# FCC Test Report

| | |
|---|---|
| Product Name | FCA WL/WS PASE System MY 2021 |
| Model No. | WXFOB1 |
| FCC ID. | M3NWXFOB1 |

| | |
|---|---|
| Applicant | Continental Automotive Systems US Inc. |
| Address | 4685 lnvestment Drive Troy Michigan, 48098 United States Of America |

| | |
|---|---|
| Date of Receipt | Apr. 28, 2020 |
| Issued Date | Sep. 21, 2020 |
| Report No. | 2040736R-E3032110105 |
| Report Version | V1.0 |



The test results relate only to the samples tested.
The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
This report must not be used to claim product endorsement by TAF or any agency of the government.
The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

# Test Report

Issued Date: Sep. 21, 2020
Report No.: 2040736R-E3032110105

| | |
|---|---|
| Product Name | FCA WL/WS PASE System MY 2021 |
| Applicant | Continental Automotive Systems US Inc. |
| Address | 4685 lnvestment Drive Troy Michigan, 48098 United States Of America |
| Manufacturer | Continental Automotive GmbH |
| Model No. | WXFOB1 |
| FCC ID. | M3NWXFOB1 |
| EUT Rated Voltage | DC 3V (Power by Battery) |
| EUT Test Voltage | DC 3V (Power by Battery) |
| Trade Name | Continental |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart C<br>ANSI C63.4: 2014, ANSI C63.10: 2013 |
| Test Result | Complied |

Documented By : Joanne Lin

( Senior Adm. Specialist / Joanne Lin )

Tested By : Ivan Chuang

( Senior Engineer / Ivan Chuang )

Approved By :

( Director / Vincent Lin )

# TABLE OF CONTENTS

# Revision History

| Report No. | Version | Description | Issued Date |
|---|---|---|---|
| 2040736R-E3032110105 | V1.0 | Initial issue of report. | 2020-09-21 |

# 1. General Information

## 1.1. EUT Description

| | |
|---|---|
| Product Name | FCA WL/WS PASE System MY 2021 |
| Trade Name | Continental |
| Model No. | WXFOB1 |
| FCC ID | M3NWXFOB1 |
| Frequency Range | 433.925MHz |
| Number of Channels | 1 |
| Type of Modulation | FSK, ASK |
| Antenna Type | PCB antenna |

Frequency of Each Channel:

| Channel | Frequency |
|---|---|
| Channel 1: | 433.925MHz |

Note:

1. The EUT is a FCA WL/WS PASE System MY 2021 with a built-in 433.925MHz transmitter.
2. The manufacturer declared that the WXFOB1 can be available in different button configurations, depending on car manufacturer requirement. The EUT tested in this report represents the highest populated variant and is further declared as the worst case configuration by the manufacturer.
3. The antenna of EUT is conform to FCC 15.203.
4. These tests are conducted on a sample for the purpose of demonstrating compliance of transmitter with Part 15 Subpart C Paragraph 15.231.
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

| | |
|---|---|
| Test Mode | Mode 1: Transmit (ASK)<br>Mode 2: Transmit (FSK)<br>Mode 3: Normal Mode |

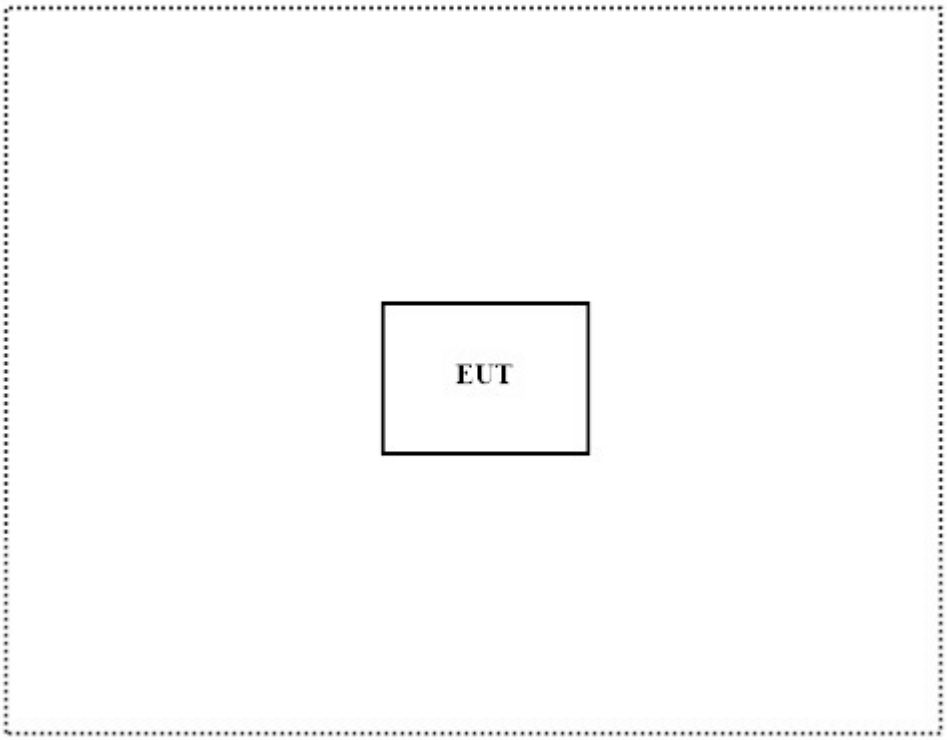
## 1.2. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Product | Manufacturer | Model No. | Serial No. | FCC ID | Power Cord |
|---|---|---|---|---|---|
| N/A | | | | | |

| Signal Cable Type | Signal cable Description |
|---|---|
| N/A | |

## 1.3. Configuration of tested System




## 1.4. EUT Exercise Software

| | |
|---|---|
| 1 | Setup the EUT as shown in section 1.4. |
| 2 | Push the button of EUT. |
| 3 | Start transmit continually. |
| 4 | Verify that the EUT works properly. |

## 1.5. Test Facility

Ambient conditions in the laboratory:

| Performed Item | Items | Required | Actual |
|---|---|---|---|
| Radiated Emission | Temperature (°C) | 10~40 °C | 21°C |
| | Humidity (%RH) | 10~90 % | 61.6% |
| Conductive | Temperature (°C) | 10~40 °C | 23.2°C |
| | Humidity (%RH) | 10~90 % | 56% |

**USA : FCC Registration Number: TW0023**

**Canada : IC Registration Number: 25880**

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan, R.O.C.
Phone number : 886-2-2602-7968
Fax number : 866-2-2602-3286
Email address : info.tw@dekra.com
Website : http://www.dekra.com.tw

## 1.6. List of Test Equipment

**For Conducted measurements /ASR2**

| | Equipment | Manufacturer | Model No. | Serial No. | Cali. Data | Due. Data |
|---|---|---|---|---|---|---|
| X | Spectrum Analyzer | R&S | FSV30 | 103466 | 2019.12.16 | 2020.12.15 |
| | Peak Power Analyzer | KEYSIGHT | 8900B | MY51000539 | 2020.05.13 | 2021.05.12 |
| | Power Sensor | KEYSIGHT | N1923A | MY59240002 | 2020.05.22 | 2021.05.21 |
| | Power Sensor | KEYSIGHT | N1923A | MY59240003 | 2020.05.22 | 2021.05.21 |

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test System V9.0.5

**For Radiated measurements /ACB1**

| | Equipment | Manufacturer | Model No. | Serial No. | Cali. Data | Due. Data |
|---|---|---|---|---|---|---|
| X | Loop Antenna | AMETEK | HLA6121 | 49611 | 2020.03.16 | 2021.03.15 |
| X | Bi-Log Antenna | SCHWARZBECK | VULB9168 | 9168-953 | 2020.01.03 | 2021.01.02 |
| X | Horn Antenna | ETS-Lindgren | 3117 | 00203800 | 2019.12.12 | 2020.12.11 |
| | Horn Antenna | Com-Power | AH-840 | 101087 | 2020.06.08 | 2021.06.07 |
| X | Pre-Amplifier | EMCI | EMC001330 | 980316 | 2020.06.23 | 2021.06.22 |
| X | Pre-Amplifier | EMCI | EMC051835SE | 980313 | 2019.09.17 | 2020.09.16 |
| | Pre-Amplifier | EMCI | EMC05820SE | 980310 | 2020.06.24 | 2021.06.23 |
| | Pre-Amplifier | EMCI | EMC184045SE | 980314 | 2020.06.10 | 2021.06.09 |
| | Filter | MICRO TRONICS | BRM50702 | G251 | 2020.09.17 | 2021.09.16 |
| | Filter | MICRO TRONICS | BRM50716 | G188 | 2020.09.17 | 2021.09.16 |
| X | EMI Test Receiver | R&S | ESR7 | 101602 | 2019.12.16 | 2020.12.15 |
| X | Spectrum Analyzer | R&S | FSV40 | 101148 | 2020.03.16 | 2021.03.15 |
| X | Coaxial Cable | SUHNER | SUCOFLEX 106 | RF002 | 2020.07.03 | 2021.07.02 |
| | Mircoflex Cable | HUBER SUHNER | SUCOFLEX 102 | MY3381/2 | 2020.06.10 | 2021.06.09 |

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Testing System V1.2

## 1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

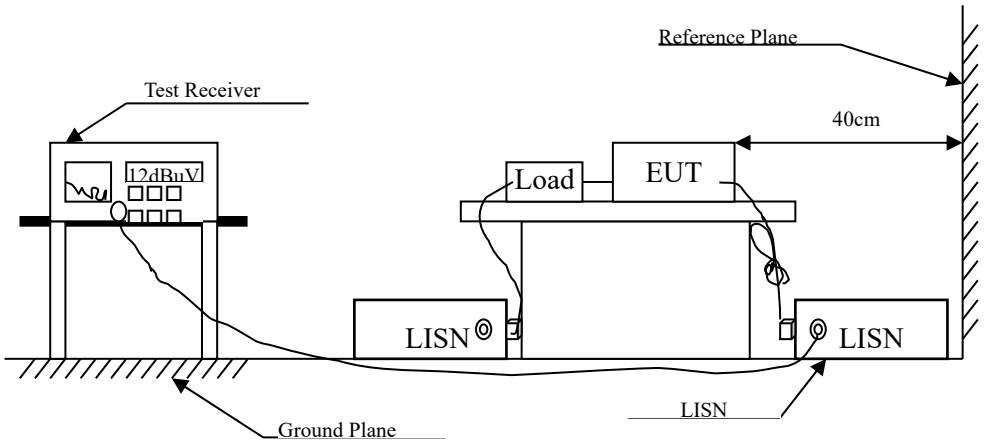
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

| **Test item** | **Uncertainty** | |
|---|---|---|
| Conducted Emission | ±3.42 dB | |
| Radiated Emission | Under 1GHz<br>±4.06 dB | Above 1GHz<br>±3.73 dB |
| Transmit time | ±2.31 ms | |
| Occupied Bandwidth | ±682.83 Hz | |
| Duty Cycle | ±2.31 ms | |

## 2. Conducted Emission

### 2.1. Test Setup




### 2.2. Limits

| FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV) | | |
|---|---|---|
| Frequency<br>MHz | QP | AV |
| 0.15 - 0.50 | 66-56 | 56-46 |
| 0.50-5.0 | 56 | 46 |
| 5.0 - 30 | 60 | 50 |

Remarks : In the above table, the tighter limit applies at the band edges.

