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-RFUSP17V01
Report Version	V1.0

Testing Laboratory
3023

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.

Test Report

Issued Date: May 25, 2017
Report No.: 1740538R-RFUSP17V01

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: 2016 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By : Genie Chang

(Senior Adm. Specialist / Genie Chang)

Tested By : Jen Chen

(Engineer / Jen Chen)

Approved By :

(Director / Vincent Lin)

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	WMI
Trade Name	Continental
Model No.	D-WMI2017A
FCC ID	KR5DWMI2017A
Frequency Range	13.56MHz
Modulation	ASK
Antenna Type	Coil

Frequency of Each Channel:

Channel	Frequency
Channel 1:	13.56 MHz

Note:

1. The EUT is a WMI with a built-in 13.56MHz transmitter.
2. 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.

3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.225
4. 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

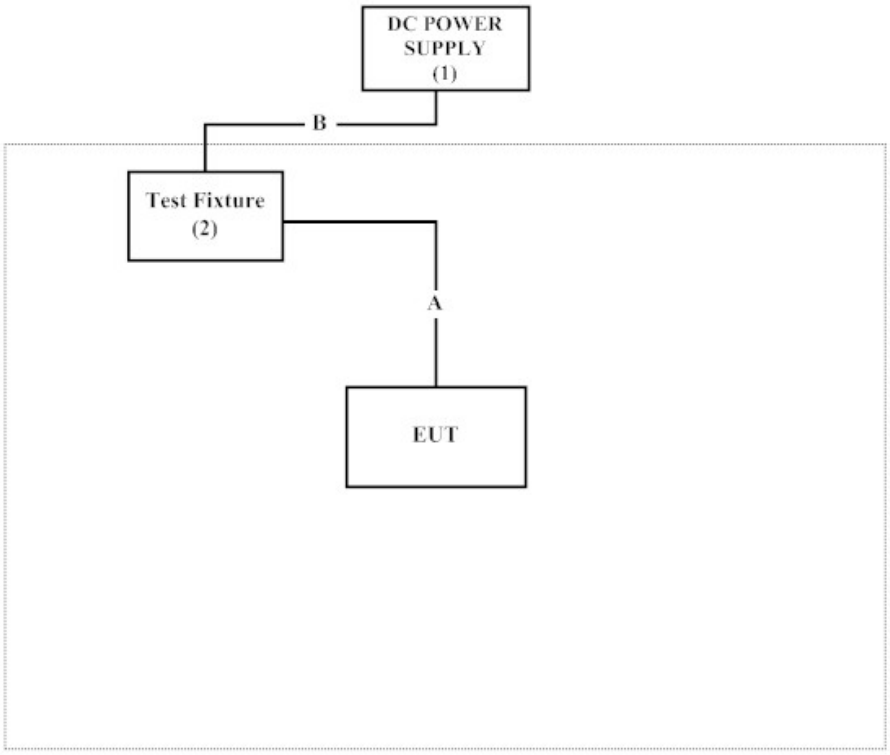
1.3. Tested System Datails

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	Non-shielded, 0.3m
B	DC Cable	Non-shielded, 1.8m

