



TEST REPORT

KCTL Inc. 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-SRF0115 Page (1) of (44)	 KCTL
1. Client		
◦ Name : SystemBase Co., Ltd. ◦ Address : Daerung Post Tower-1 16F, 288, Digital-ro, Guro-gu, Seoul, South Korea ◦ Date of Receipt : 2022-05-04		
2. Use of Report : Certification		
3. Name of Product / Model : Serial to WiFi Converter / sWiFi/all V1.1		
4. Manufacturer / Country of Origin : SystemBase Co., Ltd. / Korea		
5. FCC ID : PRO-SWIFIALLV11		
6. Date of Test : 2022-05-25 to 2022-06-20		
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		
Affirmation	Tested by Name : Taeyoung Kim 	Technical Manager Name : Seungyong Kim 
2022-06-22		
KCTL Inc.		
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 KCTL Inc.		

KCTL Inc. 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-SRF0115 Page (2) of (44)	 
---	---	---

REPORT REVISION HISTORY

Date	Revision	Page No
2022-06-22	Originally issued	-

This report shall not be reproduced except in full, without the written approval of KCTL Inc. This document may be altered or revised by KCTL Inc. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KCTL Inc. will constitute fraud and shall nullify the document. This test report is a general report that does not use the KOLAS accreditation mark and is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

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	4
2.	Device information	4
2.1.	Accessory information	5
2.2.	Frequency/channel operations.....	5
2.3.	Duty Cycle Factor	5
3.	Antenna requirement	6
4.	Summary of tests	6
5.	Measurement uncertainty	7
6.	Measurement results explanation example	8
7.	Test results	9
7.1.	Maximum conducted output power	9
7.2.	Spurious Emission, Band Edge and Restricted bands.....	11
7.3.	AC Conducted emission	42
8.	Measurement equipment	44

1. General information

Client : SystemBase Co., Ltd.
 Address : Daerung Post Tower-1 16F, 288, Digital-ro, Guro-gu, Seoul, South Korea
 Manufacturer : SystemBase Co., Ltd.
 Address : Daerung Post Tower-1 16F, 288, Digital-ro, Guro-gu, Seoul, South Korea
 Laboratory : KCTL Inc.
 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 : Serial to WiFi Converter
 Model : sWiFi/all V1.1
 Modulation technique : WIFI(802.11a/b/g/n_HT20)_DSSS, OFDM
 Number of channels : 802.11b/g/n_HT20 : 11 ch
 UNII-1: 4 ch (20 MHz)
 UNII-2A: 4 ch (20 MHz)
 UNII-2C: 11 ch (20 MHz)
 UNII-3: 5 ch (20 MHz)
 Power source : DC 5 V
 Antenna specification : Dipole Antenna
 Antenna gain : WIFI/Bluetooth(BDR/EDR/BLE)_6.13 dBi
 UNII-1 : 6.20 dBi
 UNII-2A : 6.67 dBi
 UNII-2C : 7.45 dBi
 UNII-3 : 6.40 dBi
 Frequency range : 2 412 MHz ~ 2 462 MHz (802.11b/g/n_HT20)
 UNII-1: 5 180 MHz ~ 5 240 MHz (802.11a/n_HT20)
 UNII-2A: 5 260 MHz ~ 5 320 MHz (802.11a/n_HT20)
 UNII-2C: 5 500 MHz ~ 5 700 MHz (802.11a/n_HT20)
 UNII-3: 5 745 MHz ~ 5 825 MHz (802.11a/n_HT20)
 Software version : sWiFi all V1.1.1
 Hardware version : FW_5092_DU0_SU0_S411N_MA400D_6L3T,
 sWiFi_all_Firmware_V1.1.2
 Test device serial No. : N/A
 Operation temperature : -40 °C ~ 85 °C

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source
SWITCHING ADAPTOR	SHENZHEN FUJIA APPLIANCE CO., LTD,	FJ-SW126K0501000DN	-	INPUT : 100 ~ 240 V / 50/60 Hz / 0.4 A OUTPUT : 5 V, 1.0 A

2.2. Frequency/channel operations

This device contains the following capabilities:
WiFi (802.11a/b/g/n)

UNII-1		UNII-2A		UNII-2C		UNII-3	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
36	5 180	52	5 260	100	5 500	149	5 745
40	5 200	56	5 280	120	5 600	157	5 785
48	5 240	64	5 320	140	5 700	165	5 825

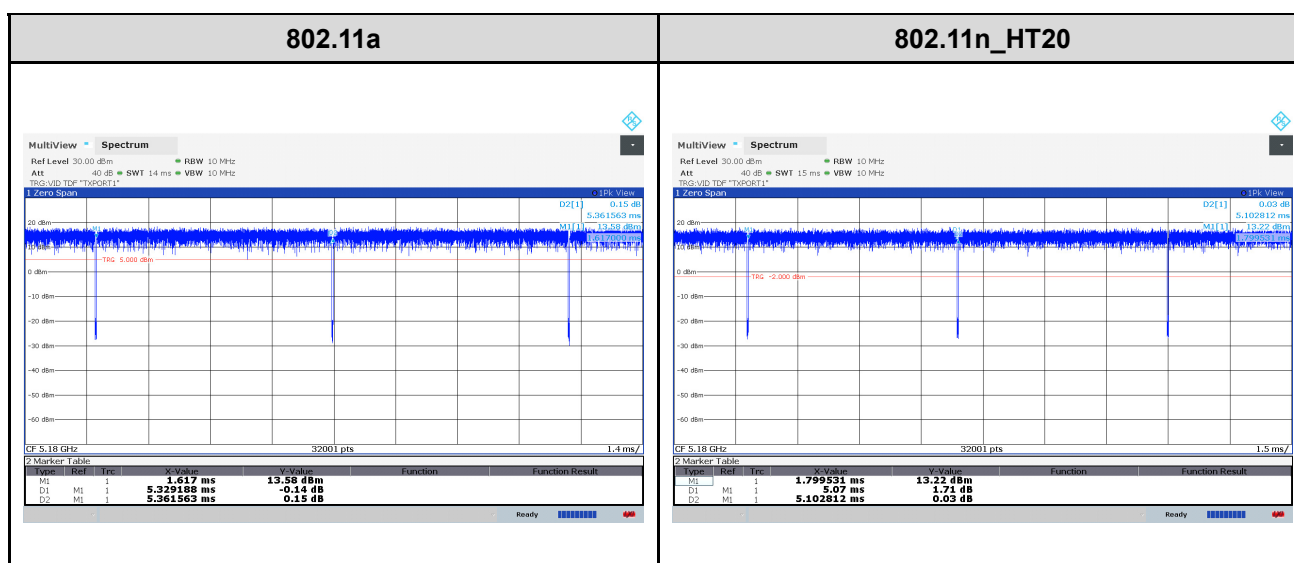
Table 2.2. 802.11a/n_HT20 mode

2.3. Duty Cycle Factor

Test mode	Period (ms)	T _{on} time (ms)	Duty cycle		Duty cycle factor (dB)
			(Linear)	(%)	
802.11a	5.361 6	5.329 2	0.994 0	99.40	0.03
802.11n_HT20	5.102 8	5.070 0	0.993 6	99.36	0.03

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%



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 a dipole antenna with unique antenna connector(RP-SMA).

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 ^(Note1)
15.407(a)	26 dB Channel Bandwidth		N/T ^(Note1)
15.407(e)	6 dB Channel Bandwidth		N/T ^(Note1)
15.207(a)	AC Conducted Emissions		Pass
15.407(b), 15.205(a), 15.209(a)	Spurious emission	Radiated	Pass
	Band-edge, restricted band		Pass
15.407(h)	DFS -Channel closing transmission time -Channel move time -Non occupied period	Conducted	N/T ^(Note1)

Notes:

- In this test report, certified module is integrated in to this device. This test item can be referred to module report. (FCC ID: 2ADXS-WFM60-SFP2501, Grant date : 08/21/2018)
- 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.
- 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.
- The test procedure(s) in this report were performed in accordance as following.
 - ANSI C63.10-2013
 - KDB 789033 D02 v02r01
- Based on the baseline scan, the worst-case data rates were:
 - 802.11a mode: 6Mbps
 - 802.11n HT20 mode: MCS0

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 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 ($\pm$)	
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	10.21	9000	13.05
50	10.25	10000	13.08
100	10.34	11000	13.16
200	10.44	12000	13.32
300	10.57	13000	13.35
400	10.59	14000	13.42
500	10.69	15000	13.52
600	10.72	16000	13.56
700	10.79	17000	13.67
800	10.90	18000	13.71
900	10.91	19000	13.95
1000	10.95	20000	13.97
2000	11.89	21000	14.00
3000	11.95	22000	14.06
4000	12.24	23000	14.14
5000	12.33	24000	14.20
6000	12.48	25000	14.51
7000	12.65	26000	14.56
8000	13.02	26500	15.08

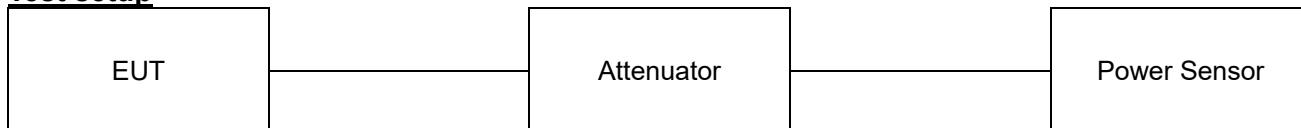
Notes:

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	
	√	Client device	250 mW (23.98 dBm)
UNII-2A	√		250 mW or 11 dBm + 10logB ¹⁾
UNII-2C	√		250 mW or 11 dBm + 10logB ¹⁾
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	14.52	-	14.52	23.78
		5 200	14.50	-	14.50	
		5 240	14.77	-	14.77	
	UNII 2A	5 260	14.74	-	14.74	23.31
		5 300	13.82	-	13.82	
		5 320	12.72	-	12.72	
	UNII 2C	5 500	13.05	-	13.05	22.53
		5 580	13.52	-	13.52	
		5 700	11.24	-	11.24	
	UNII 3	5 745	14.03	-	14.03	29.60
		5 785	13.42	-	13.42	
		5 825	13.55	-	13.55	
802.11n HT20	UNII 1	5 180	13.71	-	13.71	23.78
		5 200	14.09	-	14.09	
		5 240	14.52	-	14.52	
	UNII 2A	5 260	14.63	-	14.63	23.31
		5 300	13.69	-	13.69	
		5 320	12.91	-	12.91	
	UNII 2C	5 500	13.54	-	13.54	22.53
		5 580	13.67	-	13.67	
		5 700	11.18	-	11.18	
	UNII 3	5 745	13.13	-	13.13	29.60
		5 785	13.29	-	13.29	
		5 825	13.41	-	13.41	

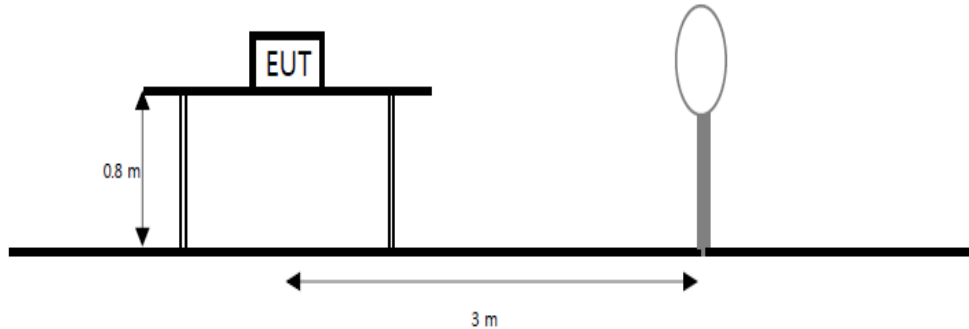
Note.

