

FCC Test Report

Product Name	WMI
Model No.	D-WMI2017A
FCC ID.	KR5DWMI2017A

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

Date of Receipt	Apr. 24, 2017
Issued Date	May 25, 2017
Report No.	1740538R-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.

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Test Report

Issued Date: May 25, 2017

Report No.: 1740538R-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-WMI2017A
FCC ID.	KR5DWMI2017A
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 / Genie Chang)

Tested By :



(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-WMI2017A
FCC ID.	KR5DWMI2017A
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 difference of each variant is shown below:

Variants	Description
A2C1094850	Antenna PCB for NFC & GSM Trace with the different orientation of the supply
A2C1094860	Antenna PCB for NFC & GSM Trace with the different orientation of the supply but Fakra connector and components around are not populated.
A2C1101490	Antenna PCB for NFC & GSM Trace with the different orientation of the supply.
A2C1101500	Antenna PCB for NFC & GSM Trace with the different orientation of the supply but Fakra connector and components around are not populated.
A2C1648860	Antenna PCB for NFC & GSM Trace with the different orientation of the supply.

- 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
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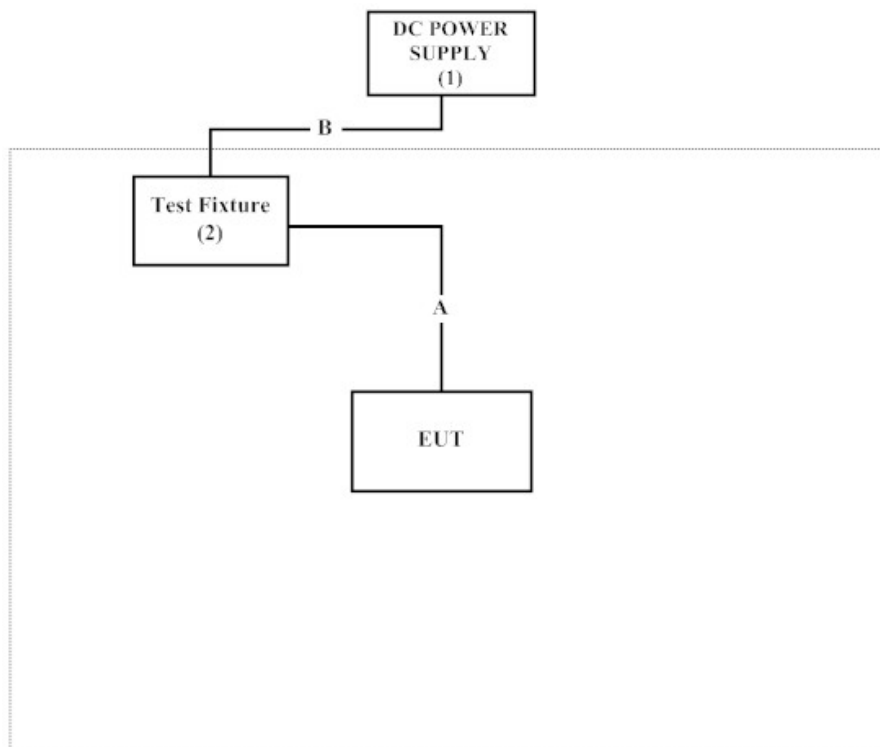
1.3. Test System Details

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	N/A	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
B	DC Cable

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.aspx

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd
Site Address: No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451,
Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789
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 : QuiTek Conduction Test System V8.0.110

