DEKRA Testing and Certification (Suzhou) Co., Ltd.
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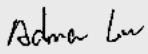
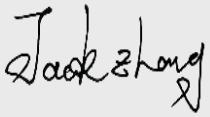
Test report No:
2170153R-RF-US-P06V01

TEST REPORT
FCC Rules&Requlations 47 CFR Chapter I - Part 15C

Product Name	Passive Entry Passive Start
Trademark	SGMW
Model and /or type reference	PEPS ECU
FCC ID	2AVYX-PEPS-ECU-NAEN
Applicant's name / address	SAIC GM WULING AUTOMOBILE COMPANY LIMITED No.18 Hexi Road Liuzhou City, Guangxi Zhuang Autonomous Region, 545007 China
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart C
Verdict Summary	IN COMPLIANCE
Documented By (name / position & signature)	Adma Lu/Project Engeneer 
Approved by (name / position & signature)	Jack Zhang/ Supervisor 
Date of issue	2021-12-01
Report Version	V1.0
Report template No	Template_FCC Part 15C-RF-V1.0

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page

COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.
In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	July. 05, 2021
Date (start test)	July. 10, 2021
Date (finish test)	Sep. 27, 2021

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT : Equipment Under Test
QP : Quasi-Peak
CAV : CISPR Average
AV : Average
CDN : Coupling Decoupling Network
SAC : Semi-Anechoic Chamber
OATS : Open Area Test Site
BW : Bandwidth
AM : Amplitude Modulation
PM : Pulse Modulation
HCP : Horizontal Coupling Plane
VCP : Vertical Coupling Plane
U_N : Nominal voltage
*T*x : Transmitter
*R*x : Receiver
N/A : Not Applicable
N/M : Not Measured

DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
2170153R-RF-US-P06V01	V1.0	Initial issue of report.	2021-12-01

REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with Part 15 Subpart C.
3. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
4. The test results presented in this report relate only to the object tested.
5. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
6. This report will not be used for social proof function in China market.
7. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:

   - Chapter 1.1 General Description of the Item(s);
   - Chapter 1.2 Antenna information.

USED EQUIPMENT

Emission in non-restricted frequency bands / TR-8					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2021.08.13	2022.08.12
EXA Spectrum Analyzer	Keysight	N9010A	MY55370495	2021.04.15	2022.04.14
MXA Signal Analyzer	Keysight	N9020A	MY56060147	2021.08.13	2022.08.12
Temperature/Humidity Meter	Zhichen	ZC1-2	TR8-TH	2021.08.17	2022.08.16
Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

Radiated Emission(Below 1GHz) / AC-3					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESCI	100176	2021.08.13	2022.08.12
Loop Antenna	R&S	HFH2-Z2	833799/003	2021.01.24	2022.01.23
Bilog Antenna	Teseq GmbH	CBL6112D	27613	2021.08.17	2022.08.16
Coaxial Cable	Huber+Suhner	SUCOFLEX 106	AC3-C	2021.04.11	2022.04.10
Temperature/Humidity Meter	RTS	RTS-8S	AC3-TH	2021.08.17	2022.08.16
Quietek EMI V3(test software)	Quietek	N/A	N/A	N/A	N/A
Note: All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

UNCERTAINTY

Uncertainties have been calculated according to the DEKRA internal document. 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%, The Uncertainties is complice with standard required as below.

Test item	Uncertainty
AC Power Line Conducted Emission	± 2.02 dB
Peak Power Output	± 1.27 dB
Radiated Emission(30MHz~1GHz)	± 3.80 dB
RF antenna conducted test	± 1.27 dB
DTS Bandwidth	± 1kHz
Occupied Bandwidth	± 1kHz
Power Density	± 1.27 dB
Frequency Stability	± 100 Hz

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Product Name.....:	Passive Entry Passive Start
Model No.....:	PEPS ECU
Trademark.....:	SGMW
FCC ID.....:	2AVYX-PEPS-ECU-NAEN
Manufacturer.....:	Shanghai NAEN Auto Technology Co.,Ltd
Manufacturer Address .....:	Floor 3,Blog.1,No.185 Jiangtian East Rd.,Songjiang District,Shanghai,China

Wireless Specification.....:	N/A
Operating frequency range(s).....:	125 kHz
Type of modulation .....:	ASK
Number of channel .....:	1

Rated power supply.....:	Voltage and Frequency	
	☐	AC: 220 – 240 V, 50/60 Hz
	☐	AC: 100 – 240 V, 50/60 Hz
	☒	DC: 12 Vdc
	☐	Battery:
Mounting position.....:	☐	Table top equipment
	☐	Wall/Ceiling mounted equipment
	☐	Floor standing equipment
	☐	Hand-held equipment
	☒	Other: vehicle-mounted equipment

1.2 Antenna Information

Antenna model / type number .....:	N/A			
Antenna serial number.....:	N/A			
Antenna Delivery .....:	☒	1TX		
	☐	2TX + 2RX		
	☐	Others:……		
Antenna technology.....:	☒	SISO		
	☐	MIMO	☐	CDD
			☐	Beam-forming
Antenna Type .....:	☐	External	☐	Dipole
			☐	Sectorized
	☒	Internal	☐	Coil
			☒	PCB
			☐	Metal
			☐	PIFA
			☐	Others……..
Antenna Gain.....:	N/A			

Note: The General Description of the Item and antenna information in clause 1 are provided and confirmed by the client.

