

# TEST REPORT

<b>Eurofins KCTL Co.,Ltd.</b> 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-31-285-0894 FAX: 82-505-299-8311 <a href="http://www.kctl.co.kr">www.kctl.co.kr</a>	Report No.: KR22-SRF0147 Page (1) of (26)	 <b>KCTL</b>
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**1. Client**

- Name : MVTECH
- Address : 1004, Hanshin IT Tower, 272, Digital-ro, Guro-gu, Seoul, Republic of Korea
- Date of Receipt : 2022-08-26

**2. Use of Report** : Certification

**3. Name of Product / Model** : IOT\_3\_ANALOG / IOT\_3\_ANALOG

**4. Manufacturer / Country of Origin** : MVTECH / Korea

**5. FCC ID** : 2A8WW-IOT3ANALOG

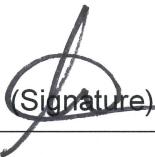
**6. Date of Test** : 2022-09-26 to 2022-10-04

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

**8. Test method used** : FCC Part 15 Subpart E, 15.407

**9. Test Result** : Refer to the test result in the test report

This laboratory is not accredited for the test results marked. \*

Affirmation	Tested by  Name : Taekyong Nam  (Signature)	Technical Manager  Name : Heesu Ahn  (Signature)
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2022-10-12

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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.

## REPORT REVISION HISTORY

Date	Revision	Page No
2022-10-12	Originally issued	-

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## 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 : MVTECH  
Address : 1004, Hanshin IT Tower, 272, Digital-ro, Guro-gu, Seoul, Republic of Korea  
Manufacturer : MVTECH  
Address : 1004, Hanshin IT Tower, 272, Digital-ro, Guro-gu, Seoul, Republic of Korea  
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 : IOT\_3\_ANALOG  
Model : IOT\_3\_ANALOG  
Derivative Model : IOT\_4\_VIBRATION  
Modulation technique : WIFI(802.11b/g)\_DSSS, OFDM  
Number of channels : 802.11b/g : 11 ch  
UNII-1: 4 ch (20 MHz)  
UNII-3: 5 ch (20 MHz)  
Power source : DC 24 V  
Antenna specification : Dipole Antenna  
Antenna gain : 2.4 GHz WLAN \_4.16 dBi  
UNII-1 : 3.92 dBi  
UNII-3 : 3.07 dBi  
Frequency range : 2 412 MHz ~ 2 462 MHz (802.11b/g)  
UNII-1: 5 180 MHz ~ 5 240 MHz (802.11a\_HT20)  
UNII-3: 5 745 MHz ~ 5 825 MHz (802.11a\_HT20)  
Software version : Rev1.0  
Hardware version : Rev1.0  
Test device serial No. : N/A  
Operation temperature : -20 °C ~ 50 °C

## 2.1. Information about derivative model

The difference between basic model and derivative models is:

The difference is the vibration sensor.

The basic model does not support vibration sensors, but the derivative supports it.

The basic model and the derivative are hardware-equivalent.

## 2.2. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
N/A	-	-	-	-

## 2.3. Frequency/channel operations

This device contains the following capabilities:

WLAN 2.4 GHz(802.11b/g), WLAN 5 GHz(802.11a)

**UNII-1**

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

**UNII-3**

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

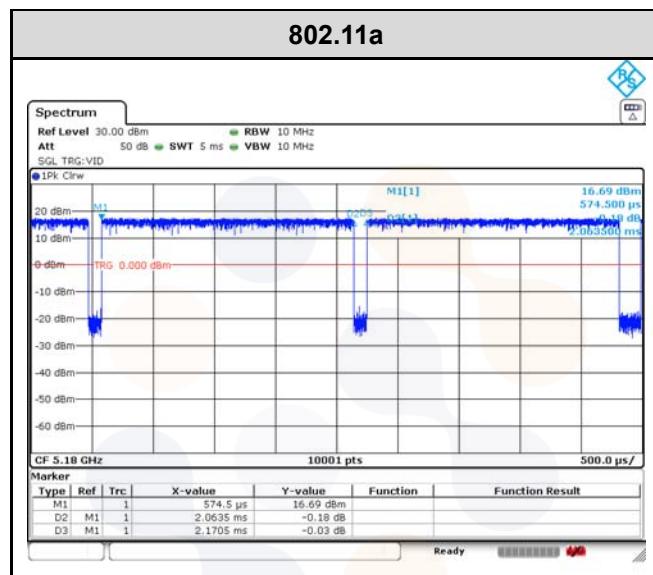
Table 2.3.1. 802.11a\_HT20 mode

## 2.4. Duty Cycle Factor

Test mode	Period (ms)	T <sub>on</sub> time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	2.170 5	2.063 5	0.950 7	95.07	0.22

### 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%



### **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 female dipole antenna (external antenna).
- The E.U.T Complies with the requirement of §15.203, §15.407.



