FCC PART 15E
TEST REPORT

No. I18Z60290-IOT14

for

HMD Global Oy

Smart phone

TA-1061

With

FCC ID: 2AJOTTA-1061

Hardware Version: 0403/0407

Software Version: 00WW_0_266

Issued Date: 2018-06-06

TESTING
NVLAP LAB CODE 600118-0

Note:

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I18Z60290-IOT14	Rev.0	1st edition	2018-06-06

CONTENTS

1. TEST LATORATORY

1.1. Testing Location

Conducted testing Location: CTTL(huayuan North Road)

Address:	No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China100191

Radiated testing Location: CTTL(BDA)

Address:	No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176

1.2. TestingEnvironment

Normal Temperature:	15-35℃
Extreme Temperature:	-20/+60℃
Relative Humidity:	20-75%

1.3. Project data

Testing Start Date:	2018-04-08
Testing End Date:	2018-05-21

1.4. Signature

Jiang Xue

(Prepared this test report)

Zheng Wei

(Reviewed this test report)

Lv Songdong

(Approved this test report)

2. CLIENT INFORMATION

2.1. Applicant Information

Company Name:	HMD Global Oy
Address:	Karaportti 2 02610 Espoo FINLAND
City:	Espoo
Postal Code:	/
Country:	FINLAND
Telephone:	+358 408036126
Fax:	+97143697604

2.2. Manufacturer Information

Company Name:	HMD Global Oy
Address:	Karaportti 2 02610 Espoo FINLAND
City:	Espoo
Postal Code:	/
Country:	FINLAND
Telephone:	+358 408036126
Fax:	+97143697604

3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT(AE)

3.1. About EUT

Description	Smart phone
Model name	TA-1061
FCC ID	2AJOTTA-1061
WLAN Frequency Range	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM
Voltage	3.8VDC by Battery

Note: Photographs of EUT are shown in ANNEX C of this test report. Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	/	0403/0407	00WW_0_266
EUT2	/	0403/0407	00WW_0_266

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	Type	SN
AE1	Battery	/	/
AE2	Charger	/	/
AE3	Charger	/	/

AE1

Model	HE336
Manufacturer	SCUD(Fujian) Electronics Co., Ltd.
Capacitance	2900 mAh
Nominal voltage	3.85 V

AE2

Model	AD-10WX
Manufacturer	Salcomp
Length of cable	/

AE3

Model	AD-10WX
Manufacturer	/
Length of cable	/

*AE ID: is used to identify the test sample in the lab internally.

3.4. General Description

Equipment Under Test (EUT) is a model of Smart phone with integrated antenna. It consists of normal options: Battery and Charger.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the Client.

4. REFERENCE DOCUMENTS

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

FCC Part15	FCC CFR 47, Part 15, Subpart C and E: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.407 General technical requirements	2016
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2013
UNII: KDB 789033 D02	General U-NII Test Procedures New Rules v02r01	2017-12

5. LABORATORY ENVIRONMENT

Conducted RF performance testing is performed in shielding room.

EMC performance testing is performed in Semi-anechoic chamber.

6. SUMMARY OF TEST RESULTS

6.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.407 (a)	/	**BR**
Peak Power Spectral Density	15.407 (a)	/	**BR**
Occupied 6dB Bandwidth	15.407 (e)	/	**BR**
Band Edges Compliance	15.407 (b)	/	**BR**
Transmitter Spurious Emission - Conducted	15.407	/	**BR**
Transmitter Spurious Emission - Radiated	15.407, 15.205, 15.209	/	**BR**
AC Powerline Conducted Emission	15.107, 15.207	/	**BR**
Transmitter Spurious Emission - Radiated < 30MHz	15.407, 15.209	/	**BR**

Please refer to **ANNEX A** for detail.

Terms used in Verdict column

P	Pass, The EUT complies with the essential requirements in the standard.
NM	Not measured, The test was not measured by CTTL
NA	Not Applicable, The test was not applicable
F	Fail, The EUT does not comply with the essential requirements in the standard

6.2. Statements

CTTL has evaluated the test cases requested by the client/manufacturer as listed in section 6.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.1.

This report only deals with the WLAN function among the features described in section 3.

6.3. Test Conditions

The Equipment Under Test (EUT) model TA-1061 (FCC ID: 2AJOTTA-1061) is a variant product of TA-1075 (FCC ID: 2AJOTTA-1075), according to the declaration of changes provided by the applicant and FCC KDB publication 178919 D01, all the test results are derived from test report No. I18Z60297-IOT08. Please refer Annex A for detail data.

For this report, all the test cases are tested under normal temperature and normal voltage, and also under norm humidity, the specific condition is shown as follows:

Temperature	26℃
Voltage	3.8V
Humidity	44%

7. TEST EQUIPMENTS UTILIZED

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	2017-06-02	2018-06-01
2	Test Receiver	ESCI	100766	Rohde & Schwarz	2018-08-04	2019-05-05
3	LISN	ESH2-Z5	829991/012	Rohde & Schwarz	2018-05-06	2019-03-11
4	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration date	Calibration Due date
1	Test Receiver	ESU26	100235	Rohde & Schwarz	1 year	2019-03-31
2	BiLog Antenna	VULB9163	9163-483	Schwarzbeck	3 years	2018-08-20
3	Dual-Ridge Waveguide Horn Antenna	3115	6914	ETS-Lindgren	1 years	2018-12-31
4	EMI Antenna	3117	00139065	ETS-Lindgren	3 Years	2020-11-15
5	EMI Antenna	3116	2663	ETS-Lindgren	3 Years	2020-05-31
6	Vector Signal Analyzer	FSV40	101047	Rohde & Schwarz	1 year	2018-07-22

Test Software Utilized

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01.00	R&S
Conducted Continuous Emission	EMC32 V8.52.0	R&S

8. Measurement Uncertainty

8.1. Transmitter Output Power

Measurement Uncertainty: 0.339dB,k=1.96

8.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dBm/MHz,k=1.96

8.3. Occupied 6dB Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

8.4. Band Edges Compliance

Measurement Uncertainty : 0.62dBm,k=1.96

8.5. Spurious Emissions

Conducted (k=1.96)

Frequency Range	Uncertainty(dBm)
30MHz ≤ f ≤ 2GHz	1.22
2GHz ≤ f ≤3.6GHz	1.22
3.6GHz ≤ f ≤8GHz	1.22
8GHz ≤ f ≤12.75GHz	1.51
12.75GHz ≤ f ≤26GHz	1.51
26GHz ≤ f ≤40GHz	1.59

Radiated (k=2)

Frequency Range	Uncertainty(dBm)
9kHz-30MHz	
30MHz ≤ f ≤ 1GHz	4.86
1GHz ≤ f ≤18GHz	5.26
18GHz ≤ f ≤40GHz	5.28

8.6. AC Power-line Conducted Emission

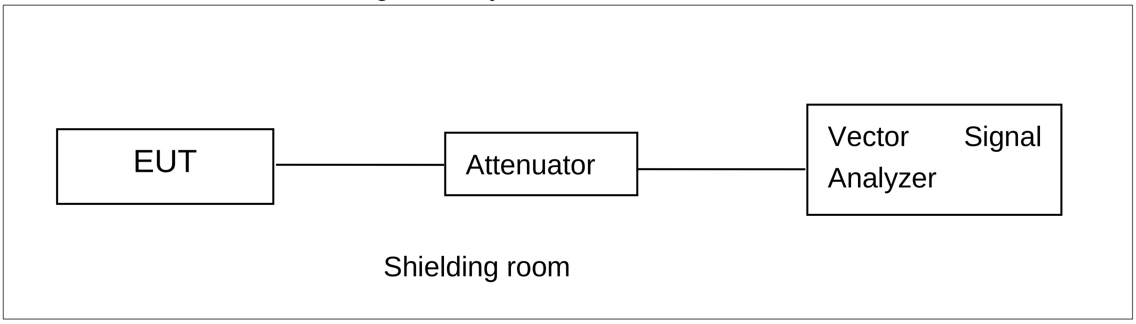
Measurement Uncertainty : 3.38dBm,k=2

ANNEX A: MEASUREMENT RESULTS

A.1. Measurement Method

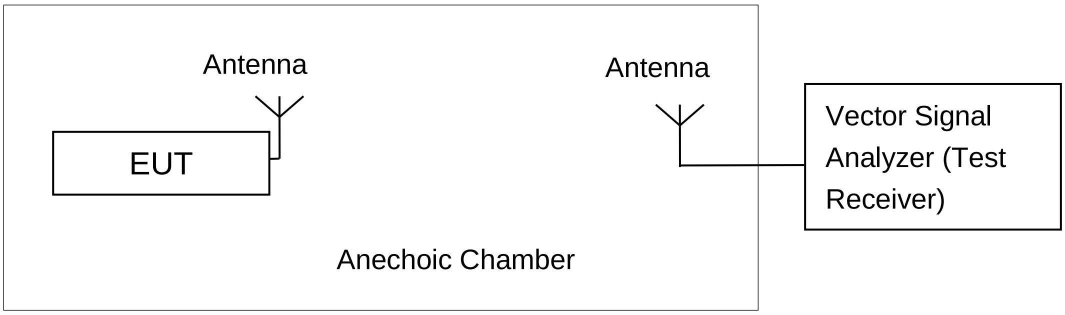
A.1.1. Conducted Measurements

1). Connect the EUT to the test system correctly.
2). Set the EUT to the required work mode.
3). Set the EUT to the required channel.
4). Set the spectrum analyzer to start measurement.
5). Record the values. Vector Signal Analyzer



A.1.2. Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows,
Sweep frequency from 30 MHz to 1GHz, RBW = 100 kHz, VBW = 300 kHz;
Sweep frequency from 1 GHz to 26GHz, RBW = 1MHz, VBW = 10Hz;



The measurement is made according to ANSI C63.10.
The radiated emission test is performed in semi-anechoic chamber. The distance from the EUT to the reference point of measurement antenna is 3m. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated 360° and the measurement antenna is moved from 1m to 4m to get the maximization result.

A.2. Maximum Peak Output Power

Measurement Limit and Method:

Standard	Limit (dBm)
FCC CRF Part 15.407(a)	< 30

A.2.1. Maximum Peak Output Power-conducted

Measurement Results:

802.11a mode

Mode	Data Rate (Mbps)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	6	19.17	/	/
	9	18.16	/	/
	12	19.94	19.43	19.75
	18	19.42	/	/
	24	18.87	/	/
	36	18.54	/	/
	48	18.59	/	/
	54	18.95	/	/

The data rate 12Mbps is selected as worse condition, and the following cases are performed with this condition.

802.11n-HT20 mode

Mode	Data Rate (Index)	Test Result (dBm)		
		5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11n (20MHz)	MCS0	19.07	/	/
	MCS1	19.20	19.25	19.41
	MCS2	18.75	/	/
	MCS3	18.94	/	/
	MCS4	18.93	/	/
	MCS5	18.48	/	/
	MCS6	17.58	/	/
	MCS7	17.45	/	/

The data rate MCS1 is selected as worse condition, and the following cases are performed with this condition.

802.11n-HT40 mode

Mode	Data Rate (Index)	Test Result (dBm)	
		5755MHz (Ch151)	5795MHz (Ch159)
802.11n (40MHz)	MCS0	19.21	/
	MCS1	19.07	/
	MCS2	19.15	/
	MCS3	19.29	/
	MCS4	19.46	19.38
	MCS5	19.02	/
	MCS6	18.86	/
	MCS7	18.55	/

The data rate MCS4 is selected as worse condition, and the following cases are performed with this condition.

Conclusion: PASS

A.2.2. Maximum Average Output Power-Conducted

Method of Measurement: See ANSI C63.10-clause 12.3.2.2 Method SA-1

802.11a mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	13.42	13.61	13.41

802.11n-HT20 mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz(Ch165)
802.11n(20MHz)	12.68	12.48	12.50

802.11n-HT40 mode

Mode	Test Result (dBm)	
	5755MHz (Ch151)	5795MHz(Ch159)
802.11n(40MHz)	12.59	12.45

Conclusion: PASS

A.3. Peak Power Spectral Density

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.407(a)	< 30 dBm/500 kHz

The measurement is made according to ANSI C63.10 and KDB789033 D02

Measurement Uncertainty:

Measurement Uncertainty	0.75dB

Measurement Results:

Mode	Channel	Power Spectral Density (dBm/500kHz)	Conclusion
802.11a	149	-2.29	P
	157	-1.79	P
	165	-2.03	P
802.11n HT20	149	-1.25	P
	157	-0.71	P
	165	-1.09	P
802.11n HT40	151	-3.76	P
	159	-3.84	P

Conclusion: PASS

A.4. Occupied 6dB Bandwidth

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.407 (e)	≥ 500

The measurement is made according to KDB789033 D02 .

Measurement Uncertainty:

Measurement Uncertainty	60.80Hz

Measurement Result:

Mode	Channel	Occupied 6dB Bandwidth (KHz)		conclusion
802.11a	149	Fig.1	16350	P
	157	Fig.2	16300	P
	165	Fig.3	16350	P
802.11n HT20	149	Fig.4	17600	P
	157	Fig.5	17600	P
	165	Fig.6	17600	P
802.11n HT40	151	Fig.7	36320	P
	159	Fig.8	36320	P

Conclusion: PASS

Test graphs as below:

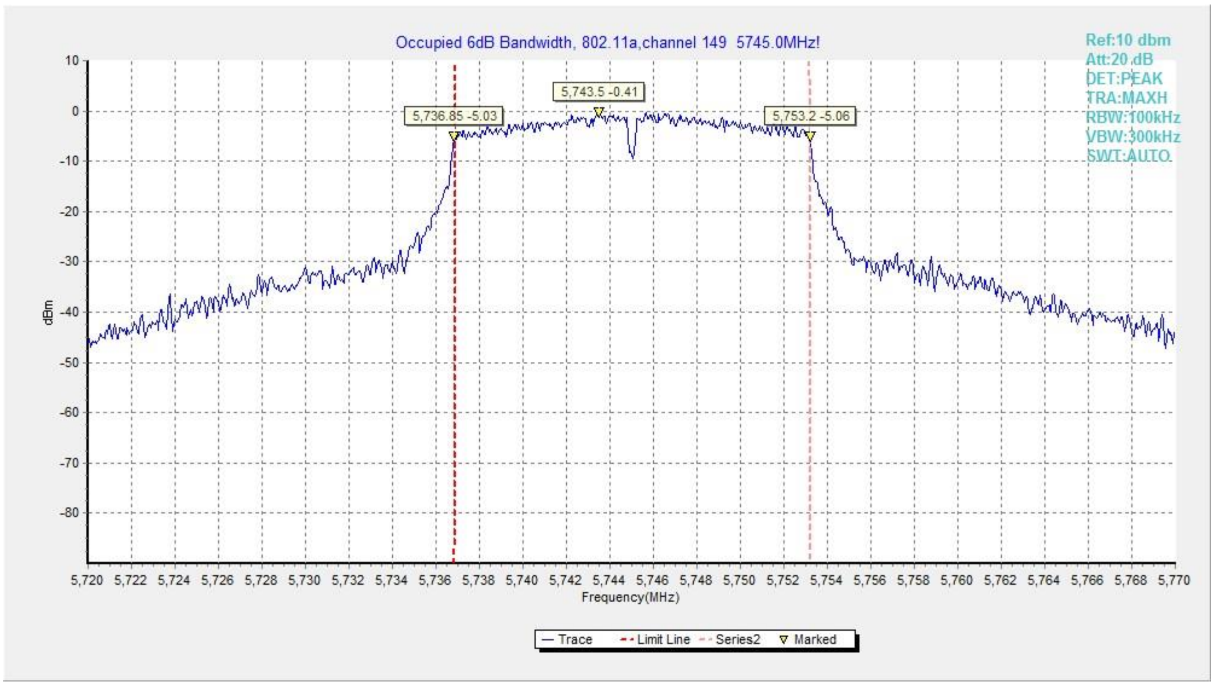


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

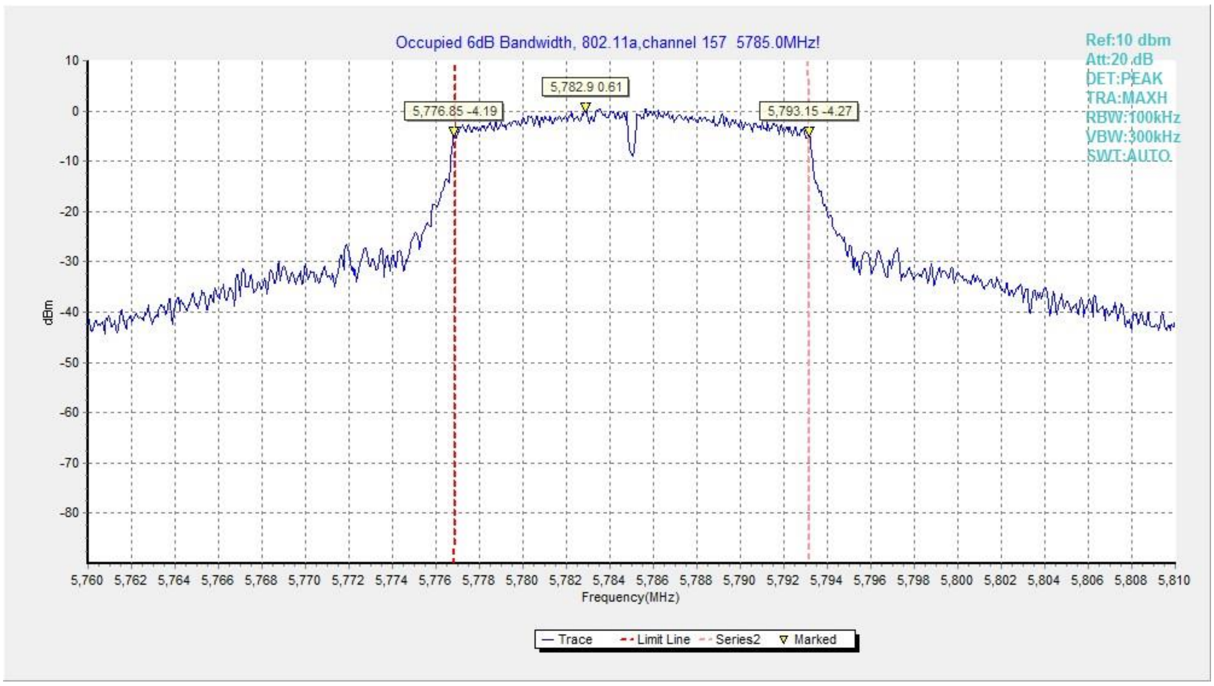


Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)

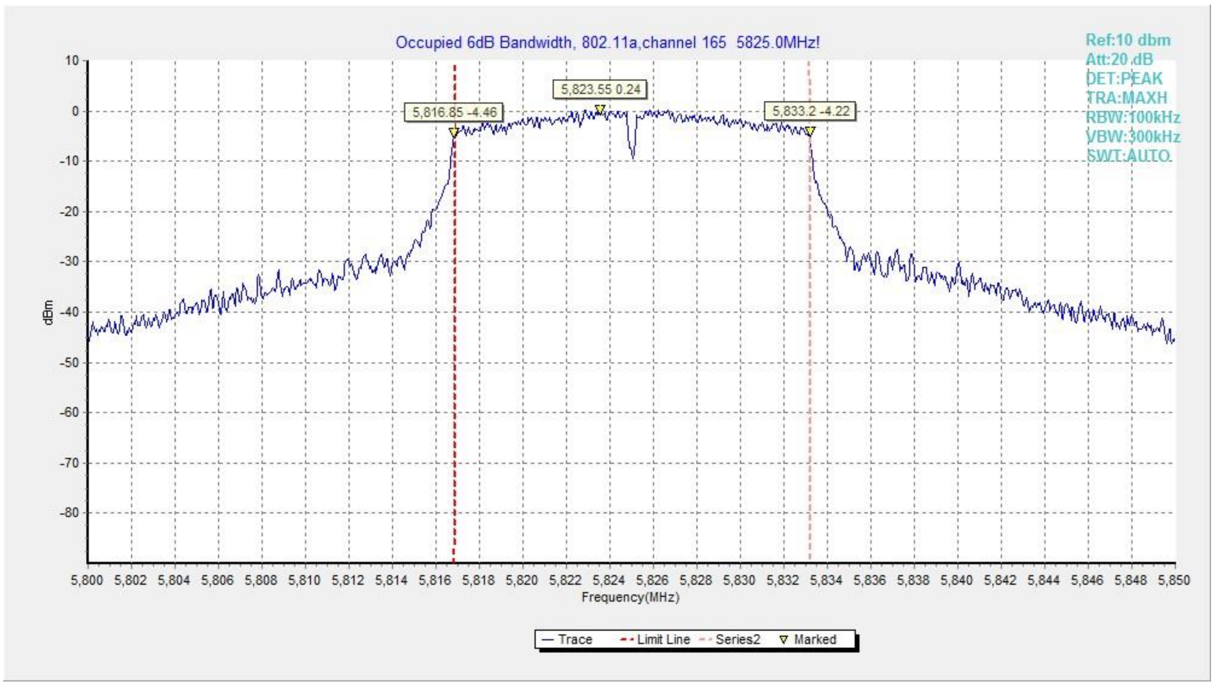


Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)

