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TEST REPORT

Application No.:	SZEM1709009748CR
Applicant:	Harman International Industries, Inc
Address of Applicant:	8500 Balboa Boulevard, Northridge, California 91329, UNITED STATES
Manufacturer:	Harman International Industries, Inc
Address of Manufacturer:	8500 Balboa Boulevard, Northridge, California 91329, UNITED STATES
Factory:	TCL TECHNOLY ELECTRONICS (HUIZHOU) CO., LTD
Address of Factory:	Section 19, Zhongkai High-tech development Zone, Huizhou City, Guangdong Province, China Section 37, Zhongkai High-tech development Zone, Huizhou City, Guangdong Province, China
Equipment Under Test (EUT):	
EUT Name:	SUBWOOFER
Model No.:	VW6
Trade mark:	harman/kardon
FCC ID:	APIHKVW6
Standard(s) :	47 CFR Part 15, Subpart E 15.407
Date of Receipt:	2017-09-13
Date of Test:	2017-09-13 to 2017-09-29
Date of Issue:	2017-10-10
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.

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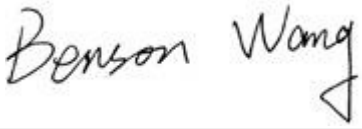
Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2017-10-10		Original

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

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2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
Antenna Requirement	47 CFR Part 15, Subpart E 15.407	N/A	47 CFR Part 15, Subpart C 15.203	Pass
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
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
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

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4 General Information

4.1 Details of E.U.T.

Power supply:	AC 120V/60Hz
Master / Slave	Non-Radar Detector
Hardware Version	D
Software Version	V18
Operation frequency	5743MHz -5840MHz
Channel	35
Modulation	GFSK
Antenna Type	Integrated
Antenna gain	ANT A: 2.85dBi
	ANT B: 2.85dBi
	(The two antennas cannot simultaneous transmission)

EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	**5743**	12	5778	24	5812
1	5747	1	5779	25	5815
2	5751	14	5783	26	5818
3	5752	15	5787	27	5819
4	5755	**16**	**5791**	28	5823
5	5758	17	5792	29	5827
6	5759	18	5795	30	5831
7	5763	19	5798	31	5832
8	5767	20	5799	32	5835
9	5771	21	5803	33	5837
10	5772	22	5807	**34**	**5840**
11	5775	23	5811	/	/

Remark:
The word in bold were the selected test channels in the report.

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4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
iPhone 5s	Apple	A1530	REF. No.SEA1600
2.1 Soundbar with Wireless Subwoofer	Harman	Bar 2.1	N/A

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%

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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

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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
Coaxial Cable	SGS	N/A	SEM024-01	2017-07-13	2018-07-12

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
Coaxial Cable	SGS	N/A	SEM031-01	2017-07-13	2018-07-12

RE in Chamber					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017-08-05	2020-08-04
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2017-09-27	2018-09-27
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-02	2017-03-05	2020-03-05
Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEM005-01	2017-04-14	2018-04-13
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2017-07-13	2018-07-12

RE in Chamber					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2017-05-02	2020-05-01
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A

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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	2017-09-27	2018-09-27
Low Noise Amplifier(100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2017-09-27	2018-09-27
Pre-amplifier(0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEM004-11	2016-12-02	2017-12-01
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	2017-09-27	2018-09-27
Active Loop Antenna	ETS-Lindgren	6502	SEM003-08	2017-08-22	2020-08-21
Band filter	N/A	N/A	SEM023-01	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2017-07-13	2018-07-12

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

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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

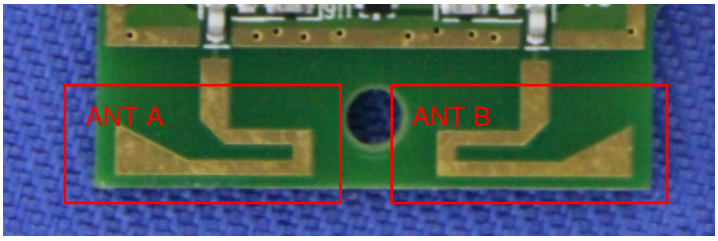
47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

Standard Requirement:

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

EUT Antenna:



The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2.85dBi.

There is only one antenna was selected for use at any time, through the on-board Transmit-receive/Diversity RF switch.

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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:

The chip of the sample 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.

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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.

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7.1.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

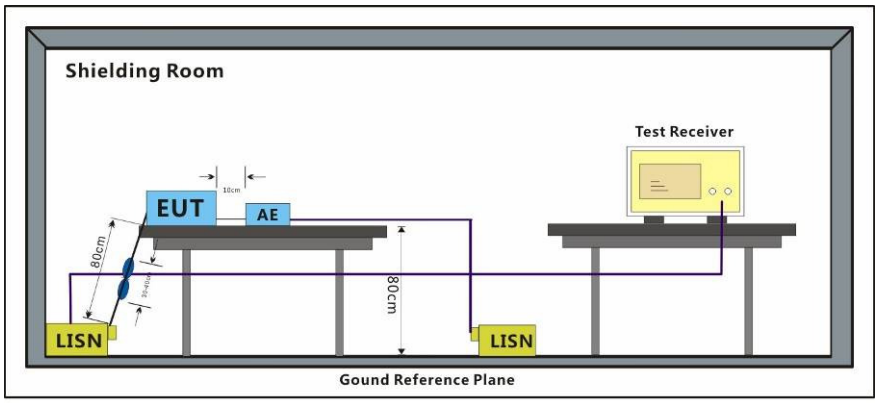
Pretest these modes to find the worst case:

a:TX mode_Keep the EUT in continuously transmitting mode with ANT A.

b: TX mode_Keep the EUT in continuously transmitting mode with ANT B.

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

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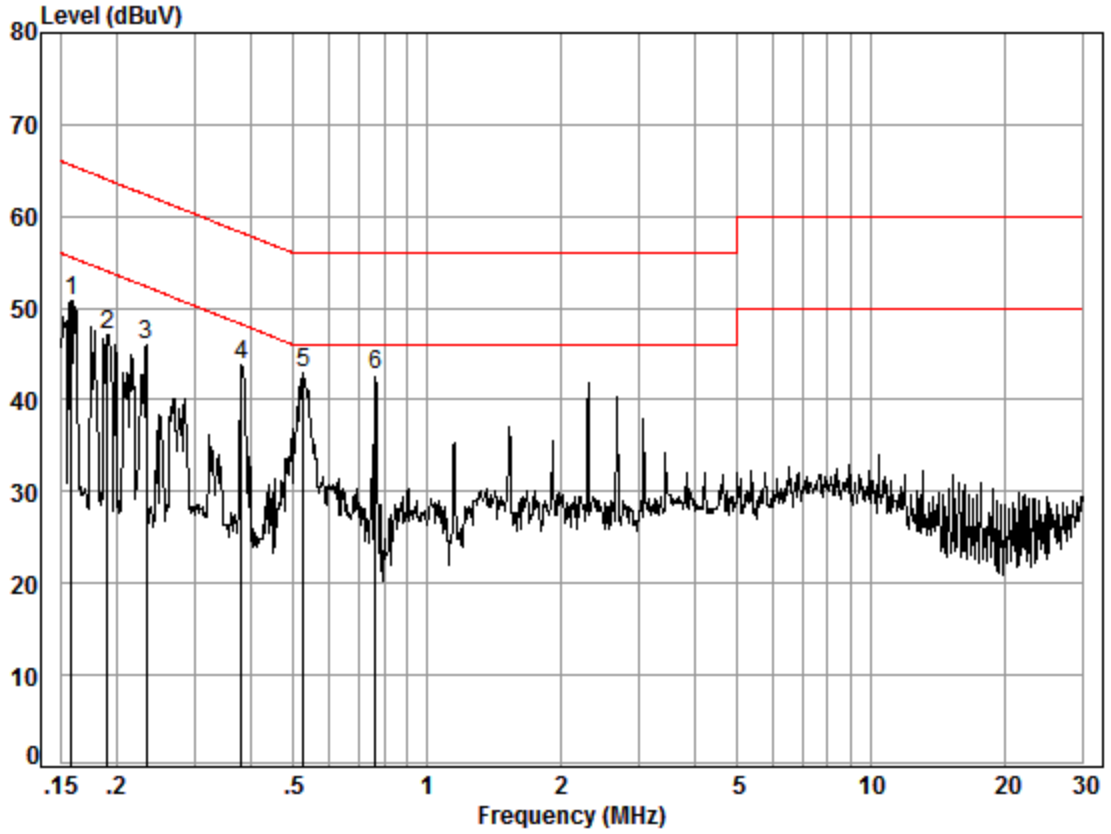
Mode:a; Line:Live Line



Site : Shielding Room
Condition: Line
Job No. : 09748CR
Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.02	9.64	41.16	50.82	55.56	-4.74	Peak
2	0.19	0.02	9.63	37.41	47.06	54.02	-6.96	Peak
3	0.23	0.02	9.63	36.41	46.06	52.35	-6.29	Peak
4	0.38	0.01	9.63	34.10	43.74	48.25	-4.51	Peak
5	0.53	0.01	9.63	33.21	42.85	46.00	-3.15	Peak
6	0.77	0.02	9.64	33.04	42.70	46.00	-3.30	Peak

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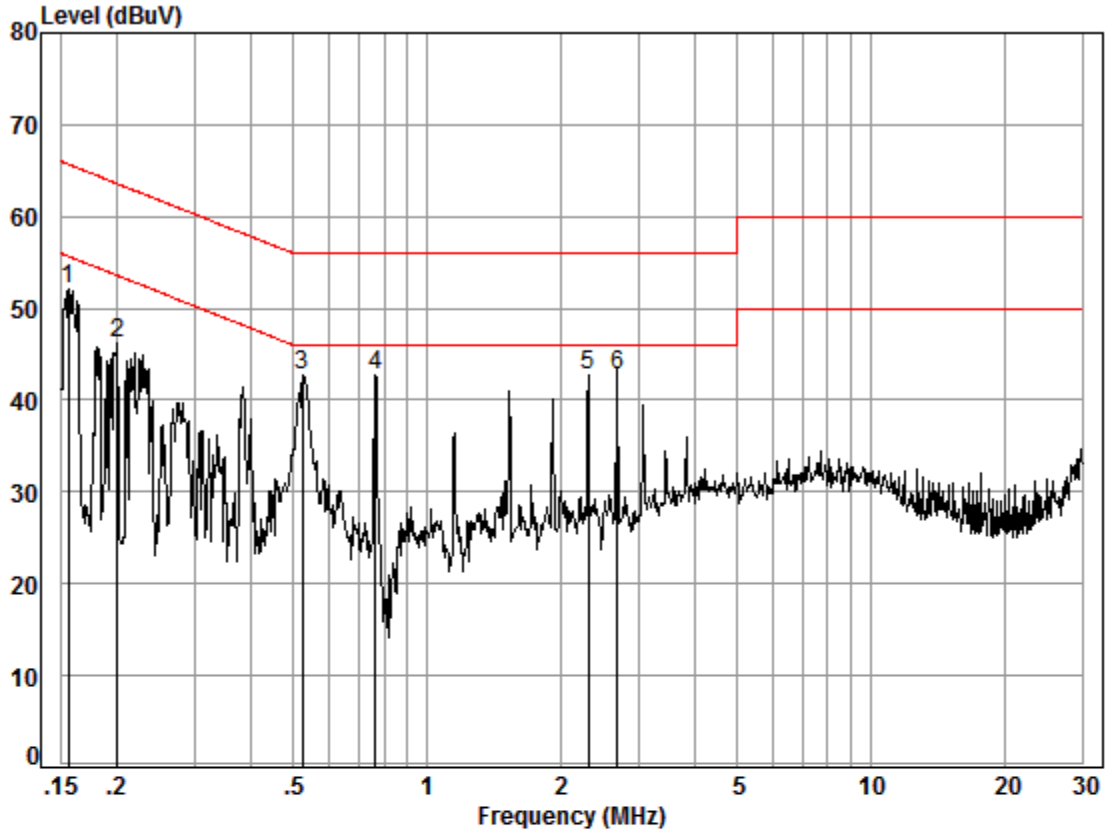
Mode:a; Line:Neutral Line



Site : Shielding Room
Condition: Neutral
Job No. : 09748CR
Test mode: a

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.02	9.64	42.54	52.20	55.69	-3.49	Peak
2	0.20	0.02	9.63	36.58	46.23	53.58	-7.35	Peak
3	0.52	0.01	9.63	33.05	42.69	46.00	-3.31	Peak
4	0.77	0.02	9.64	33.04	42.70	46.00	-3.30	Peak
5	2.31	0.02	9.66	33.06	42.74	46.00	-3.26	Peak
6	2.69	0.02	9.66	33.13	42.81	46.00	-3.19	Peak

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7.2 99% Bandwidth

Test Requirement N/A

Test Method: KDB 789033 II D

7.2.1 E.U.T. Operation

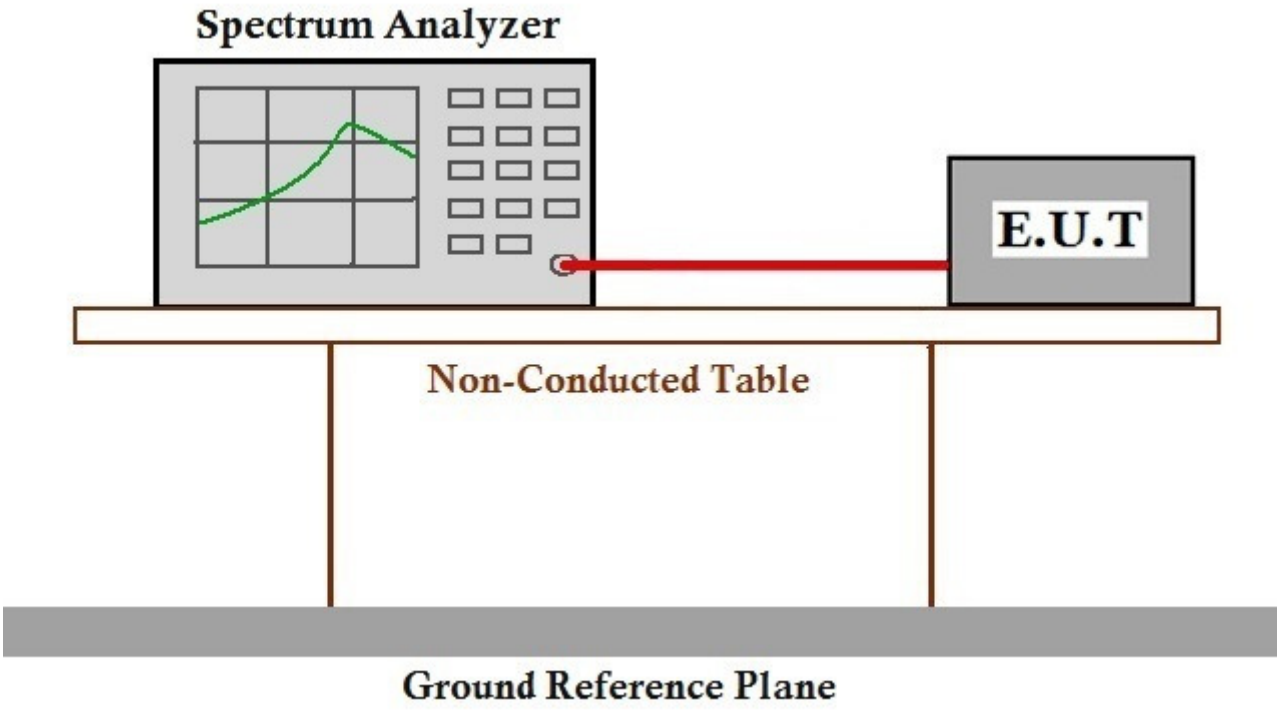
Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with ANT A.

b: TX mode_Keep the EUT in continuously transmitting mode with ANT B.

7.2.2 Test Setup Diagram



7.2.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.407

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7.3 26dB Emission bandwidth

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

Test Method: KDB 789033 D02 II C 1

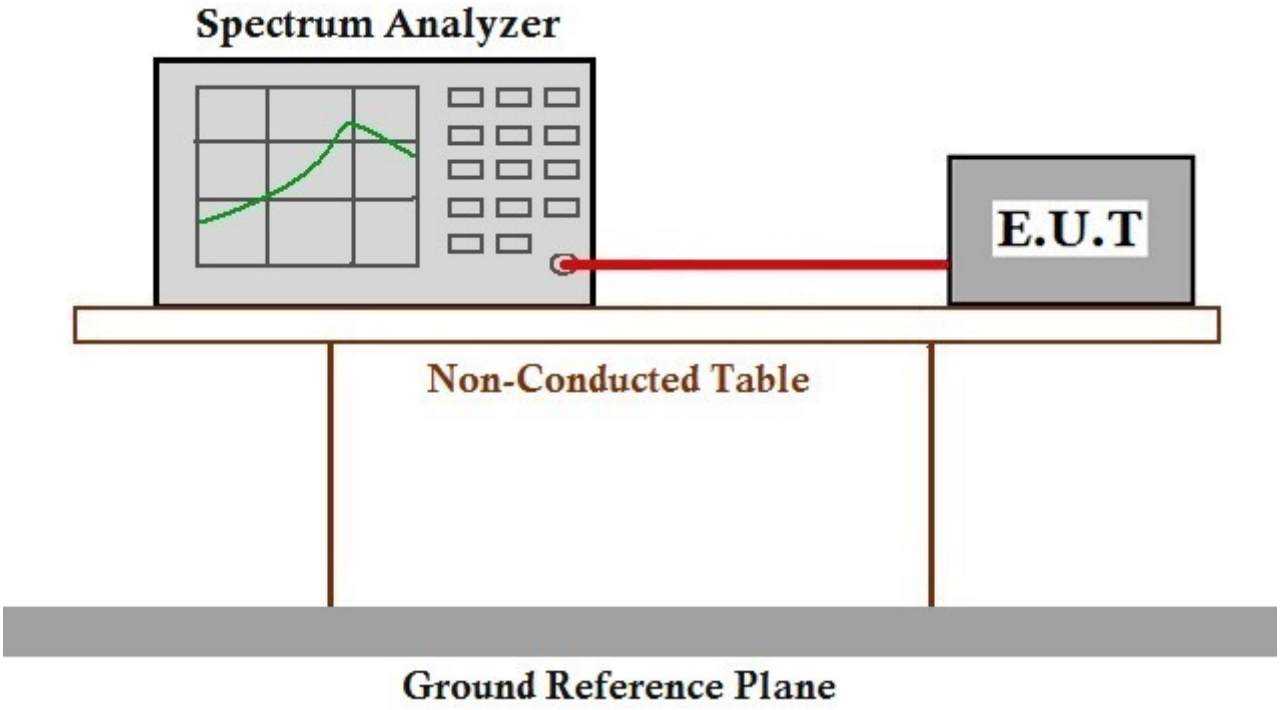
7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode N/A

