FCC TEST REPORT

According to

CFR47 §15.231

Applicant	:	**Ningbo Diya Electric Appliance Co., Ltd**
Address	:	**Simen Town, Yuyao City, Zhejiang, Province, China**
Manufacturer	:	**Ningbo Diya Electric Appliance Co., Ltd**
Address	:	**Simen Town, Yuyao City, Zhejiang, Province, China**
Equipment	:	**Wireless plug-in remote control adaptor**
Model No.	:	**DR-V02/VSF**
FCC ID	:	**2AC2CDR-016**
Test Period	:	**Sept.10,2017~ Oct.31, 2017**

■ The test result refers exclusively to the test presented test model / sample.

■ Without written approval of ***Cerpass Technology Corporation Test Laboratory.*** the test report shall not be reproduced exc- ept in full.

■ The test report must not be used by the clients to claim product certification approval by any agency of the Government.

I HEREBY CERTIFY THAT :
The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.10 – 2013&Part15.231**and the energy emitted by this equipment was ***passed.***

Approved by:

Mark Liao / Assistant Manager

Laboratory Accreditation:

☒ Cerpass Technology Corporation Test Laboratory

TAF LAB Code:	**1439**

Contents

History of this Test Report

Report No.	Version	Issue Date	Description
TEFN1709066	Rev 01	Oct.31, 2017	Original.
TEFN1709066	Rev 02	Nov.07, 2017	1. Delete the duty cycle in page 7 2. Update the set up photo

1. Report of Measurements and Examinations

Performed Test Item	Normative References	Test Performed	Deviation	Result
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.207	Yes	N/A	Pass
Fundamental & spurious emission	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.231(b)	Yes	No	Pass
Restrict band radiated emission	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.205	Yes	N/A	Pass
Emission bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.231(c)	Yes	N/A	Pass
Deactivating time	FCC CFR Title 47 Part 15 Subpart C: 2016 Section 15.231(a)(1)	Yes	No	Pass

2. General Info

2.1 Description of EUT

Product name	Wireless plug-in remote control adaptor
Model No.	DR-V02/VSF

2.2 Description of wireless module

Module Name	HY2300MN R2
Modulation Type	ASK/OOK
Frequency Range	433.92MHz
Channel Number	1
Data Rate	4.8kbps

Note: For more details, please refer to the EUT User manual.

2.3 Description of Antenna

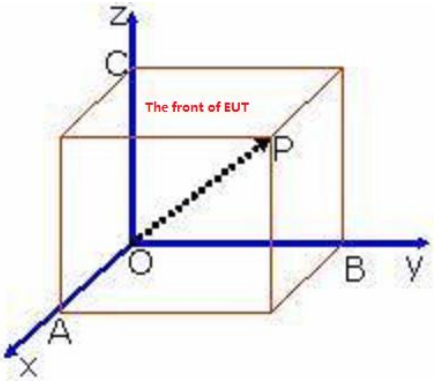
Antenna	Peak Gain
Dipole Antenna	0dBi for 433.92MHz

2.4 EUT Exercise Software

1	Turn on the power of equipment，then RF start continue transmit.

2.5 The Worst Case Configuration

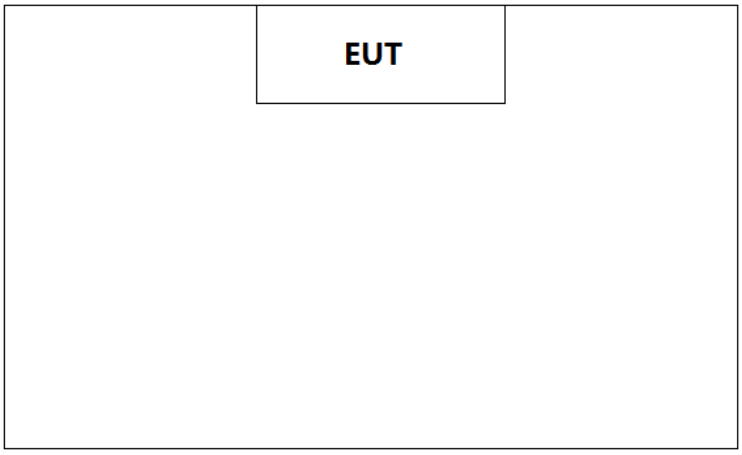
EUT is put X,Y,Z three axial assessment test,and Y axial is the worst case, so the EUT is put Y axial for all RF items tested.



2.6 Support equipment

Product	Manufacturer	Model No.	Serial No.	Power Cord
N/A	N/A	N/A	N/A	N/A

Connection Diagram



Signal Cable Type		Signal cable Description
A	N/A	N/A

3. General Information of Test Site

3.1 Information of Test Site

Test Site :	**Cerpass Technology Corporation Test Laboratory** Location: No.10 Lane2 Lianfu Street Luzhu District, Taoyuan City Taiwan ROC Tel:+886-3-3226-888 Fax:+886-3-3226-881
FCC Registration Number :	TW1439
IC Registration Number :	4934B-1
VCCI	T-2205 for Telecommunication Test C-4663 for Conducted emission test R-4399, R-4218 for Radiated emission test G-812, G-813 for radiated disturbance above 1GHz

3.2 Measuring Equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Test Receiver	R&S	ESCI	100565	2017.03.26	2018.03.25
AMN	R&S	ESH2-Z5	100182	2017.09.06	2018.09.05
Two-Line V-Network	R&S	ENV216	100325	/	/
Pulse Limiter	R&S	ESH3-Z2	100529	2017.03.26	2018.03.25
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-004	2017.03.29	2018.03.28
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
EMI Test Receiver	R&S	ESCI	101183	2017.03.26	2018.03.25
Preamplifier	songyi	EM330	60618	2017.03.26	2018.03.25
Preamplifier	Agilent	8449B	3008A02342	2017.03.26	2018.03.25
Bilog Antenna	Sunol Science	JB1	A072414-1	2017.04.16	2018.04.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-618	2017.04.16	2018.04.15
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	9170-347	2017.04.16	2018.04.15
Preamplifier	COM-POWER	PA-840	711885	2017.03.26	2018.03.25
Spectrum Analyzer	R&S	FSP40	100324	2017.03.26	2018.03.25
Spectrum Analyzer	KEYSIGHT	N9010A	MY54200207	2017.03.17	2018.03.16
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-002	2017.03.29	2018.03.28
EZ-EMC	Fala	Ver CT3A1	N/A	N/A	N/A