#### 4. Summary of tests

FCC Part section(s)	Parameter	Test Condition	Test results
15.407(a)	Maximum conducted output power	Conducted	Pass
15.407(a)	Maximum power spectral density		N/T <sup>(Note1)</sup>
15.407(a)	26 dB Channel Bandwidth		N/T <sup>(Note1)</sup>
15.407(e)	6 dB Channel Bandwidth		N/T <sup>(Note1)</sup>
15.207(a)	AC Conducted Emissions		N/A <sup>(Note2)</sup>
15.407(b), 15.205(a), 15.209(a)	Spurious emission	Radiated	Pass
	Band-edge, restricted band		Pass

**Notes:** (N/T: Not Tested, N/A: Not Applicable)

1. In this test report, certified module is integrated in to this device. This test item can be referred to module report. (FCC ID: 2AATL-8223A-SR, Grant date : 12/28/2017)
2. This test is not applicable because the device only connects DC power line.
3. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
4. 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.
5. The fundamental of the 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.
6. The test procedure(s) in this report were performed in accordance as following.
  - ANSI C63.10-2013
  - KDB 789033 D02 v02r01
7. Based on the baseline scan, the worst-case data rates were:  
802.11a mode: 6Mbps

## 5. 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  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty ( $\pm$ )	
Conducted RF power	0.9 dB	
Radiated spurious emissions	9 kHz ~ 30 MHz:	2.4 dB
	30 MHz ~ 1 000 MHz	2.3 dB
	1 000 MHz ~ 18 000 MHz	5.6 dB
	Above 18 000 MHz	5.7 dB
Conducted emissions	9 kHz ~ 150 kHz	1.6 dB
	150 kHz ~ 30 MHz	1.7 dB

## 6. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.

With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

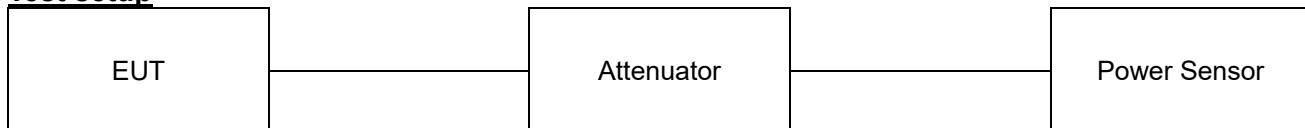
Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	10.31	9 000	12.85
50	10.37	10 000	13.84
100	10.47	11 000	13.72
200	10.62	12 000	13.63
300	10.69	13 000	13.39
400	10.77	14 000	13.36
500	10.85	15 000	13.45
600	10.94	16 000	13.97
700	10.99	17 000	13.90
800	11.01	18 000	13.79
900	11.05	19 000	14.01
1 000	11.03	20 000	13.90
2 000	11.45	21 000	14.33
3 000	11.76	22 000	14.13
4 000	11.75	23 000	14.40
5 000	12.16	24 000	14.70
6 000	12.20	25 000	14.62
7 000	12.60	26 000	15.22
8 000	12.98	26 500	14.98

### Notes:

Offset(dB) = RF cable loss(dB) + Attenuator(dB)

## **7. Test results**

### **7.1. Maximum conducted output power**

**Test setup****Limit**

According to §15.407(a),

Band	EUT category		Conducted output power limit
UNII-1	Outdoor access point		1 W (30 dBm)
	Indoor access point		
	Fixed point-to-point access point		250 mW (23.98 dBm)
	Client device		
UNII-2A			250 mW or 11 dBm + 10logB <sup>1</sup> )
UNII-2C			250 mW or 11 dBm + 10logB <sup>1</sup> )
UNII-3	√		1 W (30 dBm)

**Note:**

1) Conducted output power limit B is the 26 dB emission bandwidth.

**Test procedure**

ANSI C63.10-2013-Section 12.3.3.2

KDB 789033 D02 v02r01 - Section E.2.d)

**Test settings**

Used test method is Section E.2.d)

◆ **KDB 789033 D02 v02r01**

**Section E.3.a)****Method PM (Measurement using an RF average power meter):**

- (i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.
  - The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
  - At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
  - The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five
- (ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in II
- (iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
- (iv) Adjust the measurement in dBm by adding  $10 \log (1/x)$  where x is the duty cycle (e.g.,  $10 \log (1/0.25)$  if the duty cycle is 25%).

**Test results**

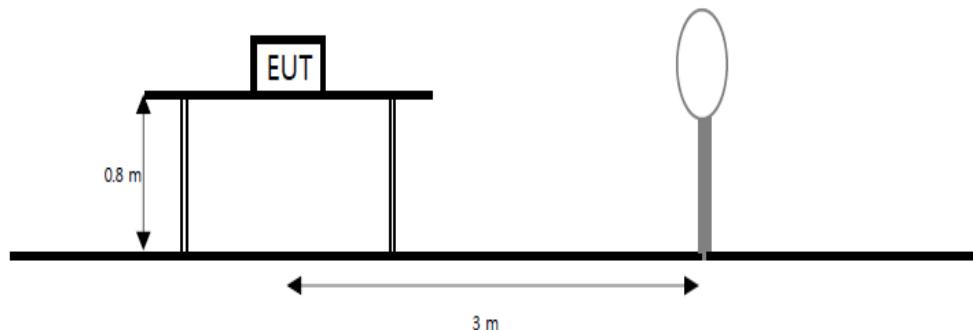
Test mode	Band	Frequency (MHz)	Measured output power			Limit (dBm)
			Reading (dBm)	DCF (dB)	Result (dBm)	
802.11a	UNII 1	5 180	14.82	0.22	15.04	30.00
		5 200	16.61	0.22	16.83	
		5 240	17.58	0.22	17.80	
	UNII 3	5 745	17.03	0.22	17.25	30.00
		5 785	16.17	0.22	16.39	
		5 825	16.39	0.22	16.61	