7.3.2 Test Setup Diagram



7.3.3 Measurement Procedure and Data

N/A

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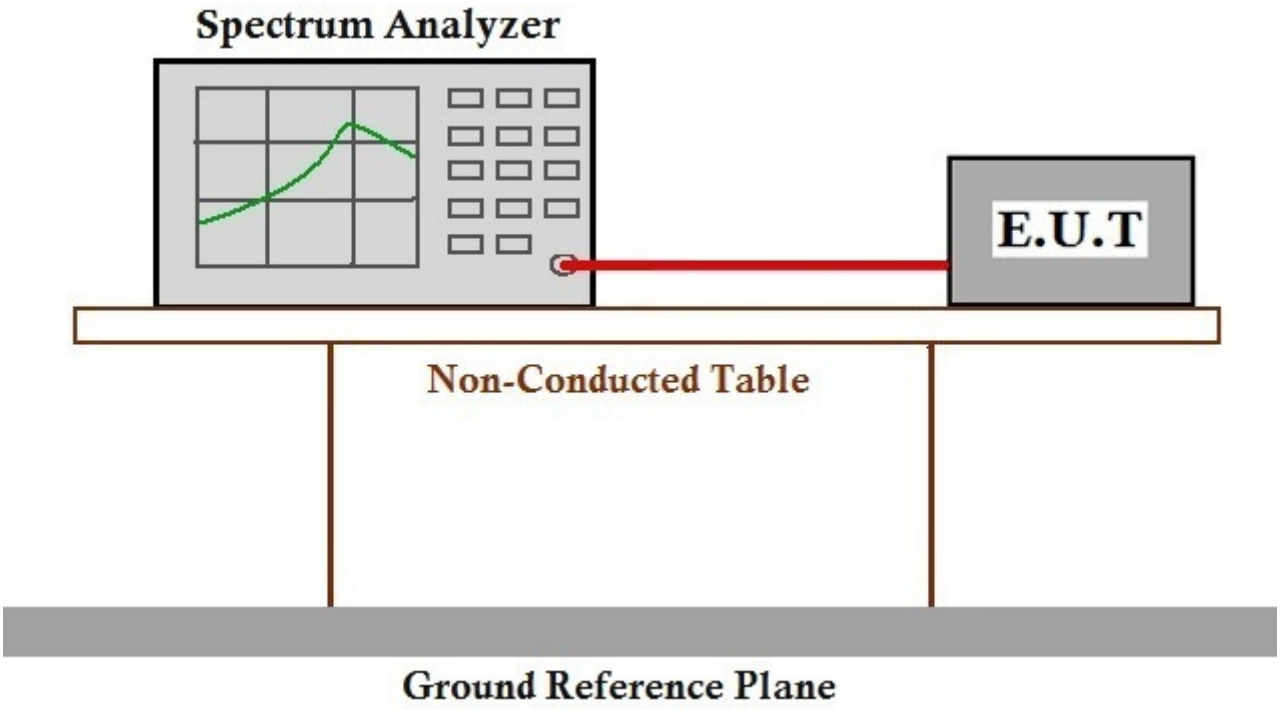
7.4 Minimum 6 dB bandwidth (5.725-5.85 GHz band)

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: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar
Test mode a:TX mode_Keep the EUT in continuously transmitting mode with ANT A.
b: TX mode_Keep the EUT in continuously transmitting mode with ANT B.

7.4.2 Test Setup Diagram



7.4.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.407

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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.

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7.5.1 E.U.T. Operation

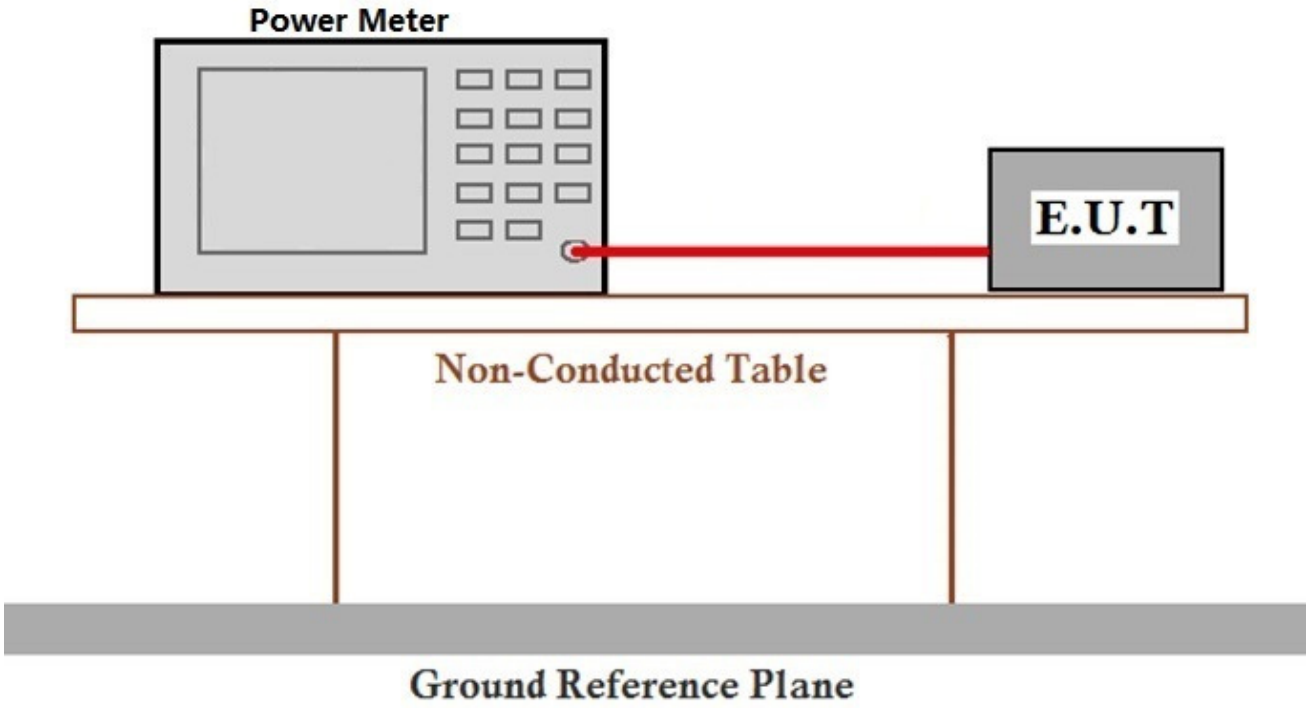
Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with ANT A.

b: TX mode_Keep the EUT in continuously transmitting mode with ANT B.

7.5.2 Test Setup Diagram



7.5.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.407

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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.

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7.6.1 E.U.T. Operation

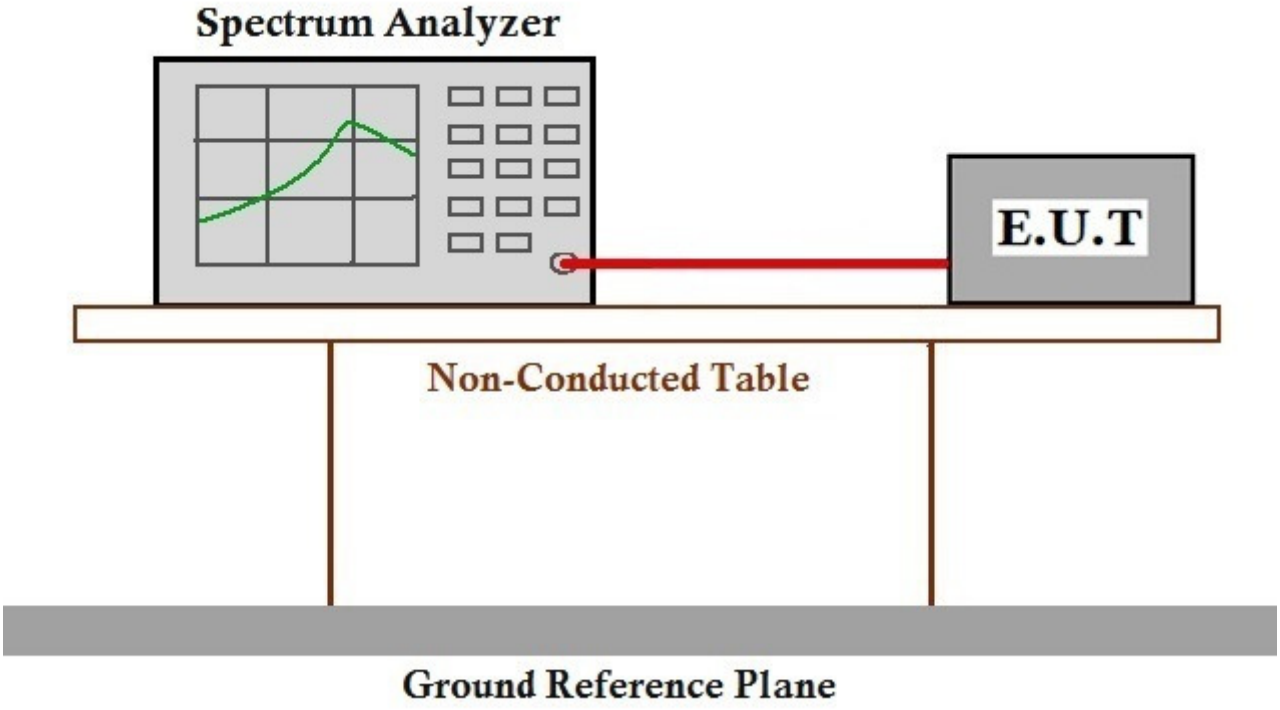
Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with ANT A.

b: TX mode_Keep the EUT in continuously transmitting mode with ANT B.

7.6.2 Test Setup Diagram



7.6.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.407

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7.7 Radiated Emissions and 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

7.7.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Pretest these mode to find the worst case:

a:TX mode_Keep the EUT in continuously transmitting mode with ANT A.

b: TX mode_Keep the EUT in continuously transmitting mode with ANT B.

Only the data of worst case is recorded in the report.

The worst case for final test:

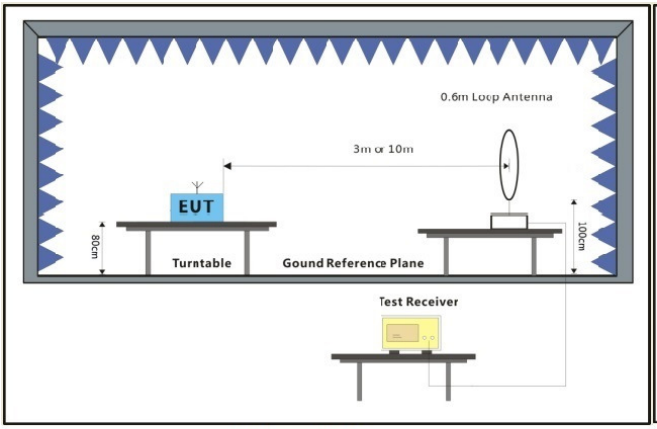
Below 1GHz:

a: TX mode_Keep the EUT in continuously transmitting mode with ANT A.

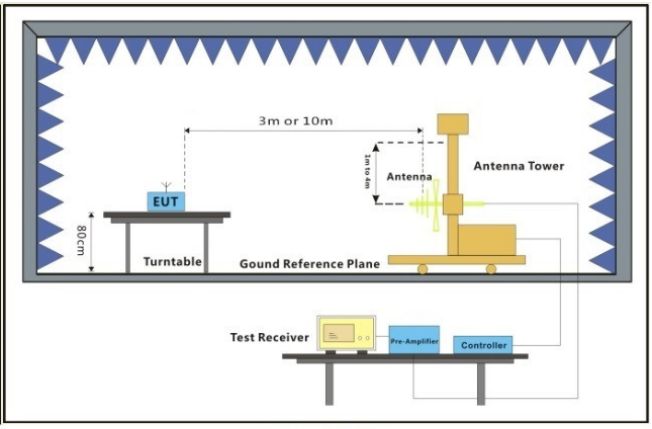
Above 1GHz:

b: TX mode_Keep the EUT in continuously transmitting mode with ANT B.

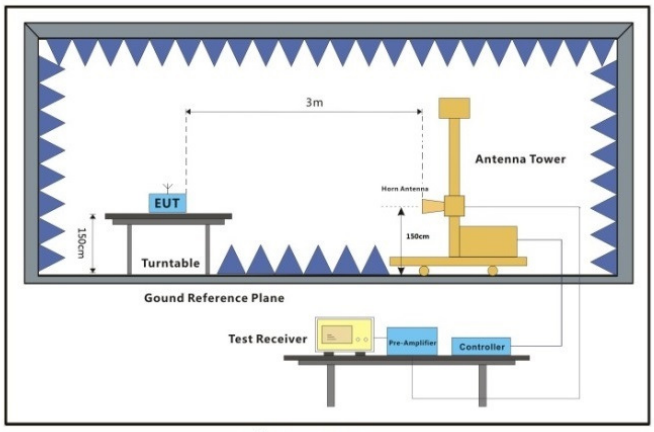
7.7.2 Test Setup Diagram



Below 30MHz



30MHz-1GHz



Above 1GHz

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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

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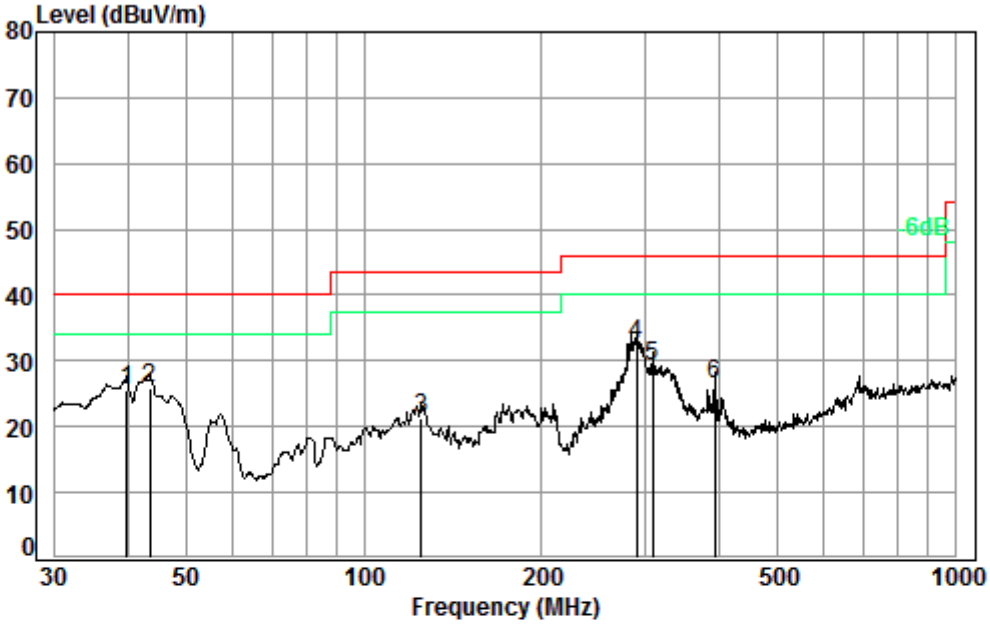
Radiated emission below 1GHz

Mode:a; Polarization:Horizontal



Condition: 3m HORIZONTAL
Job No. : 09748CR
Test Mode: a

	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	39.71	0.60	13.26	27.32	39.06	25.60	40.00	-14.40
2	43.51	0.68	11.56	27.31	41.05	25.98	40.00	-14.02
3	125.01	1.26	7.80	27.04	39.29	21.31	43.50	-22.19
4 pp	289.00	1.85	13.42	26.43	43.66	32.50	46.00	-13.50
5	307.83	1.93	14.18	26.46	39.54	29.19	46.00	-16.81
6	392.10	2.18	16.21	27.09	35.07	26.37	46.00	-19.63

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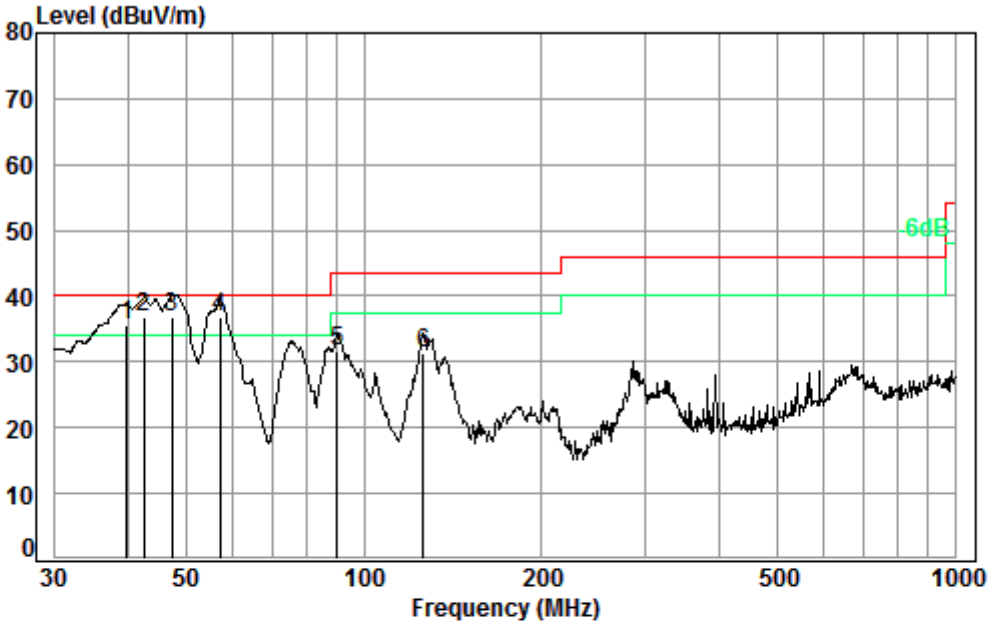
Mode:a; Polarization:Vertical



Condition: 3m VERTICAL
Job No. : 09748CR
Test Mode: a

	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	39.71	0.60	13.26	27.32	49.20	35.74	40.00	-4.26
2	42.60	0.66	11.96	27.31	51.49	36.80	40.00	-3.20
3 pp	47.49	0.75	9.80	27.30	53.61	36.86	40.00	-3.14
4	57.19	0.80	7.62	27.27	55.65	36.80	40.00	-3.20
5	90.22	1.10	8.71	27.21	48.91	31.51	43.50	-11.99
6	125.89	1.27	7.78	27.03	49.39	31.41	43.50	-12.09

