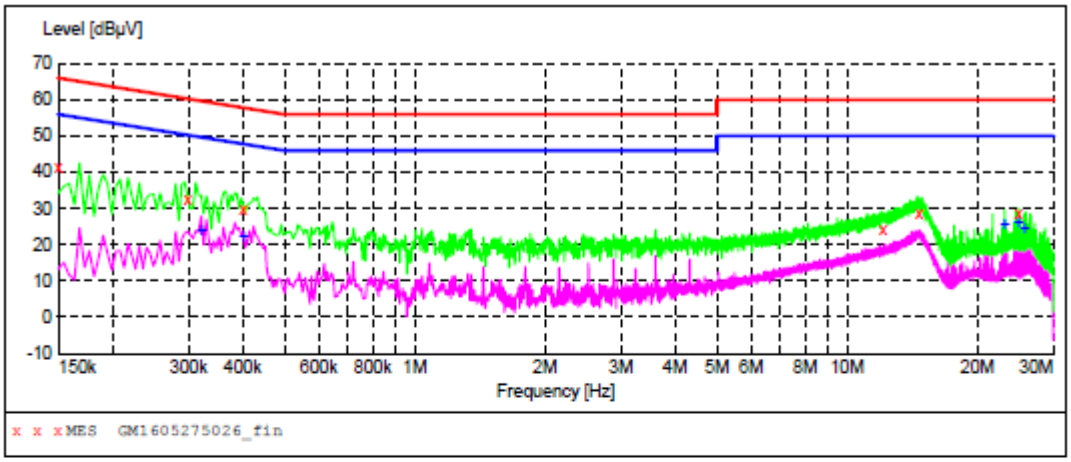


TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above theconducting ground plane. The vertical conducting plane was located 40 cm to the rear of theEUT. All other surfaces of EUT were at least 80 cm from any other grounded conductingsurface.
3. The EUT and simulators are connected to the main power through a line impedancestabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for themeasuring equipment.
4. The peripheral devices are also connected to the main power through aLISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor,was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were foldedback and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHzusing a receiver bandwidth of 9 kHz.

TEST RESULTS

Test mode:AC 120V	5G WIFI	Polarization	L



MEASUREMENT RESULT: "GM1605275026_fin"

5/27/2016 2:25PM

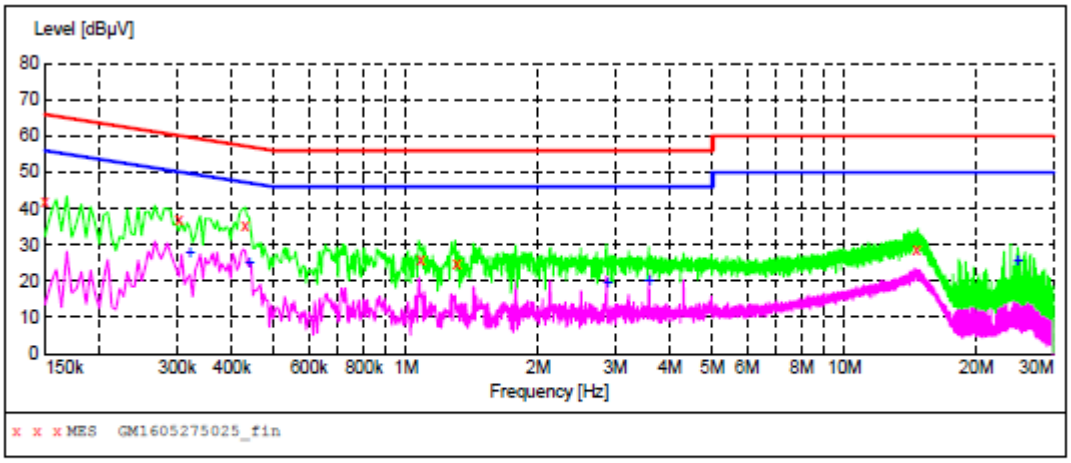
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	41.50	10.3	66	24.5	QP	L1	GND
0.298500	32.80	10.2	60	27.5	QP	L1	GND
0.402000	29.70	10.2	58	28.1	QP	L1	GND
12.102000	24.50	10.8	60	35.5	QP	L1	GND
14.698500	28.80	10.8	60	31.2	QP	L1	GND
24.900000	28.60	11.0	60	31.4	QP	L1	GND

MEASUREMENT RESULT: "GM1605275026_fin2"

5/27/2016 2:25PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.321000	24.20	10.2	50	25.5	AV	L1	GND
0.402000	22.50	10.2	48	25.3	AV	L1	GND
23.127000	25.70	11.0	50	24.3	AV	L1	GND
24.900000	26.40	11.0	50	23.6	AV	L1	GND
25.692000	24.60	11.0	50	25.4	AV	L1	GND

Test mode: AC 120V	5G WIFI	Polarization	N



MEASUREMENT RESULT: "GM1605275025_fin"

5/27/2016 2:22PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	42.00	10.3	66	24.0	QP	N	GND
0.303000	36.90	10.2	60	23.3	QP	N	GND
0.429000	35.50	10.2	57	21.8	QP	N	GND
1.077000	25.70	10.2	56	30.3	QP	N	GND
1.302000	24.80	10.2	56	31.2	QP	N	GND
14.608500	28.80	10.8	60	31.2	QP	N	GND

MEASUREMENT RESULT: "GM1605275025_fin2"

5/27/2016 2:22PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.321000	28.20	10.2	50	21.5	AV	N	GND
0.438000	25.30	10.2	47	21.8	AV	N	GND
2.881500	19.90	10.3	46	26.1	AV	N	GND
3.601500	20.60	10.3	46	25.4	AV	N	GND
24.900000	26.20	11.0	50	23.8	AV	N	GND

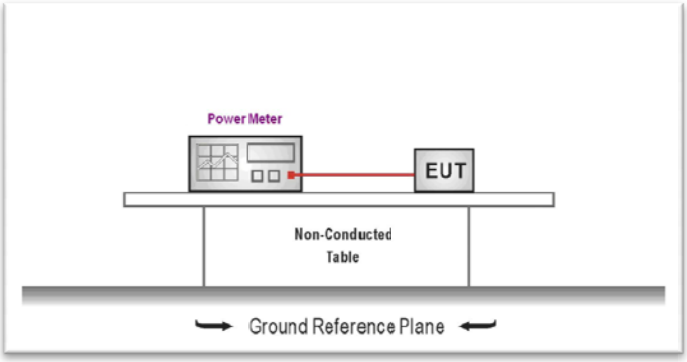
Remark:Transd=Cable lose+ PULSE LIMITER factor+ ARTIFICIAL MAINS factor; Margin= Limit -Level

4.3. Maximum Conducted Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407:
In the 5.15 – 5.25GHz band, the maximum permissible conducted output power is 250mW (23.98dBm)
In the 5.25 – 5.35GHz band, the maximum permissible conducted output power is the lesser of 250mW (23.98dBm) and 11 dBm + 10log10(26dB BW) = 11 dBm + 10log10(18.87) = 23.76dBm.
In the 5.725 – 5.850GHz band, the maximum permissible conducted output power is 1W (30dBm).

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was tested according to KDB789033 D02 V01R02 requirements.

2. The maximum conducted output power may be measured using a broadband AVG RF power meter.

3. Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power

4. Record the measurement data.

TEST RESULTS

	Type	Channel	Output power (dBm)	Limit (dBm)	Result
Band I 5150-5250MHz	802.11a	Low	11.07	24.00	Pass
		Mid	10.62		
		High	10.53		
	802.11ac(H40)	Low	11.40	24.00	Pass
		High	10.95		
	802.11n(H20)	Low	10.28	24.00	Pass
		Mid	10.44		
		High	10.79		
	802.11n(H40)	Low	10.42	24.00	Pass
		High	10.75		

	Type	Channel	Output power (dBm)	Limit (dBm)	Result
Band II 5250-5350MHz	802.11a	Low	10.27	24.00	Pass
		Mid	10.05		
		High	9.89		
	802.11ac(H40)	Low	10.30	24.00	Pass
		High	9.99		
	802.11n(H20)	Low	10.77	24.00	Pass
		Mid	9.92		
		High	9.80		
	802.11n(H40)	Low	10.94	24.00	Pass
		High	10.01		

	Type	Channel	Output power (dBm)	Limit (dBm)	Result
Band IV 5725-5850MHz	802.11a	Low	10.25	30.00	Pass
		Mid	10.14		
		High	9.87		
	802.11ac(H40)	Low	10.65	30.00	Pass
		High	9.68		
	802.11n(H20)	Low	10.47	30.00	Pass
		Mid	9.58		
		High	10.25		
	802.11n(H40)	Low	9.78	30.00	Pass
		High	10.66		

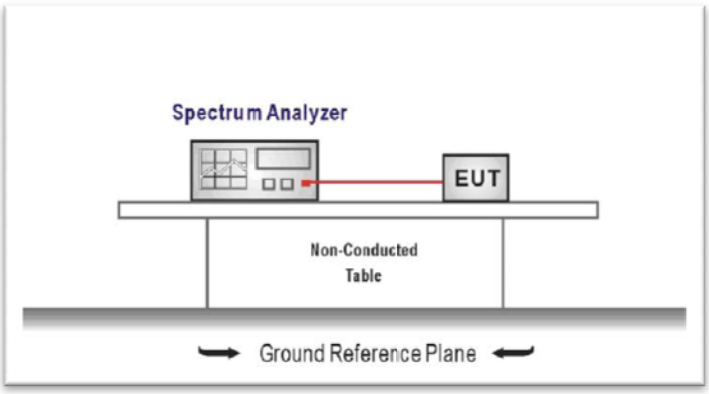
4.4. Maximum Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407:

In the 5.15 – 5.25GHz, 5.25 – 5.35GHz, 5.47 – 5.725GHz bands, the maximum permissible power spectral density is 11dBm/MHz.
In the 5.725 – 5.850GHz band, the maximum permissible power spectral density is 30dBm/500kHz.

TEST CONFIGURATION



TEST PROCEDURE

According KDB 789033 D02 v01r02 – Section F
1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. RBW = 1MHz, 4. VBW = 3MHz
7. Number of sweep points > 2 x (span/RBW)
8. Sweep time = auto
6. Detector = power averaging (RMS)
7. Trigger was set to free run for all modes
8. Trace was averaged over 100 sweeps
9. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

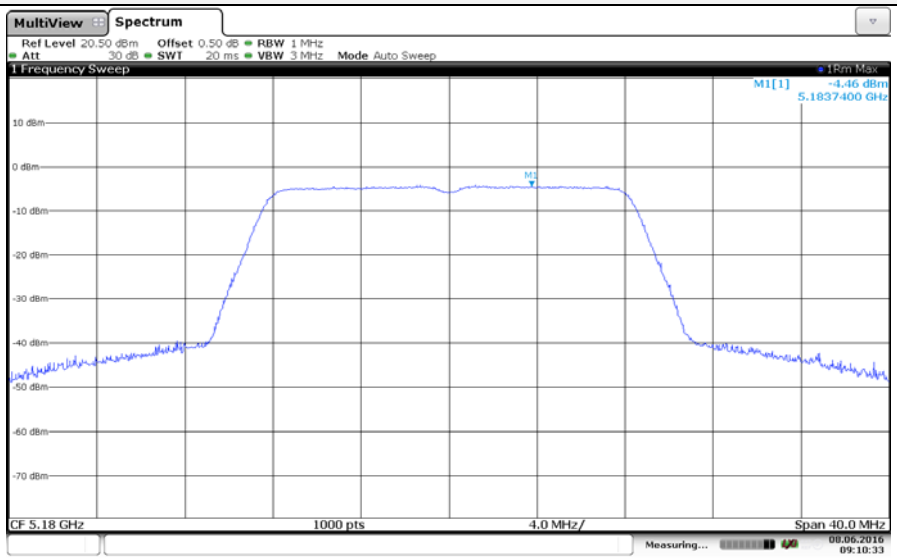
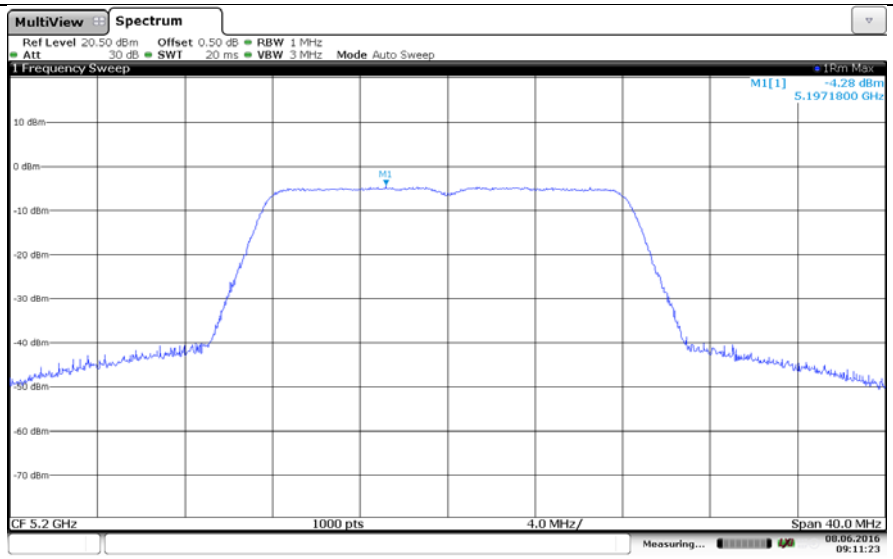
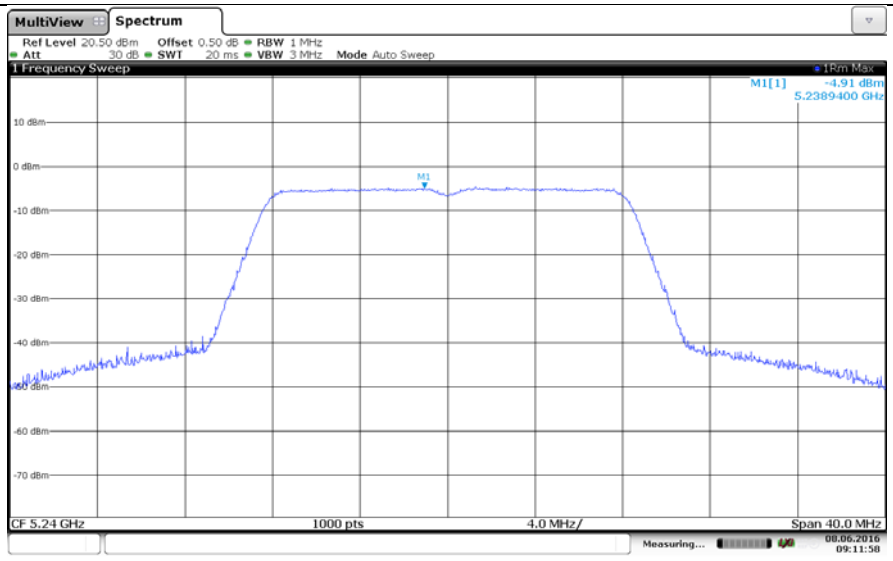
TEST RESULTS

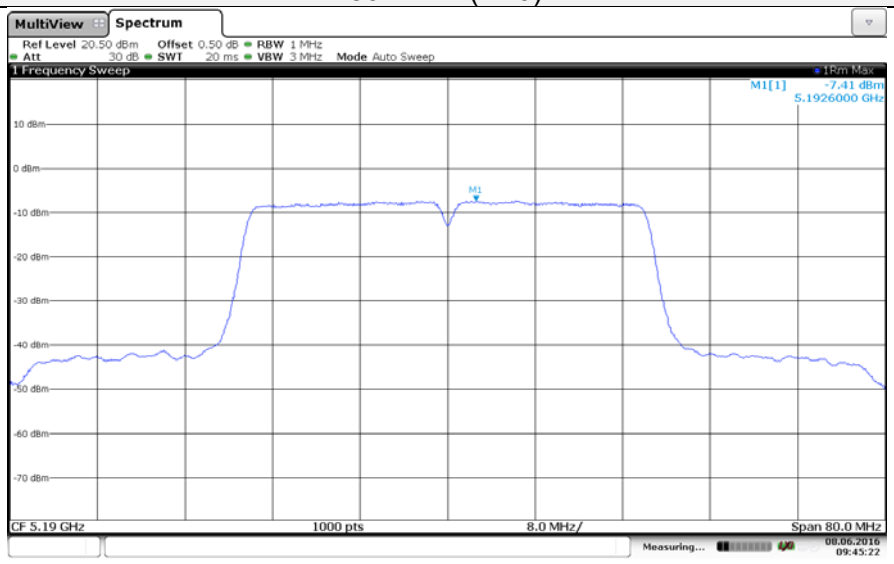
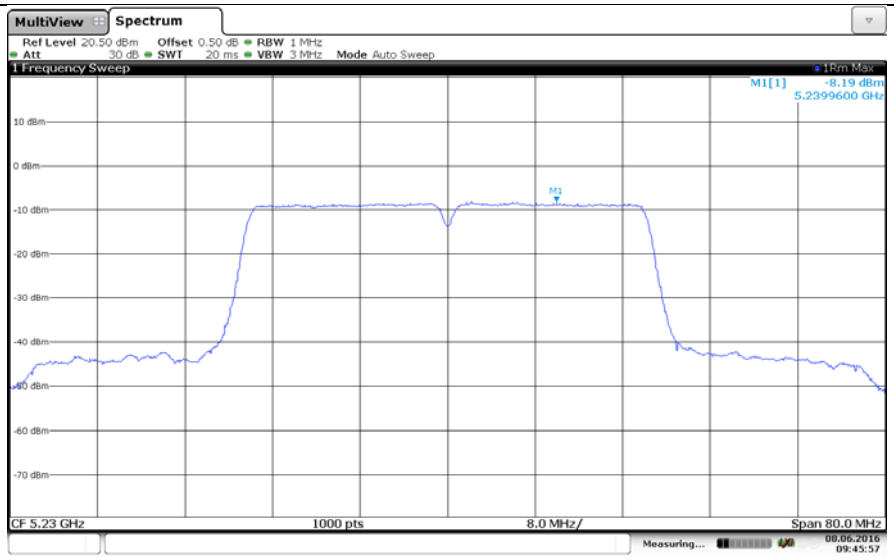
	Type	Channel	PSD (dBm/MHz)	Limit (dBm/MHz)	Result
Band I 5150-5250MHz	802.11a	Low	-4.46	11.00	Pass
		Mid	-4.28		
		High	-4.91		
	802.11ac(H40)	Low	-7.41	11.00	Pass
		High	-8.19		
	802.11n(H20)	Low	-4.89	11.00	Pass
		Mid	-5.14		
		High	-4.86		
	802.11n(H40)	Low	-7.78	11.00	Pass
		High	-8.05		

	Type	Channel	PSD (dBm/MHz)	Limit (dBm/MHz)	Result
Band II 5250-5350MHz	802.11a	Low	-4.73	11.00	Pass
		Mid	-5.11		
		High	-5.47		
	802.11ac(H40)	Low	-8.08	11.00	Pass
		High	-7.75		
	802.11n(H20)	Low	-5.20	11.00	Pass
		Mid	-5.39		
		High	-5.04		
	802.11n(H40)	Low	-8.22	11.00	Pass
		High	-8.28		

