





# TEST REPORT

<b>Eurofins KCTL Co.,Ltd.</b> 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 <a href="http://www.kctl.co.kr">www.kctl.co.kr</a>	Report No.: <b>KR23-SRF0244-B</b> Page(1) of (29)	   <b>KCTL</b>
<b>1. Client</b>		
<ul style="list-style-type: none"> <li>◦ Name : Samsung Electronics Co., Ltd.</li> <li>◦ Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea</li> <li>◦ Date of Receipt : 2023-09-05</li> </ul>		
<b>2. Use of Report</b> : Certification		
<b>3. Name of Product / Model</b> : Tablet PC / SM-X300		
<b>4. Manufacturer / Country of Origin</b> : Samsung Electronics Co., Ltd. / Vietnam		
<b>5. FCC ID</b> : A3LSMX300		
<b>6. Date of Test</b> : 2023-10-23 to 2023-11-08		
<b>7. Location of Test</b> : <input checked="" type="checkbox"/> Permanent Testing Lab <input type="checkbox"/> On Site Testing (Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)		
<b>8. Test method used</b> : FCC Part 15 Subpart E, 15.407		
<b>9. Test Result</b> : Refer to the test result in the test report		
Affirmation	Tested by  Name : Sunghyun Yoon (Signature)	Technical Manager  Name : Seungyong Kim (Signature)
2023-12-01		
<b>Eurofins KCTL Co.,Ltd.</b>		
As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by Eurofins KCTL Co.,Ltd.		

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## REPORT REVISION HISTORY

Date	Revision	Page No
2023-11-14	Originally issued	-
2023-11-24	Updated	12
2023-12-01	Updated	12

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Note. The report No. KR23-SRF0244-A is superseded by the report No. KR23-SRF0244-B.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

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## 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 Thai Nguyen Co., Ltd  
 Address : Yen Binh Industrial Park, Dong Tien Ward, Pho Yen Town, Thai Nguyen Province, 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 : Tablet PC  
 Model : SM-X300  
 Modulation technique : WIFI(802.11a/n/ac/ax) : OFDM, OFDMA  
 Number of channels : UNII-1 : 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)  
 UNII-2A : 4 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)  
 UNII-2C : 12 ch (20 MHz), 6 ch (40 MHz), 3 ch (80 MHz)  
 UNII-3 : 5 ch (20 MHz), 2 ch (40 MHz), 1 ch (80 MHz)  
 Power source : DC 3.85 V  
 Antenna specification : Antenna 1 : LDS Antenna  
 Antenna 2 : LDS Antenna  
 Antenna gain :  

	Antenna 1	Antenna 2
UNII-1	: -4.50 dBi	UNII-1 : -4.00 dBi
UNII-2A	: -4.70 dBi	UNII-2A : -4.40 dBi
UNII-2C	: -4.50 dBi	UNII-2C : -5.00 dBi
UNII-3	: -5.80 dBi	UNII-3 : -4.40 dBi

 Frequency range : UNII-1 : 5 180 MHz ~ 5 240 MHz (802.11a/n/ac/ax\_HT20/VHT20)  
 UNII-1 : 5 190 MHz ~ 5 230 MHz (802.11n/ac/ax\_HT40/VHT40/HE40)  
 UNII-1 : 5 210 MHz (802.11ac/ax\_VHT80/HE80)  
 UNII-2A : 5 260 MHz ~ 5 320 MHz (802.11a/n/ac/ax\_HT20/VHT20/HE20)  
 UNII-2A : 5 270 MHz ~ 5 310 MHz (802.11n/ac/ax\_HT40/VHT40/HE40)  
 UNII-2A : 5 290 MHz (802.11ac/ax\_VHT80/HE80)  
 UNII-2C : 5 500 MHz ~ 5 720 MHz (802.11a/n/ac/ax\_HT20/VHT20/HE20)  
 UNII-2C : 5 510 MHz ~ 5 710 MHz (802.11n/ac/ax\_HT40/VHT40/HE40)  
 UNII-2C : 5 530 MHz ~ 5 690 MHz (802.11ac/ax\_VHT80/HE80)  
 UNII-3 : 5 745 MHz ~ 5 825 MHz (802.11a/n/ac/ax\_HT20/VHT20/HE20)  
 UNII-3 : 5 755 MHz ~ 5 795 MHz (802.11n/ac/ax\_HT40/VHT40/HE40)  
 UNII-3 : 5 775 MHz (802.11ac/ax\_VHT80/HE80)  
 Software version : X300.001  
 Hardware version : REV1.0  
 Test device serial No. : Conducted : R32W9001LMN  
 Radiated : R32W9001L0M  
 Operation temperature : 0 °C ~ 35 °C

## 2.1. Frequency/channel operations

This device contains the following capabilities:

