

TEST REPORT



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
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Report No.:
CTK-2021-03641
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1. Client

- Name : Samsung Electronics Co Ltd
- Address : 19 Chapin Rd, Building D. Pine Brook, New Jersey, United States
- Date of Receipt : 2021-09-07

2. Manufacturer

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea

3. Use of Report : For FCC Report (Spot Check)

4. Test Sample / Model: Wi-Fi/BT Transceiver / WCB940M



5. Date of Test : 2021-09-27

6. Test Standard(method) used : FCC 47 CFR part 15 subpart C 15.247
FCC 47 CFR part 15 subpart E 15.407

7. Testing Environment: Temp.: (23 ± 1) °C, Humidity: (50 ± 3) % R.H.

8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by  Ji-Hye, Kim: (Signature)	Technical Manager  Won-Jae, Hwang: (Signature)
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2021-09-30

Republic of KOREA **CTK Co., Ltd.**



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REPORT REVISION HISTORY

Date	Revision	Page No
2021-09-30	Issued (CTK-2021-03641)	all

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1. General Product Description

1.1 Client Information

Company	Samsung Electronics Co., Ltd.
Contact Point	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Contact Person	Name : Youngjoong Noh E-mail : monk.noh@samsung.com Tel : +82-277-0598 Fax : -

1.2 Product Information

FCC ID	A3LWCB940M
Product Description	Wi-Fi/BT Transceiver
Model name	WCB940M
Variant Model name	-
Operating Frequency	Bluetooth, BLE : 2 402 MHz - 2 480 MHz WLAN : 2 412 MHz - 2 472 MHz UNII 1 : 5 180 MHz - 5 240 MHz (20 MHz_BW) 5 190 MHz - 5 230 MHz (40 MHz_BW) 5 210 MHz (80 MHz_BW) UNII 2A : 5 260 MHz - 5 320 MHz (20 MHz_BW) 5 270 MHz - 5 310 MHz (40 MHz_BW) 5 290 MHz (80 MHz_BW) UNII 2C : 5 500 MHz - 5 720 MHz (20 MHz_BW) 5 510 MHz - 5 710 MHz (40 MHz_BW) 5 530 MHz - 5 690 MHz (80 MHz_BW) UNII 3 : 5 745 MHz - 5 825 MHz (20 MHz_BW) 5 755 MHz - 5 795 MHz (40 MHz_BW) 5 775 MHz (80 MHz) UNII 5 : 5 955 MHz - 6 415 MHz (20 MHz_BW) 5 965 MHz - 6 405 MHz (40 MHz_BW) 5 985 MHz - 6 385 MHz (80 MHz_BW) UNII 6 : 6 435 MHz - 6 515 MHz (20 MHz_BW) 6 445 MHz - 6 485 MHz (40 MHz_BW) 6 465 MHz (80 MHz_BW) UNII 7 : 6 535 MHz - 6 855 MHz (20 MHz_BW) 6 525 MHz - 6 845 MHz (40 MHz_BW) 6 545 MHz - 6 865 MHz (80 MHz_BW) UNII 8 : 6 875 MHz - 7 115 MHz (20 MHz_BW) 6 885 MHz - 7 085 MHz (40 MHz_BW) 6 945 MHz - 7 025 MHz (80 MHz_BW)
Antenna Specification	Antenna type : Chip Antenna Peak Gain (Bluetooth, BLE) : -1.04 dBi (BT0), -5.11 dBi (BT1) Peak Gain (WLAN 2.4GHz) : -2.31 dBi (ANT1), -0.52 dBi (ANT2) Peak Gain (WLAN 5GHz) : -0.07 dBi (ANT1), 1.65 dBi (ANT2) Peak Gain (WLAN 6GHz) : -0.97 dBi (ANT1), 0.74 dBi (ANT2)
Power Source	DC 5 V



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Hardware Rev	V1.0
Software Rev	FC2

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253QPR
AC/DC Adapter	HP	HSTNN-LA40	-



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2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea.

