



Test Report No.:
FCC2020-0024-2

TEST REPORT

Applicant : Schneider Electric (China) Co., Ltd.,
Shenzhen Branch

Product Name : Z-WAVE+ SWITCH SINGLE POLE

Mode No. : SQR14102WHZ,SQR14102LAZ,SQ
R14102BKZ



Vkan Certification & Testing Co., Ltd.
威凯检测技术有限公司

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Vkan Certification & Testing Co., Ltd. CVC


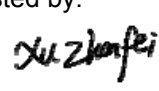
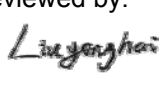

Test Report No. FCC2020-0024-2(XG1)		Page 2 of 48	
Applicant	Name : Schneider Electric (China) Co., Ltd., Shenzhen Branch Address : Room 201, Building A, No. 1 Qianwanyi Road, Shengang Cooperation Zone, Qianhai, Shenzhen, China		
Manufacturer	Name : Schneider Electric (China) Co., Ltd., Shenzhen Branch Address : Room 201, Building A, No. 1 Qianwanyi Road, Shengang Cooperation Zone, Qianhai, Shenzhen, China		
Equipment under Test	Product Name : Z-WAVE+ SWITCH SINGLE POLE Model No. : SQR14102WHZ,SQR14102LAZ,SQR14102BKZ Trade mark : Schneider Electric,Square D Serial no. : — Sampling : —		
Date of Receipt.	2020.12.01	Date of Testing	2020.12.01~2021.01.27
Test Specification		Test Result	
FCC CFR47 Part 15C (2020) Radio Frequency Devices ANSI C63.10 (2013)		PASS	
Evaluation of Test Result	The equipment under test was found to comply with the requirements of the standards applied. <div style="text-align: right; margin-top: 10px;">  <p>Issue Date: 2021.01.27</p> </div>		
Tested by:  _____ Xu Zhenfei □ Name Signature	Reviewed by:  _____ Liu Yonghai □ Name Signature	Approved by:  _____ Zeng Bo □ Name Signature	
Other Aspects: NONE.			
Abbreviations:OK, Pass= passed Fail = failed N/A= not applicable EUT= equipment, sample(s) under tested			
This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC . Note: The report was originally issued on January 5, 2021, and was modified for the first time on January 28, 2021. The modification contents are as follows: the test block diagram of radiated emission is modified from "3m / 10m" to "3M"; the number of punctuation points in the result diagram of all test items is modified from "3" to "6"; the antenna description is added to the test photos; the level value of the main frequency of radiated emission is marked; the modification is involved The page is the whole certification report with (XG1) symbol after the corresponding original report number.			

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1. General Product Information

The model of this application: SQR14102WHZ, SQR14102LAZ, SQR14102BKZ. SQR14102LAZ and SQR14102BKZ have the same technical construction including circuit diagram, PCB Layout, components and component layout, all electrical construction and mechanical construction with SQR14102WHZ. The difference lies only model number and color. All the tests carried out on model SQR14102WHZ.

1.1 General information

Product Name	Z-WAVE + SWITCH SINGLE POLE
Model No.	SQR14102WHZ,SQR14102LAZ,SQR14102BKZ
Power Supply	120 Vac,60Hz
Antenna Type	External Antenna
Antenna Connector	A permanently attached antenna (meet with the standard FCC Part 15.203 requirement)
Antenna Gain	Antenna 1:0.5dBi
Wireless Frequency	908.4 MHz, 908.42 MHz, 916.00 MHz
Modulation Type	FSK, GFSK
Data rate	9.6 kbps, 40 kbps, 100 kbps
FCC ID	2AUCU-14102Z
Note :	
1. The information of the EUT is declared by the manufacturer.	

2. Test Sites

2.1 Test Facilities

The tests and measurements refer to this report were performed by EMC testing Lab. of Vkan Certification & Testing Co., Ltd.

Addr.: No.3, Tiantaiyi Road, Kaitai Avenue, Science City, Guangzhou, 510663, P. R. China

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The EMC testing laboratory has been recognized by CNAS, and authorized by Nemko of Norway since 1997, and accredited by DAkkS of Germany since 2007, and assessed and found eligible to participated in the TDAP of VDE testing and certification Institute since 2004, and registered by FCC since 2001.

2.2 Description of Non-standard Method and Deviations

The testing and measurement methods used in this report are applied by all standard methods. Not any non-standard method or deviation from the used standards was used.

2.3 List of Test and Measurement Instruments

Refer to **Appendix**.

3. Test Configuration

3.1 Test Mode

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

4. Summary of measurement results

Summary of measurements of results	Clause in FCC rules	Verdict	Note
AC Power Line Conducted Emissions	15.207	PASS	
Radiated Emissions	15.249(a)(d)(e), 15.205, 15.209	PASS	
Occupied Bandwidth	15.215(c)	PASS	
Antenna Requirement	15.203	PASS	

5. Measurement procedure

5.1 AC Power Line Conducted Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.10-2013. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

The test is in transmitting mode.

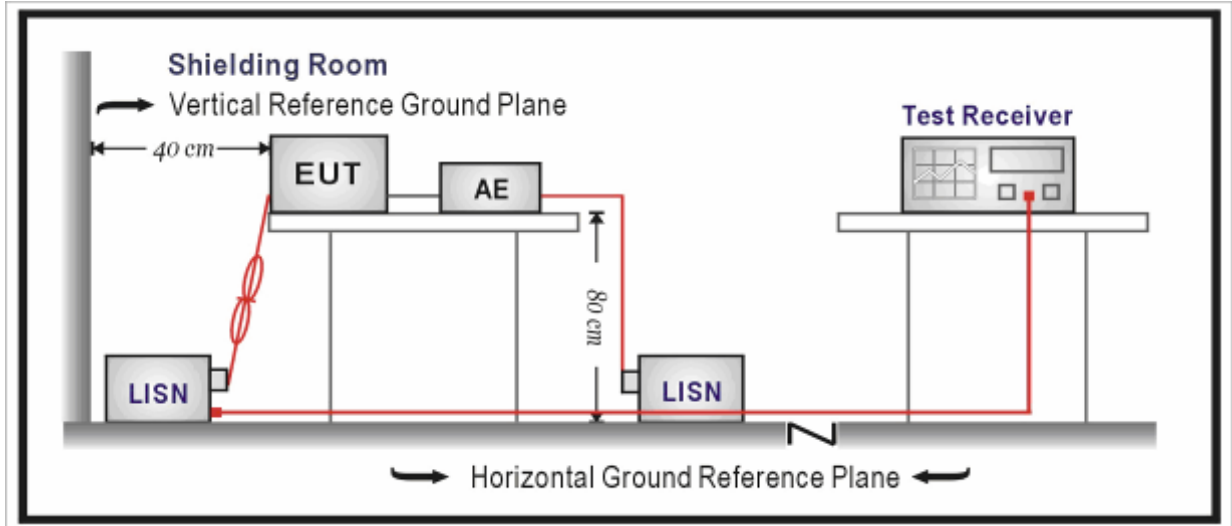
Limits:

Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Test Setup:



Note: AC Power source is used to change the voltage 120V/60Hz.

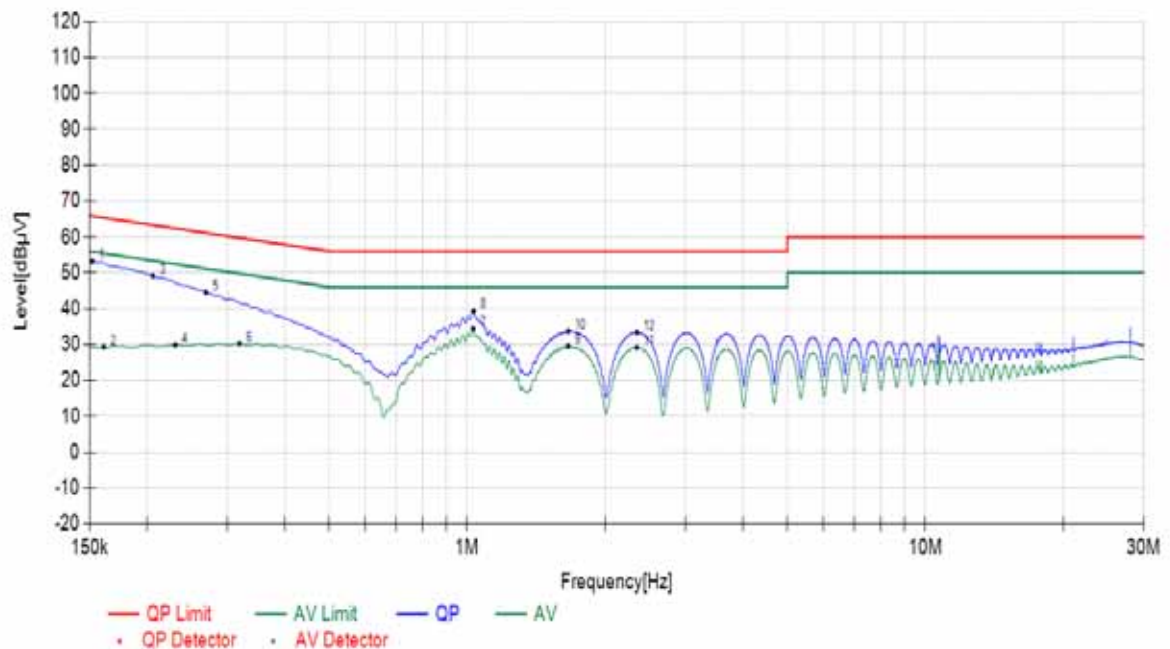
Measurement Uncertainty :

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.12$ dB.

Test Results:

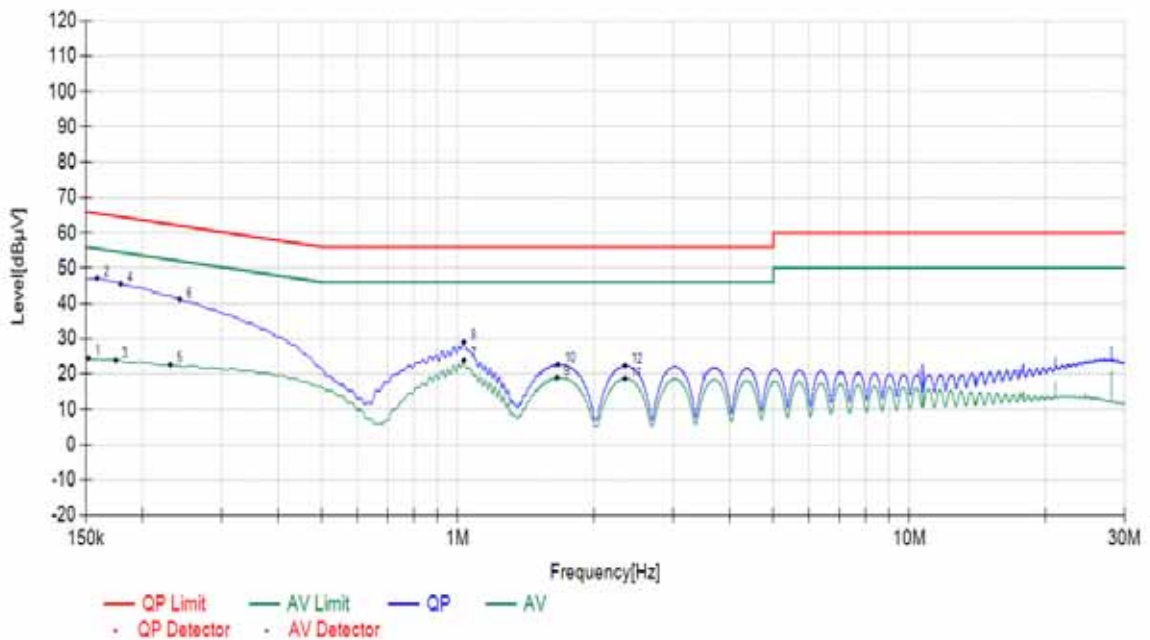
Test Carrier frequency (MHz)	908.4
Power port	L

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
12	2.3505	10.20	23.21	33.41	56.00	22.59	QP	PASS
10	1.6643	10.19	23.57	33.76	56.00	22.24	QP	PASS
1	0.1523	10.16	43.03	53.19	65.88	12.69	QP	PASS
8	1.0343	10.17	29.14	39.31	56.00	16.69	QP	PASS
5	0.2693	10.14	34.48	44.62	61.14	16.52	QP	PASS
3	0.2063	10.15	38.95	49.10	63.35	14.25	QP	PASS
11	2.3460	10.20	18.94	29.14	46.00	16.86	AV	PASS
2	0.1613	10.15	19.17	29.32	55.40	26.08	AV	PASS
4	0.2310	10.15	19.70	29.85	52.41	22.56	AV	PASS
9	1.6620	10.19	19.34	29.53	46.00	16.47	AV	PASS
7	1.0320	10.17	24.22	34.39	46.00	11.61	AV	PASS
6	0.3188	10.14	20.14	30.28	49.74	19.46	AV	PASS