## 2.3. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

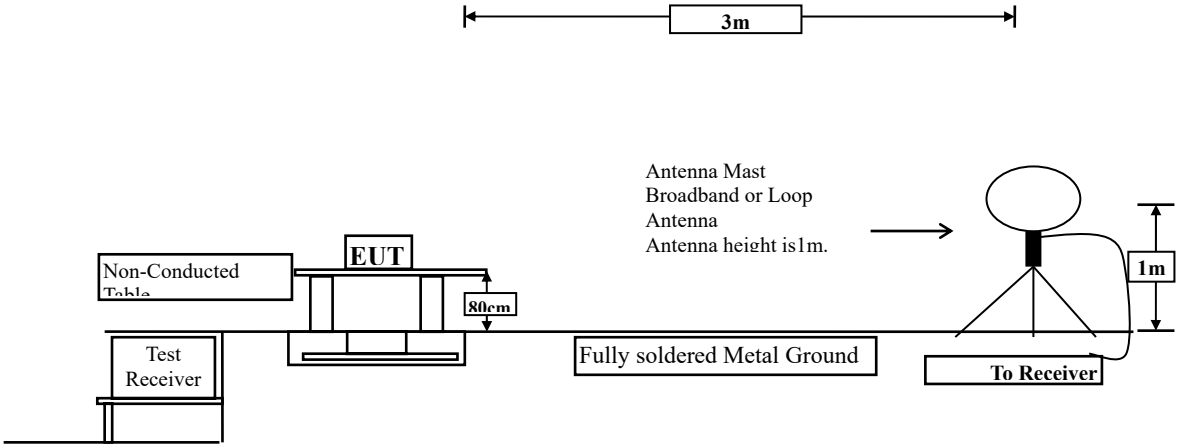
## 2.4. Test Result of Conducted Emission

Owing to the Battery operation of EUT, this test item is not performed.

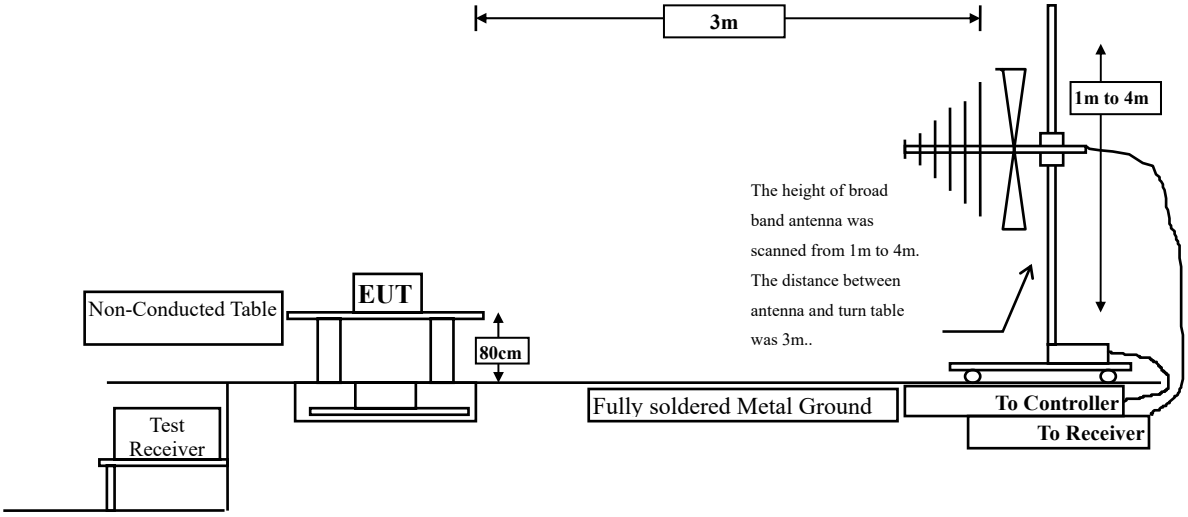
# 3. Radiated Emission

## 3.1. Test Setup

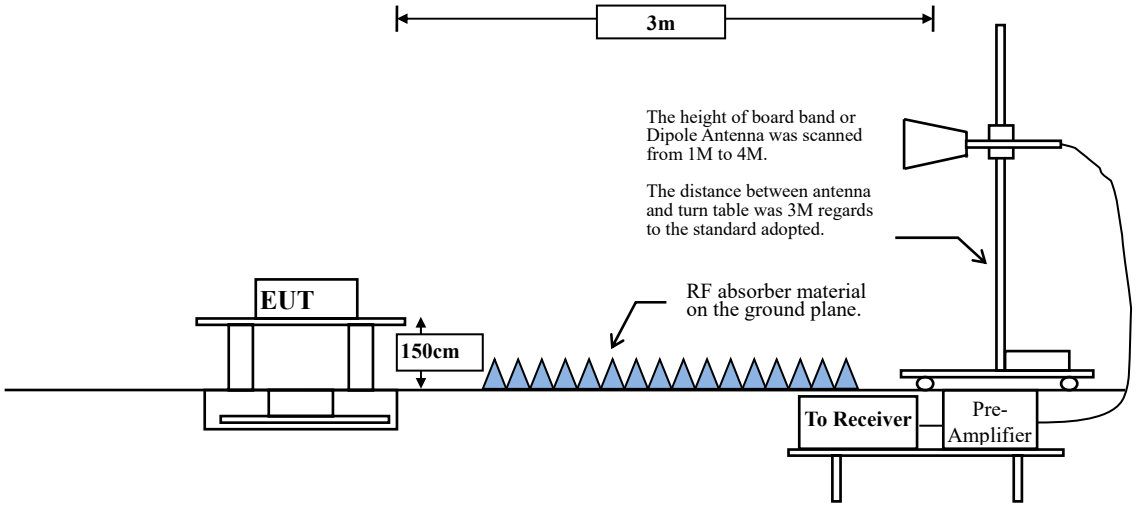
Radiated Emission Under 30MHz




Radiated Emission Below 1GHz




Radiated Emission Above 1GHz



## 3.2. Limits

➢ Fundamental and Harmonics Emission Limits

| FCC Part 15 Subpart C Paragraph 15.231(b) Limits | | |
|---|---|---|
| Fundamental Frequency MHz | Field Strength of Fundamental | Field Strength of Spurious Emission |
| 40.66-40.70 | 2250 | 225 |
| 70-130 | 1250 | 125 |
| 130-174 | 1250-3750 | 125-375 |
| 174-260 | 3750 | 375 |
| 260-470 | 3750-12500 | 375-1250 |
| above 470 | 12500 | 1250 |

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

➢ Spurious electric field strength limits

| FCC Part 15 Subpart C Paragraph 15.209 Limits | | | |
|---|---|---|---|
| Frequency MHz | uV/m | dBuV/m | Measurement distance (meter) |
| 0.009-0.490 | 2400/F(kHz) | See Remark[1] | 300 |
| 0.490-1.705 | 24000/F(kHz) | See Remark[1] | 30 |
| 1.705-30 | 30 | 29.5 | 30 |
| 30-88 | 100 | 40 | 3 |
| 88-216 | 150 | 43.5 | 3 |
| 216-960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

## 3.3. Test Procedure

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

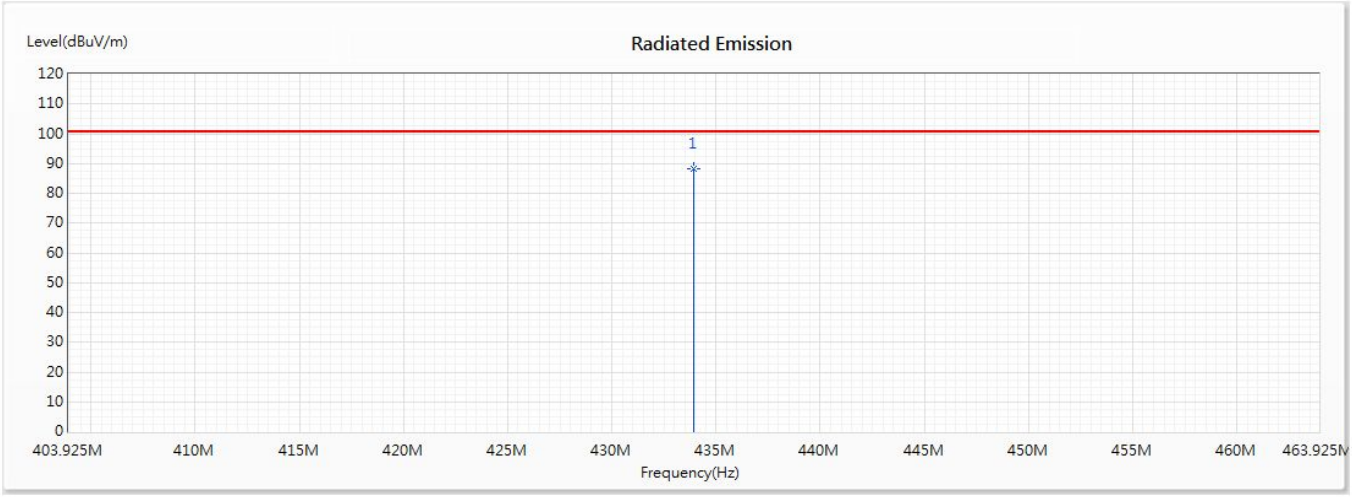
The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

## 3.4. Test Result

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Horizontal_X-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 88.10 | 100.82 | -12.72 | 94.50 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