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

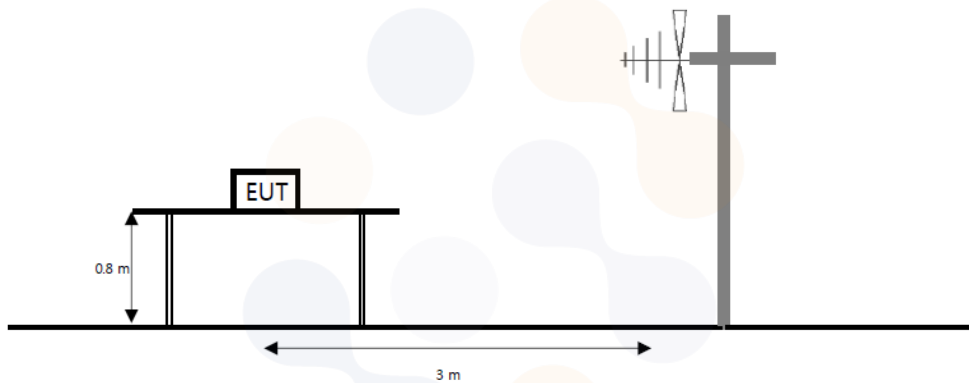
7.2. Spurious Emission, Band Edge and Restricted bands

Test setup

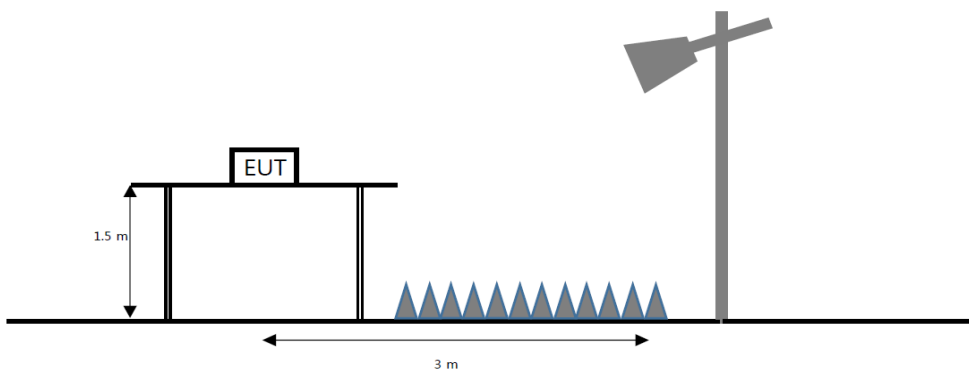
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



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.

KCTL Inc. 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-SRF0115 Page (13) of (44)	 
---	--	---

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 procedureANSI 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 $\geq (3 \times \text{RBW})$
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 $\geq (3 \times \text{RBW})$.
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 $\geq [3 \times \text{RBW}]$.
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. $f < 30$ 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. ¹⁾ 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.

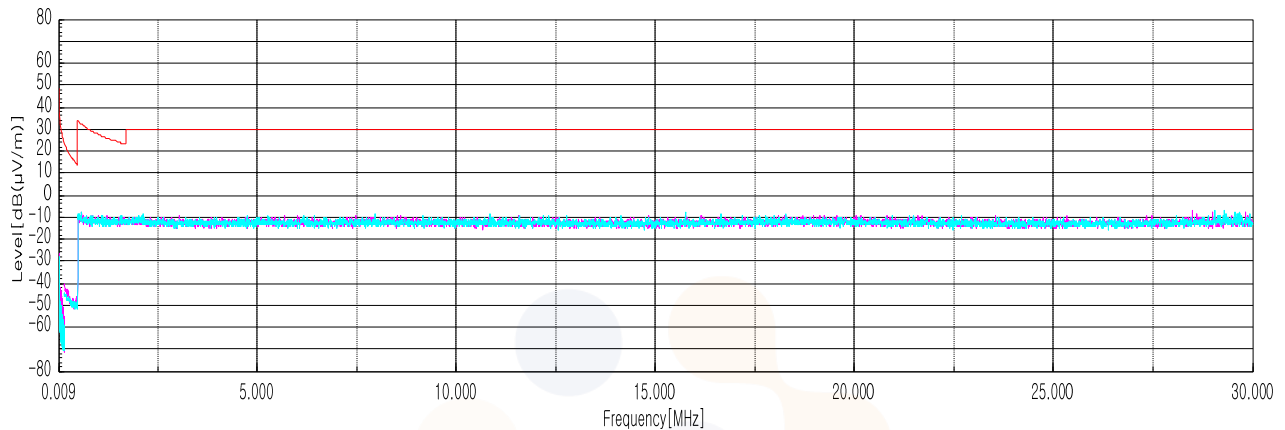
KCTL Inc.

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-SRF0115
Page (16) of (44)

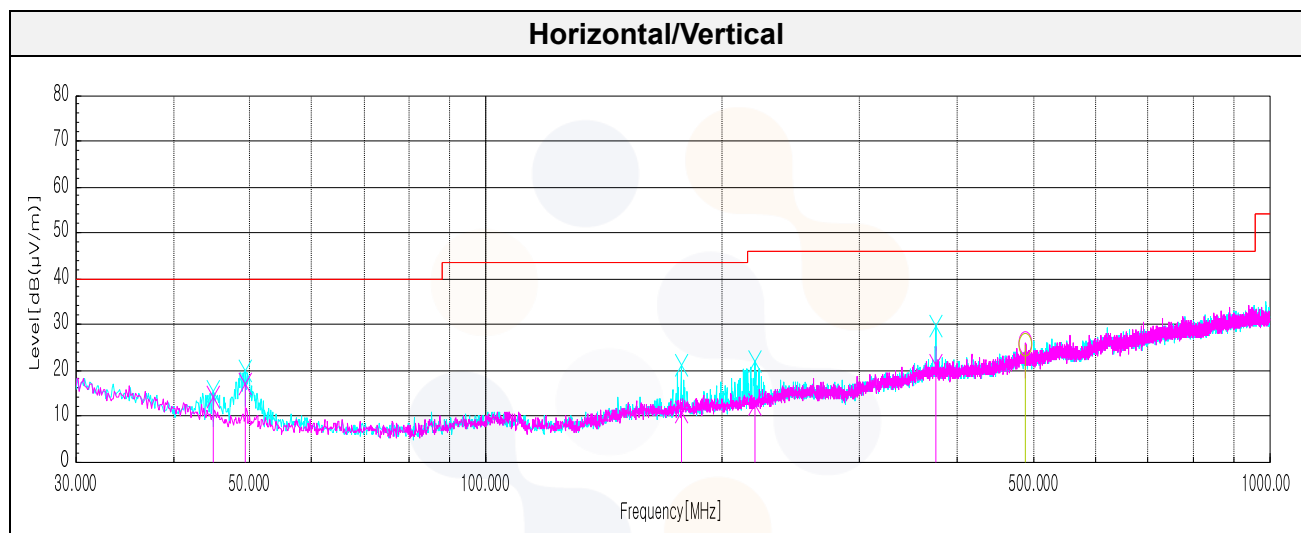
**Test results (Below 30 MHz) – Worst case: 802.11a / UNII-1 5 240 MHz**

Frequency	Pol.	Reading	Ant. Factor	Amp. +Cable	Distance Factor	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/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(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi peak data								
44.91	V	28.40	15.63	-30.05	-	13.98	40.00	26.02
49.40	V	32.60	14.40	-29.89	-	17.11	40.00	22.89
177.68	V	21.70	16.44	-27.39	-	10.75	43.50	32.75
220.48	V	22.30	17.14	-26.81	-	12.63	46.00	33.37
375.08	V	23.10	22.70	-24.80	-	21.00	46.00	25.00
488.81	H	24.30	24.72	-23.60	-	25.42	46.00	20.58



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)
Peak data								
5 147.33 ¹⁾	H	42.53	33.89	-24.59	-	51.83	74.00	22.17
10 360.05	V	66.55	37.22	-49.11	-	54.66	68.20	13.54
15 564.88 ¹⁾	V	56.55	40.55	-46.24	-	50.86	74.00	23.14
16 714.16	V	57.93	42.94	-46.31	-	54.56	68.20	13.64
Average Data								
5 147.33 ¹⁾	H	32.85	33.89	-24.59	-	42.15	54.00	11.85

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)
Peak data								
10 397.06	V	63.65	37.24	-49.03	-	51.86	68.20	16.34
15 641.78 ¹⁾	H	56.47	40.61	-46.27	-	50.81	74.00	23.19
Average Data								
No spurious emissions were detected within 20 dB of the limit								

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)
Peak data								
10 480.08	H	63.73	37.29	-48.86	-	52.16	68.20	16.04
15 727.67 ¹⁾	H	55.95	40.68	-46.31	-	50.32	74.00	23.68
Average Data								
No spurious emissions were detected within 20 dB of the limit								

KCTL Inc.

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

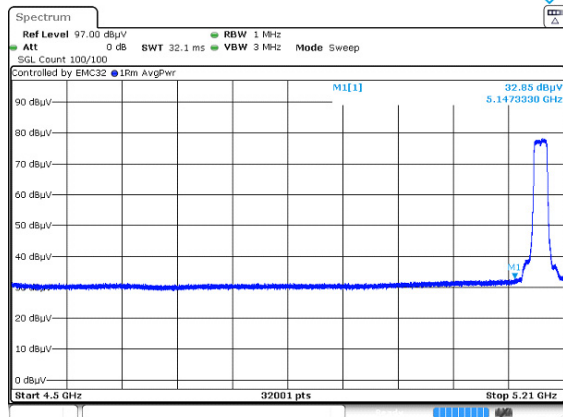
Report No.:
KR22-SRF0115
Page (19) of (44)



802.11a UNII-1

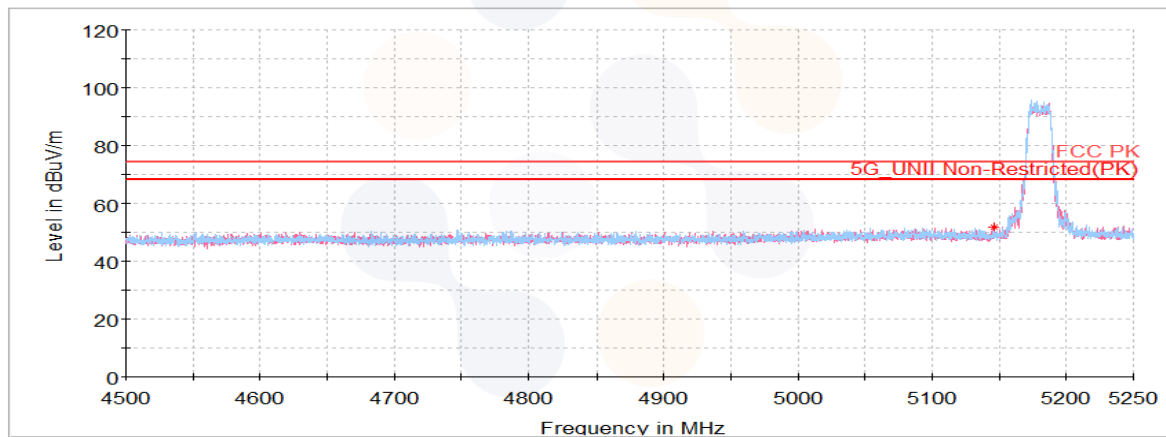
Lowest Channel (5 180 MHz)

Average data



Blank

Horizontal/Vertical for Band-edge



KCTL Inc. 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-SRF0115 Page (20) of (44)	 
---	--	---

802.11n HT20 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)
Peak data								
5 149.15 ¹⁾	H	42.33	33.90	-24.60	-	51.63	74.00	22.37
10 369.39	V	63.75	37.22	-49.09	-	51.88	68.20	16.32
15 444.48 ¹⁾	H	56.64	40.54	-46.34	-	50.84	74.00	23.16
Average Data								
5 149.15 ¹⁾	H	32.87	33.90	-24.60	-	42.17	54.00	11.83

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)
Peak data								
10 389.52	V	63.29	37.23	-49.05	-	51.47	68.20	16.73
15 593.63 ¹⁾	H	56.54	40.57	-46.25	-	50.86	74.00	23.14
Average Data								
No spurious emissions were detected within 20 dB of the limit								

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)
Peak data								
10 482.95	V	64.16	37.29	-48.86	-	52.59	68.20	15.61
15 710.78 ¹⁾	V	56.34	40.67	-46.30	-	50.71	74.00	23.29
Average Data								
No spurious emissions were detected within 20 dB of the limit								

KCTL Inc.

