



FCC PART 15C TEST REPORT No.I19Z61444-IOT05

for

Client name: Micromax Informatics Ltd

Product name: LTE Mobile Phone

Model name: T5542

With

FCC ID: 2AU5XT5542

Hardware Version: MMX_T5542_V3.0

Software Version: MMX_T5542_SW_V03_20191106

Issued Date: 2019-11-14

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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REPORT HISTORY

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1. TEST LATORATORY

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL(huayuan North Road)

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

Location 2: CTTL(BDA)

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

1.3. TestingEnvironment

Normal Temperature: 15-35°C

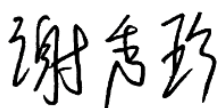
Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2019-09-19

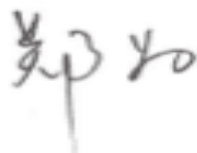
Testing End Date: 2019-11-07

1.5. Signature



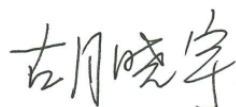
Xie Xiuzhen

(Prepared this test report)



Zheng Wei

(Reviewed this test report)



Hu Xiaoyu

(Approved this test report)

2. CLIENT INFORMATION

2.1. Applicant Information

Company Name: Micromax Informatics Ltd
Address: 288A Udyog Vihar Phase 4 Gurgaon 122015
City: /
Postal Code: /
Country: /
Telephone: +91 8447446444
Fax: /

2.2. Manufacturer Information

Company Name: Micromax Informatics Ltd
Address: 288A Udyog Vihar Phase 4 Gurgaon 122015
City: /
Postal Code: /
Country: /
Telephone: +91 8447446444
Fax: /

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

3.1. About EUT

Description	LTE Mobile Phone
Model name	T5542
FCC ID	2AU5XT5542
WLAN Frequency Range	ISM Band: 5725MHz~5850MHz
Type of modulation	OFDM
Voltage	3.8V

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
EUT3	358849109008639	MMX_T5542_V3.0	MMX_T5542_SW_V03_20191106
EUT2	358849109008654	MMX_T5542_V3.0	MMX_T5542_SW_V03_20191106

*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	/	Inbuilt
AE2	Charger	/	CH002
AE3	USB Cable	/	DC004

AE1

Model	Li-Polymer
Manufacturer	NINGBO VEKEN BATTERY CO., LTD.
Capacitance	4000mAh
Nominal voltage	3.85V

AE2

Model	HA-19050200UU
Manufacturer	ShenZhen HongGuangDe Technology CO.,LTD.
Length of cable	/

AE3

Model	YXT-537-TYPE-1.2M(Type-C)
Manufacturer	THIN STRIP OF SKY,SHENZHEN ELECTRONICS CO.,LTD.
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 LTE Mobile 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;	2018
	15.209 Radiated emission limits, general requirements;	
	15.407 General technical requirements	
ANSI C63.10	Methods of Measurement of Radio-Noise Emissions from	2013
	Low-Voltage Electrical and Electronic Equipment in the	
	Range of 9 kHz to 40 GHz	
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)	/	P
Peak Power Spectral Density	15.407 (a)	/	P
Occupied 6dB Bandwidth	15.407 (e)	/	P
Band Edges Compliance	15.407 (b)	/	P
Transmitter Spurious Emission - Conducted	15.407	/	P
Transmitter Spurious Emission - Radiated	15.407, 15.205, 15.209	/	P
AC Powerline Conducted Emission	15.107, 15.207	/	P
Transmitter Spurious Emission - Radiated < 30MHz	15.407, 15.209	/	P

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

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°C
Voltage	3.8V
Humidity	44%

7. TEST EQUIPMENTS UTILIZED

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSQ40	200089	Rohde & Schwarz	1 year	2020-05-15
2	LISN	ENV216	101200	Rohde & Schwarz	1 year	2020-02-14
3	Test Receiver	ESCI	100344	Rohde & Schwarz	1 year	2020-02-14
4	Shielding Room	S81	/	ETS-Lindgren	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESU26	100235	Rohde & Schwarz	1 year	2020-03-01
2	BiLog Antenna	VULB9163	9163-1222	Schwarzbeck	1 year	2020-03-14
3	Dual-Ridge Waveguide Horn Antenna	3115	6914	ETS-Lindgren	1year	2020-01-03
4	EMI Antenna	3116	2661	ETS-Lindgren	1 Year	2020-10-14
5	Vector Signal Analyzer	FSV40	101047	Rohde & Schwarz	1 year	2020-05-16

8. Measurement Uncertainty

8.1. Transmitter Output Power

Measurement Uncertainty: 0.387dB,k=1.96

8.2. Peak Power Spectral Density

Measurement Uncertainty: 0.705dB,k=1.96

8.3. Occupied 6dB Bandwidth

Measurement Uncertainty: 60.80Hz,k=1.96

8.4. Band Edges Compliance

Measurement Uncertainty : 0.62dB,k=1.96

8.5. Spurious Emissions

Conducted (k=1.96)

Frequency Range	Uncertainty(dB)
$30\text{MHz} \leq f \leq 2\text{GHz}$	1.22
$2\text{GHz} \leq f \leq 3.6\text{GHz}$	1.22
$3.6\text{GHz} \leq f \leq 8\text{GHz}$	1.22
$8\text{GHz} \leq f \leq 12.75\text{GHz}$	1.51
$12.75\text{GHz} \leq f \leq 26\text{GHz}$	1.51
$26\text{GHz} \leq f \leq 40\text{GHz}$	1.59

Radiated (k=2)

Frequency Range	Uncertainty(dB)
9kHz-30MHz	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	4.86
$1\text{GHz} \leq f \leq 18\text{GHz}$	5.26
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.28

8.6. AC Power-line Conducted Emission

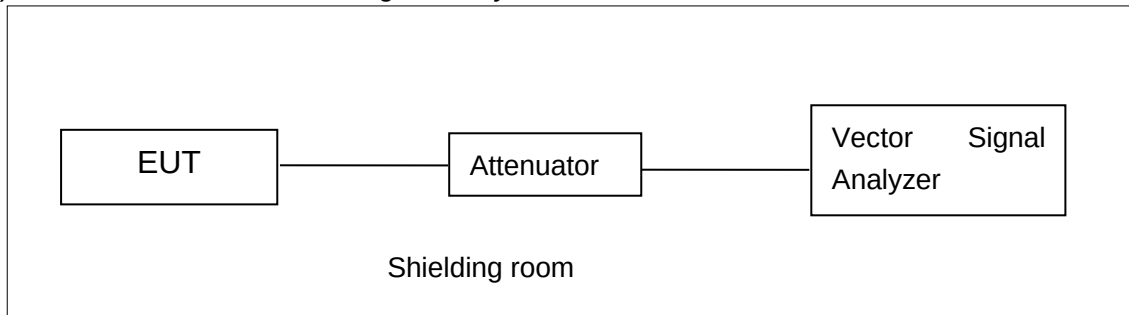
Measurement Uncertainty : 3.38dB,k=2

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

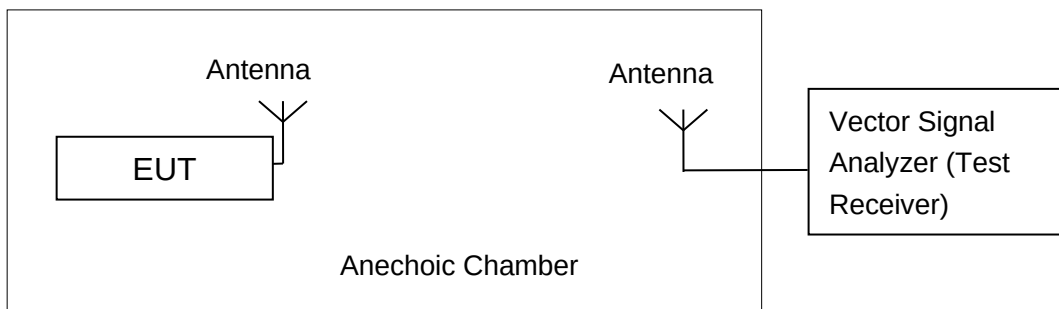


A.1.2. Radiated Emission Measurements

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 Antenna Gain

Antenna gain is 3.6dBi and the value is supplied by the applicant or manufacturer.

A.2.2. 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	22.25	/	/
	9	22.18	/	/
	12	21.97	/	/
	18	22.03	/	/
	24	22.54	/	/
	36	22.56	/	/
	48	22.59	/	/
	54	22.62	22.74	23.05

The data rate 54Mbps 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	22.31	/	/
	MCS1	22.15	/	/
	MCS2	22.22	/	/
	MCS3	22.63	/	/
	MCS4	22.65	/	/
	MCS5	22.71	/	/
	MCS6	22.75	22.62	22.98
	MCS7	22.67	/	/

The data rate MCS6 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	22.77	/
	MCS1	22.66	/
	MCS2	22.67	/
	MCS3	23.15	/
	MCS4	23.12	/
	MCS5	23.19	/
	MCS6	23.20	/
	MCS7	23.22	23.42

The data rate MCS7 is selected as worse condition, and the following cases are performed with this condition.

Conclusion: PASS

A.2.3. 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	13.77	13.86	14.22

802.11n-HT20 mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz(Ch165)
802.11n(20MHz)	13.42	13.76	14.53

802.11n-HT40 mode

Mode	Test Result (dBm)	
	5755MHz (Ch151)	5795MHz(Ch159)
802.11n(40MHz)	14.82	14.84

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
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Measurement Results:

Mode	Channel	Power Spectral Density (dBm/500kHz)	Conclusion
802.11a	149	2.84	P
	157	2.96	P
	165	2.89	P
802.11n HT20	149	2.81	P
	157	2.84	P
	165	2.73	P
802.11n HT40	151	0.42	P
	159	0.41	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
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Measurement Result:

Mode	Channel	Occupied 6dB Bandwidth (MHz)		conclusion
802.11a	149	Fig.1	16.50	P
	157	Fig.2	16.50	P
	165	Fig.3	16.50	P
802.11n HT20	149	Fig.4	17.80	P
	157	Fig.5	17.75	P
	165	Fig.6	17.75	P
802.11n HT40	151	Fig.7	36.40	P
	159	Fig.8	36.40	P

Conclusion: PASS

Test graphs as below:

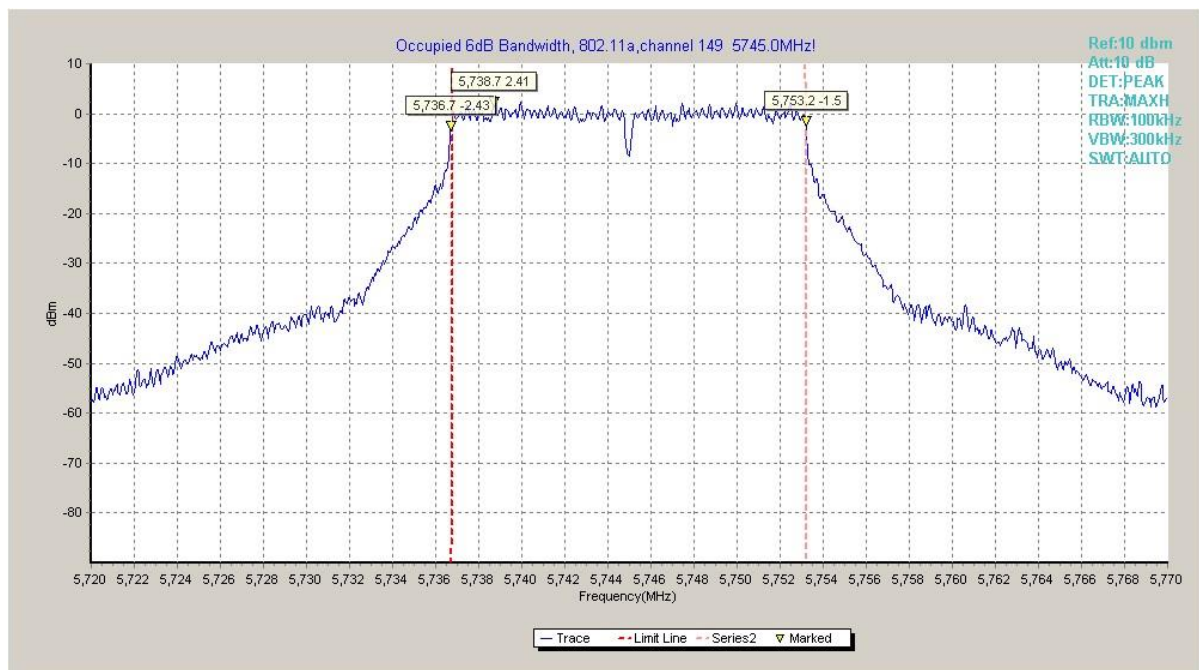


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)

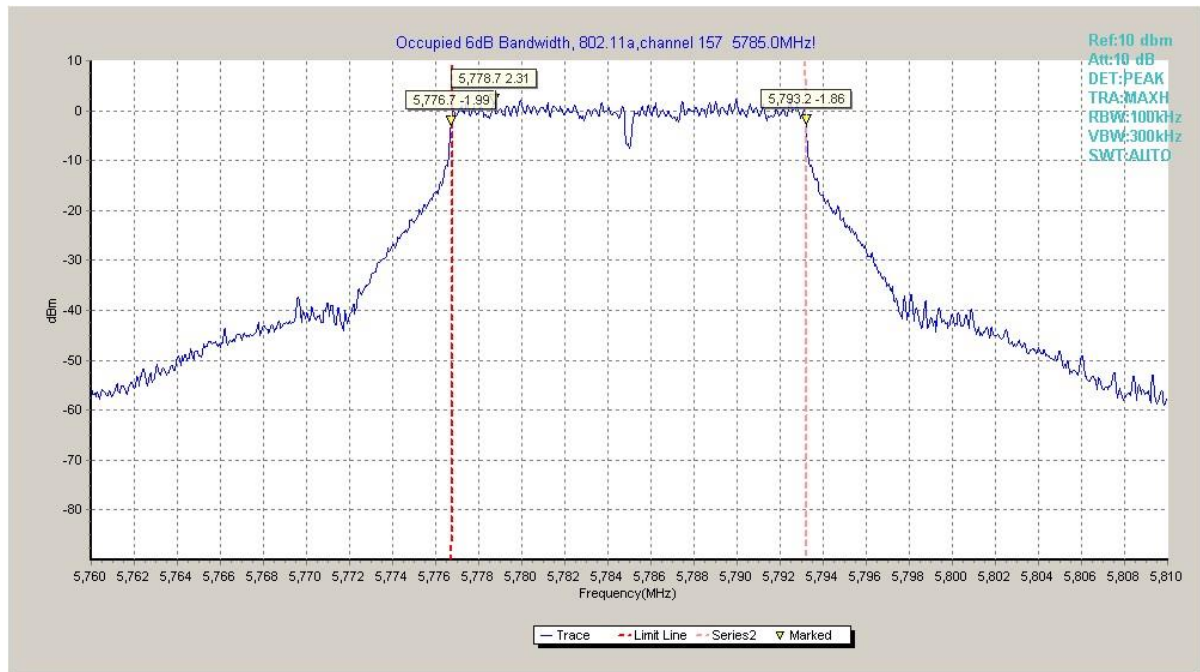


Fig. 2 Occupied 6dB Bandwidth (802.11a, Ch 157)

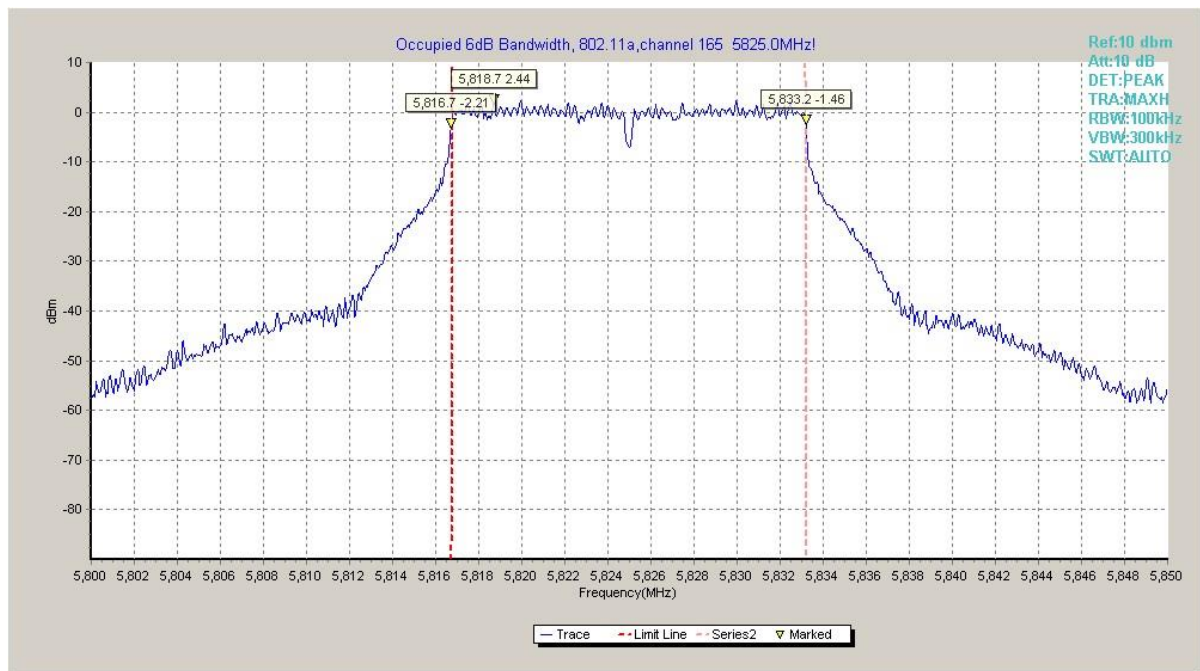


Fig. 3 Occupied 6dB Bandwidth (802.11a, Ch 165)

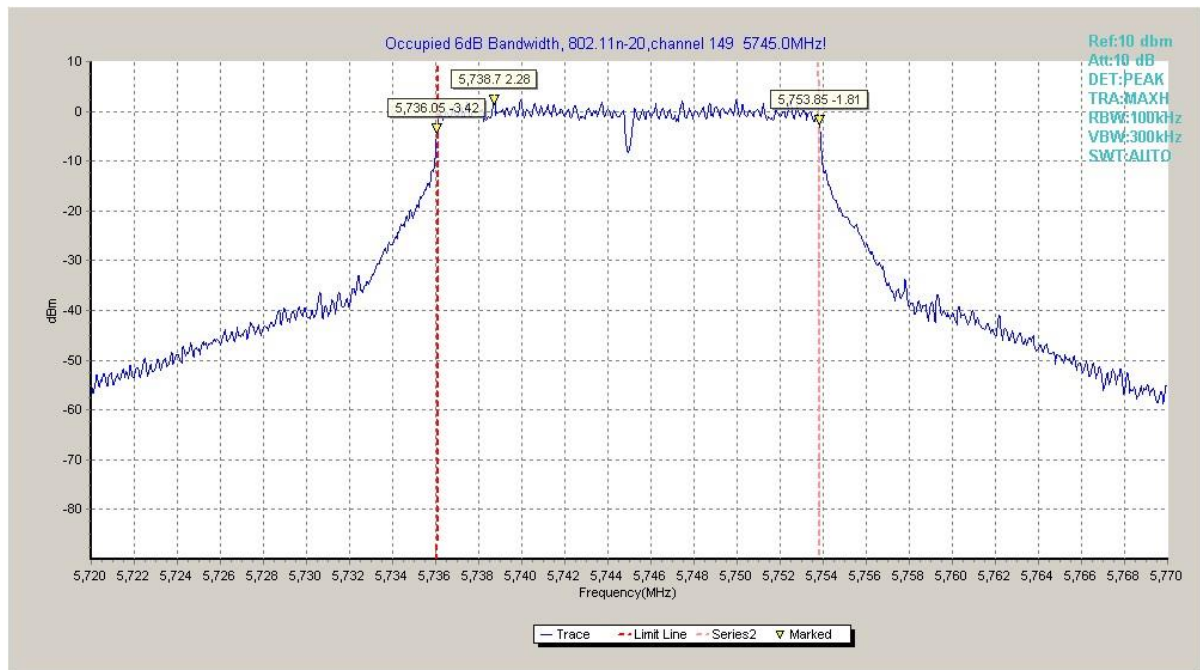


Fig. 4 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)