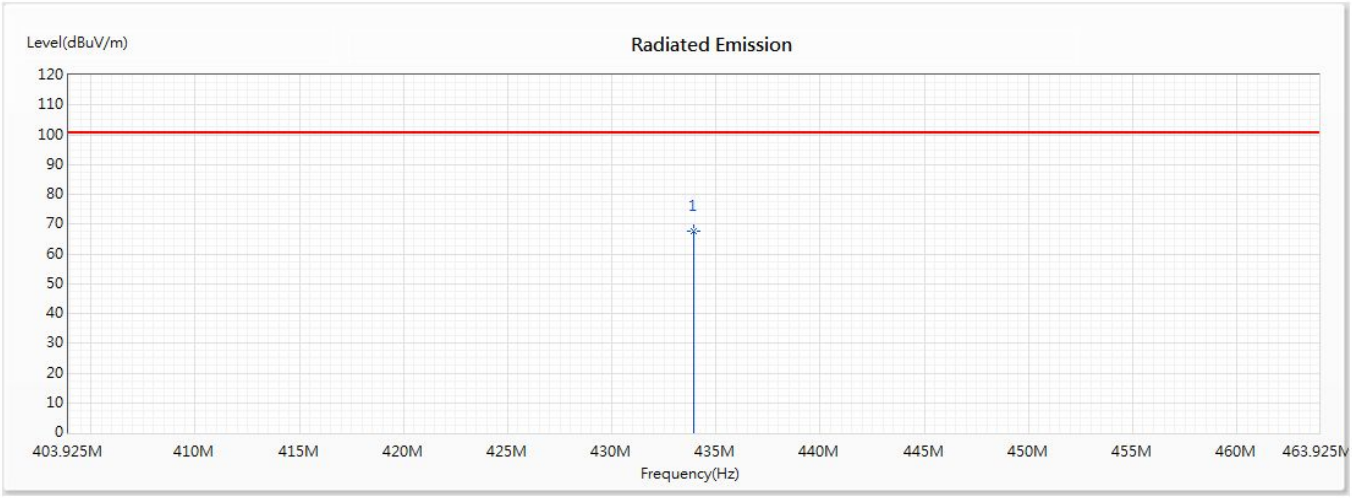
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 88.10 | -12.249 | 75.851 | -4.969 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Vertical_X-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 67.80 | 100.82 | -33.02 | 74.20 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

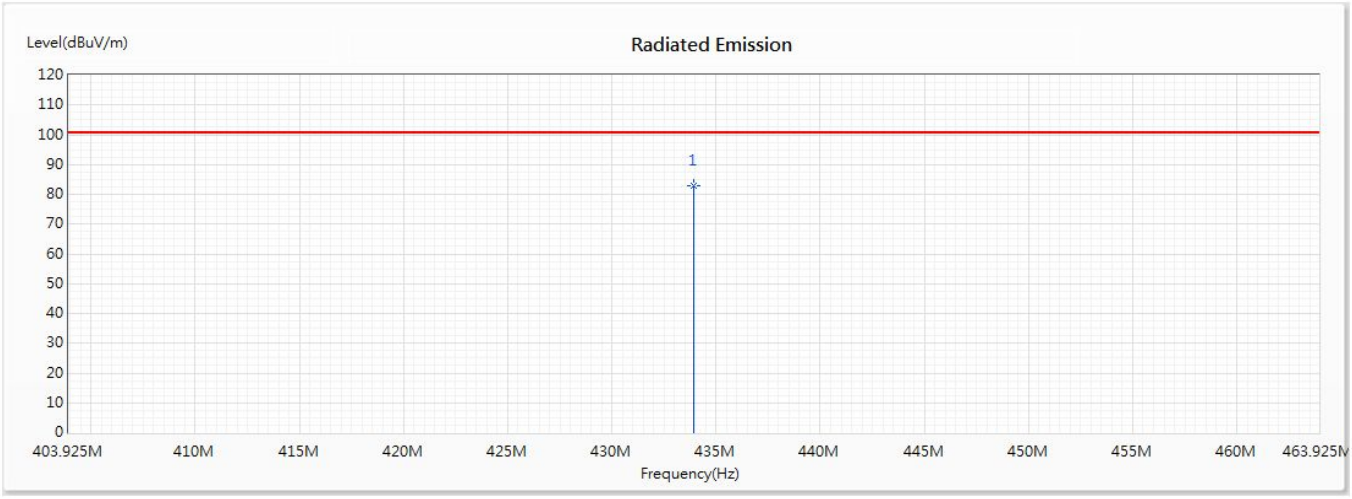
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 67.80 | -12.249 | 55.551 | -25.269 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Horizontal_Y-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 82.80 | 100.82 | -18.02 | 89.20 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

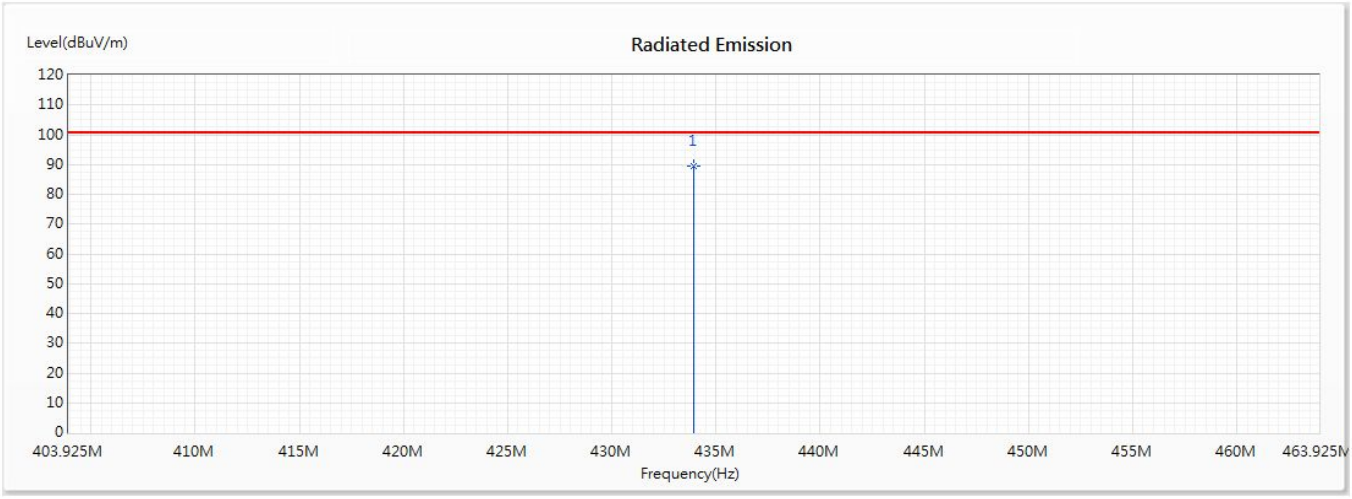
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 82.80 | -12.249 | 70.551 | -10.269 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Vertical_Y-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 89.60 | 100.82 | -11.22 | 96.00 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

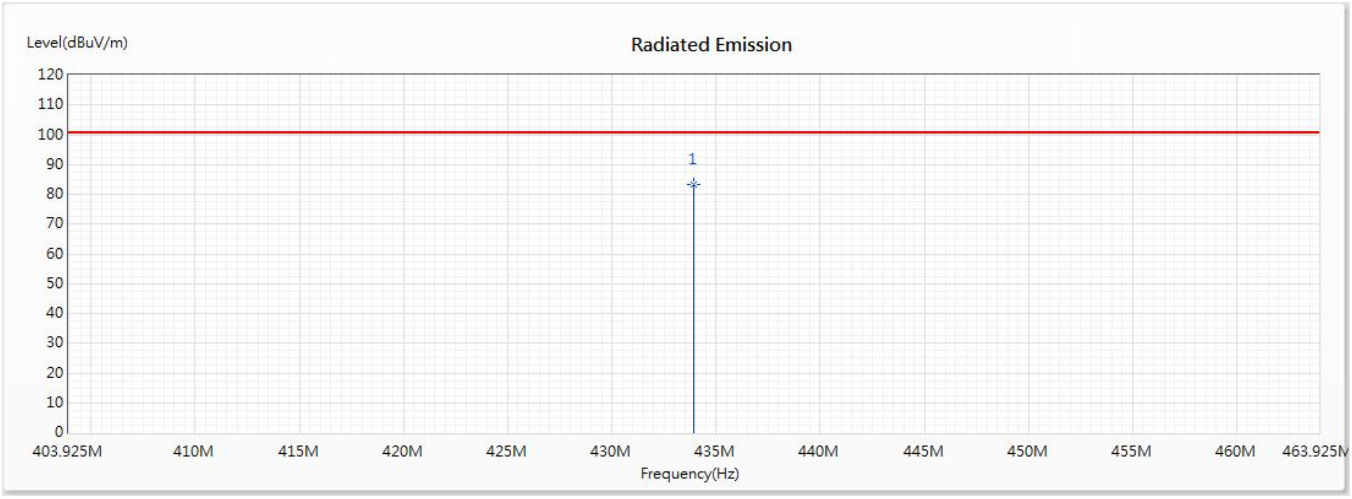
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 89.60 | -12.249 | 77.351 | -3.469 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Horizontal_Z-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 83.10 | 100.82 | -17.72 | 89.50 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

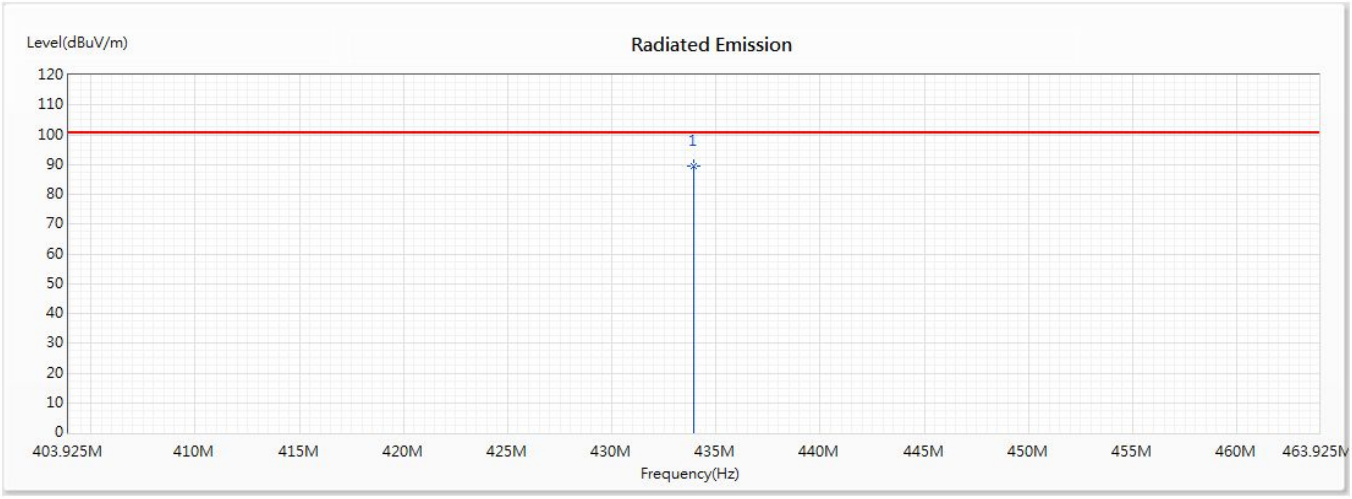
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 83.10 | -12.249 | 70.851 | -9.969 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Vertical_Z-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 89.50 | 100.82 | -11.32 | 95.90 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