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

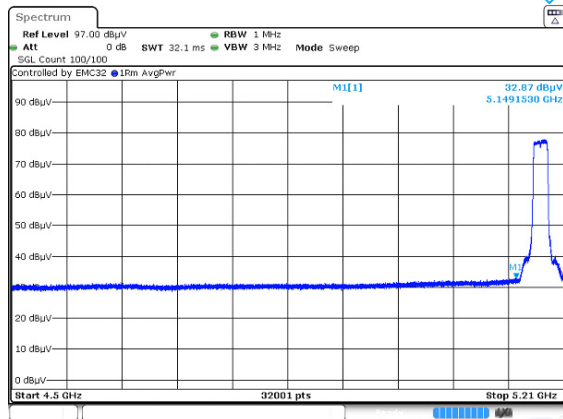
Report No.:
KR22-SRF0115
Page (21) of (44)



802.11n HT20 UNII-1

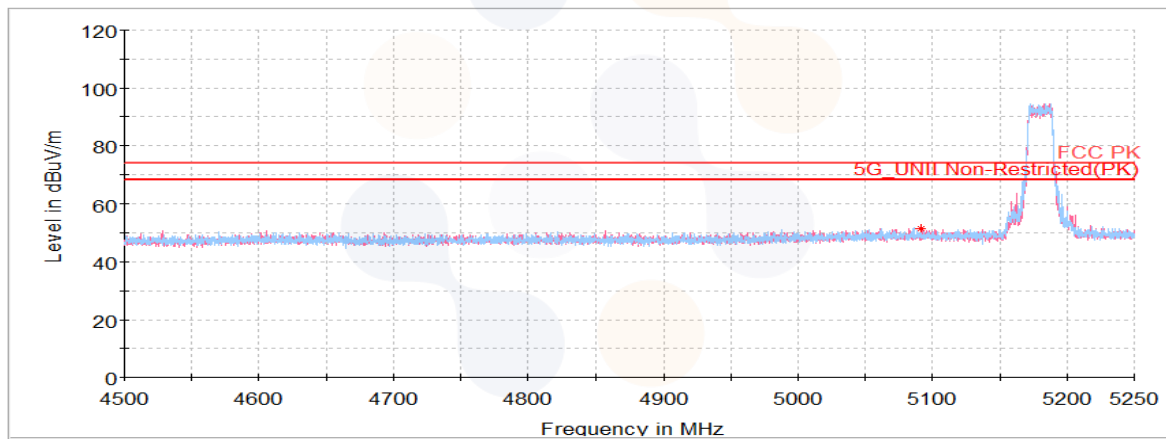
Lowest Channel (5 180 MHz)

Average data



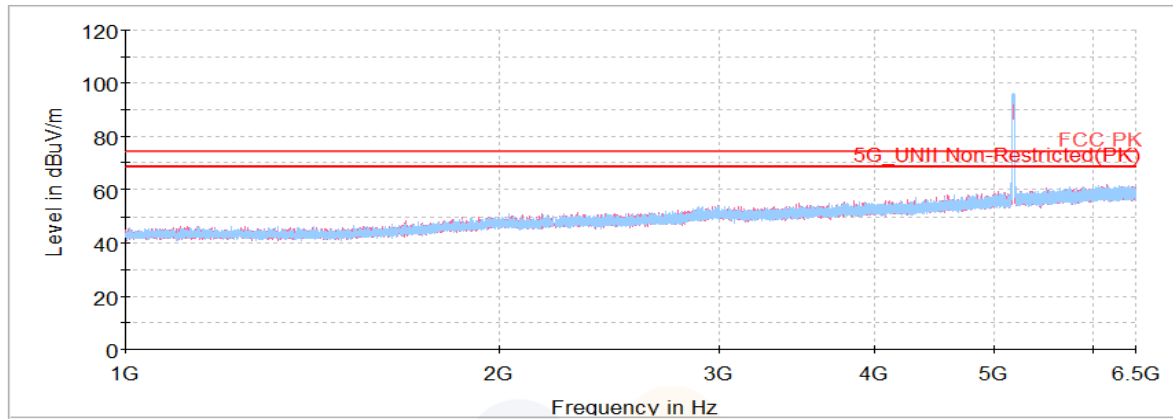
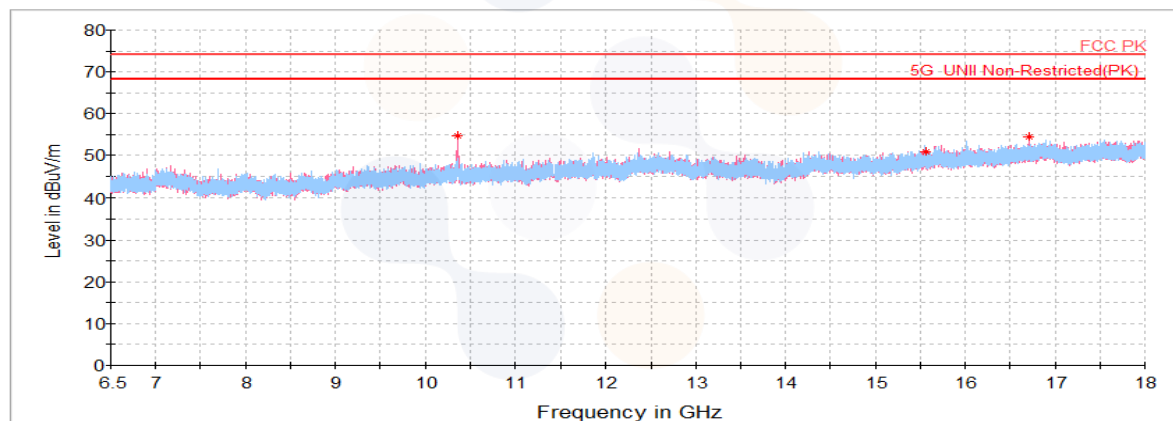
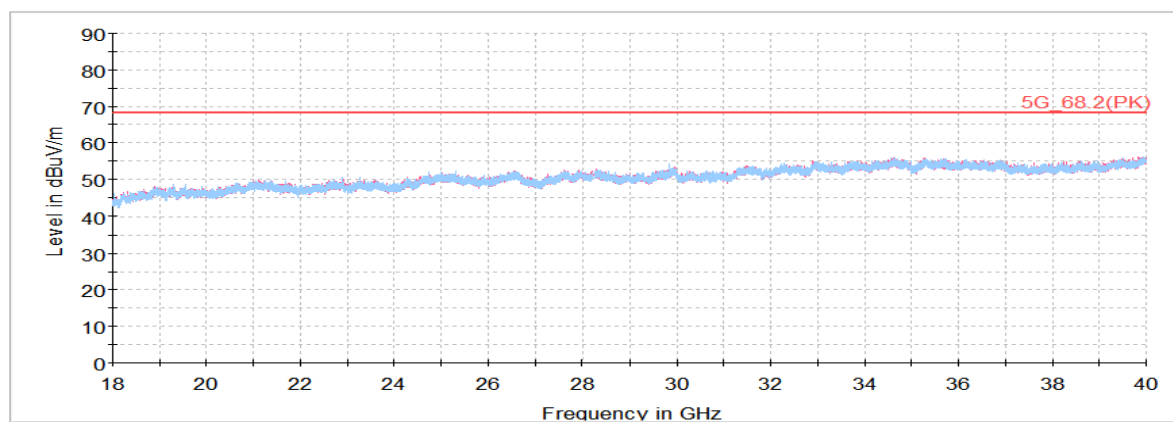
Blank

Horizontal/Vertical for Band-edge



Plot of Harmonics and Spurious Emissions

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

802.11a_UNII-1_Lowest Channel (5 180 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-2A

Lowest Channel (5 260 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)
Peak data								
10 509.55	H	64.48	37.31	-48.83	-	52.96	68.20	15.24
15 767.56 ¹⁾	V	56.36	40.71	-46.32	-	50.75	74.00	23.25
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Middle Channel (5 300 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)
Peak data								
10 599.65	H	64.73	37.38	-48.91	-	53.20	68.20	15.00
15 886.52 ¹⁾	V	56.18	40.81	-46.37	-	50.62	74.00	23.38
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 320 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)
Peak data								
5 351.02 ¹⁾	H	43.33	34.30	-24.61	-	53.02	74.00	20.98
10 639.70 ¹⁾	H	64.98	37.41	-48.94	-	53.45	74.00	20.55
15 969.89 ¹⁾	V	56.16	40.88	-46.25	-	50.79	74.00	23.21
Average Data								
5 351.02 ¹⁾	H	33.66	34.30	-24.61	-	43.35	54.00	10.65
10 639.70 ¹⁾	H	57.27	37.41	-48.94	-	45.74	54.00	8.26

KCTL Inc.

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

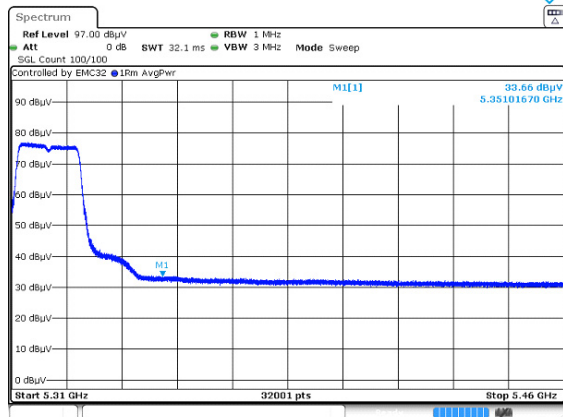
Report No.:
KR22-SRF0115
Page (24) of (44)



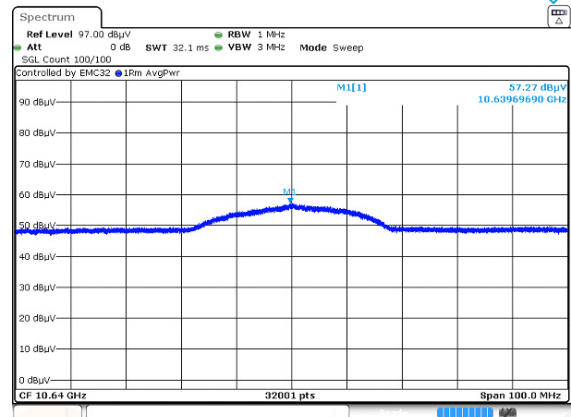
802.11a UNII-2A

Highest Channel (5 320 MHz)

