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

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

Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com

TEST REPORT

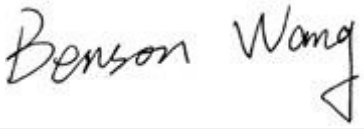
Application No.:	SZEM1706006520CR
Applicant:	Logitech Far East Ltd
Address of Applicant:	No. 2, Creation Road IV Science-Based Industrial Park Hsin-Chu Taiwan
Manufacturer:	Logitech Far East Ltd
Address of Manufacturer:	No. 2, Creation Road IV Science-Based Industrial Park Hsin-Chu Taiwan
Equipment Under Test (EUT):	
EUT Name:	A20 Wireless Headset
Model No.:	A20G01 ♣
♣	Please refer to section 2 of this report which indicates which sample was actually tested and which were electrically identical.
Trade mark:	ASTRO
FCC ID:	YQ6-A20G01
Standards:	47 CFR Part 15, Subpart E 15.407 (2016)
Date of Receipt:	2017-06-28
Date of Test:	2017-07-08 to 2017-07-17
Date of Issue:	2017-07-24
Test Result :	**Pass***

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

Jack Zhang
EMC Laboratory 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	**Chapter**	**Date**	**Modifier**	**Remark**
01		2017-07-24		Original

Authorized for issue by:				
				
		Benson Wang /Project Engineer		
				
		Eric Fu /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	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
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

Remark:

Model No.: A20G01

There are two colours of the above model, only the sample with green was tested fully, since the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above samples, with only difference being colour.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	Li-polymer Battery: 3.7V 1000mAh (charge by usb port)
Cable:	USB cable: 59cm unshielded Optical cable: 109cm unshielded
Operation Frequency:	5.745-5.825GHz.
Channel Numbers:	5G WiFi, 802.11a(VHT20):5 channels
Modulation Type	For 802.11a: OFDM(8PSK/QPSK/16QAM/64QAM)
Sample Type:	Portable
Antenna Type:	Integral
Antenna Gain:	Antenna 1: 3.99dBi, Antenna 2: 4.25dBi (The two antenna can not simultaneous transmission.)

Note:

In FCC 15.31 , for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table, and the selected channel to perform the test as below:

Frequency Range of Operation Operating Frequency Range (in each Band)	Number of Measurement Frequencies Required	Location of Measurement Frequency in Band of Operation
1 MHz or less	1	centre
1 MHz to 10 MHz	2	1 near high end, 1 near low end
Greater than 10 MHz	3	1 near high end, 1 near centre

For 802.11a(HT20)

Mode	Channel	Frequency(MHz)
IEEE 802.11a 20MHz	The Lowest channel	5745
	The Middle channel	5785
	The Highest channel	5825

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	T430u	REF. No.SEA1800
Mouse	Lenovo	M-U0025-O	REF. No.:SEA2400

4.3 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.25×10^{-8}
2	Duty cycle	0.37%
3	Occupied Bandwidth	3%
4	RF conducted power	0.75dB
5	RF power density	2.84dB
6	Conducted Spurious emissions	0.75dB
7	RF Radiated power	4.5dB (below 1GHz)
		4.8dB (above 1GHz)
8	Radiated Spurious emission test	4.5dB (30MHz-1GHz)
		4.8dB (1GHz-18GHz)
9	Temperature test	1℃
10	Humidity test	3%
11	Supply voltages	1.5%
12	Time	3%

4.4 Test Location

All tests were performed at:

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

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 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 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.

• **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None

5 Equipment List

Conducted Emissions at AC Power Line (150kHz-30MHz)					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017-05-10	2018-05-10
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
LISN	Rohde & Schwarz	ENV216	SEM007-01	2016-10-09	2017-10-09
LISN	ETS-LINDGREN	3816/2	SEM007-02	2017-04-14	2018-04-13
8 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T8-02	EMC0120	2016-09-28	2017-09-28
4 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T4-02	EMC0121	2016-09-28	2017-09-28
2 Line ISN	Fischer Custom	FCC-TLISN-T2-02	EMC0122	2016-09-28	2017-09-28

RF Conducted Test					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09
Measurement Software	JS Tonscend	JS1120-2 BT/WIFI V2.	N/A	N/A	N/A
Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2017-04-14	2018-04-13
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09

Radiated Emissions					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2017-05-10	2018-05-10
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Spectrum Analyzer	Rohde & Schwarz	FSU43	SEM004-08	2017-04-14	2018-04-13
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2017-03-05	2020-03-05
Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-14
Horn Antenna(15GHz-40GHz)	Schwarzbeck	BBHA 9170	SEM003-14	2017-06-16	2020-06-15
Pre-amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2016-10-09	2017-10-09
Low Noise Amplifier(100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2016-10-09	2017-10-09
Pre-amplifier(0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-10	2016-10-17	2017-10-17
Pre-amplifier(26GHz-40GHz)	Compliance Directions Systems Inc.	PAP-2640-50	SEM005-08	2017-04-14	2018-04-13
DC Power Supply	Zhao Xin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2015-08-14	2018-08-14
Band filter	N/A	N/A	SEM023-01	N/A	N/A

RE in Chamber					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
10m Semi-Anechoic Chamber	SAEMC	FSAC1018	SEM001-03	2017-05-10	2018-05-10
EMI Test Receiver (9k-7GHz)	Rohde & Schwarz	ESR	SEM004-03	2017-04-14	2018-04-13
Trilog-Broadband Antenna(30M-1GHz)	Schwarzbeck	VULB9168	SEM003-18	2016-06-29	2019-06-29
Pre-amplifier (9kHz-1GHz)	Sonoma Instrument Co	310N	SEM005-04	2017-06-05	2018-06-04
Loop Antenna (9kHz-30MHz)	ETS-Lindgren	6502	SEM003-08	2015-08-14	2018-08-14
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

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	2016-10-12	2017-10-12
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2016-10-12	2017-10-12
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2016-10-12	2017-10-12
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2017-04-18	2018-04-18

6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

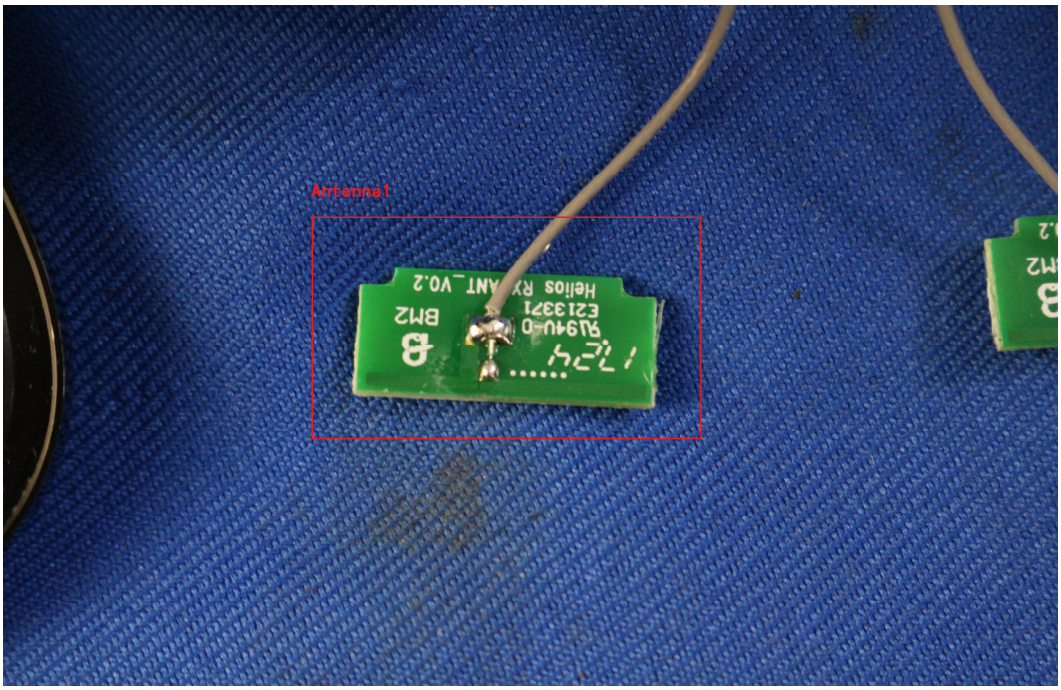
47 CFR Part 15, Subpart C 15.203

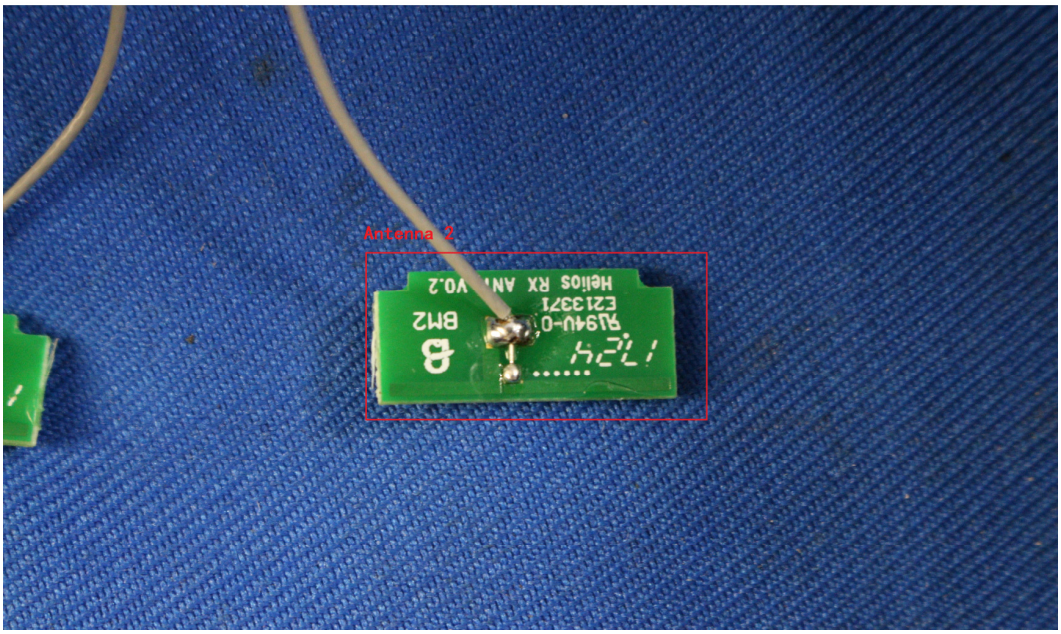
6.1.2 Conclusion

Standard Requirment:

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 antenna and no consideration of replacement. The best case gain of the antenna 1 is 3.99dBi, antenna 2 is 4.25dBi.

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.		

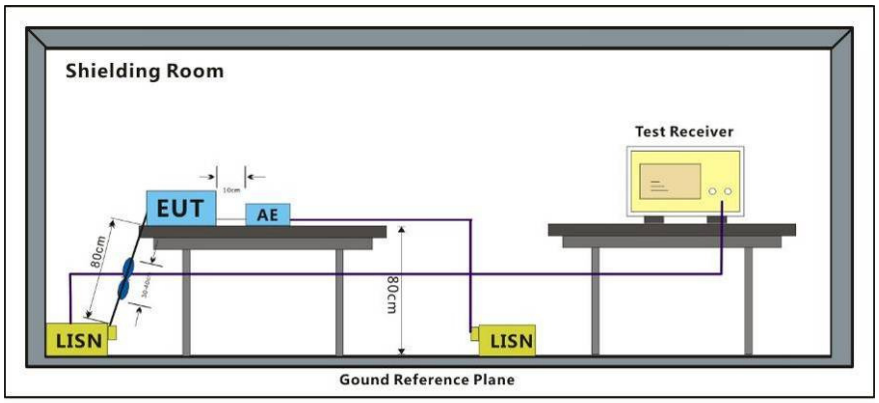
7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1005 mbar

Pretest these mode to find the worst case:	c:Charge + TX mode (Band 3)_Keep the EUT in charging and 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.
The worst case for final test:	c:Charge + TX mode (Band 3)_Keep the EUT in charging and 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.

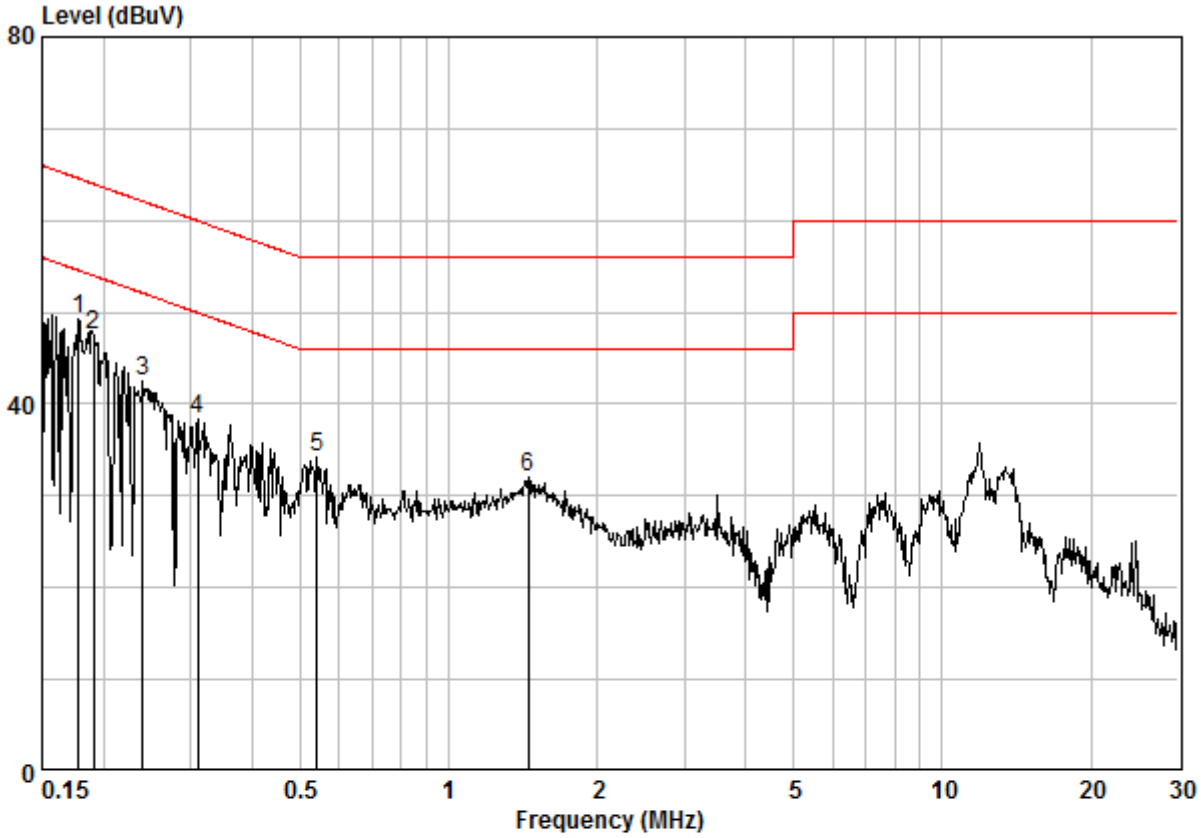
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

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

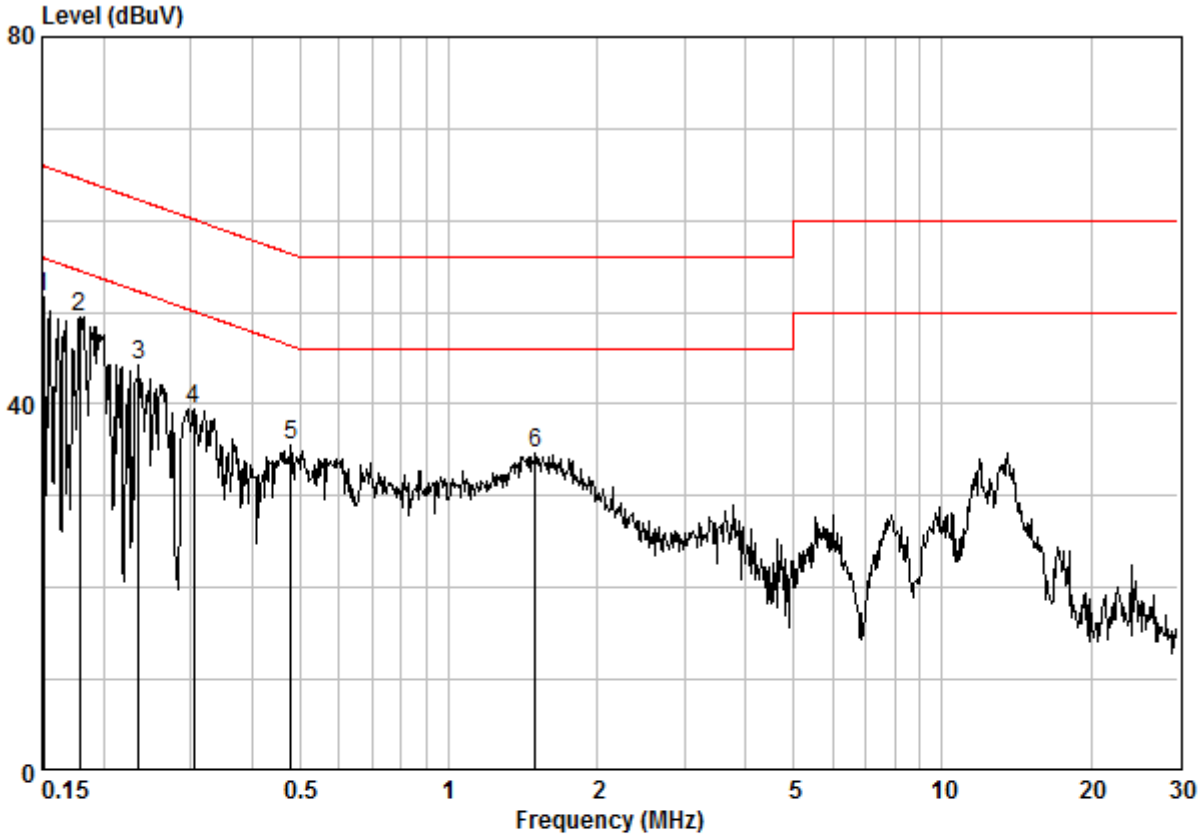
Mode:c; Line:Live Line



Site : Shielding Room
Condition : CE LINE
Job No. : 06520CR
Test Mode : c

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.17772	0.02	9.64	39.66	49.32	54.59	-5.28	Peak
2	0.19039	0.02	9.64	37.90	47.56	54.02	-6.46	Peak
3	0.24037	0.02	9.64	32.91	42.57	52.08	-9.51	Peak
4	0.30998	0.02	9.64	28.75	38.41	49.97	-11.56	Peak
5	0.54068	0.02	9.64	24.49	34.15	46.00	-11.85	Peak
6	1.449	0.03	9.66	22.38	32.07	46.00	-13.93	Peak

Mode:c; Line:Neutral Line



Site : Shielding Room
Condition : CE NEUTRAL
Job No. : 06520CR
Test Mode : c

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1 @	0.15080	0.02	9.64	41.96	51.62	55.96	-4.34	Peak
2	0.17866	0.02	9.63	39.94	49.59	54.55	-4.96	Peak
3	0.23533	0.02	9.63	34.64	44.29	52.26	-7.97	Peak
4	0.30509	0.02	9.63	29.89	39.54	50.10	-10.57	Peak
5	0.47865	0.02	9.63	25.81	35.46	46.36	-10.90	Peak
6	1.495	0.03	9.65	25.00	34.68	46.00	-11.32	Peak

7.2 99% Bandwidth

Test Requirement N/A

Test Method: KDB 789033 II D

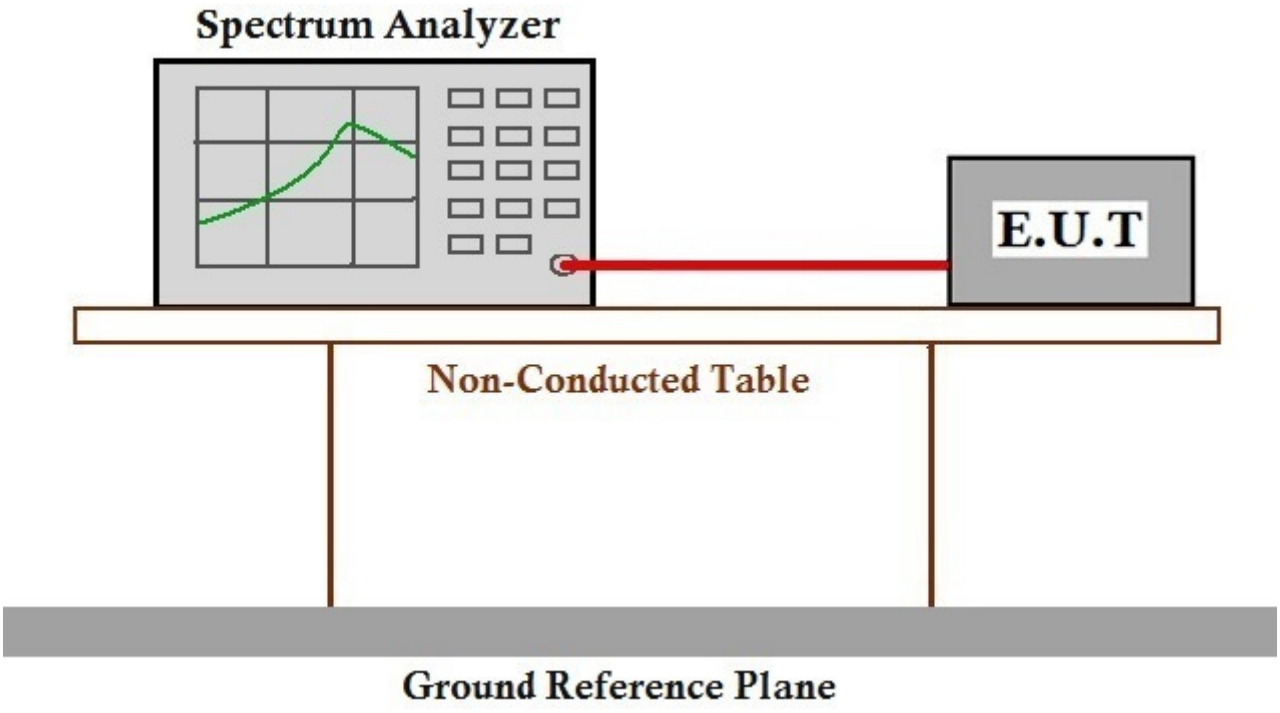
7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1005 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 15.407