3.3 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

RF Conducted Measurement

Test Item		Uncertainty	Limit
Radio Frequency		±8.7X10^{-7}	±1X10^{-5}
RF output power, conducted		±0.63dB	±1.5dB
Power density, conducted		±1.21dB	±3dB
Unwanted emissions, conducted	30-1000MHz	±0.51dB	±3dB
	1-25GHz	±0.67dB	±3dB
All emissions, radiated	30-1000MHz	±2.28dB	±6dB
	1-25GHz	±2.59dB	±6dB
Temperature		±0.8℃	±1℃
Humidity		±3%	±5%
DC and low frequency voltages		±3%	±3%

AC Conducted Measurement

Measurement	Frequency	Uncertainty
Conducted emissions(LINE)	9KHz-30MHz	+/- 0.7738 dB
Conducted emissions(NEUTRAL)	9KHz-30MHz	+/- 0.7886 dB
Conducted emissions(10Mbps)	150KHz-30MHz	+/- 1.3013dB
Conducted emissions(100Mbps)	150KHz-30MHz	+/- 1.3197 dB
Conducted emissions(1000Mbps)	150KHz-30MHz	+/- 1.2987 dB

Radiated Measurement

Measurement	Polarity	Frequency	Uncertainty
Radiated emissions	Horizontal	below 1GHz	+/- 3.8936 dB
	Vertical	below 1GHz	+/- 3.8928 dB
	Horizontal	above 1GHz	+/- 5.18858dB
	Vertical	above 1GHz	+/- 5.18928 dB

4. AC Conducted Emission Measurement

4.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.10-2013 Section 6.2. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 6.2.2.The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	**Quasi Peak (dB μ V)**	**Average (dB μ V)**
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

4.2 Test Standard

Tested according to ANSI C63.10: 2013 Section 6.2 for compliance to FCC 47CFR 15.247 Part15.207 (a) requirements.

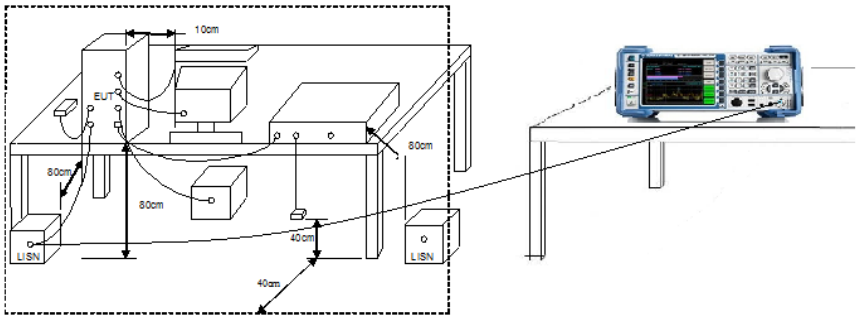
4.3 Test Procedures

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

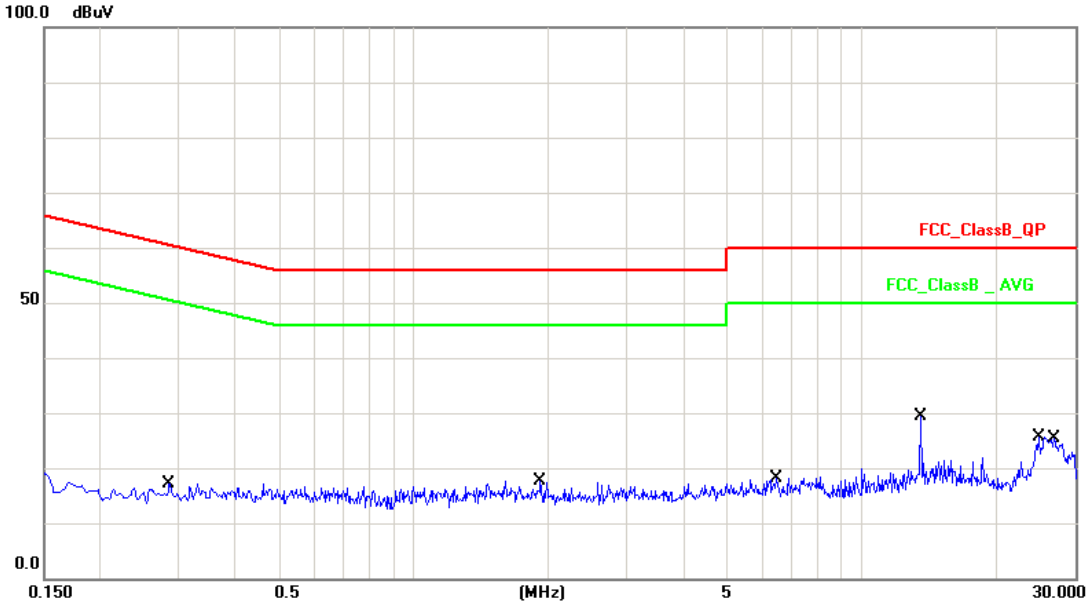
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

4.4 Test Setup Layout



4.5 Test Result

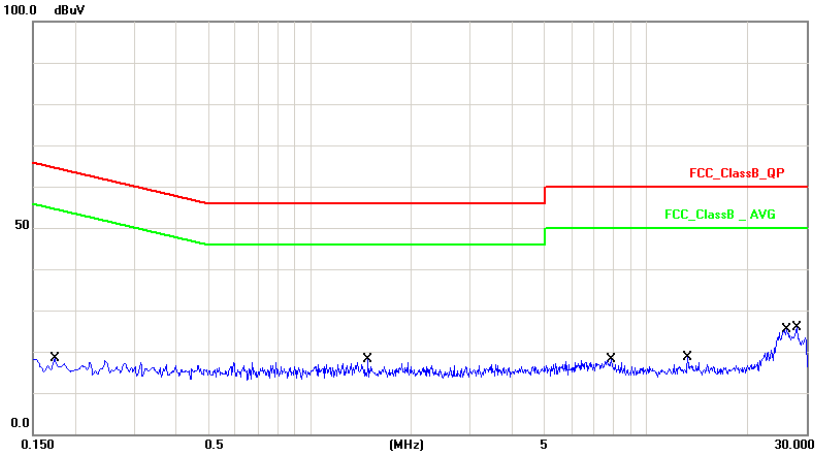
Test Mode :	Mode 1: Normal Operation		
AC Power :	AC 120V/60Hz	Phase:	LINE
Temperature :	26°C	Humidity:	60%
Pressure(mbar) :	1002	Date:	2017/09/18



