TEST REPORT

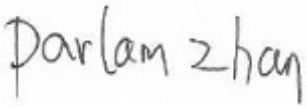
Application No.:	SHEM1904012423CR
FCC ID:	2ADTD-KB8103WIP
Applicant:	Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Applicant:	No.555 Qianmo Road, Binjiang District, Hangzhou 310052, China
Manufacturer:	Hangzhou Hikvision Digital Technology Co., Ltd.
Address of Manufacturer:	No.555 Qianmo 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:	Doorbell Camera
Model No.:	DS-KB8103-WIP, DS-KB8103-WIPUHK, DS-KB8103-WIPCKV, DS-KB8103-WIPUVS, DS-KB8103-WIPKVO, DS-KB8103-WIPHUN ¤
¤	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 E 15.407
Date of Receipt:	2019-04-17
Date of Test:	2019-04-17 to 2019-04-22
Date of Issue:	2019-05-06
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

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.

Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2019-05-06	/

Authorized for issue by:				
				
		Vincent Zhu / Project Engineer		
				
		Parlam Zhan / Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart E 15.407	N/A	47 CFR Part 15, Subpart C 15.203	Customer Declaration
Transmission in the Absence of Data	47 CFR Part 15, Subpart E 15.407	N/A	47 CFR Part 15, Subpart C 15.407 (c)	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 E 15.407	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207 & 15.407 b(6)	Pass
99% Bandwidth	47 CFR Part 15, Subpart E 15.407	KDB 789033 II D	N/A	Pass
26dB Emission bandwidth	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II C 1	47 CFR Part 15, Subpart C 15.407 (a)	Pass
Minimum 6 dB bandwidth (5.725-5.85 GHz band)	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II C 2	47 CFR Part 15, Subpart C 15.407 (e)	Pass
Maximum Conducted output power	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II E	47 CFR Part 15, Subpart C 15.407 (a)	Pass
Peak Power spectrum density	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II F	47 CFR Part 15, Subpart C 15.407 (a)	Pass
Radiated Emissions	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II G	47 CFR Part 15, Subpart C 15.209 & 15.407(b)	Pass
Radiated Emissions which fall in the restricted bands	47 CFR Part 15, Subpart E 15.407	KDB 789033 D02 II G	47 CFR Part 15, Subpart C 15.209 & 15.407(b)	Pass
Frequency Stability	47 CFR Part 15, Subpart E 15.407	ANSI C63.10 (2013) Section 6.8	47 CFR Part 15, Subpart C 15.407 (g)	Pass

N/A: Not applicable

Declaration of EUT Family Grouping:

Note: There are series models mentioned in this report, and they are the identical in electrical and electronic characters. Only the model DS-KB8103-WIP was tested since their differences were the model number and appearance.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	16~24V AC or POE(36-57V)
Test voltage:	AC 120V 60Hz for POE & AC 24V
Antenna Gain	2.9 dBi
Antenna Type	PCB Antenna
Operation Frequency:	802.11a/n(HT20)/ac(HT20): 5745MHz-5825MHz 802.11n(HT40)/ac(HT40): 5755MHz-5795MHz 802.11ac(HT80): 5775MHz
Modulation Technique:	OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK) Remark: 256QAM for 802.11 ac only
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0-7 802.11ac: MCS0-9
Number of Channel:	802.11 a/n(HT20)/ac(HT20): 5 Channel 149, 153, 157, 161, 165 802.11 n(HT40)/ac(HT40): 2 Channel 151, 159 802.11 ac(HT80): 1 Channel 155

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
PoE Adapter	PowerDsine	PD-9001GR/AC	/
Laptop	Lenovo	ThinkPad X100e	/
SecureCRT	VanDyke	V 6.2.0	/
Serial port adapter plate	/	Test Plate 3	/

4.3 Power level setting using in test:

Band	802.11 a	802.11 n (HT20)	802.11 n (HT40)	802.11 ac (VHT20)	802.11 ac (VHT40)	802.11 ac (VHT80)
NII 3	15	14	12	13	12	11

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	±8.4 x 10-8
2	Timeout	±2s
3	Duty cycle	±0.37%
4	Occupied Bandwidth	±3%
5	RF conducted power	±0.6dB
6	RF power density	±2.84dB
7	Conducted Spurious emissions	±0.75dB
8	RF Radiated power	±4.6dB (Below 1GHz)
		±4.1dB (Above 1GHz)
9	Radiated Spurious emission test	±4.2dB (Below 30MHz)
		±4.4dB (30MHz-1GHz)
		±4.8dB (1GHz-18GHz)

		±5.2dB (Above 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.

4.5 Test Location

All tests were performed at:

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

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

4.6 Test Facility

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

• CNAS (No. CNAS L0599)

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. 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.

• NVLAP (Certificate No. 201034-0)

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program(NVLAP). Certificate No. 201034-0.

• FCC –Designation Number: CN5033

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN5033. Test Firm Registration Number: 479755.

• Innovation, Science and Economic Development Canada

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

IC Registration No.: 8617A-1. CAB identifier: CN0020.

• VCCI (Member No.: 3061)

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4.7 Deviation from Standards

None

4.8 Abnormalities from Standard Conditions

None

5 Equipment List

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Conducted Emission at AC Power Line					
EMI test receiver	R&S	ESR7	SHEM162-1	2018-12-20	2019-12-19
LISN	Schwarzbeck	NSLK8127	SHEM061-1	2018-12-20	2019-12-19
LISN	EMCO	3816/2	SHEM019-1	2018-12-20	2019-12-19
Pulse limiter	R&S	ESH3-Z2	SHEM029-1	2018-12-20	2019-12-19
CE test Cable	/	CE01	/	2018-12-26	2019-12-25
Conducted Test					
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2018-12-20	2019-12-19
Spectrum Analyzer	Agilent	N9020A	SHEM181-1	2018-08-13	2019-08-12
Signal Generator	R&S	SMR20	SHEM006-1	2018-08-13	2019-08-12
Signal Generator	Agilent	N5182A	SHEM182-1	2018-08-13	2019-08-12
Communication Tester	R&S	CMW270	SHEM183-1	2018-08-13	2019-08-12
Switcher	Tonscend	JS0806	SHEM184-1	2018-08-13	2019-08-12
Power Sensor	Keysight	U2021XA * 4	SHEM184-1	2018-08-13	2019-08-12
Splitter	Anritsu	MA1612A	SHEM185-1	/	/
Coupler	e-meca	803-S-1	SHEM186-1	/	/
High-low Temp Cabinet	Suzhou Zhihe	TL-40	SHEM087-1	2017-09-25	2020-09-24
AC Power Stabilizer	WOCEN	6100	SHEM045-1	2018-12-26	2019-12-25
DC Power Supply	MCN	MCH-303A	SHEM210-1	2018-12-26	2019-12-25
Conducted test Cable	/	RF01~RF04	/	2018-12-26	2019-12-25
Radiated Test					
EMI test Receiver	R&S	ESU40	SHEM051-1	2018-12-20	2019-12-19
Spectrum Analyzer	R&S	FSP-30	SHEM002-1	2018-12-20	2019-12-19
Loop Antenna (9kHz-30MHz)	Schwarzbeck	FMZB1519	SHEM135-1	2017-04-10	2020-04-09
Antenna (25MHz-2GHz)	Schwarzbeck	VULB9168	SHEM048-1	2017-02-28	2020-02-27
Antenna (25MHz-3GHz)	Schwarzbeck	HL562	SHEM010-1	2017-02-28	2020-02-27
Horn Antenna (1-8GHz)	Schwarzbeck	HF906	SHEM009-1	2017-10-24	2020-10-23
Horn Antenna (1-18GHz)	Schwarzbeck	BBHA9120D	SHEM050-1	2017-01-14	2020-01-13
Horn Antenna (14-40GHz)	Schwarzbeck	BBHA 9170	SHEM049-1	2017-12-03	2020-12-02
Pre-amplifier (9KHz-2GHz)	CLAVIIO	BDLNA-0001	SHEM164-1	2018-08-13	2019-08-12
Pre-amplifier (1-18GHz)	CLAVIIO	BDLNA-0118	SHEM050-2	2018-08-13	2019-08-12
High-amplifier (14-40GHz)	Schwarzbeck	10001	SHEM049-2	2018-12-20	2019-12-19
Signal Generator	R&S	SMR40	SHEM058-1	2018-08-13	2019-08-12
Band Filter	LORCH	9BRX-875/X150	SHEM156-1	/	/
Band Filter	LORCH	13BRX-1950/X500	SHEM083-2	/	/
Band Filter	LORCH	5BRX-2400/X200	SHEM155-1	/	/
Band Filter	LORCH	5BRX-5500/X1000	SHEM157-2	/	/
High pass Filter	Wainwright	WHK3.0/18G	SHEM157-1	/	/
High pass Filter	Wainwright	WHKS1700	SHEM157-3	/	/
Semi/Fully Anechoic	ST	11*6*6M	SHEM078-2	2017-07-22	2020-07-21
RE test Cable	/	RE01, RE02, RE06	/	2018-12-26	2019-12-25

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 PCB antenna and no consideration of replacement. The best case gain of the antenna is 2.9dBi.

6.2 Transmission in the Absence of Data

6.2.1 Test Requirement:

47 CFR Part 15, Subpart C 15.407 (c)

6.2.2 Conclusion

Standard Requirement:

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Applicants shall include in their application for equipment authorization a description of how this requirement is met.

EUT Details:

WIFI chip (AW-CM256SM) support automatically discontinue transmission in case of either absence of information to transmit or operational failure, if the chip detect absence of information to transmit or operational failure, it will be automatically shut off.

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 & 15.407 b(6)

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.		

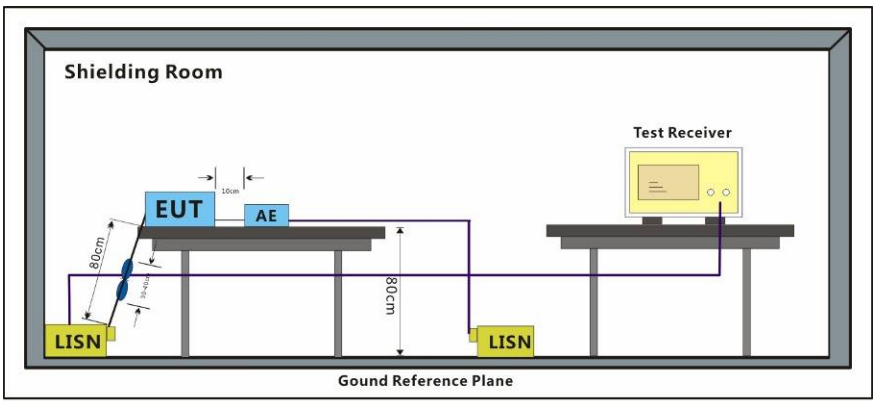
7.1.1 E.U.T. Operation

Operating Environment:

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

Test mode b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

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.

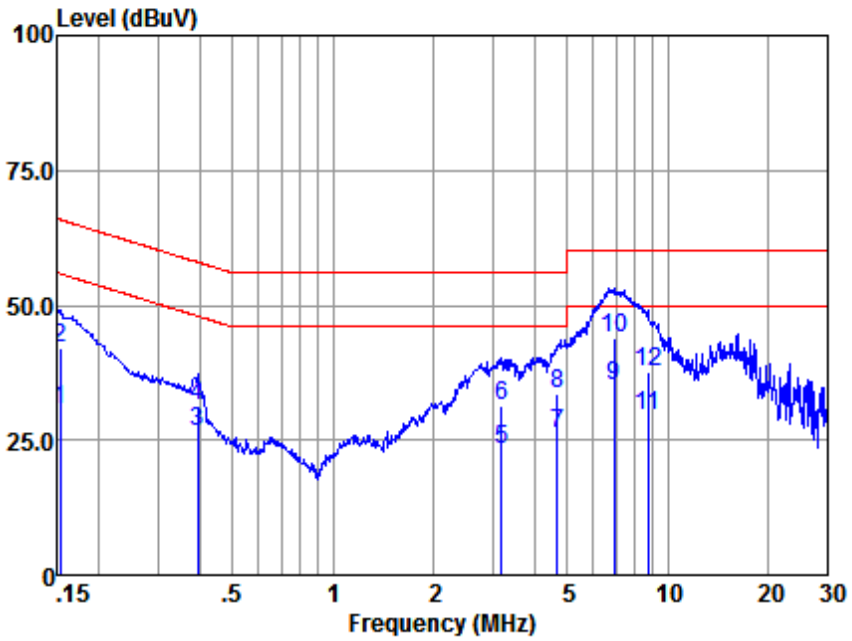
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

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.