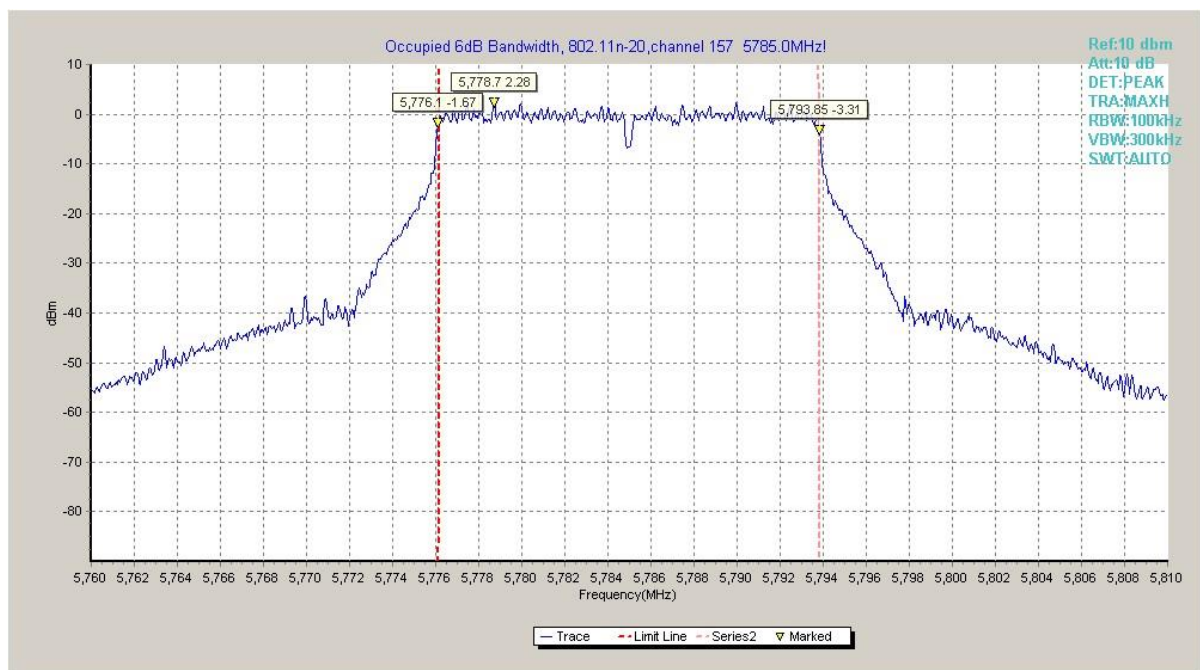


Fig. 5 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)

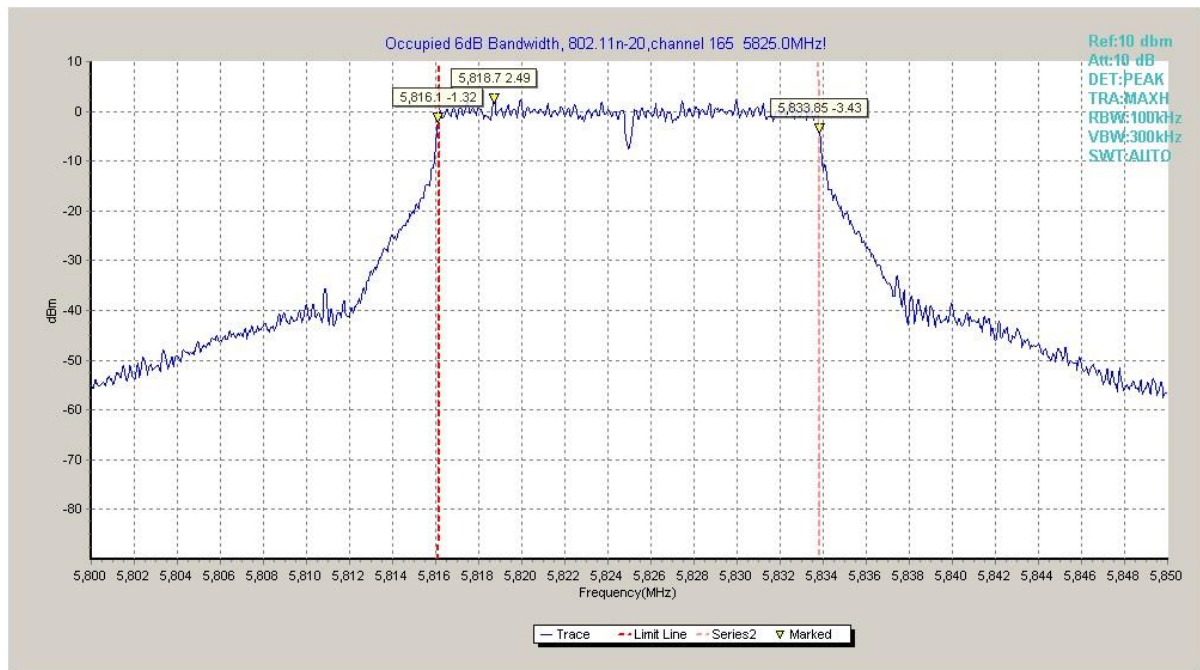


Fig. 6 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)

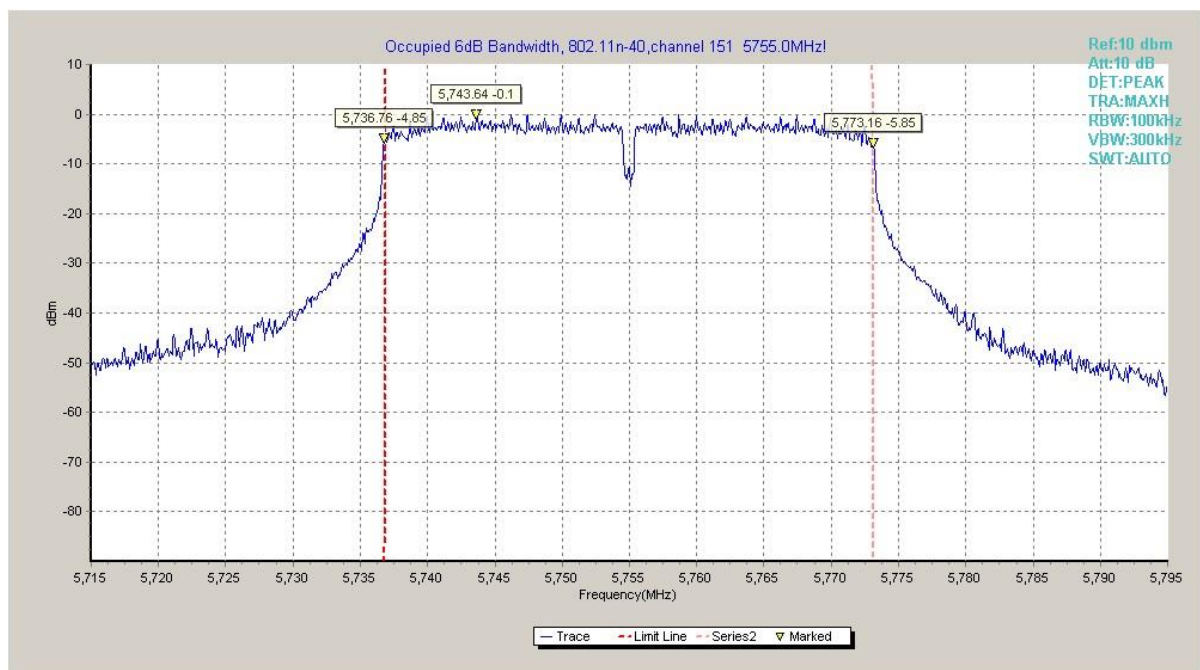


Fig. 7 Occupied 6dB Bandwidth (802.11n-HT40, Ch 151)

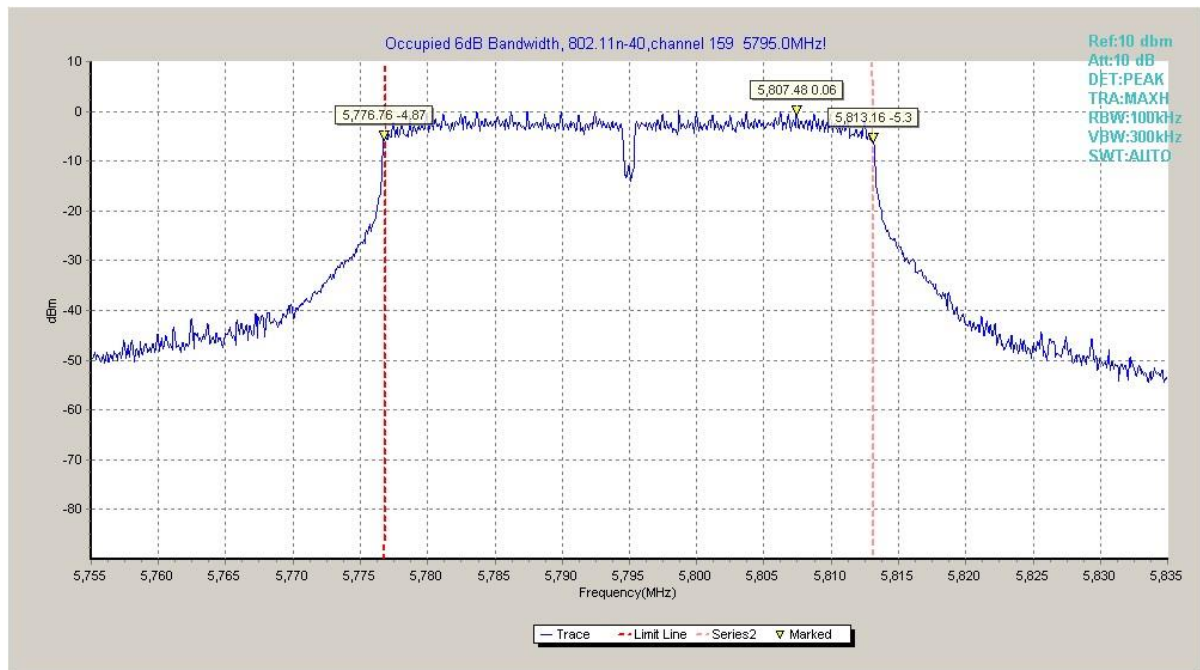


Fig. 8 Occupied 6dB Bandwidth (802.11n-HT40, Ch 159)

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:

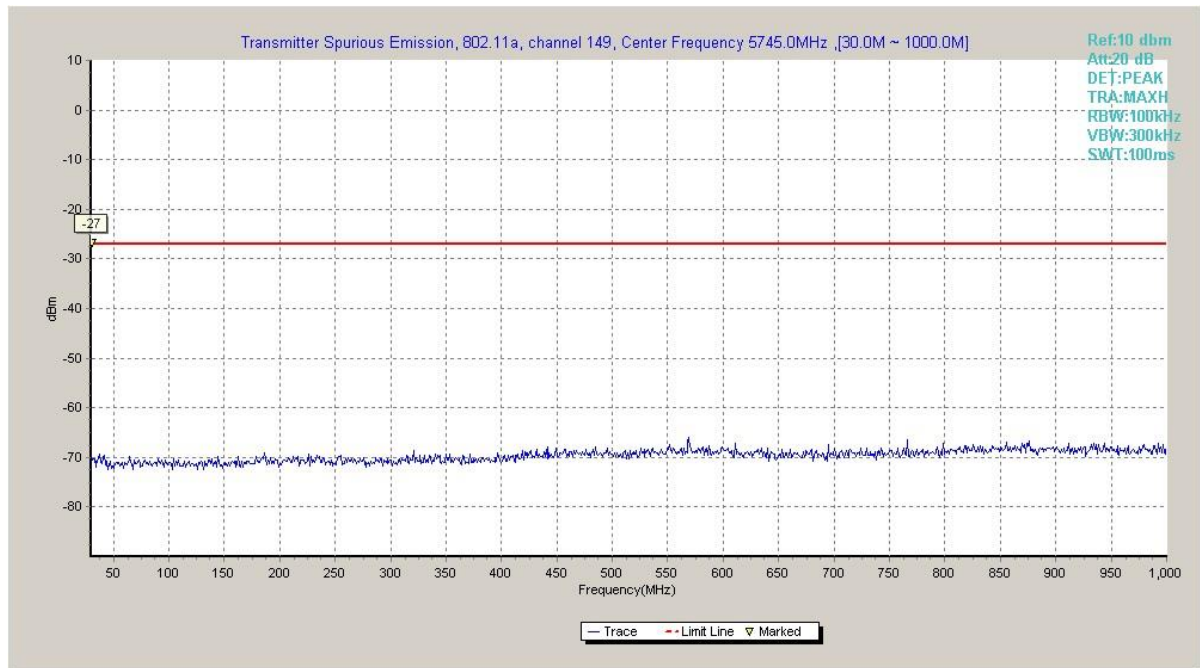


Fig. 9 Conducted Spurious Emission (802.11a, Ch149, 30 MHz-1 GHz)

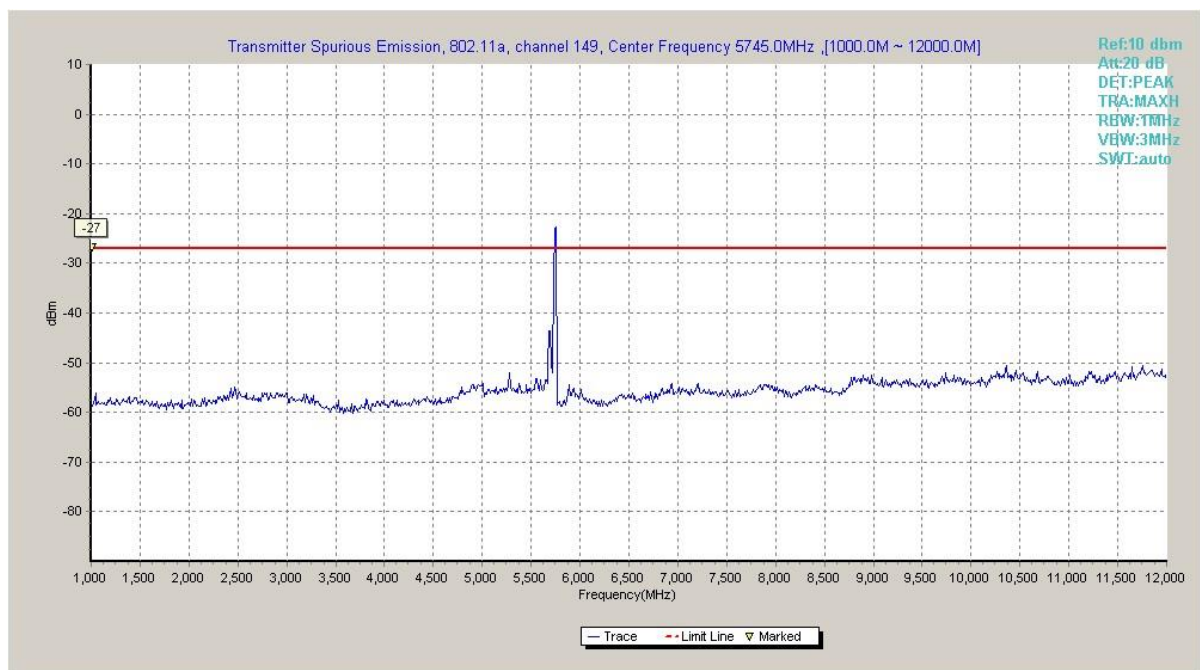


Fig. 10 Conducted Spurious Emission (802.11a, Ch149, 1 GHz -12 GHz)

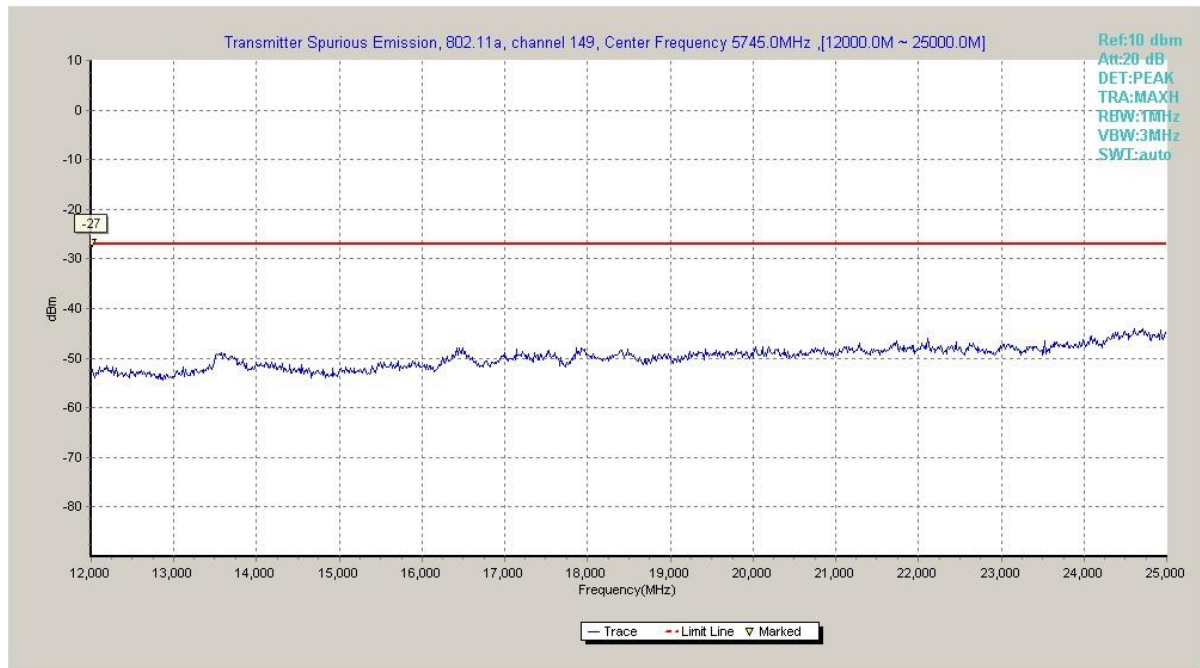


Fig. 11 Conducted Spurious Emission (802.11a, Ch149, 12 GHz-25 GHz)