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2860	10.14	-0.87	9.27	60.64	-51.37	QP
2	0.2860	10.14	-3.75	6.39	50.64	-44.25	AVG
3	1.9220	10.17	-1.19	8.98	56.00	-47.02	QP
4	1.9220	10.17	-4.12	6.05	46.00	-39.95	AVG
5	6.4580	10.25	0.66	10.91	60.00	-49.09	QP
6	6.4580	10.25	-4.04	6.21	50.00	-43.79	AVG
7	13.5620	10.45	13.15	23.60	60.00	-36.40	QP
8	13.5620	10.45	6.43	16.88	50.00	-33.12	AVG
9	24.7940	10.43	11.26	21.69	60.00	-38.31	QP
10	24.7940	10.43	7.73	18.16	50.00	-31.84	AVG
11	26.9460	10.43	9.82	20.25	60.00	-39.75	QP
12	26.9460	10.43	5.42	15.85	50.00	-34.15	AVG

Note: Measurement Level = Reading Level + Correct Factor

Test Mode :	Mode 1: Normal Operation		
AC Power :	AC 120V/60Hz	Phase :	NEUTRAL
Temperature :	26°C	Humidity :	60%
Pressure(mbar) :	1002	Date:	2017/09/18



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1740	10.13	0.56	10.69	64.76	-54.07	QP
2	0.1740	10.13	-2.80	7.33	54.76	-47.43	AVG
3	1.4940	10.18	-1.36	8.82	56.00	-47.18	QP
4	1.4940	10.18	-4.17	6.01	46.00	-39.99	AVG
5	7.8860	10.26	1.34	11.60	60.00	-48.40	QP
6	7.8860	10.26	-3.50	6.76	50.00	-43.24	AVG
7	13.3060	10.43	3.30	13.73	60.00	-46.27	QP
8	13.3060	10.43	-1.09	9.34	50.00	-40.66	AVG
9	26.2260	10.33	11.54	21.87	60.00	-38.13	QP
10	26.2260	10.33	8.66	18.99	50.00	-31.01	AVG
11	28.0140	10.30	10.01	20.31	60.00	-39.69	QP
12	28.0140	10.30	7.33	17.63	50.00	-32.37	AVG

Note: Measurement Level = Reading Level + Correct Factor

5. Radiated Emission Measurement

5.1 Test Limit

The emission shall test through the 10th harmonic or to 40GHz, whichever is lower. It must comply with the limits below:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	[1]1,250 to 3,750	[1]125 to 375
174-260	3,750	375
260-470	[1]3,750 to 12,500	[1]375 to 1,250
Above 470	12,500	1,250

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emission (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500[1]	50 to 150[1]
174-260	1,500	150
260-470	1,500 to 5,000[1]	150 to 500[1]
Above 470	5,000	500

[1]Linear interpolations.

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

The formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, uV/m at 3 meters = 56.81818(Frequency) - 6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(Frequency) - 7083.3333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

For that the EUT use fundamental frequency of 433.92MHz, after calculation, the limit is:

Fundamental limit = 41.6667 * 433.92 - 7083.3333 = 10996.68 uV/m = 80.80dBuV/m

Spurious limit = 80.80 – 20 = 60.80dBuV/m

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

FCC Part 15 Subpart C Paragraph 15.209		
FREQUENCIES (MHz)	**FIELD STRENGTH (micro volts/meter)**	**MEASUREMENT DISTANCE (meters)**
0.009~0.490	2400/F(kHz)	300

0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

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)

Note 4: **Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.

5.2 Test Procedures

Quasi-Peak Field Strength Measurements:

The specifications for measurements using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Frequency Interference (CISPR) of the International Electrotechnical Commission.

As an alternative to CISPR quasi-peak measurement, compliance can be demonstrated to the applicable emission limits using a peak detector.

Peak Field Strength Measurements:

Analyzer center frequen was set to the frequency of the radiated spurious emission of interest

1. RBW=As specified in Table 1
2. VBW=3×RBW
3. Detector=Peak
4. Trace mode=Max hold
5. Sweep time=Auto couple
6. Allow the trace to stabilize

Table 1-RBW as a function of frequency

Frequency	RBW
9 ~ 150kHz	200 ~ 300Hz
0.15 ~ 30MHz	9 ~ 10kHz
30 ~ 1000MHz	100 ~ 120kHz
＞ 1000MHz	1MHz

AVE Field Strength Measurements:

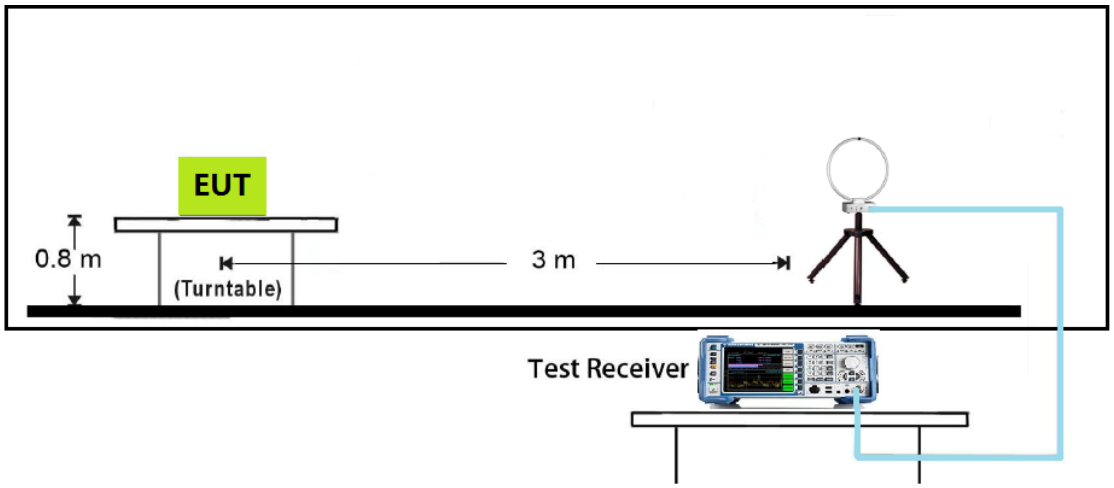
Analyzer center frequen was set to the frequency of the radiated spurious emission of interest

1. RBW= 1MHz
2. VBW≥1/T
3. Detector=Peak
4. Trace mode=Max hold
5. Sweep time=Auto couple
6. Allow max hold to run for at least 50 times(1/duty cycle) trace