**Note.**1. Result(dBm) = Reading Power + D.C.F

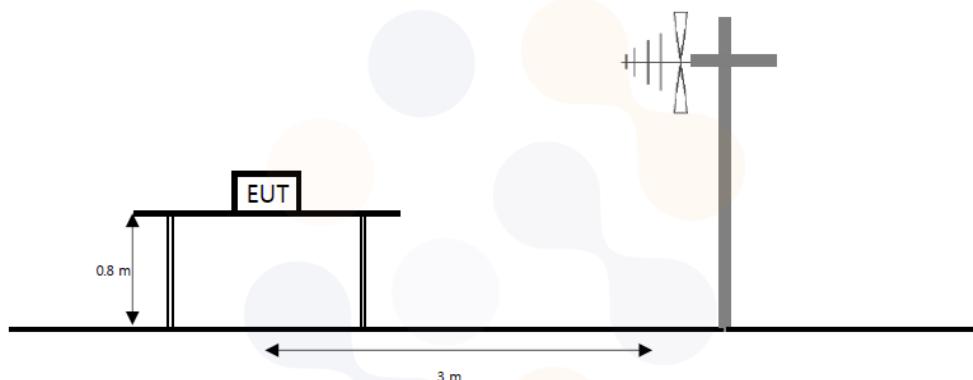
## 7.2. Spurious Emission, Band Edge and Restricted bands

### Test setup

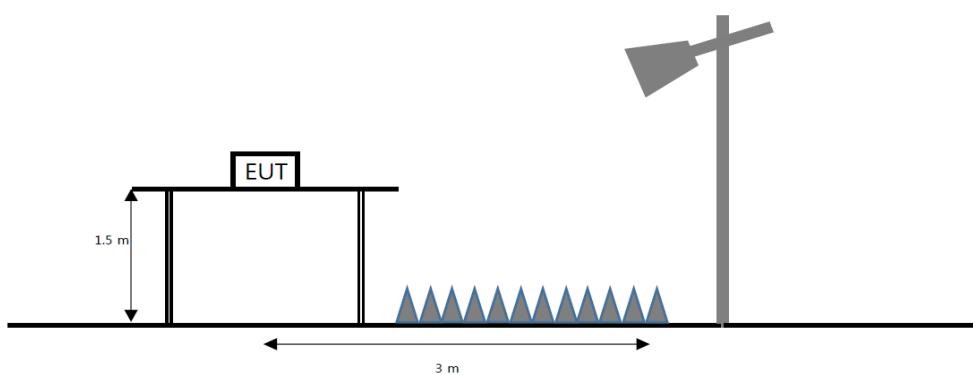
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



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 ( $\mu$ V/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.

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 5.725-5.85 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**

Frequency	RBW
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 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 the transmit cycle, then no duty cycle correction is required for that emission.

**Notes:**

1.  $f < 30 \text{ MHz}$ , extrapolation factor of 40 dB/decade of distance.  $F_d = 40 \log(D_m/D_s)$
2.  $f \geq 30 \text{ MHz}$ , extrapolation factor of 20 dB/decade of distance.  $F_d = 20 \log(D_m/D_s)$

Where:

$F_d$  = Distance factor in dB

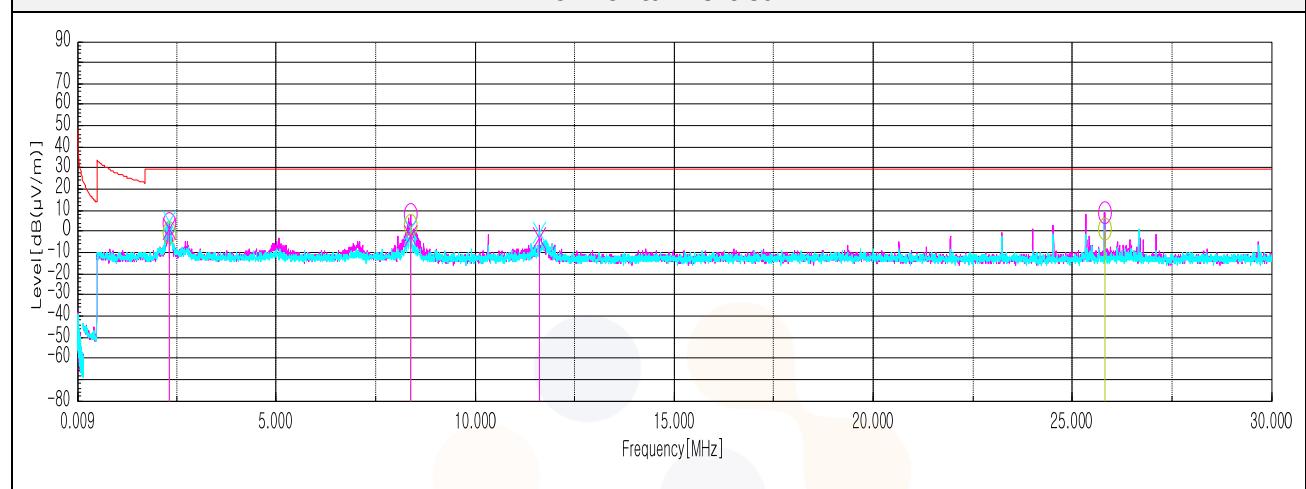
$D_m$  = Measurement distance in meters

$D_s$  = Specification distance in meters

3. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or  $F_d$ (dB)
4. Average test would be performed if the peak result were greater than the average limit.
5. <sup>1)</sup> means restricted band.
6. According to part 15.31(f)(2), an extrapolation factor of 40 dB/decade is applied because measured distance of radiated emission is 3 m.
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.