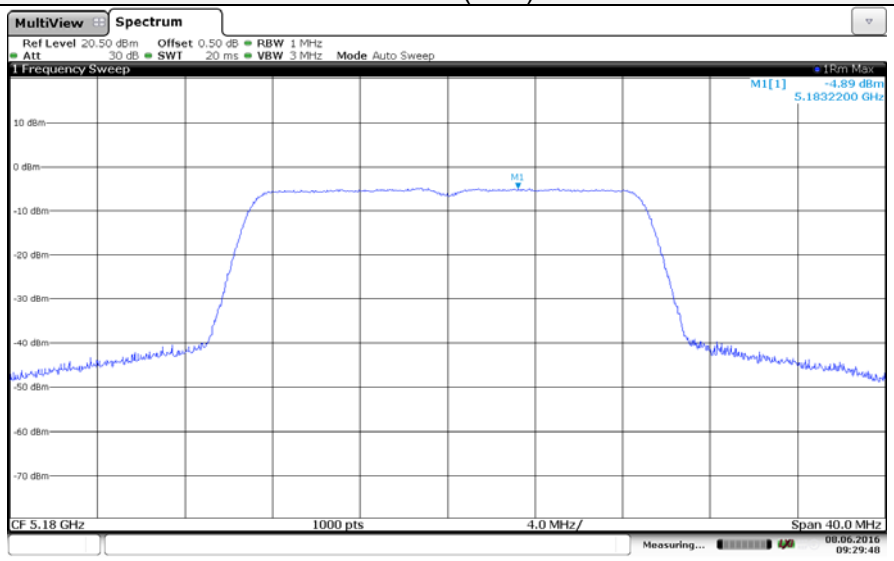
	Type	Channel	PSD (dBm/500KHz)	Limit (dBm/500KHz)	Result
Band IV 5725-5850MHz	802.11a	Low	-7.85	30.00	Pass
		Mid	-7.98		
		High	-8.54		
	802.11ac(H40)	Low	-10.11	30.00	Pass
		High	-11.21		
	802.11n(H20)	Low	-6.97	30.00	Pass
		Mid	-7.81		
		High	-8.69		
	802.11n(H40)	Low	-10.35	30.00	Pass
		High	-11.10		

Test plot as follows:

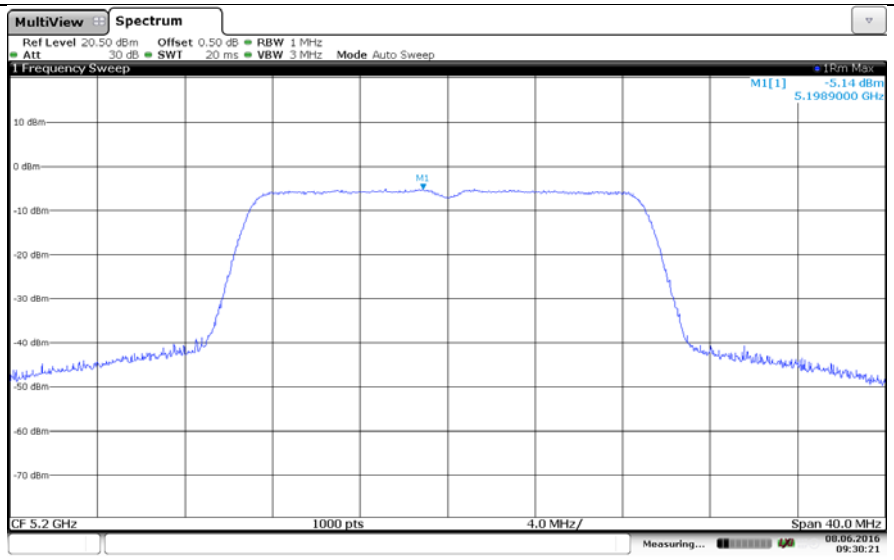
Band I
802.11a

Low

Mid

High

802.11ac(H40)

Low

High

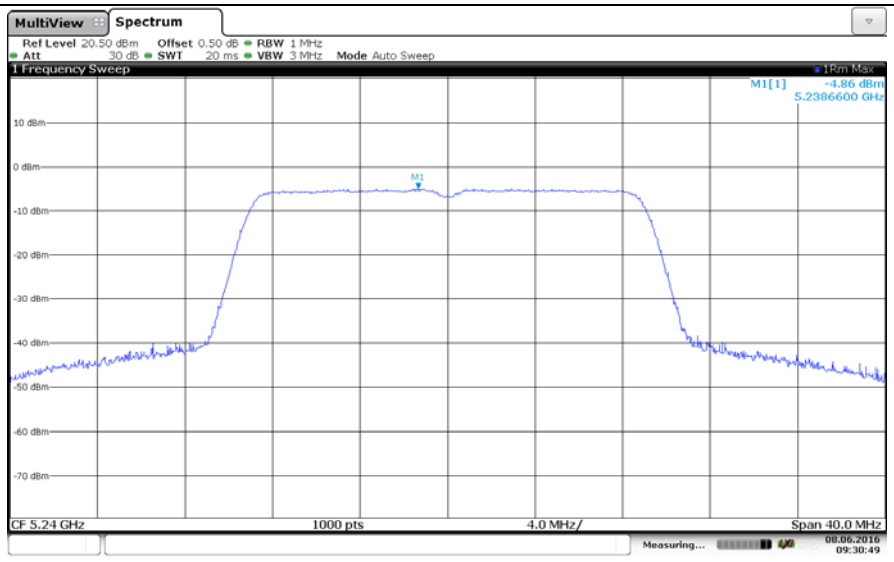
802.11n(H20)



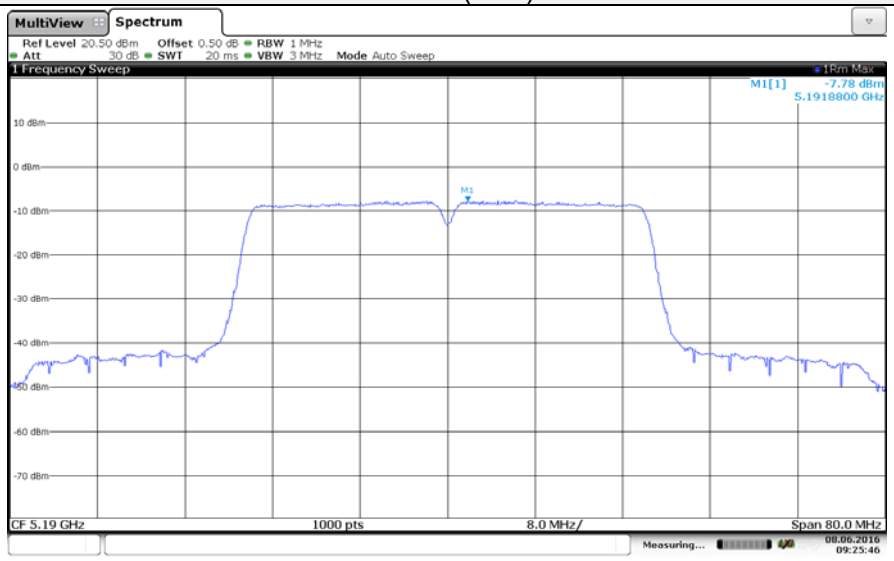
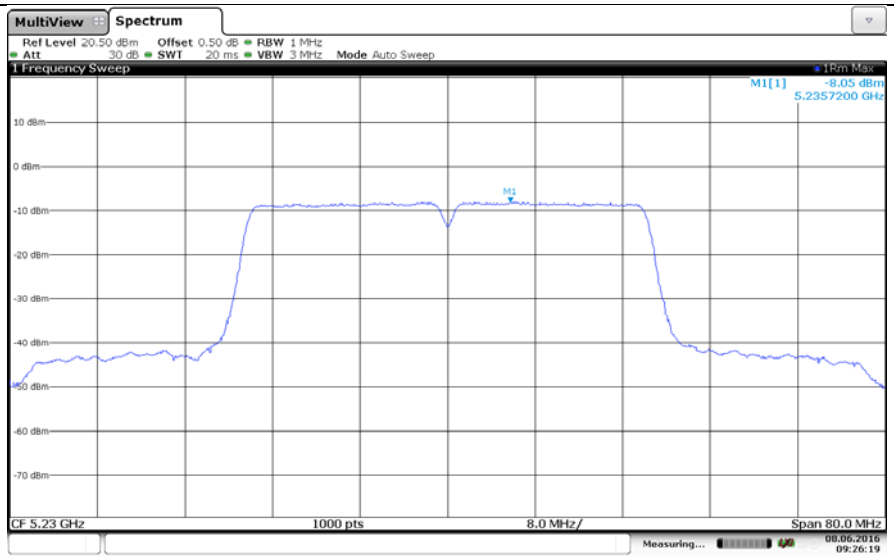
Low

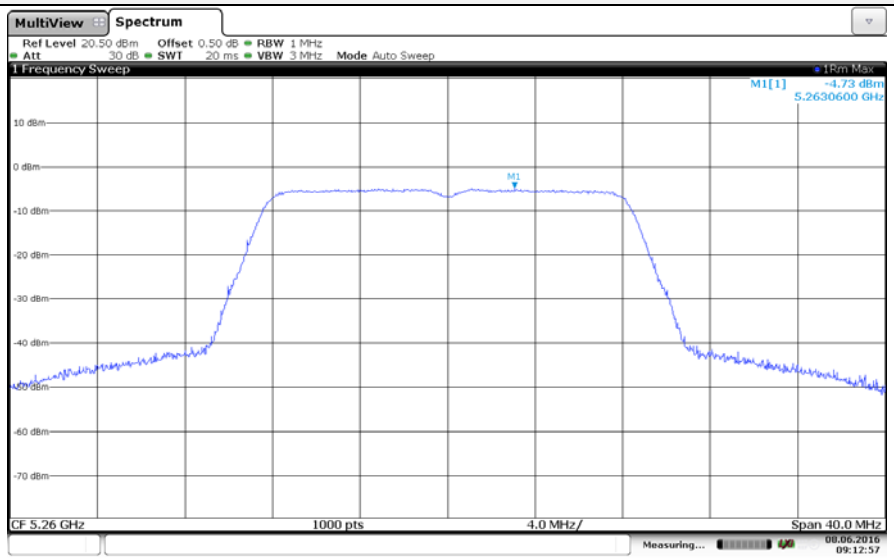
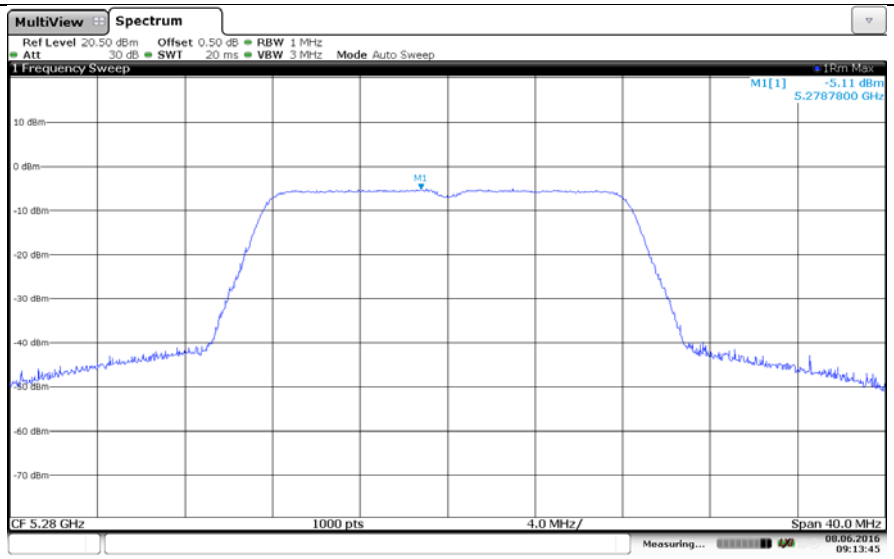
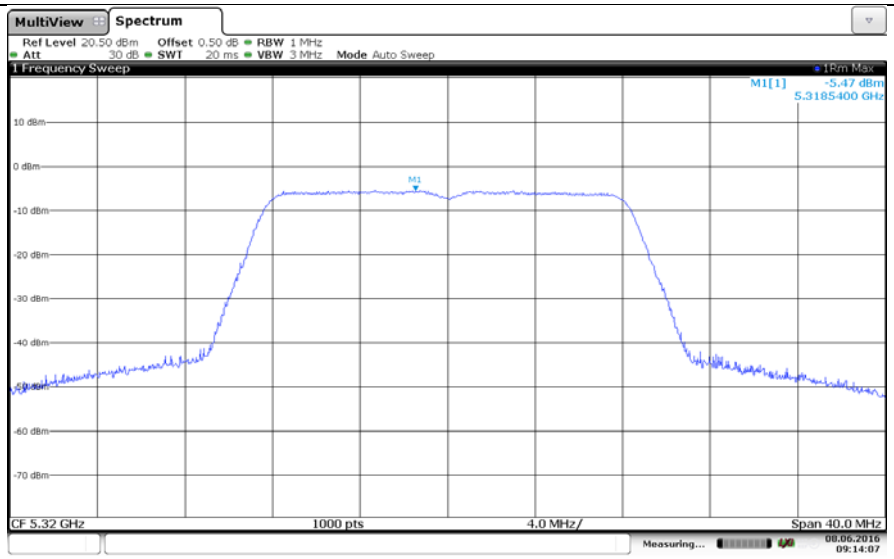


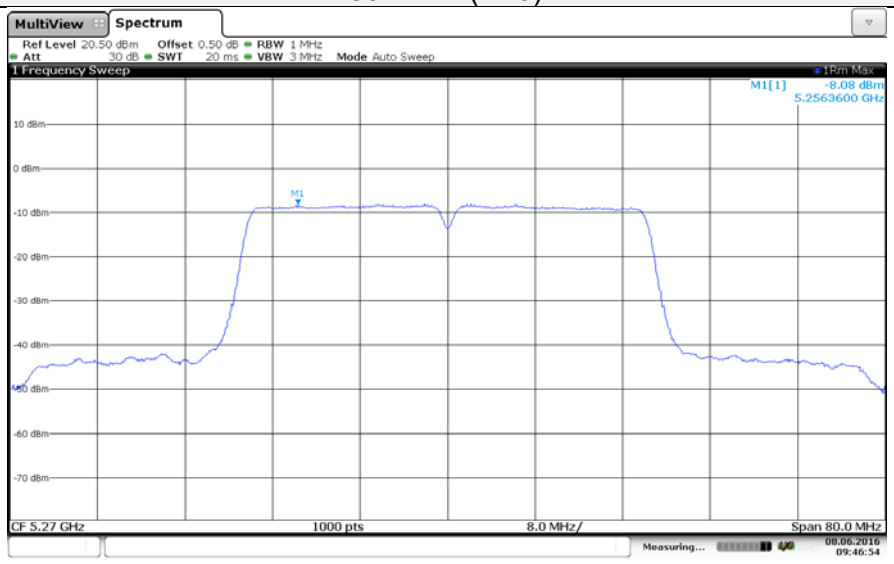
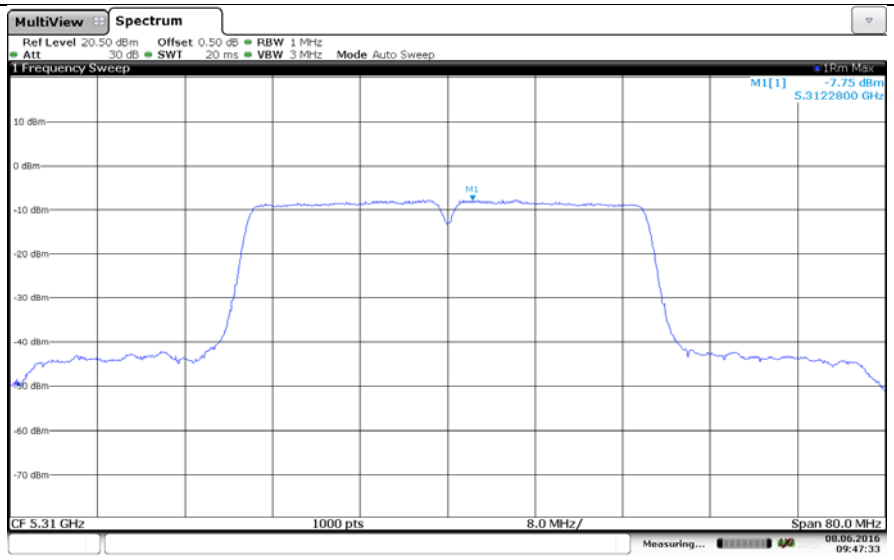
Mid

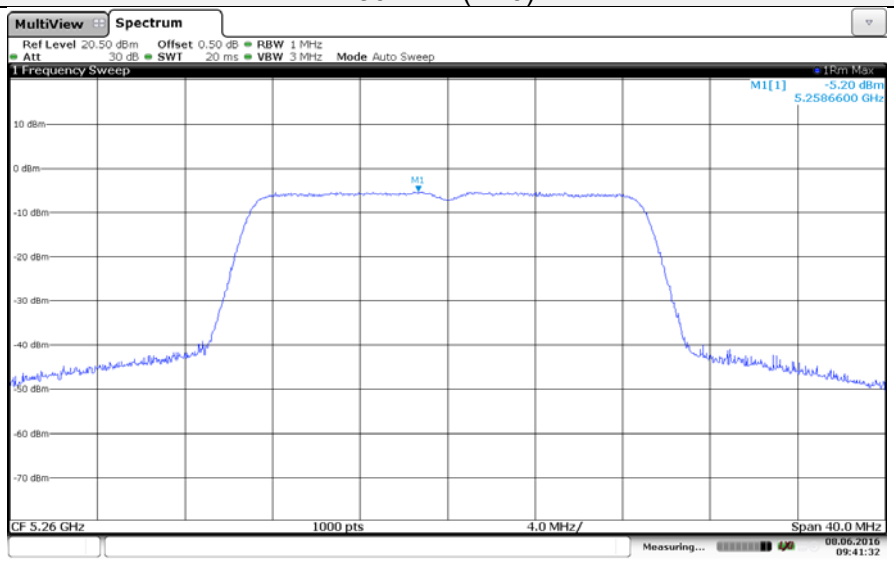
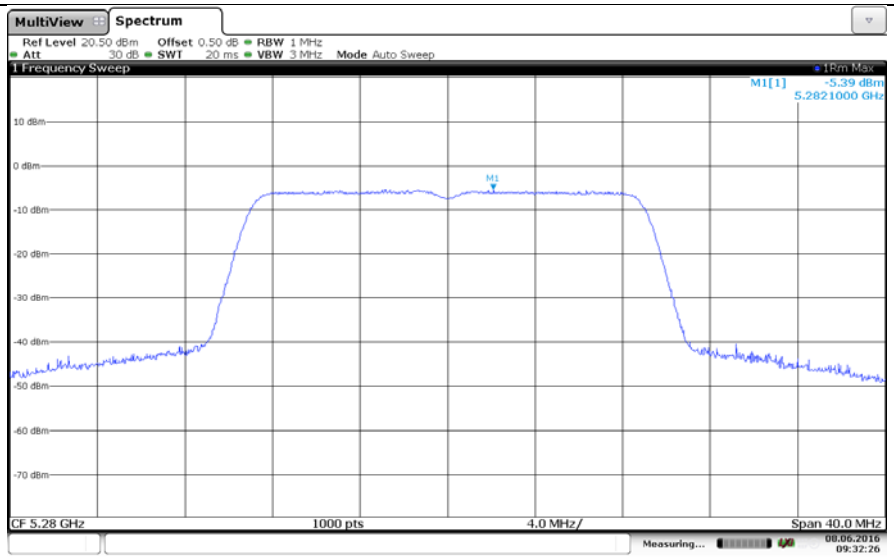
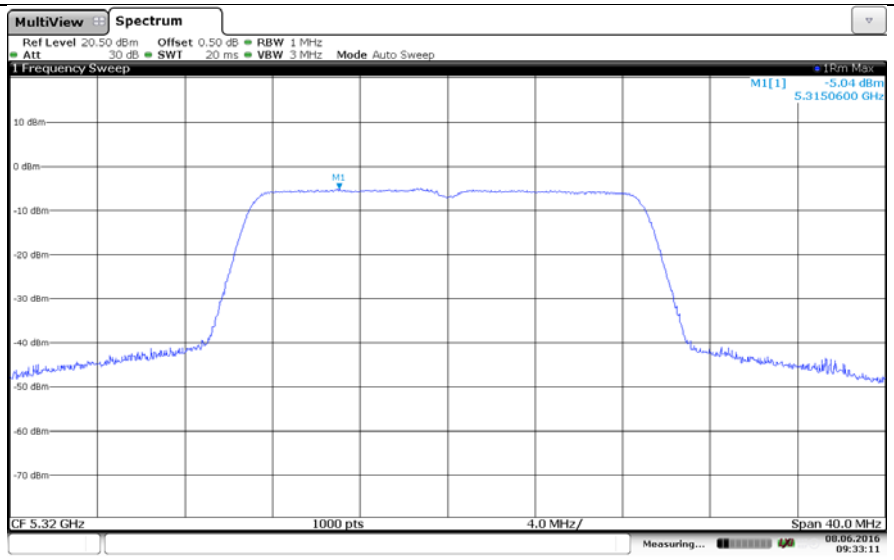