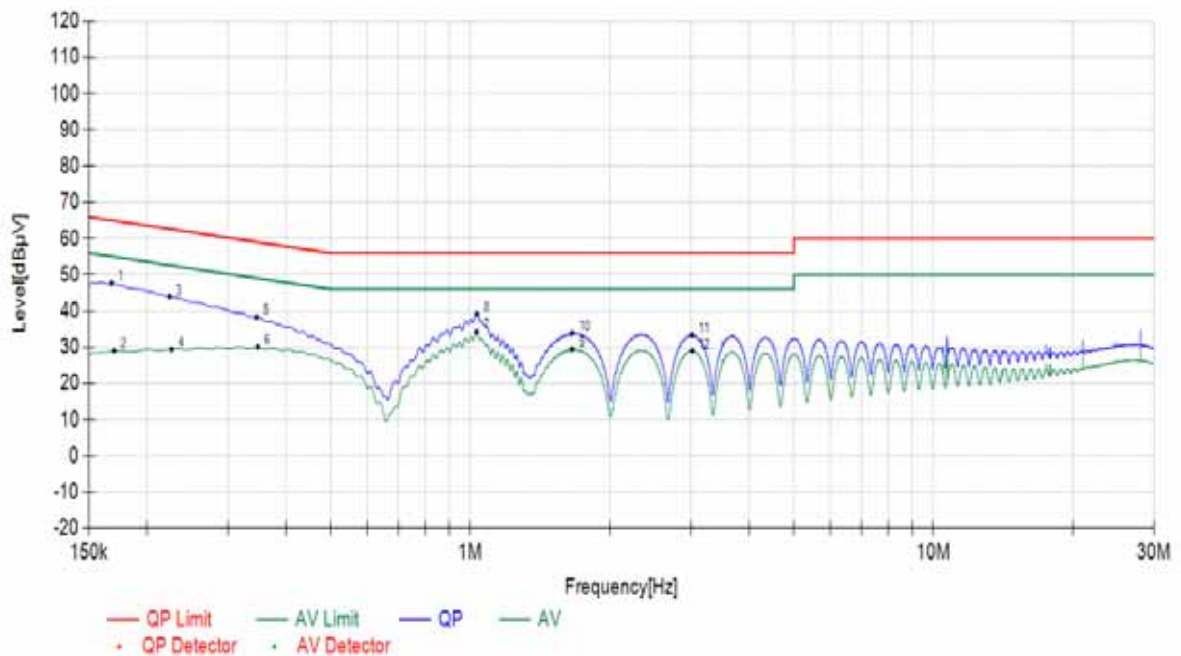
Test Carrier frequency (MHz)	908.4
Power port	N

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
12	2.3460	10.20	12.23	22.43	56.00	33.57	QP	PASS
10	1.6665	10.19	12.59	22.78	56.00	33.22	QP	PASS
6	0.2423	10.14	31.01	41.15	62.02	20.87	QP	PASS
8	1.0320	10.17	18.93	29.10	56.00	26.90	QP	PASS
2	0.1590	10.15	37.06	47.21	65.52	18.31	QP	PASS
4	0.1793	10.14	35.44	45.58	64.52	18.94	QP	PASS
11	2.3438	10.20	8.50	18.70	46.00	27.30	AV	PASS
5	0.2310	10.14	12.57	22.71	52.41	29.70	AV	PASS
3	0.1748	10.14	13.79	23.93	54.73	30.80	AV	PASS
7	1.0320	10.17	13.75	23.92	46.00	22.08	AV	PASS
9	1.6598	10.19	8.80	18.99	46.00	27.01	AV	PASS
1	0.1523	10.15	14.41	24.56	55.88	31.32	AV	PASS



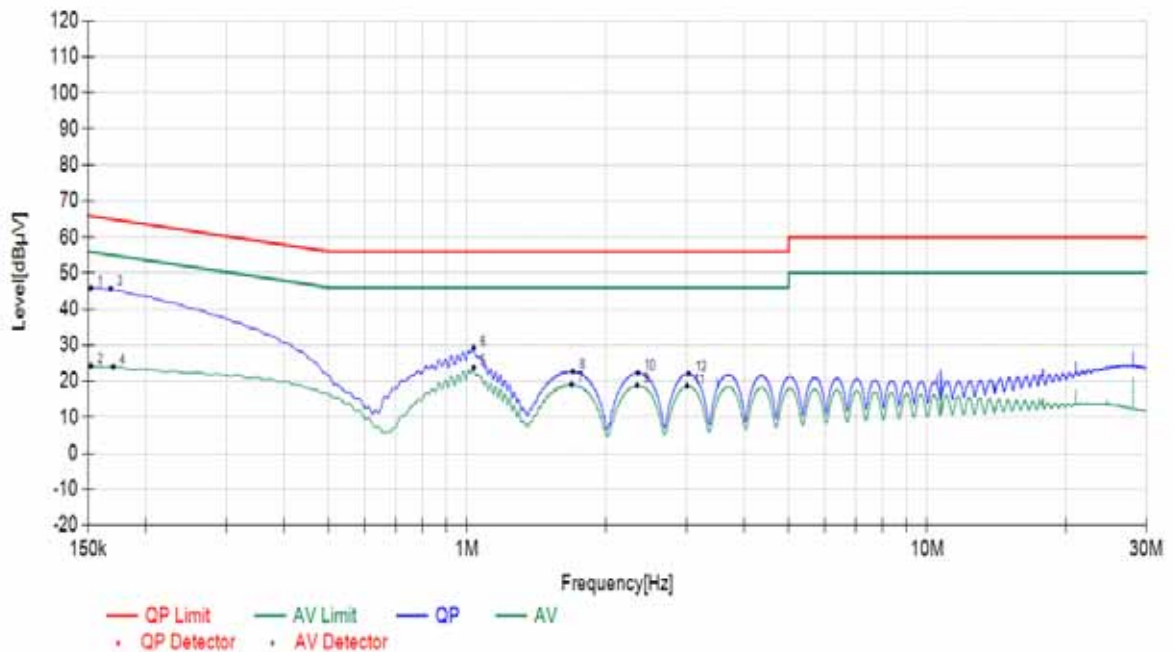
Test Carrier frequency (MHz)	908.42
Power port	L

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
1	0.1680	10.15	37.49	47.64	65.06	17.42	QP	PASS
10	1.6598	10.19	23.73	33.92	56.00	22.08	QP	PASS
11	3.0120	10.21	23.13	33.34	56.00	22.66	QP	PASS
3	0.2243	10.15	33.92	44.07	62.66	18.59	QP	PASS
8	1.0343	10.17	29.02	39.19	56.00	16.81	QP	PASS
5	0.3458	10.15	28.16	38.31	59.06	20.75	QP	PASS
4	0.2265	10.15	19.28	29.43	52.58	23.15	AV	PASS
2	0.1703	10.15	18.91	29.06	54.95	25.89	AV	PASS
12	3.0165	10.21	18.75	28.96	46.00	17.04	AV	PASS
9	1.6598	10.19	19.32	29.51	46.00	16.49	AV	PASS
7	1.0320	10.17	24.07	34.24	46.00	11.76	AV	PASS
6	0.3480	10.15	19.94	30.09	49.01	18.92	AV	PASS



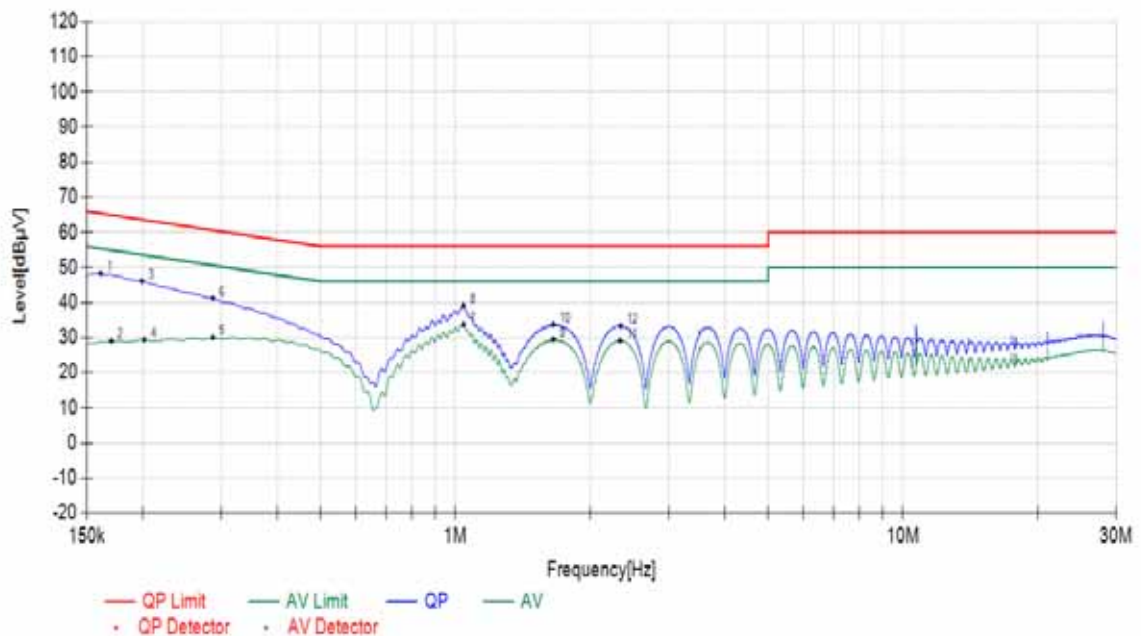
Test Carrier frequency (MHz)	908.42
Power port	N

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
12	3.0323	10.21	11.93	22.14	56.00	33.86	QP	PASS
10	2.3505	10.20	12.15	22.35	56.00	33.65	QP	PASS
6	1.0343	10.17	19.11	29.28	56.00	26.72	QP	PASS
8	1.6980	10.19	12.60	22.79	56.00	33.21	QP	PASS
1	0.1523	10.15	35.71	45.86	65.88	20.02	QP	PASS
3	0.1680	10.14	35.54	45.68	65.06	19.38	QP	PASS
11	3.0075	10.21	8.50	18.71	46.00	27.29	AV	PASS
2	0.1523	10.15	14.15	24.30	55.88	31.58	AV	PASS
4	0.1703	10.14	13.91	24.05	54.95	30.90	AV	PASS
9	2.3438	10.20	8.65	18.85	46.00	27.15	AV	PASS
7	1.6868	10.19	8.91	19.10	46.00	26.90	AV	PASS
5	1.0343	10.17	13.64	23.81	46.00	22.19	AV	PASS



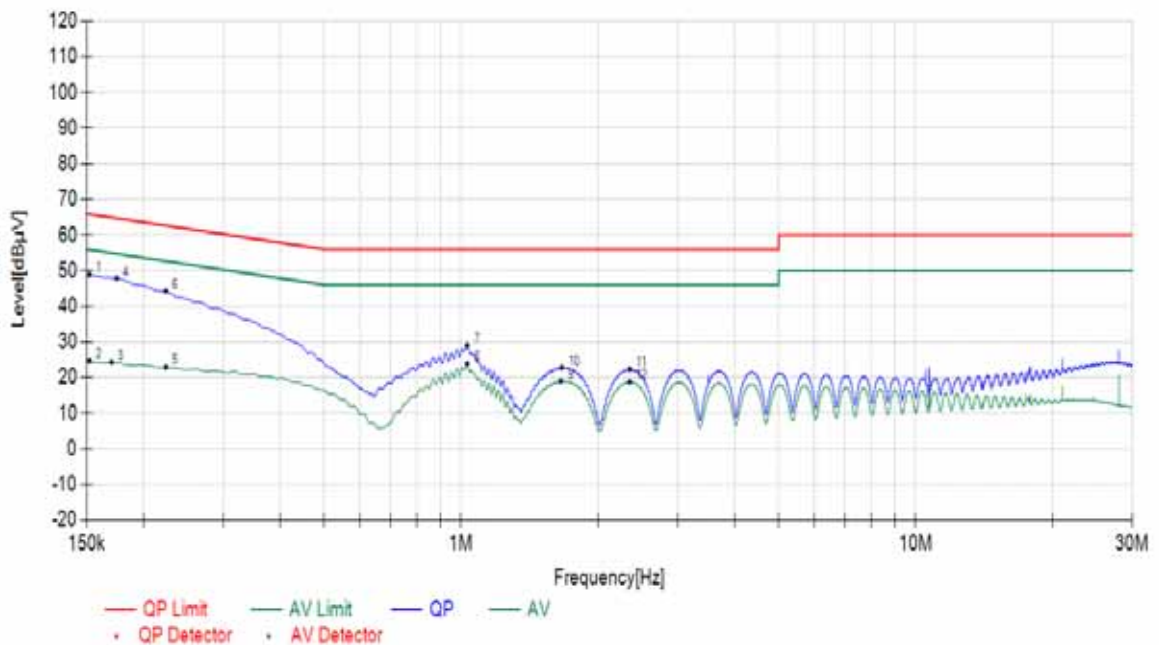
Test Carrier frequency (MHz)	916
Power port	L

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
12	2.3438	10.20	23.15	33.35	56.00	22.65	QP	PASS
10	1.6553	10.19	23.56	33.75	56.00	22.25	QP	PASS
6	0.2873	10.14	31.01	41.15	60.60	19.45	QP	PASS
8	1.0433	10.17	28.99	39.16	56.00	16.84	QP	PASS
1	0.1613	10.15	38.19	48.34	65.40	17.06	QP	PASS
3	0.1995	10.15	35.97	46.12	63.63	17.51	QP	PASS
11	2.3348	10.20	18.92	29.12	46.00	16.88	AV	PASS
2	0.1703	10.15	18.89	29.04	54.95	25.91	AV	PASS
4	0.2018	10.15	19.25	29.40	53.54	24.14	AV	PASS
9	1.6553	10.19	19.37	29.56	46.00	16.44	AV	PASS
7	1.0433	10.17	23.59	33.76	46.00	12.24	AV	PASS
5	0.2873	10.14	19.86	30.00	50.60	20.60	AV	PASS



Test Carrier frequency (MHz)	916
Power port	N

Suspected List								
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV]	Limit [dBμV]	Margin [dB]	Detector	Pass/Fail
1	0.1523	10.15	38.77	48.92	65.88	16.96	QP	PASS
10	1.6665	10.19	12.61	22.80	56.00	33.20	QP	PASS
11	2.3505	10.20	12.15	22.35	56.00	33.65	QP	PASS
4	0.1748	10.14	37.74	47.88	64.73	16.85	QP	PASS
6	0.2243	10.14	34.13	44.27	62.66	18.39	QP	PASS
7	1.0320	10.17	18.91	29.08	56.00	26.92	QP	PASS
8	1.0320	10.17	13.73	23.90	46.00	22.10	AV	PASS
2	0.1523	10.15	14.56	24.71	55.88	31.17	AV	PASS
3	0.1703	10.14	14.19	24.33	54.95	30.62	AV	PASS
5	0.2243	10.14	12.80	22.94	52.66	29.72	AV	PASS
9	1.6598	10.19	8.87	19.06	46.00	26.94	AV	PASS
12	2.3505	10.20	8.62	18.82	46.00	27.18	AV	PASS



5.2 Radiated Emission

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

The test set-up was made in accordance to the general provisions of ANSI C63.10-2013. The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration.

