TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR22-SRF0188-B Page (1) of (46)	eurofins | KCTL

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2022-09-20

2. Use of Report : Certification

3. Name of Product / Model : Notebook PC / NP340XNA

4. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Vietnam

5. FCC ID : A3LNP340XNA

6. IC Certificate No. : 649E-NP340XNA

7. Date of Test : 2022-10-18 to 2022-11-15

8. Location of Test : ■ Permanent Testing Lab □ On Site Testing
(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

9. Test method used : FCC Part 15 Subpart E, 15.407
RSS-248 Issue 1 November 2021
RSS-Gen Issue 5 February 2021

10. Test Result : Refer to the test result in the test report

	Tested by	Technical Manager
Affirmation	Name : Kwonse Kim (Signature)	Name : Seungyong Kim (Signature)

2022-11-21

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2022-11-08	Originally issued	-
2022-11-15	Added CBP Measurement	15 ~ 25
2022-11-21	Added note of IC ID	10 ~ 12

Note. The report No. KR22-SRF0188-A is superseded by the report No. KR22-SRF0188-B.

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

CONTENTS

1. General information

Client	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Factory	:	SAMSUNG ELECTRONICS VIETNAM CO.,LTD.(SEV)
Address	:	Khu Cong nghiep Ten Phong 1, Yen Trung, Yen Phong, Bac Ning, Vietnam
Laboratory	:	Eurofins KCTL Co.,Ltd.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056 CAB Identifier: KR0040 ISED Number: 8035A KOLAS No.: KT231

2. Device information

Equipment under test	:	Notebook PC				
Model	:	NP340XNA				
Modulation technique	:	WIFI (802.11a/ax)	:	OFDM, OFDMA		
Number of channels	:	UNII-5	:	24 ch (20 ㎒), 12 ch (40 ㎒), 6 ch (80 ㎒), 3 ch (160 ㎒)		
		UNII-6	:	5 ch (20 ㎒), 3 ch (40 ㎒), 1 ch (80 ㎒) , 1 ch (160 ㎒)		
		UNII-7	:	18 ch (20 ㎒), 8 ch (40 ㎒), 5 ch (80 ㎒) , 2 ch (160 ㎒)		
		UNII-8	:	12 ch (20 ㎒), 6 ch (40 ㎒), 2 ch (80 ㎒) , 1 ch (160 ㎒)		
Power source	:	DC 7.72 V				
Antenna specification	:	Antenna 1	:	FPCB Antenna		
		Antenna 2	:	FPCB Antenna		
Antenna gain	:		Antenna 1			Antenna 2
		UNII-5	: -8.02 dBi		UNII-5	: -8.02 dBi
		UNII-6	: -8.01 dBi		UNII-6	: -8.12 dBi
		UNII-7	: -8.02 dBi		UNII-7	: -8.06 dBi
		UNII-8	: -8.02 dBi		UNII-8	: -8.06 dBi
Frequency range	:	UNII-5	: 5 955 ㎒ ~ 6 415 ㎒		(802.11a/ax_HE20)	
		UNII-5	: 5 965 ㎒ ~ 6 405 ㎒		(802.11ax_HE40)	
		UNII-5	: 5 985 ㎒ ~ 6 385 ㎒		(802.11ax_HE80)	
		UNII-5	: 6 025 ㎒ ~ 6 345 ㎒		(802.11ax_HE160)	
		UNII-6	: 6 435 ㎒ ~ 6 515 ㎒		(802.11a/ax_HE20)	
		UNII-6	: 6 445 ㎒ ~ 6 525 ㎒		(802.11ax_HE40)	
		UNII-6	: 6 465 ㎒		(802.11ax_HE80)	
		UNII-6	: 6 505 ㎒		(802.11ax_HE160)	
		UNII-7	: 6 535 ㎒ ~ 6 875 ㎒		(802.11a/ax_HE20)	
		UNII-7	: 6 565 ㎒ ~ 6 845 ㎒		(802.11ax_HE40)	
		UNII-7	: 6 545 ㎒ ~ 6 865 ㎒		(802.11ax_HE80)	
		UNII-7	: 6 665 ㎒ ~ 6 825 ㎒		(802.11ax_HE160)	
		UNII-8	: 6 895 ㎒ ~ 7 115 ㎒		(802.11a/ax_HE20)	
		UNII-8	: 6 885 ㎒ ~ 7 085 ㎒		(802.11ax_HE40)	
		UNII-8	: 6 945 ㎒ ~ 7 025 ㎒		(802.11ax_HE80)	
		UNII-8	: 6 985 ㎒		(802.11ax_HE160)	
Software version	:	NP340XNA.001				
Hardware version	:	REV0.3				
Test device serial No.	:	Conducted	:	KE86930T900162Y		
	:	Radiated	:	KE86930T900163N		
Operation temperature	:	-20 ℃ ~ 60 ℃				

2.1. Frequency/channel operations

This device contains the following capabilities:
WLAN (11a/b/g/n/ac/ax), Bluetooth (BDR/EDR/BLE)

UNII-5		UNII-6		UNII-7		UNII-8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
1	5 955	97	6 435	117	6 535	189	6 895
.	.	.	.	.	.	.	.
45	6 175	105	6 475	149	6 695	209	6 995
.	.	.	.	.	.	.	.
93	6 415	113	6 515	185	6 875	233	7 115

Table 2.1-1. 802.11a, ax_HE20 mode

UNII-5		UNII-6		UNII-7		UNII-8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
3	5 965	99	6 445	123	6 565	187	6 885
.	.	.	.	.	.	.	.
43	6 165	107	6 485	147	6 685	211	7 005
.	.	.	.	.	.	.	.
91	6 405	115	6 525	179	6 845	227	7 085

Table 2.1-2. 802.11ax_HE40 mode

UNII-5		UNII-6		UNII-7		UNII-8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
7	5 985	103	6 465	119	6 545	199	6 945
.	.			.	.	215	7 025
39	6 145			151	6 705		
.	.			.	.		
87	6 385			183	6 865		

Table 2.1-3. 802.11ax_HE80 mode

UNII-5		UNII-6		UNII-7		UNII-8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
15	6 025	111	6 505	143	6 665	207	6 985
47	6 185			175	6 825		
79	6 345						

Table 2.1-4. 802.11ax_HE160 mode

2.2. Test RU offset for tones in each modes

BW (㎒)	Tones (T)	RU offset	Test RU offset		
			Low	Mid	High
20	26	0 ~ 8	0	4	8
	52	37 ~ 40	37	38	40
	106	53 ~ 54	53	-	54
	242	61 / SU	-	61 / -	-
40	26	0 ~ 17	0	9	17
	52	37 ~ 44	37	41	44
	106	53 ~ 56	53	54	56
	242	61 ~ 62	61	-	62
	484	65 / SU	-	65 / -	-
80	26	0 ~ 36	0	18	36
	52	37 ~ 52	37	45	52
	106	53 ~ 60	53	57	60
	242	61 ~ 64	61	62	64
	484	65 ~ 66	65	-	66
	996	67 / SU	-	67 / -	-
160[Note]	26	0 ~ 36	0L	0U	36U
	52	37 ~ 52	37L	37U	52U
	106	53 ~ 60	53L	53U	60U
	242	61 ~ 64	61L	61U	64U
	484	65 ~ 66	65l	65U	66U
	996	67	67L	-	67U
	2x996	68 / SU	-	68 / -	-

Notes.

1. HE160 = HE80(L) + HE80(H)
   Measurement RU offset for HE80(L) and HE80(U) was investigated then worst RU offset of testing offset (L/M/H) was reported.

2.3. Duty Cycle Factor

Test mode		ANT	Tone	Period (ms)	T_{on} time (ms)	Duty cycle		Duty cycle factor (dB)
						(Linear)	(%)	
11a	6Mbps	MIMO	-	1.581	1.464	0.9260	92.60	0.33
11ax	HE20	MIMO	26T	5.186	5.056	0.9749	97.49	0.11
			52T	5.178	5.041	0.9735	97.35	0.12
			106T	2.870	2.737	0.9537	95.37	0.21
			242T	1.346	1.219	0.9056	90.56	0.43
			SU	1.252	1.136	0.9073	90.73	0.42
	HE40	MIMO	26T	5.175	5.033	0.9726	97.26	0.12
			52T	5.194	5.022	0.9669	96.69	0.15
			106T	2.903	2.742	0.9445	94.45	0.25
			242T	1.351	1.237	0.9156	91.56	0.38
			484T	0.767	0.652	0.8501	85.01	0.71
			SU	0.705	0.606	0.8596	85.96	0.66
	HE80	MIMO	26T	5.201	5.037	0.9685	96.85	0.14
			52T	5.184	5.020	0.9684	96.84	0.14
			106T	2.869	2.724	0.9495	94.95	0.23
			242T	1.346	1.232	0.9153	91.53	0.38
			484T	0.757	0.656	0.8666	86.66	0.62
			996T	0.453	0.354	0.7815	78.15	1.07
			SU	0.426	0.325	0.7629	76.29	1.18
	HE160	MIMO	26T	5.180	4.991	0.9635	96.35	0.16
			52T	5.152	4.982	0.9670	96.70	0.15
			106T	2.858	2.725	0.9535	95.35	0.21
			242T	1.337	1.226	0.9170	91.70	0.38
			484T	0.756	0.655	0.8664	86.64	0.62
			996T	0.452	0.354	0.7832	78.32	1.06
			2x996T	0.225	0.128	0.5689	56.89	2.45
			SU	0.297	0.199	0.6700	67.00	1.74

Notes.

1. Duty cycle (Linear) = T_{on} time / Period
2. DCF(Duty cycle factor) = 10log(1/duty cycle)
3. DCF is not compensated to average result if duty cycle is more than 98%
4. Please refer to Appendix B for plots,

3. Antenna requirement

Requirement of FCC part section 15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Requirement of RSS-Gen Section 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

- The transmitter has permanently attached FPCB Antenna (Internal antenna) on board.
- The E.U.T Complies with the requirement of §15.203, §15.247, §15.407.

3.1 Antenna information

Mode	CDD	MIMO
	ANT 1 + 2	ANT 1 + 2
802.11a	√	√
802.11ax HE20	√	√
802.11ax HE40	√	√
802.11ax HE80	√	√
802.11ax HE160	√	√

√ = Support, ✕ = Not support

3.2 Directional Gain Calculations

According to clause F), 2), d), (i) of KDB 662911 D01 Multiple Transmitter Output, Directional gain may be calculated by using the formulas as below.

Directional Antenna Gain

Band	ANT 1 Gain (dBi)	ANT 2 Gain (dBi)	Directional Gain (dBi)
UNII 5	-8.02	-8.02	-5.01
UNII 6	-8.01	-8.12	-5.05
UNII 7	-8.02	-8.06	-5.03
UNII 8	-8.02	-8.06	-5.03

Note.

Unequal antenna gains, with equal transmit powers. For antenna gains given by G_1, G_2, …, G_N dBi

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ dBi

Sample calculation

In case of UNII 5, directional gain = $10 \log[(10^{-8.02/20} + 10^{-8.02/20})^2 / 2] = -5.01$ dBi

4. Introduction

This report referenced from the FCC ID : A3LNP345XNA
Based on their similarity, the FCC Part 15E and RSS-248 (equipment class: 6XD) reuse the original model's result and do spot-check, following the FCC KDB 484596 D01 v01.
And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

4.1 Difference

The FCC ID: A3LNP340XNA and IC ID: 649E-NP340XNA share the same enclosure and circuit board as FCC ID: A3LNP345XNA. The WIFI/BT/BLE antenna and surrounding circuitry and layout are identical between these two units.
As for all bands, they have been verified and the parent model test results under FCC ID : A3LNP345XNA shall remain representative of FCC ID : A3LNP340XNA and IC ID: 649E-NP340XNA.

Note. The difference between the parent and variant is that the RF circuit for WCDMA/LTE/NR bands in the parent model NP345XNA is removed from the variant model NP340XNA.