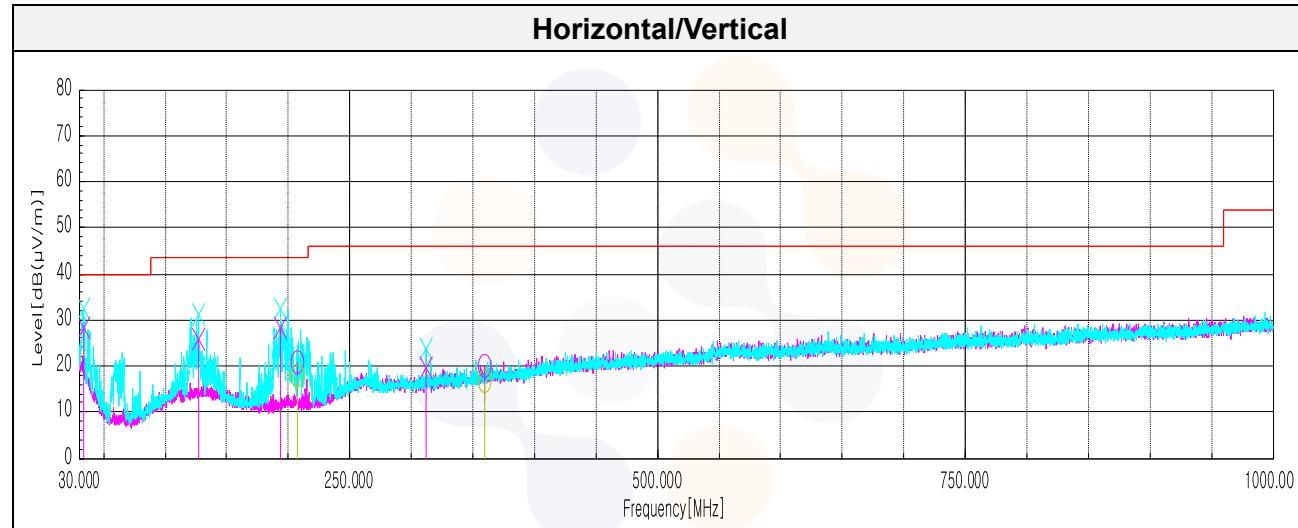
**Test results (Below 30 MHz) – Worst case: 802.11a / UNII-1 5 240 MHz**

Frequency	Pol.	Reading	Ant. Factor	Amp. +Cable	Distance Factor	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB( $\mu$ V)]	[dB]	[dB]	[dB]	[dB]	[dB( $\mu$ V/m)]	[dB( $\mu$ V/m)]	[dB]
No spurious emissions were detected within 20 dB of the limit.									

**Horizontal/Vertical**

**Test results (Below 1 000 MHz) – Worst case: 802.11a / UNII-1 5 240 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>Quasi peak data</b>								
159.74	V	36.10	15.90	-26.82		25.18	43.50	18.32
176.47	H	35.20	15.00	-26.62		23.58	43.50	19.92
258.07 <sup>1)</sup>	V	37.60	19.43	-25.57		31.46	46.00	14.54
270.32 <sup>1)</sup>	H	32.10	18.79	-25.40		25.49	46.00	20.51
368.65	H	29.90	20.80	-24.20		26.50	46.00	19.50
625.34	V	36.20	24.81	-21.56		39.45	46.00	6.55
625.34	H	24.10	24.81	-21.56		27.35	46.00	18.65

**Horizontal/Vertical**

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### Test results (Above 1 000 MHz)

#### 802.11a UNII-1

##### Lowest Channel (5 180 MHz)

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(µV))	(dB)	(dB)	(dB)	(dB(µV/m))	(dB(µV/m))	(dB)
<b>Peak data</b>								
5 148.15 <sup>1)</sup>	V	51.82	33.88	-23.83	-	61.87	74.00	12.13
10 340.64	H	57.93	37.07	-47.96	-	47.04	68.20	21.16
15 498.31 <sup>1)</sup>	V	58.50	40.20	-46.87	-	51.83	74.00	22.17
<b>Average Data</b>								
5 148.15 <sup>1)</sup>	V	40.11	33.88	-23.83	0.22	50.38	54.00	3.62
15 498.31 <sup>1)</sup>	V	47.64	40.20	-46.87	0.22	41.19	54.00	12.81