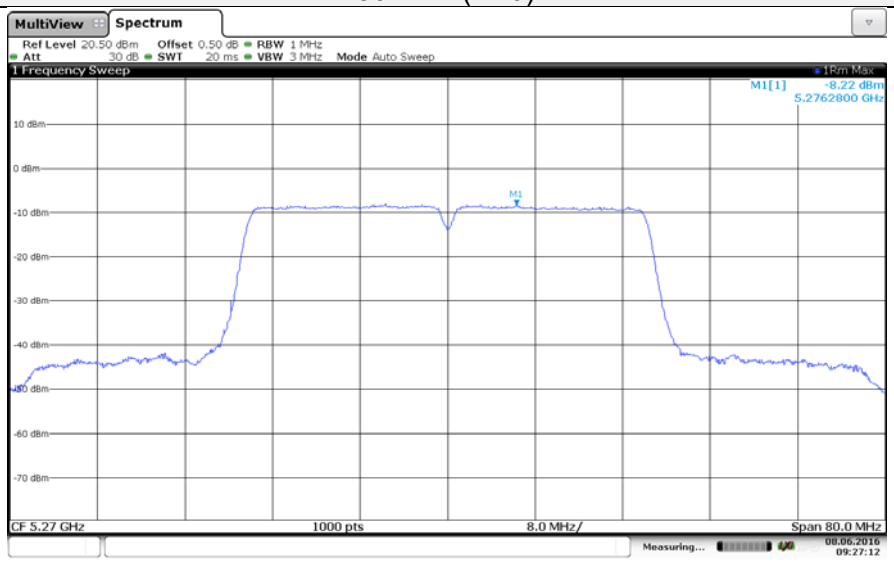
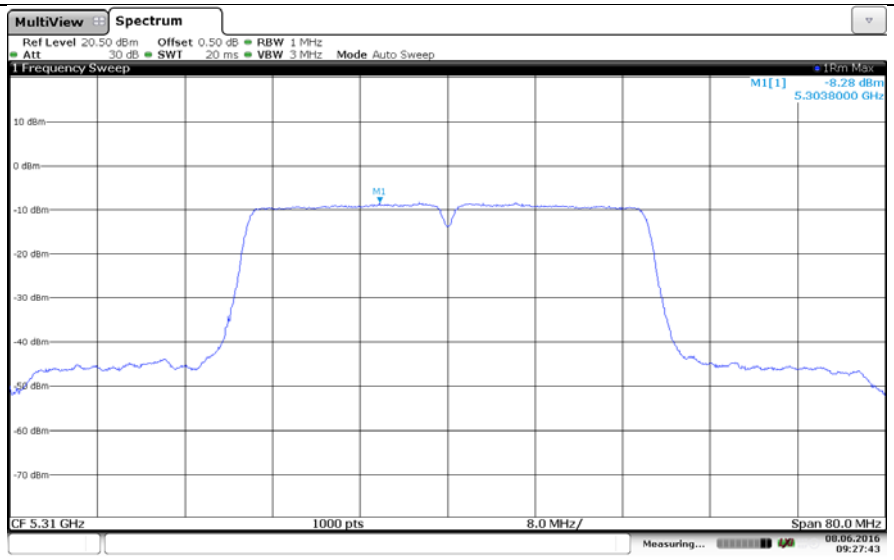
High

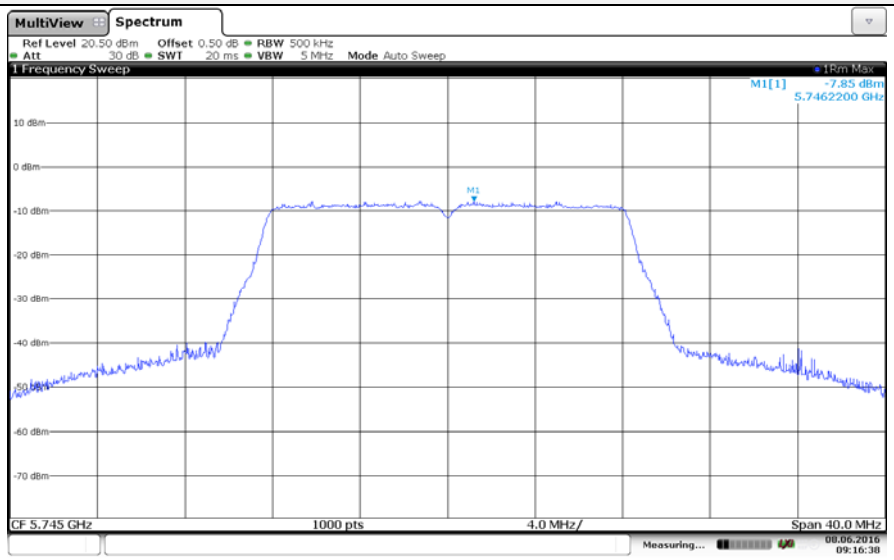
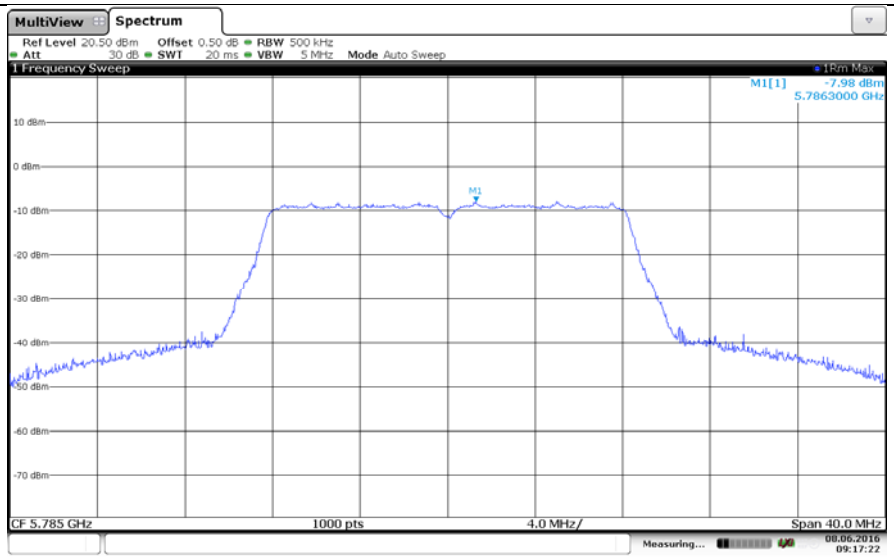
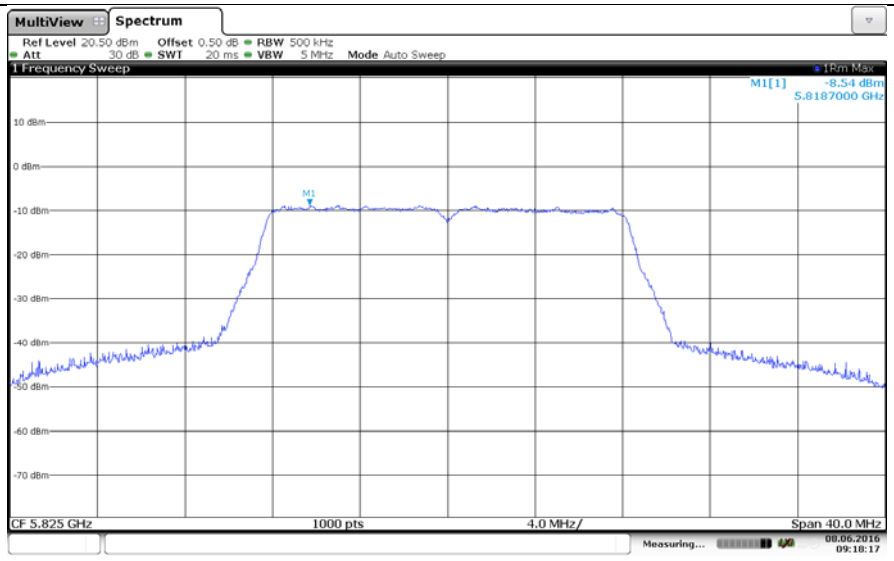
802.11n(H40)

Low

High

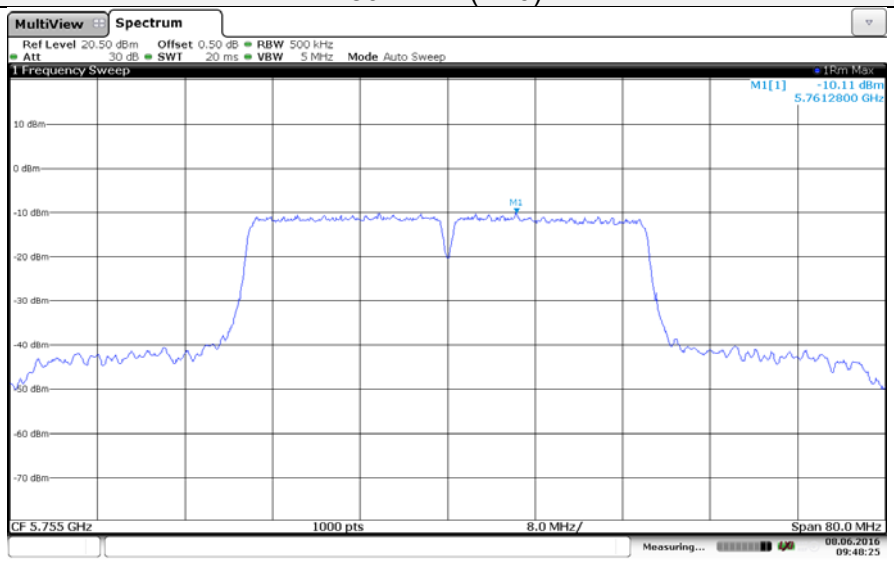
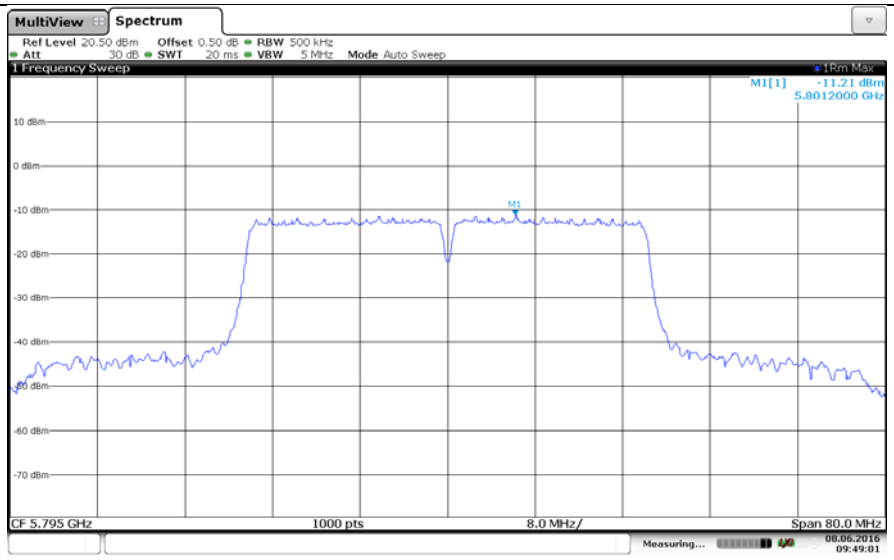
Band II
802.11a

Low

Mid

High

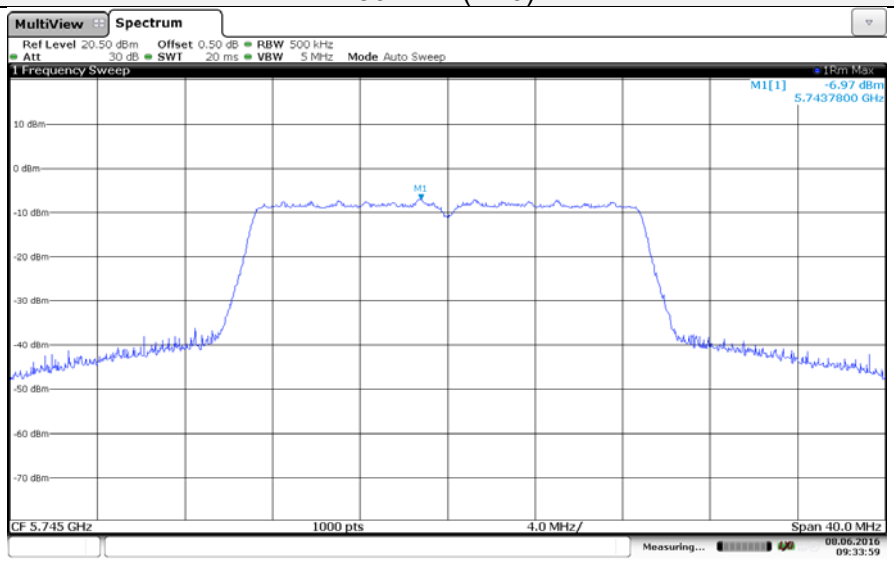
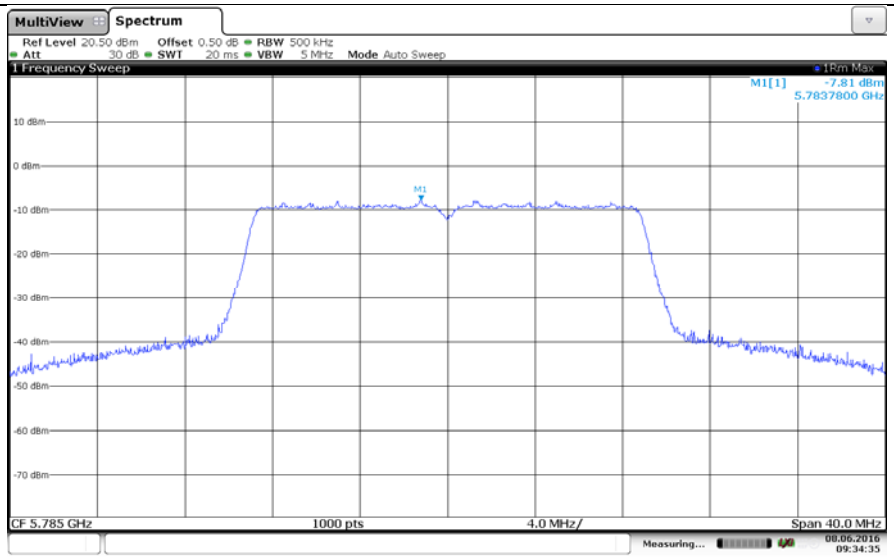
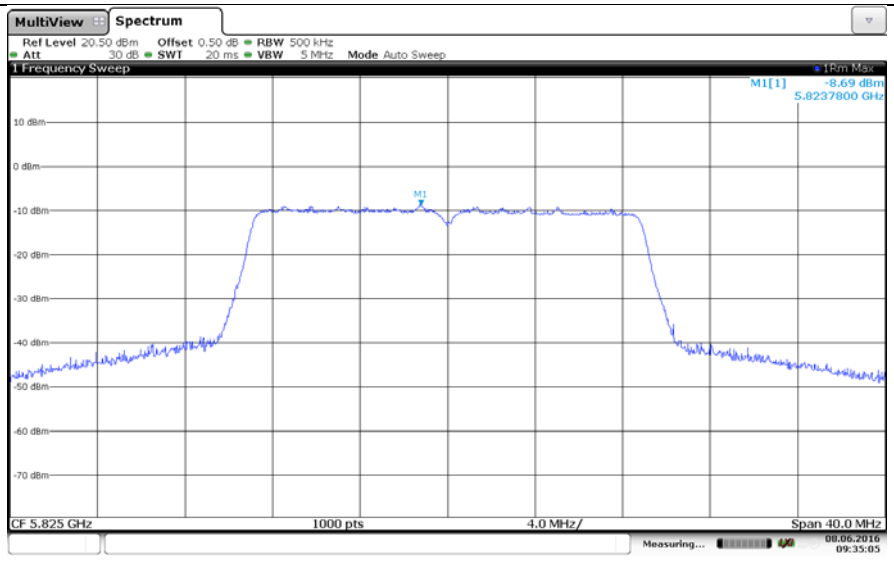
802.11ac(H40)