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

Mode:b; Line:Live Line

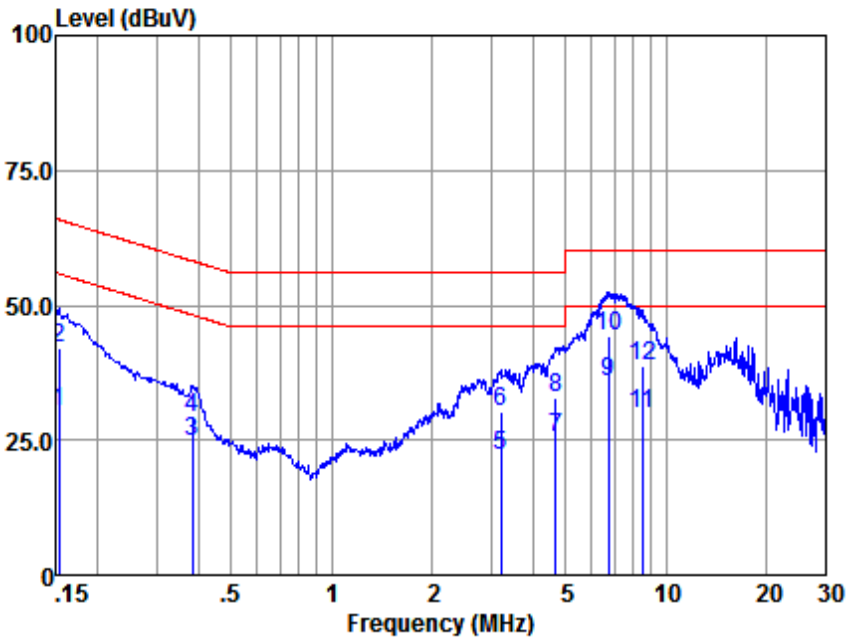


LISN : LINE
EUT/Project No : 2422CR
Test mode : b

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.15	20.47	0.09	10.00	30.56	55.87	-25.31	Average
2	0.15	31.98	0.09	10.00	42.07	65.87	-23.80	QP
3	0.39	16.57	0.08	10.00	26.65	47.99	-21.34	Average
4	0.39	21.23	0.08	10.00	31.31	57.99	-26.68	QP
5	3.19	12.98	0.13	10.30	23.41	46.00	-22.59	Average
6	3.19	20.84	0.13	10.30	31.27	56.00	-24.73	QP
7	4.70	15.64	0.13	10.30	26.07	46.00	-19.93	Average
8	4.70	23.08	0.13	10.30	33.51	56.00	-22.49	QP
9	6.91	24.65	0.19	10.30	35.14	50.00	-14.86	Average
10	6.91	33.46	0.19	10.30	43.95	60.00	-16.05	QP
11	8.73	18.98	0.23	10.30	29.51	50.00	-20.49	Average
12	8.73	27.23	0.23	10.30	37.76	60.00	-22.24	QP

Notes: Emission Level = Read Level +LISN Factor + Cable loss

Mode:b; Line:Neutral Line



LISN : NEUTRAL
EUT/Project No : 2422CR
Test mode : b

	Freq (MHz)	Read level (dBuV)	LISN Factor (dB)	Cable Loss (dB)	Emission Level (dBuV)	Limit (dBuV)	Over Limit (dB)	Remark
1	0.15	20.36	0.07	10.00	30.43	55.87	-25.44	Average
2	0.15	31.81	0.07	10.00	41.88	65.87	-23.99	QP
3	0.38	14.79	0.06	10.00	24.85	48.21	-23.36	Average
4	0.38	18.93	0.06	10.00	28.99	58.21	-29.22	QP
5	3.21	11.63	0.12	10.30	22.05	46.00	-23.95	Average
6	3.21	19.90	0.12	10.30	30.32	56.00	-25.68	QP
7	4.70	14.90	0.14	10.30	25.34	46.00	-20.66	Average
8	4.70	22.35	0.14	10.30	32.79	56.00	-23.21	QP
9	6.73	25.26	0.15	10.30	35.71	50.00	-14.29	Average
10	6.73	33.85	0.15	10.30	44.30	60.00	-15.70	QP
11	8.50	19.38	0.18	10.30	29.86	50.00	-20.14	Average
12	8.50	28.30	0.18	10.30	38.78	60.00	-21.22	QP

Notes: Emission Level = Read Level +LISN Factor + Cable loss

7.2 99% Bandwidth

Test Requirement N/A

Test Method: KDB 789033 II D

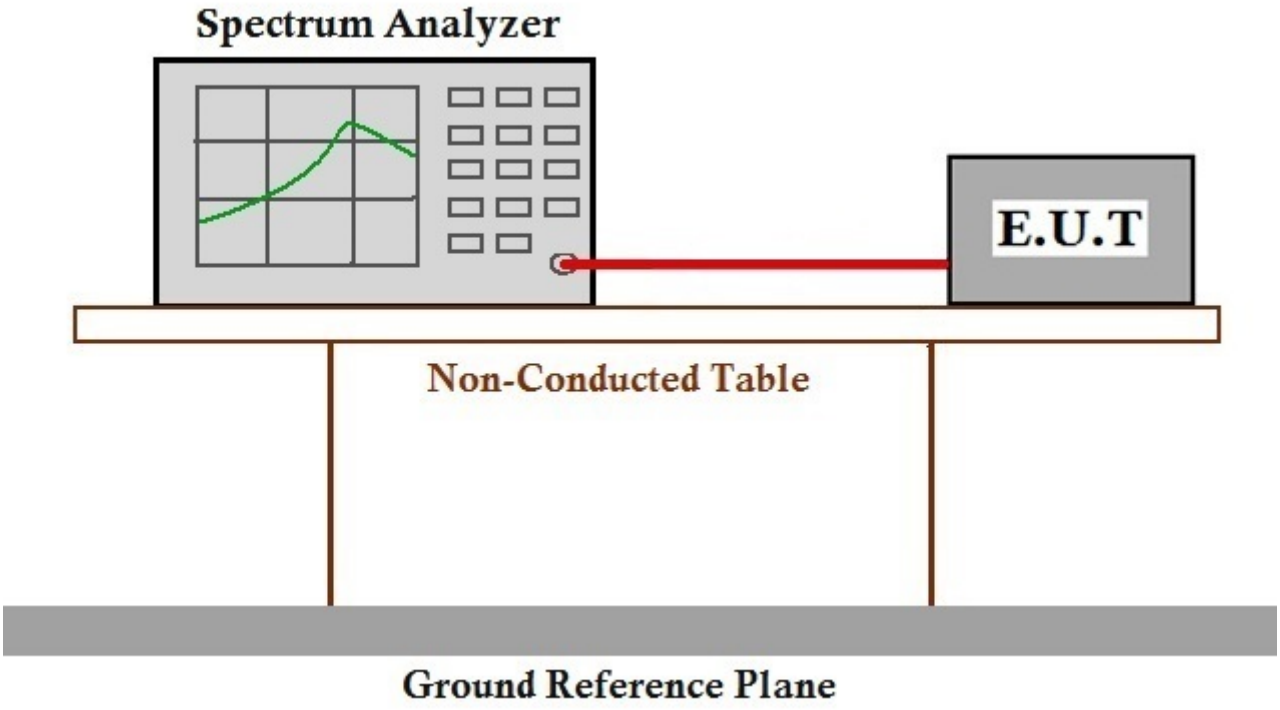
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix B SHEM190401242302

7.3 26dB Emission bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II C 1

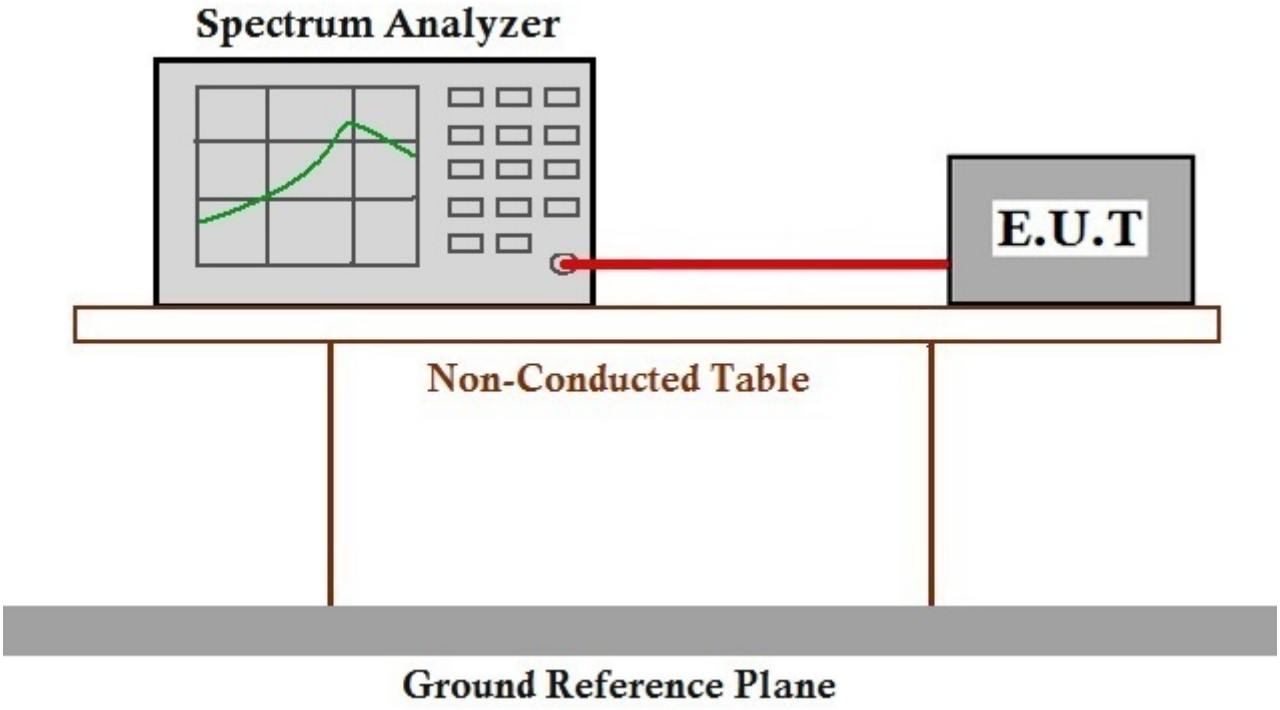
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

The detailed test data see: Appendix B SHEM190401242302

7.4 Minimum 6 dB bandwidth (5.725-5.85 GHz band)

Test Requirement 47 CFR Part 15, Subpart C 15.407 (e)

Test Method: KDB 789033 D02 II C 2

Limit: ⩾500 kHz

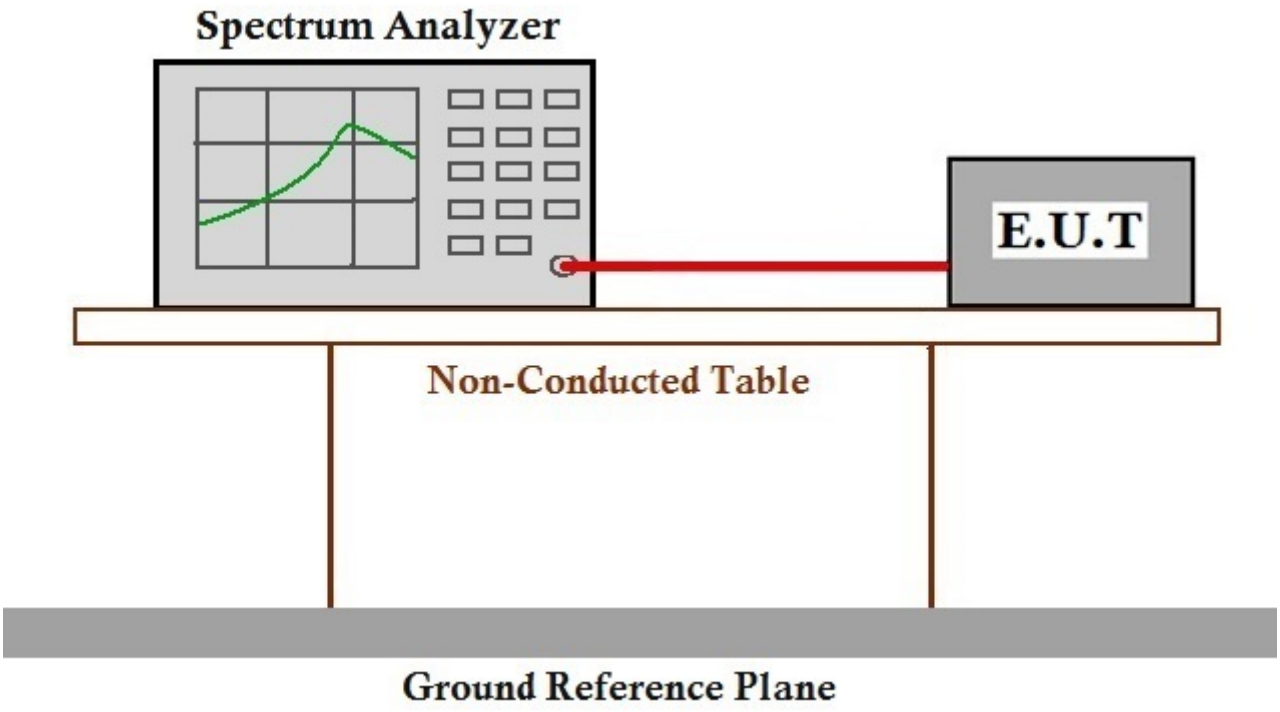
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix B SHEM190401242302