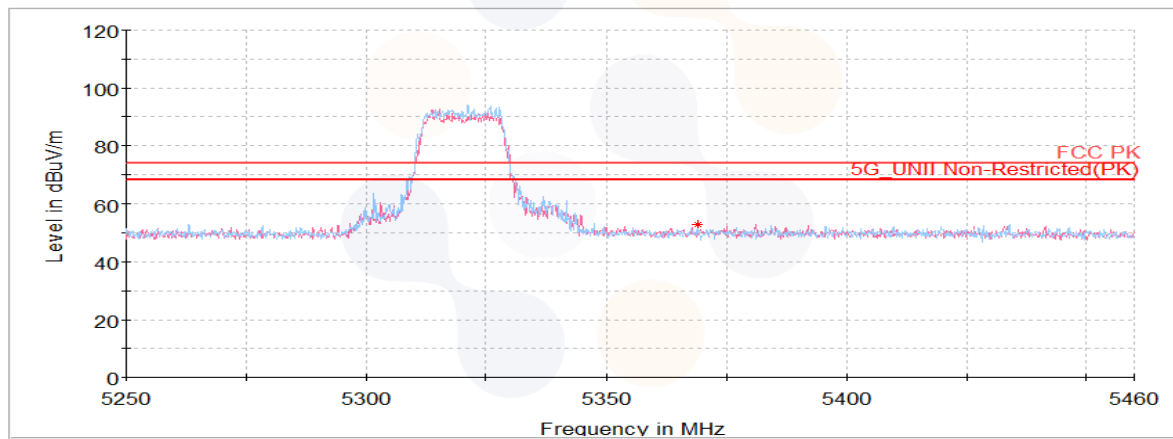
Average data



Average data



Horizontal/Vertical for Band-edge



802.11n HT20 UNII-2A

Lowest Channel (5 260 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)
Peak data								
10 510.98	V	64.73	37.31	-48.83	-	53.21	68.20	14.99
15 785.89 ¹⁾	H	56.01	40.73	-46.33	-	50.41	74.00	23.59
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Middle Channel (5 300 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)
Peak data								
10 589.33	H	63.41	37.37	-48.90	-	51.88	68.20	16.32
15 899.45 ¹⁾	H	56.52	40.82	-46.37	-	50.97	74.00	23.03
16 705.17	V	57.68	42.93	-46.31	-	54.30	68.20	13.90
Average Data								
No spurious emissions were detected within 20 dB of the limit								

Highest Channel (5 320 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)
Peak data								
5 354.02 ¹⁾	H	42.42	34.31	-24.60	-	52.13	74.00	21.87
10 639.73 ¹⁾	H	63.92	37.41	-48.94	-	52.39	74.00	21.61
15 973.13 ¹⁾	V	56.45	40.88	-46.40	-	50.93	74.00	23.07
Average Data								
5 354.02 ¹⁾	H	34.14	34.31	-24.60	-	43.85	54.00	10.15
10 639.73 ¹⁾	H	57.36	37.41	-48.94	-	45.83	54.00	8.17

KCTL Inc.

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

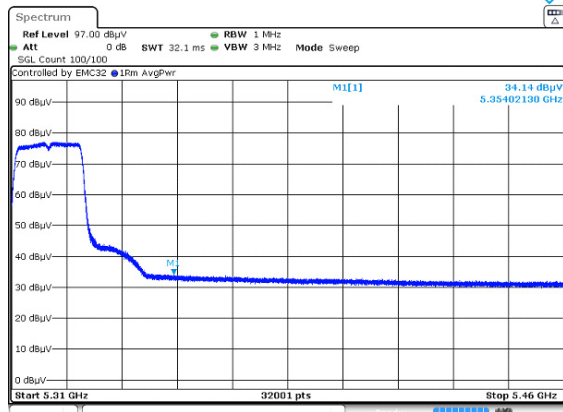
Report No.:
KR22-SRF0115
Page (26) of (44)



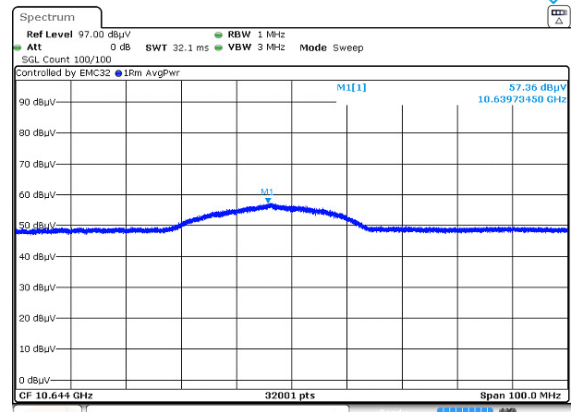
802.11n HT20 UNII-2A

Highest Channel (5 320 MHz)

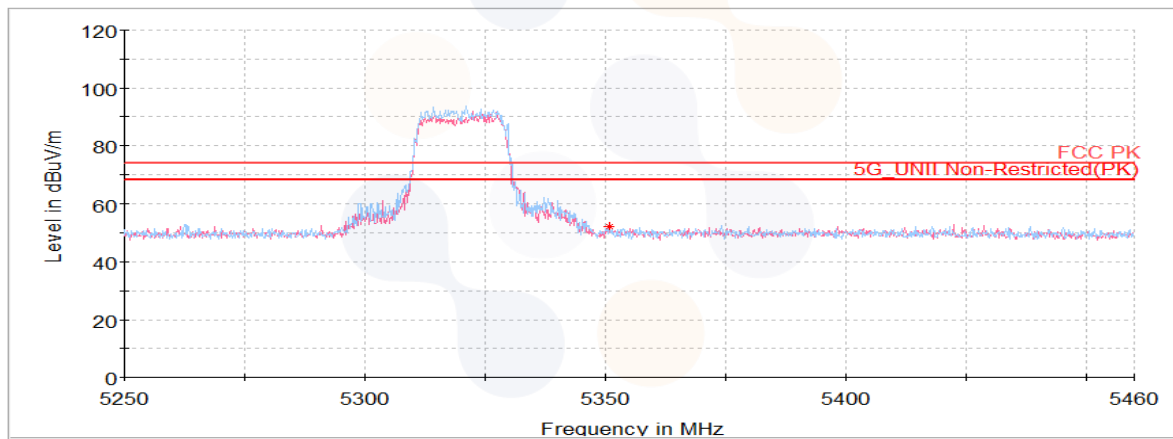
Average data



Average data

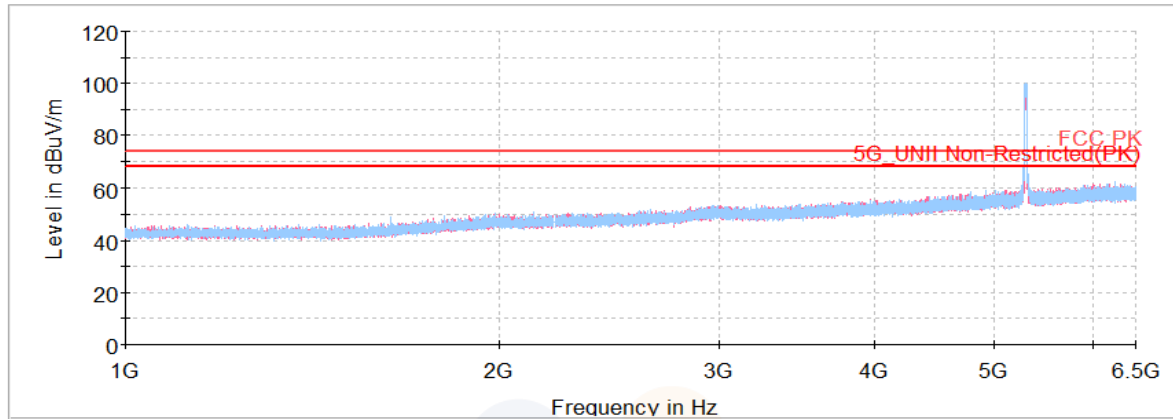
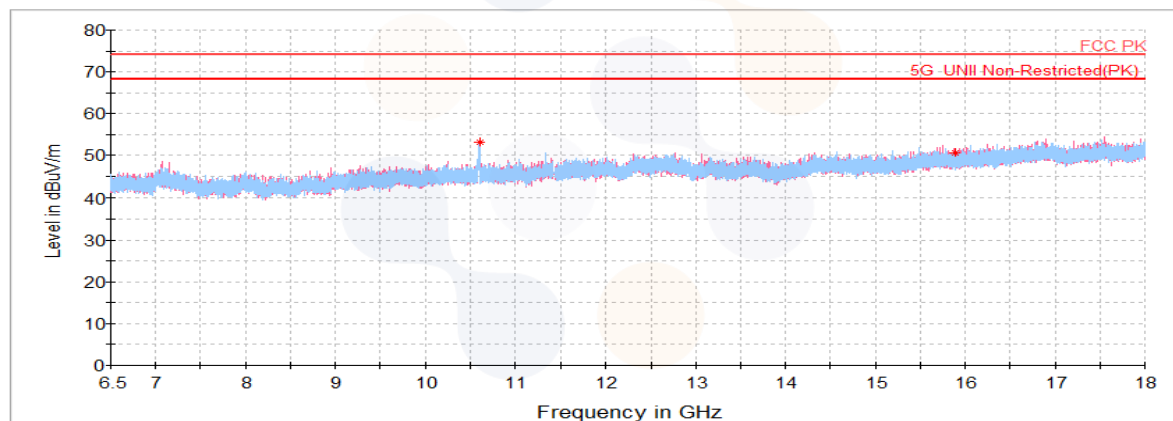
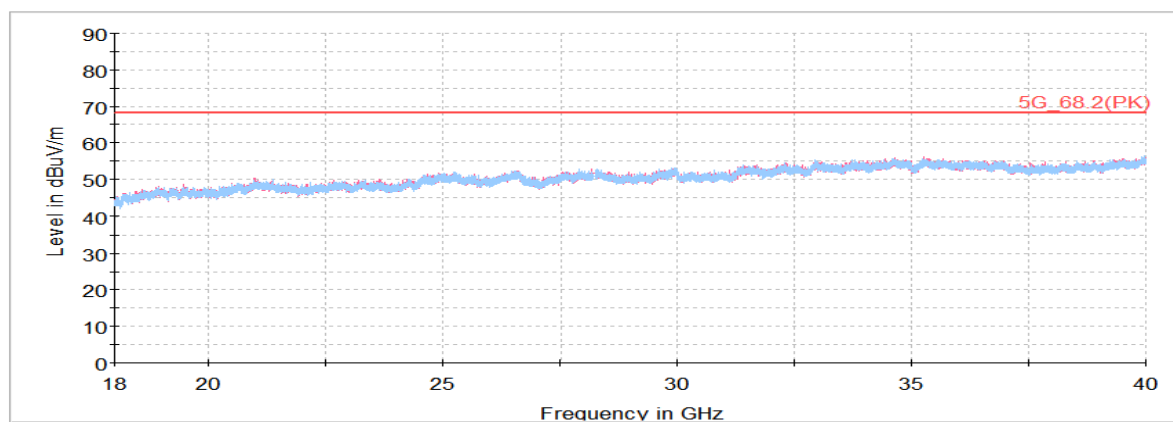


Horizontal/Vertical for Band-edge



Plot of Harmonics and Spurious Emissions

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

802.11a_UNII-2A_Middle Channel (5 300 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-2C

Lowest Channel (5 500 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)
Peak data								
5 459.77 ¹⁾	H	41.79	34.52	-24.41	-	51.90	74.00	22.10
10 999.83 ¹⁾	V	66.48	37.70	-49.26	-	54.92	74.00	19.08
16 493.86	V	58.03	43.08	-46.29	-	54.82	68.20	13.38
Average Data								
5 459.77 ¹⁾	H	33.03	34.52	-24.41	-	43.14	54.00	10.86
10 999.83 ¹⁾	V	57.87	37.70	-49.26	-	46.31	54.00	7.69

Middle Channel (5 580 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)
Peak data								
11 159.88 ¹⁾	V	65.71	37.83	-48.98	-	54.56	74.00	19.44
16 733.56	V	62.51	42.97	-46.31	-	59.17	68.20	9.03
Average Data								
11 159.88 ¹⁾	V	57.87	37.83	-48.98	-	46.72	54.00	7.28

Highest Channel (5 700 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)
Peak data								
5 735.16	H	42.36	34.88	-24.09	-	53.15	68.20	15.05
11 400.93 ¹⁾	V	62.11	38.02	-48.56	-	51.57	74.00	22.43
17 179.91	H	57.83	41.38	-45.84	-	53.37	68.20	14.83
Average Data								
11 400.93 ¹⁾	V	53.52	38.02	-48.56	-	42.98	54.00	11.02

KCTL Inc.