Low

High

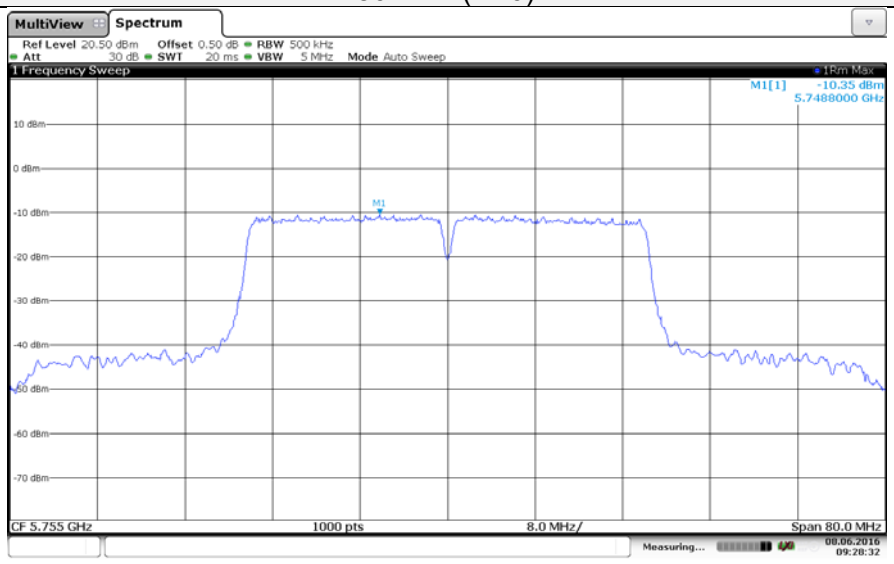
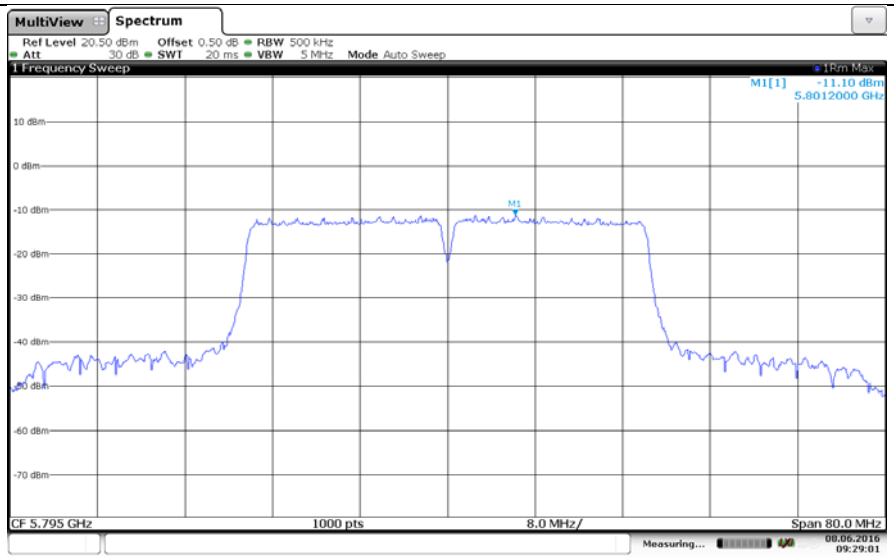
802.11n(H20)

Low

Mid

High

802.11n(H40)

Low

High

Band IV
802.11a

Low

Mid

High

802.11ac(H40)

Low

High

802.11n(H20)

Low

Mid

High

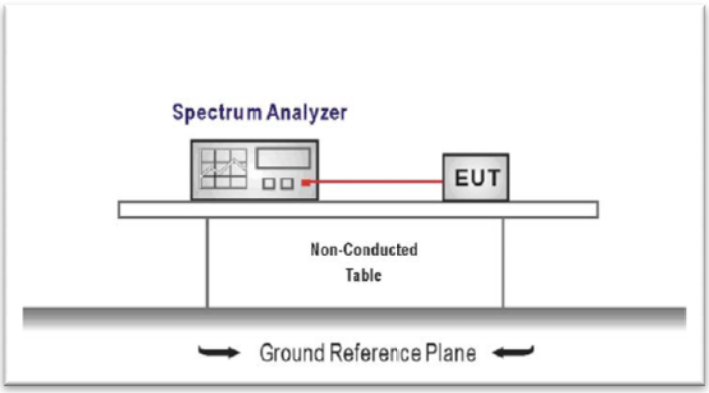
802.11n(H40)

Low

High

4.5. 6dB&26dB bandwidth

LIMIT

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 v01r02, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

TEST CONFIGURATION



TEST PROCEDURE

According KDB 789033 D02 v01r02 – Section C
1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth
3. VBW > 3 x RBW
4. Detector = Peak
5. Trace mode = max hold

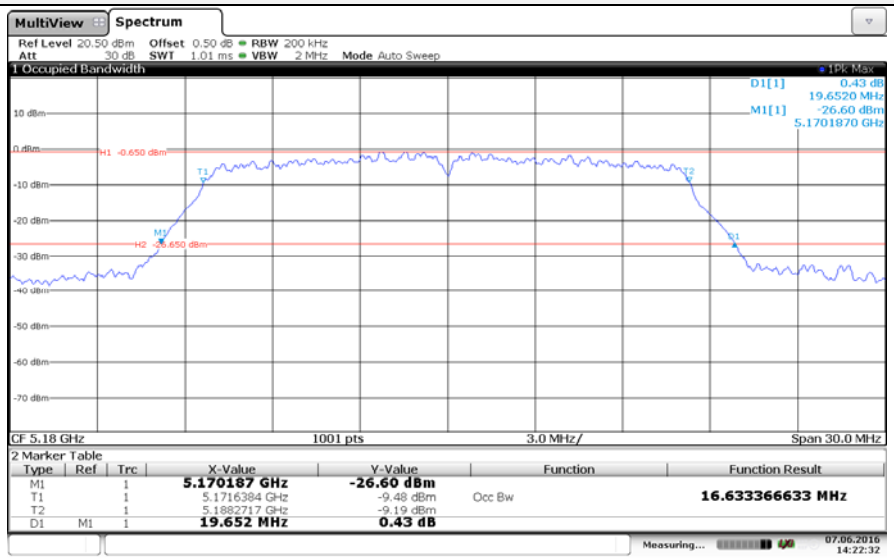
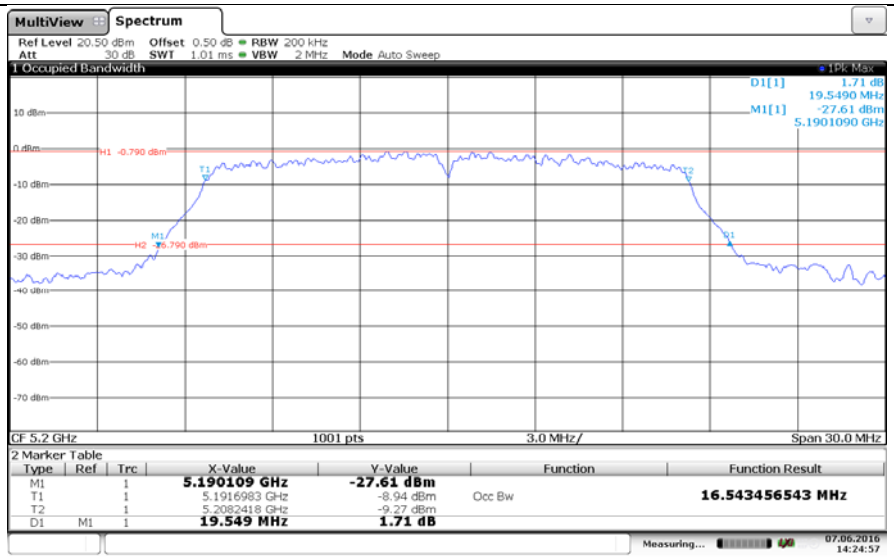
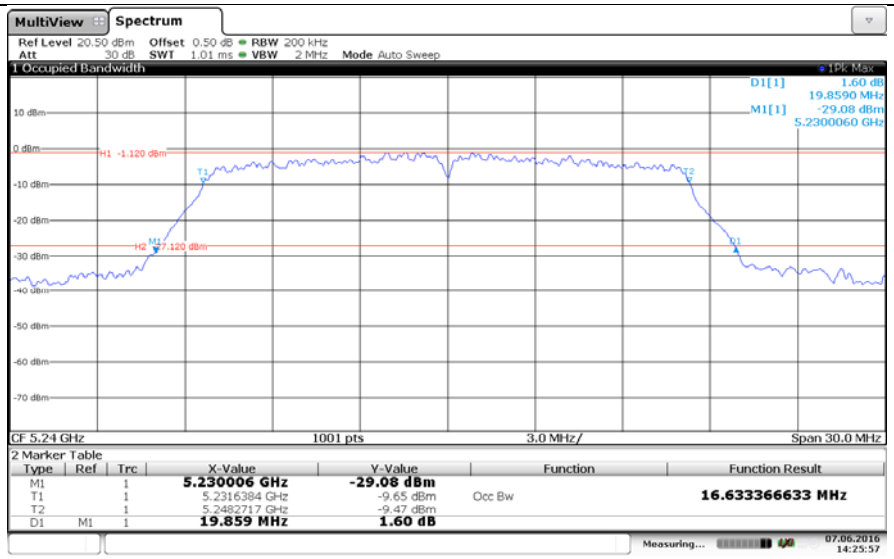
TEST RESULTS

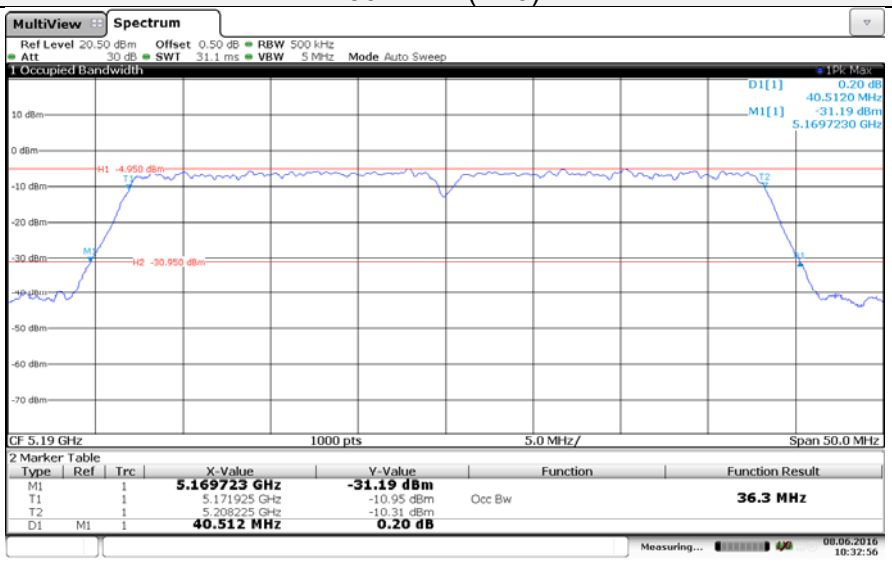
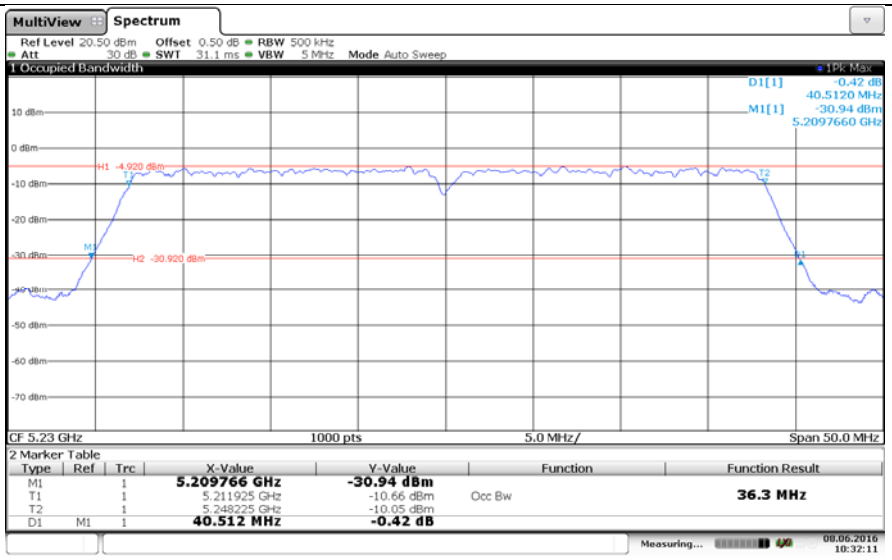
	Type	Channel	26dB Bandwidth (MHz)	Limit	Result
Band I 5150-5250MHz	802.11a	Low	19.65	-	Pass
		Mid	19.55		
		High	19.86		
	802.11ac(H40)	Low	40.51	-	Pass
		High	40.51		
	802.11n(H20)	Low	20.01	-	Pass
		Mid	19.96		
		High	19.96		
	802.11n(H40)	Low	40.38	-	Pass
		High	40.30		

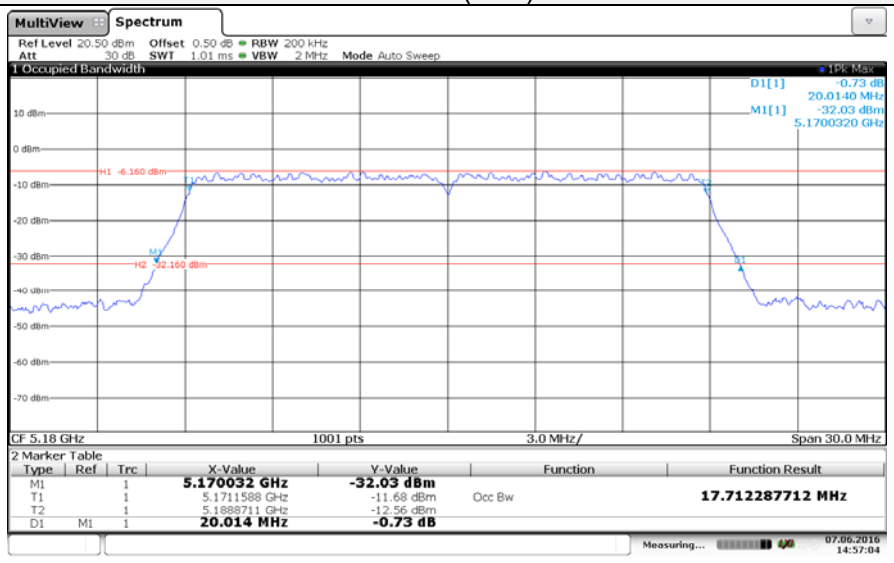
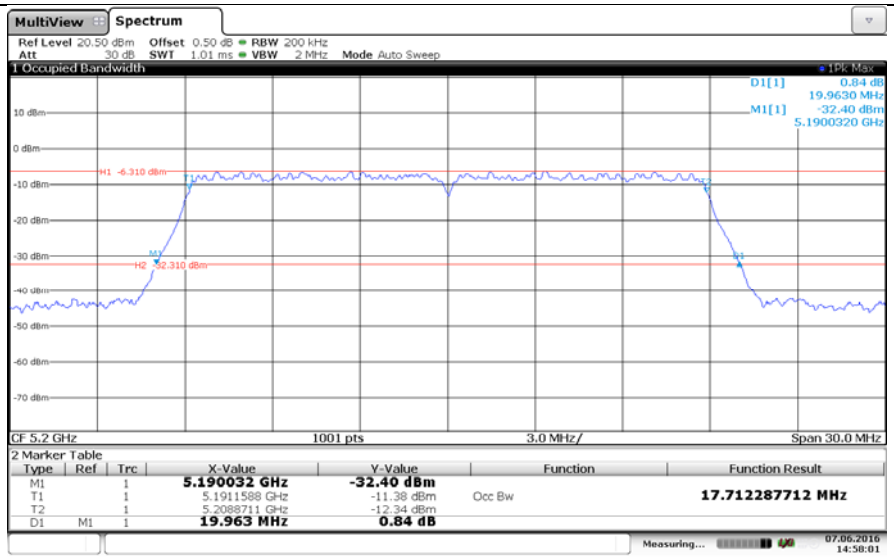
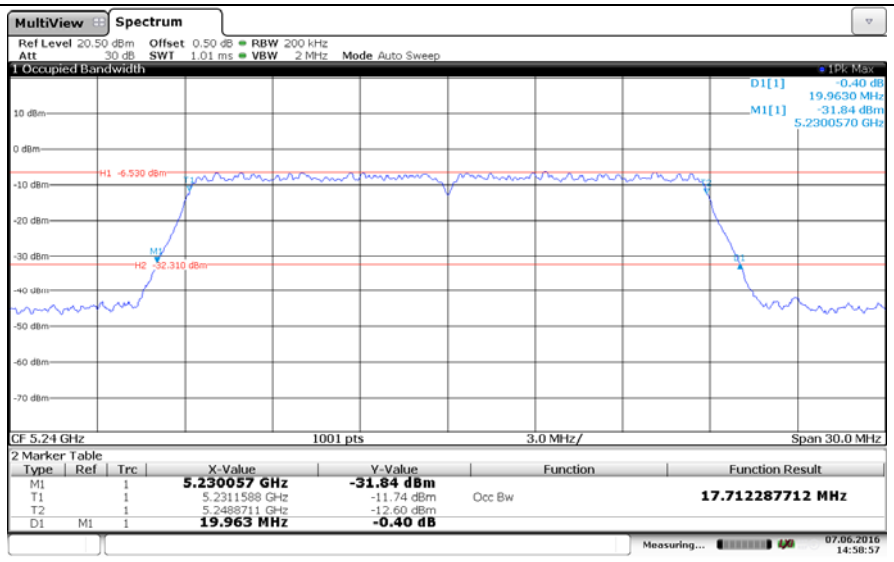
	Type	Channel	26dB Bandwidth (MHz))	Limit	Result
Band II 5250-5350MHz	802.11a	Low	19.81	-	Pass
		Mid	19.99		
		High	19.81		
	802.11ac(H40)	Low	40.77	-	Pass
		High	40.21		
	802.11n(H20)	Low	19.96	-	Pass
		Mid	19.99		
		High	19.99		
	802.11n(H40)	Low	40.60	-	Pass
		High	40.30		

	Type	Channel	6dB Bandwidth (MHz))	Limit (MHz)	Result
Band IV 5720-5850MHz	802.11a	Low	16.58	0.5	Pass
		Mid	16.60		
		High	16.60		
	802.11ac(H40)	Low	36.50	0.5	Pass
		High	36.55		
	802.11n(H20)	Low	17.74	0.5	Pass
		Mid	17.81		
		High	17.84		
	802.11n(H40)	Low	36.46	0.5	Pass
		High	36.46		

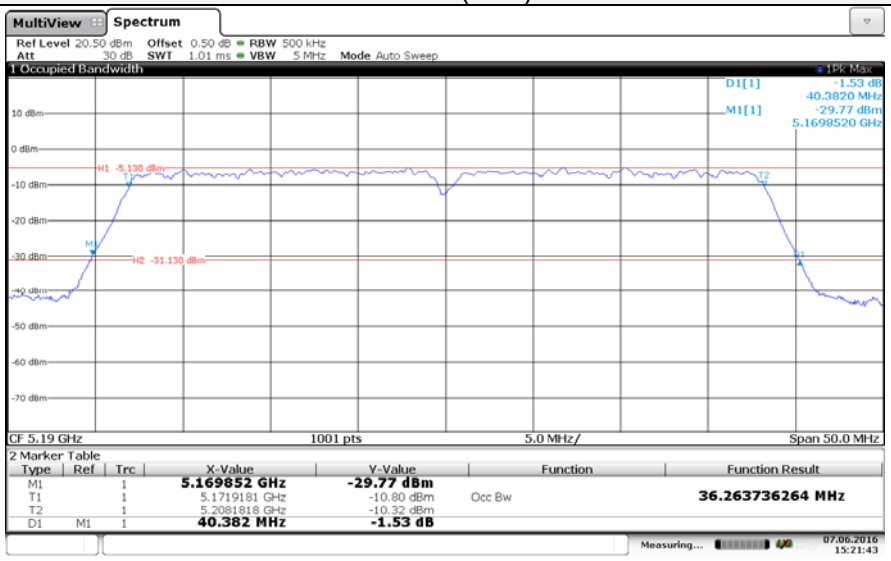
Test plot as follows:

Band I
802.11a

Low

Mid

High

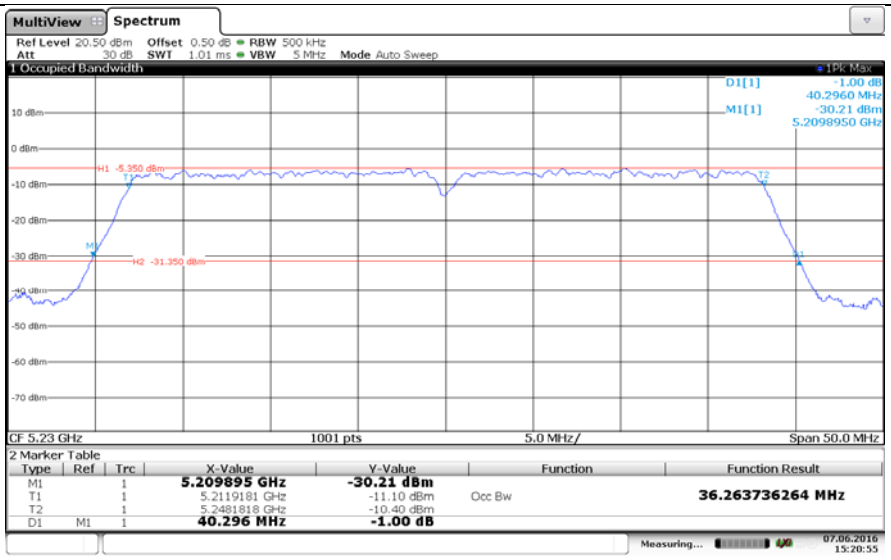
802.11ac(H40)

Low

High

802.11n(H20)

Low

Mid

High

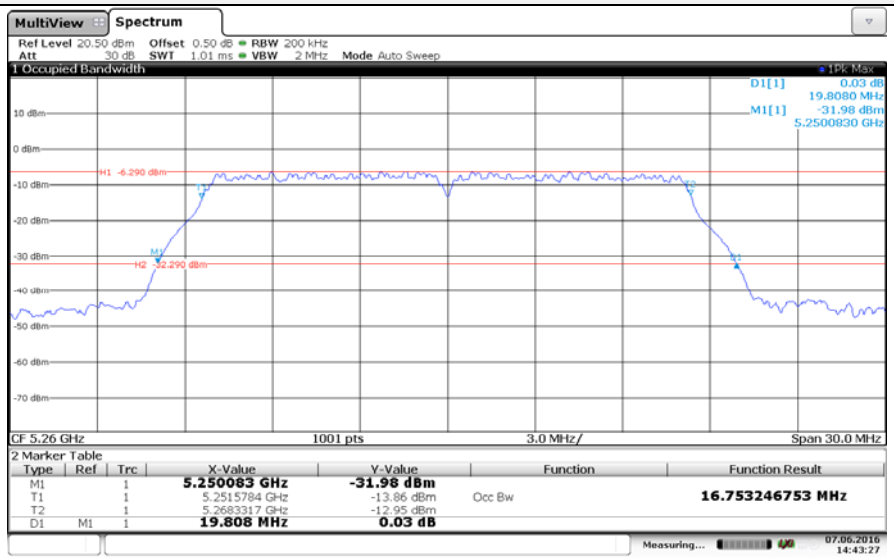
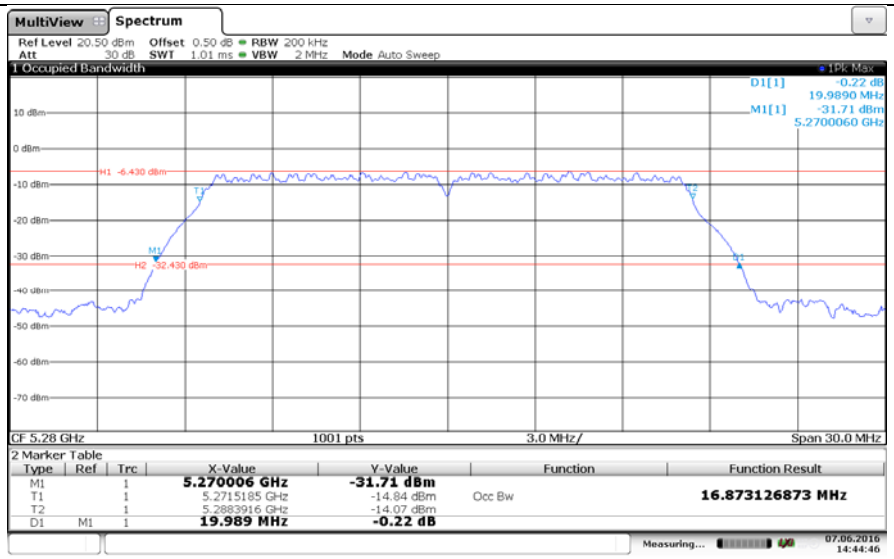
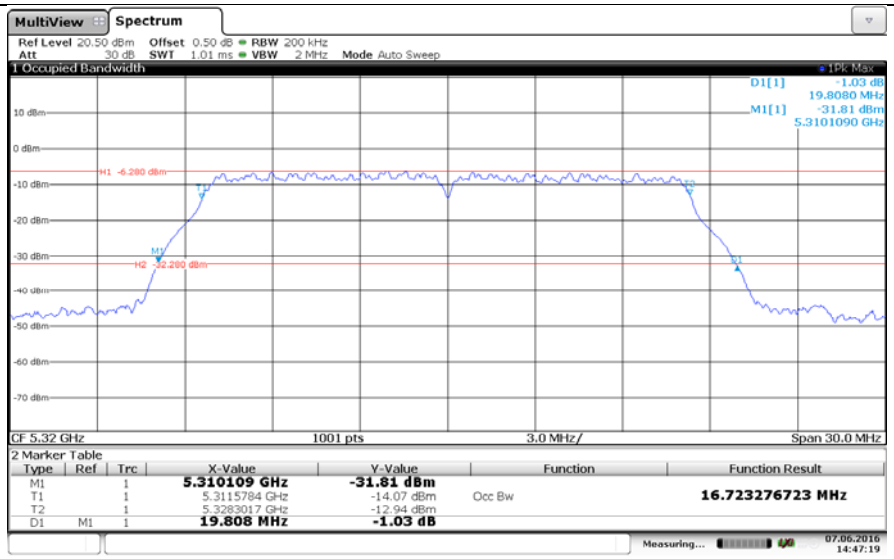
802.11n(H40)

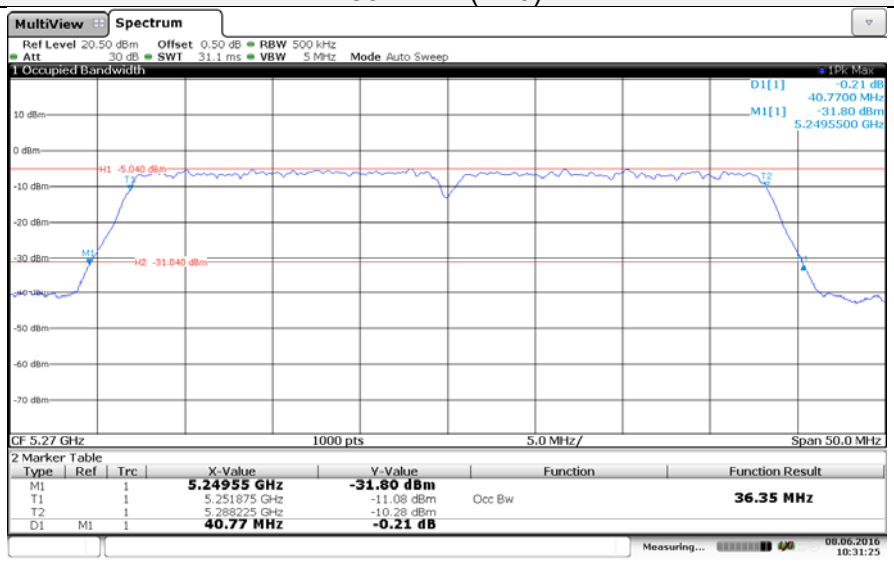
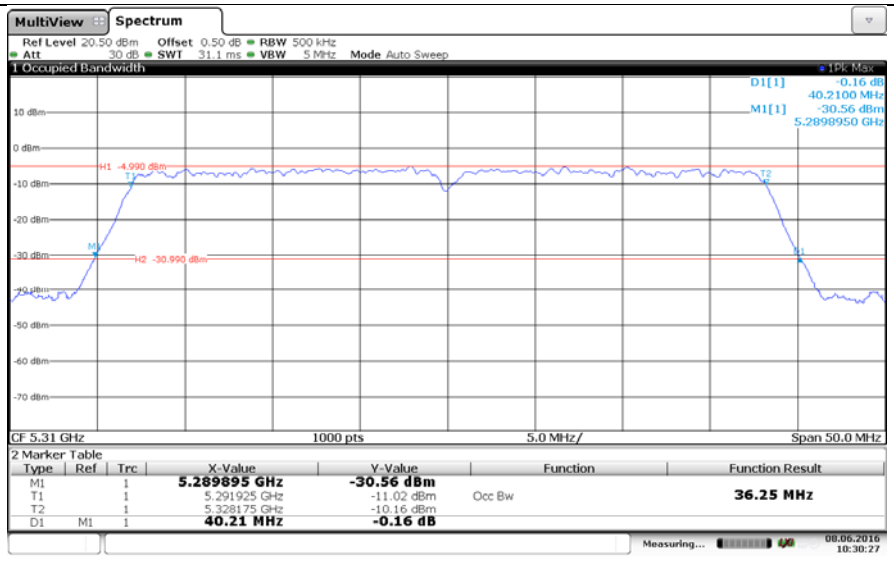


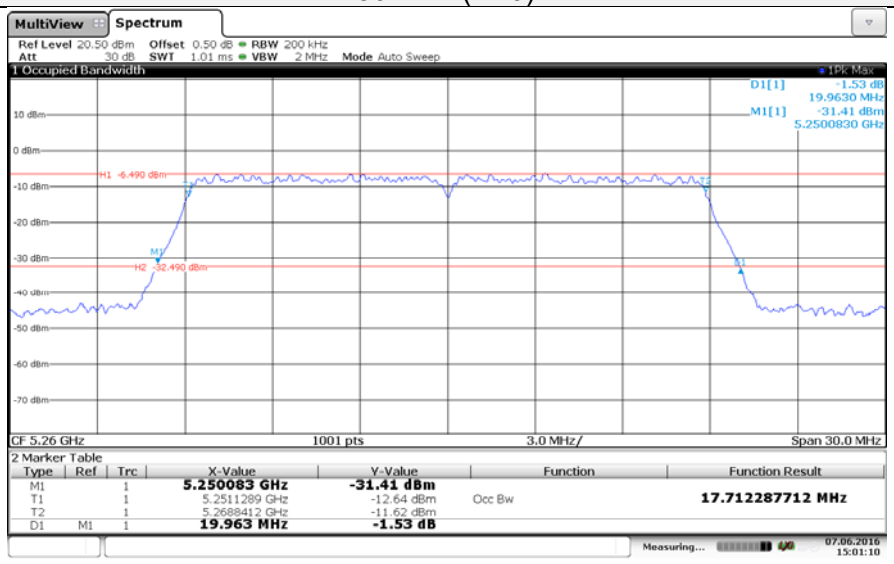
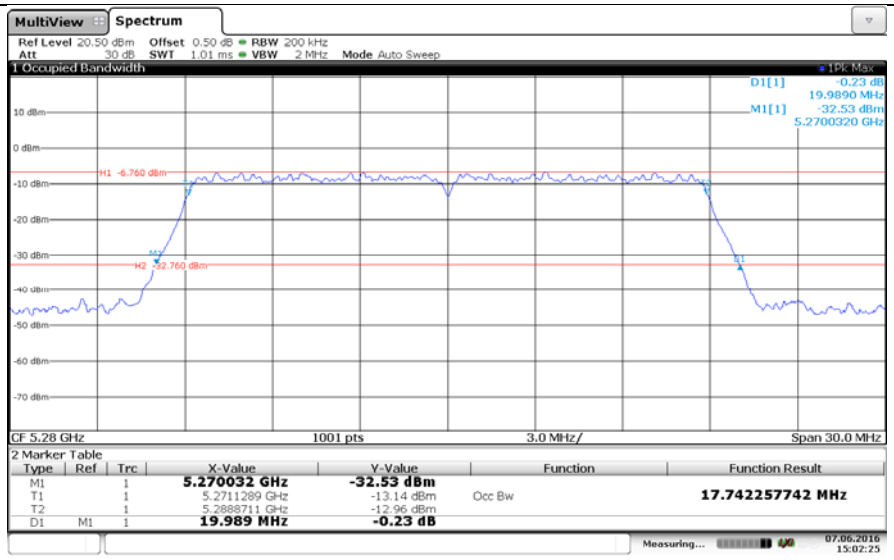
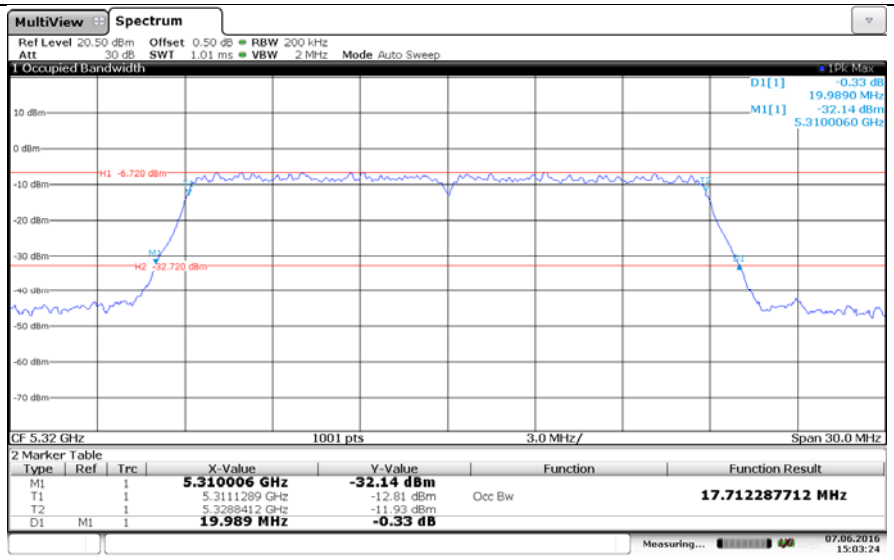
Low



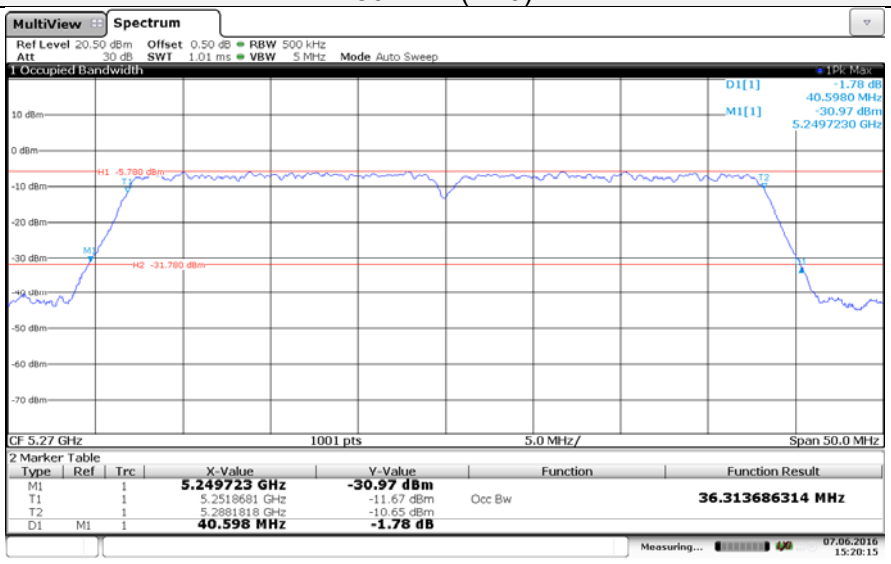
High

Band II
802.11a

Low

Mid

High

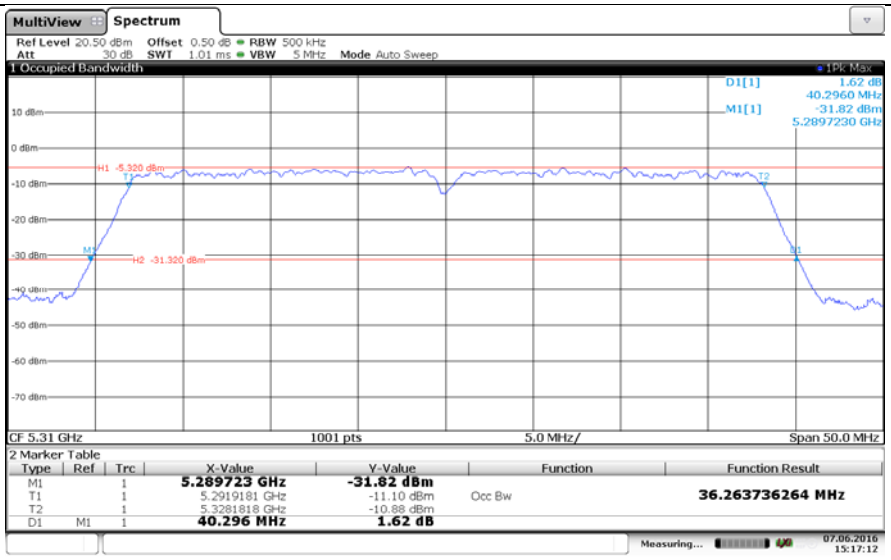
802.11ac(H40)

Low

High

802.11n(H20)