7.5 Maximum Conducted output power

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II E

Limit:

Frequency band(MHz)	Limit
5150-5250	≤1W(30dBm) for master device
	≤250mW(24dBm) for client device
5250-5350	≤250mW(24dBm) for client device or 11dBm+10logB*
5470-5725	≤250mW(24dBm) for client device or 11dBm+10logB*
5725-5850	≤1W(30dBm)
Remark:	* Where B is the 26dB emission bandwidth in MHz. The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

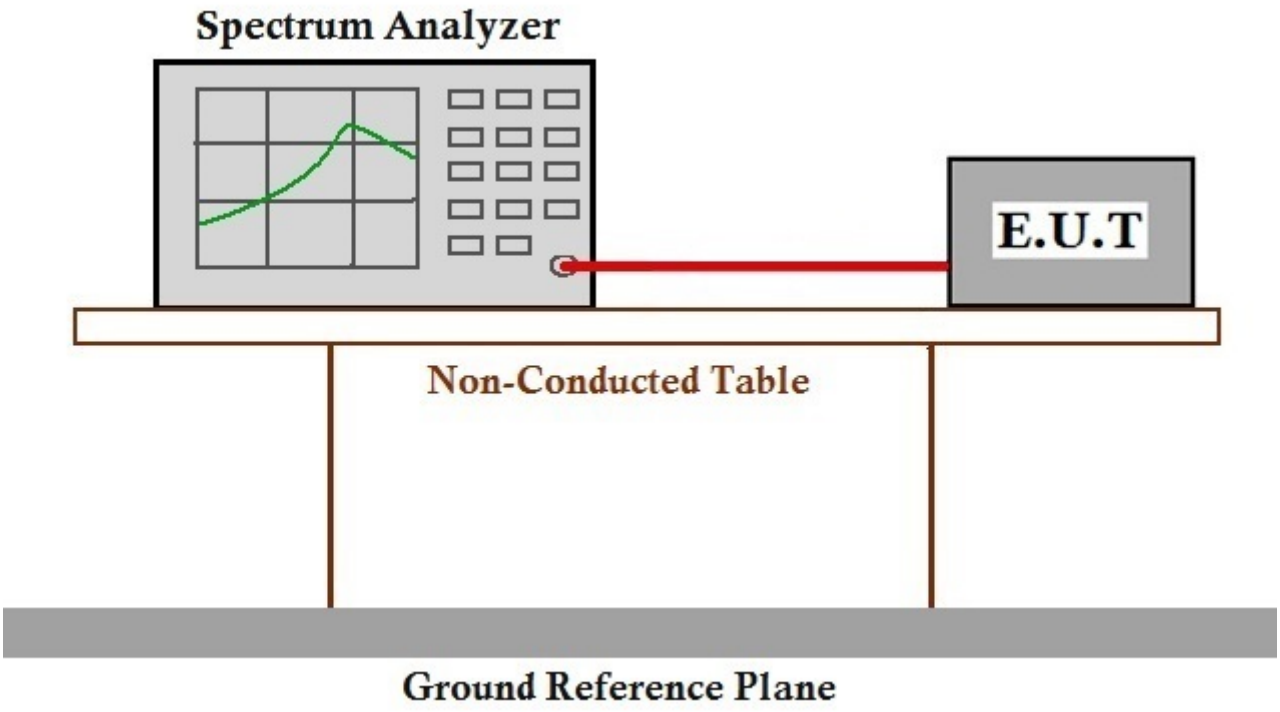
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix B SHEM190401242302

7.6 Peak Power spectrum density

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II F

Limit:

Frequency band(MHz)	Limit
5150-5250	≤17dBm in 1MHz for master device
	≤11dBm in 1MHz for client device
5250-5350	≤11dBm in 1MHz for client device
5470-5725	≤11dBm in 1MHz for client device
5725-5850	≤30dBm in 500 kHz
Remark:	The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test.

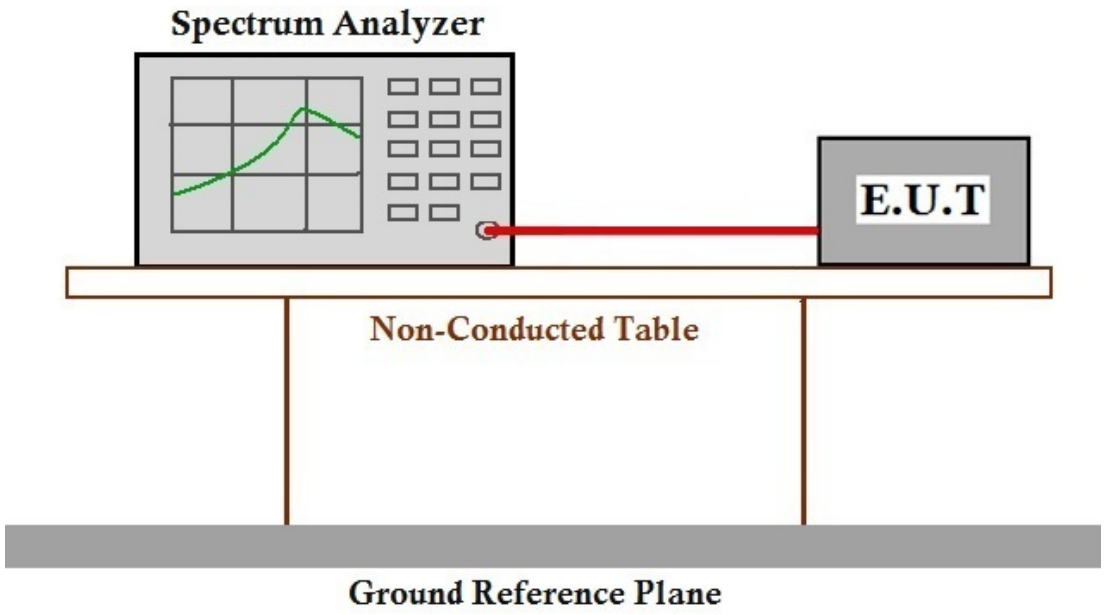
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix B SHEM190401242302

7.7 Radiated Emissions

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.407(b)

Test Method: KDB 789033 D02 II G

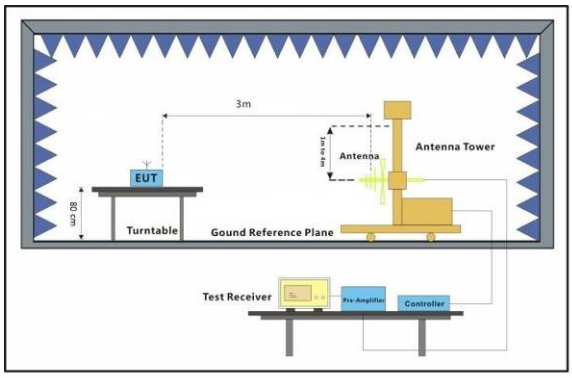
7.7.1 E.U.T. Operation

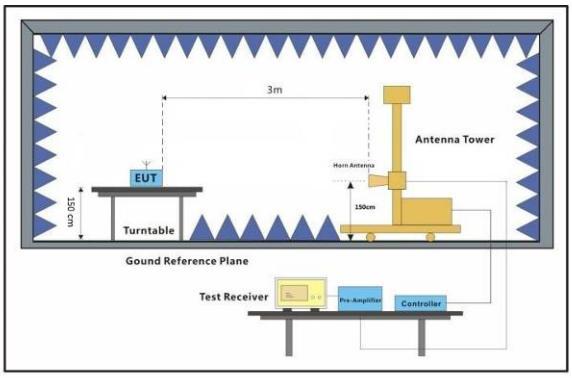
Operating Environment:

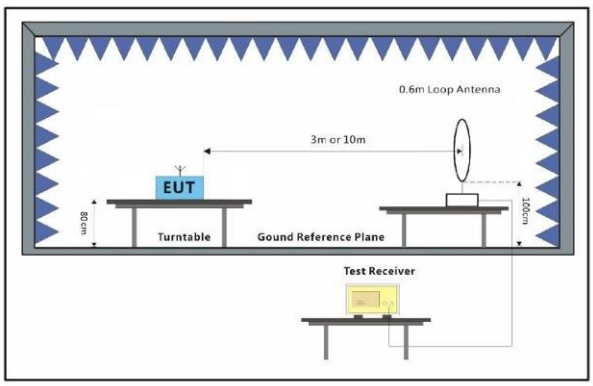
Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.7.2 Test Setup Diagram







7.7.3 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

2. For emission below 1GHz, through the pre-scan found the worst case is the lowest channel of 802.11a. Only the worst case is recorded in the report.

3. Scan from 9kHz to 40GHz, 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. As shown in this section, 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.

This test item be test using two power supply（AC 24V & AC 120V for POE）, and only record the worst data of POE in the report.

Mode:b; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11490	33.37	14.41	47.78	54	-6.22	peak
17235	27.02	22.57	49.59	68.2	-18.61	peak
22980	25.12	24.45	49.57	54	-4.43	peak

Mode:b; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11490	34.14	14.41	48.55	54	-5.45	peak
17235	29.98	22.57	52.55	68.2	-15.65	peak
22980	26.50	24.45	50.95	54	-3.05	peak

Mode:b; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:middle

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11570	34.54	14.25	48.79	54	-5.21	peak
17355	25.29	21.86	47.15	68.2	-21.05	peak
23140	28.15	24.68	52.83	68.2	-15.37	peak

Mode:b; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:middle

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11570	32.59	14.25	46.84	54	-7.16	peak
17355	30.41	21.86	52.27	68.2	-15.93	peak
23140	25.80	24.68	50.48	68.2	-17.72	peak

Mode:b; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11650	31.30	14.06	45.36	54	-8.64	peak
17475	26.60	21.15	47.75	68.2	-20.45	peak
23300	28.91	25.11	54.02	68.2	-14.18	peak

Mode:b; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11650	31.52	14.06	45.58	54	-8.42	peak
17475	29.59	21.15	50.74	68.2	-17.46	peak
23300	22.98	25.11	48.09	68.2	-20.11	peak

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11490	33.06	14.41	47.47	54	-6.53	peak
17235	27.56	22.57	50.13	68.2	-18.07	peak
22980	27.24	24.45	51.69	54	-2.31	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11490	31.79	14.41	46.20	54	-7.80	peak
17235	29.06	22.57	51.63	68.2	-16.57	peak
22980	25.65	24.45	50.10	54	-3.90	peak

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:middle

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11570	31.91	14.25	46.16	54	-7.84	peak
17355	26.51	21.86	48.37	68.2	-19.83	peak
23140	25.27	24.68	49.95	68.2	-18.25	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:middle

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11570	32.66	14.25	46.91	54	-7.09	peak
17355	29.72	21.86	51.58	68.2	-16.62	peak
23140	23.53	24.68	48.21	68.2	-19.99	peak

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11650	34.83	14.06	48.89	54	-5.11	peak
17475	27.61	21.15	48.76	68.2	-19.44	peak
23300	29.87	25.11	54.98	68.2	-13.22	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11650	33.40	14.06	47.46	54	-6.54	peak
17475	27.00	21.15	48.15	68.2	-20.05	peak
23300	29.67	25.11	54.78	68.2	-13.42	peak

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11510	31.00	14.40	45.40	54	-8.60	peak
17265	29.49	22.40	51.89	68.2	-16.31	peak
23020	25.16	24.68	49.84	54	-4.16	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11510	31.70	14.40	46.10	54	-7.90	peak
17265	30.03	22.40	52.43	68.2	-15.77	peak
23020	25.89	24.68	50.57	54	-3.43	peak

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11590	32.76	14.20	46.96	54	-7.04	peak
17385	29.69	21.68	51.37	68.2	-16.83	peak
23180	23.91	24.72	48.63	68.2	-19.57	peak

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11590	31.58	14.20	45.78	54	-8.22	peak
17385	25.70	21.68	47.38	68.2	-20.82	peak
23180	29.73	24.72	54.45	68.2	-13.75	peak

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11490	33.12	14.41	47.53	54	-6.47	peak
17235	29.71	22.57	52.28	68.2	-15.92	peak
22980	25.75	24.45	50.20	54	-3.80	peak

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11490	33.59	14.41	48.00	54	-6.00	peak
17235	26.83	22.57	49.40	68.2	-18.80	peak
22980	26.46	24.45	50.91	54	-3.09	peak