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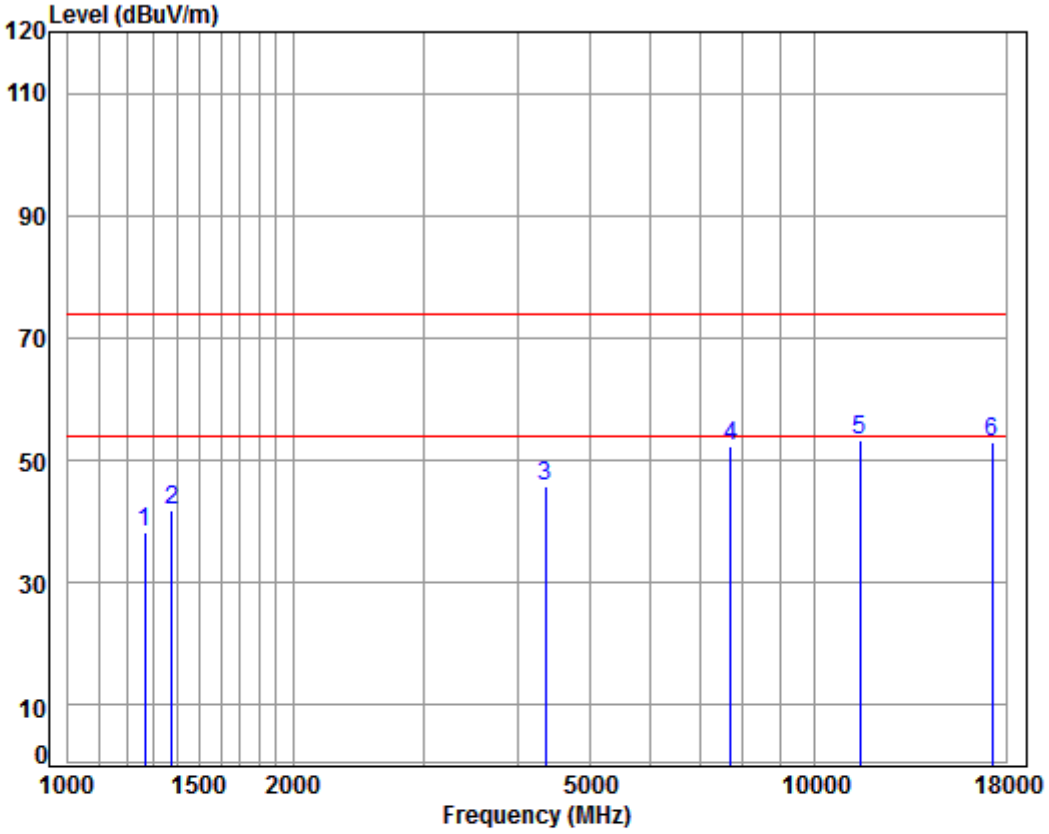
Transmitter emission above 1GHz

Mode:b; Polarization:Horizontal; Channel:Low



Condition: 3m HORIZONTAL
Job No : 09748CR/09749CR
Mode : 5745 TX RSE
: ANT B

	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	4.68	24.80	38.07	46.79	38.20	74.00	-35.80	peak
2	1378.273	5.08	25.30	38.05	49.58	41.91	74.00	-32.09	peak
3	4354.454	7.40	33.60	38.19	43.06	45.87	74.00	-28.13	peak
4	7717.518	9.98	36.43	36.64	42.56	52.33	74.00	-21.67	peak
5	pp11490.000	12.13	38.09	36.00	39.11	53.33	74.00	-20.67	peak
6	17235.000	16.18	43.08	36.18	29.76	52.84	74.00	-21.16	peak

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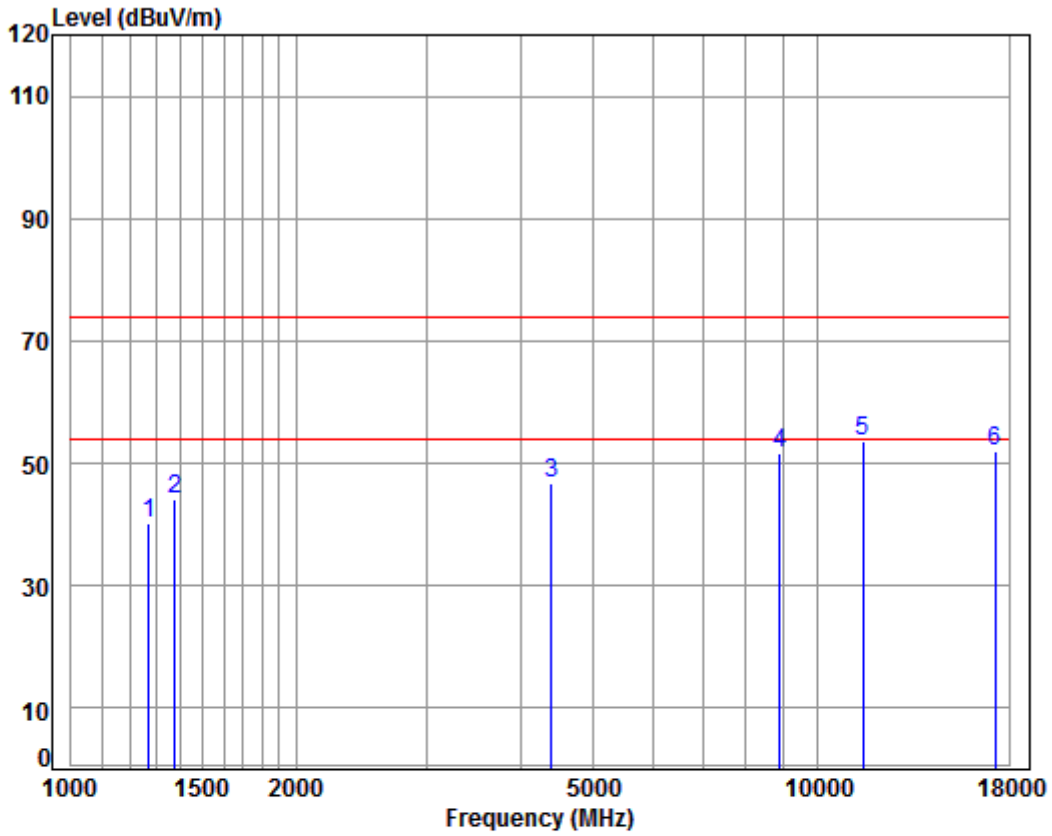
Mode:b; Polarization:Vertical; Channel:Low



Condition: 3m VERTICAL
Job No : 09748CR/09749CR
Mode : 5745 TX RSE
: ANT B

	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	1271.123	4.69	24.82	38.07	48.94	40.38	74.00	-33.62	peak
2	1378.273	5.08	25.30	38.05	51.87	44.20	74.00	-29.80	peak
3	4392.376	7.44	33.60	38.21	44.07	46.90	74.00	-27.10	peak
4	8891.725	10.37	36.47	35.50	40.47	51.81	74.00	-22.19	peak
5	pp11490.000	12.13	38.09	36.00	39.46	53.68	74.00	-20.32	peak
6	17235.000	16.18	43.08	36.18	28.87	51.95	74.00	-22.05	peak

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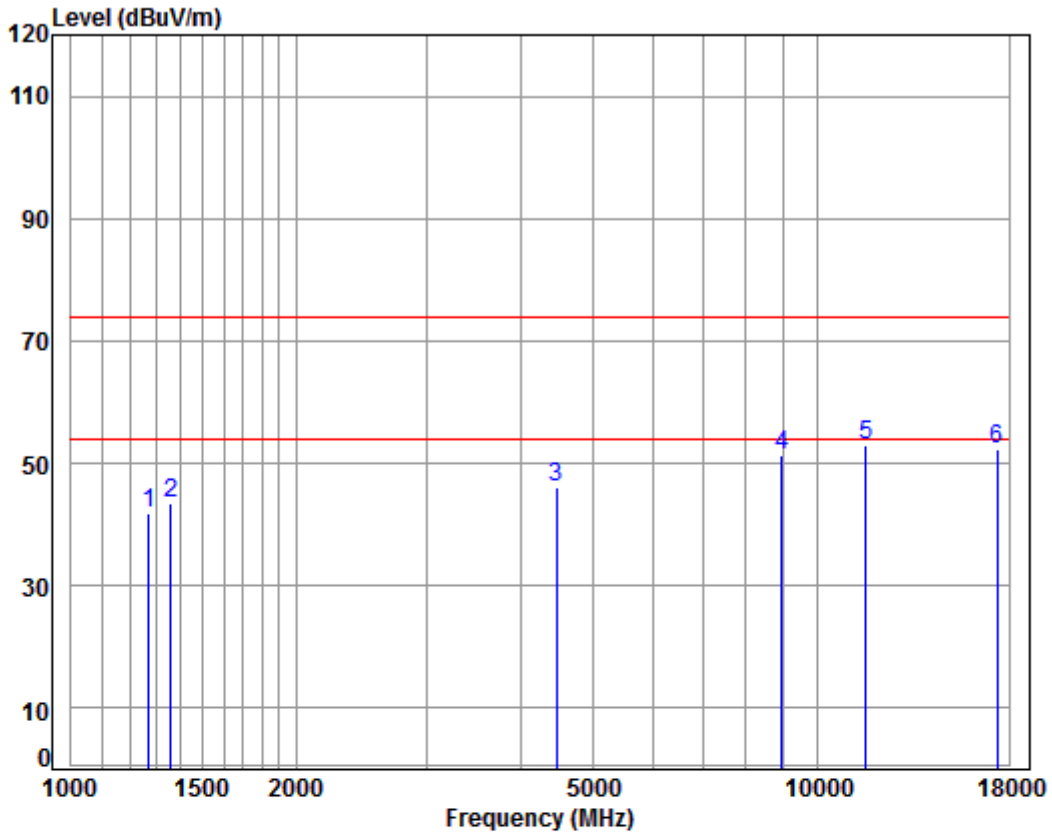
Mode:b; Polarization:Horizontal; Channel:middle



Condition: 3m HORIZONTAL
Job No : 09748CR/09749CR
Mode : 5785 TX RSE
: ANT B

	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	1271.123	4.69	24.82	38.07	50.41	41.85	74.00	-32.15	peak
2	1362.430	5.02	25.23	38.06	51.39	43.58	74.00	-30.42	peak
3	4469.214	7.53	33.60	38.25	43.27	46.15	74.00	-27.85	peak
4	8943.274	10.39	36.53	35.45	39.92	51.39	74.00	-22.61	peak
5	pp11570.000	12.17	38.17	36.10	38.67	52.91	74.00	-21.09	peak
6	17355.000	15.92	43.23	36.12	29.18	52.21	74.00	-21.79	peak

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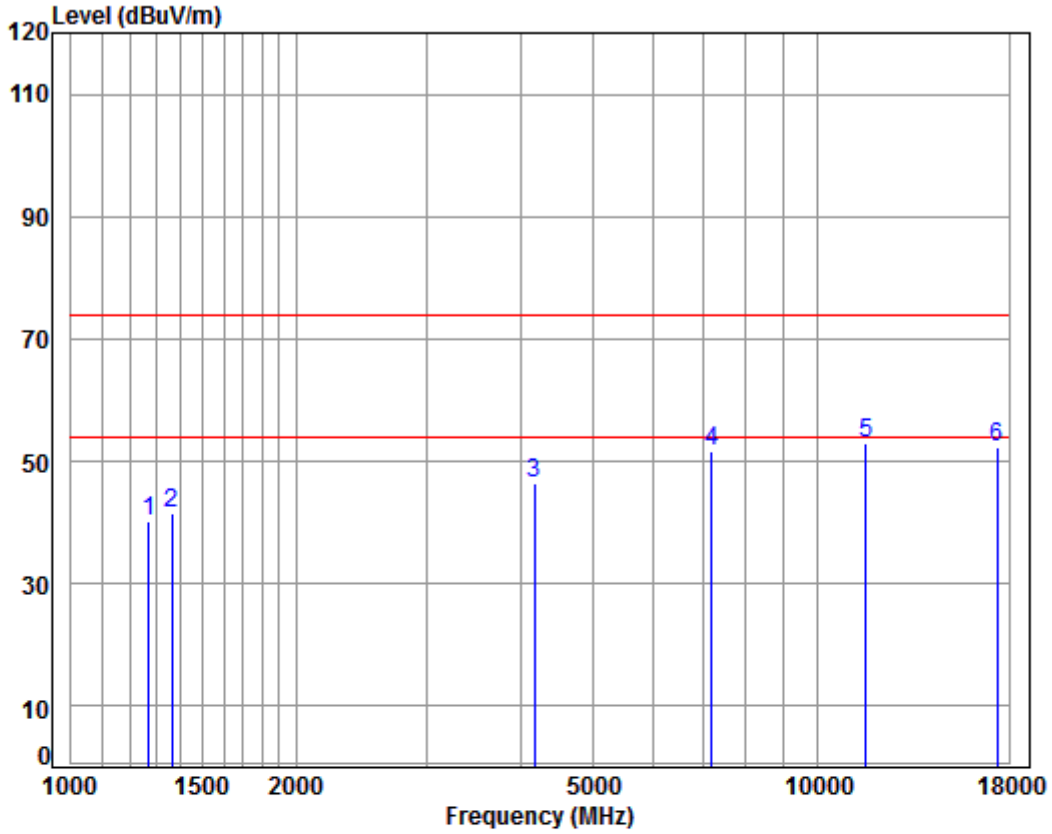
Mode:b; Polarization:Vertical; Channel:middle



Condition: 3m VERTICAL
Job No : 09748CR/09749CR
Mode : 5785 TX RSE
: ANT B

	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	1271.123	4.69	24.82	38.07	48.70	40.14	74.00	-33.86	peak
2	1366.374	5.04	25.25	38.05	49.23	41.47	74.00	-32.53	peak
3	4169.698	7.18	33.60	38.09	43.86	46.55	74.00	-27.45	peak
4	7200.309	10.08	36.42	37.11	42.39	51.78	74.00	-22.22	peak
5	pp11570.000	12.17	38.17	36.10	38.79	53.03	74.00	-20.97	peak
6	17355.000	15.92	43.23	36.12	29.26	52.29	74.00	-21.71	peak

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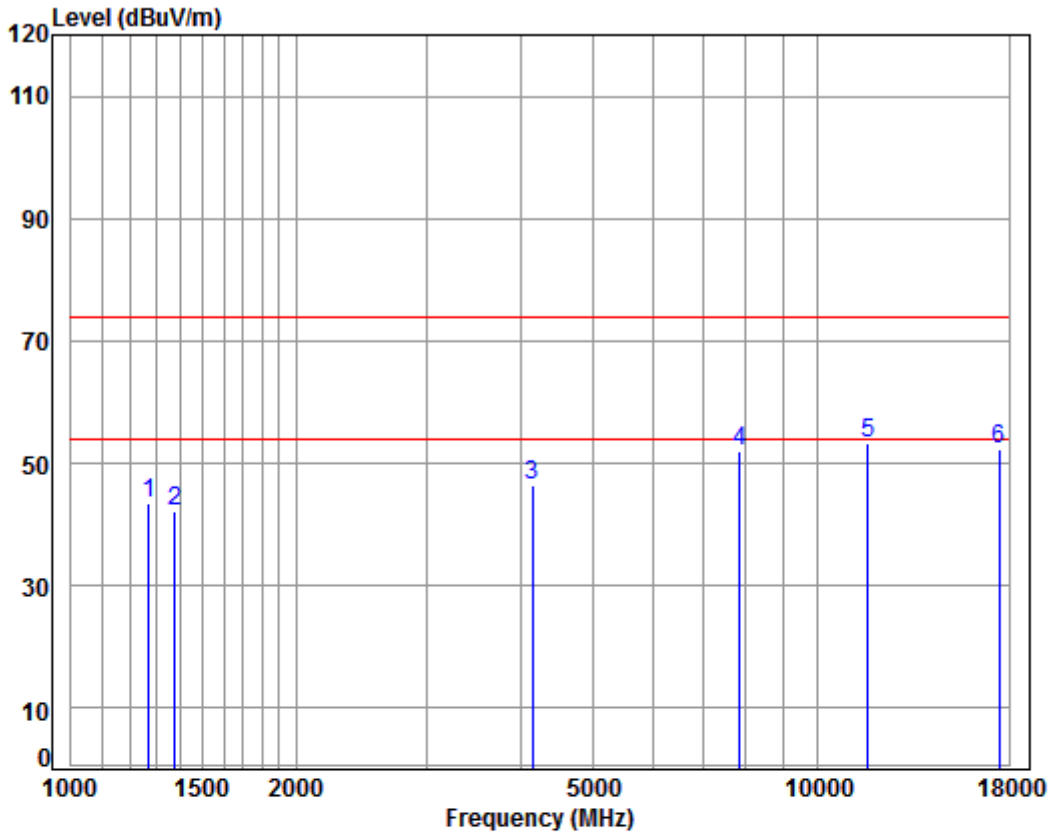
Mode:b; Polarization:Horizontal; Channel:High



Condition: 3m HORIZONTAL
Job No : 09748CR/09749CR
Mode : 5825 TX RSE
: ANT B

	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	1271.123	4.69	24.82	38.07	51.98	43.42	74.00	-30.58	peak
2	1378.273	5.08	25.30	38.05	49.74	42.07	74.00	-31.93	peak
3	4145.664	7.16	33.60	38.08	43.60	46.28	74.00	-27.72	peak
4	7852.524	9.96	36.51	36.53	41.91	51.85	74.00	-22.15	peak
5	pp11650.000	12.20	38.25	36.19	38.95	53.21	74.00	-20.79	peak
6	17475.000	15.65	43.37	36.06	29.26	52.22	74.00	-21.78	peak

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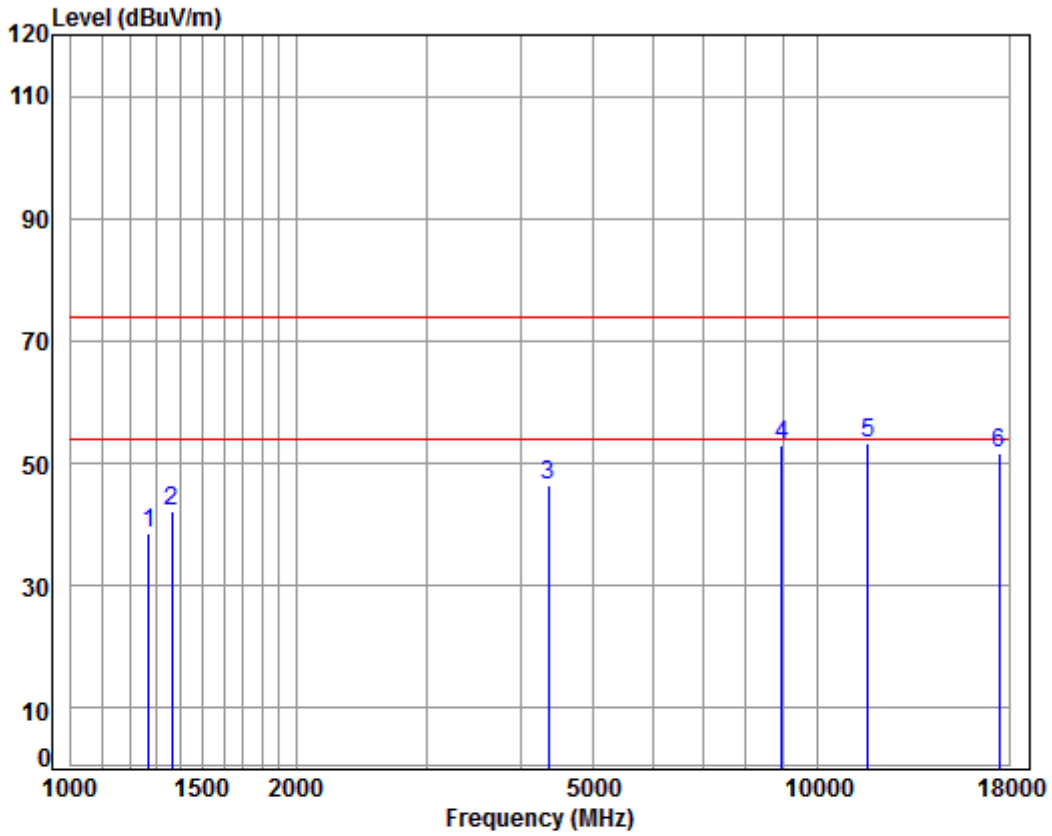
Mode:b; Polarization:Vertical; Channel:High



Condition: 3m VERTICAL
Job No : 09748CR/09749CR
Mode : 5825 TX RSE
: ANT B

	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	1271.123	4.69	24.82	38.07	47.19	38.63	74.00	-35.37	peak
2	1366.374	5.04	25.25	38.05	49.96	42.20	74.00	-31.80	peak
3	4354.454	7.40	33.60	38.19	43.62	46.43	74.00	-27.57	peak
4	8943.274	10.39	36.53	35.45	41.49	52.96	74.00	-21.04	peak
5	pp11650.000	12.20	38.25	36.19	38.93	53.19	74.00	-20.81	peak
6	17475.000	15.65	43.37	36.06	28.83	51.79	74.00	-22.21	peak

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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 18GHz 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 above measurement data were shown in the report.