1.4. Configuration of tested 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

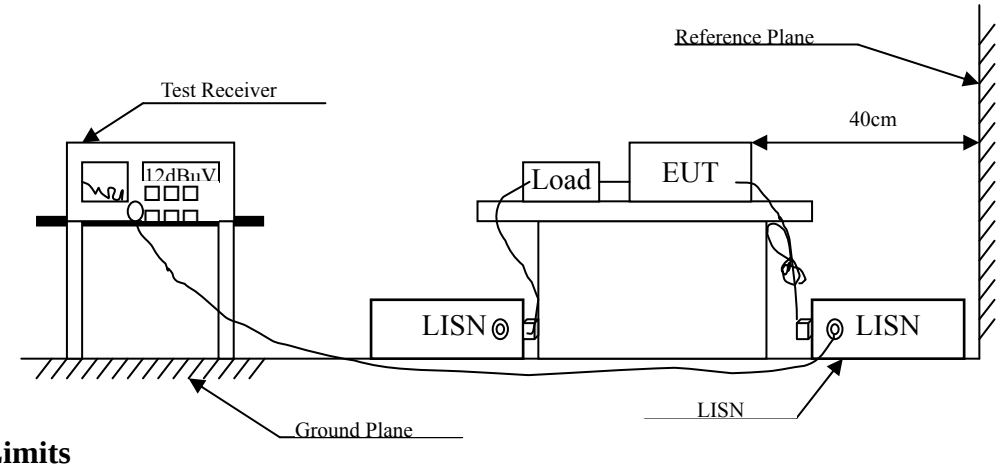
For Radiated measurements /ACB1

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

2.4. Uncertainty

±2.35dB

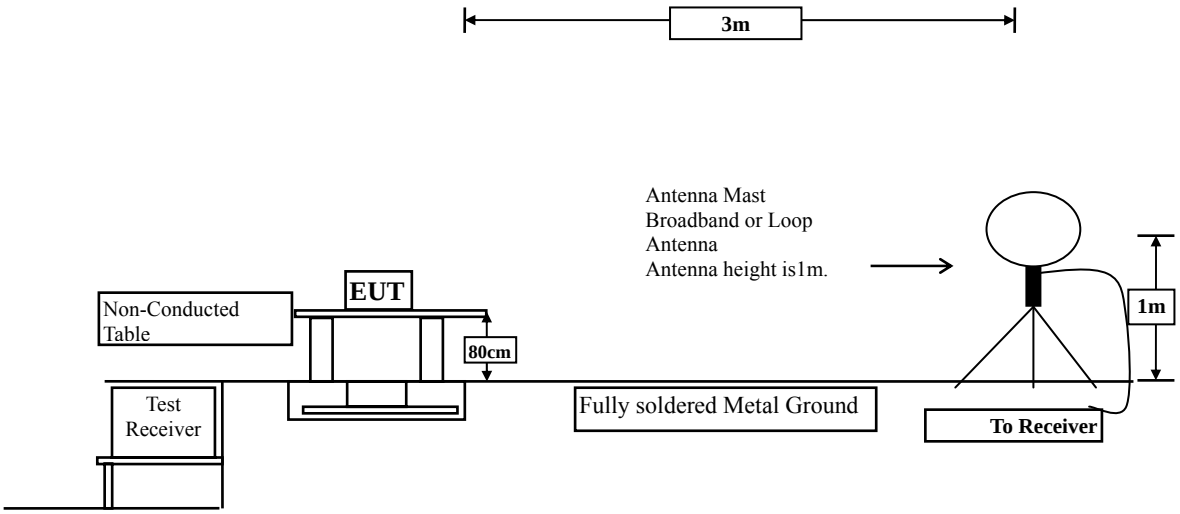
2.5. Test Result of Conducted Emission

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

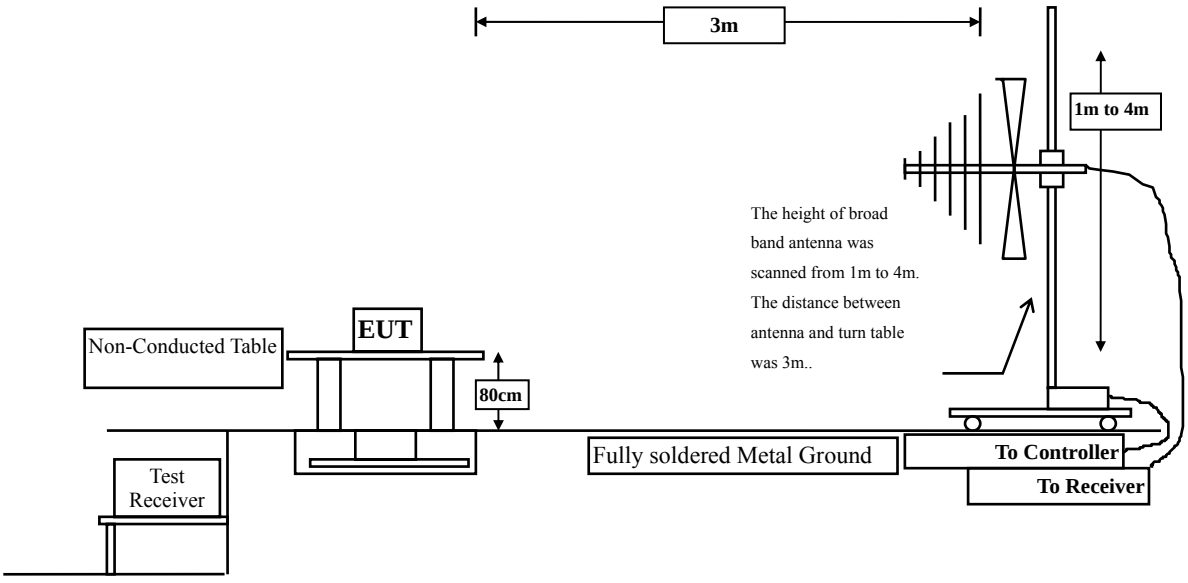
3. Radiated Emission

3.1. Test Setup

Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



3.2. Limits

➢ Fundamental electric field strength Limit

FCC Part 15 Subpart C Paragraph 15.225 Limits				
Fundamental Frequency MHz	Field strength of fundamental			
	uV/m	Distance (meter)	dBuV/m	Distance (meter)
13.553 – 13.567	15848	30	124	3
13.410 – 13.553 and 13.567 – 13.710	334	30	90.50	3
13.110 – 13.410 and 13.710 – 14.010	106	30	80.50	3
Outside of the 13.110 – 14.010	See 15.209 Limits			

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 quasi-peak detector.

➢ Spurious electric field strength Limit

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/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

Fundamental electric field strength:

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 electric field strength.

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

The antenna which is 1 meter above ground. All X-axis, Y-axis and Z-axis polarization of the antenna are set on measurement.

Spurious electric field strength:

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 antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

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 C6310: 2013 on radiated measurement.

The bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz. The frequency range from 9kHz to 10th harmonics is checked.

3.4. Uncertainty

Horizontal polarization：

30-300MHz: ±4.08dB；300M-1GHz: ±3.86dB；1-18GHz: ±3.77dB；18-40GHz: ±3.98dB

Vertical polarization：

30-300MHz: ±4.81dB；300M-1GHz: ±3.87dB；1-18GHz : ±3.83dB；18-40GHz: ±3.98dB

3.5. Test Result of Radiated Emission

Product : WMI
Test Item : Fundamental Radiated Emission
Test Mode : Mode 1: Transmit
Test date : 2017/05/10

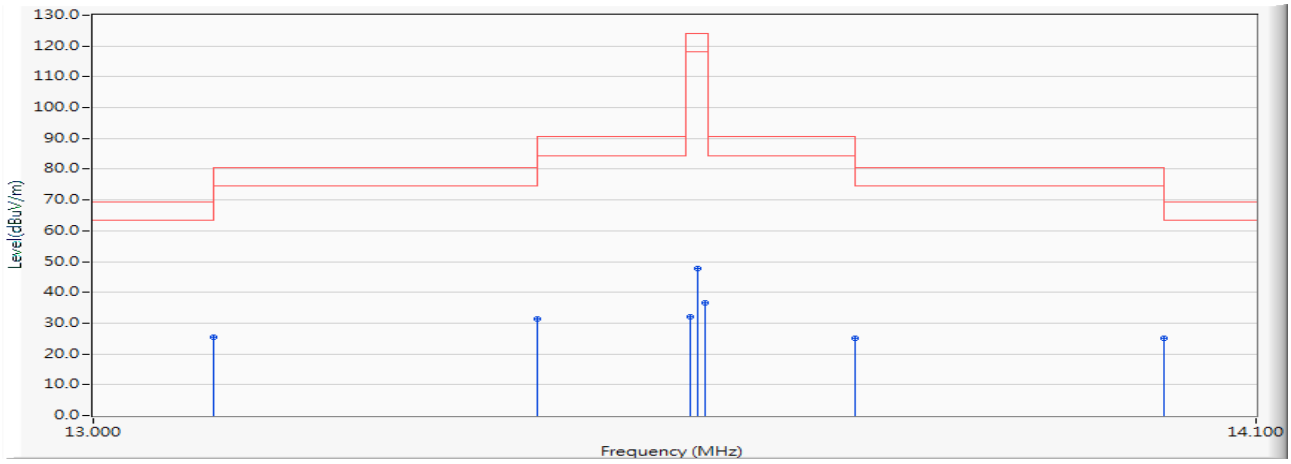
(External Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
X-axis					
Quasi-Peak					
Horizontal					
13.110	20.020	5.580	25.600	-43.900	69.500
13.410	20.020	11.400	31.420	-49.080	80.500
13.553	20.020	11.910	31.930	-92.070	124.000
13.560	20.020	27.650	47.670	-76.330	124.000
13.567	20.020	16.540	36.560	-87.440	124.000
13.710	20.020	5.130	25.150	-55.350	80.500
14.010	20.020	5.060	25.080	-44.420	69.500
Vertical					
13.110	20.020	5.020	25.040	-44.460	69.500
13.410	20.020	9.350	29.370	-51.130	80.500
13.553	20.020	10.170	30.190	-93.810	124.000
13.560	20.020	23.510	43.530	-80.470	124.000
13.567	20.020	14.510	34.530	-89.470	124.000
13.710	20.020	4.800	24.820	-55.680	80.500
14.010	20.020	4.690	24.710	-44.790	69.500

