

TEST REPORT

Application No.: SHEM2011009541CR
FCC ID: 2ADTD-K3G411RE
Applicant: Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Applicant: No. 555 Qianmo Road, Binjiang District, Hangzhou 310052, China
Manufacturer: Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Manufacturer: No. 555 Qianmo Road, Binjiang District, Hangzhou 310052, China
Factory: 1. Hangzhou Hikvision Technology Co., Ltd.
 2. Hangzhou Hikvision Electronics Co., Ltd.
 3. Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Factory: 1. No. 700, Dongliu Road, Binjiang District, Hangzhou City, Zhejiang, 310052, China
 2. No. 299, Qiushi Road, Tonglu Economic Development Zone, Tonglu County, Hangzhou, Zhejiang, 310052, China.
 3. No. 555 Qianmo Road, Binjiang District Hangzhou 310052, China

Equipment Under Test (EUT):

EUT Name: tripod turnstile
Model No.: DS-K3G411-R, DS-K3G411-R/E, DS-K3G411-REUHK, DS-K3G411-RECKV, DS-K3G411-REUVS, DS-K3G411-REKVO, DS-K3G412-REHUN

Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.

Trade mark: HIKVISION
Standard(s) : 47 CFR Part 15, Subpart C 15.231
Date of Receipt: 2020-11-02
Date of Test: 2020-11-02 to 2020-12-17
Date of Issue: 2020-12-21

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

Parlam Zhan

Parlam Zhan
E&E Section Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.



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Revision Record			
Version	Description	Date	Remark
00	Original	2020-12-21	/

Authorized for issue by:			
			
		Micheal Niu / Project Engineer	
			
		Parlam Zhan / Reviewer	



2 Test Summary

Radio Spectrum Technical Requirement			
Item	Standard	Method	Result
Antenna Requirement	47 CFR Part 15.203	N/A	Pass

N/A: Not applicable

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.231(c)	Pass
Dwell Time	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.231(a)	Pass
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.5	47 CFR Part 15.231 (b)	Pass
Radiated Emissions	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15.209 15.231(b)	Pass

N/A: Not applicable

Note: Declaration of EUT Family Grouping:

There are series models mentioned in this report and they are the similar in electrical and electronic characters. Only the model DS-K3G411-R/E was tested since their differences are model number and appearance.



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4 General Information

4.1 Details of E.U.T.

Power supply:	AC 100V~240V 50/60Hz
Test voltage:	AC 120V/60Hz
Modulation Type	2GFSK
Number of Channels	1
Operation Frequency	433.60MHz
Antenna Type	PCB Antenna

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	8.4 x 10-8
2	Timeout	2s
3	Duty cycle	0.4%
4	Occupied Bandwidth	3%
5	RF conducted power	0.6dB
6	RF power density	2.9dB
7	Conducted Spurious emissions	0.75dB
8	RF Radiated power	5.1dB (Below 1GHz) 5.9dB (Above 1GHz)
9	Radiated Spurious emission test	4.2dB (Below 30MHz) 4.5dB (30MHz-1GHz) 5.1dB (1GHz-6GHz) 5.4dB (6GHz-18GHz)
10	Temperature test	1°C
11	Humidity test	3%
12	Supply voltages	1.5%
13	Time	3%

Note: The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



4.4 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

4.5 Test Facility

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

- **CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 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. 2541.01)**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

- **FCC (Designation Number: CN1172)**

Compliance Certification Services Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

- **ISED (CAB identifier: CN0072)**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

CAB Identifier: CN0072.

- **VCCI (Member No.: 1938)**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-1600, C-1707, T-1499, G-10216 respectively.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



5 Equipment List

Item	Equipment	Manufacturer	Model	Serial Number	Cal Date	Cal. Due Date
Conducted Emission at Mains Terminals (150kHz-30MHz)						
1	EMI Test Receive	R&S	ESCI	100781	02/24/2020	02/23/2021
2	LISN	R&S	ENV216	101604	10/19/2020	10/18/2021
3	LISN	Schwarzbeck	NNLK 8129	8129-143	10/19/2020	10/18/2021
4	Pulse Limiter	R&S	ESH3-Z2	100609	02/24/2020	02/23/2021
5	CE test Cable	Thermax	/	14	02/24/2020	02/23/2021
RF Conducted Test						
1	Spectrum Analyzer	Agilent	E4446A	MY44020154	04/22/2020	04/21/2021
2	Spectrum Analyzer	Keysight	N9020A	MY55370209	10/19/2020	10/18/2021
3	Signal Generator	Agilent	E8257C	MY43321570	10/19/2020	10/18/2021
4	Vector Signal Generator	R&S	SMU 200A	102744	09/25/2020	09/24/2021
5	Universal Radio Communication Tester	R&S	CMU200	109525	10/19/2020	10/18/2021
6	Universal Radio Communication Tester	R&S	CMW500	159275	10/19/2020	10/18/2021
7	Power Meter	Anritsu	ML2495A	1445010	04/21/2020	04/20/2021
8	Switcher	CCSRF	FY562	KS301219	10/19/2020	10/18/2021
9	AC Power Source	EXTECH	6605	1570106	N.C.R	N.C.R
10	DC Power Supply	Agilent	E3632A	MY50340053	N.C.R	N.C.R
11	6dB Attenuator	Mini-Circuits	NAT-6-2W	15542-1	N.C.R	N.C.R
12	Power Divider	AISI	IOWOPE2068	PE2068	N.C.R	N.C.R
13	Filter	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
14	Conducted test cable	/	RF01-RF04	/	04/21/2020	04/22/2021
15	Temp. / Humidity Chamber	TERCHY	MHK-120AK	X30109	04/21/2020	04/20/2021
RF Radiated Test						
1	Spectrum Analyzer	R&S	FSV40	101493	01/08/2020	01/07/2021
2	Signal Generator	Agilent	E8257C	MY43321570	10/19/2020	10/18/2021
3	Loop Antenna	COM-POWER	AL-130R	10160008	04/29/2019	04/28/2021
4	Bilog Antenna	TESEQ	CBL 6112D	35403	06/22/2019	06/21/2021
5	Bilog Antenna	SCHWARZBECK	VULB9160	9160-3342	04/29/2019	04/28/2021
6	Horn-antenna(1-18GHz)	Schwarzbeck	BBHA9120D	267	10/26/2020	10/25/2022
7	Horn-antenna(1-18GHz)	ETS-LINDGREN	3117	00143290	02/25/2019	02/24/2021
8	Horn Antenna(18-40GHz)	Schwarzbeck	BBHA9170	BBHA9170171	02/27/2018	02/26/2021
9	Pre-Amplifier(30MHz~18GHz)	CCSRF	AMP1277	1	12/19/2019	12/18/2020
10	Pre-Amplifier(0.1~26.5GHz)	EMCI	EMC012645	980060	04/21/2020	04/20/2021
11	Low Pass Filter	MICRO-TRONICS	VLFX-950	RV142900829	N.C.R	N.C.R
12	High Pass Filter	Mini-Circuits	VHF-1200	15542	N.C.R	N.C.R
13	Filter (5450MHz~5770 MHz)	MICRO-TRONICS	BRC50704-01	2	N.C.R	N.C.R
14	Filter (5690 MHz~5930 MHz)	MICRO-TRONICS	BRC50705-01	4	N.C.R	N.C.R
15	Filter (5150 MHz~5350 MHz)	MICRO-TRONICS	BRC50703-01	2	N.C.R	N.C.R
16	Filter (885 MHz~915 MHz)	MICRO-TRONICS	BRM14698	1	N.C.R	N.C.R
17	Filter (815 MHz~860 MHz)	MICRO-TRONICS	BRM14697	1	N.C.R	N.C.R
18	Filter (1745 MHz~1910 MHz)	MICRO-TRONICS	BRM14700	1	N.C.R	N.C.R
19	Filter (1922 MHz~1977 MHz)	MICRO-TRONICS	BRM50715	1	N.C.R	N.C.R
20	Filter (2550 MHz)	MICRO-TRONICS	HPM13362	5	N.C.R	N.C.R
21	Filter (1532 MHz~1845 MHz)	MICRO-TRONICS	BRM50713	1	N.C.R	N.C.R
22	Filter (2.4GHz)	MICRO-TRONICS	BRM50701	5	N.C.R	N.C.R
23	RE test cable	/	RE01-RE04	/	04/21/2020	04/22/2021
24	Spectrum Analyzer	Keysight	N9020A	MY53420174	09/25/2020	09/24/2021



6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

15.203 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 permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The antenna is PCB antenna and no consideration of replacement.

Antenna location: Refer to Appendix (Internal Photos)

7 Radio Spectrum Matter Test Results

7.1 Conducted Emissions at AC Power Line (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207
Test Method: ANSI C63.10 (2013) Section 6.2
Limit:

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

*Decreases with the logarithm of the frequency.