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7.8 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.

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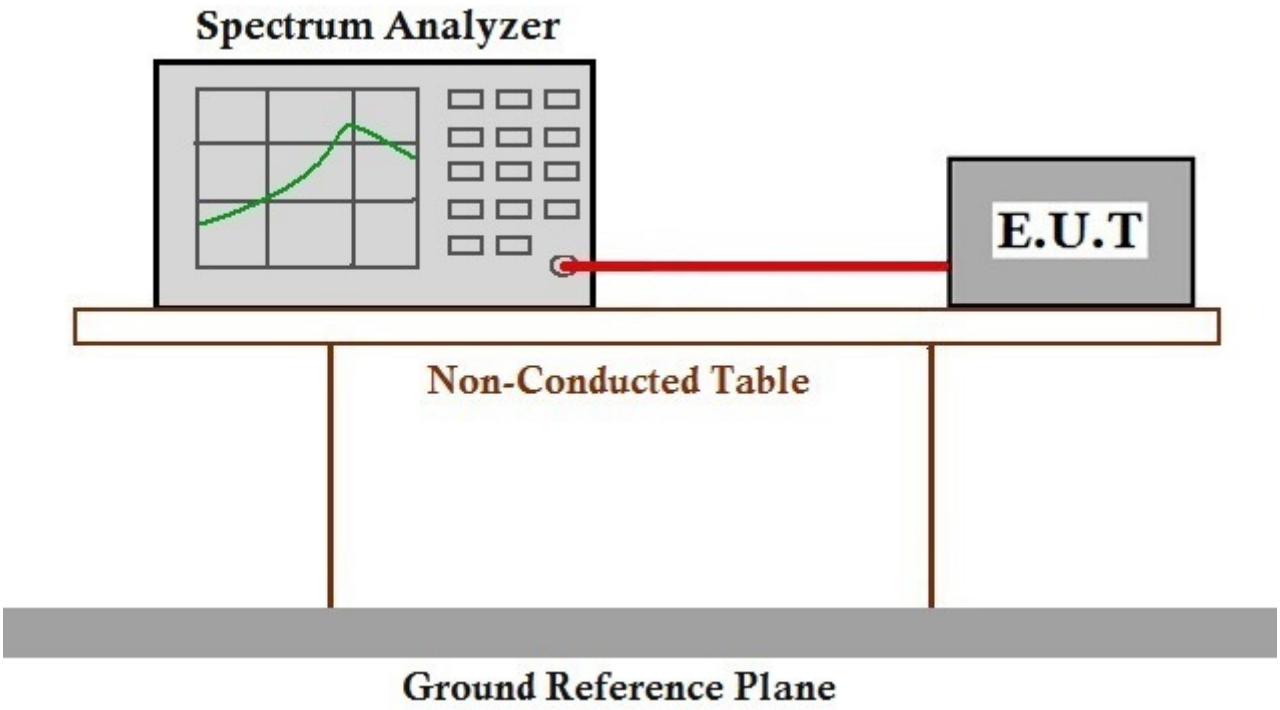
7.8.1 E.U.T. Operation

Operating Environment:

Temperature: 23 °C Humidity: 54 % RH Atmospheric Pressure: 1010 mbar

Test mode a:TX mode_Keep the EUT in continuously transmitting mode with ANT A.

7.8.2 Test Setup Diagram



7.8.3 Measurement Procedure and Data

The detailed test data see: Appendix 15.407

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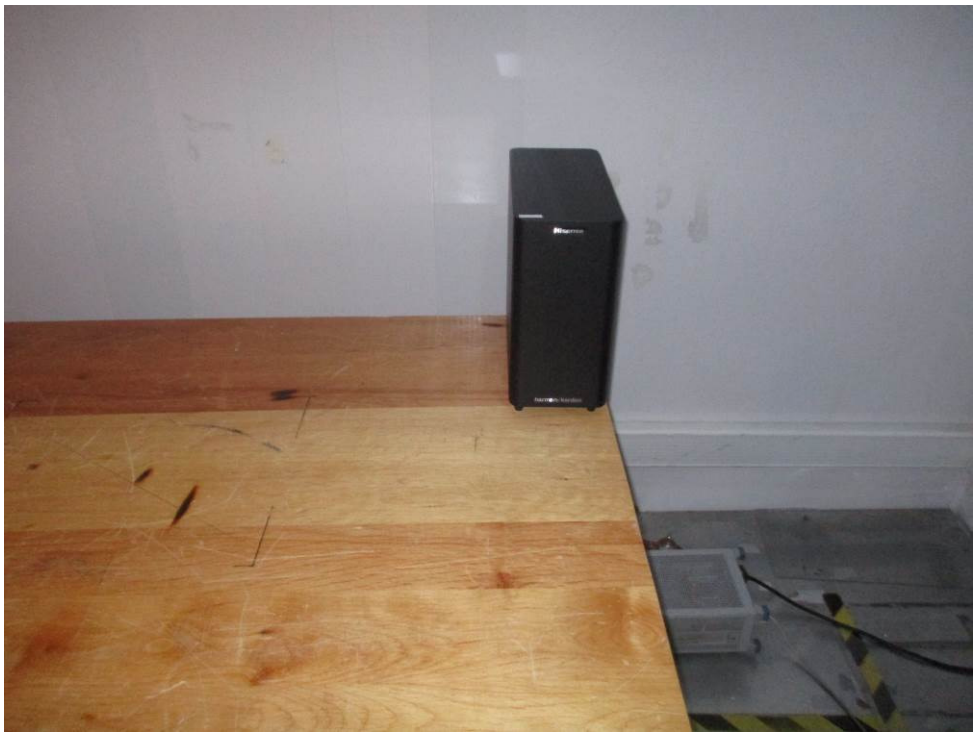
8 Photographs

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



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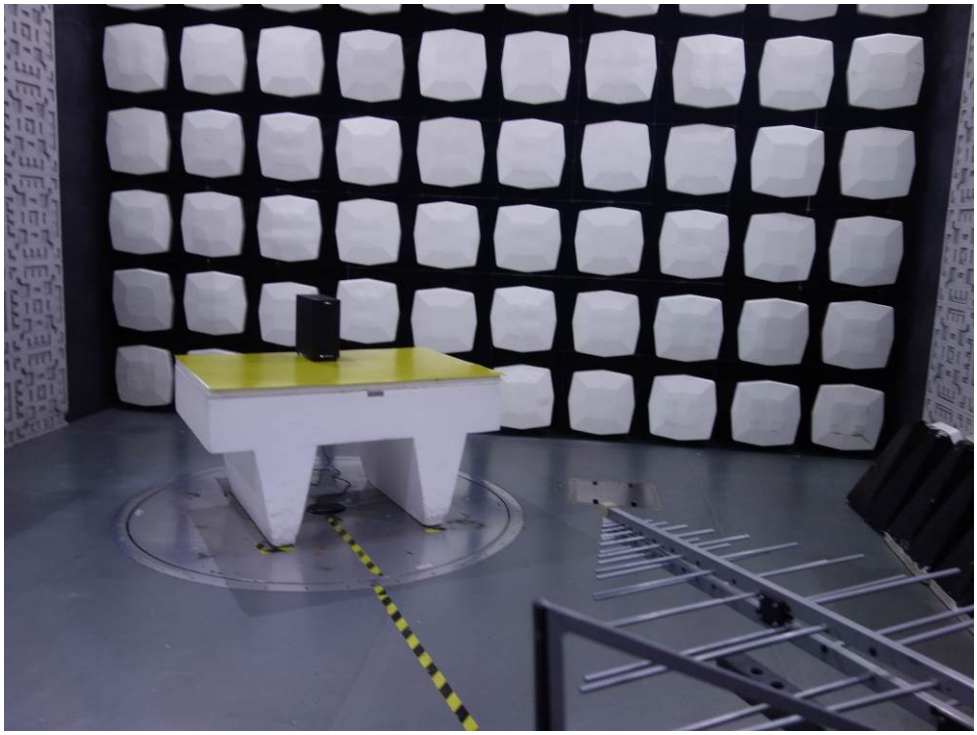
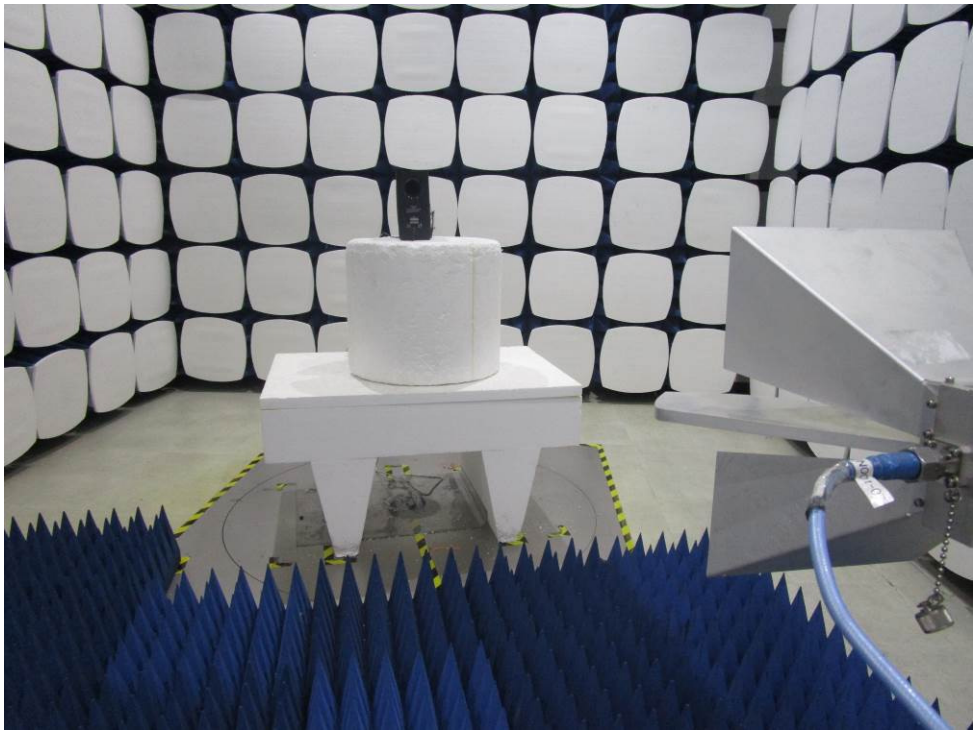
8.2 Radiated Emissions Test Setup





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9 Appendix

9.1 Appendix 15.407

1.Emission Bandwidth Measurement

Test Mode	Test Channel	Ant	EBW[MHz]	Limit[MHz]	Verdict
Tx	5743	ANT A	1.580	>=0.5	PASS
Tx	5743	ANT B	1.680	>=0.5	PASS
Tx	5791	ANT A	1.690	>=0.5	PASS
Tx	5791	ANT B	1.700	>=0.5	PASS
Tx	5840	ANT A	1.690	>=0.5	PASS
Tx	5840	ANT B	1.690	>=0.5	PASS

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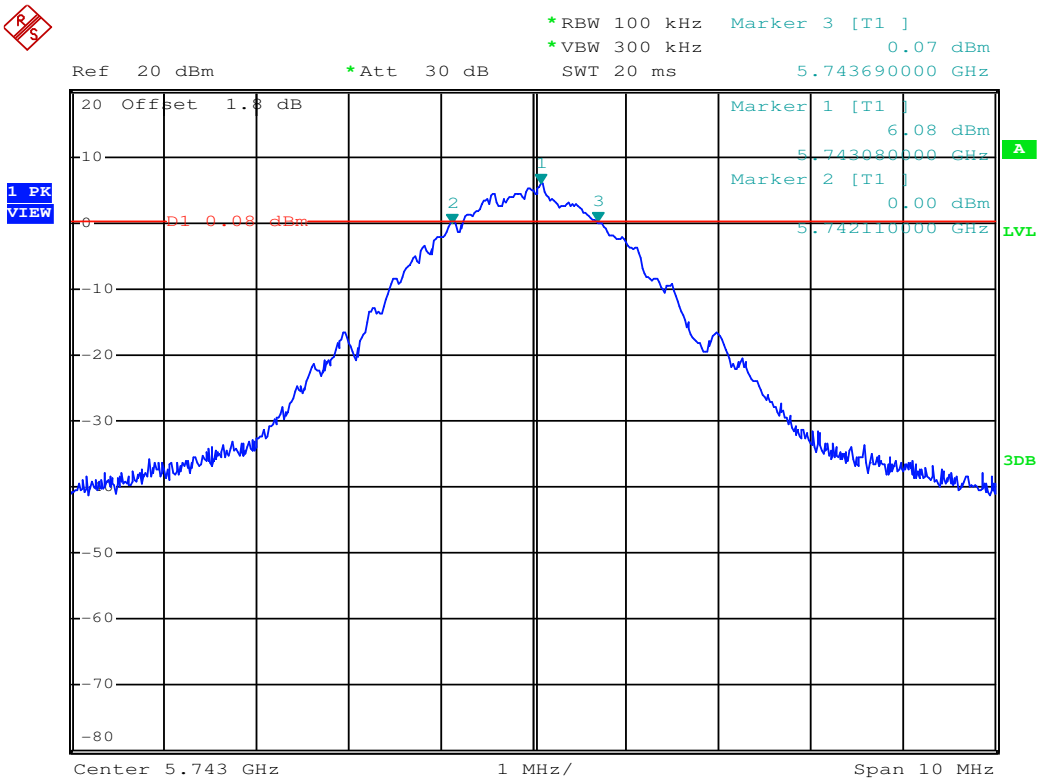
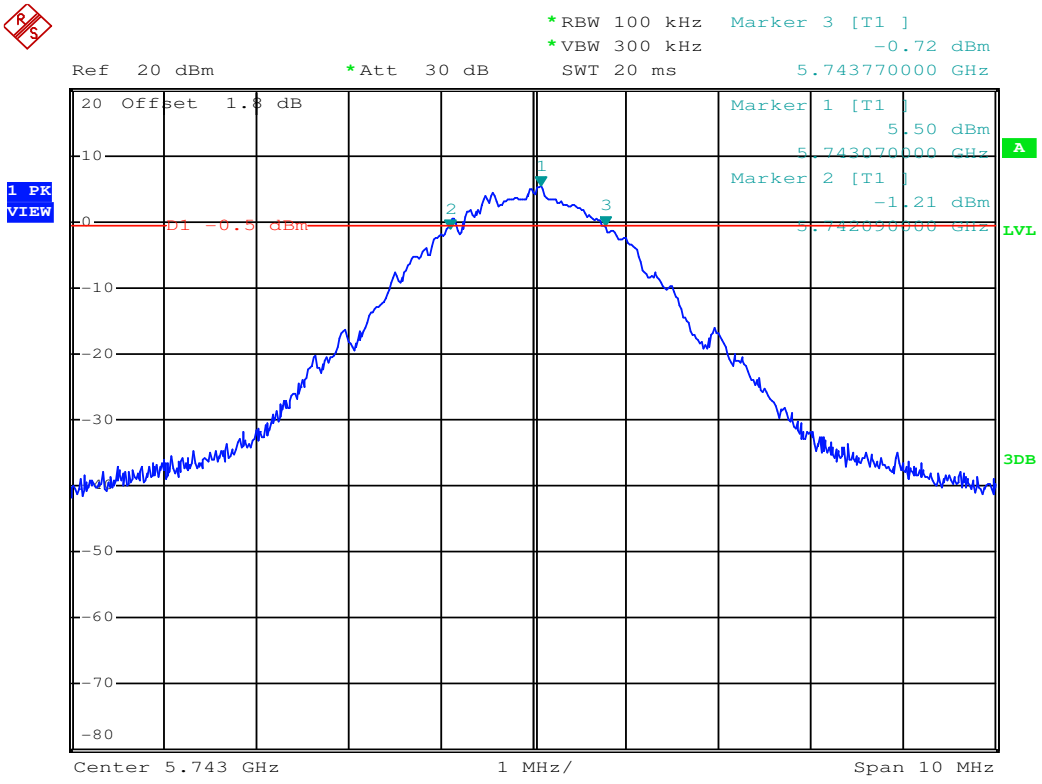
Emission Bandwidth Measurement_Tx_5743_ANT A