WLAN (11a/b/g/n/ac/ax), Bluetooth (BDR/EDR/BLE), NFC, Digitizer

### UNII-1

Ch.	Frequency (MHz)
36	5 180
40	5 200
48	5 240

### UNII-2A

Ch.	Frequency (MHz)
52	5 260
56	5 280
64	5 320

### UNII-2C

Ch.	Frequency (MHz)
100	5 500
120	5 600
140	5 700
144	5 720

### UNII-3

Ch.	Frequency (MHz)
149	5 745
157	5 785
165	5 825

Table 2.1-1. 802.11ax HE20 mode

### UNII-1

Ch.	Frequency (MHz)
38	5 190
46	5 230

### UNII-2A

Ch.	Frequency (MHz)
54	5 270
62	5 310

### UNII-2C

Ch.	Frequency (MHz)
102	5 510
118	5 590
134	5 670
142	5 710

### UNII-3

Ch.	Frequency (MHz)
151	5 755
159	5 795

Table 2.1-2. 802.11ax HE40 mode

### UNII-1

Ch.	Frequency (MHz)
42	5 210

### UNII-2A

Ch.	Frequency (MHz)
58	5 290

### UNII-2C

Ch.	Frequency (MHz)
106	5 530
122	5 610
138	5 690

### UNII-3

Ch.	Frequency (MHz)
155	5 775

Table 2.1-3. 802.11ax HE80 mode

## 2.2 Test RU offset for tones in each modes

BW (MHz)	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 / -	-



### 2.3. Band portion of RU allocation about straddle channels

Mode	Channel	Tone number in RU	RU offset	Portion
HE20	Straddle 5720 MHz	26T	0	UNII-2C
			4	UNII-2C
			8	UNII-3
		52T	37	UNII-2C
			38	UNII-2C
			40	UNII-3
		106T	53	UNII-2C
242T / SU	61 / -	UNII-2C & UNII-3		
HE40	Straddle 5710 MHz	26T	0	UNII-2C
			9	UNII-2C
			17	UNII-3
		52T	37	UNII-2C
			41	UNII-2C
			44	UNII-3
		106T	53	UNII-2C
			54	UNII-2C
			56	UNII-2C & UNII-3
		242T	61	UNII-2C
62	UNII-2C & UNII-3			
484T / SU	65 / -		UNII-2C & UNII-3	
HE80	Straddle 5690 MHz	26T	0	UNII-2C
			18	UNII-2C
			36	UNII-3
		52T	37	UNII-2C
			45	UNII-2C
			52	UNII-3
		106T	53	UNII-2C
			57	UNII-2C
			60	UNII-2C & UNII-3
		242T	61	UNII-2C
			62	UNII-2C
			64	UNII-2C & UNII-3
		484T	65	UNII-2C
66	UNII-2C & UNII-3			
996T / SU	67 / -	UNII-2C & UNII-3		

## 2.4. Duty Cycle Factor

Test mode	ANT	Tone	Period (ms)	T <sub>on</sub> time (ms)	Duty cycle		Duty cycle factor (dB)	
					(Linear)	(%)		
802.11ax	HE20	SISO (ANT2)	26T	5.799	5.529	0.953 4	95.34	0.21
			52T	5.251	5.125	0.976 0	97.60	0.11
			106T	2.553	2.434	0.953 4	95.34	0.21
			242T	1.199	1.098	0.915 8	91.58	0.38
			SU	1.204	1.094	0.908 6	90.86	0.42
	HE40	SISO (ANT2)	26T	5.807	5.526	0.951 6	95.16	0.22
			52T	5.248	5.118	0.975 2	97.52	0.11
			106T	2.551	2.434	0.954 1	95.41	0.20
			242T	1.190	1.098	0.922 7	92.27	0.35
			484T	0.698	0.580	0.830 9	83.09	0.80
			SU	0.685	0.576	0.840 9	84.09	0.75
	HE80	SISO (ANT2)	26T	5.785	5.529	0.955 7	95.57	0.20
			52T	5.250	5.130	0.977 1	97.71	0.10
			106T	2.547	2.426	0.952 5	95.25	0.21
			242T	1.217	1.097	0.901 4	90.14	0.45
			484T	0.689	0.581	0.843 3	84.33	0.74
			996T	0.407	0.307	0.754 3	75.43	1.22
			SU	0.412	0.303	0.735 4	73.54	1.33



Test mode	ANT	Tone	Period (ms)	T <sub>on</sub> time (ms)	Duty cycle		Duty cycle factor (dB)	
					(Linear)	(%)		
802.11ax	HE20	MIMO	26T	5.257	5.129	0.975 7	97.57	0.11
			52T	2.727	2.600	0.953 4	95.34	0.21
			106T	1.348	1.229	0.911 7	91.17	0.40
			242T	0.716	0.588	0.821 2	82.12	0.86
			SU	0.694	0.584	0.841 5	84.15	0.75
	HE40	MIMO	26T	5.239	5.129	0.979 0	97.90	0.09
			52T	2.719	2.599	0.955 9	95.59	0.20
			106T	1.375	1.247	0.906 9	90.69	0.42
			242T	0.707	0.588	0.831 7	83.17	0.80
			484T	0.429	0.329	0.766 9	76.69	1.15
			SU	0.434	0.325	0.748 8	74.88	1.26
	HE80	MIMO	26T	5.259	5.129	0.975 3	97.53	0.11
			52T	2.719	2.598	0.955 5	95.55	0.20
			106T	1.373	1.246	0.907 5	90.75	0.42
			242T	0.751	0.588	0.783 0	78.30	1.06
			484T	0.447	0.329	0.736 0	73.60	1.33
			996T	0.294	0.185	0.629 3	62.93	2.01
			SU	0.282	0.181	0.641 8	64.18	1.93

**Notes.**

1. Duty cycle (Linear) = T<sub>on</sub> 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 A 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.

- The transmitter has permanently attached LDS 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	SISO		CDD	SDM
	ANT1	ANT2	ANT 1 + 2	ANT 1 + 2
802.11ax HE20	X	√	X	√
802.11ax HE40	X	√	X	√
802.11ax HE80	X	√	X	√

√ = Support, X = Not support

### 3.2 Directional Gain Calculations

According to clause F), 2), d), (ii) 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)	Power Directional Gain (dBi)
UNII 1	-4.50	-4.00	-4.24
UNII 2A	-4.70	-4.40	-4.55
UNII 2C	-4.50	-5.00	-4.74
UNII 3	-5.80	-4.40	-5.04

#### Note.

Unequal antenna gains, with equal transmit powers. For antenna gains given by  $G_1, G_2, \dots, G_N$  dBi  
 Directional gain =  $10 \log[(10^{G_1/10} + 10^{G_2/10} + \dots + 10^{G_N/10}) / N_{ANT}]$  dB i

#### Sample calculation

In case of UNII 1, directional gain =  $10 \log[(10^{-4.50/10} + 10^{-4.00/10}) / 2] = -4.24$  dB i

## 4. Introduction

This report referenced from the FCC ID: A3LSMX306B

Based on their similarity, the FCC Part 15E (equipment class: NII) reuse the original model's result and do spot-check, following the FCC KDB 484596 D01 v02r01.

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: A3LSMX300 share the same enclosure and circuit board as FCC ID: A3LSMX306B.

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 : A3LSMX306B shall remain representative of FCC ID: A3LSMX300.

**Note.** The difference between the parent and variant is that the RF circuit for GSM/WCDMA/LTE/NR bands in the parent model SM-X306B is removed from the variant model SM-X300.