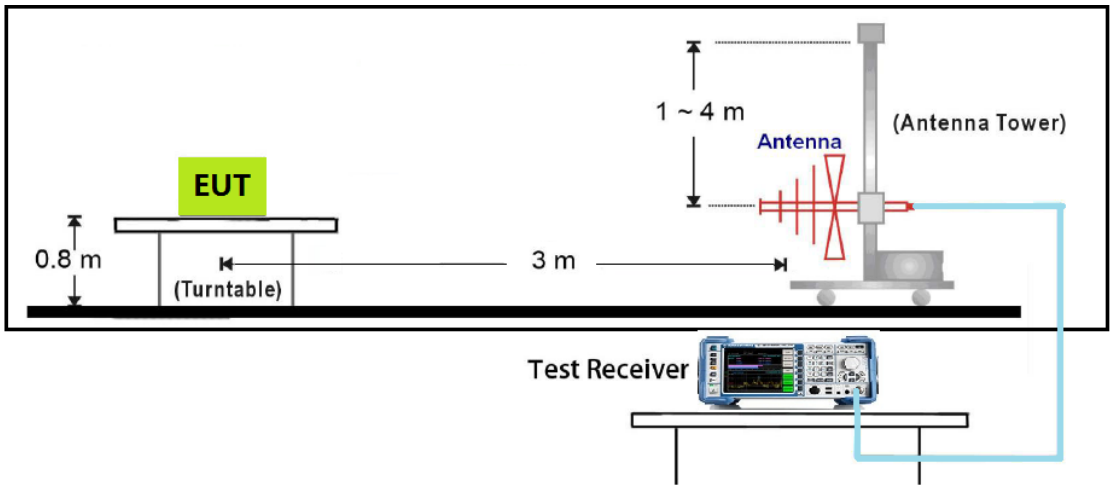
Do as an alternative, the instrument may be set to linear detector mode. Ensure that video filtering is applied in linear voltage domain (rather than in a log or dB domain). Some instruments require linear display mode in order to accomplish this. Others have a setting for Average-VBW Type, which can be set to “Voltage” regardless of the display mode

5.3 Test Setup Layout

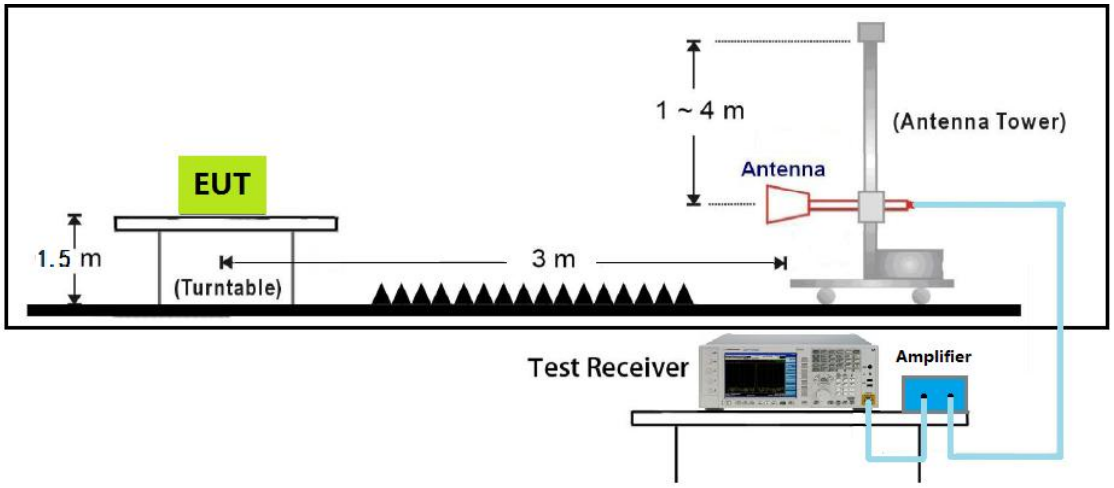
9kHz~30MHz Test Setup



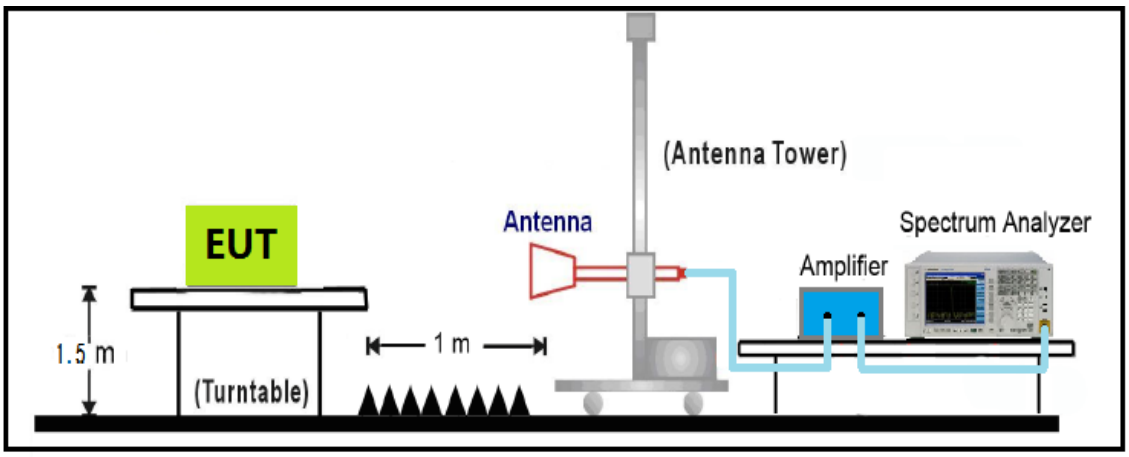
30MHz~1GHz Test Setup



1GHz~18GHz Test Setup



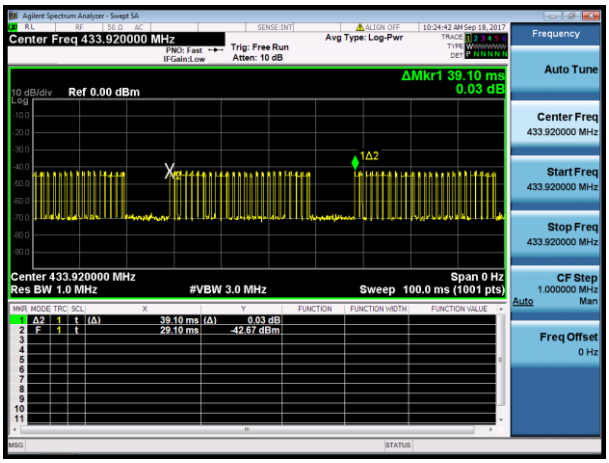
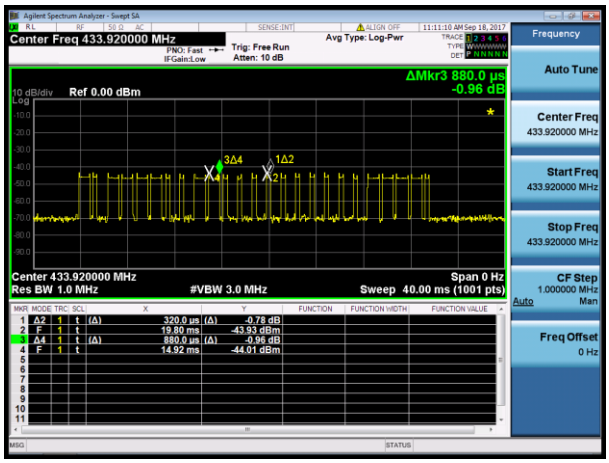
18GHz~40GHz Test Setup