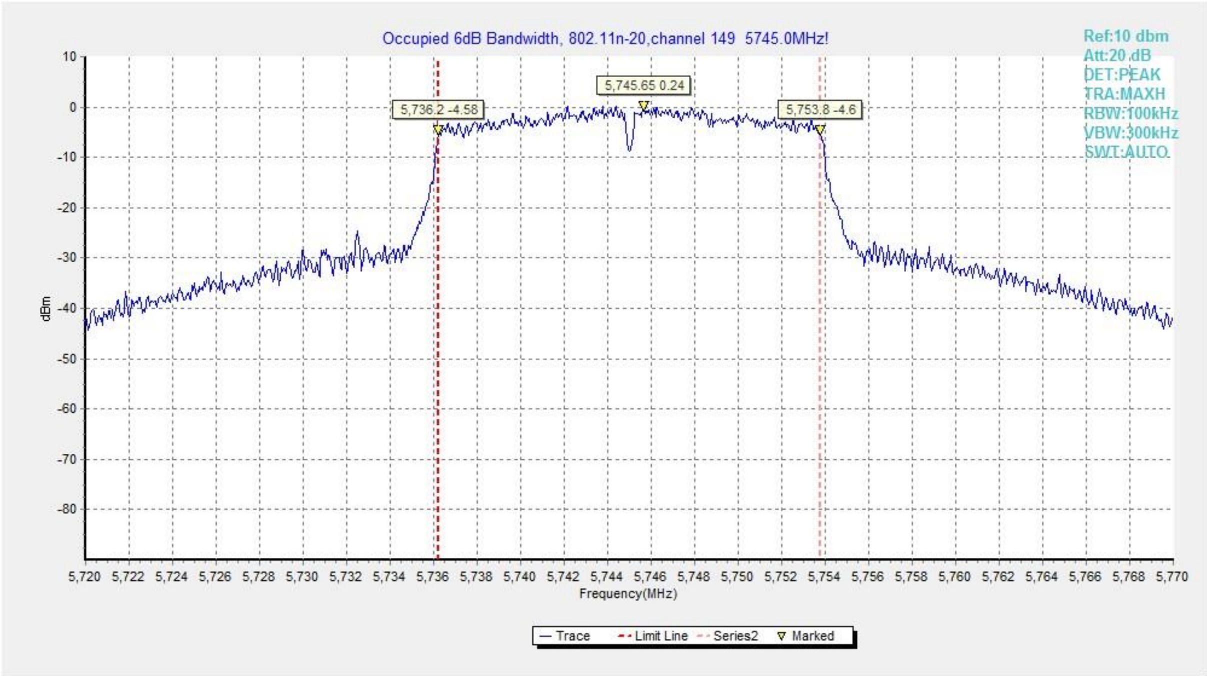


Fig. 4 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)

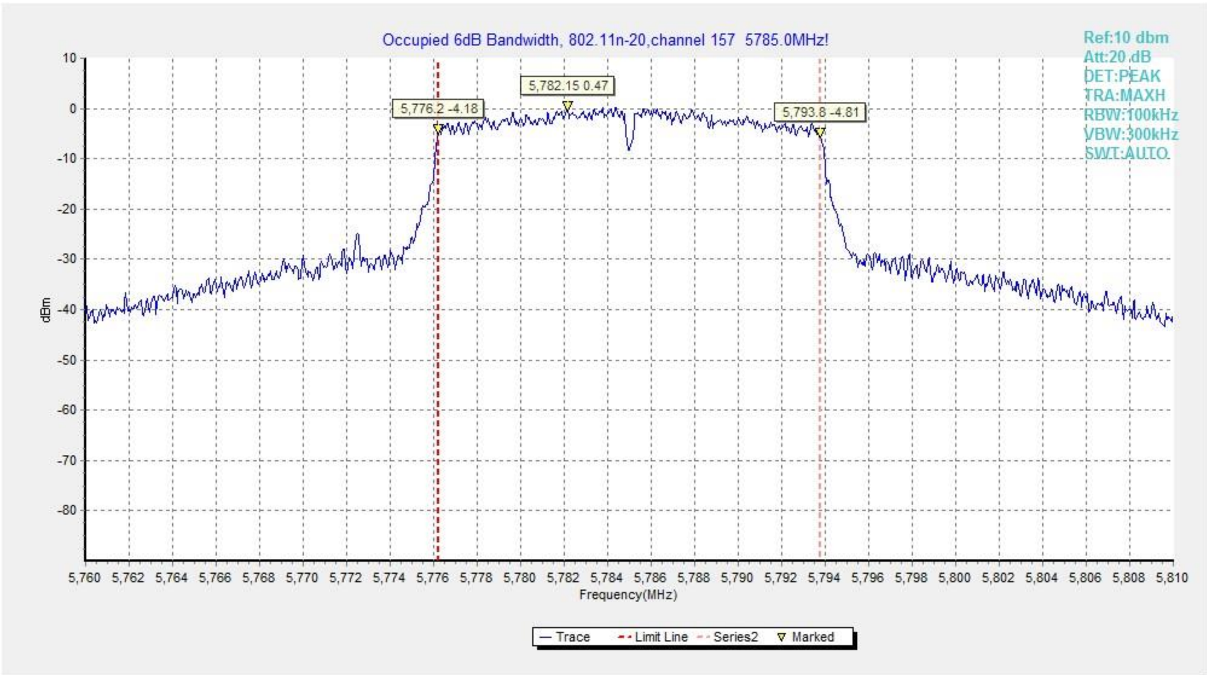


Fig. 5 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)

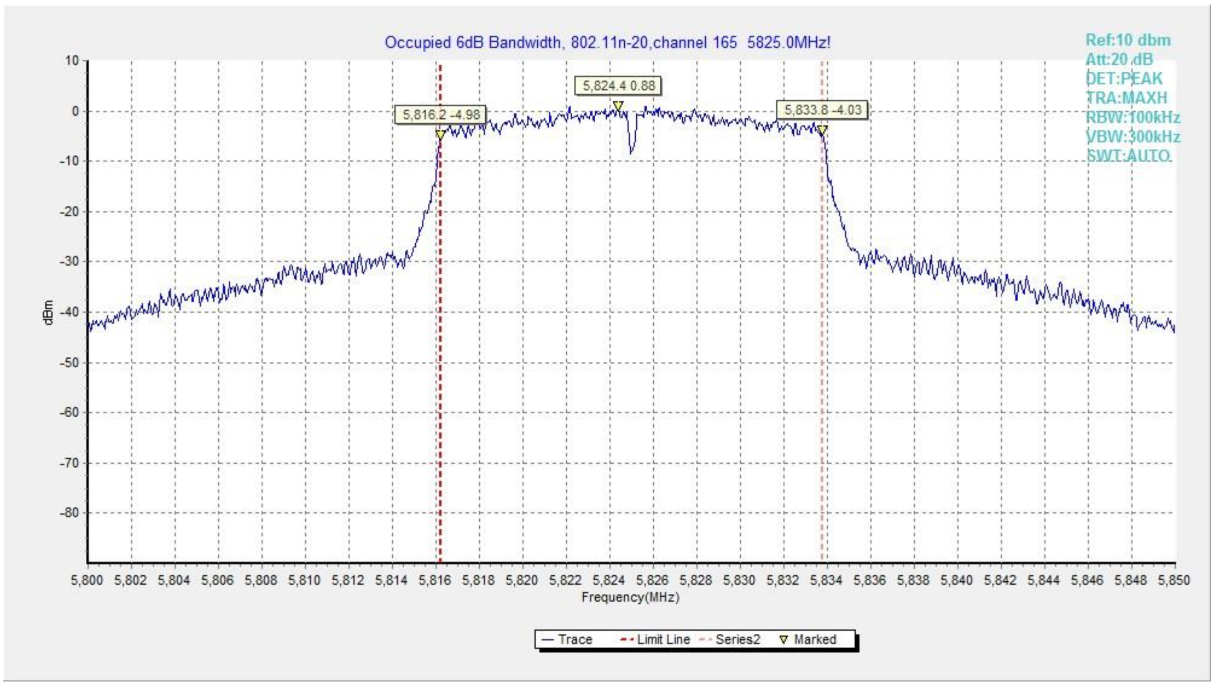


Fig. 6 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)

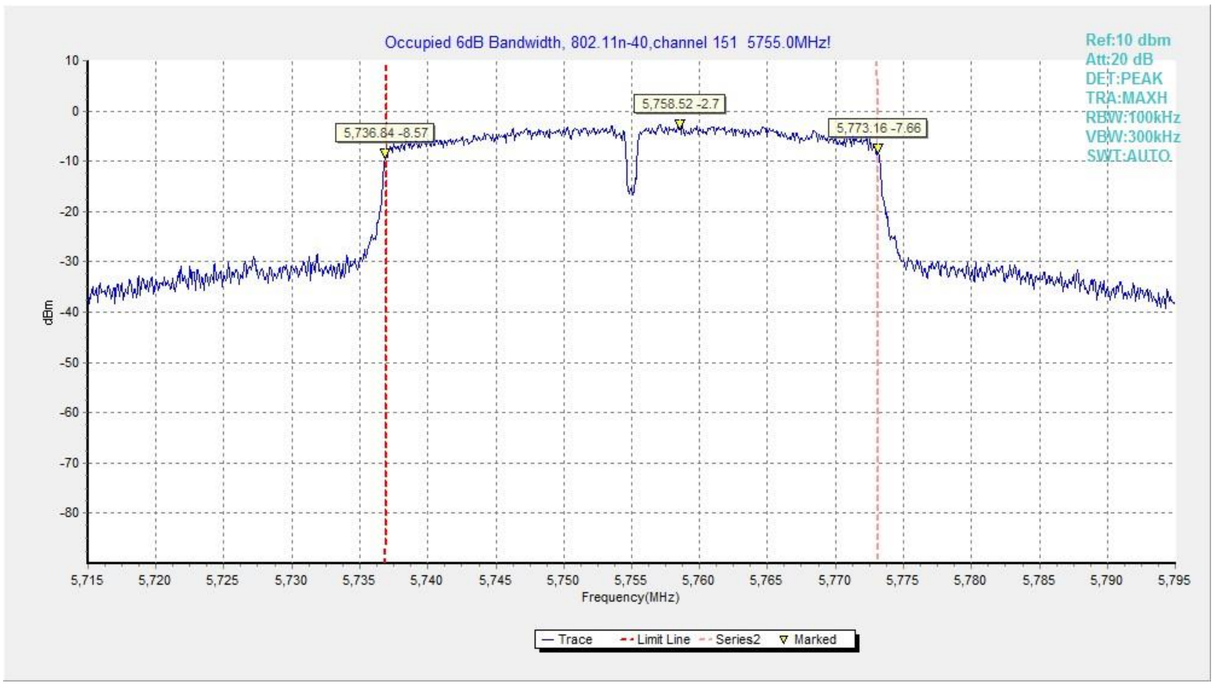


Fig. 7 Occupied 6dB Bandwidth (802.11n-HT40, Ch 151)

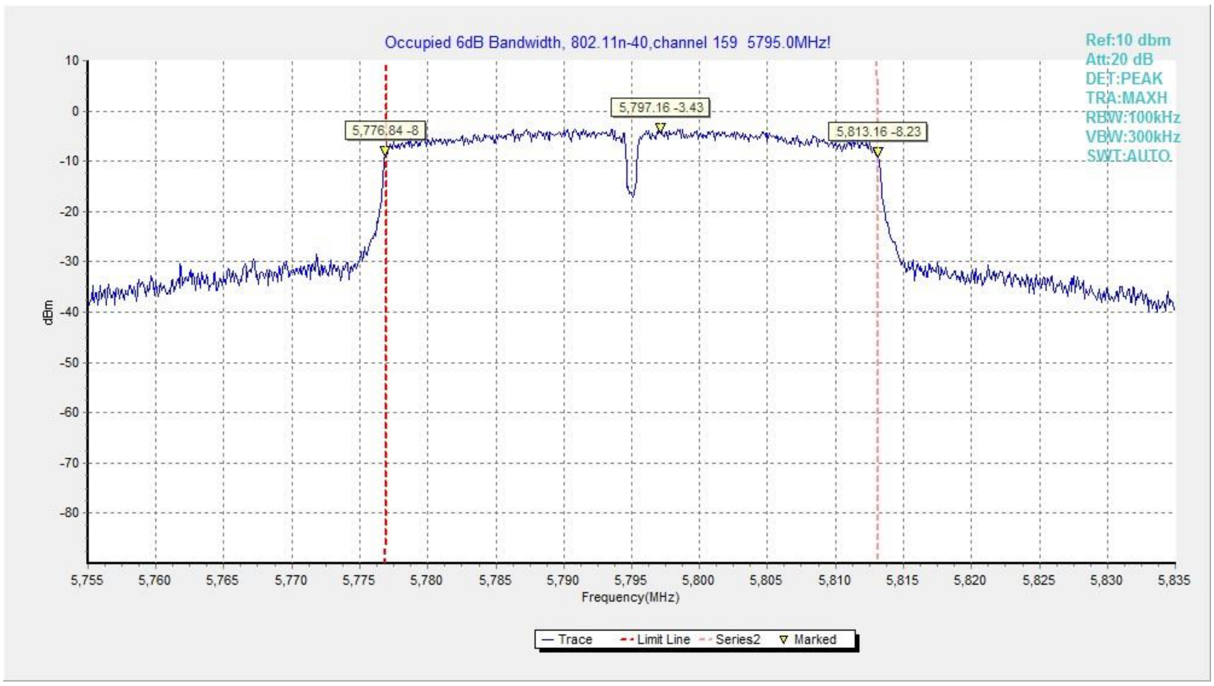


Fig. 8 Occupied 6dB Bandwidth (802.11n-HT40, Ch 159)

A.5. Transmitter Spurious Emission

Measurement Limit:

Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC 47 CFR Part 15.407	5725MHz~5850MHz	< -27

The measurement is made according to ANSI C63.10 .

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Measurement Uncertainty:

Frequency Range	Uncertainty(dB)
30MHz ≤ f ≤ 2GHz	0.63
2GHz ≤ f ≤3.6GHz	0.82
3.6GHz ≤ f ≤8GHz	1.55
8GHz ≤ f ≤20GHz	1.86
20GHz ≤ f ≤22GHz	1.90

22GHz ≤ f ≤26GHz	2.20

A.5.1 Transmitter Spurious Emission - Conducted

Measurement Results:

802.11a mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11a	149	30 MHz ~ 1 GHz	Fig.9	P
		1 GHz ~ 12 GHz	Fig.10	P
		12 GHz ~ 25 GHz	Fig.11	P
		25 GHz ~ 40 GHz	Fig.12	P
	157	30 MHz ~ 1 GHz	Fig.13	P
		1 GHz ~ 12 GHz	Fig.14	P
		12 GHz ~ 25 GHz	Fig.15	P
		25 GHz ~ 40 GHz	Fig.16	P
	165	30 MHz ~ 1 GHz	Fig.17	P
		1 GHz ~ 12 GHz	Fig.18	P
		12 GHz ~ 25 GHz	Fig.19	P
		25 GHz ~ 40 GHz	Fig.20	P

802.11n-HT20 mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n HT20	149	30 MHz ~ 1 GHz	Fig.21	P
		1 GHz ~ 12 GHz	Fig.22	P
		12 GHz ~ 25 GHz	Fig.23	P
		25 GHz ~ 40 GHz	Fig.24	P
	157	30 MHz ~ 1 GHz	Fig.25	P
		1 GHz ~ 12 GHz	Fig.26	P
		12 GHz ~ 25 GHz	Fig.27	P
		25 GHz ~ 40 GHz	Fig.28	P
	165	30 MHz ~ 1 GHz	Fig.29	P
		1 GHz ~ 12 GHz	Fig.30	P
		12 GHz ~ 25 GHz	Fig.31	P
		25 GHz ~ 40 GHz	Fig.32	P

802.11n-HT40 mode

MODE	Channel	Frequency Range	Test Results	Conclusion
802.11n HT40	151	30 MHz ~ 1 GHz	Fig.33	P
		1 GHz ~ 12 GHz	Fig.34	P
		12 GHz ~ 25 GHz	Fig.35	P
		25 GHz ~ 40 GHz	Fig.36	P
	159	30 MHz ~ 1 GHz	Fig.37	P
		1 GHz ~ 12 GHz	Fig.38	P

		12 GHz ~ 25 GHz	Fig.39	P
		25 GHz ~ 40 GHz	Fig.40	P

Conclusion: PASS

Test graphs as below:

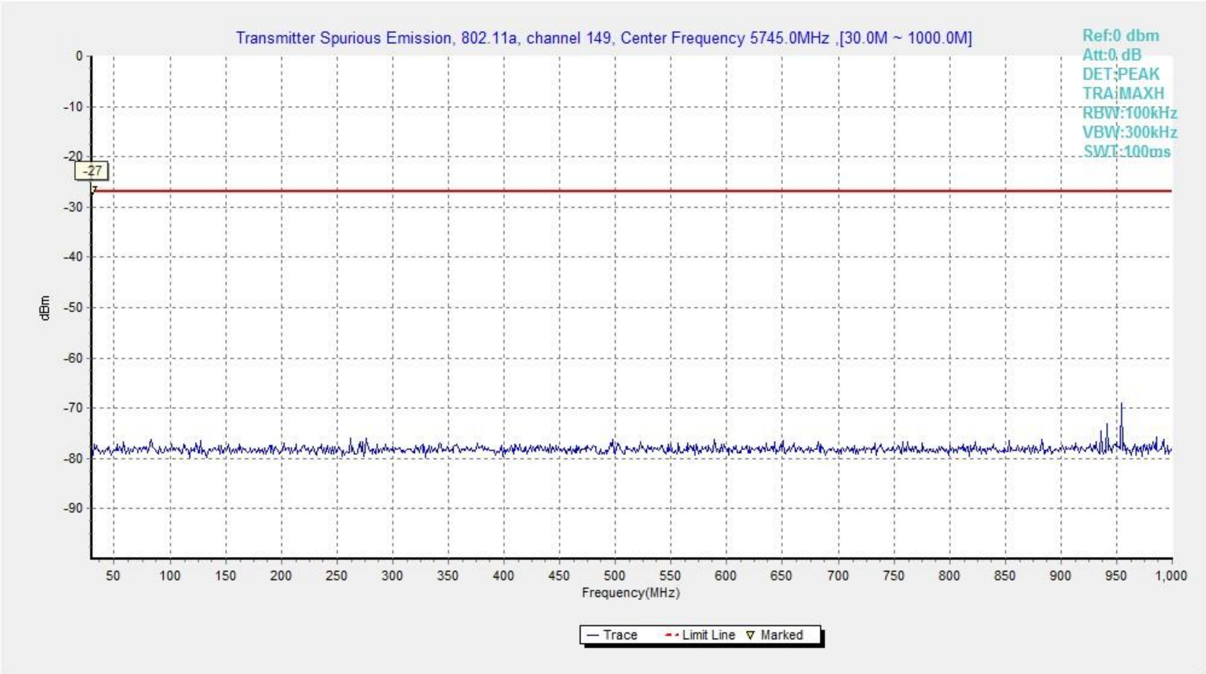


Fig. 9 Conducted Spurious Emission (802.11a, Ch149, 30 MHz-1 GHz)