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

Test band	Test item	Test mode	CH	Measured frequency (MHz)	SM-X306B (dBμV)		SM-X300 (dBμV)		Deviation (dB)		Deviation (%)	
					Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak
UNII-1	Band edge	802.11ax HE80 SU MIMO	42	4 500 ~ 5 150	51.70	66.35	49.84	63.96	-1.86	-2.39	-19.28	-24.05
	RSE	802.11ax HE40 SU SISO	46	15 793.18	41.37	51.63	41.58	50.33	0.21	-1.30	2.45	-13.90
UNII-2A	Band edge	802.11ax HE40 SU SISO	62	5 350 ~ 5 460	51.36	70.83	49.49	67.63	-1.87	-3.20	-19.37	-30.82
	RSE	802.11ax HE80 SU MIMO	58	15 925.66	42.77	51.07	43.08	50.47	0.31	-0.60	3.63	-6.67
UNII-2C	Band edge	802.11ax HE20 RU 26T offset 8 MIMO	140	5 725 ~ 5 825	-	66.14	-	64.98	-	-1.16	-	-12.50
	RSE	802.11ax HE40 RU 242T offset 62 SISO	118	16 718.13	-	52.99	-	51.09	-	-1.90	-	-19.65
UNII-3	Band edge	802.11ax HE20 RU 26T offset 8 MIMO	165	5 850 ~ 5 950	-	70.89	-	70.46	-	-0.43	-	-4.83
	RSE	802.11ax HE80 RU 26T offset 36 SISO	155	17 250.20	-	52.35	-	50.84	-	-1.51	-	-15.96

#### Notes:

- FCC ID: A3LSMX300 have been verified the performance as for WIFI identical with the FCC ID: A3LSMX306B.
- Comparison of two models, the variant model emissions do not exceed the parent model emissions by more than 25% in linear units and all measurements are below FCC technical limits.  

$$\text{Deviation (\%)} = \frac{|\text{Spot check data} - \text{Reference data}|}{|\text{Reference data}|} \leq 0.25 \text{ (25 \%)}$$
- Data reuse is based on KDB 484596 D01 v02r01 and has been approved via FCC KDB inquiry.

### 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	A3LSMX306B	Original	KR23-SRF0224 (802.11b/g/n)	Test report	KR23-SRF0241	All
			KR23-SRF0226 (802.11ax)	Test report	KR23-SRF0243	All
			KR23-SRF0223 (Bluetooth LE)	Test report	KR23-SRF0240	All
DSS	A3LSMX306B	Original	KR23-SRF0222 (Bluetooth)	Test report	KR23-SRF0239	All
NII	A3LSMX306B	Original	KR23-SRF0225 (802.11a/n/ac)	Test report	KR23-SRF0242	All
			KR23-SRF0227 (802.11ax)	Test report	KR23-SRF0244	All



## 5. Summary of tests

FCC Part section(s)	Parameter	Test Condition	Test results
15.407(b), 15.205(a), 15.209(a)	Spurious emission	Radiated	Pass
	Band-edge, restricted band		Pass

### Notes.

- All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. 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.
- EUT was investigated in three orthogonal orientations X, Y and Z. it was determined that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation.
- All configurations have been performed (Stand-alone, Stand-alone with TA, With accessories).  
Worst case: Stand-alone
- 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.
- 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
- Based on the baseline scan, the worst-case data rates were:  
802.11ax HE20 mode: MCS0  
802.11ax HE40 mode: MCS0  
802.11ax HE80 mode: 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 or 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 ( $\pm$ )	
Radiated spurious emissions	1 000 MHz ~ 18 000 MHz	4.7 dB



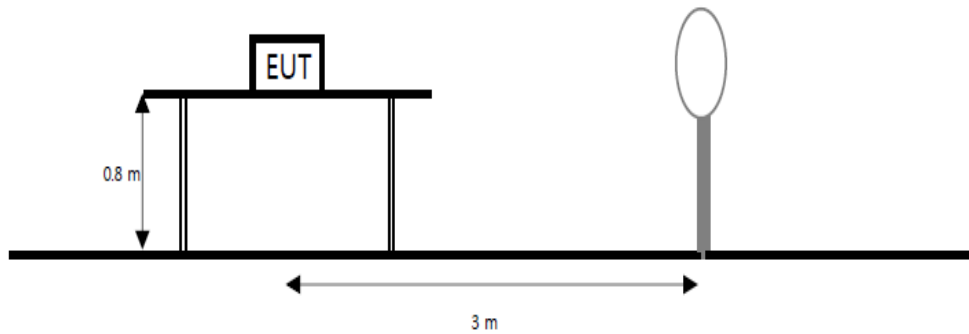


## 7. Test results

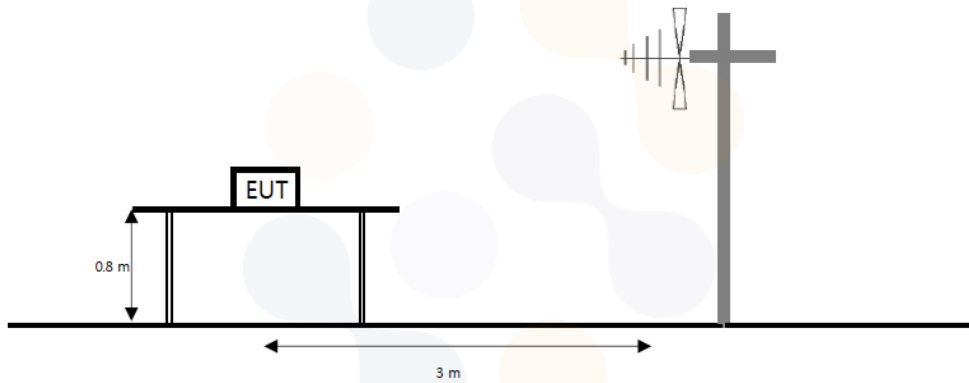
### 7.1. Spurious Emission, Band Edge and Restricted bands

#### Test setup

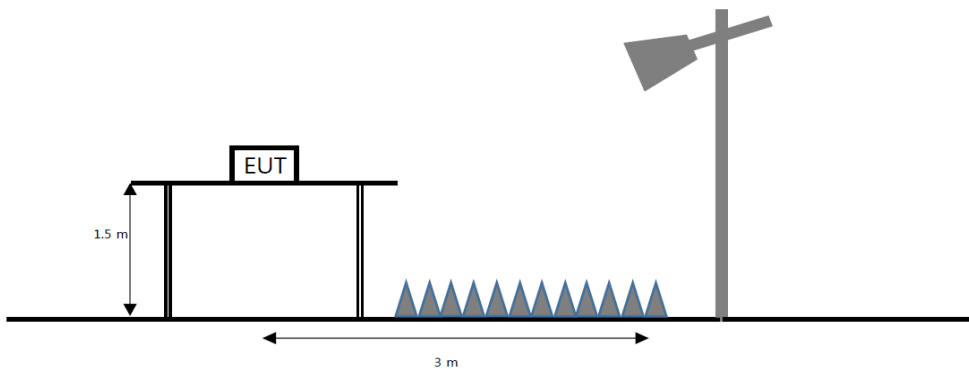
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



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



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



**Limit**

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 (MHz)	Field strength ( $\mu\text{V}/\text{m}$ )	Measurement distance (m)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/F(kHz)	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 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section 15.231 and 15.241.