For Radiated measurements /ACB1

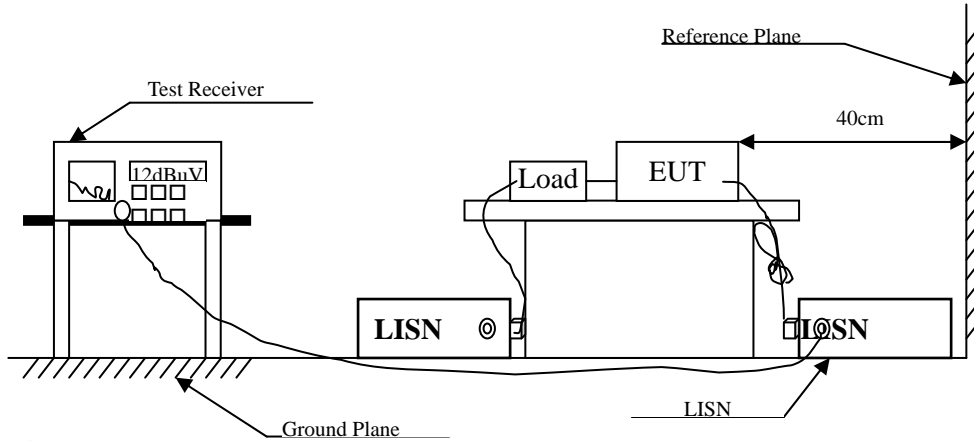
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	A.H.	SAS-562B	272	2016.07.21	2017.07.20
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2017.02.09	2018.02.08
	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
	Horn Antenna	Com-Power	AH-840	101087	2017.05.03	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 : QuiTek 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