4.2 Spot check verification data (Band-edge & Spurious emission)

Test band	Test item	Test mode	CH	Measured frequency (㎒)	NP345XNA (dB㎶)		NP340XNA (dB㎶)		Deviation (dB)	
					Avg	Peak	Avg	Peak	Avg	Peak
UNII-5	Band edge	802.11a MIMO	1	5 885 ~ 5 925	43.88	52.35	44.37	54.25	0.49	1.90
	RSE	802.11a MIMO	1	11 866.46	42.41	52.22	41.95	51.76	-0.46	-0.46
	Band edge	802.11ax HE160 RU 2X996T offset 68 MIMO	15	5 885 ~ 5 925	45.72	52.70	46.68	53.14	0.96	0.44
	RSE	802.11ax HE80 SU MIMO	7	17 953.36	43.47	53.88	43.36	54.35	-0.11	0.47
UNII-6	RSE	802.11a MIMO	105	12 916.28	-	52.15	-	51.76	-	-0.39
	RSE	802.11ax HE20 RU 242T offset 61 MIMO	113	13 139.45	-	51.45	-	51.22	-	-0.23
UNII-7	RSE	802.11a MIMO	117	13 159.94	-	52.51	-	50.32	-	-2.19
	RSE	802.11ax HE20 RU 242T offset 61 MIMO	149	8 926.86	-	52.93	-	51.92	-	-1.01
UNII-8	Band edge	802.11a MIMO	233	7 125 ~ 7 750	62.21	71.84	62.49	72.00	0.28	0.16
	RSE	802.11a MIMO	233	14 241.30	-	51.16	-	50.53	-	-0.63
	Band edge	802.11ax HE20 SU MIMO	233	7 125 ~ 7 750	65.96	75.86	66.54	76.57	0.58	0.71
	RSE	802.11ax HE160 RU 2X996T offset 68 MIMO	207	13 984.34	-	50.93	-	49.91	-	-1.02

Notes:

1. FCC ID: A3LNP340XNA and IC ID: 649E-NP340XNA have been verified the performance as for WIFI identical with the FCC ID: A3LNP345XNA.
2. Comparison of two models, the variant model emissions are less than 3 dB higher than the parent model, and all test results are under FCC/ISED technical limits.
3. The test procedure(s) in this report were performed in accordance as following.
   - KDB 484596 D01 v01

4.3 Reference Detail

Reference application that contains the reused reference data in the individual test reports.

Equipment Class	Reference FCC ID	Application Type	Reference Test report Number	Exhibit Type	Variant Test Report Number	Data Re-used
DTS	A3LNP345XNA	Original	KR22-SRF0169 (802.11b/g/n/ac)	Test report	KR22-SRF0185	All
			KR22-SRF0177 (802.11ax)	Test report	KR22-SRF0189	All
			KR22-SRF0168 (Bluetooth LE)	Test report	KR22-SRF0184	All
DSS	A3LNP345XNA	Original	KR22-SRF0167 (Bluetooth)	Test report	KR22-SRF0183	All
NII	A3LNP345XNA	Original	KR22-SRF0170 (802.11a/n/ac)	Test report	KR22-SRF0186	Partial[1)]
			KR22-SRF0178 (802.11ax)	Test report	KR22-SRF0190	Partial[1)]
6XD	A3LNP345XNA	Original	KR22-SRF0176 (802.11a/ax)	Test report	KR22-SRF0188	Partial[2)]

Notes:

1. This device does not support the UNII-4 band (5 850 ㎒ ~ 5 895 ㎒). So All data were re-used except for the UNII-4 band.
2. Contention based protocol test item was investigated.

5. Summary of tests

FCC Part section(s)	IC Rule	Parameter	Test Condition	Test results
15.407(b)(6)	RSS-248 4.7.2 a	Undesirable Emissions	Radiated	Pass
15.205(a), 15.209(a)	RSS-Gen 8.9 RSS-Gen 8.10	General Field Strength Limits (Restricted Bands and Radiated Emission Limits		Pass
15.407(d)(6)	RSS-248 4.8.2	Contention Based Protocol	Conducted	Pass

Notes:

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2. According to exploratory test no any obvious emission were detected from 9 ㎑ to 30 ㎒. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
3. The orthogonal plan is configured as x-axis because the device operates as desktop device in standard laptop mode. Therefore, all final radiated testing was performed with the EUT in X orientation.
4. The maximum production power and tolerance are not impacted by the change. So only spot-check test was done against the worst case from the original model.
5. All the radiated tests have been performed several case. (Stand-alone, with accessories (TA etc.)) Worst case: stand-alone
6. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
   - KDB 662911 D01 v02r01
   - KDB 789033 D02 v02r01
   - KDB 987594 D02 v01r01
7. Based on the baseline scan, the worst-case data rates were:
   802.11a mode: 6Mbps
   802.11ax HE20 mode (MIMO): MCS0
   802.11ax HE40 mode (MIMO): MCS0
   802.11ax HE80 mode (MIMO): MCS0
   802.11ax HE160 mode (MIMO): MCS0

6. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty (±)	
Conducted RF power	0.9 dB	
Conducted spurious emissions	1.1 dB	
Radiated spurious emissions	Below 30 ㎒:	2.4 dB
	30 ㎒ ~ 1 000 ㎒	2.3 dB
	1 000 ㎒ ~ 18 000 ㎒	5.6 dB
	Above 18 000 ㎒	5.7 dB

7. Test results

7.1. Contention Based Protocol

Test Overview and Limit

According to §15.407(d)(6),
Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 ㎓ band (herein referred to as unlicensed devices) are required to use technologies that include a contention-based protocol to avoid co-channel interference with incumbent devices sharing the band. To ensure incumbent co-channel operations are detected in a technology-agnostic manner, unlicensed devices are required to detect co-channel radio frequency energy (energy detect) and avoid simultaneous transmission.

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 ㏈m or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel (in which incumbent signal is transmitted) and stay off the incumbent channel as long as detected radio frequency power is equal to or greater than the threshold (-62 ㏈m). The -62 ㏈m (or lower) threshold is referenced to a 0 dBi antenna gain.

To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 ㎒- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

According to RSS-248 4.8.2,
The minimum detection threshold power is the received power referenced to a 0 dBi antenna. Devices shall use a contention-based protocol to detect the presence of any emissions on the channel that the device intends to occupy. The device shall be able to detect, within its entire occupied bandwidth, a radio frequency power of –62 dBm or lower.

If an emission is detected on a channel, the device shall cease transmissions and shall not resume transmissions on this channel while the detected radio frequency power is at or above the –62 dBm threshold.

Test Procedure

A. Simulating Incumbent Signal

The incumbent signal is assumed to be noise-like. One example of such transmission could be Digital Video Broadcasting (DVB) systems that use Orthogonal Frequency Division Multiplexing (OFDM). Incumbent systems may also use different bandwidths for their transmissions. A 10 MHz-wide additive white Gaussian noise (AWGN) signal is selected to simulate and represent incumbent transmission.

B. Required number of tests

Incumbent and EUT (access point, subordinate or client) signals may occupy different portions of the channel. Depending on the EUT transmission bandwidth and incumbent signal center frequency (simulated by a 10 ㎒-wide AWGN signal), the center frequency of the EUT signal f_{c1} may fall within the incumbent's occupied bandwidth (Figure 1.a), or outside of it (Figure 1.b).

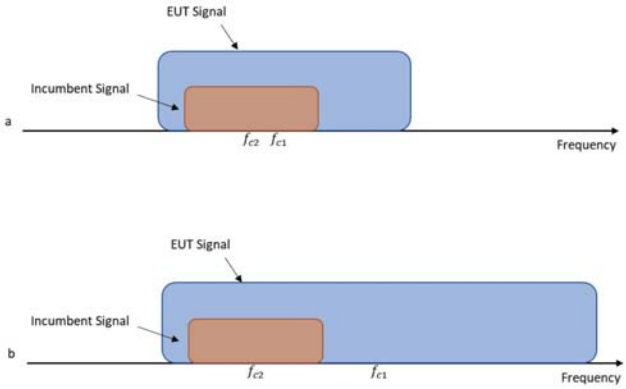


Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

To ensure EUT reliably detects an incumbent signal in both scenarios shown in Figure 1, the detection threshold test may be repeated more than once with the incumbent signal (having center frequency f_{c2}) tuned to different center frequencies within the UT transmission bandwidth. The criteria specified in Table 1 determines how many times the detection threshold test must be performed;

Table 1. Criteria to determine number of times detection threshold test may be performed

If	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leq BW_{Inc}$	Once	Tune incumbent and EUT transmissions ($f_{c1} = f_{c2}$)
$BW_{Inc} \leq BW_{EUT} \leq 2BW_{Inc}$	Once	Incumbent transmission is contained within BW_{EUT}
$2BW_{Inc} \leq BW_{EUT} \leq 4BW_{Inc}$	Twice. Incumbent transmission is contained within BW_{EUT}	Incumbent transmission is located as closely as possible to the lower edge and upper edge, respectively, of the EUT channel
$BW_{EUT} > 4BW_{Inc}$	Three times	Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible to the upper edge of the EUT channel

where:
BW_{EUT}: Transmission bandwidth of EUT signal
BW_{Inc}: Transmission bandwidth of the simulated incumbent signal (10 ㎒ wide AWGN signal)
f_{c1}: Center frequency of EUT transmission
f_{c2}: Center frequency of simulated incumbent signal

C. Test Setup

To ensure the EUT is capable of detecting co-channel energy, the first step is to configure the EUT to transmit with a constant duty cycle.2 To simulate an incumbent signal, a signal generator (or similar source) that is capable of generating band-limited additive white Gaussian noise (AWGN) is required. Depending on the EUT antenna configuration, the AWGN signal can be provided to the EUT receiver via a conducted method (Figure 2) or a radiated method (Figure 3). Figure 2 shows the conducted test setup where a band-limited AWGN signal is generated at a very low power level and injected into the EUT's antenna port. The AWGN signal power level is then incrementally increased while the EUT transmission is monitored on a signal analyzer 2 to verify if the EUT can sense the AWGN signal and can subsequently cease its transmission. A triggered measurement, as shown in Figure 2, is optional, and assists with determining the time it takes the EUT to cease transmission (or vacate the channel) upon detecting RF energy. If the EUT has only one antenna port, then an AWGN signal source can be connected to the same antenna port.

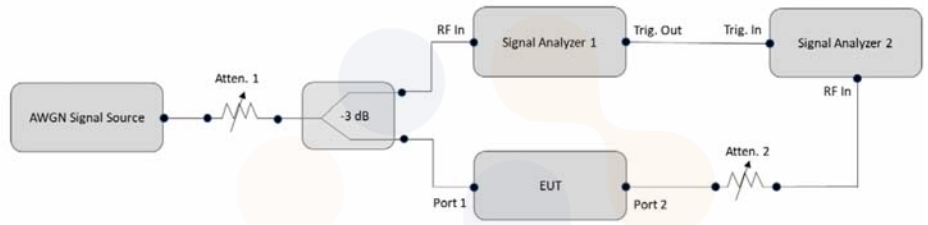


Figure 2. Contention-based protocol test setup, conducted method Step-by-Step Procedure, Conducted Setup

1) Configure the EUT to transmit with a constant duty cycle.
2) Set the operating parameters of the EUT including power level, operating frequency, modulation and bandwidth.
3) Set the signal analyzer center frequency to the nominal EUT channel center frequency. The span range of the signal analyzer shall be between two times and five times the OBW of the EUT. Connect the output port of the EUT to the signal analyzer 2, as shown in Figure 2. Ensure that the attenuator 2 provides enough attenuation to not overload the signal analyzer 2 receiver.
4) Monitoring the signal analyzer 2, verify the EUT is operating and transmitting with the parameters set at step two.
5) Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 ㎒-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 ㎒ AWGN signal relative to the EUT's channel bandwidth and center frequency.
6) Set the AWGN signal power to an extremely low level (more than 20 dB below the -62 ㏈m threshold). Connect the AWGN signal source, via a 3-㏈ splitter, to the signal analyzer 1 and the EUT as shown in Figure 2.
7) Transmit the AWGN signal (RF ON) and verify its characteristics on the signal analyzer 1.
8) Monitor the signal analyzer 2 to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
9) (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.

10) Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 5, choose a different center frequency for the AWGN signal and repeat the process.

Note.

1) KDB 987594 D02, contention based protocol was tested using an AWGN signal with a bandwidth of 10 ㎒. The amplitude of the signal was increased until detected by the EUT, signaled by the ceasing of transmission, marker indicates the point at which the AWGN signal is introduced.

2) Modified Detection Threshold Limit.