5.4 Test Result

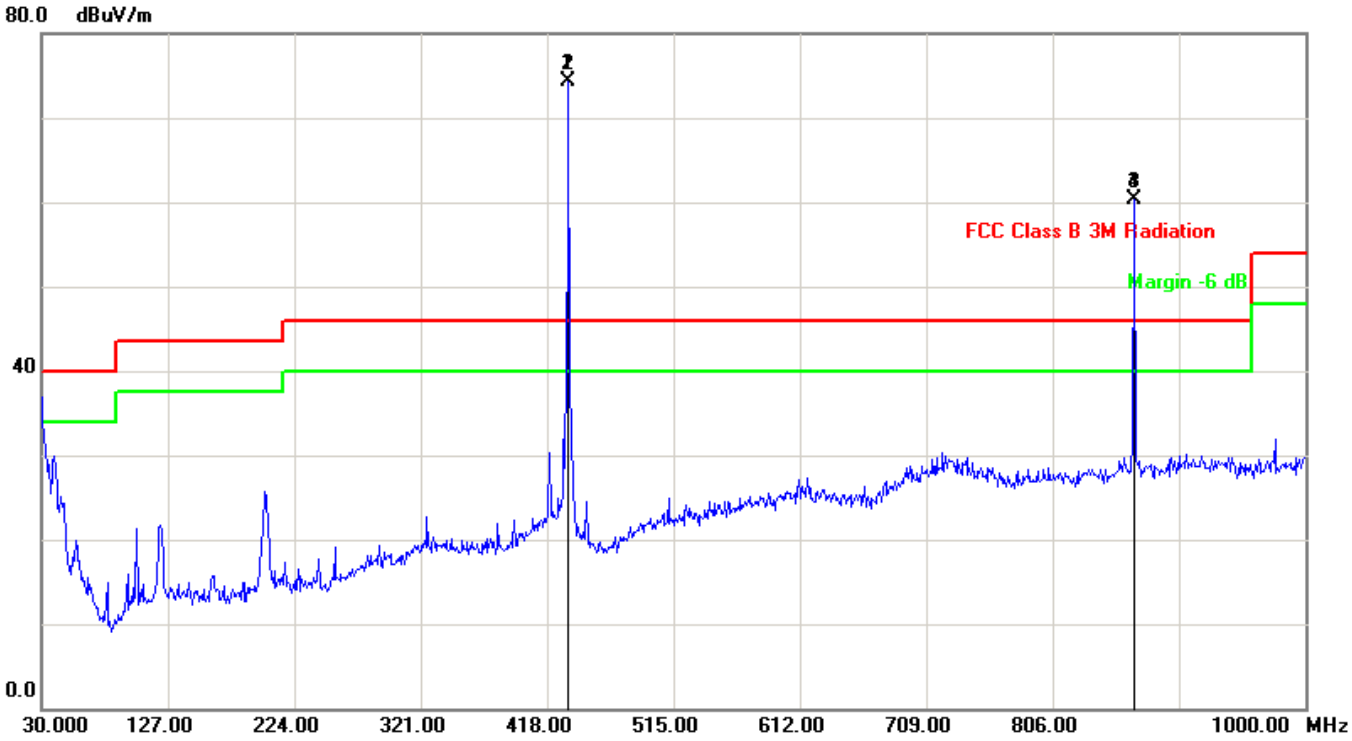
Test Period（ms）	Total Time(ms)	Duty Cycle(%)	Duty Cycle Factor(dB)
39.10	14.16	36.21	-8.82

Note 1 :Duty Cycle Factor=-20*Log(1/Duty Cycle)

Test Period（ms）	Total Time(ms)
	

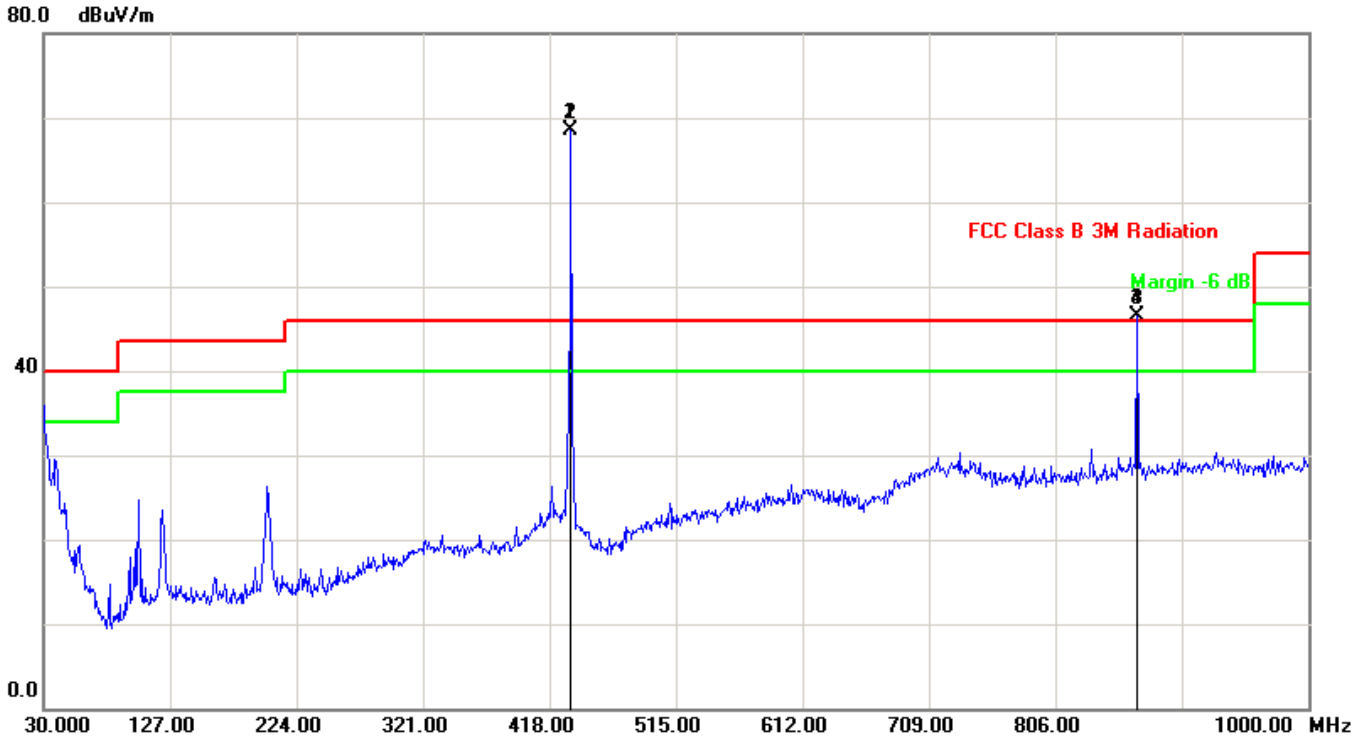
Below 1G:

Site: AC102	Time: 2017/09/18
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: DR-V02/VSF	Power: 120V/60Hz
Note: Mode:Transmit 433.92MHz	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Duty Cycle Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	434.49	-4.82	79.06	N/A	74.24	100.8	-26.56	434.49
2	434.49	-4.82	N/A	-8.82	65.42	80.8	-15.38	434.49
3	869.05	2	58.26	N/A	60.26	80.8	-20.54	869.05
4	869.05	2	N/A	-8.82	51.44	60.8	-9.36	869.05

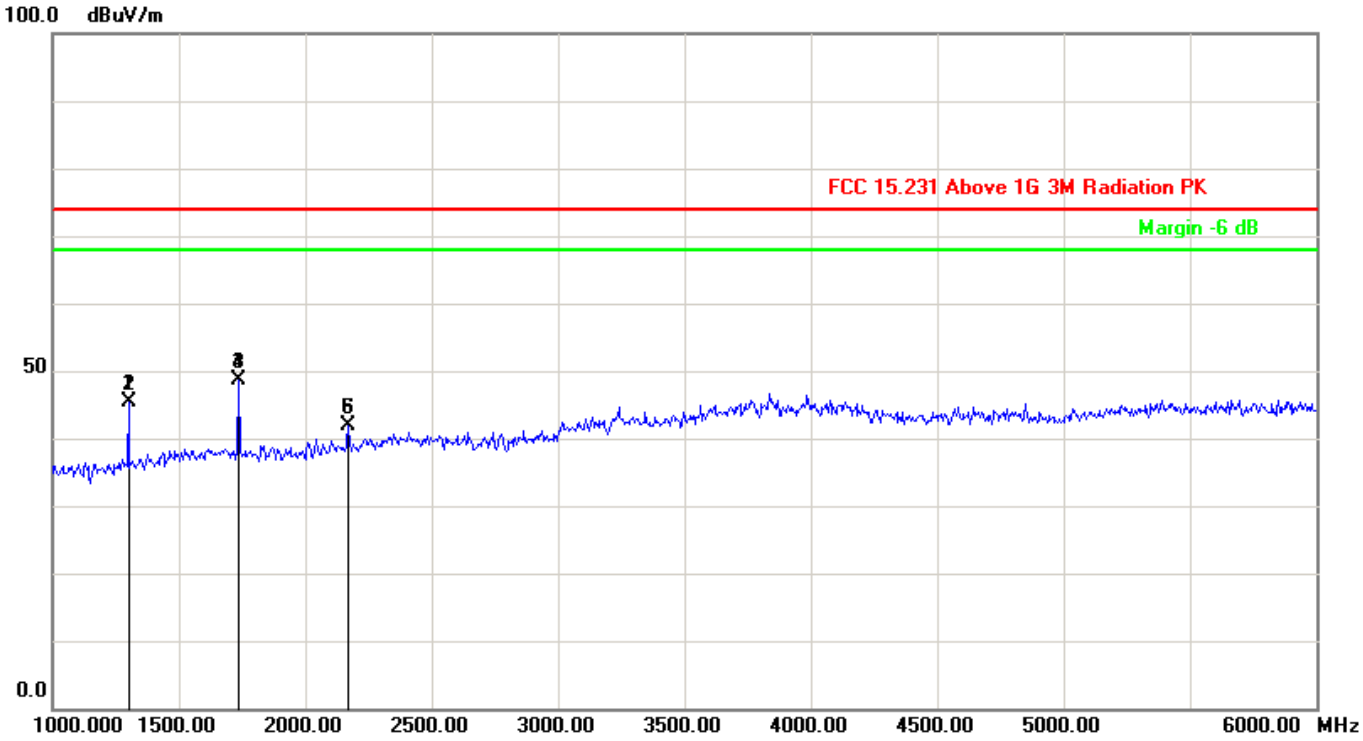
Site: AC102	Time: 2017/09/18
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: DR-V02/VSF	Power: 120V/60Hz
Note: Mode:Transmit 433.92MHz	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Duty Cycle Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	434.49	-4.82	73.34	N/A	68.52	100.8	-32.28	peak
2	434.49	-4.82	N/A	-8.82	59.70	80.8	-21.10	AVG
3	869.05	2	44.58	N/A	46.58	80.8	-34.22	peak
4	869.05	2	N/A	-8.82	37.76	60.8	-23.04	AVG