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

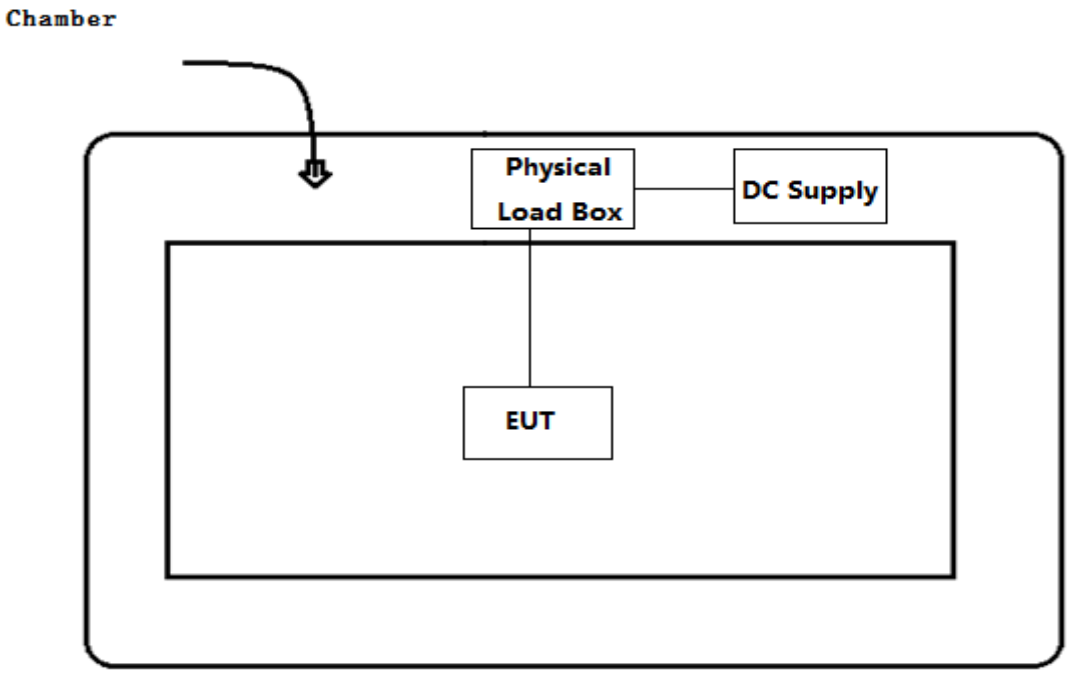
Test Mode	Mode 1: Transmit

2.2 Support / Auxiliary equipment / unit / Test software for the EUT

Auxiliary equipment	Type / Version	Manufacturer	Supplied by
N/A	N/A	N/A	N/A
software	Type / Version	Manufacturer	Supplied by
N/A	N/A	N/A	N/A

2.3 Test Configuration / Block diagram used for tests

Connection Diagram



Signal Cable Type		Signal cable Description
A	RS485 cable	Shield , > 5m

2.4 Testing process

1	Setup the EUT as shown in Section 2.3.
2	Turn on the physical load box and configure the signal.
3	Verify that the EUT works properly.

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
FCC CFR Title 47 Part 15 Subpart C	2020	Intentional Radiators

3.2 Overview of results

Requirement – Test case	Basic standard(s)	Verdict	Remark
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C Section 15.207	N/A	---
Field Strength of Spurious	FCC CFR Title 47 Part 15 Subpart C Section 15.209	PASS	---
Channel Bandwidth	FCC CFR Title 47 Part 15 Subpart C Section 15.215(c)	PASS	---
Antenna Requirement	FCC CFR Title 47 Part 15 Subpart C Section 15.203	PASS	---
Supplementary information:			

3.3 Test Facility

USA	**:**	**FCC Designation Number: CN1199**

4 TEST RESULTS

4.1 AC Power Line Conducted Emission	VERDICT: N/A

4.1.1 Limit

Standard	FCC Part 15 Subpart E Paragraph 15.207	
Frequency range [MHz]	Limit: QP [dB(μV)[1)]]	Limit: AV [dB(μV) [1)]]
0,15 - 0,50	66 – 56 [2)]	56 - 46 [2)]
0,50 - 5,0	56	46
5,0 - 30	60	50

