

FCC Test Report

| | |
|--------------|--------------|
| Product Name | WMI |
| Model No. | D-WMI2017B |
| FCC ID. | KR5DWMI2017B |

| | |
|-----------|---------------------------------------------------------------------------|
| Applicant | Continental Automotive GmbH |
| Address | Siemensstrasse 12 SV C TS RBG EMC-Laboratory, 93055 Regensburg Germany |

| | |
|-----------------|---------------------|
| Date of Receipt | Apr. 24, 2017 |
| Issued Date | Jul. 06, 2017 |
| Report No. | 1740541R-RFUSP20V00 |
| 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.

Test Report

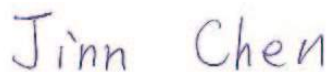
Issued Date: Jul. 06, 2017

Report No.: 1740541R-RFUSP20V00



| | |
|---------------------|---------------------------------------------------------------------------------|
| Product Name | WMI |
| Applicant | Continental Automotive GmbH |
| Address | Siemensstrasse 12 SV C TS RBG EMC-Laboratory, 93055 Regensburg Germany |
| Manufacturer | Continental Automotive GmbH |
| Factory | Continental Automotive Systems Srl |
| Factory Address | Strada Salzburg 8, Sibiu 550018, Romania |
| Model No. | D-WMI2017B |
| FCC ID. | KR5DWM2017B |
| EUT Rated Voltage | DC 13.5V (Power by Battery) |
| EUT Test Voltage | DC 13.5V (Power by Battery) |
| Trade Name | Continental |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart C: 2015 ANSI C63.4: 2014, ANSI C63.10: 2013 |
| Test Result | Complied |

Documented By :



(Senior Adm. Specialist / Jinn Chen)

Tested By :



(Assistant Engineer / Jen Chen)

Approved By :



(Director / Vincent Lin)

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1. GENERAL INFORMATION

1.1. EUT Description

| | |
|--------------------|-----------------|
| Product Name | WMI |
| Trade Name | Continental |
| Model No. | D-WMI2017B |
| FCC ID. | KR5DWMI2017B |
| Frequency Range | 113.6kHz |
| Type of Modulation | Load Modulation |
| Type of antenna | Coil |
| Number of Channel | 1 |

Frequency of Each Channel:

| Channel | Frequency |
|---------|-----------|
| 1 | 113.6kHz |

Note:

- The EUT is a WMI with a built-in 113.6kHz transmitter.
- The different of each variant is shown as below:

| Variants | Description |
|------------|---------------------------------------------------------------|
| A2C1104930 | No antenna PCB |
| A2C1104940 | With PCB antenna & GSM coupler |
| A2C1384530 | No antenna PCB |
| A2C1384540 | With PCB antenna for GSM coupler and contains Fakra Connector |
| A2C1714380 | No antenna PCB |

- These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.209
- 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 |
|-----------|------------------|