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:middle

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11570	32.63	14.25	46.88	54	-7.12	peak
17355	27.70	21.86	49.56	68.2	-18.64	peak
23140	24.35	24.68	49.03	68.2	-19.17	peak

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:middle

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11570	33.65	14.25	47.90	54	-6.10	peak
17355	29.80	21.86	51.66	68.2	-16.54	peak
23140	28.99	24.68	53.67	68.2	-14.53	peak

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11650	34.54	14.06	48.60	54	-5.40	peak
17475	28.48	21.15	49.63	68.2	-18.57	peak
23300	23.84	25.11	48.95	68.2	-19.25	peak

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11650	33.91	14.06	47.97	54	-6.03	peak
17475	28.94	21.15	50.09	68.2	-18.11	peak
23300	28.47	25.11	53.58	68.2	-14.62	peak

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11510	32.58	14.40	46.98	54	-7.02	peak
17265	27.47	22.40	49.87	68.2	-18.33	peak
23020	26.87	24.68	51.55	54	-2.45	peak

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11510	34.63	14.40	49.03	54	-4.97	peak
17265	28.28	22.40	50.68	68.2	-17.52	peak
23020	24.78	24.68	49.46	54	-4.54	peak

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11590	35.72	14.20	49.92	54	-4.08	peak
17385	27.37	21.68	49.05	68.2	-19.15	peak
23180	23.74	24.72	48.46	68.2	-19.74	peak

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:High

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11590	31.78	14.20	45.98	54	-8.02	peak
17385	28.39	21.68	50.07	68.2	-18.13	peak
23180	27.25	24.72	51.97	68.2	-16.23	peak

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:80MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11550	34.40	14.30	48.70	54	-5.30	peak
17325	27.26	22.04	49.30	68.2	-18.90	peak
23100	26.77	24.60	51.37	54	-2.63	peak

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:80MHz; Channel:Low

Frequency	RX_R	Factor	Emission	Limit	Margin	Detector
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
11550	33.41	14.30	47.71	54	-6.29	peak
17325	28.36	22.04	50.40	68.2	-17.80	peak
23100	24.75	24.60	49.35	54	-4.65	peak

7.8 Radiated Emissions which fall in the restricted bands

Test Requirement 47 CFR Part 15, Subpart C 15.209 & 15.407(b)

Test Method: KDB 789033 D02 II G

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.		

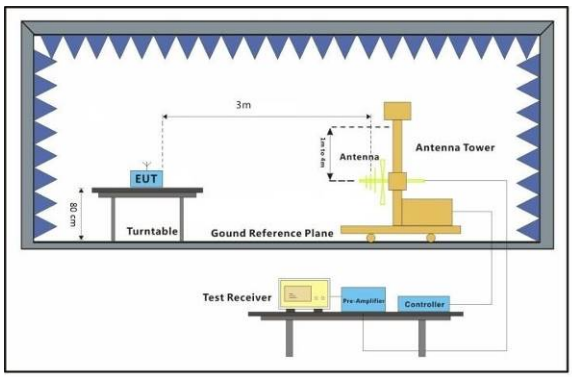
7.8.1 E.U.T. Operation

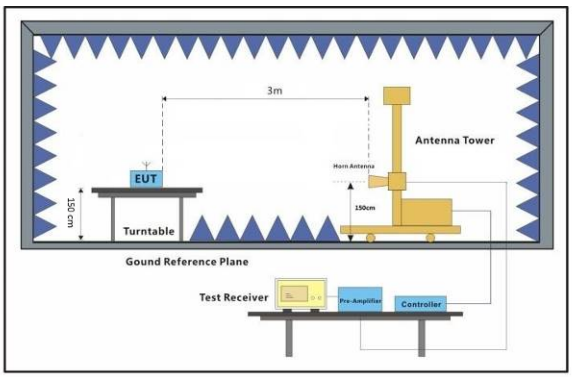
Operating Environment:

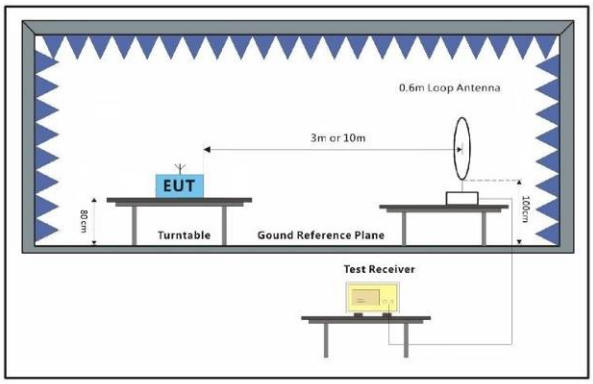
Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.8.2 Test Setup Diagram







7.8.3 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.

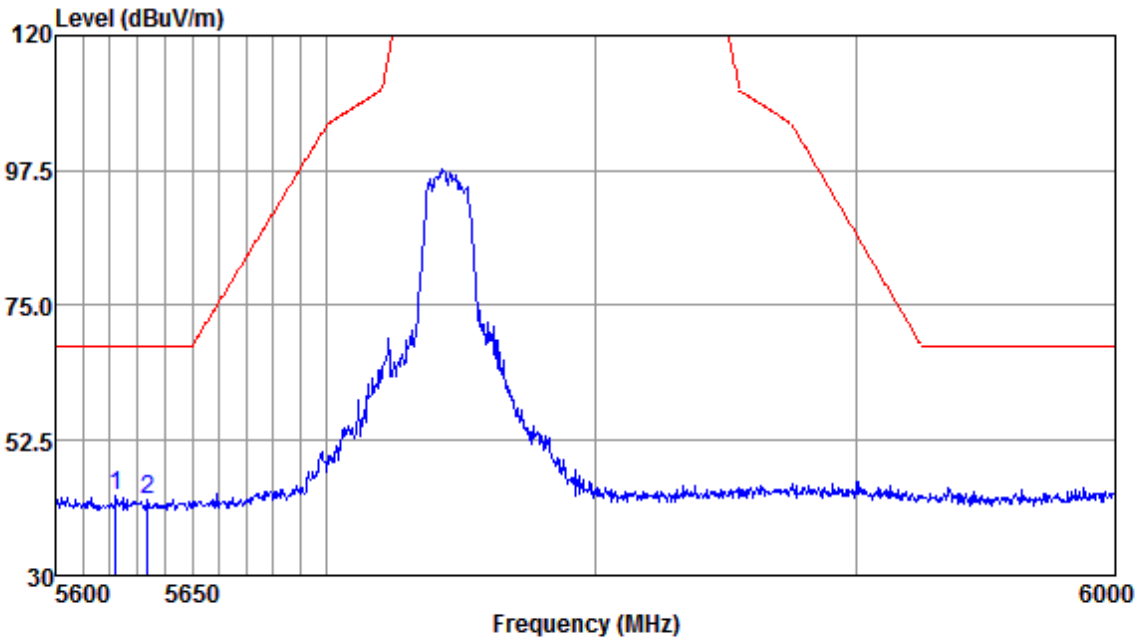
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.

j. Repeat above procedures until all frequencies measured was complete.

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

This test item be test using two power supply (AC 24V & AC 120V for POE), and only record the worst data of POE in the report.

Mode:b; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:Low

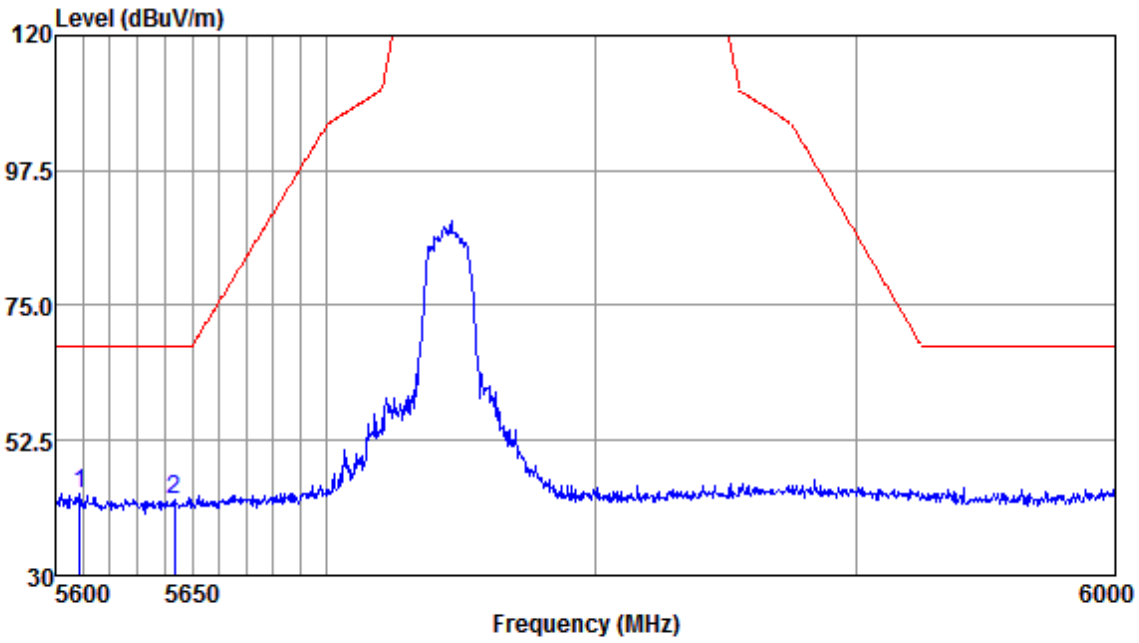


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5622.07	44.69	32.12	5.06	38.58	43.29	68.20	-24.91	Peak
5633.71	43.82	32.13	5.16	38.57	42.54	68.20	-25.66	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:Low

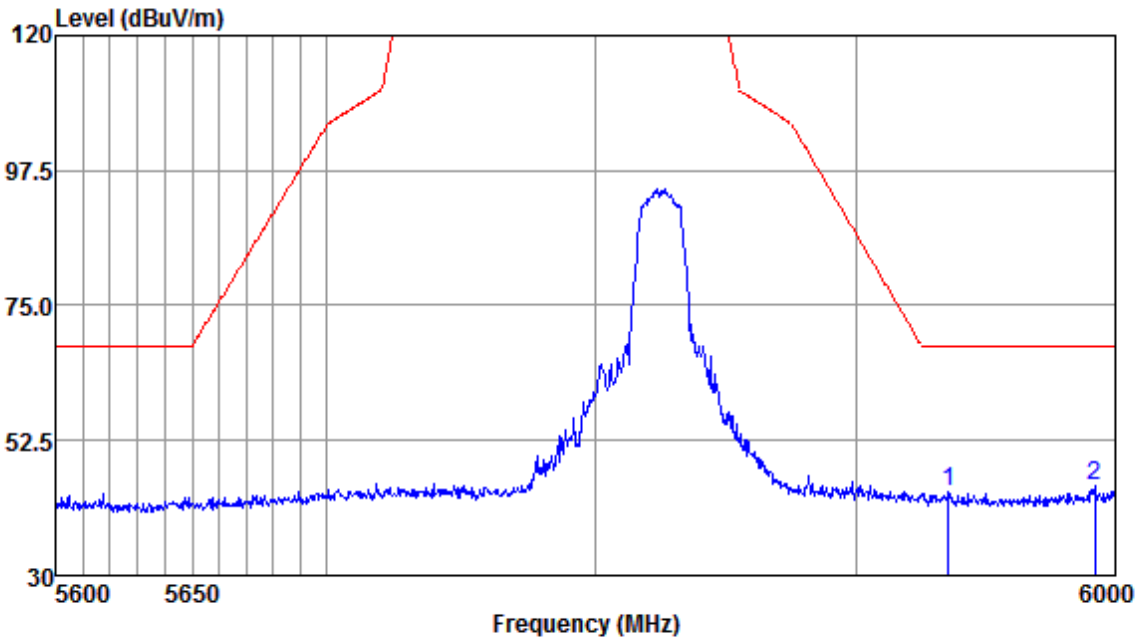


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5608.89	45.05	32.12	5.06	38.58	43.65	68.20	-24.55	Peak
5643.44	44.00	32.13	5.11	38.57	42.67	68.20	-25.53	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:a; bandwidth:20MHz; Channel:High