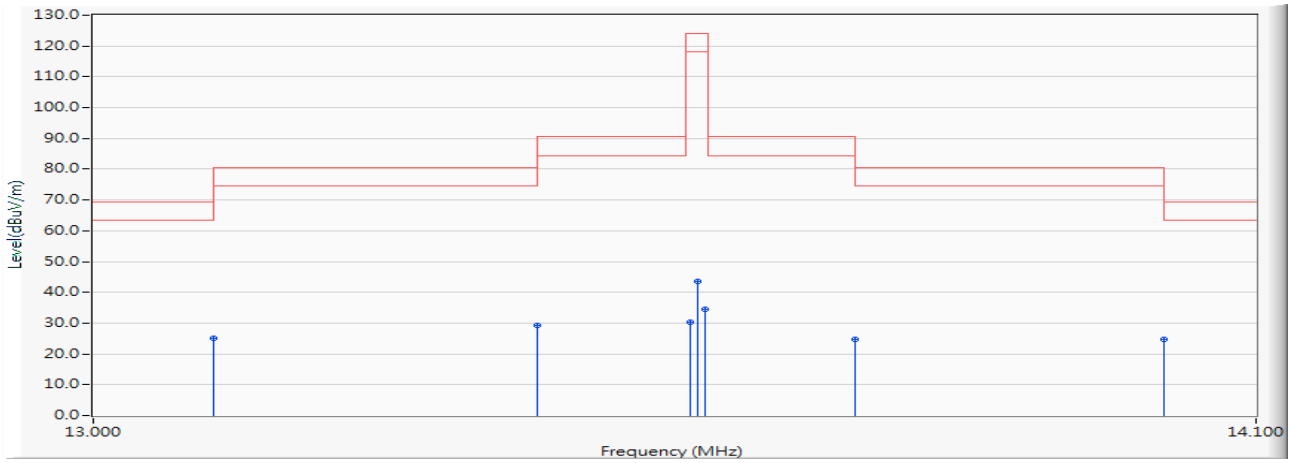
Note:

1. Fundamental Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. " " means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Horizontal



Vertical



Product : WMI
Test Item : Fundamental Radiated Emission
Test Mode : Mode 1: Transmit
Test date : 2017/05/10

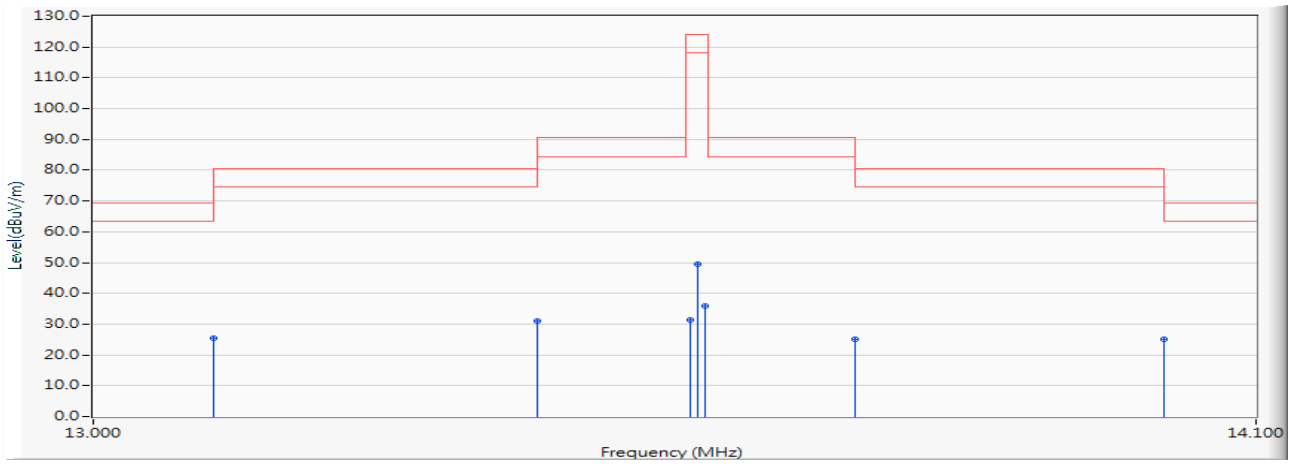
(External Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Y-axis					
Quasi-Peak					
Horizontal					
13.110	20.020	5.560	25.580	-43.920	69.500
13.410	20.020	10.880	30.900	-49.600	80.500
13.553	20.020	11.480	31.500	-92.500	124.000
13.560	20.020	29.610	49.630	-74.370	124.000
13.567	20.020	15.970	35.990	-88.010	124.000
13.710	20.020	4.900	24.920	-55.580	80.500
14.010	20.020	5.130	25.150	-44.350	69.500
Vertical					
13.110	20.020	4.980	25.000	-44.500	69.500
13.410	20.020	8.950	28.970	-51.530	80.500
13.553	20.020	12.140	32.160	-91.840	124.000
13.560	20.020	26.710	46.730	-77.270	124.000
13.567	20.020	16.770	36.790	-87.210	124.000
13.710	20.020	4.480	24.500	-56.000	80.500
14.010	20.020	4.680	24.700	-44.800	69.500

