FCC AND ISED CERTIFICATION TEST REPORT

FOR

Applicant	:	Continental Automotive Systems US Inc.
Address	:	4685 Investment Drive, Troy, Michigan, United States
Equipment under Test	:	FCA WL/WS PASE System MY 2021
Model No.	:	WXRFHM1
Trade Mark	:	Continental
FCC ID	:	M3NWXRFHM1
IC	:	7812D-WXRFHM1
Manufacturer	:	Continental Automotive GmbH
Address	:	Siemensstrasse 12, SV C TS RBG EMC-Laboratory, 93055 Regensburg, Germany

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808
Tel.: +86-0769-38826678, **E-mail:** ddt@dgddt.com, http://www.dgddt.com

REPORT

Table of Contents

Test Report Declare

Applicant	:	Continental Automotive Systems US Inc.
Address	:	4685 Investment Drive, Troy, Michigan, United States
Equipment under Test	:	FCA WL/WS PASE System MY 2021
Model No.	:	WXRFHM1
Trade Mark	:	Continental
Manufacturer	:	Continental Automotive GmbH
Address	:	Siemensstrasse 12, SV C TS RBG EMC-Laboratory, 93055 Regensburg, Germany

Test Standard Used:

FCC Rules and Regulations Part 15 Subpart C, RSS-210 Issue 10 December 2019

Test procedure used:

ANSI C63.10:2013, RSS-Gen Issue 5 Amendment 1 March 2019

We Declare:

The equipment described above is tested by Dongguan Dongdian Testing Service Co., Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Dongguan Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above FCC&ISED standards.

Report No:	DDT-R21010815-1E1		
Date of Receipt:	Jan. 11, 2021	**Date of Test:**	Jan. 11, 2021 ~ Jan. 26, 2021

Prepared By:

Sam Li

Sam Li/Engineer

Approved By:

DONGGUAN DONGDIAN TESTING SERVICE CO., LTD. APPROVED

Damon Hu/EMC Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Jan. 27, 2021	

1 Summary of Test Results

Description of Test Item	Standard	Results
20 dB Bandwidth and 99% Bandwidth	FCC Part 15: 15.215 ANSI C63.10:2013 RSS-210 Issue 10	Pass
Radiated Emission	FCC Part 15: 15.209 ANSI C63.10:2013 RSS-210 Issue 10 RSS-Gen Issue 5 Amendment 1	Pass
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10: 2013 RSS-Gen Issue 5 Amendment 1	N/A
Antenna Requirement	FCC Part 15: 15.203 RSS-Gen Issue 5 Amendment 1	Pass
Note: N/A is an abbreviation for Not Applicable.		

2 General Test Information

2.1. Description of EUT

EUT* Name	:	FCA WL/WS PASE System MY 2021
Model Number	:	WXRFHM1
EUT Function Description	:	Please reference user manual of this device
Power Supply	:	DC 6V-12V
Operation Frequency	:	125 kHz
Antenna Type	:	LF antenna
Serial Number	:	N/A

Note: EUT is the abbreviation of equipment under test.

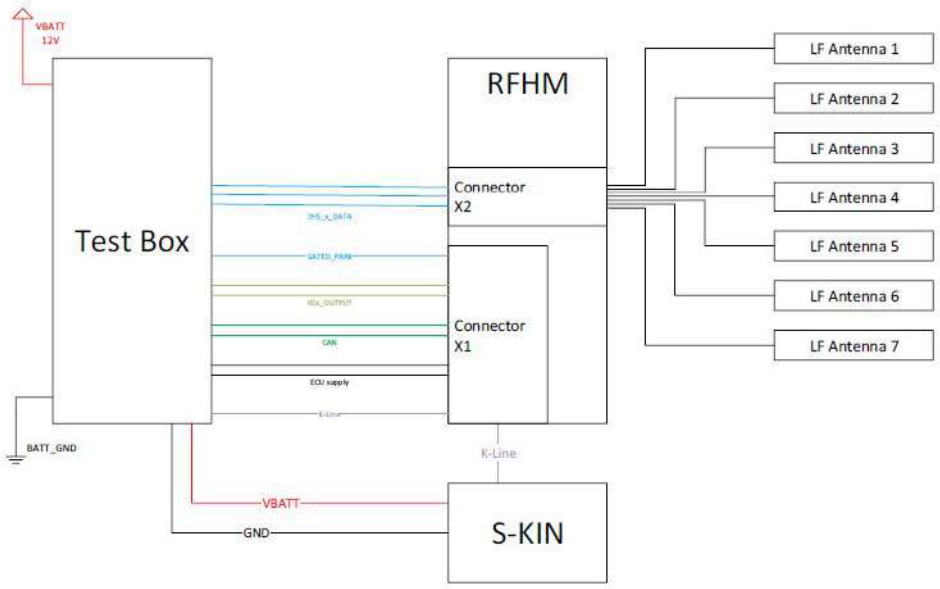
2.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Serial No.	Other
Test Box	Continental	N/A	N/A	N/A
K-Line	N/A	N/A	N/A	N/A

