



FCC PART 15E TEST REPORT

No. I17N00290-RLAN02

For

Doro AB

LTE phone

Model Name: DSB-0090

With

Hardware Version: 1011

Software Version: FRANK01A-S10A_DSB0090_201_USER_170503

FCC ID: WS5DSB0090

Issued Date: 2017-06-08

Test Laboratory:

FCC 2.948 Listed: No.342690

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.

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REPORT HISTORY

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I17N00290-RLAN02	Rev.0	1st edition	2017-05-05
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CONTENTS

1.	TEST LATORATORY.....	6
1.1.	TESTING LOCATION	6
1.2.	TESTING ENVIRONMENT.....	6
1.3.	PROJECT DATA	6
1.4.	SIGNATURE	6
2.	CLIENT INFORMATION.....	7
2.1.	APPLICANT INFORMATION	7
2.2.	MANUFACTURER INFORMATION	7
3.	EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)	8
3.1.	ABOUT EUT	8
3.2.	INTERNAL IDENTIFICATION OF EUT	8
3.3.	INTERNAL IDENTIFICATION OF AE USED DURING THE TEST	8
4.	REFERENCE DOCUMENTS	9
4.1.	DOCUMENTS SUPPLIED BY APPLICANT	9
4.2.	REFERENCE DOCUMENTS FOR TESTING	9
5.	SUMMARY OF TEST RESULTS	10
5.1.	SUMMARY OF TEST RESULTS	10
5.2.	STATEMENTS	10
5.3.	TERMS USED IN THE RESULT TABLE	10
6.	TEST EQUIPMENTS UTILIZED	11
	ANNEX A: MEASUREMENT RESULTS.....	12
A.1.	MEASUREMENT METHOD	12
A.2.	MAXIMUM PEAK OUTPUT POWER	13
A.3.	PEAK POWER SPECTRAL DENSITY	15
A.4.	OCCUPIED 6dB BANDWIDTH	16
FIG. 1	OCCUPIED 6dB BANDWIDTH (802.11A, CH 149).....	16
FIG. 2	OCCUPIED 6dB BANDWIDTH (802.11A, CH 157).....	17
FIG. 3	OCCUPIED 6dB BANDWIDTH (802.11A, CH 165).....	17
FIG. 4	OCCUPIED 6dB BANDWIDTH (802.11N-HT20, CH 149)	18
FIG. 5	OCCUPIED 6dB BANDWIDTH (802.11N-HT20, CH 157)	18
FIG. 6	OCCUPIED 6dB BANDWIDTH (802.11N-HT20, CH 165)	19
FIG. 7	OCCUPIED 6dB BANDWIDTH (802.11N-HT40, CH 151)	19
FIG. 8	OCCUPIED 6dB BANDWIDTH (802.11N-HT40, CH 159)	20
A.5.	TRANSMITTER SPURIOUS EMISSION	21
A.5.1	TRANSMITTER SPURIOUS EMISSION - CONDUCTED	21
FIG. 9	CONDUCTED SPURIOUS EMISSION (802.11A, CH149, 30 MHz-1 GHz).....	22
FIG. 10	CONDUCTED SPURIOUS EMISSION (802.11A, CH149, 1 GHz -12 GHz).....	23

FIG. 11	CONDUCTED SPURIOUS EMISSION (802.11A, CH149, 12 GHz-25 GHz)	23
FIG. 12	CONDUCTED SPURIOUS EMISSION (802.11A, CH149, 25 GHz-40 GHz)	24
FIG. 13	CONDUCTED SPURIOUS EMISSION (802.11A, CH157, 30 MHz-1 GHz).....	24
FIG. 14	CONDUCTED SPURIOUS EMISSION (802.11A, CH157, 1 GHz -12 GHz).....	25
FIG. 15	CONDUCTED SPURIOUS EMISSION (802.11A, CH157, 12 GHz-25 GHz)	25
FIG. 16	CONDUCTED SPURIOUS EMISSION (802.11A, CH157, 25 GHz-40 GHz)	26
FIG. 17	CONDUCTED SPURIOUS EMISSION (802.11A, CH165, 30 MHz-1 GHz).....	26
FIG. 18	CONDUCTED SPURIOUS EMISSION (802.11A, CH165, 1 GHz -12 GHz).....	27
FIG. 19	CONDUCTED SPURIOUS EMISSION (802.11A, CH165, 12 GHz-25 GHz)	27
FIG. 20	CONDUCTED SPURIOUS EMISSION (802.11A, CH165, 25 GHz-40 GHz)	28
FIG. 21	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH149, 30 MHz-1 GHz)	28
FIG. 22	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH149, 1 GHz -12 GHz)	29
FIG. 23	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH149, 12 GHz-25 GHz).....	29
FIG. 24	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH149, 25 GHz-40 GHz)	30
FIG. 25	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH157, 30 MHz-1 GHz)	30
FIG. 26	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH157, 1 GHz -12 GHz)	31
FIG. 27	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH157, 12 GHz-25 GHz)	31
FIG. 28	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH157, 25 GHz-40 GHz)	32
FIG. 29	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH165, 30 MHz-1 GHz)	32
FIG. 30	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH165, 1 GHz -12 GHz)	33
FIG. 31	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH165, 12 GHz-25 GHz).....	33
FIG. 32	CONDUCTED SPURIOUS EMISSION (802.11N-HT20, CH165, 25 GHz-40 GHz)	34
FIG. 33	CONDUCTED SPURIOUS EMISSION (802.11N-HT40, CH151, 30 MHz-1 GHz)	34
FIG. 34	CONDUCTED SPURIOUS EMISSION (802.11N-HT40, CH151, 1 GHz -12 GHz)	35
FIG. 35	CONDUCTED SPURIOUS EMISSION (802.11N-HT40, CH151, 12 GHz-25 GHz)	35
FIG. 36	CONDUCTED SPURIOUS EMISSION (802.11N-HT40, CH151, 25 GHz-40 GHz)	36
FIG. 37	CONDUCTED SPURIOUS EMISSION (802.11N-HT40, CH159, 30 MHz-1 GHz)	36
FIG. 38	CONDUCTED SPURIOUS EMISSION (802.11N-HT40, CH159, 1 GHz -12 GHz)	37
FIG. 39	CONDUCTED SPURIOUS EMISSION (802.11N-HT40, CH159, 12 GHz-25 GHz)	37
FIG. 40	CONDUCTED SPURIOUS EMISSION (802.11N-HT40, CH159, 25 GHz-40 GHz)	38
A.5.2 TRANSMITTER SPURIOUS EMISSION - RADIATED	39	
FIG. 41	WIFI-11A-CH149-1G-18G	40
FIG. 42	WIFI-11A-CH157-9K-30M	40
FIG. 43	WIFI-11A-CH157-30M-1G	41
FIG. 44	WIFI-11A-CH157-1G-18G	41
FIG. 45	WIFI-11A-CH157-18G-26.5G	42
FIG. 46	WIFI-11A-CH157-26.5G-40G	42
FIG. 47	WIFI-11A-CH165-1G-18G	43
FIG. 48	WIFI-11N(HT20)-CH149-1G-18G	43
FIG. 49	WIFI-11N(HT20)-CH157-9K-30M.....	44
FIG. 50	WIFI-11N(HT20)-CH157-30M-1G.....	44
FIG. 51	WIFI-11N(HT20)-CH157-1G-18G	45
FIG. 52	WIFI-11N(HT20)-CH157-18G-26.5G	45
FIG. 53	WIFI-11N(HT20)-CH157-26.5G-40G	46

FIG. 54	WIFI-11N(HT20)-CH165-1G-18G	46
FIG. 55	WIFI-11N(HT40)-CH151-9K-30M.....	47
FIG. 56	WIFI-11N(HT40)-CH151-30M-1G.....	47
FIG. 57	WIFI-11N(HT40)-CH151-1G-18G	48
FIG. 58	WIFI-11N(HT40)-CH151-18G-26.5G	48
FIG. 59	WIFI-11N(HT40)-CH151-26.5G-40G	49
FIG. 60	WIFI-11N(HT40)-CH159-1G-18G	49
A.6.	BAND EDGES COMPLIANCE	54
FIG. 61	BAND EDGES (802.11A, 5745MHz)	54
FIG. 62	BAND EDGES (802.11A, 5825MHz)	55
FIG. 63	BAND EDGES (802.11n-HT20, 5745MHz).....	55
FIG. 64	BAND EDGES (802.11n-HT20, 5825MHz)	56
FIG. 65	BAND EDGES (802.11n-HT40, 5755MHz).....	56
FIG. 66	BAND EDGES (802.11n-HT40, 5795MHz).....	57
A.7.	AC POWERLINE CONDUCTED EMISSION.....	58
FIG. 67	AC POWERLINE CONDUCTED EMISSION (802.11A, AE1, 120V)	60
FIG. 68	AC POWERLINE CONDUCTED EMISSION (IDLE, AE1, 120V).....	61
FIG. 69	AC POWERLINE CONDUCTED EMISSION (802.11A, AE2, 120V)	62
FIG. 70	AC POWERLINE CONDUCTED EMISSION (IDLE, AE2, 120V).....	63
FIG. 71	AC POWERLINE CONDUCTED EMISSION (802.11A, AE1, 240V)	64
FIG. 72	AC POWERLINE CONDUCTED EMISSION (IDLE, AE1, 240V).....	65
FIG. 73	AC POWERLINE CONDUCTED EMISSION (802.11A, AE2, 240V)	66
FIG. 74	AC POWERLINE CONDUCTED EMISSION (IDLE, AE2, 240V).....	67
A.8.	FREQUENCY STABILITY	68

1. TEST LATORATORY

1.1. Testing Location

Location: CTTL(South Branch)

Address: TCL International E city, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong, China 518000

1.2. Testing Environment

Normal Temperature: 15-35°C

Extreme Temperature: 0/+40°C

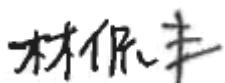
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2017-03-21

Testing End Date: 2017-04-26

1.4. Signature



Lin Kanfeng

(Prepared this test report)



Tang Weisheng

(Reviewed this test report)



Zhang Bojun

(Approved this test report)



2. CLIENT INFORMATION

2.1. Applicant Information

Company Name: Doro AB
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Country: Sweden
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2.2. Manufacturer Information

Company Name: CK TELECOM LTD.
Address: Technology Road. High-Tech Development Zone. Heyuan,
Guangdong, P.R. China
City: Heyuan
Postal Code: /
Country: China
Telephone: 0755-26739100 ext.8515
Fax: 0755-26739600

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	LTE phone
Model Name	DSB-0090
Market Name	Doro8040
FCC ID	WS5DSB0090
WLAN Frequency Range	ISM Band: 5745MHz~5825MHz
Type of modulation	OFDM
Voltage	3.8V DC by Battery

3.2. Internal Identification of EUT

EUT ID*	IMEI	HW Version	SW Version	Receive Date
EUT1	35511508 0003723	1011	FRANK01A-S10A_DSB0090_201_U SER_170503	2017-03-21

*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	SN
AE1	Charger	/
AE2	Charger	/

AE1

Model	A2-3762-501000
Manufacturer	Dongguan Aohai Power Technology Co., LTD

AE2

Model	A806A-050100U-UK1
Manufacturer	Dongguan Aohai Power Technology Co., LTD

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

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.

Reference	Title	Version
FCC Part15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices	Nov,2015
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	Jun,2013
UNII: KDB 789033	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E	Jun,2014

5. SUMMARY OF TEST RESULTS

5.1. Summary of Test Results

SUMMARY OF MEASUREMENT RESULTS	Sub-clause of Part15E	Verdict
Maximum Peak Output Power	15.407(a)	P
Peak Power Spectral Density	15.407(a)	P
Occupied 6dB Bandwidth	15.407(e)	P
Transmitter Spurious Emission	15.407(a)	P
Band Edges Compliance	15.407(b)	P
AC Powerline Conducted Emission	15.107, 15.207	P
Frequency Stability	15.407(g)	P

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

5.2. Statements

CTTL has evaluated the test cases requested by the applicant/manufacturer as listed in section 5.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2.

5.3. Terms used in the result table

Terms used in Verdict column

P	Pass
NA	Not Available
F	Fail

Abbreviations

AC	Alternating Current
AFH	Adaptive Frequency Hopping
BW	Band Width
E.I.R.P.	equivalent isotropical radiated power
ISM	Industrial, Scientific and Medical
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
Tx	Transmitter

6. TEST EQUIPMENTS UTILIZED

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2018-01-18	1 year
2	Climate chamber	SU-242	93008165	ESPEC	2018-04-06	1 year
3	DC Power Supply	NGSM3 2/10	5425	Rohde & Schwarz	2017-11-12	1 year

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Test Receiver	ESCI	100701	R&S	2017-08-09	1 year
2	Loop Antenna	HLA6120	35779	TESEQ	2019-05-02	3 years
3	BiLog Antenna	VULB9163	9163 329	Schwarzbeck	2020-02-17	3 years
4	Horn Antenna	3117	00066585	ETS-Lindgren	2019-03-05	3 years
5	Universal Radio Communication Tester	CMW270	100540	Rohde & Schwarz	2018-04-12	1 year
6	Spectrum Analyzer	FSP 40	100378	R&S	2017-12-15	1 year
7	Chamber	FACT5-2.0	4166	ETS-Lindgren	2018-05-13	3 years

Anechoic chamber

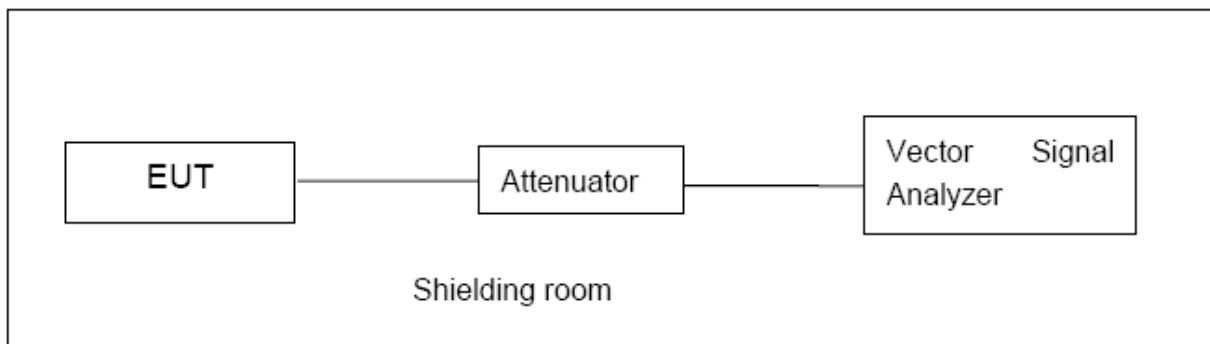
Fully anechoic chamber by ETS-Lindgren

ANNEX A: MEASUREMENT RESULTS

A.1. Measurement Method

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

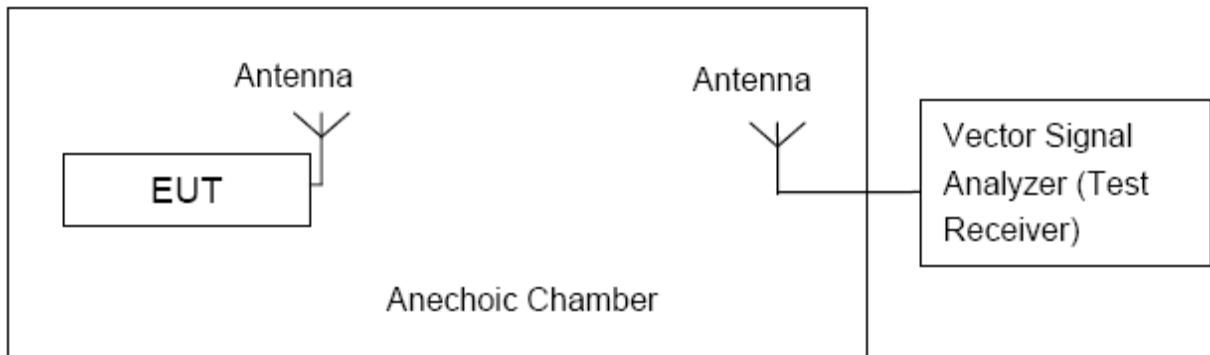


Radiated Emission Measurements

In the case of radiated emission, the used settings are as follows:

Sweep frequency from 30 MHz to 1 GHz, RBW = 100 KHz, VBW = 300 KHz;

Sweep frequency from 1 GHz to 26 GHz, RBW = 1 MHz, VBW = 10 Hz;



The measurement is made according to KDB 789033.

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

Antenna Gain

Antenna gain is 1dBi and the value is supplied by the applicant or manufacturer.

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	19.18	/	/
	9	19.23	/	/
	12	19.30	/	/
	18	19.33	/	/
	24	19.41	/	/
	36	19.37	/	/
	48	19.48	/	/
	54	19.56	19.07	19.03

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	19.52	/	/
	MCS1	19.27	/	/
	MCS2	19.24	/	/
	MCS3	19.43	/	/
	MCS4	19.58	/	/
	MCS5	19.64	/	/
	MCS6	19.65	/	/
	MCS7	19.71	19.42	19.55

The data rate MCS7 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	19.46	/
	MCS1	19.33	/
	MCS2	19.59	/
	MCS3	19.62	19.34
	MCS4	19.57	/
	MCS5	19.39	/
	MCS6	19.34	/
	MCS7	19.33	/

The data rate MCS3 is selected as worse condition, and the following cases are performed with this condition.

Maximum Average Output Power-Conducted

Measurement Results:

802.11a mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11a	11.23	11.17	11.15

802.11n-HT20 mode

Mode	Test Result (dBm)		
	5745MHz (Ch149)	5785MHz (Ch157)	5825MHz (Ch165)
802.11n(20MHz)	11.25	11.15	11.12

802.11n-HT40 mode

Mode	Test Result (dBm)	
	5755MHz (Ch151)	5795MHz(Ch159)
802.11n(40MHz)	10.92	10.63

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	6.20	P
	157	5.27	P
	165	5.22	P
802.11n HT20	149	3.21	P
	157	5.22	P
	165	5.27	P
802.11n HT40	151	2.63	P
	159	2.60	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 (kHz)		conclusion
802.11a	149	Fig.1	16350	P
	157	Fig.2	16300	P
	165	Fig.3	16200	P
802.11n HT20	149	Fig.4	17500	P
	157	Fig.5	17200	P
	165	Fig.6	17300	P
802.11n HT40	151	Fig.7	35840	P
	159	Fig.8	35760	P

Conclusion: PASS

Test graphs as below:

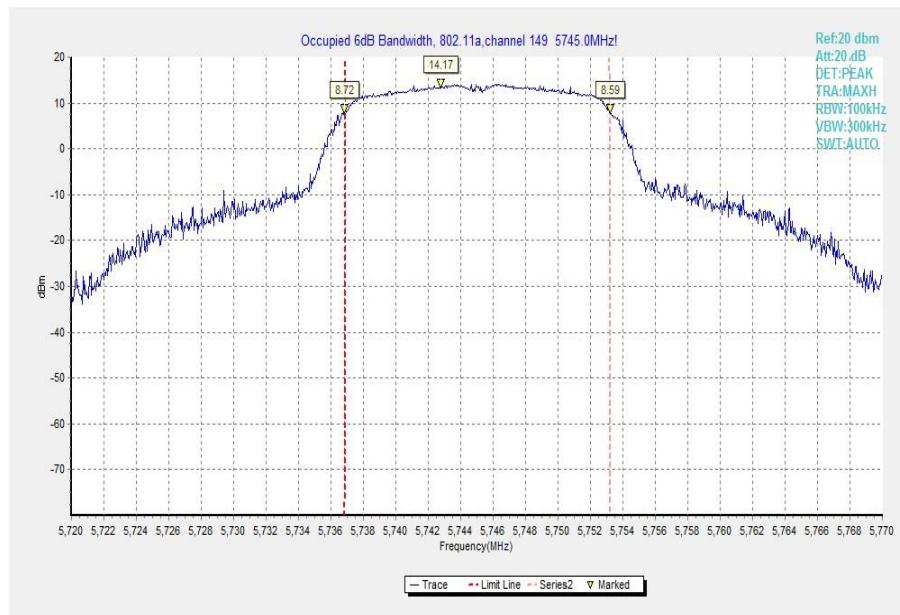
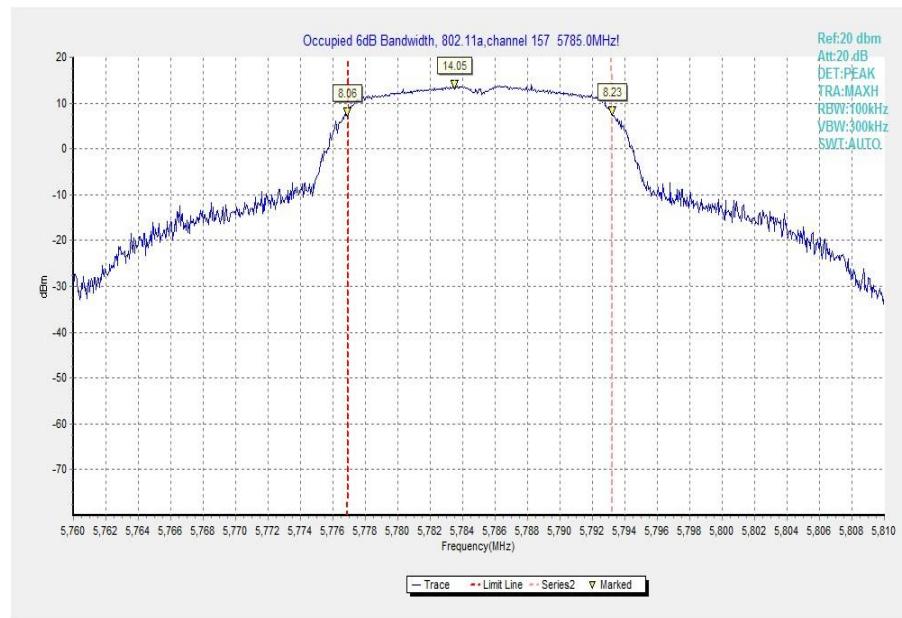
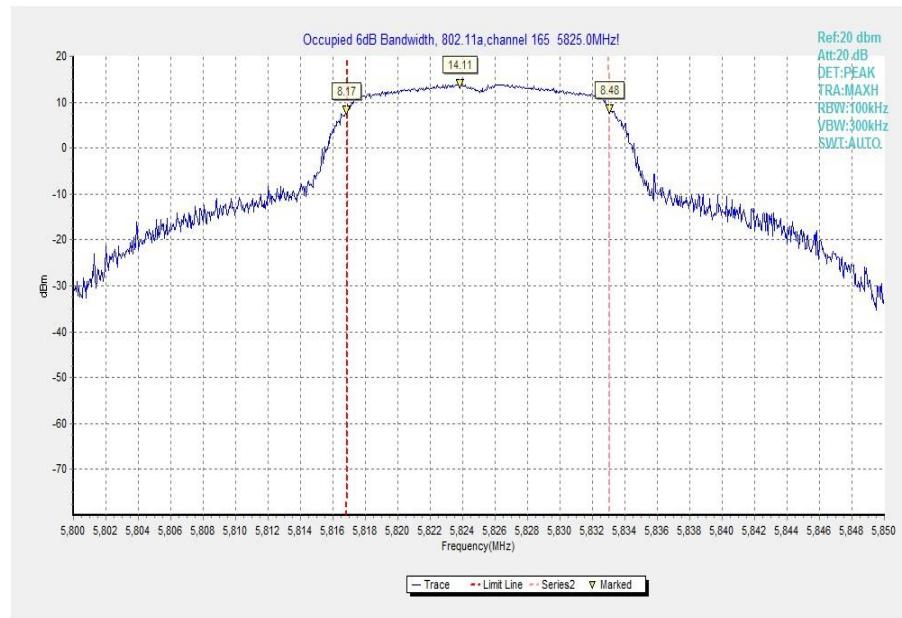