Emission Bandwidth Measurement_Tx_5743_ANT B



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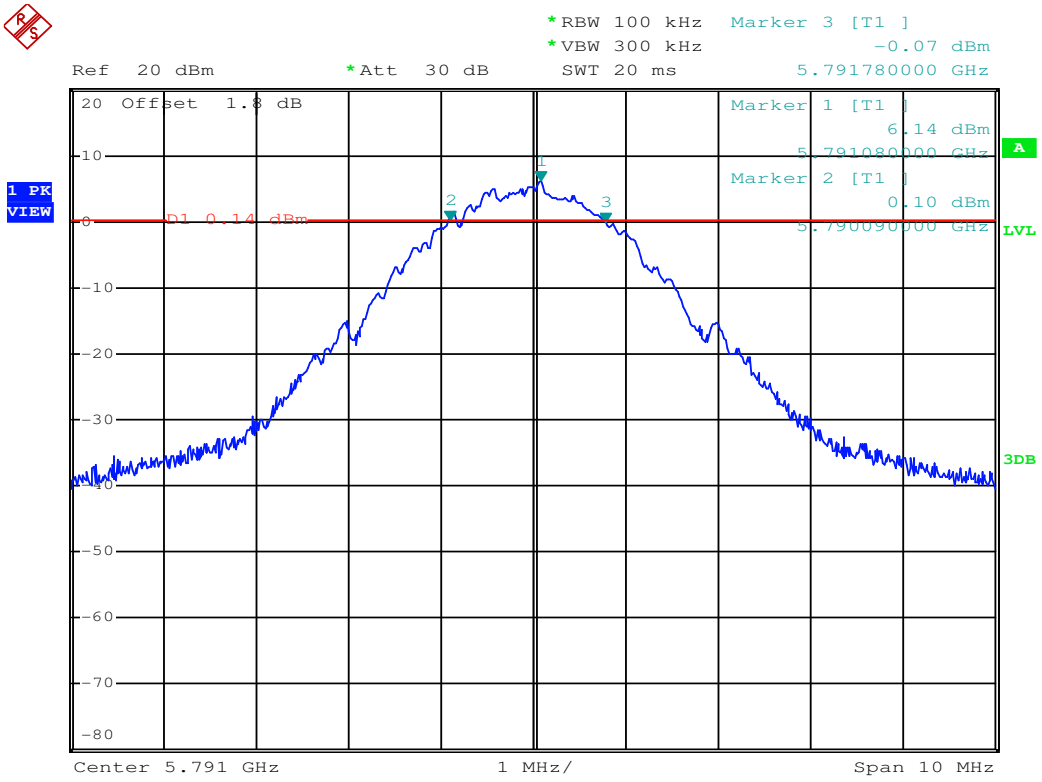
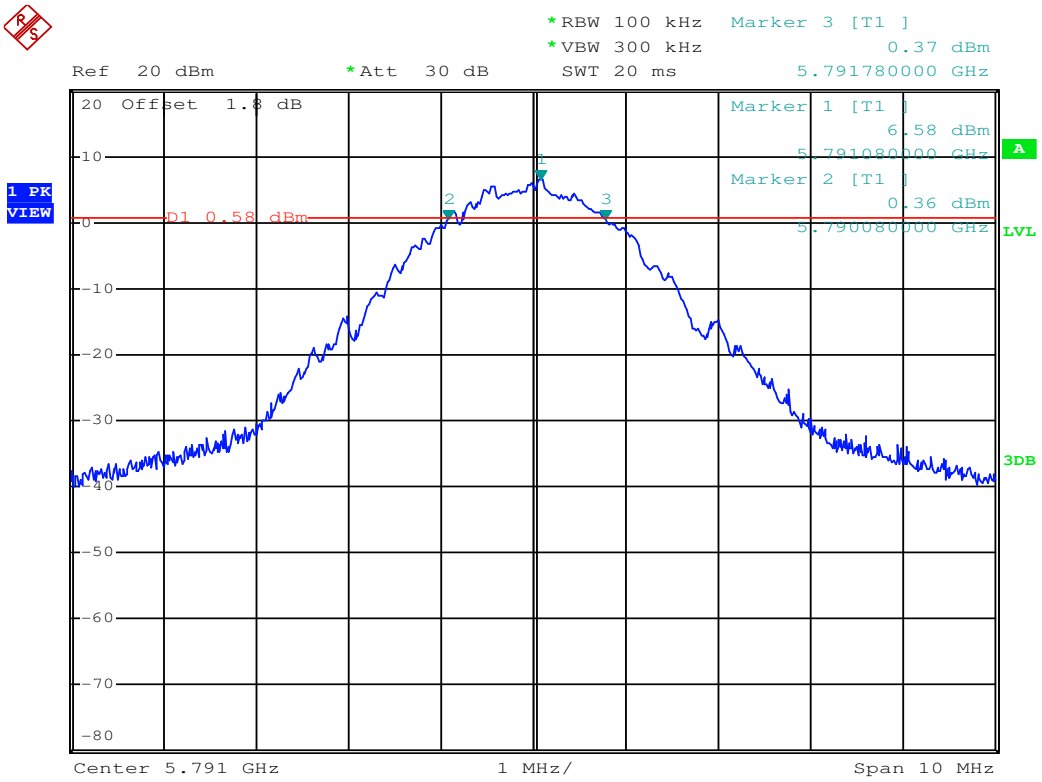
Emission Bandwidth Measurement_Tx_5791_ANT A



Emission Bandwidth Measurement_Tx_5791_ANT B



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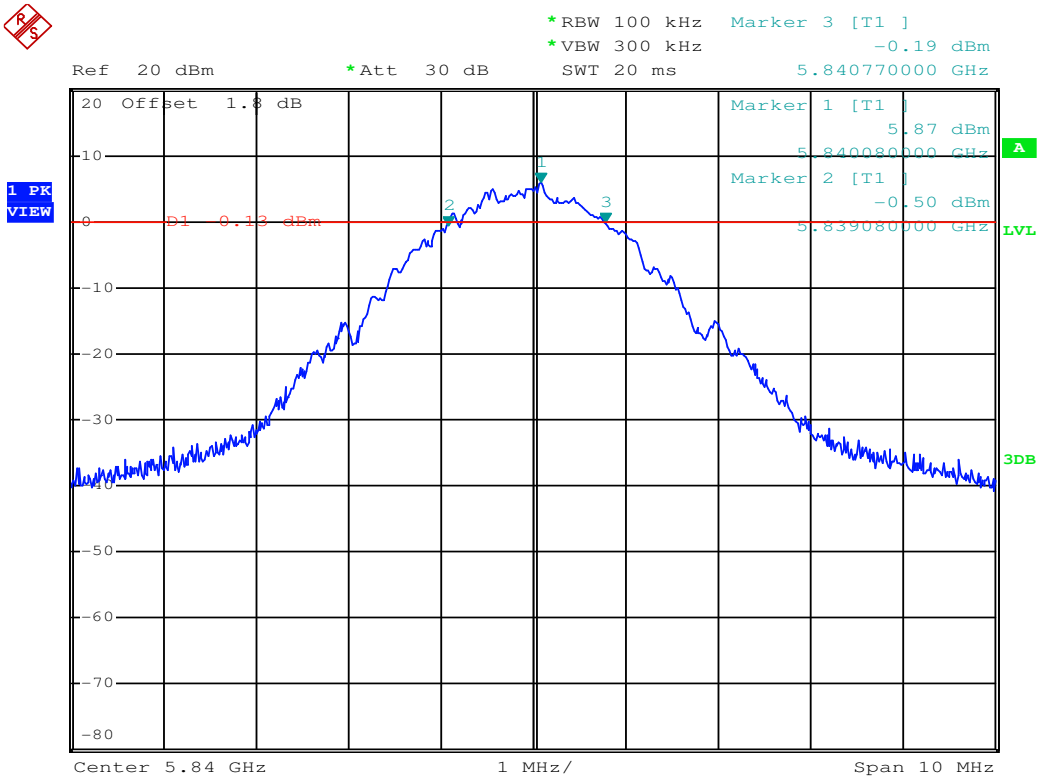
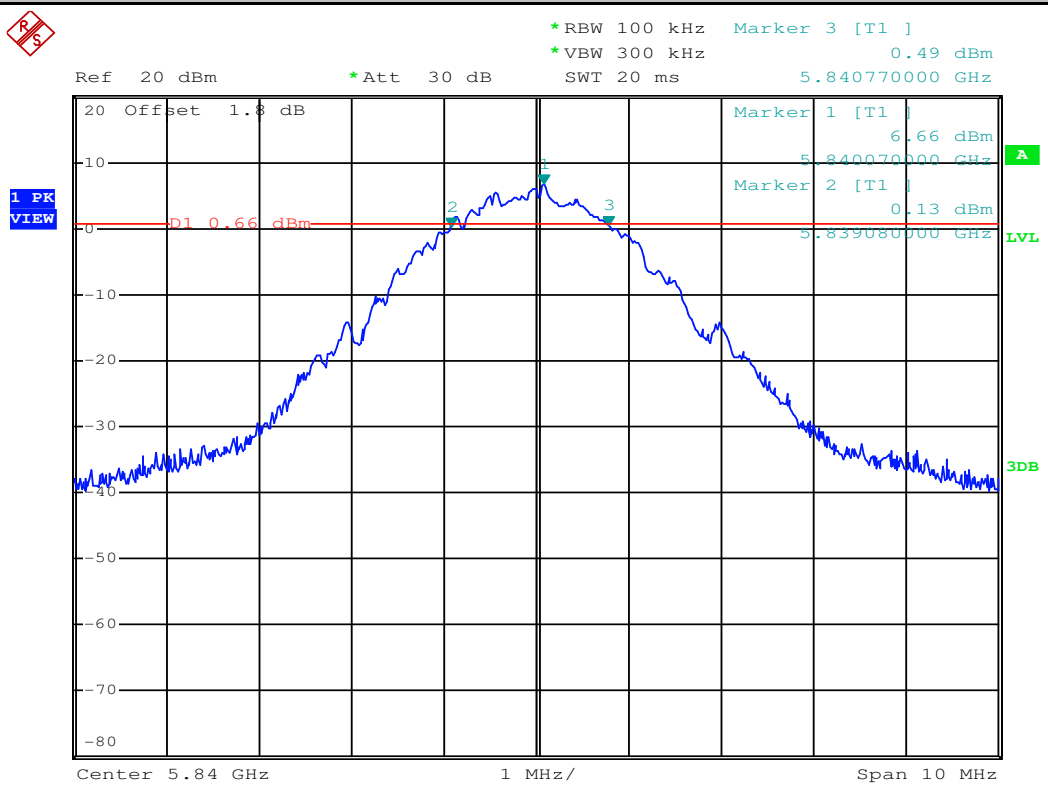
Emission Bandwidth Measurement_Tx_5840_ANT A



Emission Bandwidth Measurement_Tx_5840_ANT B



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2.Occupied Bandwidth Measurement

Test Mode	Test Channel	Ant	OBW[MHz]	Limit[MHz]	Verdict
Tx	5743	ANT A	3.200	---	PASS
Tx	5743	ANT B	3.200	---	PASS
Tx	5791	ANT A	3.240	---	PASS
Tx	5791	ANT B	3.240	---	PASS
Tx	5840	ANT A	3.260	---	PASS
Tx	5840	ANT B	3.260	---	PASS

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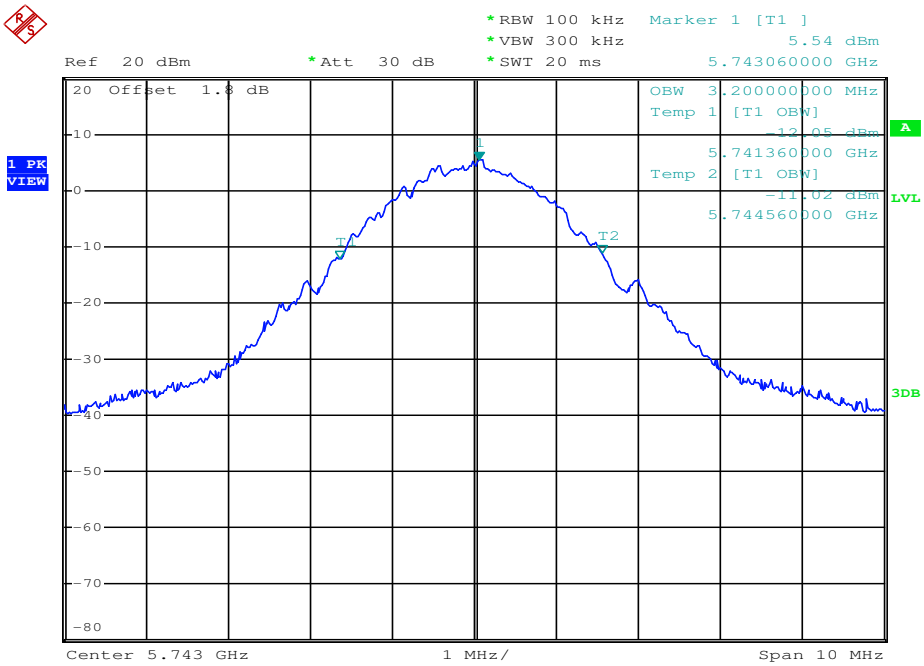
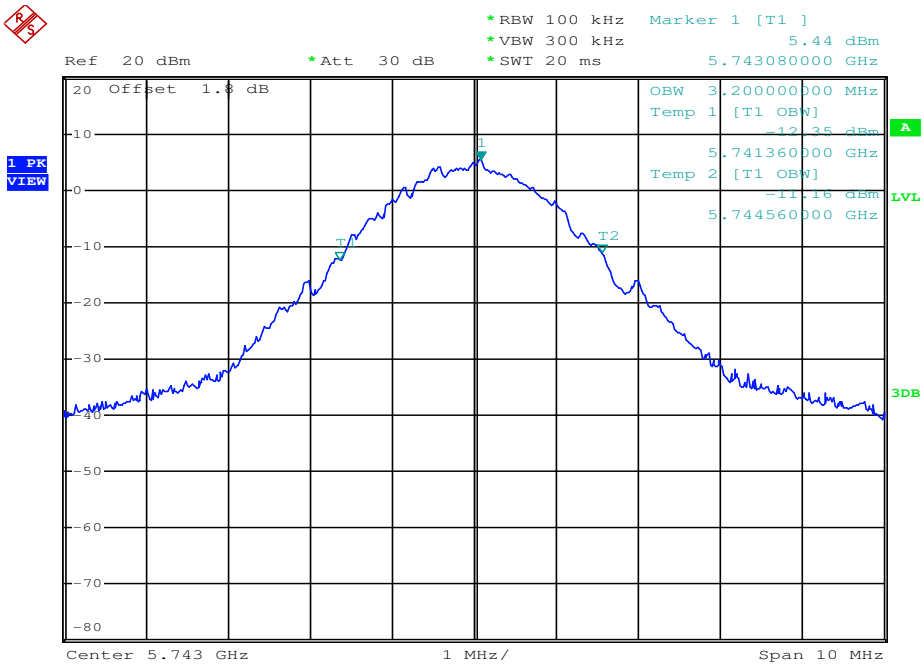
Occupied Bandwidth Measurement_Tx_5743_ANT A



Occupied Bandwidth Measurement_Tx_5743_ANT B



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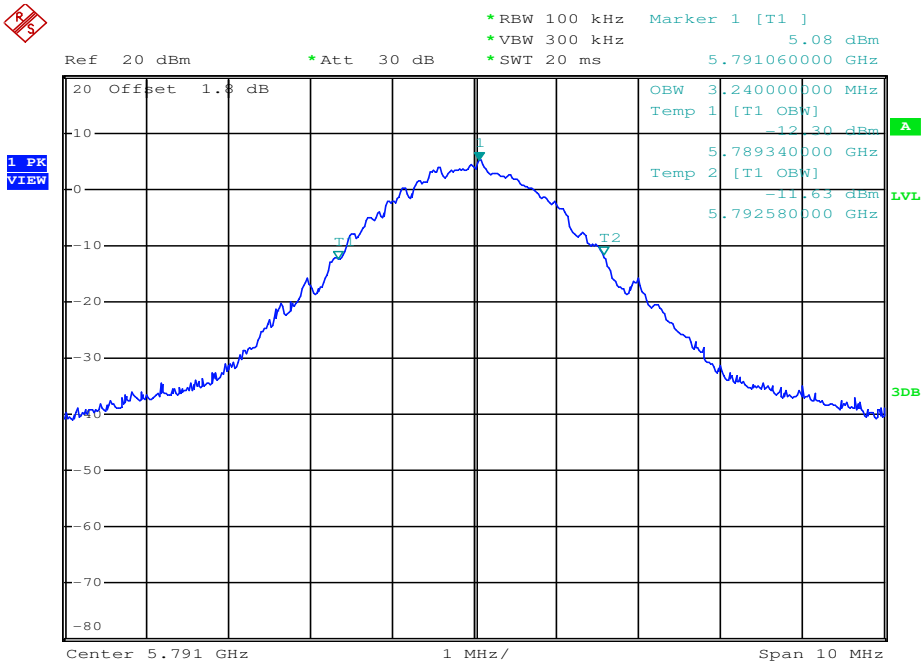
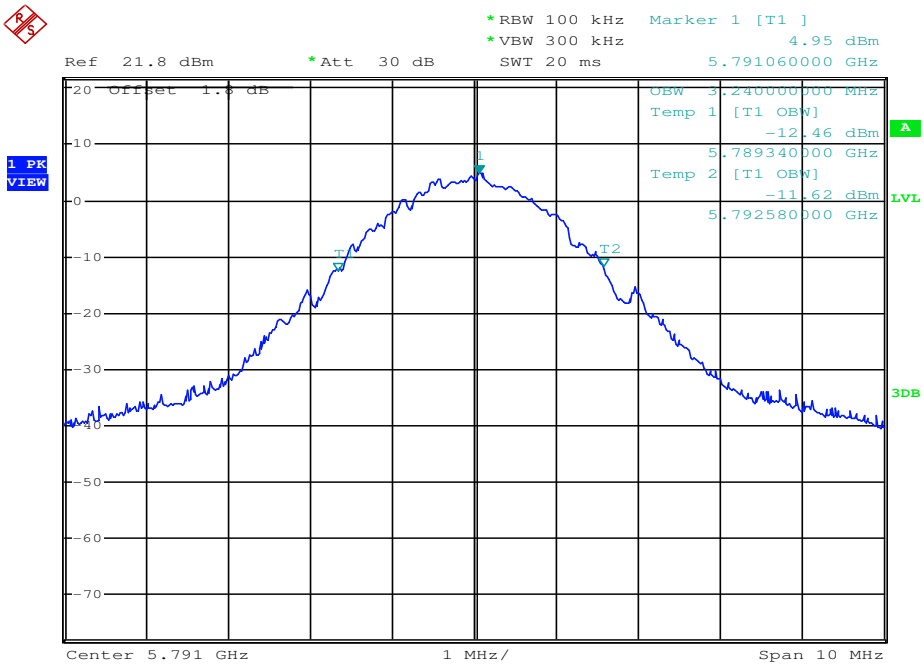
Occupied Bandwidth Measurement_Tx_5791_ANT A