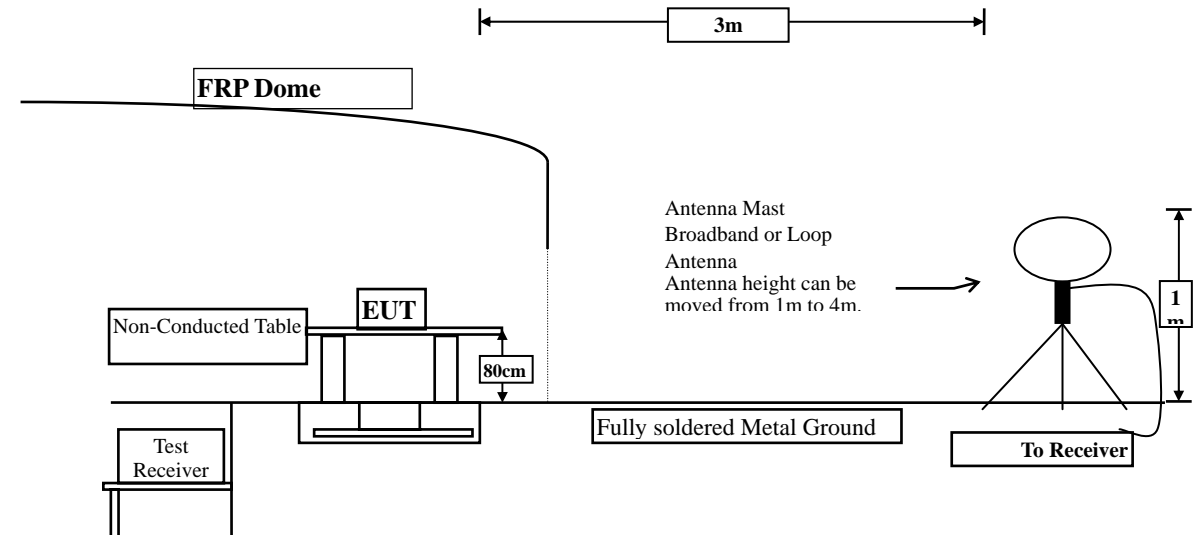
2.5. Test Result of Conducted Emission

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

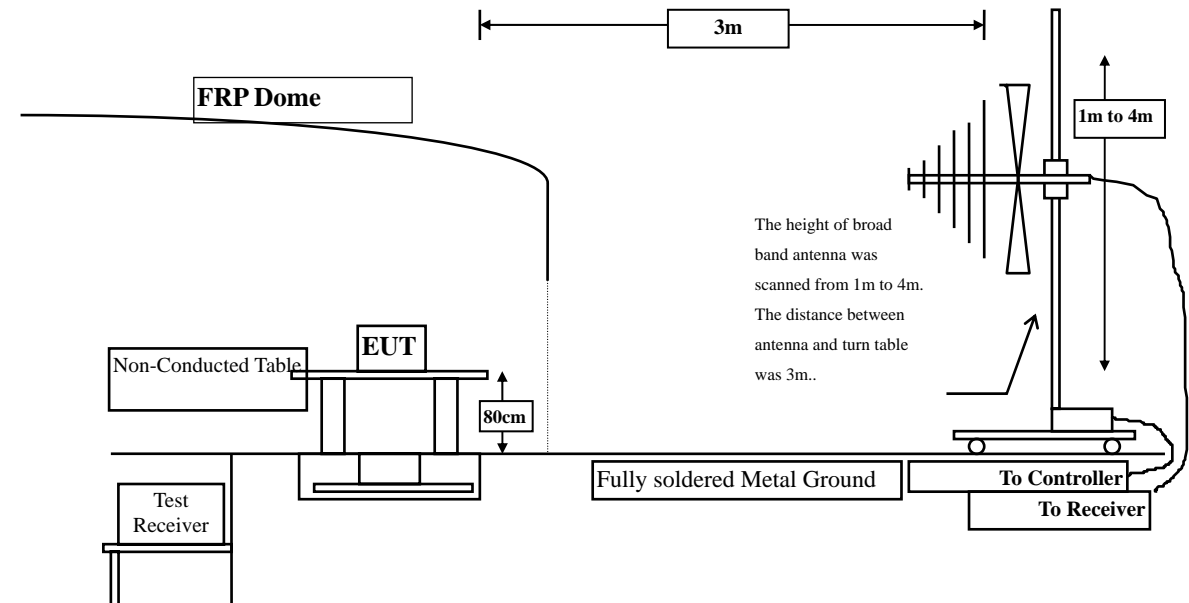
3. Radiated Emission

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 form 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 : 2017/05/10
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
X-axis					
Peak					
Horizontal					
0.113	19.737	42.400	62.137	-44.733	106.496
Vertical					
0.113	19.737	31.000	50.737	-56.133	106.496
Y-axis					
Peak					
Horizontal					
0.113	19.737	51.500	71.237	-35.633	106.496
Vertical					
0.113	19.737	46.400	66.137	-40.733	106.496
Z-axis					
Peak					
Horizontal					
0.113	19.737	51.300	71.037	-35.833	106.496
Vertical					
0.113	19.737	46.500	66.237	-40.633	106.496

Note:

1. $\text{Limit} = 25.666 \text{ dBuV/m} + 40 * \text{Log} (300(\text{m})/3(\text{m})) = 105.666 \text{ dBuV/m}$ (Average detector),
125.6666666 dBuV/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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Quasi-Peak					
Horizontal					
0.217	19.700	14.400	34.100	-79.447	113.547
0.326	19.690	23.100	42.790	-62.873	105.663
0.435	19.680	7.100	26.780	-70.998	97.778
0.543	19.680	22.000	41.680	-31.650	73.330
0.652	19.680	6.900	26.580	-45.782	72.362
0.761	19.680	18.000	37.680	-33.714	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	14.500	34.170	-34.330	68.500
Vertical					
0.217	19.700	12.200	31.900	-81.647	113.547
0.326	19.690	18.900	38.590	-67.073	105.663
0.435	19.680	6.800	26.480	-71.298	97.778
0.543	19.680	17.600	37.280	-36.050	73.330
0.652	19.680	5.900	25.580	-46.782	72.362
0.761	19.680	5.900	25.580	-45.814	71.394
0.870	19.680	14.000	33.680	-36.747	70.427
0.978	19.670	5.700	25.370	-44.098	69.468
1.087	19.670	11.500	31.170	-37.330	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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
160.739	-10.620	30.195	19.576	-23.924	43.500
315.377	-9.742	29.307	19.565	-26.435	46.000
457.362	-6.287	27.998	21.711	-24.289	46.000
599.348	-3.344	29.033	25.690	-20.310	46.000
734.304	-1.454	28.090	26.636	-19.364	46.000
869.261	0.168	28.537	28.705	-17.295	46.000
Vertical					
84.826	-16.325	46.806	30.481	-9.519	40.000
283.043	-10.457	40.303	29.846	-16.154	46.000
509.377	-5.356	30.227	24.871	-21.129	46.000
672.449	-2.473	29.878	27.404	-18.596	46.000
807.406	-0.574	30.401	29.826	-16.174	46.000
942.362	0.996	29.421	30.417	-15.583	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.