2.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number or Type	EMC Compliance	Other
N/A	N/A	N/A	N/A	N/A

2.4. Block diagram of EUT configuration for test



Note: The S-KIN is not necessary in actual test.

2.5. Deviations of test standard

No deviation.

2.6. Test environment conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature range:	21-25 ℃
Humidity range:	40-75%
Pressure range:	86-106 kPa

2.7. Test laboratory

Dongguan Dongdian Testing Service Co., Ltd

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808

Tel.: +86-0769-38826678, http://www.dgddt.com, Email: ddt@dgddt.com

CNAS Accreditation No. L6451; A2LA Accreditation No. 3870.01

FCC Designation Number: CN1182; FCC Test Firm Registration Number: 540522

Industry Canada site registration number: 10288A-1; CAB identifier: CN0048

2.8. Measurement uncertainty

Test Item	Uncertainty
Uncertainty for Conduction emission test	3.32 dB (150 kHz - 30 MHz)
	3.72 dB (9 kHz - 150 kHz)
Uncertainty for Radiation Emission test (30 MHz - 1 GHz)	4.70 dB (Antenna Polarize: V)
	4.84 dB (Antenna Polarize: H)
Uncertainty for Radiation Emission test (1 GHz to 18 GHz)	4.10 dB (1-6 GHz)
	4.40 dB (6 GHz - 18 GHz)
Bandwidth	1.1%
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