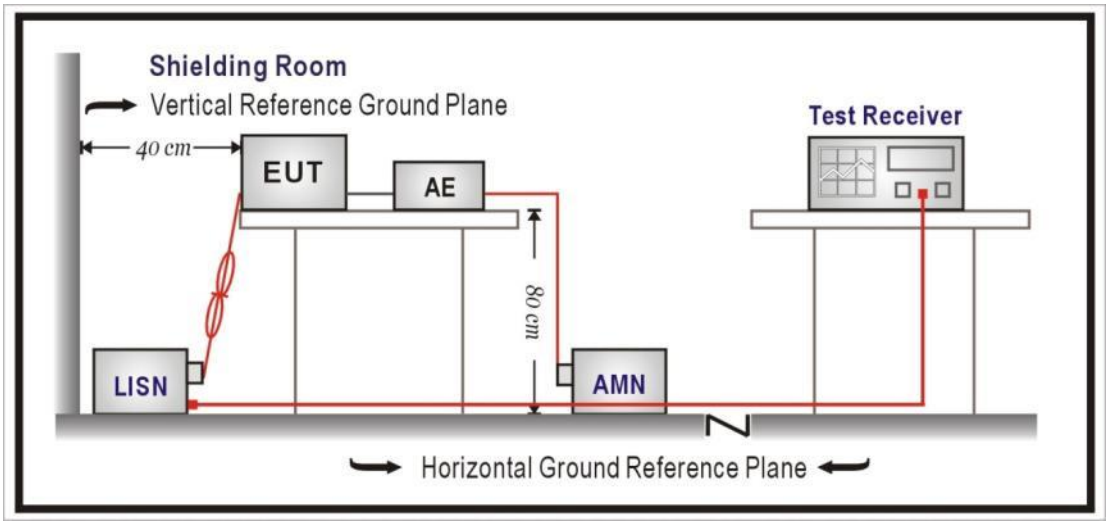
[1)] At the transition frequency, the lower limit applies.

[2)] The limit decreases linearly with the logarithm of the frequency.

NOTE 1: The exclusion band for transmitters shall be considered for transmitters operating at frequencies below 30 MHz.

NOTE 2: Where the AC output port is directly connected (or via a circuit breaker) to the AC power input port of the EUT the AC power output port need not to be tested.

4.1.2 Test Setup



4.1.3 Test Procedure

	References Rule	Chapter	Item
☒	ANSI C63.10-2013	6.2	Standard test method for ac power-line conducted emissions from unlicensed wireless devices

4.1.4 Test Data

N/A: The sample is supply by DC .

4.2 Radiated Emissions — VERDICT: PASS

4.2.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15. 209

Restricted Band Emissions Limit

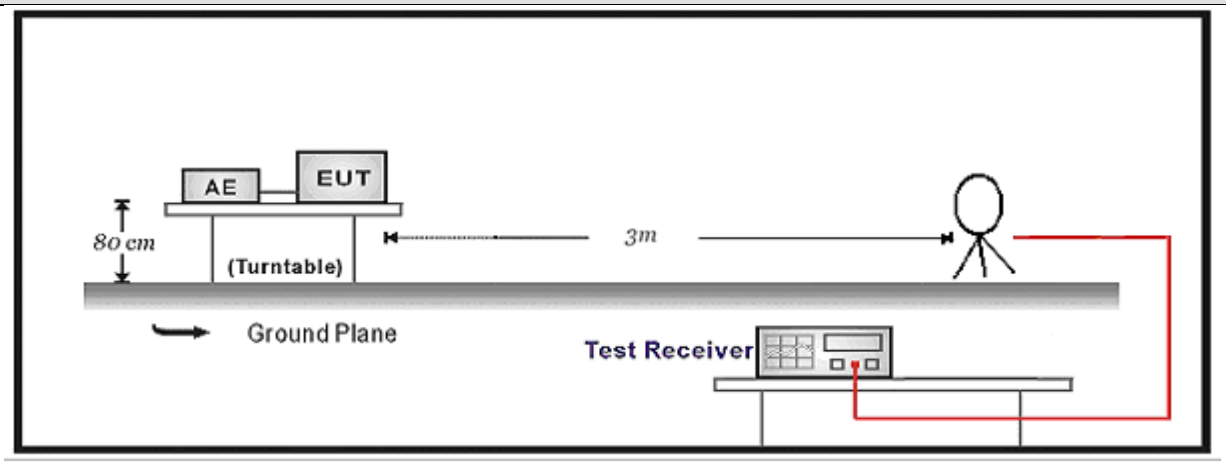
Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30(Note 1)
1.705 - 30	30	29.5	30(Note 1)
30 - 88	100	40	3(Note 2)
88 - 216	150	43.5	3(Note 2)
216 - 960	200	46	3(Note 2)
Above 960	500	54	3(Note 2)

Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

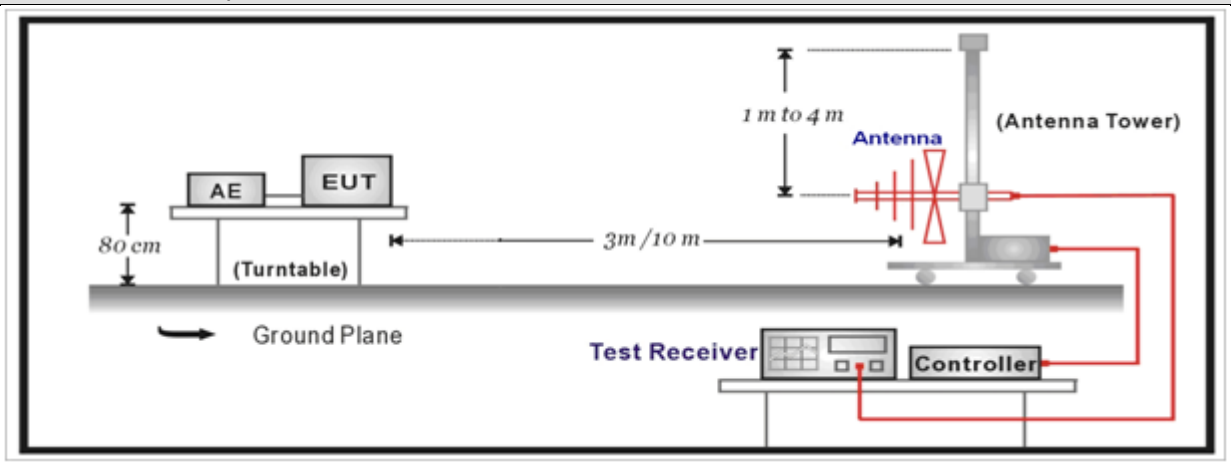
Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

4.2.2 Test Setup

Below 30MHz Test Setup:



30MHz-1GHz Test Setup:

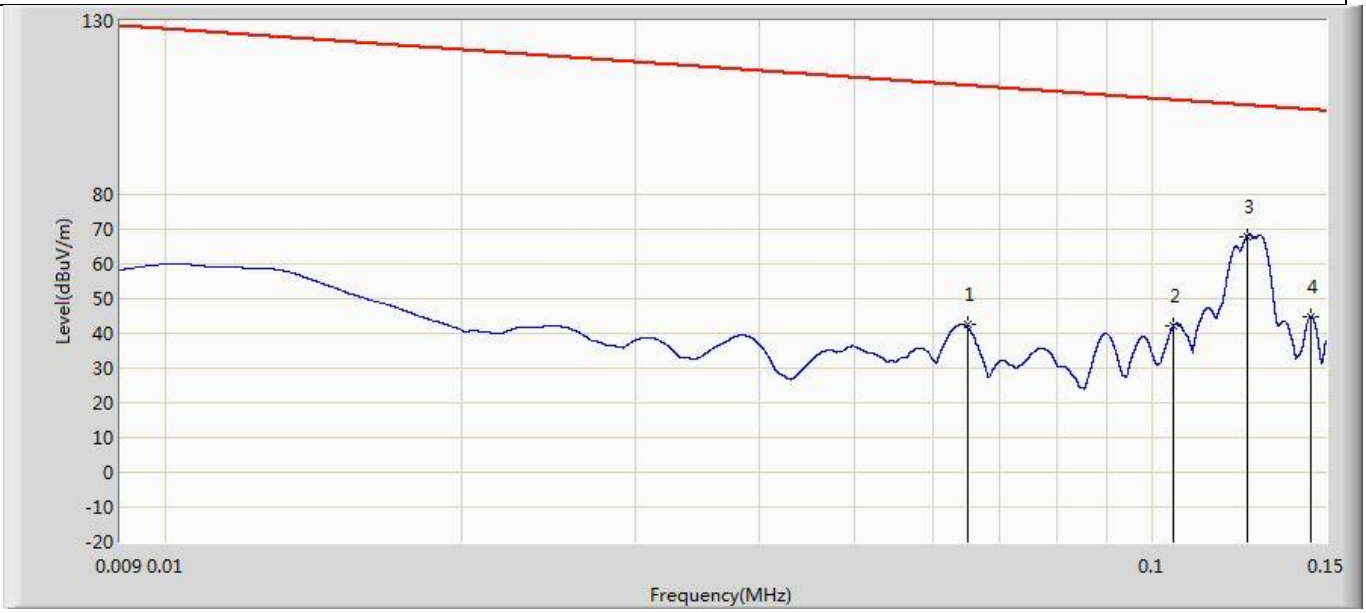


4.2.3 Test Procedure

	References Rule		Chapter	Description
	☒	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
	☒	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
	☐	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