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

MHz	MHz	MHz	GHz
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	2 483.5 - 2 500	17.7 - 21.4
8.376 25 - 8.386 75	25	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 MHz, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, 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.

<p><b>Eurofins KCTL Co.,Ltd.</b> 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 <a href="http://www.kctl.co.kr">www.kctl.co.kr</a></p>	<p>Report No.: KR23-SRF0244-B Page (18) of (29)</p>	<p>   </p>
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According to section 15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz

For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of  $-27$  dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.



### **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  $\geq$  (3 $\times$ 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**

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

#### **Average field strength measurements**

##### **Trace averaging with continuous EUT transmission at full power**


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

1. RBW = 1 MHz (unless otherwise specified).
2. VBW  $\geq$  (3 $\times$ RBW).
3. Detector = RMS (power averaging), if  $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$ . 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 dB 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 ( $D \geq 98\%$ ) cannot be achieved and the duty cycle is constant (duty cycle variations are less than  $\pm 2\%$ ), 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 MHz (unless otherwise specified).
4. VBW  $\geq$  [3  $\times$  RBW].
5. Detector = RMS (power averaging), if  $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$ . Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this

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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 dB 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 ( $D \geq 98\%$ ) rather than turning ON and OFF with with the transmit cycle, then no duty cycle correction is required for that emission.

**Notes:**

1.  $f < 30$  MHz, extrapolation factor of 40 dB/decade of distance.  $F_d = 40 \log(D_m/D_s)$   
 $f \geq 30$  MHz, extrapolation factor of 20 dB/decade of distance.  $F_d = 20 \log(D_m/D_s)$   
Where:  
 $F_d$ = Distance factor in dB  
 $D_m$ = Measurement distance in meters  
 $D_s$ = Specification distance in meters
2. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or  $F_d$ (dB)
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. <sup>1)</sup> means restricted band.
6. Above 1 GHz the worst results between two antenna polarizations (H and V) were documented in the test report.
7. Below 30 MHz 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 dB of the limit, then the following statement shall be made: "No spurious emissions were detected within 20 dB of the limit."
8. For above 1 GHz pre-scan to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

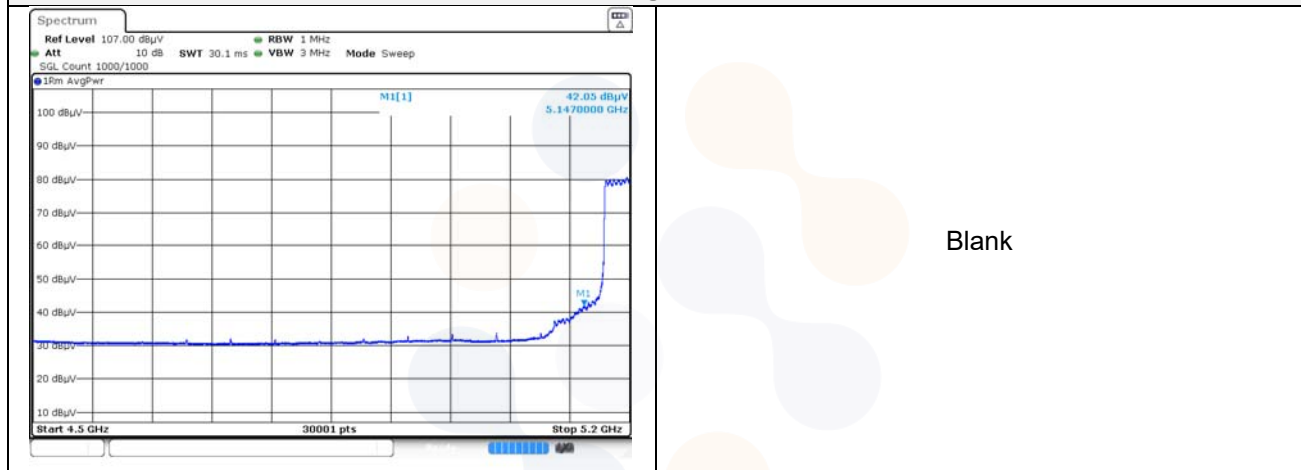
**Spot-check Test results**

**802.11ax HE80 SU mode MIMO UNII-1 / Band-edge**

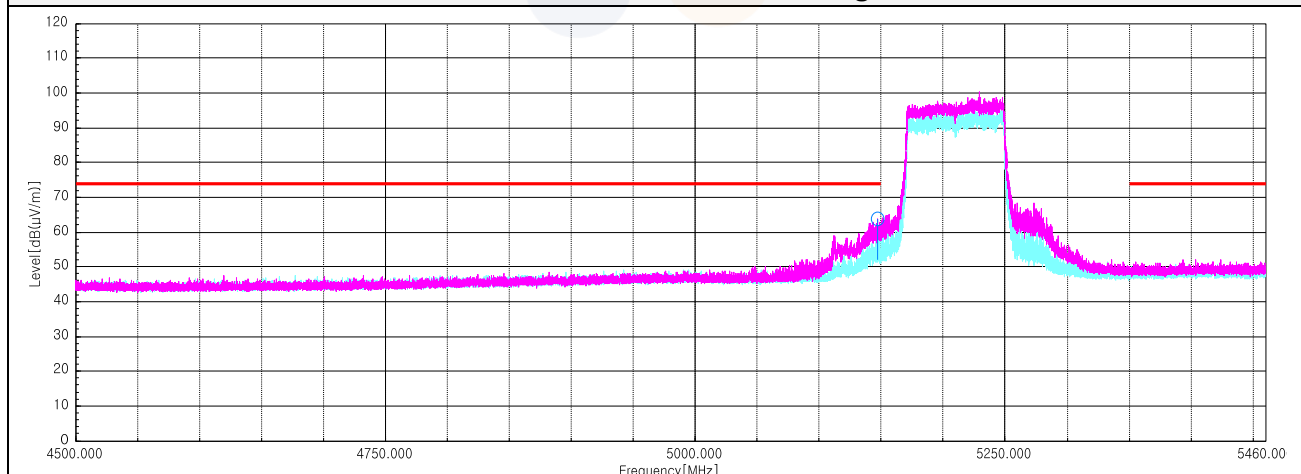
**Middle Channel (5 210 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB( $\mu$ V))	(dB)	(dB)	(dB)	(dB( $\mu$ V/m))	(dB( $\mu$ V/m))	(dB)
<b>Peak data</b>								
5 147.00 <sup>1)</sup>	H	58.10	33.29	-27.43	-	63.96	74.00	10.04
<b>Average Data</b>								
5 147.00 <sup>1)</sup>	H	42.05	33.29	-27.43	1.93	49.84	54.00	4.16

