

FCC 15.231

Report

for

Chungear Industrial Co., Ltd

106 Kanho Rd., Taichung, Taiwan

**Product Name : CEILING FAN REMOTE
CONTROLLER
(TRANSMITTER)**

Model Name : TR111B-2

FCC ID : KUJCE10503

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APPENDIX A TEST PHOTOGRAPHS

TEST REPORT CERTIFICATION

Applicant : Chungear Industrial Co., Ltd
Manufacturer #1 : Chungear Industrial Co., Ltd
Manufacturer #2 : SATELLITE ELECTRONIC (ZHONGSHAN)., LTD.
Manufacturer #3 : ZHONGSHAN AMITY ELECTRONIC LTD.
Product Name : CEILING FAN REMOTE CONTROLLER (TRANSMITTER)
Model No. : TR111B-2
Serial No. : N/A
Power Supply : AC 120V/60Hz

Applicable Standards:

47 CFR FCC Part 15 Subpart C:2015
ANSI C63.10:2013

AUDIX Technology Corp. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report. **AUDIX Technology Corp.** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Test: 2016. 04. 27 ~ 05. 26

Date of Report: 2016. 06. 03

Producer: 
(Annie Yu/Administrator)

Signatory: 
(Ben Cheng/Manager)

1. REPORT HISTORY

Revision	Date	Revision Summary	Report Number
0	2016. 06. 03	Original Report	EM-F160327

2. SUMMARY OF TEST RESULTS

Rule	Description	Results
15.207	Conducted Emission	PASS
15.209/15.231(b)	Radiated Spurious Emission and Fundamental Frequency	PASS
15.231(c)	Emission Bandwidth	PASS
15.231(a)(1)	Periodic Operated	PASS
15.203	Antenna Requirement	PASS

3. GENERAL INFORMATION

3.1. Description of EUT

Product	CEILING FAN REMOTE CONTROLLER (TRANSMITTER)
Model Number	TR111B-2 The EUT supports 5 bits DIP switch and 8 bits DIP switch, others circuit and specification are the same. The EUT with 8 bits DIP switch is tested in this report.
Serial Number	N/A
Applicant	Chungear Industrial Co., Ltd 106 Kanho Rd., Taichung, Taiwan
Manufacture#1	Chungear Industrial Co., Ltd 106 Kanho Rd., Taichung, Taiwan
Manufacture#2	SATELLITE ELECTRONIC (ZHONGSHAN)., LTD. 8 CHUANG YE RD.TORCH DEVELOPMENT ZONE. ZHONGSHAN.GUANGDONG.528437 CHINA
Manufacture#3	ZHONGSHAN AMITY ELECTRONIC LTD. NO.16,TORCH HI-TECH INDUSTRIAL DEVELOPMENT ZONE, ZHONGSHAN CITY GUANGDONG PROVINCE CHINA
Power Wire	Unshielded, Undetachable, 0.15m*2 Unshielded, Undetachable, 0.2m
Fundamental Frequency	433.92MHz
Date of Receipt of Sample	2016. 04. 20

AUDIX Technology Corp.
No. 53-11, Dingfu, Linkou, Dist.,
New Taipei City 244, Taiwan

Tel: +886 2 26099301
Fax: +886 2 26099303

Ceiling Fan Remote Controller (Receiver) - Receiver	(1)Model No.: JY199, FCC by DoC (2)Model No.: JY326B, FCC by DoC (3)Model No.: JY326D, FCC by DoC (4)Model No.: MR36T, FCC by DoC (5)Model No.: MR36R, FCC by DoC (6)Model No.: MR58A, FCC by DoC (7)Model No.: MR56E, FCC by DoC (8)Model No.: MR101D, FCC by DoC (9)Model No.: MR101F, FCC by DoC (10)Model No.: MR101F-2, FCC by DoC (11)Model No.: MR62A, FCC by DoC (12)Model No.: MR76T, FCC by DoC (13) Model No.: MR153A (14) Model No.: JY1028 (15) Model No.: MR47B
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3.2. EUT Specifications Assessed in Current Report

Fundamental Range (MHz)	Channel Number	Modulation	Data Rate (bps)
433.92	1	ASK	---

3.3. Antenna Information

Manufacture	Antenna Type
N/A	Internal

3.4. Tested Supporting System List

3.4.1. Support Peripheral Unit

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Light Bulb Load	N/A	N/A	N/A	N/A

3.4.2. Cable Lists

No.	Cable Description Of The Above Support Units
1.	AC Power Cord: Unshielded, Detachable, 1.8m

3.5. Setup Configuration



3.6. Operating Condition of EUT

To Set EUT on RF function under continues transmitting and choosing channel.