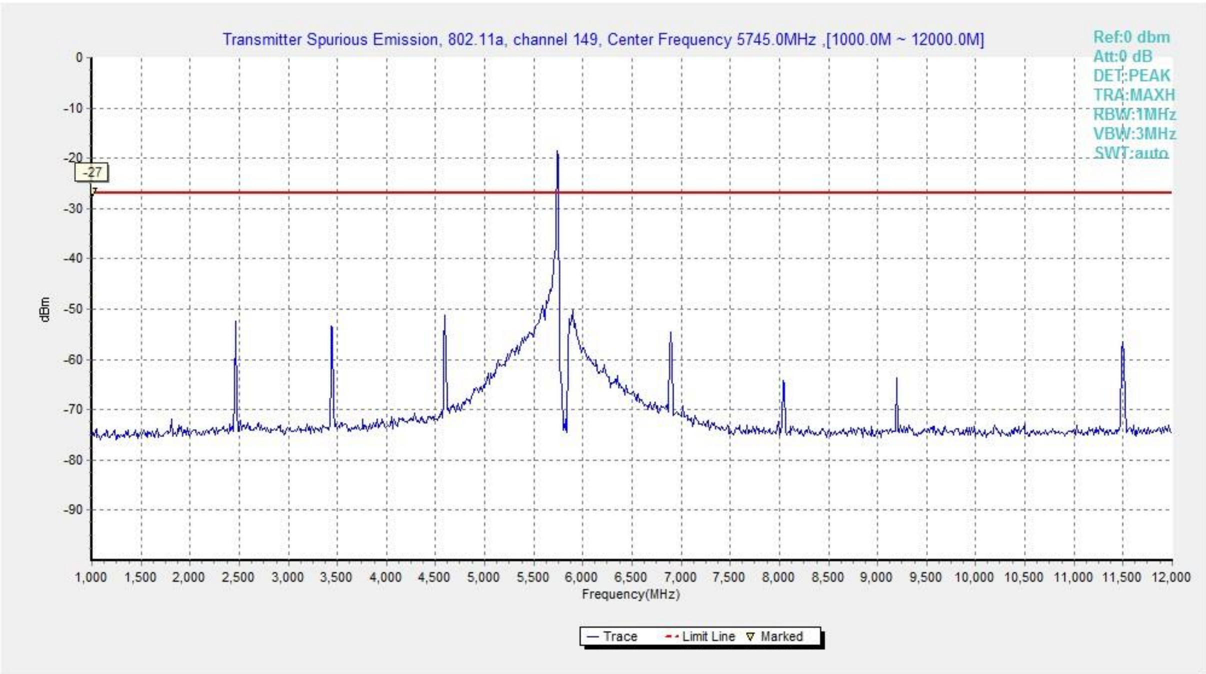


Fig. 10 Conducted Spurious Emission (802.11a, Ch149, 1 GHz -12 GHz)

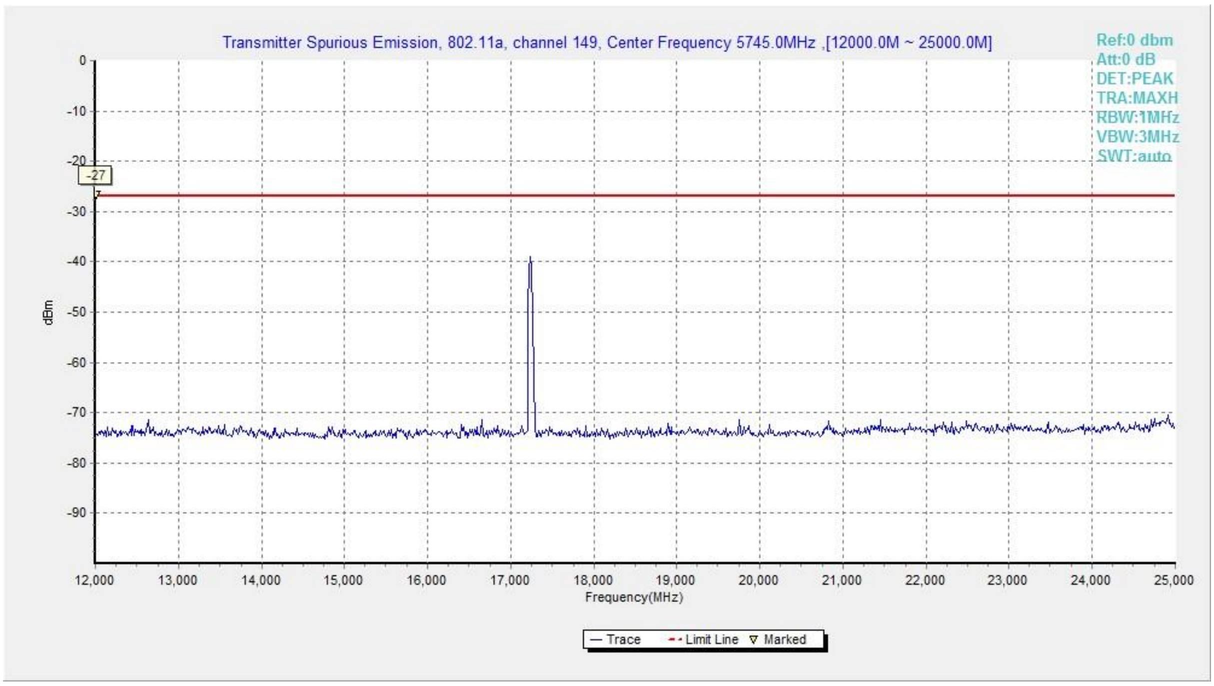


Fig. 11 Conducted Spurious Emission (802.11a, Ch149, 12 GHz-25 GHz)

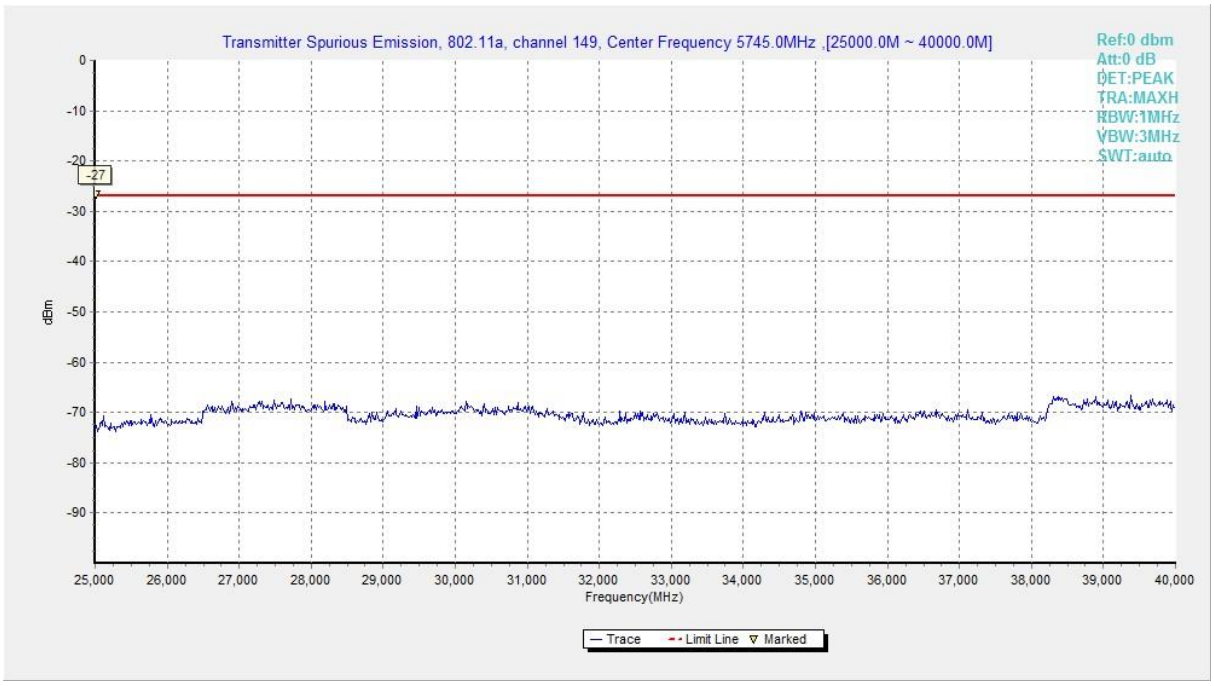


Fig. 12 Conducted Spurious Emission (802.11a, Ch149, 25 GHz-40 GHz)

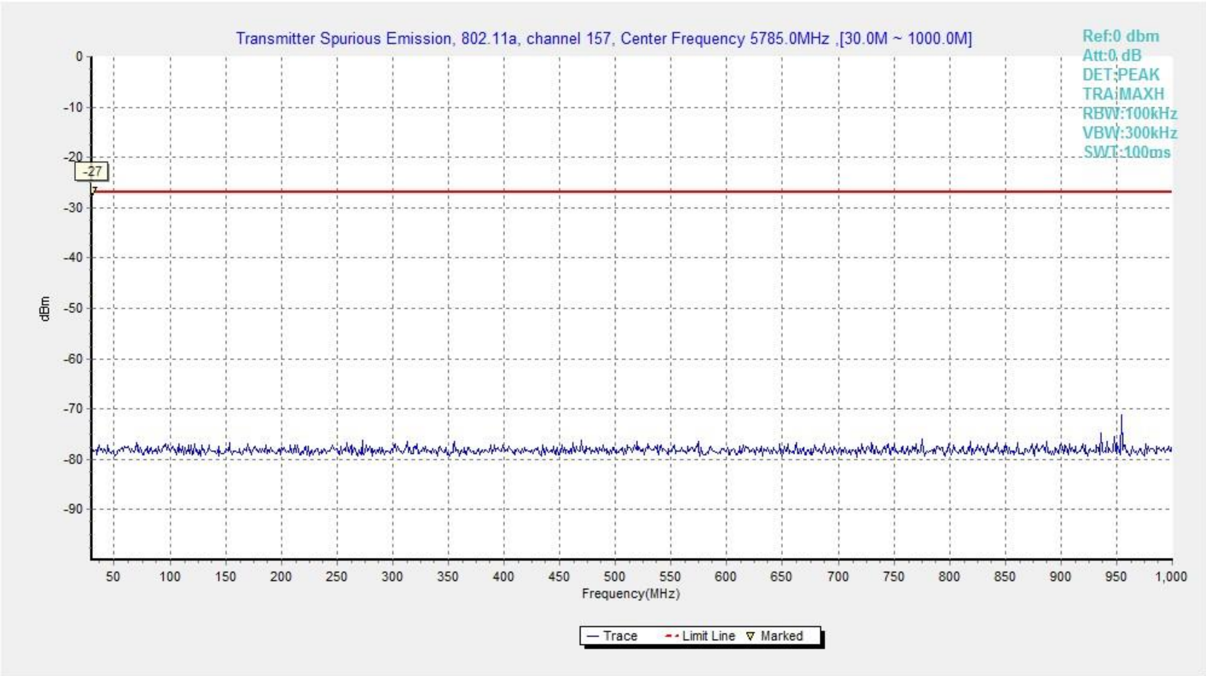


Fig. 13 Conducted Spurious Emission (802.11a, Ch157, 30 MHz-1 GHz)

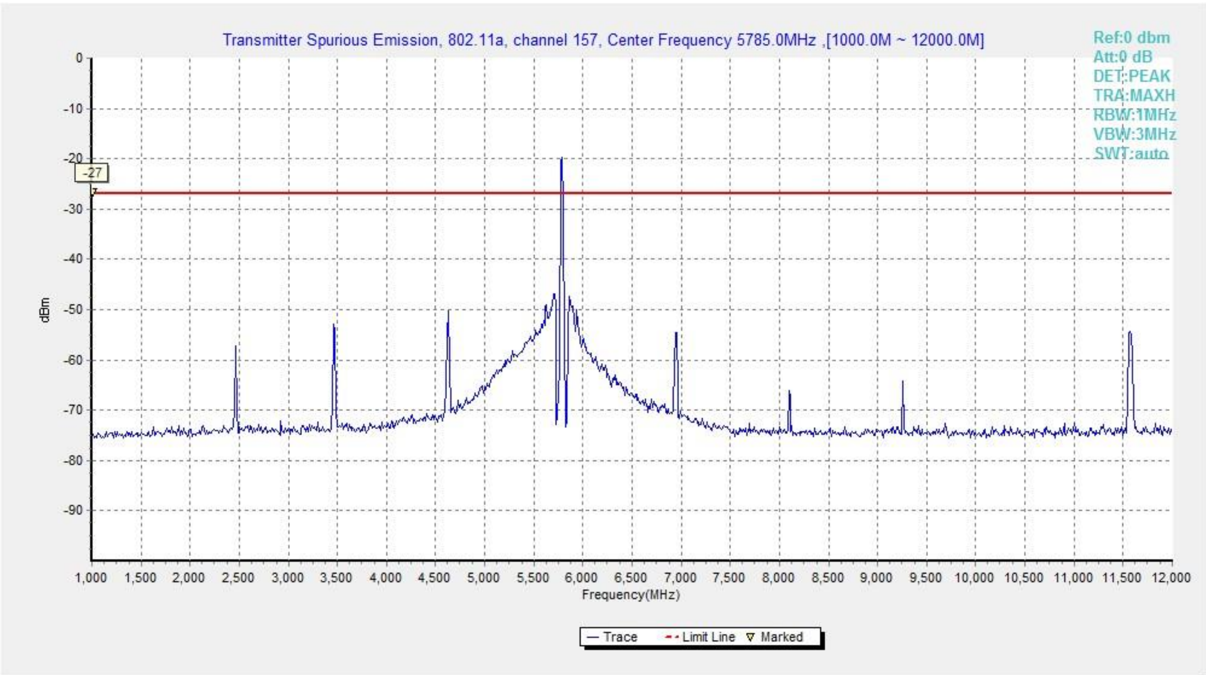


Fig. 14 Conducted Spurious Emission (802.11a, Ch157, 1 GHz -12 GHz)

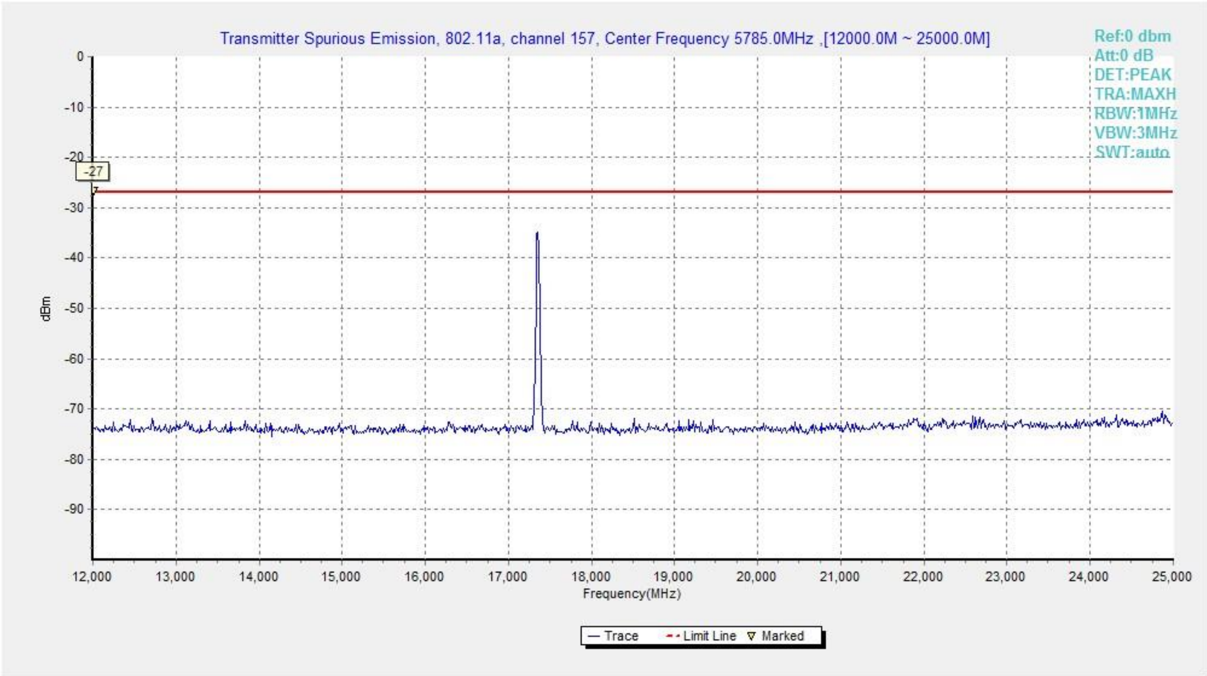


Fig. 15 Conducted Spurious Emission (802.11a, Ch157, 12 GHz-25 GHz)

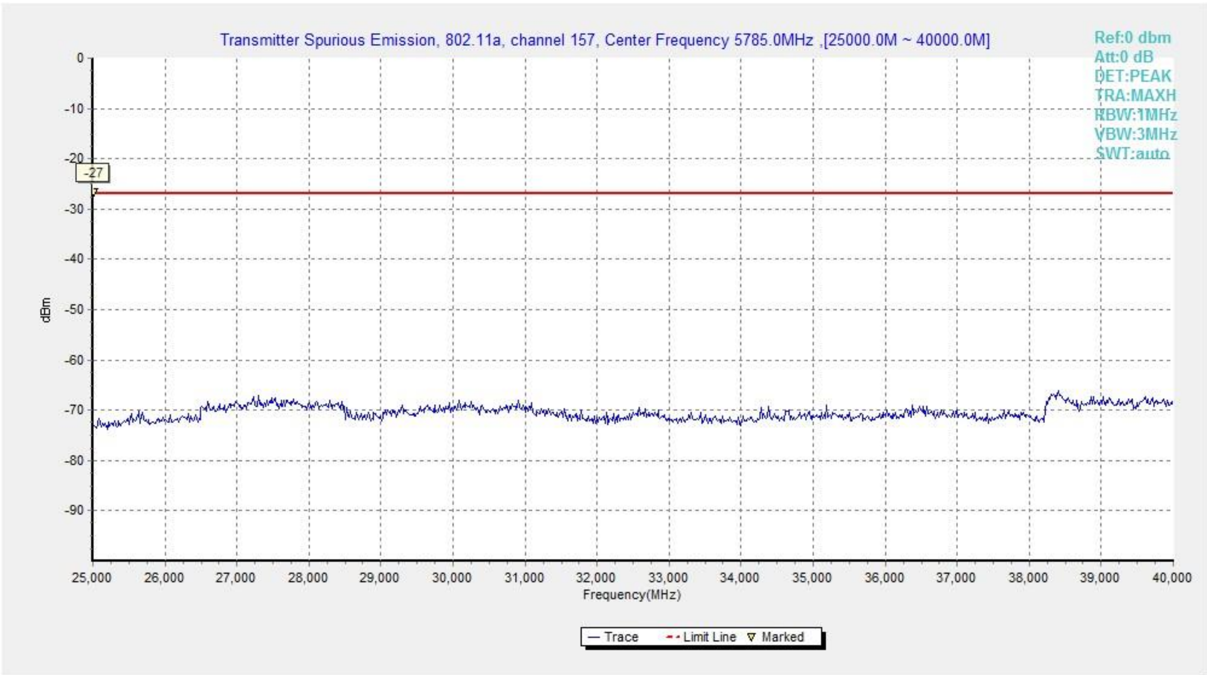


Fig. 16 Conducted Spurious Emission (802.11a, Ch157, 25 GHz-40 GHz)

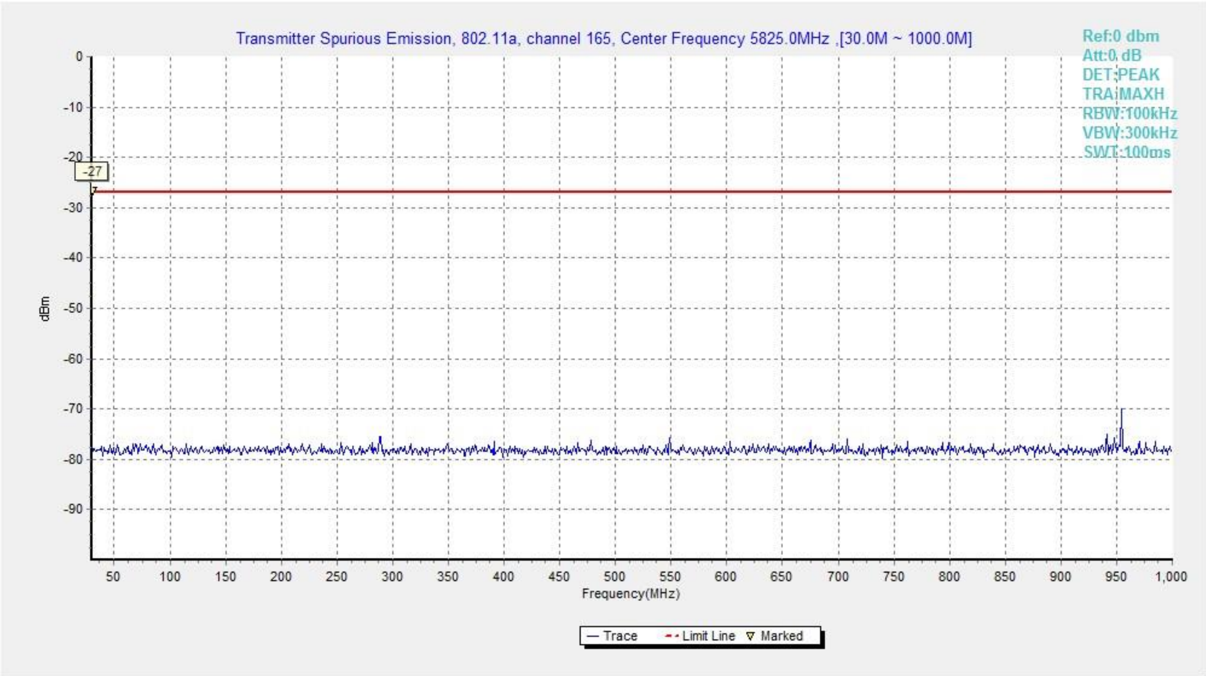


Fig. 17 Conducted Spurious Emission (802.11a, Ch165, 30 MHz-1 GHz)

