

TEST REPORT

Application No.: SZEM1903012057CR
Applicant: Shenzhen Pano Technology Co., Ltd
Address of Applicant: 3/F of No.3, Yuanhu Industrial Zone, Xinlian Community, Longcheng Sub-District, Longgang Dist. Shenzhen, China
Manufacturer: Shenzhen Pano Technology Co., Ltd
Address of Manufacturer: 3/F of No.3, Yuanhu Industrial Zone, Xinlian Community, Longcheng Sub-District, Longgang Dist. Shenzhen, China
Factory: Shenzhen Pano Technology Co., Ltd
Address of Factory: 3/F of No.3, Yuanhu Industrial Zone, Xinlian Community, Longcheng Sub-District, Longgang Dist. Shenzhen, China
Equipment Under Test (EUT):
EUT Name: Bluetooth FM transmitter
Model No.: CBT3348A, MBT3348A ♣
 ♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.
Trade mark: Craig, Magnavox
FCC ID: 2ASVW3348A
Standard(s) : 47 CFR Part 15, Subpart C 15.239
Date of Receipt: 2019-03-25
Date of Test: 2019-03-27 to 2019-04-23
Date of Issue: 2019-04-26

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager





SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-04-26		Original

Authorized for issue by:			
			
		Powell Bao /Project Engineer	
			
		Eric Fu /Reviewer	



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2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.239	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
20dB Bandwidth	47 CFR Part 15, Subpart C 15.239	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.239(a)	Pass
Field Strength of the Fundamental Signal (15.239(b))	47 CFR Part 15, Subpart C 15.239	ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.239(b)	Pass
Radiated Emissions (9kHz-30MHz)	47 CFR Part 15, Subpart C 15.239	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.209 & 15.239 (c)	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart C 15.239	ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.209 & 15.239 (c)	Pass

Remark:

Model No.: CBT3348A, MBT3348A

Only the model CBT3348A was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for the above models, with only difference on model No..

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4 General Information

4.1 Details of E.U.T.

Power supply:	Input: DC12-24V Output: DC5V, 2.1A
Operation Frequency:	88MHz-108MHz
Modulation Type:	FM
Antenna Type:	Helical Antenna
Antenna Gain:	0dBi

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	Duty cycle	$\pm 0.37\%$
3	Occupied Bandwidth	$\pm 3\%$
4	RF conducted power	$\pm 0.75\text{dB}$
5	RF power density	$\pm 2.84\text{dB}$
6	Conducted Spurious emissions	$\pm 0.75\text{dB}$
7	RF Radiated power	$\pm 4.5\text{dB}$ (below 1GHz)
		$\pm 4.8\text{dB}$ (above 1GHz)
8	Radiated Spurious emission test	$\pm 4.5\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (Above 1GHz)
9	Temperature test	$\pm 1^\circ\text{C}$
10	Humidity test	$\pm 3\%$
11	Supply voltages	$\pm 1.5\%$
12	Time	$\pm 3\%$

4.4 Test Location

All tests were performed at:

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No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2018-09-25	2019-09-24
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2018-09-27	2019-09-26
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM031-02	2018-07-12	2019-07-11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018-09-27	2019-09-26
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018-09-25	2019-09-24

Field Strength of the Fundamental Signal (15.239(b))					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2018-07-12	2019-07-11
EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2018-09-25	2019-09-24
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2019-04-01	2020-03-31

Radiated Emissions (9kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2018-03-31	2021-03-30
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM029-01	2018-07-12	2019-07-11
EMI Test Receiver (9kHz-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2019-04-01	2020-03-31
Trilog-Broadband Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2016-06-29	2019-06-28
Pre-amplifier	Sonoma Instrument Co	310N	SEM005-04	2019-04-12	2020-04-11
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21





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Radiated Emissions (30MHz-1000MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2018-07-12	2019-07-11
EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2018-09-25	2019-09-24
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2017-06-27	2020-06-26
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2019-04-01	2020-03-31

Radiated Spurious Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018-03-13	2021-03-12
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2018-07-12	2019-07-11
EXA Spectrum Analyzer	Agilent Technologies Inc	N9010A	SEM004-12	2019-04-12	2020-04-11
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2017-06-27	2020-06-26
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018-04-13	2021-04-12
Horn Antenna (15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017-10-17	2020-10-16
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2018-09-25	2019-09-24
Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2018-11-12	2019-11-11
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2019-04-01	2020-03-31
Pre-amplifier (26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2019-04-01	2020-03-31
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2018-09-25	2019-09-24
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21



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General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2018-09-27	2019-09-26
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2018-09-27	2019-09-26
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2019-04-04	2020-04-03



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit permanently attached antenna or of an so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 0dBi.

Antenna location: Refer to Appendix(Internal photos)



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7 Radio Spectrum Matter Test Results

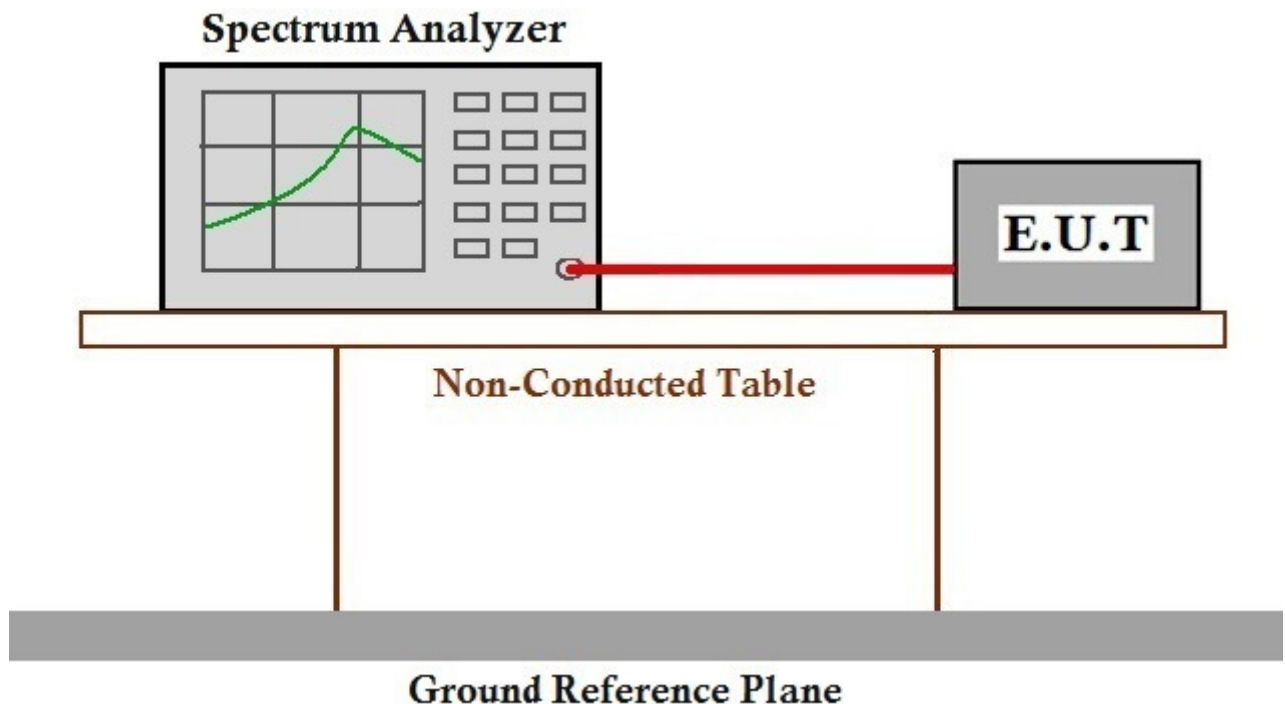
7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.239(a)
Test Method: ANSI C63.10 (2013) Section 6.9
Limit: <200 kHz
The 200 kHz band shall lie wholly within the above specified frequency ranges

7.1.1 E.U.T. Operation

Operating Environment:
Temperature: 24.9 °C Humidity: 59.2 % RH Atmospheric Pressure: 1020 mbar
Test mode: c:TX mode_Keep the EUT in transmitting with modulation mode.