7.1.1 E.U.T. Operation

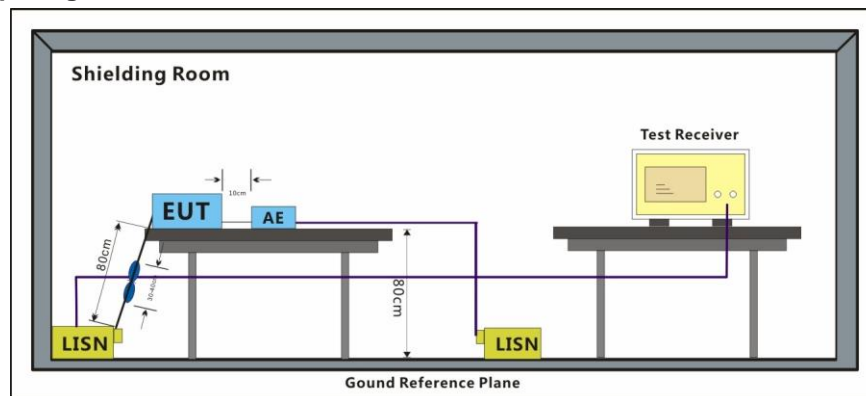
Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1020 mbar

Test mode c:TX mode_Keep the EUT in transmitting with modulation mode. (433 modular 1)

d:TX mode_Keep the EUT in transmitting with modulation mode. (433 modular 2)

7.1.2 Test Setup Diagram





7.1.3 Measurement Procedure and Data

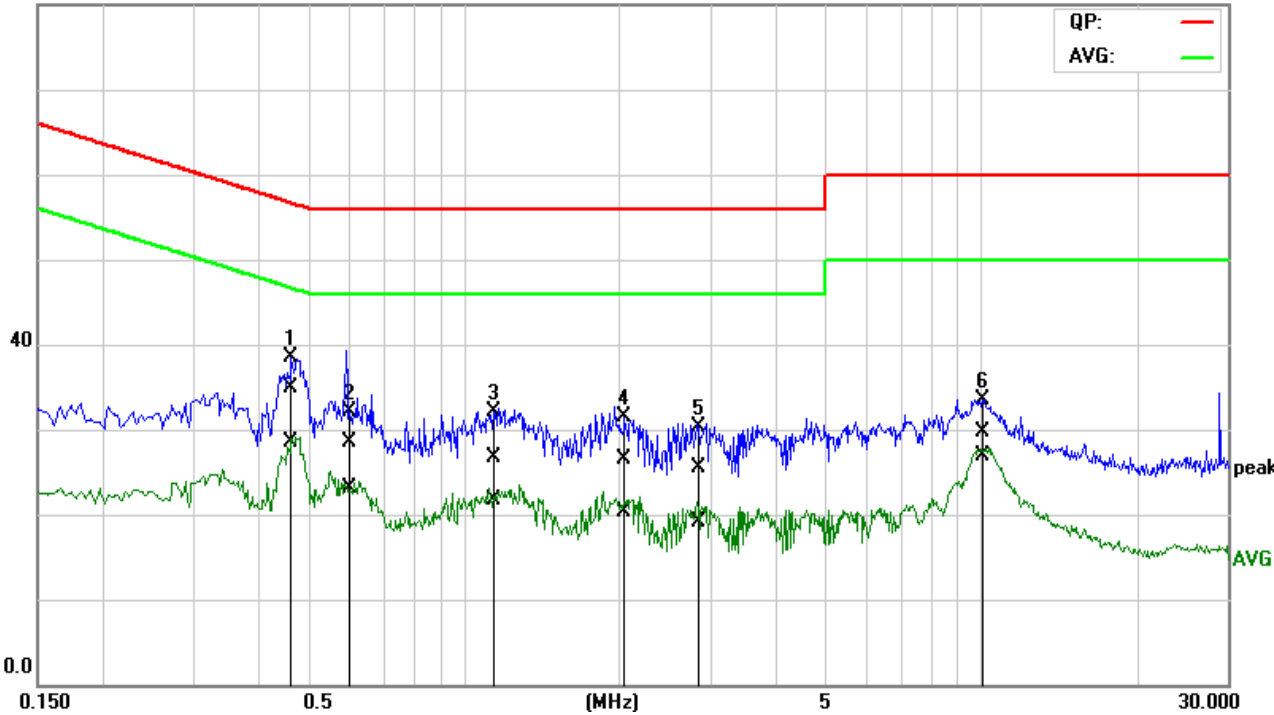
- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50ohm/50μH + 5ohm linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.
- 6) This product is a floor product. It is placed on the ground during normal use. Because the product size is too large , so use the 433MHz module to test.

Remark: LISN=Read Level+ Cable Loss+ LISN Factor



Mode:c; Line:Live Line

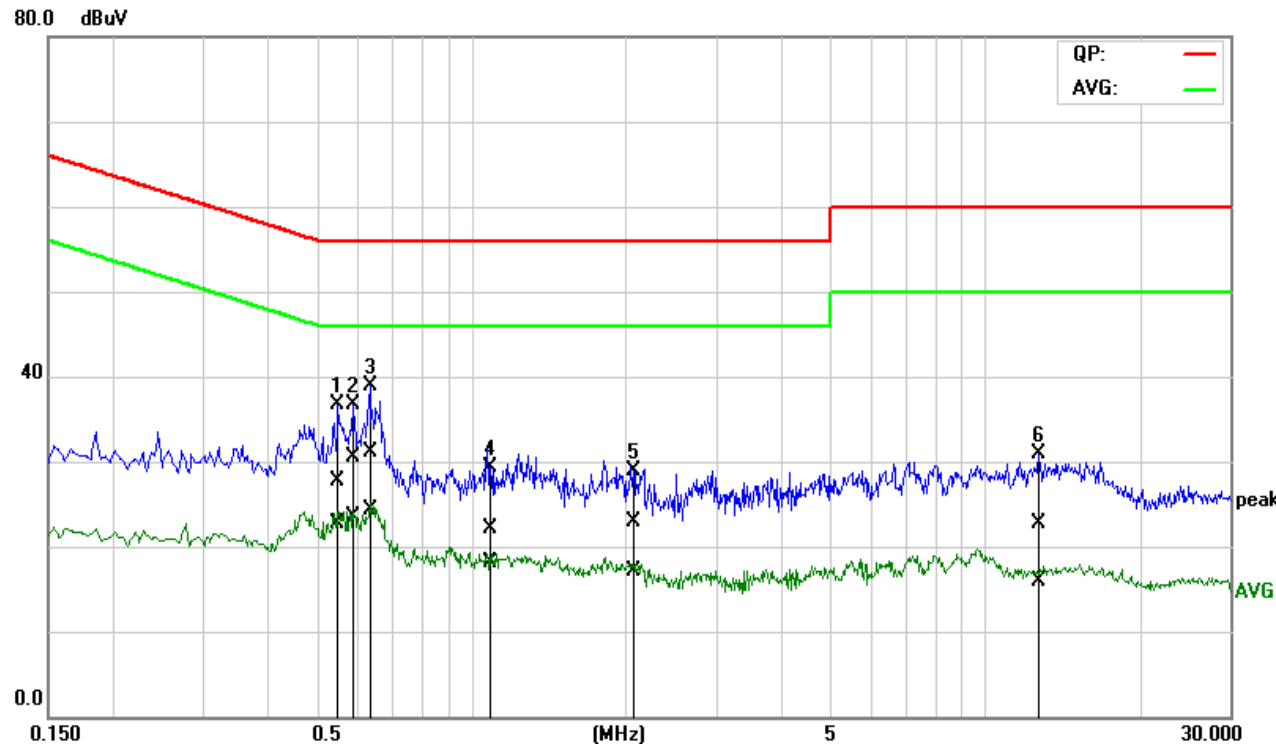
80.0 dBuV



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.4683	15.41	9.14	19.46	34.87	28.60	56.54	46.54	-21.67	-17.94	Pass
2	0.6027	9.07	3.55	19.47	28.54	23.02	56.00	46.00	-27.46	-22.98	Pass
3	1.1306	7.23	2.15	19.50	26.73	21.65	56.00	46.00	-29.27	-24.35	Pass
4	2.0166	6.89	0.78	19.54	26.43	20.32	56.00	46.00	-29.57	-25.68	Pass
5	2.8552	5.87	-0.49	19.57	25.44	19.08	56.00	46.00	-30.56	-26.92	Pass
6	10.0365	9.81	6.91	19.94	29.75	26.85	60.00	50.00	-30.25	-23.15	Pass



