Test Report

Product: Vibrating RC Double

Trade Mark: -

Model Number: 54016070000

FCC ID: 2BCSB54016070000

Prepared for

Olympia Manufacturing Co., Ltd.

Unit B, 3/F, Goodman Tsuen Wan Centre, 68 Wang Lung Street, Tsuen Wan, N.T. Hong Kong

Prepared by

Shenzhen HongBiao Certification& Testing Co., Ltd

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TEST RESULT CERTIFICATION

Applicant's Name..... :	Olympia Manufacturing Co., Ltd.
Address ..... :	Unit B, 3/F, Goodman Tsuen Wan Centre, 68 Wang Lung Street, Tsuen Wan, N.T. Hong Kong
Manufacturer's Name ..... :	Audio Plastic Products (Shenzhen) Co., Ltd.
Address ..... :	Block F6, F7, 11 Pengfei Road, Dapeng New District, Shenzhen, Guangdong, China

Product description

Product name ..... :	Vibrating RC Double
Model Number ..... :	54016070000
Standards..... :	FCC Part 15.231(e)
Test procedure..... :	IEEE/ANSI C63.10-2020

This device described above has been tested by Shenzhen HongBiao Certification& Testing Co., Ltd and the test results show that the equipment under test (EUT) is in compliance with the EMC requirements. And it is applicable only to the tested sample identified in the report.

Date of Test

Date (s) of performance of tests..... :	August 29, 2023~October 31, 2023
Test Result..... :	**Pass**

Testing Engineer : Zoe Su

(Zoe Su)

Technical Manager : Gary Lu

(Gary Lu)

Authorized Signatory : Leo Su

(Leo Su)

SHENZHEN HONGBIAO CERTIFICATION&TESTING CO., LTD HONG BIAO 弘 标 认 证 APPROVAL

Revision History

Revised No.	Date of Issue	Description
01	October 31, 2023	Original

1 General Description

1.1 Description of EUT

Product name:	Vibrating RC Double
Model name:	54016070000
Series Model:	OK-RM10-4536BK
Different of series model:	The color of appearance and model name of series models listed are different from the main model, but the circuit and the electronic construction are the same, declared by the manufacturer.
Operation frequency:	433.92MHz
Modulation type:	FSK
Antenna type:	PCB Antenna
Antenna gain:	0dBi
Hardware version:	V1.0
Software version:	V1.0
Battery:	DC 3.0V
Power supply:	DC 3.0V by button battery
Adapter information:	-

1.2 Test Mode

Test Mode	Channel	Frequency (MHz)
1	1	433.92MHz
2	/	/
3	/	/

1.3 Operation Channel list

Channel	Frequency
1	433.92MHz

1.4 Test Setup

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

1.5 Ancillary Equipment

Equipment	Model	S/N	Manufacturer
/	/	/	/

2 Summary of Test Result

No.	Standard Section	Test Item	Result	Remark
1	15.203	Antenna requirement	Pass	
2	15.207	AC power line conducted emission	Pass	
3	15.231(e)	Field strength of fundamental and harmonic emissions	Pass	
4	15.205 and 15.209	Radiated emission and bandedge	Pass	
5	15.215	Occupied Bandwidth	Pass	
6	15.231(e)	Release time	Pass	

3 Test Facilities and Accreditations

3.1 Test Laboratory

Test Site	Shenzhen HongBiao Certification& Testing Co., Ltd
Test Site Location	Room 102, 201, Building 2, Yuanwanggu RFID Industrial Park, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen, China
Telephone:	(86-755) 2998 9321
Fax:	(86-755) 2998 5110
FCC Registration No.:	CN1341
A2LA Certificate No.:	6765.01

3.2 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15ºC~35ºC
Relative Humidity:	20%~75%
Air Pressure:	98kPa~101kPa

3.3 Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.
The data and results quoted in this document are true and accurate values, and uncertainties are not involved in the calculations.
In addition, components and mass production processes that are similar to testing equipment may introduce additional deviations, and the manufacturer is solely responsible for the continued compliance of the equipment.

Measurement Frequency Range	U，(dB)	Note
RF frequency	$2x\ 10^{-5}$	
RF power, conducted	± 0.57 dB	
Conducted emission(150kHz~30MHz)	± 2.5 dB	
Radiated emission(30MHz~1GHz)	± 4.2 dB	
Radiated emission (above 1GHz)	± 4.7 dB	
Temperature	±1 degree	
Humidity	± 5 %	

3.4 Test Software

Software name	Manufacturer	Model	Version
EMI Measurement	Farad	EZ-EMC	V1.1.4.2
Conducted test system	MWRF-test	MTS 8310	V2.0.0

4 List of Test Equipment

Radiation emission							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E001	Horn Antenna	Schwarzbeck	BBHA 9120D	02592	2022-04-02	2024-04-01
2	HB-E002	Biconical log-periodic composite antenna	Schwarzbeck	VULB 9168	01340	2022-04-06	2024-04-05
3	HB-E003	SHF-EHF Horn	Schwarzbeck	BBHA 91270	01193	2022-04-02	2024-04-01
4	HB-E004	Preamplifier	Noyetec	LAN-0910	NYCM1420101	2023-05-11	2024-05-10
5	HB-E005	Preamplifier	Noyetec	LAN-0118	NYCM1420102	2023-05-12	2024-05-11
6	HB-E006	Preamplifier	Noyetec	LAN-1840	NYCM1420103	2023-06-11	2024-06-10
7	HB-E007	EMI TEST RECEIVER	R&S	ESR7	102520	2023-05-12	2024-05-11
8	HB-E009	POSITINAL COTROLLER	Noyetec	N/A	N/A	/	/
9	HB-E013	RF switch	Noyetec	NY-RF4	NY0CM1420204	/	/
10	HB-E066	Illuminance Tester	TASI	TA8121	N/A	2023-05-11	2024-05-10
11	HB-E075	Active loop antenna	Schwarzbeck	FMZB 1519B	1519B-245	2022-07-24	2024-07-23
Conduction emission							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E014	4 Path V-LISN	Schwarzbeck	NNLK 8121	00770	2023-05-12	2024-05-11
2	HB-E015	Pulse Limiter	Schwarzbeck	VTSD 9561-F	00949	2023-05-12	2024-05-11
3	HB-E016	ZN23201	Noyetec	ZN23201	N/A	2023-05-11	2024-05-10
4	HB-E059	Attenuator	Xianghua	TS2-6-1	220215166	2023-05-12	2024-05-11
5	HB-E069	EMI TEST RECEIVER	R&S	ESCI	N/A	2023-05-12	2024-05-11