7.3 26dB Emission bandwidth

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

Test Method: KDB 789033 D02 II C 1

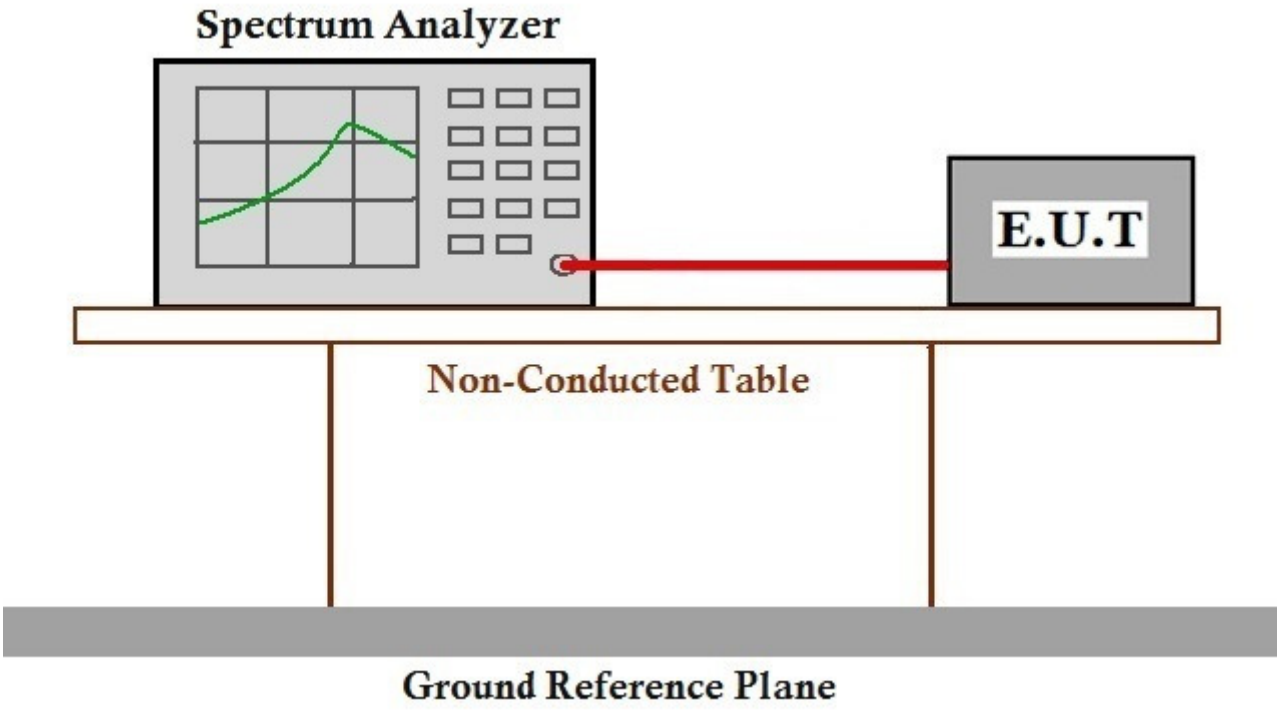
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1005 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 15.407

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

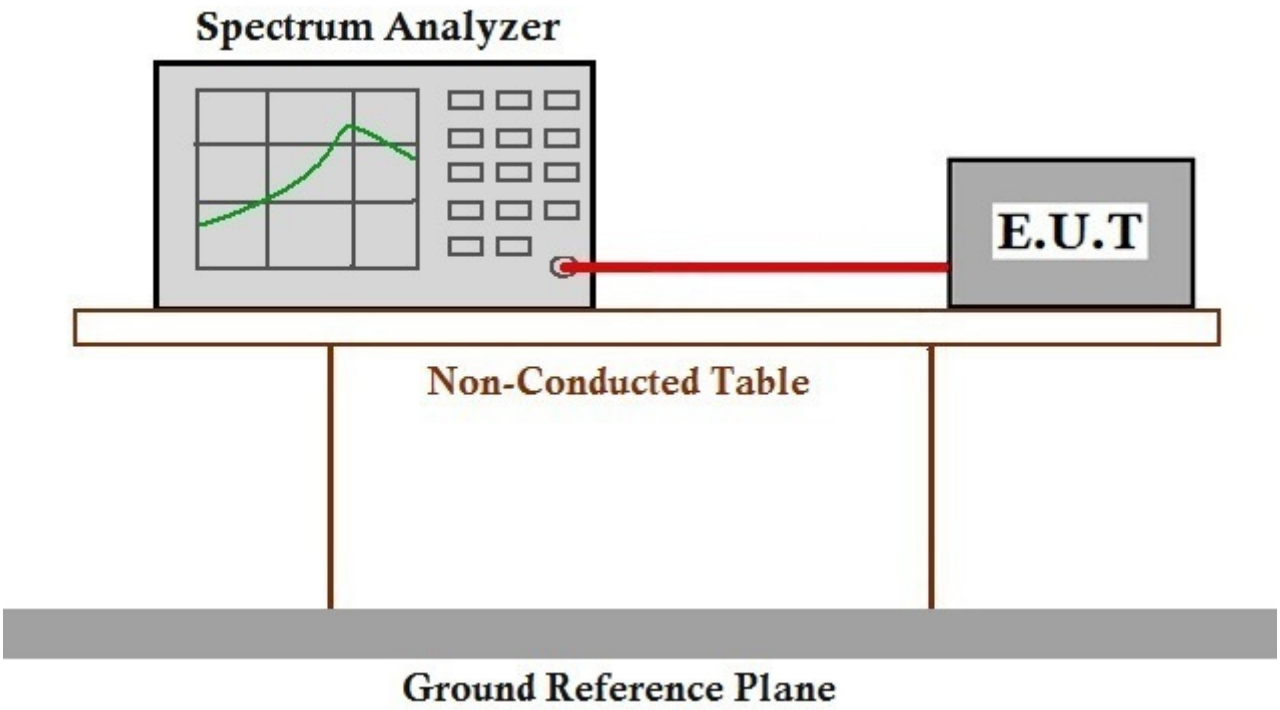
7.4.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1005 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 15.407

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.	

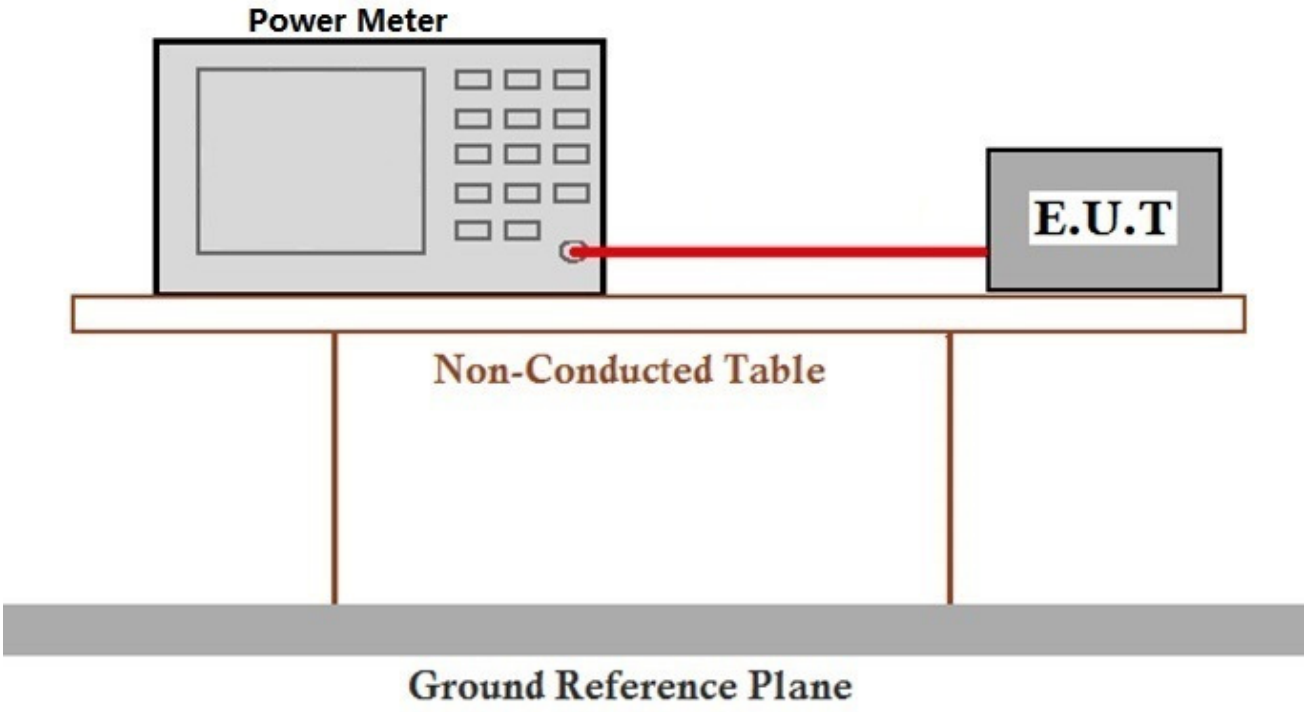
7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1005 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 15.407

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.	

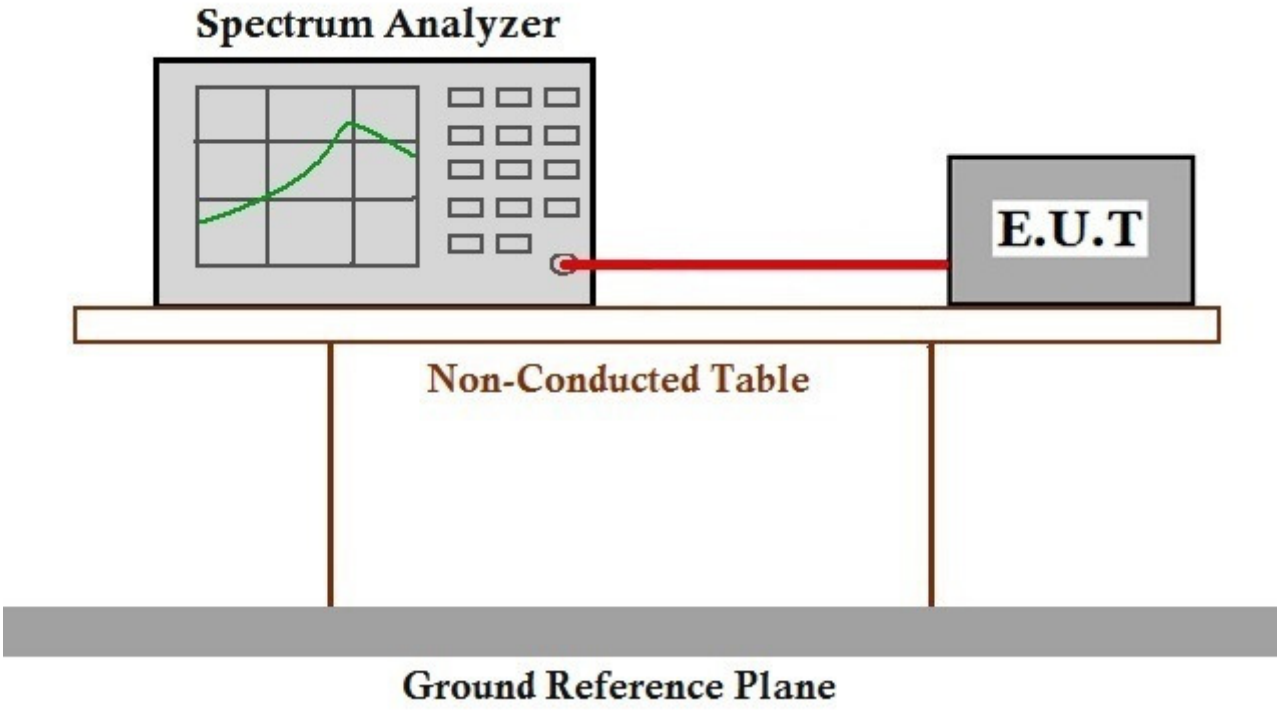
7.6.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1005 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 15.407

7.7 Radiated Emissions

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

Test Method: KDB 789033 D02 II G

Measurement Distance: 10m

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 24 °C Humidity: 54 % RH Atmospheric Pressure: 1005 mbar

Pretest these mode to find the worst case:

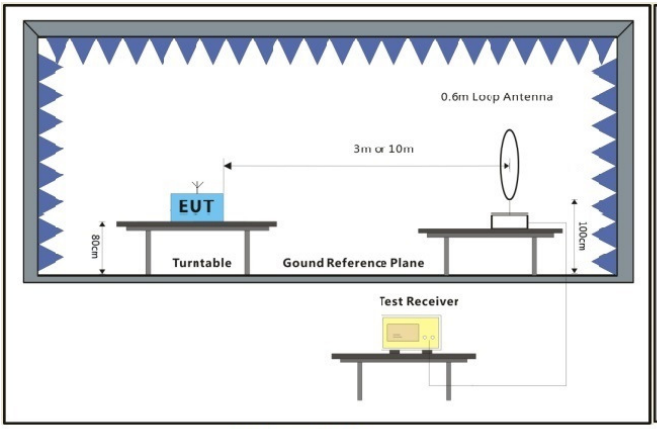
b:TX mode (Band 3)_Keep the EUT in continuously transmitting mode with all modulation types. All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst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

c:Charge + TX mode (Band 3)_Keep the EUT in charging and 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.

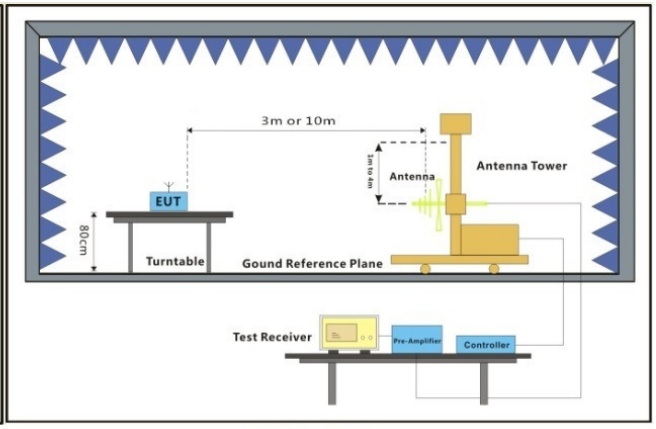
The worst case for final test:

c:Charge + TX mode (Band 3)_Keep the EUT in charging and 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.

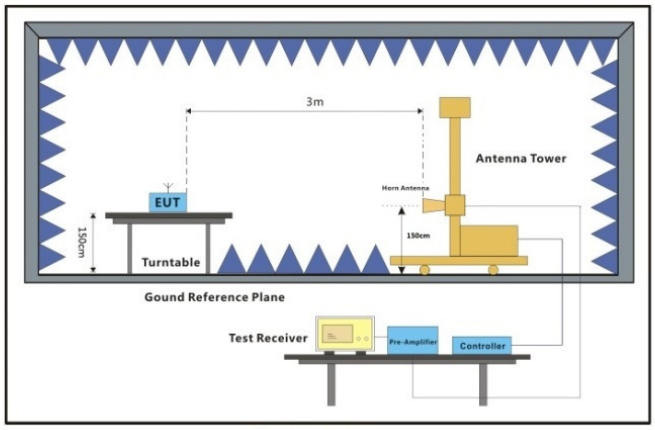
7.7.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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

Radiated Emission below 1GHz

The test was performed at a 10m test site. According to below formulate and the test data at 10m test distance,

$L_3 / L_{10} = D_{10} / D_3$

Note:

L_3: Level @ 3m distance. Unit: uV/m;

L_{10}: Level @ 10m distance. Unit: uV/m;

D_3: 3m distance. Unit: m

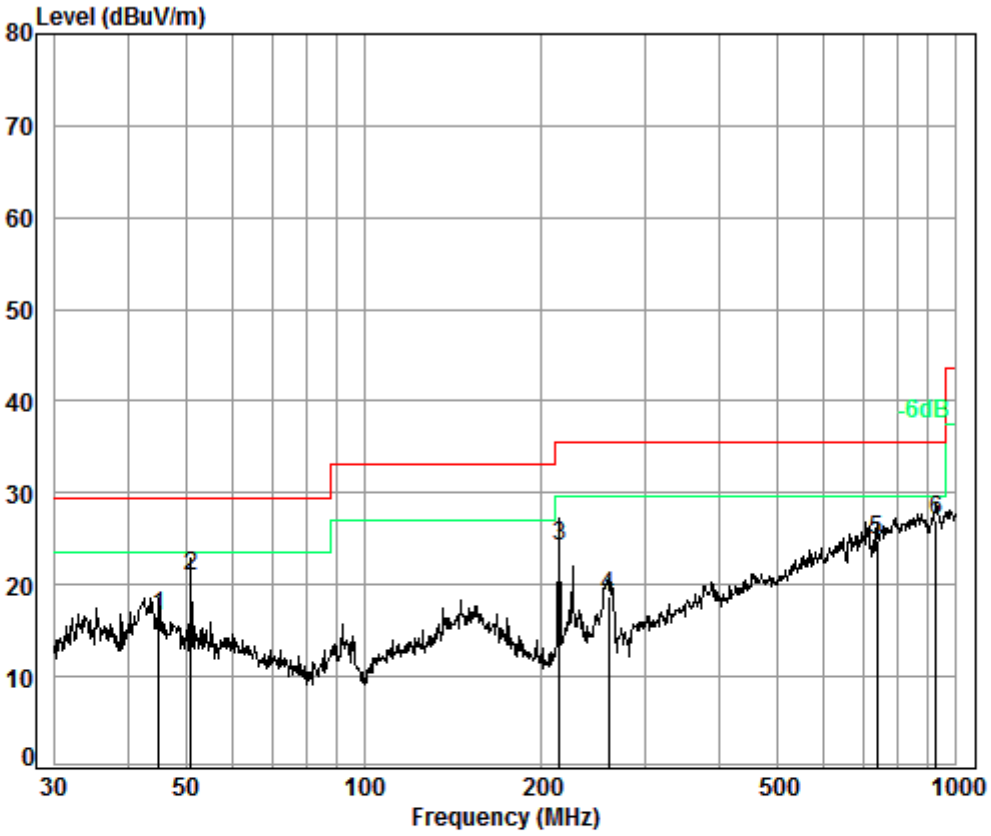
D_{10}: 10m distance. Unit: m

The level at 3m test distance is below:

Mode c:

Frequency (MHz)	Level @ 10m (dBuV/m)	Level @ 10m (uV/m)	Level @ 3m (uV/m)	Level @ 3m (dBuV/m)	Limit @ 3m (dBuV/m)	Margin (dB)	Ant. Polarization
45.06	16.62	6.78	22.59	27.08	40.00	-12.92	V
51.12	20.92	11.12	37.06	31.38	40.00	-8.62	V
214.51	24.21	16.24	54.12	34.67	43.50	-8.83	V
259.23	18.73	8.64	28.80	29.19	46.00	-16.81	V
737.07	24.90	17.58	58.60	35.36	46.00	-10.64	V
925.76	27.07	22.57	75.23	37.53	46.00	-8.47	V
48.84	22.52	13.37	44.55	32.98	40.00	-7.02	H
106.76	16.49	6.68	22.25	26.95	43.50	-16.55	H
227.23	20.44	10.52	35.07	30.90	46.00	-15.10	H
273.23	19.28	9.20	30.68	29.74	46.00	-16.26	H
689.56	25.75	19.39	64.62	36.21	46.00	-9.79	H
842.13	27.12	22.70	75.66	37.58	46.00	-8.42	H

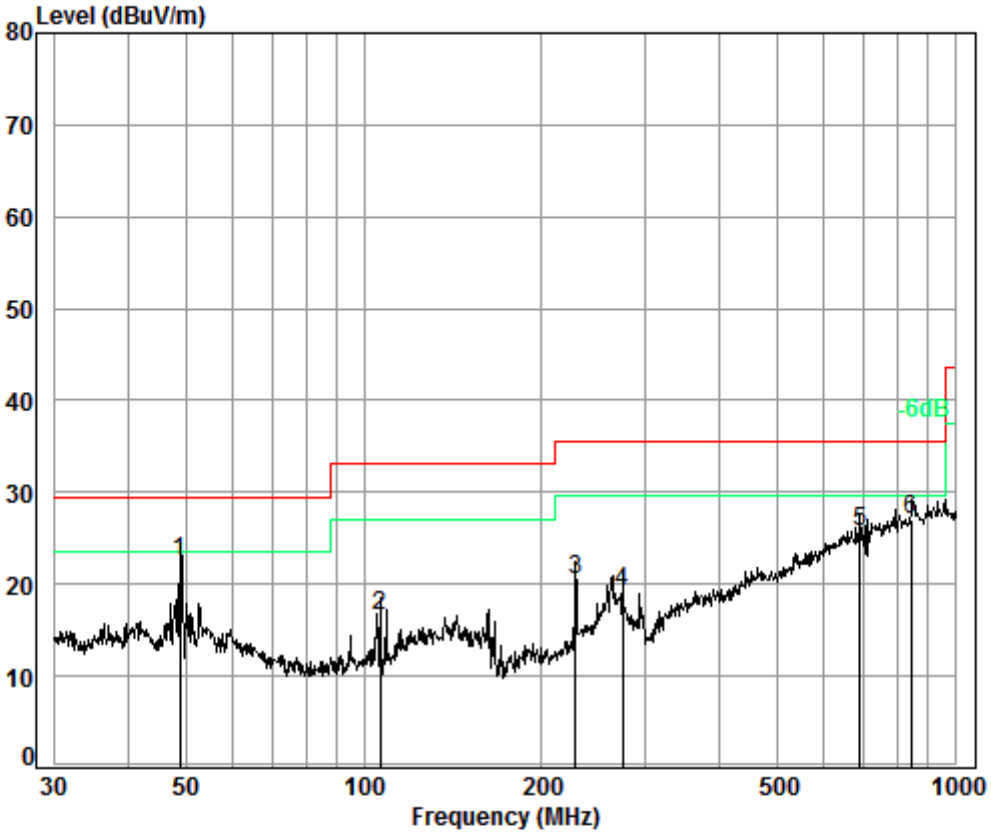
30MHz~1GHz（QP）		
Test mode:	c	Vertical



Condition: 10m VERTICAL
Job No. : 06520CR
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	45.06	6.80	12.90	32.99	29.91	16.62	29.50	-12.88
2	51.12	6.92	12.69	32.99	34.30	20.92	29.50	-8.58
3	214.51	7.67	9.82	32.68	39.40	24.21	35.60	-11.39
4	259.23	7.90	11.46	32.64	32.01	18.73	35.60	-16.87
5	737.07	9.20	20.61	32.60	27.69	24.90	35.60	-10.70
6 pp	925.76	9.51	22.57	32.50	27.49	27.07	35.60	-8.53

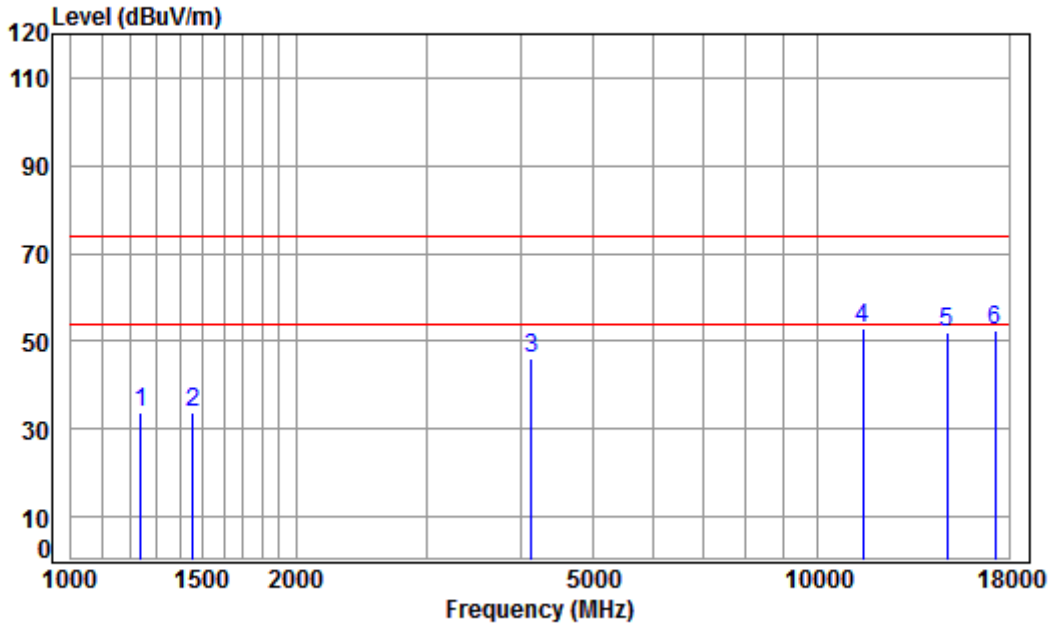
Test mode:	c	Horizontal



Condition: 10m HORIZONTAL
Job No. : 06520CR
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 pp	48.84	6.88	12.81	33.00	35.83	22.52	29.50	-6.98
2	106.76	7.24	10.06	32.79	31.98	16.49	33.10	-16.61
3	227.69	7.74	10.64	32.67	34.73	20.44	35.60	-15.16
4	273.23	7.97	11.95	32.62	31.98	19.28	35.60	-16.32
5	689.56	9.12	20.00	32.60	29.23	25.75	35.60	-9.85
6	842.13	9.31	21.54	32.56	28.83	27.12	35.60	-8.48