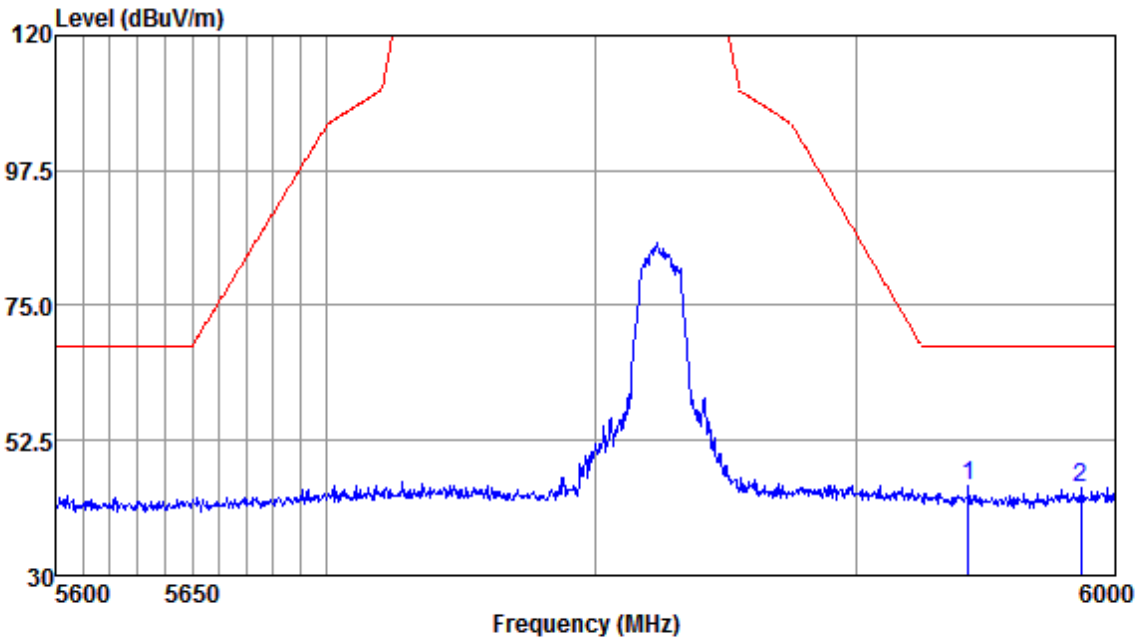


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5935.36	44.93	32.19	5.22	38.51	43.83	68.20	-24.37	Peak
5992.14	46.04	32.20	5.22	38.50	44.96	68.20	-23.24	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:a; bandwidth:20MHz; Channel:High

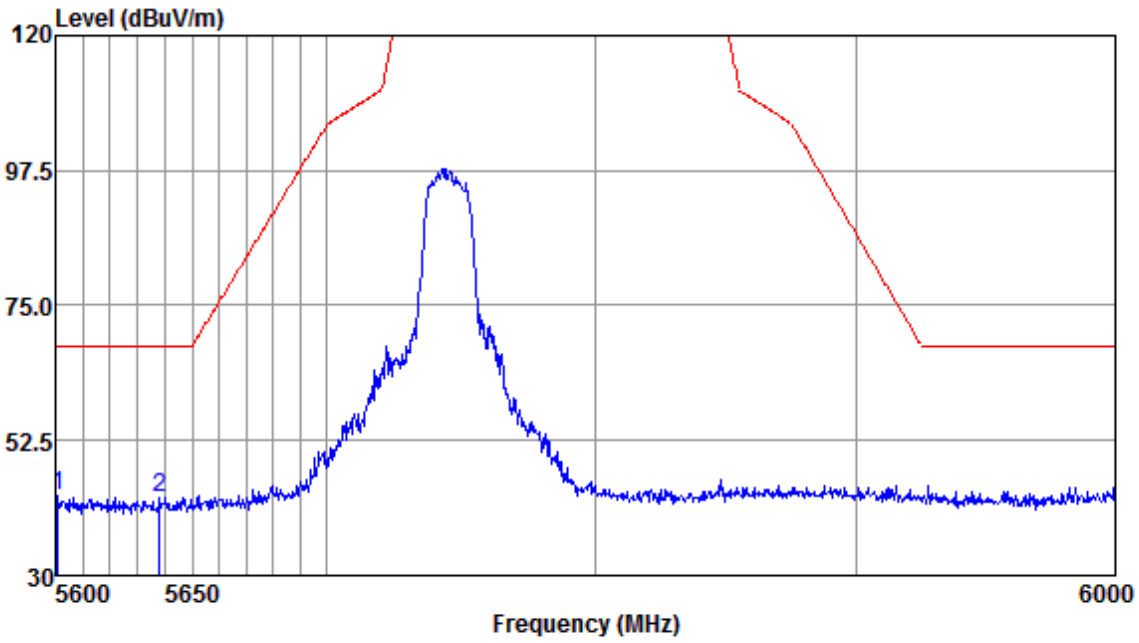


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5942.74	45.81	32.19	5.32	38.51	44.81	68.20	-23.39	Peak
5986.77	45.53	32.20	5.26	38.50	44.49	68.20	-23.71	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:Low

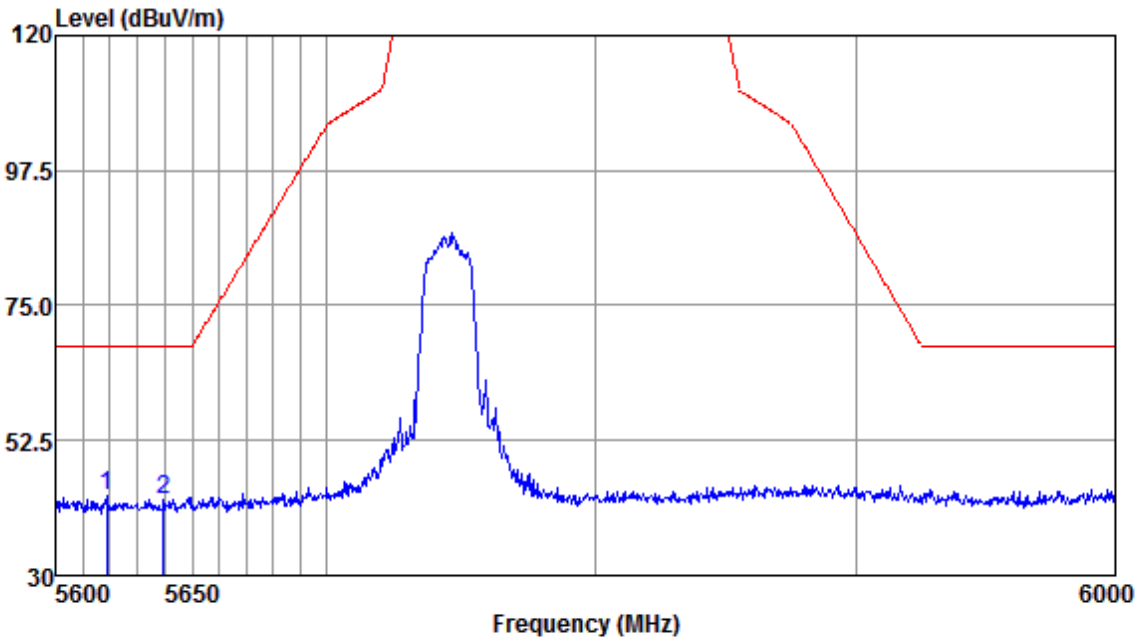


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5600.77	44.86	32.12	4.96	38.58	43.36	68.20	-24.84	Peak
5637.99	44.39	32.13	5.16	38.57	43.11	68.20	-25.09	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:Low

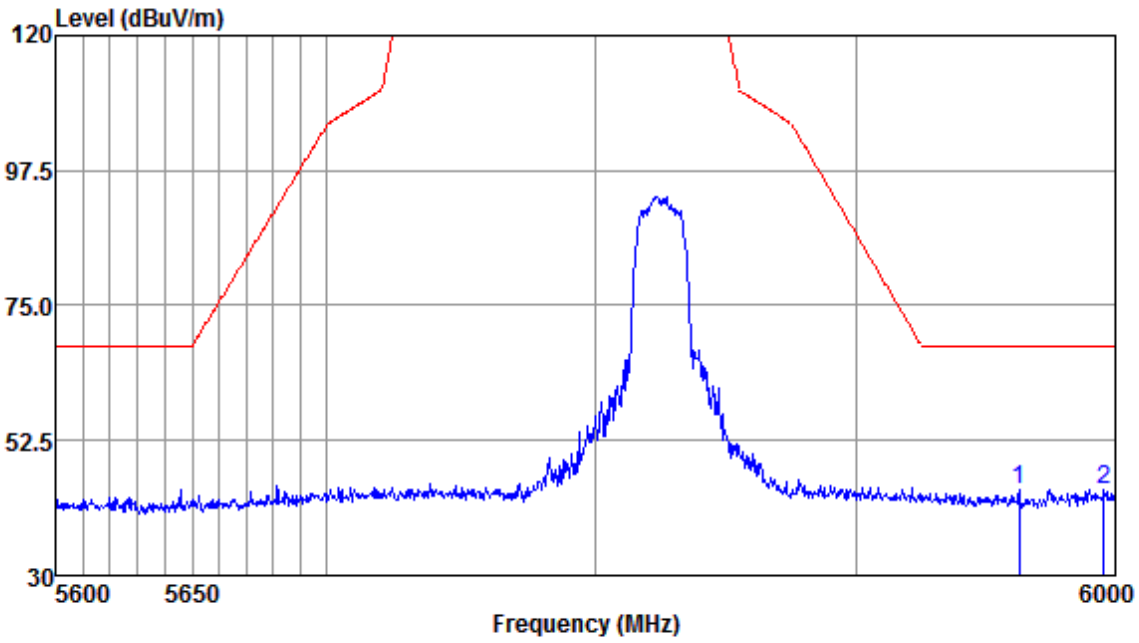


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5618.58	44.70	32.12	5.06	38.58	43.30	68.20	-24.90	Peak
5639.55	43.93	32.13	5.16	38.57	42.65	68.20	-25.55	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:20MHz; Channel:High

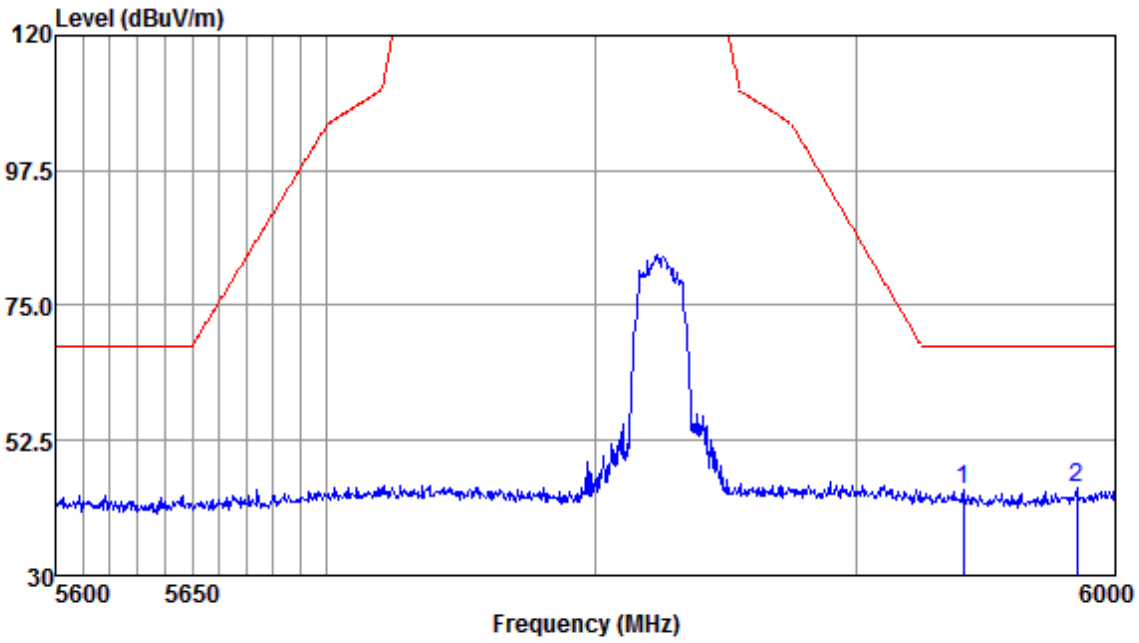


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5962.45	45.26	32.19	5.29	38.51	44.23	68.20	-23.97	Peak
5995.45	45.40	32.20	5.22	38.50	44.32	68.20	-23.88	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:20MHz; Channel:High