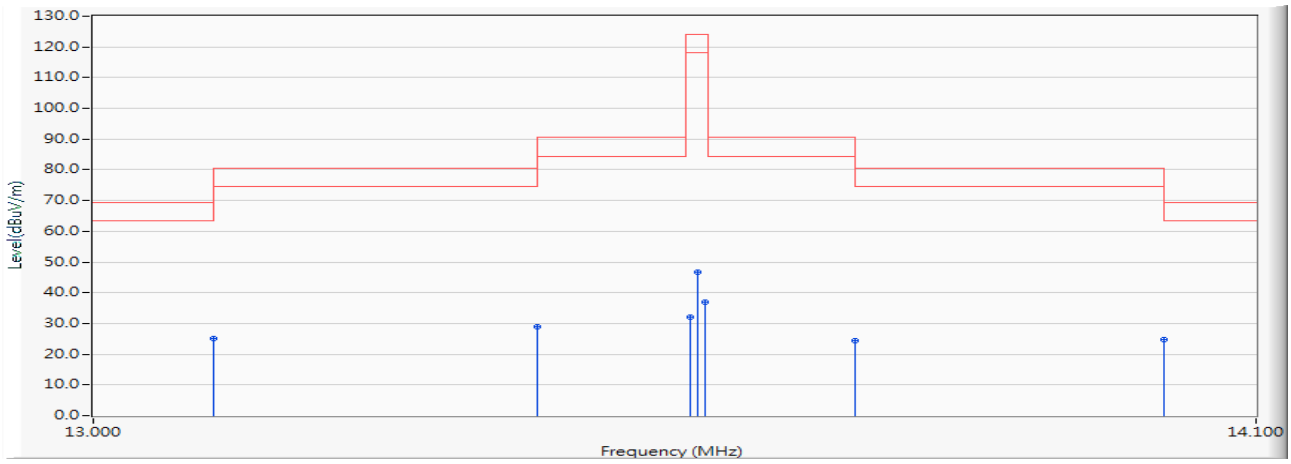
Note:

1. Fundamental Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. " " means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Horizontal



Vertical



Product : WMI
Test Item : Fundamental Radiated Emission
Test Mode : Mode 1: Transmit
Test date : 2017/05/10

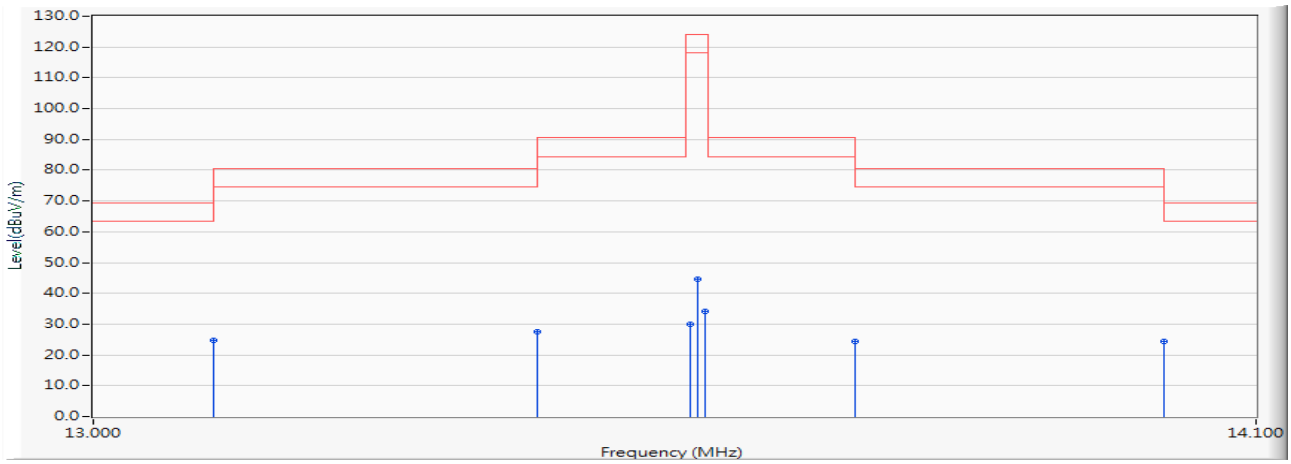
(External Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Z-axis					
Quasi-Peak					
Horizontal					
13.110	20.020	4.680	24.700	-44.800	69.500
13.410	20.020	7.510	27.530	-52.970	80.500
13.553	20.020	10.090	30.110	-93.890	124.000
13.560	20.020	24.760	44.780	-79.220	124.000
13.567	20.020	14.260	34.280	-89.720	124.000
13.710	20.020	4.470	24.490	-56.010	80.500
14.010	20.020	4.380	24.400	-45.100	69.500
Vertical					
13.110	20.020	5.230	25.250	-44.250	69.500
13.410	20.020	10.480	30.500	-50.000	80.500
13.553	20.020	11.650	31.670	-92.330	124.000
13.560	20.020	27.250	47.270	-76.730	124.000
13.567	20.020	16.100	36.120	-87.880	124.000
13.710	20.020	4.760	24.780	-55.720	80.500
14.010	20.020	4.790	24.810	-44.690	69.500

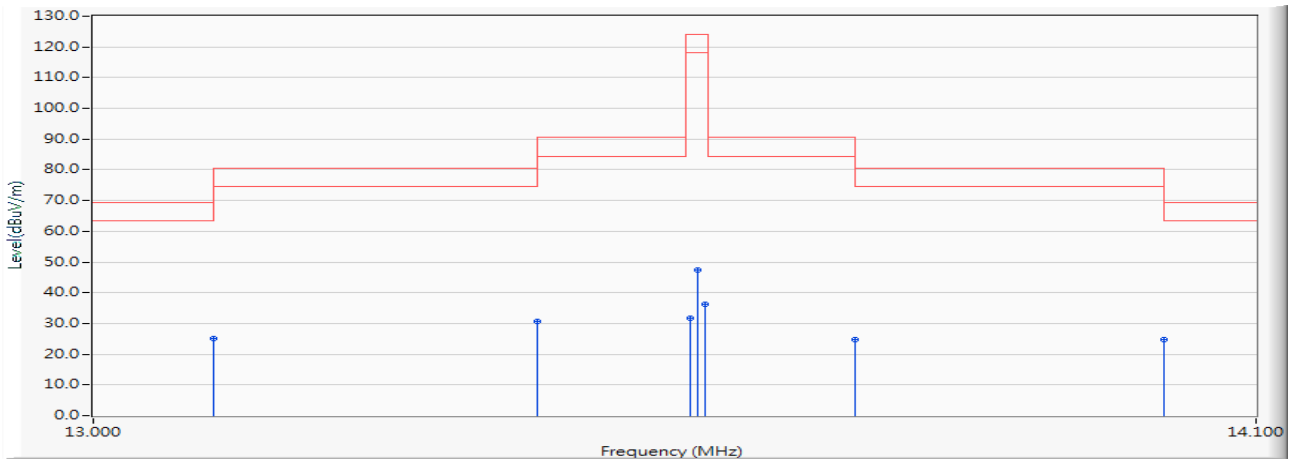
Note:

1. Fundamental Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. " " means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Horizontal



Vertical



Product : WMI
Test Item : Fundamental Radiated Emission
Test Mode : Mode 1: Transmit
Test date : 2017/05/10