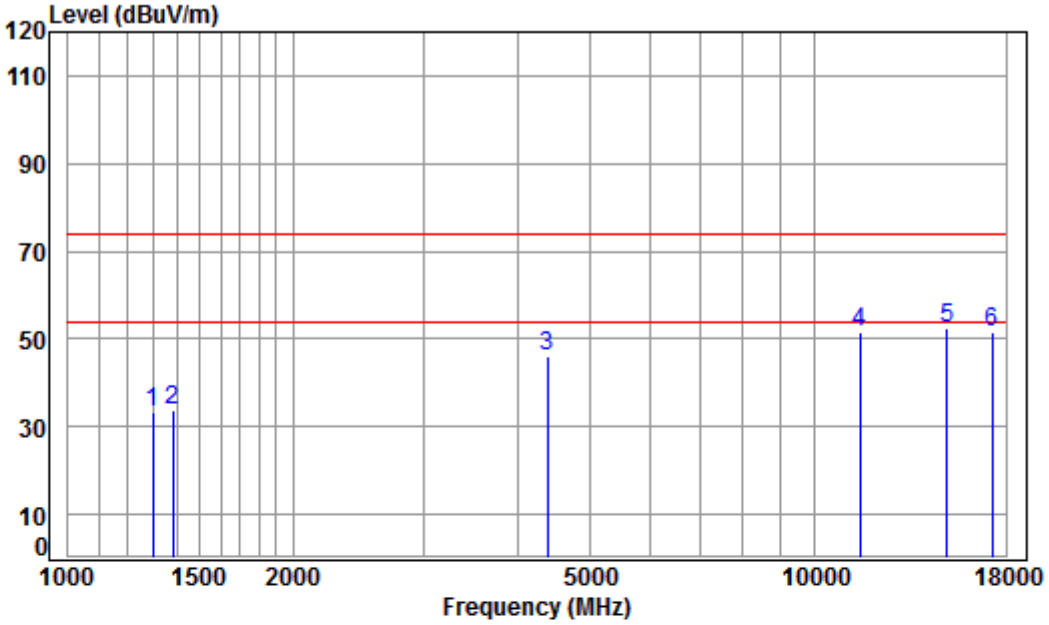
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:Low



Condition: 3m HORIZONTAL
Job No: : 06520CR/06559CR
Mode: : 5745 TX SE
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1238.483	4.13	24.67	38.08	43.27	33.99	74.00	-40.01	peak
2	1456.081	4.42	25.62	38.05	41.83	33.82	74.00	-40.18	peak
3	4133.699	6.86	33.60	38.07	43.69	46.08	74.00	-27.92	peak
4	pp11490.000	12.33	38.09	35.50	38.11	53.03	74.00	-20.97	peak
5	14873.890	14.82	41.08	38.91	35.02	52.01	74.00	-21.99	peak
6	17235.000	17.60	43.08	36.18	27.77	52.27	74.00	-21.73	peak

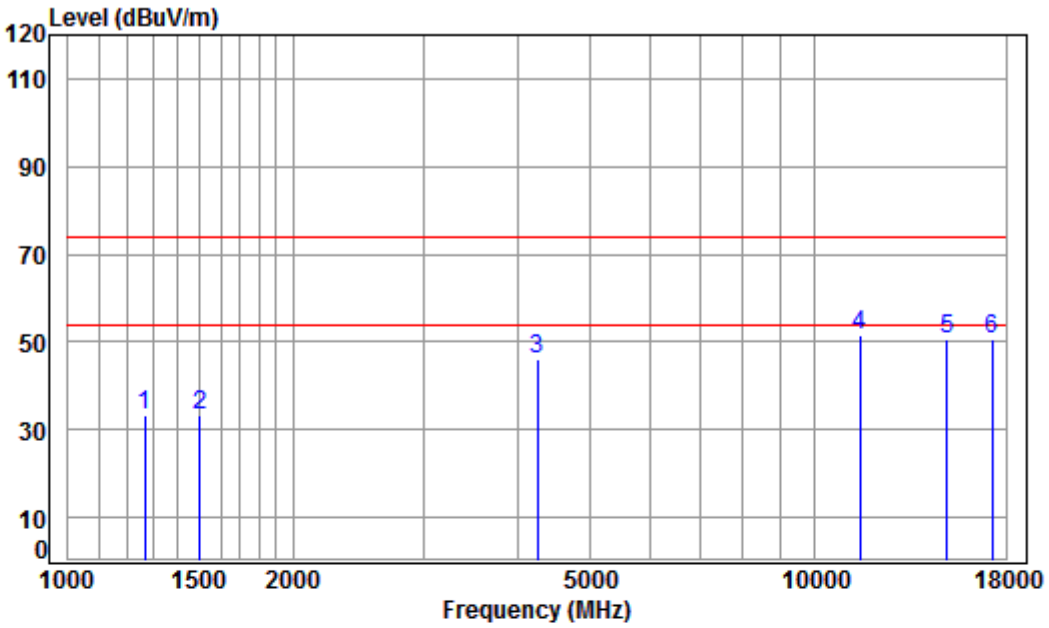
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:Low



Condition: 3m HORIZONTAL
Job No: : 06520CR/06559CR
Mode: : 5745 TX SE
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1297.103	4.22	24.94	38.07	42.15	33.24	74.00	-40.76	peak
2	1382.262	4.33	25.32	38.06	42.40	33.99	74.00	-40.01	peak
3	4379.699	7.15	33.60	38.19	43.47	46.03	74.00	-27.97	peak
4	11490.000	12.33	38.09	35.50	36.62	51.54	74.00	-22.46	peak
5	pp15003.420	14.85	41.30	38.90	35.42	52.67	74.00	-21.33	peak
6	17235.000	17.60	43.08	36.18	27.20	51.70	74.00	-22.30	peak

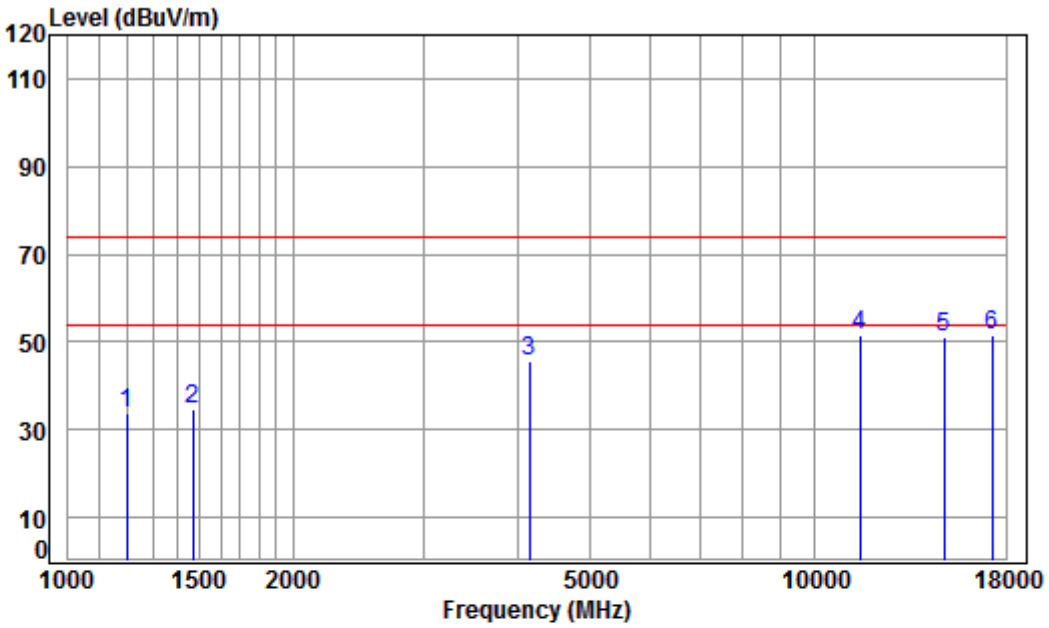
Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:Low



Condition: 3m VERTICAL
Job No: : 06520CR/06559CR
Mode: : 5745 TX SE
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1267.454	4.18	24.80	38.07	42.43	33.34	74.00	-40.66	peak
2	1503.119	4.47	25.81	38.05	41.28	33.51	74.00	-40.49	peak
3	4254.921	7.00	33.60	38.13	43.73	46.20	74.00	-27.80	peak
4	pp11490.000	12.33	38.09	35.50	36.85	51.77	74.00	-22.23	peak
5	15003.420	14.85	41.30	38.90	33.55	50.80	74.00	-23.20	peak
6	17235.000	17.60	43.08	36.18	26.13	50.63	74.00	-23.37	peak

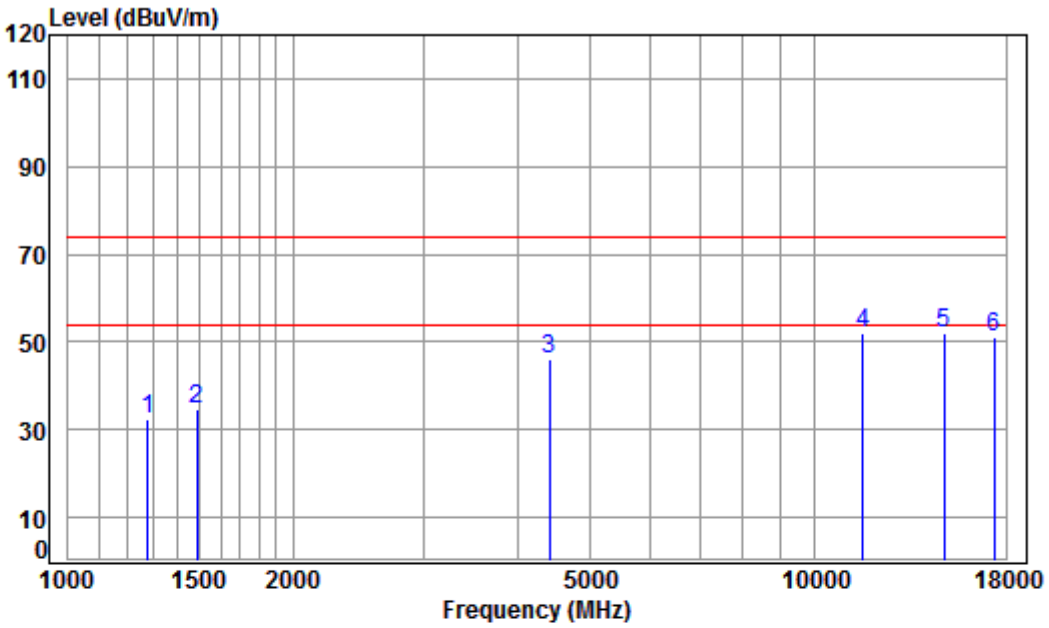
Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:Low



Condition: 3m VERTICAL
Job No: : 06520CR/06559CR
Mode: : 5745 TX SE
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1199.726	4.08	24.48	38.08	43.41	33.89	74.00	-40.11	peak
2	1468.761	4.43	25.68	38.05	42.57	34.63	74.00	-39.37	peak
3	4145.664	6.88	33.60	38.07	43.39	45.80	74.00	-28.20	peak
4	pp11490.000	12.33	38.09	35.50	36.70	51.62	74.00	-22.38	peak
5	14873.890	14.82	41.08	38.91	34.14	51.13	74.00	-22.87	peak
6	17235.000	17.60	43.08	36.18	26.97	51.47	74.00	-22.53	peak

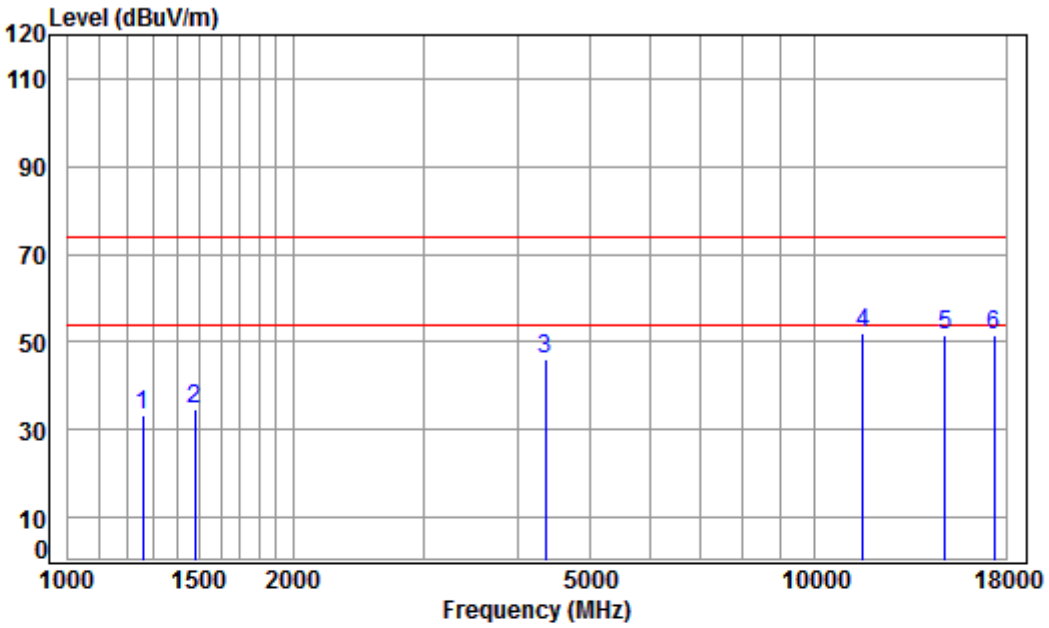
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:middle



Condition: 3m HORIZONTAL
Job No: : 06520CR/06559CR
Mode: : 5785 TX SE
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1278.492	4.19	24.85	38.07	41.65	32.62	74.00	-41.38	peak
2	1485.841	4.45	25.74	38.05	42.35	34.49	74.00	-39.51	peak
3	4405.090	7.18	33.60	38.20	43.59	46.17	74.00	-27.83	peak
4	pp11570.000	12.34	38.17	35.51	37.14	52.14	74.00	-21.86	peak
5	14873.890	14.82	41.08	38.91	34.92	51.91	74.00	-22.09	peak
6	17355.000	17.93	43.23	36.12	26.10	51.14	74.00	-22.86	peak

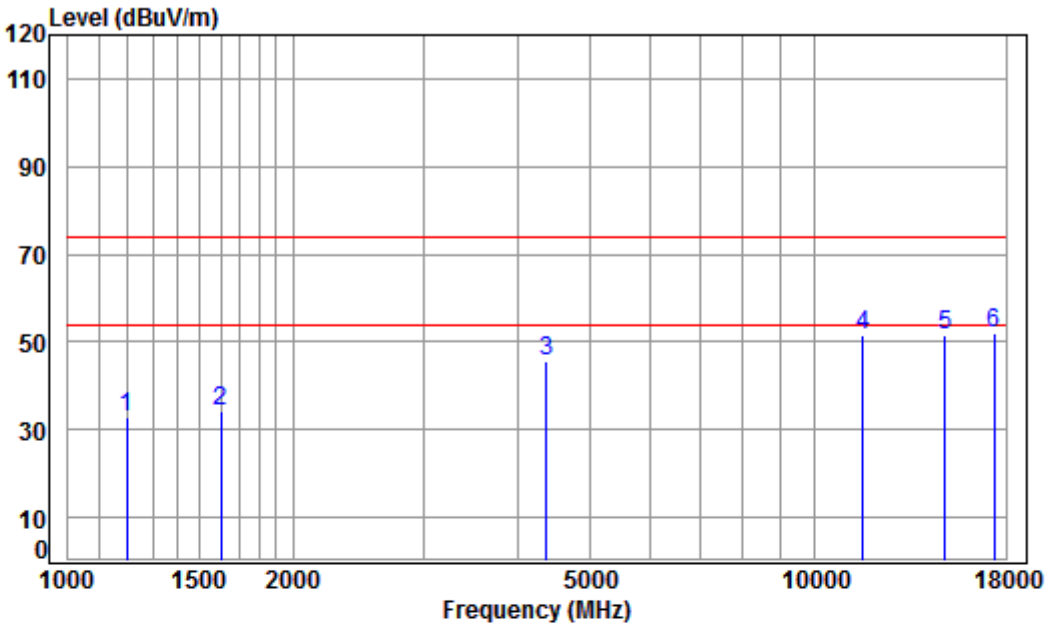
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:middle



Condition: 3m HORIZONTAL
Job No: : 06520CR/06559CR
Mode: : 5785 TX SE
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1260.149	4.16	24.77	38.07	42.67	33.53	74.00	-40.47	peak
2	1477.276	4.44	25.71	38.05	42.77	34.87	74.00	-39.13	peak
3	4354.454	7.12	33.60	38.18	43.55	46.09	74.00	-27.91	peak
4	pp11570.000	12.34	38.17	35.51	36.92	51.92	74.00	-22.08	peak
5	14916.940	14.83	41.15	38.91	34.66	51.73	74.00	-22.27	peak
6	17355.000	17.93	43.23	36.12	26.66	51.70	74.00	-22.30	peak

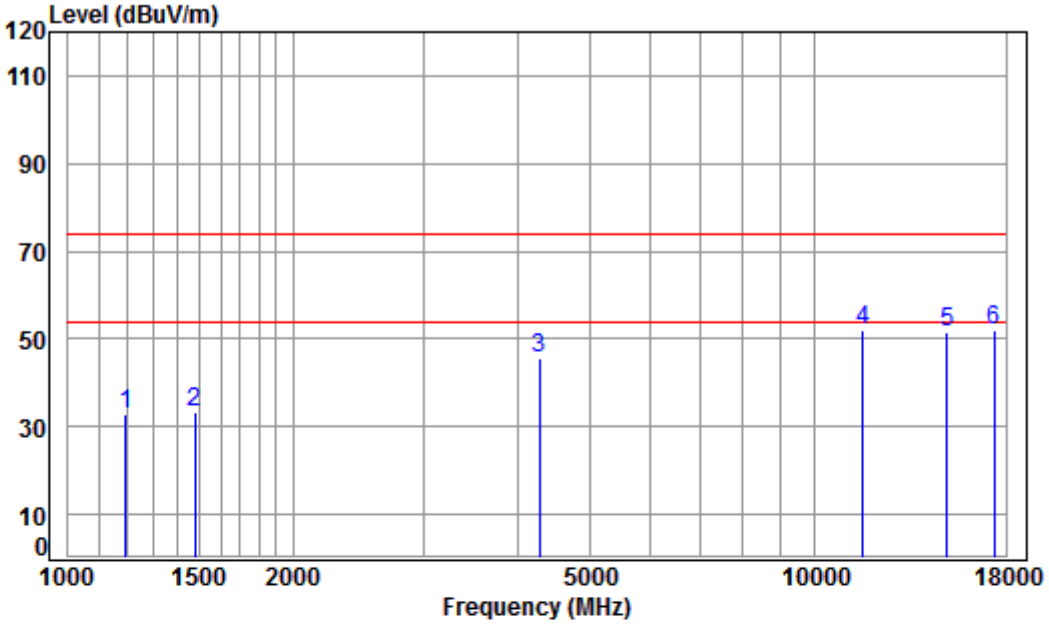
Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:middle



Condition: 3m VERTICAL
Job No: : 06520CR/06559CR
Mode: : 5785 TX SE
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1199.726	4.08	24.48	38.08	42.41	32.89	74.00	-41.11	peak
2	1601.804	4.59	26.26	38.04	41.51	34.32	74.00	-39.68	peak
3	4367.058	7.13	33.60	38.18	43.18	45.73	74.00	-28.27	peak
4	11570.000	12.34	38.17	35.51	36.79	51.79	74.00	-22.21	peak
5	14916.940	14.83	41.15	38.91	34.54	51.61	74.00	-22.39	peak
6	pp17355.000	17.93	43.23	36.12	27.15	52.19	74.00	-21.81	peak

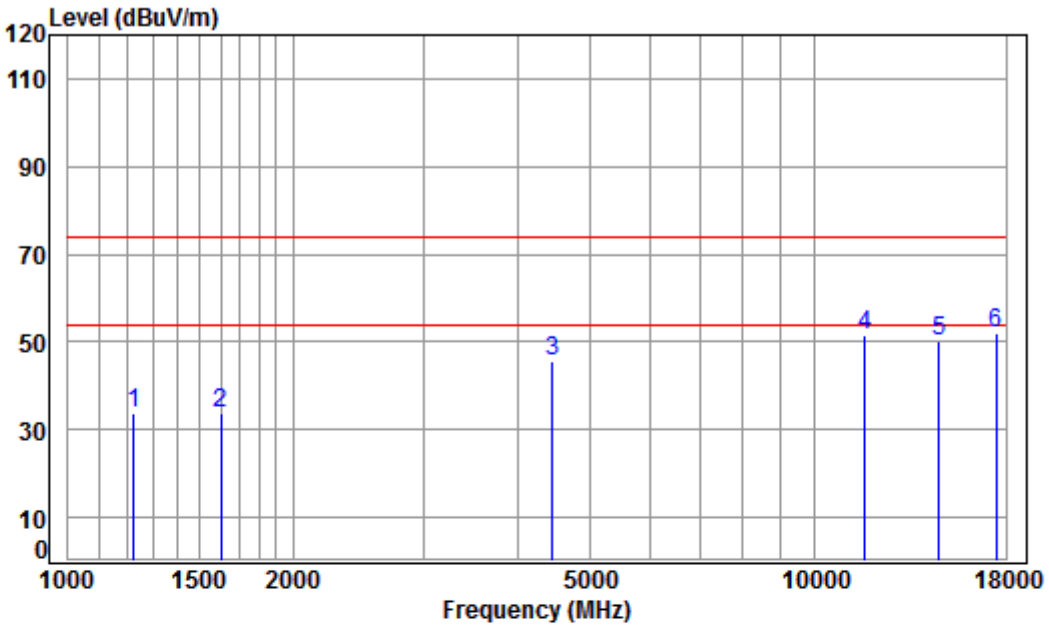
Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:middle



Condition: 3m VERTICAL
Job No: : 06520CR/06559CR
Mode: : 5785 TX SE
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1196.264	4.07	24.46	38.08	42.62	33.07	74.00	-40.93	peak
2	1477.276	4.44	25.71	38.05	41.39	33.49	74.00	-40.51	peak
3	4279.589	7.03	33.60	38.14	43.11	45.60	74.00	-28.40	peak
4	11570.000	12.34	38.17	35.51	36.81	51.81	74.00	-22.19	peak
5	15003.420	14.85	41.30	38.90	34.25	51.50	74.00	-22.50	peak
6	pp17355.000	17.93	43.23	36.12	27.07	52.11	74.00	-21.89	peak

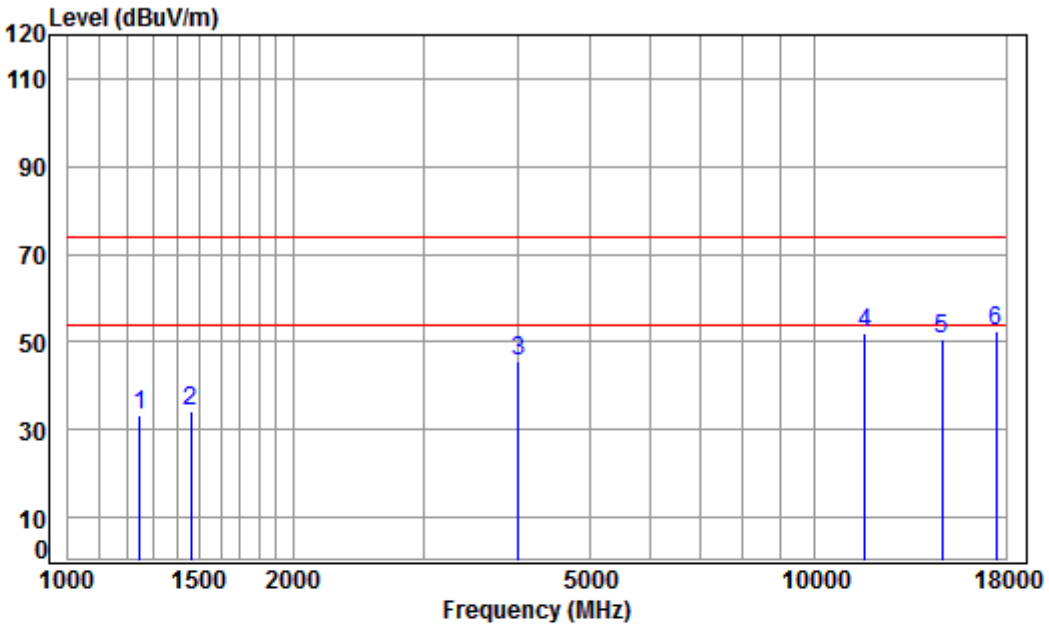
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:High