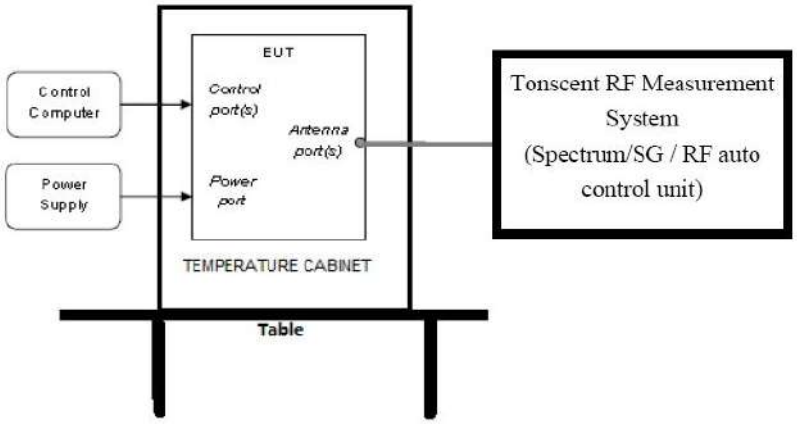
3 Equipment Used During Test

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
RF Connected Test (Tonscend RF Measurement System 1#)					
Spectrum analyzer	R&S	FSU26	101272	Jul. 01, 2020	1 Year
Spectrum analyzer	Agilent	N9020D	MY49100362	Sep. 28, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	E8267D	US49060192	Sep. 24, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180737	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150010	Jul. 01, 2020	1 Year
Power Sensor	Agilent	U2021XA	MY55150011	Jul. 01, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Apr. 25, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 28, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jul. 01, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
RF Connected Test (Tonscend RF Measurement System 2#)					
Spectrum analyzer	R&S	FSU26	200071	Sep. 25, 2020	1 Year
Spectrum analyzer	Agilent	N9020D	MY49100362	Sep. 28, 2020	1 Year
Wideband Radio Communication tester	R&S	CMW500	117491	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY19060405	Jul. 01, 2020	1 Year
Vector Signal Generator	Agilent	N5182A	MY48180912	Jul. 01, 2020	1 Year
RF Control Unit	Tonsend	JS0806-2	DDT-ZC01449	Jul. 01, 2020	1 Year
DC Power Source	MATRIS	MPS-3005L-3	D813058W	Apr. 25, 2020	1 Year
RF Cable	Micable	C10-01-01-1	100309	Sep. 28, 2020	1 Year
Temp&Humi Programmable	ZHIXIANG	ZXGDJS-150L	ZX170110-A	Jul. 01, 2020	1 Year
Test Software	JS Tonscend	JS1120-3	Ver.2.7	N/A	N/A
Radiation 1#chamber					
EMI Test Receiver	R&S	ESU8	100316	Sep. 24, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB9163	9163-462	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 13, 2020	1 Year
Double Ridged Horn Antenna	R&S	HF907	100276	Nov. 18, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 11, 2020	1 Year
Pre-amplifier	A.H.	PAM-0118	360	Sep. 28, 2020	1 Year
RF Cable	HUBSER	CP-X2+ CP-X1	W11.03+ W12.02	Sep. 24, 2020	1 Year

RF Cable	N/A	5m+6m+1m	06270619	Sep. 30, 2020	1 Year
MI Cable	HUBSER	C10-01-01-1 M	1091629	Sep. 30, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A
Radiation 2#chamber					
EMI Test Receiver	R&S	ESCI	101364	Sep. 28, 2020	1 Year
Spectrum analyzer	Agilent	E4447A	MY50180031	Jul. 01, 2020	1 Year
Trilog Broadband Antenna	Schwarzbeck	VULB 9163	9163-994	Nov. 13, 2020	1 Year
Active Loop antenna	Schwarzbeck	FMZB-1519	1519-038	Nov. 13, 2020	1 Year
Double Ridged Horn Antenna	Schwarzbeck	BBHA9120	02108	Jul. 11, 2020	1 Year
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	790	Apr. 11, 2020	1 Year
Pre-amplifier	TERA-MW	TRLA-0040 G35	1013 03	Sep. 28, 2020	1 Year
RF Cable	N/A	14+1.5m	06270619	Sep. 28, 2020	1 Year
Test software	Audix	E3	V 6.11111b	N/A	N/A

4 20 dB Bandwidth and 99% Bandwidth

4.1. Block diagram of test setup



4.2. Limits

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.3. Test procedure

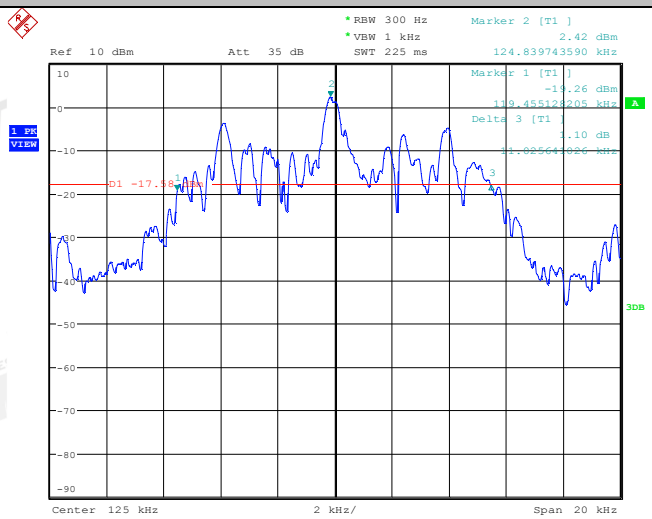
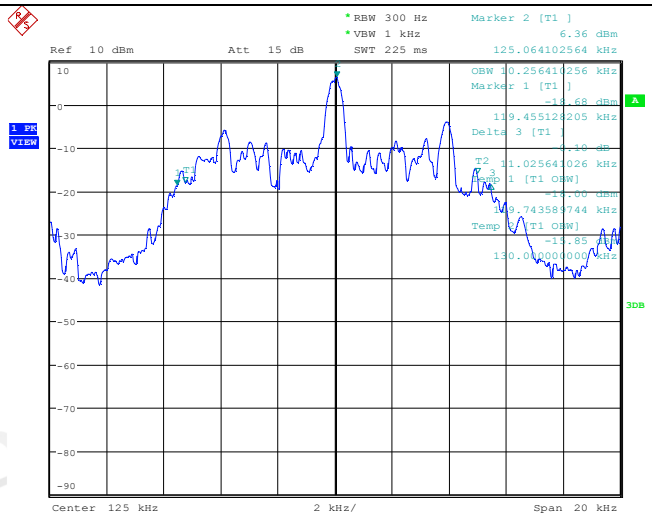
(1) Connect EUT's antenna output to spectrum analyzer by RF cable.