- Detection Threshold = -62.0 [㏈m] + G [㏈i] + path Loss [㏈]

Band	Lowest Gain (㏈i)		Threshold Level (㏈m)
	ANT1	ANT2	
UNII-5	-8.14	-8.18	-70.18
UNII-6	-8.03	-8.14	-70.14
UNII-7	-8.05	-8.15	-70.15
UNII-8	-8.18	-8.15	-70.18

3) Supported Equipment

Equipment	Manufacturer	Model	FCC ID
Access Point	ASUSTek Computer Inc.	GT-AXE11000	MSQ-RTAXJF00

Test result

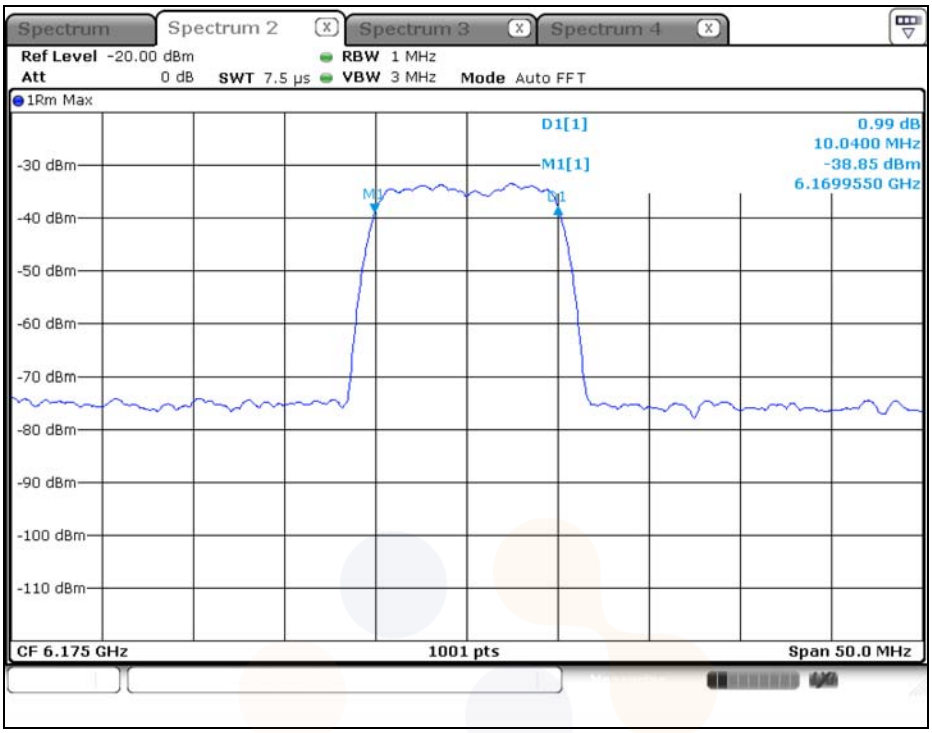
Band	BW [㎒]	Channel Freq. [㎒]	Incumbent Freq. [㎒]	Detection Power Level [dBm]	Detection Threshold Limit [dBm]	Margin [dB]	Number of AWGN	AWGN Detection Probability (%)	Limit Probability (%)	EUT TX Status
UNII 5	20	6 175	6 175	-90.00	-70.18	19.82	10	100	90	ON
				-84.50	-70.18	14.32	10	100	90	Minimal
				-84.00	-70.18	13.82	10	100	90	OFF
	160	6 185	6 110	-90.00	-70.18	19.82	10	100	90	ON
				-83.50	-70.18	13.32	10	100	90	Minimal
				-83.00	-70.18	12.82	10	100	90	OFF
			6 185	-90.00	-70.18	19.82	10	100	90	ON
				-78.00	-70.18	7.82	10	100	90	Minimal
				-77.50	-70.18	7.32	10	100	90	OFF
			6 260	-90.00	-70.18	19.82	10	100	90	ON
				-84.50	-70.18	14.32	10	100	90	Minimal
				-84.00	-70.18	13.82	10	100	90	OFF
UNII 6	20	6 475	6 475	-90.00	-70.14	19.86	10	100	90	ON
				-84.50	-70.14	14.36	10	100	90	Minimal
				-84.00	-70.14	13.86	10	100	90	OFF
	160	6 505	6 430	-90.00	-70.14	19.86	10	100	90	ON
				-83.50	-70.14	13.36	10	100	90	Minimal
				-83.00	-70.14	12.86	10	100	90	OFF
			6 505	-90.00	-70.14	19.86	10	100	90	ON
				-78.00	-70.14	7.86	10	100	90	Minimal
				-77.50	-70.14	7.36	10	100	90	OFF
			6 580	-90.00	-70.14	19.86	10	100	90	ON
				-82.50	-70.14	12.36	10	100	90	Minimal
				-82.00	-70.14	11.86	10	100	90	OFF
UNII 7	20	6 695	6 695	-90.00	-70.15	19.85	10	100	90	ON
				-83.50	-70.15	13.35	10	100	90	Minimal
				-83.00	-70.15	12.85	10	100	90	OFF
	160	6 665	6 590	-90.00	-70.15	19.85	10	100	90	ON
				-83.50	-70.15	13.35	10	100	90	Minimal
				-83.00	-70.15	12.85	10	100	90	OFF
			6 665	-90.00	-70.15	19.85	10	100	90	ON
				-78.50	-70.15	8.35	10	100	90	Minimal
				-78.00	-70.15	7.85	10	100	90	OFF
			6 740	-90.00	-70.15	19.85	10	100	90	ON
				-85.00	-70.15	14.85	10	100	90	Minimal
				-84.50	-70.15	14.35	10	100	90	OFF

Band	BW [㎒]	Channel Freq. [㎒]	Incumbent Freq. [㎒]	Detection Power Level [dBm]	Detection Threshold Limit [dBm]	Margin [dB]	Number of AWGN	AWGN Detection Probability (%)	Limit Probability (%)	EUT Status
UNII 8	20	6 995	6 995	-90.00	-70.18	19.82	10	100	90	ON
				-77.50	-70.18	7.32	10	100	90	Minimal
				-77.00	-70.18	6.82	10	100	90	OFF
	160	6 985	6 910	-90.00	-70.18	19.82	10	100	90	ON
				-82.00	-70.18	11.82	10	100	90	Minimal
				-81.50	-70.18	11.32	10	100	90	OFF
			6 985	-90.00	-70.18	19.82	10	100	90	ON
				-73.00	-70.18	2.82	10	100	90	Minimal
				-72.50	-70.18	2.32	10	100	90	OFF
			7 060	-90.00	-70.18	19.82	10	100	90	ON
				-78.50	-70.18	8.32	10	100	90	Minimal
				-78.00	-70.18	7.82	10	100	90	OFF

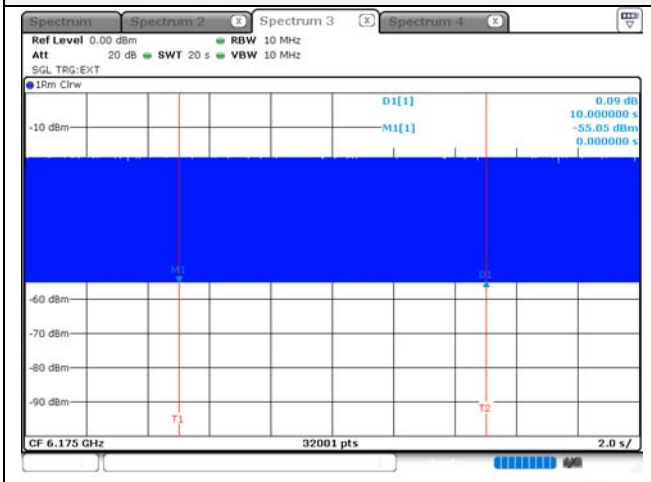
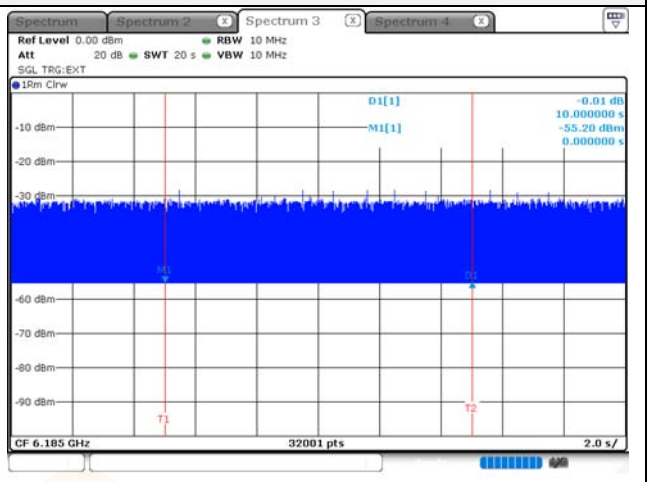
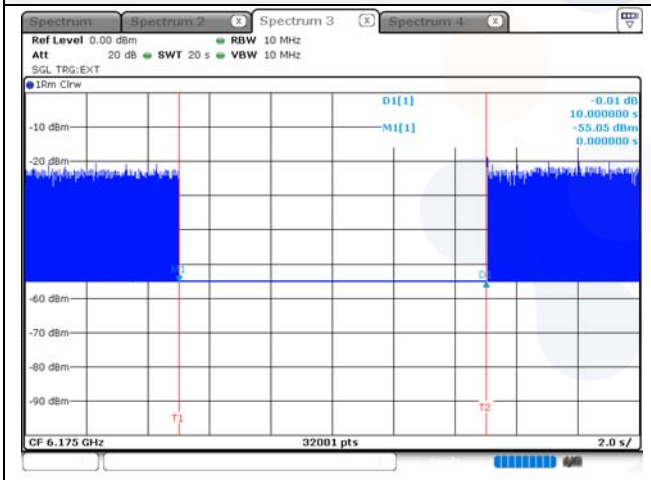
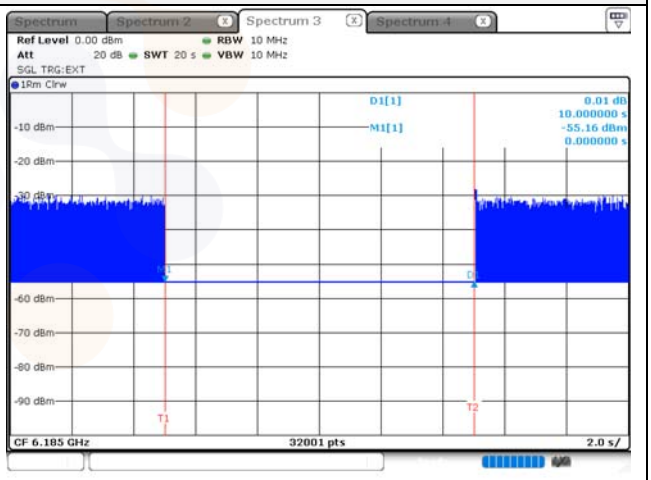
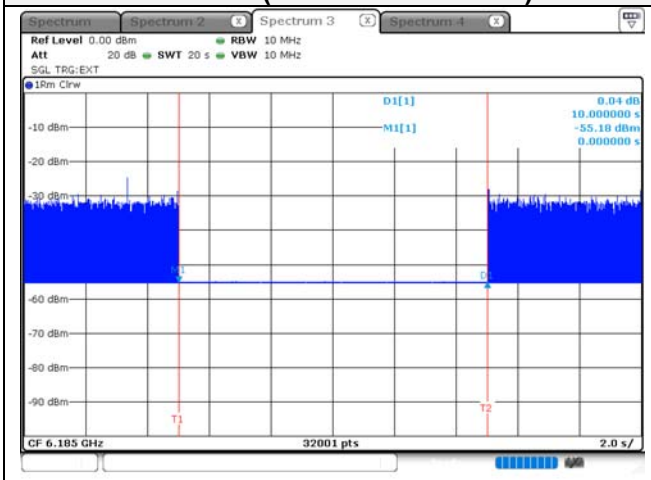
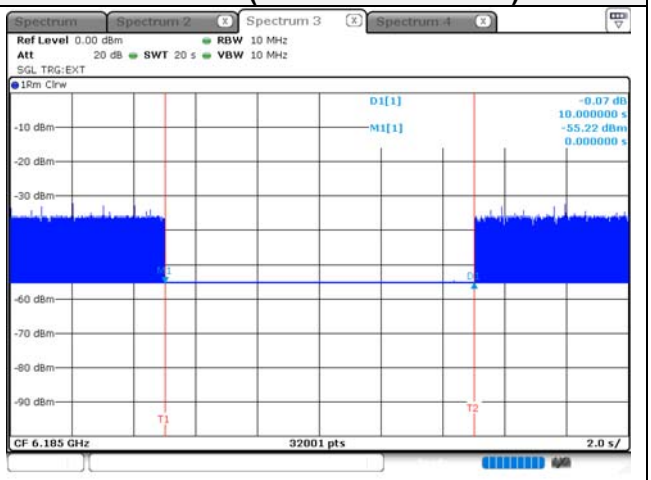
Notes:

1. EUT TX Status
   1) OFF: AWGN level at which no transmission is detected, consistently for a minimum period of 10 seconds.
   2) Minimal: AWGN level at which the system begins to trigger the transmission switch off, albeit not being kept off consistently.
   3) ON: AWGN level at which no impact on the transmission is detected, consistently for a minimum period of 10 seconds.