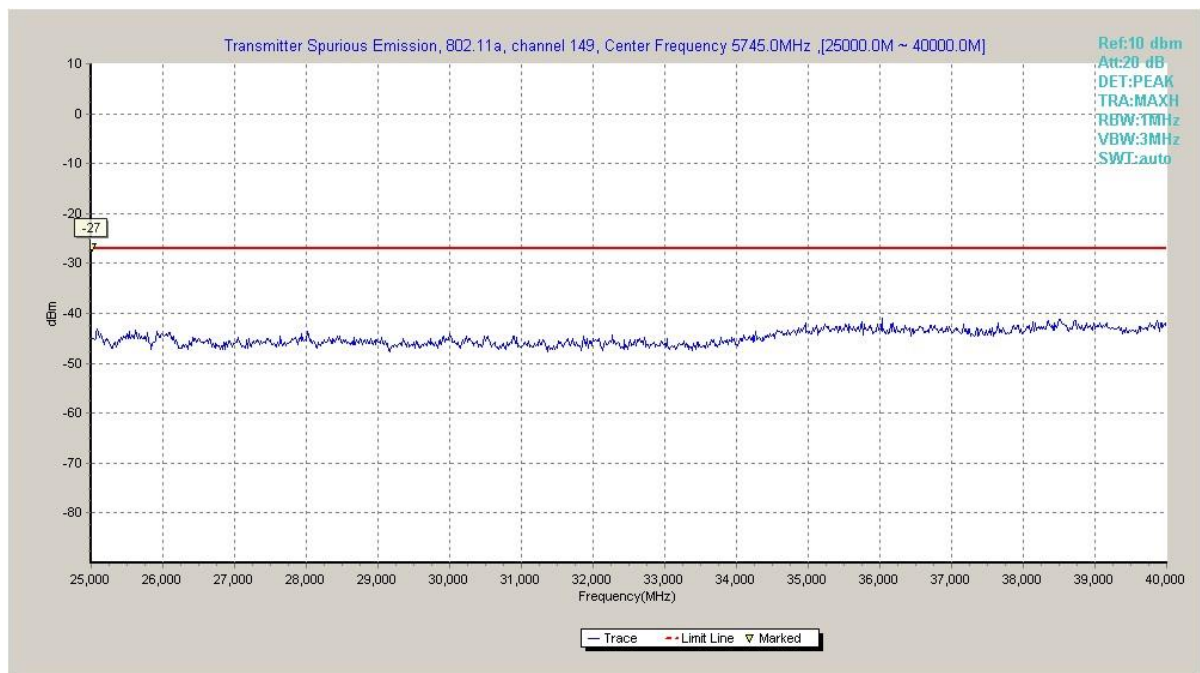


Fig. 12 Conducted Spurious Emission (802.11a, Ch149, 25 GHz-40 GHz)

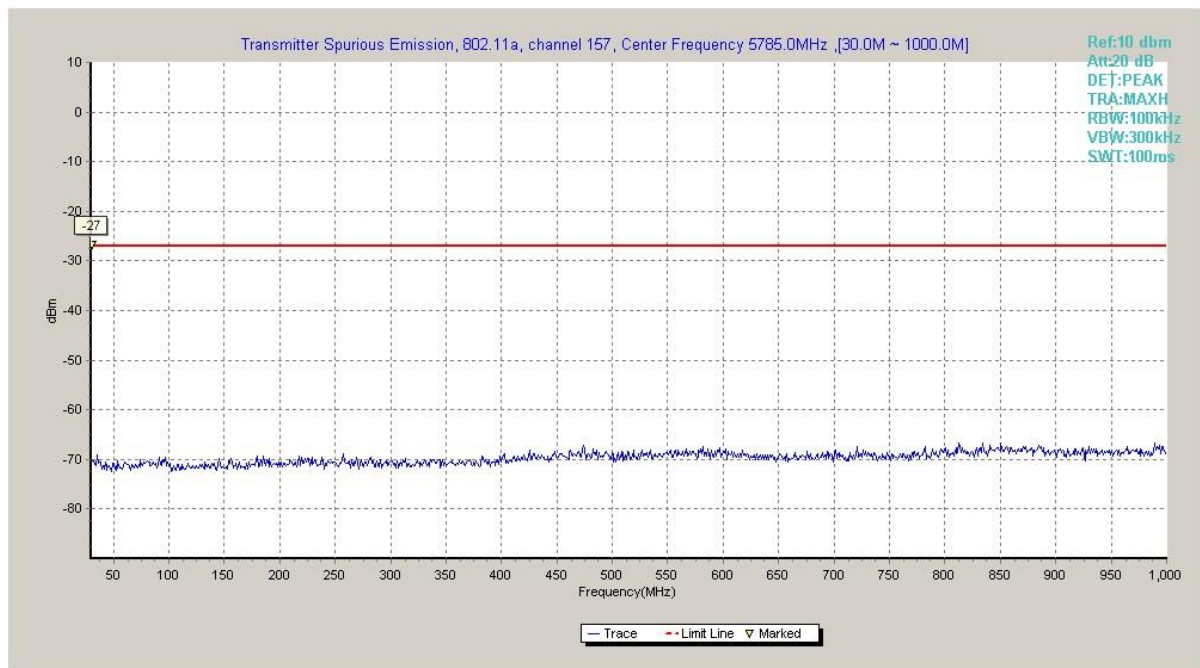


Fig. 13 Conducted Spurious Emission (802.11a, Ch157, 30 MHz-1 GHz)

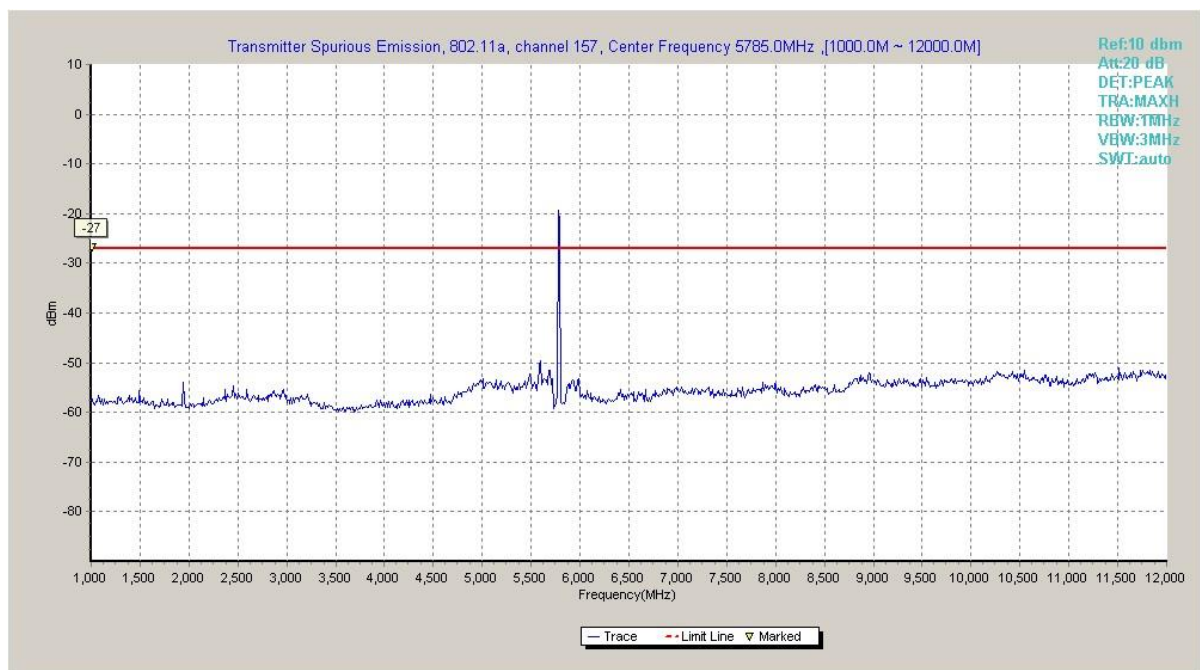


Fig. 14 Conducted Spurious Emission (802.11a, Ch157, 1 GHz -12 GHz)

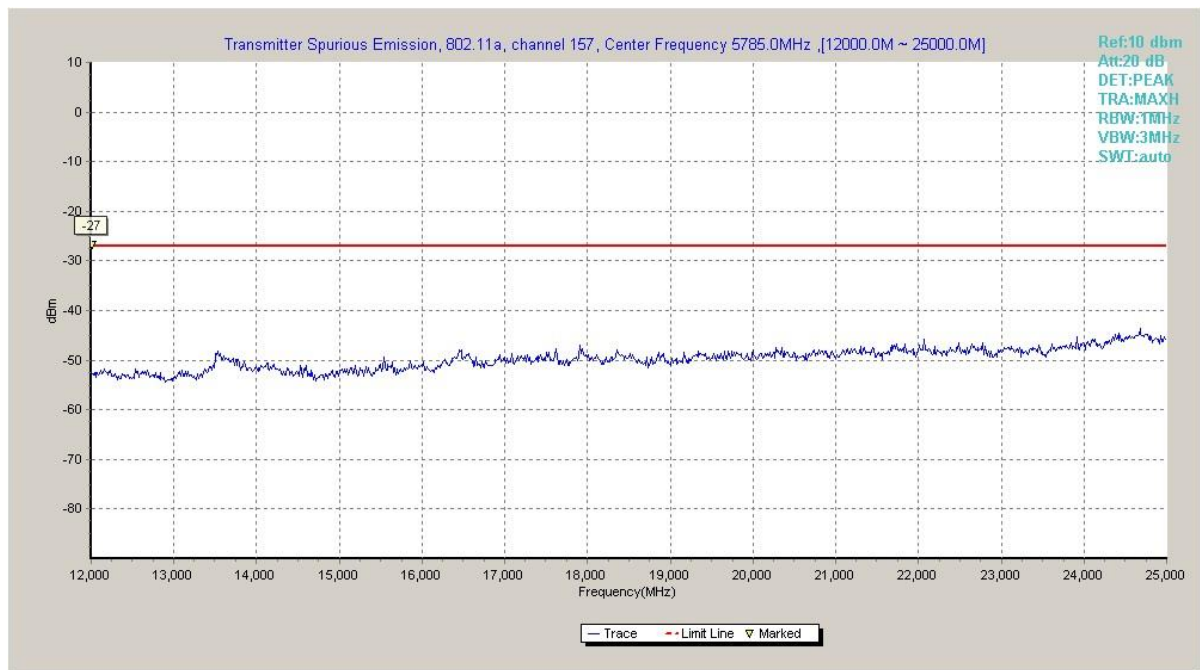


Fig. 15 Conducted Spurious Emission (802.11a, Ch157, 12 GHz-25 GHz)

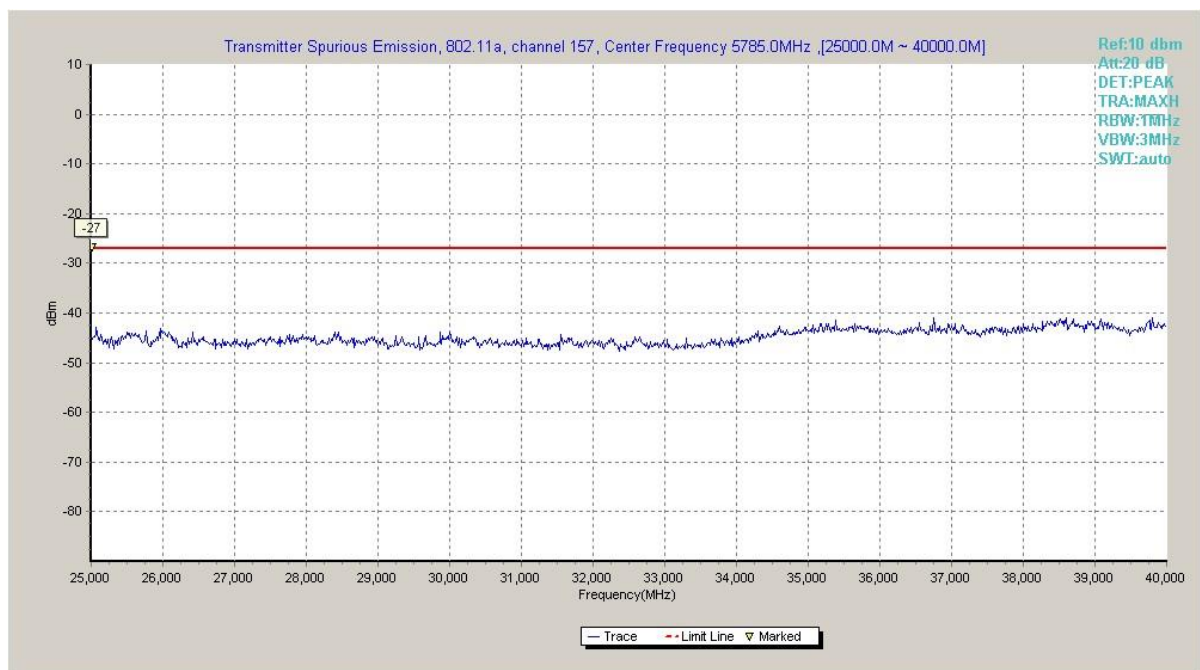


Fig. 16 Conducted Spurious Emission (802.11a, Ch157, 25 GHz-40 GHz)

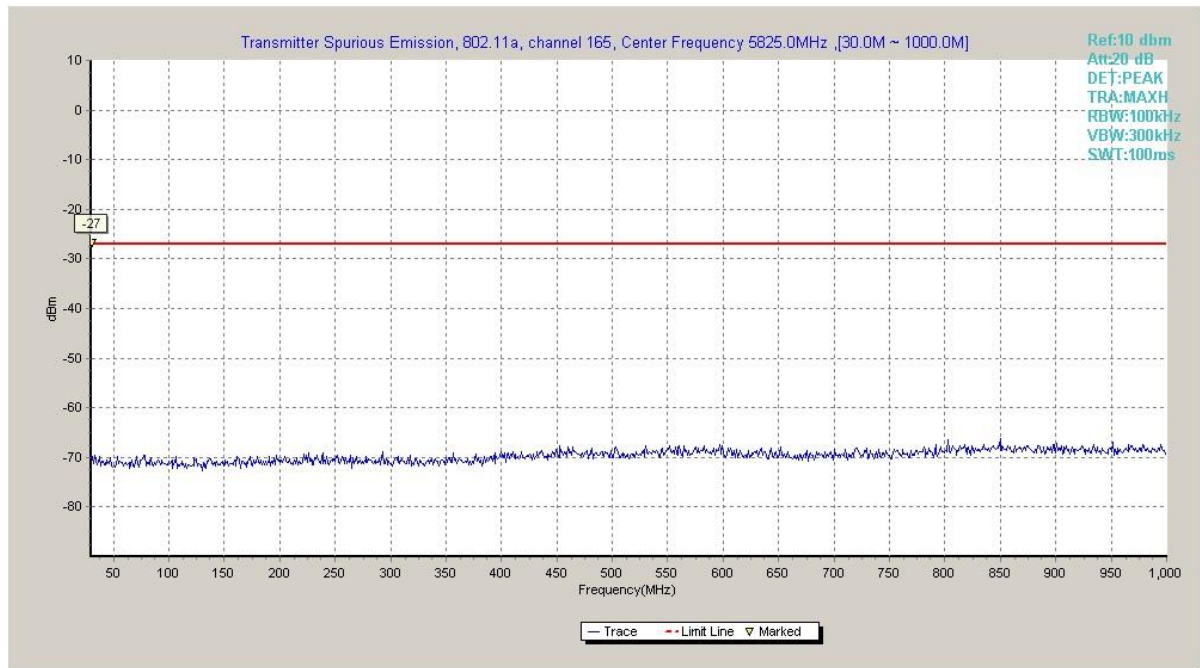


Fig. 17 Conducted Spurious Emission (802.11a, Ch165, 30 MHz-1 GHz)

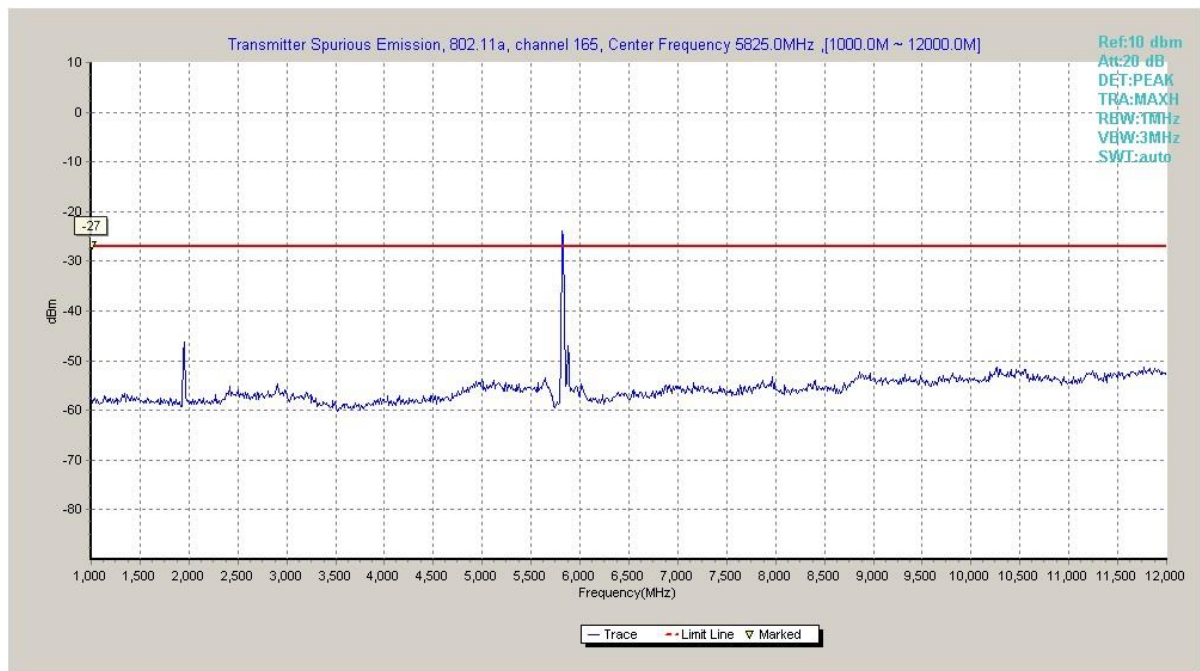


Fig. 18 Conducted Spurious Emission (802.11a, Ch165, 1 GHz -12 GHz)