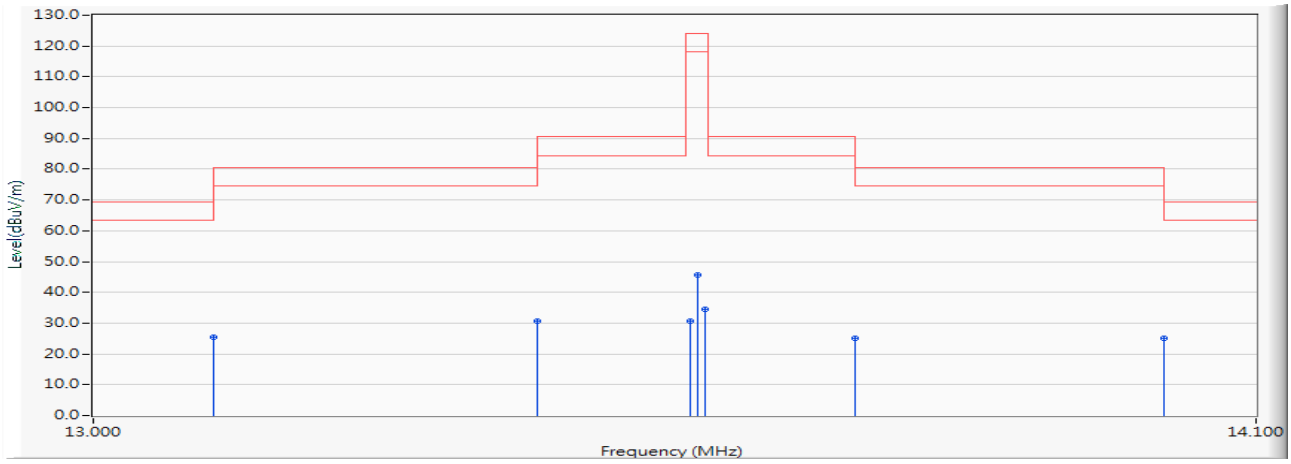
(Internal Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
X-axis					
Quasi-Peak					
Horizontal					
13.110	20.020	5.490	25.510	-43.990	69.500
13.410	20.020	10.630	30.650	-49.850	80.500
13.553	20.020	10.480	30.500	-93.500	124.000
13.560	20.020	25.610	45.630	-78.370	124.000
13.567	20.020	14.620	34.640	-89.360	124.000
13.710	20.020	5.060	25.080	-55.420	80.500
14.010	20.020	5.130	25.150	-44.350	69.500
Vertical					
13.110	20.020	4.900	24.920	-44.580	69.500
13.410	20.020	10.120	30.140	-50.360	80.500
13.553	20.020	30.200	50.220	-73.780	124.000
13.560	20.020	47.630	67.650	-56.350	124.000
13.567	20.020	35.690	55.710	-68.290	124.000
13.710	20.020	7.700	27.720	-52.780	80.500
14.010	20.020	4.670	24.690	-44.810	69.500

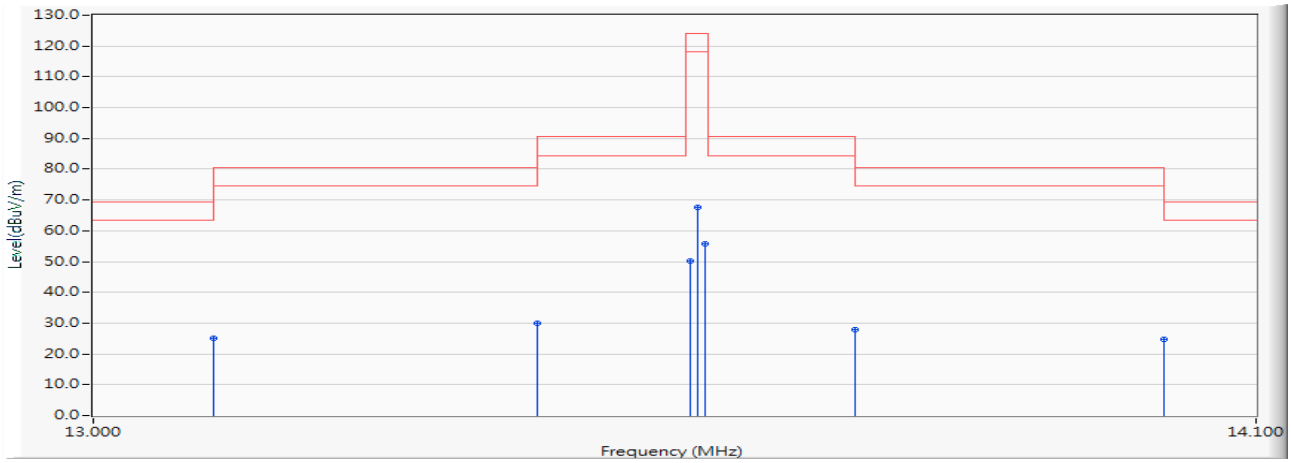
Note:

1. Fundamental Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. " " means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Horizontal



Vertical



Product : WMI
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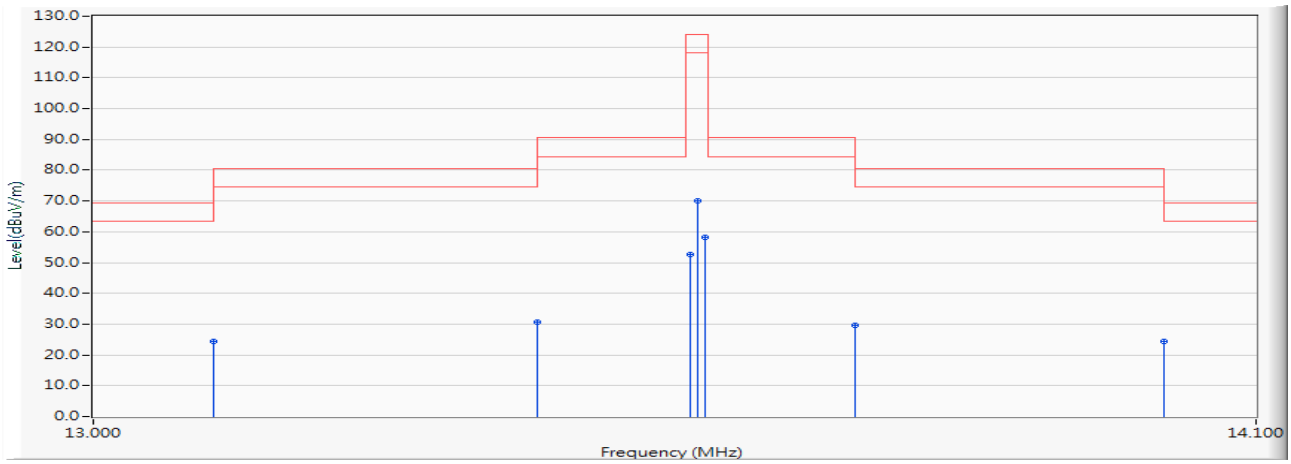
(Internal Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Y-axis					
Quasi-Peak					
Horizontal					
13.110	20.020	4.400	24.420	-45.080	69.500
13.410	20.020	10.480	30.500	-50.000	80.500
13.553	20.020	32.610	52.630	-71.370	124.000
13.560	20.020	50.060	70.080	-53.920	124.000
13.567	20.020	38.120	58.140	-65.860	124.000
13.710	20.020	9.650	29.670	-50.830	80.500
14.010	20.020	4.310	24.330	-45.170	69.500
Vertical					
13.110	20.020	4.760	24.780	-44.720	69.500
13.410	20.020	9.970	29.990	-50.510	80.500
13.553	20.020	30.470	50.490	-73.510	124.000
13.560	20.020	47.900	67.920	-56.080	124.000
13.567	20.020	35.960	55.980	-68.020	124.000
13.710	20.020	7.730	27.750	-52.750	80.500
14.010	20.020	4.460	24.480	-45.020	69.500