Plot of AWGN Signal



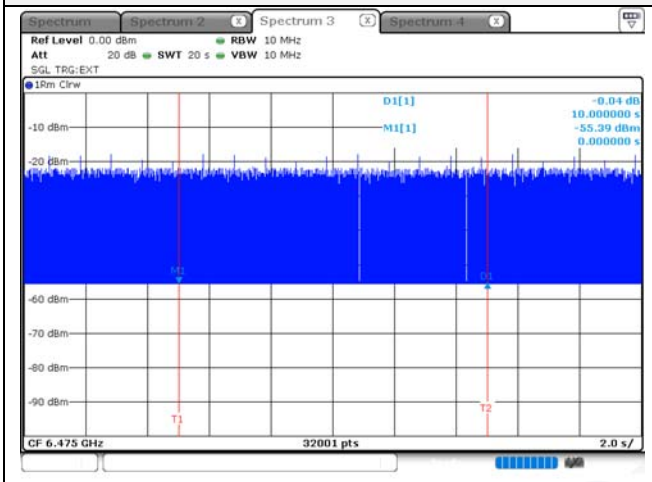
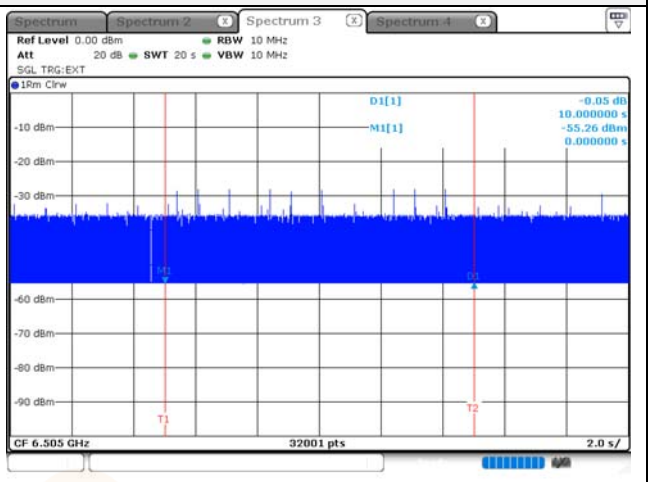
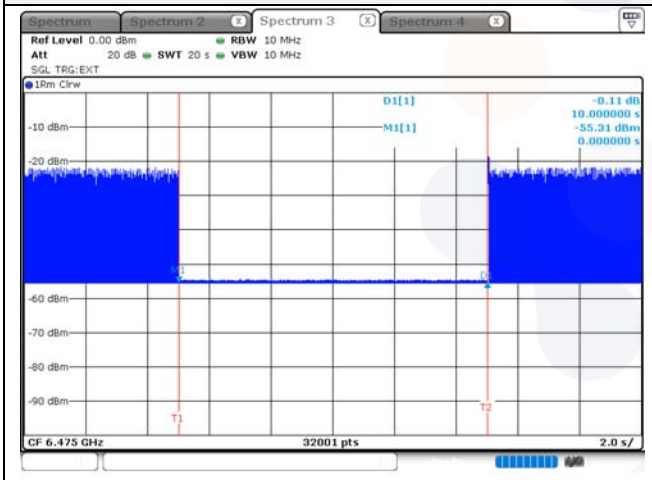
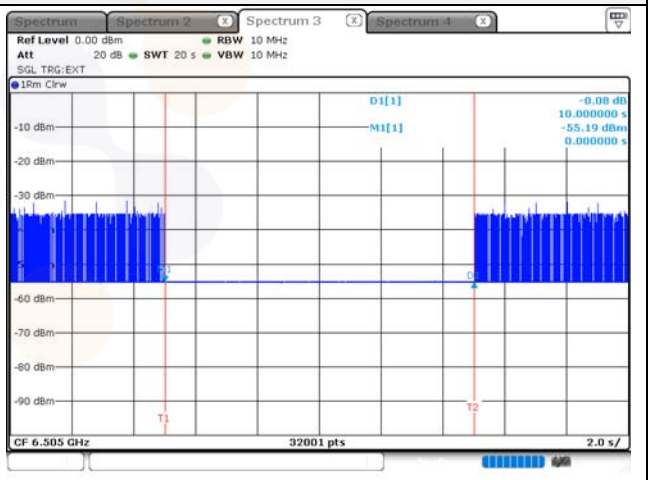
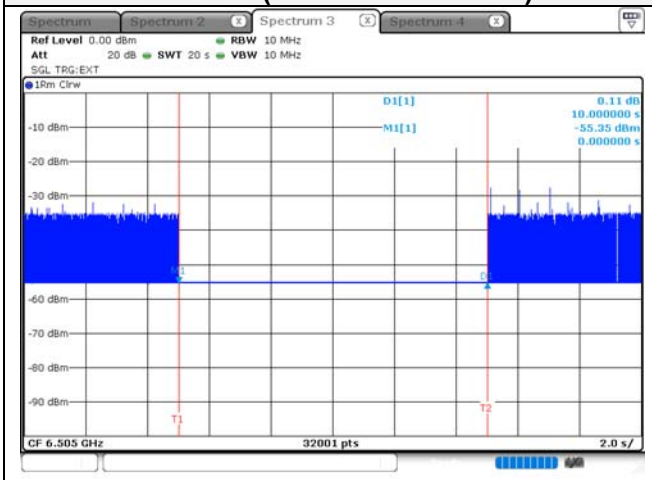
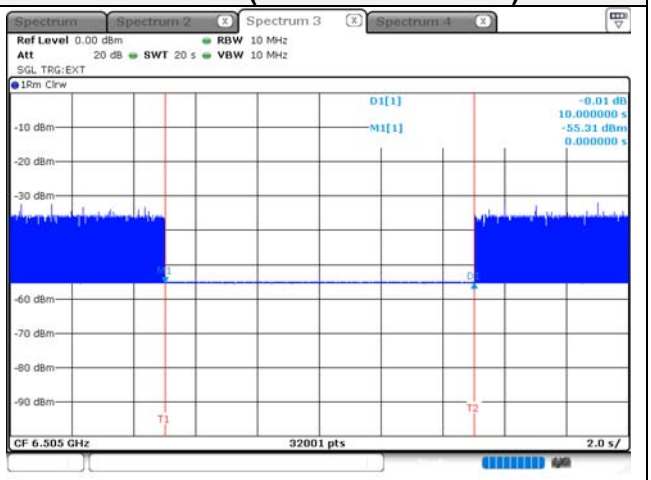
UNII-5

EUT Transmission	
6 175 ㎒ (20 ㎒ bandwidth)	**6 185 ㎒ (160 ㎒ bandwidth)**
	
Injected Incumbent Signal	
6 175 ㎒ (20 ㎒ bandwidth)	**6 110 ㎒ (160 ㎒ bandwidth)**
	
6 185 ㎒ (160 ㎒ bandwidth)	**6 260 ㎒ (160 ㎒ bandwidth)**
	

Note.

- M1: Injection of AWGN signal, D2: Removal of AWGN signal.

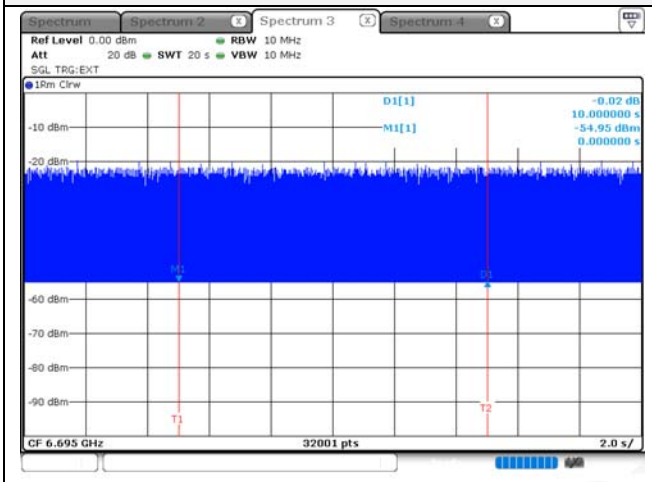
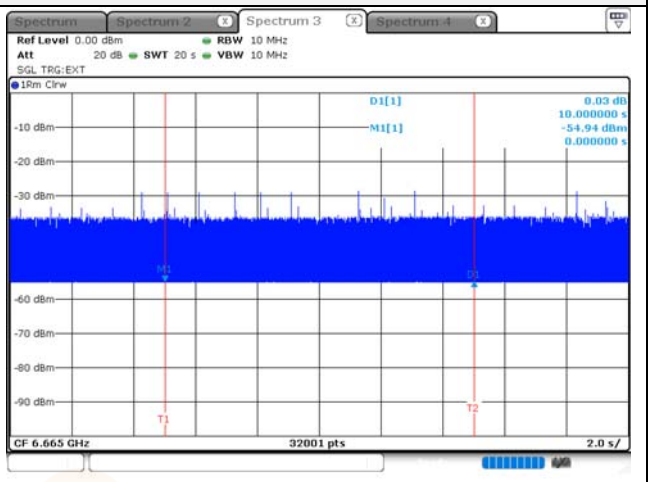
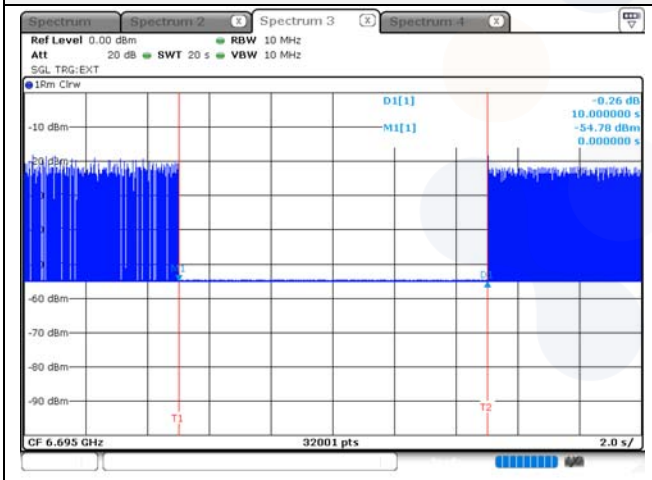
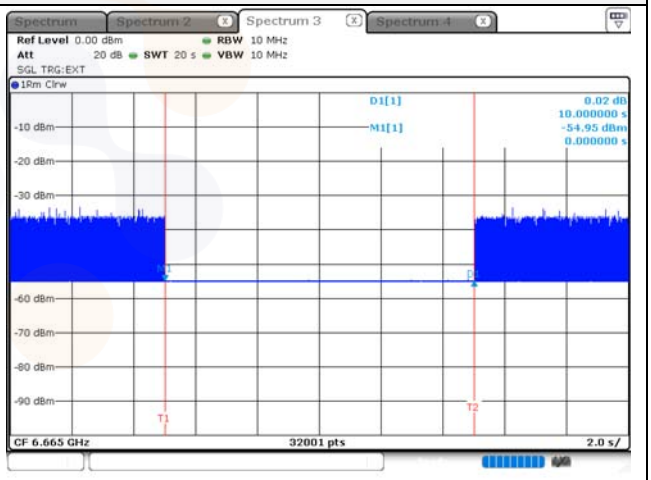
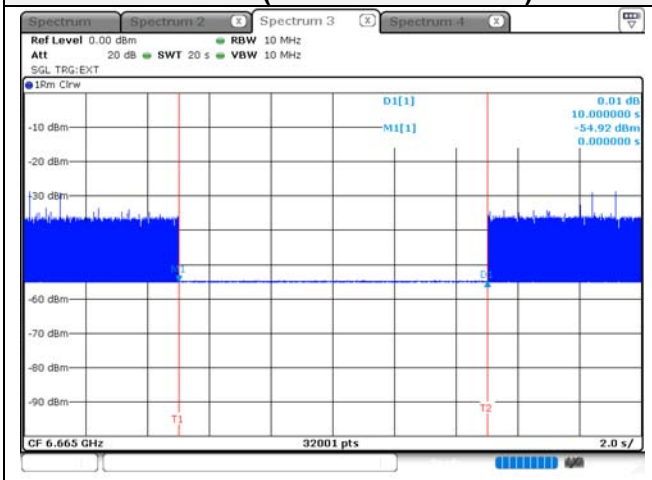
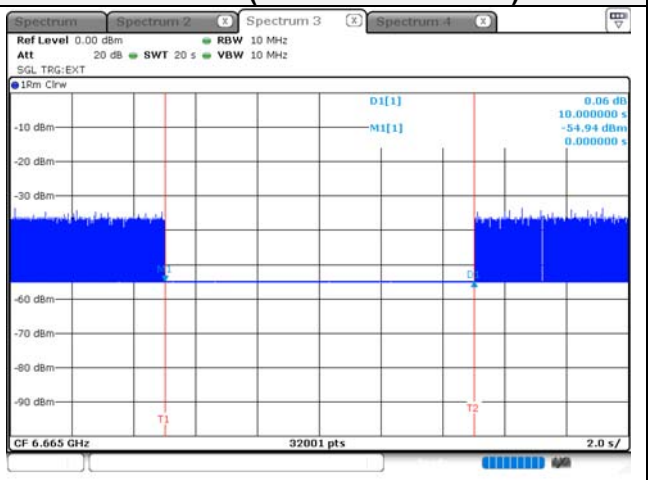
UNII-6

EUT Transmission	
6 475 ㎒ (20 ㎒ bandwidth)	**6 505 ㎒ (160 ㎒ bandwidth)**
	
Injected Incumbent Signal	
6 475 ㎒ (20 ㎒ bandwidth)	**6 430 ㎒ (160 ㎒ bandwidth)**
	
6 505 ㎒ (160 ㎒ bandwidth)	**6 580 ㎒ (160 ㎒ bandwidth)**
	

Note.