7.1.2 Test Setup Diagram



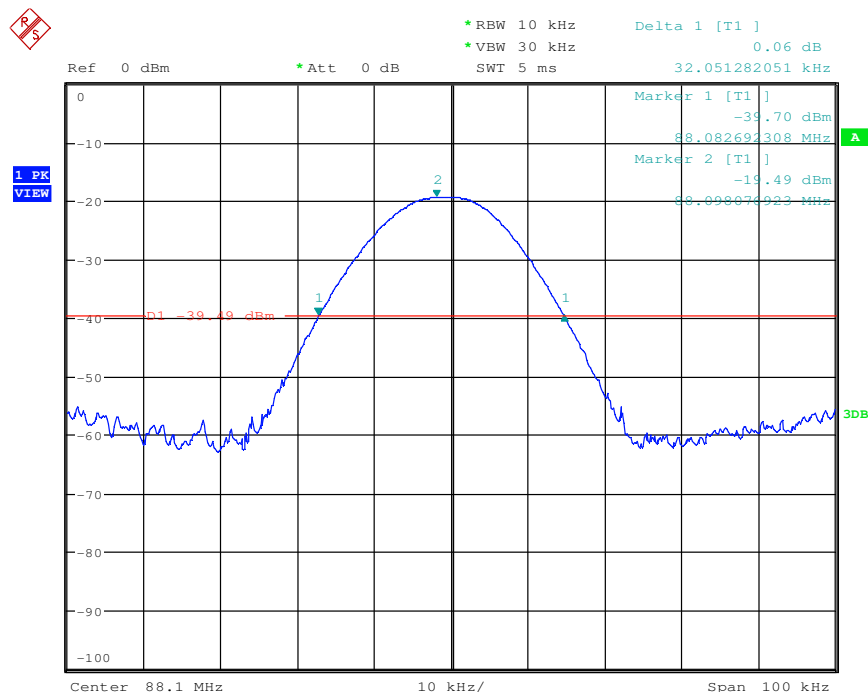
7.1.3 Measurement Procedure and Data



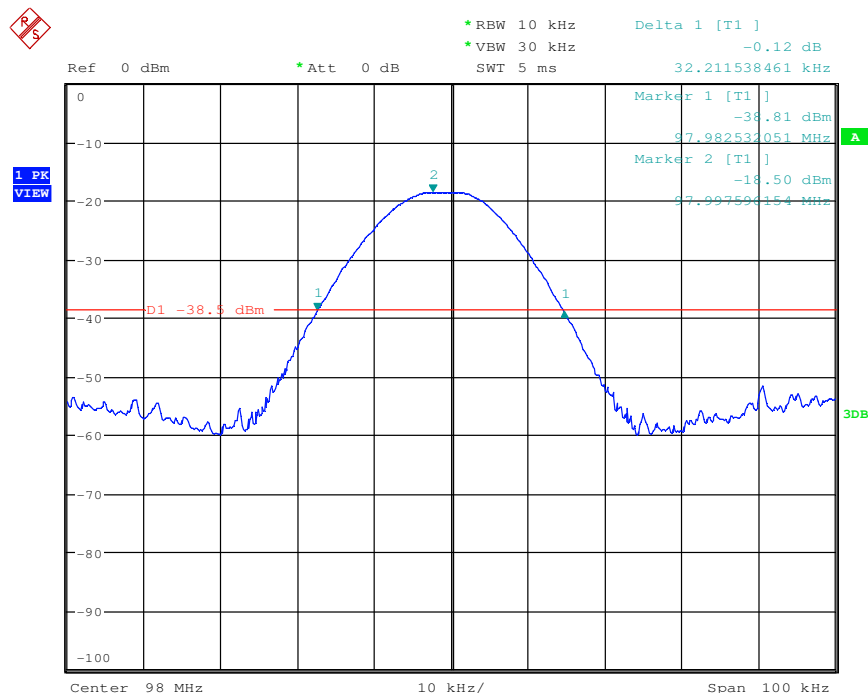
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Mode: c; Channel: Low; 88MHz



Mode: c; Channel: middle; 98MHz



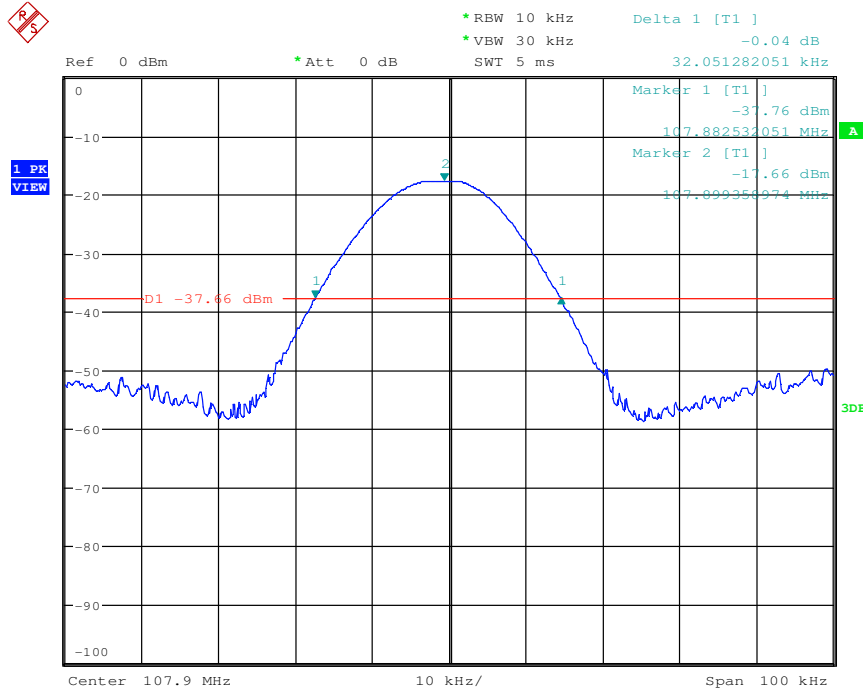
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Mode: c; Channel: High; 108MHz



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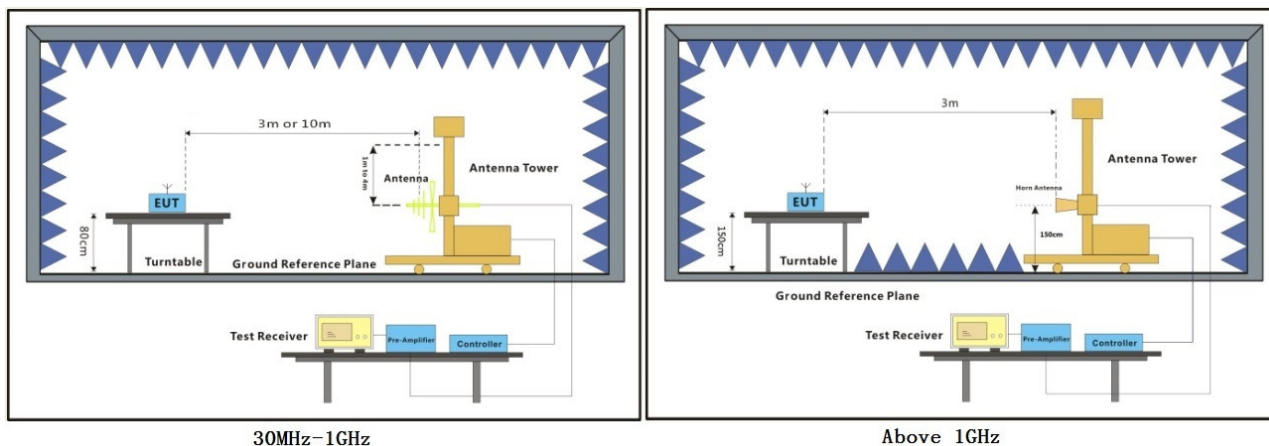
7.2 Field Strength of the Fundamental Signal (15.239(b))

Test Requirement 47 CFR Part 15, Subpart C 15.239(b)
Test Method: ANSI C63.10 (2013) Section 6.5
Measurement Distance: 3m
Limit: ≤ 250 microvolts/meter at 3 meters, the emission limit is based on measurement instrumentation employing an average Detector. The provisions in § 15.35 for limiting peak emissions apply.