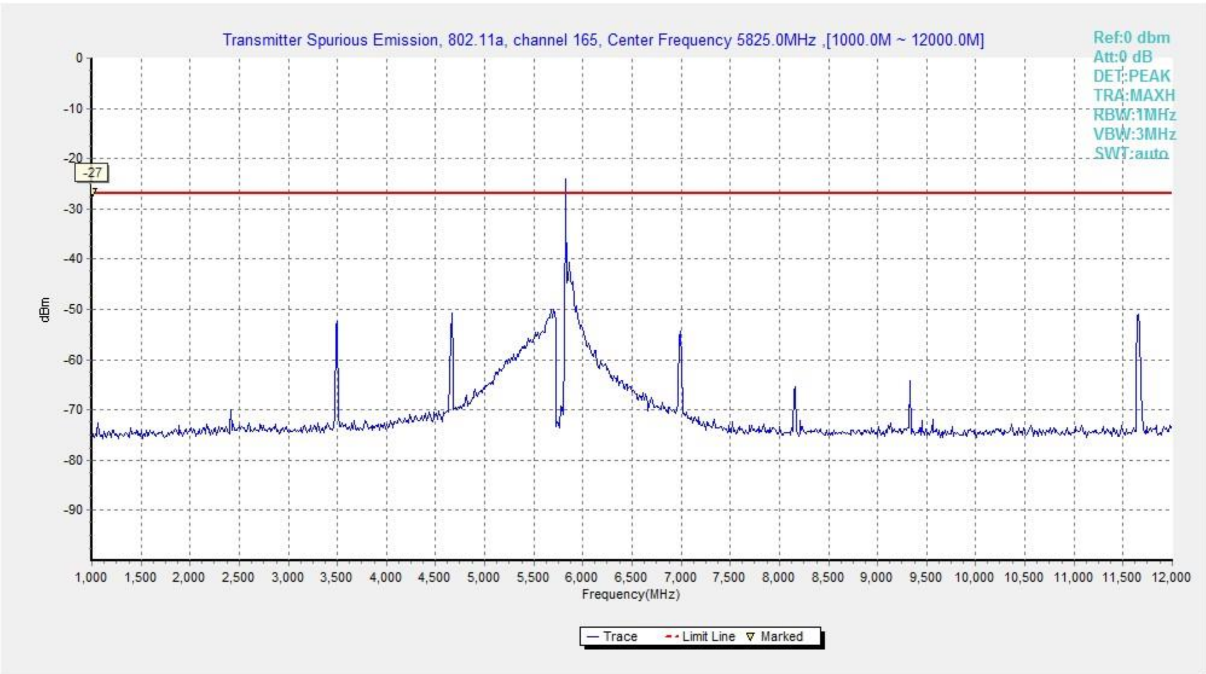


Fig. 18 Conducted Spurious Emission (802.11a, Ch165, 1 GHz -12 GHz)

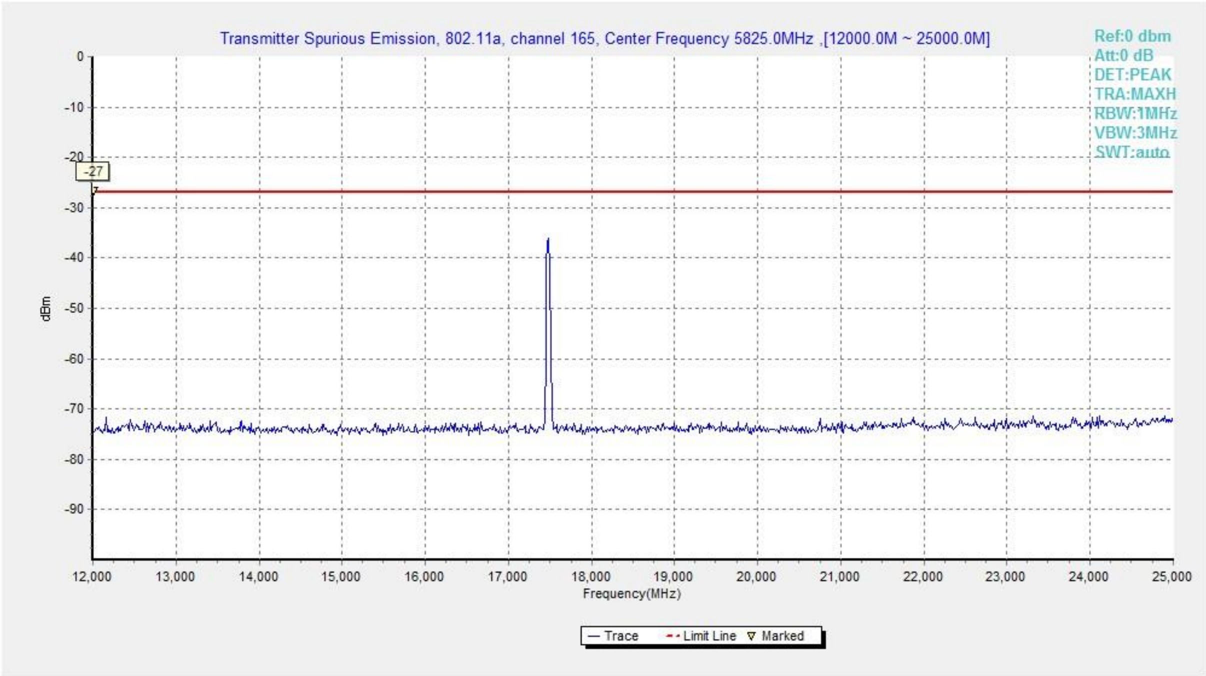


Fig. 19 Conducted Spurious Emission (802.11a, Ch165, 12 GHz-25 GHz)

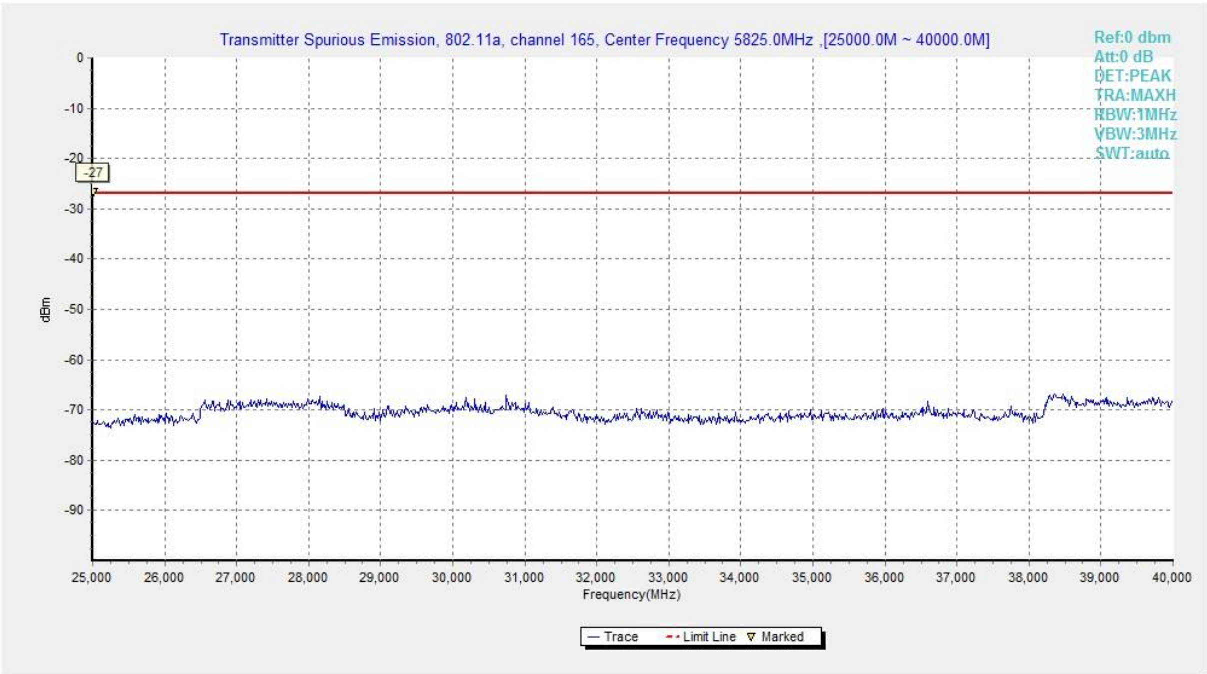


Fig. 20 Conducted Spurious Emission (802.11a, Ch165, 25 GHz-40 GHz)

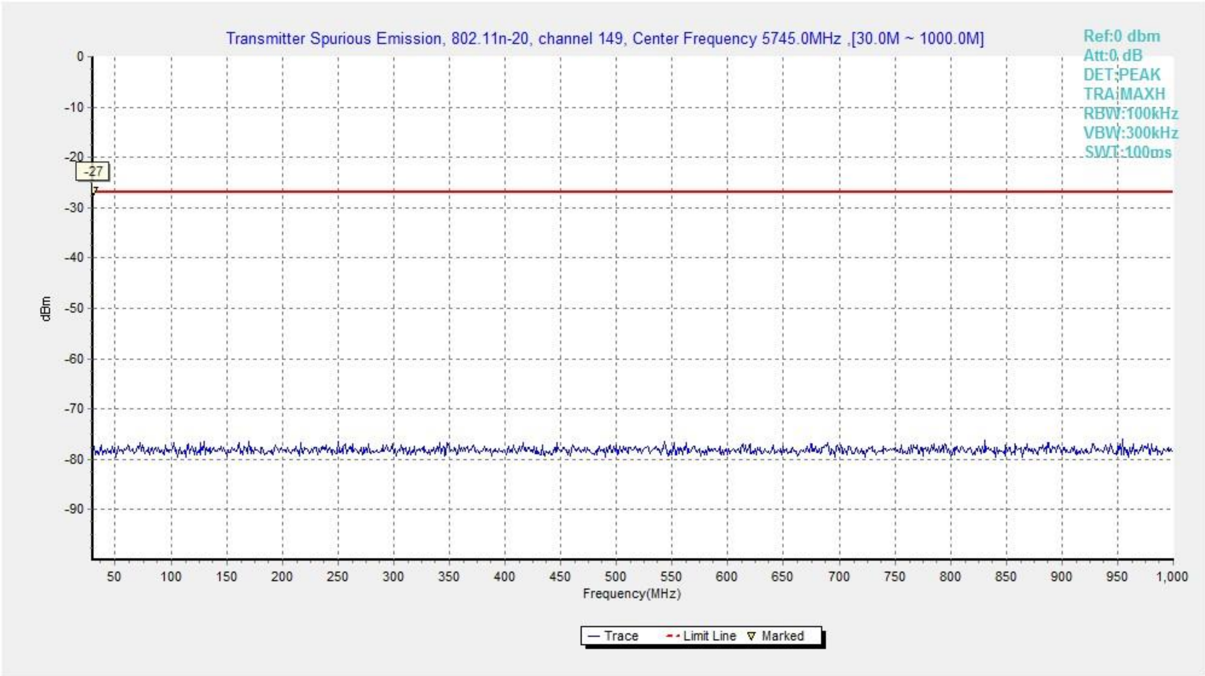


Fig. 21 Conducted Spurious Emission (802.11n-HT20, Ch149, 30 MHz-1 GHz)

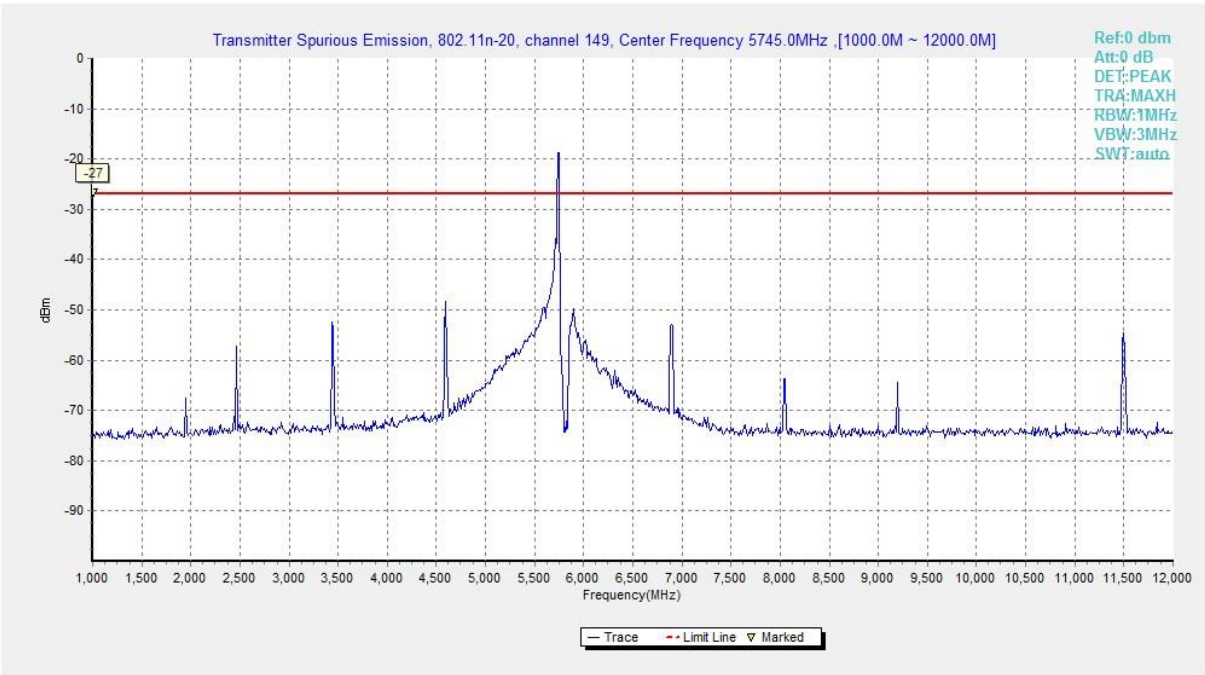


Fig. 22 Conducted Spurious Emission (802.11n-HT20, Ch149, 1 GHz -12 GHz)

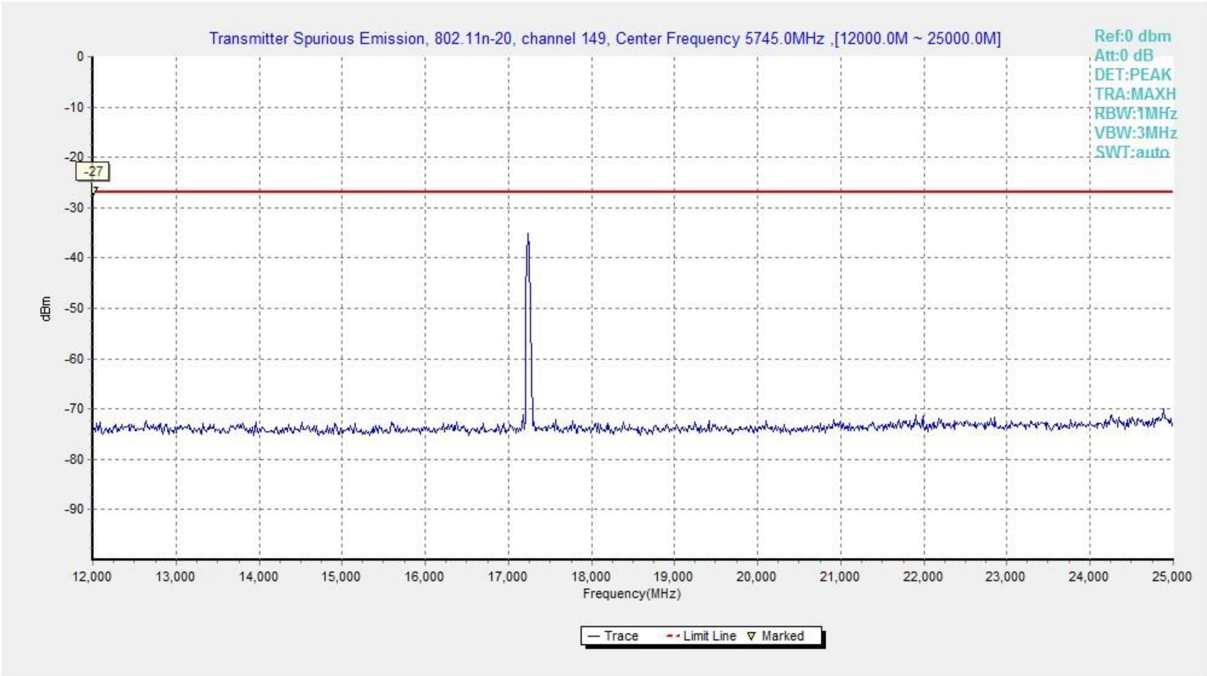


Fig. 23 Conducted Spurious Emission (802.11n-HT20, Ch149, 12 GHz-25 GHz)

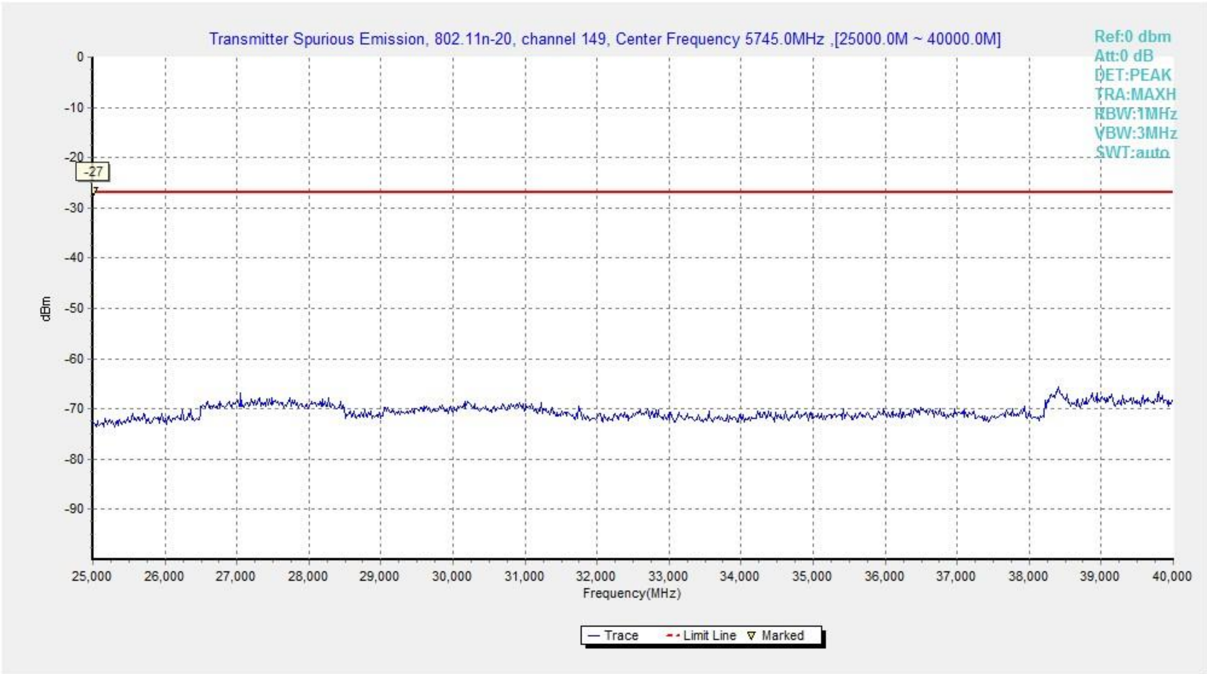


Fig. 24 Conducted Spurious Emission (802.11n-HT20, Ch149, 25 GHz-40 GHz)