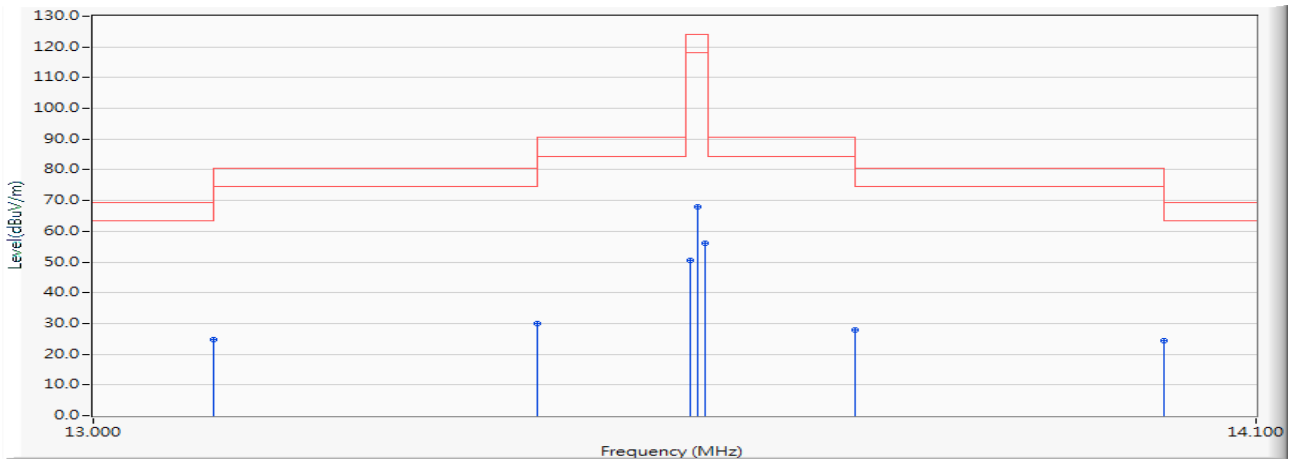
Note:

1. Fundamental Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. " " means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Horizontal



Vertical



Product : WMI
Test Item : Fundamental Radiated Emission
Test Mode : Mode 1: Transmit
Test date : 2017/05/10

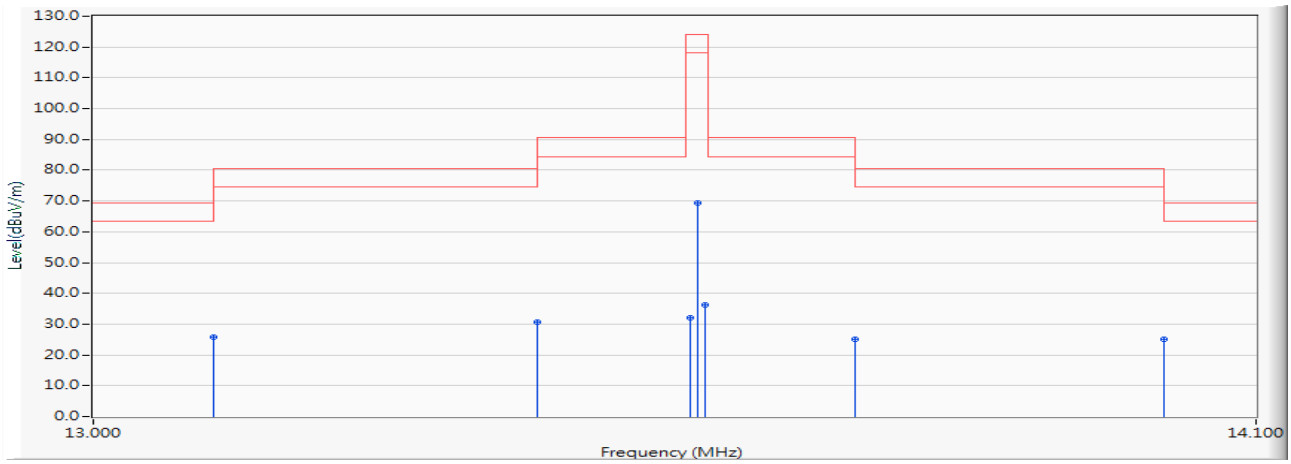
(Internal Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Z-axis					
Quasi-Peak					
Horizontal					
13.110	20.020	5.600	25.620	-43.880	69.500
13.410	20.020	10.520	30.540	-49.960	80.500
13.553	20.020	11.930	31.950	-92.050	124.000
13.560	20.020	49.360	69.380	-54.620	124.000
13.567	20.020	16.380	36.400	-87.600	124.000
13.710	20.020	4.950	24.970	-55.530	80.500
14.010	20.020	4.920	24.940	-44.560	69.500
Vertical					
13.110	20.020	4.990	25.010	-44.490	69.500
13.410	20.020	11.890	31.910	-48.590	80.500
13.553	20.020	33.950	53.970	-70.030	124.000
13.560	20.020	45.460	65.480	-58.520	124.000
13.567	20.020	39.450	59.470	-64.530	124.000
13.710	20.020	11.080	31.100	-49.400	80.500
14.010	20.020	4.570	24.590	-44.910	69.500