Low

Mid

High

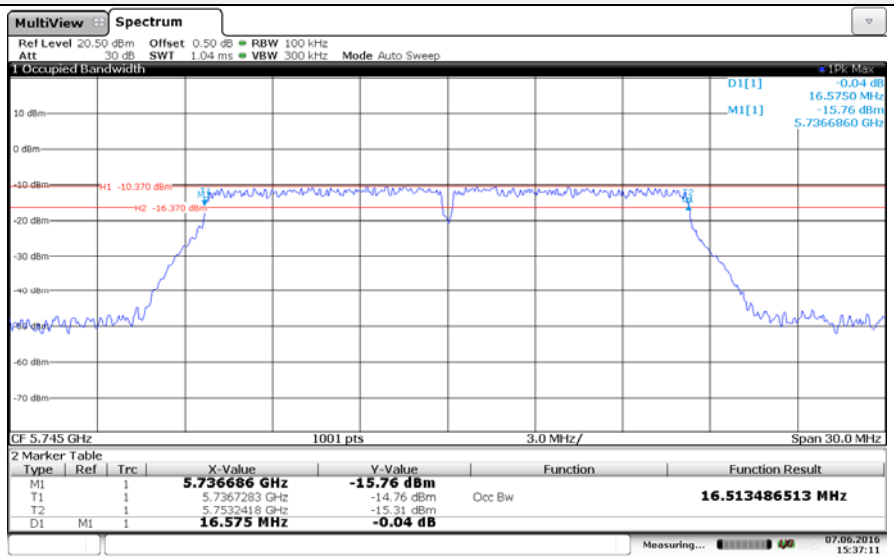
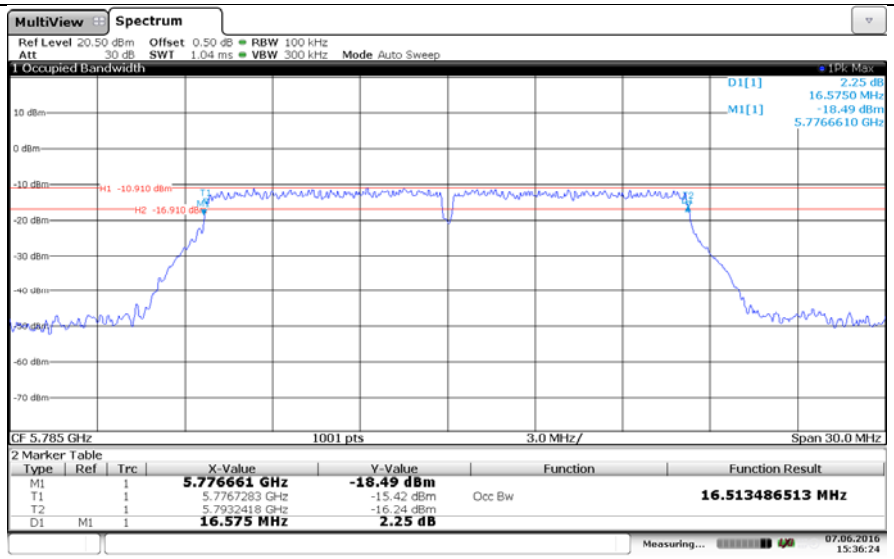
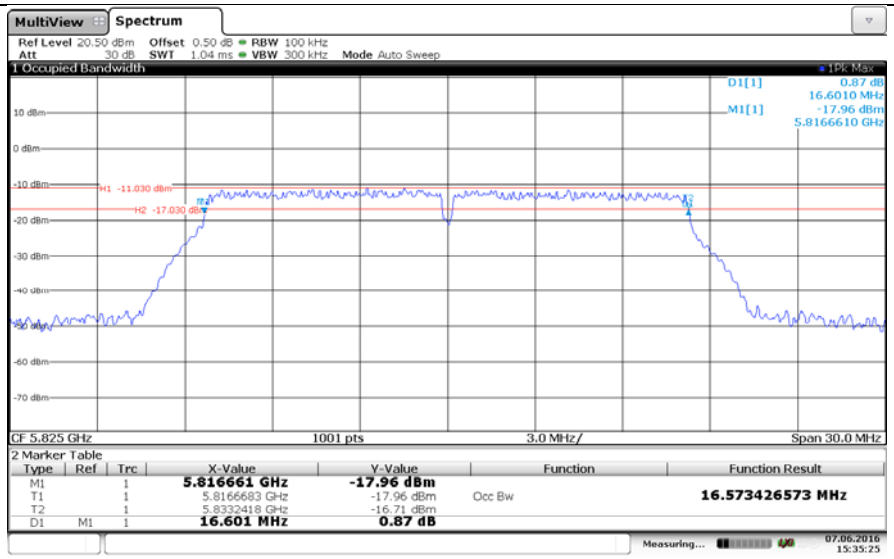
802.11n(H40)

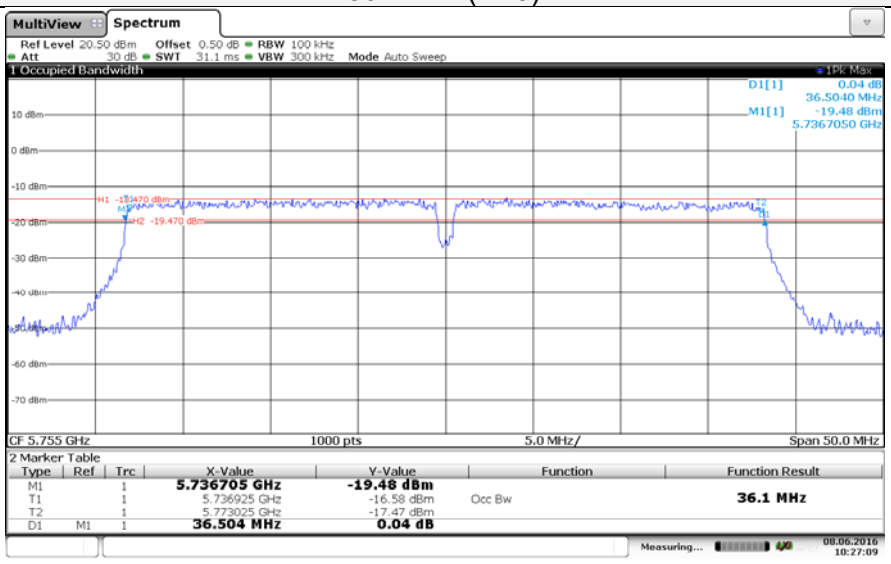
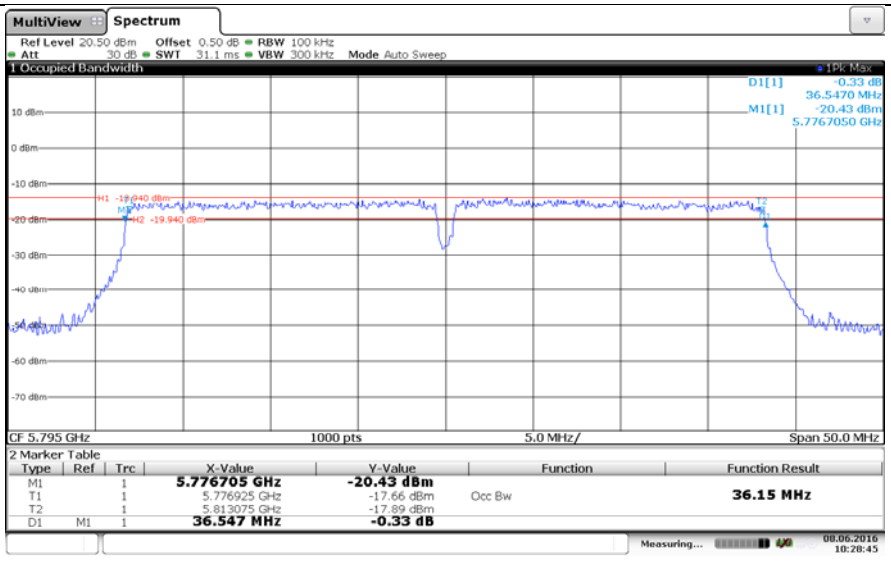


Low

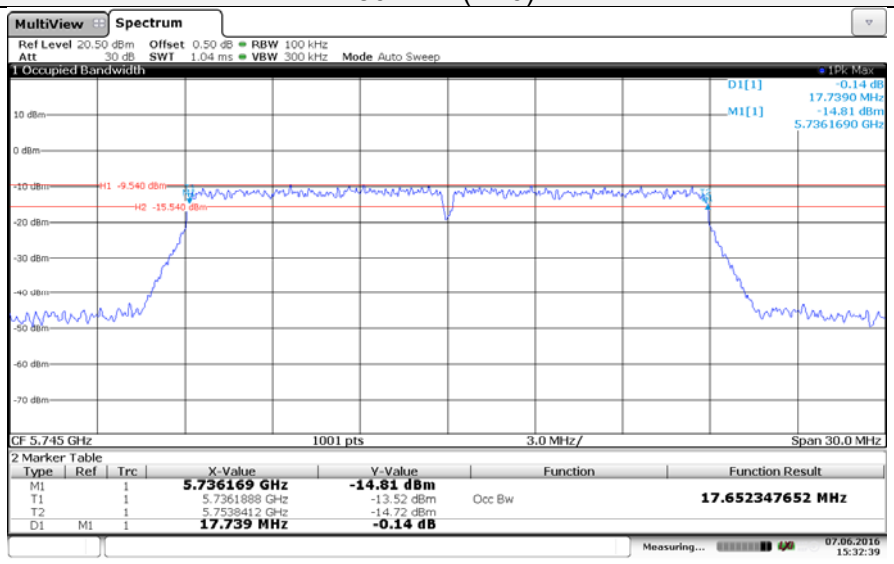


High

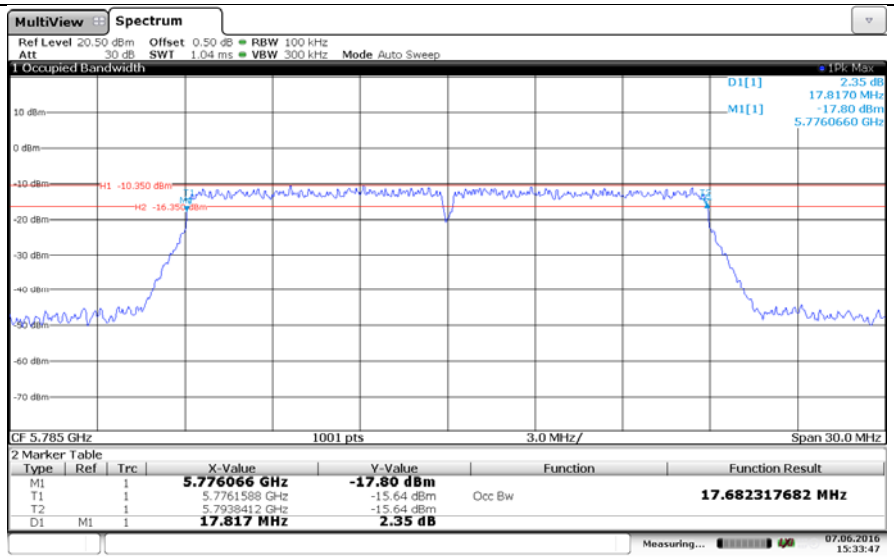
Band IV
802.11a

Low

Mid

High

802.11ac(H40)

Low

High

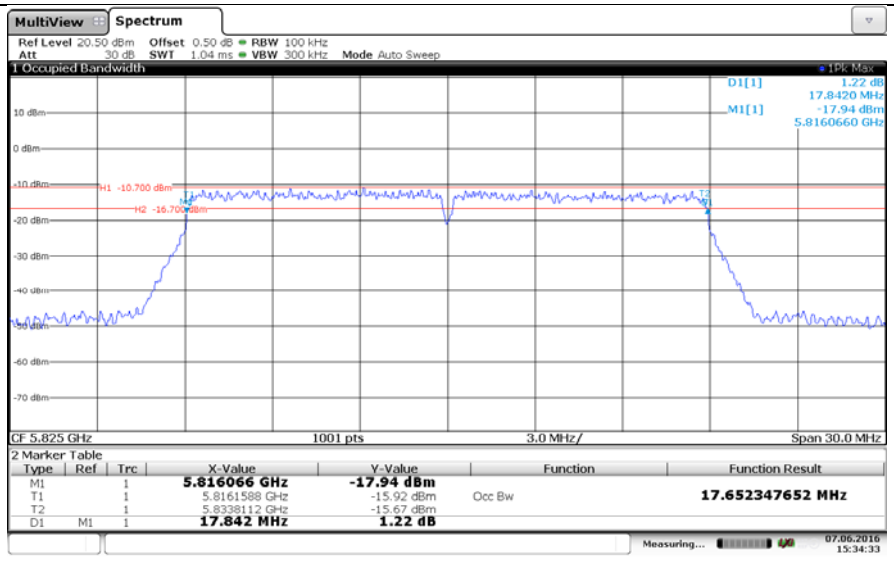
802.11n(H20)



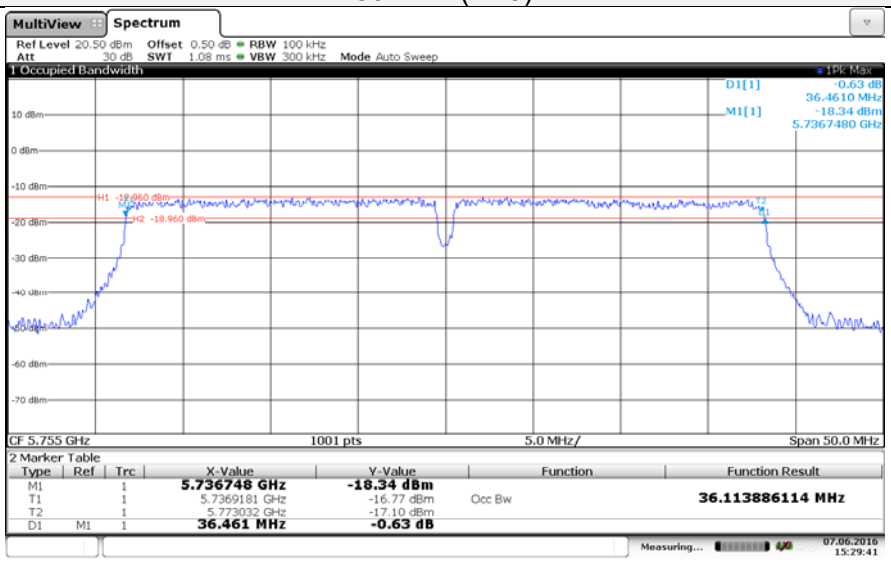
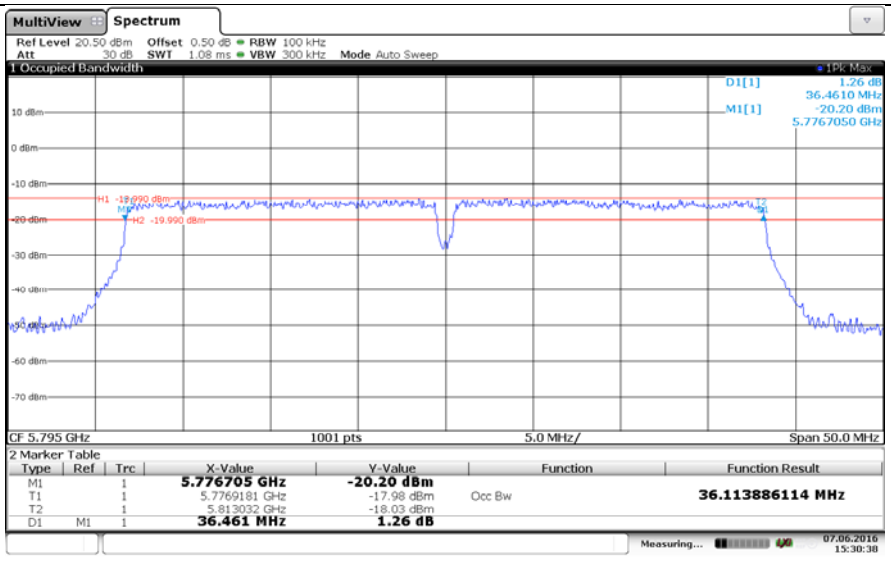
Low



Mid



High

802.11n(H40)

Low

High

4.6. Radiated Emissions & Bandedge

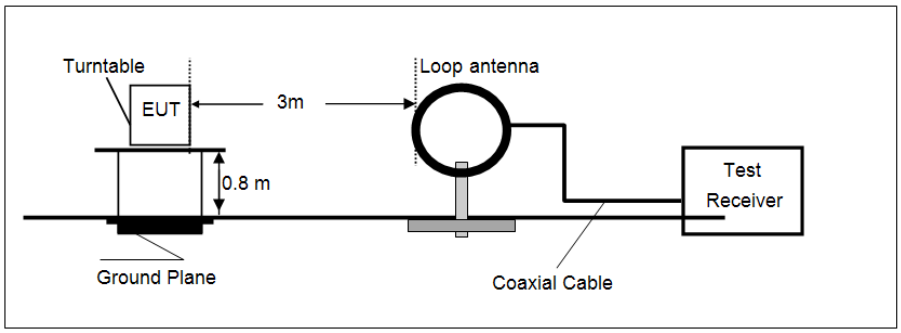
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

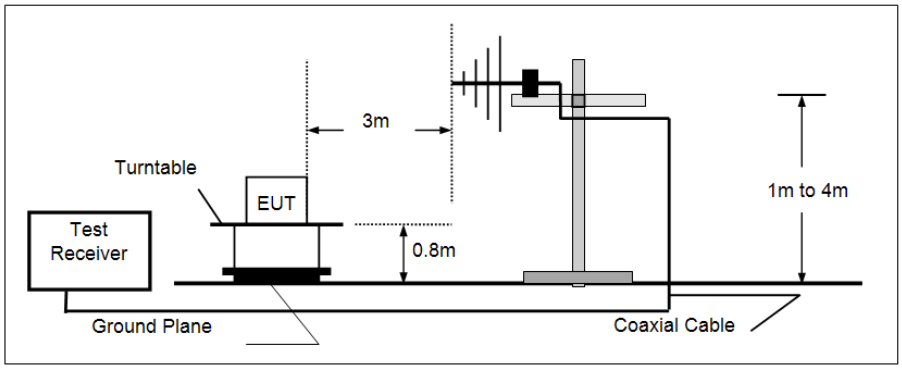
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

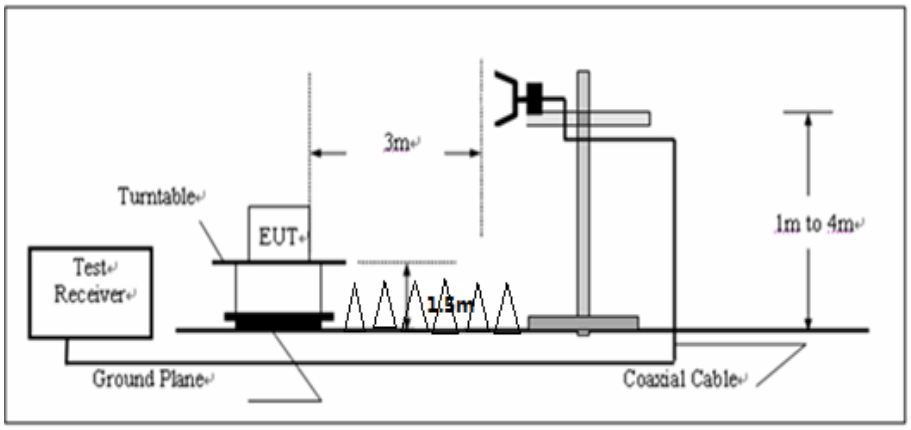
- 9KHz ~30MHz



- 30MHz ~ 1GHz



- Above 1GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.407 requirements.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1GHz,and 1.5m for above 1GHz. The turn table is rotated360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. Use the following spectrum analyzer settings
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Below 1GHz, RBW=120KHz, VBW=300KHz, Sweep=auto, Detector function=peak, Trace=max hold; *If the emission level of the EUT measured by the peak detectoris 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, theemission measurement will be repeated using the quasi-peak detector and reported.*
   (3) Above 1GHz, RBW=1MHz, VBW=3MHz for Peak value
   RBW=1MHz, VBW=10Hz for Average value.