(2) The bandwidth of the fundamental frequency was measured by spectrum analyzer with 300 Hz RBW and 1 kHz VBW. The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

4.4. Test result

Freq. (kHz)	20 dB bandwidth Result (kHz)	99% bandwidth Result (kHz)	Conclusion
125	11.026	10.256	Pass

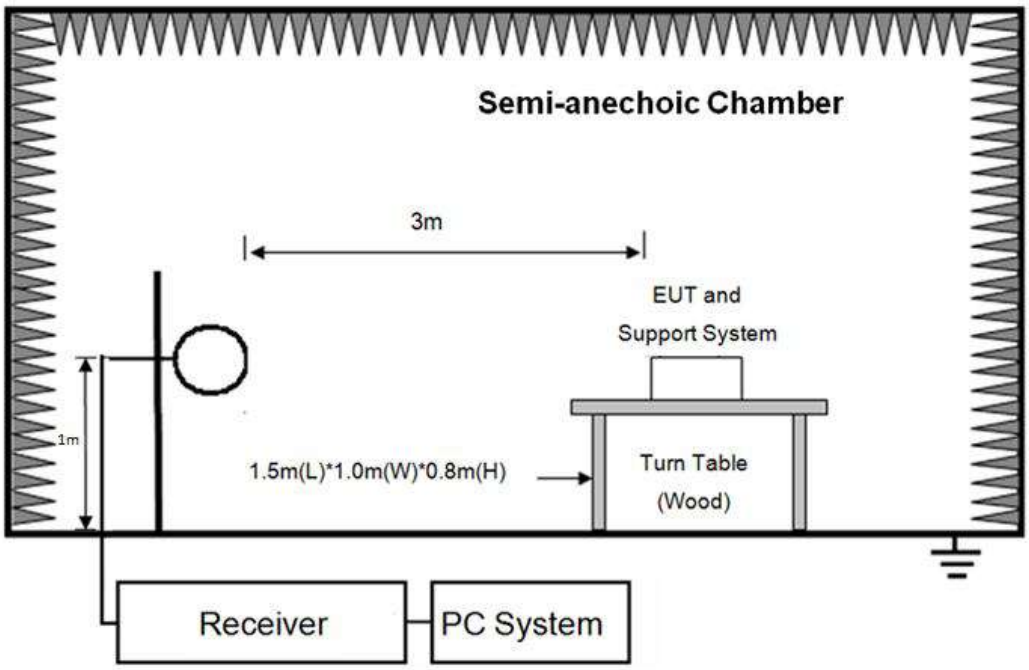
4.5. Original test data

Graphs	
20 dB bandwidth	
99% bandwidth	

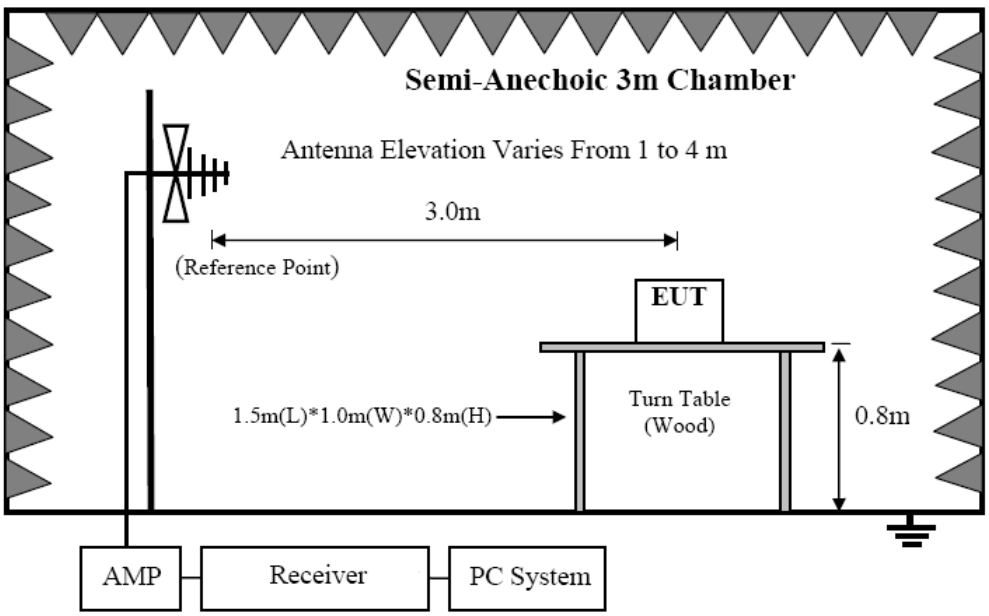
5 Radiated Emission

5.1. Block diagram of test setup

In 3 m Anechoic Chamber Test Setup Diagram for 9 kHz ~ 30 MHz



In 3 m Anechoic Chamber Test Setup Diagram for 30 MHz ~ 1 GHz



5.2. Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	67.6-20log(F)
0.490 ~ 1.705	30	24000/F(kHz)	87.6-20log(F)
1.705 ~ 30.0	30	30	29.54
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0

Note: (1) The emission limits shown in the above table are based on measurements employing a CISPR QP detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

(2) At frequencies below 30 MHz, measurement may be performed at a distance closer than that specified, and the limit at closer measurement distance can be extrapolated by below formula:

$Limit_{3m}(dBuV/m) = Limit_{300m}(dBuV/m) + 40Log(300m/3m) = Limit_{300m}(dBuV/m) + 80$
$Limit_{3m}(dBuV/m) = Limit_{30m}(dBuV/m) + 40Log(30m/3m) = Limit_{30m}(dBuV/m) + 40$

5.3. Test procedure