2.2 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A-2
KOREA	NRRA	KR0025

2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.



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3. Test Specifications

3.1 Standards

FCC Part Section(s)	Requirement(s)	Status (Note 1)	Test Condition
15.209	Radiated Emissions (Spot Check)	C	Radiated
<i>Note 1:</i> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
<i>Note 2:</i> The data in this test report are traceable to the national or international standards.			
<i>Note 3:</i> The sample was tested according to the following specification: FCC Part 15.247			
<i>Note 4:</i> The tests were performed according to the method of measurements prescribed in KDB No.558074, ANSI C63.10-2013			



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3.2 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments. During at testing, system components were manipulated within the confines of typical usage to maximize each emission. All modulation modes were tests. The results are only attached worst cases.

Test Frequency

Bluetooth 8-DPSK
2 480 MHz

WLAN 802.11b
2 442 MHz

WLAN 802.11n_HT40
5 590 MHz

WLAN 802.11ax_HE80
6 545 MHz

3.3 Introduction

WCA942M and WCB940M has identical PCB layout, antenna, SW implementation for Wi-Fi and Bluetooth. Based on their similarity, the FCC Part 15C (equipment class: DTS), Part 15E (equipment class: NII, 6XD) test data issued data of WCA942M references the test data of existing report.

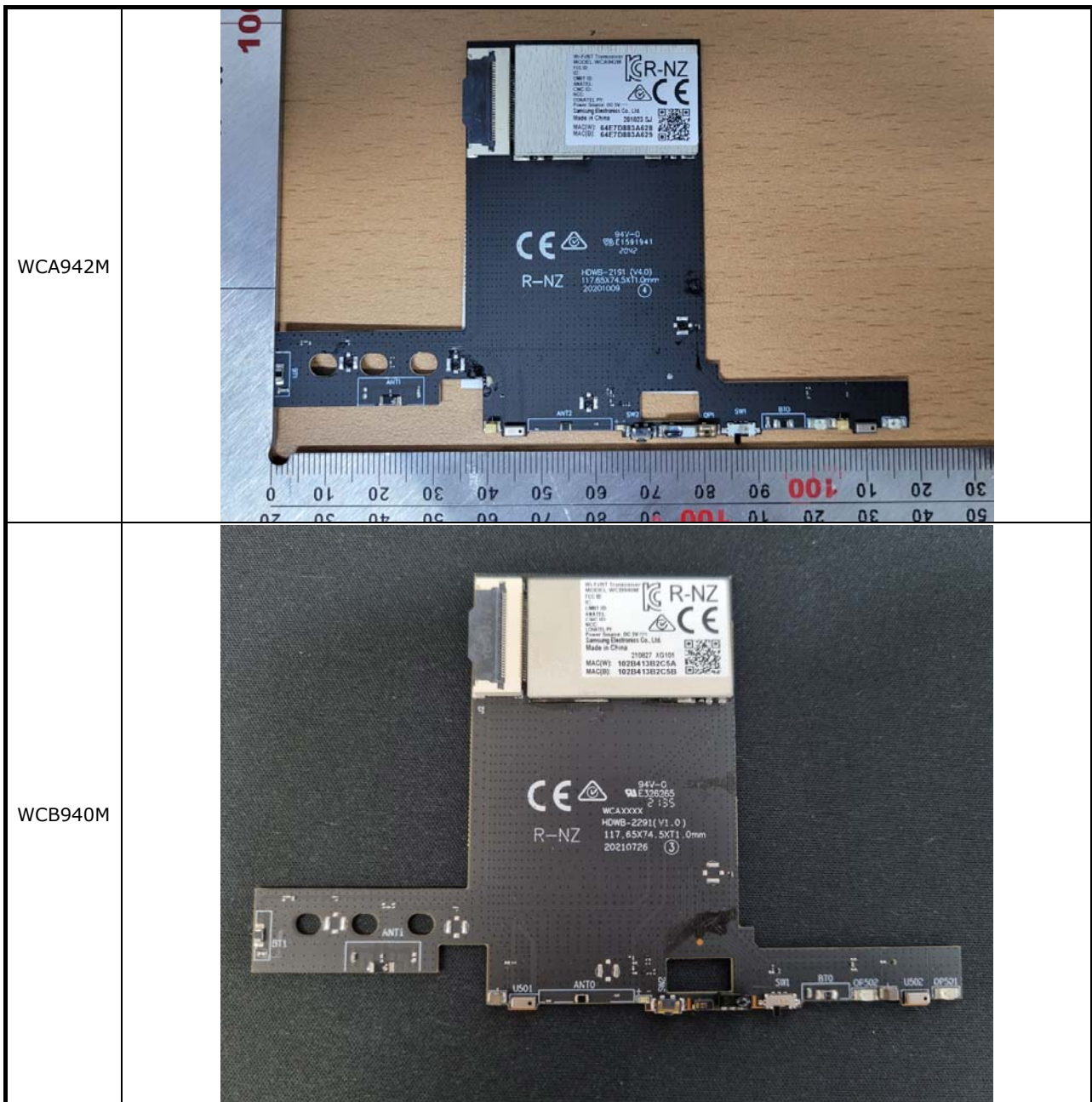
The applicant takes full responsibility that the test data as referenced in this report represent compliance for FCC(FCC ID: A3LWCA942M).