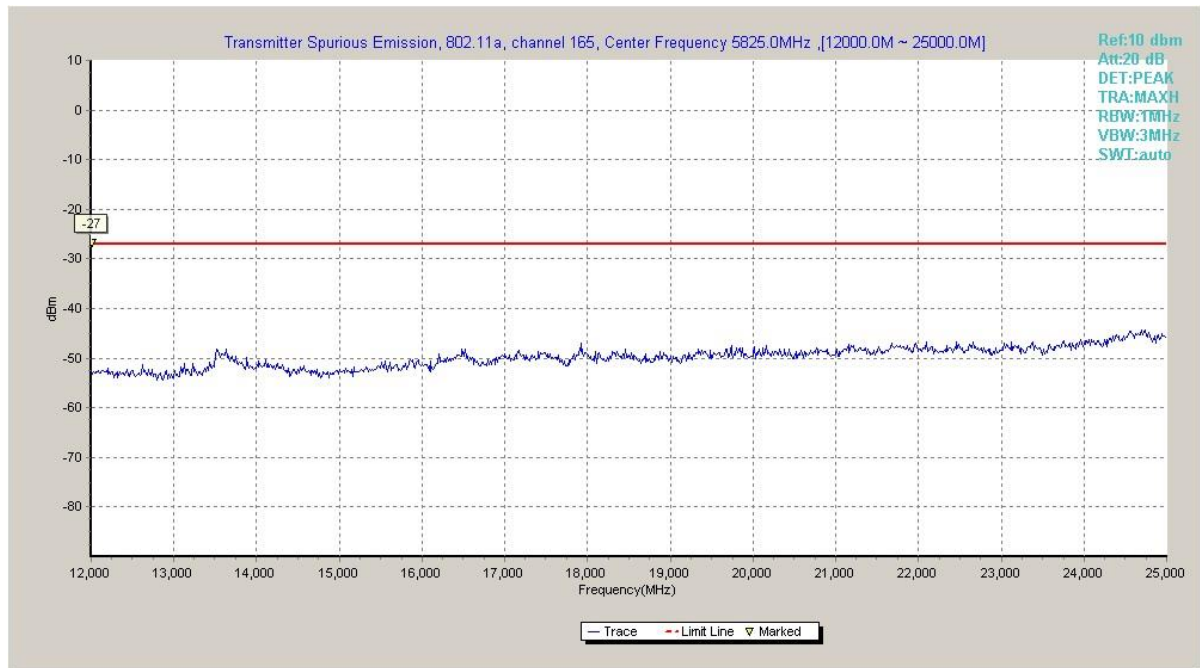


Fig. 19 Conducted Spurious Emission (802.11a, Ch165, 12 GHz-25 GHz)

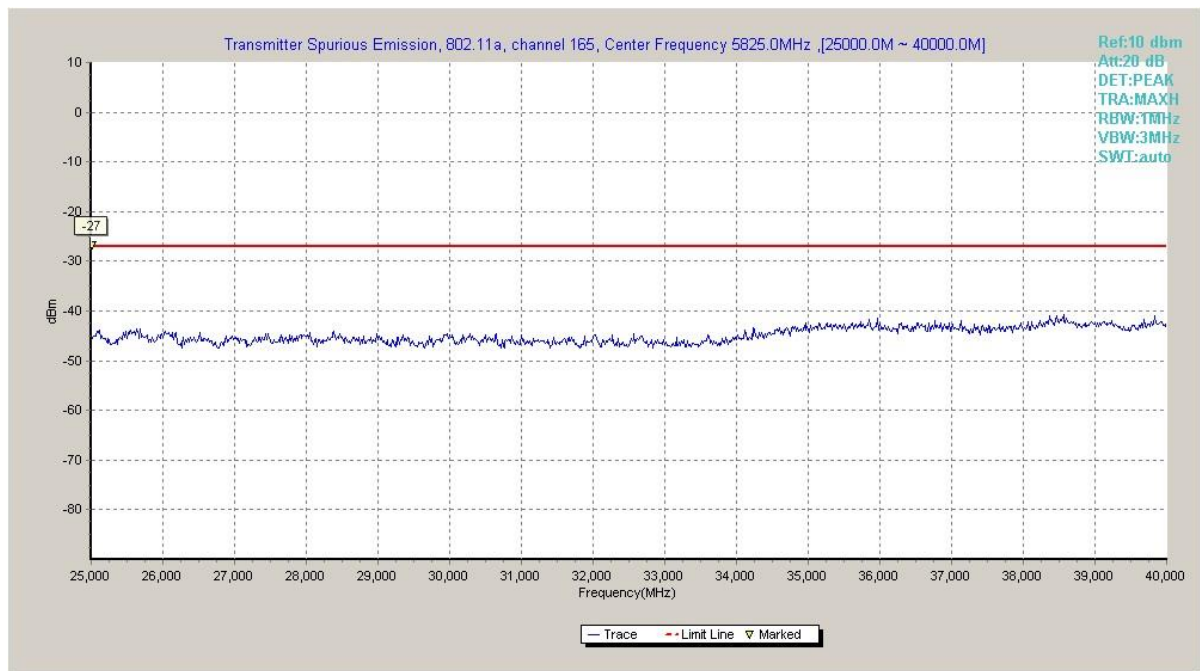


Fig. 20 Conducted Spurious Emission (802.11a, Ch165, 25 GHz-40 GHz)

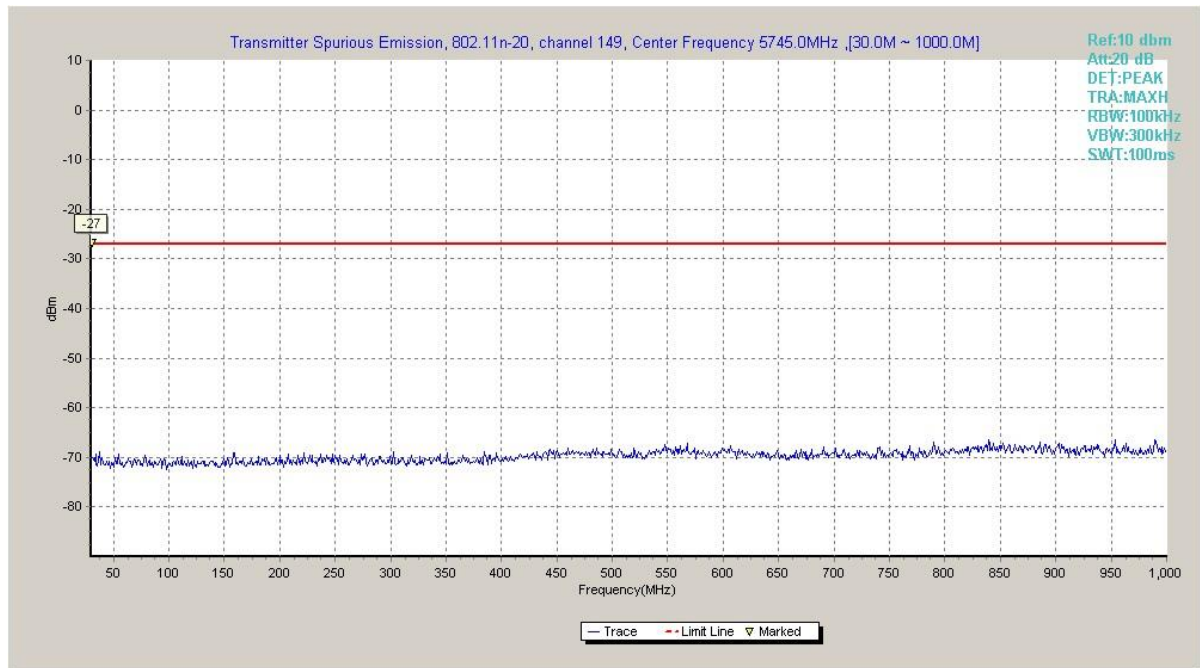


Fig. 21 Conducted Spurious Emission (802.11n-HT20, Ch149, 30 MHz-1 GHz)

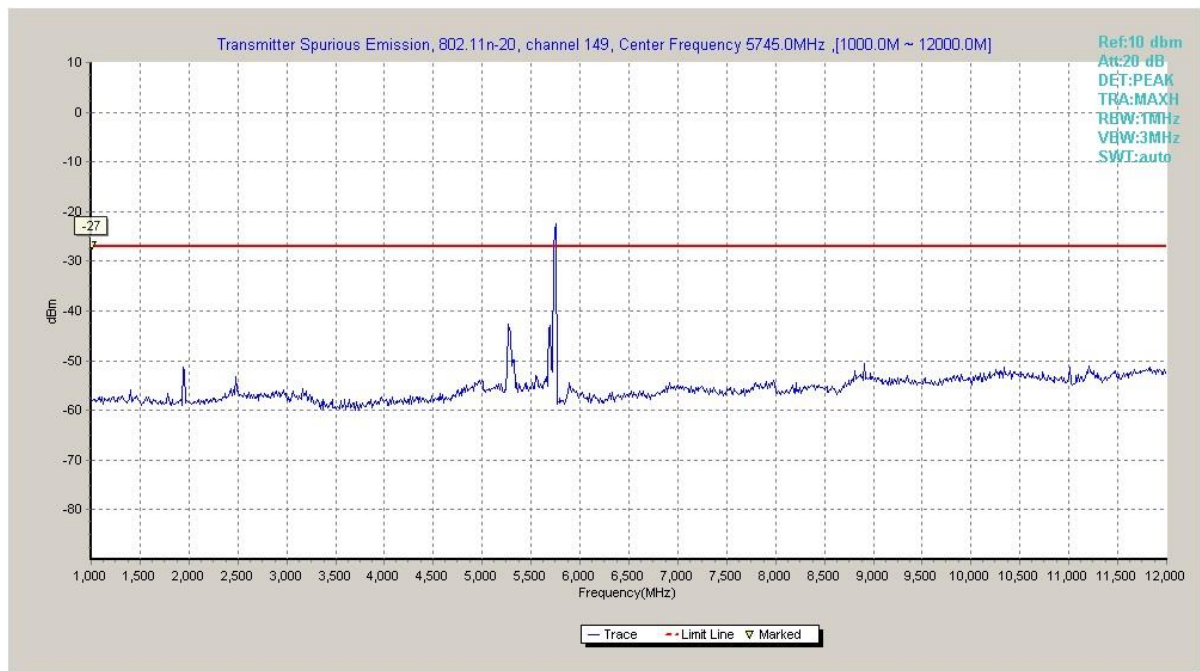


Fig. 22 Conducted Spurious Emission (802.11n-HT20, Ch149, 1 GHz -12 GHz)

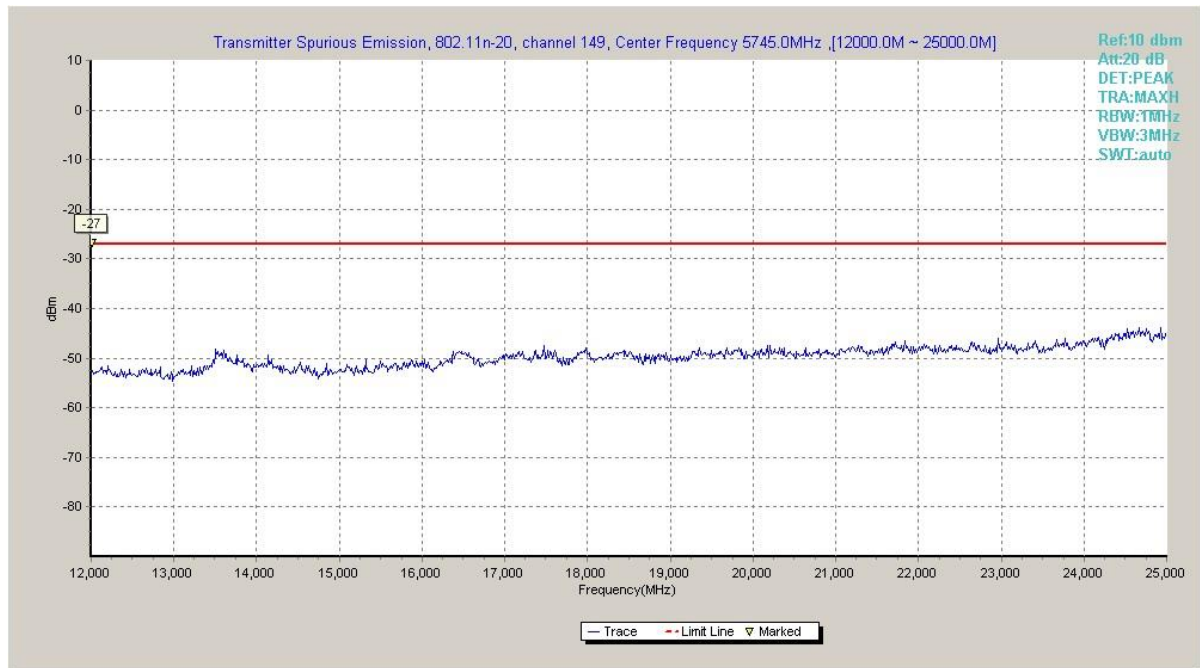


Fig. 23 Conducted Spurious Emission (802.11n-HT20, Ch149, 12 GHz-25 GHz)

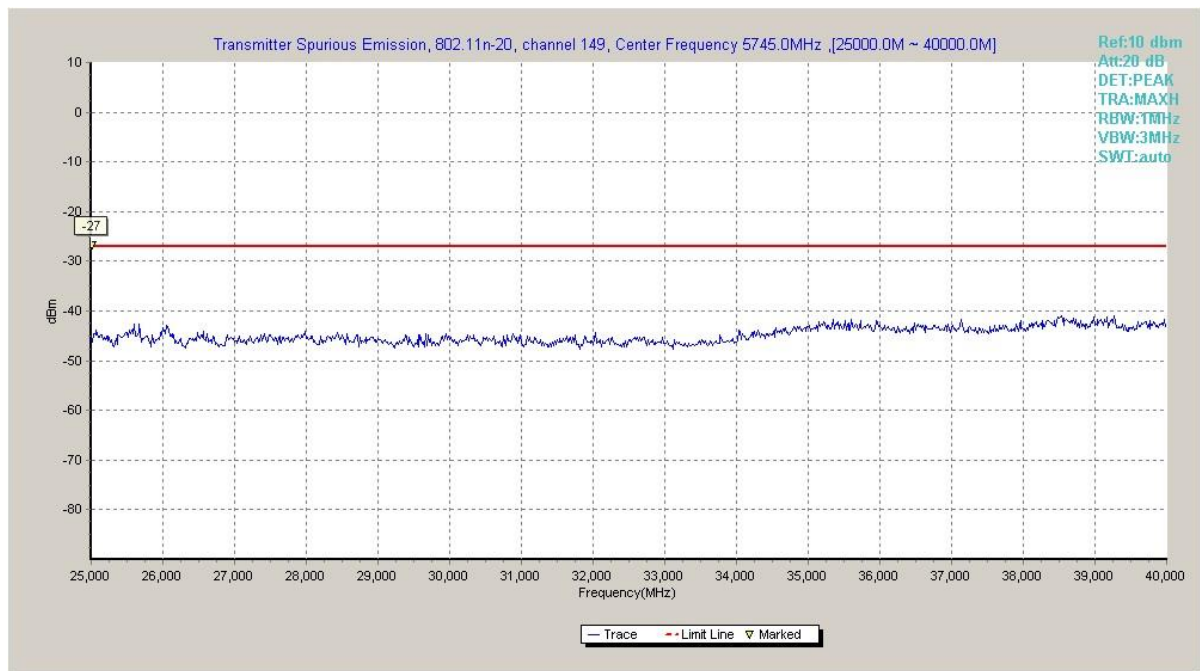


Fig. 24 Conducted Spurious Emission (802.11n-HT20, Ch149, 25 GHz-40 GHz)

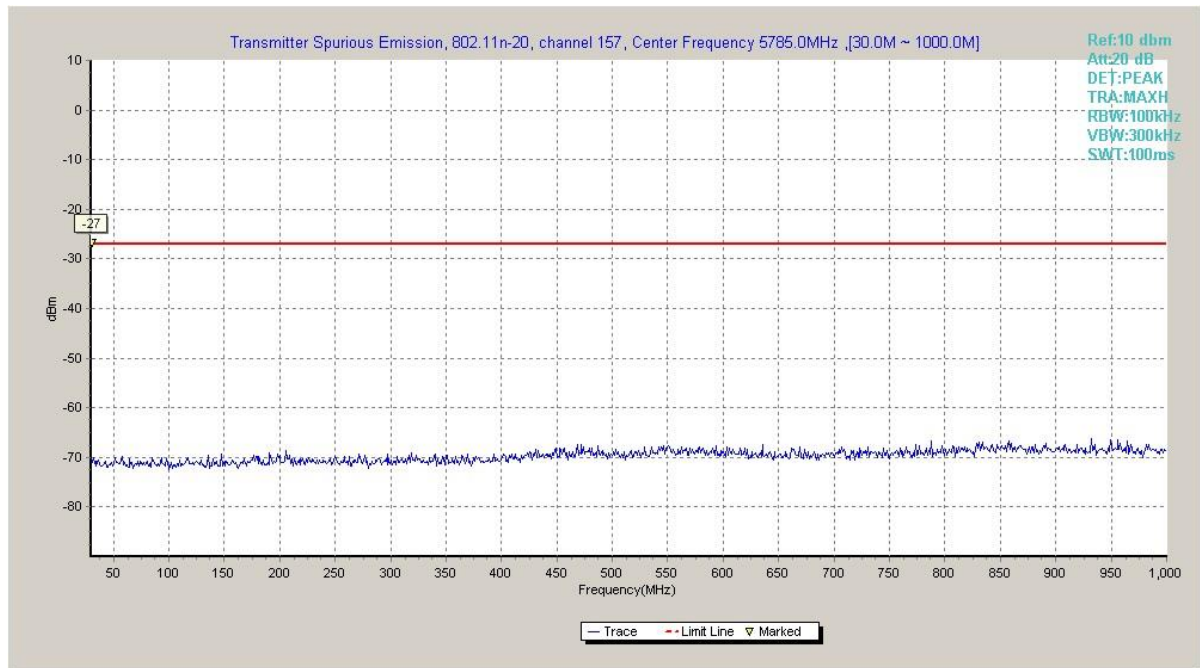


Fig. 25 Conducted Spurious Emission (802.11n-HT20, Ch157, 30 MHz-1 GHz)

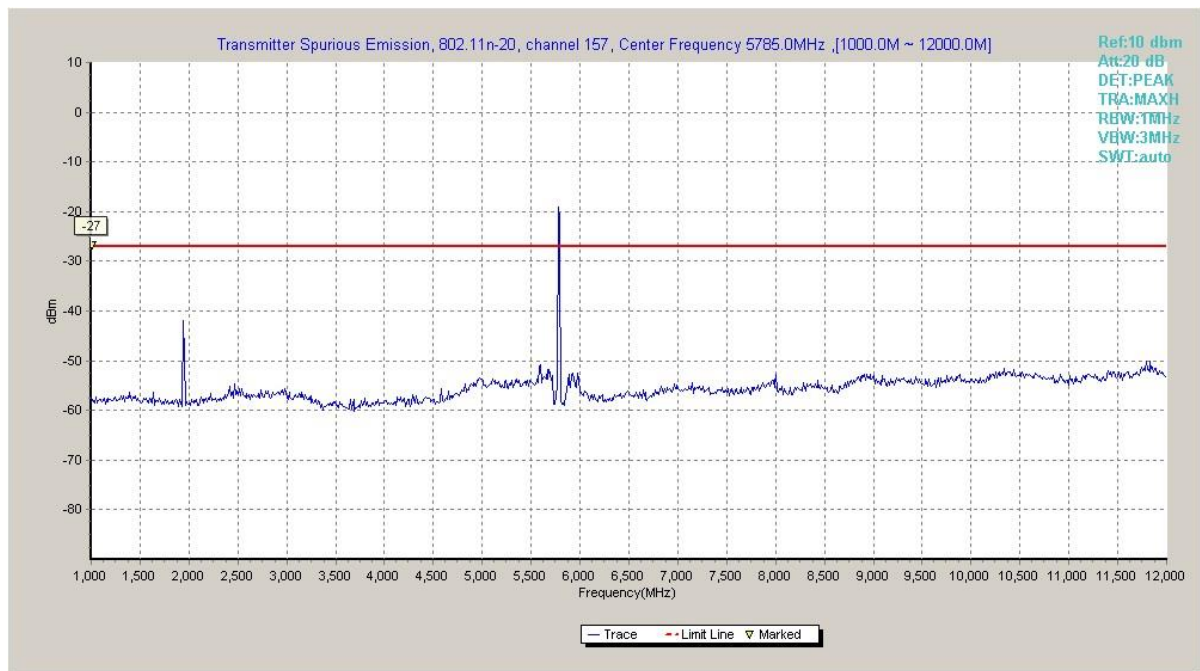


Fig. 26 Conducted Spurious Emission (802.11n-HT20, Ch157, 1 GHz -12 GHz)