(1) EUT was placed on a non-metallic table, 150 cm above the ground plane inside a semi-anechoic chamber.

(2) Test antenna was located 3m from the EUT on an adjustable mast, and the antenna used as below table.

Test frequency range	Test antenna used	Test antenna distance
9 kHz - 30 MHz	Active Loop antenna	3 m
30 MHz - 1 GHz	Trilog Broadband Antenna	3 m

According ANSI C63.10:2013 clause 6.4.4.2 and 6,5.3, for measurements below 30 MHz, the loop antenna was positioned with its plane vertical from the EUT and rotated about its vertical axis for maximum response at each azimuth position around the EUT. And the loop antenna also is positioned with its plane horizontal at the specified distance from the EUT. The center of the loop is 1 m above the ground. For measurement above 30 MHz, the Trilog Broadband Antenna or Horn Antenna was located 3 m from EUT, Measurements were made with the antenna positioned in both the horizontal and vertical planes of Polarization, and the measurement antenna was varied from 1 m to 4 m. in height above the reference ground plane to obtain the maximum signal strength.

(3) Below pre-scan procedure was first performed in order to find prominent frequency spectrum radiated emissions from 9 kHz to 1 GHz:

(a) Scanning the peak frequency spectrum with the antenna specified in step (3), and the EUT

was rotated 360 degree, the antenna height was varied from 1 m to 4 m (Except loop antenna, it's fixed 1 m above ground.)