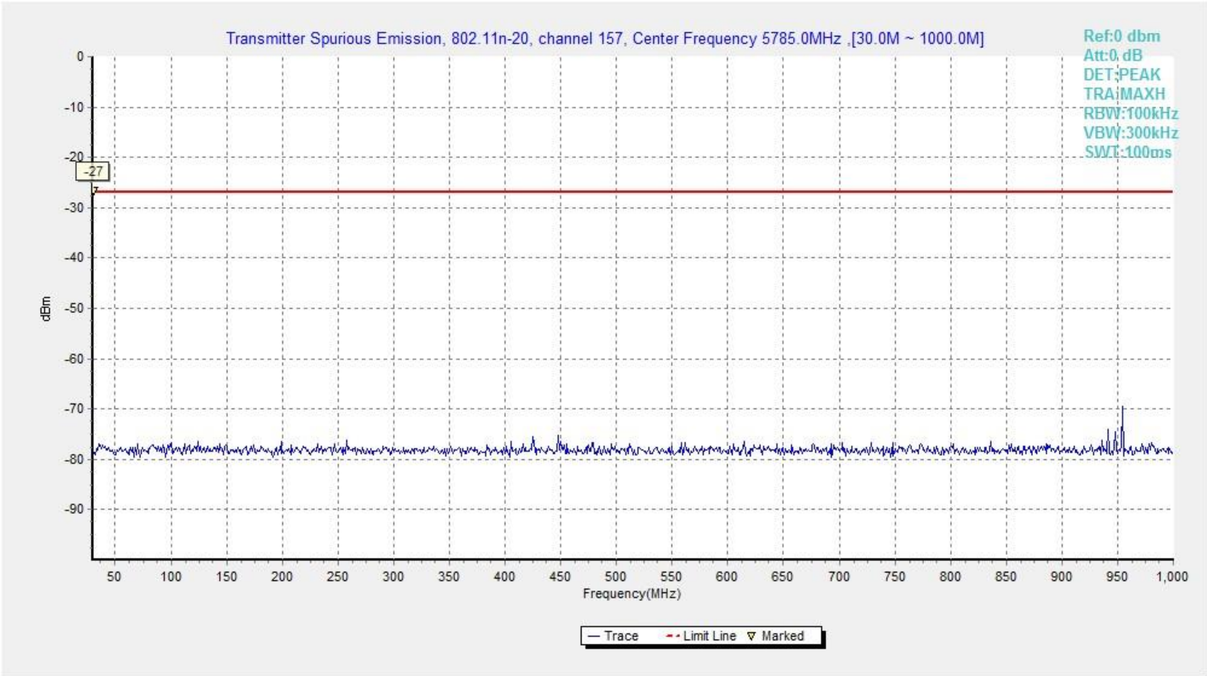


Fig. 25 Conducted Spurious Emission (802.11n-HT20, Ch157, 30 MHz-1 GHz)

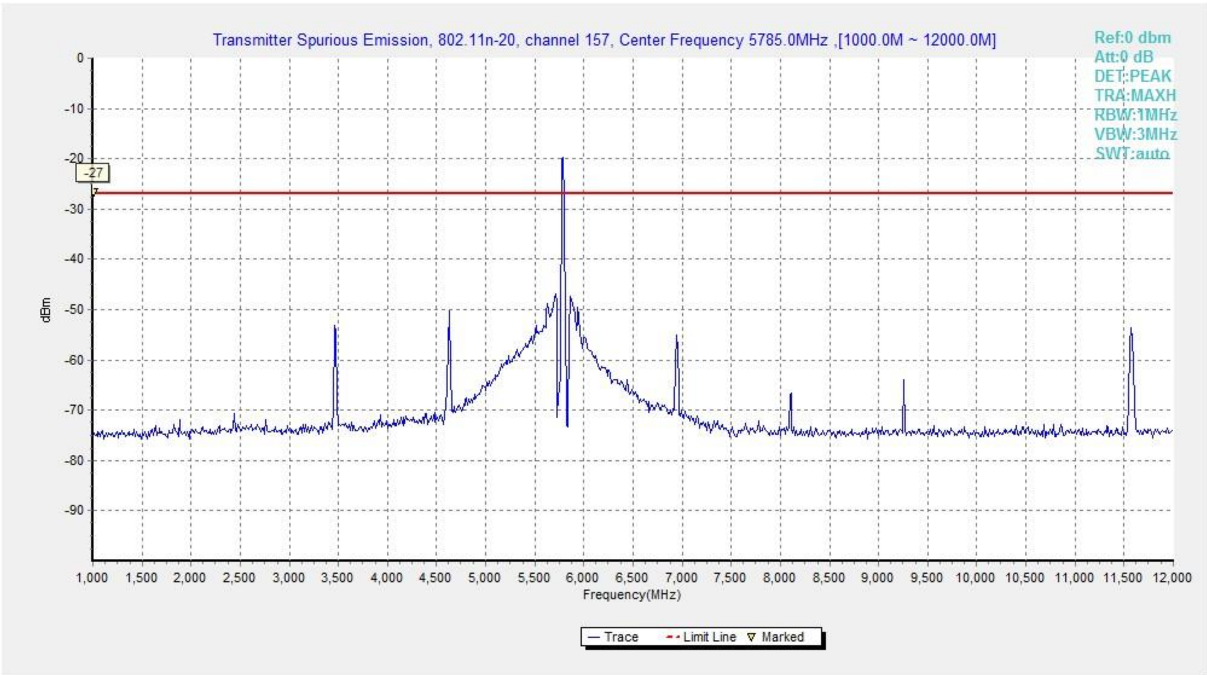


Fig. 26 Conducted Spurious Emission (802.11n-HT20, Ch157, 1 GHz -12 GHz)

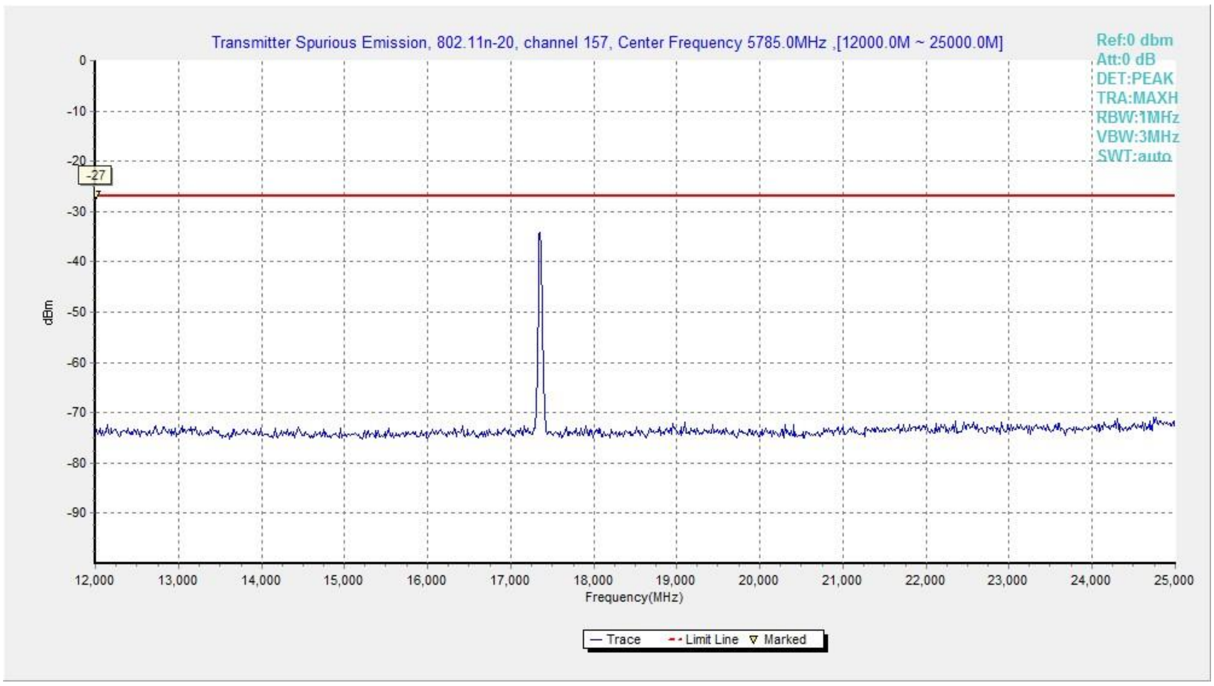


Fig. 27 Conducted Spurious Emission (802.11n-HT20, Ch157, 12 GHz-25 GHz)

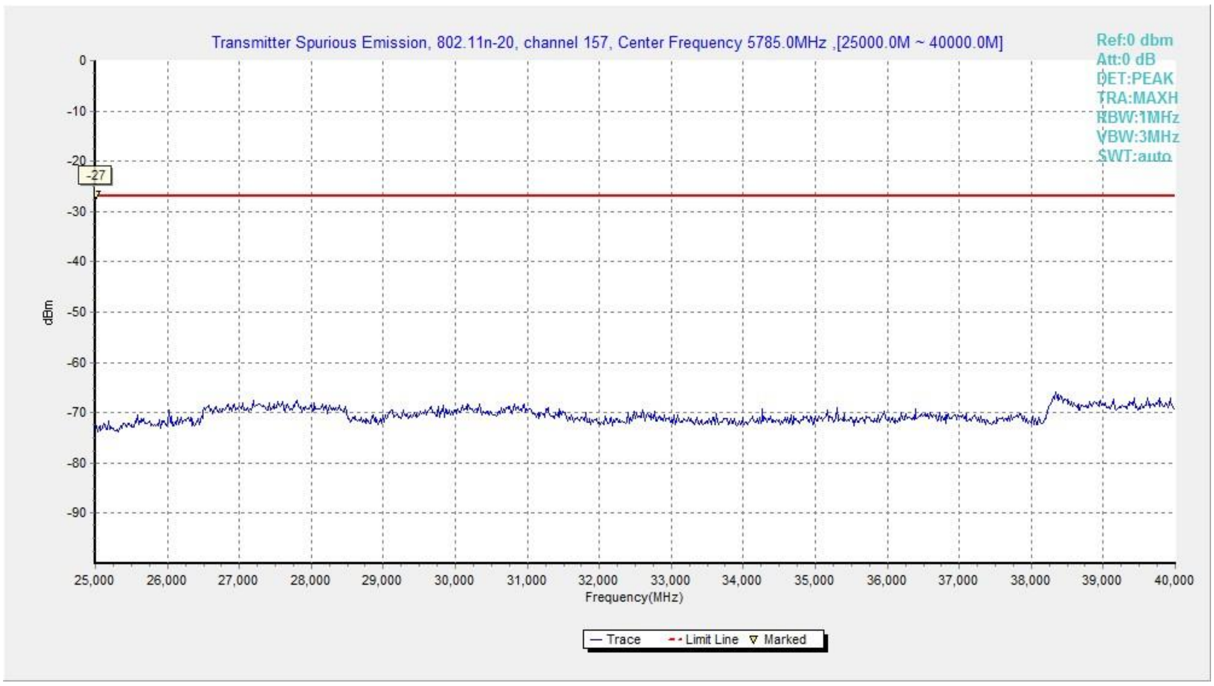


Fig. 28 Conducted Spurious Emission (802.11n-HT20, Ch157, 25 GHz-40 GHz)

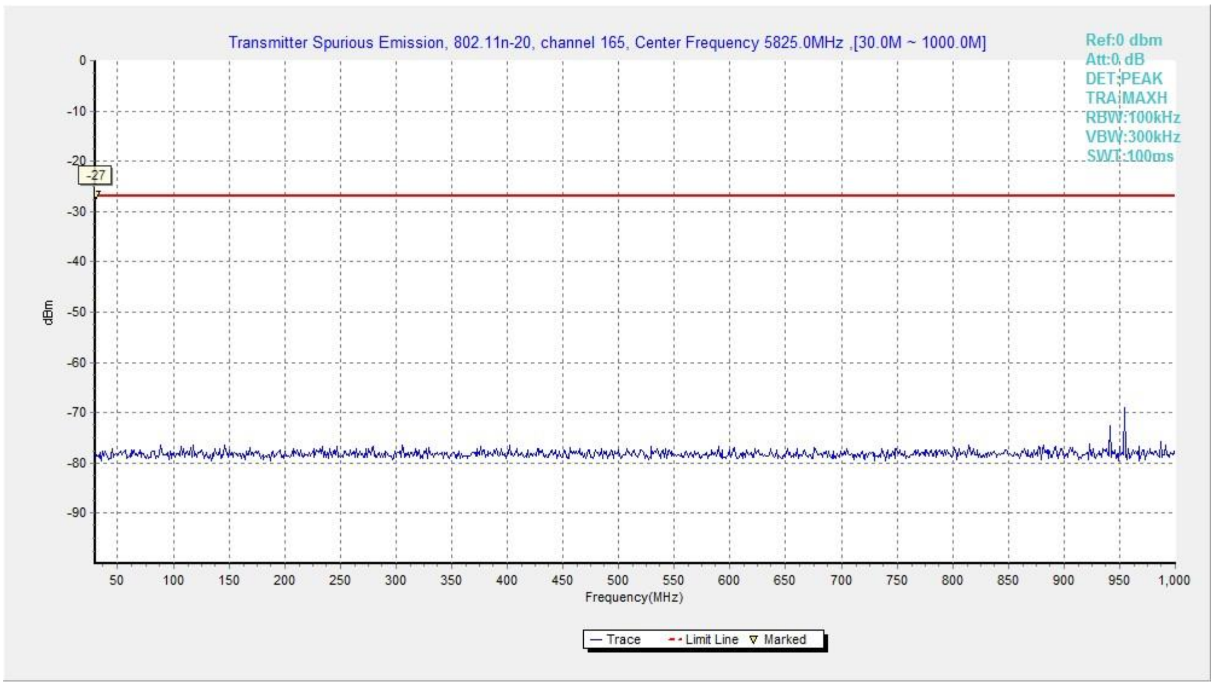


Fig. 29 Conducted Spurious Emission (802.11n-HT20, Ch165, 30 MHz-1 GHz)

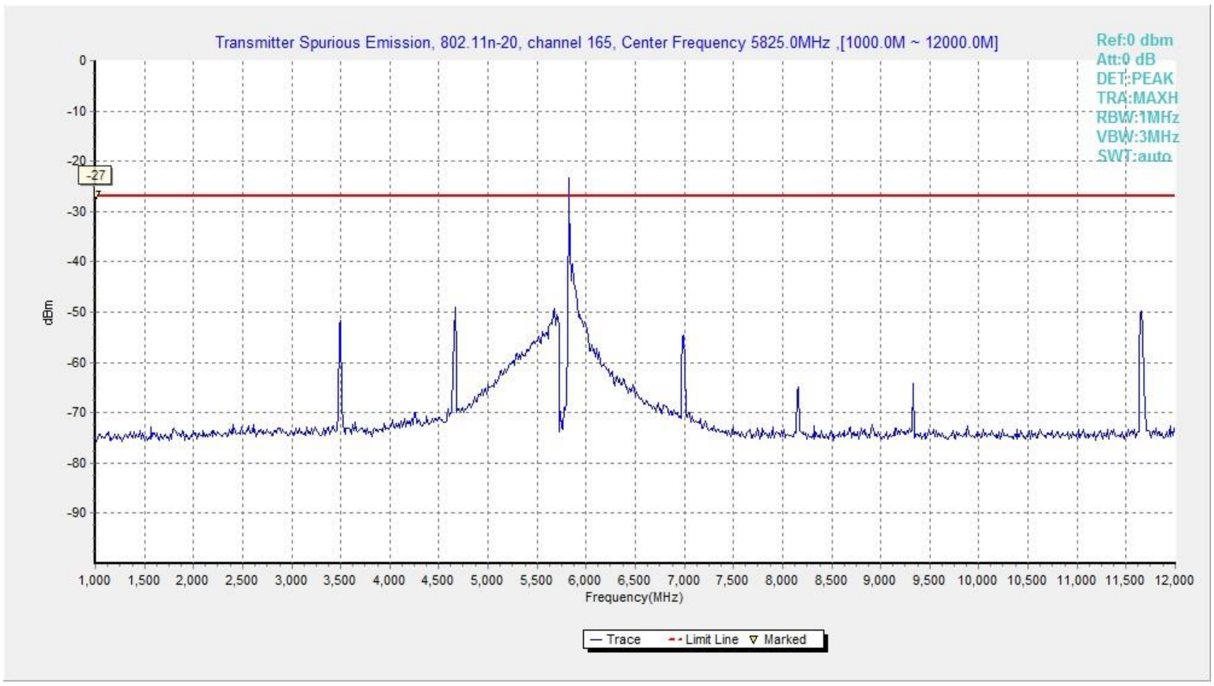


Fig. 30 Conducted Spurious Emission (802.11n-HT20, Ch165, 1 GHz -12 GHz)

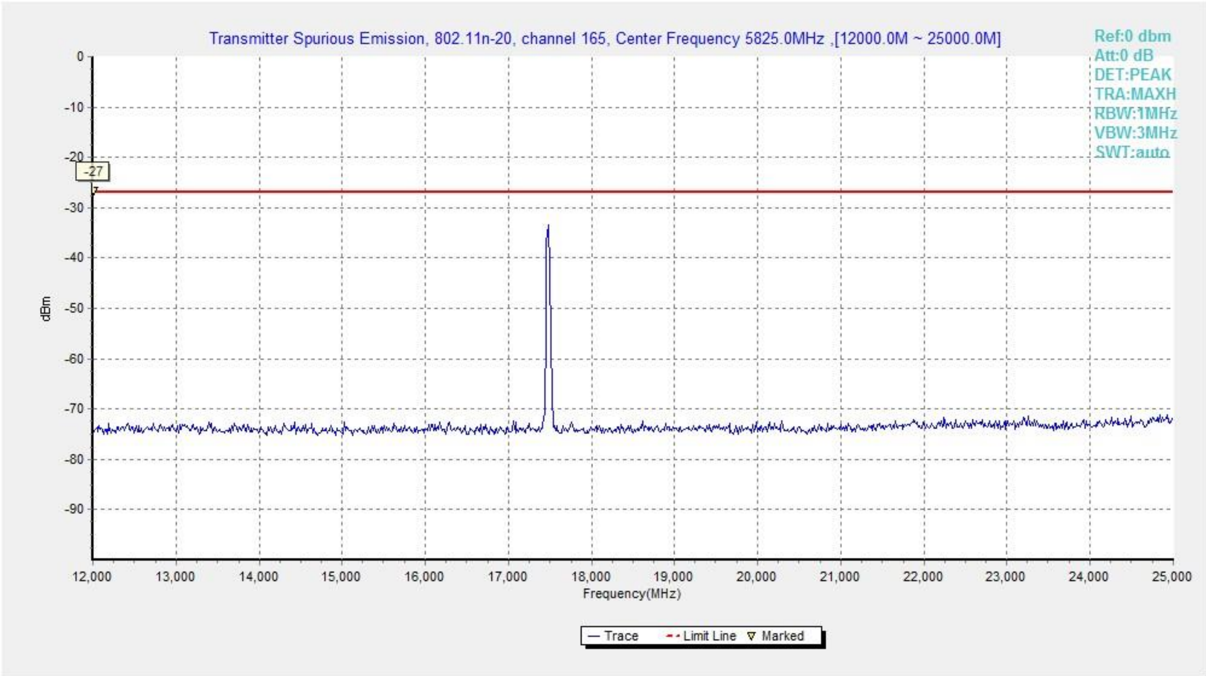


Fig. 31 Conducted Spurious Emission (802.11n-HT20, Ch165, 12 GHz-25 GHz)

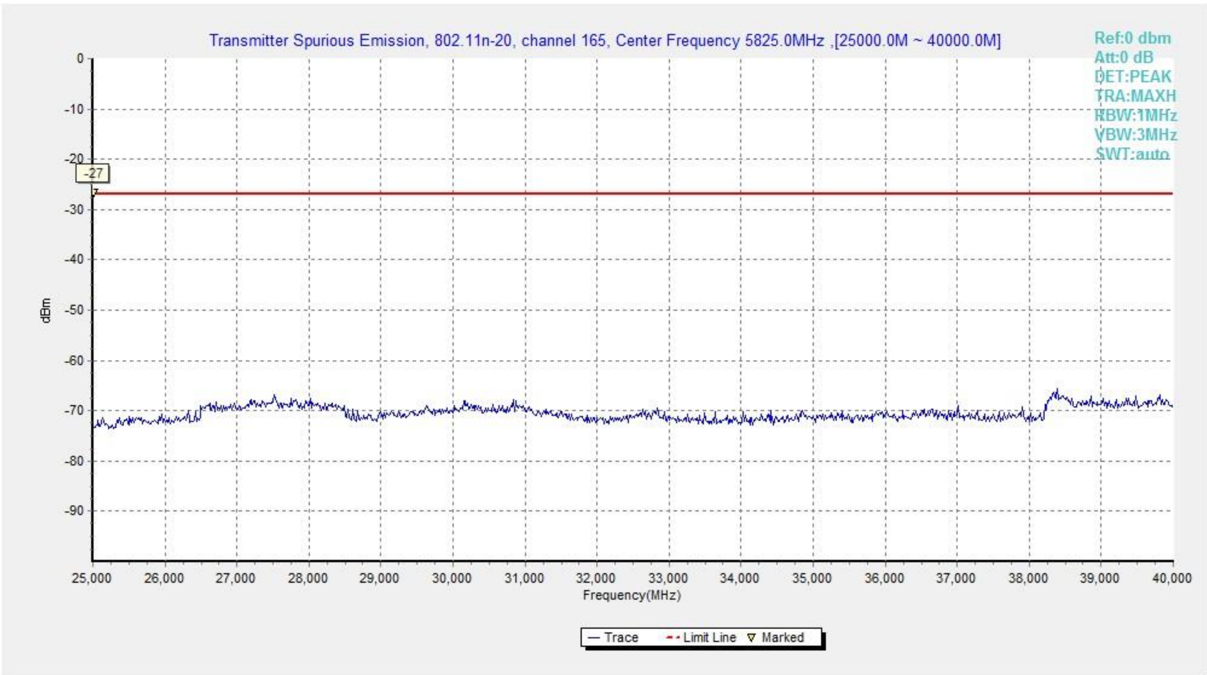


Fig. 32 Conducted Spurious Emission (802.11n-HT20, Ch165, 25 GHz-40 GHz)