RF							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E041	MXG Anaiog Signal Generator	Agilent	N5181A	MY47070421	2023-05-11	2024-05-10
2	HB-E042	WIDEBAND RADIO COMMUNICA	R&S	CMW500	132108	2023-05-11	2024-05-10

		TION TESTER					
3	HB-E043	MXG Anaiog Signal Generator	Agilent	N5182A	US46240335	2023-05-11	2024-05-10
4	HB-E044	Signal& spectrum Analyzer	R&S	FSV3044	101264	2023-05-11	2024-05-10
5	HB-E045	RF Control Box	Noyetec	NY100-R FCB	N/A	/	/
6	HB-E058	Thermometer Clock Humidity Monitor	N/A	HTC-1	N/A	/	/
7	HB-E077	PXA Signal Analyzer	Agilent	N9030A	N/A	2023-05-11	2024-05-10

Note: the calibration interval of the above test instruments is 12&24 months and the calibrations are traceable to international system unit (SI).

5 Test Item And Results

5.1 Antenna Requirement

5.1.1 Standard Requirement

15.203 requirement: For intentional device, according to 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

5.1.2 Test Result

The EUT antenna is PCB Antenna. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.

5.2 AC Power Line Conducted Emission

5.2.1 Limits

Limits – Class B		
Frequency (MHz)	Limit (dBμV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

Note:
1. the tighter limit applies at the band edges.
2. the limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

5.2.2 Test Procedures

a) EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

b) The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

c) The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

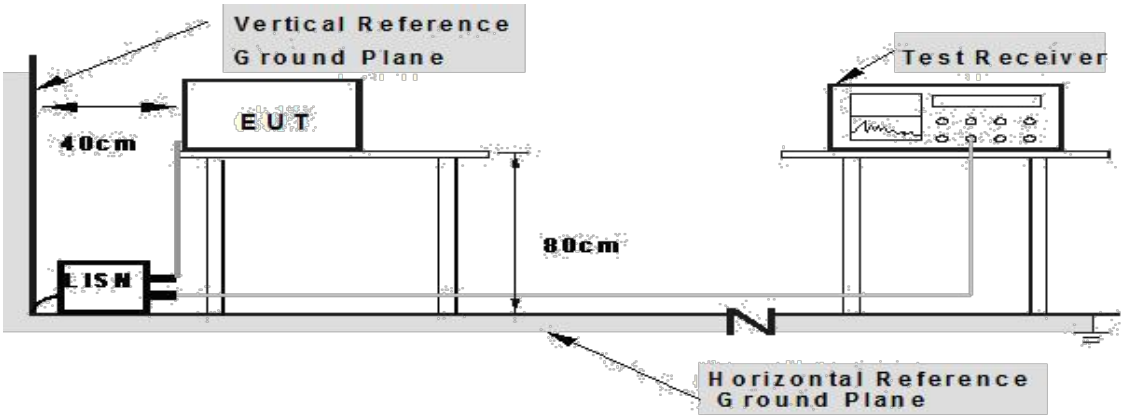
d) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

e) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

f) LISN is at least 80 cm from nearest part of EUT chassis.

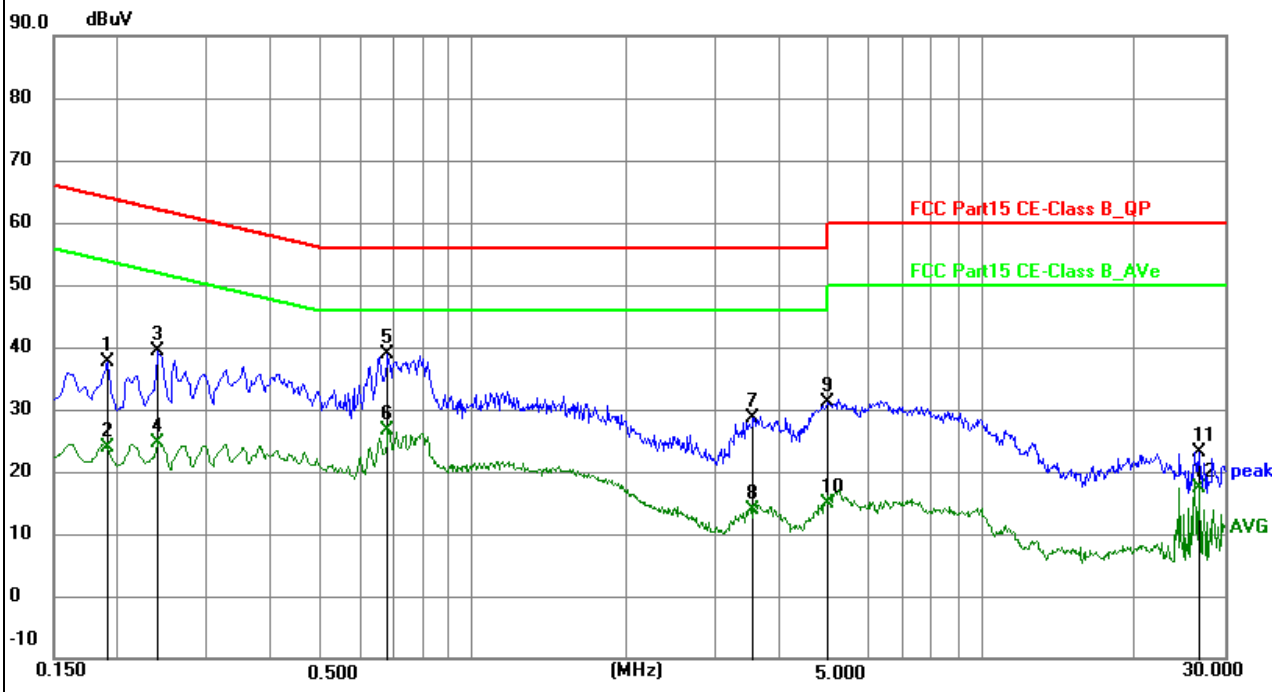
g) For the actual test configuration, please refer to the related Item – photographs of the test setup.