Fig. 1 Occupied 6dB Bandwidth (802.11a, Ch 149)


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

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

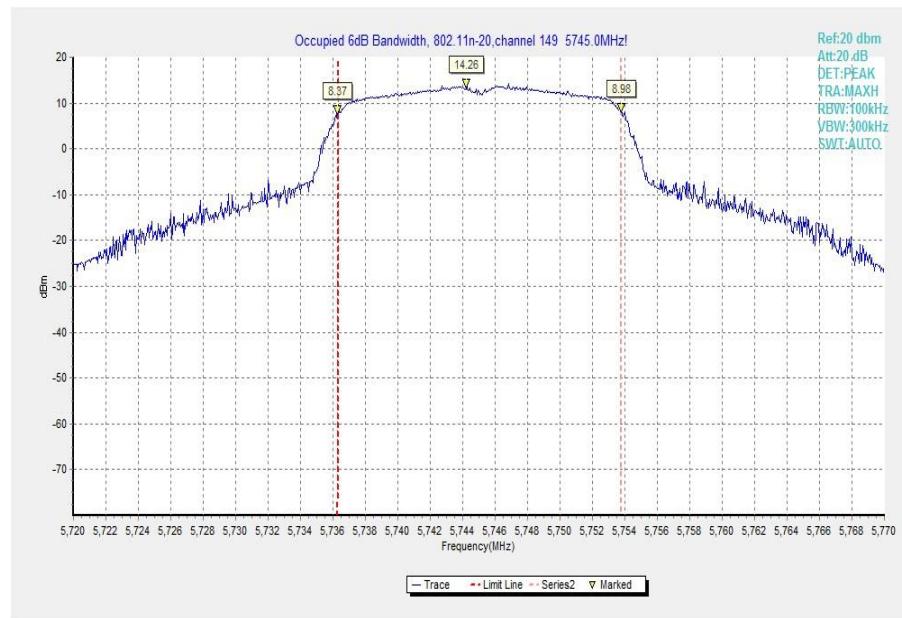


Fig. 4 Occupied 6dB Bandwidth (802.11n-HT20, Ch 149)

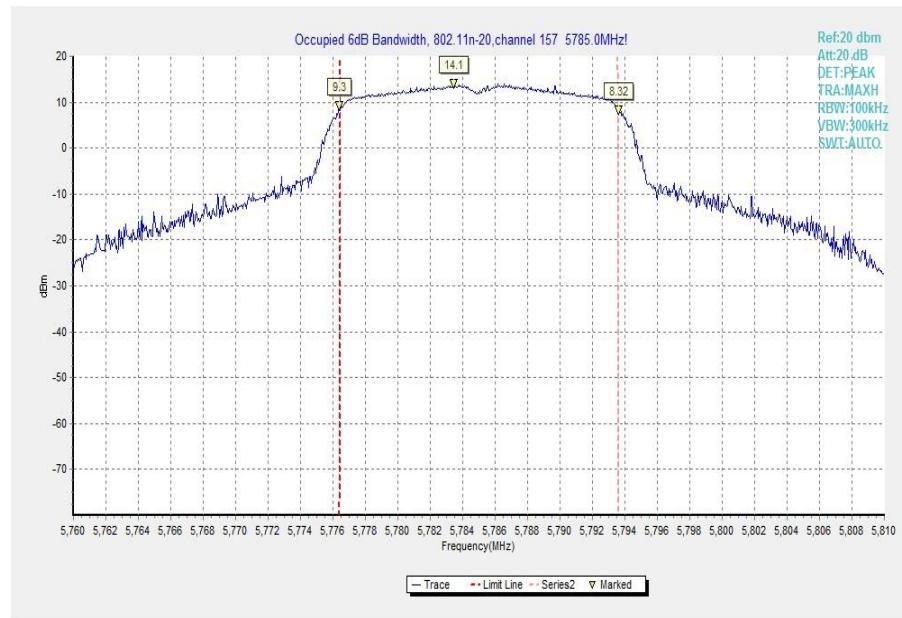


Fig. 5 Occupied 6dB Bandwidth (802.11n-HT20, Ch 157)

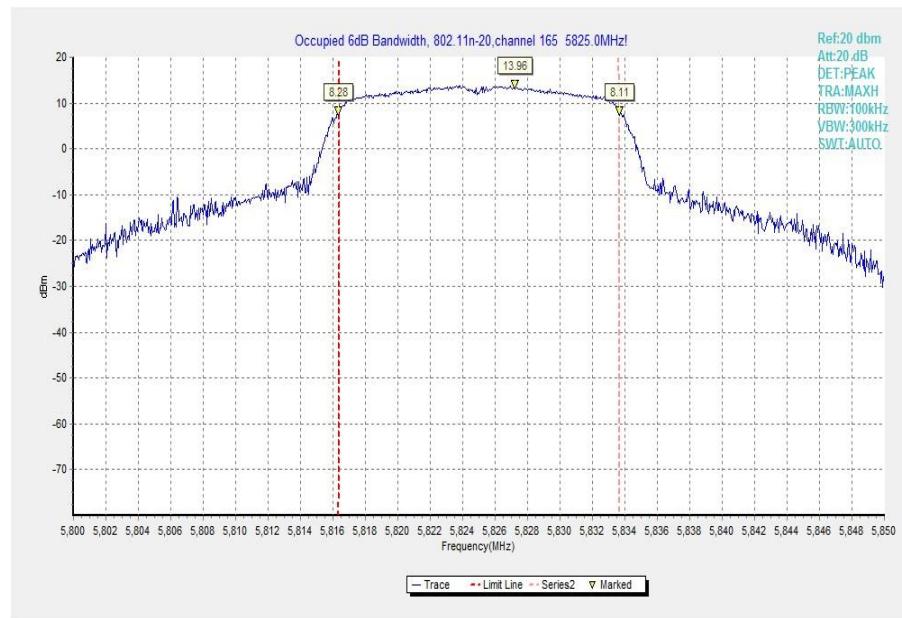


Fig. 6 Occupied 6dB Bandwidth (802.11n-HT20, Ch 165)

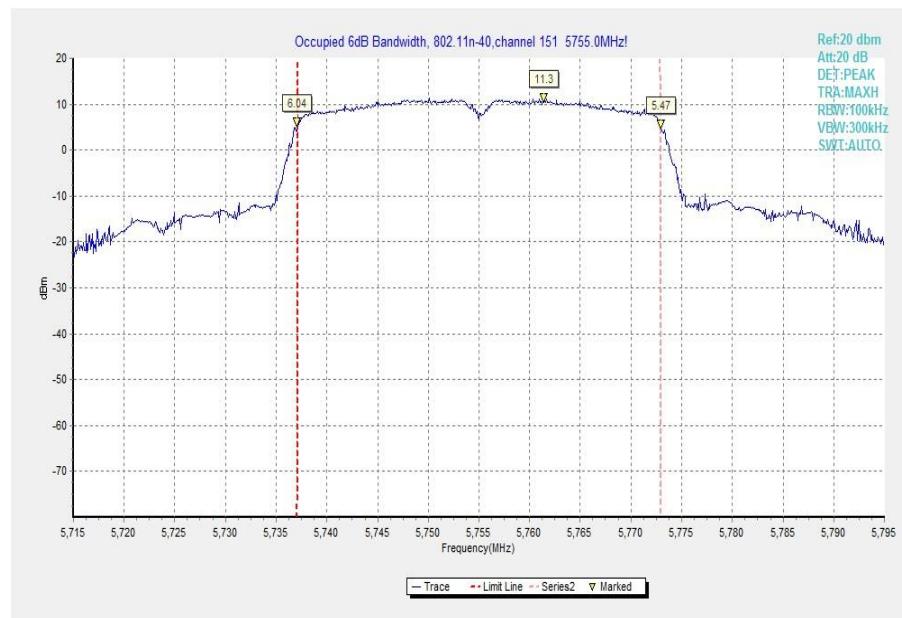


Fig. 7 Occupied 6dB Bandwidth (802.11n-HT40, Ch 151)

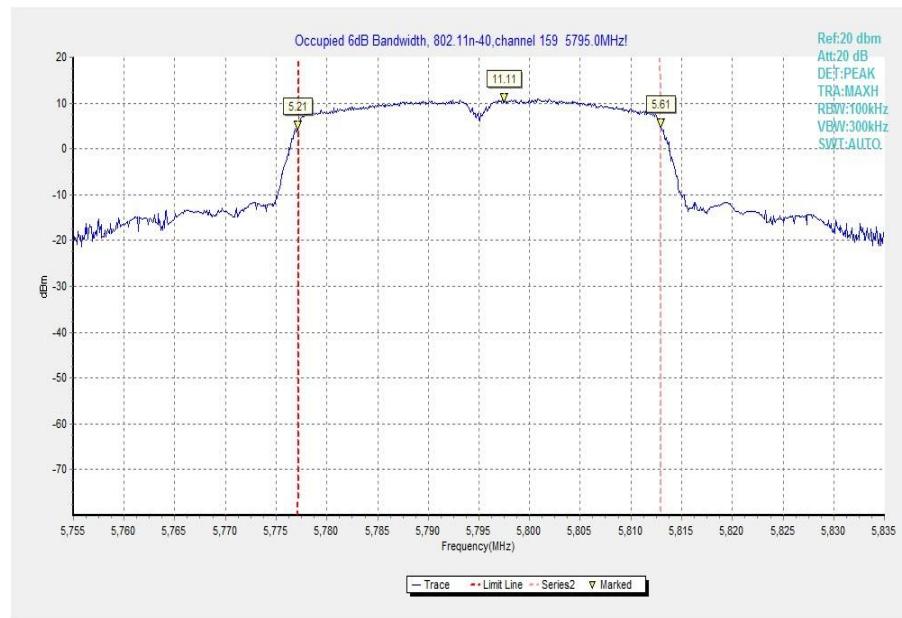


Fig. 8 Occupied 6dB Bandwidth (802.11n-HT40, Ch 159)

A.5. Transmitter Spurious Emission

Measurement Limit:

Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC 47 CFR Part 15.407(a)	5745MHz~5825MHz	< -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:

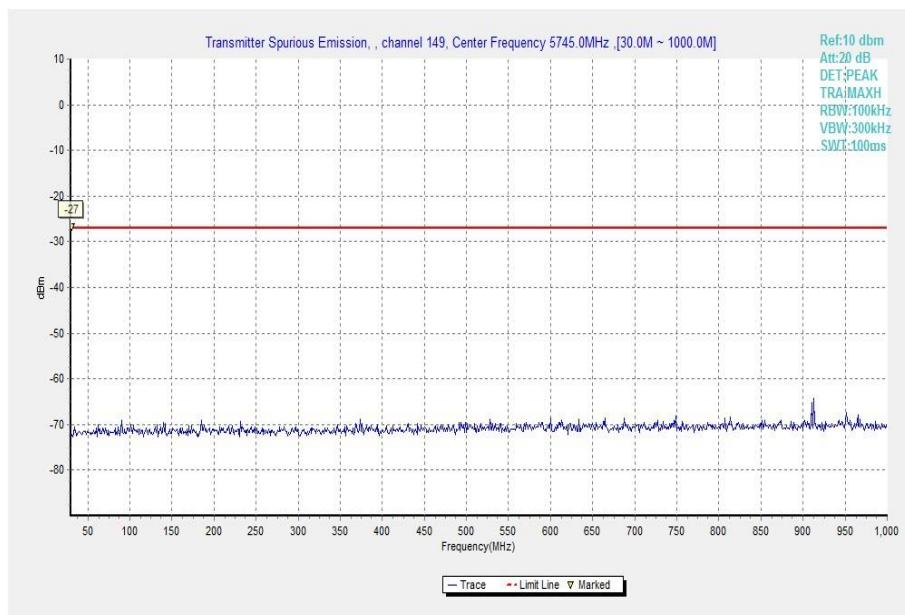


Fig. 9 Conducted Spurious Emission (802.11a, Ch149, 30 MHz-1 GHz)

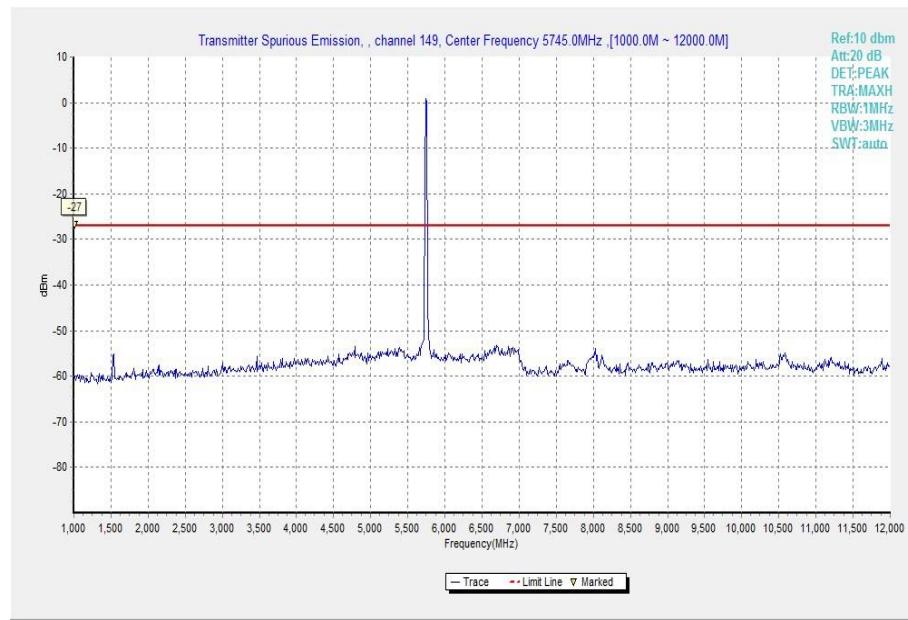


Fig. 10 Conducted Spurious Emission (802.11a, Ch149, 1 GHz -12 GHz)

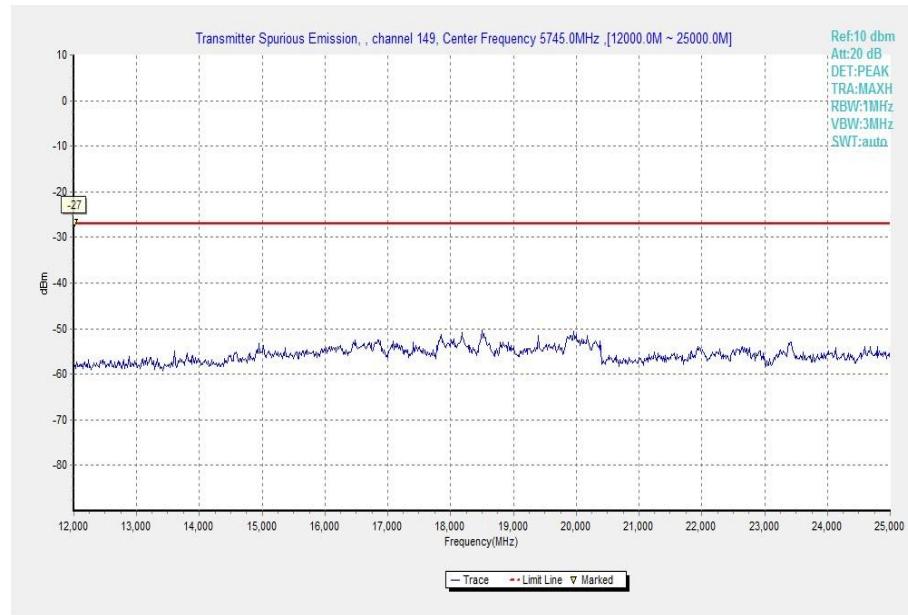


Fig. 11 Conducted Spurious Emission (802.11a, Ch149, 12 GHz-25 GHz)

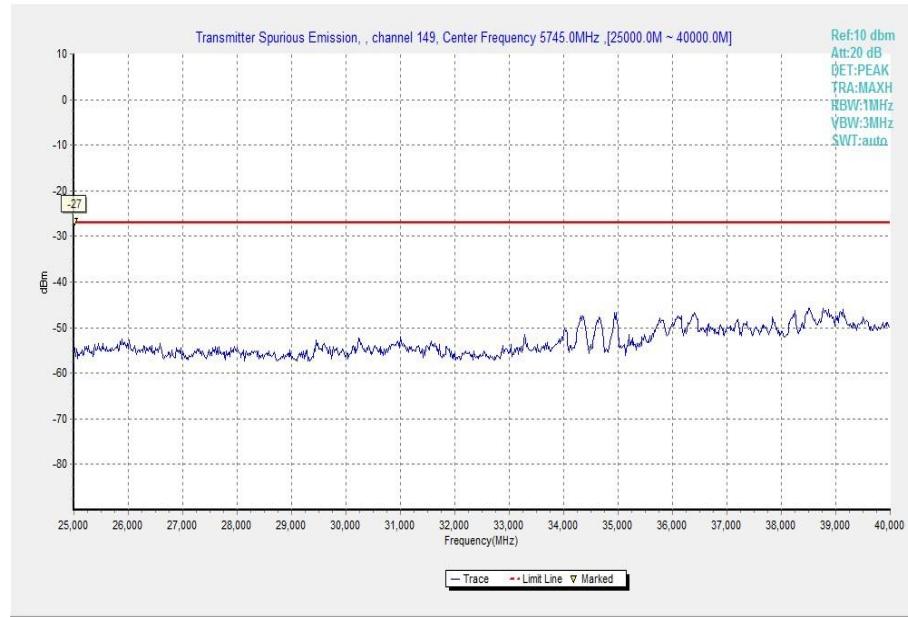


Fig. 12 Conducted Spurious Emission (802.11a, Ch149, 25 GHz-40 GHz)

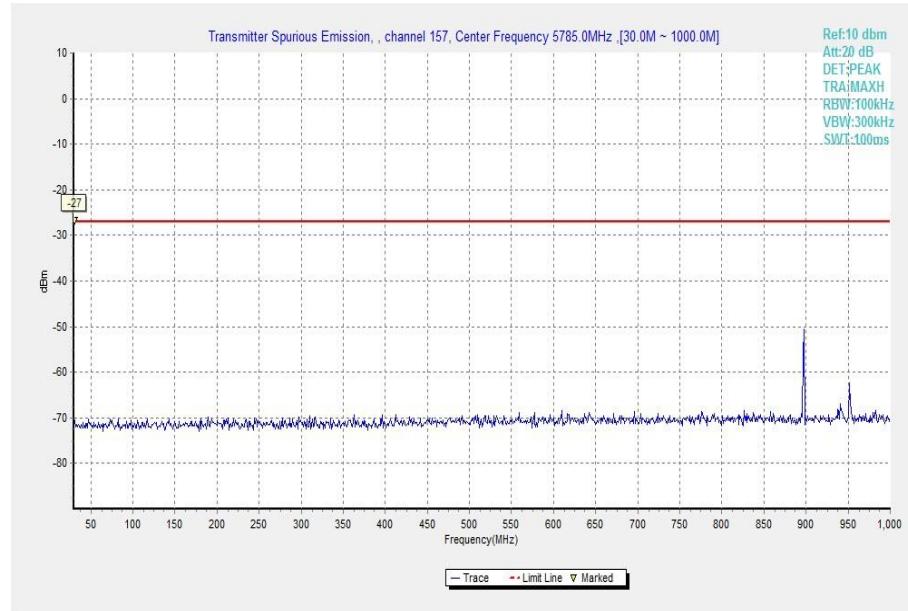


Fig. 13 Conducted Spurious Emission (802.11a, Ch157, 30 MHz-1 GHz)