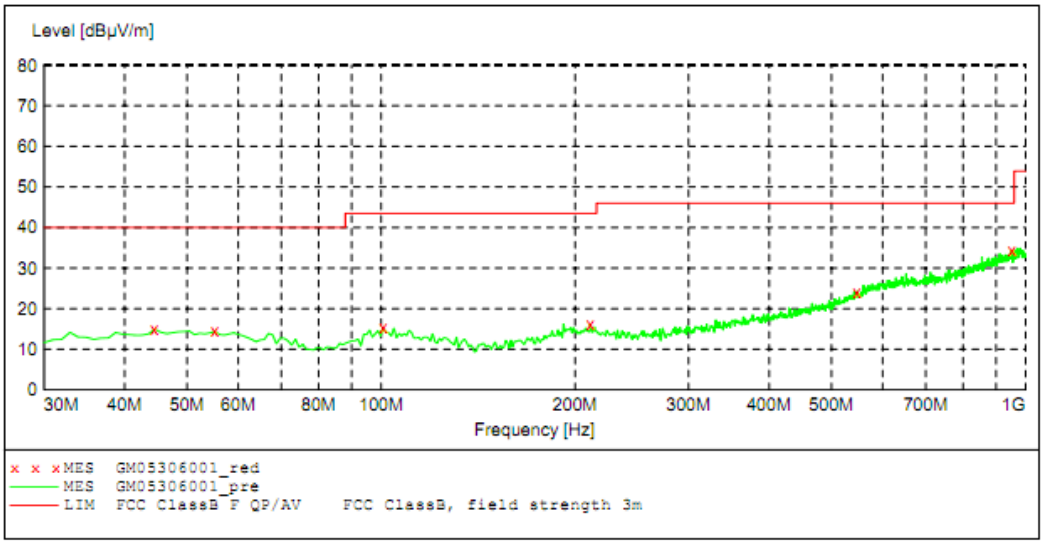
TEST RESULTS

Measurement data:

■ **9kHz ~ 30MHz**

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

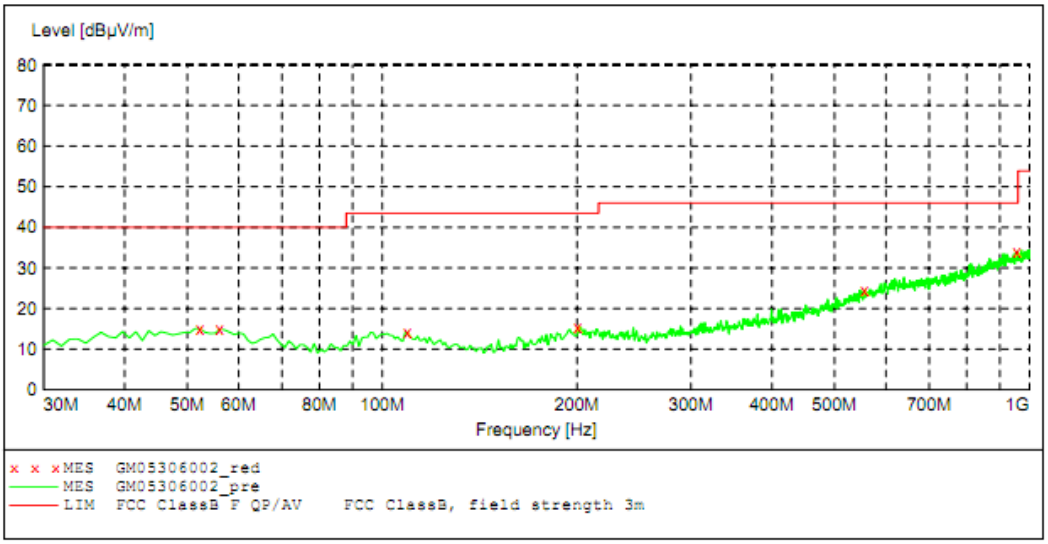
■ **30MHz ~ 1GHz**



MEASUREMENT RESULT: "GM05306001_red"

5/30/2016 8:52AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
44.550000	14.90	-14.8	40.0	25.1	QP	300.0	26.00	HORIZONTAL
55.220000	14.40	-14.6	40.0	25.6	QP	100.0	55.00	HORIZONTAL
100.810000	15.30	-14.3	43.5	28.2	QP	100.0	358.00	HORIZONTAL
211.390000	16.20	-14.1	43.5	27.3	QP	100.0	202.00	HORIZONTAL
547.980000	24.20	-4.9	46.0	21.8	QP	100.0	288.00	HORIZONTAL
953.440000	34.20	3.7	46.0	11.8	QP	100.0	68.00	HORIZONTAL



MEASUREMENT RESULT: "GM05306002_red"

5/30/2016 8:55AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
52.310000	15.00	-14.4	40.0	25.0	QP	100.0	346.00	VERTICAL
56.190000	14.90	-14.7	40.0	25.1	QP	100.0	268.00	VERTICAL
109.540000	14.20	-15.1	43.5	29.3	QP	100.0	282.00	VERTICAL
200.720000	15.50	-13.6	43.5	28.0	QP	100.0	28.00	VERTICAL
556.710000	24.60	-4.5	46.0	21.4	QP	100.0	41.00	VERTICAL
956.350000	34.00	3.8	46.0	12.0	QP	100.0	234.00	VERTICAL

Remark:Transd=Cable lose+ Antenna factor- Pre-amplifier;Margin=Limit -Level

Above 1GHz

Band I for 802.11a Low									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5150.00	17.03	31.56	9.43	0	58.02	74.00	-15.98	Vertical	Peak
5180.00	57.10	31.64	9.45	0	98.19	-	-	Vertical	
10360.00	44.83	33.08	12.59	38.05	52.45	74.00	-21.55	Vertical	
15540.00	*					74.00		Vertical	
5150.00	15.76	31.56	9.43	0	56.75	74.00	-17.25	Horizontal	
5180.00	56.41	31.64	9.45	0	97.50	-	-	Horizontal	
10360.00	45.24	33.08	12.59	38.05	52.86	74.00	-21.14	Horizontal	
15540.00	*					74.00		Horizontal	
5150.00	8.48	31.56	9.43	0	49.47	54.00	-4.53	Vertical	Average
5180.00	50.65	31.64	9.45	0	91.74	-	-	Vertical	
10360.00	39.90	33.08	12.59	38.05	47.52	54.00	-6.48	Vertical	
15540.00	0.00					54.00		Vertical	
5150.00	7.37	31.56	9.43	0	48.36	54.00	-5.64	Horizontal	
5180.00	0.56	31.64	9.45	0	41.65	-	-	Horizontal	
10360.00	39.95	33.08	12.59	38.05	47.57	54.00	-6.43	Horizontal	
15540.00	*					54.00		Horizontal	

Band I for 802.11a High									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5240.00	56.82	30.91	8.99	0	96.72	-	-	Vertical	Peak
5250.00	16.64	31.78	9.49	0	57.91	74.00	-16.09	Vertical	
10500.00	43.26	33.01	12.61	38.04	50.84	74.00	-23.16	Vertical	
15750.00	*					74.00		Vertical	
5240.00	55.14	31.78	9.49	0	96.41	-	-	Horizontal	
5250.00	10.88	35.44	10.53	0	56.85	74.00	-17.15	Horizontal	
10500.00	39.43	38.2	12.17	38.08	51.72	74.00	-22.28	Horizontal	
15750.00	*					74.00		Horizontal	
5240.00	48.84	30.91	8.99	0	88.74	-	-	Vertical	Average
5250.00	9.47	31.78	9.49	0	50.74	54.00	-3.26	Vertical	
10500.00	38.17	33.01	12.61	38.04	45.75	54.00	-8.25	Vertical	
15750.00	*					54.00		Vertical	
5240.00	47.69	31.78	9.49	0	88.96	-	-	Horizontal	
5250.00	4.05	35.44	10.53	0	50.02	54.00	-3.98	Horizontal	
10500.00	33.49	38.2	12.17	38.08	45.78	54.00	-8.22	Horizontal	
15750.00	*					54.00		Horizontal	

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

Band I for 802.11n(H40) Low									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5150.00	13.53	31.56	9.43	0	54.52	74.00	-19.48	Vertical	Peak
5190.00	55.61	31.68	9.46	0	96.75	-	-	Vertical	
10380.00	44.13	33.09	12.59	38.06	51.75	74.00	-22.25	Vertical	
15570.00	*					74.00		Vertical	
5150.00	14.85	31.56	9.43	0	55.84	74.00	-18.16	Horizontal	
5190.00	56.11	31.68	9.46	0	97.25	-	-	Horizontal	
10380.00	44.70	33.09	12.59	38.06	52.32	74.00	-21.68	Horizontal	
15570.00	*					74.00		Horizontal	
5150.00	5.75	31.56	9.43	0	46.74	54.00	-7.26	Vertical	Average
5190.00	47.61	31.68	9.46	0	88.75	-	-	Vertical	
10380.00	36.75	33.09	12.59	38.06	44.37	54.00	-9.63	Vertical	
15570.00	0.00					54.00		Vertical	
5150.00	7.95	31.56	9.43	0	48.94	54.00	-5.06	Horizontal	
5190.00	49.11	31.68	9.46	0	90.25	-	-	Horizontal	
10380.00	38.16	33.09	12.59	38.06	45.78	54.00	-8.22	Horizontal	
15570.00	*					54.00		Horizontal	

Band I for 802.11n(H40) High									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5230.00	54.85	30.91	8.99	0	94.75	-	-	Vertical	Peak
5250.00	11.37	31.78	9.49	0	52.64	74.00	-21.36	Vertical	
10460.00	42.18	33.01	12.61	38.04	49.76	74.00	-24.24	Vertical	
15690.00	*					74.00		Vertical	
5230.00	56.25	31.78	9.49	0	97.52	-	-	Horizontal	
5250.00	8.39	35.44	10.53	0	54.36	74.00	-19.64	Horizontal	
10460.00	37.56	38.2	12.17	38.08	49.85	74.00	-24.15	Horizontal	
15690.00	*					74.00		Horizontal	
5230.00	46.55	30.91	8.99	0	86.45	-	-	Vertical	Average
5250.00	5.17	31.78	9.49	0	46.44	54.00	-7.56	Vertical	
10460.00	34.05	33.01	12.61	38.04	41.63	54.00	-12.37	Vertical	
15690.00	0.00					54.00		Vertical	
5230.00	46.98	31.78	9.49	0	88.25	-	-	Horizontal	
5250.00	1.55	35.44	10.53	0	47.52	54.00	-6.48	Horizontal	
10460.00	29.67	38.2	12.17	38.08	41.96	54.00	-12.04	Horizontal	
15690.00	*					54.00		Horizontal	

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

Band II for 802.11a Low									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5250.00	11.10	31.78	9.49	0	52.37	74.00	-21.63	Vertical	Peak
5260.00	54.12	31.82	9.49	0	95.43	-	-	Vertical	
10520.00	36.28	38.22	12.17	38.08	48.59	74.00	-25.41	Vertical	
15780.00	*					74.00		Vertical	
5250.00	13.48	31.78	9.49	0	54.75	74.00	-19.25	Horizontal	
5260.00	56.31	31.82	9.49	0	97.62	-	-	Horizontal	
10520.00	37.37	38.22	12.17	38.08	49.68	74.00	-24.32	Horizontal	
15780.00	*					74.00		Horizontal	
5250.00	4.47	31.78	9.49	0	45.74	54.00	-8.26	Vertical	Average
5260.00	46.34	31.82	9.49	0	87.65	-	-	Vertical	
10520.00	29.45	38.22	12.17	38.08	41.76	54.00	-12.24	Vertical	
15780.00	*					54.00		Vertical	
5250.00	8.36	31.78	9.49	0	49.63	54.00	-4.37	Horizontal	
5260.00	48.43	31.82	9.49	0	89.74	-	-	Horizontal	
10520.00	29.65	38.22	12.17	38.08	41.96	54.00	-12.04	Horizontal	
15780.00	*					54.00		Horizontal	

Band II for 802.11a High									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5320.00	53.27	31.96	9.52	0	94.75	-	-	Vertical	Peak
5350.00	9.15	31.98	9.52	0	50.65	74.00	-23.35	Vertical	
10640.00	37.38	38.06	12.34	38.04	49.74	74.00	-24.26	Vertical	
15960.00	*					74.00		Vertical	
5320.00	56.36	31.78	9.49	0	97.63	-	-	Horizontal	
5350.00	9.94	31.82	9.49	0	51.25	74.00	-28.16	Horizontal	
10640.00	38.55	38.22	12.17	38.08	50.86	74.00	-23.14	Horizontal	
15960.00	*					74.00		Horizontal	
5320.00	45.28	31.96	9.52	0	86.76	54.00	32.76	Vertical	Average
5350.00	1.95	31.98	9.52	0	43.45	54.00	-10.55	Vertical	
10640.00	30.55	38.06	12.34	38.04	42.91	54.00	-11.09	Vertical	
15960.00	*					54.00		Vertical	
5320.00	49.47	31.78	9.49	0	90.74	54.00	36.74	Horizontal	
5350.00	1.71	31.82	9.49	0	43.02	54.00	-10.98	Horizontal	
10640.00	30.65	38.22	12.17	38.08	42.96	54.00	-11.04	Horizontal	
15960.00	*					54.00		Horizontal	

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

Band II for 802.11n(H40) Low									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5250.00	10.38	31.78	9.49	0	51.65	74.00	-22.35	Vertical	Peak
5270.00	51.27	31.82	9.49	0	92.58	-	-	Vertical	
10540.00	35.12	38.22	12.17	38.08	47.43	74.00	-26.57	Vertical	
15810.00	*					74.00		Vertical	
5250.00	11.20	31.78	9.49	0	52.47	74.00	-21.53	Horizontal	
5270.00	53.45	31.82	9.49	0	94.76	-	-	Horizontal	
10540.00	37.21	38.22	12.17	38.08	49.52	74.00	-24.48	Horizontal	
15810.00	*					74.00		Horizontal	
5250.00	2.38	31.78	9.49	0	43.65	54.00	-10.35	Vertical	Average
5270.00	43.45	31.82	9.49	0	84.76	-	-	Vertical	
10540.00	28.34	38.22	12.17	38.08	40.65	54.00	-13.35	Vertical	
15810.00	*					54.00		Vertical	
5250.00	8.36	31.78	9.49	0	49.63	54.00	-4.37	Horizontal	
5270.00	45.43	31.82	9.49	0	86.74	-	-	Horizontal	
10540.00	29.32	38.22	12.17	38.08	41.63	54.00	-12.37	Horizontal	
15810.00	*					54.00		Horizontal	

Band II for 802.11n(H40) High									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5310.00	51.17	31.96	9.52	0	92.65	-	-	Vertical	Peak
5350.00	6.99	31.98	9.52	0	48.49	74.00	-25.51	Vertical	
10620.00	36.89	38.06	12.34	38.04	49.25	74.00	-24.75	Vertical	
15930.00	*					74.00		Vertical	
5310.00	54.47	31.78	9.49	0	95.74	-	-	Horizontal	
5350.00	8.37	31.82	9.49	0	49.68	74.00	-28.16	Horizontal	
10620.00	37.87	38.22	12.17	38.08	50.18	74.00	-23.82	Horizontal	
15930.00	*					74.00		Horizontal	
5310.00	43.18	31.96	9.52	0	84.66	54.00	30.66	Vertical	Average
5350.00	-0.45	31.98	9.52	0	41.05	54.00	-12.95	Vertical	
10620.00	28.88	38.06	12.34	38.04	41.24	54.00	-12.76	Vertical	
15930.00	*					54.00		Vertical	
5310.00	47.38	31.78	9.49	0	88.65	54.00	34.65	Horizontal	
5350.00	-0.04	31.82	9.49	0	41.27	54.00	-12.73	Horizontal	
10620.00	29.77	38.22	12.17	38.08	42.08	54.00	-11.92	Horizontal	
15930.00	*					54.00		Horizontal	

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

Band IV for 802.11a Low									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5725.00	6.26	32.8	9.69	0	48.75	74.00	-25.25	Vertical	Peak
5745.00	52.27	32.8	9.69	0	94.76	-	-	Vertical	
11490.00	34.05	39.1	13.49	37.88	48.76	74.00	-25.24	Vertical	
17235.00	*					74.00		Vertical	
5725.00	49.77	30.24	8.81	38.17	50.65	74.00	-23.35	Horizontal	
5745.00	93.30	35.44	10.53	38.02	101.25	74.00	27.25	Horizontal	
11490.00	37.23	38.2	12.17	38.08	49.52	74.00	-24.48	Horizontal	
17235.00	*					74.00		Horizontal	
5725.00	40.46	30.24	8.81	38.17	41.34	54.00	-12.66	Vertical	Average
5745.00	76.56	35.44	10.53	38.02	84.51	-	-	Vertical	
11490.00	28.36	38.2	12.17	38.08	40.65	54.00	-13.35	Vertical	
17235.00	*					54.00		Vertical	
5725.00	42.64	30.24	8.81	38.17	43.52	54.00	-10.48	Horizontal	
5745.00	85.50	35.44	10.53	38.02	93.45	-	-	Horizontal	
11490.00	28.96	38.2	12.17	38.08	41.25	54.00	-12.75	Horizontal	
17235.00	*					54.00		Horizontal	

Band IV for 802.11a High									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5825.00	57.96	32.93	9.72	0.00	100.61	-	-	Vertical	Peak
5850.00	8.56	32.96	11.24	0.00	52.76	74.00	-21.24	Vertical	
11650.00	36.44	38.21	12.32	38.01	48.96	74.00	-25.04	Vertical	
17475.00	*					74.00		Vertical	
5825.00	59.87	32.93	9.72	0.00	102.52	-	-	Horizontal	
5850.00	9.54	32.96	11.24	0.00	53.74	74.00	-20.26	Horizontal	
11650.00	36.73	38.21	12.32	38.01	49.25	74.00	-24.75	Horizontal	
17475.00	*					74.00		Horizontal	
5825.00	51.10	32.93	9.72	0.00	93.75	-	-	Vertical	Average
5850.00	2.54	32.96	11.24	0.00	46.74	54.00	-7.26	Vertical	
11650.00	28.73	38.21	12.32	38.01	41.25	54.00	-12.75	Vertical	
17475.00	*					54.00		Vertical	
5825.00	51.73	32.93	9.72	0.00	94.38	-	-	Horizontal	
5850.00	3.45	32.96	11.24	0.00	47.65	54.00	-6.35	Horizontal	
11650.00	28.92	38.21	12.32	38.01	41.44	54.00	-12.56	Horizontal	
17475.00	*					54.00		Horizontal	