3.7. Description of Test Facility

Test Firm Name	:	AUDIX Technology Corporation EMC Department No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
Test Location & Facility	:	No. 8 Shielded Room Semi-Anechoic Chamber Fully Anechoic Chamber No. 53-11, Dingfu, Linkou Dist., New Taipei City 244, Taiwan
NVLAP Lab. Code	:	200077-0
TAF Accreditation No	:	1724

3.8. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty
Conduction Test	150kHz~30MHz	± 3.64dB
Radiation Test (Distance: 3m)	30MHz~1000MHz	± 4.70dB
	Above 1GHz	± 5.82dB

Remark : Uncertainty = $k_{uc}(y)$

Test Item	Uncertainty
Emission Bandwidth (20dB)	± 0.2kHz
Periodic Operated	± 0.05s

4. MEASUREMENT EQUIPMENT LIST

4.1. Conducted Emission Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESR3	101774	2016. 02. 04	1 Year
2.	A.M.N.	R&S	ENV4200	100169	2015. 05. 08	1 Year
3.	L.I.S.N.	Kyoritsu	KNW-407	8-855-9	2015. 12. 23	1 Year
4.	Pulse Limiter	R&S	ESH3-Z2	100354	2016. 01. 17	1 Year
5.	Test Software	Audix	e3	V.6.120424	N.C.R.	1 Year

4.2. Radiated Emission Measurement

4.2.1. Frequency Range 30MHz~1000MHz (Semi-Anechoic Chamber)

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A-526	MY53400071	2015. 09. 14	1 Year
2.	Test Receiver	R & S	ESCS30	100338	2015. 06. 24	1 Year
3.	Amplifier	HP	8447D	2944A06305	2016. 02. 23	1 Year
4.	Bilog Antenna	TESEQ	CBL6112D	33821	2016. 01. 30	1 Year
5.	Test Software	Audix	e3	V.6.1206197	N.C.R.	N.C.R.

4.2.2. Frequency Range Above 1GHz (Fully Anechoic Chamber)

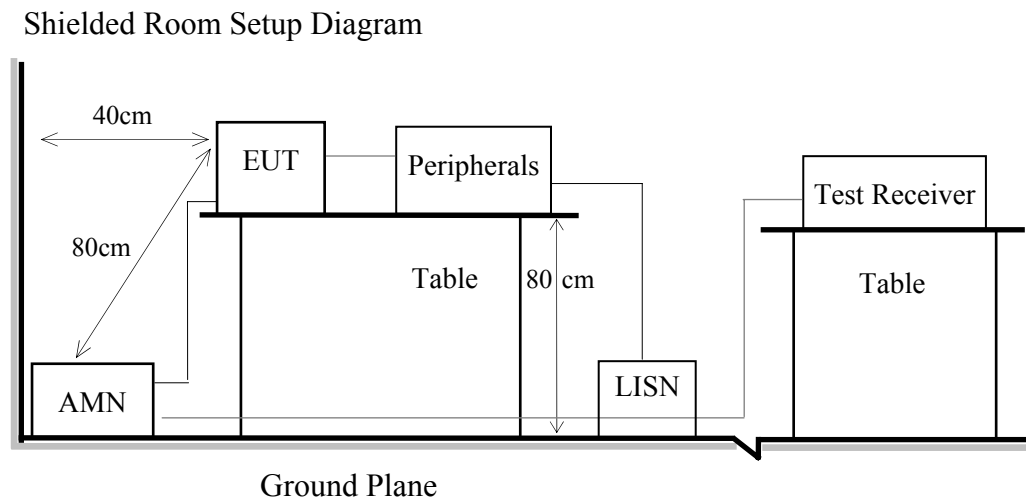
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	US44300366	2015. 08. 20	1 Year
2.	Amplifier	Sonoma	310N	187161	2015. 06. 17	1 Year
3.	Horn Antenna	ETS-Lindgren	3117	00135902	2016. 03. 09	1 Year
4.	Test Software	Audix	e3	V.6.110601	N.C.R.	N.C.R.

4.3. RF Conducted Measurement

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9030A-544	US51350140	2015. 06. 10	1 Year
2.	Wide Band Antenna	Diamond	RH799	N/A	N.C.R	N.C.R

5. CONDUCTED EMISSION MEASUREMENT

5.1. Block Diagram of Test Setup



5.2. Power Line Conducted Emission Limit

Frequency	Conducted Limit	
	Quasi-Peak Level	Average Level
150kHz ~ 500kHz	66 ~ 56 dB μ V	56 ~ 46 dB μ V
500kHz ~ 5MHz	56 dB μ V	46 dB μ V
5MHz ~ 30MHz	60 dB μ V	50 dB μ V