3.4 Differences

WCA942M and WCB940M has identical PCB layout, antenna, SW implementation for Wi-Fi and Bluetooth.

Except for the circuit below, the transmitter schematics and circuits including the antenna are electrically identical.

1. IR Sensor : DC 3.3 V voltage supply and pin arrangement order changed.
2. MIC GND : Independent MIC GND applied.
3. Color sensor and IR Receiver : 2-in-1 sensor -> Each separate sensor applied.





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3.5 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
Coverage factor $k = 2$, Confidence levels of 95 %

Description	Uncertainty
Radiated Emissions ($f \leq 1$ GHz)	4.54 dB (C.L.: Approx. 95 %, $k = 2$)

3.6 Test Software

Radiated Test	TOYO EMI software EP5RE Ver. 6.0.1.0
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4. Technical Characteristic Test

4.1 Radiated Emission (Spot Check Data)

Test Location

- 10 m SAC (test distance : 10 m, 3 m)
 3 m SAC (test distance : 3 m)

Test Procedures

KDB 558074 - Section 8.5, 8.6
 ANSI C63.10-2013 - Section 11.11, 11.12
 RSS-Gen - Section 6.13

- 1) In the frequency range above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

Test Settings:

Frequency Range = 30 MHz ~ 1 GHz

- a) RBW = 100 kHz for $f < 1$ GHz
- b) VBW \geq RBW
- c) Detector = CISPR Quasi-peak
- d) Sweep time = auto couple

Limit :

FCC Part 15 § 15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	MHz	GHz
0.09-0.11	8.37626-8.38675	73-74.6	399.9-410	2690-2900	10.6-12.7
¹ 0.495-0.505	8.41425-8.41475	74.8-75.2	608-614	3260-3267	13.25-13.4
2.1735-2.1905	12.29-12.293	108-121.94	960-1240	3332-3339	14.47-14.5
4.125-4.128	12.51975-12.52025	123-138	1300-1427	3345.8-3358	15.35-16.2
4.17725-4.17775	12.57675-12.57725	149.9-150.05	1435-1626.5	3600-4400	17.7-21.4
4.20725-4.20775	13.36-13.41	156.52475-156.52525	1645.5-1646.5	4500-5150	22.01-23.12
6.215-6.218	16.42-16.423	156.7-156.9	1660-1710	5350-5460	23.6-24
6.26775-6.26825	16.69475-16.69525	162.0125-167.17	1718.8-1722.2	7250-7750	31.2-31.8
6.31175-6.31225	16.80425-16.80475	167.72-173.2	2200-2300	8025-8500	36.43-36.5
8.291-8.294	25.5-25.67	240-285	2310-2390	9000-9200	² Above 38.6
8.362-8.366	37.5-38.25	322-335.4	2483.5-2500	9300-9500	



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¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

§ 15.205 (b) Except as provided in paragraphs (d) and (e), 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 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 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.