Condition: 3m HORIZONTAL
Job No: : 06520CR/06559CR
Mode: : 5825 TX SE
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1224.247	4.11	24.60	38.08	43.02	33.65	74.00	-40.35	peak
2	1601.804	4.59	26.26	38.04	40.74	33.55	74.00	-40.45	peak
3	4456.315	7.23	33.60	38.23	43.07	45.67	74.00	-28.33	peak
4	11650.000	12.35	38.25	35.53	36.57	51.64	74.00	-22.36	peak
5	14660.480	14.76	40.69	38.93	33.88	50.40	74.00	-23.60	peak
6	pp17475.000	18.25	43.37	36.06	26.37	51.93	74.00	-22.07	peak

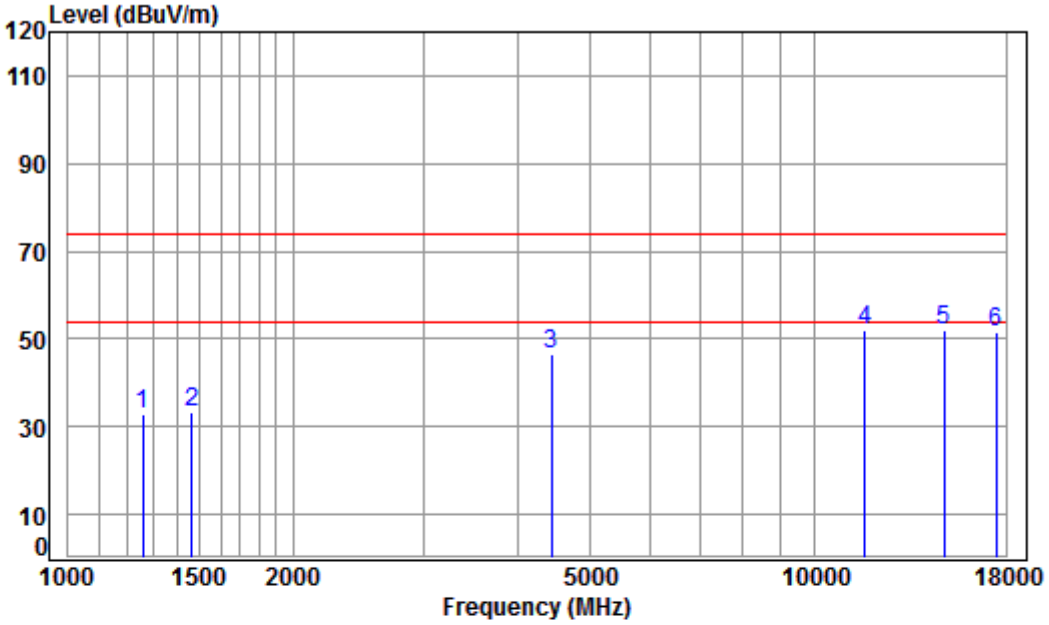
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:High



Condition: 3m HORIZONTAL
Job No: : 06520CR/06559CR
Mode: : 5825 TX SE
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1249.269	4.15	24.72	38.08	42.39	33.18	74.00	-40.82	peak
2	1460.295	4.42	25.64	38.05	41.99	34.00	74.00	-40.00	peak
3	4004.339	6.71	33.60	38.00	43.21	45.52	74.00	-28.48	peak
4	11650.000	12.35	38.25	35.53	36.88	51.95	74.00	-22.05	peak
5	14788.150	14.80	40.92	38.92	33.94	50.74	74.00	-23.26	peak
6	pp17475.000	18.25	43.37	36.06	27.11	52.67	74.00	-21.33	peak

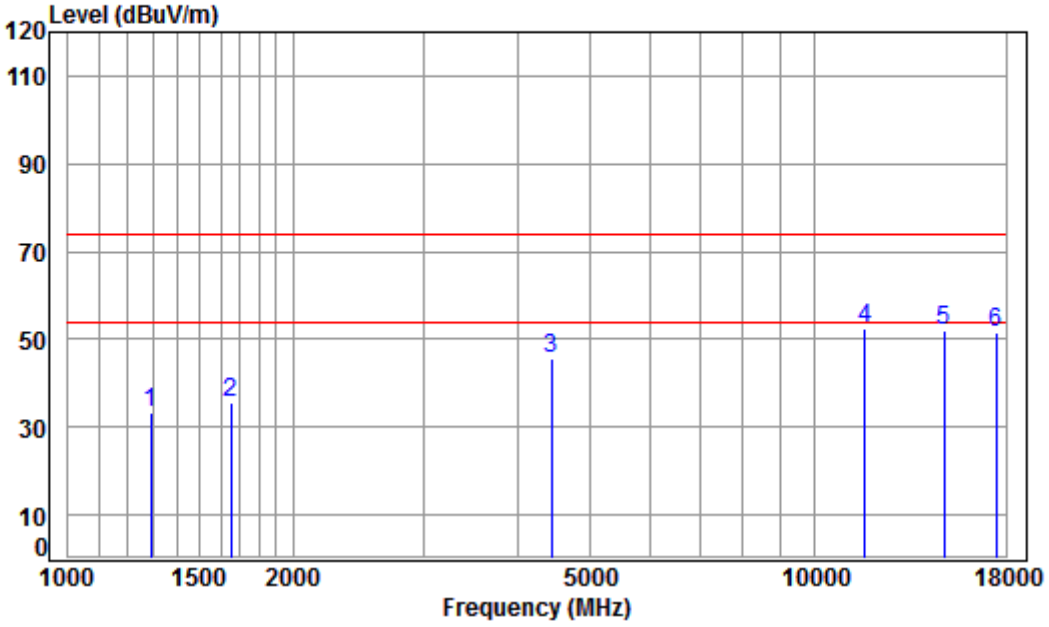
Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:High



Condition: 3m VERTICAL
Job No: : 06520CR/06559CR
Mode: : 5825 TX SE
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1260.149	4.16	24.77	38.07	42.18	33.04	74.00	-40.96	peak
2	1464.522	4.43	25.66	38.05	41.37	33.41	74.00	-40.59	peak
3	4430.628	7.20	33.60	38.22	43.82	46.40	74.00	-27.60	peak
4	pp11650.000	12.35	38.25	35.53	37.09	52.16	74.00	-21.84	peak
5	14873.890	14.82	41.08	38.91	35.15	52.14	74.00	-21.86	peak
6	17475.000	18.25	43.37	36.06	26.10	51.66	74.00	-22.34	peak

Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:High



Condition: 3m VERTICAL
Job No: : 06520CR/06559CR
Mode: : 5825 TX SE
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	1289.627	4.21	24.91	38.07	42.16	33.21	74.00	-40.79	peak
2	1653.550	4.65	26.48	38.03	42.28	35.38	74.00	-38.62	peak
3	4430.628	7.20	33.60	38.22	42.89	45.47	74.00	-28.53	peak
4	pp11650.000	12.35	38.25	35.53	37.43	52.50	74.00	-21.50	peak
5	14873.890	14.82	41.08	38.91	35.08	52.07	74.00	-21.93	peak
6	17475.000	18.25	43.37	36.06	25.78	51.34	74.00	-22.66	peak

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 + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz,The disturbance above 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .

3) 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. So, only the peak measurements were shown in the report.

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
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.		

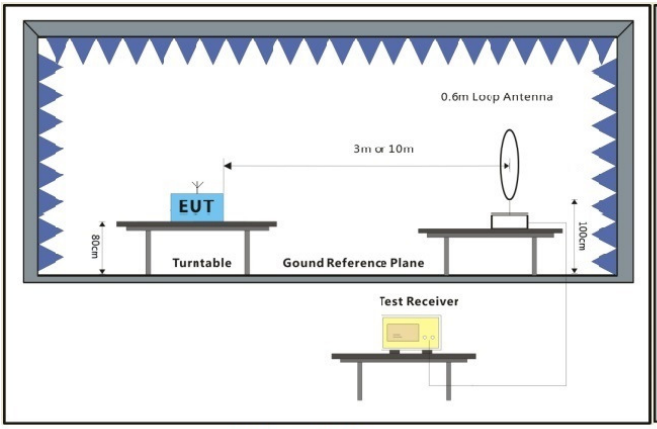
7.8.1 E.U.T. Operation

Operating Environment:

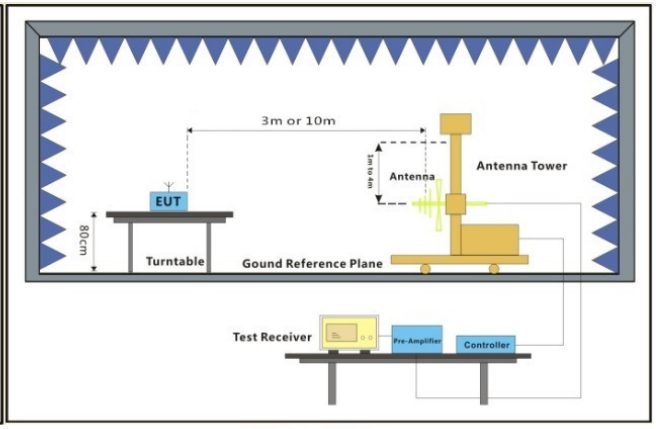
Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1005 mbar

Pretest these mode to find the worst case:	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. c:Charge + TX mode (Band 3)_Keep the EUT in charging and 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.
The worst case for final test:	c:Charge + TX mode (Band 3)_Keep the EUT in charging and 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.

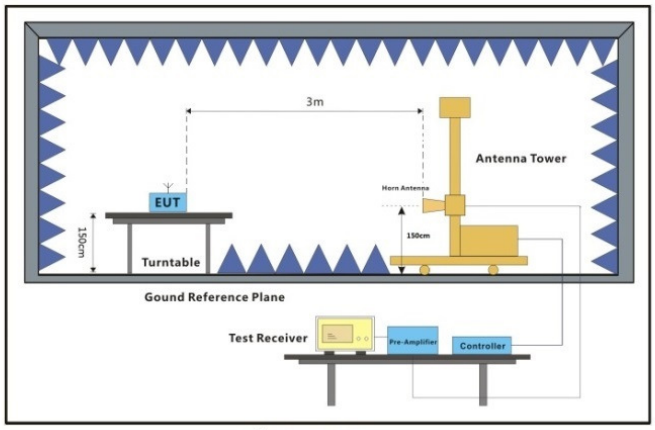
7.8.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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.

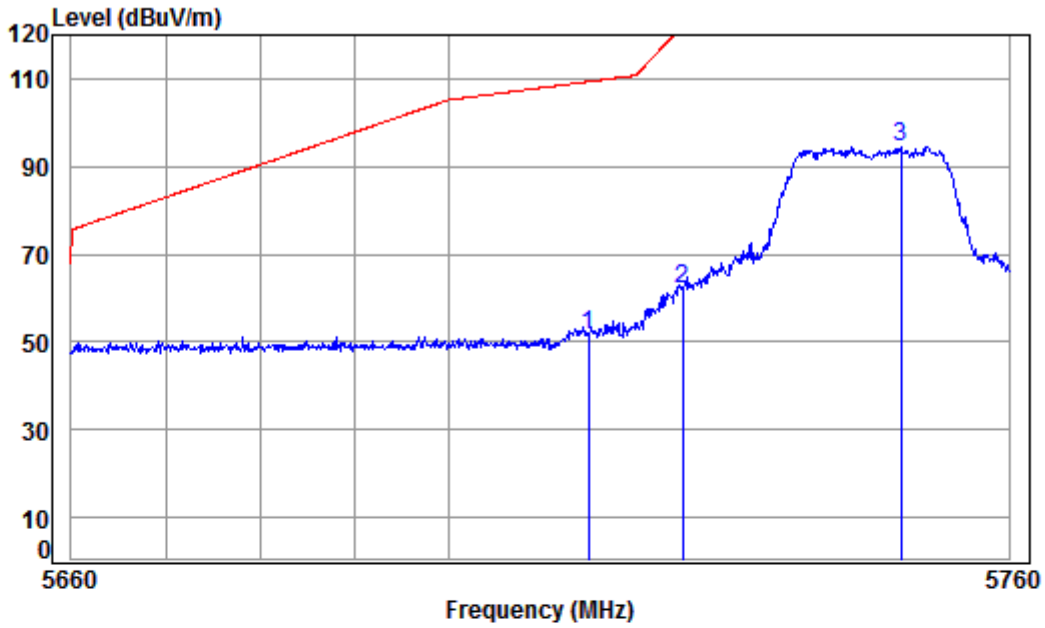
h. Test the EUT in the lowest channel,the middle channel,the Highest channel.

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

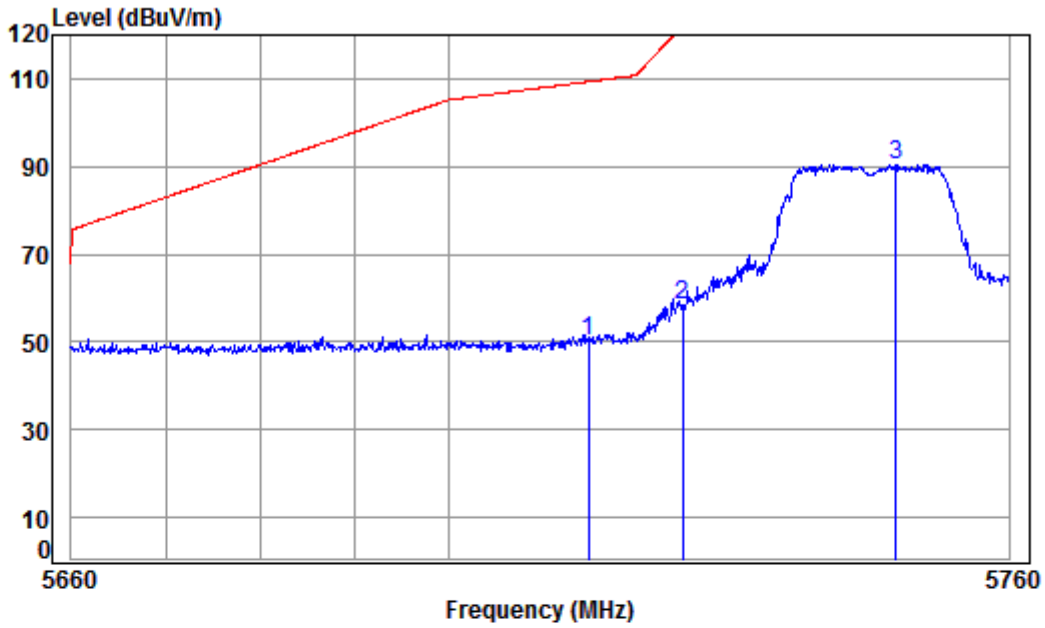
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:Low



Condition: 3m HORIZONTAL
Job No : 06520CR/06559CR
Mode : 5745 Band edge
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5715.000	8.47	34.53	38.36	47.03	51.67	109.40	-57.73	peak
2	5725.000	8.48	34.54	38.35	57.45	62.12	122.20	-60.08	peak
3 pp	5748.411	8.50	34.55	38.35	89.79	94.49	125.20	-30.71	peak

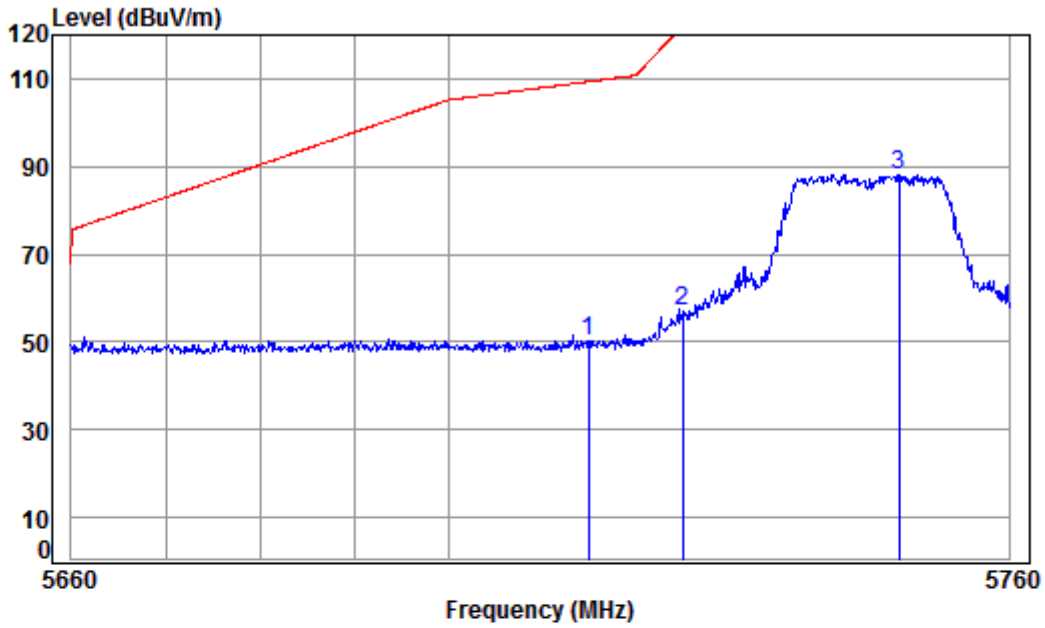
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:Low



Condition: 3m HORIZONTAL
Job No : 06520CR/06559CR
Mode : 5745 Band edge
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5715.000	8.47	34.53	38.36	45.59	50.23	109.40	-59.17	peak
2	5725.000	8.48	34.54	38.35	53.54	58.21	122.20	-63.99	peak
3 pp	5747.907	8.50	34.55	38.35	85.74	90.44	125.20	-34.76	peak

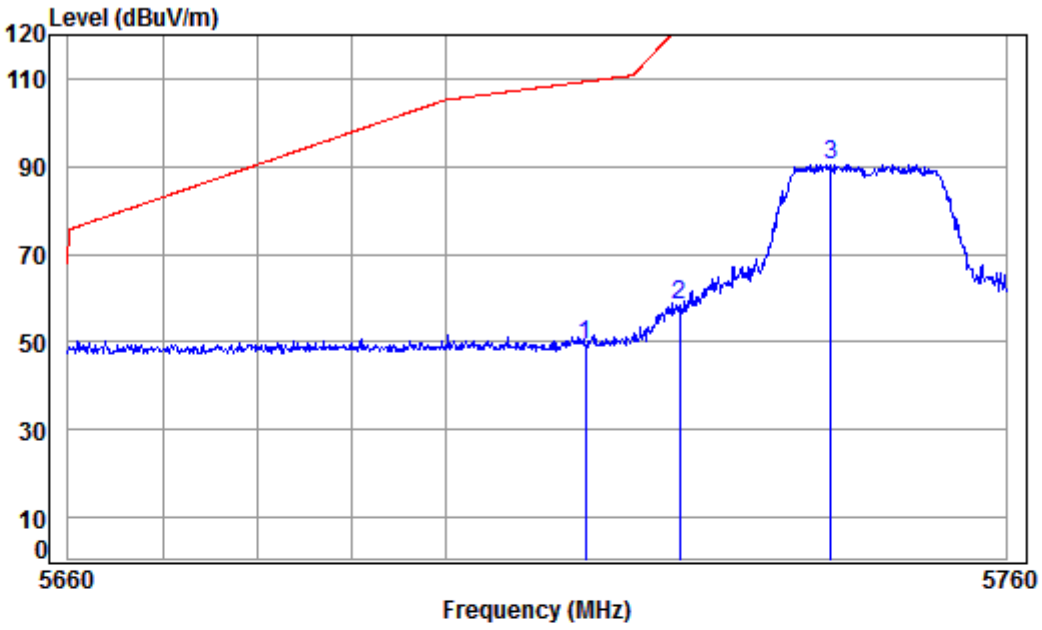
Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:Low



Condition: 3m VERTICAL
Job No : 06520CR/06559CR
Mode : 5745 Band edge
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5715.000	8.47	34.53	38.36	45.33	49.97	109.40	-59.43	peak
2	5725.000	8.48	34.54	38.35	52.17	56.84	122.20	-65.36	peak
3 pp	5748.209	8.50	34.55	38.35	83.43	88.13	125.20	-37.07	peak

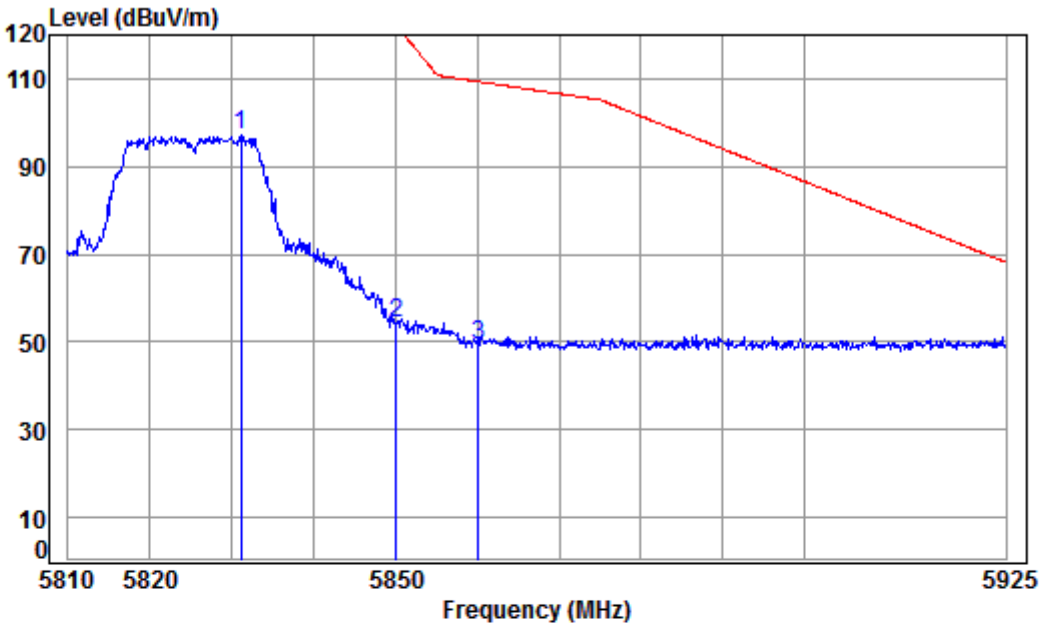
Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:Low



Condition: 3m VERTICAL
Job No : 06520CR/06559CR
Mode : 5745 Band edge
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1	5715.000	8.47	34.53	38.36	44.64	49.28	109.40	-60.12	peak
2	5725.000	8.48	34.54	38.35	53.92	58.59	122.20	-63.61	peak
3 pp	5741.167	8.50	34.55	38.35	85.71	90.41	125.20	-34.79	peak