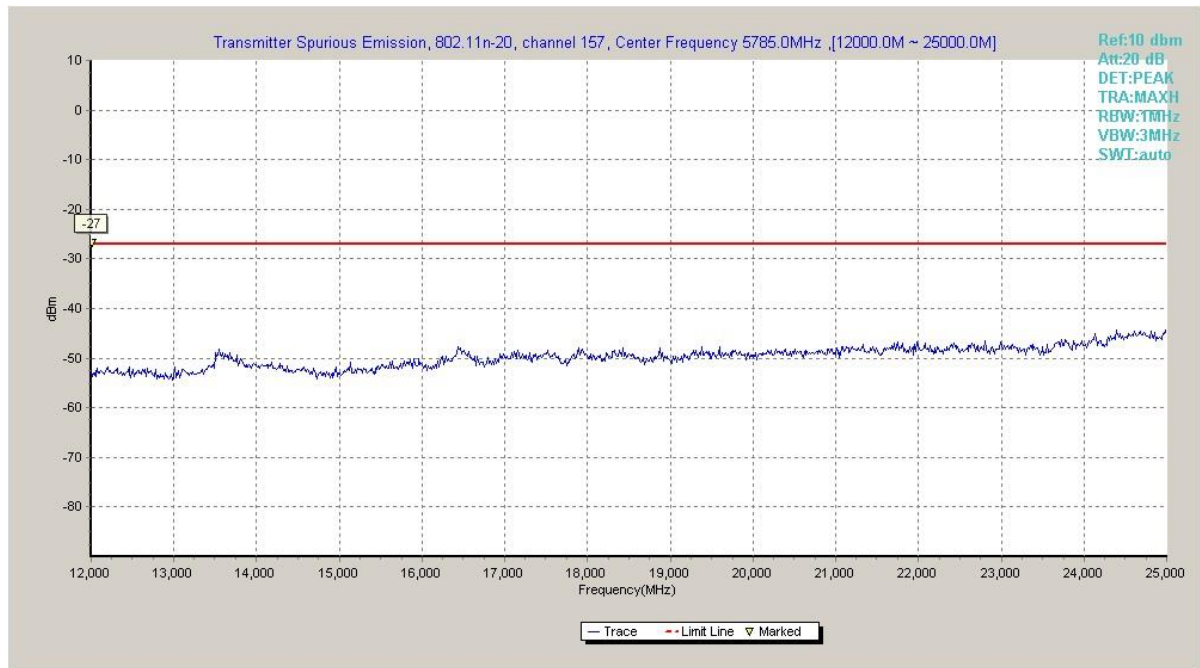


Fig. 27 Conducted Spurious Emission (802.11n-HT20, Ch157, 12 GHz-25 GHz)

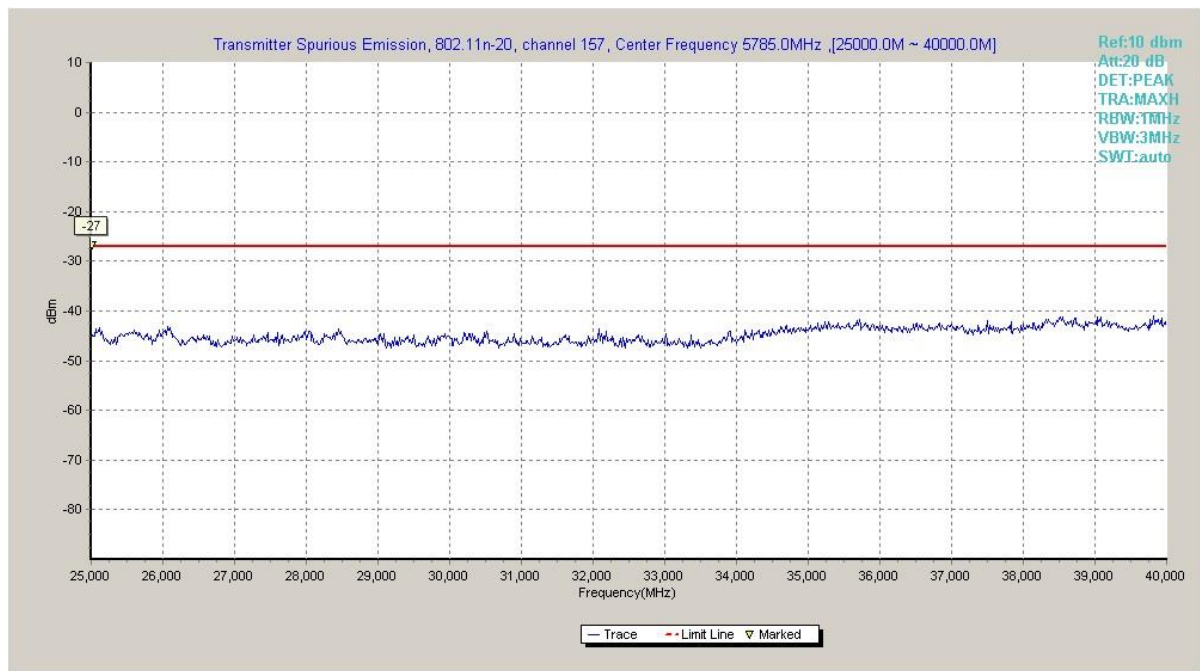


Fig. 28 Conducted Spurious Emission (802.11n-HT20, Ch157, 25 GHz-40 GHz)

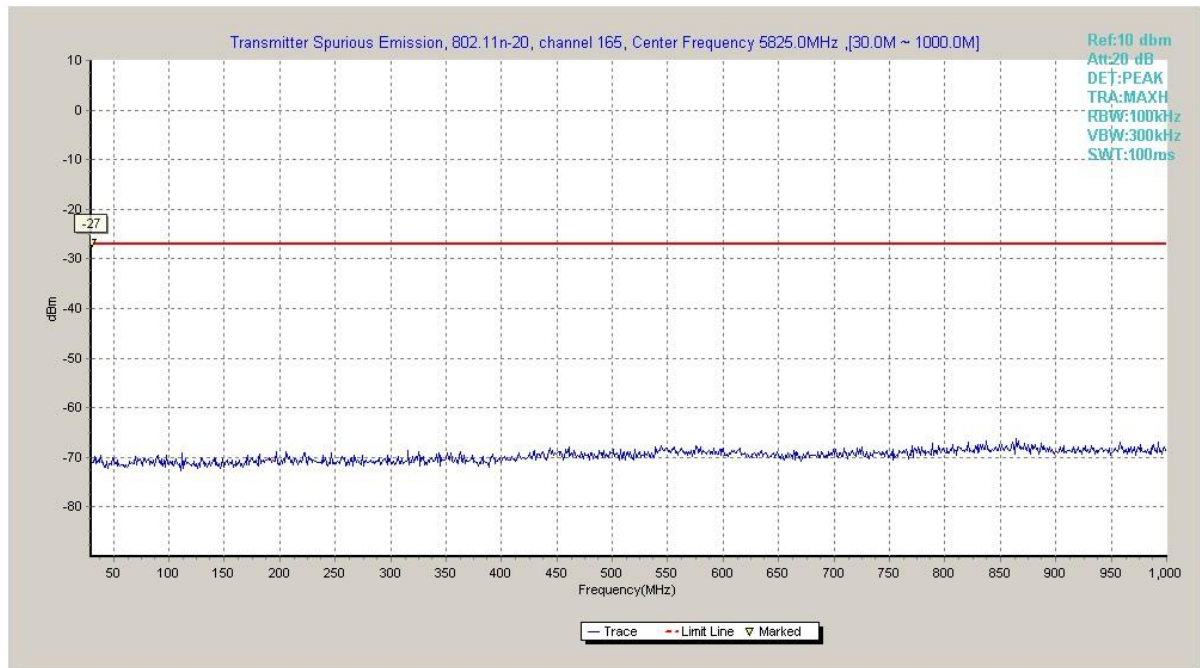


Fig. 29 Conducted Spurious Emission (802.11n-HT20, Ch165, 30 MHz-1 GHz)

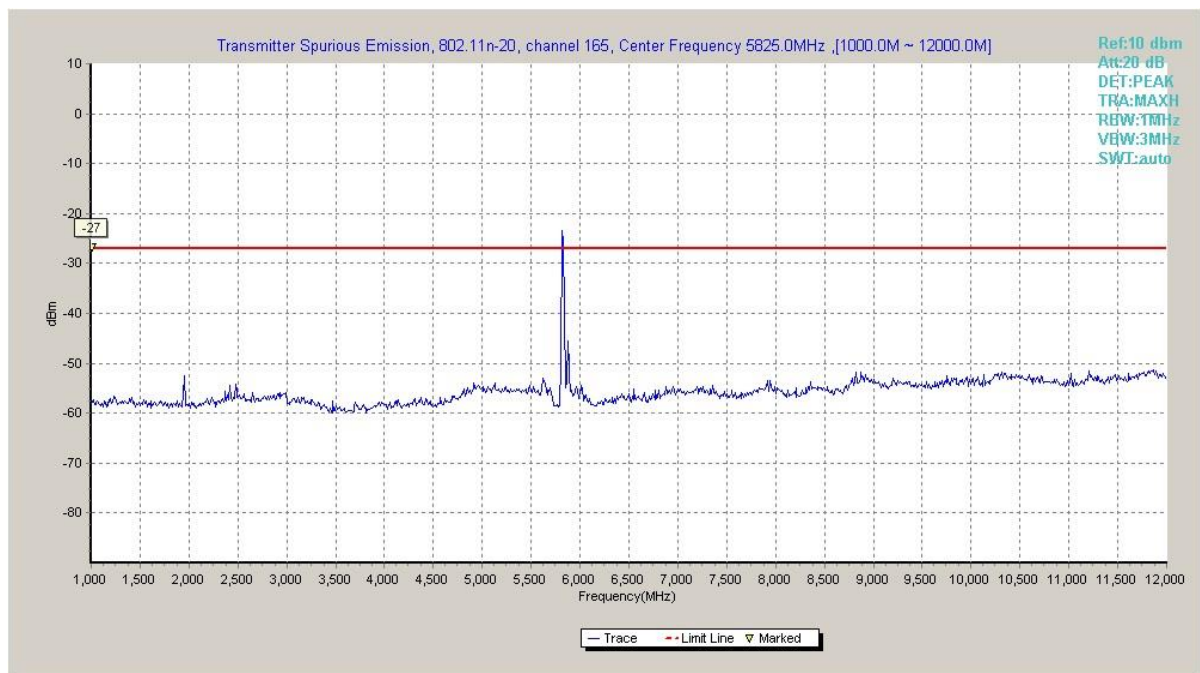


Fig. 30 Conducted Spurious Emission (802.11n-HT20, Ch165, 1 GHz -12 GHz)

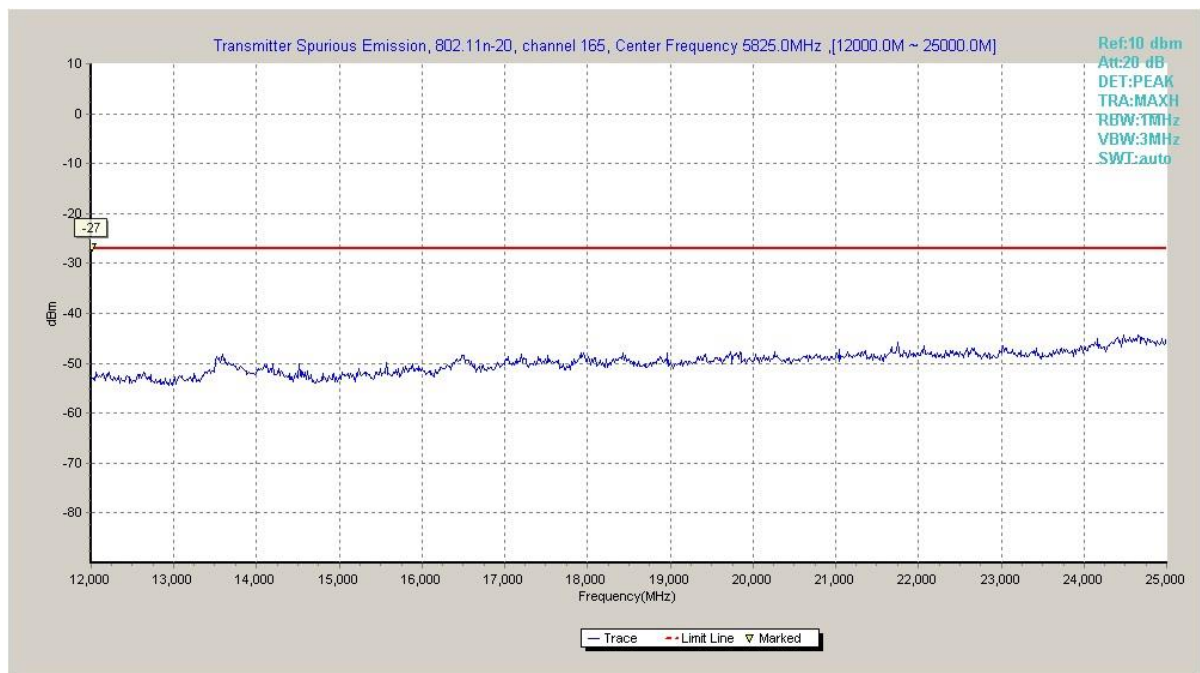


Fig. 31 Conducted Spurious Emission (802.11n-HT20, Ch165, 12 GHz-25 GHz)

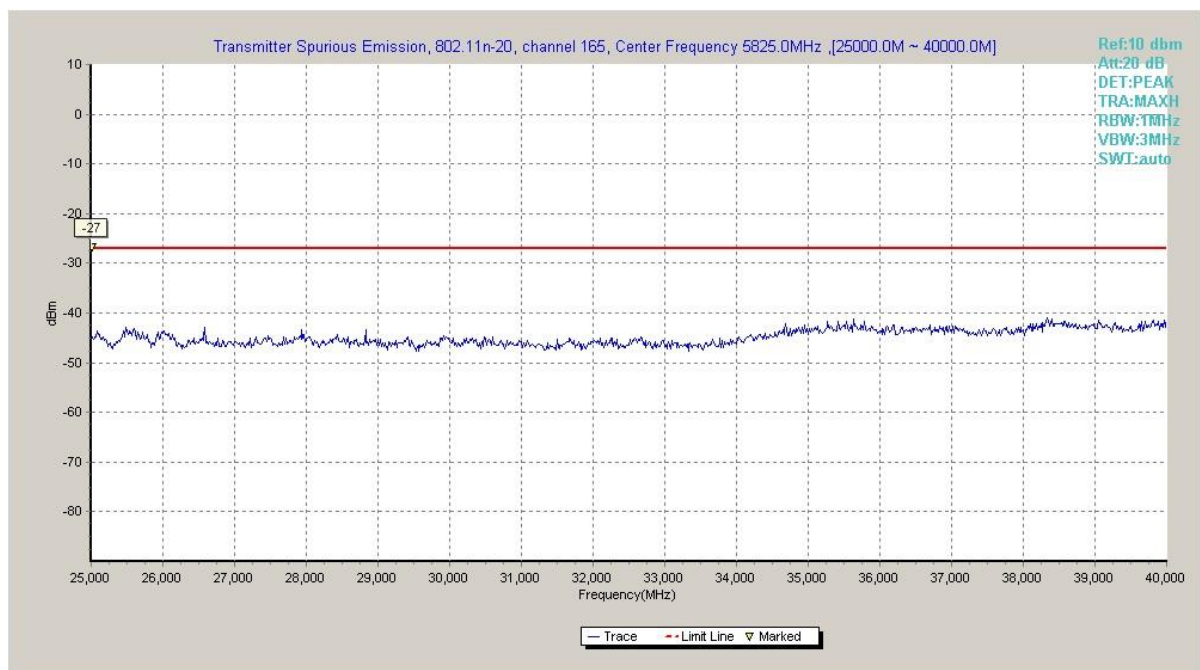


Fig. 32 Conducted Spurious Emission (802.11n-HT20, Ch165, 25 GHz-40 GHz)

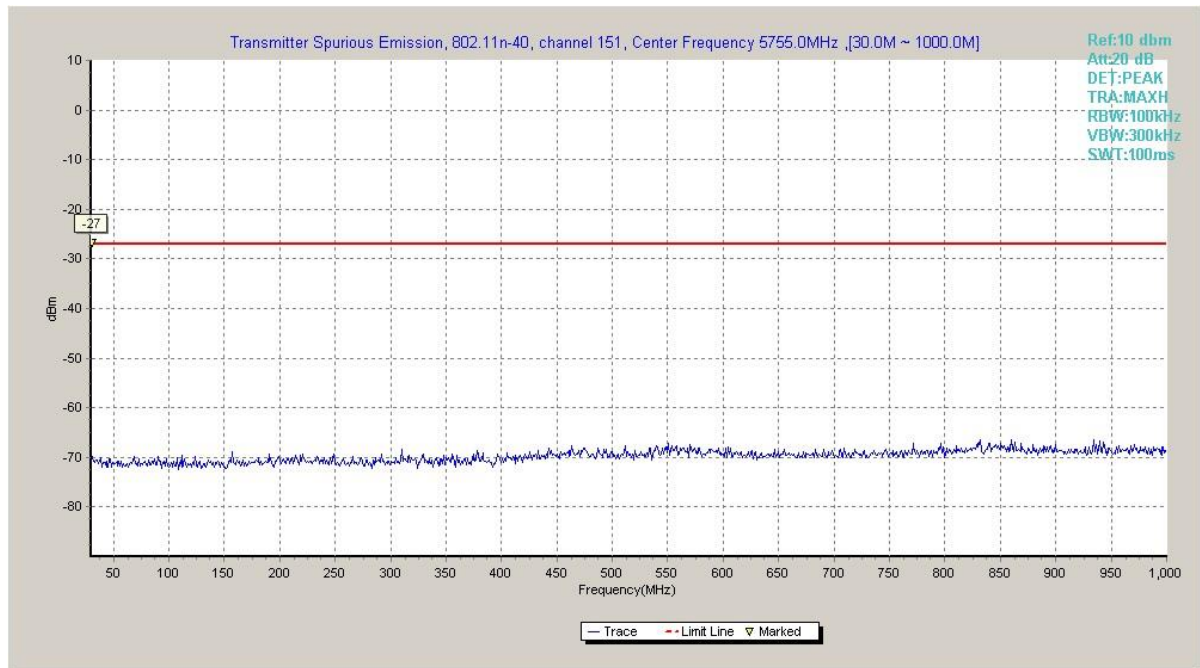


Fig. 33 Conducted Spurious Emission (802.11n-HT40, Ch151, 30 MHz-1 GHz)