FCC Part 15 § 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 uV/m@3m	Field Strength dBuV/m@3m	Deasurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705-30	30	-	30
30-88	100**	40	3
88-216	150**	43.5	3
216-960	200**	46	3
Above 960	500	54	3

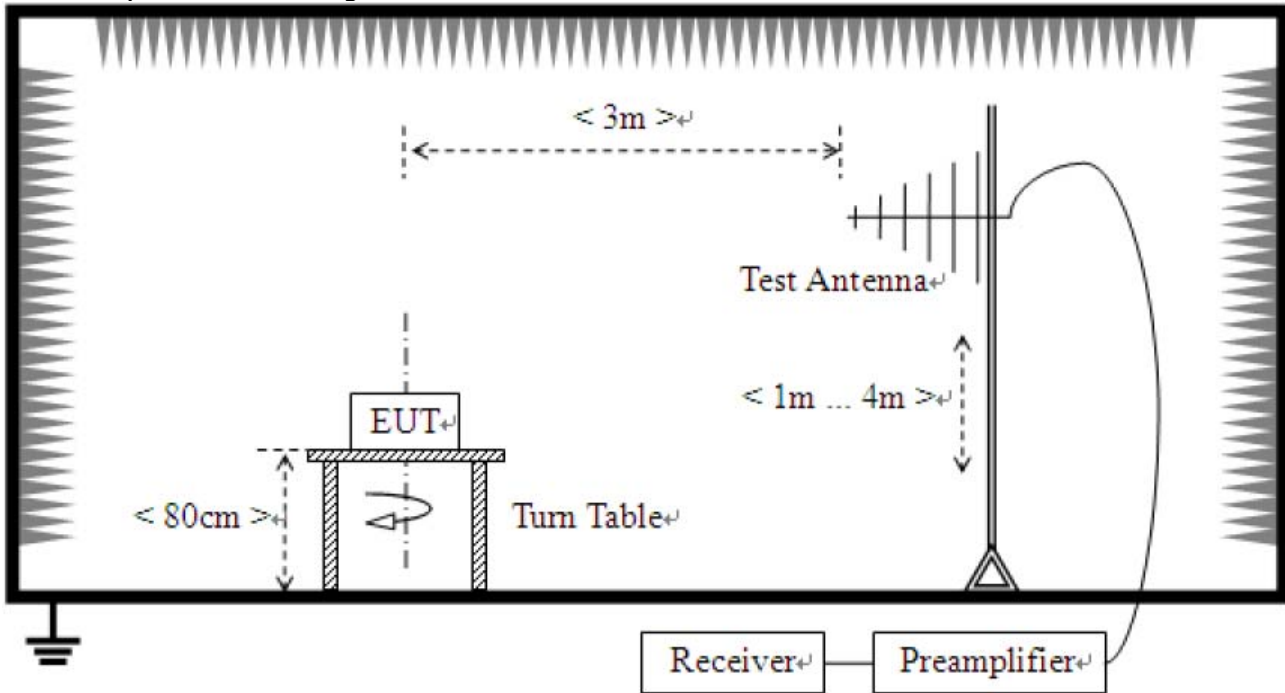
** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

We have done all test mode.

The worst-case antenna configuration and Test mode are determined to be as follows.

So the results are only attached worst cases.