**Average data**



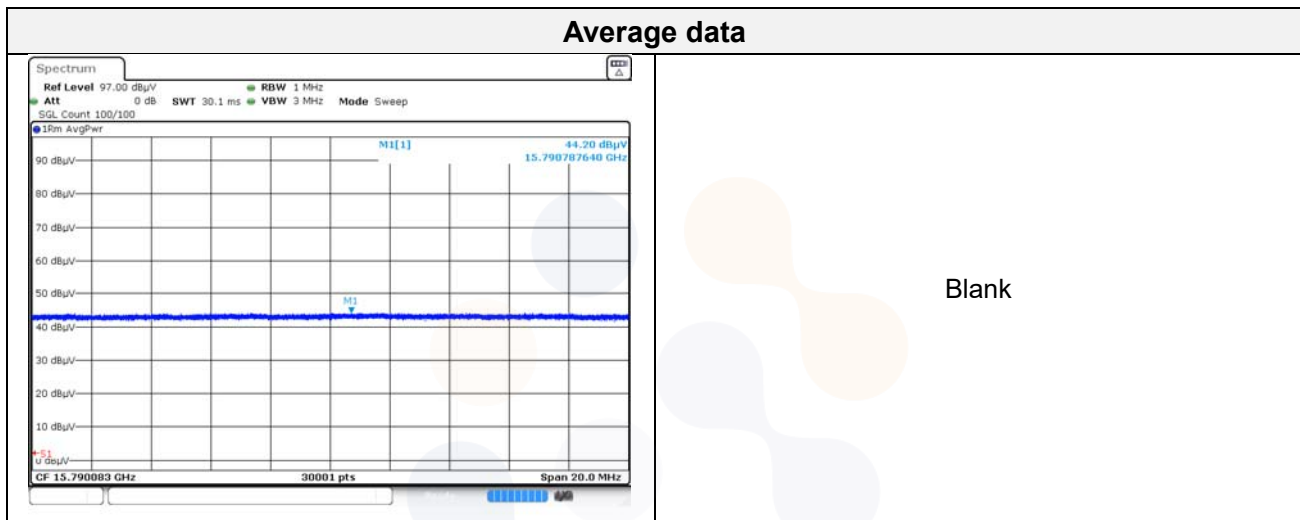
**Horizontal/Vertical for Band-edge**



**802.11ax HE40 SU mode SISO UNII-1 / Harmonic**

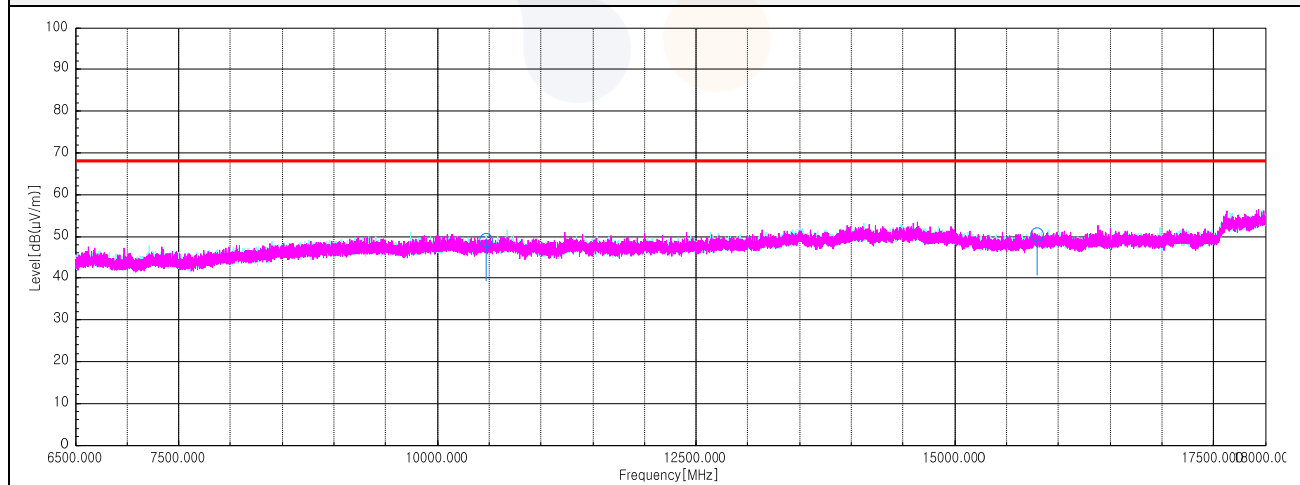
**Highest Channel (5 230 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB( $\mu$ V))	(dB)	(dB)	(dB)	(dB( $\mu$ V/m))	(dB( $\mu$ V/m))	(dB)
<b>Peak data</b>								
15 790.79 <sup>1)</sup>	H	53.70	38.10	-41.47	-	50.33	74.00	23.67
<b>Average Data</b>								
15 790.79 <sup>1)</sup>	H	44.20	38.10	-41.47	0.75	41.58	54.00	12.42



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**Horizontal/Vertical for 6.5 GHz ~ 18 GHz**