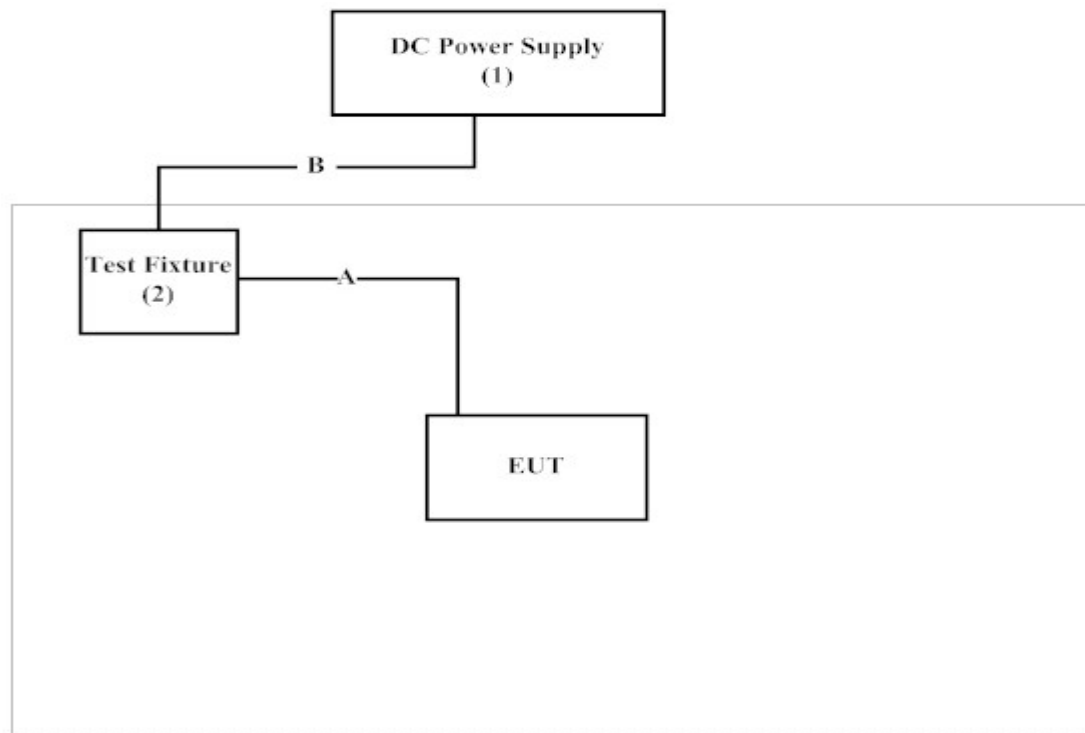
1.3. Test System Details

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

| | Product | Manufacturer | Model No. | Serial No. | Power Cord |
|-----|-----------------|----------------|-----------|------------|------------|
| (1) | DC POWER SUPPLY | GWInstek | SPD-3606 | N/A | N/A |
| (2) | Test Fixture | IB-Lenhardt AG | N/A | N/A | N/A |

| | Signal Cable Type | Signal cable Description |
|---|-------------------|--------------------------|
| A | DC Cable | Non-shielded, 0.3m |
| B | DC Cable | Non-shielded, 1.8m |

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Turn on the power of all equipment.
- (3) Start the continuous transmitter.
- (4) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

| Items | Required (IEC 68-1) | Actual |
|----------------------------|---------------------|----------|
| Temperature (°C) | 15-35 | 20-35 |
| Humidity (%RH) | 25-75 | 50-65 |
| Barometric pressure (mbar) | 860-1060 | 950-1000 |

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: http://www.dekra.com.tw/index_en

Site Description: Accredited by TAF
Accredited Number: 3023

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Site Address: No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan.
TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW1014

1.7. List of Test Equipment

For Conducted measurements /ASR3

| | Equipment | Manufacturer | Model No. | Serial No. | Cali. Data | Due. Data |
|---|---------------------|--------------|-------------|------------|------------|------------|
| X | Temperature Chamber | KSON | THS-D4T-100 | A0606 | 2017.03.31 | 2018.03.30 |
| X | Spectrum Analyzer | R&S | FSV40 | 101146 | 2016.12.14 | 2017.12.13 |
| | Power Meter | Anritsu | ML2496A | 1548003 | 2017.01.10 | 2018.01.09 |
| | Power Sensor | Anritsu | MA2411B | 1531024 | 2016.12.06 | 2017.12.05 |
| | Power Sensor | Anritsu | MA2411B | 1531025 | 2016.12.06 | 2017.12.05 |

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 : QuieTek Conduction Test System V8.0.110