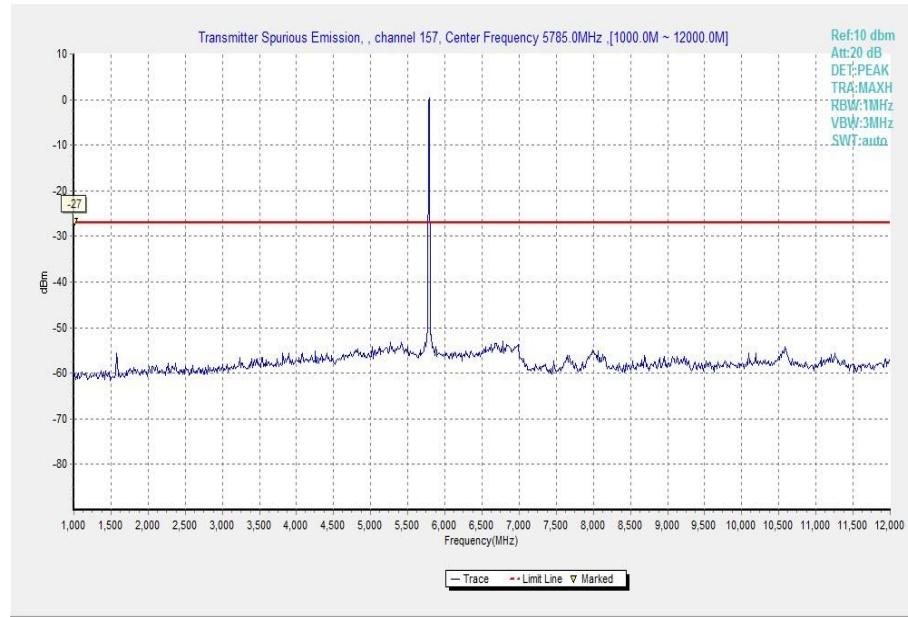


Fig. 14 Conducted Spurious Emission (802.11a, Ch157, 1 GHz -12 GHz)

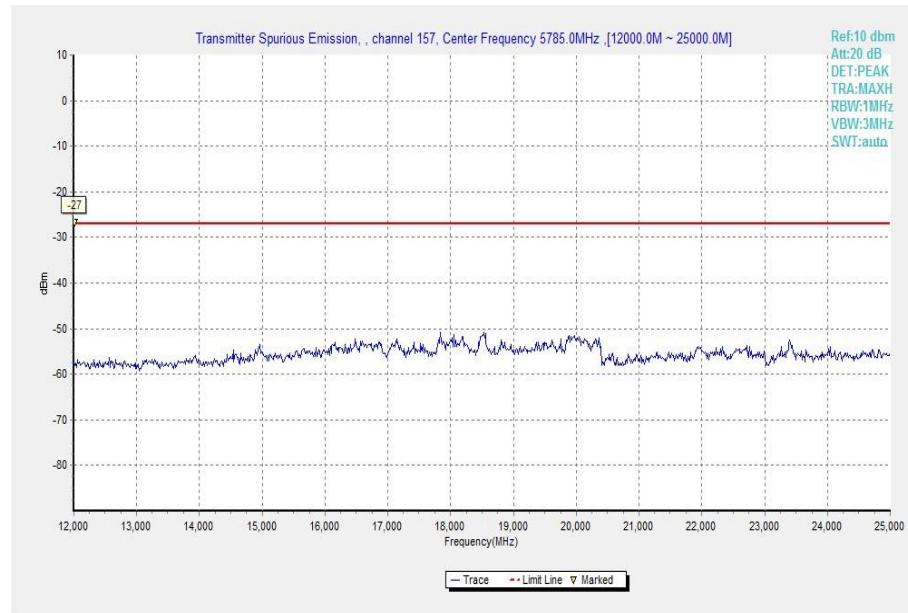


Fig. 15 Conducted Spurious Emission (802.11a, Ch157, 12 GHz-25 GHz)

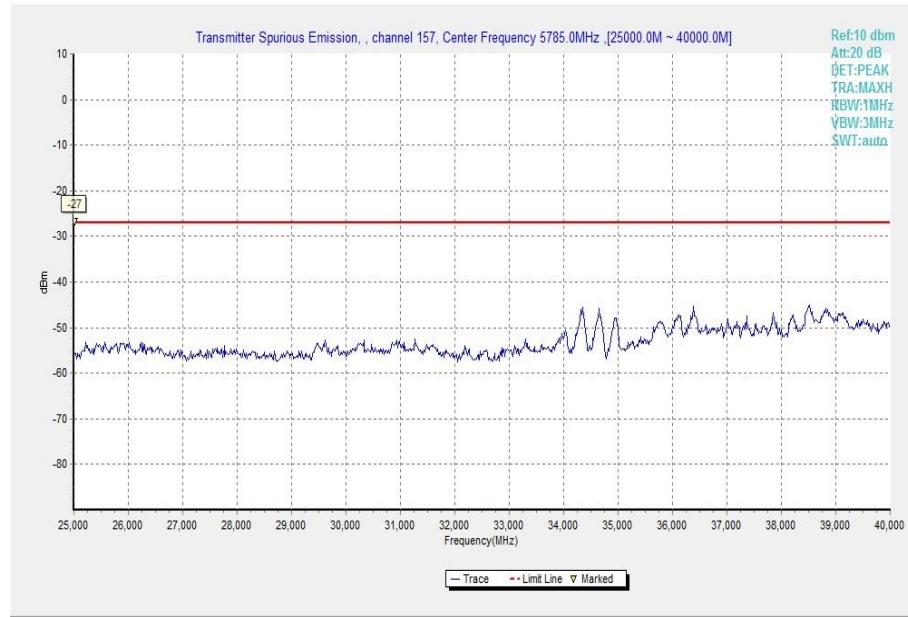


Fig. 16 Conducted Spurious Emission (802.11a, Ch157, 25 GHz-40 GHz)

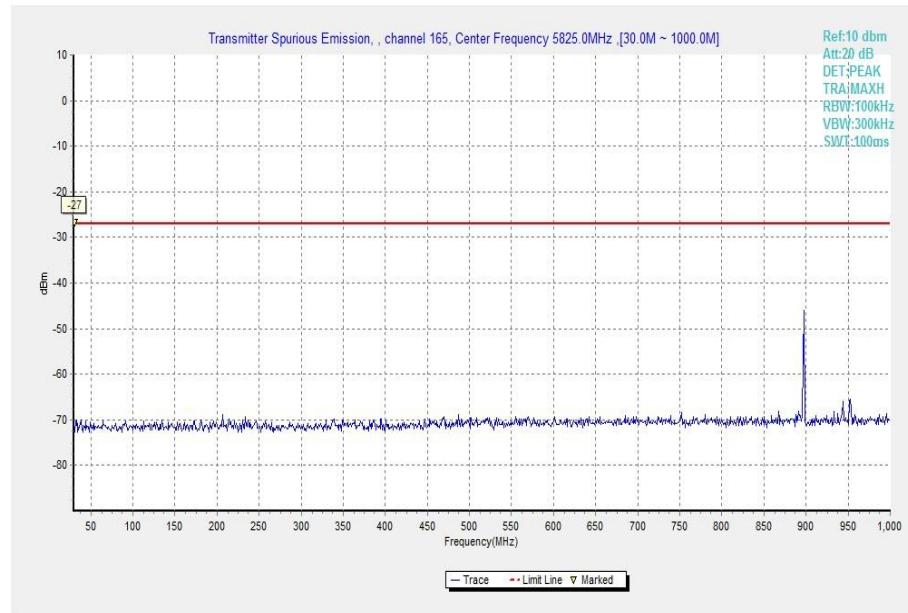
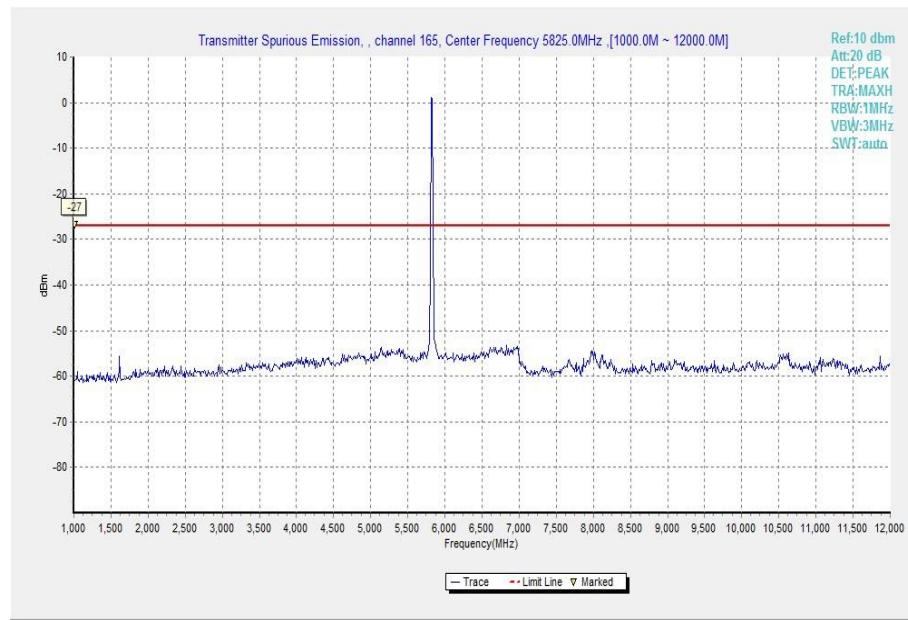
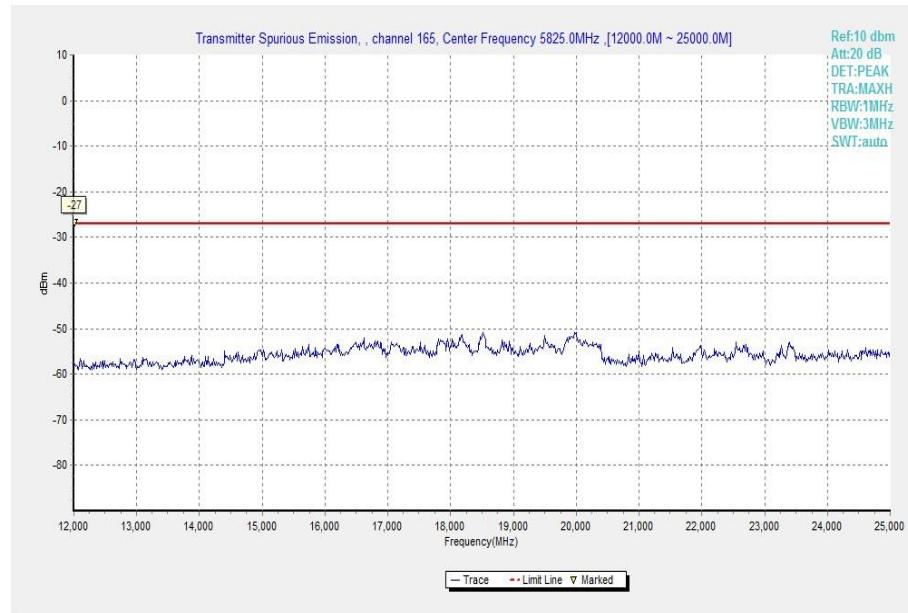


Fig. 17 Conducted Spurious Emission (802.11a, Ch165, 30 MHz-1 GHz)


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

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

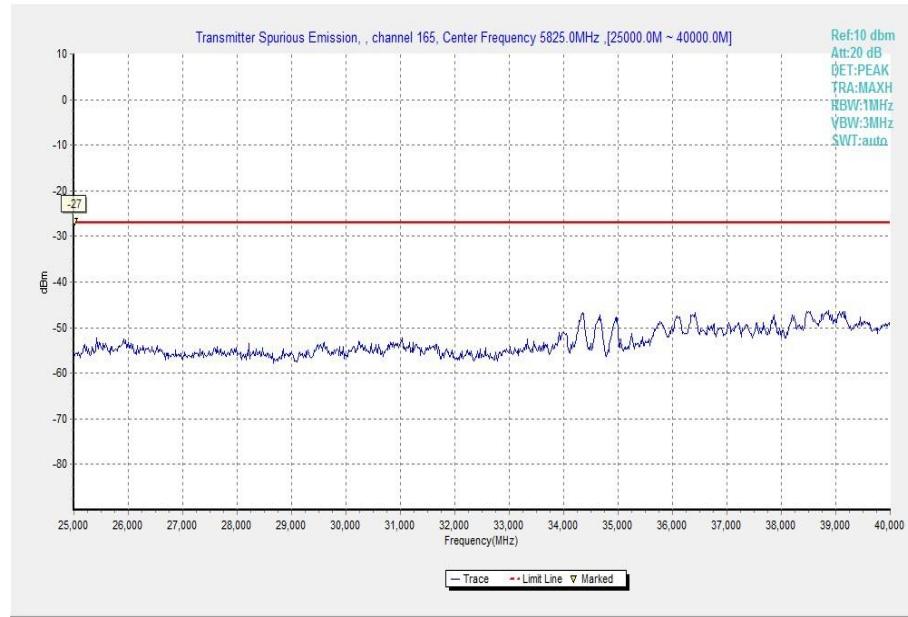


Fig. 20 Conducted Spurious Emission (802.11a, Ch165, 25 GHz-40 GHz)

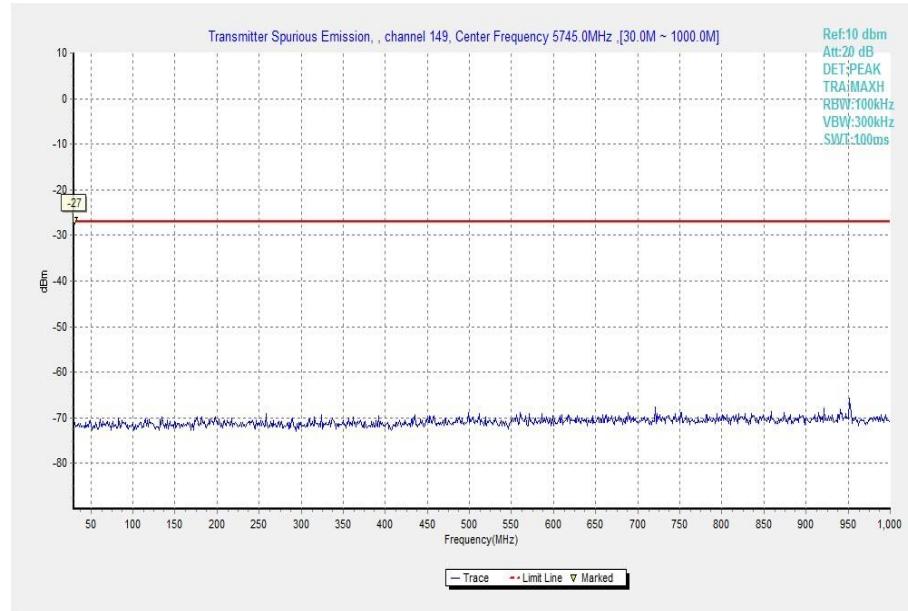


Fig. 21 Conducted Spurious Emission (802.11n-HT20, Ch149, 30 MHz-1 GHz)

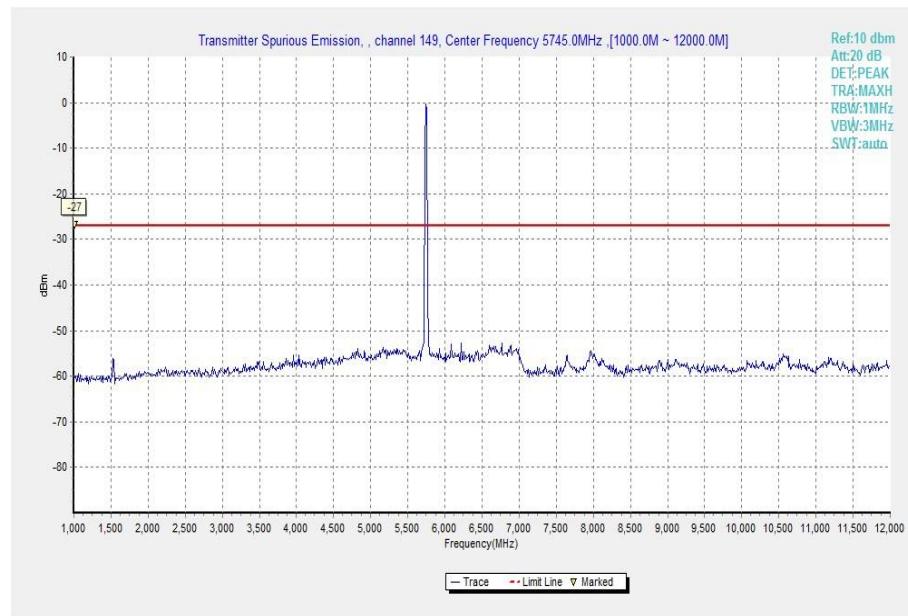


Fig. 22 Conducted Spurious Emission (802.11n-HT20, Ch149, 1 GHz -12 GHz)

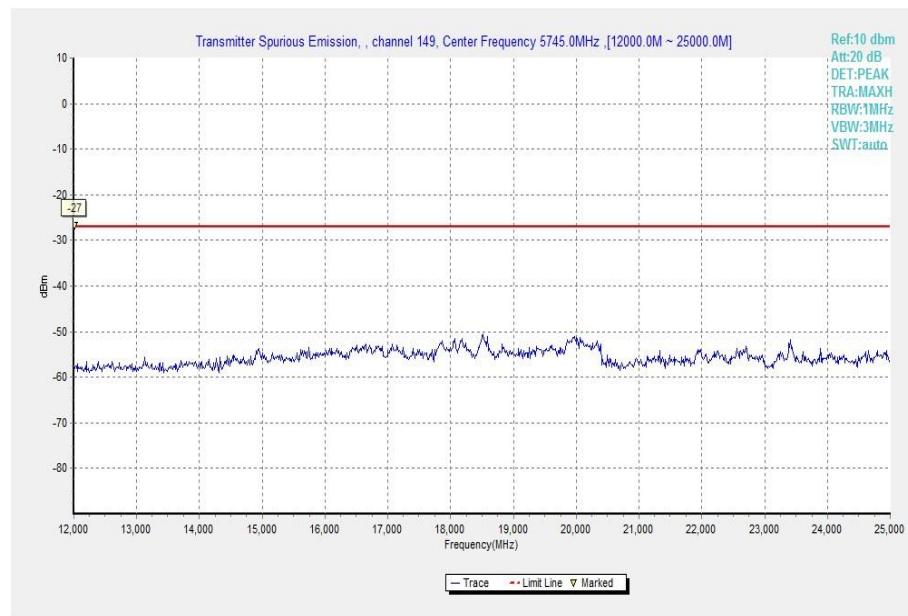


Fig. 23 Conducted Spurious Emission (802.11n-HT20, Ch149, 12 GHz-25 GHz)

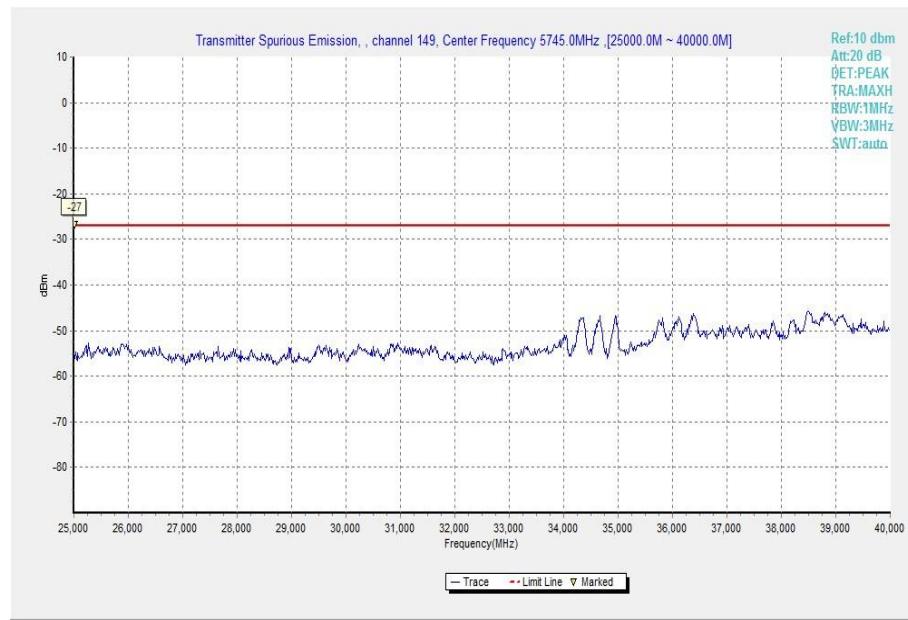


Fig. 24 Conducted Spurious Emission (802.11n-HT20, Ch149, 25 GHz-40 GHz)

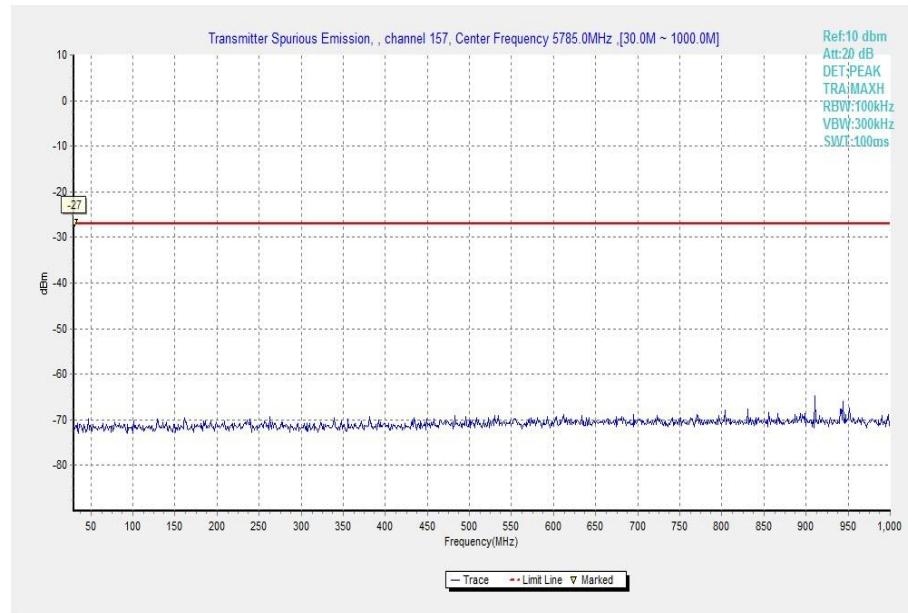


Fig. 25 Conducted Spurious Emission (802.11n-HT20, Ch157, 30 MHz-1 GHz)