7.2.1 E.U.T. Operation

Operating Environment:
Temperature: 20.9 °C Humidity: 55.5 % RH Atmospheric Pressure: 1020 mbar
Test mode: c:TX mode_Keep the EUT in transmitting with modulation mode.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor



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For Low Channel, Horizontal

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
88.1	1.1	12.89	27.65	55.47	41.81	48	-6.19	Average

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
88.1	1.1	12.89	27.65	57.90	44.24	68	-23.76	Peak

For Low Channel, Vertical

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
88.1	1.1	12.89	27.65	52.89	39.23	48	-8.77	Average

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
88.1	1.1	12.89	27.65	55.0	41.34	68	-26.66	Peak

For Middle Channel, Horizontal

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
98	1.18	13.83	27.64	56.4	43.77	48	-4.23	Average

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
98	1.18	13.83	27.64	58.0	45.37	68	-22.63	Peak

For Middle Channel, Vertical

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
98	1.18	13.83	27.64	52.94	40.31	48	-7.69	Average



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Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
98	1.18	13.83	27.64	55.40	42.77	68	-25.23	Peak

For High Channel, Horizontal

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
107.9	1.22	13.62	27.59	57.14	44.39	48	-3.61	Average

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
107.9	1.22	13.62	27.59	59.60	46.85	68	-21.15	Peak

For High Channel, Vertical

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
107.9	1.22	13.62	27.59	51.13	38.38	48	-9.62	Average

Freq (MHz)	Cable Loss (dB)	Antenna Factor(dB/m)	Preamp Gain (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Remark
107.9	1.22	13.62	27.59	53.0	40.25	68	-27.75	Peak



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7.3 Radiated Emissions (9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.239 (c)

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

Measurement Distance: 10m

Limit:

Frequency(MHz)	Field strength(microvolts/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

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

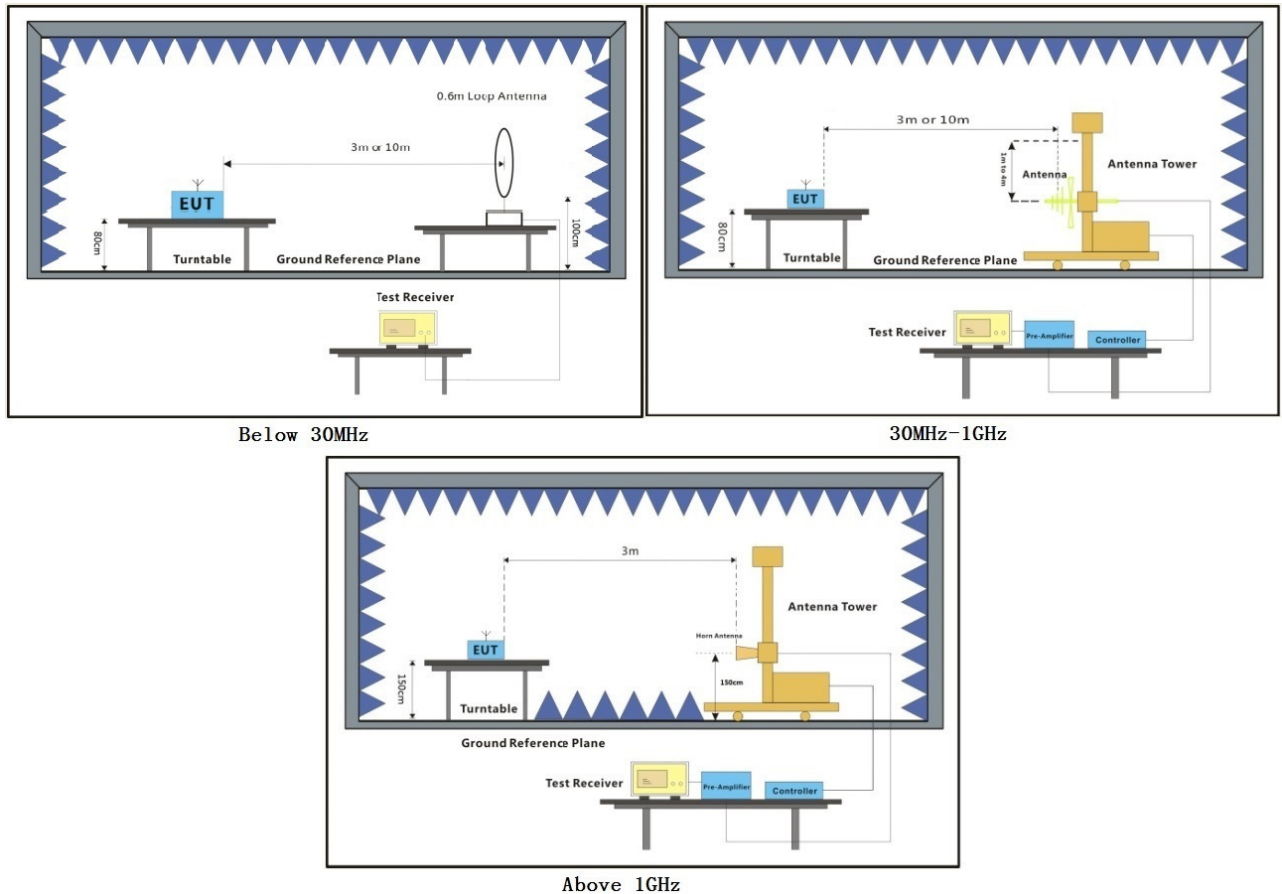
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1020 mbar

Test mode: c:TX mode_Keep the EUT in transmitting with modulation mode.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Note:

At frequencies below 30MHz:

Limit_{xm}(dBuV/m) = Limit_{10m}(dBuV/m) - 40log(xm/10m)

Remark: x replace the number 10,30,300.