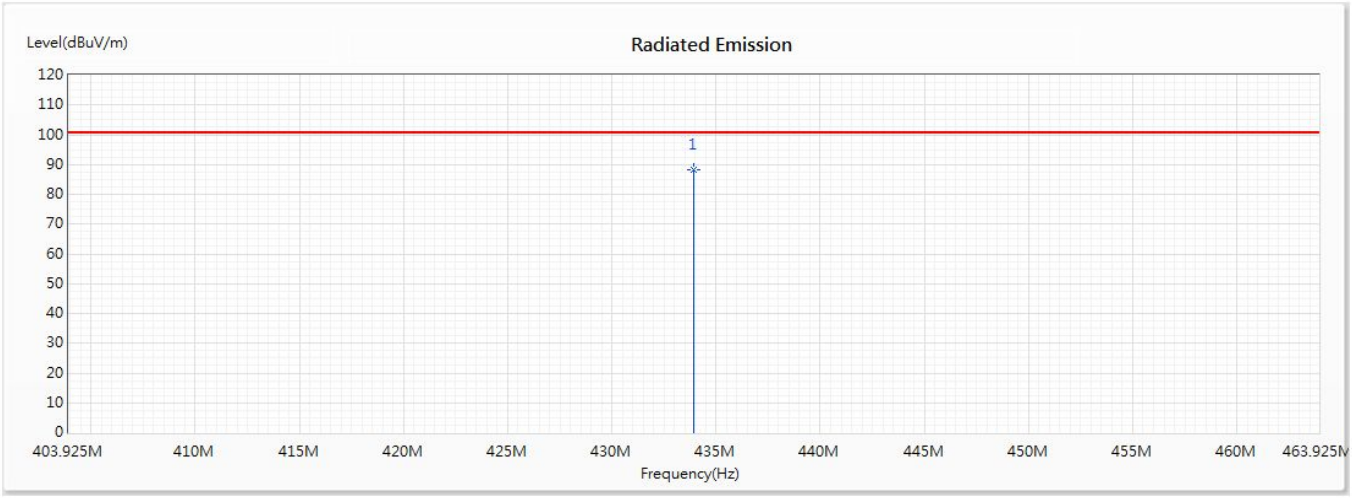
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 89.50 | -12.249 | 77.251 | -3.569 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Horizontal_X-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 88.20 | 100.82 | -12.62 | 94.60 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

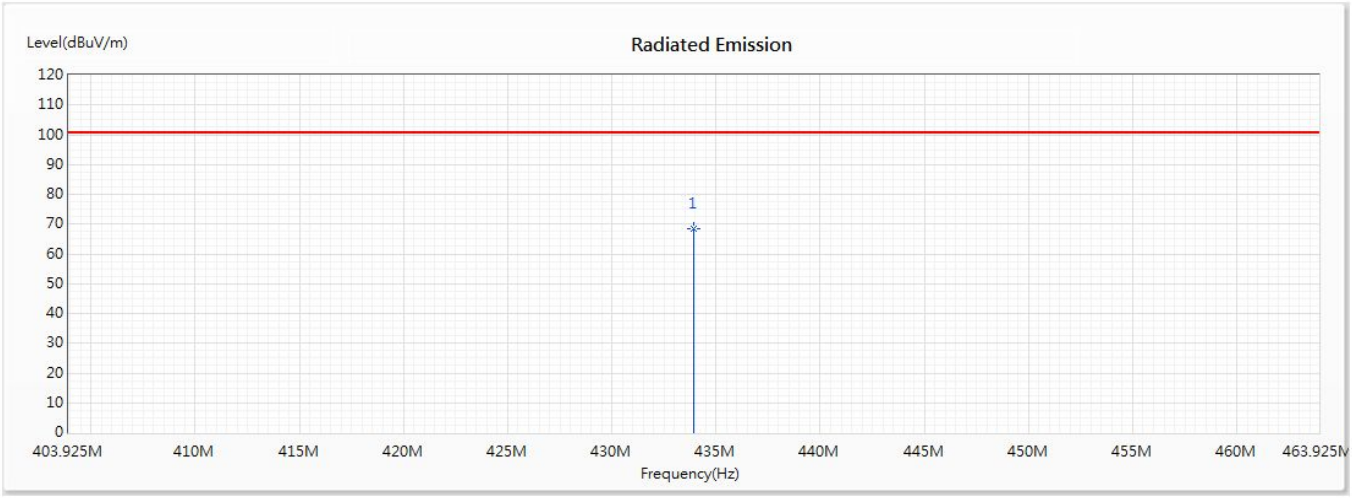
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 88.20 | -12.249 | 75.951 | -4.869 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Vertical_X-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 68.40 | 100.82 | -32.42 | 74.80 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

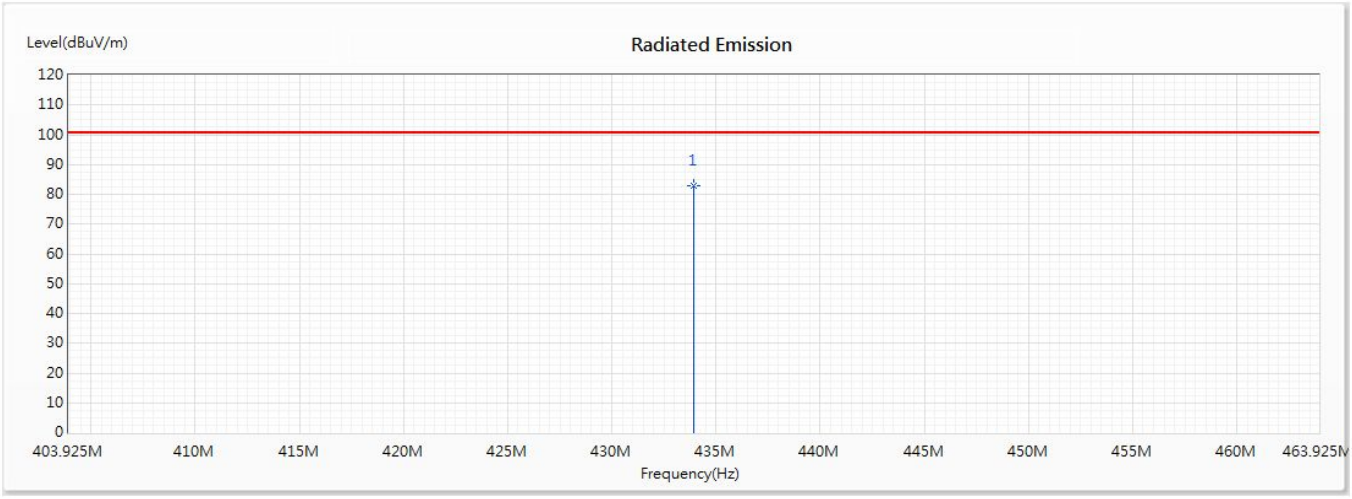
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 68.40 | -12.249 | 56.151 | -24.669 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Horizontal_Y-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 82.70 | 100.82 | -18.12 | 89.10 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

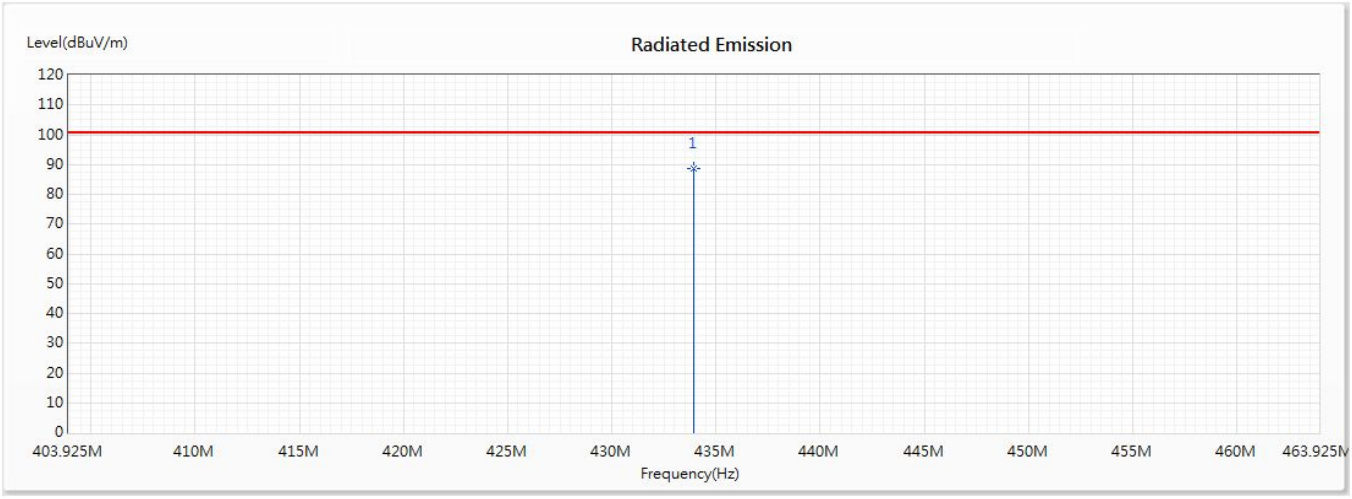
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 82.70 | -12.249 | 70.451 | -10.369 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Vertical_Y-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 88.80 | 100.82 | -12.02 | 95.20 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

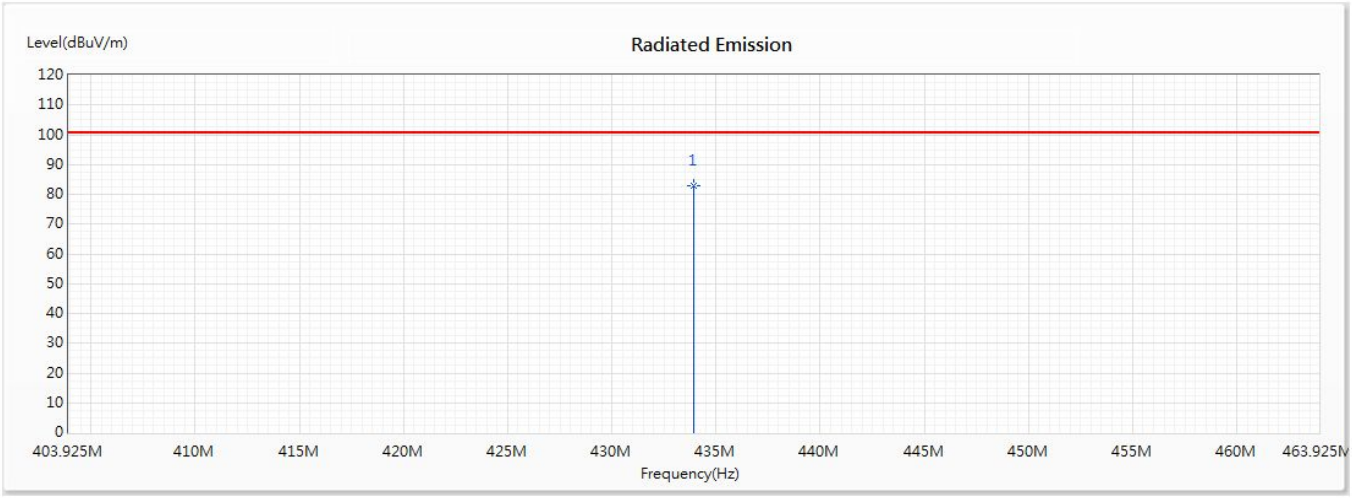
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 88.80 | -12.249 | 76.551 | -4.269 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Horizontal_Z-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 82.80 | 100.82 | -18.02 | 89.20 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