- M1: Injection of AWGN signal, D2: Removal of AWGN signal.

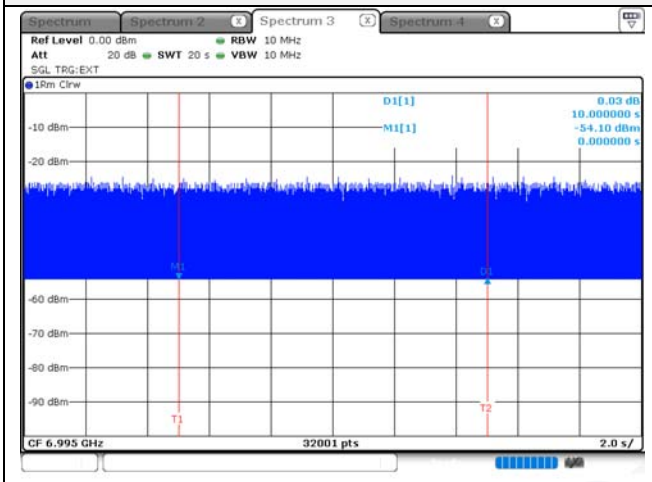
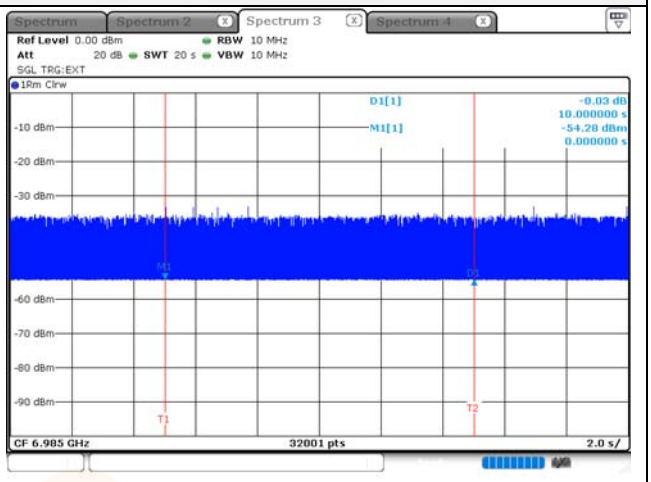
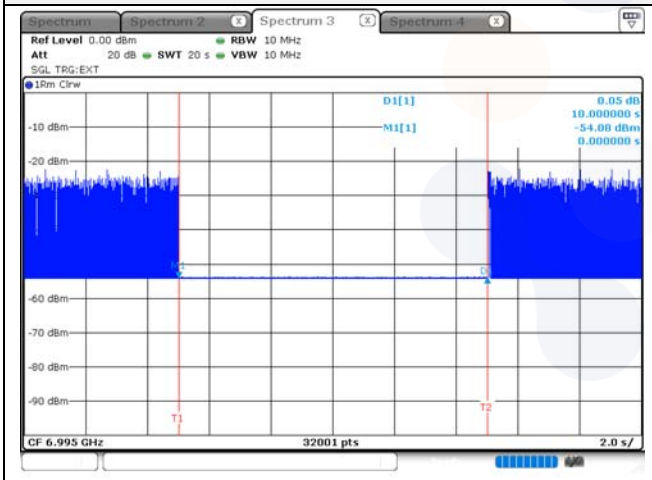
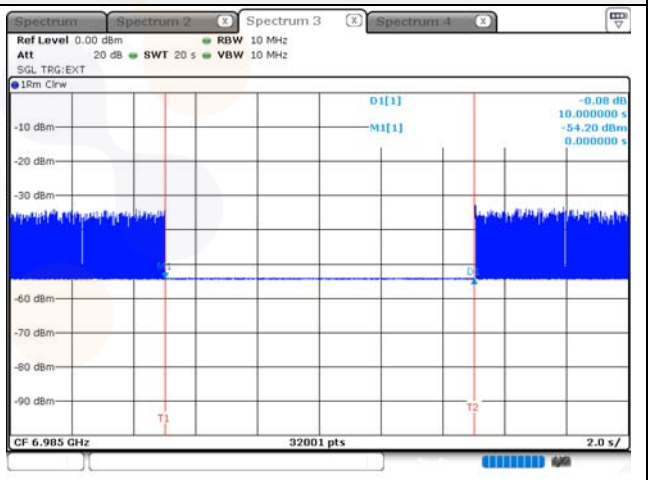
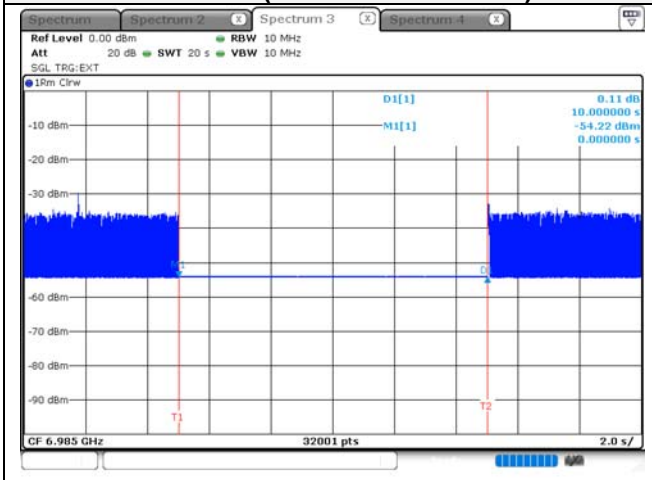
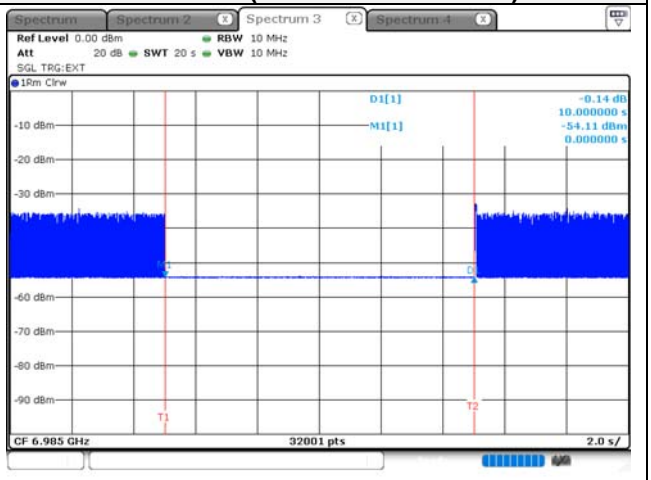
UNII-7

EUT Transmission	
6 695 ㎒ (20 ㎒ bandwidth)	**6 665 ㎒ (160 ㎒ bandwidth)**
	
Injected Incumbent Signal	
6 695 ㎒ (20 ㎒ bandwidth)	**6 590 ㎒ (160 ㎒ bandwidth)**
	
6 665 ㎒ (160 ㎒ bandwidth)	**6 740 ㎒ (160 ㎒ bandwidth)**
	

Note.

- M1: Injection of AWGN signal, D2: Removal of AWGN signal.

UNII-8

EUT Transmission	
6 995 ㎒ (20 ㎒ bandwidth)	**6 985 ㎒ (160 ㎒ bandwidth)**
	
Injected Incumbent Signal	
6 995 ㎒ (20 ㎒ bandwidth)	**6 910 ㎒ (160 ㎒ bandwidth)**
	
6 985 ㎒ (160 ㎒ bandwidth)	**7 060 ㎒ (160 ㎒ bandwidth)**
	

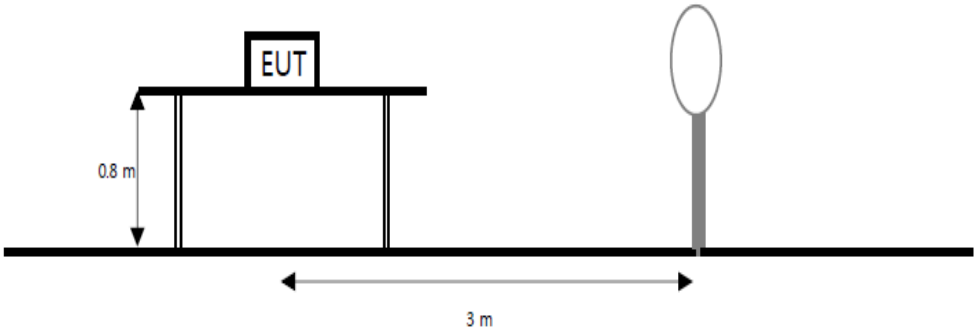
Note.

- M1: Injection of AWGN signal, D2: Removal of AWGN signal.

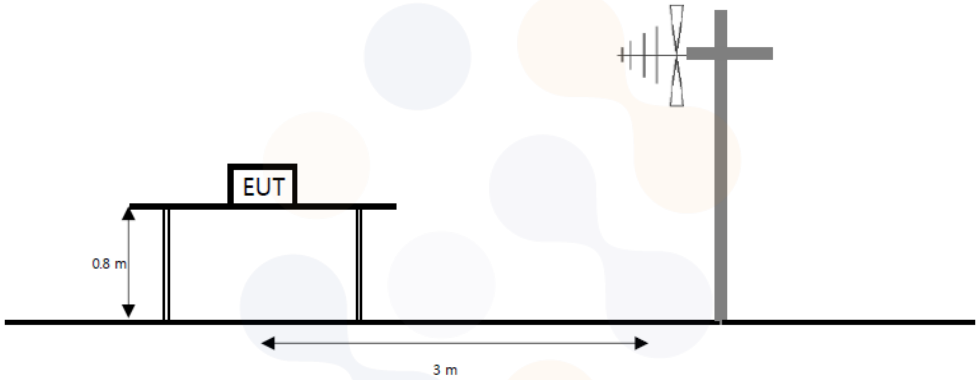
7.2. Spurious Emission, Band Edge and Restricted bands

Test setup

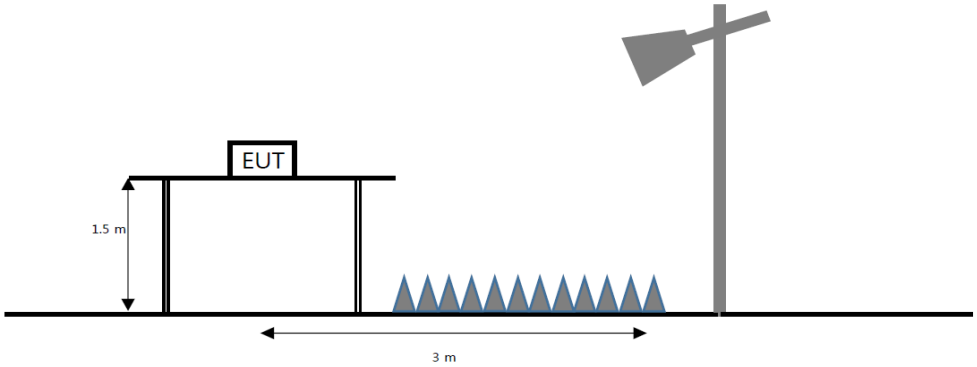
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



Limit

FCC

According to section 15.407(b)(6), For transmitters operating within the 5.925-7.125 ㎓ band: Any emissions outside of the 5.925-7.125 ㎓ band must not exceed an e.i.r.p. of −27 ㏈m/㎒.

According to section 15.209(a) except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (㎒)	Field strength (㎶/m)	Measurement distance (m)
0.009 - 0.490	2 400/F(㎑)	300
0.490 - 1.705	24 000/F(㎑)	30
1.705 - 30	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 ㎒, 76–88 ㎒, 174–216 ㎒ or 470–806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section15.231 and 15.241.