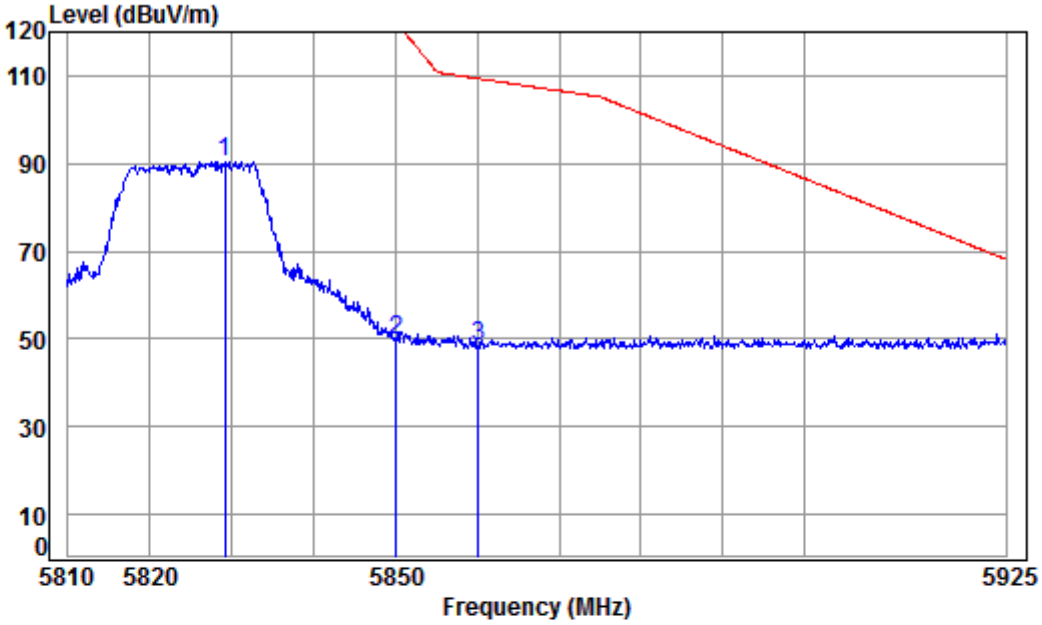
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:High



Condition: 3m HORIZONTAL
Job No : 06520CR/06559CR
Mode : 5825 Band edge
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	5831.105	8.59	34.60	38.33	92.11	96.97	125.20	-28.23	peak
2	5850.000	8.60	34.61	38.33	49.64	54.52	122.20	-67.68	peak
3	5860.000	8.61	34.62	38.33	44.37	49.27	109.40	-60.13	peak

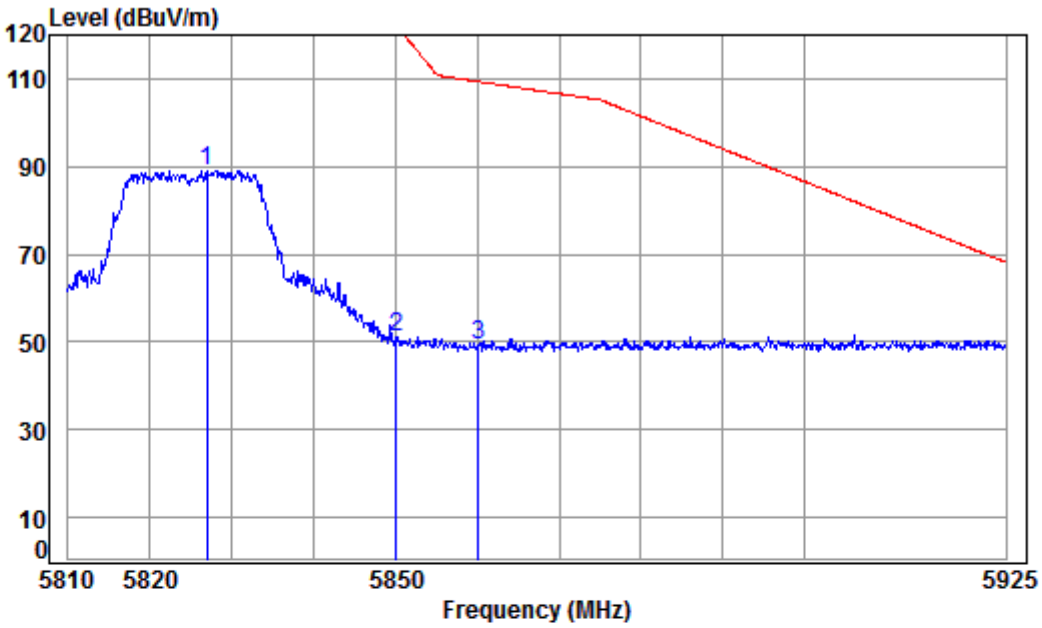
Mode:c; Polarization:Horizontal; Modulation Type:802.11a; bandwidth:20MHz; Channel:High



Condition: 3m HORIZONTAL
Job No : 06520CR/06559CR
Mode : 5825 Band edge
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	5829.048	8.58	34.60	38.33	85.47	90.32	125.20	-34.88	peak
2	5850.000	8.60	34.61	38.33	44.88	49.76	122.20	-72.44	peak
3	5860.000	8.61	34.62	38.33	43.54	48.44	109.40	-60.96	peak

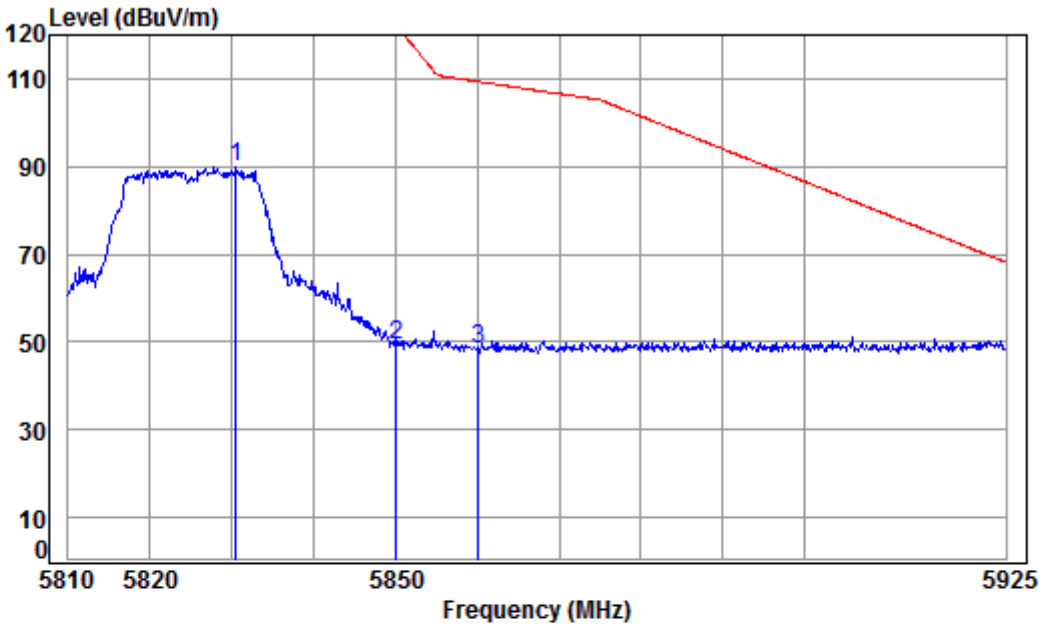
Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:High



Condition: 3m VERTICAL
Job No : 06520CR/06559CR
Mode : 5825 Band edge
: Earphone
: Antenna 1

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	5826.878	8.58	34.60	38.33	84.32	89.17	125.20	-36.03	peak
2	5850.000	8.60	34.61	38.33	46.16	51.04	122.20	-71.16	peak
3	5860.000	8.61	34.62	38.33	44.19	49.09	109.40	-60.31	peak

Mode:c; Polarization:Vertical; Modulation Type:802.11a; bandwidth:20MHz; Channel:High



Condition: 3m VERTICAL
Job No : 06520CR/06559CR
Mode : 5825 Band edge
: Earphone
: Antenna 2

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
1 pp	5830.420	8.59	34.60	38.33	84.81	89.67	125.20	-35.53	peak
2	5850.000	8.60	34.61	38.33	44.40	49.28	122.20	-72.92	peak
3	5860.000	8.61	34.62	38.33	43.58	48.48	109.40	-60.92	peak

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.

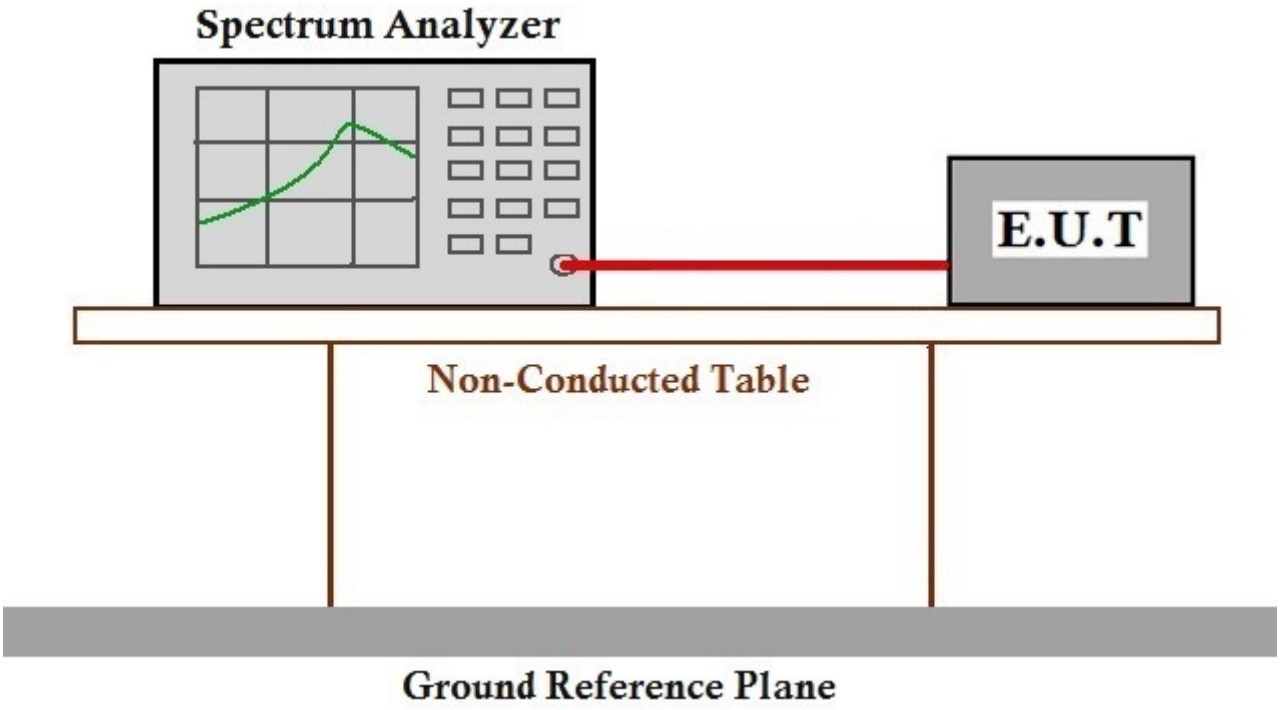
7.9.1 E.U.T. Operation

Operating Environment:

Temperature: 25 °C Humidity: 55 % RH Atmospheric Pressure: 1005 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



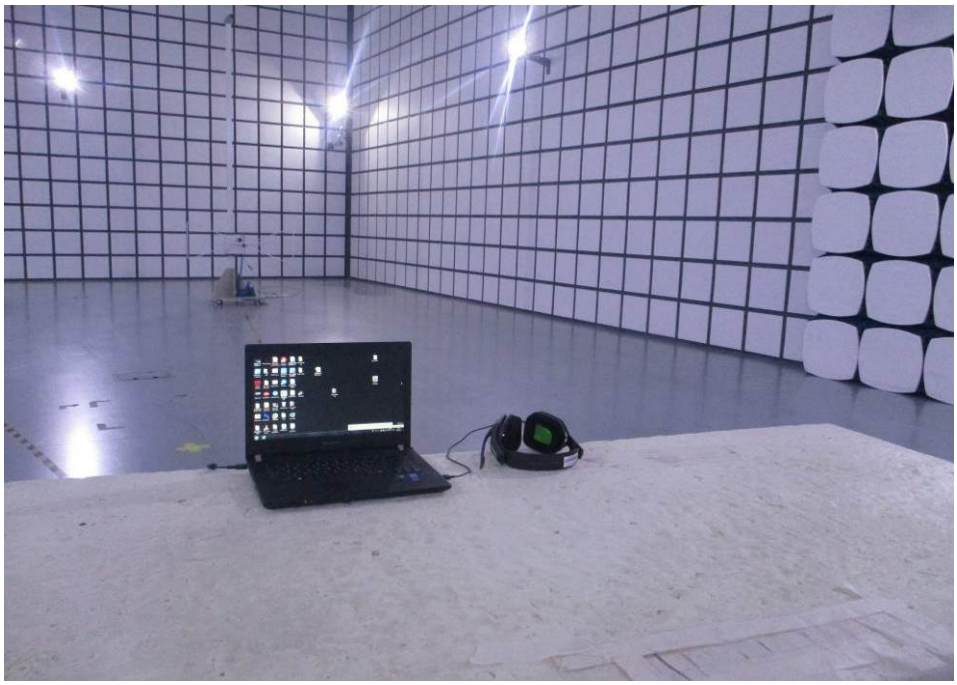
7.9.3 Measurement Procedure and Data

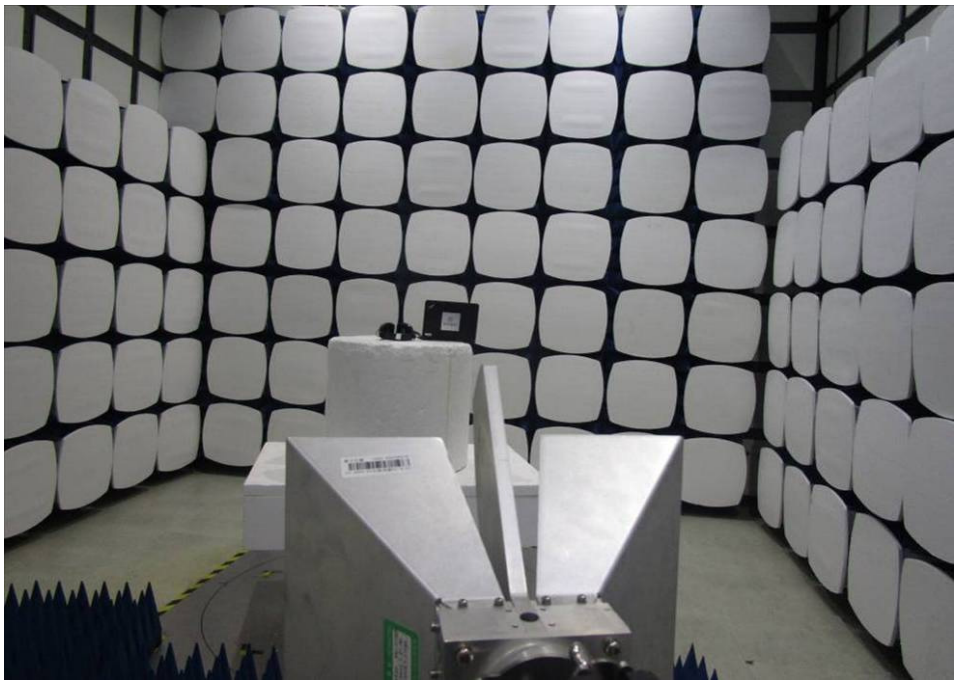
The detailed test data see: Appendix 15.407

8 Photographs

8.1 Conducted Emissions at AC Power Line (150kHz-30MHz) Test Setup

8.2 Radiated Emissions Test Setup





8.3 EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1706006520CR.

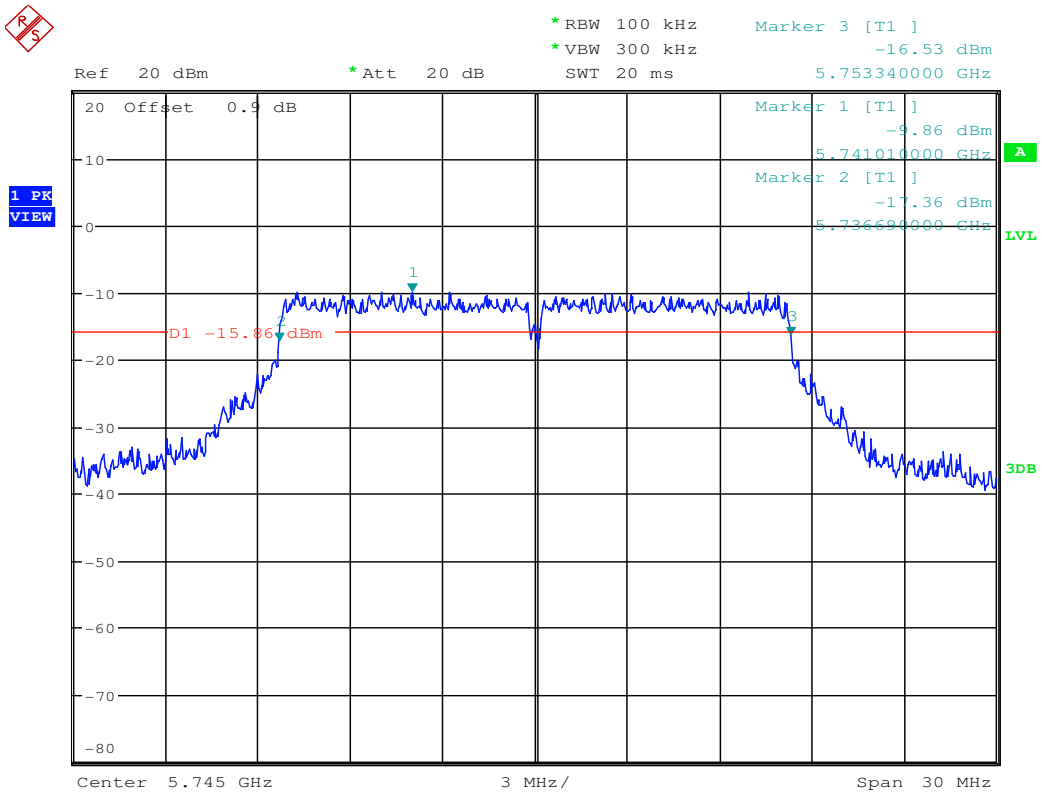
9 Appendix

9.1 Appendix 15.407

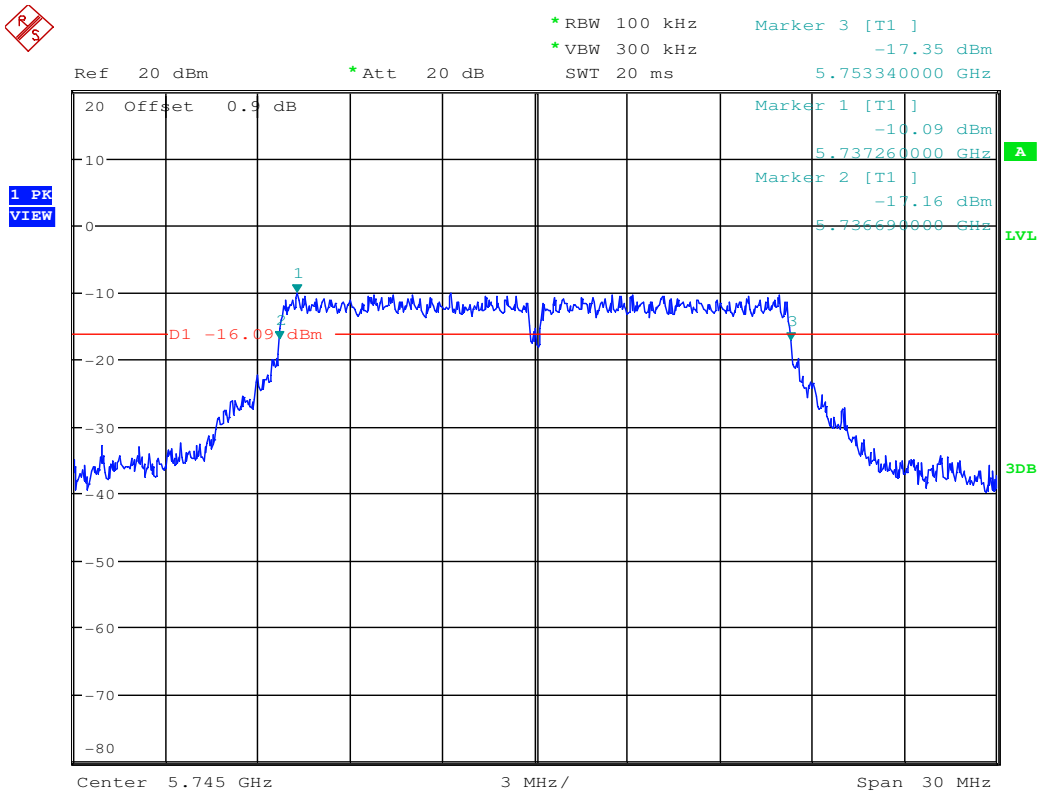
1.Emission Bandwidth Measurement

Test Mode	Test Channel	Ant	EBW[MHz]	Limit[MHz]	Verdict
11A	5745	Ant1	16.650	>=0.5	PASS
11A	5745	Ant2	16.650	>=0.5	PASS
11A	5785	Ant1	16.650	>=0.5	PASS
11A	5785	Ant2	16.650	>=0.5	PASS
11A	5825	Ant1	16.650	>=0.5	PASS
11A	5825	Ant2	16.650	>=0.5	PASS

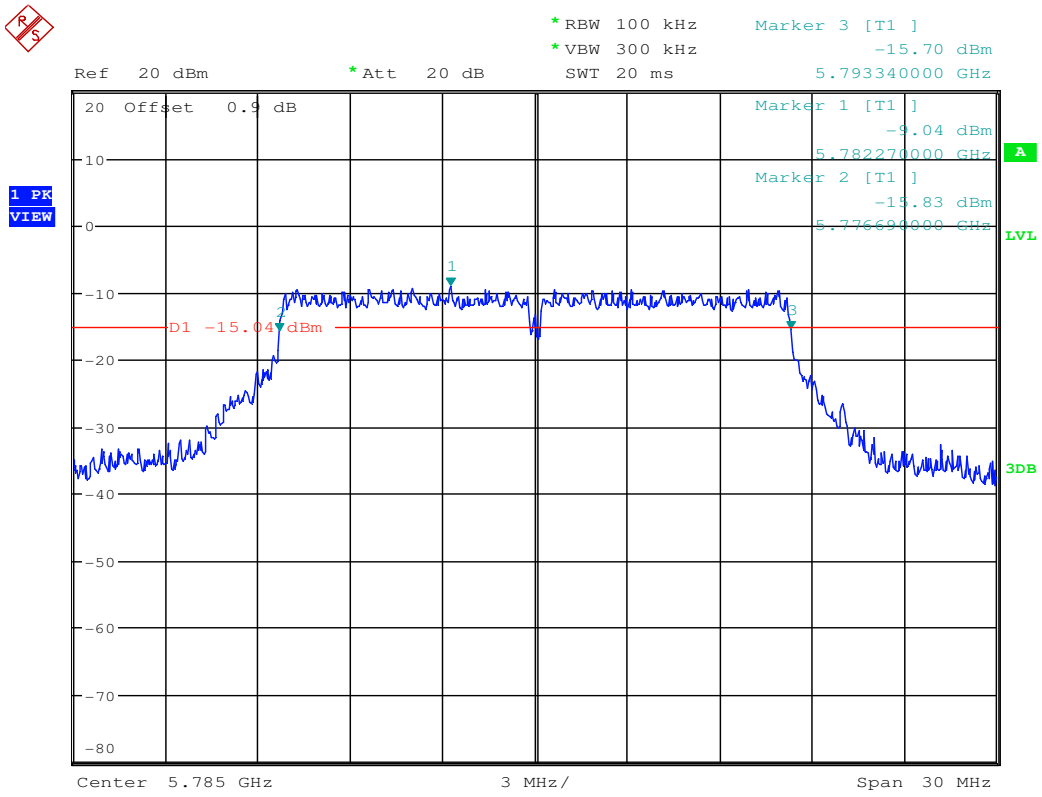
Emission Bandwidth Measurement_11A_5745_Ant1