##### Middle Channel (5 200 MHz)

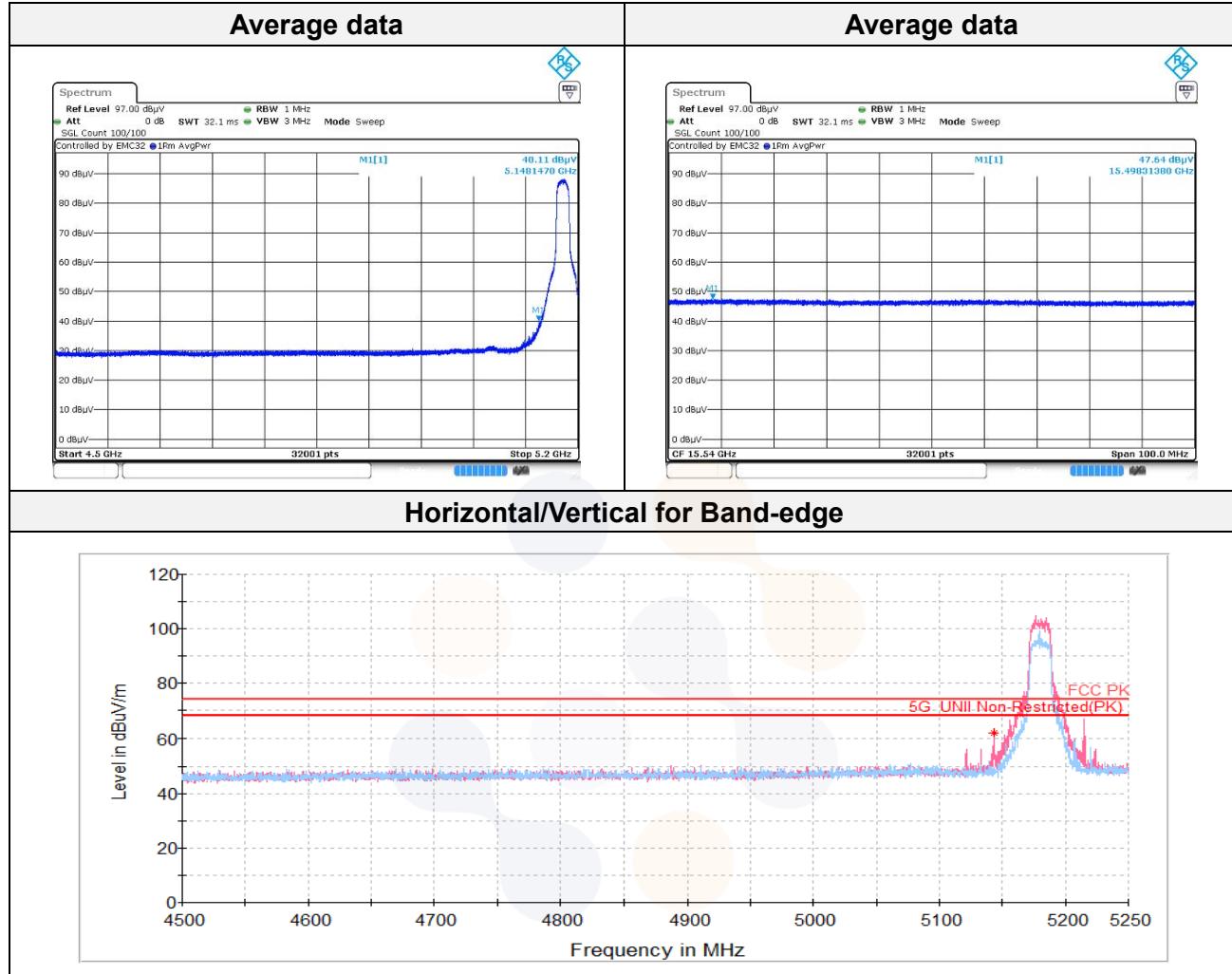
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(µV))	(dB)	(dB)	(dB)	(dB(µV/m))	(dB(µV/m))	(dB)
<b>Peak data</b>								
10 464.63	H	58.04	37.17	-47.88	-	47.33	68.20	20.87
15 615.69 <sup>1)</sup>	H	58.01	40.39	-46.76	-	51.64	74.00	22.36
<b>Average Data</b>								
15 615.69 <sup>1)</sup>	H	47.31	40.39	-46.76	0.22	41.16	54.00	12.84

##### Highest Channel (5 240 MHz)

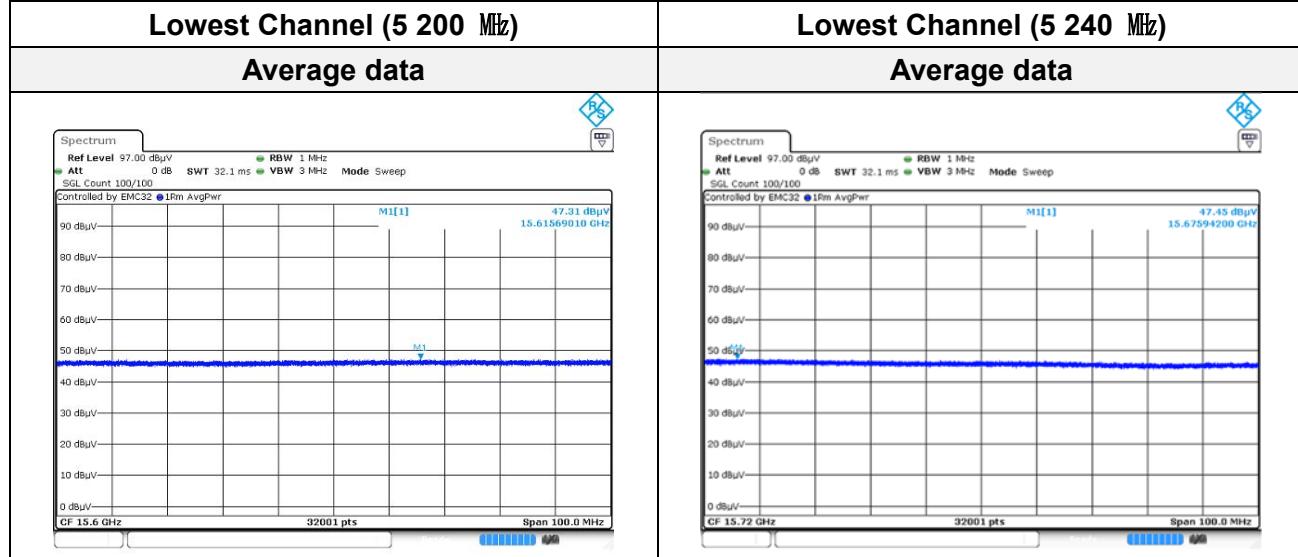
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(µV))	(dB)	(dB)	(dB)	(dB(µV/m))	(dB(µV/m))	(dB)
<b>Peak data</b>								
10 379.45	V	58.59	37.10	-47.94	-	47.75	68.20	20.45
15 675.94 <sup>1)</sup>	V	58.07	40.44	-46.70	-	51.81	74.00	22.19
<b>Average Data</b>								
15 675.94 <sup>1)</sup>	V	47.45	40.44	-46.70	0.22	41.41	54.00	12.59