1) For field strength of emissions from 30 MHz to 1 GHz



Test results

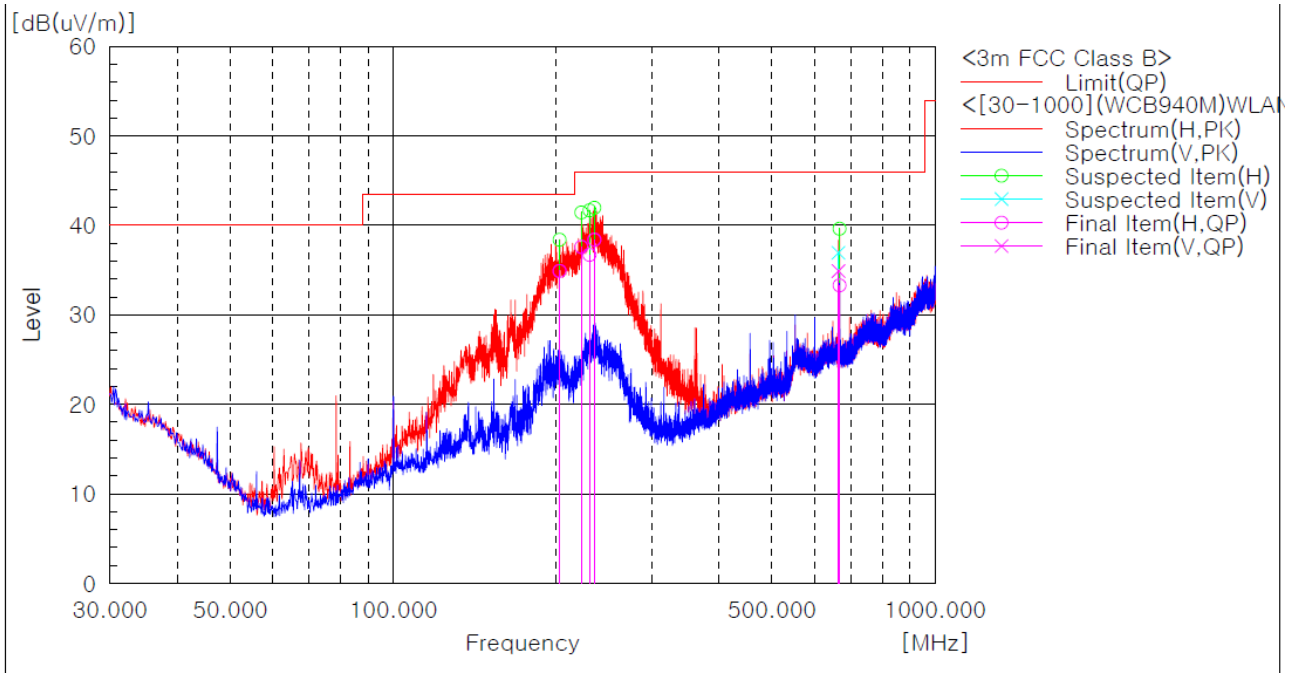
1) 30 MHz to 1 GHz

Test mode : Transmitter (simultaneous transmissions DTS + DSS)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	202.903	H	48.3	-13.4	34.9	43.5	8.6	101.0	12.0
2	222.545	H	50.6	-13.0	37.6	46.0	8.4	101.0	211.0
3	230.305	H	48.9	-12.2	36.7	46.0	9.3	101.0	338.0
4	235.155	H	49.9	-11.5	38.4	46.0	7.6	101.0	359.0
5	663.653	V	33.5	1.4	34.9	46.0	11.1	100.0	142.0
6	666.441	H	32.0	1.3	33.3	46.0	12.7	101.0	227.0

Remark :