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

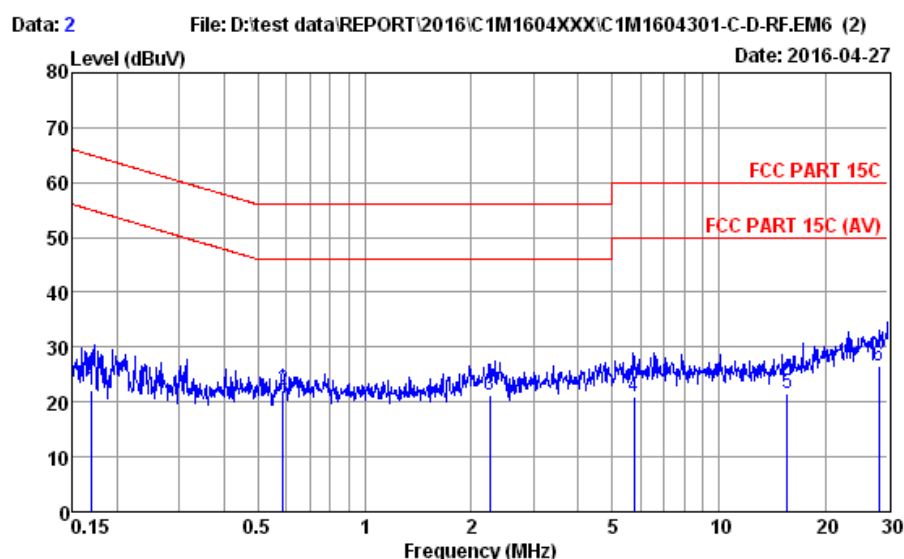
5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.4. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

5.4. Conducted Emission Measurement Results

PASSED.

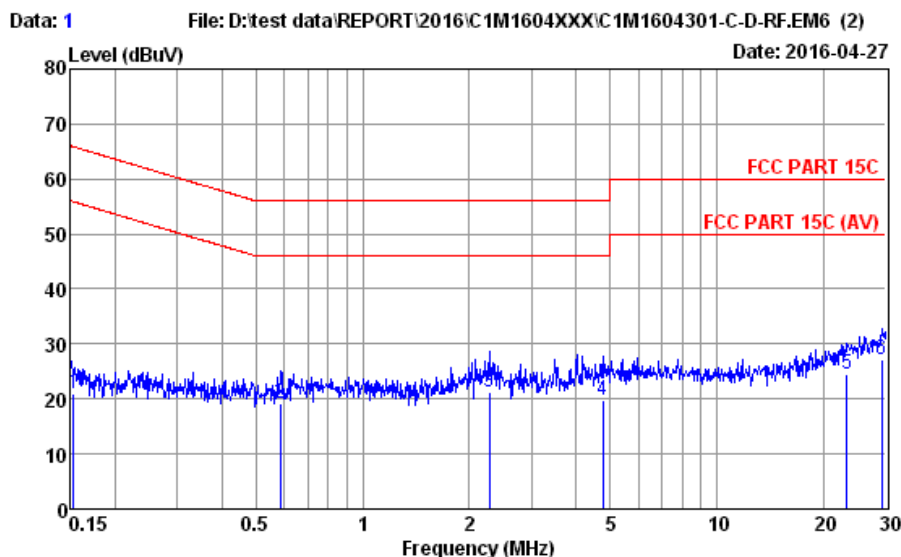
Test Date	2016/04/27	Temp./Hum.	23°C/62%
Test Voltage	AC 120V/60Hz		



Site no. : No.8 Shielded Room Data no. : 2
Condition : ENV4200 100169 Phase : NEUTRAL
Limit : FCC PART 15C
Env. / Ins. : 23°C / 62% ESR3 (1774) Engineer : Tim
EUT : TR111B-2
Power Rating : 120Vac/60Hz
Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.169	11.36	0.03	9.86	0.75	22.00	64.99	42.99	QP
2	0.589	10.98	0.04	9.86	1.40	22.28	56.00	33.72	QP
3	2.249	11.03	0.09	9.86	0.21	21.19	56.00	34.81	QP
4	5.744	11.53	0.16	9.87	-0.63	20.93	60.00	39.07	QP
5	15.552	13.45	0.25	9.90	-1.98	21.62	60.00	38.38	QP
6	28.302	16.39	0.31	9.99	0.00	26.69	60.00	33.31	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with average detector is unnecessary.