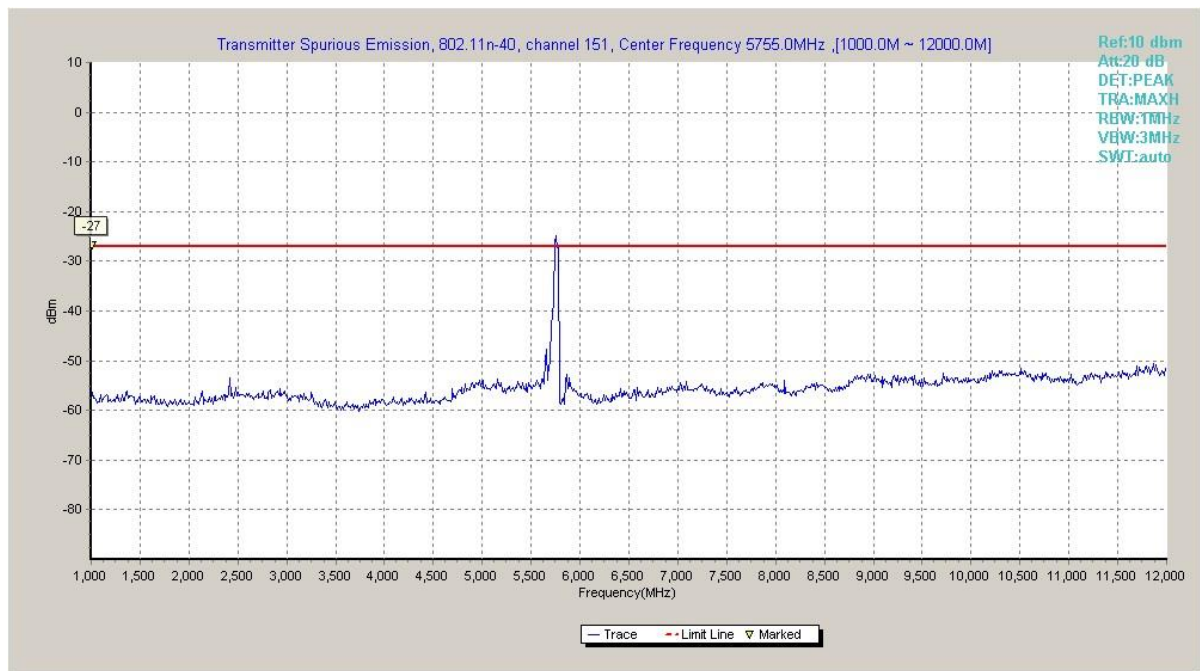


Fig. 34 Conducted Spurious Emission (802.11n-HT40, Ch151, 1 GHz -12 GHz)

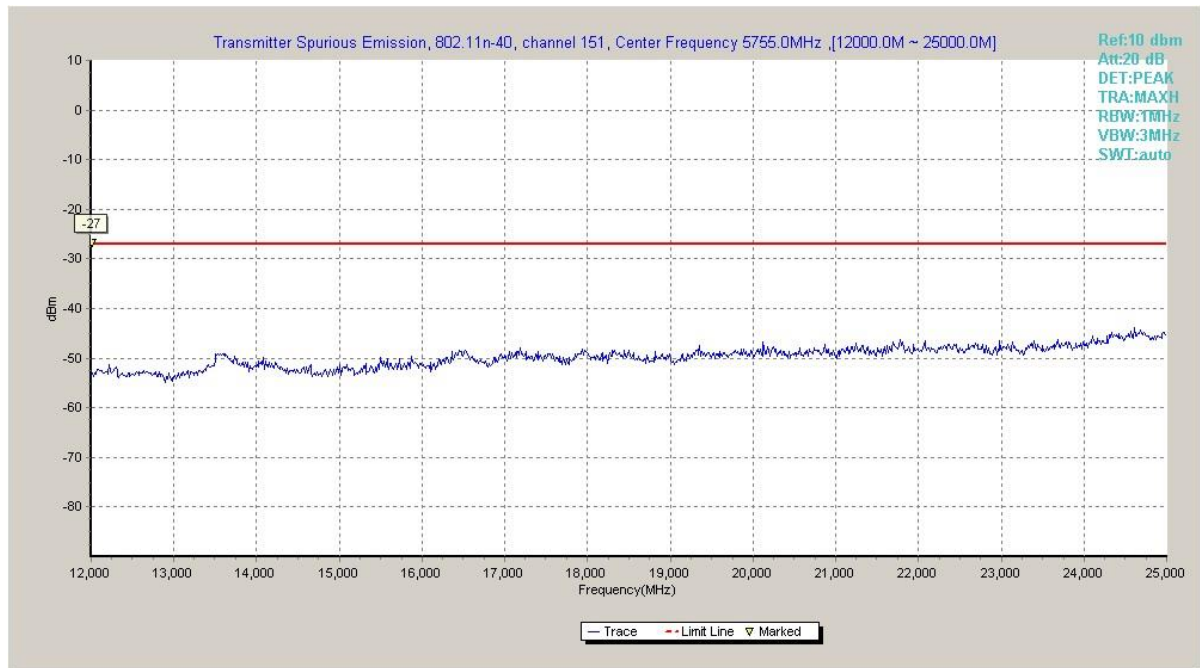


Fig. 35 Conducted Spurious Emission (802.11n-HT40, Ch151, 12 GHz-25 GHz)

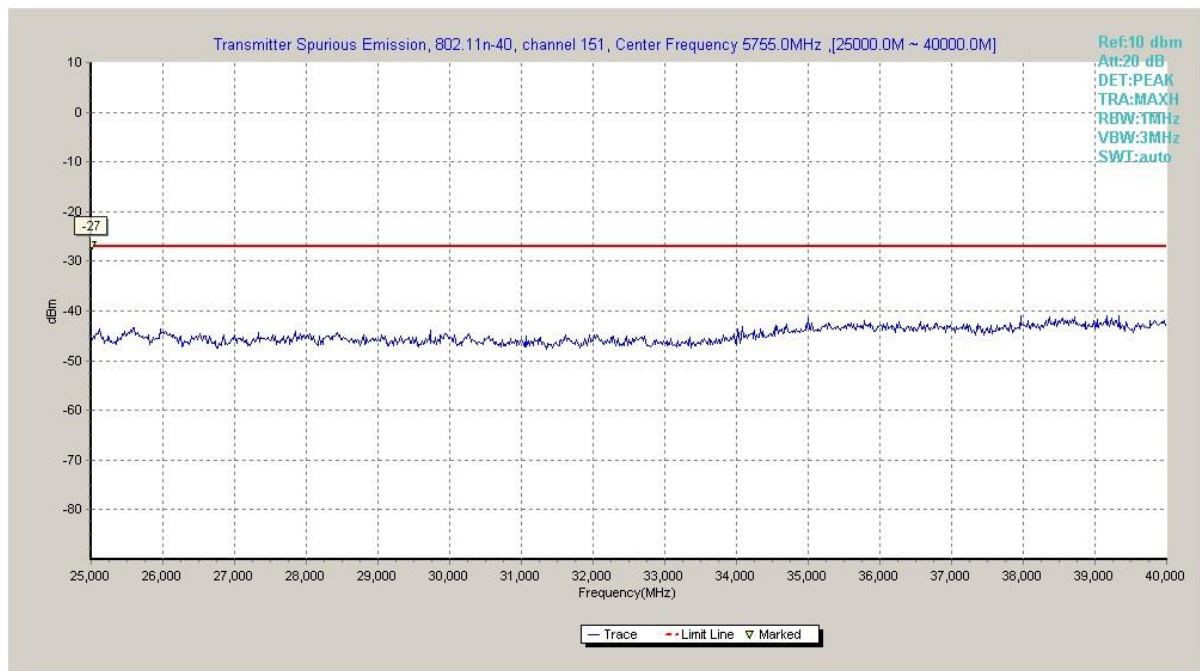


Fig. 36 Conducted Spurious Emission (802.11n-HT40, Ch151, 25 GHz-40 GHz)

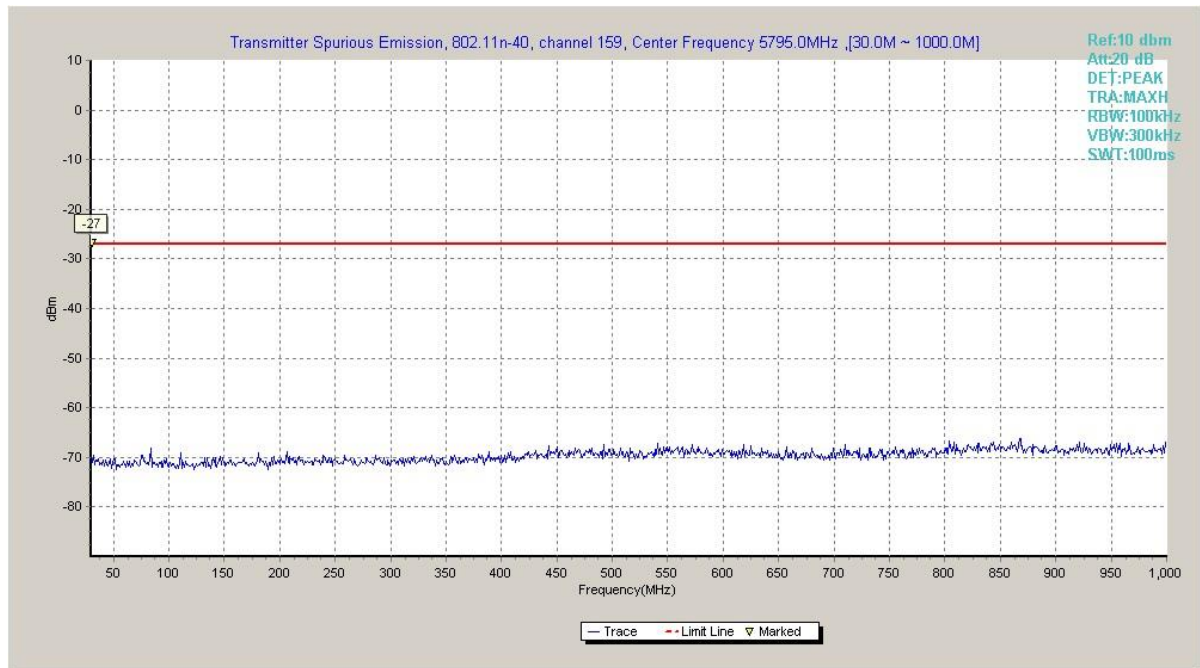


Fig. 37 Conducted Spurious Emission (802.11n-HT40, Ch159, 30 MHz-1 GHz)

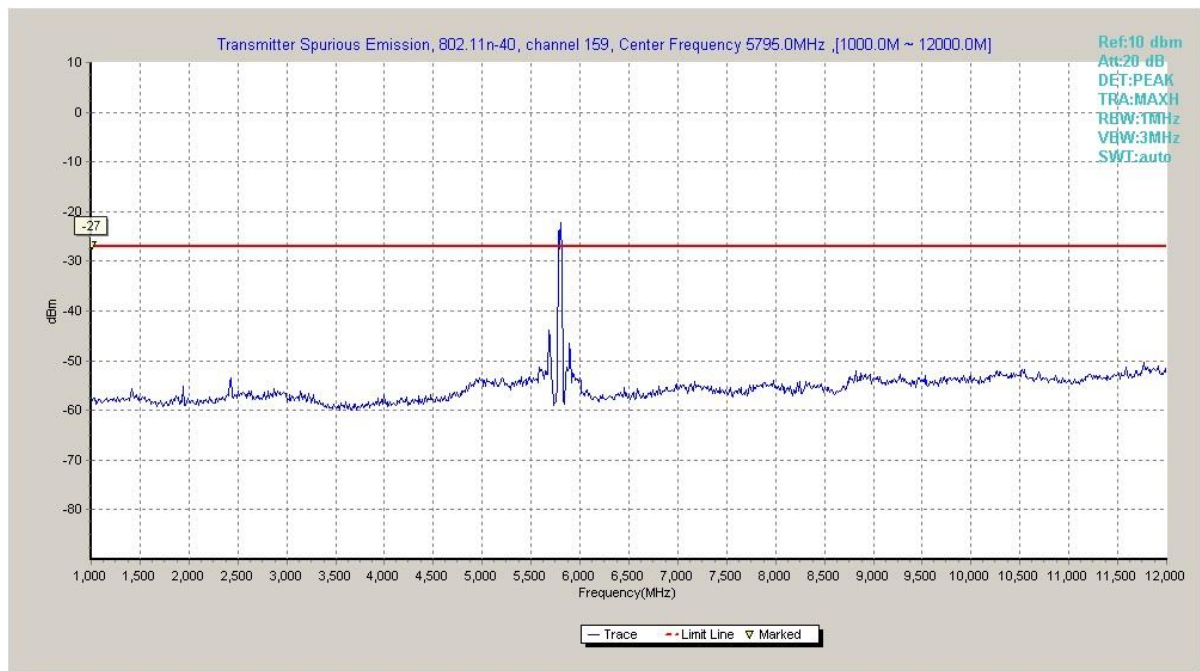


Fig. 38 Conducted Spurious Emission (802.11n-HT40, Ch159, 1 GHz -12 GHz)

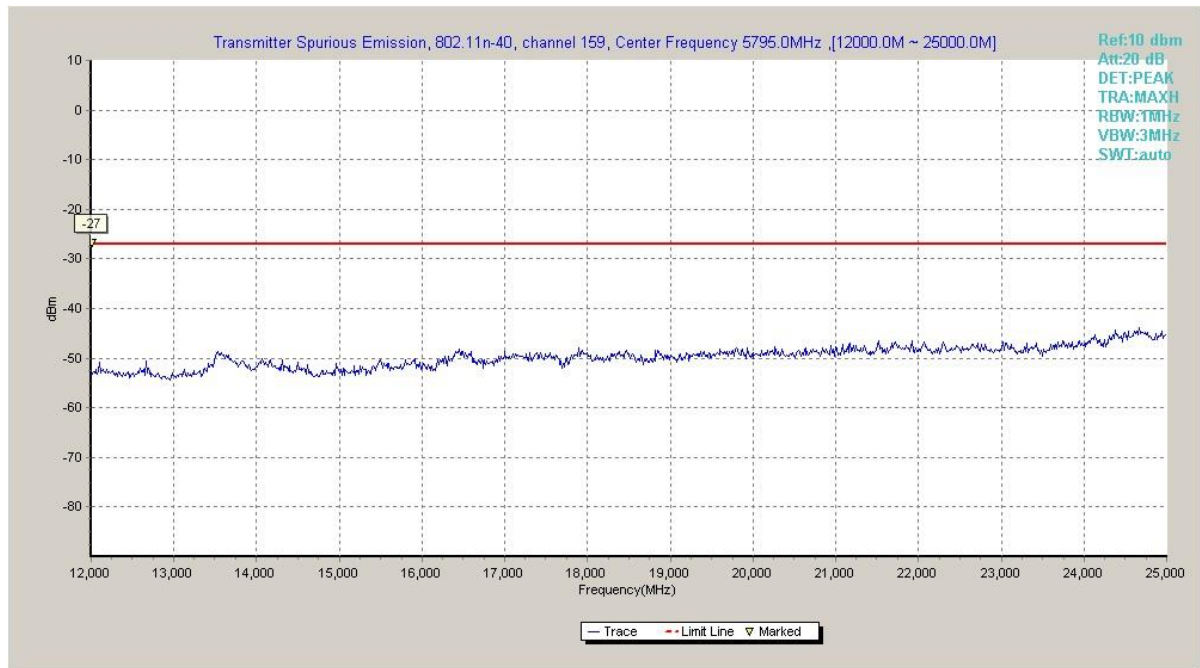


Fig. 39 Conducted Spurious Emission (802.11n-HT40, Ch159, 12 GHz-25 GHz)

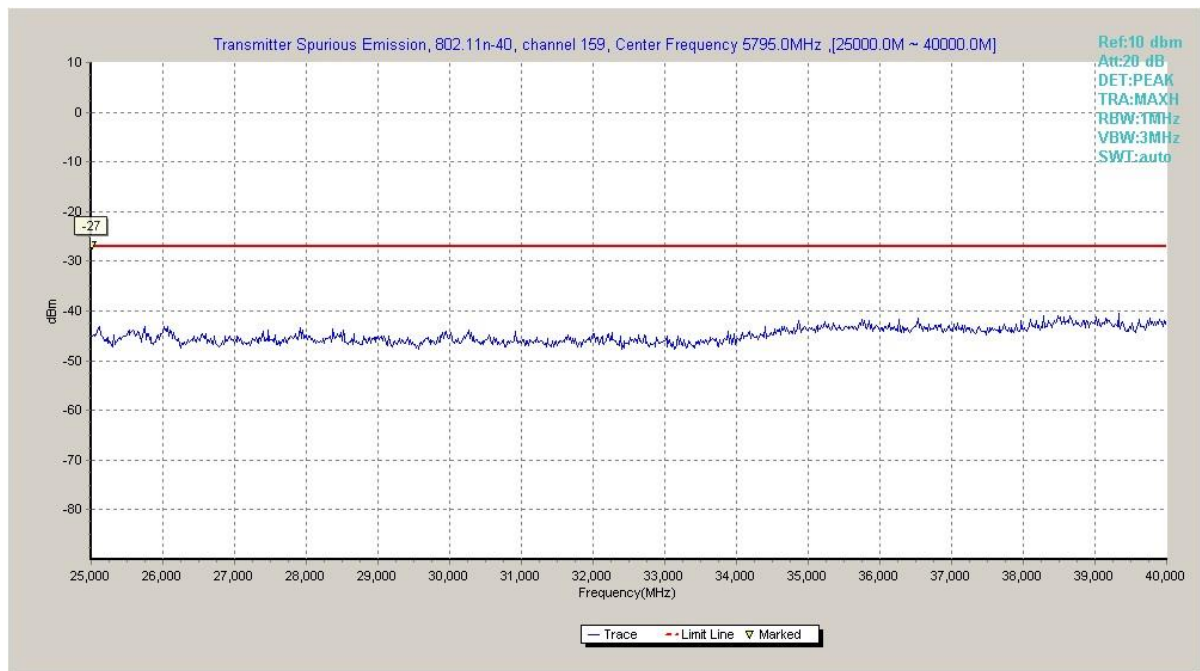


Fig. 40 Conducted Spurious Emission (802.11n-HT40, Ch159, 25 GHz-40 GHz)

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 cable loss(the gain of the preamplifier), the gain of receive antenna.