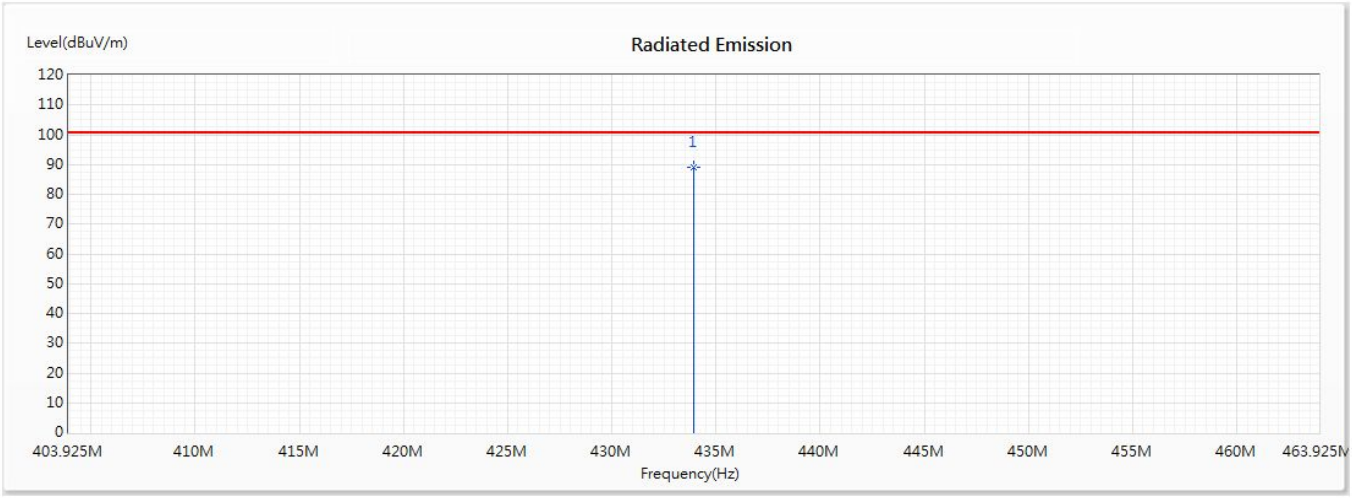
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 82.80 | -12.249 | 70.551 | -10.269 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Fundamental Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Vertical_Z-Axis**




| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 433.925 | 88.90 | 100.82 | -11.92 | 95.30 | -6.40 | PK |

Note:

1. Emission Level = Reading Level + Correct Factor
2. Average Limit=20log(10996.88)=80.82 dBuV、Peak Limit=100.82 dBuV

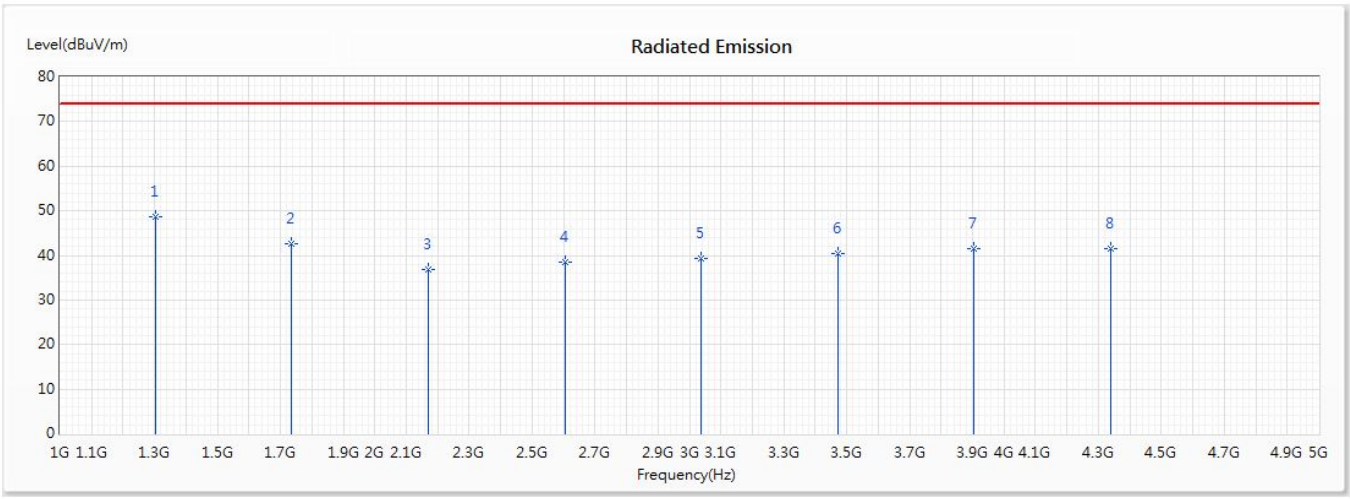
| Frequency (MHz) | Peak Measurement (dBμV/m) | Duty Cycle Factor (dB) | Average Measurement (dBμV/m) | Margin (dB) | Average Limit (dBμV/m) |
|---|---|---|---|---|---|
| 433.925 | 88.90 | -12.249 | 76.651 | -4.169 | 80.820 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Harmonic Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2020/05/14 |

**Horizontal**




| No | Frequency (MHz) | Emission Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Reading Level (dBµV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 1301.77 | 48.78 | 74.00 | -25.22 | 59.08 | -10.30 | PK |
| 2 | 1735.7 | 42.52 | 74.00 | -31.48 | 51.39 | -8.87 | PK |
| 3 | 2169.62 | 36.88 | 74.00 | -37.12 | 44.07 | -7.19 | PK |
| 4 | 2603.55 | 38.42 | 74.00 | -35.58 | 44.17 | -5.75 | PK |
| 5 | 3037.47 | 39.42 | 74.00 | -34.58 | 44.68 | -5.26 | PK |
| 6 | 3471.4 | 40.38 | 74.00 | -33.62 | 45.57 | -5.19 | PK |
| 7 | 3905.32 | 41.58 | 74.00 | -32.42 | 45.84 | -4.26 | PK |
| 8 | 4339.25 | 41.53 | 74.00 | -32.47 | 45.28 | -3.75 | PK |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

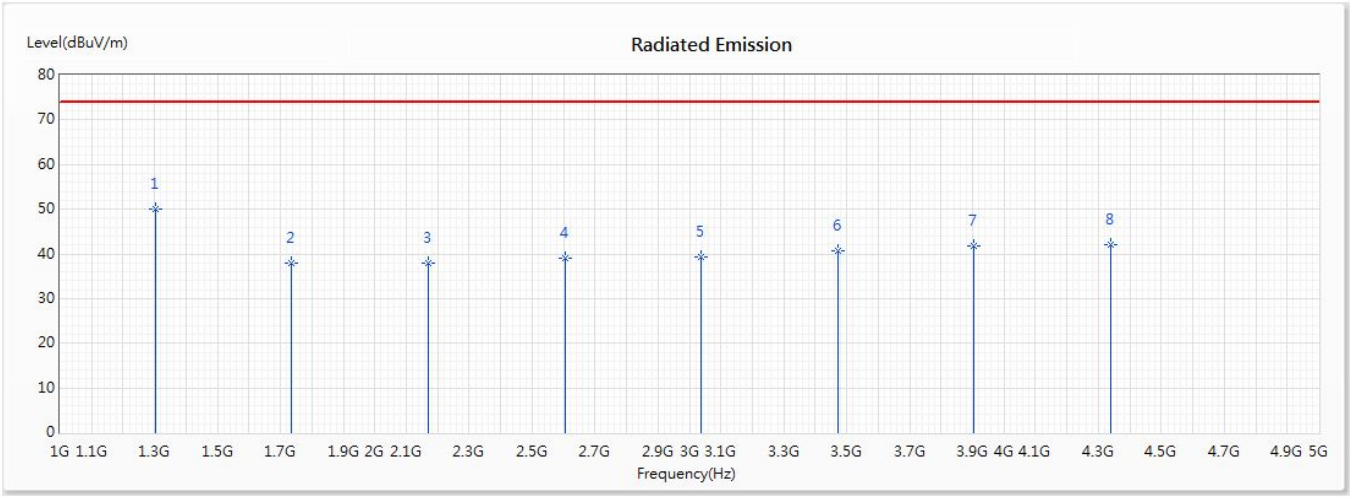
| Frequency (MHz) | Peak Measurement (dBµV/m) | Duty Cycle Factor (dB) | Average Measurement (dBµV/m) | Margin (dB) | Average Limit (dBµV/m) |
|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | 54.00 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Harmonic Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2017/05/23 |

**Vertical**




| No | Frequency (MHz) | Emission Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Reading Level (dBµV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 1301.77 | 50.05 | 74.00 | -23.95 | 60.35 | -10.30 | PK |
| 2 | 1735.7 | 37.86 | 74.00 | -36.14 | 46.73 | -8.87 | PK |
| 3 | 2169.62 | 37.96 | 74.00 | -36.04 | 45.15 | -7.19 | PK |
| 4 | 2603.55 | 38.99 | 74.00 | -35.01 | 44.74 | -5.75 | PK |
| 5 | 3037.47 | 39.44 | 74.00 | -34.56 | 44.70 | -5.26 | PK |
| 6 | 3471.4 | 40.62 | 74.00 | -33.38 | 45.81 | -5.19 | PK |
| 7 | 3905.32 | 41.72 | 74.00 | -32.28 | 45.98 | -4.26 | PK |
| 8 | 4339.25 | 41.99 | 74.00 | -32.01 | 45.74 | -3.75 | PK |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