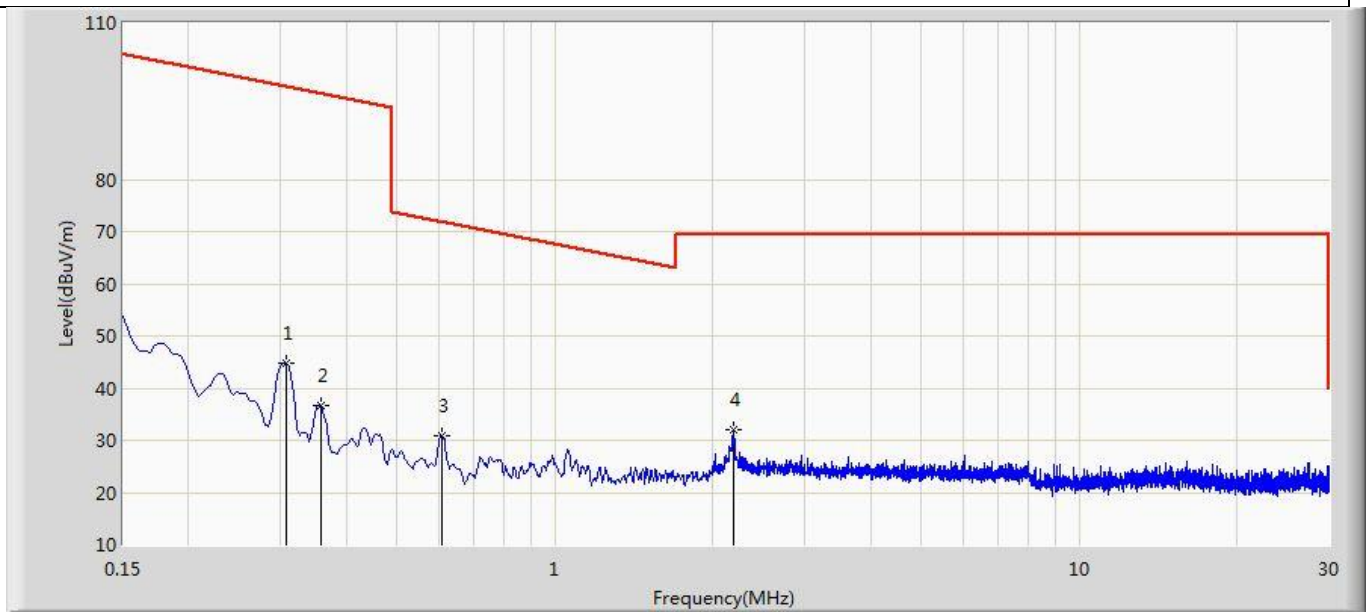
4.2.4 Test Data

Profile: 2170153R	Page No.: 1
Engineer: JunXu	
Site: AC2	Time: 2021/08/12 - 19:25
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: RF(0.009-30MHz)	Polarity: Horizontal
EUT: PEPS	Power: AC 120V/60Hz
Note: Mode 1: Transmit at 125kHz	



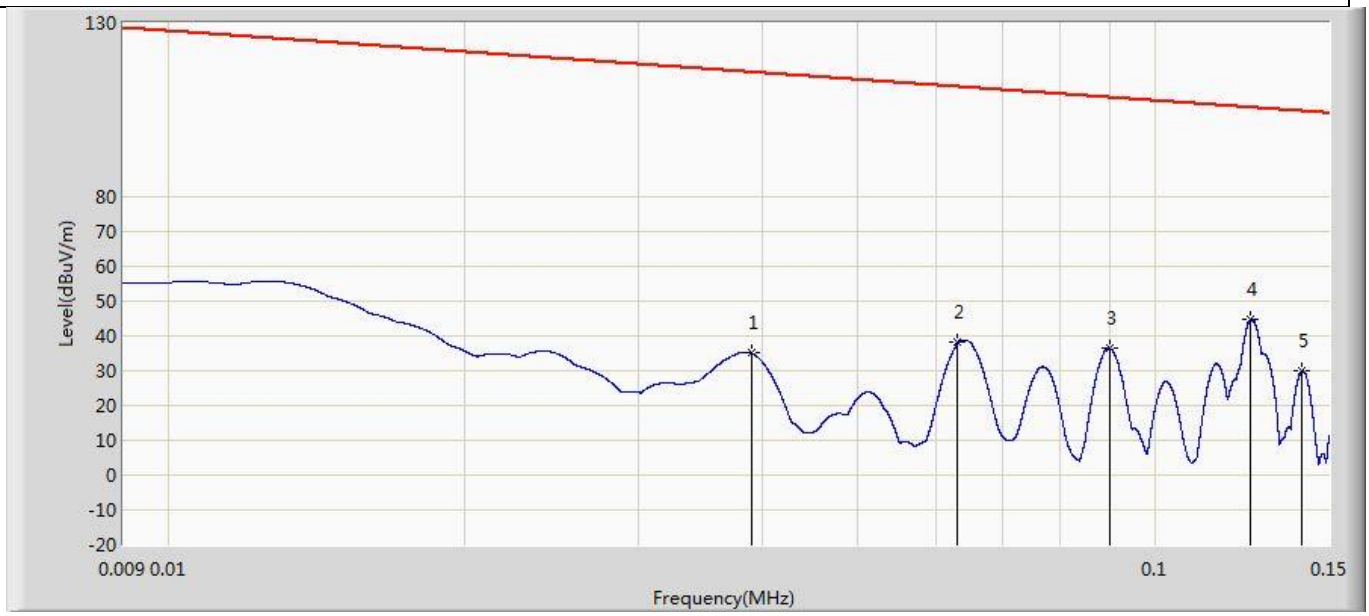
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		0.065	42.398	20.473	-68.938	111.336	21.925	QP
2		0.105	42.291	20.415	-64.882	107.173	21.876	QP
3	*	0.125	67.747	45.890	-37.912	105.659	21.857	QP
4		0.145	44.760	22.923	-59.610	104.371	21.838	QP