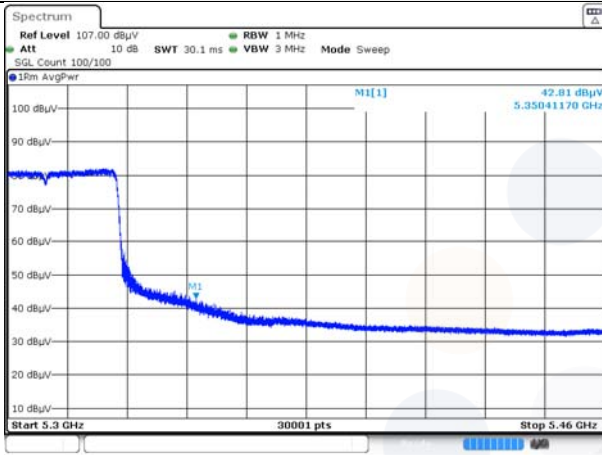


**802.11ax HE40 SU mode SISO UNII-2A / Band-edge**

**Highest Channel (5 310 MHz)**

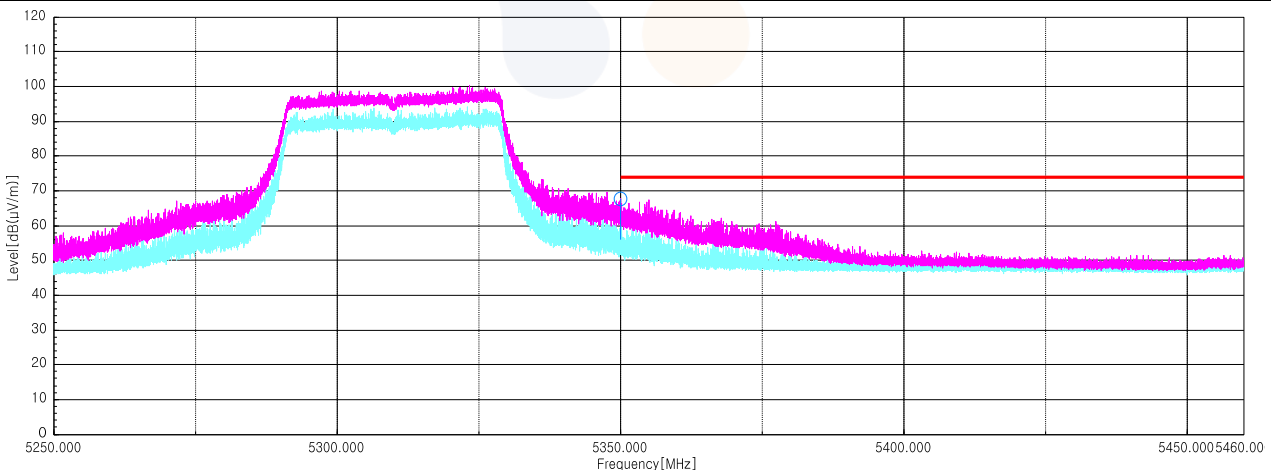
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB( $\mu$ V))	(dB)	(dB)	(dB)	(dB( $\mu$ V/m))	(dB( $\mu$ V/m))	(dB)
<b>Peak data</b>								
5 350.41 <sup>1)</sup>	H	61.70	33.00	-27.07	-	67.63	74.00	6.37
<b>Average Data</b>								
5 350.41 <sup>1)</sup>	H	42.81	33.00	-27.07	0.75	49.49	54.00	4.51

**Average data**



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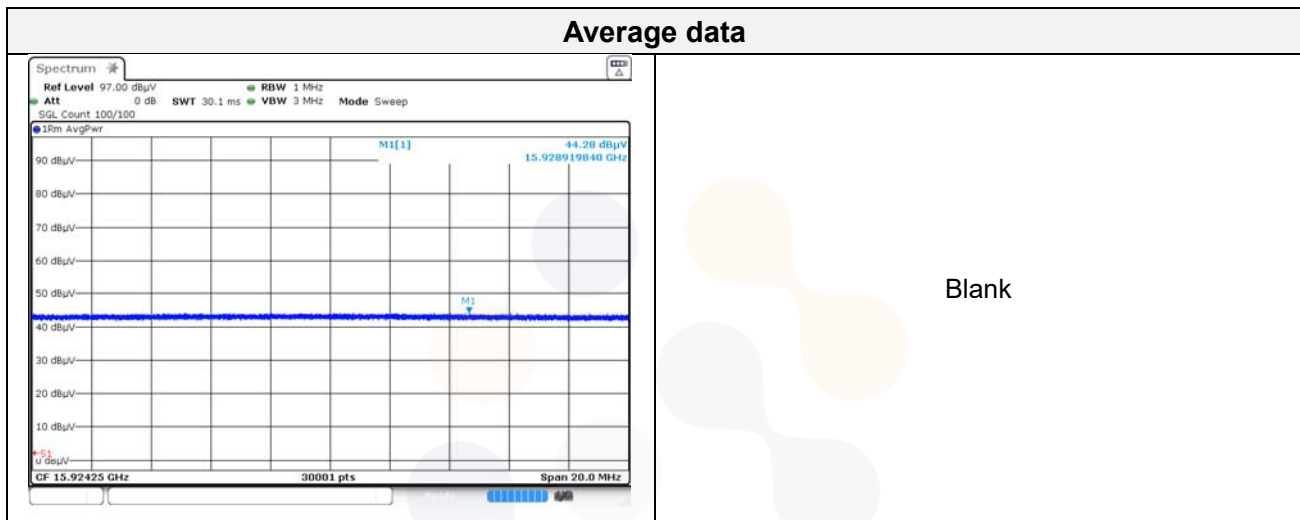
**Horizontal/Vertical for Band-edge**



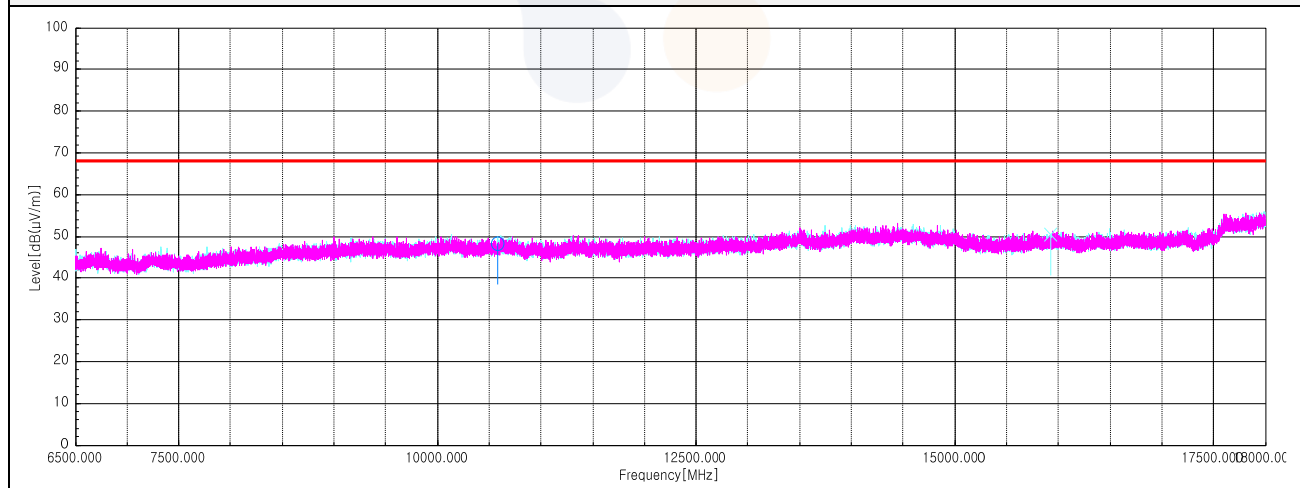
**802.11ax HE80 SU mode MIMO UNII-2A / Harmonic**