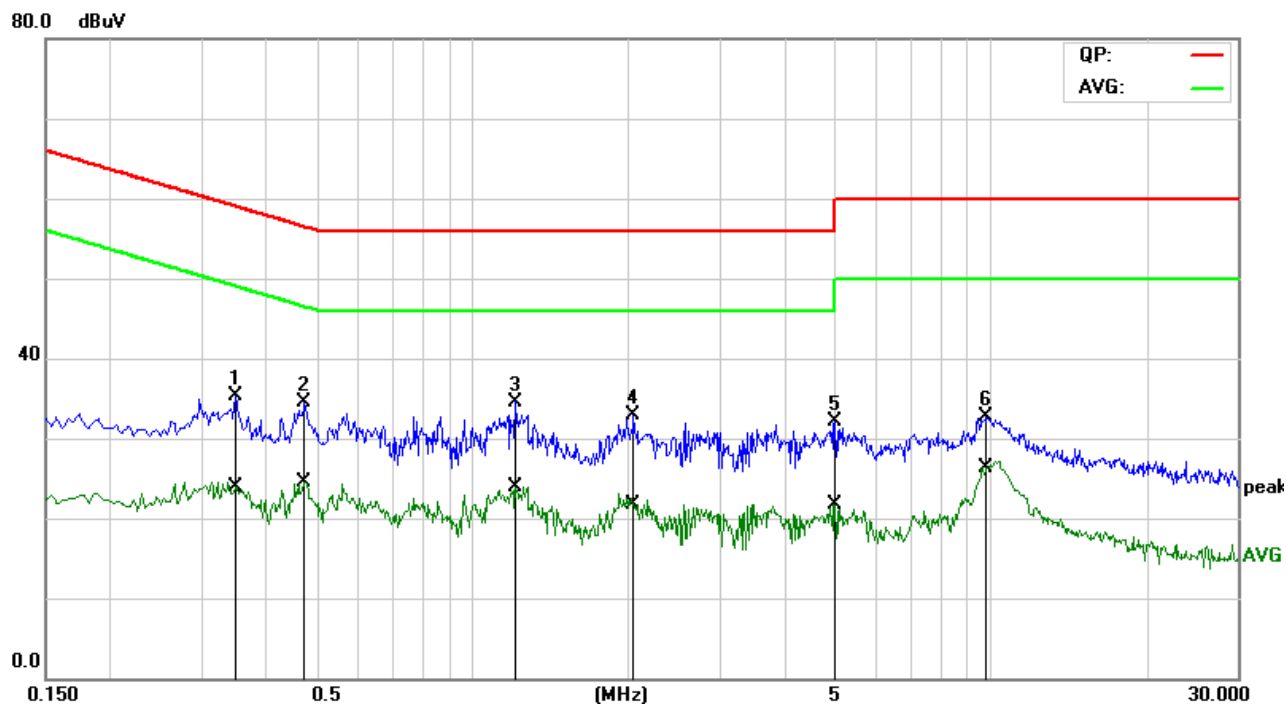
Mode:c; Line:Neutral Line



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.5460	8.20	3.35	19.45	27.65	22.80	56.00	46.00	-28.35	-23.20	Pass
2	0.5924	11.12	4.06	19.45	30.57	23.51	56.00	46.00	-25.43	-22.49	Pass
3*	0.6314	11.71	4.84	19.46	31.17	24.30	56.00	46.00	-24.83	-21.70	Pass
4	1.0877	2.55	-1.44	19.47	22.02	18.03	56.00	46.00	-33.98	-27.97	Pass
5	2.0686	3.32	-2.42	19.52	22.84	17.10	56.00	46.00	-33.16	-28.90	Pass
6	12.7319	2.64	-4.16	20.02	22.66	15.86	60.00	50.00	-37.34	-34.14	Pass



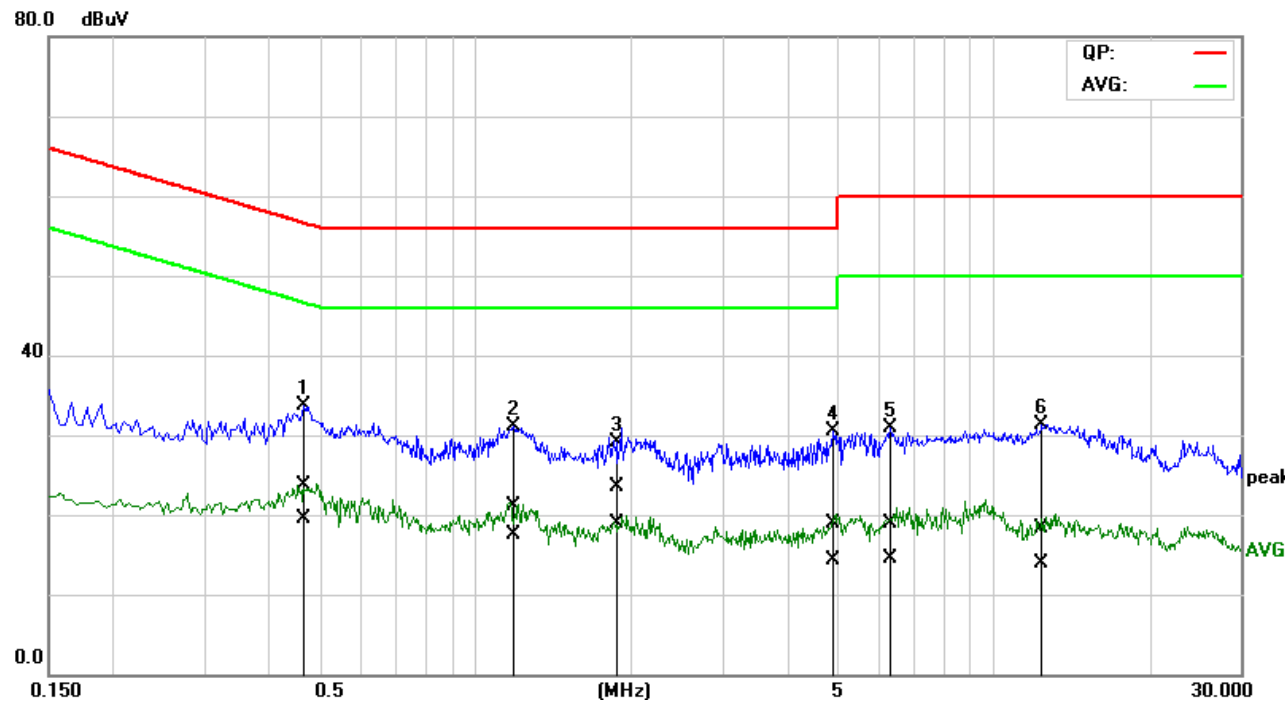
Mode d; Line:Live Line



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1*	0.3454	5.05	0.83	19.43	24.48	20.26	59.07	49.07	-34.59	-28.81	Pass
2	0.4714	4.15	0.11	19.46	23.61	19.57	56.49	46.49	-32.88	-26.92	Pass
3	1.2881	2.82	-0.88	19.50	22.32	18.62	56.00	46.00	-33.68	-27.38	Pass
4	1.9729	0.58	-2.79	19.53	20.11	16.74	56.00	46.00	-35.89	-29.26	Pass
5	4.9956	-0.63	-5.40	19.69	19.06	14.29	56.00	46.00	-36.94	-31.71	Pass
6	9.8047	-1.36	-5.97	19.93	18.57	13.96	60.00	50.00	-41.43	-36.04	Pass



Mode d; Line:Neutral Line



No.	Frequency	QuasiPeak reading	Average reading	Correction factor	QuasiPeak result	Average result	QuasiPeak limit	Average limit	QuasiPeak margin	Average margin	Remark
	(MHz)	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.4618	4.26	0.16	19.44	23.70	19.60	56.66	46.66	-32.96	-27.06	Pass
2	1.1912	1.64	-2.00	19.48	21.12	17.48	56.00	46.00	-34.88	-28.52	Pass
3*	1.8774	3.93	-0.66	19.51	23.44	18.85	56.00	46.00	-32.56	-27.15	Pass
4	4.9020	-0.79	-5.35	19.67	18.88	14.32	56.00	46.00	-37.12	-31.68	Pass
5	6.3444	-0.76	-5.34	19.75	18.99	14.41	60.00	50.00	-41.01	-35.59	Pass
6	12.4134	-1.67	-6.16	20.01	18.34	13.85	60.00	50.00	-41.66	-36.15	Pass

7.2 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.231(c)
Test Method: ANSI C63.10 (2013) Section 6.9
Limit:

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

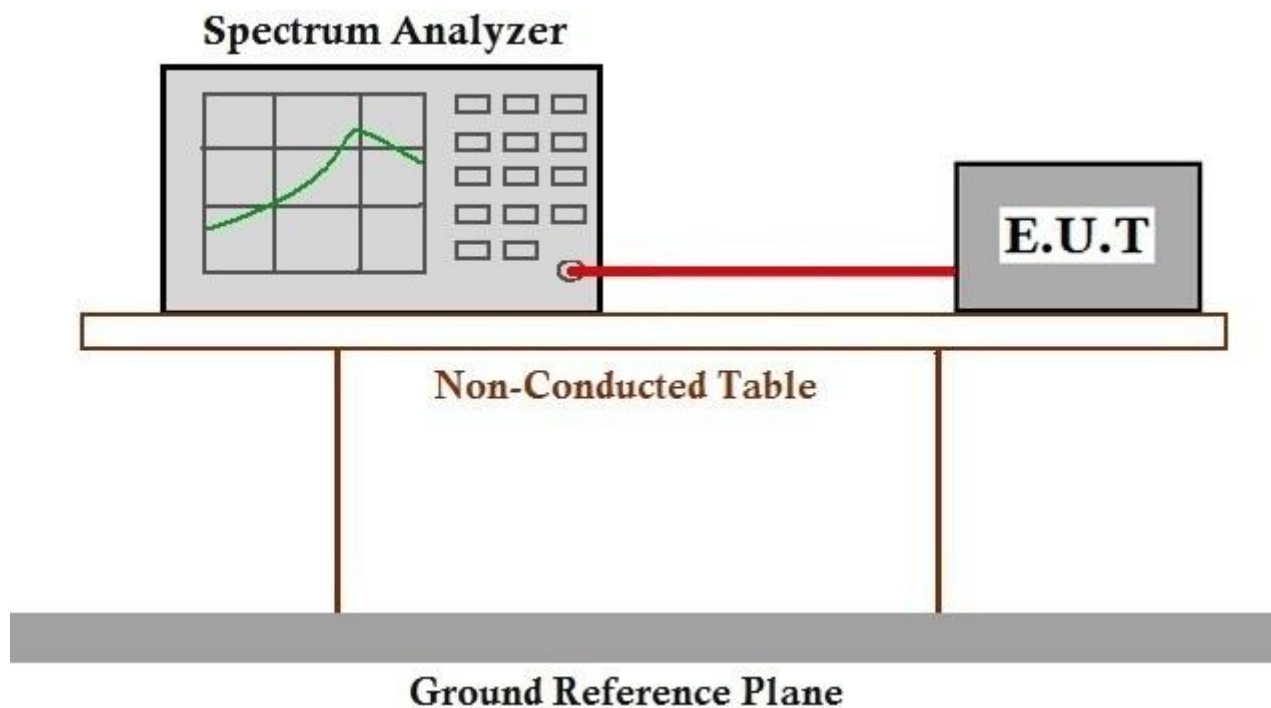
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode c:TX mode_Keep the EUT in transmitting with modulation mode. (433 modular 1)
d:TX mode_Keep the EUT in transmitting with modulation mode. (433 modular 2)

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

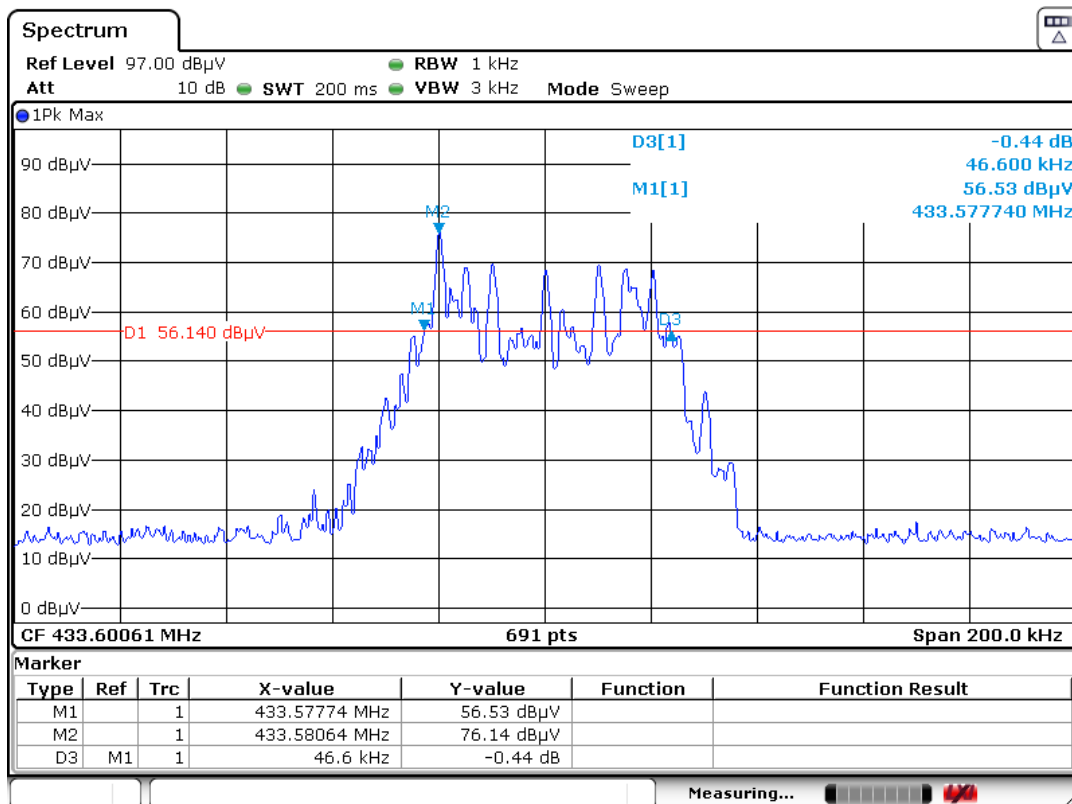


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Branch

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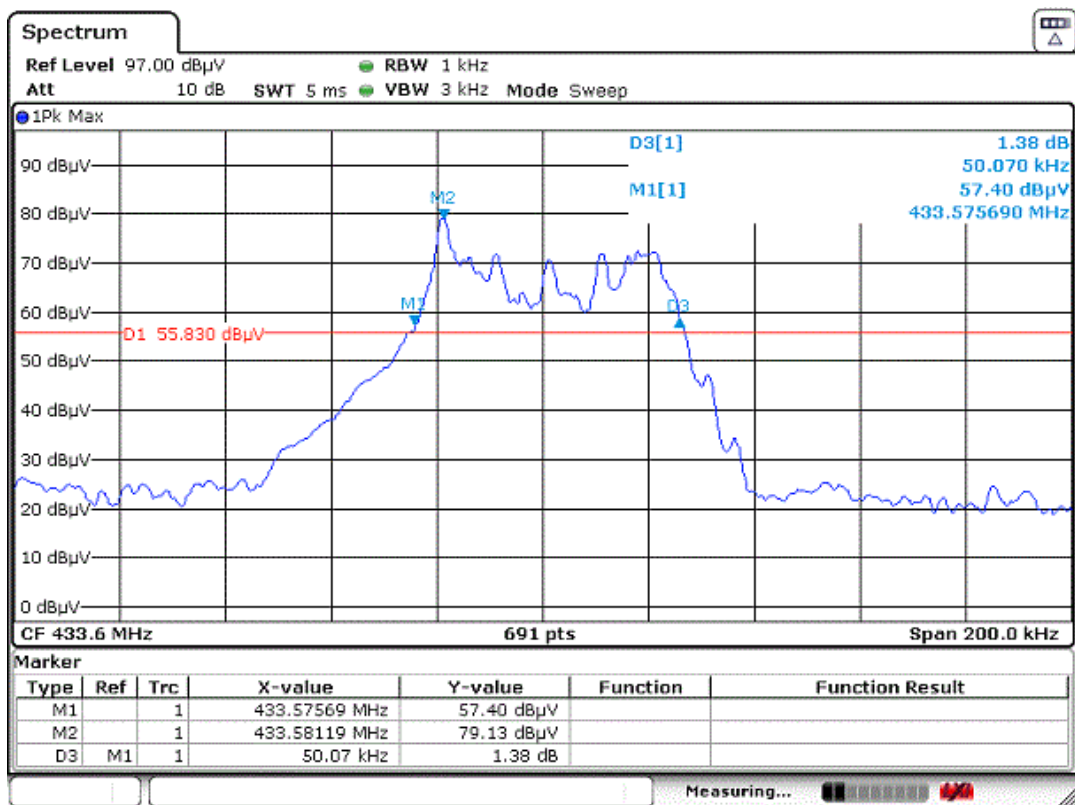
Mode	Frequency(MHz)	20dB bandwidth (kHz)	Limit (kHz)	Results
c	433.60	46.6	1084	Pass
d	433.60	50.07	1084	Pass

Mode c





Mode d



7.3 Dwell Time

Test Requirement 47 CFR Part 15, Subpart C 15.231(a)
Test Method: ANSI C63.10 (2013) Section 7.8.4
Limit:

Device type	Limit
Manually operated transmitter	The switch automatically deactivate the transmitter within not more than 5 seconds of being released
Automatically activated transmitter	Cease transmission within 5 seconds after activation
Periodic transmissions to determine system integrity of transmitters used in security or safety applications	The total transmission time does not exceed 2 seconds per hour

7.3.1 E.U.T. Operation

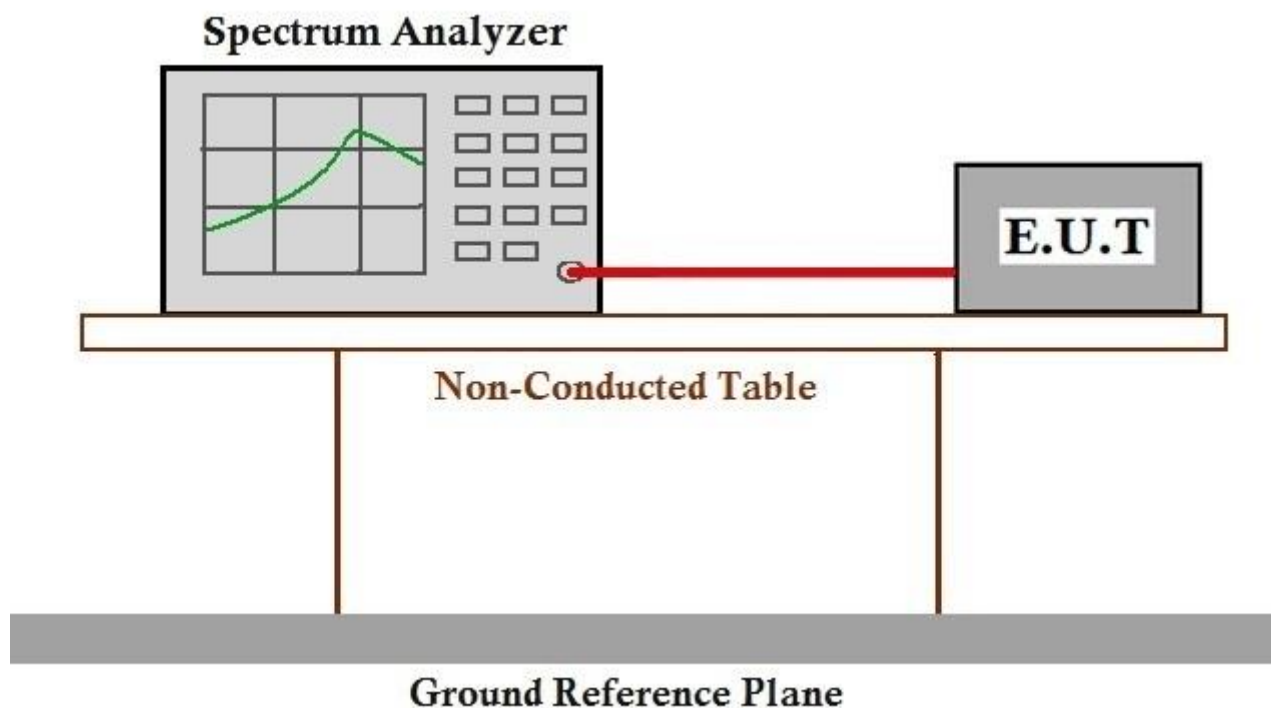
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7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

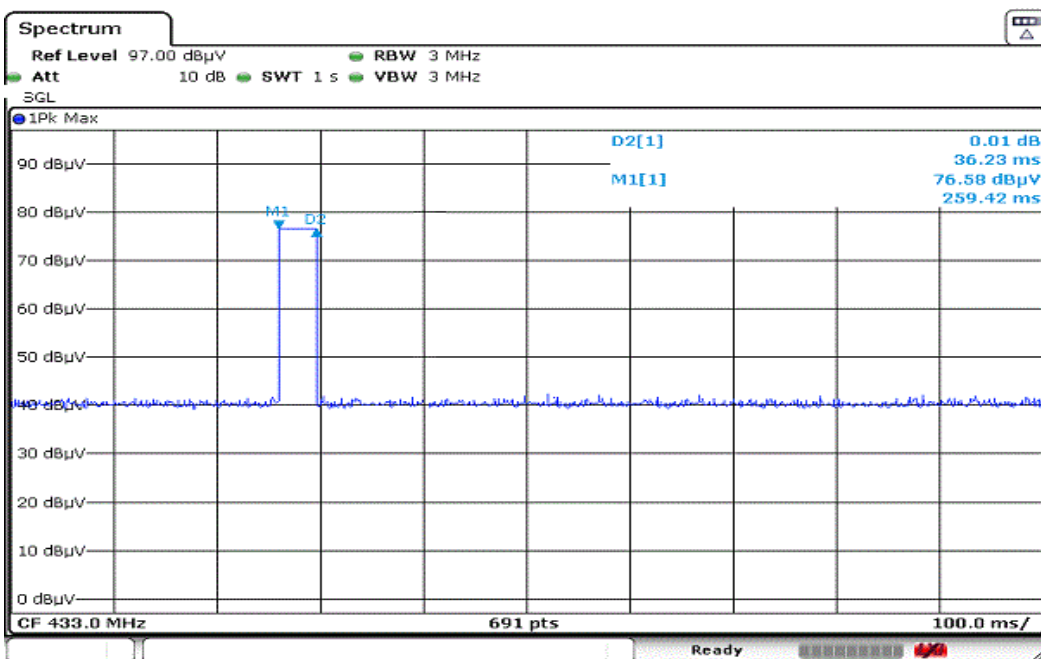
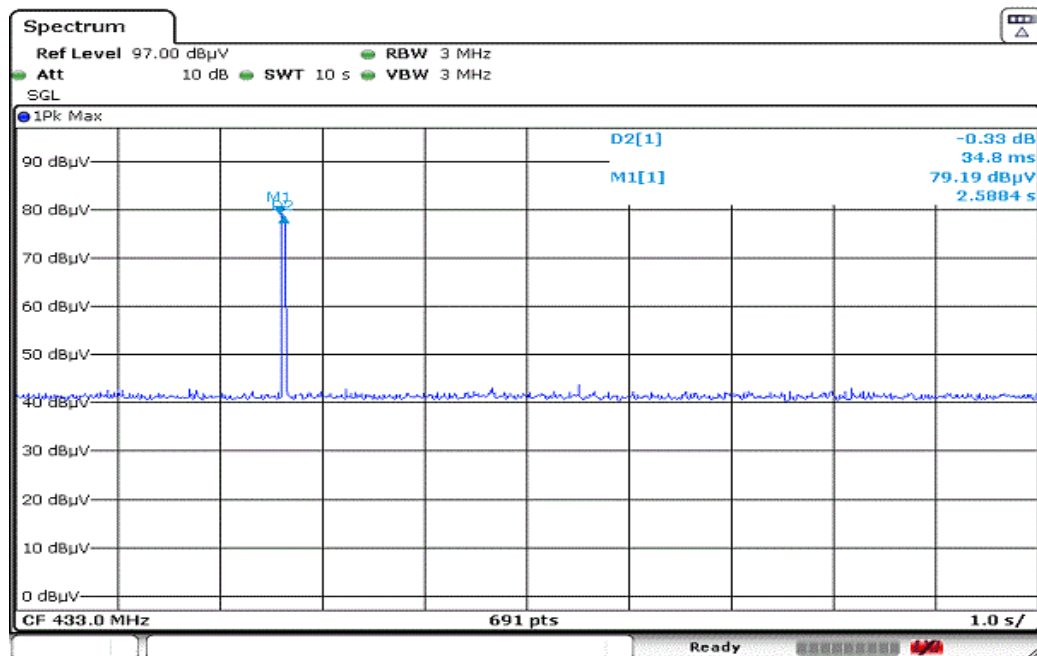


Measurement Data:

Mode	Test item	Limit (s)	Results
c	Transmission Duration	≤5s	Pass
d	Transmission Duration	≤5s	Pass