5.2.3 Test Setup



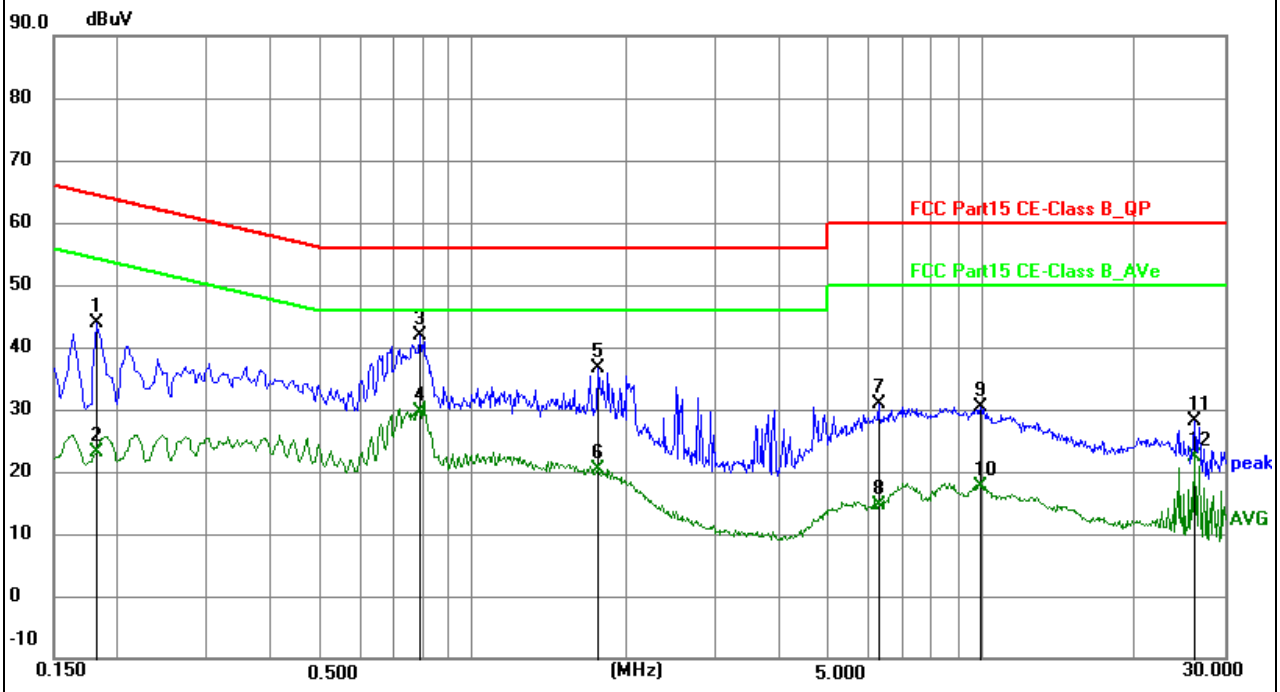
5.2.4 Test Result

EUT：	Vibrating RC Double	Model Name:	54016070000
Test Mode：	TM1	Phase :	L
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1905	27.78	9.76	37.54	64.01	-26.47	peak	P	
2	0.1905	14.19	9.76	23.95	54.01	-30.06	AVG	P	
3	0.2400	29.60	9.79	39.39	62.10	-22.71	peak	P	
4	0.2400	14.85	9.79	24.64	52.10	-27.46	AVG	P	
5 *	0.6809	28.93	9.87	38.80	56.00	-17.20	peak	P	
6	0.6809	16.87	9.87	26.74	46.00	-19.26	AVG	P	
7	3.5520	18.10	10.63	28.73	56.00	-27.27	peak	P	
8	3.5520	3.32	10.63	13.95	46.00	-32.05	AVG	P	
9	4.9605	20.25	10.91	31.16	56.00	-24.84	peak	P	
10	4.9605	4.04	10.91	14.95	46.00	-31.05	AVG	P	
11	26.7675	10.70	12.53	23.23	60.00	-36.77	peak	P	
12	26.7675	4.83	12.53	17.36	50.00	-32.64	AVG	P	

EUT：	Vibrating RC Double	Model Name:	54016070000
Test Mode：	TM1	Phase :	N
Test Voltage:	AC 120V/60Hz		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1815	34.32	9.66	43.98	64.42	-20.44	peak	P	
2	0.1815	13.45	9.66	23.11	54.42	-31.31	AVG	P	
3 *	0.7890	31.90	9.95	41.85	56.00	-14.15	peak	P	
4	0.7890	19.69	9.95	29.64	46.00	-16.36	AVG	P	
5	1.7700	26.41	10.31	36.72	56.00	-19.28	peak	P	
6	1.7700	9.97	10.31	20.28	46.00	-25.72	AVG	P	
7	6.2655	19.93	10.99	30.92	60.00	-29.08	peak	P	
8	6.2655	3.55	10.99	14.54	50.00	-35.46	AVG	P	
9	9.9330	19.10	11.28	30.38	60.00	-29.62	peak	P	
10	9.9330	6.43	11.28	17.71	50.00	-32.29	AVG	P	
11	26.2545	16.02	12.18	28.20	60.00	-31.80	peak	P	
12	26.2545	10.20	12.18	22.38	50.00	-27.62	AVG	P	