Site no. : No.8 Shielded Room Data no. : 1
Condition : ENV4200 100169 Phase : LINE
Limit : FCC PART 15C
Env. / Ins. : 23°C / 62% ESR3 (1774) Engineer : Tim
EUT : TR111B-2
Power Rating : 120Vac/60Hz
Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.152	10.76	0.03	9.86	0.29	20.94	65.87	44.93	QP
2	0.585	10.55	0.04	9.86	-1.16	19.29	56.00	36.71	QP
3	2.273	10.58	0.09	9.86	0.83	21.36	56.00	34.64	QP
4	4.772	10.76	0.14	9.87	-1.07	19.70	56.00	36.30	QP
5	23.263	14.14	0.28	9.95	0.24	24.61	60.00	35.39	QP
6	29.216	15.69	0.32	9.99	1.30	27.30	60.00	32.70	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
2. If the average limit is met when using a quasi-peak detector,
the EUT shall be deemed to meet both limits and measurement
with average detector is unnecessary.

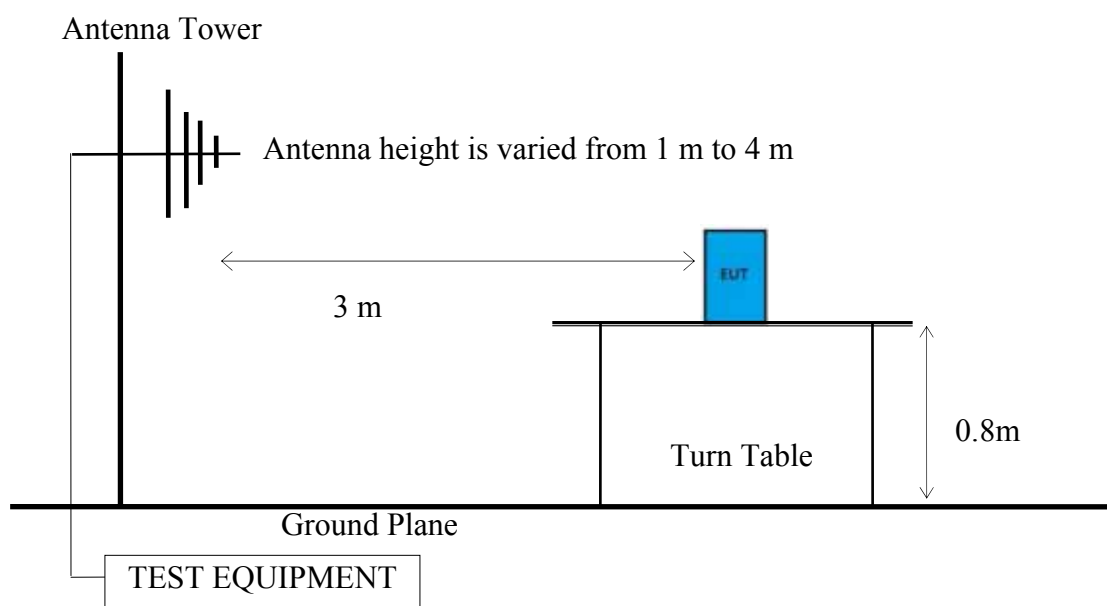
6. RADIATED EMISSION MEASUREMENT

6.1. Block Diagram of Test Setup

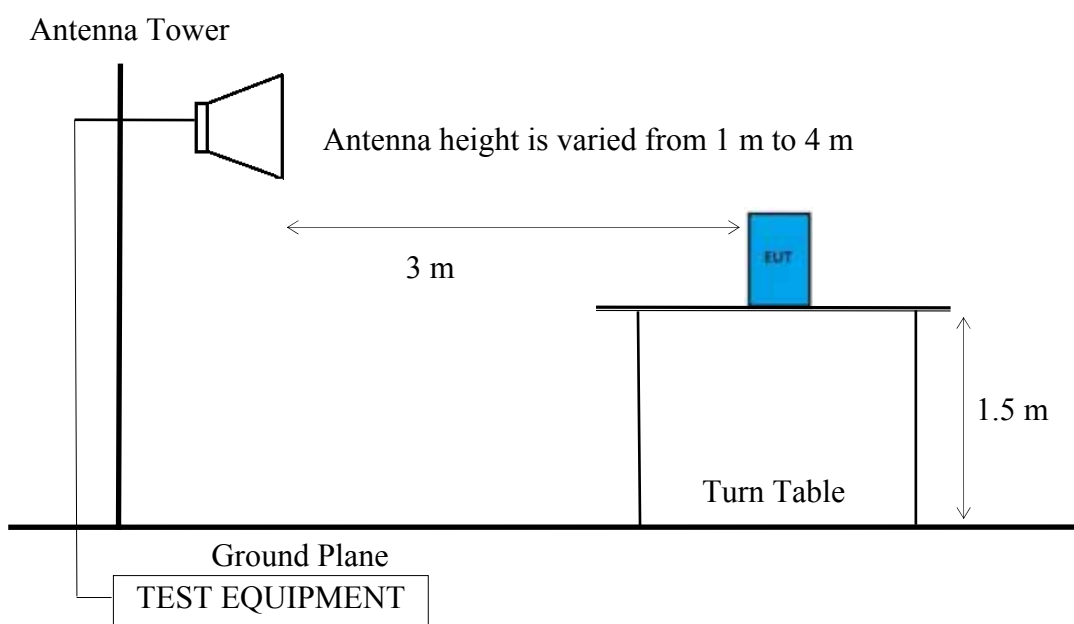
6.1.1. Block Diagram of connection between EUT and simulators