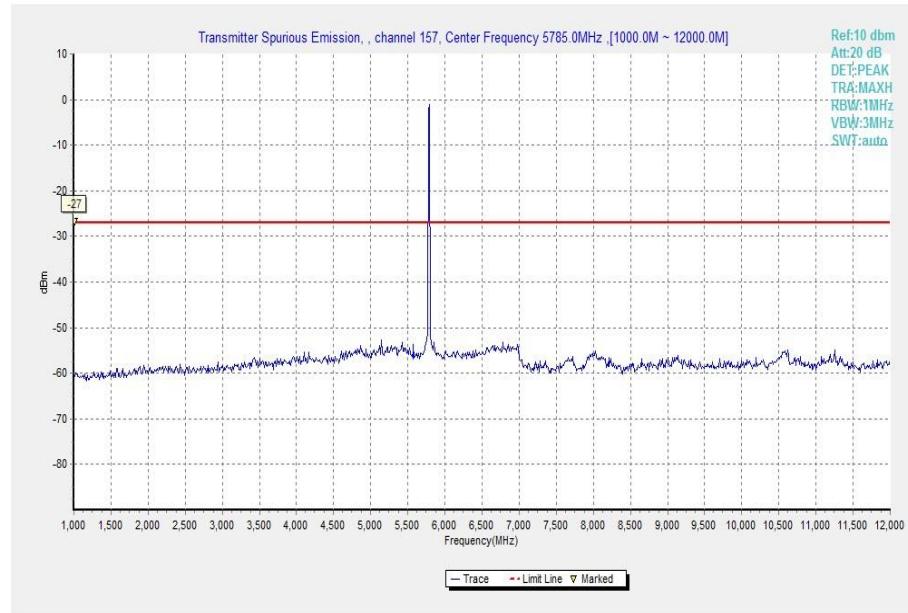


Fig. 26 Conducted Spurious Emission (802.11n-HT20, Ch157, 1 GHz -12 GHz)

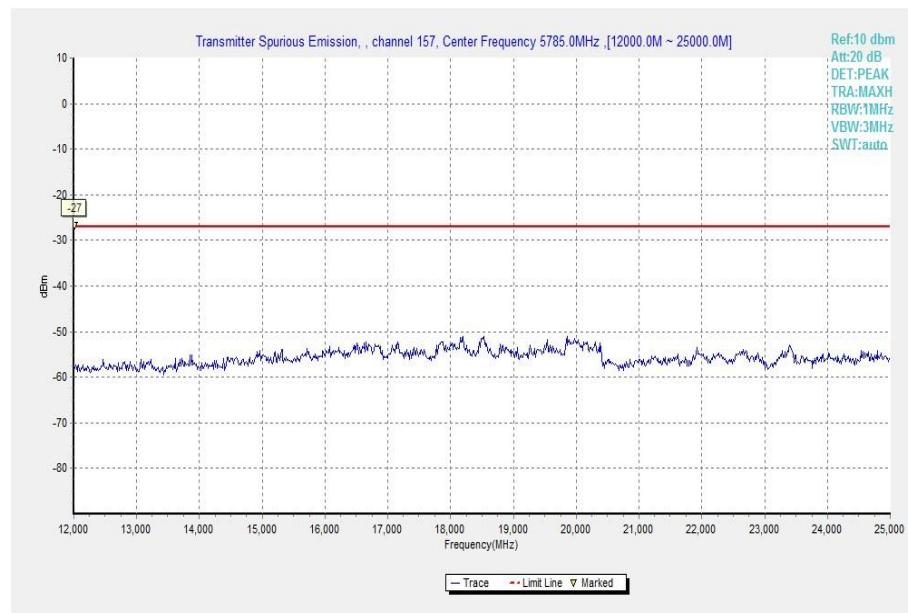


Fig. 27 Conducted Spurious Emission (802.11n-HT20, Ch157, 12 GHz-25 GHz)

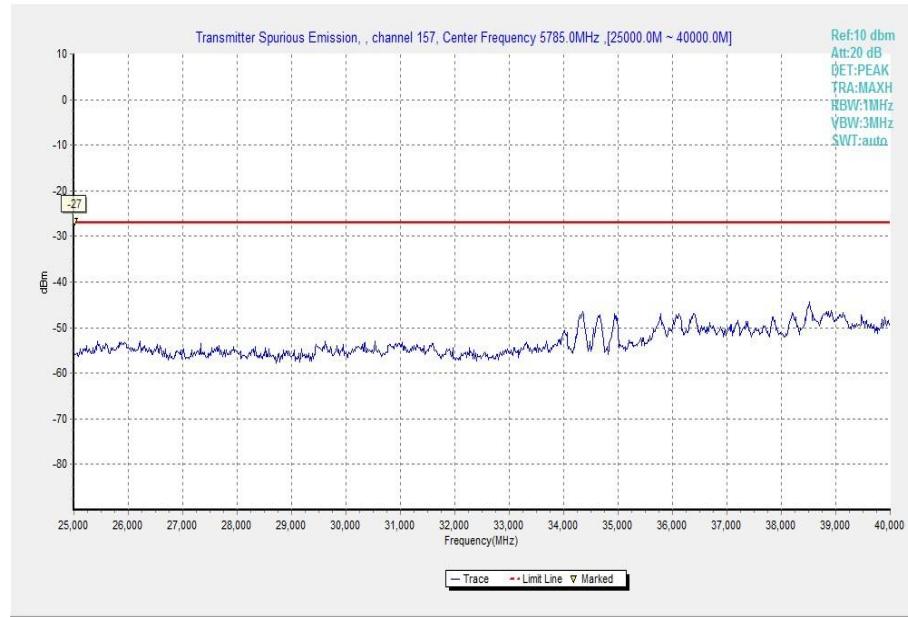


Fig. 28 Conducted Spurious Emission (802.11n-HT20, Ch157, 25 GHz-40 GHz)

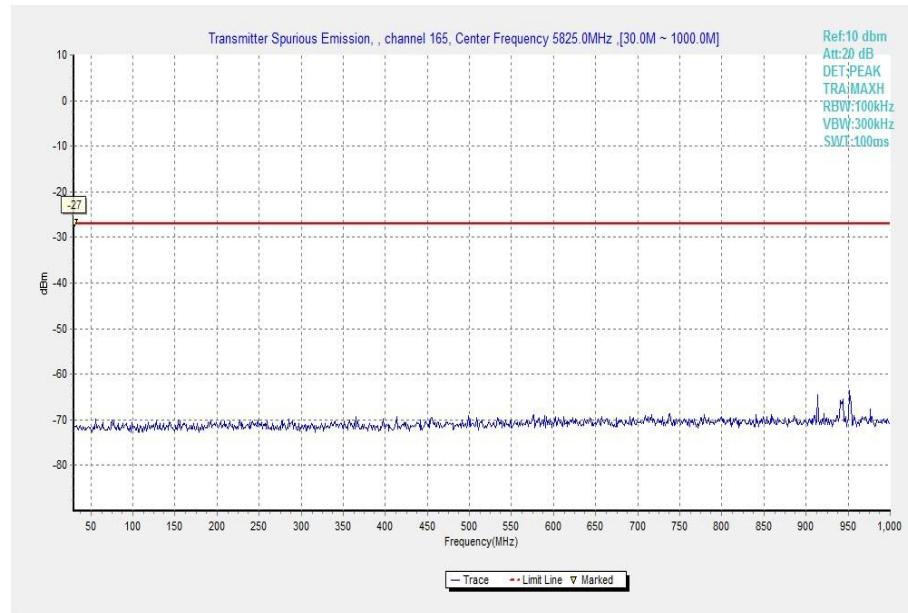


Fig. 29 Conducted Spurious Emission (802.11n-HT20, Ch165, 30 MHz-1 GHz)

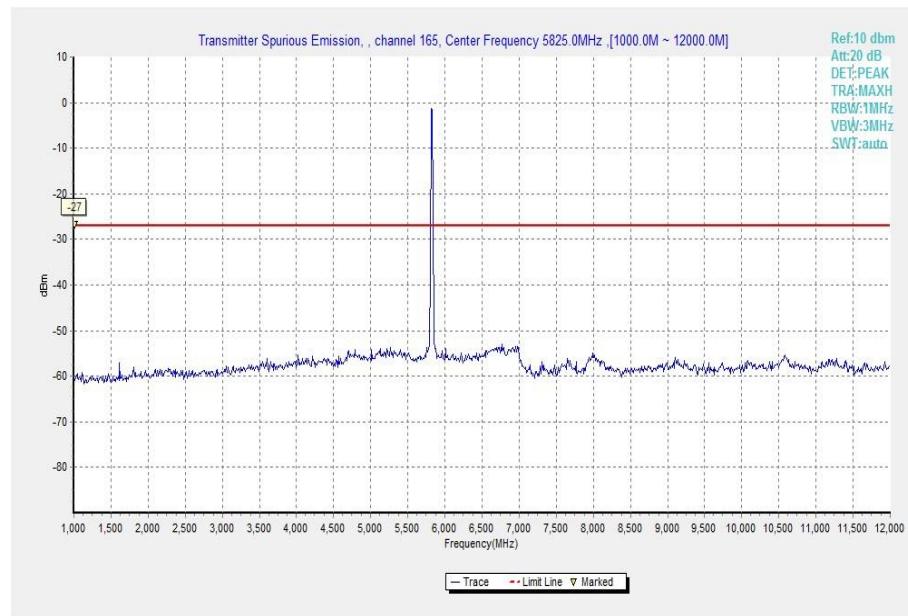


Fig. 30 Conducted Spurious Emission (802.11n-HT20, Ch165, 1 GHz -12 GHz)

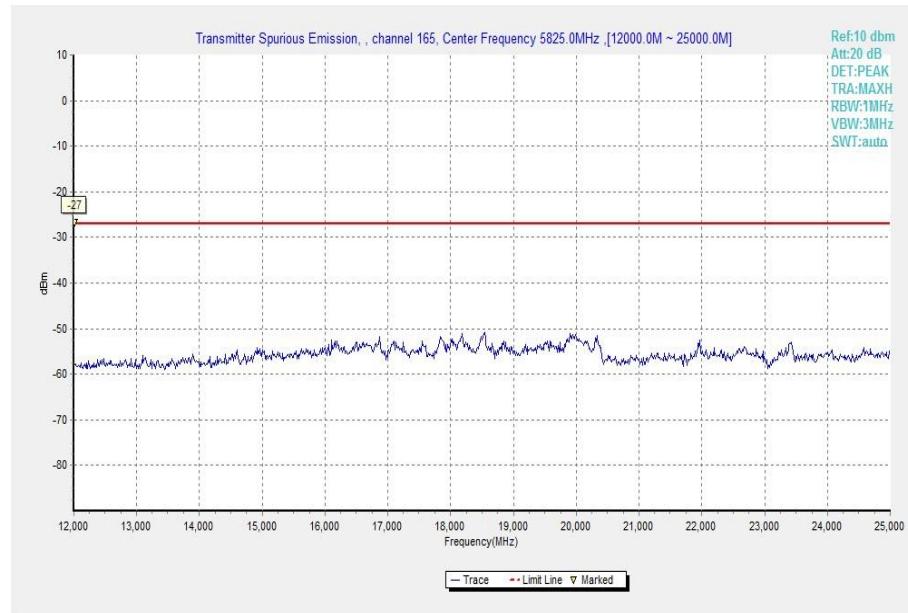


Fig. 31 Conducted Spurious Emission (802.11n-HT20, Ch165, 12 GHz-25 GHz)

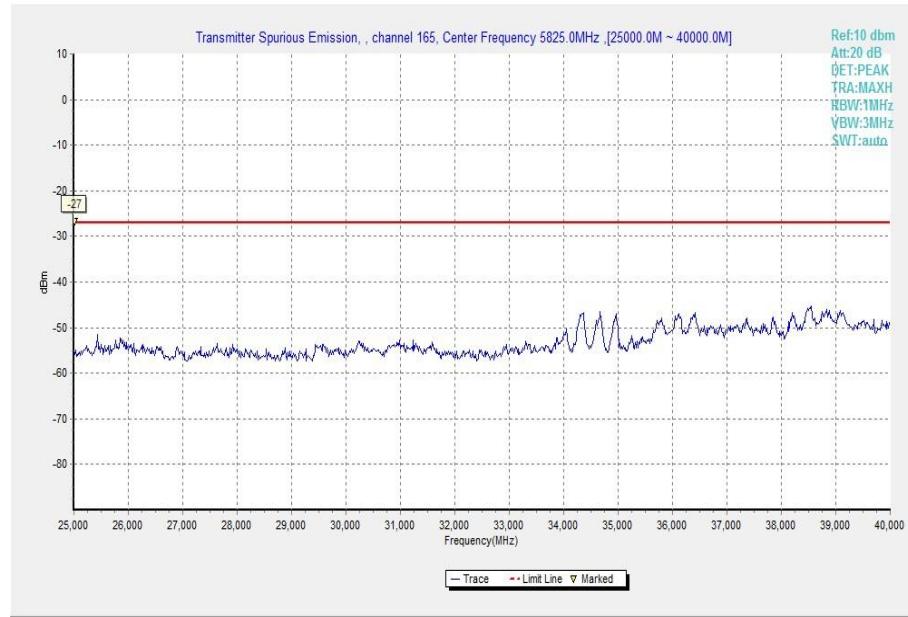


Fig. 32 Conducted Spurious Emission (802.11n-HT20, Ch165, 25 GHz-40 GHz)

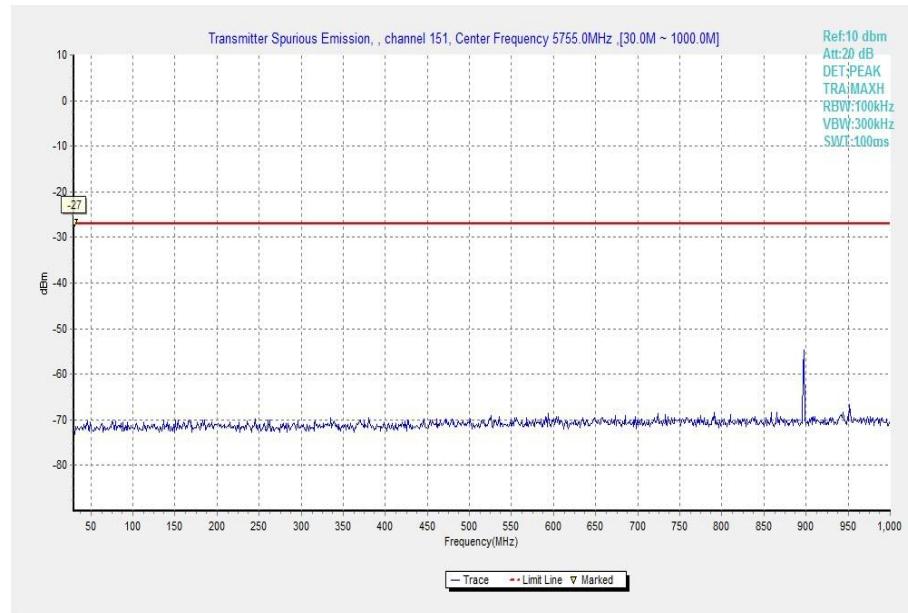


Fig. 33 Conducted Spurious Emission (802.11n-HT40, Ch151, 30 MHz-1 GHz)

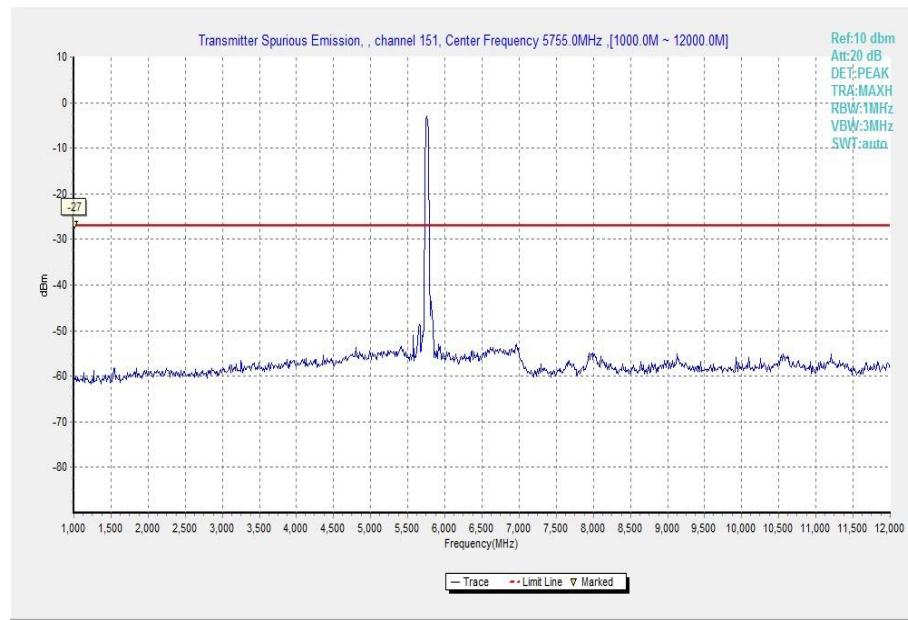


Fig. 34 Conducted Spurious Emission (802.11n-HT40, Ch151, 1 GHz -12 GHz)

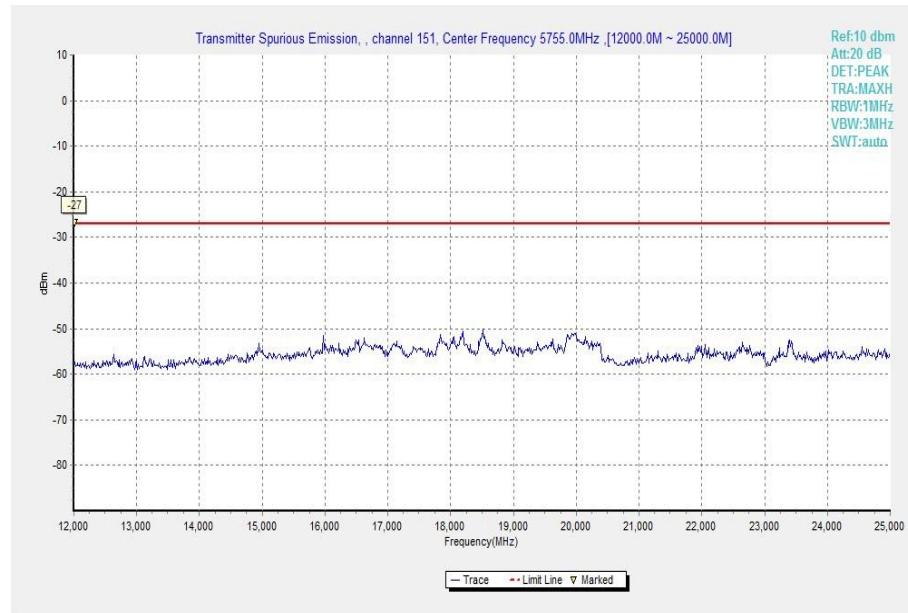


Fig. 35 Conducted Spurious Emission (802.11n-HT40, Ch151, 12 GHz-25 GHz)

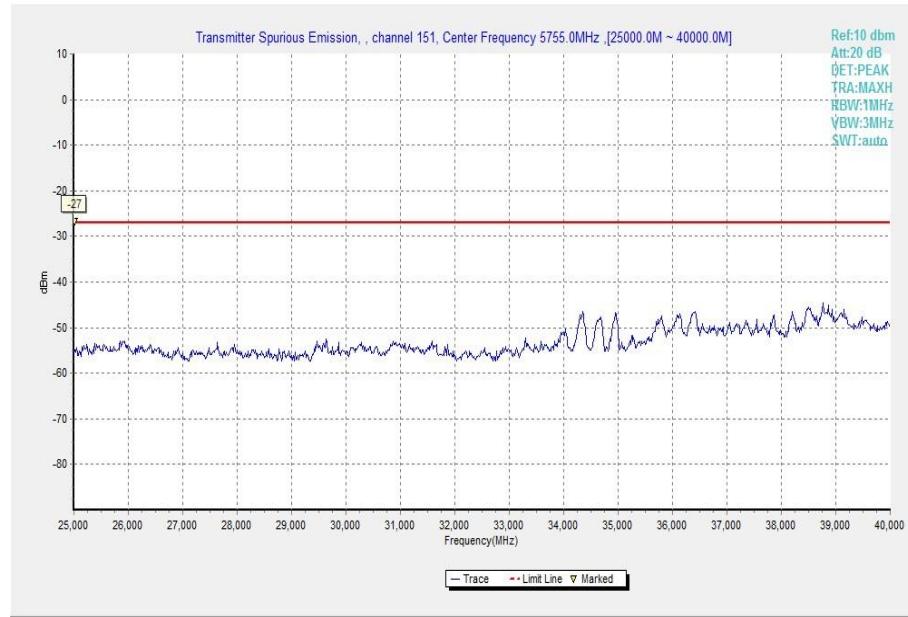


Fig. 36 Conducted Spurious Emission (802.11n-HT40, Ch151, 25 GHz-40 GHz)