According to section 15.205(a) and (b) only spurious emissions are permitted in any of the frequency bands listed below:

㎒	㎒	㎒	㎓
0.009 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505	16.694 75 - 16.695 25	608 - 614	5.35 - 5.46
2.173 5 - 2.190 5	16.804 25 - 16.804 75	960 – 1 240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1 300 – 1 427	8.025 - 8.5
4.177 25 - 4.177 75	37.5 - 38.25	1 435 – 1 626.5	9.0 - 9.2
4.207 25 - 4.207 75	73 - 74.6	1 645.5 – 1 646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1 660 – 1 710	10.6 - 12.7
6.267 75 - 6.268 25	108 - 121.94	1 718.8 – 1 722.2	13.25 - 13.4
6.311 75 - 6.312 25	123 - 138	2 200 – 2 300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2 310 – 2 390	15.35 - 16.2
8.362 - 8.366	156.524 75 - 156.525 25	2 483.5 – 2 500	17.7 - 21.4
8.376 25 - 8.386 75		2 690 – 2 900	22.01 - 23.12
8.414 25 - 8.414 75	156.7 - 156.9	3 260 – 3 267	23.6 - 24.0
12.29 - 12.293	162.012 5 - 167.17	3 332 – 3 339	31.2 - 31.8
12.519 75 - 12.520 25	167.72 - 173.2	3 345.8 – 3 358	36.43 - 36.5
12.576 75 - 12.577 25	240 - 285	3 600 – 4 400	Above 38.6
13.36 - 13.41	322 - 335.4		

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 ㎒, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 ㎒, compliance with the emission limits in section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in section 15.35 apply to these measurements.

IC

According to RSS-248 4.7.2. a, Any emissions outside of the 5925-7125 ㎒ band shall not exceed -27 ㏈m e.i.r.p.

According to RSS-Gen(8.9), Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Table 5- General field strength limits at frequencies above 30 ㎒

Frequency(㎒)	Field strength (㎶/m at 3 m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

Table 6- General field strength limits at frequencies below 30 ㎒

Frequency	Magnetic field strength (H-Field) (㎂/m)	Measurement distance(m)
9 – 490 ㎑ 1)	6.37/F (F in ㎑)	300
490 – 1705 ㎑	63.7/F (F in ㎑)	30
1.705 - 30 ㎒	0.08	30

According to RSS-Gen(8.10), Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:

(a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).
(b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.
(c) Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

Table 7- Restricted frequency bands*

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 - 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 - 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 - 8500	
108 - 138	--	

* Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

Test procedure

ANSI C63.10-2013 Section 12.7.7.2, 12.7.5, 12.7.6
KDB 789033 D02 v02r01 – Section G

Test settings

Peak field strength measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW ≥ (3×RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

Table. RBW as a function of frequency

Frequency	RBW
9 ㎑ to 150 ㎑	200 ㎐ to 300 ㎐
0.15 ㎒ to 30 ㎒	9 ㎑ to 10 ㎑
30 ㎒ to 1 000 ㎒	100 ㎑ to 120 ㎑
> 1 000 ㎒	1 ㎒

Average field strength measurements

Trace averaging with continuous EUT transmission at full power

If the EUT can be configured or modified to transmit continuously (D ≥ 98%), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1. RBW = 1 ㎒ (unless otherwise specified).
2. VBW ≥ (3×RBW).
3. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
   1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
   2) Some instruments require linear display mode to use linear voltage averaging. Log or ㏈ averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction

If continuous transmission of the EUT (D ≥ 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than ±2%), then the following procedure shall be used:

1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 ㎒ (unless otherwise specified).
4. VBW ≥ [3 × RBW].
5. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
6. Averaging type = power (i.e., rms):
   1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
   2) Some instruments require linear display mode to use linear voltage averaging. Log or ㏈ averaging shall not be used.
7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
   1) If power averaging (rms) mode was used in step f), then the applicable correction factor is [10 log (1 / D)], where D is the duty cycle.
   2) If linear voltage averaging mode was used in step f), then the applicable correction factor is [20 log (1 / D)], where D is the duty cycle.
   3) If a specific emission is demonstrated to be continuous (D ≥ 98%) rather than turning ON and OFF with with the transmit cycle, then no duty cycle correction is required for that emission.

Band edge measurements

Integration Method

For maximum emissions measurements, follow the procedures described in II.G.5., “Procedures for unwanted maximum Emissions Measurements above 1000 ㎒. Except for the following changes:

1. Set RBW = 100 ㎑
2. Set VBW ≥ 3 × RBW
3. Perform a band-power integration across the 1 ㎒ bandwidth in which the band edge emission level is to be measured. CAUTION: you must ensure that the spectrum analyzer or EMI receiver is set for peak detection and max-hold for this measurement.

For average emissions measurements, follow the procedures described in II.G.6., “Procedures for average unwanted Emissions Measurements above 1000 ㎒. Except for the following changes:

1. Set RBW = 100 ㎑
2. Set VBW ≥ 3 × RBW
3. Perform a band-power integration across the 1 ㎒ bandwidth in which the band edge emission level is to be measured.

Notes:

1. *f* <30 ㎒, extrapolation factor of 40 ㏈/decade of distance. $F_d = 40\log(D_m/D_s)$
   f ≥30 ㎒, extrapolation factor of 20 ㏈/decade of distance. $F_d = 20\log(D_m/D_s)$
   Where:
   F_d= Distance factor in ㏈
   D_m= Measurement distance in meters
   D_s= Specification distance in meters
2. Factors(㏈) = Antenna factor(㏈/m) + Cable loss(㏈) + or Amp. gain(㏈) + or F_d(㏈)
3. The worst-case emissions are reported however emissions whose levels were not within 20 ㏈ of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. 1) means restricted band.
6. Below 30 ㎒ frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 ㏈ of the limit, then the following statement shall be made: “No spurious emissions were detected within 20 ㏈ of the limit.”
7. For above 1 ㎓ pre-scan to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 ㎒; the video bandwidth is set to 30 ㎑ for peak measurements.
8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X ㎑ resulted in a level of Y ㏈㎶/m, which is equivalent to Y - 51.5 = Z ㏈㎂/m, which has the same margin, W ㏈, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

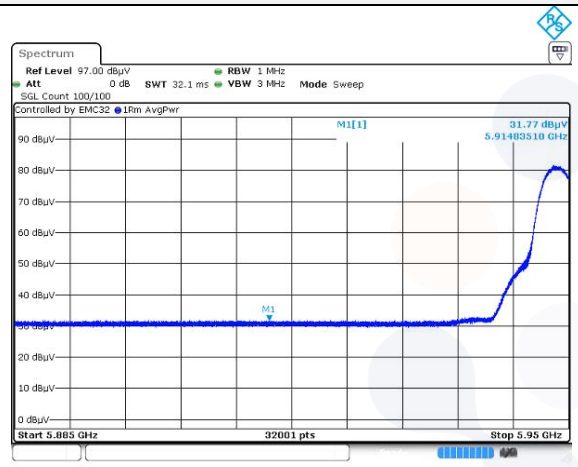
Spot-check Test results

MIMO 802.11a UNII-5 / Band-edge

Lowest Channel (5 955 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 914.84	V	41.98	35.05	-22.78	-	54.25	88.20	33.95
Average Data								
5 914.84	V	31.77	35.05	-22.78	0.33	44.37	68.20	23.83

Average data



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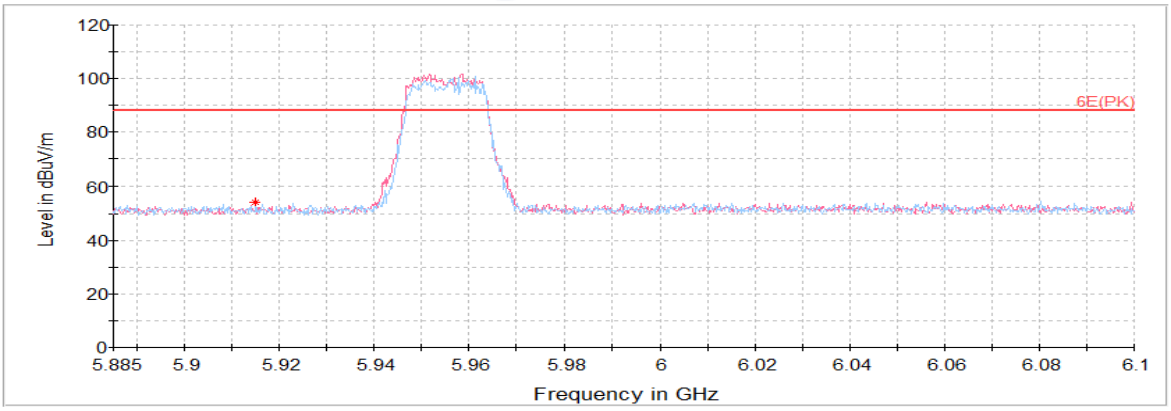
Horizontal/Vertical for Band-edge

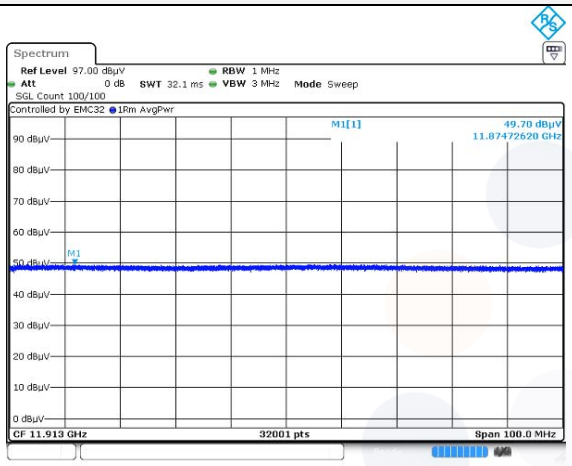


MIMO 802.11a UNII-5 / Harmonic

Lowest Channel (5 955 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
11 874.73[1)]	H	59.84	38.30	-46.38	-	51.76	74.00	22.24
Average Data								
11 874.73[1)]	H	49.70	38.30	-46.38	0.33	41.95	54.00	12.05

Average data



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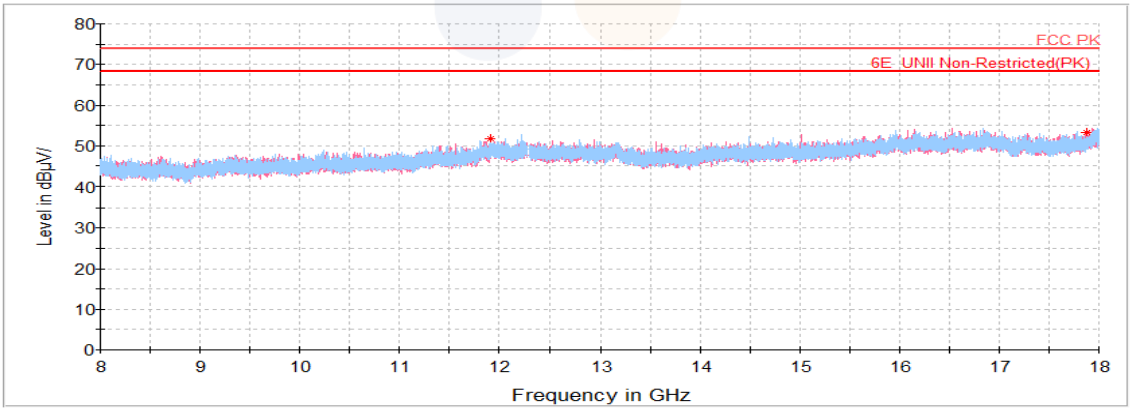
Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

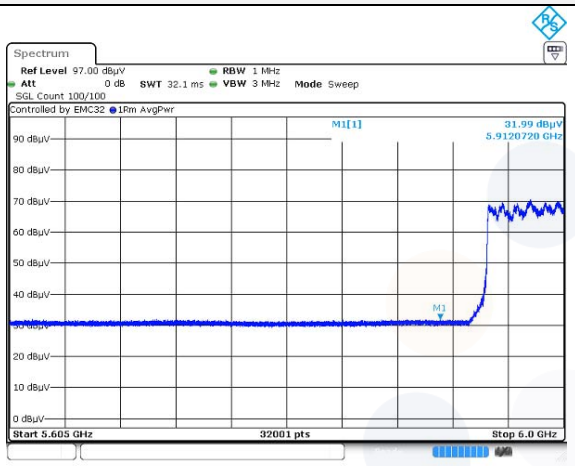


MIMO 802.11ax HE160 RU mode (2X996T / RU offset 68) UNII-5 / Band-edge

Lowest Channel (6 025 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
5 912.07	H	40.90	35.04	-22.80	-	53.14	88.20	35.06
Average Data								
5 912.07	H	31.99	35.04	-22.80	2.45	46.68	68.20	21.52