(b) Change work frequency or channel of device if practicable.

(c) Change modulation type of device if practicable.

(d) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produce highest emissions. Spectrum frequency from 9 kHz to 1 GHz (tenth harmonic of fundamental frequency) was investigated.

(4) For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10:2013 on Radiated Emission test.

(5) The emissions from 9 kHz to 1 GHz were measured based on CISPR QP detector except for the frequency bands 9-90 kHz, 110-490 kHz, for emissions from 9 kHz - 90 kHz, 110 kHz - 490 kHz and above 1 GHz were measured based on average detector, for emissions above 1 GHz, peak emissions also be measured and need comply with Peak limit.

(6) The emissions from 9 kHz to 1 GHz, QP or average values were measured with EMI receiver with below RBW.

Frequency band	RBW
9 kHz - 150 kHz	200 Hz
150 kHz - 30 MHz	9 kHz
30 MHz - 1 GHz	120 kHz

5.4. Test result

Pass. (See below detailed test result)

Note: Scan with external antenna and internal antenna, worse case is external antenna and report only.

Below 30 MHz:

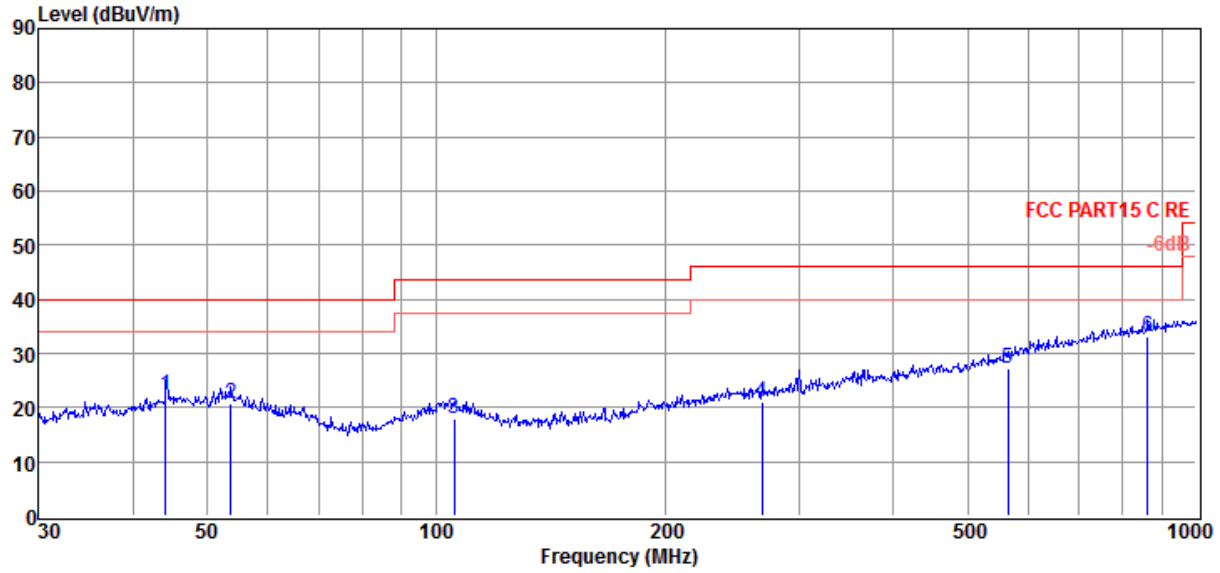
Frequency (MHz)	Result **@3m** (dBuV/m)	Limit **@3m** (dBuV/m)	Detector	Conclusion
0.03	57.72	138.06	Peak	Pass
0.03	55.14	118.06	Average	Pass
0.125	105.82	125.67	Peak	Pass
0.125	103.87	105.67	Average	Pass
0.25	50.99	119.65	Peak	Pass
0.25	48.99	99.65	Average	Pass
2.38	34.70	69.54	Peak	Pass
4.41	34.37	69.54	QP	Pass
10.85	31.00	69.54	QP	Pass

Above 30 MHz:

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 2#	D:\2021 RE2# Report Data\Q21010815-1E WXRFHM1\FCC BELOW 1G.EM6	
Test Date	: 2021-01-17	**Tested By**	: Jacky
EUT	: FCA WL/WS PASE System MY 2021	**Model Number**	: WXRFHM1
Power Supply	: DC 12V	**Test Mode**	: Tx mode
Condition	: Temp:24.5°C,Humi:55%,Press:101.4kPa	**Antenna/Distance**	: 2020 VULB 9163 2#/3m/VERTICAL
Memo	:		

Data: 1



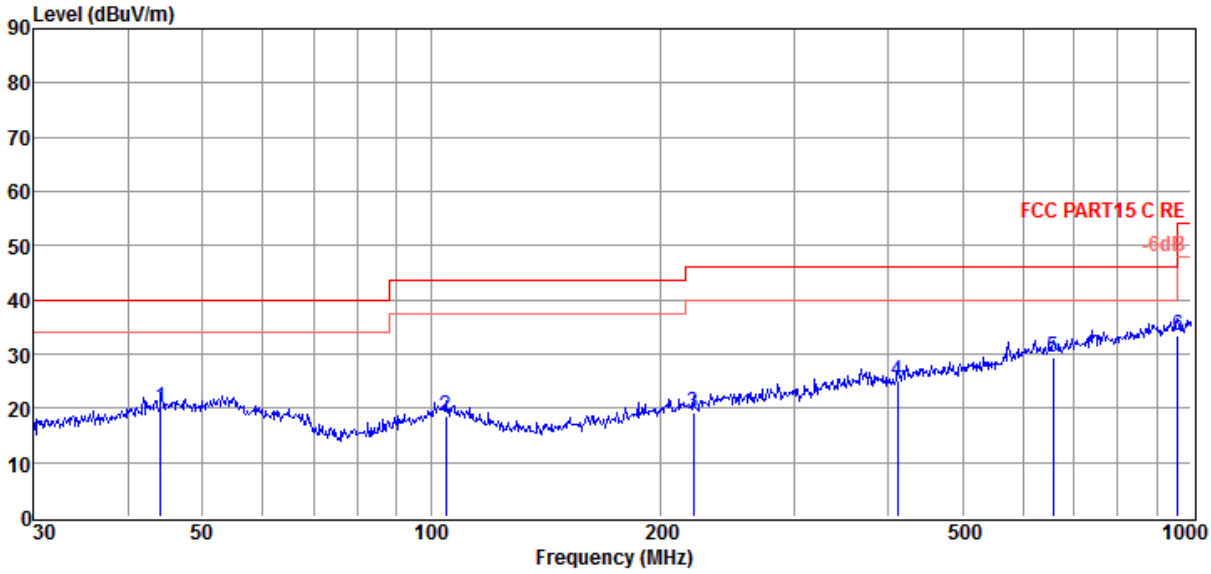
Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	44.12	5.47	12.91	3.80	22.18	40.00	-17.82	QP	VERTICAL
2	53.69	3.50	13.45	3.89	20.84	40.00	-19.16	QP	VERTICAL
3	105.64	2.10	11.52	4.45	18.07	43.50	-25.43	QP	VERTICAL
4	268.49	3.26	12.53	5.35	21.14	46.00	-24.86	QP	VERTICAL
5	564.64	2.47	18.15	6.57	27.19	46.00	-18.81	QP	VERTICAL
6	863.06	4.10	21.46	7.58	33.14	46.00	-12.86	QP	VERTICAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

TR-4-E-009 Radiated Emission Test Result

Test Site	: DDT 3m Chamber 2#	D:\2021 RE2# Report Data\Q21010815-1E WXRFHM1\FCC BELOW 1G.EM6	
Test Date	: 2021-01-17	**Tested By**	: Jacky
EUT	: FCA WL/WS PASE System MY 2021	**Model Number**	: WXRFHM1
Power Supply	: DC 12V	**Test Mode**	: Tx mode
Condition	: Temp:24.5°C,Humi:55%,Press:101.4kPa	**Antenna/Distance**	: 2020 VULB 9163 2#/3m/HORIZONTAL
Memo	:		