## 802.11a UNII-1

### Lowest Channel (5 180 MHz)



### Lowest Channel (5 200 MHz)

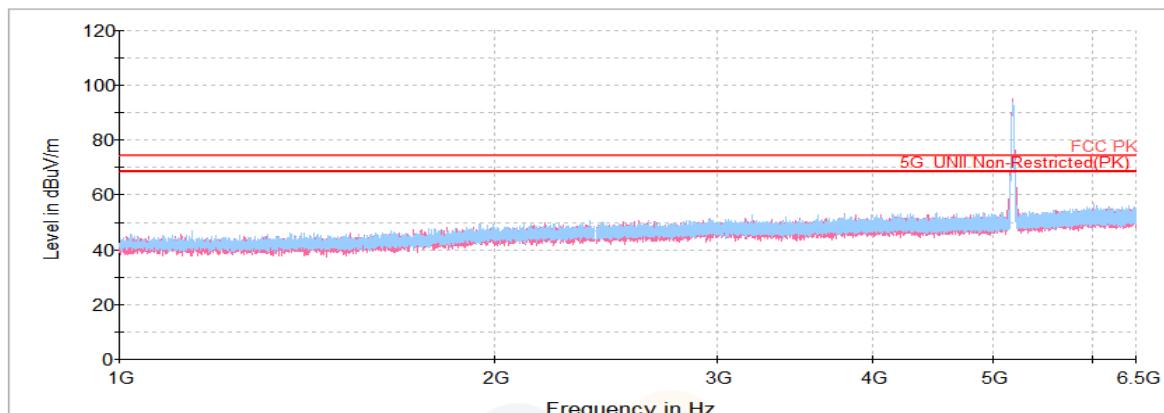


### **Plot of Band-edge, Harmonics and Spurious Emissions**

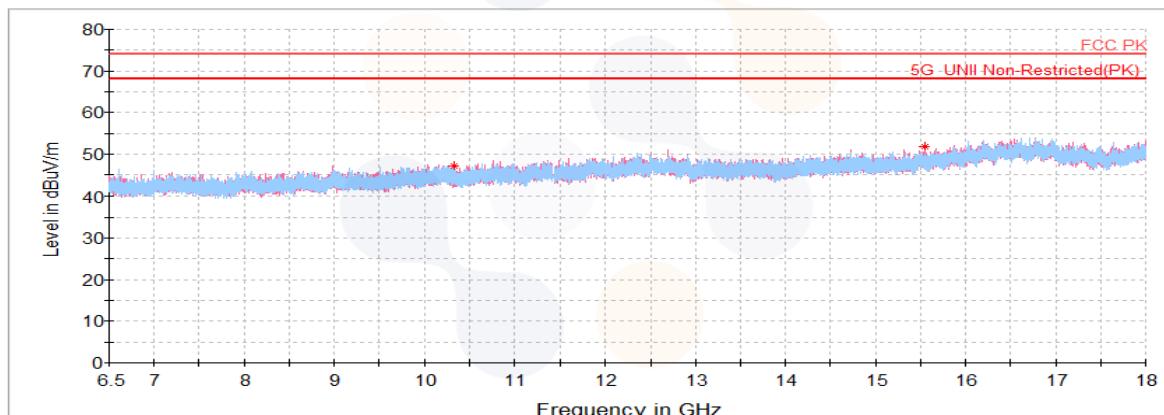
In order to simplify the report, attached plots were only the lowest margin condition

#### **802.11a\_UNII-1\_Highest Channel (5 240 MHz)**

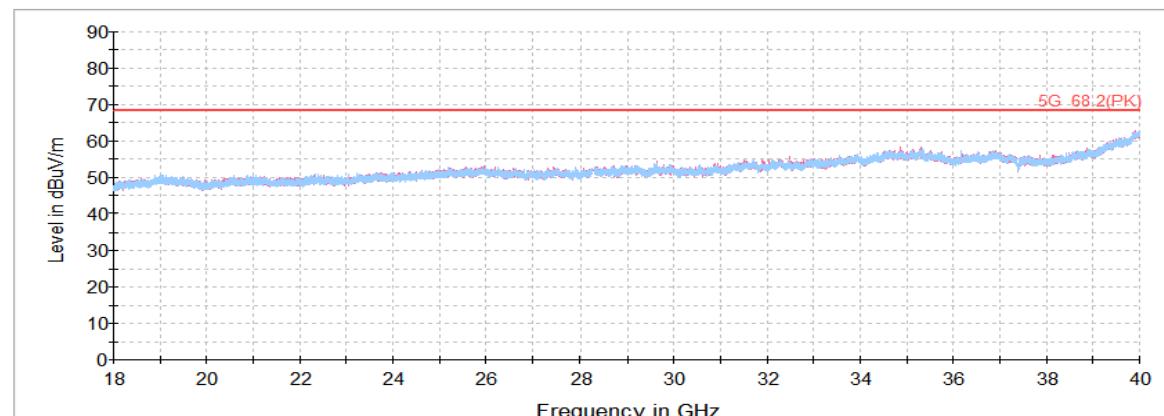
**Horizontal/Vertical for 1 GHz ~ 6.5 GHz**



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



**Horizontal/Vertical for 18 GHz ~ 40 GHz**



**802.11a UNII-3****Lowest Channel (5 745 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(µV))	(dB)	(dB)	(dB)	(dB(µV/m))	(dB(µV/m))	(dB)
<b>Peak data</b>								
5 724.16	V	73.11	34.70	-22.97	-	84.84	120.28	35.44
11 498.91 <sup>1)</sup>	H	57.98	38.00	-47.64	-	48.34	74.00	25.66
17 223.39	V	55.24	41.48	-44.91	-	51.81	68.20	16.39
<b>Average Data</b>								
No spurious emissions were detected within 20 dB of the limit.								