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

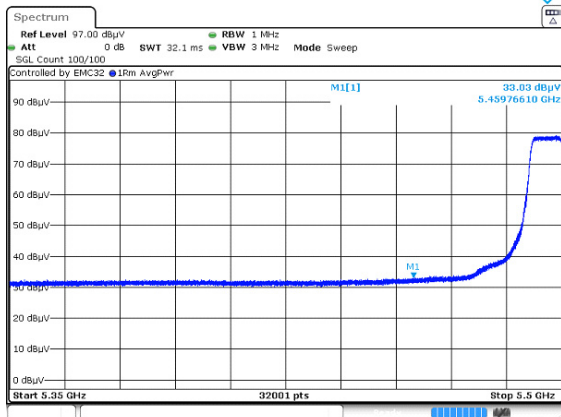
Report No.:
KR22-SRF0115
Page (29) of (44)



802.11a UNII-2C

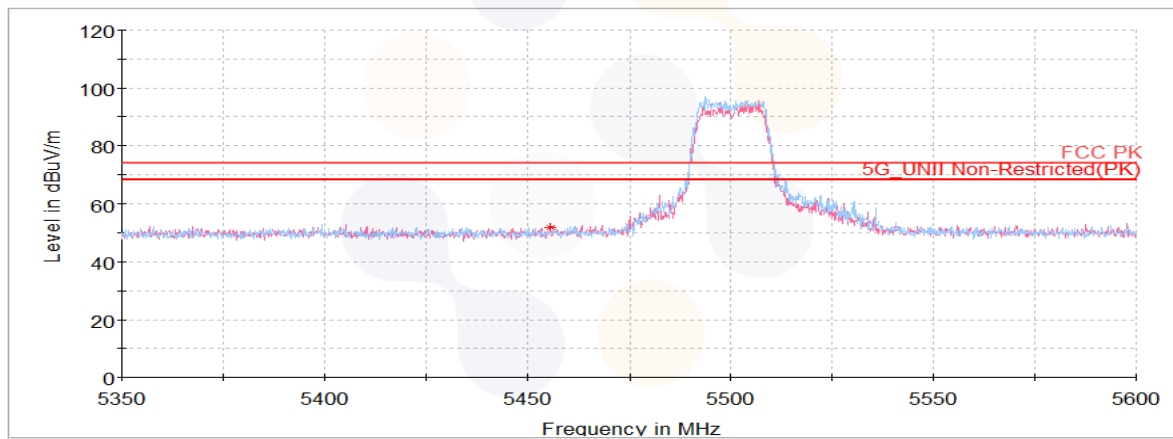
Lowest Channel (5 500 MHz)

Average data



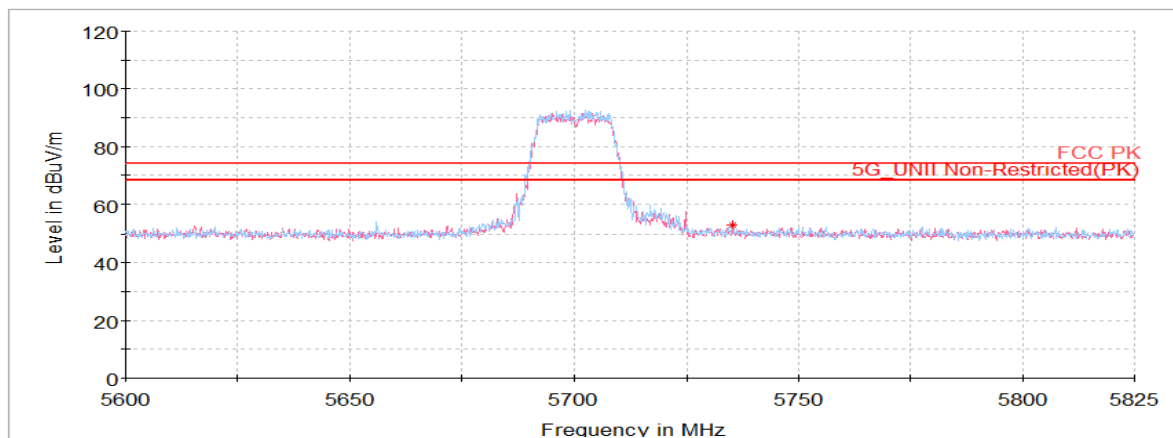
Blank

Horizontal/Vertical for Band-edge



Highest Channel (5 700 MHz)

Horizontal/Vertical for Band-edge



KCTL Inc.

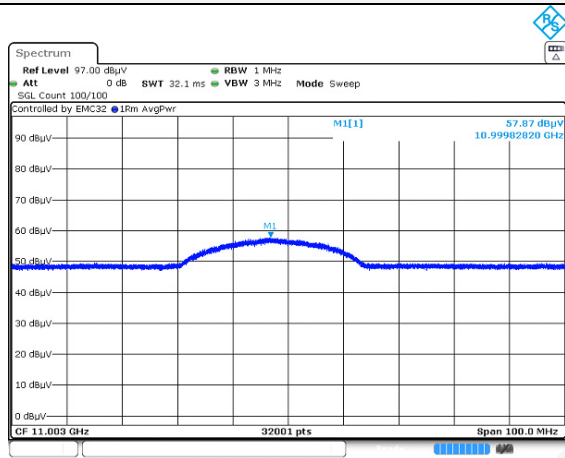
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR22-SRF0115
Page (30) of (44)

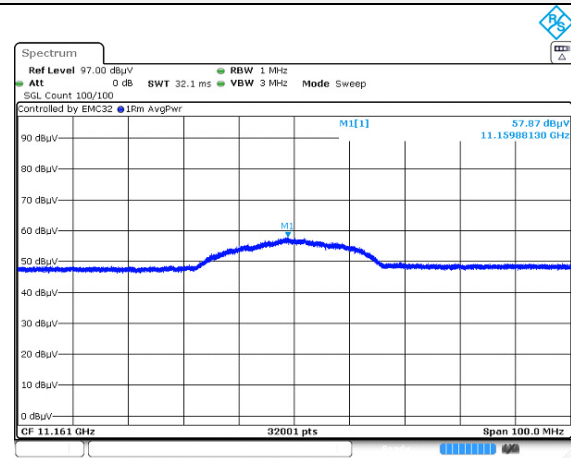


Average data

Lowest Channel (5 500 MHz)



Middle Channel (5 580 MHz)



Highest Channel (5 700 MHz)



Blank

KCTL Inc. 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-SRF0115 Page (31) of (44)	 
---	--	---

802.11n HT20 UNII-2C

Lowest Channel (5 500 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)
Peak data								
5 369.43 ¹⁾	H	42.22	34.34	-24.54	-	52.02	74.00	21.98
11 001.59 ¹⁾	V	65.68	37.70	-49.25	-	54.13	74.00	19.87
16 493.14	V	57.24	43.08	-46.29	-	54.03	68.20	14.17
Average Data								
5 369.43 ¹⁾	H	32.87	34.34	-24.54	-	42.67	54.00	11.33
11 001.59 ¹⁾	V	57.93	37.70	-49.25	-	46.38	54.00	7.62

Middle Channel (5 580 MHz)

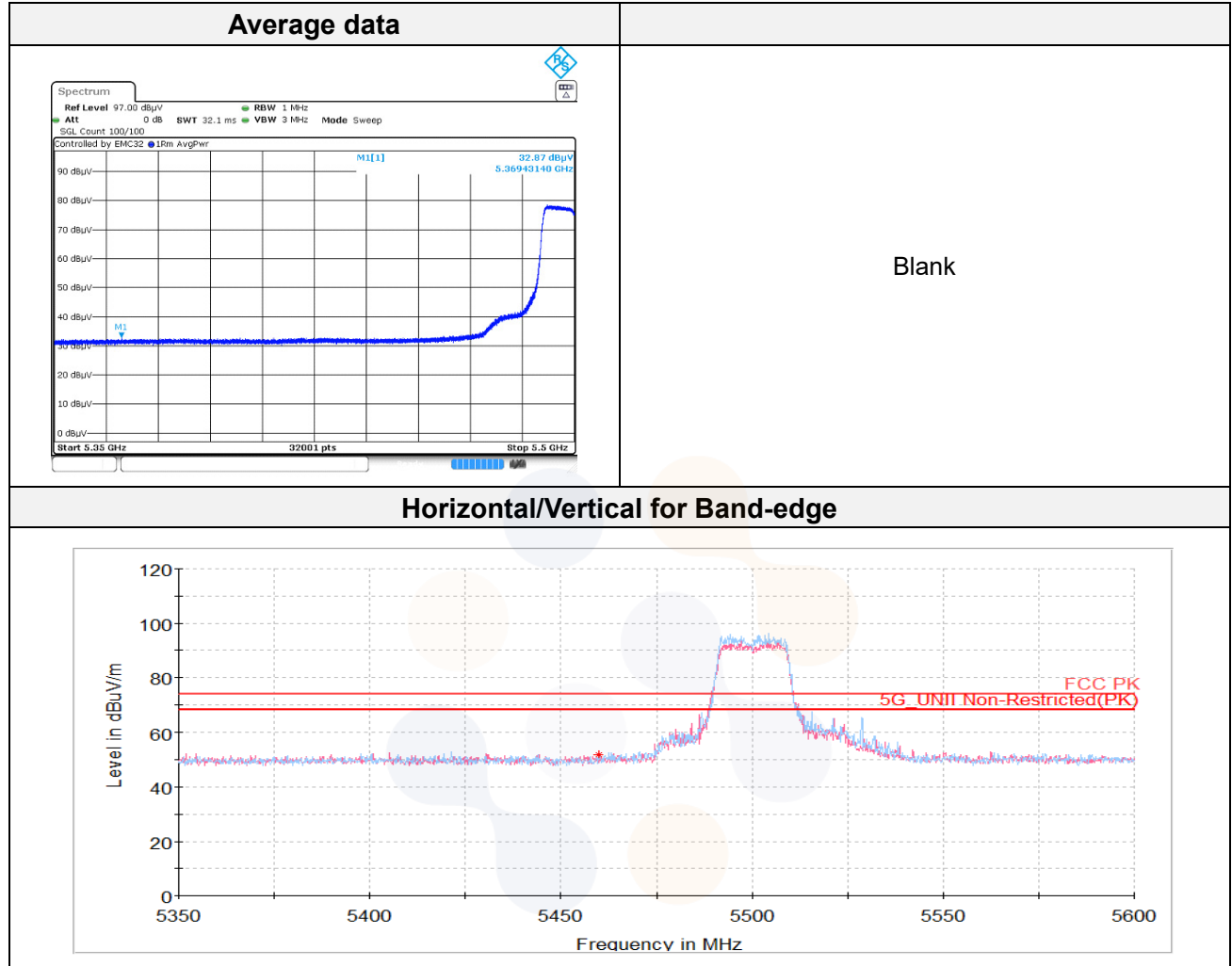
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
11 161.48 ¹⁾	V	64.25	37.83	-48.98	-	53.10	74.00	20.90
16 744.34	V	65.50	42.99	-46.31	-	62.18	68.20	6.02
Average Data								
11 161.48 ¹⁾	V	57.82	37.83	-48.98	-	46.67	54.00	7.33

Highest Channel (5 700 MHz)