Profile: 2170153R	Page No.: 2
Engineer: JunXu	
Site: AC2	Time: 2021/08/12 - 20:08
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: RF(0.009-30MHz)	Polarity: Horizontal
EUT: PEPS	Power: AC 120V/60Hz
Note: Mode 1: Transmit at 125kHz	



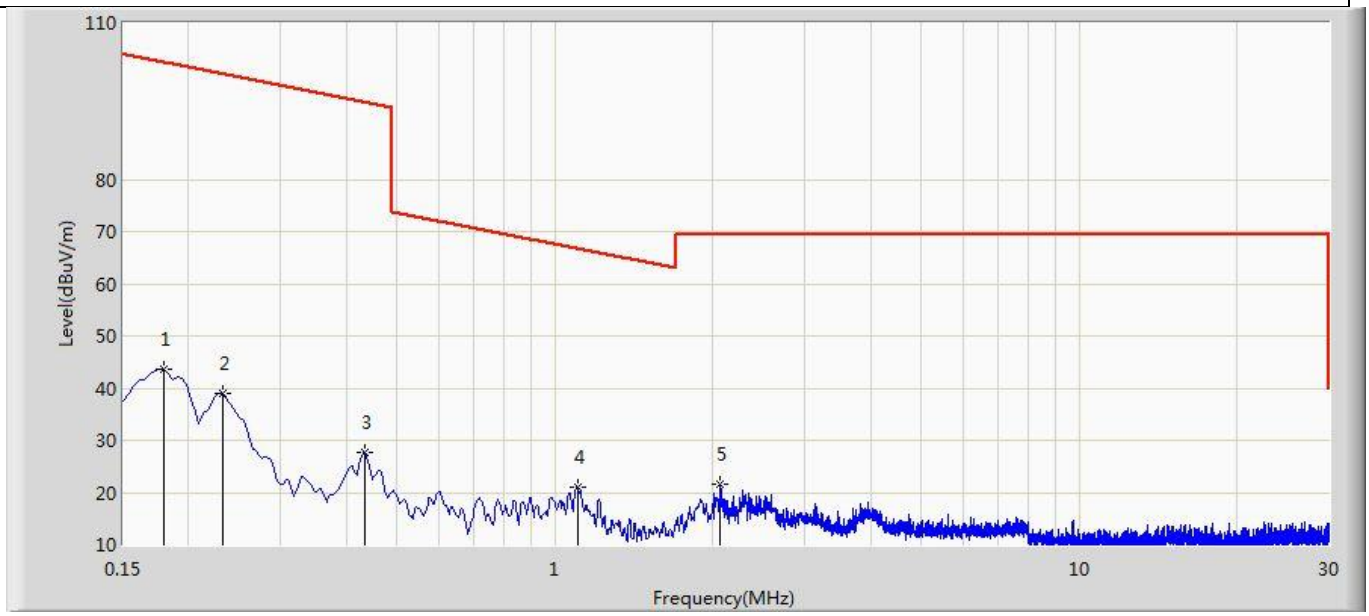
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		0.307	44.905	23.246	-52.954	97.859	21.659	QP
2		0.359	36.762	15.160	-59.739	96.501	21.602	QP
3		0.609	30.978	9.864	-40.938	71.917	21.114	QP
4	*	2.187	31.989	11.112	-37.511	69.500	20.878	QP

Profile: 2170153R	Page No.: 3
Engineer: JunXu	
Site: AC2	Time: 2021/08/12 - 20:14
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: RF(0.009-30MHz)	Polarity: Horizontal
EUT: PEPS	Power: AC 120V/60Hz
Note: Mode 1: Transmit at 125kHz	