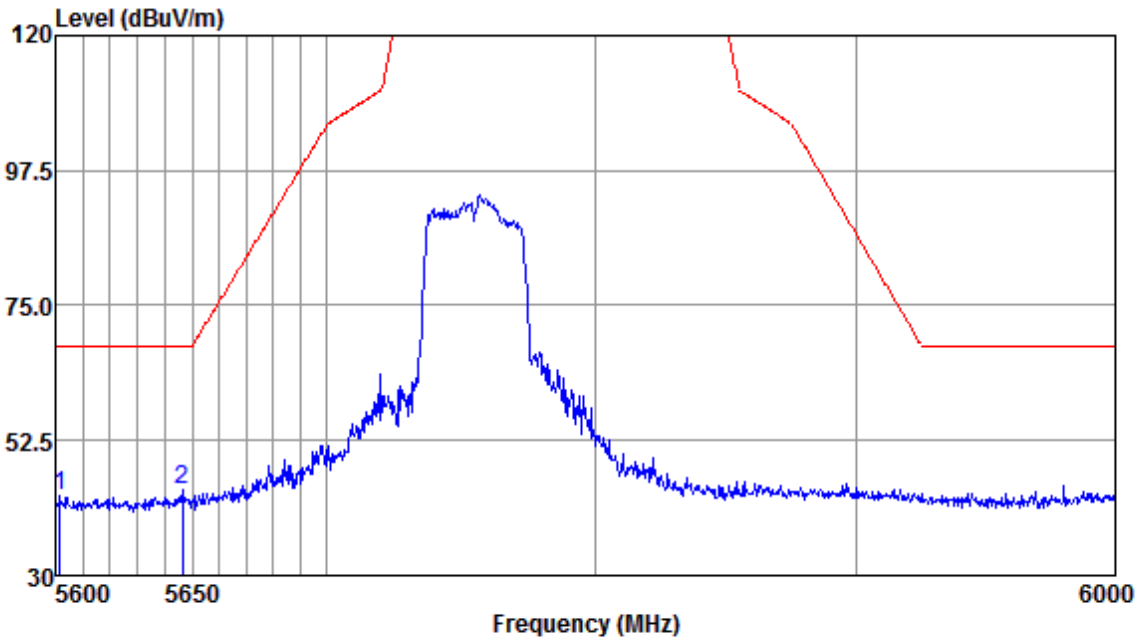


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5941.10	45.39	32.19	5.32	38.51	44.39	68.20	-23.81	Peak
5985.12	45.57	32.20	5.26	38.50	44.53	68.20	-23.67	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:Low

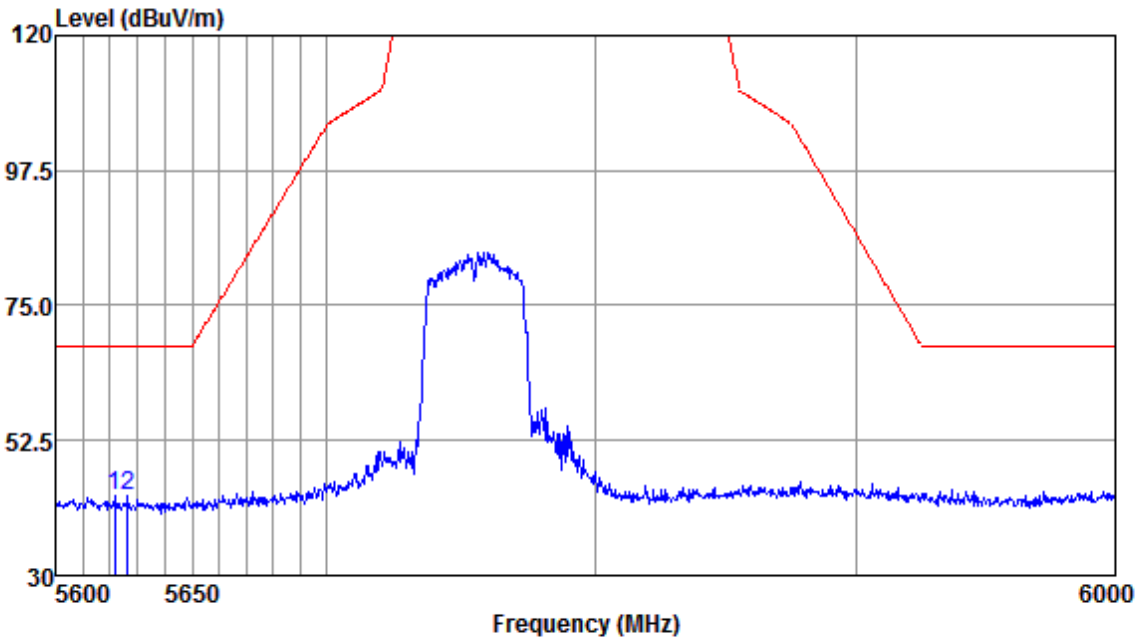


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5601.55	44.91	32.12	4.96	38.58	43.41	68.20	-24.79	Peak
5646.56	45.51	32.13	5.11	38.57	44.18	68.20	-24.02	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:Low

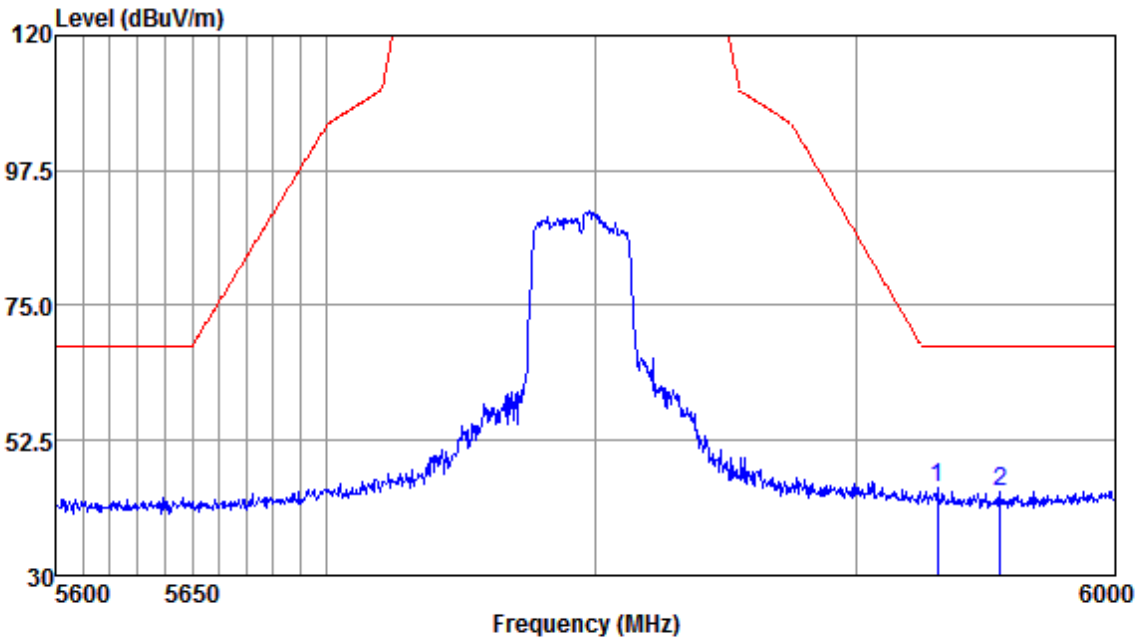


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5621.68	44.58	32.12	5.06	38.58	43.18	68.20	-25.02	Peak
5626.33	44.52	32.13	5.16	38.58	43.23	68.20	-24.97	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:n; bandwidth:40MHz; Channel:High

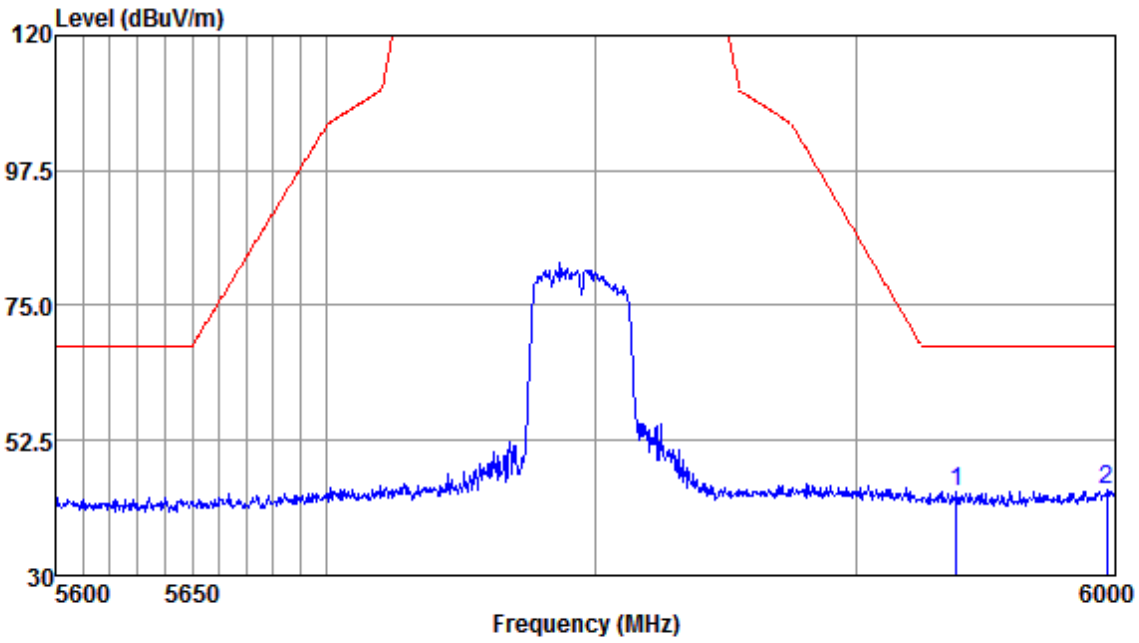


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5930.86	45.58	32.19	5.22	38.51	44.48	68.20	-23.72	Peak
5955.05	45.12	32.19	5.29	38.51	44.09	68.20	-24.11	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:n; bandwidth:40MHz; Channel:High

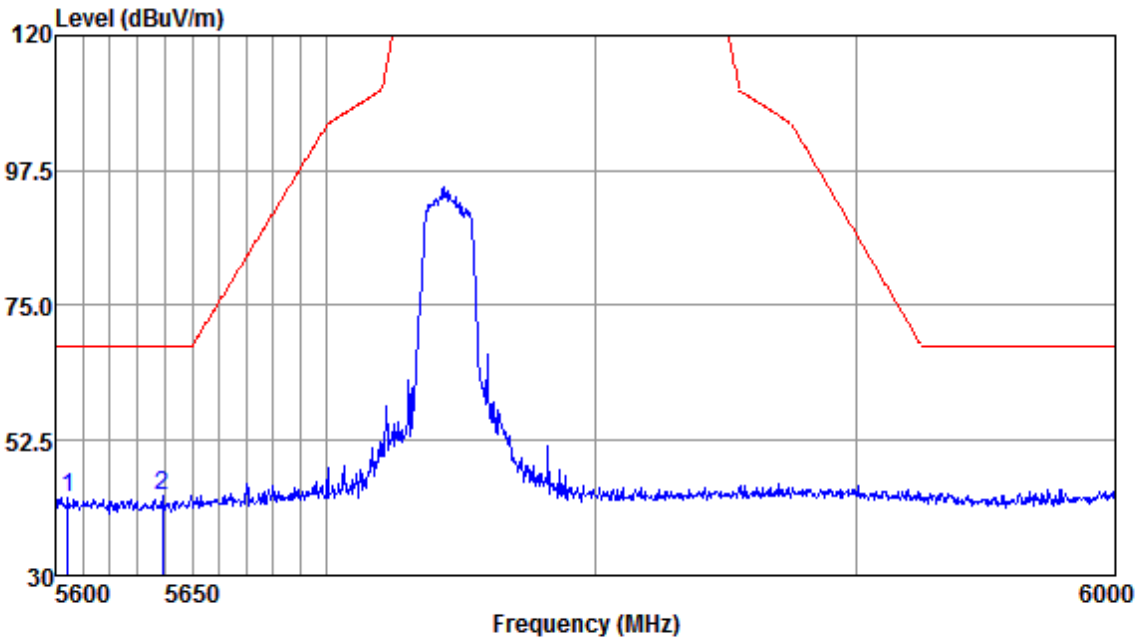


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5938.23	45.11	32.19	5.32	38.51	44.11	68.20	-24.09	Peak
5996.69	45.21	32.20	5.22	38.50	44.13	68.20	-24.07	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:Low

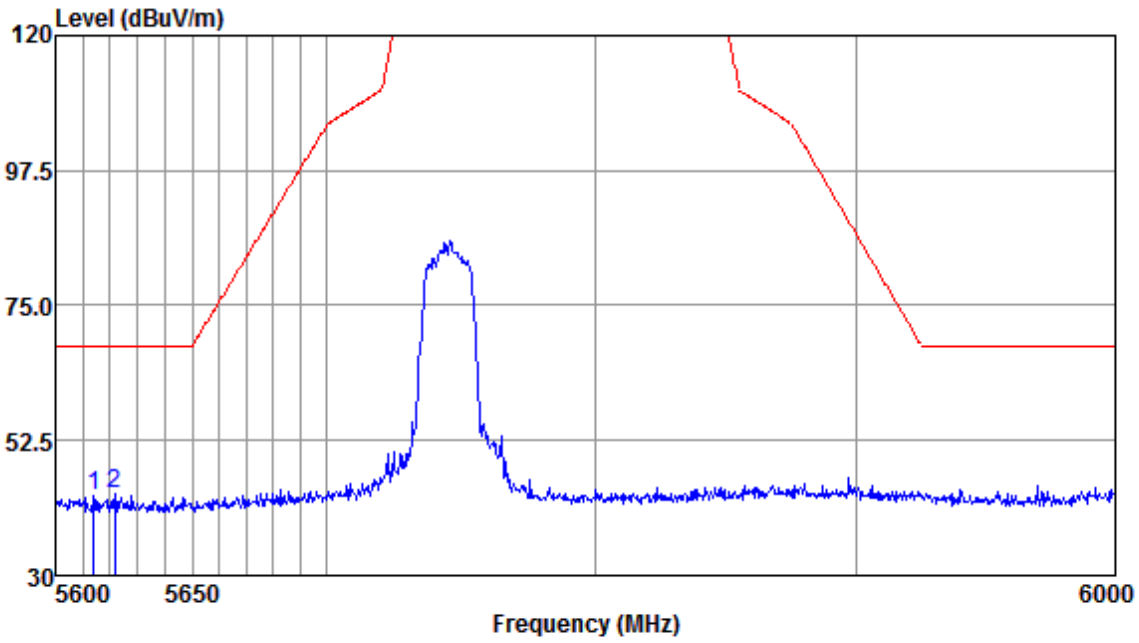


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5604.64	44.48	32.12	4.96	38.58	42.98	68.20	-25.22	Peak
5639.16	44.49	32.13	5.16	38.57	43.21	68.20	-24.99	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:Low