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

Band IV for 802.11n(H40) Low									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5725.00	5.09	32.8	9.69	0	47.58	74.00	-26.42	Vertical	Peak
5755.00	49.96	32.8	9.69	0	92.45	-	-	Vertical	
11510.00	35.15	39.1	13.49	37.88	49.86	74.00	-24.14	Vertical	
17265.00	*					74.00		Vertical	
5725.00	47.87	30.24	8.81	38.17	48.75	74.00	-25.25	Horizontal	
5755.00	86.83	35.44	10.53	38.02	94.78	74.00	20.78	Horizontal	
11510.00	37.39	38.2	12.17	38.08	49.68	74.00	-24.32	Horizontal	
17265.00	*					74.00		Horizontal	
5725.00	39.64	30.24	8.81	38.17	40.52	54.00	-13.48	Vertical	Average
5755.00	75.50	35.44	10.53	38.02	83.45	-	-	Vertical	
11510.00	29.45	38.2	12.17	38.08	41.74	54.00	-12.26	Vertical	
17265.00	*					54.00		Vertical	
5725.00	40.81	30.24	8.81	38.17	41.69	54.00	-12.31	Horizontal	
5755.00	79.57	35.44	10.53	38.02	87.52	-	-	Horizontal	
11510.00	28.79	38.2	12.17	38.08	41.08	54.00	-12.92	Horizontal	
17265.00	*					54.00		Horizontal	

Band IV for 802.11n(H40) High									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
5795.00	50.72	32.93	9.72	0.00	93.37	-	-	Vertical	Peak
5850.00	5.45	32.96	11.24	0.00	49.65	74.00	-24.35	Vertical	
11590.00	36.22	38.21	12.32	38.01	48.74	74.00	-25.26	Vertical	
17385.00	*					74.00		Vertical	
5795.00	53.11	32.93	9.72	0.00	95.76	-	-	Horizontal	
5850.00	6.48	32.96	11.24	0.00	50.68	74.00	-23.32	Horizontal	
11590.00	36.56	38.21	12.32	38.01	49.08	74.00	-24.92	Horizontal	
17385.00	*					74.00		Horizontal	
5795.00	42.10	32.93	9.72	0.00	84.75	-	-	Vertical	Average
5850.00	-3.14	32.96	11.24	0.00	41.06	54.00	-12.94	Vertical	
11590.00	28.24	38.21	12.32	38.01	40.76	54.00	-13.24	Vertical	
17385.00	*					54.00		Vertical	
5795.00	44.87	32.93	9.72	0.00	87.52	-	-	Horizontal	
5850.00	-2.12	32.96	11.24	0.00	42.08	54.00	-11.92	Horizontal	
11590.00	28.73	38.21	12.32	38.01	41.25	54.00	-12.75	Horizontal	
17385.00	*					54.00		Horizontal	

Remark:

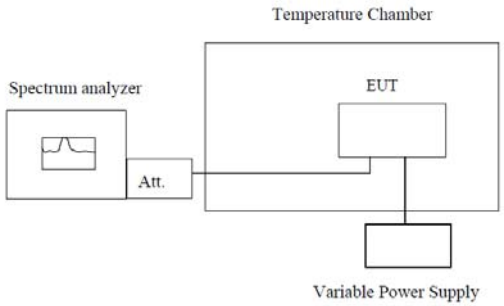
1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

4.7. Frequency stability

LIMIT

Within Operation Band

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –20℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

TEST RESULTS

Band I for 802.11a Low				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation(ppm)
100%	3.70	-30	23	0.004
100%		-20	45	0.009
100%		-10	38	0.007
100%		0	54	0.010
100%		+10	36	0.007
100%		+20	47	0.009
100%		+30	52	0.010
100%		+40	38	0.007
100%		+50	57	0.011
Low Battery power	3.50	+20	48	0.009
High Battery power	4.20	+20	45	0.009

Band II for 802.11a Low				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	3.7	-30	43	0.008
100%		-20	52	0.010
100%		-10	74	0.014
100%		0	36	0.007
100%		+10	49	0.009
100%		+20	58	0.011
100%		+30	36	0.007
100%		+40	78	0.015
100%		+50	59	0.011
Low Battery power	3.50	+20	69	0.013
High Battery power	4.20	+20	74	0.014

Band IV for 802.11a Low				
Voltage(%)	Power(VDC)	TEMP(℃)	Freq.Dev(Hz)	Deviation
100%	3.7	-30	64	0.011
100%		-20	75	0.013
100%		-10	36	0.006
100%		0	49	0.009
100%		+10	58	0.010
100%		+20	37	0.006
100%		+30	102	0.018
100%		+40	59	0.010
100%		+50	48	0.008
Low Battery power	3.50	+20	54	0.009
High Battery power	4.20	+20	49	0.009

4.8. Dynamic Frequency Selection (DFS).

Requirement

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

LIMIT

1. DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

2. DFS Response Requirements

Table 4: DFS Response Requirement Values

Paramenter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

Note 2: The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required facilitating a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the *U-NII Detection Bandwidth* detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

RADAR TEST WAVEFORMS

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Table 5 Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

For example if in Short Pulse Radar Type 1 Test B a PRI of 3066 μsec is selected, the number of pulses would be Round up $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{3066}\right)\right\}$ = Round up {17.2} = 18.

Table 5a - Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per *Burst*	Number of *Bursts*	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveforms are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type wave forms, then each additional waveform must also be unique and not repeated from the previous waveforms.

Table 7 – Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

For the Frequency Hopping Radar Type, the same *Burst* parameters are used for each wave form. The hopping sequence is different for each wave form and a 100-length segment is selected from the hopping sequence defined by the following algorithm:

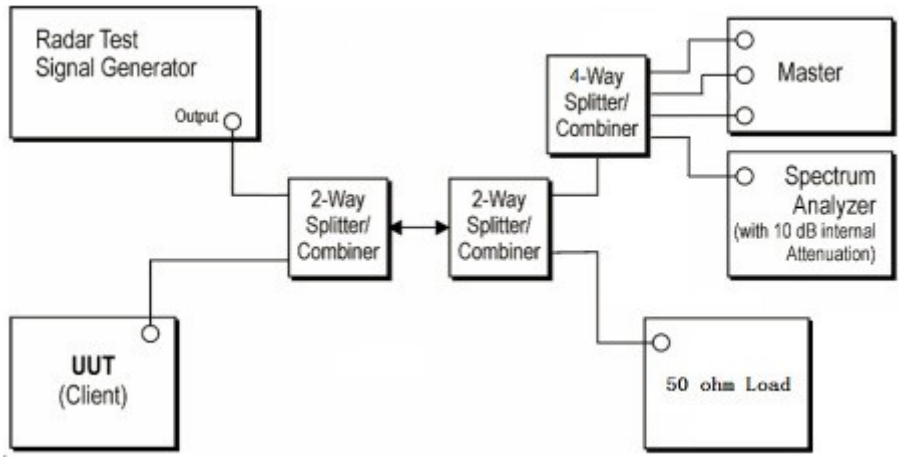
The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250–5724MHz.Next,the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

Calibration of Radar Waveform

Radar Waveform Calibration Procedure

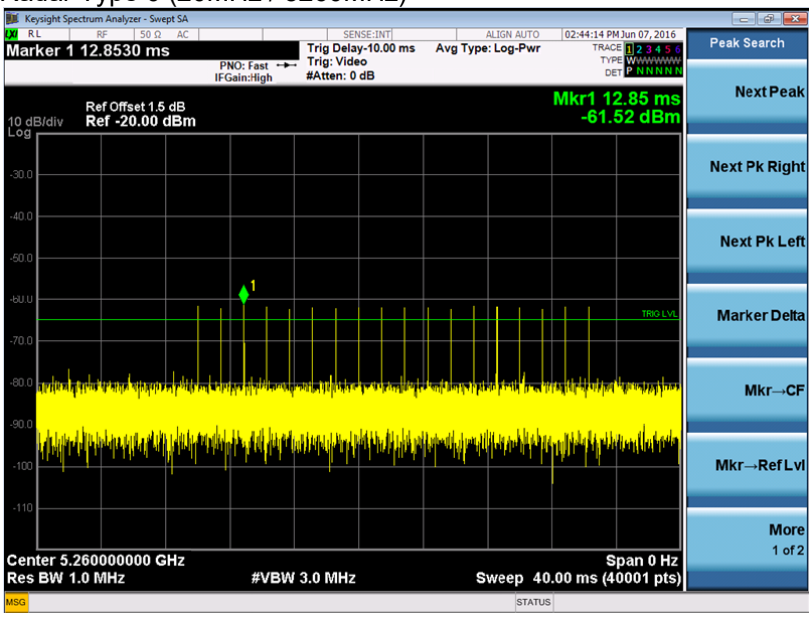
1) A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master
2) The interference Radar Detection Threshold Level is -62dBm + 0dBi +1dB = -61dBm that had been taken into account the output power range and antenna gain.
3) The following equipment setup was used to calibrate the conducted radar waveform. A vector signal generator was utilized to establish the test signal level for radar type 0. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero spans (time domain) at the frequency of the radar waveform generator. Peak detection was used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3
   MHz. The spectrum analyzer had offset -1.0dB to compensate RF cable loss 1.0dB.
4) The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was - -62dBm + 0dBi +1dB = -61dBm. Capture the spectrum analyzer plots on short pulse radar waveform.

Conducted Calibration Setup

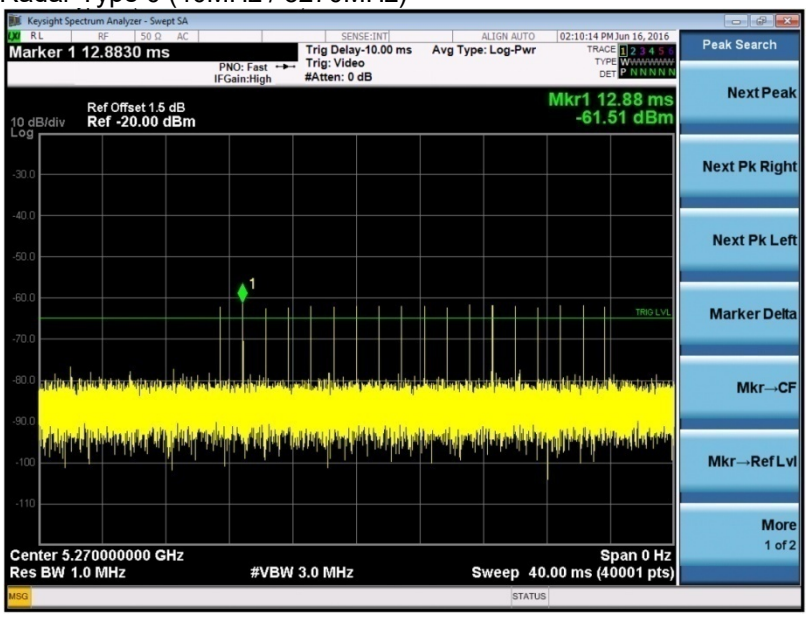


Radar Waveform Calibration Result

Radar Type 0 (20MHz / 5260MHz)

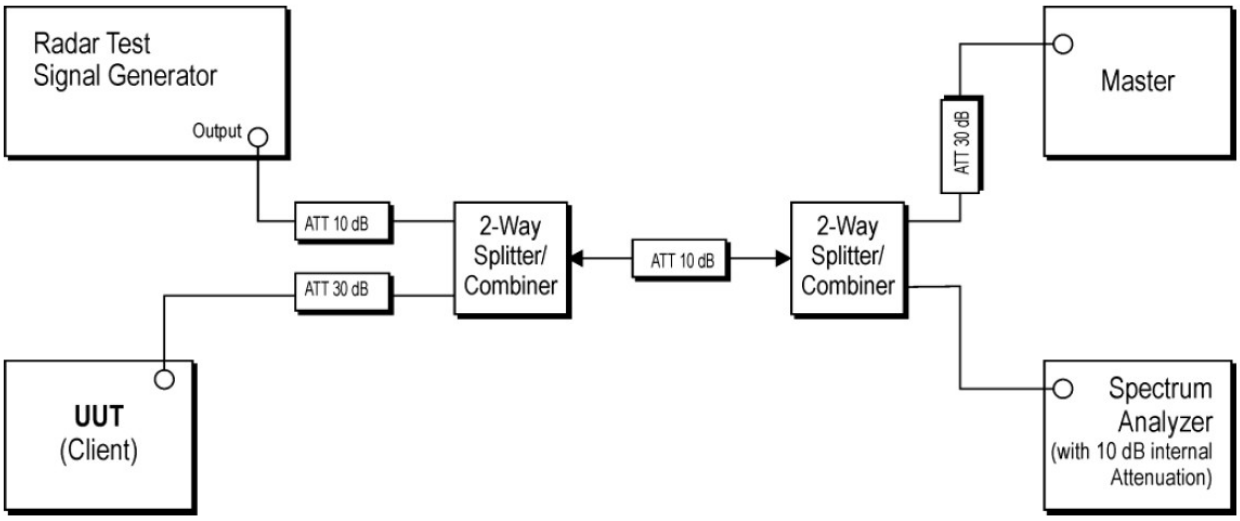


Radar Type 0 (40MHz / 5270MHz)



TEST CONFIGURATION

Setup for Client with injection at the Master



TEST PROCEDURE

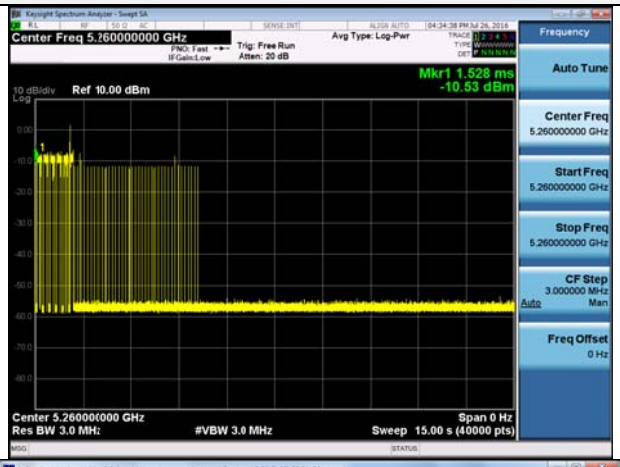
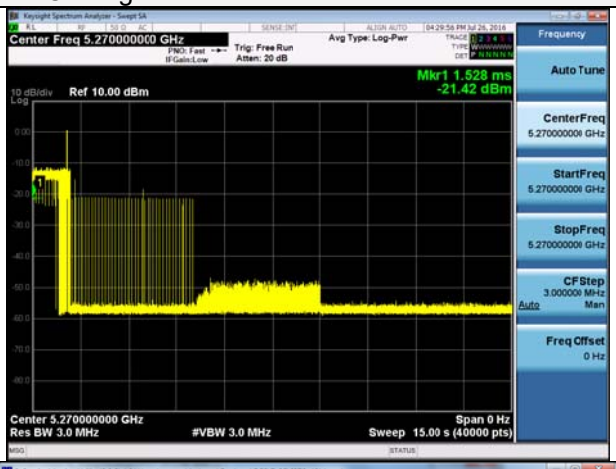
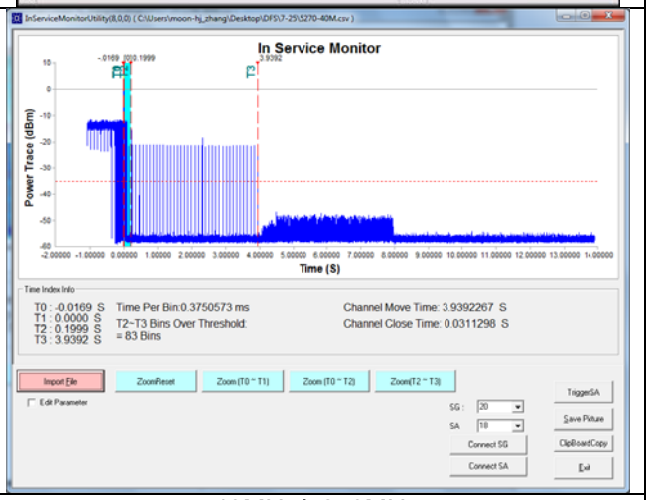
1. The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device
3. A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
4. EUT will associate with the master at channel. The file “iperf.exe” specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
5. When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
6. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short Pulse Radar Type
7. Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: Dwell (0.3ms) =S (12000ms) / B (4000); where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by: C (ms)= N X Dwell (0.3ms); where C is the Closing Time, N is the number of spectrum

analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.

8. Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

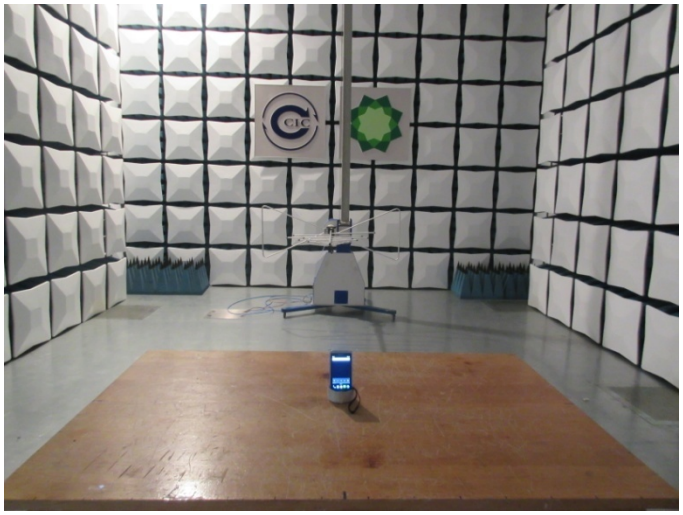
TEST RESULTS

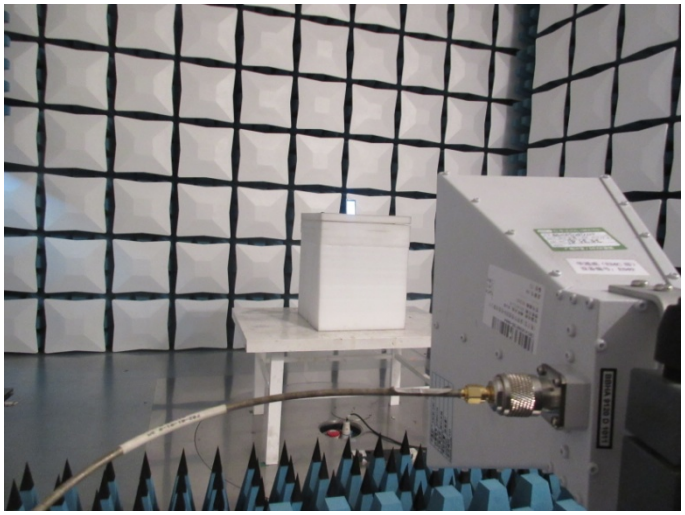
BW/Channel	Test Item	Test Result(s)	Limit	Result
20MHz/5260MHz	Channel Move Time	4.0060	＜10s	Pass
	Channel Closing Transmission Time	0.0345	＜0.26s	Pass
40MHz/5270MHz	Channel Move Time	3.9392	＜10s	Pass
	Channel Closing Transmission Time	0.0311	＜0.26s	Pass

Band II Channel Move Time& Channel Closing Transmission Time	
	
	
20MHz/5260MHz	40MHz/5270MHz

5. Test Setup Photos of the EUT

Radiated Emission





Conducted Emission (AC Mains)

DFS Test

6. External and Internal Photos of the EUT

Reference to Test Report TRE1605009201

.....End of Report.....