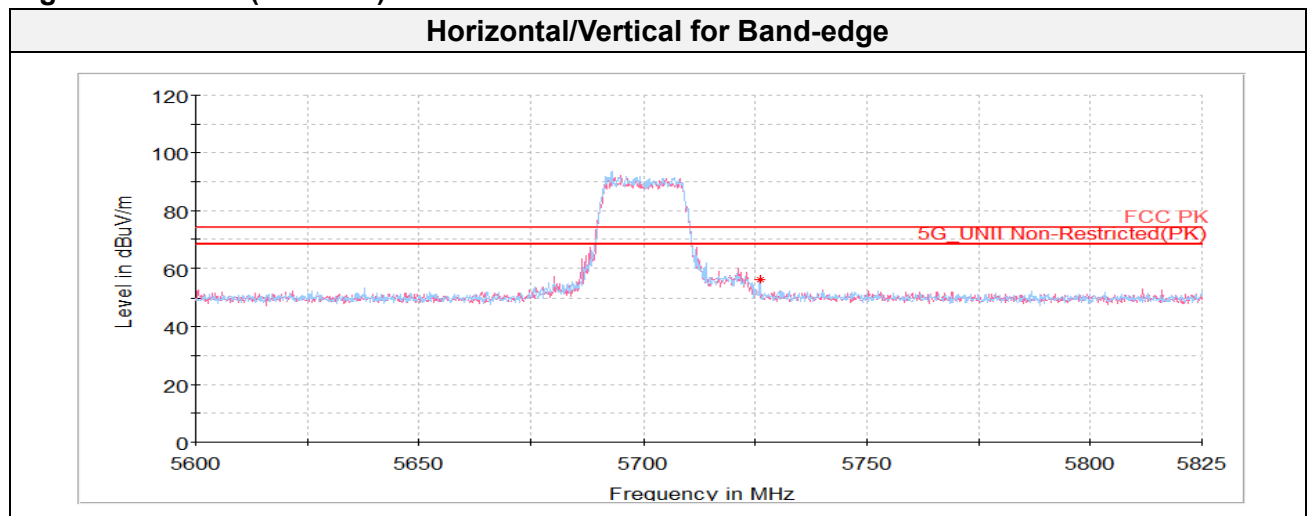
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 726.05	H	45.58	34.87	-24.10	-	56.35	68.20	11.85
11 401.44 ¹⁾	V	61.88	38.02	-48.56	-	51.34	74.00	22.66
17 113.42	V	57.33	41.50	-46.02	-	52.81	68.20	15.39
Average Data								
11 401.44 ¹⁾	V	53.81	38.02	-48.56	-	43.27	54.00	10.73

802.11n HT20 UNII-2C

Lowest Channel (5 500 MHz)



Highest Channel (5 700 MHz)



KCTL Inc.

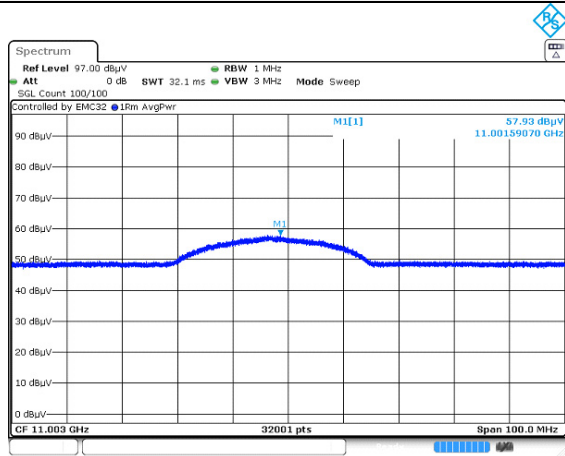
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR22-SRF0115
Page (33) of (44)

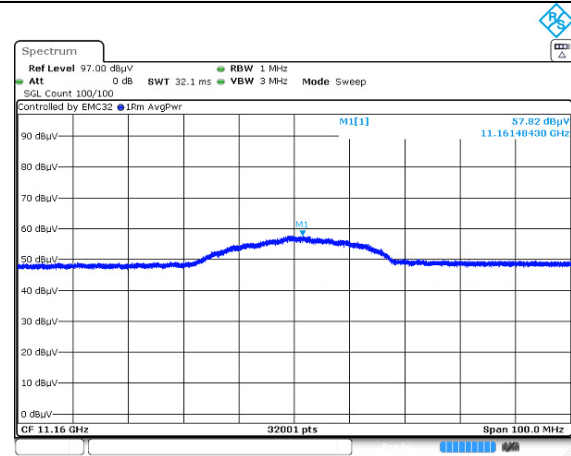


Average data

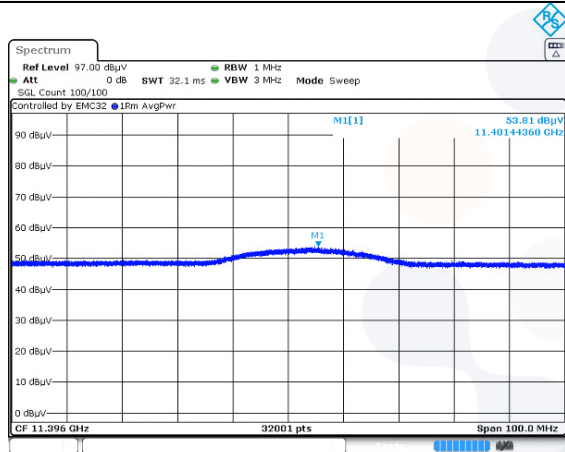
Lowest Channel (5 500 MHz)



Middle Channel (5 580 MHz)



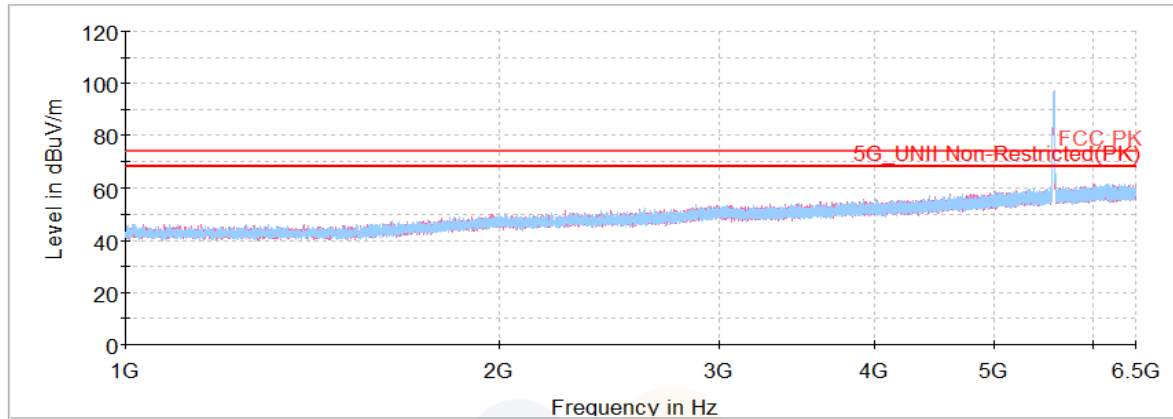
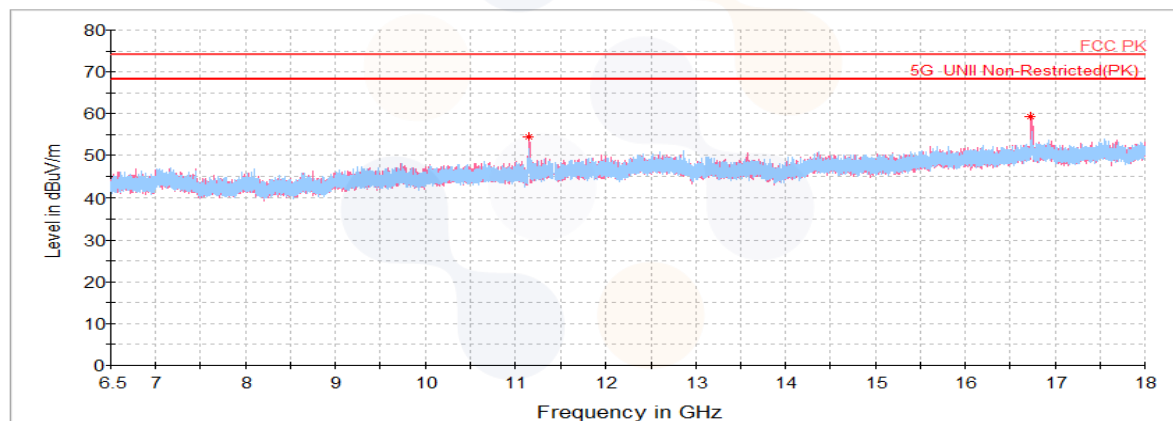
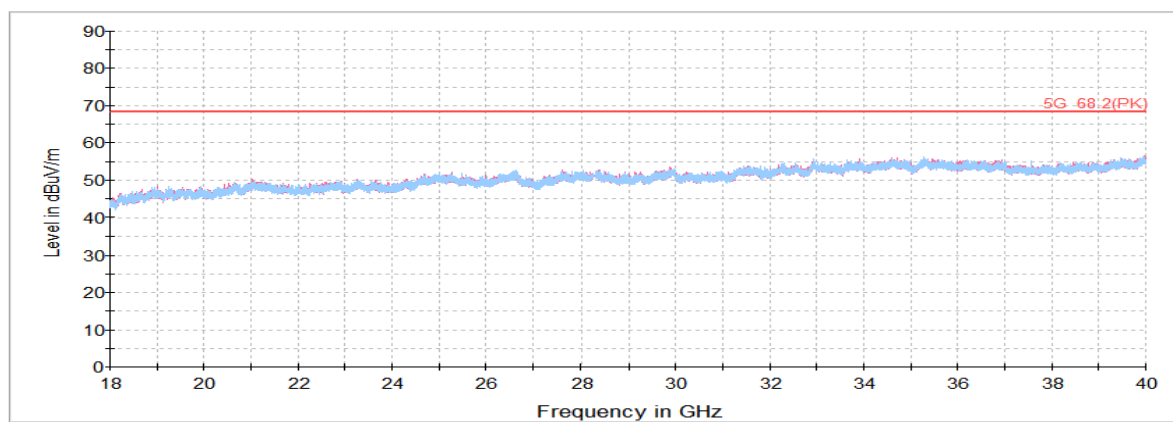
Highest Channel (5 700 MHz)



Blank

Plot of Harmonics and Spurious Emissions

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

802.11a_UNII-2C_Middle Channel (5 580 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)