Occupied Bandwidth Measurement_Tx_5791_ANT B



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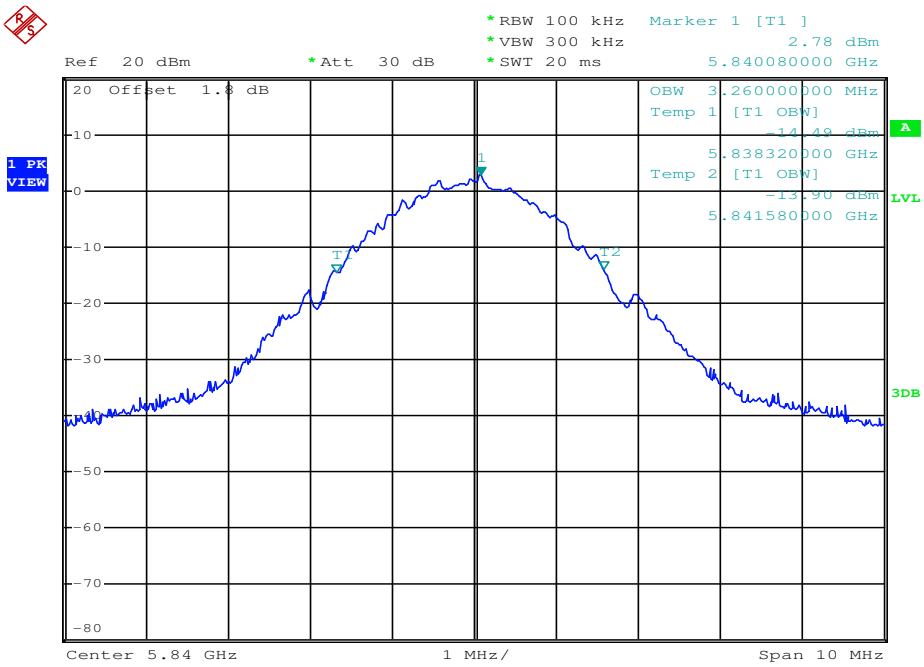
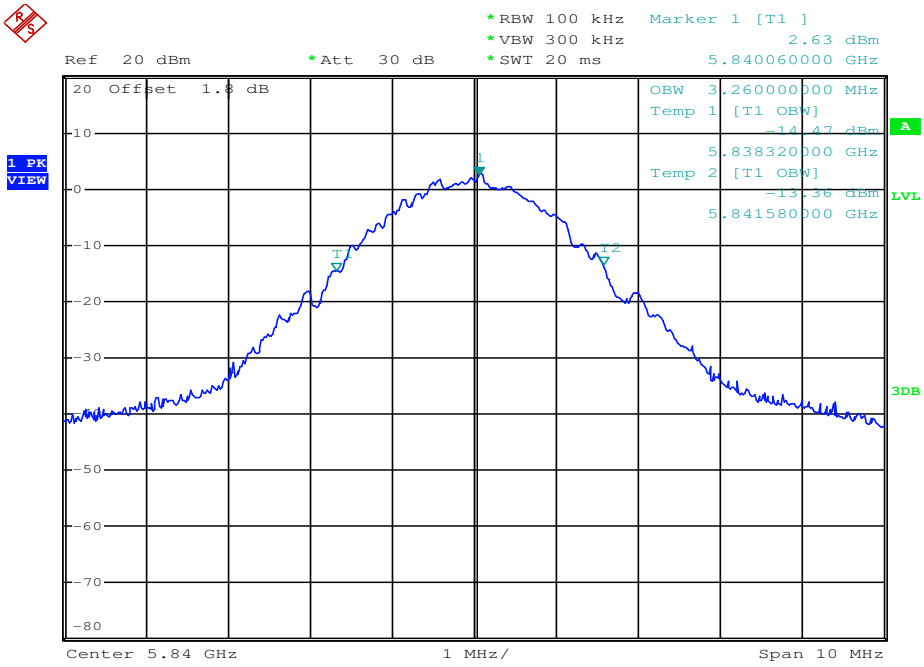
Occupied Bandwidth Measurement_Tx_5840_ANT A



Occupied Bandwidth Measurement_Tx_5840_ANT B



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3.Maximum Conduct Output Power

Test Mode	Test Channel	Ant	Level [dBm]	10log(1/x) Factor [dB]	Power [dBm]	Limit [dBm]	Verdict
Tx	5743	ANT A	9.22	0	9.22	<30.00	PASS
Tx	5743	ANT B	9.09	0	9.09	<30.00	PASS
Tx	5791	ANT A	9.32	0	9.32	<30.00	PASS
Tx	5791	ANT B	9.84	0	9.84	<30.00	PASS
Tx	5840	ANT A	9.30	0	9.30	<30.00	PASS
Tx	5840	ANT B	9.78	0	9.78	<30.00	PASS

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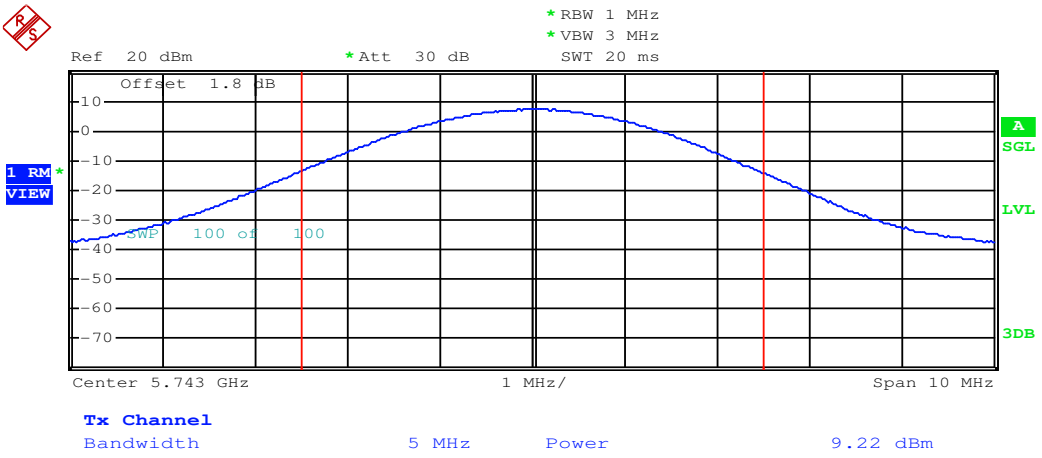
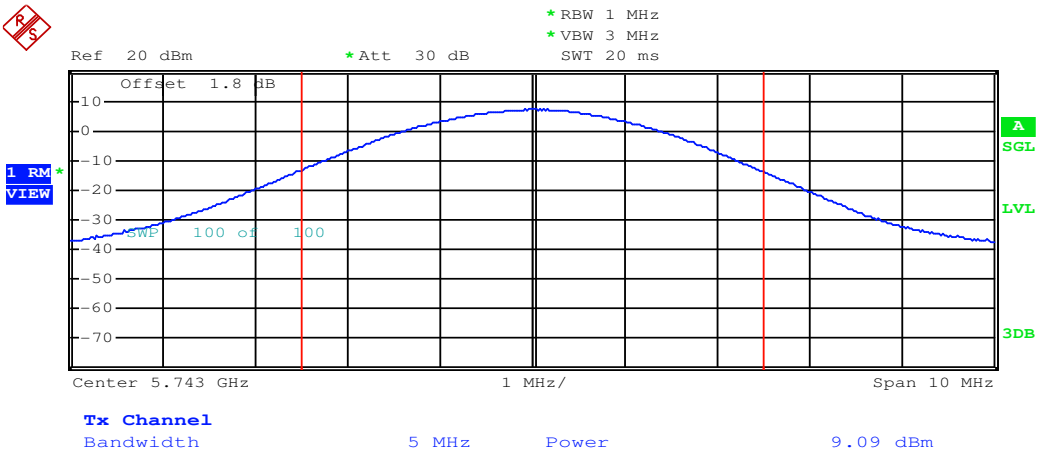
Maximum Conduct Output Power_Tx_5743_ANT A



Tx Channel

Bandwidth	5 MHz	Power	9.22 dBm

Maximum Conduct Output Power_Tx_5743_ANT B



Tx Channel

Bandwidth	5 MHz	Power	9.09 dBm

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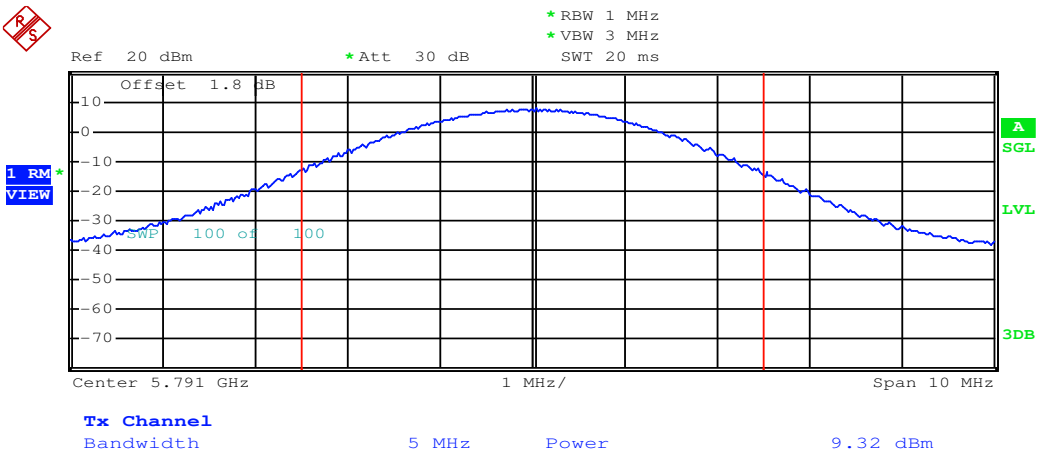
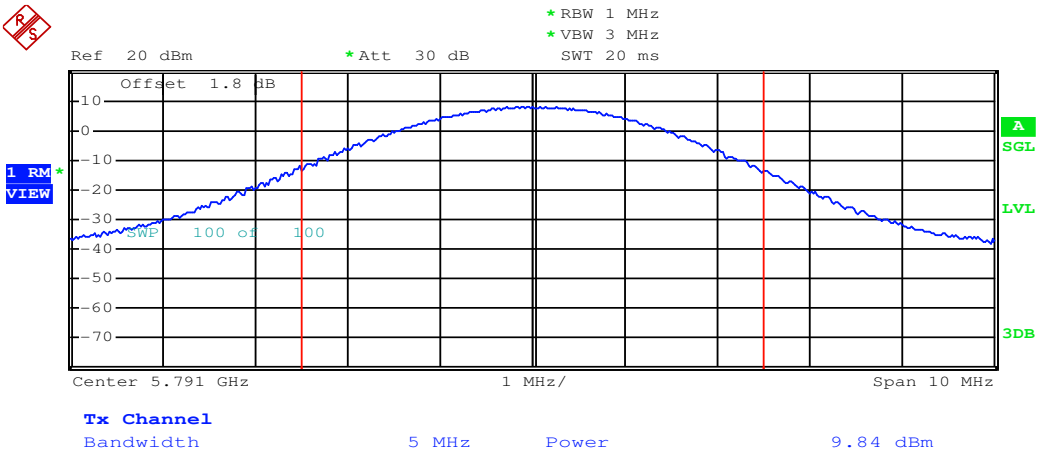
Maximum Conduct Output Power_Tx_5791_ANT A



Tx Channel

Bandwidth	5 MHz	Power	9.32 dBm

Maximum Conduct Output Power_Tx_5791_ANT B



Tx Channel

Bandwidth	5 MHz	Power	9.84 dBm

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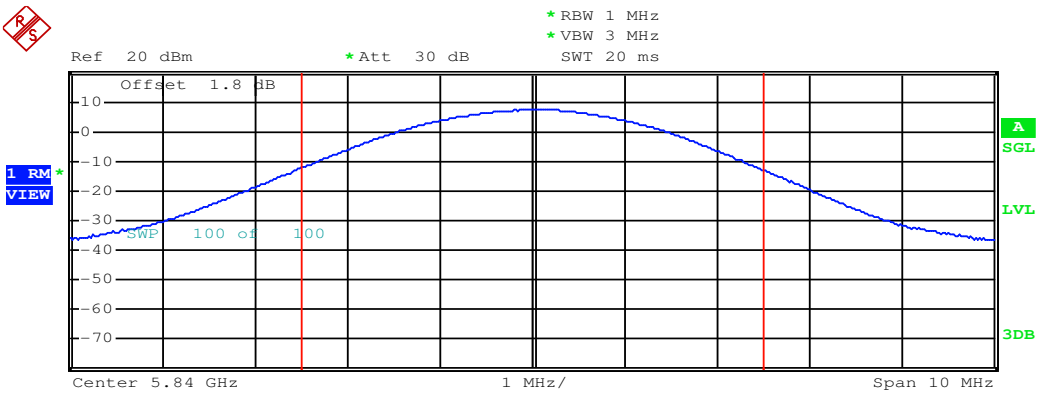
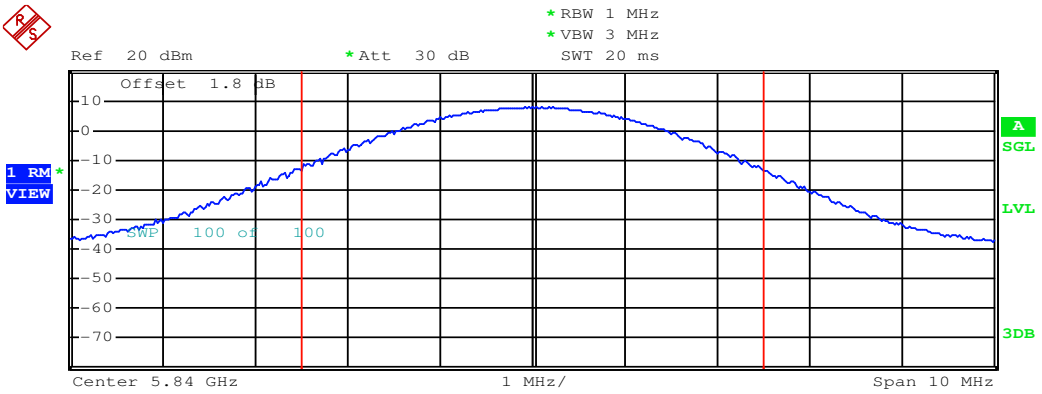
Maximum Conduct Output Power_Tx_5840_ANT A



Tx Channel

Bandwidth	5 MHz	Power	9.50 dBm

Maximum Conduct Output Power_Tx_5840_ANT B



Tx Channel

Bandwidth	5 MHz	Power	9.78 dBm

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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
Tx	5743	ANT A	5.09	0	2.21848749616356	7.308	<17.00	PASS
Tx	5743	ANT B	4.84	0	2.21848749616356	7.058	<17.00	PASS
Tx	5791	ANT A	5.52	0	2.21848749616356	7.738	<17.00	PASS
Tx	5791	ANT B	6.04	0	2.21848749616356	8.258	<17.00	PASS
Tx	5840	ANT A	5.06	0	2.21848749616356	7.278	<17.00	PASS
Tx	5840	ANT B	5.85	0	2.21848749616356	8.068	<17.00	PASS

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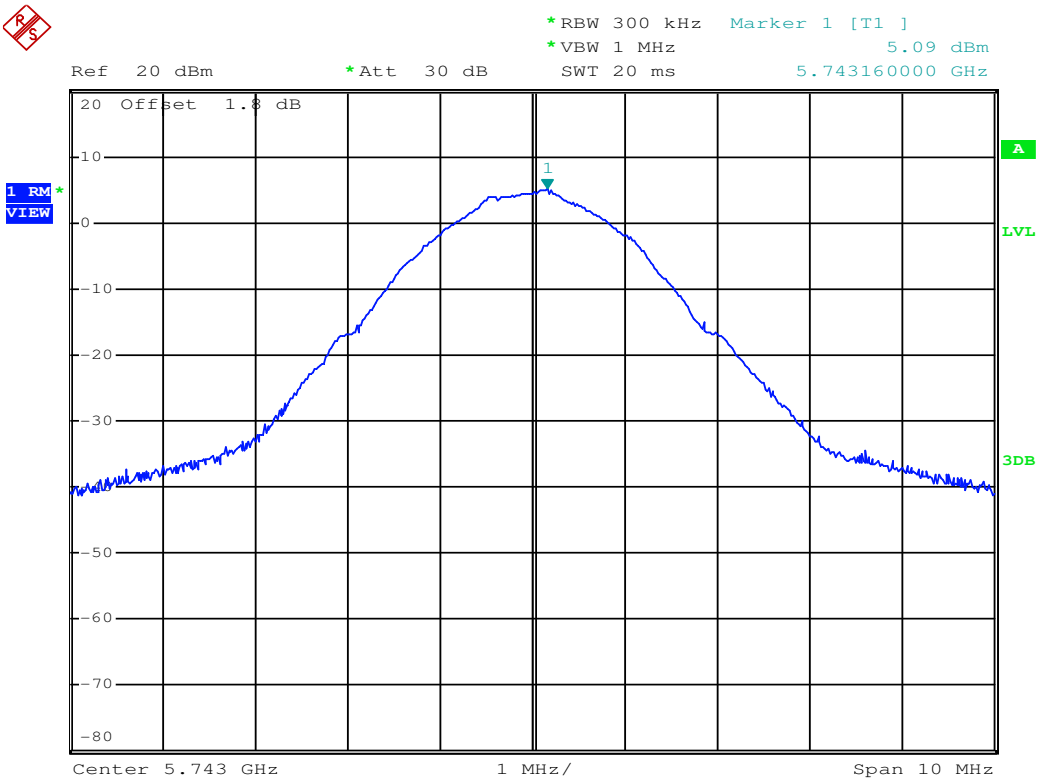
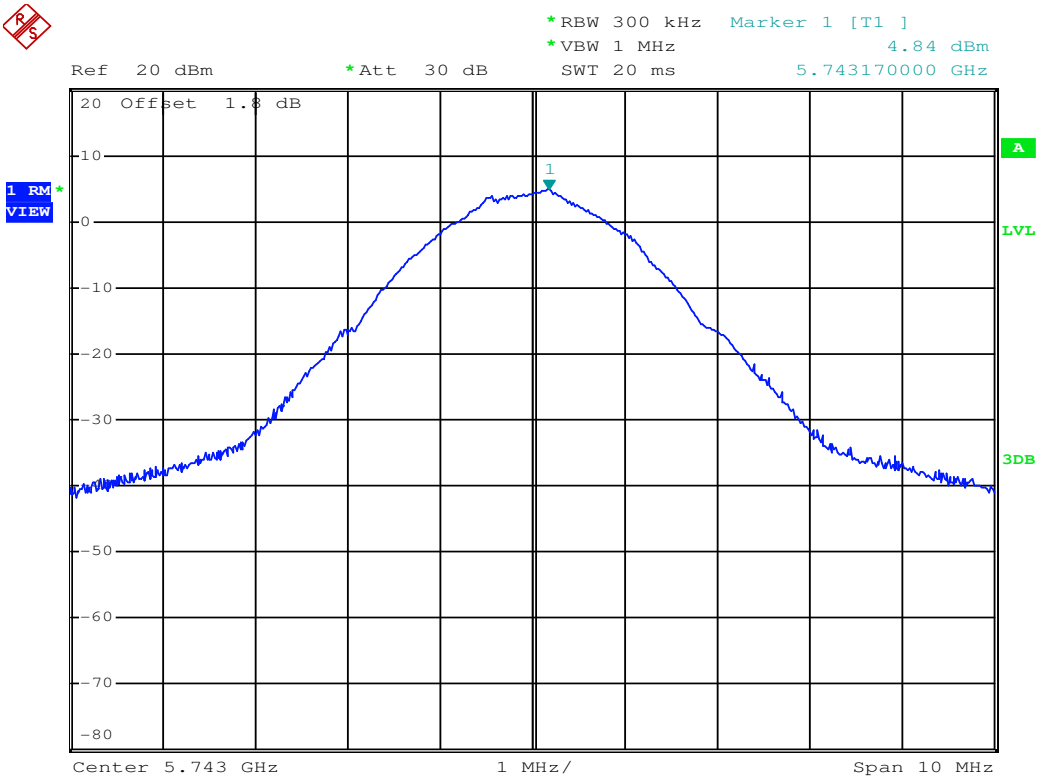
Maximum Power Spectral Density_TNVN_Tx_5743_ANT A