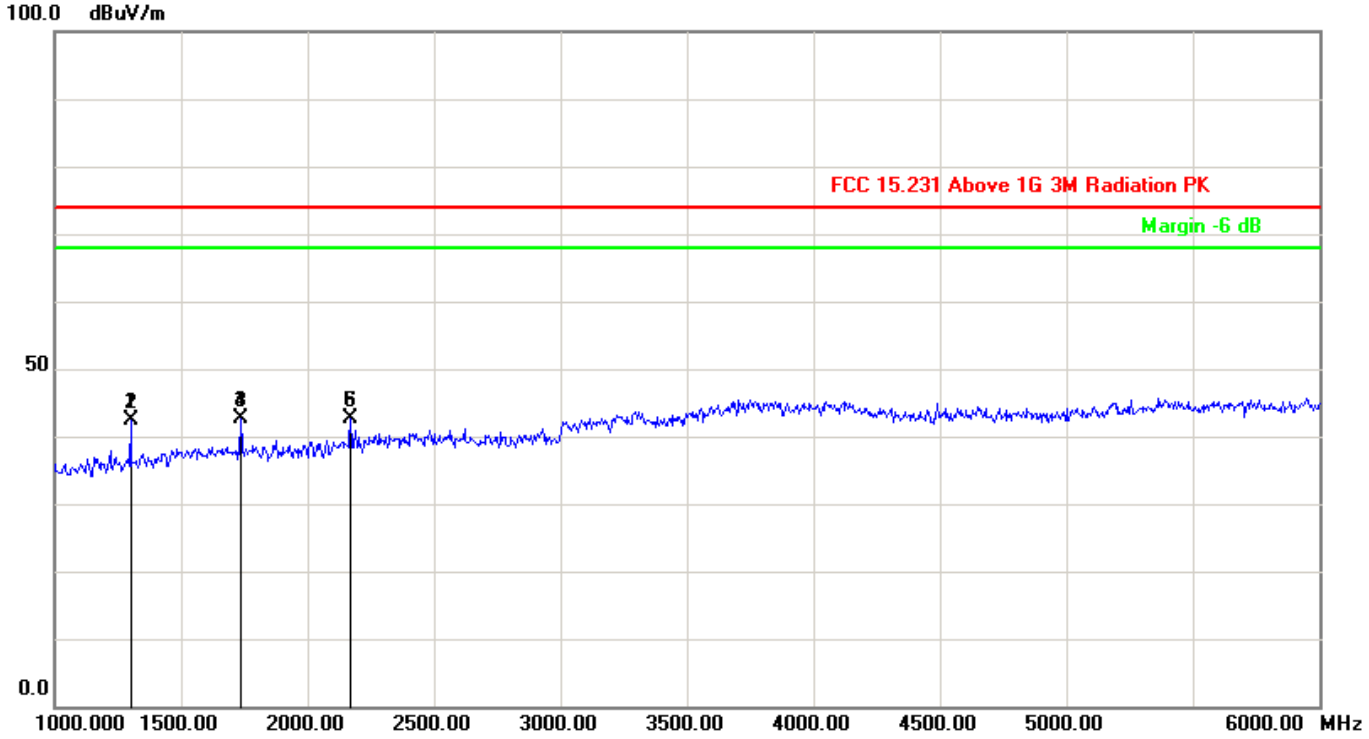
Above 1G:

Site: AC102	Time: 2017/09/18
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Horizontal
EUT: DR-V02/VSF	Power: 120V/60Hz
Note: Mode:Transmit 433.92MHz	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Duty Cycle Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1300	-7.37	52.80	N/A	45.43	74	-28.57	peak
2	1300	-7.37	N/A	-8.82	36.61	54	-17.39	AVG
3	1735	-4.8	53.32	N/A	48.52	80.8	-32.28	peak
4	1735	-4.8	N/A	-8.82	39.70	60.8	-21.10	AVG
5	2170	-3.06	44.82	N/A	41.76	80.8	-39.04	peak
6	2170	-3.06	N/A	-8.82	32.94	60.8	-27.86	AVG

Site: AC102	Time: 2017/09/18
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: N/A	Polarity: Vertical
EUT: DR-V02/VSF	Power: 120V/60Hz
Note: Mode:Transmit 433.92MHz	



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Duty Cycle Factor (dBuV/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1300	-7.37	49.63	N/A	42.26	74	-31.74	peak
2	1300	-7.37	N/A	-8.82	33.44	54	-20.56	AVG
3	1735	-4.8	47.45	N/A	42.65	80.8	-38.15	peak
4	1735	-4.8	N/A	-8.82	33.83	60.8	-26.97	AVG
5	2170	-3.06	45.74	N/A	42.68	80.8	-38.12	peak
6	2170	-3.06	N/A	-8.82	33.86	60.8	-26.94	AVG

6. Emission Bandwidth

6.1 Test Limit

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency.

Bandwidth is determined at the points 20dB down from the modulated carrier.

The limit for the EUT = 0.25% * 433.92MHz = 1084.8kHz

6.2 Test Procedures

The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

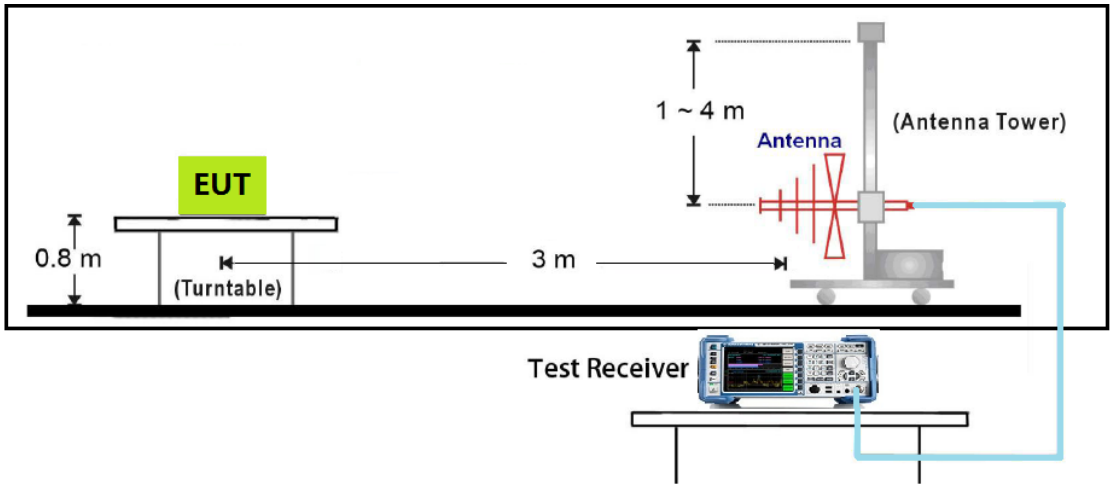
The central frequency of test receiver was set near the operating frequency of EUT.

The test was conducted using the Spectrum Analyzer with the resolutions bandwidth set below:

RBW = approximately 1% of the emission bandwidth.

VBW > RBW.