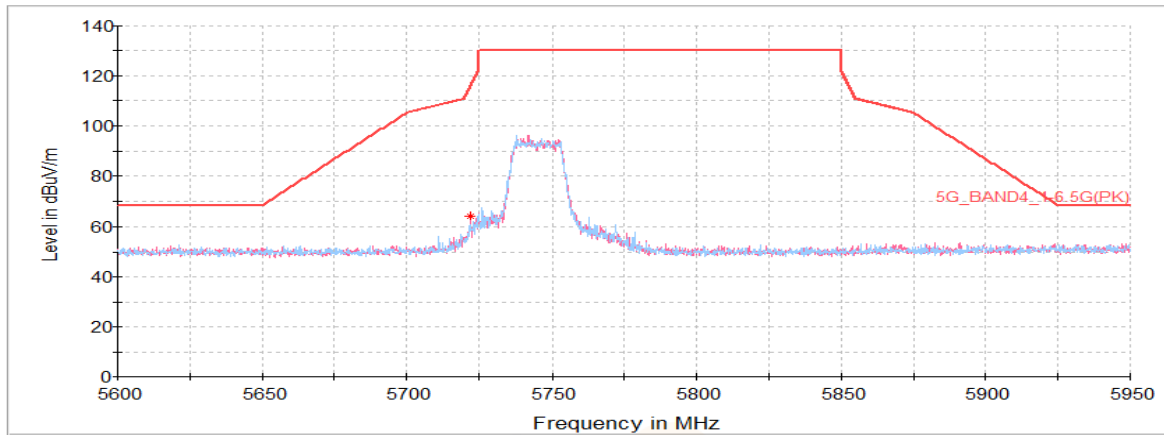
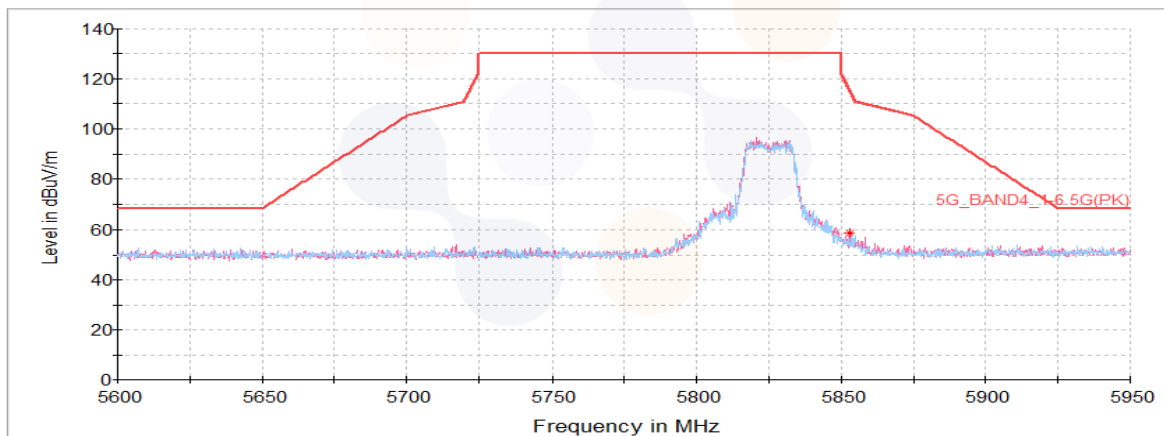
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 722.27	V	53.48	34.87	-24.11	-	64.24	115.97	51.72
11 490.43 ¹⁾	V	63.82	38.09	-48.40	-	53.51	74.00	20.49
17 238.48	H	57.71	41.27	-45.68	-	53.30	68.20	14.90
Average Data								
11 490.43 ¹⁾	V	56.56	38.09	-48.40	-	46.25	54.00	7.75

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)
Peak data								
11 569.95 ¹⁾	V	61.50	38.21	-48.47	-	51.24	74.00	22.76
17 358.52	V	58.31	41.05	-45.36	-	54.00	68.20	14.20
Average Data								
11 569.95 ¹⁾	V	56.62	38.21	-48.47	-	46.36	54.00	7.64

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)
Peak data								
5 852.89	V	47.46	35.02	-23.66	-	58.82	115.61	56.79
11 649.72 ¹⁾	V	63.94	38.34	-48.57	-	53.71	74.00	20.29
17 464.89	V	57.33	40.86	-45.07	-	53.12	68.20	15.08
17 663.27	V	59.78	40.64	-44.79	-	55.63	68.20	12.57
Average Data								
11 649.72 ¹⁾	V	57.87	38.34	-48.57	-	47.64	54.00	6.36

802.11a UNII-3**Lowest Channel (5 745 MHz)****Horizontal/Vertical for Band-edge****Highest Channel (5 825 MHz)****Horizontal/Vertical for Band-edge**

KCTL Inc.

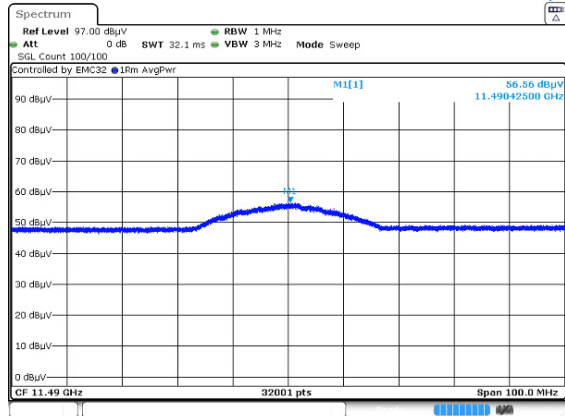
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR22-SRF0115
Page (37) of (44)

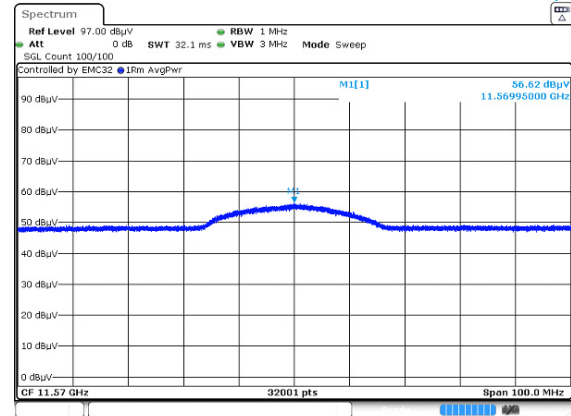


Average data

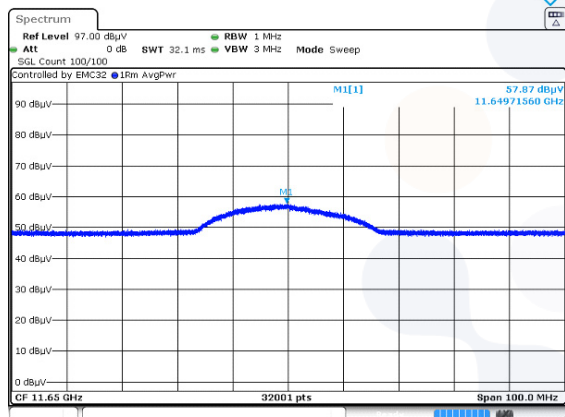
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)



Highest Channel (5 825 MHz)



Blank

802.11n HT20 UNII-3

Lowest Channel (5 745 MHz)

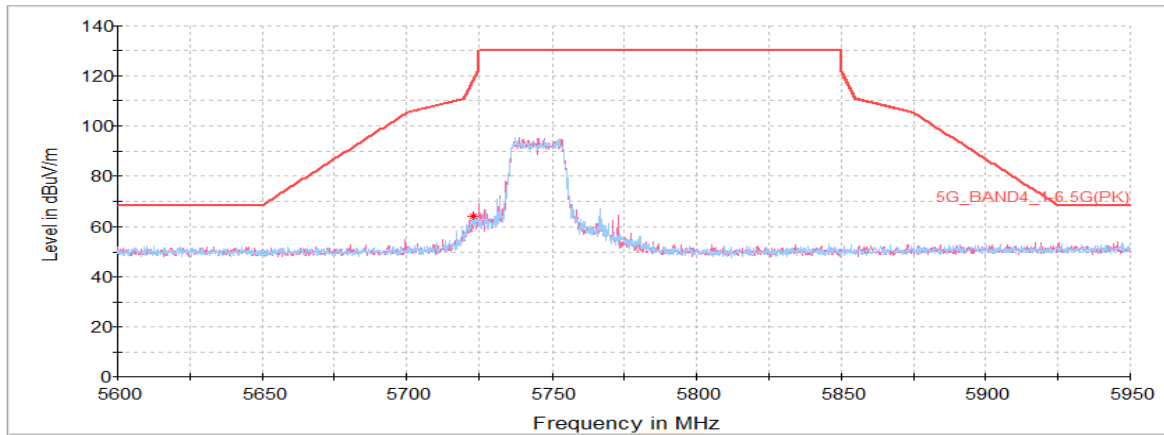
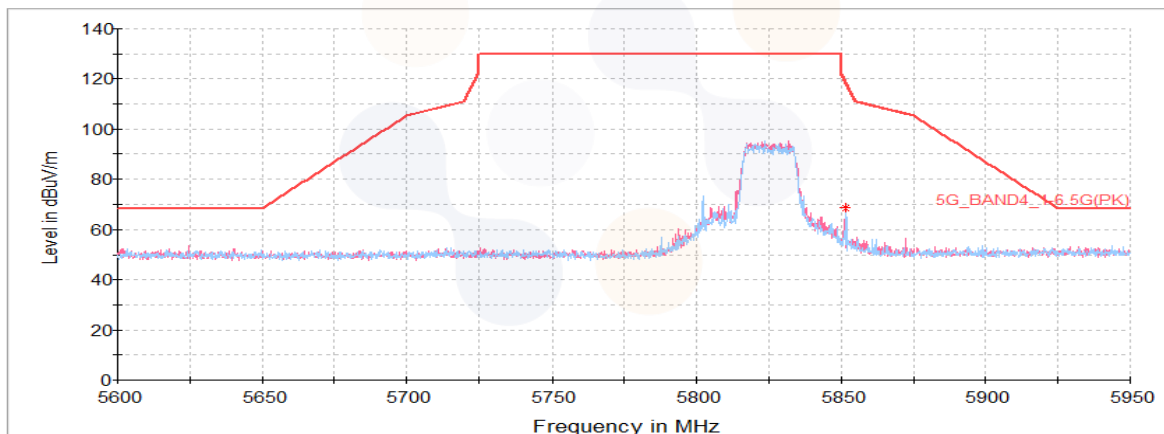
Frequency	Pol.	Reading	Ant. Factor	Amp.+Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Peak data								
5 722.95	H	53.36	34.87	-24.11	-	64.12	117.53	53.41
11 490.53 ¹⁾	V	63.01	38.09	-48.40	-	52.70	74.00	21.30
17 270.83	V	57.08	41.21	-45.60	-	52.69	68.20	15.51
Average Data								
11 490.53 ¹⁾	V	56.23	38.09	-48.40	-	45.92	54.00	8.08

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)
Peak data								
11 570.72 ¹⁾	V	62.88	38.21	-48.47	-	52.62	74.00	21.38
17 348.09	V	58.77	41.07	-45.39	-	54.45	68.20	13.75
Average Data								
11 570.72 ¹⁾	V	56.28	38.21	-48.47	-	46.02	54.00	7.98

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)
Peak data								
5 851.69	H	57.23	35.02	-23.67	-	68.58	118.35	49.77
11 648.77 ¹⁾	V	63.50	38.34	-48.57	-	53.27	74.00	20.73
17 469.92	V	58.45	40.85	-45.06	-	54.24	68.20	13.96
Average Data								
11 648.77 ¹⁾	V	57.42	38.34	-48.57	-	47.19	54.00	6.81

802.11n HT20 UNII-3**Lowest Channel (5 745 MHz)****Horizontal/Vertical for Band-edge****Highest Channel (5 825 MHz)****Horizontal/Vertical for Band-edge**

KCTL Inc.