Indicated as section 3.5

6.1.2. Semi-Anechoic Chamber (3m) Setup Diagram for 30-1000 MHz



6.1.3. Fully Anechoic Chamber (3m) Setup Diagram for above 1GHz



6.2. Radiated Emission Limits

6.2.1. General Limit

Any emission which falls in restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified as below.

Frequency (MHz)	Distance (m)	Field Strengths Limits	
		$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
Above 1000	3	74.0 $\text{dB}\mu\text{V/m}$ (Peak) 54.0 $\text{dB}\mu\text{V/m}$ (Average)	

Remark : (1) $\text{dB}\mu\text{V/m} = 20 \log (\mu\text{V/m})$

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Fundamental and emission fall within operation band are exempted from this section.
- (5) Pursuant to ANSI C63.10: 6.6.4.3 if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

6.2.2. Limite for Fundamental Frequency

In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

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
¹ :Linear Interpolations		

Remark : (1) dB μ V/m = 20 log (μ V/m)

- (2) The tighter limit applies to the edge between two frequency bands.
- (3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- (4) Where limit of Fundamental Freq. is calculated by:
 $41.6667 \times 433.92 - 7083.3333 = 10996.681164 \mu\text{V/m} = 80.83 \text{dB}\mu\text{V/m}$
- (5) The limits in this table are based on CFR 47 Part 15.231(b).

6.3. Test Procedure

The EUT setup on the turn table which has 0.8 m (for 30-1000MHz) or 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

Frequency below 1 GHz:

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

Frequency above 1GHz to 10th harmonic:

Peak Detector:

- (1) RBW = 1MHz
- (2) VBW $\geq 3 \times$ RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average detector for finally measurement.

Average Measurement:

☐ **Option 1:**

- (1) RBW = 1 MHz
- (2) VBW = 1/T
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.

☐ **Option 2:**

Average Emission Level = Peak Emission Level + D.C.C.F.

6.4. Measurement Result Explanation

- ☒ Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading
- ☐ Average Emission Level = Antenna Factor + Cable Loss + Meter Reading
- ☐ Average Emission Level = Peak Emission Level + DCCF
Duty Cycle Correction Factor (DCCF) = $20\log(TX_{on}/TX_{on+off})$ presented in section 3.4
- ☐ EPR = Peak Emission Level - 95.2dB - 2.14dB

6.5. Measurement Result Explanation

Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading

6.6. Test Results

PASSED.

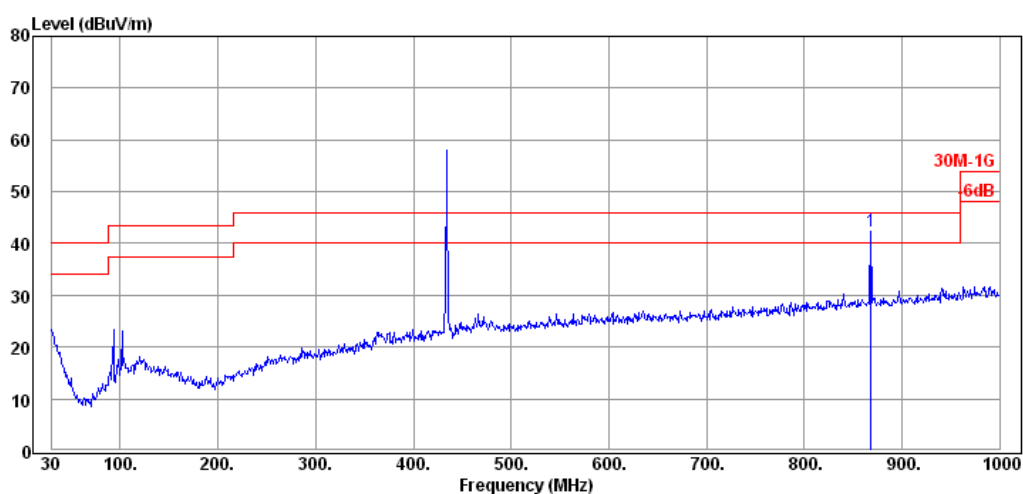
The EUT emitted the fundamental frequency with data code at the stand, side and lie conditions.