Data: 2

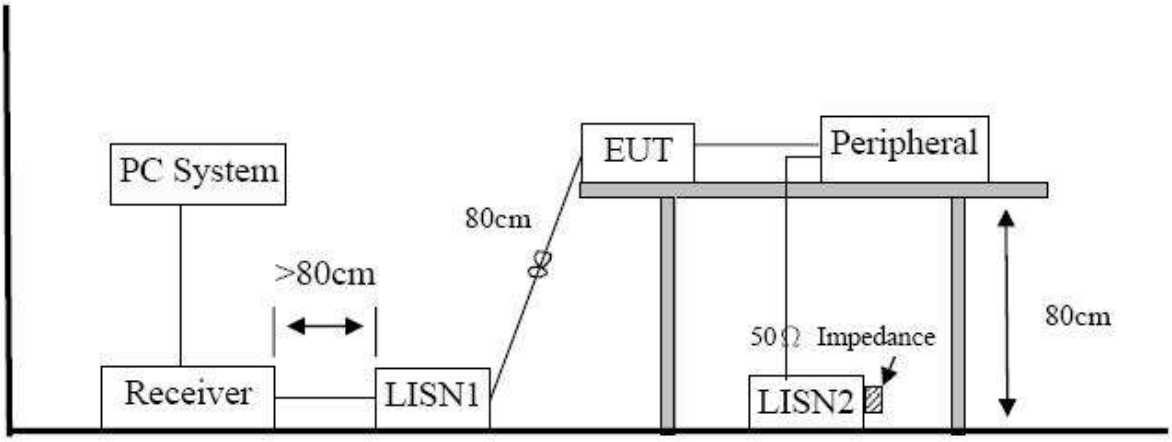


Item (Mark)	Freq. (MHz)	Read Level (dBµV)	Antenna Factor (dB/m)	Cable Loss dB	Result Level (dBµV/m)	Limit Line (dBµV/m)	Over Limit (dB)	Detector	Polarization
1	44.12	3.25	12.91	3.80	19.96	40.00	-20.04	QP	HORIZONTAL
2	104.54	2.29	11.76	4.44	18.49	43.50	-25.01	QP	HORIZONTAL
3	221.39	2.84	11.28	5.14	19.26	46.00	-26.74	QP	HORIZONTAL
4	410.38	3.45	15.61	5.96	25.02	46.00	-20.98	QP	HORIZONTAL
5	658.84	3.11	19.37	6.93	29.41	46.00	-16.59	QP	HORIZONTAL
6	958.79	3.47	22.07	7.89	33.43	46.00	-12.57	QP	HORIZONTAL

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss.
2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.
3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

6 Power Line Conducted Emission

6.1. Block diagram of test setup



6.2. Power line conducted emission limits

Frequency	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150 kHz ~ 500 kHz	66 ~ 56*	56 ~ 46*
500 kHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50

Note 1: * Decreasing linearly with logarithm of frequency.

Note 2: The lower limit shall apply at the transition frequencies.

6.3. Test procedure

The EUT and Support equipment, if needed, were put placed on a non-metallic table, 80 cm above the ground plane.

Configuration EUT to simulate typical usage as described in clause 2.4 and test equipment as described in clause 10.2 of this report.

All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.

All support equipment power received from a second LISN.

Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.

The Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.

During the above scans, the emissions were maximized by cable manipulation.

The test mode(s) described in clause 2.4 were scanned during the preliminary test.

After the preliminary scan, we found the test mode producing the highest emission level.

The EUT configuration and worse cable configuration of the above highest emission levels were recorded for reference of the final test.

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test.

A scan was taken on both power lines, Neutral and Line, recording at least the six highest emissions.

Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.

The test data of the worst-case condition(s) was recorded.

The bandwidth of test receiver is set at 9 kHz.

6.4. Test result

Not Applicable, since the EUT is not AC-operated device.

7 Antenna Requirements

For intentional device, according to FCC 47 CFR 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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Conclusion: The antennas used for this product are LF antenna and that no antenna other than that furnished by the responsible party shall be used with the device.

END OF REPORT