Sweep the whole frequency band through the range from 9 kHz to the 10th harmonic of the carrier, and the emissions less than 20 dB below the permissible value are reported.

During the test, below 30MHz, the center of the loop shall be 1 meters; above 30MHz, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turntable shall be rotated from 0 to 360 degrees for detecting the maximum of radiated spurious signal level. The measurements shall be repeated with orthogonal polarization of the test antenna. The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

Set the spectrum analyzer in the following:

Below 1GHz (detector: Peak and Quasi-Peak)

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz(detector: Peak):

(a)PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

(b)AVERAGE: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded. Then this mode was measured in the following mode: EUT with cradle and EUT without cradle. The worst emission was found in EUT with cradle mode and the worst case was recorded.

The test is in transmitting mode.

Limits:

Limit in restricted band(Part 15.209)

Frequency (MHz)	Measurement Distance (m)	Field strength(uV/m)	Level (dBuV/m)
0.009–0.490	300	2400/F(kHz)	/
0.490–1.705	30	24000/F(kHz)	/
1.705–30.0	30	30	/
30 - 88	3	100	40
88 - 216	3	150	43.5
216 - 960	3	200	46
Above 960-1000	3	500	54

Note 1: The lower limit shall apply at the transition frequency.

Note 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.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

Limit in radiated emission measurement (Part 15.209)

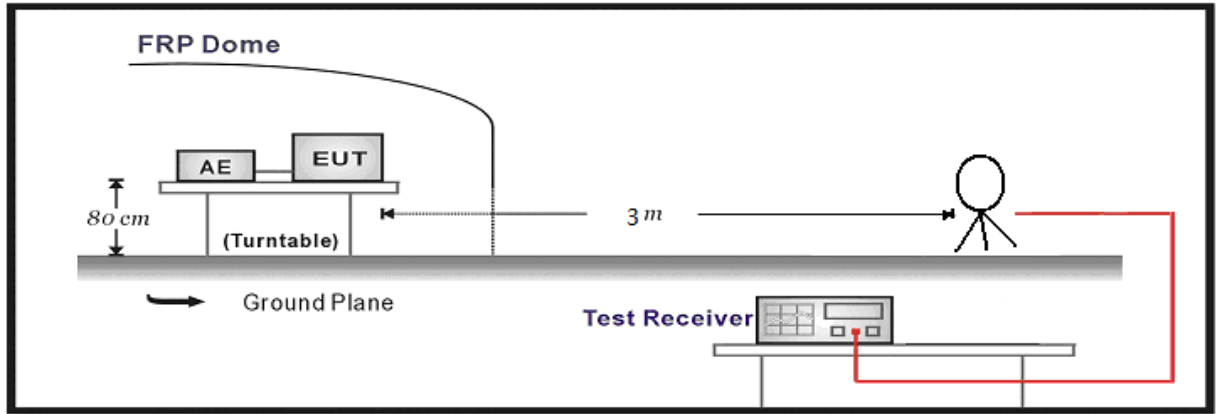
Frequency(MHz)	Field strength(dBuV/m) @3m	
Above 1000	74(peak)	54(average)

Limit in radiated emission measurement (Part 15.249)

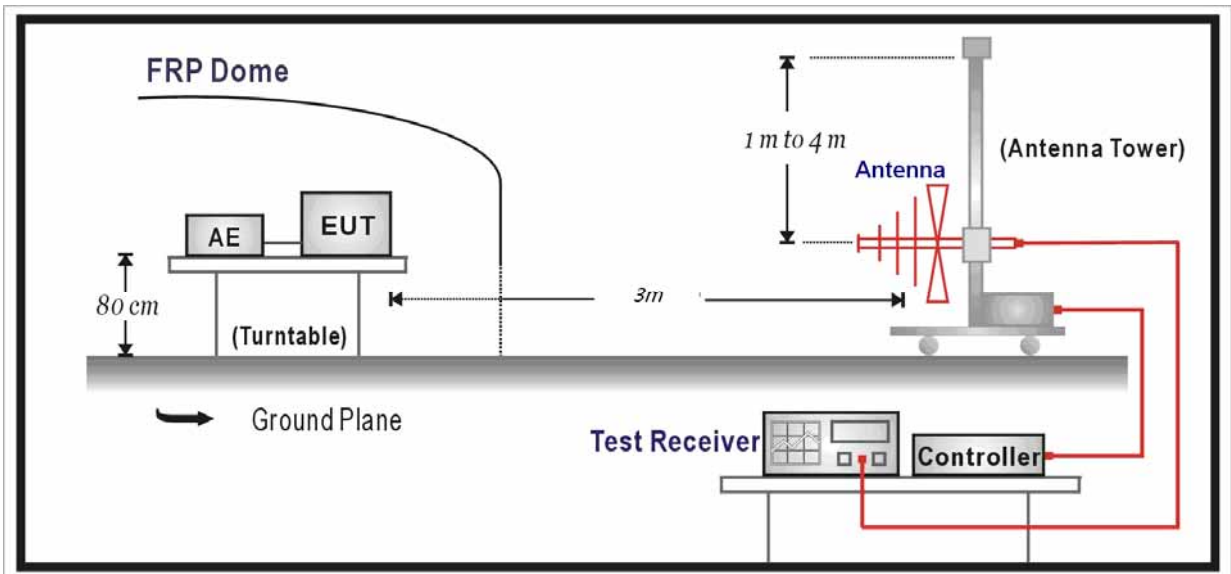
Frequency(MHz)	Field strength(dBuV/m) @3m	
	(millivolts/meter)	(dBuV/m)
902-928 MHz fundamental	50	94
902-928 MHz harmonics	500	/

Test Setup:

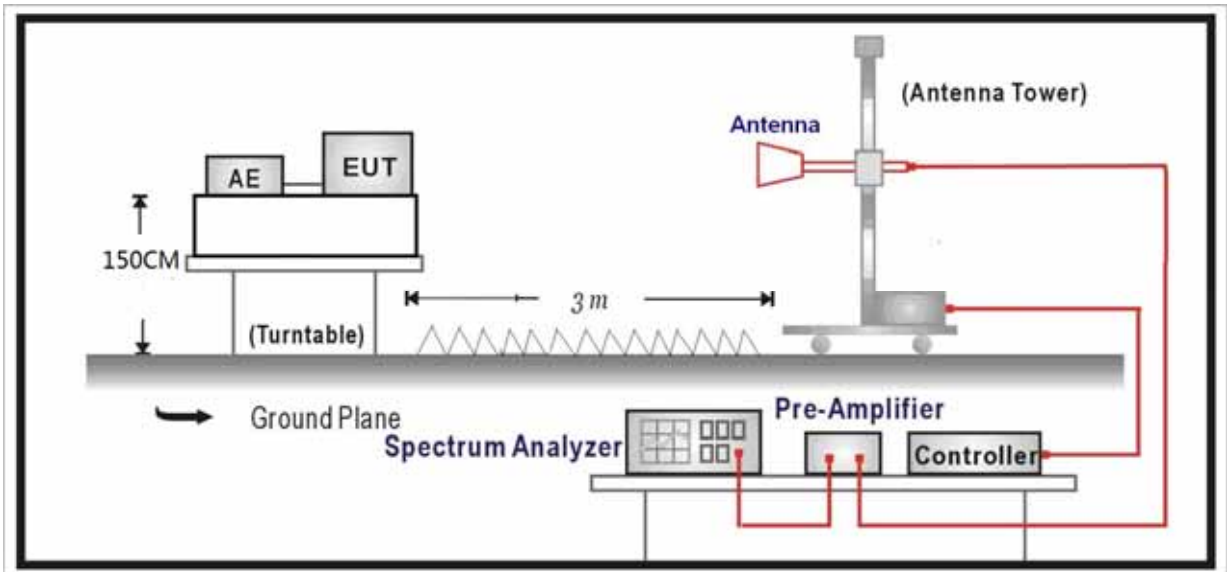
Below 30MHz Test Setup:



Below 1GHz Test Setup:



Above 1GHz Test Setup:



Measurement Uncertainty :

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
above 1G	4.10 dB
below 1G	4.84 dB

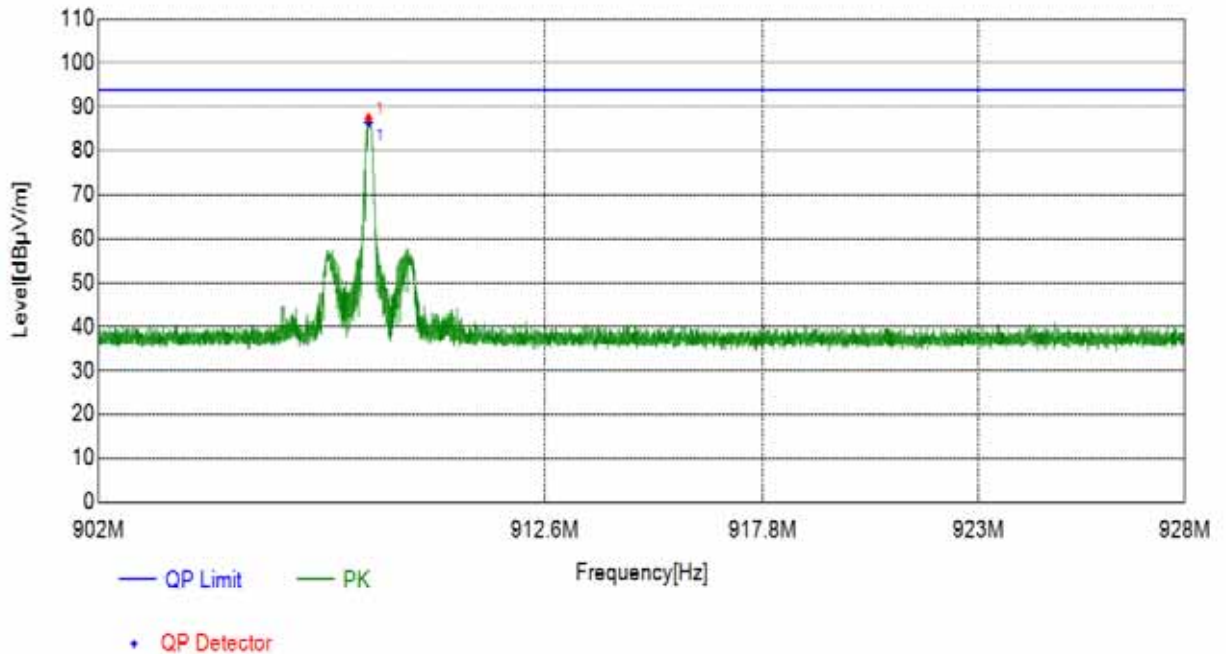
Test Results:

Fundamental Field Strength :

Test Carrier frequency (MHz)	908.4
Polarity	Horizontal

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
908.3940	Horizontal	31.87	55.57	87.44	94.00	6.56	PK	100	50	PASS

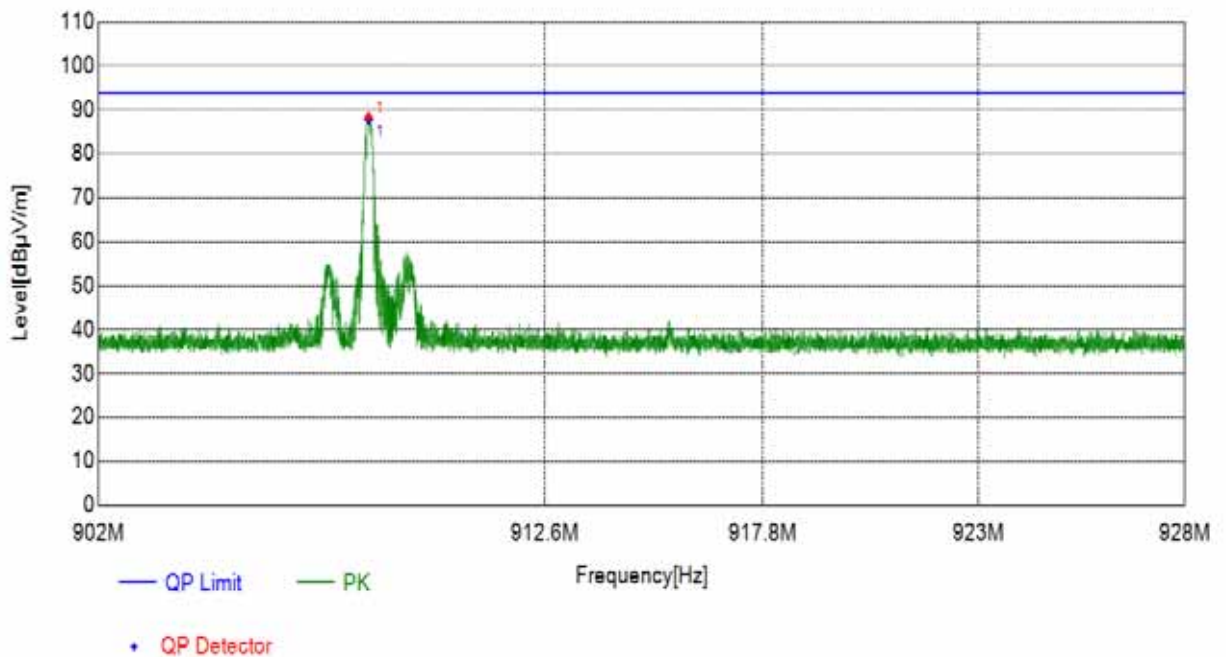
Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
908.3940	Horizontal	31.87	86.50	94.00	7.50	100	50	PASS	



Test Carrier frequency (MHz)	908.4
Polarity	Vertical

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
908.3940	Vertical	31.87	56.52	88.39	94.00	5.61	PK	100	50	PASS