Average data



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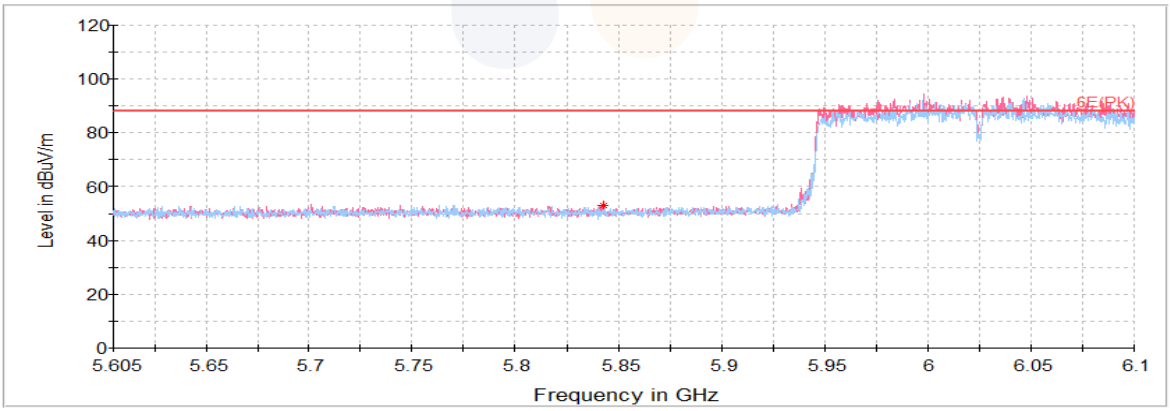
Horizontal/Vertical for Band-edge

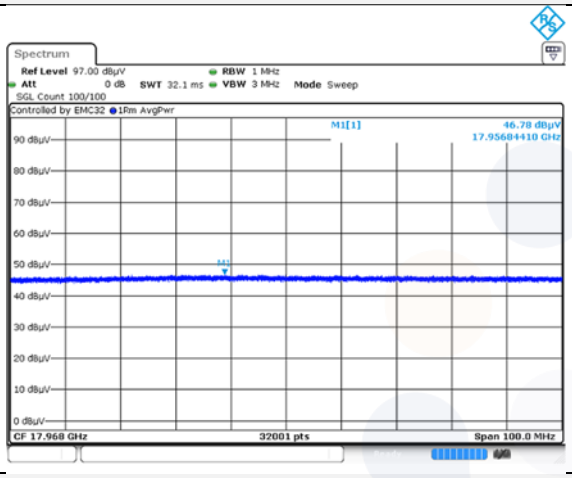


MIMO 802.11ax HE80 SU mode UNII-5 / Harmonic

Lowest Channel (5 985 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
17 956.84[1)]	V	58.95	39.79	-44.39	-	54.35	74.00	19.65
Average Data								
17 956.84[1)]	V	46.78	39.79	-44.39	1.18	43.36	54.00	10.64

Average data



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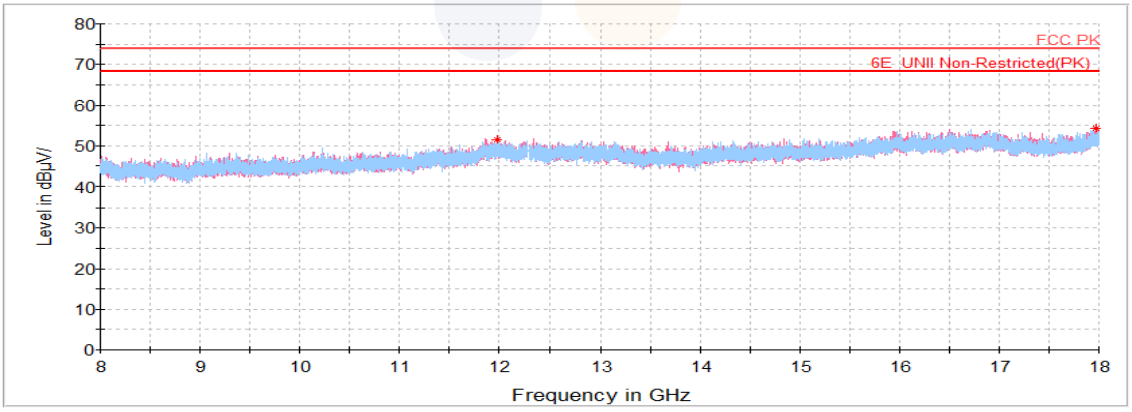
Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

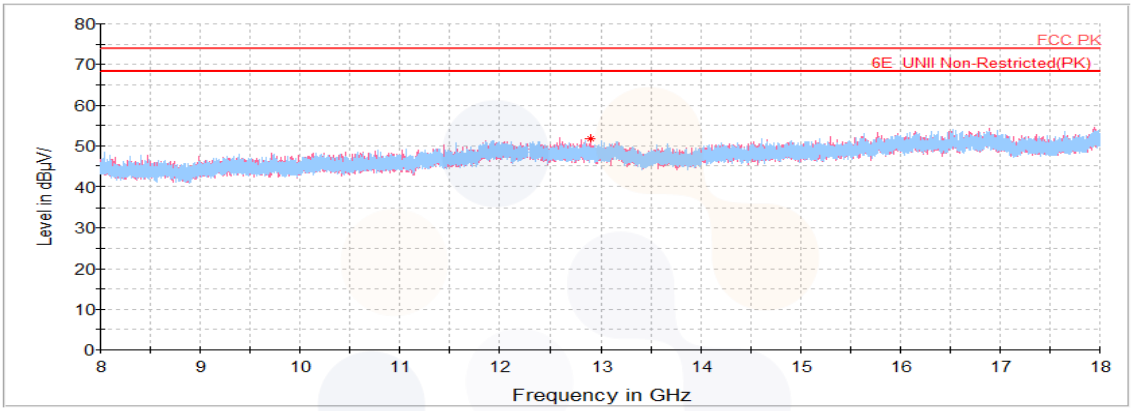


MIMO 802.11a UNII-6 / Harmonic

Middle Channel (6 475 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
12 899.39	V	59.48	39.12	-46.84	-	51.76	68.20	16.44
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

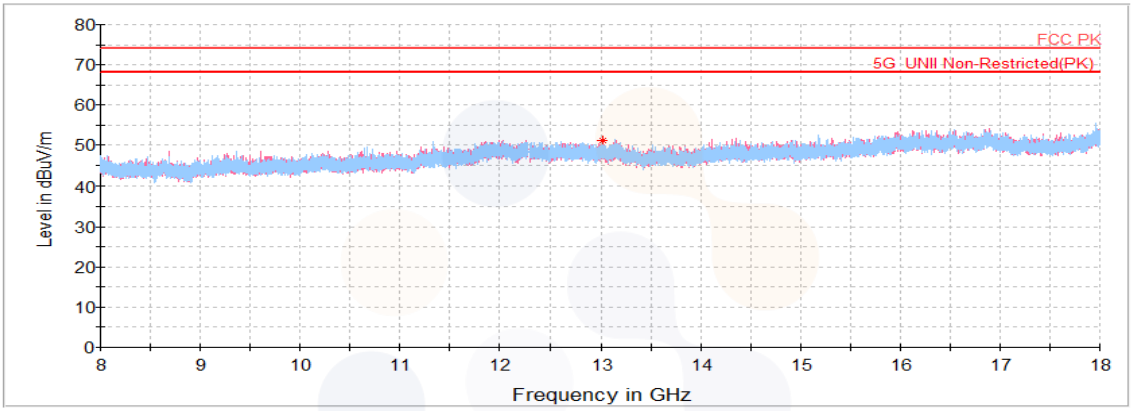


MIMO 802.11ax HE20 RU mode (242T / RU offset 61) UNII-6 / Harmonic

Highest Channel (6 515 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
13 017.63	V	58.99	39.01	-46.78	-	51.22	68.20	16.98
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

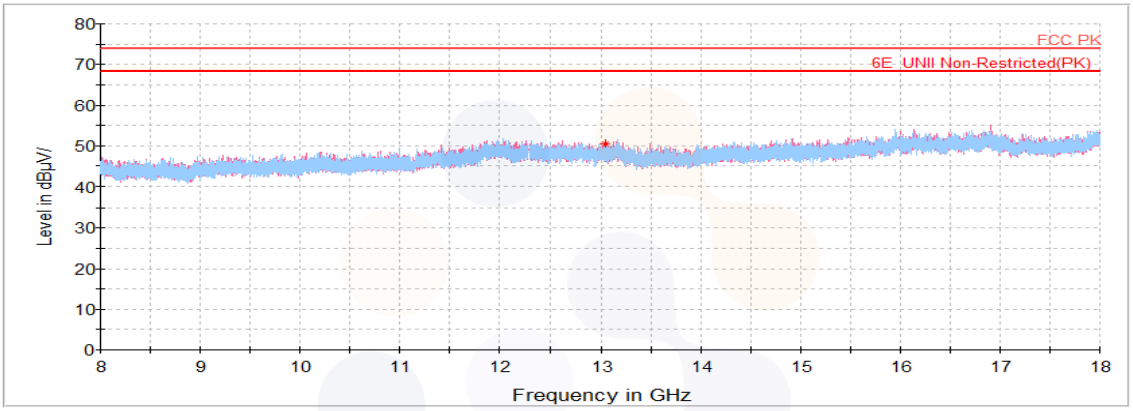


MIMO 802.11a UNII-7 / Harmonic

Lowest Channel (6 535 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
13 053.92	H	58.16	39.02	-46.86	-	50.32	68.20	17.88
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

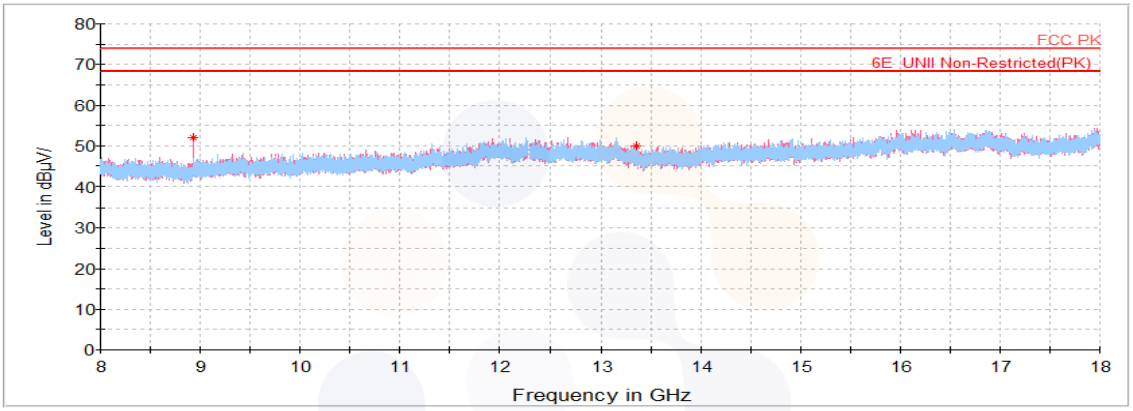


MIMO 802.11ax HE20 RU mode (242T / RU offset 61) UNII-7 / Harmonic

Middle Channel (6 695 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
8 926.50	V	65.52	35.66	-49.26	-	51.92	68.20	16.28
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

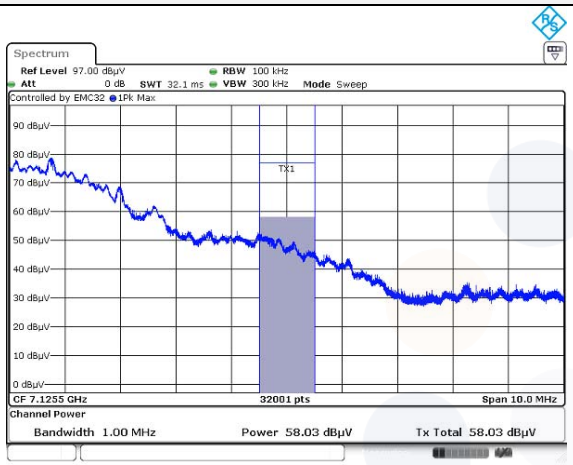


MIMO 802.11a UNII-8 / Band-edge

Highest Channel (7 115 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
7 125.50	V	58.03	35.13	-21.16	-	72.00	88.20	16.20
Average Data								
7 125.50	V	48.19	35.13	-21.16	0.33	62.49	68.20	5.71

Peak data



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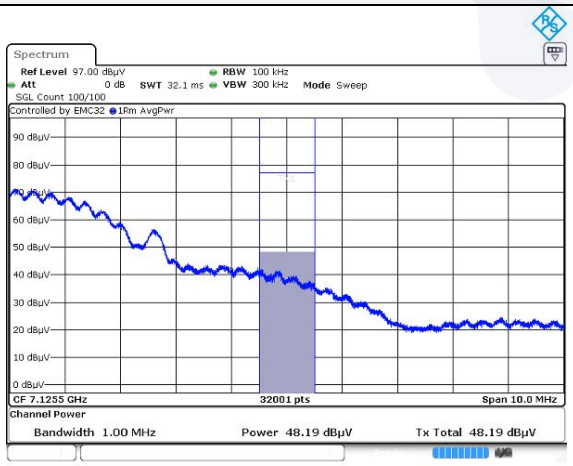
Average data