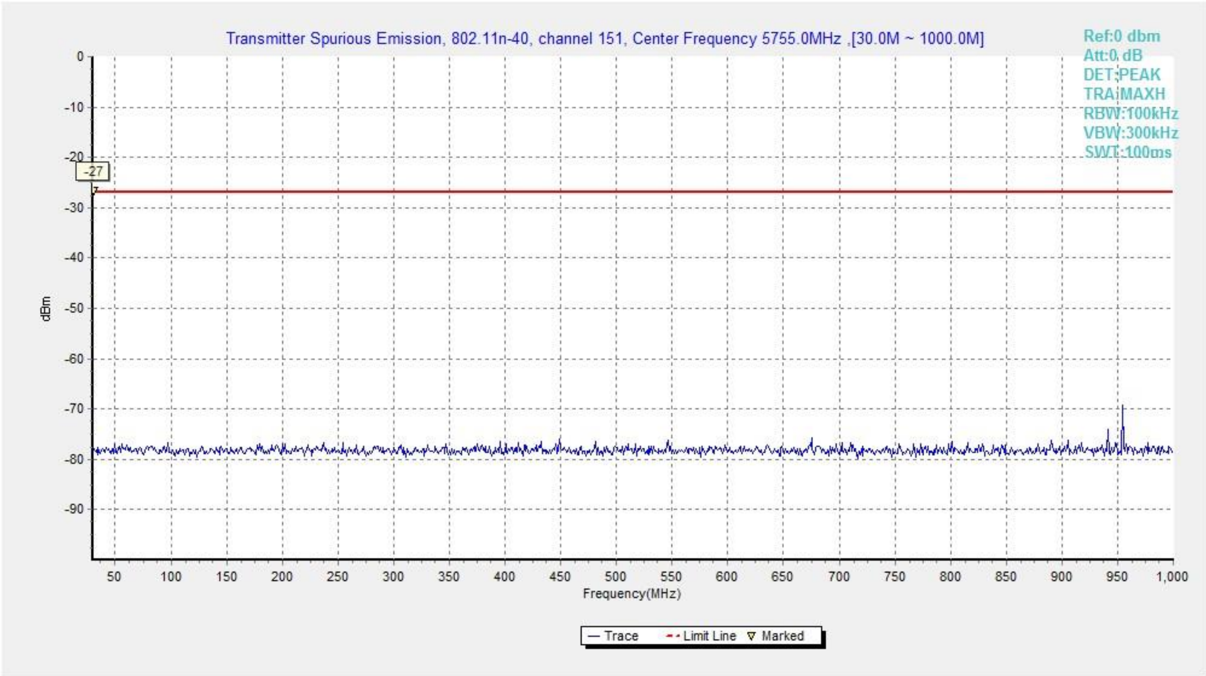


Fig. 33 Conducted Spurious Emission (802.11n-HT40, Ch151, 30 MHz-1 GHz)

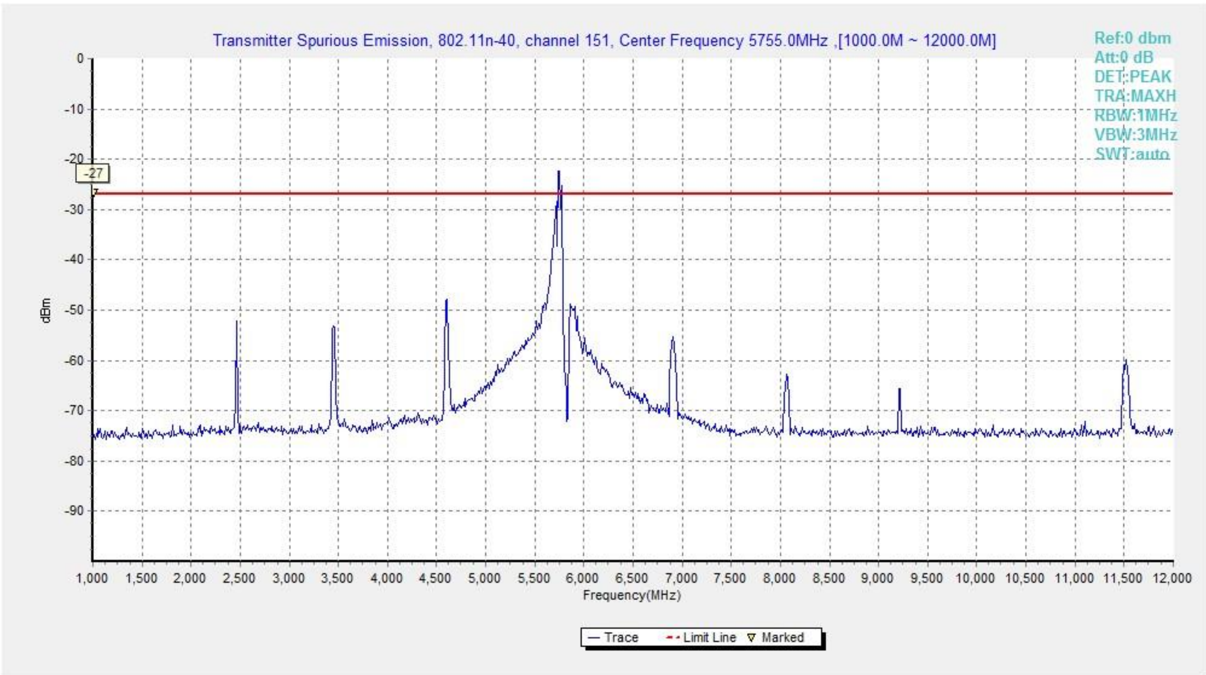


Fig. 34 Conducted Spurious Emission (802.11n-HT40, Ch151, 1 GHz -12 GHz)

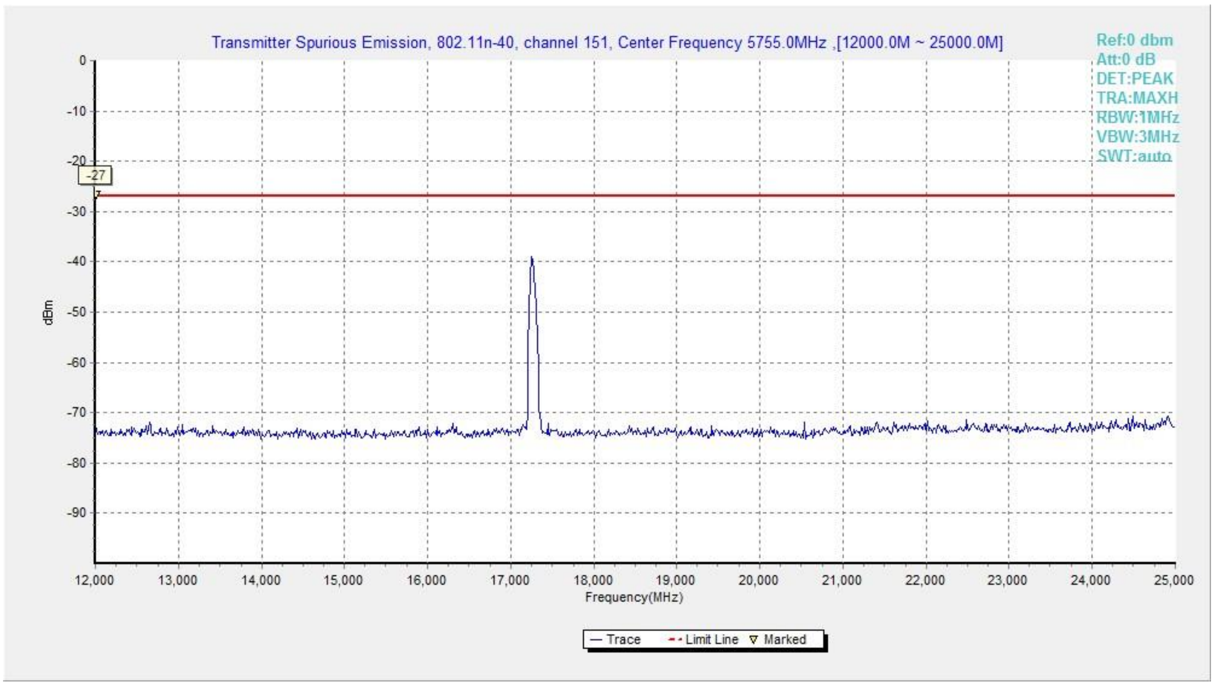


Fig. 35 Conducted Spurious Emission (802.11n-HT40, Ch151, 12 GHz-25 GHz)

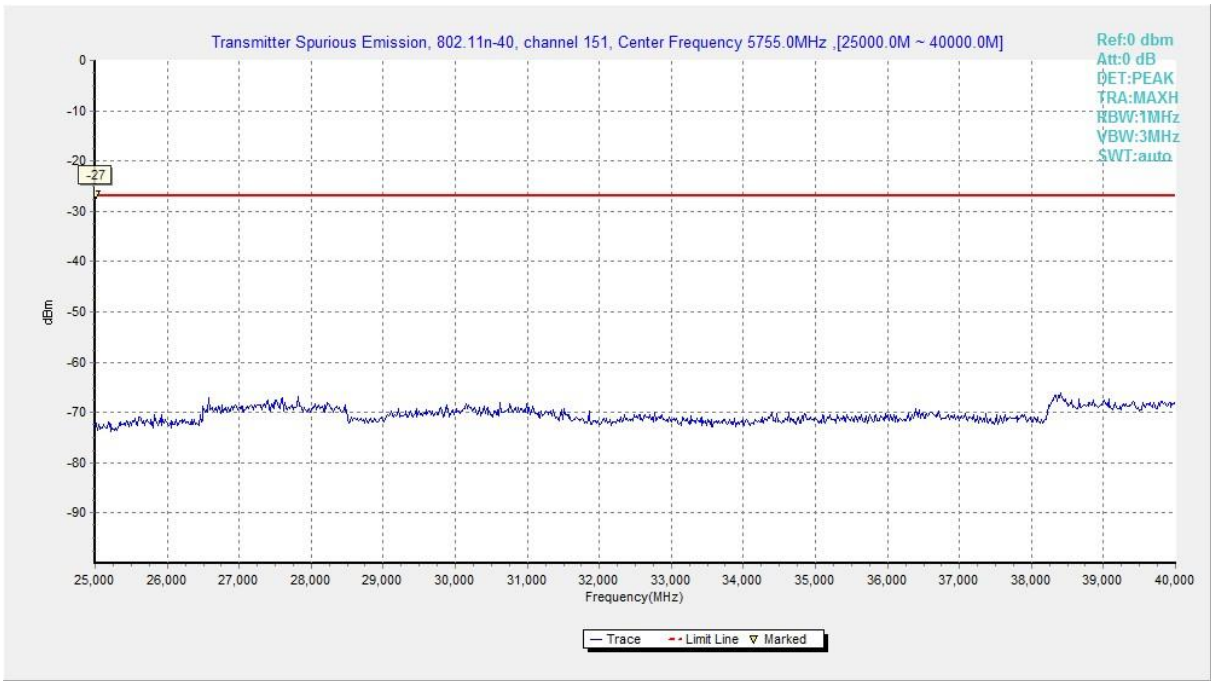


Fig. 36 Conducted Spurious Emission (802.11n-HT40, Ch151, 25 GHz-40 GHz)

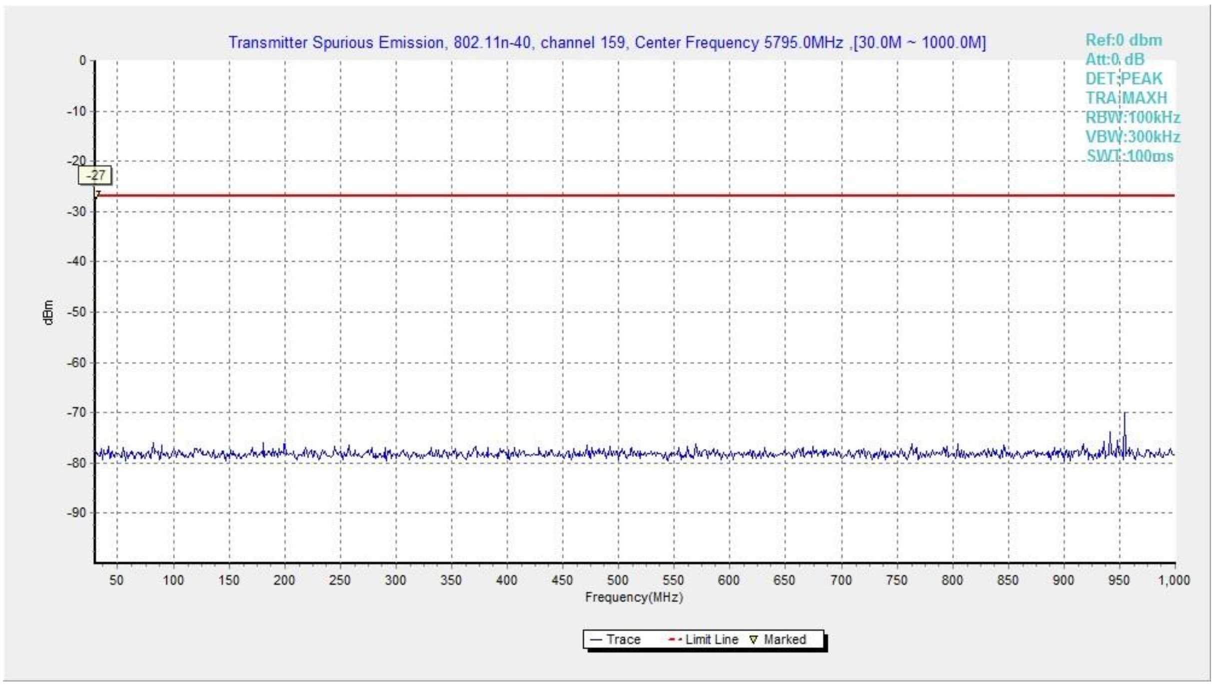


Fig. 37 Conducted Spurious Emission (802.11n-HT40, Ch159, 30 MHz-1 GHz)

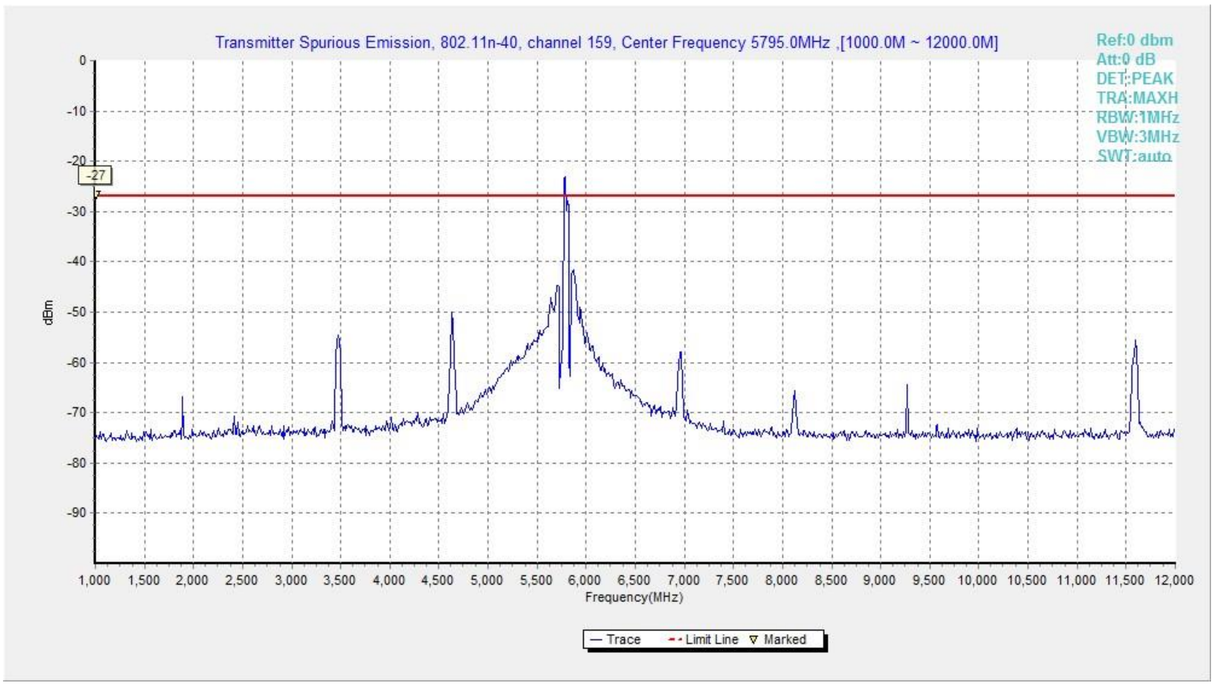


Fig. 38 Conducted Spurious Emission (802.11n-HT40, Ch159, 1 GHz -12 GHz)

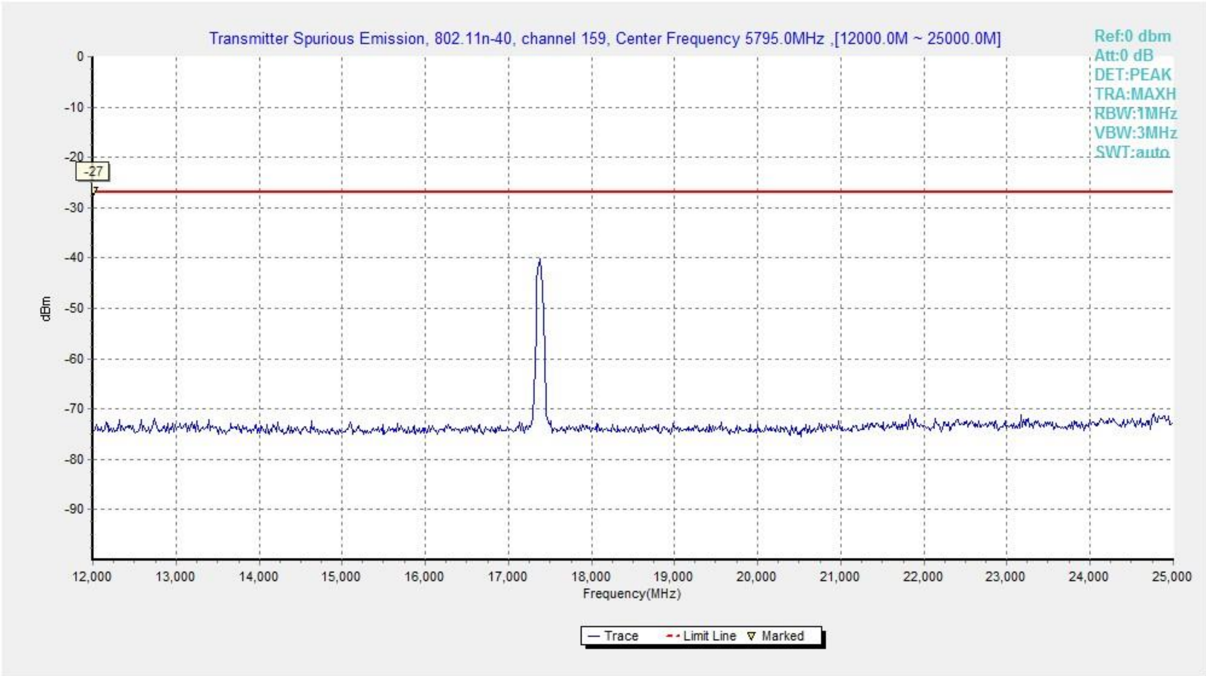


Fig. 39 Conducted Spurious Emission (802.11n-HT40, Ch159, 12 GHz-25 GHz)

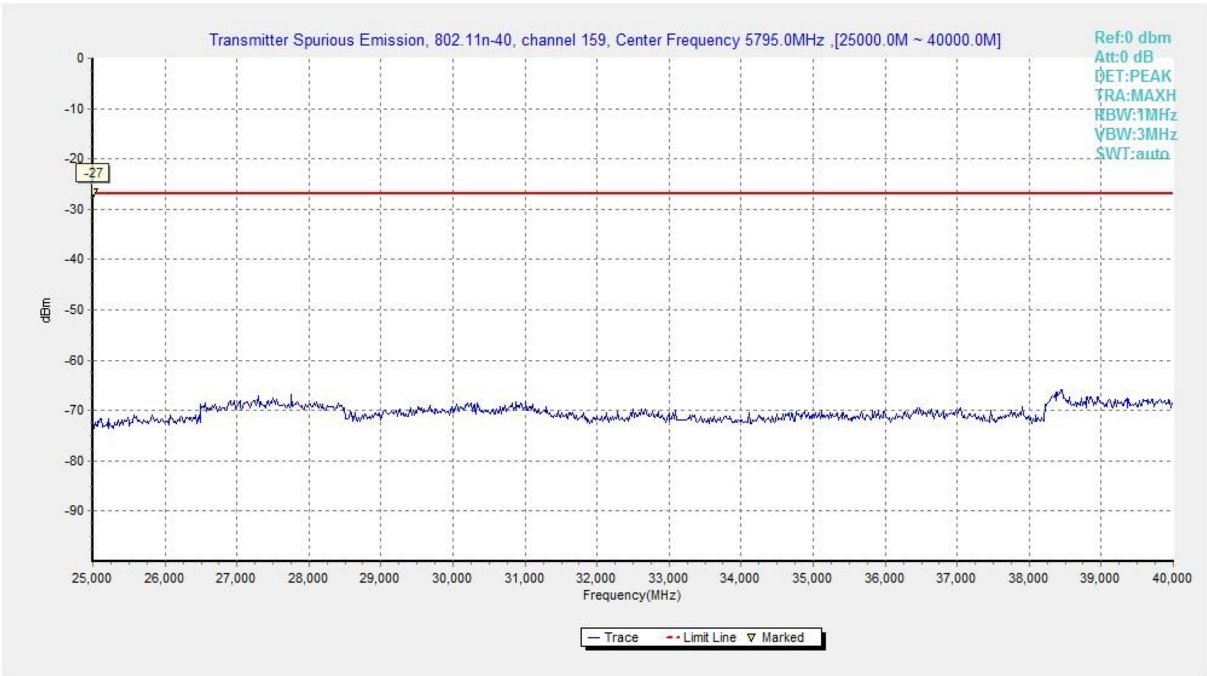


Fig. 40 Conducted Spurious Emission (802.11n-HT40, Ch159, 25 GHz-40 GHz)

A.5.2 Transmitter Spurious Emission - Radiated

Measurement Limit:

Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC 47 CFR Part 15.407	5725MHz~5850MHz	< -27

The measurement is made according to ANSI C63.10 .