For Radiated measurements /ACB1

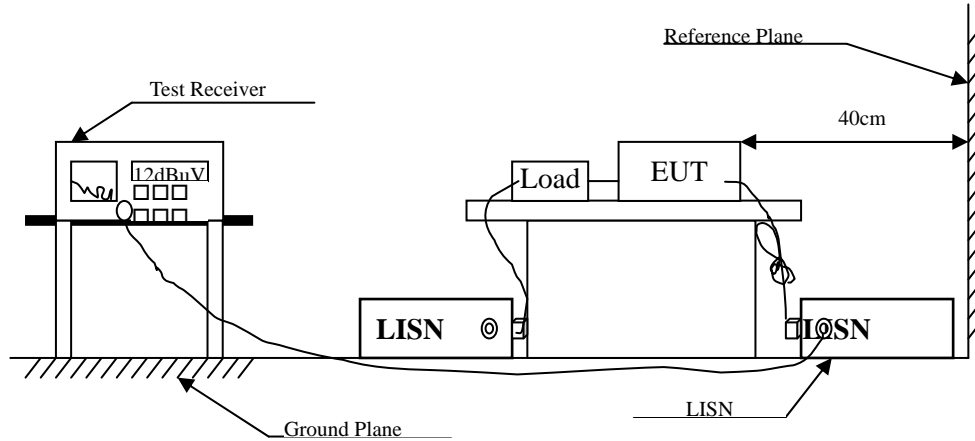
| | Equipment | Manufacturer | Model No. | Serial No. | Cali. Data | Due. Data |
|---|-------------------|---------------|--------------|------------|------------|------------|
| X | Loop Antenna | A.H. | SAS-562B | 272 | 2016.07.21 | 2017.07.20 |
| X | Bi-Log Antenna | SCHWARZBECK | VULB9168 | 9168-675 | 2017.02.09 | 2018.02.08 |
| | Horn Antenna | ETS-Lindgren | 3117 | 00203800 | 2016.10.13 | 2017.10.12 |
| | Horn Antenna | Com-Power | AH-840 | 101087 | 2017.05.03 | 2018.05.02 |
| X | Pre-Amplifier | EMCI | EMC001330 | 980316 | 2017.05.14 | 2018.05.15 |
| | Pre-Amplifier | EMCI | EMC051835SE | 980311 | 2017.05.15 | 2018.05.16 |
| | Pre-Amplifier | EMCI | EMC05820SE | 980310 | 2017.05.15 | 2018.05.16 |
| | Pre-Amplifier | EMCI | EMC184045SE | 980314 | 2017.05.17 | 2018.05.18 |
| | Filter | MICRO TRONICS | BRM50702 | G251 | 2016.08.11 | 2017.08.10 |
| | Filter | MICRO TRONICS | BRM50716 | G188 | 2016.08.11 | 2017.08.10 |
| X | EMI Test Receiver | R&S | ESR7 | 101602 | 2016.12.15 | 2017.12.14 |
| X | Spectrum Analyzer | R&S | FSV40 | 101149 | 2017.01.24 | 2018.01.23 |
| X | Coaxial Cable | SUHNER | SUCOFLEX 106 | RF002 | 2017.05.25 | 2018.05.24 |
| | Mircoflex Cable | HUBER SUHNER | SUCOFLEX 102 | MY3381/2 | 2016.08.11 | 2017.08.10 |

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 : QuieTek EMI 2.0 V2.1.113

2. Conducted Emission

2.1. Test Setup



2.2. Limits

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

2.3. Test Procedure

The EUT and simulators 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 refers 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 of 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. Uncertainty