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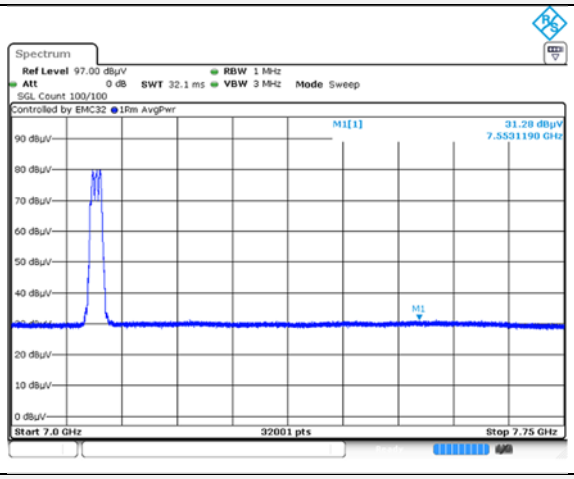
Average data



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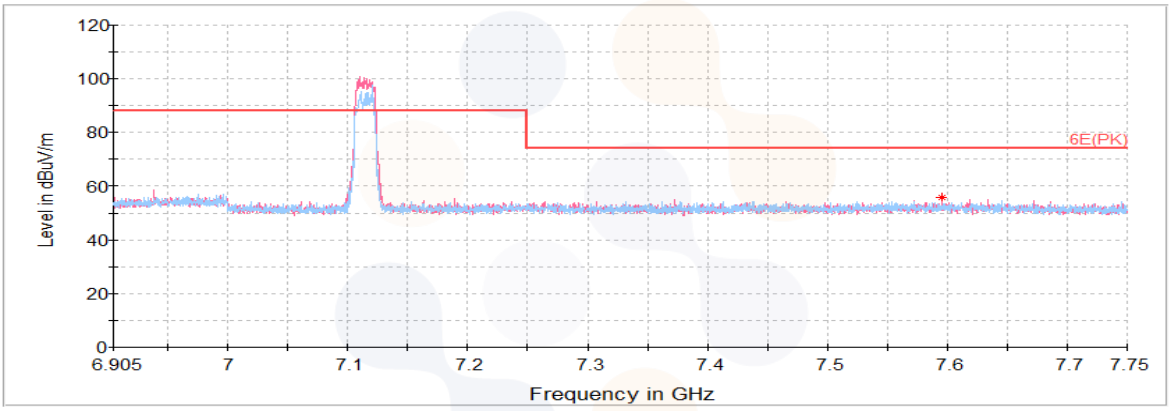
Horizontal/Vertical for Band-edge

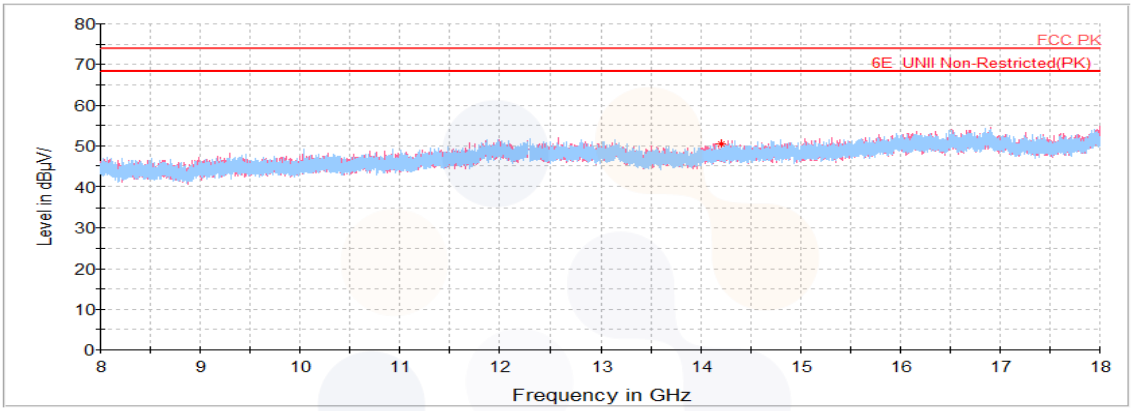


MIMO 802.11a UNII-8 / Harmonic

Highest Channel (7 115 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
14 210.03	H	58.90	39.03	-47.40	-	50.53	68.20	17.67
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓

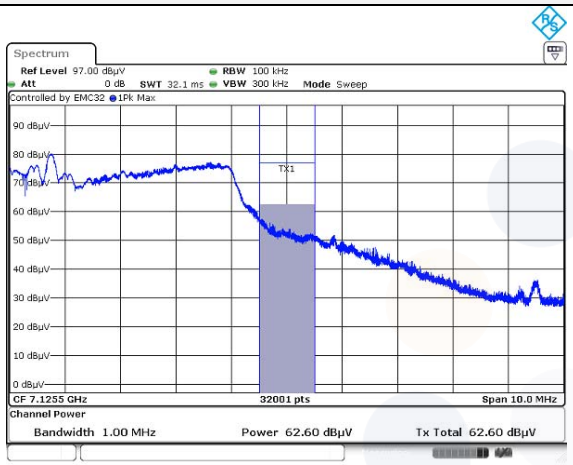


MIMO 802.11ax HE20 SU mode UNII-8 / Band-edge

Highest Channel (7 115 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
7 125.50	V	62.60	35.13	-21.16	-	76.57	88.20	11.63
Average Data								
7 125.50	V	52.15	35.13	-21.16	0.42	66.54	68.20	1.66

Peak data



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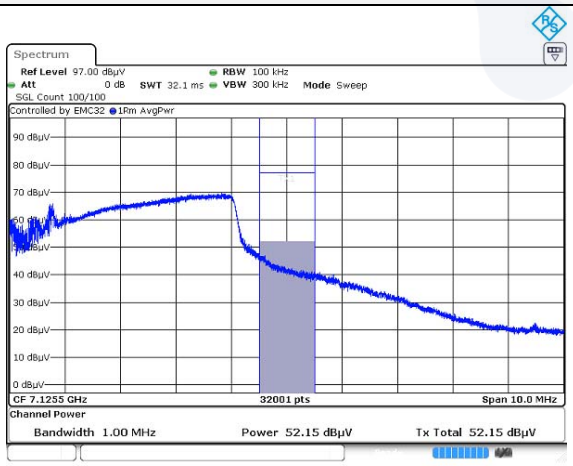
Average data



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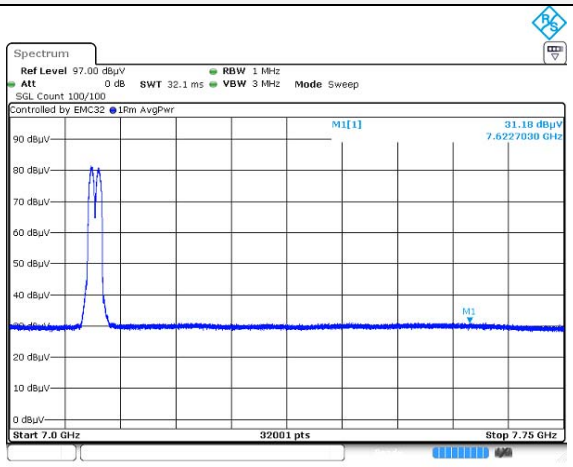
Average data



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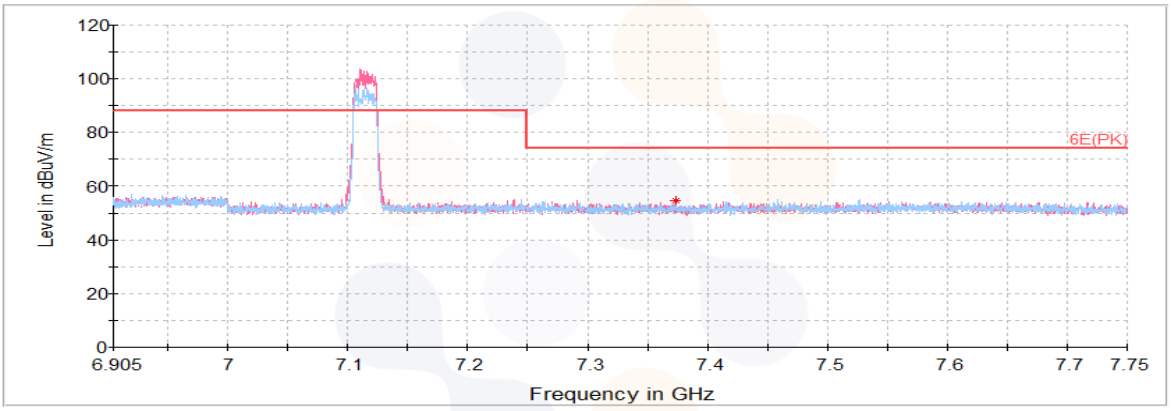
Horizontal/Vertical for Band-edge

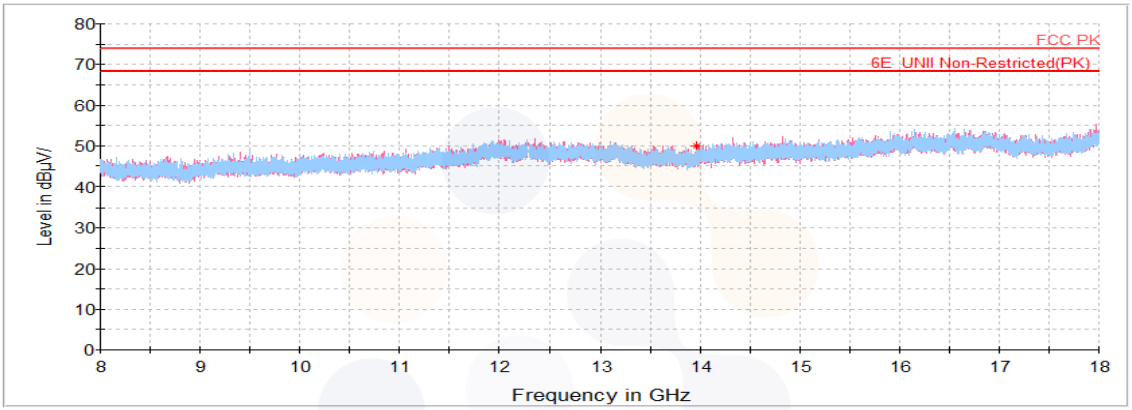


MIMO 802.11ax HE160 RU mode (2X996T / RU offset 68) UNII-8 / Harmonic

Middle Channel (6 985 ㎒)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(㎒)	(V/H)	(dB(㎶))	(dB)	(dB)	(dB)	(dB(㎶/m))	(dB(㎶/m))	(dB)
Peak data								
13 959.19	H	59.21	38.23	-47.53	-	49.91	68.20	18.29
Average Data								
No spurious emissions were detected within 20 ㏈ of the limit.								

Horizontal/Vertical for 6.5 ㎓ ~ 18 ㎓



8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSVA40	101698	23.04.24
DC Power Supply	AGILENT	E3632A	KR75304571	23.05.02
Signal Generator	R&S	SMB100A	176206	23.01.19
Vector Signal Generator	R&S	SMBV100A	257566	23.07.04
Vector Signal Generator	R&S	SMW200A	109480	23.03.04
Power Divider	Aeroflex/ Weinschel,Inc	1580-1	PE430	23.07.12
Power Divider	Aeroflex/ Weinschel,Inc	1580-1	NX380	23.07.12
Mldd 4 Way Power Divider	KRYTAR	7005265	154726	23.07.12
Step Attenuator	HP	8496A	3308A16640	23.07.11
Spectrum Analyzer	R&S	FSV40	100989	23.10.14
Horn antenna	ETS.lindgren	3117	155787	23.09.29
Horn antenna	ETS.lindgren	3116	00086632	23.01.25
Attenuator	API Inmet	40AH2W-10	12	23.05.03
AMPLIFIER	B&Z Technologies	BZRT-00504000-481055-382525	26299-27735	23.09.19
AMPLIFIER	B&Z Technologies	BZR-0050400-551028-252525	27736	23.09.19
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Turn Table	Innco Systems	CO3000	1175/45850319/P	-
Antenna Mast	Innco Systems	MA4000-EP	303	-
Turn Table	Innco Systems	CO3000	1175/45850319/P	-
High pass Filter	WT	WT-A1698-HS	WT160411001	23.05.03

End of test report