5.3 Radiated Emission Field Strength of Fundamental and Harmonic Emissions

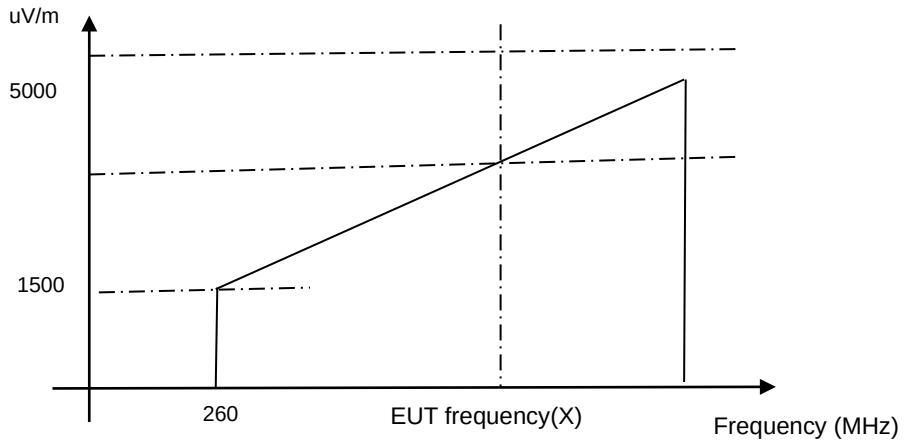
5.3.1 Limits

Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (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.

For example for 433.92MHz



The Field Strength of Fundamental Emissions (Operating Frequency) is:

1500 uV/m = 20*log (1500) dBuV/m = 63.52 dBuV/m

5000 uV/m = 20*log (5000) dBuV/m = 73.98 dBuV/m

For example the Fundamental emission is 433.92MHz, the limit is X.

(433.92-260)/(470-260)=(X-1500)/(5000-1500)

173.92/210 =(X-1500)/3500

X = 4398.67uV/m

AV Limit= 20*log (4398.67) dBuV/m = 72.87 dBuV/m

PK Limit= 92.87 dBuV/m

Test Procedures

1. The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range blew 1GHz, and 1.5m above ground plane for test frequency range above 1GHz.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:

   Span = wide enough to fully capture the emission being measured

   RBW = 1 MHz for f ≥ 1GHz

   RBW =100 kHz for f < 1 GHz

   VBW ≥ RBW

   Sweep = Auto

   Detector function = Peak

   Trace = max hold
4. Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. The peak level, once corrected, must comply with the limit specified in Section 15.209.

   Set the spectrum to

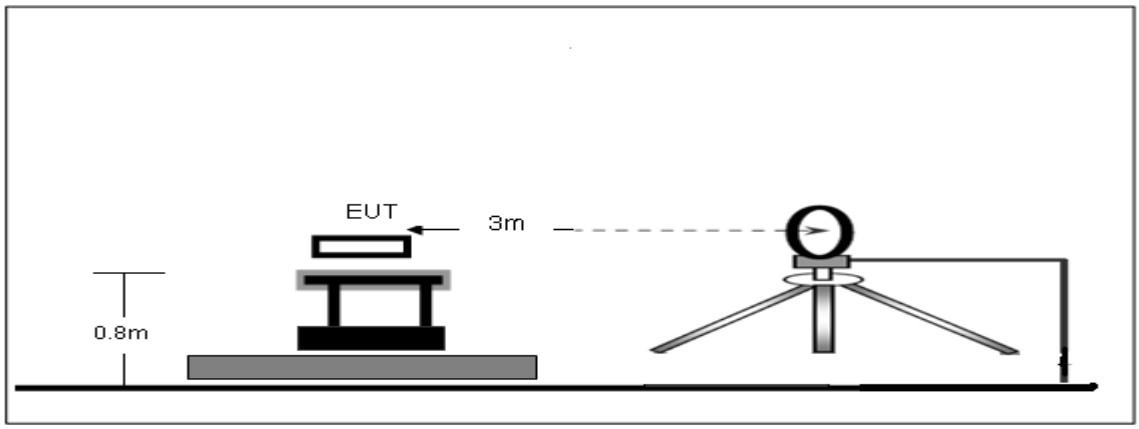
   RBW = 1MHz

   VBW = 10Hz

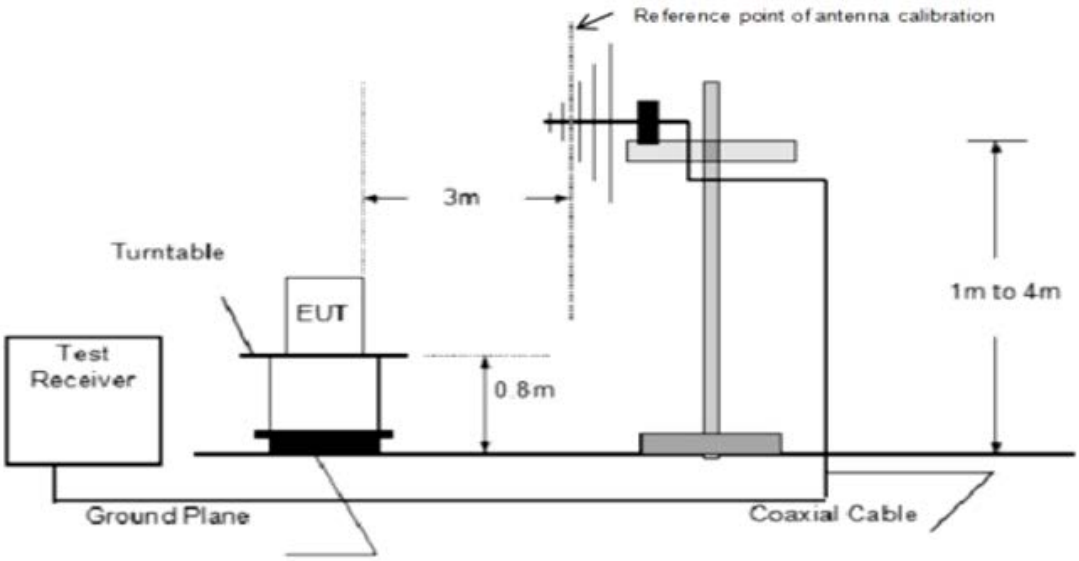
   Detector = PK for AV value, while maintaining all of the other instrument settings