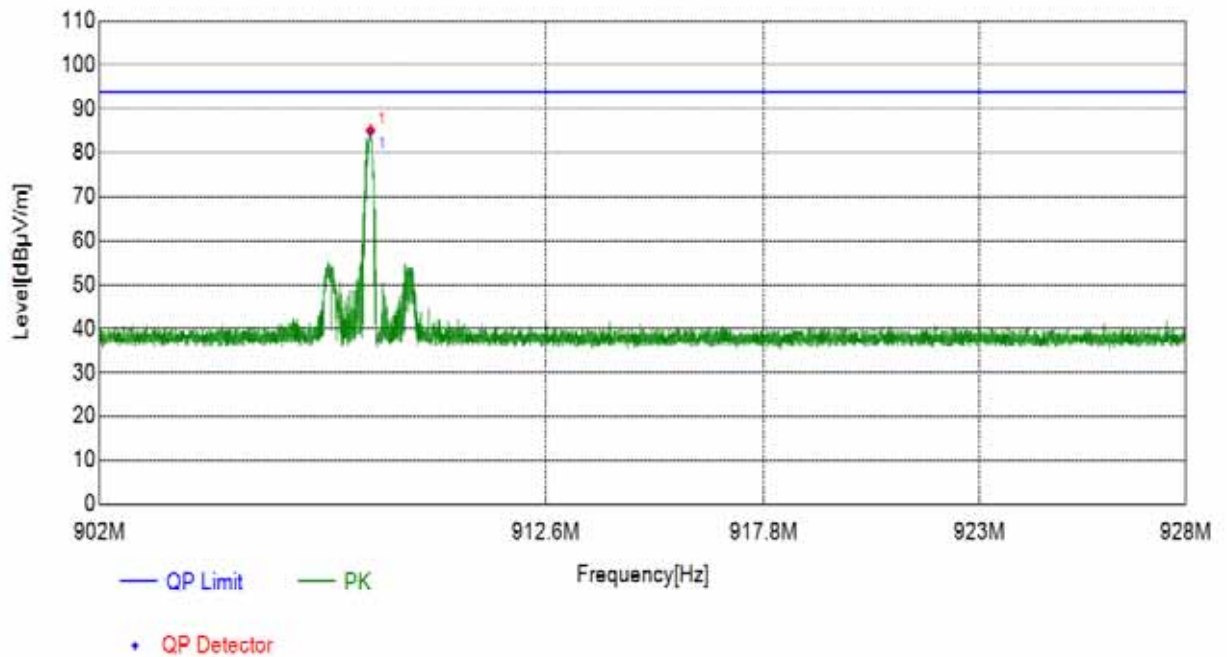
Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
908.3940	Vertical	31.87	87.77	94.00	6.23	100	50	PASS	



Test Carrier frequency (MHz)	908.42
Polarity	Horizontal

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
908.4174	Horizontal	31.87	53.45	85.32	94.00	8.68	PK	100	150	PASS

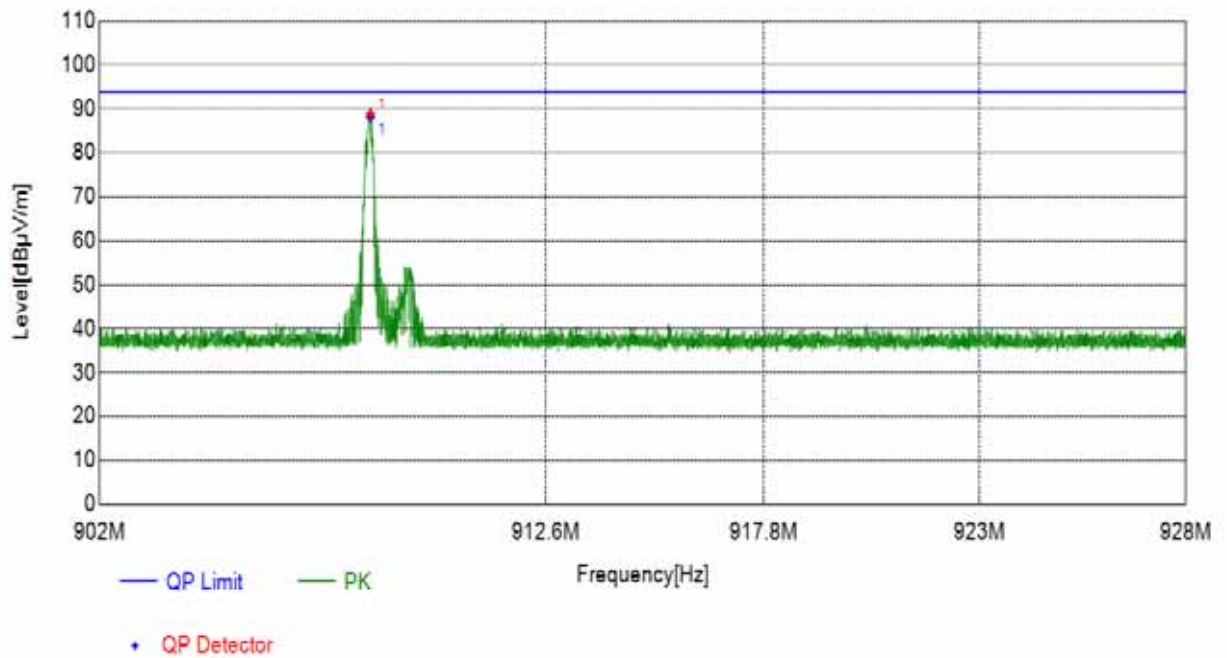
Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
908.4174	Horizontal	31.87	84.88	94.00	9.12	100	150	PASS	



Test Carrier frequency (MHz)	908.42
Polarity	Vertical

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
908.4148	Vertical	31.87	57.08	88.95	94.00	5.05	PK	100	20	PASS

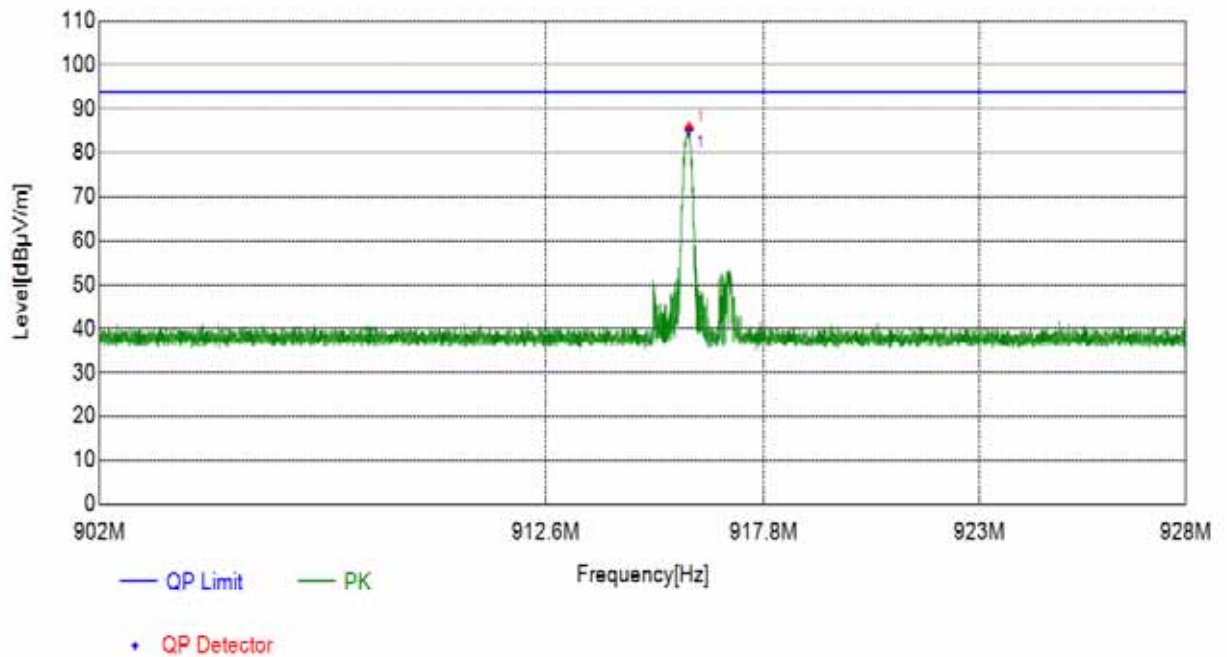
Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
908.4148	Vertical	31.87	88.13	94.00	5.87	100	20	PASS	



Test Carrier frequency (MHz)	916
Polarity	Horizontal

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
916.0206	Horizontal	31.85	54.04	85.89	94.00	8.11	PK	100	70	PASS

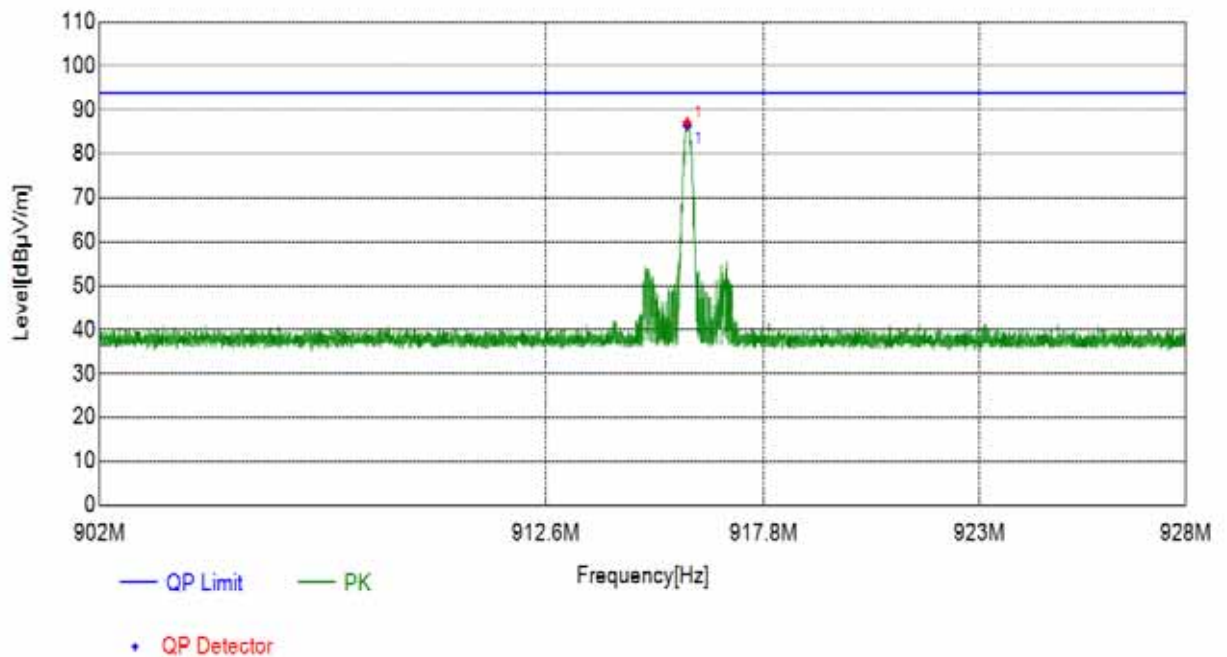
Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
916.0206	Horizontal	31.85	85.32	94.00	8.68	100	70	PASS	



Test Carrier frequency (MHz)	916
Polarity	Vertical

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
915.9738	Vertical	31.85	55.32	87.17	94.00	6.83	PK	100	90	PASS

Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
915.9738	Vertical	31.85	86.39	94.00	7.61	100	90	PASS	

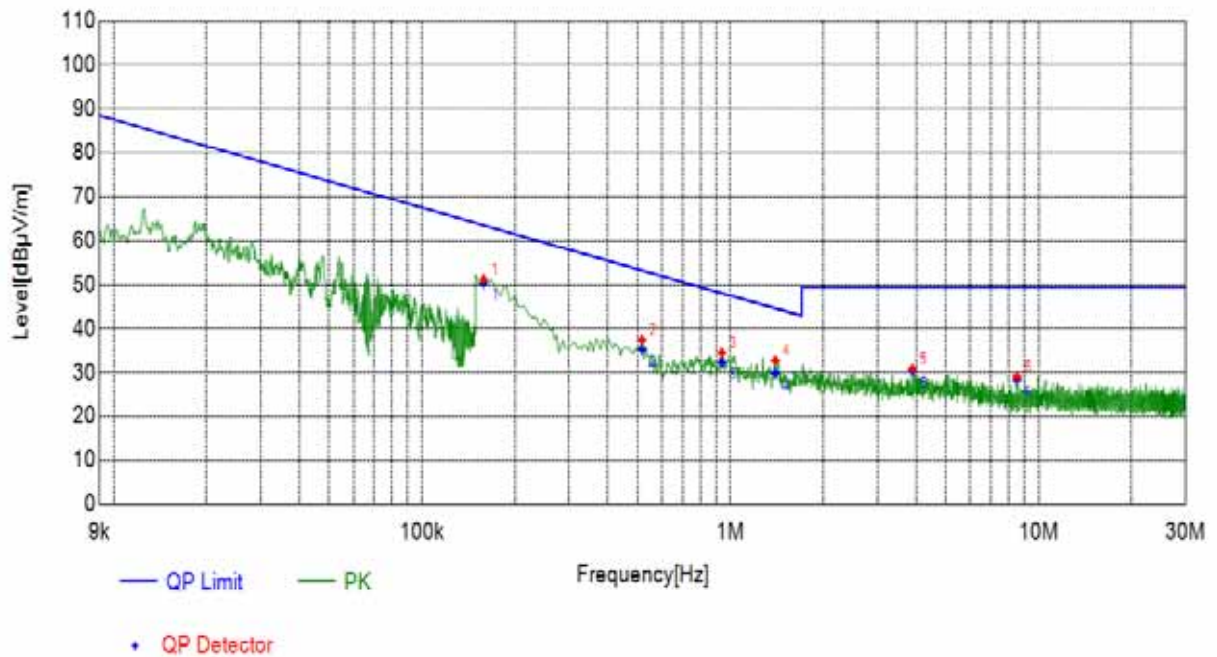


SPURIOUS EMISSIONS 9KHz~30MHz :