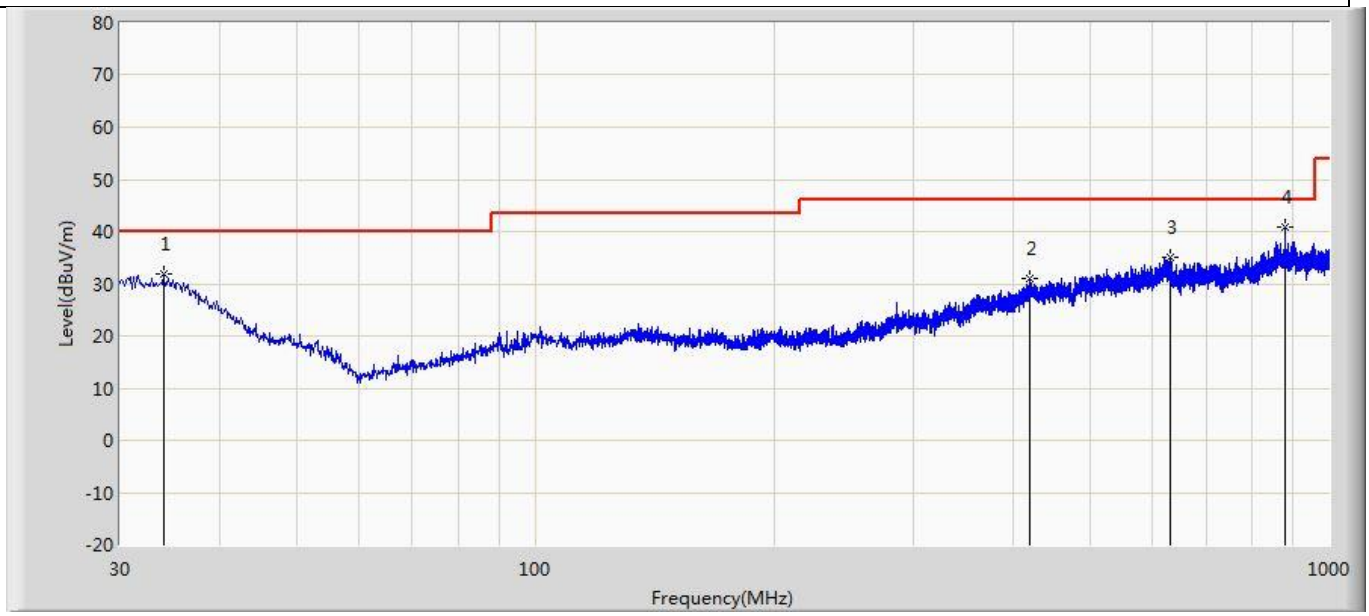
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		0.039	35.260	13.309	-80.511	115.771	21.951	QP
2		0.063	38.472	16.545	-73.135	111.607	21.927	QP
3		0.090	36.396	14.502	-72.115	108.511	21.894	QP
4	*	0.125	44.757	22.900	-60.902	105.659	21.857	QP
5		0.141	29.839	7.998	-74.774	104.614	21.841	QP

Profile: 2170153R	Page No.: 4
Engineer: JunXu	
Site: AC2	Time: 2021/08/12 - 20:17
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: RF(0.009-30MHz)	Polarity: Horizontal
EUT: PEPS	Power: AC 120V/60Hz
Note: Mode 1: Transmit at 125kHz	



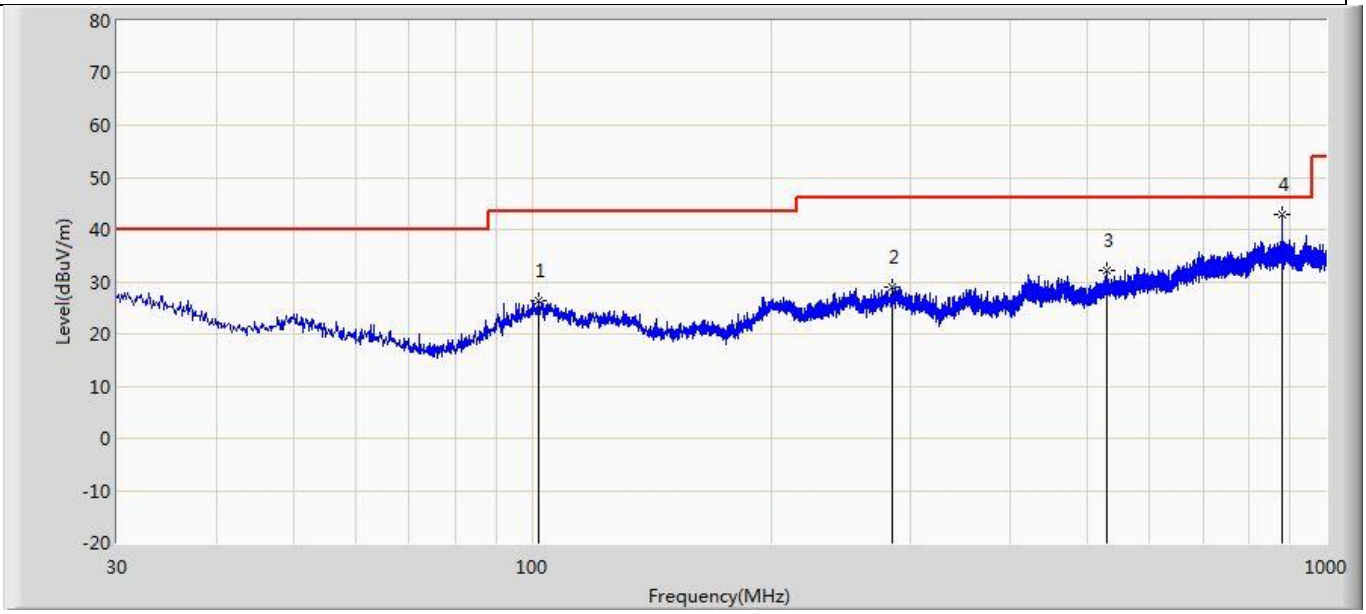
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		0.180	43.573	21.777	-58.921	102.494	21.796	QP
2		0.232	39.068	17.326	-61.222	100.291	21.742	QP
3		0.434	27.689	6.164	-67.165	94.854	21.525	QP
4	*	1.105	21.091	1.078	-45.665	66.757	20.013	QP
5		2.064	21.733	0.842	-47.767	69.500	20.891	QP