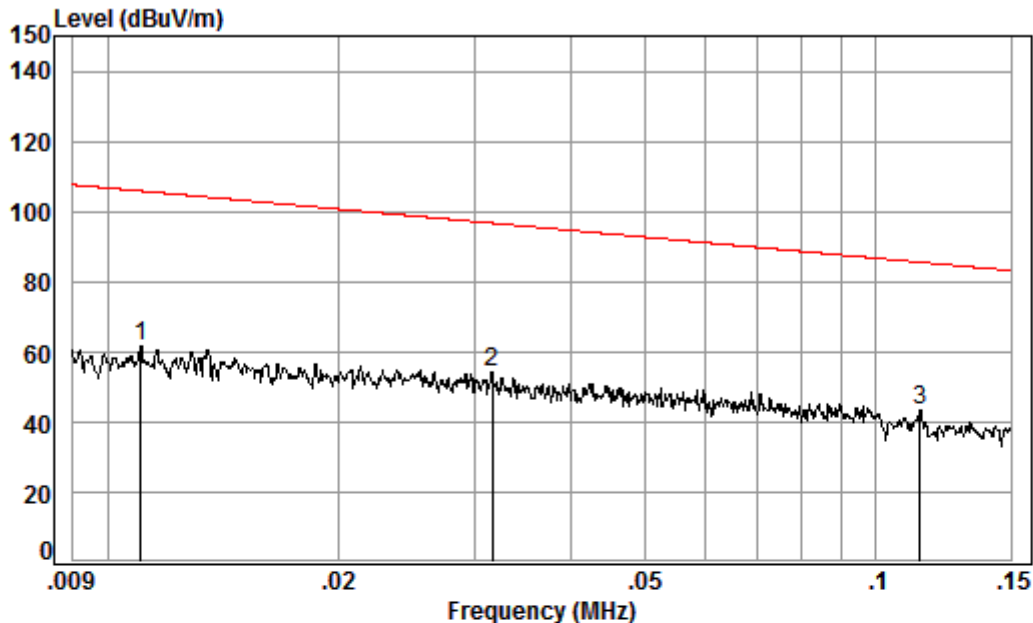


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Mode c:
9KHz-150kHz

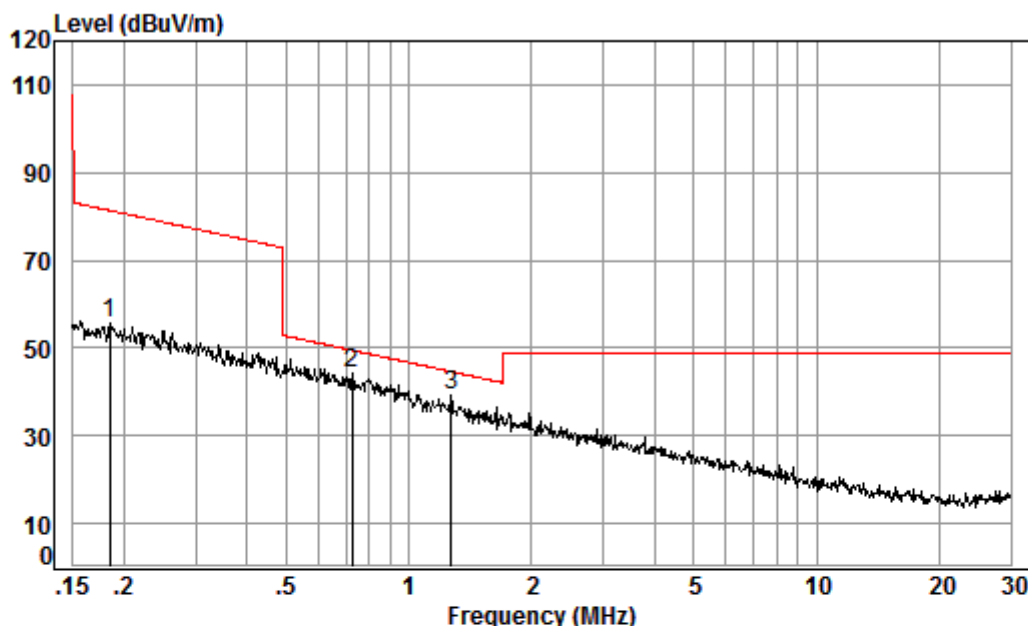


Condition: 10m
Job No. : 12057CR
Test Mode: c

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	0.01	0.28	18.70	32.55	75.14	61.57	105.84	-44.27
2	0.03	0.17	13.70	32.56	72.78	54.09	96.68	-42.59
3 pp	0.11	0.06	11.90	32.56	63.97	43.37	85.54	-42.17



150kHz-30MHz



Condition: 10m

Job No. : 12057CR

Test Mode: c

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	0.18	0.08	11.82	32.56	76.18	55.52	81.38	-25.86
2 pp	0.73	0.17	11.98	32.56	64.45	44.04	49.46	-5.42
3	1.27	0.26	12.03	32.55	59.30	39.04	44.63	-5.59

7.4 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.239 (c)
Test Method: ANSI C63.10 (2013) Section 6.4&6.5
Measurement Distance: 3m
Limit:

Frequency(MHz)	Field strength(microvolts/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

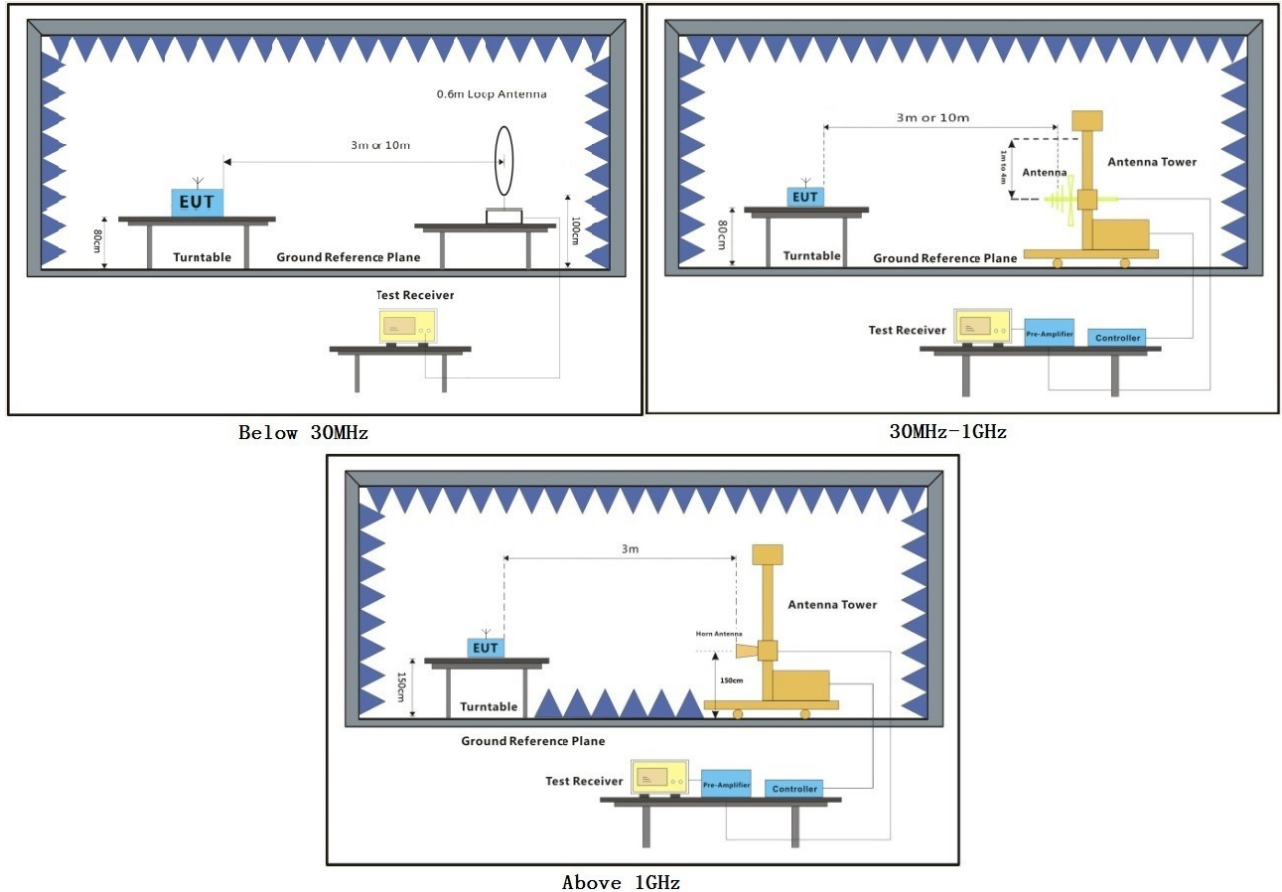
Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 51 % RH Atmospheric Pressure: 1020 mbar
Test mode: c:TX mode_Keep the EUT in transmitting with modulation mode.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. Test the EUT in the lowest channel, the middle channel, the Highest channel.
- i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
- j. Repeat above procedures until all frequencies measured was complete.

Remark:

1) For emission below 1GHz, through pre-scan found the worst case is the lowest channel. Only the worst case is recorded in the report.

2) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

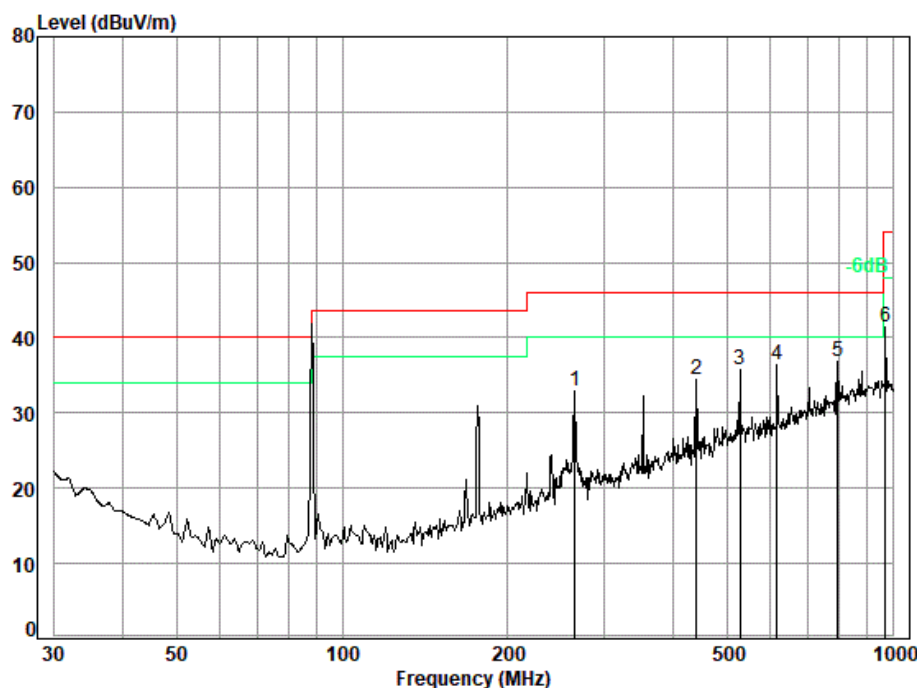
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

3) Scan from 9kHz to 25GHz, the disturbance above 18GHz and below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

4) For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.