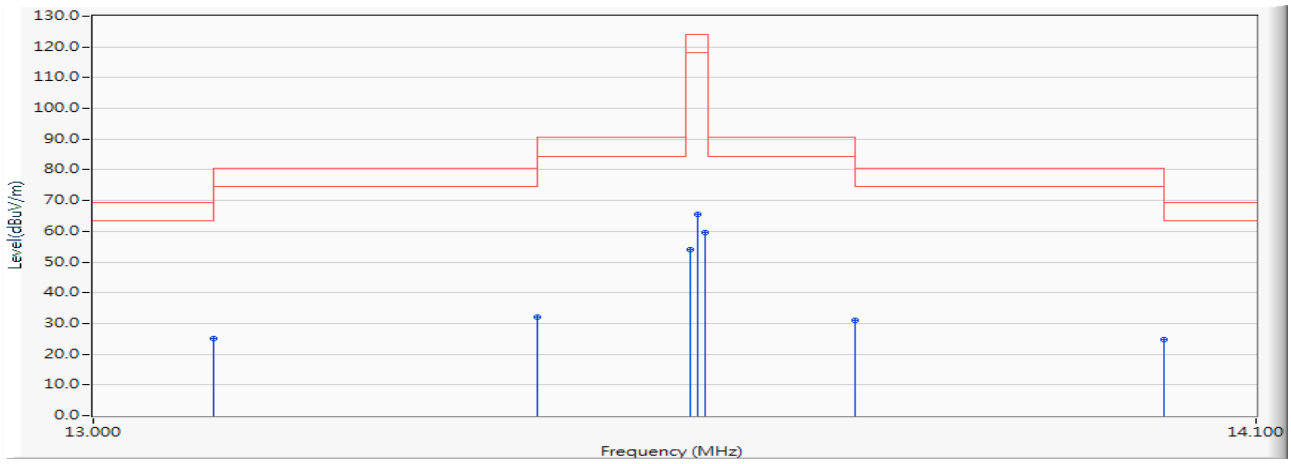
Note:

1. Fundamental Limit=84dBuV/m + 40*Log (30(m)/3(m))=124dBuV/m
2. All Readings below 1GHz are Quasi-Peak, above are average value.
3. " " means the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.

Horizontal



Vertical



Product	:	WMI
Test Item	:	General Radiated Emission Data (below 30MHz)
Test Mode	:	Mode 1: Transmit
Test date	:	2017/05/10

(External Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Quasi-Peak					
Horizontal					
27.120	20.191	9.940	30.131	-39.409	69.540
Vertical					
27.120	20.191	10.660	30.851	-38.689	69.540

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : WMI
Test Item : General Radiated Emission Data (below 30MHz)
Test Mode : Mode 1: Transmit
Test date : 2017/05/10

(Internal Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Quasi-Peak					
Horizontal					
27.120	20.191	7.450	27.641	-41.899	69.540
Vertical					
27.120	20.191	8.360	28.551	-40.989	69.540

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : WMI
Test Item : General Radiated Emission Data (above 30MHz)
Test Mode : Mode 1: Transmit
Test date : 2017/05/03

(External Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Quasi-Peak					
Horizontal					
148.087	-10.804	44.022	33.218	-10.282	43.500
311.159	-9.832	29.366	19.534	-26.466	46.000
467.203	-6.113	29.883	23.769	-22.231	46.000
609.188	-3.262	28.969	25.708	-20.292	46.000
758.203	-1.146	29.118	27.972	-18.028	46.000
914.246	0.691	29.221	29.912	-16.088	46.000
Quasi-Peak					
Vertical					
72.174	-13.955	47.542	33.588	-6.412	40.000
299.913	-10.075	38.761	28.686	-17.314	46.000
447.522	-6.474	38.052	31.578	-14.422	46.000
680.884	-2.306	31.625	29.319	-16.681	46.000
814.435	-0.488	34.118	33.630	-12.370	46.000
922.681	0.784	30.293	31.077	-14.923	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : WMI
Test Item : General Radiated Emission Data (above 30MHz)
Test Mode : Mode 1: Transmit
Test date : 2017/05/03

(Internal Antenna)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Quasi-Peak					
Horizontal					
121.377	-12.958	34.643	21.685	-21.815	43.500
238.058	-12.155	28.212	16.057	-29.943	46.000
394.101	-7.745	27.862	20.117	-25.883	46.000
557.174	-4.361	29.578	25.217	-20.783	46.000
727.275	-1.550	28.946	27.396	-18.604	46.000
911.435	0.661	26.757	27.418	-18.582	46.000
Quasi-Peak					
Vertical					
111.536	-14.008	34.759	20.751	-22.749	43.500
326.623	-9.494	30.537	21.043	-24.957	46.000
509.377	-5.356	30.755	25.399	-20.601	46.000
623.246	-3.153	30.147	26.994	-19.006	46.000
748.362	-1.266	30.212	28.946	-17.054	46.000
881.913	0.320	30.232	30.553	-15.447	46.000

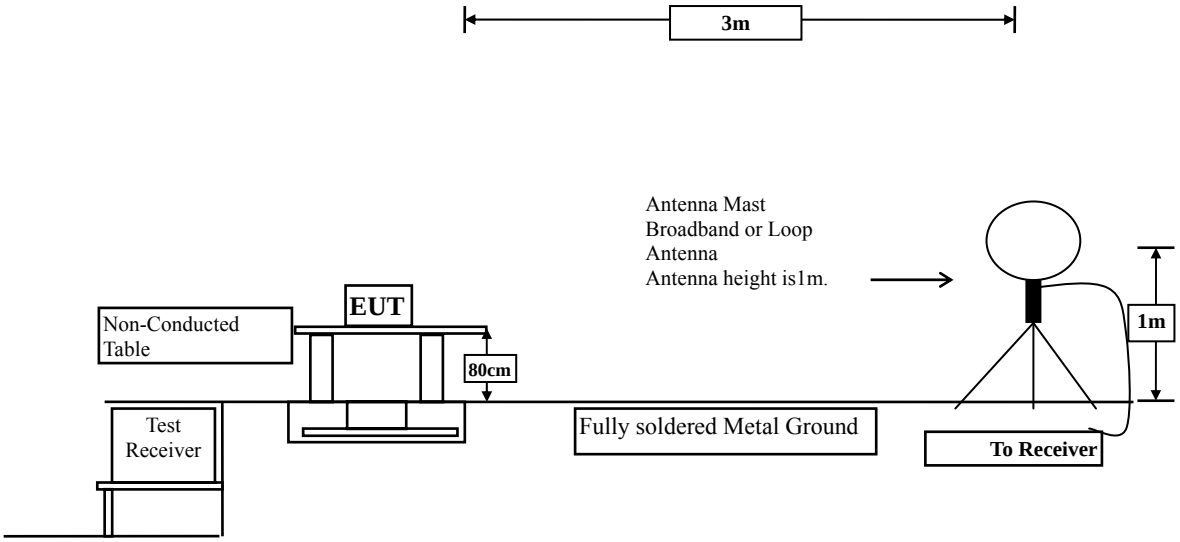
Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

4. Band Edge

4.1. Test Setup

Radiated Emission Under 30MHz



4.2. Limits

In any 9 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 50 dB below that in the 9 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

4.3. Test Procedure

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 which is 1 meter above ground.