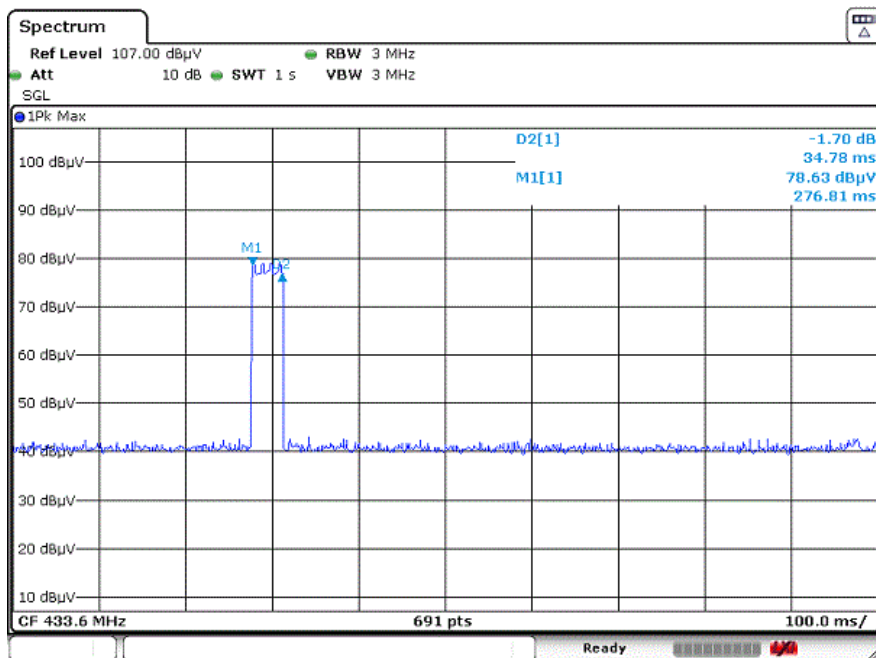
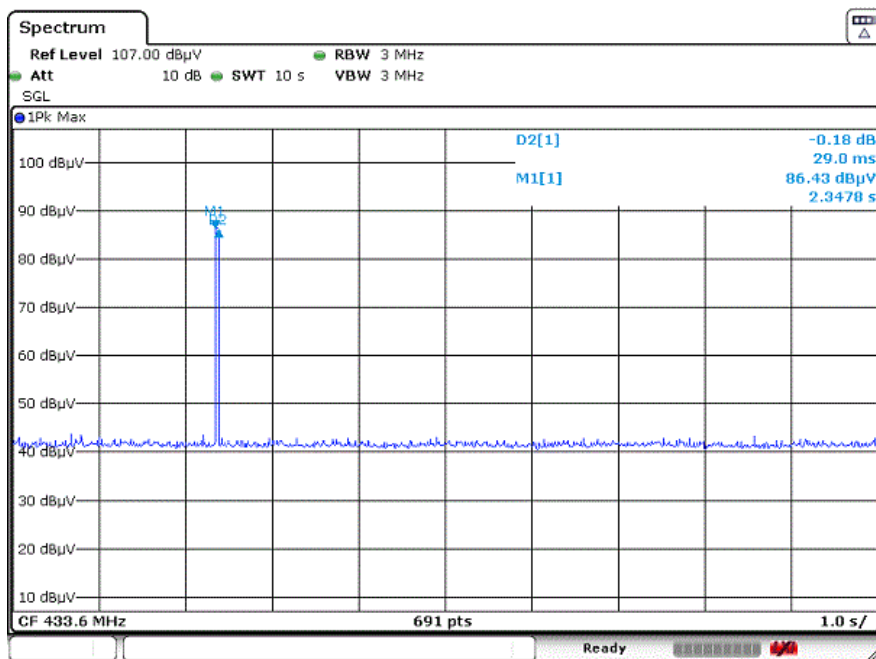
Test plot as follows:

Mode c





Mode d





7.4 Field Strength of the Fundamental Signal

Test Requirement 47 CFR Part 15.231 (b)
Test Method: ANSI C63.10 (2013) Section 6.5
Limit:

Fundamental frequency(MHz)	Field strength of fundamental(microvolts/meter)	Field strength of spurious emissions(microvolts/meter)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750	125 to 375
174-260	3750	375
260-470	3750 to 12500	375 to 1250
Above 470	12500	1250

Remark: the emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz 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.

Limit:	Frequency	Limit (dBuV/m @3m)	Remark
(Field strength of the fundamental signal)	433.09 - 434.61MHz	80.8	Average Value
		100.8	Peak Value

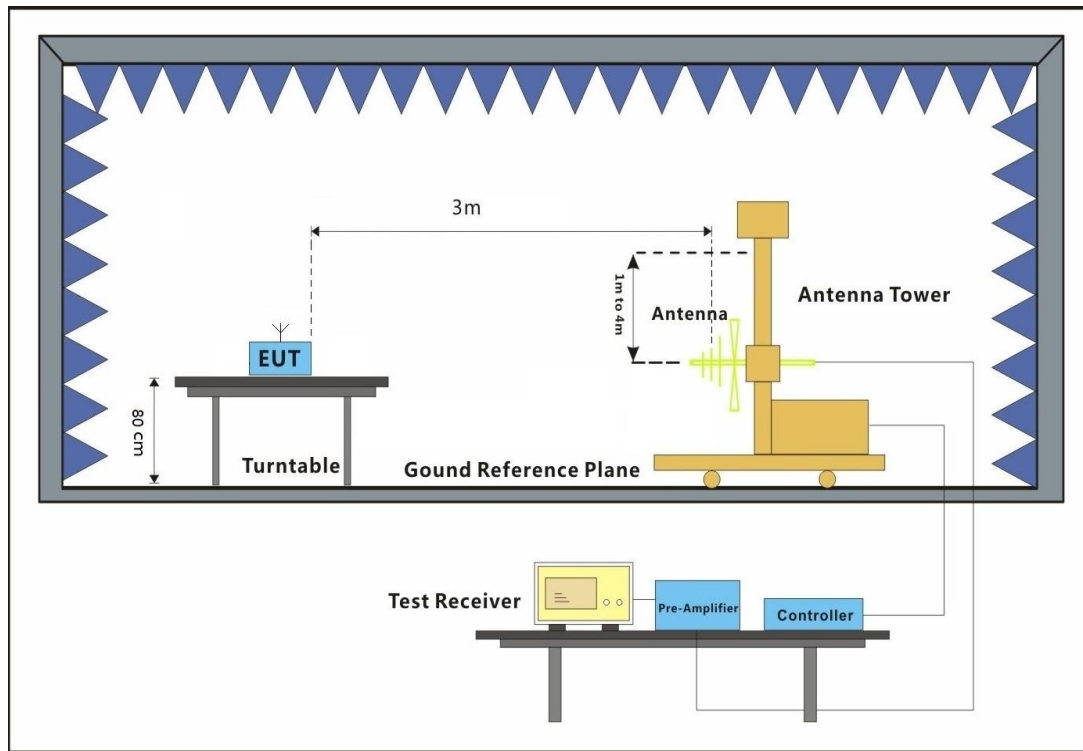
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode c:TX mode_Keep the EUT in transmitting with modulation mode. (433 modular 1)
d:TX mode_Keep the EUT in transmitting with modulation mode. (433 modular 2)

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

- 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.
- 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.
- 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.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.
- The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
- This product is a floor product. It is placed on the ground during normal use. Because the product size is too large, so use the 433MHz module to test.

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



Mode c

Test channel	Freq. (MHz)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
Channel 1	433.6	86.44	100.8	-14.36	Peak	Vertical
		94.45	100.8	-6.35	Peak	Horizontal
		69.43	80.8	-11.37	AVG	Vertical
		78.44	80.8	-2.36	AVG	Horizontal

Mode d

Test channel	Freq. (MHz)	Result Level (dB μ V/m)	Limit Line (dB μ V/m)	Over Limit (dB)	Detector	Polarization
Channel 1	433.6	86.59	100.8	-14.21	Peak	Vertical
		90.95	100.8	-9.85	Peak	Horizontal
		74.54	80.8	-6.26	AVG	Vertical
		78.91	80.8	-1.89	AVG	Horizontal



7.5 Radiated Emissions

Test frequency range: 9KHz – 6GHz

Test Requirement: 47 CFR Part 15.209 15.231(b)

Test Method: ANSI C63.10 (2013) Section 6.4&6.5&6.6

Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.015MHz	Quasi-peak	200Hz	1KHz	Quasi-peak
	0.015MHz-30MHz	Quasi-peak	9kHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit: (Spurious Emissions)	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	Quasi-peak	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	Quasi-peak	30
	1.705MHz-30MHz	30	-	Quasi-peak	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
			74.0	Peak	3