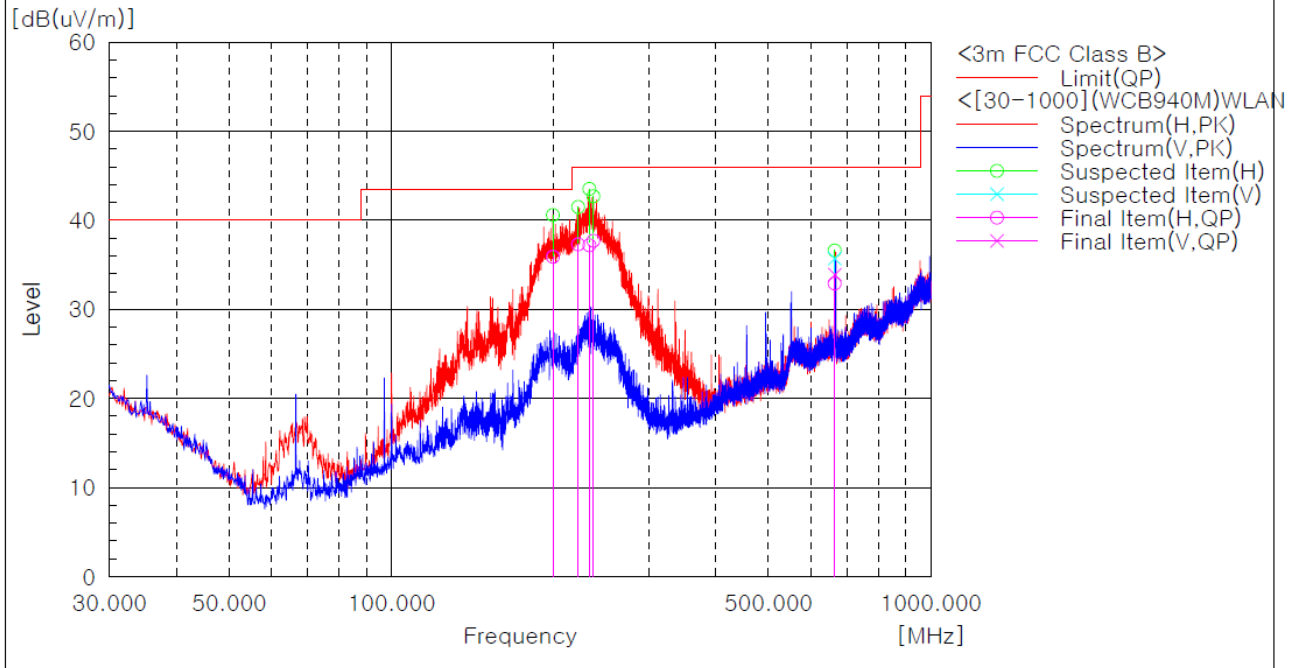
1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Transmitter (simultaneous transmissions NII + DSS)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	199.265	H	48.7	-12.8	35.9	43.5	7.6	101.0	5.0
2	221.939	H	50.3	-13.0	37.3	46.0	8.7	101.0	11.0
3	232.851	H	49.1	-11.9	37.2	46.0	8.8	101.0	339.0
4	236.853	H	48.3	-10.6	37.7	46.0	8.3	101.0	339.0
5	663.653	H	31.5	1.4	32.9	46.0	13.1	208.0	243.0
6	664.016	V	32.6	1.3	33.9	46.0	12.1	101.0	122.0

Remark :