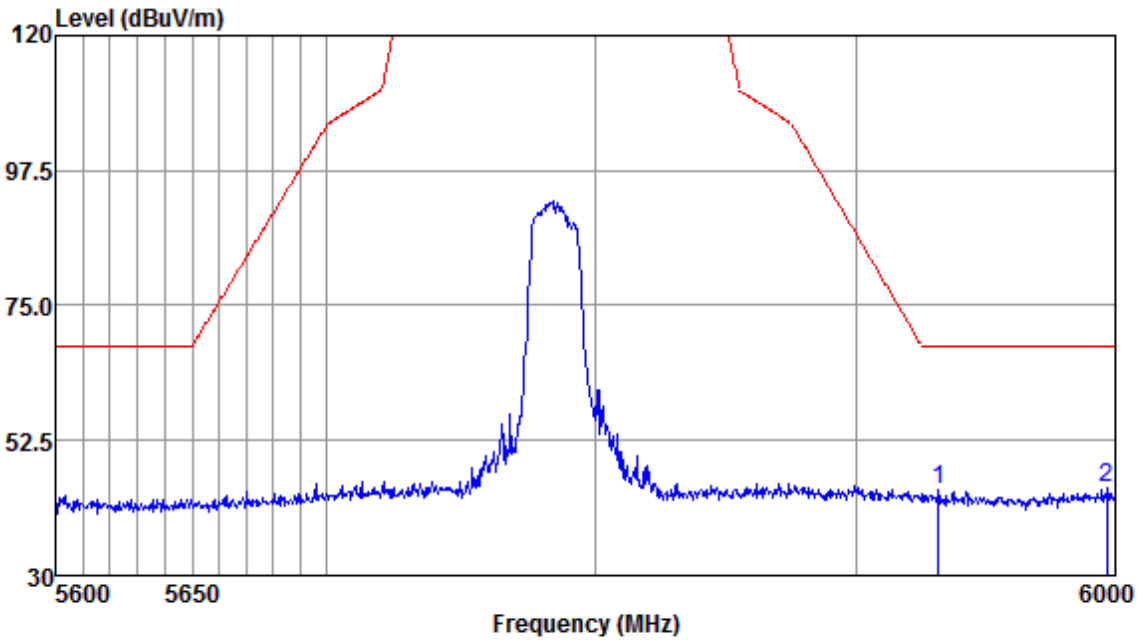


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5613.93	44.80	32.12	5.06	38.58	43.40	68.20	-24.80	Peak
5621.68	44.95	32.12	5.06	38.58	43.55	68.20	-24.65	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:20MHz; Channel:High

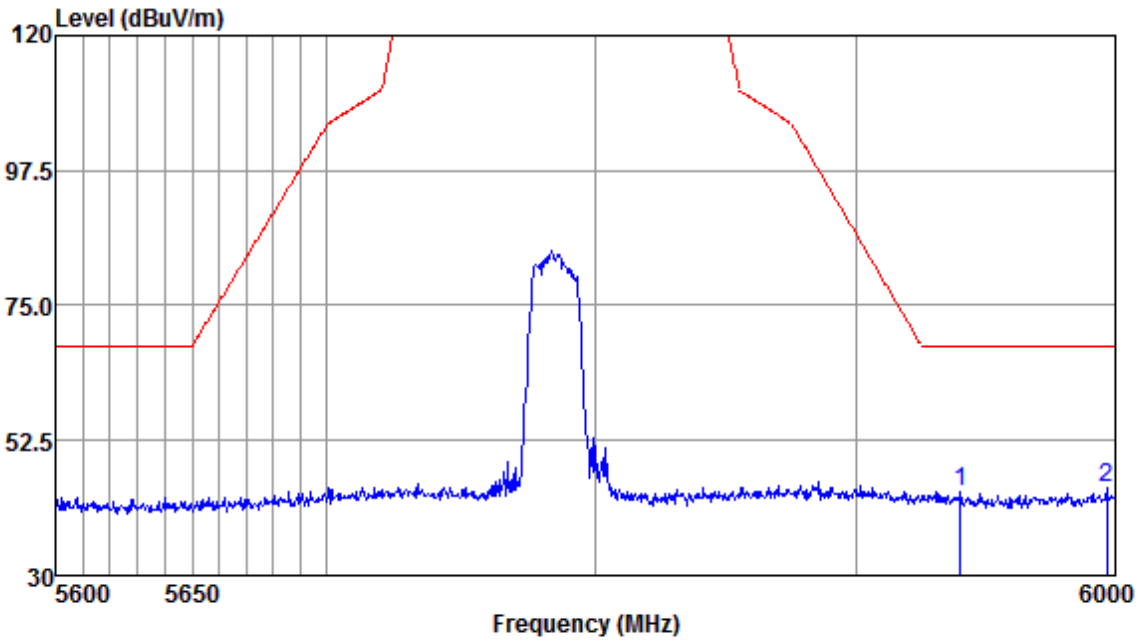


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5931.27	45.47	32.19	5.22	38.51	44.37	68.20	-23.83	Peak
5996.69	45.72	32.20	5.22	38.50	44.64	68.20	-23.56	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:20MHz; Channel:High

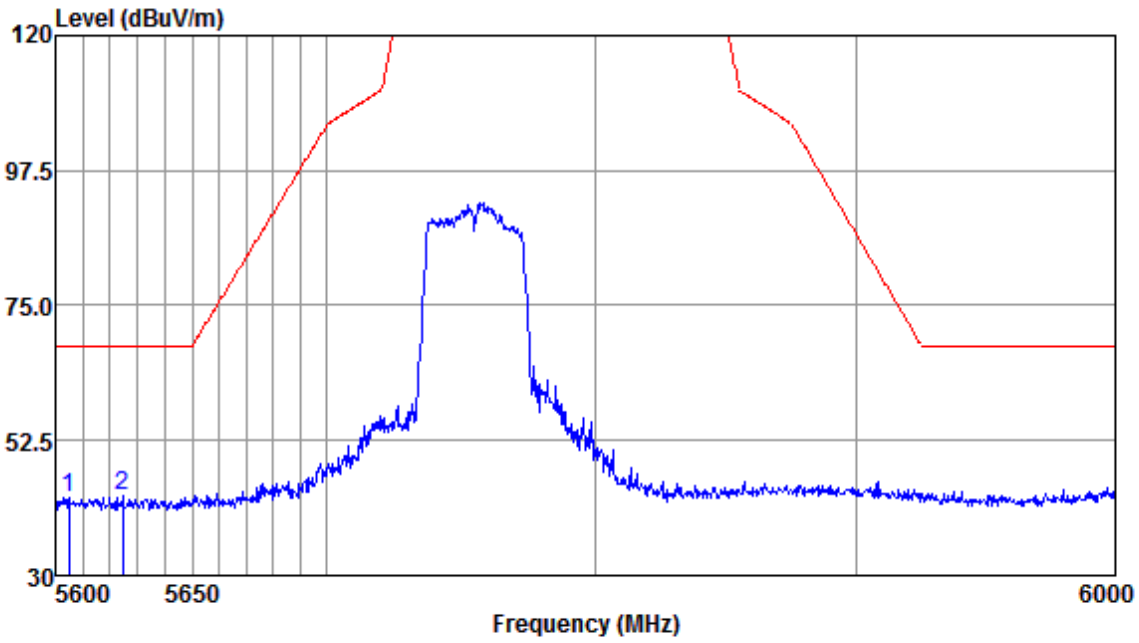


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5939.87	44.90	32.19	5.32	38.51	43.90	68.20	-24.30	Peak
5996.69	45.70	32.20	5.22	38.50	44.62	68.20	-23.58	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:Low

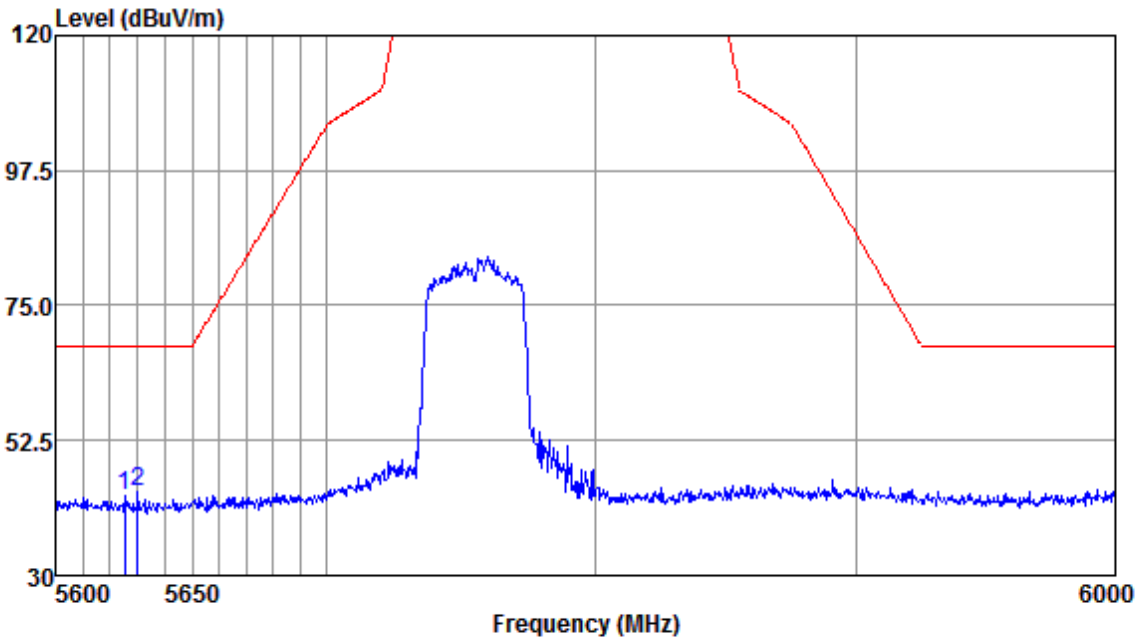


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5605.03	44.61	32.12	4.96	38.58	43.11	68.20	-25.09	Peak
5624.39	44.52	32.13	5.16	38.58	43.23	68.20	-24.97	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:Low

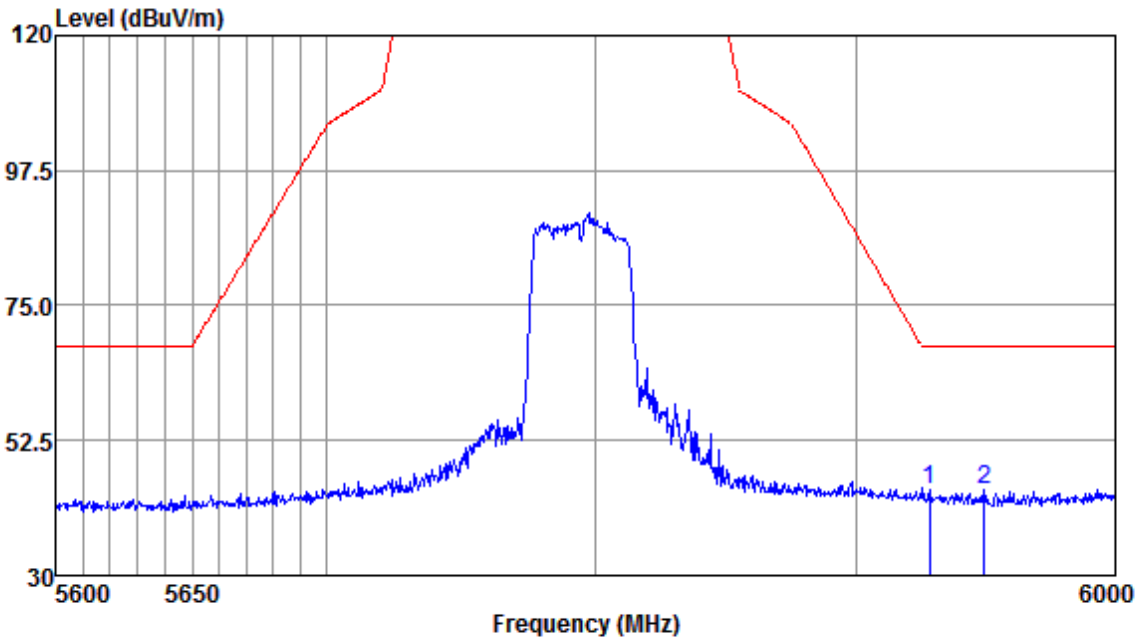


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5625.17	44.73	32.13	5.16	38.58	43.44	68.20	-24.76	Peak
5630.22	45.27	32.13	5.16	38.58	43.98	68.20	-24.22	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:40MHz; Channel:High

