

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.

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Test Report

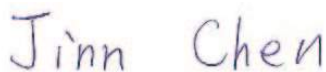
Issued Date: Jul. 06, 2017

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.	KR5DWMI2017B
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)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION.....	4
1.1. EUT Description	4
1.2. Operational Description	5
1.3. Test System Details.....	6
1.4. Configuration of Test System	6
1.5. EUT Exercise Software.....	6
1.6. Test Facility.....	7
1.7. List of Test Equipment.....	8
2. Conducted Emission.....	9
2.1. Test Setup.....	9
2.2. Limits	9
2.3. Test Procedure.....	9
2.4. Uncertainty.....	9
2.5. Test Result of Conducted Emission	10
3. Radiated Emission.....	11
3.1. Test Setup.....	11
3.2. Limits	12
3.3. Test Procedure.....	13
3.4. Uncertainty.....	13
3.5. Test Result of Radiated Emission	14
4. EMI Reduction Method During Compliance Testing	17
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

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
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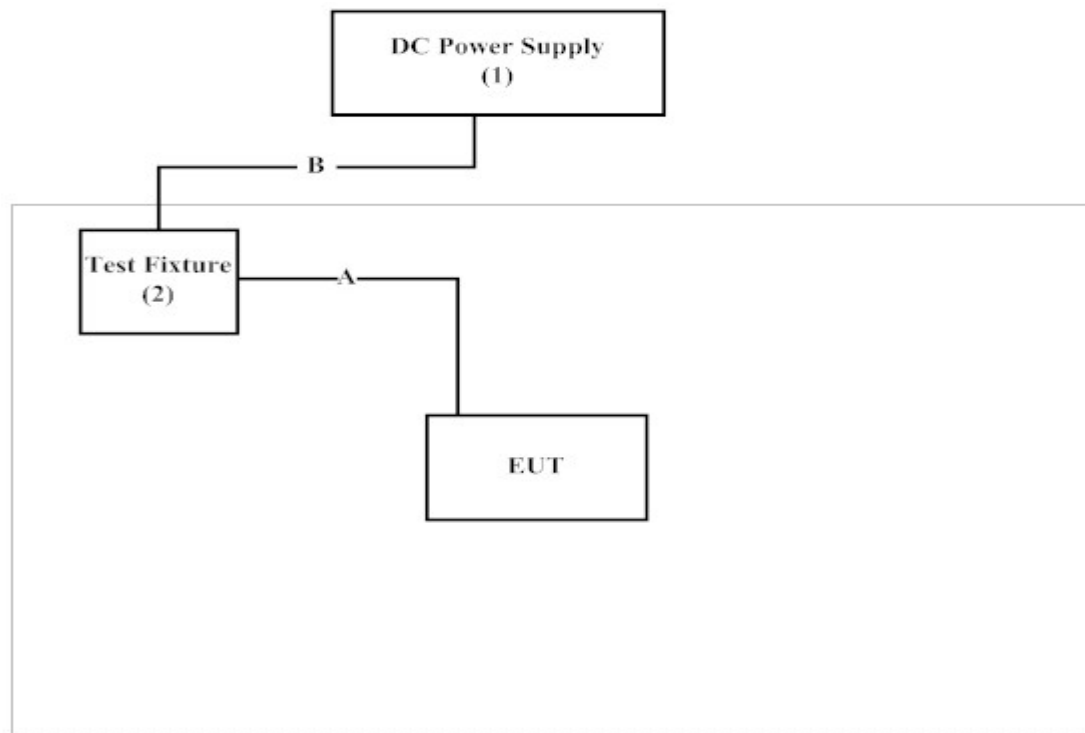
1.3. Test System Details

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	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

Site Name: DEKRA Testing and Certification Co., Ltd.
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

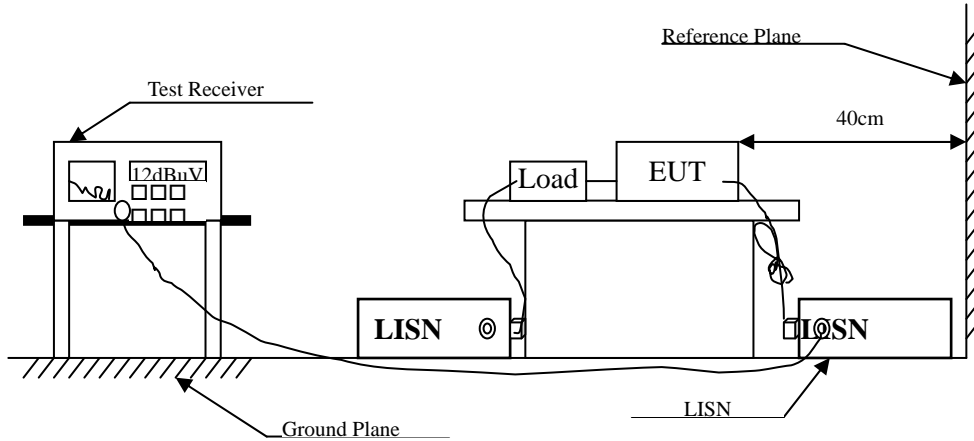
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	A.H.	SAS-562B	272	2016.07.21	2017.07.20
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2017.02.09	2018.02.08
	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
	Horn Antenna	Com-Power	AH-840	101087	2017.05.03	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 investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Uncertainty