Radiated Emission	9KHz-30MHz
Polarity	X axis

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
0.1585	X axis	20.42	30.85	51.27	63.52	12.25	PK	100	20	PASS
0.5168	X axis	20.55	16.95	37.50	53.24	15.74	PK	100	300	PASS
0.9390	X axis	20.55	13.96	34.51	48.07	13.56	PK	100	170	PASS
1.3996	X axis	20.64	12.12	32.76	44.61	11.85	PK	100	290	PASS
3.8946	X axis	21.01	9.86	30.87	49.50	18.63	PK	100	350	PASS
8.5007	X axis	20.86	8.21	29.07	49.50	20.43	PK	100	230	PASS

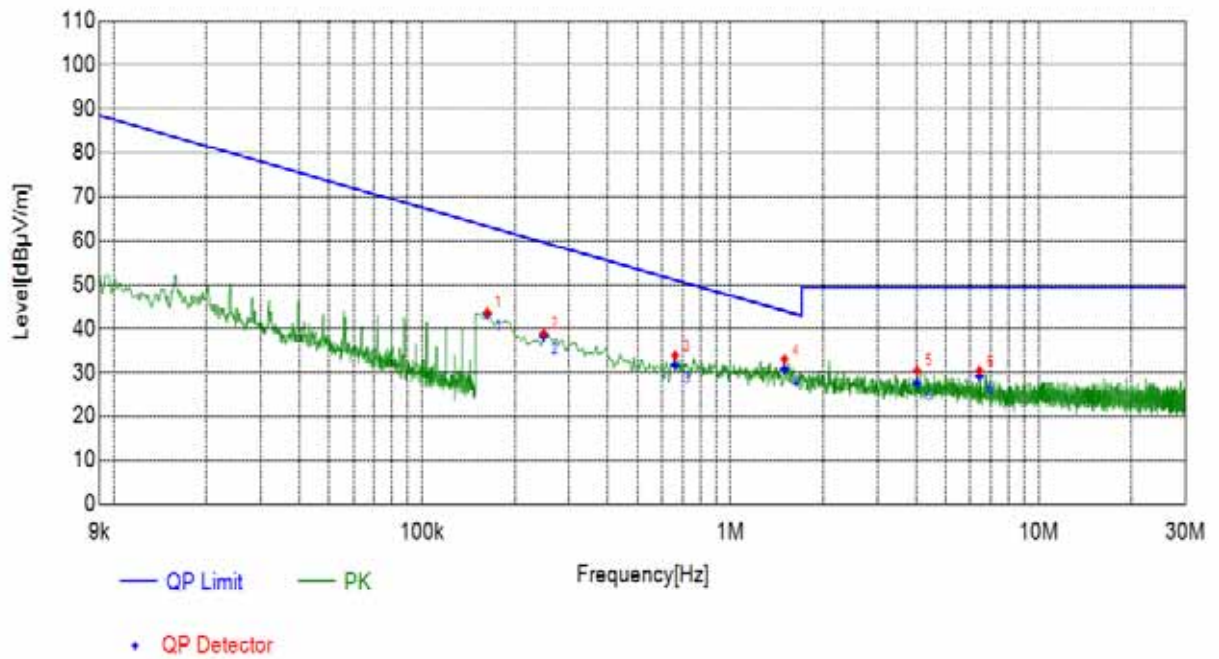
Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
0.1585	X axis	20.42	50.43	63.53	13.10	100	20	PASS	
0.5168	X axis	20.55	35.27	53.24	17.97	100	300	PASS	
0.9390	X axis	20.55	32.28	48.07	15.79	100	170	PASS	
1.3996	X axis	20.64	29.89	44.61	14.72	100	290	PASS	
3.8946	X axis	21.01	30.35	49.50	19.15	100	350	PASS	
8.5007	X axis	20.86	28.40	49.50	21.10	100	230	PASS	



Radiated Emission	9KHz-30MHz
Polarity	Y axis

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBµV/m]	Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
0.1628	Y axis	20.41	23.27	43.68	63.29	19.61	PK	100	190	PASS
0.2481	Y axis	20.40	18.51	38.91	59.63	20.72	PK	100	350	PASS
0.6618	Y axis	20.41	13.42	33.83	51.10	17.27	PK	100	320	PASS
1.4977	Y axis	20.67	12.33	33.00	44.02	11.02	PK	100	150	PASS
4.0311	Y axis	21.01	9.43	30.44	49.50	19.06	PK	100	240	PASS
6.4237	Y axis	20.97	9.45	30.42	49.50	19.08	PK	100	230	PASS

Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBµV/m]	QP Limit [dBµV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
0.1628	Y axis	20.41	43.22	63.29	20.07	100	190	PASS	
0.2481	Y axis	20.40	38.30	59.63	21.33	100	350	PASS	
0.6618	Y axis	20.41	31.65	51.10	19.45	100	320	PASS	
1.4977	Y axis	20.67	30.82	44.02	13.20	100	150	PASS	
4.0311	Y axis	21.01	27.62	49.50	21.88	100	240	PASS	
6.4237	Y axis	20.97	29.23	49.50	20.27	100	230	PASS	



- Note:
1. Quasi-Peak = Reading value + Correction factor
 2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)
 3. All the modes had been tested, but only the worst data recorded in the report.

SPURIOUS EMISSIONS 30MHz~1GHz :

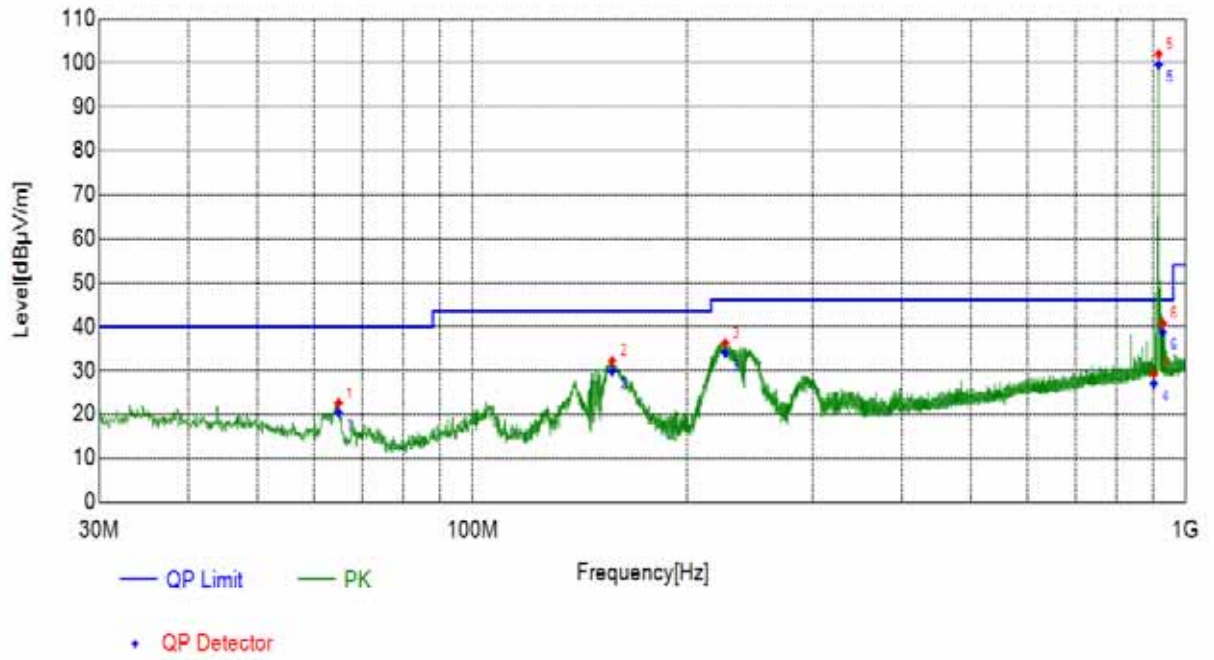
Radiated Emission	30MHz-1GHz
Polarity	Horizontal
Channel	Worst-Case HIGH channel

Suspected List

Frequency [MHz]	Polarity	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
64.9235	Horizontal	17.31	5.29	22.60	40.00	17.40	PK	100	22	PASS
156.9857	Horizontal	15.92	16.24	32.16	43.52	11.36	PK	100	131	PASS
226.0566	Horizontal	19.21	17.09	36.30	46.02	9.72	PK	100	117	PASS
902.0202	Horizontal	31.88	-2.55	29.33	46.02	16.69	PK	100	8	PASS
916.0866	Horizontal	31.85	70.11	101.96	46.02	-55.94	PK	100	131	Fundamental
928.0188	Horizontal	31.84	8.98	40.82	46.02	5.20	PK	100	131	PASS

Final Data List

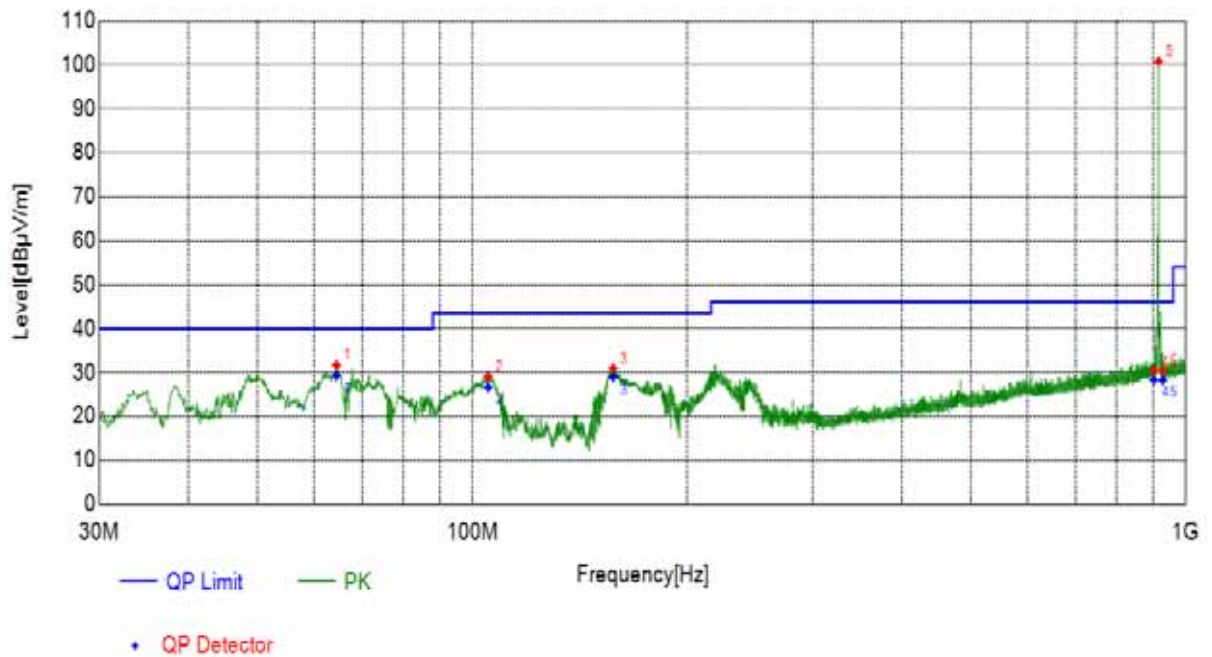
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
64.9235	Horizontal	17.31	20.42	40.00	19.58	142	22	PASS
156.9857	Horizontal	15.92	29.82	43.52	13.70	138	131	PASS
226.0566	Horizontal	19.21	33.96	46.02	12.06	109	117	PASS
902.0202	Horizontal	31.88	27.08	46.02	18.94	100	8	PASS
916.0866	Horizontal	31.85	99.54	46.02	-53.52	100	131	Fundamental
928.0188	Horizontal	31.84	38.76	46.02	7.26	100	131	PASS



Radiated Emission	30MHz-1GHz
Polarity	Vertical
Channel	Worst-Case HIGH channel

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
64.4384	Vertical	17.41	14.28	31.69	40.00	8.31	PK	100	272	PASS
105.1825	Vertical	19.43	9.67	29.10	43.52	14.42	PK	100	258	PASS
157.4707	Vertical	15.92	15.09	31.01	43.52	12.51	PK	100	1	PASS
902.0202	Vertical	31.88	-1.46	30.42	46.02	15.60	PK	100	107	PASS
916.0866	Vertical	31.85	68.97	100.82	46.02	-54.80	PK	100	84	Fundamental
928.0188	Vertical	31.84	-1.33	30.51	46.02	15.51	PK	100	145	PASS

Final Data List									
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dB μ V/m]	QP Limit [dB μ V/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail	
64.4384	Vertical	17.41	29.33	40.00	10.67	135	272	PASS	
105.1825	Vertical	19.43	26.74	43.52	16.78	172	258	PASS	
157.4707	Vertical	15.92	29.01	43.52	14.51	106	1	PASS	
902.0202	Vertical	31.88	28.38	46.02	17.64	100	107	PASS	
916.0866	Vertical	31.85	98.59	46.02	-53.52	100	131	Fundamental	
928.0188	Vertical	31.84	28.34	46.02	17.68	120	145	PASS	

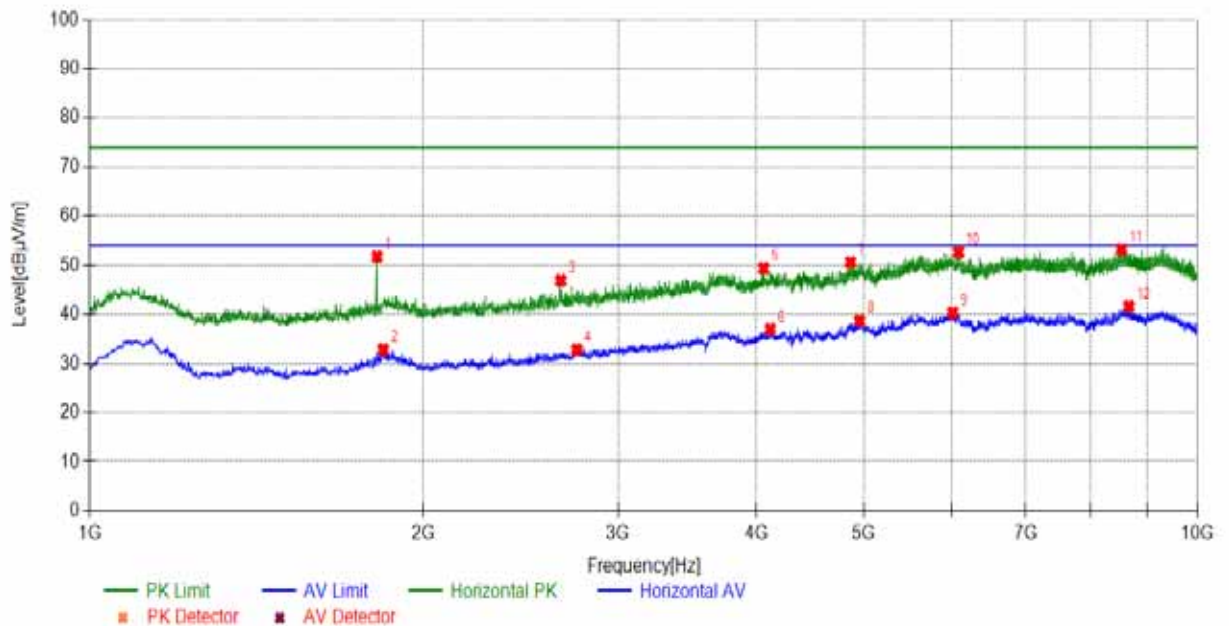


- Note:
1. Quasi-Peak = Reading value + Correction factor
 2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)
 3. All the modes had been tested, but only the worst data recorded in the report.
 4. About the Fundamental emission test result please refer to section 5.2-Fundamental Field Strength.