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength (uV/m)	Field strength (dBμV/m)	Measurement distance(m)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Measurement Results:

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

P_{Mea} is the field strength recorded from the instrument.

Average

802.11a

Ch149

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5722.830	38.3	-32.9	34.9	36.35	H
5723.690	38.6	-32.9	34.9	36.70	H
11490.200	41.7	-30.4	38.7	33.35	H
16936.300	49.8	-25.7	41.4	34.11	H
17235.500	49.0	-25.8	41.2	33.62	H
17481.900	50.0	-25.3	41.2	34.04	H

Ch157

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5725.614	40.3	-33.0	34.9	38.41	H
5851.227	39.9	-32.2	35.1	37.01	H
11570.500	41.9	-30.5	38.8	33.60	H
16962.700	49.7	-25.6	41.4	33.95	H
17355.400	49.3	-25.6	41.2	33.69	H
17556.700	49.8	-25.6	41.2	34.28	H

Ch165

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5850.040	38.6	-32.2	35.1	35.74	H
5887.210	38.2	-32.2	35.1	35.21	H
11649.700	42.3	-30.2	38.9	33.63	H
17024.300	49.6	-25.6	41.4	33.78	H
17475.300	49.9	-25.2	41.2	33.99	H
17649.100	49.8	-25.6	41.1	34.40	H

802.11n-HT20

Ch149

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5722.400	38.5	-32.9	34.9	36.59	H
5724.800	40.9	-33.0	34.9	39.00	H
11490.200	41.7	-30.4	38.7	33.42	V
16617.300	49.3	-25.9	41.3	33.91	H
17235.500	49.0	-25.8	41.2	33.61	H
17469.800	49.9	-25.2	41.2	33.88	H

Ch157

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5724.780	40.4	-33.0	34.9	38.45	H
5853.226	40.1	-32.2	35.1	37.26	H
11570.500	41.9	-30.5	38.8	33.58	H
16827.400	49.5	-26.1	41.5	34.14	H
17355.400	49.2	-25.6	41.2	33.65	H
17513.800	50.1	-25.4	41.2	34.32	H

Ch165

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5850.000	37.7	-32.2	35.1	34.86	H
5866.800	37.2	-32.2	35.1	34.26	H
11649.700	42.3	-30.2	38.9	33.62	H
16827.400	49.5	-26.1	41.5	34.14	H
17475.300	49.9	-25.2	41.2	33.98	H
17628.200	50.1	-25.9	41.1	34.86	H

802.11n-HT40

Ch151

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5722.400	48.0	-32.9	34.9	46.02	H
5724.800	49.3	-33.0	34.9	47.35	H
11510.000	41.8	-30.4	38.7	33.51	V
16890.100	49.6	-25.9	41.4	34.03	H
17265.200	49.0	-25.9	41.2	33.65	H
17488.500	50.1	-25.3	41.2	34.15	H

Ch159

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5850.000	37.1	-32.2	35.1	34.26	H
5870.800	37.1	-32.2	35.1	34.21	H
11590.300	42.0	-30.5	38.8	33.66	H
16947.300	49.8	-25.7	41.4	34.08	H
17385.100	49.5	-25.5	41.2	33.77	H
17598.500	50.0	-25.8	41.1	34.66	H

Peak

802.11a

Ch149

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5724.658	74.7	-33.0	34.9	72.73	H
5724.980	76.3	-33.0	34.9	74.40	H
11490.200	45.8	-30.4	38.7	37.47	H
16884.600	54.6	-25.9	41.4	39.00	H
17234.950	52.2	-25.8	41.2	36.78	H
17353.750	54.7	-25.6	41.2	39.18	H

Ch157

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5725.000	51.6	-33.0	34.9	49.69	H
5850.235	49.9	-32.2	35.1	47.01	H
11569.950	45.6	-30.5	38.8	37.27	H
16623.350	54.8	-25.9	41.3	39.48	H
17354.850	51.5	-25.6	41.2	35.91	H
17498.400	54.9	-25.3	41.2	39.02	H

Ch165

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5850.883	65.1	-32.2	35.1	62.23	H
5851.722	64.4	-32.2	35.1	61.50	H
11650.250	47.1	-30.2	38.9	38.38	H
16388.500	54.3	-25.8	40.9	39.20	H
17359.800	54.7	-25.6	41.2	39.10	H
17474.750	51.6	-25.2	41.2	35.63	H

802.11n-HT20

Ch149

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5723.784	76.6	-33.0	34.9	74.65	H
5724.800	77.4	-33.0	34.9	75.45	H
11490.200	46.1	-30.4	38.7	37.78	H
16563.400	54.4	-25.9	41.2	39.17	H
17234.950	51.4	-25.8	41.2	36.03	H
17603.450	55.2	-25.8	41.1	39.82	H

Ch157

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5724.020	55.0	-33.0	34.9	53.11	H
5850.610	52.8	-32.2	35.1	49.94	H
11569.950	46.8	-30.5	38.8	38.45	H
17261.350	54.4	-25.9	41.2	39.10	H
17351.850	52.0	-25.7	41.2	36.41	H
17486.300	54.6	-25.3	41.2	38.69	H

Ch165

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5850.000	67.1	-32.2	35.1	64.25	H
5850.607	65.4	-32.2	35.1	62.54	H
11650.250	46.6	-30.2	38.9	37.90	H
16468.250	54.5	-26.0	41.0	39.50	H
17019.900	55.1	-25.6	41.4	39.26	H
17474.750	51.8	-25.2	41.2	35.81	H

802.11n-HT40

Ch151

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P_{Mea} (dBuV/m)	Polarization
5721.036	78.7	-32.9	34.9	76.79	H
5722.646	78.6	-32.9	34.9	76.69	H
11510.000	47.4	-30.4	38.7	39.09	H
16936.300	55.5	-25.7	41.4	39.78	H
17265.200	51.7	-25.9	41.2	36.42	H
17443.950	55.5	-25.2	41.2	39.50	H

Ch159

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	PMea (dBuV/m)	Polarization
5850.101	64.3	-32.2	35.1	61.38	H
5850.204	64.0	-32.2	35.1	61.14	H
11589.750	44.6	-30.5	38.8	36.25	H
16907.700	54.8	-25.8	41.4	39.14	H
17305.350	55.2	-25.9	41.2	39.83	H
17385.100	51.2	-25.5	41.2	35.46	H

Sample calculation: 802.11n 40MHz CH159–Peak, 17385.100 MHz

Peak ERP(dBm) = P_{Mea}(35.5dBuV/m) + Cable Loss(-25.5) + Antenna Factor(41.2)=51.2 (dBuV/m)

Conclusion: PASS

A.6. Band Edges Compliance

A6.1 Band Edges - conducted

Measurement Limit:

Standard	Limit (dBm/MHz)
FCC 47 CFR Part 15.407(b)(4)	All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

The measurement is made according to KDB 789033 D02

Measurement Uncertainty:

Measurement Uncertainty	0.75dB

Measurement Result:

Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.41	P
	5825 MHz	Fig.42	P
802.11n HT20	5745 MHz	Fig.43	P
	5825 MHz	Fig.44	P
802.11n HT40	5755 MHz	Fig.45	P
	5795 MHz	Fig.46	P

Conclusion: PASS

Test graphs as below:

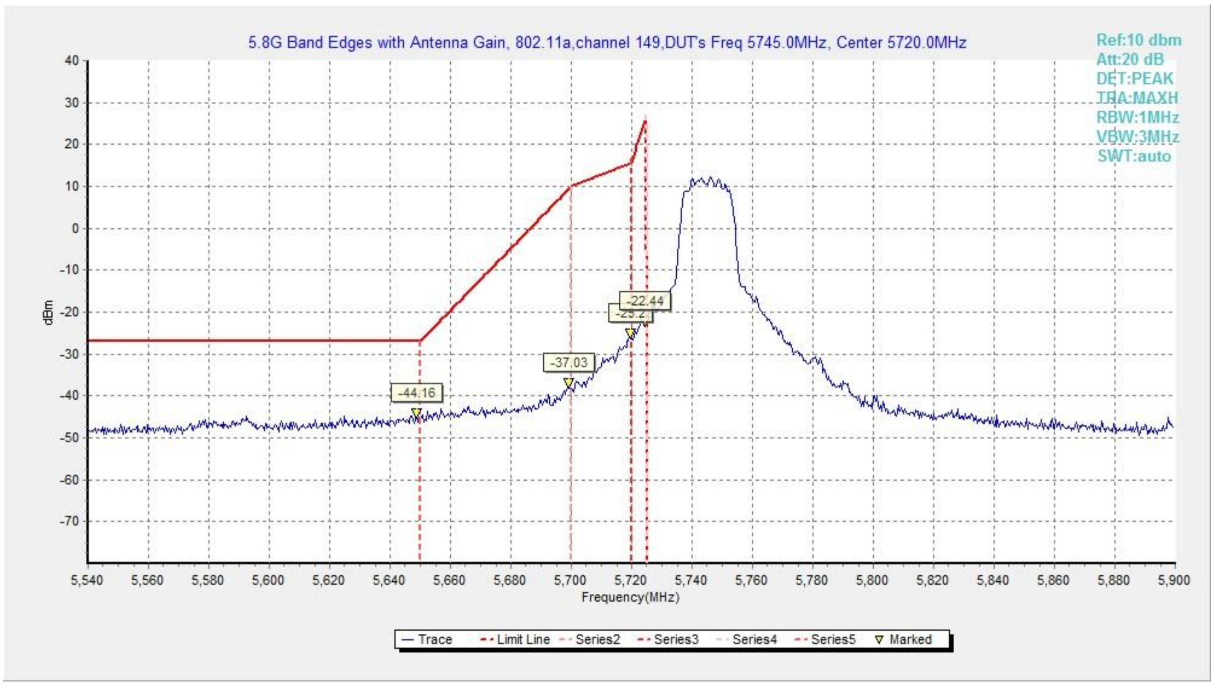


Fig. 41 Band Edges (802.11a, 5745MHz)

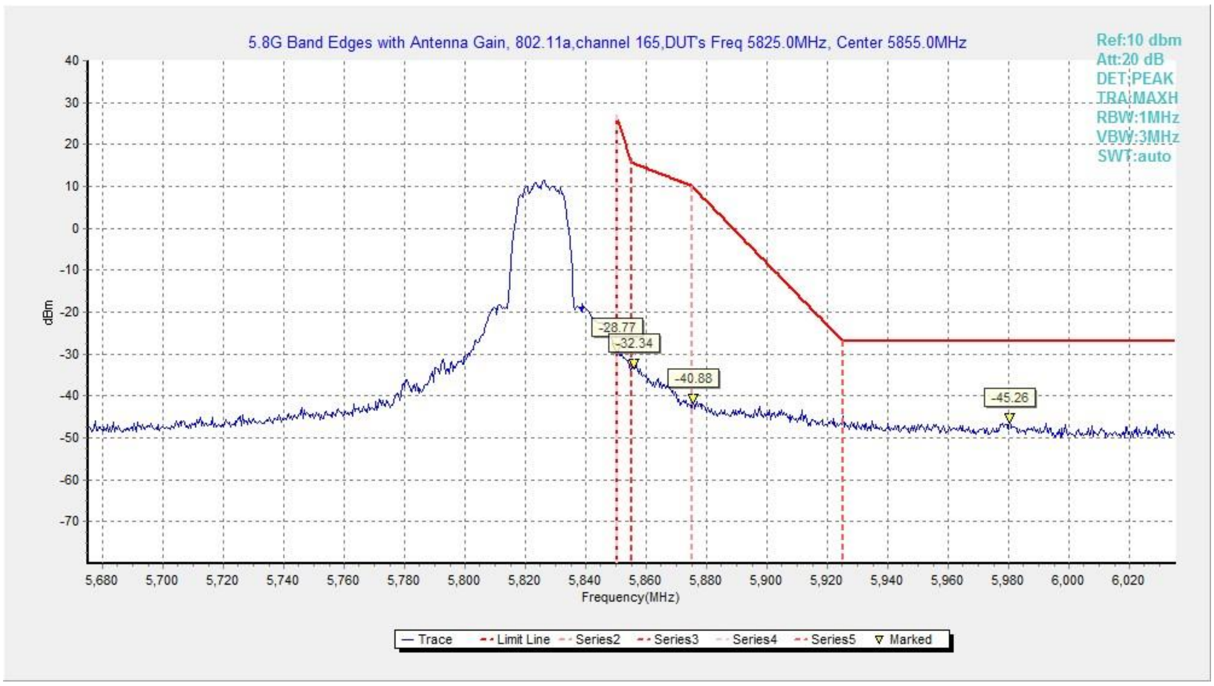


Fig. 42 Band Edges (802.11a, 5825MHz)

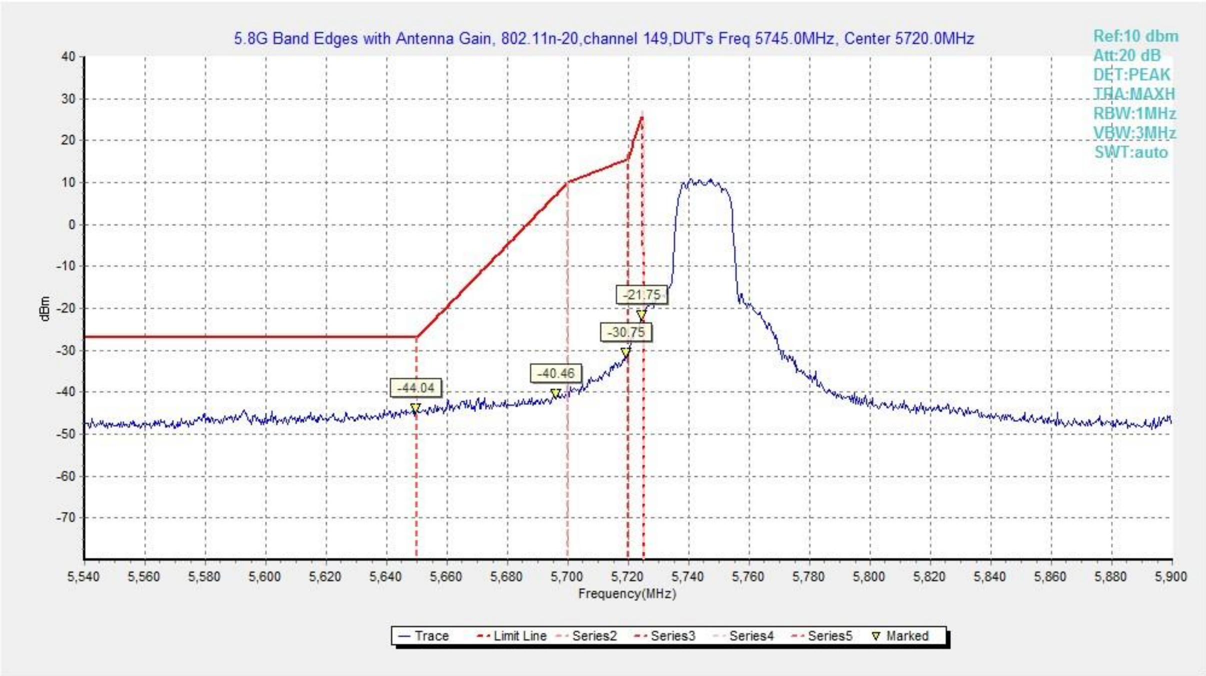


Fig. 43 Band Edges (802.11n-HT20, 5745MHz)

Fig. 44 Band Edges (802.11n-HT20, 5825MHz)

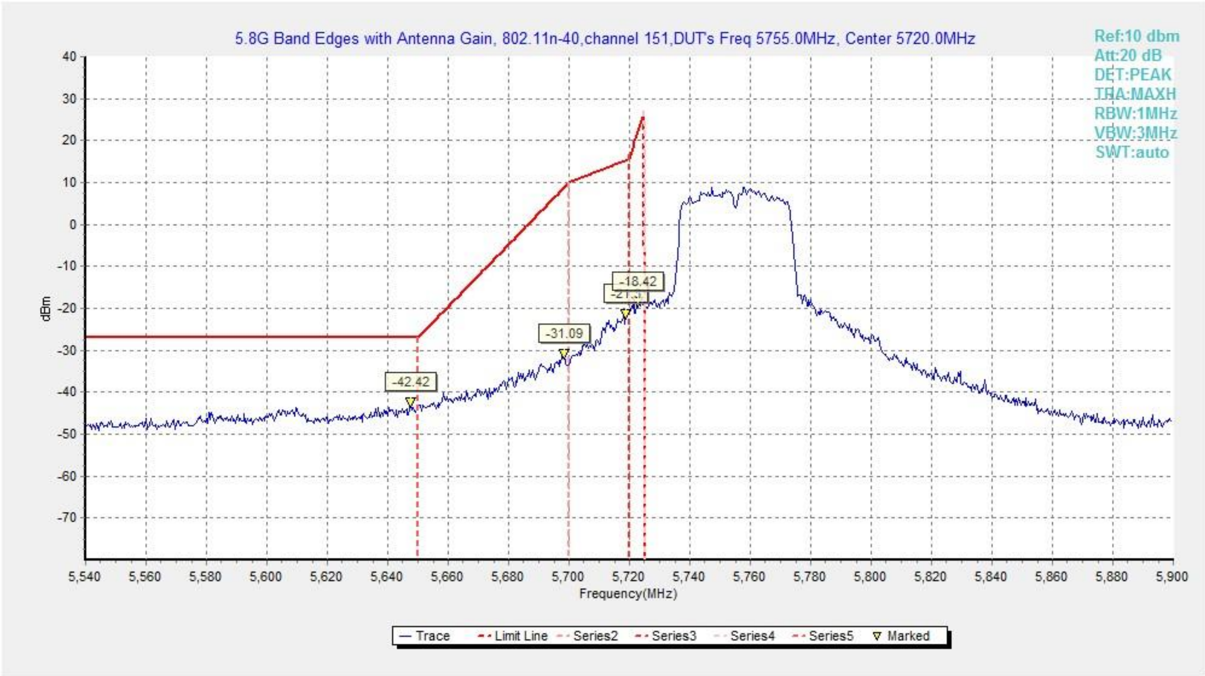


Fig. 45 Band Edges (802.11n-HT40, 5755MHz)

Fig. 46 Band Edges (802.11n-HT40, 5795MHz)

A6.2 Band Edges - Radiated

Measurement Limit:

Standard	Limit (dBm/MHz)	
FCC 47 CFR Part 15.407	at the band edge	27
	at 5 MHz above or below the band edge	15.6
	at 25 MHz above or below the band edge	10
	at 75 MHz or more above or below the band edge	-27
	Note：increasing linearly from point to point.	