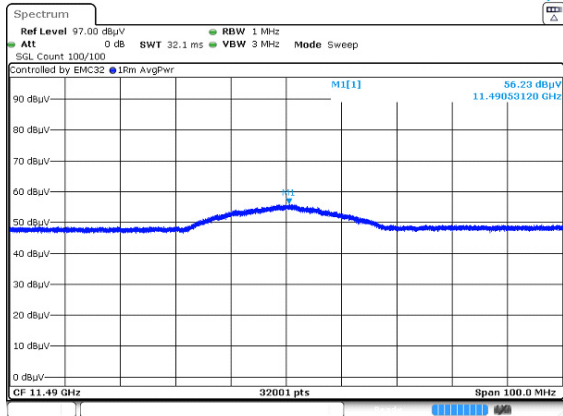
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR22-SRF0115
Page (40) of (44)

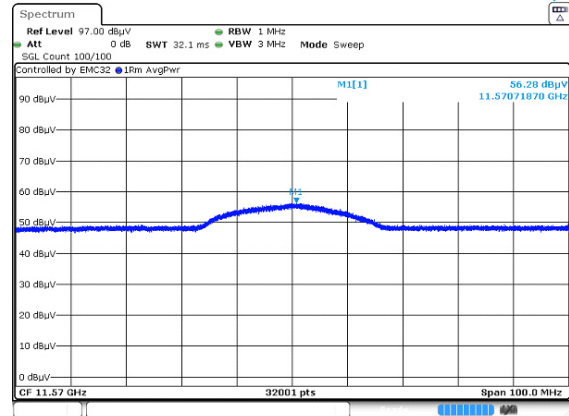


Average data

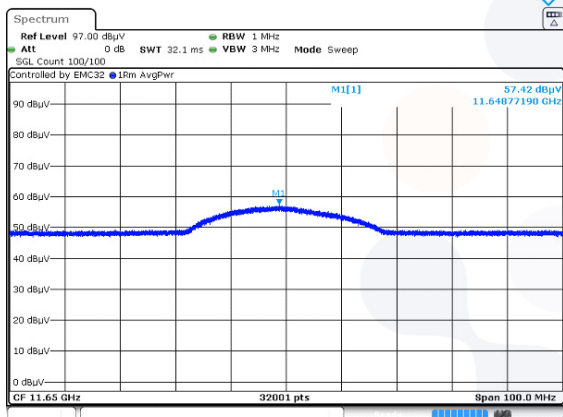
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)



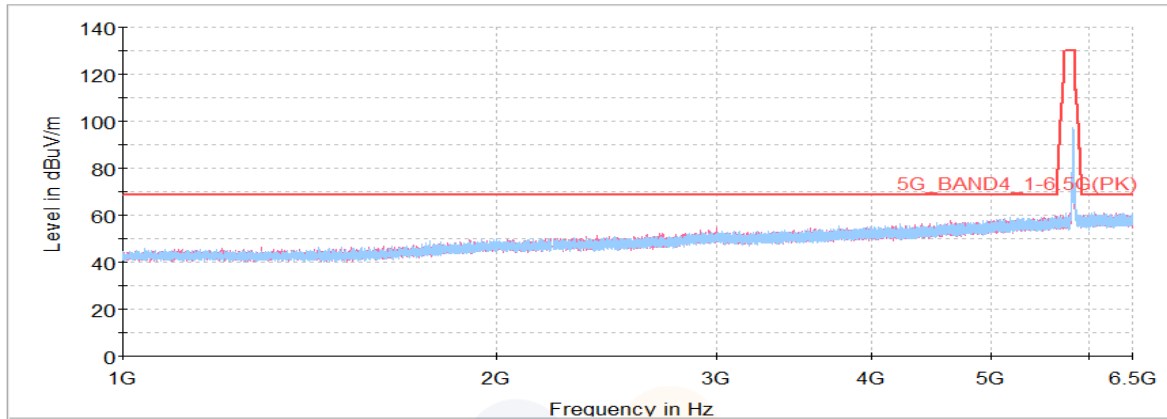
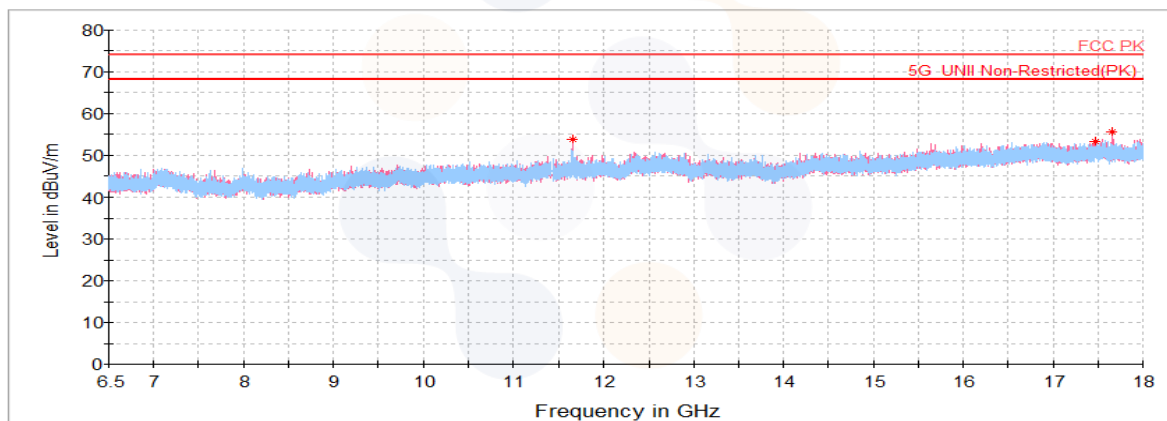
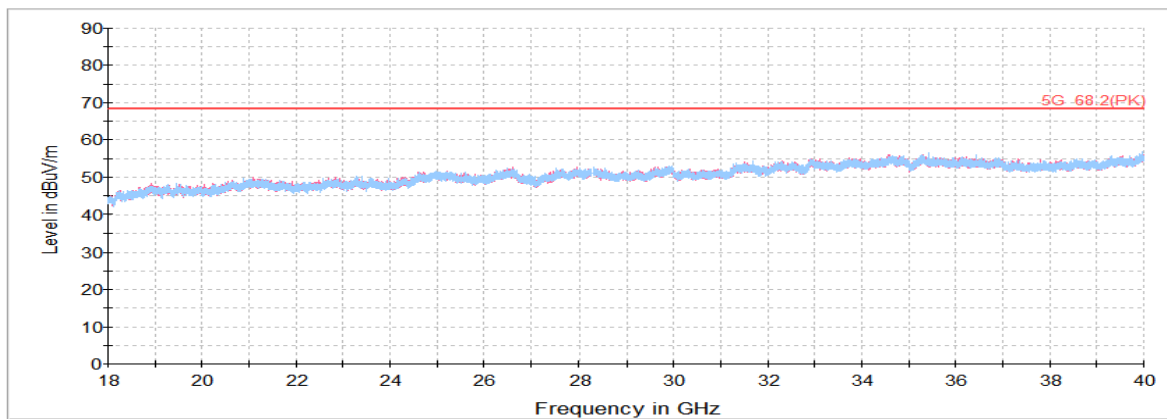
Highest Channel (5 825 MHz)



Blank

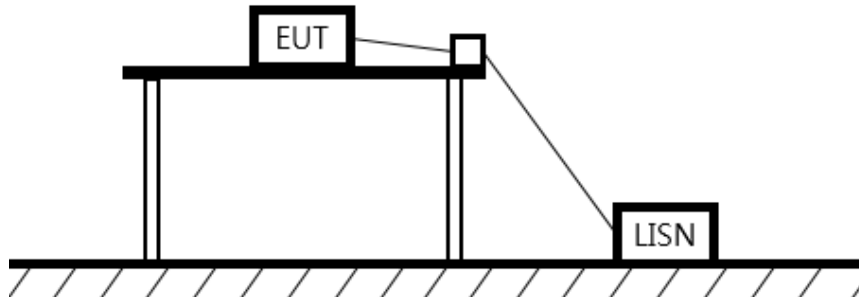
Plot of Band-edge, Harmonics and Spurious Emissions

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

802.11a_UNII-3_Highest Channel (5 825 MHz)**Horizontal/Vertical for 1 GHz ~ 6.5 GHz****Horizontal/Vertical for 6.5 GHz ~ 18 GHz****Horizontal/Vertical for 18 GHz ~ 40 GHz**

7.3. AC Conducted emission

Test setup



Limit

§15.407

According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted limit (dBμV/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity — Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 kHz or to quasi-peak and average within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

KCTL Inc.

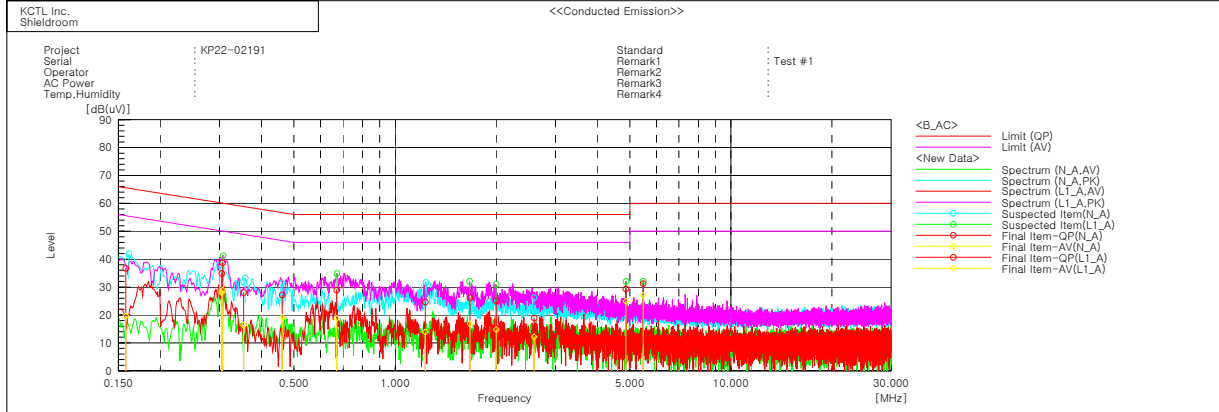
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr

Report No.:
KR22-SRF0115
Page (43) of (44)



Test results

Worst case: 802.11a / UNII-1 5 240 MHz



Final Result

--- N_A Phase ---									
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]
1	0.15791	26.8	9.7	9.9	36.7	19.6	65.6	55.6	28.9
2	0.30473	25.2	18.3	9.7	34.9	28.0	60.1	50.1	25.2
3	0.35414	18.3	6.6	9.8	28.1	16.4	58.9	48.9	30.8
4	0.46106	17.3	9.2	9.9	27.2	19.1	56.7	46.7	29.5
5	1.23115	14.8	4.1	9.8	24.6	13.9	56.0	46.0	31.4
6	2.59753	9.1	2.3	9.8	18.9	12.1	56.0	46.0	37.1

--- L_A Phase ---									
No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]
1	0.30674	29.0	19.2	9.7	38.7	28.9	60.1	50.1	21.4
2	0.66983	19.0	8.8	9.9	28.9	18.7	56.0	46.0	27.1
3	1.67025	16.4	7.1	9.8	26.2	16.9	56.0	46.0	29.8
4	2.00038	15.2	5.0	9.8	25.0	14.8	56.0	46.0	31.0
5	4.86906	19.6	15.1	9.8	29.4	24.9	56.0	46.0	26.6
6	5.47929	21.3	17.2	9.9	31.2	27.1	60.0	50.0	28.8

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSW50	101013	22.07.09
Attenuator	Weinschel ENGINEERING	56-10	51395	23.01.21
Vector Signal Generator	R&S	SMBV100A	257566	22.07.09
Signal Generator	R&S	SMB100A	176206	23.01.19
Power Sensor	R&S	NRP-Z81	1137.9009.02- 106225-JM	23.05.03
Attenuator	HP	8491A	29738	22.12.21
DC Power Supply	Agilent	E3632A	MY40004791	22.09.17
Spectrum Analyzer	R&S	FSV40	100989	22.12.21
EMI TEST RECEIVER	R&S	ESC17	100732	23.01.19
Bi-Log Antenna	TESEQ	CBL 6112D	55545	24.04.27
Amplifier	SONOMA INSTRUMENT	310N	284608	22.08.19
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	22.10.05
Horn antenna	ETS.lindgren	3116	00086635	23.05.04
Attenuator	API Inmet	40AH2W-10	12	23.05.03
Broadband PreAmplifier	SCHWARZBECK	BBV9718	216	22.07.27
AMPLIFIER	L-3 Narda-MITEQ	AMF-7D-01001800 -22-10P	2003683	22.08.19
AMPLIFIER	LTC Microwave	LLA01185522Q-B	142	23.05.20
AMPLIFIER	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000997	22.07.29
LOOP Antenna	R&S	HFH2-Z2	100355	22.08.21
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
TWO-LINE V - NETWORK	R&S	ENV216	101358	22.09.29
EMI TEST RECEIVER	R&S	ESC13	100001	22.08.19

End of test report