SPURIOUS EMISSIONS 1GHz~10GHz :

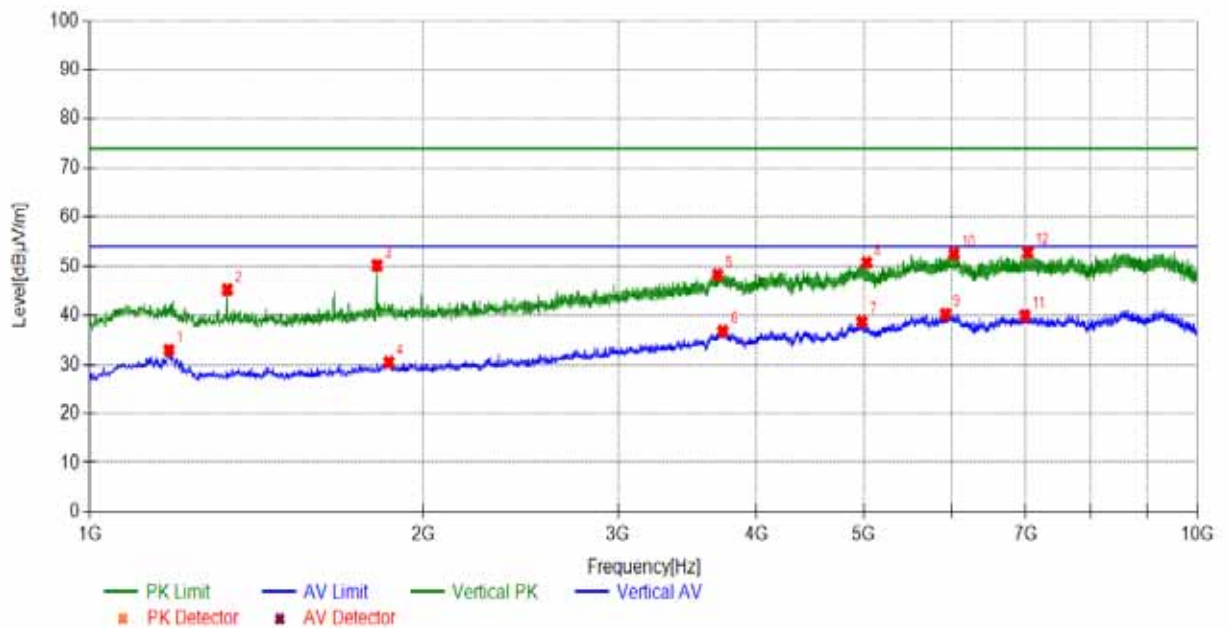
Radiated Emission	1GHz~10GHz
Polarity	Horizontal
Channel	Worst-Case HIGH channel

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
1817.2	Horizon	-10.96	62.71	51.75	74.00	22.25	PK	100	171	PASS
6084.6	Horizon	-1.05	53.68	52.63	74.00	21.37	PK	100	325	PASS
8538.2	Horizon	2.44	50.78	53.22	74.00	20.78	PK	100	360	PASS
4058.5	Horizon	-3.85	53.20	49.35	74.00	24.65	PK	100	260	PASS
2662.4	Horizon	-8.09	54.98	46.89	74.00	27.11	PK	100	16	PASS
4862.2	Horizon	-2.95	53.56	50.61	74.00	23.39	PK	100	335	PASS
2752.4	Horizon	-7.69	40.49	32.80	54.00	21.20	AV	100	11	PASS
1840.6	Horizon	-10.89	43.70	32.81	54.00	21.19	AV	100	11	PASS
8669.6	Horizon	2.63	38.97	41.60	54.00	12.40	AV	100	11	PASS
4954.0	Horizon	-2.70	41.40	38.70	54.00	15.30	AV	100	21	PASS
6012.6	Horizon	-1.05	41.40	40.35	54.00	13.65	AV	100	11	PASS
4115.2	Horizon	-3.86	40.81	36.95	54.00	17.05	AV	100	21	PASS



Radiated Emission	1GHz~10GHz
Polarity	Vertical
Channel	Worst-Case HIGH channel

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dB μ V/m]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
7028.8	Vertical	0.94	51.86	52.80	74.00	21.20	PK	100	186	PASS
6027.9	Vertical	-1.05	53.58	52.53	74.00	21.47	PK	100	76	PASS
1817.2	Vertical	-10.96	61.16	50.20	74.00	23.80	PK	100	4	PASS
5027.9	Vertical	-2.55	53.31	50.76	74.00	23.24	PK	100	148	PASS
1331.2	Vertical	-12.20	57.37	45.17	74.00	28.83	PK	100	62	PASS
3688.5	Vertical	-4.40	52.70	48.30	74.00	25.70	PK	100	158	PASS
1862.2	Vertical	-10.82	41.31	30.49	54.00	23.51	AV	100	338	PASS
3728.1	Vertical	-4.33	41.11	36.78	54.00	17.22	AV	100	343	PASS
4978.3	Vertical	-2.64	41.37	38.73	54.00	15.27	AV	100	348	PASS
6983.7	Vertical	0.85	39.07	39.92	54.00	14.08	AV	100	348	PASS
5923.4	Vertical	-1.21	41.47	40.26	54.00	13.74	AV	100	348	PASS
1179.1	Vertical	-12.42	45.35	32.93	54.00	21.07	AV	100	348	PASS



- Note:
1. Quasi-Peak = Reading value + Correction factor
 2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)
 3. All the modes had been tested, but only the worst data recorded in the report.
 4. About the Fundamental emission test result please refer to section 5.2-Fundamental Field Strength.

5.3 Occupied Bandwidth

Ambient condition:

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement:

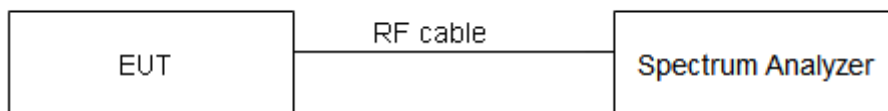
Tests are performed in accordance with ANSI C63.10-2013.

The 20 dB and 99% bandwidth of the fundamental frequency remain inside the band of operation of 902-928 MHz. The EUT was connected to the spectrum analyzer and z-wave test set via a power splitter with a known loss. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 10 kHz and VBW is set to 30 kHz on spectrum analyzer.

Limits:

No specific occupied bandwidth requirements in part 15.215(c).

Test Setup:



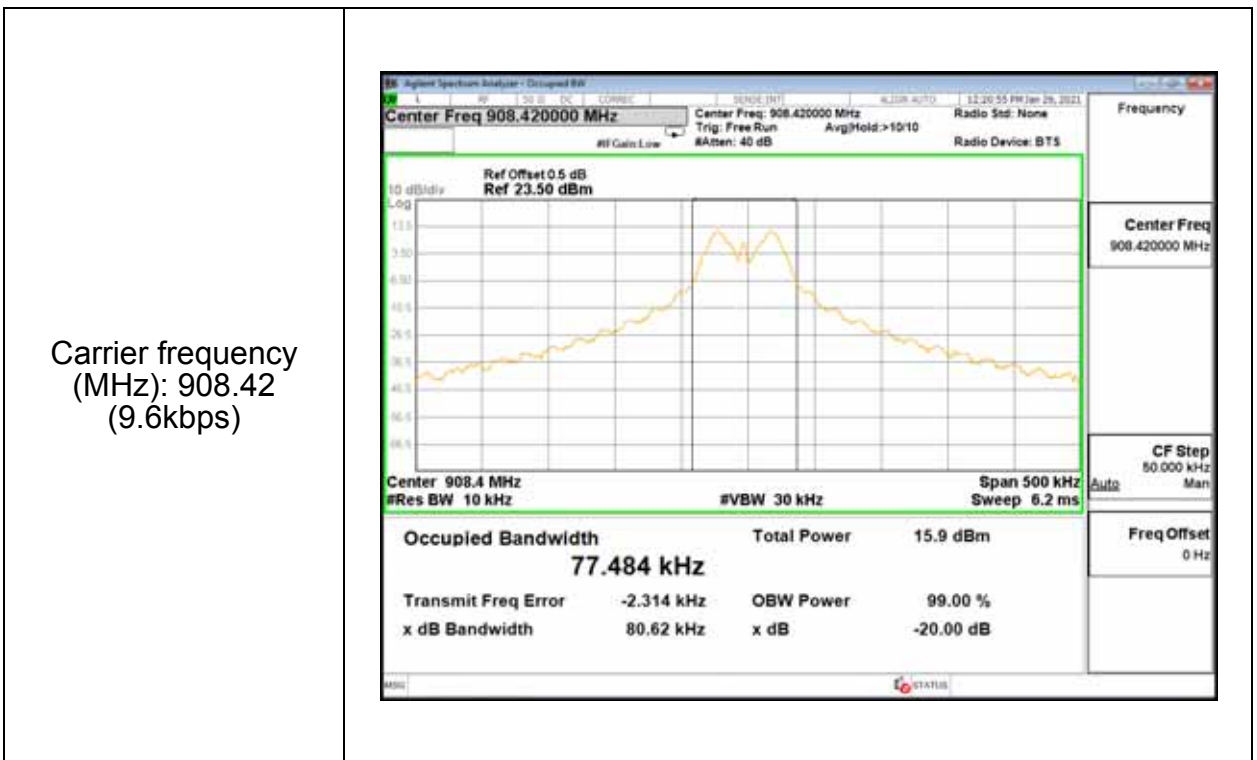
Measurement Uncertainty :

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 936$ Hz.

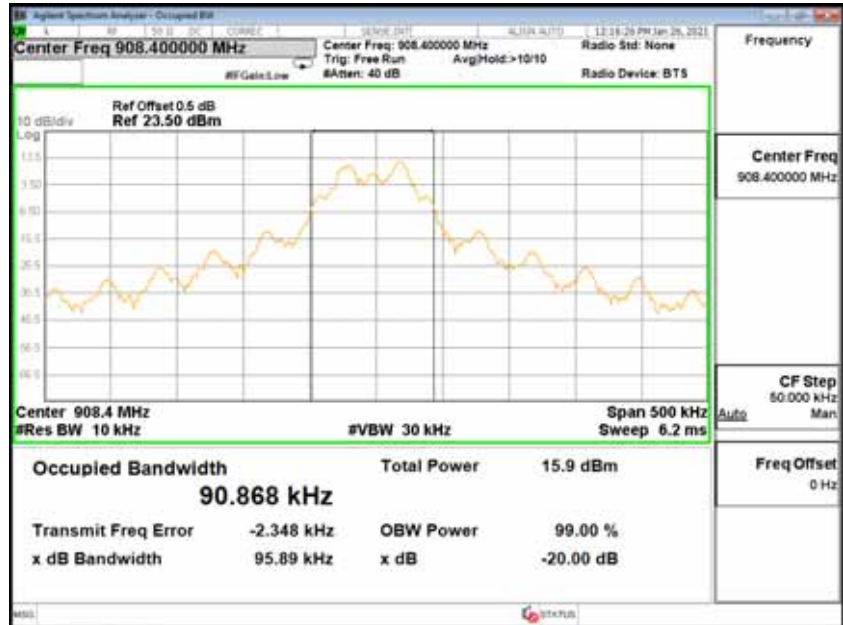
Test Results:

Mode	Frequency (MHz)	Rate (kbps)	20dB Bandwidth(kHz)	99% Bandwidth(kHz)
z-wave	908.42	9.6	80.62	77.484
	908.4	40	95.89	90.868
	916	100	120.1	113.99

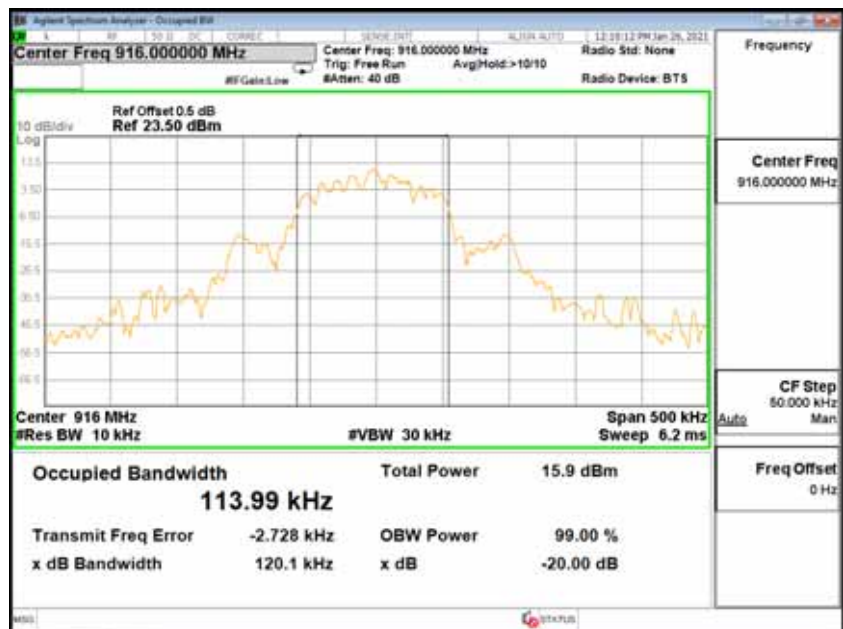
Test Graphs:



Carrier frequency
(MHz): 908.4
(40kbps)



Carrier frequency
(MHz): 916(100kbps)



5.4 Antenna Measurement

Limits:

For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

Antenna Description:

See section 1 – antenna information

6. Test Setup Photograph

(1) Radiated spurious emission Test Setup-1(9KHz~30MHz)



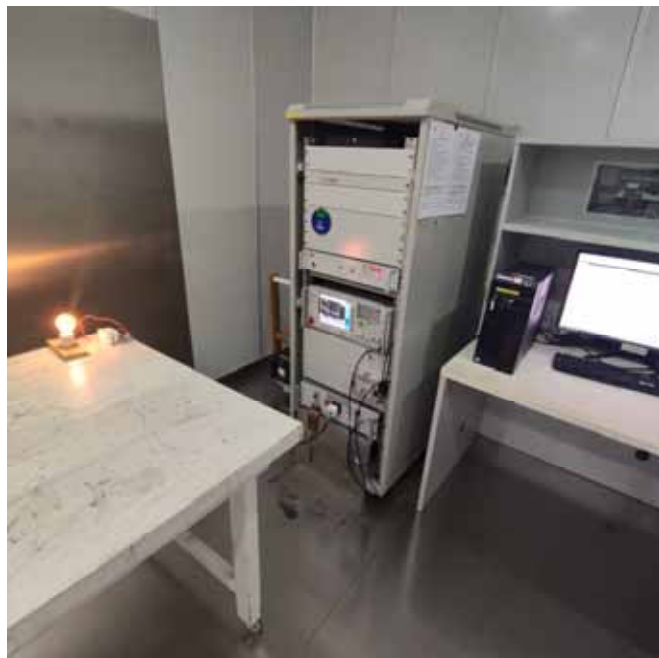
(2) Radiated spurious emission Test Setup-2(Below 1GHz)



(3) Radiated spurious emission Test Setup-3(Above 1GHz)