**Middle Channel (5 290 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB( $\mu$ V))	(dB)	(dB)	(dB)	(dB( $\mu$ V/m))	(dB( $\mu$ V/m))	(dB)
<b>Peak data</b>								
15 928.92 <sup>1)</sup>	V	53.60	38.20	-41.33	-	50.47	74.00	23.53
<b>Average Data</b>								
15 928.92 <sup>1)</sup>	V	44.28	38.20	-41.33	1.93	43.08	54.00	10.92



**Horizontal/Vertical for 6.5 GHz ~ 18 GHz**

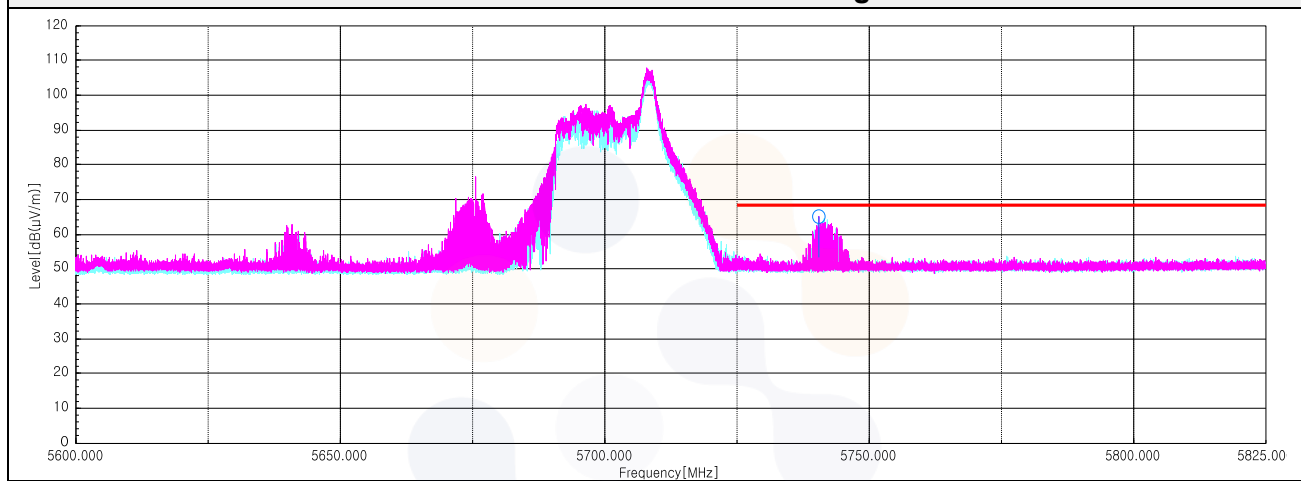


**802.11ax HE20 RU mode MIMO (26T / RU offset 8) UNII-2C / Band-edge**

**Highest Channel (5 700 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB( $\mu V$ ))	(dB)	(dB)	(dB)	(dB( $\mu V/m$ ))	(dB( $\mu V/m$ ))	(dB)
<b>Peak data</b>								
5 740.57	H	57.80	33.84	-26.66	-	64.98	68.20	3.22
<b>Average Data</b>								
No spurious emissions were detected within 20 dB of the limit.								

**Horizontal/Vertical for Band-edge**

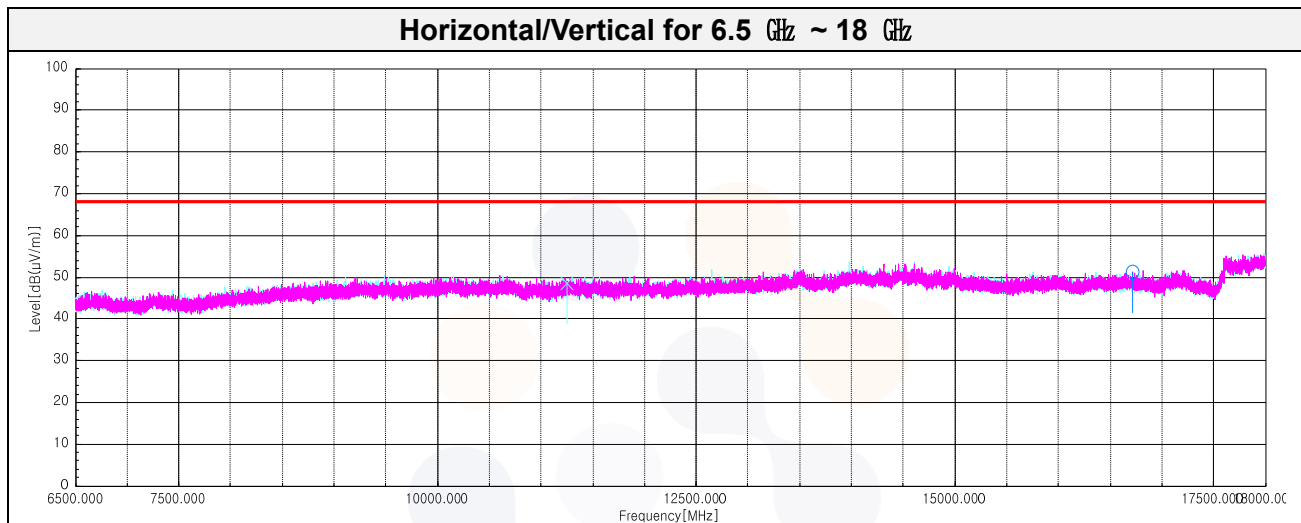


**802.11ax HE40 RU mode SISO (242T / RU offset 62) UNII-2C / Harmonic**

**Middle Channel (5 590 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB( $\mu$ V))	(dB)	(dB)	(dB)	(dB( $\mu$ V/m))	(dB( $\mu$ V/m))	(dB)
<b>Peak data</b>								
16 717.75	H	54.50	38.20	-41.61	-	51.09	68.20	17.11
<b>Average Data</b>								
No spurious emissions were detected within 20 dB of the limit.								