Profile: 2170153R	Page No.: 1
Engineer: JunXu	
Site: AC2	Time: 2021/08/12 - 19:25
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC2_3M(30-1000M)	Polarity: Horizontal
EUT: PEPS	Power: AC 120V/60Hz
Note: Mode 1: Transmit at 125kHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		34.001	31.937	4.907	-8.063	40.000	27.031	QP
2		419.334	31.145	4.188	-14.855	46.000	26.957	QP
3		629.824	35.045	4.832	-10.955	46.000	30.213	QP
4	*	879.963	40.884	8.453	-5.116	46.000	32.431	QP

Profile: 2170153R	Page No.: 2
Engineer: JunXu	
Site: AC2	Time: 2021/08/12 - 19:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: AC2_3M(30-1000M)	Polarity: Vertical
EUT: CT40-CB	Power: AC 120V/60Hz
Note: Mode 1: Transmit at 125kHz	

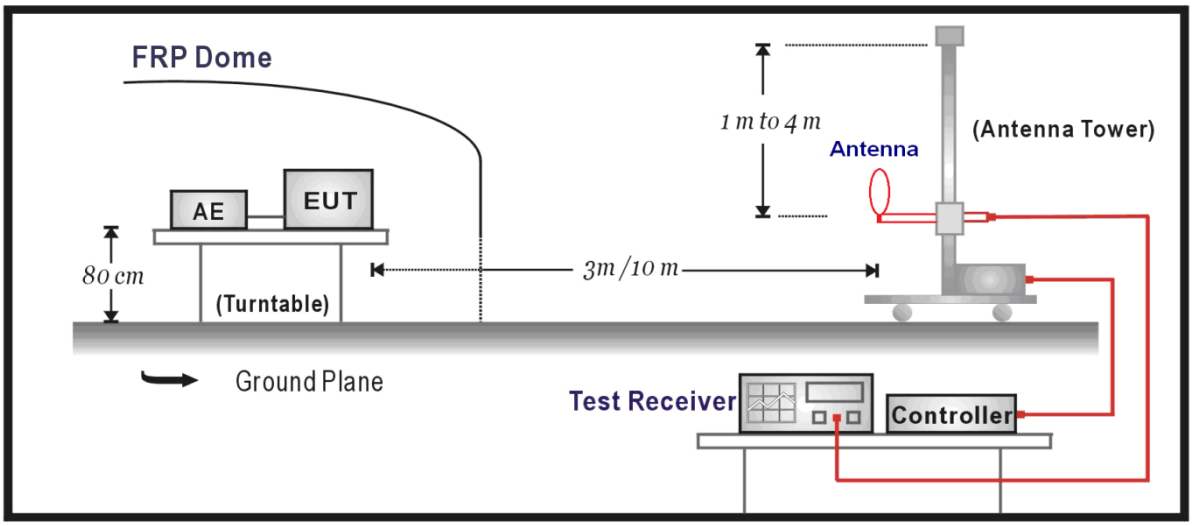


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		101.901	26.469	4.420	-17.031	43.500	22.049	QP
2		284.504	29.101	3.987	-16.899	46.000	25.114	QP
3		528.701	32.260	5.254	-13.740	46.000	27.006	QP
4	*	879.963	43.022	9.692	-2.978	46.000	33.330	QP

4.3 Emission bandwidth	VERDICT: PASS

4.3.1 Limit	
Standard	FCC Part 15 Subpart C Paragraph 15.215
Within the band.	

4.3.2 Test Setup



4.3.3 Test Procedure

	Reference Rule	Chapter	Description
☒	ANSI C63.10	6.9.2	Occupied bandwidth—relative measurement procedure

4.3.4 Test Data

Frequency (kHz)	20dB bandwidth (Hz)	99% bandwidth (Hz)	Result
125	232	352	Pass

4.4 Antenna Requirement	VERDICT: PASS

4.4.1 Limit:	
Standard	FCC Part 15 Subpart E Paragraph 15.203
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	

4.4.2 Antenna Connector Construction:	
☒	The use of a permanently attached antenna
☐	The antenna use of a unique coupling to the intentional radiator
☐	The use of a nonstandard antenna jack or electrical connector
Please refer to the attached document “Internal Photograph” to show the antenna connector.	

5 TEST SETUP PHOTO AND EUT PHOTO	VERDICT: PASS

Remark: The test setup photo and EUT Photo please see appendix.

The End