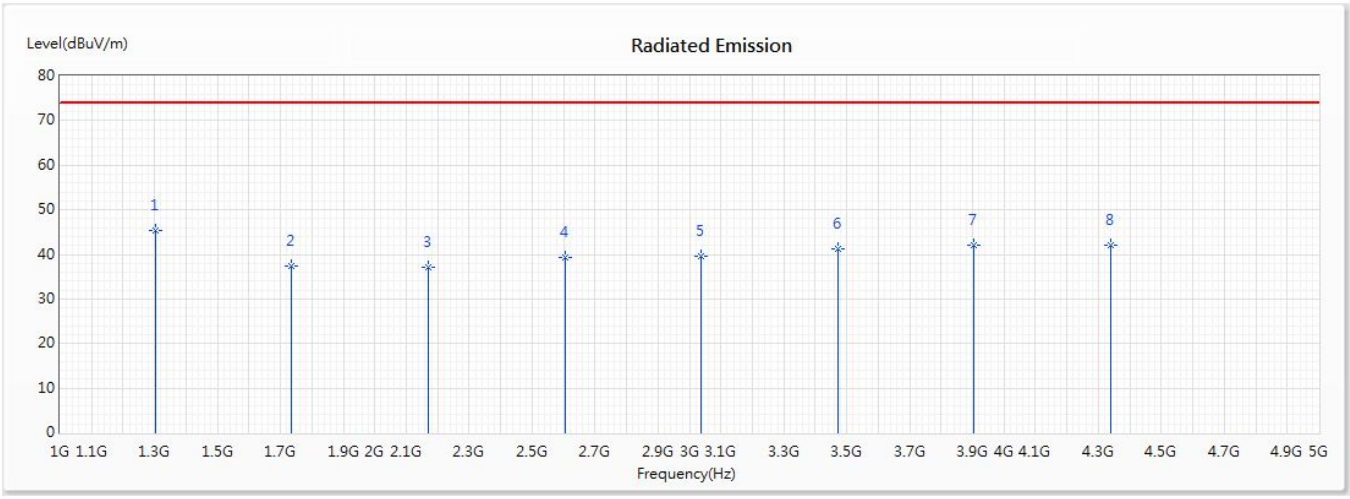
| Frequency (MHz) | Peak Measurement (dBµV/m) | Duty Cycle Factor (dB) | Average Measurement (dBµV/m) | Margin (dB) | Average Limit (dBµV/m) |
|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | 54.00 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Harmonic Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2020/05/14 |

**Horizontal**




| No | Frequency (MHz) | Emission Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Reading Level (dBµV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 1301.77 | 45.40 | 74.00 | -28.60 | 55.70 | -10.30 | PK |
| 2 | 1735.7 | 37.38 | 74.00 | -36.62 | 46.25 | -8.87 | PK |
| 3 | 2169.62 | 37.22 | 74.00 | -36.78 | 44.41 | -7.19 | PK |
| 4 | 2603.55 | 39.24 | 74.00 | -34.76 | 44.99 | -5.75 | PK |
| 5 | 3037.47 | 39.65 | 74.00 | -34.35 | 44.91 | -5.26 | PK |
| 6 | 3471.4 | 41.32 | 74.00 | -32.68 | 46.51 | -5.19 | PK |
| 7 | 3905.32 | 42.18 | 74.00 | -31.82 | 46.44 | -4.26 | PK |
| 8 | 4339.25 | 42.08 | 74.00 | -31.92 | 45.83 | -3.75 | PK |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

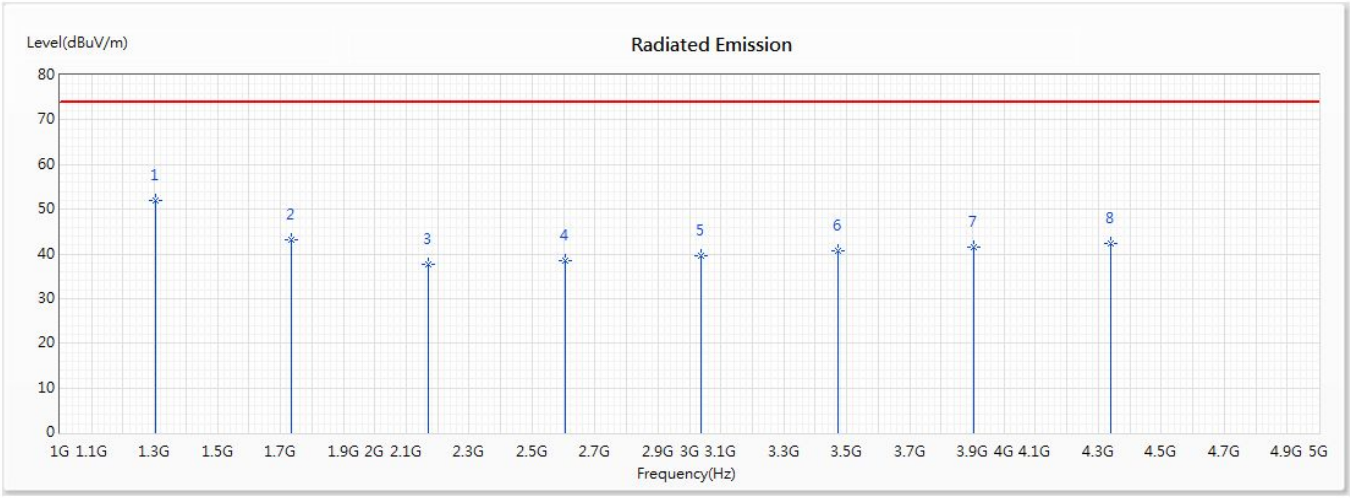
| Frequency (MHz) | Peak Measurement (dBµV/m) | Duty Cycle Factor (dB) | Average Measurement (dBµV/m) | Margin (dB) | Average Limit (dBµV/m) |
|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | 54.00 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | Harmonic Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2017/05/23 |

**Vertical**




| No | Frequency (MHz) | Emission Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Reading Level (dBµV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| * 1 | 1301.77 | 51.93 | 74.00 | -22.07 | 62.23 | -10.30 | PK |
| 2 | 1735.7 | 43.13 | 74.00 | -30.87 | 52.00 | -8.87 | PK |
| 3 | 2169.62 | 37.56 | 74.00 | -36.44 | 44.75 | -7.19 | PK |
| 4 | 2603.55 | 38.45 | 74.00 | -35.55 | 44.20 | -5.75 | PK |
| 5 | 3037.47 | 39.49 | 74.00 | -34.51 | 44.75 | -5.26 | PK |
| 6 | 3471.4 | 40.79 | 74.00 | -33.21 | 45.98 | -5.19 | PK |
| 7 | 3905.32 | 41.56 | 74.00 | -32.44 | 45.82 | -4.26 | PK |
| 8 | 4339.25 | 42.45 | 74.00 | -31.55 | 46.20 | -3.75 | PK |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Measurement Level = Reading Level + Correct Factor.
4. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
5. The average measurement was not performed when the peak measured data under the limit of average detection.
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

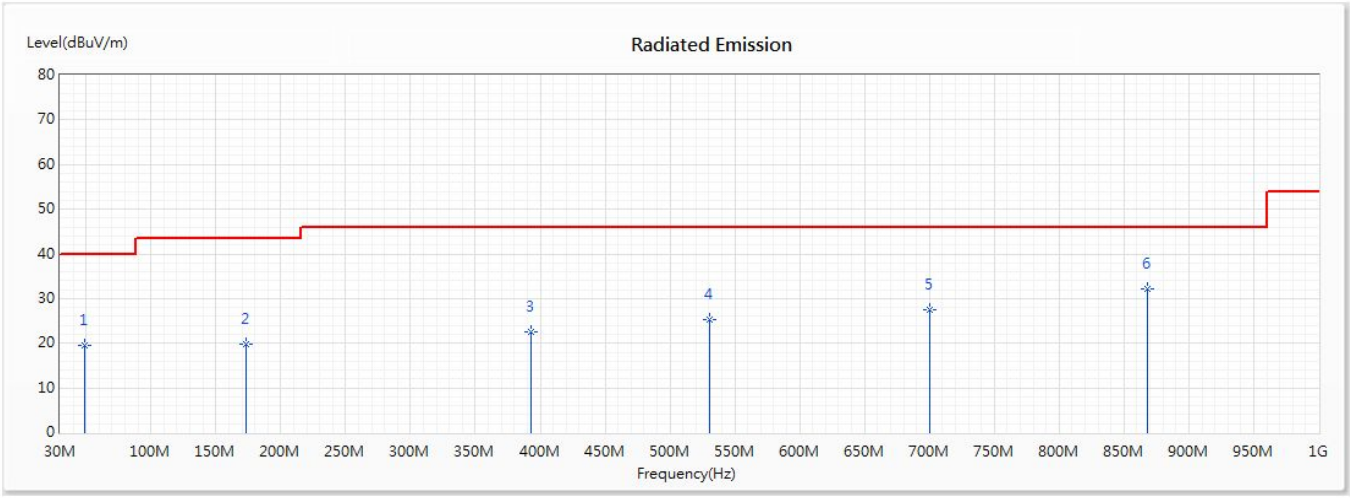
| Frequency (MHz) | Peak Measurement (dBµV/m) | Duty Cycle Factor (dB) | Average Measurement (dBµV/m) | Margin (dB) | Average Limit (dBµV/m) |
|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | 54.00 |

Note:

1. Average Measurement=Peak Measurement + Duty Cycle Factor
2. The Duty Cycle is refer to section 6.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | General Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Horizontal**



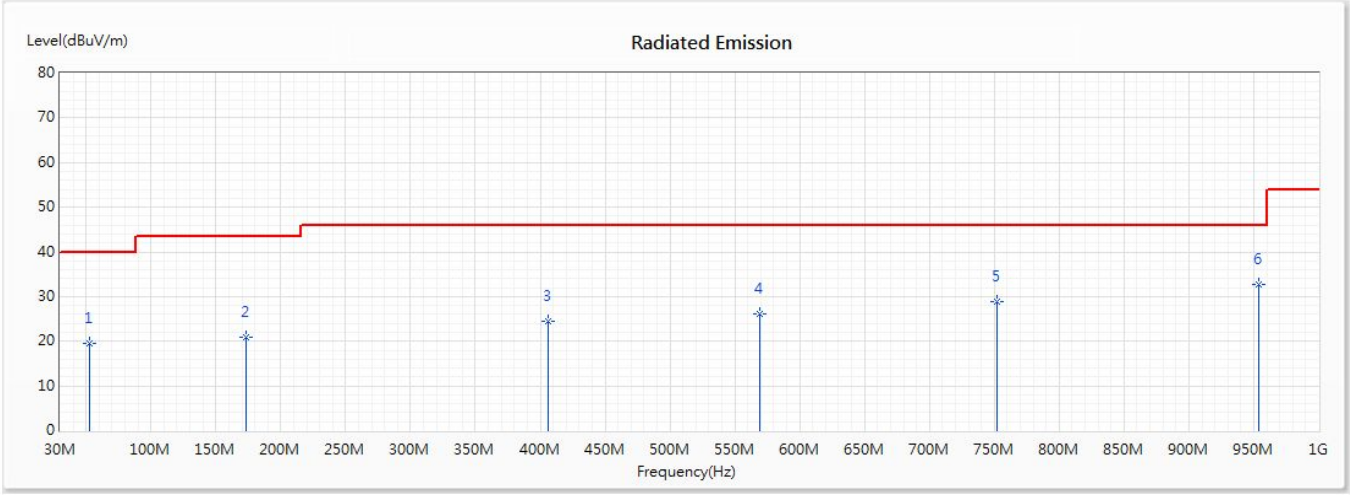

| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| 1 | 48.43 | 19.47 | 40.00 | -20.53 | 29.69 | -10.22 | QP |
| 2 | 173.56 | 19.69 | 43.50 | -23.81 | 30.45 | -10.76 | QP |
| 3 | 392.78 | 22.46 | 46.00 | -23.54 | 29.57 | -7.11 | QP |
| 4 | 530.52 | 25.16 | 46.00 | -20.84 | 29.71 | -4.55 | QP |
| 5 | 700.27 | 27.44 | 46.00 | -18.56 | 29.20 | -1.76 | QP |
| * 6 | 868.08 | 32.16 | 46.00 | -13.84 | 32.12 | 0.04 | QP |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | General Radiated Emission |
| Test Mode | Mode 1: Transmit (ASK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Vertical**