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

The measurement results are obtained as described below:

Result= $P_{Mea}+A_{Rpl}= P_{Mea}+Cable Loss+Antenna Factor$

Average Results:

802.11a

Ch149

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17981.3	35.6	-25.5	43.4	17.7	V
17833.9	35.4	-25.5	43.4	17.5	V
17912.0	35.4	-25.5	43.4	17.5	V
17935.1	35.4	-25.5	43.4	17.5	V
17936.2	35.4	-25.5	43.4	17.5	V
5725.0	57.3	-16.3	34.2	39.4	H

Ch157

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17993.4	35.7	-25.5	43.4	17.8	V
17978.0	35.6	-25.5	43.4	17.7	V
17989.0	35.6	-25.5	43.4	17.7	V
17965.9	35.5	-25.5	43.4	17.6	V
17972.5	35.5	-25.5	43.4	17.6	V
17979.1	35.5	-25.5	43.4	17.6	V

Ch165

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17979.1	35.8	-25.5	43.4	17.9	V
17987.9	35.6	-25.5	43.4	17.7	V
17994.5	35.6	-25.5	43.4	17.7	V
17995.6	35.6	-25.5	43.4	17.7	V
17926.3	35.5	-25.5	43.4	17.6	V
5850.3	48.0	-16.2	34.2	30.0	H

802.11n-HT20

Ch149

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17970.3	35.8	-25.5	43.4	17.9	V
17869.1	35.6	-25.5	43.4	17.7	V
17960.4	35.5	-25.5	43.4	17.6	V
17974.7	35.5	-25.5	43.4	17.6	V
17983.5	35.5	-25.5	43.4	17.6	V
5724.9	57.8	-16.3	34.2	39.9	H

Ch157

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17994.5	36.0	-25.5	43.4	18.1	V
17932.9	35.6	-25.5	43.4	17.7	V
17976.9	35.6	-25.5	43.4	17.7	V
17973.6	35.5	-25.5	43.4	17.6	V
17982.4	35.5	-25.5	43.4	17.6	V
17986.8	35.5	-25.5	43.4	17.6	V

Ch165

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17950.5	35.7	-25.5	43.4	17.8	V
17980.2	35.7	-25.5	43.4	17.8	V
17969.2	35.6	-25.5	43.4	17.7	V
17979.1	35.6	-25.5	43.4	17.7	V
17982.4	35.6	-25.5	43.4	17.7	V
5850.0	49.9	-16.2	34.2	31.9	H

802.11n-HT40

Ch151

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17974.7	35.7	-25.5	43.4	17.8	V
17994.5	35.7	-25.5	43.4	17.8	V
17990.1	35.6	-25.5	43.4	17.7	V
17882.3	35.4	-25.5	43.4	17.5	V
17888.9	35.4	-25.5	43.4	17.5	V
5722.4	58.3	-16.3	34.2	40.4	H

Ch159

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17970.3	35.7	-25.5	43.4	17.8	V
17979.1	35.7	-25.5	43.4	17.8	V
17963.7	35.6	-25.5	43.4	17.7	V
17990.1	35.6	-25.5	43.4	17.7	V
17991.2	35.6	-25.5	43.4	17.7	V
5850.1	44.5	-16.2	34.2	26.5	H

Peak Results:
802.11a

Ch149

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17887.8	48.1	-25.5	43.4	30.2	H
17374.1	47.4	-25.9	40.1	33.2	V
17455.5	47.4	-26.9	43.4	30.9	V
17848.2	47.1	-25.5	43.4	29.2	H
17278.4	47.0	-25.9	40.1	32.8	V
5723.1	77.1	-16.3	34.2	59.2	H

Ch157

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17434.6	48.1	-26.9	43.4	31.6	V
17886.7	48.0	-25.5	43.4	30.1	V
17982.4	48.0	-25.5	43.4	30.1	V
17802.0	47.5	-25.5	43.4	29.6	V
17808.6	47.5	-25.5	43.4	29.6	V
17822.9	47.3	-25.5	43.4	29.4	V

Ch165

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17708.5	47.7	-25.7	43.4	30.0	V
17791.0	47.4	-25.5	43.4	29.5	V
17954.9	47.2	-25.5	43.4	29.3	V
17980.2	47.2	-25.5	43.4	29.3	V
17949.4	47.1	-25.5	43.4	29.2	V
5850.9	66.2	-16.2	34.2	48.2	H

802.11n-HT20

Ch149

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17946.1	47.7	-25.5	43.4	29.8	H
17891.1	47.5	-25.5	43.4	29.6	V
17969.2	47.5	-25.5	43.4	29.6	H
17877.9	47.4	-25.5	43.4	29.5	V
17938.4	47.4	-25.5	43.4	29.5	V
5724.3	76.5	-16.3	34.2	58.6	H

Ch157

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17974.7	47.8	-25.5	43.4	29.9	H
17978.0	47.6	-25.5	43.4	29.7	V
17976.9	47.4	-25.5	43.4	29.5	V
17379.6	47.3	-25.9	40.1	33.1	V
17905.4	47.3	-25.5	43.4	29.4	H
17939.5	47.3	-25.5	43.4	29.4	V

Ch165

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17979.1	47.6	-25.5	43.4	29.7	V
17695.3	47.2	-25.7	43.4	29.5	V
17609.5	47.0	-25.7	43.4	29.3	H
17836.1	47.0	-25.5	43.4	29.1	V
17304.8	46.9	-25.9	40.1	32.7	V
5850.3	69.3	-16.2	34.2	51.3	H

802.11n-HT40

Ch151

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17665.6	48.2	-25.7	43.4	30.5	V
17591.9	47.3	-25.7	43.4	29.6	H
17990.1	47.1	-25.5	43.4	29.2	V
17994.5	47.1	-25.5	43.4	29.2	V
17432.4	47.0	-26.9	43.4	30.5	H
5724.8	76.9	-16.3	34.2	59.0	H

Ch159

Frequency (MHz)	Measurement Result (dBμV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBμV)	Antenna Pol. (H/V)
17993.4	48.1	-25.5	43.4	30.2	V
17732.7	47.8	-25.7	43.4	30.1	V
17863.6	47.5	-25.5	43.4	29.6	H
17937.3	47.5	-25.5	43.4	29.6	V
17949.4	47.3	-25.5	43.4	29.4	V
5850.5	63.4	-16.2	34.2	45.4	H

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
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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:

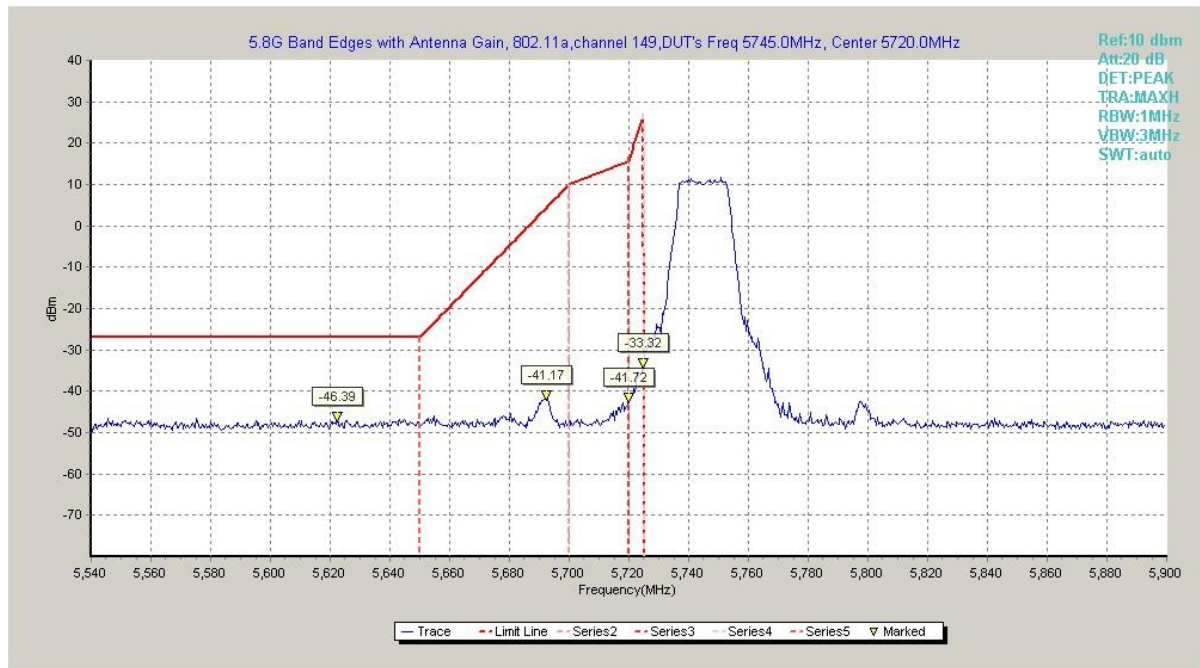


Fig. 41 Band Edges (802.11a, 5745MHz)

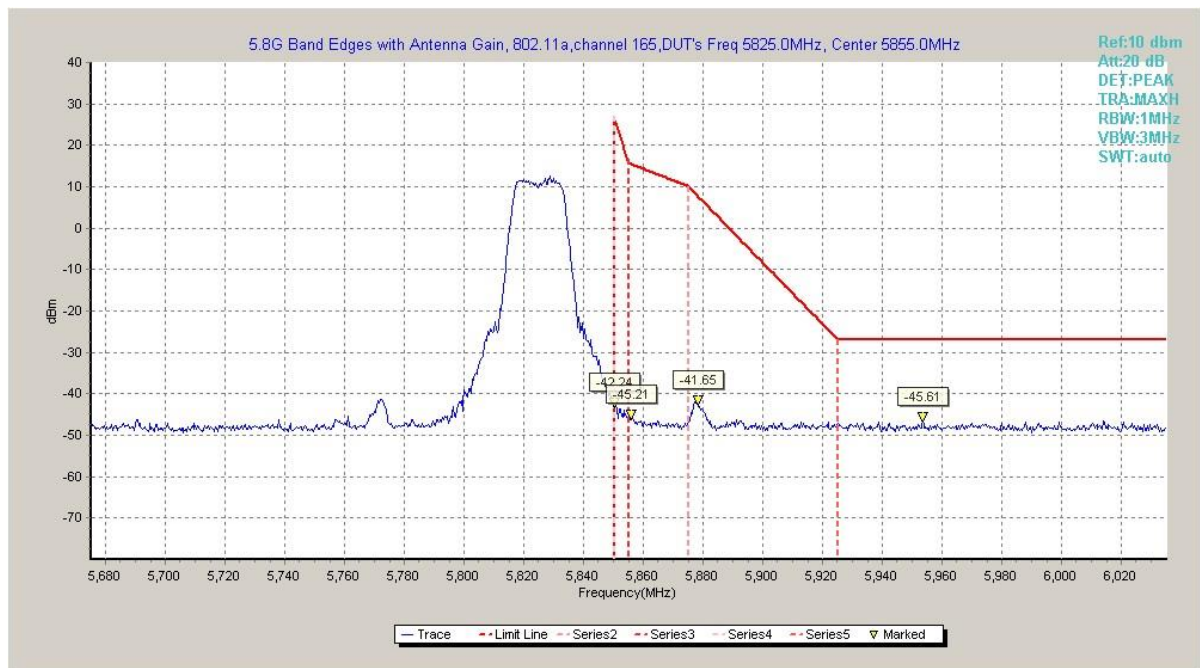


Fig. 42 Band Edges (802.11a, 5825MHz)

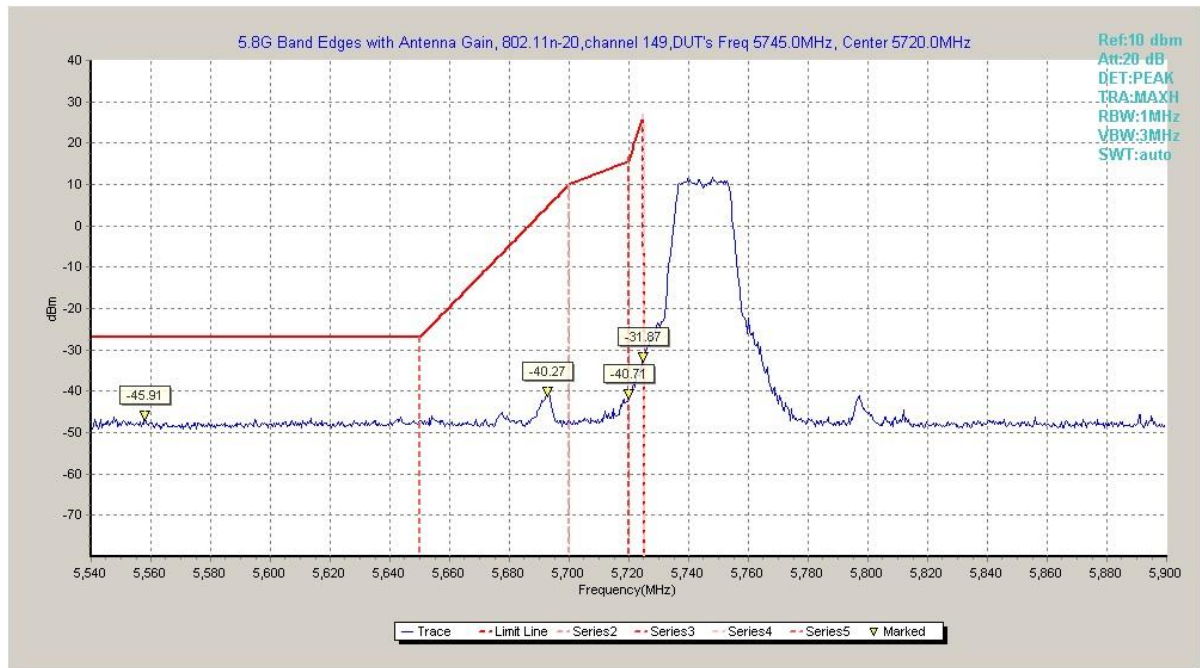


Fig. 43 Band Edges (802.11n-HT20, 5745MHz)

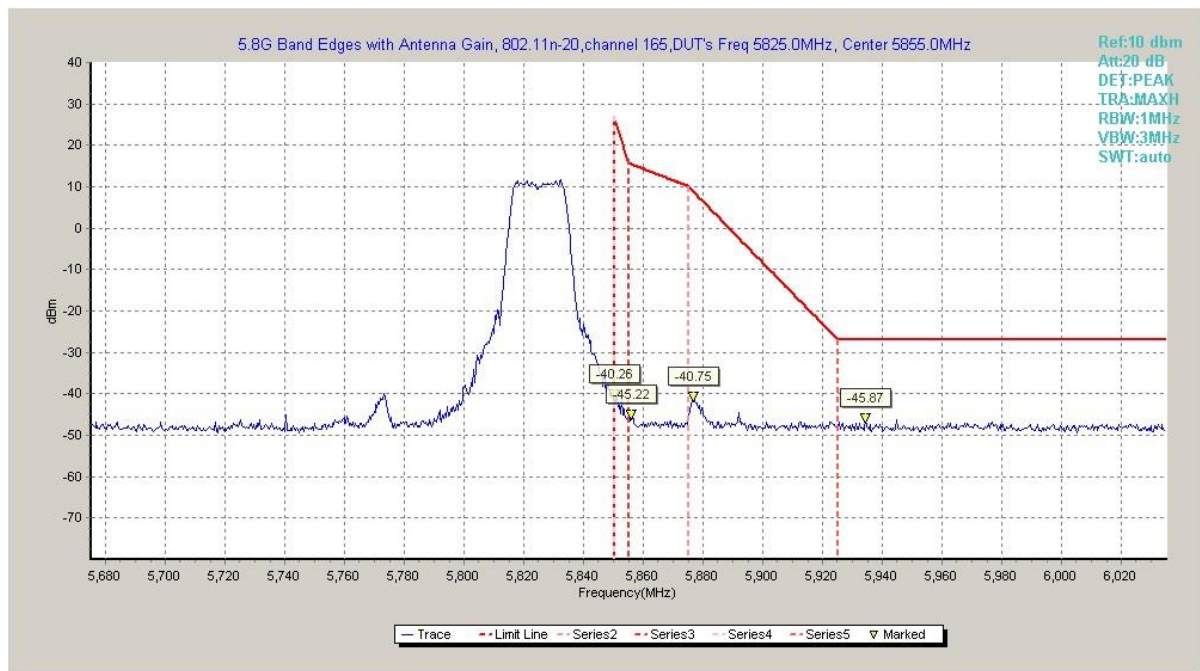


Fig. 44 Band Edges (802.11n-HT20, 5825MHz)

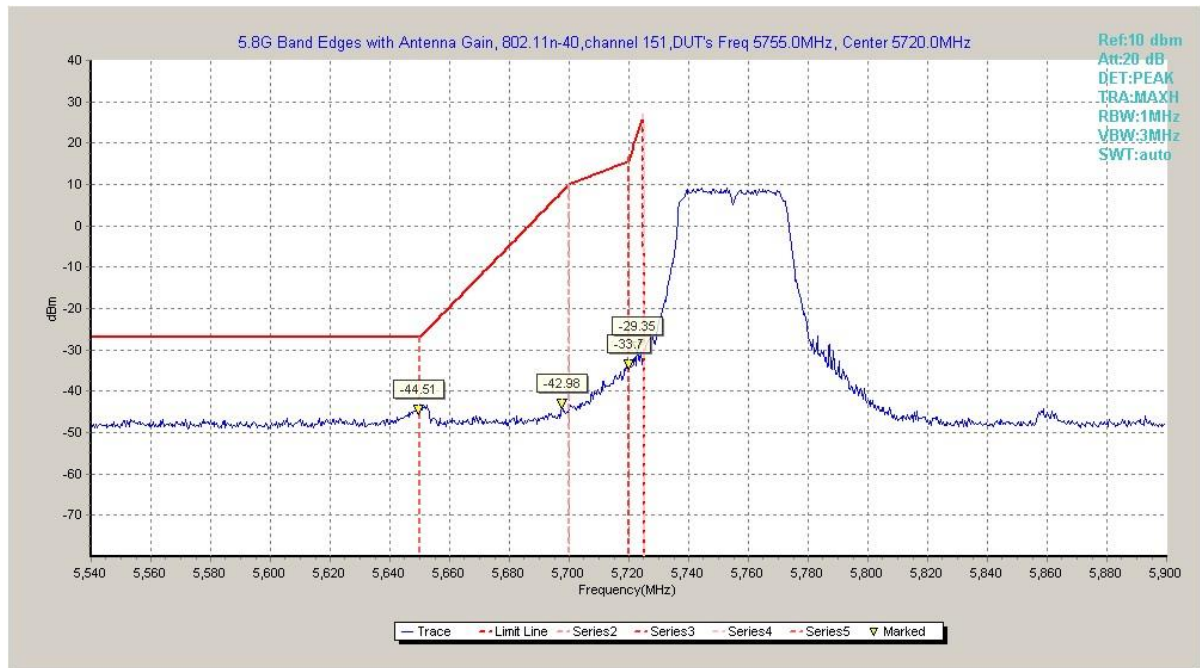


Fig. 45 Band Edges (802.11n-HT40, 5755MHz)

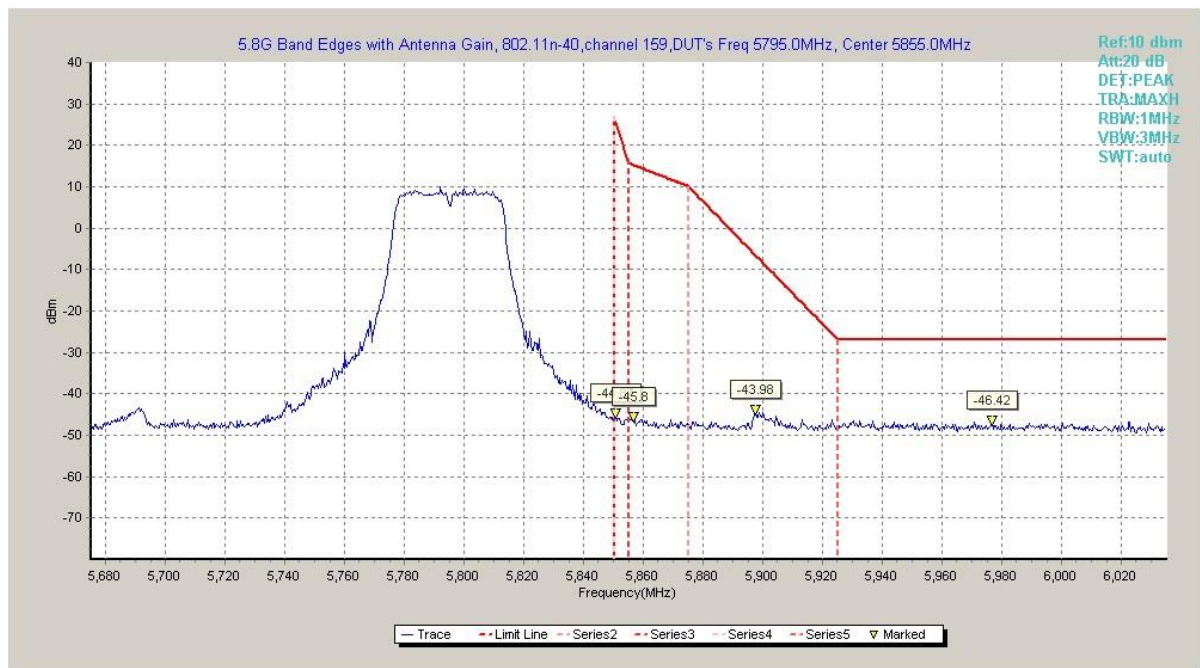


Fig. 46 Band Edges (802.11n-HT40, 5795MHz)