**Middle Channel (5 785 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(µV))	(dB)	(dB)	(dB)	(dB(µV/m))	(dB(µV/m))	(dB)
<b>Peak data</b>								
11 588.03 <sup>1)</sup>	V	57.33	38.07	-47.68	-	47.72	74.00	26.28
17 332.28	V	55.91	41.37	-45.11	-	52.17	68.20	16.03
<b>Average Data</b>								
No spurious emissions were detected within 20 dB of the limit.								

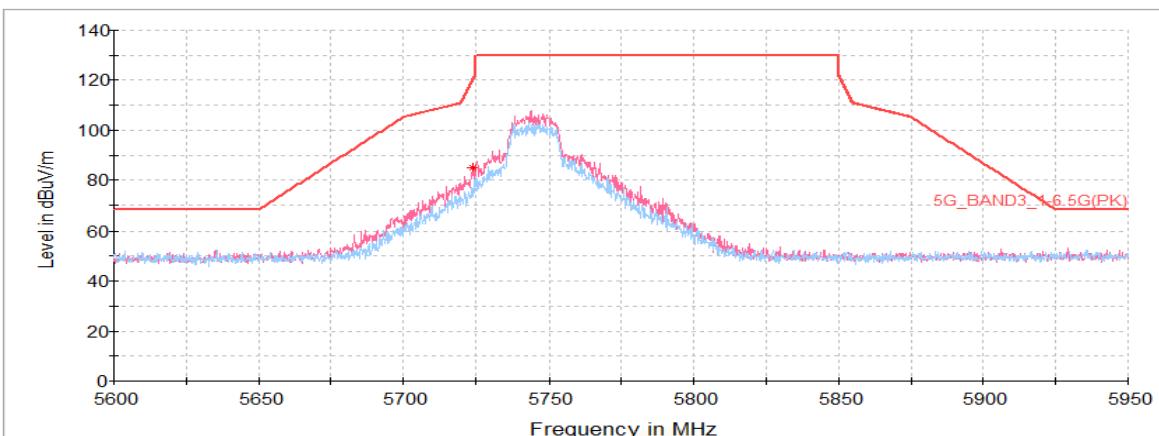
**Highest Channel (5 825 MHz)**

Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(µV))	(dB)	(dB)	(dB)	(dB(µV/m))	(dB(µV/m))	(dB)
<b>Peak data</b>								
5 853.75	V	58.91	34.94	-22.80	-	71.05	113.65	42.60
11 694.05 <sup>1)</sup>	V	57.66	38.16	-47.73	-	48.09	74.00	25.91
17 445.13	V	55.70	41.25	-45.32	-	51.63	68.20	16.57
<b>Average Data</b>								
No spurious emissions were detected within 20 dB of the limit.								