5.3.2 Test Setup

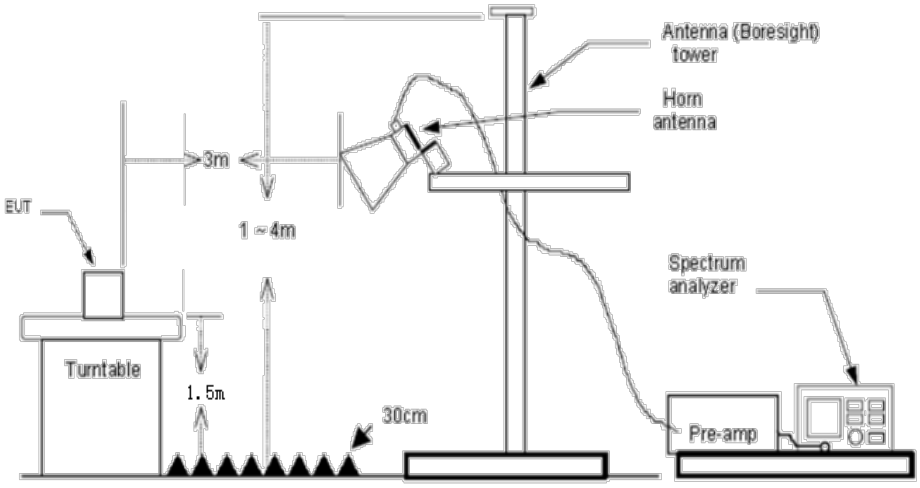
<u>Radiated Emission Test-Up Frequency Below 30MHz</u>



Radiated Emission Test-Up Frequency 30MHz~1GHz



Radiated emission test-up frequency above 1GHz



5.3.3 Test Result

Operating Frequency (MHz)	Field Strength (dBuV/m)	Detector	Limit @3m (dBuV/m)	Margin (dB)	Antenna
433.92	70.2	QP	92.87	22.67	Vertical
	33.06	AV	72.87	39.81	Vertical
	80.67	QP	92.87	12.2	Horizontal
	43.53	AV	72.87	29.34	Horizontal
867.84	66.05	QP	72.87	6.82	Vertical
	28.91	AV	52.87	23.96	Vertical
	69.31	QP	72.87	3.56	Horizontal
	32.17	AV	52.87	20.7	Horizontal

Notes: 1. Average emission Level = QP Level + Duty cycle factor

2.Duty cycle factor is -37.14dB.

5.4 Radiated Emission and Band Edge Spurious Emission

5.4.1 Limit

Emissions radiated outside of the specified frequency bands, except for harmonic emissions, (b)shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in FCC Part 15.209, whichever is less stringent.

Frequency (MHz)	Field strength μV/m	Field strength dBμV/m	Detector	Measurement distance
30-88	100	40	QP	3m
88-216	150	43.5	QP	
216-960	200	46	QP	
960-1000	500	54	QP	
Above 1000	500	54	AV	
Above 1000	5000	74	PK	

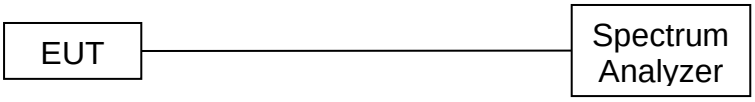
5.4.2 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range blew 1GHz, and 1.5m above ground plane for test frequency range above 1GHz.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1GHz
100 kHz for f < 1 GHz, VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

4. Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. The peak level, once corrected, must comply with the limit specified in Section 15.209. Set the RBW = 1MHz, VBW = 10Hz, Detector = PK for AV value, while maintaining all of the other instrument settings.