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 bandwidth below 30MHz setting on the field strength meter is 9kHz and above 30MHz is 120kHz.

4.4. Uncertainty

Horizontal polarization：

30-300MHz: ±4.08dB；300M-1GHz: ±3.86dB；1-18GHz: ±3.77dB；18-40GHz: ±3.98dB

Vertical polarization：

30-300MHz: ±4.81dB；300M-1GHz: ±3.87dB；1-18GHz：±3.83dB；18-40GHz: ±3.98dB

4.5. Test Result of Band Edge

Product : WMI
Test Item : Band Edge Data
Test Mode : Mode 1: Transmit
Test date : 2017/05/15

(External Antenna)

RF Radiated Measurement

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Quasi-Peak					
Horizontal					
13.110	20.020	4.350	24.370	-45.170	69.540
13.360	20.020	4.450	24.470	-45.070	69.540
13.410	20.020	25.740	45.760	-23.780	69.540
14.010	20.020	4.200	24.220	-45.320	69.540
Vertical					
13.110	20.020	4.350	24.370	-45.170	69.540
13.360	20.020	4.450	24.470	-45.070	69.540
13.410	20.020	25.740	45.760	-23.780	69.540
14.010	20.020	4.200	24.220	-45.320	69.540

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : WMI
Test Item : Band Edge Data
Test Mode : Mode 1: Transmit
Test date : 2017/05/15

(Internal Antenna)

RF Radiated Measurement

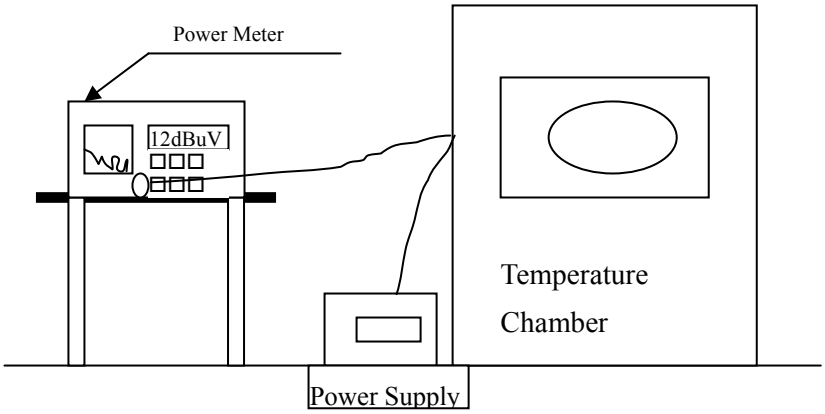
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Quasi-Peak					
Horizontal					
13.110	20.020	4.330	24.350	-45.190	69.540
13.360	20.020	4.300	24.320	-45.220	69.540
13.410	20.020	6.180	26.200	-43.340	69.540
14.010	20.020	4.320	24.340	-45.200	69.540
Vertical					
13.110	20.020	4.320	24.340	-45.200	69.540
13.360	20.020	4.370	24.390	-45.150	69.540
13.410	20.020	6.370	26.390	-43.150	69.540
14.010	20.020	4.180	24.200	-45.340	69.540

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

5. Frequency Tolerance

5.1. Test Setup



5.2. Limits

The frequency tolerance of the carrier signal shall be maintained within ±0.01％ of the operating frequency.

5.3. Test Procedure

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

5.4. Uncertainty

±279.2Hz

5.5. Test Result of Frequency Stability

Product : WMI
Test Item : Frequency Tolerance
Test Mode : Mode 1: Transmit
Test date : 2017/05/09

Temperature (℃)	Voltage (V)	Observe Time	Declared Frequency (MHz)	Read Frequency (MHz)	Tolerance (%)	Limit (%)
20	13.5	start	13.56	13.55989	-0.000811	±0.01%
		2mins	13.56	13.55989	-0.000811	
		5mins	13.56	13.55989	-0.000811	
		10mins	13.56	13.55989	-0.000811	
20	15.525	start	13.56	13.55989	-0.000811	±0.01%
		2mins	13.56	13.55989	-0.000811	
		5mins	13.56	13.55989	-0.000811	
		10mins	13.56	13.55989	-0.000811	
20	11.475	start	13.56	13.55989	-0.000811	±0.01%
		2mins	13.56	13.55989	-0.000811	
		5mins	13.56	13.55989	-0.000811	
		10mins	13.56	13.55989	-0.000811	
50	13.5	start	13.56	13.55977	-0.001696	±0.01%
		2mins	13.56	13.55977	-0.001696	
		5mins	13.56	13.55977	-0.001696	
		10mins	13.56	13.55977	-0.001696	
40	13.5	start	13.56	13.55977	-0.001696	±0.01%
		2mins	13.56	13.55977	-0.001696	
		5mins	13.56	13.55977	-0.001696	
		10mins	13.56	13.55977	-0.001696	
30	13.5	start	13.56	13.55987	-0.000959	±0.01%
		2mins	13.56	13.55987	-0.000959	
		5mins	13.56	13.55987	-0.000959	
		10mins	13.56	13.55987	-0.000959	

10	13.5	start	13.56	13.55998	-0.000147	± 0.01 %
		2mins	13.56	13.55998	-0.000147	
		5mins	13.56	13.55998	-0.000147	
		10mins	13.56	13.55998	-0.000147	
0	13.5	start	13.56	13.55998	-0.000147	± 0.01 %
		2mins	13.56	13.55998	-0.000147	
		5mins	13.56	13.55998	-0.000147	
		10mins	13.56	13.55998	-0.000147	
-10	13.5	start	13.56	13.55998	-0.000147	± 0.01 %
		2mins	13.56	13.55998	-0.000147	
		5mins	13.56	13.55998	-0.000147	
		10mins	13.56	13.55998	-0.000147	
-20	13.5	start	13.56	13.55998	-0.000147	± 0.01 %
		2mins	13.56	13.55998	-0.000147	
		5mins	13.56	13.55998	-0.000147	
		10mins	13.56	13.55998	-0.000147	

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.