The measurement is made according to KDB 789033 D02
In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Measurement Result:

Mode	Channel	Test Results	Conclusion
802.11a	5745 MHz	Fig.47	P
	5825 MHz	Fig.48	P
802.11n HT20	5745 MHz	Fig.49	P
	5825 MHz	Fig.50	P
802.11n HT40	5755 MHz	Fig.51	P
	5795 MHz	Fig.52	P

Conclusion: PASS

Test graphs as below:

RE - Power-5.650GHz-5.765GHz

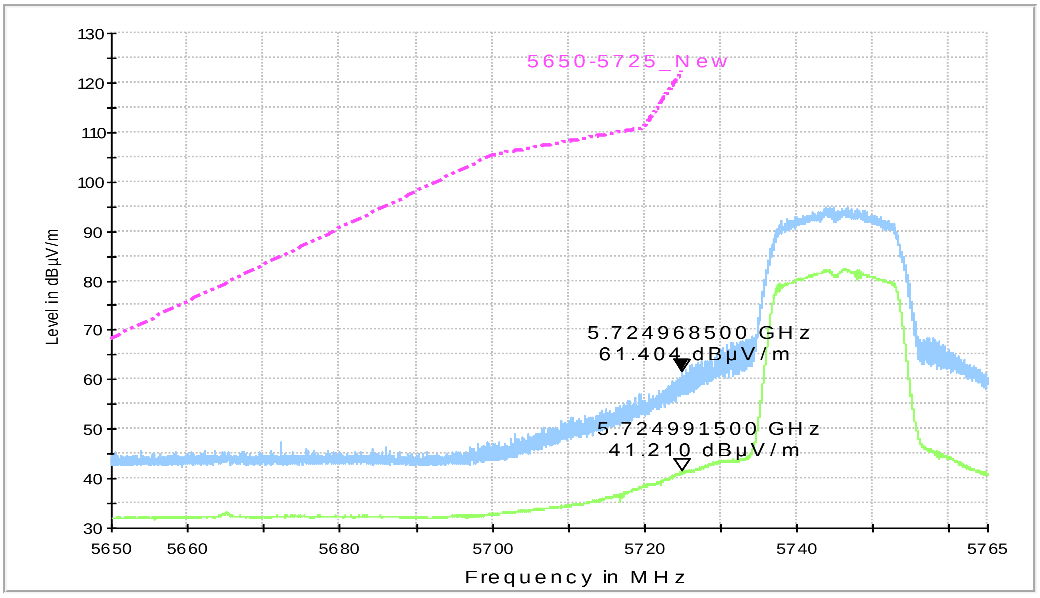


Fig. 47 Band Edges (802.11a, 5745MHz)

RE - Power-5.810GHz-5.925GHz

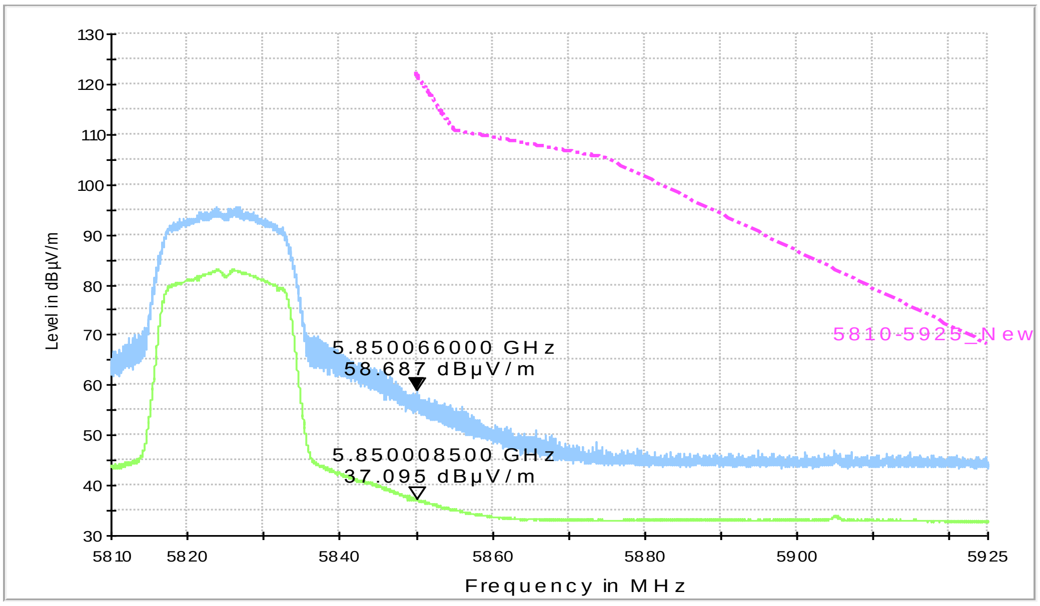


Fig. 48 Band Edges (802.11a, 5825MHz)

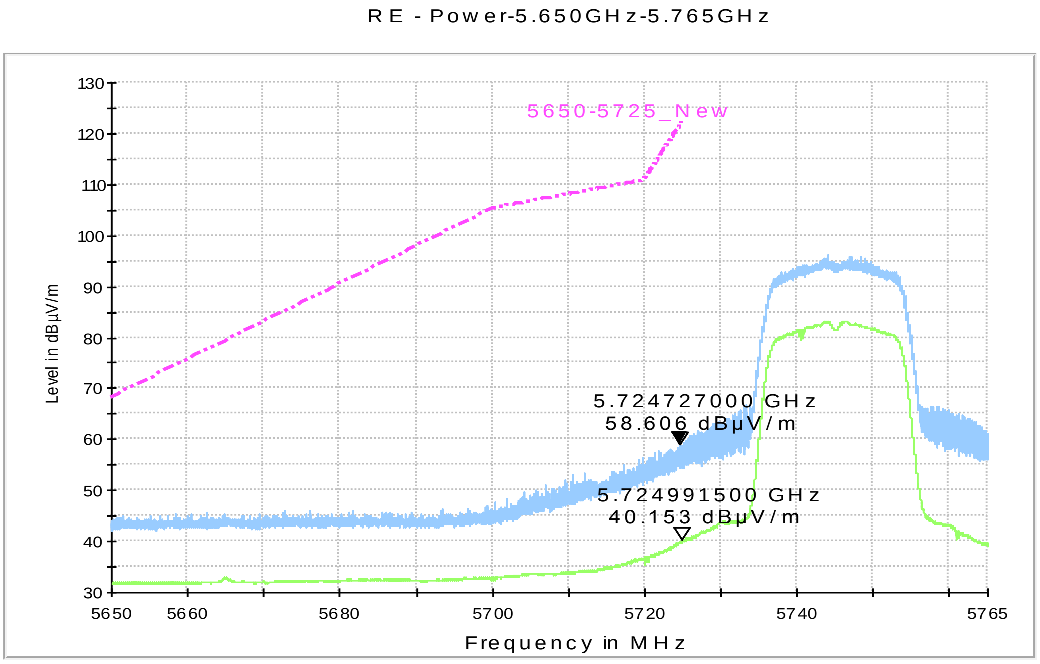


Fig. 49 Band Edges (802.11n-HT20, 5745MHz)

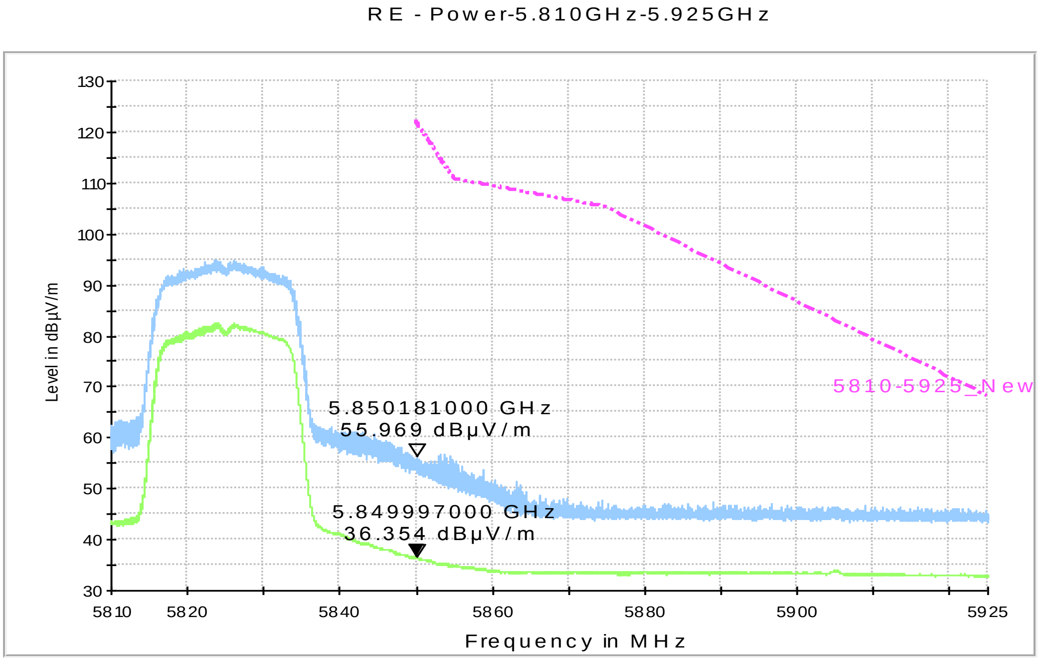


Fig. 50 Band Edges (802.11n-HT20, 5825MHz)

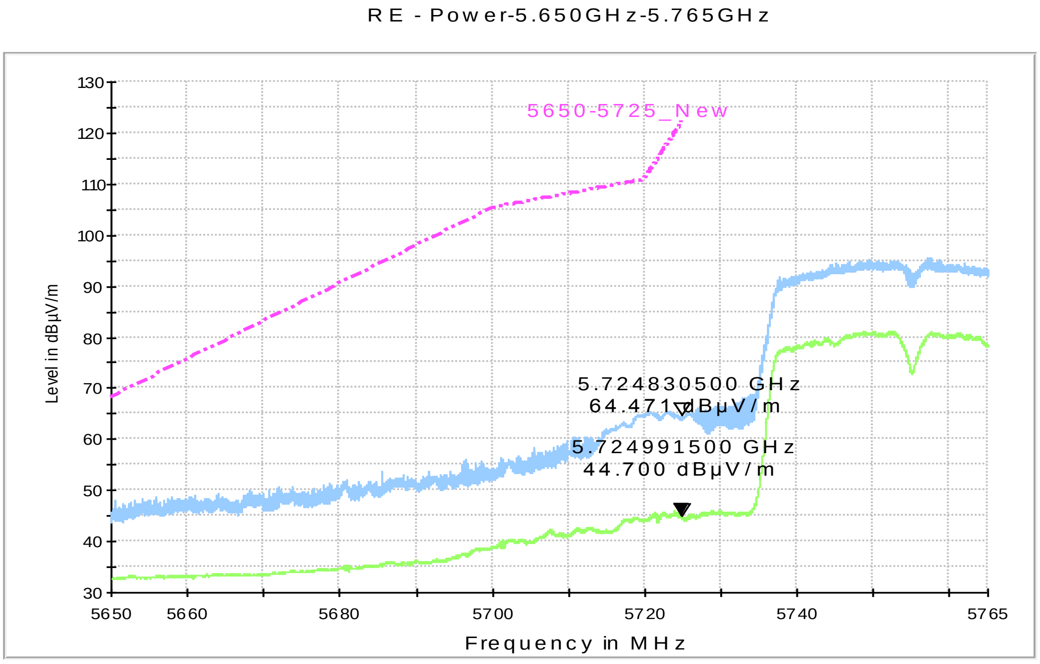


Fig. 51 Band Edges (802.11n-HT40, 5755MHz)

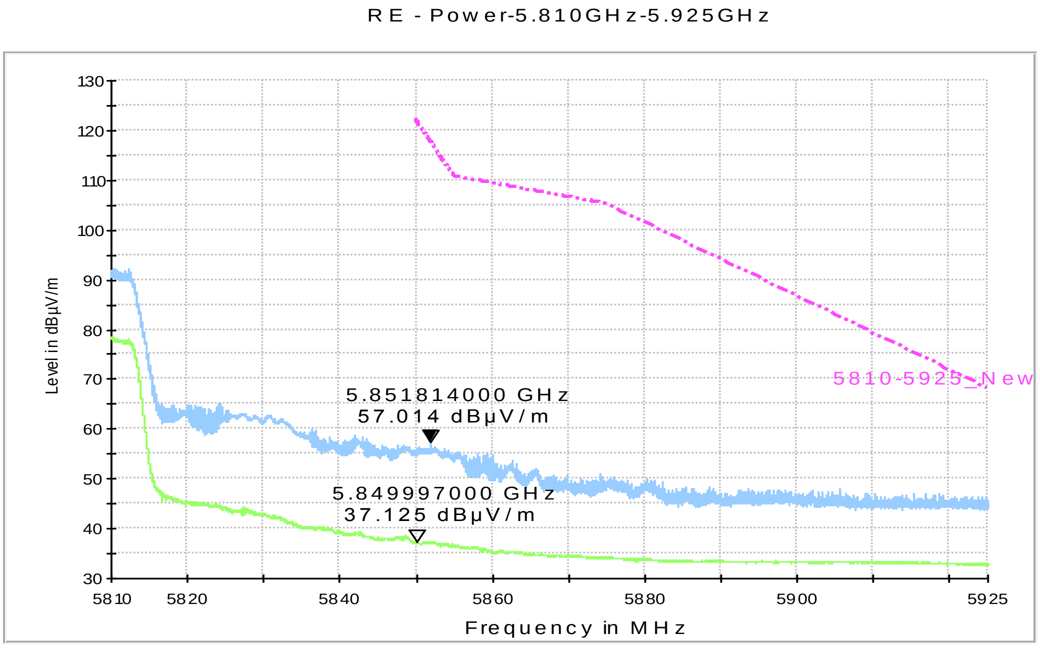


Fig. 52 Band Edges (802.11n-HT40, 5795MHz)

A.7. AC Powerline Conducted Emission

Test Condition:

Voltage（V）	Frequency（Hz）
110	60

Measurement uncertainty:

Expanded measurement uncertainty for this test item is U =3.2dB, k=2.

Measurement Result and limit:

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV) With charger		Conclusion
		802.11a	Idle	
0.15 to 0.5	66 to 56	Fig.53	Fig.54	P
0.5 to 5	56			
5 to 30	60			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

WLAN (Average Limit)

Frequency range (MHz)	Average Limit (dBμV)	Result (dBμV) With charger		Conclusion
		802.11a	Idle	
0.15 to 0.5	56 to 46	Fig.53	Fig.54	P
0.5 to 5	46			
5 to 30	50			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

The measurement is made according to ANSI C63.10 .

Conclusion: PASS

Test graphs as below:

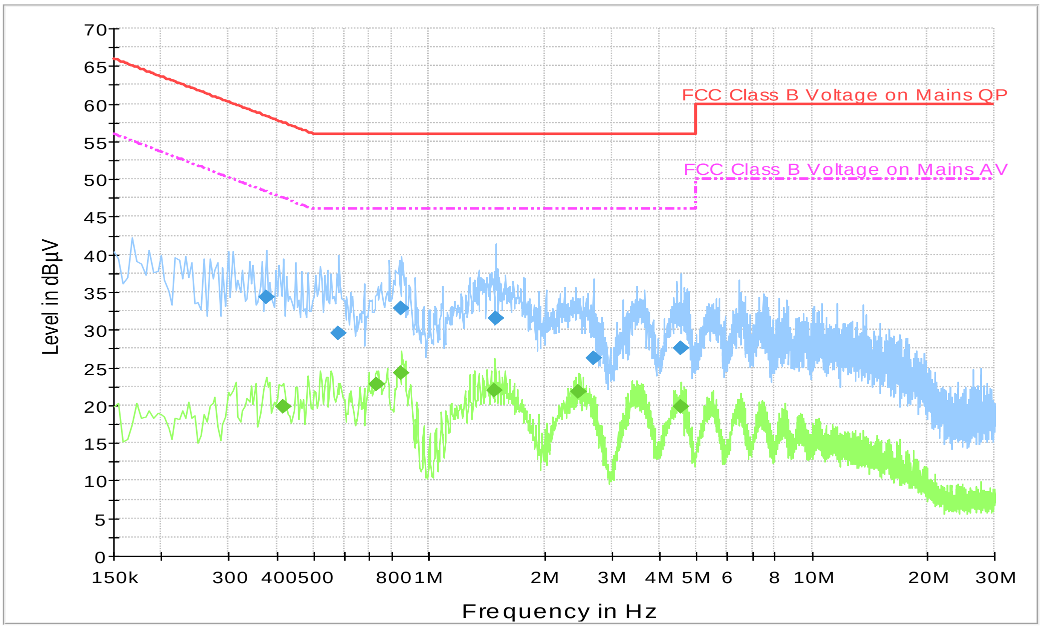


Fig. 53 AC Powerline Conducted Emission-802.11a

Measurement Result 1:

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.375000	34.4	2000.0	9.000	On	N	19.9	24.0	58.4
0.582000	29.5	2000.0	9.000	On	N	19.9	26.5	56.0
0.847500	32.8	2000.0	9.000	On	L1	19.7	23.2	56.0
1.495500	31.6	2000.0	9.000	On	L1	19.6	24.4	56.0
2.683500	26.2	2000.0	9.000	On	L1	19.7	29.8	56.0
4.542000	27.5	2000.0	9.000	On	L1	19.6	28.5	56.0

Measurement Result 2:

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.415500	19.9	2000.0	9.000	On	N	19.9	27.7	47.5
0.730500	22.8	2000.0	9.000	On	L1	19.8	23.2	46.0
0.847500	24.3	2000.0	9.000	On	L1	19.7	21.7	46.0
1.486500	21.9	2000.0	9.000	On	L1	19.6	24.1	46.0
2.458500	21.9	2000.0	9.000	On	L1	19.7	24.1	46.0
4.542000	19.8	2000.0	9.000	On	L1	19.6	26.2	46.0

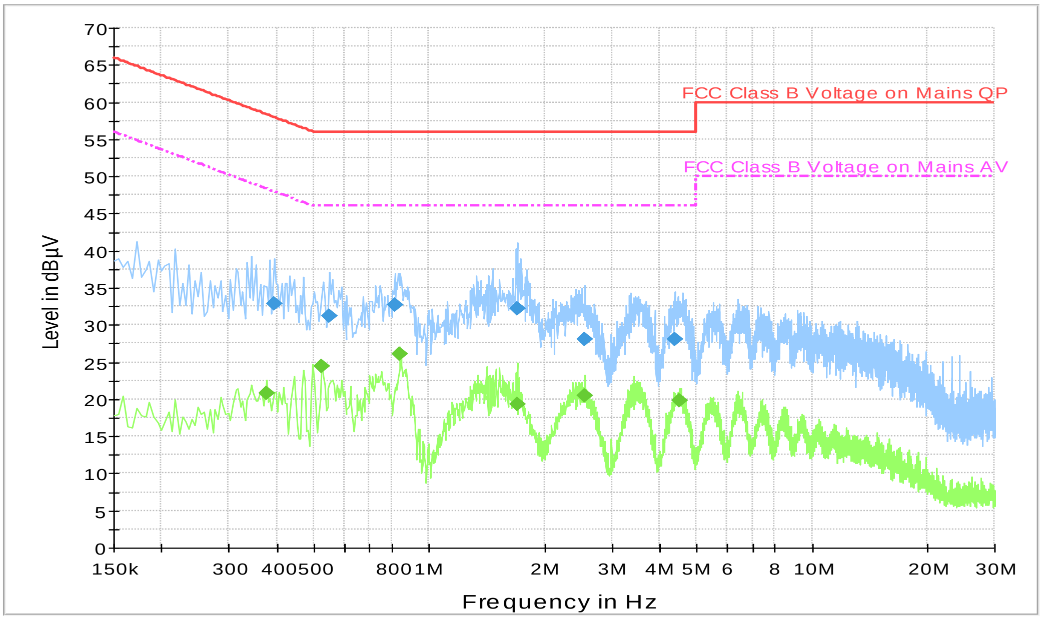


Fig. 54 AC Powerline Conducted Emission-Idle

Measurement Result 1:

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.393000	32.9	2000.0	9.000	On	N	19.9	25.1	58.0
0.550500	31.2	2000.0	9.000	On	N	19.9	24.8	56.0
0.811500	32.6	2000.0	9.000	On	N	19.8	23.4	56.0
1.693500	32.1	2000.0	9.000	On	N	19.6	23.9	56.0
2.548500	28.1	2000.0	9.000	On	L1	19.7	27.9	56.0
4.371000	28.1	2000.0	9.000	On	N	19.7	27.9	56.0

Measurement Result 2:

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.375000	20.8	2000.0	9.000	On	L1	19.8	27.6	48.4
0.523500	24.5	2000.0	9.000	On	L1	19.9	21.5	46.0
0.838500	26.1	2000.0	9.000	On	L1	19.7	19.9	46.0
1.693500	19.3	2000.0	9.000	On	N	19.6	26.7	46.0
2.548500	20.4	2000.0	9.000	On	L1	19.7	25.6	46.0
4.528500	19.8	2000.0	9.000	On	L1	19.6	26.2	46.0

ANNEX B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2016-09-29 through 2017-09-30
Effective Dates

DEPARTMENT OF COMMERCE UNITED STATES OF AMERICA

For the National Voluntary Laboratory Accreditation Program

***** END OF REPORT BODY *****