± 2.26 dB

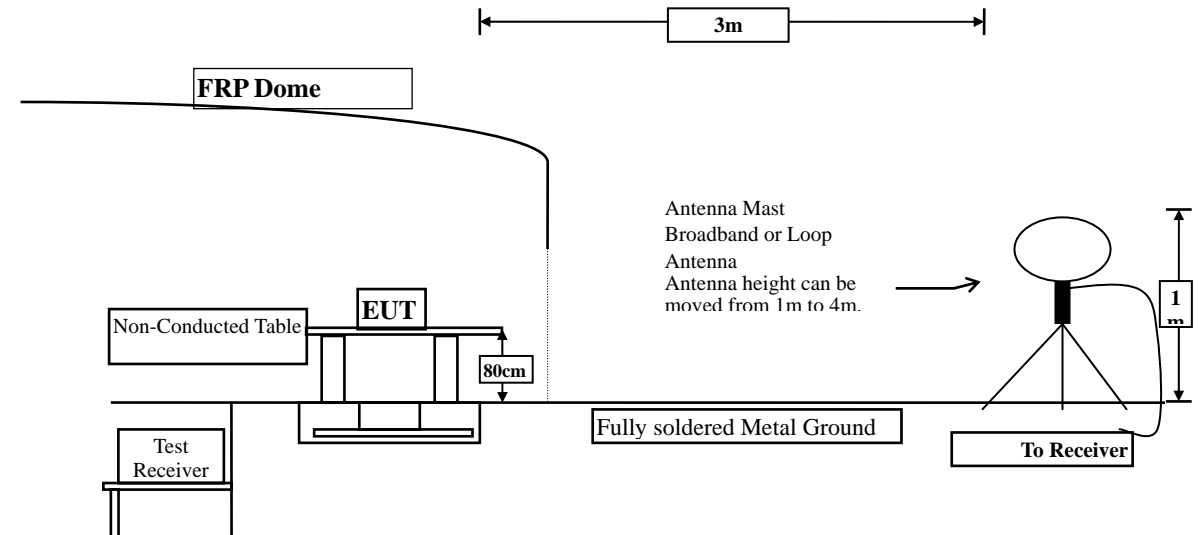
2.5. Test Result of Conducted Emission

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

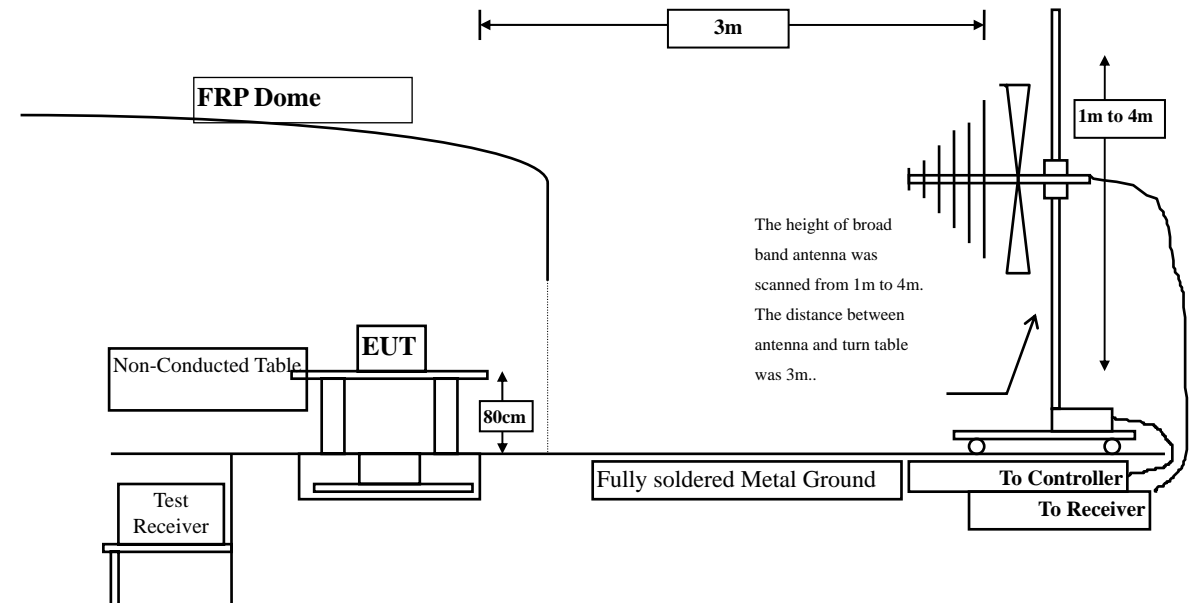
3. Radiated Emission

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 : 2017/05/11
 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	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. $\text{Limit} = 25.666 \text{ dBuV/m} + 40 \cdot \log(300 \text{ (m)} / 3 \text{ (m)}) = 105.666 \text{ dBuV/m}$ (Average detector),
125.666666 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	14.500	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 MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit 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.