Note: The disturbance above 1GHz was very low, and there is no highest point could be found when testing, so only the below 1GHz had been displayed in the report.

Mode: c; Polarization: Horizontal; Channel: Low



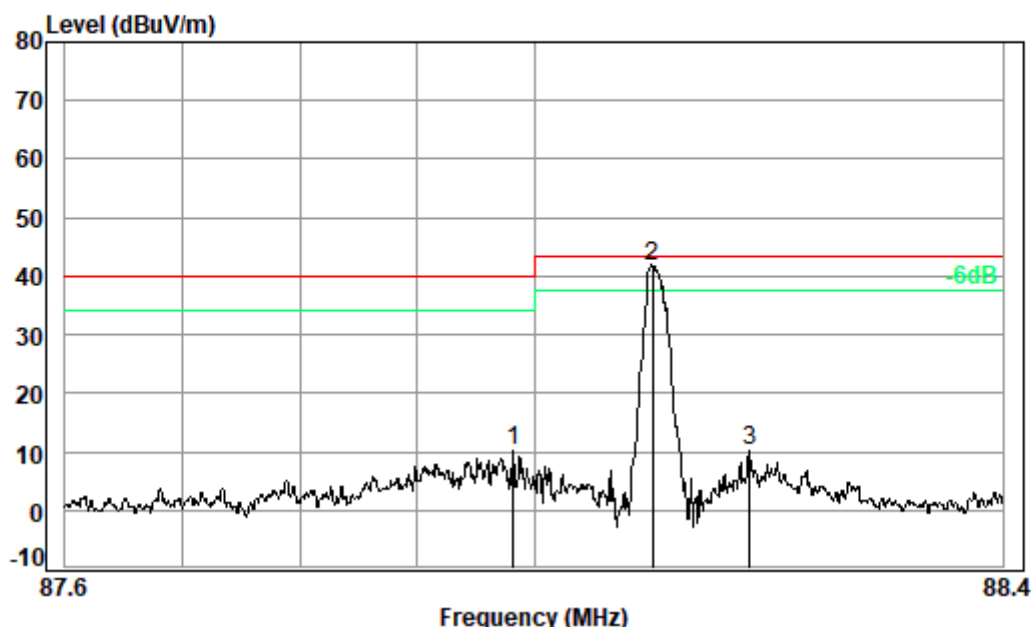
Test Site: 47 CFR PART 15B 3M-chamber, HORIZONTAL
EUT: 12057CR

Test mode: c

Remark1 : 88.1M

Remark2 :

Marker	Freq. MHz	AntFac dB/m	CabLos dB	Reading dBuV	Measured dBuV/m	Limit dBuV/m	Over dBuV	Remark
1	264.75	19.03	1.74	39.16	32.95	46.00	-13.05	
2	440.20	23.34	2.37	36.40	34.51	46.00	-11.49	
3	528.25	25.20	2.63	35.86	35.76	46.00	-10.24	
4	616.37	26.83	2.74	35.04	36.48	46.00	-9.52	
5	793.40	28.46	3.18	32.94	36.85	46.00	-9.15	
6	968.93	30.15	3.67	34.65	41.45	54.00	-12.55	



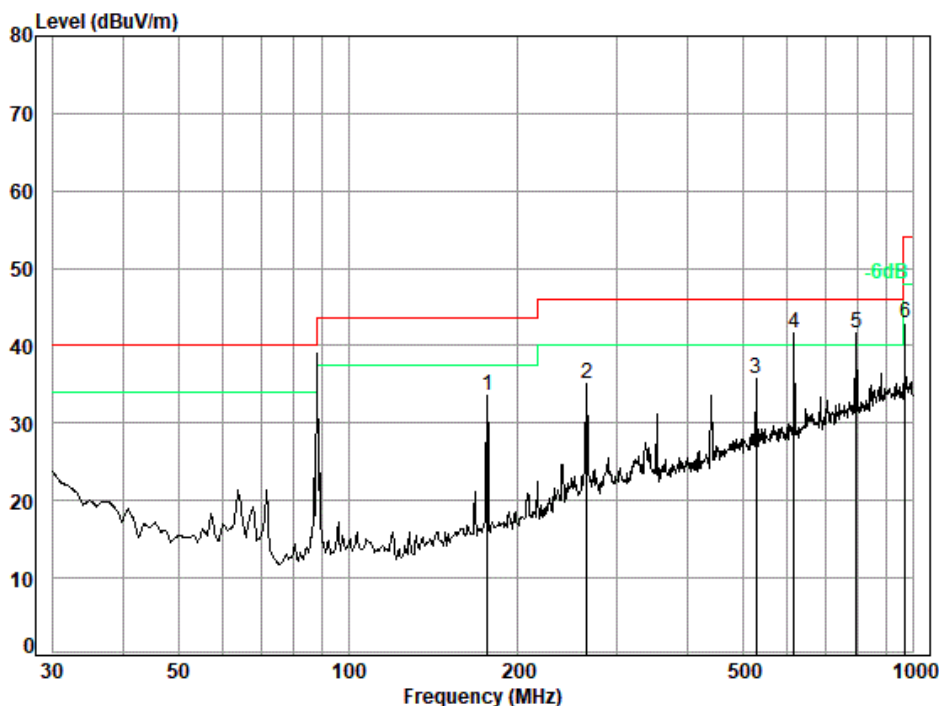
Condition: 3m HORIZONTAL

Job No. : 12057CR

Test Mode: c

		Cable	Ant	Preamp	Read	Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m
1	87.98	1.10	12.89	27.65	24.00	10.34	40.00
2 pp	88.10	1.10	12.90	27.65	55.47	41.82	43.50
3	88.18	1.10	12.91	27.65	23.97	10.33	43.50

Mode :c; Polarization: Vertical; Channel: Low



Test Site: 47 CFR PART 15B 3M-chamber, VERTICAL

EUT: 12057CR

Test mode: c

Remark1 : 88.1M

Remark2 :

Marker	Freq. MHz	AntFac dB/m	CabLos dB	Reading dBuV	Measured dBuV/m	Limit dBuV/m	Over dBuV	Remark
1	176.27	15.83	1.36	43.65	33.59	43.50	-9.91	
2	264.75	19.03	1.74	41.37	35.16	46.00	-10.84	
3	528.25	25.20	2.63	35.78	35.68	46.00	-10.32	
4	616.37	26.83	2.74	40.09	41.53	46.00	-4.47	
5	793.40	28.46	3.18	37.63	41.54	46.00	-4.46	
6	968.93	30.15	3.67	36.12	42.92	54.00	-11.08	