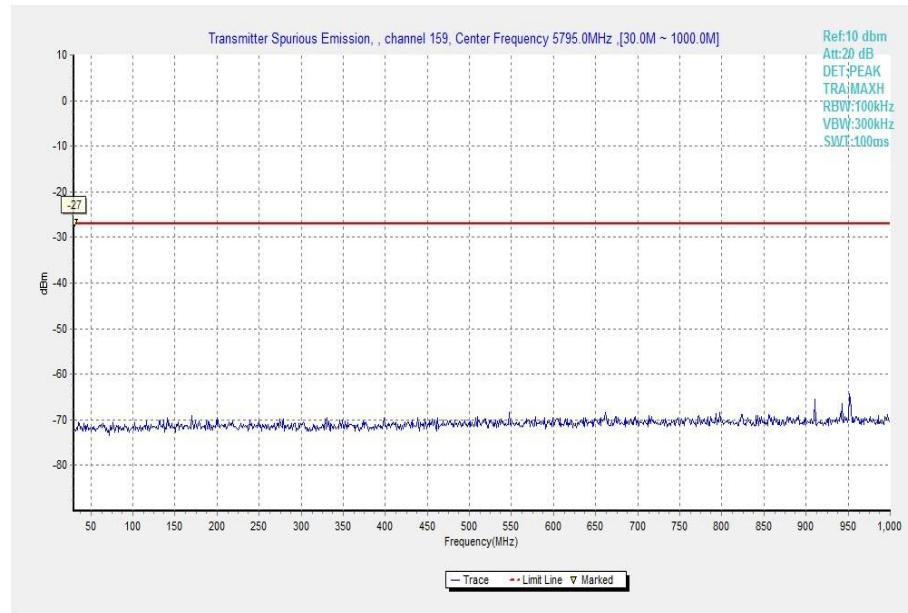


Fig. 37 Conducted Spurious Emission (802.11n-HT40, Ch159, 30 MHz-1 GHz)

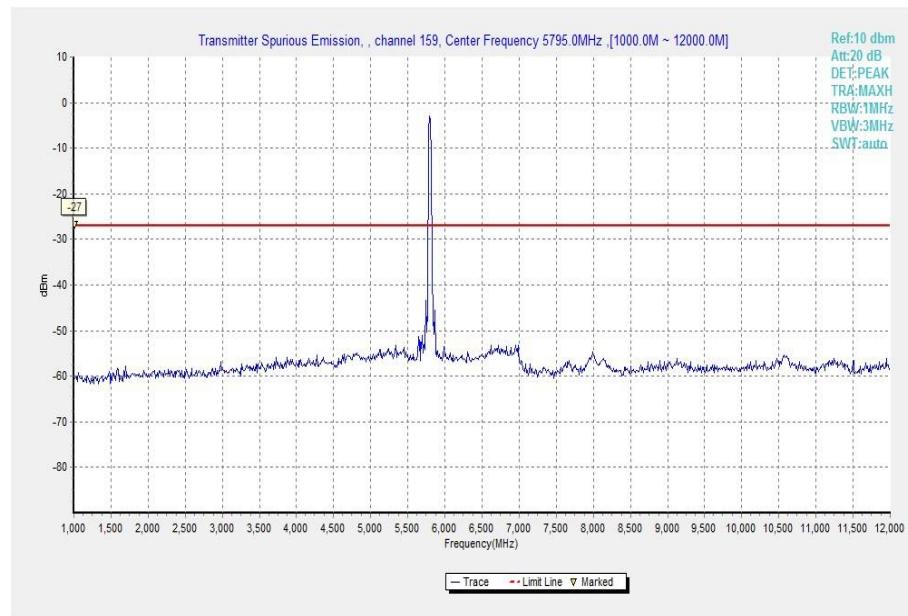


Fig. 38 Conducted Spurious Emission (802.11n-HT40, Ch159, 1 GHz -12 GHz)

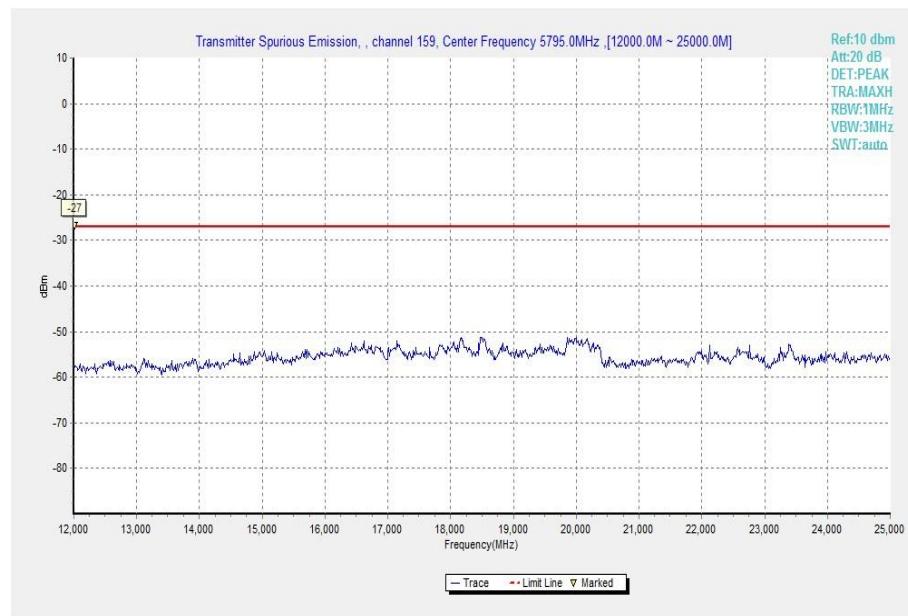


Fig. 39 Conducted Spurious Emission (802.11n-HT40, Ch159, 12 GHz-25 GHz)

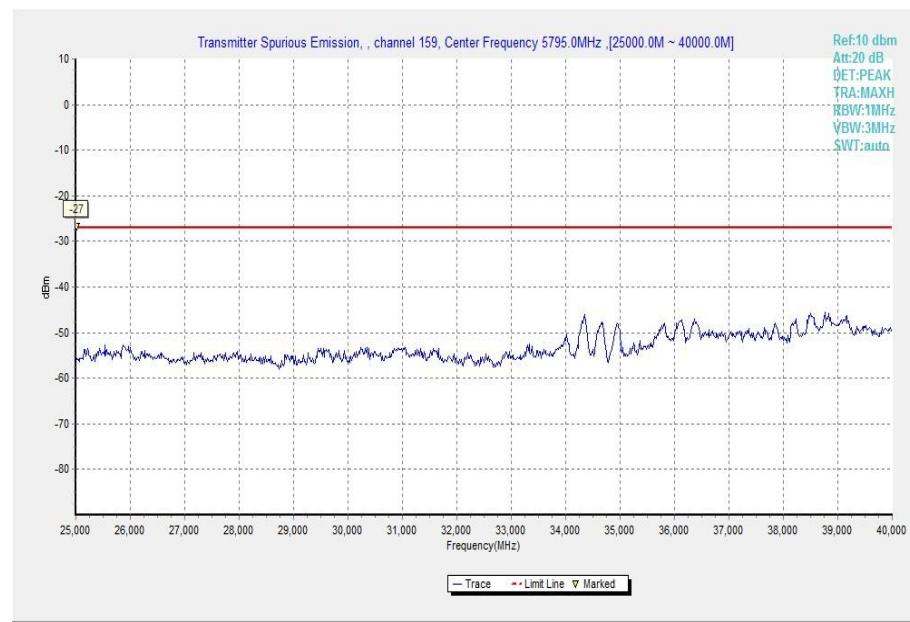


Fig. 40 Conducted Spurious Emission (802.11n-HT40, Ch159, 25 GHz-40 GHz)

A.5.2 Transmitter Spurious Emission - Radiated

Measurement Uncertainty:

Frequency Range	Uncertainty (dB)
f < 1GHz	4.86
f > 1GHz	5.28

Measurement Result:

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11a	149	1 GHz ~18 GHz	Fig.41	P
		9 KHz ~30 MHz	Fig.42	P
		30 MHz ~1 GHz	Fig.43	P
		1 GHz ~18 GHz	Fig.44	P
		18 GHz ~26.5 GHz	Fig.45	P
		26.5 GHz ~40 GHz	Fig.46	P
	165	1 GHz ~18 GHz	Fig.47	P
802.11n HT20	149	1 GHz ~18 GHz	Fig.48	P
		9 KHz ~30 MHz	Fig.49	P
		30 MHz ~1 GHz	Fig.50	P
		1 GHz ~18 GHz	Fig.51	P
		18 GHz ~26.5 GHz	Fig.52	P
		26.5 GHz ~40 GHz	Fig.53	P
	165	1 GHz ~18 GHz	Fig.54	P
802.11n HT40	151	9 KHz ~30 MHz	Fig.55	P
		30 MHz ~1 GHz	Fig.56	P
		1 GHz ~18 GHz	Fig.57	P
		18 GHz ~26.5 GHz	Fig.58	P
		26.5 GHz ~40 GHz	Fig.59	P
		1 GHz ~18 GHz	Fig.60	P

Conclusion: PASS

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.

The measurement results are obtained as described below:

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

Test graphs as below:

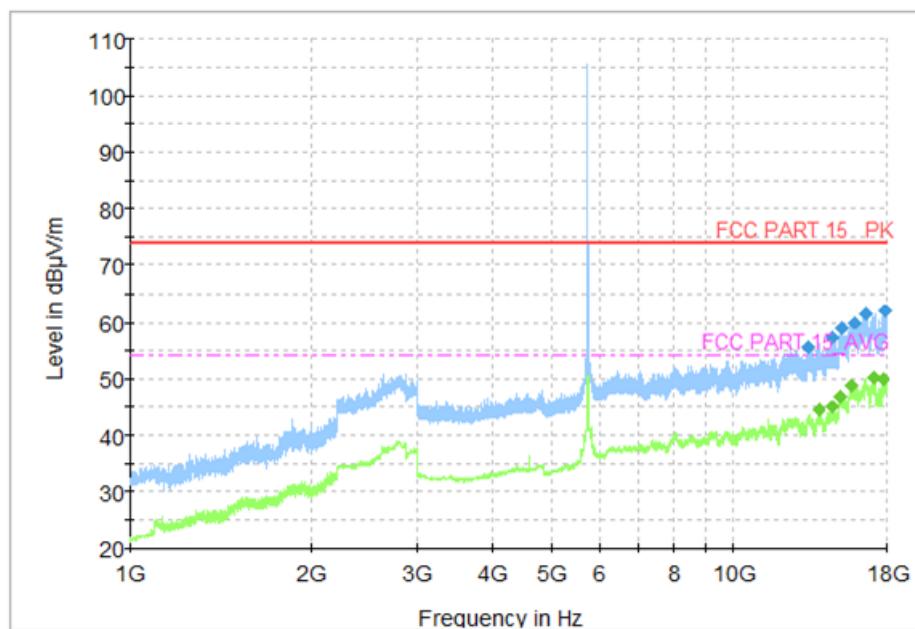


Fig. 41 WIFI-11a-CH149-1G-18G

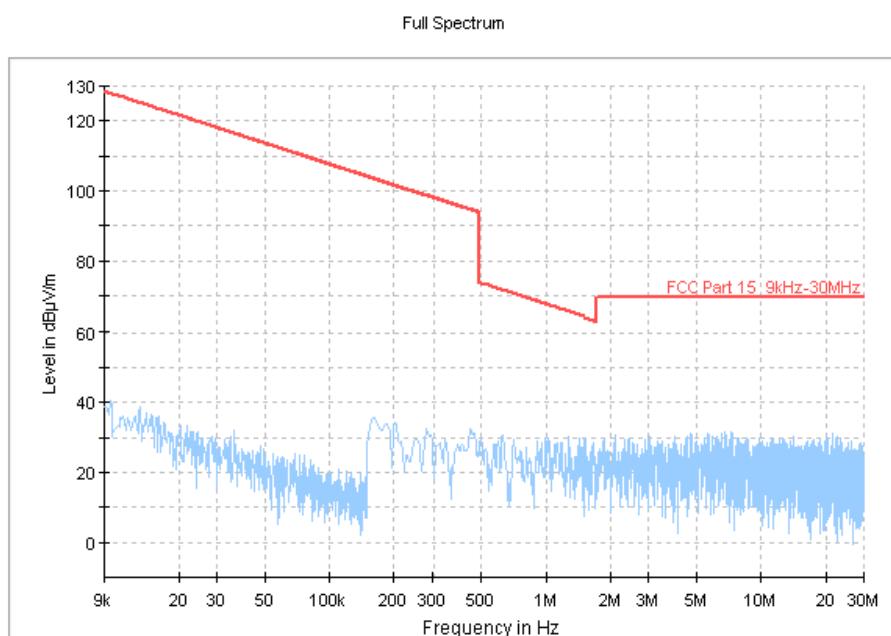


Fig. 42 WIFI-11a-CH157-9K-30M

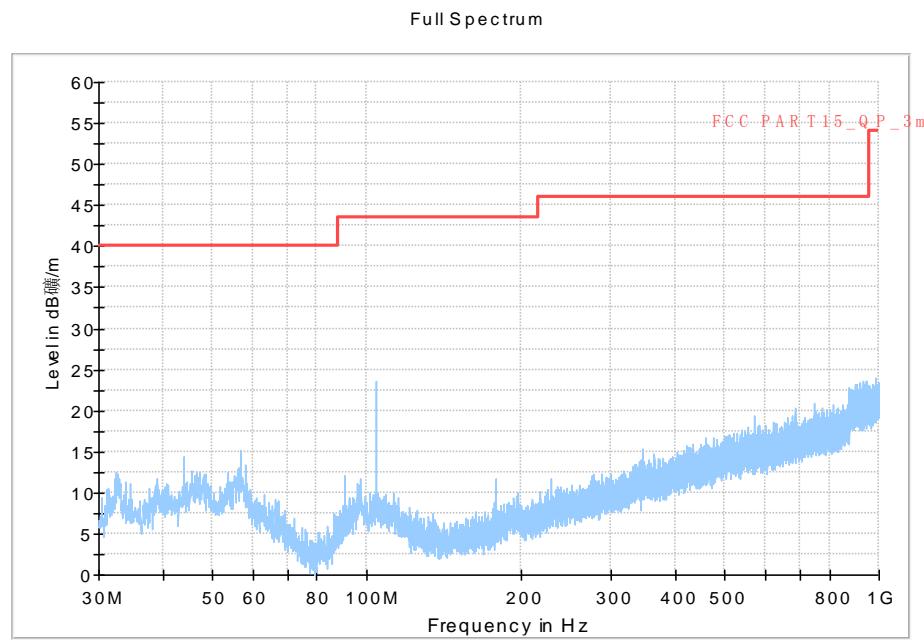


Fig. 43 WIFI-11a-CH157-30M-1G

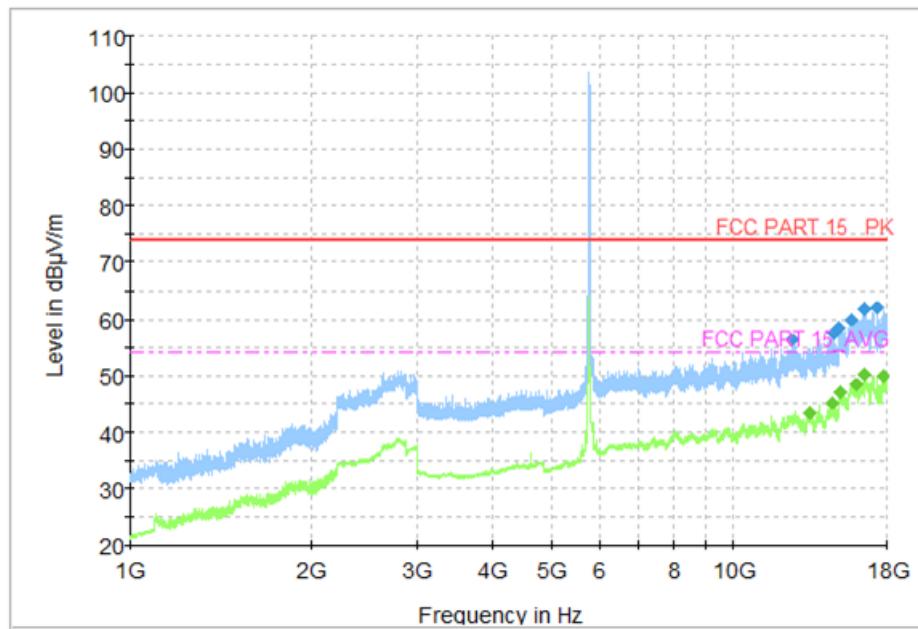


Fig. 44 WIFI-11a-CH157-1G-18G

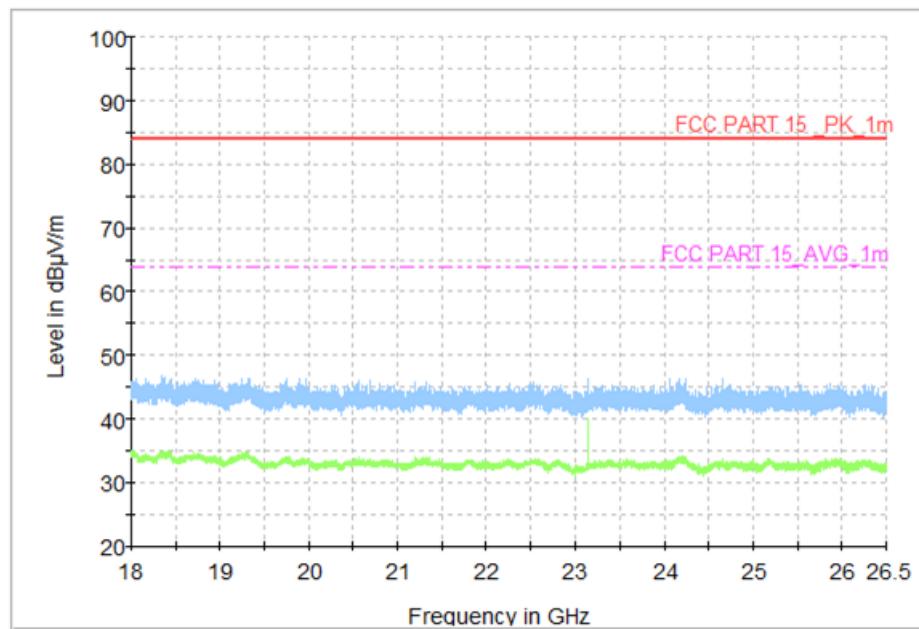


Fig. 45 WIFI-11a-CH157-18G-26.5G

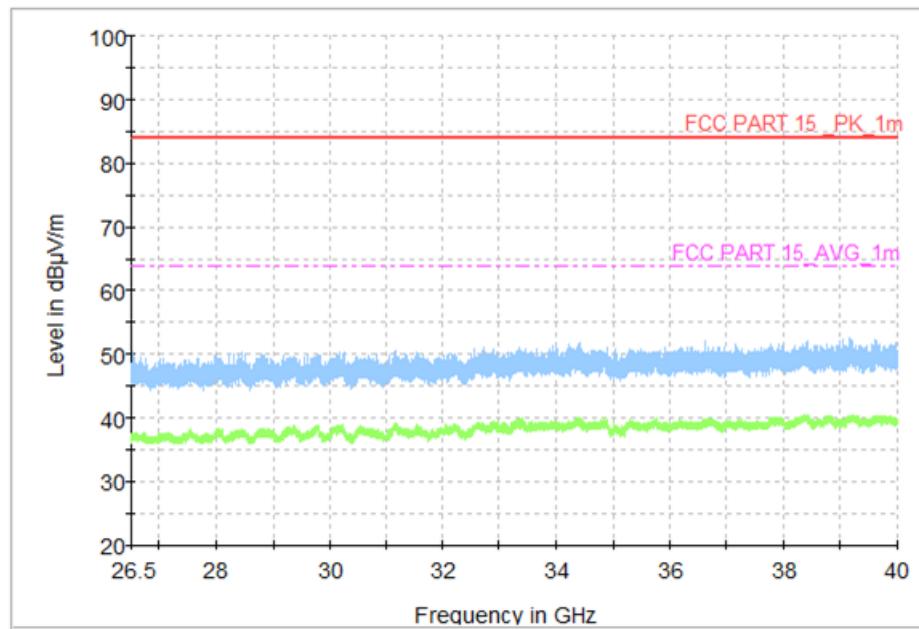


Fig. 46 WIFI-11a-CH157-26.5G-40G

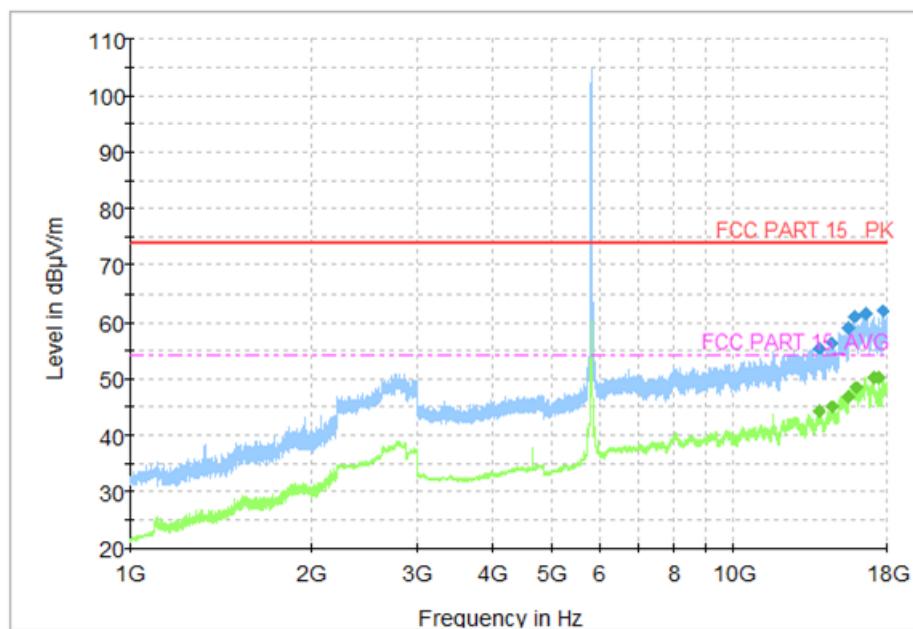


Fig. 47 WIFI-11a-CH165-1G-18G

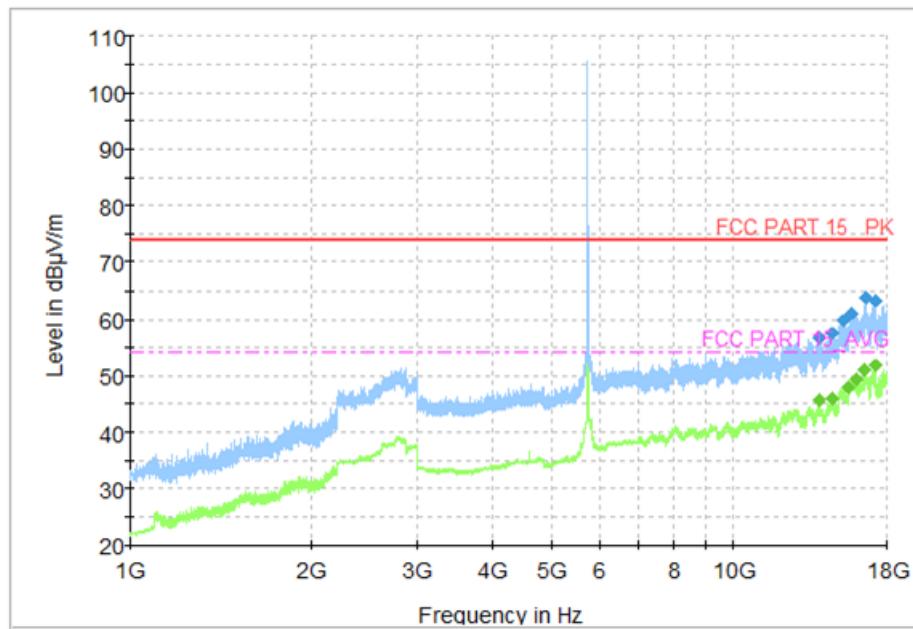


Fig. 48 WIFI-11n(HT20)-CH149-1G-18G

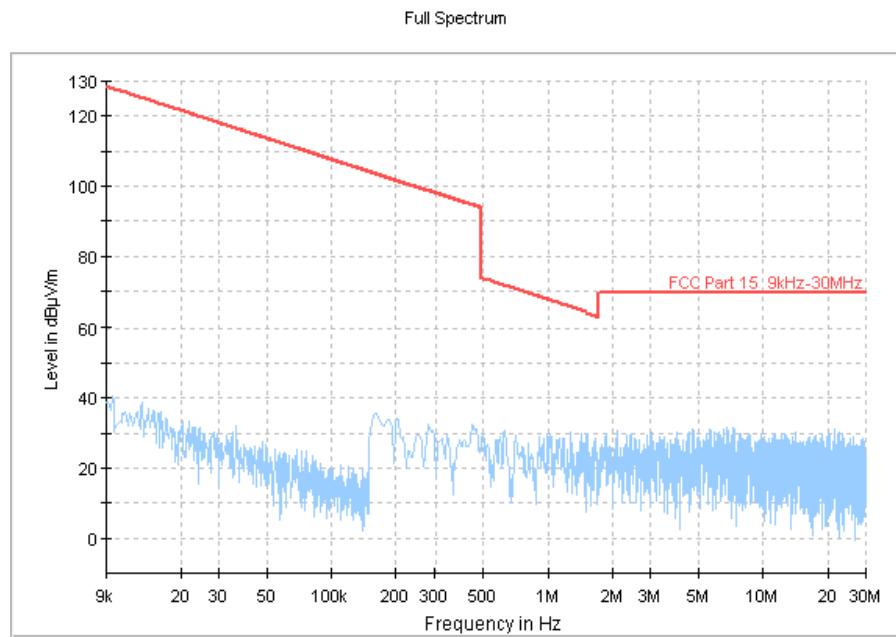


Fig. 49 WIFI-11n(HT20)-CH157-9K-30M

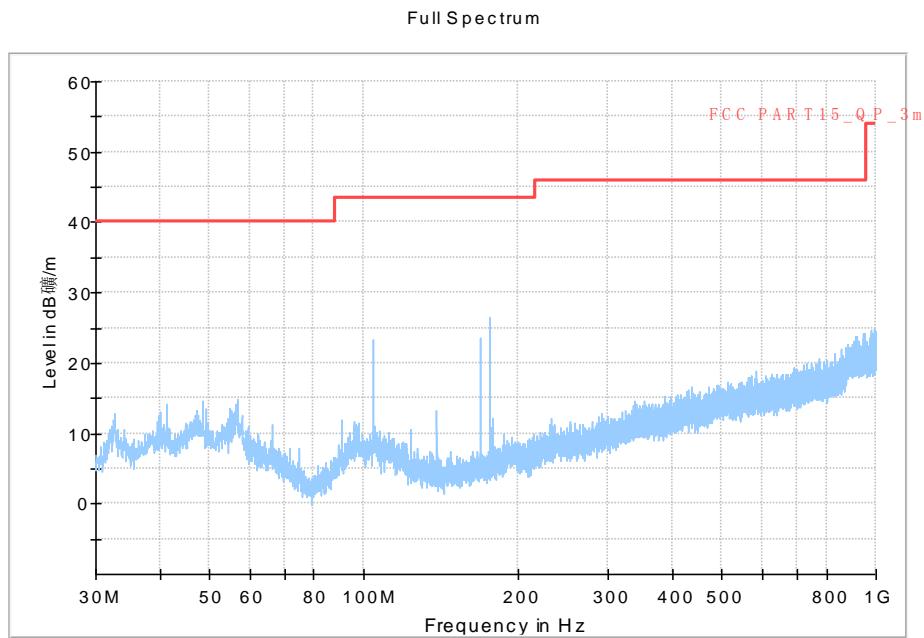


Fig. 50 WIFI-11n(HT20)-CH157-30M-1G

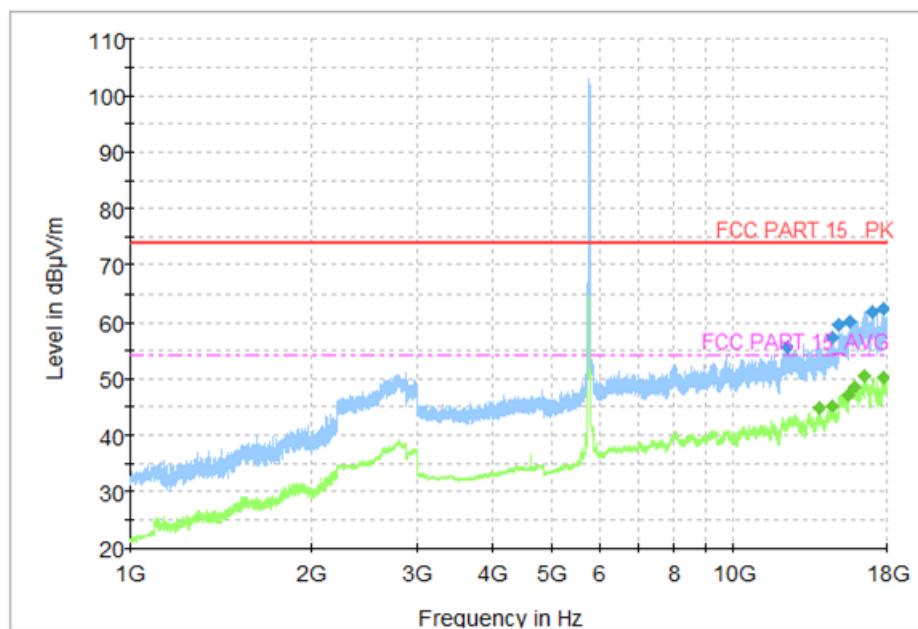


Fig. 51 WIFI-11n(HT20)-CH157-1G-18G

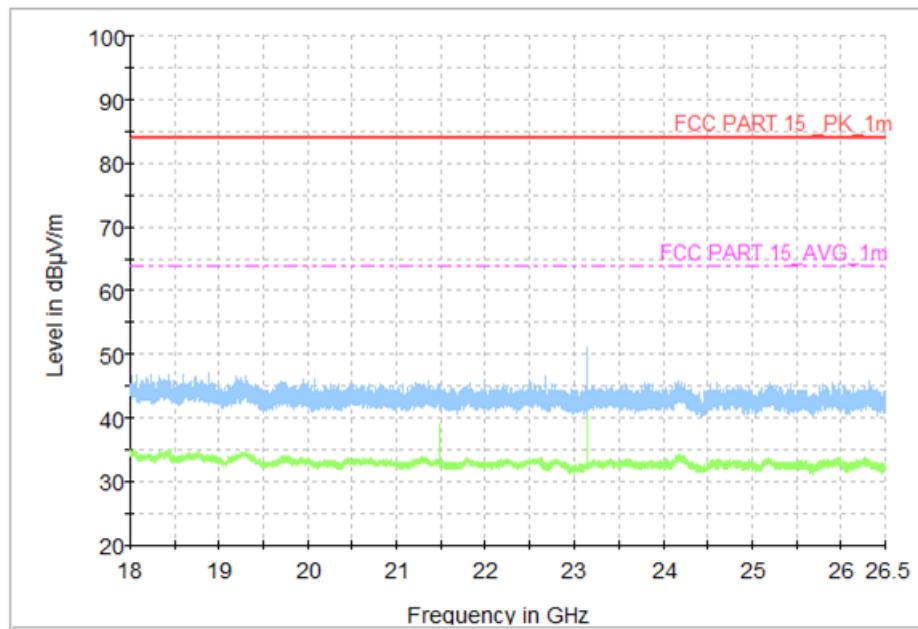


Fig. 52 WIFI-11n(HT20)-CH157-18G-26.5G

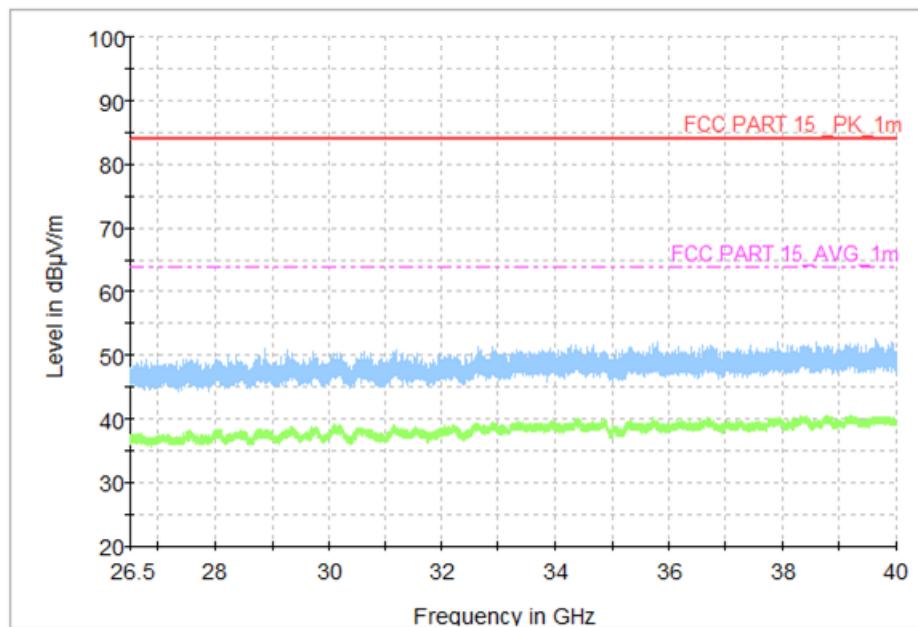


Fig. 53 WIFI-11n(HT20)-CH157-26.5G-40G

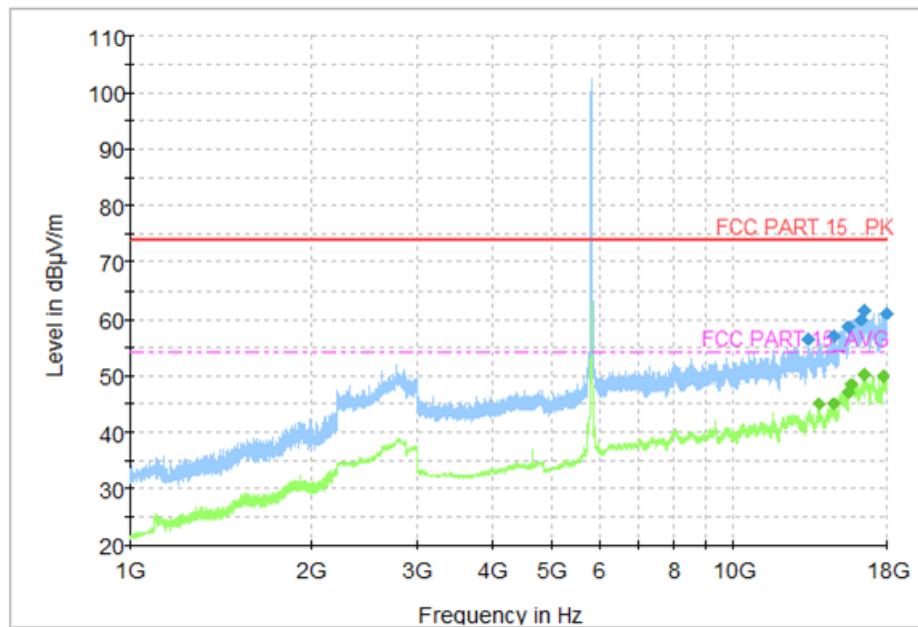


Fig. 54 WIFI-11n(HT20)-CH165-1G-18G

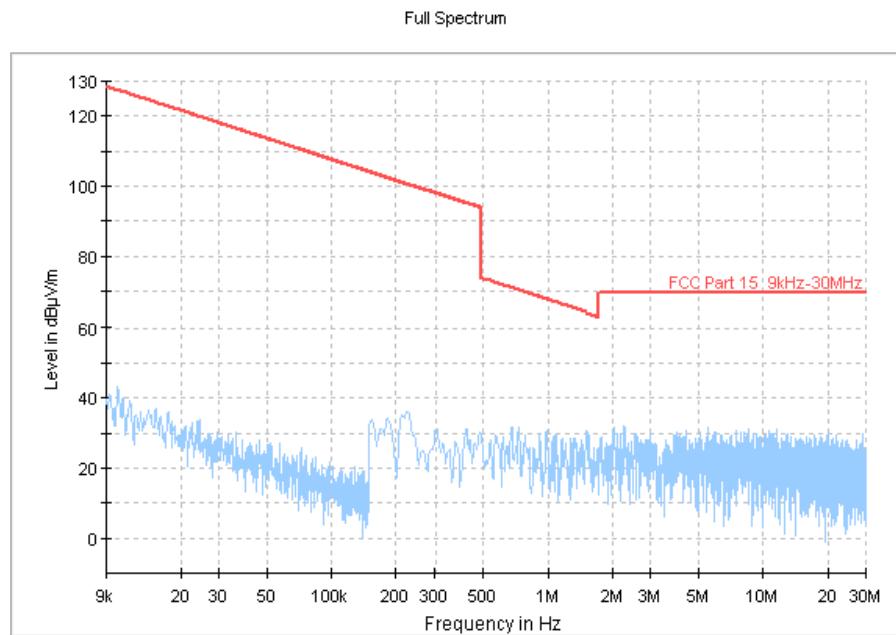


Fig. 55 WIFI-11n(HT40)-CH151-9K-30M

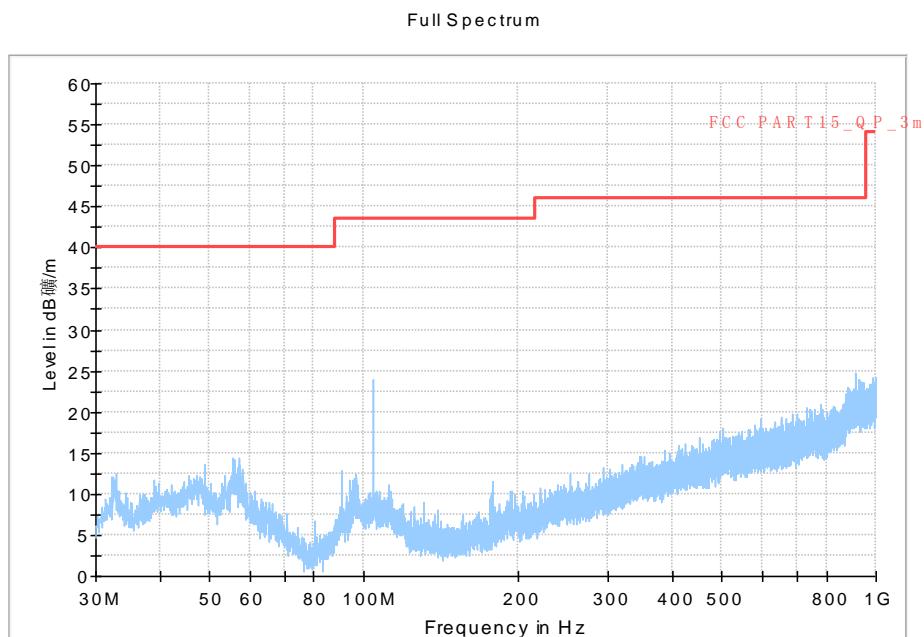


Fig. 56 WIFI-11n(HT40)-CH151-30M-1G

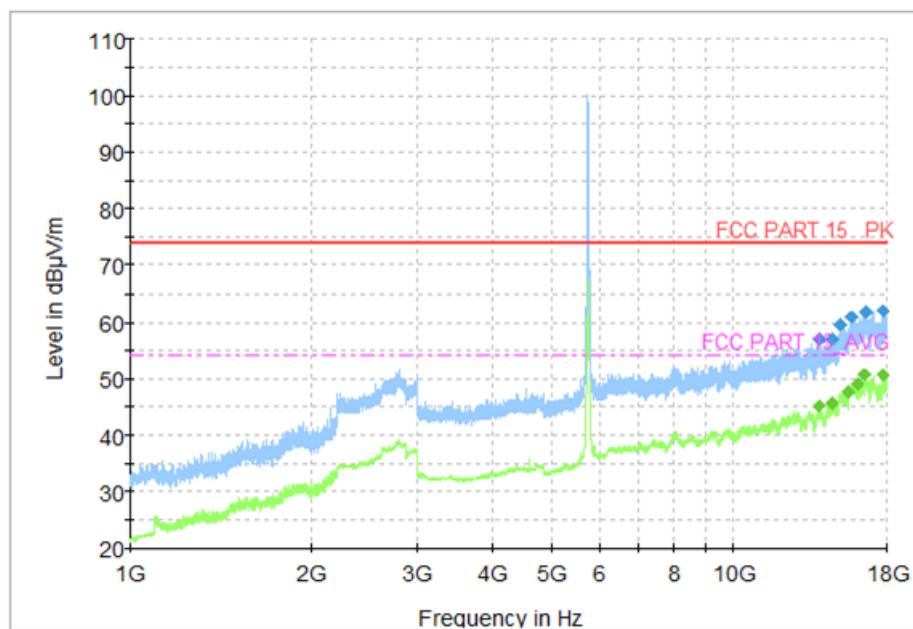


Fig. 57 WIFI-11n(HT40)-CH151-1G-18G

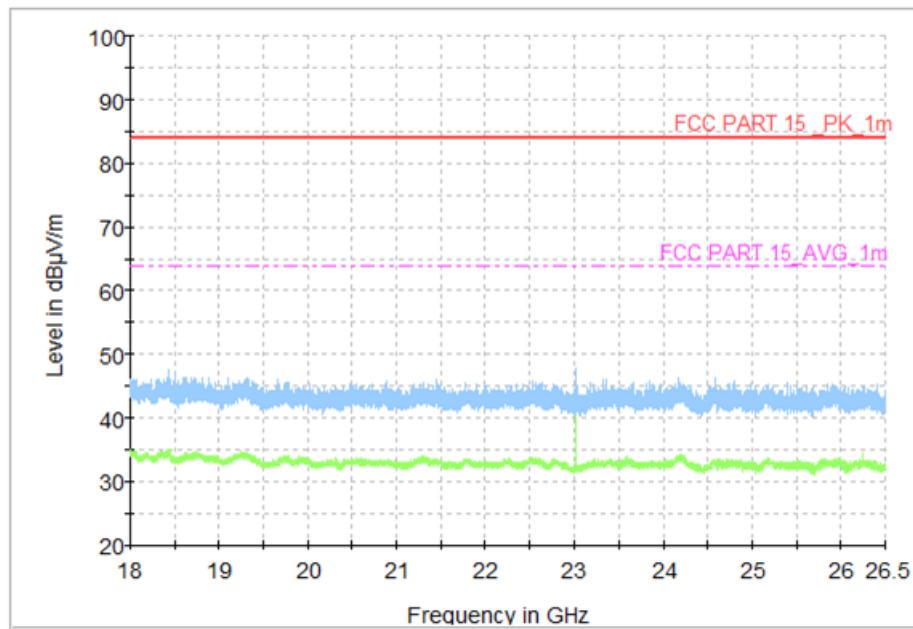


Fig. 58 WIFI-11n(HT40)-CH151-18G-26.5G

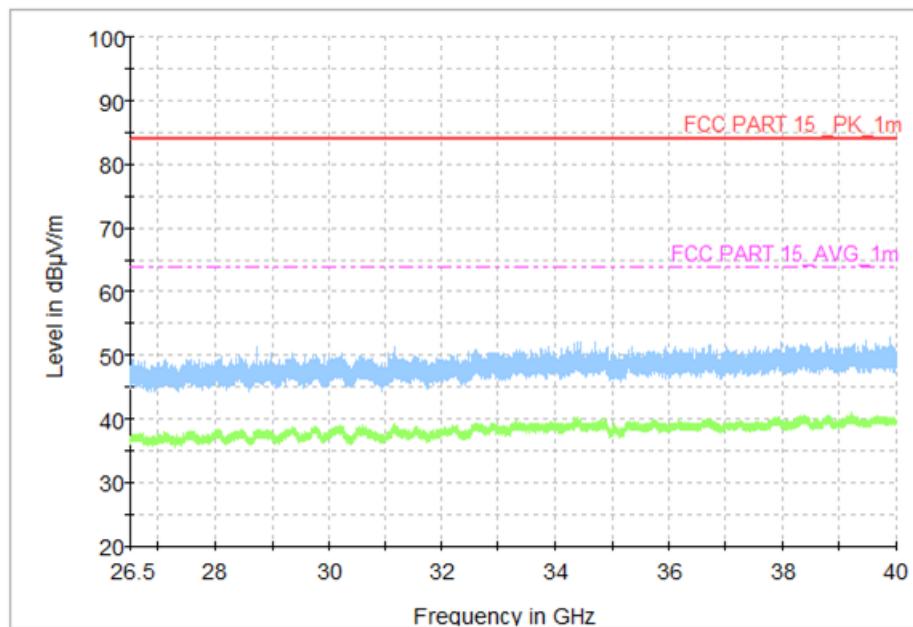


Fig. 59 WIFI-11n(HT40)-CH151-26.5G-40G

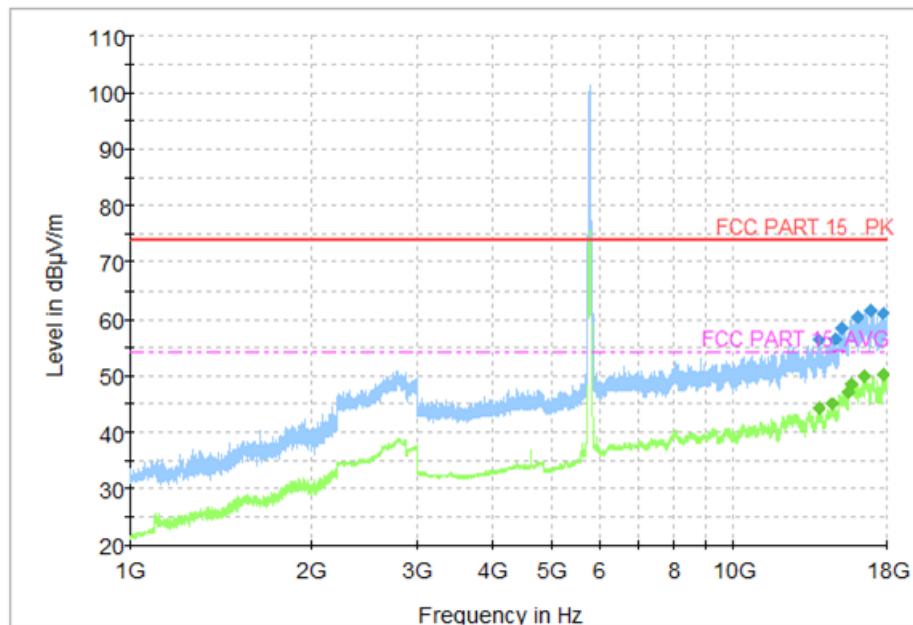


Fig. 60 WIFI-11n(HT40)-CH159-1G-18G

802.11a CH149 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13338.000000	55.48	74.00	18.52	20.3	H
14665.500000	57.16	74.00	16.84	21.3	V
15135.500000	59.07	74.00	14.93	22.3	V
15907.500000	59.97	74.00	14.03	24.2	V
16632.000000	61.49	74.00	12.51	25.9	V
17886.500000	61.84	74.00	12.16	28.2	H