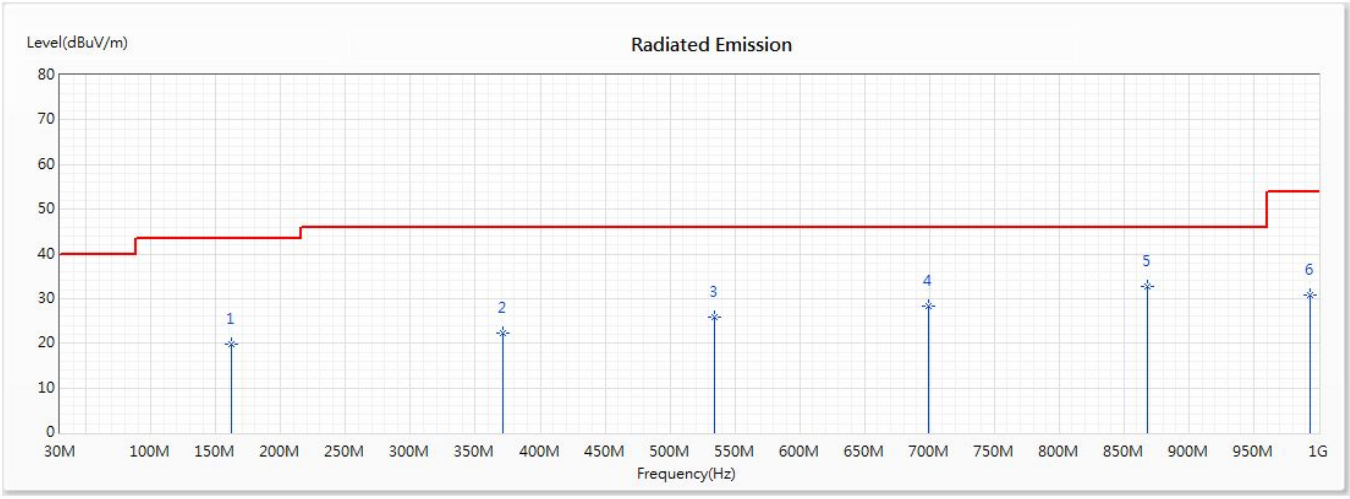

| No | Frequency (MHz) | Emission Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Reading Level (dBµV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| 1 | 52.31 | 19.56 | 40.00 | -20.44 | 29.88 | -10.32 | QP |
| 2 | 173.56 | 20.79 | 43.50 | -22.71 | 31.55 | -10.76 | QP |
| 3 | 406.36 | 24.48 | 46.00 | -21.52 | 31.41 | -6.93 | QP |
| 4 | 569.32 | 26.17 | 46.00 | -19.83 | 29.96 | -3.79 | QP |
| 5 | 751.68 | 28.98 | 46.00 | -17.02 | 30.08 | -1.10 | QP |
| * 6 | 953.44 | 32.67 | 46.00 | -13.33 | 31.42 | 1.25 | QP |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | General Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Horizontal**



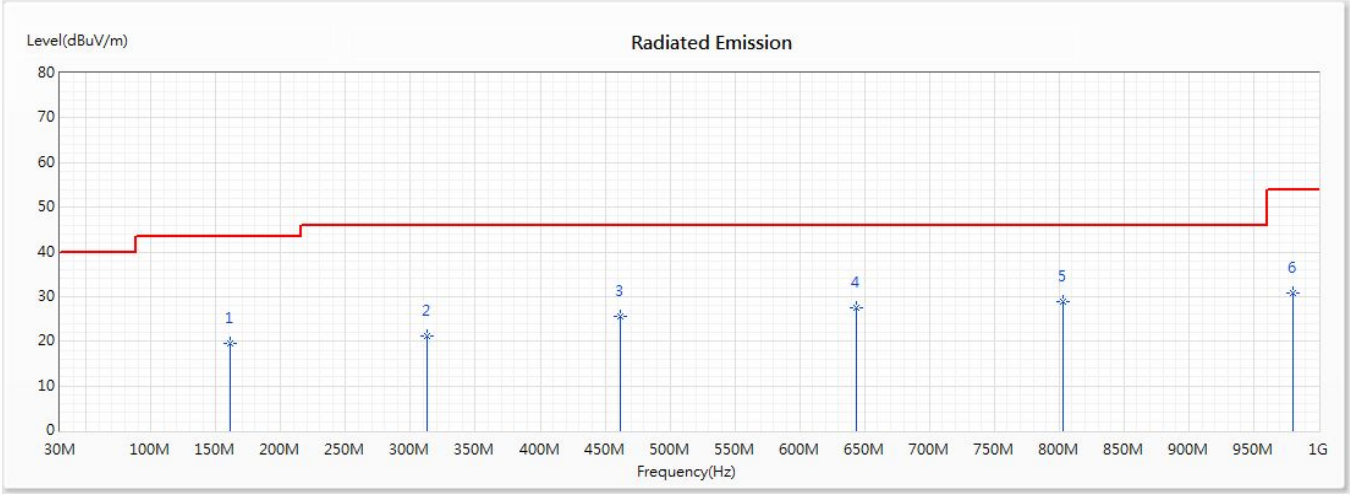

| No | Frequency (MHz) | Emission Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Reading Level (dBμV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| 1 | 161.92 | 19.70 | 43.50 | -23.80 | 29.96 | -10.26 | QP |
| 2 | 371.44 | 22.17 | 46.00 | -23.83 | 29.94 | -7.77 | QP |
| 3 | 534.4 | 25.72 | 46.00 | -20.28 | 30.18 | -4.46 | QP |
| 4 | 699.3 | 28.36 | 46.00 | -17.64 | 30.16 | -1.80 | QP |
| * 5 | 868.08 | 32.64 | 46.00 | -13.36 | 32.60 | 0.04 | QP |
| 6 | 993.21 | 30.69 | 54.00 | -23.31 | 29.19 | 1.50 | QP |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

| | |
|---|---|
| Product | FCA WL/WS PASE System MY 2021 |
| Test Item | General Radiated Emission |
| Test Mode | Mode 2: Transmit (FSK) (433.925MHz) |
| Date of Test | 2020/05/13 |

**Vertical**



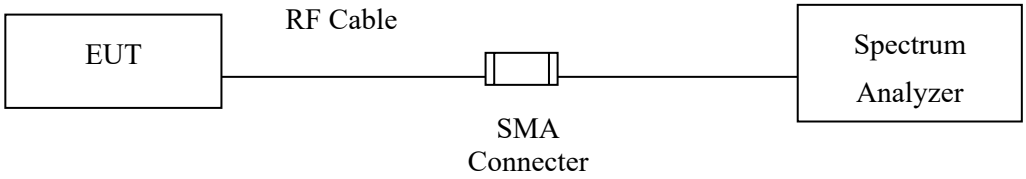

| No | Frequency (MHz) | Emission Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Reading Level (dBµV) | Correct Factor (dB/m) | Detector Type |
|---|---|---|---|---|---|---|---|
| 1 | 160.95 | 19.46 | 43.50 | -24.04 | 29.74 | -10.28 | QP |
| 2 | 313.24 | 21.22 | 46.00 | -24.78 | 30.47 | -9.25 | QP |
| 3 | 461.65 | 25.47 | 46.00 | -20.53 | 31.19 | -5.72 | QP |
| 4 | 644.01 | 27.42 | 46.00 | -18.58 | 30.01 | -2.59 | QP |
| * 5 | 803.09 | 29.00 | 46.00 | -17.00 | 29.58 | -0.58 | QP |
| 6 | 980.6 | 30.88 | 54.00 | -23.12 | 29.13 | 1.75 | QP |

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

# 4. Transmit time

## 4.1. Test Setup



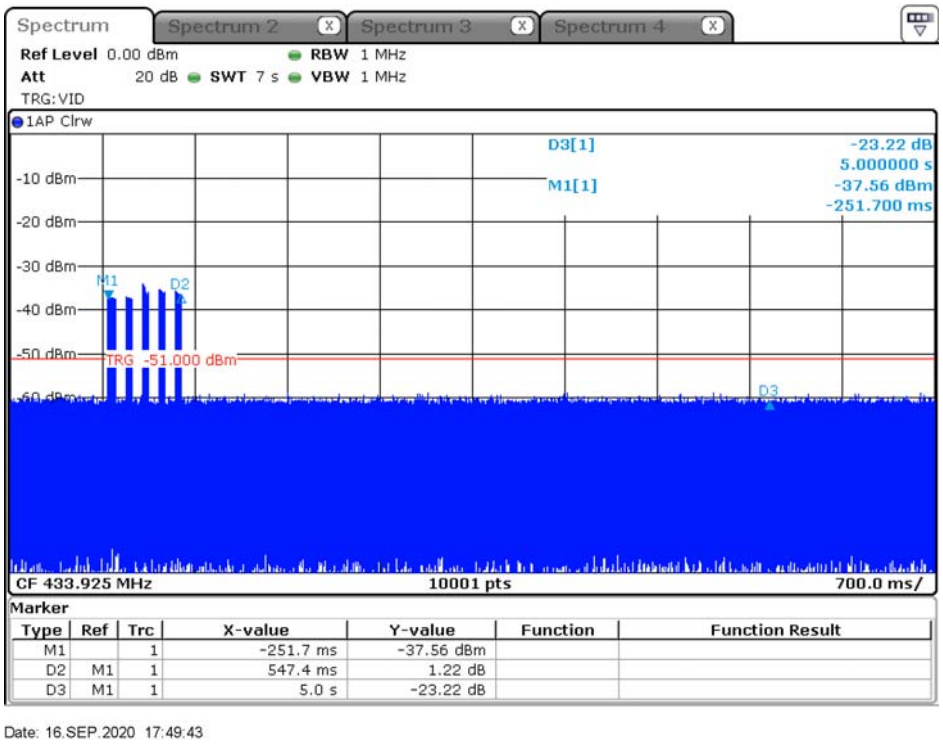

## 4.2. Limits

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
A transmitter activated automatically shall cease transmission within 5 seconds after activation.