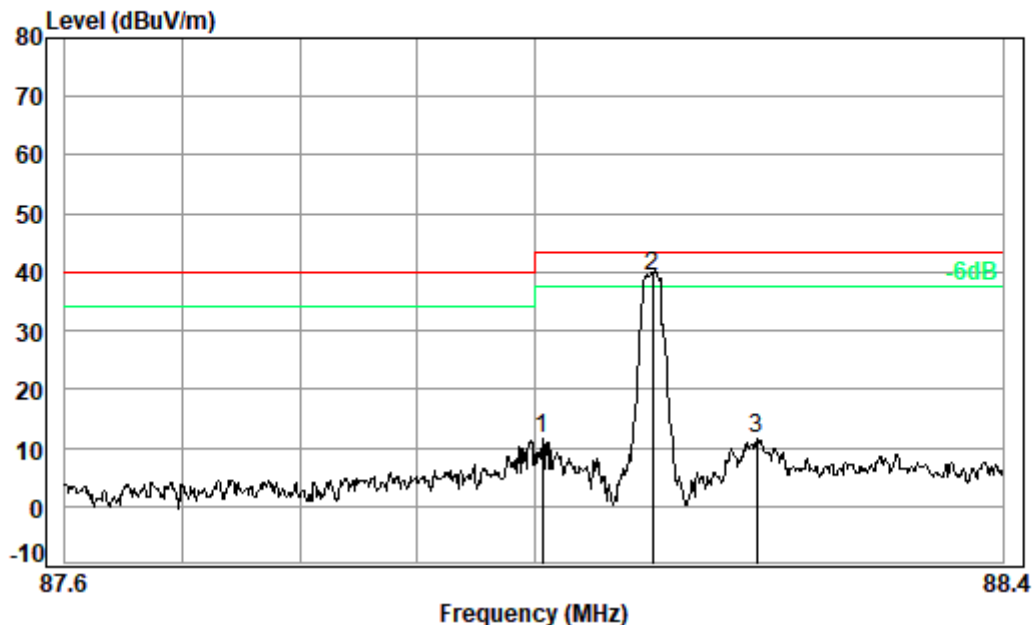


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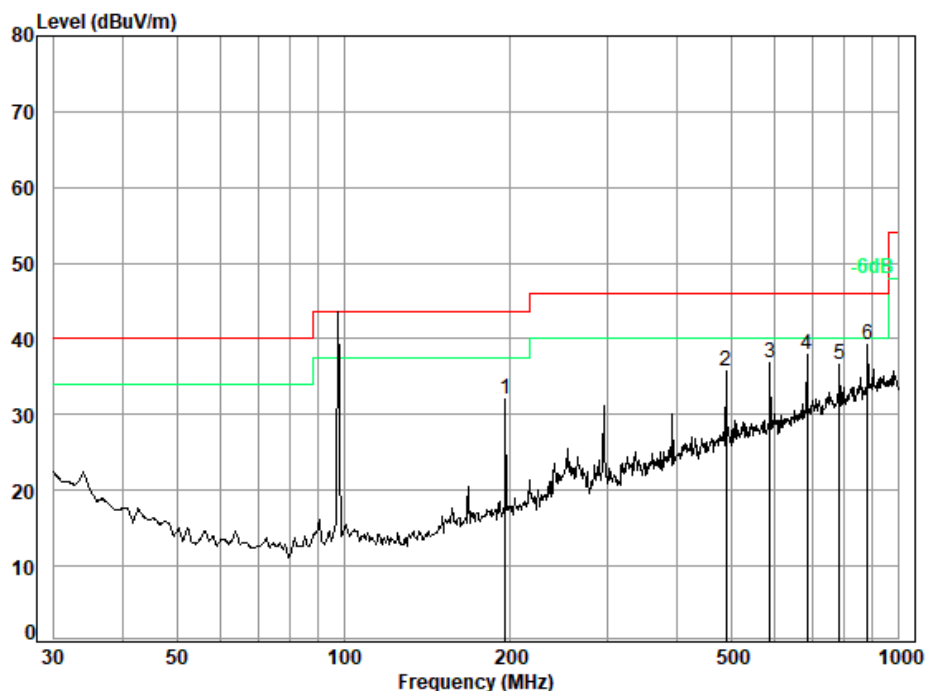


Condition: 3m VERTICAL
Job No. : 12057CR
Test Mode: c

	Freq	Cable Loss	Ant Factor	Preamplifier Factor	Read Level	Level	Limit	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	88.01	1.10	12.89	27.65	25.11	11.45	43.50	-32.05
2 pp	88.10	1.10	12.90	27.65	52.89	39.24	43.50	-4.26
3	88.19	1.10	12.91	27.65	25.13	11.49	43.50	-32.01



Mode: c; Polarization: Horizontal; Channel: middle



Test Site: 47 CFR PART 15B 3M-chamber, HORIZONTAL

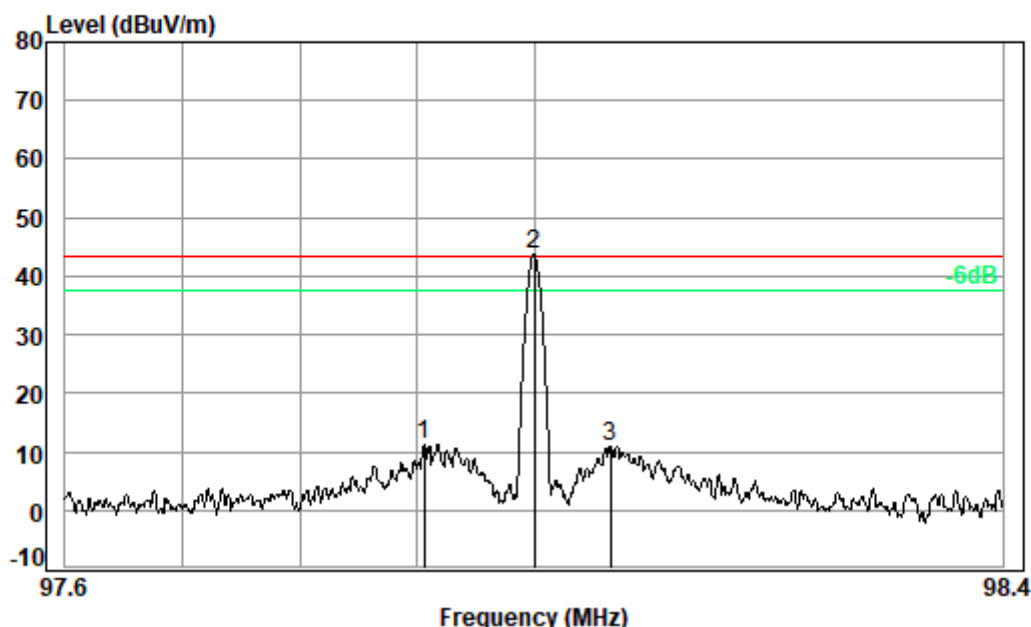
EUT: 12057CR

Test mode: c

Remark1 : 98M

Remark2 :

Marker	Freq. MHz	AntFac dB/m	CabLos dB	Reading dBuV	Measured dBuV/m	Limit dBuV/m	Over dBuV	Remark
1	195.82	16.38	1.39	41.40	31.99	43.50	-11.51	
2	489.03	24.38	2.56	36.51	35.66	46.00	-10.34	
3	586.84	26.36	2.69	35.83	36.75	46.00	-9.25	
4	684.75	27.71	2.87	35.24	37.86	46.00	-8.14	
5	782.35	28.40	3.15	32.83	36.63	46.00	-9.37	
6	881.41	29.57	3.53	33.61	39.34	46.00	-6.66	