**Horizontal/Vertical for 6.5 GHz ~ 18 GHz**

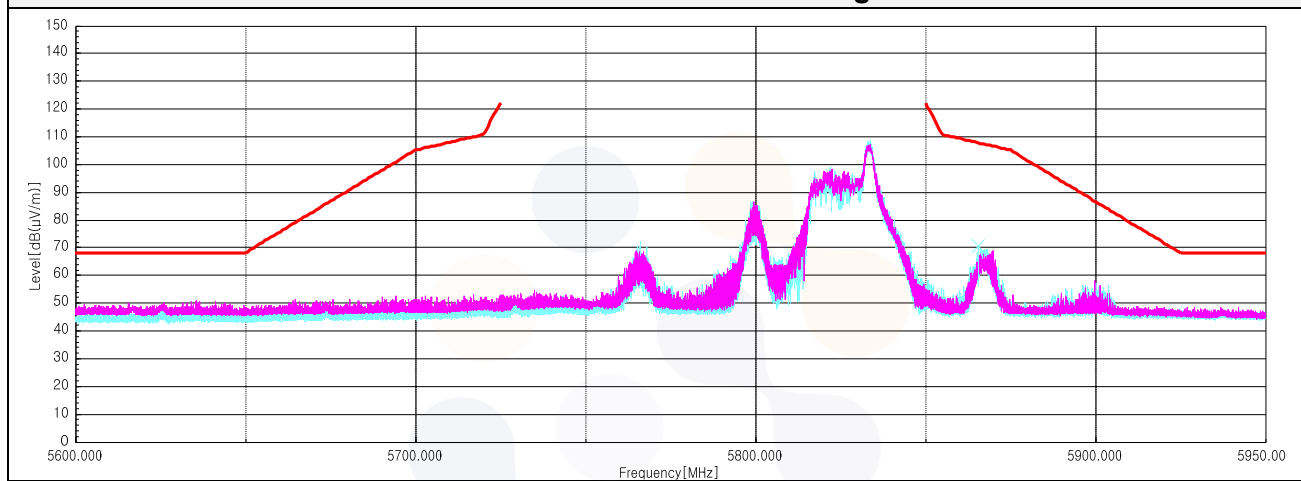


**802.11ax HE20 RU mode MIMO (26T / RU offset 8) UNII-3 / Band-edge**

**Highest Channel (5 825 MHz)**

Frequency (MHz)	Pol. (V/H)	Reading (dB( $\mu$ V))	Ant. Factor (dB)	Amp.+Cable (dB)	DCF (dB)	Result (dB( $\mu$ V/m))	Limit (dB( $\mu$ V/m))	Margin (dB)
<b>Peak data</b>								
5 865.50	V	62.40	34.26	-26.20	-	70.46	107.90	37.44
<b>Average Data</b>								
No spurious emissions were detected within 20 dB of the limit.								

**Horizontal/Vertical for Band-edge**

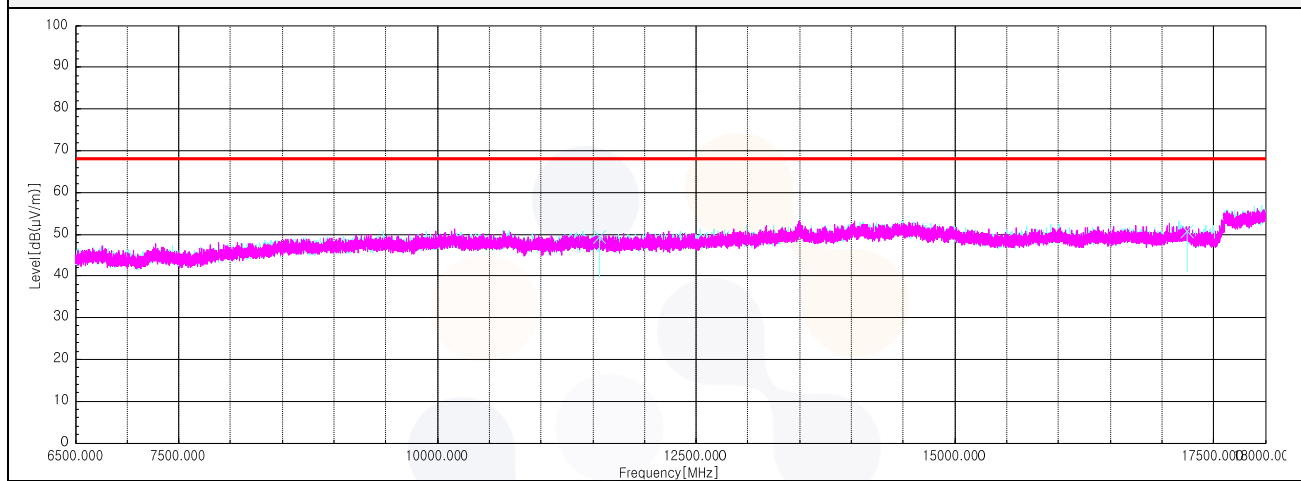


**802.11ax HE80 RU mode SISO (26T / RU offset 36) UNII-3 / Harmonic**

**Middle Channel (5 785 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB( $\mu$ V))	(dB)	(dB)	(dB)	(dB( $\mu$ V/m))	(dB( $\mu$ V/m))	(dB)
<b>Peak data</b>								
17 249.05	V	53.50	38.50	-41.16	-	50.84	68.20	17.36
<b>Average Data</b>								
No spurious emissions were detected within 20 dB of the limit.								

**Horizontal/Vertical for 6.5 GHz ~ 18 GHz**



## 8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Vector Signal Generator	R&S	SMBV100A	257566	24.07.04
Signal Generator	R&S	SMB100A	176206	24.01.19
Spectrum Analyzer	R&S	FSVA40	101575	24.06.19
Broadband PreAmplifier	SCHWARZBECK	BBV9718D	57	24.03.17
Low Noise Amplifier	TESTEK	TK-PA18H	220124-L	24.10.12
Horn Antenna	SCHWARZBECK	BBHA9120D	2763	24.10.18
High Pass Filter	Wainwright Instruments GmbH	WHKX8-5655-6500-18000-40SS	SN8	24.10.16
Controller	INNCO SYSTEMS	CO3000	1441/54370322/P	-
Antenna Mast	INNCO SYSTEMS	MA4640-XP-ET	-	-
Turn Device	INNCO SYSTEMS	DS1200-S-1t	-	-

**End of test report**