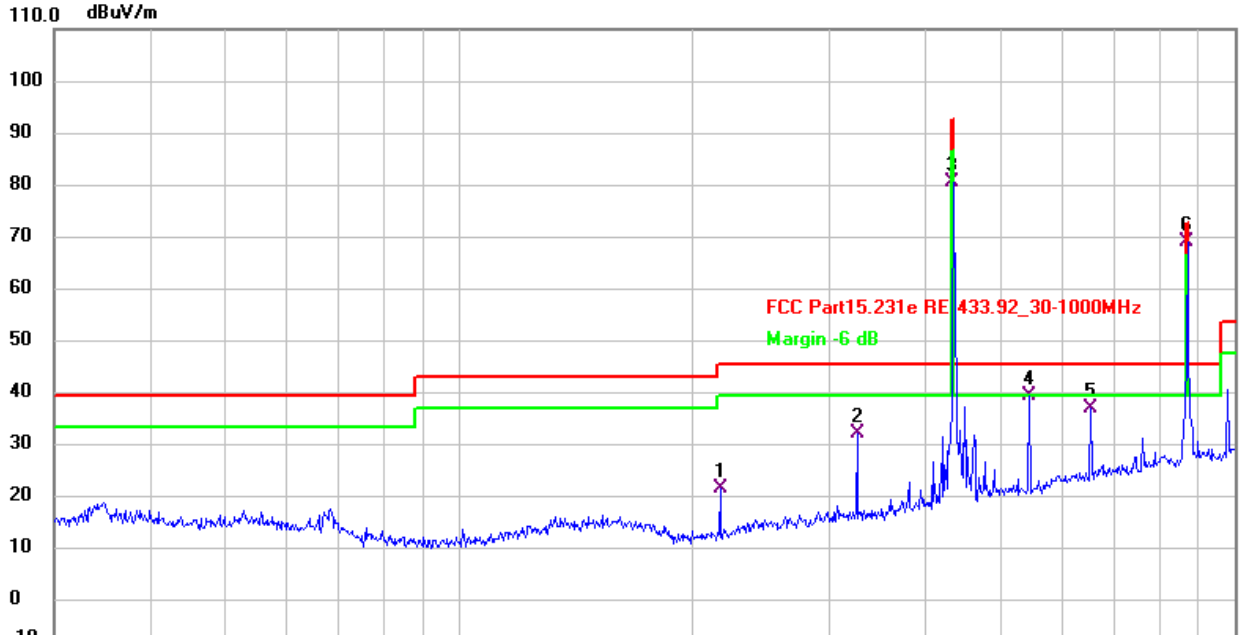
5.4.3 Test Setup



5.4.4 Test Results

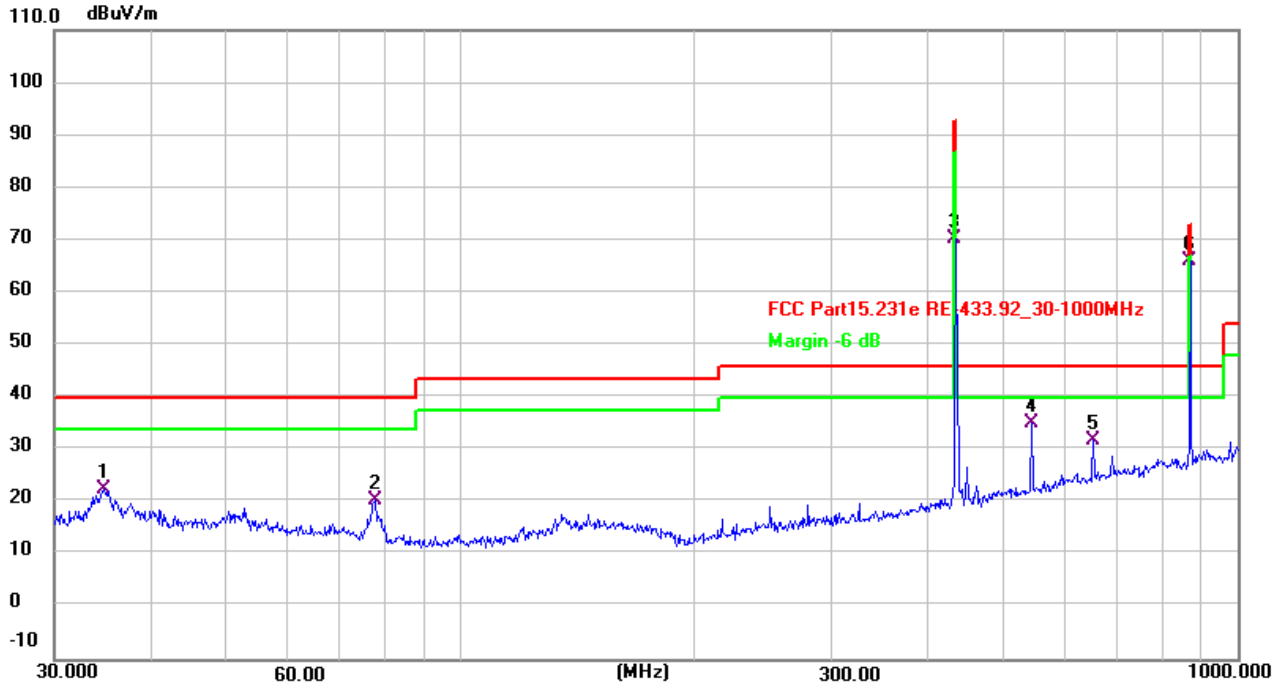
Between (30MHz – 1GHz)

EUT：	Vibrating RC Double	Model Name ：	54016070000
Pressure：	1010 hPa	Phase:	H
Test Mode ：	TX	Test Voltage：	DC 3V



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	216.7828	33.67	-11.41	22.26	46.00	-23.74	QP	100	349	P	
2	325.5958	40.95	-8.12	32.83	46.00	-13.17	QP	100	349	P	
3	433.9200	86.04	-5.37	80.67	92.87	-12.20	QP	100	259	P	
4	543.2742	42.79	-2.97	39.82	46.00	-6.18	QP	100	125	P	
5	651.9417	37.96	-0.43	37.53	46.00	-8.47	QP	100	331	P	
6 *	867.8400	66.72	2.59	69.31	72.87	-3.56	QP	100	331	P	

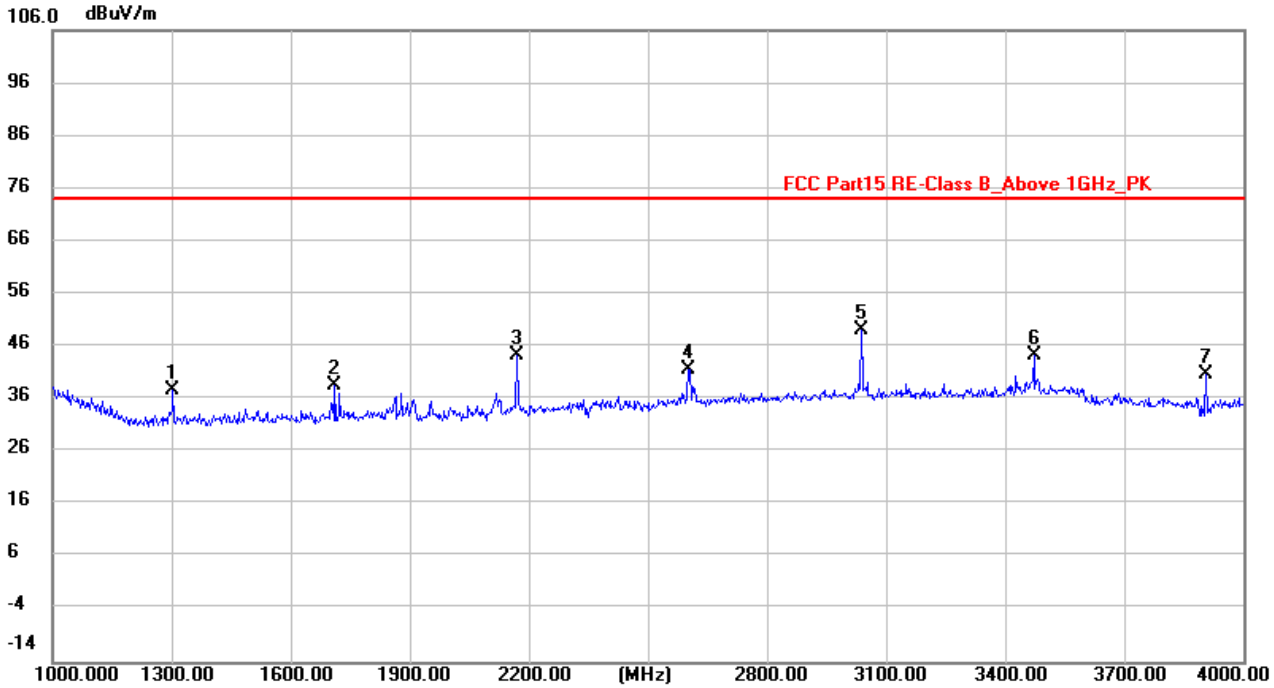
EUT：	Vibrating RC Double	Model Name ：	54016070000
Pressure：	1010 hPa	Phase:	V
Test Mode ：	TX	Test Voltage：	DC 3V