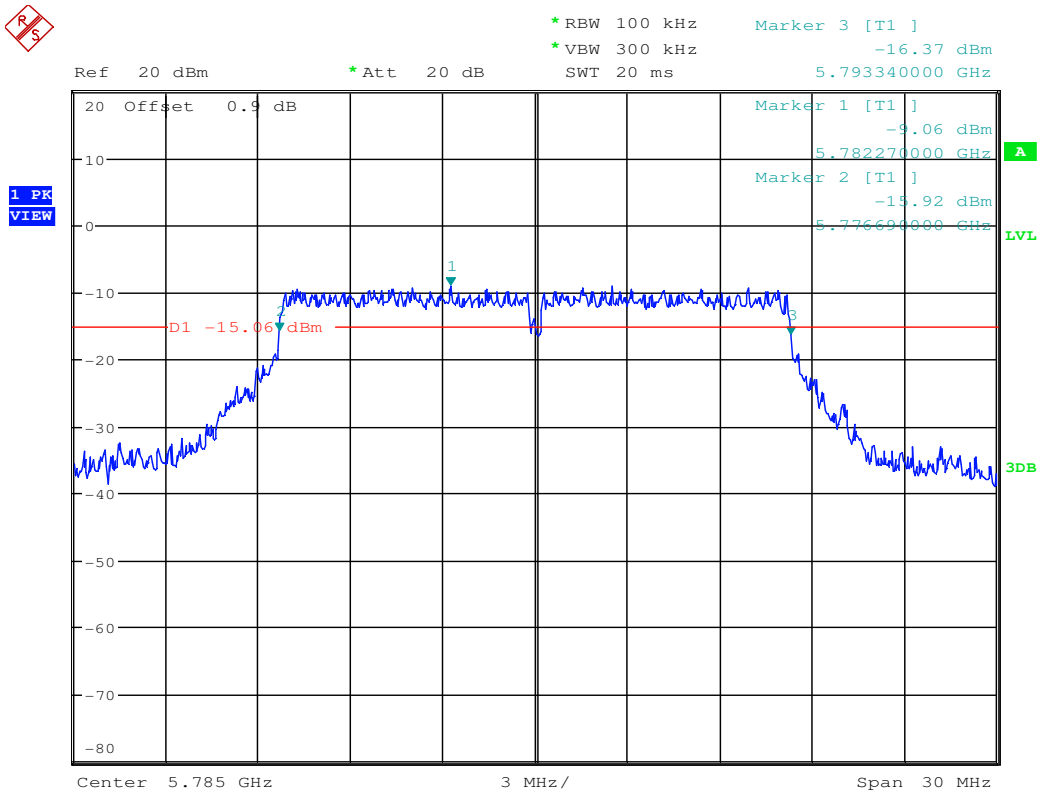
Emission Bandwidth Measurement_11A_5745_Ant2



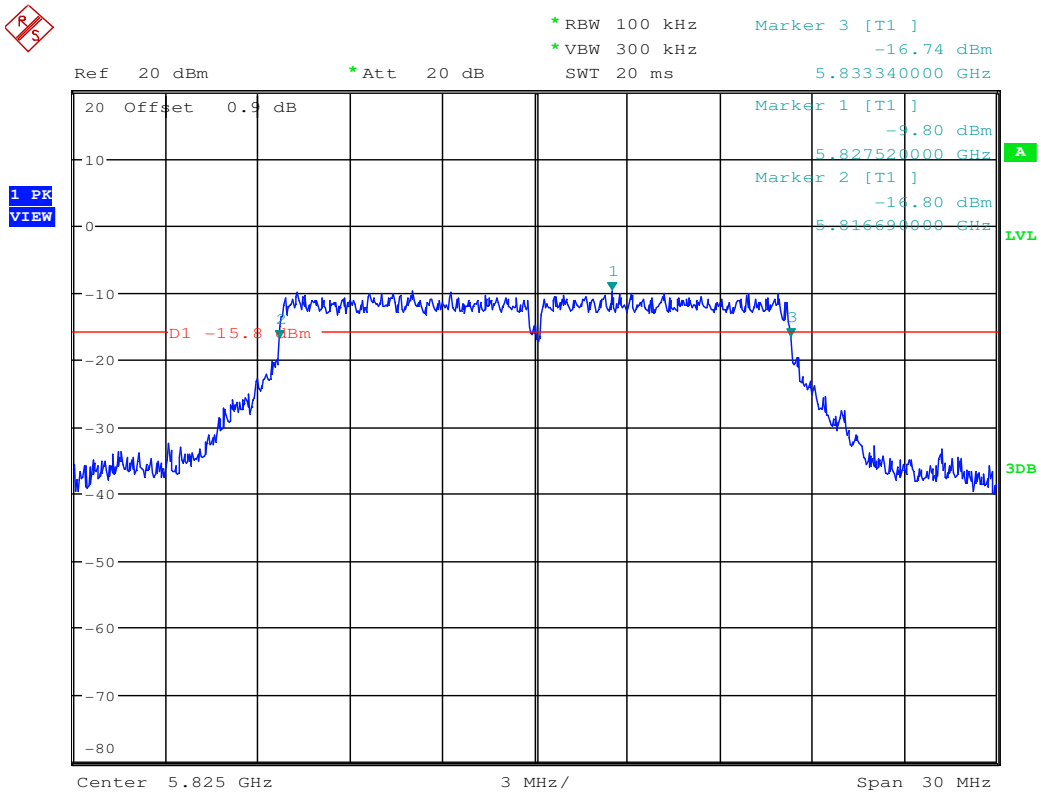
Emission Bandwidth Measurement_11A_5785_Ant1



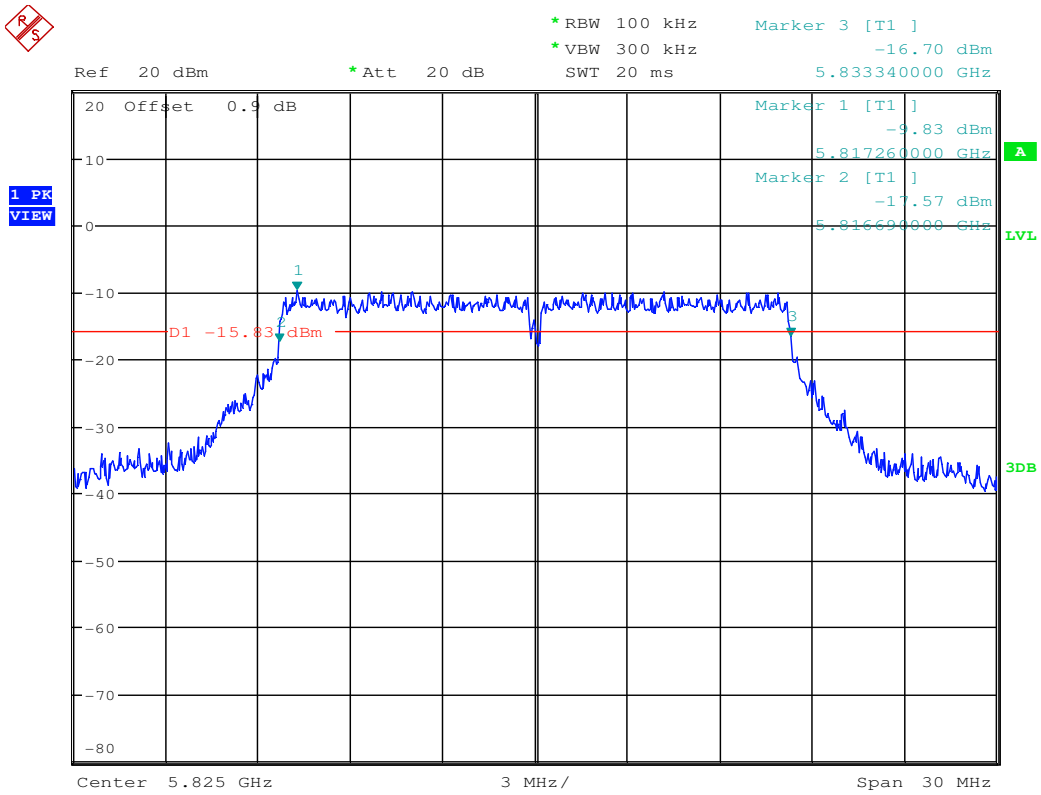
Emission Bandwidth Measurement_11A_5785_Ant2



Emission Bandwidth Measurement_11A_5825_Ant1



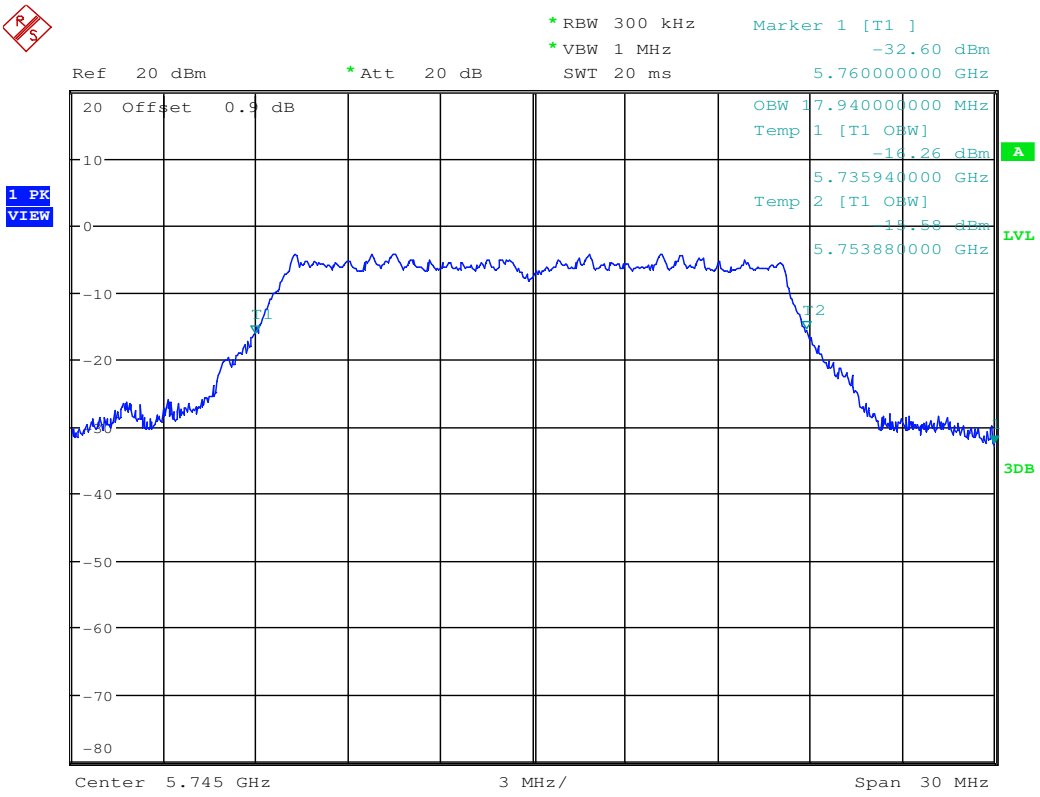
Emission Bandwidth Measurement_11A_5825_Ant2



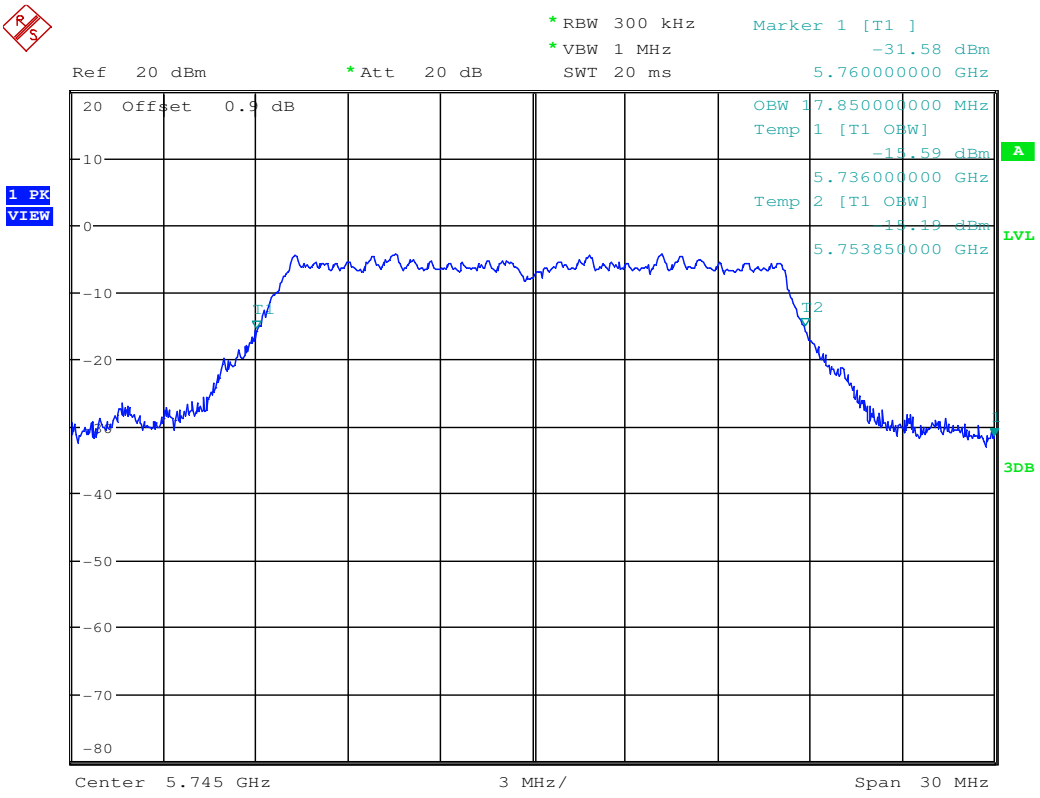
2.Occupied Bandwidth Measurement

Test Mode	Test Channel	Ant	OBW[MHz]	Limit[MHz]	Verdict
11A	5745	Ant1	17.940	---	PASS
11A	5745	Ant2	17.850	---	PASS
11A	5785	Ant1	17.850	---	PASS
11A	5785	Ant2	17.850	---	PASS
11A	5825	Ant1	17.790	---	PASS
11A	5825	Ant2	17.790	---	PASS

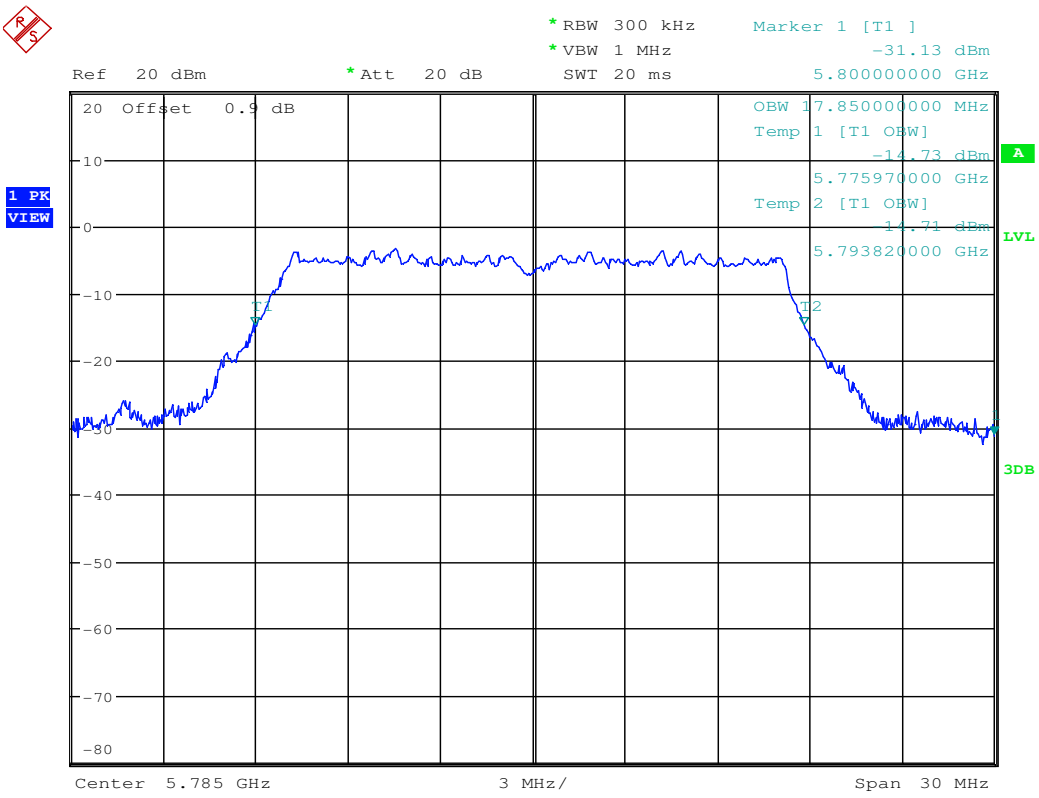
Occupied Bandwidth Measurement_11A_5745_Ant1



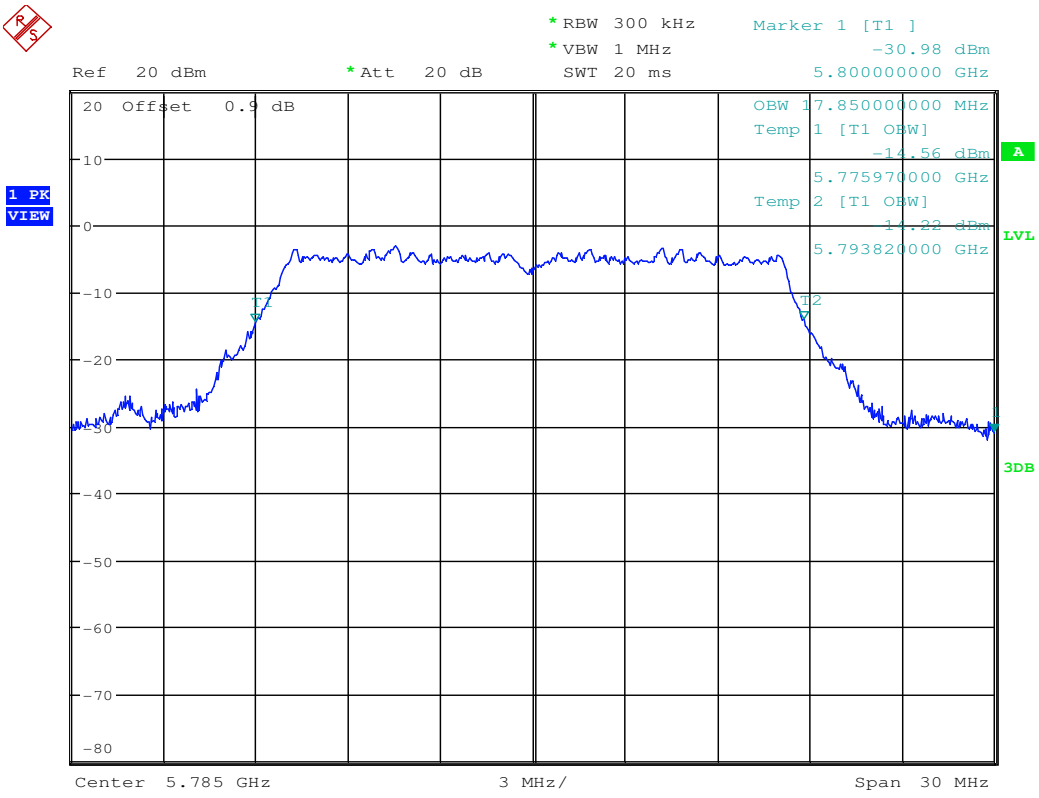
Occupied Bandwidth Measurement_11A_5745_Ant2



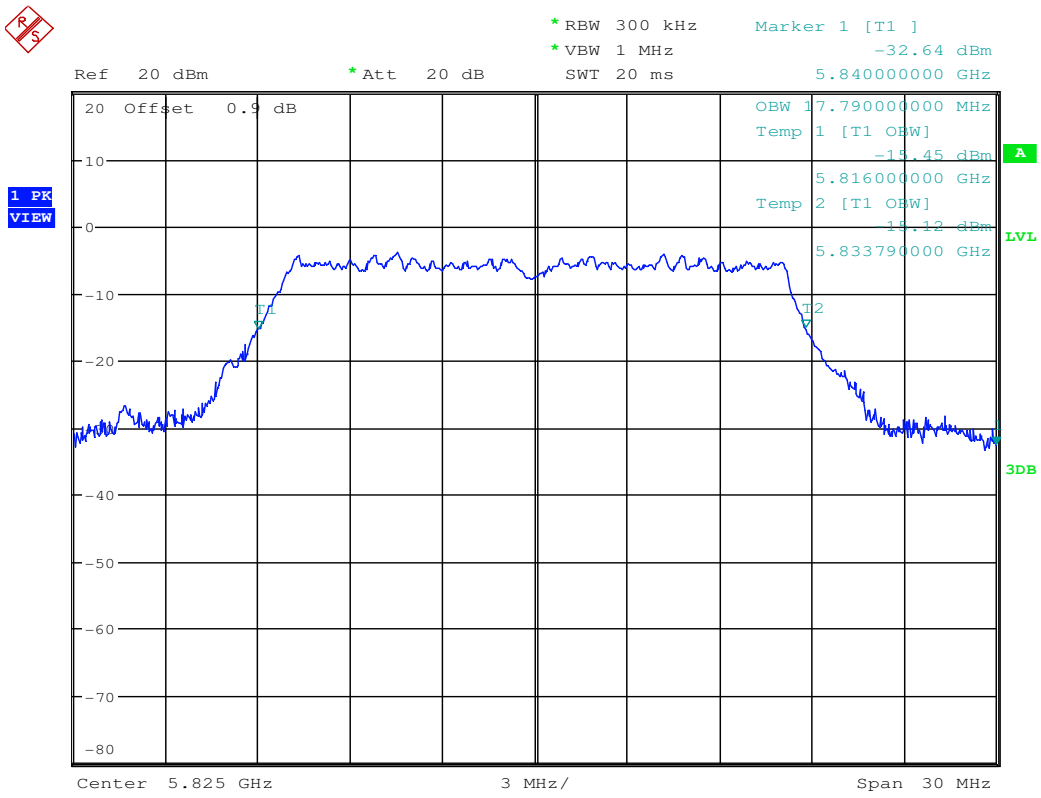
Occupied Bandwidth Measurement_11A_5785_Ant1



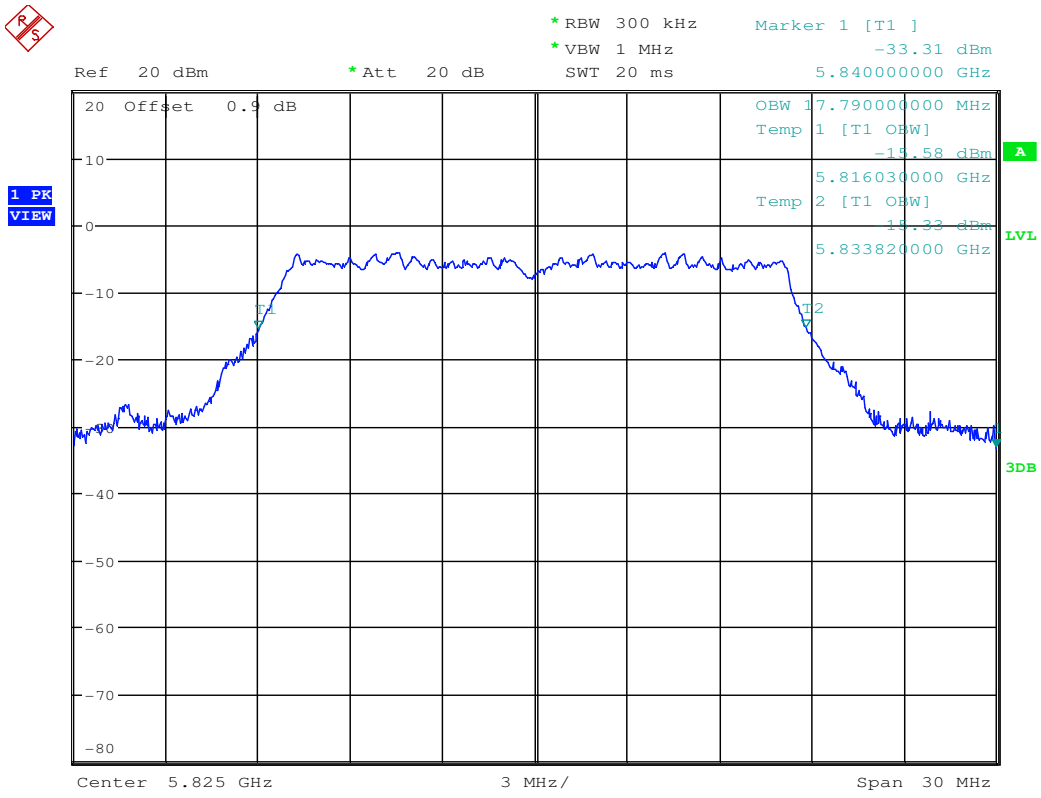
Occupied Bandwidth Measurement_11A_5785_Ant2