7.5.1 E.U.T. Operation

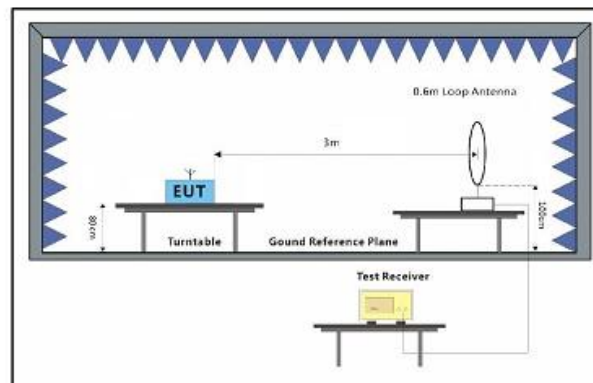
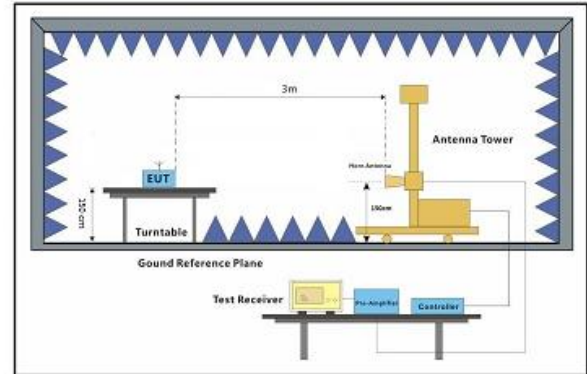
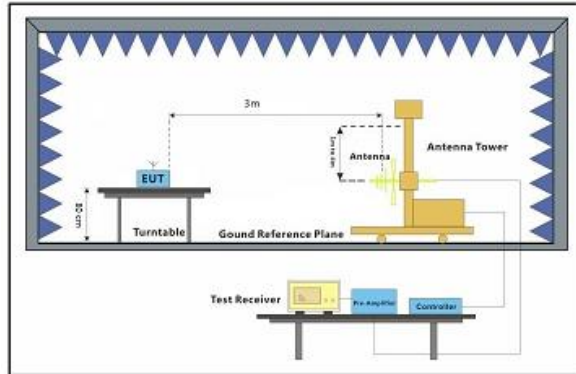
Operating Environment:

Temperature: 22 °C Humidity: 50 % RH Atmospheric Pressure: 1002 mbar

Test mode c:TX mode_Keep the EUT in transmitting with modulation mode. (433 modular 1)

d:TX mode_Keep the EUT in transmitting with modulation mode. (433 modular 2)

7.5.2 Test Setup Diagram





7.5.3 Measurement Procedure and Data

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. 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.
- g. The radiation measurements are performed in X, Y, Z axis positioning. And found the Z axis positioning which it is worse case, only the test worst case mode is recorded in the report.
- h. Scan from 9kHz to 6GHz, 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.

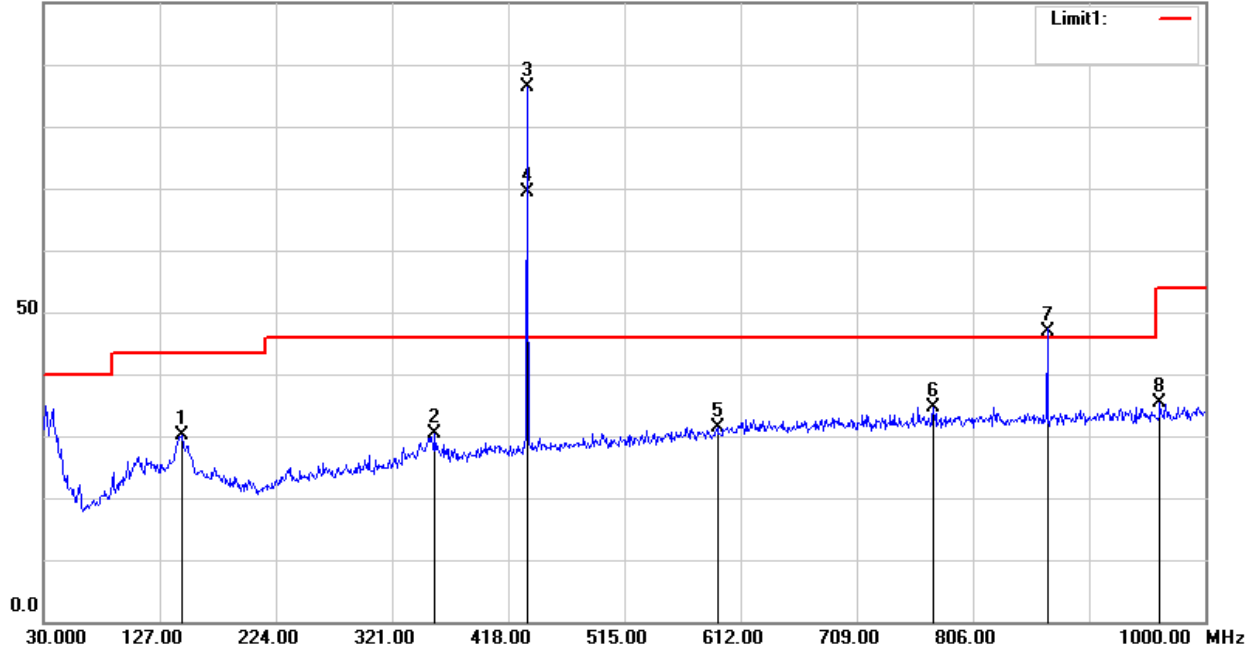


Below 1GHz

Mode c

Vertical:

100.0 dBuV/m

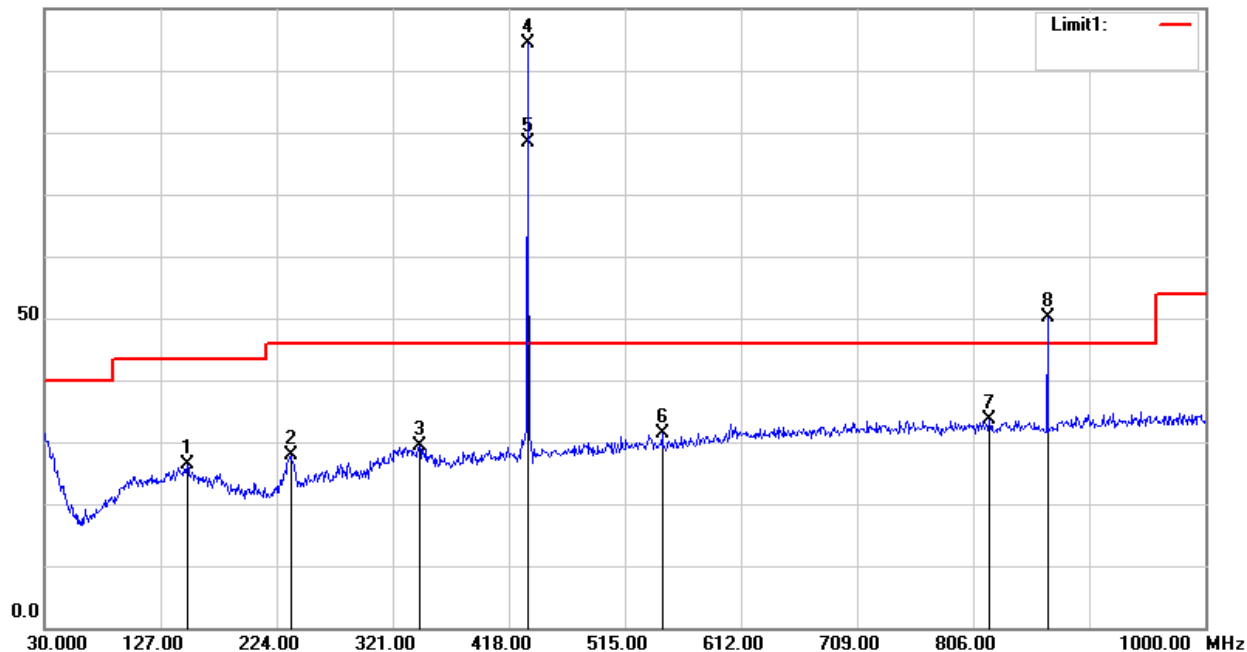


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	145.4300	10.16	20.06	30.22	43.50	-13.28	QP
2	356.8900	7.49	22.92	30.41	46.00	-15.59	QP
3	433.5200	62.15	24.29	86.44	100.8	-14.36	peak
4	433.5200	45.14	24.29	69.43	80.8	-11.37	AVG
5	592.6000	4.82	26.49	31.31	46.00	-14.69	QP
6	773.0200	6.57	28.03	34.60	46.00	-11.40	QP
7	868.0800	18.28	28.57	46.85	60.83	-13.98	QP
8	962.1700	6.05	29.21	35.26	54.00	-18.74	QP



Horizontal:

100.0 dBuV/m



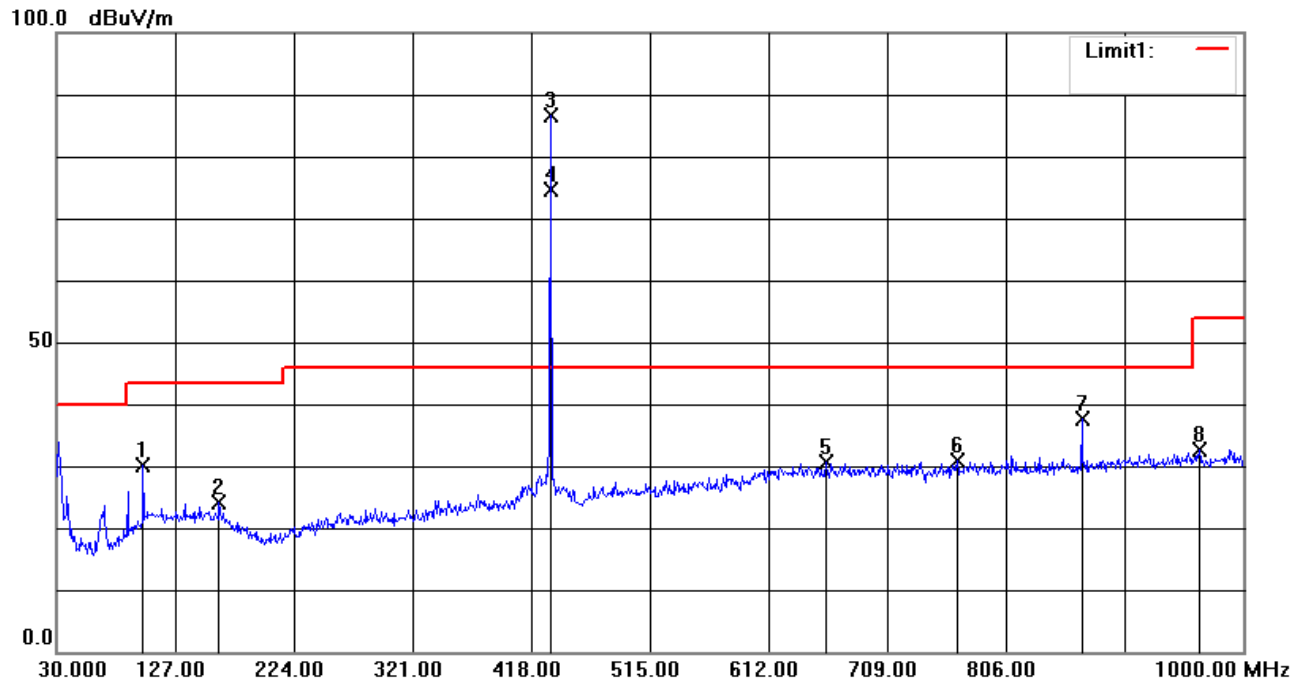
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	149.3100	6.08	20.18	26.26	43.50	-17.24	QP
2	235.6400	9.32	18.56	27.88	46.00	-18.12	QP
3	343.3100	6.80	22.50	29.30	46.00	-16.70	QP
4	433.5200	70.16	24.29	94.45	100.8	-6.35	peak
5	433.5200	54.15	24.29	78.44	80.8	-2.36	AVG
6	546.0400	5.51	25.85	31.36	46.00	-14.64	QP
7	819.5800	5.25	28.31	33.56	46.00	-12.44	QP
8	868.0800	21.65	28.57	50.22	60.83	-10.61	QP



Below 1GHz

Mode d

Vertical:

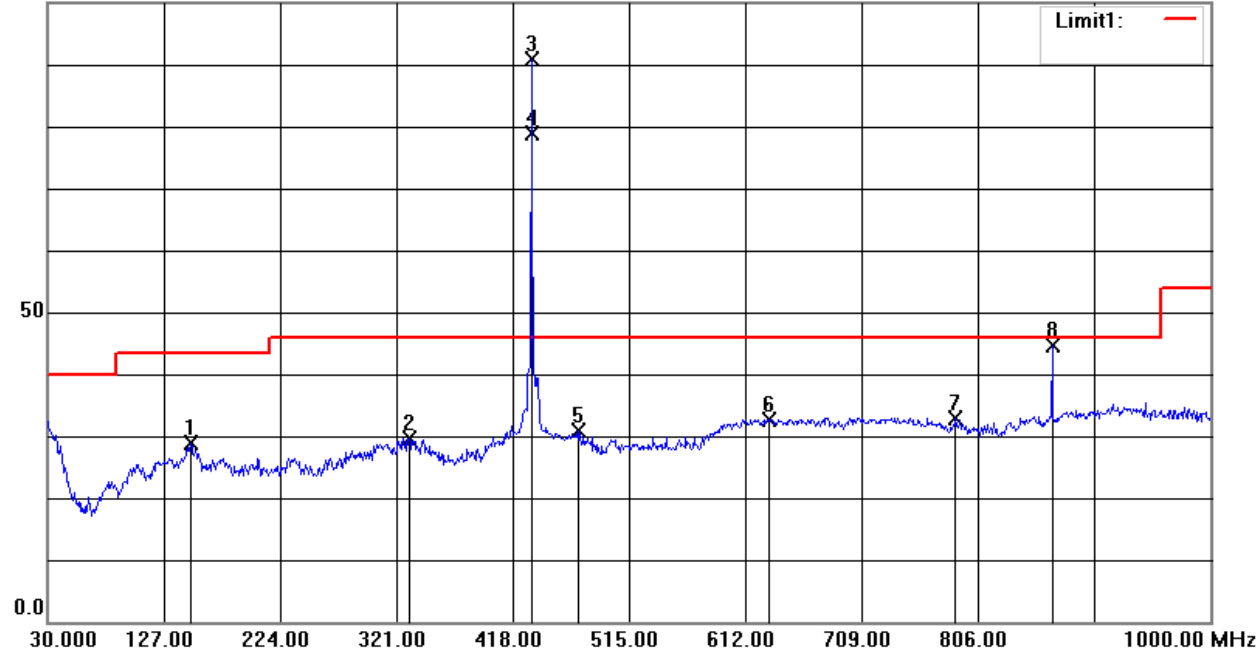


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	100.8100	11.61	18.54	30.15	43.50	-13.35	QP
2	162.8900	4.88	19.14	24.02	43.50	-19.48	QP
3	433.5200	62.52	24.07	86.59	100.8	-14.21	peak
4	433.6000	50.47	24.07	74.54	80.8	-6.26	AVG
5	658.5600	3.52	27.18	30.70	46.00	-15.30	QP
6	766.2300	3.23	27.59	30.82	46.00	-15.18	QP
7	868.0800	9.29	28.29	37.58	46.00	-8.42	QP
8	964.1100	3.45	29.27	32.72	54.00	-21.28	QP



Horizontal:

100.0 dBuV/m



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	149.3100	8.58	20.18	28.76	43.50	-14.74	QP
2	331.6700	7.71	22.00	29.71	46.00	-16.29	QP
3	433.5200	66.66	24.29	90.95	100.8	-9.85	peak
4	433.6000	54.62	24.29	78.91	80.8	-1.89	AVG
5	473.2900	6.08	24.83	30.91	46.00	-15.09	QP
6	632.3700	5.81	26.94	32.75	46.00	-13.25	QP
7	787.5700	4.79	28.12	32.91	46.00	-13.09	QP
8	868.0800	16.15	28.57	44.72	46.00	-1.28	QP



Above 1GHz

Mode c:

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	1715.000	57.48	-17.19	40.29	54.00	-13.71	peak	Vertical
2	2175.000	57.01	-15.97	41.04	54.00	-12.96	peak	Vertical
3	2590.000	56.56	-14.40	42.16	54.00	-11.84	peak	Vertical
4	1450.000	55.09	-17.78	37.31	54.00	-16.69	peak	Horizontal
5	2145.000	54.15	-16.10	38.05	54.00	-15.95	peak	Horizontal
6	2705.000	52.82	-14.15	38.67	54.00	-15.33	peak	Horizontal

Mode d

Mark	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	polarization
1	1200.000	65.44	-29.75	35.69	54.00	-18.31	peak	Vertical
2	1545.000	64.59	-28.25	36.34	54.00	-17.66	peak	Vertical
3	1945.000	63.51	-27.51	36.00	54.00	-18.00	peak	Vertical
4	1400.000	64.36	-28.80	35.56	54.00	-18.44	peak	Horizontal
5	1900.000	63.89	-27.59	36.30	54.00	-17.70	peak	Horizontal
6	2260.000	63.36	-26.08	37.28	54.00	-16.72	peak	Horizontal

Remark:

- 1) 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 Level + Antenna Factor + Cable Factor – Preamplifier Factor
- 2) If Peak Result comply with AV limit, AV Result is deemed to comply with QP limit
- 3) No any other emissions level which are attenuated less than 20dB below the limit. According to 15.31(o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part. Hence there no other emissions have been reported.
- 4) This product is a floor product. It is placed on the ground during normal use. Because the product size is too large, so use the 433MHz module to test.



8 Test Setup Photographs

Refer to the < Test Setup photos-FCC>.

9 EUT Constructional Details

Refer to the < External Photos > & <Internal Photos >.

- End of the Report -