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13909.000000	44.55	54.00	9.45	21.1	V
14683.000000	44.99	54.00	9.01	21.5	V
15111.500000	46.75	54.00	7.25	22.8	H
15739.000000	48.70	54.00	5.30	24.4	V
17110.500000	50.05	54.00	3.95	26.2	V
17705.000000	49.88	54.00	4.12	27.6	V

802.11a CH 157 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
12549.000000	56.28	74.00	17.72	19.4	V
14698.500000	57.32	74.00	16.68	21.6	H
15013.500000	58.41	74.00	15.59	22.5	V
15768.000000	59.98	74.00	14.02	23.8	V
16594.500000	61.60	74.00	12.40	26.3	V
17353.500000	61.94	74.00	12.06	26.4	V

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13418.000000	43.46	54.00	10.54	20.4	H
14686.500000	45.09	54.00	8.91	21.6	V
15108.500000	46.92	54.00	7.08	22.7	V
15969.500000	48.34	54.00	5.66	25.6	H
16589.500000	50.12	54.00	3.88	26.3	V
17707.500000	49.89	54.00	4.11	27.6	H

802.11a CH165 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13930.000000	55.38	74.00	18.62	20.5	H
14598.000000	56.28	74.00	17.72	21.6	H
15577.000000	58.96	74.00	15.04	23.8	V
15927.000000	60.92	74.00	13.08	24.8	V
16624.000000	61.57	74.00	12.43	26.1	H
17709.000000	62.01	74.00	11.99	27.6	V

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13909.000000	44.34	54.00	9.66	21.1	V
14683.500000	44.91	54.00	9.09	21.5	H
15577.000000	46.73	54.00	7.27	23.8	V
15969.000000	48.39	54.00	5.61	25.6	H
17110.000000	50.25	54.00	3.75	26.2	V
17473.000000	50.14	54.00	3.86	25.3	V

802.11n (HT20) CH 149 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13909.000000	56.80	74.00	17.20	21.1	V
14652.000000	57.37	74.00	16.63	21.2	V
15264.000000	59.63	74.00	14.37	22.9	H
15783.500000	61.11	74.00	12.89	23.9	V
16651.000000	63.68	74.00	10.32	26.0	V
17239.500000	63.26	74.00	10.74	25.8	V

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13909.000000	45.65	54.00	8.35	21.1	H
14680.500000	45.82	54.00	8.18	21.5	H
15576.000000	47.82	54.00	6.18	23.8	V
15969.000000	49.19	54.00	4.81	25.6	V
16592.500000	51.10	54.00	2.90	26.3	V
17236.500000	51.73	54.00	2.27	25.8	V

802.11n (HT20) CH157 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
12288.000000	55.62	74.00	18.38	18.8	V
14683.500000	57.29	74.00	16.71	21.5	H
15049.500000	59.35	74.00	14.65	22.4	V
15633.500000	60.22	74.00	13.78	24.0	V
17060.500000	61.75	74.00	12.25	25.8	V
17703.000000	62.32	74.00	11.68	27.5	H

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13909.000000	44.79	54.00	9.21	21.1	V
14686.500000	45.18	54.00	8.82	21.6	V
15573.500000	47.06	54.00	6.94	23.7	V
15959.500000	48.57	54.00	5.43	25.4	H
16592.500000	50.35	54.00	3.65	26.3	V
17707.000000	50.23	54.00	3.77	27.6	V

802.11n (HT20) CH 165 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13375.500000	56.41	74.00	17.59	19.6	V
14693.000000	56.90	74.00	17.10	21.6	H
15550.500000	58.53	74.00	15.47	23.4	H
16341.000000	59.95	74.00	14.05	25.9	V
16601.000000	61.51	74.00	12.49	26.2	H
17987.000000	61.14	74.00	12.86	27.4	V

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13909.000000	44.85	54.00	9.15	21.1	V
14693.500000	44.98	54.00	9.02	21.6	V
15576.000000	46.99	54.00	7.01	23.8	H
15739.000000	48.35	54.00	5.65	24.4	V
16583.000000	50.07	54.00	3.93	26.4	H
17708.500000	50.02	54.00	3.98	27.6	V

802.11n (HT40) CH151 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13889.000000	57.00	74.00	17.00	20.2	V
14679.000000	57.06	74.00	16.94	21.4	V
15074.000000	59.51	74.00	14.49	22.1	V
15743.000000	60.79	74.00	13.21	24.2	H
16628.500000	61.80	74.00	12.20	26.1	H
17721.500000	61.98	74.00	12.02	27.6	V

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13913.000000	45.19	54.00	8.81	20.9	V
14598.500000	45.63	54.00	8.37	21.6	V
15576.000000	47.77	54.00	6.23	23.8	V
16058.000000	48.99	54.00	5.01	25.4	V
16583.500000	50.71	54.00	3.29	26.4	V
17707.500000	50.57	54.00	3.43	27.6	V

802.11n (HT40) CH 159 (1-18GHz)

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13902.500000	56.20	74.00	17.80	20.7	V
14803.000000	56.58	74.00	17.42	21.4	V
15141.500000	58.35	74.00	15.65	22.4	V
16069.000000	60.38	74.00	13.62	25.4	V
16999.000000	61.47	74.00	12.53	26.6	V
17704.500000	61.11	74.00	12.89	27.6	H

Frequency (MHz)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Corr. (dB)	Pol
13909.500000	44.33	54.00	9.67	21.1	V
14686.500000	44.97	54.00	9.03	21.6	V
15576.000000	46.97	54.00	7.03	23.8	V
15741.000000	48.51	54.00	5.49	24.3	H
16598.000000	49.90	54.00	4.10	26.3	H
17707.500000	50.05	54.00	3.95	27.6	V

A.6. Band Edges Compliance

A6.1 Band Edges - conducted

Measurement Limit:

Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC 47 CFR Part 15.407(b)	5715MHz~5860MHz	< -17
	Below 5715MHz, Above 5860MHz	< -27

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.61	P
	5825 MHz	Fig.62	P
802.11n	5745 MHz	Fig.63	P
	HT20	Fig.64	P
802.11n	5755 MHz	Fig.65	P
	HT40	Fig.66	P

Conclusion: PASS

Test graphs as below:

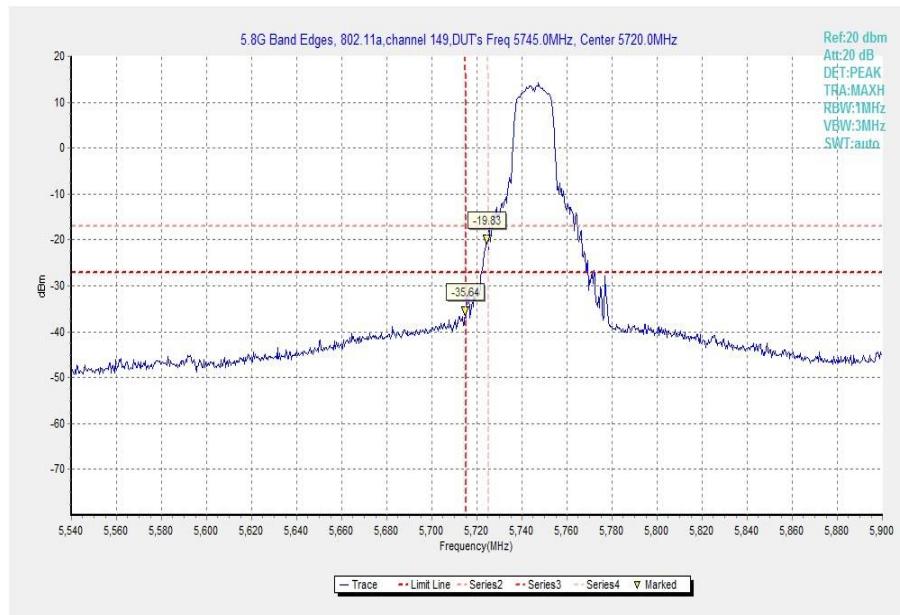
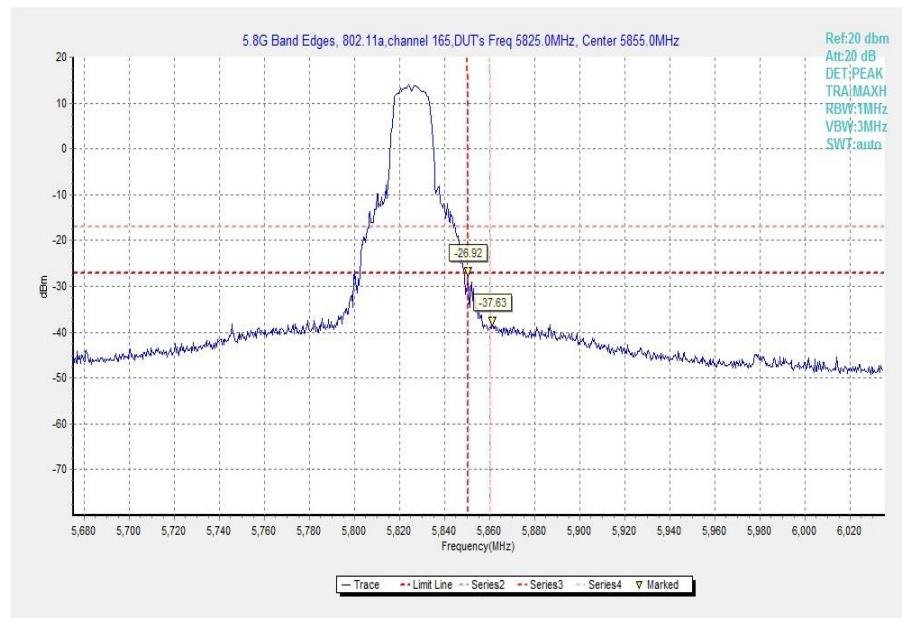
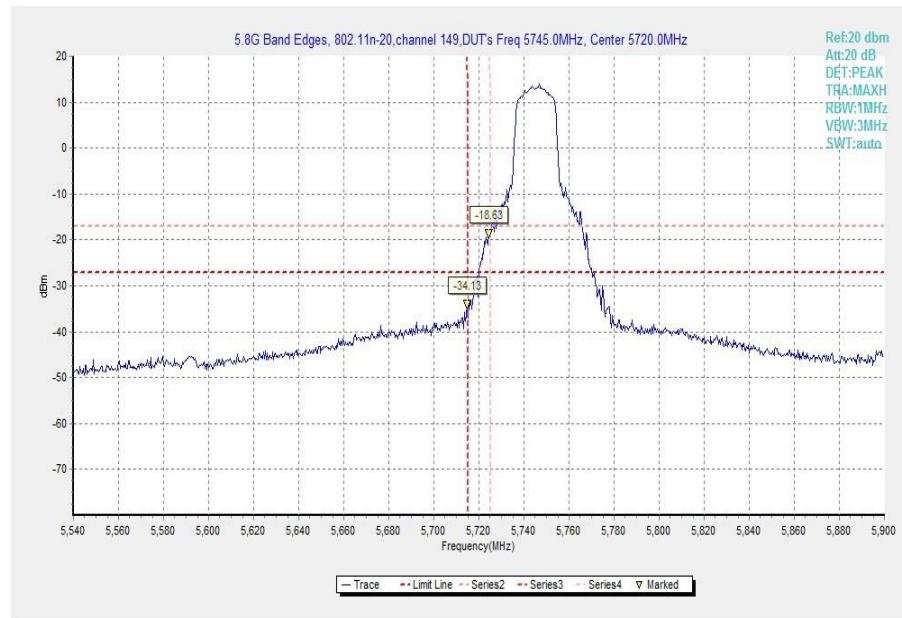
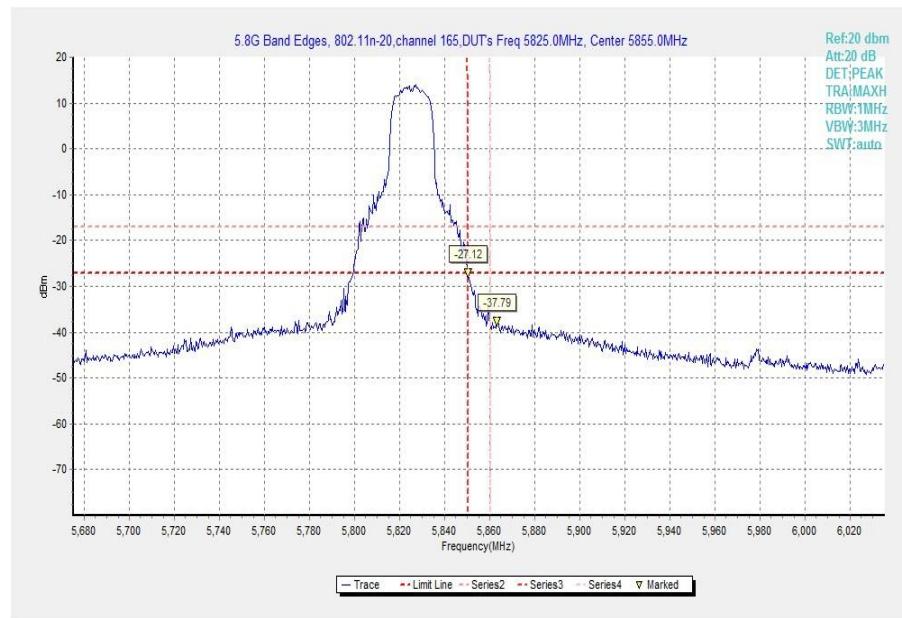
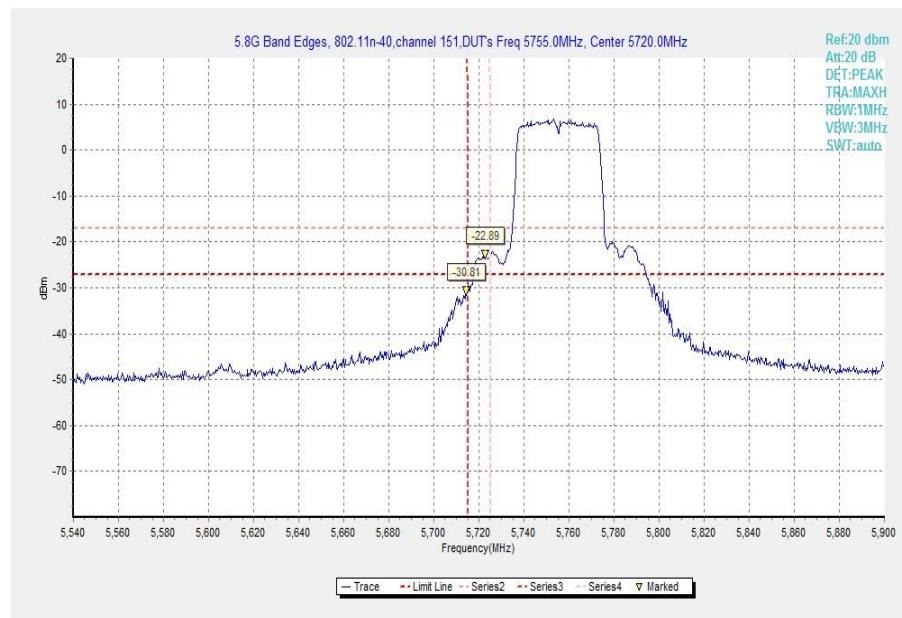


Fig. 61 Band Edges (802.11a, 5745MHz)


Fig. 62 Band Edges (802.11a, 5825MHz)

Fig. 63 Band Edges (802.11n-HT20, 5745MHz)


Fig. 64 Band Edges (802.11n-HT20, 5825MHz)

Fig. 65 Band Edges (802.11n-HT40, 5755MHz)

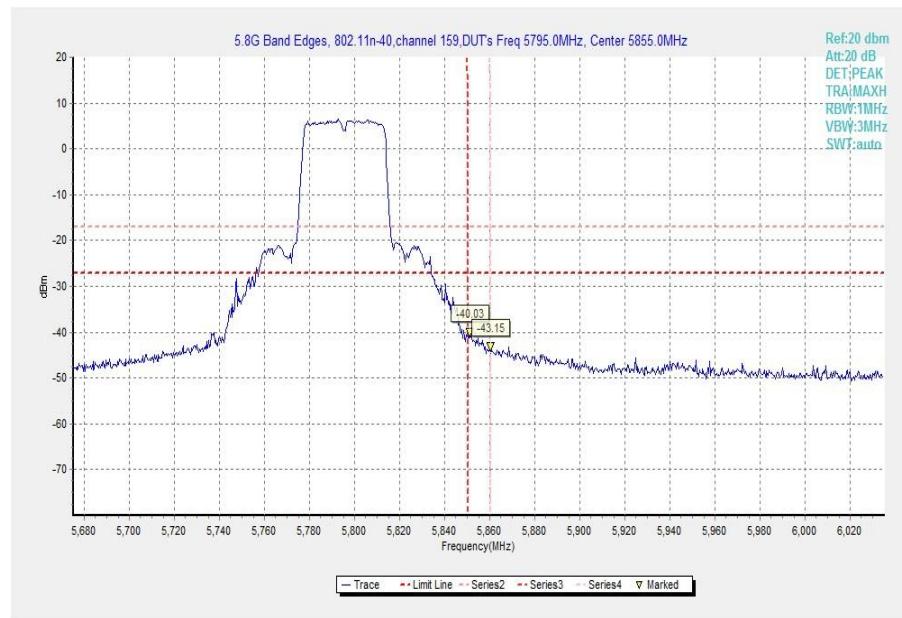


Fig. 66 Band Edges (802.11n-HT40, 5795MHz)

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 = 3.38dB, k=2.

Measurement Result and limit:

WLAN (Quasi-peak Limit)-AE1

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		11a mode	Idle	
0.15 to 0.5	66 to 56	Fig.67	Fig.68	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)-AE1

Frequency range (MHz)	Average-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		11a mode	Idle	
0.15 to 0.5	56 to 46	Fig.67	Fig.68	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.

WLAN (Quasi-peak Limit)-AE2

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		11a mode	Idle	
0.15 to 0.5	66 to 56	Fig.69	Fig.70	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)-AE2

Frequency range (MHz)	Average-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		11a mode	Idle	
0.15 to 0.5	56 to 46	Fig.69	Fig.70	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.

Test Condition:

Voltage (V)	Frequency (Hz)
240	60

Measurement Uncertainty:

Expanded measurement uncertainty for this test item is U = 3.38dB, k=2.

Measurement Result and limit:

WLAN (Quasi-peak Limit)-AE1

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		11a mode	Idle	
0.16 to 0.5	66 to 56	Fig.71	Fig.72	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)-AE1

Frequency range (MHz)	Average-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		11a mode	Idle	
0.15 to 0.5	56 to 46	Fig.71	Fig.72	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.

WLAN (Quasi-peak Limit)-AE2

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		11a mode	Idle	
0.15 to 0.5	66 to 56	Fig.73	Fig.74	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)-AE2

Frequency range (MHz)	Average-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		11a mode	Idle	
0.15 to 0.5	56 to 46	Fig.73	Fig.74	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.