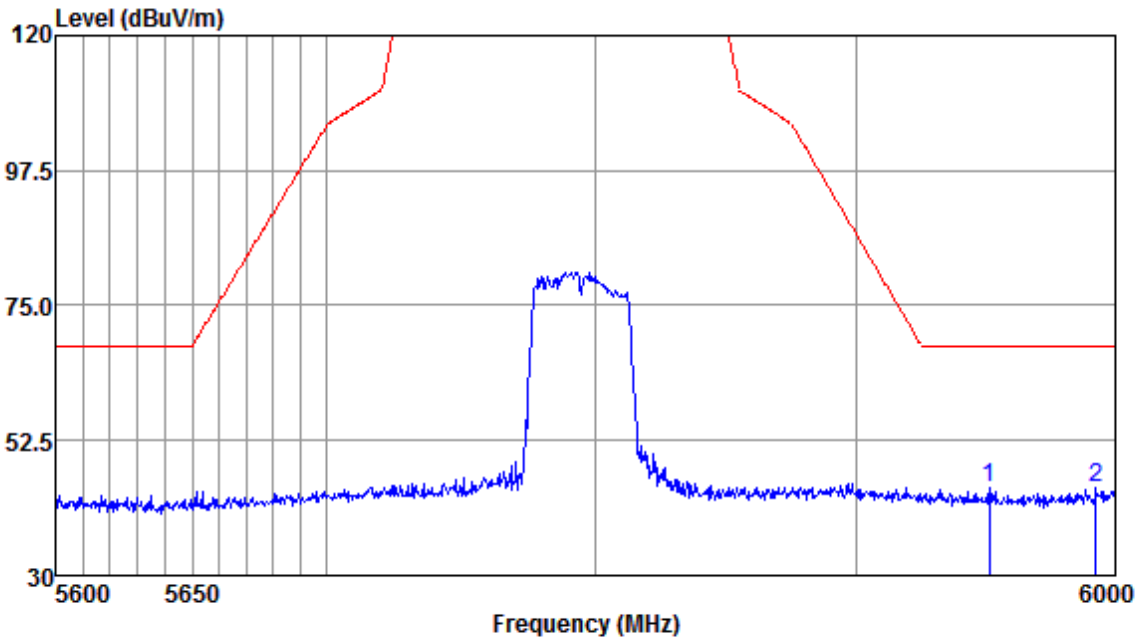


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5927.99	45.50	32.19	5.22	38.51	44.40	68.20	-23.80	Peak
5948.89	45.26	32.19	5.32	38.51	44.26	68.20	-23.94	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:40MHz; Channel:High

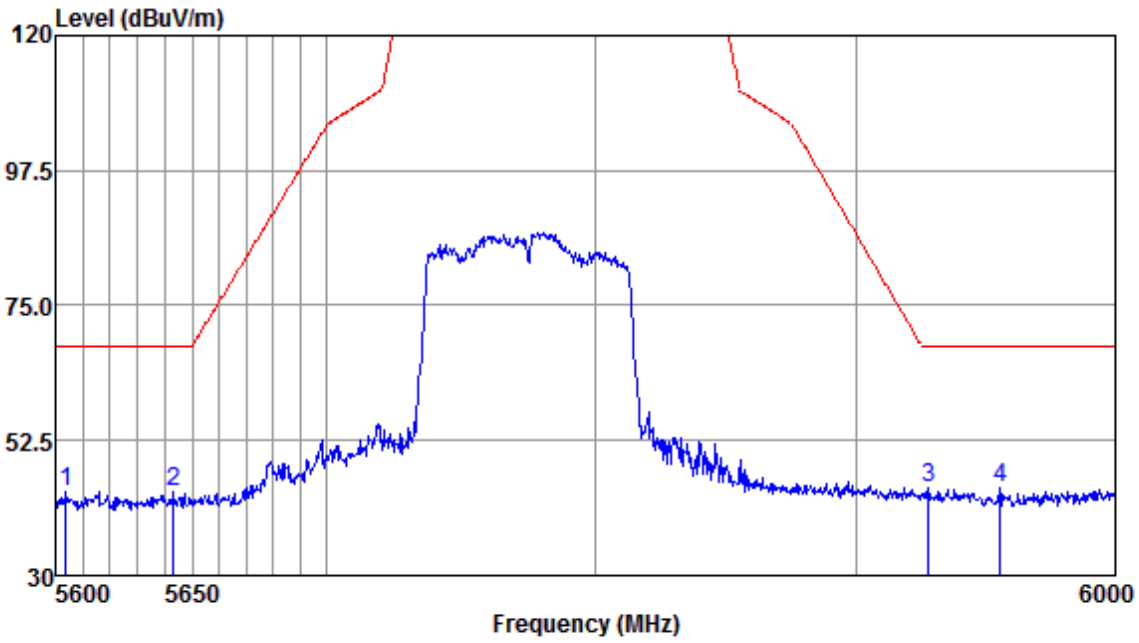


Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5950.94	45.55	32.19	5.32	38.51	44.55	68.20	-23.65	Peak
5992.55	45.85	32.20	5.22	38.50	44.77	68.20	-23.43	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Horizontal; Modulation:c; bandwidth:80MHz; Channel:Low

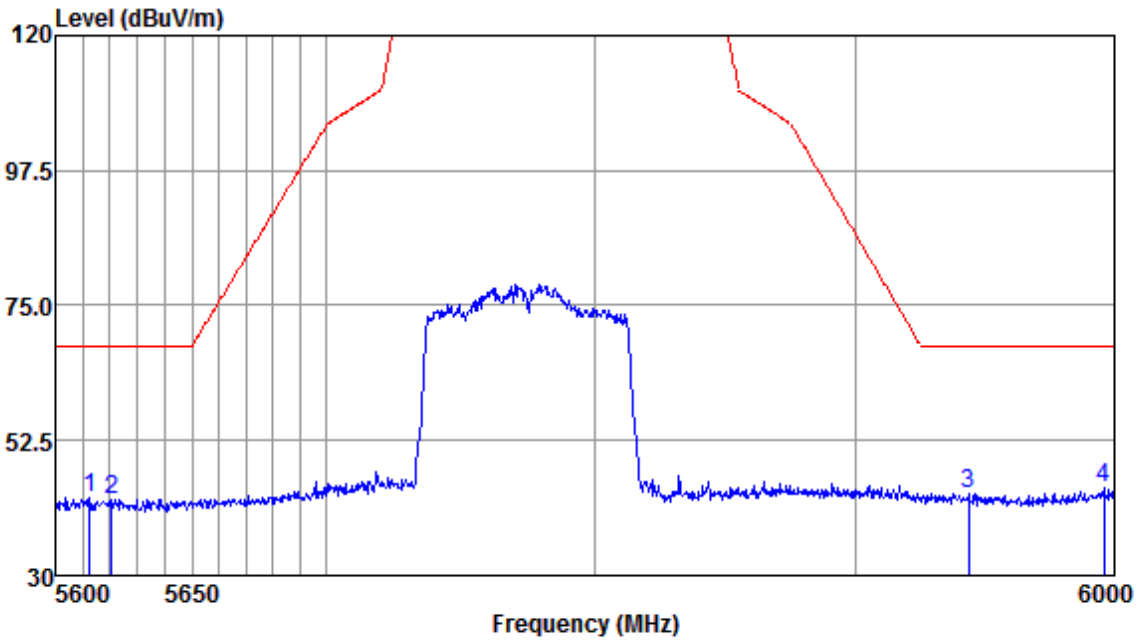


Antenna Polarity :HORIZONTAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5603.87	45.41	32.12	4.96	38.58	43.91	68.20	-24.29	Peak
5643.05	45.20	32.13	5.11	38.57	43.87	68.20	-24.33	Peak
5927.58	45.56	32.19	5.22	38.51	44.46	68.20	-23.74	Peak
5955.05	45.48	32.19	5.29	38.51	44.45	68.20	-23.75	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

Mode:b; Polarization:Vertical; Modulation:c; bandwidth:80MHz; Channel:Low



Antenna Polarity :VERTICAL

Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Emission Level	Limit Line	Over Limit	Remark
MHz	dBuv	dB/m	dB	dB	dBuv/m	dBuv/m	dB	
5612.38	44.43	32.12	5.06	38.58	43.03	68.20	-25.17	Peak
5620.52	44.02	32.12	5.06	38.58	42.62	68.20	-25.58	Peak
5943.15	44.71	32.19	5.32	38.51	43.71	68.20	-24.49	Peak
5995.86	45.82	32.20	5.22	38.50	44.74	68.20	-23.46	Peak

Note:Emission Level=Read Level+Antenna Factor+Cable loss-Preamp Factor

7.9 Frequency Stability

Test Requirement 47 CFR Part 15, Subpart C 15.407 (g)

Test Method: ANSI C63.10 (2013) Section 6.8

Limit: The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

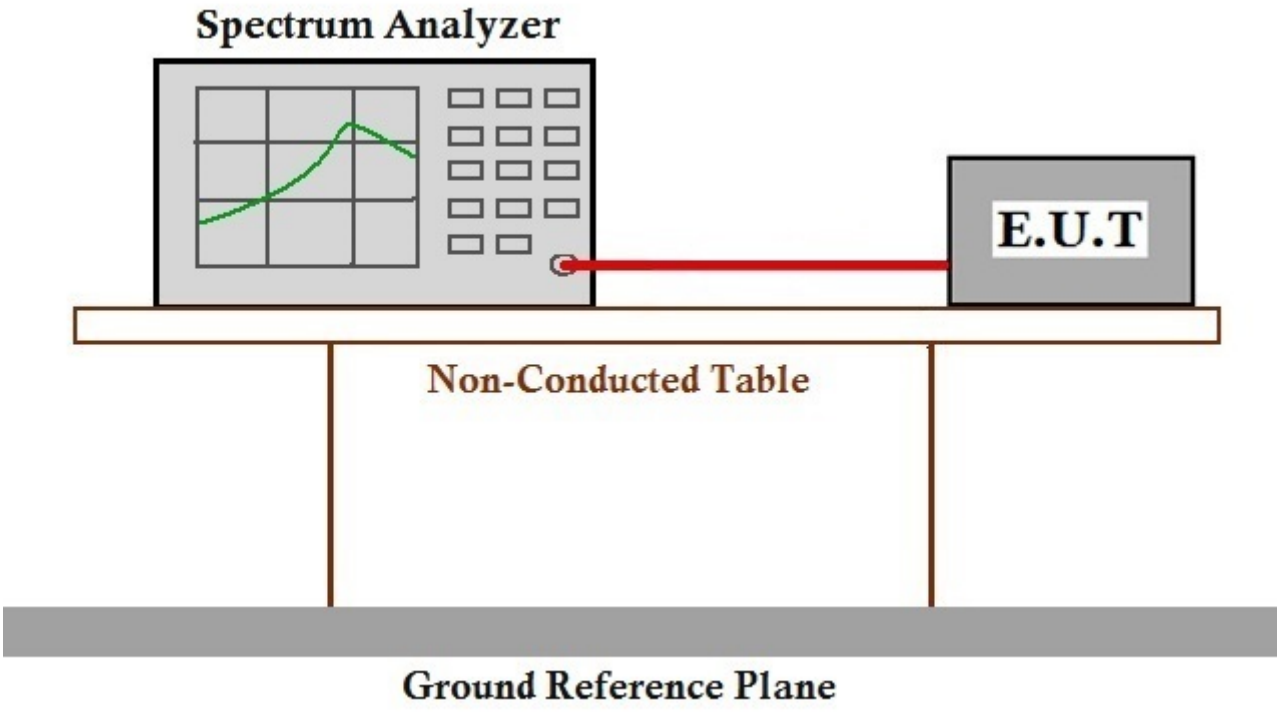
7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 20 °C Humidity: 50 % RH Atmospheric Pressure: 1010 mbar

Test mode b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80). Only the data of worst case is recorded in the report.

7.9.2 Test Setup Diagram



7.9.3 Measurement Procedure and Data

The detailed test data see: Appendix B SHEM190401242302

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 -