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	34.7601	31.40	-8.90	22.50	40.00	-17.50	QP	100	80	P	
2	77.5927	33.17	-12.79	20.38	40.00	-19.62	QP	100	204	P	
3	433.9200	75.57	-5.37	70.20	92.87	-22.67	QP	100	276	P	
4	543.2742	38.24	-2.97	35.27	46.00	-10.73	QP	100	266	P	
5	651.9417	32.34	-0.43	31.91	46.00	-14.09	QP	100	286	P	
6 *	867.8400	63.46	2.59	66.05	72.87	-6.82	QP	100	276	P	

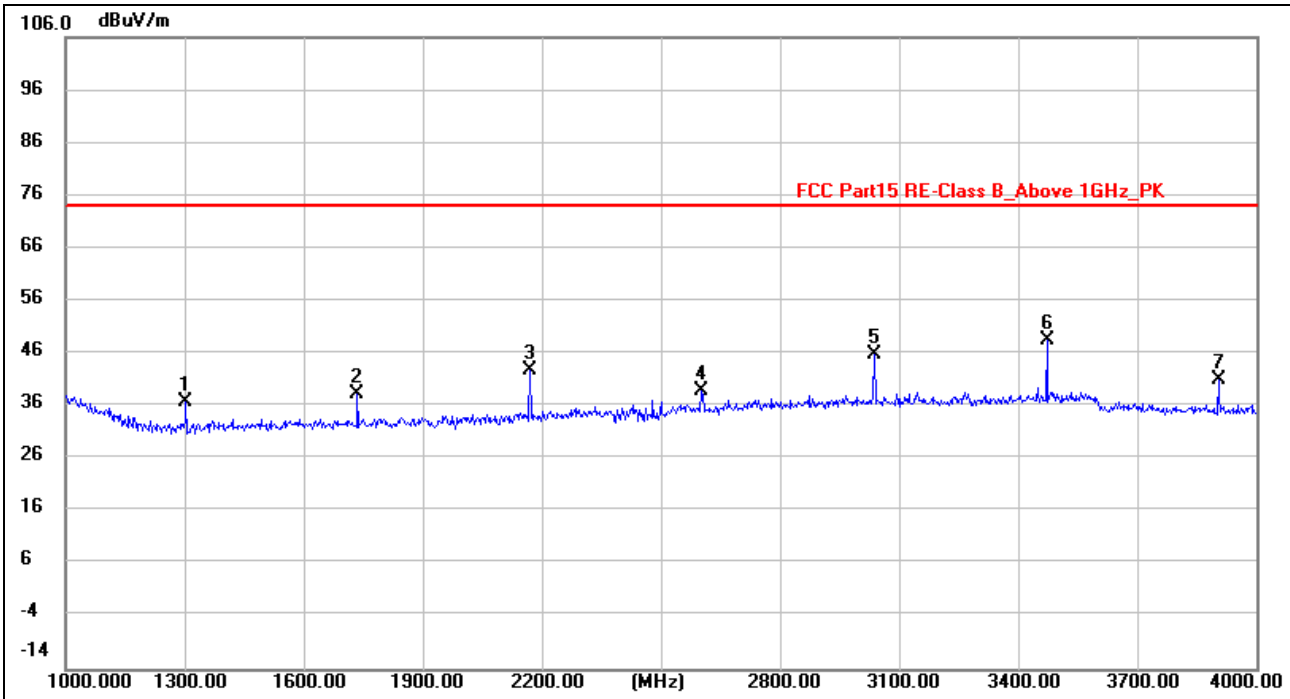
Between (1GHz-4GHz)

EUT：	Vibrating RC Double	Model Name ：	54016070000
Pressure：	1010 hPa	Phase:	H
Test Mode ：	TX	Test Voltage：	DC 3V



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	1303.000	62.18	-24.55	37.63	74.00	-36.37	peak	150	271	P	
2	1711.000	62.36	-23.76	38.60	74.00	-35.40	peak	150	75	P	
3	2170.000	66.25	-22.02	44.23	74.00	-29.77	peak	150	348	P	
4	2602.000	61.81	-20.05	41.76	74.00	-32.24	peak	150	227	P	
5 *	3037.000	67.70	-18.43	49.27	74.00	-24.73	peak	150	271	P	
6	3472.000	61.66	-17.38	44.28	74.00	-29.72	peak	150	348	P	
7	3904.000	57.04	-16.26	40.78	74.00	-33.22	peak	150	348	P	

EUT：	Vibrating RC Double	Model Name ：	54016070000
Pressure：	1010 hPa	Phase:	V
Test Mode ：	TX	Test Voltage：	DC 3V



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	1303.000	61.25	-24.55	36.70	74.00	-37.30	peak	150	348	P	
2	1735.000	62.15	-23.71	38.44	74.00	-35.56	peak	150	131	P	
3	2170.000	64.94	-22.02	42.92	74.00	-31.08	peak	150	297	P	
4	2602.000	59.09	-20.05	39.04	74.00	-34.96	peak	150	11	P	
5	3037.000	64.27	-18.43	45.84	74.00	-28.16	peak	150	286	P	
6 *	3472.000	65.90	-17.38	48.52	74.00	-25.48	peak	150	308	P	
7	3904.000	57.37	-16.26	41.11	74.00	-32.89	peak	150	297	P	

Note:

1. Absolute Level = Reading Level+ Factor, Margin= Absolute Level- Limit, Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. The peak value is less than the AV value, AV value is not required Factor added by measurement software automatically.