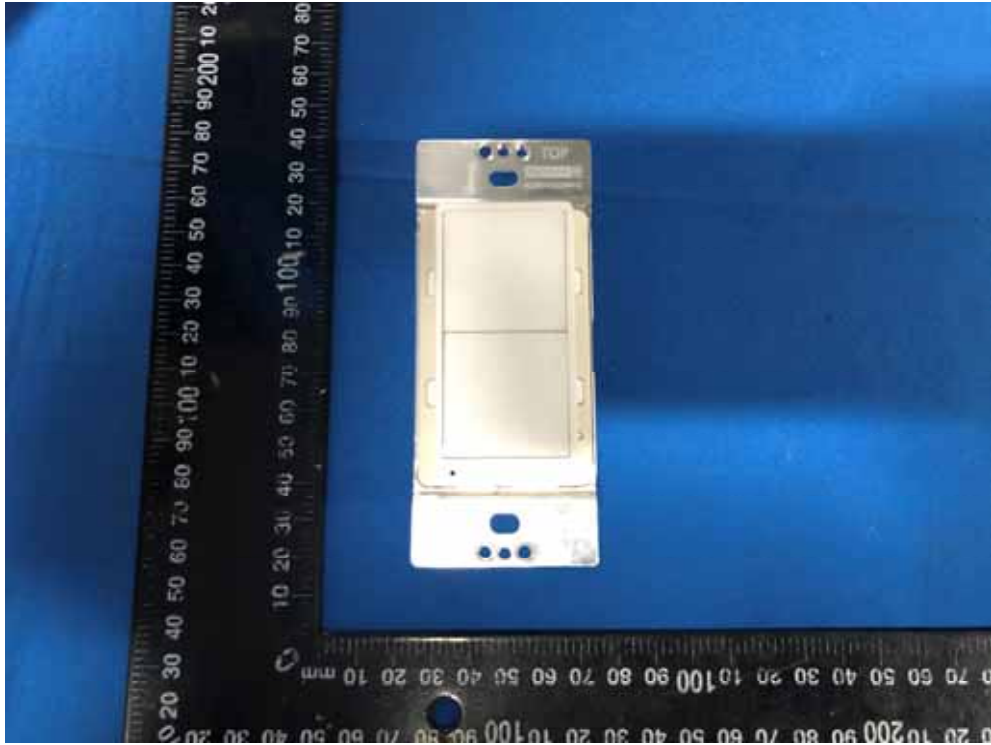


(4) Conducted Emission Test Setup

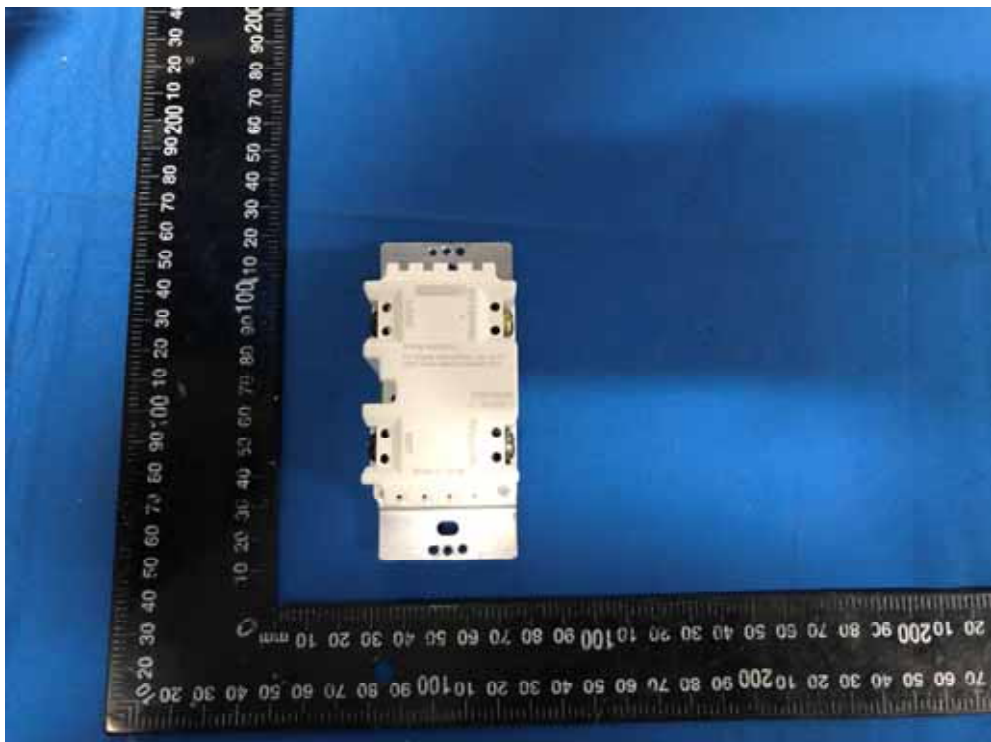


7. EUT Photograph

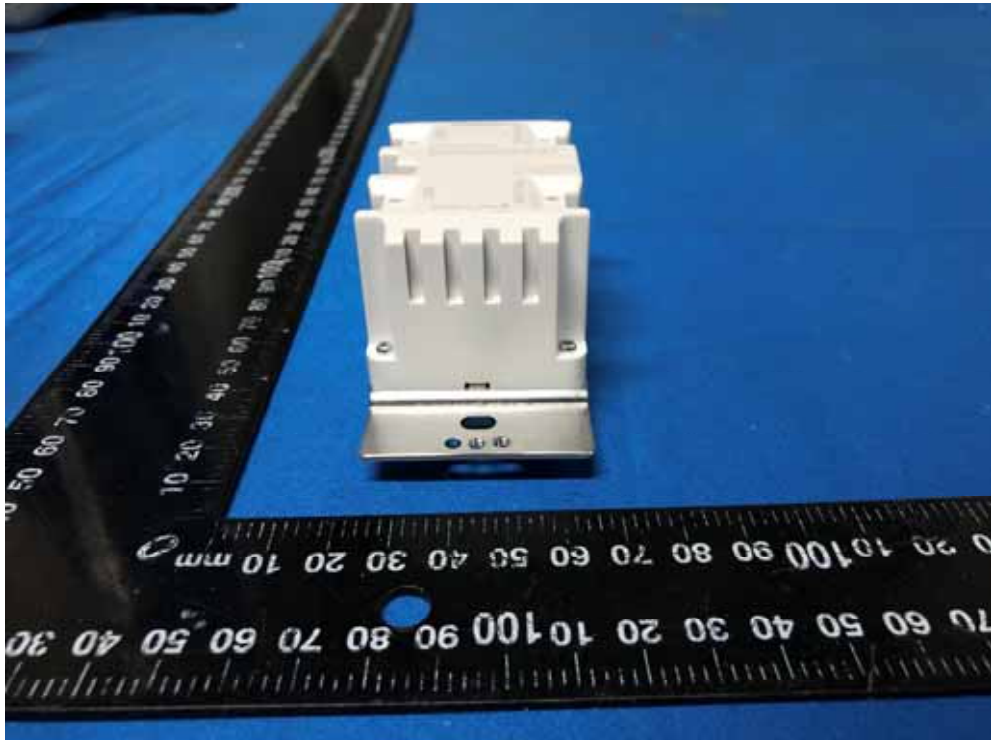
(1) EUT Photo



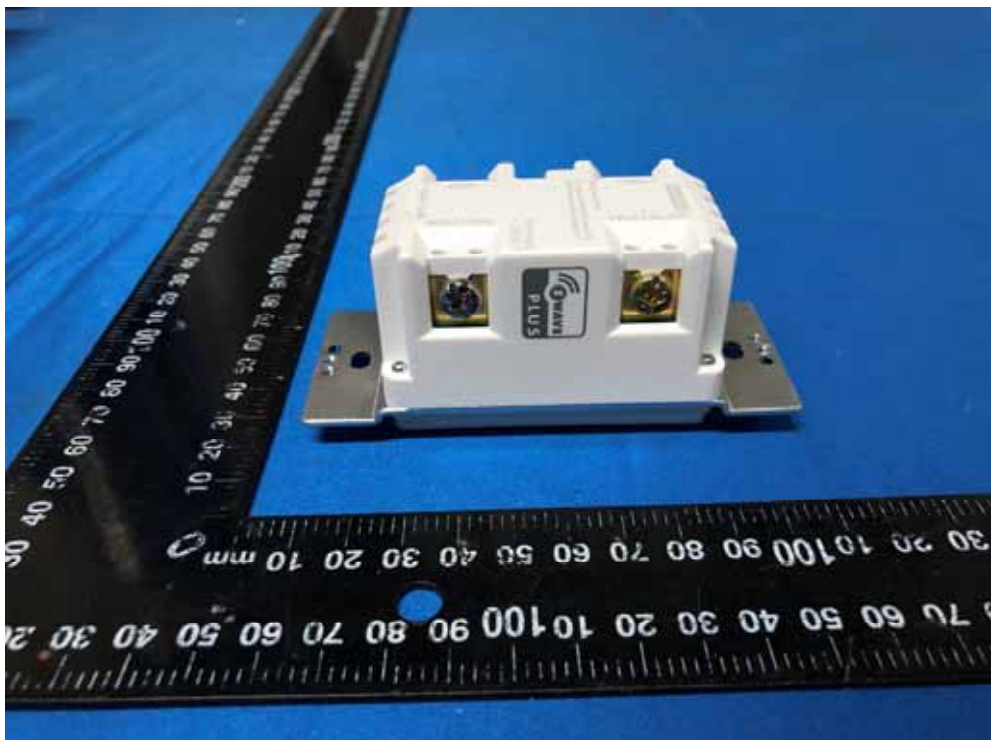
(2) EUT Photo



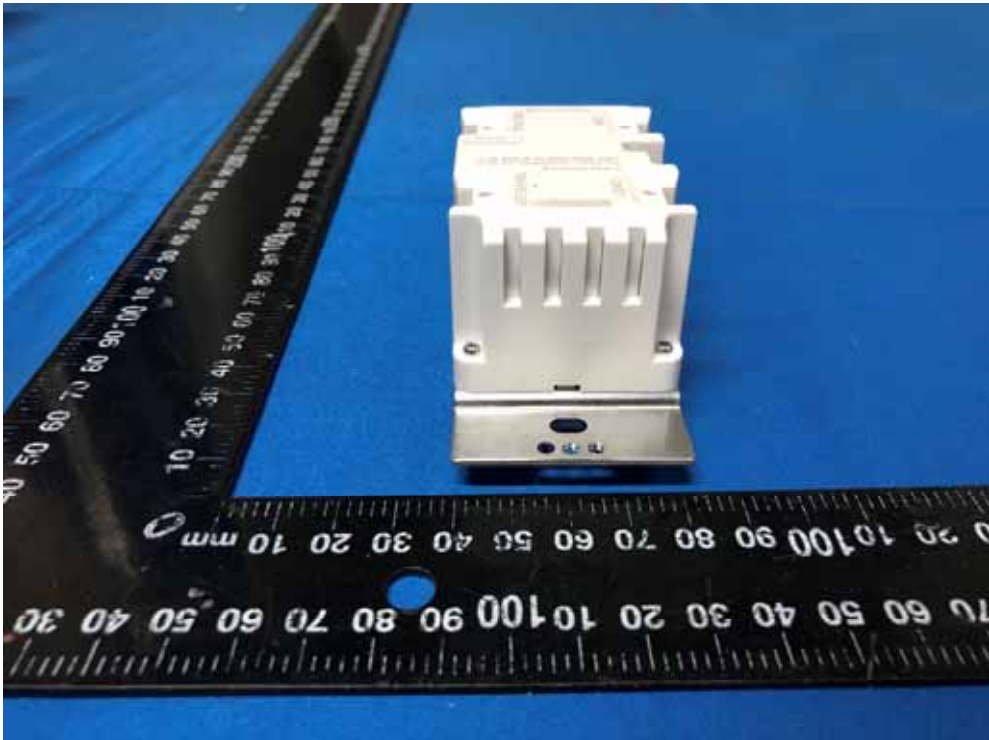
(3) EUT Photo



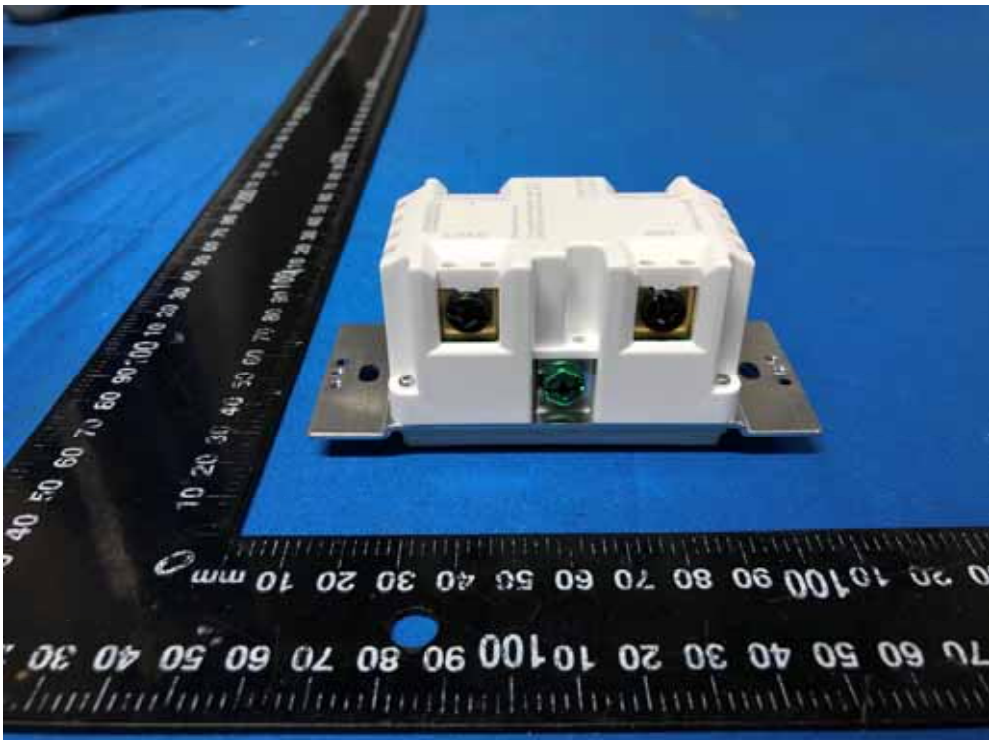
(4) EUT Photo



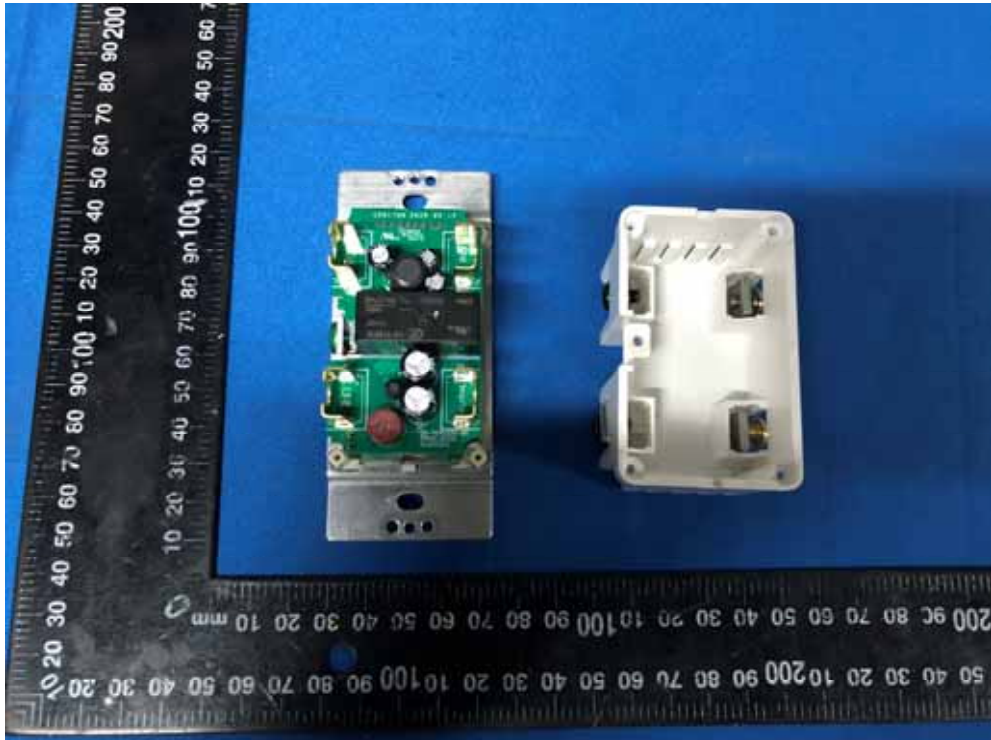
(5) EUT Photo



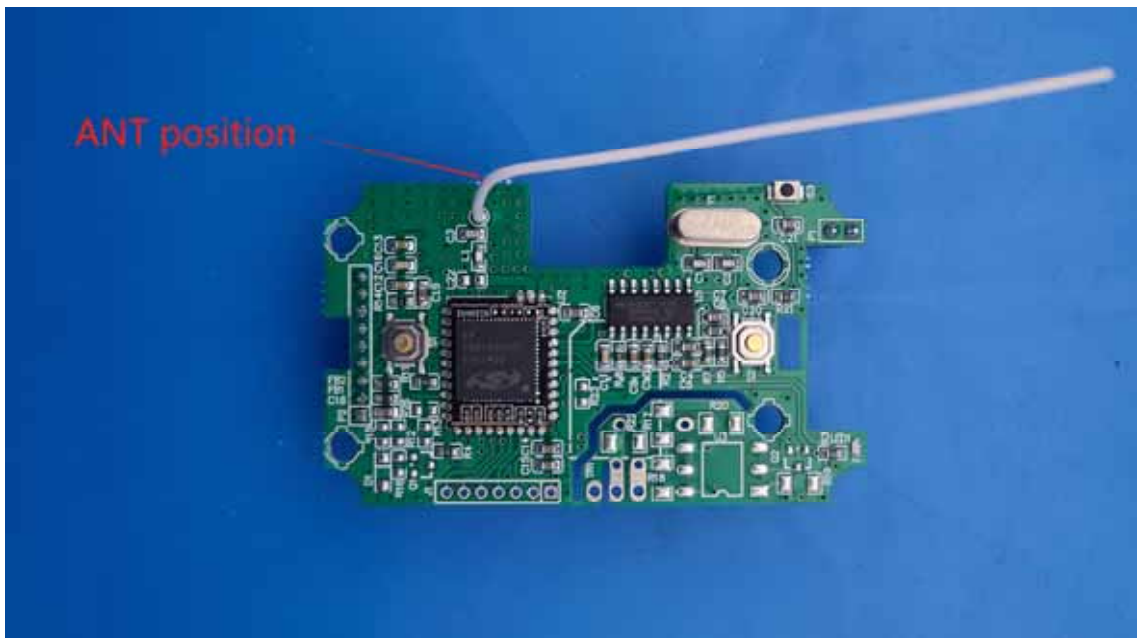
(6) EUT Photo



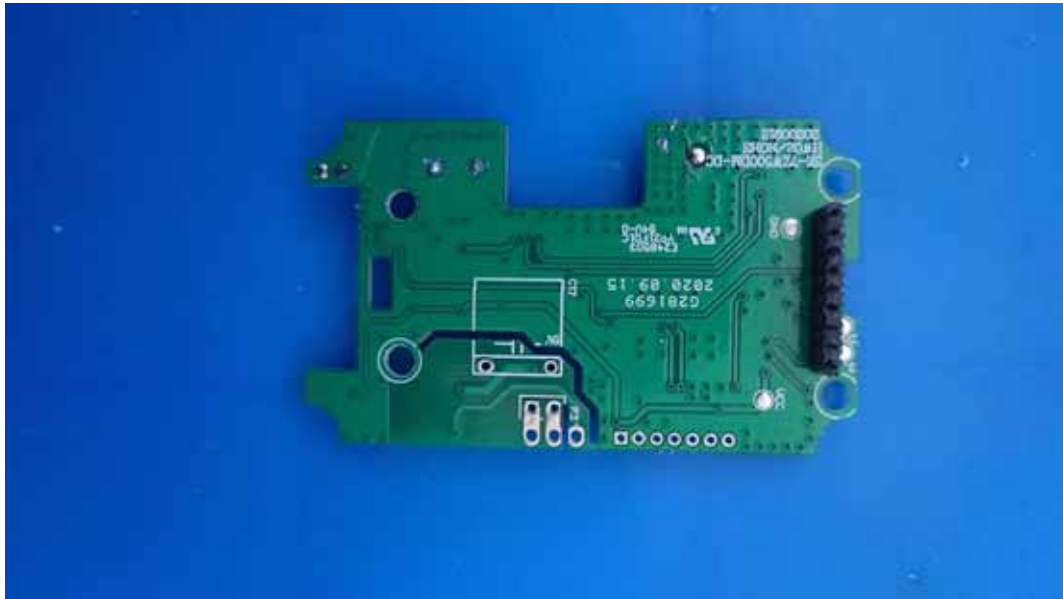
(7) EUT Photo



(8) EUT Photo



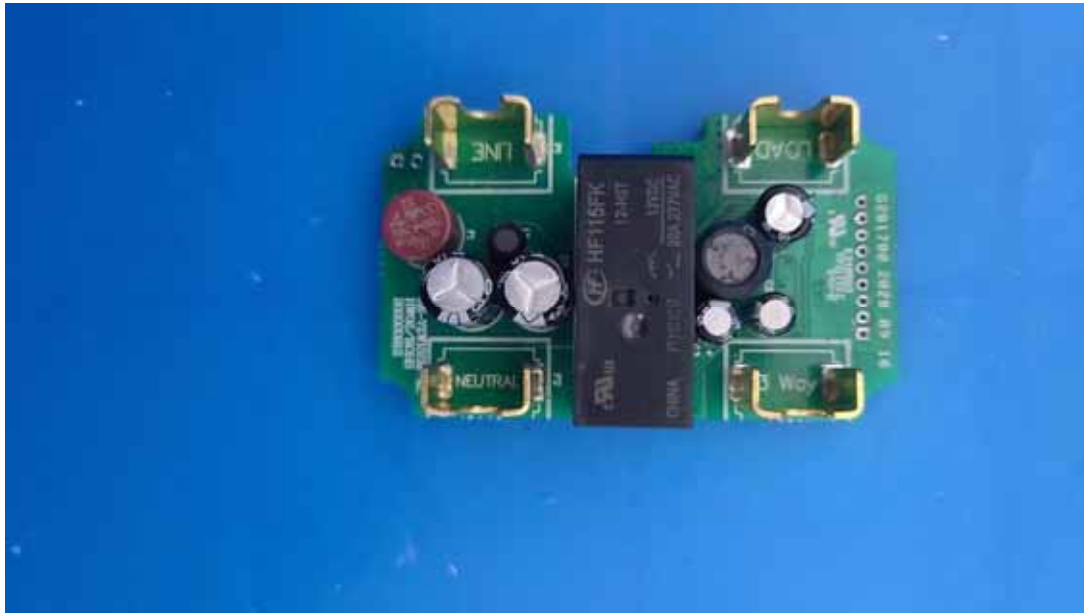
(9) EUT Photo



(10) EUT Photo



(11) EUT Photo



8. Appendix

Equipment list	Type/Mode	Equipment No.	Manufacturer	Cal. Due
EMI Test Receiver	ESI26	EM-0087	R&S	2021-03-15
EMI Test Receiver	ESR3	VG DY-0705	R&S	2021-03-15
LISN	NSLK 8127	VG DY-0150	SCHWARZBECK	2021-09-04
LISN	NSLK 8128	VG DY-0149	SCHWARZBECK	2021-09-04
Impedance Stabilization Network	NTFM8131	EM-000498	SCHWARZBECK	2021-06-09
Voltage Probe	TK9420	VG DY-0128	SCHWARZBECK	2021-03-11
Power Divider	4901.17.B	DB-0016	HUBER+SUHNER	2021-11-08
Shielding Room(#1)	GP1A	WKNF-0001	LEINING	2024-08-08
Shielding Room(#2)	GP1A	WKNF-0006	LEINING	2024-08-08
EMI Test Receiver	N9038A-508	EM-000397	Agilent	2021-03-15
EMI Test Receiver	ESR7	VG DY-0956	R&S	2021-03-11
Broadband Antenna(3m)	VULB 9163	EM-000342	SCHWARZBECK	2021-07-11
Broadband Antenna(5m)	VULB 9163	EM-000382	SCHWARZBECK	2021-05-10
Loop Antenna	HLA 6121	EM-000546	TESEQ	2021-06-28
Waveguide Horn Antenna	BBHA9120B	EM-000383	SCHWARZBECK	2021-03-15
Waveguide Horn Antenna	HF906	WKNA-0024-8	R&S	2021-03-15
Semi-Anechoic Chamber(3m)	FACT-4	WKNA-0024	ETS	2024-12-12
Semi-Anechoic Chamber(5m)	SAC-5	EM-000557	COMTEST	2024-11-02
Spectrum analyzer	N9030	EM-000395	Agilent	2021-06-08

The End