6.3 Test Setup Layout

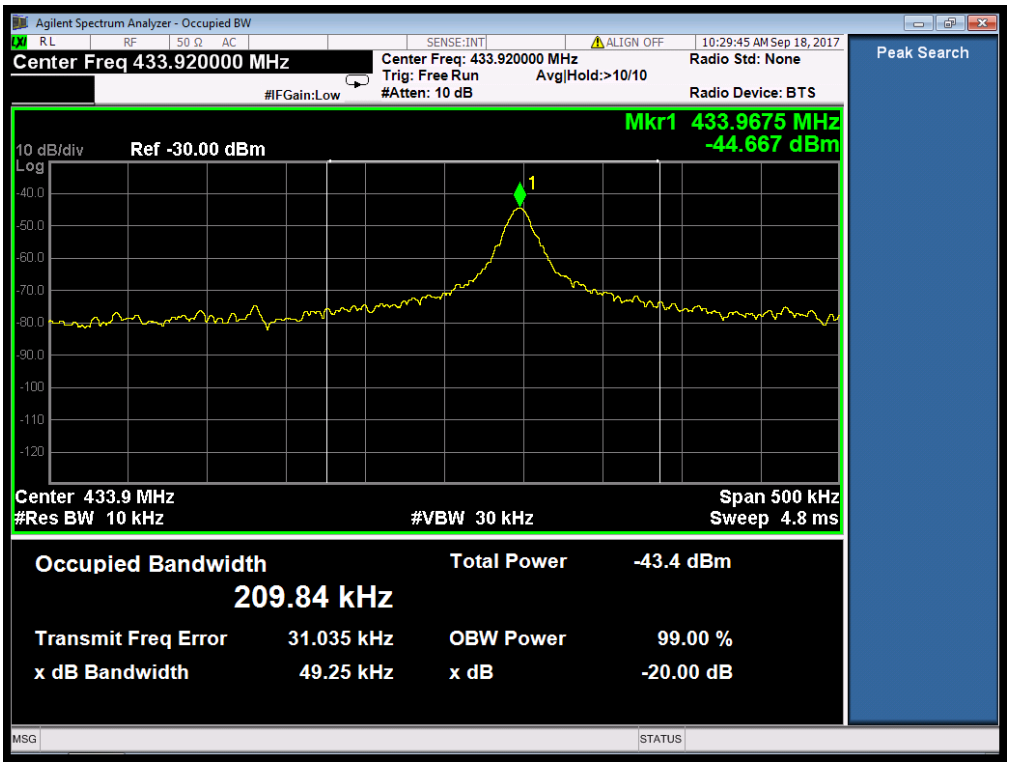


6.4 Test Result

Test Item	Emission Bandwidth
Test Mode	Mode 1: Transmit

Frequency(MHz)	Emission Bandwidth(kHz)
433.92MHz	49.25

433.92MHz



7. Deactivating time

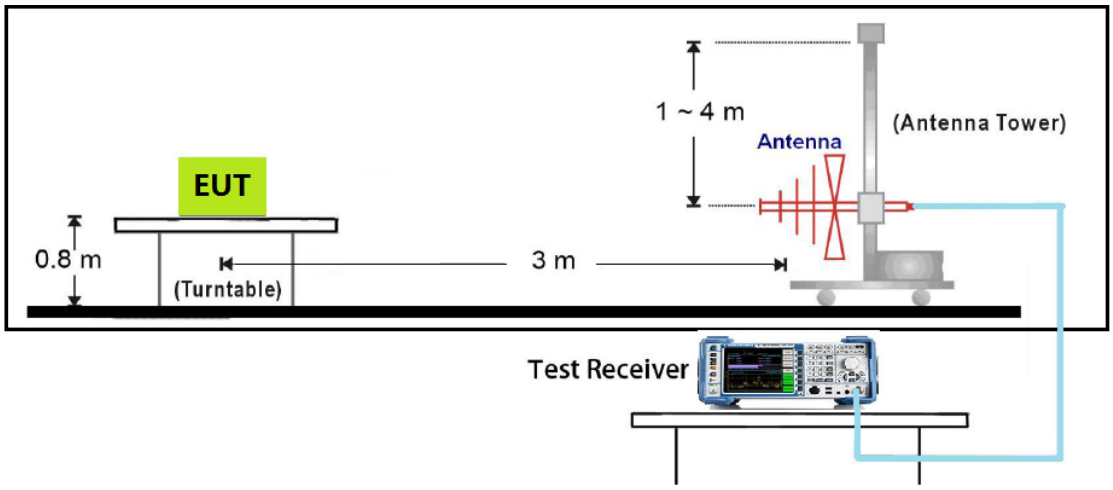
7.1 Test Limit

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

7.2 Test Procedures

The measurement was applied in a semi-anechoic chamber. The central frequency of test receiver was set as the operating frequency of EUT and the Span was set as 0.
The EUT was switched once. The test receiver recorded the whole time from the triggered moment to the time of stopping radiating. For manual switching, to avoid uncertainty, the operating above would be repeated five times and the worst data is recorded.

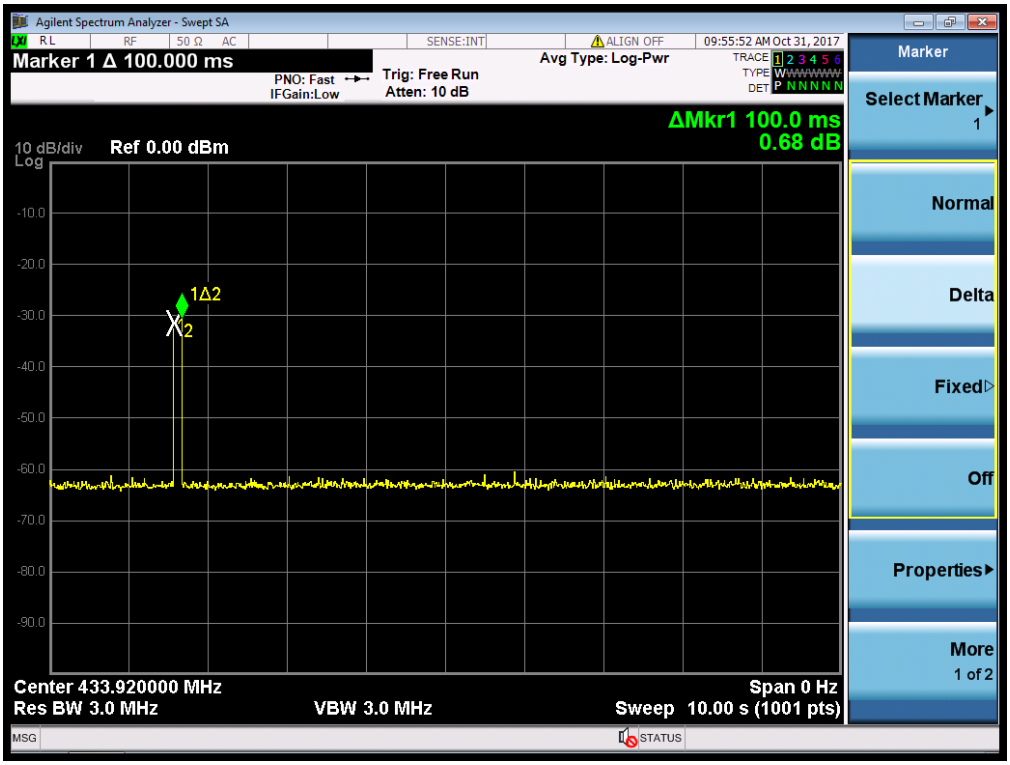
7.3 Test Setup Layout



7.4 Test Result

Whole time from the triggered moment to the time of stopping radiating: 100ms

As a result, the EUT complies with the limit of 5s' deactivating time.



The End