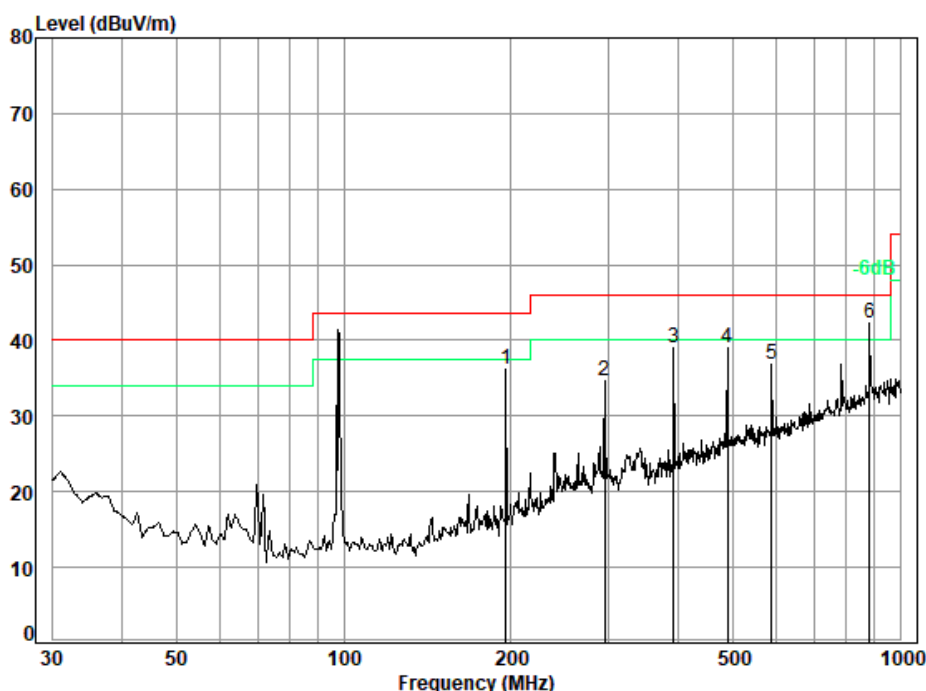
Condition: 3m HORIZONTAL

Job No. : 12057CR

Test Mode: c

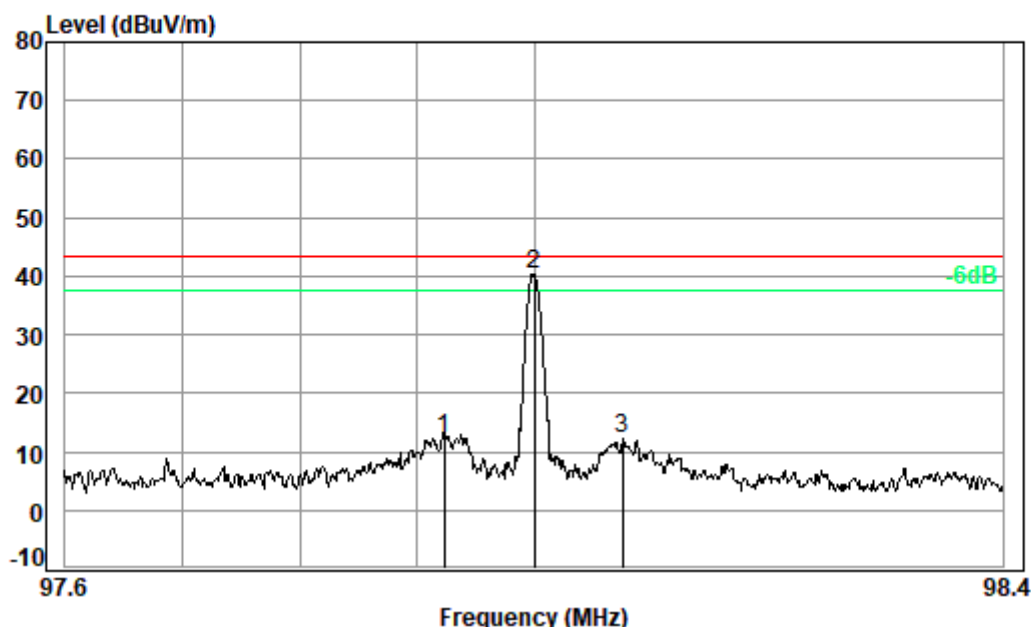
	Freq	Cable	Ant	Preamp	Read	Limit	Over
	MHz	Loss	Factor	Factor	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dB
1	97.91	1.18	13.82	27.64	23.85	11.21	43.50 -32.29
2 pp	98.00	1.18	13.83	27.64	56.40	43.77	43.50 0.27
3	98.06	1.18	13.83	27.64	23.65	11.02	43.50 -32.48

Mode :c; Polarization: Vertical; Channel: middle



Test Site: 47 CFR PART 15B 3M-chamber, VERTICAL
EUT: 12057CR
Test mode: c
Remark1 : 98M
Remark2 :

Marker	Freq. MHz	AntFac dB/m	CabLos dB	Reading dBuV	Measured dBuV/m	Limit dBuV/m	Over dBuV	Remark
1	195.82	16.38	1.39	45.51	36.10	43.50	-7.40	
2	294.11	19.37	1.87	40.39	34.73	46.00	-11.27	
3	392.10	22.21	2.18	42.04	39.05	46.00	-6.95	
4	489.03	24.38	2.56	39.91	39.06	46.00	-6.94	
5	586.84	26.36	2.69	35.98	36.90	46.00	-9.10	
6	881.41	29.57	3.53	36.50	42.23	46.00	-3.77	



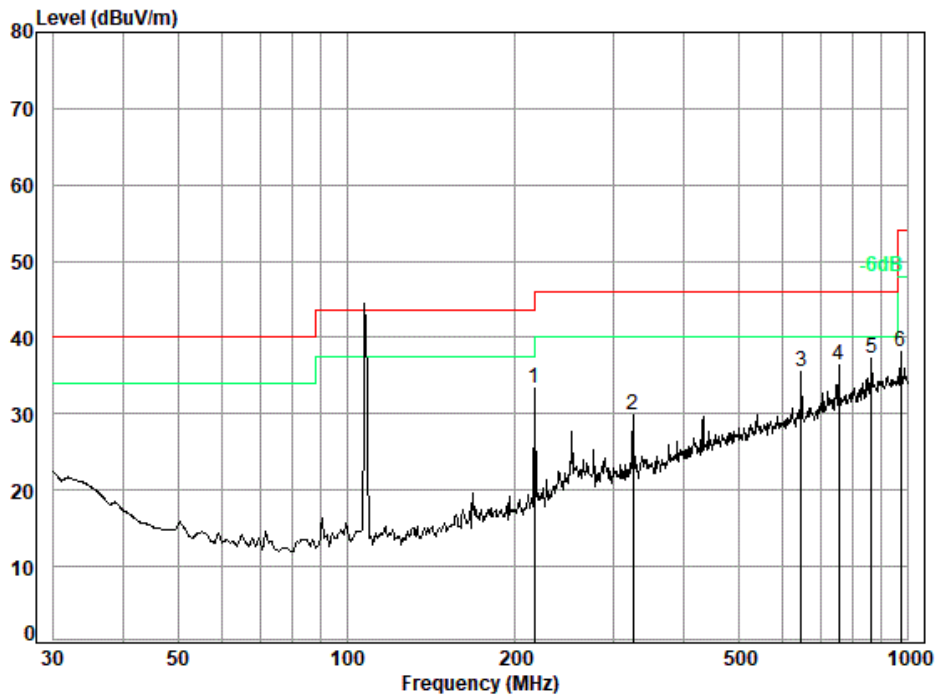
Condition: 3m VERTICAL

Job No. : 12057CR

Test Mode: c

	Freq	Cable	Ant	Preamp	Read	Limit	Over
	MHz	Loss	Factor	Factor	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m
1	97.92	1.18	13.82	27.64	24.97	12.33	43.50
2 pp	98.00	1.18	13.83	27.64	52.94	40.31	43.50
3	98.08	1.18	13.83	27.64	24.84	12.21	43.50