## 4.3. Test Result

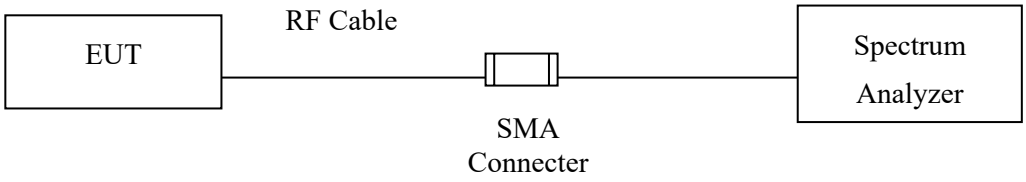
Product FCA WL/WS PASE System MY 2021
Test Item Transmit time
Test Mode Mode 3: Normal Mode (433.925MHz)

| Channel No. | Frequency (MHz) | Measurement Value (Sec) | Limit (Sec) | Result |
|---|---|---|---|---|
| 01 | 433.925 | 0.5474 | < 5 | Pass |



# 5. Occupied Bandwidth

## 5.1. Test Setup




## 5.2. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier

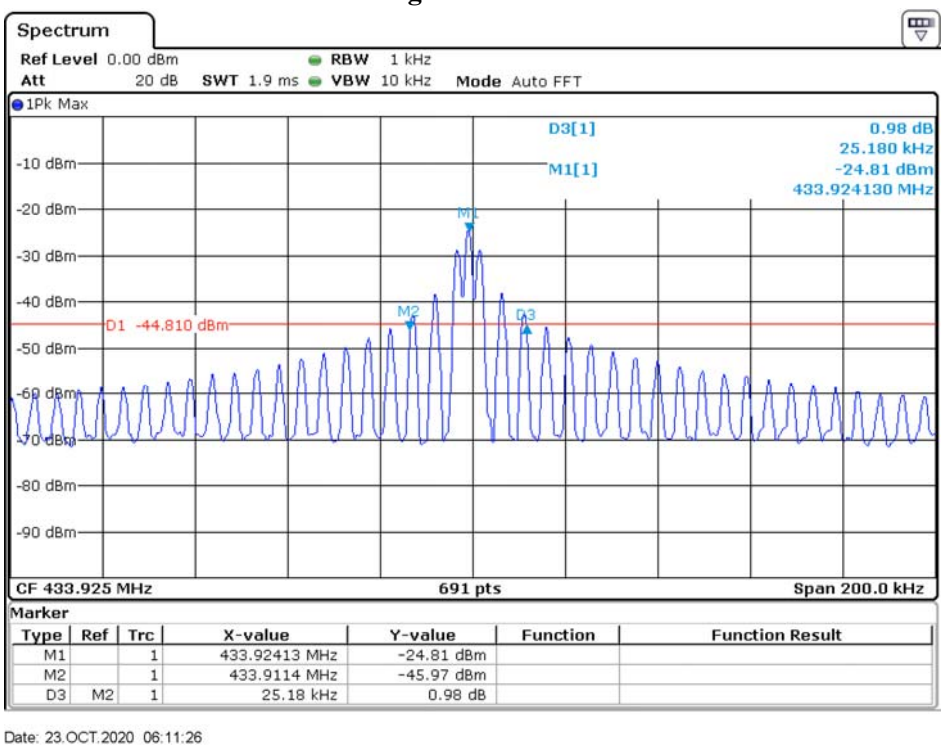
## 5.3. Test Result

Product FCA WL/WS PASE System MY 2021
Test Item Occupied Bandwidth
Test Mode Mode 1: Transmit (ASK) (433.925MHz)

| Channel No. | Frequency (MHz) | Measurement Value (MHz) | Limit (MHz) | Result |
|---|---|---|---|---|
| 01 | 433.925 | 0.0251 | 1.0848 | Pass |

**Note: Limit = 433.925MHz * 0.25%= 1.0848MHz**

**Figure Channel 01:**

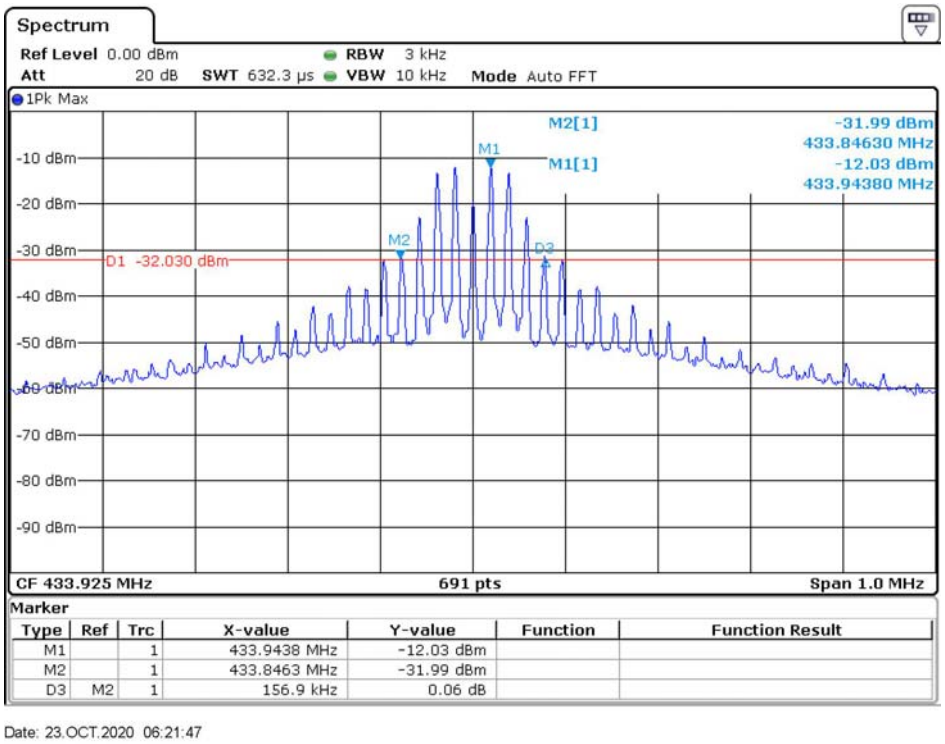


Product FCA WL/WS PASE System MY 2021
Test Item Occupied Bandwidth
Test Mode Mode 2: Transmit (FSK) (433.925MHz)

| Channel No. | Frequency (MHz) | Measurement Value (MHz) | Limit (MHz) | Result |
|---|---|---|---|---|
| 01 | 433.925 | 0.1569 | 1.0848 | Pass |

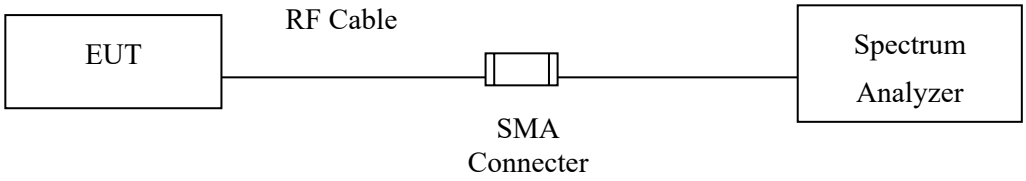
**Note: Limit = 433.925MHz * 0.25%= 1.0848MHz**

**Figure Channel 01:**



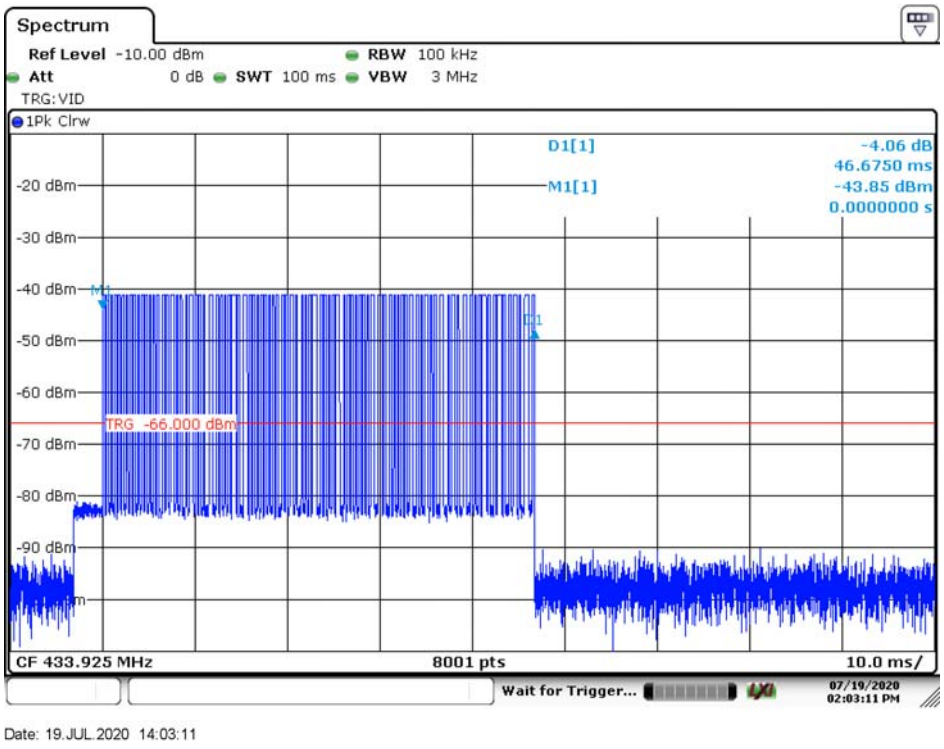
## 6. Duty Cycle

### 6.1. Test Setup



## 6.2. Test Result of Duty Cycle

Product : FCA WL/WS PASE System MY 2021
Test Item : Duty Cycle Data
Test Mode : Mode 3: Normal Mode




Bins Size = Sweep time / Sweep points

Time on of 100ms = Bins Size * total transmitter bins

Time on of 100ms = (100ms/8001points) * 1953(bins) = 24.41ms

Time on of 100ms= 24.41ms

Duty Cycle=24.41ms / 100ms= 0.2441

Duty Cycle correction factor= 20 LOG 0.2441= -12.249 dB

| | |
|---|---|
| **Duty Cycle correction factor** | **-12.249dB** |