Conclusion: PASS

Test graphs as below:

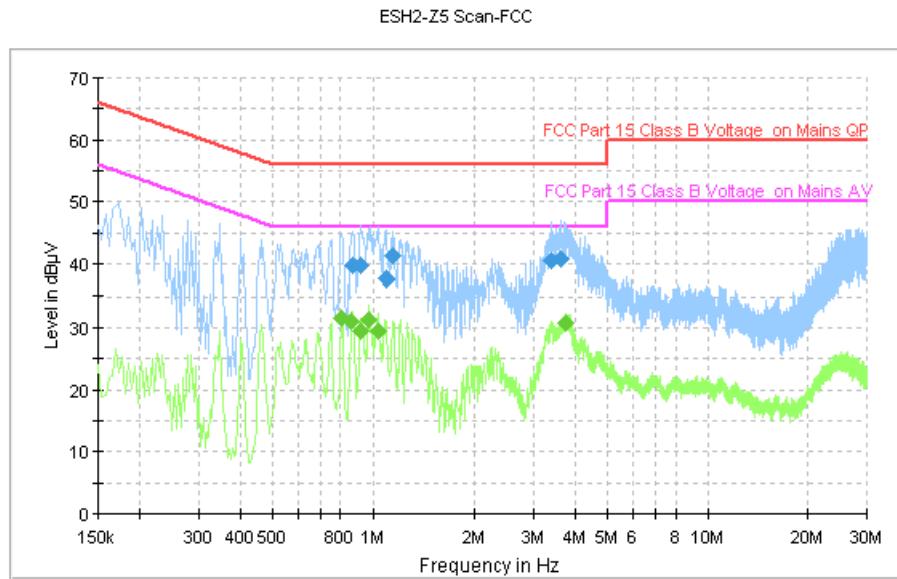


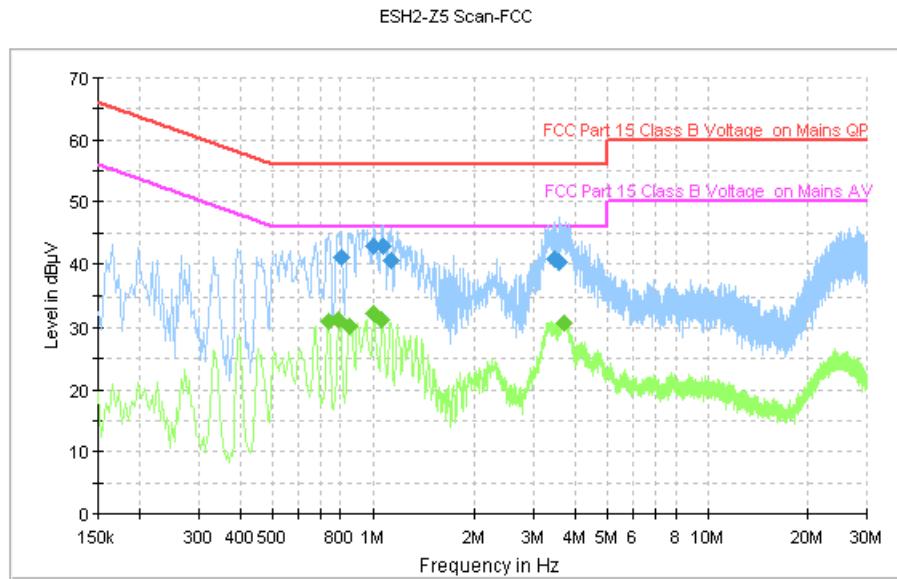
Fig. 67 AC Powerline Conducted Emission (802.11a, AE1, 120V)

MEASUREMENT RESULT: "QuasiPeak"

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.874000	39.8	GND	N	9.6	16.2	56.0
0.922000	39.9	GND	N	9.6	16.1	56.0
1.098000	37.8	GND	N	9.6	18.2	56.0
1.146000	41.3	GND	N	9.6	14.7	56.0
3.410000	40.5	GND	N	9.6	15.5	56.0
3.626000	40.8	GND	N	9.6	15.2	56.0

MEASUREMENT RESULT: "Average"

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.806000	31.4	GND	N	9.6	14.6	46.0
0.862000	31.0	GND	N	9.6	15.0	46.0
0.922000	29.5	GND	N	9.6	16.5	46.0
0.974000	31.3	GND	N	9.6	14.7	46.0
1.034000	29.3	GND	N	9.5	16.7	46.0
3.730000	30.6	GND	N	9.6	15.4	46.0


Fig. 68 AC Powerline Conducted Emission (Idle, AE1, 120V)
MEASUREMENT RESULT: "QuasiPeak"

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.802000	41.2	GND	N	9.6	14.8	56.0
1.006000	43.0	GND	N	9.5	13.0	56.0
1.070000	42.8	GND	N	9.6	13.2	56.0
1.130000	40.5	GND	N	9.6	15.5	56.0
3.462000	40.7	GND	N	9.6	15.3	56.0
3.578000	40.4	GND	N	9.6	15.6	56.0

MEASUREMENT RESULT: "Average"

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.734000	31.0	GND	N	9.5	15.0	46.0
0.790000	31.3	GND	N	9.6	14.7	46.0
0.850000	30.1	GND	N	9.5	15.9	46.0
1.006000	32.4	GND	N	9.5	13.6	46.0
1.066000	31.4	GND	N	9.6	14.6	46.0
3.714000	30.8	GND	N	9.6	15.2	46.0

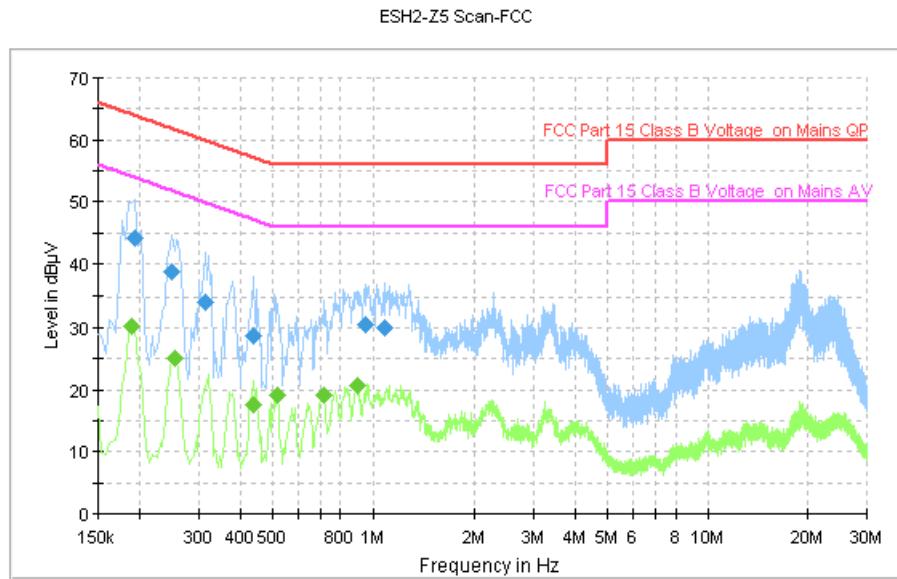


Fig. 69 AC Powerline Conducted Emission (802.11a, AE2, 120V)

MEASUREMENT RESULT: "QuasiPeak"

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.194000	44.2	GND	N	9.6	19.7	63.9
0.250000	38.6	GND	N	9.6	23.1	61.8
0.314000	34.1	GND	N	9.6	25.8	59.9
0.438000	28.7	GND	N	9.7	28.4	57.1
0.950000	30.5	GND	N	9.6	25.5	56.0
1.086000	29.9	GND	N	9.6	26.1	56.0

MEASUREMENT RESULT: "Average"

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.190000	30.2	GND	N	9.6	23.8	54.0
0.254000	25.0	GND	N	9.6	26.7	51.6
0.438000	17.5	GND	N	9.7	29.6	47.1
0.518000	19.2	GND	N	9.7	26.8	46.0
0.714000	19.0	GND	N	9.5	27.0	46.0
0.902000	20.6	GND	N	9.6	25.4	46.0

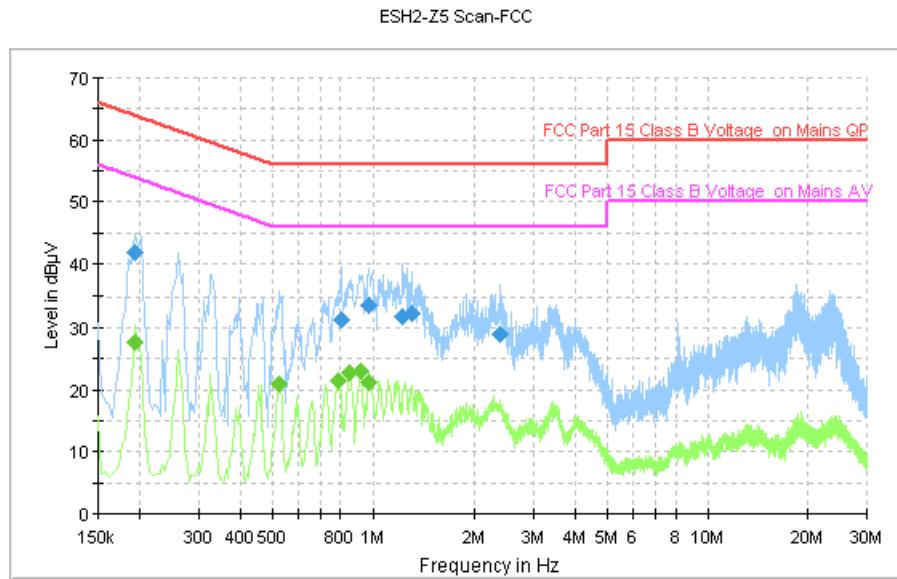


Fig. 70 AC Powerline Conducted Emission (Idle, AE2, 120V)

MEASUREMENT RESULT: "QuasiPeak"

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.194000	41.9	GND	N	9.6	22.0	63.9
0.802000	31.3	GND	N	9.6	24.7	56.0
0.974000	33.6	GND	N	9.6	22.4	56.0
1.230000	31.8	GND	N	9.6	24.2	56.0
1.314000	32.2	GND	N	9.6	23.8	56.0
2.390000	29.0	GND	N	9.6	27.0	56.0

MEASUREMENT RESULT: "Average"

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.194000	27.7	GND	N	9.6	26.1	53.9
0.522000	20.9	GND	N	9.7	25.1	46.0
0.790000	21.5	GND	N	9.6	24.5	46.0
0.850000	22.7	GND	N	9.5	23.3	46.0
0.918000	22.9	GND	N	9.6	23.1	46.0
0.974000	21.1	GND	N	9.6	24.9	46.0

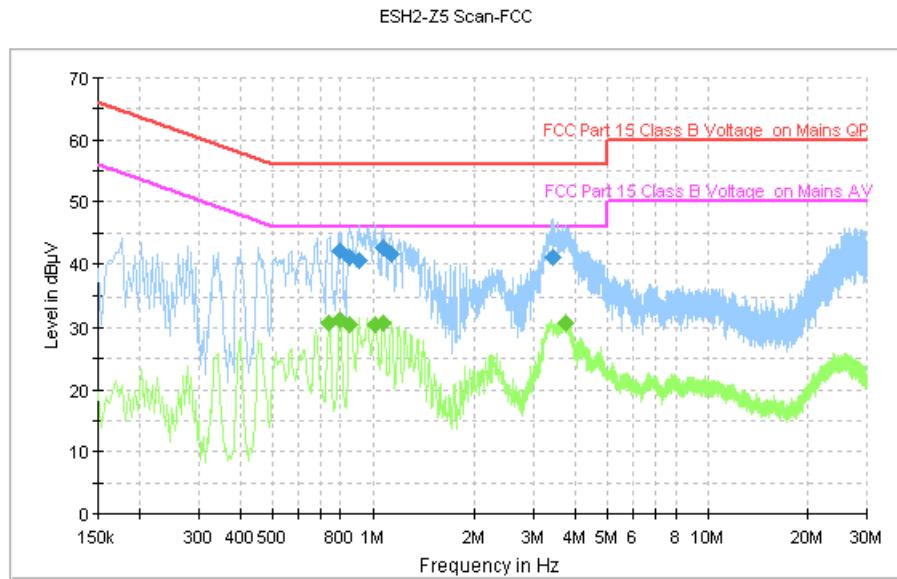


Fig. 71 AC Powerline Conducted Emission (802.11a, AE1, 240V)

MEASUREMENT RESULT: "QuasiPeak"

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.794000	42.0	GND	N	9.6	14.0	56.0
0.854000	41.2	GND	N	9.5	14.8	56.0
0.910000	40.5	GND	N	9.6	15.5	56.0
1.074000	42.6	GND	N	9.6	13.4	56.0
1.130000	41.6	GND	N	9.6	14.4	56.0
3.438000	41.1	GND	N	9.6	14.9	56.0

MEASUREMENT RESULT: "Average"

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.738000	30.8	GND	N	9.5	15.2	46.0
0.794000	31.3	GND	N	9.6	14.7	46.0
0.854000	30.4	GND	N	9.5	15.6	46.0
1.018000	30.6	GND	N	9.5	15.4	46.0
1.078000	30.6	GND	N	9.6	15.4	46.0
3.742000	30.7	GND	N	9.6	15.3	46.0

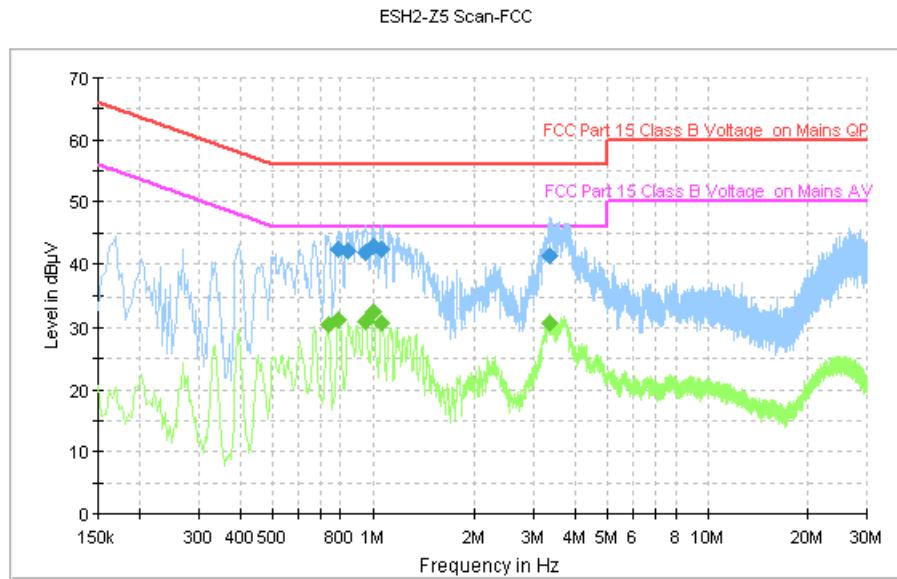


Fig. 72 AC Powerline Conducted Emission (Idle, AE1, 240V)

MEASUREMENT RESULT: "QuasiPeak"

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.786000	42.2	GND	N	9.6	13.8	56.0
0.846000	42.0	GND	N	9.5	14.0	56.0
0.950000	41.9	GND	N	9.6	14.1	56.0
1.006000	43.0	GND	N	9.5	13.0	56.0
1.066000	42.3	GND	N	9.6	13.7	56.0
3.354000	41.3	GND	N	9.6	14.7	56.0

MEASUREMENT RESULT: "Average"

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.734000	30.5	GND	N	9.5	15.5	46.0
0.786000	31.3	GND	N	9.6	14.7	46.0
0.950000	31.0	GND	N	9.6	15.0	46.0
1.006000	32.5	GND	N	9.5	13.5	46.0
1.066000	30.8	GND	N	9.6	15.2	46.0
3.366000	30.8	GND	N	9.6	15.2	46.0

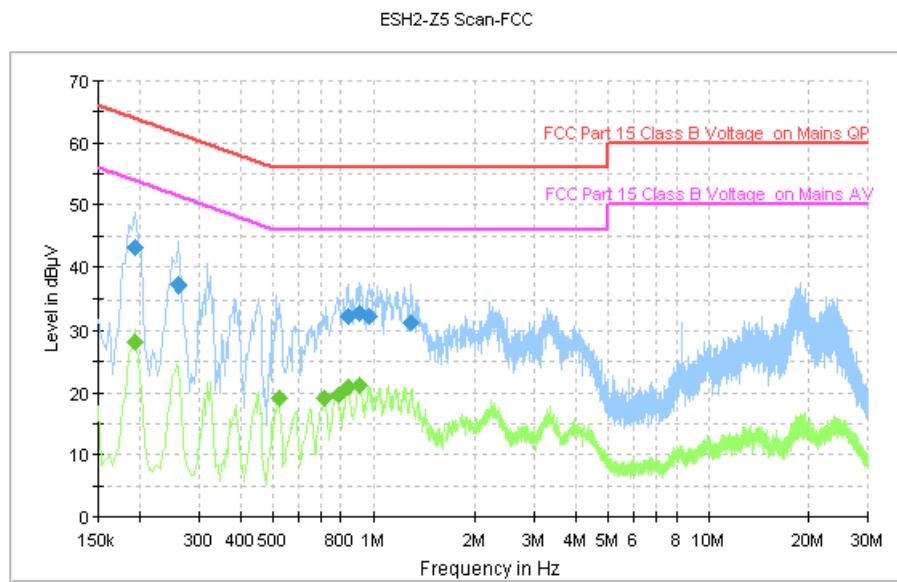


Fig. 73 AC Powerline Conducted Emission (802.11a, AE2, 240V)

MEASUREMENT RESULT: "QuasiPeak"

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.194000	43.1	GND	N	9.6	20.8	63.9
0.262000	37.2	GND	N	9.6	24.1	61.4
0.838000	32.3	GND	N	9.5	23.7	56.0
0.906000	32.8	GND	N	9.6	23.2	56.0
0.974000	32.4	GND	N	9.6	23.6	56.0
1.298000	31.3	GND	N	9.6	24.7	56.0

MEASUREMENT RESULT: "Average"

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.194000	28.2	GND	N	9.6	25.6	53.9
0.522000	19.1	GND	N	9.7	26.9	46.0
0.714000	19.2	GND	N	9.5	26.8	46.0
0.786000	19.6	GND	N	9.6	26.4	46.0
0.838000	20.9	GND	N	9.5	25.1	46.0
0.906000	21.1	GND	N	9.6	24.9	46.0

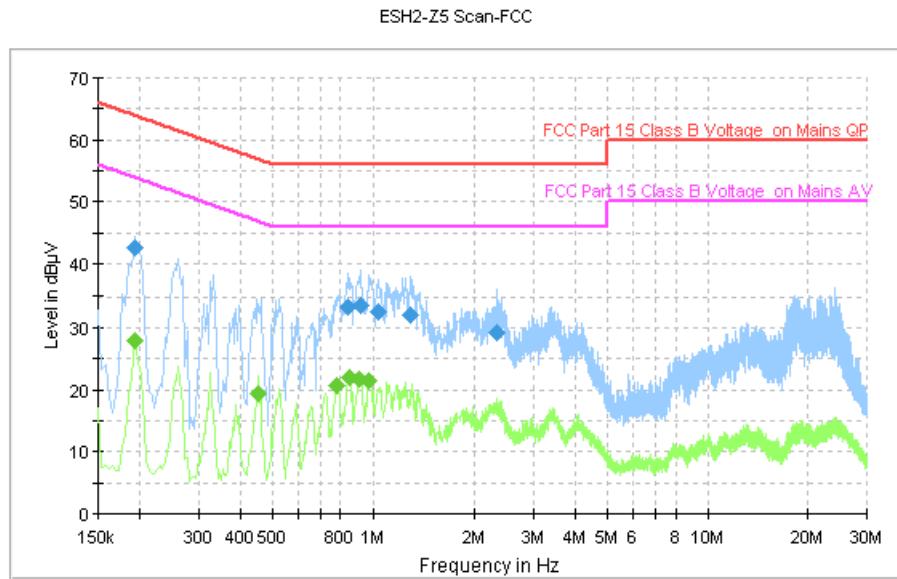


Fig. 74 AC Powerline Conducted Emission (Idle, AE2, 240V)

MEASUREMENT RESULT: "QuasiPeak"

Frequency (MHz)	QuasiPeak (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.194000	42.5	GND	N	9.6	21.3	63.9
0.842000	33.4	GND	N	9.5	22.6	56.0
0.918000	33.7	GND	N	9.6	22.3	56.0
1.042000	32.6	GND	N	9.5	23.4	56.0
1.294000	32.0	GND	N	9.6	24.0	56.0
2.330000	29.1	GND	N	9.6	26.9	56.0

MEASUREMENT RESULT: "Average"

Frequency (MHz)	Average (dB μ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.194000	27.8	GND	N	9.6	26.1	53.9
0.454000	19.4	GND	N	9.7	27.4	46.8
0.782000	20.6	GND	N	9.6	25.4	46.0
0.850000	21.9	GND	N	9.5	24.1	46.0
0.910000	21.8	GND	N	9.6	24.2	46.0
0.974000	21.5	GND	N	9.6	24.5	46.0

A.8. Frequency Stability

Manufacturers ensured the EUT meet the requirement of frequency stability, such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

Measurement Limit:

Standard	Frequency (MHz)	Limit (dBm/MHz)
FCC CRF Part 15.407(g)	5745MHz~5825MHz	Specified in the user's manual

Measurement Condition:

T min = 0°C T nom = 25°C T max = 40°C
V min = 3.6V V nom = 3.8V V max = 4.2V

Measurement Result:

Mode	Channel	Condition		Frequency
802.11a	5745 MHz	T nom	V nom	5744.9876
		T max	V nom	5744.9592
		T min	V nom	5744.9705
		T nom	V max	5744.9892
		T nom	V min	5744.9726

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