6.6.1. Emissions Applied to General Requirement

6.6.1.1. Frequency Below 1 GHz

Test Date	2016/05/26	Temp./Hum.	23°C/53%
Test Voltage	AC 120V/60Hz	Frequency	TX 433.92MHz

Antenna at Horizontal Polarization

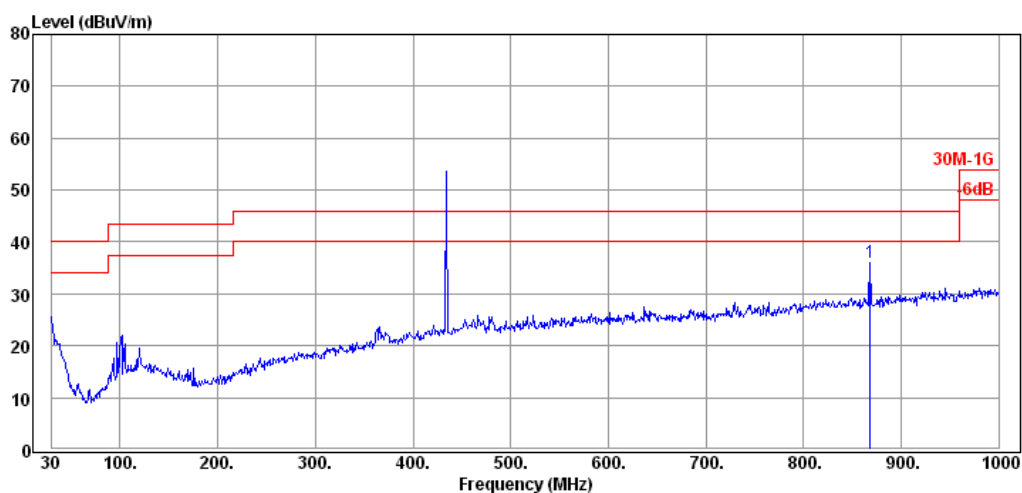


Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
868.08	20.42	7.43	14.47	42.32	46.00	3.68	Peak

The emissions not reported for there is no emission be found.

Test Date	2016/05/26	Temp./Hum.	23°C/53%
Test Voltage	AC 120V/60Hz	Frequency	TX 433.92MHz

Antenna at Vertical Polarization



Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
868.08	20.42	7.43	8.09	35.94	46.00	10.06	Peak

The emissions not reported for there is no emission be found.

6.6.1.2. Frequencies above 1 GHz:

The emissions (up to 25GHz) not reported for there is no emission be found.

Frequency	TX 433.92MHz	EUT Position	---
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Antenna at Horizontal Polarization

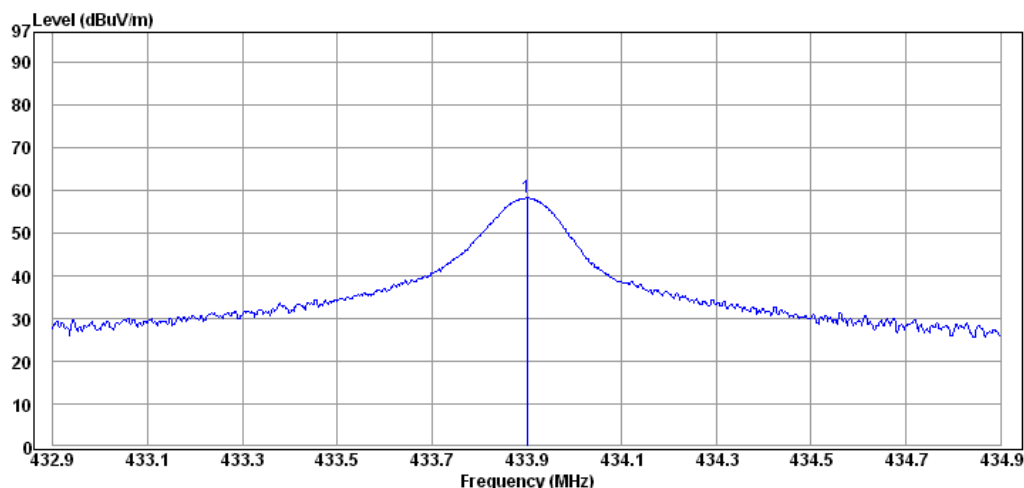
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1302.00	28.04	3.80	2.78	34.62	54.00	19.38	Peak
1736.00	29.68	4.55	2.92	37.15	54.00	16.85	Peak
2170.00	31.84	5.51	2.81	40.16	54.00	13.84	Peak
2604.00	32.42	6.00	1.53	39.95	54.00	14.05	Peak
3038.00	32.89	6.25	1.51	40.65	54.00	13.35	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1302.00	28.04	3.80	2.87	34.71	54.00	19.29	Peak
1736.00	29.68	4.55	3.52	37.75	54.00	16.25	Peak
2170.00	31.84	5.51	2.24	39.59	54.00	14.41	Peak
2604.00	32.42	6.00	2.56	40.98	54.00	13.02	Peak
3038.00	32.89	6.25	1.17	40.31	54.00	13.69	Peak