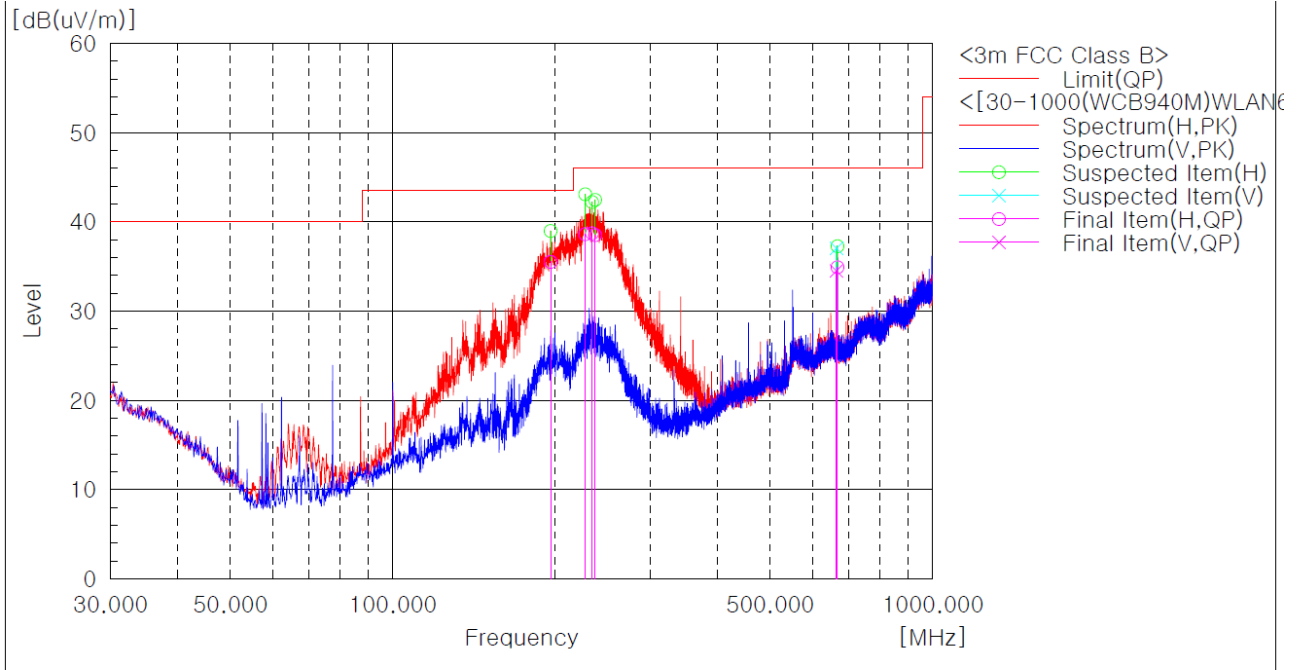
1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain

Test mode : Transmitter (simultaneous transmissions 6XD + DSS)

The requirements are:

Complies

Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit QP [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	196.113	H	48.9	-13.4	35.5	43.5	8.0	101.0	6.0
2	227.395	H	51.1	-12.5	38.6	46.0	7.4	101.0	339.0
3	234.064	H	50.4	-11.7	38.7	46.0	7.3	101.0	2.0
4	237.216	H	49.6	-11.1	38.5	46.0	7.5	101.0	9.0
5	663.774	V	33.1	1.4	34.5	46.0	11.5	101.0	60.0
6	666.441	H	33.6	1.3	34.9	46.0	11.1	308.0	274.0

Remark :

1. The unwanted emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in lie-down position(X axis) and the worst case was recorded.
2. Result = Reading + c.f(Correction factor)
3. Correction factor = Antenna factor + Cable loss + 6 dB attenuator - Amp Gain



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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date
1	Signal Generator	Rohde & Schwarz	SMB100A	175528	2021-04-12	2022-04-12
2	EMI Test Receiver	Rohde & Schwarz	ESCI7	100814	2020-10-20	2021-10-20
3	Bilog Antenna	Schaffner	CBL6111C	2551	2020-05-26	2022-05-26
4	Active Loop Antenna	SCHWARZBECK	FMZB 1513	1513-126	2020-05-20	2022-05-20
5	6dB Attenuator	R&S	DNF	272.4110.50-2	2020-10-23	2021-10-23
6	AMPLIFIER	SONOMA	310	291721	2021-01-22	2022-01-22

	Cable	Manufacturer	Model No.	Serial No.	Check Date
1	RF Cable	Canare Corporation	L-5D2W	N/A	2021-01-21
2	RF Cable	HUBER+SUHNER	SUCOFLEX 104	MY27558/4	2021-06-01
3	RF Cable	HUBER+SUHNER	SUCOFLEX 104	N/A	2021-06-01
4	RF Cable	HUBER+SUHNER	SUCOFLEX 104	MY27573/4	2021-06-01
5	RF Cable	HUBER+SUHNER	SUCOFLEX 106	N/A	2021-06-01