Occupied Bandwidth Measurement_11A_5825_Ant1



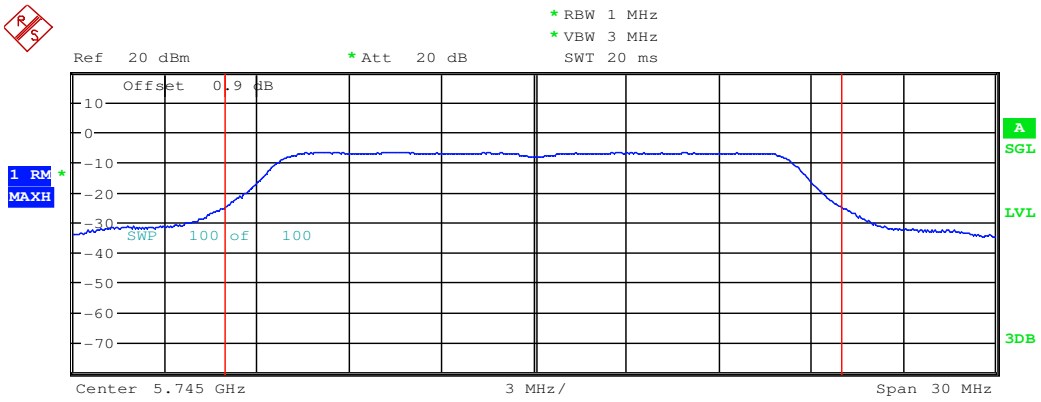
Occupied Bandwidth Measurement_11A_5825_Ant2



3.Maximum Conduct Output Power

Test Mode	Test Channel	Ant	Level [dBm]	10log(1/x) Factor [dB]	Power [dBm]	Limit [dBm]	Verdict
11A	5745	Ant1	4.3	0	4.30	<30.00	PASS
11A	5745	Ant2	4.12	0	4.12	<30.00	PASS
11A	5785	Ant1	5.06	0	5.06	<30.00	PASS
11A	5785	Ant2	5.07	0	5.07	<30.00	PASS
11A	5825	Ant1	4.45	0	4.45	<30.00	PASS
11A	5825	Ant2	4.43	0	4.43	<30.00	PASS

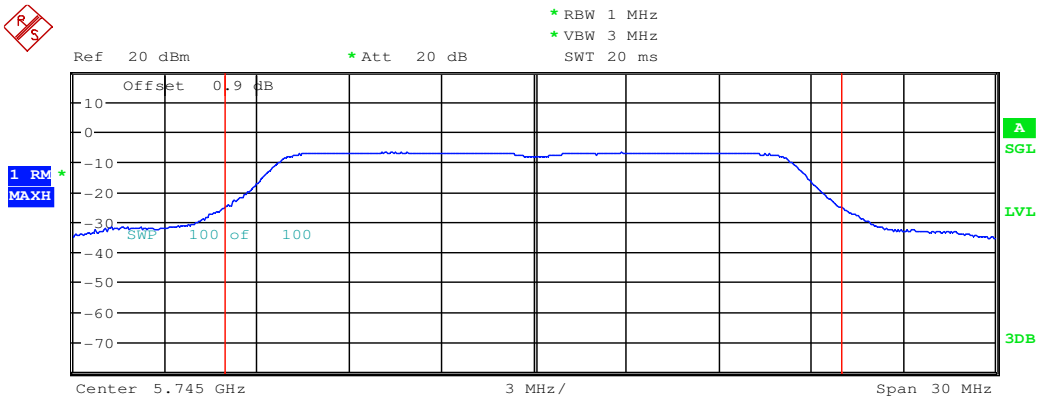
Maximum Conduct Output Power_11A_5745_Ant1



Tx Channel

Bandwidth	20 MHz	Power	4.30 dBm

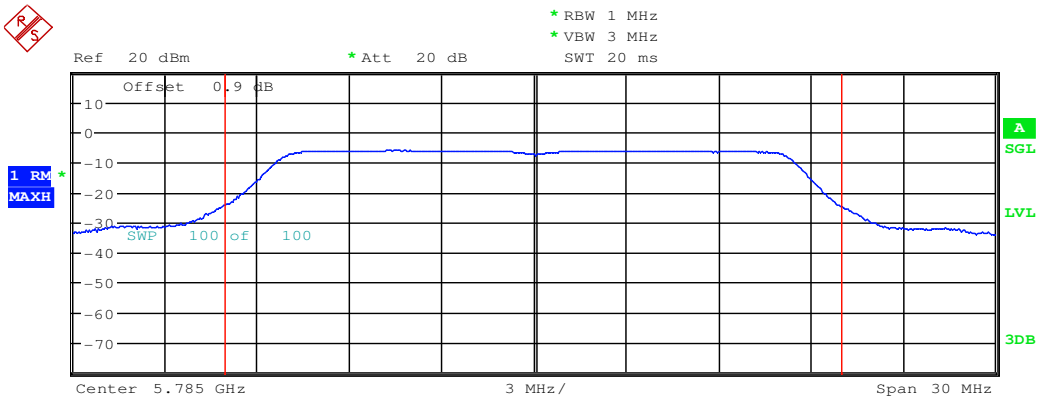
Maximum Conduct Output Power_11A_5745_Ant2



Tx Channel

Bandwidth	20 MHz	Power	4.12 dBm

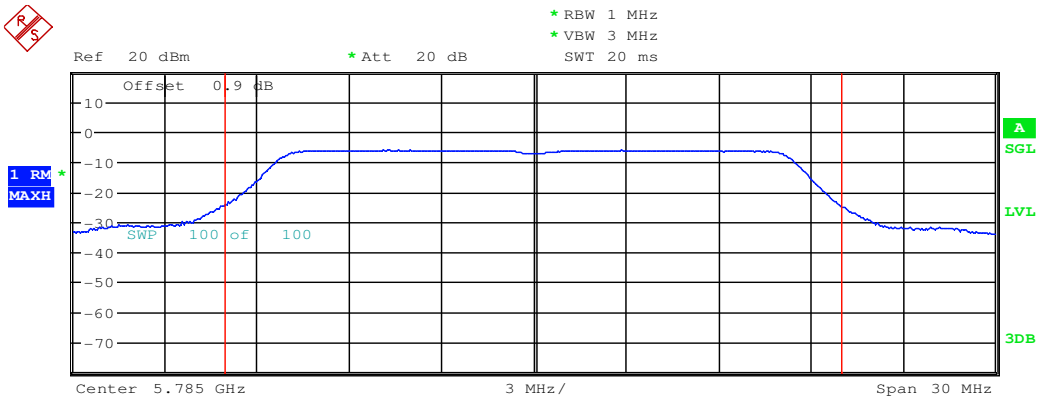
Maximum Conduct Output Power_11A_5785_Ant1



Tx Channel

Bandwidth	20 MHz	Power	5.06 dBm

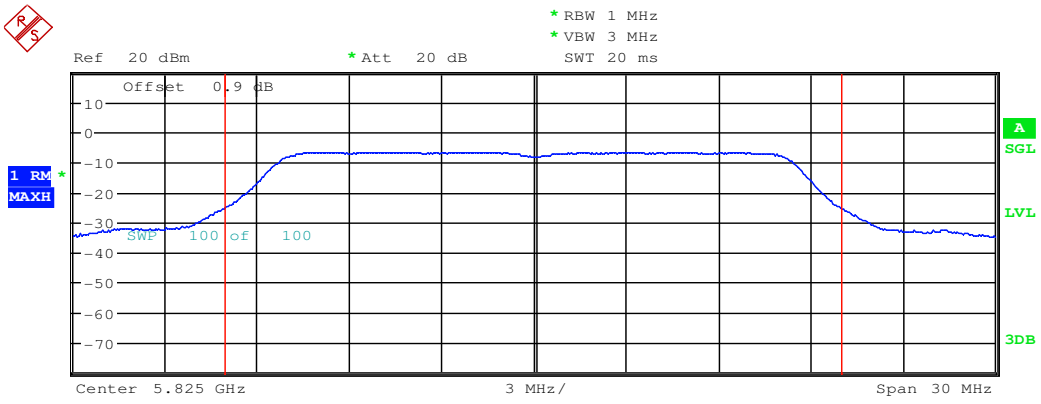
Maximum Conduct Output Power_11A_5785_Ant2



Tx Channel

Bandwidth	20 MHz	Power	5.07 dBm

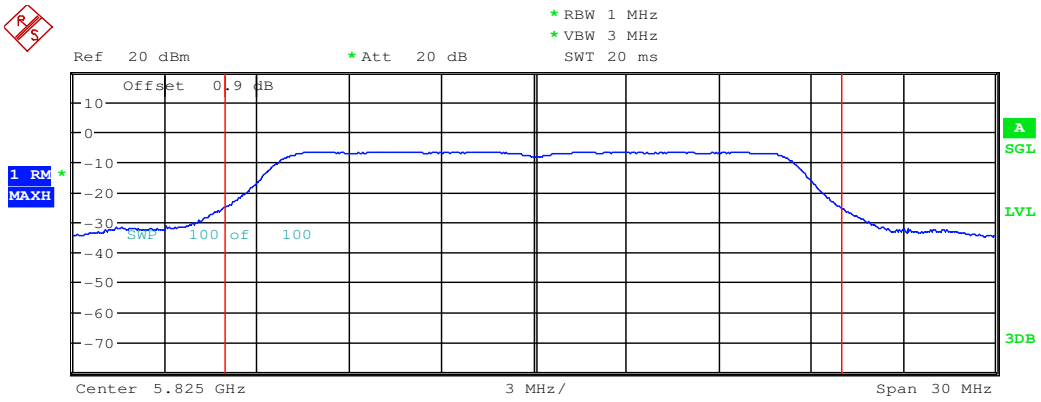
Maximum Conduct Output Power_11A_5825_Ant1



Tx Channel

Bandwidth	20 MHz	Power	4.45 dBm

Maximum Conduct Output Power_11A_5825_Ant2



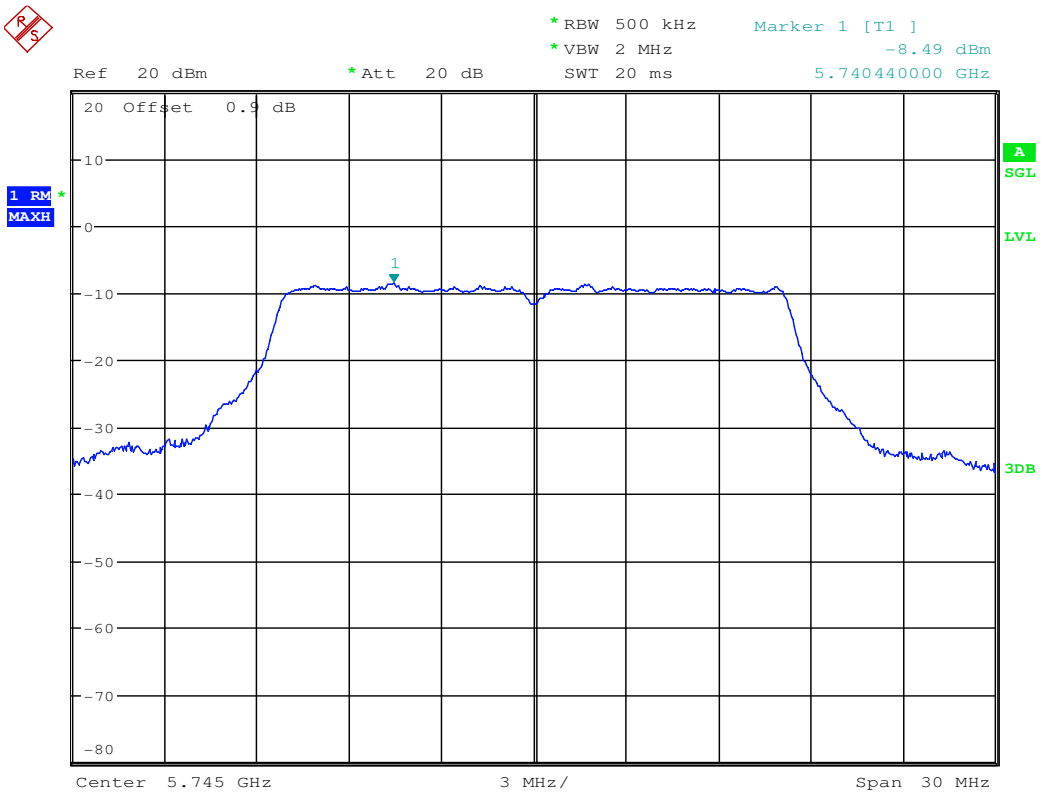
Tx Channel

Bandwidth	20 MHz	Power	4.43 dBm

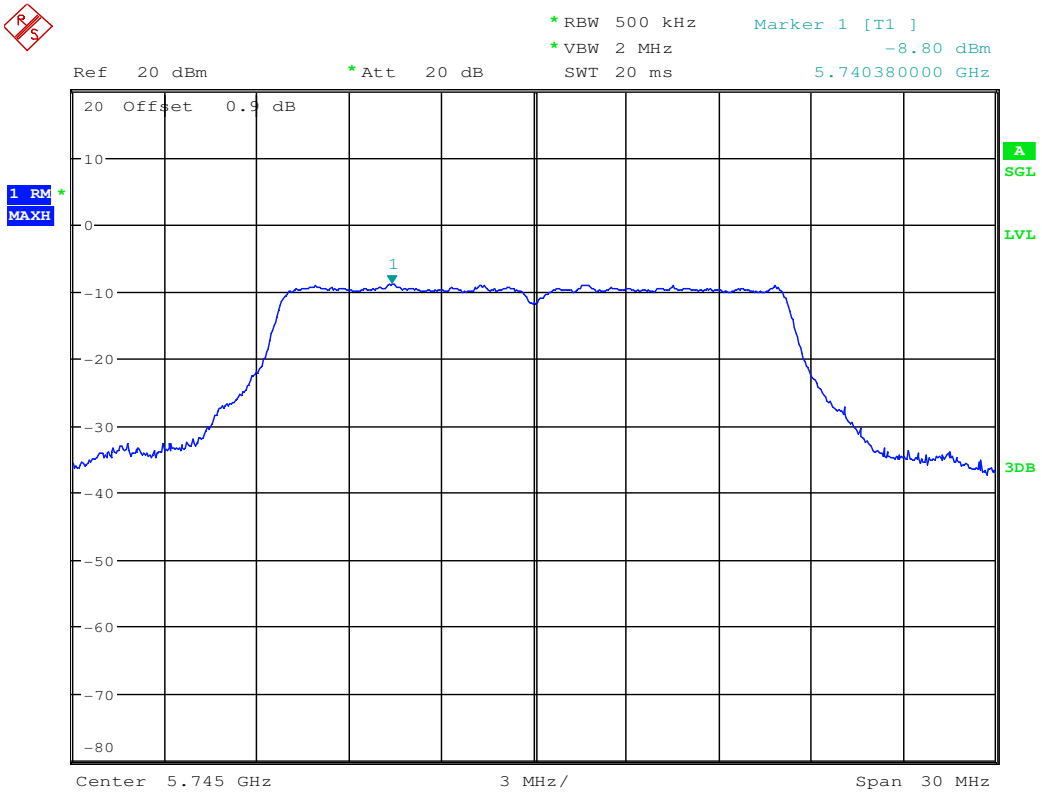
4.Maximum Power Spectral Density

Test Mode	Test Channel	Ant	Level [dBm/500kHz]	10log(1/x) Factor [dB]	10log (500kHz/RBW) Factor [dB]	PSD [dBm/500kHz]	Limit [dBm/500kHz]	Verdict
11A	5745	Ant1	-8.49	0	0	-8.49	<30.00	PASS
11A	5745	Ant2	-8.8	0	0	-8.80	<30.00	PASS
11A	5785	Ant1	-8	0	0	-8.00	<30.00	PASS
11A	5785	Ant2	-7.82	0	0	-7.82	<30.00	PASS
11A	5825	Ant1	-8.39	0	0	-8.39	<30.00	PASS
11A	5825	Ant2	-8.54	0	0	-8.54	<30.00	PASS

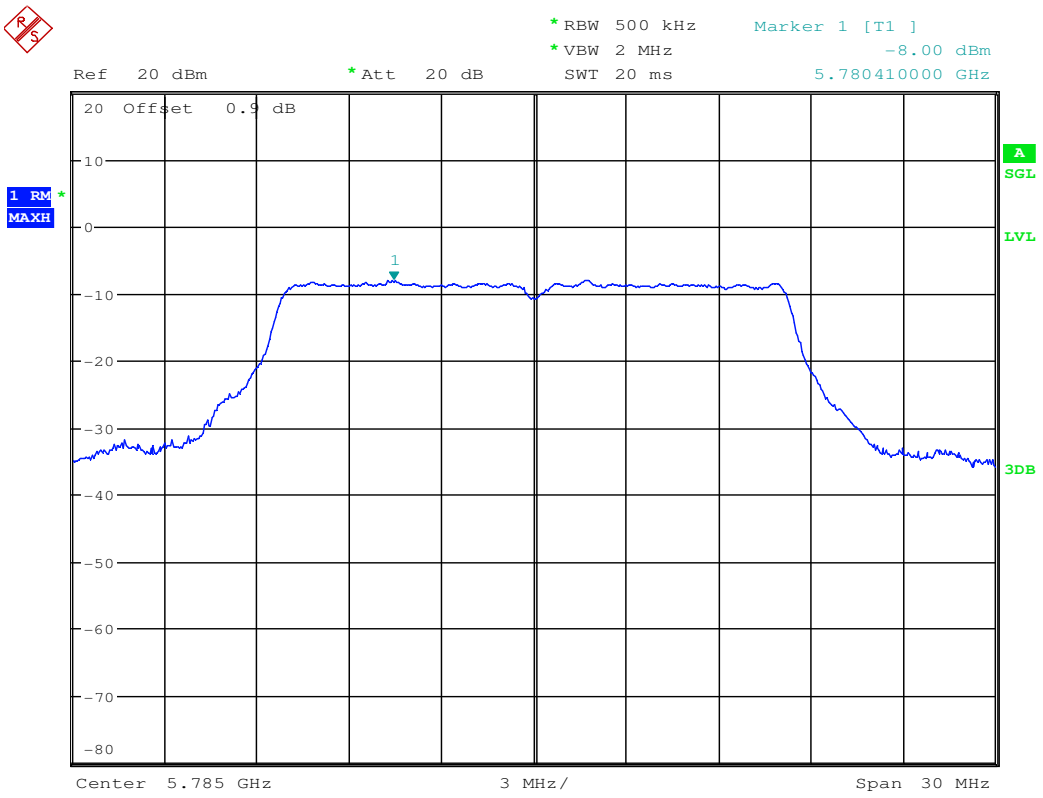
Maximum Power Spectral Density _TNVN_11A_5745_Ant1



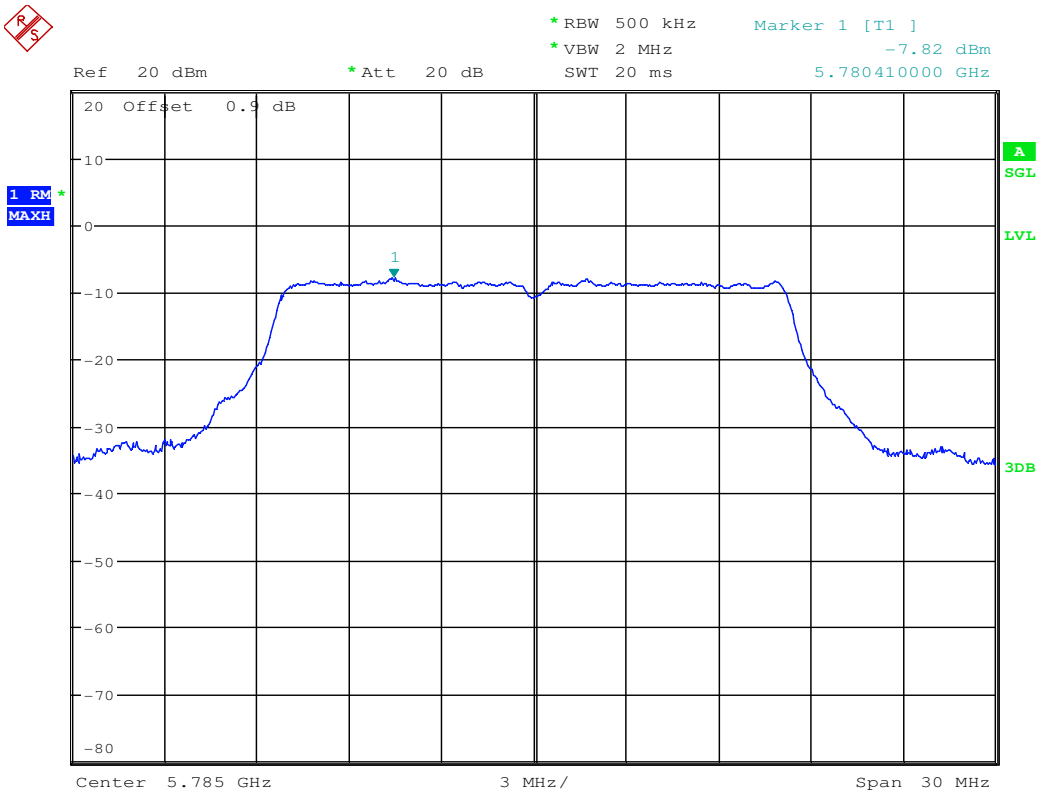
Maximum Power Spectral Density _TNVN_11A_5745_Ant2



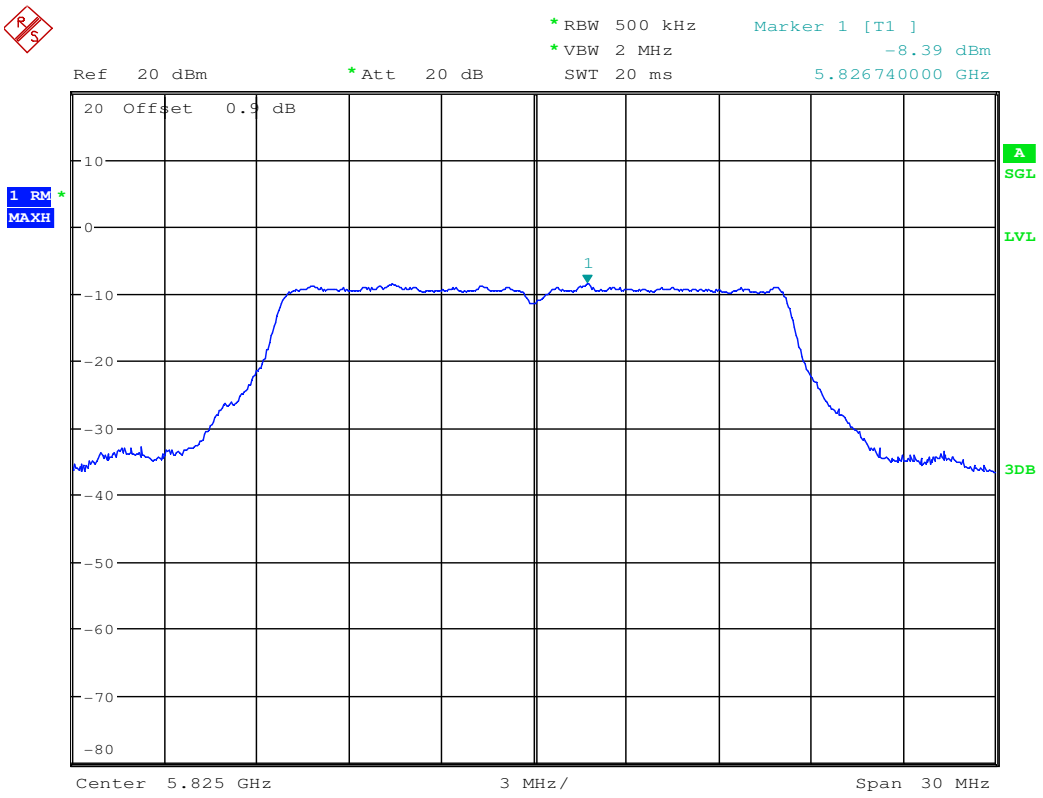
Maximum Power Spectral Density _TNVN_11A_5785_Ant1