6.6.2. Fundamental Frequency:

Frequency	TX 433.92MHz	EUT Position	---
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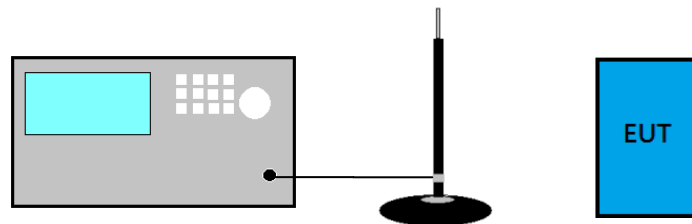
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
433.90	16.07	5.94	36.18	58.19	80.83	22.64	Peak

Remark: Horizontal is the strongest polarization and peak value has complied with average limit, so vertical won't be listed in test report.

7. EMISSION BANDWIDTH MEASUREMENT

7.1. Block Diagram of Test Setup



7.2. Specification Limits

The bandwidth of emission shall be no wider than 0.25% of the center frequency for device operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20dB down from the modulated carrier.

7.3. Test Procedure

- (1) Set RBW close to 1-5 % of OBW.
- (2) Set $VBW \geq RBW$.
- (3) Detector = Peak.
- (4) Trace mode = max hold.
- (5) Sweep = auto couple.
- (6) Allow the trace to stabilize.
- (7) Setting channel bandwidth function x dB to -20 dB to record the final bandwidth.

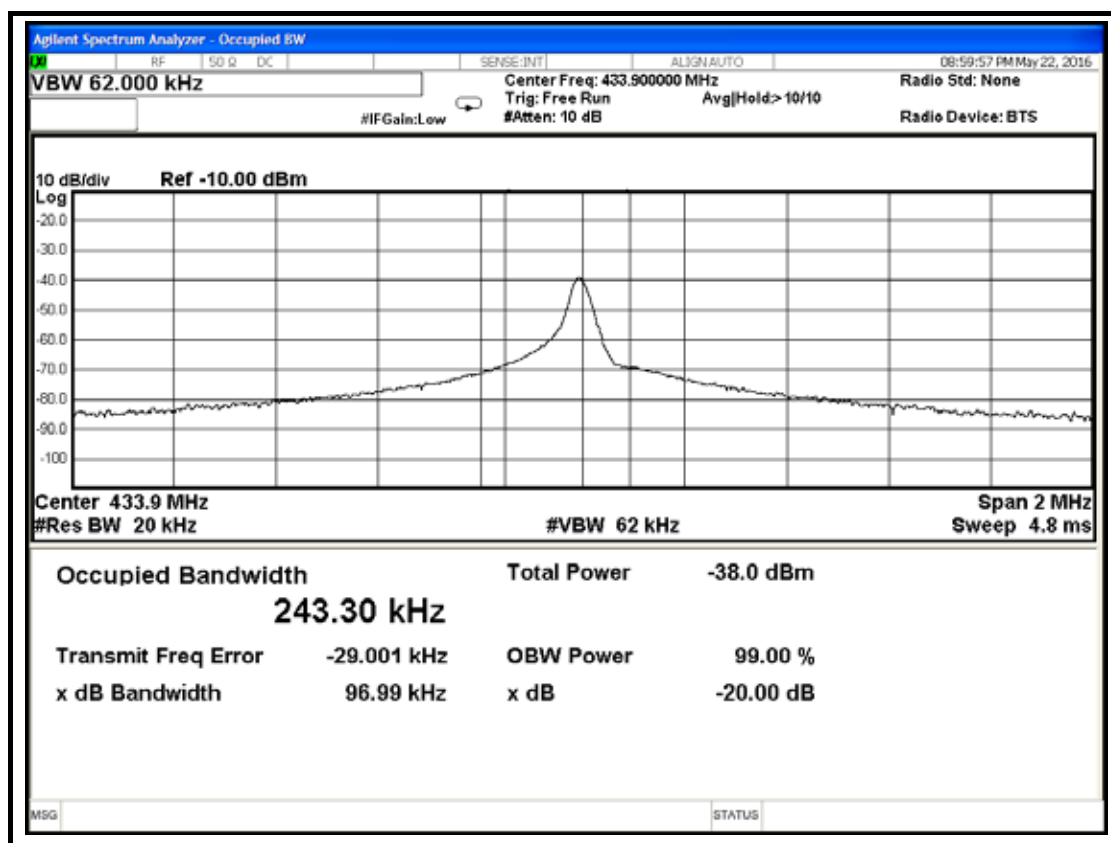
7.4. Test Results

Test Date	2016/05/22	Temp./Hum.	27°C/47%
Test Voltage	AC 120V/60Hz	Frequency	TX 433.92MHz