± 2.26 dB

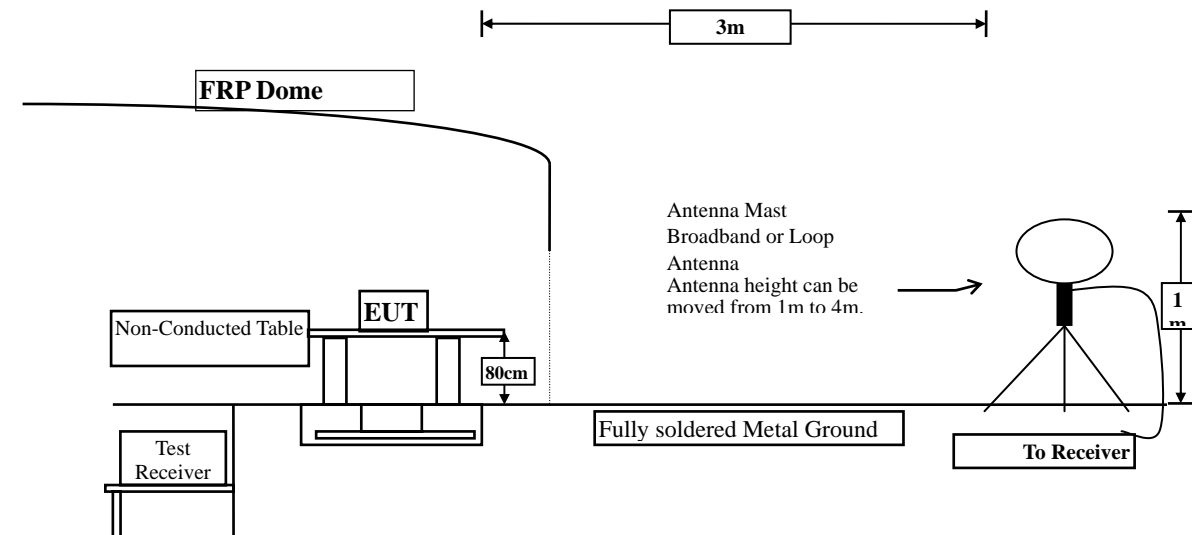
2.5. Test Result of Conducted Emission

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

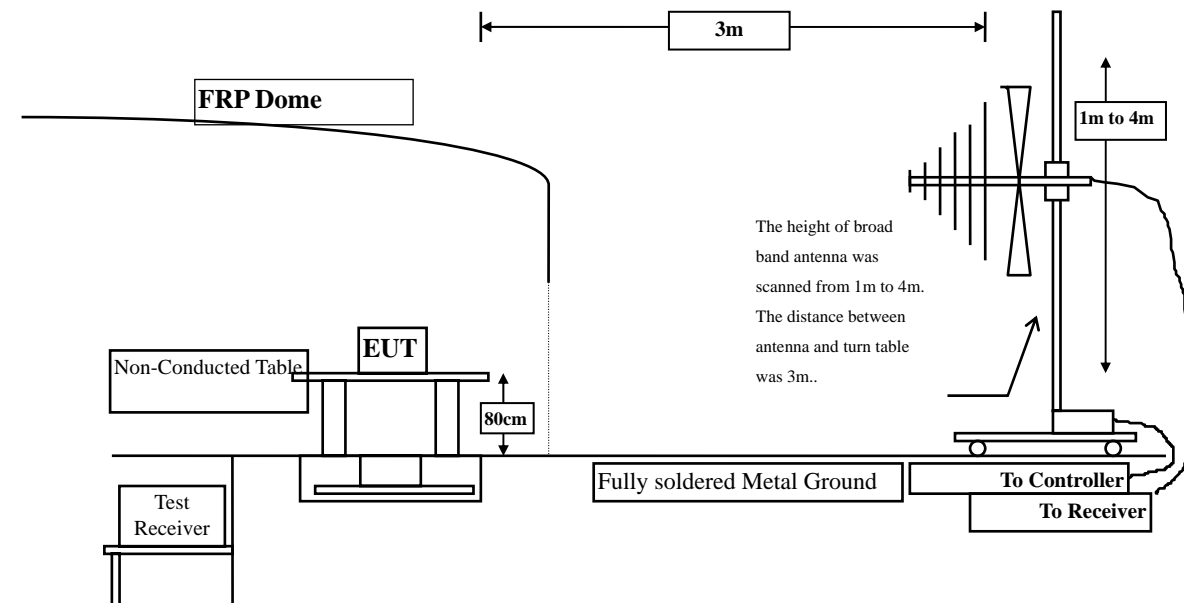
3. Radiated Emission

3.1. Test Setup

Under 30MHz Test Setup



Radiated Emission Below 1GHz



3.2. Limits

| FCC Part 15 Subpart B Paragraph 15.209 Limits | | |
|-----------------------------------------------|-----------------------------------|-------------------------------|
| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
| 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 |

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

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.209 requirements.

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

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 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz. Radiated emission measurements below 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 worst radiated emission is measured on the Final Measurement.

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

3.4. Uncertainty

± 4.08 dB above 1GHz

± 4.22 dB below 1GHz

3.5. Test Result of Radiated Emission

Product : WMI
 Test Item : Fundamental Radiated Emission
 Test Site : No.3 OATS
 Test date : 2017/05/11
 Test Mode : Mode 1: Transmit

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|-------------------|---------|---------|-------------|---------|---------|
| MHz | Factor | Level | Level | | |
| | dB | dBuV | dBuV/m | dB | dBuV/m |
| X-axis | | | | | |
| Peak | | | | | |
| Horizontal | | | | | |
| 0.113 | 19.737 | 56.000 | 75.737 | -31.133 | 106.496 |
| Vertical | | | | | |
| 0.113 | 19.737 | 47.300 | 67.037 | -39.833 | 106.496 |
| Y-axis | | | | | |
| Peak | | | | | |
| Horizontal | | | | | |
| 0.113 | 19.737 | 63.500 | 83.237 | -23.633 | 106.496 |
| Vertical | | | | | |
| 0.113 | 19.737 | 58.800 | 78.537 | -28.333 | 106.496 |
| Z-axis | | | | | |
| Peak | | | | | |
| Horizontal | | | | | |
| 0.113 | 19.737 | 54.900 | 74.637 | -32.233 | 106.496 |
| Vertical | | | | | |
| 0.113 | 19.737 | 59.900 | 79.637 | -27.233 | 106.496 |