5.5 Occupied Bandwidth

5.5.1 Limit

No requirement.

5.5.2 Test Procedure

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW ≥1% of the 20 dB bandwidth

VBW ≥RBW

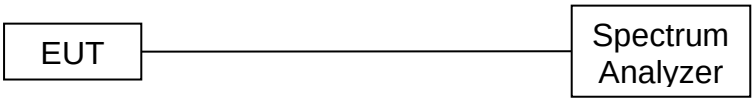
Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth and 99% occupied bandwidth of the emission.

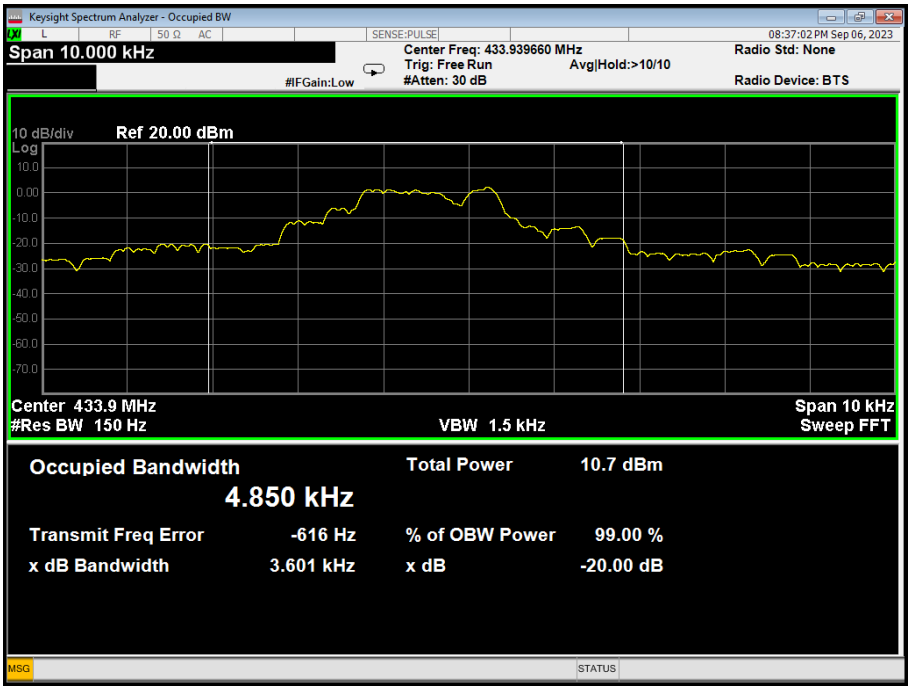
5.5.3 Test Setup



5.5.4 Test Results

Frequency (MHz)	20dB emission bandwidth (kHz)	99% occupied bandwidth (kHz)
433.92	3.601	4.85

Test plots

433.92MHz


5.6 Release time

5.6.1 Limit

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.

5.6.2 Test Procedure

Setup the EUT as show in the block diagram above.

Set Spectrum Analyzer

Centre Frequency= Fundamental Frequency

RBW=1MHz, VBW= 3MHz

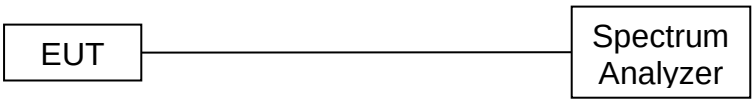
Span= 0 Hz

Sweep Time= 12 Seconds.

Setup the EUT as normal operation and press Transmitter button

Release the button, use Delta Mark function to test the time.

5.6.3 Test Setup

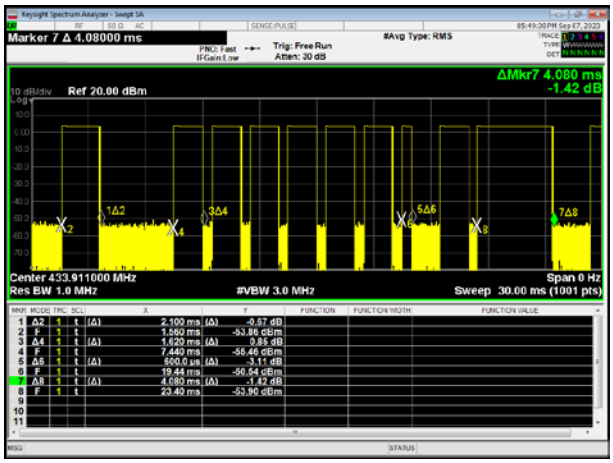


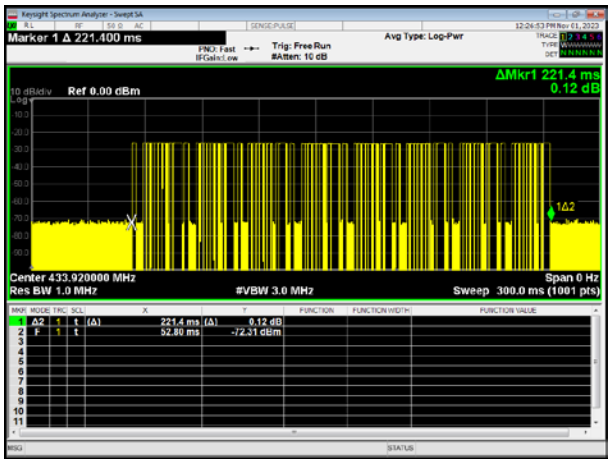
5.6.4 Test Results

Duty Cycle=(2.1ms+1.62ms*7+0.6ms+4.08ms)*8/10420ms=1.39%

The averaging factor is found by 20log0.139= -37.14dB

On Time(s)	Limit(s)	Result
0.14496	1	Pass





Off Time(s)	Limit(s)	Result
10.1986	＞10	Pass

6 Photographs of the Test Setup

Reference to the appendix Test Setup Photos for details.

7 Photographs of the EUT

Reference to the appendix External Photos and Internal Photos for details.

******** END OF REPORT ********