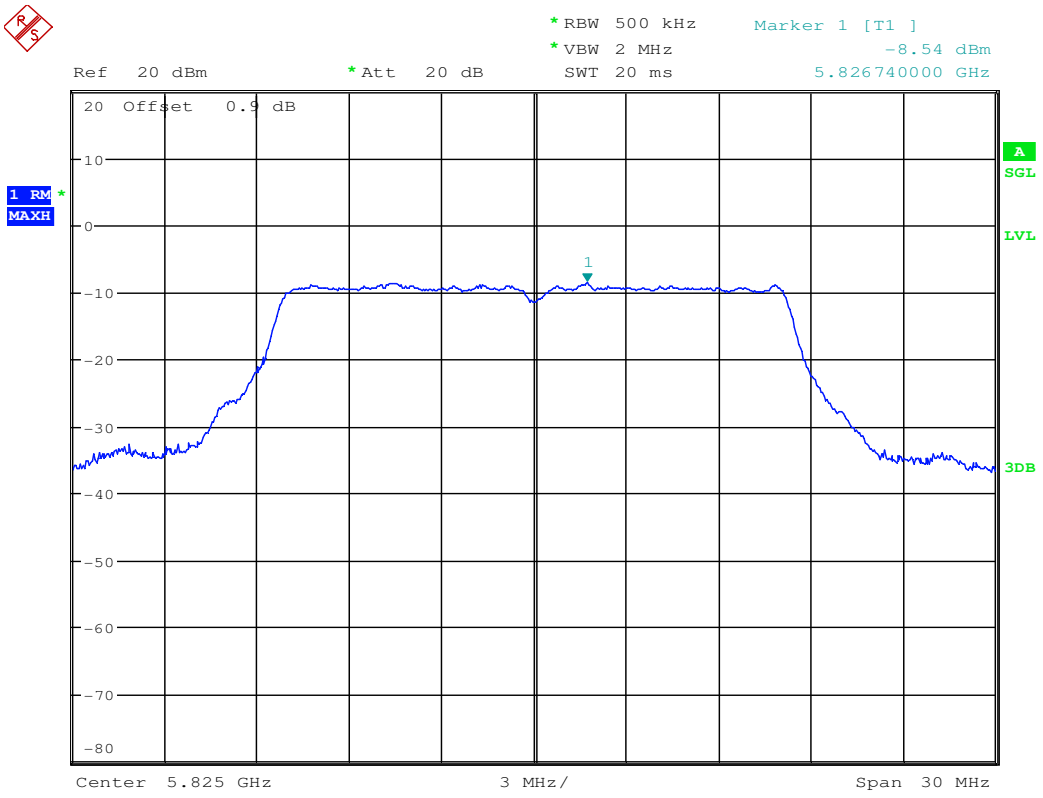
Maximum Power Spectral Density _TNVN_11A_5785_Ant2



Maximum Power Spectral Density _TNVN_11A_5825_Ant1



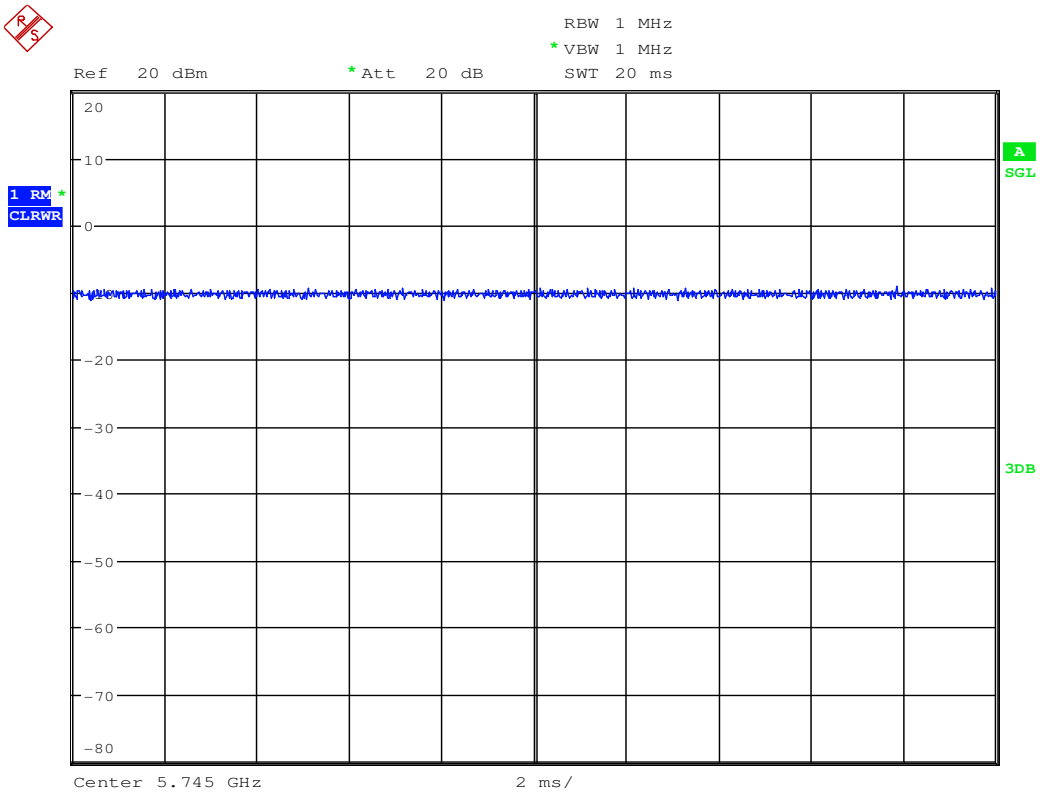
Maximum Power Spectral Density _TNVN_11A_5825_Ant2



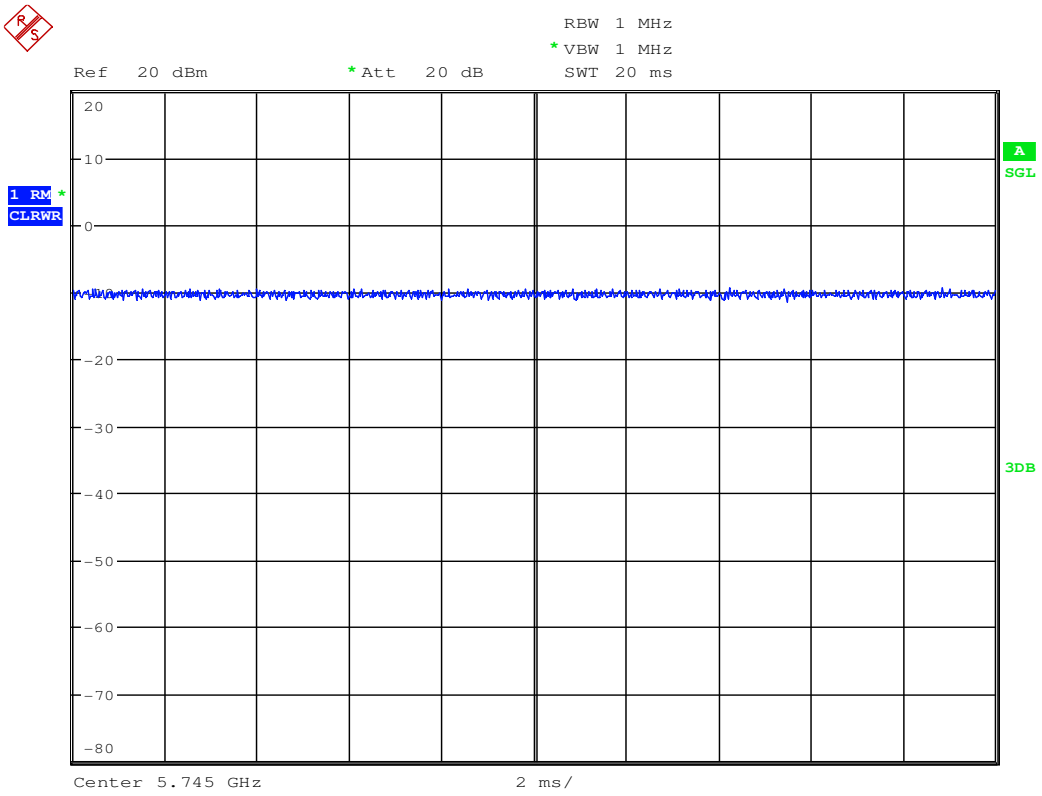
5.Duty Cycle (x)

Test Mode	Test Channel	Ant	Duty Cycle[%]	10log(1/x) Factor[dB]
11A	5745	Ant1	100	0
11A	5745	Ant2	100	0
11A	5785	Ant1	100	0
11A	5785	Ant2	100	0
11A	5825	Ant1	100	0
11A	5825	Ant2	100	0

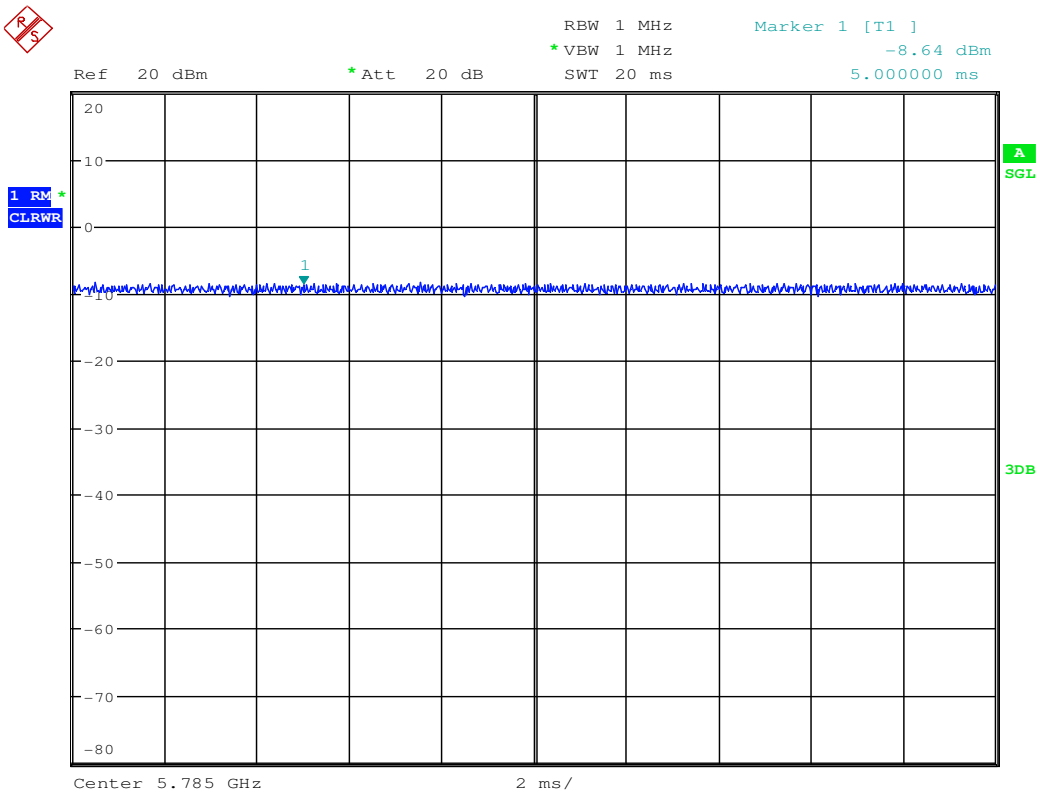
Duty Cycle_11A_5745_Ant1



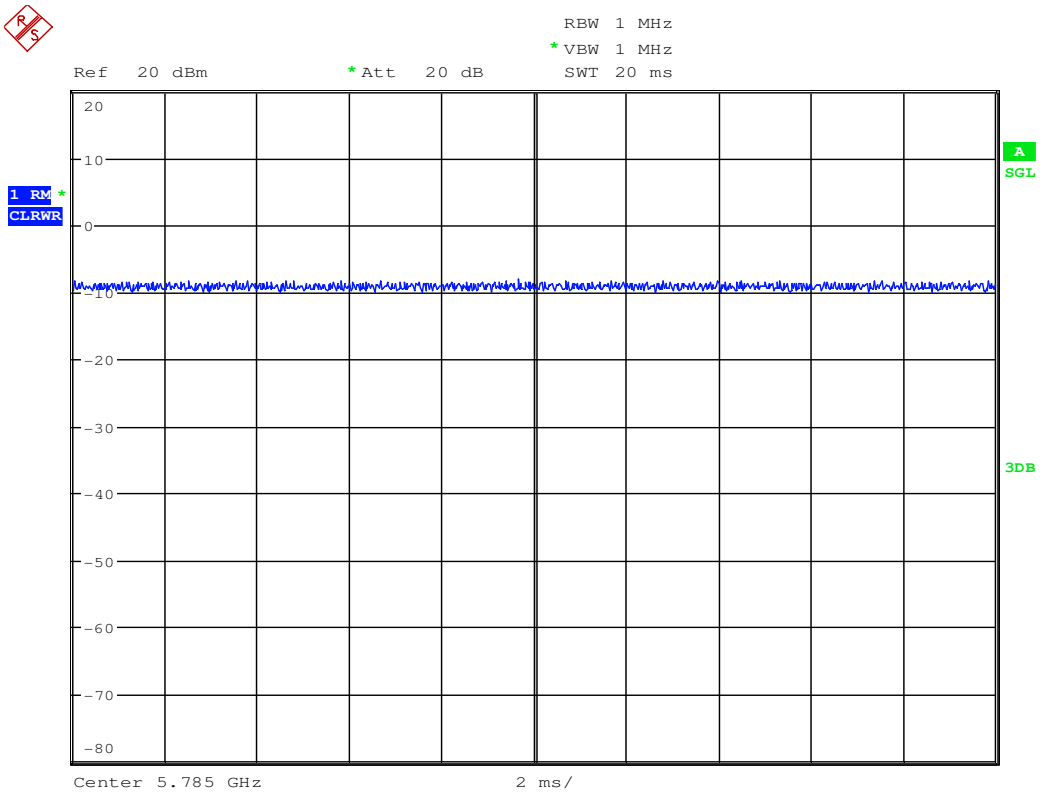
Duty Cycle_11A_5745_Ant2



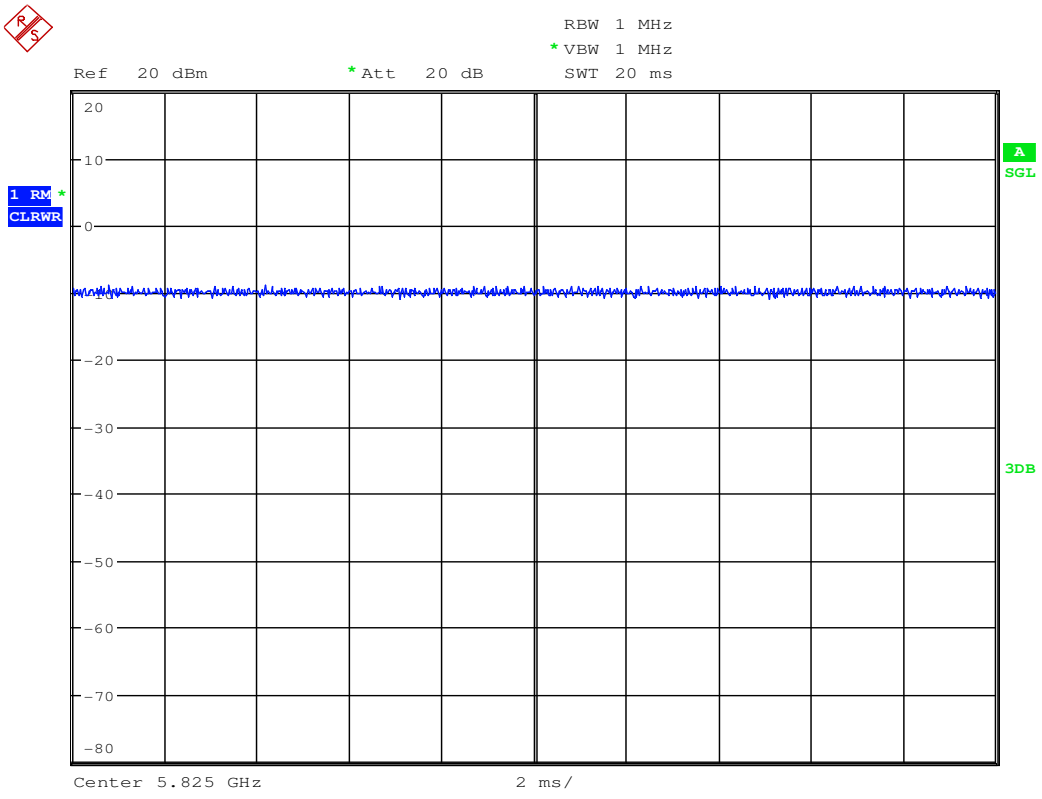
Duty Cycle_11A_5785_Ant1



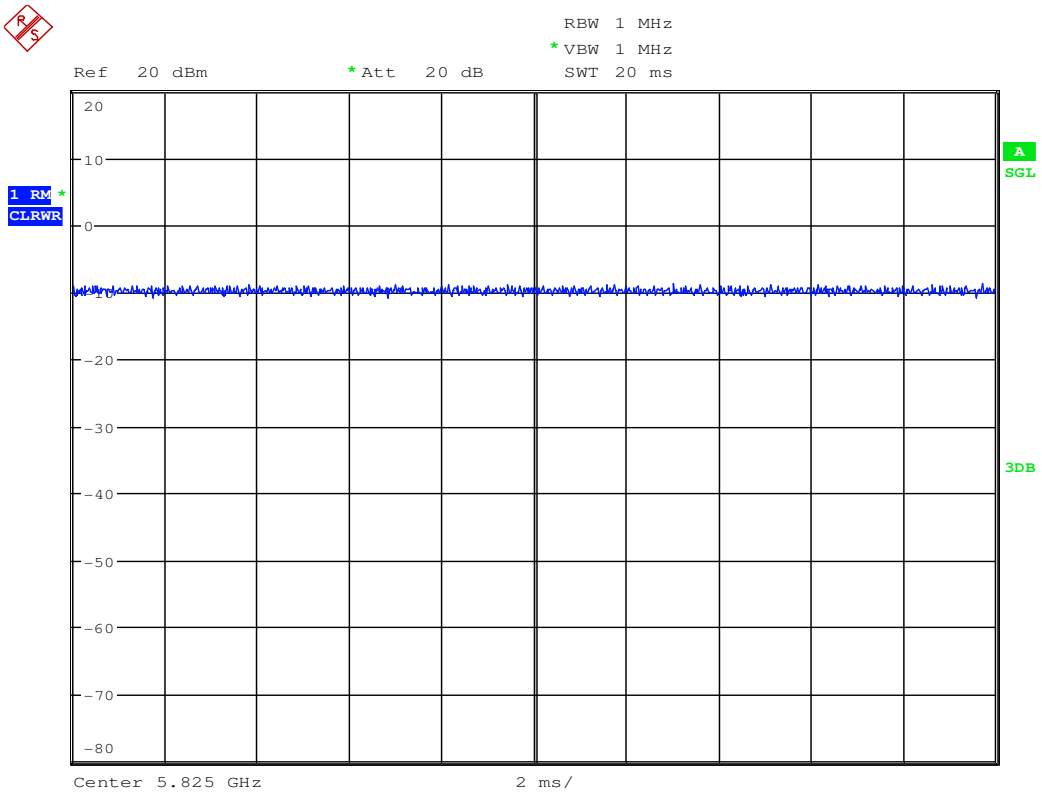
Duty Cycle_11A_5785_Ant2



Duty Cycle_11A_5825_Ant1



Duty Cycle_11A_5825_Ant2



6.Frequency Stability

Antenna 1:

Test mode:	802.11ac20	Frequency(MHz):	5745

Temperature (℃)	Voltage(VAC)	Measurement Frequency(MHz)	Delta Frequency(kHz)	Result
35	120	5746.2596	-1.2596	Pass
25		5746.2600	-1.2600	Pass
15		5746.2610	-1.2610	Pass
5		5746.2602	-1.2602	Pass
0		5746.2594	-1.2594	Pass
20	138	5746.2592	-1.2592	Pass
	120	5746.2600	-1.2600	Pass
	102	5746.2609	-1.2609	Pass

Test mode:	802.11ac20	Frequency(MHz):	5785

Temperature (℃)	Voltage(VAC)	Measurement Frequency(MHz)	Delta Frequency(kHz)	Result
35	120	5785.9259	-0.9259	Pass
25		5785.9263	-0.9263	Pass
15		5785.9266	-0.9266	Pass
5		5785.9256	-0.9256	Pass
0		5785.9246	-0.9246	Pass
20	138	5785.9254	-0.9254	Pass
	120	5785.9263	-0.9263	Pass
	102	5785.9271	-0.9271	Pass

Test mode:	802.11ac20	Frequency(MHz):	5825

Temperature (℃)	Voltage(VAC)	Measurement Frequency(MHz)	Delta Frequency(kHz)	Result
35	120	5826.1175	-1.1175	Pass
25		5826.1184	-1.1184	Pass
15		5826.1186	-1.1186	Pass
5		5826.1180	-1.1180	Pass
0		5826.1173	-1.1173	Pass
20	138	5826.1180	-1.1180	Pass
	120	5826.1184	-1.1184	Pass
	102	5826.1187	-1.1187	Pass

Antenna 2:

Test mode:	802.11a	Frequency(MHz):	5745

Temperature (℃)	Voltage(VAC)	Measurement Frequency(MHz)	Delta Frequency(kHz)	Result
35	120	5746.2696	-1.2696	Pass
25		5746.2601	-1.2601	Pass
15		5746.2610	-1.2610	Pass
5		5746.2642	-1.2642	Pass
0		5746.2394	-1.2394	Pass
20	138	5746.2592	-1.2592	Pass
	120	5746.2600	-1.2600	Pass
	102	5746.2609	-1.2609	Pass

Test mode:	802.11a	Frequency(MHz):	5785

Temperature (℃)	Voltage(VAC)	Measurement Frequency(MHz)	Delta Frequency(kHz)	Result
35	120	5785.9239	-0.9239	Pass
25		5785.9263	-0.9263	Pass
15		5785.9246	-0.9246	Pass
5		5785.9216	-0.9216	Pass
0		5785.9246	-0.9246	Pass
20	138	5785.9284	-0.9284	Pass
	120	5785.9243	-0.9243	Pass
	102	5785.9231	-0.9231	Pass

Test mode:	802.11a	Frequency(MHz):	5825

Temperature (℃)	Voltage(VAC)	Measurement Frequency(MHz)	Delta Frequency(kHz)	Result
35	120	5826.1175	-1.1175	Pass
25		5826.1184	-1.1184	Pass
15		5826.1186	-1.1186	Pass
5		5826.1180	-1.1180	Pass
0		5826.1173	-1.1173	Pass
20	138	5826.1180	-1.1180	Pass
	120	5826.1184	-1.1184	Pass
	102	5826.1187	-1.1187	Pass