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:

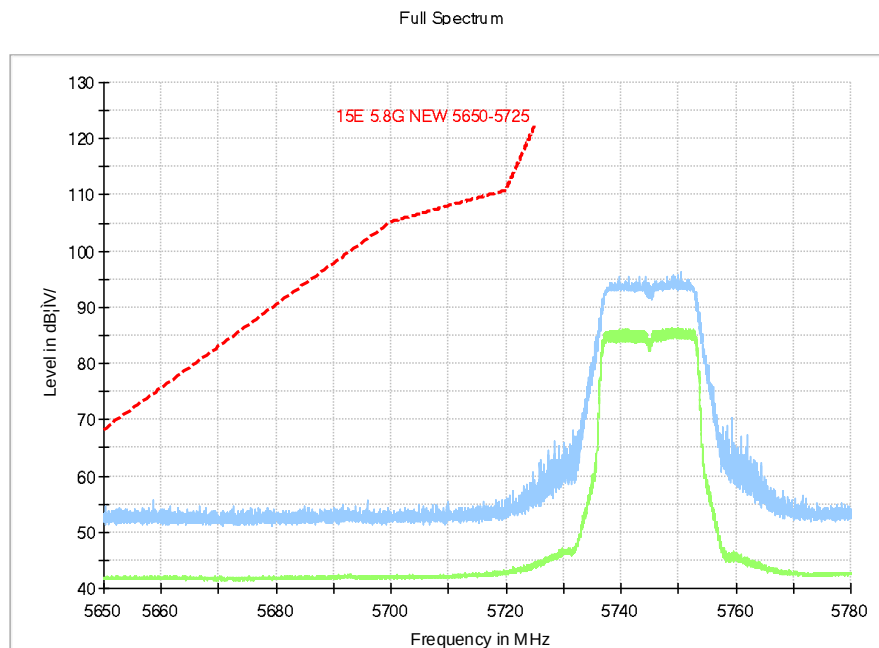


Fig. 47 Band Edges (802.11a, 5745MHz)

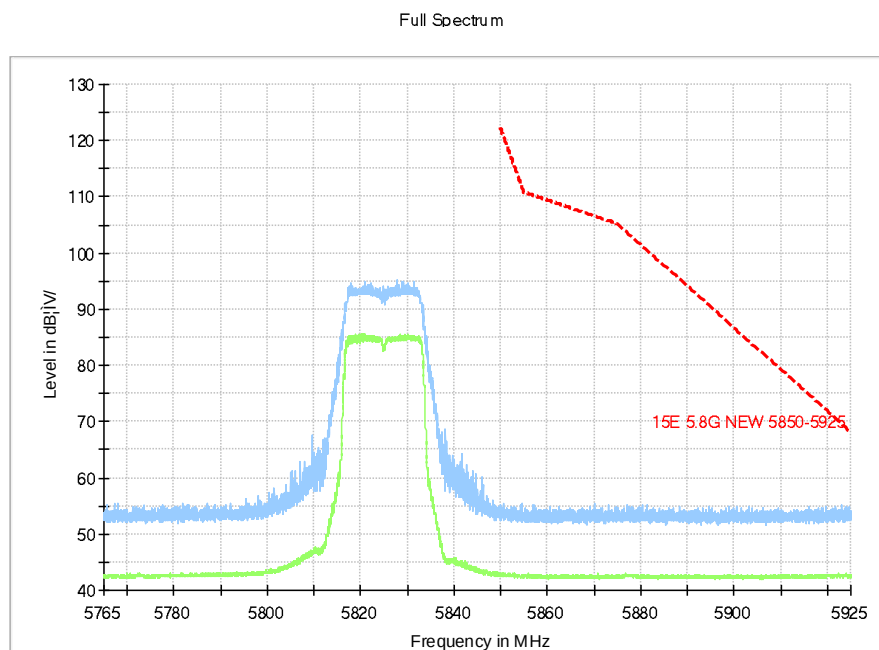


Fig. 48 Band Edges (802.11a, 5825MHz)

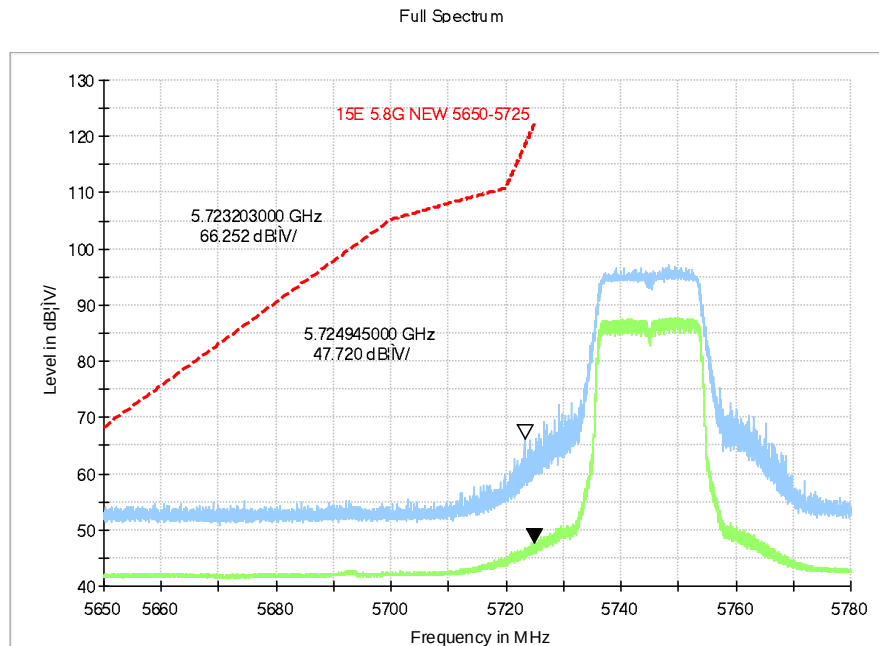


Fig. 49 Band Edges (802.11n-HT20, 5745MHz)

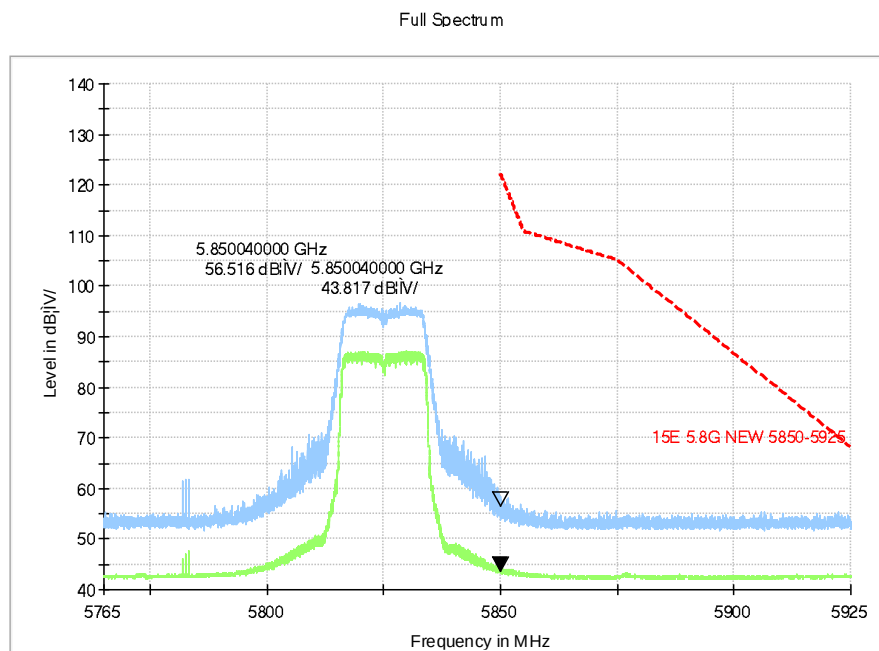


Fig. 50 Band Edges (802.11n-HT20, 5825MHz)

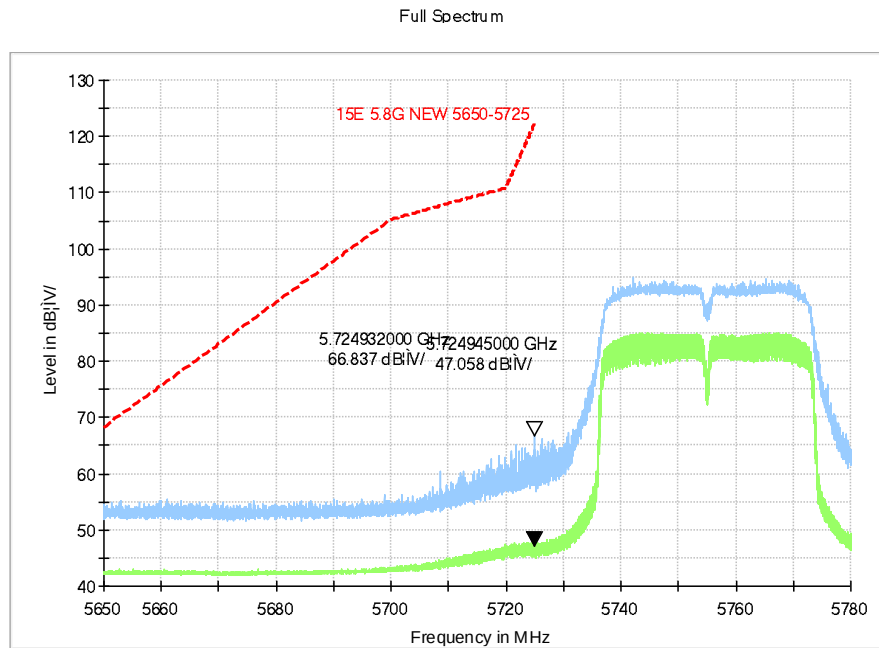


Fig. 51 Band Edges (802.11n-HT40, 5755MHz)

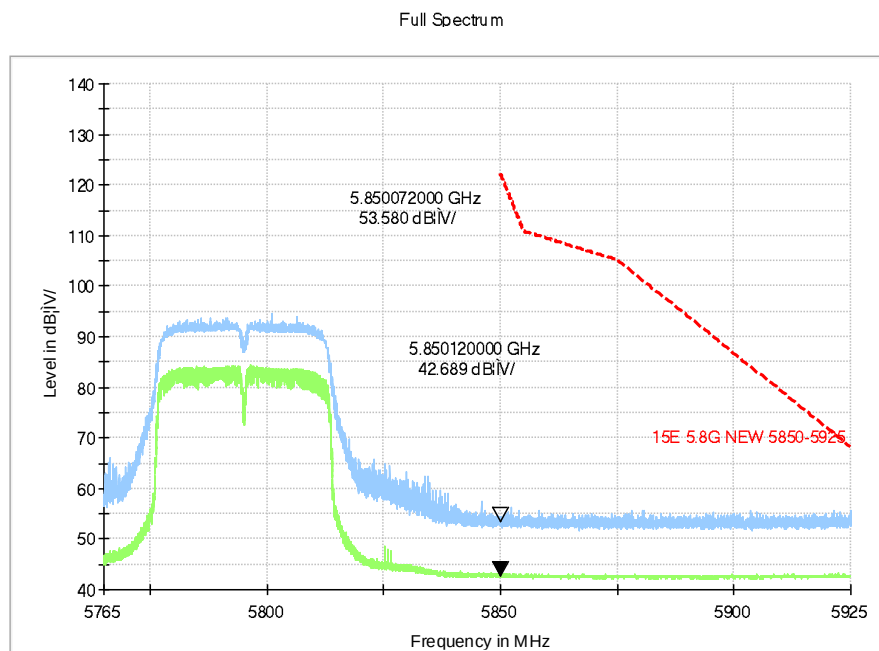


Fig. 52 Band Edges (802.11n-HT40, 5795MHz)

A.7. AC Powerline Conducted Emission

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement uncertainty:

Expanded measurement uncertainty for this test item is $U = 3.2\text{dB}$, $k=2$.

Measurement Result and limit:

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Result (dBμV)		Conclusion
		With charger		
		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)		Conclusion
		With charger		
		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:

Result for traffic:

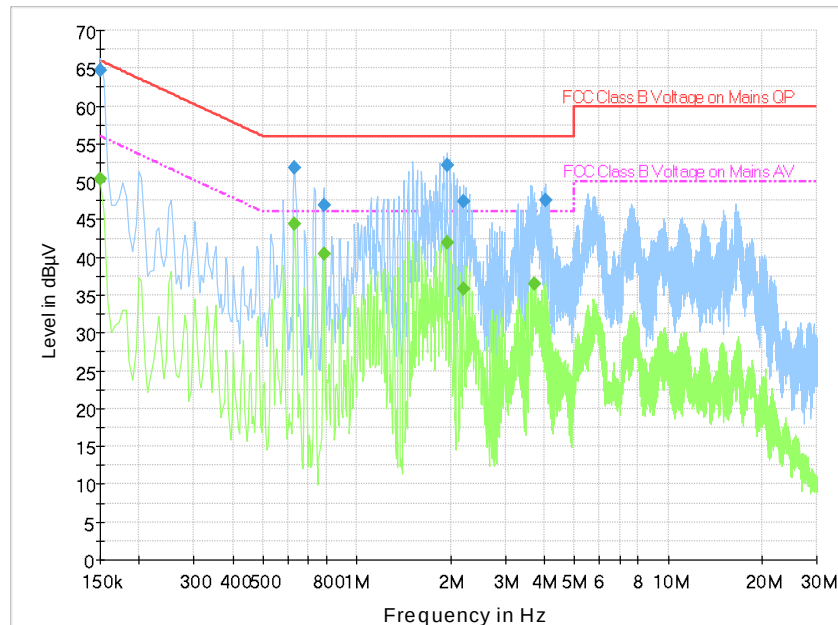


Fig. 53 AC Powerline Conducted Emission-802.11a

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	64.7	2000.0	9.000	On	N	30.6	1.3	66.0	
0.631500	51.8	2000.0	9.000	On	L1	19.8	4.2	56.0	
0.784500	46.8	2000.0	9.000	On	L1	19.8	9.2	56.0	
1.945500	52.1	2000.0	9.000	On	L1	19.6	3.9	56.0	
2.197500	47.4	2000.0	9.000	On	L1	19.6	8.6	56.0	
4.038000	47.5	2000.0	9.000	On	L1	19.6	8.5	56.0	

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	50.4	2000.0	9.000	On	N	30.6	5.6	56.0	
0.631500	44.5	2000.0	9.000	On	L1	19.8	1.5	46.0	
0.784500	40.5	2000.0	9.000	On	L1	19.8	5.5	46.0	
1.945500	42.0	2000.0	9.000	On	L1	19.6	4.0	46.0	
2.197500	35.8	2000.0	9.000	On	L1	19.6	10.2	46.0	
3.709500	36.4	2000.0	9.000	On	L1	19.6	9.6	46.0	

Result for Idle:

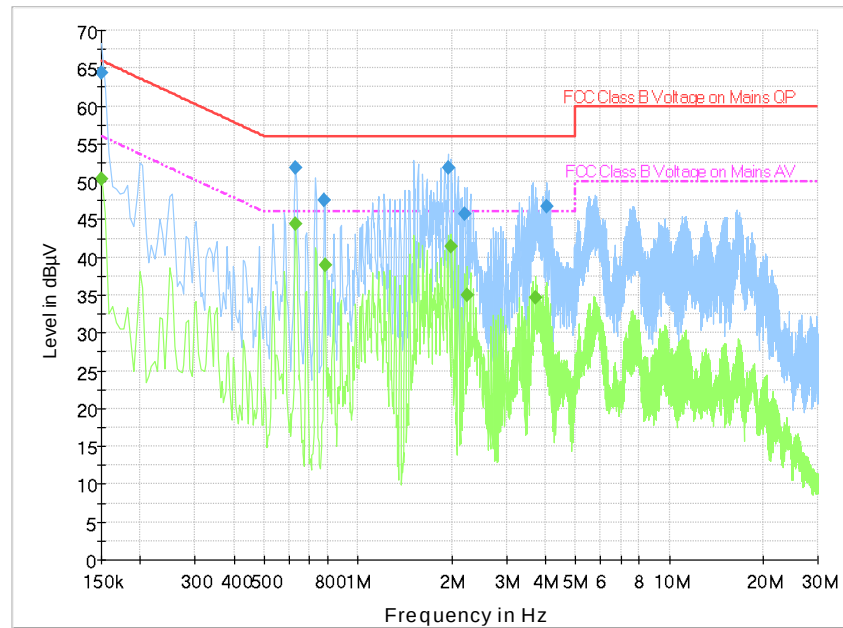


Fig. 54 AC Powerline Conducted Emission-Idle

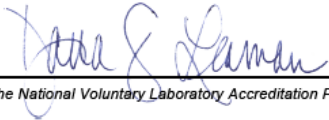
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	64.5	2000.0	9.000	On	N	30.6	1.5	66.0	
0.631500	51.9	2000.0	9.000	On	L1	19.8	4.1	56.0	
0.780000	47.6	2000.0	9.000	On	L1	19.8	8.4	56.0	
1.945500	51.8	2000.0	9.000	On	L1	19.6	4.2	56.0	
2.197500	45.8	2000.0	9.000	On	L1	19.6	10.2	56.0	
4.038000	46.7	2000.0	9.000	On	L1	19.6	9.3	56.0	

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	50.4	2000.0	9.000	On	L1	30.7	5.6	56.0	
0.631500	44.5	2000.0	9.000	On	L1	19.8	1.5	46.0	
0.784500	39.0	2000.0	9.000	On	L1	19.8	7.0	46.0	
1.995000	41.4	2000.0	9.000	On	L1	19.6	4.6	46.0	
2.247000	35.0	2000.0	9.000	On	L1	19.6	11.0	46.0	
3.709500	34.6	2000.0	9.000	On	L1	19.6	11.4	46.0	

ANNEX B: Accreditation Certificate

United States Department of Commerce National Institute of Standards and Technology  Certificate of Accreditation to ISO/IEC 17025:2005	
NVLAP LAB CODE: 600118-0	
Telecommunication Technology Labs, CAICT Beijing China	
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>	
Electromagnetic Compatibility & Telecommunications	
<i>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).</i>	
2019-09-26 through 2020-09-30 <i>Effective Dates</i>	  <i>For the National Voluntary Laboratory Accreditation Program</i>

*** END OF REPORT BODY ***