Maximum Power Spectral Density_TNVN_Tx_5743_ANT B



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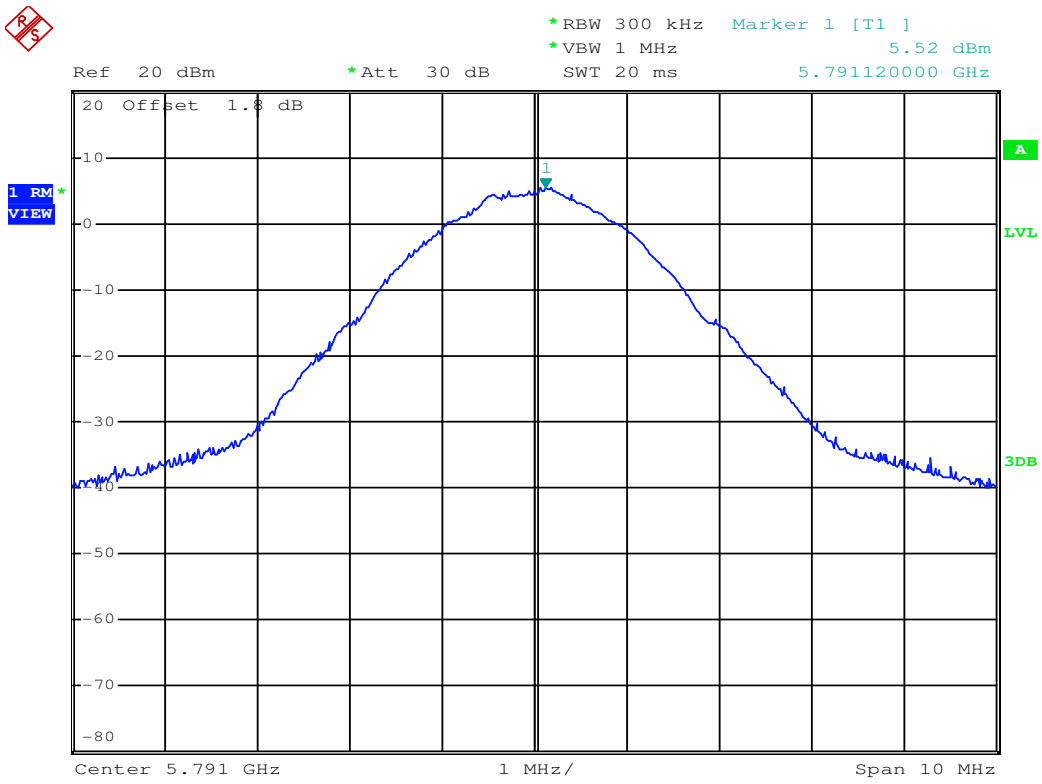
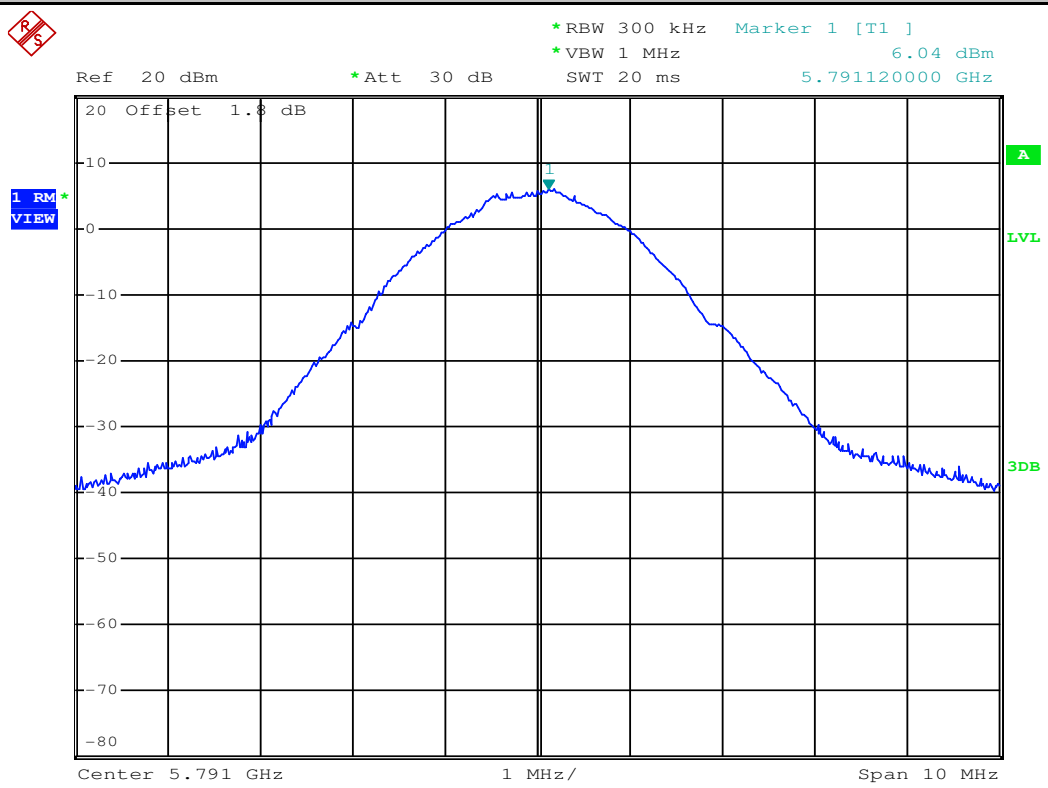
Maximum Power Spectral Density_TNVN_Tx_5791_ANT A



Maximum Power Spectral Density_TNVN_Tx_5791_ANT B



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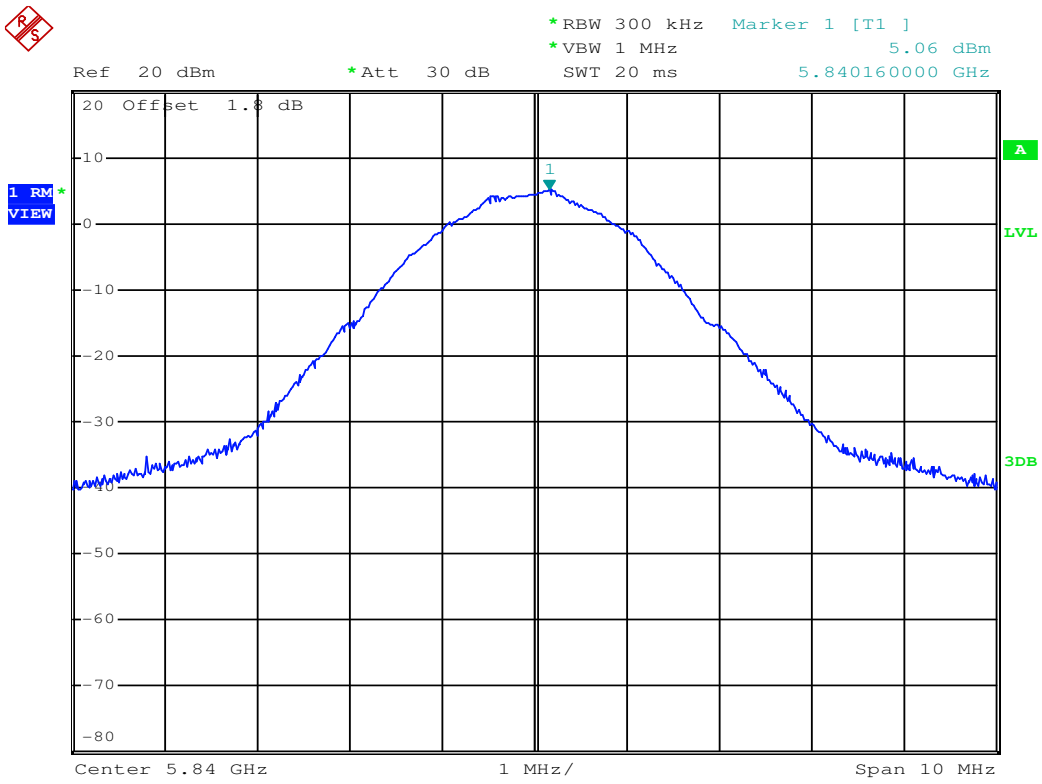
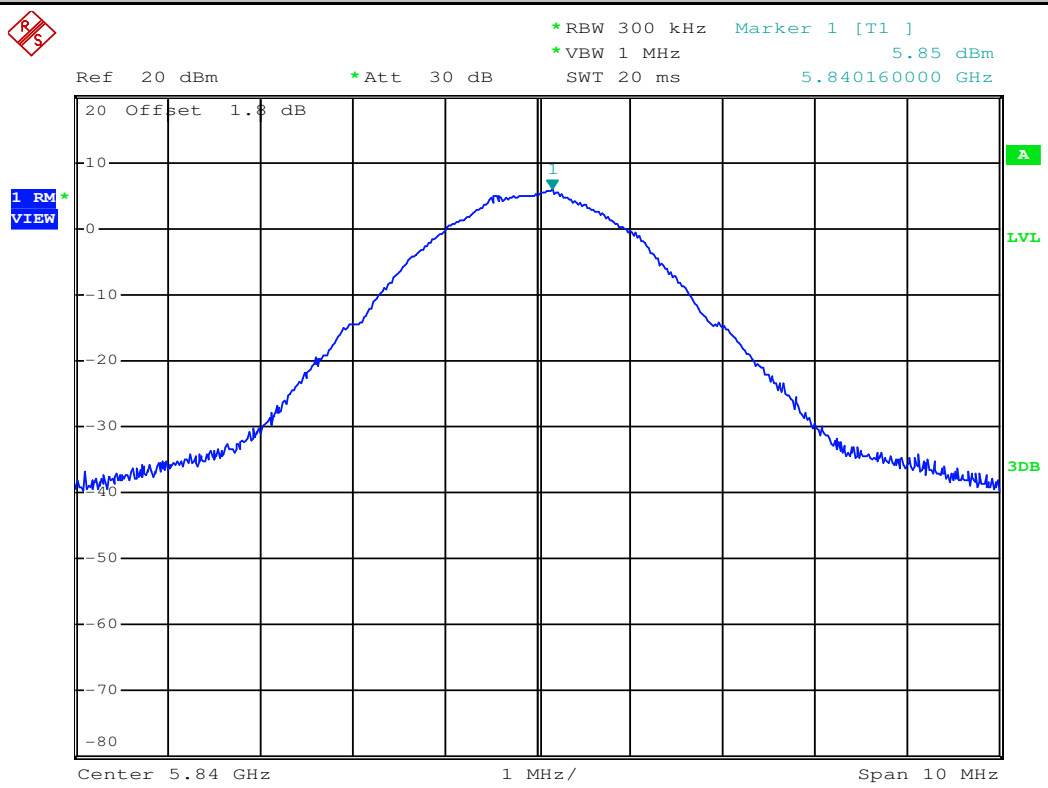
Maximum Power Spectral Density_TNVN_Tx_5840_ANT A



Maximum Power Spectral Density_TNVN_Tx_5840_ANT B



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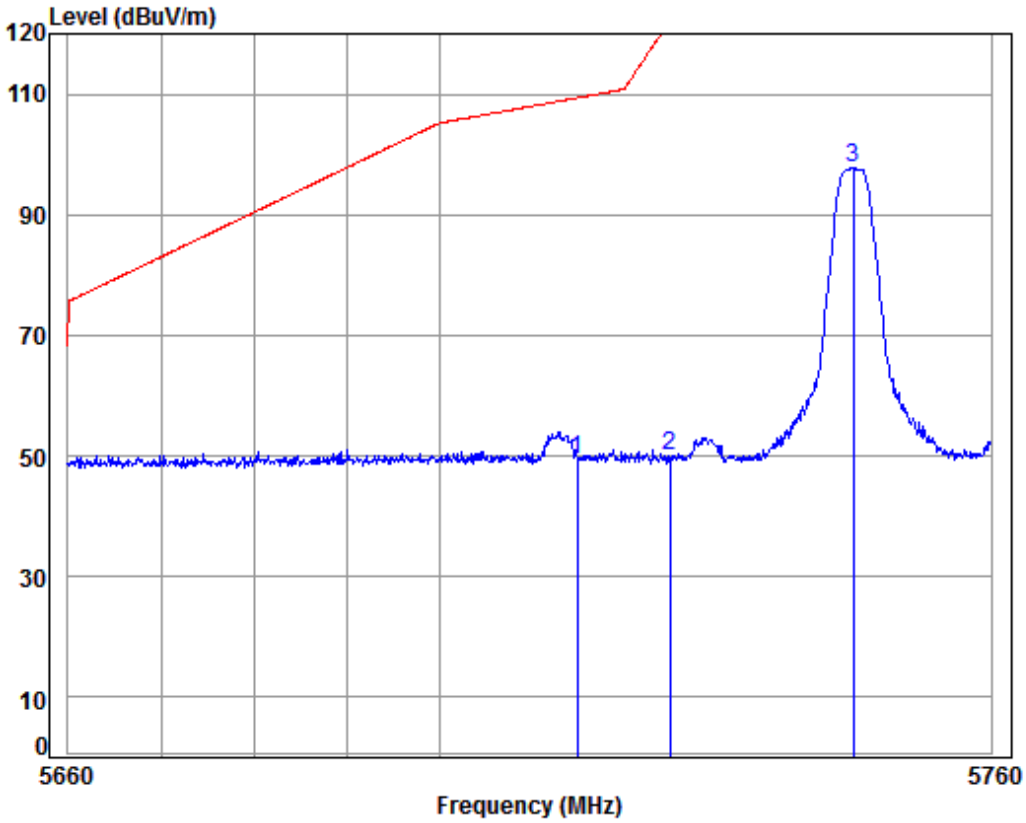
5.Band Edge Measurements (Radiated)

Mode:b; Polarization:Horizontal; Channel:Low



Condition: 3m HORIZONTAL
Job No : 09748CR/09749CR
Mode : 5745 Band edge
: ANT B

	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	9.61	34.53	38.35	43.63	49.42	109.40	-59.98	peak
2	5725.000	9.64	34.54	38.35	44.15	49.98	122.20	-72.22	peak
3 pp	5745.000	9.71	34.55	38.35	91.76	97.67	125.20	-27.53	peak

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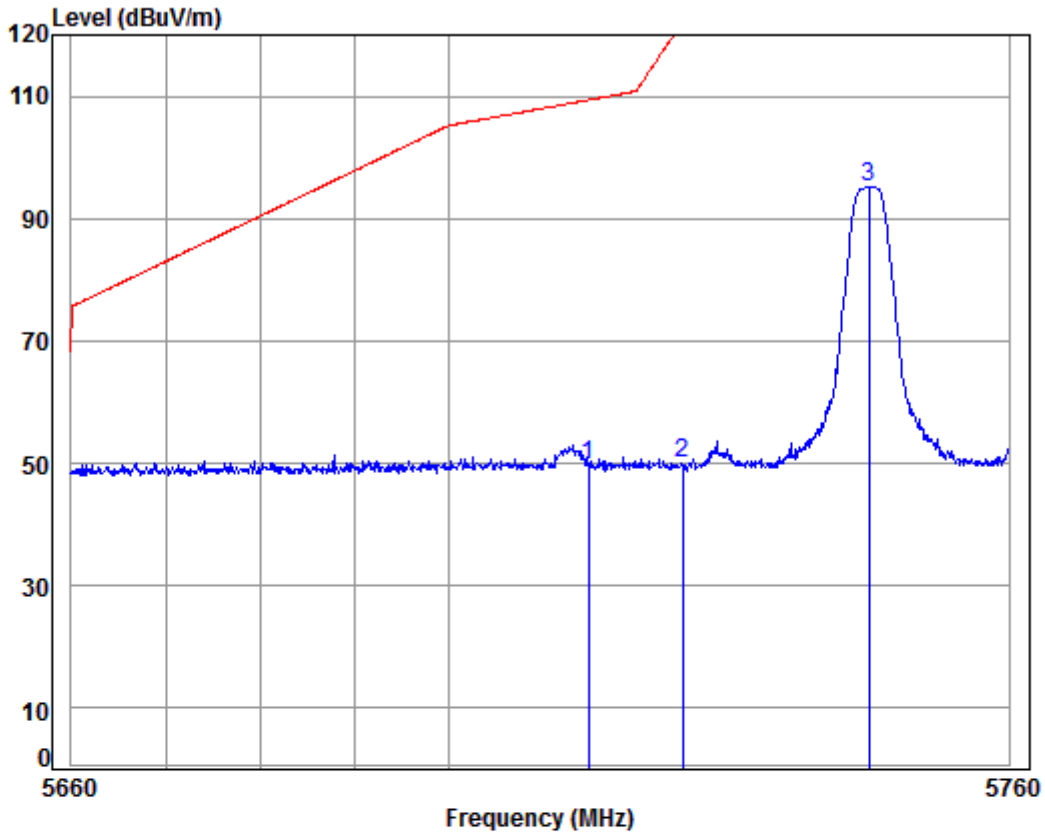
Mode:b; Polarization:Vertical; Channel:Low



Condition: 3m VERTICAL
Job No : 09748CR/09749CR
Mode : 5745 Band edge
: ANT B

	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	9.61	34.53	38.35	43.76	49.55	109.40	-59.85	peak
2	5725.000	9.64	34.54	38.35	44.05	49.88	122.20	-72.32	peak
3 pp	5745.000	9.71	34.55	38.35	89.29	95.20	125.20	-30.00	peak

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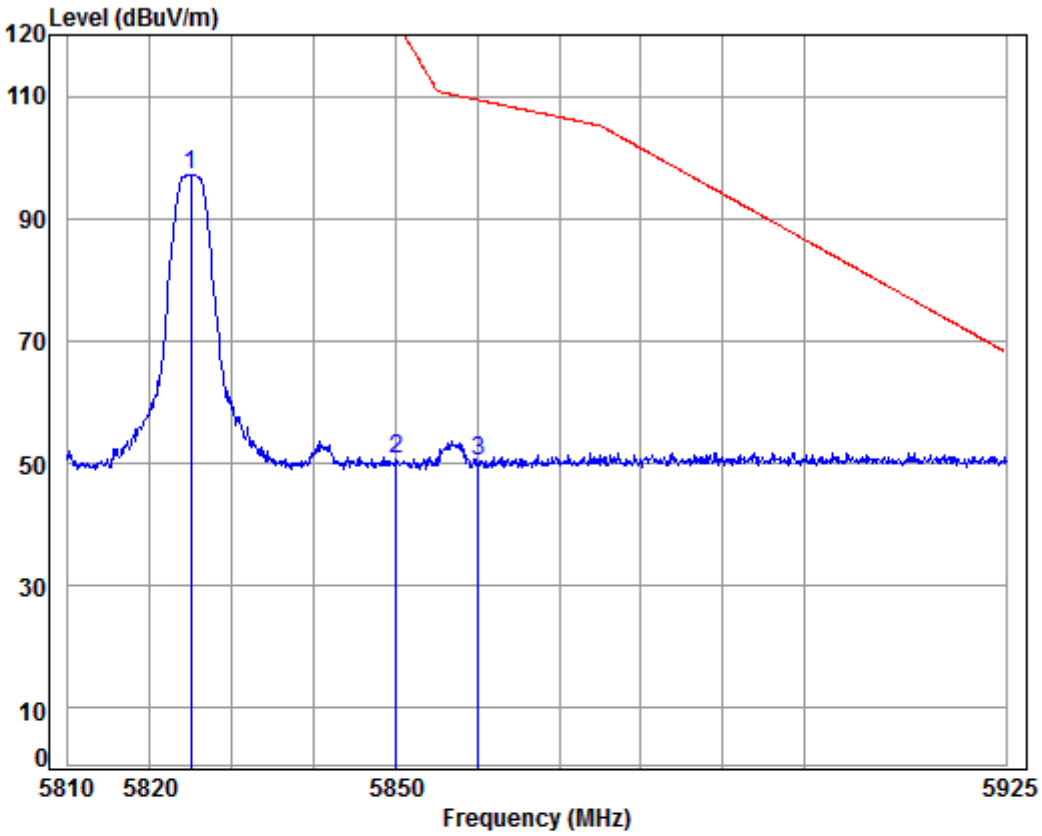
Mode:b; Polarization:Horizontal; Channel:High