Note:

1. Limit=25.666dBuV/m + 40*Log (300(m)/3(m))=105.666dBuV/m(Average detector), 125.666666dBuV/m (Peak detector)
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. Measurement Level = Reading Level + Correct Factor.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : WMI
 Test Item : Fundamental Radiated Emission
 Test Site : No.3 OATS
 Test date : 2017/05/10
 Test Mode : Mode 1: Transmit

9kHz~30MHz

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|-------------------|---------|---------|-------------|---------|---------|
| | Factor | Level | Level | | |
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| Quasi-Peak | | | | | |
| Horizontal | | | | | |
| 0.217 | 19.700 | 14.500 | 34.200 | -79.347 | 113.547 |
| 0.326 | 19.690 | 23.800 | 43.490 | -62.173 | 105.663 |
| 0.435 | 19.680 | 10.100 | 29.780 | -67.998 | 97.778 |
| 0.543 | 19.680 | 22.500 | 42.180 | -31.150 | 73.330 |
| 0.652 | 19.680 | 6.700 | 26.380 | -45.982 | 72.362 |
| 0.761 | 19.680 | 18.400 | 38.080 | -33.314 | 71.394 |
| 0.870 | 19.680 | 5.500 | 25.180 | -45.247 | 70.427 |
| 0.978 | 19.670 | 5.500 | 25.170 | -44.298 | 69.468 |
| 1.087 | 19.670 | 15.000 | 34.670 | -33.830 | 68.500 |
| Vertical | | | | | |
| 0.217 | 19.700 | 11.100 | 30.800 | -82.747 | 113.547 |
| 0.326 | 19.690 | 19.600 | 39.290 | -66.373 | 105.663 |
| 0.435 | 19.680 | 7.800 | 27.480 | -70.298 | 97.778 |
| 0.543 | 19.680 | 18.000 | 37.680 | -35.650 | 73.330 |
| 0.652 | 19.680 | 5.900 | 25.580 | -46.782 | 72.362 |
| 0.761 | 19.680 | 14.400 | 34.080 | -37.314 | 71.394 |
| 0.870 | 19.680 | 5.400 | 25.080 | -45.347 | 70.427 |
| 0.978 | 19.670 | 5.700 | 25.370 | -44.098 | 69.468 |
| 1.087 | 19.670 | 12.000 | 31.670 | -36.830 | 68.500 |

Note:

1. All Readings below 1GHz are Quasi-Peak.
2. Measurement Level = Reading Level + Correct Factor.
3. "■" means the worst emission level.
4. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : WMI
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test date : 2017/05/03
 Test Mode : Mode 1: Transmit

30MHz~1GHz

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|-------------------|---------|---------|-------------|---------|--------|
| MHz | Factor | Level | Level | | |
| | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal | | | | | |
| 108.725 | -14.391 | 36.650 | 22.259 | -21.241 | 43.500 |
| 276.014 | -10.729 | 29.483 | 18.754 | -27.246 | 46.000 |
| 396.913 | -7.668 | 29.657 | 21.989 | -24.011 | 46.000 |
| 531.870 | -4.903 | 29.392 | 24.490 | -21.510 | 46.000 |
| 694.942 | -2.030 | 29.036 | 27.006 | -18.994 | 46.000 |
| 843.957 | -0.135 | 29.473 | 29.338 | -16.662 | 46.000 |

Vertical

| | | | | | |
|---------|---------|--------|--------|---------|--------|
| 76.391 | -14.728 | 46.614 | 31.886 | -8.114 | 40.000 |
| 204.319 | -13.470 | 34.592 | 21.122 | -22.378 | 43.500 |
| 441.899 | -6.609 | 32.412 | 25.804 | -20.196 | 46.000 |
| 619.029 | -3.186 | 29.199 | 26.013 | -19.987 | 46.000 |
| 768.043 | -1.030 | 27.896 | 26.866 | -19.134 | 46.000 |
| 903.000 | 0.571 | 30.911 | 31.481 | -14.519 | 46.000 |

Note:

1. The reading levels below 1GHz are quasi-peak values.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

4. EMI Reduction Method During Compliance Testing

No modification was made during testing.