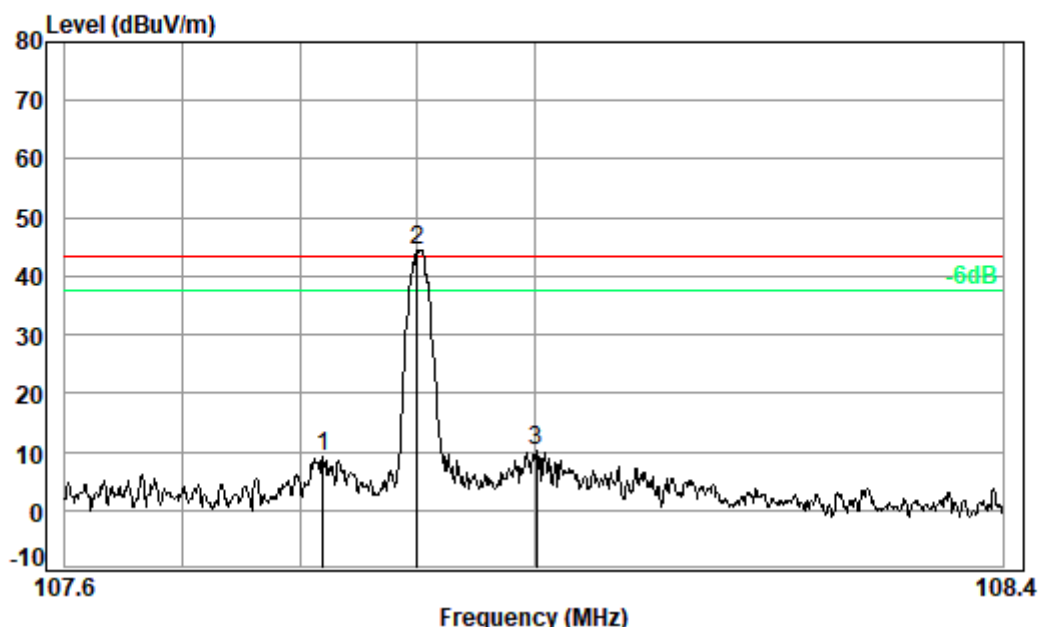
Mode: c; Polarization: Horizontal; Channel: High



Test Site: 47 CFR PART 15B 3M-chamber, HORIZONTAL
EUT: 12057CR
Test mode: c
Remark1 : 107.9M
Remark2 :

Marker	Freq. MHz	AntFac dB/m	CabLos dB	Reading dBuV	Measured dBuV/m	Limit dBuV/m	Over dBuV	Remark
1	216.02	17.07	1.49	41.89	33.34	46.00	-12.66	
2	324.46	20.36	1.98	34.58	29.89	46.00	-16.11	
3	647.39	27.24	2.80	33.64	35.63	46.00	-10.37	
4	755.39	28.24	3.07	32.87	36.37	46.00	-9.63	
5	863.06	29.34	3.46	31.86	37.22	46.00	-8.78	
6	972.34	30.17	3.67	31.38	38.21	54.00	-15.79	





Condition: 3m HORIZONTAL

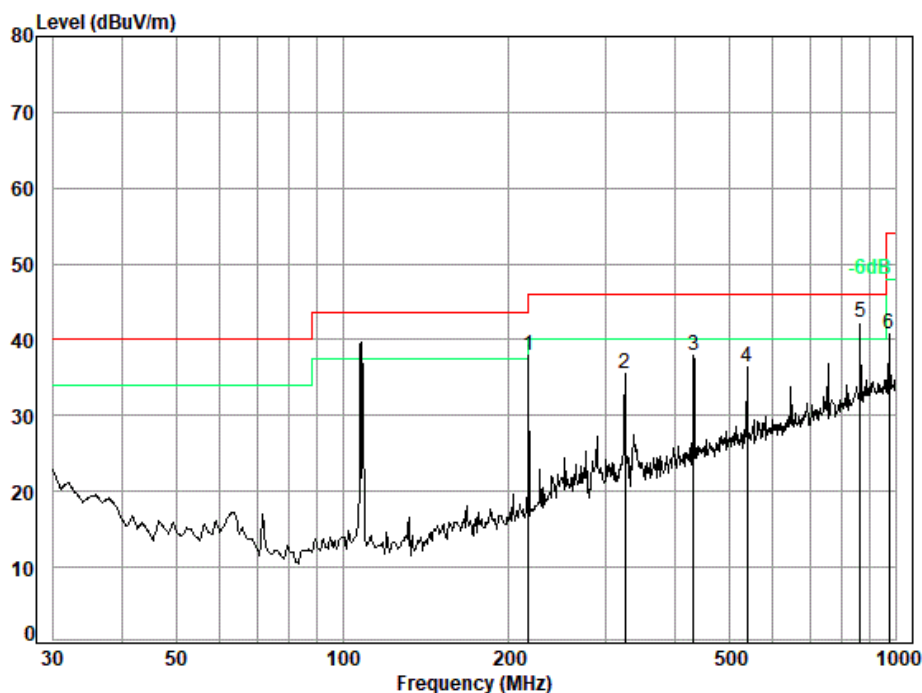
Job No. : 12057CR

Test Mode: c

		Cable	Ant	Preamp	Read		Limit	Over
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	107.82	1.22	13.63	27.59	21.85	9.11	43.50	-34.39
2	pp 107.90	1.22	13.62	27.59	57.15	44.40	43.50	0.90
3	108.00	1.22	13.62	27.59	22.98	10.23	43.50	-33.27



Mode :c; Polarization: Vertical; Channel: High



Test Site: 47 CFR PART 15B 3M-chamber, VERTICAL

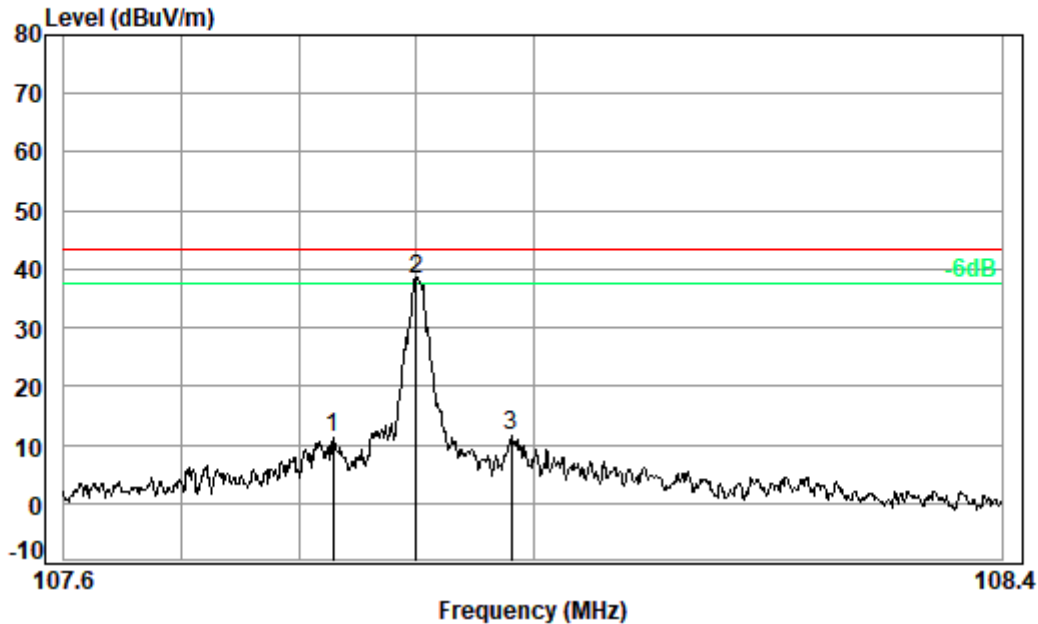
EUT: 12057CR

Test mode: c

Remark1 : 107.9M

Remark2 :

Marker	Freq. MHz	AntFac dB/m	CabLos dB	Reading dBuV	Measured dBuV/m	Limit dBuV/m	Over dBuV	Remark
1	216.78	17.09	1.50	46.41	37.89	46.00	-8.11	
2	324.46	20.36	1.98	40.13	35.44	46.00	-10.56	
3	431.03	23.14	2.33	39.95	37.86	46.00	-8.14	
4	539.48	25.43	2.64	36.38	36.48	46.00	-9.52	
5	863.06	29.34	3.46	36.86	42.22	46.00	-3.78	
6	972.34	30.17	3.67	33.84	40.67	54.00	-13.33	



Condition: 3m VERTICAL
Job No. : 12057CR
Test Mode: c

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit	Over
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	107.83	1.22	13.63	27.59	23.86	11.12	43.50	-32.38
2 pp	107.90	1.22	13.62	27.59	51.14	38.39	43.50	-5.11
3	107.98	1.22	13.62	27.59	24.35	11.60	43.50	-31.90





8 Photographs

8.1 Test Setup

Please refer to setup photos.

8.2 EUT Constructional Details (EUT Photos)

Please refer to external and internal photos for details.

- End of the Report -



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