Condition: 3m HORIZONTAL
Job No : 09748CR/09749CR
Mode : 5825 Band edge
: ANT B

	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	5825.000	9.98	34.60	38.33	90.90	97.15	125.20	-28.05	peak
2	5850.000	10.07	34.61	38.33	44.21	50.56	122.20	-71.64	peak
3	5860.000	10.10	34.62	38.33	43.98	50.37	109.40	-59.03	peak

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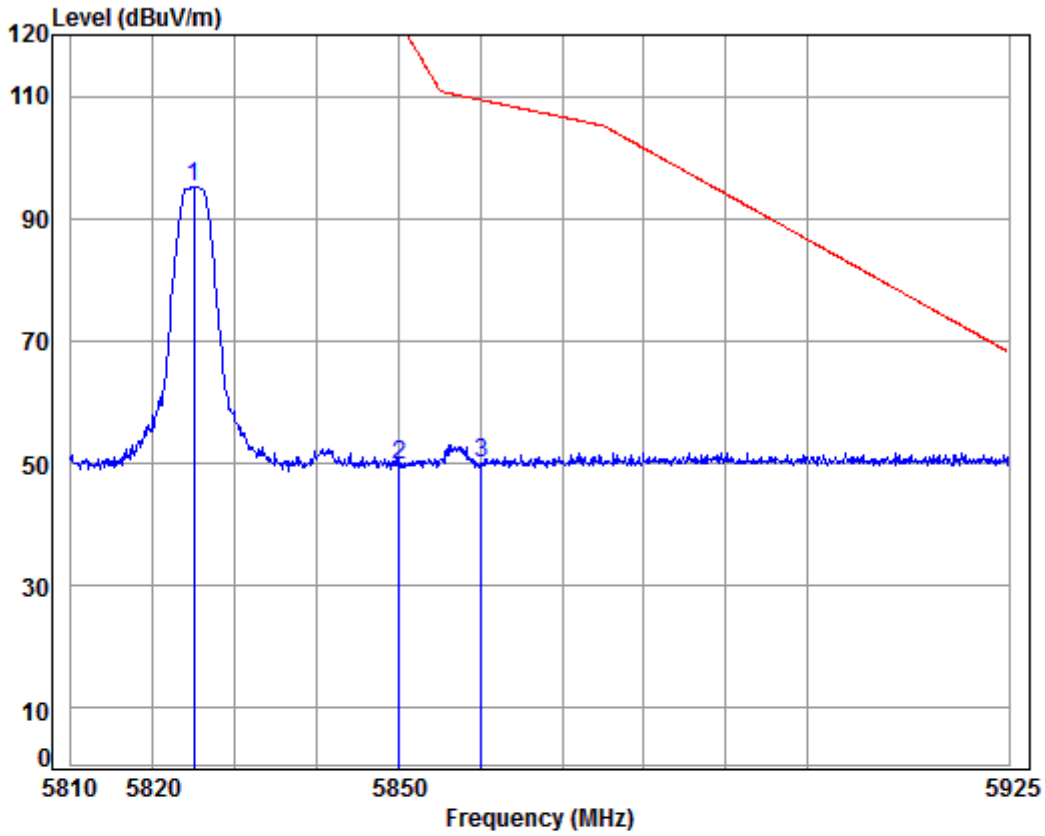
Mode:b; Polarization:Vertical; Channel: High



Condition: 3m VERTICAL
Job No : 09748CR/09749CR
Mode : 5825 Band edge
: ANT B

	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	5825.000	9.98	34.60	38.33	88.87	95.12	125.20	-30.08	peak
2	5850.000	10.07	34.61	38.33	43.40	49.75	122.20	-72.45	peak
3	5860.000	10.10	34.62	38.33	43.61	50.00	109.40	-59.40	peak

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6.Frequency Stability

Test mode:	Tx	Frequency(MHz):	5743

Temperature (℃)	Voltage(VAC)	Measurement Frequency(MHz)	Result
45	120	5743.4134	Pass
40		5743.4131	Pass
30		5743.4139	Pass
20		5743.4143	Pass
10		5743.4136	Pass
0		5743.4135	Pass
25	138	5743.4139	Pass
	120	5743.4141	Pass
	102	5743.4131	Pass

Test mode:	Tx	Frequency(MHz):	5791

Temperature (℃)	Voltage(VAC)	Measurement Frequency(MHz)	Result
45	120	5791.2293	Pass
40		5791.2286	Pass
30		5791.2295	Pass
20		5791.2299	Pass
10		5791.2293	Pass
0		5791.2287	Pass
25	138	5791.2295	Pass
	120	5791.2304	Pass
	102	5791.2286	Pass

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Test mode:	Tx	Frequency(MHz):	5840

Temperature (℃)	Voltage(VAC)	Measurement Frequency(MHz)	Result
45	120	5840.8448	Pass
40		5840.8440	Pass
30		5840.8443	Pass
20		5840.8451	Pass
10		5840.8445	Pass
0		5840.8443	Pass
25	138	5840.8443	Pass
	120	5840.8444	Pass
	102	5840.8440	Pass

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7.Duty Cycle (x)

Test Mode	Test Channel	Ant	Duty Cycle[%]	10log(1/x) Factor[dB]
Tx	5743	ANT A	100	0
Tx	5743	ANT B	100	0
Tx	5791	ANT A	100	0
Tx	5791	ANT B	100	0
Tx	5840	ANT A	100	0
Tx	5840	ANT B	100	0

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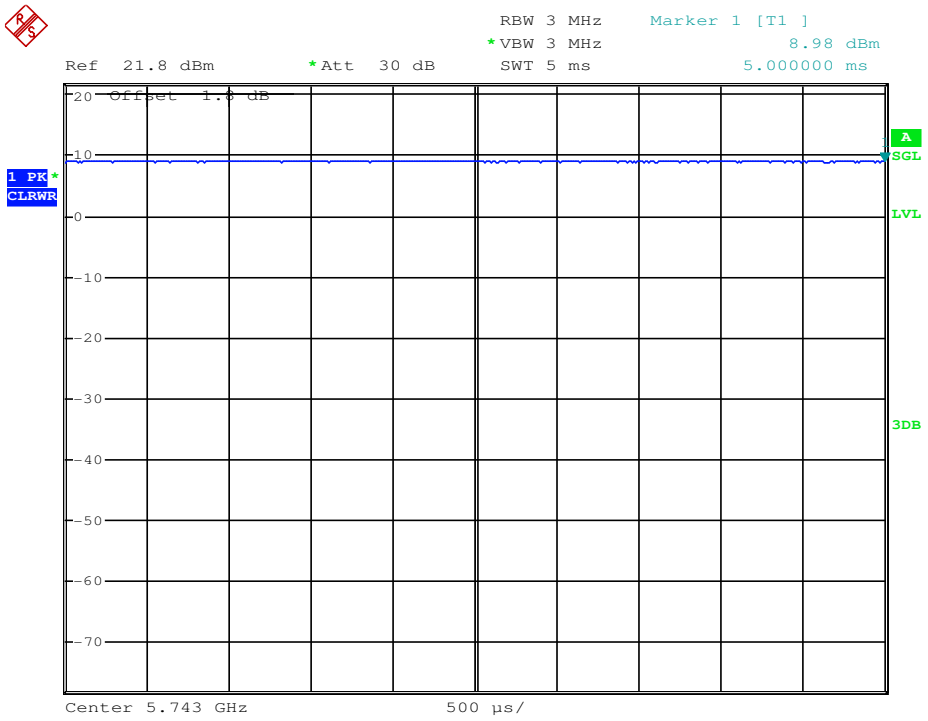
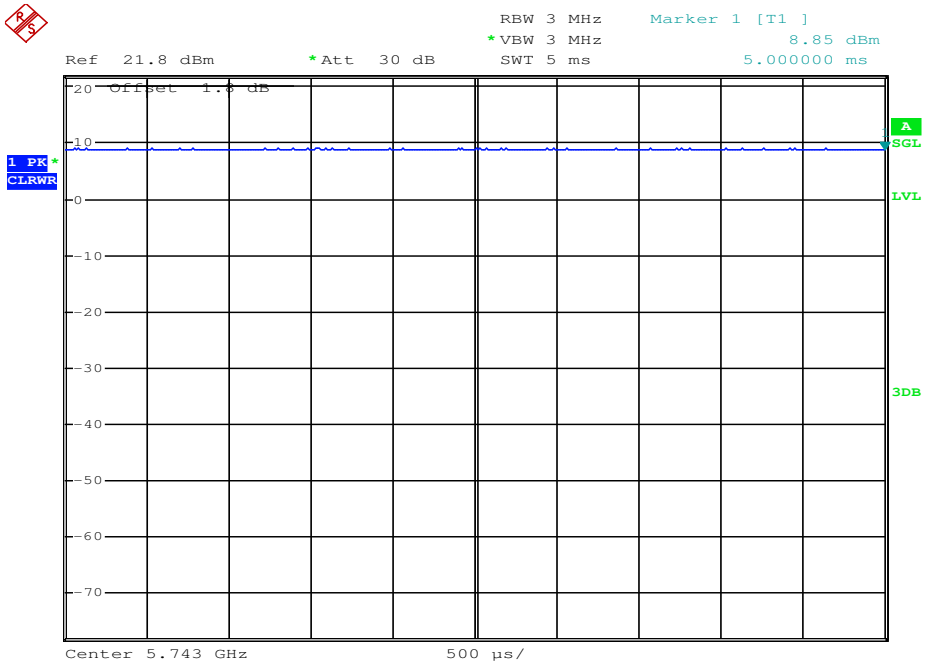
Duty Cycle_Tx_5743_ANT A



Duty Cycle_Tx_5743_ANT B



Duty Cycle_Tx_5791_ANT A

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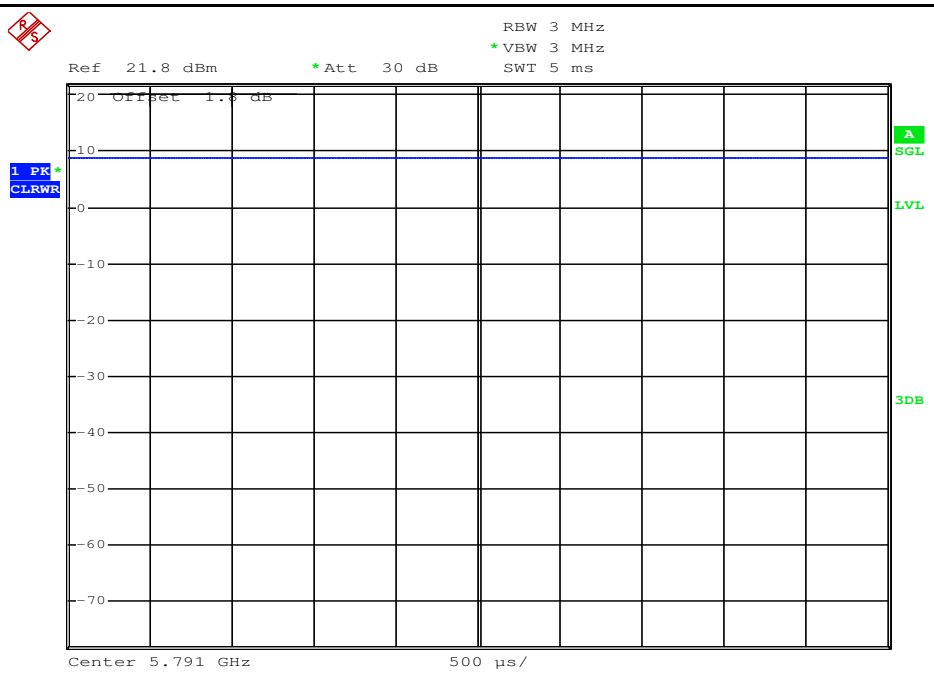
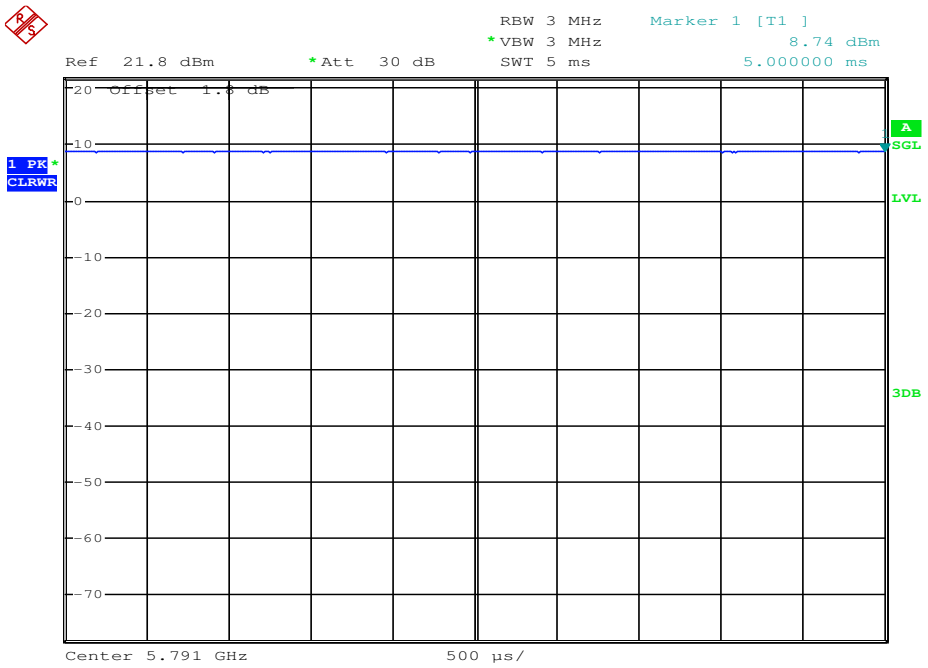


Duty Cycle_Tx_5791_ANT B



Duty Cycle_Tx_5840_ANT A

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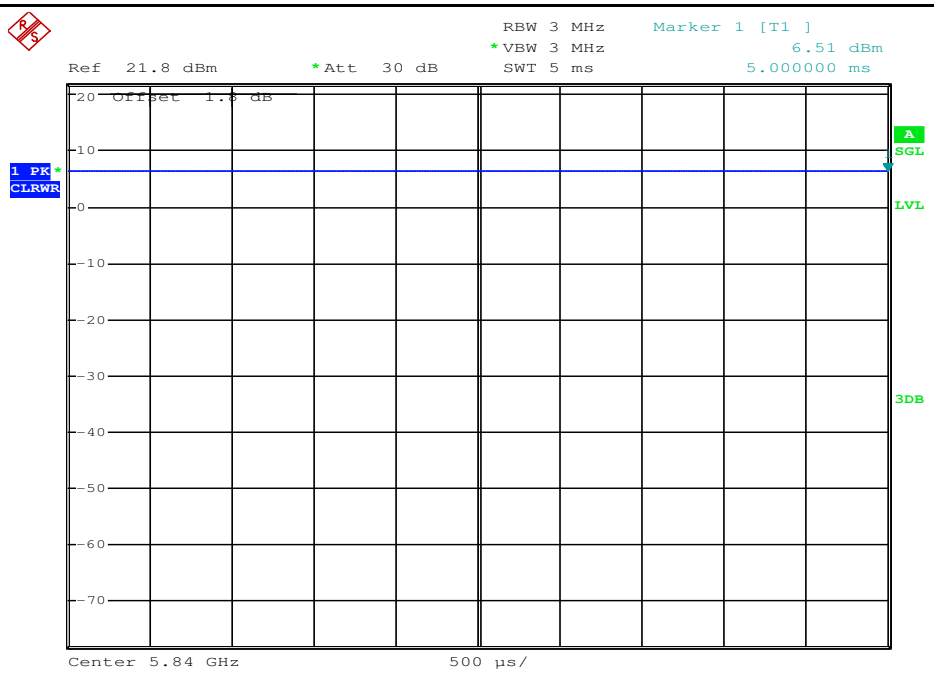
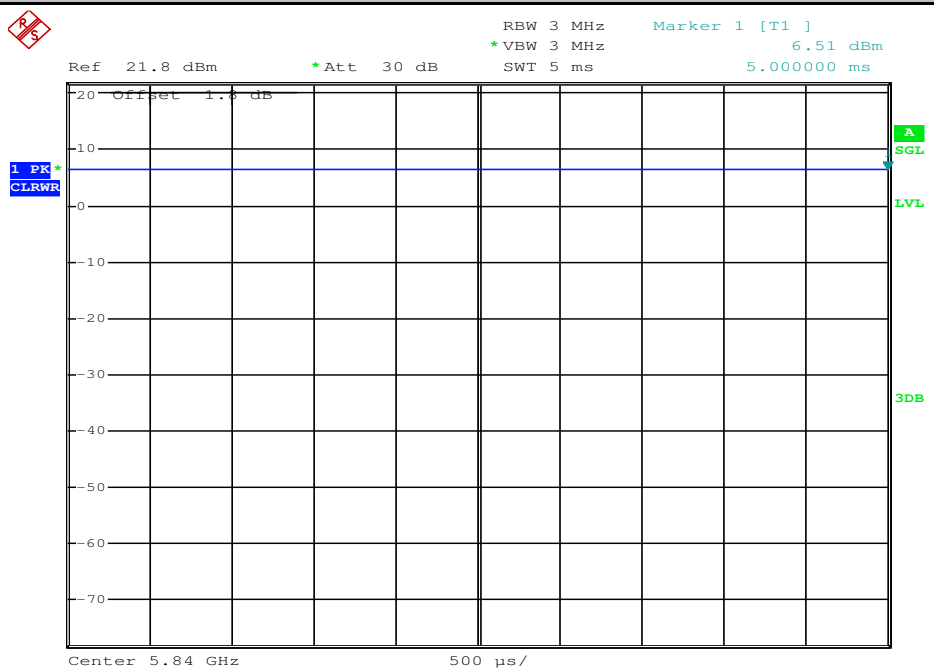


Duty Cycle_Tx_5840_ANT B



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