7.4.1. Emission Bandwidth:

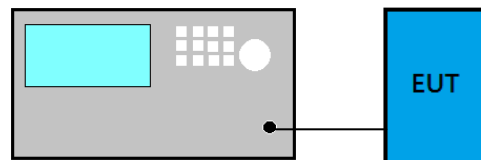
Center Frequency (MHz)	Occupied Bandwidth (MHz)	Tolerance (%)	Limit (%)
433.92	0.09699	0.022	0.25

7.4.2. Measurement Plot:



8. PERIODIC OPERATED MEASUREMENT

8.1. Block Diagram of Test Setup



8.2. Specification Limits

The operation of this device is manually operated transmitter that is automatically deactivated the transmitter within not more than 5 seconds of being released

8.3. Test Procedure

- (1) Span = zero
- (2) RBW $\geq$ 100kHz
- (3) VBW $\geq$ RBW
- (4) Sweep = 5s
- (5) Detector function = peak
- (6) Trace = single sweep

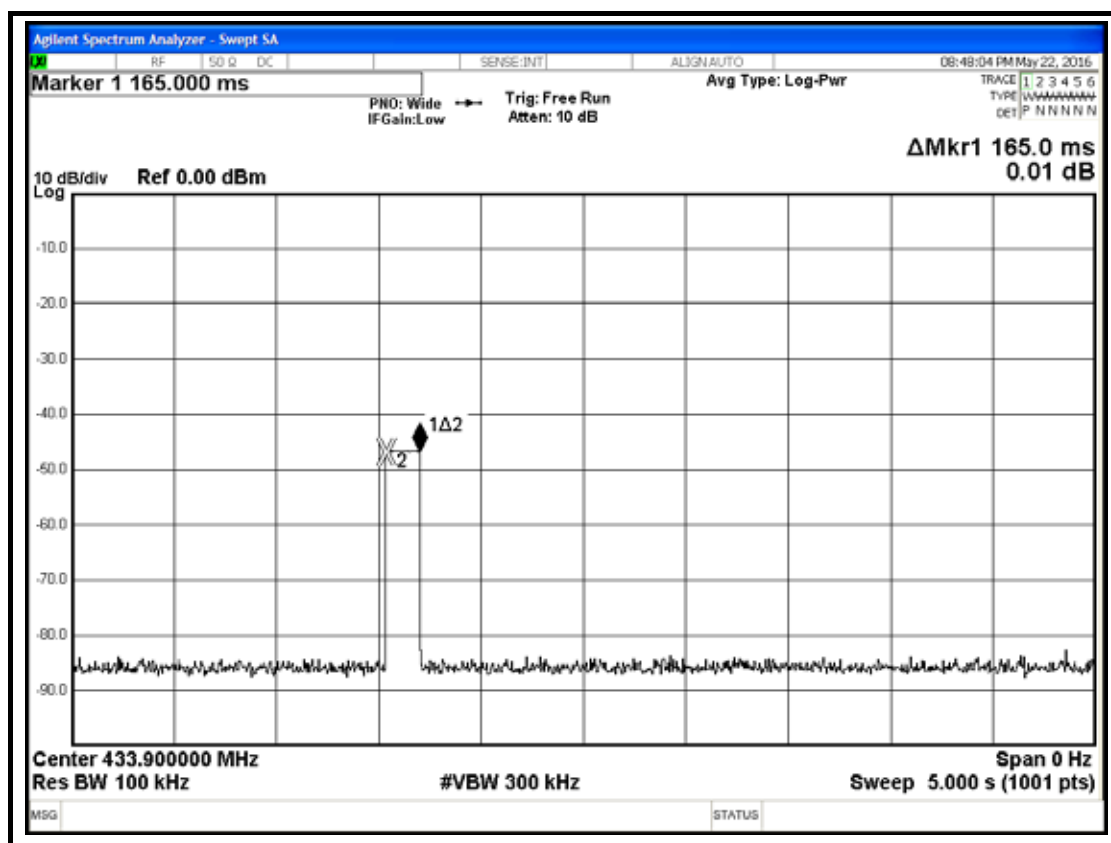
8.4. Test Results

Test Date	2016/05/22	Temp./Hum.	27°C/47%
Test Voltage	AC 120V/60Hz	Frequency	TX 433.92MHz

8.4.1. Periodic Operated:

Center Frequency (MHz)	Time (Sec.)	Limit (Sec.)
433.92	0.165	< 5

8.4.2. Measurement Plot:



9. DEVIATION TO TEST SPECIFICATIONS

【NONE】