## **802.11a UNII-3**

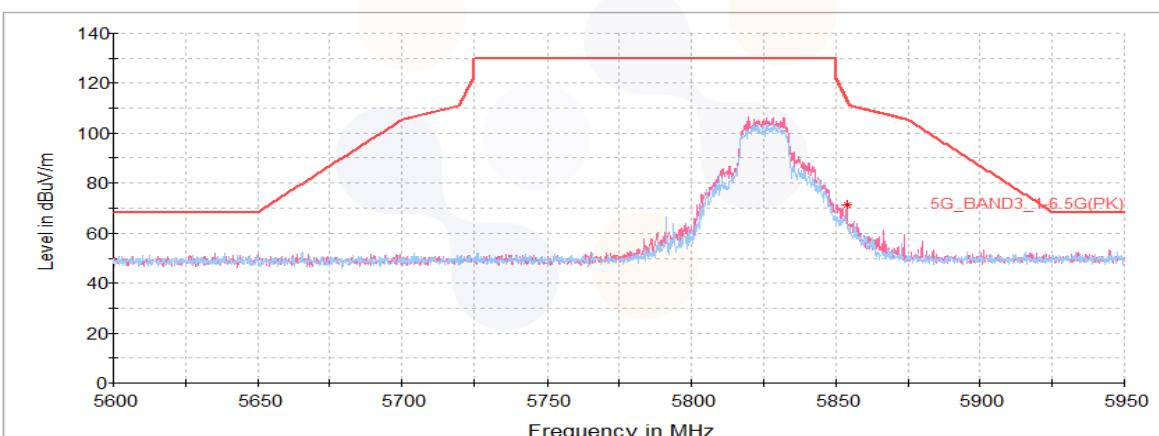
### **Lowest Channel (5 745 MHz)**

**Horizontal/Vertical for Band-edge**



### **Highest Channel (5 825 MHz)**

**Horizontal/Vertical for Band-edge**

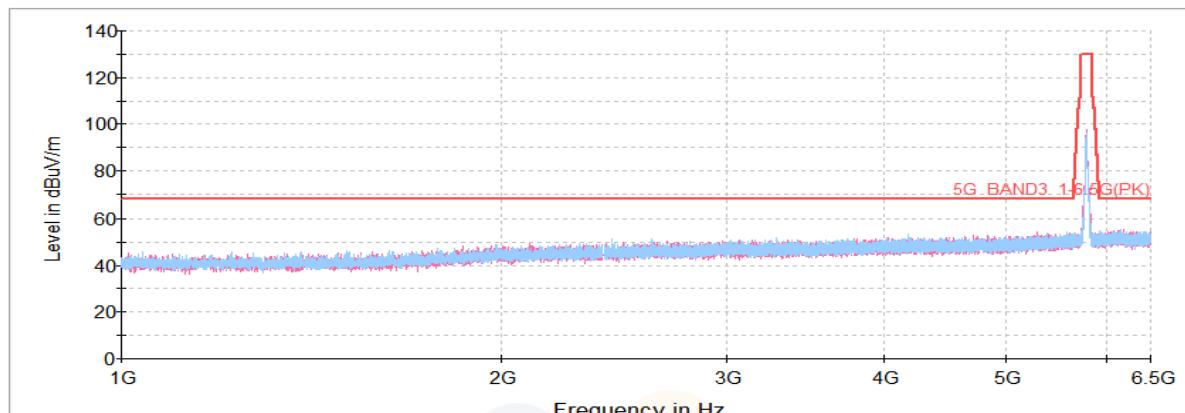


### **Plot of Band-edge, Harmonics and Spurious Emissions**

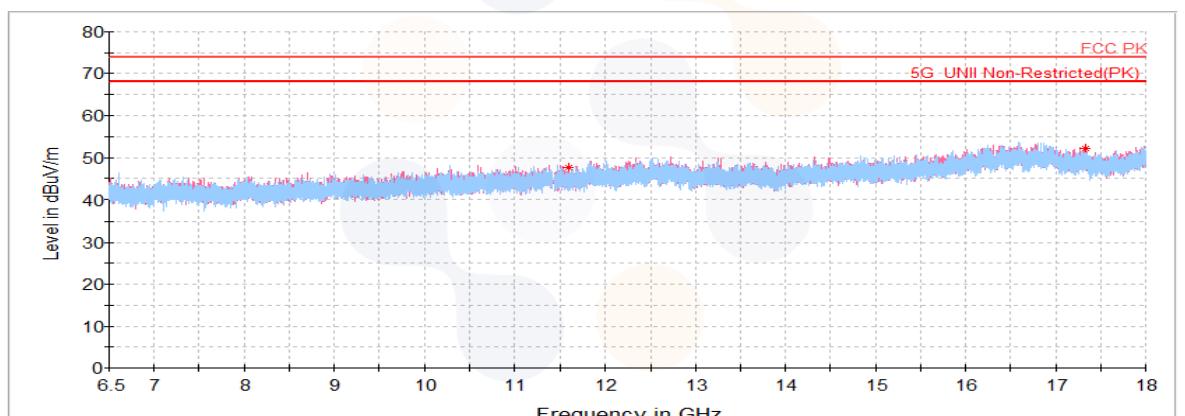
In order to simplify the report, attached plots were only the lowest margin condition

#### **802.11a\_UNII-3\_Middle Channel (5 785 MHz)**

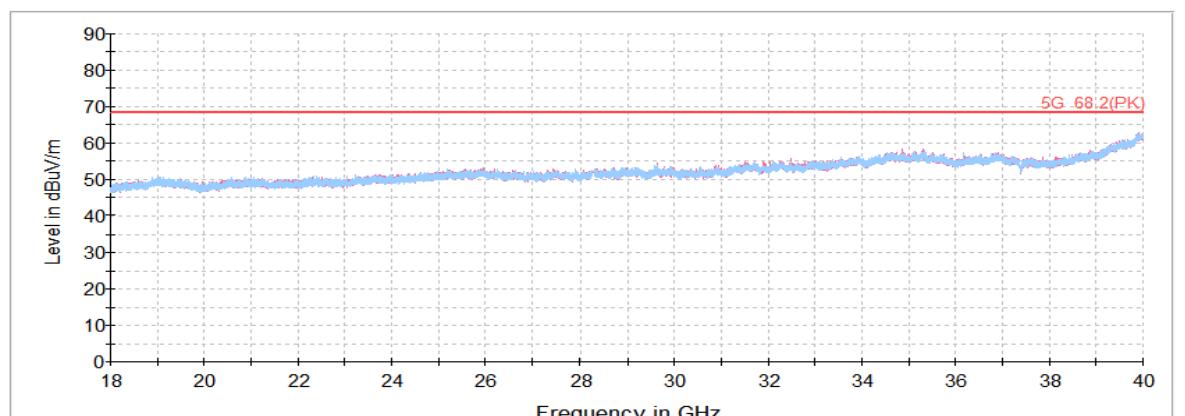
##### **Horizontal/Vertical for 1 GHz ~ 6.5 GHz**



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



##### **Horizontal/Vertical for 18 GHz ~ 40 GHz**



## 8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40	100989	22.12.21
EMI TEST RECEIVER	R&S	ESCI7	100732	23.01.19
Bi-Log Antenna	TESEQ	CBL 6112D	62438	24.08.24
Amplifier	SONOMA INSTRUMENT	310N	284608	23.08.18
ATTENUATOR	KEYSIGHT	8491B-6dB	MY39271060	24.04.27
ISOLATION TRANSFORMER	ONETECH CO., LTD	OT-IT500VA	OTR1-16026	23.03.28
Horn antenna	ETS.lindgren	3117	155787	23.09.29
Horn antenna	ETS.lindgren	3116	86635	23.05.04
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
LOOP Antenna	R&S	HFH2-Z2	100355	24.08.10
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	-
Highpass Filter	WT	WT-A1699-HS	WT160411002	23.05.03
Power sensor	R&S	NRP-Z81	1137.9009.02-106223-bB	23.03.11
Vector Signal Generator	R&S	SMBV100A	257566	23.07.04
Signal Generator	R&S	SMB100A	176206	23.01.19
DC Power Supply	AGILENT	E3632A	KR73001026	23.03.28

**End of test report**